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PROJECT NAME: COMSTAFF PROPRIETARY LIMITED

TITLE: SIX MONTHLY REPORT
TO THE DEPARTMENT OF MINES, TASMANIA
FOR THE PERIOD ENDED 31ST DECEMBER 1978

DKSG

OPEN FILE

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APPENDICES:

AUTHOR/S: D. B. Orr

DATE: 8th December 1978

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

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APPENDIX I

RENISON EAST - GRID GAP

G. F. PIGOTT

VOLUMES 2 TO 6

APPENDIX II

PHOTOGEOLOGICAL INVESTIGATION OF COMSTAFF TENEMENTS AND ADJACENT AREAS IN TASMANIA

M. C. HUSSEY

VOLUME 7

APPENDIX III

GEOLOGICAL ASSESSMENT OF THE COMSTAFF LICENCE AREAS

D. B. ORR

VOLUME 8

APPENDIX IV

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

D. N. HALL

VOLUMES 9 - 11

TCR 78-1319

APPENDIX V - NOT CONTAINED IN THIS REPORT - REFER TO TCR 78-1319

MOUNT BISCHOFF TIN PROSPECT REPORT ON STAGE 1 PROGRAMME

VOLUMES I - III

AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROPRIETARY LIMITED

SIX MONTHLY REPORT TO DEPARTMENT OF MINES

TO 31st DECEMBER 1978

1. INTRODUCTION

Most of the field work was done during the first six months of 1978. Work was concentrated on the Renison East and Chester-Pinnacles areas under the control of G. Pigott and D. Hall (Preussag) respectively. Details of the work completed are contained in the progress reports for the two areas. Two diamond drill holes were completed, and an assessment of the Comstaff tenements was undertaken during the second half of the year.

2. RENISON EAST

Grid GAP was extended northwards for 1000m by cutting lines 3200N to 4000N. All grid lines, except 4000N, were surveyed by IP and magnetics, and selected IP anomalies were checked by SP and EM. Eleven IP anomalies were located, one of which was examined by a costean.

Geologically, it was found that most of grid GAP is underlain by rocks which have been equated with the Crimson Creek Group. Although no bedded dolomites were identified, one of the faulted serpentinites at the western end of lines 3200N and 3400N has been dolomitised and contains galena and sphalerite. The faults bounding the serpentinite have anomalous copper, lead, zinc and tin values, and they are considered to be conduits for hydrothermal solutions in a similar way to the Bassett-Federal Fault at the Renison Tin Mine.

One borehole, RBE 2, was sited on line 3200N at 3740W. It was inclined at -50° on a bearing of 280°M and was completed at 313.5m. This borehole was drilled to explore the altered serpentinite exposed in the Colebrook River. Up to 20% disseminated pyrrhotite was intersected in the serpentinite, but assay results are not yet available.

3. CHESTER-PINNACLES

The East Chester grid lines were extended north-west and

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south-east, and three more lines were cut north of the Pinnacles grid. All lines were mapped and sampled, and magnetics, SP and IP were completed over selected areas.

Two costeans exposed black pyritic shale on the eastern limb of a major syncline, the Burns Peak Syncline. The access track to these costeans uncovered disseminated sphalerite and galena (Leo's Find) in silicified sediments on the western limb of the Syncline.

A student, B. Beamish, completed an honours thesis over the headwaters of Boco Creek. Soil and chip sampling gave enhanced copper, lead and zinc values at the contact of volcanics and sediments. This contact has been interpreted as the strike extension to the mineralisation exposed at Leo's Find.

4. MOUNT BLOCK

Nine lines, each 2000m long and spaced 200m apart, were cut, surveyed and the A^{O} soil horizon sampled every 20m along each line. The grid has not been geologically mapped, and the assessment of the geochemical patterns will be postponed until the mapping is complete.

5. HEAZLEWOOD

Three lines of grid HAB in the Heazlewood drainage basin were mapped. Very little outcrop was seen, but most of the mapped area appears to be underlain by basic volcanics. The western part of the lines is interpreted to overly rocks of the Success Creek Phase.

6. MAGNET

An EM anomaly, centred at 200E 900N on grid BAB, was examined by a diamond drill hole which was collared at 200E 960N and inclined at -50° on a bearing of $150^{O}M$. No conductors were intersected, and the EM anomaly has been interpreted as being due to a deep lead in the Tertiary gravels below the Tertiary basalt cap.

7. RAMSAY

A road suitable for four wheel drive vehicles is being constructed along the eastern margin of the Meredith Granite to provide access to the Input anomalies in Exploration Licence 5/63 part 2. So far it has progressed 6 km of the estimated 10 km required.

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8. MOUNT BISCHOFF

20 square kilometres of Exploration Licence 5/63 part 1, centred on Mount Bischoff, was farmed out to Metals Exploration Limited. They have completed four diamond drill holes to explore the strike and down dip extensions of the porphyry. A fifth borehole, which is in progress, is testing the possibility of the repetition of the mineralised dolomite horizon. An airborne magnetic survey is planned.

9. ASSESSMENT OF THE COMSTAFF TENEMENTS

A.P. Bravo and D.B. Orr have examined the work which has been completed in the Comstaff tenements. This work re-emphasises the prospectivity of the areas held under Exploration Licences 1/68 and 5/63. A number of geophysical and geochemical anomalies require explanation, and the re-interpretation of the geology has highlighted areas which are geologically favourable environments for massive sulphide deposits with both hydrothermal and volcanogenic origins. A report on this assessment has been completed.

Approved by

Written By

D.B. ORR
Divisional Geologist

for R.J. KERNICK
Exploration Manager

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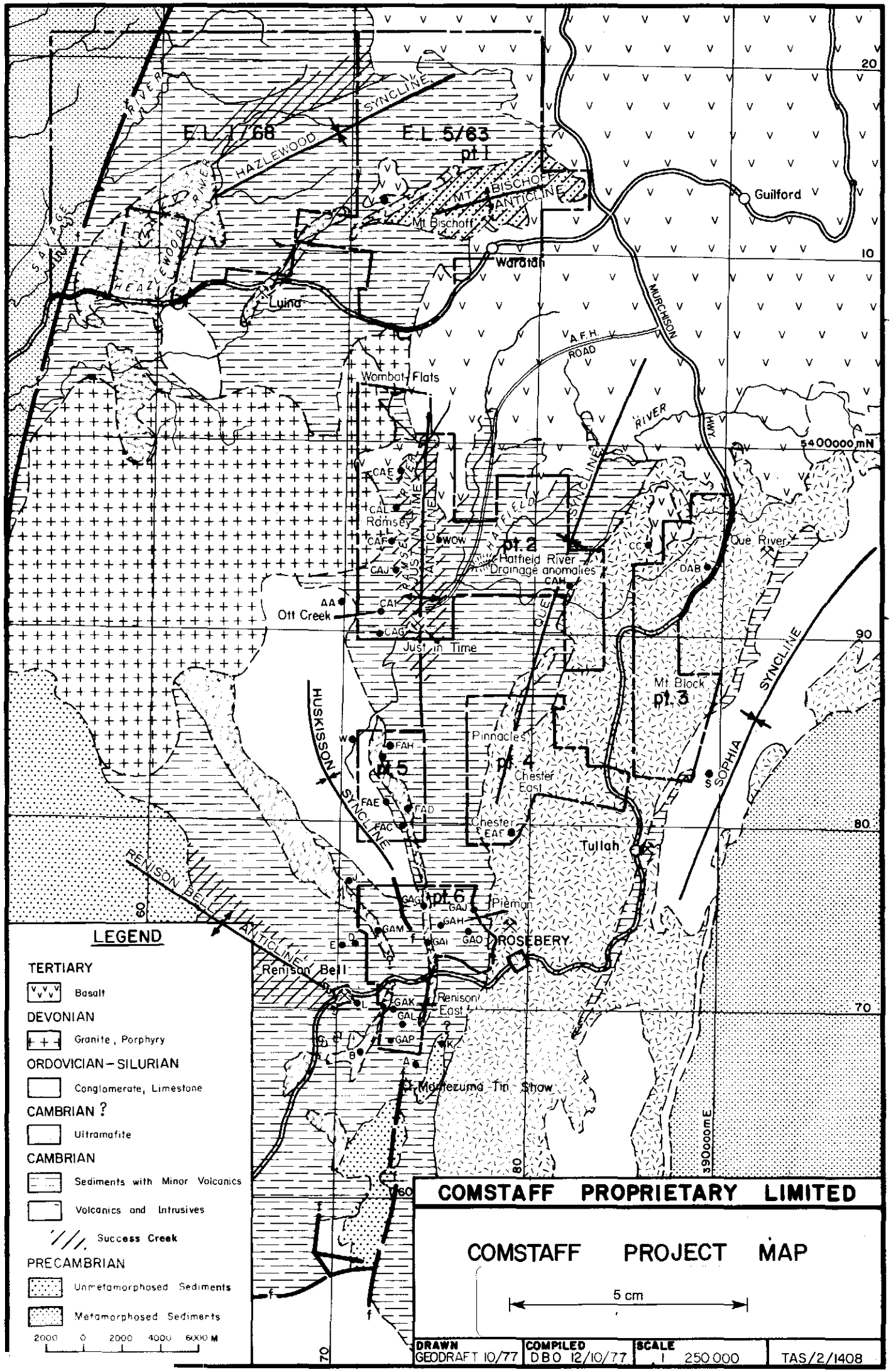
E.L. 7/68
E.L. 5/63
pt 1
HAZLEWOOD SYNCLINE
HAZLEWOOD RIVER
SAVAGE RIVER
MT BISCHOFF ANTICLINE
Mt Bischoff
Waratah
Guilford
Luina
MURCHISON HWY
A.F.H. ROAD
Wombat Flats
RAMSEY ANTICLINE
JUSTIN TIME SYNCLINE
QUE RIVER SYNCLINE
Ramsey
Hatfield River
Drainage anomalies
Que River
Ott Creek
Just in Time
pt 2
pt 3
Mt Block
pt 4
Pinnacles
Chester East
Chester
HUSKISSON SYNCLINE
pt 5
pt 6
Tullah
SOPHIA SYNCLINE
RENISON BELL ANTICLINE
Renison Bell
Renison East
ROSEBERY
Piemon
Montezuma Tin Show
5400000mN
390000mE
20
10
90
80
70
60
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
5 cm
DRAWN GEODRAFT 10/77
COMPILED DBO 12/10/77
SCALE 1 250 000
TAS/2/1408

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I, JANET ELIZABETH CLARK, 2 Newry Street Windsor in the State of Victoria, Secretary, DO SOLEMNLY AND SINCERELY DECLARE as follows:

1. That the details of our work during the six months to 31st December 1978 on Exploration Licence 5/63 (excluding Mt. Bischoff) are described in the accompanying report.

2. That in six months to 31st December 1978 we have expended $175,056 on work on Exploration Licence 5/63 (excluding Mt. Bischoff) and that this is further broken down into:

		$
(a)	Salaries and wages, including professional fees	49,399
(b)	Contractors, plant, etc.	36,831
(c)	Management, accounting and secretarial	18,958
(d)	Field expenses, meals, accommodation	65,208
(e)	Capital Expenditure	4,660
		175,056

3. That total expenditure upon the Exploration Licence (excluding Mt. Bischoff) in the year to 31st December 1978 is $449,725.

AND I MAKE this solemn Declaration conscientiously believing the same to be true and by virtue of the provisions of an Act of the Parliament of Victoria rendering persons making a false declaration punishable for wilful and corrupt perjury.

DECLARED AT Melbourne)
)
In the State of Victoria)
)
this 6th day of)
)
February 1979)

Janet Clark

Before Me:

A Commissioner for taking Declarations and Affidavits under the Evidence Act 1958.

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210008

I, JANET ELIZABETH CLARK, 2 Newry Street Windsor in the State of Victoria, Secretary, DO SOLEMNLY AND SINCERELY DECLARE as follows:

1. That the details of our work during the six months to 31st December 1978 on Exploration Licence 1/68 are described in the accompanying report.

2. That in six months to 31st December 1978 we have expended $17,377 on work on Exploration Licence 1/68 and that this is further broken down into:

		$
(a)	Salaries and wages, including professional fees	7,398
(b)	Contractors, plant, etc.	Nil
(c)	Management, accounting and secretarial	2,927
(d)	Field expenses, meals, accommodation	5,499
(e)	Capital Expenditure	1,553
		17,377

3. That total expenditure upon the Exploration Licence in the year to 31st December 1978 is $27,537.

AND I MAKE this solemn Declaration conscientiously believing the same to be true and by virtue of the provisions of an Act of the Parliament of Victoria rendering persons making a false declaration punishable for wilful and corrupt perjury.

DECLARED AT Melbourne)
)
In the State of Victoria)
)
this 6th day of)
)
February 1979)

Janet Clark

Before Me:

A Commissioner for taking Declarations and Affidavits under the Evidence Act 1958.

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210009

I, JANET ELIZABETH CLARK, 2 Newry Street Windsor in the State of Victoria, Secretary, DO SOLEMNLY AND SINCERELY DECLARE as follows:

1. That the details of our work during the six months to 31st December 1978 on Exploration Licence 5/63 (Mt. Bischoff) are described in the accompanying report.

2. That in six months to 31st December 1978 we have expended $226,042 on work on Exploration Licence 5/63 (Mt. Bischoff) and that this is further broken down into:

		$
(a)	Salaries and wages, including professional fees	65,764
(b)	Contractors, plant, etc.	118,762
(c)	Management, accounting and secretarial	Nil
(d)	Field expenses, meals, accommodation	41,516
		226,042

3. That total expenditure upon the Exploration Licence 5/63 (Mt. Bischoff) in the year to 31st December 1978 is $262,290.

AND I MAKE this solemn Declaration conscientiously believing the same to be true and by virtue of the provisions of an Act of the Parliament of Victoria rendering persons making a false declaration punishable for wilful and corrupt perjury.

DECLARED AT Melbourne)
)
In the State of Victoria)
)
this 6th day of)
)
February 1979)

Before Me:

A Commissioner for taking Declarations and Affidavits under the Evidence Act 1958.

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APPENDIX 1

PROJECT NAME: SIX MONTHLY REPORT TO DEPARTMENT OF MINES, TASMANIA

TITLE:

RENISON EAST - GRID GAP

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Queenstown Sheet S 55/5
Grid Co-Ordinate 1000N, 5000E
Metric Co-ordinate 5368390N, 373015E

COMMODITY/IES: Tin Copper Lead Zinc Alluvial Chrome

TEXT PAGES NO: 52

PLAN NOS: See Section 11

TABLE NOS: 3 in text, Appendices I and II and III

APPENDICES: Volumes I, II, III, IV and V

AUTHOR/S: G. F. Pigott

DATE: September 1978

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

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Appendix I : GAP Soil Sample Statistics
Appendix II : GAP Spectrographic Scans and Assays
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A Report on a Visit to the Renison Bell

1. SUMMARY

The main objective of the prospecting programme at Renison East was to establish if an ore deposit similar to that at the Renison Bell Tin Mine exists on the property. There, stanniferous mineralisation occurs as metasomatic replacement of carbonate beds, as vein filling in fault zones with wall rock replacement and as veinlets and disseminations in quartzite.

The work programme comprised geological mapping, soil sampling of cut grid lines, heavy concentrate sampling of major water courses and geophysical surveys in the form of induced polarisation, Crone shootback EM, self potential and ground magnetic measurements. Costeans excavated by bulldozer were geologically mapped and rock chip sampled.

The mapping has defined a tightly folded turbiditic sequence of clastic, arenaceous and argillaceous rocks with mafic volcanics, intruded by ultramafic-mafic complexes. The rocks are assigned to the Lower Cambrian Crimson Creek Formation. They are overlain, apparently unconformably, by a sequence of black shale, siltstone, arkose and acid pyroclastics of the Middle Cambrian Dundas Group. The succession is thought to be indicative of rapid, intermittent deposition in a fault controlled, elongate trough like basin. Dolomites, cherts and quartzites which characterise the shallow water shelf-like sequence at Renison Bell do not appear to outcrop on the property.

The styles of mineralisation observed within rocks of the Crimson Creek Formation result from the introduction of hydrothermal fluids into permeable beds, along fault planes and in anticlinal axial zones. The sources of the solutions are thought to be adjacent Devonian adamellite bodies with the faults acting as conduits. Fissure vein type of deposits in rocks of the Dundas Group contain irregular lodes of sulphide mineralisation. These may have resulted from remobilisation and reconstruction of syngenetic sulphides along Devonian structures. Syngenetic pyrite occurs in carbonaceous shales interbedded with acid tuffs.

Analysis of the results from the geochemical and geophysical surveys has led to the interpretation of 12 anomalous zones in which stanniferous replacement type ore deposits may occur. Additional geophysical prospecting is advocated to further define these zones.

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A costean with an access track is proposed to determine if syngenetic base metal mineralisation occurs within the rocks of the Dundas Group where geophysical anomalies have been recorded.

2. INTRODUCTION

2.1. General

This report relates to prospecting activities carried out in the southern part of Exploration Licence 5/63, Part 5, incorporating grids GAP, GAK and GAL. A review of previous work is followed by a detailed assessment of the integrated mineral exploration programme carried out during the periods January to March 1977, and from September 1977 to June 1978. This work has consisted of data compilation, geological mapping, geochemical surveys, ground geophysical surveys and costeaning. The assessment of the exploration carried out is followed by a discussion on prospective areas, and recommendations are made for detailed follow up prospecting programmes to be carried out on certain prospects before any drilling is proposed.

2.2. Location

The area is located in North West Tasmania, 140 km south-west of Burnie, between Rosebery (Zn-Pb-Ag) to the east, and Renison (Sn) to the west. The region is rugged, with an elevation range of 125m to 525m above sea level. It is heavily forested, residual soils on the mountain slopes being covered with eucalyptus and myrtle, frequently with thick undergrowth. Flat to gently undulating areas, usually overlying glacial soils, are covered with tea trees, bauera and sword grass.

The area is drained by the Exe, Colebrook and Ring Rivers and is generally deeply dissected. However, much of the central part is poorly drained with swamps widely developed. It is underlain by varying thicknesses of glacial till comprising moraine, fluvioglacial and periglacial deposits.

2.3. Access and Infrastructure

Access is via the metalled Murchison Highway with four wheel drive bulldozed tracks leading off southwards into the area. The Emu Bay Railway

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passes north of the area, connecting Melba Flats, Renison and Rosebery with Burnie. Cheap hydro-electric power will become available from 1981 when the first of the new power stations (MacKintosh) starts up. A large dam with power station will be constructed on the Pieman River by 1985 (Lower Pieman) only 10 km west of the area.

If an economically viable prospect is discovered, a new township with the necessary facilities would probably be required. A major problem encountered by all West Coast mining companies is the high labour turnover brought about by the cold wet climate and inadequate facilities. The average annual rainfall in the area (as measured at Rosebery) is 2000mm. It is probable however, that the existing township at Zeehan could be used since the Tasmanian Government is opposed to mining companies setting up new townships.

2.4. Objectives

The main objectives of the prospecting programme at GAP were:

a) To establish if a Renison type of orebody (tin in massive sulphides) exists in the prospect.

b) To establish if any other type of orebody exists in the area.

c) To define prospective areas and potential targets where detailed follow up work, including drilling, might be carried out.

3. PREVIOUS WORK

3.1. History of Exploration in the Region

1890 (May): Gossans on Renison Bell Hill and across the Argent River were pegged by George Renison Bell who believed them to reflect silver-lead mineralisation. The Renison Bell Prospecting and Mining Company (N.L.) was registered.

1890 (June): Alluvial cassiterite was discovered in the Ring River by Ringrose Nicholson, who pegged a lease which straddled the Ring River, adjacent to the junction with Dalcoath Creek.

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Prospecting of the main creeks located stanniferous gossan overlying massive bodies of cassiterite bearing pyrrhotite. However, most of the mining activity was centred on the alluvial prospects.

1891: Alluvial tin and gold were discovered in the fluvioglacial and alluvial deposits upstream from Ringville on the Ring River.

1893: The Ring Valley-Fahlore tetrahedrite-chalcopyrite lodes were discovered, and mining commenced. Shortly afterwards, the silver rich gossans at Bonnie Dundee were discovered.

A town was established at Ringville to support the various mining operations in the area.

1900: Cassiterite-sulphide ore was found on the Renison Bell lease during the construction of the Emu Bay Railway.

1907: The first concentrating mill was established to treat the gossans and oxidised sulphide ore.

1911: Cassiterite was discovered in gossanous outcrops near the mouth of the Exe River and alluvial cassiterite traced up the river to a number of minor lodes. The largest lode was discovered by T. Williams at the X Proprietary Syndicate Mine. The total recorded production from the X Proprietary is four tons of tin.

c. 1911: Prospectors working up Colebrook Creek discovered galena in dolomite in the Grid 4 area (Colebrook Creek 740m). A number of shallow pits and trenches were excavated but no mining activities were carried out.

1914: Many of the small copper-lead-zinc mines in the North Dundas area (including Ring Valley-Fahlore Mine and Bonnie Dundee) closed down. The main reason was that the ore could not be treated in Australia on account of the complex mineralogy and had been exported to Germany for processing. This market was closed on the outbreak of World War I.

1922: The easily worked stanniferous gossans and oxidised sulphide ore at Renison became exhausted.

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1934: Renison Associated Tin Mines N.L. took over the various mines and prospects at Renison Bell and began experimenting on ways of treating the primary sulphides to free the cassiterite.

1936: It was discovered that the sulphides could be removed from the cassiterite by flotation, and output increased substantially.

1958: Following extensive diamond drilling which indicated that the deposits were larger than first estimated, the Mount Lyell Mining and Railway Company Limited gained controlling interest in the mines.

1964: Consolidated Gold Fields gained a controlling interest in Renison through its interest in the Mount Lyell Company.

1965: The Bassett-Federal Lode was discovered and an extensive development programme commenced for a mine and concentrating plant.

1966: Mines Exploration Proprietary Limited (a subsidiary of Broken Hill South) tested Fenton's (also called Salmon's) Prospect near the mouth of the Exe River by a diamond drill hole DDH XI. The hole was drilled to 185m on a bearing of 213° MN at a declination of 10° from the Emu Bay Railway line. Tin mineralisation was intersected in dolomitised serpentinite and in quartz fissure veins, but was not considered to be of economic importance.

1967: Comstaff, which became the operating company in 1964, secured Exploration Licence 5/63 and Anglo American became the managing company.

Two points stand out from this brief review of the exploration history:

a) The prospecting and mining history of the region is dominated by the discoveries of the Renison Bell lodes and the problems in extracting cassiterite from the primary sulphides once the alluvial and gossanous tin was exhausted. Prior to 1936, tin in massive sulphides was not considered to be prospective, so it is likely that a number of other prospects discovered in the region were not mined on account of this association.

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b) Most of the short lived base metal mines along the North-East Dundas Tramway, including those along the Ring River, were closed down on account of the complex mineralogy of the ore. Some closed down on account of persistent flooding (eg. the Bonnie Dundee) since pumping facilities were inadequate in those days.

3.2. Regional Stream Sampling

1970: A programme of geological mapping, stream sediment sampling and heavy concentrate sampling was carried out in the Renison Bell East area. Stream sediment anomalies for tin, nickel, zinc, copper, silver and bismuth were realised. Recommendations were made to follow up this programme by establishing grids, in order to locate the sources of the anomalies (1).

(Note numbers in brackets refer to references).

3.3. Soil Grids

1971-1974: Six soil sample grids were established in the area, but were not surveyed. The approximate positions are shown on Plan TAS/2/1421, and the results are now plotted on 1:5000 standard sheets on a best fit basis.

3.3.1. Grid 0 (Fenton's)

The gridded area incorporates Fenton's Lode where diamond drill hole DDH XI was drilled. A well defined and consistent anomaly in tin (>80 ppm), coincident with anomalous lead, zinc and copper, was delineated encompassing Fenton's Lode. The lode is exposed as a quartz-limonite gossan in a railway cutting and in a number of trenches, short adits and drives over a strike length of 1000m from the railway to where it is exposed in the Exe River. DDH XI intersected the line of lode at 48.8m but assay values recorded were low. The best values returned from the lode were 2600 ppm tin over a width of 1.5m in a trench. The mineralisation occurs in irregular pods and veins of quartz-arsenopyrite-pyrrhotite-chalcopyrite-tourmaline with cassiterite.

No geological mapping was carried out on the grid and the lines are now overgrown, but lithologies

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recognised on the 1970 survey comprise a sequence of argillite, basic tuff, greywacke and quartzite intruded by altered serpentinite and quartz fissure veins. The number of limonite gossans indicate the possible existence of carbonates, while the "quartzites" in DDH XI are in fact slightly calcareous siltstones which have been metasomatised. The serpentinite is extensively sheared and altered, but may indicate a conduit type structure.

The definition and consistency of the tin anomaly in the soil suggests a mineralised zone rather than separate veins. A costean is required to establish if carbonates are present which could contain replacement type bodies, or if there is a concentration of fissure and vein type mineralisation to warrant a low grade, high tonnage target.

3.3.2. Grid 1

Grid 1 was established south of the Murchison Highway to follow up the anomalous tin values in sediments collected from Moose Creek. No soil anomalies were realised, probably because the grid should have been established upstream of the sediment anomalies. This area is included in the GAP grid.

3.3.3. Grid 2

Grid 2 was established in an area from the Exe River to the eastern boundary of the lease, to follow up anomalous tin values in tributaries of the Exe River. The source of the tin is thought to be the Olympic Mine which lies on the west slope of Colebrook Hill. Indurated green and purple argillite with interbedded siltstone and greywacke, intruded by a body of serpentinised pyroxenite and norite, is mineralised by quartz-cassiterite-chalcopyrite veins in easterly dipping fissure zones. The mine is outside the lease boundary, but the access tramway and treatment plant lie within Grid 2 (GAP lines 3800N and 4000N at 6000E). The southern part of the grid is covered by Grid 5, while the northern part connects Grid 0 with Grid 5. The soil sample results are incorporated into these grids.

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3.3.4. Grid 3

Grid 3 was established immediately south of Grid 2 to sample the area of anomalous tin values in the creeks. Tin anomalies in the soils are recorded associated with zinc, and strike north-north-west into Grids 2 and 5. It is considered that the source of the tin in the soils could be fissure veins, but the anomaly in the creeks may have its source in the alluvials where there are signs of prospecting activities.

3.3.5. Grid 4

Grid 4 was established to follow up stream and heavy concentrate tin anomalies in Colebrook Creek and tributaries. Mapping along Colebrook Creek during the regional survey in 1970 located the old workings at Colebrook Creek 740m (see 3.1). Possible stanniferous gossans in altered serpentinite and galena in dolomite were recorded. Also mineralised quartz veins containing pyrite, galena, chalcopyrite, arsenopyrite and cassiterite were observed in chloritised basic rocks.

Anomalous tin values (>100 ppm) were recorded on two lines in association with zinc, arsenic and copper, and a follow up 4m x 30m grid was cut to examine this anomaly. A circular copper-zinc-lead soil anomaly (170m x 180m) was indicated encompassing two smaller tin anomalies (Cu >85 ppm, Zn >220 ppm, Pb >400 ppm and Sn >80 ppm). Geological mapping carried out at the time (1972) indicated a granophyre plug with mineralisation on the contacts with the tuffaceous and argillic country rocks.

In the following year (1973) the geochemical anomalies were trenched and the trenches mapped and sampled. Tin values of up to 500 ppm were recorded from rocks noted to consist predominantly of goethite, manganese oxide and talc with cellular boxworks developed from carbonates. However, no further work was done and no significance was attached to the dolomite containing galena exposed in the old pits.

3.3.6. Grid 5

Grid 5 was established to follow up stream

anomalies in tin and zinc in the Exe River, and to cover the area of the X Proprietary Syndicate Mine. The grid ties in with Grid 0 to the north, and Grid 2 to the east. While the grid was cut and sampled in 1971, it was not until 1974 that follow up work was carried out (2). The grid lines west of the Exe River were geologically mapped, but not tied into the road or river mapping. Two parallel tin anomalies of >1300 ppm Sn, approximately 600m x 100m in size, were outlined within a broad zone of >44 ppm Sn which was seen to continue northwards into the Grid 0 anomaly. A costean was excavated through the tin anomaly and across the line of the X Proprietary Syndicate lode. Quartz fissure veins containing tourmaline, cassiterite, arsenopyrite and pyrite were exposed. A Crone EM survey located a conductor on line 20S at 2050E, where a limited dipole-dipole IP survey carried out on these lines indicated a zone of low resistivity coincident with a high frequency effect.

The coincident EM, IP and soil anomaly at 20S/2050E was tested with a diamond drill hole, RBE 1, collared at 20S/2250E and declined at 50° to the west. The drill hole intersected an east facing succession of finely intercalated argillites with silty argillites, sandy argillites, argillaceous siltstones and tuffaceous greywackes. The coarser grained, and consequently more porous layers were seen to be metasomatically altered with the development of tremolite-actinolite, chlorite, phlogopite, carbonate, tourmaline, prehnite and sphene. Sulphides had been introduced into the metasomatically altered units in the form of pyrite, pyrrhotite and chalcopyrite. However, the assay results were low and no tin mineralisation was indicated. Therefore the source of the anomalous tin values in the soils was not found.

3.4. Input Survey

In 1975 an airborne electromagnetic Input survey was carried out by Geoterrex Pty. Ltd. over the area. Anomalous responses were recorded as follows (see overlays TAS/2/1426 and TAS/2/1427):

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Flight Line	Fiducal	Channels	Source	Comments
105AE	172.37		Bedrock	Located on four lines centred over Longreach Minerals' costeans and extending northwards into EL 5/63. GAP
110E	132.4		Surficial	50m from line 111W but shifted 450m to the east. GAL
111AW	127.64	6	Bedrock	A two line anomaly associated with a magnetic high. GAK
116E	90.93	6	Surficial	An anomaly of high conductivity which lines up with a weak response on line 115W. No direct magnetic correlation. GAN

3.5. Soil Grid GAK

The six channel Input anomaly indicative of a definite bedrock conductor, named GAK, was located on the ground using aerial photographs. A three line standard follow up grid was established over the anomaly (the lines were 640m in length and 120m apart). Crone EM, ground magnetics and soil sampling surveys were carried out. The ground EM survey located conductors at 4880N/5000E, 5000N/4840E, 5000N/5020E, 5120N/4760E and 5120N/4960E. Since these conductors were only indicated on the high frequency channel, low conductive sources were indicated. The ground magnetic survey defined a highly magnetic serpentinite in contact with rocks of much lower magnetic susceptibility. Geological mapping was not carried out, and the soil sample values were not considered to be anomalous. Three Costeans were excavated and channel sampled, but the channel sample values did not indicate tin or base metal mineralisation.

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4. WORK COMPLETED

4.1. Access Tracks and Grid Lines

11.2 km of track were established by a D6 bulldozer. The main access track being 5.3 km in length, from the Murchison Highway to the Ring River. 16 grid lines were cut on a bearing of magnetic east-west, totalling 43.4 km, along with a base line and western tie line (4.0 km). The grid lines were spaced at 200m intervals. In addition, 5.2 km of old tracks were cleared, namely the Exe River Tramway, the Ringville-Colebrook Hill Tramway and the "Cattle Track", to allow easier access for the induced polarisation crew.

4.2. Surveying

The newly established and pre-existing tracks were surveyed by tape, compass and clinometer (18.7 km) and the grid lines surveyed at 20m stations. The map of the track surveys was used as a framework into which the less accurate grid line surveys were fitted using grid line/track crossing point co-ordinates. The Ring River and its major tributaries, Confidence Creek, Tin Creek and Wilbur Creek were flagged and surveyed. Colebrook Creek was also reflagged and surveyed, mainly to tie in the original mapping with the subsequent work in the Grid 4 area. In all, 15.8 km of drainage courses were surveyed.

4.3. Geological Mapping

All grid lines, tracks and surveyed water courses were geologically mapped, a total of 81.9 line km. More detailed follow up mapping was carried out in areas where costeaning was proposed. All newly excavated costeans were mapped in detail as were the pre-existing trenches at Grid 4 and GAK, a total of 2200m. The soil types on lines 3200N to 4000N were mapped prior to carrying out any soil sampling since the sampling method depended on the nature of the soil cover.

4.4. Geochemical Surveys

Soil samples were collected at the surveyed 20m stations along the cut lines. A^{O} samples were collected at all stations, and samples of the C

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horizon collected on line 3200N northwards, using hand screw augers. The A° samples were dried, sieved to -80# and submitted to Geochemical and Mineralogical Laboratories (1475 samples from lines 1000N to 3000N) and Analabs Pty. Ltd. (728 samples from lines 3200N to 4000N) for analysis by AAS (tin by XRF). Auger samples collected from sections of lines 3200N, 3400N and 3600N were also submitted. Analysis was carried out for the elements of copper, lead, zinc, nickel and tin, while selected samples were also analysed for mercury and manganese.

31 panned heavy concentrates were collected from the Ring River drainage system and analysed by Australian Mineral Development Laboratories for tin by XRF. 296 channel samples, collected from the costeans were dried, crushed and pulverised before being analysed by Analabs for copper, lead, zinc, tin, nickel and manganese. Chip and grab samples collected from outcrops and old workings were submitted to Australian Mineral Development Laboratories for spectographic scans.

4.5. Geophysical Surveys

A ground magnetic survey using a Proton Precession Magnetometer was carried out over the grid. Care was taken to close all traverses and co-ordinate all readings to those at a base station. 17.3 line km of medium frequency Crone EM, and 6.0 line km at high frequency, were surveyed. 16.1 line km of self potential surveys were completed. An induced polarisation and resistivity survey was carried out on all grid lines except 4000N and the eastern ends of lines 3600N and 3800N. A dipole-dipole array was used using 60m electrode spacing. 32.9 line km were covered by induced polarisation.

4.6. Costeaning

Four costeans, a total of 1506m, were established at GAP. Excavation by bulldozer is a most effective method of prospecting in an area such as this. Rock outcrop is confined to incised creek beds and steep slopes, while there is little on the cut lines. It is difficult to establish the bedrock source of mineralised float or geophysical or geochemical anomalies without removing the overburden.

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5. GEOLOGICAL MAPPING

5.1. Results Achieved

5.1.1. General

The rocks at GAP comprise a tightly folded turbiditic sequence of arenaceous, argillaceous and clastic sediments with mafic volcanic rocks and ultramafic-mafic complexes. This sequence appears to be unfossiliferous but is assigned to the Cambrian Crimson Creek Formation on the basis of correlation by lithology. The south-east sector of the area is underlain by a sequence of black shales, siltstones, arkoses and acid pyroclastics assigned to the overlying Dundas Group.

These rocks, together with the underlying Upper Proterozoic Success Creek Group, are thought to have been deposited in a broad, longitudinal basin or trough that developed between the Tyennan and Rocky Cape geanticlinal massifs. To the east, the sedimentary succession is flanked by the Mount Read Volcanics, an Andean type accumulation of predominantly acid rocks.

5.1.2. Lithologies

The geological succession in the Renison Bell - Zeehan area was established by Blissett in 1962 (3). The three major stratigraphic units defined by him are still maintained for the purpose of this report. Detailed mapping in the mine area of Renison Bell (4) has defined the Success Creek Group - Crimson Creek Formation contact zone; but the boundary between the Crimson Creek Formation and the Dundas Group (youngest) remains a problem. Table 5-1 (p 14) illustrates the interpreted lithological succession at GAP, but must be regarded as tentative. The stratigraphic sequence at the Success Creek Group - Crimson Creek Formation is based on that observed at the Renison Mine (Appendix III) and is thought to underly GAP (albeit at 1000+ metres). Definition of units within the Crimson Creek Formation and the Dundas Group is difficult due to the paucity of outcrop, the lenticular nature of most of the beds, the facies changes and the structural complexity.

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AGE	NAME	UNIT	THICKNESS	LITHOLOGIES
Quarternary		Glacial Deposits	0-20m	Boulder till, gravel, sand, varved clay.
? Middle Cambrian	Dundas Group	Arkosic Conglomerate	(±)120m	Arkosic Conglomerate, grey shale
		Black shale/Tuff sequence	650+m	Black shale, siltstone, acid pyroclastic, arkose.
		Fault or unconformity		
	Upper Crimson Creek Formation	Siltstone-Argillite sequence	(±)1000m	Siltstone, mudstone, shale, greywacke, metamorphosed to argillite, arenite in places.
Lower Cambrian		Conglomerate-Lithic-wacke sequence	30-450m	Conglomerate, lithicwacke, greywacke, argillite, basalt.
		Basaltic complex	60-250+m	Basalt, dolerite, gabbro, volcanomict conglomerate, argillite.
Upper Proterozoic to ? Lower Middle Cambrian	Lower Crimson Creek Formation	Volcaniclastic Greywacke sequence (Dreadnought Hill Member)	850m+	Basic to intermediate volcaniclastic greywacke, tuff, purple green and grey mudstone, shale, siltstone.
		No. 1 Carbonate	5-15m	Dolomite
		Red Rock Member	20-50m	Haematitic chert, chert conglomerate, carbonate, andesitic tuff.
		disconformity		
Upper Proterozoic	Success Creek Group	No. 2 Carbonate	15m	Dolomite
		Renison Bell Member	60m	Shale, quartzite
		No. 3 Carbonate	15m	Dolomite
		Dalcoath Member	800m+	Quartz sandstone, micaceous quartzite, siltstone, shale.

OUTCROP ON GAP

TABLE 5-1

Success Creek Group

The Success Creek Group consists of quartz sandstones, micaceous quartzites, siltstones and shales with carbonates at the top of the succession. The rocks, regarded as Upper Proterozoic in age (3), are exposed in the northerly trending Renison anticline. The carbonates host the major stratabound massive sulphide lenses at Renison. Rock units of this Group are not represented in outcrop on GAP.

Lower Crimson Creek Formation

The basal units of the Crimson Creek Formation, namely the Red Rock Member and the mineralised Number 1 Carbonate, do not outcrop on GAP. However, the overlying Dreadnought Hill Member passes up into the volcaniclastic greywacke sequence, units of which are exposed along the Murchison Highway, in Colebrook Creek and on the P.M.G. road (west).

The Volcaniclastic Greywacke Sequence

The greywacke beds are fine to coarse grained, poorly bedded and poorly sorted. They exhibit graded bedding, scour and fill structures, roll casts and flame structures. Mudstone and siltstone flake breccias occur towards the base of the coarser grained greywacke beds. The rocks are comprised of mafic to intermediate volcanic lithics, plagioclase and pyroxene crystals in an argillaceous matrix. They are generally grey, green or purple in colour.

The tuffaceous units closely resemble the greywackes, particularly when weathered or where outcrop is sparse. They are, however, thinly bedded, generally harder and more iron stained. They are comprised of intermediate and basic volcanic lithics, plagioclase and quartz crystals, devitrified shards and fragments of volcanic glass. The matrix is comprised of chlorite, ash, carbonate and opaques. For mapping purposes the greywackes and tuffs have been given the same notation. It proved almost impossible to differentiate between them, particularly when the argillaceous matrix of the greywackes has been altered by metamorphism to a similar mineral composition as that of the tuffs. Both rock

types are predominantly made up of basic volcanic debris, so the term "volcaniclastic" has been used to incorporate both.

Units of purple, green and grey mudstone and siltstone occur throughout the greywacke sequence. They are either thinly bedded and intercalated with the greywackes, or form massively bedded units containing thin partings of greywackes. Where well exposed on the Murchison Highway, siltstone beds exhibit current ripple laminations, ripple cross stratifications and grading and closely resemble the coarser greywackes in composition and mode of bedding.

The coarser greywacke sandstone units have a fairly limited distribution on GAP, only being found in the north-west sector of the grid, north of line 3200N and west of the Western Serpentinite Complex. South of line 3200N along the Ring River, the rocks are predominantly siltstones interbedded with greywackes, tuffs, mudstones and shales, which progressively become more metasomatosed towards the serpentinite. Generally the volcaniclastic greywacke sequence appears to fine upwards with an increase in mudstone, siltstone and shale horizons and a decrease in grain size and unit thickness of the greywackes.

Upper Crimson Creek Formation

The rocks are similar in many respects to the coarser volcaniclastic greywacke sequence, but are predominantly siltstone, mudstone and shale with minor greywacke, tuff and sandstone. The underlying basalts and conglomerates, although localised and lenticular, are taken as the base of the succession. The rocks crop out east of the Western Serpentinite and underly most of GAP.

Basaltic Complex

Basic rocks of this complex crop out along the eastern margin of the Western Serpentinite, in an antiformal structure near the southern end of the Ring River road and along the P.M.G. road (east). The rocks are best exposed in Costean 1000N and in the Ring River, where, being within the metamorphic aureole of the Pine Hill Adamellite, they are somewhat indurated. Otherwise they are

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poorly exposed and are deeply weathered.

The complex is comprised of gabbro and basalt breccias with angular clasts of gabbro, granophyre and basalt in a flow banded basaltic groundmass. Sill like bodies of dolerite, gabbro and granophyre also occur, as for example in the Grid 4 area where intrusive rocks predominate. But generally, however, the outcrops can be recognised as being mainly comprised of extrusive rocks. Thin interlayered rafts of chert conglomerate and grey argillite have been mapped in Costean 1000N and in the Ring River. No pillow textures, indicative of subaqueous extrusion, have been observed in the basalts. On the P.M.G. road (east) the basalts are flow banded and amygdaloidal with interbedded shales.

These rocks pass up into a sequence of basaltic volcaniclastics, mainly basalt volcanomict conglomerate with interbedded chert-argillite breccia and grey argillite. The proportion of exotic clasts, mainly chert argillite and quartzite, increases up the sequence, but the matrix remains basaltic in composition.

Conglomerate - Lithicwacke Sequence

Coarse grained sedimentary rocks conformably overly the basaltic volcaniclastic conglomerates. In Costean 1000N and in the Ring River, the basal units are comprised of basaltic conglomerate with an argillaceous matrix, tuffite, chert-argillite conglomerate, siltstone and mudstone. Some interlayered units of basaltic breccia, brecciated gabbro and basalt in a basic lava matrix, have also been mapped. So this section of the sequence represents a transition between the predominantly volcanic sequence below, and the mainly sedimentary sequence above.

This transition sequence was not recognised north of the Ring River where the contact between the basalts and conglomerates is relatively sharp. At Grid 4 the basic complex is overlain by argillite with minor sandstone and basic tuffs, while on the P.M.G. road (east) the basalts are overlain by volcaniclastic greywackes and tuffs. Also no intermixed zone was recognised overlying the basic complex on the Ring River road or in the Ring River.

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Conglomerate, pebbly lithicwacke, pebbly tuffaceous greywacke and coarse conglomerate with interlayered siltstones comprise the sequence overlying the intermixed transition zone. The sequence is so variable in composition and grain size that it is best described with reference to the main areas of exposure.

Costean 1000N (Plans TAS/2/1558-1559)

Interbedded basic volcanomict conglomerates and siltstones are overlain by interbedded chert conglomerates, lithicwackes and siltstones, including a massive 25m-35m unit of angular chert conglomerate with slump structures. In this unit the chert clasts are angular and range in size from pebbles to boulders. The matrix to the clasts is argillaceous. It is in turn overlain by pebbly tuffaceous greywacke and pyritic grey shale. The greywacke consists of altered basalt and minor andesite lithic clasts with grains of quartz and plagioclase in an argillaceous matrix.

Ring River

Massive grey green and haematite stained conglomerate and chert conglomerate with impersistent greywacke and siltstone layers make up the sequence. Clasts of subangular pebbles and cobbles of grey and green chert predominate, but pebbles of black argillite, quartzite and carbonate also occur. Minor volcanomict clastic layers are interbedded in the sequence.

Myrtle Grove Road

Northwards at the Ring River-Myrtle road junction area, the unit is made up of interlayered basaltic conglomerate and chert-argillite pebble wacke. Further north the unit is covered by glacial deposits.

Grid 4 - Colebrook Creek

A thick (450m) sequence of polymictic conglomerate, pebble lithicwacke, feldspathic greywacke and siltstone represents the unit. The pebbles in the conglomerates and lithicwacke are rounded to subangular and comprise basalt, gabbro, argillite,

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siltstone, silicified carbonate and quartzite. The rocks are roughly sorted with the pebbles concentrated in lenses and in lags with an arenaceous matrix.

P.M.G. Road (East)

Further north the unit is represented by basalt volcaniclastic greywacke and argillite lithic-wacke. There are no conglomerates in the sequence and there are few exotic clasts in the greywackes.

Ring River Road

A sequence of lithicwackes with pebble lags, conglomerates, feldspathic sandstone and greywacke conformably overlies the basic complex exposed in the anticlinal dome. The rocks are comparatively well sorted, with some units made up of basalt and gabbro lithics in a greywacke matrix, and others comprised of chert, argillite and quartzite in an argillaceous matrix.

Siltstone-Argillite Sequence

Most of the southern, central and northern portions of GAP are underlain by this monotonous sequence of finely interlayered siltstone, shale, feldspathic greywacke, sandstone and tuff. The absence of marker horizons and the complexity of the folding in the area has made correlation of units impossible. The sequence conformably overlies the Lower Crimson Creek Formation greywacke sequence west of the Serpentinite Complex and also conformably overlies the conglomerate-lithicwacke sequence east of the serpentinite. The distribution of the rocks is shown on plans TAS/2/1482-1483, where they are subdivided into the Siltstone and Argillite Sequences.

Siltstone Sequence

Despite the underlying mud of the area, these rocks are poorly exposed (see field sheets TAS/2/1488-1489). The best exposures are on the Ring River road, north of the basic complex in the anticlinal structure in the south central part of the grid, and in the Ring River to the west.

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The rocks are finely intercalated and where fresh, are grey to green in colour. Siltstone is the main rock type grading into silty mudstone, argillaceous siltstone and shaley siltstone. The composition of the rocks is similar to that of the greywackes; they are made up of basic volcanic lithics, plagioclase crystals and opaque minerals. Graded bedding, scour and fill structures, mud flake breccias and current bedding support the view that these rocks are representative of a fine greywacke sequence. Grey, green and rarely red mudstone and shale make up the sequence along with thin, relatively restricted units of greywacke sandstone and felspathic basic tuff. Tuffaceous rocks are more common in the Exe River-Grid 5 area.

Argillite Sequence

Rocks of this sequence are well exposed in the south-western sector of the grid within the metasomatic aureole of the Pine Hill Adamellite. Argillites also occur adjacent to faults and fold axes which are possible conduits for the hydro-thermal fluids. Argillites also crop out in the Exe River.

The Argillite Sequence is the hornfelsed and metasomatically altered variety of the Siltstone Sequence. It is best exposed in Costeans 1000N and 1200N, on the Myrtle Grove road and in the Ring River. The argillites mapped west of the Serpentinite Complex are thought to be metasom-atised units of a greywacke siltstone facies of the Volcaniclastic Greywacke Sequence.

The basal beds of the unit are well exposed in Costean 1000N and in the Ring River east of the Conglomerate-Lithicwacke Sequence. The pebble lithicwackes pass up eastwards into interbedded argillite, siltstone and greywacke. There is cyclic repetition of units, but the sequence fines upwards as the thickness and relative proportion of coarse detrital units decreases. Above this basal transition zone the rocks are mainly grey argillite with thin silty layers, grading into silty argillite. Intercalations, lenses and layers of greywacke sandstone and silicified feldspathic tuff occur throughout, and together with the silty layers give the rock a

characteristic banded appearance. While all the units are hornfelsed, the coarser siltstone and sandstone layers, being relatively coarser grained, are more metasomatically altered. Pseudo chilled contacts at the margins of metasomatised horizons reflect original bedding enhanced by incipient zoning of the metasomatic phases. This probably reflects primary porosity and mineralogical variations between the various laminae (5).

Dundas Group

The rock units which crop out in the south-east sector of the grid are assigned to the Dundas Group on the basis of lithology. Since many of the beds are lenticular, and because of the difficulties encountered in attempting correlations in an area of poor exposure and complex geology, the Dundas Group Formation names are not used (3). The rocks differ markedly from those of the Crimson Creek Formation, indicating both a different provenance and environment of deposition. The contact between the two "groups" is interpreted as being a fault as there is no evidence of a basal conglomerate indicating an unconformity, nor is there evidence of a conformable change of geological environment (paraconformity).

Black Shale - Tuff Sequence

The sequence is comprised of black shale, siltstone, immature greywacke, arkose, micaceous sandstone, rhyolitic tuff and conglomerate. The stratigraphic relationship of the rocks has been established from good exposures in the Ring River and in Wilbur Creek. However, tracing individual rock units through the grid has proved most difficult, so only broad lithological groupings can be recognised. From west to east there are:

(i) 100m: Laminated black shales with minor (10cm) units of coarsely graded immature greywackes are exposed in the Ring River. Along strike in Wilbur Creek, these rocks are represented by grey and green shales with minor siltstone and greywacke units.

(ii) 260m: Rhyolitic crystal lithic tuffs and xeno

tuffs, with carbonaceous shales and minor quartz arkosic lithicwackes, are well exposed in Wilbur Creek and may be traced from the Ring River to north of line 2400N. The tuffs vary in composition and grain size. The lowermost tuff exposed in the Ring River is very coarse grained with lithics of chert, shale, quartzite and rhyolite in a carbonaceous matrix. However, along strike in Wilbur Creek, it is a massively bedded crystal lithic tuff. A lensoid lithic tuff unit, exposed at 635m in Wilbur Creek, shows penecontemporaneous weathering in the upper plane and has carbonaceous shales overlying it with load casts developed. The uppermost tuff taken to be the top of this lithological group is a flow textured rhyolitic ignimbrite (5) which forms a fairly consistent mappable unit.

(iii) 200m - 250m: A complex interlayered sequence of carbonaceous shales and siltstones, with a characteristic banded appearance, flaggy micaceous quartz sandstones and siltstones comprise this lithological group. There is also some development of coarse quartz-lithicwackes and arkosic conglomerates. The rocks are well exposed in the Ring River where they are folded in a series of Z and M folds in an anticlinal axial zone. In Wilbur Creek and northwards, coarser units are more common. This rock sequence is of possible economic interest since it hosts the Bonnie Dundee and Fahlore Mines on the Ring River and has Crone EM and self potential anomalies associated with it on the GAP grid lines.

(iv) 60m - 90m: A sequence of grey silicified shales, pyritic black shales, quartz crystal tuffs and quartz sandstones may be traced from the Ring River as far north as line 1400N. The rocks coarsen upwards from black shale at the base to predominately quartz lithic sandstone at the top.

Arkose-Conglomerate Sequence

The overlying arenaceous sequence lies conformably on the Black Shale Tuff Sequence. It was mapped at the far eastern end of grid lines 1000N to 1800N and in the Ring River, where it crops out in a synclinal axial zone. The sequence is comprised of grey quartzose arkose, coarse pebbly arkosic lithicwacke and poorly sorted conglomerate

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with intercalated black shale. Evidence of winnowing in the form of pebble lags and current bedding was found in the Ring River. The arenaceous and rudaceous units are poorly sorted and not obviously graded, but individual units are separated by black shale bands and partings. Clasts of black shale up to cobble size occur in the conglomerates.

Glacial Deposits

Thick deposits of glacial and periglacial deposits cover a large proportion of GAP. Coarse boulder ground moraine occurs in the ridge between the Ring River and Colebrook Creek, and between Colebrook Creek and the Exe River. Southwards, the deposits are represented by sands, gravel and varved clays, particularly in the Colebrook Creek drainage basin. Coarse fluvioglacial deposits occur in the Ring River valley. In many instances the rivers and creeks have incised down through the base of the glacials.

The ice sheet which deposited these deposits is thought to have been fairly localised between Dreadnought Hill and Colebrook Ridge. It probably formed an arm of the sheet which moved down the Pieman River valley. In the northern-most costean at GAK, the deposits are seen to consist of thick beds of boulder till separated by narrow bands of white varved clay and sand. Some palaeosol development is evidenced by the presence of carbon and fossil wood in the profile.

The top of the glacial deposits are extensively leached, with a white siliceous appearance. An iron pan is intermittently developed below the leached zone, and below this the deposits are streaky with iron rich sections alternating with iron depleted sections. A^{o} soil development is very poor over most of the glacial deposits, with little red soil development between the A^{oo} and B horizons.

5.1.3. Igneous Intrusives

Two large serpentinite complexes have been tectonically emplaced into the sedimentary sequence. The western complex forms part of the Serpentine Hill Complex (6) which is well

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exposed south of Renison Bell. The eastern complex, which outcrops at the far eastern end of the grid, has been named the Colebrook Hill Serpentinite (3). A small (500m x 50m) faulted off serpentinite dyke has been mapped in the Dundas Group sediments between lines 2000N and 2400N. This indicates that the emplacement of the serpentinites post dates the Middle Cambrian Dundas Group.

The Serpentine Hill Complex

The portion of the Serpentine Hill Complex in GAP is comprised of layered pyroxenite and harzburgite partially replaced by serpentinite. Good outcrop occurs only in the Ring River, in the GAK costeans, on the Ring River access road and at Grid 4.

The olivine rich rocks are mainly harzburgite (5) with minor diorite. In most cases the layering and cumulate textures have been obliterated since the rocks have largely been altered to serpentine, talc and tremolite. The rocks are either granular or poikilitic, and characteristically are altered to dark green, almost black, serpentinite composed of lizardite, talc, platey bastite, chromite and magnetite. Finely disseminated magnetite gives the dark colour to the rocks and accounts for the high magnetic susceptibilities. Localised shearing along joints and faults has led to the development of chrysolite, talc and tremolite, as well as sweated out slickensided magnetite.

The pyroxenite rocks are mainly orthopyroxenite with minor olivine pyroxenite and plagioclase pyroxenite. There is every gradation from pyroxenites with slight alteration to talc and tremolite along grain boundaries and cracks, to pyroxenites entirely replaced by serpentine, talc and tremolite. Characteristically, the serpentinised pyroxenites are apple green in colour and have a vitreous, waxy lustre. They range from highly sheared to massive varieties, and contain abundant relict pods of primary layered pyroxenite, often surrounded by sheared green serpentinite with cross fibre asbestos. The green serpentinites are composed of lizardite chrysotile mixtures with little or no magnetite. Magnetite

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does occur, however, in shear zones and in joints.

Sheared contact serpentinites occur at the eastern contact zone with the Crimson Creek basic complex, particularly in the GAK and Grid 4 areas (plans TAS/2/1480 and TAS/2/1562). They consist of chrysotile and antigorite where relatively fresh, grading to talc-magnesite-goethite assemblages where extensively sheared and altered. Sheared serpentinite also occurs in sections within the main ultramafite body, probably associated with internal faults formed during tectonic emplacement.

Lensoid pods and inclusions of amphibolite and gabbro have been mapped in the Ring River, associated with the Serpentinite Complex. The amphibolite consists of uralite and saussurite minerals with chlorite amphiboles and relict plagioclase.

The Colebrook Hill Serpentinite

The Colebrook Hill Serpentinite is comprised mainly of apple green serpentinised pyroxenite and contains inclusions of sedimentary country rocks. It forms a belt in which a number of anastomising shear zones have a general northerly trend. The shearing and serpentinisation cuts across the primary layering. Magnetite occurs as large clots (>3cm) within certain sections of the serpentinite, in veins and as infilling in joints. Serpentinised layers and dykes of microgabbro also occur in this complex; these have been extensively altered to chlorite-amphibole rocks.

The dyke like serpentinite body intruded into the Dundas Group rocks is related to the Colebrook Hill Complex. It is mainly comprised of light to dark green sheared serpentinite along with partially serpentinised microgabbro, patchily altered to uralite and sausserite. The body lenses out in an arkosic conglomerate in which there is a development of fuchsite up to 300m away from the contact.

A gabbro dyke, possibly injected along a fault, has been mapped in Colebrook Creek, Costean 3600N and on grid lines 3200N, 3400N and 3600N. Where

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the exposure is fresh, the rock is seen to be comprised of hypersthene, augite, plagioclase and titano magnetite, with replacement by uralite, chlorite, saussurite and epidote. In Costean 3600N, the rock is deeply weathered and has a pseudoclastic texture similar to that in the intrusive rocks of the Basaltic Complex. It appears to be related to the Serpentine Hill Complex and was probably tectonically emplaced at the same time. Other similar gabbroic bodies are thought to occur in the area but are not exposed.

A stock of altered greisenised adamellite occurs at Pine Hill, south-west of GAP (plan TAS/2/1421). This body, together with porphyry dykes extending radially from it, forms the top of a buried granitic body which is known to underly the Renison Bell Anticline (Appendix III). The country rocks, including ultramafics and gabbros, have been metamorphosed up to 1300m from Pine Hill.

The dyke like body of altered microgranodiorite, mapped in Wilbur Creek along a probable fault zone, is thought to be related to the Pine Hill body. The rock is silicified and made up of almost equal proportions of quartz, plagioclase and chloritised mafic minerals.

5.1.4. Structure

Folding

A structural interpretation of GAP must be regarded as highly tentative on account of the problems of correlation of lithologies and poor exposure. Good exposures in Costeans 1000N and 1200N, on sections of the Ring River and on the Ring River Road, allow for an appreciation of the complexity of folding. The meso and micro fold structures have been measured where possible, and these, together with cleavage bedding relationships and facing directions, have led to a definition of the macro fold pattern.

The dominant fold structures are the Renison Bell Anticline to the west, and the Huskisson Syncline to the east. These structures plunge to the north-north-west in the northern part of the

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region, and to the south in the southern part. These folds indicate compression on east-west axes, the trend of which may be traced across GAP. The variation in plunge direction gives rise to saddle and dome type structures along with interference folding in some areas. Generally antiformal axes are dominant in southerly plunging structures, with synformal axes the dominant structures plunging north.

The rock sequences west of the Serpentine Hill Complex generally dip and face east; minor dip reversals occur where the beds are slightly overturned. In the southern part of GAP the structure east of the Complex is seen to be a series of synclines and anticlines (see plan TAS/2/1619). A synclinal axis may be traced from the Ring River southwards to west of Costean 1200N. The pattern of drag folds on the Myrtle Grove road indicates a synclinal axis to the east, while the complex pattern mapped in Costean 1200N (Plan TAS/2/1560) indicates an axis to the west. In Costean 1200N the rocks are seen to be folded in a series of asymmetrical folds with broad crenulated anticlinal zones and tight, probably faulted, synclinal axial zones. The fold pattern, when plotted on a profile, is that of drag folding indicating an anticlinal axis at the eastern end of the costean. This has been mapped just to the west of Tin Creek. To the east of the main structure, is a domal anticline which has been upfaulted into the sequence exposing basalts and lithicwackes in the axial zone. These rocks are correlated with the Basaltic Complex and the Conglomerate-Lithicwacke Sequence exposed east of the Serpentine Hill Complex. The major axis seen in the Ring River plunges south as do the associated drag folds mapped in the overlying sediments. However, to the north on the Ring River road, the rocks are also folded into a broad syncline which plunges to the north-east at approximately 30°. The associated drag folds mapped on the road all plunge in the same direction. The anticlinal zone is interpreted as lying to the east, again plunging north. This interpretation is enhanced by the presence of a magnetic high indicating a deep structure.

To the east, the rocks dip and face east and form

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the western limb of the southerly plunging Huskisson Synclinorium. Z and M folds have been mapped on the Ring River indicating drag folding, and there is also some flexing on F fold axes. The main synclinal axis is seen on the Ring River where the rocks are fairly contorted with variable dips and strikes. The axial zone is broad with some horizontal bedding.

The fold pattern in the northern part of the grid cannot be worked out in much detail. Generally the exposed rocks are seen to dip and face east, although dip reversals do occur. A flexured synclinal axis was mapped on the P.M.G. road (east) while a series of tight drag folds have been mapped in the Grid 5 costean and in the Exe River. The fold structures observed plunge to the north-west and form part of the western limb of the north-west plunging Huskisson Syncline, the major axis of which lies to the east.

Faulting

Faulting is probably fairly extensive at GAP as evidenced by the fault pattern at the Renison Mine. However, many of the faults are not exposed, so only where obvious fault relationships can be demonstrated, can the structures be drawn in. At Renison Mine north-west - south-east trending faults have the largest throw, for example, the Bassett-Federal Fault downthrows the sequence to the east at least 700m.

In GAP the Serpentine Hill Complex is faulted into the sequence. To the west it is faulted against mylonitised mudstone and siltstone, and to the east against brecciated basalt. The extent and direction of movement along this structure is not known, but there is a change of facies from greywackes to the west, to lavas, lithicwackes and conglomerates to the east. The effect of the structure appears to feather out to the north. Where the faulted contacts are seen, the structure dips to the west at 74° to 84°.

North-north-east trending faults are associated with the anticlinal structures on the Ring River road. These faults may be associated with a deep seated lineament of the same trend. Where such faults have been seen in outcrop, as in Costean 1200N and on the road, the downthrow is

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to the west. Thus the basalts and lithicwackes may be block faulted into position by a series of step like normal faults rather than by a simple anticlinal fold.

A north-east trending fault is interpreted as forming the contact between the Upper Crimson Creek Formation and the Dundas Group. This postulated fault downthrows the sequence to the east. Its existence is inferred by lithological changes and by the trend of the microgranodiorite dyke.

The Colebrook Hill Serpentinite is faulted into the sequence in a similar manner as the Serpentine Hill Complex, and is associated with a number of shear zones within the complex. The serpentinite is truncated by a north-west trending fault which also truncates the Dundas Group sediments. This fault downthrows the rocks to the west and complements the direction of throw in the Bassett-Federal Fault. It may be tentatively traced to the north-west where it is truncated by the Serpentine Hill structure.

The Serpentine Hill Complex is itself cut by a number of east-west faults. Some of the faults can only be inferred from the pattern of the magnetic profiles, but one fault of some importance has been mapped in the Ring River. This fault downthrows the serpentinite to the south and has a lateral displacement north block to the west.

The distribution and pattern of the faults at GAP is of importance since the structures could have acted as conduits for mineralising hydrothermal solutions. Large scale replacement of the sediments may have occurred where the faults are sufficiently open to have acted as major channel ways.

5.1.5. Alteration

Three types of alteration may be recognised at GAP:

(i) Penecontemporaneous weathering of the basalts.

(ii) Alteration associated with the process of serpentinisation.

(iii) Metasomatism of the country rocks by emplacement of the Pine Hill Adamellite and associated granitic bodies.

(i) Basaltic volcanomict conglomerate, lithicwacke and greywacke units of the Basaltic Complex show indications of predepositional alteration and weathering. The basalts appear to have been altered (uralitised, saussuritised, albitised) before being broken up and swept into the depositional basin as slump or turbidite debris (5). Also extensive development of goethite, manganese hydroxides (wad) and iron rich clay minerals occur within sections of the basaltic rocks, even if in contact with relatively unweathered rock (e.g. Costean 1000N and at GAK). The indications are that hydrothermal fluids were actively circulating within the basalt pile as it was extruded. Upon interaction of the fluids with the ground water, sea water in sediments and oxygen, precipitation of amorphous ferric hydroxide particles may have taken place. A programme of whole rock geochemistry would be required to prove or disprove this theory, but it is interesting to note that goethite, iron rich montmorillonite and manganese hydroxides occur on oceanic ridges associated with hydrothermally altered basalts.

(ii) The serpentinised ultramafic rocks in the Grid 4 area are extensively sheared, and sections have undergone a form of hydrothermal alteration associated with the serpentinisation process. Two zones containing pod like bodies of dolomite have been mapped through a series of pits and trenches and costeans (see Plan TAS/2/1480). The dolomites are best exposed south of Colebrook Creek, where they occur as vein like pods which pinch and swell up to two metres in width but generally average less than one metre. They consist of coarse interlocking carbonate crystals, thought to be dolomite with patches of sulphide, hydromuscovite and ? barite. Some consist of dolomite-quartz-talc-serpentine, while others consist of quartz-dolomite-sulphides. Fine grained chromite occurs in the rocks which confirms their serpentinitic origin. The carbonate pods are enveloped by talc-manganese oxide-goethite schistose rocks which pass gradationally into fresh apple green serpentinite. The contact

zone of the carbonates are sharp but irregular, indicative of replacement rather than tectonic emplacement. Northwards the dolomites pass into black ferruginous manganiferous breccias which contain anomalous amounts of base metals (Appendix I) and do possess a cellular boxwork indicative of carbonate.

The carbonates are thought to result from CO_2 metasomatism of a sheared serpentinite. This may have caused remobilisation of the Fe and Mn ions to give concentrations of ferruginous and manganiferous minerals in the enveloping talcose schists.

(iii) The rocks mapped as hornfelsed argillite and make up the Argillite Sequence result from metamorphism of the country rocks by emplacement of granitic bodies. The main area of hornfelsing occurs in the aureole of the Pine Hill adamellite, within which all the rocks, including the ultramafics, have been hydrothermally metamorphosed. To a large extent the original mineralogical composition of the rock determined the nature of the metamorphic minerals as much as the distance from the hydrothermal source. The alteration effect was metasomatism due to introduction of hydrothermal fluids in addition to thermal contact metamorphism. Metasomatic effects do occur along deep seated structures and fault zones which acted as conduits for the hydrothermal fluids. The metasomatic alteration is best described with relation to the rock types:

Serpentinite

The serpentinites in the Ring River are silicified in sections, and this is thought to be due in part to hornfelsing, but also to the introduction of silica. Patches of felted tremolite-actinolite enclosed in the serpentinised pyroxenite, may also have formed during thermal metamorphism. Generally, however, the rocks show little obvious effect, since many of the hydrothermal minerals introduced into the system are similar to those formed during serpentinisation.

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Basic Rocks

The brecciated basalt containing gabbro clasts in a basaltic matrix, along the faulted eastern contact of the Serpentinite Complex, is extensively altered. In Costean 1000 it has been altered to a quartz-epidote-actinolite assemblage with veins of epidote, quartz and fibrous actinolite. In the Ring River the rock has been altered to a tremolite-chlorite-plagioclase amphibolite. Away from the contact zone, the basic rocks are amphibolitised with tremolite-actinolite-chlorite assemblages developed, along with minor quartz and epidote. The basaltic matrix to the volcanomict conglomerates is amphibolitised, while the argillaceous matrix is hornfelsed. Interbedded argillaceous rocks have been metamorphosed to flinty argillites. Axinite has been mapped in Costean 1000N and in the Ring River as a crystalline mineral in vugs within basaltic rocks.

At Grid 4, the gabbro and granophyre of the Basaltic Complex is seen to be extensively altered with tremolite, phlogopite and chlorite replacing the mafic minerals. The rock is almost dioritic in composition where quartz has been introduced and, where schistose, the assemblage is talc-chlorite-quartz. Hydrothermal alteration is extensive in this area although the assemblage of minerals is suggestive of low temperature solutions.

Sedimentary Rocks

Metasomatic phases comprise tremolite-actinolite, chlorite, phlogopite, carbonate, tourmaline and prehnite, sphene and sulphides. Generally the metasomatism is most marked in the relatively coarse grained layers, the beds of greywacke, sandstone, tuff and siltstone. The coarser layers were presumably more permeable for the hydrothermal fluids, and the detrital grains more chemically reactive. The ideal rocks are carbonates such as those at the Renison Mine, as such rocks, in addition to being permeable and porous, are also readily dissolved by acid solutions and are chemically reactive. No sedimentary carbonates have been mapped at GAP, but the carbonates formed from the process of

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serpentinisation at Grid 4 could have been reactive. Where fresh and siliceous, the only replacing minerals observed so far are illite and muscovite. But these rocks being silicified may not have been sufficiently permeable. Where the carbonate rocks are not silicified, they are seen to be comprised of goethite, manganese wad and talc. This could also reflect hydrothermal alteration.

The fine grained rocks, the shales, mudstones and silty shales are generally simply hornfelsed but do contain biotite, phlogopite, clinozoisite and muscovite as alteration minerals (5). The rocks are slatey or cherty in aspect and are very fine grained. Quartz-tourmaline veins have been mapped in Costeans 1000N and 1200N, generally cross cutting fairly acid rocks such as chert conglomerate or shale.

5.1.6. Mineralisation

Mineralisation of the Renison Bell Tin Mine is of three main types:

(a) Metasomatic replacement of carbonate beds: The sulphide ore has formed by replacement of dolomite as the ore solutions moved away from the major fractures. The main sulphide is pyrrhotite with patches of arsenopyrite and pyrite, widespread trace amounts of chalcopyrite and sporadic development of stannite, sphalerite and galena. The tin occurs as cassiterite and is contemporaneous with quartz and much of the pyrrhotite.

(b) Vein filling in fault zones with limited wall rock replacement: These occur in the Bassett-Federal Fault and in adjacent faults. The ore consists of fracture fillings and vein networks of quartz-pyrrhotite-arsenopyrite-cassiterite, sometimes with chalcopyrite. Volcaniclastic greywacke, adjacent to the Bassett-Federal Fault, is patchily replaced and reaches ore grade in places.

(c) Veinlet and disseminated mineralisation in recrystallised quartzite: This is confined to a zone of quartzite in the Renison Bell Member and consists of quartz-tourmaline with veinlets and

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and disseminations of cassiterite-arsenopyrite-pyrrhotite.

The ore solutions are considered to have risen along tension faults in the Renison Bell Anticline and replaced adjacent carbonate beds. The source of the hydrothermal solutions is considered to be the underlying granitic body with faults acting as conduits.

At GAP the following types of mineralisation are seen to occur in rocks of the Crimson Creek Formation:

(i) Metasomatic replacement of permeable beds: The most common form of sulphide mineralisation observed at GAP is of this form. Since the hydrothermal solutions which introduced the sulphides also metasomatised the rocks, the distribution of this style of mineralisation is restricted to rocks of the Argillite Sequence. Pyrite and chalcopyrite is seen to occur with tremolite, axinite and chlorite in metasomatised arenaceous layers in Costean 1000N and on the Myrtle Grove road. Pyrite crystals occur as clusters showing replacive textures associated with phlogopite in sandy lenses mapped in Costean 1200N. Generally however, in Costean 1200N and the surrounding area, pyrrhotite is seen as the main introduced sulphide in the silty and sandy layers. Disseminated pyrite, pyrrhotite and chalcopyrite occurs in the metasomatic hornfels units mapped in the Exe River. Pyrrhotite, pyrite, arsenopyrite, chalcopyrite, galena, sphalerite and stannite have been detected in metasomatised arenaceous layers in the core of RBE 1 at Grid 5.

The carbonate rocks at Grid 4 show evidence of some introduction of sulphides, namely galena and chalcopyrite. More extensive replacement may occur at depth, particularly where the carbonate rocks are seen as ferruginous-manganiferous breccias. It is possible too that suitably altered and prepared sections in the Serpentinite Complex could host replacement type sulphides.

(ii) Vein filling in fault zones: Mineralisation of this type has been mapped in a short adit off the Ring River, along a faulted contact between

argillite and basalt conglomerate. Quartz-tourmaline-pyrite-? cassiterite was observed in the 10cm vein filled fault zone. In the Costean 1200N area, linear magnetic zones probably reflect pyrrhotite mineralisation in faulted fold axes. Chalcopyrite-pyrite-pyrrhotite mineralisation has been mapped in actinolite veins along anticlinal axes in the costean. In Costean 3600N an inferred fault zone, along which a gabbro has been intruded, may have acted as a mineralising conduit because a conglomerate within the zone has been hydrothermally altered and quartz-tourmaline-pyrite-pyrrhotite-arsenopyrite-? cassiterite mineralisation introduced.

Shear zones and faults associated with the emplacement of the Colebrook Hill Serpentinite are mineralised in sections. The X Proprietary Syndicate Mine in Grid 5 appears to be a vein filled fissure or fault zone. The mineralisation occurs as quartz-tourmaline-arsenopyrite-pyrite-chalcopyrite-cassiterite. Other old mines in the area, such as the Athenic, Olympic and Colebrook, appear to be of this type.

The Serpentine Hill Fault structure would appear to form an ideal conduit system for hydrothermal ore solutions. It seems apparent that metasomatic solutions have come up the structure, but there is no evidence of vein filling within it.

(iii) Veinlet and disseminated mineralisation: Veins of quartz-arsenopyrite-pyrite have been mapped in the Grid 4 area, particularly within the gabbro and granophyre of the Basaltic Complex and in the serpentinite in the same area, as indicated by induced polarisation anomalies. Quartz-tourmaline-pyrrhotite veins have been mapped in Costean 1200N, cross cutting beds in metasomatised silty argillite. Actinolite-chalcopyrite-axinite veins occur in the Basaltic Complex exposed in Costean 1000N. In general the veins are scattered and of no economic potential.

Disseminated pyrite has been observed in the microgranodiorite body exposed in Wilbur Creek. This unit gives rise to an induced polarisation anomaly, and may contain more sulphides along strike, at depth, or introduced into the country rocks.

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The styles of mineralisation observed in the Dundas Group are as follows:

(i) Fissure filled veins: The Ring River-Fahlore Mine and the Bonnie Dundee Mine on the Ring River are apparently of this type. Pyrite-chalcopyrite-tetrahedrite-arsenopyrite veins occur in black shales, striped siltstones and arkosic lithicwackes associated with a quartz-siderite gangue. Geological mapping on the Ring River indicates that the host rocks to these mineral occurrences are in the same sequence (Sequence iii of the Black Shale-Tuff Sequence), folded in the axial zone of the Huskisson Anticline.

The adit at 1870N/5700E on the old Ringville-Colebrook Hill tramway is in black shales, underlying a sericitised acid lithic flow textured rhyolitic tuff. Pyrite and chalco-pyrite occur in the shales and in quartz veins along the contact. Further north at 2200N/5880E a quartz-pyrite gossan occurs in black shales; this may be a fissure filled type of occurrence.

(ii) Stratiform volcanogenic-sedimentary type sulphide mineralisation: Syngenetic pyrite occurs throughout the black shale sequence of the Dundas Group, but appears to be of particular concentration in certain lithological sequences. The shales, interbedded with the acid tuffs in Sequence (ii), are very carbonaceous with bedded and disseminated pyrite. The well bedded shale/siltstone lithology of Sequence (iii) is also pyritised. The pyrite observed is considered to be volcanogenic in origin. It is possible that the fissure vein type of mineralisation observed in rocks of these sequences is remobilised and concentrated syngenetic sulphides, along with the introduction of Devonian mineralisation along structural conduits. Both at Bonnie Dundee and Fahlore, the rock sequence is faulted and folded with the mineralisation more extensive in fold axial zones. The host rock sequence to these mineral occurrences may be mapped through the south-east sector of GAP, where it is characterised to some extent by Crone EM and self potential anomalies.

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5.2. Geological Interpretation

A brief geochronological interpretation is presented with the major geological events listed in order of increasing age:

Post-Devonian

Recent: Incision and establishment of present day drainage pattern. Development of narrow alluvial flats along the Ring River, and broad flats along Colebrook Creek.

Quarternary: Deposition of glacial and fluvio-glacial deposits in pre-existing river valleys.

Jurassic: Intrusion of sills and dykes of dolerite. No Jurassic dolerites have been recognised at GAP, but a dyke has been mapped at the Renison Mine.

Late Devonian

Emplacement of high level granitised plutons, particularly of the Pine Hill adamellite. The nature and extent of the emplacement was probably controlled by Tabberabberan fold and fault structures. Emanations of late stage hydrothermal fluids, together with thermal metamorphism, caused the development of a contact metamorphic aureole. Hydrothermal mineralising fluids were introduced into the country rocks, with fault and fissure structures acting as conduits.

Early Middle Devonian

The Tabberabberan Oregeny, a major period of deformation, involved early arcuate folds (F_1) which followed the Pre-Cambrian nucleii and later small scale compression folds (F_2). Both major and minor fault zones developed, particularly on north-east to south-west and north-west to south-east trends.

Late Cambrian?

Injection and emplacement of serpentinised ultramafic bodies and gabbros. Emplacement was probably controlled by the pre-existing fundamental fault structures. The ultramafic and mafic rocks were probably deeply emplaced at the same time as

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the Basaltic Complex was developed as the equivalent high intrusive/extrusive phase.

Middle Cambrian

Deposition of the Dundas Group units. The wide variation in lithology, both laterally and vertically, suggests sedimentation in impermanent basins. Periods of quiescence and stability, in which carbonaceous and pyritic shales and siltstones were deposited, were interrupted by periods of rapid deposition of arkosic conglomerate and tuff. The detritus probably originated from a developing Andean volcanic complex to the east. Contemporary volcanism is indicated by the presence of rhyolitic tuffs.

Early Cambrian

The sequence of greywacke, siltstone and shale, fining upwards to predominantly siltstone, is indicative of deposition from both turbidity and waning currents. Either the depositional trough gradually became more stable or there was waning of contemporary volcanism and uplift in the source areas.

As the Dundas Trough developed, basaltic magma upwelled along the longitudinal fundamental faults. Coarse conglomerate, greywacke and conglomerate were deposited along fault scarps, probably largely as outwash or submarine fans. Shallow water shelf type detritus was slumped and washed into the rapidly subsiding fault controlled troughs along the escarpments.

Late Proterozoic to Early Cambrian

The sedimentary rocks of the top of the Success Creek Group, and the lower part of the Crimson Creek Formation, were deposited in calm shallow water in a near shore shelf or lagoonal environment. Varying influxes of haematitic and siliceous material with carbonate rich waters gave rise to deposition of the Renison Bell Sequence.

Eastwards, on the margins of this stable environment, a rapidly subsiding trough developed in which turbidites were deposited. The margins of the trough were probably fault controlled.

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Contemporaneous basaltic to intermediate volcanic rocks were extruded along the faulted trough margins. Erosion of the weathering volcanic piles gave the provenance for the basaltic lithicwacke and greywackes deposited in the trough.

6. GEOCHEMICAL SURVEYS

6.1. Panned Concentrates

Tin values were recorded in all the samples analysed. The sample sites and values are shown on Plans TAS/2/1482-1483. The panned concentrates collected on the original survey in the Colebrook and Exe drainage systems were not analysed quantitatively. Instead, a visual estimate was made using a binocular microscope. However, cassiterite was recorded in all the samples collected.

Two creeks within GAP contain significant concentrations of tin. One, draining the western contact zone of the Serpentine Hill Complex (2600N-3500E), contains sediment which when panned, analyses 26.8% Sn near the confluence with the Ring River (R.R. 3600m), and 46.7% Sn upstream about 300m. Tin Creek contains sediment which is anomalous in tin. The tin values in these panned samples cannot be treated statistically as different volumes of material were used, and a variety of trap sites sampled. The values recorded from Tin Creek, near its confluence with the Ring River upstream to line 1000N, are:

Tin Creek 920	1.95% Sn
Tin Creek 720	12.90% Sn
Tin Creek 520	6.90% Sn
Tin Creek 320	1.66% Sn
Tin Creek 210	55.40% Sn
Tin Creek 40	20.60% Sn

The significance of these results is discussed under Section 8.2.

6.2. Soil Sampling

6.2.1. General

The values of the A^{o} soil samples collected on the GAP grid are presented in plan form (plans

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TAS/2/1498 to TAS/2/1517) and in profiles. Only the gross characteristics of the soil geochemical patterns are discussed under this heading. The finer points are discussed along with geology and geophysical properties in Section 8.

Pattern recognition is difficult at GAP. The problems are compounded by the somewhat geochemical inertness of cassiterite. It does not leach or dissolve, and unless it comes to surface is not seen in the soil sampling. Also there is an absence of universally consistent pathfinder elements associated with primary tin deposits. Again, the small size and irregular, unpredictable shapes of many tin deposits present problems in pattern interpretation.

6.2.2. Orientation

A small orientation programme of geochemical sampling was carried out at Costean 1000N. 15 sites were chosen in the costean to measure and sample the soil-rock profile by carefully channel sampling the costean walls, from the A^o to the C horizon, for comparison with the values in the bedrock. The work was carried out in order to find which soil horizon in residual soils was most appropriate when sampling the grid.

The results of the work programme are shown on plan TAS/2/1563, and the values in bedrock are shown on plan TAS/2/1558. Contamination was suspected at one site which is down the wall of an old water race (profile 00). Copper, arsenic and tin are seen to be relatively depleted in the A^o, A^1 and B horizons, and there is a tendency for the value to improve with depth. Zinc, nickel and manganese are less noticeably depleted in the humic layers, but do tend to be more concentrated in the C horizon relative to the A and B horizons. In marked contrast, lead is relatively enriched in the A^o horizon.

It does appear, however, that both A^o and C soil horizon data patterns direct attention to the same localities. Auger samples were collected from lines 3200N northwards, but a problem arose with interpretation in that most of the samples were of till, well above the till-bedrock interface. In addition, due to budgetry restrictions,

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auger samples were not collected on lines 1000N to 3000N. For consistency, the A^{O} sample values have been used for the statistical compilations.

6.2.3. Tin

The most significant anomalous values occur in an irregular zone associated with the metasomatised rocks of the Basaltic Complex in the south-west corner of the grid. The high soil values are a reflection of the high tin values in the bedrock. The tin has been introduced into the rocks along with sulphides by hydrothermal metasomatism associated with the emplacement of granitic bodies. Soil values are also anomalous in the Grid 4 area which is in a similar geological environment, except that the anomalies are associated with altered ultramafics and conglomerates in addition to the basic rocks.

Anomalous tin values are associated with the eastern contact zone of the Serpentine Hill Complex and the Basaltic Complex. A somewhat erratic, but quite tracable, linear zone is associated with the GAK ground EM anomalies.

A zone of linear soil anomalies may be traced through the north-east sector of the grid, northwards into Grid 5. The anomalous values may outline a fault zone or vein zone which could have acted as a conduit for hydrothermal mineralising fluids. Tin-tourmaline mineralisation occurs at the X Proprietary Mine within an extension of this zone of soil anomalies.

6.2.4. Copper

Anomalous copper values are associated with the metasomatised basic rock units in the south-west sector of the grid. The values decrease to the north, which either reflects a northerly plunge of the hydrothermally altered bedrock, or marks the feathering out of the mineralising fluids. High background copper values are also associated with the inlier of basic rocks near the southern end of the Ring River road. These basic rocks are not hydrothermally altered.

Anomalous copper values are associated with the eastern contact zone of the Serpentine Hill

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Complex, particularly on lines 2400N and 2600N.

6.2.5. Lead

The main soil anomalies are associated with the Colebrook Hill Serpentinite, particularly where galena occurs in dolomitic serpentinite. Anomalous values also occur in the soils associated with the faulted off serpentinite dyke which intrudes acid pyroclastics, black shale and arkosic conglomerates of the Dundas Group.

Anomalous values are associated with the Serpentine Hill Complex, particularly the eastern contact zone with the Basaltic Complex in the south-west sector of the grid. The anomalous values in soil samples collected from alluvium of the Ring River are spurious and simply form part of the geochemical drainage train from the Hercules Mine at Williamsford upstream.

6.2.6. Zinc

The eastern contact of the Serpentine Hill Complex and the Basaltic Complex/conglomerate contact, in the south-west sector of the grid, are anomalous in zinc. Zinc soil anomalies also occur over the altered ultramafic rocks in Grid 4. A major anomaly is associated with the contact zone of the Colebrook Hill Serpentinite.

Minor anomalies in zinc, along sections of the Exe and Colebrook drainage courses, reflect the base of the glacial overburden on fairly steep slopes. These anomalous values are therefore regarded as spurious.

6.2.7. Nickel

Two zones of anomalous soil values are associated with the contact zone of the Serpentine Hill Complex with a broad zone between lines 2600N and 3200N. There is no obvious nickel anomaly associated with the altered ultramafics of Grid 4, while to the north, the nickel values no longer indicate serpentinite. High nickel values also occur in the soils developed on the Colebrook Hill Serpentinite and the faulted off dyke in the Dundas Group sediments.

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6.3. Rock Geochemistry

Costean 1000N was channel sampled in 4m sections. The costean was excavated on line 1000N, from 3520E to 3980E, to test coincident tin, zinc and copper soil anomalies, and to investigate the extent of the sulphide mineralisation associated with the metasomatised Argillite Sequence. The values are shown plotted on plans TAS/2/1558 and TAS/2/1559. Overall the background values for tin, zinc, lead, manganese and copper are anomalous, but there are no intersections of economic significance. The highest consistent tin values occur in the amphibolitised basaltic volcanomict conglomerates and breccias with interbedded argillites, and in the metasomatised basaltic volcaniclastic greywacke units finely interbedded with the predominantly argillite sequence to the east. The highest lead values occur in the epidotised gabbro breccia near the western contact of the Basaltic Complex. Copper and zinc are uniformly dispersed, although zinc appears to be depleted in the sections made up mainly of chert conglomerate and argillite. There seems to be little correlation between the elements; arsenic values have no apparent relation to tin, and manganese values appear to be independent of copper, lead or zinc.

Costean 1200N was excavated on line 1200N, from 4300E to 4600E, and channel samples were collected over 4m intervals. The costean was required in order to investigate coincident induced polarisation anomalies (high resistivity with moderate chargeability), linear magnetic anomalies (L_1, L_2), and sporadic tin, copper and lead anomalous soil values. The values of copper, manganese, tin, zinc and lead in the channel samples are generally low and not of economic significance. The highest tin value of 300 ppm is in the sample from 36m to 40m, where there is a southerly plunging anticlinal drag fold. The higher bedrock metal values occur in the western sector of the costean, where minor folding and axial plane cleavage is fairly intense. The higher values are also coincident with the more metasomatised and hornfelsed rocks.

Costean 3200N, A and B, (plan TAS/2/1562) were excavated to investigate the hydrothermally altered serpentinised ultramafic-mafic complex at Grid 4, where there are well defined induced polarisation,

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Crone electromagnetic, magnetic and self potential anomalies. The highest tin values recorded were in a 3m sample, collected from 140.5m to 143.5m in Costean 3200N A, which analysed Cu 10 ppm, Mn 1.8%, Ni 465 ppm, Pb 420 ppm, Zn 575 ppm, Sn 370 ppm. The rock type is dolomitised serpentinite with disseminated (relict?) chromite. In Costean 3200N B, the highest value was in a 4m sample, collected from 60m to 64m in talc chlorite schist, which analysed Cu 150 ppm, Mn 1400 ppm, Ni 325 ppm, Pb 1250 ppm, Zn 555 ppm, Sn 250 ppm.

The values in the channel and chip samples collected from Costean 3600N (plan TAS/2/1561) were uniformly low. The best being in a 4m sample, from 40m to 44m in deeply weathered manganiferous conglomerate, which analysed at Cu 110 ppm, Mn 1.05%, Ni 60 ppm, Pb 540 ppm and Sn 40 ppm. The weathered bedrock values do not substantiate the anomalous soil geochemistry on grid lines 3400N and 3600N. Weathered and leached hydrothermally altered conglomerate, with quartz-tourmaline-pyrite-pyrrhotite-arsenopyrite-?cassiterite in veinlets, is exposed in a cutting on the road north of the costean. A grab sample of this rock analysed at Pb 200 ppm, Zn 700 ppm, Cr 200 ppm, Mn >1%, As 50 ppm, Cu 50 ppm, Co 150 ppm, Ag 0.5 ppm. Mineralisation of this style must therefore be fairly localised as no sign of it was found in Costean 3600N.

Grab samples of mineralised, and possibly mineralised, rocks were collected from a number of localities on the grid. Sample number, rock types and values are listed in Appendix II. An extensive rock sampling programme was carried out in the Grid 4 pits, trenches and costeans. The metal values in the carbonates and related rocks are erratically dispersed. The sample values of the carbonate rocks collected are summarised on page 45.

The tin values are sub-economic, but sufficient to account for the soil geochemistry. The chromium values are of particular interest in that they are indicative of ultramafic rocks. This supports the geological evidence that the carbonates are derived by carbon dioxide metasomatism of serpentinised ultramafics, and were not originally sedimentary limestones.

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Sample	Description	Pb	Zn	Sn	Cr	Mn	As	Cu	Ni	Ag	Fe_2O_3	MgO	SiO_2
T 3943	Ga, chl. in silic. dol.	1000	200	30	400	>1%	2000	20	500	1.5			
GAP 4/1	Ga in silic. dol.	2000	85	100	-	>1%	>1000	35					
T 3960	Goethite + wad in vein	2000	5000	10	800	>1%	700	100	800	5.0			
T 3962	Goethite in weath. dol.	1000	3000	100	1000	>1%	500	30	1500	0.8			
T 3963	Goethite + wad in vein	30	500	200	800	8000	100	50	1500	0.2			
T 3964	Goethite + wad in vein	2000	3000	30	1000	>1%	1000	70	2000	20.0			
T 3965	Goethite + wad in vein	300	2000	10	3000	>1%	1000	80	1000	1.0			
T 3966	Goethite + wad in vein	150	800	80	1000	1%	100	30	800	0.8			
T 6688	Chloritic altered gabbro	122	940	45	2700	2.8%	20	112					
T 6689	Goethite in qtz. vein	23	800	20	1.05%	1.4%	164	17			11%	24%	52%
T 6690	Quartz dolomite vein	930	3800	50	3600	6.0%	3085	46	-	-			
T 6691	Sheared dolomitic serp.	850	4600	100	7500	9.0%	1966	60			42%	3%	12%
T 6692	Quartz-dolomite	45	100	190	2300	4.4%	432	13					
T 6693	? Quartz-dolomite	85	360	130	7400	7.6%	970	34			35%	15%	5%
T 6694	Py in dolomitic serp.	32	72	15	3400	4800	32	5			8%	34%	33%
T 6695	Dolomitic serp.	52	185	90	2450	4.2%	191	18					
T 6696	Serpentinised dolomite	1060	2200	70	2500	10.2%	1030	34			42%	6%	3%
T 6697	Dolomite	580	3600	75	2000	5.8%	4324	38					

SAMPLE VALUES OF CARBONATE ROCKS

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8. DISCUSSION

8.1. The sequence and distribution of rock units at GAP are indicative of intermittent to rapid deposition of sedimentary and volcanic rocks in a complex trough-like basin, the margins of which were probably fault controlled. Shelf-type, shallow water rock types such as carbonate, chert and quartzite, which characterises the Renison Mine area, have not been found in outcrop on the property. The Renison rock sequence may, however, underlie the turbiditic sequence, but probably at a depth exceeding 1000m. But deep seated magnetic anomalies along the faulted anticlinal structure could reflect Renison type rocks faulted into the sequence at a shallower depth.

The carbonate beds at the Renison Mine form an ideal host for stanniferous-sulphide replacement mineralisation. The rocks were porous, permeable and chemically reactive to the acid hydrothermal metalliferous solutions which were transported along adjacent fault conduits. If carbonates are absent in the rock sequence, other rock units with similar physiochemical properties might be expected to be mineralised, but at a lower concentration of metals. Essentially then, at GAP, we are looking for hydrothermal mineralisation within different rock units from those mineralised at Renison, but similar to that in the hanging wall rocks of the Bassett-Federal Fault (Appendix III). The potential targets are stanniferous replacement type ore deposits in basalt, greywacke, lithicwacke, conglomerate and ultramafite adjacent to fault conduits which, if sufficiently open, may also contain ore grade mineralisation.

8.2. The zone of metasomatised and hornfelsed rocks, which comprises the Argillite Sequence in the south-west sector of GAP, may be traced southwards into costeans excavated by Longreach Metals in 1971-1972. Here metasomatised arenite units containing pyrite, chalcopyrite and pyrrhotite weather to goethite gossans from where a grab sample (T 3951) analysed as follows:

Element:	Pb	Zn	Sn	Cr	Mn	As	Cu	Bi	Ag	Sb
(ppm)	300	500	800	80	200	>1%	8000	500	70	100

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Prior to 1970 this ground was held by the Consolidated Syndicate (New Consolidated Gold Fields Australia Proprietary Limited, Mount Lyell Mining and Railway Company Limited and Renison Limited). The area was soil sampled and tin values exceeding 300 ppm Sn were recorded. Subsequent costeaning and rock chip sampling was carried out and the results, though of uneconomic grade, apparently substantiated the high soil values.

This whole zone is outlined by the GAP low order Input anomaly, but it does appear that the tin values decrease northwards into the ground held by Comstaff. It has been defined by linear magnetic anomalies and characteristic induced polarisation responses of very high resistivities with high chargeabilities. The presence of tin within the zone is confirmed by the tin concentrated in the heavy mineral fraction of the Tin Creek sediments.

The source of the metasomatic alteration, hornfelsing and sulphide mineralisation may be a granite porphyry body intruded at depth into the sedimentary sequence, and related to the Devonian Pine Hill adamellite. Shear zones and fault planes could have acted as channel ways for hydrothermal fluids which subsequently replaced detrital minerals in the more permeable beds or crystallised on joints and fractures.

The tin values in the rocks exposed in Costean 1200N are low, which would suggest that the mineralising source lies to the south, probably within the ground now held by C.S.R. Ltd. Tin appears to be disseminated in the sedimentary rocks associated with introduced sulphides and metasomatic alteration of the more arenaceous intercalations. There could be open type structures or sufficiently thick permeable reactive sedimentary/volcanic units in which replacement tupe ore bodies could occur.

8.3. The Bassett-Federal structure cannot be traced south-eastwards into Comstaff's ground. It is either truncated by, or feathers out against, the fault controlled Serpentinite Complex. The Complex may have acted as a conduit for granitic hydrothermal solutions, while the reaction between granitic magma and the ultramafite could have caused the precipitation of tin and copper. Physiochemically reactive rock types in the vicinity of such a conduit could

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contain replacement type mineralisation. In the Grid 4 area the carbonate bodies, resulting from serpentinisation processes, are such a rock type. Also in this area, hydrothermal alteration of serpentinite has occurred. Coincident self potential, electromagnetic and induced polarisation anomalies suggest the presence of some form of mineralisation within the Serpentinite Complex. It is thought likely to result from the introduction of stanniferous-sulphide solutions into suitably prepared host rocks.

Faults associated with the injection of the Serpentinite Complex may have formed open structures where mineralisation could occur. The en echelon pattern of induced polarisation anomalies over the Serpentinite Complex in the GAK, Grid 4, area may reflect mineralisation in tension faults developed within the Complex. Tension faults within such a structure would be expected to be of limited strike length.

8.4. The black shale dominated sequence of the Dundas Group, in the south-east sector of GAP, could be a possible environment for volcano-sedimentary type ore deposits. The pyritic black shales with turbidites and volcanic units, interlayered with units of conglomerate arkose, were probably deposited in impermanent basins where syngenetic sulphides may have accumulated. As far as is understood, the rocks of the Dundas Group have not been prospected very actively for stratabound base metal deposits. Occurrences of sulphide mineralisation are common in the region and many have been mined, but all are regarded as being in vein or filling fissures. Yet such a rock sequence, particularly one containing acid pyroclastics (evidence of contemporaneous volcanism), would appear to be prospective.

The host rocks of the Bonnie Dundee (Ag, Cu) and Fahlore (Ag, Cu, Pb, Sb) mineralisation are black shales, phyllites, siltstones and lithic quartz arenites folded in a southerly plunging synclinorium. The rock sequence may be traced northwards into Comstaff's property, where it is marked by well defined and coincident Crone EM and self potential anomalies within a zone of anomalous induced polarisation response. These fissure vein type deposits could well be in fact remobilised

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syngenetic sulphides within Devonian structures.

9. RECOMMENDATIONS

Further work is recommended, particularly in the form of additional geophysical prospecting, to define possible mineralisation.

9.1. The programme of geophysical follow up, as outlined by D.B. Trussell, should be adopted. This proposed programme is based on 11 individual induced polarisation anomalies. Where glacial cover has not been recorded, field visits should be made to anomalous areas and the bedrock source examined.

9.2. The length and strike direction of the GAK Input and Crone EM anomaly on line 3000N should be established. The follow up work as outlined by Trussell should be carried out, and in addition, both pulse EM and self potential measurements taken on north-south lines 3800E, 3900E and 4000E, from 2800N to 3200N. It is quite possible that the strike of this EM anomaly is west-north-west to east-south-east and not north-north-east to south-south-west as previously thought, and may reflect sulphide mineralisation on the fault which displaces the Serpentinite Complex and downthrows the succession to the south.

9.3. Input anomaly GAL, which corresponds to induced polarisation anomaly V, lies under glacial overburden. The geophysical follow up work as outlined by Trussell should be done, and in addition, pulse EM and self potential can be done along the Ring River access track at approximately 2300N.

9.4. The linear zone of soil anomalies in tin which may be traced through the north-east sector of the gridded area into Grid 5 should be examined. Cassiterite-tourmaline mineralisation in sulphides occurs within this anomaly along strike to the north. It is recommended that self potential and pulse EM traverses be carried out over the X Proprietary Mine on Grid 5 and the geophysical patterns noted. Similar traverses can then be made over the tin anomalies on the GAP grid lines.

9.5. A costean is proposed on line 1200N, between 5600E and 5800E, to determine if the mineralisation exposed at Bonnie Dundee and Fahlore continues

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northwards to cause the observed geophysical anomalies. In addition, the access track into this area would give a valuable cross section through the geological sequence.

9.6. A bulldozed cut is warranted through Fenton's Grid to determine the nature and extent of the mineralisation seen in the old trenches, and to examine the bedrock source of the soil anomalies.

G.F. Pigott

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10. REFERENCES

1. Pigott, G.F. 1970 EL 5/63, The Renison Bell East Area: 1970 Winter Field Season Report. Comstaff Pty. Ltd.

2. Cammell, G. 1974 EL 5/63, Renison East Block: Interim Report 1973/74 Summer Field Season. Comstaff Pty. Ltd.

3. Blissett, A.H. 1962 Zeehan Explan. Rep. Geol. Surv. Tas. 1 mile Geol. Map Ser. K/55-5-50.

4. Patterson, D.J. 1976 The Renison Tin Deposit. In 25th Int. Geol. Cong. Excursion Guide, No. 31 AC.

5. Central Mineralogical Services 1970-1978 Various Petrological Reports.

6. Rubenach, M.J. 1974 The Origin and Emplacement of the Serpentine Hill Complex, Western Tasmania. J. Geol. Soc. Aust. 21, 91-106.

11. LIST OF PLANS AND SECTIONS

11.1 List of Plans and Sections included in text

Vol. 2

Location of Comstaff Leases in Tasmania	1:2 500 000	TAS-2-1586
Comstaff Project Maps Proposed Programme 1978	1:2 500 000	TAS-2-1408
Renison Grid-Gap Geological Interpretation	1:5 000	TAS-2-1618
Renison Grid-Gap Geological Interpretation	1:5 000	TAS-2-1619
Renison Grid-Gap Grid 4 Area-Geology	1:1 000	TAS-2-1564

11.2 Included in Volumes 3, 4, 5 and 6.

Vol. 3	370370 - Geology	1:10 000	TAS-2-1422
	370365 - Geology	1:10 000	TAS-2-1421
	Gap 1000N Loop Costean Geology and Geochemistry	1:500	TAS-2-1559
	Gap 1000N Costean Geochemistry of Soil Horizons	1:500	TAS-2-1563
	Gap 1000N Costean Geology and Geochemistry	1:500	TAS-2-1558
	Gap 1200N Costean Geology and Geochemistry	1:500	TAS-2-1560
	Geochemistry and Geology Gap - Costean 3A and 3B	1:500	TAS-2-1562
	Geochemistry and Geology Gap - Costean 36	1:500	TAS-2-1561
	Renison Grid - Gap Sheet 370365-A Grid Geochemical Sampling A^{o} Copper Results in ppm	1:5 000	TAS-2-1498
	Renison Grid - Gap Sheet 370365-B Grid Geochemical Sampling A^{o} Copper Results in ppm	1:5 000	TAS-2-1499
	Renison Grid - Gap Sheet 370370-C Grid Geochemical Sampling A^{o} Copper Results in ppm	1:5 000	TAS-2-1500
	Renison Grid - Gap Sheet 370370-D Grid Geochemical Sampling A^{o} Copper Results in ppm	1:5 000	TAS-2-1501
	Renison Grid - Gap Sheet 370365-A Grid Geochemical Sampling A^{o} Lead Results in ppm	1:5 000	TAS-2-1502

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Renison Grid - Gap Sheet 370365-B Grid Geochemical Sampling A° Lead Results in ppm	1:5 000	TAS-2-1503
Renison Grid-Gap Sheet 370370-C Grid Geochemical Sampling A° Lead Results in ppm	1:5 000	TAS-2-1504
Renison Grid-Gap Sheet 370370-D Grid Geochemical Sampling A° Lead Results in ppm	1:5 000	TAS-2-1505
Renison Grid-Gap Sheet 370365-A Grid Geochemical Sampling A° Zinc Results in ppm	1:5 000	TAS-2-1506
Renison Grid-Gap Sheet 370365-B Grid Geochemical Sampling A° Zinc Results in ppm	1:5 000	TAS-2-1507
Renison Grid-Gap Sheet 370370-C Grid Geochemical Sampling A° Zinc Results in ppm	1:5 000	TAS-2-1508
Renison Grid-Gap Sheet 370370-D Grid Geochemical Sampling A° Zinc Results in ppm	1:5 000	TAS-2-1509
Renison Grid- Gap Sheet 370365-A Grid Geochemical Sampling A° Tin Results in ppm	1:5 000	TAS-2-1510
Renison Grid-Gap Sheet 370365-B Grid Geochemical Sampling A° Tin Results in ppm	1:5 000	TAS-2-1511
Vol. 4 Renison Grid-Gap Sheet 370370-C Grid Geochemical Sampling A° Tin Results in ppm	1:5 000	TAS-2-1512
Renison Grid-Gap Sheet 370370-D Grid Geochemical Sampling	1:5 000	TAS-2-1513

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Renison Grid-Gap Sheet 370365-A Grid Geochemical Sampling A° Nickel Results in ppm	1:5 000	TAS-2-1514
Renison Grid-Gap Sheet 370365-B Grid Geochemical Sampling A° Nickel Results in ppm	1:5 000	TAS-2-1515
Renison Grid-Gap Sheet 370370-C Grid Geochemical Sampling A° Nickel Results in ppm	1:5 000	TAS-2-1516
Renison Grid-Gap Sheet 370370-D Grid Geochemical Sampling A° Nickel Results in ppm	1:5 000	TAS-2-1517
Renison Grid-Gap Tin Content in Heavy Mineral Concentrates	1:5 000	TAS-2-1664
Renison Grid-Gap Tin Content in Heavy Mineral Concentrates	1:5 000	TAS-2-1665
Grid Gap Line 1000	1:5 000	TAS-2-1620
Grid Gap Line 1200	1:5 000	TAS-2-1621
Grid Gap Line 1400	1:5 000	TAS-2-1622
Grid Gap Line 1600	1:5 000	TAS-2-1623
Grid Gap Line 1800	1:5 000	TAS-2-1624
Grid Gap Line 2000	1:5 000	TAS-2-1625
Grid Gap Line 2200	1:5 000	TAS-2-1626
Grid Gap Line 2400	1:5 000	TAS-2-1627
Grid Gap Line 2600	1:5 000	TAS-2-1628
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Grid Gap Line 3600		TAS-2-1633
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Renison Grid-Gap Line 1000N Geophysical Section	1:5 000	TAS-2-1538
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Renison Grid-Gap Line 3600N Geophysical Section	1:5 000	TAS-2-1551
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Renison Grid-Gap Sheet 370365-A2 Detail Geological Field Plan	1:2 500	TAS-2-1486
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Renison Grid-Gap Sheet 370370-C4 Detailed Geological Field Plan	1:2 500	TAS-2-1495

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Renison Grid-Gap Sheet 370370-D2 Detailed Geological Field Plan	1:2 500	TAS-2-1496
Renison Grid-Gap Sheet 370370-D3 Detailed Geological Field Plan	1:2 500	TAS-2-1497
Renison Grid-Gap Sheet 370365-A Geophysical Plan Magnetic Values (in nanotesla's)	1:5 000	TAS-2-1518
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Renison Grid-Gap Sheet 370370-C Geophysical Plan Magnetic Values (in nanotesla's)	1:5 000	TAS-2-1520
Renison Grid-Gap Sheet 370370-D Geophysical Plan Magnetic Values (in nanotesla's)	1:5 000	TAS-2-1521
Renison Grid-Gap Sheet 370365-A Geophysical Plan Chargeability N=2	1:5 000	TAS-2-1522
Renison Grid-Gap Sheet 370365-B Geophysical Plan Chargeability N=2	1:5 000	TAS-2-1523
Renison Grid-Gap Sheet 370370-C Geophysical Plan Chargeability N=2	1:5 000	TAS-2-1524
Renison Grid-Gap Sheet 370370-D Geophysical Data Chargeability N=2	1:5 000	TAS-2-1525
Renison Grid-Gap Sheet 370365-A Geophysical Data Chargeability N=4	1:5 000	TAS-2-1526

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Renison Grid-Gap Sheet 370365-B Geophysical Data Chargeability N=4	1:5 000	TAS-2-1527
Renison Grid-Gap Sheet 370370-C Geophysical Plan Chargeability N=4	1:5 000	TAS-2-1528
Renison Grid-Gap Sheet 370370-D Geophysical Plan Chargeability N=4	1:5 000	TAS-2-1529
Renison Grid-Gap Sheet 370365-A Geophysical Plan Resistivity N=2	1:5 000	TAS-2-1530
Renison Grid-Gap Sheet 370365-B Geophysical Plan Resistivity N=2	1:5 000	TAS-2-1531
Renison Grid-Gap Sheet 370370-C Geophysical Plan Resistivity N=2	1:5 000	TAS-2-1532
Renison Grid-Gap Sheet 370370-D Geophysical Plan Resistivity N=2	1:5 000	TAS-2-1533
Renison Grid-Gap Sheet 370365-A Geophysical Plan Resistivity N=4	1:5 000	TAS-2-1534
Renison Grid-Gap Sheet 370365-B Geophysical Data Resistivity N=4	1:5 000	TAS-2-1535
Renison Grid-Gap Sheet 370370-C Geophysical Plan Resistivity N=4	1:5 000	TAS-2-1536
Renison Grid-Gap Sheet 370370-D Geophysical Plan	1:5 000	TAS-2-1537

APPENDIX I

Residual Soils (A) No. of Samples: 1416

Element	Range of Values	Mean (m)	Standard Deviation (σ)	m + 2 σ	Critical Points
Cu	0 - 440	26.41	27.27	81	80, 130, 180
Pb	9 - 1300	59.09	78.56	216	105, 350, 435
Zn	4 - 2800	109.46	172.20	545	105, 275
Ni	0 - 5000	107.83	387.79	883	78, 333, 2000
Sn	0 - 1600	18.03	50.91	120	13, 45, 98, 150
i) Hg	0 - 250	40.82	51.63	144	None
ii) Mn	10 - >1%	N/A	N/A	N/A	53, 120, 500, 1480

Note: (i) Statistics for Hg samples are based on 158 samples.
(ii) Statistics for Mn samples are based on 272 samples, m and σ not applicable as values >1% were not taken into account.

The contour levels were selected by inspection with the assistance of the cumulative frequency plots.

Cu	35	80	130
Pb	105	220	430
Zn	105	270	450
Ni	80	330	2000
Sn	45	90	120
Mn	500	1000	2000

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Transported Soils (B) No. of Samples 733

Element	Range of Values	Mean (m)	Standard Deviation (σ)	m + 2 σ	Critical Points
Cu	0 - 800	15.62	38.02	92	13, 35, 334
Pb	6 - 1000	49.96	89.60	229	18, 143, 540
Zn	1.45 - 3100	90.06	177.52	445	23, 720
Ni	0 - 835	17.95	45.87	110	39, 150
Sn	0 - 380	24.83	26.07	77	5, 14, 184
i) Hg	0 - 380	44.41	66.83	178	None
ii) Mn	4 - 505	62.89	77.30	217	22, 98

Note: (i) Statistics for Hg samples are based on 127 samples
(ii) Statistics for Mn samples are based on 171 samples

The contour levels were selected by inspection with the assistance of the cumulative frequency plots.

Cu	35	70	100
Pb	140	230	500
Zn	120	445	720
Ni	40	100	150
Sn	35	70	105
Mn	100	200	500

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Lines 1000N - 3000N Analysed by Geomin No. of Samples: 1475

Element	Range of Values	Mean (m)	Standard Deviation (σ)	m + 2σ	Critical Points
Cu	0 - 800	26.63	37.97	103	67, 132, 330
Pb	6 - 1300	63.03	95.95	255	125, 430, 850
Zn	1.45 - 31	92.56	186.60	466	21, 140, 420, 1180
Ni	0 - 5000	102.19	376.66	856	64, 140, 500, 1350
Sn	0 - 1600	15.54	49.73	115	42, 84, 135, 260

Lines 3200N - 4000N Analysed by Analabs No. of Samples: 728

Cu	2 - 92	15.59	10.91	37	None
Pb	6 - 445	40.36	34.27	109	26, 90
Zn	6 - 1500	119.37	137.76	395	165
Ni	3 - 1800	22.68	92.34	207	23, 50, 130, 490
Sn	0 - 380	28.80	25.67	80	13.5, 64
(i)Hg	0 - 380	42.42	58.80	160	40, 85, 350, 2000
(ii)Mn	4 - >1%	N/A	N/A	N/A	80

Note: (i) Statistics for Hg samples are based on 285 samples
(ii) Statistics for Mn samples are based on 443 samples, m and σ are not applicable as values >1% were not taken into account.

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APPENDIX II

Sample	Description	Location	Pb	Zn	Sn	Cr	Mn	As	Hg	Cu	Co	Ni	Bi	Ag	Sb	Au	W	SiO_2	Fe_2O_3	MgO
T3944	Dk brown gossan + qtz vn breccia	GAP 4000N/5540E	50	300	x	80	800	50	0.04	30	10	80	x	x	30					
T3945	Goethite gossan	Rd 2400N	30	500	x	>1%	300	x	0.10	30	100	300	x	x	x					
T3946	Ferruginous weath. vein qtz	GAP 3000N/5883E	20	250	x	700	1500	x	0.10	700	70	300	x	x	x					
T3947	Py gossan, c. crystalline vein qtz, altered complex sulphide	GAP 2200N/5880E	500	1000	x	300	100	100	1.28	250	80	250	x	0.7	x					
T3949	Pale sulphides 2° in c. crystalline quartz - ferruginous	Grid 4 ext road	1000	500	100	150	300	8000	0.10	1000	30	100	3	0.3	x					
T3950	Black Mn wad basic, uralitised rock, mainly of goethite and quartz	GAP Grid 4 Ext	500	2000	250	100	>1%	100	0.08	80	150	100	x	0.7	x					
T3951	Quartz vein + goethite in brec tuffaceous sediment	Grab sample from Longreach Cost.	300	500	800	80	200	>1%	0.45	8000	10	80	500	70.0	100					
T3955	Ferug/Mn/Qtz gossan vugs of 2nd qtz-tourmaline, alt conglom	Grid 4 ext road	60 200	270 700	700	200	>1%	50		50		150	x	0.5	x	x				
T3956	Ferrug Mn + qtz gossan	Grid 4 ext road	220 300	200 700	10	150	>1%	x		80		150	x	0.8	x	x				
T3957	Ferrug Mn + qtz gossan	Grid 4 ext road	290 800	320 800	200	150	>1%	x		100		80	x	0.3	x	x				
T3980	Basic volc, chert, quartzite breccia in tremolite matrix	GAP Cos 1000N 101.4m			10			14					14							
T3981	Disseminated py + chl in chl siltstone	Grid 4 road 55m	-	-	10			18		84		-								
T3982	Qtz veined siliceous foliated serpentinite breccia + Py Po	PMG/E 1355m	-	-	x			7		8		1550								
T3985	Mn basic conglomerate	GAP road 2440m			x		1.55%													
T3943	Dump, dolomite with galena	Grid 4 4900N/600S	1000	200	30	400	>1%	2000		20	70	500	1	1.5	70					
T3948	Qtz vn in alt gabbro/granophyre	Cos 1 9m, G 4	200	x	10	100	200	100	0.08	200	15	20	x	0.1	x					

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Sample	Description	Location	Pb	Zn	Sn	Cr	Mn	As	Hg	Cu	Co	Ni	Bi	Ag	Sb	Au	W	SiO_2	Fe_2O_3	MgO
T3952	Quartz vein	C Ch 860m	640 1500	210 -	30			800		80			20	5.0						
T3953	Chloritised conglomerate	CB road 348m	35	120									x			0.05				
T3954	Dump, alt gabbro/granophyre	C 17 Grid 4	140 200	740 2000	30	200	7000	50		80		100	x	0.5	x	x				
T3958	Goethite in sheared serp um	Sm T road 450m	470 2000	1200 5000	70	700	>1%	2000		300		800	3	7.0	x	x				
T3959	Goethite in sheared serp um	C 15	600 1000	760 2000	10	2000	8000	800		70		800	x	0.8	x	x				
T3960	Goethite + wad in vein, sheared um	Cos 3 8m	1800 2000	2800 5000	10	800	>1%	700		100		800	x	5.0	x	x				
T3961	Ferruginous + manganiferous altered ultramafic	Cos 2 16m	100 300	940 2000	80	1000	>1%	2000		30		1500	1	1.0	x	x				
T3962	Mn + Fe vein - alt carbonate	Cos 4 6-6.3m	270 1000	1550 3000	100	1000	>1%	500		30		1500	1	0.8	x	x				
T3963	Mn + Fe vein - alt carbonate	Cos 4 7.8-8.0m	25 30	190 500	200	800	8000	100		50		1500	1	0.2	x	x				
T3964	Mn + Fe vein - alt carbonate	Cos 4 9-9.3m	1500 2000	2400 3000	30	1000	>1%	1000		70		2000	50	20.0	x	x				
T3965	Mn + Fe vein - alt carbonate	Cos 4 15.3-16.1	120 300	1300 2000	10	3000	>1%	1000		80		1000		1.0	x	x				
T3966	Mn + Fe vein - alt carbonate	Cos 4 20.4-21.2	80 150	510 800	80	1000	1%	100		30		800		0.8	x	x				
T3967	Sheared magnesite + talc from altered ultramafic	Cos 4 0-3m	120 100	370	7			50		50				x	x					
T3968	Sheared magnesite + talc from altered ultramafic	Cos 4 3-6m	48 100	520	10			500		30				0.8	x					
T3969	Sheared magnesite + talc from altered ultramafic	Cos 4 6.3-7.8m	10 3	400	30			x		10				x	x					
T3970	Sheared magnesite + talc from altered ultramafic	Cos 4 8-9m	22 70	250	80			500		30				0.3	1					
T3971	Sheared magnesite + talc from altered ultramafic	Cos 4 9.3-12.3m	20 30	560	30			800		50				1.0	x					
T3972	Sheared magnesite + talc from altered ultramafic	Cos 4 12.3-13.3	35 70	570	30			200		30				0.8	x					

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Sample	Description	Location	Pb	Zn	Sn	Cr	Mn	As	Hg	Cu	Co	Ni	Bi	Ag	Sb	Au	W	SiO_2	Fe_2O_3	MgO
T3973	Sheared magnesite + talc from altered ultramafic	Cos 4 13.3-14.3m	10 30	360	3			700		30				0.3	x					
T3974	Sheared magnesite + talc from altered ultramafic	Cos 4 14.3-15.3m	940 2000	3150	5			2000		100				7.0	x					
T3975	Sheared magnesite + talc from altered ultramafic	Cos 4 16.1-17.1m	95 200	670	5			500		10				0.3	x					
T3976	Sheared and altered serp	Cos 4 17.1-18.1m	540 500	2000	30		(Mn0)	500		10			x	1.0						
T3977	Sheared and altered serp	Cos 4 18.1-20.1m	30 20	690	x			100					x	x						
T3978	Sheared and altered serp	Cos 4 21.2-22.5m	440 700	550	80			700		100			x	0.5						
T3979	Sheared and altered serp	Cos 4 22.5-23.5m	320 500	800	30			500		70			x	0.5						
T6688	Sheared and altered serp	Cos 17	122	940	45	2700	2.8% (2%)	20	0.15	112										
T6689	Sheared and altered serp	Cos 16	23	800	20	1.05%	1.4%	164	0.04	17								52%	11%	24%
T6690	Sheared and altered serp	Cos 15	930	3800	50	3600	6.0% (22%)	3085	0.16	46										
T6691	Sheared and altered serp	Pit 6	850	4600	100	7500	9.0%	1966	0.02	60								12%	42%	3%
T6692	Sheared and altered serp	Pit 7	45	100	190	2300	4.4% (11%)	432	x	13										
T6693	Sheared and altered serp	Cos 11	85	360	130	7400	7.6% (0.7%)	970	0.01	34								5%	35%	15%
T6694	Sheared and altered serp	Cos 13 0	32	72	15	3400	4800	32	x	5								33%	8%	34%
T6695	Sheared and altered serp	Cos 13	52	185	90	2450	4.2%	191	x	18										
T6696	Sheared and altered serp	Pit 8	1060	2200	70	2500	10.0%	1030	0.04	34								3%	42%	6%
T6697	Sheared and altered serp	Cos 12	580	3600	75	2000	5.8%	4324	0.15	38										
T3931	Altered clastic basic complex	GAP road			570															
GAP4/1	Dolomite vein	Cr Ck 725m	2000	85	100		>1%	>1000		35										

AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROPRIETARY LIMITED

THE RENISON BELL TIN DEPOSIT, TASMANIA

1. INTRODUCTION

On 11th July 1977 I had the opportunity of visiting the Renison Bell Tin Mine in Western Tasmania. The visit was arranged by Preussag Australia Pty. Ltd. as part of a familiarisation tour for Dr. K. Rellensmann accompanied by J. Hill and G. Krummei.

2. GENERAL

The Renison Bell Tin Mine is the most successful mine operating in Tasmania, and is a substantial profit earner for the controlling company, Consolidated Gold Fields Australia Limited. Total production up to June 1975 is 28 000 tonnes Sn, and the annual production is 4 000 tonnes Sn. By mid 1978 it will have produced more tin than Mt. Bischoff.

Published ore reserves at June 1974 stood at 9.3 million tonnes (1.36% Sn) proven ore, and 7.6 million tonnes (1.27% Sn) possible ore.

3. GEOLOGY

The geology of the Renison area consists of a folded and faulted series of sediments which have been intruded at depth by a granitic body. The sequence in the mine area is as follows:

	Dreadnought Hill Member	800m+	Hanging Wall
Crimson Creek Formation (Cambrian)	No. 1 Carbonate	5-15m	
	Red Rock Member	20-50m	
	No. 2 Carbonate	15m	
Success Creek Group (Precambrian)	Renison Bell Member	60m	
	No. 3 Carbonate	15m	
	Dalcoath Member	800m+	Footwall

3.1. Dalcoath Member

The footwall beds, called the Dalcoath Member on the Mine, are more generally known as the Oonah Quartzite. They consist of thickly bedded quartz

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sandstones and micaceous quartzites with minor siltstones and shale. The sandstones are recrystallised, almost cherty, within the one metre zone underlying the No. 3 Carbonate.

3.2. No 3 Carbonate

The No. 3 Carbonate is the main ore bearing horizon at Renison. Away from the mineralised areas it is comprised of fine grained grey dolomite with minor quartz, talc and tremolite. Where mineralised, it consists of 50-70% sulphides with disseminated quartz cassiterite and rare fluorite. The main sulphide is magnetic pyrrhotite with traces of chalcopyrite, sphalerite, galena and stannite. Patches rich in pyrite and arsenopyrite also occur. The tin occurs mainly as cassiterite with an average grain size of 70 microns - thus it is invisible to the naked eye, yet the average grade of this ore-body is 1.8% Sn. Under the lens the cassiterite is seen to be yellow in colour and columnar in crystal form.

At the margin of the pyrrhotite ore there is a narrow zone of manganese siderite with disseminated pyrrhotite and coarse grained recrystallised dolomite. Coarse grained magnetite dykes also occur, but are rare. The contact zones with the footwall, hanging wall and unmineralised dolomite are sharp and distinctive. The pyrrhotite ore may take up the full width of the carbonate bed, and there is not any noticeable decrease in width nor drop in grade away from the Bassett-Federal Fault.

3.3. Renison Bell Member

The Renison Bell Member is very similar to the Dalcoath Member but contains a greater proportion of shales. This rock unit hosts the "Two Point Five" orebody (so called because it lies between No 3 and No 2 Carbonates). The mineralisation consists of veinlets and disseminations of cassit-erite, arsenopyrite and pyrrhotite with quartz and tourmaline, in brecciated quartzite. The grade of this orebody is 1.3% Sn. It is limited to a zone adjacent to the Bassett- Federal Fault.

3.4. No. 2 Carbonate

The No. 2 Carbonate is similar in all respects to

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the No. 3 Carbonate. Pillars of high grade ore in stoped out sections of this orebody were examined. Extensive secondary development of marcasite was noticed along fracture planes within the unmineralised footwall and hanging wall dolomites.

3.5. Red Rock Member

The Red Rock Member comprises haematitic chert, chert conglomerate, silicified carbonate rocks and andesitic tuffs. It marks the start of the volcanic activity at the base of the Crimson Creek Formation. This member is a distinctive marker horizon, not only on account of its appearance and composition, but also because it is highly magnetic. It was demonstrated underground that it is even more magnetic than the massive pyrrhotite ore.

3.6. No. 1 Carbonate

The No. 1 Carbonate is similar in most respects to the No.2 and No. 3 Carbonates except that it is more limited in extent and is generally thinner. Most of it has been mined out and it was not visited on this excursion.

3.7. Dreadnought Hill Member

Rocks of the Dreadnought Hill Member were not seen at the Mine. However, they appear to be typical Crimson Creek Formation type rocks which have been mapped on Comstaff's Exploration Licence to the east of the Bassett-Federal Fault. They consist of basic to intermediate volcanoclastic greywackes and tuffs with interbedded grey mudstones. Of particular interest is the fact that greywackes and tuffs of the Dreadnought Hill Member adjacent to the Bassett-Federal Fault show extensive replacement. Mineralisation in the form of quartz-pyrrhotite-chalcopyrite-cassiterite is common and reaches ore grade in places. Apparently such ore is only mined if it is adjacent to mine development within the Bassett-Federal Lode.

3.8. Structure

The sedimentary sequence is exposed in a north-west trending anticline with a horizontal plunge, and has been uplifted between north-west - south-east trending normal faults. The major (eastern) boundary fault is the Bassett-Federal Fault which

has a downthrow to the east of at least 700m. Many small normal faults trending north-south and east-west dissect the sequence.

The faulting appears to predate the mineralisation, and the faults are generally mineralised with fracture fillings and vein networks of quartz-pyrrhotite-arsenopyrite-cassiterite. The mineralisation within the Bassett-Federal Fault forms an extensive orebody with an average grade of 1.0% Sn. It is this orebody which crops out on the surface and gives rise to stanniferous gossans. It has a strike length of 500m, a width of 5m and a depth extension of 1 000m.

Post mineralisation movement in the fault fractured the cassiterite crystals and broke them down to fragments with an average grain size of 5 microns. The sulphide minerals were also broken down so the ore has a fine grained massive appearance. The tin from the Bassett-Federal orebody is sometimes contaminated with native bismuth and arsenic, and is so fine that it tends to be lost with the slimes.

3.9. Igneous Intrusions

Devonian granitic greisenized rocks crop out at Pine Hill. Relatively fresh granites have been intersected in drill holes along the axis of the Renison Bell anticline.

The sedimentary rocks in the mine area have been contact metamorphosed. Alteration zones of biotite, tourmaline (or axinite) and tremolite may be traced outwards from the granite (see Figure 3). There is a development of talc, tremolite and quartz in the dolomites, phlogopite and axinite in the basic volcanics, and clinozoisite and muscovite in the shales.

3.10. Mineralisation

The various orebodies have been described above in relation to their host rocks. Mineralisation at Renison Bell is of three main types:

a) Metasomatic replacement of carbonate beds.
b) Vein and fissure fillings in fault zones.
c) Veinlet and disseminated mineralisation in recrystallised quartzite.

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Ore solutions are considered to have risen along tension faults in the Renison Bell anticline and replaced successive carbonate beds adjacent to the faults. The source of the hydrothermal solutions is considered to be the granite, the faults acting as conduits.

Dave Patterson of the University of Tasmania is writing a Ph.D. thesis on the mineralisation at Renison. His research indicates that the average filling temperatures of the ore solutions in the replacement orebodies was 350°C (at 1kb) at a pH of 4.3, while the pH of the hydrothermal solutions in the conduits has been estimated as being 3.5. He also considers that Sn is divalent in hydrothermal solutions which means that granite magma, though poor in Sn, can give replacement deposits, because all the Sn goes into the aqueous phase. He further suggests that the granitic solutions reacted with the mafic or ultramafic rocks at Renison Bell, Razorback and Cleveland giving rise to the presence of copper in the orebodies.

The dolomites appear to be ideal beds to host replacement orebodies, being porous and readily dissolved by acid solutions. It is significant that Patterson's research indicates that there was an increase in the pH of the hydrothermal solutions from the Bassett-Federal conduit (pH 3.5) to the dolomites (pH 4.3). However, carbonate rich mafic or ultramafic rocks may also host replacement orebodies adjacent to hydrothermal conduits, particularly in the absence of dolomites.

4. MINING

The flat back cut and fill stoping method is used in all orebodies. In the more flatly dipping carbonate replacement orebodies, pillars of ore are left to provide hanging wall support and to limit the roof spans. Development waste rock and concentrator tailings are used as stope fill material.

The underground operations are fully mechanised using rubber tyred diesel powered equipment. 20 tonne capacity 300hp trucks are used for carting both waste rock and ore. Entrance to the mine is by means of two adits declined at a gradient of 1 in 9.

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5. EXPLORATION

A brief discussion was held with Mike McEwen, Mine Geologist, about exploration techniques. Detailed geological mapping, costeaning and diamond drilling are the main exploration tools, together with ground magnetics and occasionally induced polarisation. Difficulty is experienced in differing between carbonate and stanniferous gossans. Both are similar in appearance - brown to red massive goethite with no primary textures. Geochemical analysis is used to differentiate between them. A number of gossan samples were examined in the collection at the geology office.

The range of metal values in the gossan is as follows:

Sn	20 - 200 ppm	Co	±30 ppm
Pb	20 - 2 000 ppm	Ag	>20 ppm
Zn	500 - 5 000 ppm	Li	5-10 ppm
Mn	5 000 - 10 000 ppm	Ba	>300 ppm
As	50 - 500 ppm	Cu	(not available)

In areas of poor outcrop geochemical and magnetic surveys are useful in tracing ore horizons. The Oonah-Crimson Creek Formation boundary is well defined geochemically in the soils, while the ore horizons can be determined by the low order, but characteristic, magnetic signatures of the haematitic cherts (see fig 4).

19th July 1977

G. Pigott

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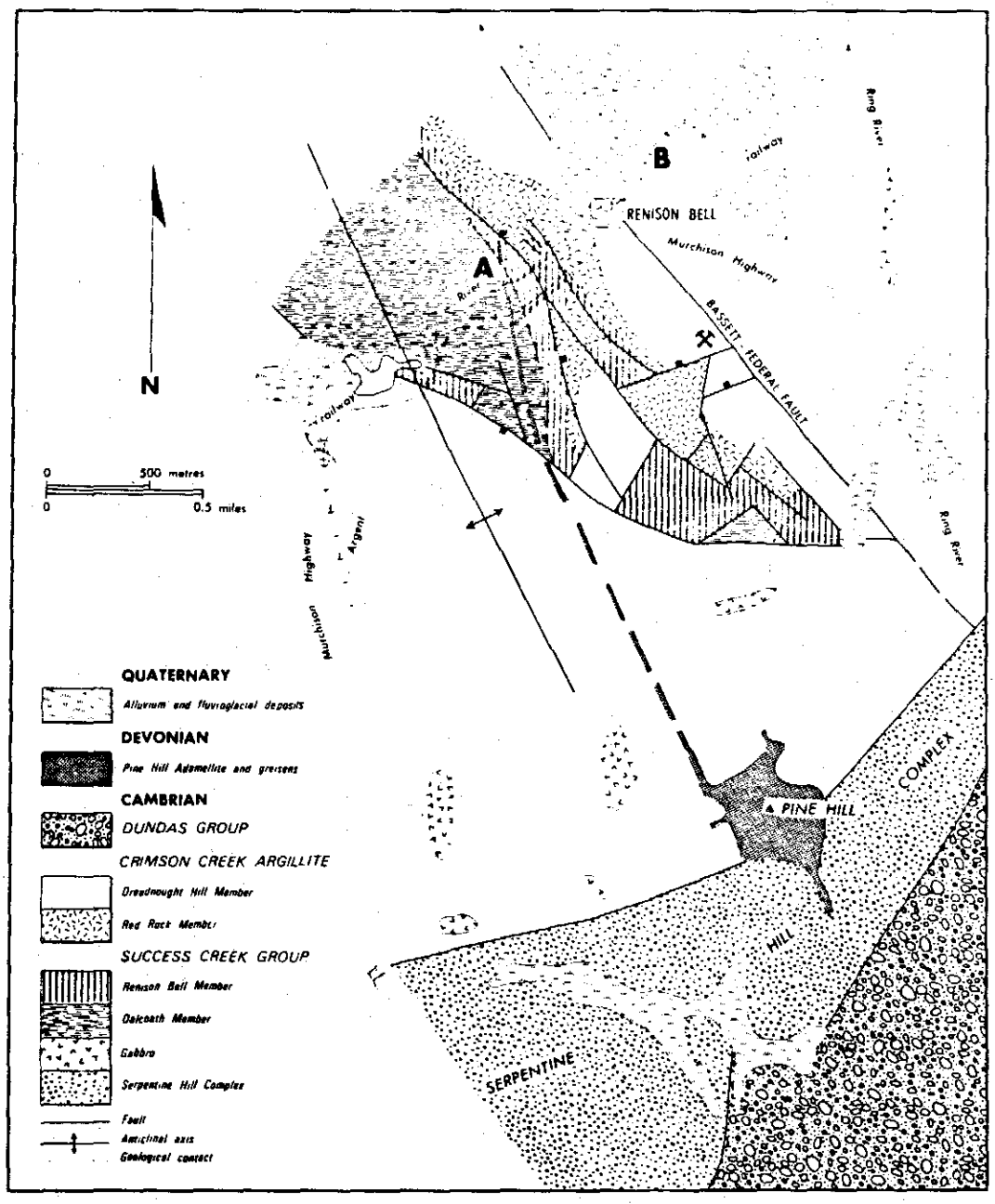

FIGURE 1 *Geological map of the Renison Bell area (from mapping by geologists of Renison Ltd).*

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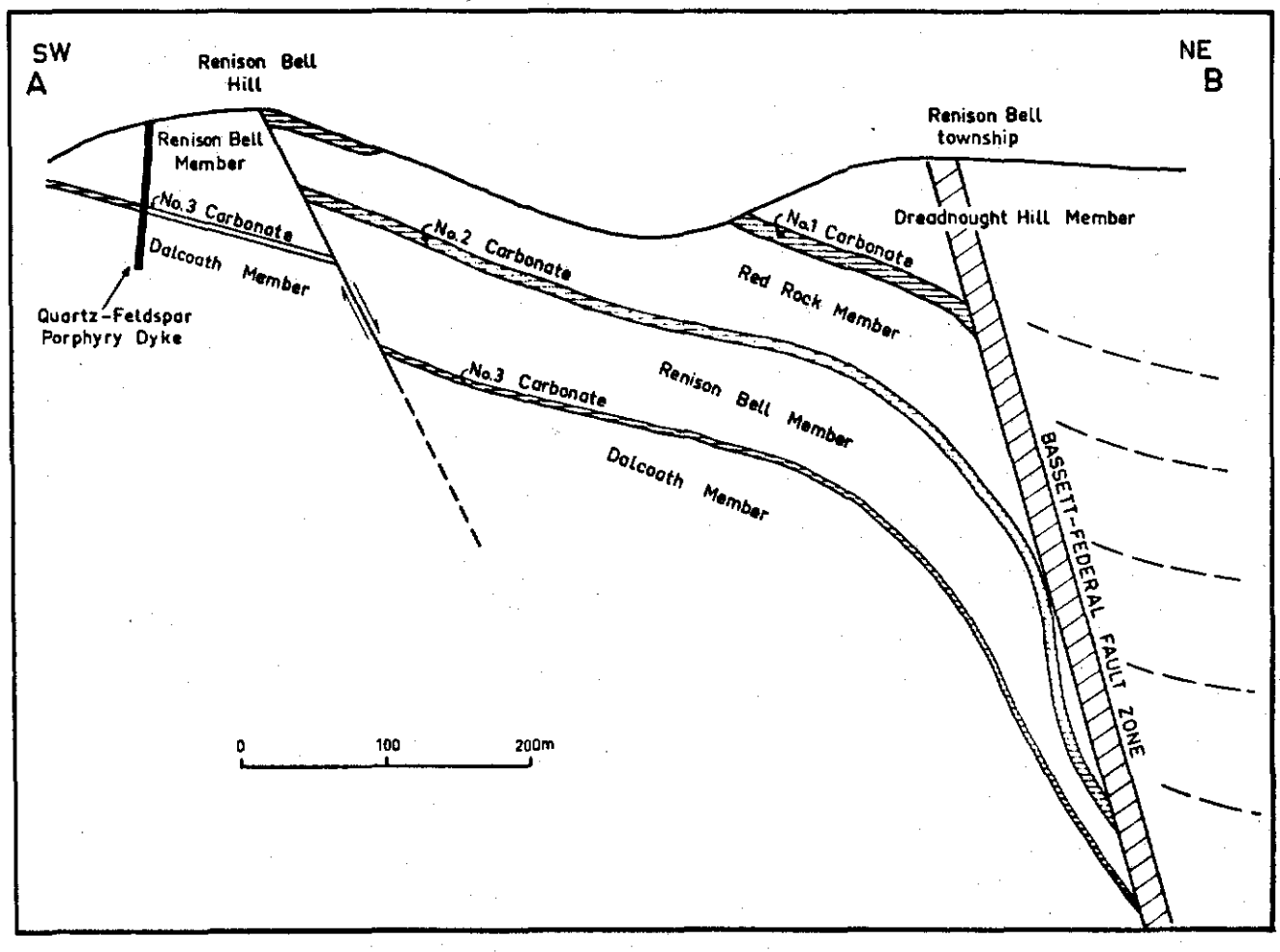

FIGURE 2. Northeast-southwest section, looking northwest, of the Renison mine area (location on Fig. 19).

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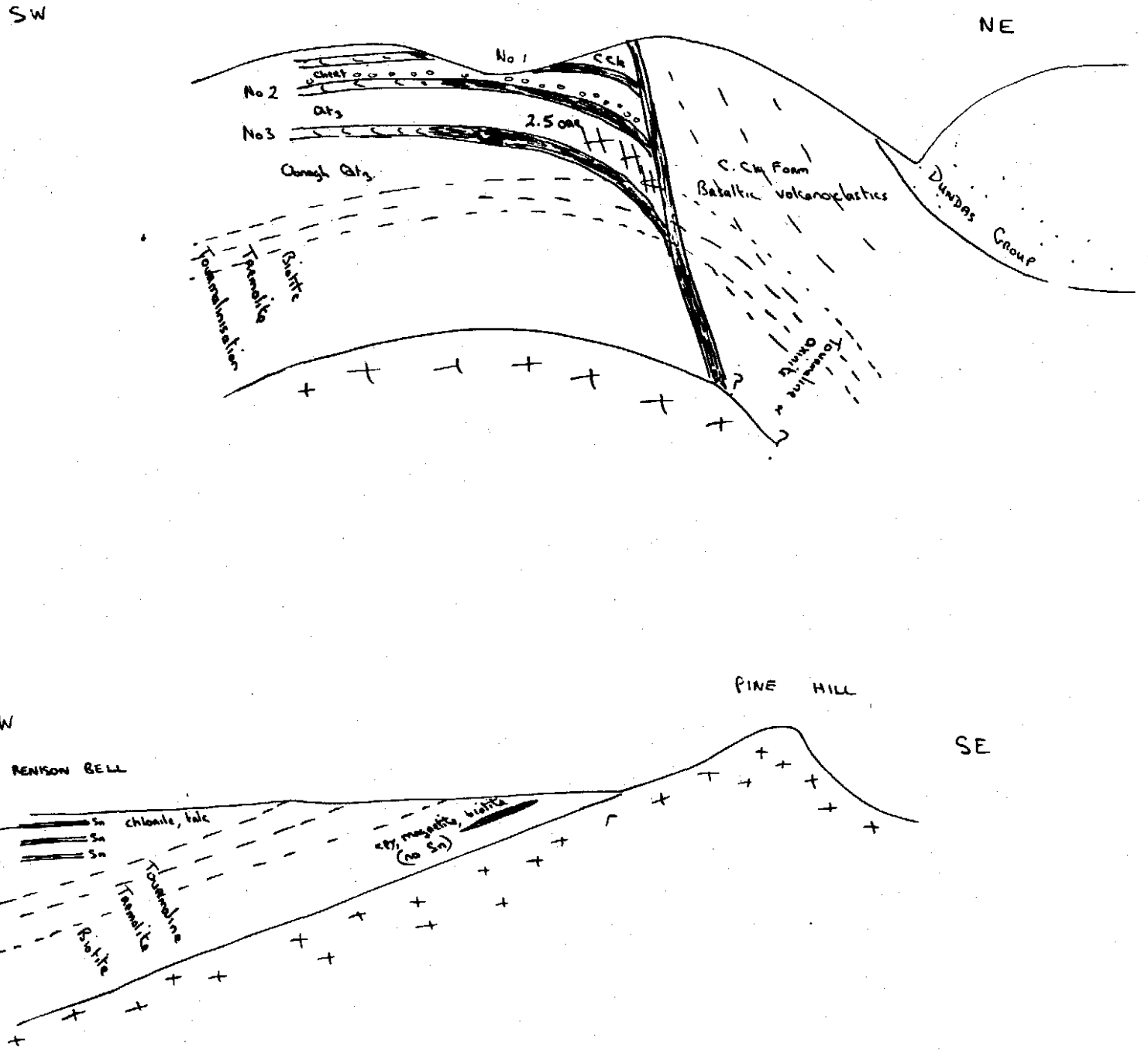

FIGURE 3 GENERALISED SECTIONS OF RENISON AREA.

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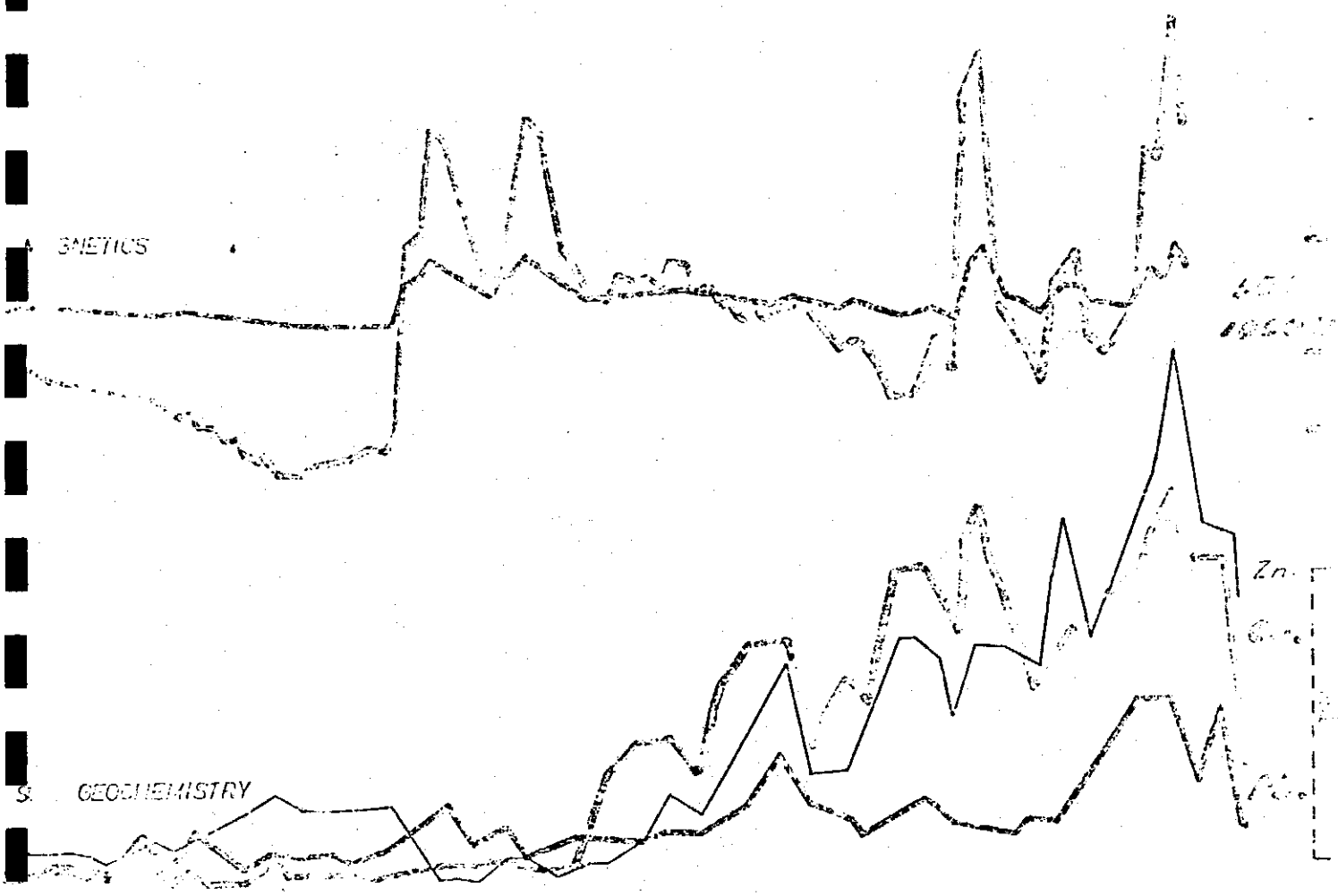

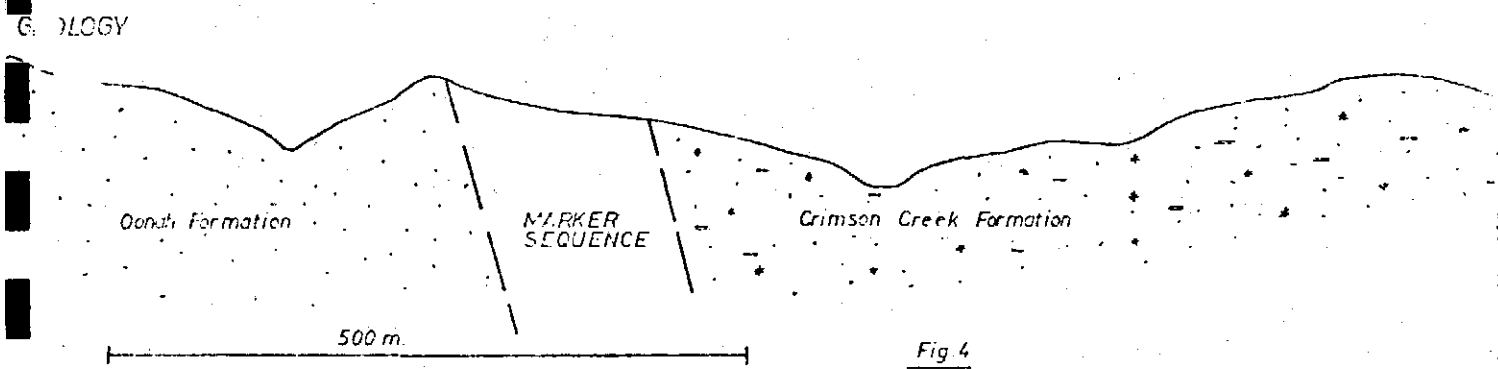

Fig 4

GEOPHYSICAL AND GEOCHEMICAL CHARACTERS

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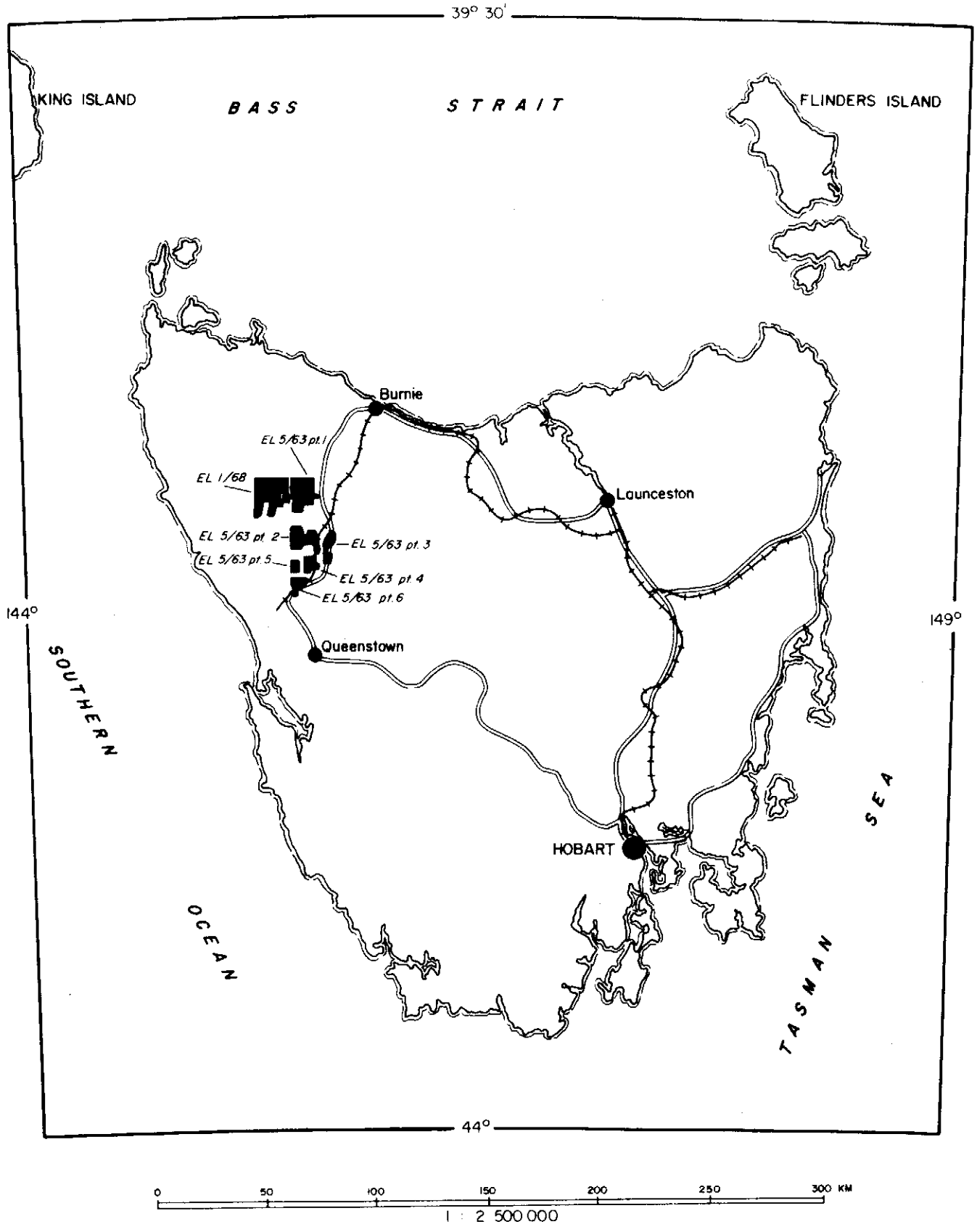

Major roads
Major railways
Burnie Major towns
Comstaff lease areas

5 cm

COMSTAFF PROPRIETARY LIMITED

LOCATION OF COMSTAFF LEASES IN TASMANIA

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

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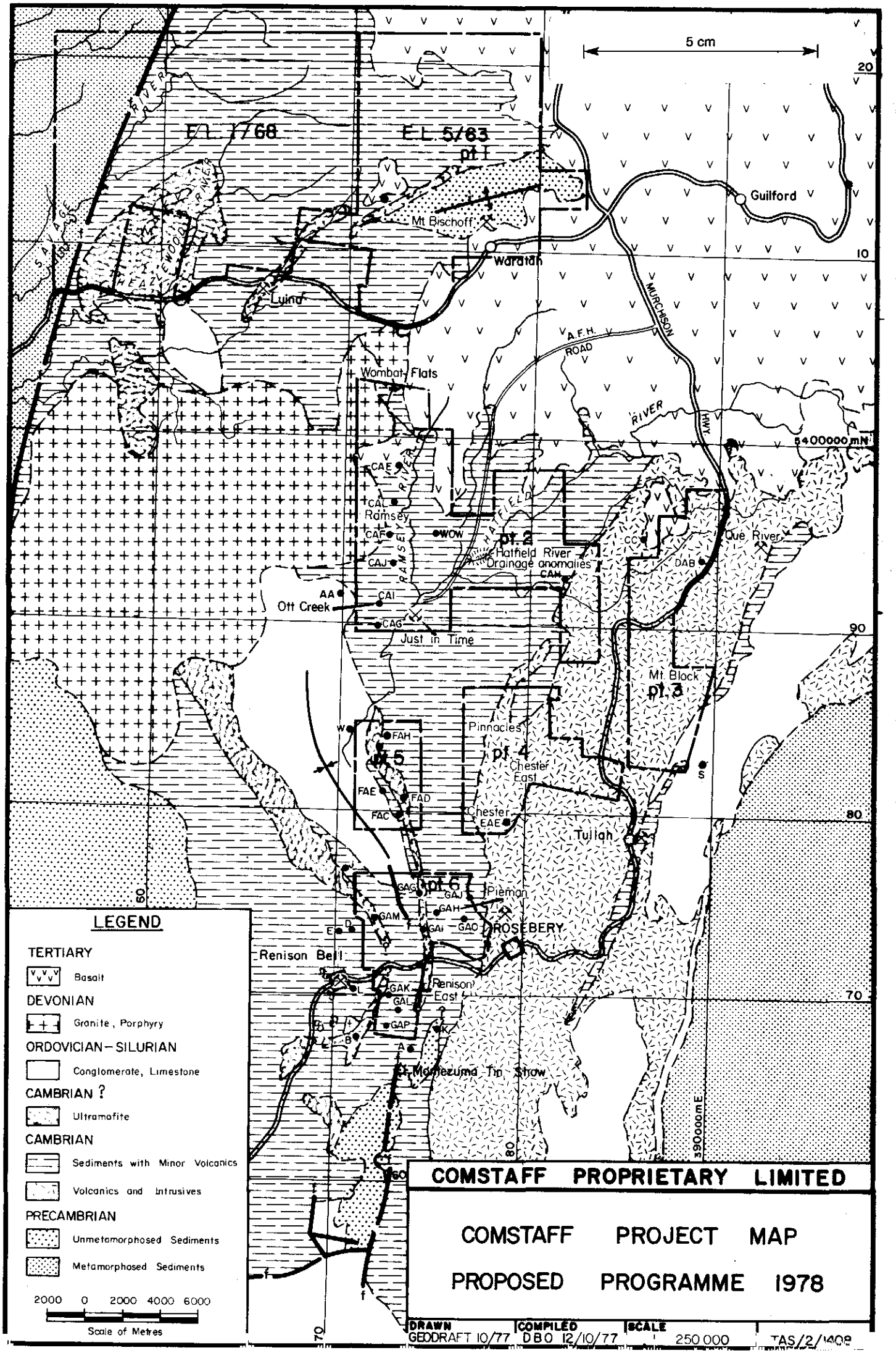

LEGEND

TERTIARY
- Basalt

DEVONIAN
- Granite, Porphyry

ORDOVICIAN–SILURIAN
- Conglomerate, Limestone

CAMBRIAN ?
- Ultramafite

CAMBRIAN
- Sediments with Minor Volcanics
- Volcanics and Intrusives

PRECAMBRIAN
- Unmetamorphosed Sediments
- Metamorphosed Sediments

2000 0 2000 4000 6000
Scale of Metres

COMSTAFF PROPRIETARY LIMITED

COMSTAFF PROJECT MAP
PROPOSED PROGRAMME 1978

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

GEOPHYSICAL REPORT RENISON GRID

A. BACKGROUND

The Renison grid has been covered by an Input aeromagnetic program and ground magnetic surveys. Selected portions of the grid have also been examined by IP, EM, and SP. The foregoing are listed in order of extent of coverage. Parameters of the various surveys are listed in Table 1.

B. RESULTS

Input Survey:

Three Input anomalies are located within the grid area. These are GAK, GAL, and GAP. They all have expression in the IP and/or EM data.

Magnetic Survey:

The line spacing is too large to permit meaningful contouring of the ground magnetic data. In fact there is also some difficulty even in confidently correllating anomalies from one line to the next. The current interpretation of the data differs substantially from the interim assessment shown on plan TAS2/764.

The following significant features are evident in the data (refer to plan TAS 2-766.)

Zone A: This zone is comprised of a number of magnetic anomalies which cannot be correllated from line to line but are spacially close together. The amplitude of the anomalies ranges from moderate (200nT) to very large (4000nT). Basalt has been mapped in the vicinity. It undoubtedly is the source of anomaly A.

Zone A_1: This zone may be a part of A but does appear to be a single independent anomaly. The source lies at some depth (150+ metres).

Zone C: The portion of this anomaly located south of the most northerly east-west fault consists of a single anomaly the origin of which is more than 100m subsurface. North of the fault the zone appears to consist of at least two parallel anomalies. The amplitude of these is less possibly because of a decrease in the width of the source. The depth of burial could also be less - about 50 to 75m.

Zone D: This anomaly is due to a source at or near surface on line 1800N and appears to plunge northward. The dip is steep and to the west. Outcrop in the area is limited due to glacial overburden. That which has been observed is siltstones and sandstones of the Crimson Creek Formation.

Zone E: The anomaly plunges south. The source is near surface on line 1200N. It appears to be 15m or less in width. The location is coincident with a contact between basalts and Crimson Creek conglomerates. No other magnetic anomalies occur in this geologic situation.

Zones H and J: Zone H lies close to the eastern margin of the western ultrabasic (Zone R). It is offset several times by faults. Anomaly J in the north is in a similar position but smaller in amplitude probably because it has a narrower source. The signature of both anomalies is distorted by the large amplitude anomaly due to the ultrabasic. At one location anomaly J coincides with a mapped gabbro. The geology of the rest

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of the area is obscured by glacial cover.

Zone K: This is an indistinct low amplitude anomaly axis located on lines 3200N, 3400N and 3600N. It lies within Crimson Creek conglomerates.

Zone L_1 and L_2: These are narrow anomalies. The source is near vertical pyrrhotite rich dikes.

Zones M and N: These are two anomaly axis located within an area of magnetic disturbance in the north-west section of the grid.

Zone P: This is an isolated one line anomaly on line 3600N.

Zone Q: This is a broad low amplitude anomaly possibly due to multiple magnetic bands. The depth of burial is 100+ metres.

Zones R S and T: These are very large amplitude anomalies (2000+ nT) caused by ultrabasic bodies. Zone T is a north-east striking dike like body having a southerly dip. It could be a faulted off portion of the eastern ultrabasic (Zone S).

In addition to the abovementioned localised anomalies, there is a major north south striking regional feature (U) located in the vicinity of 5000E. It extends from south of 1000N to 2800N where it abruptly terminates. The depth of the source is over 1500m. The anomaly may reflect a high in the magnetic basement or a deep fold structure.

Several faults have been interpreted from offsets in the trends of magnetic zones. With one exception they are oriented east-west.

C. IP SURVEY

An extensive area of high chargeability within which it is not possible to resolve individual sources occurs in the Renison Grid. This zone and individual anomalies are plotted on the electrical survey interpretation overlay (TAS 2-768). The salient features of the anomalies are described below. They are also summarised in Table 2. It should be noted that dip and depth values are only guidelines since they have been determined by comparison of the field data with model study results. They are highly dependent on the model selected.

Anomaly I:

This anomaly is located on the extreme west end of the four most northern lines. The position of the anomaly is an estimated one since only the eastern half of the standard anomaly pattern was obtained in the survey. Very low resistivities are associated with the high chargeability values. There is insufficient information for a reliable depth estimation to be made. The source is however within 25 metres of the surface. The anomaly is best defined on line 3800N at 2760E.

Anomaly II:

This is the most extensive anomaly on the grid. It covers eight lines (1400m) and is open to the north. In general the IP anomaly is a low resistivity anomaly as well. The anomaly is best defined on line 3200N at 3580E. Here the source is within 15m of the surface.

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ANOMALY III:

This anomaly is composed of two responses. It is open to the north. The source may plunge to the south. It is more clearly defined on line 3800N at 4920E where it should be within 10m of the surface. The source is either thin (less than 15m or else is depth limited since the centre of the psuedo-section chargeability response is a relative low.

ANOMALY IV:

This anomaly is composed of three responses. These lie at the Western edge of a high chargeability zone. The resistivities in the vicinity of the anomaly are intermediate (300 ohm metres) in magnitude. There does not appear to be any direct correllation between resistivity and chargeability. The source is dipping to the west. It lies within 15m of the surface. The clearest response is at 4520E on line 3000N.

ANOMALY V:

This anomaly is probably the surface expression of Input anomaly GAL. It may be a fault offset(to the west) extension of anomaly X. The strike and general character of anomalies is similar. The anomaly is open to the north where it disappears into an area of high chargeability. The clearest expression of the anomaly is on line 2200N at 4600E. The depth of burial is estimated to be 25 to 30 metres. The source is highly conductive. On line 2400 there is an additional anomaly evident at 4650E. This is 100m east of the main zone.

ANOMALY VI:

This is a three line anomaly. It is open to the north where it disappears into an area of high chargeability. Dip is near vertical. The source lies within 15m of the surface on line 2000N. There appears to be a gradual increase in depth of the source to the north. Because of its clear low resistivity signature and high chargeability (60+ms) the anomaly stands out clearly. The strike is NE, parallel to anomaly VII.

ANOMALY VII:

Three responses have been grouped to form anomaly VII because they line up close (NE) to the general strike direction (NNE) in the area. Otherwise they have little in common. The source is at substantial depth (60m or more) on the central line (2000N). To the north of 2200N the anomaly is lost in an area of high chargeability. The anomaly is not well defined on any line but the response at 5120E on line 1800N is the preferred one for further examination. There is no correllation with resistivity.

ANOMALY VIII:

This anomaly occurs on 6 lines. It strikes parallel (NNE) to the SP responses in the south east corner of the grid. It is open to the north. The zone is characterised by high chargeabilities. On some lines (e.g. 1400N) low resistivities are associated with the chargeability anomaly. On other lines (e.g. 1600N) the anomaly appears to have no resistivity expression. The anomaly is best defined on 1600N at 5520E.

ANOMALIES IX AND X

These are five line responses striking NNE which is parallel to the strike of the SP anomalies located in the SE corner of the grid. They are open to the south. Anomaly V to the north could be a westward faulted extension of anomaly X.

...4

Anomaly IX appears to plunge to the north and its source may be as much as 100m deep on line 1800N. On line 1000N at 4260E it is best defined. There it should lie within 20m of the surface. The response of anomaly IX is dominated by that of anomaly X which lies 130m to the east. Anomaly IX has no resistivity expression. It is within the very resistive rocks of the southwest corner of the grid.

Anomaly X except for line 1000N coincides with a low resistivity zone. This is most clearly seen at 4680E on line 1800N where the anomaly is also best developed. The source has a near vertical dip and lies within 25m of the surface. There is no evidence for a plunge to anomaly X.

ANOMALY XI

This is a poorly defined low amplitude anomaly situated within Dundas shales. The source is within 15m of the surface at 3060E on line 3600N. This is the best expression of anomaly XI.

D. RESISTIVITY RESULTS

The range of resistivity values encountered ranged over four orders of magnitude from less than 4 ohm metres to over 40,000 ohm metres. Resistivity values depart from the background of 200 ohm metres over some chargeability anomalies and four generally anomalous areas. Two of the latter are areas of very high resistivity and two are areas of very low resistivity. These are shown on the interpretation overlay. The areas do not correlate directly with topography and so must be due to geologic causes. The high resistivity areas are truly exceptional. Values of over 5000 ohm metres are usually encountered only over unweathered intrusives or highly siliceous sediments. The eastern resistivity high appears to be associated with the basalts outlined by magnetic zone A. The south western resistivity low is likely due to carbonaceous sediments. The central eastern low occurs over an area of glacial cover. Both low resistivity areas are also areas of high chargeability.

RECOMMENDATION

Anomalies worthy of further investigation have been grouped into four priority ratings. A summary of the work recommended is outlined in Table 3.

FIRST PRIORITY

Anomaly II:

This is considered the most important anomaly for two reasons. Firstly there is the close association of EM and SP anomalies with the chargeability zone. Secondly favourable mineralisation has been observed in the area of line 3200N. In order to determine the most favourable location for detail probing investigation (trenching or drilling) the following work is recommended.

(a) SP traverses of line 2600N from 3500E to 4100E and line 2800N from 3500E to 4200. Localised anomalies (80 mv peak within a half maximum width of 100m) should be detailed with readings every 10m and 5m over the anomaly peak. In this regard the SP anomaly on 3200N should be sampled every 10m from 3440E to 3620E and every 5m from 3510E to 3580E. Line 3400E should be sampled every 10m from 3490E to 3760E and every 5m from 3490E to 3580E as well as 3700E to 3780E.

(b) EM coverage of line 2800N from 3400E to 4100E line 3000N from 3400E to 4200E line 3200N from 3200E to 3900E and line 3400N from 3200E to 4000E.

Transient EM is recommended for this work because it will probably give more diagnostic information than the crone shootback method.

SECOND PRIORITY

Both anomalies in this category arise from sources at substantial depth (30m). They cannot therefore be expected to necessarily have any geochemical expression. The transient EM method is recommended to define the position of these anomalies since it will give a more reliable response from deep sources than the crone shootback method.

Anomaly 1:

This anomaly is on the very edge of the Comstaff licence area. Unless a co-operative agreement can be obtained from Renison (which controls the adjacent ground) follow up work is probably not worthwhile. The following work is recommended to define the IP anomaly.

(a) EM and SP line 3800N from 2500E to 3100E
line 3600N from 2500E to 3100E
line 3400N from 2500E to 3100E

(b) IP one line to define the IP response to the west is desirable. At present it is open to the west. Coverage of line 3400N from 2500E to 3000E would achieve the desired result.

Anomaly V:

This anomaly should be covered with at least two lines of EM on line 2200N from 4350E to 5350E and on 2400N from 4350E to 5350E. These lines have been extended eastward to cover anomaly VII at the same time. The purpose of this EM work is to define a definite location of a target for drilling. If no EM response occurs then a series of three percussion holes is necessary to test the source. SP has not been done on 2400N and so 4350E to 5350E should also be covered with this method.

THIRD PRIORITY

GAK east (EM anomaly at 3950E, 3000N)

The coverage of lines 50m north and south is necessary to determine that the conductor actually crosses line 3000N. It is not likely but still possible that the EM anomaly is an end effect. Specifically the recommended work is lines 2950N and 3050N from 4300E to 5000E. SP coverage of these lines would also be of some value.

Anomaly VI:

The results from EM work outlined under Anomaly V will show if the chargeability anomaly is an electrical conductor. In any event the source of the chargeability anomaly must be determined.

FOURTH PRIORITY

The anomalies in this category are not of any particular outstanding merit. They are however well defined geophysically. The cause of the responses must be determined.

Anomaly IV:

There is no EM response. No further geophysical work is strongly recommended. It would be desirable to extend the proposed transient EM coverage of line 3400N (see Anomaly II recommendations under First Priority) from 4000E to 4600E.

Anomaly VII:

One line of EM would be desirable. The proposed transient EM coverage of line 2200N (see Anomaly V recommendations under priority) should be extented to cover from 5350E to 5650E.

LOW PRIORITY

The anomalies in this category are of indifferent geophysical merit. It would be desirable to determine their source.

Anomaly III:

This anomaly is considered to be of low priority because the character of the response is that of a thin source. It is well defined on only one line - 3800N. SP and EM coverage of this line from 4650E to 5150E would be desirable.

Anomaly VIII:

This anomaly has been considered low priority because it is very probably due to a formational source. It has been crossed with several EM lines with negative results. Surface trenching or drilling is necessary to determine the cause of the anomaly.

Anomaly XI:

The low amplitude character of this anomaly is the reason for it being considered low priority. It is desirable to investigate the area around 3600N 3060E to see if a cause for the anomaly can be found. Coverage by SP of 2800E to 3250E on line 3600N is also worth trying.

D.B.T.

DBT:mp
20th June, 1978.

TABLE 1

Parameters of Geophysical Surveys over
Renison Grid

A. Airborne: line spacing - 400m
terrain clearance - 150m

1. Mark V Input Survey

2. 2nT magnetometer sensitivity

B. Ground: line spacing 200m
station interval 20m

1. Total field magnetic survey - 1 nT sensitivity

2. IP Survey
   - 60m dipole - dipole array
   - readings to n=6
   - scintrex Mark VII receiver

3. EM survey
   - vertical transmitter shootback method
   - 160m coil spacing
   - 2525 Hz and 825Hz operating frequencies

4. SP

21096

TABLE 2

SUMMARY OF IP ANOMALIES

Anomaly Number	Location*	Strike	Length	Chargeability (Average Max.)	Resistivity	Dip	Max Depth	Comment
I	3800N 2760E	0°E	600 +NS	55	40	?	25	1. Essentially outside licence area 2. Insufficient coverage for proper anomaly definition.
II	3200N 3580E	176°E	1400+N	60	10	near vertical	15	1. Source deeper on lines 3400N and 3600N 2. Could be late stage mineralised shear 3. Anomaly may terminate to the north in vicinity of 3800N. 4. Complex shape on 3400N-indicative of faulting?
III	3800N 4920E	30°E	200+N	90	20	flat lying	10	1. Southward plunge? 2. Source has limited vertical extent
IV	3000N 4520E	165°E	400	60	300 -	Westerly	15	1. At western edge of an area of generally high chargeability and therefore possibly not due to a discrete source.
V	2200N 4600E	20°E	600+N	50	60	near vertical	30	1. Line 2400 is best line for field check since there are two sources indicated there 2. May be continuation of X (or IX) 3. Disappears northwards into high chargeability zone. 4. Corresponds to Input anomaly GAL
VI	2400N 5130E	52°E	600+N	80	10	near vertical	20	1. Disappears northwards into high chargeability zone
VII	1800N 5120E	52°E	600+N	50	varies	?	Varies	1. " " " " 2. Little correlation of anomalies from one line to the next
VIII	1600N 5520E	40°E	600+N	60	5 to 200 varies	near vertical	10 varies	1. Low resistivity correlation not always present.
IX	1000N 4260E	27°E	400+S	60	2000 -	steep westerly or near vert.	Varies plunges N? 30m	1. Appears to plunge north
X	1800N 4680E	30°E	400+S	45	100 to 150	near vertical	25m	
XI	3600N 3060E	0°E	400+N	35	100	?	15m	1. Poorly defined

*of clearest response. +N open to north +S open to south - no resistivity association

DBT:mp
20th June, 1978

093

TABLE 3

Recommended Work for Renison East Grid Geophysics

Method		Priority	Line	Coverage	Comment
Line Cutting	GAK East	3	2950N	4250E to 5050E	
	"	3	3050N	4250E to 5050E	
	II	1	2800N	3350E to 3500E	
	"	1	3000N	3350E to 3500E	
	I	2*	3400N	2450E to 2800E	
	"	2*	3600N	2450E to 2800E	
	"	2*	3800N	2450E to 2800E	
SP	V & VI	2	2400N	4350E to 5350E	
SP	GAK East	3	2950E	4300E to 5000E	
		3	3050E	4300E to 5000E	
	II	1	2600N	3500E to 4100E	
	II	1	2800N	3500E to 4200E	
	II	1	3200N	3440E to 3620E	10m stations
	II	1	3200N	3510E to 3580E	5m stations
	II	1	3400N	3490E to 3760E	10m stations
	II	1	3400N	3490E to 3580E	5m stations
	I	2*	3400N	2500E to 3100E	
	I	2*	3600N	2500E to 3100E	
SP	XI	Low	3600N	2800E to 3250E	
	I	2*	3800N	2500E to 3100E	
	III	Low	3800N	4700E to 5100E	
Transient	VII	4	2200N	5350E to 5650E	
EM	GAK East	3	2950N	4300E to 5000E	
	GAK East	3	3050N	4300E to 5000E	
	V & VI	2	2200N	4350E to 5350E	
	V & VI	2	2400N	4350E to 5350E	
	II	1	2800N	3400E to 4100E	
	II	1	3000N	3400E to 4200E	
	II	1	3200N	3200E to 3900E	
	II	1	3400N	3200E to 4000E	
	IV	4	3400N	4000E to 4600E	
	I	2*	3400N	2500E to 3100E	
	I	2*	3600N	2500E to 3100E	
	I	2*	3800N	2500E to 3100E	
	III	Low	3800N	4650E to 5150E	
IP	I	2*	3400N	2500E to 3600E	60m Dipole Dipole array

*Work on Anomaly I cannot proceed without agreement from Renison Mines.

210698

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RENISON GRID - GAP 00 519

GEOLOGICAL INTERPRETATION

781316

5 cm

COMPILED	G. F. P.
DRAWN	DATE
GEODRAFT	20/8/78
REVISED	
SCALE	1 : 5000
PLAN No.	TAS/2/1618

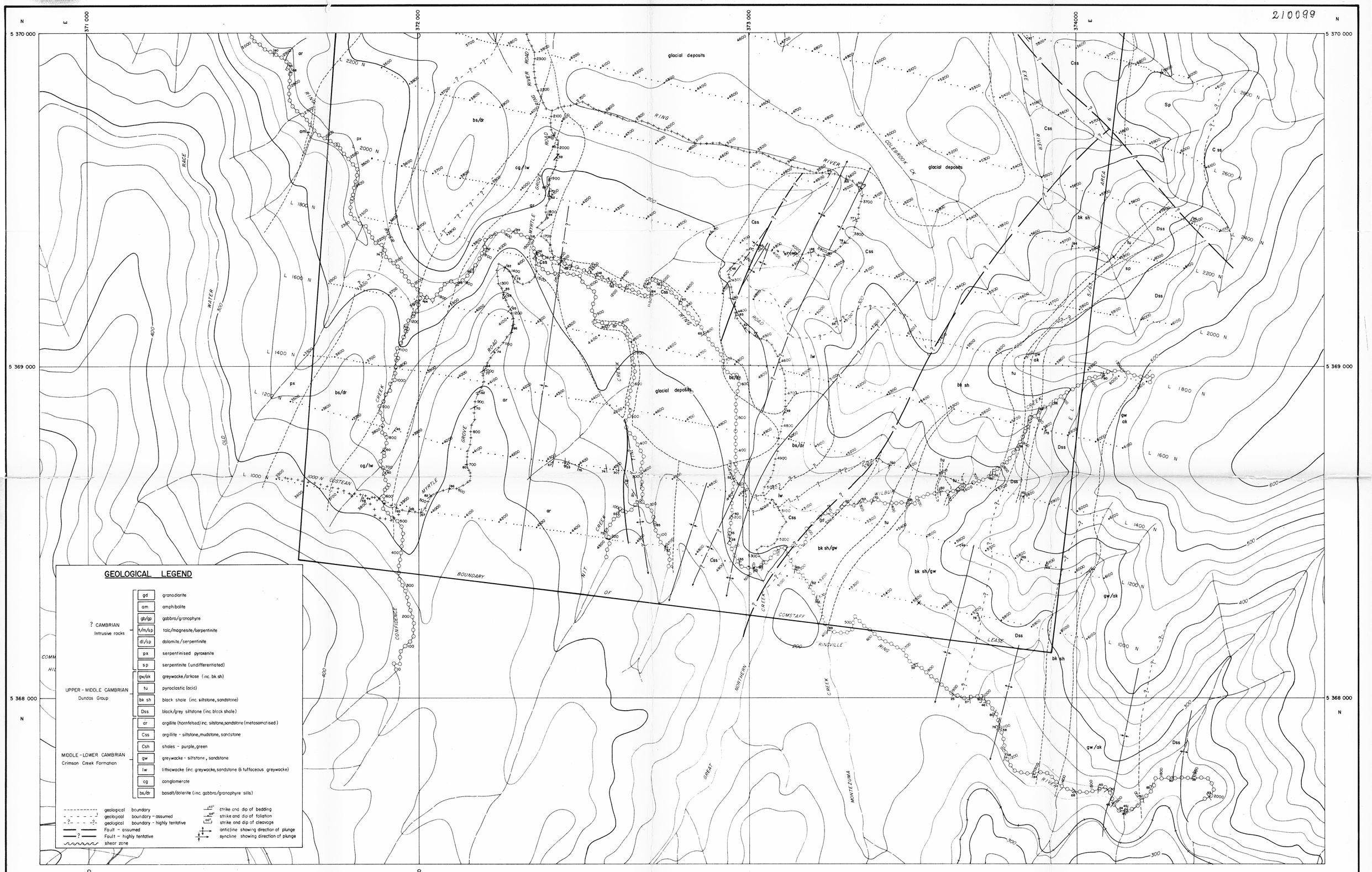
TAS/2/1619
Sheet Index

TN

LEGEND

- 400 — 25m interval contour line
- Surveyed watercourse
- Unsurveyed watercourse
- Surveyed road/track
- Unsurveyed road/track
- Grid lines showing sample locations
- Costean survey points
- Railway

210099



GEOLOGICAL LEGEND

? CAMBRIAN Intrusive rocks	gd	granodiorite
	am	amphibolite
	gb/gp	gabbro/granophyre
	t/m/sp	talc/magnesite/serpentinite
	dl/sp	dolomite/serpentinite
	px	serpentinised pyroxenite
	sp	serpentinite (undifferentiated)
UPPER - MIDDLE CAMBRIAN Dundas Group	gw/ak	greywacke/arkose (inc. bk.sh)
	tu	pyroclastic (acid)
	bk sh	black shale (inc. siltstone, sandstone)
	Dss	black/grey siltstone (inc. black shale)
MIDDLE - LOWER CAMBRIAN Crimson Creek Formation	ar	argillite (hornfelsed) inc. silstone, sandstone (metasomatised)
	Css	argillite - siltstone, mudstone, sandstone
	Csh	shales - purple, green
	gw	greywacke - siltstone, sandstone
	lw	lithicwacke (inc. greywacke, sandstone & tuffaceous greywacke)
	cg	conglomerate
	bs/dr	basalt/dolerite (inc. gabbro/granophyre sills)

- geological boundary
- geological boundary - assumed
- geological boundary - highly tentative
- Fault - assumed
- Fault - highly tentative
- shear zone
- 45° strike and dip of bedding
- 84° strike and dip of foliation
- 66° strike and dip of cleavage
- anticline showing direction of plunge
- syncline showing direction of plunge

LEGEND

- 400 25m interval contour line
- Surveyed watercourse
- Unsurveyed watercourse
- Surveyed track/road
- Unsurveyed track/road
- Grid lines showing sample locations
- Costean survey points
- Railway

TAS/2/1618

Sheet Index

TN

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RENISON GRID - GAP

GEOLOGICAL INTERPRETATION

5 cm

78/316

520

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DRAWN	GEODRAFT
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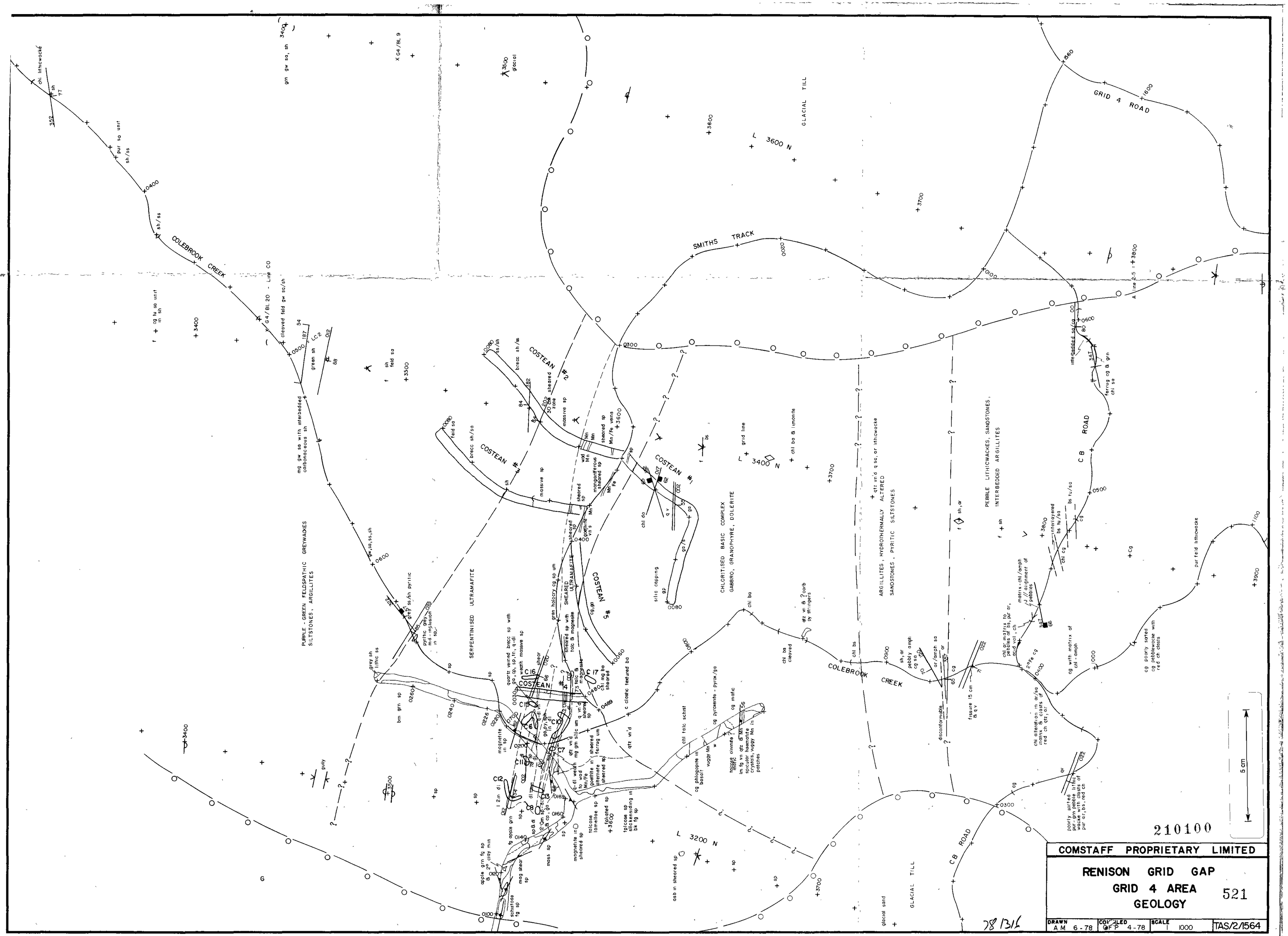
PLAN No.	TAS/2/1619



210100

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RENISON GRID GAP
GRID 4 AREA
GEOLOGY

521

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A M 6-78	G F P 4-78	1 1000	TAS/2/1564

78 1316

OPEN FILE

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MICROFILMED

PROJECT NAME: APPENDIX I

TITLE: SIX MONTHLY REPORT TO DEPARTMENT OF MINES, TASMANIA

RENISON EAST - GRID GAP

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES:

COMMODITY/IES:

TEXT PAGES NO:

PLAN NOS:

TABLE NOS:

APPENDICES:

AUTHOR/S:

DATE:

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria



NOTE – for legend, see plan TAS/2/1421

210102

5 cm

78-1316 (pp)

COMSTAFF PROPRIETARY LIMITED	
370370 - GEOLOGY	COMPILED G.F.P.
	DRAWN GEODRAFT 11/77
	AMENDED 10/78
	SCALE 1 : 10000
	TAS/2/1422

522

EL 5/63 AREA 6

glacial overburden

GRID GAP

PINE HILL

'RINGVILLE' Au

TRENCHES

MINING LEASE 62M/75 (MINOPS)

'BONNIE DUNDEE' Ag,Cu

'FAIRLORE' Ag

'FRASER' Ag,Cu,As

'MONTEZUMA' Cu

MINING LEASE 12M/42

'CURTIN DAVIS' Ag, Cu, Bi

'KAPI' Pb, Zn

5 370 000 N
5 369 000 N
5 368 000 N
5 367 000 N
5 366 000 N
5 365 000 N

370 000 E
371 000 E
372 000 E
373 000 E
374 000 E
375 000 E

GEOLOGICAL LEGEND

DEVONIAN		gd	granodiorite (granodiorite/granite/adamellite)
CAMBRIAN	(intrusive rocks)	bt	basite (basalt/dolerite/amphibolite/gabbro/granophyre)
		um	ultramafic (talc/dolomite/serpentinite/pyroxenite)
UPPER/MIDDLE CAMBRIAN	(Dundas Group)	sh	shales with interbedded acid volcanics (greywacke/arkose/tuff/black shale/siltstone)
MIDDLE/LOWER CAMBRIAN	(Crimson Creek Group)	ss	interbedded siltstone/greywacke (siltstone/greywacke/argillite/shale)
		cg	lithewacke/conglomerate
	(Success Creek Group)	dm	dolomite (quartzite/shale/dolomite)

- geological boundary
- geological boundary - highly tentative
- fault
- fault — highly tentative
- costean
- 'KAPI' Pb, Zn — mine site showing mineral mined
- lease boundary
- grid sample lines

210103

78-1316 Appl

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370365 - GEOLOGY

5 cm

C 523

COMPILED	G.F.P.
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SCALE	1 : 10 000

TAS/2/1421

Soil horizons and sample numbers.

As

Cu

Mn

Ni

Pb

Zn

Sn

210104

78-1316 app 1

AUSTRALIAN ANGLO AMERICAN LIMITED

GAP 1000 N COSTEAN

GEOCHEMISTRY OF SOIL HORIZONS

525

5 cm

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DATE	Feb '78
AMENDED	
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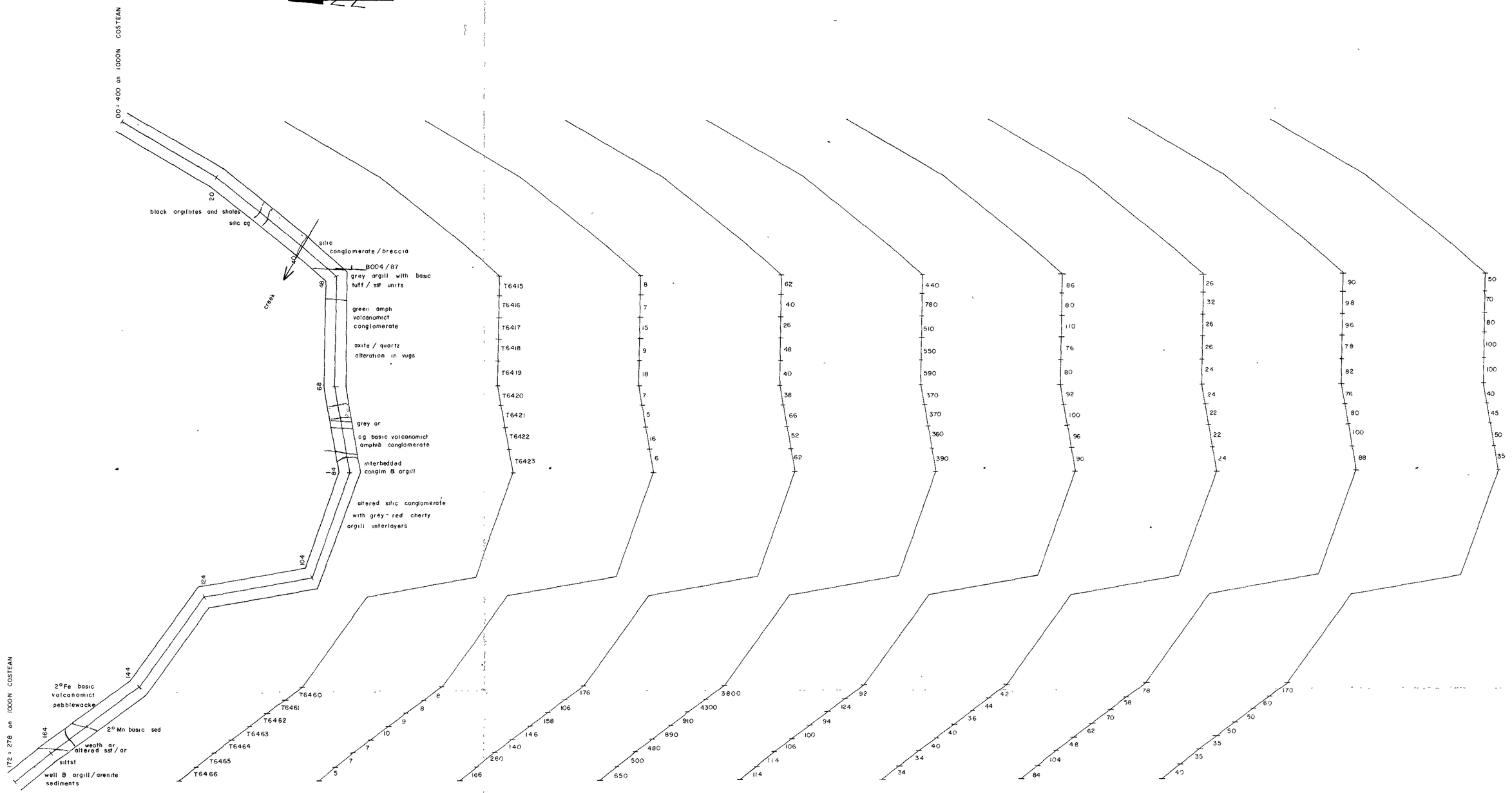
PLAN No	TAS/2/1563



Plan

Sample No's

As

Cu

Mn

Ni

Pb

Zn

Sn

210105

5 cm

78-1316 App 1

AUSTRALIAN ANGLO AMERICAN LIMITED

GAP 524

1000 N LOOP COSTEAN

Geology and Geochemistry

DRAWN	COMPILED	SCALE	
5/2/78 A M	G P	1 500	TAS/2/1559

Profile

Plan

Sample No's

As

Cu

Mn

Ni

Pb

Zn

Sn

210106

AUSTRALIAN ANGLO AMERICAN LIMITED

GAP
1000 N COSTEAN
Geology and Geochemistry

78-1316
App 1
526

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REPORT	TAS/2/1558

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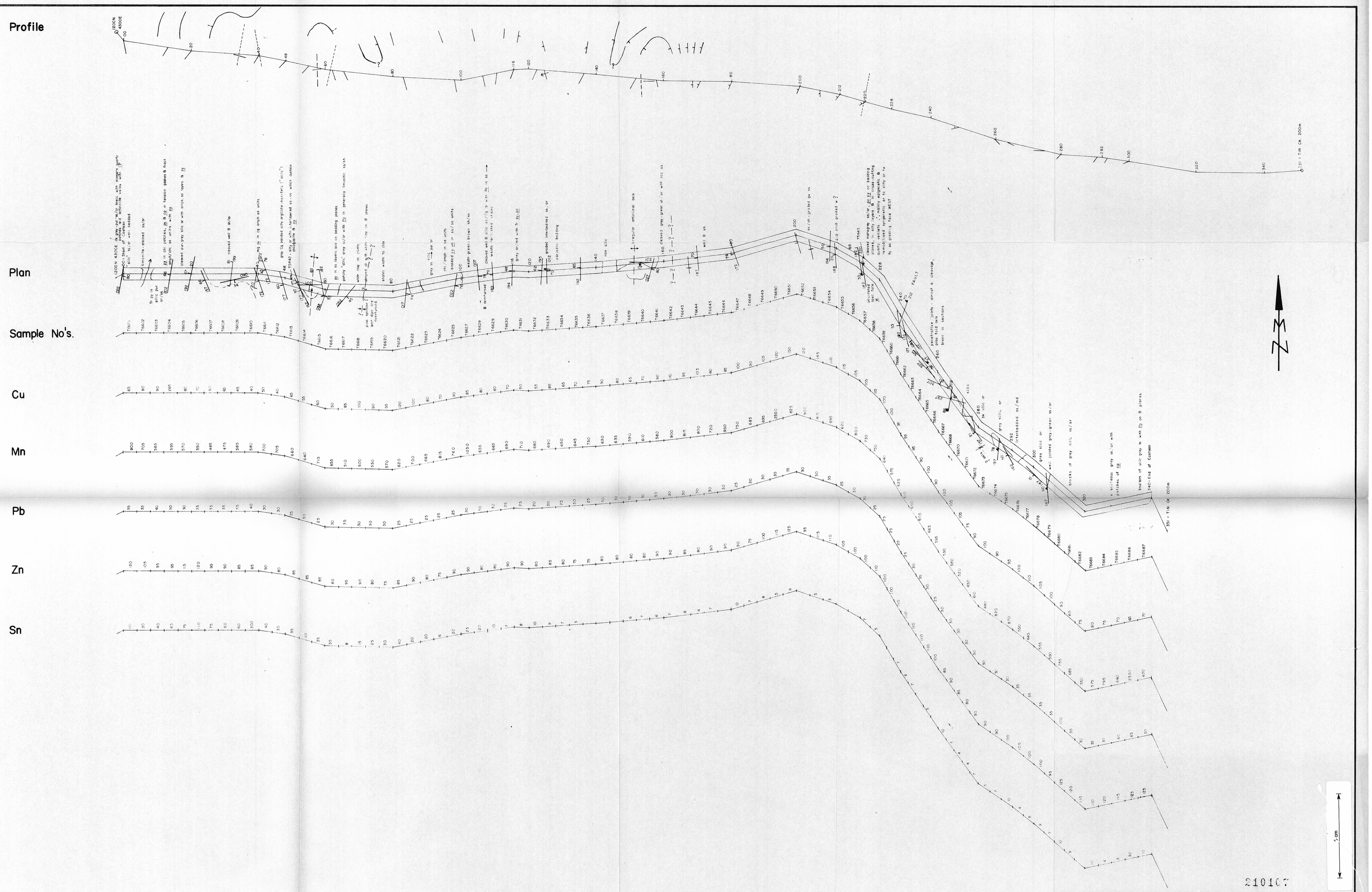

210107

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GAP 78-1316 Appl

1200 N COSTEAN

Geology and Geochemistry 527

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AMENDED	
SCALE	1 : 500
PLAN No.	TAS/2/1560


Costean 3B
00
c gr sheared sp
dk grn sheared sp
dk grn, m-c gr schistose sp
apple green, f gr sp
apple grn
sheared magnetite sp
magnetite in shear planes, mass f gr sp
magnetic mass m gr sp
c gr sp pyr
c gr lamellar talc - sp
GAP 3200N 3600E
foliated magnetic sp
slickensiding in f gr lt gm sp
talc sp
40
T7208
T7209
Cu 20 35
Mn 1350 660
Ni 2380 2300
Pb 55 50
Zn 50 40
Sn 5 8
grey pyritic carb ss & lithic ss
brn - grn goethitic sp patches in v sheared dk grn talc sp
260
COLEBROOK CREEK
240
225
220
asb fibre in m - f gr sp
m-c gr sp perid
grn mass sp
Ga & Cp ind! sp
replacement of sp by dl - q CX 4
sheared talc - goethite dl sp & chromite
dl sp & goethite & wad goethite - talc mag - q sheared talc goethite
sheared sp
irregular contact
T7217
T7216
T7215
T7214
T7213
T7212
T7211
T7210
Cu 10 25 10 20 30
Mn 1.8% 2.2% X 1.9% 1.1% 1.3%
Ni 465 900 1300 1600 1500 1800
Pb 420 385 160 340 70 75 320 415 75 170 125 190
Zn 5175 260 840 265 X 35 25 205
Sn 330 75 85 X 40 25
T7218
T7219
T7220
T7221
T7222
T7223
T7224
T7225
T7226
T7227
T7228
T7229
T7230
Cu 150 30 25 110 100 140 40 65 40 30 105 170 135
Mn 1400 2050 1700 1550 2450 1350 950 2150 3100 2050 1.4% 2750 6600
Ni 325 330 230 260 380 210 165 430 420 370 310 210 250
Pb 1250 455 545 240 215 165 240 115 270 460 165 2700 1100 1500 900
Zn 555 575 375 395 455 240 160 265 210 280 225 920 1500
Sn 250 25 20 7 15 7 8 X 10 6 25 40 40
talc chlorite schist
q - phig alt in bs / gb
vuggy Mn gs vn
q - epidote cg pyr gb & phlog in patches
talc - chl f gr um goethite & wad & talc
cry q vn & spec haematite
brn w c gr bs/gb
100
Costean 3A
N
5 cm
78-1316 App 1
210108
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GEOCHEMISTRY & GEOLOGY
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COSTEANS 3A & 3B
1562
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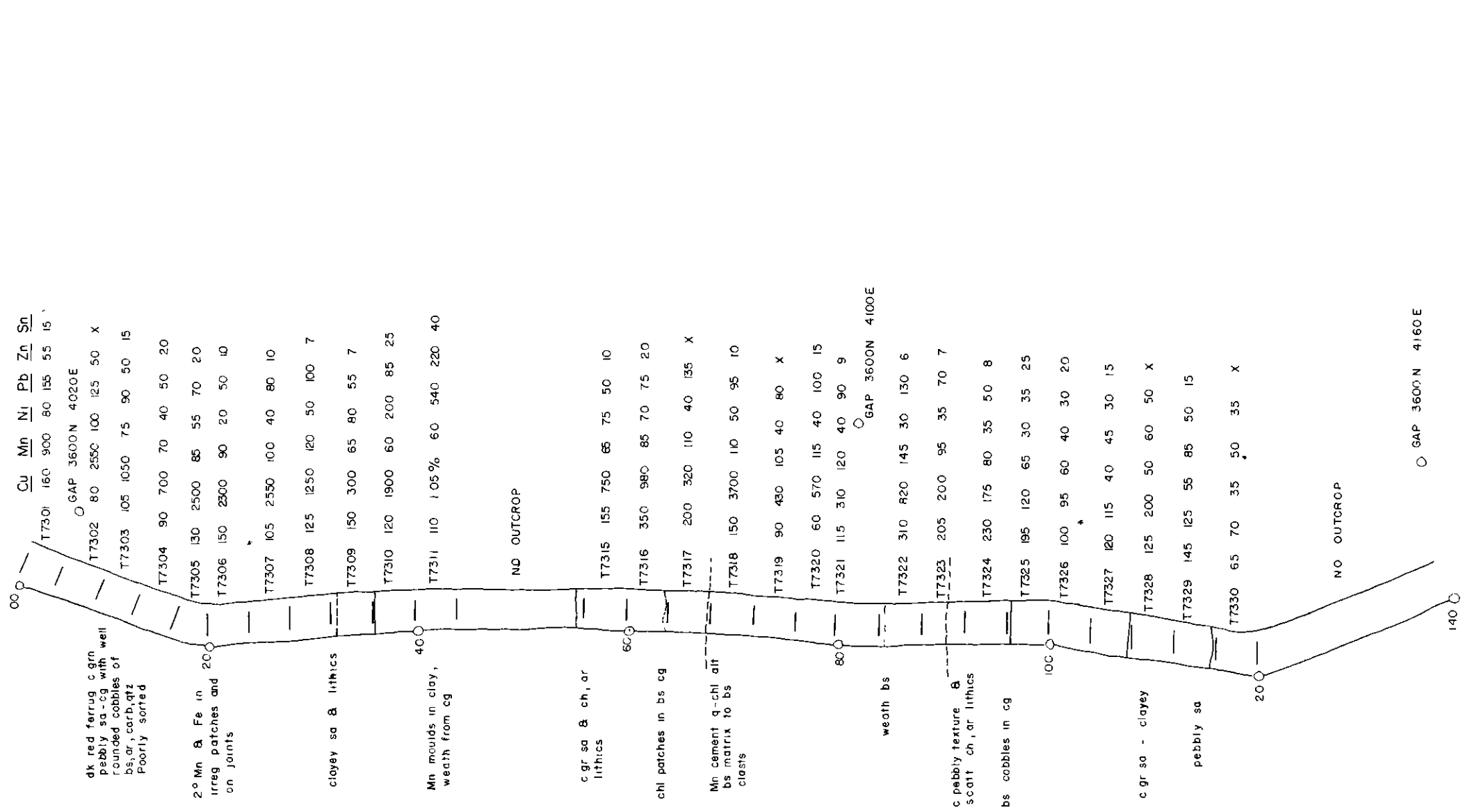
COMPILED G P
SCALE



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GEOCHEMISTRY & GEOLOGY.

GAP

COSTEAN 36' 529

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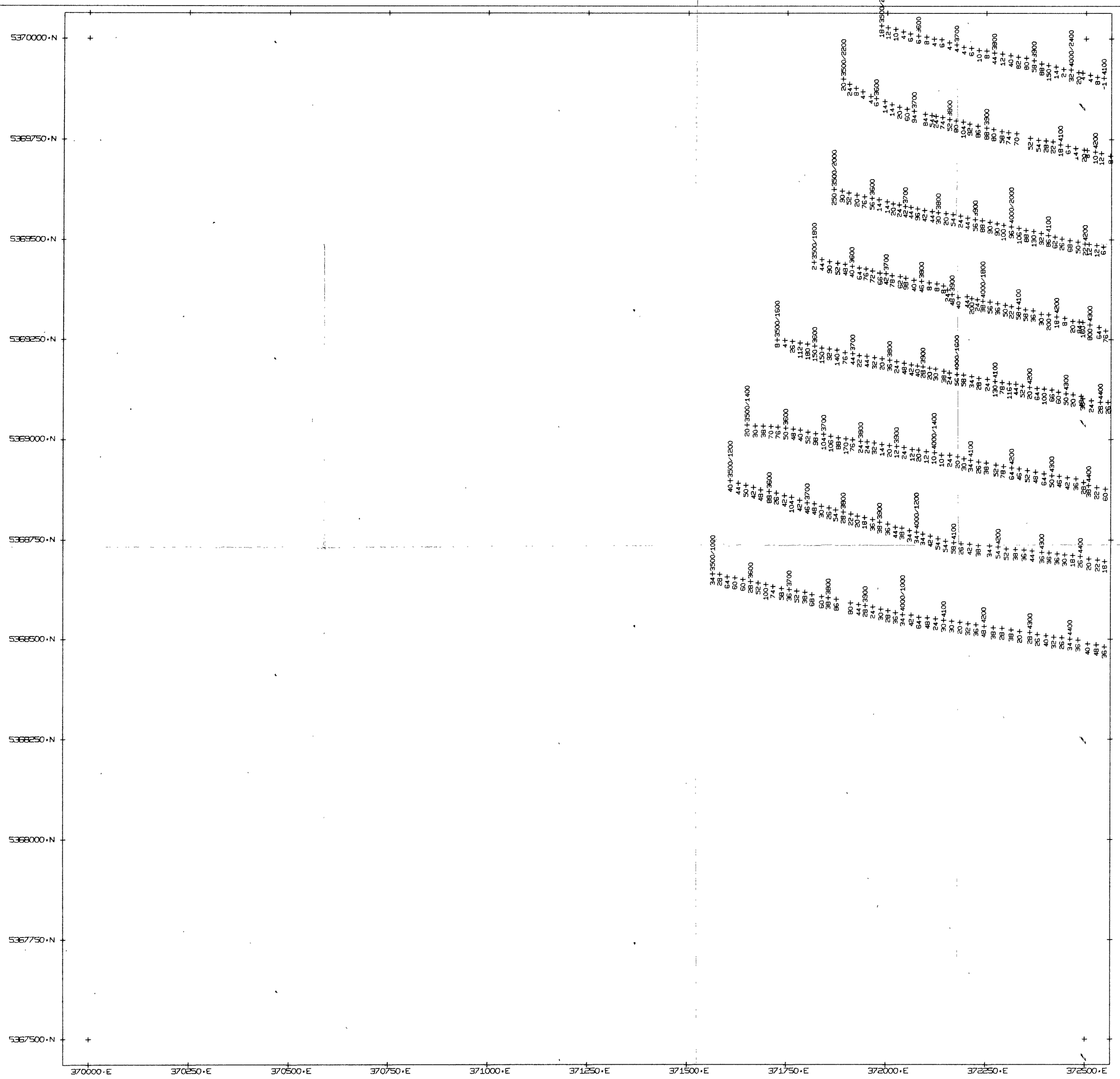

210110 78-1316 Appl

5 cm

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RENISON GRID - GAP 530
SHEET 370365 - A
GRID GEOCHEMICAL SAMPLING
A° COPPER RESULTS in ppm

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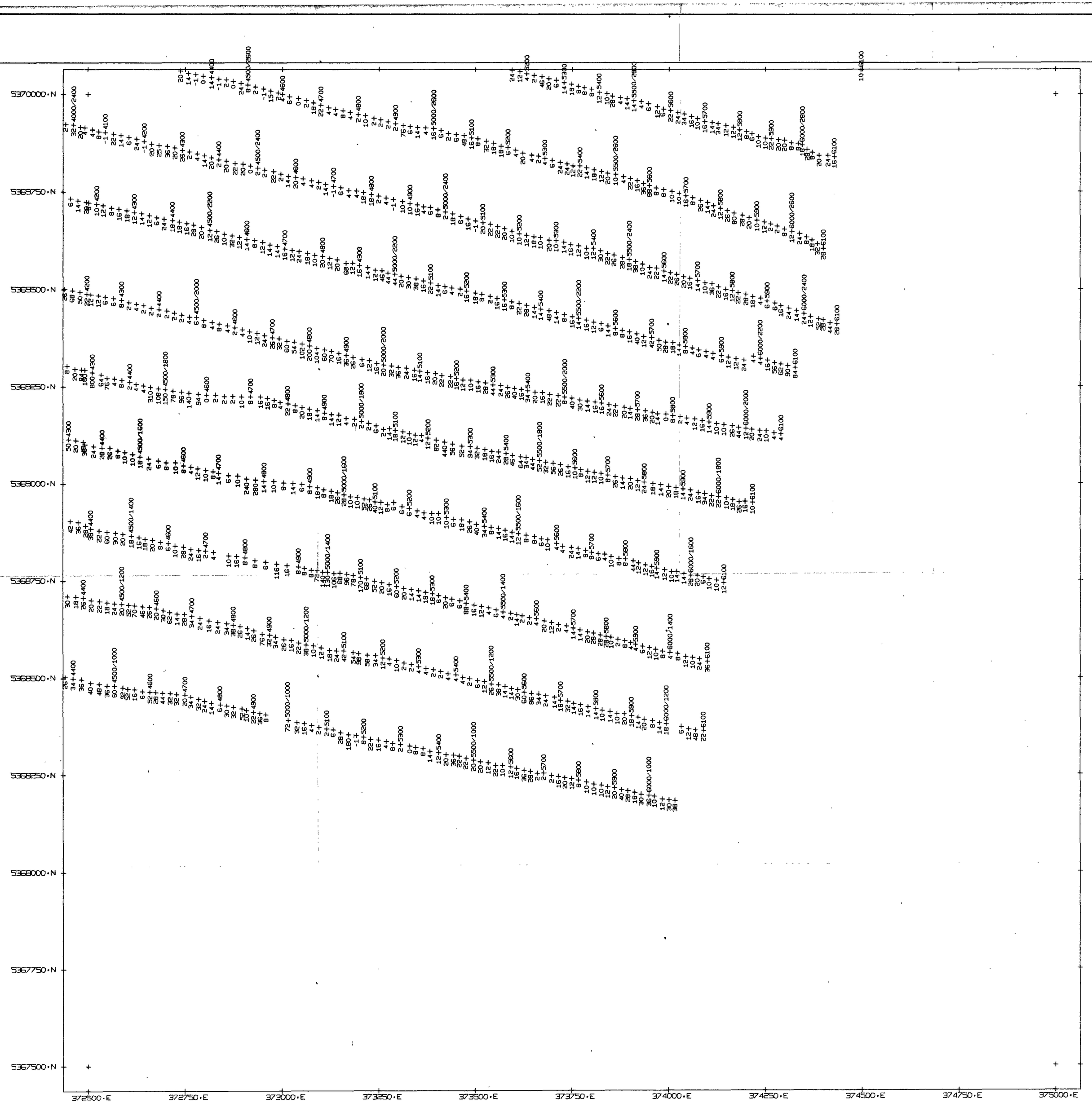
TAS/2/1498



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5 cm

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RENISON GRID - GAP
SHEET 370365 - B
GRID GEOCHEMICAL SAMPLING
A° COPPER RESULTS in ppm

531

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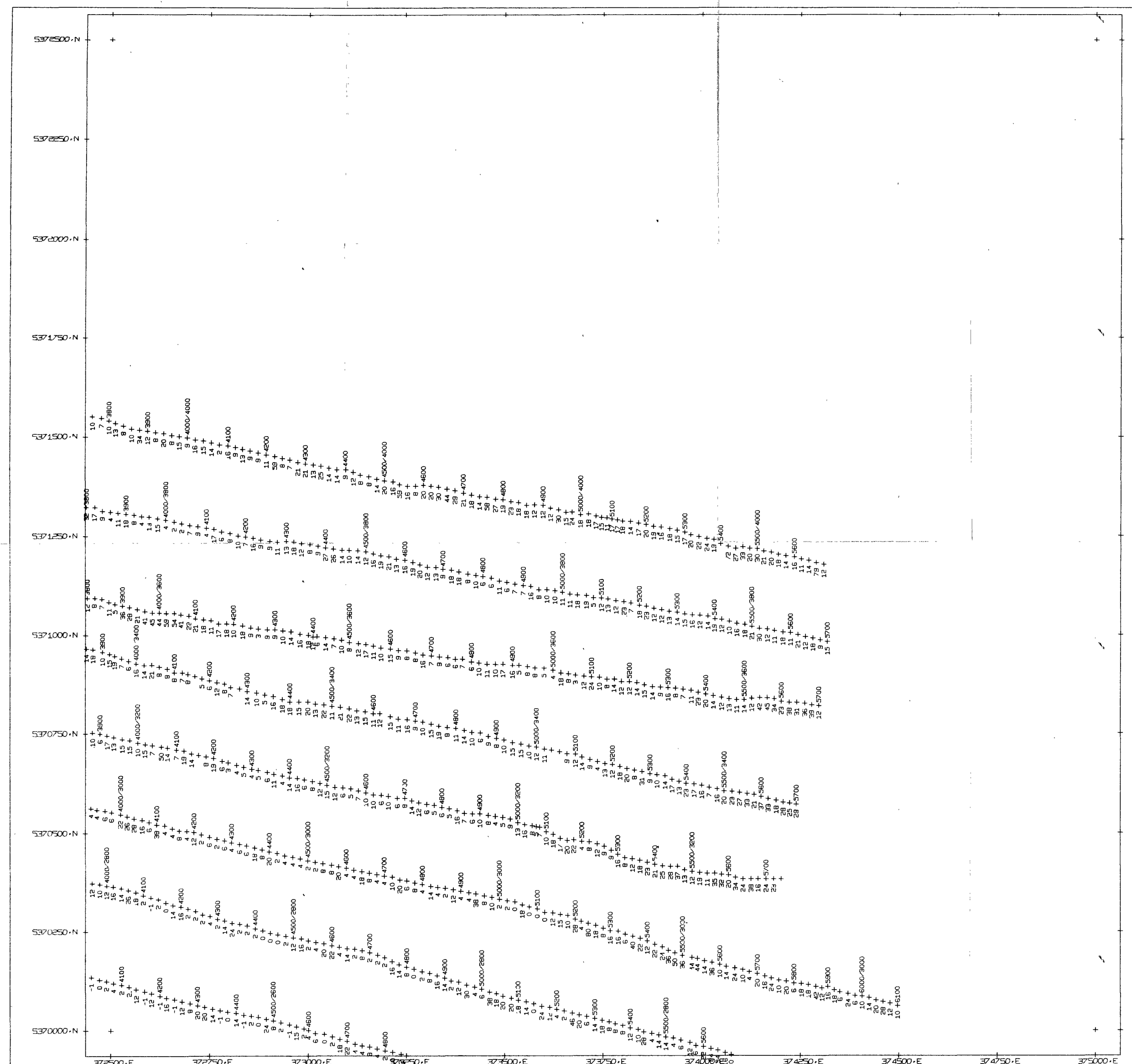

5cm

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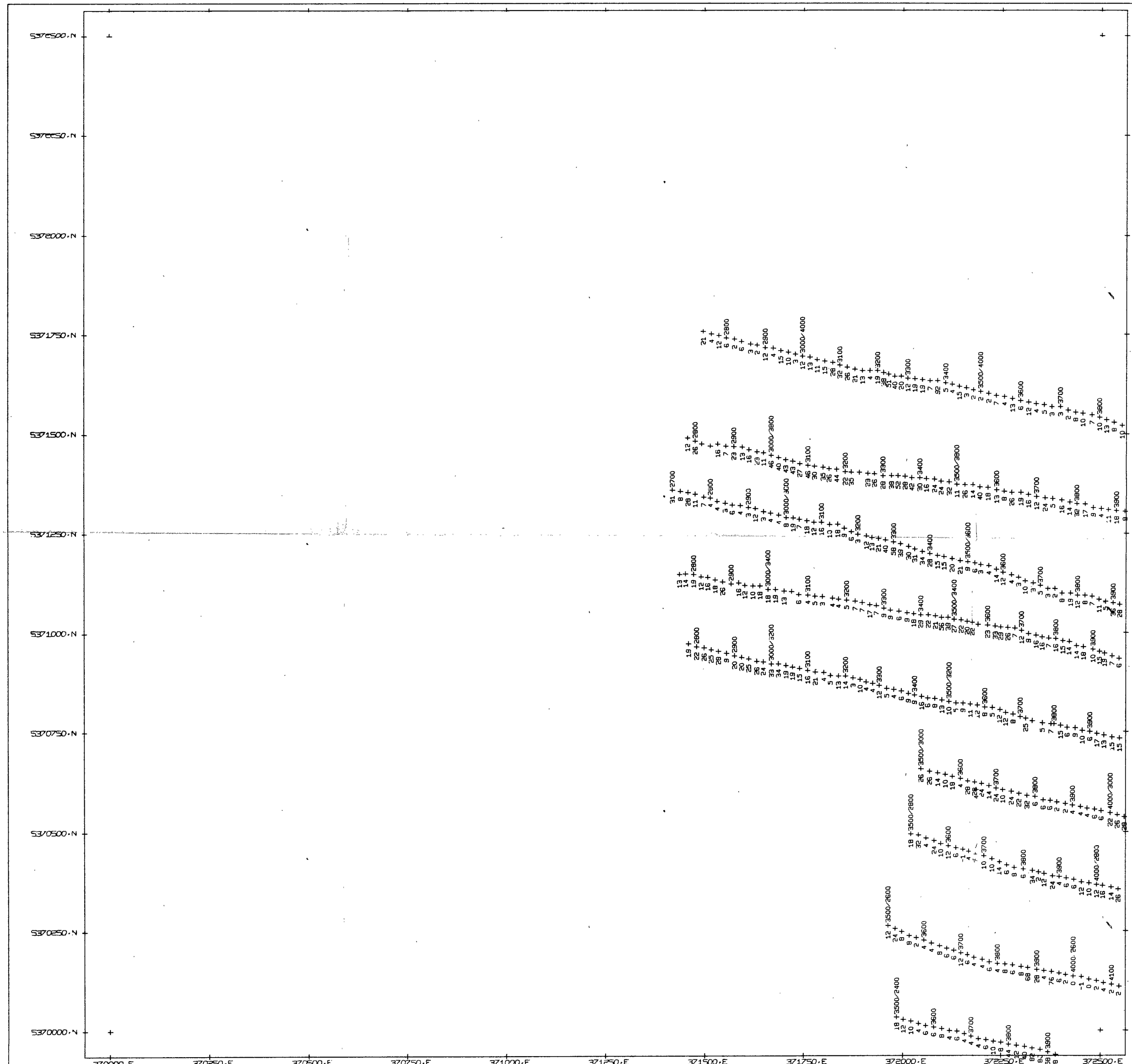
RENISON GRID - GAP 0 582
SHEET 370370 - C
GRID GEOCHEMICAL SAMPLING
A° COPPER RESULTS in ppm

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1:5000
	TAS/2/1500



78-1316 Appl

210113

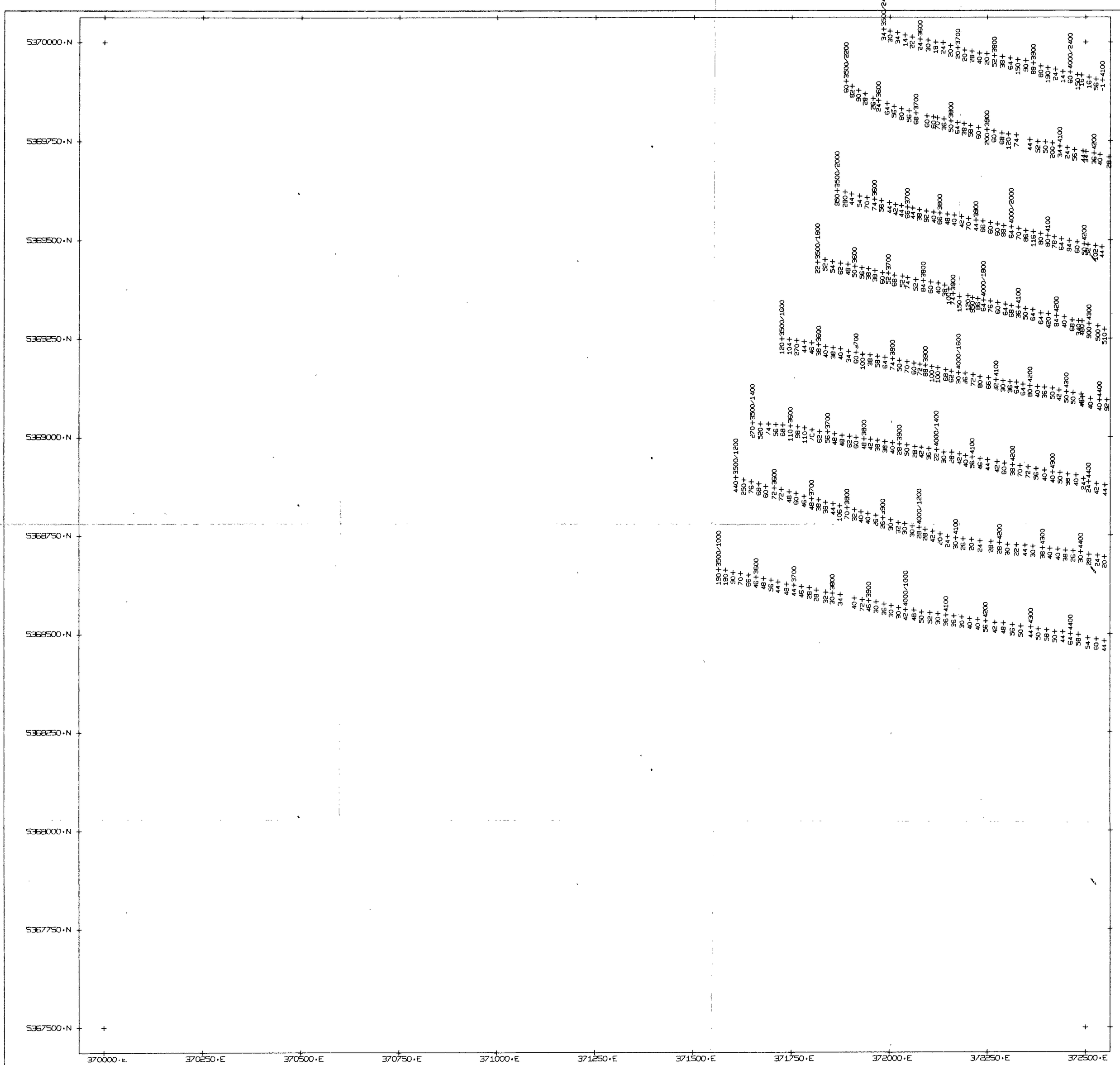
5 cm

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - D
GRID GEOCHEMICAL SAMPLING
A° COPPER RESULTS in ppm

533

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1:5000
	TAS/2/1501



5 cm

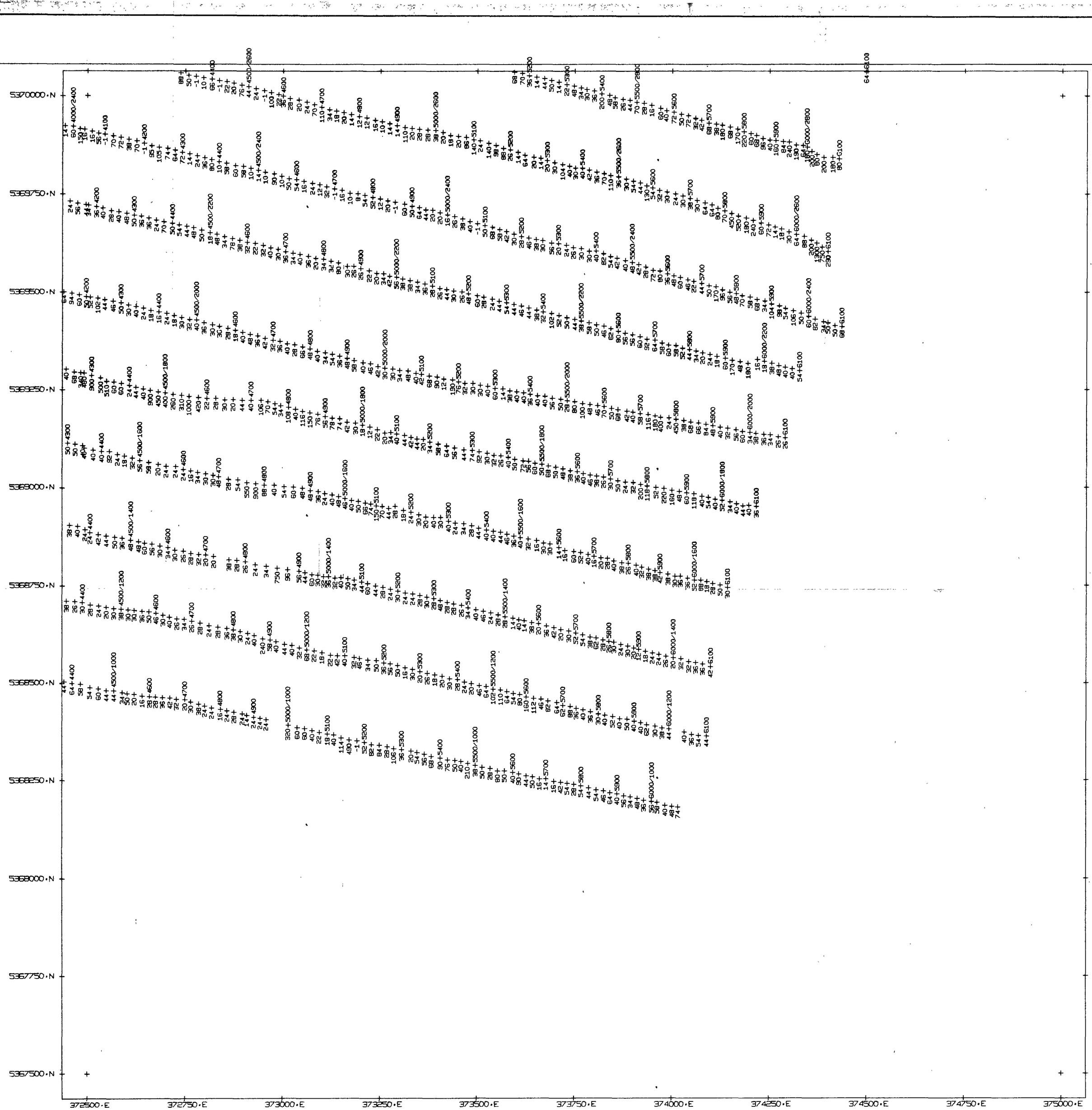
78-1316 Appl 210114

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 00 534
SHEET 370365 - A
GRID GEOCHEMICAL SAMPLING
A° LEAD RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1 5000

TAS/2/1502

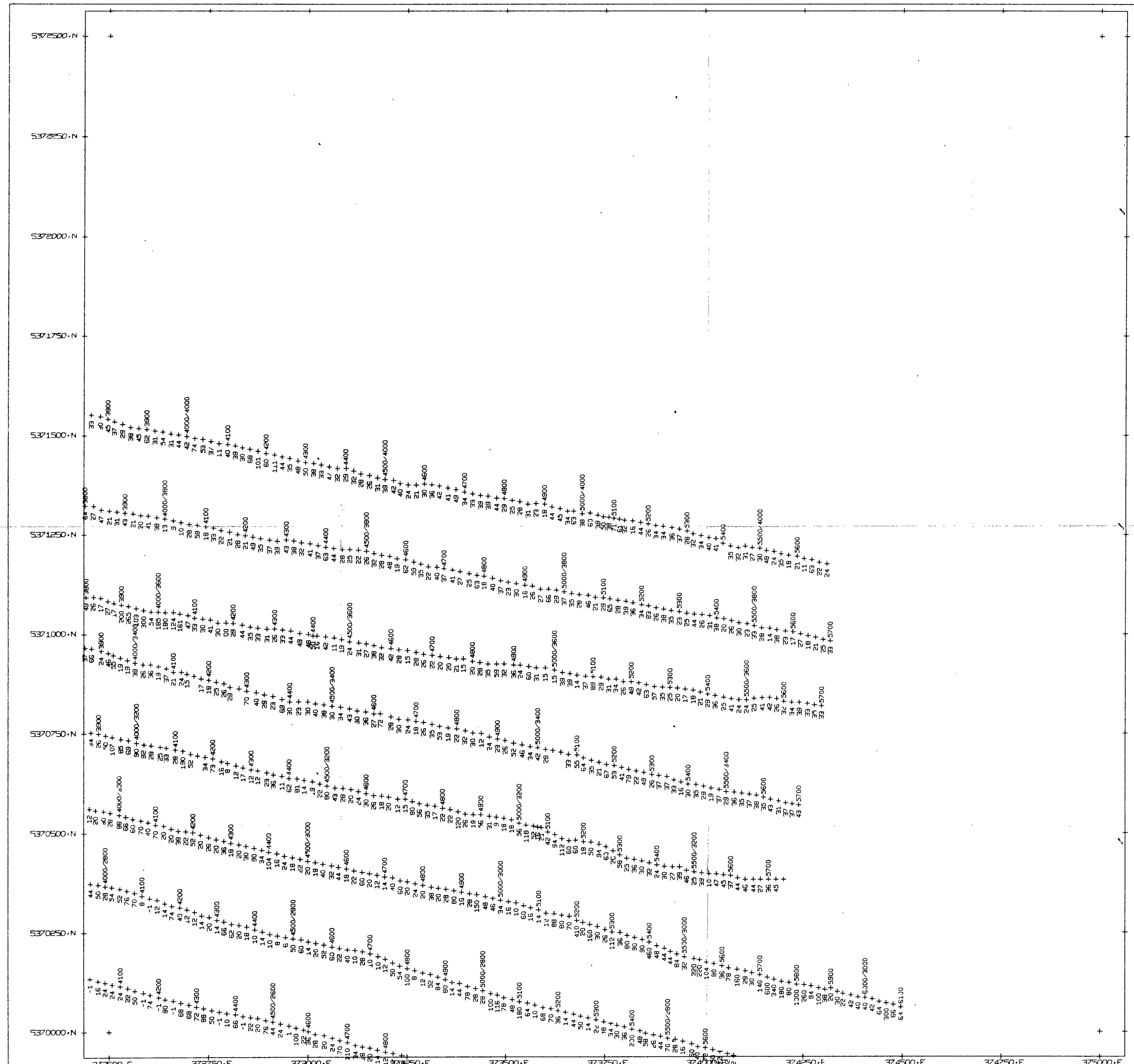


210115 78-1336 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 535
SHEET 370365 - B
GRID GEOCHEMICAL SAMPLING
A° LEAD RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1:5000
	TAS/2/1503



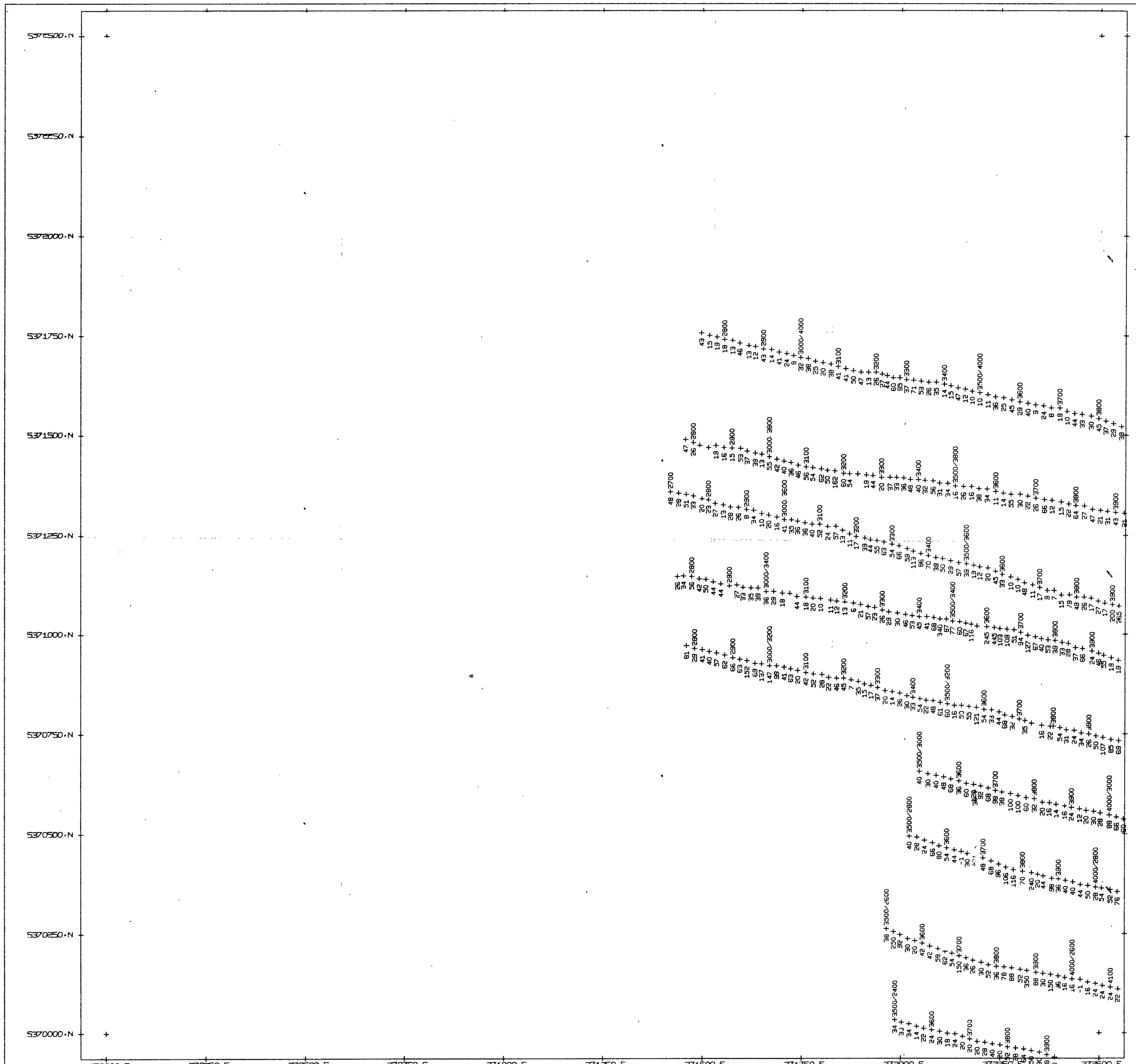
5 cm

210116 78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 536
SHEET 370370 - C
GRID GEOCHEMICAL SAMPLING
A° LEAD RESULTS in ppm

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1 : 5000
	TAS/2/1504



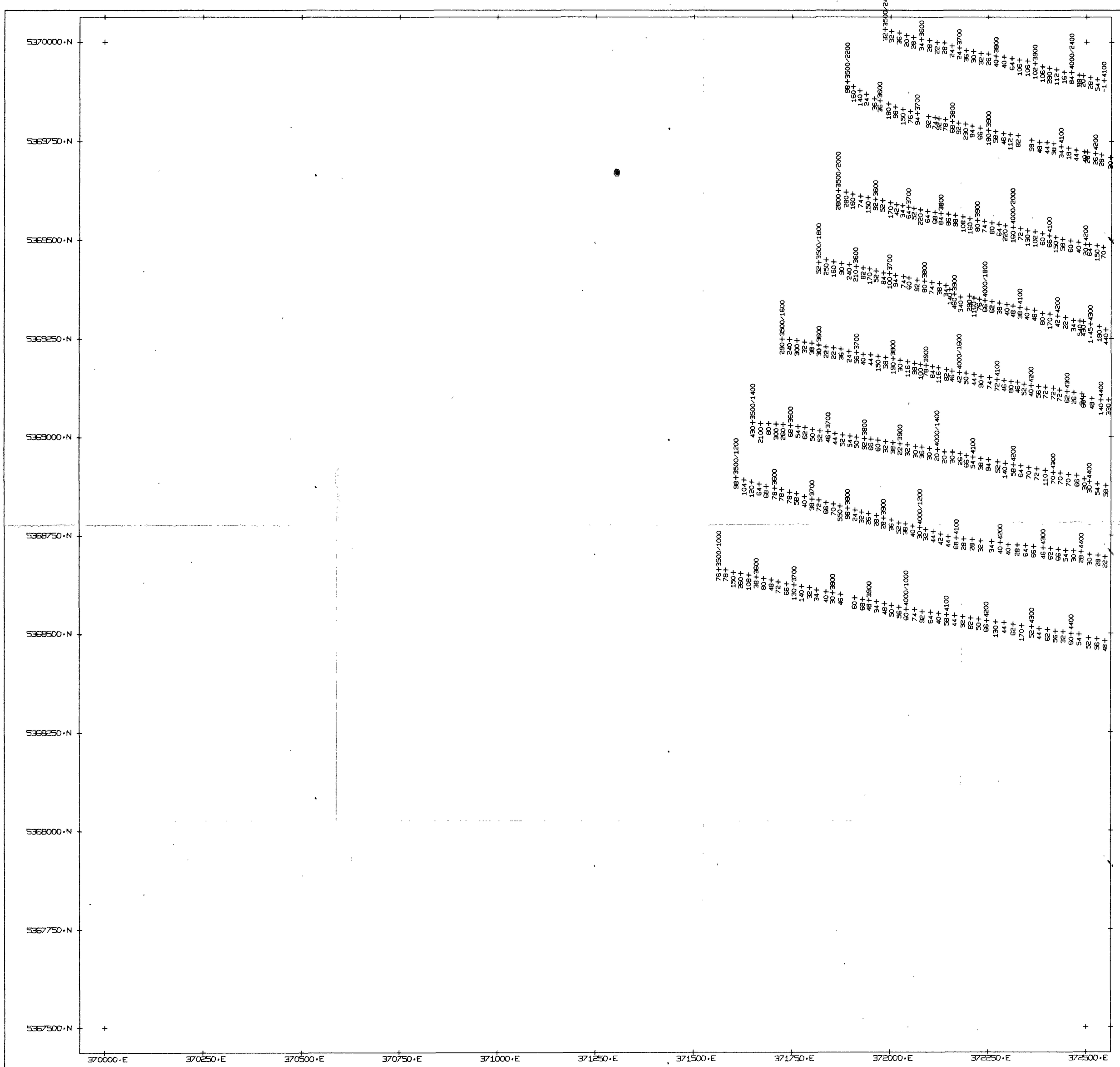
5 cm

210117 78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP SHEET 537
SHEET 370370 - D
GRID GEOCHEMICAL SAMPLING
A° LEAD RESULTS in ppm

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1:5000
	TAS/2/1505



5cm

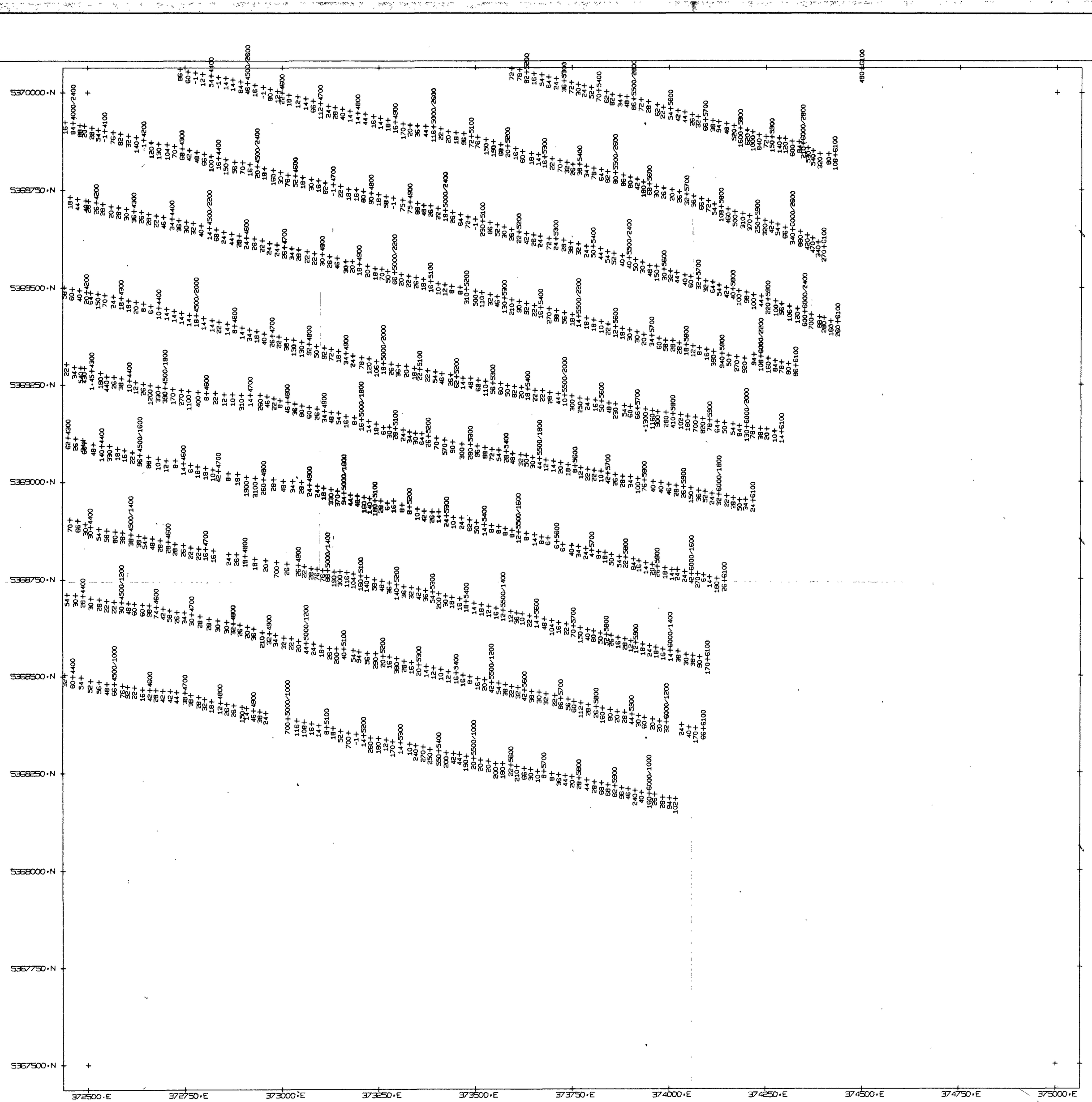
210118

78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370365 - A 538
GRID GEOCHEMICAL SAMPLING
A° ZINC RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1 5000
	TAS/2/1506



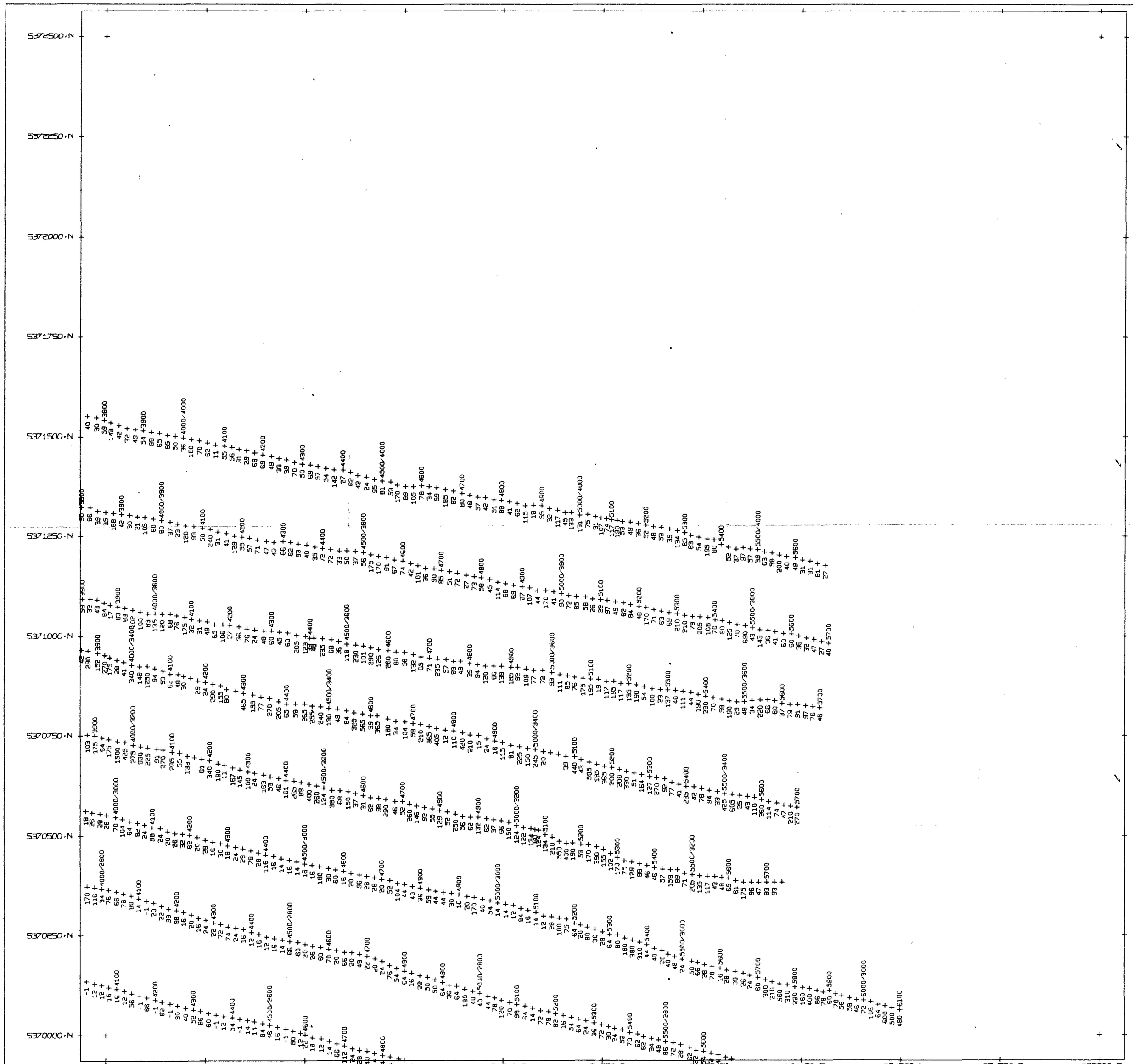
210119 78-1316 App

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370365 - B
GRID GEOCHEMICAL SAMPLING
A° ZINC RESULTS in ppm

539

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1 - 5000
	TAS/2/1507



5 cm

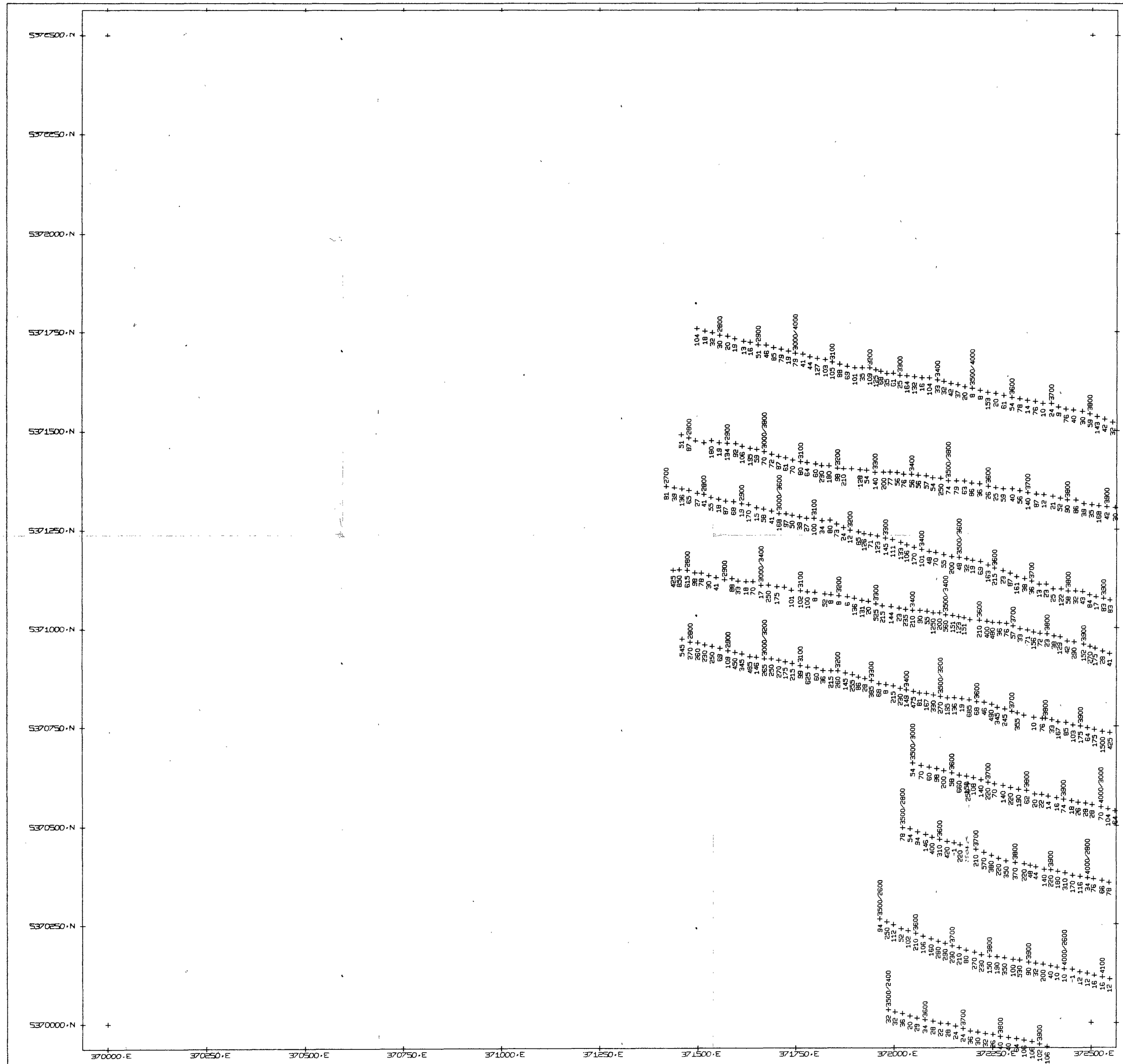
210120 78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - C
GRID GEOCHEMICAL SAMPLING
A° ZINC RESULTS in ppm

540

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1 5000
	TAS/2/1508



210121 78-1316 Appl

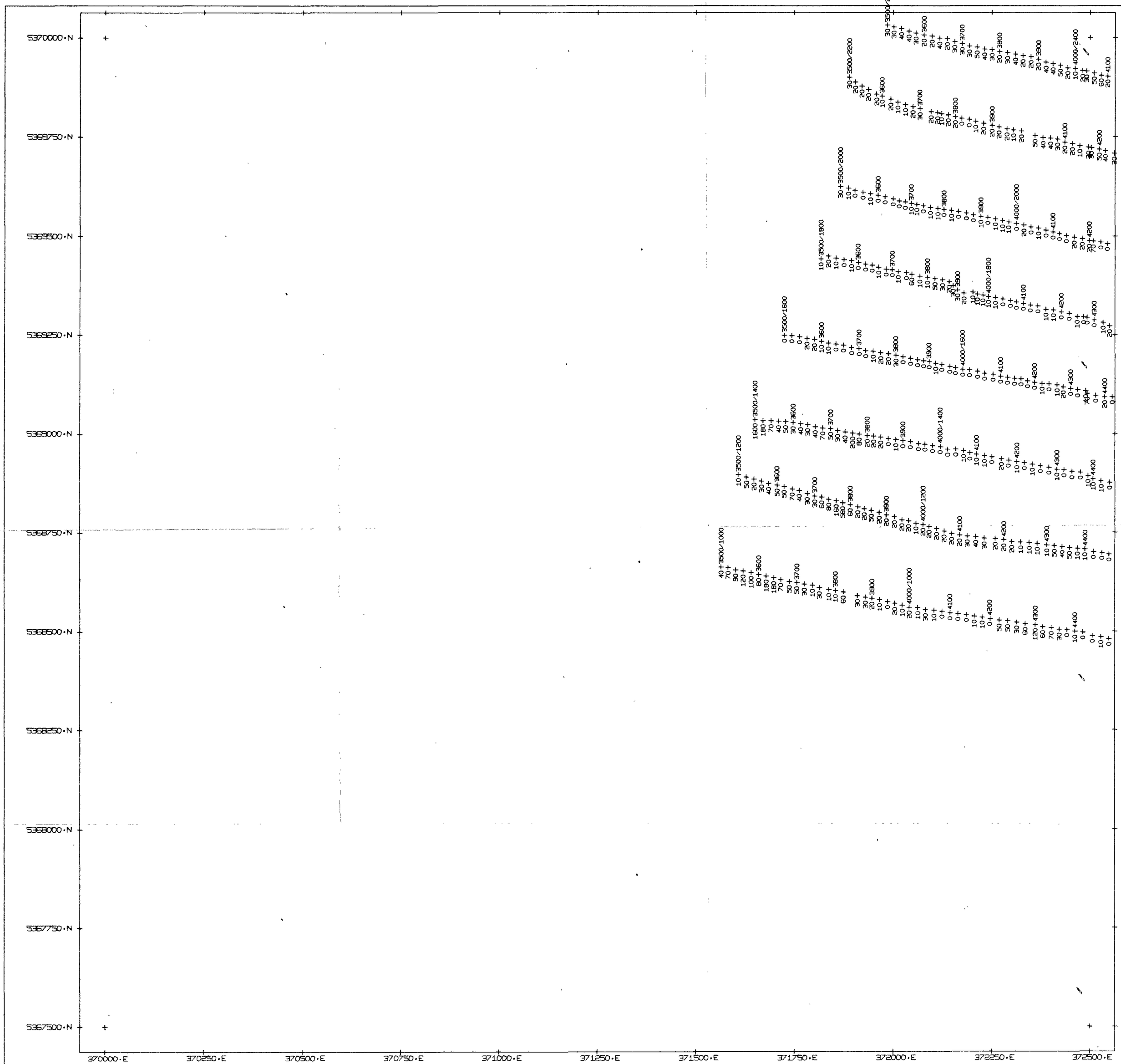
5cm

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - D
GRID GEOCHEMICAL SAMPLING
Aº ZINC RESULTS in ppm

541

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1 · 5000
	TAS/2/1509



5cm

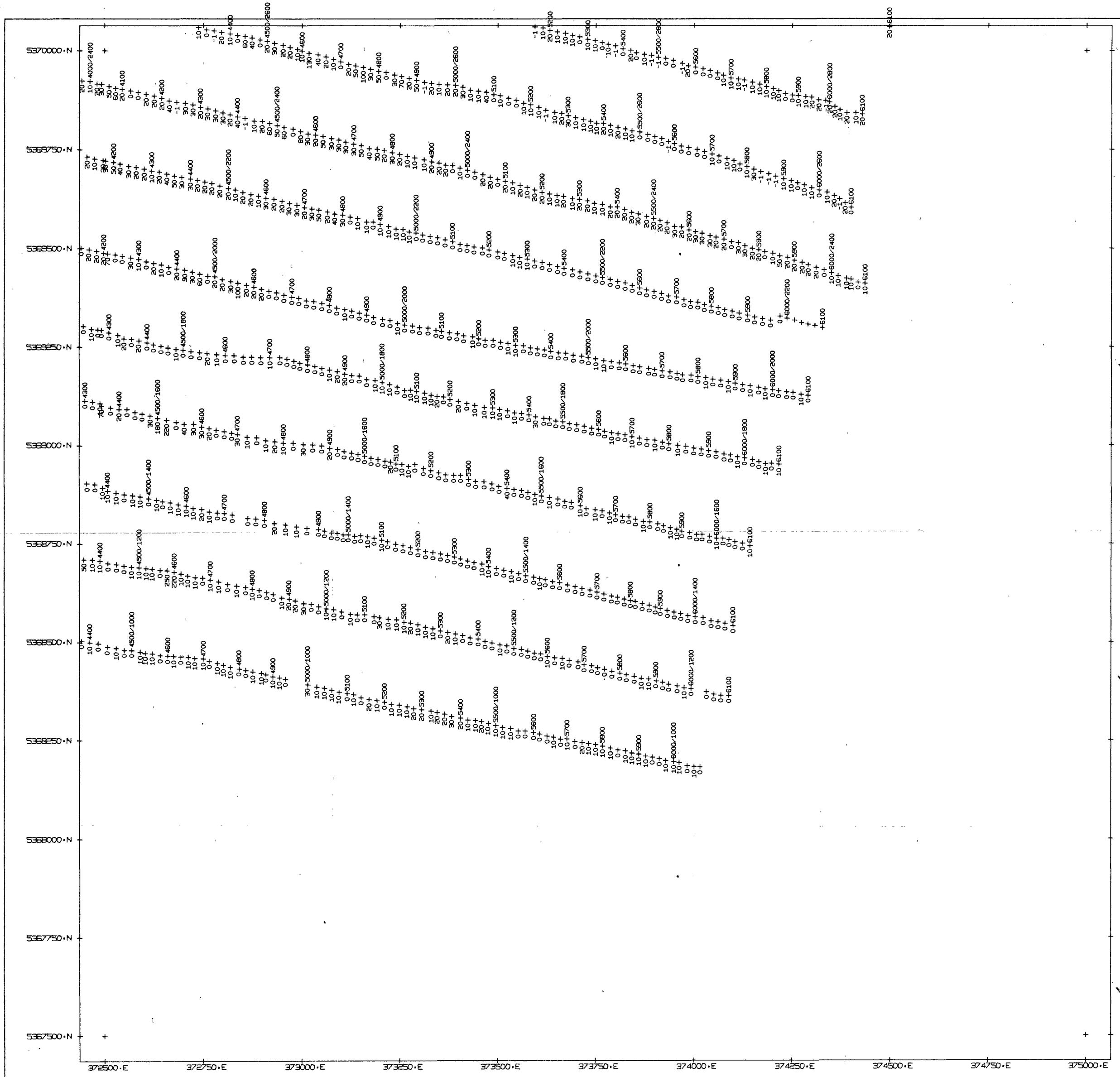
210122

78-1316 Ref Appl

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 542
SHEET 370365 - A
GRID GEOCHEMICAL SAMPLING
A° TIN RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1 5000
	TAS/2/1510



5 cm

210123 78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 543
SHEET 370365 - B
GRID GEOCHEMICAL SAMPLING
A° TIN RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1-5000
	TAS/2/1511

OPEN FILE

210124

aac

MICROFILMED

PROJECT NAME: APPENDIX 1

SIX MONTHLY REPORT TO DEPARTMENT

TITLE: OF MINES, TASMANIA

RENISON EAST - GRID GAP

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES:

COMMODITY/IES:

TEXT PAGES NO:

PLAN NOS:

TABLE NOS:

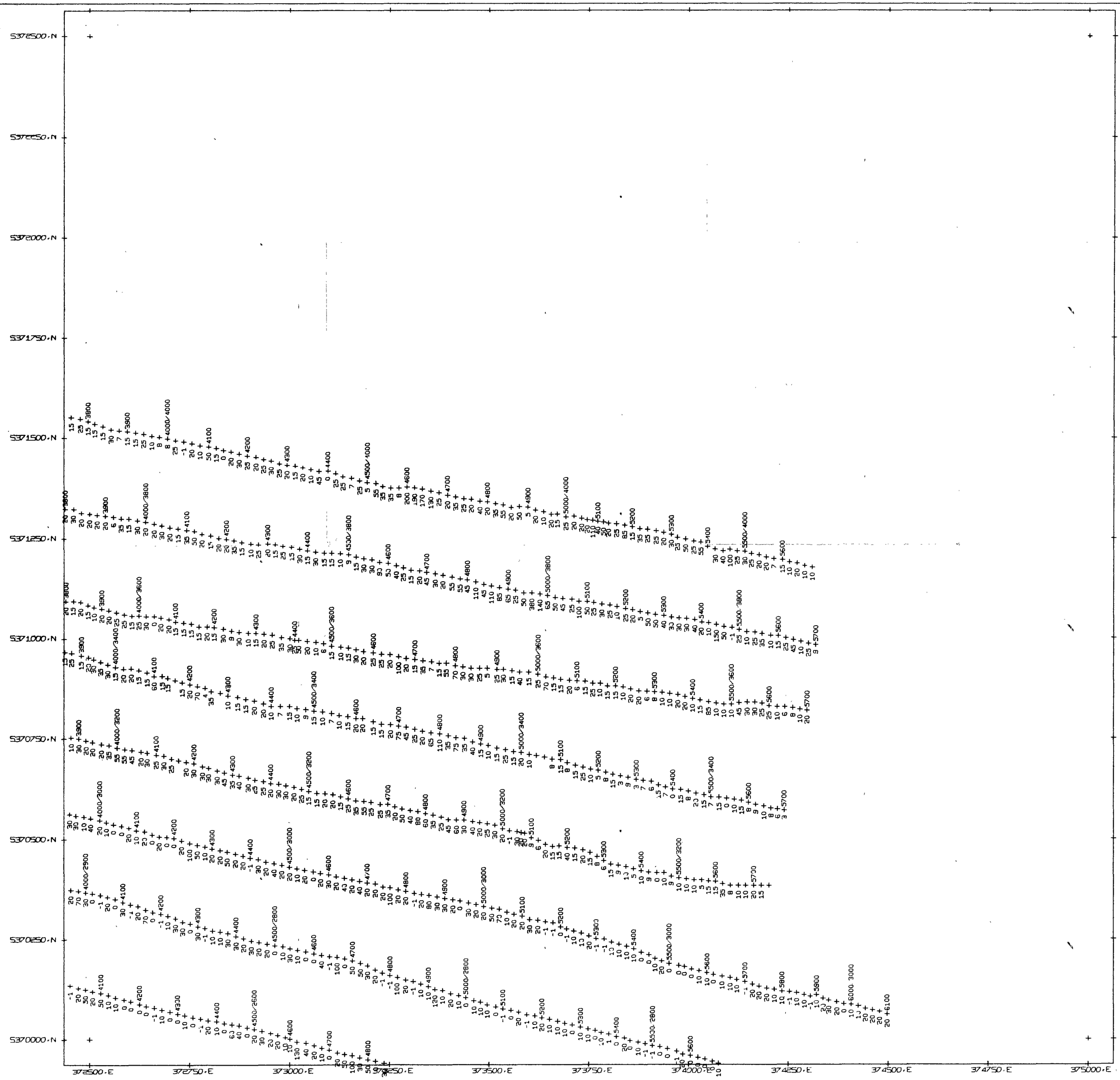
APPENDICES:

AUTHOR/S:

DATE:

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria



5 cm

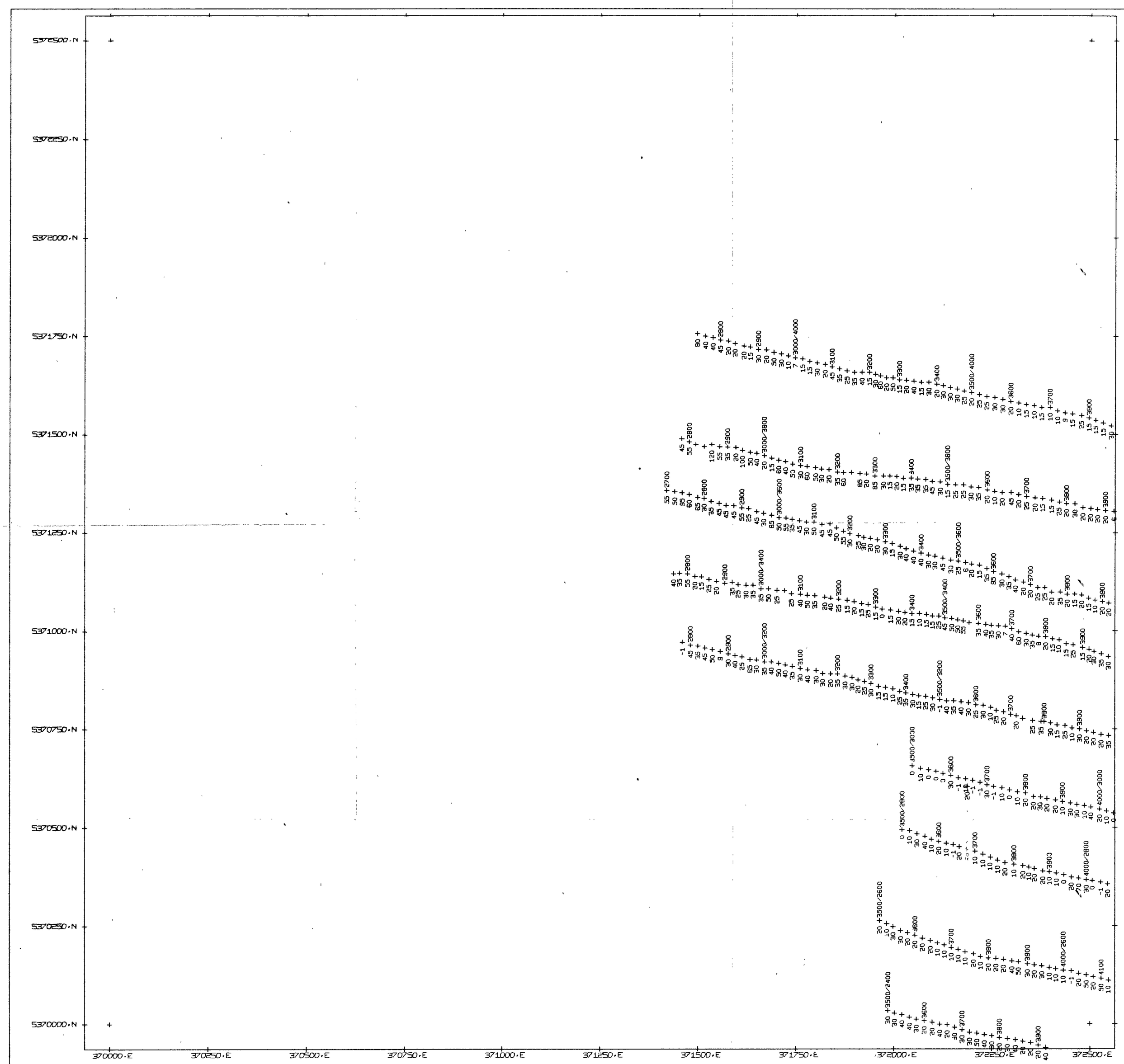
210125

78-1310 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - C 544
GRID GEOCHEMICAL SAMPLING
A° TIN RESULTS in ppm

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1 : 5000
	TAS /2 /1512



5 cm

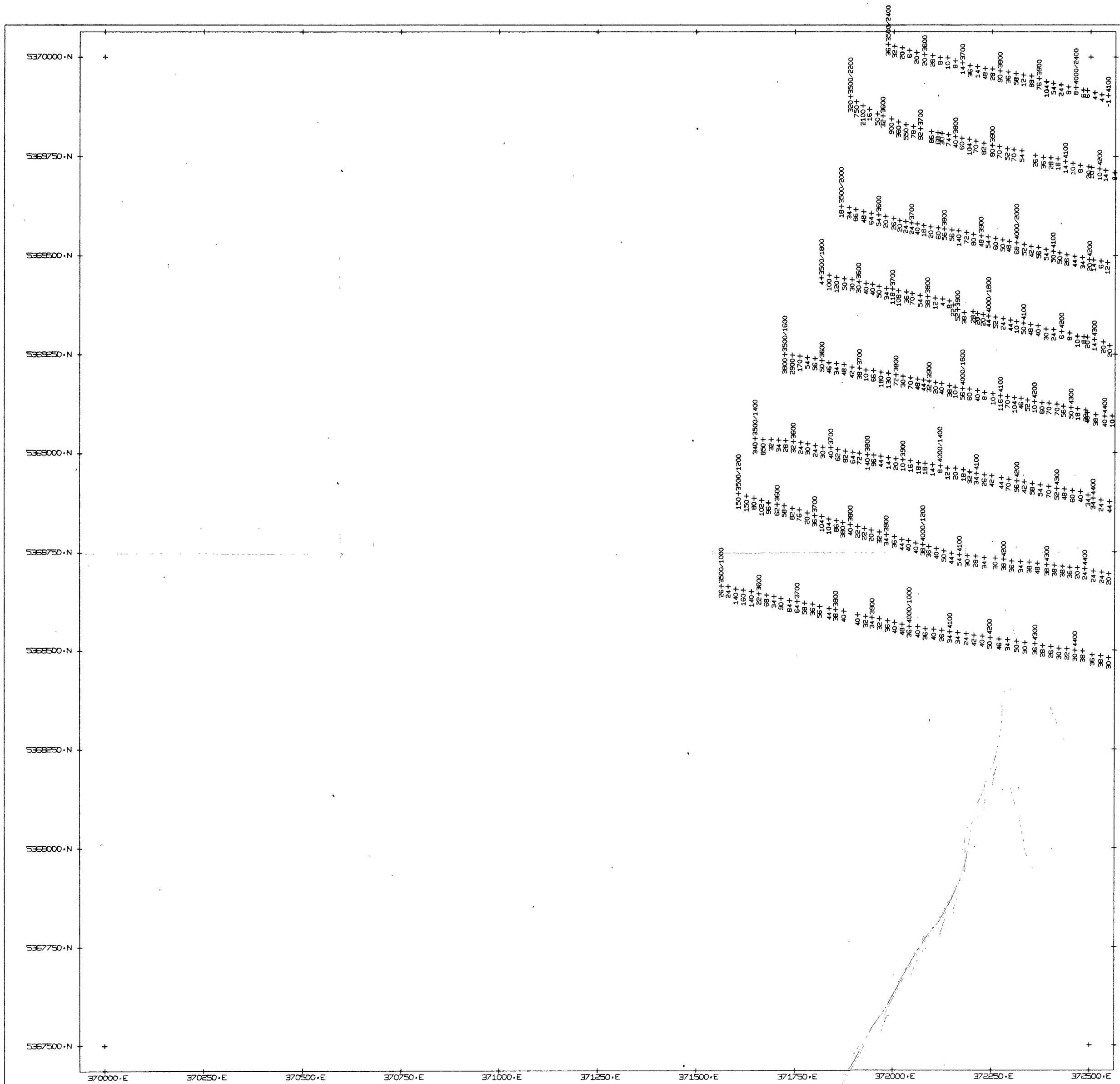
210126

78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 545
SHEET 370370-D
GRID GEOCHEMICAL SAMPLING
A° TIN RESULTS in ppm

DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1:5000
	TAS/2/1513



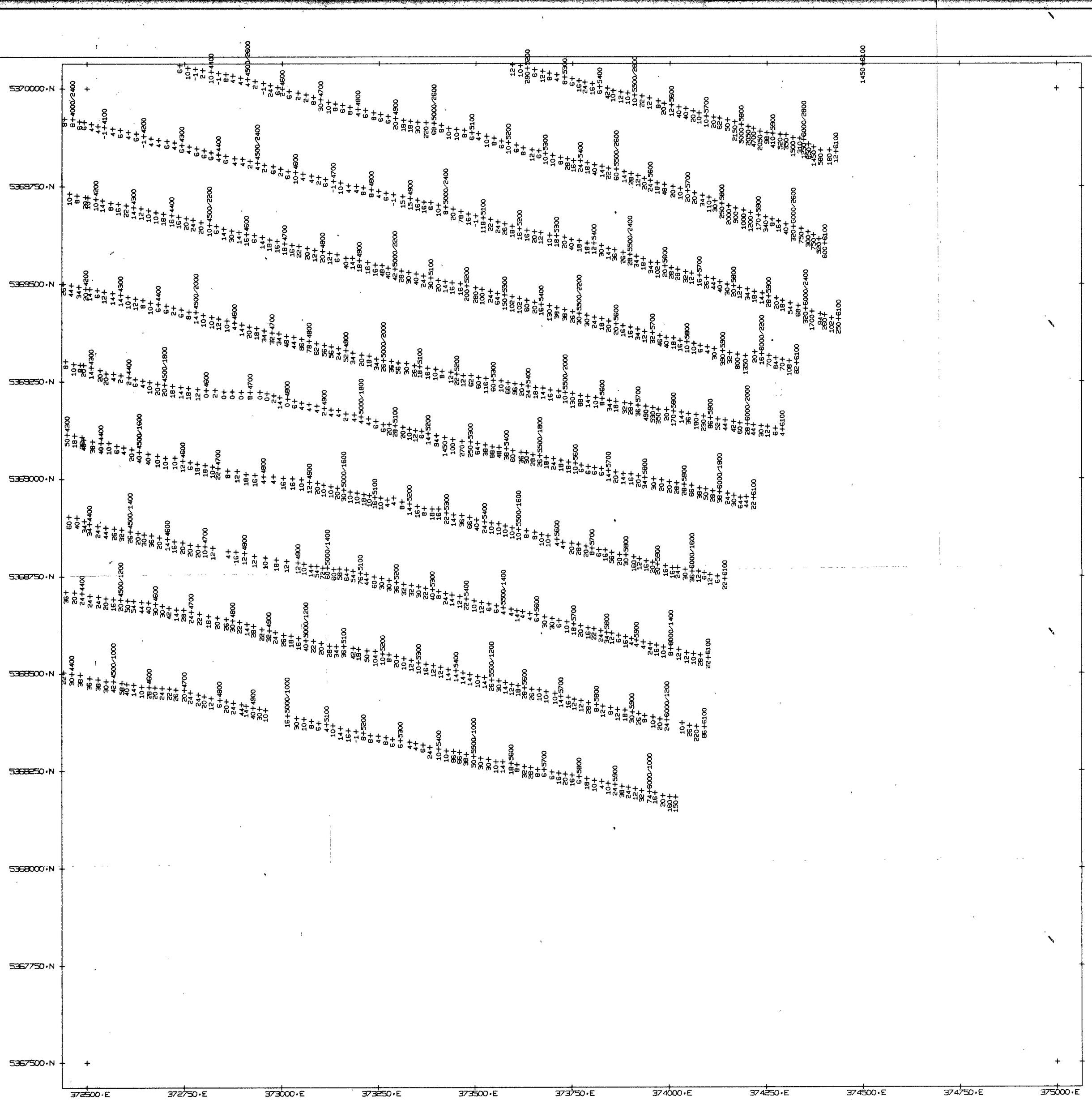
5 cm

210127 78-1316 - App 1.

COMSTAFF PROPRIETARY LIMITED

RENISON GRID – GAP 546
SHEET 370365 – A
GRID GEOCHEMICAL SAMPLING
Ag NICKEL RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/78
COMPILED	COMPUTER
SCALE	1 5000
	TAS/2/1514



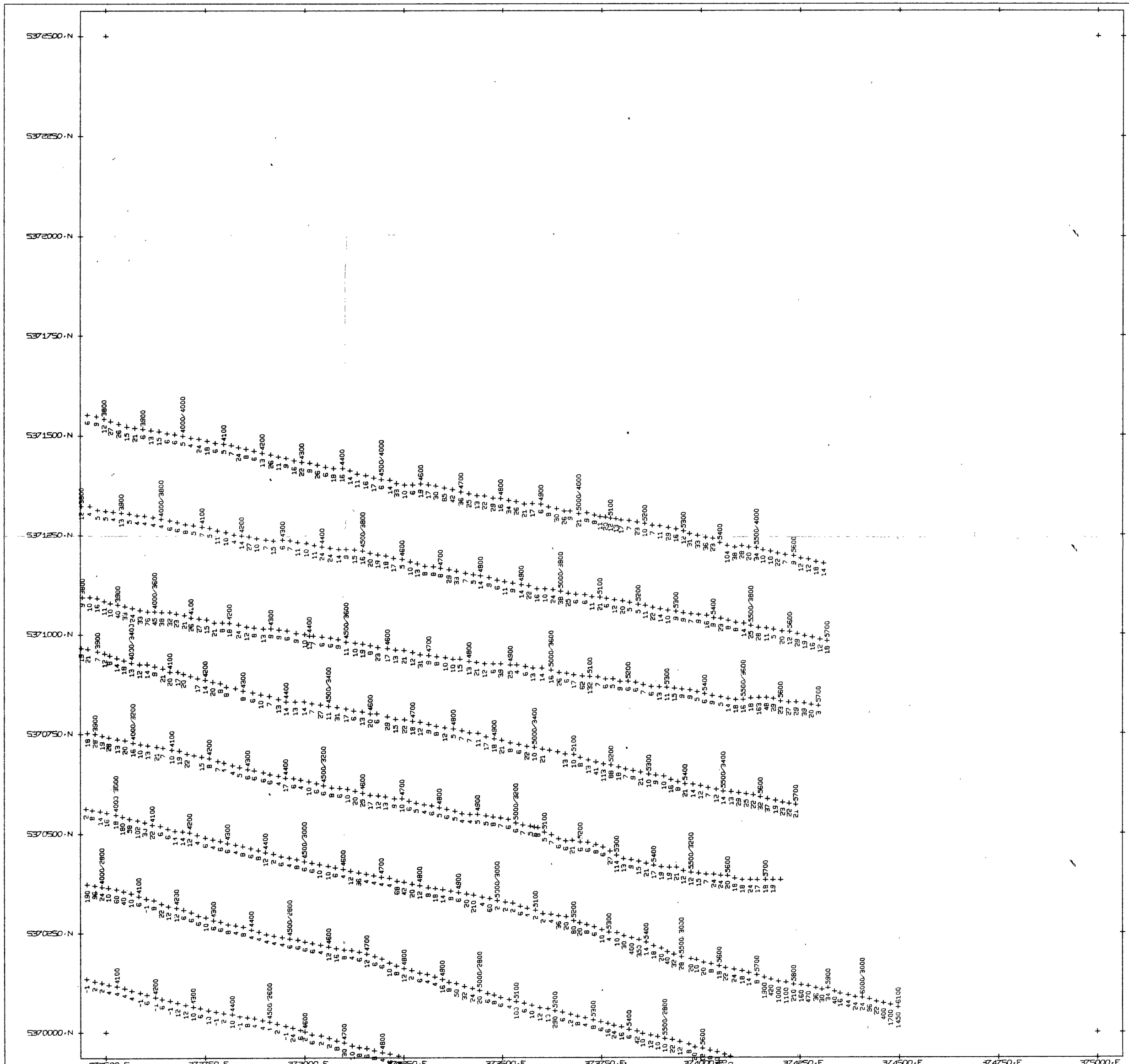
210128 78-1316-App1

5 cm

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP C 547
SHEET 370365 - B
GRID GEOCHEMICAL SAMPLING
Aº NICKEL RESULTS in ppm

DRAWN	COMPUTER
DATE	10/5/76
COMPILED	COMPUTER
SCALE	1 · 5000
	TAS/2/1515



5 cm

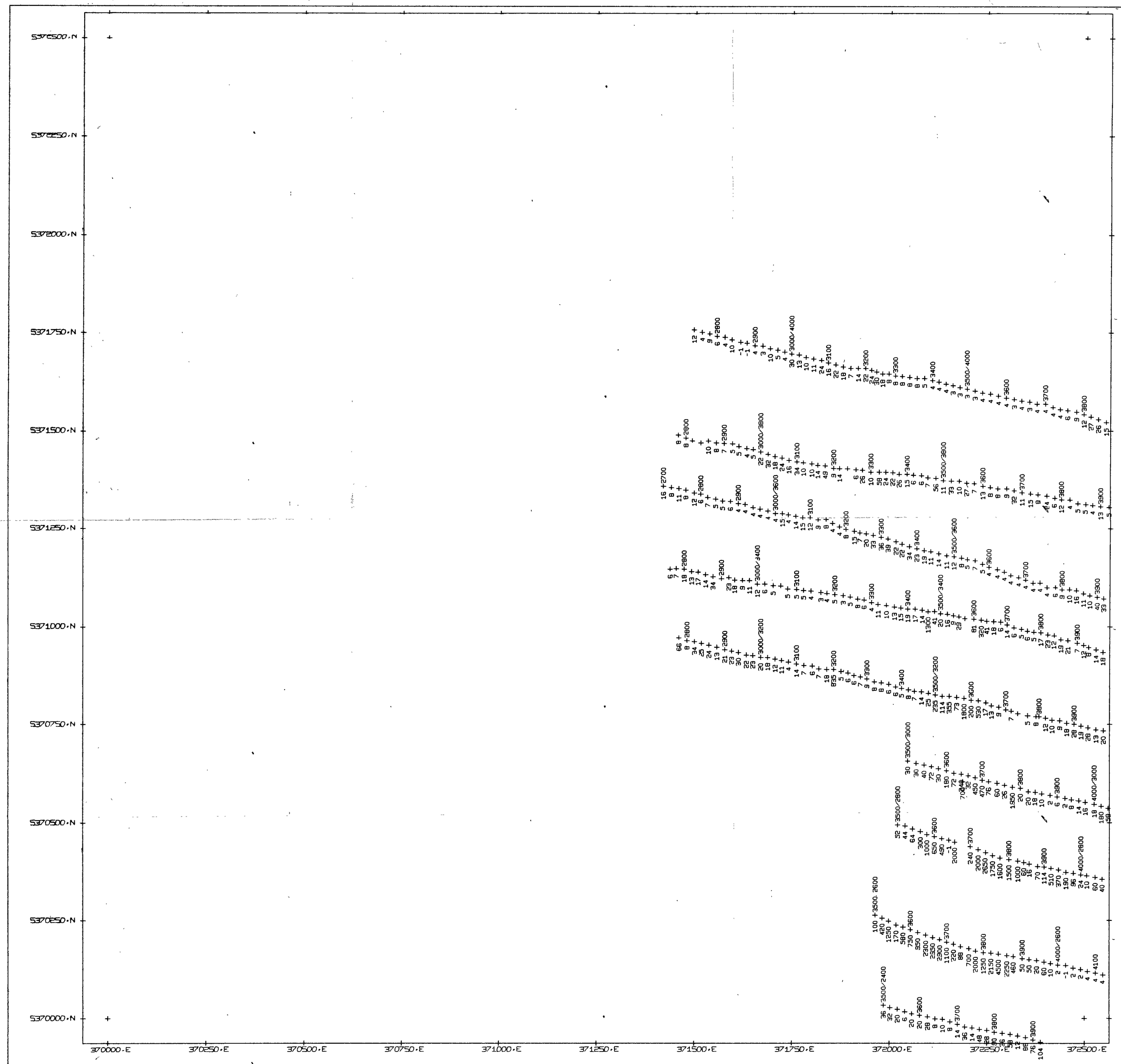
210129 78-1316 Appl

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - C
GRID GEOCHEMICAL SAMPLING
A° NICKEL RESULTS in ppm

548

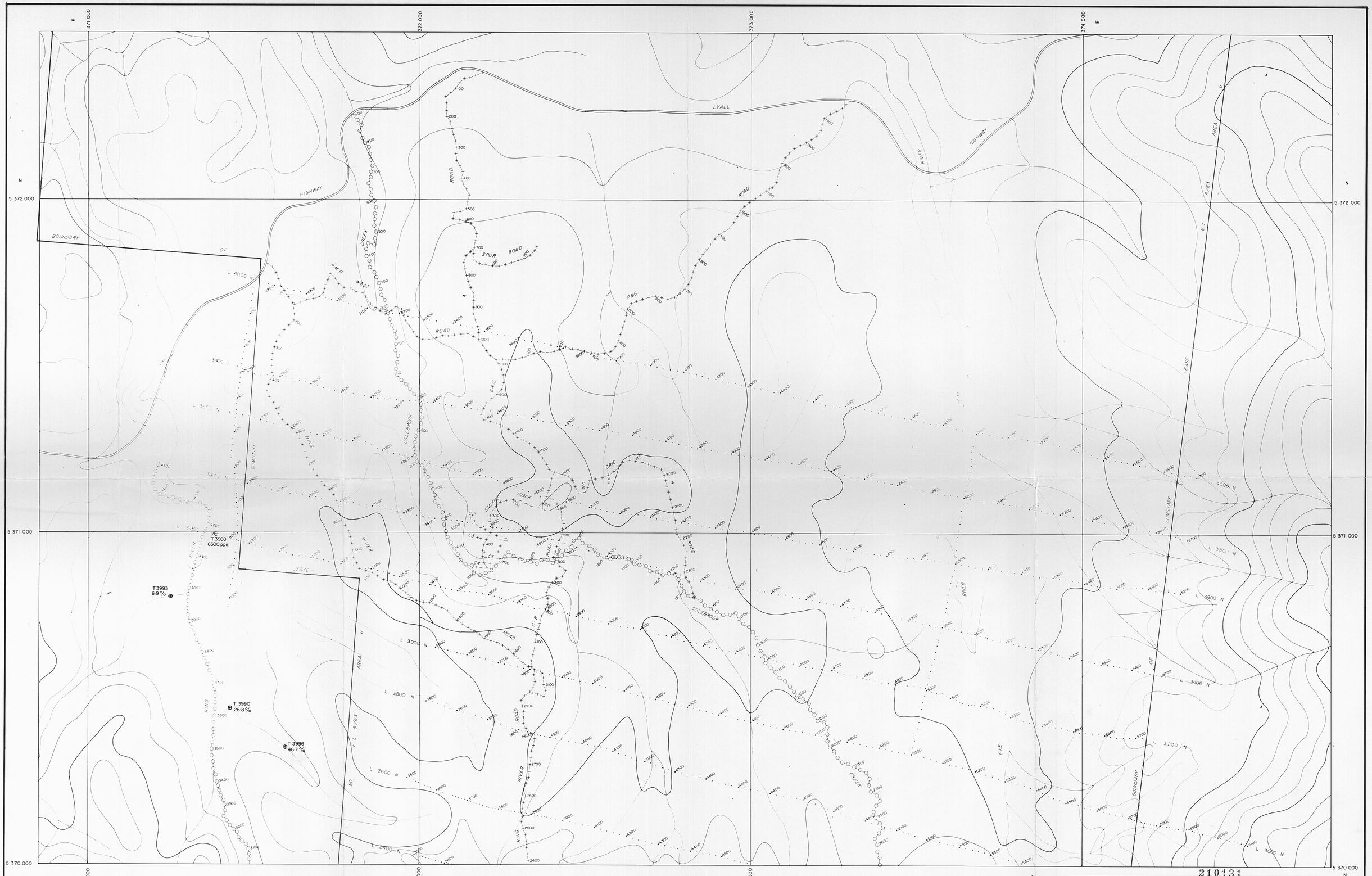
DRAWN	COMPUTER
DATE	30/5/78
COMPILED	COMPUTER
SCALE	1 : 5000
	TAS/2/1516



5 cm

210130

COMSTAFF PROPRIETARY LIMITED		
RENISON GRID - GAP 78-1316 SHEET 370370 - D App 1. GRID GEOCHEMICAL SAMPLING A° NICKEL RESULTS in ppm 549	DRAWN	COMPUTER
	DATE	30/5/78
	COMPILED	COMPUTER
	SCALE	1:5000
		TAS/2/1517



LEGEND

- 25m interval contour line
- Surveyed watercourse
- Unsurveyed watercourse
- Surveyed road/track
- Unsurveyed road/track
- Grid lines showing sample locations
- Costean survey points
- Railway

5 cm

Sheet Index

TN

210131

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP

TIN CONTENT IN

HEAVY MINERAL CONCENTRATES

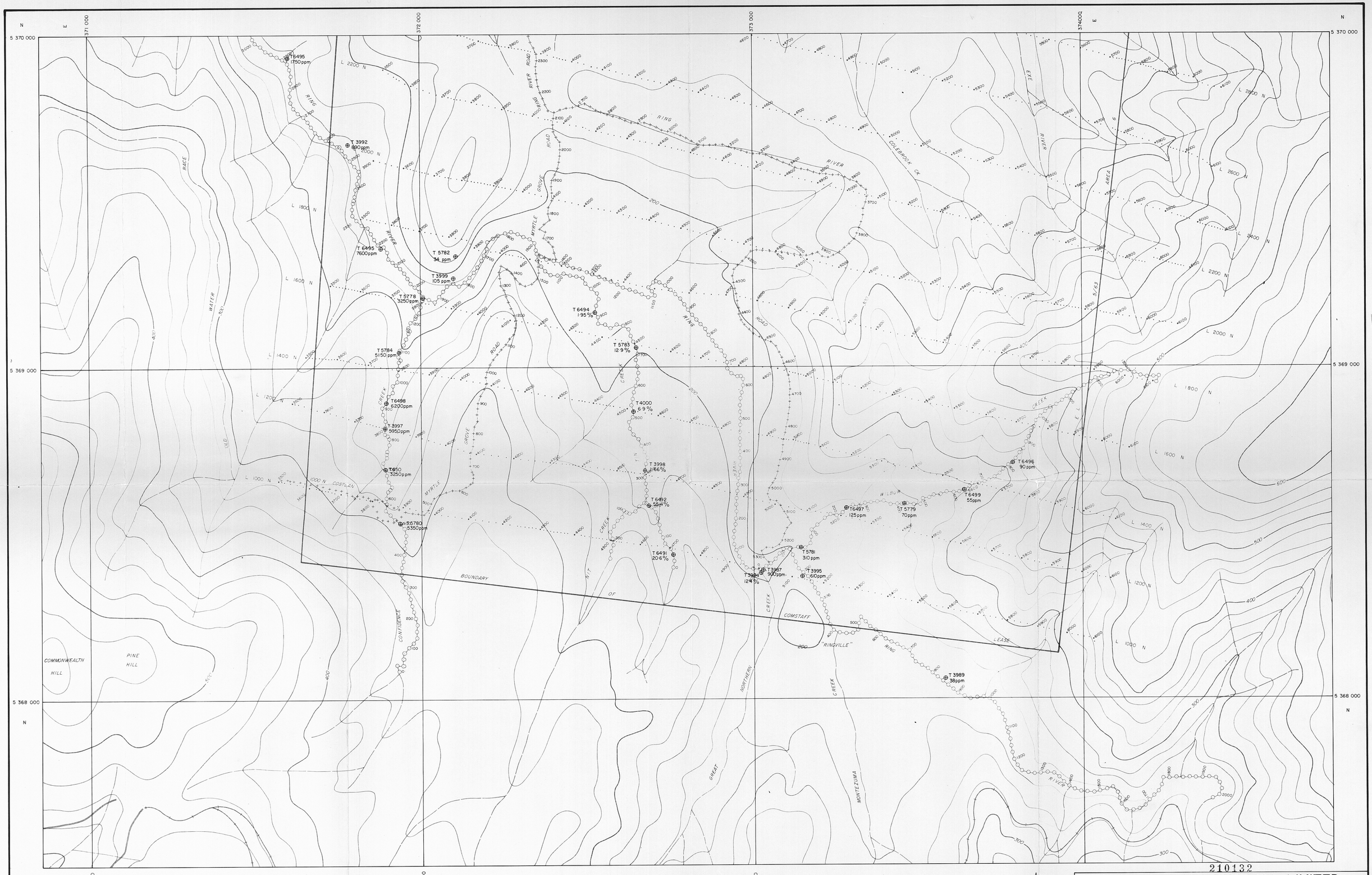
78-1316

App 1.

Vol 4/11

550

COMPILED	G.F.P.
DRAWN GEODRAFT	DATE 16/10/78
AMENDED	
SCALE	1 : 5000
PLAN No	TAS/2/1664



LEGEND

- 400 — 25m interval contour line
- Surveyed watercourse
- Unsurveyed watercourse
- Surveyed track /road
- Unsurveyed track / road
- Grid lines showing sample locations
- Costean survey points
- Railway

5 cm

Sheet Index

T N

210132

COMSTAFF PROPRIETARY LIMITED

78-1316

RENISON GRID - GAP
TIN CONTENT IN
HEAVY MINERAL CONCENTRATES

App'l Vol 4/11

C 551

COMPILED	G.F.P.
DRAWN GEODRAFT	DATE 16/10/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1665

210133 78-1316 App 1 552

5 cm

GRID GAP LINE 1000 SCALE 1 TO 5,000

TAS/2/1620

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

AS PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

CONFIDENCE CREEK

NIT CREEK

TIN CREEK

RING RIVER

RING RIVER

TRACK

alluvial - qp

bs

cg/lw

qr

qr

ss

ss

gd

bk sh

fu

fu

sh

bk sh/gw

Dss

gw/qk

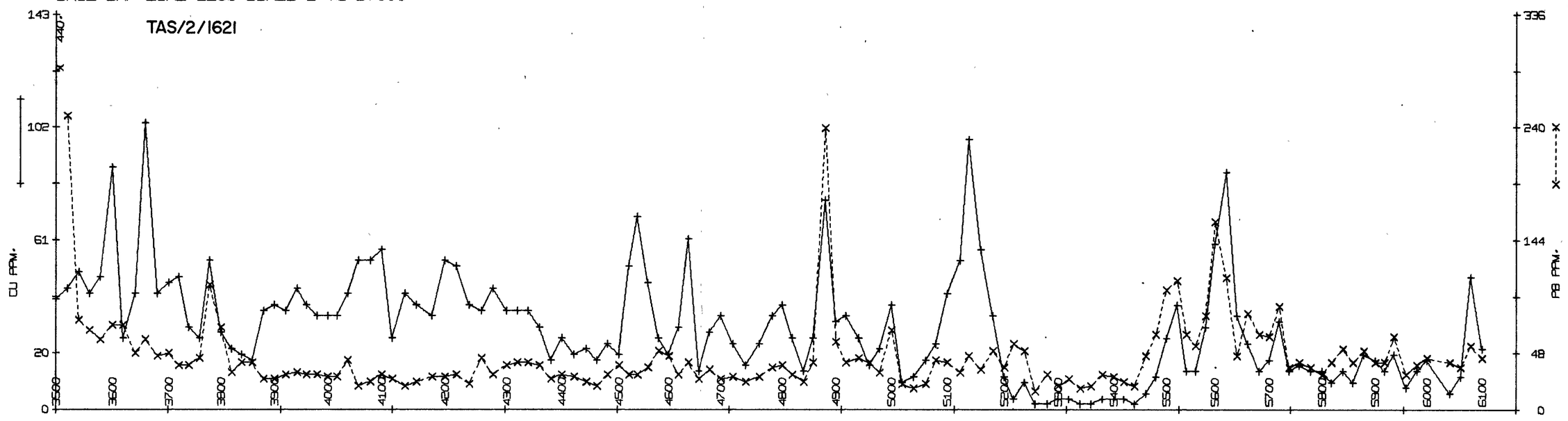
bk sh /fu

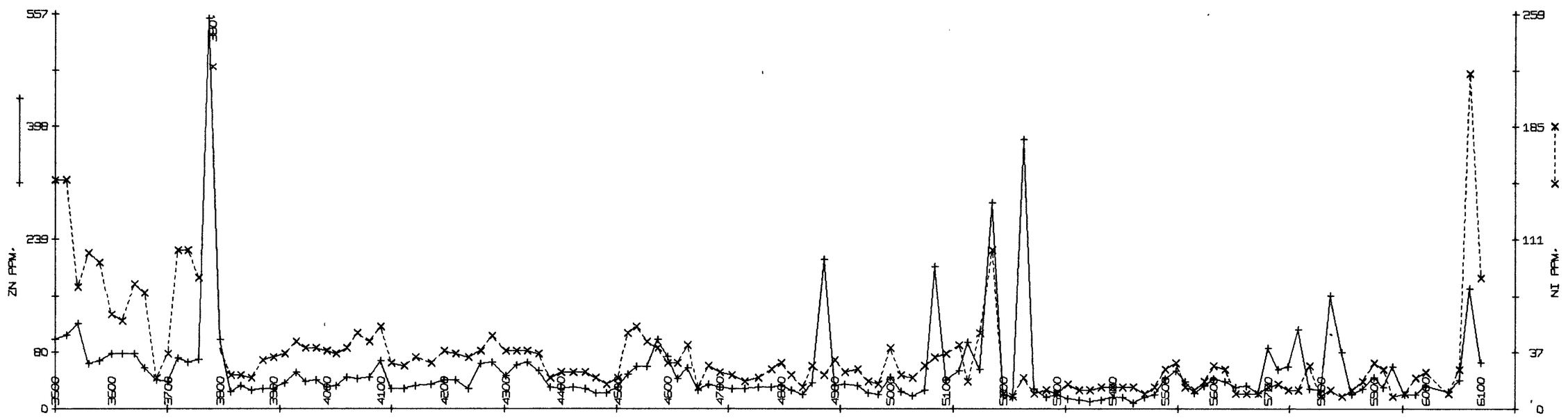
78-1316 Appl 553 210134

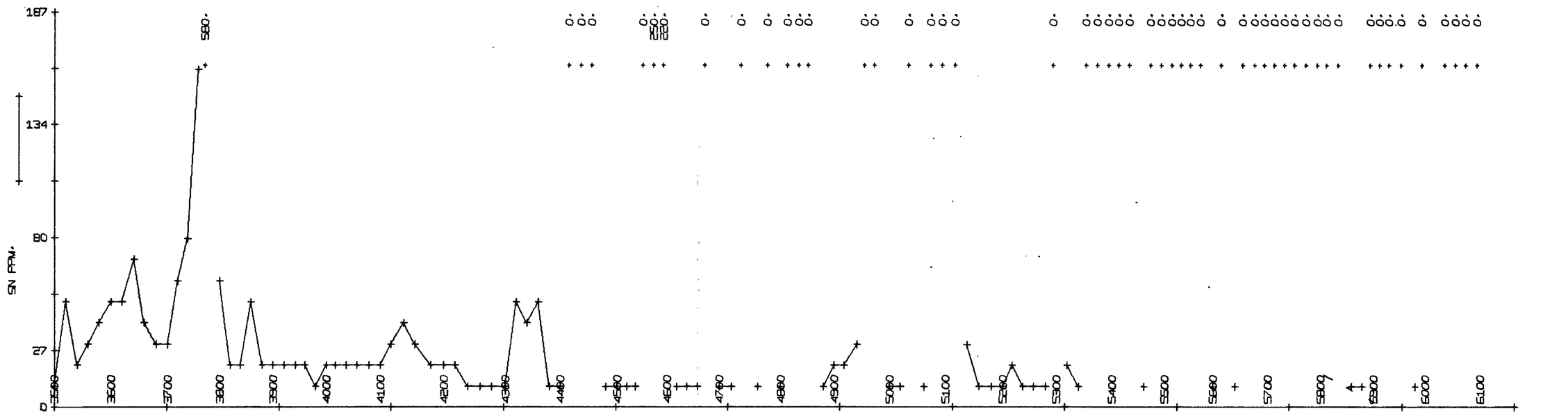
5 cm

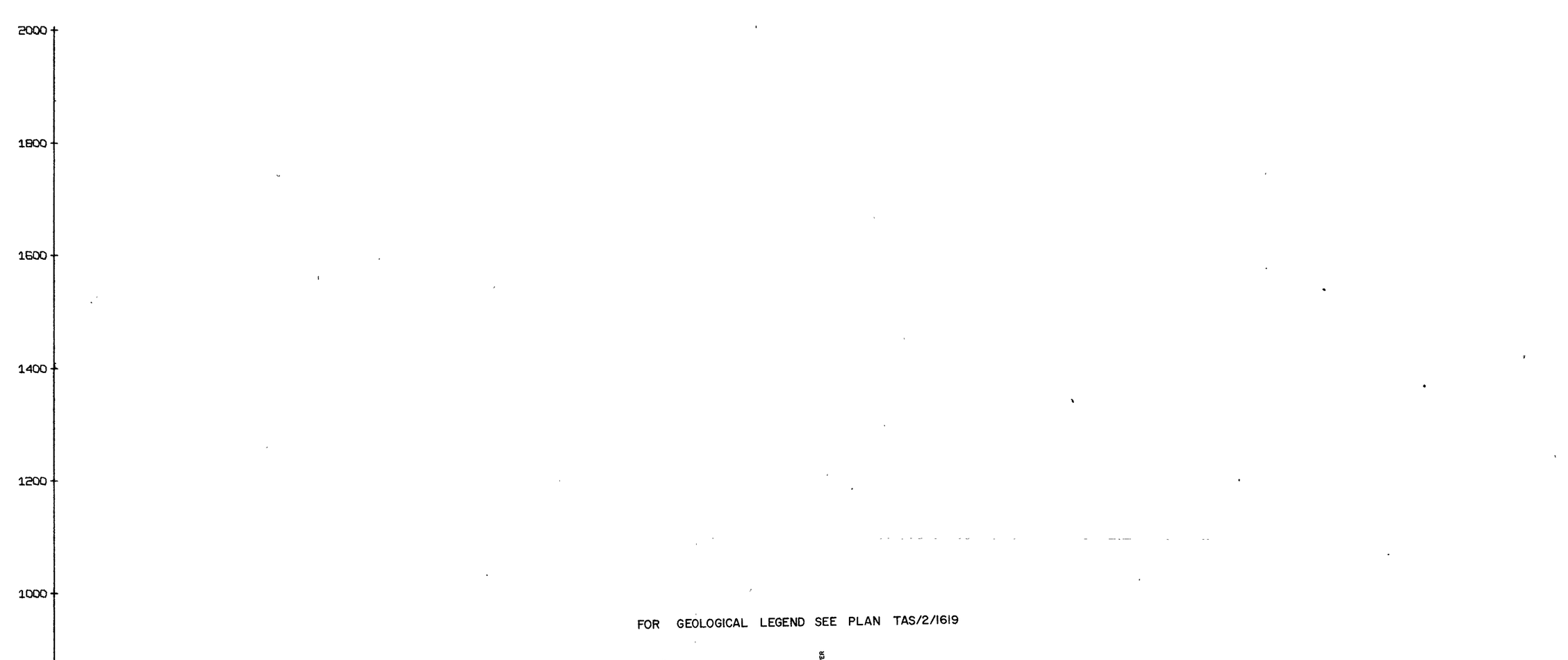
GRID GAP LINE 1200 SCALE 1 TO 5,000

TAS/2/1621









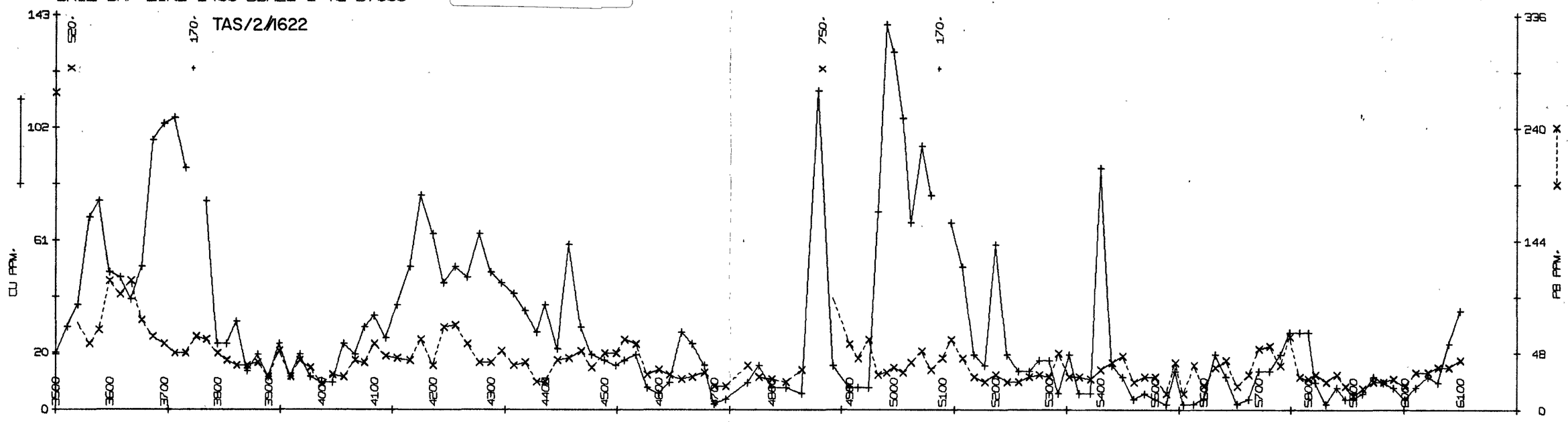
FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

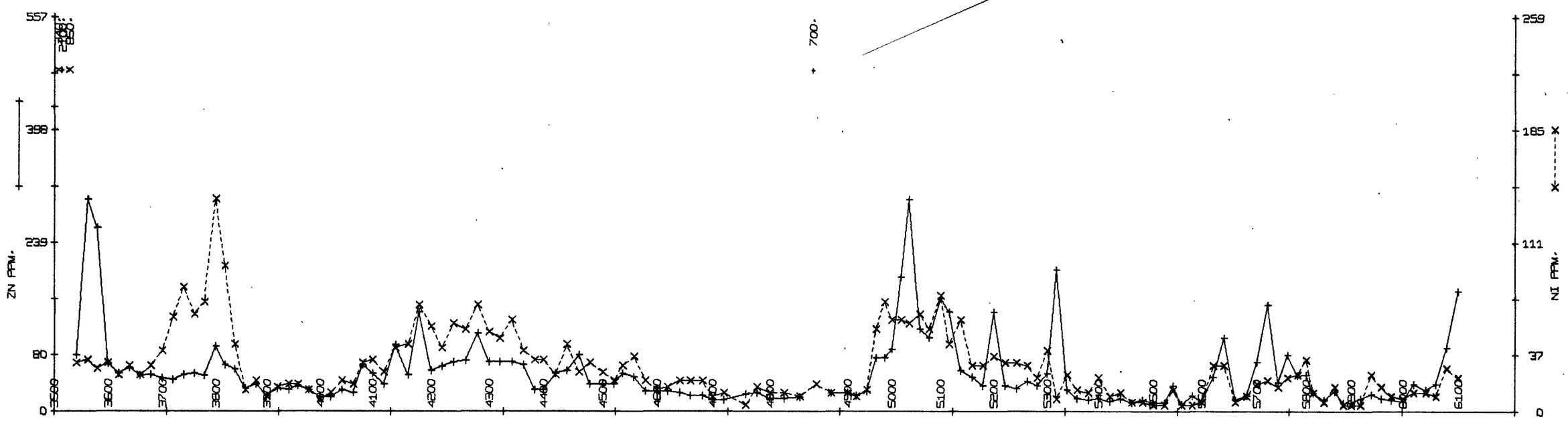
210135 78-1316 App) 554

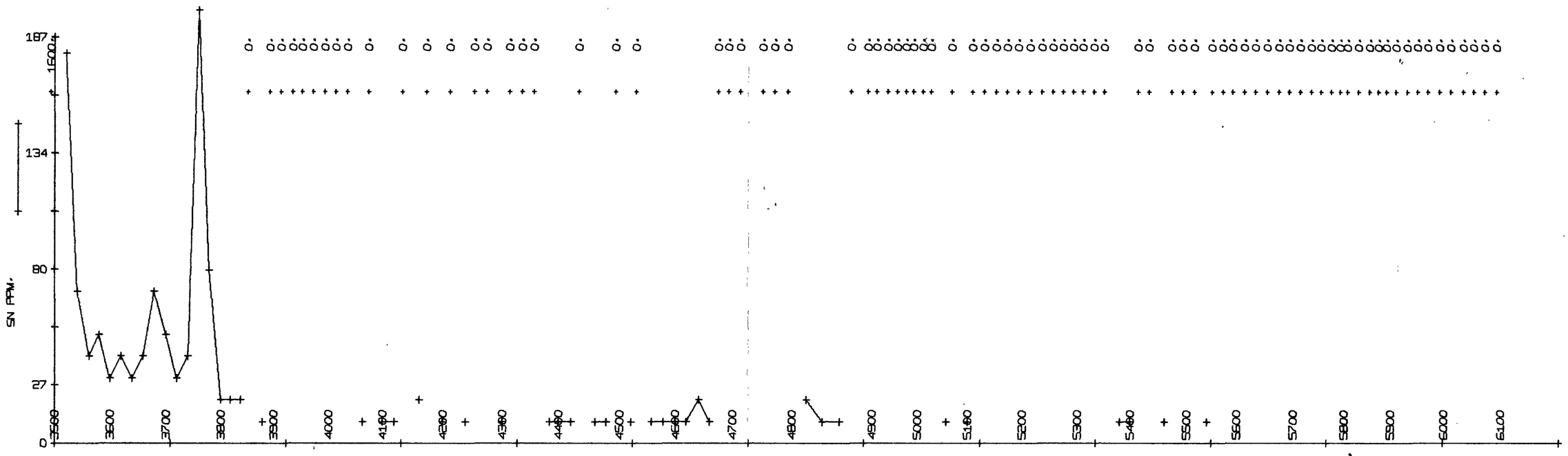
GRID GAP LINE 1400 SCALE 1 TO 5,000

5 cm

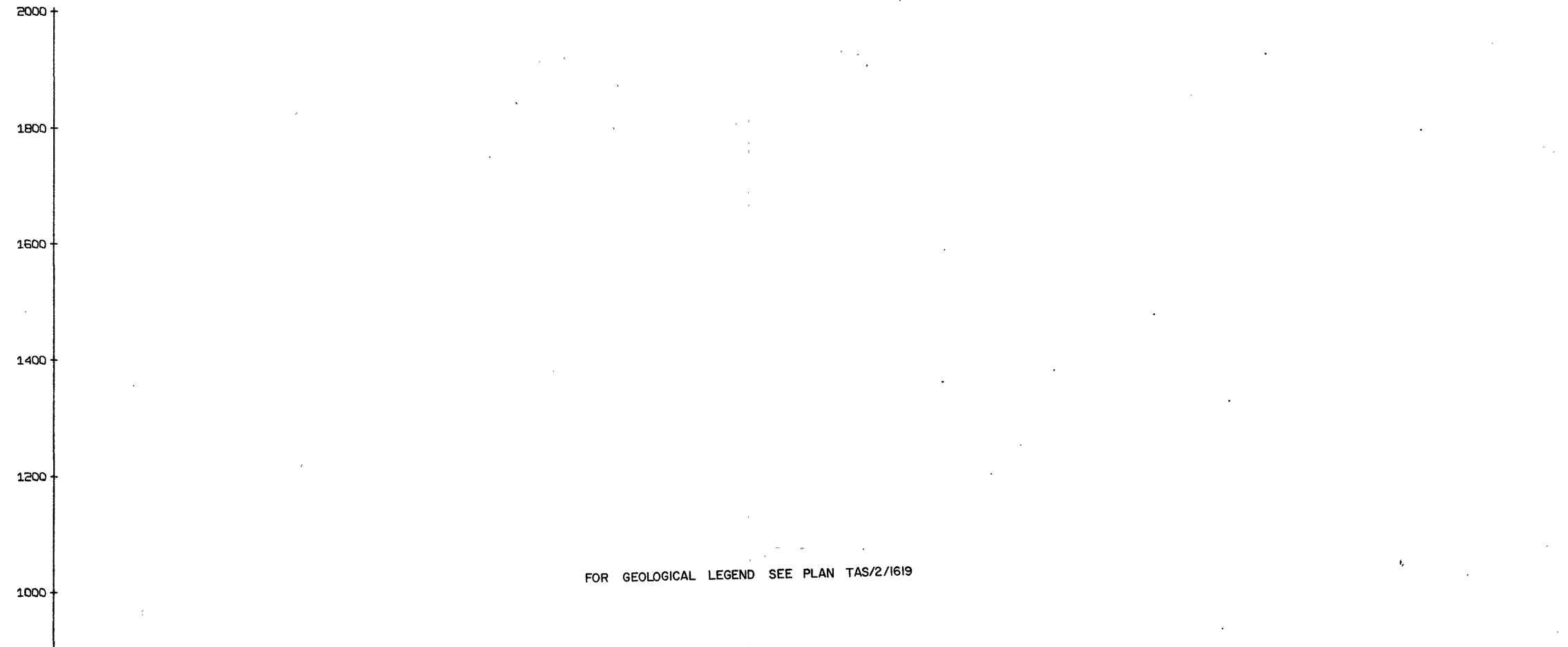
TAS/2/1622







FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

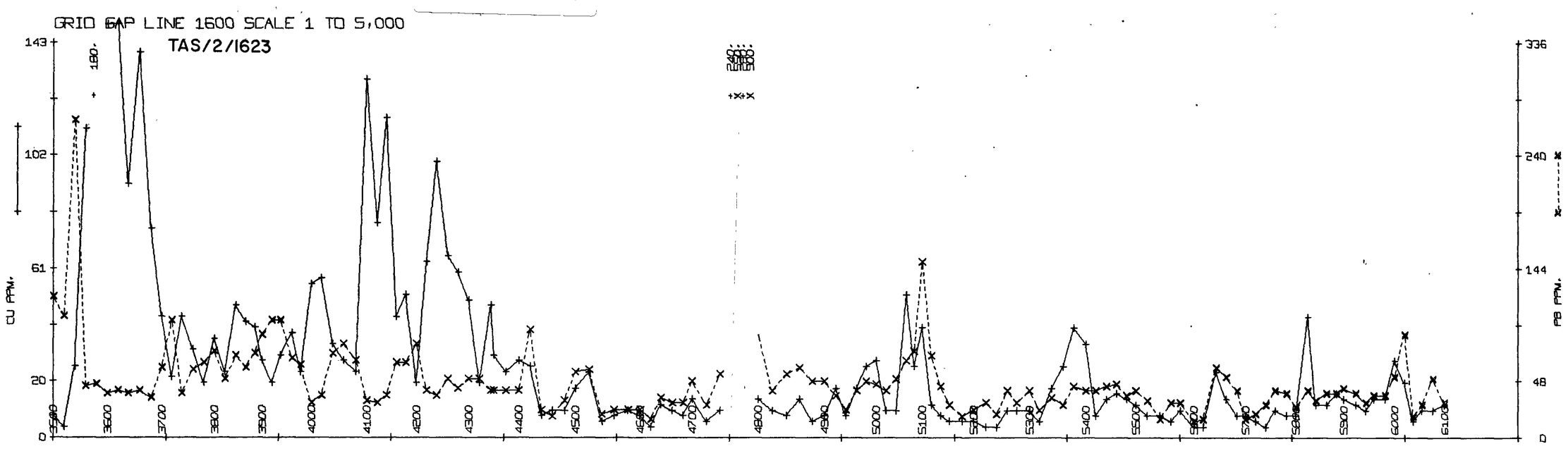


210136 78-1316 App 1 555

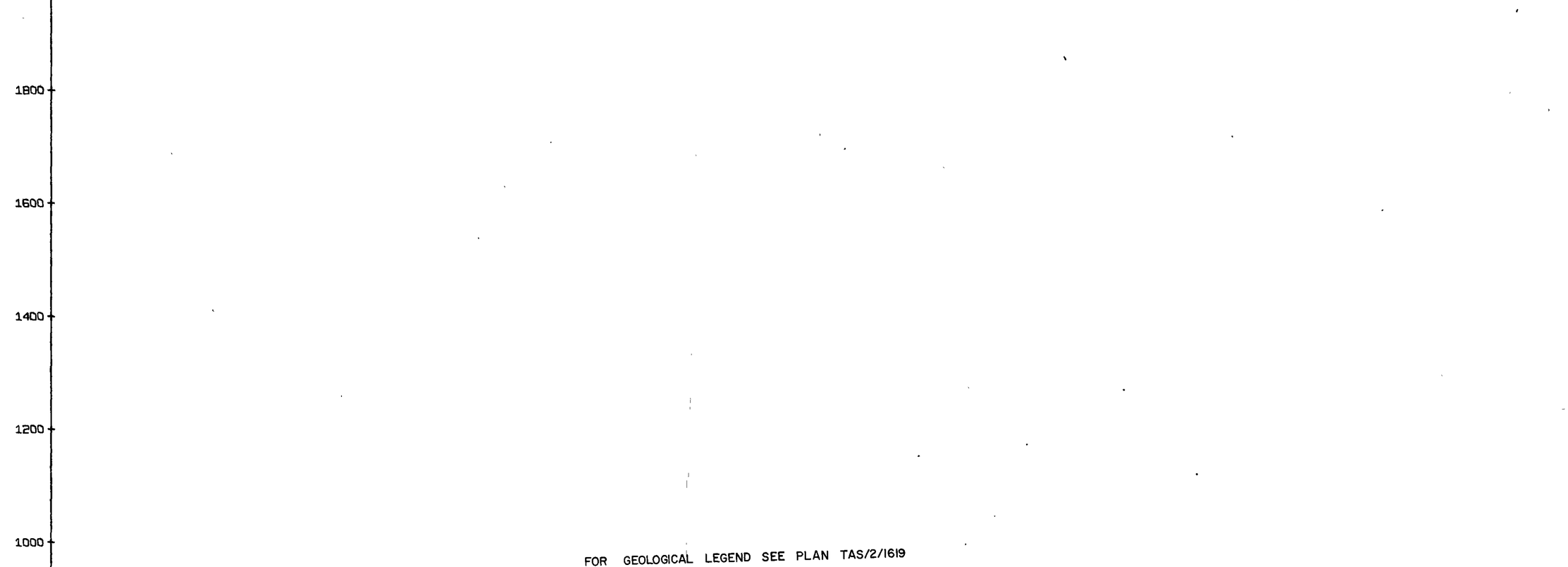
5 cm

GRID GAP LINE 1600 SCALE 1 TO 5,000

TAS/2/1623



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619



210137

5 cm

78-1316 App 1. 556

GRID GAP LINE 1800 SCALE 1 TO 5,000

TAS/2/1624

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

AG PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

TIN CREEK

RING RIVER

cg/lw bs gr ss sp gb lw bs ss ss lw bs ss bk st/gw tu ok Dss ok/gw Dss/gw

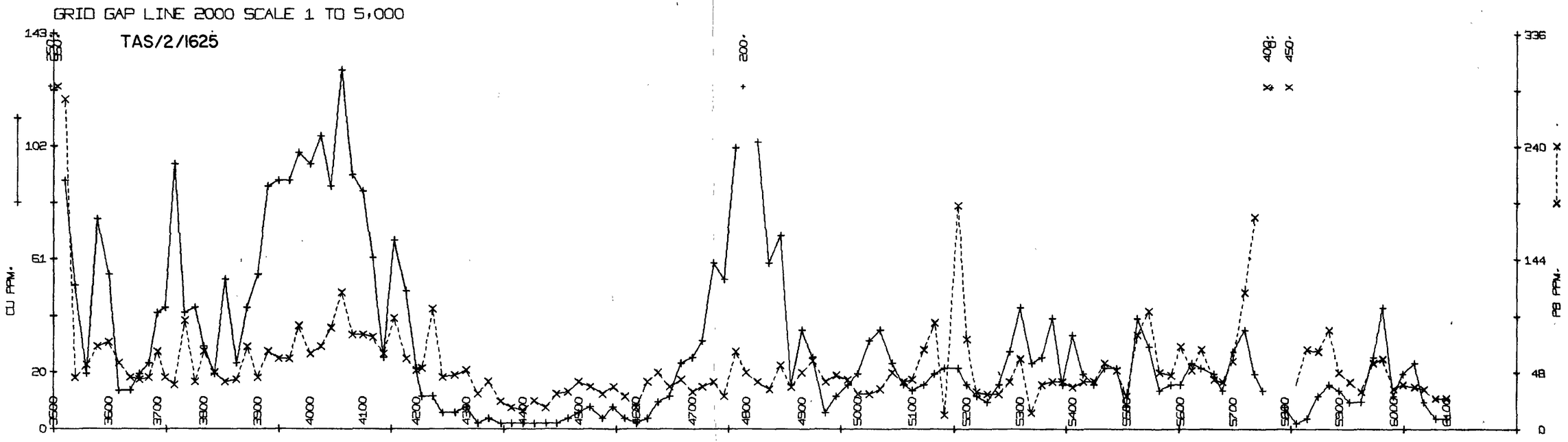
78-1316 Appl.

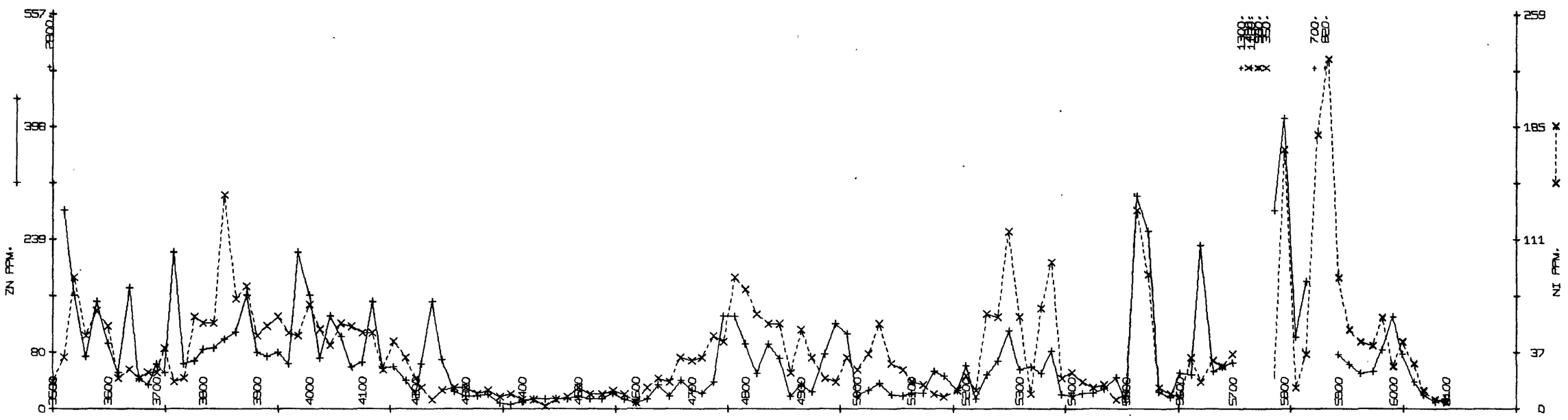
210188 557

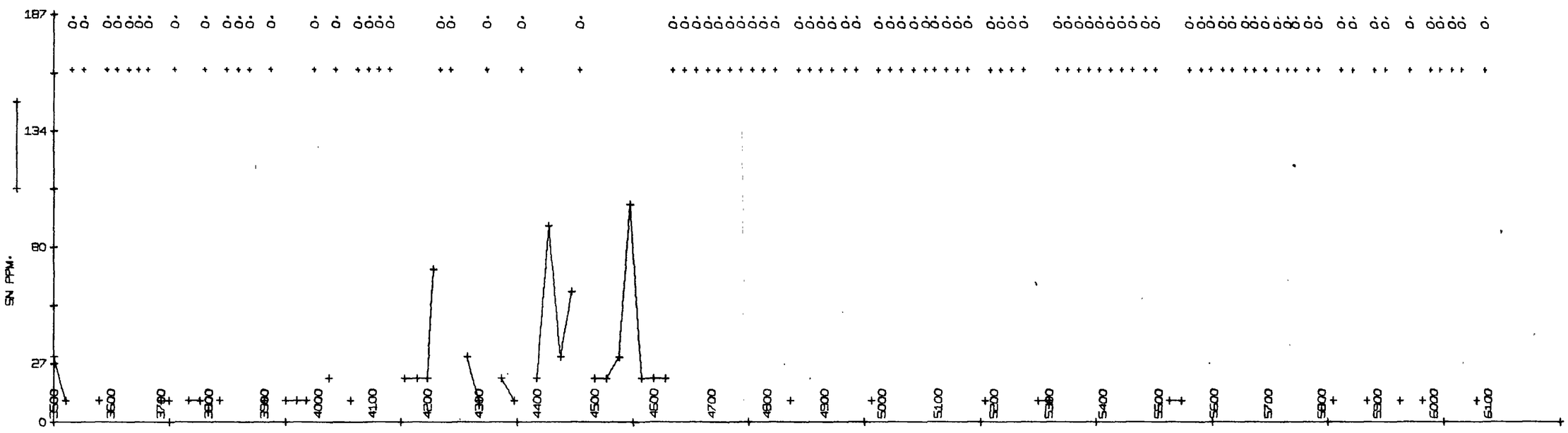
5 cm

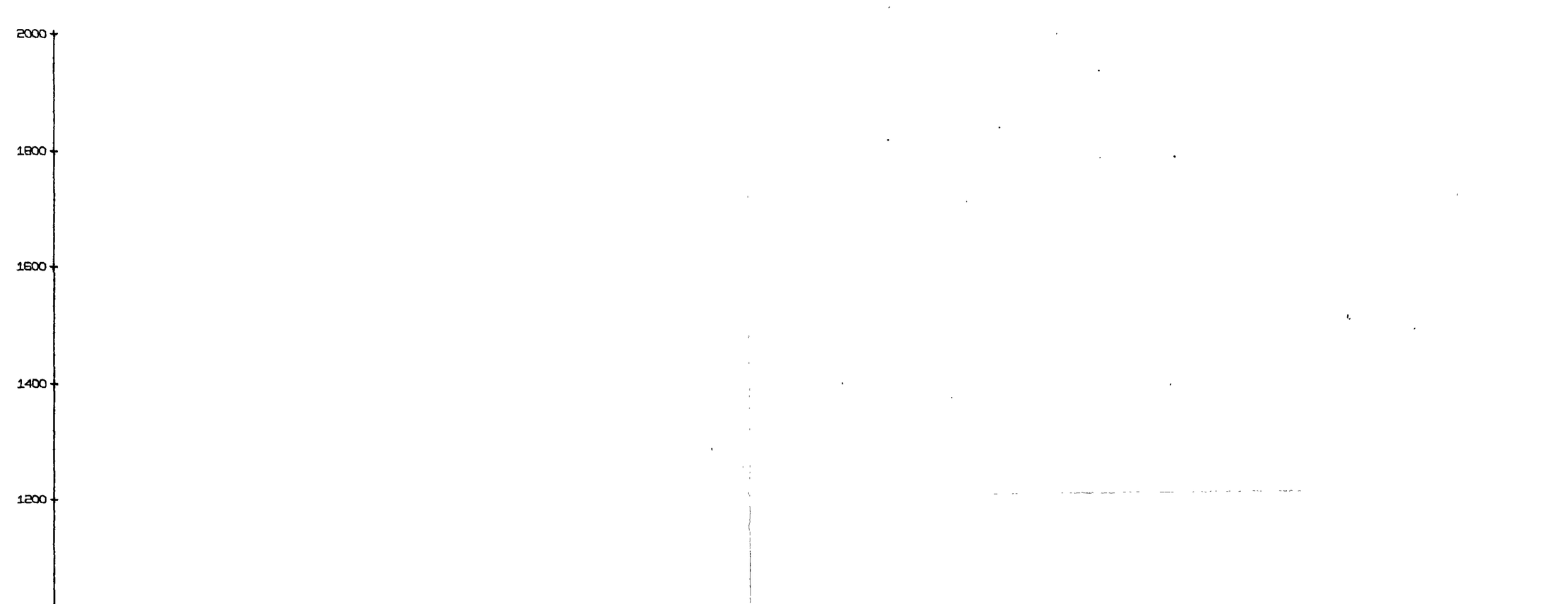
GRID GAP LINE 2000 SCALE 1 TO 5,000

TAS/2/1625









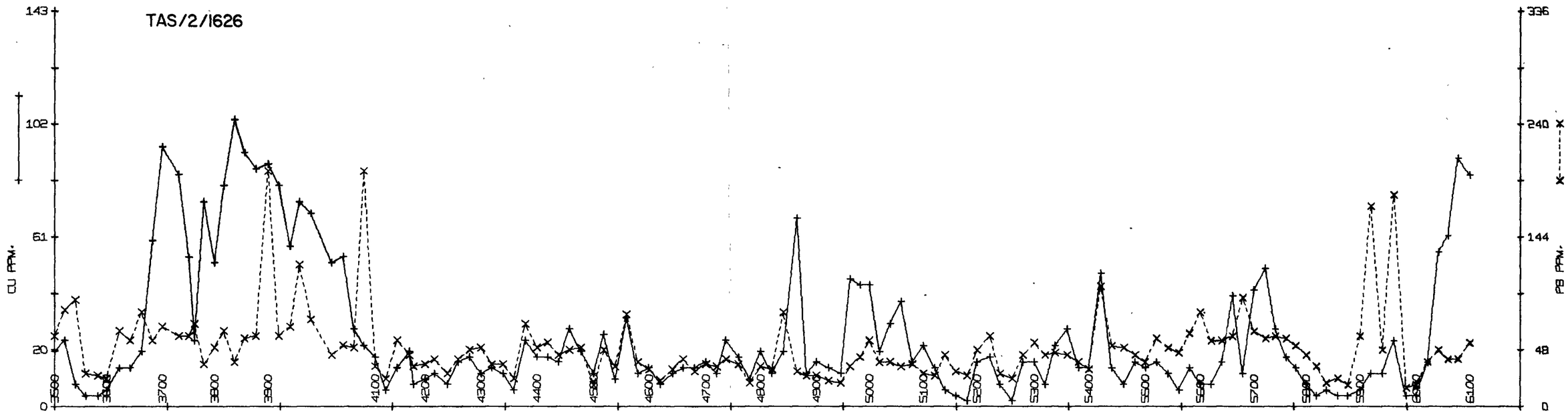
78-1316 App!

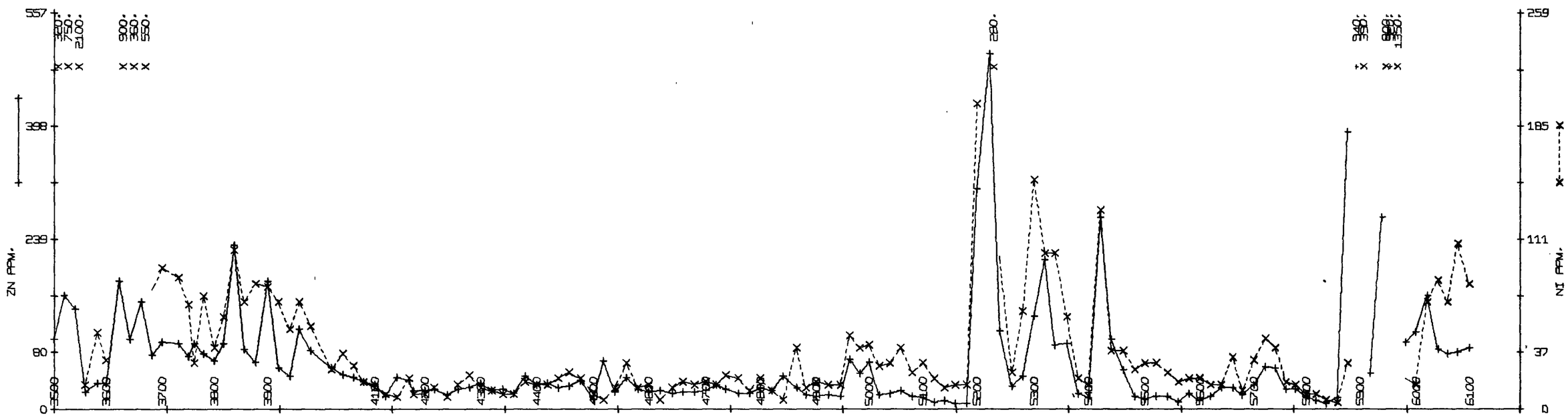
210139 558

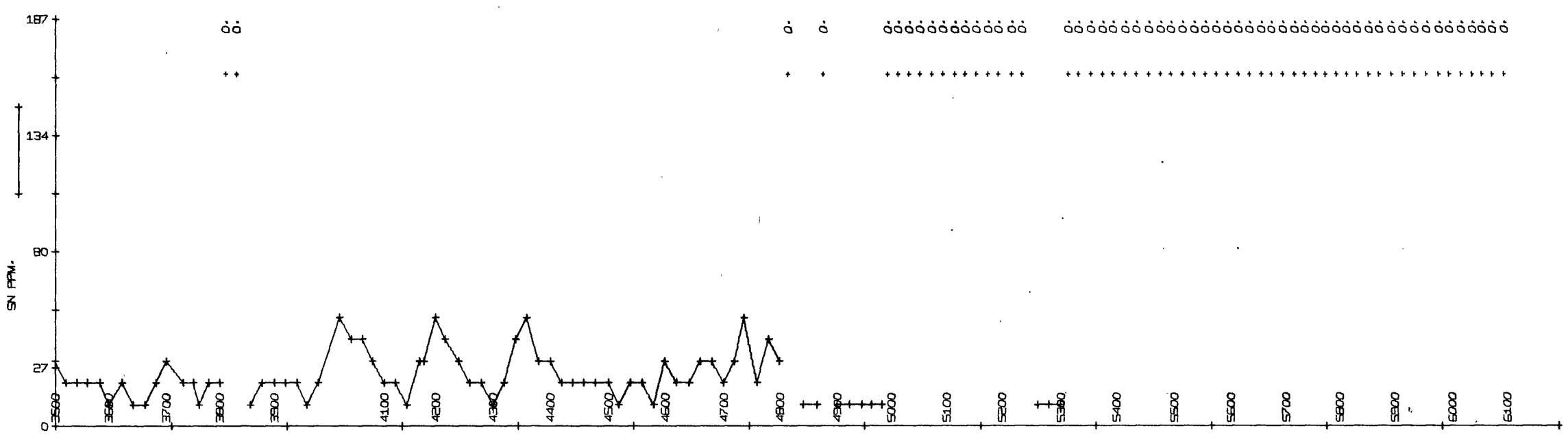
5 cm

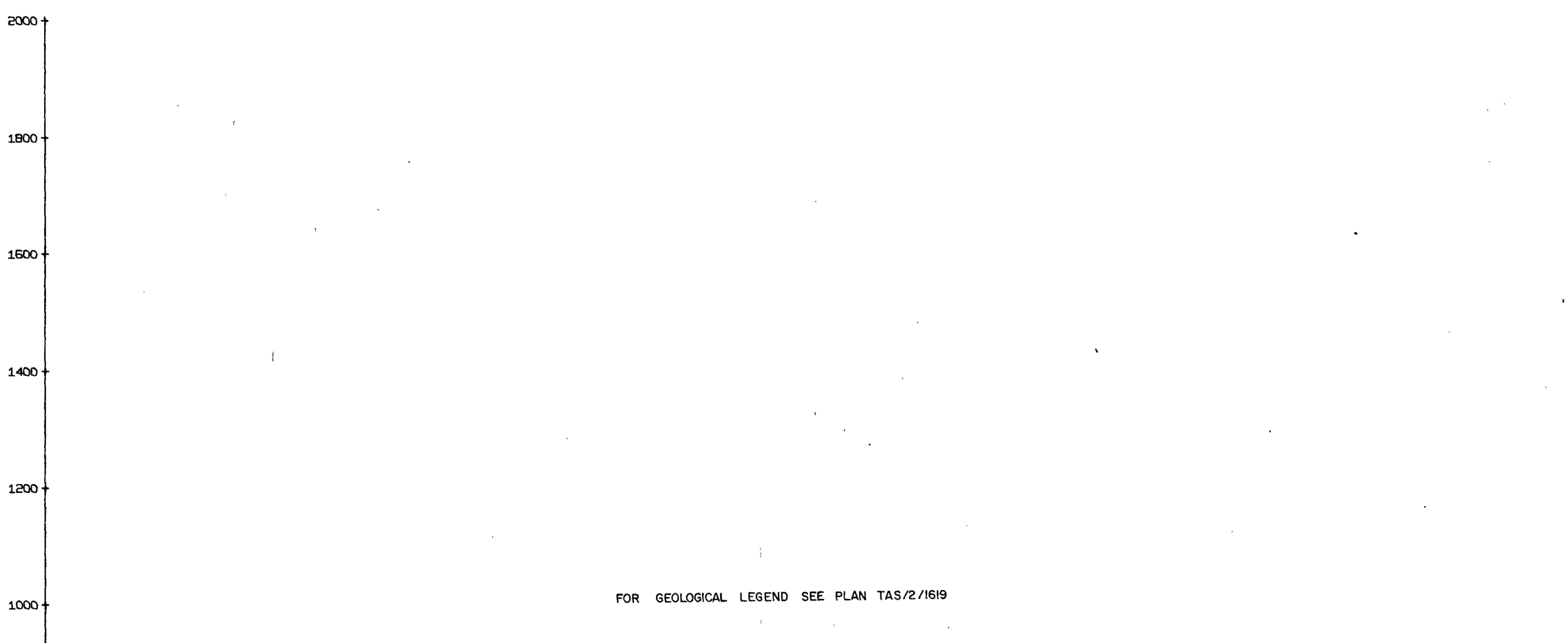
GRID GAP LINE 2200 SCALE 1 TO 5,000

TAS/2/1626









FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

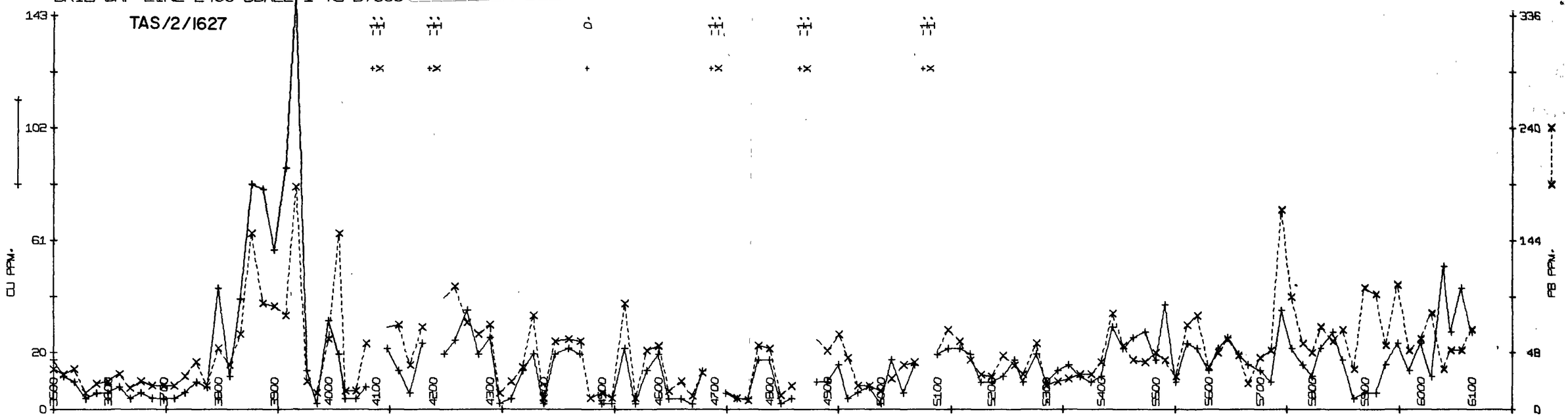
78-1316 Appl 559

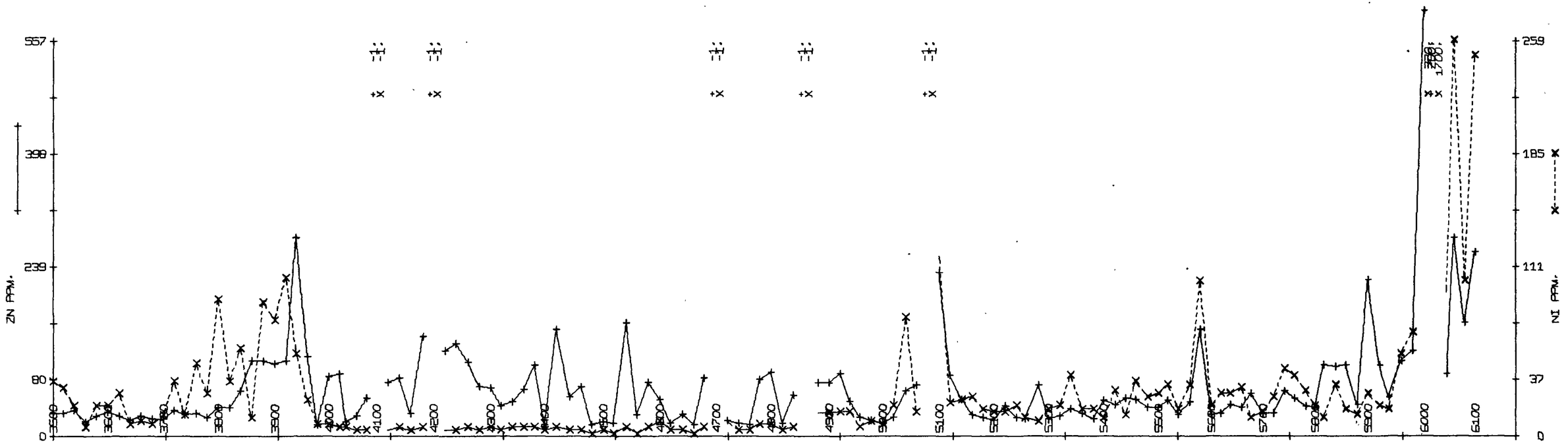
5 cm

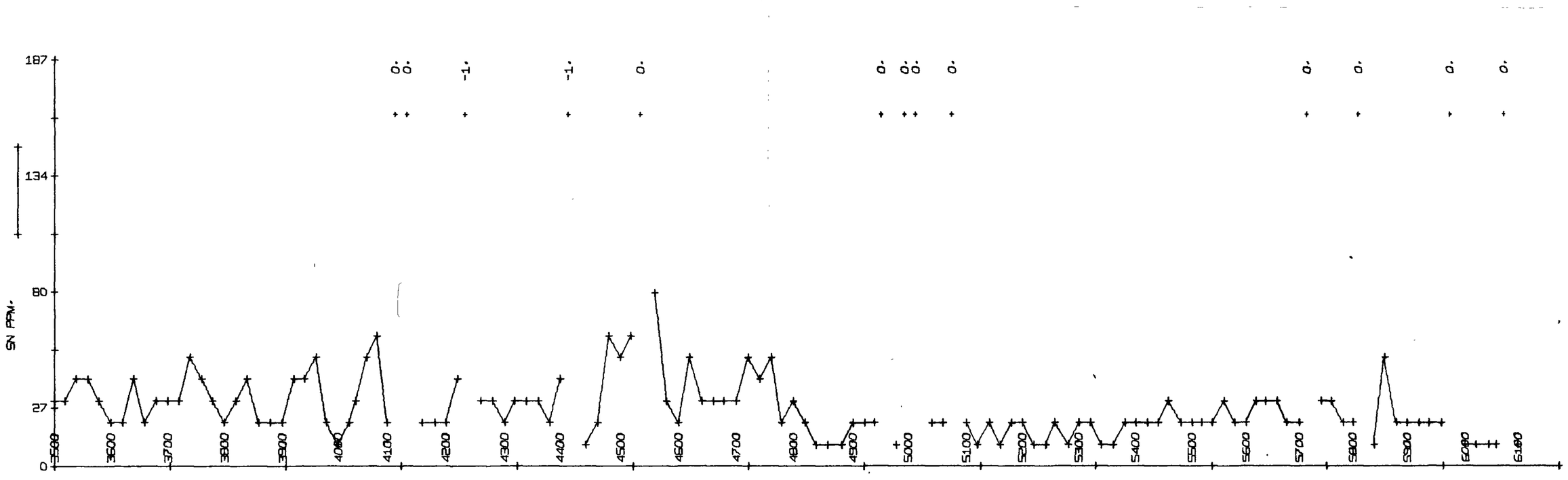
210140

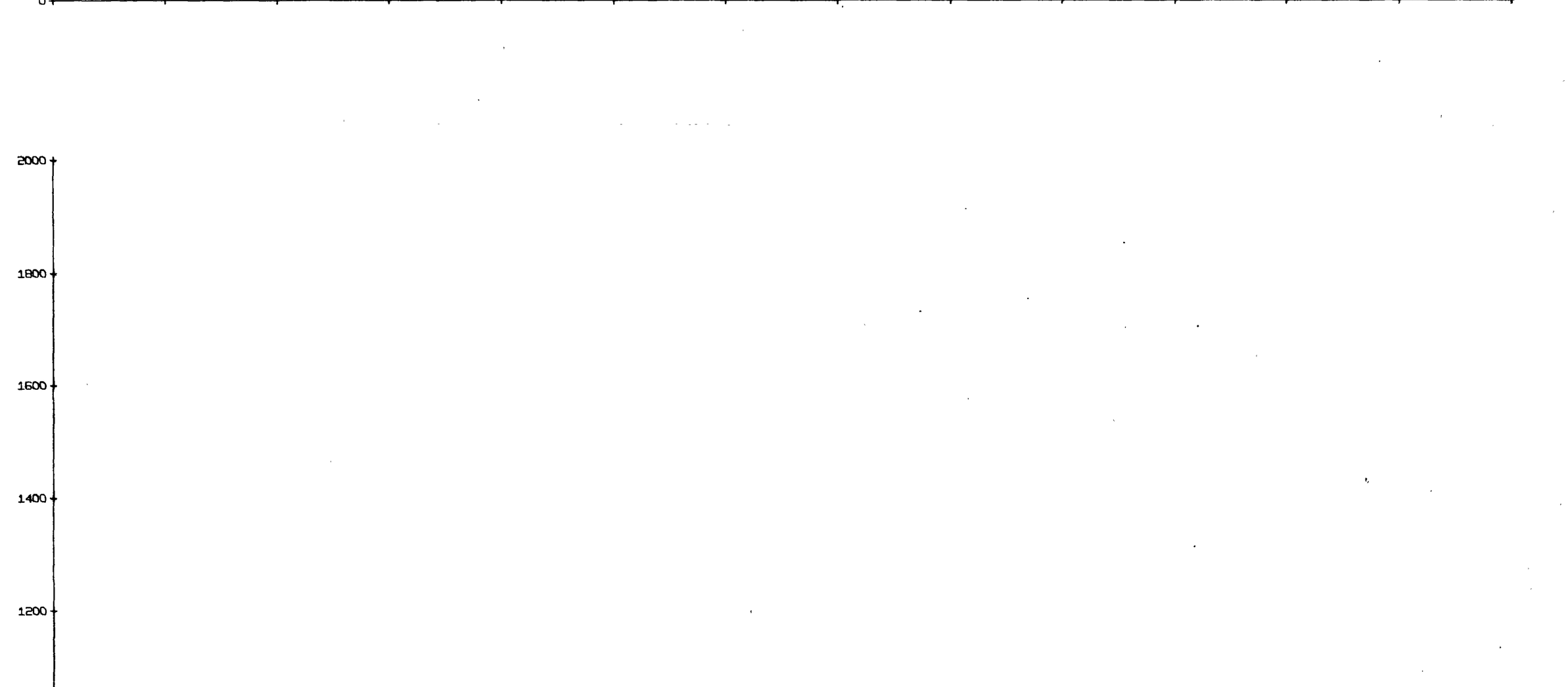
GRID GAP LINE 2400 SCALE 1 TO 5,000

TAS/2/1627









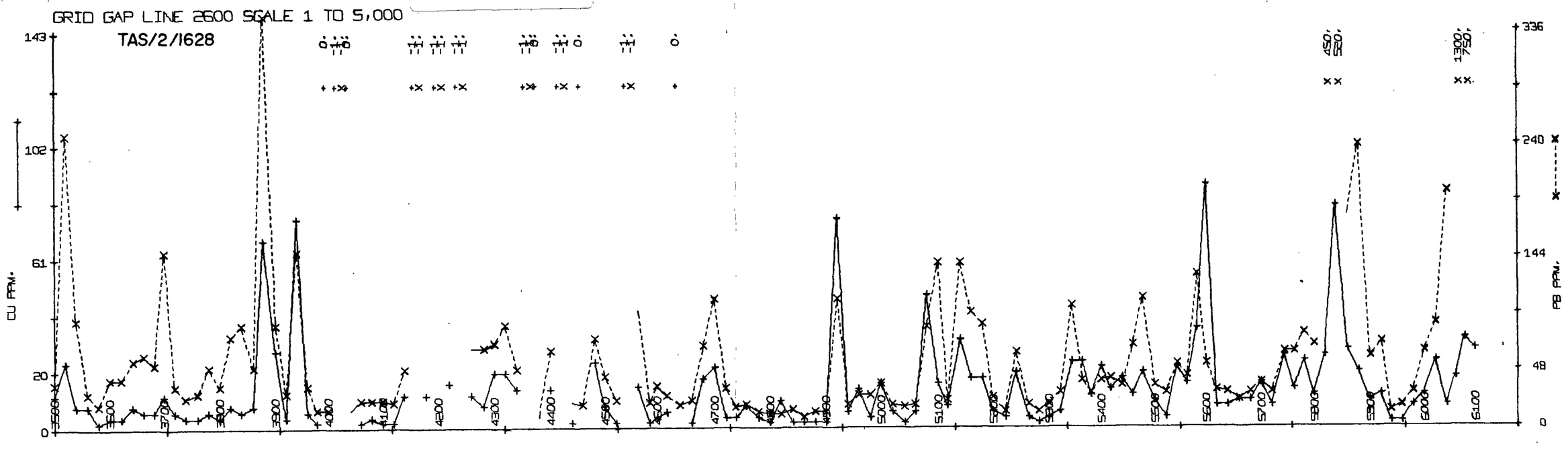
FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

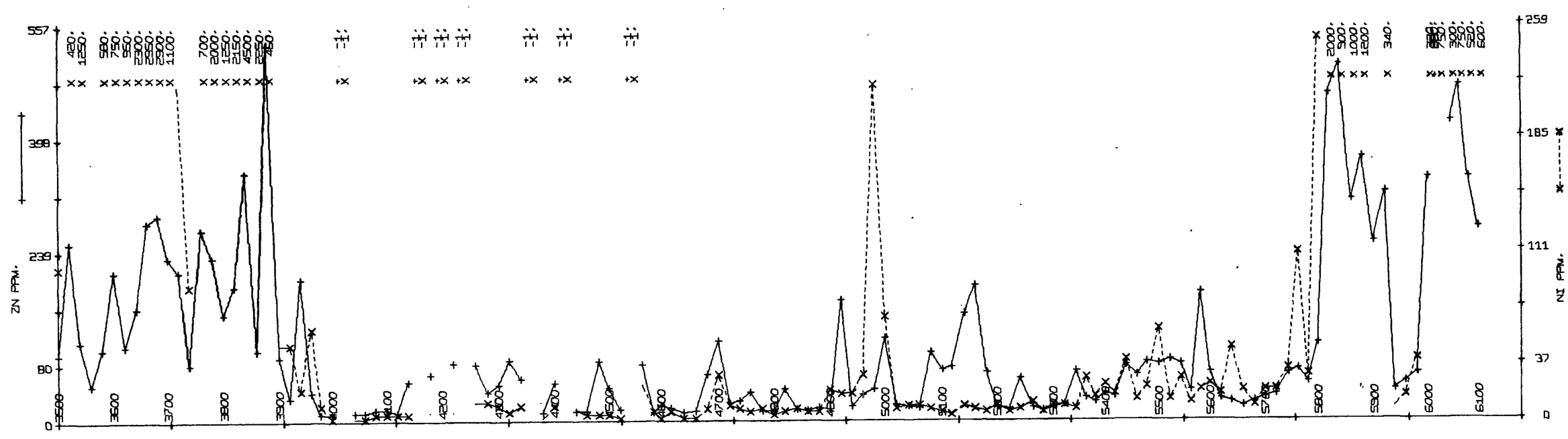
210141 78-1316 App 1 560

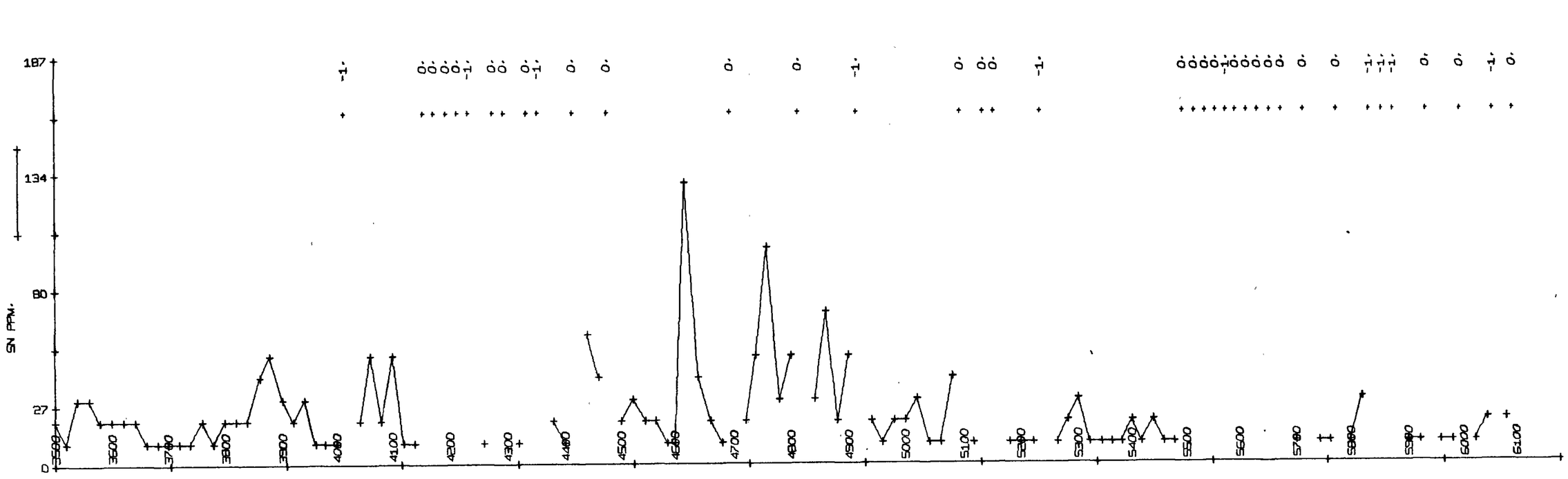
5 cm

GRID GAP LINE 2600 SCALE 1 TO 5,000

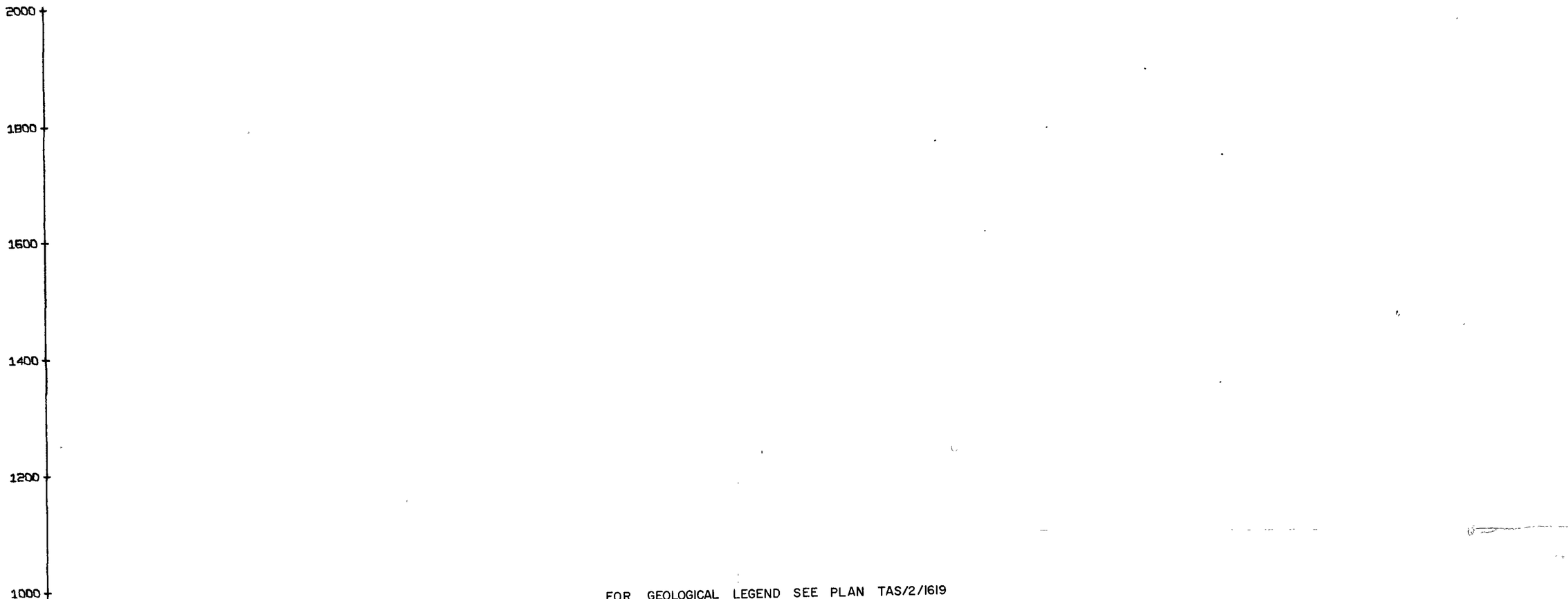
TAS/2/1628







FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619



GRID GAP LINE 2800 SCALE 1 TO 5,000

5 cm

210142

TAS/2/1629

561

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

SN PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

RING RIVER ROAD

COLEBROOK CREEK

EXE RIVER

ar

sp

mvs

bs

cg

ss

210143

78-1316 App1 562

5 cm

GRID GAP LINE 3000 SCALE 1 TO 5,000

TAS/2/1630

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

SN PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

TRACK

RINO RIVER ROAD

COLEBROOK CREEK

EXE RIVER

ss sp tm sp gb cg ss qr ss sp

210144 78-1316 App 1 563

5 cm

GRID GAP LINE 3200 SCALE 1 TO 5,000

TAS/2/1631

CU PPM.

ZN PPM.

PB PPM.

NI PPM.

AG PPM.

AS PPM.

MO PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

RING RIVER ROAD

COLEBROOK CREEK

EXE RIVER

ss gw ss sp fm.sp df sp gb gw cg lw gb cg ss gr ss

210145 78-1316 App 1. 564

5 cm

GRID GAP LINE 3400 SCALE 1 TO 5,000

TAS/2/1632

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

SN PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

RING RIVER ROAD

COLEBROOK CREEK

COSTEAN

TRACK

TRACK

COLEBROOK CREEK

EXE RIVER

ss

gw

sp

dl

fm sp

gb

gw

cg

lw

gb

cg

ss

ss

gr

ss

210146

OPEN FILE

aac

MICROFILMED

PROJECT NAME: APPENDIX 1

SIX MONTHLY REPORT TO DEPARTMENT OF MINES, TASMANIA

TITLE: RENISON EAST - GRID GAP

VOLUME IV

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES:

COMMODITY/IES:

TEXT PAGES NO:

PLAN NOS:

TABLE NOS:

APPENDICES:

AUTHOR/S:

DATE:

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

GRID GAP LINE 3600 SCALE 1 TO 5,000

TAS/2/1633 78-1316 App 1.

5 cm

£10147

CU PPM.

ZN PPM.

SN PPM.

PB PPM.

NI PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

RING RIVER ROAD

COLEBROOK CREEK

TRACK

COLEBROOK CREEK

EXE RIVER

ss gw sp gb cg lw ar

78-1316 Appl 566

5 cm

GRID GAP LINE 3800 SCALE 1 TO 5,000

210148

TAS/2/1634

CU PPM.

PB PPM.

ZN PPM.

NI PPM.

SN PPM.

FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619

RING RIVER ROAD

COLEBROOK CREEK

TRACK

EXE RIVER

gw ss gw ss sp gb cg lm gb cg ss qr ss

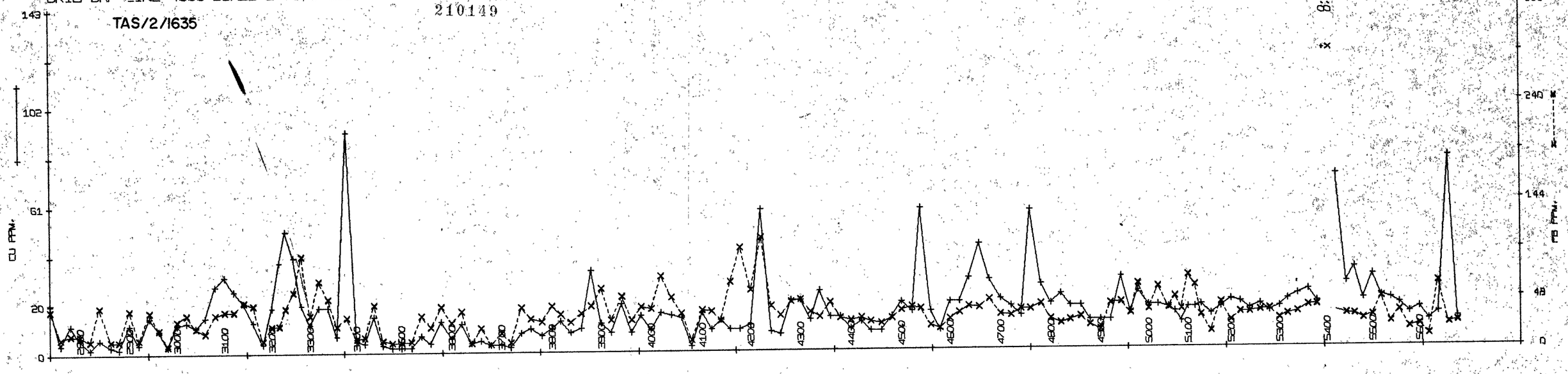
78-1316 App 1 567

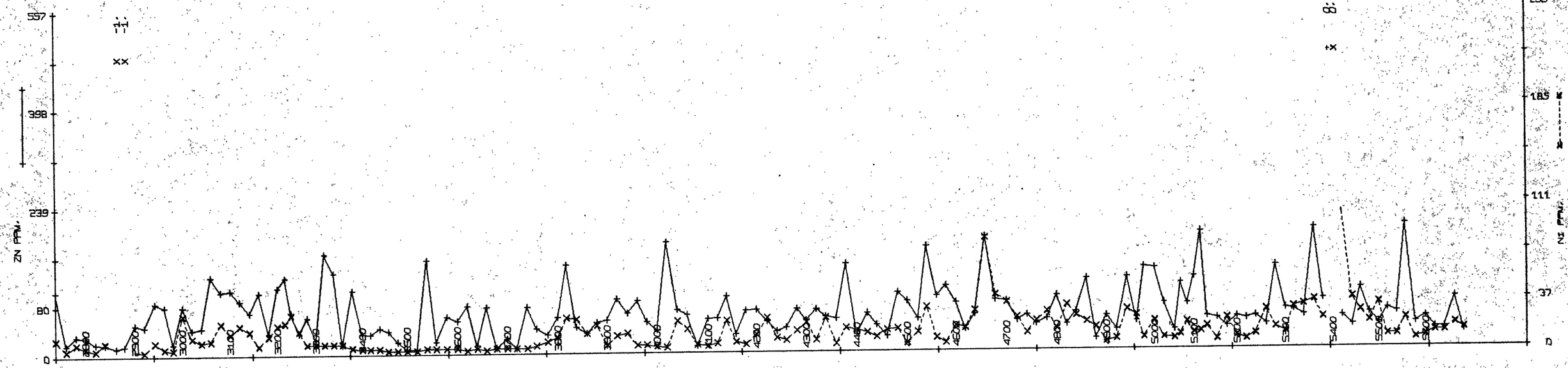
5 cm

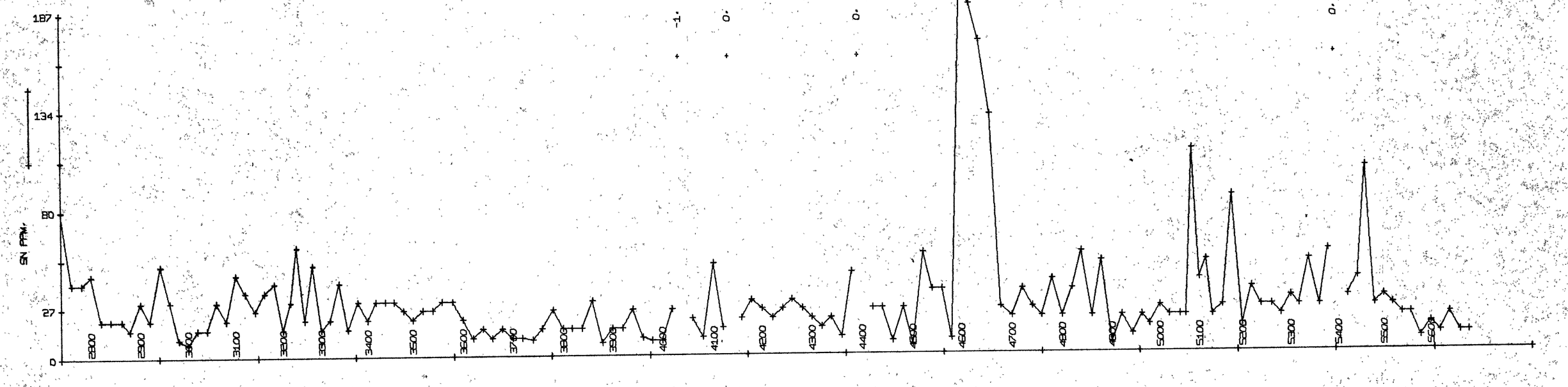
GRID GAP LINE 4000 SCALE 1 TO 5,000

210149

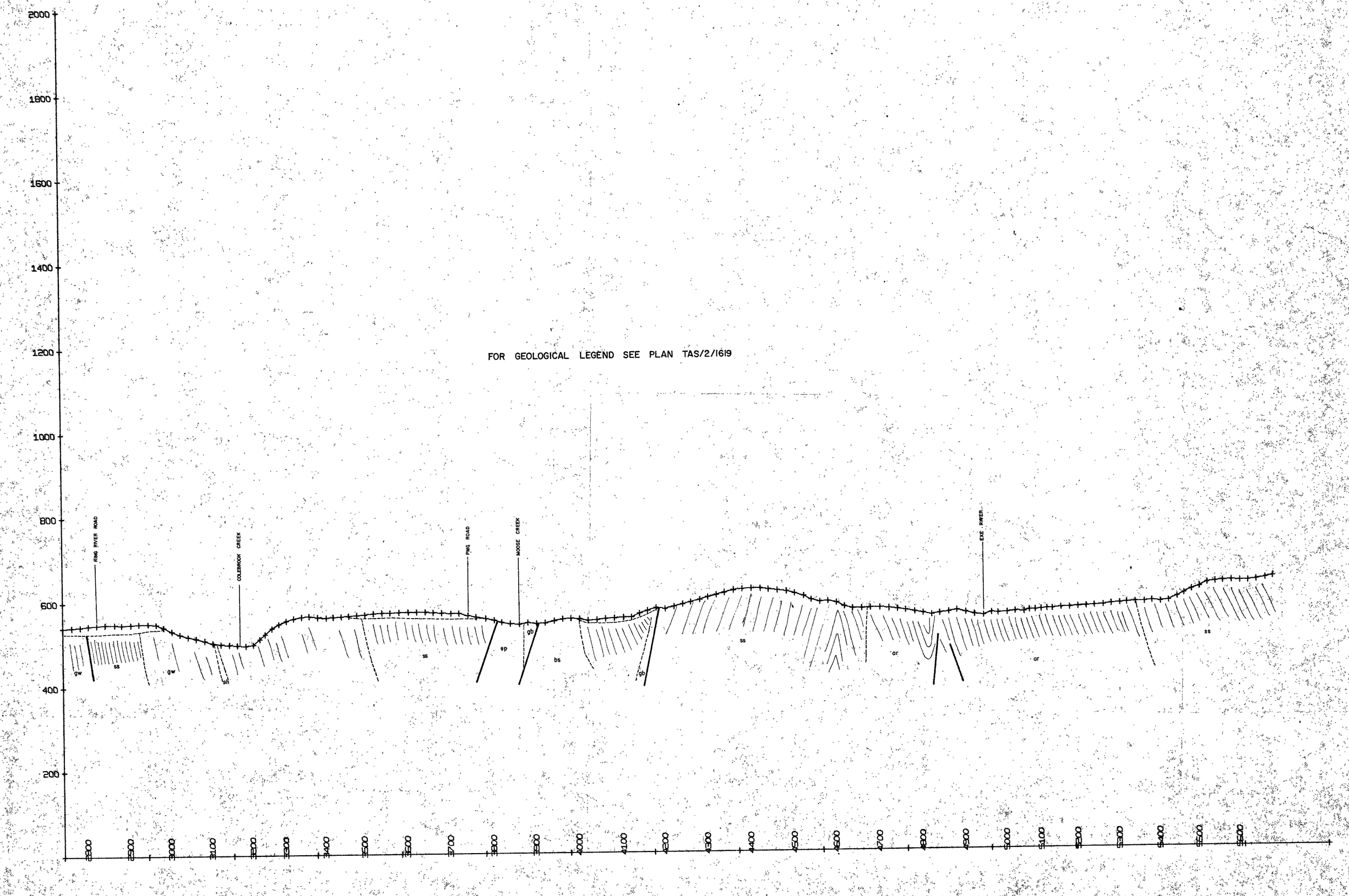
TAS/2/1635







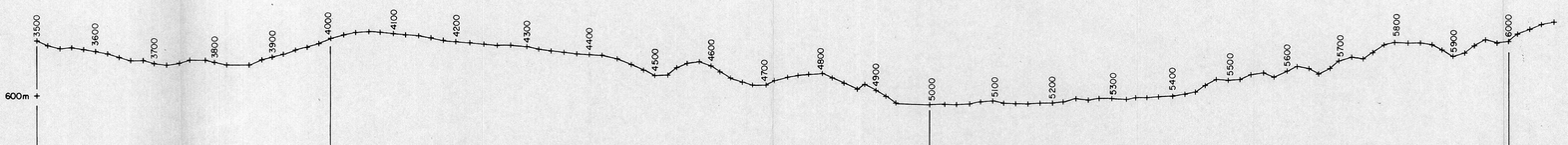
FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1619



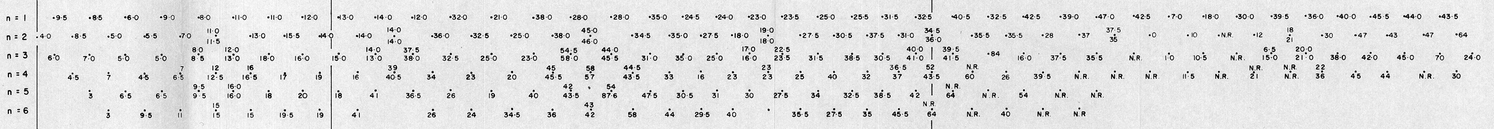
TOPOGRAPHIC PROFILE

800m +

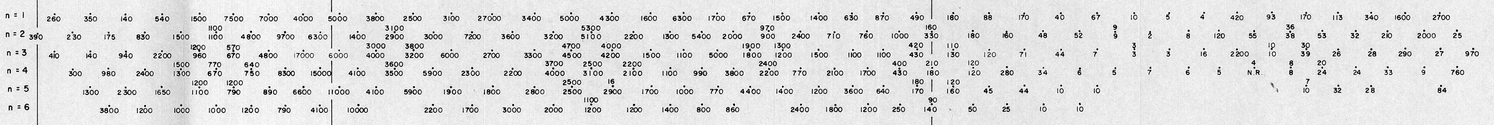
600m +



APPARENT CHARGEABILITY
(m. secs)

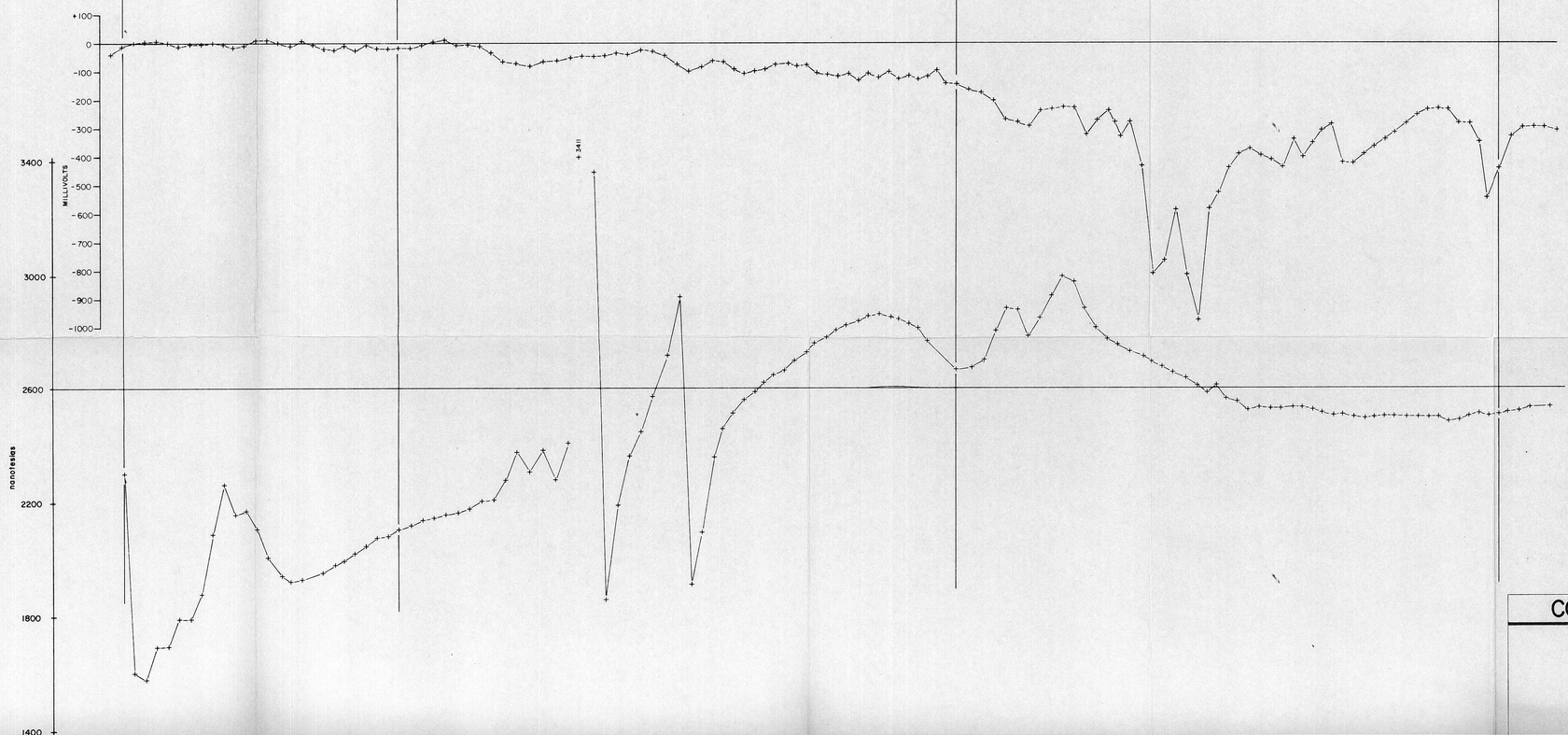


APPARENT RESISTIVITY
(ohm m)



SELF - POTENTIAL

GROUND MAGNETICS



210150

78-1316 App 1.

5 cm

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP

LINE 1000 N

GEOPHYSICAL SECTION

568

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1538

TOPOGRAPHIC PROFILE

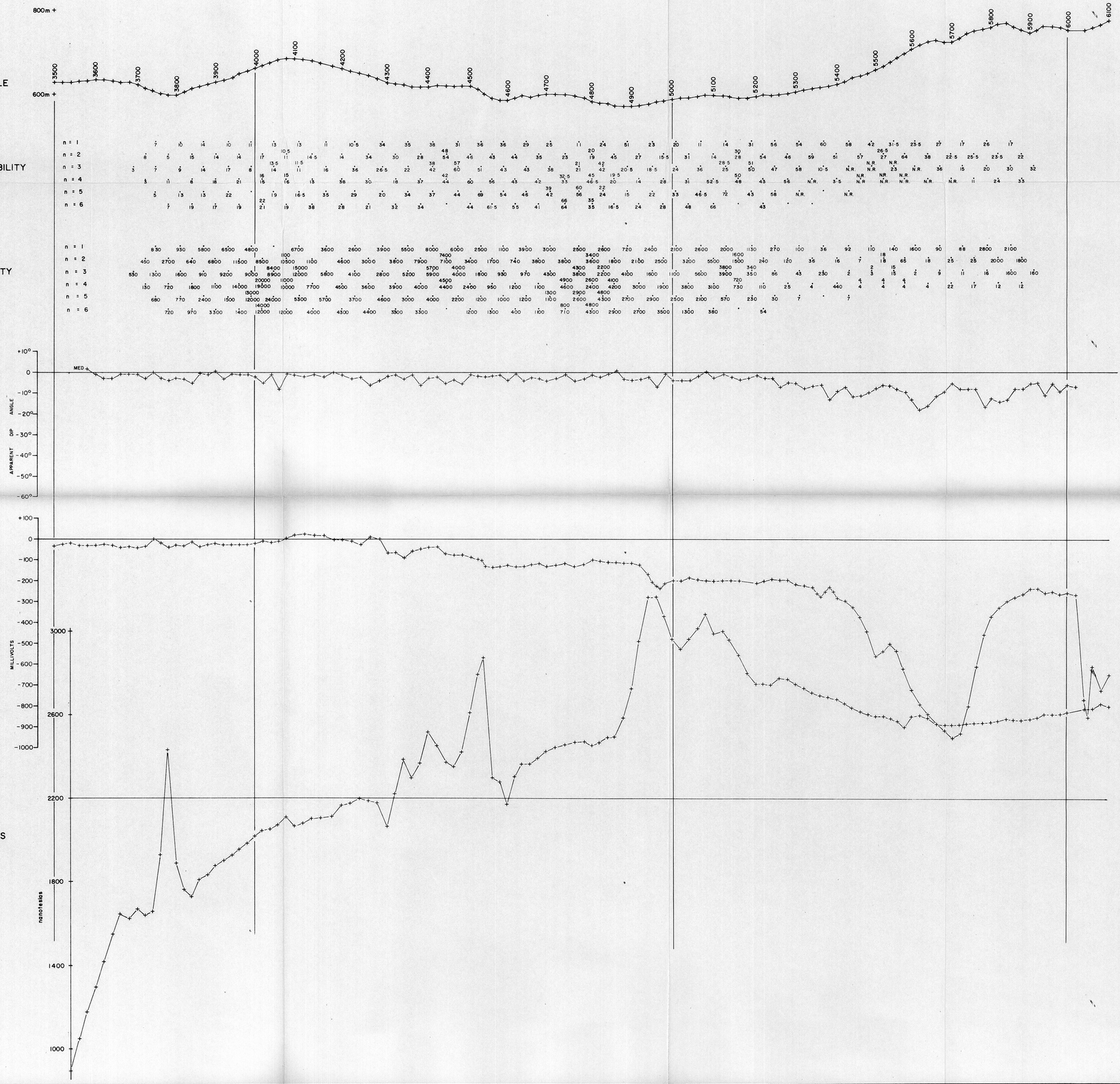
APPARENT CHARGEABILITY (m. secs)

APPARENT RESISTIVITY (ohm m)

CRONE E.M.

SELF - POTENTIAL

GROUND MAGNETICS



210151

5 cm

78-1316 Appl.

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 1200 N
GEOPHYSICAL SECTION

569

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1539

TOPOGRAPHIC PROFILE

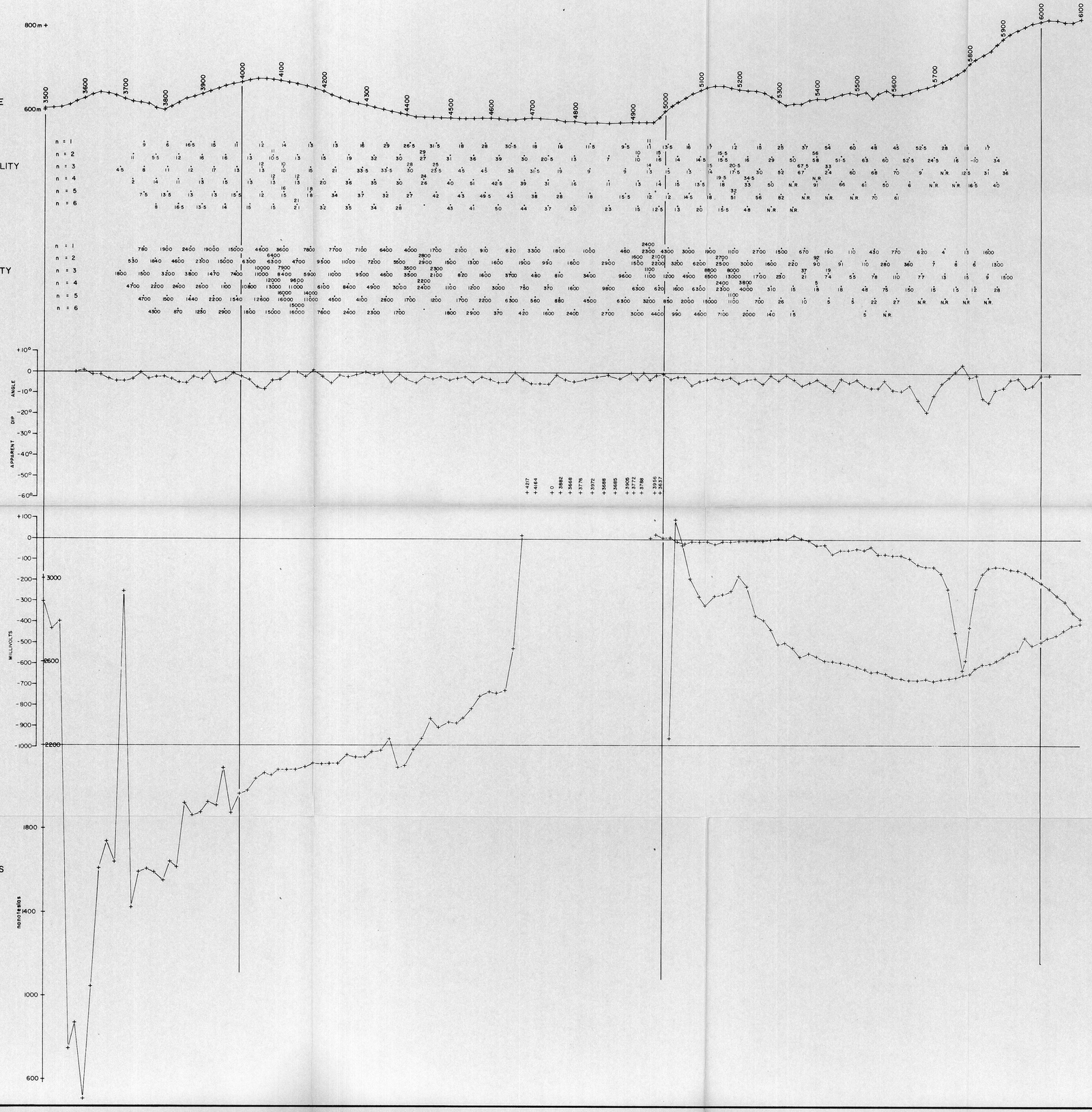
APPARENT CHARGEABILITY (m. secs)

APPARENT RESISTIVITY (ohm m)

CRONE E.M.

SELF - POTENTIAL

GROUND MAGNETICS



210152

5 cm

48-1316 App 1.

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 1400 N 570
GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1540

TOPOGRAPHIC PROFILE

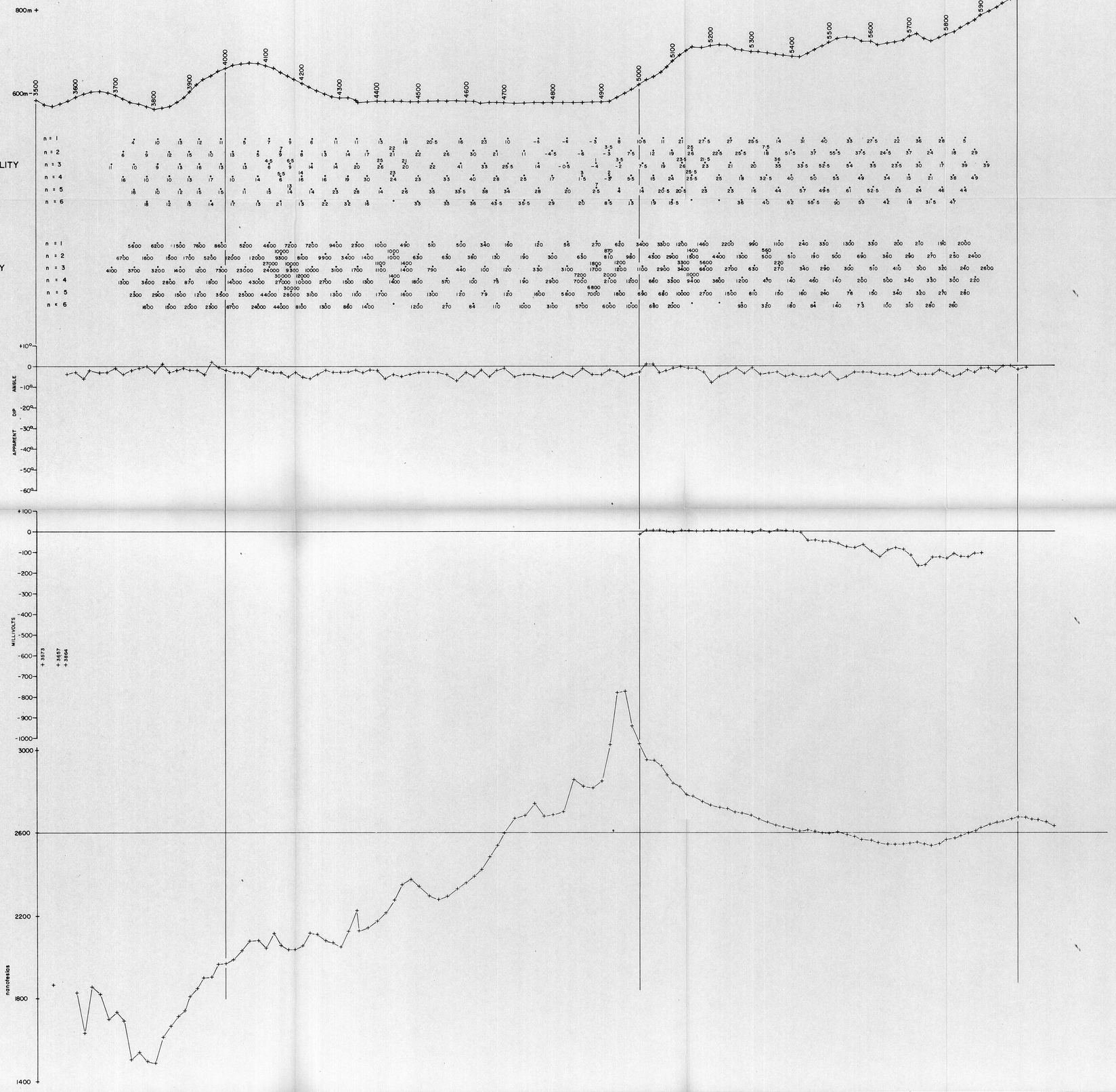
APPARENT CHARGEABILITY (m. secs)

APPARENT RESISTIVITY (ohm m)

CRONE E.M.

SELF - POTENTIAL

GROUND MAGNETICS



210153

5 cm

48-1316 Dpp)

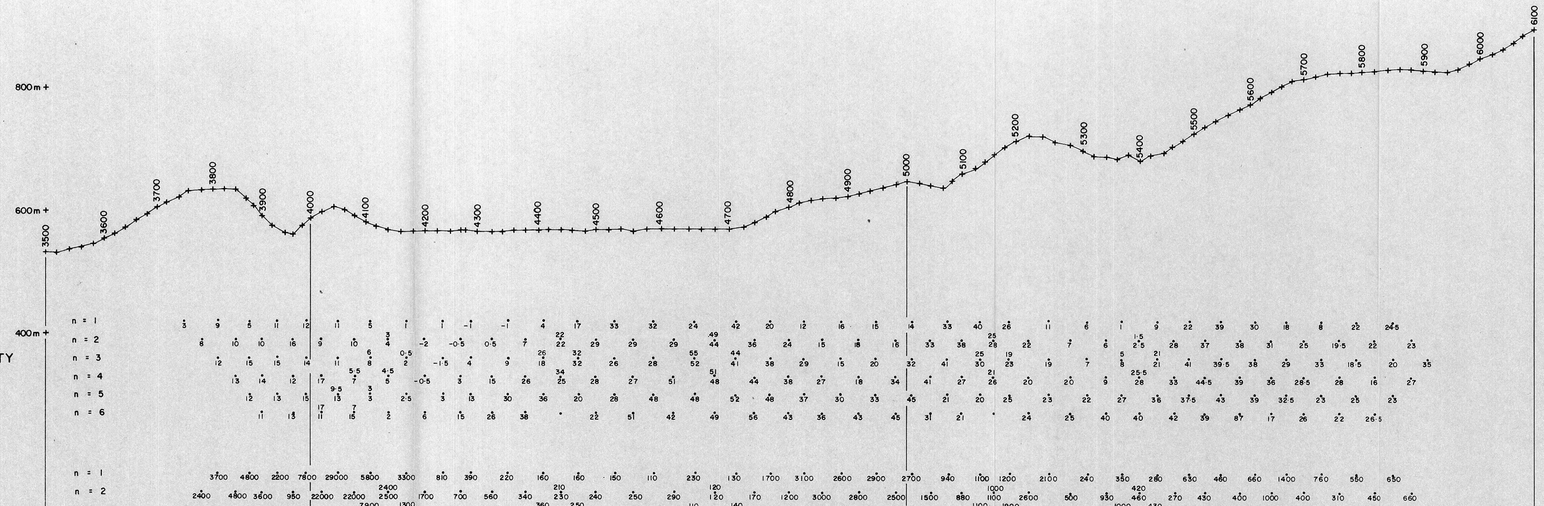
COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 1600 N
GEOPHYSICAL SECTION

571

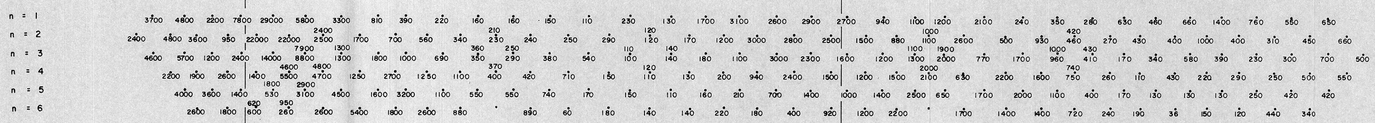
COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1541

TOPOGRAPHIC PROFILE

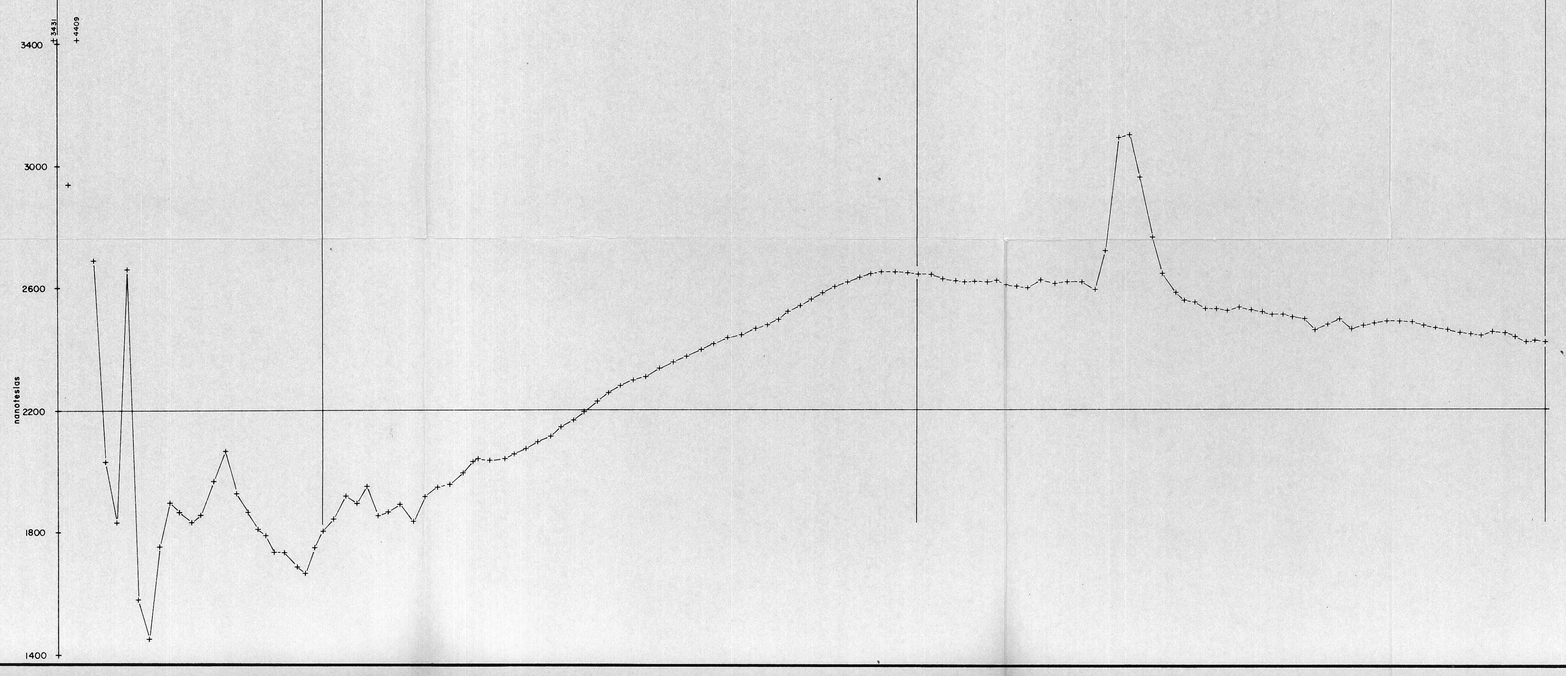


APPARENT CHARGEABILITY
(m. secs)

APPARENT RESISTIVITY
(ohm m)



GROUND MAGNETICS



5 cm

210154

78-1316-Appl

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 1800 N
GEOPHYSICAL SECTION

572

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1542

TOPOGRAPHIC PROFILE

800m +

600m +

3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700 5800 5900 6000 6100

APPARENT CHARGEABILITY
(m secs)

400m +

n = 1
n = 2
n = 3
n = 4
n = 5
n = 6

APPARENT RESISTIVITY
(ohm m)

CRONE E.M.

DIP ANGLE
APPARENT

+10°
0
-10°
-20°
-30°
-40°
-50°
-60°

SELF - POTENTIAL

MILLIVOLTS

+100
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000

+3373 +3923 +4119 +4788 +5017 +5307 +3853 +4230 +4910 +4909

3000

GROUND MAGNETICS

nanoteslas

2600
2200
1800
1400
1000

5 cm

210155

78-1316 App 1.

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 573
LINE 2000 N
GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1543

TOPOGRAPHIC PROFILE

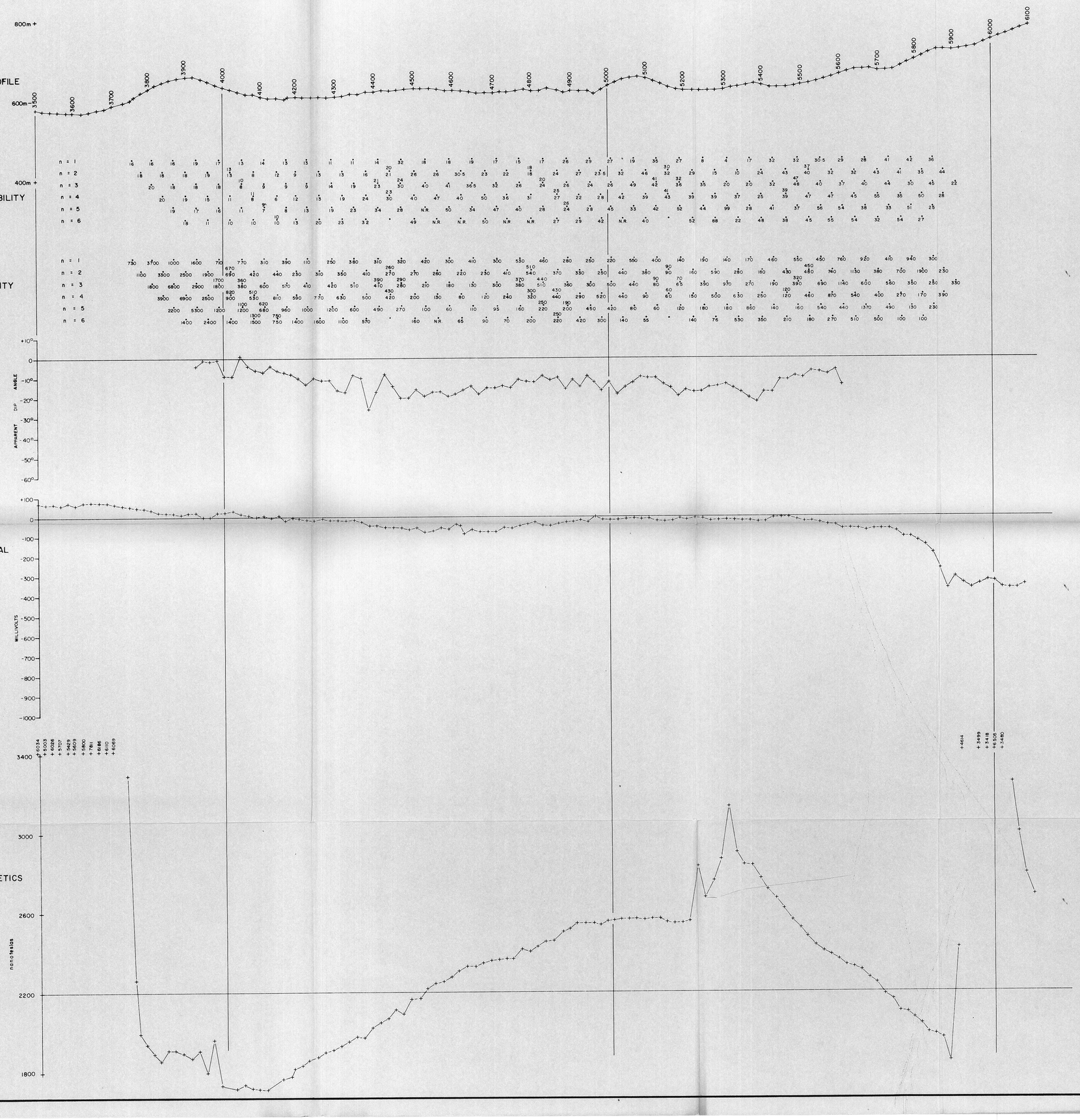
APPARENT CHARGEABILITY
(m secs)

APPARENT RESISTIVITY
(ohm m)

CRONE E.M.

SELF - POTENTIAL

GROUND MAGNETICS



5 cm

210156

48-1316 Appl

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 574
LINE 2200 N
GEOPHYSICAL SECTION

COMPILED: VARIOUS
DRAWN: GEODRAFT | DATE: 5/78
AMENDED:
SCALE: 1:5000
PLAN No: TAS/2/1544

TOPOGRAPHIC PROFILE

APPARENT CHARGEABILITY
(m secs)

APPARENT RESISTIVITY
(ohm m)

GROUND MAGNETICS

nanoteslas

5 cm

210157

78 -1316 (pp)

COMSTAFF PROPRIETARY LIMITED

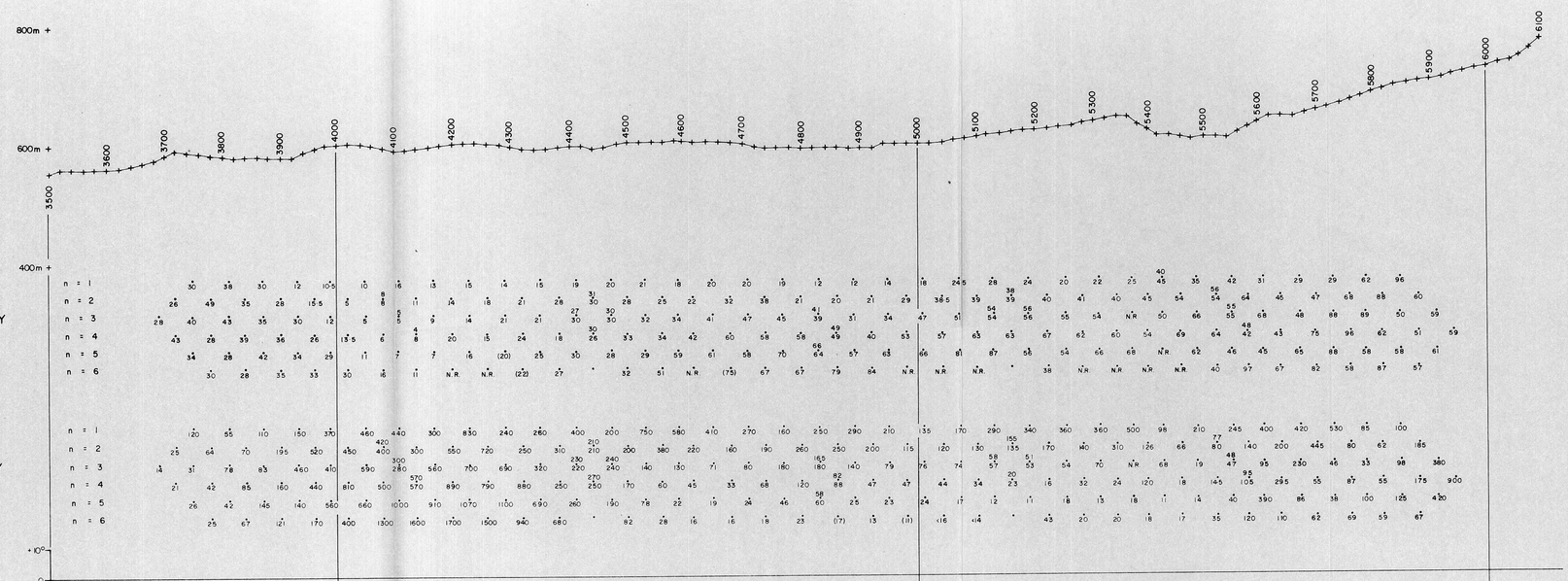
RENISON GRID - GAP 575

LINE 2400 N

GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No	TAS/2/1545

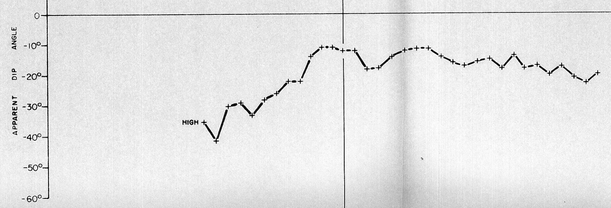
TOPOGRAPHIC PROFILE



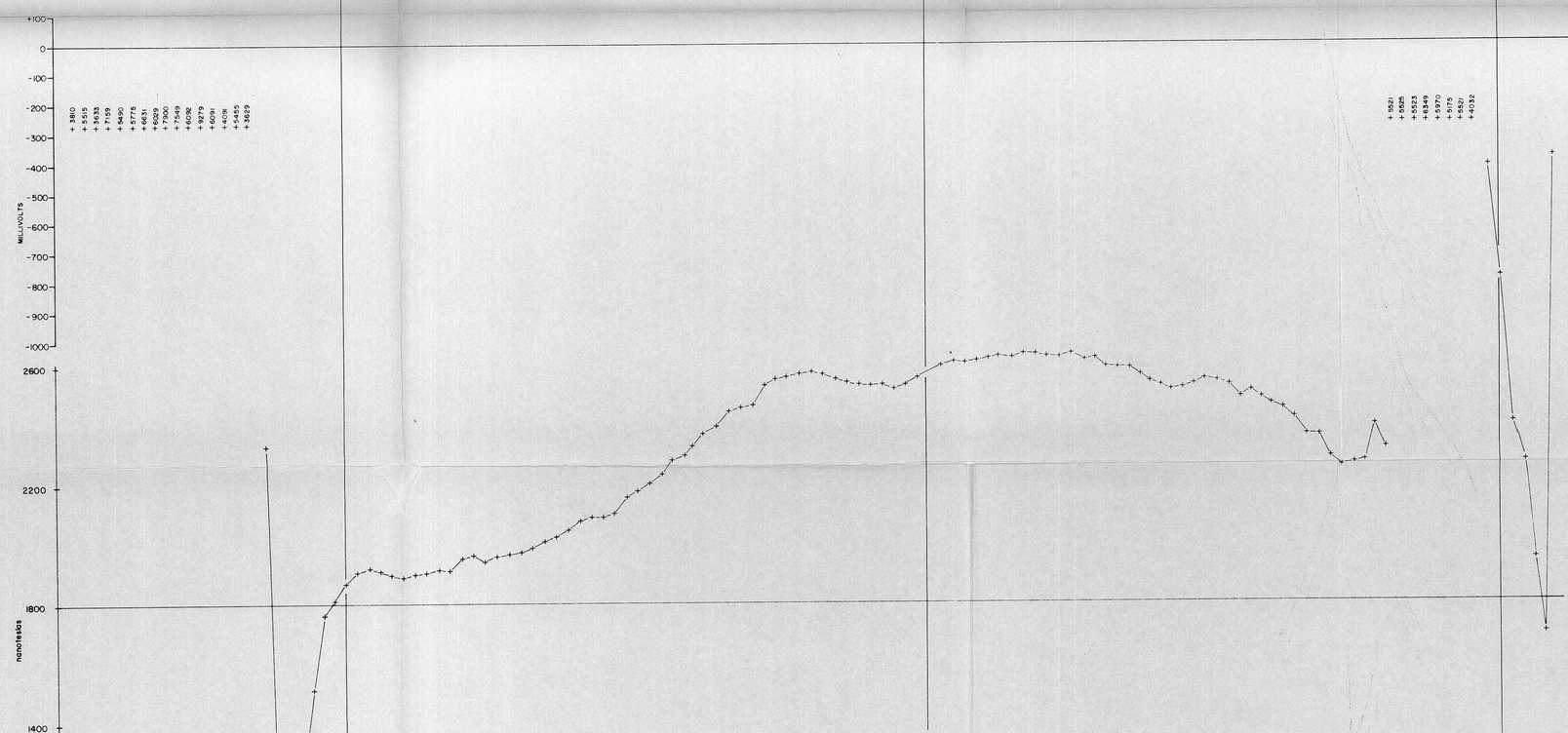
APPARENT CHARGEABILITY
(m secs)

APPARENT RESISTIVITY
(ohm m)

CRONE E.M.



SELF POTENTIAL



GROUND MAGNETICS

5 cm

210158

78-1316 Rep 1

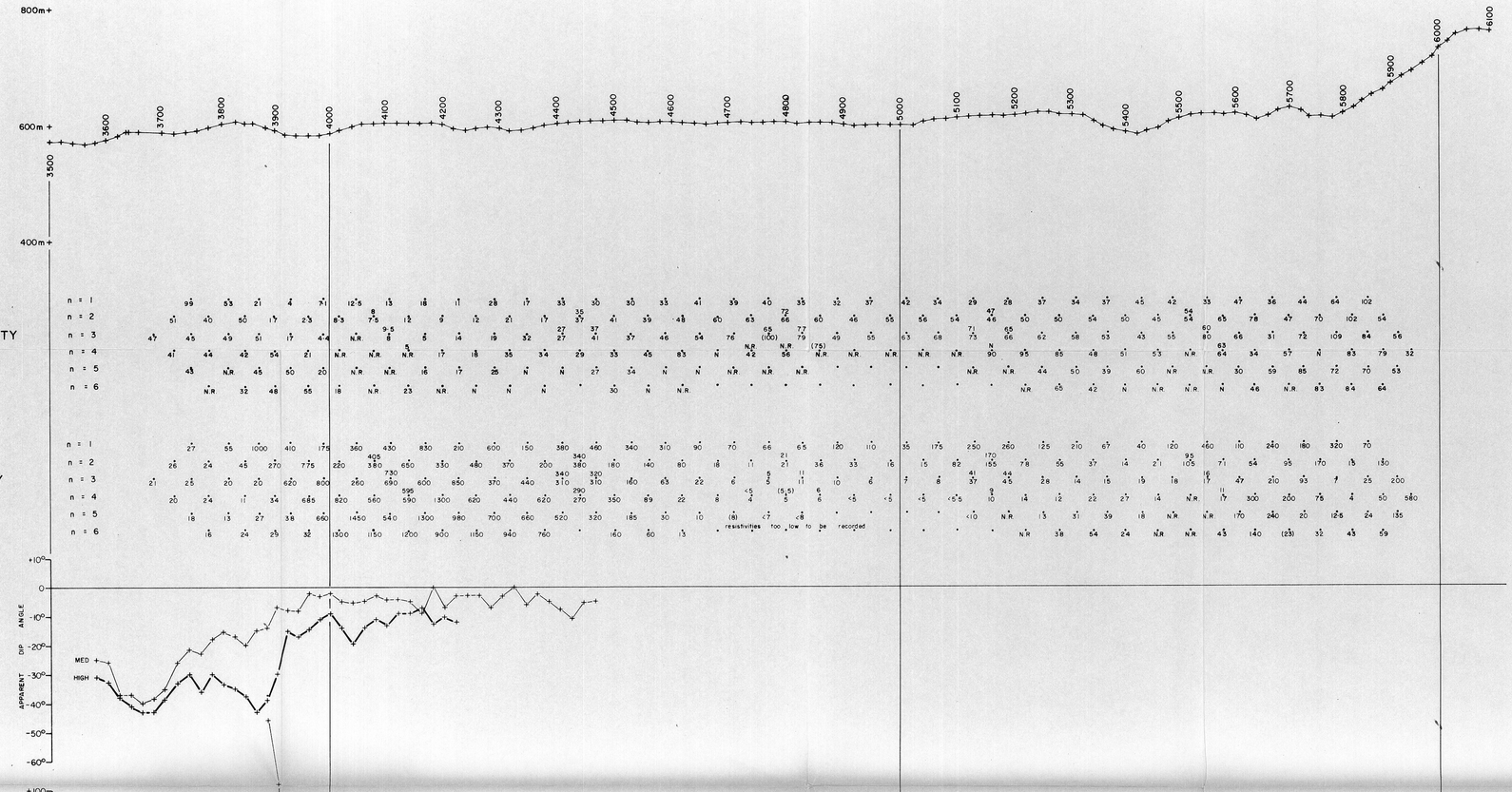
COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 2600 N
GEOPHYSICAL SECTION

576

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1546

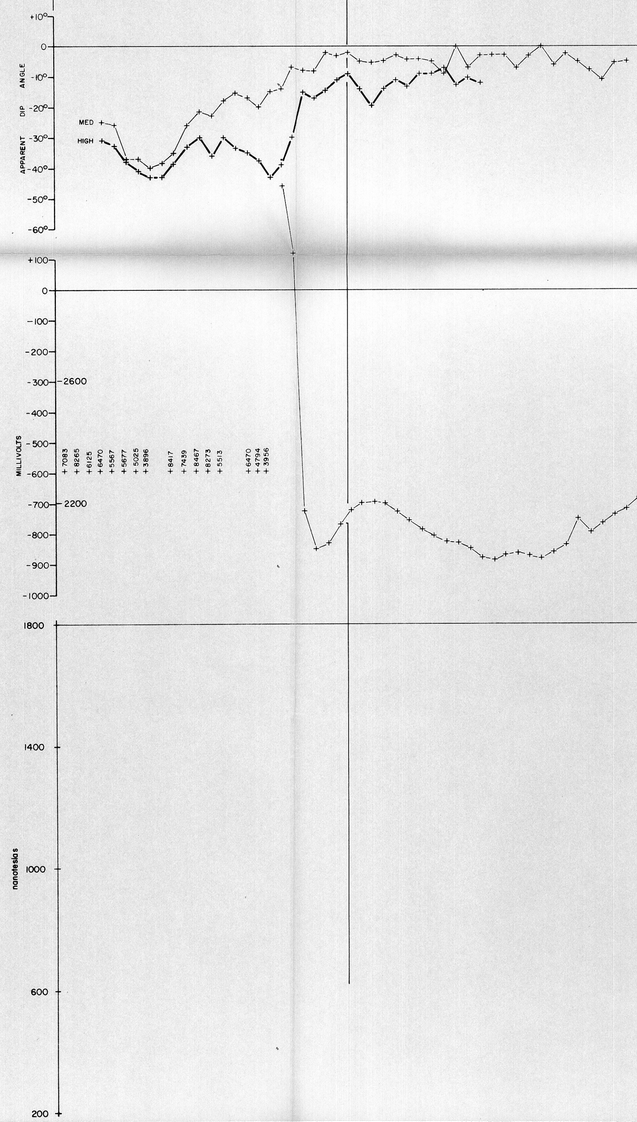
TOPOGRAPHIC PROFILE



APPARENT CHARGEABILITY (m secs)

APPARENT RESISTIVITY (ohm m)

CRONE E.M.



SELF-POTENTIAL

GROUND MAGNETICS

210159

5 cm

78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 577

LINE 2800 N

GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN	GEODRAFT
DATE	5/78
AMENDED	
SCALE	1 : 5000
PLAN NO.	TAS/2/1547

5 cm

210160 48-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 3' 578

LINE 3000 N

GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1548

800m+

600m+

400m+

TOPOGRAPHIC PROFILE

2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700

APPARENT CHARGEABILITY (m secs)

n=1 6 15 17 12 10 7 8 19 18 22 51 63 63 28 5 -0·5 6 9 5 14 19 13 28 28 31 36 53 46 24 23 25 25 26 34 33 35 44

n=2 18 13 13 14 16 9 7 8 18 18 22 57 60 63 54 57 31 5 0·5 7 6 5 6 26 4 21 43 31 41 42 51 32 21 38 35 25 35 43 38 36 48

n=3 43 27 13 12 13 20 12 11 19 14 15 54 66 54 69 63 56 62 29 8 3 1 3 5 18 12 13 28 41 41 34 33 34 46 50 33 33 35 34 35 41 46 37 45 53

n=4 50 29 13 11 13 23 24 22 13 13 51 78 N 45 49 62 60 31 11 -2 -3 0 15 5 23 21 30 40 41 28 39 45 48 46 32 48 48 38 46 45 40 50

n=5 48 25 14 18 14 32 19 14 42 N N N 50 44 63 36 6 -2 14 1 14 29 24 30 38 33 36 53 60 41 39 54 44 43 50 47

n=6 42 21 11 9 21 25 19 48 N N N · 36 55 66 32 9 11 0 8 21 30 23 · 44 30 36 57 66 46 49 57 42 44 53

APPARENT RESISTIVITY (ohm m)

n=1 405 490 385 510 290 235 300 240 400 350 37 26 60 68 110 110 230 360 450 330 230 150 1100 360 330 180 250 310 360 325 290 170 220 140 90 185

n=2 180 510 380 485 510 365 485 550 310 390 500 45 19 29 28 66 95 280 440 240 530 580 65 470 240 570 870 250 235 220 280 200 335 755 335 345 250 270 270 105 140 180

n=3 210 240 340 440 580 800 680 640 470 470 670 81 21 22 20 26 27 64 210 910 400 280 300 700 88 460 810 710 670 175 190 440 375 245 480 610 215 210 310 390 210 135 125 200

n=4 275 125 400 595 930 1440 1400 530 740 820 91 45 19 19 16 22 130 570 880 530 540 330 750 860 1200 1000 640 500 490 230 415 380 395 385 330 230 250 410 295 240 105 120

n=5 140 135 496 940 1860 1100 700 1130 105 44 36 16 14 59 330 450 960 580 410 630 2100 1100 1000 520 820 280 525 580 285 185 360 300 270 315 195 85

n=6 165 136 665 1600 1220 1500 1100 125 45 42 32 · 41 140 240 440 890 760 300 1600 1900 1400 720 · 640 340 720 315 155 185 425 175 240 195 115

CRONE E.M.

APPARENT DIP ANGLE

+10° 0 -10° -20° -30° -40° -50° -60°

MED. HIGH

SELF POTENTIAL

MILLIVOLTS

+100 0 -100 -200 -300 -400 -500 -600 -700 -800 -900 -1000

GROUND MAGNETICS

nanoteslas

3400 3000 2600 2200 1800

+6292 +10470 +10038 +19707 +5769 +9036 +6876 +6590 +8526 +9853 +7669 +6293

210161

5 cm

98-1376 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 3200 N
GEOPHYSICAL SECTION

579

COMPILED	VARIOUS
DRAWN	GEODRAFT
DATE	5/78
AMENDED	
SCALE	1 5000
PLAN No	TAS/2/1549

TOPOGRAPHIC PROFILE

800m +

600m +

400m +

2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100 4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600 5700

APPARENT CHARGEABILITY (m secs)

| | | |

TOPOGRAPHIC PROFILE

APPARENT CHARGEABILITY (m secs)

APPARENT RESISTIVITY (ohm m)

CRONE E.M.

SELF-POTENTIAL

GROUND MAGNETICS

210163

5 cm

48-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 581
LINE 3600 N
GEOPHYSICAL SECTION

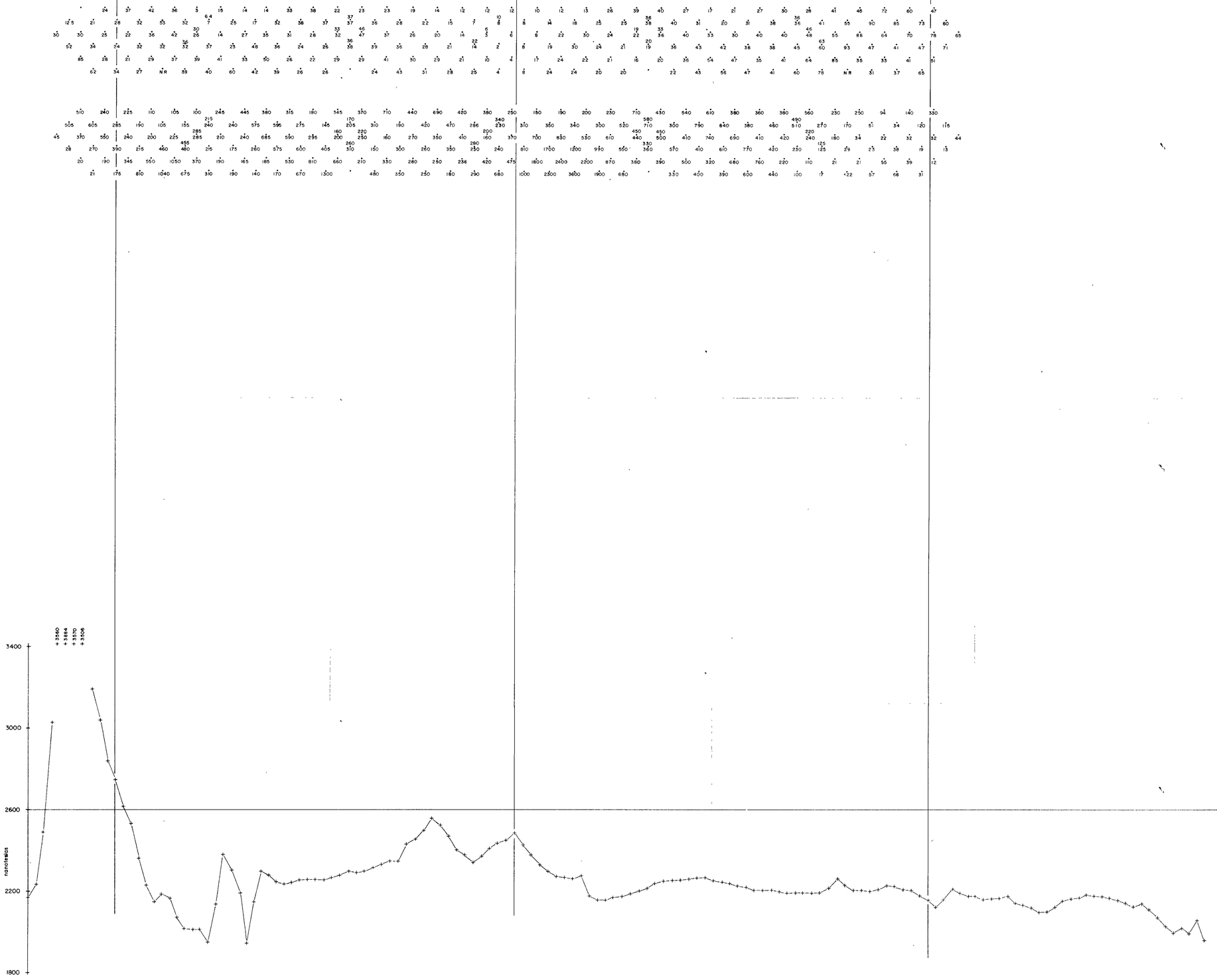
COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 5000
PLAN No	TAS/2/1551

800m +

600m +

400m +

+2800 +2900 +3000 +3100 +3200 +3300 +3400 +3500 +3600 +3700 +3800 +3900 +4000 +4100 +4200 +4300 +4400 +4500 +4600 +4700 +4800 +4900 +5000 +5100 +5200 +5300 +5400 +5500 +5600 +5700



210164

5 cm

78-1316 App 1

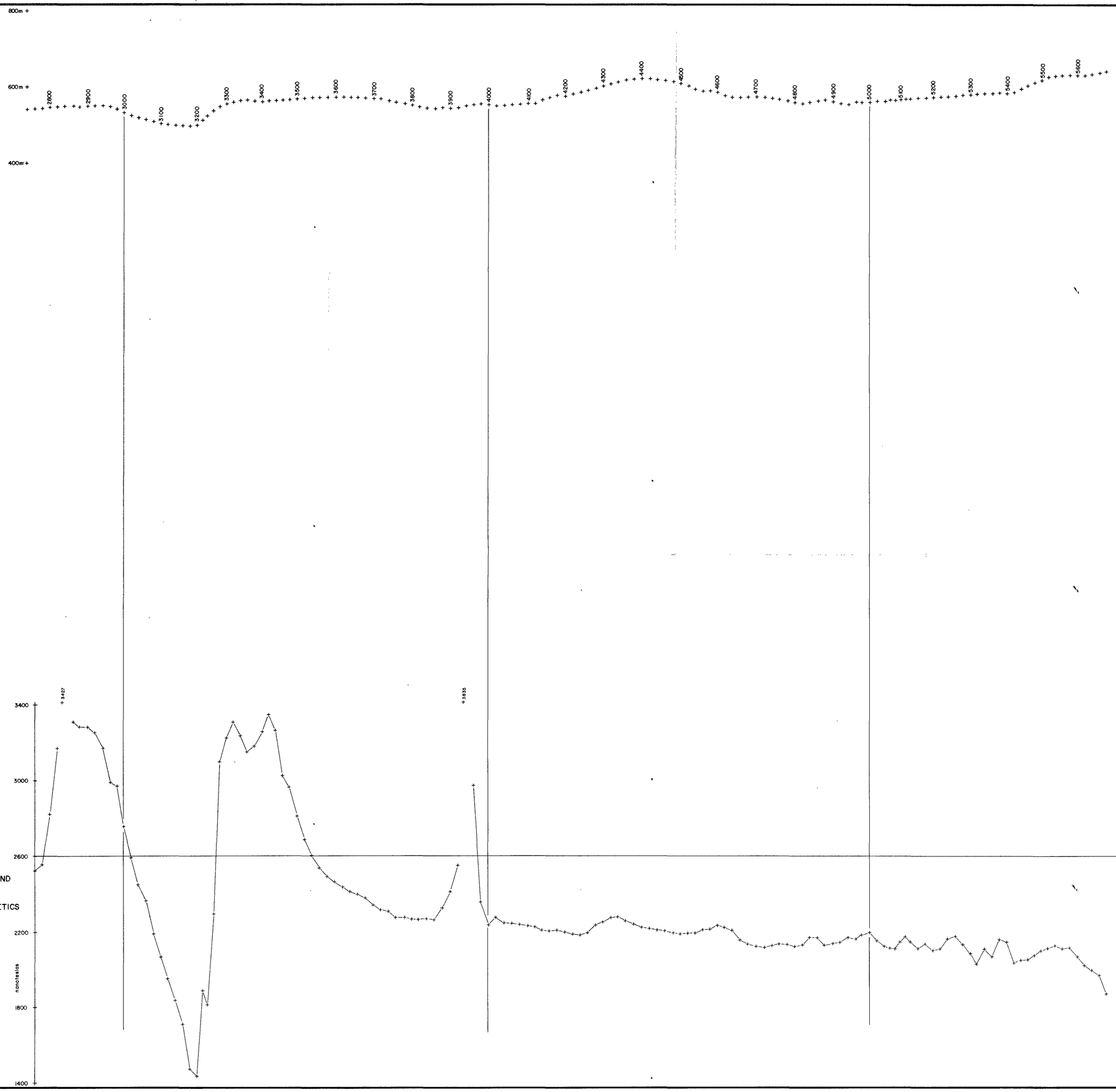
COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP (582

LINE - 3800 N

GEOPHYSICAL SECTION

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 5000
PLAN No.	TAS/2/1552



210165

5 cm

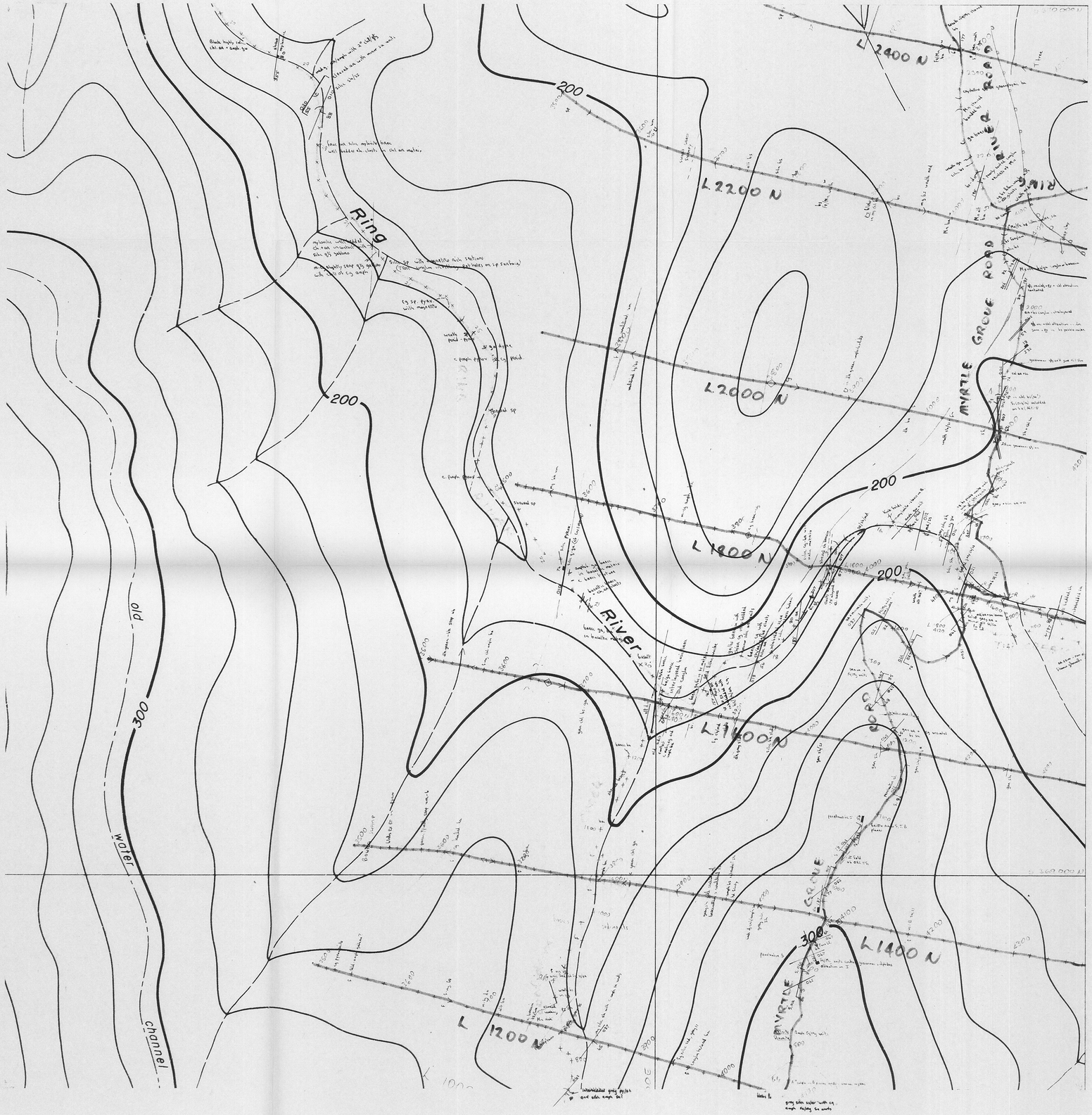
78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
LINE 4000 N
GEOPHYSICAL SECTION

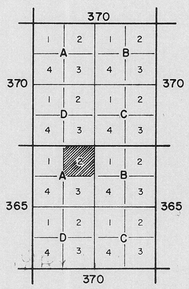
583

COMPILED	VARIOUS
DRAWN GEODRAFT	DATE 5/78
AMENDED	
SCALE	1 5000
PLAN NO.	TAS/2/1553



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/~~1554~~ 1619

SHEET INDEX



210166

5 cm

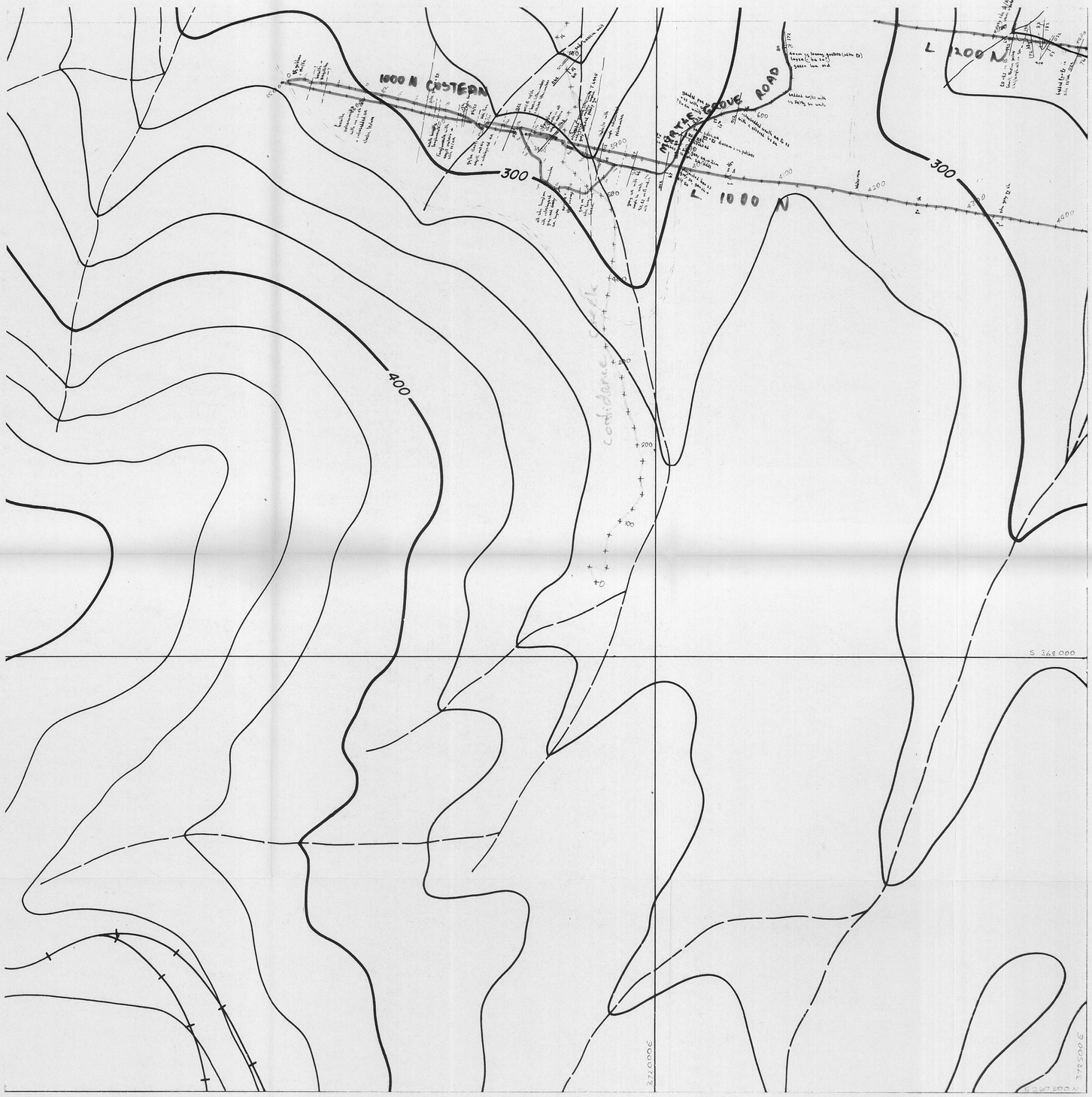
78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370365 - A2
DETAILED GEOLOGICAL FIELD PLAN

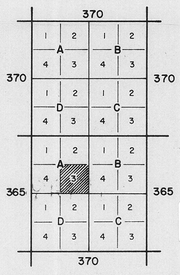
584

COMPILED	G.F.P.
DRAWN G.F.P.	DATE 6/78
AMENDED	
SCALE	1:2500
PLAN No.	TAS/2/1486



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554 1619

SHEET INDEX



210167

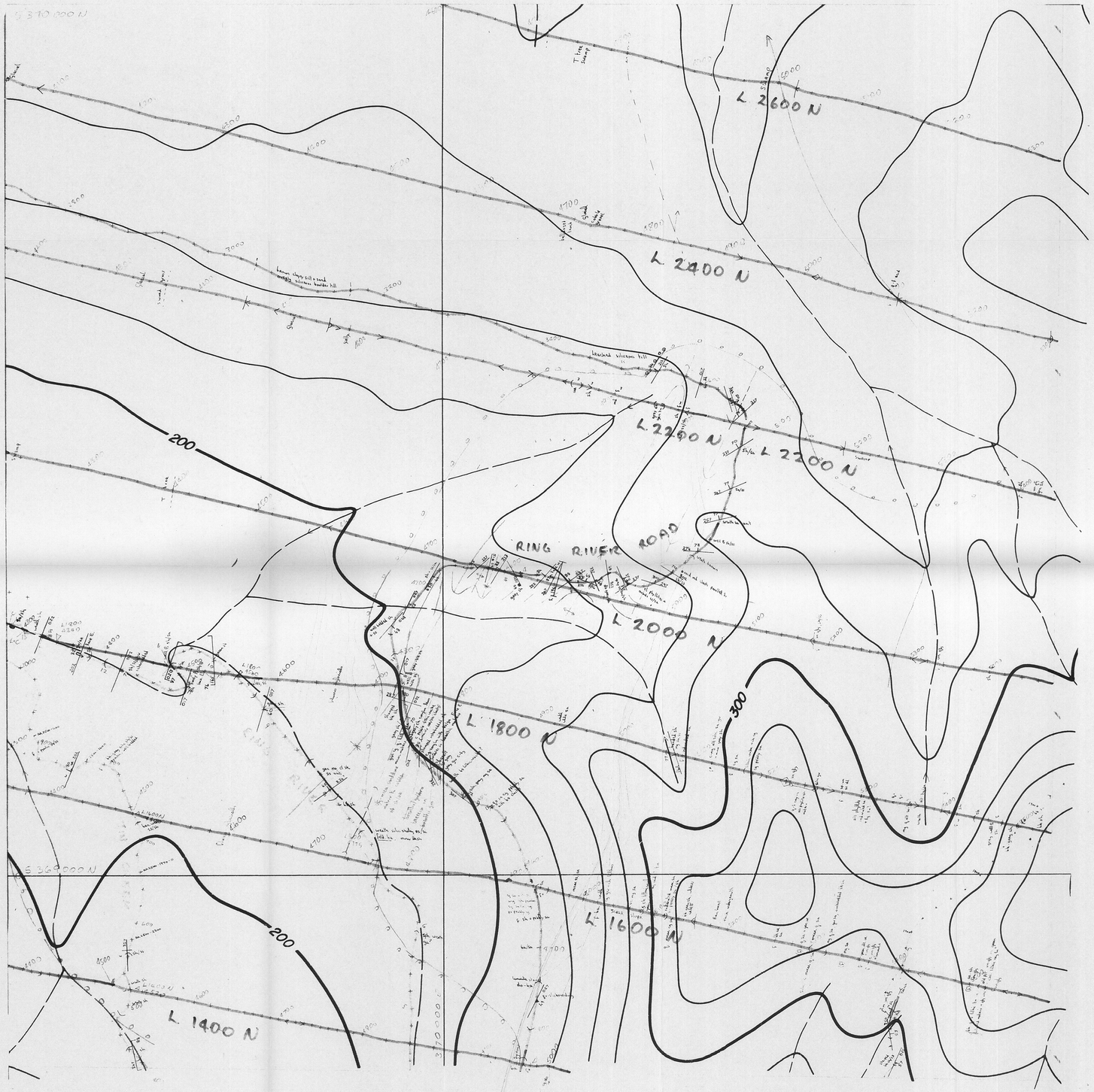
5 cm

78-1316 Appl

COMSTAFF PROPRIETARY LIMITED

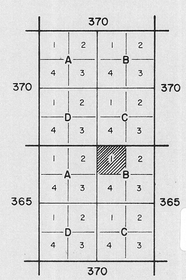
RENISON GRID - GAP 585
SHEET 370365 - A3
DETAILED GEOLOGICAL FIELD PLAN

COMPILED	G.F.P.
DRAWN G.F.P.	DATE 6/78
AMENDED	
SCALE	1 : 2500
PLAN No.	TAS/2/1487



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX



210168

5 cm

78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

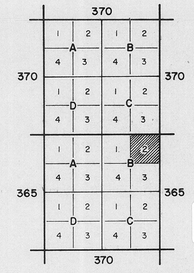
RENISON GRID - GAP 586
SHEET 370365 - B1
DETAILED GEOLOGICAL FIELD PLAN

COMPILED	G. F. P.
DRAWN G.F.P.	DATE 6/78
AMENDED	
SCALE	1:2500
PLAN No.	TAS/2/1488



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX



210169

5 cm

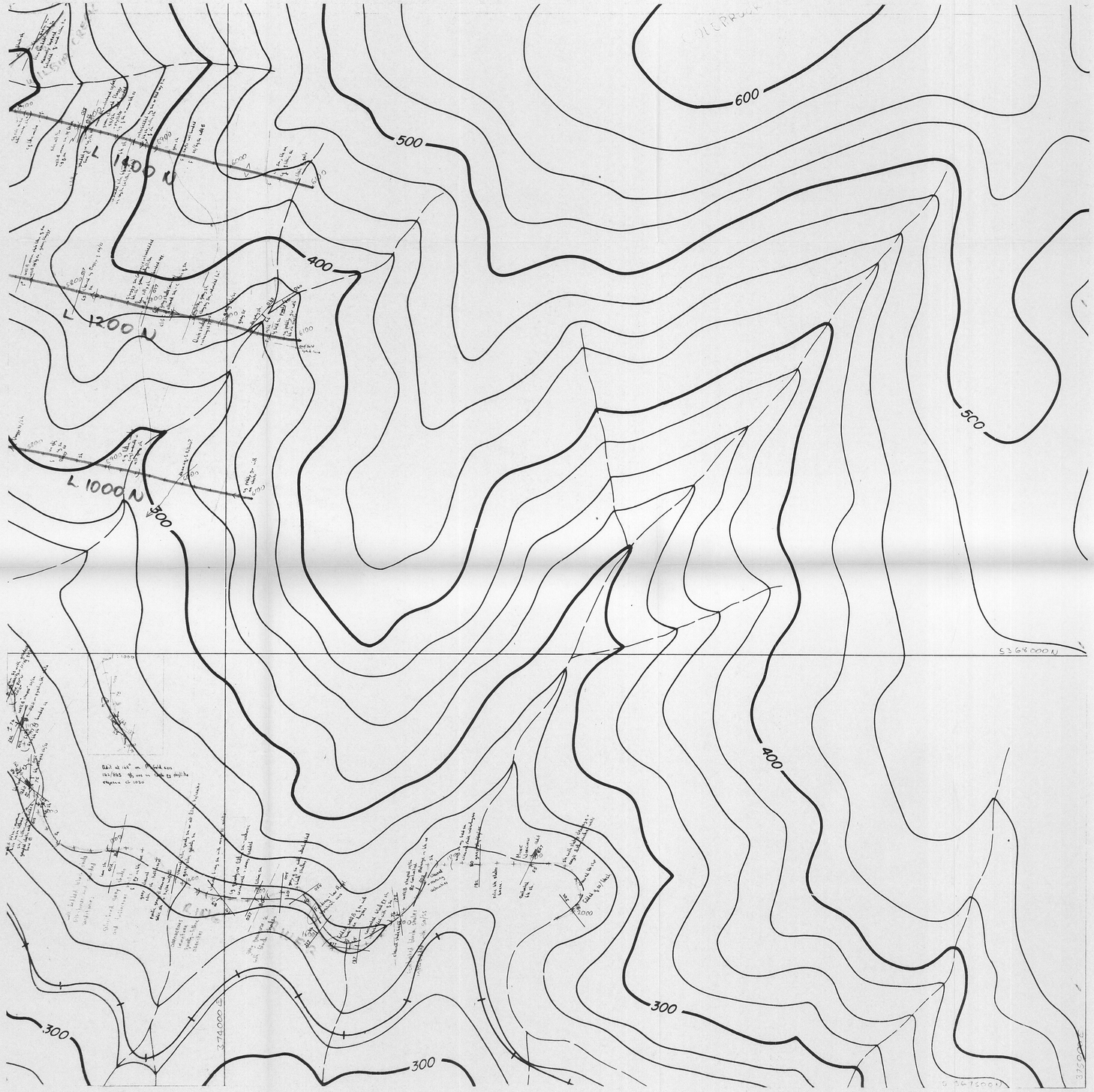
78-1316 App1

COMSTAFF PROPRIETARY LIMITED

587

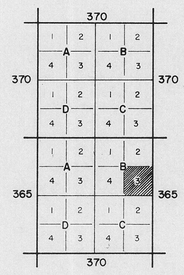
RENISON GRID - GAP
SHEET 370365 - B2
DETAILED GEOLOGICAL FIELD PLAN

COMPILED	G.F.P.
DRAWN	G.F.P.
DATE	6/78
AMENDED	
SCALE	1 : 2500
PLAN No.	TAS/2/1489



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554 1619

SHEET INDEX



210170

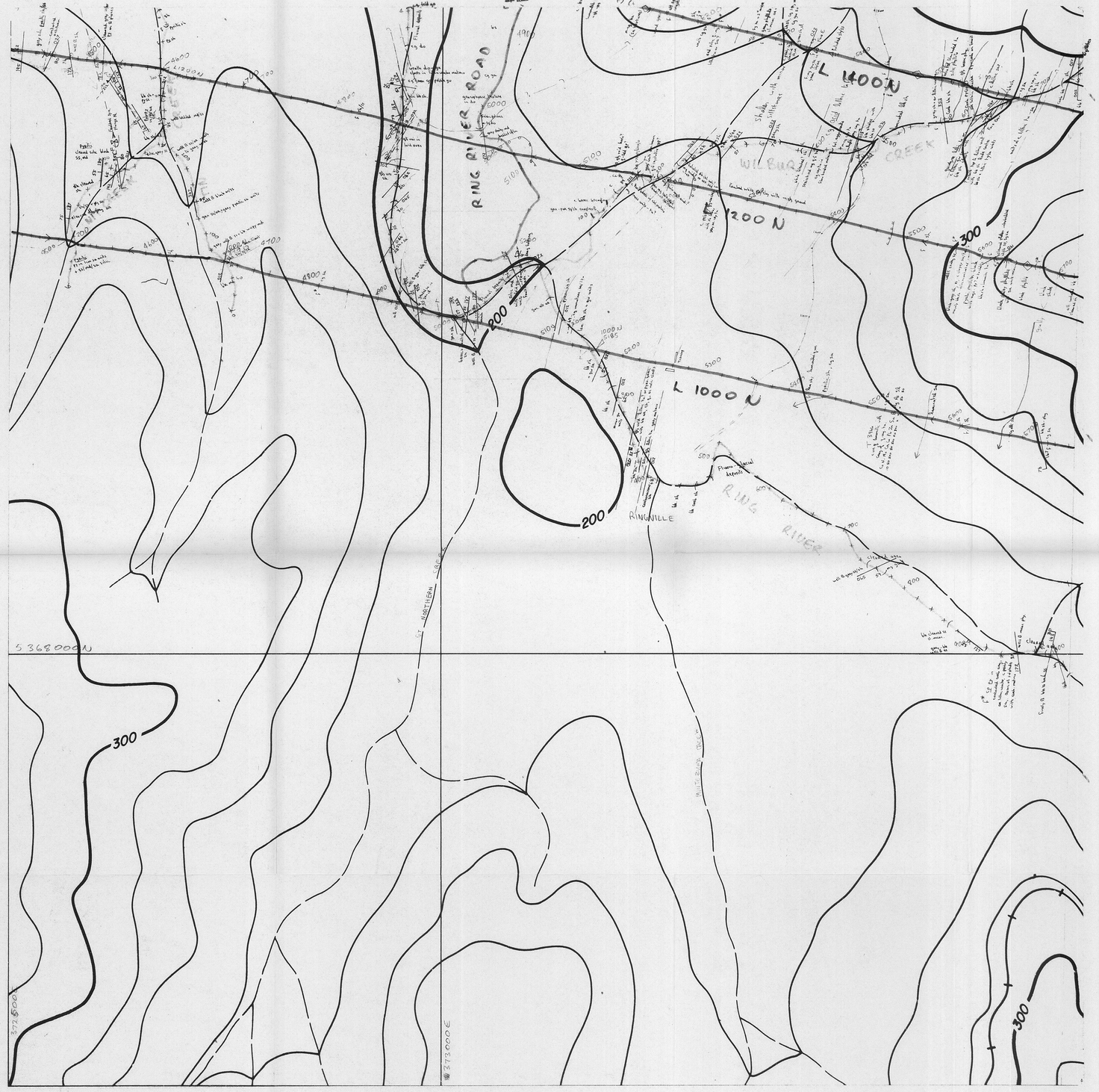
5 cm

78-1316 Appl

COMSTAFF PROPRIETARY LIMITED

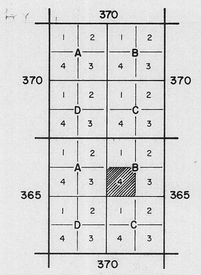
RENISON GRID - GAP 588
SHEET 370365 - B3
DETAILED GEOLOGICAL FIELD PLAN

COMPILED	G.F.P.
DRAWN	G.F.P.
DATE	6/78
AMENDED	
SCALE	1 : 2500
PLAN No.	TAS/2/1490



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/~~1554~~ 1619

SHEET INDEX



210171

5 cm

78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370365 - B4
DETAILED GEOLOGICAL FIELD PLAN

589

COMPILED	G.F.P.
DRAWN G.F.P.	DATE 6/78
AMENDED	
SCALE	1 : 2500
PLAN No.	TAS/2/1491

210172

OPEN FILE

AAC

MISDIRECTED

PROJECT NAME:

TITLE:

APPENDIX 1

SIX MONTHLY REPORT TO DEPARTMENT OF MINES, TASMANIA

RENISON EAST - GRID GAP

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES:

COMMODITY/IES:

TEXT PAGES NO:

PLAN NOS:

TABLE NOS:

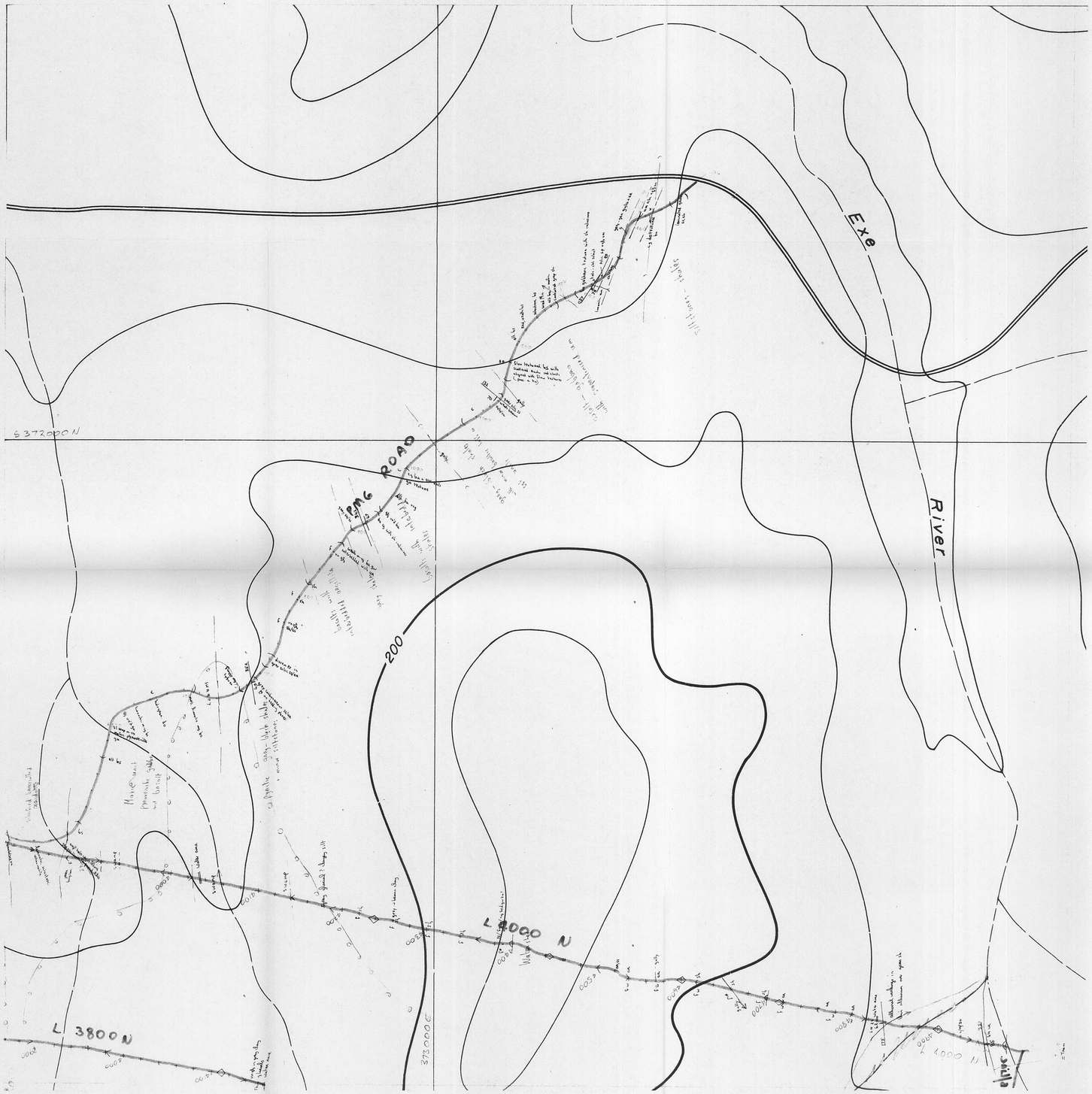
APPENDICES:

AUTHOR/S:

DATE:

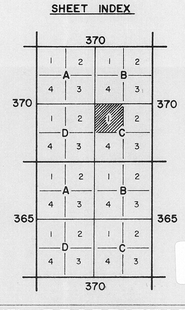
AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554 1619

SHEET INDEX



210173

5 cm

78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 590
SHEET 370370 - CI
DETAILED GEOLOGICAL FIELD PLAN

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DRAWN G.F.P.	DATE 6/78
AMENDED	
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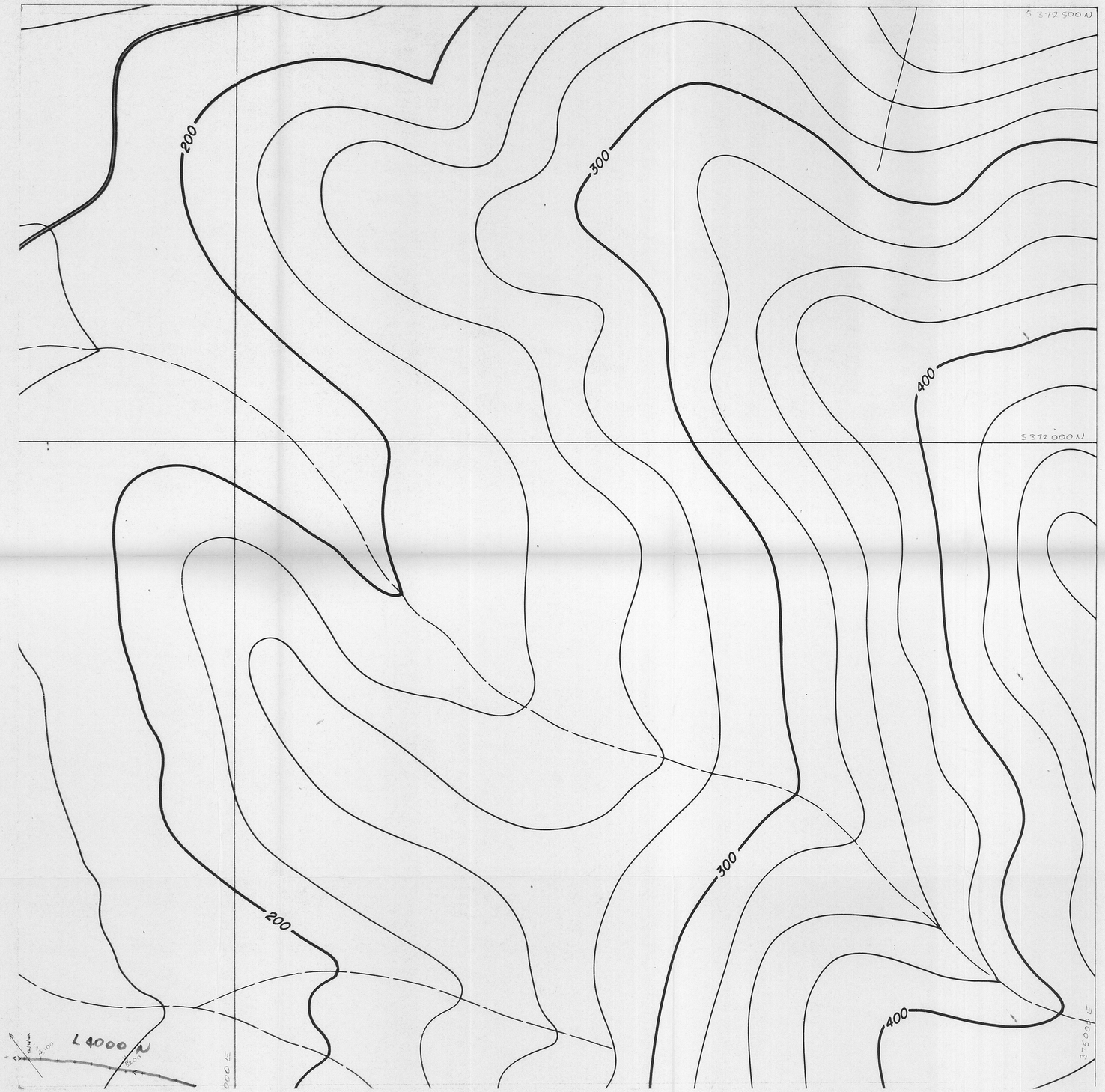
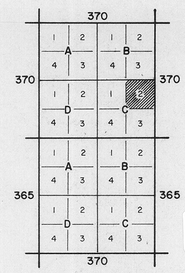
PLAN No.	TAS/2/1492



FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/~~1554~~ 1619

SHEET INDEX



210174

5 cm

78-1316 App 1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 591
SHEET 370370 - C2
DETAILED GEOLOGICAL FIELD PLAN

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DRAWN G.F.P.	DATE 6/78
AMENDED	
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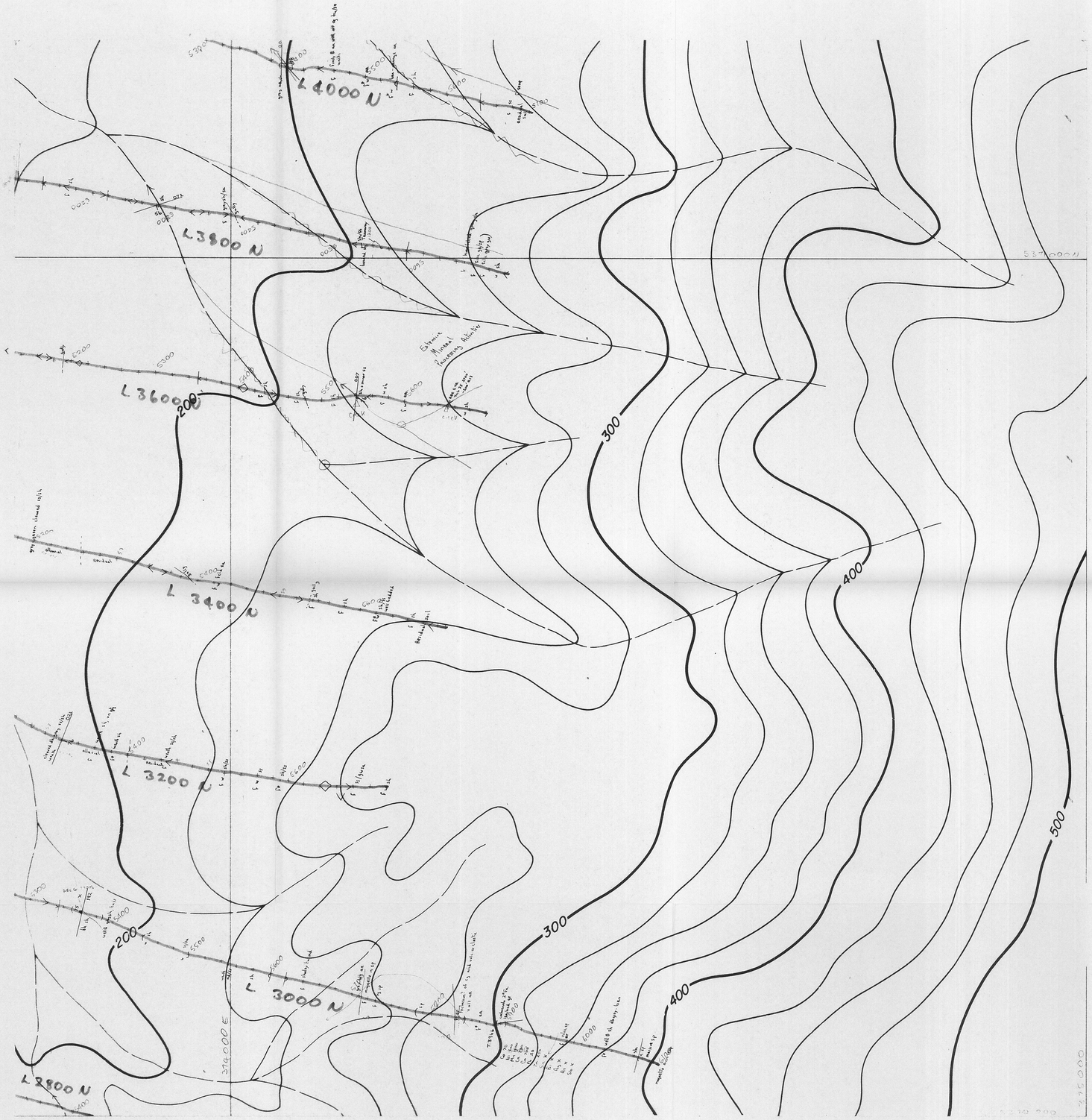
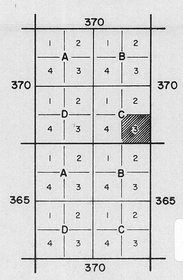


FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX



210175

5 cm

78-1316 App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 532
SHEET 370370 - C3
DETAILED GEOLOGICAL FIELD PLAN

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DRAWN G.F.P.	DATE 6/78
AMENDED	
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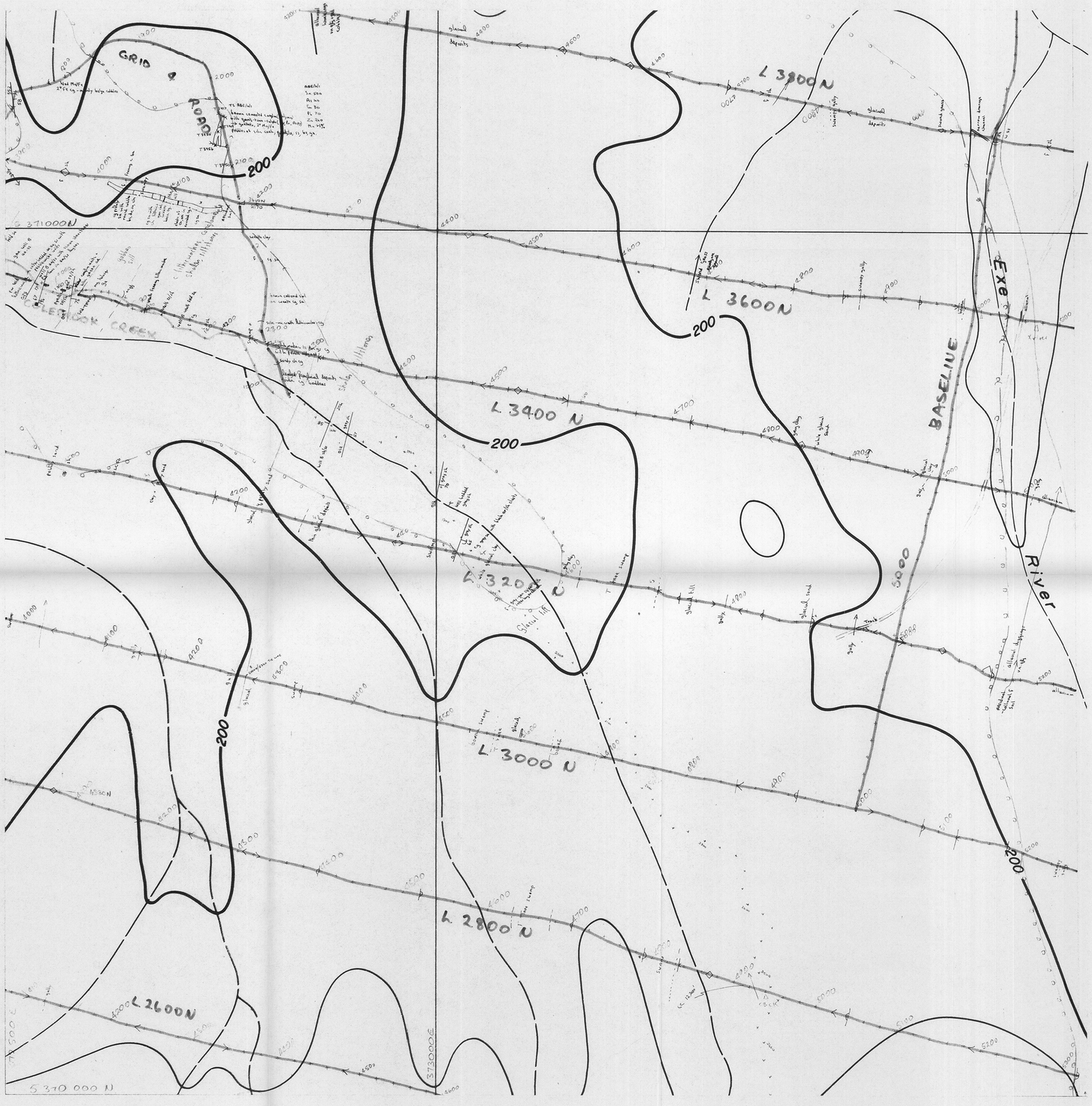
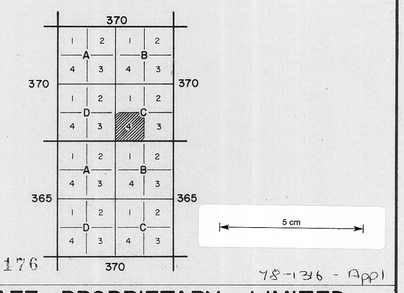


FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX



210176

78-1396 - Appl

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP 533
SHEET 370370 - C4
DETAILED GEOLOGICAL FIELD PLAN

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AMENDED	
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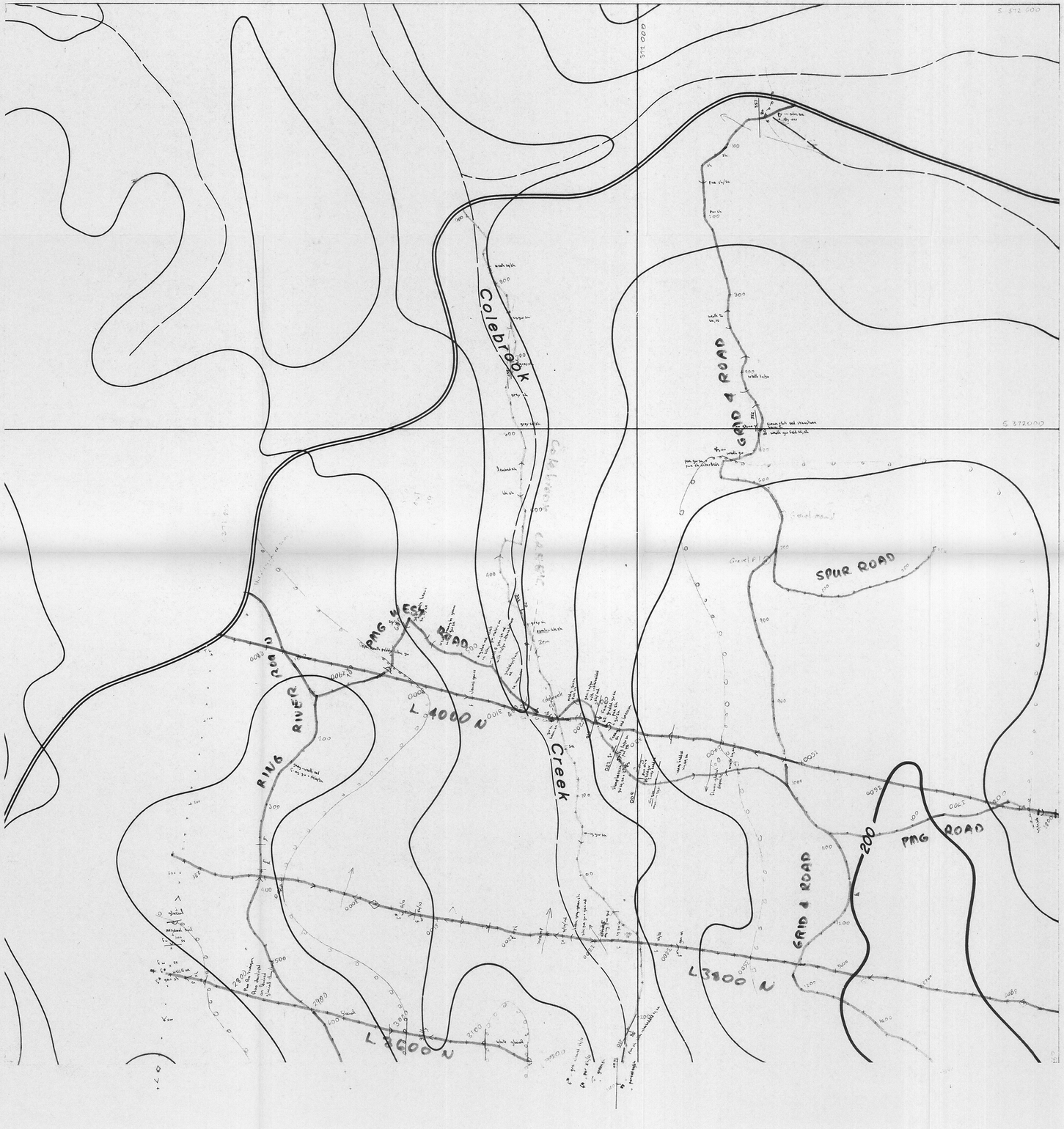
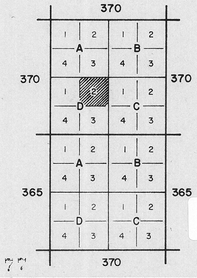


FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX



5 cm

210177

78-1316 - App1

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP
SHEET 370370 - D2
DETAILED GEOLOGICAL FIELD PLAN

594

COMPILED	G. F. P.
DRAWN G.F.P.	DATE 6/78
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