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FINAL REPORT

ON

THE SHEFFIELD AREA,

TASMANIA.

EXPLORATION LICENCE 15/65

compiled by
N. COCHRANE

MELBOURNE

OCTOBER, 1970.

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CONTENTS

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FINAL REPORT ON
EL.15/65 SHEFFIELD TAS.

FIG NO.	TITLE	DRAWING NO.
1	LOCALITY MAP.	A4-1077 In Text
2 A-B	AEROMAGNETIC CONTOUR MAP SHEET 1 AND 2.	G1718 A-B.
3	AEROMAGNETIC CONTOUR MAP SHOWING ANOMALIES.	G1719.
4 A-G	LOCATION MAP AND RESULTS GROUND MAGNETIC SURVEYS.	A4-1032. A4-1044-49 In Text
5	LOCATION OF GEOPHYSICAL TRAVERSES UPPER FORTH RIVER AREA.	A4-1064 In Text
6	MAGNETIC AND E.M. PROFILES UPPER FORTH RIVER AREA.	A3-1048
7	GROUND MAGNETIC PROFILES AND RADIOMETRIC RESULTS PENGUIN AREA.	A1-1062
8 A	GEOLOGICAL MAP CLAYTON RIVULET.	A4-1092
8 B	GEOLOGY AND GEOPHYSICAL TRAVERSES CLAYTON RIVULET.	A2-1013
9	E.M. AND MAGNETIC PROFILES TRAVERSES 1-3 CLAYTON RIVULET.	A3-1061
10	E.M. AND MAGNETIC PROFILES TRAVERSES 4-11 CLAYTON RIVULET.	A3-1062
11	GEOCHEMICAL SAMPLE SITES EL.15/65 SHEFFIELD.	A1-1357
12	STREAM SEDIMENT SURVEY PPM COPPER	A1-1344
13	STREAM SEDIMENT SURVEY pH-PPM SILVER.	A1-1346
14	STREAM SEDIMENT SURVEY PPM ARSENIC - PPM LEAD	A1-1345
15	GEOCHEMICAL SAMPLE SITES AND VALUES P.P.M. Cu, Zn, Pb, As. WILMOT AREA.	A4-1281 In Text
16	GEOCHEMICAL SAMPLE SITES AND VALUES P.P.M. Cu, Zn, Pb, As. McBRIDES CREEK AREA.	A4-1245 In Text
17A	GEOCHEMICAL SAMPLE SITES AND NUMBERS LEVEN HILL - McKENNAS CK. AREAS	A3-1148
17B	RESULTS P.P.M. COPPER, ZINC, LEAD, ARSENIC LEVEN HILL - McKENNAS CK AREAS.	A3-1149

INTRODUCTION

Exploration Licence 15/65 was granted to the Broken Hill Proprietary Co. Ltd., on 2nd July 1965, covering an area of 1,700 square miles in North Central Tasmania.

Subsequent amendments to the exploration licence were.

(a) Reduced to 440 square miles on 28th April, 1969 and extended until 2nd July, 1969.
(b) Reduced to 328 square miles on 17th July, 1969 and extended until 2nd January 1970.
(c) Reduced to two areas of 81 square miles and 25 square miles on 24th March 1970, and extended until 2nd July 1970.

The area was relinquished in July 1970.

The area was regarded as being potentially favourable for the development of iron deposits of the magnetite type associated with granite - limestone contacts, and sulphide ore deposits associated with granitic and ultra-basic rock suites.

The presence of some 60 old mining prospects covering iron, tin, tungsten, molybdenum, copper, lead, silver and gold mineralization, appeared to enhance the possibility of there existing further buried deposits of similar ores.

A summary of the work carried out is as follows:

March and April 1966 - AMEG conducted an airborne magnetometer survey over the area.

January 1967 - old mineral prospects were investigated.

March and April 1967 - reconnaissance of a number of anomalous magnetic features, together with detailed prospecting on and around areas of granitic and ultra basic rock, and along some of the belts of Precambrian metamorphics.

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January	1968 -	geological and geophysical traverses over five aeromagnetic anomalies.
March and April	1968 -	geological investigations of magnetic anomalies in the Upper Forth River,area, and examination of the Lone Pine, Birthday and Barn Bluff prospects.
May	1968 -	E.M. and magnetic survey of the Upper Forth River area.
May	1968 -	Magnetic, radiometric and E.M. survey of Penguin Beach.
May	1968 -	E.M. and Magnetic survey of Clayton Rivulet.
January	1969 -	preliminary geological examination of the Dial Range area.
June to December	1969-	geochemical survey of the Dial Range area.
March to May	1970 -	additional soil and stream sampling in the Dial Range area.

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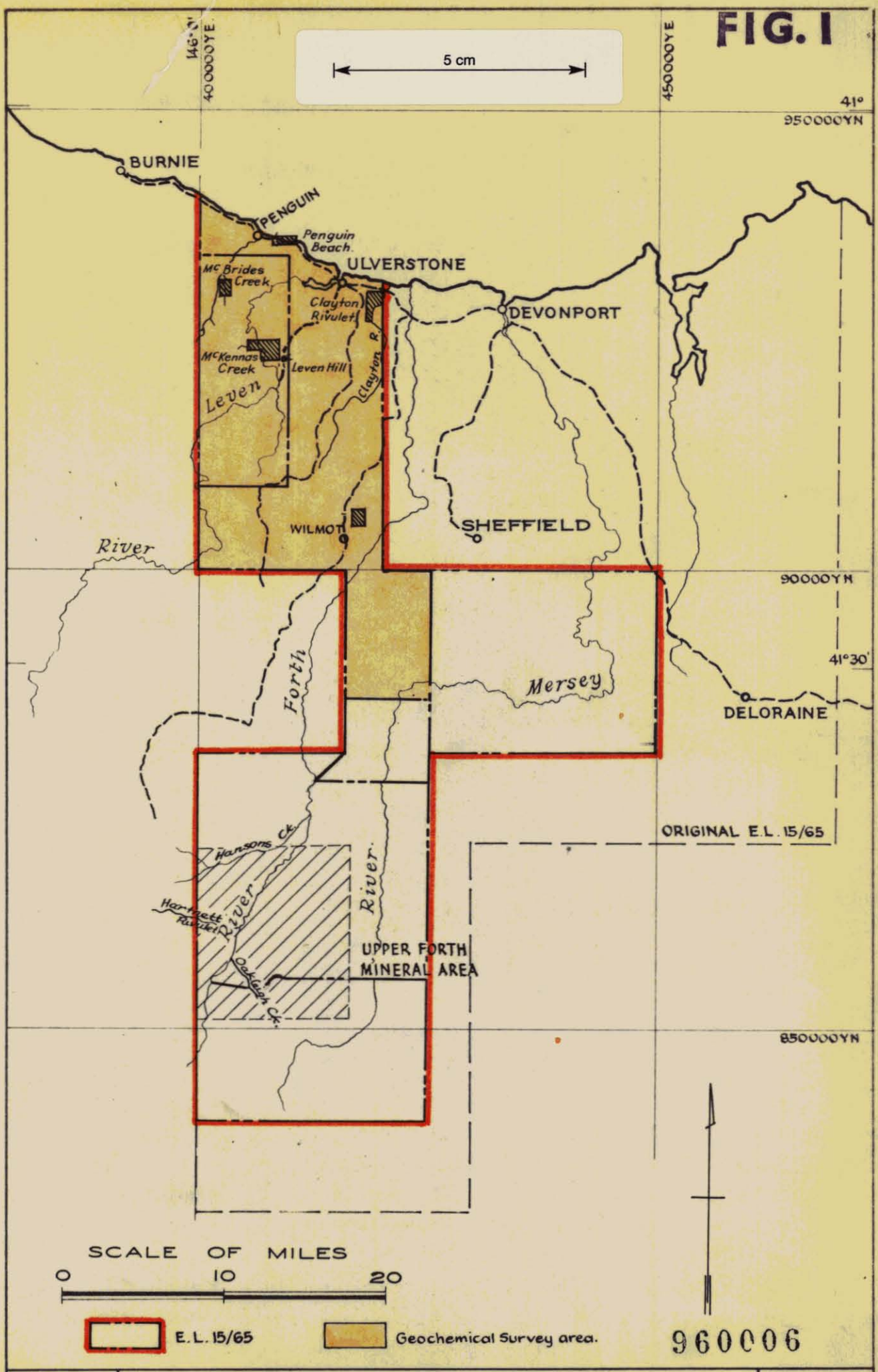
FIG. 1



Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSh. 20
Date 25 July 1968	E.L. 15/65, SHEFFIELD – TASMANIA LOCALITY MAP	Drawing No. A4-1077

GENERAL GEOLOGY OF THE AREA

GENERALIZED STRATIGRAPHIC COLUMN

QUATERNARY	: sand, gravels, glacial and fluvioglacial deposits, talus and alluvium.
TERTIARY	: sand and gravels overlain by extensive basaltic volcanics.
JURASSIC	: extensive dolerite sills.
TRIASSIC	: minor sandstone.
PERMIAN	: mudstones and glacials with minor coal seams.
DEVONIAN	: only minor remnants ; intrusion of granitic rocks into Cambrian and Pre-cambrian.
SILURIAN	: only minor remnants.
ORDOVICIAN	: Gordon Limestone Moina Sandstone Roland (Duncan, Owen) Conglomerate Gnomon Mudstone (localized) Largely inferred angular unconformity.
CAMBRIAN	: overall succession not yet fully estsblished; broadly - Minnow Keratophyre. Gog Range Greywacke Radfords Creek Group - sediments and eruptives. Motton Spilite. Beulah Formation Barrington Chert Cateena Group - sediments and eruptives Lobster Creek Volcanics Ultrabasics intrude the Pre-Cambrian Largely inferred, angular unconformity.
PRE CAMBRIAN	: not yet subdivided in detail apart from broad sub-groupings in localized areas.

The above stratigraphic column and the following notes are based on the published map sheets, and accompanying explanatory reports for the Devonport, Sheffield and Middlesex 1 mile map series.

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The various phyllitic and schistose slates, shales etc., and banded quartzites which comprise the Pre Cambrian rocks in the area are difficult to correlate over any distance, and have been variously subdivided on the basis of lithological and structural variations by the workers in local areas. In the Golden Valley area, Wells combines all such rocks as the Davey Group. In the Devonport area, Burns has divided them into the following units:-

Upper Division : Rocky Cape Group
Lower Division : Ulverstone Metamorphics
Forth Metamorphics.

In the Upper Mersey and Forth Rivers, Jennings used

Dove Group
Fisher Group
Howell Group

In the Cambrian, the various lavas, breccias, tuffs and greywackes are locally intercalated with mudstone, sandstone and conglomerate lenses, and once again the various workers have had to resort to the naming of local successions which are not readily correlatable in detail with adjoining successions. The stratigraphic succession outlined earlier is applicable in various degrees to most of the areas of Cambrian rock outcrop, although the differentiated sequence in the Golden Valley area is at present difficult to correlate with the adjoining Mole Creek (Middlesex) area. The Golden Valley succession is as follows: Warner Laminated Siltstone
Kentish Spilite and Volcanic Breccia
Scott Quartz Keratophyre
Archer Sub-greywacke and Greywacke
Calstock Slate and Sub-greywacke.

The Ordovician succession is readily differentiated into three distinct lithological units, which have a widespread distribution. The Moina Sandstone is probably the most varied of these units, ranging from massive orthoquartzite to thinly interbedded shale/siltstone/sandstone squences.

The abundant outcrops of the Jurassic sheet dolerites show remarkable uniformity in the hand speciman. A major structural feature evident is the drop in elevation of their outcrop when travelling north from the Central Plateau, apparently due to tilting or faulting, downwards to the north.

The widespread occurrence of Tertiary basaltic material is probably the main feature of the geology of the area. Most of the major basalt remnants are considered to represent fillings in old stream valleys. The flooding of the coastal Tertiary drainage system by flows of scoreaceous, columnar and banded basalts with intercalated breccia and tuffaceous horizons resulted in the development of a new drainage system north of the base of the highland plateau areas, largely resulting in the exposure of the present surface geology.

AEROMAGNETIC SURVEY

During March and April of 1966, Australasian Mining and Engineering Geophysics Pty. Ltd. (AMEG) conducted an airborne magnetometer survey over the Sheffield area as an aid in the interpretation of the geology of the area. The isomagnetic contours and their interpretation are shown on Figure 2.

It is possible to divide the magnetic pattern into eight zones, the most significant being Zones C and H. In general, the magnetic pattern of a considerable part of the area is complicated by numerous low to medium amplitude anomalies due to thick and widespread basalt flows. The magnetic picture does not appear to bear any definite relation to the granites, sedimentary lithologies or structural orientations of the area. With the possible exception of Zone H, areas of known mineralization cannot be related to any recognisable magnetic feature.

Zone A : The anomalies of this zone are related to the basalts in the area, which are either exposed or concealed by alluvium.

Zone B : This zone covers a very large area and contrasts sharply with the adjoining zones in that it contains very few anomalies. All the exposed Pre Cambrian and Palaeozoic rocks, local and regional structures, and mines and mineral shows which occur within the limits of Zone B cannot be related to any recognisable magnetic features.

Zone C : This zone contains a strong positive trend and several large circular anomalies. The sources of these features are most likely steeply dipping dyke - like bodies and vertical cylindrical shaped masses of basic and ultrabasic character.

Zone D : This zone is overlain completely by Jurassic dolerite, and does not contain any distinctive anomalies.

Zone E : The recognisable anomalies of this zone can be related to dolerite and basalt. The rest of the area consists of Pre Cambrian and Palaeozoic rocks which apparently lack magnetic expression.

Zone F : This zone contains a complex anomalous pattern, the negative anomalies being as numerous as the positive ones. They are most likely the effect of widespread basalt, and possibly dolerite.

Zone G : Most of the anomalies of this zone may be attributed to basalt, others may be due to a basement source, and an ultrabasic source.

Zone H : This zone is occupied by a 200 gamma plateau - like high. This feature is probably due to a change in the lithology of the basement to a more basic character than the surrounding zones.

GROUND INVESTIGATION OF AEROMAGNETIC ANOMALIES

Following the aeromagnetic survey of the area, and re-interpretation of the results, field reconnaissance of a number of minor and major anomalous magnetic features was carried out, together with detailed prospecting on and around areas of granitic and ultrabasic rock suites, and along some of the belts of Pre-Cambrian metamorphics.

Inspections of many of the old mineral prospects were also made, and geological and geophysical traverses conducted over five anomalies deemed worthy of further investigation.

Re-interpretation: The re-interpretation of the aeromagnetic results was aimed at defining the many less intense anomalous features indicated by the contractor's contour plot. This resulted in the definition of a considerable number of generally minor features, numbered 51 to 142, many of which could be grouped as subsiduary features to major anomalies (1 to 50) defined by the contractor. Another division can be made by the grouping of features apparently related to similar lithological environments. There still remained a broad spread of isolated features, some of which were of relatively high intensity.

Ground Investigations: The primary fact that became apparent from ground inspections is that many of both the major and minor anomalous magnetic features can be explained by the presence of basic and intermediate rock suites which show readily detectable magnetic susceptibilities. These susceptibilities appear sufficiently strong to account for the magnetic intensities present.

The other major feature was that no evidence of major mineralization was located, although in a number of places sulphide mineralization of minor appearance was noted.

The most common causative rock is Tertiary basalt; the next most common are the dolerites of the Jurassic sill system. These generally show much weaker magnetic attractions, frequently only just detectable.

Next are the series of intermediate to basic eruptives grouped as the Beulah Formation. These are by far the most strongly magnetic of the Cambrian volcanics, and give rise to strong, well-defined magnetic patterns, anomalies 24, 25, 26, 81 and 130. Almost all specimens collected from rocks of this formation show discornible

magnetic attraction, the darker the fresh rock colour, the stronger the attraction.

The other magnetic Cambrian eruptives include the Lobster Creek Volcanics (Anomalies 43, 44, 45 and 46), the Motton Spilite (anomaly 63) and the Kentish Volcanics (anomaly 136).

A number of facies variants of the Gog Range Greywacke were also shown to be magnetic (anomalies 88, 89 and 138), although generally the outcrop of this formation is not sufficiently bold or unweathered to be able to check many of the anomalous features which plot within its mapped area of outcrop.

The various outcrops of serpentine type rocks in the region of anomalies 40 and 41 show a generally strong magnetic attraction, depending simply on the amount of visible magnetite in the specimen.

The mapped micro-granitic rocks of the area of anomalies 21, 79 and 80 show variable magnetic attractions, in places quite strong, but elsewhere not discernable. Once again the darker the fresh rock, generally the stronger is its magnetic susceptibility.

The granite of anomaly 12 shows a detectable magnetic susceptibility along its northern margin only, possibly partly associated with a magnetic sulphide occurrence in a thin vein-type structure. Interpretation of this feature indicates that it is a tabular body dipping gently north-east probably lying along the granite contact.

One rather surprising result of the magnetic survey was the lack of any anomalous magnetic features associated with the various known iron ore occurrences in the Penguin - Dial Range area. Ground inspections of some of these old mining prospects indicate that the iron is massive to specular hematite, often high grade in the hand specimen, but showing no detectable magnetic

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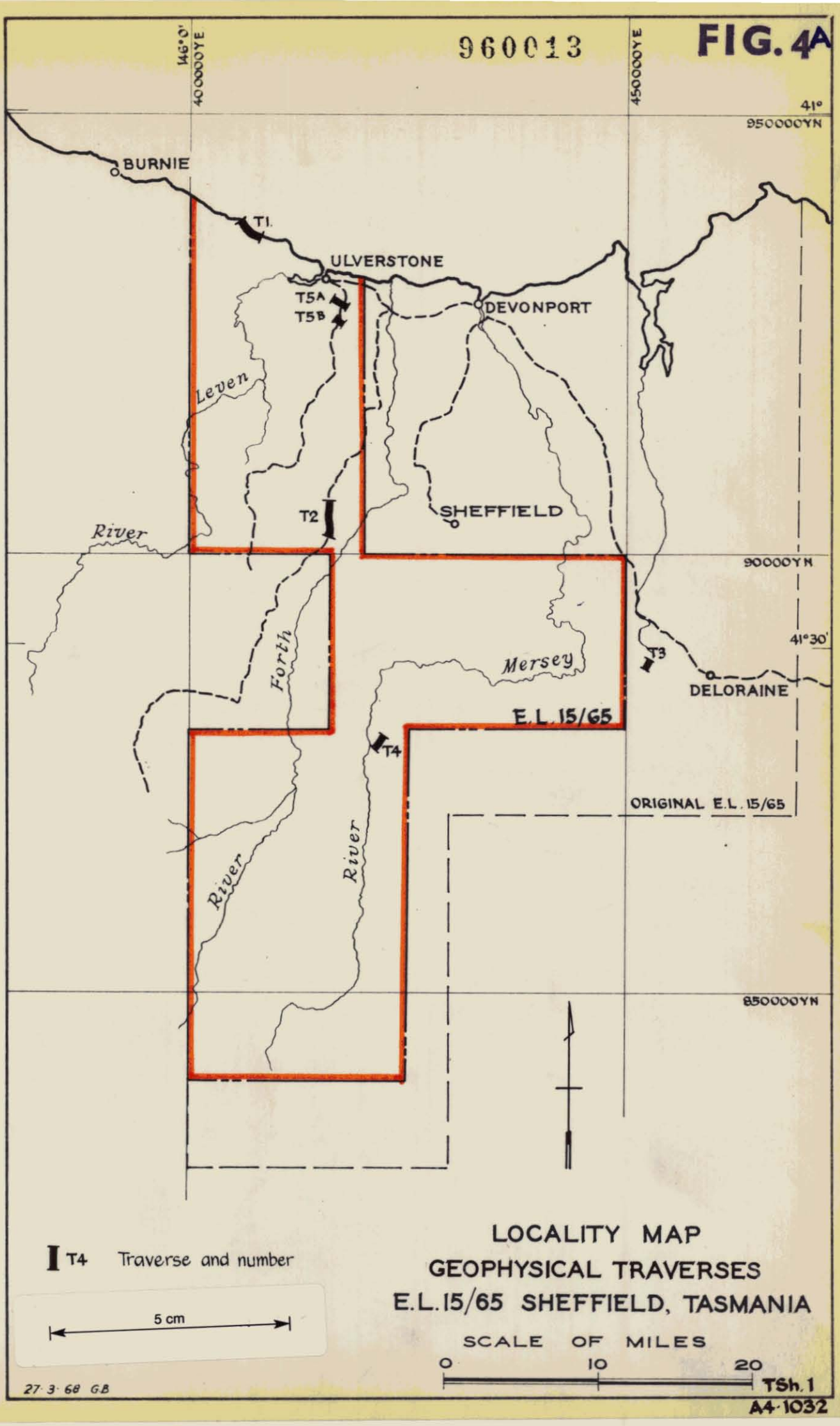
960013

FIG. 4A



T4 Traverse and number

5 cm

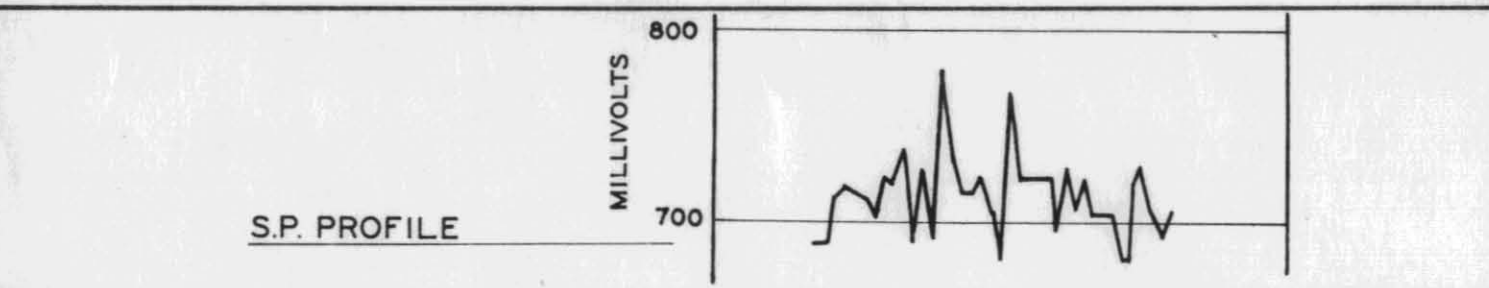
LOCALITY MAP
GEOPHYSICAL TRAVERSES
E.L. 15/65 SHEFFIELD, TASMANIA

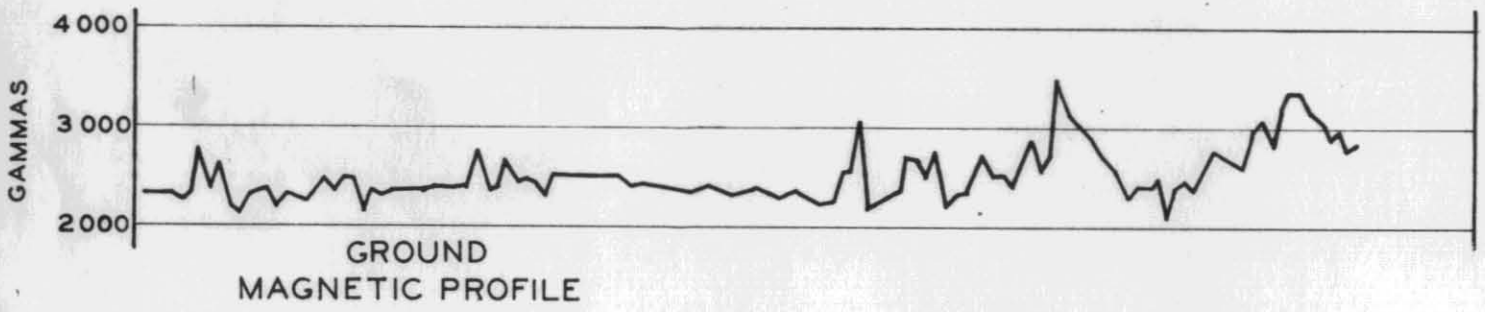
SCALE OF MILES
0 10 20

27·3·68 GB

TSh. 1

A4·1032





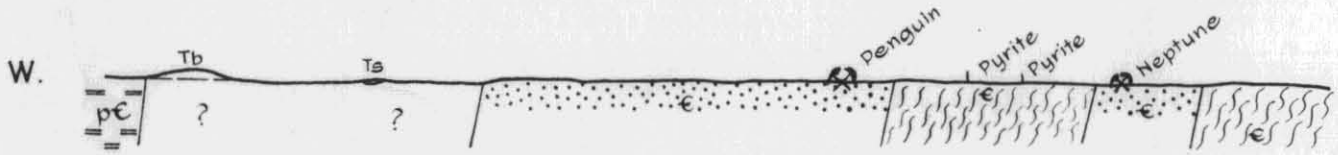
Tb Basalt

Ts Sand & gravel

€ Sandstone, mudstone conglomerate

rє Spilite

pє Mudstone



GEOLOGICAL SECTION

SCALE OF FEET
0 2000 4000

5 cm

4000'W 2000'W 0 2000'E 6000'E

TRAVERSE I

S.P. & MAGNETIC PROFILES

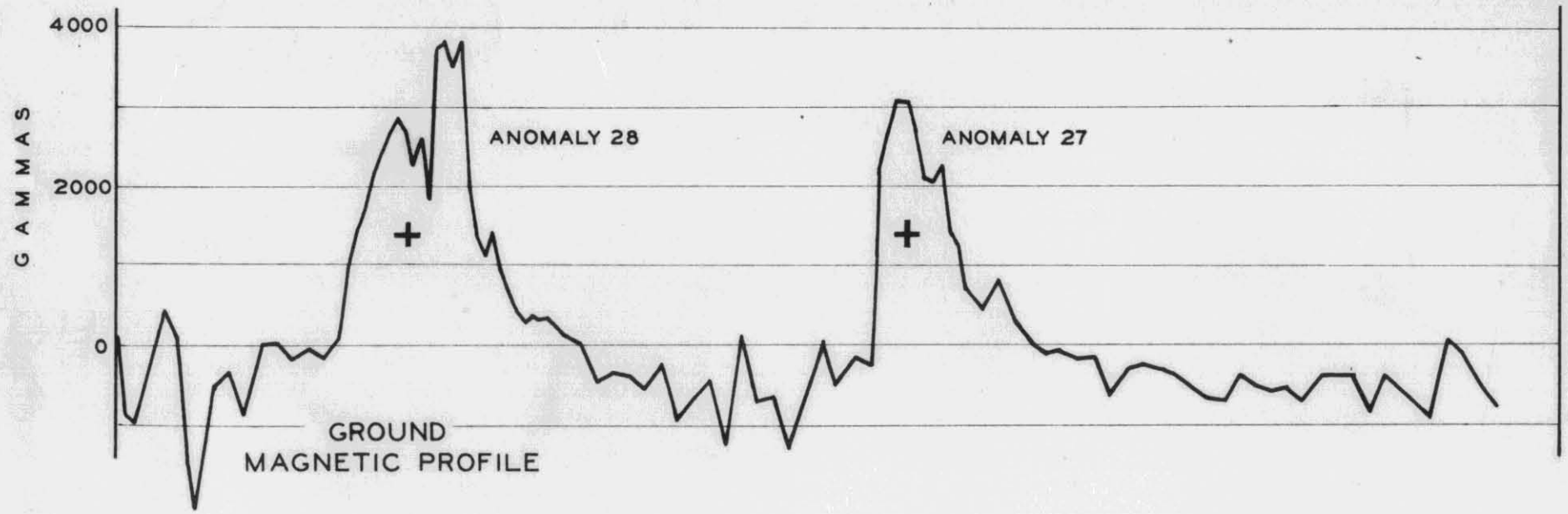
ANOMALY 53 - PENGUIN BEACH

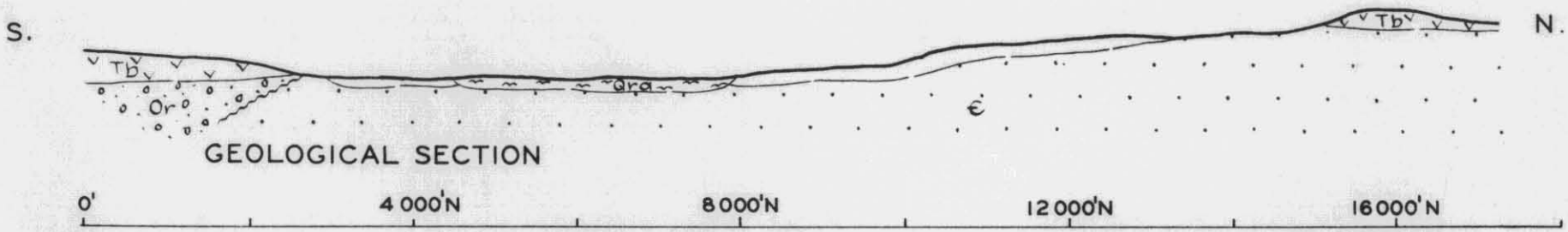
E.L.15/65 SHEFFIELD, TAS. TSh.4

A4.1044

960014 FIG. 4B

16-4 68





Qra Alluvium

Soil with basalt float

Tb Basalt

Or Roland Conglomerate

€ Gog Range Greywacke

SCALE OF FEET
0 2000 4000

TRAVERSE 2
MAGNETIC PROFILE—ANOMALY 27 & 28
E.L. 15/65 SHEFFIELD, TAS.

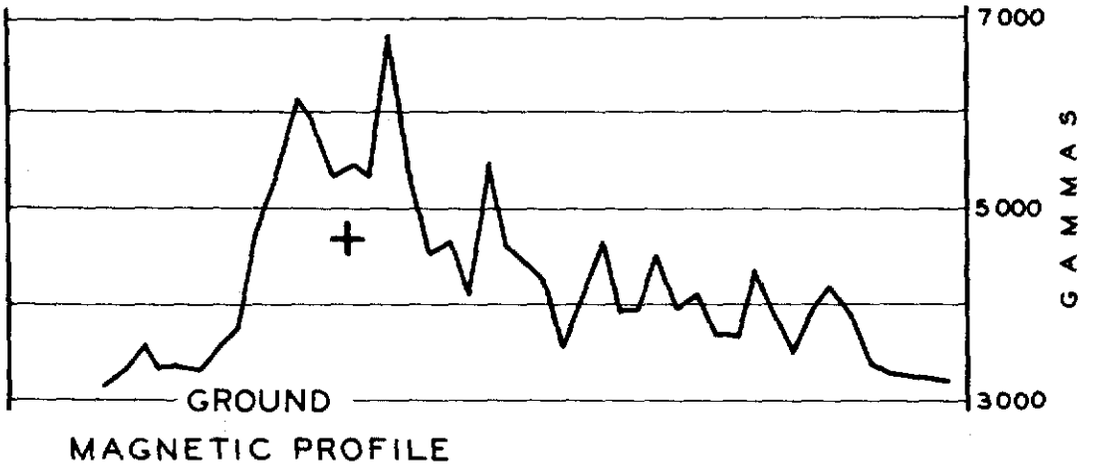
5 cm

TSh.5
A4.1045

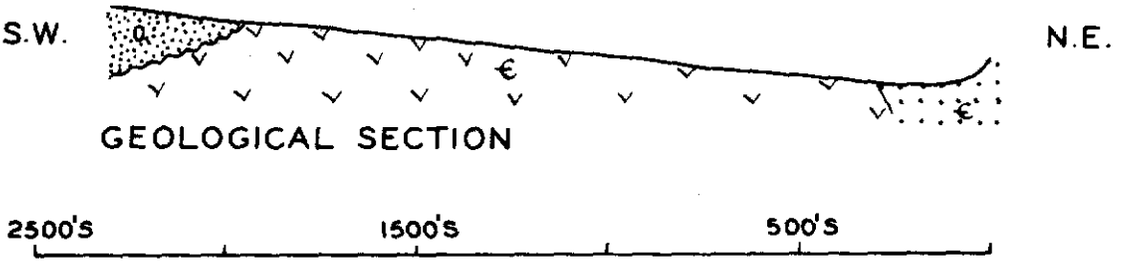
FIG. 4C

960015

16.4.68



MAGNETIC PROFILE



GEOLOGICAL SECTION

Q Quartzite

Basic volcanics.

€ Sandstone, quartzite

TRAVERSE 3

MAGNETIC PROFILE—ANOMALY 22

E.L. 15/65 SHEFFIELD, TAS.

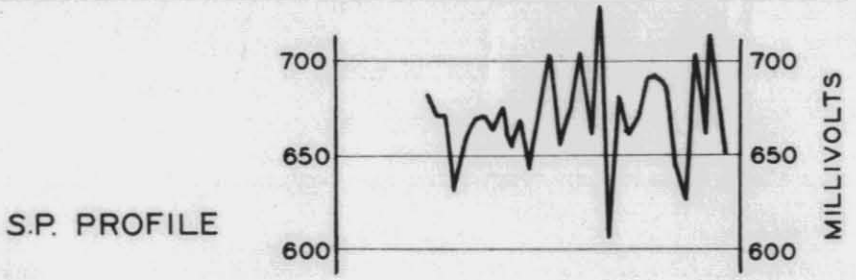
SCALE OF FEET

0 500 1000

5 cm

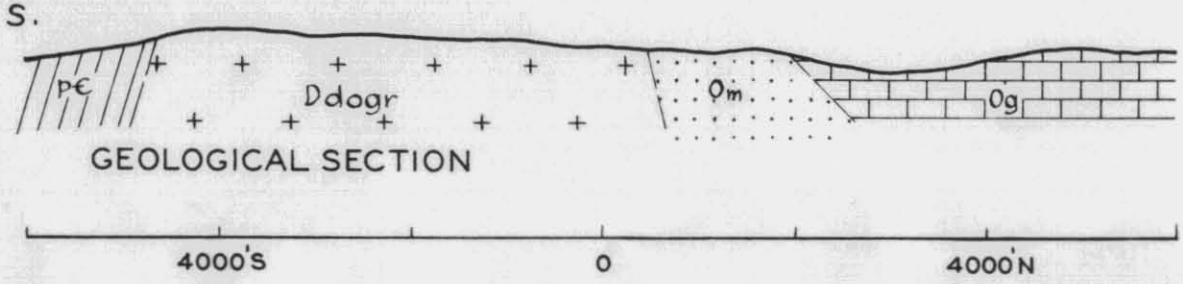
16 . 4 . 68

TSh.6
A2. 104.6



S.P. PROFILE

GROUND
MAGNETIC PROFILE



GEOLOGICAL SECTION

Og Gordon Limestone

Om Moina Sandstone

pЄ Dove group

Ddogr Dove Granite

SCALE OF FEET
0 2000 4000

5 cm

TRAVERSE 4

S.P. & MAGNETIC PROFILES-ANOMALY 12

E.L. 15/65 SHEFFIELD, TAS.

960017 FIG. 4E

TSh.7
A4.1047

16.4.68

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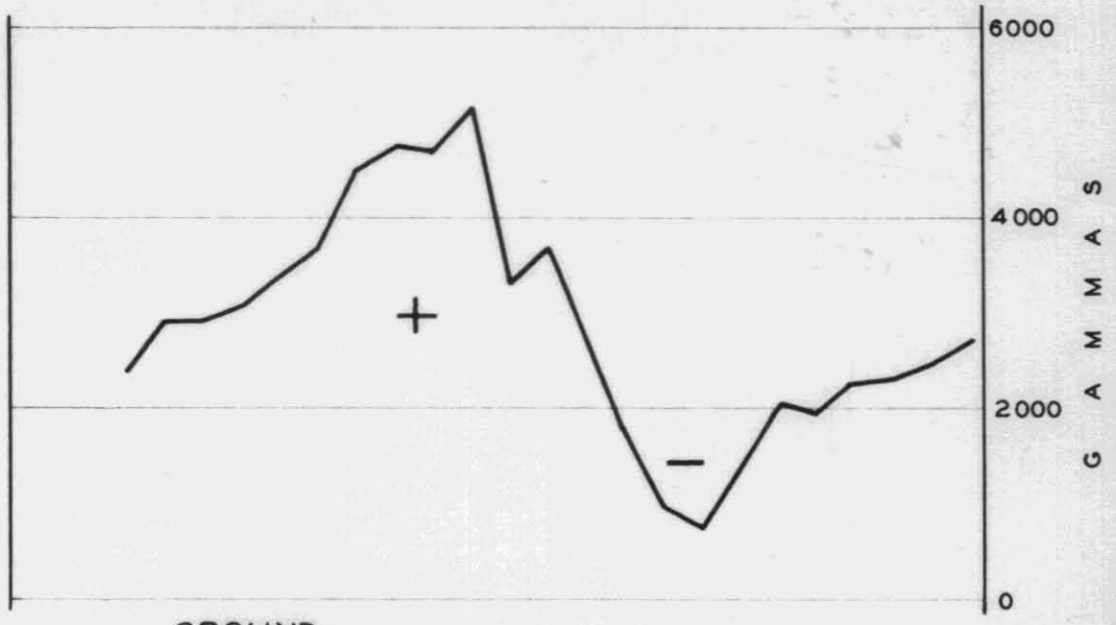
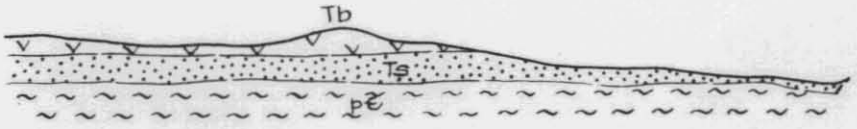
960018 **FIG. 4F**



GROUND
MAGNETIC PROFILE



GEOLOGICAL SECTION

2500'W 1500'W 500'W 0

Tb Basalt

Ts Sediments

p€ Quartz-muscovite-garnet schist

5 cm

TRAVERSE 5A

MAGNETIC PROFILE—ANOMALY 67

E.L. 15/65 SHEFFIELD, TAS.

SCALE OF FEET

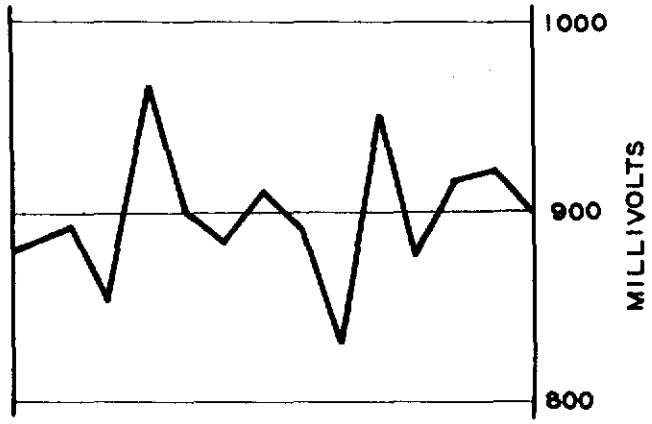
0 500 1000

16·4·68

T5h,8
A4.1048

018

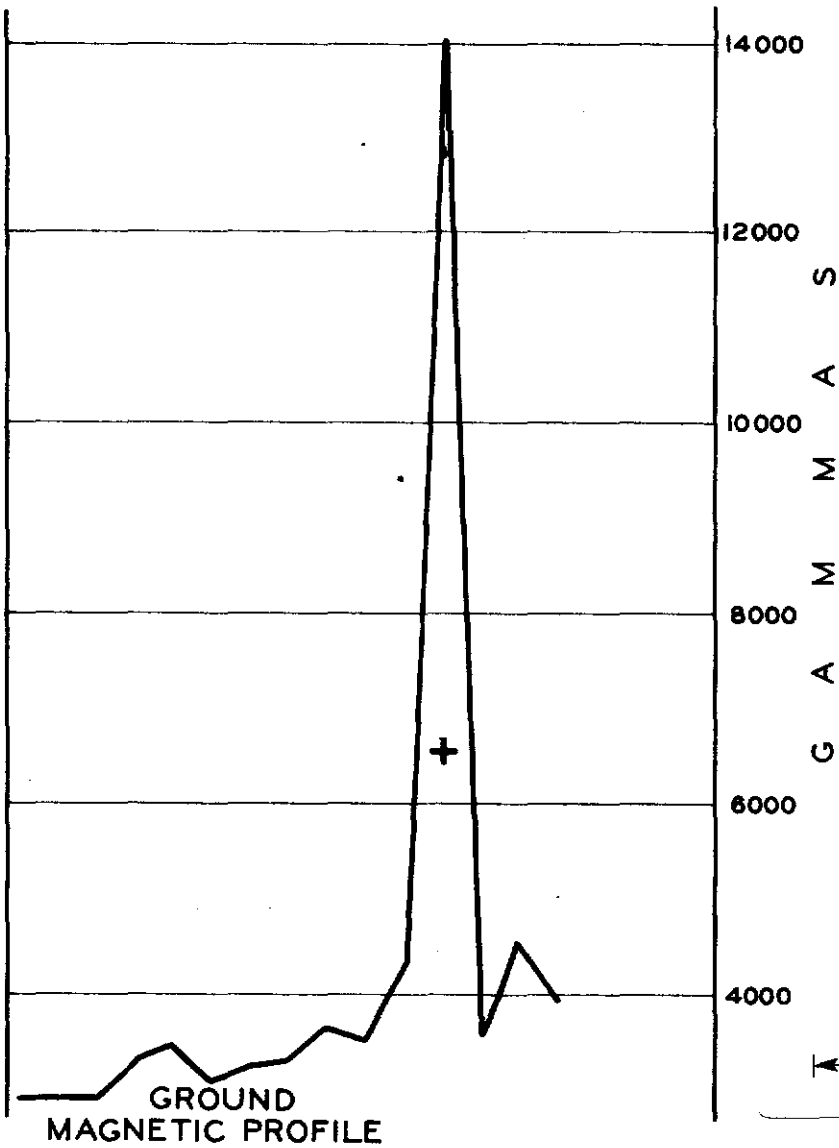
960019 **FIG. 4G**



S.P. PROFILE

Quartz-muscovite-garnet schist

Quartzite



5 cm

GROUND MAGNETIC PROFILE

S.P. & MAGNETIC PROFILES

TRAVERSE 5B - ANOMALY 67

E.L. 15/65 SHEFFIELD, TAS.

GEOLOGICAL SECTION

500'W 0 500'E 1000'E

SCALE OF FEET

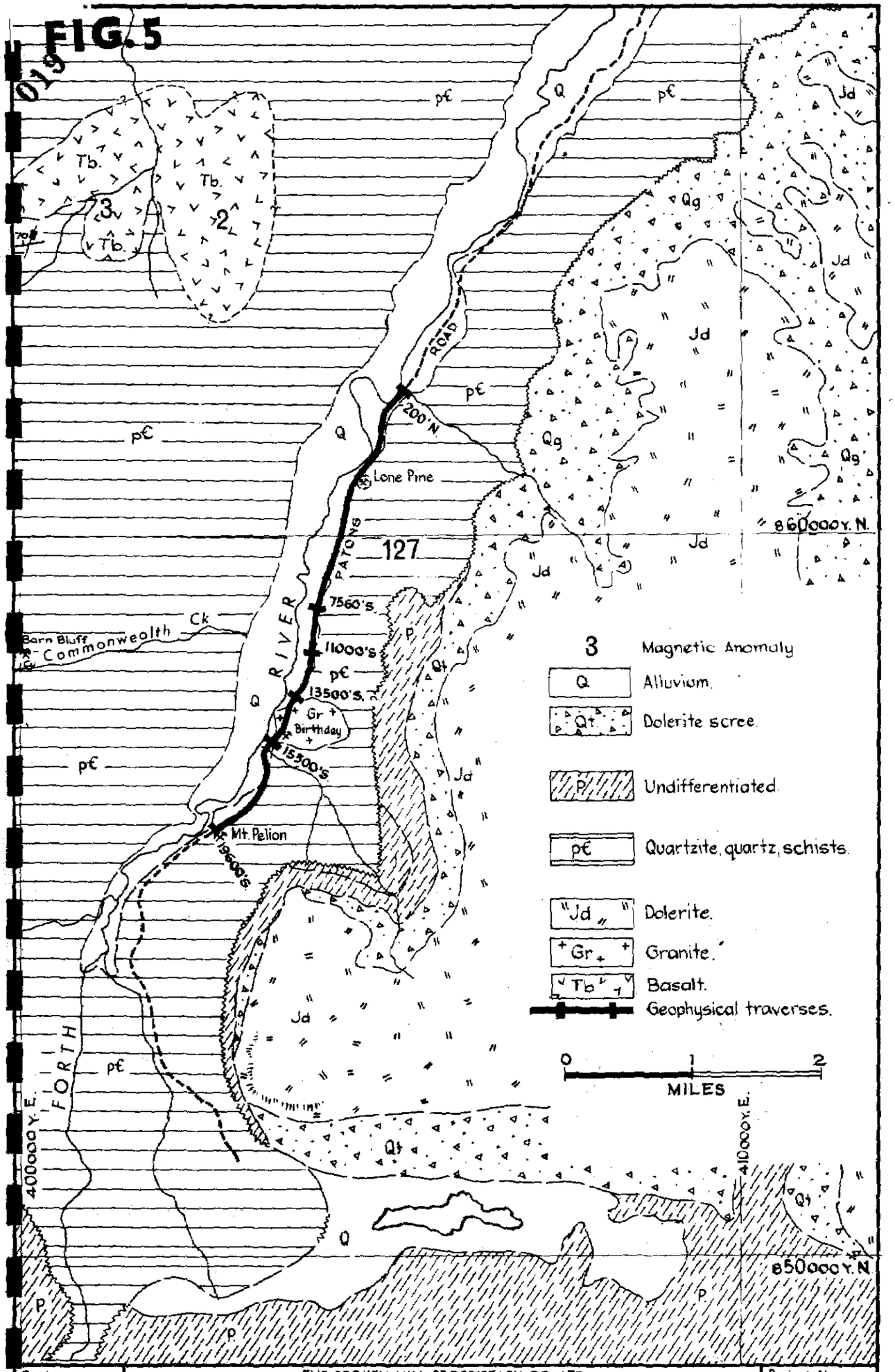
0 500 1000

TSh,9

A4.1049

16.4.68

FIG. 5



Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. T.Sh.10
Date 2·7·68	E.L.15/65 SHEFFIELD, TASMANIA. LOCATION OF GEOPHYSICAL TRAVERSES UPPER FORTH RIVER AREA	Drawing No. A4/1064

960020

5 cm

susceptibility.

Inspections of a number of the old copper, lead and wolfram prospects in the area led to the conclusion that they were of only small scale interest.

A feature of the serpentines examined was their general poor outcrop and apparent lack of laterite soil profile development. The typical outcrop form consists of massive, relatively fresh small bluffs and masses protruding through red-brown clayey to sandy soils on the sides of steep ridges, underlying basalt cappings. There was no detectable sign of any nickeliferous laterites associated with the serpentines.

The potential for bauxite development on the weathered basalt also seems poor. In remarkably few places were pisolitic or low-iron laterites evident.

Geophysical Traverses: Six geological and geophysical traverses were made over each of the five anomalies as indicated on Figure 4. Magnetic readings were taken along all traverses and S.P. on three.

Anomaly 53. (Penguin Beach) is caused by spilite which is weakly magnetic compared to the non-magnetic surrounding rocks. There are several nearby anomalies, however, which were not resolved on the aeromagnetic survey. One of these has an amplitude of 800 gammas and is slightly west of the Penguin Mine. There is no anomaly over the Nepture mineralization. There is no significant S.P. anomaly along the traverse. Minor lows may correspond to the pyrite mineralization, but this is doubtful.

Anomalies 27 and 28 are near Wilmot which is eight miles west of Sheffield. The area of these anomalies is covered by soil and alluvium, but they may be underlain by quartz dolerite, which could be the cause.

Anomaly 22 is fourteen miles south-east of Sheffield. It corresponds to an outcrop of basic volcanics, probably basalt, and hand specimens of this rock are weakly magnetic.

Anomaly 12 is sixteen miles south-east of Sheffield, beside the Mersey River. The magnetic profile along the traverse consists of many small irregular variations superimposed on a broad high centred about 1000N. A 400 gamma anomaly coincides with a 15 inch wide mineralized zone in the granite. There is no S.P. anomaly over this mineralization, and field evidence indicates it has no economic value.

Anomaly 67 is four miles south of Ulverstone. Tertiary basalt corresponds to the magnetic anomaly and appears to be the cause. On the traverse to the south of 67 there is good correlation between the 10,000 gamma anomaly and a narrow band of highly magnetic quartz-magnetite schist, and again the anomaly is simply explained.

INDIVIDUAL AREAS

(1) Upper Forth River

Exploration in the Upper Forth River area consisted of a ground investigation of aeromagnetic anomalies, and of the Lone Pine, Birthday, and Barn Bluff Prospects, and an E.M. and magnetic survey to determine any extension of the known mineralization. Figure 5 shows the geology of the area taken from the Du Cane one mile sheet, and includes Cambrian quartzite intruded by Devonian granite. Mineralization consists of wolfram and tin which were mined by open cut from quartz veins associated with a granite intrusion. Figure 5 also shows the location of geophysical traverses.

Lone Pine Prospect

The Lone Pine Prospect is described by Reid (Geological Survey Bulletin No. 30) as consisting of a quartz vein three to five inches wide in a small granite outcrop. The granite is shown on the Mines Department Map as occurring on the east side of the Forth River not far from the junction of the Forth River and Hartnett Rivulet. No granite was found in this vicinity. A small outcrop of granite measuring 90 feet by 60 feet was found about one mile further south. This is

presumably the Lone Pine Granite. It is a fine to medium grained, light coloured rock consisting of quartz, orthoclase and muscovite. In places it is aplitic with a fine intergrowth of quartz and feldspar crystals.

Several small quartz veins occur striking N40°W but these are barren. The two shallow open cuts reported by Reid were not located. The rocks surrounding the granite consist of quartzite and schistose quartzite with a fairly uniform strike of N80°E, and a dip to the north of 40°. Jointing is well developed in a N40°W direction. In the massive quartzite beds the joints are regularly spaced between one and two feet apart. Detrital tourmaline occurs in places along the bedding planes in the quartzite.

The area surrounding the granite was carefully examined but no dolomite could be found. There is no sign of alteration such as occurs at the Barn Bluff deposit.

The steep slope above the road is covered with quartzitic scree. 400 feet above the road and to the north-east of the Lone Pine Granite, a number of very large boulders of a medium grained granite were found. The granite is probably in situ at this point. Elsewhere over the scree covered slope a number of smaller granite boulders were found, indicating that a granite mass is probably present close to the surface.

Anomaly 127

This is situated at an elevation of 2,200 feet on the steep east side of the Forth River. It is north-east (south?) of Lone Pine. The rocks in the vicinity consist of massive quartzites striking N60-70°E with a dip of 40°N. Close ground inspection in the area did not indicate the cause of the anomaly.

Small granite boulders were found at 2300 feet. No source could be found for these and it is doubtful if they are in situ at this point. The granite showed no

magnetic susceptibility in hand specimens.

Birthday Prospect

This occurs on the east side of the Forth Valley, ¼ mile north-east from where the road crosses Oakleigh Creek. It lies 500 feet east of the road, and 200 feet above its level.

The prospect consists of a series of quartz veins with varying amounts of wolfram, and traces of other metallic minerals. The veins occur in Devonian granite which has intruded the Pre-Cambrian quartzite and quartz-schist. The granite shows alteration (greisenization) for a few inches on either side of the veins. Reid reported three vein systems but only one was found, presumably the one he referred to as No.2. It is up to one foot wide and can be traced for 300 feet up the hillside (representing about 50 feet vertical extent). It strikes N35°W, parallel to the jointing in the granite, and dips steeply to the north-east. The granite in the vicinity of this vein has withstood erosion slightly better than the rest of the granite.

Much of the quartz is barren but medium to coarsely crystalline wolfram occurs together with traces of molybdenite, arsenopyrite, and pyrite.

Barn Bluff Copper Mine.

This is situated on Commonwealth Creek, a tributary on the west side of the Forth River. It is in the Cradle Mountains - Lake St. Clair National Park, 4½ miles south-east of Barn Bluff.

The general geology consists of east-west striking quartzites and quartz mica schists dipping to the north between 45 and 60 degrees. Immediately west of the workings there is a local change of strike to N20°W. Strong fracturing occurs in a N20-40°W direction.

The workings consist of three tunnels, the largest 448 feet long, and eighteen open cuts of various sizes. These cover an area of approximately 600 feet by 450

feet on a spur between Commonwealth Creek and a small tributary.

Mineralization occurs as impregnations and veins in the quartzites and schists, which have been considerably altered near the mine workings. Pyrite, pyrrhotite, specularite, arsenopyrite, chalcopyrite and secondary copper minerals are present. Alteration has produced chlorite, epidote, actinolite and talc, while quartz and calcite have been introduced.

Reid describes a chloritized basic dyke trending north-west, in the vicinity of the mine. This does not appear to be present. To the west of No. 3 Tunnel where the strike changes to N40°W the rock is a dark green dense chert heavily mineralized with pyrite. This is possibly the same rock Reid describes as "hard, dense, dark-green rock, partly chloritized, strongly impregnated with pyrite".

The main object in visiting this mine was to observe the type of mineralization for guidance in reconnaissance outside the scenic reserve. In particular it was hoped to establish if dolomite was present as a host rock. In several places along the roof of No. 1 Tunnel, small limestone formations were seen and one specimen from this tunnel was subsequently identified as limestone or dolomite. It is apparent, however, that dolomite is not present as thick beds in the quartzite sequence. It may occur as local bands, limited in extent.

Geochemical stream sediment samples were taken to provide information on background values and decay pattern in such an environment. The creeks are not very satisfactory for sampling, containing little minus 80 mesh material. Contamination from the workings is to be expected. Further contamination by bank fall is suspected in other places.

<u>Anomaly 3</u>.

Anomalies 2 and 3 occur in the south-west corner of the Middlesex one mile sheet to the west of the Forth River.

The centre of anomaly 3 occurs near the junction of Weindorper Creek, and a tributary from the west.

They are small elongated anomalies of about 200 gammas. The geophysical contractors, AMEG Pty. Ltd., suggested they were an expression of basalt, and this view proved to be correct.

The lithology surrounding the anomaly consists of schistose quartzite containing bands of harder quartzite up to 4 inches wide. The strike trends N80°E. Small quartz veins ½ inch wide also course in this direction.

The rock type at the ground location of anomaly 3 is basalt of probably Tertiary age. This outcrops along Weindorfer Creek and its main tributary from the west. It is also present on the hill to the east of the anomaly.

Anomaly 2 was not located on the ground, but it seems probable from photo interpretation that basalt occurs in this area too. The interpreted limits of the basalt appear to conform approximately to the outline of the anomalies. The peaks of the anomalies, especially No. 2, probably occur at the point where the basalt is thickest.

E.M. and Magnetic Survey

Traverses were made along four miles of Paton Road which runs approximately north-south, and along six cross traverves of total length 0.72 miles running east-west. The location of these traverses is shown on Figure 5.

The magnetic and E.M. profiles are plotted on Figure 6. On the E.M. profiles there are only minor variations which do not indicate mineralized zones. There are minor anomalies at the granite-quartzite contacts at 136008 and 152008 on the Patons Road traverse.

There is little variation in the magnetic profiles as the quartzite and granite contain only minor amounts of magnetite. The granite contains less magnetite than the quartzite, and also the magnetite is more uniformly distributed through the granite than through the quartzite. This is illustrated by the magnetic profile over the Birthday Granite (13600S to 15200S). It is not as well illustrated at the Lone Pine Granite which outcrops for 100 feet at 5000S.

From Oakleigh Creek to the south, the increasing magnetic gradient is caused by a change in basement magnetism rather than a change in the magnetic properties of the quartzite.

Also, the more uniform character of the profile between 18400S and 20000S suggests a granite body at a shallow depth beneath the quartzite. This interpretation is supported by the presence of quartz veining at 19600S.

An anomaly of 200 gammas was recorded at the abandoned open cut at 19600S. No comparable anomaly was recorded on the other traverses.

The magnetic and E.M. results did not show any extensions to the known mineralization in the Upper Forth River. The magnetic results could be explained by the magnetic properties of the rock types in the area. The E.M. profiles did not show any major conducting zones indicating mineralization. The minor variations are caused by granite-quartzite contacts and surface viregularities.

(2) <u>Penguin Beach</u>

A magnetic, radiometric and E.M. survey was conducted on the wave-cut rock platform exposed at low tide at Penguin, to detect any concentrations of sulphides in the beach rocks, and to define any extension of the mineralization to the south-west under the alluvium and basaltic soil. Gossans occur over the whole area.

The magnetic profiles are shown on Figure 7. Several anomalies continue over several hundred feet, all striking roughly north-north-east. None of these are caused by mapped gossans or veins. All but two can be explained by the rock types as mapped by Burns in the "Geological Survey Explanatory Report, Devenport" (1964). The anomalies follow bands of rock having high susceptibilities, for example the band of spilite tuff at 250'W. Two anomalies over greywacke at 500'E and 1000'E, have a magnitude of 1500 gammas and persist under a greater cover of soil than the other anomalies. They cover only part of the greywacke beds, and greywacke normally has low susceptibility. This indicates that these two anomalies are caused by rocks of medium susceptibility within the greywacke. Burns admits that the boundaries of the greywacke are difficult to define and some sections are rich in fragments of volcanic rock (which has high susceptibility). An explanation of the anomalies, then, is that these sections of the greywacke are inbedded with volcanics. Alternatively greywacke provides a satisfactory environment for secondary mineralization which may include magnetite or pyrrhotite. The anomalies could therefore indicate mineralization within the greywacke.

The radiometric results show two bands of radioactive rocks, the first lying between the two beds of greywacke previously mentioned, the other on the base line at 100'N in a slab of microsyenite. The maximum size of these anomalies is 1100 counts per minute, or nearly four times background. This is not unusually high, but since uranium and its early decay products are easily leached away at the surface leaving later insoluble members of its decay series, this count could indicate good deposits at depth. The anomalies could also be caused by thorium. The radioactive rocks to the east were traced south until a few feet of sand absorbed the radiation.

E.M. methods were not successful owing to the sea water at Penguin Beach, and, south of the road, to the proximity of power lines, underground P.M.G. cables, fences and water pipes.

(3) Clayton Rivulet

The Clayton Rivulet area is situated 5 miles east of Ulverstone on the northern coast of Tasmania. The Devonport one mile map shows serpentinite intruded into quartzites with the area largely covered by basaltic soil. Asbestos is associated with the serpentinite. Magnetic and electromagnetic surveys were conducted to determine the extent of the serpentinite beneath the soil cover. Fifteen traverses were covered consisting of 5.07 miles, of which 1.83 miles were cleared by bulldozer and 3.24 miles were across cleared land. The station spacing was 100 feet.

The magnetic and E.M. profiles are shown on Figures 9 and 10. The magnetic profiles were used to determine the extent of the serpentinite. Being more magnetic than the quartzite and the basaltic soil, the serpentinite is recognised by an anomaly, or by edge effects depending on the size of the body. Since the serpentinite is only slightly more magnetic than the basaltic soil, the soil increasingly masks the effect of the serpentinite as soil thickness increases. There are two separate bodies of serpentinite as shown on Figure 8. The major parts of these were covered by the traverses.

The E.M. profiles over the two areas do not indicate any conducting zones caused by mineralization. Only minor and irregular conductivity variations are indicated by the profiles. Interpretation is limited to the imaginary component. The real component could not be corrected for differences in elevation between the two staffs because the levels required were not taken. Several spurious anomalies resulted from the numerous boundary fences which crossed most of the traverses.

(4) Dial Range

The Dial Range is a north-south trending ridge about seven miles long extending south from Mount Montgomery (about three miles south of Penguin) through Mount Duncan, east of Riana. The range rises 1500 feet above

the surrounding plains, and is covered with eucalyptus forest with dense undergrowth. Exploration in the area consisted of preliminary geological mapping and sampling, followed by a stream sediment survey, with soil and stream follow-up sampling.

General Geology: The area consists geologically of a sedimentary basin, flanked by the Precambrian rocks of the Rocky Cape Group to the west and the Forth Metamorphics to the east. During the Lower Cambrian, the acid Lobster Creek Volcanics were extruded in the trough (Burns, 1964) and overlain by greywackes and siltstones of the Cateena Group. Gentle folding and faulting terminated the Cateena Deposition, and the acid volcanics were uplifted to form a ridge in the centre of the basin, over which cherts and spilites were deposited in the Middle Cambrian. After a period of uplift and erosion, sediments of the Radfords Creek Group were deposited and intruded by keratophyres; deposition ceased at the on-set of the Upper Cambrian Jukesian Movement. The Lower Ordovician Dial Group was deposited on the flanks of the emergent central part of the trough and lapped onto the uplifted basement on either side. The basal part of the Dial Group consists of thickly bedded hematitic conglomerates which form the top of the Dial Range. Following the Middle Devonian Tabberabberan Orogeny, a granite body several miles across was intruded south of Riana, and it may be the source of the sulphate and phosphate mineralization (Hughes 1952). Basalt extrusions during the Tertiary covered much of the country surrounding the Dial Range, obscuring the older rocks.

Mineralization

Small mineral prospects are scattered all over the Dial Range and on a number of small exposures of pre-Tertiary rocks surrounding the Range. Burns has divided the area into a number of mineral provinces, and generally each province is characterised by a different mode of mineral deposition as well as by different mineral assemblages.

On the western edge of the trough, there are a number of hematite and limonite deposits which appear to be fissure fillings. These deposits occur in the Pre-Cambrian rocks close to the contact with the Cambrian, and some or all may be controlled by a large Cambrian fault marking the edge of the basin. A number of small deposits of hematite occur in Ordovician conglomerates derived from Pre-Cambrian rocks.

Quartz-hematite and quartz-pyrite deposits with traces of gold and copper are reported from the basement east of the trough.

Within the Cambrian trough there is a silver-nickel-cobalt province at the north end (near Penguin) and a more extensive field of pyrite replacement deposits occupying the Dial Range. To the south, there are a few occurrences of cupriferous pyrite-quartz-hematite. The central field is flanked by barite and galena prospects, while manganiferous iron ore deposits are scattered over the whole area.

Dial Creek - Stanton Creek Area

The Lobster Creek Volcanics are exposed in road cuttings, in Dial Creek, and in the Leven River north of Davies Adit. The volcanics consist of massive aphyric and porphyritic acid rocks, grey when fresh, but pink or white when weathered. These are some variations in the degree of chloritization and size and type of pheno-crysts (quartz, feldspar), but at present it is not possible to sub-divide the volcanics, although more than one lava or intrusive body may be present.

The Cateena Group occurs south of Dial Creek. On the Cart Track between Dial Road and the Leven the sediments consist of hard siliceous conglomerate with chert fragments, interbedded dark and pale banded siltstone, and possibly fine tuff. There are overlain by weathered silstones and greywackes, and as the contact with Ordovician rocks is approached, pale silicified siltstones, greywacke and maroon argillite predominate. These sediments occupy the centre of a north-west trending

syncline which passes beneath the Dial Conglomerate.

Contacts between the acid volcanics and the sediments are exposed only in underground workings. Near Keddies' Prospect, the sediments are disturbed, silicified, and mineralized, but the evidence for age relationships is scant.

Coarse, hematitic Duncan Conglomerate unconformably overlies the Cambrian rocks, with contacts along the upper part of Dial Creek and the face of Mt. Duncan. Contacts are generally obscured by conglomerate scree, but are probably faulted in some places.

The mineral prospects examined (Keddies, Davies Adit, Dial Mine - Stanton Creek, Revell's Prospect) all show the same type of mineralization - replacement by pyrite and silica of narrow breccia bands within Cateena Group sediments. Mineralization is essentially restricted to the breccias and is thus not likely to be extensive. Only the Dial Mine appears at all promising for metals (principally copper) and unless horizons other than the breccia bands are replaced at depth, the lode cannot be extensive.

Geochemical Survey

A stream sediment survey was considered to be the most economical method of exploration in the Dial Range. It consisted of an orientation survey, followed by the main stream survey, with follow-up soil and stream sampling.

Orientation Survey: Samples were taken every 100 feet from four creeks including Stanton, Revell, and Dial Creeks, draining into the Leven River. Those samples were dried, lightly crushed and three size fractions (minus 30, minus 80 and minus 150 mesh size) were separated and analysed. Each fraction was attacked by two separate acid mixtures, the first a perchloric, nitric, hydrochloric acid mixture at 180°, and the second a five normal hydrochloric acid solution under reflux. Determinations were made for manganese, cobalt, nickel,

copper, zinc, arsenic, molybdenum, silver, cadmium and lead. Manganese, cobalt, nickel, copper, zinc, arsenic, cadmium and lead were all found to be anomalous in one creek (Stanton). Molybdenum was not detected in sufficient samples to be considered. The contrast was better and the train longer for copper in the minus 80 mesh fraction, and it was considered that 2,000 feet sample spacing would be the most economic for the survey. A higher contrast was obtained with a 5M hydrochloric acid attack on the minus 80 mesh material. The trains for other elements were more erratic, and the use of other extraction methods did not effect the erratic nature of the results.

Stream sediment survey: As a result of the preliminary work, the survey was carried out on the basis of ½ mile sample spacing on first and second order streams, with density not exceeding five samples per square mile of drainage area. The selection of sample sites was controlled by the distribution of roads, and is presented in Figure 11. The elements copper, arsenic, silver, cadmium and lead were determined on the minus 80 mesh fraction after hot five normal hydrochloric acid leach. The results returned by samples collected during the survey are shown in Figures 12, 13 and 14.

There are 30 anomalous copper values, that is values outside + 1.3 standard deviations. Twelve of these, however, are close spaced samples from four creeks in the same area which were already indicated. There is some correlation between copper and silver in that area.

There are 28 anomalous lead values of which several are from close spaced samples. There is reasonable correlation here between lead and arsenic. These values are also associated with a pH below the mean.

Areal distribution of the results can be seen in Figures 12, 13 and 14. Associated arsenic and lead anomalies stretch in a belt from (403932) to (409 915). All these points lie over Cambrian Dundas Group volcanics and shales. The Dundas Group is known to be

mineralized and it is possible that the high values are background for this rock group. Copper values based on these statistical anomalies lie in a stream draining the east bank of the Leven River about 407 923. This area is underlain by Motton Spilite and they may be background values for this member, as spilites commonly have associated low copper mineralization.

The copper data was subjected to trend surface analysis. The first order plane was almost horizontal and was not considered further. The second order surface is done shaped with the long axis trending north-north-west. The third order surface has the same general trend as the second, but is open to the south and west.

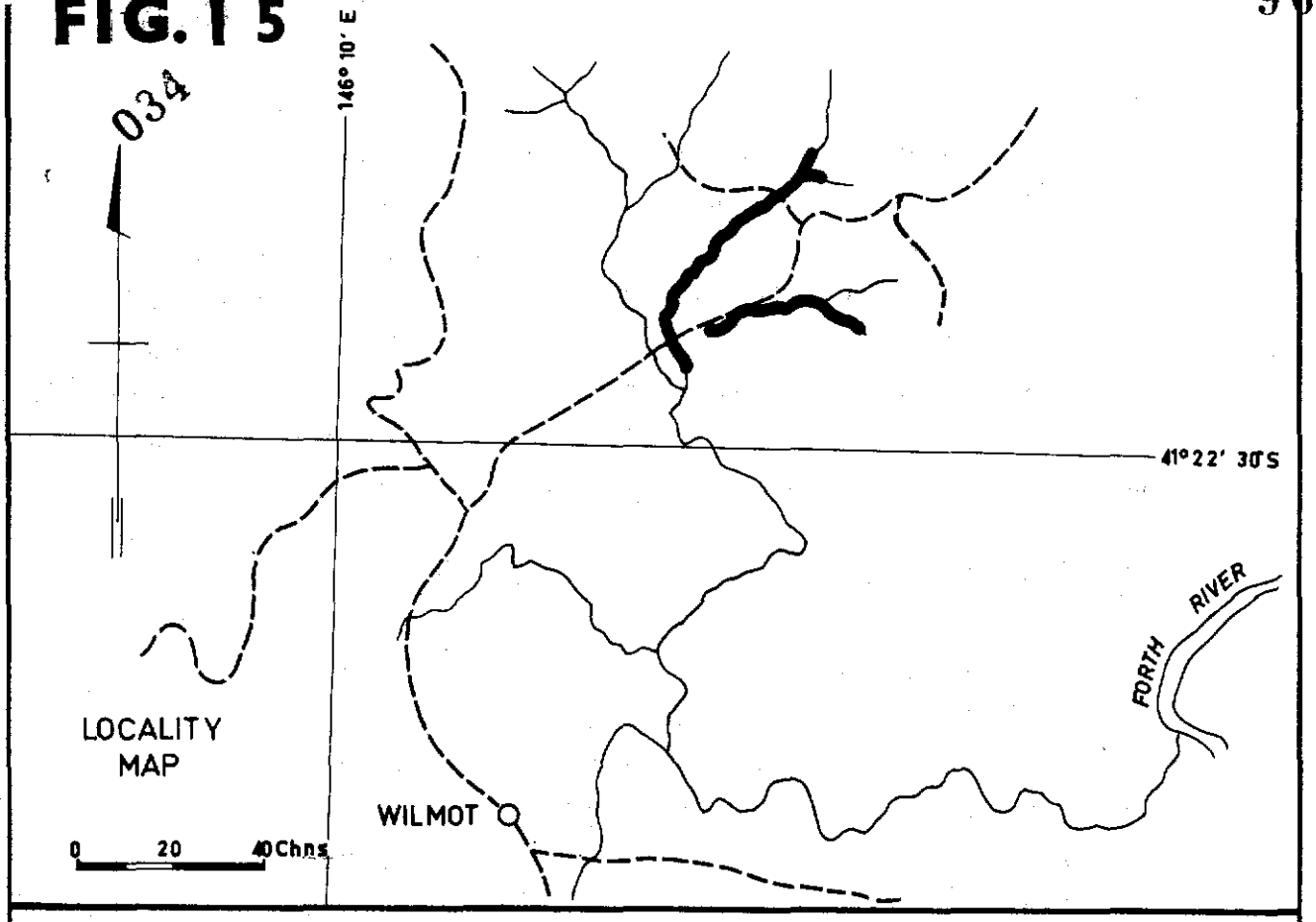
Both these surfaces indicate that an area to the north or centre of the exploration licence is of interest. Three second order residue peaks are considered significant. They indicate two areas at (408923) and (408 920) on the east bank of the Leven River, and one on the west side. At the +40 ppm level these anomalies cover 3.6 square miles, 1.5 square miles and 0.25 square miles, and the first reaches over the +100 ppm level.

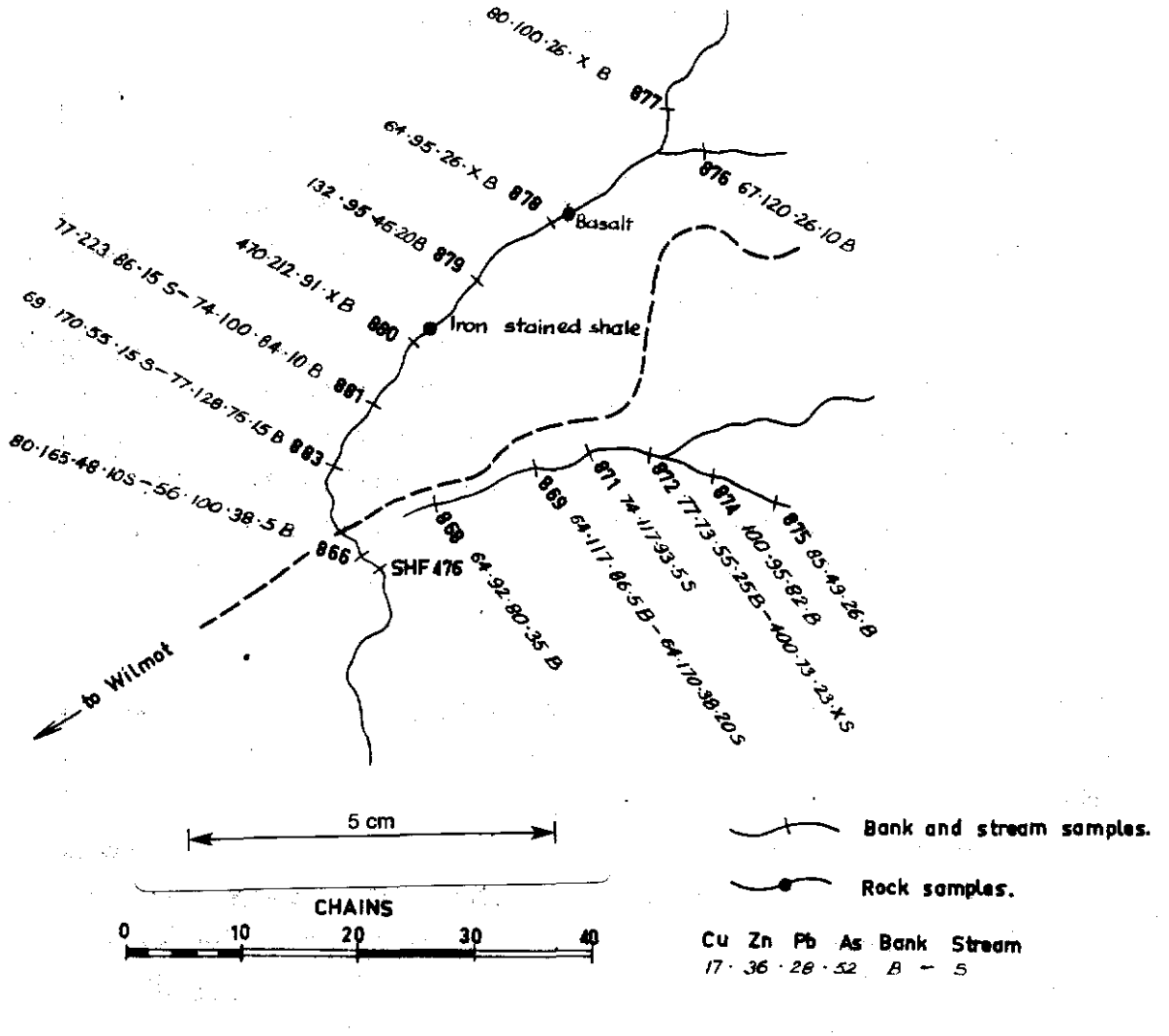
The third order anomalies are essentially the same, but a slight decrease in size is also found. The association of copper and silver can be taken as encouraging, possibly indicating vein mineralization by association with occurrences in the Dundas Group to the south.

Soil and Stream follow-up sampling: Soil sampling at 100 feet spacing along roads and tracks in the area about 40859225 was undertaken as a first step in assessing the stream values previously reported. Sampling of the B horizon was carried out after the characteristics of the profile were studied from a pit three feet deep on Leven Hill. The soil over the Motton Spilite was characteristically red, while that over the Barrington Chert encountered near the base of the hill was grey. Samples were analysed for copper, zinc, silver and lead.

FIG. 15

960035





Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSh 47
Date 10 · 7 · 70	WILMOT AREA – E.L.15/65 SHEFFIELD TASMANIA GEOCHEMICAL SAMPLE SITES & VALUES – P.P.M. Cu, Zn, Pb, As.	Drawing No. A4/1281

The results indicated that the values found in the streams draining this area are in fact background values for the Motton Spilite. At the base of Leven Hill a distinct change is seen in the analytical results. It is postulated that the boundary between the Barrington Chert and Motton Spilite is in fact higher up the hill than shown on the maps. Some outcrop of chert has been seen in this area. The possibility of a lower volcanic bed of different chemistry cannot be discounted.

The analytical values rise over a ferruginous chert which appears to cross cut the spilite. The trend of this chert is north-west, which is the major structural trend in the Cambrian. The chert band is represented poorly in outcrop and on chemical data varies between 300 and 500 feet wide, with an outcrop length (between lines) of 2,000 feet. No satisfactory chert samples were available for analysis, but it is not believed that this represents significant mineralization.

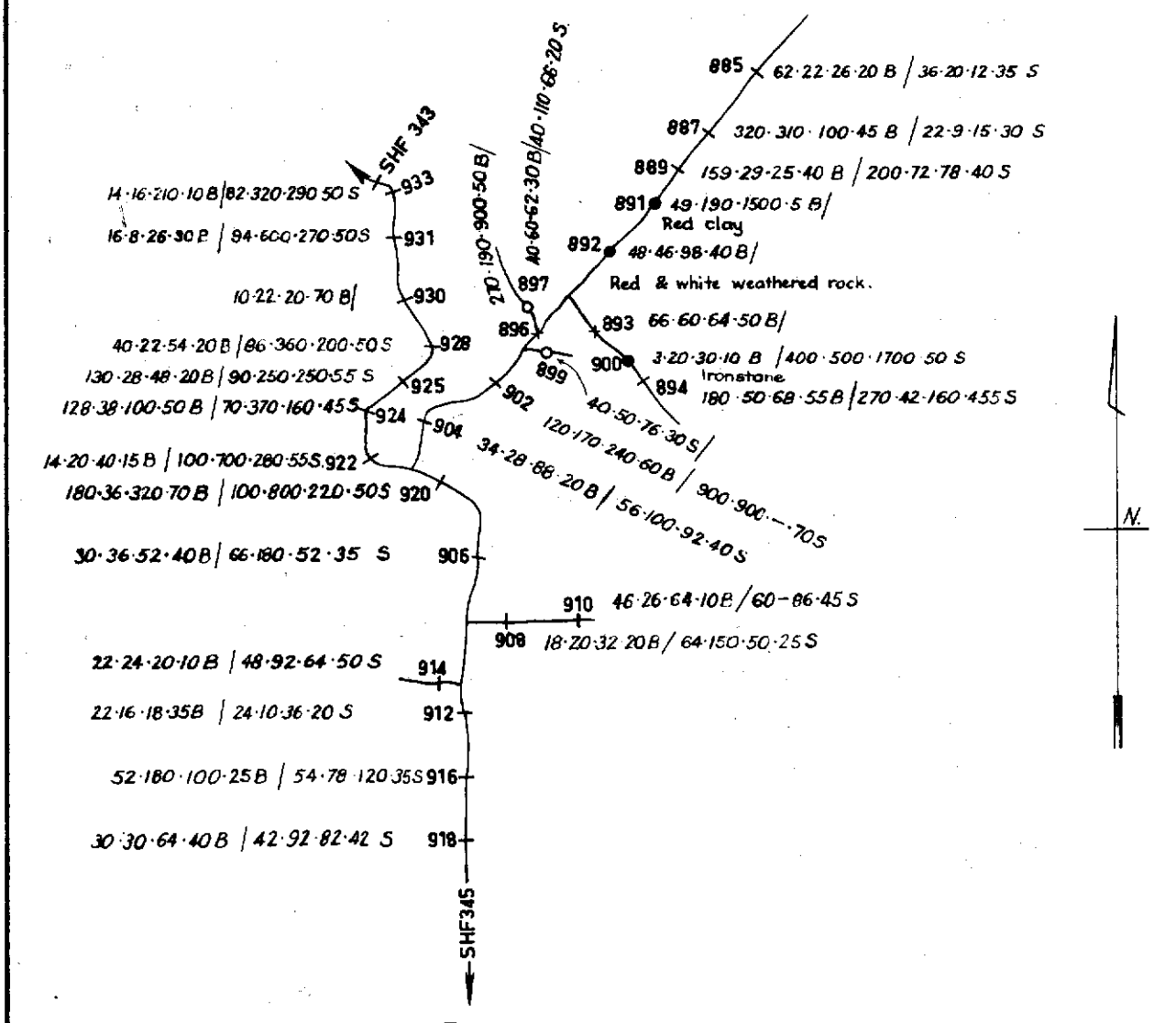
A number of streams showing lead arsenic anomalies were resampled by bank and sediment sampling at 200 feet intervals. These were McKennas Creek (40639240), McBrides Creek (40309326) and a small creek (41699052) draining into the Wilmot River. These were also analysed for copper, zinc, silver and lead, after crushing and seiving to give a minus 80 mesh fraction, followed by a perchloric acid leach. Due to the change in analytical method, the results were expected to be higher than in the main survey. This proved to be true for copper, but the reverse was true for lead. Arsenic values are in tolerable agreement.

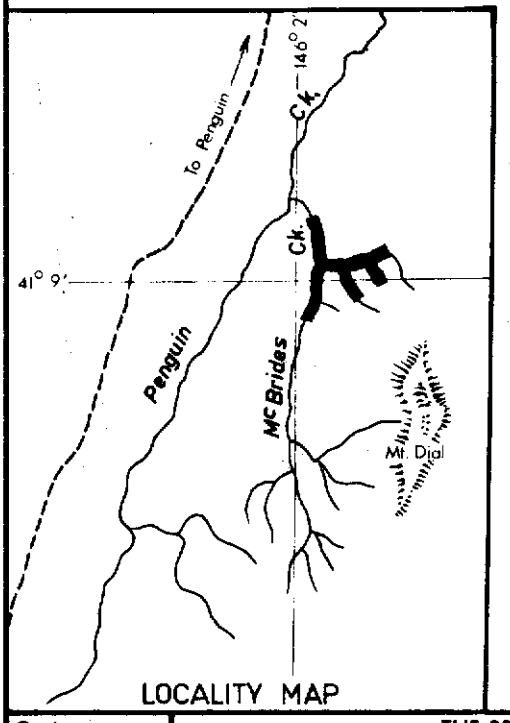
In McKennas creek, copper, zinc, lead and arsenic values are erratic and none can be considered anomalous. Only lead values show anomalies in the present samples. These were all associated with black chert or red clay. The arsenic values remain near the mean. Bank samples between sample positions SHF.820 and SHF.810 all have values of 200 ppm lead and are associated with grey chert. Rock samples show no mineralization.

FIG. 16

960037

036





Bank sample only.

Stream & bank sample.

Adit sample

Rock sample

Cu	Zn	Pb	As	Bank	Stream
17	36	28	52	B	S

5 cm

FEET
0 500 1000

Centre: Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No.: TSh 50
Date: 10·7·70	McBRIDES CREEK AREA – E.L.15/65 SHEFFIELD TASMANIA GEOCHEMICAL SAMPLE SITES & VALUES – P.P.M. Cu, Zn, Pb, As.	Drawing No.: A4/1245

Near the Wilmot River, one bank sample alone shows anomalous values. This is SHF880 with a copper value of 470 ppm. in bank material over iron-stained shale. Similar values have been encountered in South West Tasmania and indicated small veins of pyritiferous shale. Thus this stream is not considered to be significant.

Results from McBrides Creek are more interesting. Stream values below sample SHF900 show high zinc and lead values. The train is seen in these samples for 3000 feet, with values running between 160 and 1700 ppm. lead and 100 ppm and 900 ppm zinc compared with a background of 22 ppm and a threshold of 45 ppm for lead. Isolated low lead values (78 ppm) also occur, but these appear to be erractic. The lead values show a relatively faster drop off in value compared to the zinc values.

Bank samples show that mineralization, if it is present, is of limited and sporadic occurrence. It is felt from the values, that the potential of the area as a mineral prospect is low.

<u>Summary of Expenditure</u>

Total Expenditure for 1966 :		$21,031
Total Expenditure for 1967 :		$12,512
Expenditure for 1968, 1969, 1970 :		
Company Personnel :	$17,566	
Transport	$ 5,589	
Company Plant	$ 361	
Contract Services	$ 1,135	
Sample Analyses	$ 6,634	
Other Expenses	$12,428	
Total		$43,713
Total Expenditure in the area		$77,256

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FIG. 2A

SHEFFIELD AREA - TASMANIA

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE PROTON MAGNETOMETER

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1 : 63,360

1 INCH = 1 MILE

CONTOUR INTERVAL 20 GAMMAS

500 FEET M.S.L.

FLIGHT ALTITUDE 1000 FEET

TRAVERSE INTERVAL 1 MILE

MAGNETIC CONTOURS

MAGNETIC LOW

LEGEND

ANOMALY NUMBER

ANOMALOUS TREND

ANOMALOUS ZONE BOUNDARIES

ZONE A / ZONE B

SERPENTINE OUTCROP

GRANITE OUTCROP

BASALT OUTCROP

SURFACE STRUCTURAL FEATURES

FAULTS

FOLDS

MINES AND MINERAL HOLDINGS

INTERPRETATION BY PAPKEN A. ZARZAVATJIAN

PLANS AND CHARTS BY AMCA.

1086

NORTH SHEET

SHEET INDEX

TSh 30

GI718A

1086

TO-679

5 cm

960610

ZONE D

ZONE E

ZONE C

ZONE G

ZONE E

ZONE F

ZONE H

ZONE G

TR 10

TR 9

TR 8

TR 11

TR 12

TR 13

TR 14

TR 15

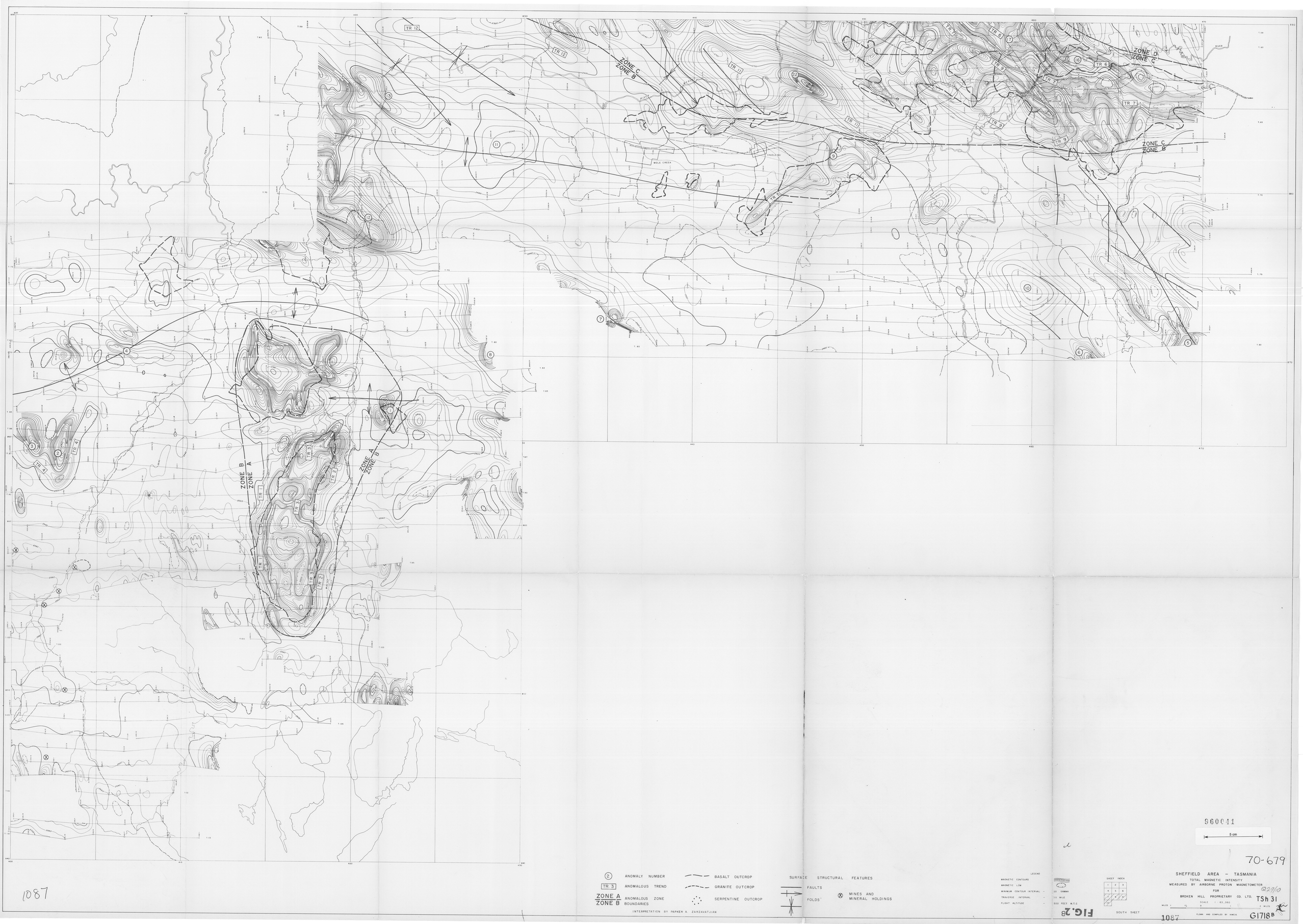
TR 16

TR 21

TR 20

TR 19

BASS STRAIT



(2) ANOMALY NUMBER

TR 3 ANOMALOUS TREND

ZONE A / ZONE B ANOMALOUS ZONE BOUNDARIES

BASALT OUTCROP

GRANITE OUTCROP

SERPENTINE OUTCROP

SURFACE STRUCTURAL FEATURES

FAULTS

FOLDS

MINES AND MINERAL HOLDINGS

INTERPRETATION BY PAPKEN A. ZARZAVATJIAN

LEGEND

MAGNETIC CONTOURS — 20 GAMMA

MAGNETIC LOW — ½ MILE

MINIMUM CONTOUR INTERVAL — 800 FEET M.S.L.

TRAVERSE INTERVAL —

FLIGHT ALTITUDE —

SHEET INDEX

1	2	3
4	5	6
7	8	9

SOUTH SHEET

FIG. 2B

SHEFFIELD AREA – TASMANIA

TOTAL MAGNETIC INTENSITY

MEASURED BY AIRBORNE PROTON MAGNETOMETER

FOR

BROKEN HILL PROPRIETARY CO. LTD. TSh 31

SCALE 1 : 63,360

MILES 1 0 1 2 MILES

FLOWN AND COMPILED BY A.M.E.G. G1718B

960011

5 cm

70-679

Q29/0

1087

1087

BASS STRAIT

PENGUIN

ULVERSTONE

DEVONPORT

PORT SORELL

SHEFFIELD

DELORAINE

MAGNETIC LOW
BELOW 2400 GAMMA

MAGNETIC LOW
ABOVE 2400 GAMMA

FLOWN BY AMEG
COMPILED BY B.K. LENON AND ASSOC.

SHEFFIELD AREA — TASMANIA

TOTAL MAGNETIC INTENSITY

FOR

BROKEN HILL PROPRIETARY CO. LTD.

SCALE 1: 126,720

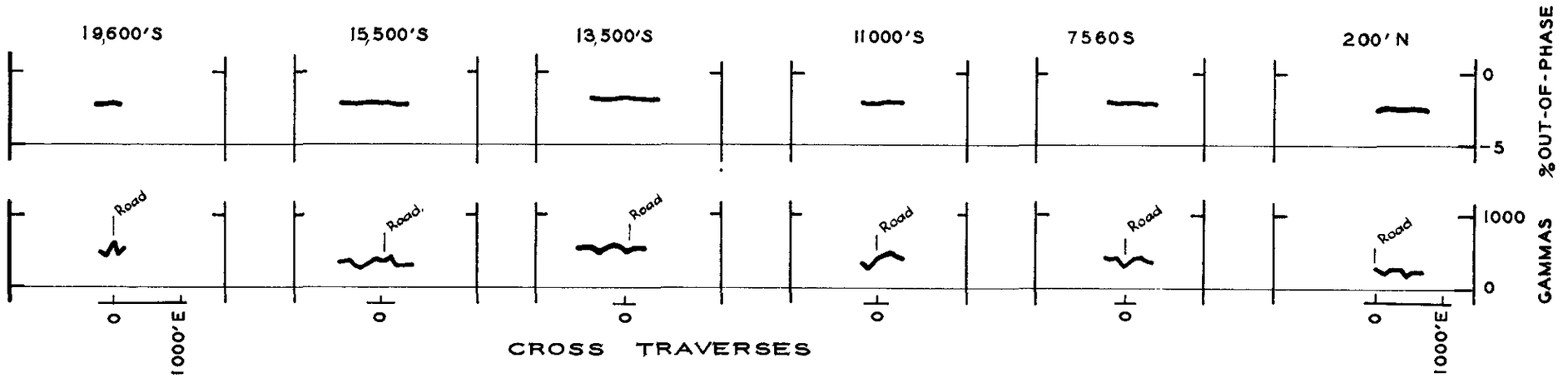
MILES 2 1 0 2 4 6 8 MILES

5 cm

960042

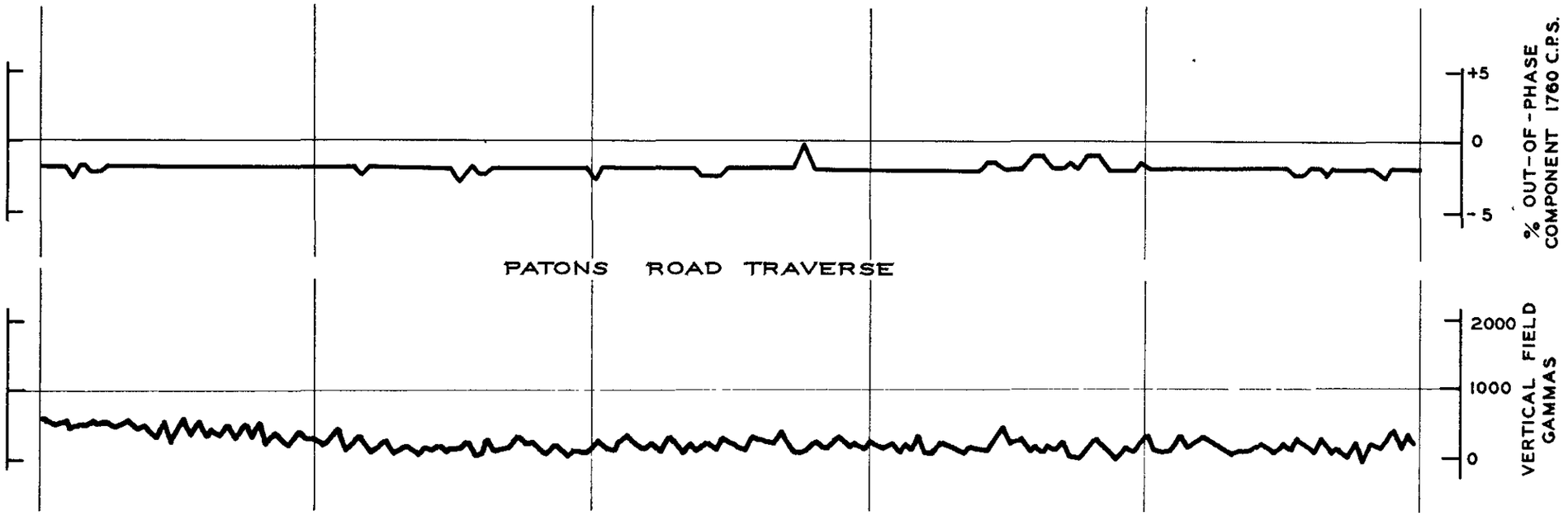
TSh 29
G1719

70-679 TSh 29 Fig. 3



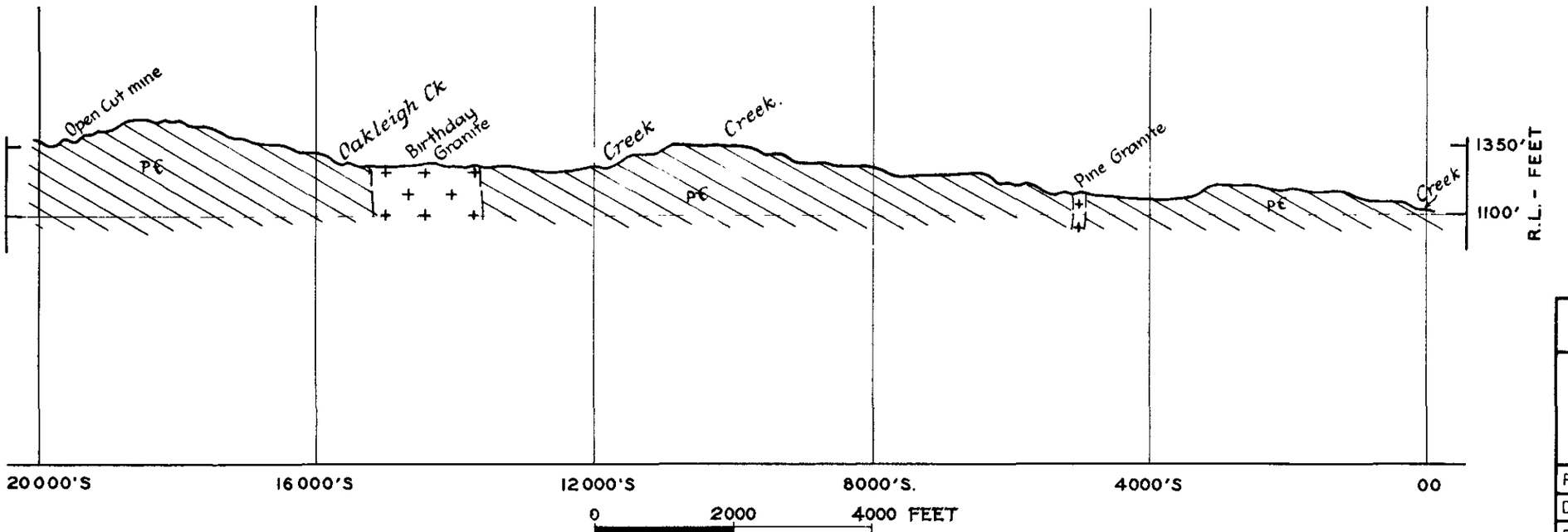
E M. PROFILES

MAGNETIC PROFILES



E.M. PROFILE

MAGNETIC PROFILE



5 cm

9600 13

GEOLOGICAL SECTION

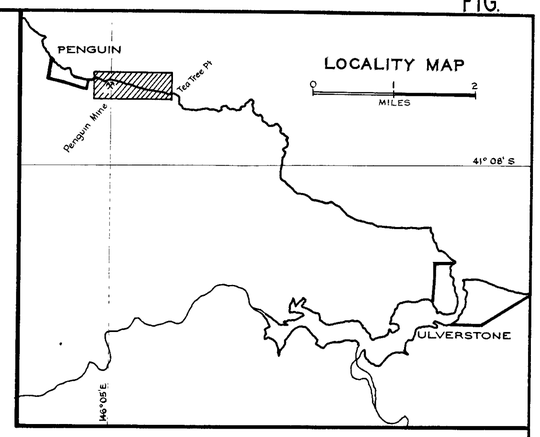
1088

THE BROKEN HILL PROPRIETARY CO. LTD
EXPLORATION DEPARTMENT

E.L 15/65 SHEFFIELD - TASMANIA MAGNETIC AND E.M. PROFILES UPPER FORTH RIVER AREA

Prepared by P H.	Centre Melbourne	
Date 2 7 68	Drawing No A3-1048	Project No T Sh 11
Drawn G B		

FIG.



B E E C R A F T

M E G A B R E C C I A

GAMMAS +1000 0

300 N
250 N
200 N
150 N
100 N
50 N
00
50 S
100 S
200 S
400 S
500 S

Penguin 1 mile

B e a c h

BASS HIGHWAY

PENGUIN MINE

B e a c h

Gossanous lump } Mapped by K.Hall
Gossanous vein }

Albite-microsyenite, trachyte.

Greywacke, conglomerate, to taffaceous sandstone

Spilite and tuff

Interbedded spilite and conglomerate

Chert conglomerate, breccia & interbedded siltst

Chert

Fish beds

Magnetic profile.

○ 300 - 600
● 600 - 900
Radiometric results - counts-per-minute
2 times background.

SCALE OF FEET
0 100 200 300 400 500

5 cm

960044

Fig 2.
To accompany Report No 705
Dated June 1968

70-679

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 15 65 SHEFFIELD, TASMANIA
GROUND MAGNETIC PROFILES
AND RADIOMETRIC RESULTS
PENGUIN AREA

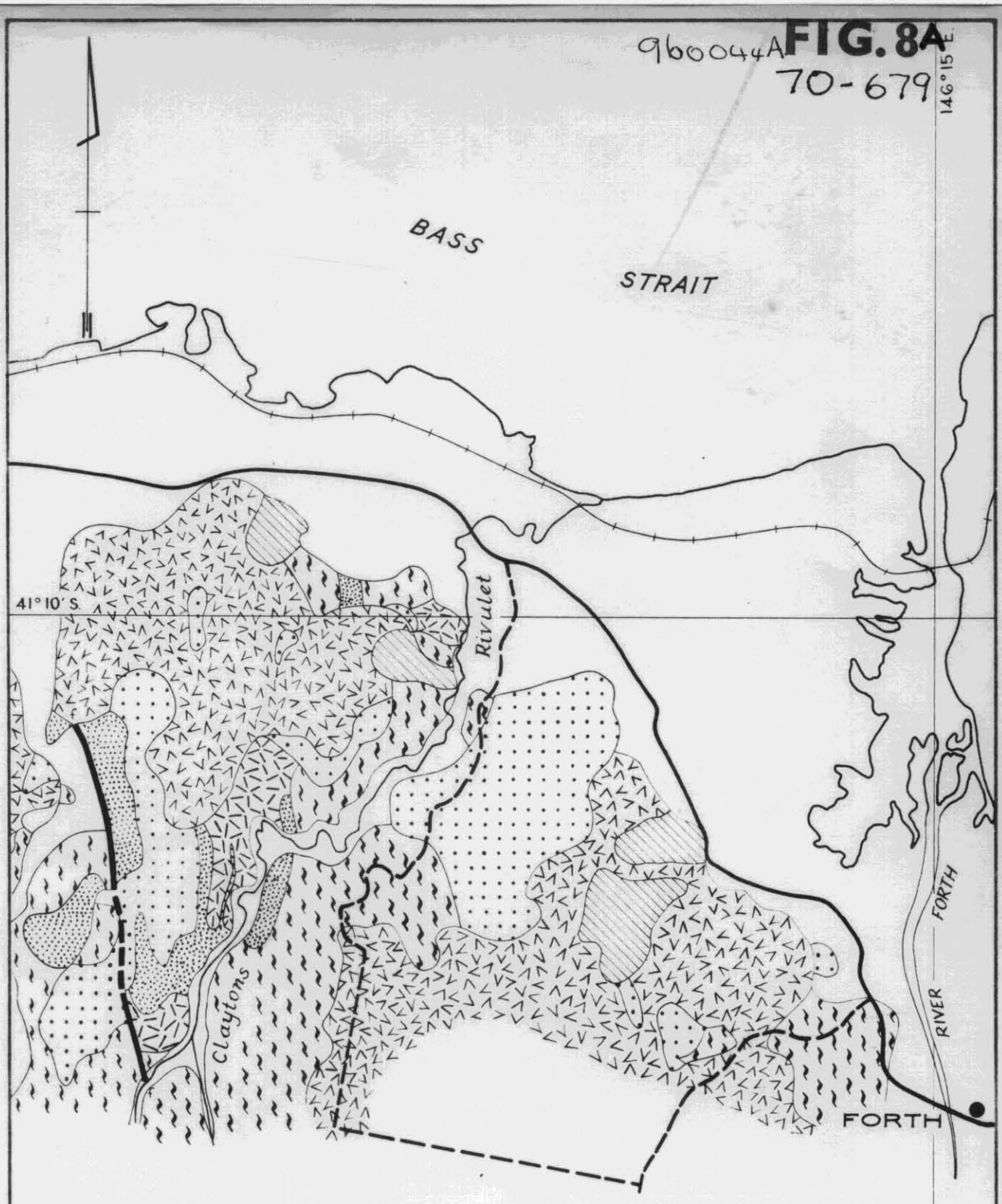
Drawn	Date July 1968	Centre
Traced	Drawing No	Project No.
Checked	A1-1062	TSh 14
O I C		

FIG.7

1089

960044A **FIG. 8A**

70-679



TERTIARY

- Alluvium
- Basalt
- Sand, grit
- Undifferentiated

CAMBRIAN

- Serpentinite

PRECAMBRIAN

- Quartzite
- Garnet schist

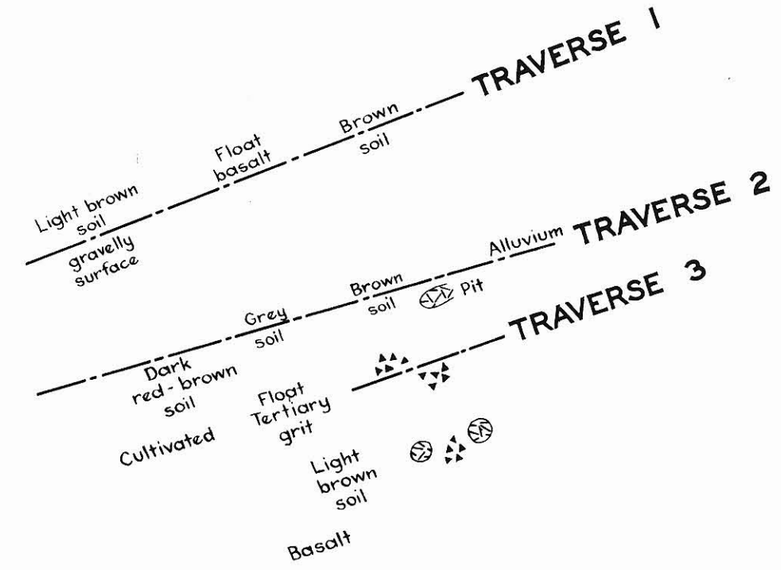
5 cm

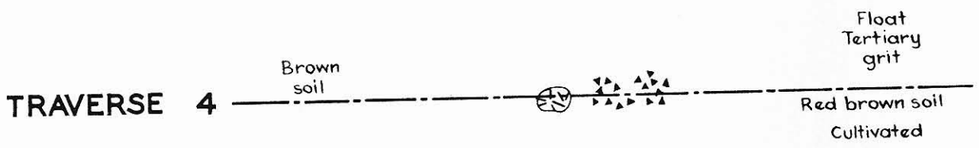
0 1 2

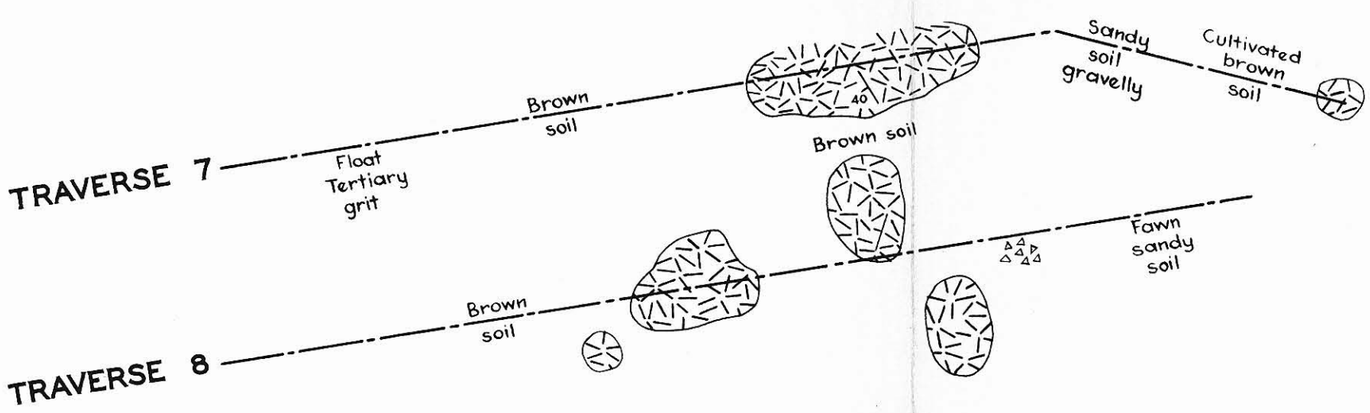
SCALE OF MILES

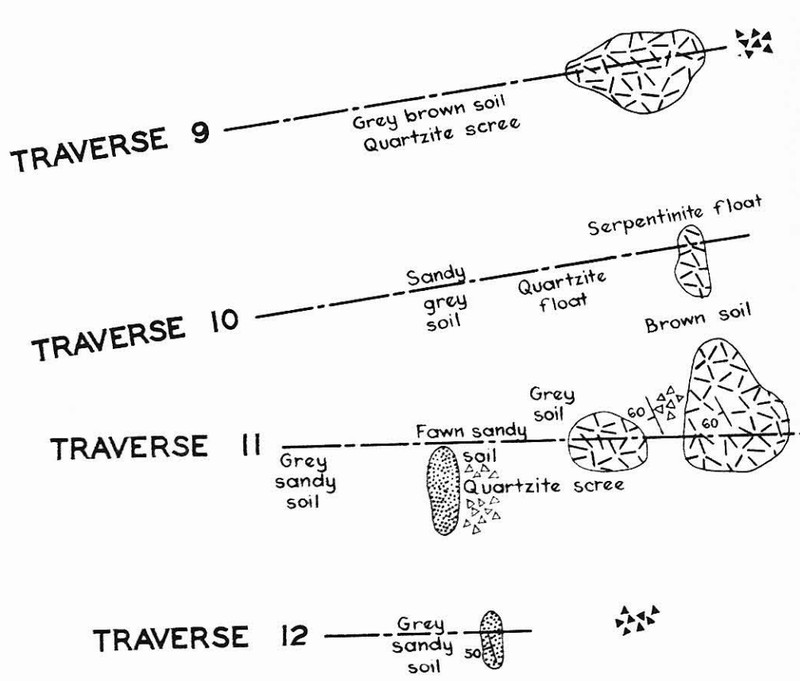
1090

Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSh 43
Date 7-11-68	E.L 15/65 SHEFFIELD – TASMANIA GEOLOGICAL MAP CLAYTON RIVULET	Drawing No. A4-1092









Sepentinite outcrop

Sepentinite scree, float

Quartzite outcrop

Quartzite scree, float

960045

0 400 800 1200

FEET

5 cm

70-679

1091

FIG. 8B

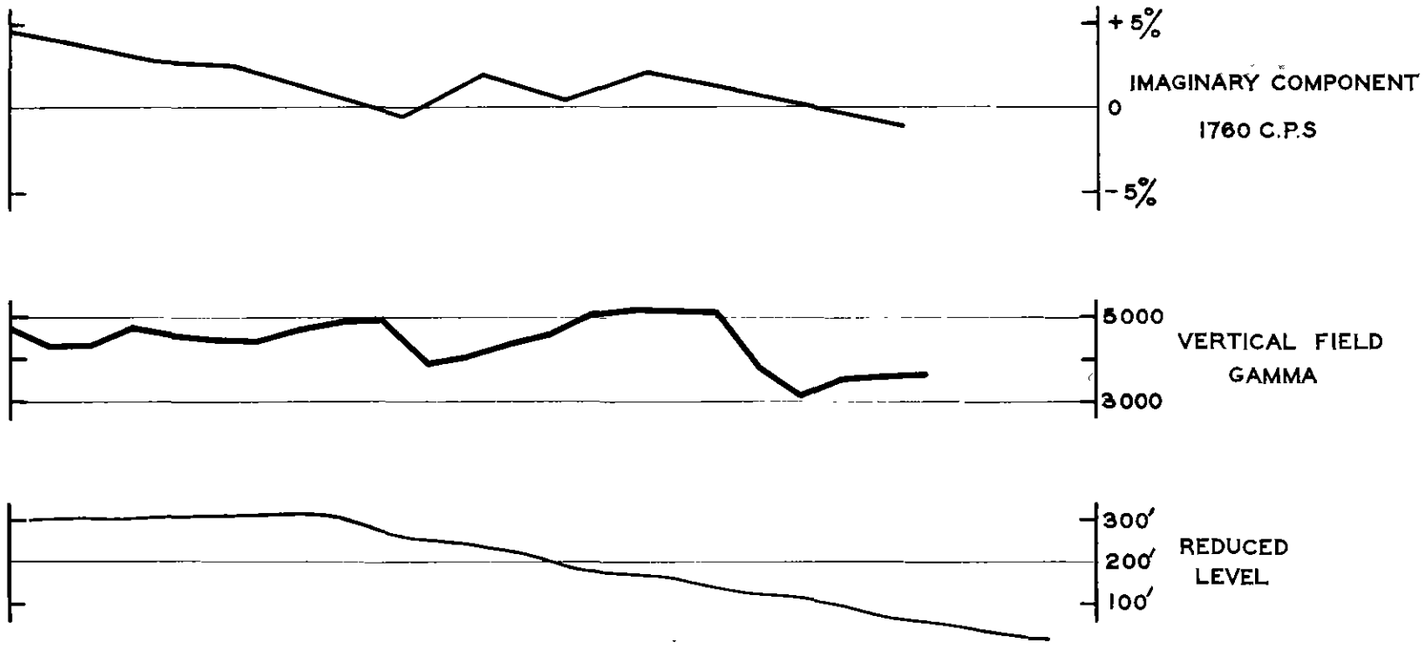
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 15/65 SHEFFIELD TASMANIA
CLAYTON RIVULET
GEOPHYSICAL TRAVERSES

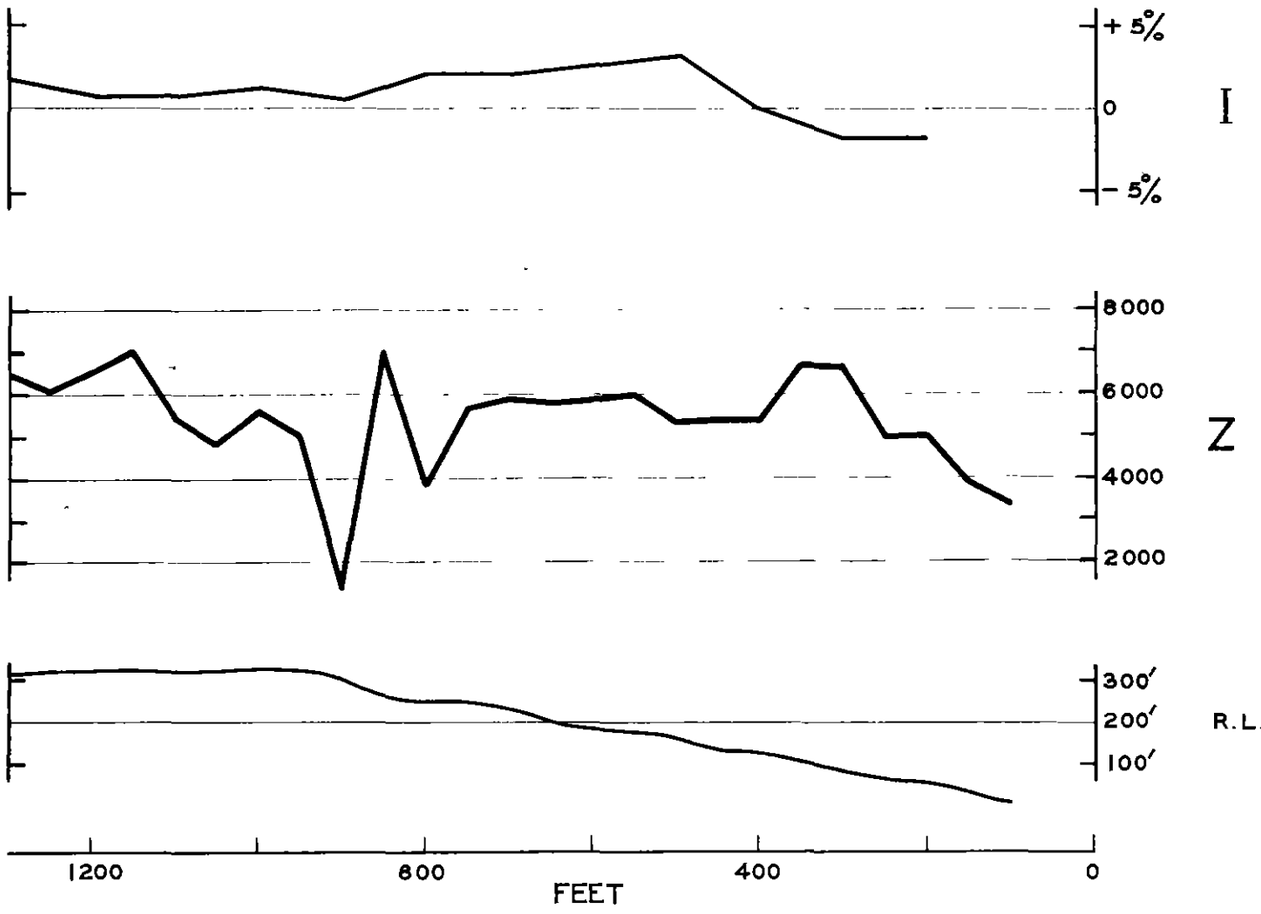
Drawn: K.M.H.	Date: 7-11-68	Centre: Melbourne
Traced: I.W.	Drawing No: A2-1013	Project No: TSh 43
Checked:		
O.I.C.:		

960046

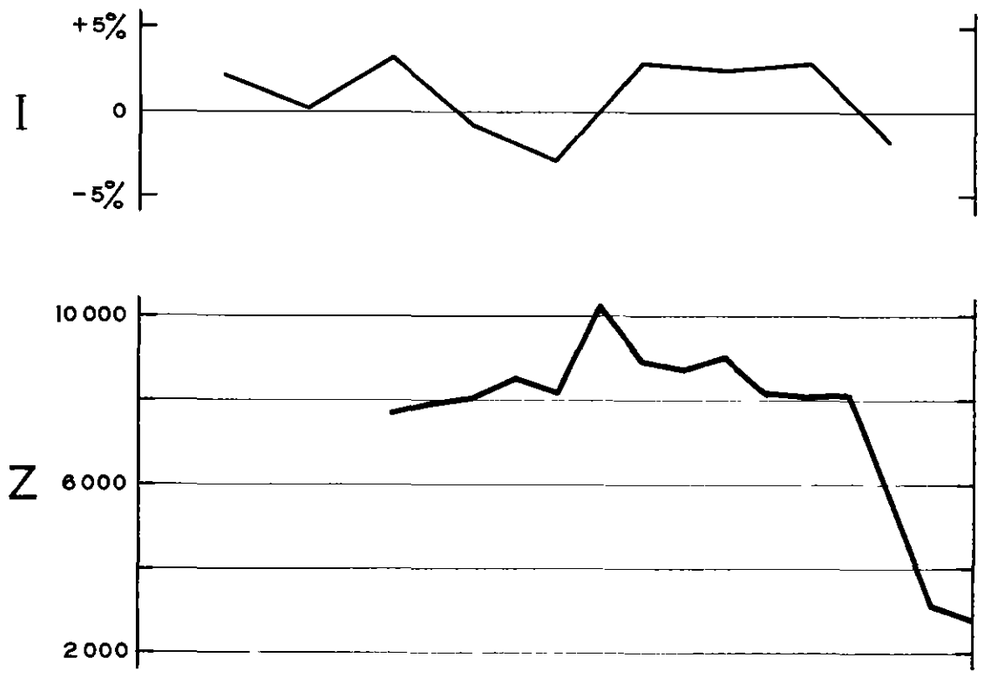
TRAVERSE 1



TRAVERSE 2



TRAVERSE 3



I IMAGINARY COMPONENT 1760 C P.S.

Z VERTICAL FIELD GAMMA

ELECTROMAGNETIC PROFILE

MAGNETIC PROFILE

5 cm

1092

THE BROKEN HILL PROPRIETARY CO LTD. EXPLORATION DEPARTMENT		
E L 15/65 SHEFFIELD – TASMANIA E M AND MAGNETIC PROFILES TRAVERSES 1 – 3 CLAYTON RIVULET		
Prepared by P H	Centre. Melbourne	
Date 7-11-68	Drawing No	Project No
Drawn I W	A3-1061	TSh 45

960047

IMAGINARY COMPONENT 1760 C.P.S.

VERTICAL FIELD GAMMA

TRAVERSE 4

TRAVERSE 5

TRAVERSE 6

TRAVERSE 7

TRAVERSE 8

TRAVERSE 9

TRAVERSE 10

TRAVERSE 12

I IMAGINARY COMPONENT 1760 C.P.S.

Z VERTICAL FIELD GAMMA

ELECTROMAGNETIC PROFILE

MAGNETIC PROFILE

5 cm

FEET

THE BROKEN HILL PROPRIETARY CO LTD.
EXPLORATION DEPARTMENT

E.L. 15/65 SHEFFIELD—TASMANIA
E.M AND MAGNETIC PROFILES
TRAVERSES 4 – 11 CLAYTON RIVULET

Prepared by P.H
Drawn I.W
Date 7-11-68
Centre. Melbourne
Drawing No A3-1062
Project No T5h 46

1093

1094

FIG. 11

THE BROKEN HILL PROPRIETARY CO. LTD.	
EXPLORATION DEPARTMENT	
EL.15/65 SHEFFIELD – TASMANIA	
GEOCHEMICAL SAMPLE SITES	
Drawn: C.Irwin	Date: 19 - 5 - 70
Traced: C.Irwin	Drawing No: A1-1357
Checked:	
O.I.C.:	

Centre: Melbourne
Project No: T5h 54

960048 70-679

9000000 V.N

9200000 V.N

400000 V.E

410000 V.E

420000 V.E

Stream sediment sample site and value.

0 1 2 3 MILES

5 cm

RIVER

LEVEN

PENGUIN

BASS

WILMOT

RIVER

FORTH

RIVER

DASHER

RIVER

SHEFFIELD

Gawler

River

HIGHWAY

ULVERSTONE

Claytons

Rivulet

BASS

FORTH

RIVER

HIGHWAY

FIG. 12

1093

Drawn: C. Irwin	Date: 17.4.70	Centre: Melbourne	
Traced: C. Irwin	Drawing No: A1-1344	Project No: TSH 57	
Checked:			
O.I.C.:			

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

EL.15/65 SHEFFIELD – TASMANIA
STREAM SEDIMENT SURVEY PPM COPPER

960049 70-679

900000 VN

920000 VN

400000 VE

410000 VE

420000 VE

ppm copper
Stream sediment sample site and value.

5 cm

0 1 MILES 2 3

RIVER LEVEN

PENGUIN

BASS

HIGHWAY

ULVERSTONE

Gawler River

WILMOT

RIVER

FORTH

Claytons Rivulet

BASS

DASHER

RIVER

RIVER

FORTH

RIVER

HIGHWAY

SHEFFIELD

FIG. 13

1096

Drawn: C. Irwin	Date: 17 - 4 - 70	Centre: Melbourne	
Traced: C. Irwin.	Drawing No:	A1-1346	Project No: T5h 56
Checked:			
O.I.C.:			

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

EL.15/65 SHEFFIELD – TASMANIA
STREAM SEDIMENT SURVEY
pH – PPM SILVER

9600 50 70-679

9601

1096

9000 00 VN

9250 00 VN

4000 00 VE

4100 00 VE

4200 00 VE

pH
ppm silver.

Stream sediment sample site and value.

0 1 2 3 MILES

5 cm

RIVER

LEVEN

WILMOT

RIVER

FORTH

RIVER

DASHER

RIVER

FORTH

RIVER

PENGUIN

BASS

HIGHWAY

ULVERSTONE

Gawler

River

Claytons

Rivulet

BASS

HIGHWAY

SHEFFIELD

FIG. 1 4

1097

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

EL.15/65 SHEFFIELD - TASMANIA
STREAM SEDIMENT SURVEY
ppm ARSENIC - ppm LEAD

Drawn: C. Irwin	Date: 17-4-70	Centre: Melbourne	
Traced: C. Irwin	Drawing No: A1-1345	Project No: T5h 55	
Checked:			
O.I.C.:			

960051

70-679

9000000 V.N

9200000 V.N

400000 V.E

410000 V.E

420000 V.E

ppm arsenic - ppm lead

Stream sediment sample site and value.

5 cm

0 1 2 3 MILES

RIVER

LEVEN

PENGUIN

BASS

WILMOT

RIVER

Gawler River

HIGHWAY

ULVERSTONE

FORTH

Claytons Rivulet

BASS

DASHER RIVER

RIVER

FORTH RIVER

HIGHWAY

SHEFFIELD

Stream and bank sample
Rock sample
Soil sample

M N

FEET
0 1000 2000 3000

5 cm

LOCALITY MAP
BURNIE
ULVERSTONE
DEVONPORT
LEVEN
LEVEN HILL
EL 15/65
SHEFFIELD
RIVER

LEVEN
CREEK
McKENNAS
RIVER
RIVER

923000 YN
921000 YN
405000 YE
406000 YE
408000 YE

Red clay
Black chert
Grey chert
Grey chert
Red clay
Black chert
Ferruginous chert
Spilite
Chert
Ferruginous chert
ULVERSTONE 6·5 M
LEVEN HILL
To Gunns Plains

GUNNS PLAINS ROAD SURVEY

960052 1098

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L.15/65 SHEFFIELD TASMANIA
GEOCHEMICAL SURVEY
LEVEN HILL – McKENNAS CK. AREAS'
SAMPLE SITES AND NUMBERS

Prepared by: E. Bumstead	Centre: Melbourne	
Date: 24-6-70	Drawing No: A3-1148	Project No: TSh 52
Drawn: C. Irwin		

Stream and bank sample.
Rock sample.
Soil sample.

M A N

FEET
0 1000 2000 3000

Cu Zn Pb As Cu Zn Pb As
40·18·36·15 S – 76·32·40·10 B p.p.m. results.
Stream Bank

5 cm

LOCALITY MAP
BURNIE
ULVERSTONE
DEVONPORT
LEVEN
LEVEN HILL
EL 15/65
SHEFFIELD
RIVER

LEVEN

30·12·18·20 S – 115·18·50 B
30 – 116·90 S
46 – 140·50 S
14·7·9·10 S – 36·20·62·45 B
48 – 158·90 S
120 – ·12·X S
52 – 178·80 S
56 – 160·120 S
69·14·32·10 S – 40·25·70·35 B
118·11·38·30 S – 50·40·36·45 B
44 – 160·60 S
52·12·100·25 S – 46·31·95·45 B
55·14·67·20 S – 40·24·80·40 B
34·41·38·25 S – 46·39·86·50 B
52·39·100·20 S – 47·49·95·40 B
120·28·50·20 S – 72·110·240·65 B
40·14·39·X S – 58·78·220·50 B
36·22·80·25 S – 80·110·250·65 B
36·24·110·45 S – 46·49·93·50 B
18·9·12·7·5 S – 46·39·93·15 B
32·25·57·15 S – 47·29·84·40 B
97·14·48·40 S – 42·31·80·70 B
46·11·41·10 S – 64·35·26·60 B
32·26·110·20 S – 70·100·290·70
86·42·100·65 S – 68·90·210·40 B
100·14·200 X S – 68·72·180·55 B
70·24·160·30 S – 68·130·180·65 B
42·20·170·35 S – 64·220·130·15 B
44·24·20·5 S – 40·46·130·35 B
62·10·64·50 S – 30·14·160·30 B
26·8·14·5 S – 36·70·170·40 B
14·14·10·X S – 32·70·130·35 B
54·36·110·25 S – 30·70·100·25 B
40·50·100·55 S – 42·80·140·20 B
30·14·8·5 S – 48·26·38·5 B
40·18·36·15 – 76·32·40·10 B

923000 YN

406 000 YE

409000 YE

225·95·20·–
200·95·18·–
94·64·23·–
115·92·20·–
194·100·20·–
173·68·21·–
102·85·26·–
122·80·25·–
209·75·20·5
194·88·20·5
163·80·20·5
94·73·28·–
150·83·20·–
278·95·20·–
142·117·20·5
225·73·18·–
225·71·20·–
45·80·26·5
138·62·20·5
175·77·15·5

921 000 YN

RIVER

GUNNS PLAINS ROAD SURVEY

80·36·30·–
110·62·26·–
36·28·12·–
220·78·36·–
130·72·22·–
210·98·28·–
150·88·30·–
210·84·30·–
130·36·36·–
230·66·34·–
230·80·38·–
48·28·14·–
46·30·12·–
70·54·14·–
120·84·26·–
110·60·18·–
150·92·26·–
210·140·36·–
210·160·34·–
140·38·38·–
240·84·32·–
160·64·36·0
140·30·42·–
170·48·38·–
160·42·44·–
140·58·40·–
130·40·44·–
130·44·40·–
180·60·38·–
170·40·36·–
180·54·46·10
220·130·42·–
130·130·44·5
200·120·84·–
150·94·34·5
180·76·36·5
150·96·26·–
138·72·28·–
110·86·26·5
150·54·34·5
110·52·30·5
116·86·22·–
94·60·18·–
150·52·32·–
106·36·36·–
180·62·32·–
120·60·26·5
190·120·36·–
160·76·40·–
130·110·32·–
130·120·54·–
160·72·42·–
150·44·40·10
180·86·34·5
145·78·28·5
110·78·28·5
64·36·26·5
180·120·22·–
154·120·24·–
152·70·28·–
148·46·32·–
152·48·36·–
46·26·10·–
32·24·12·–
44·28·12·5
28·20·10·–
38·32·16·5
88·48·18·5
58·44·32·5
60·32·16·5
24·26·14·–
36·28·10·5
62·52·18·10
70·62·18·5
38·30·14·5
14·12·8·5

408000 YE

LEVEN HILL

960053

1099
70-679

THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT		
E.L.15/65 SHEFFIELD TASMANIA GEOCHEMICAL SURVEY LEVEN HILL – McKENNAS CK. AREAS' RESULTS PPM – COPPER, ZINC, LEAD, ARSENIC.		
Prepared by: E. Bumstead	Centre: Melbourne	
Date: 24·6·70	Drawing No: A3-1149	Project No: TSh 53
Drawn: C. Irwin		