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COMALCO LIMITED

EXPLORATION DEPARTMENT

E.L.17/76 QUAMBY, TASMANIA

REPORT ON ALL INVESTIGATIONS TO OCTOBER, 1978

OPEN FILE

G. WESTE.
OCTOBER, 1978.

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1. INTRODUCTION

E.L.17/76 was granted to Comalco Limited on 26th July, 1976. The licence covers an area of 220sq.km. and is situated in the vicinity of Deloraine, 46km SE of Devonport and 40km WSW of Launceston (see Fig. 1).

Exploration of the Cambrian rocks commenced early in 1977 and has included initial geological reconnaissance and stream sediment sampling. Following the initial phase more detailed evaluation has been carried out in two areas; gridding and geophysical surveys at Kentish Hill in the SE, and reconnaissance magnetics and costeaning in the Lobster Rivulet area in the W. No significant mineralisation has been located.

2. EXPLORATION AIMS

The aims of our exploration program in the Quamby area have been to locate economic magnetite-flourite-tin mineralisation and copper sulphides. Exploration for copper-lead-zinc volcanogenic massive sulphides has also been carried out. Models on which exploration has been based include Cyprus type copper, Moina 'wrigglite' skarn, and Rosebery deposits.

3. EXPLORATION METHODS

Exploration has concentrated on the Cambrian rocks. Following a literature search and stereoscopic study of air photographs an initial reconnaissance exploration program was carried out. This involved mapping at scales of 1:20,000 and 1:2,500, accompanied by detailed stream sediment sampling. Samples of potentially mineralised rocks were collected for analysis and a number of rocks sent for thin section description.

More detailed exploration has been carried out over two areas including detailed geological and geophysical surveys over a grid in one area, and detailed traversing and minor costeaning using air photograph control in another.

4. TOPOGRAPHY & ACCESS

The region consists largely of undulating to flat cleared farmland areas developed on rich alluvial and basaltic soils. Separating these areas are two parallel NW trending ridges. The southern most ridge of Ordovician conglomerate and sandstone is abrupt, whereas the northern ridge is a lower, less abrupt feature. The Mersey and Meander rivers and a number of the larger creeks have formed consequent drainage patterns cutting through the ridges in often steep sided gorges which appear to have been partially dammed for some time following extrusion of the Tertiary basalts.

Access to the area is good, but some difficulties have been experienced in the W of the licence area in the Mersey River and Pig Creek gorges. A number of major railways and highways cut the area, and 4 W.D. tracks are common in the more rugged forested sections. Access roads are shown on Fig. 2.

5. REGIONAL GEOLOGY

The Quamby licence area has been mapped as part of the 'Geological Atlas One Mile Series', most of the area being covered by the Quamby sheet (Pike 1969, 1973) with small portions of the NW corner falling on the Frankford (Gulline etal 1973), Sheffield (Jennings etal 1959), and Middlesex (Jennings, 1958, 1963) sheets. The tectonics and stratigraphy of the area are discussed in Williams, 1976, Crawford and Campbell (1973), Solomon and Griffiths (1972, 1974), the main topic being the development of the late Pre Cambrian and Cambrian sequences.

Regional structures interpreted from Gravity and airborne magnetic data are discussed in Longman and Leaman (1967, 1971) and Sheehan (1969).

6. GEOLOGY OF THE LICENCE AREAA. GENERAL.

Rocks from Precambrian to Recent in age outcrop within the licence area. Our attention has been concentrated on the Cambrian rocks which have been mapped and prospected at 1:20,000 scale over the whole of the licence. Only brief descriptions of rocks older than, or younger than Cambrian are given below.

B. PRE CAMBRIAN.

Banded quartzite, quartz-muscovite schist and phyllite outcrop in the SE of the licence area. These rocks have been strongly deformed. They are highly folded and strongly foliated in contrast to the younger Cambrian and Ordovician rocks which overlay them with angular unconformity. The relationship of this small exposure of 'Older'? Precambrian to the main geanticlines to the N and SW is not clear, but it is possible part of the Tyennan block, or an upfaulted slice of basement.

No signs of mineralisation were observed.

C. CAMBRIAN.1. GENERAL.

The licence area contains the SE limit of exposure of the Fossey Mountain Trough situated between the Tyennan, Forth and Badger Head geanticlines. The rocks in this portion of the trough trend SE, possibly as a result of compression of the Badger Head and Tyennan geanticlines during closure of the trough.

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Acid pyroclastics are more abundant than previously recognised in the NW of the area, wedging out to the SE. They consist of crystal airfall tuffs and fine grained welded ash flows and appear to have been derived from a vent or vents some distance away. Less significant basic volcanics also occur, and are SE extensions of possible oceanic tholeiites at the base of the Beulah formation to the NW of the licence area. Nine thin sections of various acid and basic volcanic rocks are described in appendix 1.

Both acid and basic volcanics appear to have been the major source for the greywacke trough sediments which dominate the area, particularly in the SE. The source for the volcanic material appears to have been well to the W or NW.

The Cambrian rocks have been mapped by P. Komysan. (see drg. No.78-128: Geology of the Cambrian rocks, E.L.17/76, Quamby) and he has described them below.

2. MAPPING & DESCRIPTION OF CAMBRIAN ROCKS - P. KOMYSHAN.

The area mapped, which consists of approximately 55 sq km of Cambrian sediments, volcanoclastics, volcanics and Ordovician sediments, is located 4 km SW of Deloraine. It is bounded on the west by the Mersey River and on the east by Quamby Brook.

Outcrop of the Cambrian rocks within the area is limited to about 5% due to the low undulating topography, nature of the rocks and weathering. Ordovician sandstones and conglomerates form prominent NW-SE trending ridges and are more extensive in outcrop.

Geological boundaries were inferred by:

- (1) Direct observation of outcrop (rare)
- (2) Soil type changes (Not always reliable due to remnant

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Tertiary sediments and soils).

- (3) Breaks in slope.
- (4) Changes in rock floatsam (on soil and tree roots).
- (5) Vegetation changes (e.g. changes from broad leaf eucalypts to fine leaf eucalypts across the Ordovician Cambrian boundary).
- (6) Photo interpretation (i.e. photolinears).

One method of inference was usually not sufficient to determine any particular boundary.

It should be noted that boundary inference from rock floatsam of sandstone and other resistant rocks will give on the maps a larger area of outcrop compared to siltstones which are less likely to occur as floatsam.

Accuracy of the boundaries varies but they are generally to within 20 metres.

A detailed ordered stratigraphy of the area was not possible due to the lack of sufficient outcrop which gave facing information. However, an attempt was made to separate the Cambrian sediments and volcanic units. For ease of description these units have been labelled from A to K. The order of labelling is not an indication of stratigraphic order.

Unit A - silty sandstone: This unit is predominantly a yellow brown to red brown, silty sandstone interbedded with siltstone conglomerate and clay pebble conglomerate. This unit also contains minor beds of greywacke with grading of clay particles (weathered feldspar?).

Unit B - siltstone, slate: This unit consists predominantly of yellow-brown siltstone, slate, fine grained greywacke grading into the silty sandstone of Unit A. It is very likely that the extensive outcrop of Unit B in the western portion of the mapped area is laterally equivalent to Unit A outcropping in the East.

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Throughout Units A and B, vein quartz floatsam is abundant. This floatsam, which is generally midly stained red and barren of mineralisation, is probably derived from tension veins.

Unit C - coarse grained greywacke: This unit is a coarse grained green grey feldspathic greywacke. It is limited in occurrence to the Eastern portion of the mapped area.

Unit D - micaceous sandstone: This unit generally outcrops along long, rounded and flat topped linear ridges and consists of quartz sandstone conglomerates and lithic-wackes. Cleavage is defined by a good alignment of micaceous minerals and clasts. The presence of muscovite and fragments of phyllite in a predominantly quartz rich rock makes this rock distinctive.

Unit E - acid pyroclastic: This unit consists mainly of ash flows. A number of samples have been petrologically described as lithic-vitric tuff, plagioclase crystal vitric tuff, and quartz-plagioclase crystal tuff. (See samples 6, 19 and 42). Lenses of greywacke and siltstone occur within the pyroclastics. Topographically this unit is expressed as an undulating depression perhaps due to relative chemical instability. However this unit forms resistant outcrops in the Mersey River.

Unit F - green slate: This unit which is largely a volcani-clastic (reworked lapilli tuff), consisting of a fine grained dark green to red brown groundmass with ellipsoidal fragments of volcanic material ranging from trachytic to andesitic in composition (Q/T/5). This unit only outcrops in the eastern portion of the mapped area.

Unit G - fine grained greywacke: Fine grained blue grey greywacke containing rounded quartz and feldspar grains and minor mica in a fine grained green-blue groundmass. This unit, which is graded and laminated, generally outcrops in topographic lows. It also has a good grey soil cover with little rock floatsam.

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Unit H - polymictic conglomerate. This unit is a massive bedded, poorly sorted pebble and boulder conglomerate of varying grain size in a highly cleaved continuous greywacke matrix. The sub rounded pebbles consist of Precambrian quartzite and quartz schist, vein quartz, minor phyllite, slate and quartz feldspar porphyry. The groundmass consists of sub angular to sub rounded sand sized grains of quartz and mica (muscovite, chlorite bonded by a weak haematitic cement. Weathering of the matrix to clay has resulted in a weak disaggregated rock. The conglomerate is interbedded with greywacke and lithic sandstone of similar composition to the matrix of the conglomerate.

Unit I - quartz feldspar porphyry: For description see p.19 Pike (1973). This rock unit outcrops $\frac{1}{2}$ km south of Pumicestone Ridge and also $\frac{1}{2}$ km west of Punches Terror. Outcrop distribution indicates that the porphyry is partially intrusive. However the porphyry was also probably extrusive as indicated by presence of reworked pebbles of porphyry in overlying Cambrian conglomerate beds. There is no evidence to suggest that the porphyry intruded into the Ordovician quartz sandstone of Pumicestone Ridge as suggested by Pike (1973).

Unit J - laminated sandstone and siltstone: This unit consists of alternating laminated beds of sandstone and siltstone. The beds are often graded on a fine scale. Outcrop of this unit just east of the Mersey River indicates that the Cambrian rocks of the area have undergone at least two phases of folding. The first phase resulting in tight parasitic folds and cleavage sub-parallel to bedding, which in many areas could result in misinterpretation of cleavage as a bedding surface.

A second minor event overprints the first. This is associated with axial planar cleavage, which in most outcrops is approximately 10° - 20° to the bedding.

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Unit K - Basic volcanic: This unit outcrops north of Magog, to the north of Pig Creek and to the north of Kentish Hill. Thin sections of three samples (50B, 75A and 75C) indicate that the rock is generally basaltic to andesitic in composition with phenocrysts of plagioclase (15 - 30%), clinopyroxene (10 - 15%), hornblende (0 - 10%), and minor magnetite (0 - 5%). Varying degrees of chloritic and sericitic alteration have taken place.

The rock which shows extensive epidote veining is occasionally brecciated. It is associated with lapilli tuff, volcaniclastics and occasional massive magnetite.

D. ORDOVICIAN.

Basal conglomerate (a correlate of Owen Conglomerate) and sandstone rest with apparent angular unconformity on both Precambrian and Cambrian rocks. The conglomerate is resistant to weathering and forms two parallel NW - SE ridges. In many places the conglomerate is thin or absent, the actual Cambrian-Ordovician contact being obscured by talus. The conglomerate contains large to small pebbles of Precambrian quartzite in a sandy matrix. The sandstone is often tubicular.

Impure stylolitic Gordon Limestone underlies Tertiary sediments and Recent alluvium in the SW of the licence area and near Quamby Brook in the E.

E. PERMIAN

Permian mudstone and oil shale (Reid, 1924) outcrop in the very SE of the area mapped. These rocks are undeformed and dip at about 5° SW. A more detailed description of the rocks can be read in Pike (1973).

F. JURASSIC.

Downfaulted dolerite outcrops as low ridges at the E boundary of the licence area. A smaller outcrop occurs in the NW corner

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where it is largely overlain by Tertiary basalt. The dolerite forms well developed talus slopes.

G. TERTIARY.

Gravels and grits have been deposited on old flood plains and in lakes formed by damming of rivers by basalt flows. In the area mapped, S of Red Hill, iron lateritised clays and sands form fairly extensive outcrop. Where directly overlain by basalt they have often been silicified to greybilly. Tertiary basalt covers much of the N and S of the licence area.

H. RECENT.

Rich alluvial floodplains cover much of the lower lying areas. Well developed talus from the Ordovician conglomerates and sandstones occur on the N sides of Gardners, Needles, and Long ridges.

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7. STRUCTURE OF THE LICENCE AREA - P. KOMYSHANA. GENERAL STRUCTURE.

Wells (1957) interpreted the Cambrian rocks directly south of Deloraine as a shallow plunging (to NW) isoclinal anticline. He observed an angular unconformity between the Cambrian and Ordovician units but interpreted the axes of the assymetrical folds in the Junee Group (Ordovician rocks) as parallel to the fold axis in the Cambrian rocks.

Pike (1973) does not venture an opinion as to the structure of the Cambrian rocks although notes the occurrence of minor tight asymmetric folding and axial planar cleavage. He also notes the presence of crenulation cleavage ("Strain-slip cleavage") which indicate two folding phases. Rocks units were mapped as linear entities and show no indication of the plunging anticline of Wells (1957). Pike recognized an angular unconformity between the Cambrian and Ordovician strata and broad concentric folds accompanied by break thrusts of the competent "Owen" type sandstone.

My mapping indicates that the Cambrian sediments have undergone at least two phases of folding. The first phase producing tight isoclinal asymmetric folds. Sedimentary facing and structural facing where available indicates that the Cambrian rocks north of Magog and south of Punches Terror are part of the SW limb of a shallow plunging syncline.

No definite conclusions about the structure of the Cambrian rocks south of Deloraine can be made. However the following points can be made.

1. Loose boulders show cleavage at right angles to bedding. i.e. the rocks are folded although fold closures are not exposed.
2. Rock distribution in the SE portion of mapped area could

be interpreted as either:

- (a) some form of fold closure (as by Wells 1957)

However, the data supports;

- (b) lateral lithological variation.

Outcrop is insufficient to define the structure adequately.

The angular unconformity between the Ordovician and Cambrian rocks is well exposed in the quarry at Punches Terror and implied at Pumicestone Ridge, as stated by Pike (1973). A thrust fault is needed at the base of the Owen conglomerate correlate to explain the anomaly in dips between the Cambrian and Ordovician beds in the area of Lobster Rivulet.

The major structure of the area is that of a broad antiform in the core of which the Cambrian rocks are exposed and the limbs of which are of Ordovician sandstone and conglomerate.

This antiform has an amplitude of 3.6km (estimated) near the Mersey River and reduces to 2.4km between Beefeater Hill and Needles Ridge.

Towards the east the antiform amplitude increases and a small parasitic syncline with a shallow easterly plunge has developed on the southern limb, (outcropping to the north of Native Hop Hill). Figures 3, 4 and 5 are stereoplots of the bedding and cleavage.

B. FAULTING.

The area mapped appears to be relatively unfaulted. This may be a function of the lack of outcrop.

Tertiary and Quaternary depositinal basins (e.g. alluvial plain of the Meander River) cut across the major NW-SE trending structures of the Cambro-Ordovician rocks. These basins appear to be covering major N-S and NE-SW(?) trending fault systems. (e.g. Quamby Brook). The Mersey River and Lobster

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Rivulet also appear to have N-S trends across the Cambrian Rocks probably following faults.

To the east the Cambrian rocks are faulted against Permian sediments and Jurassic dolerite. This fault which is well exposed on Spear Hill probably extends beneath the talus to the south and probably extends to the north, juxtaposing Jurassic dolerite against the Cambrian conglomerate.

Minor faulting is difficult to recognize. However, two faults south of Panches Terror have been inferred from the outcrop of Ordovician sandstone and corresponding photo linears. To the south of Magog three faults were inferred due to the ill fit of geology across valley and photo linears. However, their position is tentative due to cover of talus, alluvium, river gravel and aeolian sand.

8. STREAM GEOCHEMISTRY

A. SAMPLING & ANALYSIS.

A detailed stream sediment survey was carried out along all streams draining areas of outcropping Cambrian rocks, or where Cambrian rocks may exist beneath a shallow cover. Samples were collected from the stream bed, dried and sieved through 80 mesh. The minus 80 mesh fraction has been analysed at Comalco Research Centre by AAS for copper, lead and zinc following digestion in hot HCl and HNO₃. A total of 414 samples were collected and analysed. Results (sample No. and analytical values) are shown on drawing Nos. 78-223, -224, -225, -226, which are at the same scale (1:20,000) as, and overlay, the geology sheet.

B. STATISTICAL ASSESSMENT OF RESULTS.

Simple statistics have been carried out to aid interpretation of the analytical results. Histograms have been plotted, (app.2 Figs.1 and 2) and the mean and standard deviation calculated for each element. The statistical assessment is described in appendix 2. Values are divided into 3 categories; background (up to mean + one standard deviation), high (between one and two standard deviations above the mean), and anomalous (greater than two standard deviations above the mean). High and anomalous drainage areas are outlined and listed in appendix 2.

C. INTERPRETATION OF RESULTS.

Backgrounds for all elements are low. Few anomalies for lead and zinc occur and the statistical thresholds are very low for all three elements (copper 54ppm, lead 42ppm, zinc 94ppm).

COPPER.

1. A number of low order copper anomalies (Nos. 14, 15 and 16) are associated with malachite stained basic volcanics in the Kentish Hill area in the SE of the licence.

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The strongest Cu anomaly (No. 13) occurs in greywackes and minor sandstones in Unit A on the geology sheet. This unit contains clasts of probable basic volcanic material and may have been derived from the basic volcanic unit to the S. Streams draining the S and E of Beefeater Hill are also anomalous (No.10), the apparent source being the siltstones and greywackes of Unit B which are not exposed in the anomalous area. Copper-zinc anomalies in the NW corner of the licence are probably derived from weathering of Tertiary basalt.

LEAD.

2. Lead anomalies are of very low order and probably do not represent mineralisation. The highest value is 80ppm and occurs at anomaly 2 in the NW of the licence where unit B contains intercalated tuffs of Unit C type. Other very low order lead anomalies occur in the acid pyroclastics and volcanoclastics of Unit E and associated with copper and zinc anomalies.

ZINC.

3. The strongest zinc anomaly (No.4) is 320ppm and occurs just W of the Mersey River in a creek draining an area of poor outcrop. There are coincident low-order lead anomalies. Possible source rocks include feldspathic tuff/greywacke from Unit C and laminated siltstone/sandstone from Unit J. A fault which occurs in the vicinity of the anomaly appears to have cut off a basic lava to the E. Low-order zinc anomalies occur in Unit B (anomaly 3), and in areas draining Tertiary basalt (anomalies 1 and 9).

D. CONCLUSIONS.

Most of the anomalies are of very low order and are unlikely to actually indicate economic mineralisation. Three anomalies (ranked 'good' and numbered 4, 10 and 13 in appendix 2 and on the sample location plans warranted careful follow reconnaissance and sampling of any interesting rock types in their areas). This has been carried out during reconnaissance mapping to

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produce the 1:20,000 scale geology plan. No mineralisation has been observed in any of the anomalous areas.

The other 13 anomalous areas may indicate potential source or host rocks for economic mineralisation (e.g. copper anomalies 14, 15 and 16 in the Kentish Hill region).

8E. RECENT ADDITIONAL ANALYSES - 18-12-78.

Following the discovery of tin and tungsten bearing magnetite associated with basic volcanics in the Lobster Rivulet area (see section 11) 142 minus 80 mesh stream sediment samples from the basic volcanic areas have been sent to Amdel Laboratories to be analysed for tin and tungsten by XRF. Results have just been received and are attached in Appendix 10.

Most samples contained tin and tungsten values at or below the detection limits (4 and 10ppm respectively). However a number of samples contain values greater than 25ppm tin and are probably anomalies. Sample 104 (grid ref. 5948/0400) contains 55ppm tin (no tungsten) and was taken from a creek draining the acid tuffs of unit E and greywackes of unit B. No basic volcanic or airborne magnetic anomaly exists here, and the source remains unexplained. Sample 106 (grid ref. 6008/0292) contains 50ppm tin and occurs in the volcanics of unit E. Two tin anomalies are possibly associated with the magnetite bearing basic volcanics:- sample 107 (40ppm at grid ref. 5964/0288), and sample 108 (30ppm at grid ref. 5880/0345). No outcrop occurs in the vicinity of these anomalies because of a thick cover of periglacial sandstone scree. Two samples are anomalous for tungsten, sample 26 (grid ref. 5893/0660) contains 150ppm and sample 27 (grid ref. 5914/0700) contains 90ppm. These samples were taken from a creek draining mixed acid/basic volcanic and volcanoclastic rocks and are possibly related to the NW intermediate volcanic.

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8.E. No field inspection for the source of the tin and tungsten anomalies has yet been carried out. The areas surrounding the strongest anomalies (samples 104, 106, 26-27) warrant further investigation.

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9. PREVIOUS EXPLORATION.A. GENERAL.

The exploration licence area has been the subject of only limited previous exploration. In 1973 the area was held by Asarco who carried out a widely spaced stream sediment survey and then relinquished the area.

During 1975 and 1976 the area was held by Union Oil Development Corporation under E.L.15/75. Limited exploration was carried out only in the Kentish Hill area in the S of the licence.

B. COPPER-GOLD (KENTISH HILL AREA).

In 1921 minor malachite and azurite mineralisation (Quamby Copper Mine) was discovered along the contact of the basic volcanic, Unit K and the slates of Unit B (1:20,000 geology sheet, at grid ref. 4750 3937). The rocks were found to also contain very minor gold, silver and nickel. The mineralisation is reported by Reid (1923) to have occurred with the volcanics as low grade lenses separated by barren rock. Two shafts and one adit were cut in an unsuccessful search for economic mineralisation.

Prospecting in the vicinity of the Quamby Copper Mine was carried out by T.W.Davies Syndicate during 1970-71. The work showed little geological control but located an electromagnetic anomaly in the vicinity of the known mineralisation and drilling intersected an interval of 46.5 metres of weakly mineralised (0.08% - 0.4%, av. 0.18% copper) in basic volcanic(?) in one (BH4) of six drill holes. The holes (vertical) were drilled almost down dip and were not geologically logged. The geology described in the Davies syndicate reports on the prospected area bear little resemblance to that observed by other explorers.

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Union Oil cut grid lines across the prospective basic volcanics and adjacent sediments and carried out B and C soil horizon sampling programs (McGregor - Dawson, 1976). The soils were anomalous for copper with associated weaker zinc and nickel highs. No further work was carried out in the area.

C. TIN & TUNGSTEN.

Costeaning was carried out at two localities (grid refs. 4705/3968, 4714/3962) at the contact of the Cambrian and Precambrian sediments. Analyses of samples from one costean. indicated minor tin mineralisation (0.15%) with trace tungsten and zinc.

D. OIL SHALE.

A 1.4 metre seam of "Tasmanite" oil shale was investigated in 1920 (Hills, 1921). The shale occurs in the Permian Quamby Mudstone at grid ref. 4767/3916 and surrounding area. Tenement for oil has been held over these rocks at various times since 1920 but no further exploration has been carried out.

0210. KENTISH HILL GRID.A. GENERAL.

The basic volcanic rocks and associated sediments in the Kentish Hill area including the Quamby Copper Mine were considered as potential hosts for Cyprus type copper deposits.

Following initial mapping by I. Picken in February, 1977, the existing Union Oil grid was extended and a program of geological mapping, induced polarisation and magnetics has been carried out over the grid. No highly prospective drilling targets have been located.

B. RECONNAISSANCE MAPPING.

Reconnaissance geological mapping of the Kentish Hill - Quamby Brook area at 4 x enlarged airphoto scale (1:7,500 approx.) was carried out to delineate the area to be gridded. The reconnaissance geology is shown on drawing No.78-166.

C. GRIDDING.

The Union Oil grid consisted of 7 lines each 600 metres long (bearing 038.5°M) and spaced 200 metres apart. This grid has been extended to the E and intermediate lines cut to gain 100 metre line separation. An additional 5 lines have been cut to grid S. The grid lines are not slope corrected.

D. GEOLOGY.

The geology of the grid area has been mapped by R. Poltock at 1:2,500 scale and is shown on sheet 77-104. The rocks are described in section 6 of this report. The Union Oil grid has been extended to cover the Basic volcanic and poorly exposed overlying rocks to the NE.

028

1 CAMBRIAN.

Conglomerate, micaceous sandstone, and phyllite of Unit D on the 1:20,000 plan outcrop in the S of the grid. The rocks of this unit are generally well sorted, the conglomerates and sandstones containing very little matrix. There is a gradual decrease in grain size from the base (pebble beds) to the top (N) where phyllites or slates are dominant.

N of the micaceous sandstone unit a relatively thin dark grey to grey-green slate contains fine basic volcanic material. This is overlain by a basic volcanic unit containing altered basic lava consisting of small lensoidal pods up to 1 metre maximum diameter surrounded by epidote and chrysotile (probably a pillow lava). Thin cross cutting veins of chlorite and chrysotile are also common. Intercalated with the lavas of this unit are a number of tuffs and volcanoclastics (greywackes and silts on plan). These include a lapilli tuff described in appendix 1 (sample Q/T5). The volcanics become more intermediate to acid in character to the N and are overlain by volcanoclastics including coarse greywackes containing fragments of basic, intermediate and acid volcanic material. Small bands of intermediate and basic tuffs(?) are common within the volcanoclastics.

2 ORDOVICIAN.

Basal Ordovician conglomerate outcrops on the SE corner of the grid. This rock trends almost parallel to the grid, but about 50 metres to the S and occurs as only a skeletal covering over Cambrian conglomerates and micaceous sandstones.

E. STRUCTURE.

The Cambrian and Ordovician rocks trend grid E-W (125° M) in the grid W of the area, swinging slightly to grid NE

029

(115°M) in the E of the grid. The Cambrian rocks dip grid N fairly steeply. No reliable facings were obtained but slight grading in the Cambrian conglomerates indicates that the rocks are not overturned. The Ordovician conglomerate dips gently grid S.

A strong cleavage has developed in the Cambrian rocks parallel to their strike. This same cleavage is evident to a slight degree in the Ordovician conglomerate which has also been partially recrystallised, approaching quartzite in the grid area.

No faults were observed whilst mapping the grid, but the geophysical surveys carried out show terminated trends which may be caused by faulting. A significant N-S fault lies just to the W of the grid along Elmers Creek. A block of Precambrian shist has been uplifted on the E side of this fault 300 metres S of the grid. The Cambro-Ordovician contact does not appear to be faulted, although the strongly cleared nature of the Cambrian rocks at the contact indicate some minor movement during deformation.

F. MAGNETICS.

A proton precession magnetic survey was carried out over the grid. Readings were taken every 25 metres along grid lines. Four base station readings were taken each day at the base station located at 3600N/10,000S. Raw data not corrected for diurnal drift is plotted on drawing No.78-229. A contour plan (drg. No. 77-95) with intervals of 100 gammas has been prepared from stacked profiles (drg. No.78-229).

The probable pillow lavas at the base of the volcanic unit are strongly magnetic and show 2 main parallel trends in the centre portion of the grid. Another shorter similar trending high occurs in the NE of the grid and probably has a similar source. The trends are discontinuous, indicating that the basic lava itself occurs as lenses. The intermediate volcanics

030
in the NW of the grid and the volcanoclastics and sandstones show no magnetic relief.

G. INDUCED POLARISATION.

A time domain gradient array electrical induced polarisation survey has been carried out by Comalco over the grid using a Scintrex 2.5kw transmitter and IPR7 receiver. Readings have been taken every 25 metres along grid lines using a 25 metre dipole.

1. RESISTIVITY.

Resistivity data has been plotted as stacked profiles (drg. No.78-177) at the same scale and to overlay the geology sheet. A contour plan (drg. No.77-101) has been prepared from the stacked profiles.

Simple strong resistivity trends agree well with the observed geology. The conglomerate-micaceous sandstone in the S of the grid is strongly resistive (up to 4000 ohm metres). The slate overlying it is less resistive and contains a low of about 200 ohm metres trending along the contact of the slate and the basic volcanic unit. The basic volcanic unit is not strongly resistive. Tuffs and volcanoclastics within it stand out as narrow, more resistive bands. Intermediate to acid volcanics and volcanoclastic greywackes in the N of the grid are resistive.

No strong breaks in resistivity trends are evident indicating that no significant grid N-S faulting has occurred.

2. CHARGEABILITY.

A stacked profile plan has been prepared to overlay the geology sheet (drg. No.78-176) and a contour plan (drg. No.77-102) has been prepared from it.

031

Chargeability trends follow those in the resistivity and also agree well with the observed geology. The strongly resistive conglomerate-micaceous siltstone unit is also strongly chargeable (up to 40 milliseconds). The overlying slate and volcanics are less chargeable with flat profiles of about 8 milliseconds. The volcanoclastic greywacke in the NW of the grid is mildly chargeable.

(3) CONCLUSIONS.

A copper sulphide deposit should produce a marked resistivity low. A low does exist in the uppermost portion of the slate and at its contact with the overlying basic volcanics. This low varies from 130 to 400 ohm metres and is continuous across the grid. It appears to be equivalent to the ground E.M. anomaly detected by a survey for the Daviessynidicate. No chargeability anomaly corresponds to the resistivity low which indicates that the source of the resistivity low is not sulphides. A discrete massive electrically continuous copper sulphide body with very sharp boundaries and no aureole containing disseminated sulphide may be nonchargeable. However, this type of body is extremely rare, is very conductive (less than 20 ohm metres) and is most unlikely to have the observed strike length. The source of the resistivity low appears to be the slate itself which is strongly sheared and possibly faulted along its contact with the volcanics.

Chargeability highs in the conglomerate-micaceous sandstone are probably due to disseminated pyrite.

H. SOIL SAMPLING.

1. GENERAL.

Much of the grid has been soil sampled previously by Union Oil. They collected mainly B horizon samples (using a spade). C horizon samples were taken along one line (using a hand auger) and proved more reliable.

032
Further C horizon soil sampling has been carried out by Comalco and samples analysed for copper, lead, zinc and nickel by AAS. Analytical results are plotted on Drg. No. 78-230.

2. RESULTS.

The highest copper values occur over the basic volcanics and related volcanoclastics in the W of the grid with a peak of 800ppm at 3,800N/10,475E and values of over 200ppm on line 4,200N. Copper values are low over the conglomerate-micaceous siltstone and in the E half of the grid.

Lead values are low throughout the areas sampled. The values obtained (10-30ppm) are background for most unmineralised rocks.

Zinc shows some tendency to follow copper, but at lower values. Over the E half of the grid zinc values are low.

The volcanics and derived volcanoclastics in the W half of the grid are anomalous for nickel. The distribution appears to be erratic but values of 200-400ppm are common. The highest value of 900ppm occurs at 3,800N/10,275E.

3. CONCLUSIONS.

Because some samples were taken in the C and others in the B soil horizons, comparison of values is difficult. C horizon samples generally give higher values and this was substantiated by Union Oil duplicate sampling.

The basic volcanics and derived volcanoclastics are anomalous for copper, nickel and to a lesser extent for zinc. Copper and zinc highs are often coincident. The absolute values indicate that surface and near surface mineralisation is weak and disseminated.

033

I. CONCLUSIONS.

Disseminated minor copper mineralisation occurs in slate and basic volcanic rocks in the W of the grid area. Minor malachite staining occurs on the cleavage faces of the slate immediately underlying what appears to be a pillow lava. A resistivity low occurs over this stratigraphic horizon for the full length of the grid, but has no associated chargeability anomaly. From the nature of the surface mineralisation, it would be expected that any significant mineralisation below the water table would exist as disseminated sulphides. The chargeability low over the host rocks indicates that this is not the case. The source of the resistivity low appears to be the slate itself. However it is possible the source is a discrete massive sulphide body.

034

11. LOBSTER RIVULET AREA.A. GENERAL.

Following assessment of the stream sediment survey, reconnaissance prospecting and mapping of the Cambrian rocks within the licence area located boulders of magnetite anomalous for tin (500ppm), tungsten (1000ppm) and molybdenum (250ppm). The magnetite occurs in basic lava and tuff/volcaniclastic on the NE slopes of Gardner's Ridge in the W of the licence. More detailed sampling, magnetic surveys, and costeaning have been carried out, but have failed to detect significant mineralisation.

B. RECONNAISSANCE ROCK SAMPLING.

Surface rock chip sampling results are tabulated in appendices 4 and 5. Field descriptions and grid references are listed in appendix 3. 12 samples from Gardner's Ridge and Magog are anomalous for tin and 9 of these are also anomalous for tungsten. The highest values were obtained from a sample of massive magnetite collected near an old prospecting pit. (Sample PK/Q 14R, 860ppm W, 680ppm Sn). Samples of sediment/volcaniclastic from the same area are slightly anomalous. The rocks in the pit ('PK pit') area consist of strongly fractured tuff/volcaniclastic of basic composition. Very minor quartz veins are associated with the magnetite. In Lobster Rivulet the basic volcanic is a fine grained black rock cut by numerous veins of epidote and although no pillow structures have been observed, is very similar to the possible pillow lava at Kentish Hill. A sample collected 500 metres to the NW of Lobster Rivulet contains small sericitised feldspar phenocrysts. A thin section of this rock (PK/T/Q50B) has been described in appendix 1 as being basaltic-andesite. As at Kentish Hill, hand specimens of the probable lavas swing a suspended magnet and deflect the compass.

035
11.C. MAGNETOMETER SURVEYS.

A reconnaissance survey was carried out over the area thought likely to contain magnetite bearing volcanics. The area was covered by 25 reconnaissance lines (shown on the 1:20,000 geology plan) which were orientated from air photograph enlargements. Readings were taken approximately every 25 metres using a Scintrex MP-2 proton precession magnetometer. The results of this survey are shown as stacked profiles on drg. No.78-286. A magnetic high trends along the strike of the basic volcanic, becoming stronger and more erratic to the NW but flattening on line 25 in the vicinity of a NE trending fault which may terminate the volcanic unit.

The location and trend of the magnetics agrees well with that obtained by the airborne survey flown by AMEG for B.H.P. and is described as anomaly No.22, trend 11 (Zarzavatzian, 1966). The airborne trend continues as a very slight high for about 4km to the SE along the strike indicating that the basic volcanic may extend in this direction beneath the Ordovician rocks.

Three areas with the strongest magnetic anomalies were selected for more detailed assessment. They are: traverse 10 - anomaly 4 of 64,500 gamma; traverse 22 - anomalies 15 and 16 of 68,000 gamma; and traverse 23 - anomaly 18 of 71,000 gamma. Detailed magnetic traversing was carried out over these areas to detect the exact location of the peak of the magnetic anomalies. The data obtained is shown on drg. No.78-235

11.D. COSTEANING.

Following completion of the detailed magnetic reconnaissance, three locations were selected for costeaning. One costean was cut through the anomaly between lines 10 and 11, a second through the 'P.K.pit' area where the most anomalous magnetite samples were collected, and a third was cut through the peak of the anomalies on line 22. The location of the costeans is shown on the geology sheet and plans of the Magog and 'P.K.pit' costeans are shown on drg. No.78-284.

The costean cut between traverses 10 and 11 is located just downslope from the probable position of the Cambrian Ordovician contact but has not penetrated through deep periglacial scree of Ordovician sandstone. The width of the anomaly and its gradient indicate that it may be quite deep.

Costean C₃, cut through the P.K.pit area, has exposed very soft iron stained clays. Thin bands of decomposing goethite and magnetite dip very steeply down the trench (NE). The costean was dug to a depth of 4 metres but failed to locate any fresh or partially weathered rock such as observed in the old prospecting trench (P.K.pit) less than 10 metres away. A magnetometer survey with pole mounted sensor was conducted along the edge of the costean and the results are shown in profile form on figure 6. The band of highly weathered magnetite shows as an anomaly.

The Magog costean has exposed a basic volcanic lava under shallow scree of Ordovician sandstone. Much of the lava is magnetic, deflecting a hand compass. In parts the lava is strongly epidote veined, showing pillow like structures. Possible basic pyroclastic, and a rock similar to the basaltic andesite described from thin section, have also been exposed. There is no massive magnetite such as sampled in the P.K.pit area.

037
11. E. COSTEAN SAMPLING.

The P.K. Pit and Magog costean have been sampled by chip sampling along the bottom or side over 2 metre intervals. Samples have been labelled with their distance along the costean and prefixed 3 for the P.K. Pit and 4 for the Magog costean. Samples have been analysed at Amdel laboratories by Code A emission spectrography. The results are tabulated as appendix 6.

The weathered magnetite in the P.K. Pit costean contains minor tin, tungsten and copper. The sampling was not biased and sample 318 - 19 (over 2 metres) only contains about one metre of magnetite material, the probable metal contents of which would be about double that shown (i.e. about one metre of 0.6% W, 0.08% Sn, 0.3% Cu). The clay is also anomalous for copper and is probably derived from weathering of strongly altered and broken basic volcanic rock.

Metal values are much lower in the Magog costean, only one sample being slightly anomalous for tin and copper and another for tungsten. Copper and zinc values show a high background.

11. F. CONCLUSIONS.

The origin of the tin, tungsten (and molybdenum) bearing magnetite has not been clearly established. The material appears to occur as veins in the fractured basic lava and volcanoclastic indicating that it is epigenetic. A granitic origin is possible although the nearest granite outcrop is 15 km NE and the regional gravity data does not indicate a granite at shallow depth in the area. Iron may have been remobilised from the basic volcanic rocks scavenging tin and tungsten and redepositing as veins during deformation or very low grade metamorphism. This is unlikely

11.F. because there is no evidence of sufficient thermal metamorphism.

The veins are very small and appear to be discontinuous. Peak values average at 300ppm tin, 2500ppm tungsten and 1200ppm copper over a 3 metre interval in the P.K. Pit costean. The mineral species containing the metals have not been determined. Examination of samples was made under ultraviolet light but no fluorescence was observed (magnetite surpresses fluorecence).

Float sampling located occassional boulders of magnetite anomalous for tin and/or tungsten outside the immediate area of the costeans and it is possible that other small veins do occur.

The large magnetic anomaly over the area is caused by the basic volcanics and not by a large mineralised magnetite body or bodies.

It is very unlikely that an economic tin, tungsten or molybdenum ore body occurs in the area covered. There are, however, 2 areas with anomalous stream sediment, one for tin, the other for tungsten, which have not yet been assessed.

12. OTHER MINERALISATION.

Costeaning was carried out by the Davies Syndicate at grid ref. 4714/3962 at a contact of the Precambrian shists, Cambrian volcanoclastics and greywackes, and Ordovician conglomerate. Their aim was to trace anomalies detected by sampling surface ironstones (a sample of dark ironstone contained 1500ppm tin and 155ppm tungsten).

Sampling of jarosite rich material, ironstone and chloritised sheared Precambrian schist from the costean and surrounding area has failed to locate any mineralisation (samples PA/T/Q1-6; appendices 4 and 5) although one copper value is above background (250ppm) and a sample of ironstone scree contains 20ppm tungsten.

5 other rock samples collected during reconnaissance mapping and prospecting outside areas already discussed are anomalous (see appendices 3, 4 and 5).

Sample 81 (2000ppm zinc) is ironstone breccia with quartzose fragments from within the greywackes of Unit B.

Sample 86 (700ppm copper) is of iron oxide, vein quartz and yellow-brown siltstone in Unit B.

Sample 112 (2.0ppm silver) consists of limonite grit with coarse quartz in an area of abundant quartz float in silty sandstones of Unit A.

Sample 193 (3000ppm copper, 5.0ppm silver) is a loose boulder of ironstone and vein quartz in a paddock. Other similar boulders are abundant in the paddock. There is no outcrop (probable rock Unit B), but stream sediment copper anomalies occur in the area.

040

Sample 213 (200ppm molybdenum) is a brecciated ironstone and clay with a leached gossan appearance. It occurs within siltstone of Unit B.

Careful examination of the areas around the anomalous samples has failed to locate any mineralisation, or significant alteration. The samples are all of loose surface material and are possibly transported some distance from their source.

A. CONCLUSIONS.

No strong indications of economic mineralisation have been obtained. Low order copper stream sediment anomalies and minor malachite staining in basic volcanics at Kentish Hill indicate a very remote possibility for economic cyprus type copper mineralisation. Considering the long term over supply of copper on the world market a copper search for anything but a very large rich body, at present, is unlikely to succeed. A number of magnetite samples yielded highly anomalous tin and tungsten values but no significant concentrations or tonnages appear to exist.

B. RECOMMENDATIONS.

The following recommendations are of low order of importance.

1. A program of two diamond drill holes be carried out in the Kentish Hill grid to finally test for the presence of significant copper mineralisation. One hole at grid 2600mN/10,300mE, azimuth 218^oM (grid W), angle 45^o, to be drilled for 70 metres to intersect a resistivity low of 120 ohm metre in an area malachite stained phyllite/basic tuff. The other hole to be drilled at grid 3900mN/10,220mE, azimuth 218^oM, angle 45^o for 125 metres to intersect a similar target.
2. Detailed reconnaissance to be carried out to assess the possibility of further exploration including geophysics and deep augering over the area immediately SE of Beafeater Hill. In this area a boulder sample yielded highly anomalous copper (3000ppm) and silver (5.0ppm) values and four copper stream sediment anomalies also occur.
3. Reconnaissance be made of recently available tin and tungsten anomalies at grid refs. 5948/0400 (55ppm tin) and at 5893/0660 (150ppm tungsten).

- 13.B. 3. Thin and/ or polished section descriptions of tin, tungsten and molybdenum bearing magnetite in the Gardners Ridge area be obtained in an attempt to identify the genesis and mineralogy of the mineralisation.

Because of our heavy committments in other areas, it is recommended that a joint venture partner be sought to finance and continue exploration over the exploration licence before the next renewal date (26/1/79).

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045

FIGURES

FIG.1.

217047

E.L.7/76 QUAMBY

046

LOCATION PLAN

SCALE: 1:250,000

5 cm



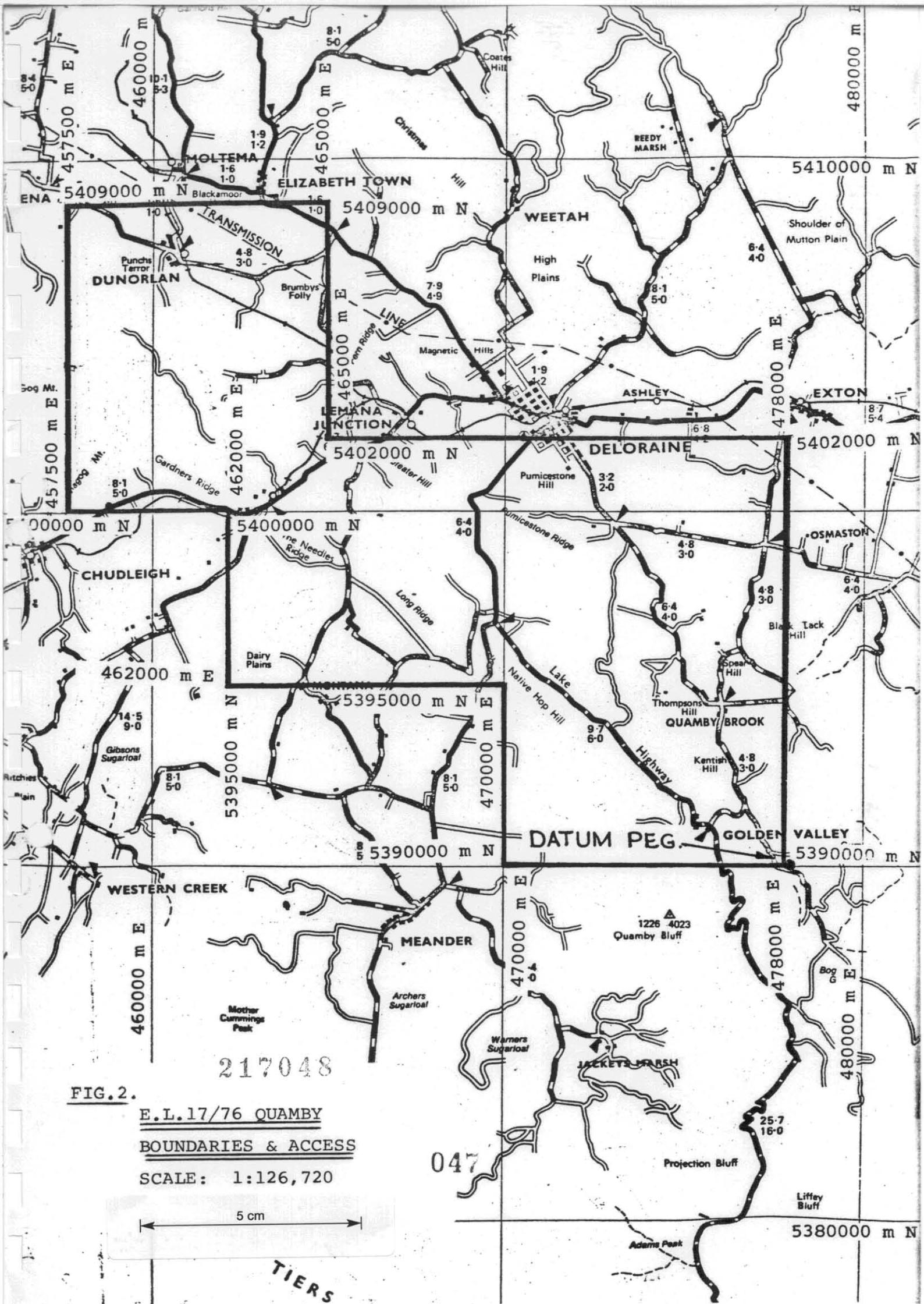


FIG. 2.

E.L.17/76 QUAMBY
BOUNDARIES & ACCESS

SCALE: 1:126,720

5 cm

TIERS

217049

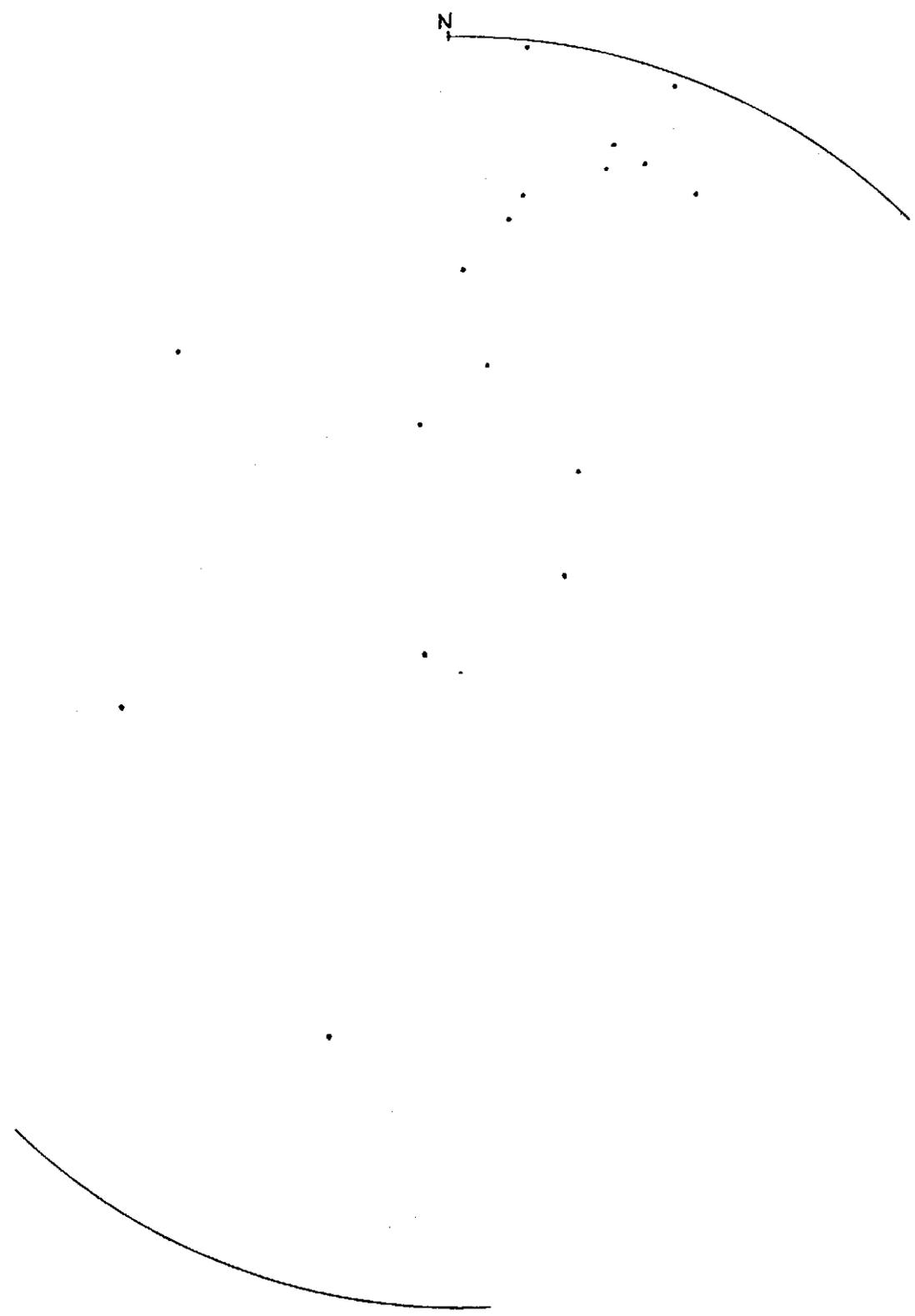
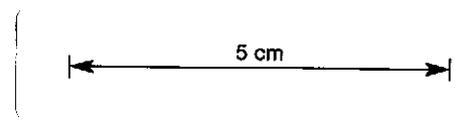
048

FIG.3. E.L.17/76 QUAMBY.

STRUCTURAL ANALYSIS.

Ordovician - S o all points.

(17pts.) P.Komyshon.



217051

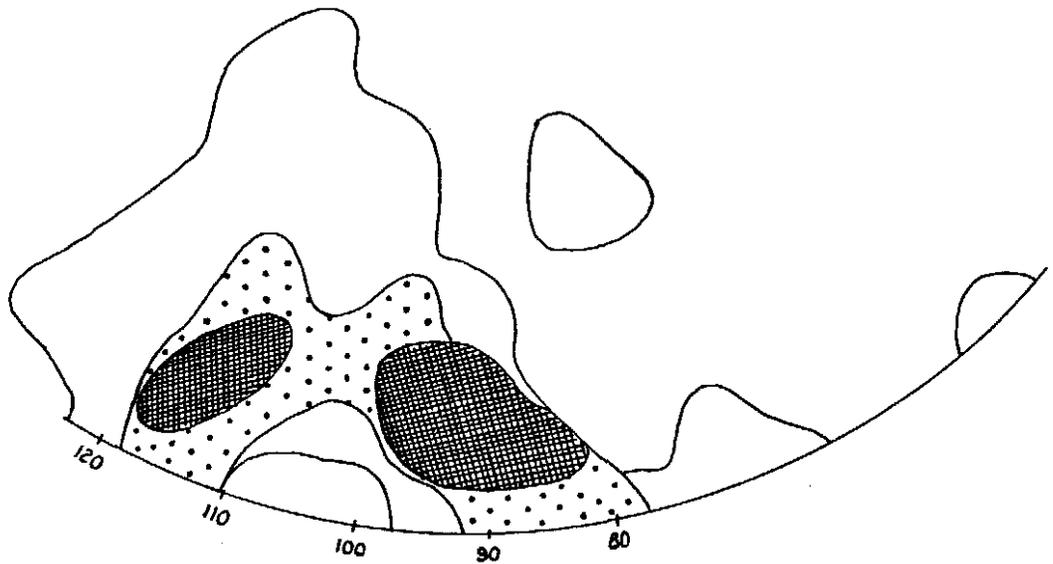
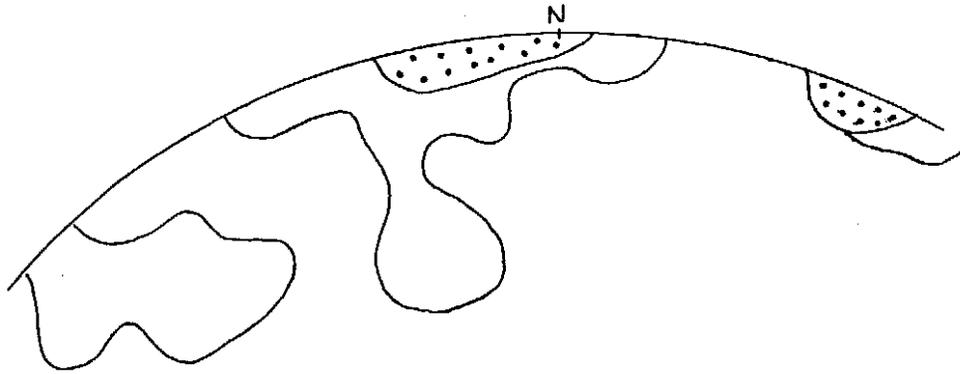
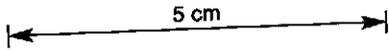
FIG.5. E.L.17/76 QUAMBY.

STRUCTURAL ANALYSIS.

S o West of Mole Creek Road.
3, 9, 15% per 1% area. 33pts.

P.Komyshon.

050



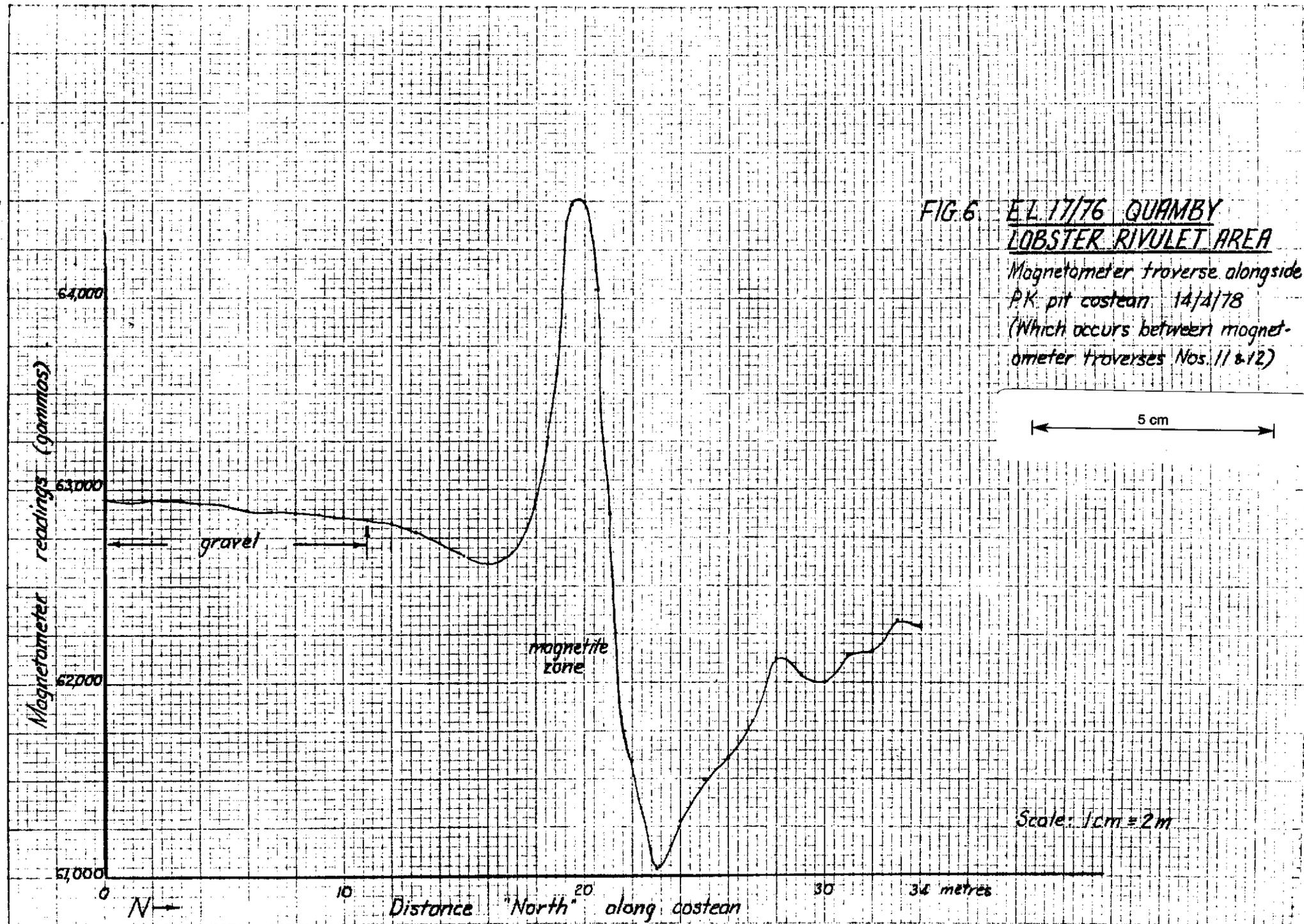


FIG. 6. EL. 17/76 QUAMBY
LOBSTER RIVULET AREA
 Magnetometer traverse alongside
 PK. pit coastline. 14/4/78
 (Which occurs between magnetometer
 traverses Nos. 11 & 12)

5 cm

Scale: 1cm = 2m

052

APPENDICES

APPENDIX 1

E.L.17/76 QUAMBY

RECONNAISSANCE ROCK SAMPLE

THIN SECTION DESCRIPTIONS

054

THIN SECTION DESCRIPTIONS BY H.W. FANDER

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Q/T5 Field Name - Reworked intermediate tuff at 4751/3938.

This is a lapilli-tuff of broadly intermediate composition; it is strongly epidotised, which has obscured many details and altered the volcanic grains (lapilli).

The rock consists of large and small (0.3 - 10mm) irregular, ovoid, rounded and angular fragments of intermediate lavas, randomly orientated and arranged (i.e. not bedded, on the scale of the T.S.) in a finer matrix of lithic-volcanic grains and altered vitric and crystal fragments, as well as finer ash and dark iron oxides. Granular to prismatic-acicular epidote has replaced most of the finer matrix and has also developed within the larger lapilli, where it replaces ferromagnesian minerals.

The lapilli appear to range from trachytic to andesitic composition, and are composed of fine, generally random fine feldspar laths and crystallites (oligoclase-andesine in some fragments), devitrified glass, iron oxides and altered ferromagnesian minerals.

Q/T6 Field Name - Sericitised tuff/lava at 4623/4021.

This is a sericitised, porphyritic devitrified glassy rhyolite-dacite; it is more likely to be dacitic, because of the paucity of free quartz, but the composition of the groundmass is critical in classification, and cannot now be determined (because of alteration).

Sericitised feldspar phenocrysts are very common and are totally altered; in a few there are vague indications of former plagioclase twinning. Quartz phenocrysts are fairly rare and are small and strongly resorbed. The groundmass is typical devitrified glass and shows fine flow-banding and perlitic cracks. The rock was a shallow intrusive or possibly extrusive.

Patches of leucoxene are relatively conspicuous throughout and represent leucoxenised magnetite or ilmenite.

055

Q/T7 Field Name - Altered rhyolite porphyry at 4623/4022.

This is a somewhat altered porphyritic ?dacite; the same problems of classification arise as in Q/T6, in that the groundmass is indeterminate (K-staining may have been informative). If the groundmass were alkali feldspar and quartz, the rock would be termed a toscanite (rhyodacite). However, in view of fairly abundant oligoclase phenocrysts, the rock is probably close to a dacite, even though quartz phenocrysts are also abundant.

The quartz phenocrysts tend to be angular and flow-brecciated, and show strain-extinction. The oligoclase phenocrysts (calcic oligoclase) are fairly extensively replaced by secondary minerals, including zoisite, barite, carbonate and argillic minerals. Isolated chlorite pseudomorphs after ?hornblende occur. The groundmass is very fine-grained, consisting of quartz (perhaps largely secondary), sericite and dark, ?manganiferous carbonate; it shows marked flow-banding.

056

PK/T/Q6: (plagioclase crystal), lithic-vitric tuff;
(with incipient ignimbritic characteristics
in the matrix)

At 46245/40210

This is a massive and reasonably homogeneous rock. Irregular fragments of altered glass (35%), up to 6 mm, but average size 3 mm, (including minor glassy rhyolite); also euhedral crystals of plagioclase (10-12%), average size 1 mm, are all randomly, but evenly scattered. Most of the glass fragments are irregularly streaky, vesicular and devitrified, and almost certainly pumiceous.

These components occur within a matrix of cryptocrystalline silica, with relict extremely fine, ?ignimbritic textures, and also represents devitrified glass. Extremely fine tuffaceous detritus is dispersed. Staining indicates that the matrix is locally, incipiently potassic.

Apart from the devitrification of the various glass components + minor streaky clays, and minor argillic alteration of the plagioclase crystals, the rock is essentially unaltered.

I.R. Pontifex.
Ian R. Pontifex & Assoc. P/L

057

PK/T/Q19: quartz, plagioclase crystal tuff with
silicified (?vitric) matrix;
extensive sericite \pm carbonate clay
alteration of plagioclase; accessory pyrite

At 45980/40335.

A massive, fairly homogeneous rock. Variably subhedral to euhedral, commonly fractured, and some distorted crystals of quartz (20-25%) and of plagioclase (20-25%), average and fairly consistent size of about 1 mm, are vaguely layered, through a cryptocrystalline matrix. Minor streaky-chloritic fragments of altered basic-glass (10%) and accessory small pyrite granules (3-5%) are also scattered.

The matrix consists essentially of ultra-fine quartz, with minor chlorite which outlines an apparent primary glass texture. It is not clear however if this quartz is devitrified glass, or the product of volcanogenic silicification.

The abundant plagioclase crystals are virtually completely pseudomorphically replaced by sericite, \pm generally minor carbonate, clays and/or ultra-fine silica.

I.R. Pontifex.
Ian R. Pontifex & Assoc. Pty. Ltd.

PK/T/Q42: (quartz) plagioclase-crystal,
vitric tuff; matrix completely
silicified with minor, intimately
associated, diffuse potash felspar

At 458350/403950.

A massive to roughly bedded, homogeneous rock.
Tuff detritus, average size about 0.3 mm, consists of
variably angular, subhedral, euhedral, and broken crystals of
plagioclase (10-15%) and lesser quartz (3-5%).

These have a vaguely layered distribution through a
matrix of ultra-fine (cryptocrystalline) quartz, with fairly
abundant diffuse patches of microcrystalline potash felspar
(25%). The distribution and abundance of the potash felspar
is highlighted on the thin section off-cut.

It appears that this matrix was originally glass, but
it has been pervasively silicified with associated potash
felspar enrichment. Thus the classification of "tuff" is
qualified by the term vitric.

PK/T/Q50 B: basaltic-andesite; plagioclase phenocrysts replaced by sericite, clays and/or ?zeolite; mafic phases in groundmass, hornblende and dispersed magnetite; minor veins of epidote + quartz

At 4593/4028.

Euhedral crystals of plagioclase (30%), average size about 2 mm, generally occur in clumps of 2 or more, but rarely independently, randomly disposed through a microcrystalline groundmass. This felspar is virtually completely pseudomorphically replaced by intimately mixed, mottled, extremely fine, clouded sericite, clays, probable zeolite, and/or scapolite.

These are randomly disposed through a homogeneous groundmass of plagioclase microlites, which tend to have a similar abundance of extremely fine green hornblende, and subordinate dispersed magnetite.

Veins and stringers of (deuteric) quite coarse crystalline epidote + quartz cut groundmass and plagioclase phenocrysts.

U60

PK/T/Q75A: porphyritic (pyroxene) microdiorite;
extensive chloritic alteration of hornblende
moderate clay-sericite alteration of plagioclase;
minor late-stage potash felspar and quartz
in interstices

At 4603/4049.

This is a massive, homogeneous microporphyritic rock with no absolutely clear evidence diagnostic of an intrusive or extrusive. It does however appear to be a high-level intrusive (?dyke).

Phenocrysts, average size 2 mm, consist of euhedral plagioclase (30%), clinopyroxene (10%) and hornblende crystals (10%). These are disposed through a homogeneous groundmass of randomly interlocking fine plagioclase laths, minor irregular grains of brown and greenish hornblende, also minor, interstitial quartz (5-7%) and potash felspar (7-10%). The latter components are deuteric enrichment products, in what is essentially a microdiorite.

Hornblende as phenocrysts, and in the groundmass, are commonly replaced by fine chlorite. The plagioclase phenocrysts and in the groundmass are turbid with clay-sericite alteration products. The pyroxene is unaltered. Minor, fine, magnetite (3-5%) is disseminated.

061

PK/T/Q75E: microporphyritic, (pyroxene) andesite;
unaltered except for deuteric replacement
of hornblende by chlorite \pm quartz;
(? dyke rock or extrusive)

At 46030 /40495.

A homogeneous, mass very fine porphyritic rock.
Phenocrysts of euhedral plagioclase (15%) and clinopyroxene
(15%), average size about 0.6 mm, are randomly disposed as
individuals and as clumps.

Minor small patches of fine chlorite mosaic (10%)
 \pm quartz appear to be deuteric replacement products of original
hornblende.

Minute grains (0.03 mm) of titaniferous material (5%)
are dispersed and appear to proxy for Fe and/or Ti oxides which
may be expected in this rock type.

These components occur within a homogeneous extremely
fine crystalline (felted) mass of intimately interlocking
plagioclase microlites, and accessory dispersed, ultra-fine
carbonate. A vague flow texture is preserved. All components,
except pseudomorphically replaced hornblende noted above,
are essentially unaltered.

062

217063

APPENDIX 2E.L.17/76 QUAMBYSTATISTICAL ASSESSMENT OF STREAM SEDIMENT SURVEYJAN - APRIL, 1977.

Sample Numbers: JB/T/Q/D1 to 142

RD/T/Q/D200 to 367, 369 - 472

Total number of samples: 414

All samples were analysed for Cu, Pb and Zn

STATISTICAL INTERPRETATION

	Cu	Pb	Zn
Number of Samples	414	414	414
Mean	18	18	42
Standard Deviation	18	12	26
Mean + 1 standard deviation	36	30	68
Mean + 2 standard deviation	54	42	94

Frequency Histograms show that for Cu (Fig. 1) many values (153) fell below the detection limit.

- the fall off in frequency is exponential.
- the curve is very asymmetric (log normal).

for Pb (Fig. 1) the curve has a short tail (small standard deviation).

- the curve is less asymmetric than Cu

for Zn (Fig. 2) the curve has a long tail (large standard deviation)

- the curve is the least asymmetric.
- the frequency is more erratic than for Cu or Pb (the curve is a poor fit).

E.L.17/76 QUAMBYSTREAM SEDIMENT SURVEY, JAN. - APRIL, 1977

The sample numbers and Cu, Pb and Zn analyses were plotted on 1:20,000 cadastral transparencies. Prints were coloured to show high and possibly anomalous values using statistical divisions based on standard deviations. The analyses were thus divided into 3 categories:-

- C less than mean + one standard deviation (Cu = <36, Pb = <30, Zn = <68)
- B more than mean + one standard deviations but less than mean +2 standard deviations (Cu = 36-54, Pb = 30-42, Zn = 68-94).
- A more than mean + two standard deviations (Cu = >54, Pb = >42, Zn = >94)

Category C includes most expected values.

Category B consists of expected values + some relatively high values.

Category A contains anomalous values.

Category B samples on their own do not designate 'anomalous' stream sediment, but can support category A samples, or may show a trend related to a certain rock type.

Category A samples are not necessarily indicators of mineralisation because Pb and Cu values in the sampled area are fairly low. Some category A samples will be 'anomalous' whilst others may indicate a rock type with a higher than expected Cu content. For the purposes of ground followup - all category A samples are considered anomalous.

STREAM SEDIMENT SURVEY, JAN. - APRIL, 1977.ANOMALOUS AREAS

CADASTRAL SHEET & ANOMALY NUMBER.		GENERAL GRID REFERENCE.	CATEGORY			SAMPLE NUMBERS	RANK	REMARKS GEOLOGICAL SYMBOLS AS ON PIKE (1969)
			Cu	Pb	Zn			
4540	1	4583/54078	5xA 4xB	1xA 5xB	5xA 4xB	3-10, 16	Fair	Mainly Cu-Zn anomaly @ upper contact Cambrian with Jurassic dolerite. Inspect along this contact & also @ No.7 near Mersey River.
4540	2	4587/54077	3xC	1xA 2xB	2xB	12, 13, 15	Poor	Mainly isolated Pb anomaly (80ppm) No Cu, some Zn, Gog Range greywack
4540	3	4593/54050 to 4587/54038	3xB	2xA 5xB	4xA 2xB	18, 21, 22 33-36, 85	Fair	Zn-Pb anomaly Esp, ss, (vb)
4540	4	458/5403	2xC	2xA	2xA	125, 126	Good	Zn-Pb anomaly (Zn=320) Oo, Evb.
4640	5	4606/540390	C	A, B	A	91, 92	Poor	Isolated, Pb on 50 Esp, ss, sm?
4640	6	46126/540262	C	1xA 3xB	1xB	72, 73, 78, 82	Poor	Doubtful Pb anom. (45) Ess
4640	7	46219/540214	A	C	C	69	Poor	Isolated Cu (60) Csm, ss
4640	8	46340/540176	C	A	C	136	Poor	Isolated Pb (60) Ess (+some Sm as 69)
4640	9	46450/540256 to 46450/54023	3xC	1xA 1xB	3xA	140 - 142	Poor	Zn anom. (175)+Pb, Tb only out-crop but Csp at shallow depth.
4640	10	4673/54007 to 46835/540095	4xA	1xB	6xC	457 - 462	Good	Cu anom. (85) Esp, Oo
4739	11	4725/5399	3xA 3xB	1xA 6xB	- -	391, 392, 396 422-425	Fair	Cu anom. (55) Esc, Eva, Esp Csg (possibly related to anom.12)

E.L.17/76 - QUAMBY

217066

065

STREAM SEDIMENT SURVEY, JAN. - APRIL, 1977.

ANOMALOUS AREAS

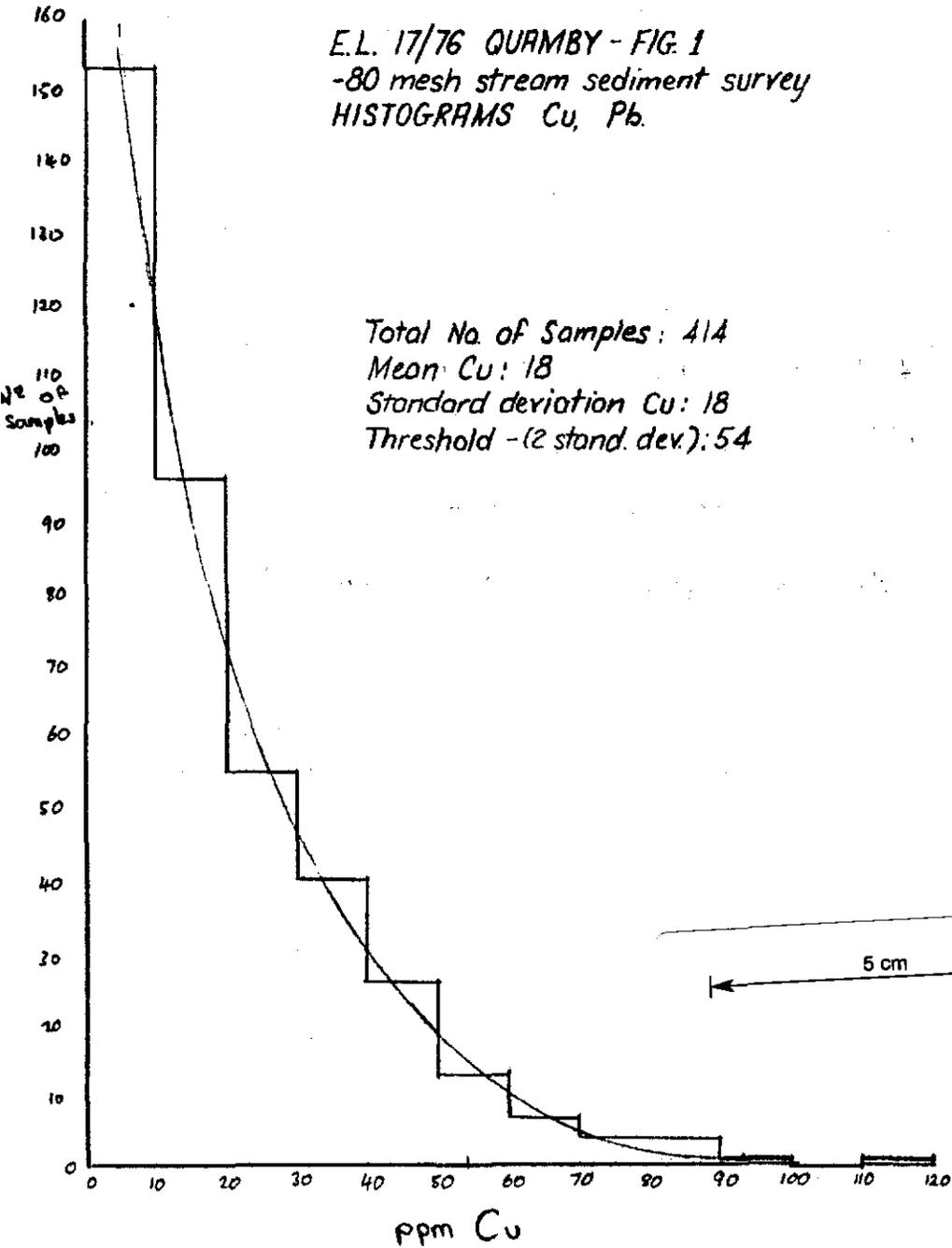
CADASTRAL SHEET & ANOMALY NUMBER.		GENERAL GRID REFERENCE.	CATEGORY Cu Pb Zn			SAMPLE NUMBERS	RANK	REMARKS GEOLOGICAL SYMBOLS AS ON PIKE (1969)
4739	12	473/53977	2xA 4xB	- -	- 1xB	387-389 415-418	Fair	Cu anom. (85) Csg, Css (possibly related to anom. 11)
4739	13	474/53955	5xA 3xB	4xA 8xB	- 5xB	301-309 312-315, 267- 270	Good	Cu (115) +Pb (55) anomaly. C, Csg, Css (related to anom. 11&12?)
4739	14	475/5394	2xA	-	-	271, 272	Fair	Cu anomaly (85) Evb-known Cu mineralisation.
4739	15	4755/53933	1xA 1xB	- -	- 1xB	252, 253 255	Poor	Small Cu anomaly (70) Evb along strike from anom. 14
4739	16	477/53923	1xA 2xB	- -	- 1xB	369 - 371	Poor	Evb still further along strike from anoms. 14 and 15.

217067

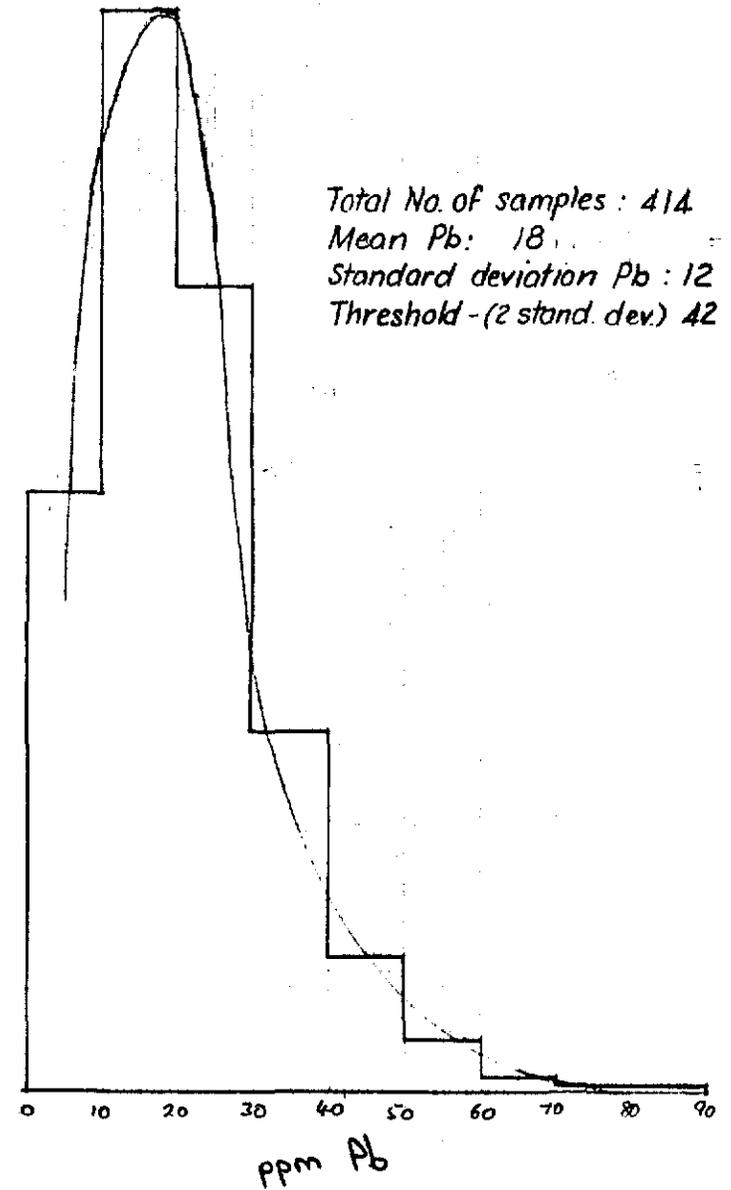
066

E.L. 17/76 QURMBY - FIG. 1
-80 mesh stream sediment survey
HISTOGRAMS Cu, Pb.

Total No. of Samples: 414
Mean Cu: 18
Standard deviation Cu: 18
Threshold $-(2 \text{ stand. dev.})$: 54



Total No. of samples: 414
Mean Pb: 18
Standard deviation Pb: 12
Threshold $-(2 \text{ stand. dev.})$: 42

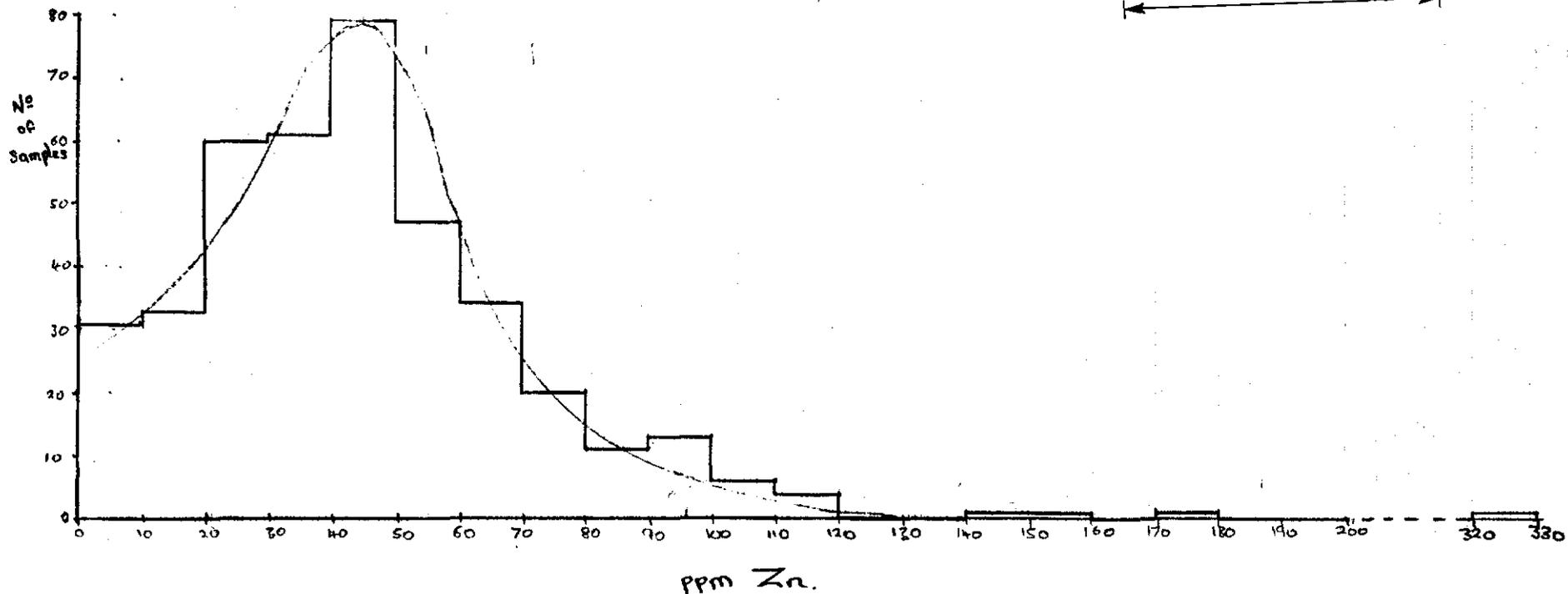
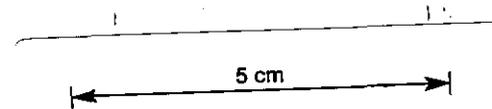


217068

067

E.L. 17/76, QUAMBY - FIG. 2
-80 Mesh stream sediment survey
HISTOGRAM - Zn

Total No. Samples: 414
Mean Zn: 42
Standard deviation: 26
Threshold (2 standard dev.): 94



068

APPENDIX 3

217069

E.L.17/76 - QUAMBYROCK SAMPLE DESCRIPTIONS & LOCATIONS

SAMPLE NUMBER	DESCRIPTION	NAT. GRID REF.
GW/T/Q R1 } 2 } 3 }	Strongly brecciated pyritic chert From in and beside old adit On west bank of creek	4758/3929 4758/3929 4758/3929
4	Fractured phyllite, minor quartz veins	4758/3929
5	Reworked intermediate tuff	4751/3938
6	Sericitised tuff/lava	4751/3940
7	Green altered, resilicified rhyolite porphyry	4753/3935
8	Hard green altered crystal ash flow	4630/4020
PA/T/Q 1	Jarosite rich material in lower part costean	4714/3942
2	Jarosite rich material in upper part costean	4714/3942
3	Ironstone outcrop in costean	4714/3942
4	Ironstone scree on track N of costean	4714/3942
5	Ironstone scree on track further N	4714/3942
6	Highly altered (chlorite) sheared Precambrian shist N of costean	4714/3942
PK/T/Q 7	Strongly Fe+Mn stained siltstone & sandstone	4600/4012
14	Massive magnetite	4599/4025
29	Leached quartz rich Fe-stone	4626/4015
47	Vein of brecciated Fe oxide and quartz	4580/4044
48	Vein of brecciated Fe oxide and quartz	4580/4045
49	Vein of brecciated Fe oxide and quartz	4584/4046
4626/4012	Brecciated Fe siltstone	4626/4012
4600/40125	Fe-stone quartz vein in siltstone	4600/40125
37	Transported Fe oxide, sandy ironstone	4582/4036
50	Basic volcanic with minor quartz veins	4593/4029
57	Basic volcanic - mineralised	4590/4081
70	Transported Fe oxide, sandy ironstone	45915/40595
81	Transported Fe oxide with quartzose fragments	4592/40625
86	Transported Fe oxide with minor quartz	4607/4042
112	Coarse quartz and limonite grit	4672/3998
120	Transported goethite - limonite, sandy Fe-stone	4718/3997

ROCK SAMPLE DESCRIPTIONS & LOCATIONS

069

SAMPLE NUMBER	DESCRIPTION	NAT. GRID REF.
PK/T/Q 128A	Fe stained phyllite	4716/3975
179	Hematitic chert	4750/39330
185	Magnetite & Fe oxide 'gossan'	47625/3932
185A	Magnetite & Fe oxide 'gossan'	47625/3932
186	Magnetite & Fe oxide 'gossan'	47625/3932
187	Dark green felsic volcanic with epidote veining, malachite stained	4766/3924
189	Basic volcanic? with quartz & malachite	4763/3928
193	Boulder of Fe stone in paddock	4677/4002
194	Brecciated vein quartz & limonite with ilmenite	
200A	Massive magnetite vein in brecciated basic volcanic	4601/4022
200B	Massive magnetite vein in brecciated basic volcanic	4601/4022
200C	Massive magnetite vein in brecciated basic volcanic	4601/4022
201	Cambrian volcanic with feldspar laths in grey groundmass	4592/4028
202	Siltstone/volcaniclastic	4593/40275
203	Basic volcanic with epidote veining	4597/4026
205B	Fractured magnetite rock	4592/40295
206	Hematitic siltstone	4590/40275
207	Magnetite rock & limonite, fractured	4590/40275
208	Basic volcanic	4601/4022
209 (205A)	Volcanic with magnetite & limonite in vein (pit)	4601/4022
210	volcanic with magnetite & limonite in vein (pit)	4601/4022
211	Impure magnetite rock (pit area)	4601/4022
212	Altered volcanics	4590/4032
213	Brecciated hematitic siltstone	4590/4033
14repeat	Magnetite	4599/4025
</Q316-334	Pk pit costean see plan	4602/4023
400-442	Magog costean see plan	4591/4028

APPENDIX 4

E.L.17/76 - QUAMBY

RECONNAISSANCE ROCK SAMPLES, EMISSION SPECTROGRAPHIC ANALYSES, AMDEL LABORATORIES

217071070

Results are semiquantitative and in parts per million. x denotes below detection limit.

SAMPLE NO.	Ba	Be	Ce	Co	Cr	La	Mn	Mo	Nb	Ni	Sc	Sr	Ta	Th	Ti	V	W	Y	Yb	Zr	Ag	As	Bi	Cd	Cu	Ga	Ge	In	Pb	Sb	Sn	Zn
PR/T/Q 1		x																			x	x	x	x	250		x		1	x		150
2		1																			x	x	1	x	250		x		3	x		100
3		1																			x	x	1	x	80		1		10	x		80
4		x																			0.3	x	1	x	15		1		10	x		80
5		1																			0.2	x	2	x	30		1		10	x		50
6		2																			x	x	x	x	10		x		10	x		x
PK/T/QR 7	x	10	x	200	20	x	10,000	x	x	200	3	x	x	x	800	30	x	50	x	70	x	x	x	x	5	5	x	x	5	x	x	1000
14	x	5	x	10	80	x	300	250	x	200	5	x	x	x	200	200	1000	10	x	200	x	x	3	x	100	10	x	x	70	x	500	200
29	x	10	x	x	400	x	200	5	x	100	10	x	x	x	1500	100	x	10	x	200	x	x	1	x	100	10	x	x	100	30	x	300
37	x	x	x	70	250	x	500	x	x	200	15	x	x	x	1000	80	x	x	x	100	0.1	x	x	x	150	10	x	x	30	x	3	200
47	x	20	x	20	80	x	500	5	x	250	30	x	x	x	500	100	x	20	x	100	x	x	x	x	200	3	x	x	250	x	x	500
48	x	30	x	30	100	x	700	x	x	300	10	x	x	x	1000	100	x	20	x	100	x	x	x	x	200	3	x	x	150	x	x	500
49	x	20	x	10	150	x	500	x	x	150	10	x	x	x	1000	80	x	10	x	100	x	x	x	x	200	10	x	x	30	x	x	200
50	500	1						x													0.1		x		200				50		40	200
57	x	1						x													0.1		x		50				100		1	100
4626/4012	x	10	x	10	100	x	300	x	x	70	5	x	x	x	1000	70	x	20	x	100	x	x	x	x	80	3	x	x	70	x	x	500
4600/40125	x	10	x	20	150	x	2000	x	x	80	5	x	x	x	1000	80	x	10	x	200	x	x	x	x	150	3	x	x	50	x	x	200
70	x	1	x	50	80	x	500	x	x	30	10	x	x	x	500	80	x	x	x	100	x	x	x	x	100	10	x	x	100	x	x	300
81	x	1	x	70	80	x	800	20	x	100	5	x	x	x	500	70	x	x	x	100	x	x	x	10	70	5	x	x	250	x	x	2000
86	x	30	x	5	80	x	70	x	x	100	10	x	x	x	500	150	x	10	x	100	x	x	x	x	700	10	x	x	100	x	x	700
112	1500	x	x	5000	100	100	>10,000	x	x	500	10	x	x	x	1000	70	x	80	x	100	2.0	x	x	x	500	3	x	x	300	x	x	700
120	1000	3	x	70	50	x	10,000	30	x	70	10	x	x	x	700	50	x	20	x	200	x	50	x	x	70	10	x	x	200	x	x	300
128H	x	3	x	30	50	x	1,500	x	x	300	5	x	x	x	1000	50	x	10	x	200	x	x	x	x	200	10	x	x	200	x	x	500
179	300	7						30													0.1		x		100				20		10	x
187	x	x						x													0.2		x		200				30		1	x
189	3000	1						10													0.5		x		700				20		x	200
193	3000	2						10													50		x		3000				50		x	700
194	x	1						10													0.1		x		150				50		1	80
212	x	x						x													0.3		1		100				80		3	80
213	x	x						200													0.3		x		150				80		x	50
Detection limit	200	1	300	5	20	100	10	3	20	5	3	5	100	100	100	100	50	10	1	16	Ag	As	Bi	3	1	1	1	10	1	30	1	20

071

APPENDIX 5

E.L.17/76 QUAMBY

217072

RECONNAISSANCE ROCK SAMPLES

XRF ANALYSES, AMDEL LABORATORIES

Results in parts per million

SAMPLE NO.	Au	Sn	W	Mo	F	Cu	Pb	Zn
185	0.10	< 4	< 10	< 4	< 0.02			
185A	< 0.05	< 4	15	< 4	< 0.02			
186	0.35	< 4	60	< 4	< 0.02			
200A	0.05	44	45	< 4	< 0.02			
200B	< 0.05	55	55	8	< 0.02			
200C	< 0.05	120	440	< 4	< 0.02			
201	< 0.05	< 4	< 10	< 4	< 0.02			
202	< 0.05	30	10	6	< 0.02			
203	< 0.05	4	< 10	< 4	< 0.02			
205 (205B)	0.05	25	10	10	< 0.02			
206	< 0.05	16	15	48	< 0.02			
207	0.05	38	85	< 4	< 0.02			
208	0.05	34	65	28	< 0.02			
209 (205A)	< 0.05	70	100	22	< 0.02			
210	0.10	40	210	55	0.02			
211	< 0.05	70	211	< 4	< 0.02			
14 Repeat	< 0.05	680	860	65	< 0.02			
PA/T/Q1		< 4	< 10					
2		< 4	< 10					
3		< 4	< 10					
4		< 4	15					
5		8	20					
6		< 4	< 10					
GW/T/QR1						8	12	2
2						20	32	8
3						85	12	28
4						2	5	2
5						45	5	45
6						5	8	20
7						5	< 5	5
8						10	5	25
CODE	C3	B1	B1	B1	E3	C1	C1	C1
Det. limit	0.05	4	10	4	0.02	2	5	1

072

APPENDIX 6 - E.L.17/76 QUAMBY

217073

LOBSTER RIVULET AREA

COSTEAN SAMPLE ANALYSES, EMISSION SPECTROSCOPY

AMDEL LABORATORIES

Results are semiquantitative and in p.p.m. x = below detection limit.

ELEMENT	Sn	W	Bi	Be	Ag	Mo	Cu	As	Y	Zn
DETECT. LIMIT	(1)	(50)	(1)	(1)	(0.1)	(3)	(1)	(50)	(10)	(20)
PK/T/Q										
316m+317m	x	x	x	x	0.1	x	150	x	15	150
322m+3m	3	x	x	x	x	x	700	x	100	300
326	10	x	x	3	x	20	800	x	100	400
327	10	x	x	3	0.2	10	800	x	70	400
312m+3m	x	x	x	x	x	x	200	x	10	30
314m+5m	x	x	x	x	x	x	200	x	10	70
318m+319m	400	3000	x	3	x	3	1500	50	40	x
320	200	2000	x	10	x	30	800	100	40	x
321	6	200	x	3	0.2	x	1000	x	50	200
324m+5m	x	x	x	3	x	x	500	x	50	150
328m+9m	7	x	x	3	x	3	500	x	70	300
330m+1m	10	50	x	3	x	3	1000	x	70	400
332m+3m	2	x	x	3	x	x	400	x	80	50
334m	15	100	x	x	x	x	500	x	200	400
400m+1m	30	x	x	x	0.2	10	300	x	100	70
402m+3m	25	x	x	3	0.1	30	400	x	100	200
404m+5m	10	x	x	20	x	20	400	x	100	70
406m+7m	10	x	x	5	x	x	80	x	100	200
408m+9m	20	x	x	5	0.1	10	200	x	100	300
410m+1m	20	x	x	5	0.2	15	300	x	100	300
412m+3m	15	x	x	5	0.3	x	300	x	100	400
414m+5m	15	x	x	3	0.2	50	300	x	100	200
416m+7m	20	x	x	5	0.3	50	250	x	100	200
418m+9m	3	x	x	5	0.4	40	300	x	150	400
420m+1m	30	x	x	3	0.1	30	100	x	70	70
422m+3m	15	x	x	3	0.2	5	100	x	60	150
K/T/Q										
424m+5m	5	x	x	3	0.2	15	200	x	60	150
426m+7m	5	x	x	3	0.3	20	150	x	150	300

073

APPENDIX 6 - E.L.17/76 QUAMBY

217074

LOBSTER RIVULET AREACOSTEAN SAMPLE ANALYSES, EMISSION SPECTROSCOPYAMDEL LABORATORIES

Results are semiquantitative and in p.p.m. x = below detection limit.

ELEMENT	Sn	W	Bi	Be	Ag	Mo	Cu	As	Y	Zn
DETECT. LIMIT	(1)	(50)	(1)	(1)	(0.1)	(3)	(1)	(50)	(10)	(20)
428m+9m	150	50	x	5	0.4	5	600	x	30	400
430m+1m	6	x	x	x	x	x	100	x	100	300
432m+3m	6	x	x	x	x	3	100	x	80	200
434m+5m	50	50	x	3	x	3	200	x	70	300
436m+7m	10	x	x	3	x	5	70	x	70	200
438m+9m	50	200	x	x	x	x	300	x	50	600
440m+1m	10	x	x	x	x	5	100	x	50	400
442m	20	x	x	3	0.1	5	300	x	80	300

APPENDIX 7ANALYTICAL TECHNIQUES USED BY COMALCO, AMDELA. COMALCO LABORATORIES (COMALCO RESEARCH CENTRE).STREAM SEDIMENT AND SOIL SAMPLES.Cu, Pb, Zn, Ni:

Determined by AAS after dissolution of 1g sample in hot
HCl + HNO₃

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 HClO₄.

C2 Ag, Mo, accuracy \pm 5%. Dissolution in hot HCl + HNO₃?

C3 Au, accuracy dependant on sample, detection limit
0.05ppm. Details of method not available, but
dissolution in HCl + HNO₃.

CODE E. E3. F (total) determination by specification electrode
after fusion with flux of Na₂CO₃, KNO₃, K₂CO₃, SiO₂
and water leach.

APPENDIX 8

E.L.17/76 - QUAMBY

LANDS DEPARTMENT AIR PHOTOGRAPH COVERAGE

078

217079

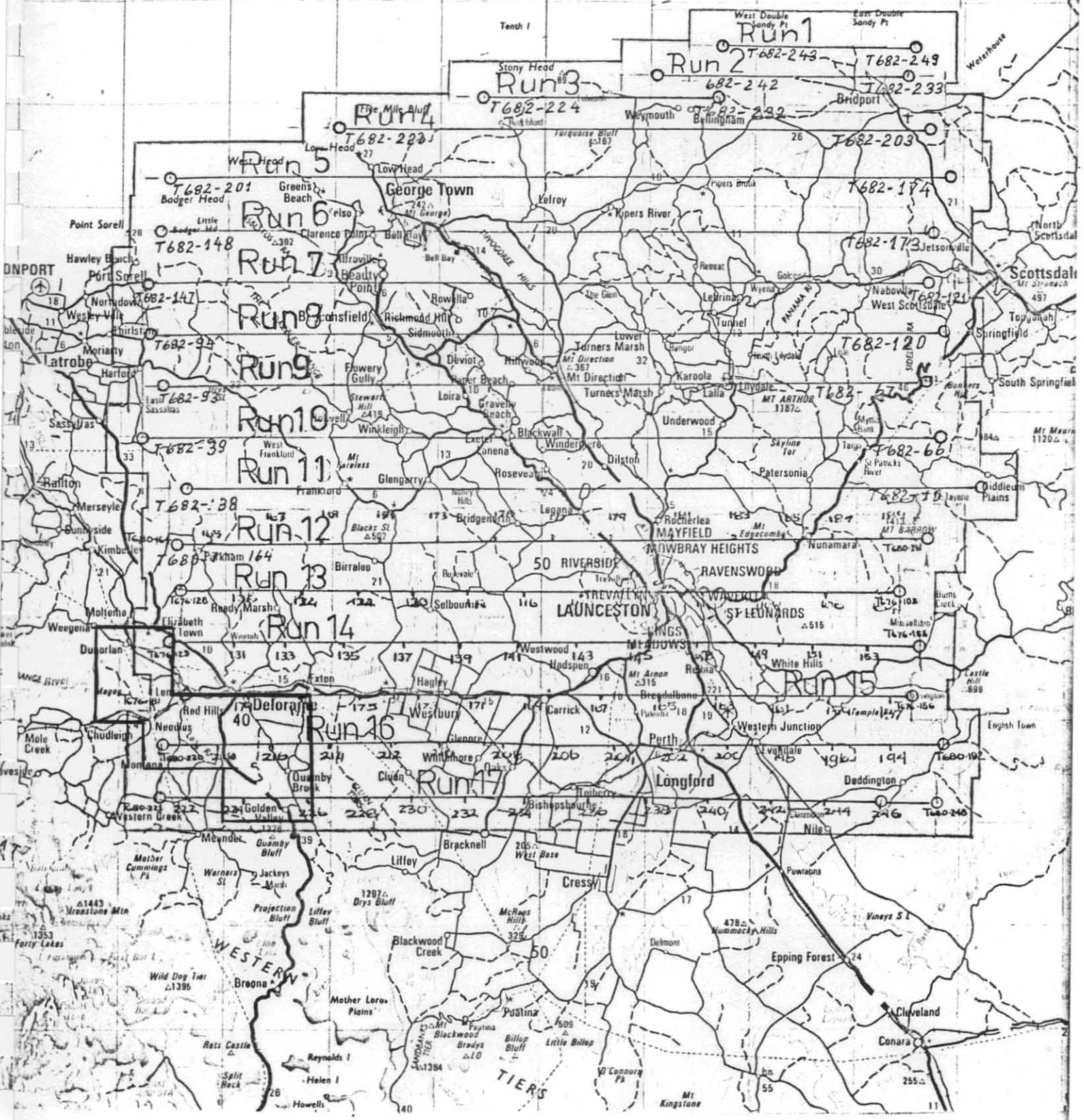
F 488 1:30,000 50

Ninth I

Lit Waterho

Croppies Pt

South Croppies Pt



5 cm

079

APPENDIX 10

217080

RECENT ADDITIONAL -80 MESH STREAM SEDIMENT ANALYSES.

AMDEL ANALYTICAL SERVICE REPORT AN 235879

PAGE 1

NATA CERTIFICATE			XRF ANALYSIS CODE B1			RESULTS IN PPM		
SAMPLE	SN	W	SAMPLE	SN	W	SAMPLE	SN	W
JB/T/QD0001	20	10	JB/T/QD0049	<4	<10	JB/T/QD0049	<4	<10
JB/T/QD0002	12	10	JB/T/QD0050	<4	<10	JB/T/QD0050	<4	<10
JB/T/QD0003	6	<10	JB/T/QD0051	4	<10	JB/T/QD0051	4	<10
JB/T/QD0004	<4	10	JB/T/QD0052	<4	<10	JB/T/QD0052	<4	<10
JB/T/QD0005	<4	<10	JB/T/QD0053	<4	10	JB/T/QD0053	<4	10
JB/T/QD0006	4	<10	JB/T/QD0054	<4	<10	JB/T/QD0054	<4	<10
JB/T/QD0007	4	<10	JB/T/QD0055	<4	10	JB/T/QD0055	<4	10
JB/T/QD0008	4	<10	JB/T/QD0056	4	<10	JB/T/QD0056	4	<10
JB/T/QD0009	<4	<10	JB/T/QD0057	<4	<10	JB/T/QD0057	<4	<10
JB/T/QD0010	<4	<10	JB/T/QD0058	<4	<10	JB/T/QD0058	<4	<10
JB/T/QD0011	4	<10	JB/T/QD0059	6	10	JB/T/QD0059	6	10
JB/T/QD0012	4	<10	JB/T/QD0060	<4	<10	JB/T/QD0060	<4	<10
JB/T/QD0013	4	<10	JB/T/QD0061	<4	<10	JB/T/QD0061	<4	<10
JB/T/QD0014	<4	<10	JB/T/QD0062	<4	<10	JB/T/QD0062	<4	<10
JB/T/QD0015	<4	<10	JB/T/QD0063	<4	10	JB/T/QD0063	<4	10
JB/T/QD0016	<4	10	JB/T/QD0064	4	<10	JB/T/QD0064	4	<10
JB/T/QD0017	<4	<10	JB/T/QD0065	4	10	JB/T/QD0065	4	10
JB/T/QD0018	<4	15	JB/T/QD0066	<4	<10	JB/T/QD0066	<4	<10
JB/T/QD0019	<4	10	JB/T/QD0067	<4	<10	JB/T/QD0067	<4	<10
JB/T/QD0020	<4	<10	JB/T/QD0068	<4	10	JB/T/QD0068	<4	10
JB/T/QD0021	4	<10	JB/T/QD0069	<4	<10	JB/T/QD0069	<4	<10
JB/T/QD0022	4	<10	JB/T/QD0070	<4	<10	JB/T/QD0070	<4	<10
JB/T/QD0023	6	10	JB/T/QD0071	<4	15	JB/T/QD0071	<4	15
JB/T/QD0024	6	10	JB/T/QD0072	<4	<10	JB/T/QD0072	<4	<10
JB/T/QD0025	<4	<10	JB/T/QD0073	<4	10	JB/T/QD0073	<4	10
JB/T/QD0026	6	150	JB/T/QD0074	<4	15	JB/T/QD0074	<4	15
JB/T/QD0027	4	90	JB/T/QD0075	8	10	JB/T/QD0075	8	10
JB/T/QD0028	6	25	JB/T/QD0076	<4	10	JB/T/QD0076	<4	10
JB/T/QD0029	<4	20	JB/T/QD0077	<4	<10	JB/T/QD0077	<4	<10
JB/T/QD0030	<4	10	JB/T/QD0078	<4	<10	JB/T/QD0078	<4	<10
JB/T/QD0031	4	25	JB/T/QD0079	<4	<10	JB/T/QD0079	<4	<10
JB/T/QD0032	<4	15	JB/T/QD0080	<4	<10	JB/T/QD0080	<4	<10
JB/T/QD0033	<4	<10	JB/T/QD0081	<4	10	JB/T/QD0081	<4	10
JB/T/QD0034	<4	<10	JB/T/QD0082	<4	10	JB/T/QD0082	<4	10
JB/T/QD0035	<4	10	JB/T/QD0083	6	<10	JB/T/QD0083	6	<10
JB/T/QD0036	<4	10	JB/T/QD0084	<4	<10	JB/T/QD0084	<4	<10
JB/T/QD0037	4	10	JB/T/QD0085	<4	<10	JB/T/QD0085	<4	<10
JB/T/QD0038	6	10	JB/T/QD0086	10	<10	JB/T/QD0086	10	<10
JB/T/QD0039	6	15	JB/T/QD0087	8	<10	JB/T/QD0087	8	<10
JB/T/QD0040	6	<10	JB/T/QD0088	8	<10	JB/T/QD0088	8	<10
JB/T/QD0041	<4	15	JB/T/QD0089	12	<10	JB/T/QD0089	12	<10
JB/T/QD0042	<4	<10	JB/T/QD0090	8	<10	JB/T/QD0090	8	<10
JB/T/QD0043	<4	<10	JB/T/QD0091	10	<10	JB/T/QD0091	10	<10
JB/T/QD0043b	<4	<10	JB/T/QD0092	8	<10	JB/T/QD0092	8	<10
JB/T/QD0044	<4	10	JB/T/QD0093	8	<10	JB/T/QD0093	8	<10
JB/T/QD0044b	<4	<10	JB/T/QD0094	10	<10	JB/T/QD0094	10	<10
JB/T/QD0045	4	<10	JB/T/QD0095	10	<10	JB/T/QD0095	10	<10
JB/T/QD0046	<4	<10	JB/T/QD0096	16	<10	JB/T/QD0096	16	<10
JB/T/QD0047	<4	10	JB/T/QD0097	12	10	JB/T/QD0097	12	10
JB/T/QD0048	6	<10	JB/T/QD0098	12	<10	JB/T/QD0098	12	<10
DETN LIMIT	(4)	(10)	DETN LIMIT	(4)	(10)	DETN LIMIT	(4)	(10)

080

NATA CERTIFICATE

XRF ANALYSIS CODE B1

RESULTS IN PPM

SAMPLE	SN	W
JB/T/00099	12	10
JB/T/00100	18	<10
JB/T/00101	14	<10
JB/T/00102	28	<10
JB/T/00103	30	<10
JB/T/00104	55	<10
JB/T/00105	24	<10
JB/T/00106	50	<10
JB/T/00107	40	<10
JB/T/00108	12	<10
JB/T/00109	6	<10
JB/T/00110	12	<10
JB/T/00111	4	<10
JB/T/00112	4	<10
JB/T/00113	6	<10
JB/T/00114	12	<10
JB/T/00115	8	10
JB/T/00116	<4	<10
JB/T/00131	4	<10
JB/T/00132	6	<10
JB/T/00133	6	<10
RD/T/00332	<4	<10
RD/T/00333	10	<10
RD/T/00334	4	<10
RD/T/00335	4	10
RD/T/00336	4	<10
RD/T/00337	16	<10
RD/T/00338	<4	<10
RD/T/00339	4	<10
RD/T/00340	8	<10
RD/T/00341	10	10
RD/T/00342	6	<10
RD/T/00343	4	10
RD/T/00344	<4	<10
RD/T/00345	6	15
RD/T/00457	<4	<10
RD/T/00458	<4	<10
RD/T/00459	<4	<10
RD/T/00460	<4	10
RD/T/00461	<4	<10
RD/T/00462	<4	<10
RD/T/00463	6	<10

For sample locations see
Drg. Nos. 78-223, 226.

DETN LIMIT (4) (10)

DETN LIMIT (4) (10)

PLANSA. REGIONAL

- 78 - 128 - Geology of the Cambrian Rocks. E.L.17/76 Quamby.
78 - 223 - E.L.17/76 Quamby Stream Sediment.
78 - 224 - Sample locations and results.
78 - 225 - Sample locations and results.
78 - 226 - Sample locations and results.

B. KENTISH HILL

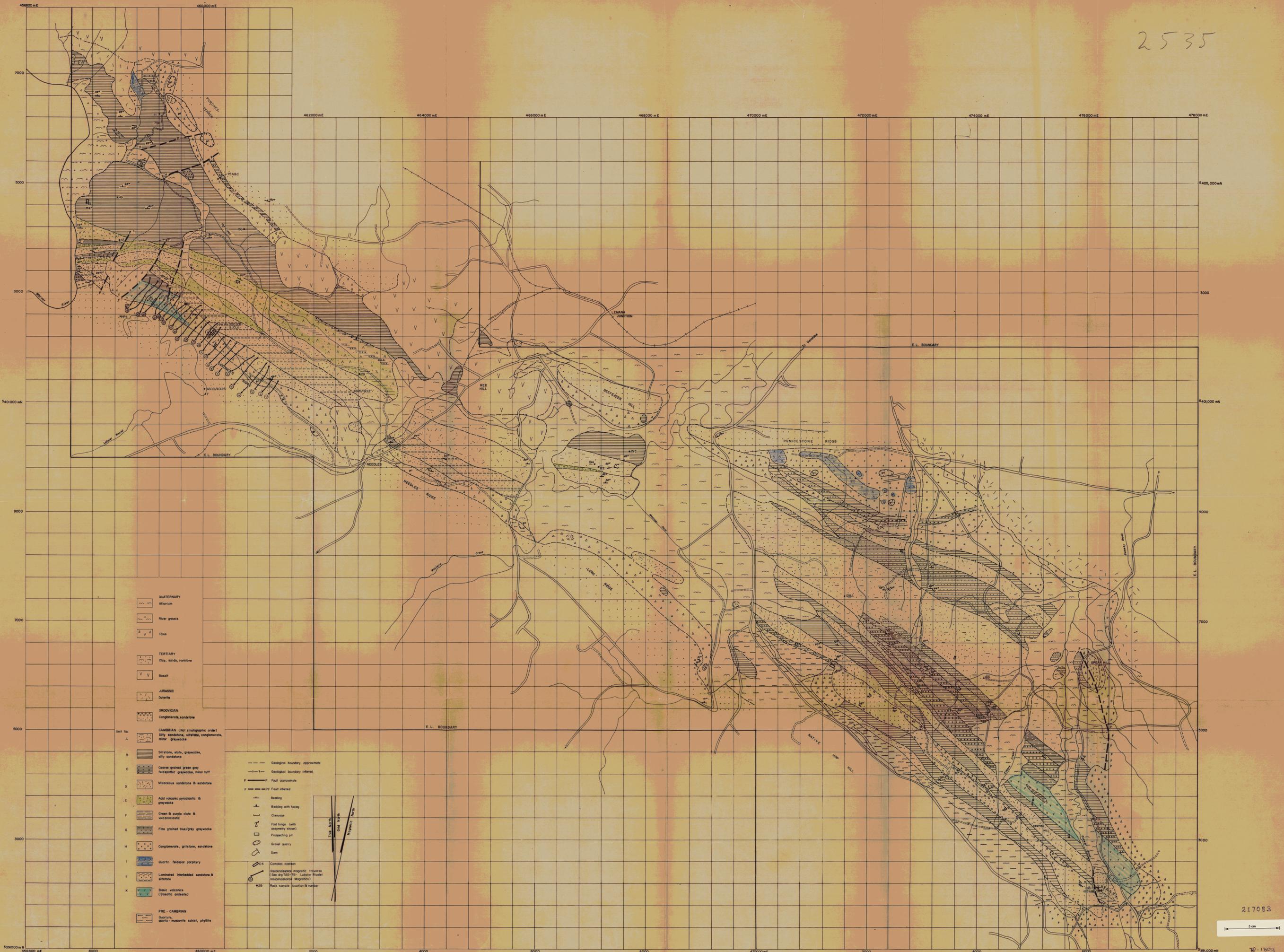
- 78 - 166 - Quamby Brook, Reconnaissance geology.
77 - 104 - Kentish Hill, Geology.
78 - 229 - Kentish Hill grid. Total magnetic field, data sheet.
78 - 285 - Kentish Hill grid, total magnetic field, stacked profiles.
77 - 95 - Kentish Hill grid, total magnetic field, contour plan.
78 - 177 - Kentish Hill, time domain gradient array electrical induced polarisation RESISTIVITY profiles.
77 - 101 - Kentish Hill grid. RESISTIVITY contour plan. Time domain electrical induced polarisation, gradient array.
78 - 176 - Kentish Hill. Time domain gradient array electrical induced polarisation CHARGEABILITY profiles.
77 - 102 - Kentish Hill grid. CHARGEABILITY contour plan. Time domain electrical induced polarisation, gradient array.
78 - 230 - Kentish Hill grid. Soil chemistry.

C. LOBSTER RIVULET AREA

- 78 - 286 - Lobster Rivulet. Reconnaissance magnetics, total magnetic field.
78 - 236 - E.L.17/76 Quamby. Lobster Rivulet area, magnetometer survey of the P.K. Pit area.
78 - 237 - Lobster Rivulet area. Detailed magnetometer survey over Magog reconnaissance magnetic anomalies.
78 - 284 - Lobster Rivulet area. P.K. Pit costean and Magog costean - Geology.

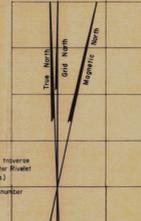
OPEN FILE

2535



- QUATERNARY**
- Alluvium
 - River gravels
 - Talus
- TERTIARY**
- Clay, sands, siltstone
 - Basalt
- JURASSIC**
- Dolomite
- ORDOVICIAN**
- Conglomerate, sandstone
- CAMBRIAN (Not stratigraphic order)**
- Unit No:
- A Silty sandstone, siltstone, conglomerate, minor greywacke
 - B Siltstone, slate, greywacke, silty sandstone
 - C Coarse grained green grey feldspathic greywacke, minor tuff
 - D Micaceous sandstone & siltstone
 - E Acid volcanic pyroclastic & greywacke
 - F Green & purple slate & volcanoclastic
 - G Fine grained blue/grey greywacke
 - H Conglomerate, gritstone, sandstone
 - I Quartz feldspar porphyry
 - J Laminated interbedded sandstone & siltstone
 - K Basic volcanics (Basaltic andesite)
- PRE-CAMBRIAN**
- Quartzite, quartz-muscovite schist, gneiss

- Geological boundary approximate
- Geological boundary inferred
- Fault approximate
- Fault inferred
- Bedding
- Bedding with facing
- Cleavage
- Fold hinge (with asymmetry shown)
- Projecting pit
- Gravel quarry
- Dam
- Combed section
- Reconnaissance magnetic traverse (See grid 7500 mE - "Lobby River" Reconnaissance Magnetic)
- Rock sample location & number



217083

5 cm

76-1306

COMALCO LIMITED

GEOLOGY OF THE CAMBRIAN ROCKS EL 17/76 QUAMBY 2533

Compiled: P. Komyshan	Revised:	Drawn: S. Hutchison
Date: May, 1978	Scale: 1:20,000	Eng. No: Taa - 78 - 128

Index numbers shown on this tenure map when used in conjunction with the sheet number provides a unique reference to any 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.

QUAMBY
CADASTRAL - TOPOGRAPHIC SERIES
(Preliminary Edition)
DEVON

Table with columns: Index, Map Ref, Survey Plan, Lot, Area, Name / Purpose, Tenure, Index, Map Ref, Survey Plan, Lot, Area, Name / Purpose, Tenure. Includes a 'KEY' section and a 'COMALCO LIMITED' box with 'TASMANIA E.L. 17/76 QUAMBY STREAM SEDIMENT SAMPLE LOCATIONS AND RESULTS 2532'.

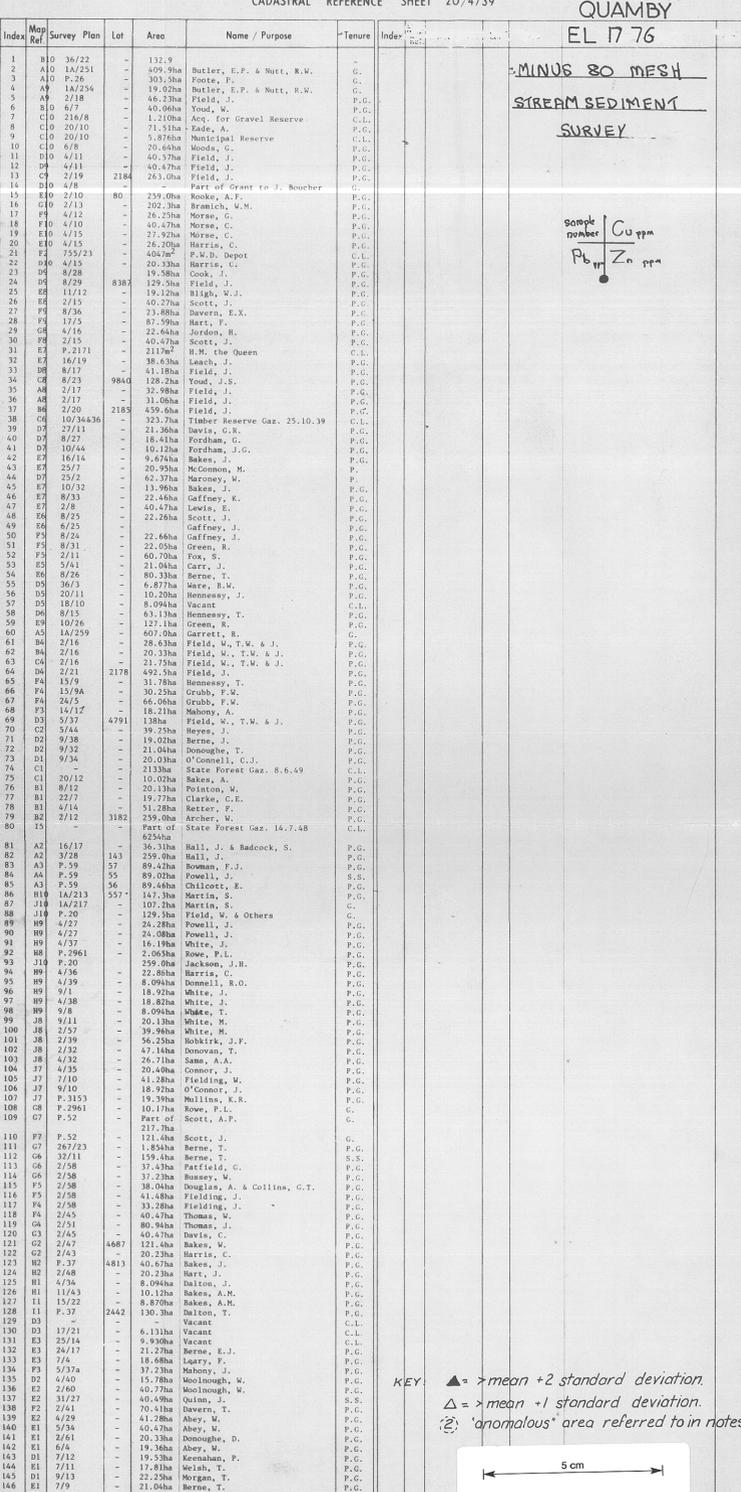


Scale 1:20 000, Contour Interval 20 Metres, Conversion Tables, Map Reference System 20/4640, Boundary Legend, Road Classification, Index to Adjoining Sheets, Location Diagram, and other technical details.

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. 20/4739/4845). 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.

Index	Map Ref	Survey Plan	Lot	Area	Name / Purpose	Tenure	Index
1	B10	36/22	-	132.9	-	-	-
2	A10	1A/251	-	409.9ha	Butler, E.P. & Nutt, R.W.	G.	-
3	A10	7/26	-	303.5ha	Butler, E.P. & Nutt, R.W.	G.	-
4	A9	1A/254	-	19.02ha	Butler, E.P. & Nutt, R.W.	G.	-
5	A9	2/18	-	46.23ha	Field, J.	P.G.	-
6	A9	6/7	-	40.60ha	Field, J.	P.G.	-
7	C10	216/8	-	1.210ha	Acq. for Gravel Reserve	C.L.	-
8	C10	20/10	-	21.33ha	Tade, A.	P.G.	-
9	C10	20/10	-	5.876ha	Municipal Reserve	C.L.	-
10	C10	6/8	-	20.64ha	Moore, G.	P.G.	-
11	D10	4/11	-	40.47ha	Field, J.	P.G.	-
12	D10	4/8	-	263.0ha	Field, J.	P.G.	-
13	E10	2/10	-	239.0ha	Rooke, A.P.	P.G.	-
14	E10	2/11	-	102.0ha	Branich, W.M.	P.G.	-
15	E10	4/12	-	26.25ha	Morse, G.	P.G.	-
16	E10	4/13	-	40.47ha	Morse, G.	P.G.	-
17	E10	4/15	-	27.52ha	Morse, G.	P.G.	-
18	E10	4/15	-	26.20ha	Harris, G.	P.G.	-
19	E10	4/15	-	40.47ha	Field, J.	P.G.	-
20	E10	4/15	-	20.33ha	Harris, G.	P.G.	-
21	E10	4/15	-	19.58ha	Cook, J.	P.G.	-
22	E10	4/15	-	129.5ha	Field, J.	P.G.	-
23	E10	4/15	-	19.12ha	Bligh, W.J.	P.G.	-
24	E10	4/15	-	23.88ha	Davera, E.X.	P.G.	-
25	E10	4/15	-	67.59ha	Hart, F.	P.G.	-
26	E10	4/15	-	22.44ha	Jordan, B.	P.G.	-
27	E10	4/15	-	40.47ha	Scott, J.	P.G.	-
28	E10	4/15	-	211.2ha	H.M. the Queen	P.G.	-
29	E10	4/15	-	38.63ha	Leach, J.	P.G.	-
30	E10	4/15	-	41.18ha	Field, J.	P.G.	-
31	E10	4/15	-	128.2ha	Yend, J.S.	P.G.	-
32	E10	4/15	-	32.98ha	Field, J.	P.G.	-
33	E10	4/15	-	10.06ha	Field, J.	P.G.	-
34	E10	4/15	-	439.0ha	Field, J.	P.G.	-
35	E10	4/15	-	323.7ha	Timber Reserve Gaz. 25.10.39	C.L.	-
36	E10	4/15	-	21.36ha	Haves, G.R.	P.G.	-
37	E10	4/15	-	16.41ha	Fordham, G.	P.G.	-
38	E10	4/15	-	10.12ha	Fordham, J.G.	P.G.	-
39	E10	4/15	-	6.67ha	Baker, W.	P.G.	-
40	E10	4/15	-	20.95ha	McCommon, M.	P.G.	-
41	E10	4/15	-	62.37ha	Baker, W.	P.G.	-
42	E10	4/15	-	13.96ha	Baker, W.	P.G.	-
43	E10	4/15	-	22.46ha	Gaffney, K.	P.G.	-
44	E10	4/15	-	40.47ha	Scott, J.	P.G.	-
45	E10	4/15	-	22.26ha	Scott, J.	P.G.	-
46	E10	4/15	-	22.66ha	Gaffney, J.	P.G.	-
47	E10	4/15	-	22.05ha	Green, R.	P.G.	-
48	E10	4/15	-	60.70ha	Fox, S.	P.G.	-
49	E10	4/15	-	21.04ha	Carr, J.	P.G.	-
50	E10	4/15	-	80.33ha	Berne, T.	P.G.	-
51	E10	4/15	-	6.87ha	Mere, R.W.	P.G.	-
52	E10	4/15	-	10.20ha	Hennessey, J.	P.G.	-
53	E10	4/15	-	8.09ha	Vacant	P.G.	-
54	E10	4/15	-	63.13ha	Hennessey, T.	P.G.	-
55	E10	4/15	-	127.1ha	Green, K.	P.G.	-
56	E10	4/15	-	607.0ha	Garrett, R.	P.G.	-
57	E10	4/15	-	28.63ha	Field, W. T.W. & J.	P.G.	-
58	E10	4/15	-	20.33ha	Field, W. T.W. & J.	P.G.	-
59	E10	4/15	-	21.75ha	Field, W. T.W. & J.	P.G.	-
60	E10	4/15	-	492.5ha	Field, J.	P.G.	-
61	E10	4/15	-	31.78ha	Hennessey, T.	P.G.	-
62	E10	4/15	-	30.23ha	Grubb, F.W.	P.G.	-
63	E10	4/15	-	66.08ha	Grubb, F.W.	P.G.	-
64	E10	4/15	-	18.21ha	Mahony, A.	P.G.	-
65	E10	4/15	-	138ha	Field, W. T.W. & J.	P.G.	-
66	E10	4/15	-	38.25ha	Haves, G.R.	P.G.	-
67	E10	4/15	-	19.02ha	Berne, J.	P.G.	-
68	E10	4/15	-	21.04ha	Donoghue, T.	P.G.	-
69	E10	4/15	-	20.03ha	O'Connell, C.J.	P.G.	-
70	E10	4/15	-	10.02ha	Baker, A.	P.G.	-
71	E10	4/15	-	2133ha	State Forest Gaz. 8.6.69	C.L.	-
72	E10	4/15	-	10.13ha	Pointon, W.	P.G.	-
73	E10	4/15	-	19.77ha	Clarke, C.E.	P.G.	-
74	E10	4/15	-	51.28ha	Reiter, F.	P.G.	-
75	E10	4/15	-	239.0ha	Archer, W.	P.G.	-
76	E10	4/15	-	Part of State Forest Gaz. 14.7.48	-	-	-
77	E10	4/15	-	623ha	-	-	-
78	E10	4/15	-	36.33ha	Hall, J. & Badcock, S.	P.G.	-
79	E10	4/15	-	259.0ha	Hall, J.	P.G.	-
80	E10	4/15	-	89.47ha	Bowman, F.J.	P.G.	-
81	E10	4/15	-	89.02ha	Fowell, J.	P.G.	-
82	E10	4/15	-	89.44ha	Chicott, E.	P.G.	-
83	E10	4/15	-	147.3ha	Martin, S.	P.G.	-
84	E10	4/15	-	107.3ha	Martin, S.	P.G.	-
85	E10	4/15	-	129.3ha	Field, W. & Others	P.G.	-
86	E10	4/15	-	24.08ha	Fowell, J.	P.G.	-
87	E10	4/15	-	16.19ha	White, J.	P.G.	-
88	E10	4/15	-	2.003ha	Rose, P.L.	P.G.	-
89	E10	4/15	-	259.0ha	Jackson, J.H.	P.G.	-
90	E10	4/15	-	22.08ha	Harris, G.	P.G.	-
91	E10	4/15	-	8.09ha	Donnell, R.O.	P.G.	-
92	E10	4/15	-	18.92ha	White, J.	P.G.	-
93	E10	4/15	-	18.82ha	White, J.	P.G.	-
94	E10	4/15	-	39.94ha	White, M.	P.G.	-
95	E10	4/15	-	56.25ha	Hobkirk, J.P.	P.G.	-
96	E10	4/15	-	27.14ha	Donovan, F.	P.G.	-
97	E10	4/15	-	26.71ha	Sams, A.A.	P.G.	-
98	E10	4/15	-	20.33ha	Comor, J.	P.G.	-
99	E10	4/15	-	41.28ha	Fielding, W.	P.G.	-
100	E10	4/15	-	18.92ha	O'Connor, J.	P.G.	-
101	E10	4/15	-	19.79ha	Hullins, E.K.	P.G.	-
102	E10	4/15	-	10.17ha	Kowe, P.L.	P.G.	-
103	E10	4/15	-	Part of Scott, A.P.	-	-	-
104	E10	4/15	-	217.3ha	-	-	-
105	E10	4/15	-	121.4ha	Scott, J.	G.	-
106	E10	4/15	-	1.83ha	Berne, T.	P.G.	-
107	E10	4/15	-	159.4ha	Berne, T.	S.S.	-
108	E10	4/15	-	37.43ha	Patfield, G.	P.G.	-
109	E10	4/15	-	31.23ha	Rose, W.	P.G.	-
110	E10	4/15	-	38.04ha	Douglas, A. & Collins, C.T.	P.G.	-
111	E10	4/15	-	41.68ha	Fielding, J.	P.G.	-
112	E10	4/15	-	33.28ha	Fielding, J.	P.G.	-
113	E10	4/15	-	40.47ha	Thomas, J.	P.G.	-
114	E10	4/15	-	80.94ha	Thomas, J.	P.G.	-
115	E10	4/15	-	40.47ha	Davis, C.	P.G.	-
116	E10	4/15	-	121.4ha	Baker, W.	P.G.	-
117	E10	4/15	-	20.23ha	Harris, G.	P.G.	-
118	E10	4/15	-	40.47ha	Baker, J.	P.G.	-
119	E10	4/15	-	20.23ha	Hart, J.	P.G.	-
120	E10	4/15	-	8.09ha	Dalton, J.	P.G.	-
121	E10	4/15	-	20.23ha	Hart, J.	P.G.	-
122	E10	4/15	-	10.12ha	Baker, A.H.	P.G.	-
123	E10	4/15	-	8.87ha	Baker, A.H.	P.G.	-
124	E10	4/15	-	130.3ha	Dalton, T.	P.G.	-
125	E10	4/15	-	Vacant	-	-	-
126	E10	4/15	-	6.13ha	Vacant	C.L.	-
127	E10	4/15	-	9.93ha	Vacant	C.L.	-
128	E10	4/15	-	21.22ha	Berne, E.J.	P.G.	-
129	E10	4/15	-	18.68ha	Lary, F.	P.G.	-
130	E10	4/15	-	37.23ha	Mahony, J.	P.G.	-
131	E10	4/15	-	15.78ha	Mooninough, W.	P.G.	-
132	E10	4/15	-	40.77ha	Mooninough, W.	P.G.	-
133	E10	4/15	-	31.727	Outim, P.	P.G.	-
134	E10	4/15	-	70.51ha	Davern, T.	P.G.	-
135	E10	4/15	-	41.28ha	Ahey, W.	P.G.	-
136	E10	4/15	-	40.47ha	Ahey, W.	P.G.	-
137	E10	4/15	-	20.33ha	Donoghue, D.	P.G.	-
138	E10	4/15	-	19.36ha	Ahey, W.	P.G.	-
139	E10	4/15	-	19.53ha	Keenan, P.	P.G.	-
140	E10	4/15	-	17.81ha	Walsh, T.	P.G.	-
141	E10	4/15	-	22.25ha	Morgan, T.	P.G.	-
142	E10	4/15	-	21.04ha	Berne, T.	P.G.	-
143	E10	4/15	-	20.44a	Leary, B.	P.G.	-
144	E10	4/15	-	40.47ha	Deam, W.A. & Bloe	P.G.	-
145	E10	4/15	-	59.49ha	Death, D.	P.G.	-
146	E10	4/15	-	61.92ha	Pullen, G.	P.G.	-
147	E10	4/15	-	20.23ha	Harris, G.	P.G.	-
148	E10	4/15	-	20.07ha	Harris, G.	P.G.	-
149	E10	4/15	-	32.37ha	Pullen, G.	P.G.	-
150	E10	4/15	-	19.63ha	Berne, T.	P.G.	-
151	E10	4/15	-	40.97ha	Donovan, M.	P.G.	-
152	E10	4/15	-	20.53ha	Walsh, J.	P.G.	-
153	E10	4/15	-	40.47ha	Toad, J.	P.G.	-
154	E10	4/15	-	19.12ha	Graham, W.	P.G.	-
155	E10	4/15	-	29.54ha	Donovan, J.	P.G.	-
156	E10	4/15	-	33.44ha	Donovan, B.	P.G.	-
157	E10	4/15	-	4047a	Donovan, J.	P.G.	-
158	E10	4/15	-	55.85ha	Harding, J. & Har	P.G.	-
159	E10	4/15	-	137.6ha	Sullivan, B.	P.G.	-
160	E10	4/15	-	20.23ha	Grubb, F.W.	P.G.	-
161	E10	4/15	-	19.43ha	Grubb, F.W.	P.G.	-
162	E10	4/15	-	8.09ha	McClone, B.	P.G.	-
163	E10	4/15	-	23.67ha	McClone, B.	P.G.	-
164	E10	4/15	-	427.75ha	Field, W.	P.G.	-



217085
COMALCO LIMITED
TASMANIA
E.L. 17/76 QUAMBY
STREAM SEDIMENT
SAMPLE LOCATIONS AND RESULTS
2533

78-1309

Compiled: R Duraj
Scale: 1:20,000
Drg. No: TAS-78-224

Index	Map Ref	Survey Plan	Lot	Area	Name / Purpose	Tenure	Index
1	B10	36/22	-	132.9	-	-	-
2	A10	1A/251	-	409.9ha	Butler, E.P. & Nutt, R.W.	G.	-
3	A10	7/26	-	303.5ha	Butler, E.P. & Nutt, R.W.	G.	-
4	A9	1A/254	-	19.02ha	Butler, E.P. & Nutt, R.W.	G.	-
5	A9	2/18	-	46.23ha	Field, J.	P.G.	-
6	A9	6/7	-	40.60ha	Field, J.	P.G.	-
7	C10	216/8	-	1.210ha	Acq. for Gravel Reserve	C.L.	-
8	C10	20/10	-	21.33ha	Tade, A.	P.G.	-
9	C10	20/10	-	5.876ha	Municipal Reserve	C.L.	-
10	C10	6/8	-	20.64ha	Moore, G.	P.G.	-
11	D10	4/11	-	40.47ha	Field, J.	P.G.	-
12	D10	4/8	-	263.0ha	Field, J.	P.G.	-
13	E10	2/10	-	239.0ha	Rooke, A.P.	P.G.	-
14	E10	2/11	-	102.0ha	Branich, W.M.	P.G.	-
15	E10	4/12	-	26.25ha	Morse, G.	P.G.	-

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 44a G.P.O. Hobart.

EL 1776 QUAMBY STREAM GEOMETRY CADASTRAL 24639

CADASTRAL REFERENCE SHEET 20/4639. Table with columns: Index, Map Ref, Survey Plan, Lot, Area, Name/Purpose, Tenure, Index, Map Ref, Survey Plan, Lot, Area, Name/Purpose, Tenure. Includes a 'KEY' section with symbols for standard deviations and an 'INDEX TO ADJOINING SHEETS' grid.

COMALCO LIMITED 217086. TASMANIA E.L.1776 QUAMBY. STREAM SEDIMENT SAMPLE LOCATIONS AND RESULTS 2534. Compiled: R. Duraj. Scale: 1:20000. Drg. No.: TAS-78-225.



PRODUCTION: Lands Dept 1974. PROJECTION: Transverse Mercator. HORIZONTAL DATUM: Australian Geodetic Datum 1966. VERTICAL DATUM: Mean Sea Level. SCALE 1:20 000. Line Scale Factor K for this sheet = 0.99961. CONTOUR INTERVAL 20 METRES. Conversion tables for METRES to FEET, METRES to METRES, METRES TO KILOMETRES, KILOMETRES TO METRES. MAGNETIC VARIATION 1970 APPROX. RATE OF CHANGE APPROX. 0.17 ANNUAL. MAP REFERENCE: 20/4639. 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. LOCATION DIAGRAM: Grid showing sheet 20/4639 in context with adjacent sheets 4540, 4640, 4740, 4539, 4738, 4538, 4638, 4739.

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.L. = 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.

QUAMBY CADASTRAL - TOPOGRAPHIC SERIES (Preliminary Edition)

CADASTRAL REFERENCE SHEET 20/4540

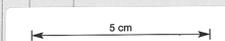
QUAMBY EL17/76

MINUS 80 MESH STREAM SEDIMENT SURVEY

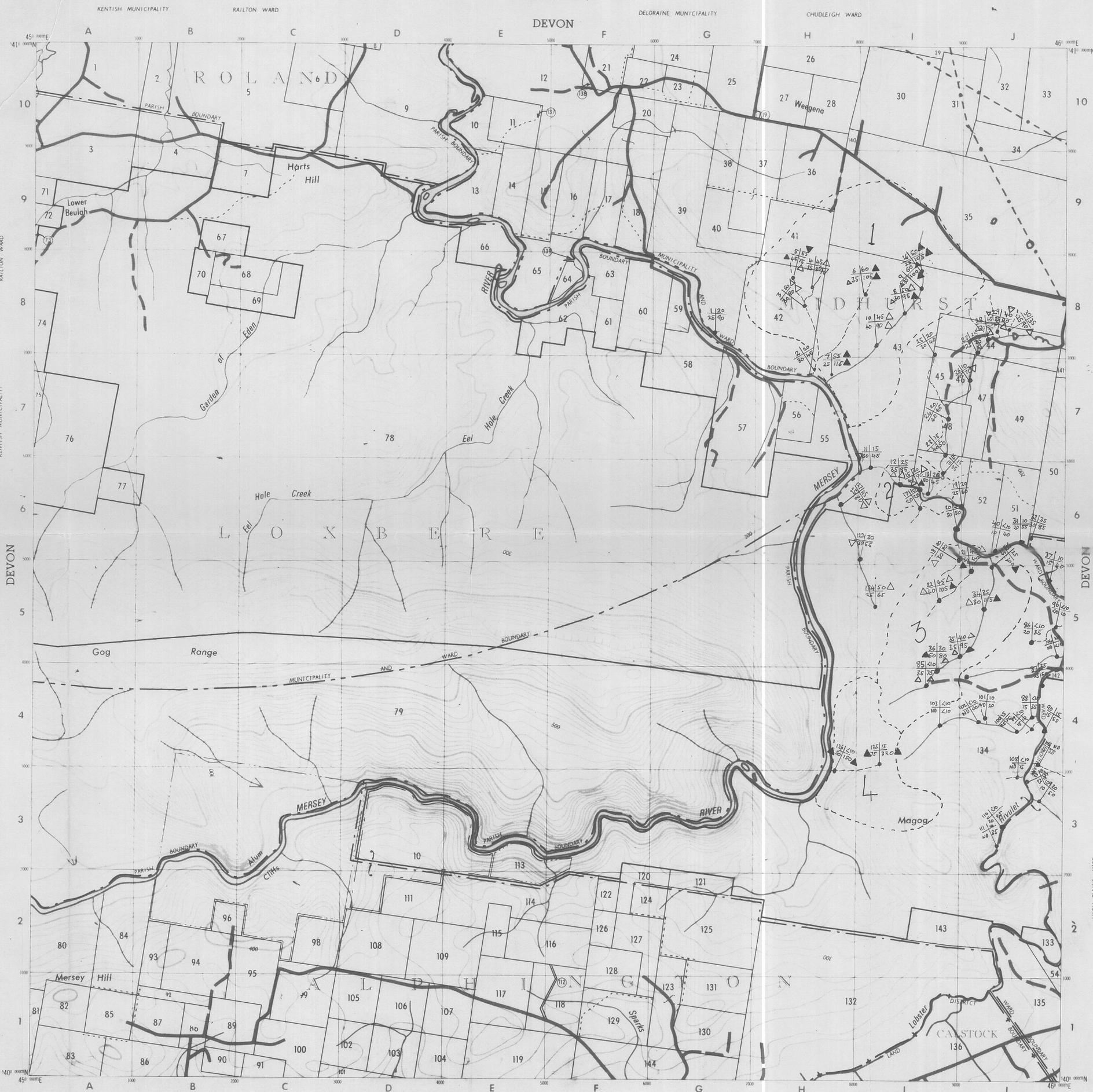
sample number Cu ppm Pb ppm Zn ppm

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

KEY: ▲ = mean + 2 standard deviations, △ = mean + 1 standard deviations, (Z) = anomalous area referred to in notes.



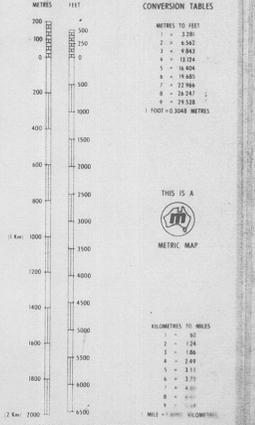
COMALCO LIMITED 217087 TASMANIA EL17/76 QUAMBY STREAM SEDIMENT SAMPLE LOCATIONS AND RESULTS 2536. Compiled: R. Duraj. Scale: 1:20,000. Drg. No.: TAS-78-226.



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

PRODUCTION: Lands Dept 1975. PROJECTION: Transverse Mercator. HORIZONTAL DATUM: Australian Geodetic Datum 1986. VERTICAL DATUM: Mean Sea Level. COMPILED: based on 1:200 000 Topographical Series and Land District Charts.

SCALE 1:20 000. Line Scale Factor K for this sheet = 0.99992. CONTOUR INTERVAL 20 METRES.

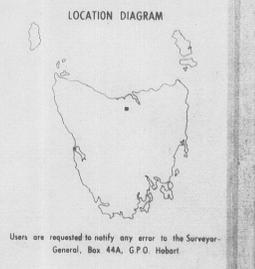


MAP REFERENCE SYSTEM 20/4540. 1 Fractional scale in thousands is 1:20 000. 2 South West co-ordinates of this map sheet as represented by 10,000 metre grid intervals of the Australian Map Grid is 450,000m East and 610,000m North.

BOUNDARY LEGEND. Land District, Municipality, Parish, Ward, Town, 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. Grid of sheet numbers: 4441, 4541, 4641; 4440, 4540, 4640; 4439, 4539, 4639.



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

Mag. North

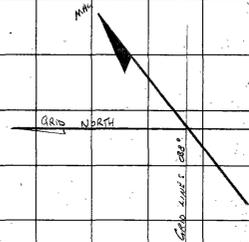


RECENT		Alluvial cover
		Talus - Owen Conglomerate
ORDOVICIAN		Owen Conglomerate
CAMBRIAN		Greywacke Medium-light grey, generally medium grained with pebbly horizons, micaceous and foliated, some siltstone, some quartz veining
		Phyllite Dark grey to purple with siltstone and cherty layers and mineralized where indicated
		Volcanics Medium to dark greenish-grey and reddish-brown, fine grained, often chloritic with iron and manganese staining, epidote and chrysotile veining
		Tufts Grey to greenish-grey and red-brown fine grained tufts and silty sediments
PRECAMBRIAN		Slate Medium to light grey and buff coloured slate, micaceous quartzite and siltstone, kaolinitic, chloritic (chl).
		Quartz muscovite, schists and phyllite
IGNEOUS		Dolerite talus and/or dykes.
		Union Oil Grid
		Major fence line
		Overgrown track
		Dip and strike
		Defined
Geological Boundaries		Approximate
		Inferred
		Dam
		Stream
		Fault inferred
		Mine shaft
		Quartz float
		Quartz veins

217088



COMALCO LIMITED			
EL 17/76 TASMANIA			
QUAMBY BROOK			
RECONNAISSANCE GEOLOGY			
2537			
Compiled	I. D. Picken	Revised	Drawn O. Hedditch
Date	Feb 1977	Scale	1:7500
		Drng No	TAS 78-166



700 E	62271	62291	62284	62332	62369	62379	62320	62315	62392	62312	62316	62341	62391	62442	62502	62493	62467	62432	62325
	62250	62292	62291	62332	62378	62307	62296	62347	62291	62321	62298	62342	62403	62483	62561	62621	62429	62407	62475
	62291	62284	62300	62337	62359	62284	62316	62209	62316	62334	62320	62337	62399	62525	62560	62567	62445	62445	62472
600 E	62299	62276	6310	62326	62407	62282	62362	62314	62332	62365	62350	62350	62391	62551	62575	62452	62451	62493	62520
	62291	62290	62313	62301	62396	62313	62366	62400	62371	62436	62462	62358	62397	62316	62533	62442	62555	62540	62528
	62283	62296	62315	62309	62328	62300	62316	62509	62310	62462	62406	62358	62397	62775	62476	62501	62582	62507	62556
	62286	62297	62322	62298	62312	62315	62332	62436	62298	62306	62406	62358	62729	62929	62467	62703	62626	62572	62568
500 E	62284	62300	62324	62289	62310	62295	62323	62578	62305	62264	62343	62490	62547	62620	62492	62614	62816	62659	62616
	62295	62303	62309	62356	62309	62307	62312	62620	62261	62254	62627	62590	62561	62523	62366	62761	62928	62823	62804
	62290	62301	62316	62307	62314	62316	62311	62469	62251	62198	62365	62465	62427	62559	62508	62812	63293	62735	62479
	62284	62312	62321	62389	62318	62315	62352	62282	62270	62273	62518	62287	62461	62602	62669	63026	63525	62641	62468
400 E	62293	62320	62333	62322	62324	62323	62314	62302	62387	62327	62336	62775	62678	62238	62809	63082	63932	62652	62213
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300 E	62218	62326	62370	62416	62437	62377	62325	62298	62255	62741	62608	63993	63686	62996	61958	62064	62084	62778	62159
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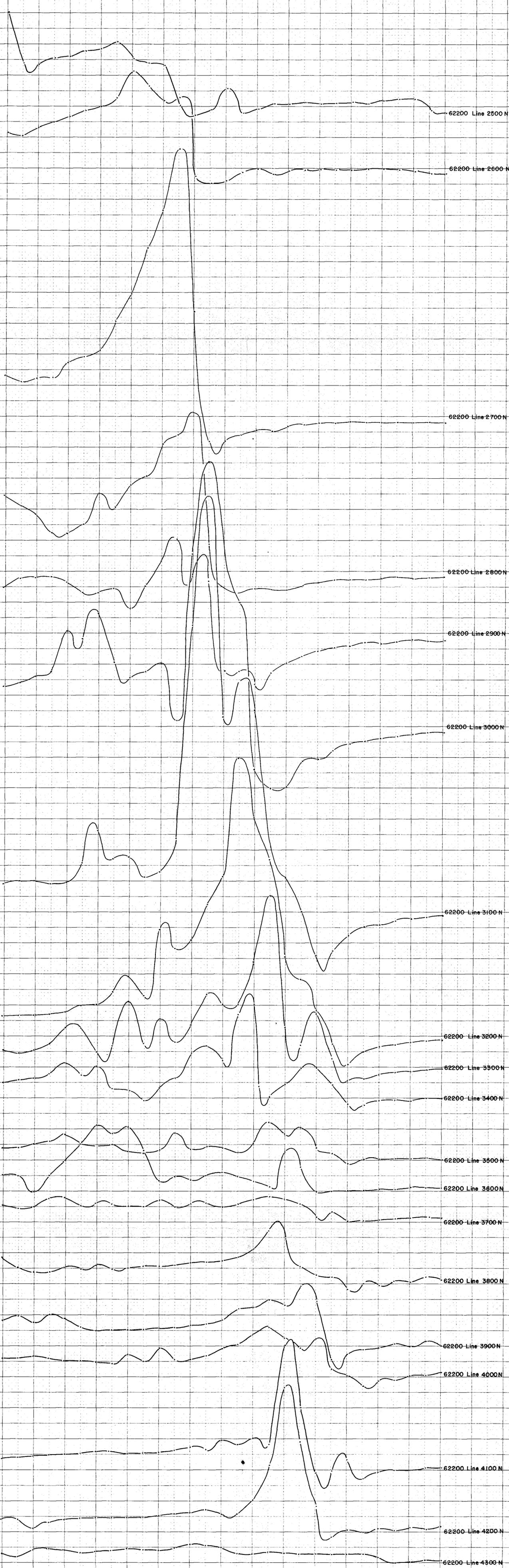
Note: Instrument - Geometrics G-816 proton precession magnetometer

COMALCO LIMITED
217030

TASMANIA
EL 17.76 QUAMBY

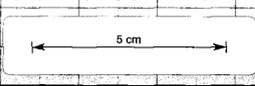
KENTISH HILL GRID
TOTAL MAGNETIC FIELD, DATA SHEET

Compiled: R Potlock Revised: Drawn: R Potlock
Date: Oct 1978 Scale: 1:2500 Dwg No: TAS-78-229



Instrument - Geometrics G-816 Proton Precession Magnetometer
 Operator - G. Shovelton

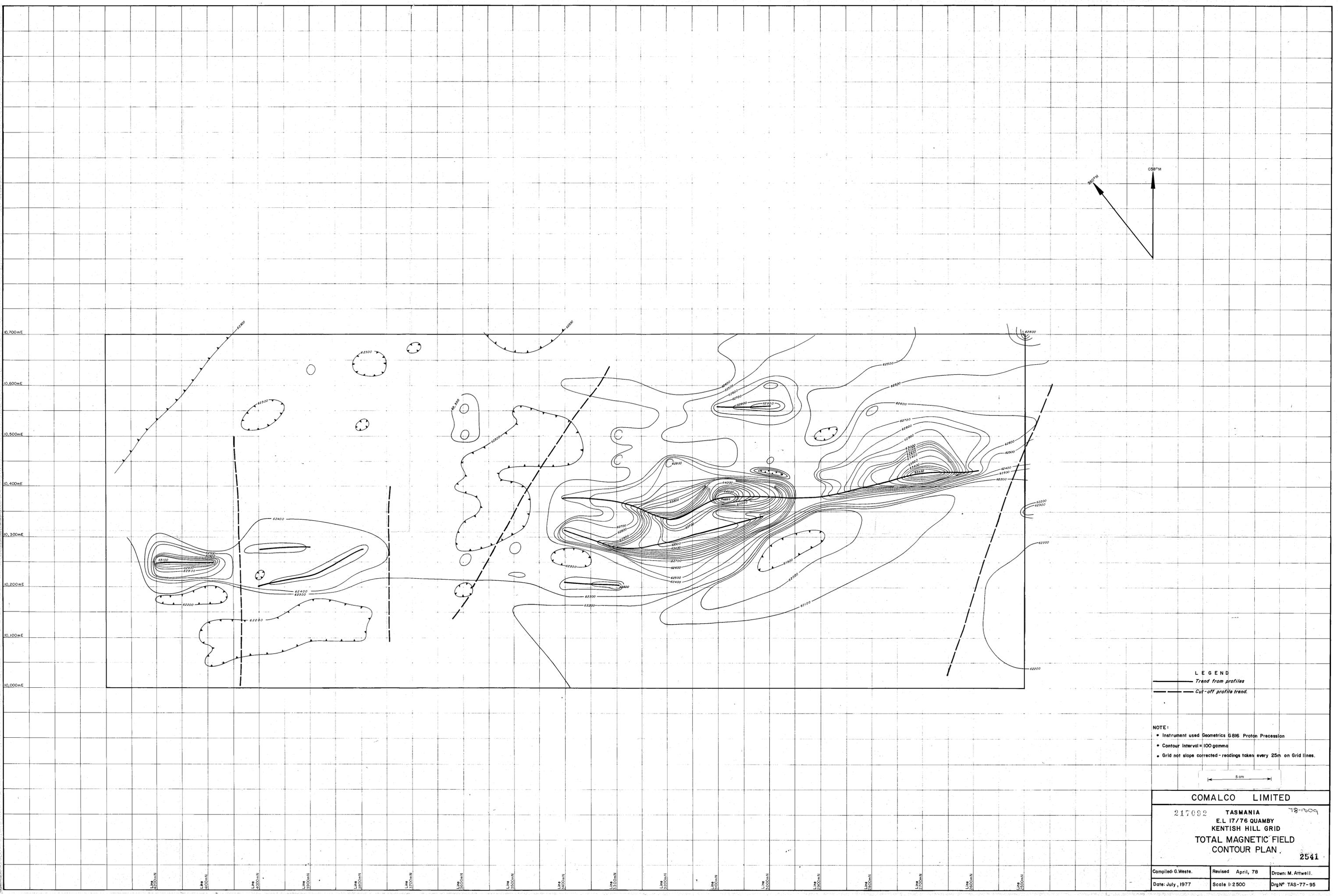
Horizontal Scale 1:2,500
 Vertical Scale 1:10,000



217091

C O M A L C O		
E.L. 17/74 QUAMBY TASMANIA 78-1309		
KENTISH HILL GRID TOTAL MAGNETIC FIELD STACKED PROFILES		
Completed: G. Shovelton	Revised:	Drawn: M.A.
Date: November, 1978	Scale:	Drg No: TAS-78-285

2540
2r10



LEGEND
 — Trend from profiles
 - - - Cut-off profile trend.

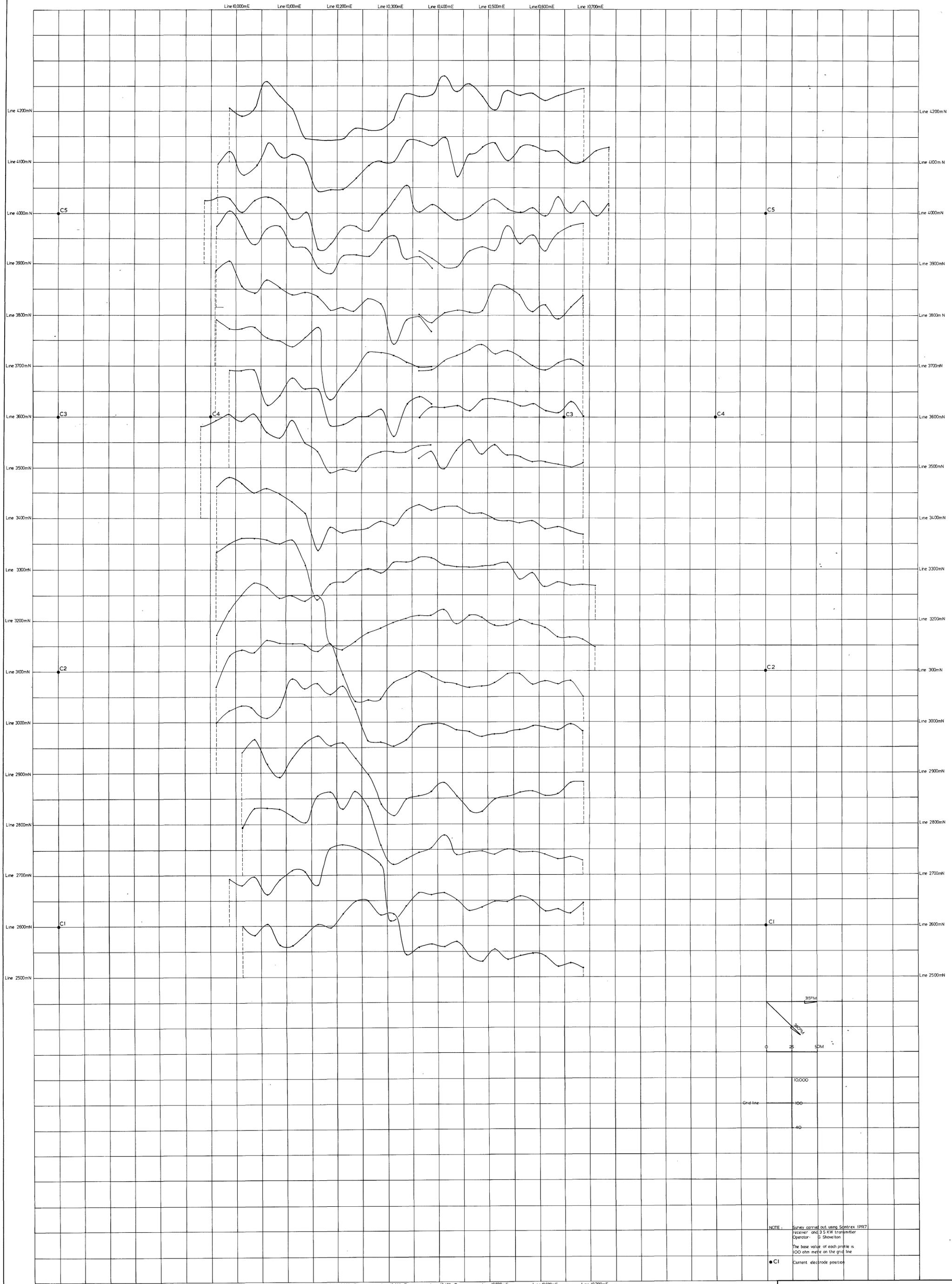
NOTE:
 • Instrument used Geometrics SB16 Proton Precession
 • Contour Interval = 100 gamma
 • Grid not slope corrected - readings taken every 25m on Grid lines.

5 cm

COMALCO LIMITED
 217092 TASMANIA
 E.L. 17/76 QUAMBY
 KENTISH HILL GRID
 TOTAL MAGNETIC FIELD
 CONTOUR PLAN
 2541

Compiled: G.Weste. Revised: April, 78 Drawn: M. Attwell.
 Date: July, 1977 Scale 1:2500 Dwg No TAS-77-95

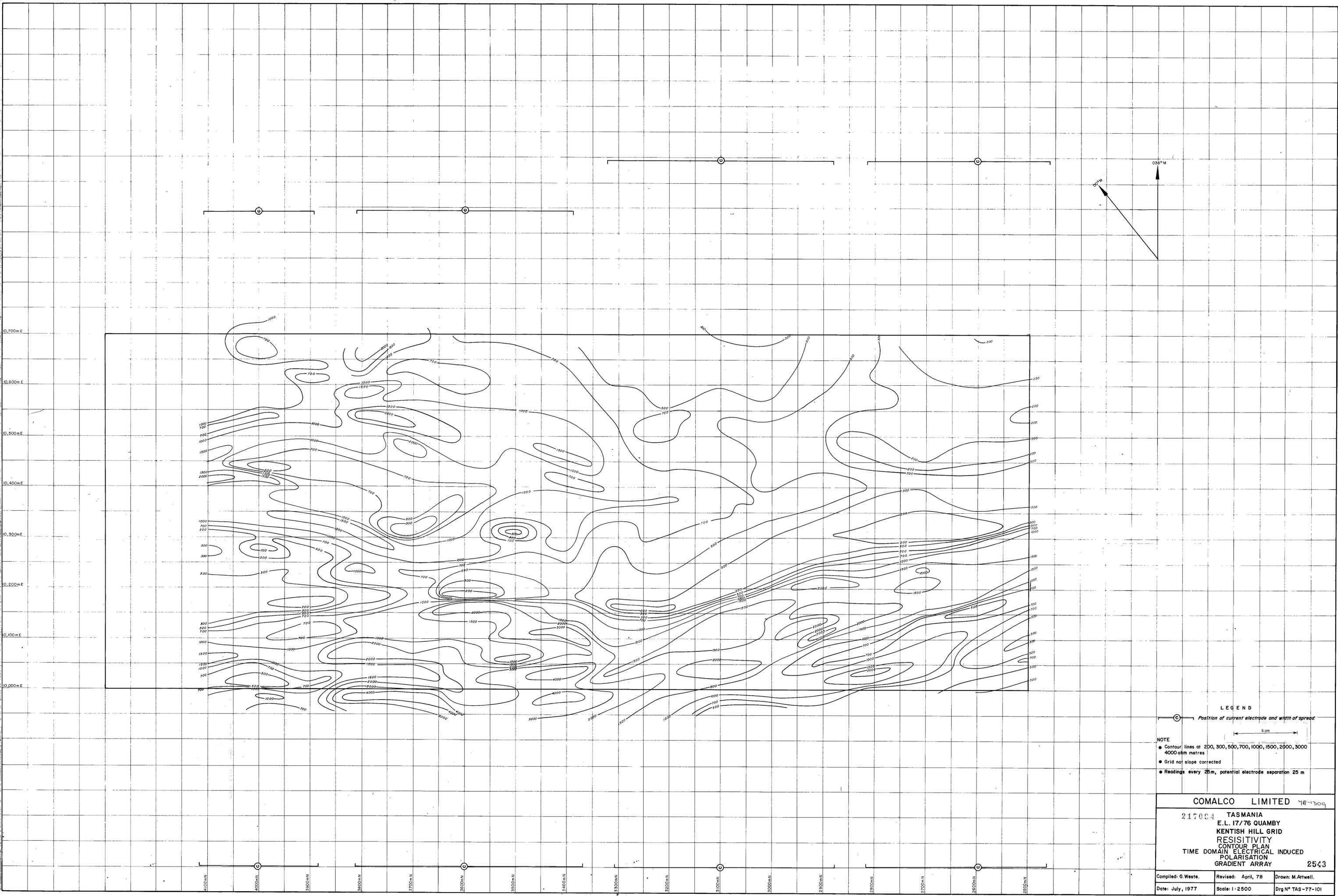
Line 26500mN
 Line 26600mN
 Line 26700mN
 Line 26800mN
 Line 26900mN
 Line 27000mN
 Line 27100mN
 Line 27200mN
 Line 27300mN
 Line 27400mN
 Line 27500mN
 Line 27600mN
 Line 27700mN
 Line 27800mN
 Line 27900mN
 Line 28000mN



5m

COMALCO LIMITED 48-7309
 217093 EL17/76 TASMANIA
 QUAMBY KENTISH HILL
 TIME DOMAIN GRADIENT ARRAY
 ELECTRICAL INDUCED POLARISATION
 RESISTIVITY PROFILES 2542

Compiled: G. Skewell	Revised:	Drawn: O. Heald
Date: Sept 1978	Scale: 1:2500	Dwg No: TAS-78-177

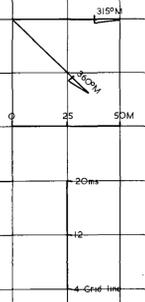


LEGEND
 ● Position of current electrode and width of spread
 5 cm

NOTE
 ● Contour lines at 200, 300, 500, 700, 1000, 1500, 2000, 3000, 4000 ohm metres
 ● Grid not slope corrected
 ● Readings every 25m, potential electrode separation 25 m

COMALCO LIMITED 18-1209
 217004 TASMANIA
 E.L. 17/76 QUAMBY
 KENTISH HILL GRID
 RESISTIVITY
 CONTOUR PLAN
 TIME DOMAIN ELECTRICAL INDUCED
 POLARISATION
 GRADIENT ARRAY 2543

Compiled: G.Weste. Revised: April, 78 Drawn: M.Attwell.
 Date: July, 1977 Scale: 1:2500 Drg N° TAS-77-101



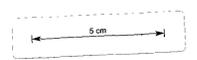
NOTE: Survey carried out using Scintrex IP-7 receiver and 25KW transmitter. Operator: G. Shovelton. The base value of each profile is 4 milliseconds on the grid line.

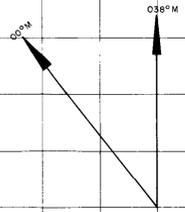
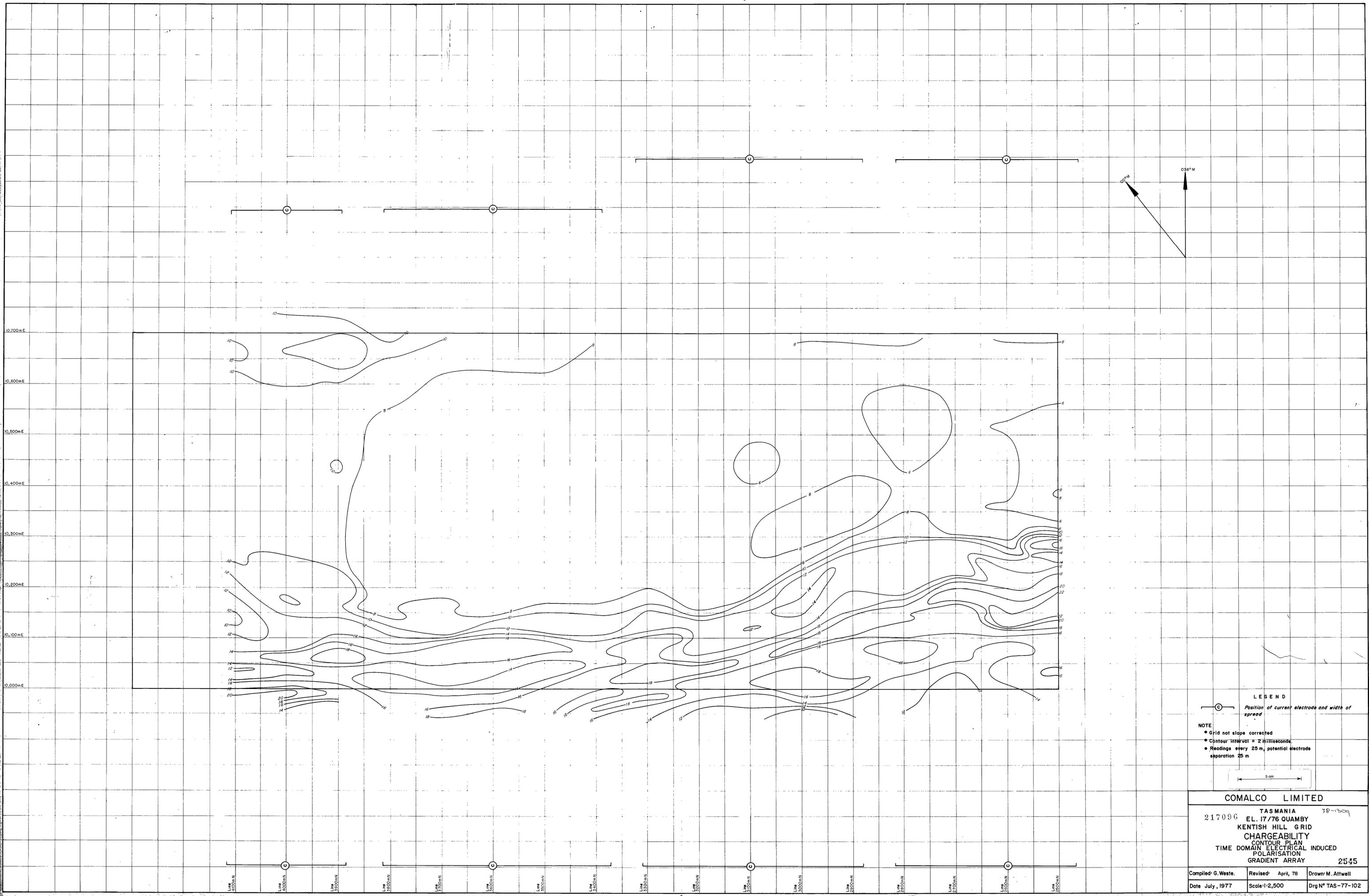
● C1 Current electrode position

217095 COMALCO LIMITED 48-17509

E.L. 17/76 TASMANIA
 QUAMBY, KENTISH HILL
 TIME DOMAIN, GRADIENT ARRAY
 ELECTRICAL INDUCED POLARISATION
 CHARGEABILITY PROFILES 2544

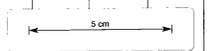
Compiled: G. Shovelton Revised: Drawn: O. Heddtich
 Date: Sept 1978 Scale: 1:2500 Dwg No: TAS-78-176





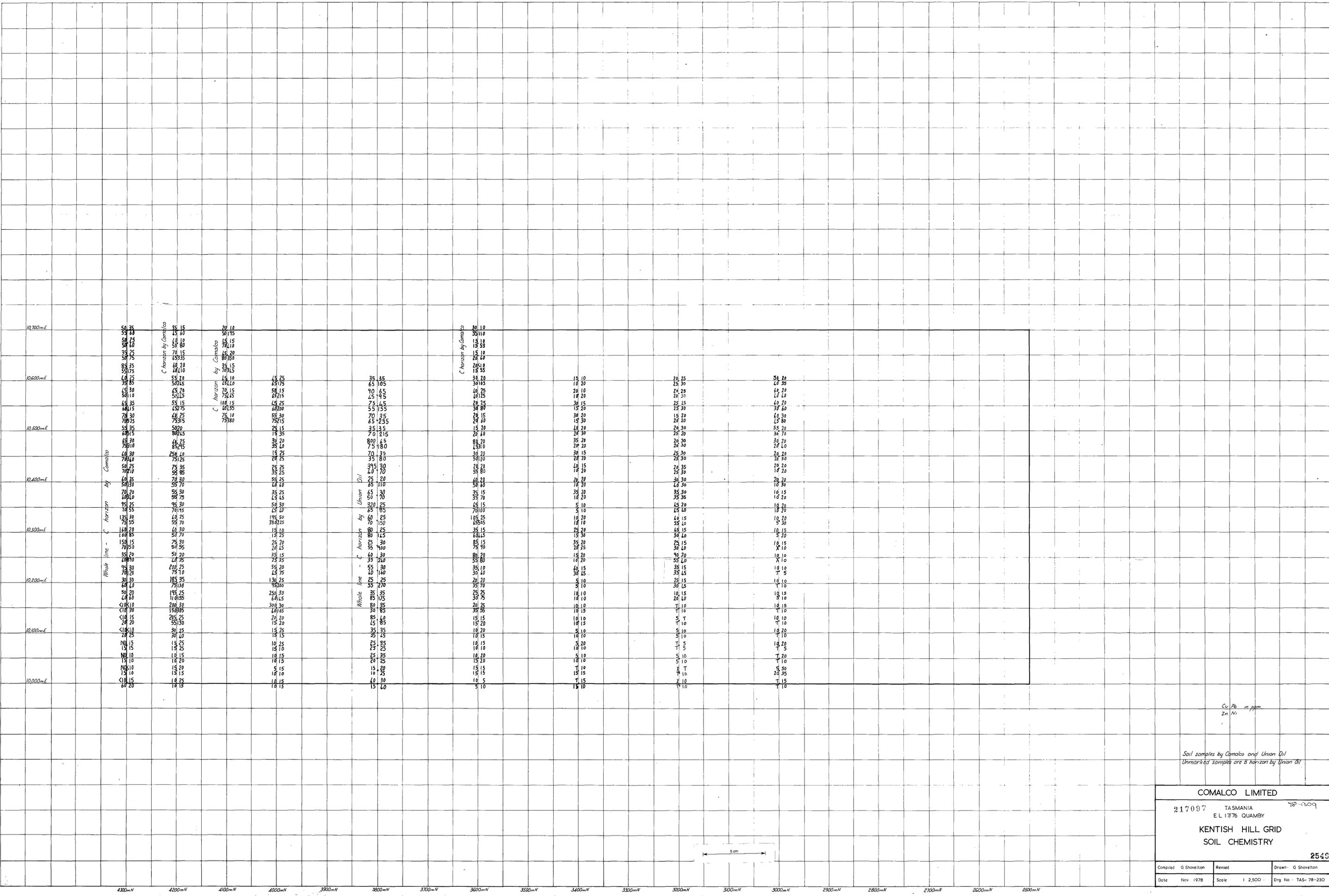
LEGEND
 (Symbol: circle with a dot) Position of current electrode and width of spread

NOTE
 • Grid not slope corrected
 • Contour interval = 2 milliseconds
 • Readings every 25 m, potential electrode separation 25 m



COMALCO LIMITED
 TASMANIA
 217096 EL. 17/76 QUAMBY 78-1209
 KENTISH HILL GRID
CHARGEABILITY
 CONTOUR PLAN
 TIME DOMAIN ELECTRICAL
 POLARISATION
 GRADIENT ARRAY 2545

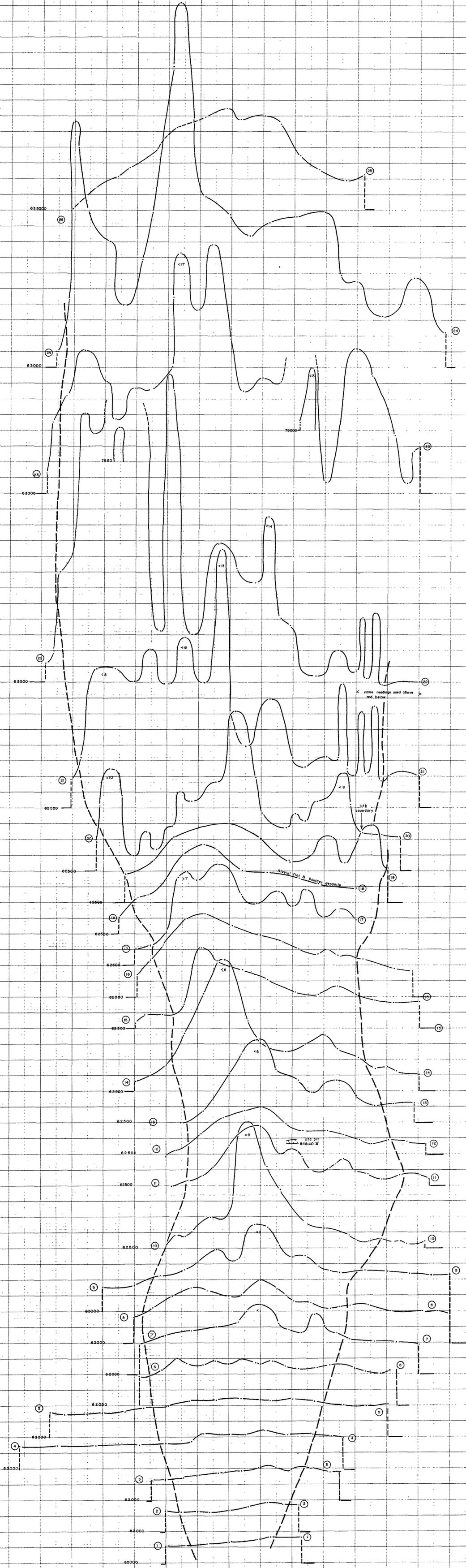
Compiled: G. Weste. Revised: April, 78. Drawn: M. Attwell
 Date: July, 1977. Scale: 1:2,500. Drg N° TAS-77-102



Cu Pb in ppm
Zn Ni

Soil samples by Comalco and Union Oil
Unmarked samples are B horizon by Union Oil

COMALCO LIMITED		
217097	TASMANIA	78-1309
E L 1776 QUAMBY		
KENTISH HILL GRID		
SOIL CHEMISTRY		
2540		
Compiled	G Shovelton	Revised
Date	Nov 1978	Scale
		1:2,500
		Drawn
		G Shovelton
		Drawn
		No. TAS-78-230



5 cm

3000 M

L E G E N D

Data transferred from airphoto 4x blow up overlay
T669-87 position of traverse lines is shown on
orig. No. TAS-78-128

← Anomaly reference number

(10) Traverse line

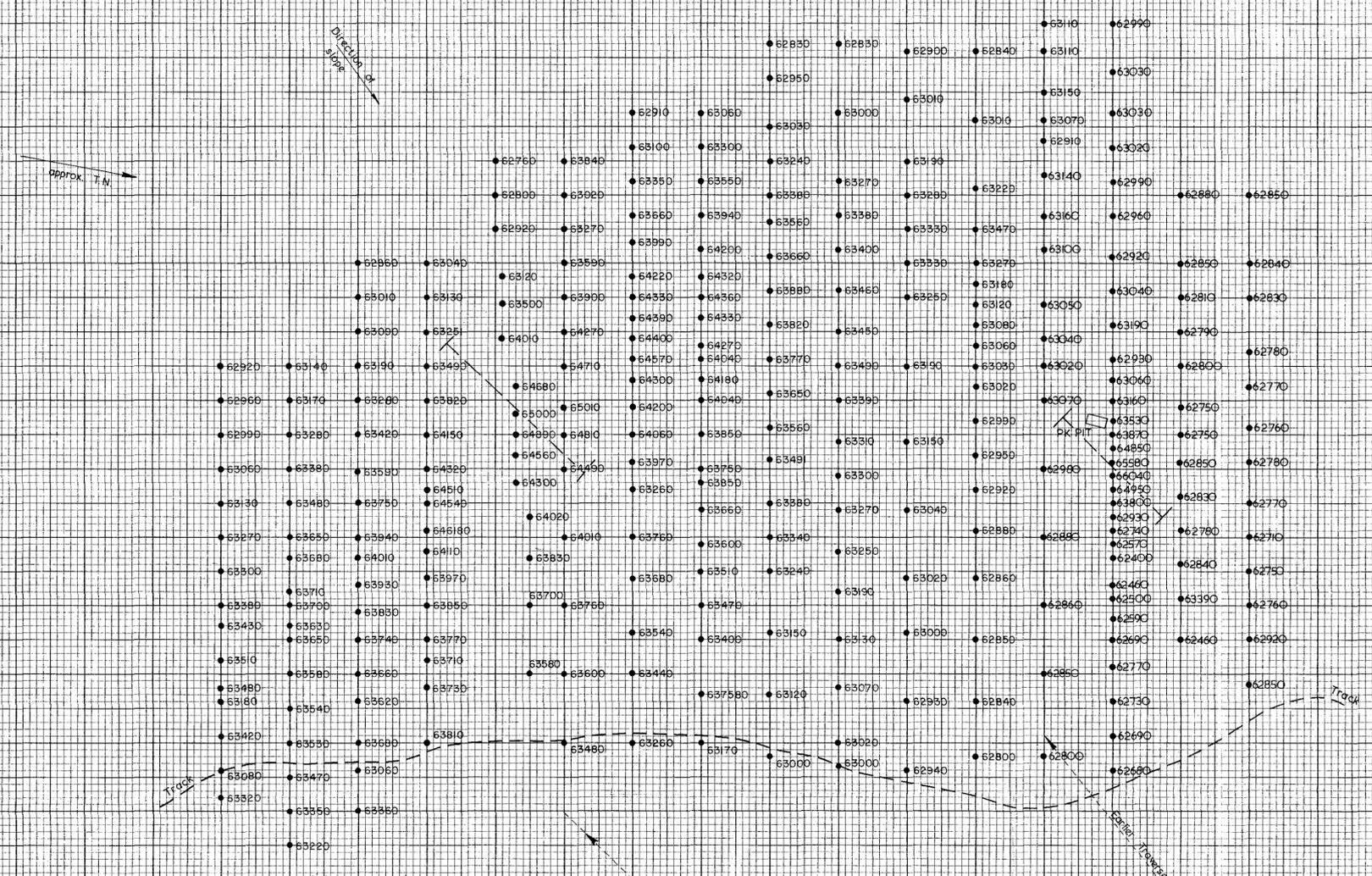
(---) Edge of volcanic unit ?

• Instrument: Sinter MP-2 Proton Precision magnetometer
operator: P. Komyssan adapted: P. Komyssan

217.008

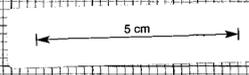
Horizontal scale 1:2,500 Vertical scale 1:10,000

C O M A L C O		
E.L. 17/74 QUAMBY 78-128		
LOBSTER RIVULET		
RECONNAISSANCE MAGNETICS		
TOTAL MAGNETIC FIELD		
254		
Compiled: P. Komyssan	Revised:	Drawn: M.A.
Date: November, 1978	Scale: 1:2500	Org. No. TAS-78-286

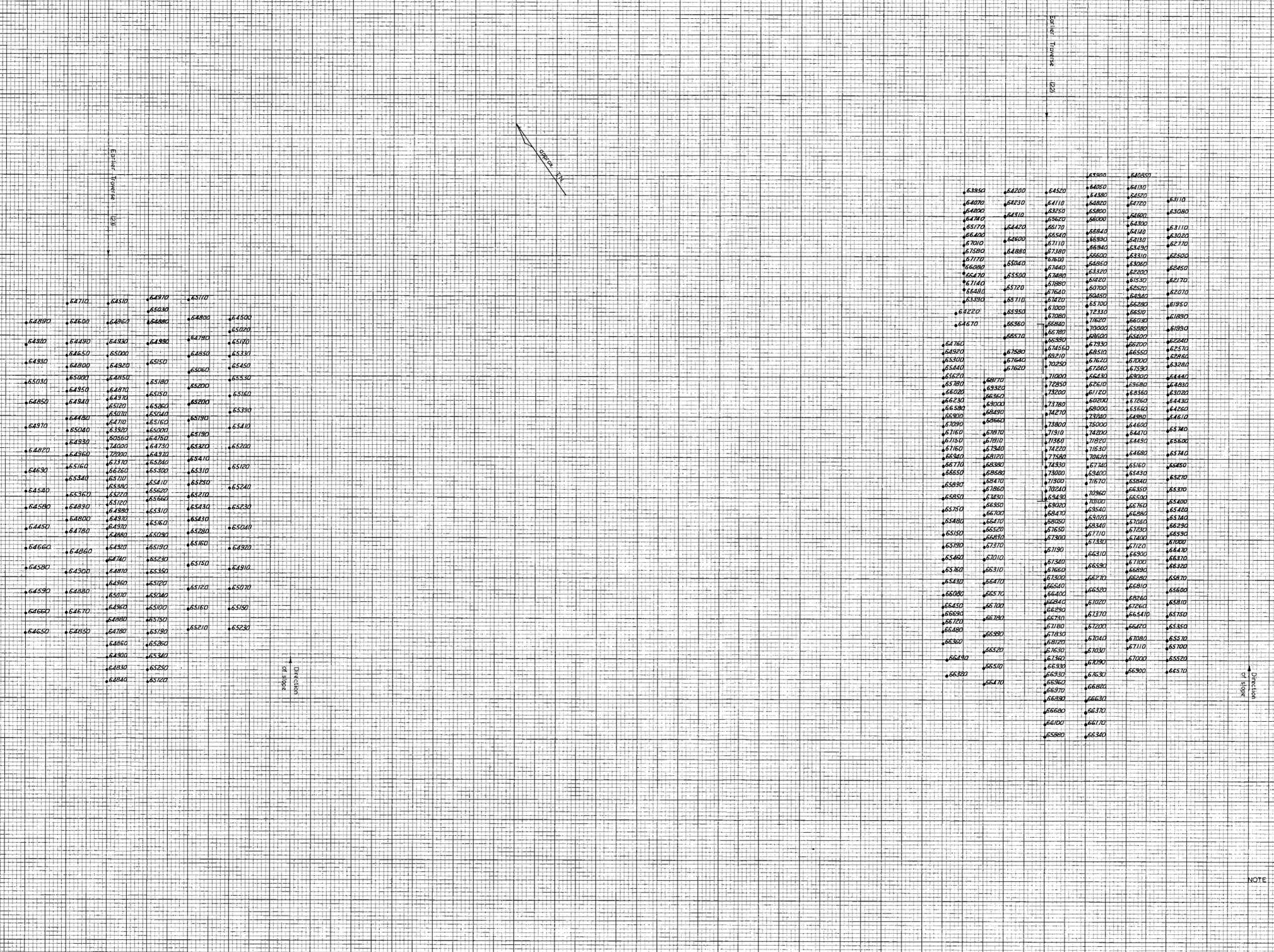


NOTE: Compass readings in this area are meaningless due to buried magnetic bodies.
 Instrument: Scintrex MP2 proton precession magnetometer.
 For location of area see drg no 78-284

----- Proposed coastline



217000		COMALCO		48-1309
TASMANIA E.L. 17/76 QUAMBY				
LOBSTER RIVULET AREA				
MAGNETOMETER SURVEY OF THE				
PK PIT AREA				
2548				
Compiled	P. Komyshon	Revised	Drawn: O. Hedditch	
Date	Dec. 1978	Scale	1:500	Dwg. No. TAS-78-236



NOTE: Compass readings in this area are meaningless due to buried magnetic bodies.
 Instrument: Schmidt MP2 proton gradient magnetometer.
 For location of area see 20/7078-284.

Proposed coastline
 5 cm

217100 COMALCO 98-1309
 TASMANIA
 E.L. 17/76 QUAMBY
 LOBSTER RIVULET AREA 2549
 DETAIL MAGNETOMETER SURVEY OVER MAGOS
 RECONNAISSANCE MAGNETIC ANOMALIES

Compiled: P. Komyschak	Revised:	Drawn: Q. Healditch
Date: Dec 1978	Scale: 1:500	Dwg. No. TAS-78-237

