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REPORT ON 1968-69 FIELD WORK E.L. 13/65

SOUTH WEST TASMANIA

by

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INTRODUCTION

1. Titles

E.L. 13/65, South West Tasmania has now been split into three portions which together cover an area of 1150 square miles. The major portion is on the west coast and stretches from Macquarie Harbour to Low Rocky Point and inland to the longitude of the Gordon River. The two smaller portions are the Jukes - Darwin area and the Adamsfield area respectively (See Fig. 1).

All field work during the 1968-69 season was restricted to the west coast portion.

2. Summary of work

The main target for exploration in E.L. 13/65, S.W. Tasmania during the 1968-69 field season was a copper anomaly located in Cambrian rocks between the Urquhart and Mainwaring Rivers and centred on Cypress Creek (See Fig.1).

Soil sampling, geological mapping and geophysical traverses were done along the tracks. Little work could be done between the tracks because of the dense undergrowth. Geophysical methods used were magnetic and S.P.

The coastline from Abo Creek southwards to Sassafras Creek was closely examined for signs of mineralization, since rock types there were similar to the Cypress Creek Area.

Three areas of interest containing acid Lewis Volcanics were investigated. These were Pender's Copper Prospect, a sulphide-schist zone, the unconformable contact of the Owen Conglomerate with the Lewis Volcanics and an aeromagnetic anomaly situated just north of the Lewis River.

Three areas in the Double Cove Belt were investigated. Soil sampling, bank sampling and detailed stream sediment sampling were done in Lucas Creek where a copper anomaly was discovered in the 1967-68 season. Soil sampling was also done at aeromagnetic anomaly 128 and at Pelias Cove where Lyell E.Z. Explorations drilled a sulphide zone outcropping on the beach.

Radiometric Anomaly 401, between Mt. Lee and Mt. Discovery in the D'Aguillar Range, was investigated from the air but no signs of mineralization could be seen. An unsuccessful attempt was also made to investigate from the air some inaccessible radiometric anomalies in the vicinity of Mt. Sorell.

A total of 1976 geochemical samples were taken throughout the season. These included soil, bank, stream sediment and rock samples. All soil, bank and stream sediment samples were assayed for copper and nickel and over half were assayed for silver, lead and zinc. Rock samples were assayed for copper, lead, zinc, tin, silver, gold, arsenic, antimony, cadmium, cobalt, nickel, chromium, tungsten, molybdenum, manganese, palladium and platinum.

3. General

Eleven company personnel, including three geologists, and sixcontract personnel were engaged in the exploration campaign for the majority of the field season which lasted from November 1968 to April 1969.

Contract equipment used throughout the season consisted of a 47J Bell helicopter, two CAT D7E bulldozers and a Bombardier.

Work was carried out from two camps - the base camp at Moore's Valley and the Cypress Creek camp.

The major problem that confronted operations during the 1968-69 field season was access, as the area is covered with dense rain forest. Eighteen miles of tracks and three helipads were cleared.

All food, fuel and equipment had to be transported at least thirty miles to the Moore's Valley Camp and much of this had to continue out to the bulldozer camp, a further 15 miles by track from Moore's. However the bulldozer camp was only a five to ten minute helicopter flight from Moore's Valley and all personnel, food and equipment were ferried by helicopter.

The major problem was the supplying of diesel fuel to the two CAT D7E bulldozers working in the Cypress Creek area. Due to the inadequacy of the Nodwell, nearly

all fuel had to be flown from Moore's to Cypress Creek. The fuel was transported from the Bombardier Landing to Moore's by Nodwell early in the season and later by Bombardier. A large quantity of diesel fuel was flown from the Bombardier Landing direct to Cypress Creek.

4. Nomenclature

(a) The"Owen Conglomerate" referred to throughout is a siliceous conglomerate, lithologically similar to the Ordovician conglomerate which outcrops on Mt. Owen and which is a member of the Junee Group. Since both conglomerates are unfossiliferous, correlation has been made on lithology and association. The correct name for the conglomerate in the South West would probably be the Osmund Conglomerate.

(b) The Nomenclature Board of Tasmania has made a number of changes in the South West area. These were released too late to be included in this report, but the main changes are listed here for future reference:

MIDDLE CYPRESS CREEK	becomes	FLAT CREEK
SOUTH CYPRESS CREEK	becomes	RHEUBEN CREEK
SANDY POINT	becomes	THE SHANK
SASSAFRAS CREEK	becomes	SASSY CREEK
GREEN POINT	may become	EPIDOTE POINT

GENERAL GEOLOGY OF THE CAMBRIAN (See fig.2)

Introduction

All rocks which contain any signs of mineralization in the west coast part of E.L. 13/65 are Cambrian in age. Below is a table of the Cambrian sequence:

		Thickness
DUNDAS GROUP	Argillite,greywacke greywacke-conglomerate	6,700'
MAINWARING GROUP	Andesite,basalt,agglomerate,tuff,slate,siltstone.	12,600'
LEWIS GROUP	Dacite,rhyolite,quartz feldspar porphyry,minor slate horizons.	4,000'

The thicknesses above are those measured on the 729,000 y N line at Cypress Creek and represent the maximum thickness of the Mainwaring Group. Sixteen hundred feet of Dundas sediments are faulted into the Mainwaring Group. Faulting is evident on aerial photographs making estimation of true thicknesses difficult.

Lewis Group

The main area of the Lewis Group is from south of Copper Creek to Low Rocky Point. These rocks generally have a cover of peat and button grass. The group consists almost wholly of acid volcanics with minor bands of slate or chlorite schist. The entire group is sheared, but little alteration is evident apart from the sediment horizons which havebeen chloritized. The acid volcanics

were not affected by alteration due to their composition.

Mainwaring Group

The best development of the Mainwaring Group is in the Cypress Creek area and rocks of this group extend from the Urquhart River to just south of Sassafras Creek, where the basal slate of the Mainwaring Group makes contact with the Lewis Group.

The Mainwaring Group consists mainly of intermediate volcanics. Rock types include andesite, basalt, volcanic breccia, agglomerate, tuff and gabbro. All volcanics are chloritized and many are epidotized or sheared. This makes identification of these rocks difficult. Sediments are a minor constituent of the group and include shales, slates and phyllites.

Dundas Group

The Dundas Group is a typical turbidite sequence and contains interbedded siltstone, argillite and greywacke. Graded bedding is common and shows that the rocks along the west coast from north of the Wanderer River southwards to Abo Creek become younger towards the west.

1. CYPRESS CREEK AREA

LOCATION: (See fig. 1)

The Cypress Creek Area is that area bounded by the Urquhart River to the north, the Mainwaring River to the south, the coast to the west and the Osmund Syncline to the east. The major stream in this area is Cypress Creek with Middle Cypress Creek about half a mile further south and South Cypress Creek about one mile further south.

PREVIOUS WORK:

Regional stream sediment sampling over the entire E.L. 13/65 was done between the 1964 and the 1967-68 seasons. This sampling showed that streams in the Mainwaring-Urquhart area contained higher values for copper nickel and zinc than those in other areas. Copper values were the most noticeably high and were obtained from stream sediment sampling of the Urquhart River, Cypress Creek, Middle Cypress Creek and the Mainwaring River in the 1966-67 season. The highest of these values was investigated in the 1967-68 season by detailed sampling which was done at 100 foot intervals, four samples being taken each time: two stream sediment samples and one sample each from the left and right banks. This sampling was done in two tributaries of the Urquhart River, part of Cypress Creek and part of South Cypress Creek. Bank samples were found to have much higher values than stream sediment samples. The best values were obtained in Cypress Creek where a maximum value of 1875 ppm copper was recorded. High values were also obtained

in South Cypress Creek (maximum 610 ppm copper). It was apparent that high values were restricted to the volcanic rocks.

GEOLOGY: (see figs. 3, 4a, 5a and 6)

The Cypress Creek Area is composed wholly of Cambrian rocks. Three main units are present:-

Youngest	DUNDAS GROUP
	MAINWARING GROUP
Oldest	LEWIS VOLCANICS

These rocks all have a northerly trend which in some cases is bedding but more often is cleavage. Much shearing has occurred in these rocks and the Mainwaring Group has been highly altered - chloritization and epidotization being evident.

The rock sequence from east to west across the Mainwaring Group at the latitude of Cypress Creek from the Osmund Syncline to the coast is shown below:-

Thickness	Group	Age	Unit	Rock Type
3800'	DUNDAS	C	11	Argillite and greywacke
3000'	MAIN-WARING	A	10	Siltstone-conglomerate and tuff
5000'	"		9	Massive intermediate volcanics
800'	"	M	8	Sheared gabbro, talc schist
1200'	"	B	7	Shales, siltstone, slate
2600'	"		6	Siltstone-conglomerate and tuff
800'	DUNDAS	R	5	Massive intermediate volcanics
1600'	"	I	4	Siltstone with gabbro sill
4000'	LEWIS	A	3	Acid volcanics with slate bands
500'	DUNDAS	N	2	Brecciated greywacke and argillite
	OWEN	ORDOVICIAN	1	Conglomerate, sandstone

Much faulting is present in this area as evidenced by the brecciated and sheared rocks and the transverse trends apparent on the photo. It is impossible to gauge a true thickness for any of these units.

Unit 2 in the table above appears to consist of sheared greywacke and siltstone typical of the Dundas sediments. It is possible that this is conformable with the Owen Conglomerate to the east. A major fault which exists between these Dundas sediments and the Lewis Volcanics follows the Upper Mainwaring River.

The Lewis Volcanics (Unit 3) are about 4000 feet thick and consist of acid lavas with numerous horizons of slate, siltstone and shale.

Another fault exists between the Lewis Volcanics and Unit 4 to the west. Unit 4 is composed of siltstone and is intruded by a gabbro sill 450 feet wide. The siltstone and gabbro are typical of the Dundas Group in other areas.

Unit 5 is composed of massive intermediate volcanics which include keratophyre (E.B. Corbett 1969). The rocks of this assemblage are similar both macroscopically and in thin section to the Noddy Creek Volcanics and are included in the Dundas Group as a correlative of the Dundas Group.

Unit 6 is composed of siltstone, conglomerates and tuffs as well as chlorite schist. It is identical to unit 10 which is considered the youngest unit of the Mainwaring Group. Two possibilities exist - either unit 6 and 10 are the same sequence or they represent two separate cycles of identical sedimentation with minor volcanic activity. The second possibility seems the most likely since the photo patterns do not suggest a fault of sufficient magnitude to cause a repetition of the same sequence.

A fault is thought to exist between units 6 and 7. Unit 7 is composed of siltstone, shale and slate and correlates with the basal phyllite of the Mainwaring

Group south of Sassafras Creek. The sequence is thought to be continuous to Sassafras Creek but cuts out just north of the 729,000 y N line at Cypress Creek. Its southward extension is based on the Mainwaring River section and aero e.m. anomalies along the western contact of unit 7.

Unit 8 is composed of highly sheared rocks which include talc schist, pyroxene schist and gabbro.

Unit 9 is composed mainly of massive intermediate lavas with minor basalt. A common rock type is volcanic breccia or agglomerate. This rock is considered entirely volcanic although a thin section (E.B. Corbett 1969) failed to reveal whether the matrix is igneous or sedimentary. The breccia is hard and thought to be the result of violent volcanic activity so common to andesitic volcanism. Agglomerate also occurs at Green Point and in the Noddy Creek Volcanics. These three agglomerates differ in that the one at Green Point is highly sheared and contains chlorite and epidote, the one at Cypress Creek is not sheared but does contain chlorite and epidote and the one at Noddy Creek is neither sheared nor does it contain chlorite or epidote. It therefore seems likely that all of these volcanics belong to the same group with a decrease in chemical alteration and dynamic metamorphism northwards.

Unit 10 has already been described and it is against unit 11 to the west.

Unit 11 is a typical turbidite sequence of and argillite and is thought to correlate with unit . except that here it is not sheared.

It is considered that all rocks, both volcanic and sedimentary, belong to one group - the Dundas Group. Originally the name the Mainwaring Group was used to describe rocks along the coast between Sassafras Creek and Abo Creek. However the later work suggests that the rocks along the coast have similarities with rocks in the Noddy Creek area, the only difference being the lack of alteration in the north. Due to much faulting in all areas (Hibbs Belt, Double Cove Belt, Mainwaring Belt and coastal sections) no true sequence has been worked out for the Dundas Group and this matter will only be elucidated with more field work and thin section study. Quite apart from the faulting, mapping has shown that many horizons, especially in the volcanics, are discontinuous and lens-shaped as a rule, making correlation difficult. However it is considered that the rocks generally decrease in age to the west in the Cypress Creek Area and the names Dundas and Mainwaring have both been retained in this report toaid understanding. Hence rocks in the Cypress Creek area similar to rocks between Abo Creek and Sassafras Creek on the west coast have been assigned to the Mainwaring Group and all sediments except the basal slate have been assigned to the Dundas Group. Unit 5 is also called Dundas with reservation since it correlates with the Noddy Creek Volcanics.

GEOCHEMISTRY:

Soil Sampling

A total of 66,900 feet of track was sampled at 100 foot intervals. Two samples were taken where possible, one of the 'A' horizon and the other of the 'B' horizon.

This sampling consisted of five lines (1-5) across strike and one along strike (See fig. 3):

		Footage		Line
1.	729,000 y N line	29,200'	sampled	Middle
2.	727,500 y N line	12,000	sampled	South
3.	(729,800 y N line	8,400	sampled)	North
	(729,500 y N line	7,300	sampled)	

The 729,800 y N line is essentially an extension of the 729,500 y N line. The Middle Line crosses the entire sequence from the Osmund Syncline to the Dundas turbidites.

Two other lines were sampled across strike:

728,500 y N line	1,300'	sampled
728,000 y N line	3,500'	sampled

One line of soil sampling was done along strike:

349,800 y E line	5,200'	sampled

Detailed Sampling: (See figs. 4c and 5c)

A costean was cut on the 729,000 y N line between 26,000'W and 26,100'W to investigate high copper values. The costean was 100 feet long and cut to a maximum depth of six feet. It was sampled at 10 foot intervals over

three horizons - the 'A' horizon, weathered rock at about 2 feet depth and weathered rock at about 6 feet depth.

Detailed sampling at 25 foot intervals was done between 3800' W and 5500' W on the 729,000 y N line. Samples of the 'B' horizon only were taken. The purpose of the detailed sampling was to better define three copper anomalies in the Lewis Volcanics detected during the 100 foot interval sampling.

Method of Sampling and Analysis:

A hand auger was used to collect samples of the 'A' and 'B' horizons. The 'A' horizon sample was generally taken at about 6 inches depth and the 'B' at 12 inches, although sometimes the latter was taken from as deep as three feet.

The soil samples were of two types: peat which covers the Owen Conglomerate and Lewis Volcanics, and a clay loam which covers the argillaceous sediments and intermediate volcanics.

All soil samples were dried and sieved to -80 mesh. The -80 mesh fraction was sent to Geochemical and Mineralogical Laboratories Pty. Ltd. for analysis. Samples were analysed by atomic absorption following a perchloric acid leach.

Results of Sampling (See figs. 4b, c d and 5b, c,d)

All samples taken in the Cypress Creek area were

analysed for copper and nickel. Most samples were analysed for silver and many were assayed for lead and zinc.

Initially the samples were assayed for all five metals mentioned above, but on receipt of the first two batches which covered the entire width of the Cambrian rocks, it was seen that all lead and zinc values were low and erratic at background level. Hence analysis for these two metals was discontinued.

Both copper and nickel are high in places and high copper is reflected by an increase in silver values in all cases.

Samples were taken over three rock types and these must be treated separately since the background for each type is different. The rock types are:

1. Acid Volcanics
2. Sediments
3. Intermediate Volcanics.

1. ACID VOLCANICS:

Evaluation

The eastern end of the 729,000 y N line was the only line that crossed over acid volcanics. The background values over this rock type are very low: copper about 3 ppm, nickel 8 ppm, lead 15 ppm and zinc 20 ppm. No lead or zinc values are anomalous in this area.

Three anomalous zones are present for copper, with support from nickel. The 'B' horizon copper values in the three zones are 370, 215 ppm; 230, 215, 90 ppm; and 173 ppm respectively. These three anomalies occur between 4100 feet east and 5300 feet east on the 729,000 y N line and are coincident with magnetic highs in an otherwise magnetically flat area.

Consequently the copper anomalies were sampled at 25 foot spacing and the results are tabulated below:

	Location	Cu ppm	Approx width
Anomaly 1	4200' - 4225'	118, 370	25'
Anomaly 2	4525' - 4725'	252, 155, 133, 260, 178, 205, 215, 220, 205.	200'
Anomaly 3	5225'	220	25'

Anomalies 1 and 3 are very narrow but anomaly 2 is 200 feet wide. An S.P. survey was run across each geochemical anomaly but no corresponding S.P. anomalies were recorded. This was unexpected since the source of the copper is well located and geochemical and magnetic results suggest copper enrichment associated with magnetite veins.

A costean was cut at anomaly 1 but no mineralization was observed in the rock, which was unidentifiable due to its weathered nature. The rock was highly ferruginous.

Rock samples from each of the three anomalies were sent for analysis and the results are tabulated below:

Location on 729,000 y N line	Value in ppm Cu	Ni
4100'E	40	60
4100'E	50	120
4100'E	300	120
4800'E	300	150
4800'E	300	150
5200'E	150	120
5250'E	200	150
5300'E	60	8

The results above are low and do not indicate copper mineralization.

The field relations of each anomaly were hard to distinguish due to the highly weathered nature of the rock. However, it was decided that anomalies 2 and 3 lie at the contact of slate horizons with acid volcanics.

Conclusions

The magnetic and soil sampling results indicate three classic anomalies in the acid volcanics. (It is unlikely that the anomalies are located in the slate horizons since these do not contain sufficient copper.) The values are so high above background that some source of copper must occur at each anomaly. Much iron staining is present at each site, so there may be a copper-magnetite body below the surface.

The null-results from the S.P. surveys do not indicate the presence of major orebodies, although some doubt exists as to whether the instruments were operating properly, since the readings were practically all zero. Trouble was experienced with the S.P. meter during the season.

Recommendations

A ground electromagnetic survey should be carried out over each anomaly to prove the presence or absence of a conductor at depth. If one does exist work should be done to test each anomaly along strike by soil sampling, magnetics and e.m.

Drilling would then follow if results are encouraging.

2. SEDIMENTS:

The metal values of soil samples taken over all sediments were low and were always coincident with the backgroumd values of the underlying rocks, showing that lateral migration of these metals (copper, lead, zinc, silver and nickel) has been negligible.

The soil values over a gabbro dyke cutting Dundas sediments east of Pad 2 were of a much lower order for copper and nickel than the volcanic rocks in the area, suggesting that the gabbro had a different source. The values over the gabbro in the 'B' horizon averaged about 35 ppm copper and nickel whereas the values in the volcanics were of the order of 100 ppm copper and nickel.

3. INTERMEDIATE VOLCANICS:

The majority of samples were taken from soils overlying this rock type. Copper, nickel and silver values were considerably higher than in soils overlying the sediments or acid volcanics.

Two distinct soil types exist over the intermediate volcanics. The first consists solely of root matter which covers the hard massive volcanics and volcanic breccias. A 'B' horizon sample could rarely be taken over this rock type as the soil cover was often only an inch thick. The second soil type consists of an 'A' horizon composed of root matter and a well developed 'B' horizon of clay which rests on highly weathered tuffs, siltstone-conglomerates and schists.

A statistical analysis assuming a log normal distribution for the elements has been carried out on values from A and B horizon soil samples. Anomalies have been considered as these samples having values greater than the mean plus one standard deviation.

Soil Hor.	Metal	Mean	S.D.Log_{10}	Anomalous Values mean + 1SD
A	Cu	27	0.42	71
	Ni	20	0.87	151
B	Cu	58	0.54	205
	Ni	48	0.79	298

(a) Copper

Values are plotted on figs. 4b, c and 5b, c and it can be seen that the highest, most consistent, anomalous copper values occur on the 729,000 y N line between the 25,500 feet west peg and the 26,900 feet west peg. In many cases both the 'A' and 'B' horizons are anomalous. Weathered pyroclastics outcrop at this locality, so a costean was cut between the 26,000 feet west and the 26,100 feet west pegs in the hope of exposing fresh rock. The costean was cut to about six feet depth but no fresh outcrop was revealed.

The costean was sampled at ten foot intervals over three horizons - 'B' soil horizon, weathered rock between 1 and 2 feet depth and weathered rock at about 6 feet depth. The results are plotted on fig. 4c and show that copper values increase with depth. A maximum of 1300 ppm copper was recorded compared with a surface value of 144 ppm copper.

Other areas of intermediate volcanics contain copper anomalies but none are as continuous across strike as the one described above.

Except at 729,000 yds N/15,500'W the geochemical copper anomalies do not coincide with the occurrences of native copper which are in massive volcanics with a poorly developed soil (see later).

Mapping has shown that, except in rare cases, the rock horizons are lens shaped. It is therefore thought

that the copper anomalies are restricted to certain (lens-shaped) lithologies, which, on present indications appear to be weathered tuff. The fact that no copper anomalies are continuous between any of the bulldozed tracks does not preclude the occurrence of a large orebody.

Recommendations

It is recommended that holes be drilled between 25,500'W and 26,900'W on the 729,000 y N line to see if copper values continue to increase with depth.

No further work on the other copper anomalies in the area is recommended unless it is proved that economic copper values are present in this locality.

(b) Nickel

As can be seen on figs. 4c and 5c, anomalous nickel values appear to be continuous between the bulldozed lines. The best example is in unit 8 where the anomalous values are continuous from the 729,800 y N line southwards to the 727,500 y N line.

All nickel anomalies occur over a highly sheared rock which appears to have originally been a gabbro. This rock is thought to be the source of the nickel anomalies since four samples of it contained 1000 ppm, 1000 ppm, 1500 ppm and 1500 ppm nickel respectively.

(c) Lead, zinc and silver (See figs. 4d and 5d)

No anomalies are present for either lead, zinc or silver but it was noted that the higher copper values were associated with a slight increase in silver values.

GEOPHYSICS

S.P. traverses and magnetic traverses were run over various tracks in the Cypress Creek area and tracks covered are shown on fig. 3.

1. Ground Magnetic Survey

The magnetic survey delineated areas of intermediate volcanics and areas of acid volcanics.

The acid volcanics had a low magnetic background of about 200 gammas. Three anomalous peaks occurred in the acid volcanics and are described in the geochemistry section under "acid volcanics". The intermediate volcanics ranged in value from 500 to 800 gammas and contained many peaks, probably due to narrow horizons of basalt, andesite, breccia and tuff. The basalt horizons gave the largest peaks, the most obvious being a basalt at the eastern edge of unit 9. The Dundas sediments at the coast (unit 11) have a background value of about 350 gammas and the basal Mainwaring (unit 7) has a background value of about 500 gammas.

The gabbro intruded into the Dundas Sediments (unit 4) gave a weak magnetic high which was much lower than that over the basic rocks in the Mainwaring Group.

The magnetic survey was also useful in locating breccia zones and faults, as these gave negative readings.

Profiles of the magnetic survey are shown on figs. 4e and 5e.

2. S.P. Survey

S.P. anomalies were located on the 729,000 y N line only. The major anomaly was at the contact of units 7 and 8.

This anomaly was found to be caused by a sheared zone with graphite and pyrite, very similar to the zone drilled at Noddy Creek. A sample of the pyrite-graphite-shale contained 150 ppm copper, 200 ppm nickel, 400 ppm zinc and over 10,000 ppm manganese. Hence no mineralization other than pyrite is thought to be associated with this zone.

All S.P. anomalies recorded were found to be caused by horizons of graphitic shale or slate containing minor pyrite.

It is thought possible that the S.P. meter was not operating properly throughout the season, because the majority of readings taken were zero and fluctuations in voltage should occur even if no conductor exists in the ground. Another feature was that no S.P. response whatsoever was recorded over the three copper-magnetic anomalies in the Lewis Volcanics. (See earlier).

MINERALIZATION: (See figs. 4a, 5a and 6)

1. Acid Volcanics

No mineralization was seen in the Lewis Volcanics. The only indications of mineralization were ferruginous horizons at the contact of weathered acid volcanics and shales. Ferruginous horizons occurred at the site of the copper and magnetic anomalies.

2. Sediments

Pyrite was common in the black shales and slates of units 2 and 7. Below are shown the results of analyses of some pyrite-bearing specimens:

Rock Type	Unit	Cu	Ni	As	Pb(ppm)
Black argillite with pyrite	2	80	150	0	60
Grey slate with pyrite	7	100	100	0	80
Black shale with pyrite	7	100	80	0	80
Brecciated argillite with pyrite	2	30	20	70	60
" " "	2	30	50	0	15

The values do not indicate the presence of any sulphides other than pyrite.

3. Gabbro:

The gabbro sill intruded into unit 4 contained large blebs of sulphide up to half an inch across. In the hand specimen the sulphide appeared to be a mixture of pyrite and milky quartz. Specimens of this rock were sent for analysis and results are shown below:-

	Ni	Cu	As	Pb	Zn	Cr	Co(ppm)
1. Gabbro	50	100	0	5	150	50	150
2. Gabbro	50	60	0	10	400	70	100

Hence the only sulphide is pyrite.

4. Intermediate Volcanics:

Numerous signs of mineralization were seen in the Intermediate Volcanics. Minerals identified were native copper, chalcopyrite and pyrite.

(a) Native Copper and Chalcopyrite:

Native copper occurred in units 8& 9 as minute flakes situated along planes in the rock. It was seen in two zones in unit 9 and in a highly sheared and altered gabbro in unit 8. In unit 9 the native copper was in a dense hard volcanic breccia in the western zone. Other minor occurrences of native copper were seen in the hard massive volcanics but these appeared to have no along-strike extension.

The native copper occurred about an inch below the surface of the rock as en echelon flakes. Very minor disseminated chalcopyrite and pyrite occurred in these rocks. It is thought that the native copper is produced by the oxidation of chalcopyrite to copper sulphate which is then leached to the surface. The ground water is acid and contains peat thereby reducing the copper sulphate to native copper just beneath the surface of the rock. There is a possibility that native copper, or some concentration of copper occurs at the base of weathering in the weathered tuffs, agglomerates and conglomerate-siltstones.

The highest value for copper in the rocks containing native copper or chalcopyrite is 800 ppm and the average is between 100 and 200 ppm copper. Hence there is nothing approaching economic standard in the massive volcanics.

The highest copper values in the soil samples were recorded over the pyroclastic sequence (unit 10) but no mineralization other than iron oxide was seen. However all rocks were deeply weathered. At the surface the weathered tuffs averaged between 100 and 200 ppm copper,

with one tuff sample containing 8,000 ppm copper and 2 ppm silver.

(b) Pyrite:

Pyrite was occasionally seen disseminated in the massive volcanics but in no instance was it in quantities greater than 1%. However a horizon of massive pyrite occurred in the intermediate volcanics at their contact with the Dundas argillite and greywacke to the west. This horizon was four inches wide at 2800'S/349,800 y E and two inches wide in South Cypress Creek and was thought to be continuous along the Dundas/Mainwaring contact. A sample of the massive pyrite was analysed and contained 400 ppm nickel, 300 ppm lead, 500 ppm zinc and 150 ppm copper.

SUMMARY OF RECOMMENDATIONS

1. Copper-Magnetic Anomalies in Lewis (Acid) Volcanics

Additional soil sampling should be done over the three copper-magnetic anomalies to see if they continue along strike. An e.m. survey should be done across these zones to see if a conductor exists at depth.

2. Copper Anomaly in Mainwaring (Intermediate) Volcanics

Drilling should be done at the copper anomaly at 26,000 feet west on the 729,000 y N line in the inter-bedded siltstone-conglomerate, tuff and andesite horizons constituting unit 10. This unit is considered the most promising for copper mineralization since it would provide good access for mineralizing solutions and tuffs are conducive to replacement. The costean cut at this

location showed that values increased with depth and drilling is necessary to find out if economic values exist at greater depth. All tuffs and siltstone-conglomerates are highly weathered at the surface and it is considered that any mineralization present would be weathered out. The mineralization in this rock type is considered to be low grade and disseminated, probably as stringers throughout the sequence and hence any electrical prospecting method other than I.P. would be useless. The conditions would make I.P. a very expensive proposition.

2. COPPER CREEK AREA. (See fig.1)

Mainwaring group rocks outcropping along the coastline from Abo Creek southward to Sassafras Creek were closely examined for signs of mineralisation because of their similarity to those in the Cypress Creek area. However, the coastal sequence is much more altered both chemically and structurally. Chloritization and epidotization are ubiquitous and carbonatization is common. Tight isoclinal and chevron folds and well developed cleavage show that dynamic metamorphism has been strong. The dynamic metamorphism and chemical alteration diminish northwards along the coast: The strongest metamorphism is seen at Green Point just north of Sassafras Creek. At the Mainwaring River the metamorphism is still relatively strong, but is weaker at Cypress Creek and weakest at the Urquhart River. Tuffs and lavas about two miles up the Wanderer River, which are thought to belong to the Mainwaring Group, show no metamorphism at all.

Four areas along the coast where mineralization was discovered were investigated in detail.

A. Abo Creek - (bornite - quartz lens)
B. South of Copper Creek - (chalcopyrite veins)
C. North of Copper Creek
D. Copper Creek - (e.m. anomalies)

A. Abo Creek Bornite - Quartz Lens

Two en echelon quartz lenses outcropping at the mouth of Abo Creek were found to contain bornite. The

quartz lenses are pod shaped, being 15 feet wide and 90 and 30 feet long respectively. They occur in interbedded volcanics and sediments of the Mainwaring Group, about twenty feet away from the Mainwaring-Dundas contact.

The bornite occurs around the edges of the quartz pods and the best concentration occurs at the tail of the southern pod. Mineralization, although rich, is very patchy and would amount to less than a hundredweight. Small specimens containing appreciable percentages of copper were assayed but were not representative of any large volume of ore. A narrow aureole of the surrounding country rock (i.e. the Mainwaring Group) contains 0.18% and 0.30% copper in the two samples taken. This occurrence is of no further interest.

The important feature of this occurrence is that is suggests further concentrations of mineralization northwards at the Mainwaring Dundas contact which can be traced to the Urquhart River.

B. South of Copper Creek - Chalcopyrite veins

Thin stringers of chalcopyrite with an occasional bornite blab were found in calcite-quartz enrichments in the Mainwaring Volcanics about half a mile south of Copper Creek on the coast.

The chalcopyrite stringers are restricted to a zone six inches wide and about twenty feet long. Assays of this material were 0.76, 0.78 and 0.48% copper respectively. The occurrence is of no further interest.

C. North of Copper Creek

Minor copper mineralization in numerous small gossanous horizons occur in the Mainwaring Volcanics north of Copper Creek for about a quarter of a mile along the coast. These are of no further interest.

D. Copper Creek e.m. anomalies (See fig. 7)

Two airborne e.m. anomalies occur just south of Copper Creek, one about a hundred yards in from the coast and the second about a mile in from the coast. Soil sampling at 100 foot intervals was done over these anomalies simultaneously with an S.P. survey so that the anomalies could be accurately located.

The S.P. meter located one airborne e.m.zone on the line done nearest the beach. This anomaly is thought to occur at the contact of the Mainwaring Volcanics and basal sediments which is also the site of a large e.m. anomaly at Cypress Creek. The soil sampling revealed no major anomalies and this zone is considered to be of no further interest.

The second e.m. zone about a mile inland is at the contact of the Lewis and Mainwaring Groups. The airborne e.m. anomaly was not substantiated by ground S.P. and no geochemical soil anomalies were located. This area is of no further interest.

3. LEWIS RIVER AREA

A. PENDER'S COPPER PROSPECT

LOCATION:

Pender's Prospect is situated on the coast about half a mile south of the Lewis River (see fig. 8).

PREVIOUS WORK:

Pender's Prospect was originally discovered by prospectors, presumably around 1900. It consists of two NE striking zones of chlorite schist containing at least 50% pyrite and minor chalcopyrite. The larger of these two zones, which is between six and nine feet wide and about 170 feet long, has been completely mined out and the ore has been left at grass. About four tons of ore are present. The smaller zone, which is about three feet wide and twenty feet long, has been partly mined. A shaft and some cuts were made about two hundred feet north along strike and failed to intersect the sulphide zone. The presence of ore at grass indicates that it was of too low a grade to warrant removal. An assay of the ore was 0.16% copper, 2 pennyweights of gold/ton and 5 pennyweights of silver/ton (Nye 1926).

GEOLOGY:

Pender's Prospect occurs in a chlorite schist at the faulted contact of the Lewis Volcanics to the north and Cambrian quartz feldspar porphyry to the south. About a mile further south the quartz feldspar porphyry is faulted against Cambrian granite. The shearing prevalent in all of these rocks may have occurred simultaneously with the formation of the chlorite schist, which was probably originally shale.

1968-69 WORK:

Geological mapping was done in the general area of Pender's Prospect with the purpose of finding other similar chlorite schist zones. Several were located but none were mineralized.

Geochemical soil samples were taken north and south of the 355,000 y E line parallel to the coast across the Lewis Volcanics/quartz feldspar porphyry contact and southwards to the latter's contact with granite (see fig. 8). Most of these samples were peat and none of the results were anomalous. Samples were taken across the strike of the sulphide zone, east of the 710,000 y N line, about fifty feet inland and one anomalous copper value was obtained. This was expected since the mineralization of Pender's should give an anomaly if soil sampling is effective. An S.P. survey was run across this line also and no anomaly was detected. Two samples of the sulphide zone were taken and analysed. One contained 50 ppm copper and 0.2 ppm silver and the other assayed 10,000 ppm copper and 20 ppm silver.

CONCLUSIONS AND RECOMMENDATIONS:

It is considered that Pender's Prospect has been completely worked out and that the ore mined is of too low a grade to be economic. Other zones similar to Pender's Prospect found in the area contained no mineralization. The area is of no further interest.

B. LEWIS RIVER AEROMAGNETIC ANOMALY

LOCATION:

The aeromagnetic anomaly lies just north of the Lewis River and about two miles inland (see fig. 1).

GEOLOGY:

The rocks in the area are the Lewis Volcanics, which include rhyolites and dacites.

PREVIOUS WORK:

The Lewis River aeromagnetic anomaly was soil sampled early in the 1967-68 field season. Some doubt existed as to whether the soil sampling had actually been done over the anomaly, since the magnetometer used for ground location was faulty, and the results of soil sampling were very low with no anomalous values.

1968-69 WORK:

To check up on the location of the magnetic anomaly, a traverse using a Gelander magnetometer was run over the area and it was found that the previous soil sampling had been correctly located. This traverse, which was run across the peak of the aeromagnetic anomaly and westwards to the coast, located other magnetic anomalies of smaller magnitude and one was found to be caused by a magnetite lens about two feet wide and twenty feet long.

A sample of this was sent for analysis and contained 100 ppm copper, 4 ppm lead, 200 ppm zinc, zero ppm arsenic, 800 ppm manganese and 10 ppm nickel. These values show that the magnetite is of no economic interest as far as base metal mineralization is concerned.

CONCLUSIONS:

The aeromagnetic anomaly that was soil sampled during the 1967-68 season is thought to be due to a magnetite body, probably of larger size than the one discovered near the coast. The soil sampling indicates that no base metal mineralization is present at the site of the aeromagnetic anomaly and none occurs associated with the magnetite lens to the west.

RECOMMENDATIONS:

No further work is warrented in this area.

C. EAST OSMUND AREA

INTRODUCTION AND LOCATION:

The western contact of the Osmund Syncline, where it is unconformable against the Lewis Volcanics, was investigated. This area was though to have good prospects for mineralization since it is similar to Mt. Lyell in that the Owen Conglomerate abuts against acid volcanics.

The Osmund Syncline is composed of Owen Conglomerate with horizons of siltstone and sandstone. It is a north-plunging syncline about four miles wide at the Wanderer River and its nose is six miles further south, just south of Mt. Osmund.

GEOCHEMISTRY:

Three lines of soil sampling at 100 foot intervals were done across the Owen-Lewis contact. Each line was sampled for 1,000 feet on either side of the contact and lines were about one and a half miles apart (see fig. 9).

Where possible, samples of both the A and B horizons were taken. All A horizon samples were peat. B horizon samples could be taken at only 12 of the 33 sample locations due to the thick peat cover.

RESULTS AND CONCLUSIONS:

Metal values are very low and show this contact to be devoid of mineralization. The nickel values are all zero except one which is 2 ppm. All silver values are zero and the average copper value is 1 ppm with a maximum of 3 ppm.

These values are exceptionally low, and had only the A horizon been sampled, much doubt would have existed as to the validity of this method of sampling. However the fact that all B horizon samples are of the same order as the A horizon samples suggests that low values were obtained due to a total absence of mineralization. Acid volcanics and arenaceous sediments are generally very low in copper, nickel and silver.

RECOMMENDATIONS:

The area is of no further interest.

D. SUMMARY OF PROSPECTS IN THE LEWIS VOLCANICS

The area containing acid volcanics belonging to the Lewis Volcanics was stream sediment sampled in the 1965-66 and the 1966-67 field seasons. No anomalies were detected during this work.

However, after consideration it was thought that this area may be one not suitable for prospecting by stream sampling.

Three areas in the Lewis Volcanics were investigated during the current field season as previously described:

1. Mt. Osmund Owen/Lewis contact.
2. Lewis River Magnetic Anomaly.
3. Pender's Copper Prospect.

Soil sampling was done at Mt. Osmund and Pender's Copper Prospect, and had already been done during the 1967-68 season at the Lewis River.

Of all this sampling, the only value recorded above background was at Pender's Prospect where a line of soil sampling was done across the top of the prospect. Hence all soil sampling has given negative results and has thus backed up the conclusion drawn from the stream sediment results - that no mineralization exists in this rock type.

The value of sampling peat is considered doubtful as it may enrich or mask bedrock mineralization. At Mt. Osmund both peat samples and B horizon samples were taken at twelve sample sites. In all cases the B horizon

value was of the same order as the peat value.

It is therefore considered that no mineralization of economic significance exists in the Lewis Group. Many small shows like Pender's Copper Prospect exist but these are not detected by sampling due to their smallness. As can be seen at Pender's Copper Prospect the E-W line of sampling across the prospect gave higher values than the N-S line only one hundred yards inland. It is considered that the stream sediment sampling is dense enough to pick up economic mineralization in the Lewis Group. The area covered by the Lewis Group is therefore of no further interest and should be relinquished.

4. DOUBLE COVE BELT

4A. LUCAS CREEK COPPER ANOMALY

INTRODUCTION:

During the 1967-68 season in S.W. Tasmania a programme of stream sediment sampling was done over the Double Cove Belt. Results of this sampling revealed an area containing anomalous values of copper, with support from zinc and nickel in Lucas Creek, which flows into Macquarie Harbour about half a mile west of Double Cove.

GEOLOGY:

The Lucas Creek area is comprised of Cambrian rocks belonging to the Dundas Group. Siltstones, tuffs and fine grained andesites have been cut by gabbro. The sediments and tuffs are much weathered. The gabbro is a medium grained, green and white speckled rock containing asbestos in part. Mineralization was seen in the siltstone which contains syngenetic pyrite.

1968-69 WORK:

To define more clearly the anomalous copper distribution, a programme of stream sediment, bank and ridge sampling was carried out at one hundred foot spacing. At each location a stream sediment sample and a sample of each of the right and left banks were taken. Samples of the A and B soil horizons were taken along two spurs between tributaries of Lucas Creek which had anomalous copper values.

EVALUATION:

Below are shown the range of values and average values of copper and nickel in the stream sediment samples taken in the anomalous part of Lucas Creek in the 1967-68 season and the detailed sampling of Lucas Creek in the 1968-69 season:-

		1967-68			1968-69		
		Max.	Min.	Av.	Max.	Min.	Av.
ppm	Cu	110	58	75	270	50	108
ppm	Ni	154	90	120	255	70	150

The 1968-69 detailed sampling gives a larger range of values with a higher average and supports values from the previous year.

The bank samples are slightly higher in copper than the stream samples; c.f. 124 ppm with 108 ppm. The peak copper value in Lucas Creek is 348 ppm, much lower than the peak recorded in Cypress Creek of 1875 ppm copper. Compared with an average of 124 ppm, a value of 348 ppm is not anomalous.

The soil samples are low for all metals (see fig. 10) and do not suggest that the creeks are fed by mineralization from the spurs. It seems more likely that the copper is enriched in the streams and banks.

Nickel values throughout are not high and can easily be explained by the presence of gabbro which contains 1000 ppm nickel (see table below).

Lead and zinc values are low. One exception is the three consecutive high lead samples taken from the left bank of the western tributary of Lucas Creek. These values are 105, 109 and 178 ppm respectively. This area was closely investigated but no cause for the anomaly could be found. The rock types in the area are siltstone and tuff. Two samples of the rock were taken (see rocks 1 and 3 on the table below) and assayed 8 and 15 ppm lead respectively. No mineralization is present and the values show that the rocks do not carry sufficient lead to cause the anomaly.

Below is a table of analyses of rocks taken in the Lucas Creek area (see fig. 10 for locations).

	Ni	Cu	Zn	As	Mn	Cr	Co	Pb (ppm)
1. Grey laminated argillite	100	120	150	x	1500	150	40	8
2. Andesite	200	120	150	x	4000	200	60	10
3. Siltstone - sandstone	200	100	200	x	3000	400	150	15
4. Argillite with pyrite	200	120	100	x	3000	1000	60	15
5. Gabbro with asbestos	1000	100	120	x	3000	2500	200	1
6. Andesite	100	150	150	x	3000	300	80	2

x indicates below level of detection.

CONCLUSIONS:

The metal content of the rock types present is considered high enough to cause the geochemical values recorded in the Lucas Creek area without any mineralization being present. It is thought that this area of the Double Cove Belt is more anomalous than the rest since it contains rocks with a higher background of copper, zinc and nickel.

The background copper in the rocks is 120 ppm and this is high enough to cause the copper values recorded in the stream sediment, bank and soil samples.

The three high lead values are the only ones that cannot be explained by the background values of the rocks, but since no lead mineralization was found it is considered of no further interest.

RECOMMENDATIONS:

No further work is warranted in this area since stream sediment, soil and bank sample values are not high enough to indicate mineralization.

4B. PELIAS COVE COPPER PROSPECT

INTRODUCTION:

Lyell E.Z. Explorations (L.E.E.) discovered a sulphide zone containing copper on the beach of Pelias Cove on the south shore of Macquarie Harbour about half a mile east of Double Cove (see fig. 1).

WORK DONE BY L.E.E: (See fig. 11)

L.E.E. did considerable work on this prospect using geological, geophysical and geochemical methods. They also drilled five diamond holes. Their work is summarized below:

Geochemical: Two lines of soil samples were taken, presumably across strike, at distances of 150 and 200 feet inland from Pelias Cove. The spacing on their 150'S line was ten feet over a length of 200 feet and on their 200'S line was twenty five feet over a length of 225 feet. Values obtained from this work were most encouraging with values of up to 5000 ppm copper.

Geophysical: Two e.m. traverses were run at the 200'S line and the 400'S line, each over a length of 600 feet. No e.m. anomaly was recorded.

Geological: Mapping showed that the rock type is weathered sediments (greywacke) and that the general strike is 10°E.

Drilling: Five diamond holes were drilled at Pelias Cove. Holes L2 and L3 were drilled south of the Pelias sulphide zone on an easterly bearing at an angle of 45°. It was intended that these bores would intersect a landward extension of the copper zone. They did not. Bores L4, 5 and 6 were vertical and were drilled into the gossan on the beach.

Bore	Core rec'y	Depth	Rock type	Remarks
L2	4%	117'	Shale, tuff and gwke	114'-117' assayed 1.05% Pb. This possibly represents mineralized zone coincident with gossan on beach.
L3	7%	122'		
L4	65%	7'6"	Haematite & Pyrite	0-4'7" = 2.59% Cu. This represents entire core recovered.
L5	3%	46'		Passed through haematite/ sulphide at 6' into weath. seds.
L5A	85%			
L6	1%	44'		

DISCUSSION OF L.E.E. WORK:

The results of the drilling are most inconclusive and the only two concrete facts are that 4'7" of the haematite sulphide zone assays 2.59% Cu and that the zone

was passed through at 6 feet. The fact that the zone was lost after 6 feet does not mean that this is the bottom of the zone for it is possible that the drill passed through the footwall at 6 feet.

Bores L2 and L3 do not prove that the sulphide zone does not continue inland. Based on the geochemical results it would seem that the drill holes were sunk too far west to penetrate the haematite sulphide zone. The geochemical samples were taken over too small a length and all work was done on the assumption that the sulphide zone would follow the strike of the surrounding sediments.

1968-69 WORK:

Two lines of soil sampling were done at Pelias Cove at 787,100 y N and 787,000 y N just South of the beach. (See fig. 12). Samples of the A and B horizon were taken at 100 foot intervals, over a width of 1400' and 1350' respectively. Each sample was analysed for nickel, copper, zinc, molybdenum and lead.

RESULTS:

All molybdenum values were zero. Values for the other metals were much lower than those of L.E.E., but were still anomalous. The best anomaly was that of copper, supported by the other metals. The maximum copper value is 118 ppm compared with L.E.E's maximum value of 5000 ppm copper. However L.E.E's analysis method is unknown and the fact remains that the sites of our anomalous values coincide with those of L.E.E.

As can be seen in fig. 12, the copper anomaly occurs at 200'E on the 787,100 y N line (Cu 118 ppm, Ni 118 ppm, Zn 80 ppm) and at 400'E on the 787,000 y N line (Cu 103, Ni 30, Zn 48). A line drawn through these two locations and projected to the haematite sulphide zone on the beach strikes in a north westerly direction i.e. across the strike of the sediments. If this is the case then it appears that the mineralized zone occurs along a fault striking N.W. and therefore L.E.E's drilling and geochemical sampling were done too far west. It also appears, since L.E.E's drilling missed this zone at depth in bores L2 and L3 and as L5 passed through the haematite/ sulphide at 6 feet, that this N.W. fault has an easterly dip.

Samples of the haematite/sulphide zone were taken and the results are shown below:

	Cu	Ag	Mn	Cr	Ni	As(ppm).
Limonite-chalcopyrite pyrite malachite	5000	4	300	30	30	200
Massive pyrite with minor haematite	1000	4	1000	20	20	200
Massive pyrite with minor haematite	10,000	40	500	30	20	200
Qtz. haematite & limonite	100	0.1	2500	600	20	50

These values indicate that the haematite/sulphide zone may be associated with copper mineralization. There is little evidence of surface enrichment and scavenging often encountered with laterites.

CONCLUSIONS:

A copper-bearing haematite/sulphide zone outcrops on the beach at Pelias Cove and drilling and soil sampling indicate that it continues inland along a N.W. trending east-dipping fault.

RECOMMENDATIONS:

Soil sampling should be done to the east of Pelias Cove from the coast inland on a southwesterly bearing at 100 foot intervals. This sampling should be done to delineate the extent of the fault and its mineralization inland. Follow-up work would depend on the results of this sampling and could include drilling if this sulphide zone is sufficiently extensive.

4C. AEROMAGNETIC ANOMALY 128

INTRODUCTION:

Aeromagnetic anomaly 128 is situated in the Double Cove Belt about ten miles NW of Birch Inlet.

A system of tracks was cleared over this anomaly during the 1967-68 season and it was found that the anomaly was due to a gabbro-serpentinite sill at the contact of the Cambrian and Precambrian sediments. This sill is about 2000 feet long and attains a maximum width of about 150 feet. It is not known whether it is in fact a single differentiated sill or two separate sills.

Work during the 1967-68 season revealed no mineralization associated with the sill, other than minor pyrite in gabbro. The area was considered to be of no further interest.

Perusal during 1969 of the assay results of samples taken in 1968 revealed the following interesting values:-

	Ni	Cu	Co	Zn(ppm)
Serpentinite	1000-10000	10- 100	100-1000	100-1000
Gabbro	1000-10000	100-1000	100-1000	10- 100

Hence the area was reinvestigated.

1968-69 WORK:

A line of soil sampling was done along the strike of the gabbro-serpentinite sill and continued over the two ends of the sill into sediments. The 'A' and 'B' horizons were sampled at 100 foot intervals over a distance of 2000 feet and samples were analysed for nickel, copper, cobalt, zinc and silver. Samples of the gabbro and serpentinite were taken and sent for analysis.

RESULTS:

As can be seen from fig. 13, soil sample values reflect the rock types. The soil values in each case are of background order and indicate no mineralization.

The results of the rock type analyses are:-

		Cr	Ni	Cu	Co	Zn	Ag(ppm)
Peridotite	1	1500	250	30	50	200	x
	2	1500	250	20	60	200	.1
	3	1500	300	20	120	200	.1
	4	1500	400	10	120	150	.1
	5	1500	600	100	150	200	.1
	Av.	1500	360	35	100	200	.1

		Cr	Ni	Cu	Co	Zn	Ag(ppm)
Gabbro	1	600	150	80	100	100	.2
	2	300	100	80	30	100	.2
	3	500	200	60	40	80	.2
	4	250	80	60	20	100	.2
	Av.	400	130	70	50	100	.2
Gabbro with pyrite	1	1000	250	60	60	100	.2
	2	150	100	80	10	250	.2
	Av.	600	175	70	35	175	.2

The values of metals in the above samples are average for the rock types and indicate no mineralization. These results adequately explain the variations in values of the soil samples.

CONCLUSIONS:

This area is of no further interest.

5. THE NODDY CREEK PROSPECTS.

INTRODUCTION

The Noddy Creek Area is about six miles north-north-west of Birch Camp and is situated in the Cambrian Hibbs Belt.

Much work was done at Noddy Creek during the 1966-67 and 1967-68 field seasons.

No work was done during the 1968-69 season. However two aspects of the mineralization at Noddy Creek require elucidation - asbestos and nickel.

ASBESTOS:

Previous testing has shown that asbestos occurs in two zones in the eastern ultrabasic belt. The western zone is 7000 feet long and an average of 36 feet wide, while the eastern zone is at least 3800 feet long and is 71 feet wide at the one locality measured. The reserves of asbestos at Noddy Creek were calculated assuming that the asbestos continued to a depth of 300 feet and that the average width in the eastern zone was 35 feet. (The 71 foot width was considered to be a maximum.) From this data the following reserves were estimated:-

Tons of Asbestos	196,000 tons
Average Grade	2.3%
Tons of ore	8,520,000 tons

(see 1967-68 Report)

A consultant should inspect the area since only a person familiar with economic asbestos deposits could judge the potential of the Noddy Creek asbestos.

NICKEL:

As in all ultrabasic belts the Noddy Creek serpentinite carries some nickel.

The following occurrences of nickel have been found at Noddy Creek (see fig. 14).

(a) A zone of disseminated pentlandite occurs on the 2000 feet N line at Noddy Creek. The zone is about forty feet wide and the pentlandite occurs as small blebs up to a quarter-inch diameter in slightly sheared, olive green serpentinite. The pentlandite is evenly disseminated throughout the rock, with some concentrations along shear planes. Three samples of this rock were assayed and contained 1200 ppm, 1000 ppm and 400 ppm nickel respectively.

(b) Specks of pentlandite were found in shear planes in serpentinite in an asbestos costean on the 1000'N line.

N.B. Pentlandite identified by X.R.F. Tas. Uni. by D.I. Groves

(c) Smears of pentlandite were found in shear planes in DDH 1 which was drilled 300 feet south of the asbestos costean mentioned above.

All three of these pentlandite occurrences are aligned along strike near the base of the ultrabasic belt, hence pentlandite is known to occur along a strike length of thirteen hundred feet.

No e.m. anomalies occur across the pentlandite zone.

From the present information the pentlandite zone is at a maximum thickness at 2000'N and this has thinned to smears along shear planes at 1000'N. The northern extension of the zone is known to cut out before it reaches the 3000'N line. E.m. traverses have been run on the 1000'N, 2000'N and 3000'N lines with no anomalies in the serpentinite.

RECOMMENDATIONS:

It is recommended that e.m. traverses be run at 100 foot intervals between the 1000'N and 3000'N lines across strike. If any massive sulphide body connected with the pentlandite zone exists, an e.m. anomaly will be recorded. Soil sampling would be of little value because of poor dispersion, poor soil and high background values in the rocks. A magnetic survey would also be of no use since any pyrrhotite associated with the pentlandite would be masked by magnetite.

6. RADIOMETRIC ANOMALIES

The airborne scintillometer survey done from the helicopter during the 1967-68 field season revealed three anomalies worthy of follow up work:

1. Anomaly 201 South Mt. Darwin Peak
2. Anomalies 202 & 203 Mt. Strahan
3. Anomaly 401 between Mt. Discovery and Mt. Lewis.

1. ANOMALY 201

This anomaly occurs at the contact of the Owen Conglomerate and the Jukes Breccia. Due to helicopter trouble the exact location of the anomaly was not reached. However a landing was made about one hundred yards south of the anomaly.

The rock type was sheared granite containing haematite veins up to six inches wide. Samples were taken of the sheared granite and the haematite and contained the following metal values:-

	Cu	Ni	Zn	As (ppm)
Sheared granite	5	10	100	0
Haematite	30	20	80	0

The low values in the haematite preclude the possibility of its being a gossan, since arsenic is zero and other values are very low. A background count was recorded on the scintillometer, precluding the presence of uranium.

ANOMALIES 202 and 203:

These anomalies were not investigated due to unfavourable weather and helicopter trouble.

ANOMALY 401:

Anomaly 401 occurs on a fault in the Owen Conglomerate. It lies on the D'Aguillar Ranges, midway between Mt. Discovery and Mt. Lewis and about half a mile to the east of Cambrian volcanics.

No landing was made at the site of this anomaly due to dense rain forest, but several circles were made over the anomaly and no count above background was recorded on the scintillometer.

This anomaly is situated in a steep-sided valley and is thought to be due to the effect of topography on the scintillometer. It is therefore considered to be of no further interest.

RECOMMENDATIONS:

The investigation of the radiometric anomalies was inconclusive, since none were inspected on the ground. However the work that was carried out did not give encouraging results and since the anomalies are all less than twice the backgroumd count, no further radiometric work is warranted.

SUMMARY OF RECOMMENDATIONS FOR FURTHER WORK ON THE COASTAL PORTION OF E.L.13/65

A. CYPRESS CREEK AREA:

1. Drilling should be carried out over the copper anomaly in the pyroclastic sequence of the Mainwaring Group centred on the 26,000'W peg of the 729,000 yds N line.

2. Additional soil sampling and an e.m. survey should be carried out over three magnetic-copper anomalies in the Lewis Volcanics between the 4100'W and the 5500'W pegs of the 729,000 yds N line.

B. DOUBLE COVE AREA:

1. Additional soil sampling and an e.m. survey should be carried out over the postulated inland continuation of the Pelias Cove Copper Prospect.

C. NODDY CREEK AREA:

1. An e.m. survey should be carried out over the pentlandite zone at Noddy Creek, in the hope that a massive concentration of pentlandite exists.

2. An inspection of the Noddy Creek asbestos prospect should be made by an asbestos consultant to assess the potential of this prospect.

Recommended work programme late revised - see Correspondence 9/10/69

633061

Fig. 1.

340000YE

380000YE

800000YN

760000YN

720000YN

CAPE SORELL

MACQUARIE HARBOUR

KING RIVER

MT. JUKES
O 3800'

E.L. 13/65

MT. SORELL
O 3752

⊙Radiometric Anomaly 201

FRANKLIN RIVER

CLARKE RIVER

LUCAS CK. AREA
see fig. 10

DOUBLE COVE

PELIAS COVE COPPER PROSPECT
see figs. 11 & 12

AEROMAGNETIC ANOMALY 128
see fig. 13

NEILSON RIVER

NODDY CREEK AREA
see fig. 14

MODDER RIVER

RIVER

BIRCH CAMP

BOMBARDIER LANDING

E.L. 13/65

GORDON RIVER

⊙Radiometric Anomaly 401

POINT HIBBS

SPERO RIVER

WANDERER RIVER

MOORES VALLEY CAMP

URQUHART RIVER

AIRSTRIP

CYPRESS CK AREA
see figs. 3,4,5,6

MAINWARING RIVER

OWEN CONGLOMERATE / LEWIS RIVER VOLCANICS CONTACT
see fig. 9

Abo Ck.

COPPER CREEK

Abo Ck. Bornite lens.
Copper Ck. gossanous horizon.
Copper Ck. chalcopyrite vein.

COPPER CREEK E.M. ANOMALY
see fig. 7

LEWIS RIVER

LEWIS RIVER AEROMAGNETIC ANOMALY

PENDER'S PROSPECT.
see fig. 8

LOW ROCKY POINT

SCALE OF MILES
3 2 1 0 3 6

5 cm

Fig. No.....
To accompany.....
Dated.....

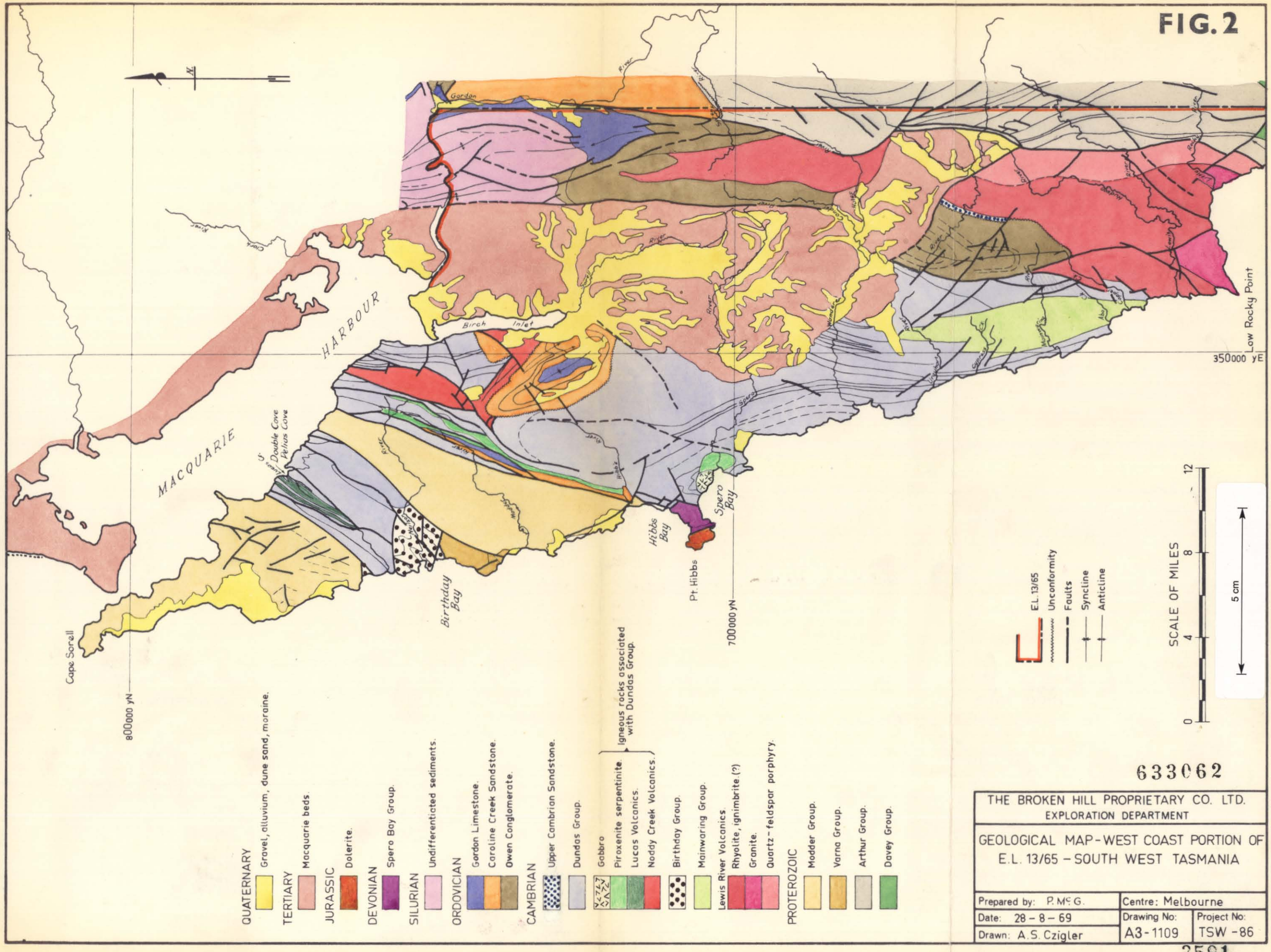
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L.13/65 S.W. TASMANIA
AREAS INVESTIGATED
DURING 1968 — 1969 SEASON

Drawn P.McG.	Date 10-6-69	Centre Melbourne.	
Traced C.I.		Project No. TSW - 85	Drawing No. A2- 1022
Checked			
O.I.C.			

3580

FIG. 2



633062

THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT		
GEOLOGICAL MAP - WEST COAST PORTION OF E.L. 13/65 – SOUTH WEST TASMANIA		
Prepared by: P. McG.	Centre: Melbourne	
Date: 28 – 8 – 69	Drawing No: A3-1109	Project No: TSW -86
Drawn: A.S. Czigler		

3581

633063

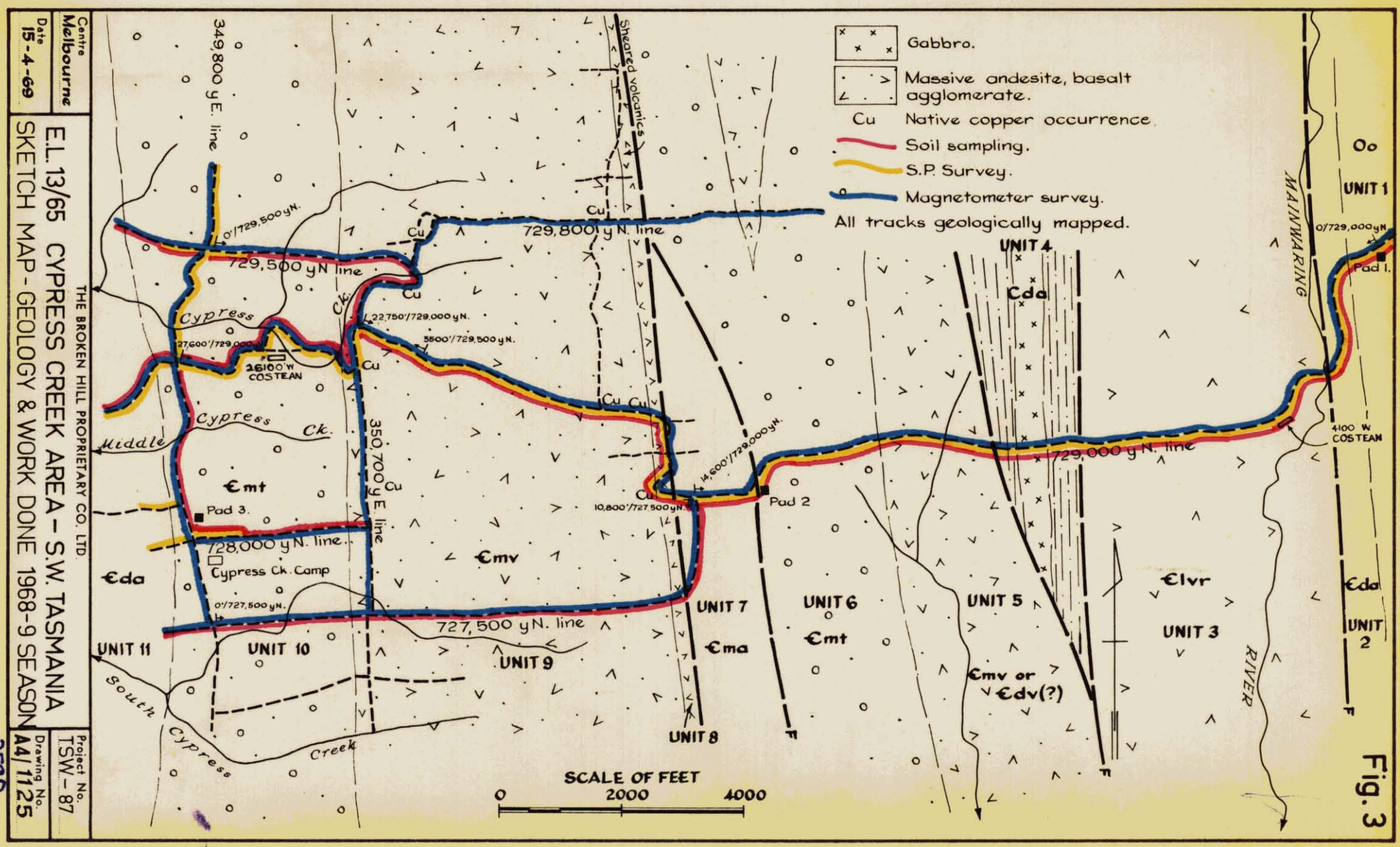


Fig. 3

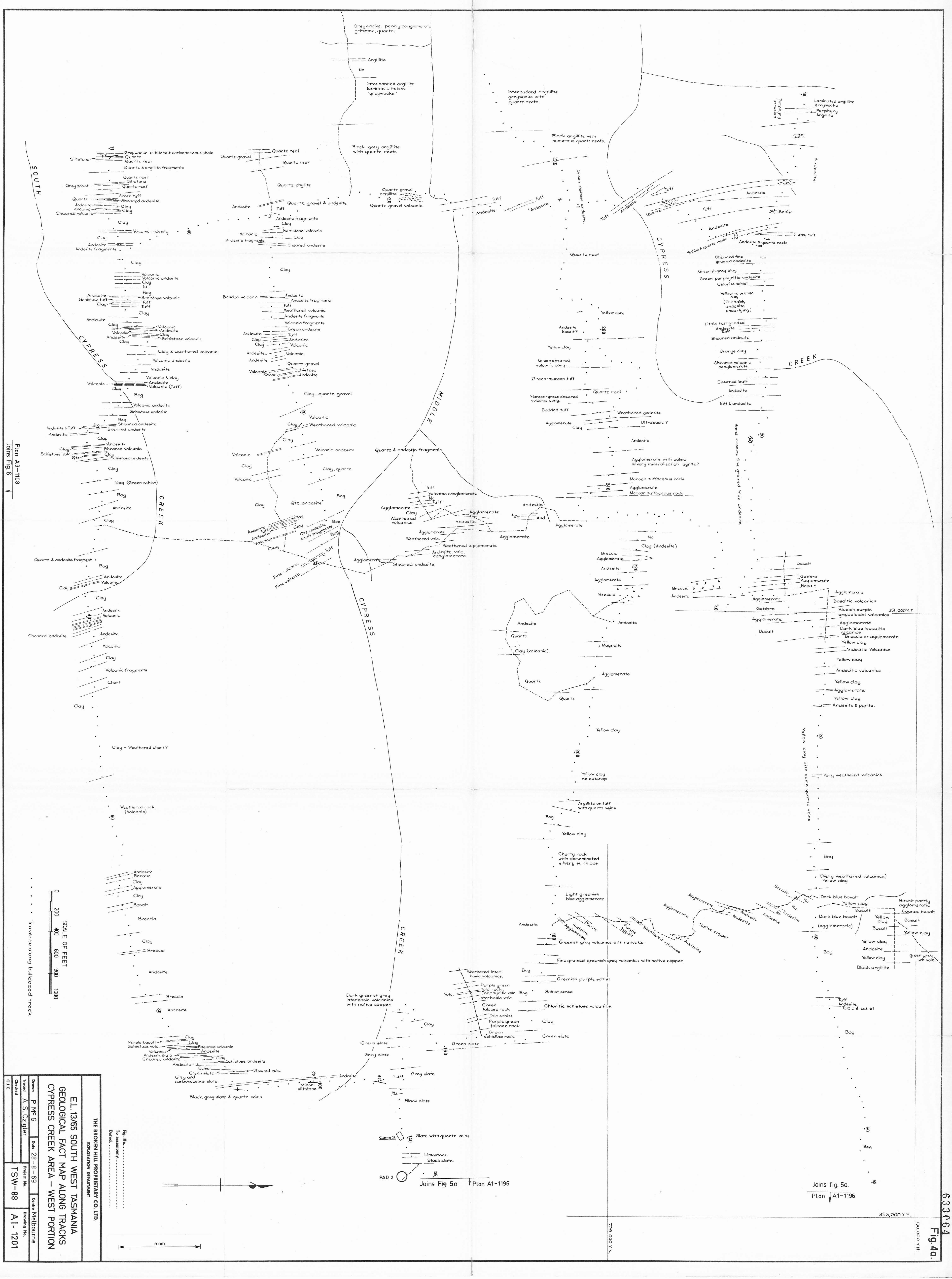
THE BROKEN HILL PROPRIETARY CO. LTD.

E.L. 13/65 CYPRESS CREEK AREA – S.W. TASMANIA

SKETCH MAP - GEOLOGY & WORK DONE 1968-9 SEASON

Centre	Date	Project No.	Drawing No.
Melbourne	15-4-69	TSW – 87	A4/1125

3582



THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 13/65 SOUTH WEST TASMANIA
GEOLOGICAL FACT MAP ALONG TRACKS
CYPRESS CREEK AREA – WEST PORTION

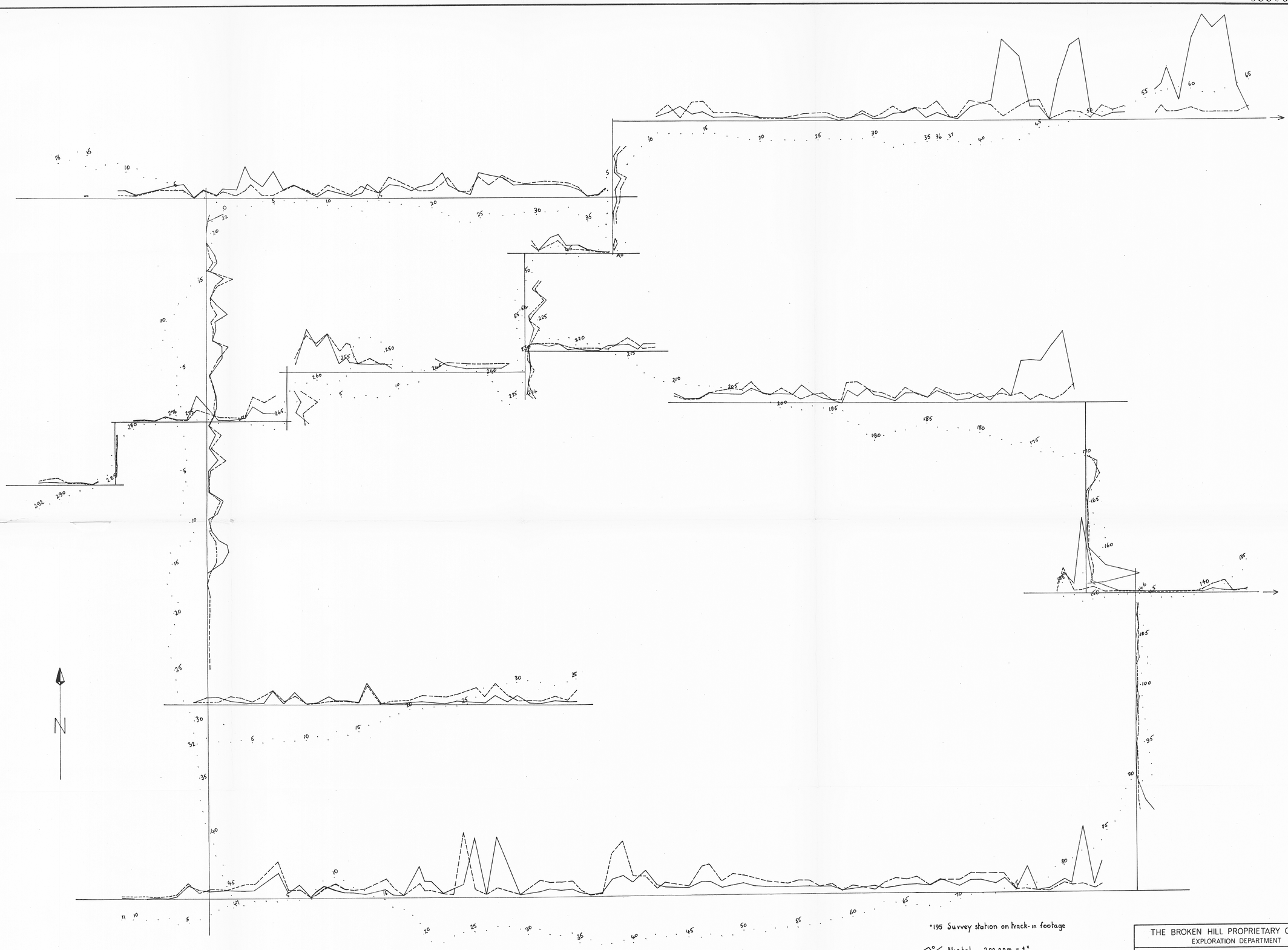
Drawn P McG	Date 28-8-69	Centre Melbourne	
Traced A.S. Czigler	Project No. TSW-88	Drawing No. A1-1201	
Checked			
O.I.C.			

Fig. 4a.

63364

3583

Fig. 4b.



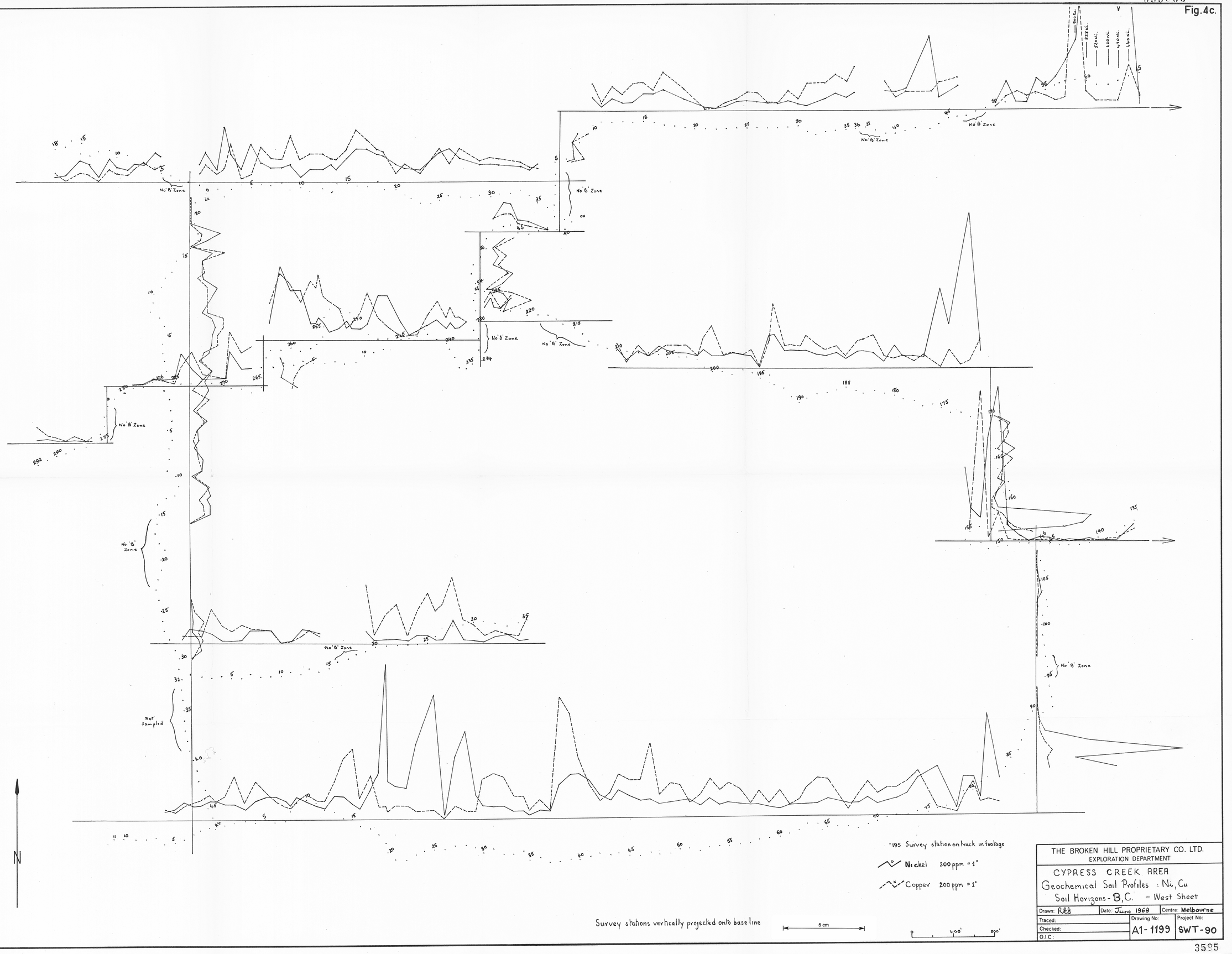
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

CYPRESS CREEK AREA
Geochemical Soil Profiles : Ni, Cu.
Soil Horizon-A – West Sheet

Drawn: RBB	Date: June 1969	Centre: Melbourne	
Traced:	Drawing No: A1-1200	Project No: SWT-89	
Checked:			
O.I.C.:			

633666

Fig.4c.



THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

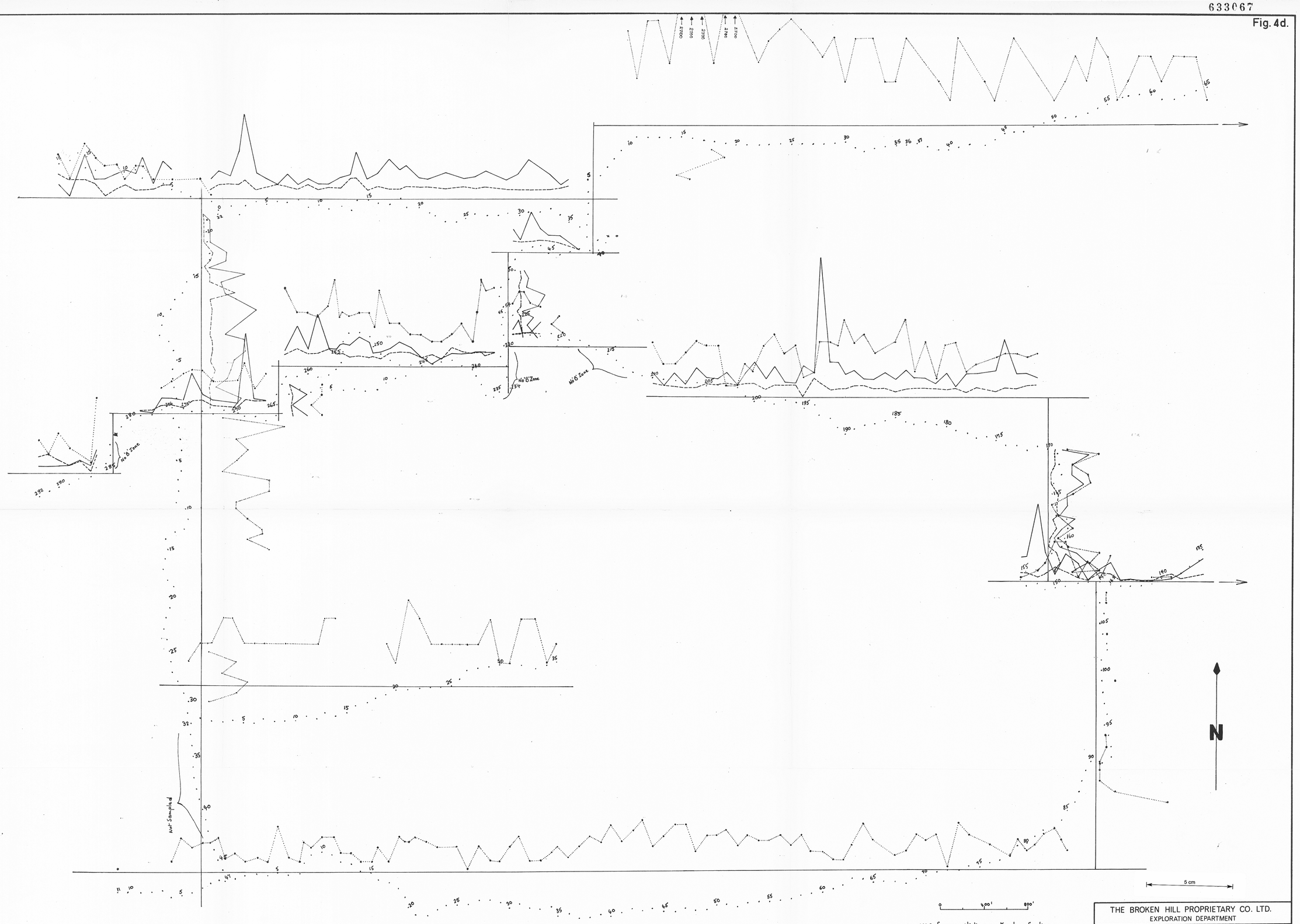
CYPRESS CREEK AREA
Geochemical Soil Profiles : Ni, Cu
Soil Horizons - B, C. - West Sheet

Drawn: RES	Date: June 1969	Centre: Melbourne	
Traced:	Drawing No: A1-1199	Project No: SWT-90	
Checked:			
O.I.C.:			

3595

633067

Fig. 4d.



Survey Stations vertically projected onto base line

•195 Survey station on track in footage

Zinc 100 ppm = 1"

Lead 100 ppm = 1"

Silver 1000 ppb = 1"

0 400' 800'

5 cm

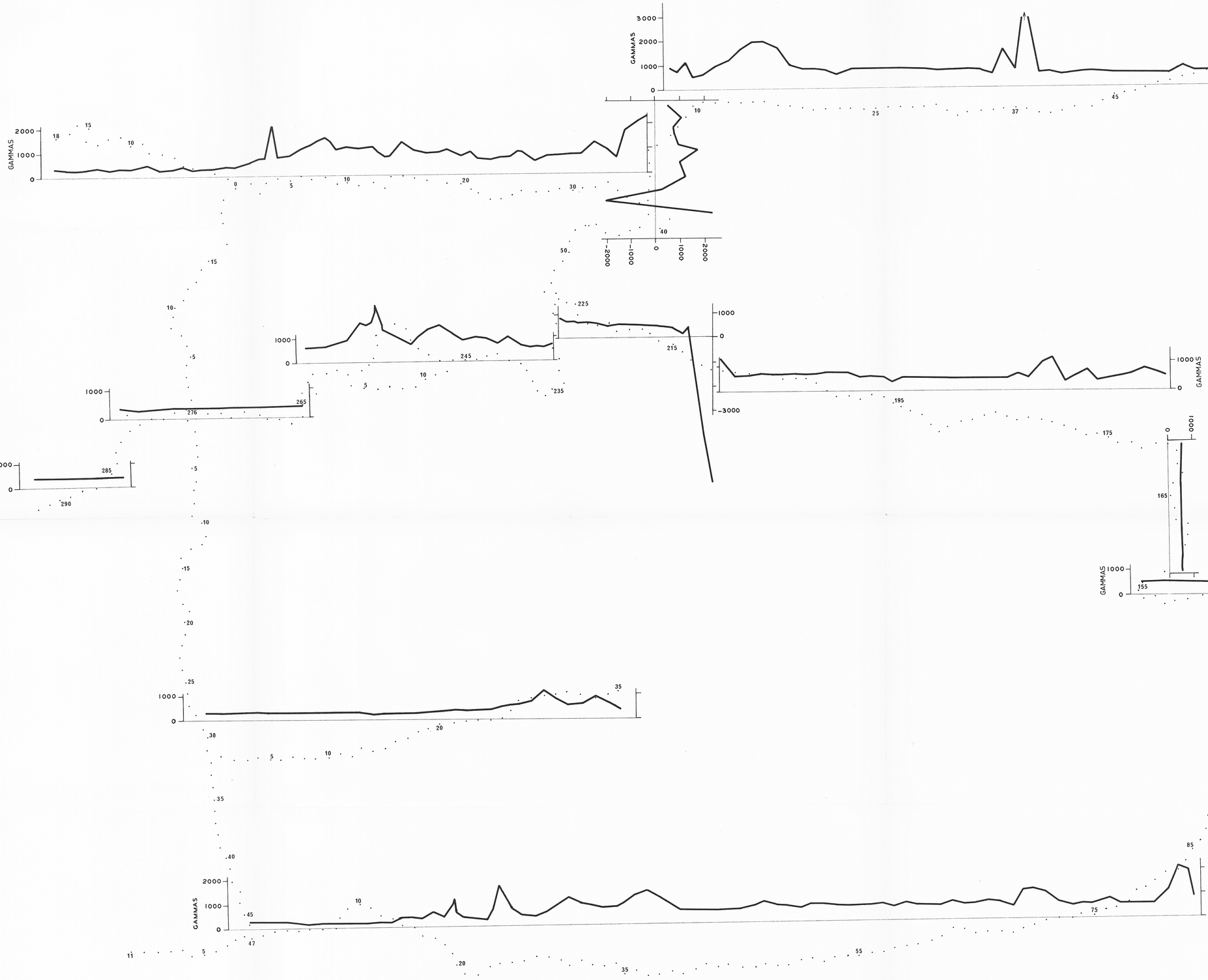
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

CYPRESS CREEK AREA
Geochemical Soil Profiles : Zn, Pb, Ag.
Soil Horizons - B.C. - West Sheet

Drawn: RBJ	Date: June 1968	Centre: Melbourne	
Traced:	Drawing No: A1-1198	Project No: SWT-91	
Checked:			
O.I.C.:			

3586

Fig. 4e



JOINS PLAN A1-1192 FIG. 5e

VERTICAL SCALE : 1" = 2,000 GAMMAS

HORIZONTAL SCALE: 500 0 500 1,000 FEET

5 cm

Fig. No.....
To accompany.....
Dated.....

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

13/65 SOUTHWEST TASMANIA
MAGNETIC PROFILES — WEST SHEET
CYPRESS CREEK AREA

Drawn P McG	Date 2 - 9 - 69	Centre Melbourne	
Traced A.S. Czigler	Project No. TSW - 92	Drawing No. A1 - 1197	
Checked			
O.I.C.			

633069

Fig.5a.

730,000 Y N

729,000 Y N.

353,000 Y E.

Plan A1-1201
Joins Fig. 4a

Basalt
Yellow clay
Bog
Quartz
Green-schistose talcy rock.
Green purple talcose rock
Hardness, schistosity variable.
Bog
Yellow clay
Basalt & chalcophyrite
Yellow clay
Basalt
Yellow clay
Andesite
Bog
Basalt
Yellow clay

Green and purple agglomerate.
Bog
Green andesitic(?) volcanics.
Bog
Black slate and quartz scree.
Bog
Chlorite schist scree.
Green chloritic volcanics with epidote-quartz veins.
Creek
Grey green int. volc.
Green schistose epidotized chloritized int.volcanics.
Green epidotized chloritized intermediate volcanic
Green intermediate volcanic scree.
Bog
Slate scree.
Slate.
Intermediate volcanics.
Slate
Chert
Dark granophyritic rock.
Gabbro
Subphyrites in gabbro
Bog
Black slate outcrop.
Weathered acid volc.(?)
Slate intruded by quartz veins.
Acid volcanics
Quartz veins
Slate
Acid volcanics.
Slate (tuffaceous ?)
Acid volcanics
Slate
Intermediate volcanics
Acid volcanic
Intermediate volcanic.
Mainwaring Fault
Dozer Camp
Int volcanics
Argillite
Intrusion
Argillite/Slate
Intermediate intrusion
Quartz, feldspar intrusion
Argillite (minor greywacke)
Acid volcanics.
Mainwaring Fault
Sandstone

Plan A1-1201
Joins Fig 4a
Pad 2.

SCALE OF FEET
0 200 400 600 800 1000

Traverse along bulldozed track.

5 cm

Fig. No.....
To accompany.....
Dated.....

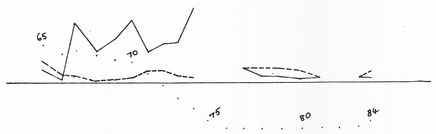
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

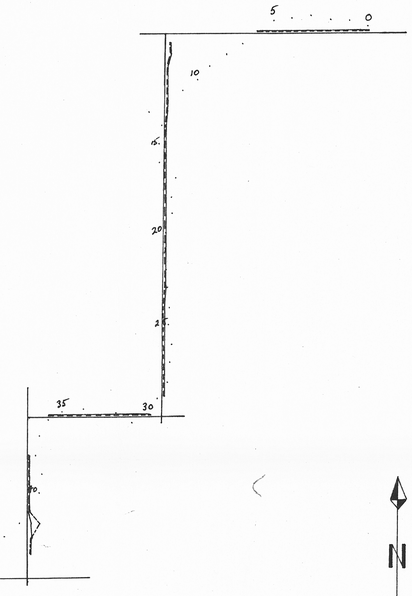
E.L 13/65 SOUTH WEST TASMANIA
GEOLOGICAL FACT MAP ALONG TRACKS
CYPRESS CREEK AREA – EAST PORTION

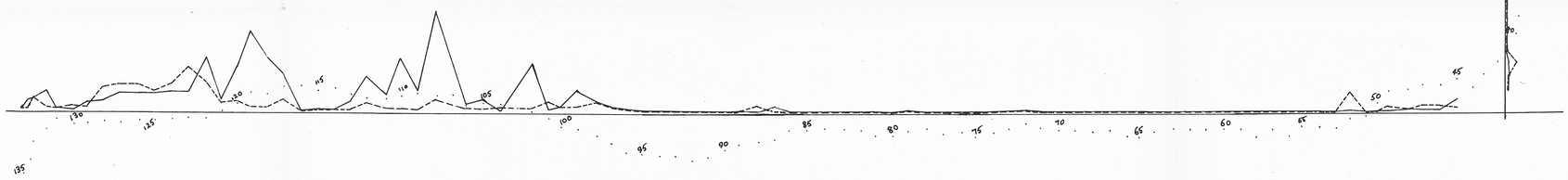
Drawn P McG	Date 1 - 9 - 69	Centre Melbourne	
Traced A.S. Czigler	Project No. TSW-93	Drawing No. A1-1196	
Checked			
O.I.C.			

3598

Fig. 5b.







·15 Survey station on track in footage

Nickel 200 ppm = 1"

Copper 200 ppm = 1"

5 cm

0 400' 800'

Survey stations vertically projected onto base line

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

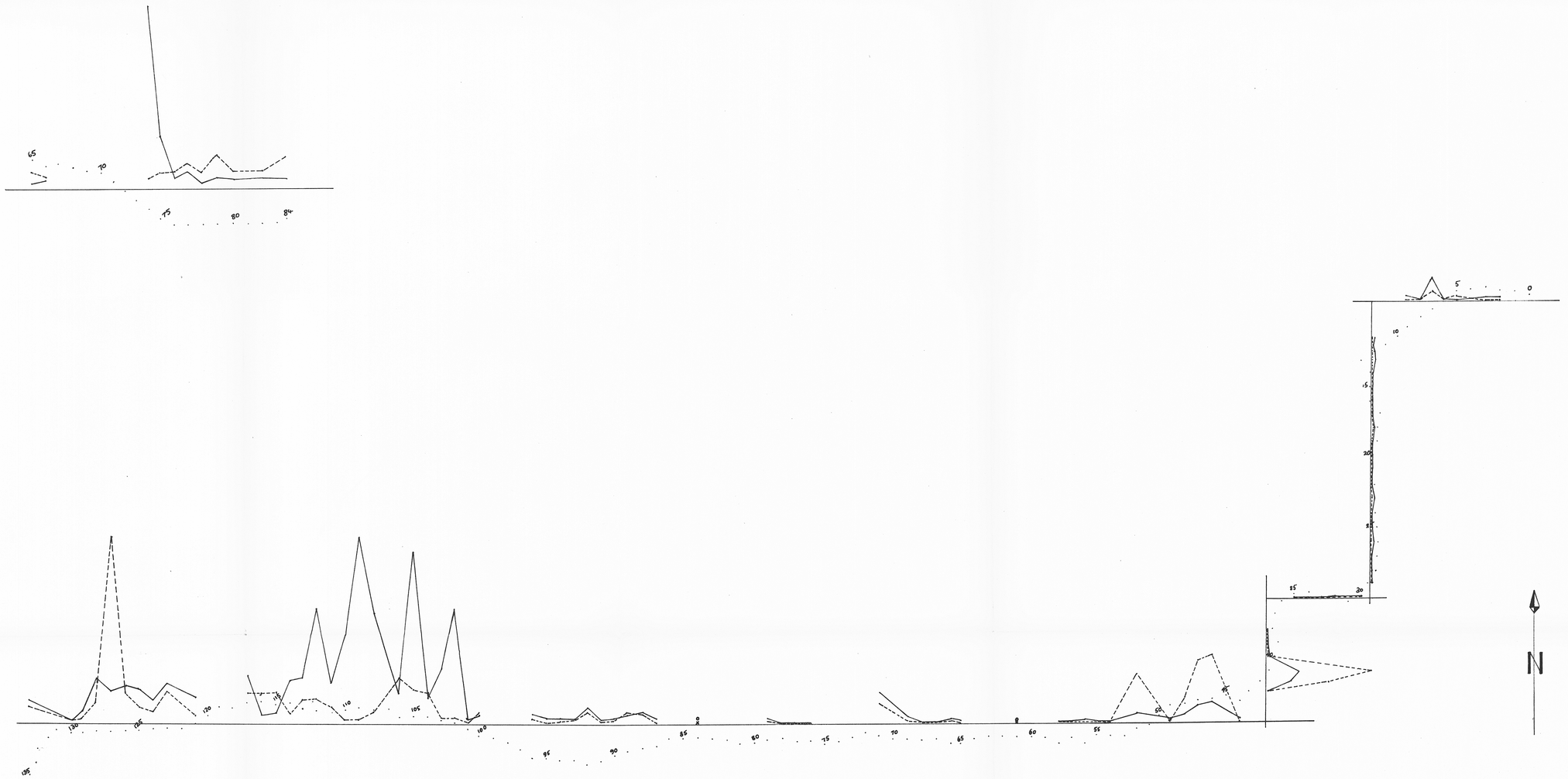
CYPRESS CREEK AREA
Geochemical Soil Profiles : Ni, Cu.
Soil Horizon-A - East Sheet

Drawn: R&B	Date: June 1969	Centre: Melbourne	
Traced:	Drawing No: A1-1195	Project No: SWT-94	
Checked:			
O.I.C.:			

3599

633671

Fig. 5c.



·15 Survey station on track in footage

Nickel 200 ppm = 1"

Copper 200 ppm = 1"

5 cm

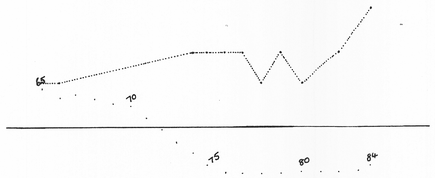
0 400' 800'

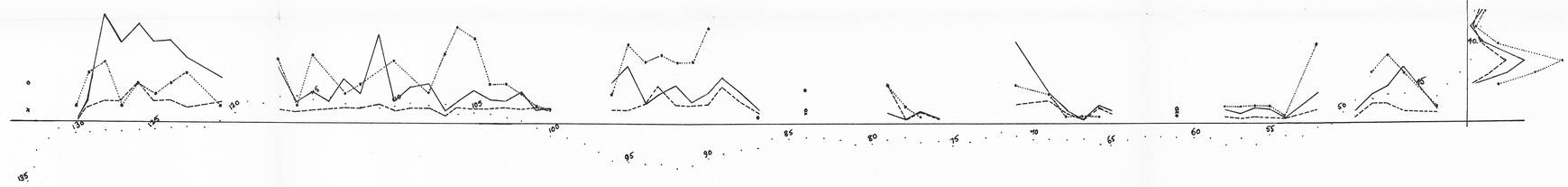
Survey stations vertically projected onto base line

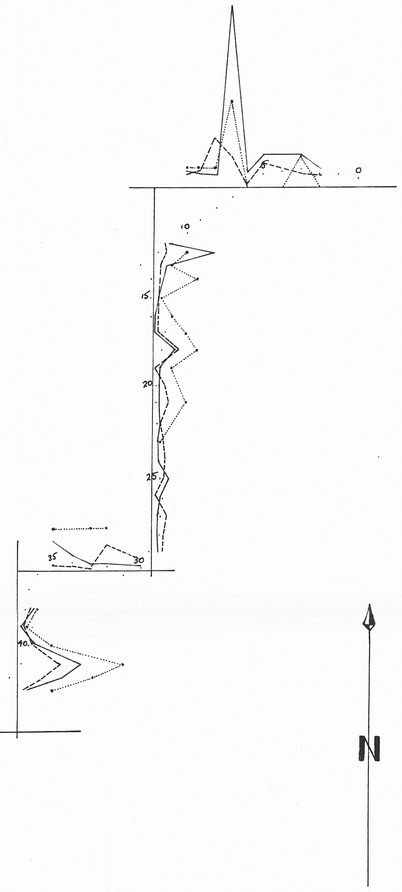
THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT			
CYPRESS CREEK AREA Geochemical Soil Profiles: Ni, Cu. Soil Horizons-B.C. – East Sheet			
Drawn: RES	Date: June 1969	Centre: Melbourne	
Traced:	Drawing No: A1-1194	Project No: SWT-95	
Checked:			
O.I.C.:			

3590

Fig. 5d.







5 cm

0 400' 800'

·15 Survey station on track in footage

Zinc 100 ppm = 1"

Lead 100 ppm = 1"

Silver 1000 ppb = 1"

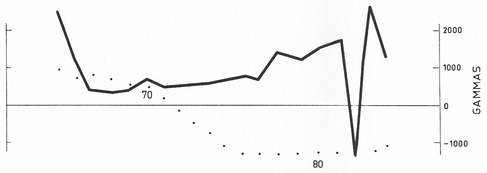
Survey stations vertically projected onto base line

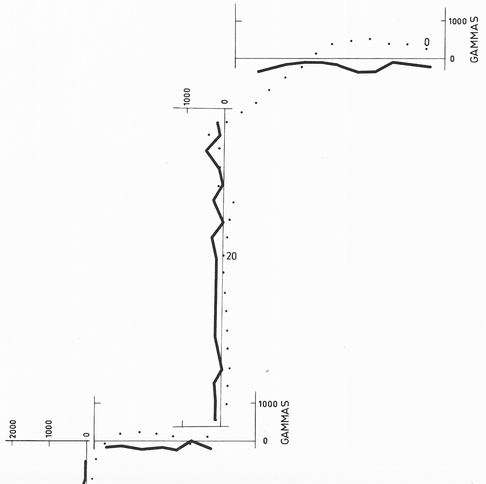
THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

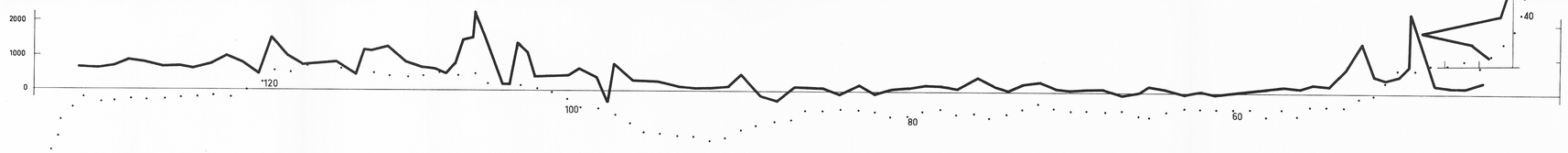
CYPRESS CREEK AREA
Geochemical Soil Profiles: Zn, Pb, Ag.
Soil Horizons - B.C. - East Sheet

Drawn: RES	Date: June 1969	Centre: Melbourne
Traced:	Drawing No: A1-1193	Project No: SWT-96
Checked:		
O.I.C.:		

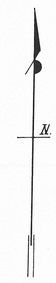
Fig. 5e.







Joins plan A1-1197 Fig.4e



VERTICAL SCALE: 1" = 2000 GAMMAS

HORIZONTAL SCALE:

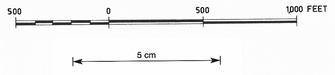


Fig. No.....
To accompany.....
Dated.....

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

E.L. 13/65 SOUTHWEST TASMANIA
MAGNETIC PROFILES — EAST SHEET
CYPRESS CREEK AREA

Drawn P McG	Date 2-9-69	Centre Melbourne	
Traced A.S. Czigler	Project No. TSW-97	Drawing No. A1-1192	
Checked			
O.i.c.			

Fig. 6.

South

Cypress

Creek

Joins Fig. 4a.
Plan A1 – 1201

SCALE OF FEET
0 200 400 600 800 1000

5 cm

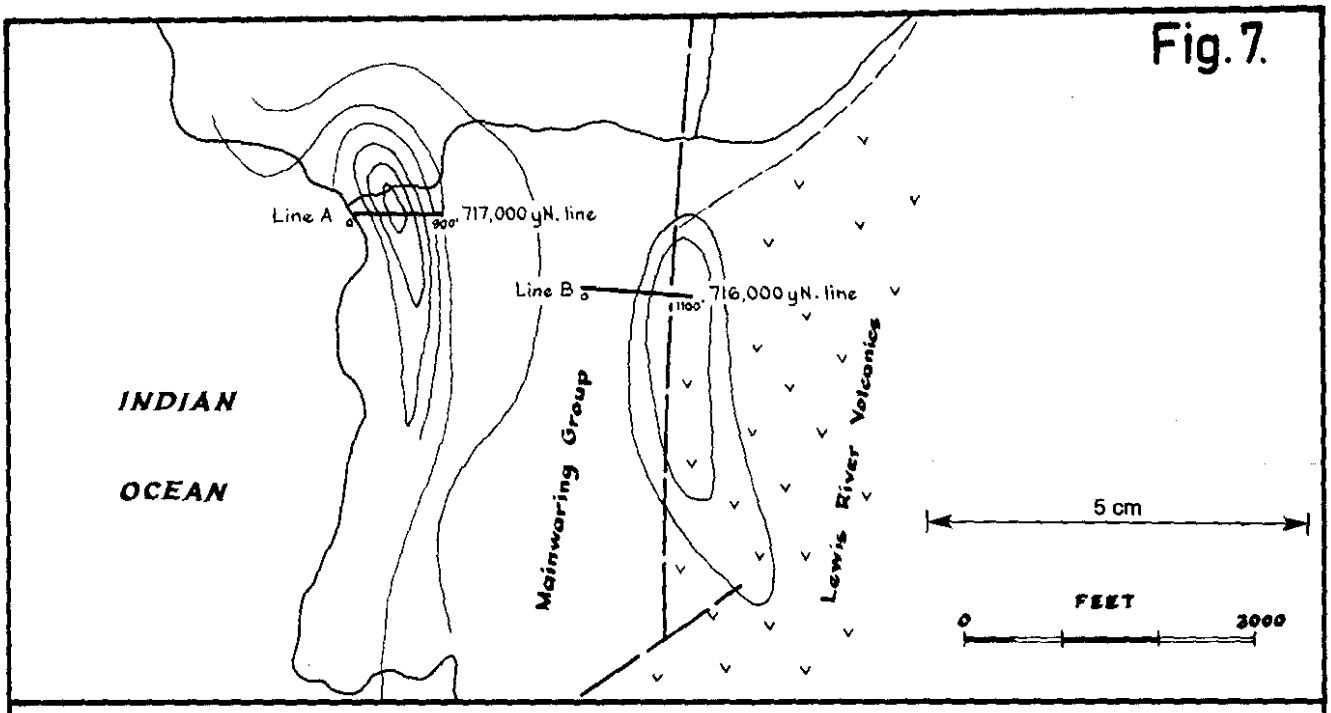
633074

THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT	
E.L. 13/65 SOUTH WEST TASMANIA GEOLOGICAL FACT MAP ALONG TRACKS CYPRESS CREEK AREA – SOUTH PORTION	
Prepared by: P. Mc G.	Centre: Melbourne
Date: 29 – 8 – 69	Drawing No: A3 – 1108 / Project No: TSW 98
Drawn: A. S. Czigler	

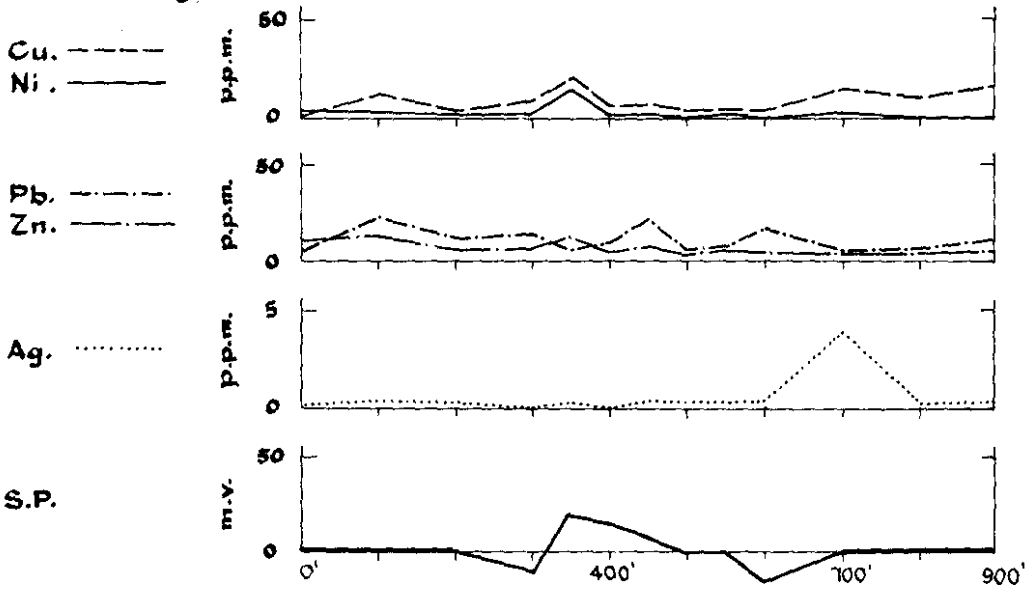
3593

633075

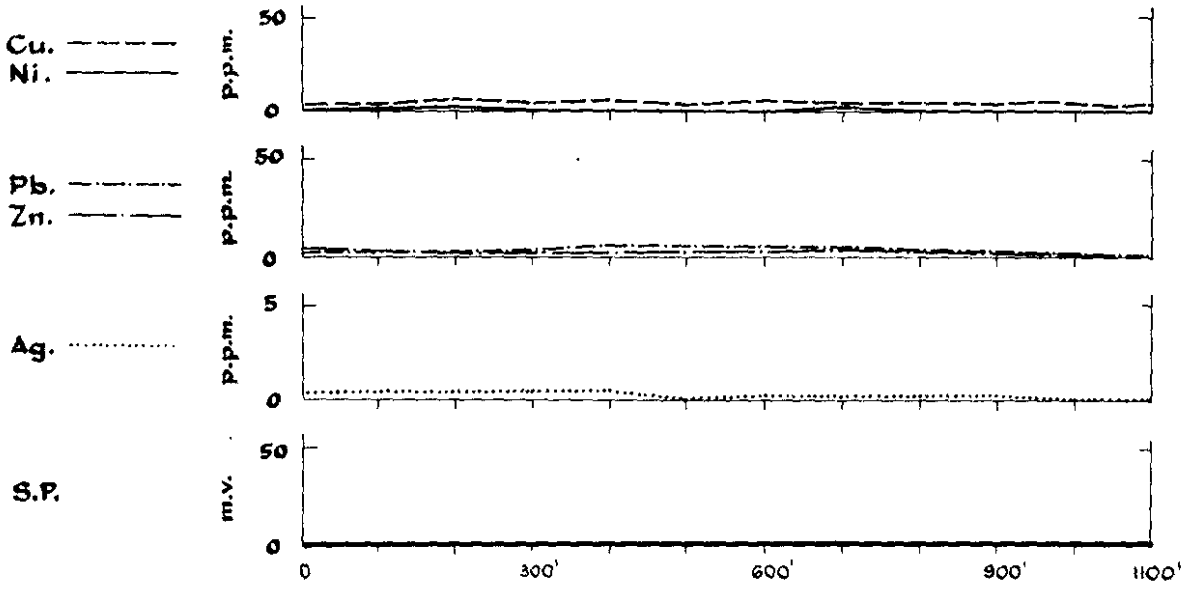
Fig. 7.



717,000 yN. line ~ Line A.



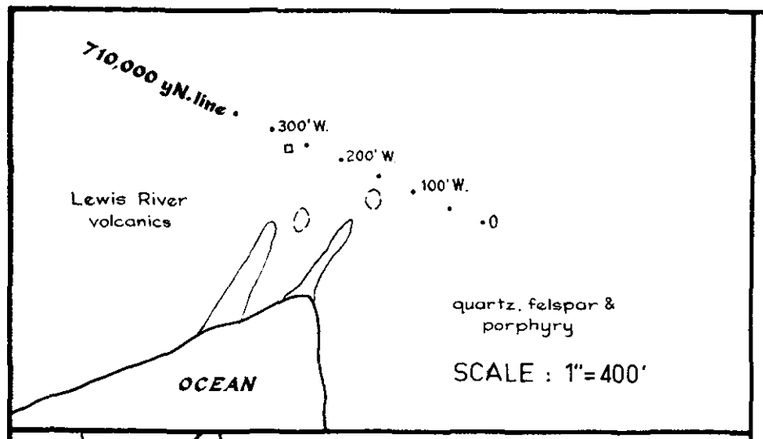
716,500 yN. line ~ Line B.

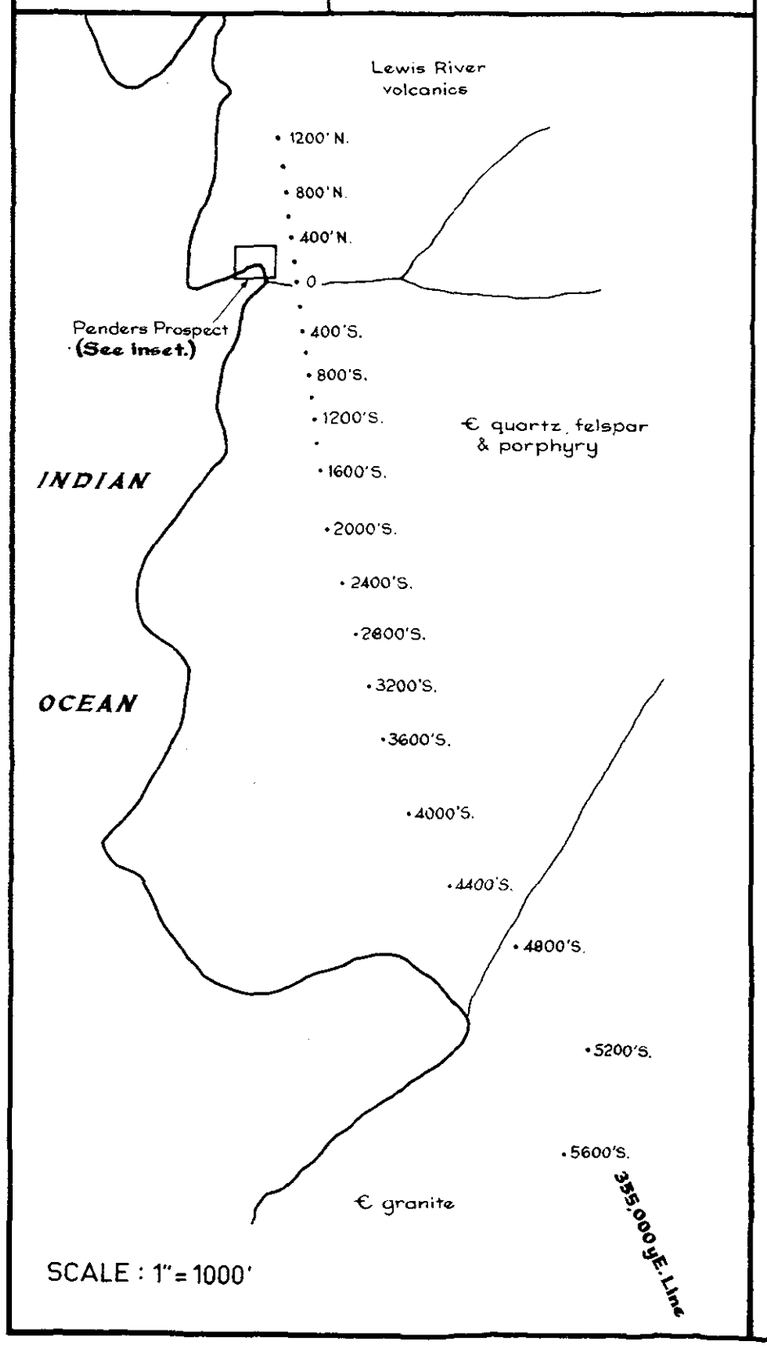


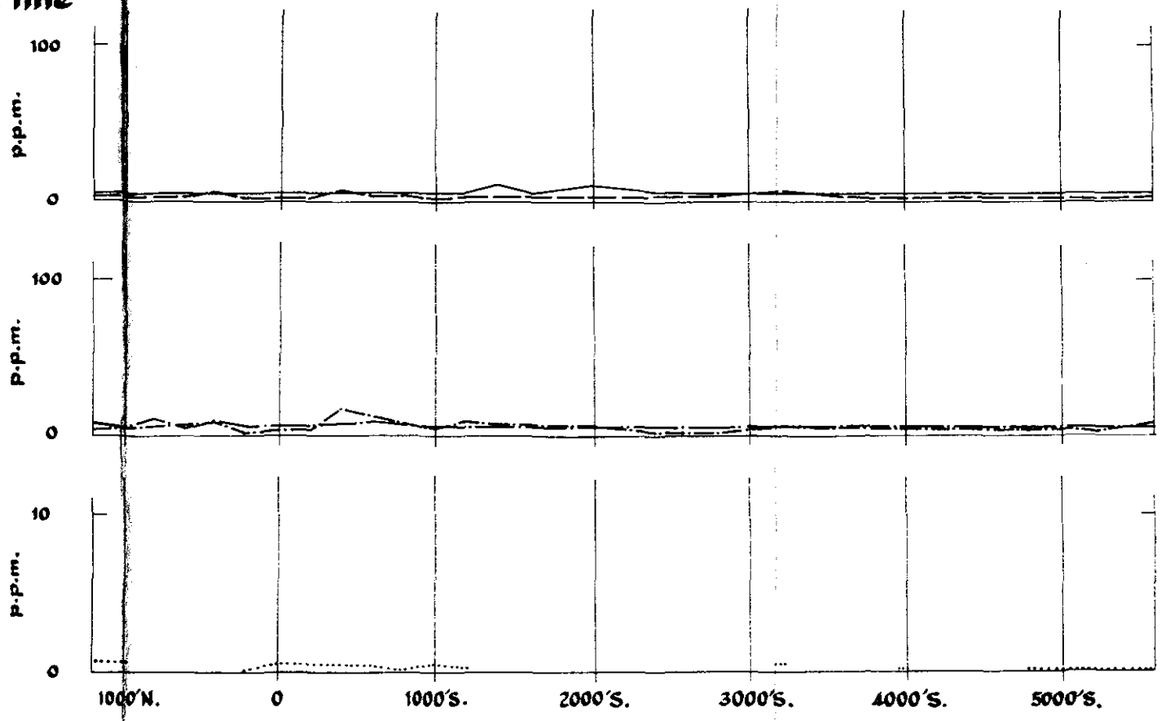
Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSW 99
Date 5-8-69	E.L. 13/65 – SOUTH WEST TASMANIA GEOCHEMICAL SOIL AND S.P. PROFILES COPPER CREEK AEROMAGNETIC E.M. ANOMALY	Drawing No. A4/1179

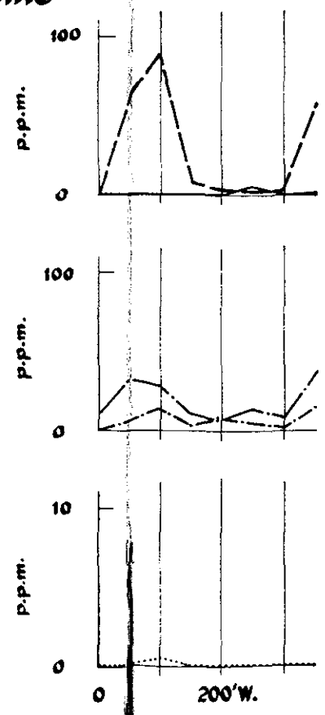
3594

633076 Fig. 8







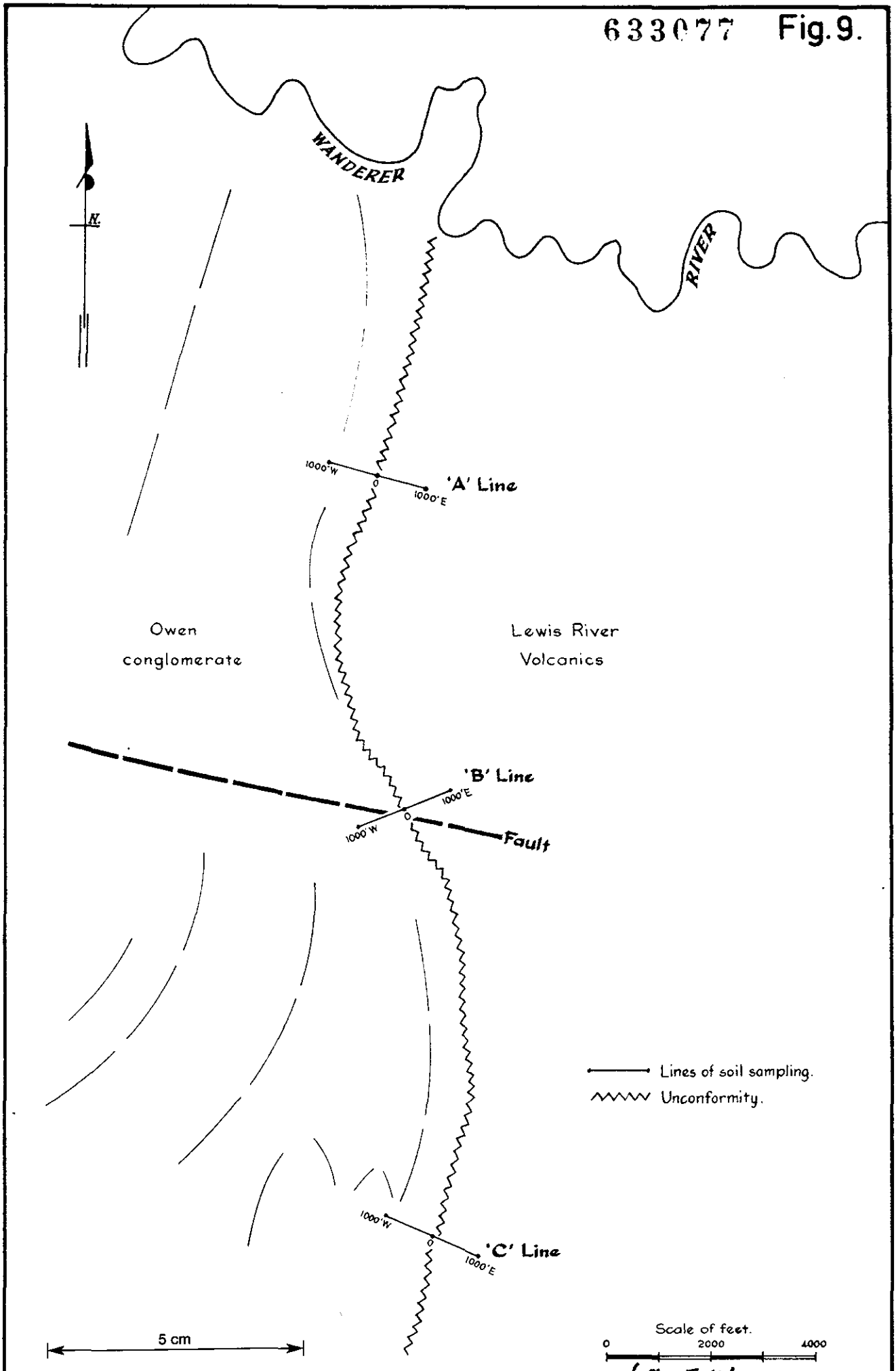


Copper — — — —
Nickel ————
Lead — · — · —
Zinc — · — · —
Silver ……

5 cm

THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT		
E.L. 13/65 – SOUTH WEST TASMANIA GEOCHEMICAL SOIL PROFILES PENDERS COPPER PROSPECT		
Prepared by: P. Mc G.	Centre: Melbourne	
Date: 5-8-69	Drawing No: A3-1107	Project No: TSW 100
Drawn: A.S.Cz.		

633077 Fig.9.

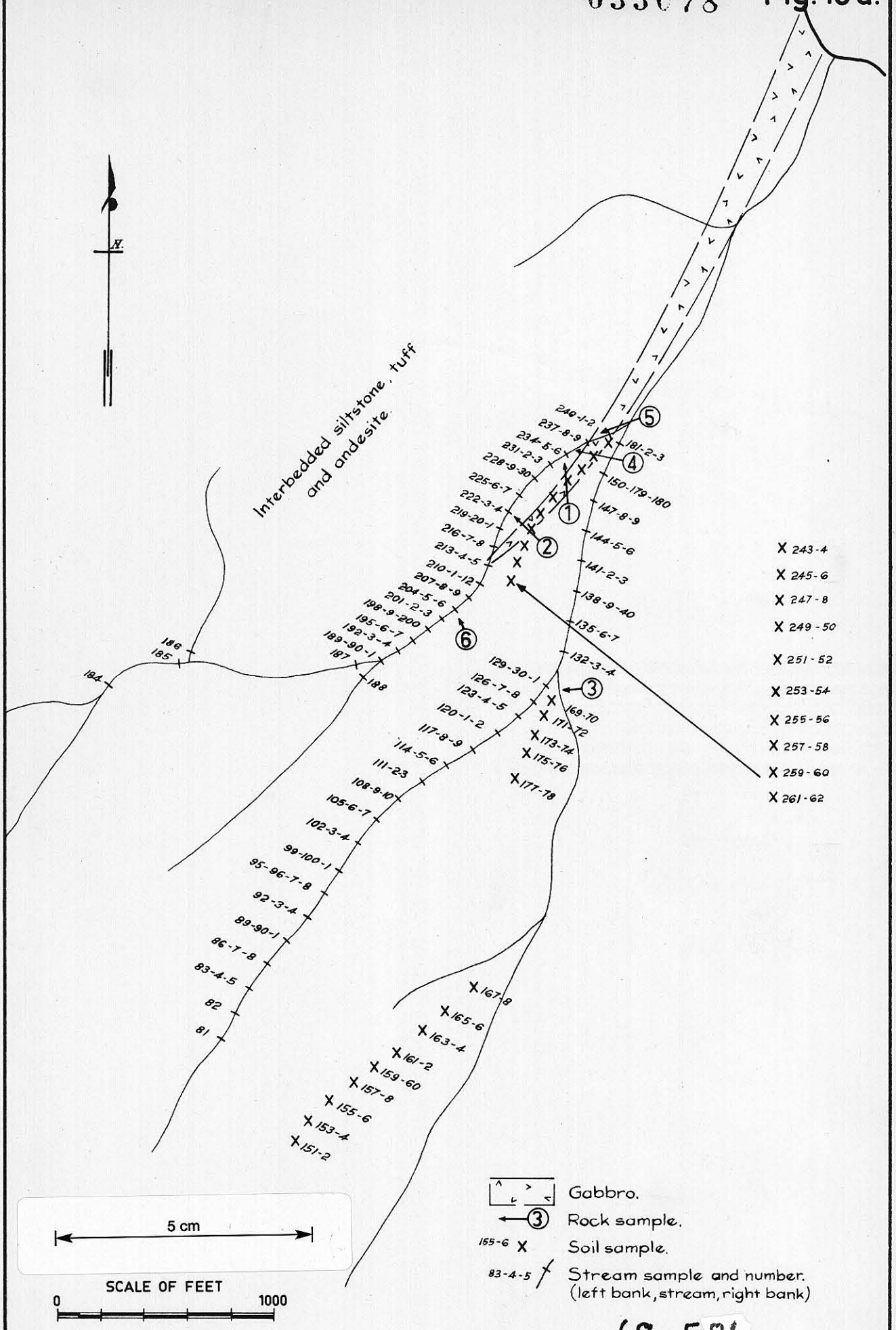


69-586

Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. T SW 101
Date 5-8-69	E.L.13/65 – SOUTH WEST TASMANIA SOIL SAMPLING - EAST OSMUND AREA	Drawing No. A4/ 1178

3596

633078 Fig. 10a.



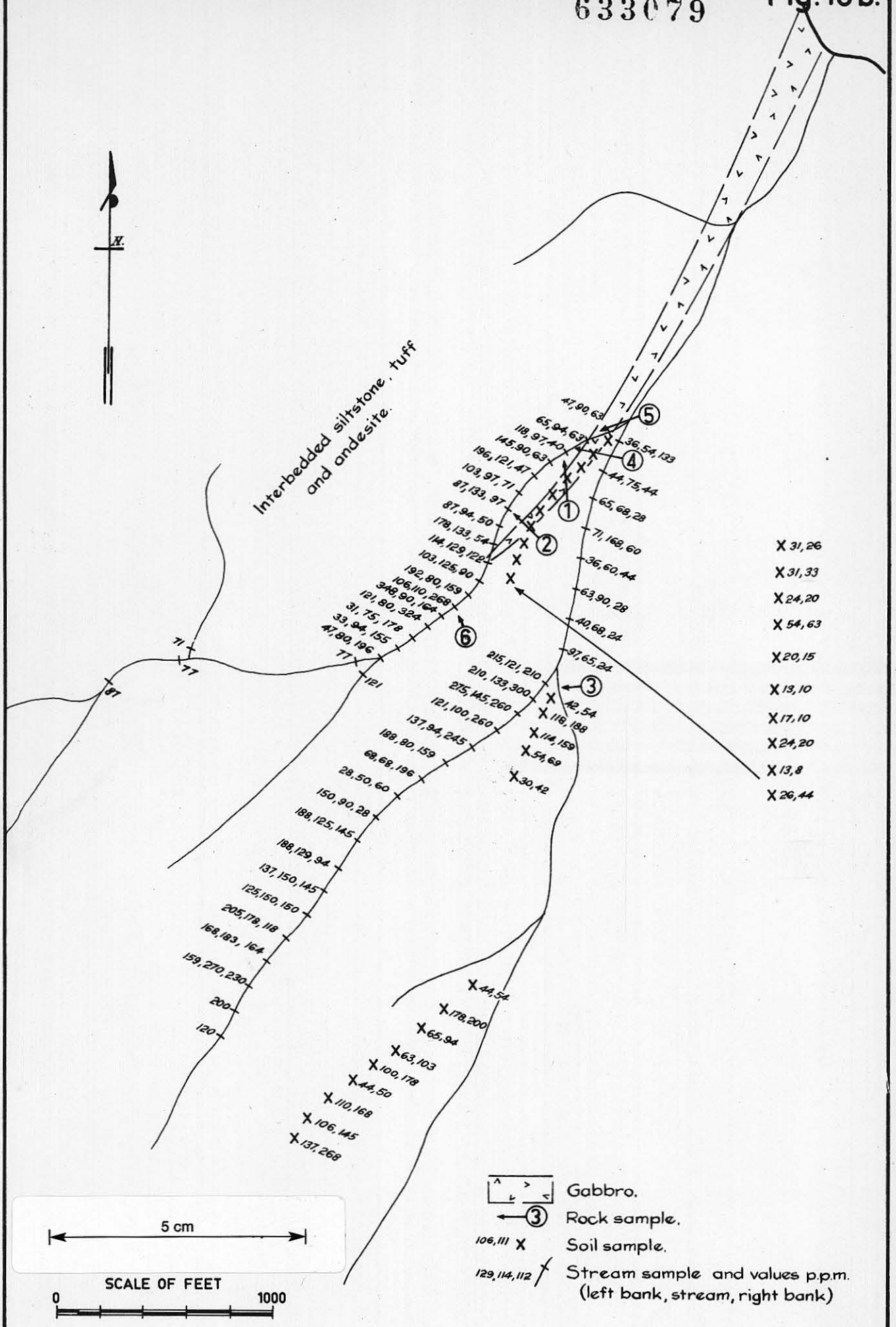
69-586.

Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L. 13/65 SOUTH WEST TASMANIA LUCAS CREEK COPPER ANOMALY GEOCHEMICAL SAMPLES	Project No. TSW 102
Date 7-8-69		Drawing No. A4/ 1177

2597

633079

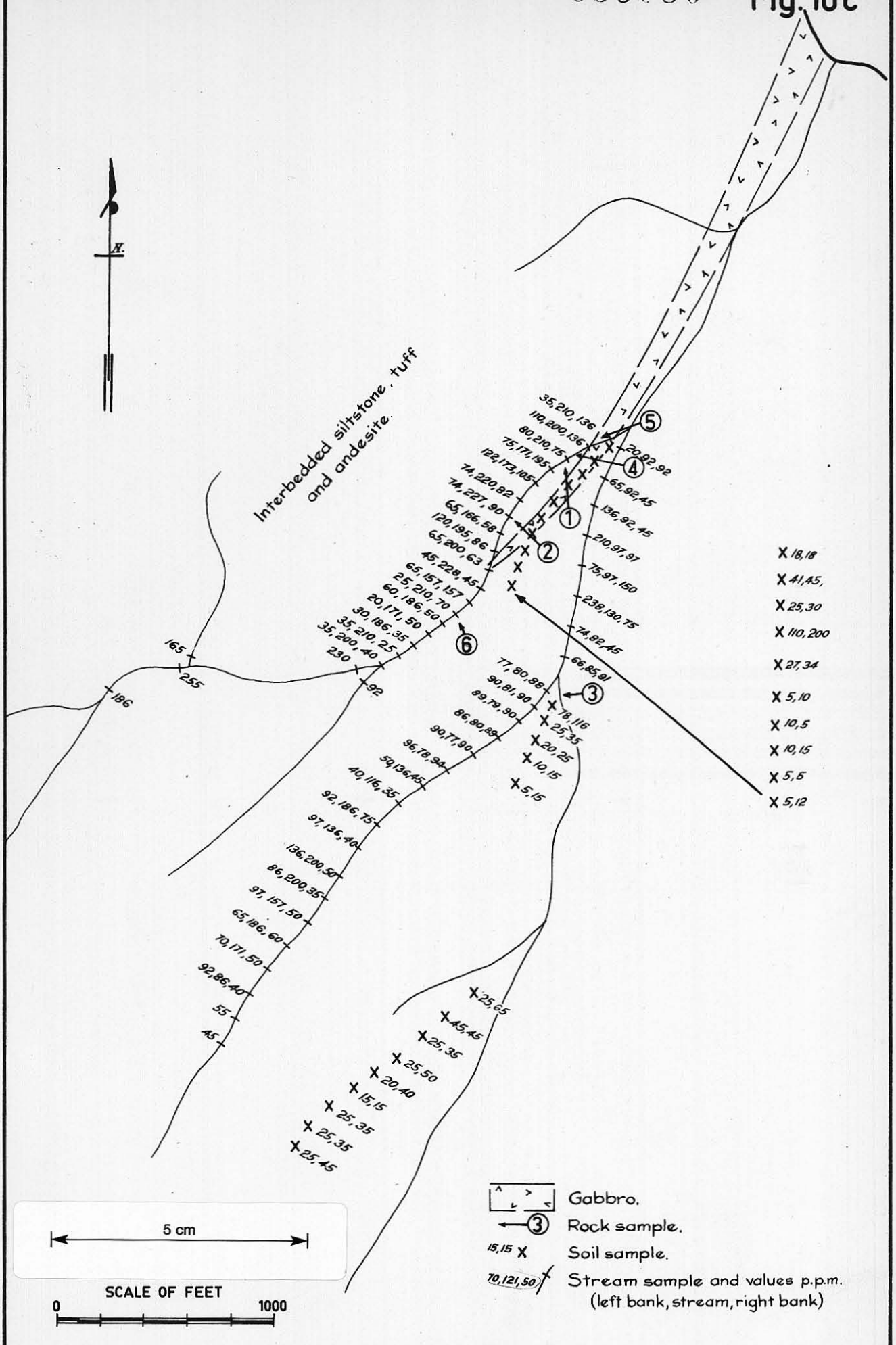
Fig. 10b.



Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L. 13/65 SOUTH WEST TASMANIA LUCAS CREEK COPPER ANOMALY GEOCHEMICAL RESULTS - P.P.M. COPPER	Project No. TSW 103
Date 7-8-69		Drawing No. A4/ 1176

060

633080 Fig. 10c

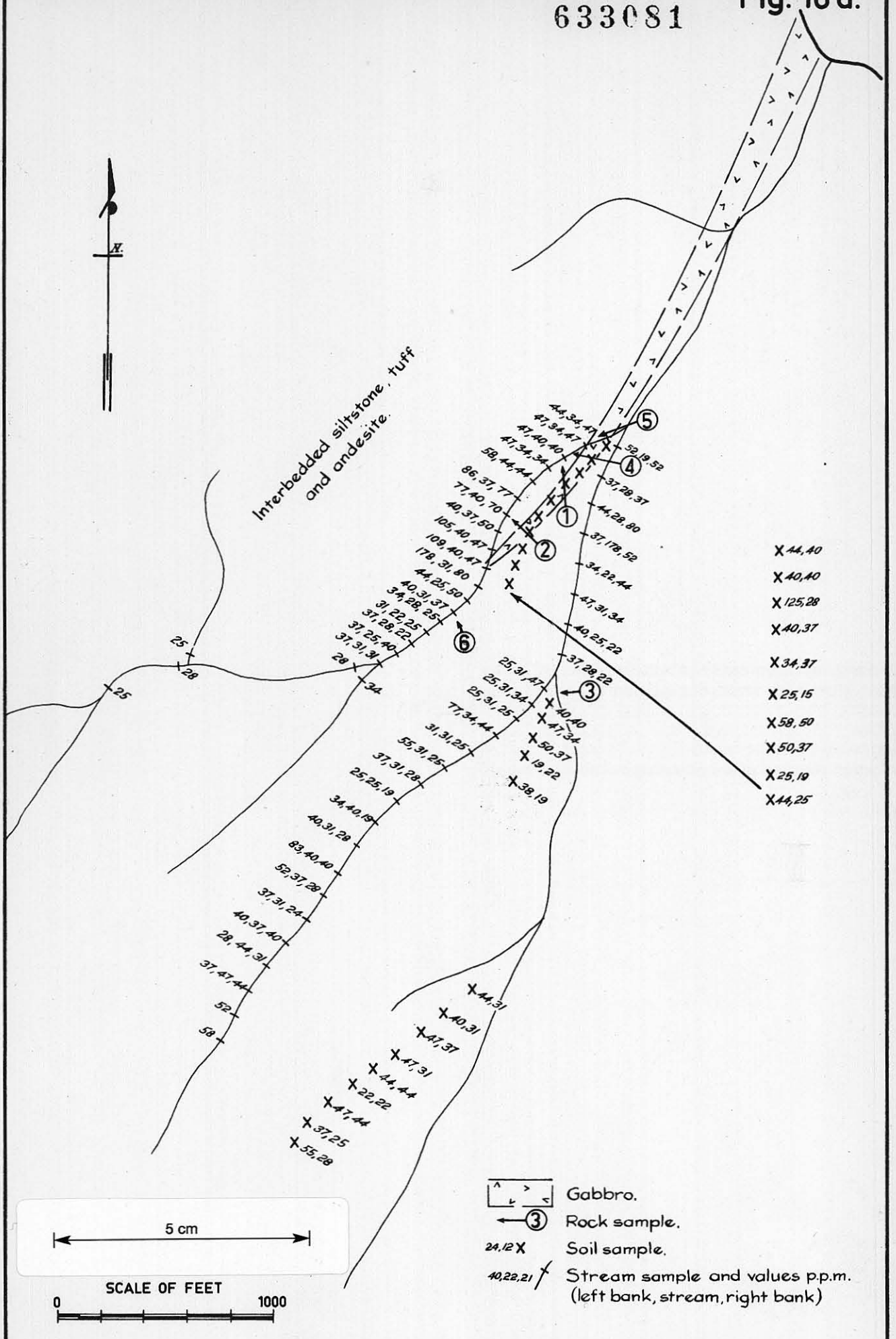


Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L.13/65 SOUTH WEST TASMANIA LUCAS CREEK COPPER ANOMALY GEOCHEMICAL RESULTS - P.P.M NICKEL	Project No. TSW 104
Date 7-8-69		Drawing No. A4/ 1175

061

633081

Fig. 10 d.

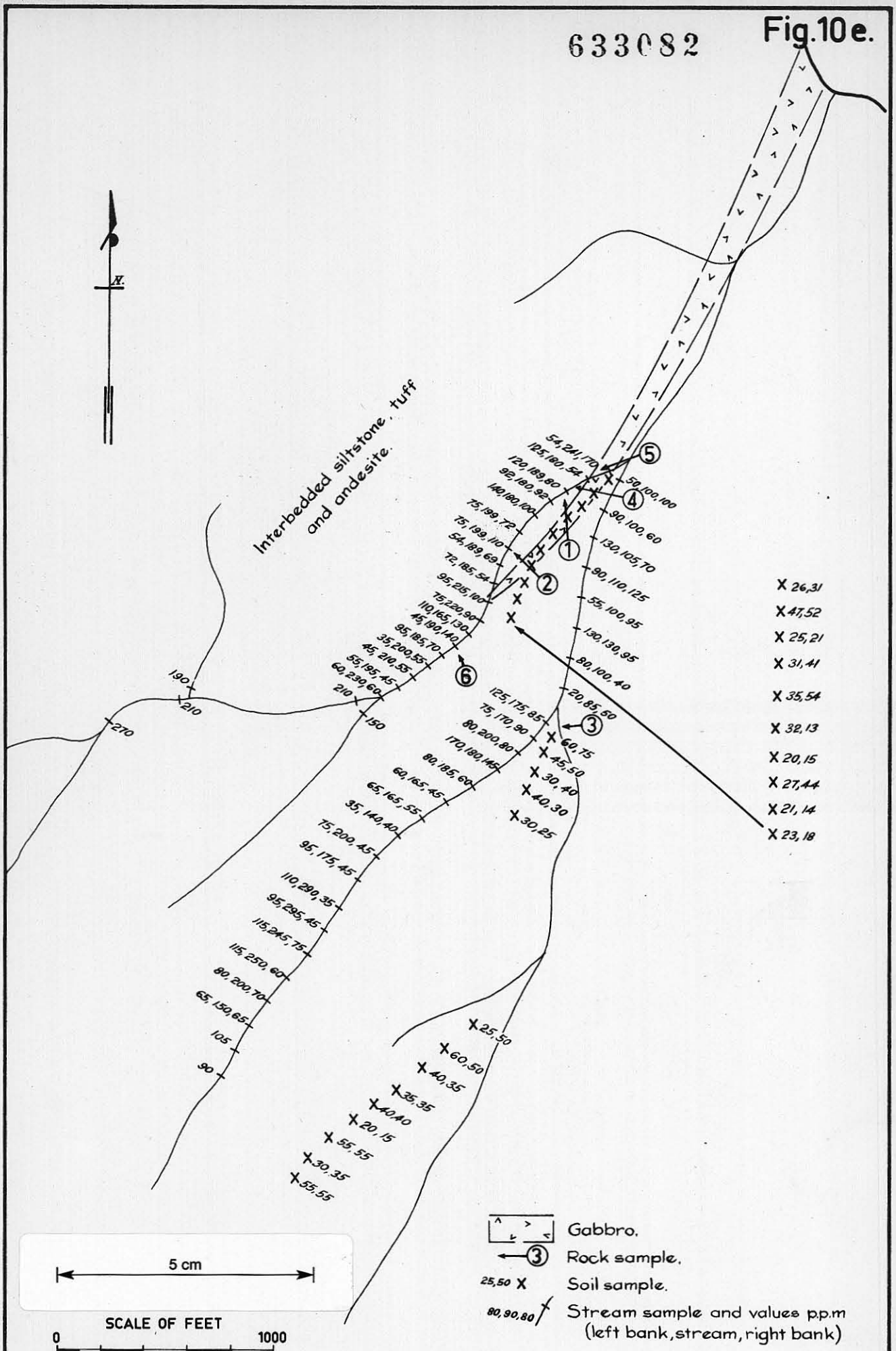


Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L. 13/65 SOUTH WEST TASMANIA LUCAS CREEK COPPER ANOMALY GEOCHEMICAL RESULTS - P.P.M. LEAD	Project No. TSW 105
Date 7-8-69		Drawing No. A4/ 1174

062

633082

Fig.10e.

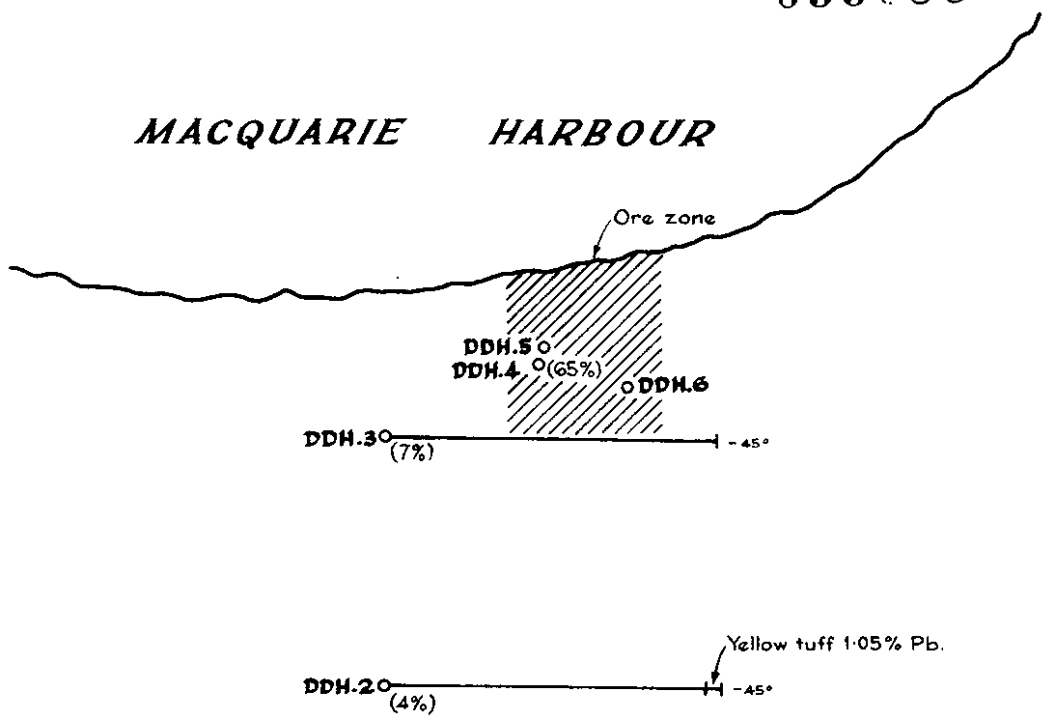


Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L.13/65 SOUTH WEST TASMANIA LUCAS CREEK COPPER ANOMALY GEOCHEMICAL RESULTS - P.P.M. ZINC	Project No. TSW 106
Date 7-8-69		Drawing No. A4/ 1173

063

633083

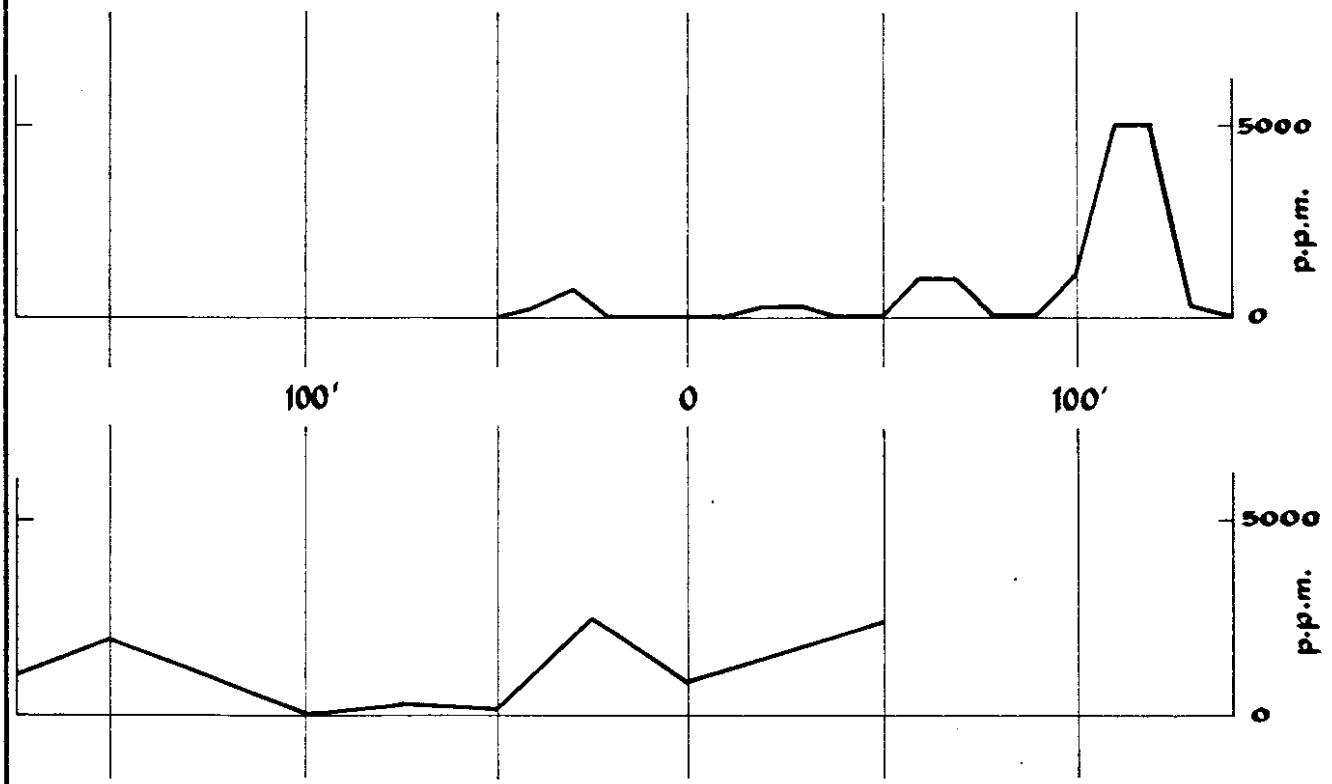
Fig. 11.



PLAN

Percentage is core recovery.

150'S.



200'S.

Copper values in parts per million.

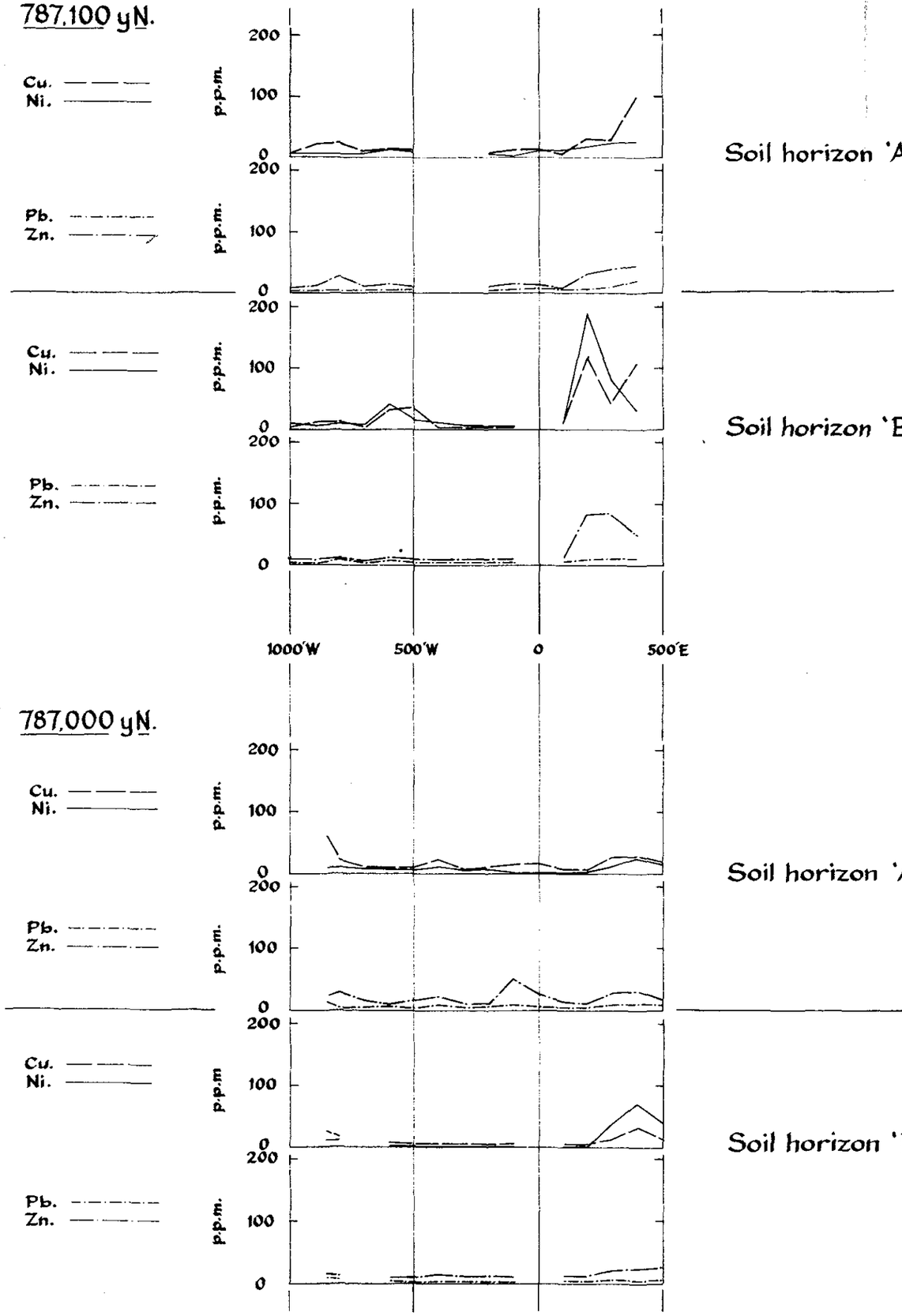
5 cm

Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSW 107
Date 5-8-69	E.L. 13/65 – SOUTH WEST TASMANIA LYELL E.Z. EXPLORATION WORK AT PELIAS COVE	Drawing No. A4/1172

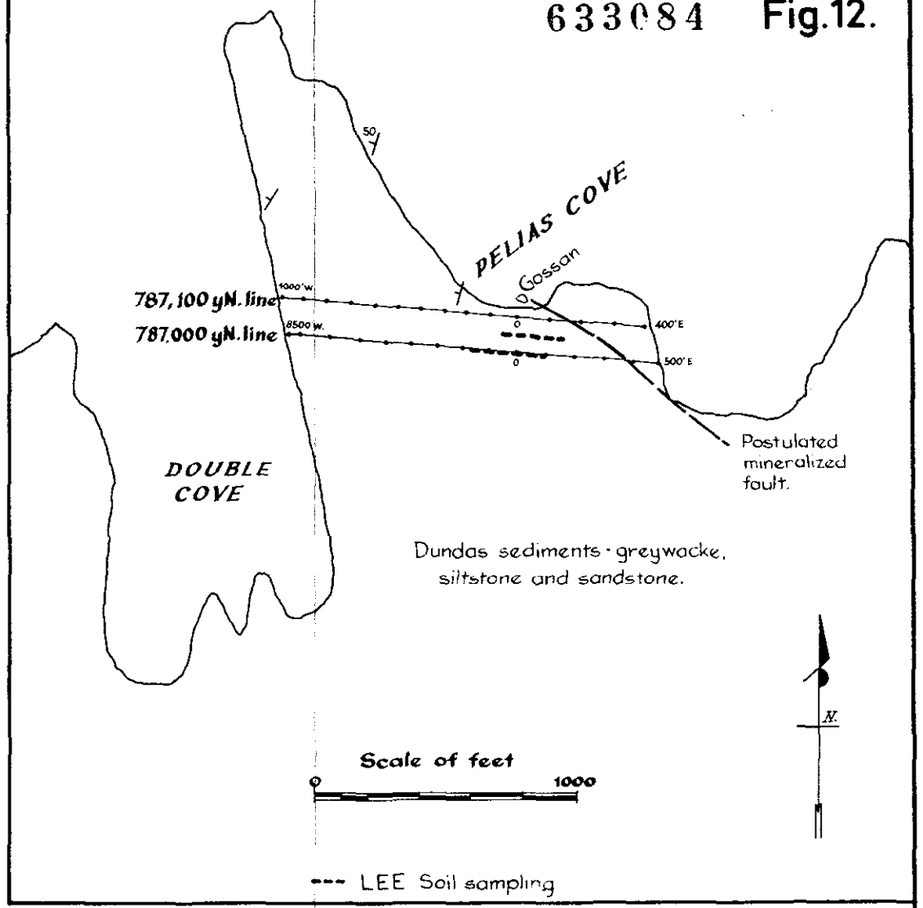
064

633084 Fig.12.

787,100 yN.



787,000 yN.



5 cm

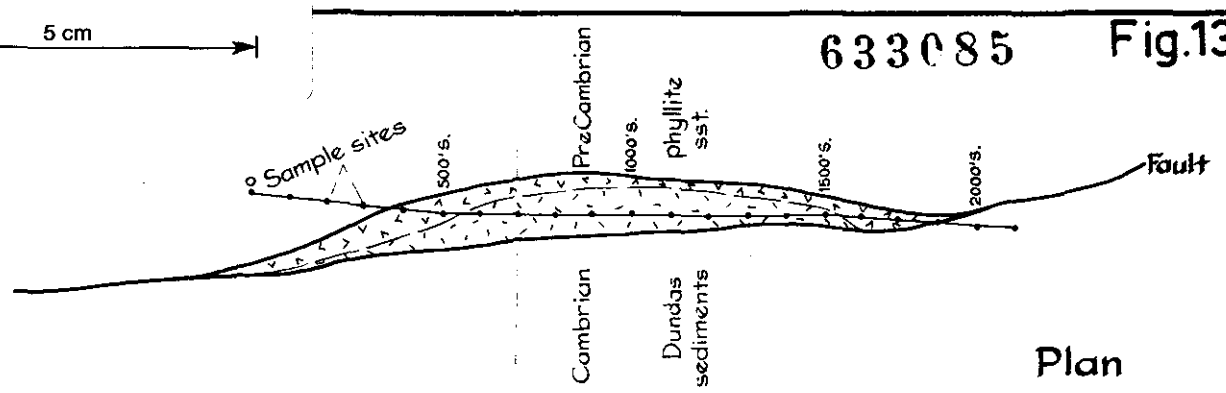
Samples also analyzed for Mo.
All values nil.

THE BROKEN HILL PROPRIETARY CO. LTD. EXPLORATION DEPARTMENT		
E.L. 13/65 – SOUTH WEST TASMANIA GEOCHEMICAL SOIL PROFILES PELIAS COVE AREA		
Prepared by: P.McG.	Centre: Melbourne	
Date: 5-8-69	Drawing No: A3-1106	Project No: TSW 108
Drawn: A.S.Cz.		

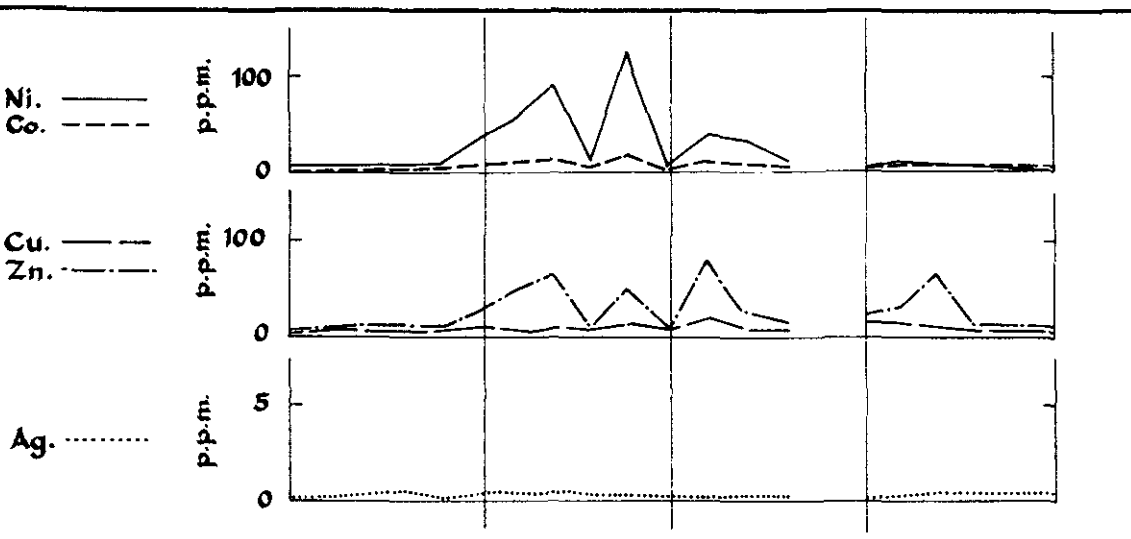
5 cm

633085

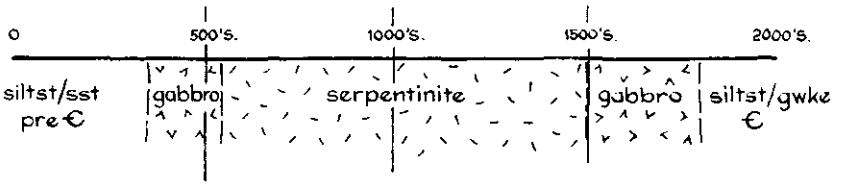
Fig.13



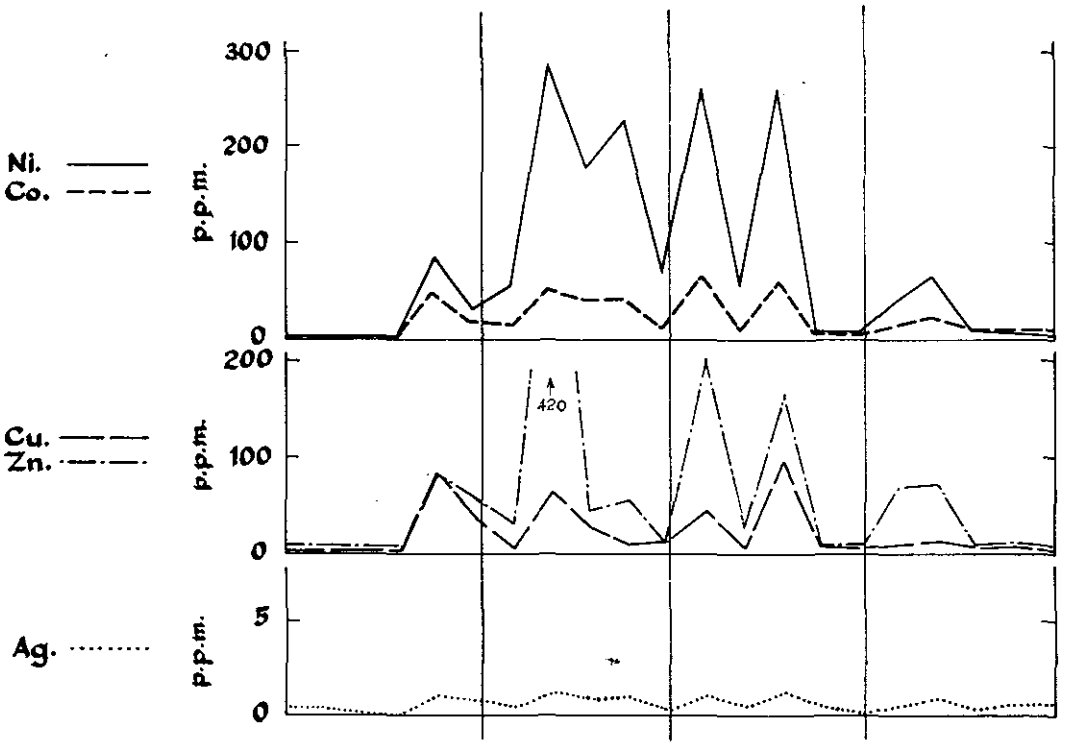
Plan



Soil horizon 'A'



Section



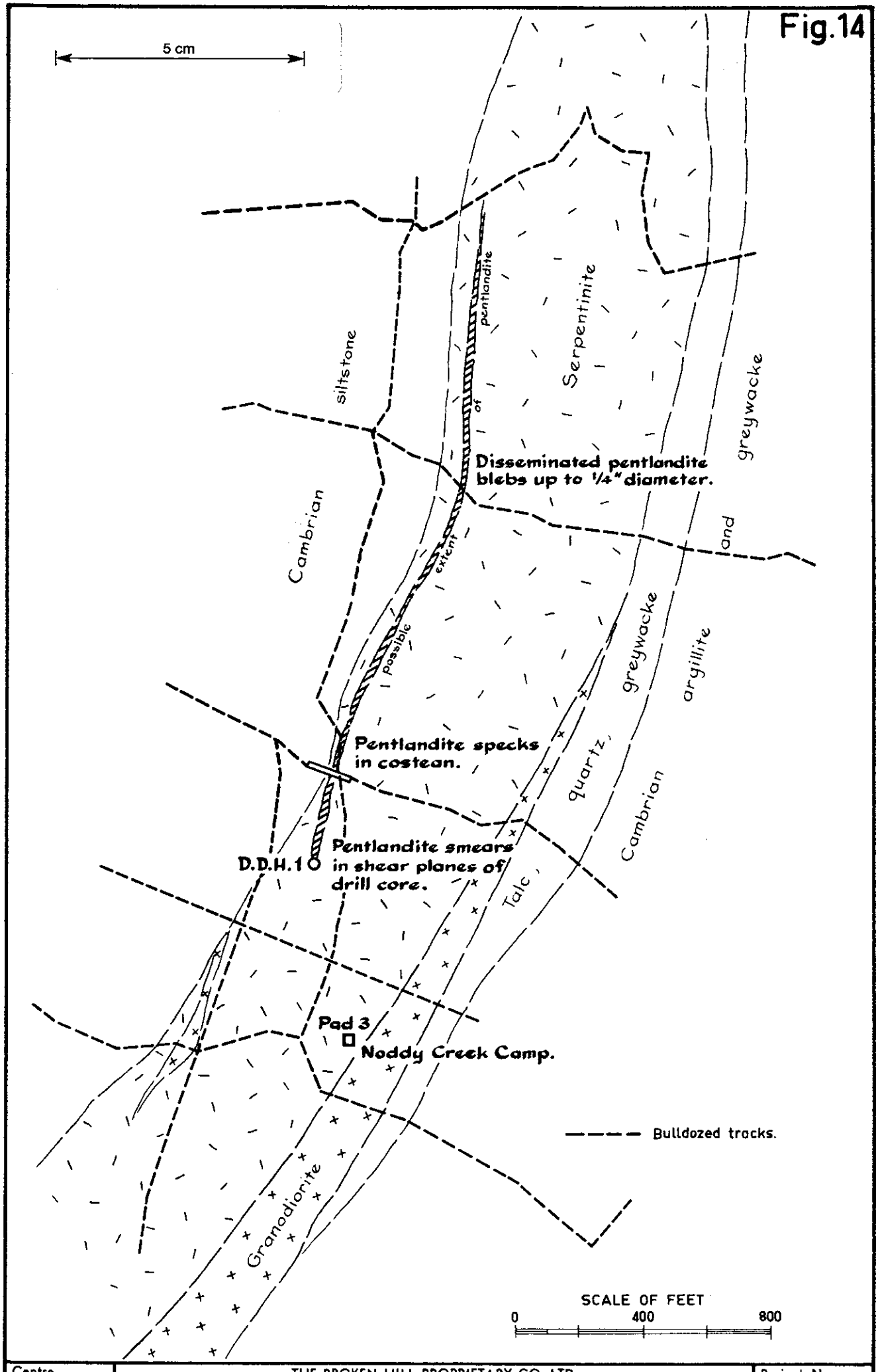
Soil horizon 'B'

Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD. E.L. 13/65 – SOUTH WEST TASMANIA GEOCHEMICAL SOIL PROFILES ANOMALY 128 – DOUBLE COVE BELT	Project No. TSW 109
Date 5-8-69		Drawing No. A4/1171

066

633086

Fig.14



Centre Melbourne	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No. TSW 110
Date 5-8-69	E.L.13/65 – SOUTH WEST TASMANIA NODDY CREEK PENTLANDITE OCCURRENCE	Drawing No. A4/ 1170