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COMMONWEALTH ALUMINIUM CORPORATION LTD

EXPLORATION DEPARTMENT

E.L. 7/74 - MOINA

GENERAL AREA

REPORT ON ALL INVESTIGATIONS

TO

DECEMBER, 1979

P.W. Askins.
March, 1980.

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1. INTRODUCTION

E.L. 7/74 was first granted on 18th July, 1974. On 29th October, 1974 an additional 9 km² in the Moina area previously held as reserve by the Mines Department, was incorporated in the licence. On 1st November, 1976 an additional 80 km² was added to the E.L., to cover further limestone areas in the Mayberry area. Also on 1st November, 1976 an additional 18 km² in the Oliver's Hill area was released from Mines Department Reserve (SR 1976 No. 39) and incorporated in the E.L.

At the renewal date of 18th July, 1979 the previous area of 488 km² was reduced to 405 km² by relinquishing an area east of Mayberry and a small area of overlap of the National Park in the south west of the licence area. The present E.L. boundary is as shown on Fig. 2.

The Exploration Licence was transferred from Comalco Ltd. to Commonwealth Aluminium Corporation Ltd., early in 1979.

This report covers all investigations in the licence area as a whole since the E.L. was granted, with the exception of the Moina area - sheets A, 1, 2, 3 and the Black Bluff - Smith's Plains areas which have been reported on separately, Askins (1978c, 1979), Weste (1978). Also excepted is work done on zeolites in the Gad's Hill area and all investigations in the Olivers Hill - Tin Spur areas;- both these will be reported on separately. The areas covered by this report are shown on Fig. 1.

2. EXPLORATION AIMS AND METHODS

As a result of our exploration in North Queensland where we had located fluorite rich magnetite-skarns, it became apparent that similar rocks occurred at Moina. C.J. Gove inspected the Moina area in February, 1974 (Gove, 1974) and reported that fluorite-magnetite skarn was widespread at Moina. The exploration licence was applied for shortly afterwards.

Our exploration in the licence area has been directed primarily at locating a fluorite orebody for Comalco's captive aluminium smelting needs. Most investigations have centred on Moina; these investigations have been covered in separate reports. In addition to the potential for fluorite, the area contains tin, tungsten, gold and minor lead-zinc deposits, and therefore investigations have included a search for such deposits.

The investigations of the areas covered by this report have included literature search, drainage, geochemical sampling, colour airphotography, assessment of a previous airborne magnetic survey, geological mapping, and for selected prospects gridding, geological mapping, rock and soil sampling, ground magnetic surveying, and induced polarization surveying.

3. LITERATURE SEARCH

A thorough search has been made of all literature covering the Moina area and the E.L. as a whole. The references at the end of this report are believed to be fairly comprehensive.

4. WORK DONE BY PREVIOUS INVESTIGATORS

The most comprehensive exploration carried out by previous investigators was by the Mt. Lyell Mining and Railway Co. Ltd. in their E.L. 8/65, from 1965 to 1972. Reports by Dandy (1970), Foster (1969), McKibben (1971a, b, 1972), Reid (1967) cover this exploration.

Where necessary, reference to previous investigations is made in this report.

Regional aeromagnetics covers most of the Exploration Licence. This was carried out for B.H.P. and The Mt. Lyell Mining & Railway Co. Ltd. by A.M.E.G. (Chestnut, 1967; Webb, 1968a, b, 1969; Zarzavatjian, 1966a,b).

5. REGIONAL GEOLOGY

The regional geology is adequately covered on Mines Department 1" = 1 mile sheets, which are not included in this report because they are in short supply. Fig. 3 is a regional geology compilation at 1" = 1 mile showing mineral occurrences compiled by Mt. Lyell. This map is a useful underlay to airborne magnetics, Fig. 4, and -20 mesh stream sediment geochemical sampling.

Explanatory notes are available only for the Middlesex sheet, (Jennings, 1963).

The broad geology of the region is shown on Fig. 5. The region lies in the "Big Bend" of Tasmania where rocks from Precambrian up to Devonian in age change their trends from N-S in the west to N-W in the east. The prominent fracture system in the area is NW: the Bismuth Creek Fault is part of this fracture system.

It is popularly stated that this fracture system is Tabberabberan in age (i.e. M. Devonian) but I believe there is evidence that the system commenced at the end of the Cambrian, corresponding closely with the end of volcanicity in the Mt. Read Volcanics (which occur predominantly towards the eastern or southern margin of the Dundas trough). NW trending grabens developed and the sedimentary environment changed, so forming continental fanglomerates or marine greywackes (e.g. St. Valentine's Peak?), known as Owen or Roland Conglomerate, adjacent to hinterlands of Precambrian rocks.

A shallow marine transgression produced widespread Moina sandstone, overlain by tidal flat facies Gordon Limestone. The NW trending fracture system was either continuously active or reactivated in the Devonian (when most observed faults and

folds formed and granite was emplaced), again in the Permian, (since Permian sedimentary basins seem to be bounded by the same fracture systems), again during the Jurassic (when the fractures seem to have been the locus for emplacement of dolerite dykes and sills), and again during the Tertiary (when continental or shallow marine silts deposited in NW trending grabens at Port Sorell and the Launceston Basin, and when the submerged Bass Basin formed).

The Devonian Dolcoath Granite at Moina is responsible for the known tin, tungsten, mineralization. (Minor lead-zinc-copper-gold vein type deposits in the area may be remobilized from Cambrian volcanogenic deposits beneath - the granite may merely have acted as a heat source).

The surface extent of the Dolcoath granite is small, but gravity data (Fig. 6) shows that there is a large subsurface batholith.

The granite has a distinct gross E-W trend (Fig. 7) and also lies in the major fracture zone of which the Bismuth Creek forms a part. (It is here proposed to call this zone the Cethana fracture zone). The Husetop Granite also lies in the same zone, suggesting that these Devonian granites have been localized at the intersection of the Cethana fracture zone and E-W or NE trending fractures.

Tin-tungsten mineralization at Moina has a pronounced E-W trend from Stormont to Round Mountain, (Figs. 6, 9). This is interpreted to be due to a shallow E-W trending granite cusp at this point.

An enormous E-W trending granite batholith probably exists 20 km south of Moina (outlined by gravity data, Fig. 7). It outcrops partially at Granite Tor, (Fig. 8). Minor tin-tungsten vein type mineralization is known at Mt. Pelion, above

this granite. Large areas of the Precambrian in this area must therefore be prospective for blind tin-tungsten deposits.

The geology around the Dolcoath granite is shown on Fig. 9.

The Bismuth Creek Fault passes through the area - it is a vertical series of fractures in a zone about 50m wide. Full details of the geology of the skarn and other deposits around Moina are covered in reports by Askins (1978c, 1979).

Fig. 10 shows airborne magnetics around the Dolcoath granite region. This map is part of a survey conducted by Mt. Lyell, (Zarzavatjian, 1966a). The Moina wrigglyite skarn body shows clearly. North-west and south-west of Moina there are clear E-W trending highs which correspond to buried magnetic Cambrian rock units. The Lorinna East and West anomalies are covered in detail elsewhere in this report.

6. DRAINAGE GEOCHEMICAL SURVEY

Two main and separate surveys have been carried out in the area. These are:

- a) an early -20 mesh stream sediment survey where samples were variously analysed for Cu, Pb, Zn, Bi, Ag, Sb, Au, W, Mo, F. This survey has a broad reconnaissance coverage and includes some rock samples. Minus 20 mesh samples were used instead of the traditional -80 mesh because it was erroneously believed that it would be difficult to collect fine sediment in high gradient streams.

Full details of this survey are in Appendix 1.

- b) a later -80 mesh survey of selected areas, with samples analysed for Cu, Pb, Zn, Bi, Sn, W. In this survey magnetite concentrate, panned concentrates and water samples were also collected.

Full details of this survey are in Appendix 2.

Minor surveys around the Campbell River and Wilmot River areas are covered in Appendix 3. Fluorine in stream water in the Moina area and along the Bismuth Creek Fault is dealt with in Appendix 4.

7. BISMUTH CREEK FAULT ZONE

The zone surrounding the Bismuth Creek Fault from Moina to Lorinna was geologically mapped (both inside and outside E.L. 7/74) in order to gain some knowledge of its regional significance and its potential for mineralization.

Notes on the geological map, TAS-78-158, are in Appendix 6. Sample locations are on plan TAS-80-338.

8. LORINNA EAST ANOMALY

A large ^{mag?} anomaly occurs about 2 km north of Lorinna (Fig. 10) on the east side of the Forth River, in an area of Tertiary gravel, basalt and soil cover. This was thought initially to possibly be a large unexposed wrigglite deposit.

The presence of the anomaly on the ground was confirmed with ground magnetometer work, but no outcropping skarns could be found. The only outcrops observed were Cambrian volcanics/sediments.

Mt. Lyell investigated this anomaly. Near the anomaly peak they found a magnetite bearing shear zone in Cambrian porphyry. They therefore assumed the whole anomaly to be due to Cambrian rocks. Since it was thought that the magnetite in the Cambrian rock could be Devonian in age and that the bulk of the anomaly could be due to wrigglite, a program of investigation, including gridding/ground magnetics and geological mapping, and soil sampling was undertaken, after land-owners were notified.

Water samples were taken from four minor gullies in the anomaly area. All contained less than 0.05 ppm F. The results are negative but were not necessarily proof of the absence of wrigglite under the basalt/talus in the area.

Details of the work done are shown on the following plans:

Grid line slopes	-	TAS-78-283
Geology	-	TAS-77- 63
Soil Geochemistry	-	TAS-77- 71
Ground magnetics - fluxgate data	-	TAS-77- 99
Ground magnetics proton precession	-	TAS-77- 68

The magnetic high is very large and is probably cut off by the Bismuth Creek Fault at the south. Surface outcrop of the rock responsible for the anomaly occurs around 300W/150N and 100W/600N. It is a very "sheared" magnetite rich originally porphyritic tuff. Thin section descriptions of two specimens from around 100W/600N by W. Fander are in Appendix 7. There is no evidence of any skarns. If skarns or pyrrhotite-cassiterite bodies in limestone occur then they must lie south of the gridded area and south of the Bismuth Creek Fault.

Analyses of this magnetite rich sheared tuff are in Appendix 7. No significant quantities of elements of economic interest such as Sn, W, Be, Cu, Pb, Zn, Ag occur. The rocks were scanned under short wave UV light but no scheelite was detected.

Weak anomalous copper and lead values occur in the soils - these anomalies seem to reflect higher background values in the Cambrian tuffs, but not reflect any economic mineralization. A few samples of quartz veinlets (with some adhering wallrock) from scree in the north-western part of the grid were analysed for Cu, Pb, Zn with negative results (Appendix 7). However there have been no analyses for Au. The old Campbell Reward gold mine occurs a short distance north of the grid (now beneath the lake) and so the Cu and Pb anomaly might reflect gold mineralization, which to have been missed in panning by the early prospectors could be ultra fine grained.

It is therefore recommended that reconnaissance rock sampling be carried out and the samples analysed for gold.

9. LORINNA WEST ANOMALY

A smaller aeromagnetic anomaly than at Lorinna East occurs 1.8 km west of Lorinna (Fig. 10), on the west side of the Forth River. Again the area on the one mile geology map is shown as covered by scree and the area was thought prospective for wrigglite.

A small grid was placed over the area and geological mapping, ground magnetics, and one trial line of soil sampling carried out.

Details are shown on the following plans:

Lorinna west and east geology	-	TAS-77- 61
Grid line slopes	-	TAS-78-281
Geology	-	TAS-77- 62
Ground magnetics, fluxgate data	-	TAS-77- 97
Ground magnetics, proton precession	-	TAS-77- 70

The area is covered in alluvium and scree except for outcropping Cambrian Lorinna Greywacke in the north east part of the grid. The magnetic anomaly is confused and probably means that the grid lies wholly within a larger magnetic high, which must be due to an underlying magnetic Cambrian rock unit. There can be no wrigglite in the area. The trial line of soil samples (Appendix 8) showed nothing of interest so further sampling was not attempted and the area was abandoned.

10. MISCELLANEOUS INVESTIGATIONSA. MOLE CREEK AREA

Investigation of a Pb-Zn anomalous zone in soils over Gordon Limestone in the Mole Creek area is reported in full in Appendix 9.

B. WILMOT TUNNEL

An opportunity to inspect the H.E.C. Wilmot Tunnel arose in December, 1977 when it was dewatered for maintenance. The tunnel is between Lake Gardiner and Cethana. Only the Cethana end was inspected, within E.L. 7/73 of CRAE. Full geological maps by the H.E.C. at one inch equals 20 feet are on file in the Devonport office. These are H.E.C. plan no's A 15694 to A 15700.

Magnetite rich extremely altered Cambrian tuffs? were sampled and sent for analysis. It was thought that a study of these rocks might aid our exploration of similar(?) rock at the Lorinna East grid. The rocks were scanned with a scintillometer but all were 'dead'. They were scanned under short wave UV light but no scheelite was present. Appendix 10 lists the analyses; the rocks are relatively enriched in Sn, Ce, La, Nb, Sc, Sr, Ta, Ti, Y, Yb, Zn, Ga. This enrichment is probably due to metasomatic introduction because the Dolcoath granite is only of the order of 100m distant.

Two samples of skarns from close to the Dolcoath granite have also been analysed; the analyses are in Appendix 11.

C. NARRAWA CREEK AREA

Calc-silicate rocks interbedded within the Moina sandstone are known in Narrawa Creek, outside E.L. 7/74. It was thought possible that such rocks occur in E.L. 7/74 so a visit was made to these in Narrawa Creek. A traverse was made at night with a short wave UV lamp but no scheelite was found. Two samples have been analysed; their analyses and locations are in Appendix 12. The samples have relatively high Sn content and one contains a trace of gold.

D. PYRITIC MOINA SANDSTONE

Much of the Moina sandstone of the district is very pyritic. Some is clearly syngenetic where pyrite occurs as framboids concentrated parallel to bedding; elsewhere the pyrite is irregularly disseminated and may be both syngenetic (diagenetic) or remobilized by hot circulating water associated with the granite.

The pyritic sandstone is thought prospective for U, Au, and Sn.

Uranium could concentrate locally in the sandstone; uranyl ions derived from weathering of the relatively hot potassic Dolcoath Granite could have percolated into the sandstone and been fixed in the pyritic reducing environment.

Gold could have been introduced into the sandstone by hydrothermal solutions associated with the granite; or the granite could merely have acted as a heat source where hot solutions remobilized gold which was already present in low quantities in the sandstone or in the underlying Cambrian tuffs and then deposited it locally in the pyritic sandstones. Gold occurs disseminated(?) in sandstone locally at Tin Spur.

Tin is known to occur in the sandstone at Tin Spur as disseminated fine grained cassiterite. The sandstone is often leached and porous, or hard and silicified, and in thin section contains topaz, indicating that the cassiterite has been introduced by metasomatic fluids. A separate report will cover work done at Tin Spur.

CRAE have tested the pyritic sandstone on the Cethana road for Au and U, with apparently negative results. We have also scanned many sandstone samples with a scintillometer with negative results. There is a pair of weak aeromagnetic radioactive anomalies over Mt. Stormont, detected in the 1950's by the BMR (see map G 207-1) which has not yet been investigated and needs some ground evaluation.

One sample of sandstone containing framboidal pyrite, from beside the Cethana road in E.L. 7/73 has been analysed; no elements occur in economic quantities but As, Cu, Pb, Co and perhaps Au are relatively high. The analyses, of sample PA/T/MOINA 7 are:

Sn	4	} Amdel XRF
W	15	
Au	0.05	Amdel AAS
Ba	<200	Amdel,
Be	<1	Semi
Ce	<300	quantitative
Co	300	spectrographic
Cr	100	
La	<100	
Mn	300	
Mo	20	
Nb	< 20	
Ni	500	
Sc	3	
Sr	< 50	
Ta	<100	

Th	<100	Bi	5
Ti	800	Cd	<3
V	30	Cu	700
W	<50	Ga	1
Y	10	Ge	<3
Yb	<1	In	<10
Zr	100	Pb	3000
Ag	10	Sb	30
As	300	Sn	<1
		Zn	20

E. INVESTIGATION OF SOME AEROMAGNETIC ANOMALIES

Some of the low order aeromagnetic anomalies west of Liena have been examined on the ground. Comments by G. Weste on these anomalies are:

a)

"Anomaly north of Liena is complex - made traverse up steep sandstone ridge and onto edge of Cambrian dolerite. Readings over the Limestone around Liena ranged from (62)179 to (62)285 (Proton Precession unit) and reached (62)623 on the edge of the Cambrian. The anomaly is more twisted (than shown by air mag) and seems to be orientated around the Cambrian - showing the lateral displacement caused by the fault. The Standard Hill end of this anomaly was traversed also - the limestone to south being in the range (62)207 to (62)230 and the sandstone 203 to steadily increase (.25 km readings) to 217 to 253 to 287 to 290 to 310 to 293 as I crossed the 2500 contour from the airmag. The low gradient here also indicates a deep Cambrian source as there is a fair thickness of sandstone in Standard Hill.

b) The Wesley Dale anomaly - 2 mile SW of Chudleigh overlies a 400 foot hill consisting of limestone at the base overlain by Permian sediments then Jurassic dolerite and finally Tertiary basalt. A traverse was made from the Wesley Dale side (NE) over the top of the hill. The results were:

Wesley Dale (62) 228	Limestone
Approx. 100m SW 270	Dolerite talus
" 100m SW 258	" "
" 100m SW 266	Permian seds. + basalt soil
" 100m SW 261	" " " "
" 100m SW 247	Dolerite + basalt soil
" 100m SW 255	" " "
" 100m SW 288	Basalt
" 100m SW 294	"
" 100m SW 283	"

It appears that this anomaly is due to the Tertiary basalt. A similar anomaly to the east aligns neatly over a NE trending basalt flow.

c) The low order anomaly around Mayberry was not checked on the ground - it would be a good one to check with the fluxgate magnetometer to see how total values compare with Moina. However the airmag data shows low gradients indicating a possible deep source and the anomaly is approximately on the strike of the Cambrian anomaly to the NW. However the anomaly does not show any trend parallel to the Cambrian but this may be due to its depth".

11 RECOMMENDATIONS FOR FUTURE WORK

Some recommendations for follow up to stream sediment geochemical anomalies have been given in Section 6 and will not be repeated here.

Some of the recommendations of Reid (1967) as a follow up to the Mt. Lyell stream sediment geochemical anomalies have not yet been followed up. He recommends resampling and ground evaluation of

- * Copper and zinc anomalies in Olivia Creek.
- * Copper and zinc anomalies in the Dove River and tributary below magnetic anomaly 14.
- * Possibly anomalous copper in stream draining from magnetic anomaly 12 above the Powerful Mine (see also Austin & Serim, 1973 and Walsham, 1974)
- * Copper, zinc and tin anomalies in several small streams draining from the eastern slopes of Bell Mount into the Forth River.

Other recommendations for further work, not in order of priority are:

a) investigation of 5 Mile Rise Goldfield, both for gold and base metals. The narrow quartz veins in this area passed downwards into galena rich veins below the depth of weathering, and passed from Moina sandstone into underlying Cambrian tuffs. The gold-lead mineralization might have been remobilized from a volcanogenic base metal deposit in the Cambrian rocks at shallow depth beneath the sandstone - this idea could be followed up with by gridding a selected area, and running an E.M. survey.

b) examination of the Devon and Silver Dove lead-zinc mines on the Dove River. The Devon Mine is held under lease by a Mr. Neville McCoy of Sheffield.

c) search for pyrrhotite-cassiterite replacement deposits in the limestone adjacent to the Bismuth Creek Fault at Lorinna. This could involve a follow up from the aeromagnetic survey presently being conducted. Weak anomalies would need to be gridded and evaluated with ground magnetics, I.P. and E.M.

d) investigation of airborne radioactive anomaly over Mount Stormont (see section 10D).

e) search for Au mineralization at Lorinna East (see section 8).

f) The area around Bell Creek and the Wilmot dam needs evaluation for Au, Sn and Pb within the sandstone. A similar situation to that at Tin Spur could exist in the Bell Creek Goldfield area where like Tin Spur there is known gold, tin and lead mineralization. The alluvial gold has not been traced to a source; it might be derived from the adjacent very pyritic sandstones (which have been used as rock fill for the Wilmot Dam). Cassiterite is also reported in the alluvium and its source might be from metasomatically altered sandstone, as at Tin Spur. Lead occurs at the nearby Wilmot Mine according to Reid (1919) parallel to bedding, (as it also occurs at Olivers Hill and Round Mtn.). "Ferromanganese" outcrops are recorded by Reid in the Bell Creek Goldfield; these might be gossans after lead mineralization in the sandstone, as at Olivers Hill. It is recommended that those parts of the area within E.L. 7/74 (much of the area is in CRAE's E.L. 7/73 and some in a Mineral Lease) be systematically sampled and all samples analysed; the cassiterite at Tin Spur is often not visible to the naked eye so analyses are very necessary.

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APPENDIX 1

MINUS 20 MESH REGIONAL STREAM GEOCHEMISTRY

(by G.Weste)

INTRODUCTION

As a rapid means of initially assessing most of the Licence area, a geochemical survey was carried out along most of the streams draining the Phanerozoic rocks. The aim of the survey was to detect indications of volcanogenic sulphides, Moina fluorite/tin/tungsten, and gold, 'styles' of mineralisation.

Many of the streams in the mountainous areas have high gradients and contain very little (and mainly coarse) sediment. To enable rapid coverage samples were wet sieved through 20 mesh at the sample site. Samples of rock float in the creeks were also collected for examination and analysis.

A total of 315 stream sediment and 104 rock float samples were collected. The survey was carried out by geologist R. Craigie during the 1974-75 field season.

ANALYTICAL METHODS

Samples were analysed by C. Ong at Comalco's laboratory in North Melbourne. Samples 32 - 220 and 241 - 312 were analysed for Cu, Pb, Zn by AAS scheme 1, for Ag, Sb by AAS scheme 4, and for Au by solvent extraction AAS of 10gm of material. Samples 222 - 240, 264, 313 - 460 were analysed for Cu, Pb, Zn, Bi by AAS scheme 1, for W, Mo, Sb, by AAS scheme 4 and for F by scheme 8 (specific ion electrode). (see Appendix 5)

RESULTS

Sample locations were initially transferred from air photographs to 1:36,360 scale plans which overlay the Dept. of Mines Geological Atlas series (see drawings Nos. TAS/M/75/24A, B, C, D). Later the results were transferred to 1:20,000 scale Cadastral sheets (see drawings Nos. TAS/77/98A, B, C, D, E, F).

STATISTICAL TREATMENT OF RESULTS

Frequency and cumulative percent frequency histograms and log probability curves were plotted for Cu, Pb, Zn, F and Ag. Data for sediment and rock float were plotted separately (see Figs. 1-1 to 1-5).

Thresholds were estimated in three ways; by inspection of the histograms, by breakdown into populations using the log-probability curves, and by taking the 95 percentile on the log probability curve. Data obtained from the histograms and curves is summarised in Table 1, and anomalous values with their sample numbers are listed as Table 2.

No statistical analyses were carried out for Au, Sb, Bi, Mo or W because analytical values were too low.

DISCUSSION OF RESULTS

Copper

Background values for rock float and for sediments were very low resulting in strongly truncated positively skewed (lognormal) distributions (see Figs. 1-1 and 1-2). The deviation is small, particularly for sediments resulting in a low but obvious threshold.

The log probability curve for sediments (Fig. 3) shows a small inflexion about 45 ppm indicating that two populations are present, one comprising the upper 3% of the data and is truncated at the top. This population may represent mineralisation and overlaps but does not intersect the lower 'barren' population. The threshold for sediment is represented by the inflection point on the log probability curve at the 97 percentile (i.e. 40 ppm). Because the populations overlap, a few samples below 40 ppm will belong to the upper or anomalous population and vice versa. The histograms do not differentiate populations and indicate a higher threshold (60 ppm).

For rock float the log probability plots are strongly truncated, the mean (50 percentile) falling below the detection

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limit. The curve in this case indicates either a single population or a number of strongly overlapping populations for that portion of the data presented (i.e. above 10 ppm). Although the mean value is lower than for sediment the threshold is higher, reflecting the greater deviation expected for rocks. Because this probability curve is steep population breakdown is of little use in determining the threshold and visual inspection of the histograms gives a more reliable value of 50 ppm. This compares with the 95% probability value of 68 ppm on the log probability curve.

Lead.

Both rock float and sediment plot as positively skewed lognormal histograms (Figs. 1-4 & 1-5), ^{1-4 & 1-5, the rock data} the rock data being strongly truncated at the lower end.

The probability curve for sediment (Fig. 1-6) ^{1-6 indicates} indicates the presence of two non intersecting populations, the upper one being truncated. The inflection point between the populations is difficult to ascertain accurately but lies around the 95 percentile at 60 ppm. Inspection of the histograms which ignore separate populations results in a threshold of about 80 ppm.

For rock float the log probability curve shows a lower mean but greater deviation (as for Cu). Although the curve is only gentle, more than one population is indicated by the regular change in gradient. No inflection points are discernable and the threshold is best determined by using the 95 percentile and by inspection of the histograms.

Zinc.

The histograms for both rockfloat and sediment (Figs. 1-7 & 1-8) show a very strong positive skew and large deviation. For sediments the histograms are irregular indicating more than one population.

The log probability curve for sediments (Fig. 1-9) is a relatively smooth curve indicating that more than two populations are present. (assuming non intersecting lognormal

distribution). No inflection point can be selected and it is necessary to inspect the histograms which, although irregular, indicate a threshold about 170 ppm. Using the 95 percentile on the probability curve a lower threshold of 152 ppm is obtained.

A very similar probability curve is obtained for rock float which again shows a lower mean but greater deviation than the sediment curve. At least two populations are indicated but no inflection points occur. Inspection of the histograms indicates a threshold of about 160 ppm which is below that obtained using the 95 percentile on the probability curve.

Fluorine.

The rock float and sediment histograms (Figs. 1-10 & 1-11) are different. The sediment has a much more regular positively skewed distribution with moderate deviation. This contrasts strongly with the very broad, possibly bimodal, distribution and large deviation for rock float.

The log probability curve for sediment (Fig. 1-12) indicates that F may have a normal rather than lognormal distribution. Two populations are present with an inflection point at about 600 ppm (95 percentile). Moderate overlaps occur between the populations. Because of this overlap the threshold obtained by inspecting the histograms is higher (700 ppm).

For rock float the log probability curve is also unusual indicating two or three possible normally distributed populations. There is ambiguity in defining the inflection points. One probably exists at about 200 ppm (12 percentile), and another may exist between 900 and 1000 ppm. In this case the histograms are not much help in determining the threshold. Probably the simplest and most reliable method is to select the 95 percent probability (1300 ppm), although this value may be rather high.

Silver.

The histograms for Ag (Figs.1-13 & 1-14) show very irregular (multimodal?) distributions. This problem is not aided by the small sample number (47 for rock, 176 for sediment). Much of the irregularity is caused by the repeated occurrence of favoured values (0.3, 0.64, 0.74, 1.47, 2.06, 2.35). These favoured values indicate that the analyses are either unreliable or very approximate. Strong truncation is caused by much of the population lying below the detection limit.

The log probability curves for both rock float and sediment (Fig.1-15) are similar, up to the 50 percentile, both being strongly truncated by the detection limit. A number of populations appear to be present in both cases but the unreliability of the data limits the reliability of the curves. Determination of thresholds from the histograms gives values significantly greater than those obtained from the log probability 95 percentile.

Antimony.

Sb was analysed for because it is associated with some sulphide deposits. Unfortunately it proved to be present in very low levels, the mean falling below 10 ppm. One value is anomalous.

Gold.

Au values are all around 0.1 ppm or less and very little information can be gained from the data. One value is anomalous.

Bismuth.

Bi analyses were carried out during the latter part of the survey. All values are low and the laboratory reported problems caused by matrix effects rendering analyses unreliable below 40 ppm (i.e. all analyses). No anomalies occur.

Tungsten.

Samples were analysed for W during the second part of the survey. No W was detected in any of the samples. AAS is not really suited to stream survey detection of W because detection limit of 40-50 ppm is well above the expected mean value in most areas.

Molybdenum.

Mo suffers from the same problem as W. The detection limit of 10 ppm is well above the expected mean (1 ppm). Two anomalies occur.

LOCATION OF ANOMALIES

Many of the anomalies (i.e. those values greater than the thresholds in Table 1) are grouped in certain areas. A brief description of each area is set out below. Sample numbers and anomalous values for each area are listed as Table 2.

1. Dove Granite.

Thirteen samples collected just to the north of the Dove River and north of the Dove Granite are anomalous for Cu, Pb and Zn. Five anomalies occur in a possible Cambrian window in Tertiary basalt north east of the Dove Granite. However, one anomaly (rock sample 140) containing 1185 ppm Cu was later found to be road metal transported from an old mine dump. The other eight anomalous samples were collected from Cambrian 'Lorinna Greywacke'.

The maximum values in the area are 175 ppm Cu, 245 ppm Pb, 245 ppm Zn. One sample of Cambrian volcanoclastic from the 'Lorinna Greywacke' contained 1500 ppm F.

2. Daisy Dell - Middlesex Plains.

An area of Tertiary basalt around Daisy Dell is anomalous for Pb (4 samples, maximum 135 ppm), Zn (1 sample

195 ppm), Cu (1 sample 50 ppm) and Ag (2 samples 2.5 ppm). The source of the anomalies may be a window in the basalt which has a thin cover of Recent alluvium. Ordovician sandstone and/or Cambrian volcanics underlie the basalt.

South west of Daisy Dell at Olivia Plain a sample of Cambrian porphyry from a small window in the Tertiary basalt contained 80 ppm Cu.

Two rock samples (200 and 214) from Middlesex Plains, west of Daisy Dell and just south of the Cradle Valley road are anomalous for Mo (15 and 25 ppm) and indicate a window in the Tertiary basalt at this locality. One sediment sample from the same area contained 175 ppm Zn.

3. Lorinna South.

Stream sediment anomalies occur to the east and west of the Forth River near the Cambrian Powerful Granite about 1.5 miles south of Lorinna. Three samples are anomalous for Pb (maximum 190 ppm), 2 for Cu (65 ppm) and one for F (950 ppm). An Sb anomaly also occurs in this area (rock sample 376 contains 55 ppm) on an eastern tributary of the Forth River. The next three highest Sb values also come from the same area.

Ordovician sandstone outcrops west of the Forth and limestone outcrops to the east of the river.

4. Northeast of Lorinna.

Three F anomalies (2 sediment at 960 ppm and one rock float at 1300 ppm) occur in an area of basalt rubble overlying Ordovician sandstone.

5. West of Lorinna.

Two sediment F anomalies (1100 and 1400 ppm) occur in an area of Ordovician sandstone and possible limestone which is largely obscured by Tertiary basalt and basalt rubble.

6. Bismuth Creek Fault.

Two rock float (155 ppm Cu, 245 ppm Zn) and one sediment (70ppm Pb, 275 ppm Zn) anomalies occur in a tributary to Bull Creek along the Bismuth Creek Fault.

7. Mount Stormont.

Two rock float (1340 ppm F and 1950 ppm Pb, 275 ppm Zn) and one sediment (65 ppm Pb) anomalies are located where Stormont Creek drains both Ordovician sandstone and Cambrian porphyry.

8. South of Moina.

Two rock float samples collected from a small eastern tributary to the Iris River west of Brampton Creek are anomalous for Pb (200 ppm) and Ag (2.2 ppm). A small skarn outlier is located there.

9. Bull Creek Porphyry - Olivers Hill.

Three rock samples collected along the Lorinna Road from the Cambrian porphyries and tuffs west of Olivers Hill are anomalous for Cu (100 ppm) and Zn (185 ppm). Small veinlets of chalcopyrite and malachite staining occur sporadically in the rocks.

10. Luna Creek.

Two rock samples from Luna Creek which drains an area of Cambrian porphyry and Ordovician sandstone on the southwest end of Mt. Stormont are anomalous for Pb (295 ppm) and Zn (232 ppm).

11. Other Anomalies.

Single sample anomalies occur in Cambrian volcanics at Mt. Jacob (65 ppm Pb in sediment), in limestone at Loongana (720 ppm F in sediment) and in skarn and sandstone in Stormont Creek (sample 209 contains 0.27 ppm Au) which drains the Stormont Au - Bi mine.

CONCLUSIONS

A number of anomalous areas were detected by the survey. Some of these areas contain previously known mineralisation and others have since been shown to contain mineralisation (e.g. Mt. Jacob and skarn south of Moina).


However, some of the anomalous areas have not yet been explored. Most are prospective for Cu - Pb - Zn mineralisation but the anomalies are of low order (except for sample 401R which contains 1950 ppm Pb).

Areas with F anomalies at Lorinna have since been partially explored in some detail but no mineralisation was detected.

Minus 20 mesh sediment anomaly thresholds are lower than those for minus 80 mesh sediment and this factor must be taken into account when comparing results of different surveys.

RECOMMENDATIONS

1. Altered anomalous Cambrian porphyries on Mt. Stormont should be investigated for volcanogenic sulphides, particularly upstream from the 1950 ppm Pb anomaly.
2. The Cambrian 'Lorinna Greywacke' volcanoclastics in areas (1) and possibly (2) need to be investigated for volcanogenic sulphides.
3. Consideration should be given to more work east and west of Lorinna to explain the F anomalies.
4. The Stormont mine could be reconsidered as a possible gold deposit.


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	Cu		Pb		Zn		F		Ag	
	Sediment	Rock	Sediment	Rock	Sediment	Rock	Sediment	Rock	Sediment	Rock
No. of samples (n)	315	104	315	104	315	104	126	57	176	47
A. Data from histograms										
1. Most common value	<10	<10	15	<10	<10	<10	250	350	<0.1	<0.1
2. Estimated threshold value	60	50	80	70	170	160	700	1350	2.4	2.1
3. Threshold percentile	98	92	96	95	98	94	95	96	99	98
B. From lag probability										
1. Mean	12	<10	19	16	49	29	300	530	0.7	0.6
2. Value at inflection point	45	none	60	none	none	none	600	200/1000	none	none
3. Percentile at inflection point	97	-	95	-	-	-	94	12/80	-	-
4. Value at 95 percentile	40	68	60	70	152	188	630	1300	2.2	1.5
C. Selected threshold	45	68	60	70	170	160	600	1300	2.4	2.1
No. of anomalous samples	4	7	14	6	6	7	6	3	3	1

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TABLE 1

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SUBJECT E.L. 7/74 REGIONAL STREAM GEOCHEMISTRY
SUMMARY OF STATISTICAL DATA
SHEET OF

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TABLE 2

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SUBJECT E.L.7/74 REGIONAL STREAM GEOCHEMISTRY

ANOMALOUS SAMPLE NUMBERS & ANALYTICAL VALUES. SHEET 1 OF 2

AREA	Sample No.	Sample type		Anomalous Values in ppm				
		Rock float	Sediment	Cu	Pb	Zn	F	Ag
NE of Dove Granite	139		S			185		
	140	RF	S	1185				
	142	RF	S	175	75			
	144		S		180			
	145		S		175			
	153	RF	S		115	245		
N of Dove Granite	154	RF	S		115			
	168		S	50	245			
	170		S		85			
	171	RF	S				1500	
	172		S		65			
	173	RF	S			240		
Daisy Dell	175		S		85			
	259	RF	S	110				
	158		S		135			
	160		S		85			
	164		S		95			
	165		S		100			
	180		S					2.5
	184		S	50				
	186		S			195		
	187		S					2.5
Lorinna S.	267		S		190			
	334		S		130			
	357		S	65				
	358		S	65				
	379		S				950	
	391		S		105			
E. of Lorinna	330		S				690	
	364		S				960	
W. of Lorinna	366	RF	S			215	1300	
	319		S				1400	
Bismuth Creek Fault	335		S				1100	
	102	RF	S	155				
	114		S		70	275		
	116	RF	S			245		

PROJECT..... No.....

SUBJECT.....

PREP. BY..... DATE..... SHEET 2 OF 2

AREA	Sample No.	Sample type		Anomalous Values in ppm				
		Rock float	Sediment	Cu	Pb	Zn	F	Ag
Mount Stormont	396	RF					1340	
	400		S		65			
	401	RF			1950	275		
S. of Moina	285	RF			200			
	292	RF						2.2
Bull Creek Porphyry - Oliver's Hill	32	RF				185		
	39	RF		100				
	40	RF		85				
Luna Creek - Stormont	230	RF			295			
	232	RF				232		
Mt. Jacob	445		S		65			
Laongana	419		S				720	
Olivia Plain - Middlesex	81	RF		80				
	69		S			175		
Iris River	293		S					2.5

5 cm

E. I. 7/74 REGIONAL STREAM GEOCHEMISTRY
Frequency & Cumulative percent frequency
Histograms (n = 315)
Cu Sediment

100

90

80

70

60

50

40

30

20

10

0

0-9

10-19

20-29

30-39

40-49

50-59

60-69

70-79

Cu ppm

0-9 10-19 20-29 30-39 40-49 50-59 60-69

110-119

5 cm

F. J. TATA REGIONAL STREAM GEOCHEMISTRY
Frequency & Cumulative Percent Frequency
Histograms (n=100)
Cu Rock Pool

ff%

100

90

80

70

60

50

40

30

20

10

0

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129 130-139 140-149 150-159 160-169 170-179 180-189 190-199 200-209 210-219 220-229 230-239 240-249 250-259 260-269 270-279 280-289 290-299 300-309 310-319 320-329 330-339 340-349 350-359 360-369 370-379 380-389 390-399 400-409 410-419 420-429 430-439 440-449 450-459 460-469 470-479 480-489 490-499 500-509 510-519 520-529 530-539 540-549 550-559 560-569 570-579 580-589 590-599 600-609 610-619 620-629 630-639 640-649 650-659 660-669 670-679 680-689 690-699 700-709 710-719 720-729 730-739 740-749 750-759 760-769 770-779 780-789 790-799 800-809 810-819 820-829 830-839 840-849 850-859 860-869 870-879 880-889 890-899 900-909 910-919 920-929 930-939 940-949 950-959 960-969 970-979 980-989 990-999

Cu ppm

90

80

70

60

50

40

30

20

10

0

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129 130-139 140-149 150-159 160-169 170-179 180-189 190-199 200-209 210-219 220-229 230-239 240-249 250-259 260-269 270-279 280-289 290-299 300-309 310-319 320-329 330-339 340-349 350-359 360-369 370-379 380-389 390-399 400-409 410-419 420-429 430-439 440-449 450-459 460-469 470-479 480-489 490-499 500-509 510-519 520-529 530-539 540-549 550-559 560-569 570-579 580-589 590-599 600-609 610-619 620-629 630-639 640-649 650-659 660-669 670-679 680-689 690-699 700-709 710-719 720-729 730-739 740-749 750-759 760-769 770-779 780-789 790-799 800-809 810-819 820-829 830-839 840-849 850-859 860-869 870-879 880-889 890-899 900-909 910-919 920-929 930-939 940-949 950-959 960-969 970-979 980-989 990-999

5 cm

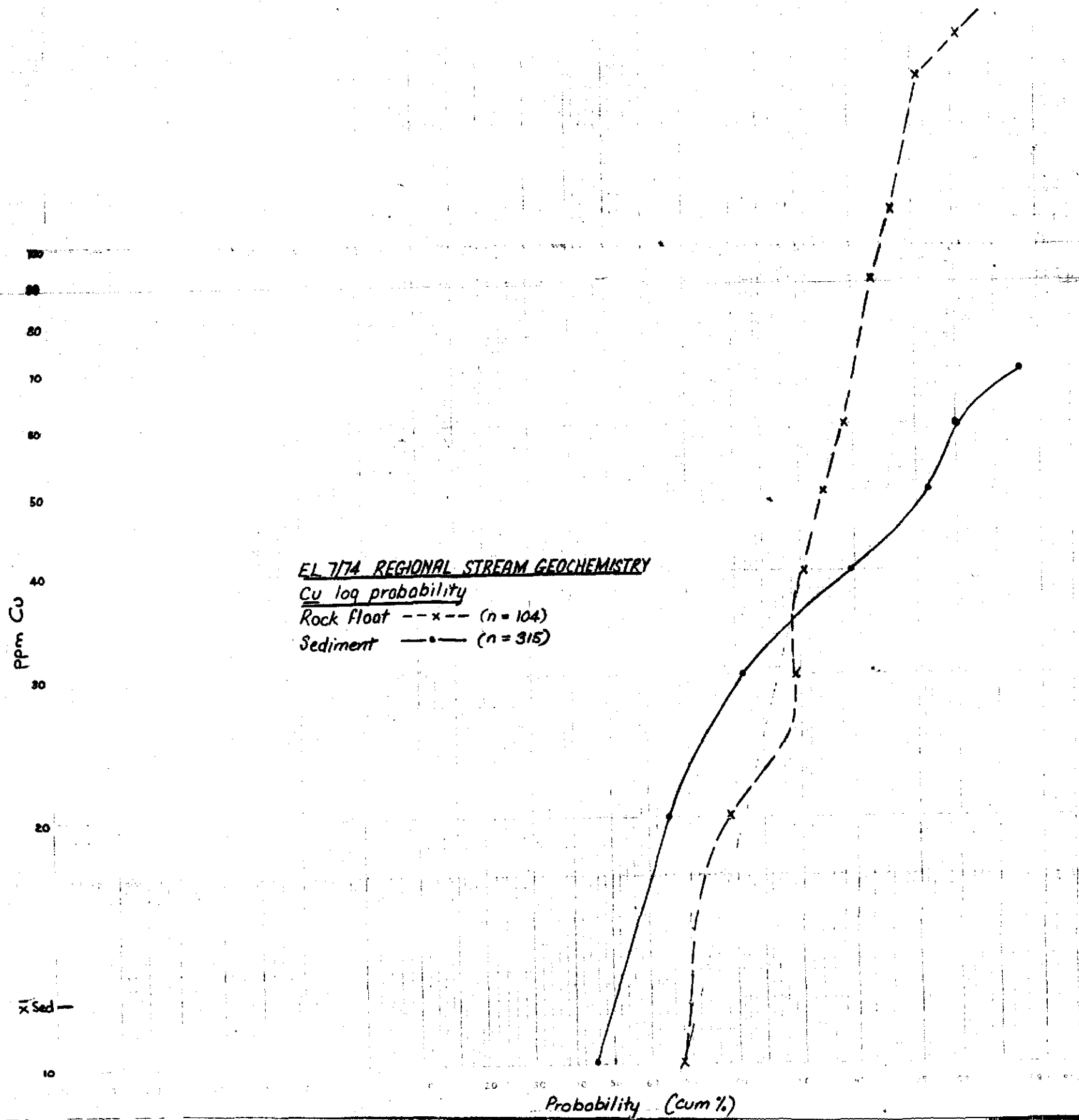


FIG. 3

106046

FIG. 3

5 cm

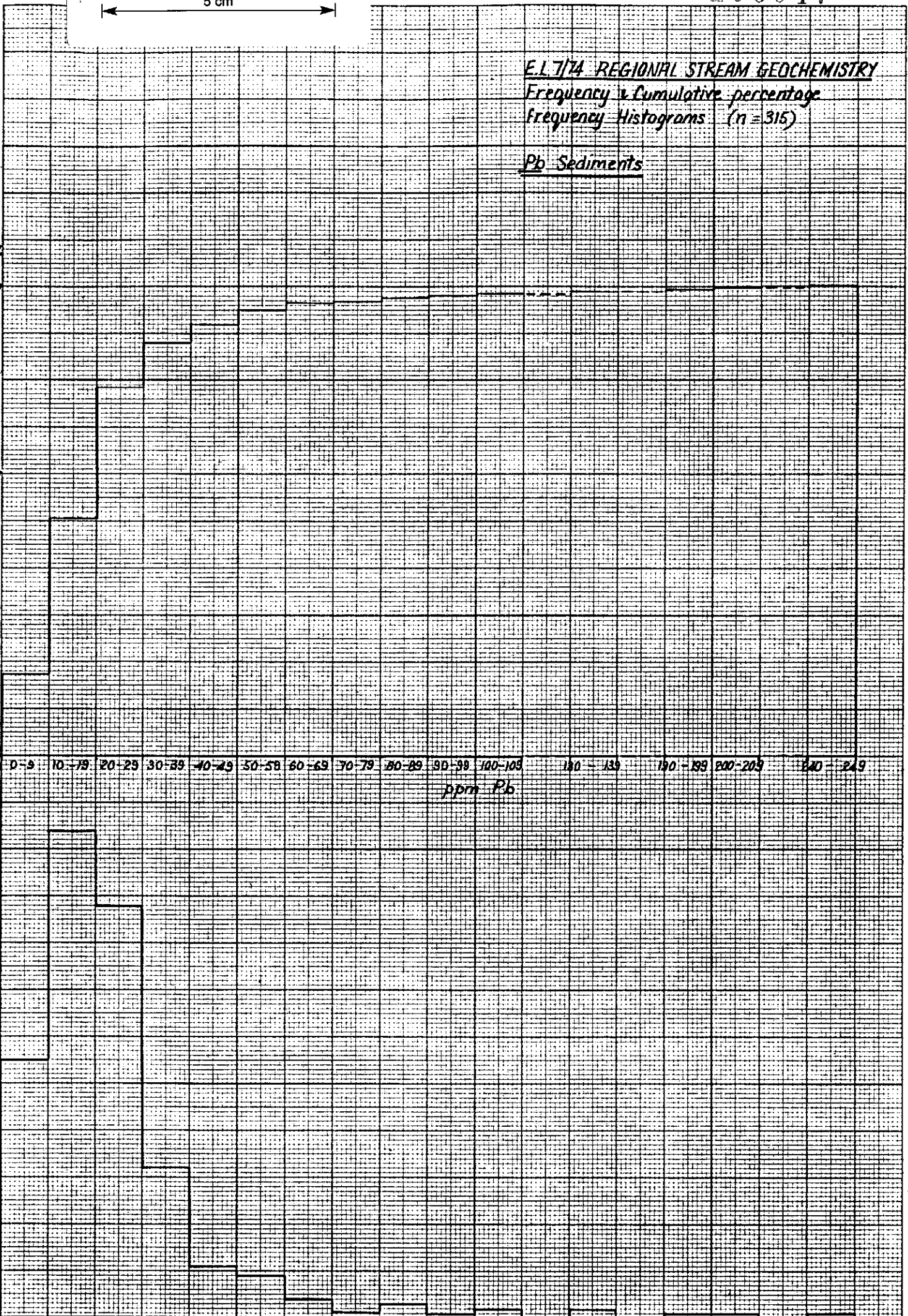
E.L. 7/74 REGIONAL STREAM GEOCHEMISTRY
Frequency & Cumulative percentage
frequency Histograms (n = 315)
Pb Sediments

100
90
80
70
60
50
40
30
20
10
0

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129 130-139 140-149
 ppm Pb

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129 130-139 140-149
 Pb ppm

FIG. 1-A



5 cm

EL-7/74 REGIONAL STREAM GEOCHEMISTRY
Frequency & cumulative percent frequency
histograms (n=104)
Pb rock float

100
90
80
70
60
50
40
30
20
10
0

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 110-119 285 1850

Pb ppm

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 110-119 285 1850

Pb ppm

5 cm

250-
240-
230-
220-
210-
200-
190-
180-
170-
160-
150-
140-
130-
120-
110-
100-
90-
80-
70-
60-
50-
40-
30-
20-
10-
0

E.L. 7174 REGIONAL STREAM GEOCHEMISTRY

Pb log probability

Rock float ---x--- (n = 104)
Sediment ---●--- (n = 315)

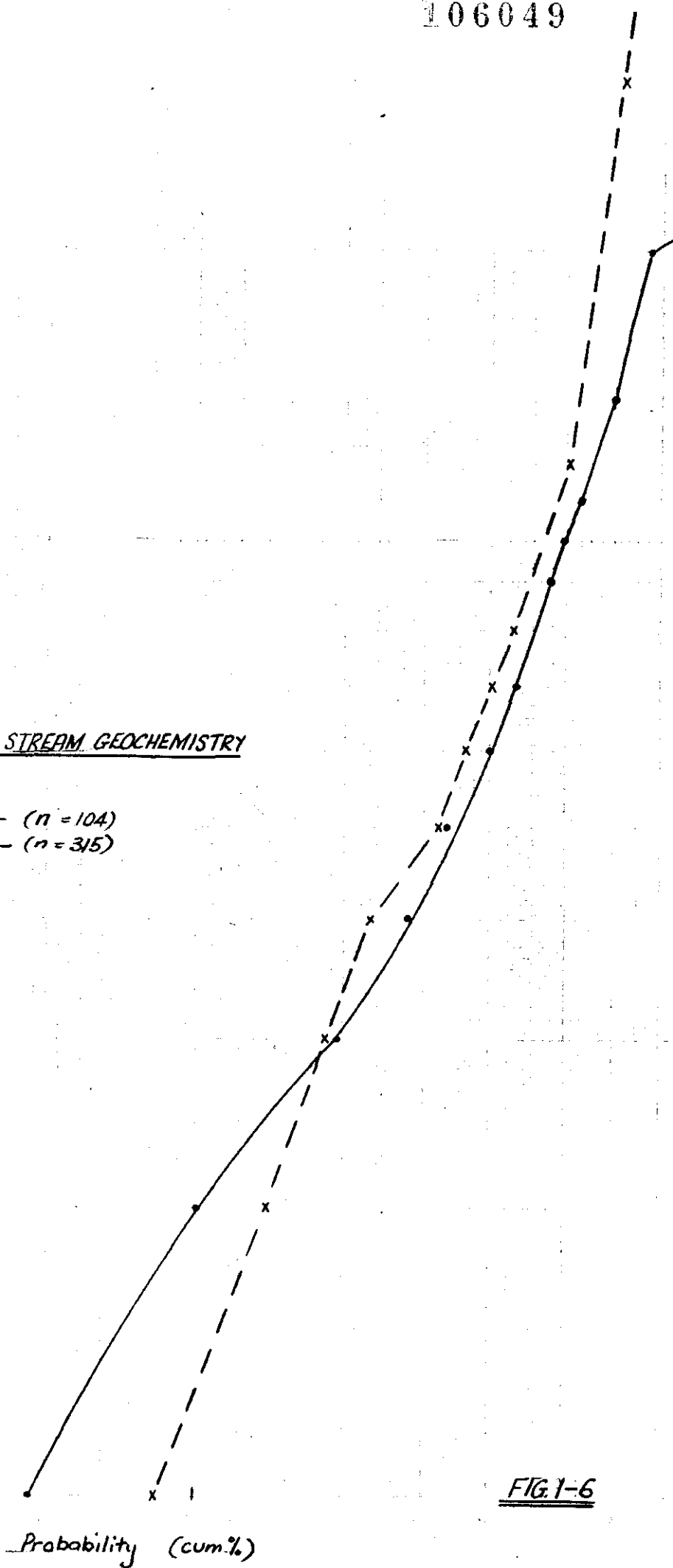
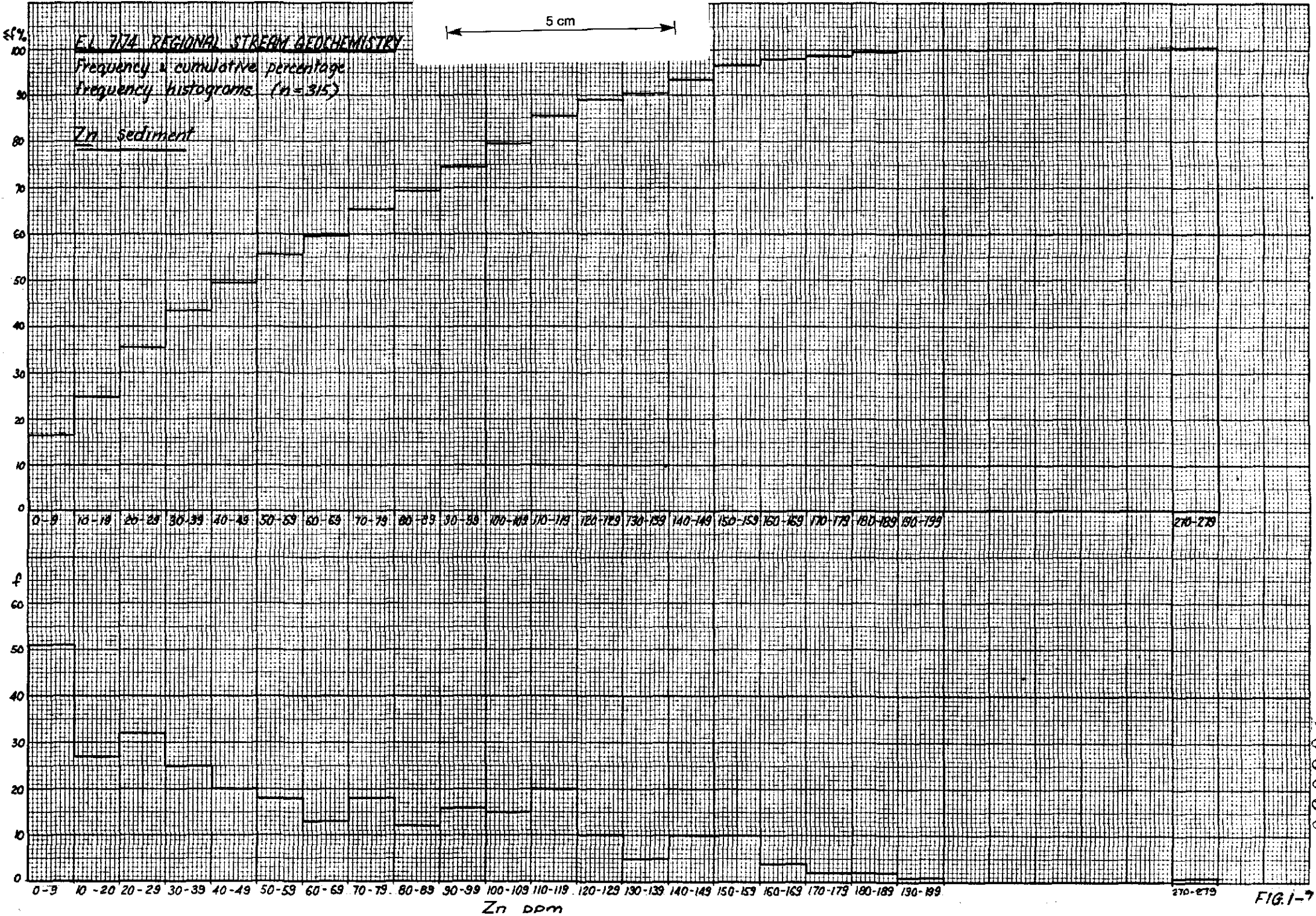


FIG. 1-6

Probability (cum.%)



106050

FIG. 1-7

E.L. 77A REGIONAL STREAM GEOCHEMISTRY

Frequency & cumulative percent
Frequency histograms (n=104)

Zn rock float

5 cm

EF%

100

90

80

70

60

50

40

30

20

10

0

0

10

20

30

40

0

0-9 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99 100-109 110-119 120-129 130-139 140-149 150-159 160-169 170-179 180-189 190-199 200-209 210-219 220-229 230-239 240-249 250-259 260-269 270-279

Zn ppm

Zn ppm

Y 0000 T

FIG. 1-8

5 cm

E.L. 7/74 REGIONAL STREAM GEOCHEMISTRY

Zn log probability

Rock float ---x--- (n=104)
Sediment —•— (n=315)

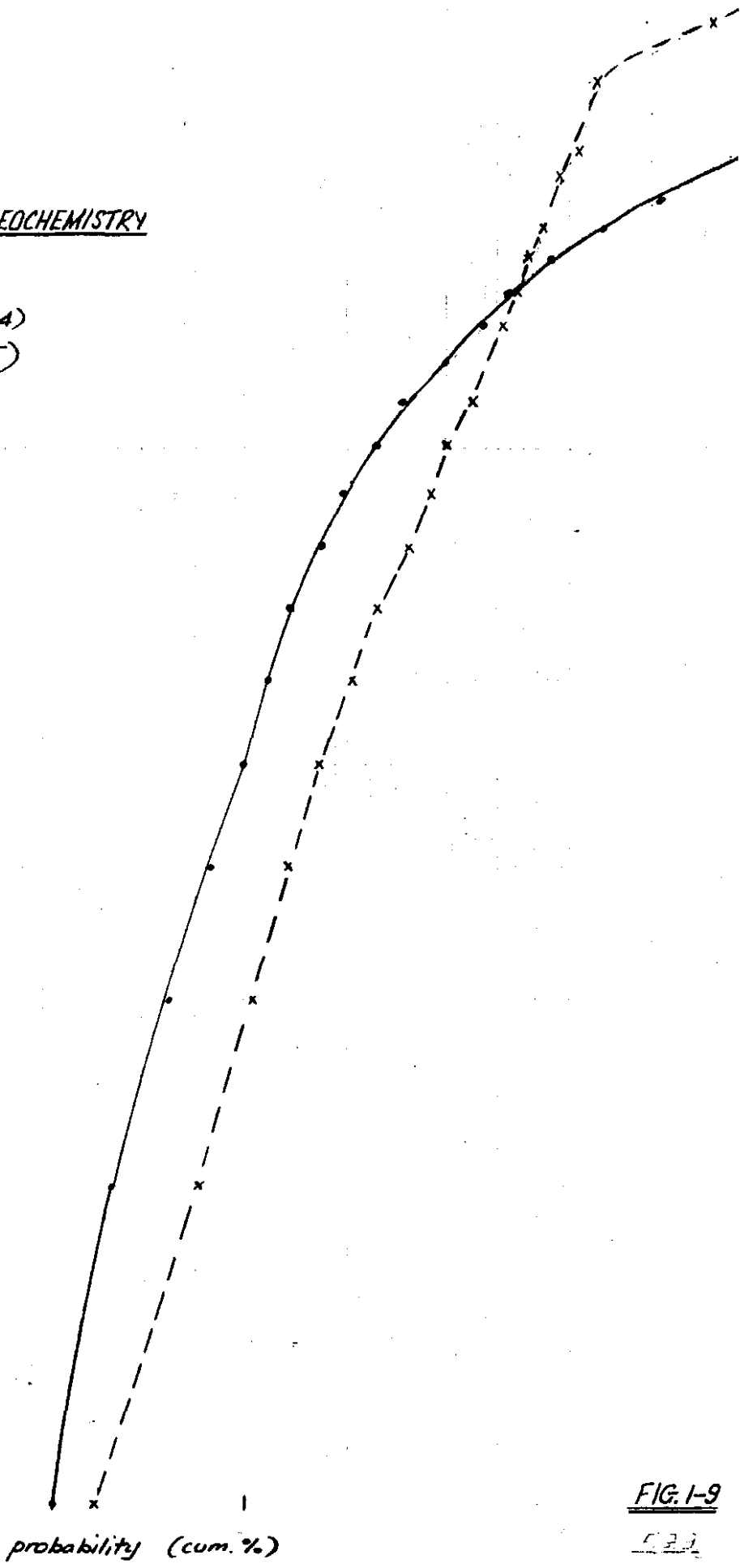


FIG. 1-9

E.L.

U S G S

5 cm

F.L. 7/74 REGIONAL STREAM GEOCHEMISTRY

F in sediment

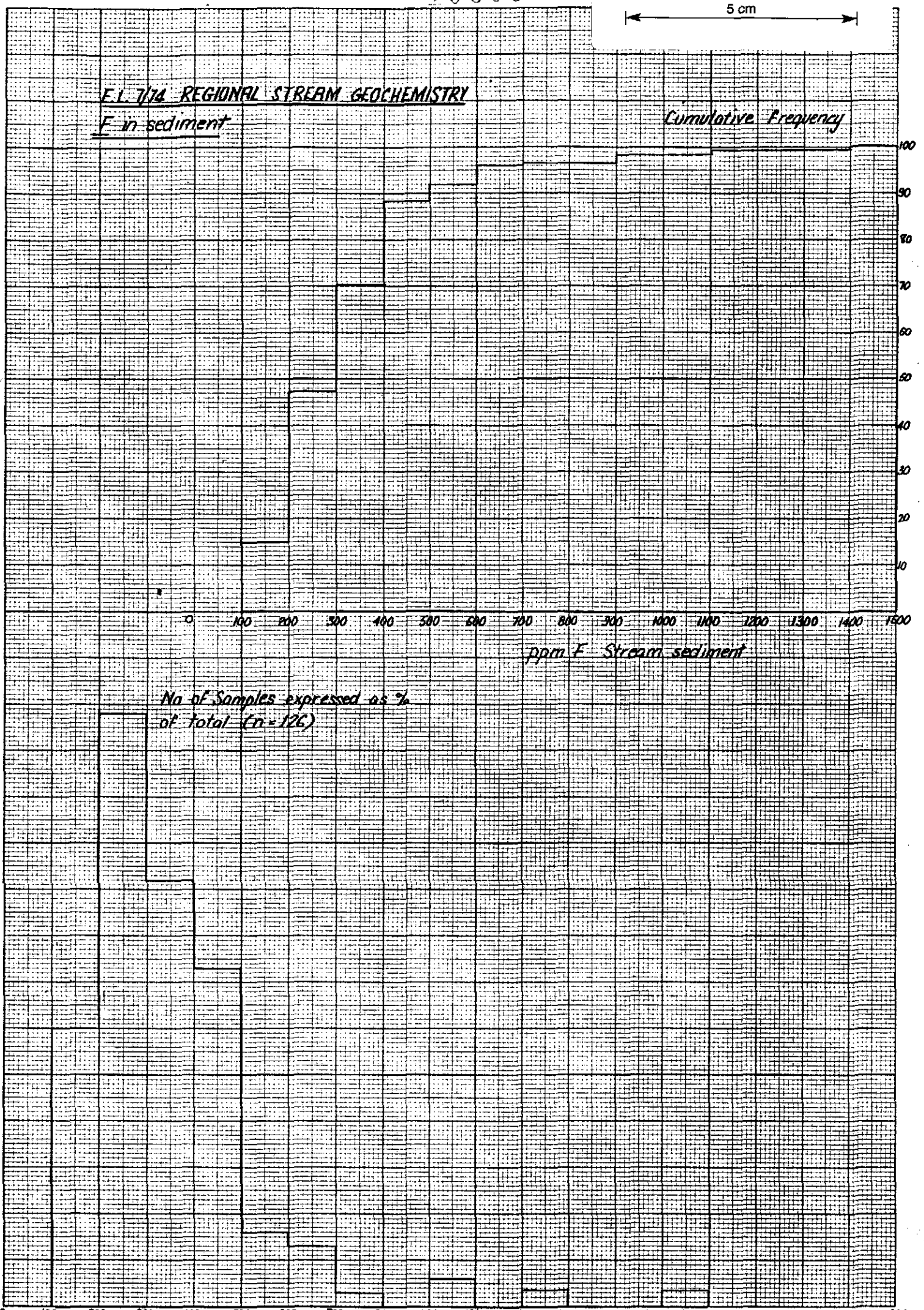
Cumulative Frequency

No of Samples expressed as %
of total (n=126)

ppm F Stream sediment

ppm F Stream sediment

FIG. 16.17



5 cm

EL 7/74 REGIONAL STREAM GEOCHEMISTRY

F in rock float

Cumulative Frequency

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600

ppm F rock

No. of samples expressed
as % of total (n=47)

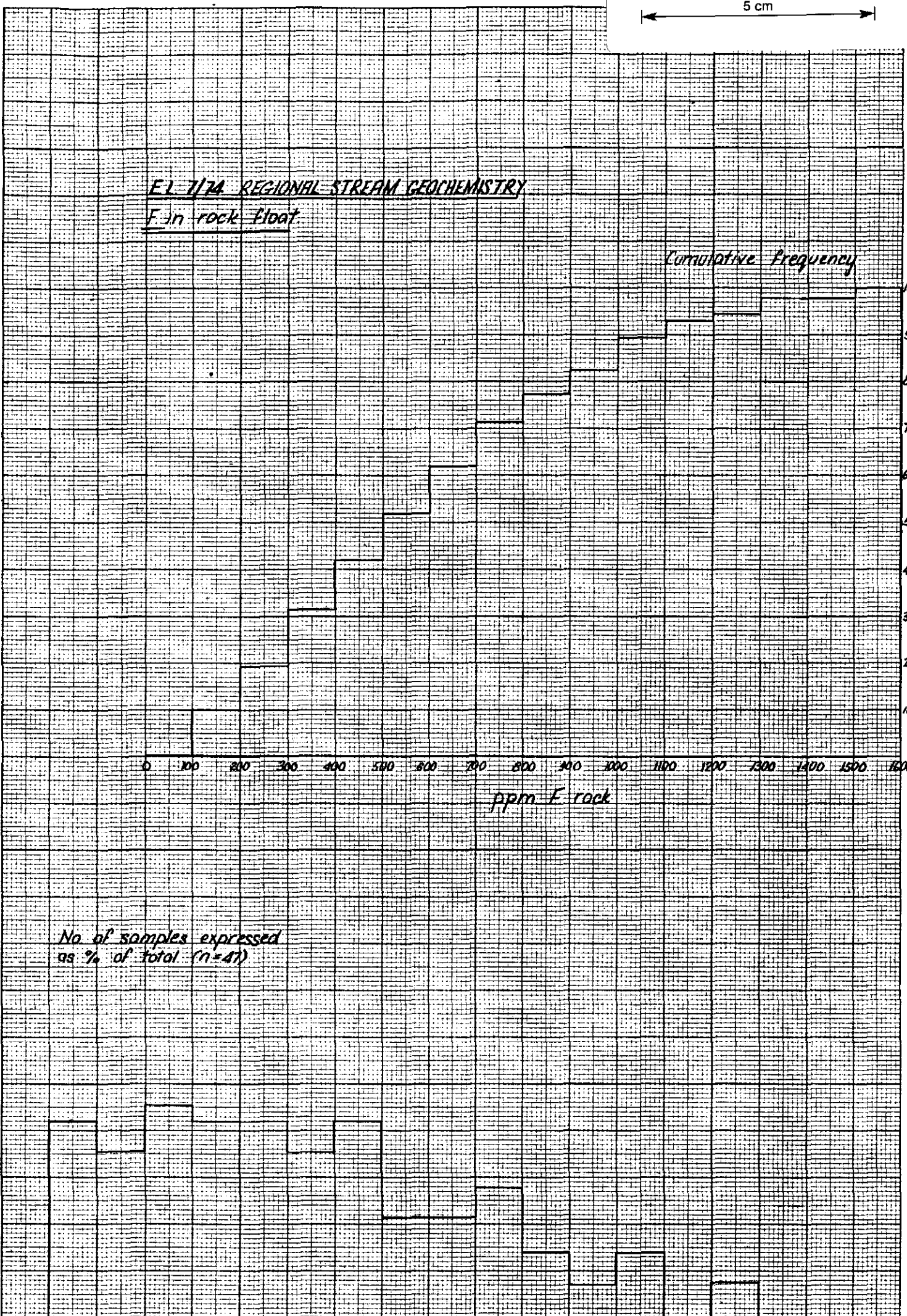
20

10

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900

ppm F rock

FIG. 1-11



5 cm

F.I. 774 REGIONAL STREAM GEOCHEMISTRY
Ag in sediment

Cumulative frequency

0 1 3 5 7 9 11 13 15 17 19 21 23 25
ppm Ag

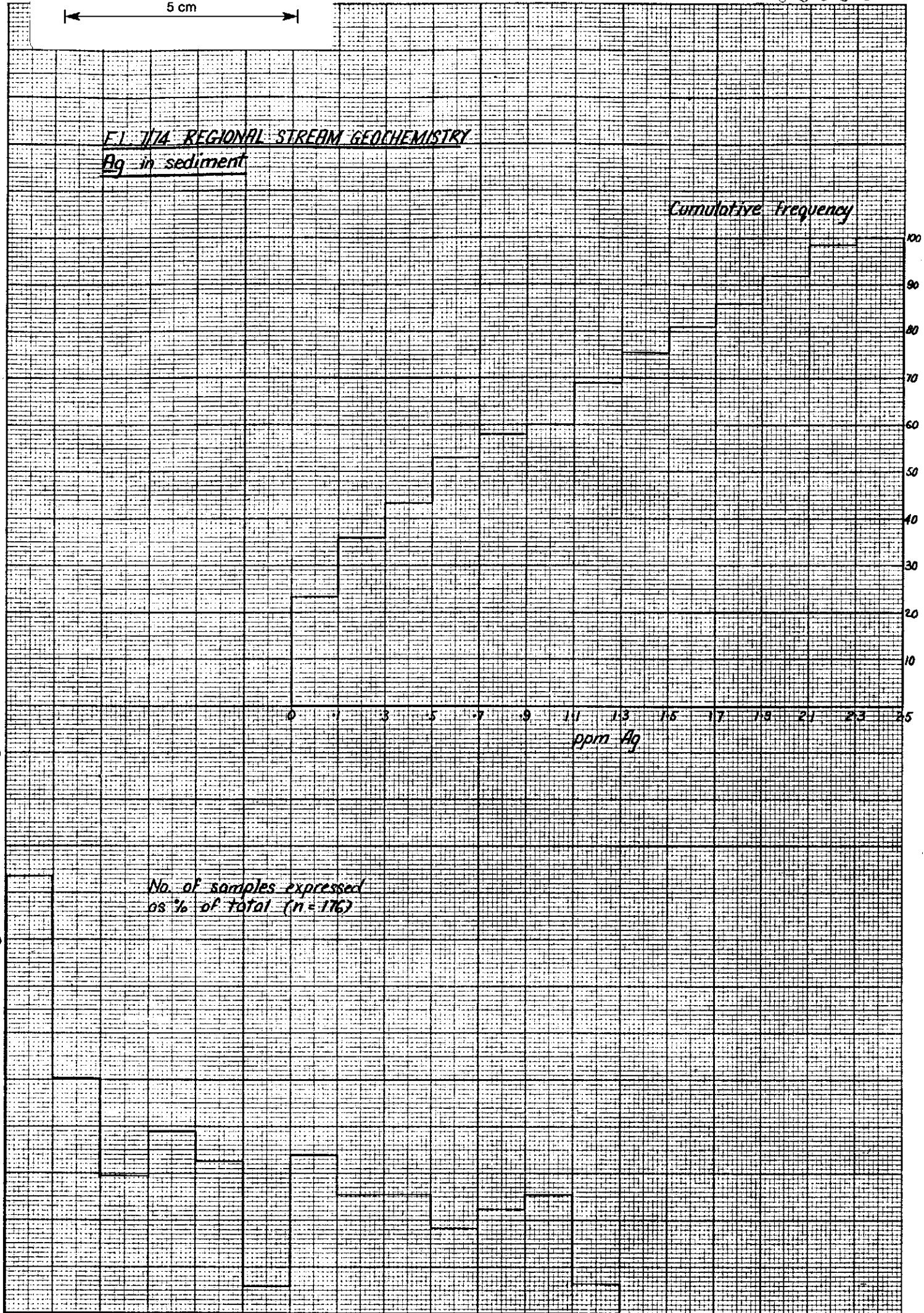
No. of samples expressed
as % of total (n = 176)

20

10

0 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29
ppm Ag

FIG. 1-13



5 cm

FL. 7/74 REGIONAL STREAM GEOCHEMISTRY
Ag in rock float

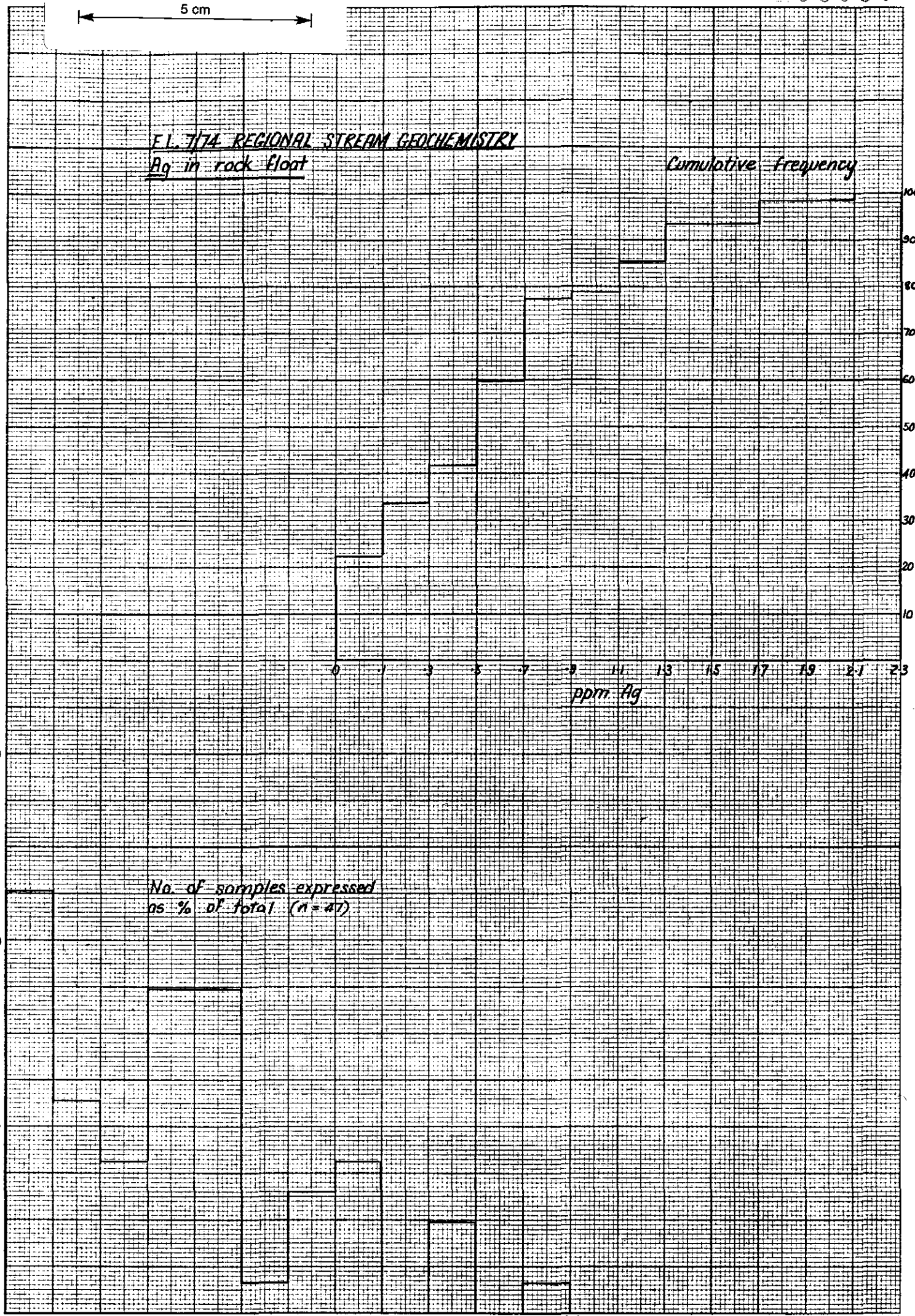
Cumulative Frequency

ppm Ag

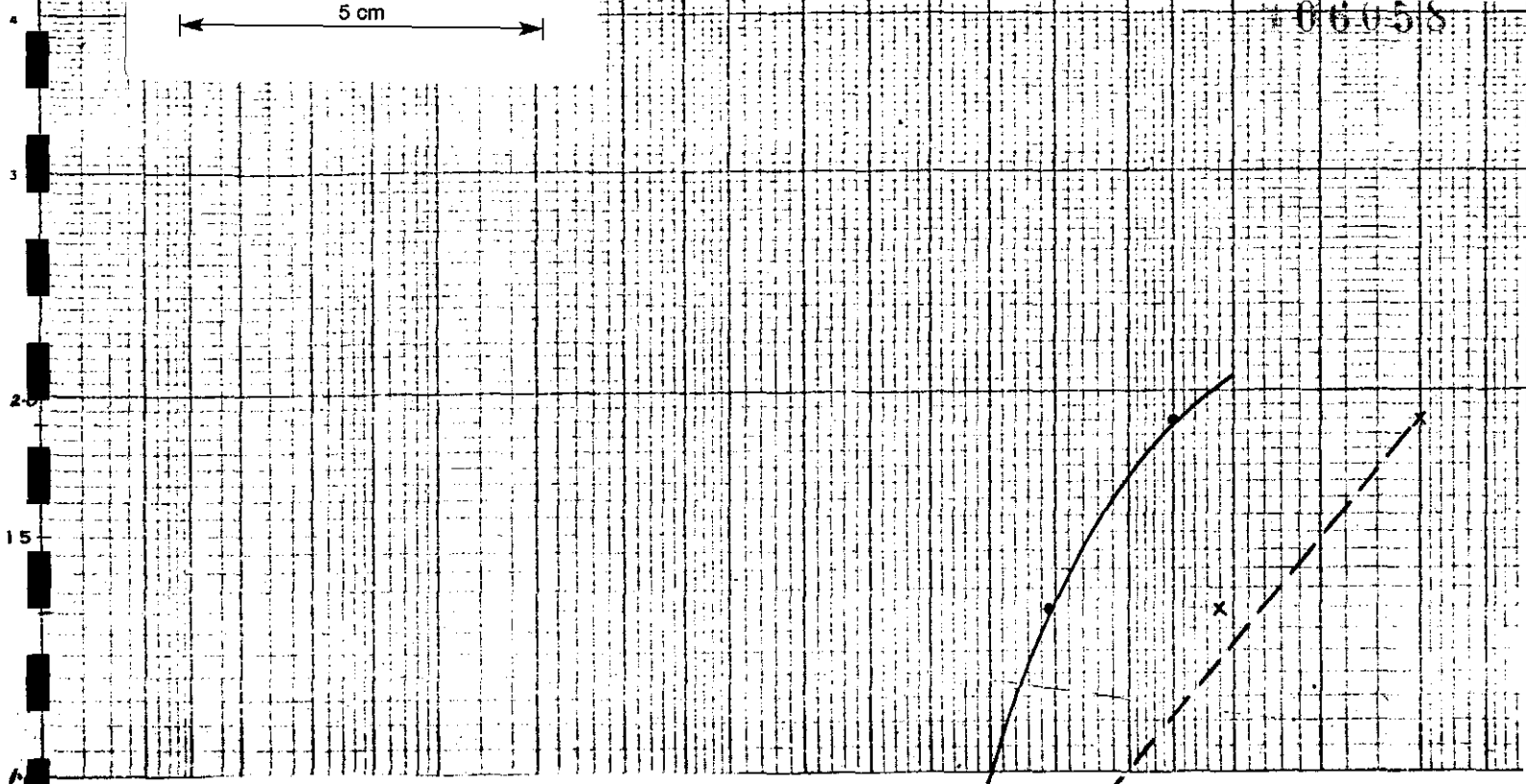
No. of samples expressed
as % of total (n = 47)

ppm Ag

FIG. 1-14



5 cm

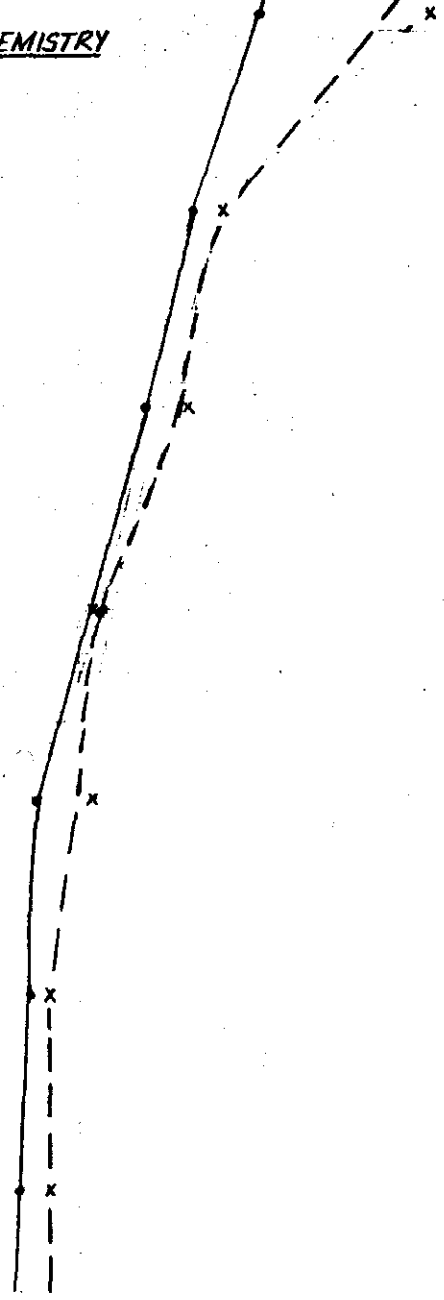


EL77A REGIONAL STREAM GEOCHEMISTRY

Aq log probability

rock float ---x--- (n=47)
 sediment —•— (n=176)

\bar{x}_s
 σ_s \bar{x}_R
 0.5
 0.4
 0.3
 0.2
 0.1
 0.05
 0.02
 0.01
 0.005
 0.002
 0.001



probability (cum.%)

SAMPLE LISTMinus 20 mesh stream sediment (302 samples)

44, 46, 48, 50-52, 54, 57-59, 61-67, 69, 71-80, 82, 84-89,
91, 92, 99, 100, 102, 103, 104, 105-107, 110, 111, 117, 119,
120-124, 126-129, 131-139, 144-148, 151, 152, 155-168, 170,
172, 175-188, 193-196, 199, 201-207, 209-213, 216, 217, 219,
220, 222, 225-227, 229, 231, 234, 236-238, 240, 241, 242, 246,
247, 253, 254, 257, 258, 260-267, 269-274, 277-284, 286-290,
293, 296-299, 301-313, 315-321, 323-234, 236-342, 347, 348,
351-355, 357-359, 362-375, 377-386, 388, 389, 391-395, 397-
400, 403, 405, 407-413, 415-430, 434, 436, 438, 439, 441-443,
445, 447, 449-451, 453, 455-460.

Rock (104 samples)

45, 49, 53, 55, 56, 60, 68, 70, 81, 83, 90, 93-98, 101, 108,
109, 112-116, 118, 125, 130, 140-143, 149, 150, 153-154, 171,
173-174, 189, 190, 197, 198, 200, 214, 215, 218, 221, 223,
224, 228, 230, 232, 233, 235, 239, 243, 244, 245, 248, 249,
255, 256, 259, 275, 276, 285, 291, 292, 294, 295, 300, 314,
322, 325, 349, 350, 356, 360, 361, 366, 376, 387, 390, 396,
401, 402, 404, 406, 414, 431, 432, 433, 435, 437, 440, 444,
446, 448, 452, 454, 461, 462, 463.

ROCK OUTCROP AND FLOAT SAMPLES COLLECTED DURING MINUS 20
MESH STREAM SEDIMENT SURVEY, DEC. 1974 - FEB. 1975.

Samples 45 to 116 collected by G. Weste, 117 to 463 by R. Craigie.
 Analyses are shown on Drg. Nos. 4139, 4140, 4141, 4239, 4241.

SAMPLE NO.	DESCRIPTION	NAT. GRID REF.
07/0705/45R	Creamy coloured massive transition calc-silicate rock	4212/4066
49R	Strongly cleaved quartz porphyry float	4206/4060
53R	Hornfelsed transition beds	4211/4059
55R	Granitic vein-pale green altered feldspar with quartz crystals & quartz veins plus pyrite	4213/4060
56R	Pink feldspar rich granite and chlorite	4213/4060
60R	horn blende & quartz veins in quartz porphyry	4248/4052
68R	Weathered pegmatitic vein near granite contact	4263/4053
70R	Banded hornfels with specular hematite	4150/3998
81R	Cambrian-tuffaceous siltstone, greisenised? musc. + quartz	4153/3973
83R	Quartz porphyry	4152/3986
90R	Sheared & strongly cleaved quartz porphyry	4200/4056
93R	Quartz porphyry float	4196/4054
94R	Fine grained Cambrian sediment/volcanic	4196/4054
95R	Quartz porphyry	4196/4054
96R	Fine grained Cambrian acid volcanic, foliated	4198/4055
97R	Hornfels Cambrian siltstone	4198/4055
98R	Quartz porphyry with quartz veins & chlorite	4198/4055
101R	Cambrian volcanoclastic? with chert fragments and pyrite	4246/4048
108R	Coarse grained quartz porphyry	4253/4037
109R	Epidote veins in quartz porphyry	4253/4037
112R	Fine grained resiliicified tuff or lava	4251/4040
113R	Pale grey quartz porphyry with abundant quartz phenocrysts	4251/4040
114R	Sheared weathered quartz porphyry	4251/4040
115R	Mylonite & vein quartz from fault zone	4251/4040
116R	Sheared quartz porphyry with altered green (amphibole)	4251/4040
118R	Quartzite	4181/3982

SAMPLE NO.	DESCRIPTION	NAT. GRID REF.
07/0705/125R	Foliated fine grained rock	4175/3972
130R	Quartzite	4186/3995
140R	Quartzite float with minor Cu mineralisation	4208/3973
141R	Quartzite float with minor Cu mineralisation	4208/3973
142R	Quartzite float with minor Cu mineralisation	4208/3973
143R	Quartzite float with minor Cu mineralisation	4208/3973
149R	Lorinna Greywacke float	4210/3979
150R	Lorinna Greywacke outcrop	4210/3979
153R	Hematitic Lorinna Greywacke	4212/3981
154R	Lorinna Greywacke	4214/3979
171R	Lorinna Greywacke	4224/3980
173R	Quartz with included country rock	4226/3979
174R	Lorinna Greywacke	4226/3979
189R	Iron stained fine grained quartzite	4239/4099
190R	Highly foliated Precambrian quartzite	4239/4099
197R	Quartzite	4161/4002
198R	Foliated quartzite	4161/4002
200R	Foliated quartzite	4163/53998
214R	Skarn	4186/4056
215R	Skarn	4186/4056
218R	Very coarse sandstone	4179/4053
221R	Moina Sandstone	4183/4052
223R	"Bull Creek Porphyry"	4152/4044
224R	Quartzite	4152/4044
228R	Quartzite	4165/4024
230R	Quartz porphyry	4173/4030
232R	Quartz porphyry	4173/4030
233R	Moina Sandstone	4173/4030
235R	Quartz porphyry	4172/4033
239R	Very fine grained volcanic?	4177/4024
243R	Sandy calc-silicate rock	4172/4048
244R	Sandy calc-silicate rock with garnet?	4172/4048
245R	Sandy calc-silicate rock?	4173/4047
248R	Moina Sandstone float	4174/4049

SAMPLE NO.	DESCRIPTION	NAT. GRID REF.
07/0705/249R	Moina Sandstone float	4174/4049
255R	Lorinna Greywacke	4257/4078
256R	Moina Sandstone	4257/4078
259R	Lorinna Greywacke and hematite	4244/3978
275R	Moina Sandstone	4248/4085
276R	Altered Moina Sandstone	4248/4085
285R	Pyritic Moina Sandstone	4224/4051
291R	Wrigglite	4219/4054
292R	Fissile quartz porphyry	4219/4054
294R	Quartz porphyry	4219/4046
295R	Granitic rock	4219/4046
300R	Quartz porphyry plus large tourmaline crystals	4222/4045
314R	Greenish (chlorite?) altered sandstone with pyrite, arsenopyrite	4259/4019
322R	Quartz porphyry	4247/4020
325R	Lorinna Greywacke	4265/4006
349R	Lorinna Greywacke	4249/3984
350R	Hematitic Lorinna Greywacke	4249/3984
356R	Foliated Precambrian? rock	4252/3982
360R	Foliated fine grained sediment	4277/4024
361R	Quartz porphyry	4277/4024
366R	Porphyry with small quartz phenocrysts	4281/4023
376R	Limestone	4276/3995
387R	Coarse conglomerate	4277/4011
390R	Phyllite	4277/4014
396R	Quartz porphyry, deformed	4188/4039
401R	Quartz porphyry	4202/4038
402R	Hard massive quartz porphyry outcrop	4206/4038
404R	Porphyry with small quartz phenocrysts in a dark purple groundmass	4206/4038
406R	Quartz feldspar porphyry with chlorite?	4211/4042
414R	Coarse grained quartz porphyry	4196/4026
431R	Quartz feldspar rock cut by quartz veins and green clay - altered?	4174/4133
432R	Coarse grained quartz porphyritic volcanic	4174/4133

SAMPLE NO.	DESCRIPTION	NAT. GRID REF.
07/0705/433R	Banded tuff-shale with minor pyrite	4172/4132
435R	Quartz porphyry	4148/4120
437R	Quartz feldspar porphyry	4153/4124
440R	Medium grained grey rock with phenocrysts of quartz and feldspar	4152/4117
444R	Green fine grained porphyry	4195/4114
446R	Coarse grained porphyry	4194/4104
448R	Strongly foliated volcanic	4193/4104
452R	Lorinna Greywacke	4181/4099
454R	Green Cambrian? quartzite	4187/4101
461R	Acid volcanic	4145/4143
462R	Fine grained porphyry	4169/4165
463R	Feldspar quartz porphyry	4169/4165

ROCK CHIP GRAB SAMPLE TRAVERSE OF "BULL CREEK PORPHYRY" 106064
ALONG LORINNA ROAD, WEST OF LAKE CETHANA, JANUARY, 1975.

SAMPLE NO.	DESCRIPTION	NAT. GRID REF
07/0705/31	Grey sheared porphyry with fractured quartz phenocrysts first outcrop N of Roland conglomerate	4277/40250
32	Moderately weathered soft faintly banded tuff with quartz and feldspar phenocrysts.	42765/40275
33	Hard grey massive quartz porphyry	42755/40310
34	Hard massive grey & grey-green quartz porphyry	42765/40335
35	Dark grey-green porphyry with scattered quartz phenocrysts.	42795/40370
36	Hard grey fine grained rhyolite? with quartz phenocrysts.	42815/40425
37	Grey & brown porphyry with abundant quartz phenocrysts.	42810/40450
38	Hard dark grey-green quartz porphyry with minor pyrite.	42820/40500
39	Moderately weathered fragmental dark grey fragments in paler matrix.	42815/40525
40	Moderately weathered brown fragmental with elongate black fragments.	42795/40555
41	Similar to 39 but fragments more elongate.	42800/40585
42	Similar to 40 but coarser and more strongly weathered. Sample taken a few metres below Roland conglomerate which overlies the Cambrian rocks with marked angular unconformity and contains fragments of Cambrian porphyry at the base.	42795/40606
43	"Lorinna Greywacke" moderately weathered acid tuff	42385/39815

This sampling was carried out to obtain background analytical values for the main Cambrian rocks outcropping in the central part of the licence area. These values can be used as an aid in interpreting stream sediment analyses. The Bull Creek Porphyry appears to consist of massive probably intrusive quartz porphyry, probably extrusive rhyolite fragmentals and tuffs including probable welded ash flows. The area is therefore the central part of a volcanic pile.

The samples were analysed for Cu, Pb, Zn, Sb and Ag by AAS at Comalco Laboratory North Melbourne and results are shown on Drg. No.77-98D, E. Cu values are high because the porphyry contains veinlets of quartz with minor chalcopyrite. Malachite staining also occurs from the weathering of the veinlets. Cu values vary from <10 to 100ppm and the background appears to be around 10ppm. Pb varies from <10 to 60ppm, the average being 20ppm. This background is probably representative of the Cambrian volcanics in the area. Zn varies from 35 to 185ppm with an average of 72ppm. No Zn mineralisation was observed and it appears that its background distribution is broader and threshold higher than for Cu and Pb.

APPENDIX 2MINUS 80 MESH REGIONAL STREAM GEOCHEMISTRYA. INTRODUCTION

A stream sediment geochemical survey has been carried out in two main areas; in the extreme NW corner of E.L. 7/74 at Taylors Flats and in the western parts of the E.L. west of Stormont. The main object was to detect Sn or W mineralization. At Taylors Flats fractures related to the Bismuth Creek fault trend through limestone and the area was thought prospective for pyrrhotite - cassiterite replacement deposits. West of Stormont the area is thought prospective for stockwork cassiterite veinlets in Cambrian and Ordovician rocks. There is a trend of known Sn - W deposits from Moina through Stormont and possibly across to Bond Peak in Geopeko's adjacent E.L., and this is thought to lie over a possible cupola in the Dolcoath granite. The samples collected are conventional stream sediment, magnetic fraction of stream sediment, panned concentrates, and stream water. Sample locations have been marked on the ground by tying labelled flagging tape to the nearest tree branch; positions were plotted on air photographs, then transferred to 1:20,000 cadastral maps in the office. There are 226 sample localities.

B. CONVENTIONAL STREAM SEDIMENT

A total of 226 samples were collected in the usual manner, sieved to -80 mesh, and analysed by Amdel for Cu, Pb, Zn by AAS and Sn, W, Bi by XRF. For analytical methods used see Appendix J.

Frequency distribution histograms for each element are Figs. 2-1 to 2-12 and probability plots are on Figs. 2-15, 2-16. Data for the probability plots is in Table 2-1, 2-2.

The Stormont and Taylors Flats areas have been treated separately. Stormont samples are RD/T/ST/D700 to D867 and Taylors Flats RD/T/TF/D868 to D940.

From the histograms "possibly anomalous" values are visually estimated to be:

Cu	equal to or greater than	35 ppm
Pb	" "	50 ppm
Zn	" "	90 ppm
Bi	" "	5 ppm
Sn	" "	8 ppm
W	" "	20 ppm

"Anomalous" values for Zn are taken to be greater than 125 ppm and for Sn greater than 11 ppm.

A perusal of the geochemical data plotted on the 1:20,000 cadastral sheets 4140, 4141, drawings TAS-79-313, 314 shows the following:-

TIN

Stormont Area (Sheet 4140)

One anomalous value occurs downstream of the skarns at the Stormont gold-bismuth mine.

There are patchy possibly anomalous tin values in the whole sampled length of the Iris River, including one anomalous value above the junction of Weaning Paddock Creek. One very anomalous value of 44 ppm occurs in the headwaters of Bifros Creek, One possibly anomalous value at the head of Luna Creek and a few possibly anomalous values in Stormont Creek. All these areas are within windows of Cambrian Bull Creek Porphyry which may be mineralized at the contact with Moina sandstone. These areas need follow up sampling and geological reconnaissance.

Two possibly anomalous values occur in the Weaning Paddock Creek area, and possibly occur in windows in the basalt.

Two possibly anomalous values occur in the creek north of the Lea River, north of Fletchers Adit area, in sandstone, and one possibly anomalous value occurs probably in sandstone in a small gully off the Lea River about 0.7 km east of the Stormont gold - bismuth skarn. None of these anomalies seem to be important targets at this stage.

Taylor's Flats Area (Sheet 4141)

Two anomalous values occur in two different gullies on a ridge east of Frosts Flats, north of the Leven River, about 1 km NW of Mostyn Hardy Cave. This area is on the boundary of and just north of E.L. 7/74. One possibly anomalous value occurs in the Leven River downstream of Mostyn Hardy Cave.

TUNGSTEN

Three anomalous values (20, 20, 25 ppm) occur on Sheet 4140; one is downstream of the known Stormont bismuth - gold mine, another is in Devonport creek near the Lea River, and the other is in line further west in the next major creek (outside E.L. 7/74). The cause of two western anomalies is unknown.

COPPER

There are scattered spotty anomalous values, not exceeding 45 ppm, in both areas.

LEAD

Sheet 4140

Most samples in Luna Creek are anomalous, (55 - 90 ppm). This creek drains Cambrian volcanics and so needs checking on the ground.

The sample which contained anomalous tungsten in the creek outside E.L. 7/74 (west of Devonport Creek) is very anomalous for Pb, 1050 ppm.

One other isolated anomaly of 120 ppm occurs in a small gully near the Lea River about 700m upstream of Devonport Creek.

Sheet 4141

One anomalous value of 35 ppm occurs outside E.L. 7/74 in Jean Brook, in what is mapped as basalt on the 1 mile map. The cause is unknown.

ZINC

Many scattered anomalies occur on both sheets: most can probably be related to basalt.

C. PANNED CONCENTRATES

62 panned concentrates were collected from the Stormont area and 41 from the Taylors Flats area. Stream sediment was lightly panned and no records of initial sample weight nor concentrate weight have been kept. The method is merely a qualitative technique designed to detect heavy minerals, in particular scheelite. All samples were examined dry under short wave ultraviolet radiation and the presence or absence of scheelite is recorded in Tables 2-4 and 2-5. No attempt was made to determine whether cassiterite was present because it is thought that early prospectors would already have located alluvial cassiterite if it were present. No gold was observed. Most samples contained zircon indicating that a significant proportion of heavy minerals had been collected and that the sample is therefore reliable. Samples are stored at Devonport base.

Only one sample contained scheelite and this was in the creek draining the known mineralization at the Stormont bismuth - gold mine.

D. MAGNETIC FRACTION OF STREAM SEDIMENT

This fraction was collected at 64 sites as listed in Table 2-6 by moving a powerful magnet through the sediment in the creek bed.

The aim of the method was to detect skarns; it was thought that it should be possible to discriminate the magnetite (and other magnetic minerals) from skarns and from basalt by their trace element content, particularly the tin and tungsten content. Our experience at Moina was that Sn as extremely fine cassiterite can occur within magnetite; and this should remain in the magnetite in stream sediment. The method has been attempted before in other areas, and seems to be successful, and hence the method was to be used in this survey. However the samples have not yet been analysed; all are stored in Devonport base for future use if needed.

E. WATER SAMPLING

Water samples were collected at 164 sites in the Stormont area and 71 sites in the Taylors Flats area, and sent to the Comalco Research Centre in Melbourne for fluorine analyses.

The aim was to detect fluorine associated with tin or tungsten mineralization.

Experience outside the area of this report has shown that fluorine analyses of water is a very sensitive indicator of the presence of fluorite.

The fluorine values are difficult to interpret because the F content of water depends greatly on its source. Ground

water surfacing as springs and seeps will contain more F than surface run-off after rain, rendering sampling during or soon after rain of little use. (There were no periods of unusually high rainfall during the collection period, but the area has a naturally fairly high rainfall).

These problems with detection limit and variable dilution mean that the results cannot be treated reliably with histograms or statistical techniques. However histograms and probability plots were prepared for each area, Figs. 2-13, 14, 17, 18. Data for the probability plots is in Table 2-3. From the histograms anomalous F values were taken as

for Stormont ≥ 0.060 ppm

for Taylors Flats ≥ 0.050 ppm

Results are:

Stormont (Sheet 4140)

Anomalies occur in four main clusters;

- a) in the area close to the junction of Devonport Creek and the Lea River
- b) in the headwaters of Stormont Creek
- c) in Weaning Paddock Creek, its tributaries, and to the NW of the creek
- d) in the next major creek west of Weaning Paddock Creek

Some comments on each:

- a) this area is westward of the known mineralization at the Stormont bismuth - gold mine and includes a tungsten anomaly.
- b) no known mineralization in this area
- c) this area is mapped as basalt on the one mile maps, but work by Mt. Lyell and the presence of these anomalies suggests that there must be windows in the basalt. There are scattered weak copper anomalies and a couple of very scattered possibly - anomalous tin anomalies in the same general area.

- d) there is no known mineralization in this area. Again it is mapped as basalt, but there could be windows into underlying Cambrian rocks. About 1.5 km SW is a locality which Tasminex N.L. explored for uranium (Collins, 1975); the fluorine could therefore indicate uranium mineralization.

Taylor's Flats (Sheet 4141)

Two single weak anomalies occur, one in the creek 2 km due east of Mostyn Hardy Cave, the other 1 km NW of Mostyn Hardy Cave. There are no coincident Sn, W, Cu or Pb anomalies, and the anomalies are therefore not considered to be significant.

PROJECT STORMONT -80 mesh STREAM SED GEOCHEM No.
 SUBJECT DATA FOR PROBABILITY PLOTS
 PREP. BY P. ASKINS | T. WAITE DATE OCT 79 SHEET 1 OF 1

SAMPLES PREFIXED RD/T/ST

Cu

0-9	10-149	15-18	19-23	24-29	30-37	38-47	class interval, ppm
96	18	9	8	10	6	6	no of samples : 153
62.75	11.76	5.88	5.23	6.54	3.92	3.92	%
100.0	37.25	25.49	19.61	14.38	7.84	3.92	Σ %

Pb

0-9	10-149	15-18	19-23	24-29	30-37	38-47	48-59	60-74	75-93	94-118	119-148	No. of samples
59	28	29	8	7	9	6	3	1	1	0	1	152
38.82	18.42	19.08	5.26	4.60	5.92	3.95	1.97	0.66	0.66	0	0.66	%
100.00	61.18	42.76	23.68	18.42	13.82	7.90	3.95	1.98	1.32	0.66	0.66	Σ %

Zn

0-9	10-149	15-18	19-23	24-29	30-37	38-47	48-59	60-74	75-93	94-118	119-148	
53	12	10	6	3	6	10	5	5	7	10	15	
34.64	7.84	6.54	3.92	1.96	3.92	6.54	3.27	3.27	4.57	6.54	9.80	%
100.00	65.36	57.52	50.98	47.06	45.10	41.18	34.64	31.37	28.10	23.53	16.99	Σ %

149-186	187-234	No. of samples : 153
9	2	
5.88	1.31	%
7.19	1.31	Σ %

PROJECT TAYLORS FLATS -80 mesh STREAM SED GEOCHEM No. _____
 SUBJECT DATA FOR PROBABILITY PLOTS
 PREP. BY P. ASKINS / T. WAITE DATE OCT '79 SHEET 1 OF 1

SAMPLES PREFIXED RD | T | TF

Cu

0-9	10-14.9	15-18	19-23	24-29	30-37	38-47	No. of samples: 73	
34	10	9	13	4	1	2		
46.57	13.70	12.33	17.81	5.48	1.37	2.74	%	
100.00	53.43	39.73	27.40	9.59	4.11	2.74	Σ%	

Pb

0-9	10-14.9	15-18	19-23	24-29	30-37	38-47	48-59	No. of samples: 73	
13	19	18	12	5	3	2	1		
17.81	26.02	24.66	16.44	6.85	4.11	2.74	1.37	%	
100.00	82.19	56.17	31.51	15.07	8.22	4.11	1.37	Σ%	

Zn

0-9	10-14.9	15-18	19-23	24-29	30-37	38-47	48-59	60-74	75-93	94-118	119-148
1	7	8	3	2	5	6	4	6	7	11	7
1.37	9.59	10.96	4.11	2.74	6.85	8.22	5.48	8.22	9.59	15.06	9.59
100.00	98.63	89.04	78.08	73.97	71.23	64.38	56.16	50.68	42.46	32.87	17.81

149-186	187-234	235-295	No. of samples: 73	
3	2	1		
4.11	2.74	1.37	%	
8.22	4.11	1.37	Σ%	

PROJECT FLUORINE IN WATER No. _____
 SUBJECT DATA FOR PROBABILITY PLOTS
 PREP. BY P. ASKINS | T. WAITE DATE OCT '79 SHEET 1 OF 1

A. STORMONT AREA
 SAMPLES PREFIXED RD/T/ST

<u>F</u>					
0-0.004	0.005-0.006	0.007-0.010	0.011-0.016	0.017-0.025	0.026-0.040
103	6	7	6	8	12
62.80	3.66	4.27	3.66	4.88	7.31
100.00	37.20	33.54	29.27	25.61	20.73
0.041-0.063	0.064-0.100	0.101-0.158	0.159-0.251	No. of samples: 164	
6	9	5	2		
3.66	5.49	3.05	1.22	%	
13.42	9.76	4.27	1.22	Σ%	

B. TAYLORS FLATS AREA
 SAMPLES PREFIXED RD/T/TF

<u>F</u>					
0-0.004	0.005-0.006	0.007-0.008	0.009-0.011	0.012-0.016	0.017-0.022
25	16	2	7	5	6
35.21	22.54	2.82	9.86	7.04	8.45
100.00	64.79	42.25	39.44	29.58	22.54
0.023-0.032	0.033-0.045	0.046-0.063	0.064-0.089	No. of samples: 71	
5	3	1	1		
7.04	4.23	1.41	1.41	%	
14.08	7.04	2.82	1.41	Σ%	

PROJECT STORMONT PANNED CONCENTRATES No. _____
 SUBJECT S.W. UV SCANNING
 PREP. BY R. DURAJ / P. ASKINS DATE OCT '79 SHEET 1 OF 1

SAMPLES PREFIXED RD/T/ST/H
 SCANNING DRY SAMPLES UNDER SHORT WAVE ULTRA-VIOLET LIGHT

PRESENCE OR ABSENCE OF SCHEELITE AND ZIRCON :-

SAMPLE NO.	SCHEELITE	ZIRCON	SAMPLE NO.	SCHEELITE	ZIRCON
709	-	✓	800	-	✓
710	-	✓	801	-	nil
711	-	✓	803	-	✓
712	-	✓	805	-	✓
714	-	✓	806	-	✓
719	-	✓	811	-	✓
726	-	✓	813	-	✓
728	-	✓	814	-	✓
729	-	✓	815	-	✓
730	-	✓	816	-	✓
734	-	✓	818	-	✓
742	-	✓	819	-	✓
743	-	✓	822	-	much
744	-	✓	823	-	✓
752	-	✓	824	-	✓
755	-	✓	825	-	✓
766	-	✓	826	-	✓
769	-	✓	829	-	✓
773	-	✓	830	-	✓
774	-	✓	831	-	✓
775	-	✓	835	-	✓
777	-	✓	838	-	✓
779	-	✓	841	-	✓
780	-	✓	846	-	✓
781	-	✓	847	-	✓
782	-	✓	852	-	✓
786	-	much	853	-	much
787	-	much	856	-	✓
788	-	✓	859	-	✓
790	-	✓	865	-	✓
797	-	✓	867	4 specks	✓

PROJECT TAYLORS FLATS PAINED CONCENTRATES

No. 106077

SUBJECT S.W. U.V. SCANNING

PREP. BY R. DURAJ / P. ASKINS DATE OCT '79 SHEET 1 OF 1

SAMPLES PREFIXED RD/T/TF/H

SCANNING DRY SAMPLES UNDER SHORT WAVE ULTRA-VIOLET LIGHT.

PRESENCE OR ABSENCE OF SCHEELITE AND ZIRCON:

SAMPLE No.	SHEELITE	ZIRCON	SAMPLE No.	SHEELITE	ZIRCON
868	-	✓	920	-	✓
869	-	✓	921	-	✓
871	-	✓	922	-	✓
873	-	✓	923	-	✓
875	-	✓	924	-	✓
876	-	✓	925	-	✓
878	-	✓	926	-	✓
879	-	✓	927	-	✓
880	-	✓	928	-	✓
881	-	✓	931	-	✓
882	-	✓			
885	-	✓			
886	-	much			
887	-	✓			
888	-	✓			
891	-	✓			
892	-	✓			
894	-	✓			
895	-	✓			
897	-	✓			
901	-	✓			
902	-	✓			
903	-	✓			
904	-	✓			
907	-	✓			
908	-	✓			
910	-	✓			
914	-	✓			
915	-	✓			
918	-	✓			
919	-	✓			

PROJECT MAGNETIC FRACTION OF STREAM SEDIMENT No. 106078

SUBJECT TAYLORS FLATS and STORMONT

PREP. BY P. ASKINS

DATE MAR. 1980 SHEET 1 OF 1

The following samples have been collected and are stored in Devonport.

STORMONT: RD/T/ST

M 710

M 711

M 712

M 726

M 728

M 729

M 730

M 734

M 755

M 769

M 773

M 774

M 775

M 777

M 779

M 780

M 781

M 782

M 786

M 788

M 790

M 797

M 813

M 814

M 818

M 824

M 825

M 826

M 830

M 831

M 838

M 865

M 867

TAYLORS.
FLATS

RD/T/TF

M 868

M 870

M 871

M 873

M 874

M 880

M 881

M 885

M 886

M 887

M 888

M 892

M 895

M 897

M 902

M 903

M 904

M 908

M 910

M 914

M 915

M 918

M 919

M 921

M 922

M 923

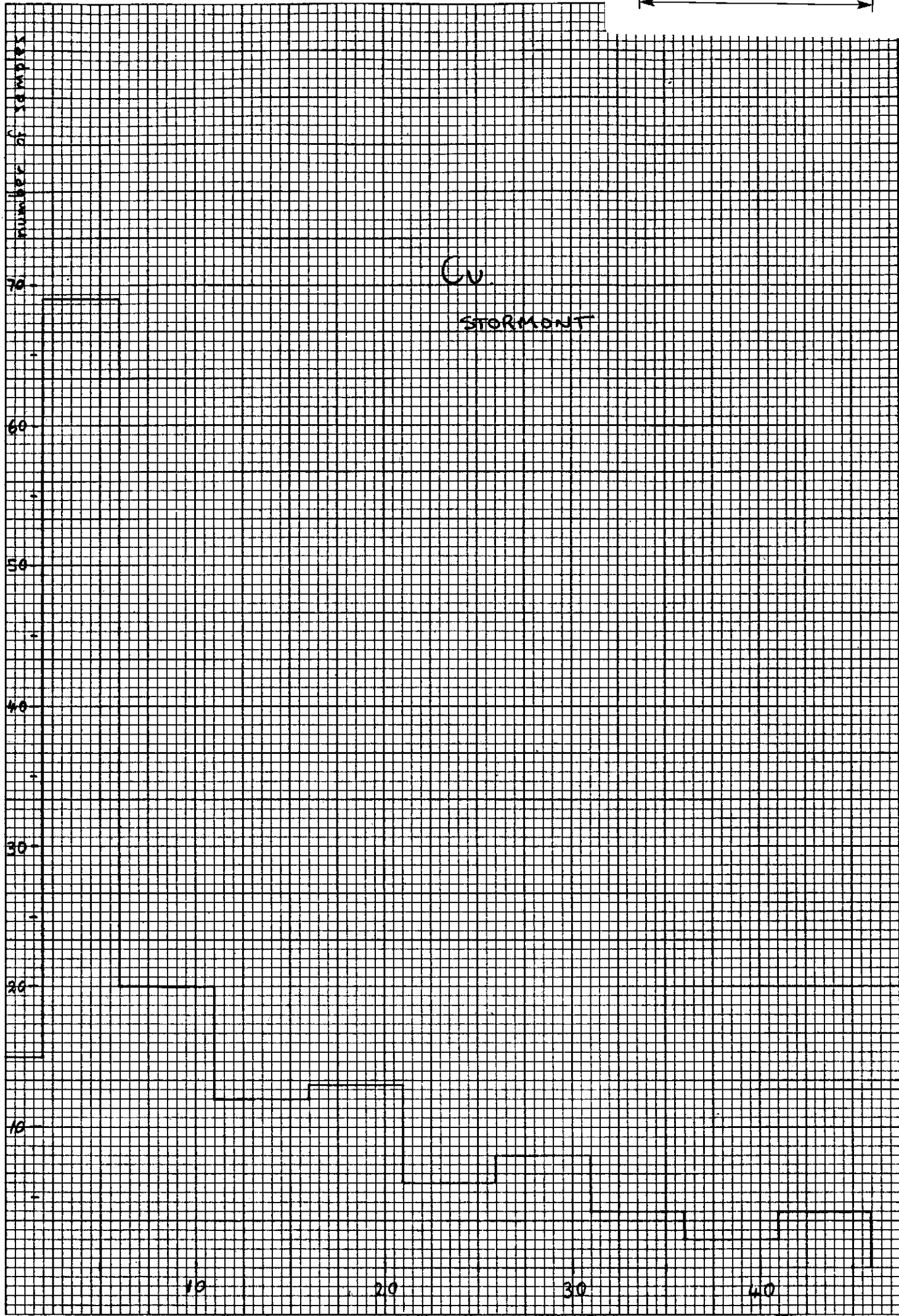
M 924

M 925

M 926

M 927

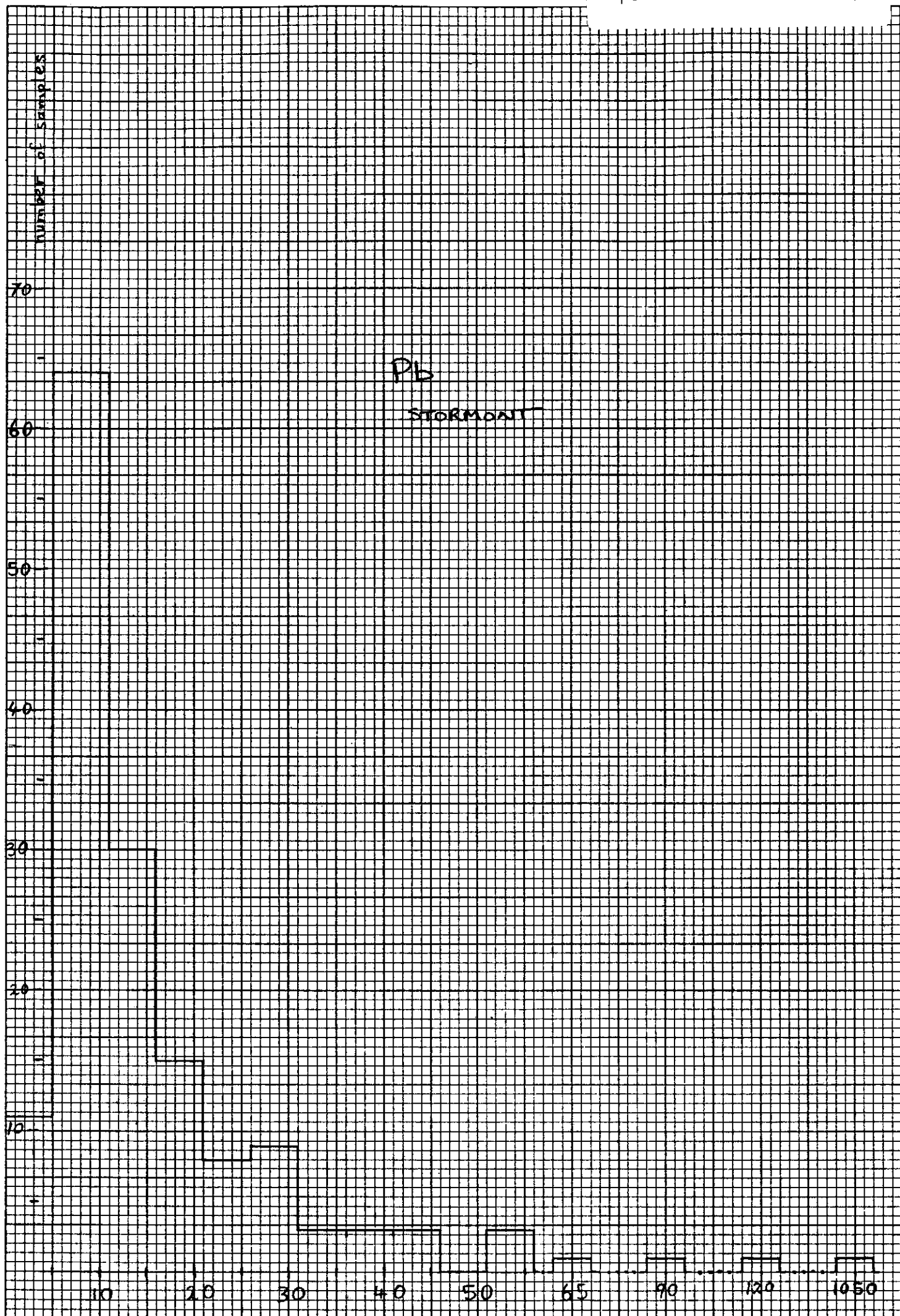
M 931



106080

5 cm





5 cm

number of samples

P_b

TAYLOR'S FLATS

40

30

20

10

10

20

30

40

50

60

5 cm

number of samples

Zn
STORMONT

80

70

60

50

40

30

20

10

30

60

90

120

150

180

210

240

5 cm

number of samples

Zn

TAYLORS PLAYS

30

20

10

30

60

90

120

150

180

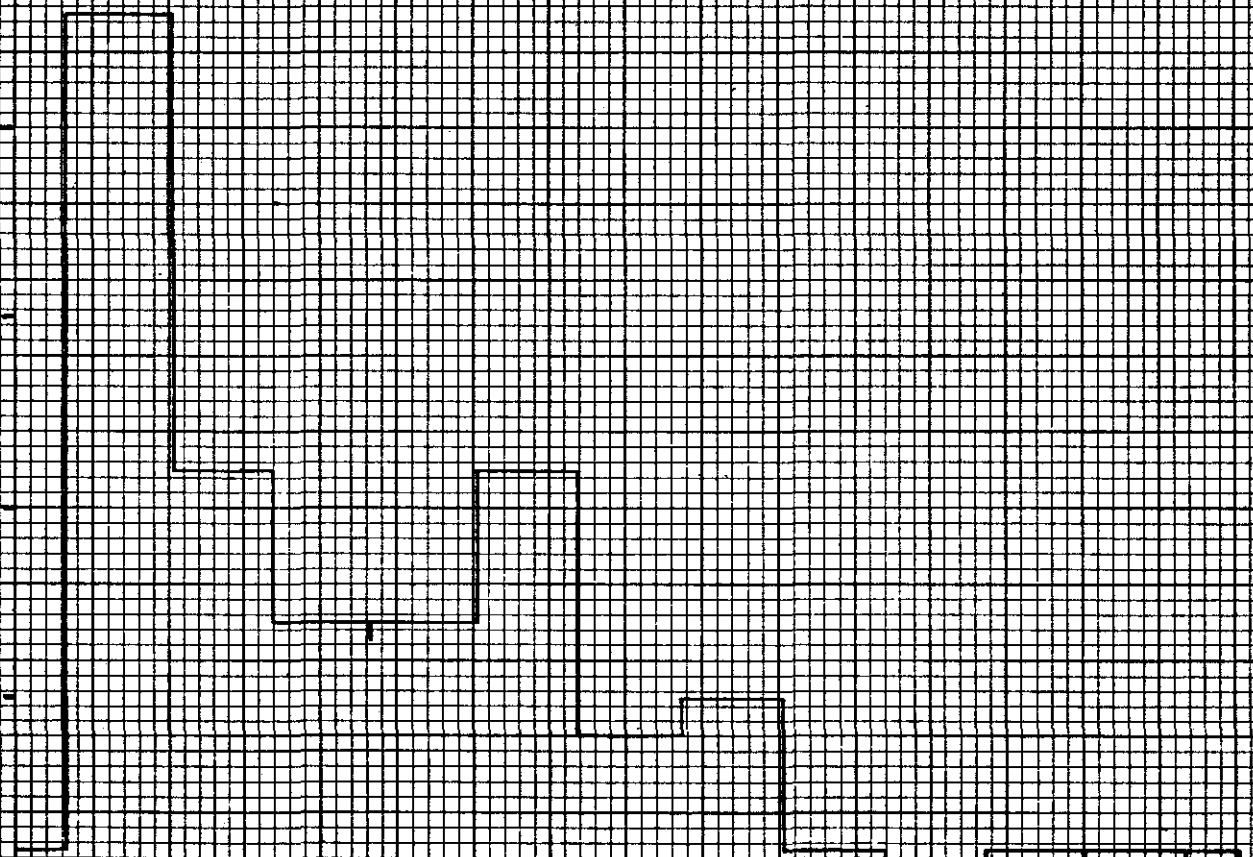
210

240

Zn ppm

GAF A4 2mm.

Fig 2-6



5 cm

NUMBER of samples

Bi
STORMONT

160

140

120

100

80

60

40

20

2

4

6

28

330

5 cm

NUMBER OF SAMPLES

B₁

TAYLORS FLATS

80

70

60

50

40

30

20

10

2

4

6

8

5 cm

number of samples

70

Sn

STORMONT

60

50

40

30

20

10

2

4

6

8

10

12

14

20

44

5 cm

S_n

TAYLORS FLATS

number of samples

50

40

30

20

10

2

4

6

8

10

12

14

106089

5 cm

number
of samples

120

110

100

90

80

70

60

50

40

30

20

10

W

STORMONT

5

10

15

20

25

30

5 cm

number of samples

W

TAYLORS FLATS

70

60

50

Samples < 10 ppm

40

30

20

10

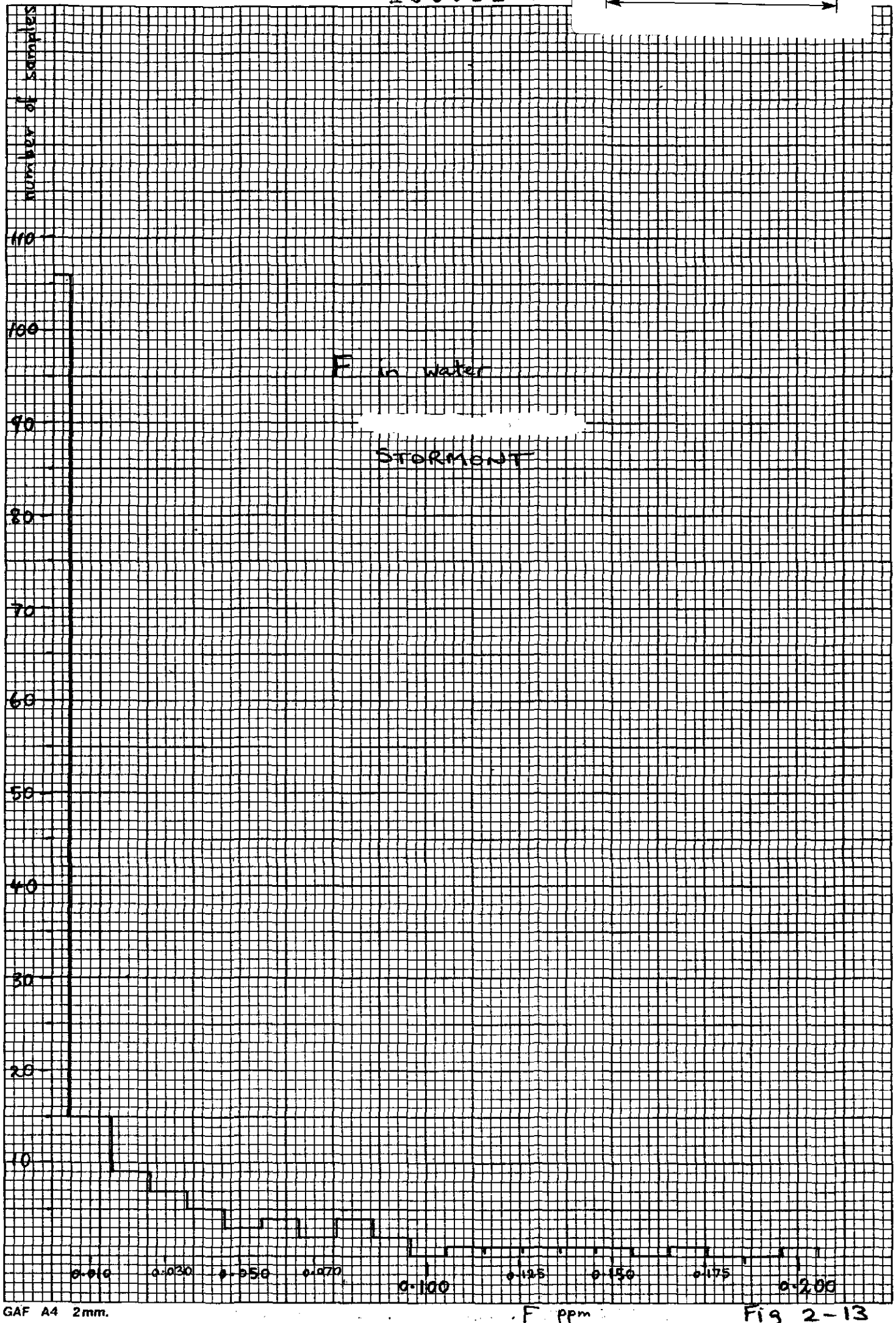
Samples = 0 ppm

10

W ppm

106091

5 cm



5 cm

number of samples

F in water

TAYLORS FLATS

40

30

20

10

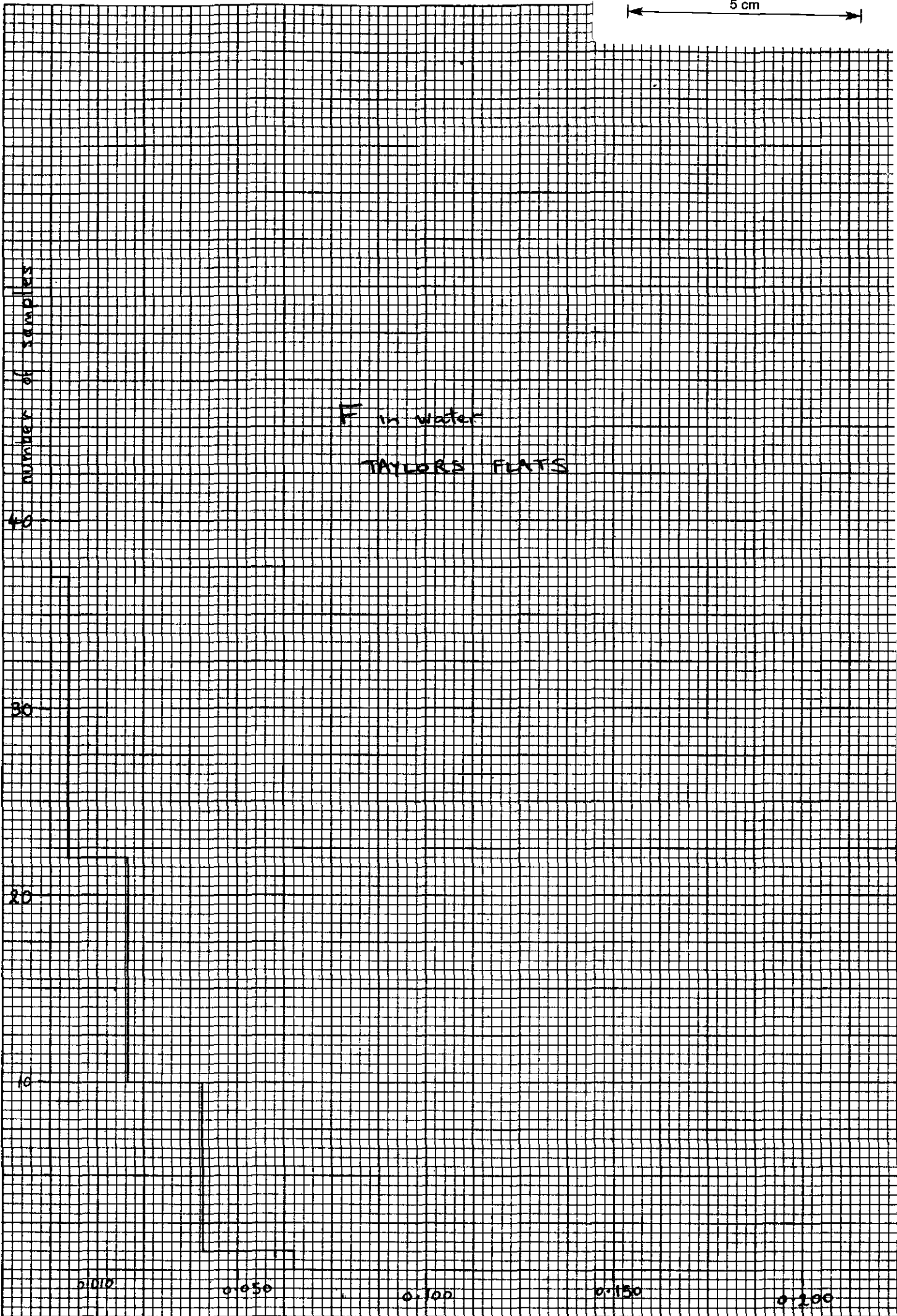
0.012

0.050

0.100

0.150

0.200



108085

5 cm

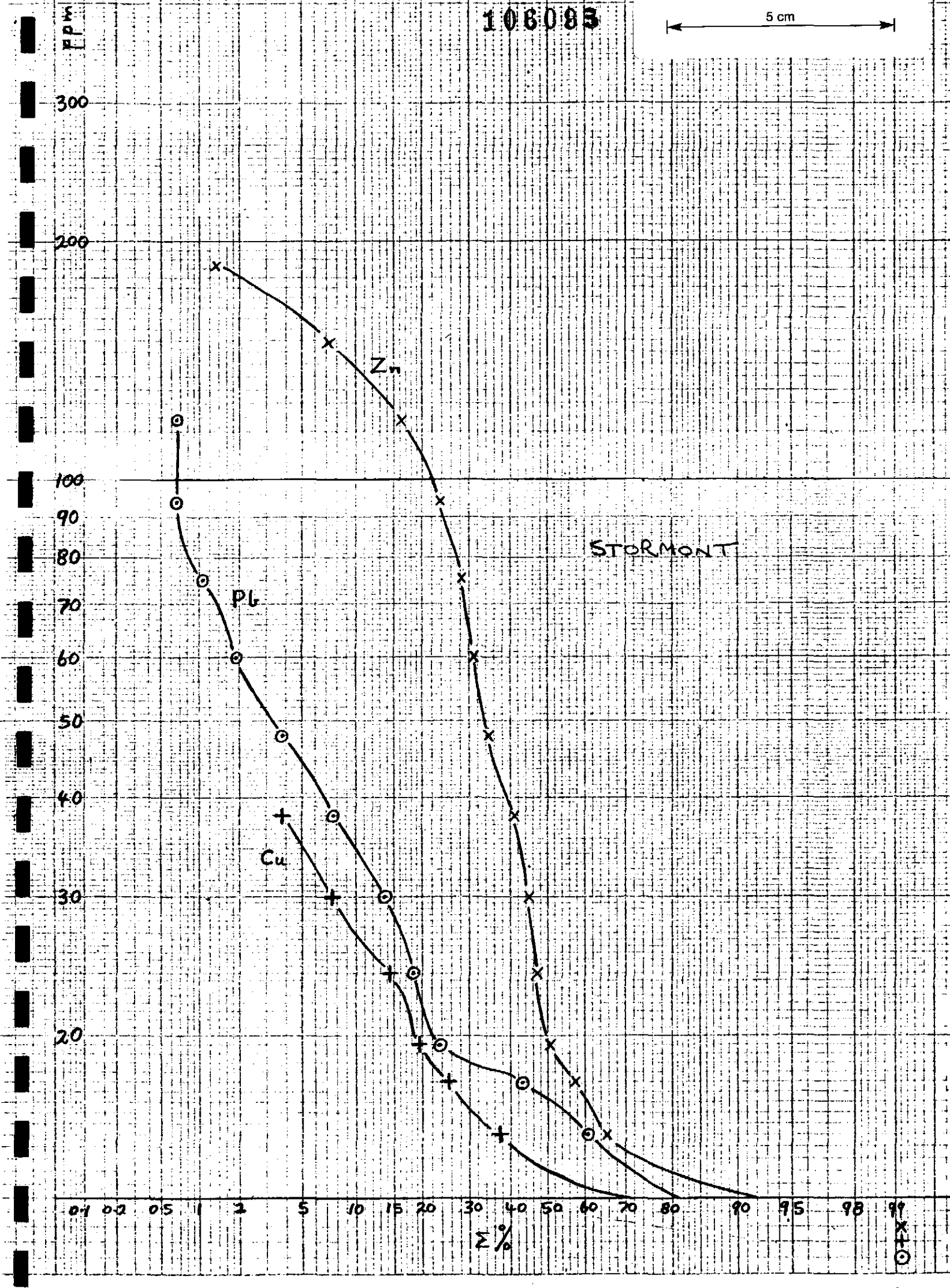


Fig 2-15

106094

5 cm

ppm

300

200

100

90

80

70

60

50

40

30

20

TAYLORS FLATS

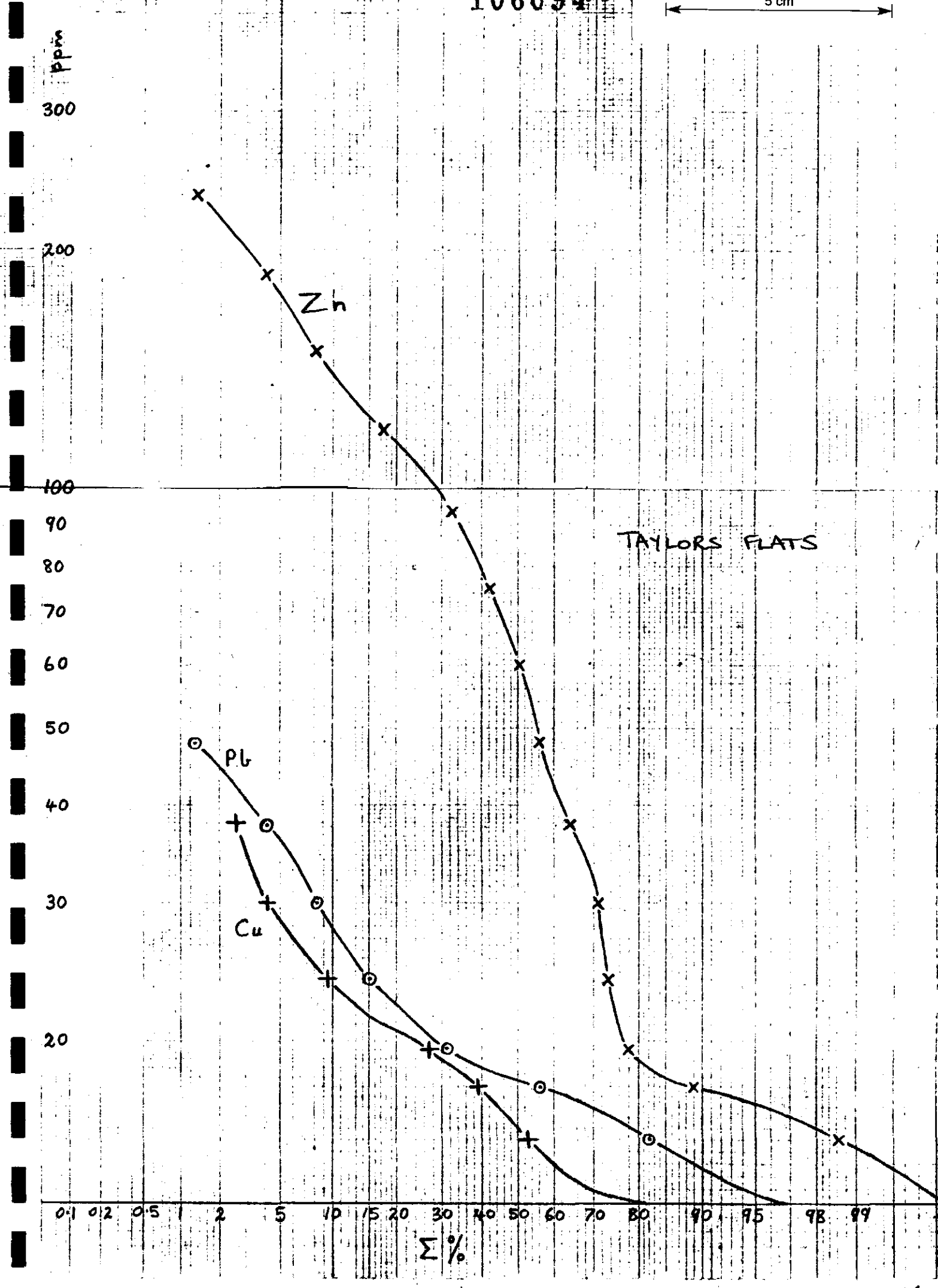
Zn

Pb

Cu

Σ %

0.1 0.2 0.5 1 2 5 10 15 20 30 40 50 60 70 80 90 95 98 99



106095

5 cm

PPM

0.30

0.20

0.10

0.09

0.08

0.07

0.06

0.05

0.04

0.03

0.02

0.01

F

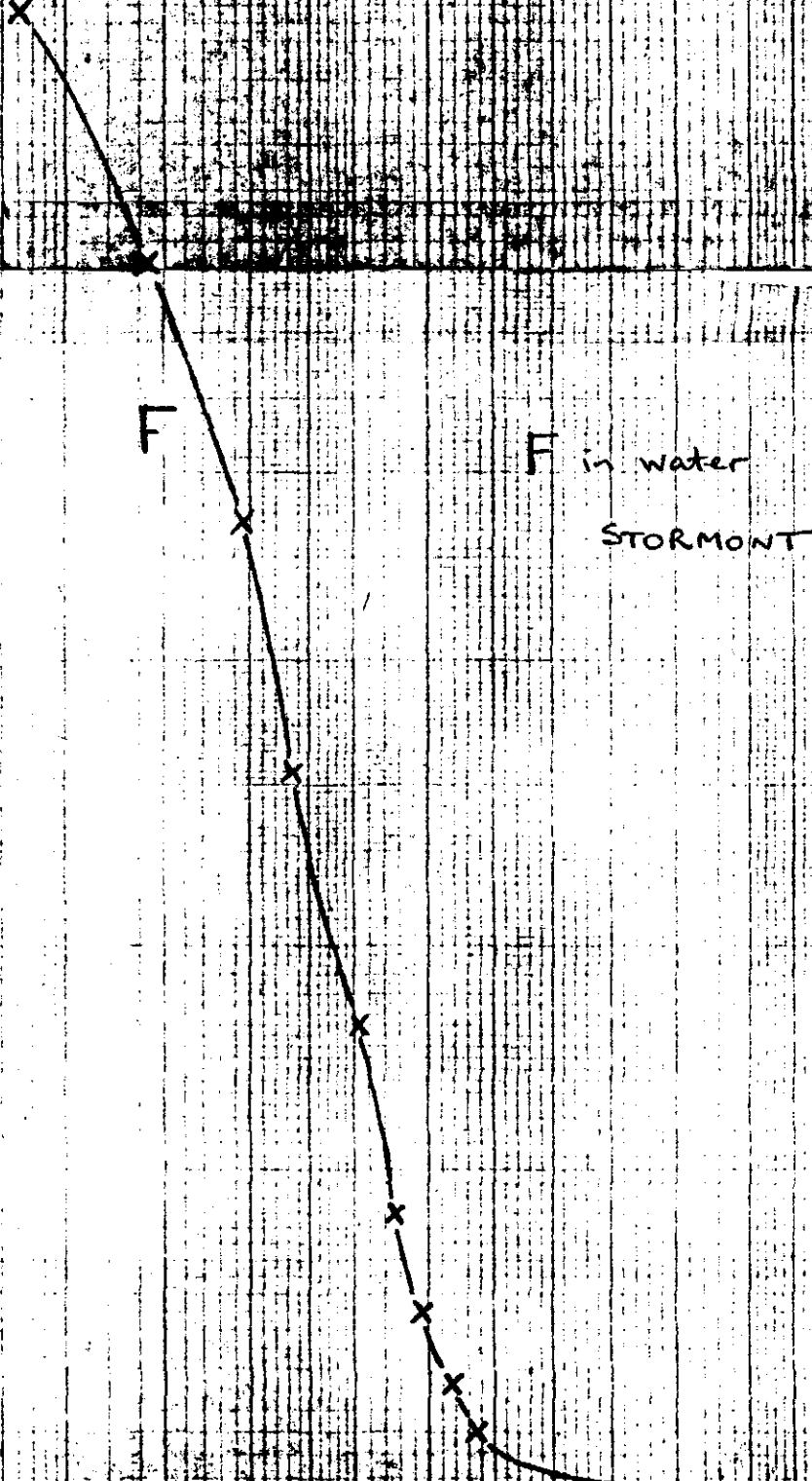
F in water

STORMONT

01 02 05 10 15 20 30 40 50 60 70 80 90 95 98 99

2%

Fig 2-17



106096

5 cm

ppm

0.07

0.06

0.05

0.04

0.03

0.02

0.01

F in water

TAYLORS FLATS

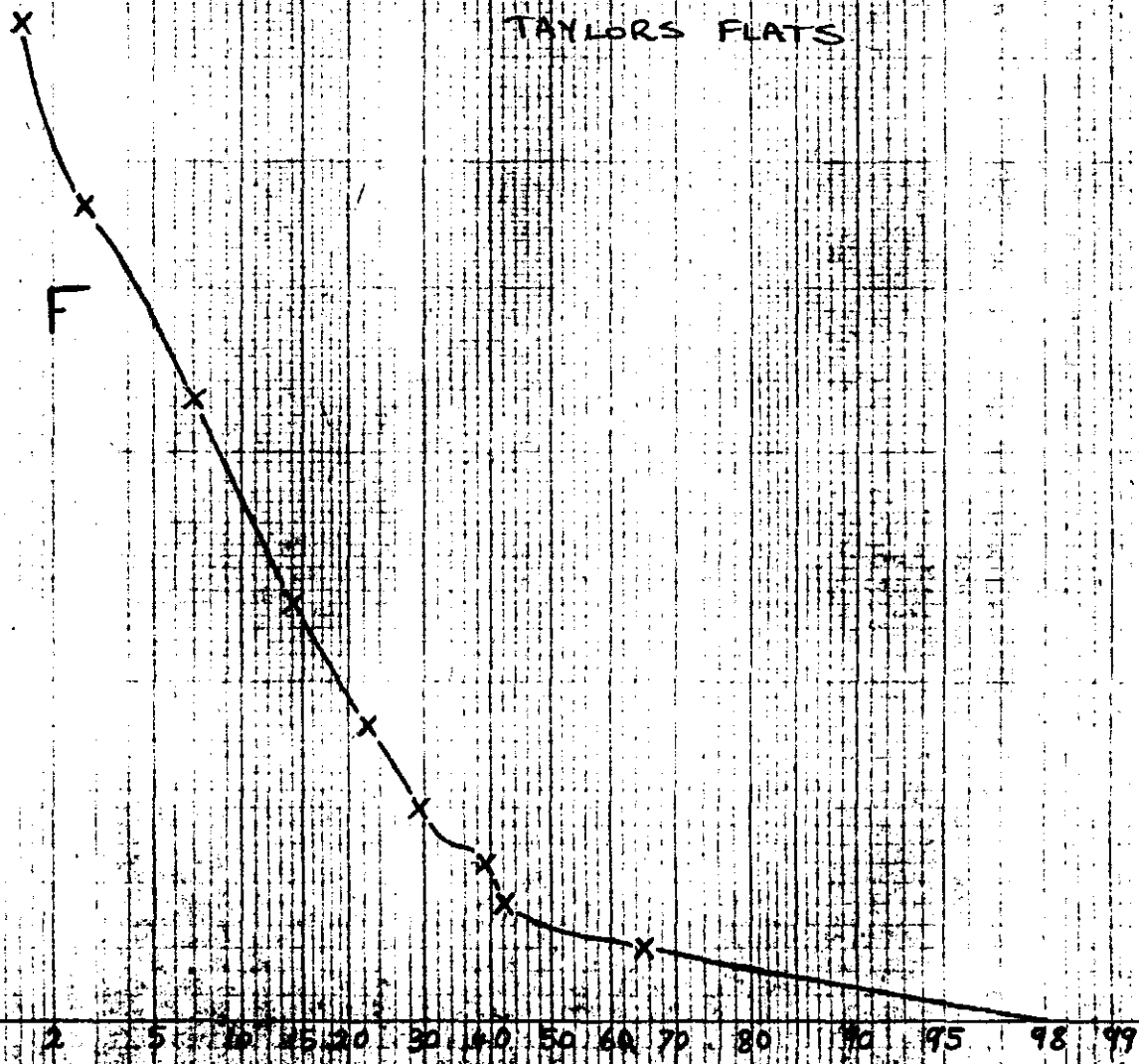


Fig 2-18

APPENDIX 3MINOR OTHER STREAM SEDIMENT SAMPLING

Three areas have been sampled, separate from the two main geochemical sampling programs. Two are reported below, namely the Campbell River area and Wilmot River area. The other is areas south of Lorinna in the Forth River system, extending out of E.L. 7/74. This area will be covered in a separate report.

Campbell River Area.

As a check on copper geochemical anomalies previously discovered in this area by Mt. Lyell (Reid, 1967) six stream sediment samples were taken in the Campbell River and tributaries about 1.5 km upstream from the Dove River junction.

Samples were sieved to -80 mesh and sent to the Comalco Laboratory, Melbourne for Cu, Pb, Zn, Bi, Mo analyses. Copper values are all anomalous (compared to the main -80 mesh survey results) with values up to 375 ppm.

A few rock samples of dyke like weathered material in the Precambrian schists/quartzite host rocks were taken. The samples contain up to 340 ppm Cu, so such dykes might be the cause of the Cu anomalies, though more investigation is needed, particularly as copper may be associated with gold in this area - alluvial gold has been worked nearby according to Nevill McCoy (prospector).

The geochemical analyses and rock analyses are compiled in Table 3-1.

Wilmot River Area.

BHP in their regional geochemical survey (Cochrane, 1970) reported a lead anomaly in a gully draining into and west of the Wilmot River, 2.2 km WNW of Erriba (just outside E.L. 7/74). Four stream sediment samples were taken in this area, sieved to -80 mesh and analysed by AAS at Comalco Laboratory Melbourne, but failed to reproduce the anomaly.

Results are:

Sample No.	Cu	Pb	Zn	Bi (ppm)
RD/T/WR/D001	35	30	125	30
002	20	35	165	15
003	30	30	140	15
004	<10	30	25	20

PROJECT CAMPBELL RIVER No. _____
 SUBJECT STREAM SEDIMENT + ROCK SAMPLING
 PREP. BY P. POLTOCK | P. ASKINS DATE MAR '80 SHEET 1 OF 1

STREAM SEDIMENT SAMPLES

Sept 1976

-80 mesh, analyses by Comalco Labs by AAS, pp

Sample No. RP/T/CR/D	Nat. Grid Co-ord.	Cu	Pb	Zn	Bi	Mo
01	42360539480	115	20	115	<20	<20
02	42350539480	105	20	85	<20	<20
03	42360539495	290	15	120	<20	<20
04	42350539495	230	20	105	<20	<20
05	42315539500	375	15	115	<20	<20
06	42310539510	315	55	50	<20	<20

ROCK SAMPLES

Sample No.	Cu	Pb	Zn	DESCRIPTION
GW/T/CR R 01	18	160	18	Contact material - quartzite with Dove Granite
2	2	15	50	Weathered Dove Granite dyke like material and chilled margin.
3	140	15	60	
4	130	15	12	
5	340	25	10	
6	60	8	42	

APPENDIX 4FLUORINE IN STREAM WATER

Apart from the results reported in Appendix 2, some minor sampling has been carried out close to Moina, particularly along the Bismuth Creek fault. Samples were taken in May and June, 1978 in a period of normal rainfall. Analyses are by S.I.E. at Comalco Laboratory, Melbourne. Results are tabulated on Table 4-1, and sample positions are plotted on plan TAS-80-338.

Values around Moina are clearly anomalous and values in the upper reaches of Dolcoath Creek are also high, reflecting the known fluorine bearing veins and greisen mineralization in the "Iris Mine" area.

PROJECT FLUORINE IN STREAM WATER collected May, June 1978

SUBJECT MOINA and BISMUTH CK FAULT ZONE

PREP. BY P. ASKINS DATE MAR '80 SHEET 1 OF 1

Sample No.	F, ppm	Notes
RD/T/W 1	<< 0.005	Bismuth Ck at Cradle Mtn Road
2	0.077	Bismuth Ck at Moina Rd crossing (30m below wrigglyite dump)
3	2.17	Water flowing out S+M no 3 adit.
4	0.292	Bismuth Ck at 550E/450N (down from 3 500m below S+M mine)
5	0.014	Brampton Ck near Cradle road.
6	< 0.005	100m downstream from sample 5.
7	0.307	Bismuth Ck 250E/830N (near lake, 1000m below S+M mine)
8	0.019	Brampton Ck at Moina Rd crossing
9	< 0.005	Hinman Ck, close to Cradle Mtn Rd
PK/T/M/W 1	<< 0.005	For sample locations see plan TAS-80-338
2	<< 0.005	
3	<< 0.005	
4	<< 0.005	
5	<< 0.005	
6	<< 0.005	
7	<< 0.005	
8	<< 0.005	
9	0.029	
10	0.021	
11	0.025	
12	0.019	
13	0.089	
14	0.052	
15	0.018	
16	0.086	
17	0.044	
20	0.014	
21	0.011	
22	< 0.005	

APPENDIX 5Analytical techniques used by Comalco, Amdel.A. COMALCO LABORATORIES (COMALCO RESEARCH CENTRE).1. STREAM SEDIMENT AND SOIL SAMPLES.Cu, Pb, Zn, Bi, Mo, Co, Ni:

Determination by AAS after dissolution of 1 g sample in hot HCl + HNO₃ (Scheme 1).

Ag, Mo, Bi:

Determination by AAS after dissolution of 5 g sample in hot HNO₃. (Scheme 2).

Fluorine: (total)

Determination by specific ion electrode after fusion of 0.25 g sample with flux of Na₂CO₃, KNO₃, K₂CO₃, SiO₂ and water leach. (Scheme 8).

2. ROCK SAMPLES.Cu, Pb, Zn, Bi, Mo, Co, Ni, Cr:

Determination by AAS after attack of 1 g sample in hot HCl + HNO₃ + HClO₄, evaporated to fuming HClO₄, and dissolution in HCl. (Scheme 3). Where silicates are suspected the method is the same but attack is by HF, HNO₃ + HClO₄. (Scheme 5).

Ag, Mo, Bi, Sb:

Determination by AAS after dissolution of 5 g sample in hot HCl + HNO₃. (Scheme 4).

W:

Fusion of 0.25 g sample with KHSO₄, leach with HCl, add SnCl₂ solution, determined with Zn-dithiol indicator in a spectrophotometer, compared with known solutions. (Scheme 7).

Au:

10 g of sample roasted, leached to dryness with HCl + HNO₃, dissolved in HCl, transfer to organic solvent and determine by AAS.

Fluorine:

As for stream sediment and soil samples.

3. WATER.Fluorine:

Read directly by specific ion electrode after addition of buffer solution.

B. AMDEL.

CODE A. Semi quantitative analyses by emission spectroscopy.

CODE B. XRF. All XRF analyses are by Code B1 unless otherwise stated.

B1 XRF, accuracy \pm 5%, detection limits as quoted.

B2 XRF, accuracy \pm 3%, detection limits as quoted.

CODE C. AAS

C1 Bi, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn, accuracy \pm 5%, detection limits as quoted. Dissolution in hot HClO_4 .

C2 Ag, Mo, accuracy \pm 5%. Dissolution in hot $\text{HCl} + \text{HNO}_3$?

C3 Au, accuracy dependent on sample, detection limit 0.05 ppm. Details of method not available, but dissolution in $\text{HCl} + \text{HNO}_3$.

CODE E. E3 F as CaF_2 . Method is not available but is suspected to be leaching in near boiling aluminium sulphate and determination by specific ion electrode. The method is more or less specific for CaF_2 and does not give total F in the sample i.e. F tied up in micas, topaz, amphibole, etc).

CODE K. K4/2 Au by fire assay and AAS, detection limit 0.005 ppm.

Explanatory Notes to the Geology
of the Bismuth Creek Fault Map -
by P. Komysan - June 1978

Introduction

The area mapped (of approximately 20 sq.km.) is situated to the S.E. of the former township of Moina, between the Cradle Mt. Road and the agricultural community of Lorinna. The focus of the mapping was on the Bismuth Creek Fault, (which trends N.W.-S.E.), in the region of the Bull Creek Pyroclastics (of Jennings, 1958), outcropping on the western slopes of the Forth Valley.

The aim of the mapping was to map the fault in detail, to subdivide the previously undifferentiated Bull Creek Pyroclastics in an attempt to place boundary conditions on the known mineralization in the Moina and Iris Tin Mine area.

Access to the mapped area was limited to: a short track from the Cradle Mt. Road to the Iris Tin mine, the gravel road to Lorinna and boat access across Lake Cethana to foreshore outcrops.

Vegetation in the area is generally thick regrowth due to successive clearing and burning for mineral prospecting and forestry. However, a number of small creeks which have not been burnt, have luxuriant growth of myrtle, sassafras and man fern providing easy access free of undergrowth.

Outcrop was generally limited to the steeper slopes. Creeks, with the exception of Bull Creek were filled with gravel, alluvium and organic debris. Geological interpretation was therefore carried out mostly on rock floatsam which was generally reliable on the ridge tops.

GEOLOGY

Introduction

The area has previously been mapped on a regional scale by Jennings (1958). However no reference to the Bull Creek Pyroclastics, away from the Forth River and the mine area, can be found in the explanatory report of Jennings (1963). Some minor reconnaissance work of the Bull Creek Pyroclastics was carried out by McKibben (1972), (Mt. Lyell Mining Co.). A number of rocks were also analysed with insignificant results.

The mining prospects have previously been described by Twelvetrees (1913), Reid (1919), Gee (1966) and others.

Mapping in detail along the Forth River before damming of the river was carried out by Burns (1961) and Patterson (1960).

General

The Bull Creek Pyroclastics are a sequence of Cambrian (?) rocks consisting of tuffs, reworked tuffs, cherts and rhyolite lavas (?). These rocks which form the central part of the mapped area are overlain unconformably by Ordovician conglomerates and sandstones. Within the area of interest the boundary between the Cambrian and Ordovician describes a U shape. This is probably due to a shallow plunging (to the east) regional anticline with an approximate east-west strike.

The Ordovician and Cambrian rocks are cut by a series of N.W. trending faults centered around the Bismuth Creek Fault. These faults, probably of Pre-Devonian age, or earlier (?), are thought to have assisted in the migration of ore solutions associated with the intrusion of the Dolcoath Granite during the Devonian.

Erosion of the landscape during the Tertiary and subsequent filling of old river channels by basalt and agglomerate has resulted in basalt plateau, which have since been incised by the present river systems.

Cambrian

The Cambrian rocks form the most significant part of the maps and have previously been described only in a minor fashion. As the lithologies are similar, and sometimes the subdivision is perhaps arbitrary, the units have been labelled from A to K for ease of description. It should be noted that stratigraphic information is not sufficient to consider the units set out below as forming a stratigraphic succession.

UNIT A - Quartz - hornblende - feldspar porphyry

This is a massive light grey coloured rock with phenocrysts of sub-rounded to subhedral, medium grained, crystal quartz, elongate medium grained, black hornblende and euhedral feldspar in a milky white feldspathic matrix. The rock also contains elongate wisps of light green chlorite.

This unit which outcrops directly below the Ordovician, is in many cases the host rock to Sn, W mineralization. Alteration of the rock surrounding quartz and greisen veins is common. In the vicinity of the Lawkewlaw mine the rock has been altered to a light yellow to red friable clay rich rock, which contains up to 1% heavy minerals (Billings R. Pers. Comm.). This rock type probably outcrops beneath the Iris Tin Mine workings.

UNIT B - Reworked crystal lithic tuff

On first observation this rock appears to be a quartz feldspar porphyry. However, large scale (over 1 $\frac{1}{2}$ m) grading of the quartz "phenocrysts" and

presence of rounded lithic fragments indicates that this may be a reworked tuff.

This is a massive dark blue rock with rounded to euhedral, medium to fine grained, crystal quartz and euhedral pink to white feldspar in a fine grained blue matrix. The matrix is generally feldspathic with about 20% mafic minerals (hornblende). The rock is generally altered by actinolite - epidote veins, knots and segregations. This actinolite is often associated with magnetite and minor pyrite mineralization.

Within $\frac{1}{2}$ km of the Bismuth Creek Fault the rock generally contains disseminated pyrite.

UNIT C - Quartz crystal tuff

This is a well cleaved light coloured rock containing rounded, medium grained, crystal quartz in a fine grained feldspar, sericite matrix. The rock appears to be dacitic to rhyolitic in composition. This unit which outcrops only close to the fault contains plentiful disseminated pyrite and the cleavage is limonite stained.

UNIT D - Rhyolite

This white to pink coloured rock contains subhedral weathered feldspar in a white aphanitic matrix. The rock often contains zones of haematite pods (after pyrite?) and magnetite, and is stained red by haematite along joints.

UNIT E - Welded rhyolite breccia

This rock contains angular fragments of rhyolite of varying size, welded in a blue grey haematitic silicified matrix. The rhyolite is similar to that described in Unit D. Most of the breccia fragments show alteration and embayment by the "matrix". This outcrop may be an old fault zone, a former breccia pipe or a feeder pipe for the rhyolites. It is interesting to note the only outcrops of rhyolite occur within the "fault zone". This may imply this an old fracture zone or a zone of weakness along which intrusion of the rhyolite occurred.

UNIT F - Reworked crystal lithic tuff

This massive dark blue rock contains medium to large grained, rounded, cracked, crystal quartz, euhedral milky feldspar, angular, fine to medium grained black, crystal quartz and ellipsoidal rounded fragments of chert in a generally feldspathic matrix which also contains ellipsoidal fragments of tuffaceous material (visible only in weathered specimens). This rock is similar to Unit B, however differs in that the quartz grains are more rounded and larger. It also contains chert fragments unlike Unit B. As a general rule the pebbles get larger and more frequent towards the chert beds of Unit G. This unit is also veined by actinolite and contains disseminated pyrite and minor chalcopyrite.

UNIT G - Silty Chert

This unit is poorly exposed, however is indicated by its generally low topographic expression, different soil and vegetation and air photo linears. Rock floatsam from this region shows a soft yellow to brown fine grained rock with interbedded chert and fine grained siltstone.

UNIT H - Reworked tuff

This rock is massive and dark blue is unweathered specimens. It contains rounded to angular grains of medium grained milky quartz, rounded fine grained lithic fragments, fine grained blue grey crystal hornblende in a felspathic groundmass. This rock contains minor pyrite and chalcopyrite.

UNIT I - Vitric, quartz crystal tuff

This rock which is light in colour contains rounded to subrounded medium grained crystal quartz in a vitric silicified (?) matrix. The rock is also sericitized and chloritised. Colour laminations within the rock is also sericitized and chloritised. Colour laminations within the rock give the appearance of banding.

UNIT J - Spotted hornfels

This is a fine grained well cleaved grey rock which contains generally ellipsoidal (irregular boundaries) segregations of green hornblende.

UNIT K - Basic to intermediate intrusive (?)

This is a fine grained dark blue grey rock which is of probable basaltic composition. It shows extensive actinolite, chlorite and kaolin alteration. Minor pyrite and chalcopyrite mineralization is present.

The Ordovician and younger rocks are described in detail in Jennings (1963).

Structure

The outcrop pattern of the Cambrian-Ordovician boundary appears to indicate a broad regional anticline, with shallow plunge to the east, and with an east-west strike. Stereoplotting of bedding readings from the Ordovician sandstones failed to confirm this picture. This is probably due to bias caused by the large number of readings taken near the fault. Folding of the rocks was more intense near the fault zone indicating "drag" folding associated with faulting.

Structural interpretation within the Cambrian is difficult due to the lack of bedding readings. The rocks show two cleavages, often spacially developed. Where the two cleavages occur in the one outcrop they show a variation in strike of 10° - 20° and dip 20° - 40° . It would easily be

be mistaken for an anastomosing cleavage. The cleavages give little information about the structure in the Cambrian rocks. However, work by Burns (1961), and the outcrop pattern indicate that there may be a regional syncline on the NE side of the Bismuth Creek fault, whose axial plane is terminated by the fault in the region of the Iris Tin mine.

The Bismuth Creek Fault which is the most prominent structure of the area, can be shown to consist of at least two parallel faults (exposed on the Lake Cethana foreshore). Within Bull Creek other small faults also are parallel to these larger faults. The large fracture zone (exposed on the Cradle Mt. Road) and the number of parallel faults probably indicates that this fault zone is perhaps reflectant of some major crustal weakness.

Economic Geology

Little evidence of extensive mineralization outside the Iris Tin mine area was found. However it should be noted that altered greisenized rocks in the vicinity of the Lawkemplaw mine do not outcrop and if similar rocks exist within the mapped area it is expected that these also would not outcrop.

There appears to be little significant mineralization associated with actinolite alteration. It may however be worthwhile to examine the rhyolites and associated rocks in greater detail as these, though not significantly altered in hand specimen, contained significant pyrite and magnetite and may be associated with other mineralization.

References

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- McKibben, 1972 - Annual Report on the Moina area, E.L. 8/65 - Unpublished report of the Mt. Lyell Mining and Railway Co. Ltd.
- Patterson, S.J., 1960 - Geological Investigation on the Lorinna Dam Site.
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- Reid, A.M. 1919 - The mining fields of Moina, Mt. Claude and Lorinna.
Bull. Geol. Surv. Tas. 29.
- Twelvetrees, W.H., 1913 - The Middlesex and Mt. Claude mining field.
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Samples and Locations, mentioned in field Notes, under Lithological headings.

Unit A - Quartz feldspar hornblende porphyry
PK/T/M 19, 18, 20, 91, 92, 93, 97.

Unit B - Reworked crystal lithic tuff
PK/T/M 25, 25, 47, 48, 59, 63, 64, 65, 69, 70, 71, 75
80, 81, 82, 83, 84, 94, 95, 96. 51

Unit C - Quartz crystal tuff
PK/T/M 3, 14, 15, 50, 54, 60, 66.

Unit D - Rhyolite
PK/T/M 46, 49, 55, 56, 58, 62.

Unit E - Rhyolite breccia
PK/T/M 57, 61.

Unit F - Quartz crystal lithic tuff
PK/T/M 31, 32, 33, 34, 39, 40, 41, 42, 43, 44, 45, 88, 90.

Unit G - Silty chert
PK/T/M 38

Unit H - Reworked tuff
PK/T/M 35, 36, 37

Unit I - Vitric, quartz crystal tuff
PK/T/M 68, 74, 76, 77, 78, 79, 85, 86

Unit J - spotted hornfels
PK/T/M 17

Unit K - Basic intrusive?
PK/T/M 16.

106110

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30th May 1978

Mr. P. Askins,
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Comalco Limited,
Exploration Department,
Post Office Box 691,
DEVONPORT. TAS. 7310

REPORT CMS 78/5/22

YOUR REFERENCE: PK/T/M
DATE RECEIVED: 12th May 1978
SAMPLE NOS.: 33, 46, 47, 50A,
51 and 60
SUBMITTED BY: P. Askins
WORK REQUESTED: Petrology

H.W. Fander
H.W. Fander, M.Sc.

Copy to

Mr. A.H. Bartlett,
Geologist *Exploration Manager*
Comalco Limited,
95 Collins Street,
MELBOURNE. VIC. 3000

REPORT CMS 78/5/22

The six samples were thin sectioned and are briefly described below, as requested. K-feldspar stain tests were carried out on the off-cuts.

Unit F - Qtz-xal-lithic tuff of P. Komyshev
No. 33 (TS 24066) K stain test positive.

This is a sheared, metasomatised porphyritic rhyolite (using this term in the broad sense).

Some phenocrysts are well preserved, especially quartz crystals with embayments and corroded margins, but are microfractured and stressed; occasional feldspars also occur, but most are fairly severely altered. The groundmass is evidently recrystallised, and primary textures obliterated, though vague flow-banding is visible in places; it is strongly potassic.

Metasomatic minerals include patches of fibrous to acicular, dark green hastingsite, granular epidote, and minor prehnite; these comprise irregular masses replacing groundmass material. Goethite pseudomorphs after pyrite, arsenopyrite, are scattered through the rock.

Unit D - Rhyolite
No. 46 (TS 24067) K stain test negative
 This is a thoroughly altered, silicified acid volcanic rock, probably a porphyritic rhyolite or similar type.

There are relict, rather poorly-defined small quartz phenocrysts and masses of quartz believed to be orthoquartzite xenoliths, set in a microcrystalline quartz matrix. Irregular patches of barite are common, and there are many small fresh and oxidised pyrite crystals. Streaks of ultrafine rutile are present, representing recrystallised leucosene (possibly derived from biotite). Any feldspar originally present has been replaced by quartz. Barite and pyrite were introduced with or after the quartz, and have an irregular vein-type distribution.

Unit B - Reworked xal lithic tuff
No. 47 (TS 24068) K stain test positive (irregular patches)
 An extensively metasomatised volcanic rock, tentatively classified as a porphyritic rhyolite on the basis of rather limited relict features.

Quartz phenocrysts are fairly common and are quite well-preserved, surrounded by quartz patches and set in a microcrystalline matrix of chlorite, quartz, sericite, and epidote; in places, epidote occurs to the exclusion of all other minerals. Skeletal leucosene, after primary opaques, is scattered through the rock, and there are isolated smoky apatite crystals.

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In places the groundmass consists of fine devitrified feldspathic glass, and the rock may have been extrusive, though more probably a shallow minor intrusive. This rock may correlate with the other "rhyolites".

Unit C - qtz - xal -tuff

No. 50A (TS 24069) K stain test negative.

This rock may be termed a metarhyolite; there is evidence of two separate metamorphic episodes.

Quartz phenocrysts with embayed, corroded outlines are well-preserved and are common throughout, and are set in a microcrystalline, schistose matrix of quartz and sericite representing an original quartz-feldspar assemblage; the schistosity is superimposed on possible flow-banding.

There are numerous microfractured andalusite crystals throughout; these pre-date the schistosity and were formed (probably from primary feldspar) by thermal metamorphism. Fine, granular rutile occurs in subparallel streaks. Granular pyrite is very conspicuous and was probably introduced at a late stage, accompanying dynamic metamorphism and incipient argillisation of andalusite.

Unit B - Reworked crystal lithic tuff

No. 51 (TS 24070) K-stain test positive in streaks

This is a metasomatised porphyritic rhyolite; as with the other rhyolitic rocks, the term rhyolite is used broadly since the primary feldspars are altered and thus a more accurate classification is not possible.

Embayed, corroded quartz phenocrysts have survived, and there are chlorite pseudomorphs after comparatively conspicuous biotite flakes (with subparallel, ?flow-orientation). The groundmass is fine-grained quartz and some K-feldspar, with flow-banding in places; much of the groundmass however, has been replaced by fine dark green biotite, minor epidote. Small euhedral pyrite crystals have formed in places.

The occurrence of smoky apatite crystals links this rock with No. 47, and there is a general similarity with the other rhyolites.

Unit C - Quartz crystal tuff.

No. 60 (TS 24071) K-stain test negative

Relict textural and other features suggest that this rock is (or was) a sintered/welded vitric tuff of rhyolitic composition.

There are occasional small quartz splinters (presumably representing fragmented phenocrysts), set in a matrix of microcrystalline quartz. Numerous relict textures are outlined by ultrafine leucoxene,

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and indicate that the bulk of the rock originally consisted of small angular feldspar fragments and glass shards, closely packed and probably sintered.

Parts of the rock are dark, due to the addition of fine hematite flakes at a late stage, during silicification.

Some grainsize variations occur, resulting in layering and supporting a pyroclastic origin.

H.W. Fander, M.Sc.

PROJECT ANALYSES OF SAMPLES No.
 SUBJECT BISMUTH CREEK FAULT ZONE
 PREP. BY P. ASKINS DATE 1980 SHEET 1 OF 1

FOR LOCATION OF ROCK SAMPLES SEE PLAN TAS-80-338

SAMPLE NO. PK/T/M	ANALYSES, ppm, Amdel semi-quant. spectro.											
	Sn	W	Bi	Be	Ag	Mo	Cu	Pb	Zn	As	Y	Ba
3	<1	<50	<1	2	0.1	<3	20	-	200	<50	80	
50A	40	<50	10	<1	0.8	<3	100	-	<20	<50	50	
78	20	<50	2	<1	1.0	30	200	100	100	-	-	500
80	1	<50	<1	2	0.3	<3	50	150	80	-	-	10000
84	3	<50	<1	2	<0.1	<3	300	100	300	-	-	3000
85	3	100	<1	5	0.4	5	250	100	1000	-	-	800
94	150	300	10	3	0.4	20	80	250	200	-	-	800

APPENDIX 7

PETROGRAPHIC AND ANALYTICAL DATA

ROCKS FROM LORINNA EAST GRID

106116

Date 25th November 1976

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 76/11/25 Date Received: 18.11.76Reference PA/TAS/MOINASample No. LOR1Nature of Sample: Hand specimen

DESCRIPTION SECTION No. 20232

a. Hand Specimen:

Dark, fine-grained siliceous rock. K stain test negative. Weakly magnetic.

() Microscopic:

This is a fairly extensively altered porphyritic "rhyolite"; the term is used in a broad sense because more precise classification is not possible, the feldspars having been altered.

The rock consists of small rounded, corroded and (thermally) fractured quartz phenocrysts, set in a devitrified, silicified felsitic groundmass which was originally glassy; relict perlitic texture is detectable. Feldspar phenocrysts were present but fairly insignificant; they are represented by pseudomorphs of sericite and fine magnetite.

Fine magnetite has pervaded the entire rock, penetrating microfractures in quartz phenocrysts, forming veinlets, stringers and minute euhedral crystals. Films of sericite also cut the rock. Both phases postdate the crystallisation of the rock, which may well be intrusive.

H.W. Fander, M.Sc.

IDENTIFICATION

LOR1

MAGNETITISED

PORPHYRITIC RHYOLITE

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 76/11/25 Date Received: 18.11.76
 Reference PA/TAS/MOINA
 Sample No. LOR2
 Nature of Sample: Hand specimen

DESCRIPTION SECTION No. 20233

a. Hand Specimen:

Brown, fine-grained ferruginous rock. Moderately magnetic.

Microscopic:

This rock is so severely altered that it is almost unrecognisable, and the interpretation is tentative. It differs from LOR1 but may well be a related volcanic/pyroclastic type. All the present minerals are secondary but some primary features have survived.

The overall impression is of a clastic fabric, and the rock may have been an acid tuff or tuff-lava, composed of crystal- and lithic fragments. Quartz pseudomorphs after feldspar crystals and laths are common, and patches representing lithic grains show relict perlitic textures, though now composed of medium-grained quartz, fine illite-sericite, and magnetite. Considerable portions of the rock now consist of microcrystalline quartz, irregular patches of ultrafine sericite and magnetite, intergrown in apparently haphazard fashion. Micaceous hematite is also present.

Occasional fine needles of tourmaline have developed, and there are irregular, poorly defined patches of monazite. Because of its poor definition and scarcity, it cannot be identified beyond doubt; there is a possibility of its being cassiterite, and an Sn assay would be desirable. The monazite is up to 240 μ in size but usually much finer.

The rock is interpreted as an acid tuff/tuff-lava, silicified, sericitised (argillised) and impregnated with magnetite.

H.W. Fander, M.Sc.

IDENTIFICATION
LOR2
SEVERELY ALTERED ?ACID TUFF/TUFF LAVA

QUALITATIVE SPECTROGRAPHIC ANALYSIS

Sample No.	Major	Minor	Heavy Trace (0.1—1%)	Trace (0.01—0.1%)	Faint Trace (0.001—0.01%)	Very Faint Trace (0.0001—0.001%)
PA/TAS/ LORINNA I	Al Si Fe	K	Ti Ba Mg	Ca Cr P Na V Rb Zr	W Co Ni Ga Cu Mn Y Pb Sr B	Mo Be Yb Bi Li Sn
<p>Purple Carbonat Magnetic 95 porphyritic highly alkali cleaved tu? [Checked for UV sheelite : nil]</p>						

Elements not sought: Hg U

Other elements not detected at limits quoted in attached sheet:

106118

SPECTROGRAPHIC ANALYSIS

Detection-Limit Concentrations of Elements
DC Arc Excitation

Element	%	ppm	Element	%	ppm
Ag	0.00001	0.1	Na	0.005	50
Al	0.02	200	Nb	0.02	20
As	0.005	50	Nd	0.03	300
Au	0.0003	3	Ni	0.0005	5
B	0.001	10	Os	0.001	10
Ba	0.005	50	P	0.01	100
Be	0.0001	1	Pb	0.0001	1
Bi	0.0001	1	Pd	0.001	10
Ca	0.002	20	Pr	0.01	100
Cd	0.003	3	Pt	0.001	10
Ce	0.03	300	Rb	0.001	10
Co	0.0005	5	Re	0.001	10
Cr	0.002	20	Rh	0.0002	2
Cs	0.003	30	Ru	0.0002	2
Cu	0.00005	0.5	Sb	0.003	30
Dy	0.01	100	Sc	0.005	50
Er	0.01	100	Si	0.02	200
Eu	0.005	50	Sm	0.03	300
Fe	0.005	50	Sn	0.0001	1
Ga	0.0001	1	Sr	0.001	10
Gd	0.03	300	Ta	0.01	100
Ge	0.0001	1	Tb	0.01	100
Hf	0.02	200	Te	0.002	20
Hg	0.01	100	Th	0.01	100
Ho	0.01	100	Ti	0.01	100
In	0.001	10	Tl	0.0001	1
Ir	0.0002	2	Tm	0.01	100
K	0.0005	5	U	0.1	1000
La	0.01	100	V	0.001	10
Li	0.0001	1	W	0.005	50
Lu	0.03	300	Y	0.001	10
Mg	0.01	100	Yb	0.005	50
Mn	0.001	10	Zn	0.002	20
Mo	0.0003	3	Zr	0.02	200

PROJECT LORINNA EAST GRID No. _____
 SUBJECT ANALYSES OF ROCK SAMPLES
 PREP. BY P. ASKINS DATE 1980 SHEET 1 OF 1

SAMPLE NO.	ANALYSES					ppm (Semi-quant. Spectro by Amdel)				
	Sn	W	Bi	Be	Ag	Mo	Cu	As	Y	Ge
RP/T/LORINNA EAST 300W/150N	1	<50	1	10	0.1	10	50	<50	60	<3

SAMPLE NO.	ANALYSES			ppm (AAS Amdel)	
	Cu	Pb	Zn		
RP/T/LN/R 225W/700N	12	<5	15		
200W/600N	25	8	230		
130W/625N	25	5	110		

Analyses of -80 mesh fraction by Comalco Labs, Melbourne
 by AAS.

SAMPLE NO.

SAMPLE NO. JHB/T/WL	ANALYSES, ppm.			
	Cu	Pb	Zn	Bi
00 / 00	55	35	105	20
00 / 50N	60	20	175	35
00 / 100N	65	40	150	50
00 / 150N	60	55	70	15
00 / 200N	15	30	10	40
00 / 250N	20	30	10	35
00 / 300N	55	50	40	30
00 / 50S	65	40	110	45
00 / 100S	65	35	105	15
00 / 150S	60	35	105	10
00 / 200S	60	20	105	15
00 / 250S	35	30	50	10
00 / 300S	55	30	105	10
00 / 350S	55	25	115	35

CYGNATREX LEAD-ZINC ANOMALIESMOLE CREEK AREA E.L.7/74General:

Exploration for 'Carlin' style gold mineralisation was carried out in the Mole Creek area (E.L.13/74) by Cygnatrex Pty. Ltd. (U.S. Steel) during 1974 and early 1975. Field work consisted of initial reconnaissance soil sampling along broadly spaced lines. Areas showing above background Pb or Zn values were then 'gridded' in more detail. In all 4 phases of exploration (and four different grids) were carried out. The final phase consisted of rock chip sampling along very narrow, shallow hand dug trenches.

The field work was carried out by Peter Ashton of Chudleigh (gridder and sampler) and the report (Tasmania Gold Project, Mole Creek Area, E.L.13/74, Final Report) was written by A.J. Cummings in April 1975. No further exploration was carried out and the E.L. was dropped and subsequently applied for by Comalco as an addition to E.L.7/74. Cummings report contains no Au analyses and it is not known if any were carried out.

Prior to Comalco visiting the area, a number of possible explanations for the Pb and Zn anomalies were put forward. The anomalies may have been caused by leakage from a skarn at depth, or may have been the top of a replacement Sn deposit (Cornwall deposits Pb, Zn rich at surface). Another source was 'Mississippi Valley' type cave filling mineralisation.

Visit to Area

During December, 1978 a visit was made to the area of the most significant Zn and Pb anomalies (see attached plan) guided by P. Ashton. The area was undulating and covered by fairly thick bush. 4 W.D. tracks allow vehicular access from the Mole Creek Road to within 2 km of the anomalies.

The rocks in the area consist of a thick sequence of Ordovician Gordon Limestone, which where traversed, consisted of impure to very muddy, often stylolitic limestones very similar to those at Moina. Sink holes are common. The zones anomalous for Pb

and Zn are parallel to the strike of the limestones (295° magnetic in the NE of the area and 270° magnetic in the S and W). The rocks in the immediate area of the anomalies are thinly bedded N dipping dark muddy limestone and calcareous shales. The peak values occur in the shale and immediately adjacent limestone which is cut by a number of calcite veins. The veining trends parallel to the strike.

Sampling and Results.

The peaks of the Pb and Zn anomalies were resampled (mostly rock samples) and analysed for Sn, W, Bi by XRF and Cu, Pb, Zn by AAS at Amdel, Adelaide. Sample descriptions and analyses are shown on the attached sheet. Samples are numbered using Cygnatrex grid locations. Samples C-R16, 17, 20 cover a 220 ppm Zn anomaly obtained from a shallow trench (see Cygnatrex plan 3, sheet 1). Samples C-R28, 29 cover a 190 ppm Pb anomaly in the same trench. Samples C-R51.5 and 53 were taken from another shallow trench (see Cygnatrex report plan 3, sheet 2) over a 120 ppm Pb high. Samples C 57, 58, 59, 60 are subsoil samples and C-R59, 60 are rock samples collected over high (100 ppm) Zn values.

Samples FR 348, 25mW, 25-50mW, 50-100mW were collected along an E-W Zn (1000 ppm) Pb (190 ppm) soil anomaly (see Cygnatrex report plan 1, sheet 1). Samples D-R 127, 128, 130, 135 and 176 were taken along the W extension of the same anomaly.

Conclusion.

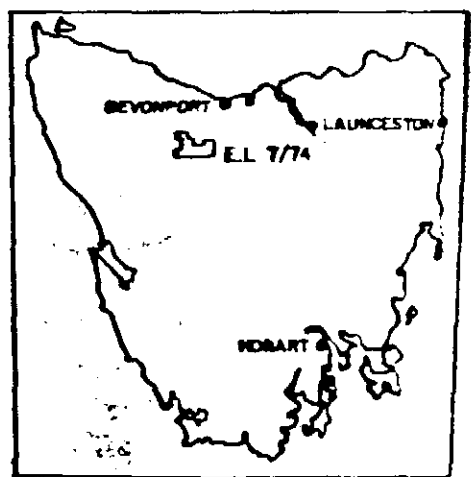
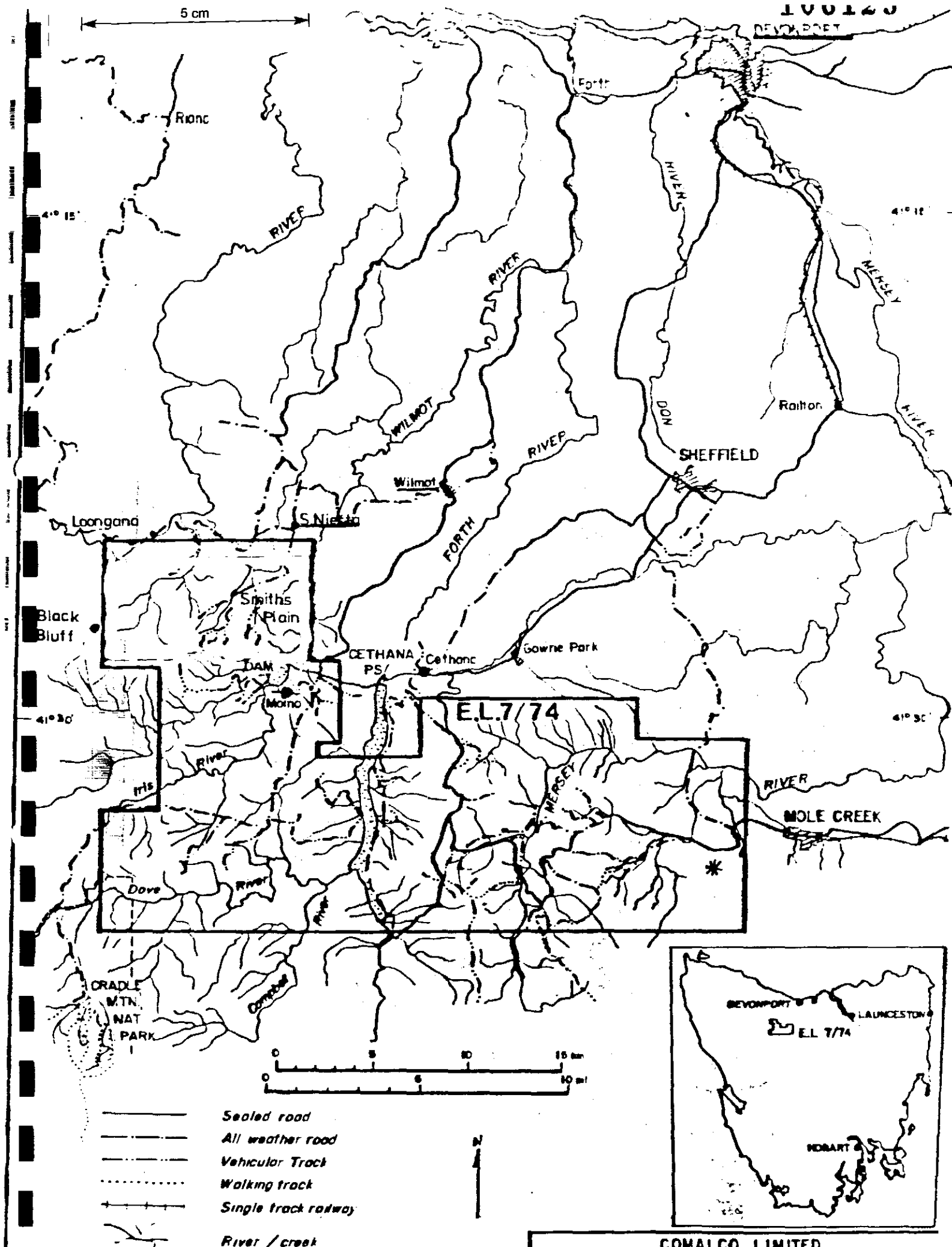
Anomaly peaks coincide with an area of calcite veined muddy limestone and calcareous shale. The maximum value (sample C-R59) occurs in calcite vein material containing minor limonite. There is no evidence to suggest skarn or other replacement mineralisation at depth.

A possible explanation is that pre existing (syngenetic?) Zn and Pb in the rocks was remobilised by minor heating and fracturing during emplacement of nearby Jurassic dolerite through the limestone.

The area does not warrant further exploration.

C. H. Webster
27/2/79

SAMPLE NO. G/T/MC	DESCRIPTION	Sn ppm	W ppm	Bi ppm	Cu ppm	Pb ppm	Zn ppm
C - R16	Coarse vein calcite with angular fragments of dark & pale grey limestone.	< 4	< 10	< 4	2	28	65
C - R17	Dark grey limestone with minor calcite veins	< 4	< 10	< 4	5	40	230
C - R20	Dark grey limestone with minor calcite veins.	< 4	< 10	< 4	2	28	100
C - R28	Coarse vein calcite with brecciated dark grey limestone.	< 4	< 10	< 4	8	12	15
C - R29	As 28 but with calcreous shale.	< 4	< 10	< 4	22	18	20
C - R51.5	Dark grey limestone with calcite vs.	< 4	< 10	< 4	2	12	15
C - R53	Dark grey limestone with calcite vs.	< 4	< 10	< 4	2	12	12
C - 57	C horizon soil sample.	6	< 10	< 4	15	170	640
C - 58	" " " "	< 4	< 10	< 4	15	370	890
C - 59	" " " "	< 4	10	< 4	18	470	1300
C - 60	" " " "	< 4	< 10	< 4	18	370	1200
C - R59	Calcite vein material with minor iron oxide & fragments of recryst. limestone.	< 4	< 10	< 4	2	15	70
C - R60	Dark grey limestone with few thin calcite veins.	< 4	< 10	< 4	2	18	50
F - R348	Thinly bedded limestone & mudstone with minor calcite veins.	< 4	< 10	< 4	2	15	15
- R348-25mW	" " " " " "	< 4	< 10	< 4	2	12	18
- R348-25-50mW	" " " " " "	< 4	< 10	< 4	8	12	15
- R348-10-100mW	" " " " " "	< 4	< 10	< 4	5	15	30
D - R127	Muddy limestone & shale, thinly bedded similar to F348 & on strike.	< 4	< 10	< 4	5	12	15
D - R128	" " " " " "	< 4	< 10	< 4	5	12	20
- R130	As 127 but more strongly calcite veined.	< 4	< 10	< 4	2	12	10
- R135	As 127.	< 4	< 10	< 4	5	22	42
D - R176	As 127.	< 4	< 10	< 4	22	25	22



COMALCO LIMITED
E.L. 7/74 MOINA, TASMANIA
LOCATION MAP

Comp. G. WASTE Revised Drawn G. HITCHCOCK

APPENDIX 10: Analyses of Rocks, Wilmot Tunnel.

106126

x = not detected at the limits quoted.

Results in ppm unless otherwise stated. Detection limits in brackets.

Semi-quant. Spectro. Amdel report 2463/78

Sample No.	Ba (200)	Be (1)	Ce (300)	Co (5)	Cr (20)	La (100)	Mn (10)	Mo (3)
PA/T/WT 1090	11X	11010	11010	11510	171010	151010	3101010	11510
1100	171010	1710	1151010	1110	131010	1101010	3101010	11510
1125	131010	115	151010	1310	131010	131010	1101010	11510
1150	181010	1115	11X	11X	131010	131010	1101010	113
1170	121010	1210	11X	11X	1101010	11510	1101010	115
1250	181010	1115	11X	11X	11510	11510	11010	11X

Sample No.	Cu (1)	Ga (1)	Ge (3)	In (10)	Pb (1)	Sb (30)	Sn (1)	Zn (20)
PA/T/WT 1090	11010	11310	11X	11X	121010	11X	11710	11010
Magnetites 1100	11510	11610	112	11X	11810	11X	1151010	1131010
Actinolite Rocks 1125	11510	11610	11X	11X	1131010	11X	1101010	1151010
1150	11510	11310	11X	11X	11510	11X	11210	1121010
Bracciated schist with anastomosing magnetite veins 1170	11710	11410	11X	11X	11510	11X	1121010	111010
Ditto, with py. 1250	11210	11310	11X	11X	11310	11X	11310	11310

Sample No.	W (50)	Y (10)	Yb (1)	Zr (10)	Ag (0.1)	As (50)	Bi (1)	Cd (3)
PA/T/WT 1090	11010	11810	1110	1101010	11X	11X	11X	11X
1100	11510	1131010	1110	1171010	11X	11X	113	11X
1125	11510	1151010	11310	112101010	11X	111010	112	11X
1150	11X	1101010	11310	112101010	11X	11X	113	11X
1170	11X	11710	11X	1151010	11X	11X	112	11X
1250	11X	11310	11X	1121010	11X	11X	11X	11X

Sample No.	Nb (20)	Ni (5)	Sc (3)	Sr (50)	Ta (100)	Th (100)	Ti (100)	V (10)
PA/T/WT 1090	11310	1131010	11310	1181010	1101010	11X	1110101010	1131010
1100	11210	1121010	11310	113101010	1121010	11X	1110101010	1121010
1125	11210	1131010	11310	111510	11X	11X	1110101010	1131010
1150	11510	11710	11310	1121010	11X	11X	1110101010	112510
1170	11210	11710	11215	111010	1101010	11X	1110101010	111010
1250	11210	11710	11210	1131010	11X	11X	118101010	111010

PROJECT MOINA No. _____
 SUBJECT ROCK ANALYSES, CLOSE TO DOLCOATH GRANITE
 PREP. BY P. ASKINS DATE 1980 SHEET 1 OF 1

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

REPORT AN 2463/78.Semi quant.
Spectrogr.

x = not detected at the limits quoted.

Results in ppm unless otherwise stated. Detection limits in brackets.

	Ba (200)	Be (1)	Ce (300)	Co (5)	Cr (20)	La (100)	Mn (10)	Mo (3)
PA/T/MOINA 8	X	3 0	X	3 0	2 0 0	X	0 0 0 0	X
9	8 0 0	0 0	X	7 0	2 0 0	X	5 0 0 0	1 0 0
	Cu (1)	Ga (1)	Ge (3)	In (10)	Pb (1)	Sb (30)	Sn (100)	Zn (20)
PA/T/MOINA 8	2 0 0	5	1	X	2 0 0	X	1 0 0	1 0 0 0
9	1 0 0	2 5	X	X	1 0 0	X	3 0	5 0 0
	W (50)	Y (10)	Yb (1)	Zr (10)	Ag (0.1)	As (50)	Bi (1)	Cd (3)
PA/T/MOINA 8	X	3 0	X	7 0 0	0 0 1	8 0 0	3	X
9	5 0 0	3 0	X	1 5 0	0 0 1	X	2	X
	Nb (20)	Ni (5)	Sc (3)	Sr (50)	Ta (100)	Th (100)	Ti (100)	V (10)
PA/T/MOINA 8	X	7 0	5	X	X	X	3 0 0 0	8 0
9	X	2 0 0	4 0	2 0 0	X	X	1 0 0 0 0	2 0 0

Sample descriptions:

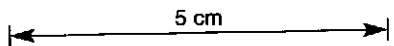
MOINA 8: Actinolite rich skarn. On Gunn's logging road at contact with Dolcoath Granite.

MOINA 9: Actinolite rich skarn. On Old Dolcoath Road in lease 6M/72. (Comalco grid ref: 3020E/060N)

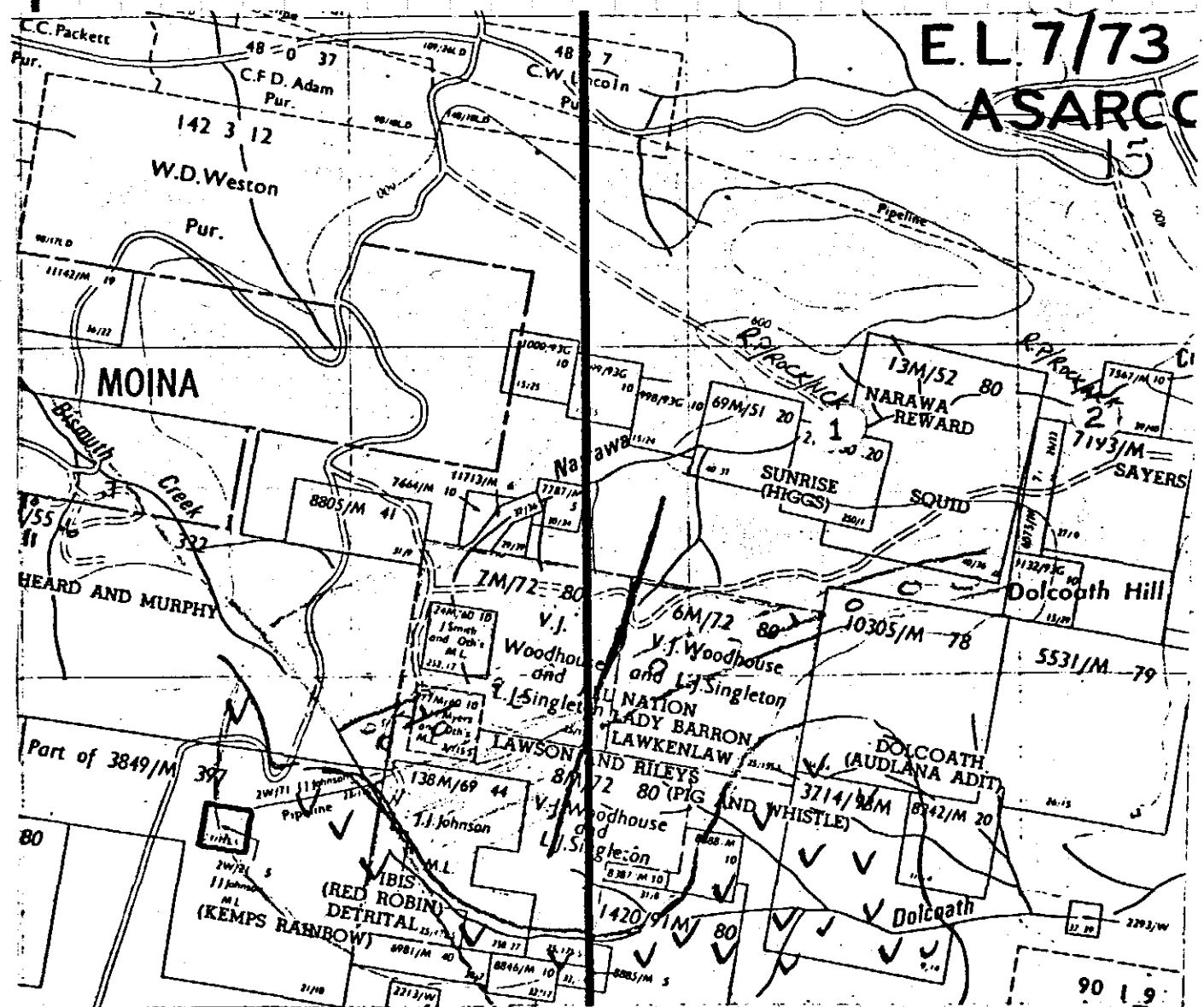
PROJECT MOINA No. _____
 SUBJECT NARRAWA CK ROCK SAMPLES
 PREP. BY P. ASKINS DATE 1980 SHEET 1 OF 1

ANALYSES OF TWO CALC-SILICATE ROCKS, INTERBEDDED IN MOINA SANDSTONE

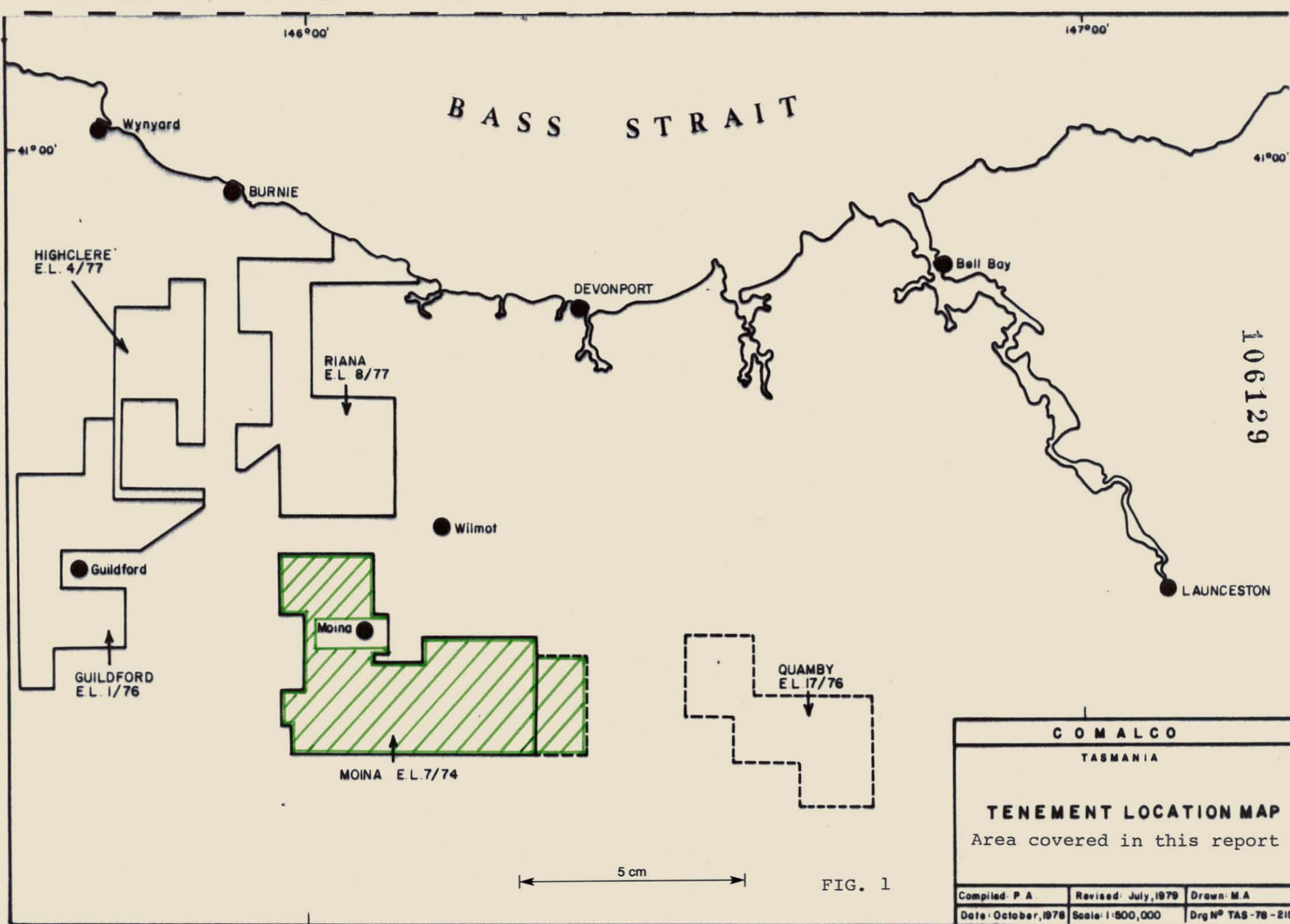
SAMPLE NO.	ANALYSES ppm										
	RP/7-1NCK/R	Au	Be	La	Sc	Ta	W	Y	Yb	Bi	Sn
	Amdel MAS	Amdel	Semi-Quant.	Spectrographic							
01	<0.05	20	200	5	<100	<50	30	<1	20	700	1
02	0.2	200	500	5	<100	<50	70	<1	30	800	1



PART OF 1:20,000 map showing location of samples:-



TABLETS



106129

COMALCO		
TASMANIA		
TENEMENT LOCATION MAP		
Area covered in this report		
Compiled: P.A.	Revised: July, 1979	Drawn: M.A.
Date: October, 1978	Scale: 1:500,000	Drg N ^o TAS-78-21E

FIG. 1

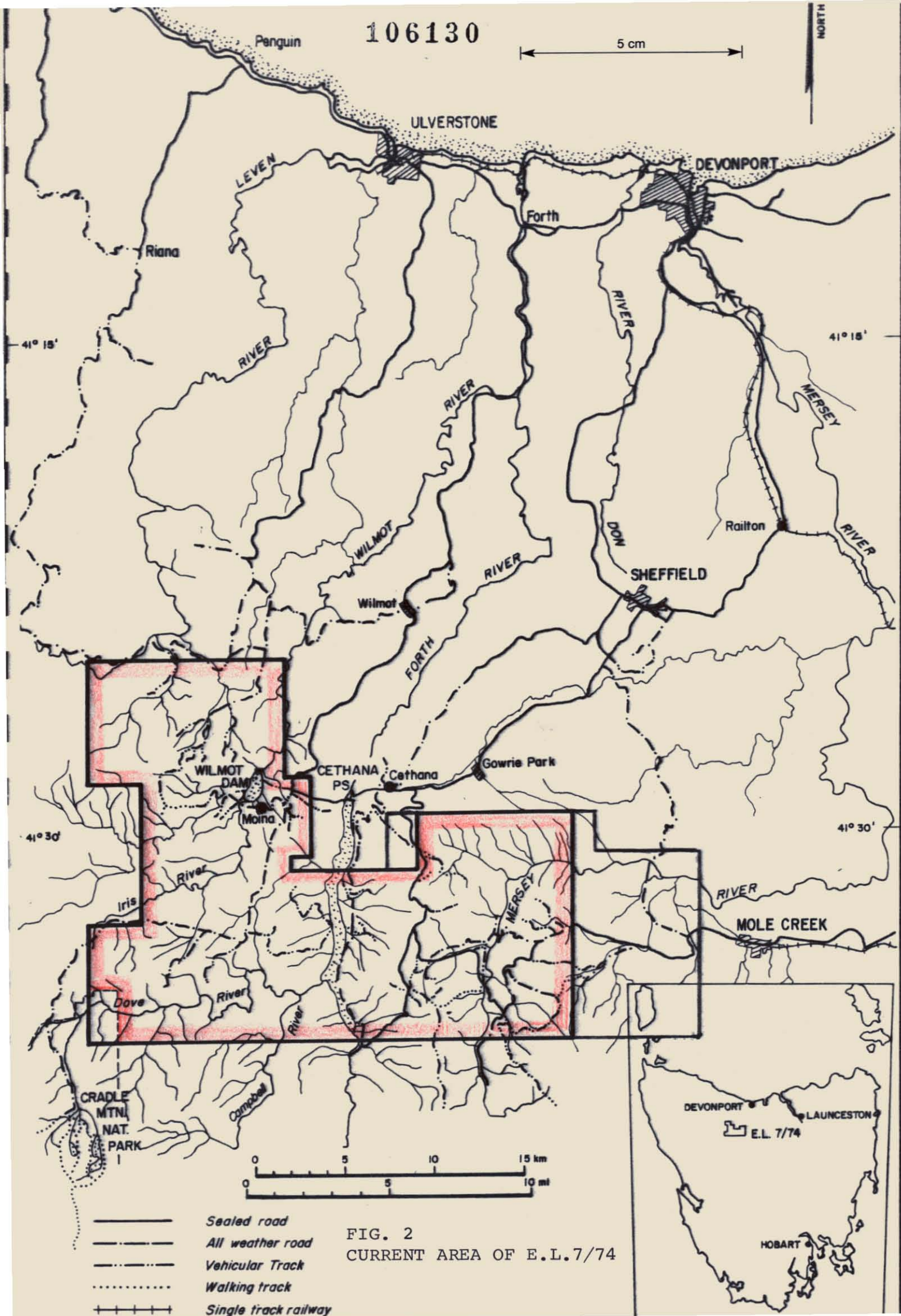
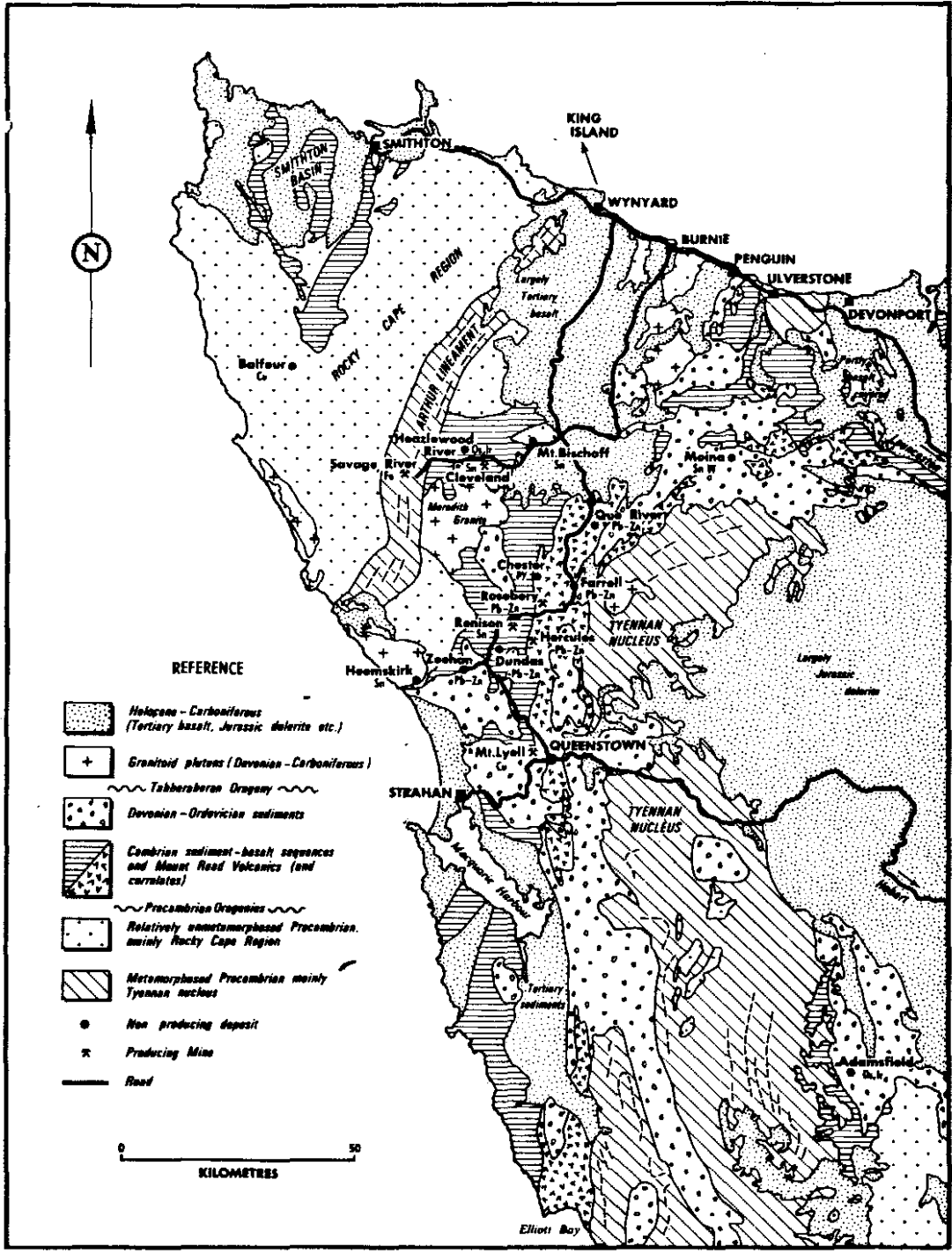
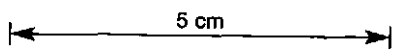


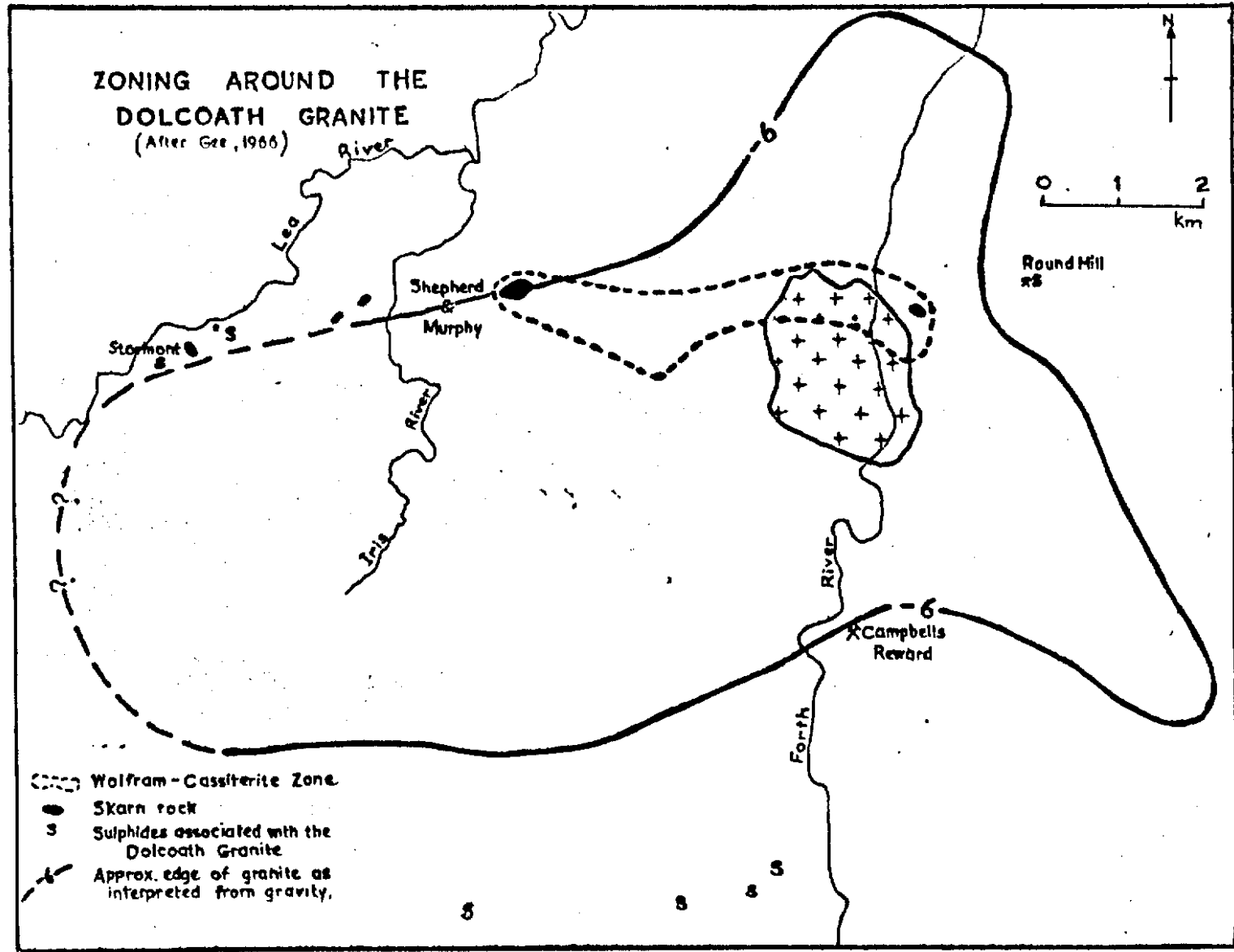
FIG. 2
CURRENT AREA OF E.L. 7/74



Locality and rock distribution map of western Tasmania (drawn from Figure 1, Williams et al., 1976).

FIG. 5





- (---) Wolfram-Cassiterite Zone.
- Skarn rock
- 3 Sulphides associated with the Dolcoath Granite
- - - Approx. edge of granite as interpreted from gravity.

from Sheehan (1969)

SUBSURFACE EXTENT OF THE DOLCOATH GRANITE

FIG. 6

5 cm

106132

106133

PART OF
REGIONAL BOUGUER MAP, TASMANIA
1:500,000

0 1 2 km

FIG. 7

DEVONPORT

5 cm

N

10

130
120

10

15

15

-15

-20

-25

-30

-35

40
DOLFOATH
GRANITE

LARGE GRANITE BATHOLITH

-50

-45

-40

-35

-30

-25

-25

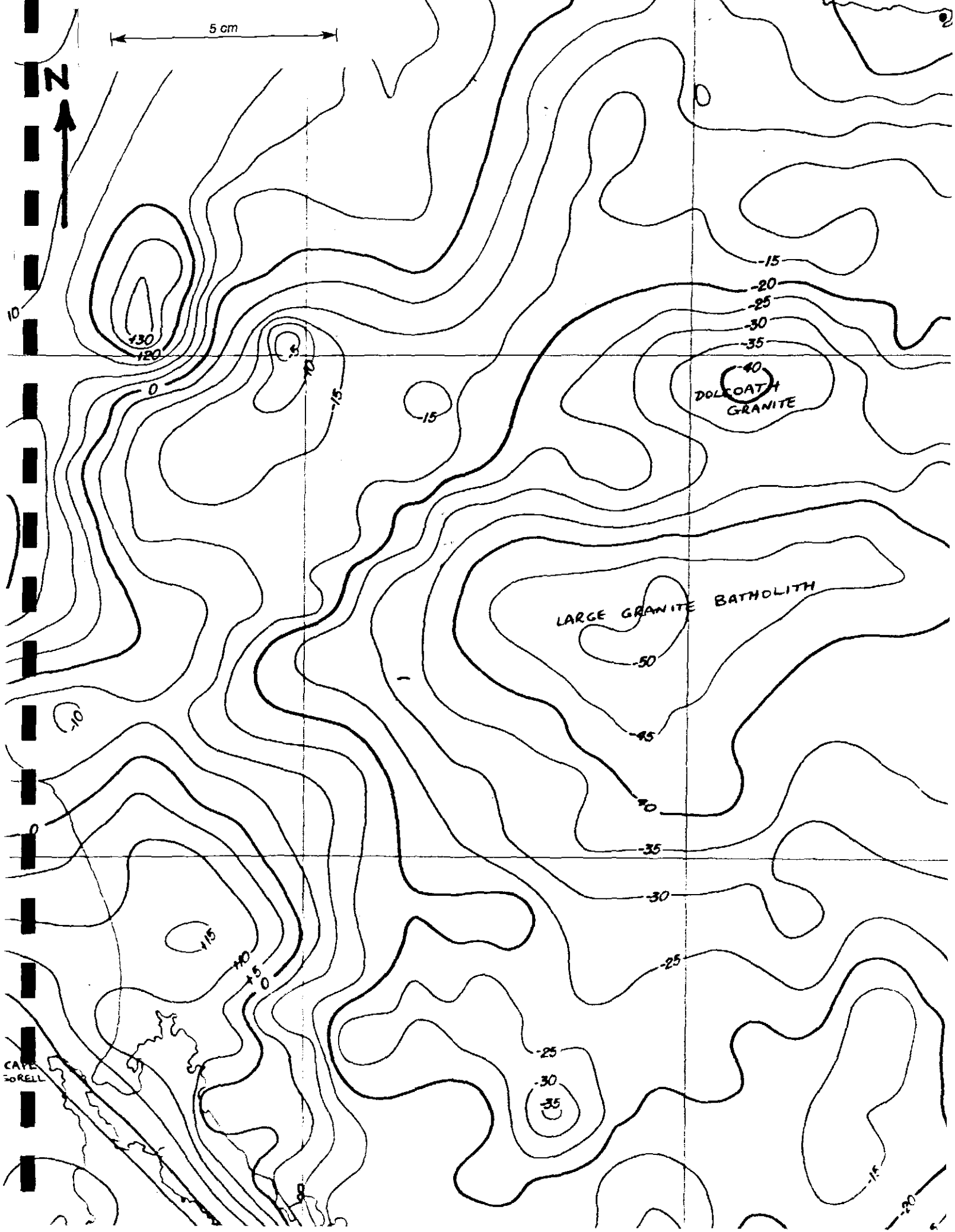
-30

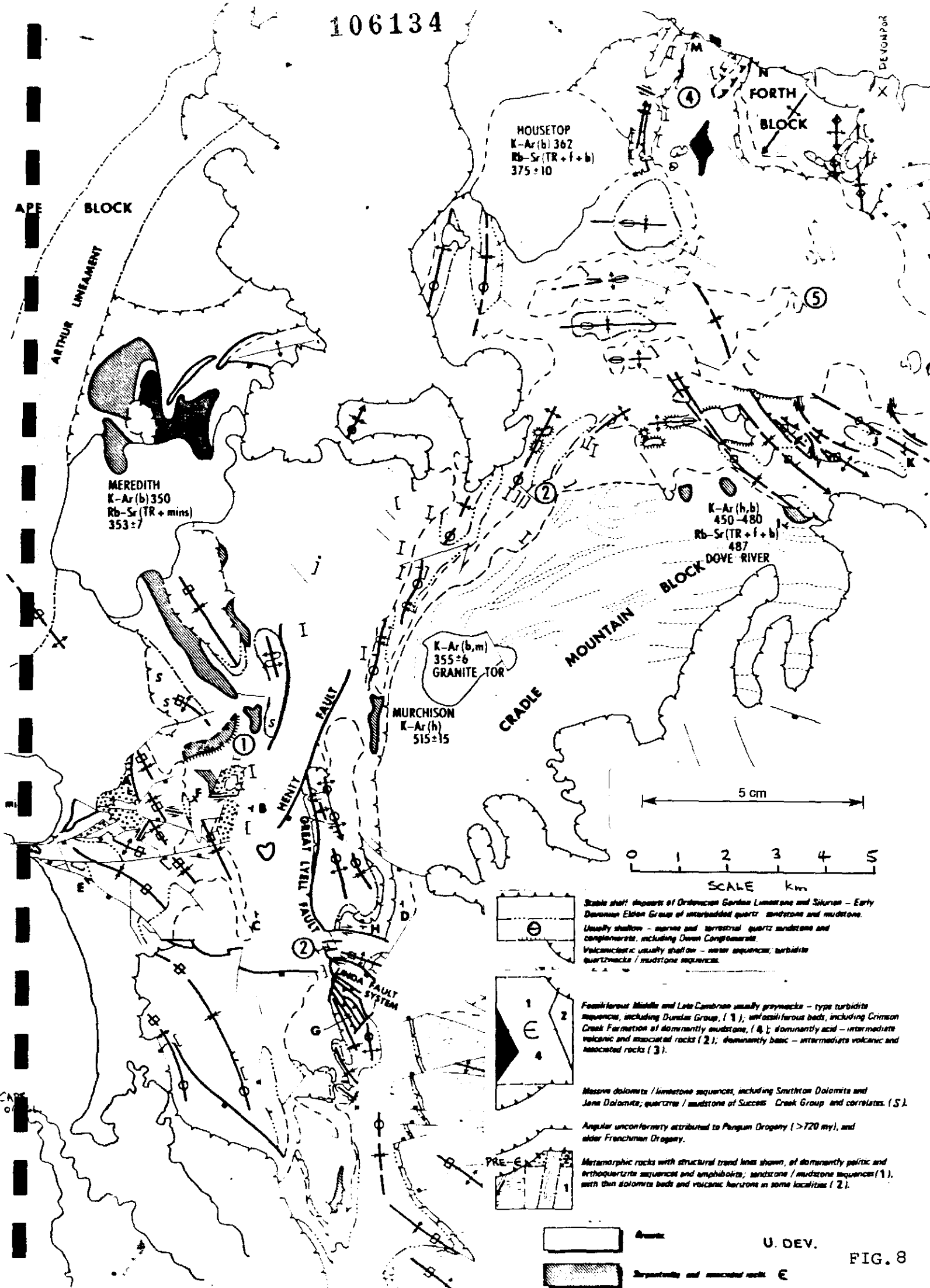
-35

-15

-20

CAPE
MORELL





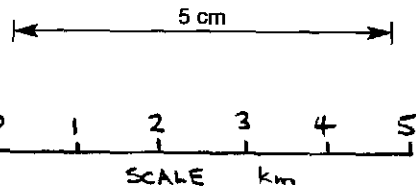
HOusetop
K-Ar (b) 362
Rb-Sr (TR + f + b)
375 ± 10

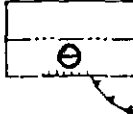
MEREDITH
K-Ar (b) 350
Rb-Sr (TR + mins)
353 ± 7


K-Ar (b,m)
355 ± 6
GRANITE TOR

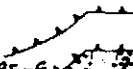
MURCHISON
K-Ar (h)
515 ± 15

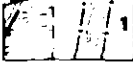
K-Ar (h,b)
450-480
Rb-Sr (TR + f + b)
487
DOVE RIVER




- 

Stable shelf deposits of Ordovician Gordale Limestone and Silurian - Early Devonian Eldon Group of interbedded quartz sandstones and mudstones. Usually shallow - marine and terrestrial quartz sandstones and conglomerates, including Owen Conglomerate. Volcanoclastic usually shallow - water sequences; turbidite quartzites / mudstone sequences.
- 

Fossiliferous Middle and Late Cambrian usually graywackes - type turbidite sequences, including Dundas Group, (1); unfossiliferous beds, including Crimmon Creek Formation of dominantly mudstone, (4); dominantly acid - intermediate volcanic and associated rocks (2); dominantly basic - intermediate volcanic and associated rocks (3).
- 

Massive dolomite / limestone sequences, including Smeethon Dolomite and Jane Dolomite; quartzite / mudstone of Success Creek Group and correlates. (5).
- 

Angular unconformity attributed to Purgun Orogeny (>720 my), and older Franchman Orogeny.
- 

Metamorphic rocks with structural trend lines shown, of dominantly pelitic and orthoquartzite sequences and amphibolites; sandstone / mudstone sequences (1), with thin dolomite beds and volcanic horizons in some localities (2).



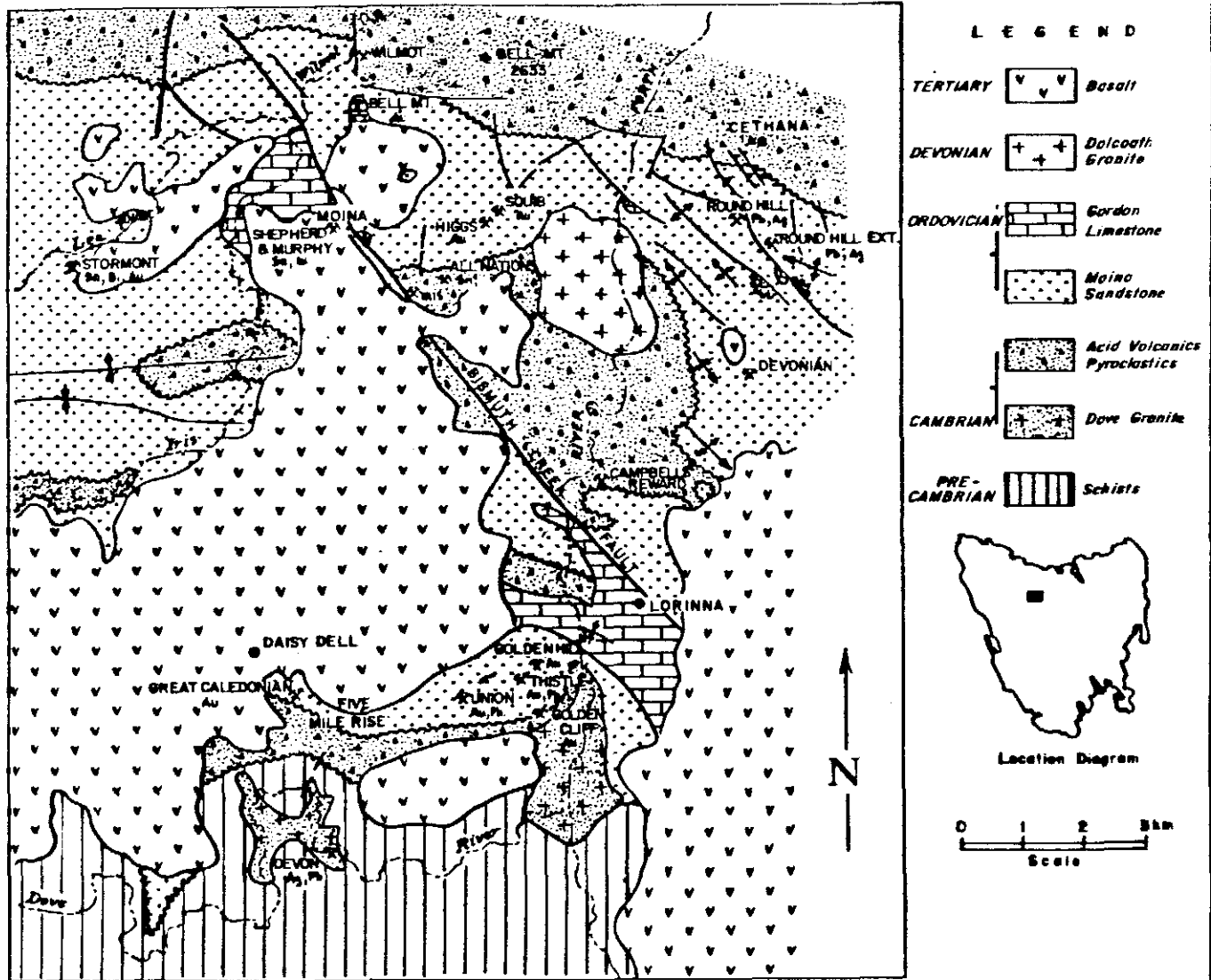
 Quartz
 Serpentinized and associated rocks
 U. DEV.
 E

FIG. 8



REGIONAL GEOLOGICAL MAP (After Jennings, 1965)

5 cm

FIG. 9

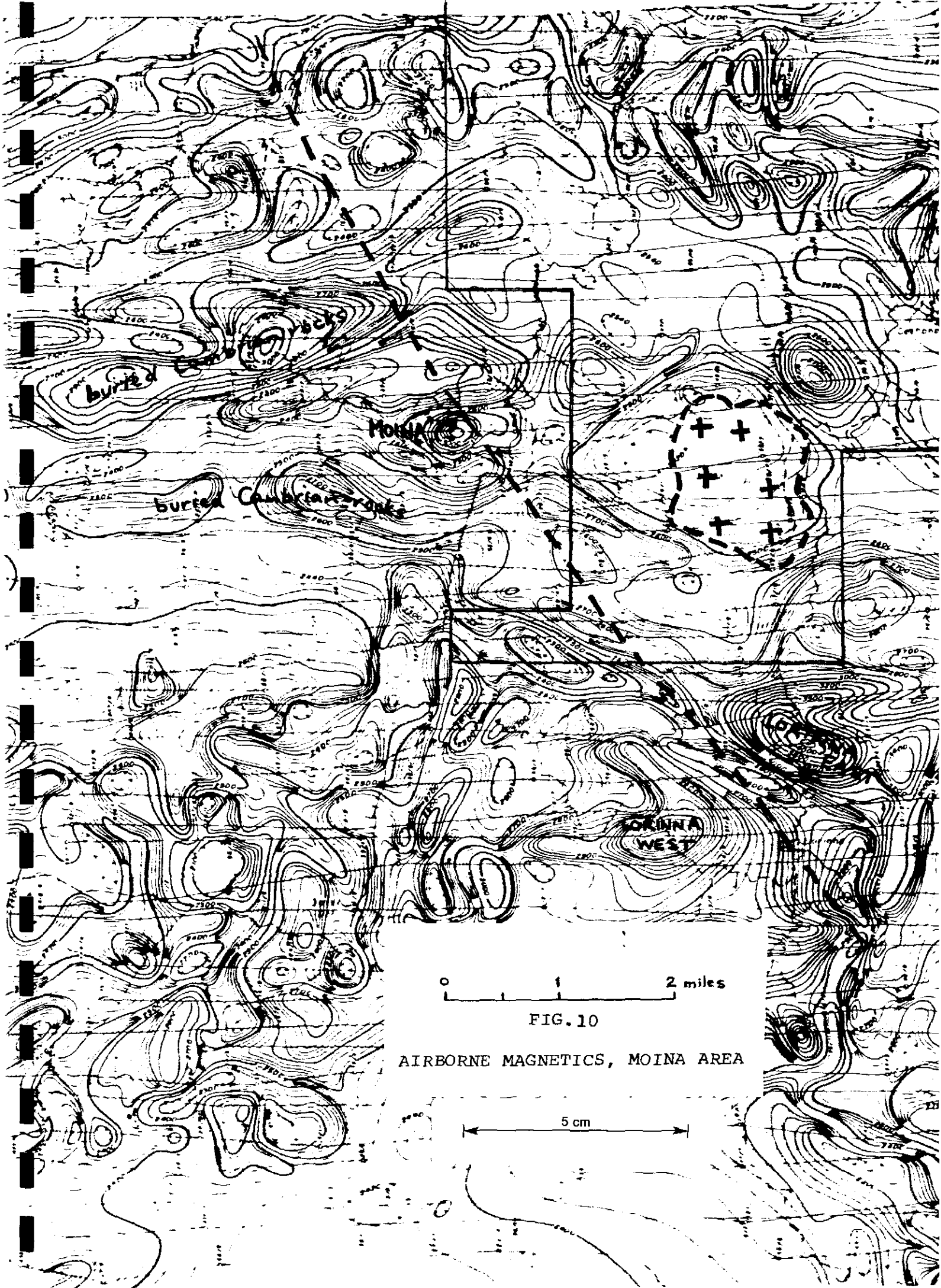


FIG. 10
AIRBORNE MAGNETICS, MOINA AREA

0 1 2 miles

5 cm

MINERAL DEPOSITS SURROUNDING THE DOLCOATH GRANITE, MIDDLESEX DISTRICT, TASMANIA

(Modified from data collected by Consol. Gold Fields (Aust.) Ltd.)

<u>MINES</u>	<u>MINERAL</u>	<u>LOCATION</u>	<u>PRODUCTION</u> (if any)	<u>HOST ROCKS</u>	<u>TYPE OF DEPOSIT</u>	<u>MINERALOGY</u>	<u>WORKINGS</u>	<u>REMARKS</u>
SHEPHERD AND MURPHY MINE	TIN	On Bismuth Ck. the settlement of Moina is centred on this deposit.	Approx 846 tons of tin conc. till late in 1956 when the mine closed down.	Moina ss or wriggilite overlying Moina ss in the contact aureole of the Dolcoath granite	Six roughly parallel quartz veins averaging 28 - 50 cm in width and up to 400 m long dipping south at 85°.	Cassiterite, wolframite bismuthinite and minor amounts of sulphides e.g.	The lodes have been worked to a depth of 100 m from 3 adits and to a further depth of 45 m in two levels from a shaft.	Ore reserves at the time the mine closed were estimated by Robinson (1957) as 42,400 tons of probable ore and 44,600 tons of possible ore. Average Grade: 0.28% Sn and 0.54% WO ₃ (approx. only.)
ALL NATIONS MINE	TUNGSTEN	Approx 1.5 km south-east of the Shepherd & Murphy Mine		Indurated quartzite and shale of the Moina ss.	2 or 3 veins up to 60 cm wide. Strike 290° & dip 60°-80° south. The veins have been cut by a low angle thrust fault which limits the ore bodies at depth and probably repeats the veins in the mine workings.	Wolframite with small amounts of cassiterite, bismuthinite, pyrite & gold (18 ppm)	Workings are over a maximum distance of 450 m.	
LAWSON & RILEY'S MINE	TUNGSTEN	1 km east of All Nations Mine		"Quartz Porphyry"	Narrow quartz veins 7 - 25 cm.	Wolfram with minor amounts of cassiterite and bismuthinite with sulphides.	Tunnels and trenches	
SQUIB MINE	TUNGSTEN	About 2 km N.E. of Moina		Sandstone quartzite and granite (in part greisenized).	Quartz veins; strike N40° - 50° S.W. Up to 20 cm wide.	Wolfram with minor amounts of cassiterite scheelite, molybdenite, bismuthinite, gold and sulphides.		
IRIS MINE	TIN- TUNGSTEN	On the South western slopes of Dolcoath Hill & along the headwaters of Bismuth Ck.	200 tons of tin-Wolfram concentrates.		Alluvial	Wolframite cassiterite and bismuthinite.		
TIN SPUR AREA	TIN	East of Forth River in the vicinity of Tin Spur.			Quartz veins along joint planes or as fine grained disseminations.			These are small prospects which have been worked from time to time and are notable for the absence of tungsten and bismuth minerals.

PRINCESS TUNGSTEN
MINE

3 km N.E. of
Moina.

Fine-grained bio-
tite granite with
pegmatitic and
aplitic dykes
which contain
mineral veins.

Narrow quartz
veins

Wolfram and
bismuthinite,
molybdenite
chalcopyrite

Open cut,
trenches
and tunnel

ROUND SILVER -
HILL LEAD
MINE

On Claude Ck.
about 6 km
east of Moina

Incomplete figures
1908-1927. Lead -
4,700 tons; Gold -
1,500 ozs. Silver -
370,000 ozs. Since
1948 approx. 20
tons of lead have
been produced con-
taining minor gold
and silver.

Quartzite and
shale of the
Moina ss.

Saddle-like ore
bodies in the apex
of a small fold.
The ore bodies were
7.5 m wide and 6 m
deep measured at
right angles to the
pitch of the fold.

Galena with some
chalcopyrite and
minor amounts of
pyrite sphalerite
and bismuthinite.

Open cut, shafts
and tunnel.

The average ore carr-
ied 1.5 oz. Ag per
cent of Pb.

ROUND SILVER -
HILL LEAD
EXTENDED

Just south of
the Round Hill
Mine.

Quartzite and
shale of the
Moina ss.

Narrow veins gener-
ally only a few cm
wide

Galena and sphal-
erite with minor
amounts of pyrite
and chalcopyrite.

The average ore carr-
ied 1 oz. Ag per
cent of Pb.

WILMOT SILVER -
MINE LEAD

On the East
bank of Wilmot
R. about 1.5 km
north of Bell
Mount.

None recorded.

Tubicolar Moina
sandstone

Narrow veins occur-
ing along the crest
of an anticline.

Galena, chalco-
pyrite, pyrite
and quartz.

Several adits.

THISTLE SILVER -
MINE LEAD

1 km S.W. of
Lorinna

Tubicolar Moina
sandstone

3 small veins fill-
ing fractures in
the ss. width up to
30 cm.

Galena, sphal-
erite, arseno-
pyrite, pyrite
and a little
chalcopyrite.

Tunnels, adits
and a number of
trenches and
shallow shafts.

Small quantities of
silver and lead were
extracted from this
mine and the nearby
similar Golden Hill
Mine following ex-
haustion of the sur-
face enriched gold
bearing gossan in the
upper workings. The
average ore carried
1/2 oz. Ag per cent
of Pb and 2 dwt gold
per ton.

DEVON SILVER -
MINE LEAD

About 1.5 km
south of the
Five Mile Rise

More than 400
tons of high
grade ore.

Granite porphyry

A number of lodas
from a few cm to
1m in width and
erratic along the
strike.

Mainly galena,
with chalco-
pyrite, sphal-
erite in a
siderite-quartz
gangue. Limited
development of
secondary min-
erals.

3 main inter-
connected adit
levels.

Ore shoots stoped
out down to No.2
Level at least, and
probably down to
No.3 Level.

SILVER SILVER -
DOVE LEAD
MINE

1.5 km down-
stream from
Devon Mine.

Not known

Precambrian
quartz schists.

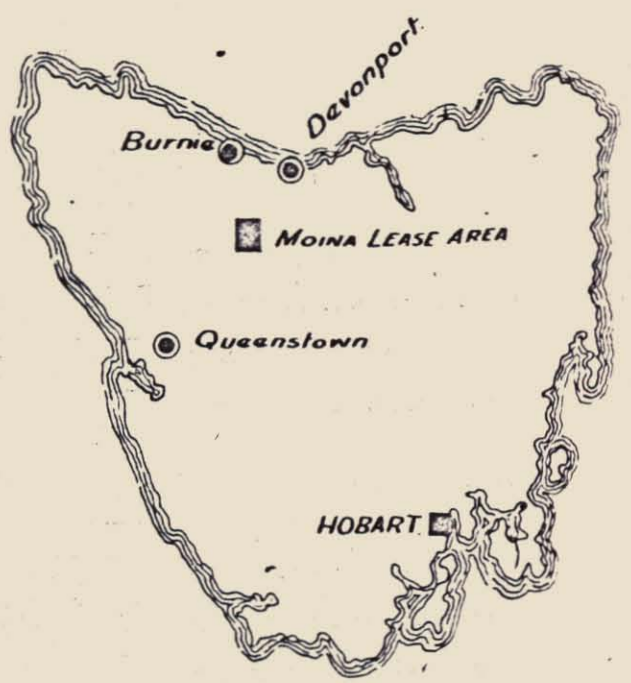
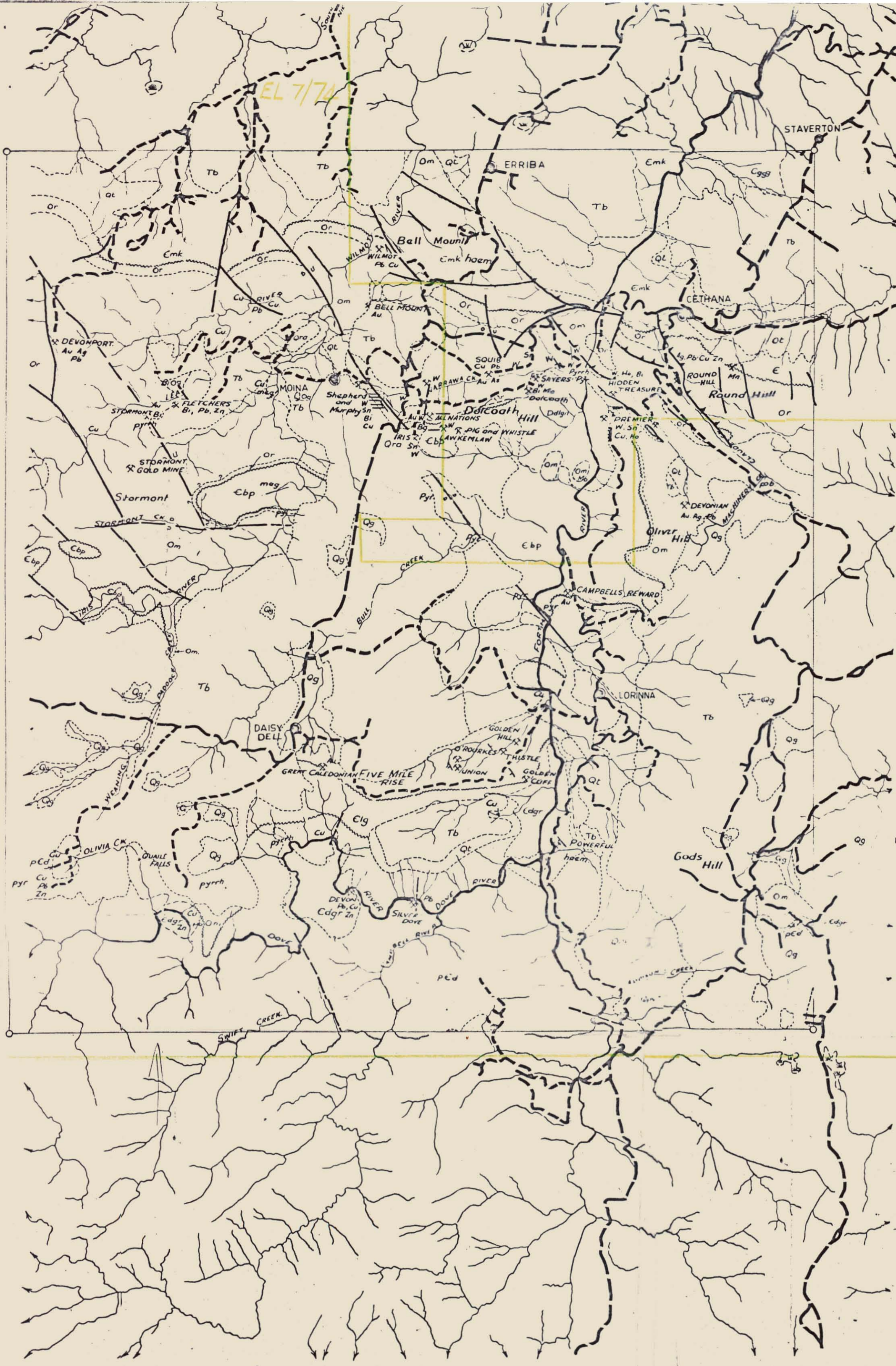
Vein 7 cm wide

Pyromorphite

Tunnel 50 m
long.

106138

BELL MOUNT	GOLD	1.5 km N.W. of Moina	Total production is estimated at 4,000 ozs.	Gold is believed to have come from quartz reefs in nearby Moina ss.			Numerous diggings	
NARRAWA CK. GOLD MINE	GOLD	On the southern bank of Narrawa Ck. 3 km east of Moina.	1000 ozs of gold	Moina ss	3 lodes, up to 3 m wide and 15 m long. The ore occurs in an extensively crushed zone, between well marked shears.	Mainly pyrite with amounts of galena, arsenopyrite and chalcopyrite. Free gold is very rare and the gold is apparently contained in the pyrite.	2 interconnected adits levels.	Gold values decrease with depth and it appears unlikely that any worthwhile deposits occur in the area.
A NUMBER OF SMALL MINES including: GOLDEN CLIFF GOLDEN HILL GLYNN GREAT CALEDONIAN & POWERFUL MINES	GOLD	On the Five Mile Rise.		Moina ss	Gold occurs at the surface in small gossanous quartz reefs.	Gold, Pyrite sphalerite and galena	Shafts and adits	The gold deposits were only superficial and gave way to mixed sulphide ores at shallow depths.
POWERFUL MINE	GOLD	East side of Forth River near confluence with Dove R.	Not known	Dove Granite	Lode strikes 320 Dip variable, Width variable 25 - 60 m (Jennings 1963)	Quartz and speccularite lode worked for gold.	Audit on road level and numerous diggings	Recent samples from lode do not show any values of gold, silver copper, wolfram, tin or bismuth (Jennings '63)
CAMPBELLS REWARD MINE	GOLD	East bank of Forth River 1.5 km N of Lorinna	Not known	Bull Creek Volcanics	Width of vein variable up to 40 cm	Gold in quartzfeldspar vein.	Adit over 70 m long.	Mine appears to be worked out.
UNION MINE	GOLD	Five Mile Rise	Not known	Moina Sandstone and porphyritic "Lorinna Greywacke"	Lode 45 - 50 cm wide in adit.	Mainly quartz and pyrite with galena sphalerite and minor gold.	1 shaft to 32 m and adit at least 80m. 2 underlay shafts 7-9m.	A thin quartz-haematite lode was encountered in the porphyry.
DEVONPORT MINE	GOLD	on Devonport Ck. near Black Bluff.	Not known	Moina Sandstone	Quartz and gossanous lodes up to 12 cm wide.	Minor gold, pyrite micaceous haematite and chalcopyrite.	Tunnel	Mineralisation largely controlled by shear zone associated with a fault.
FERRO-MANGANESE DEPOSIT		Olivers Hill		Moina Sandstone	Gossanous capping	Associated with ferro-manganese gossan is minor galena of erratic grade.	Trenches	Average grade may be as much as 2.7% Pb.
DEVONIAN MINE	GOLD	Olivers Hill		Moina Sandstone	Quartz veins up to 23 cm wide associated with a fault zone.	Minor gold, silver and lead	Shaft & trenches	



LEGEND

CAINOZOIC	QUATERNARY	Qra	RECENT Alluvium
		Qd	Basalt talus and landslide debris
		Qt	Quartzite and conglomerate talus
		Qg	Marsh deposits and residual gravels
TERTIARY	T	Ts	Pleistocene Varved clays
		Ts	Sands clays and conglomerate
PALAEOZOIC	ORDOVICIAN	Og	Skarn (Metamorphosed limestone)
		Og	Gordon Limestone
		Om	Moina Sandstone including Caroline Ck. Beds
		Or	Roland Conglomerate
CAMBRIAN	E	Ebp	Bull Creek Formation
		Elg	Lorinna Greywacke
		Emk	Minnow Keratophyre
PRECAMBRIAN	pCd	pCd	Dove group
IGNEOUS ROCKS			
TERTIARY	T	Tb	Basalt
	D	Ddgr	Dolcoath granite
DEVONIAN	E	Edgr	Dove granite
CAMBRIAN	E	Es	Serpentinite
Established boundary — position approximate			
Inferred probable or indefinite boundary			
Unconformity			
Thrust fault (teeth on upper plate)			
Wrench Fault			
Fault with direction of movement			
Mine or prospect			
Principal roads			
Vehicular tracks			
River or creek			
Swamp or marsh			
Anticlinal Axis			
Synclinal Axis			
Anticlinal Axis (position approximate)			
Synclinal Axis (position approximate)			

106140 FIG. 3
REGIONAL GEOLOGY MAP OF E.L. 8/65 80-1416

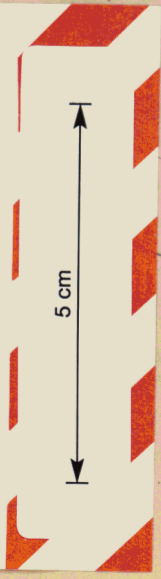


52.17 NOTE: MODIFIED AFTER JEN
 1 INCH = 1 MILE



80-1416
COMALCO LIMITED
106141
GPO BOX 2773Y MELBOURNE 3001

FIG. 4 : AIRBORNE MAGNETICS
1 inch = 1 mile
(from survey for BHP
& Mt. Lyell, by AMEG
1966).



390000 yE

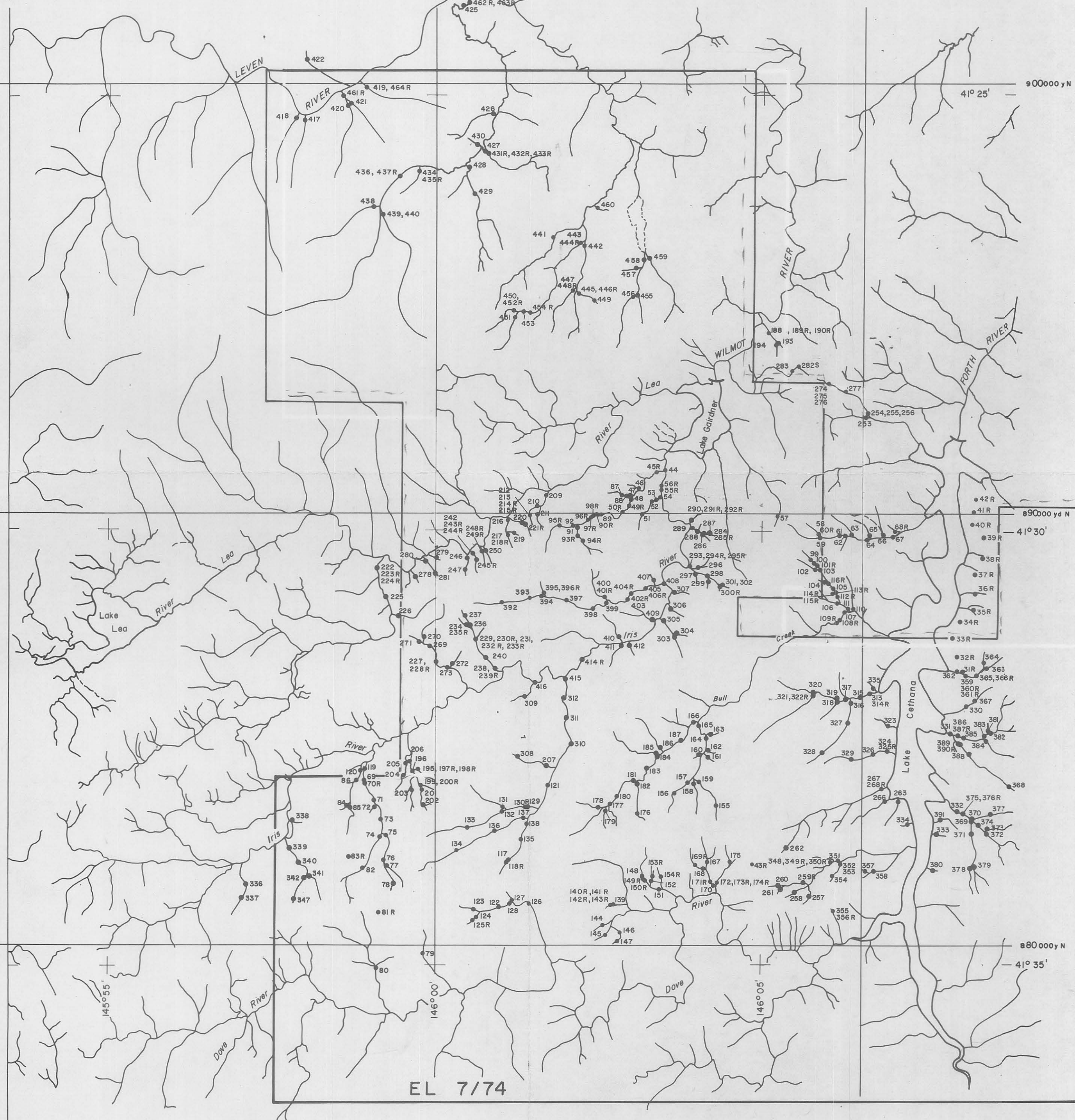
400000 yE

410000 yE

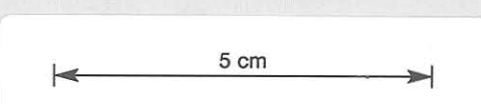
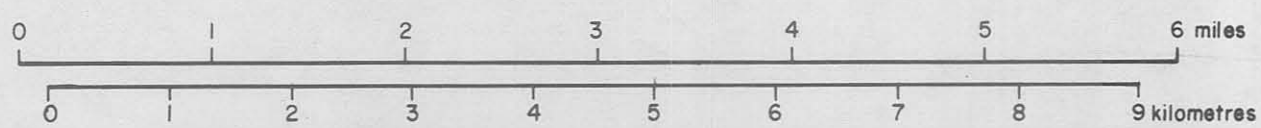
900000 yN

890000 yd N

880000 yN

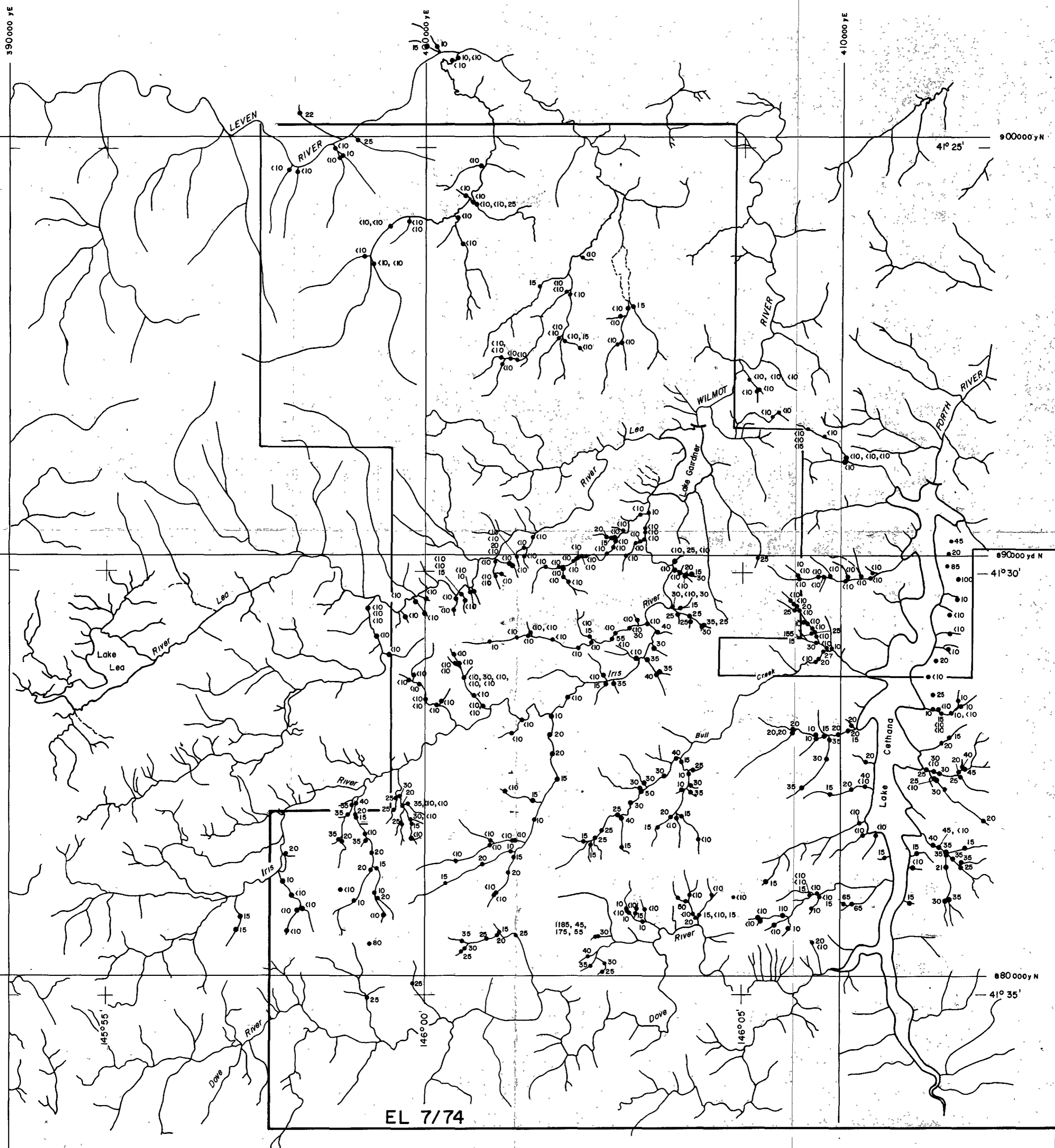


EL 7/74

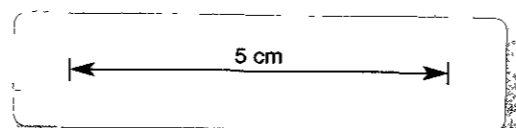
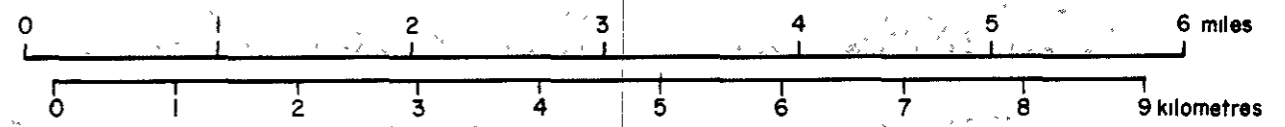


COMALCO LIMITED		80-1416
106142		EL 7/74 MOINA, TASMANIA
GEOCHEMICAL SURVEY - SAMPLE LOCATIONS		
Compiled: S. Hutchison	Revised:	Drawn: S. Hutchison
Date: September, 1975	Scale: 1" = 1 mile	Drg. No. Tas / M / 75 / 24 A

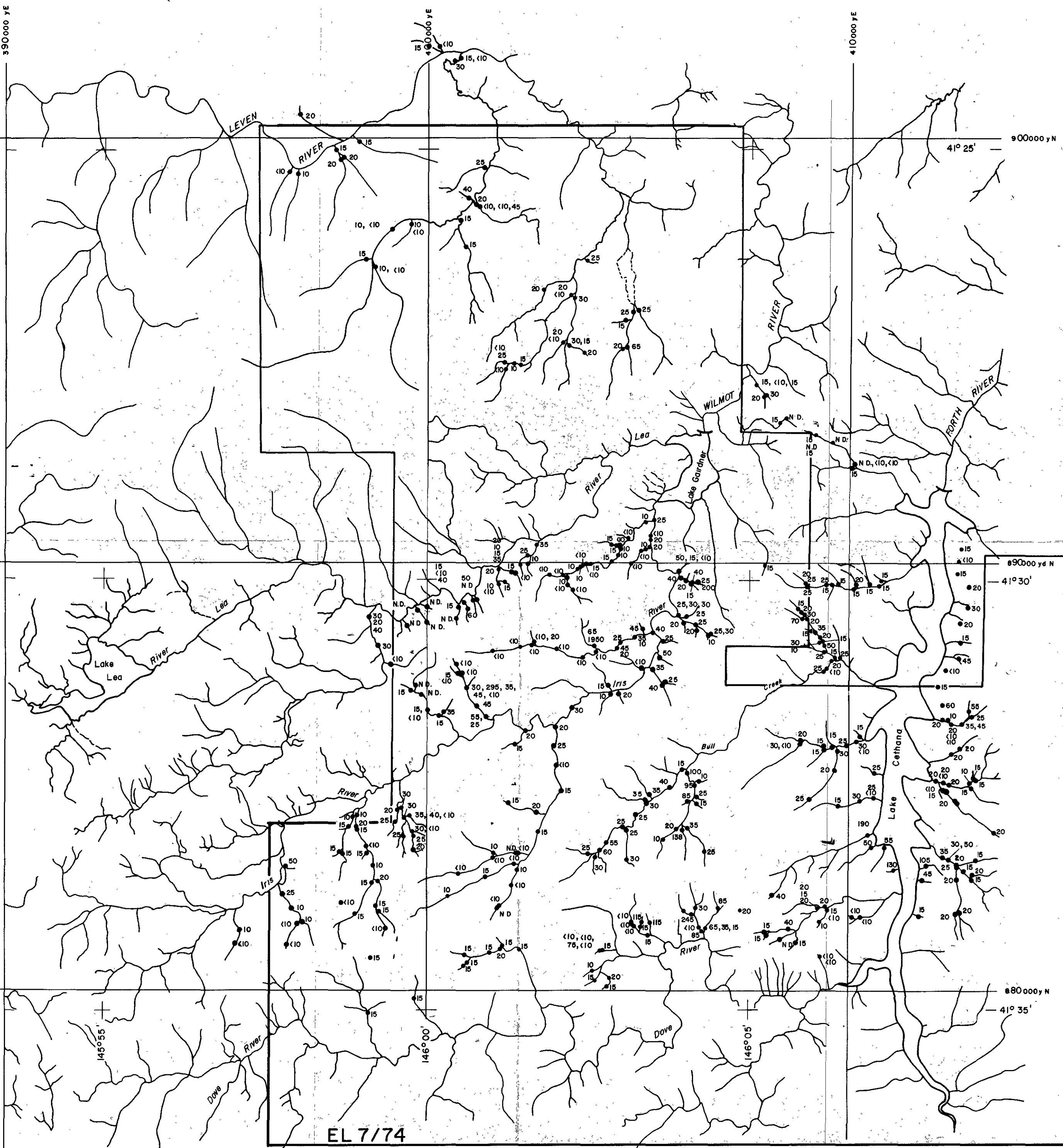
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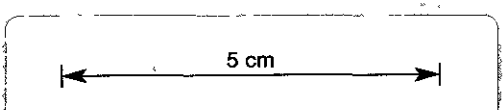
EL 7/74



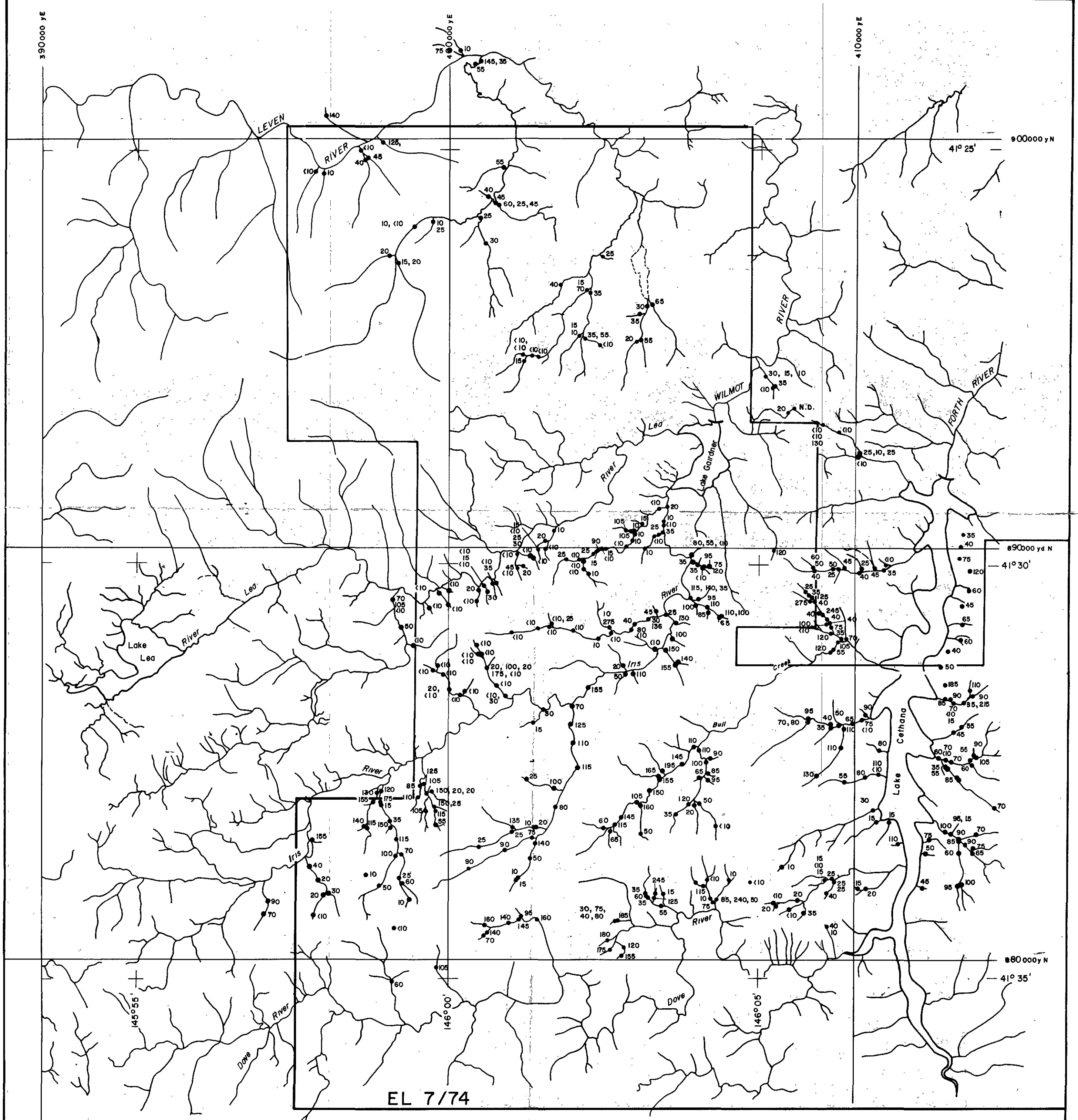
106143 COMALCO LIMITED		80-1416
EL 7/74 MOINA, TASMANIA		
GEOCHEMICAL SURVEY - COPPER VALUES PPM		
5250		
Compiled: S. Hutchison	Revised	Drawn: S. Hutchison
Date: September, 1975	Scale: 1" = 1 mile	Drng. No. Tas / M / 75 / 24 B



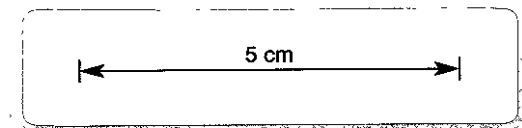
EL 7/74



106144 COMALCO LIMITED		SO-1416
EL 7/74 MOINA, TASMANIA		
GEOCHEMICAL SURVEY - LEAD VALUES PPM		5251
Compiled: S. Hutchison	Revised:	Drawn: S. Hutchison
Date: September, 1975	Scale: 1" = 1 mile	Drg. No. Tas / M / 75 / 24 C



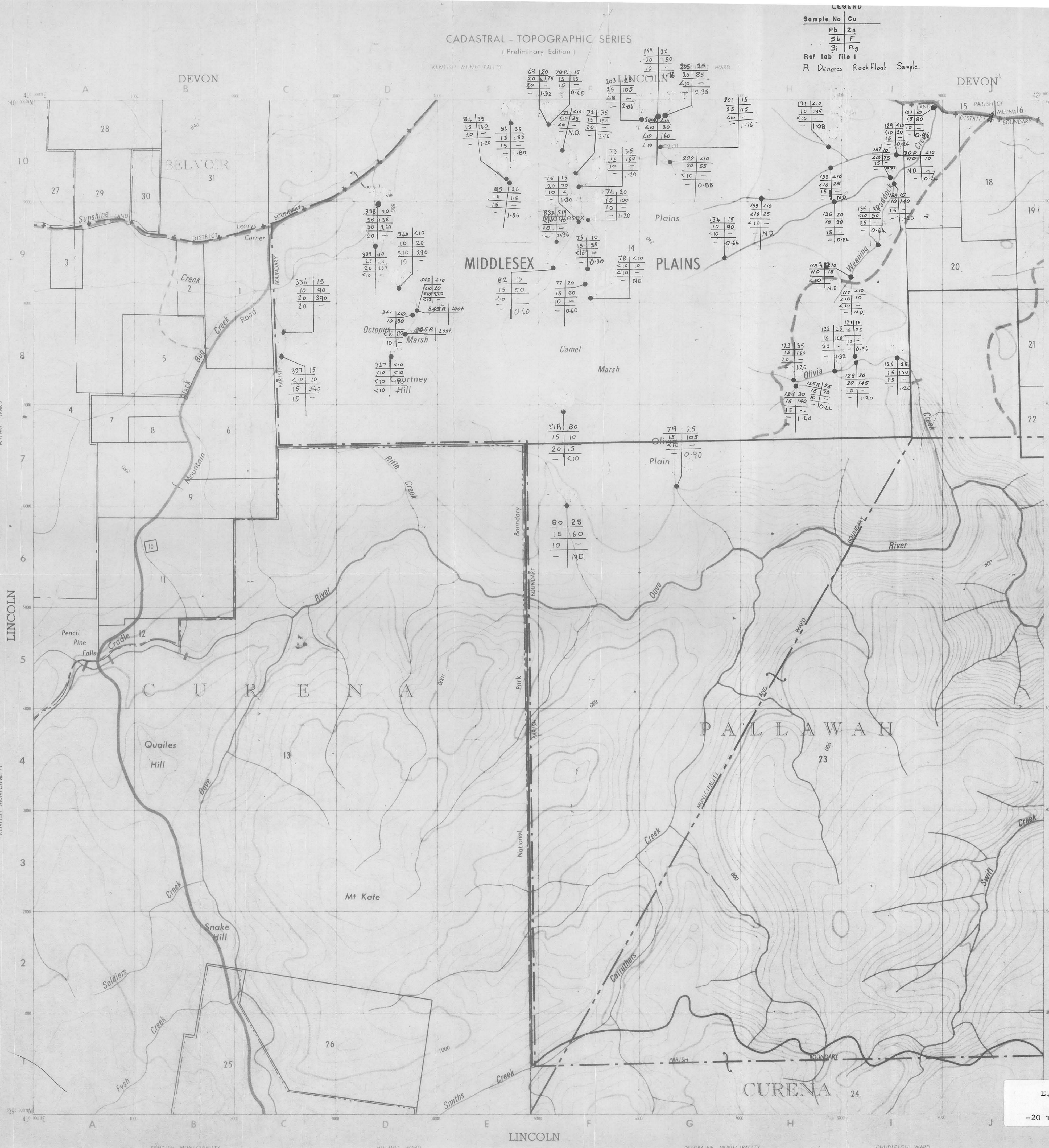
106145 COMALCO LIMITED		
EL 7/74 MOINA, TASMANIA		
GEOCHEMICAL SURVEY - ZINC VALUES PPM		5252 807416
Compiled: S. Hutchison	Revised:	Drawn: S. Hutchison
Date: September, 1975	Scale: 1" = 1 mile	Drg. No. Tas / M / 75 / 24 D



Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot (e.g. 28/20/4845). Details of Tenure: G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = soldier settlement, S.S.L. = soldier settlement lease, R.A. = residence area, L. = lease lot, T.L. = temporary licence, C.L. = crown land, G.P. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept. or Box 444 G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4139

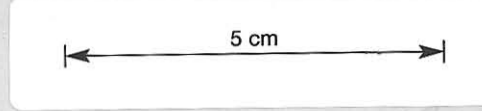
Index	Map Ref	Survey Plan	Lot	Area	Name Purpose	Tenure	Index	Map Ref	Survey Plan	Lot	Area	Name Purpose	Tenure
1	69	6/2	1	21.288ha	Kauri Timber	1975-1984	1	69	6/2	1	21.288ha	Kauri Timber	1975-1984
2	69	7/10	1	20.288ha	Kauri Timber	1975-1984	2	69	7/10	1	20.288ha	Kauri Timber	1975-1984
3	69	7/10	2	20.288ha	Kauri Timber	1975-1984	3	69	7/10	2	20.288ha	Kauri Timber	1975-1984
4	69	7/10	3	20.288ha	Kauri Timber	1975-1984	4	69	7/10	3	20.288ha	Kauri Timber	1975-1984
5	69	220/28	1	101.1ha	Vacant	1975-1984	5	69	220/28	1	101.1ha	Vacant	1975-1984
6	69	220/27	1	90.31ha	Vacant	1975-1984	6	69	220/27	1	90.31ha	Vacant	1975-1984
7	69	220/27	2	28.25ha	Vacant	1975-1984	7	69	220/27	2	28.25ha	Vacant	1975-1984
8	69	220/27	3	12.17ha	Vacant	1975-1984	8	69	220/27	3	12.17ha	Vacant	1975-1984
9	69	220/27	4	103.2ha	Vacant	1975-1984	9	69	220/27	4	103.2ha	Vacant	1975-1984
10	69	220/27	5	1.419ha	Vacant	1975-1984	10	69	220/27	5	1.419ha	Vacant	1975-1984
11	69	8/13	1	79.28ha	Vacant	1975-1984	11	69	8/13	1	79.28ha	Vacant	1975-1984
12	69	8/13	2	60.18ha	Vacant	1975-1984	12	69	8/13	2	60.18ha	Vacant	1975-1984
13	69	8/13	3	1348.5ha	Vacant	1975-1984	13	69	8/13	3	1348.5ha	Vacant	1975-1984
14	69	8/13	4	200.8ha	Vacant	1975-1984	14	69	8/13	4	200.8ha	Vacant	1975-1984
15	69	12/6/30	1	122.4ha	Vacant	1975-1984	15	69	12/6/30	1	122.4ha	Vacant	1975-1984
16	69	12/6/30	2	105.1ha	Vacant	1975-1984	16	69	12/6/30	2	105.1ha	Vacant	1975-1984
17	69	12/6/30	3	60.18ha	Vacant	1975-1984	17	69	12/6/30	3	60.18ha	Vacant	1975-1984
18	69	4/23	1	40.15ha	Vacant	1975-1984	18	69	4/23	1	40.15ha	Vacant	1975-1984
19	69	4/23	2	106.3ha	Vacant	1975-1984	19	69	4/23	2	106.3ha	Vacant	1975-1984
20	69	4/23	3	85.75ha	Vacant	1975-1984	20	69	4/23	3	85.75ha	Vacant	1975-1984
21	69	4/23	4	85.75ha	Vacant	1975-1984	21	69	4/23	4	85.75ha	Vacant	1975-1984
22	69	4/23	5	30.75ha	Vacant	1975-1984	22	69	4/23	5	30.75ha	Vacant	1975-1984
23	69	4/23	6	132.6ha	Vacant	1975-1984	23	69	4/23	6	132.6ha	Vacant	1975-1984
24	69	4/23	7	368.9ha	Vacant	1975-1984	24	69	4/23	7	368.9ha	Vacant	1975-1984
25	69	4/23	8	183.4ha	Vacant	1975-1984	25	69	4/23	8	183.4ha	Vacant	1975-1984
26	69	4/23	9	605.0ha	Vacant	1975-1984	26	69	4/23	9	605.0ha	Vacant	1975-1984
27	69	13/8/9	1	121.0ha	Vacant	1975-1984	27	69	13/8/9	1	121.0ha	Vacant	1975-1984
28	69	13/8/9	2	616.4ha	Vacant	1975-1984	28	69	13/8/9	2	616.4ha	Vacant	1975-1984
29	69	13/8/9	3	602.7ha	Vacant	1975-1984	29	69	13/8/9	3	602.7ha	Vacant	1975-1984
30	69	13/8/9	4	279.8ha	Vacant	1975-1984	30	69	13/8/9	4	279.8ha	Vacant	1975-1984



LEGEND

Sample No	Cu
Pb	Zn
Sb	F
Bi	Ag

Ref lab file 1
R Denotes Rockfloat Sample.



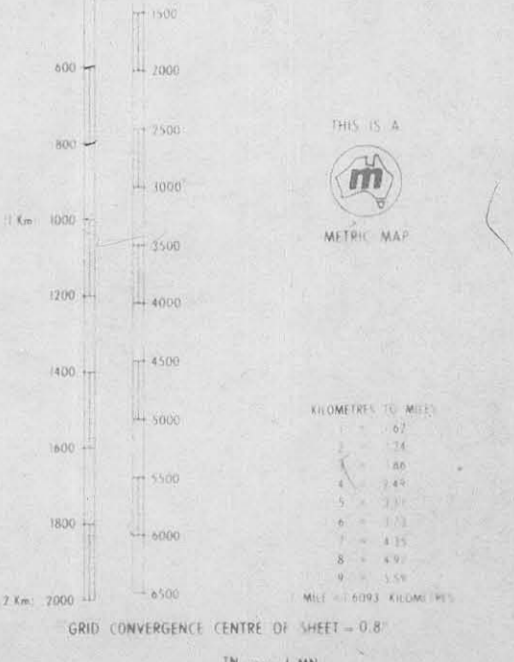
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PRODUCTION: Lands Dept 1975
 PROJECTION: Transverse Mercator
 HORIZONTAL DATUM: Australian Geodetic Datum 1966
 VERTICAL DATUM: Mean Sea Level
 COMPILATION: based on 1:100 000 Topographical Series and Land District Charts

SCALE 1:20 000
 Line Scale Factor K for this sheet 40.99949
 CONTOUR INTERVAL 20 METRES

CONVERSION TABLES

METRES	FEET
100	328
200	656
300	984
400	1312
500	1640
600	1968
700	2296
800	2624
900	2952
1000	3280
1100	3608
1200	3936
1300	4264
1400	4592
1500	4920
1600	5248
1700	5576
1800	5904
1900	6232
2000	6560
2100	6888
2200	7216
2300	7544
2400	7872
2500	8200
2600	8528
2700	8856
2800	9184
2900	9512
3000	9840
3100	10168
3200	10496
3300	10824
3400	11152
3500	11480
3600	11808
3700	12136
3800	12464
3900	12792
4000	13120
4100	13448
4200	13776
4300	14104
4400	14432
4500	14760
4600	15088
4700	15416
4800	15744
4900	16072
5000	16400
5100	16728
5200	17056
5300	17384
5400	17712
5500	18040
5600	18368
5700	18696
5800	19024
5900	19352
6000	19680
6100	20008
6200	20336
6300	20664
6400	20992
6500	21320
6600	21648
6700	21976
6800	22304
6900	22632
7000	22960
7100	23288
7200	23616
7300	23944
7400	24272
7500	24600
7600	24928
7700	25256
7800	25584
7900	25912
8000	26240
8100	26568
8200	26896
8300	27224
8400	27552
8500	27880
8600	28208
8700	28536
8800	28864
8900	29192
9000	29520
9100	29848
9200	30176
9300	30504
9400	30832
9500	31160
9600	31488
9700	31816
9800	32144
9900	32472
10000	32800



MAP REFERENCE SYSTEM
 20/4139

BOUNDARY LEGEND

Land District	—+—+—+—+—
Municipality	—+—+—+—+—
Parish	—+—+—+—+—
Ward	—+—+—+—+—
Town	—+—+—+—+—
Lease	—+—+—+—+—
Licence	—+—+—+—+—
State Forest	—+—+—+—+—
Survey	—+—+—+—+—
Miscellaneous	—+—+—+—+—

ROAD CLASSIFICATIONS

Principal road and highway	—+—+—+—+—
Secondary road	—+—+—+—+—
Minor road	—+—+—+—+—
Vehicular track	—+—+—+—+—
Reserved road	—+—+—+—+—

The representation of a road or track on this map is no evidence of the existence of a right of way

INDEX TO ADJOINING SHEETS

4040	4140	4240
4039	4139	4240
4038	4138	4238

LOCATION DIAGRAM

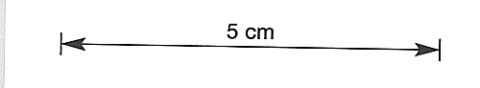
Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot (e.g. 28/20/4845). Details of Tenure: G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = soldier settlement, S.S.L. = soldier settlement lease, R.A. = residence area, L. = lease lot, T.L. = temporary licence, C.L. = crown land, G.R.P. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept or 96x 44a G.P.O. Hobart.

CADASTRAL - TOPOGRAPHIC SERIES (Preliminary Edition)

LEGEND

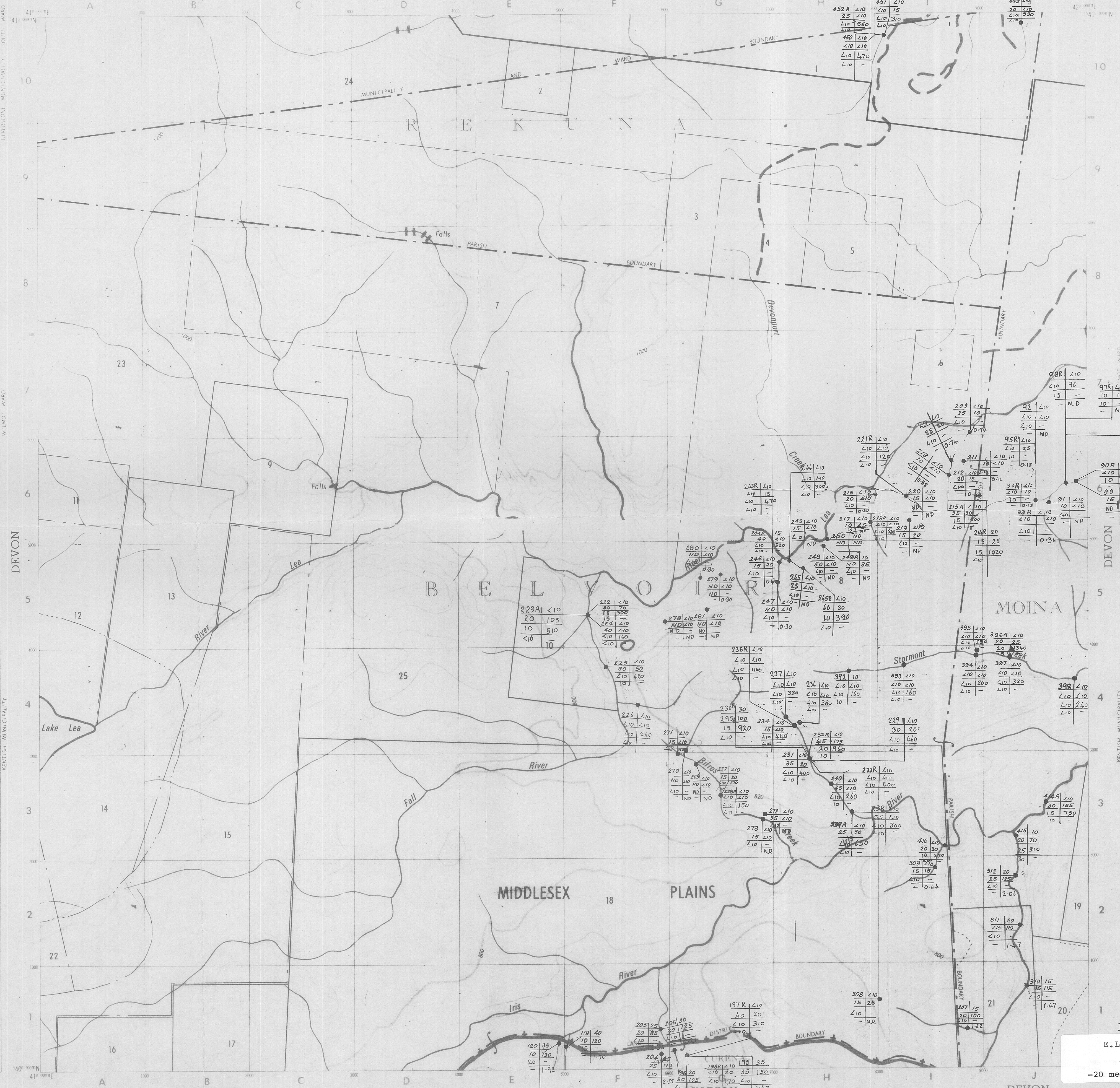
Sample No	Cu
Pb	Zn
Sb	F
Bi	Ag

Ref lab file 1
R Denotes Rockfloat Sample.



CADASTRAL REFERENCE SHEET 20/4140

Map Ref	Survey Plan	Lot	Area	Name Purpose	Tenure	Index	Map Ref	Survey Plan	Lot	Area	Name Purpose	Tenure
10	137/23	1	121.07ha	Vacant	C.L.	10	10	137/23	1	121.07ha	Vacant	C.L.
11	137/23	2	121.07ha	Vacant	C.L.	11	11	137/23	2	121.07ha	Vacant	C.L.
12	137/23	3	121.07ha	Vacant	C.L.	12	12	137/23	3	121.07ha	Vacant	C.L.
13	137/23	4	121.07ha	Vacant	C.L.	13	13	137/23	4	121.07ha	Vacant	C.L.
14	137/23	5	121.07ha	Vacant	C.L.	14	14	137/23	5	121.07ha	Vacant	C.L.
15	137/23	6	121.07ha	Vacant	C.L.	15	15	137/23	6	121.07ha	Vacant	C.L.
16	137/23	7	121.07ha	Vacant	C.L.	16	16	137/23	7	121.07ha	Vacant	C.L.
17	137/23	8	121.07ha	Vacant	C.L.	17	17	137/23	8	121.07ha	Vacant	C.L.
18	137/23	9	121.07ha	Vacant	C.L.	18	18	137/23	9	121.07ha	Vacant	C.L.
19	137/23	10	121.07ha	Vacant	C.L.	19	19	137/23	10	121.07ha	Vacant	C.L.
20	137/23	11	121.07ha	Vacant	C.L.	20	20	137/23	11	121.07ha	Vacant	C.L.
21	137/23	12	121.07ha	Vacant	C.L.	21	21	137/23	12	121.07ha	Vacant	C.L.
22	137/23	13	121.07ha	Vacant	C.L.	22	22	137/23	13	121.07ha	Vacant	C.L.
23	137/23	14	121.07ha	Vacant	C.L.	23	23	137/23	14	121.07ha	Vacant	C.L.
24	137/23	15	121.07ha	Vacant	C.L.	24	24	137/23	15	121.07ha	Vacant	C.L.
25	137/23	16	121.07ha	Vacant	C.L.	25	25	137/23	16	121.07ha	Vacant	C.L.
26	137/23	17	121.07ha	Vacant	C.L.	26	26	137/23	17	121.07ha	Vacant	C.L.
27	137/23	18	121.07ha	Vacant	C.L.	27	27	137/23	18	121.07ha	Vacant	C.L.
28	137/23	19	121.07ha	Vacant	C.L.	28	28	137/23	19	121.07ha	Vacant	C.L.
29	137/23	20	121.07ha	Vacant	C.L.	29	29	137/23	20	121.07ha	Vacant	C.L.
30	137/23	21	121.07ha	Vacant	C.L.	30	30	137/23	21	121.07ha	Vacant	C.L.
31	137/23	22	121.07ha	Vacant	C.L.	31	31	137/23	22	121.07ha	Vacant	C.L.
32	137/23	23	121.07ha	Vacant	C.L.	32	32	137/23	23	121.07ha	Vacant	C.L.
33	137/23	24	121.07ha	Vacant	C.L.	33	33	137/23	24	121.07ha	Vacant	C.L.
34	137/23	25	121.07ha	Vacant	C.L.	34	34	137/23	25	121.07ha	Vacant	C.L.
35	137/23	26	121.07ha	Vacant	C.L.	35	35	137/23	26	121.07ha	Vacant	C.L.
36	137/23	27	121.07ha	Vacant	C.L.	36	36	137/23	27	121.07ha	Vacant	C.L.
37	137/23	28	121.07ha	Vacant	C.L.	37	37	137/23	28	121.07ha	Vacant	C.L.
38	137/23	29	121.07ha	Vacant	C.L.	38	38	137/23	29	121.07ha	Vacant	C.L.
39	137/23	30	121.07ha	Vacant	C.L.	39	39	137/23	30	121.07ha	Vacant	C.L.
40	137/23	31	121.07ha	Vacant	C.L.	40	40	137/23	31	121.07ha	Vacant	C.L.
41	137/23	32	121.07ha	Vacant	C.L.	41	41	137/23	32	121.07ha	Vacant	C.L.
42	137/23	33	121.07ha	Vacant	C.L.	42	42	137/23	33	121.07ha	Vacant	C.L.
43	137/23	34	121.07ha	Vacant	C.L.	43	43	137/23	34	121.07ha	Vacant	C.L.
44	137/23	35	121.07ha	Vacant	C.L.	44	44	137/23	35	121.07ha	Vacant	C.L.
45	137/23	36	121.07ha	Vacant	C.L.	45	45	137/23	36	121.07ha	Vacant	C.L.
46	137/23	37	121.07ha	Vacant	C.L.	46	46	137/23	37	121.07ha	Vacant	C.L.
47	137/23	38	121.07ha	Vacant	C.L.	47	47	137/23	38	121.07ha	Vacant	C.L.
48	137/23	39	121.07ha	Vacant	C.L.	48	48	137/23	39	121.07ha	Vacant	C.L.
49	137/23	40	121.07ha	Vacant	C.L.	49	49	137/23	40	121.07ha	Vacant	C.L.
50	137/23	41	121.07ha	Vacant	C.L.	50	50	137/23	41	121.07ha	Vacant	C.L.
51	137/23	42	121.07ha	Vacant	C.L.	51	51	137/23	42	121.07ha	Vacant	C.L.
52	137/23	43	121.07ha	Vacant	C.L.	52	52	137/23	43	121.07ha	Vacant	C.L.
53	137/23	44	121.07ha	Vacant	C.L.	53	53	137/23	44	121.07ha	Vacant	C.L.
54	137/23	45	121.07ha	Vacant	C.L.	54	54	137/23	45	121.07ha	Vacant	C.L.
55	137/23	46	121.07ha	Vacant	C.L.	55	55	137/23	46	121.07ha	Vacant	C.L.
56	137/23	47	121.07ha	Vacant	C.L.	56	56	137/23	47	121.07ha	Vacant	C.L.
57	137/23	48	121.07ha	Vacant	C.L.	57	57	137/23	48	121.07ha	Vacant	C.L.
58	137/23	49	121.07ha	Vacant	C.L.	58	58	137/23	49	121.07ha	Vacant	C.L.
59	137/23	50	121.07ha	Vacant	C.L.	59	59	137/23	50	121.07ha	Vacant	C.L.
60	137/23	51	121.07ha	Vacant	C.L.	60	60	137/23	51	121.07ha	Vacant	C.L.
61	137/23	52	121.07ha	Vacant	C.L.	61	61	137/23	52	121.07ha	Vacant	C.L.
62	137/23	53	121.07ha	Vacant	C.L.	62	62	137/23	53	121.07ha	Vacant	C.L.
63	137/23	54	121.07ha	Vacant	C.L.	63	63	137/23	54	121.07ha	Vacant	C.L.
64	137/23	55	121.07ha	Vacant	C.L.	64	64	137/23	55	121.07ha	Vacant	C.L.
65	137/23	56	121.07ha	Vacant	C.L.	65	65	137/23	56	121.07ha	Vacant	C.L.
66	137/23	57	121.07ha	Vacant	C.L.	66	66	137/23	57	121.07ha	Vacant	C.L.
67	137/23	58	121.07ha	Vacant	C.L.	67	67	137/23	58	121.07ha	Vacant	C.L.
68	137/23	59	121.07ha	Vacant	C.L.	68	68	137/23	59	121.07ha	Vacant	C.L.
69	137/23	60	121.07ha	Vacant	C.L.	69	69	137/23	60	121.07ha	Vacant	C.L.
70	137/23	61	121.07ha	Vacant	C.L.	70	70	137/23	61	121.07ha	Vacant	C.L.
71	137/23	62	121.07ha	Vacant	C.L.	71	71	137/23	62	121.07ha	Vacant	C.L.
72	137/23	63	121.07ha	Vacant	C.L.	72	72	137/23	63	121.07ha	Vacant	C.L.
73	137/23	64	121.07ha	Vacant	C.L.	73	73	137/23	64	121.07ha	Vacant	C.L.
74	137/23	65	121.07ha	Vacant	C.L.	74	74	137/23	65	121.07ha	Vacant	C.L.
75	137/23	66	121.07ha	Vacant	C.L.	75	75	137/23	66	121.07ha	Vacant	C.L.
76	137/23	67	121.07ha	Vacant	C.L.	76	76	137/23	67	121.07ha	Vacant	C.L.
77	137/23	68	121.07ha	Vacant	C.L.	77	77	137/23	68	121.07ha	Vacant	C.L.
78	137/23	69	121.07ha	Vacant	C.L.	78	78	137/23	69	121.07ha	Vacant	C.L.
79	137/23	70	121.07ha	Vacant	C.L.	79	79	137/23	70	121.07ha	Vacant	C.L.
80	137/23	71	121.07ha	Vacant	C.L.	80	80	137/23	71	121.07ha	Vacant	C.L.
81	137/23	72	121.07ha	Vacant	C.L.	81	81	137/23	72	121.07ha	Vacant	C.L.
82	137/23	73	121.07ha	Vacant	C.L.	82	82	137/23	73	121.07ha	Vacant	C.L.
83	137/23	74	121.07ha	Vacant	C.L.	83	83	137/23	74	121.07ha	Vacant	C.L.
84	137/23	75	121.07ha	Vacant	C.L.	84	84	137/23	75	121.07ha	Vacant	C.L.
85	137/23	76	121.07ha	Vacant	C.L.	85	85	137/23	76	121.07ha	Vacant	C.L.
86	137/23	77	121.07ha	Vacant	C.L.	86	86	137/23	77	121.07ha	Vacant	C.L.
87	137/23	78	121.07ha	Vacant	C.L.	87	87	137/23	78	121.07ha	Vacant	C.L.
88	137/23	79	121.07ha	Vacant	C.L.	88	88	137/23	79	121.07ha	Vacant	C.L.
89	137/23	80	121.07ha	Vacant	C.L.	89	89	137/23	80	121.07ha	Vacant	C.L.
90	137/23	81	121.07ha	Vacant	C.L.	90	90	137/23	81	121.07ha	Vacant	C.L.
91	137/23	82	121.07ha	Vacant	C.L.	91	91	137/23	82	121.07ha	Vacant	C.L.
92	137/23	83	121.07ha	Vacant	C.L.	92	92	137/23	83	121.07ha	Vacant	C.L.
93	137/23	84	121.07ha	Vacant	C.L.	93	93	137/23	84	121.07ha	Vacant	C.L.
94	137/23	85	121.07ha	Vacant	C.L.	94	94	137/23	85	121.07ha	Vacant	C.L.
95	137/23	86	121.07ha	Vacant	C.L.	95	95	137/23	86	121.07ha	Vacant	C.L.
96	137/23	87	121.07ha	Vacant	C.L.	96	96	137/23	87	121.07ha	Vacant	C.L.
97	137/23	88	121.07ha	Vacant	C.L.	97	97	137/23	88	121.07ha	Vacant	C.L.
98	137/23	89	121.07ha	Vacant	C.L.	98	98	137/23	89	121.07ha	Vacant	C.L.
99	137/23	90	121.07ha	Vacant	C.L.	99	99	137/23	90	121.07ha	Vacant	C.L.
100	137/23	91	121.07ha	Vacant	C.L.	100	100	137/23	91	121.07ha	Vacant	C.L.



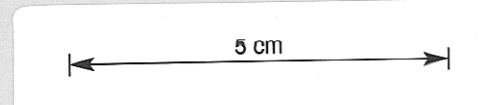
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PRODUCTION: Lands Dept 1975
PROJECTION: Transverse Mercator
HORIZONTAL DATUM: Australian Geodetic Datum 1966
VERTICAL DATUM: Mean Sea Level
COMPILED: based on 1:50,000 Topographical Series and Land District Charts.

SCALE 1:20 000
Line Scale Factor k for this sheet = 0.99969
CONTOUR INTERVAL 20 METRES

CONVERSION TABLES

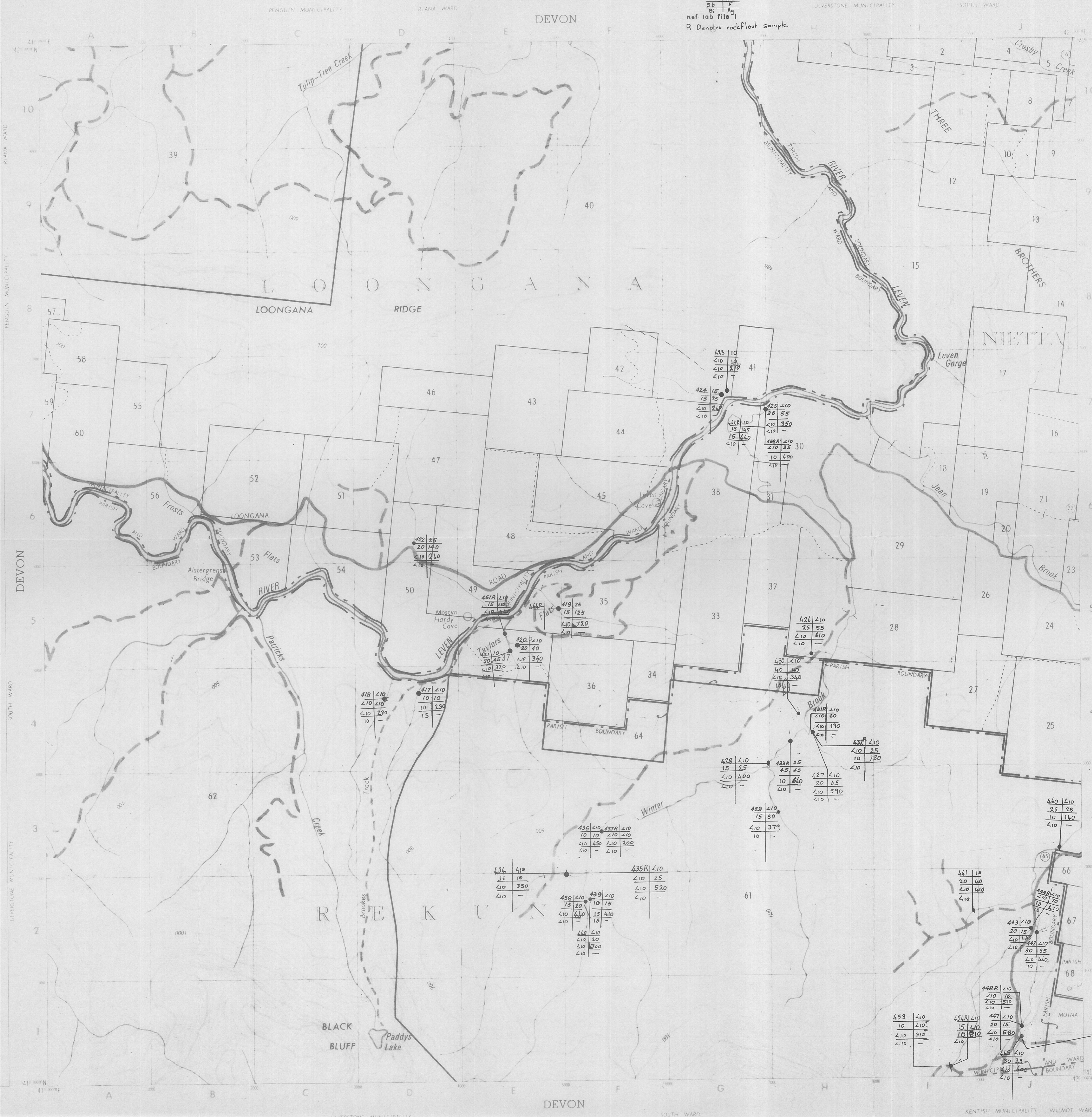
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100	328
200	656
300	984
400	1312
500	1640
600	1968
700	2296
800	2624
900	2952
1000	3280
1100	3608
1200	3936
1300	4264
1400	4592
1500	4920
1600	5248
1700	5576
1800	5904
1900	6232
2000	6560
2100	6888
2200	7216
2300	7544
2400	7872
2500	8200
2600	8528
2700	8856
2800	9184
2900	9512
3000	9840
3100	10168
3200	10496
3300	10824
3400	11152
3500	11480
3600	11808
3700	12136
3800	12464
3900	12792
4000	13120
4100	13448
4200	13776
4300	14104
4400	14432
4500	14760
4600	15088
4700	15416
4800	15744
4900	16072</



Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot (e.g.28/20/4845). Details of Tenure, G = granted lot, P = purchase lot, LO = location order, CI = certificate issued, SS = soldier settlement, S.S.L = soldier settlement lease, R.A = residence area, L = lease lot, LL = temporary licence, CL = crown land, CRP = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept or Box 44a G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4141

Table with columns: Index, Map Ref, Survey Plan, Lot, Area, Name, Purpose, Tenure, Index, Map Ref, Survey Plan, Lot, Area, Name, Purpose, Tenure. Lists various land parcels and their details.

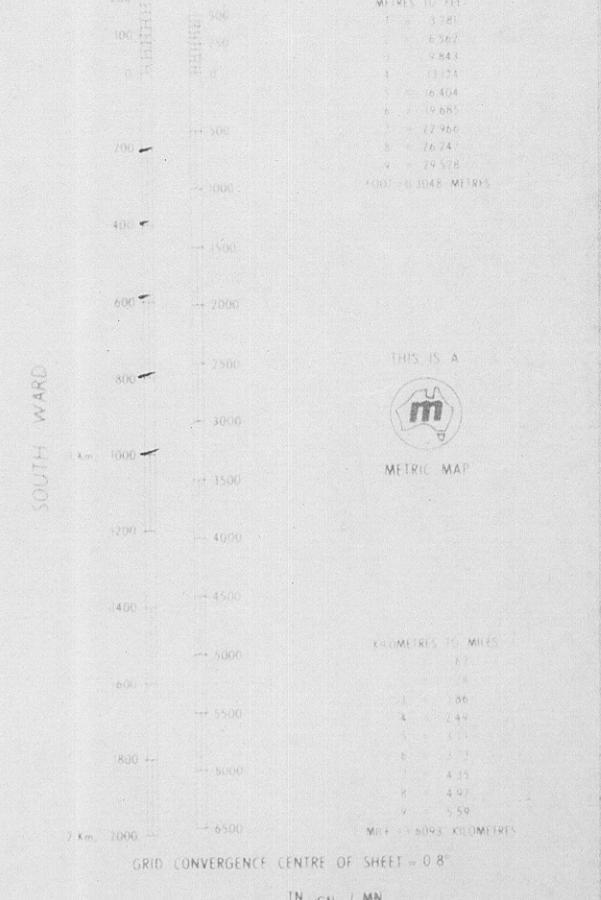


This is a Preliminary Edition prepared to provide advance information on areas in which mapping is in progress. This map is Crown Copyright and may only be reproduced upon written authority from the Surveyor General.

PROJECTION: Transverse Mercator
HORIZONTAL DATUM: Australian Geodetic Datum 1984
VERTICAL DATUM: Mean Sea Level
COMPLETION: Based on 1:50,000 Topographic Series and Land District Charts

SCALE 1:20 000

Contour Interval 20 METRES



MAGNETIC VARIATION 1970 APPROX 12.2 EAST
RATE OF CHANGE APPROX 0.1 WEST PER YEAR

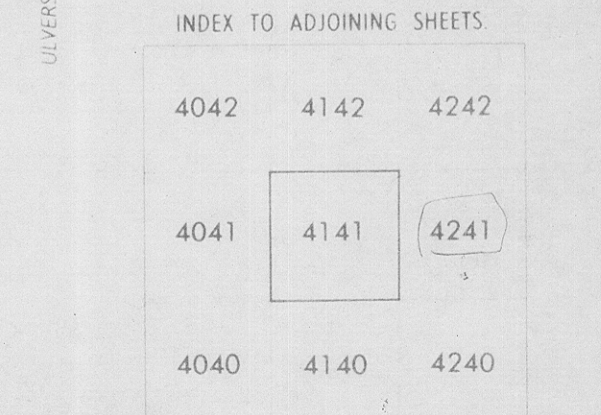
MAP REFERENCE SYSTEM
20/4141

- ① Fractional scale in thousands is 1:20 000.
② South West co-ordinates of this map sheet is represented by 10 000 metre grid intervals of the Australian Map Grid + 410 000m East and 510 000m North.

- BOUNDARY LEGEND: Land District, Municipality, Parish, Ward, Lease, Licence, State Forest, Survey, Miscellaneous.

- ROAD CLASSIFICATIONS: Principal road and highway, Secondary road, Minor road, Vehicular track, Reserved road.

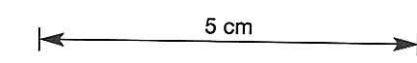
The representation of a road or track on this map is no evidence of the existence of a right of way.



LOCATION DIAGRAM

106148
E.L. 7/74 TASMANIA
ANALYSES OF
-20 mesh STREAM SEDIMENT

Users are requested to notify any error to the Surveyor General, Box 44a, G.P.O. Hobart.

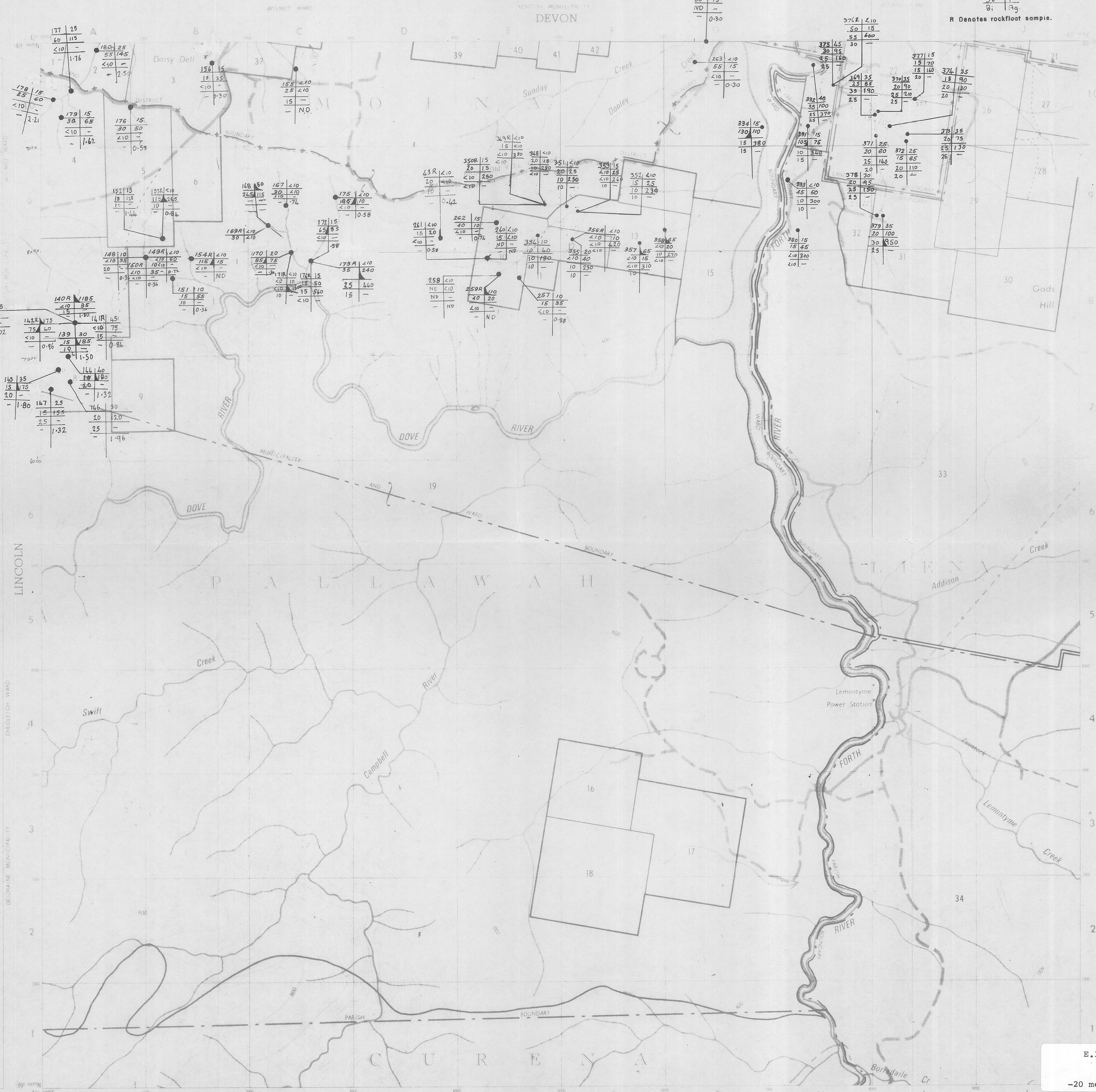


Pb	Zn
Sb	F
Bi	Ag

The numbers shown on this plan when used in conjunction with the sheet number provides a unique reference to any one of the areas depicted. G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = soldier settlement, S.S.L. = soldier settlement lease, R.A. = residence area, L. = lease lot, T.L. = temporary lease, C.L. = crown land, D.P.F. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept. at Box 440, G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4239

Map Ref.	Survey Plan	Lot	Area	Name	Purpose	Tenure
177	25					
178	15					
179	15					
180	25					
181	15					
182	15					
183	15					
184	15					
185	15					
186	15					
187	15					
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294	15					
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300	15					



This is a Preliminary Edition prepared for general advice. It is not intended to be used as a legal document. The map is prepared by the Survey Department of Tasmania. It is not intended to be used as a legal document. The map is prepared by the Survey Department of Tasmania.

SCALE 1:20 000

CONTOUR INTERVAL 20 METRES

UNIVERSITY TABLE

UNIVERSITY TABLE

UNIVERSITY TABLE

UNIVERSITY TABLE

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UNIVERSITY TABLE

UNIVERSITY TABLE

UNIVERSITY TABLE

106149

E.L. 7/74 TASMANIA
ANALYSES OF
-20 mesh STREAM SEDIMENT

5256

TAS 177/98D

80-1416



LEGEND

Sample No	Cu
Pb	Zn
Sb	F
Bi	Ag

Ref lab file 1
R Denotes Rock float sample.

Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot (e.g. 28/20/4845). Details of Tenure, G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = soldier settlement, S.S.L. = soldier settlement lease, R.A. = residence area, L. = lease lot, T.L. = temporary licence, C.L. = crown land, G.R.P. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept. or Box 444 G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4241

Map Index Ref	Survey Plan	Lot	Area	Name / Purpose	Tenure	Map Index Ref	Survey Plan	Lot	Area	Name / Purpose	Tenure			
1	110	8/31	-	Town of Nietta	-	108	H5	77/20	-	20.04ha	Clerke, J.D.	F.P.		
2	110	88/6	-	80.25ha	Crawford, F.W.	109	H5	85/23	-	30.17ha	Good, W.	F.P.		
3	110	88/6	-	20.10ha	vacant	110	H5	84/15	-	8423m	Bus Y Reserve	C.I.		
4	110	109/7	-	40.50ha	Acq. for Forestry Purp.	111	H5	80/24	-	61.92ha	Robt, J.D.	C.I.		
5	110	95/21	-	39.66ha	vacant	112	H5	77/18	-	84.77ha	Clay, J.D.	C.I.		
6	110	12/25	-	85.39ha	vacant	113	H5	56/15	-	81.39ha	Leslie, J.P.	C.I.		
7	110	13/18	-	27.53ha	vacant	114	H5	62/11	-	Part of	42.31ha	Wells, F.H.H.	F.P.	
8	110	146/15	-	20.44ha	vacant	115	H5	70/35	-	19.44ha	Richardson, W.H.	F.P.		
9	110	151/18	-	40.36ha	Rockliff, S.	116	H5	70/35	-	20.10ha	Archer, A.	F.P.		
10	110	106/16	-	32.65ha	Acq. for Forestry Purp.	117	H5	113/6	-	10.67ha	Jeffrey, S.H.	F.P.		
11	110	106/16	-	40.36ha	vacant	118	H5	77/18	-	40.36ha	Widdowson, J.D.	F.P.		
12	110	106/16	-	32.65ha	Acq. for Forestry Purp.	119	H5	80/23	-	80.13ha	Hagan, A., D.B. & H.N.	F.P.		
13	110	106/16	-	40.36ha	vacant	120	H5	85/28	-	42.38ha	Part of	11.11ha	The Queen	C.I.
14	110	146/14	-	20.27ha	Cameron, L.J.A.	121	H5	85/28	-	Part of	39.05ha	Clayton, W.H.	F.P.	
15	110	146/14	-	20.27ha	vacant	122	H5	161/17	-	16.02ha	Clerke, J.D.	F.P.		
16	110	146/14	-	20.27ha	vacant	123	H5	80/21	-	16.02ha	Clerke, J.D.	F.P.		
17	110	146/14	-	20.27ha	vacant	124	H5	80/21	-	16.02ha	Clerke, J.D.	F.P.		
18	110	124/10	-	12.19ha	vacant	125	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
19	110	124/10	-	12.19ha	vacant	126	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
20	110	124/10	-	12.19ha	vacant	127	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
21	110	124/10	-	12.19ha	vacant	128	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
22	110	124/10	-	12.19ha	vacant	129	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
23	110	124/10	-	12.19ha	vacant	130	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
24	110	124/10	-	12.19ha	vacant	131	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
25	110	124/10	-	12.19ha	vacant	132	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
26	110	124/10	-	12.19ha	vacant	133	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
27	110	124/10	-	12.19ha	vacant	134	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
28	110	124/10	-	12.19ha	vacant	135	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
29	110	124/10	-	12.19ha	vacant	136	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
30	110	124/10	-	12.19ha	vacant	137	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
31	110	124/10	-	12.19ha	vacant	138	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
32	110	124/10	-	12.19ha	vacant	139	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
33	110	124/10	-	12.19ha	vacant	140	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
34	110	124/10	-	12.19ha	vacant	141	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
35	110	124/10	-	12.19ha	vacant	142	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
36	110	124/10	-	12.19ha	vacant	143	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
37	110	124/10	-	12.19ha	vacant	144	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
38	110	124/10	-	12.19ha	vacant	145	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
39	110	124/10	-	12.19ha	vacant	146	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
40	110	124/10	-	12.19ha	vacant	147	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
41	110	124/10	-	12.19ha	vacant	148	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
42	110	124/10	-	12.19ha	vacant	149	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
43	110	124/10	-	12.19ha	vacant	150	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
44	110	124/10	-	12.19ha	vacant	151	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
45	110	124/10	-	12.19ha	vacant	152	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
46	110	124/10	-	12.19ha	vacant	153	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
47	110	124/10	-	12.19ha	vacant	154	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
48	110	124/10	-	12.19ha	vacant	155	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
49	110	124/10	-	12.19ha	vacant	156	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
50	110	124/10	-	12.19ha	vacant	157	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
51	110	124/10	-	12.19ha	vacant	158	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
52	110	124/10	-	12.19ha	vacant	159	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
53	110	124/10	-	12.19ha	vacant	160	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
54	110	124/10	-	12.19ha	vacant	161	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
55	110	124/10	-	12.19ha	vacant	162	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
56	110	124/10	-	12.19ha	vacant	163	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
57	110	124/10	-	12.19ha	vacant	164	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
58	110	124/10	-	12.19ha	vacant	165	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
59	110	124/10	-	12.19ha	vacant	166	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
60	110	124/10	-	12.19ha	vacant	167	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
61	110	124/10	-	12.19ha	vacant	168	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
62	110	124/10	-	12.19ha	vacant	169	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
63	110	124/10	-	12.19ha	vacant	170	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
64	110	124/10	-	12.19ha	vacant	171	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
65	110	124/10	-	12.19ha	vacant	172	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
66	110	124/10	-	12.19ha	vacant	173	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
67	110	124/10	-	12.19ha	vacant	174	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
68	110	124/10	-	12.19ha	vacant	175	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
69	110	124/10	-	12.19ha	vacant	176	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
70	110	124/10	-	12.19ha	vacant	177	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
71	110	124/10	-	12.19ha	vacant	178	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
72	110	124/10	-	12.19ha	vacant	179	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
73	110	124/10	-	12.19ha	vacant	180	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
74	110	124/10	-	12.19ha	vacant	181	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
75	110	124/10	-	12.19ha	vacant	182	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
76	110	124/10	-	12.19ha	vacant	183	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
77	110	124/10	-	12.19ha	vacant	184	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
78	110	124/10	-	12.19ha	vacant	185	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
79	110	124/10	-	12.19ha	vacant	186	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
80	110	124/10	-	12.19ha	vacant	187	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
81	110	124/10	-	12.19ha	vacant	188	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
82	110	124/10	-	12.19ha	vacant	189	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
83	110	124/10	-	12.19ha	vacant	190	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
84	110	124/10	-	12.19ha	vacant	191	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
85	110	124/10	-	12.19ha	vacant	192	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
86	110	124/10	-	12.19ha	vacant	193	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
87	110	124/10	-	12.19ha	vacant	194	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
88	110	124/10	-	12.19ha	vacant	195	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
89	110	124/10	-	12.19ha	vacant	196	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
90	110	124/10	-	12.19ha	vacant	197	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
91	110	124/10	-	12.19ha	vacant	198	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
92	110	124/10	-	12.19ha	vacant	199	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
93	110	124/10	-	12.19ha	vacant	200	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
94	110	124/10	-	12.19ha	vacant	201	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
95	110	124/10	-	12.19ha	vacant	202	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
96	110	124/10	-	12.19ha	vacant	203	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
97	110	124/10	-	12.19ha	vacant	204	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
98	110	124/10	-	12.19ha	vacant	205	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
99	110	124/10	-	12.19ha	vacant	206	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
100	110	124/10	-	12.19ha	vacant	207	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
101	110	124/10	-	12.19ha	vacant	208	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
102	110	124/10	-	12.19ha	vacant	209	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
103	110	124/10	-	12.19ha	vacant	210	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
104	110	124/10	-	12.19ha	vacant	211	H5	107/24	-	40.00ha	Finlayson, J.D.	F.P.		
105	110	124/10	-	12.19ha	vacant	212								

Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot. (e.g. 28/20/4845). Details of tenure: G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = soldier settlement, S.S.L. = soldier settlement lease, R.A. = residence area, L. = lease lot, T.L. = temporary licence, C.L. = crown land, G.R.P. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept. or Box 444 G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4141

Table with columns: Index, Map Ref, Survey Plan, Lot, Area, Name / Purpose, Tenure, Index, Map Ref, Survey Plan, Lot, Area, Name / Purpose, Tenure. Lists various land parcels and their details.

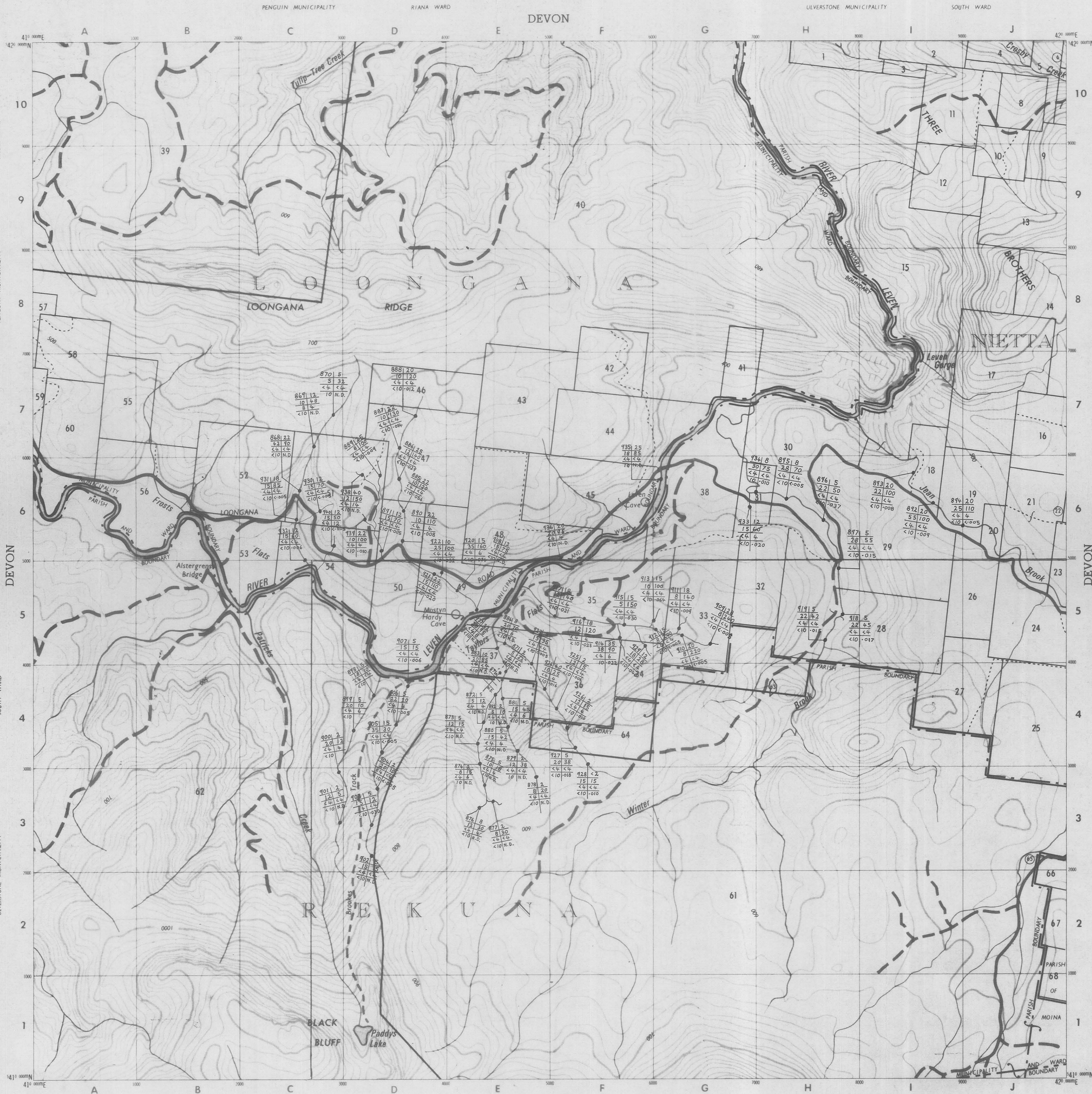
Sample No. Cu Pb Zn Bi Sn W F in water

Table with columns: Element, Anomalous, Anomalous. Lists elements like Cu, Pb, Zn, Bi, Sn, F and their concentration ranges.

KEY: Sample No. Cu Pb Zn Bi Sn W F in water

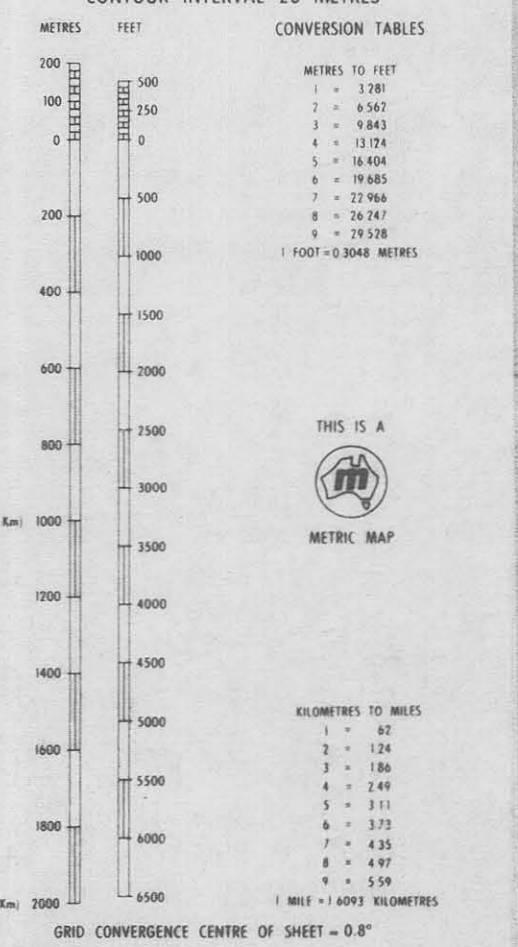
ppm in -80 mesh stream sediment sieved dry. Analyses for Cu, Pb, Zn by AAS after hot acid digestion by Amdel. Sn, W, Bi by XRF by Amdel. Fluorine in stream water in ppm by S.I.E. by Comalco Research Centre. N.D. for F is not detected, much below limit of detection.

COMALCO E.L. 7/74 TASMANIA ANALYSES OF -80 MESH STREAM SEDIMENT AND FLUORINE IN STREAM WATER. Compiled: T. Waite. Scale: 1:20000. Drg. No.: TAS-79-314.



This is a Preliminary Edition prepared to provide advance information on areas in which mapping is in progress. This map is Crown Copyright and may only be reproduced upon written authority from the Surveyor-General.

SCALE 1:20 000. Contour Interval 20 Metres. Conversion Tables for Meters to Feet and Feet to Meters.

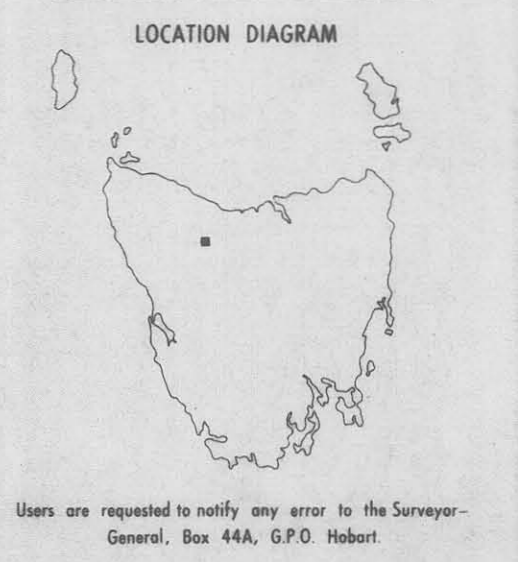


MAGNETIC VARIATION 1970 APPROX 12.7. DATE OF CHANGE APPROX 11.7 EVERY 7 YEARS. MAP REFERENCE SYSTEM 20/4141. Index to adjoining sheets.

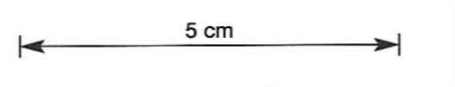
BOUNDARY LEGEND: Land District, Municipality, Parish, Town, Lease, Licence, State Forest, Survey, Miscellaneous. ROAD CLASSIFICATIONS: Principal road and highway, Secondary road, Minor road, Vehicular track, Reserved road.

The representation of a road or track on this map is no evidence of the existence of a right of way.

INDEX TO ADJOINING SHEETS table with grid coordinates: 4042, 4142, 4242; 4041, 4141, 4241; 4040, 4140, 4240.



Users are requested to notify any error to the Surveyor-General, Box 444, G.P.O. Hobart.



Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any lot (e.g. 28/20/4845). Details of Tenure: G = granted lot, P.G. = purchase grant, P. = purchase lot, L.O. = location order, C.I. = certificate issued, S.S. = S.S.I. = soldier settlement lease, R.A. = residence area, L. = leave lot, T.L. = temporary licence, C.L. = crown land, G.R.P. = granted under Real Property Act. Copies of this plan may be obtained from the Lands Dept or Box 44a G.P.O. Hobart.

CADASTRAL REFERENCE SHEET 20/4240

Table with columns: Index, Map Ref, Survey Plan, Lot, Area, Name, Purpose, Tenure. Lists various land parcels and their details.

COMALCO E.L. 7 74 TASMANIA LOCATION OF ROCK SAMPLES AND STREAM WATER SAMPLES plus BISMUTH CREEK FAULT ZONE (Minor geology around Hinman Ck.)

Compiled: P. Komysan, Revised: , Drawn: O. Heddlitch, Date: Mar. 1980, Scale: 1:20000, Drg. No. TAS - 80 - 338

5 cm scale bar

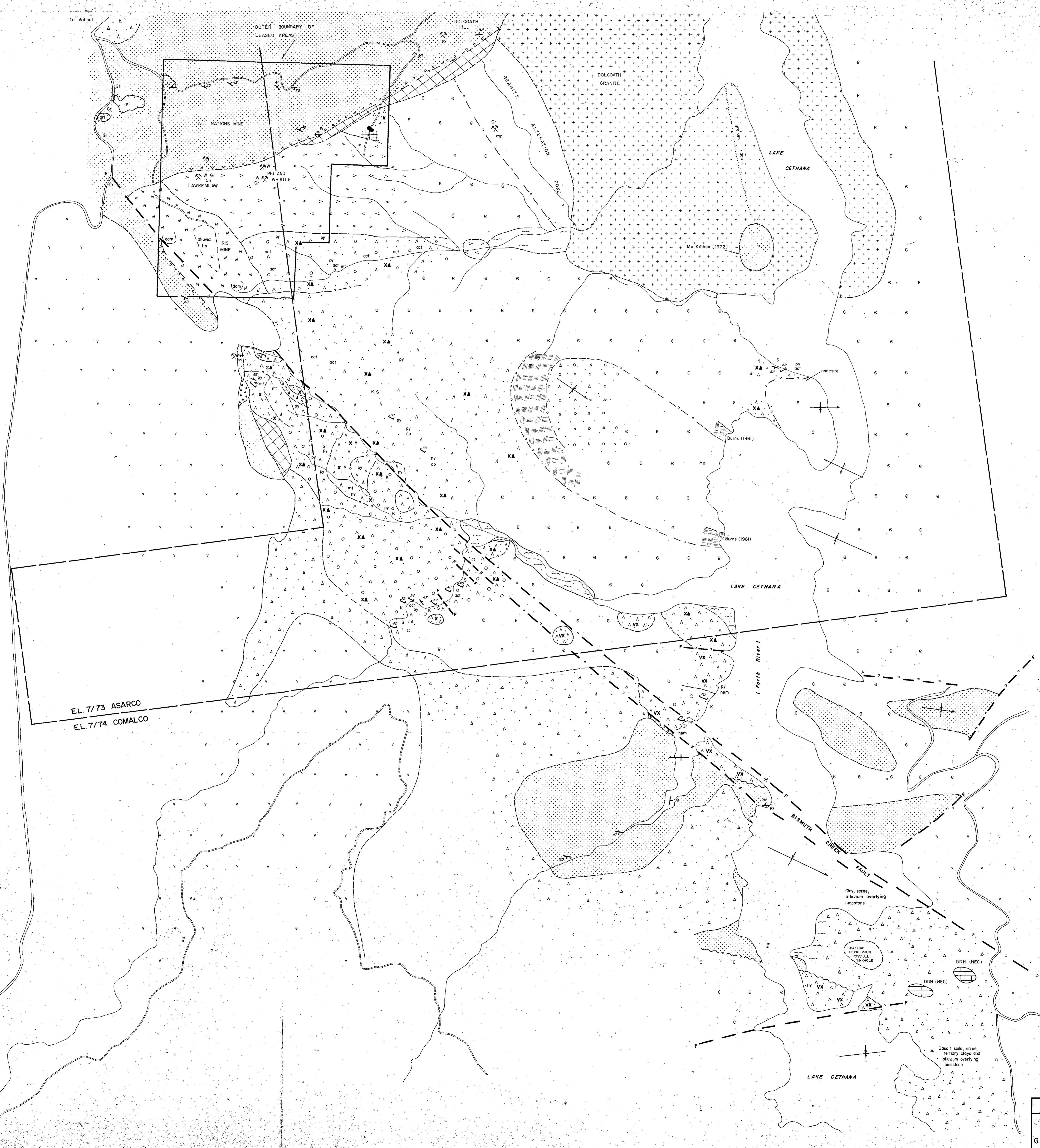
106154



SCALE 1:20 000, CONTOUR INTERVAL 20 METRES, CONVERSION TABLES, METRIC MAP, MAGNETIC VARIATION 1910 APPROX 12.3', MAP REFERENCE SYSTEM 20/4240

BOUNDARY LEGEND, ROAD CLASSIFICATIONS, INDEX TO ADJOINING SHEETS, LOCATION DIAGRAM

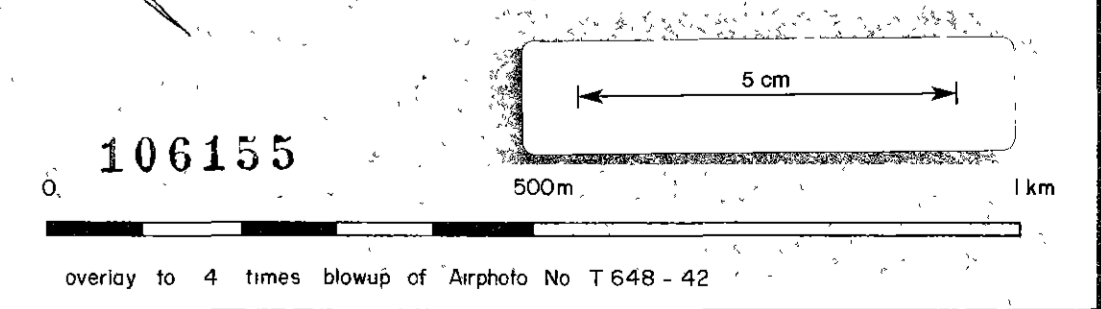
INDEX TO ADJOINING SHEETS table, LOCATION DIAGRAM map, Users are requested to notify any error to the Surveyor-General, Box 44a, G.P.O. Hobart



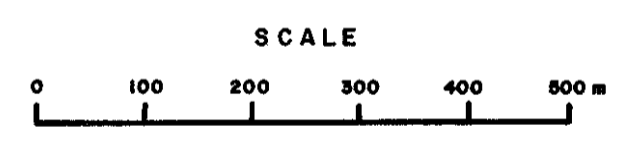
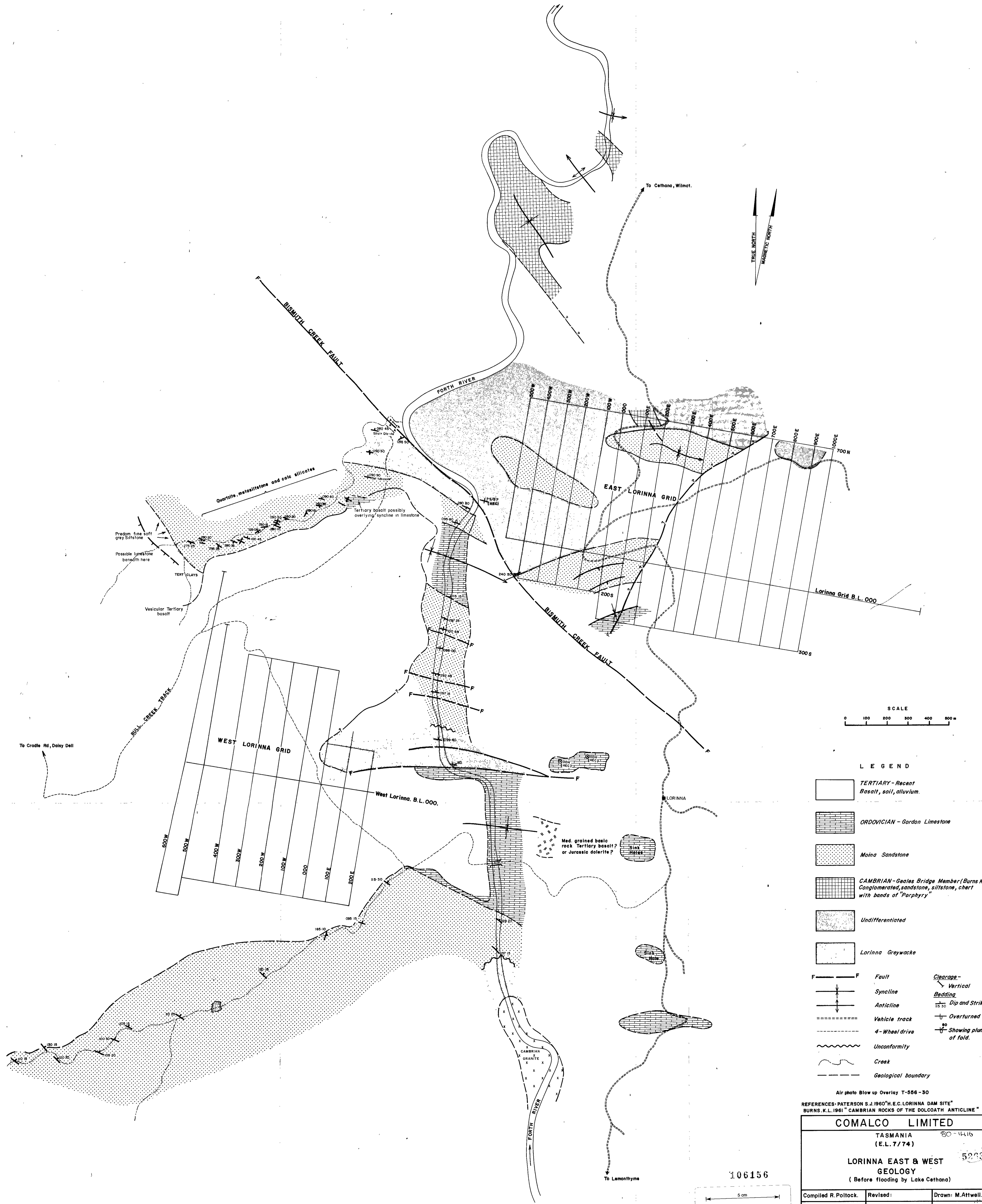
LEGEND

- RECENT**
 Alluvium, in situ weathered rock and man disturbed surface workings
- QUATERNARY**
 Alluvium, river gravels
 Sandstone talus
 Basalt talus and basalt scall
- TERTIARY**
 Basalt
 Gabbro
- ORDOVICIAN**
 Limestone
 Sandstone and Conglomerate
- CAMBRIAN**
- Unit No
- A. Quartz, hornblende, feldspar porphyry
 B. Reworked crystal, lithic tuff
 C. Quartz crystal tuff
 D. Rhyolite
 E. Welded rhyolite breccia
 F. Quartz crystal, lithic tuff
 G. Silty chert
 H. Reworked tuff
 I. Vitric, quartz crystal tuff
 J. Spotted hornfels (originally tuff)
 K. Coarse grained basic to intermediate intrusive (?)?, note actinolite rock
- DEVONIAN**
 Granite
- VEINING AND MINERALIZATION**
 act actinolite veining
 Gr green veining and alteration
 py pyrite
 cp chalcopyrite
 ml magnetite
 hem hematite
 asp arsenopyrite
 S actinolite segregation
 K actinolite knots
 grl gravel
- Other symbols:**
 Road
 Vehicular track
 Mines and prospecting pits
 Quartz
 Geological boundary
 Geological boundary - approximate
 Geological boundary - inferred
 F Fault - position approximate
 F Fault - inferred
 Bedding
 Bedding, vertical
 Cleavage
 Syncline
 Anticline
 Plunging syncline

Note: Geology by P. Konyshin with additional information from Burns (1961), Patterson (1960), and Mc Kibben (1972)



COMALCO LIMITED		
TASMANIA		
EL. 7/74 MOINA		
GEOLOGY OF THE BISMUTH CREEK FAULT ZONE		
Compiled: P. Konyshin	Revised:	Drawn: S. Hutchison
Date: July, 1978	Scale: 1:7760	Dwg No: 78-158



LEGEND

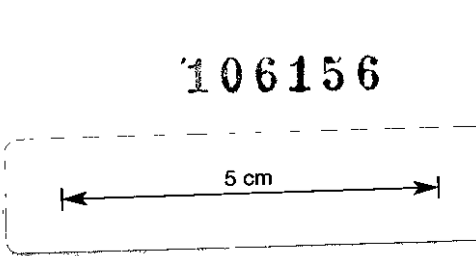
- TERTIARY - Recent Basalt, soil, alluvium.
- ORDOVICIAN - Gordon Limestone
- Moira Sandstone
- CAMBRIAN - Geales Bridge Member (Burns K.L.) Conglomerated, sandstone, siltstone, chert with bands of "Porphyry"
- Undifferentiated
- Lorinna Greywacke
- Fault
- Syncline
- Anticline
- Vehicle track
- 4-Wheel drive
- Unconformity
- Creek
- Geological boundary
- Clearance - Vertical Bedding
- Dip and Strike
- Overturned
- Showing plunge of fold.

Air photo Blow up Overlay T-556-30
 REFERENCES: PATERSON S.J. 1960 "H.E.C. LORINNA DAM SITE"
 BURNS K.L. 1961 "CAMBRIAN ROCKS OF THE DOLCOATH ANTICLINE"

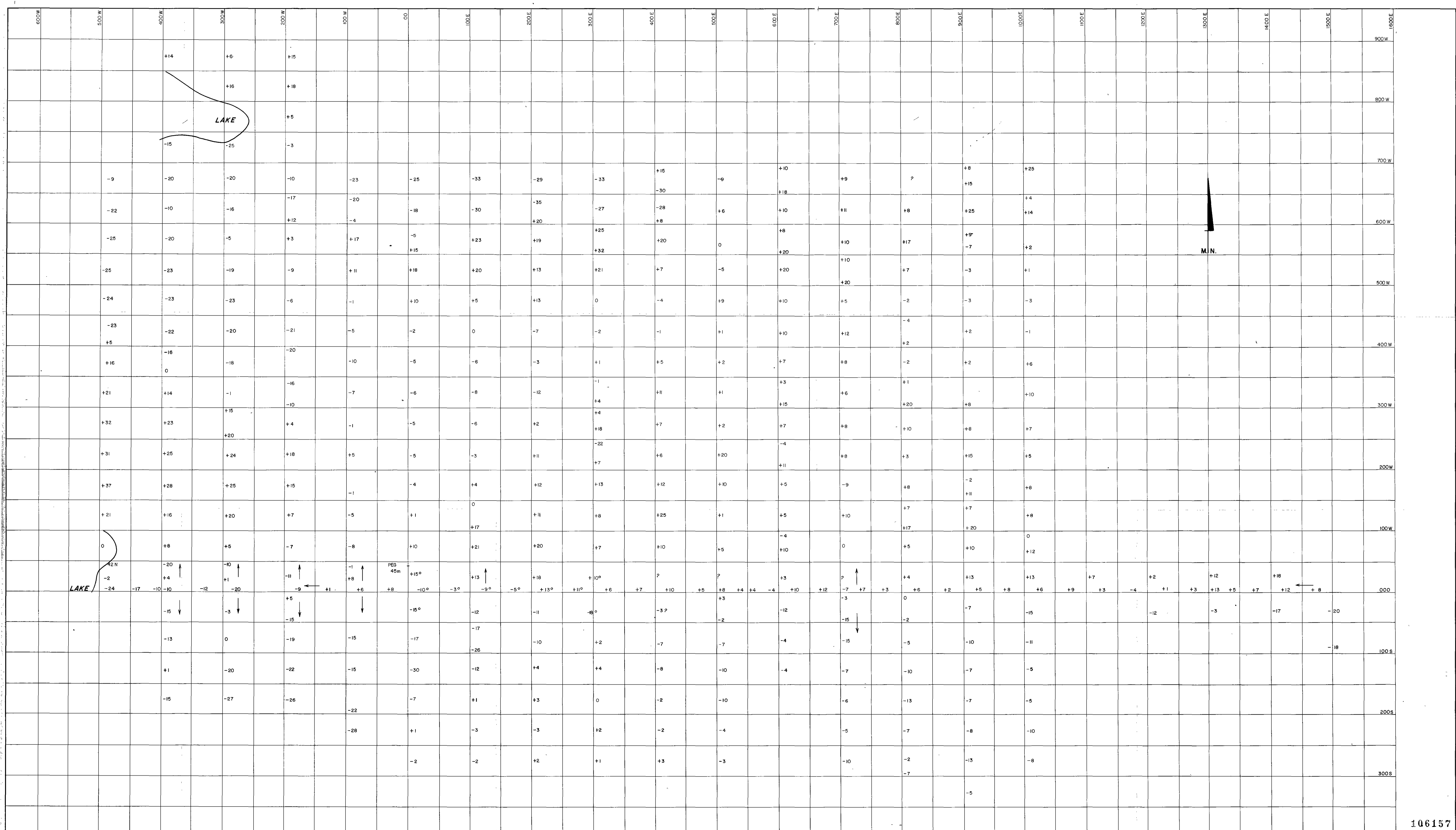
COMALCO LIMITED

TASMANIA
(E.L. 7/74)

**LORINNA EAST & WEST
GEOLOGY**
(Before flooding by Lake Cethana)

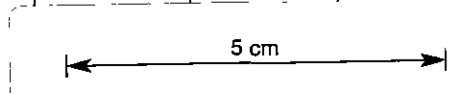


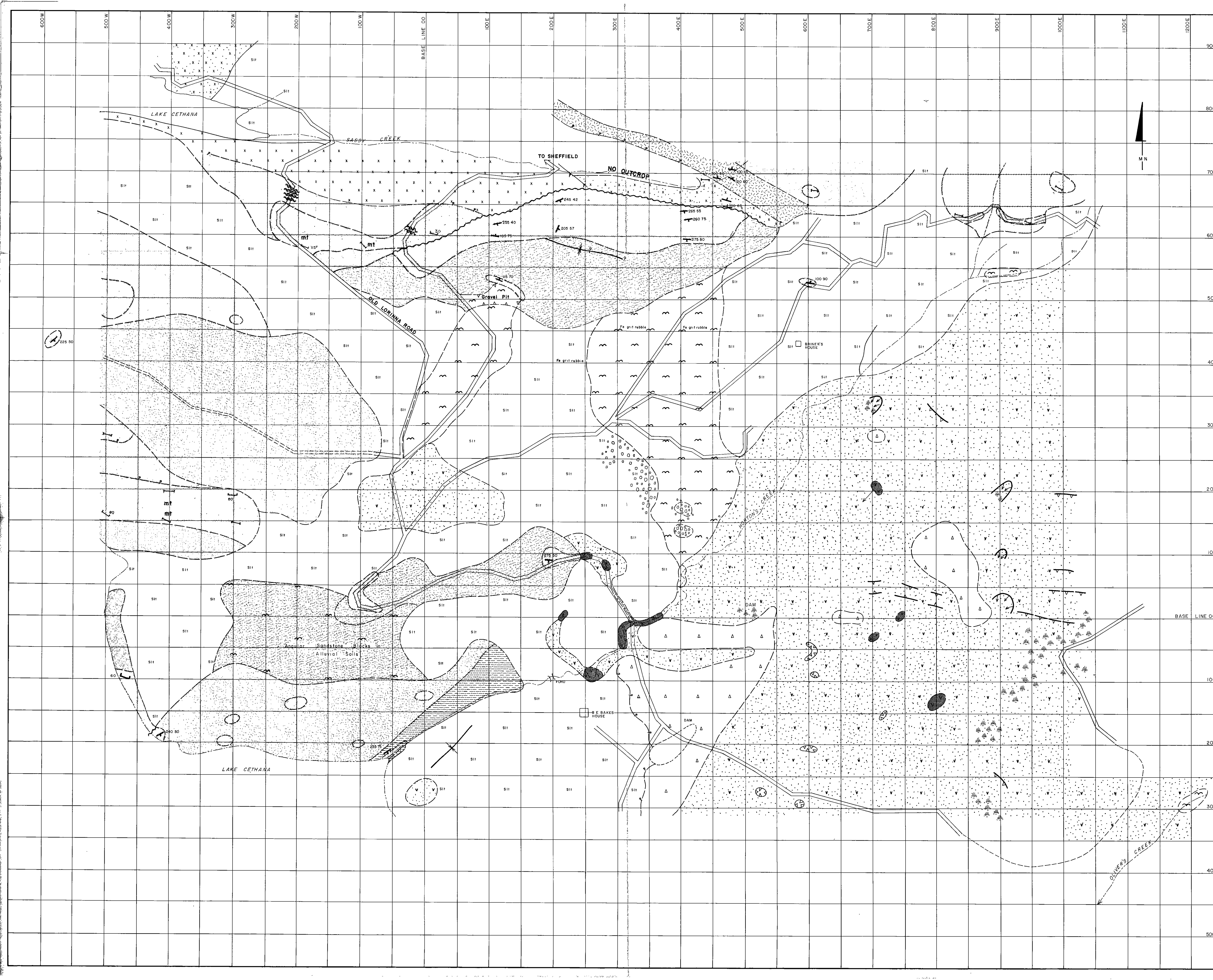
Compiled R. Pollock.	Revised:	Drawn: M. Attwell.
Date July, 1977	Scale:	Drng. No. TAS-77-61



106157

COMALCO LIMITED		
EL 7/74 MOINA TASMANIA		
LORINNA EAST GRID GRID LINE SLOPES 1976		
		5234
		80-416
Compiled R Pollock	Revised	Drawn M A
Date November, 1978	Scale 1:2,500	Dwg No TAS-78-283





- LEGEND**
- Syncline
 - Shear Zone
 - Springs
 - Topographic depressions (Usually water filled - not sink holes)
 - Swamps
 - Magnetite
 - Creeks
 - Geological boundaries
 - Road
 - 4 wheel drive track
 - Walking track
 - Alluvial Soils
 - Alluvial - Cobbles and gravels
 - Basalt - Massive
 - Basalt - Agglomerate
 - Soil derived from basalt
 - Sediments - Scree
 - Sediments - silts
 - Limestone
 - Siltstone, Sandstone
 - Soils derived from siltstone - sandstone
 - Sandstone - Conglomerate
 - Soil and scree derived from sandstone
 - Greywacke - greywacke tuffs
 - Soils derived from greywackes
 - Quartz crystal tuff ("porphyry")
 - Soils derived from "porphyry"
 - Fine grained tuff - coarse siltstone

RECENT

TERTIARY

ORDOVICIAN

CAMBRIAN

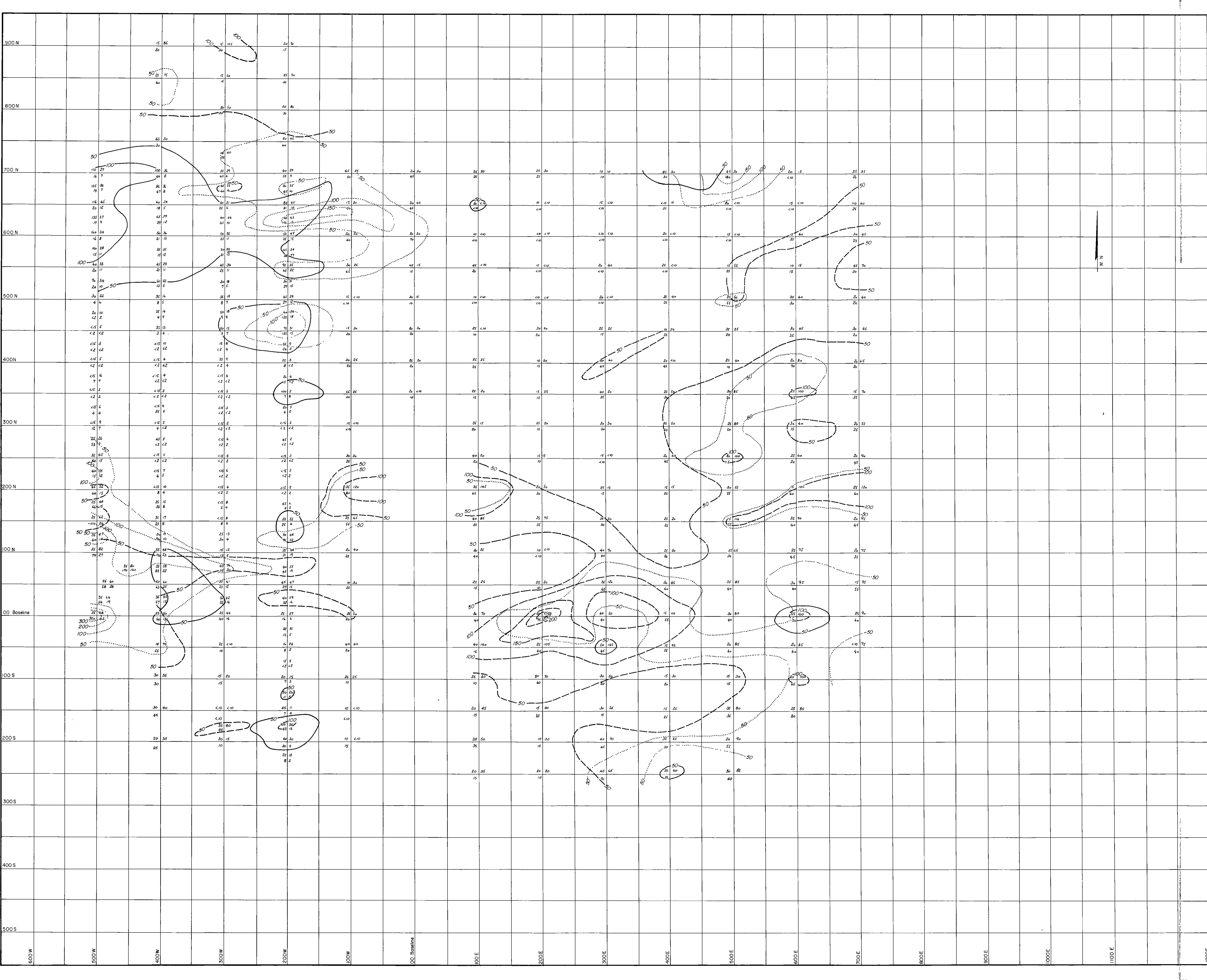
106158

COMALCO LIMITED

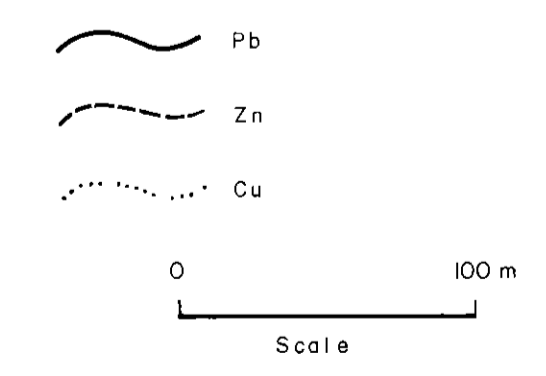
TASMANIA (E.L. 7/74)

LORINNA EAST GRID GEOLOGY

Compiled: R. Pollock Revised: Drawn: M. Attwell.
 Date: July, 1977 Scale: 1:2,500 Drg. No. TAS-77-63



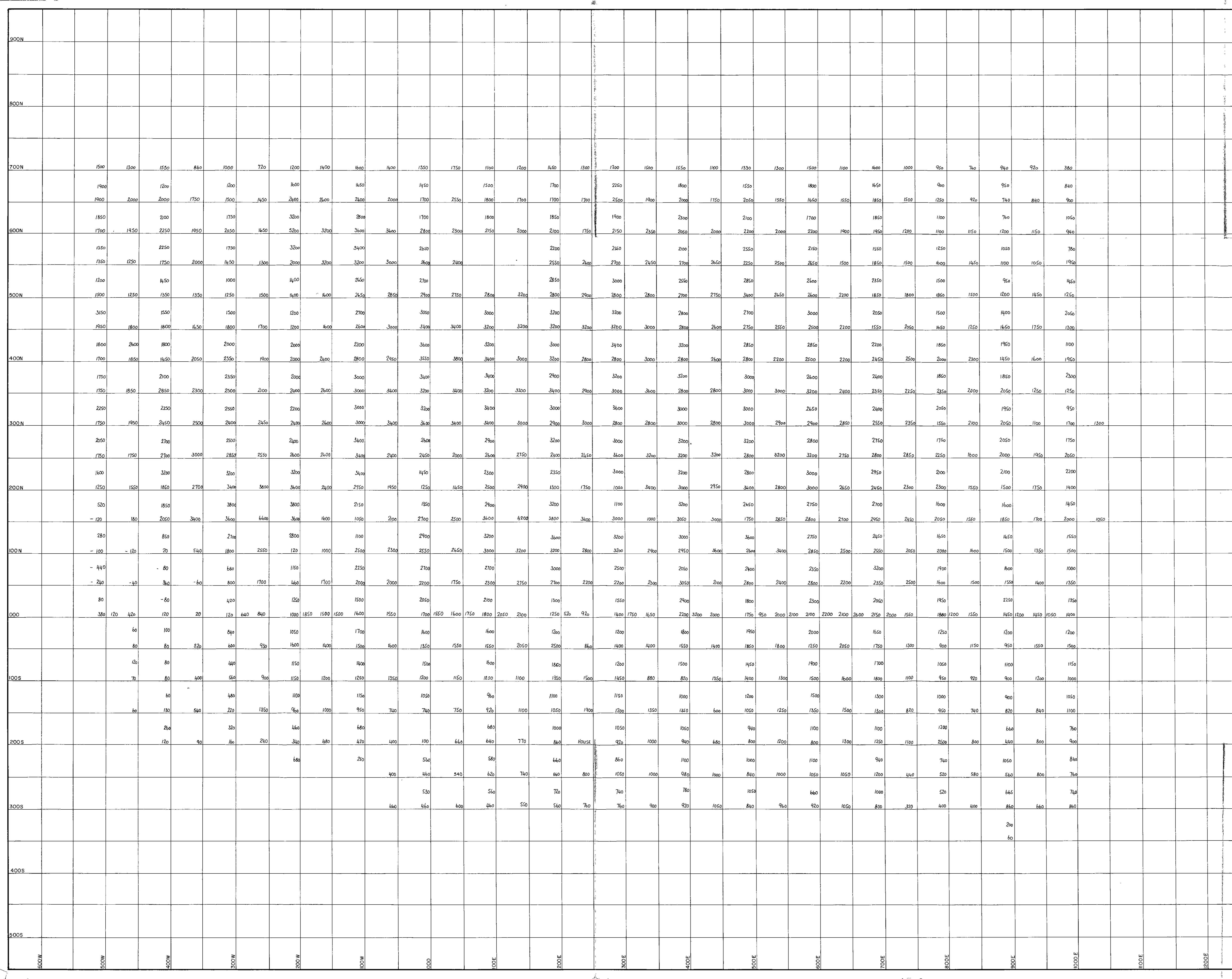
Note: Samples collected in C horizon by hand auger
 -80 mesh fraction analysed by Comalco Research Centre
 using AAS after hot HCl + HNO₃ digestion
 Key, ppm Pb | Zn
 Cu | Co
 Arbitrarily contoured at 50 ppm intervals



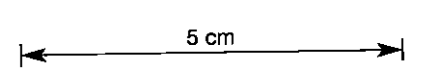
Note: Overlay for Geology Map Tas - 77 - 63

COMALCO LIMITED		
TASMANIA		
E.L. 7/74		
LORINNA EAST GRID		
SOIL GEOCHEMISTRY		
Completed R Pollock	Revised	Drawn S Hutchison
Date September, 1977	Scale 1:2500	Dwg No Tas - 77 - 71

106159

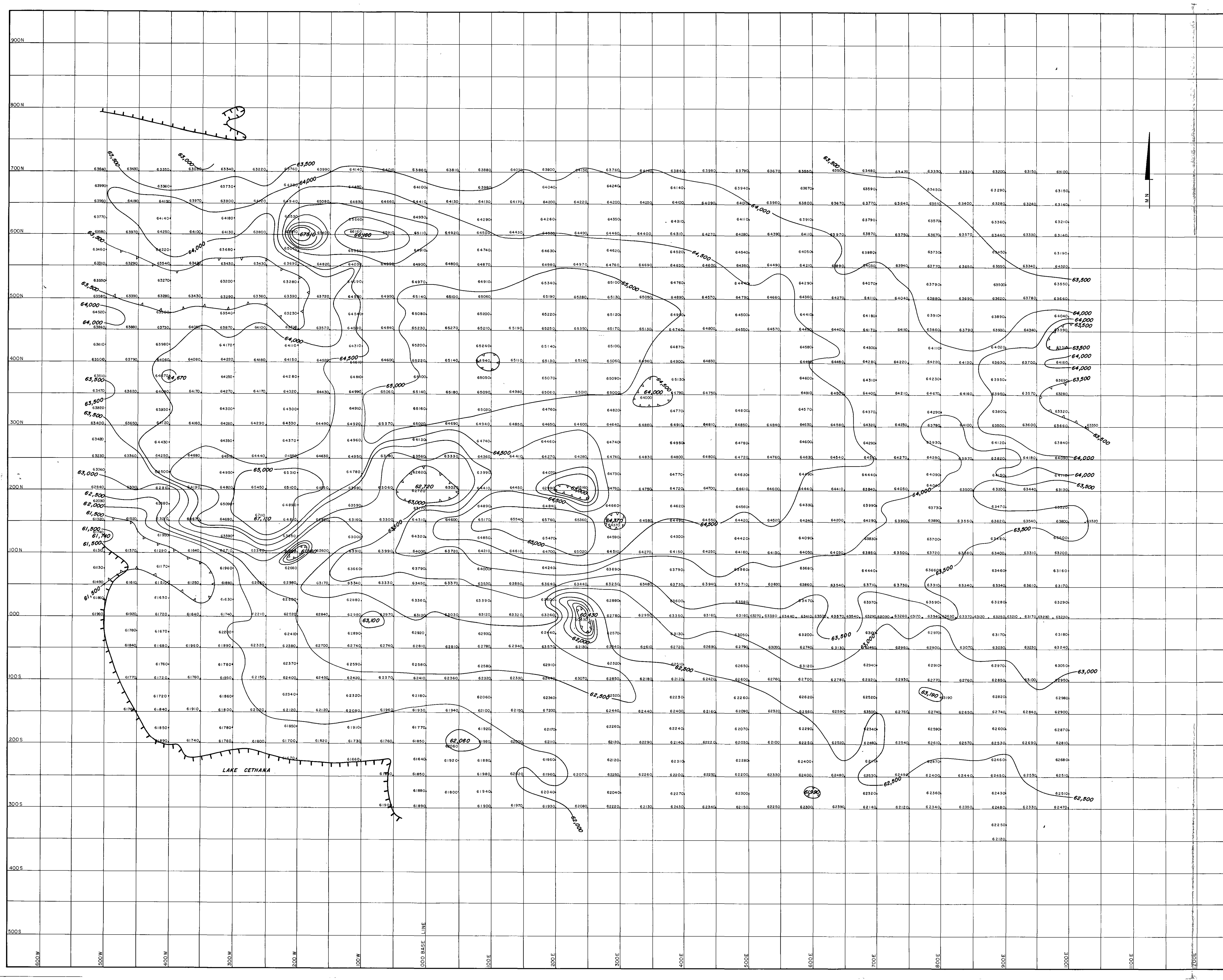


- Instrument used Scintrex MF-2 Fluxgate magnetometer
- Instrument set to zero at Moira base station

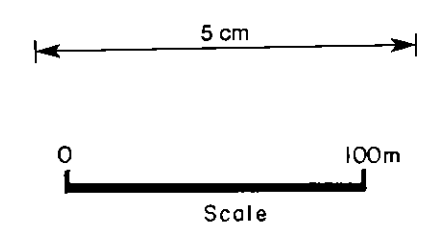


COMALCO LIMITED		
TASMANIA (E.L. 7/74)		
LORINNA EAST GRID		
GROUND MAGNETICS		
FLUXGATE DATA		
Compiled R Pollock	Revised	Drawn S Hutchison
Date October, 1977	Scale 1:2500	Drw No TAS-77-99

106160



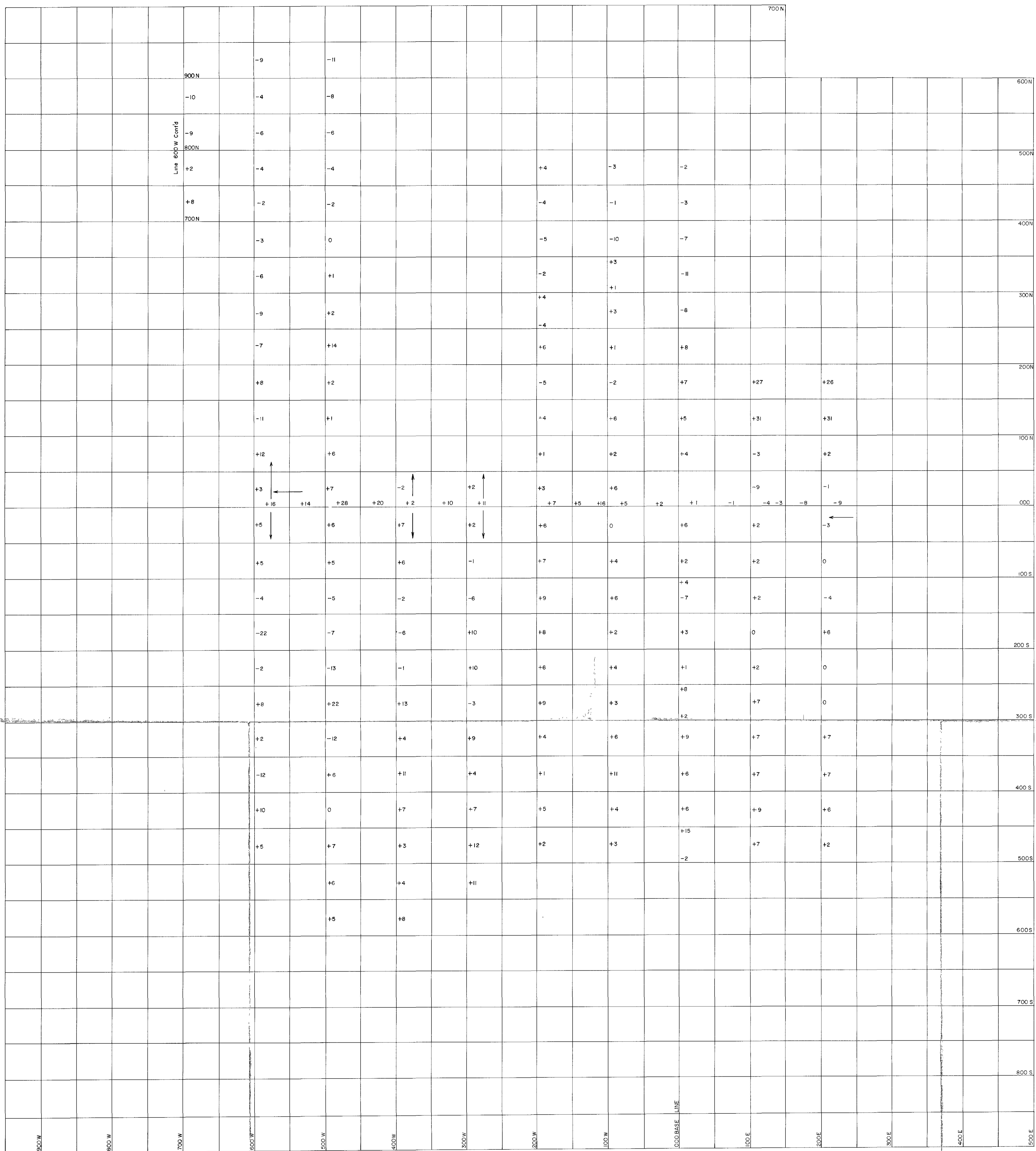
NOTE:
 • Instrument used - Geometrics G-636 "Unimag" portable proton precession magnetometer
 • Contour interval 500γ



NOTE: Overlay for Geology Map TAS-77-63

COMALCO LIMITED		
TASMANIA (E.L. 7/74)		
LORINNA EAST GRID		
(PROTON PRESSION)		
80-141b	5268	
Compiled R Pollock	Revised	Drawn M Atwell
Date August, 1977	Scale 1:2,500	Org No TAS-77-68

106161



5 cm

COMALCO LIMITED

E.L. 7/74 MOINA TASMANIA 80-446

LORINNA WEST GRID
GRID LINE SLOPES 1976

5209

14 06162

Compiled: R. Pollock

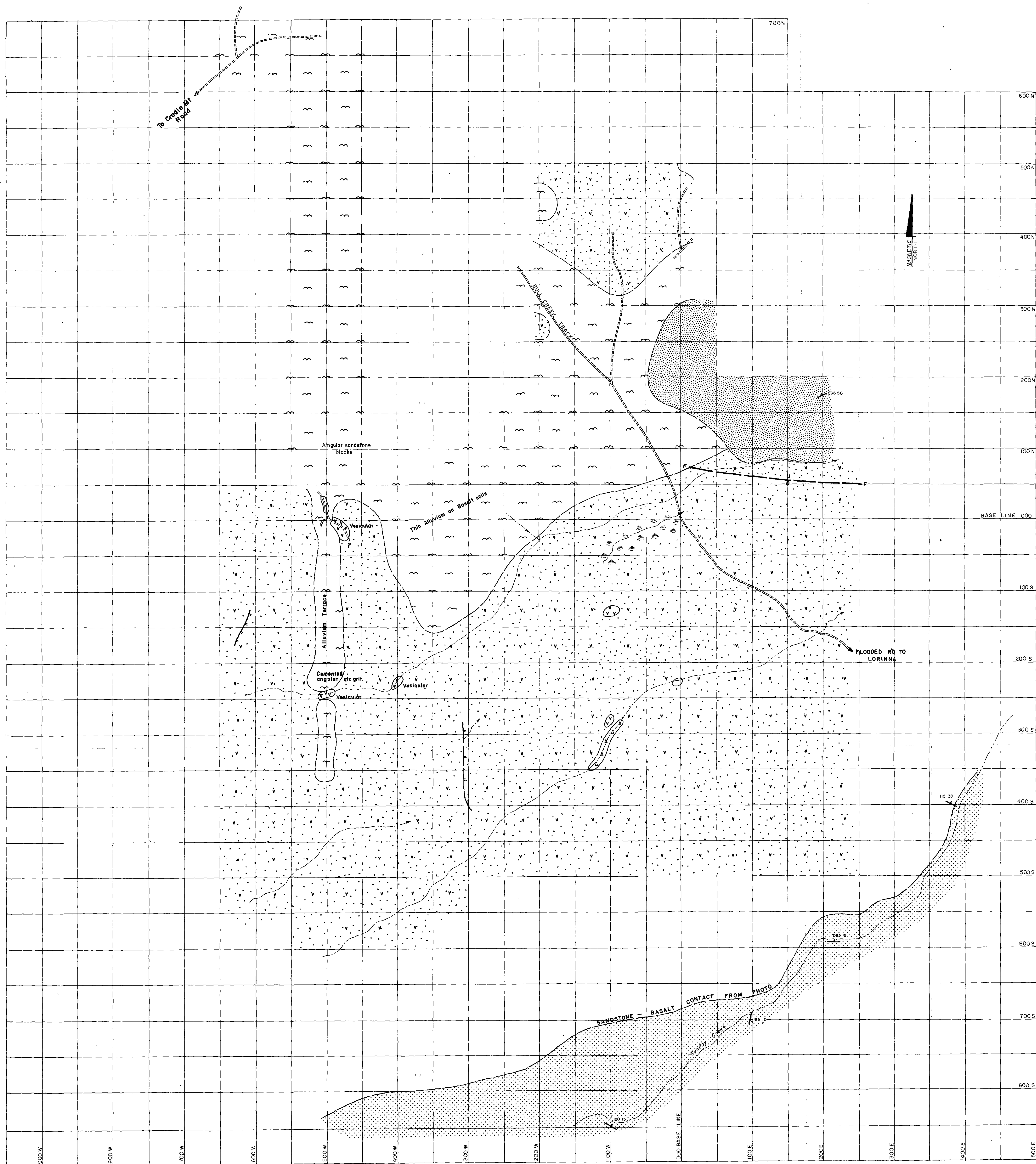
Revised:

Drawn: M.A.

Date: November, 1978

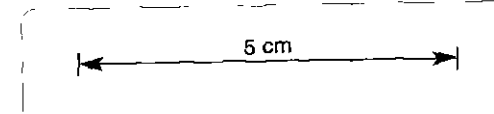
Scale 1:2,500

Drq No TAS-78-281



- LEGEND**
- Recent Alluvium
 - (Agglomeratic) Tertiary Basalt (Massive)
 - Ordovician-Moina sandstone - Tubular siltstone, sandstone
 - Cambrian-Lorinna Greywacke
 - Land Slip
 - Swamp
 - Creek
 - Geological boundary
 - Track
 - Dip of bedding

106163



COMALCO LIMITED

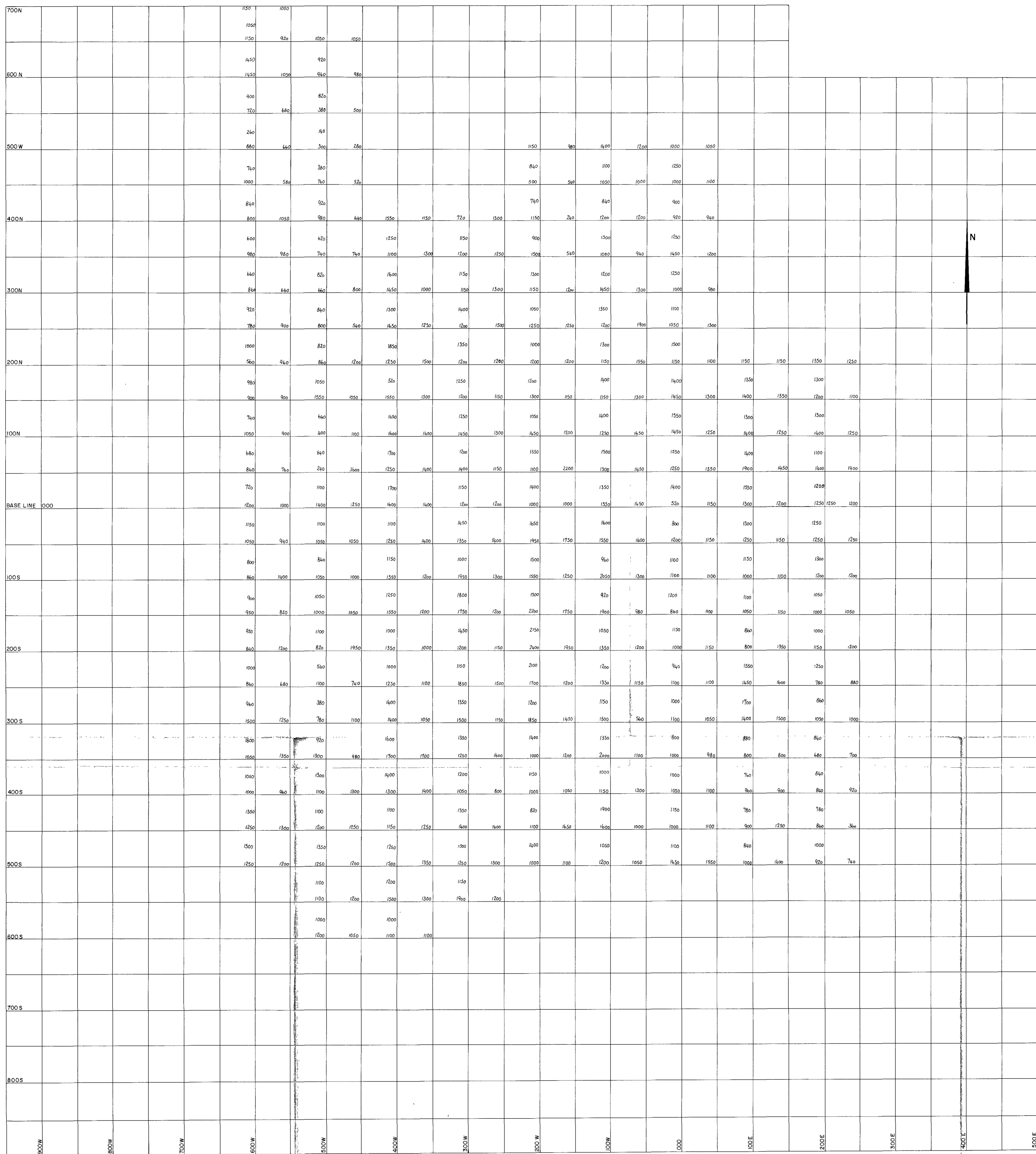
TASMANIA (E.L.7/74)

LORINNA WEST GRID 5270

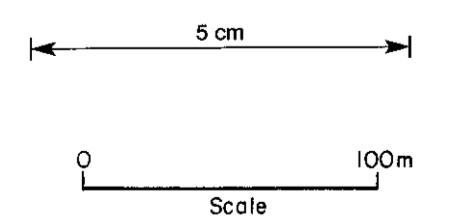
GEOLOGY

Compiled: R. Pollock. Revised: Drawn: M. Attwell

Date July, 1977. Scale 1:2,500. Drg No TAS-77-62



NOTE
 o Instrument used Scintrex MF-2 Fluxgate magnetometer
 o Instrument set to zero at Moira Base Station



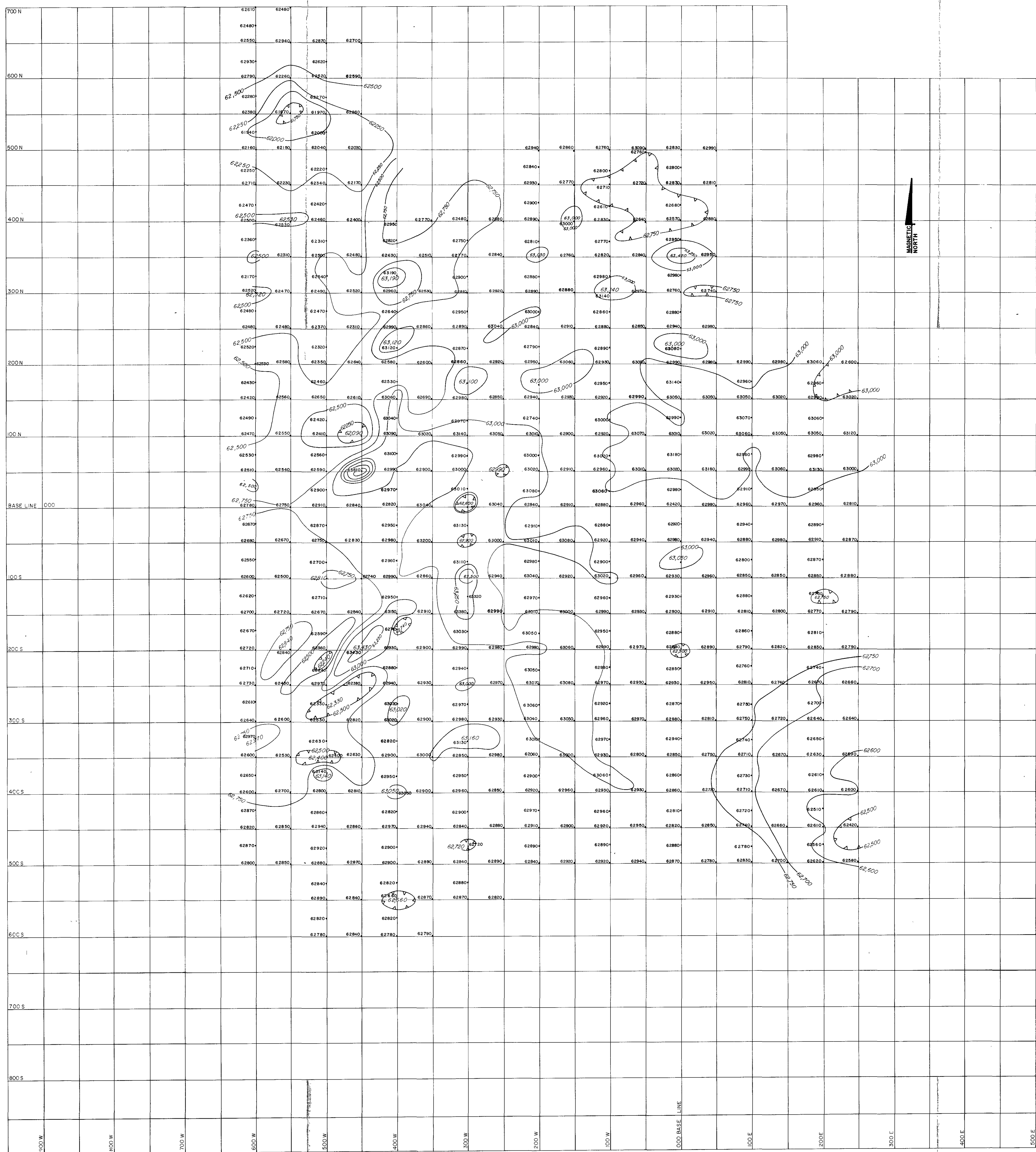
NOTE: Overlay for Geology Map TAS-77-62

106164

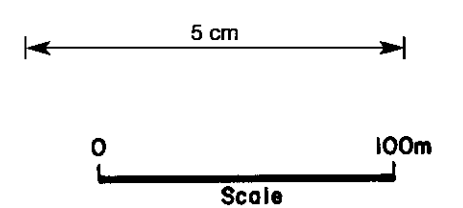
COMALCO LIMITED

TASMANIA
 (E.L. 7/74)
 LORINNA WEST GRID
 GROUND MAGNETICS
 (FLUXGATE)
 STATION READINGS 5271

Compiled R Pollock	Revised	Drawn, S. Hutchison
Date November, 1977	Scale 1:2500	Drng No. TAS-77-97



NOTE:
 • Instrument used Geometrics G-836 "Unimag" portable proton precession magnetometer
 • Contour interval 250 γ



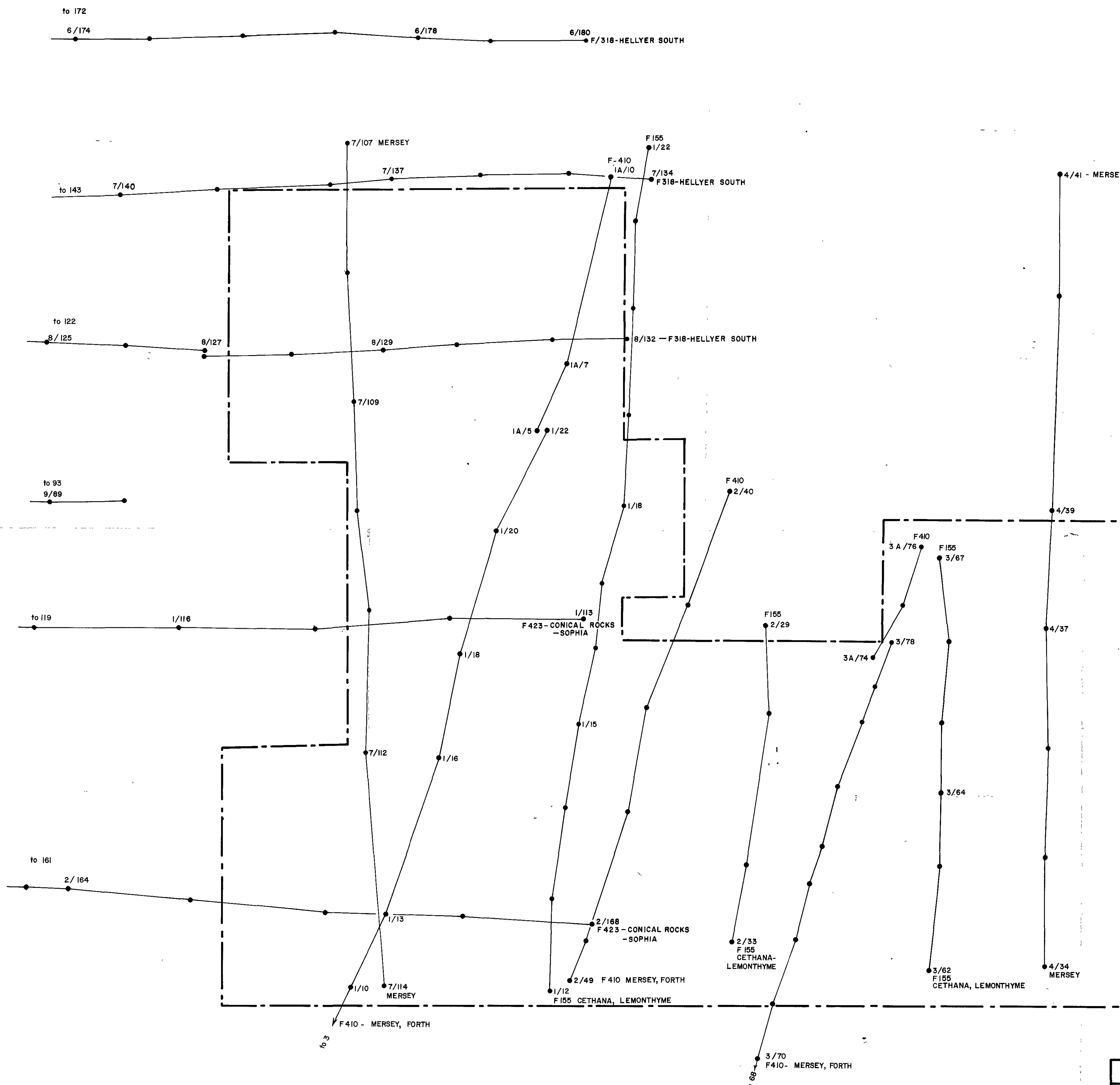
NOTE: Overlay for Geology Map TAS-77-62

COMALCO LIMITED

TASMANIA
 (E.L. 7/74)
 LORINNA WEST GRID
 GROUND MAGNETICS 50''2
 (PROTON PRESSION)

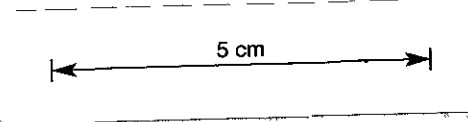
Compiled: R. Pollock.	Revised	Drawn: M. Attwell
Date July, 1977	Scale 1:2,500	Drg N° TAS-77-70

106165



PROJECT NAME	NUMBER	DATE	HEIGHT	RUNS
MERSEY, FORTH	F 410	1-74	18,000'	1-3 A
MERSEY	?	?	?	4, 7
CONICAL ROCKS - SOPHIA	F 423	4-75	23,000'	1, 2
CETHANA, LEMONTHYME	F 155	4-70	14,500'	1-3
HELLYER SOUTH	F 318	3-72	15,000'	6-9

106166



COMALCO LIMITED		80-1616
E.L. 7/74 AIR PHOTO FLIGHT PATHS		
TO 1976		
1 inch = 1 mile		5273
TAS-M-76-45		