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# ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

## WEST COAST DEPARTMENT

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## SECOND REPORT ON

## INVESTIGATIONS AT TRIAL HARBOUR.

Investigation at Trial Harbour. S.P.L. 2. (Cont.)

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### SPECIAL PROSPECTORS LICENCE NO 22.

### BY

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S U M M A R Y

Geological mapping, magnetic surveys, geochemical soil surveys and induced polarisation surveys have been conducted over a grid area of  $3\frac{1}{2}$  square miles at Trial Harbour.

The grid area lies along the south-east boundary of the Devonian Heemskirk Granite. The geology comprises (?) Upper Pre-Cambrian quartzites overlain by (?) Lower Cambrian pelitic hornfels which is intruded by a body of serpentinitised dunite. Mineralisation of possible economic significance consists of (1) a small occurrence of disseminated nickel sulphides in the serpentinite, (2) lode and alluvial cassiterite within and adjacent to the granite, and (3) a small occurrence of disseminated molybdenite in the granite.

The magnetic surveys have delineated six anomalous magnetic zones which appear to be due to disseminated magnetite in serpentinite or to disseminated and semi-massive pyrrhotite and/or magnetite in pelitic hornfels.

Geochemical soil surveys have disclosed anomalous area for (1) copper and nickel in the serpentinite body, (2) copper and zinc in pelitic hornfels, (3) tin related to alluvial cassiterite, and (4) molybdenum in the granite. The most significant of these is a zone of copper anomalies near the southern contact of the serpentinite body.

The IP survey covered the serpentinite body and additional test traverses were made over selected magnetic anomalies in the hornfels. Ten anomalous IP zones were delineated. The most important zone is along the southern contact of the serpentinite body. This zone is coincident with the zone of copper anomalies and has a possible strike length of 3,500 ft. The majority of the other anomalous IP zones appear to correlate with magnetic anomalies or else with particular lithological units. However, IP anomalies on Line 19E in the vicinity of Mayne's tin workings and on Line 12E may warrant further testing.

One diamond drill hole was drilled to test below a gossan out crop at the western end of the anomalous IP and copper geochemical zone near the southern contact of the serpentinite body. The hole intersected disseminated pyrrhotite assaying 0.54 per cent nickel over a true thickness of 36 ft. One 10 ft. interval within this intersection assayed at 1.05 per cent nickel.

INTRODUCTION

As dealt with in the first report (Bainbridge, 1966), the Trial Harbour SPL was originally taken up in 1964 with the object of investigating tin mineralisation in the southern part of the Heemskirk Granite. A number of cassiterite-bearing quartz tourmaline veins in the granite were tested by diamond drilling and were shown to lack continuity both laterally and in depth (Bainbridge, 1966).

Attention was then turned to the lease area south of the Heemskirk Granite with the object of searching for tin mineralisation in the contact metamorphic aureole and for nickel mineralisation in the ultramafic body. This project was initiated by G.H. Griffiths. The programme was subsequently directed by D.O. Hackett and R.L. Brathwaite.

Magnetic surveys, geochemical soil surveys, geological mapping and I P surveys were conducted over an area of  $3\frac{1}{2}$  square miles extending south from the Heemskirk Granite to the southern boundary of the SPL. A number of magnetic, I P and geochemical anomalies were found. Follow-up investigation of the anomalies leading to selection of drilling targets has proceeded to varying stages of completion.

### LOCATION AND ACCESS

The Trial Harbour SPL is bounded on the west by the coast-line and is centred around Trial Harbour, a small settlement of beach shacks 12 miles by road from Zeehan.

Access is by a poorly surfaced gravel road along the northern part of the lease. Most of the western part of the lease is accessible in dry weather by four-wheel-drive vehicle. The south-eastern part of the lease is accessible only on foot.

### TOPOGRAPHY AND VEGETATION

The main elements of the topography are a low-lying coastal strip, up to 300 yards wide, and a Tertiary erosion surface at an elevation ranging from 250 to 500 ft. a.s.l. which slopes gently towards the coast. This surface has been deeply dissected by the streams, most of which flows southwards into the Little Henty River.

The areas underlain by granite, quartzite and serpentinite are generally covered with button grass or light scrub. On the Crimson Creek Formation and particularly in the valleys thick scrub and gum forest are present.

### LEASES

The Trial Harbour Lease was originally taken-up as SPL 1 covering 15 square miles in October, 1964. Subsequently the lease was re-granted as SPL 22 in December, 1966 after the original licence had expired due to an oversight in applying for a renewal. In March, 1968 a further area of  $7\frac{1}{2}$  square miles in the McIvors Hill area adjoining the original SPL to the east was taken up. This area surrounds the Tenth Legion magnetite deposit, which was however, excluded from the licence because it is under a Mines Department Reservation covering an area of  $2\frac{1}{4}$  square miles around the deposit.

In December, 1969, an area of 8 square miles was dropped from the north-west part of the SPL. This part of the area was considered to have been adequately tested by previous work.

GEOLOGY

The geology of the area has been described in reports by Waterhouse (1916), Blissett (1962) and Green (1966).

The oldest rocks are the Onah Quartzite and Slate of possible late Pre-Cambrian age. This formation is overlain with apparent conformity by the Crimson Creek Formation composed of hornfels and argillite. A large serpentinite body occurs as a crudely concordant lens within the Crimson Creek Formation. Silurian slates and quartzites are in fault contact with the Crimson Creek Formation in the southern and south-eastern part of the area. The Heemskirk Granite, dated radiometrically as late Devonian or early Carboniferous in age, intrudes the Onah Quartzite and Slate in the northern part of the lease area.

Onah Quartzite and Slate

This formation consists of light coloured quartzites and thin-bedded, dark coloured siltstones which have been recrystallised through contact metamorphism by the Heemskirk Granite.

The Onah Quartzite has a regional east-west strike and dips steeply to the south. The siltstone beds, which are most abundant in the eastern part of the area, commonly show steeply plunging, small-scale folds.

Crimson Creek Formation

Overlying the Onah Quartzite are metasedimentary rocks which have been correlated with the Crimson Creek Formation. The contact with the Onah Quartzite, as exposed on the Trial Harbour road and in Pyke's Creek, appears to be gradational and conformable.

The Crimson Creek Formation up to one mile from the Heemskirk Granite has been converted to hornfels. The hornfels is generally a fine-grained, highly indurated pelitic rock in which original bedding is largely obliterated. Bands of meta-conglomerate up to 100 ft. in thickness occur in several places.

South of the serpentinite body the Crimson Creek Formation consists of indurated grey argillite and siltstone which strikes about east-west and dips south. These rocks are slightly metamorphosed as shown by the presence of biotite and actinolite in thin section. Graded bedding is well displayed in outcrops on the beach and shows that the beds face south.

### Serpentinite

The main serpentinite body is a wedge-shaped mass which tapers towards the east. The northern and southern boundaries are roughly parallel with the strike of the country rocks but in detail, as exposed on the beach at the southern contact, the contacts are discordant to bedding in the argillite.

The serpentinite body consists mainly of serpentinitised dunite, although a diopside-bearing phase is present along the northern margin of the body. The dunite consists mainly of varying proportions of olivine and serpentinite. The degree of serpentinitisation is variable but is most intense near the northern contact and to a lesser extent the southern contact. Magnetite is ubiquitous and occurs as irregular or streaky segregations, disseminated grains and grain aggregates. It is particularly abundant in a zone along the northern contact where it makes up 10 to 20 per cent of the rock. Talc and carbonate occur locally. Massive silicified rocks are found at several places along the margins of the body as shown on the geological map (Plate 2). As seen in thin sections these rocks have a relict olivine texture and therefore represent silicified dunite.

A small serpentinitised dunite body occurs about one mile to the east of the main body (Plate 2).

The Trial Harbour serpentinite could be classed as an alpine type ultramafic (e.g. Green, 1966). By comparison with other ultramafic-mafic complexes in West Tasmania, the Trial Harbour body may represent only the lower part of a differentiated complex. The McIvors Hill Gabbro, 3 miles east of Trial Harbour, could be the upper part of the original complex but there is no connection between the two bodies at the present level of erosion. The implication is that the Trial Harbour body has moved from its original site of differentiation and has been tectonically emplaced into its present position.

From its stratigraphic position and evidence on the age of the other ultramafic bodies in Tasmania the inferred age of emplacement of the Trial Harbour serpentinite is Lower Cambrian.

### Silurian

Silurian rocks of the Crotty Quartzite and Amber Slate formations are in fault contact with the Crimson Creek Formation in the south and south-east of the area. These Silurian formations are well exposed along the coast south of Trial Harbour where the Amber Slate exhibits some highly irregular fold and fault structures indicative of soft sediment deformation. Calcareous beds within the Amber slate have been metamorphosed by the granite to calc-silicate hornfels.

### Heemskirk Granite

The Heemskirk Granite occupies the north-western part of the SPL. The southern contact of the granite trends east-west and is roughly concordant with the strike of the country rocks. However, in detail the granite contact is markedly discordant to bedding in the adjacent Conah Quartzite. Green (1966) has mapped a marginal phase of grey granite which passes into pink granite composed of quartz and orthoclase with less important plagioclase and biotite. White tourmaline granite occurs to the north of the pink granite and is the main host for cassiterite-bearing quartz-tourmaline mineralisation.

The Heemskirk Granite has been dated radiometrically as late Devonian or early Carboniferous.

### Tertiary Limonite

Limonite, generally 3 to 5 ft. in thickness covers much of the upland surface of the serpentinite (Plate 2). The limonite appears to be residual in origin, derived from weathering of the underlying magnetite-bearing serpentinite. The limonite is fairly massive, assaying at 35 to 60 per cent iron. An out-crop in a cliff near the south end of Line SE gives a section through the limonite. Five feet of massive limonite grades down through a 2 ft. zone of jaspilitic rock with interbanded limonite and silica into a serpentinite containing much fine grained silica.

The upland surface on which the limonite cover occurs lies at the same level as the coastal erosion surface in the Trial Harbour area. This surface is considered to be mid-Tertiary in age.

### Tertiary Sand

Just south of the base line between Line OO and Line LE there is a deposit of quartz sand containing well-rounded quartz pebbles. This deposit lies at the same elevation as the coastal surface and it overlies the limonite on the serpentinite. This and similar sand and gravel deposits were mapped as Tertiary by Blissett (1962).

### Quaternary

Sand dunes up to 200 ft. wide border the coast south from Trial Harbour. A low-lying area between the sand dunes and the hills behind is covered by sand, silt and clay, largely alluvial in origin.

### Faulting

There are three major faults in the area. Two of the faults bring the Crimson Creek Formation into contact with the Silurian sediments, in the south and south-east of the area. The third fault is inferred to explain the great reduction in thickness of the Onah Quartzite in the north-east of the map area.

## ECONOMIC GEOLOGY

The SPL covers part of the Heemskirk tin field which was worked intensively for lode and alluvial cassiterite between 1879 and 1890. Intermittent small-scale mining has continued to the present day. The total recorded production from the Heemskirk field was estimated at 814 tons of metallic tin (Blissett, 1962).

Mineralisation in the SPL is associated with or related to either the serpentinite or the granite.

(a) Nickel Mineralisation in Serpentinite

A number of occurrences of disseminated nickel sulphide are known in the serpentinite. In weathered surface outcrops the sulphides have generally been oxidised to azarite, a green nickel carbonate.

The best known sulphide occurrence is at the Nickel Reward Prospect where some small, irregular patches of disseminated nickel sulphides have been explored by three adits and a shaft. Pentlandite is the most abundant sulphide while heazlewoodite, millerite and bravoite are in minor amounts (Williams, 1958). Waterhouse (1916) reported assays of up to 18.6 per cent nickel from dump pickings of disseminated ore but this figure appears too high. Similar material assayed at Rosebery gave values of 2.0 to 3.0 per cent nickel.

Geological mapping has located a number of gossan outcrops which are probably related to the nickel-bearing sulphide mineralisation. The largest of the gossan outcrops is located between Lines OO and 1E. It reaches a maximum width of 40 ft. and extends for 300-400 ft. along strike before disappearing under scree or soil cover.

Other gossan outcrops were mapped on Line 2W at 8.3S, Line OO at 5S and Line 3E at 26S. These gossans are much smaller with dimensions of 3-5 ft. in width and less than 100 ft. along strike.

The gossan material is typically red-brown and silica rich with a fine cellular boxwork. Analyses of grab samples from the gossan outcrops are given in Table I. Samples 2575 and 2576 show relatively high copper values; otherwise the results are unremarkable.

(b) Tin Mineralisation related to the Granite

Cassiterite-bearing quartz-tourmaline and greisen veins are present in the south-west part of the Heemskirk Granite and constitute the major part of the Heemskirk tin field. Minor quantities of pyrite, chalcopyrite, arsenopyrite, bismuthinite, bismuth, molybdenite, sphalerite and fluorite are associated with the cassiterite veins.

Cassiterite-bearing quartz-tourmaline veins are also present at Kelvin and Maynes mines which are situated within Conah Quartzite near the granite contact. Mayne's mine was one of the chief producers of the Heemskirk field and the estimated total production was 140 tons of metallic tin.

Small patches of cassiterite-bearing alluvium are found in the creeks but have mostly been worked out.

(c) Molybdenite in Granite

A small occurrence of disseminated molybdenite is exposed in a road cutting about 100 ft. from the southern contact of the Heemskirk Granite. The molybdenite is mainly in thin, irregular quartz veinlets within grey granite. A grab sample of this material assayed at 0.07 per cent molybdenum.

(d) Magnetite and Pyrrhotite Mineralisation

Waterhouse (1916) reported a number of small occurrences of magnetite variously associated with pyrrhotite, pyrite, bismuthinite, wolframite and sphalerite. These occurrences are in slate or hornfels and are generally in close proximity to the granite contact.

TABLE I - GOSSAN ANALYSES

Sample No.	2575	2576	2577	2578
As (50) ppm	ND	ND	ND	ND
Ba (50) ppm	200	50	100	400
Co (5) ppm	5	150	150	100
Cu ppm	900	800	200	100
Cr (20) ppm	800	800	100	800
Fe %	26.2%	4.5%	7.3%	17.3%
Mn (10) ppm	100	500	10000	5000
Ni ppm	900	600	800	1700
Pb (1) ppm	10	20	10	10
Se (20) ppm	ND	ND	ND	ND
V (10) ppm	10	ND	ND	ND
Zn (20) ppm	50	300	300	200

Detection Limits in brackets, ND not detected  
Cu, Fe and Ni determined by AAS at Rosebery

Se by XRF at AMDEL

Other elements by semi-quantitative Emission  
Spectrograph at AMDEL

2575 - Line 00 + 300E, 27S

2576 - Line 2W, 8.3S

2577 - Line 00 + 50E, 5S

2578 - Line 00, 5S

In the course of the present investigation a band of disseminated pyrrhotite-pyrite mineralisation, 50 to 100 ft. in thickness, was mapped in fine-grained Oonah Quartzite from Line 2E to Line 5E at 1N. In addition disseminated pyrrhotite mineralisation was found in a meta-conglomerate band in the Crimson Creek hornfels at 17S on Line 14E and in Pyke's Creek between Lines 14E and 15E. Assays of the pyrrhotite mineralisation showed trace amounts of zinc, lead and copper.

### MAGNETIC SURVEY

The lease area south of the granite was subjected to a reconnaissance magnetometer survey over a grid lay-out. The zero point of the grid was placed at a sharp bend in the road approximately one half mile east of Trial Harbour and an east-west base line was laid out from this point. At 100E, 30N a sub-base line on the same bearing of 090° TN was extended to 245E. Lines north and south were set out at 500 ft. intervals along the base line. The lines were cut and pegged at 100 ft. intervals.

The magnetic survey was carried out with a McPhar 500 fluxgate magnetometer recording the vertical component of the earth's magnetic field (error  $\pm$  10 gammas). Readings were taken at 100 ft. intervals along the lines and plotted as line profiles of vertical magnetic intensity. Fill-in readings at 20 ft. intervals were made over a number of anomalous zones.

### Magnetic Anomalies

It was not possible to contour satisfactorily the magnetic results because of the irregular nature and steep gradients of the profiles in relation to the wide spacing between the lines. The surface projections of the magnetic anomalies are shown in plan (Plate 2) along side the respective traverse lines. Most of the anomalies can be correlated from line to line into a number of anomalous zones.

### Zone M1

This zone is located between Lines 23E and 26E from 00 + 00 to 25 + 00N. This zone contains a number of separate anomalies which are grouped together because they have a similar pattern and lie within the same rock type. The individual anomalies correlate poorly from line to line and must have very limited strike lengths although the widths range up to 1000 ft. (e.g. on Line 25E). The magnetic profiles (Plates 19-21) are very irregular with some extremely high values (e.g. 162,500 gammas at 11.5N, Line 24E), often accompanied by large reverse values. This together with the

narrow width of the peaks suggests that the source is very near surface concentrations of highly magnetic material, probably magnetite.

Out-crop in the anomalous zone is poor; the rocks observed mainly as float, are pelitic hornfelses of the Crimson Creek Formation.

#### Zone M2

This zone is located at the southern end of Line 22E and correlates with a small body of serpentinite. A detailed magnetic survey with readings 20 ft. apart on lines spaced at 50 ft. intervals was conducted over this anomaly. A magnetic contour plan of the anomaly (Plate 25) shows a roughly oval-shaped positive anomaly accompanied by reverse anomalies to the north-east and south-east. The positive anomaly appears to coincide with the serpentinite out-crop and suggests a plug-like body.

A small out-crop of semi-massive pyrrhotite assaying at 0.95 per cent nickel and 0.48 per cent copper was found in a creek bed near 800S on Line 22E. The pyrrhotite is in serpentine near the southern contact of the serpentinite body.

#### Zone M3

This is a broad anomaly extending from 11N to 18N on Line 19E. The anomaly lies within Oonah Quartzite and is of interest because of its proximity to the old workings of Maynes Mine.

#### Zone M4

Zone M4 extends from Line 2E to Line 5E and is centred at 1N. The greatest intensity (8,000 gammas) is on Line 5E. The profiles are irregular with narrow peaks and vary in magnitude from line to line.

This zone correlates with a band of disseminated pyrrhotite mineralisation mapped from Line 2E to Line 5E.

#### Zone M5

Zone M5 extends from Line 3E, 13S to Line 17E, 16S. The anomalies correlate reasonably well from line to line although the positions and magnitudes of the peaks are variable. The zone parallels the contact between the Oonah Quartzite and the Crimson Creek Formation and is located within hornfels of the Crimson Creek Formation. The anomalous zone extends further east from Line 17E and further west from Line 6E but the magnitude falls off rapidly. At the western end the anomaly converges with the south-east trending contact of the serpentinite

body. As with Zone M1 the line profiles (Plates 9-16) are irregular with narrow and intense positive and negative peaks indicative of a very near surface source with very high permanent magnetism. Disseminated and semi-massive pyrrhotite was found in a meta-conglomerate band at 17S on Line 14E and in Pyke's Creek between Lines 14E and 15E. The pyrrhotite may account for the magnetic anomaly.

### Zone M6

Zone M6 is located along the northern margin of the serpentinite body from Line 5W to Line 6E with a possible extension further east to Line 10E. It is a fairly well defined zone and ranges up to 1000 ft. wide with some local high peaks. On some profiles the anomalies extend over on to the Crimson Creek hornfels. The fill-in readings over the anomalies show highly irregular profiles. The serpentinite in the anomalous zone contains 5-20 per cent magnetite, disseminated, in stringers and in massive pods up to 1 foot in length, which would adequately explain the magnetic anomalies.

### INDUCED POLARISATION SURVEY

Following the magnetic and geochemical surveys an I P survey was conducted over the serpentinite body. Traverses were made on Lines 5W to 6E (12 lines in all). Lines 1W and 2W were traversed using 100 ft. spreads; all the other lines were traversed on 200 ft. spreads with follow-up 100 ft. spreads in anomalous areas. Calibration traverses using 100 ft. and 50 ft. spreads were made on Line 00 over a known occurrence of disseminated sulphide at 27S (for results see under "Zone F"). In addition, test I P traverses were made over magnetic anomalies on Lines 12E, 19E, 22E and 24E. The I P survey was carried out under contract by McPhar Geophysics using a McPhar variable frequency I P unit.

### I P Anomalies

This section is compiled with modifications from the McPhar Report. For convenience of presentation the I P anomalies have been correlated from line to line into a number of zones. The data plots for each line are in the McPhar Report.

### Zone A

This extends from Line 5W to 2W although it appears to be absent on Line 3W. The anomalous zone appears to follow the Oonah Quartzite - Crimson Creek contact. The I P lines did not extend far enough north to complete the anomalous pattern.

### Zone B

Zone B begins on Line 1E and is centred at 1N. The anomaly splits into two distinct parts (B1 and B2) from Line 2E to Line 6E. On the data plots the two parts join at depth ( $n = 3$  or  $n = 4$ ). Both B1 and particularly B2 shows highly irregular anomalous patterns, mainly due to very sharp resistivity changes. Zone B1 is located within the hornfels of the Crimson Creek Formation while B2 appears to be mainly on the Onah Quartzite side of the contact. Zone B2 shows a broad positional correlation with the western end of Magnetic Zone M5. Zone B3 on Line 12E at 13S which probably represents the eastern extension of Zone B2, shows good positional correlation with one of the strongest magnetic anomalies of Zone M5.

### Zone C

This is a distinct zone extending from Line 4W to Line 00 along the northern margin of the serpentinite body. The data plots show well defined, generally shallow and regular anomalous patterns. On Lines 3W to 00 the anomalous patterns are caused mainly by a zone of lower resistivities without any marked frequency effects.

Zone C corresponds in position with the western part of Magnetic Zone M6. The eastern part of Zone M6, which has stronger magnetic anomalies than the western part, does not show any significant I P response.

### Zone D

The anomalies that form Zone D, show a source at depth and lie just to the south of the anomalies of Zone C. On Line 2W there is a complex anomaly that may be due to two sources.

Zone D2 is a possible eastern extension of D, since it represents a zone with moderate frequency effects bounded on the south by lower frequency effects. Zone D2 has a shallow source. (anomalous for  $n = 1$ ).

### Zone E

This is a weak, discontinuous zone within the serpentinite. The anomaly is strongest on Line 00 and has a fairly shallow source. The I P anomaly on Line 00 is coincident with a small magnetic anomaly.

### Zone F

Zone F1 is located just inside the southern contact of the serpentinite. The anomalies are well defined from Line 3E to Line 6E and indicate a narrow, fairly shallow source. On Lines 1E, 00 and 2W the frequency effects are lower and as a result the anomalies are much less evident. Calibration traverses were run over an occurrence of disseminated nickel-bearing pyrrhotite, as intersected in drill hole THP 136, near Line 00 at 27S. Separate traverses were made using 100 ft. and 50 ft. spreads at frequencies of 0.31 and 2.5 c.p.s., and 0.31 and 5.0 cp.s. A shallow anomaly ( $n = 1$ ) was detected at 27-27.5S on 50 ft. spreads but the calibration traverses were otherwise unsuccessful.

The I P anomaly on Line 5E is coincident with a minor magnetic anomaly but elsewhere along Zone F magnetic effects are weak.

Zone F2 lies just inside the serpentinite contact on Lines 5E and 6E. The data plots indicate a fairly strong source at some depth ( $n = 2$ , or  $n = 3$ ).

### Zone G

In the Crimson Creek Formation to the south of the serpentinite there is a broad zone of considerable length which is characterised by relatively high background frequency effects. These effects are probably caused by disseminated pyrite in the pelitic sediments of the Crimson Creek Formation.

### Zone H

Test traverses on Line 24E disclosed two distinct I P anomalies which are due to resistivity lows. These anomalies coincide with magnetic anomalies.

### Zone I

There is a well defined anomaly on Line 19E at 13N-14N which lies just to the north of the old Maynes Mine workings. The anomaly possibly extends at depth to Line 19.5E but it does not continue to Line 18E. The I P anomaly on Line 19E coincides with the northern end of the broad Magnetic Anomaly M3.

### Zone K

A test traverses over Magnetic Anomaly M2 on Line 22E showed complex anomalous patterns with some very high metal factor values.

GEOCHEMICAL SURVEY

The grid was used as a base for a geochemical soil survey. Soil samples were taken with a 3 inch diameter hand auger from the lower "B" or "C" horizons at 100 ft. intervals along the grid lines. Fill-in samples at 50 ft. intervals were taken over some anomalous areas. The soils are mainly podzols with a soil depth ranging from 3 inches to 3 ft. The "B" horizon was generally very thin over the serpentinite.

The -80 mesh fraction of the samples was analysed for copper, lead, zinc and nickel by AAS and in addition some samples were analysed for tin or molybdenum by colorimetric methods.

The results were plotted as profiles (Plates 6-24) for each line. The anomalies have been qualitatively estimated from the profiles and plotted in plan (Plate 4). Statistical analysis of the data was attempted but was not generally satisfactory because of irregular frequency distributions. Threshold and anomalous values calculated from the arithmetic means and standard deviations for results from soil samples over the Crimson Creek Hornfels, are given in Table 2.

TABLE 2Anomalous Values for Crimson Creek Hornfels

	Threshold (M+ 2 S.D.)	Probably Anomalous (M+ 3 S.D.)
Pb	65 ppm	85 ppm
Zn	72 ppm	110 ppm
Cu	90 ppm	125 ppm
Ni	80 ppm	100 ppm

The geochemical results are discussed firstly in relation to the underlying rock types and secondly for the significantly anomalous zones.

### Crimson Creek Formation and Oonah Quartzite

Background values for lead, zinc, copper and nickel over the Crimson Creek Formation are consistently higher than the values over the Oonah Quartzite. The background profiles over the Oonah Quartzite are characteristically low and uniform while over the Crimson Creek hornfels the profiles are usually erratic.

Apart from tin there are very few highly anomalous values and the majority are isolated single-station anomalies.

### Serpentinite

The nickel values are very high (up to 10,000 ppm and averaging about 4,000 ppm) from soil directly on weathered serpentinite but values are much lower where the serpentinite is covered by limonite or gravels. Nickel values are highest over the western part of the serpentinite body. The high nickel values do not appear to have much significance since the nickel is probably related to nickel contained in olivine and serpentine and not to nickel-bearing sulphides.

The values for zinc are generally high over the serpentinite (averaging about 300 ppm), which is probably due to preferential enrichment of zinc by absorption on limonite in the soils derived from the serpentinite (e.g. White, 1957). The zinc values tend to show positive correlation with nickel except in the limonite covered areas where zinc remains high in contrast to low nickel.

Copper values are generally very low over the serpentinite except for several anomalous zones which will be discussed later.

There are number of single-station lead anomalies and in general the lead results show erratic profiles

### Anomalous Zones

#### (a) Copper Anomalies near Southern Contact of Serpentinite

A more or less continuous zone of anomalous copper values is present from Line 00 to Line 6E near the southern contact of the serpentinite. The zone was covered by additional fill-in sampling on lines 250 ft. apart. Profiles for the original and fill-in lines are given in Plates 23 and 24. The low background and quiet profiles for Lines 4½E and 5E are explained by the presence of limonite cover on these lines.

Some of the samples from the original lines were also analysed for sulphur, arsenic and selenium. Sulphur anomalies were found on Line 3E at 24S and 27S. Arsenic results showed a significant anomaly on Line 3E at 27S. The values for Selenium were fairly high (average 180 ppm) but no significantly anomalous values were recorded.

The copper, arsenic and sulphur anomalies are considered highly significant as being indicators of a sulphide source. Ground follow-up of the copper anomalies led to the discovery of gossan on Line 0.5E and Line 3E and of sulphides in fresh serpentinite near Line 4E. The presence of sulphides (pyrrhotite with minor pentlandite) was confirmed in drill hole THP 136 near Line 00. A well defined anomalous I P zone (Zone F) is coincident with the geochemical anomalies and a sulphide zone with a strike length in excess of 3,000 ft. is indicated.

(b) Copper and Zinc in Hornfels from Line 4E to Line 12E

There are scattered anomalous values for copper and zinc over Crimson Creek hornfels on Lines 4E, 8E, 9E, 10E and 12E. These anomalies all lie within Magnetic Zone M5. Disseminated and semi-massive pyrrhotite has been found on Line 14E within this zone and assays of this mineralisation showed trace amounts of copper and zinc which would probably account for the geochemical anomalies.

(c) Copper and Zinc at 8S, Line 22E

There is a copper-zinc anomaly associated with a small occurrence of pyrrhotite mineralisation in serpentinite near 8S on Line 22E.

(d) Tin

A number of tin anomalies are present in the north-east part of the area. Ground follow-up has shown that all the anomalous tin samples come from small areas of alluvium and are due to detrital cassiterite. This is particularly evident on Line 19E along Pyke's Creek downstream from Maynes workings.

Molybdenum in Granite

On Lines 4W to 2E the original grid was extended to 20N and soil samples were taken at 100 ft. intervals from 3N to 20N. This sampling grid was designed to determine the extent of a disseminated molybdenite showing in the granite near 7N on Line 1W.

Only two samples were anomalous at 20 ppm Mo (see Plate 4); the majority were less than 2 ppm. Lead, zinc and copper were likewise very low.

### DIAMOND DRILLING

One drill hole, THP 136 was drilled to test below the southern end of the gossan on Line OO, 27S. The siting of the hole was dictated by topography and the need to drill from the southern side because of the inferred 50° to 60° south dip of the mineralised zone. However, the mineralised zone as intersected in THP 136 dips more steeply than expected, at about 70° south, and future drilling could be done more easily from the north side where topography, access and drilling conditions are more favourable.

Drill hole THP 136 intersected a zone of disseminated pyrrhotite assaying 0.54 per cent nickel over a true thickness of 36 ft. (Plate 26) from 200-240 ft. A 10 ft. interval from 205-215 ft. assayed at 1.05 per cent nickel. The proportion of nickel contained in the silicate minerals is uncertain although the fact that assays using a conc. perchloric-nitric acid attack to dissolve the whole sample gave similar results to the standard conc. nitric acid attack indicates that most of the nickel is present in sulphide form.

The mineralisation as seen in polished section consists mainly of pyrrhotite. Pentlandite is present in minor amounts in the interval from 205-215 ft. The pyrrhotite is in relatively large granular-masses up to 1.5 mm but also occurs as very fine disseminations. The pentlandite is relatively fine grained (0.1 mm) and it fringes and veins the pyrrhotite. Pyrrhotite from a section at 211 ft. contains numerous very fine grained shred-like inclusions of a pink mineral which could be valleriite or mackinwaite. Magnetite is present throughout the mineralised zone but is no more abundant than in the unmineralised serpentinite.

The mineralisation is contained in dark green serpentinite which in thin section consists of a mesh aggregate of serpentine which are pseudomorphs of olivine. Patches of talc are present in the most extensively mineralised rock. The serpentine grades through serpentinite with scattered relict kernels of olivine into relatively fresh dunite north of the mineralised zone. The dunite consists of roughly equigranular olivine grains enclosed in a serpentine matrix. The serpentine contains disseminated magnetite in elongate aggregates which range up to 1.5 mm in length.

## LOCALISATION OF THE NICKEL MINERALISATION

At this stage of the investigation the factors controlling the localisation of the nickel sulphide mineralisation are obscure.

The known sulphide occurrences at Nickel Reward and as found in drill hole TBP 136 are respectively located towards the centre and near the inferred top contact of the serpentinite body. This is unlike the classic pattern of orebodies located along the basal contact of serpentinite bodies as seen in Western Australia and elsewhere. The geological environment of the Trial Harbour serpentinite is different from the typical ore-bearing West Australian serpentinites which are syn-volcanic lenses of serpentinite enclosed by basaltic volcanics. As well, the general rarity of economic deposits of copper-nickel sulphides in "alpine-type" ultramafics, with which the Trial Harbour serpentinite can be grouped, is an unfavourable feature. Nevertheless, the possibility of economic concentrations of nickel sulphides in the Trial Harbour serpentinite cannot be discounted on these grounds.

If the Trial Harbour body has been tectonically emplaced into its present position then the mineralisation is likely to be controlled by structural factors rather than by stratigraphic position within the body. Structural control of the mineralisation is not obvious in the field though there is a suggestion of an east-west shearing along which the mineralisation is aligned at Nickel Reward. The indicated southern zone also strikes east-west.

## C O N C L U S I O N S

Mineralisation of possible economic significance found or inferred from results of investigations to date comprises:-

- (1) A nickel-bearing sulphide zone near the southern contact of the serpentinite body:- This zone has been delineated by coincident geochemical and I P anomalies and confirmed at several places by gossan out-crops. Diamond drilling at one point near the western end of the zone intersected disseminated nickel-bearing pyrrhotite mineralisation assaying at 0.54 per cent nickel over a thickness of 36 ft. with one 10 ft. interval within the zone assaying at 1.05 per cent nickel. The inferred strike length of this zone (I P Zone F) is 3,500 ft. and it could extend further. However, mineralisation may not be continuous over the full 3,500 ft. strike length.

- (2) Disseminated pyrrhotite and magnetite mineralisation containing traces of lead, zinc and copper in hornfels of the Crimson Creek Formation:- As inferred from the magnetic results this mineralisation is discontinuous but extends over a considerable area. Two separate zones of magnetic anomalies have been delineated with strike lengths of 5,000 ft. and 3,000 ft. respectively and anomaly widths averaging 500 ft. and ranging up to 1200 ft. Scattered copper and zinc geochemical anomalies were found within these zones.
- (3) Mineralisation in the vicinity of Maynes tin mine:-  
Coincident I P and magnetic anomalies were located in close proximity to the old Maynes tin workings. Maynes workings exploited narrow cassiterite-bearing quartz-tourmaline-pyrite veins but this type of mineralisation is unlikely to be the direct source of the magnetic and I P anomalies.
- (4) Molybdenite in Granite:\* An occurrence of disseminated molybdenite near the southern contact of the Heemskirk Granite was investigated but was found to be too small to be of economic interest.

### R E C O M M E N D A T I O N S

It is considered that further testing is warranted on three of the anomalous zones.

- (1) The most important of these is Zone F near the southern contact of the serpentinite. Initially, further testing should consist of scout diamond drilling to cover the strike extent of the zone. The proposed drill hole targets are:-
- |     |           |         |                |             |
|-----|-----------|---------|----------------|-------------|
| (a) | Line 0.5E | @ 27S   | Vertical depth | 150-200 ft. |
| (b) | Line 3E   | @ 26.5S | Vertical depth | 150-200 ft. |
| (c) | Line 5E   | @ 26.5S | " "            | 150-200 ft. |
| (d) | Line 6E   | @ 27.5S | " "            | 150-200 ft. |

Target (a) is to test below the main gossan out-crop. Targets (b), (c) and (d) are designed to test the three strongest coincident I P and geochemical anomalies. The length of each of the proposed holes is 300-350 ft. This scout programme should give an idea of the possible size and grade of the mineralised zone and if the results are encouraging pattern drilling would follow on as the next stage.

In addition to the scout drilling, detailed geological mapping on a scale of 100 ft. to 1 inch of the Zone F area is proposed.

- (2) The coincident I P and magnetic anomaly near Mayne's workings is considered to warrant testing by one or two diamond drill holes, to determine the source of the anomalies. The proposed drill hole target is on Line 19E to 14N and would require a hole approximately 350 ft. in length.
  
- (3) Although the Magnetic Anomalous zones M1 and M5 appear to be caused by magnetite and pyrrhotite without accompanying base metals this has only been observed at two places and further testing is desirable. The coincident I P and magnetic anomaly on Line 12E at 13S is suggested as a suitable target for a diamond drill test. One or two holes each about 350 ft. in length would be required.

### Schedule and Budget

Commencement of diamond drilling on Zone F is dependent on satisfactorily resolving the position of the disputed southern boundary of SPL 22 with Texins Development.

Drilling of the targets on Line 19E and 12E would follow on after drilling of Zone F.

Using one machine on a one-shift basis it is estimated that the drilling programme would take four to six months.

Access to all the drill sites except that on Line 12E could be obtained with the tracked muskeg vehicle or four-wheel-drive vehicles. About 300 ft. of bulldozer access track is required on Line 12E and some levelling may be needed to prepare suitable sites for some of the other holes. In addition, a bulldozer could be used for trenching over the geochemical and I P anomalies on Zone F.

The estimated cost of the proposed drilling programme is \$34,000 and is detailed as follows:

	<u>\$</u>
Diamond drilling Zone F	
4 holes of 350ft. = 1400 ft. @ \$10/ft.	14,000
Diamond drilling on Line 19E target	
2 holes of 350ft. = 700 ft. @ \$10/ft.	7,000
Diamond drilling on Line 12E target	
2 holes of 350ft. = 700 ft. @ \$10/ft.	7,000
Bulldozer hire 5 days @ \$120/day	600
Geological mapping Zone F	400
Supervision, vehicles, accommodation and overheads	5,000
	<u>34,000</u>

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INTERIM REPORT

on

MAGNETIC SURVEY

TRIAL HARBOUR

TASMANIA

*Plans enclosed  
- Repts. 00104  
R.L. Brothwaite  
November 1970*

With Comment on  
Geochemical Survey

for

Electrolytic Zinc Co. of Australasia Ltd.

Rosebery Tasmania

by

John E. Webb  
Consulting Geophysicist

INTRODUCTION

This preliminary report is a summary of the discussions held between Mr. Griffiths of the Electrolytic Zinc Co. of A/Asia Ltd. and the author. These discussions took place in Melbourne on the 10th May, 1968. Mr. Pratten was present for sections of the discussions. A later short discussion took place in Adelaide on 22nd June, 1968.

The magnetic survey was carried out by E-Z personnel using a McPhar M700, vertical force, fluxgate magnetometer. It must be noted that this instrument was set for use in the northern hemisphere and for normal southern hemisphere appreciation it was necessary to change the sign of readings by plotting negative readings upwards.

The readings were taken at a spacing of 100 feet along traverses 100 feet apart with fill in readings at shorter intervals over a number of anomalous areas. The shorter reading interval showed the magnetics to be very erratic and it is doubtful that many of the anomalies, as plotted, are truly representative of the true conditions.

The geology quoted in the report is that supplied by Mr. Griffiths on a 1:15840 Zeehan map sheet. The area of the survey extended eastwards from Remine (Trial Harbour) and was bordered on the southern-side in part by the Little Henty River.

DISCUSSION OF RESULTS

Starting from the Western end of the area, there are two major lines of anomalies. The first, which is evident on the most westerly line (line 4W) at 200N, follows the Serpentine and Gabbro (€s) - Crimson Creek

series (Ch hornfels) contact (but lying within the serpentine and gabbro) as far east as line 2E where the contact swings to the south.

The anomaly then continues to follow the contact as far as line 6E where there is a further shift to the south along a postulated fault between lines 6E and 7E. The anomaly could either shift to the south with the fault or could continue further east along the same strike. Unfortunately the close proximity of another anomaly prevents a clear interpretation.

The second anomaly mentioned above, commences at line 1E or rather branches out from the first anomaly at this point and continues eastwards following the quartzite (Oonah Quartzite) - hornfels contact but in general lying within the hornfels. This anomaly appears to recombine with the first anomaly or possibly to parallel it closely from line 6E to the east until interrupted by the fault between lines 19E and 20E.

It would appear that the two anomalies discussed above follow respectively the hornfels-serpentine and hornfels-quartzite contacts but that the former could continue eastwards into the hornfels where the contact is faulted to the south in the vicinity of line 6E.

Fill-in readings over these anomalies show that the character of both is very much more disturbed than indicated by the 100 ft. readings and are typical of the erratic anomalies usually associated with serpentine.

A third smaller anomaly also breaks away from the first anomaly somewhere between lines 00 and 2E and projects into the Oonah Quartzites extending to between lines 5E and 6E. Its greatest intensity is on line 5E. This anomaly is the only one breaking away from the major anomalies and extending any distance into the quartzite and is considered to be worthy of further attention.

Other anomalies present in the quartzites are located at:-

Line 11E,	700S
Line 13E,	1000S
Line 16E	1000S
Line 19E	1500S
Line 19E	1000N to 1800N (near an unnamed mine workings)

Should investigations show the anomaly on lines 00-5E to be of interest then further work should be carried out at the other locations listed above.

As stated earlier, the anomaly along the hornfels - gabbro contact (first anomaly) could continue into the hornfels where the contact is faulted to the south. If this is so then the anomaly along the new position of the contact (extending eastwards) could be a continuation of the anomaly which appears to be located on the Cambrian Silicified Serpentine (?) outcrops on the southern ends of lines 4E to 11E.

Between 1000N and 2500N on lines 24E and 25E there is a large anomaly which could be due to a local feature such as an intrusive plug of a roughly circular shape. There is no expression of this on the geological map in the author's possession but the possibility of such a feature was discussed with Mr. Griffith.

On lines 21E and 22E at approximately 1000S there is a anomaly over a small outcrop of serpentine and gabbro. A similar outcrop at the northern end of lines 28E and 29E also has an associated anomaly but not that at 24E, 2500N.

Other isolated anomalies such as 23E, 00N and 29E, 1500N do not have obvious sources but could be due to near surface serpentine or gabbro.

#### COMPARISON OF MAGNETIC AND GEOCHEMICAL RESULTS

The geochemical results cover most of the area of the magnetic survey. In places there is a coincidence of magnetic and geochemical anomalies, however the metal forming the high varies even along the line of a magnetic anomaly and there is not always an exact positional coincidence.

The following discussion is in general terms only. A more detailed comparison must wait until the additional magnetic work recommended has been completed.

The first magnetic anomaly considered, that is, the anomaly commencing on line 4W at 200N and following the Serpentine and Gabbro, Crimson Creek (hornfels) contact appears to be associated with geochemical highs, but the relationship is not uniform either in intensity or position.

On several of the lines the geochemical highs lie to the south of the magnetic highs. Examination of topography could assist here.

The second magnetic high which follows the Oonah Quartzite - hornfels contact has an associated geochemical high but again the relationship is variable. The variations are possibly an indication of a variable relationship between magnetite and the sulphide minerals.

The small magnetic anomaly (previously called the "third") which projects into the Oonah Quartzite from line 1E eastwards has small but definite geochemical anomalies associated with it and is therefore of interest. The quartzite appears to be geochemically quiet on the few lines sampled across it. The other magnetic anomalies listed earlier as lying in the quartzite do not have any worthwhile coincident geochemical highs.

At the southern end of lines 00 to 5E (2600S) there is a geochemical anomaly which does not have an appreciable expression in the magnetic results and is considered worthy of further attention, possibly by drilling. This high could extend further east but from 7E onwards the magnetics become disturbed and it is not certain that the anomaly is continuous.

Between 6E and 7E there is a postulated fault and the magnetic anomaly which follows the hornfels could shift to the south to approximately the same position as the anomaly discussed in the previous paragraph.

Further east on lines 11E and 12E there is again a geochemical high on the same strike line without an accompanying magnetic anomaly.

The anomalies on lines 24E and 25E (1000 to 2500N) have some associated geochemical activity but the relationship is not definite.

The magnetic anomaly at 1000S on 21E and 22E over the small serpentine and gabbro outcrop has a tin high on line 21E but little other expression. The similar outcrop at the northern end of lines 28E and 29E has no geochemical expression.

There are several other anomalous zones in the geochemical results which do not have any accompanying magnetic anomalies and these should be critically examined as there is the possibility that these are sulphide occurrences without magnetic content.

#### CONCLUSIONS & RECOMMENDATIONS

The following recommendations are made for additional geophysical work. These will allow the character of the magnetic anomalies to be further examined particularly in relation to depth of cover:-

Line	Extent of readings	Reading interval
26E	700N - 2500N	25 ft.
25E	800N - 2500N	25 ft.
24E	00N - 2200N	25 ft.
23E	600N - 2000N	25 ft.
16E	2000S - 1000S	25 ft.
15E	2000S - 1000S	25 ft.

As discussed with Mr. Griffith REM electromagnetic coverage is recommended on lines 2E to 5E at 50 feet and 100 feet spacings. This will give additional information on the first three anomalies discussed and allow an assessment of the usefulness of the electromagnetic method in the area.

It would be preferable to leave drilling recommendations until after receipt of the additional magnetic and the electromagnetic results, however the following provisional drilling recommendation is made

Target: Approx. 100 ft. below 5E, 100N. Locate collar 50 to 100 ft. to north or south (grid azimuth) of this location depending on topograph with the drill depressed to pass through target.



John E. Webb

Geophysicist

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

West Coast Mines

SECOND REPORT ON

INVESTIGATIONS AT TRIAL HARBOUR, TASMANIASPECIAL PROSPECTORS LICENCE NO. 22

by

R. L. BRATHWAITE

NOVEMBER, 1970

REPORT NO. 104

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SECOND INTERIM REPORT

on

MAGNETIC SURVEYTRIAL HARBOURTASMANIA

With Comment on  
Geochemical Survey

for

Electrolytic Zinc Co. of Australasia Ltd.

Rosebery Tasmania

by

John E. Webb

Consulting Geophysicist

INTRODUCTION

This report follows on from the First Interim Report. Previously, recommendations were made for additional magnetic readings to cover the anomalous sections of lines 15E, 16E and 23E through 26E at 25 ft. intervals. This work has been completed with additional fill in on other traverses. Also R.E.M. electromagnetic readings have been taken over a selection of traverses including the traverses recommended (2E to 5E). The R.E.M. work is still continuing over areas of geochemical anomalies where there are no accompanying magnetic anomalies.

DISCUSSION OF RESULTS

The results will be discussed under headings relating to the grouping of anomalies set out in the previous interim report.

Lines 1E to 6E

The small anomaly on the northern ends of lines 1E to 6E was pointed out as being of interest previously based on the information available and recommended as a possible drilling target.

The new magnetic coverage shows the anomaly to have a much more disturbed nature such as would be expected from very near surface magnetite. Line 5 still has the largest anomaly and the magnitude of the anomaly still varies in magnitude from line to line.

The R.E.M. readings show anomalous readings on lines 1E, 1(A)E, 2E, 2(A)E in the 250 ft. separation broadside method and very much smaller anomalies on the in-line method on traverses 1E and 2E with nothing of note on lines 1(A)E and 2(A)E. Nothing worth recording appears on any of the traverses 3E to 5(A)E and it must be assumed that the only possibilities of mineralization are on traverses 1E to 2E.

It must be concluded that there is not a relationship between magnetics and possible sulphide mineralization and that, at best, we could have a narrow zone of sulphides not more than a few hundred feet long. The previous tentative drilling site cannot now be recommended and it is considered that the amount of mineralization indicated would not justify additional work.

Lines 23E to 26E

The fill in magnetic work here confirms the anomaly but shows the character to be more erratic than indicated previously. The highest reading of 165,000 gammas is on line 24E.

The readings on lines 23E and 26E are much lower than on the intermediate lines confirming that the anomaly is of a roughly circular form and suggestive of a basic intrusive. The erratic nature of the readings indicate that the top of the source of the anomaly is very shallow and under the 165,000 gamma reading on line 24E could be a few feet at the most.

The anomaly consists of two peaks which vary greatly in intensity. On line 24E the more southerly (1200 N) peak is predominant, while on line 25E the northern peak (2000 N) is very much emphasised. Neither peak is obvious on line 23E and only a very much reduced expression of each is present on line 26E.

The "in-line" R.E.M. results on line 25E shows an anomaly over the northerly magnetic anomaly (at 1900 to 2000 N) but nothing over the southern one (1200 E) suggesting a change in character. An R.E.M. traverse on line 24E would confirm the relationship or lack of it between high magnetics and electromagnetics. The author does not have the geochemical

- 3 -

results but an examination of them with Mr. Griffith showed a relationship between these and the R.E.M. results.

Here again the chances of mineralization must be viewed in relationship to the size of the target. The length cannot be more than 1,000 feet but the width could be considerable. Further R.E.M. work is recommended on lines 23E to 26E at spacings of 100 feet and, if possible, 150 feet to 200 feet.

Lines 7E to 17E

In the previous magnetic results a small anomaly is evident on line 17E and this increased in magnitude towards the west. This is the "second" anomaly described in the previous report, and was described as extending from line 1E towards the east. For clarity it is now described in the reverse order.

The anomaly is centred at 1600 S on line 17E and has a peak value of 2,000 gammas. An extension further east is evident but with rapidly decreasing intensity in the earlier results. On line 16E the peak value has risen to 3,300 gammas and there is a further marked increase to 14,000 gammas on line 15E.

On 14E the character changes with a low appearing to the south of the peak. This change is further emphasised on line 13E where the results are almost completely negative. The only reasonable explanation is that the source has very high permanent magnetism, and is very close to the surface and should be present under a few feet of soil cover. The permanent magnetic character is also suggested by the very intense peak on line 15E.

On line 13E a second anomaly, again negative, is present at 1200S to 1400S. This second anomaly continues on the more westerly lines while the anomaly described above appears to die out on line 12E and is not covered in the westerly lines of the present survey.

On line 11E the second anomaly appears with several peaks and a third anomaly is present at 600S to 800S. These two anomalies become less separated to the west until they become one zone on line 7E.

The R.E.M. equipment has been run over lines 8E to 12E "in-line" with very little expression except on line 12E, and here the results are not clear cut. This is the line where there is a change in character of the magnetic anomalies, and a complex picture could be expected. There seems little point to carrying out additional R.E.M. reading to the west of line 12E, but some information on the lines to the east could be of value in examining the change in the magnetic picture at line 12E.

#### CONCLUSIONS AND RECOMMENDATIONS

The present survey has been described under three groupings.

The first, the small anomaly at the northern end of lines 1E to 6E and it has been concluded above that the chances of economic mineralization have been very much decreased by the R.E.M. work and no recommendation can be made for further work here at present. Drilling previously recommended should be deferred.

The second group, lines 23E to 26E is worthy of further R.E.M. work and this is recommended on lines 23E to 26E over the anomalous areas at spacings of 100 feet and, if possible, 200 feet. If 200 feet spacing is impossible then an attempt should be made at 150 feet.

The third group, lines 7E to 17E, shows a series of anomalies with a break in character at line 12E. This is either a change of sources or

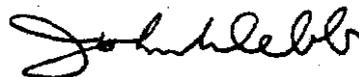
an "en echelon" faulting. Because of a change in magnetic character and the presence of R.E.M. results on line 12E and not on lines 8E, 9E and 11E, it is suggested that two sources are the answer. The character of the magnetics suggests that the sources plunge to the east. No reliable suggestion on dip can be made. It is recommended that R.E.M. work at 100 feet separations can be carried out on lines 10E and 13E to 17E.

The recommendations are summarised as below:-

- (1) No further work on the northern anomaly on line 1E to 6E.
- (2) R.E.M. readings on lines 23E to 26E at 100 and 200 feet separations.
- (3) R.E.M. readings on lines 9E to 17E as outlined in the text above.

#### GEOCHEMICAL RESULTS

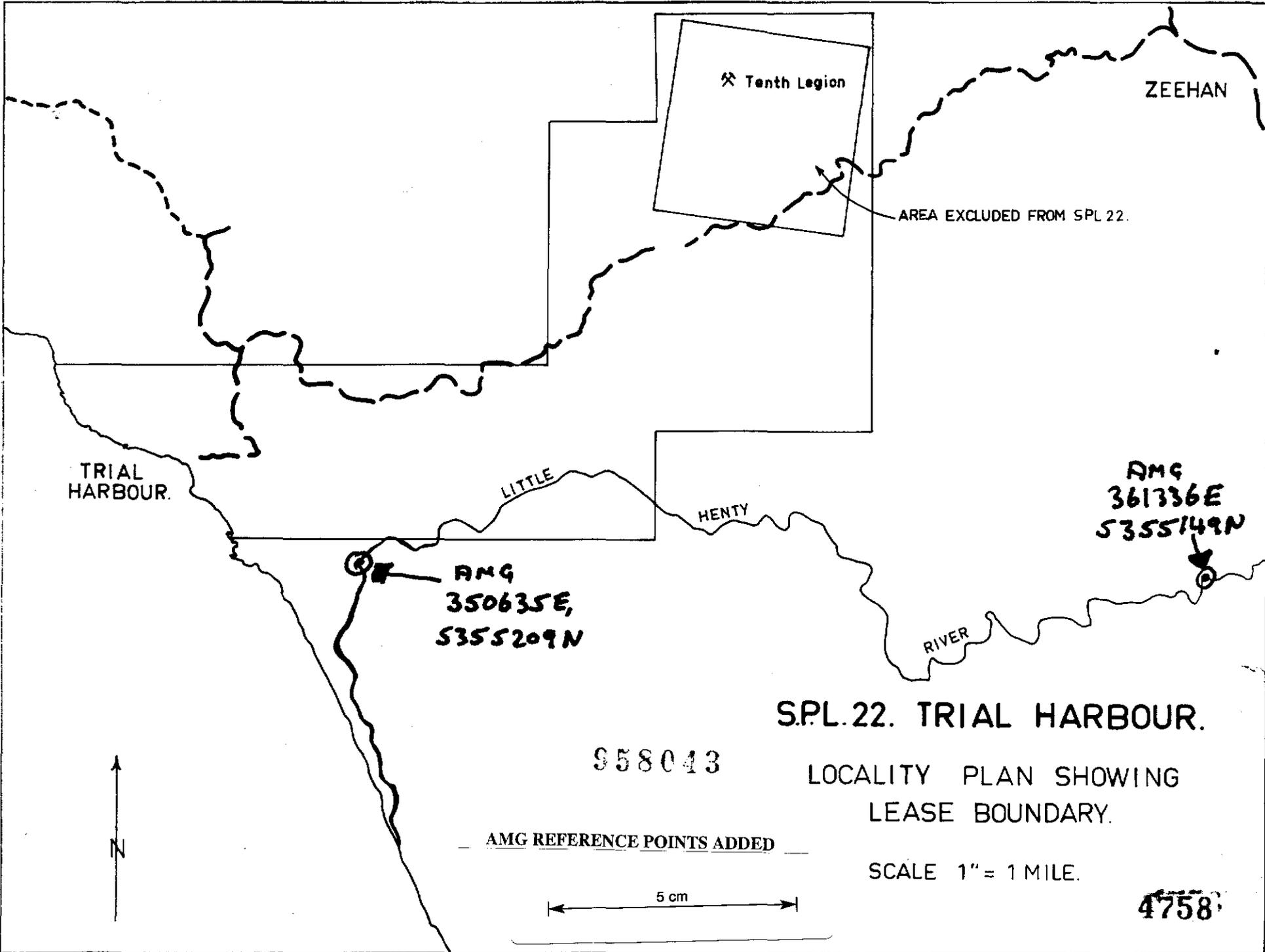
Although the author does not have a copy of the geochemical results, they were discussed with Mr. Griffith. Several areas of geochemical anomaly exist without accompanying magnetic anomalies. These are of definite interest as sulphide areas and it is recommended that these be covered with the R.E.M. equipment.



John E. Webb

Geophysicist

ZN 290



✕ Tenth Legion

ZEEHAN

AREA EXCLUDED FROM SPL 22.

TRIAL HARBOUR.

LITTLE

HENTY

AMG  
361336E  
5355149N

AMG  
350635E,  
5355209N

RIVER

### SPL.22. TRIAL HARBOUR.

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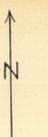
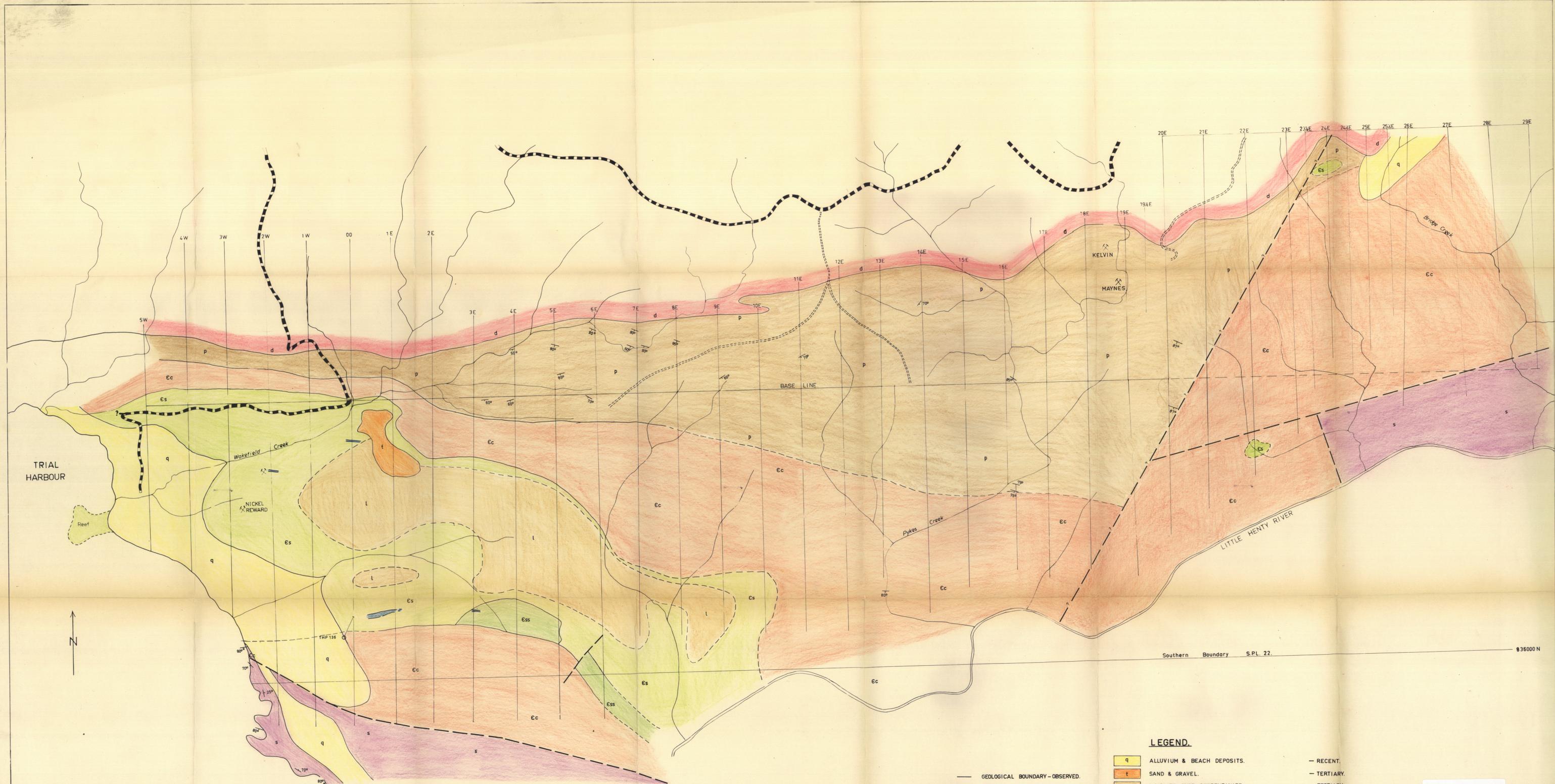
LOCALITY PLAN SHOWING  
LEASE BOUNDARY.

AMG REFERENCE POINTS ADDED

SCALE 1" = 1 MILE.

5 cm

4758



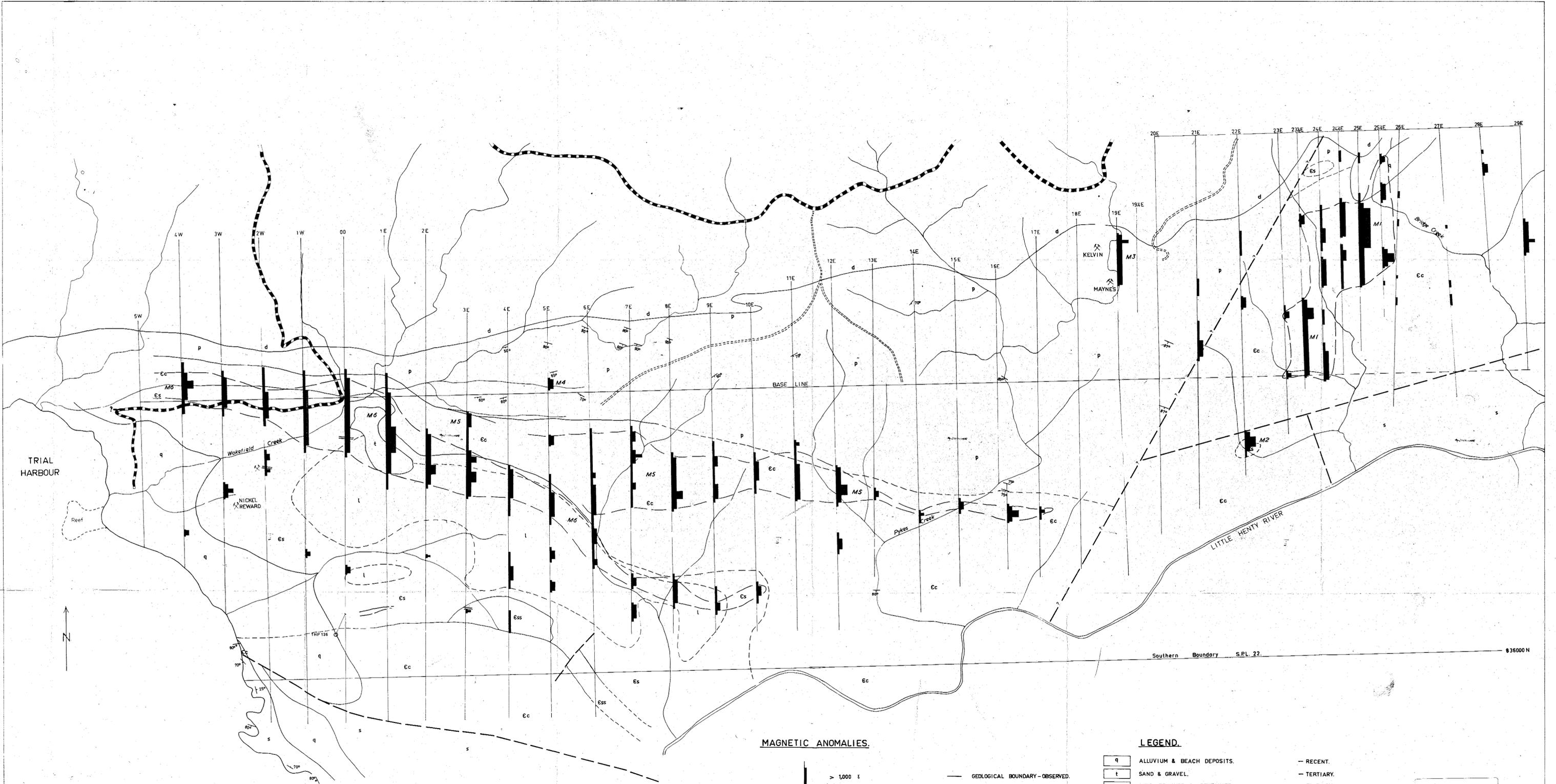
Southern Boundary S.P.L. 22. 836000 N

- GEOLOGICAL BOUNDARY - OBSERVED.
- - - GEOLOGICAL BOUNDARY - APPROXIMATE.
- ⊥ BEDDING - FACE KNOWN.
- ⊥ BEDDING - FACE UNKNOWN.
- - - FAULT - APPROXIMATE.
- ? - FAULT - INFERRED.
- GOSSAN
- ⊠ PROSPECT
- DRILL HOLE

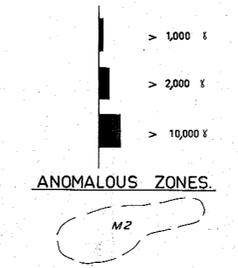
- LEGEND.**
- |                       |   |   |              |
|-----------------------|---|---|--------------|
| q                     | ALLUVIUM & BEACH DEPOSITS.                      | - | RECENT.      |
| t                     | SAND & GRAVEL.                                  | - | TERTIARY.    |
| l                     | LIMONITE OVER SERPENTINITE.                     | - | TERTIARY.    |
| s                     | CROTTY QUARTZITE & AMBER SLATES.                | - | SILURIAN.    |
| Ec                    | CRIMSON CREEK FORMATION - HORNFELS & ARGILLITE. | - | CAMBRIAN.    |
| p                     | DOONAH QUARTZITE & SLATE                        | - | PRECAMBRIAN. |
| <b>IGNEOUS ROCKS.</b> |   |   |              |
| d                     | HEEMSKIRK GRANITE.                              | - | DEVONIAN.    |
| Es                    | SERPENTINITE                                    | - | CAMBRIAN.    |
| Ess                   | SILICIFIED SERPENTINE.                          | - | CAMBRIAN.    |

50m

**TRIAL HARBOUR**  
**SPECIAL PROSPECTORS LICENCE 22.**  
 PLAN SHOWING GEOLOGY AND CUT LINES.  
 SCALE 1" = 400'  
 DATE 15/7/70.



**MAGNETIC ANOMALIES.**



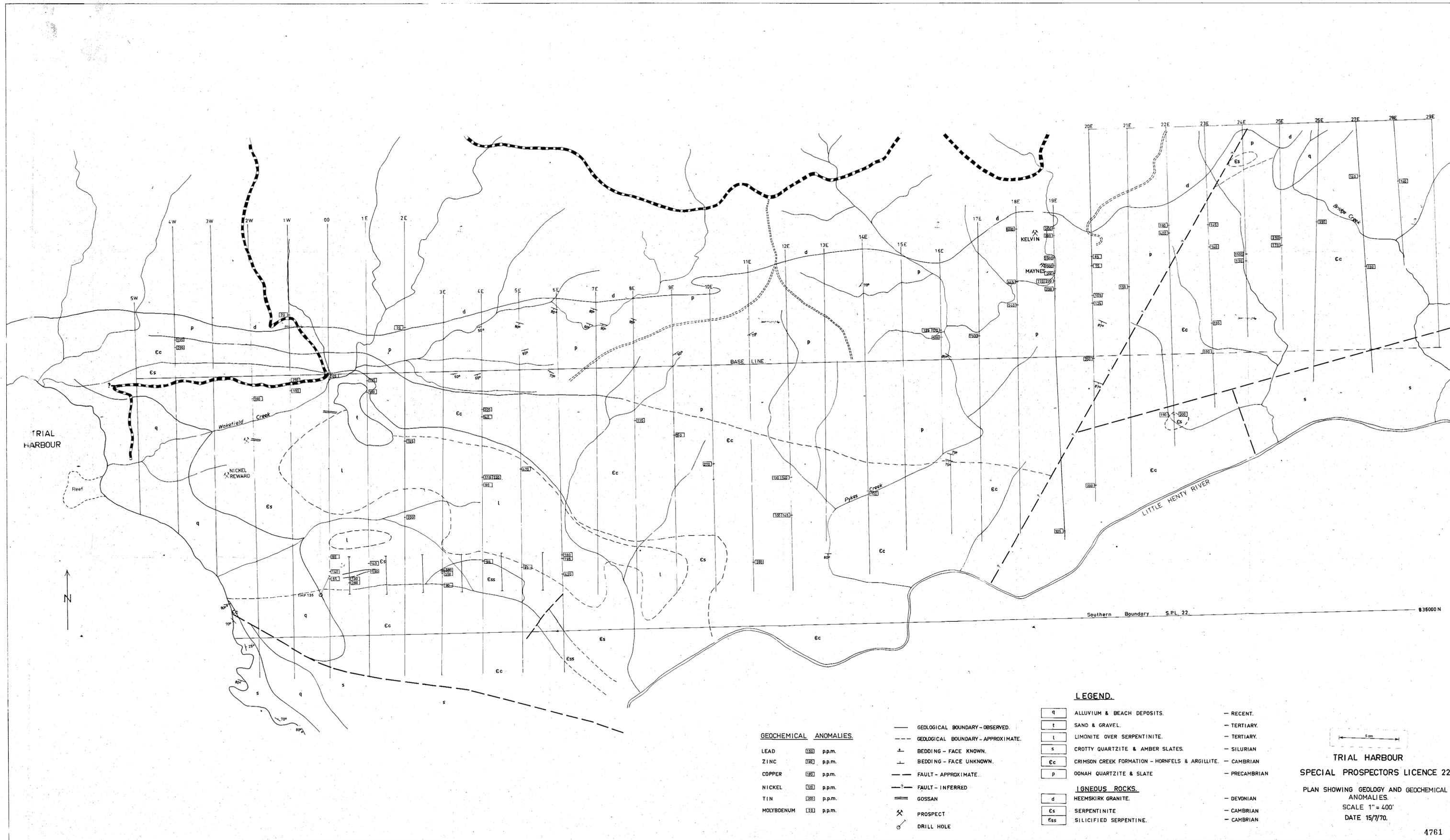
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- - - GEOLOGICAL BOUNDARY - APPROXIMATE.
- ⊥ BEDDING - FACE KNOWN.
- ⊥ BEDDING - FACE UNKNOWN.
- - - FAULT - APPROXIMATE.
- ? - FAULT - INFERRED
- ≡ GOSSAN
- ⊗ PROSPECT
- DRILL HOLE

**LEGEND.**

- |                       |   |   |             |
|-----------------------|---|---|-------------|
| q                     | ALLUVIUM & BEACH DEPOSITS.                      | - | RECENT.     |
| t                     | SAND & GRAVEL.                                  | - | TERTIARY.   |
| l                     | LIMONITE OVER SERPENTINITE.                     | - | TERTIARY.   |
| s                     | CROTTY QUARTZITE & AMBER SLATES.                | - | SILURIAN    |
| Cc                    | CRIMSON CREEK FORMATION - HORNFELS & ARGILLITE. | - | CAMBRIAN    |
| p                     | ODNAH QUARTZITE & SLATE                         | - | PRECAMBRIAN |
| <b>IGNEOUS ROCKS.</b> |   |   |             |
| d                     | HEEMSKIRK GRANITE.                              | - | DEVONIAN    |
| Es                    | SERPENTINITE                                    | - | CAMBRIAN    |
| Ess                   | SILICIFIED SERPENTINE.                          | - | CAMBRIAN    |



**TRIAL HARBOUR**  
**SPECIAL PROSPECTORS LICENCE 22.**  
 PLAN SHOWING GEOLOGY AND MAGNETIC ANOMALIES.  
 SCALE 1" = 400'  
 DATE 29/9/70.



**GEOCHEMICAL ANOMALIES.**

LEAD	100	p.p.m.
ZINC	100	p.p.m.
COPPER	100	p.p.m.
NICKEL	100	p.p.m.
TIN	200	p.p.m.
MOLYBDENUM	100	p.p.m.

- GEOLOGICAL BOUNDARY - OBSERVED.
- - - GEOLOGICAL BOUNDARY - APPROXIMATE.
- ⊥ BEDDING - FACE KNOWN.
- ⊥ BEDDING - FACE UNKNOWN.
- - - FAULT - APPROXIMATE.
- - - FAULT - INFERRED.
- ≡ GOSSAN.
- ⊙ PROSPECT.
- DRILL HOLE.

**LEGEND.**

- |    |   |               |
|----|---|---------------|
| q  | ALLUVIUM & BEACH DEPOSITS.                      | - RECENT.     |
| t  | SAND & GRAVEL.                                  | - TERTIARY.   |
| l  | LIMONITE OVER SERPENTINITE.                     | - TERTIARY.   |
| s  | CROTTY QUARTZITE & AMBER SLATES.                | - SILURIAN    |
| cc | CRIMSON CREEK FORMATION - HORNFELS & ARGILLITE. | - CAMBRIAN    |
| p  | ODNAH QUARTZITE & SLATE                         | - PRECAMBRIAN |
- 
- IGNEOUS ROCKS.**
- |     |                        |            |
|-----|------------------------|------------|
| d   | HEEMSKIRK GRANITE.     | - DEVONIAN |
| es  | SERPENTINITE           | - CAMBRIAN |
| ess | SILICIFIED SERPENTINE. | - CAMBRIAN |



**TRIAL HARBOUR**  
**SPECIAL PROSPECTORS LICENCE 22.**  
 PLAN SHOWING GEOLOGY AND GEOCHEMICAL ANOMALIES.  
 SCALE 1" = 400'  
 DATE 15/7/70.



**AXES OF ANOMALOUS I.P. ZONES.**  
 — DEFINITE.  
 - - - PROBABLE.  
 . . . SURFACE PROJECTION OF ANOMALOUS ZONES.  
 — DEFINITE  
 - - - PROBABLE  
 . . . POSSIBLE  
 200 indicates spread used.

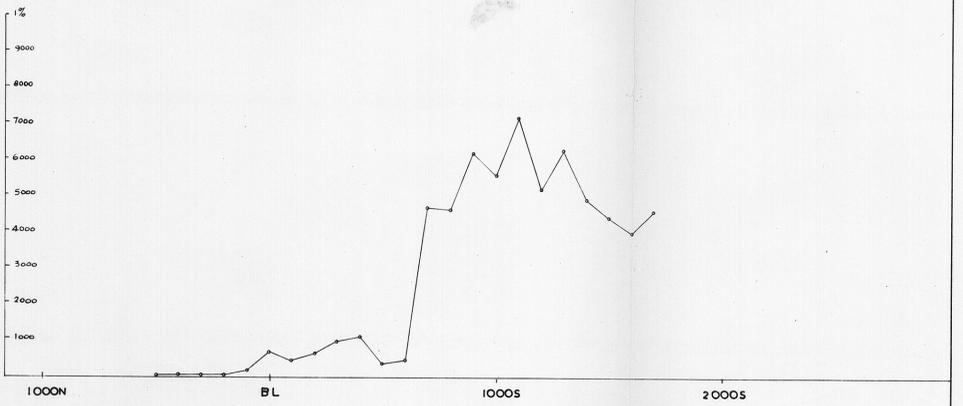
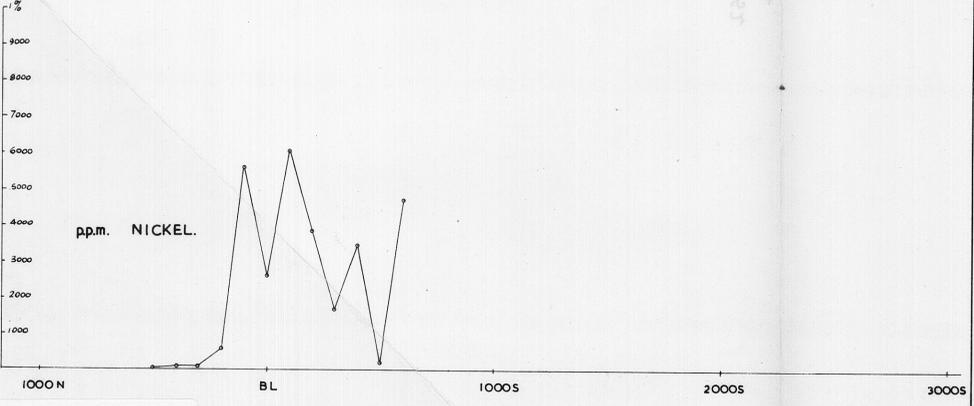
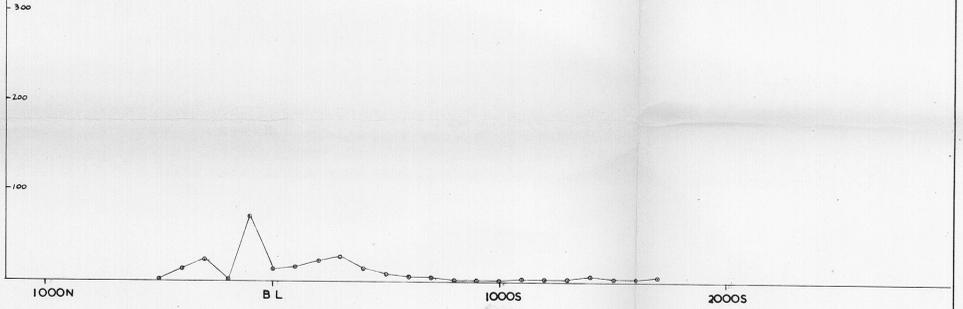
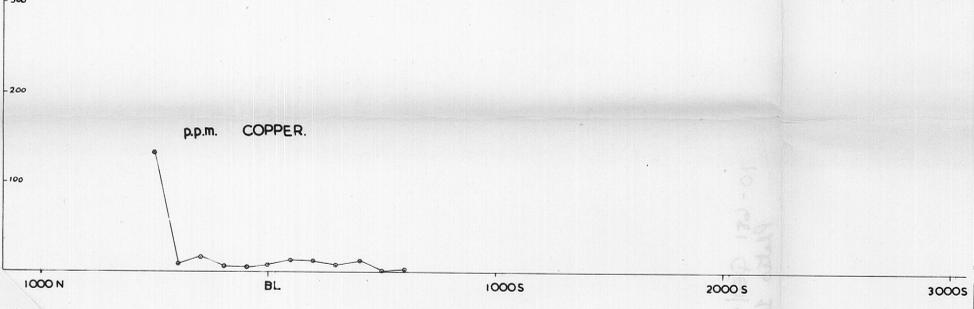
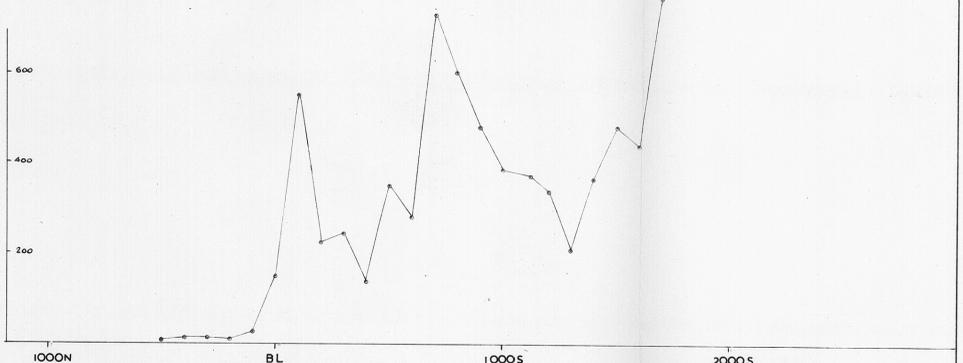
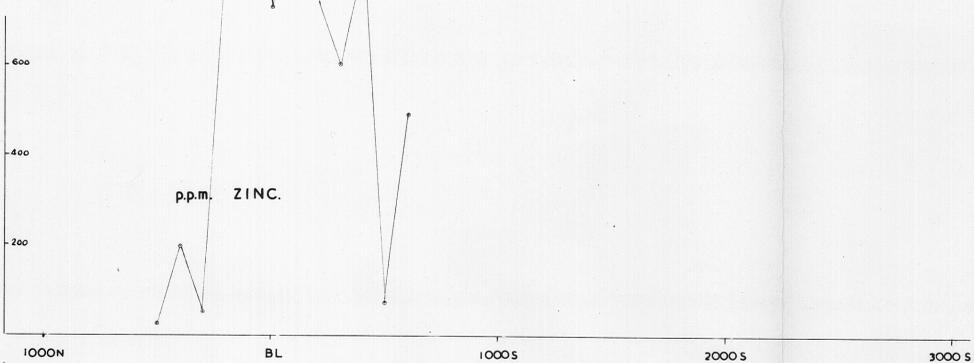
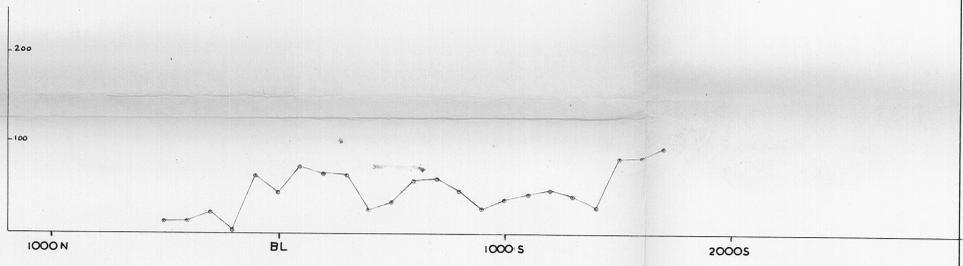
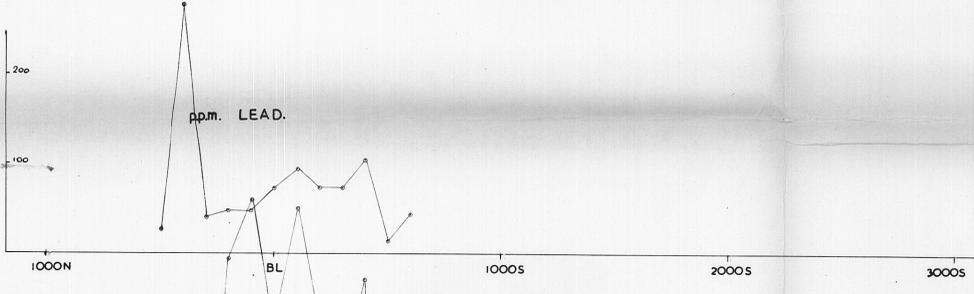
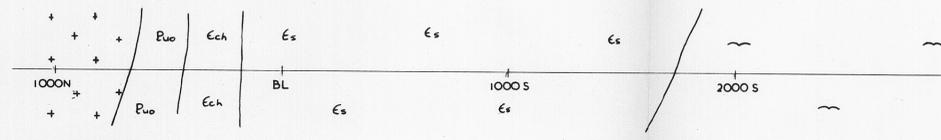
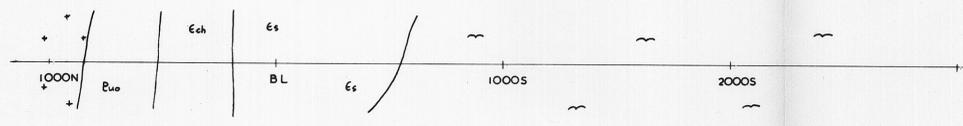
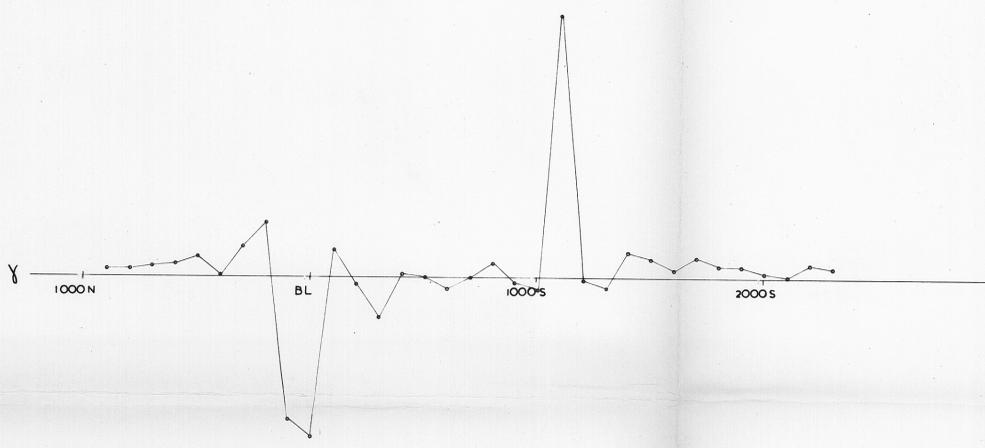
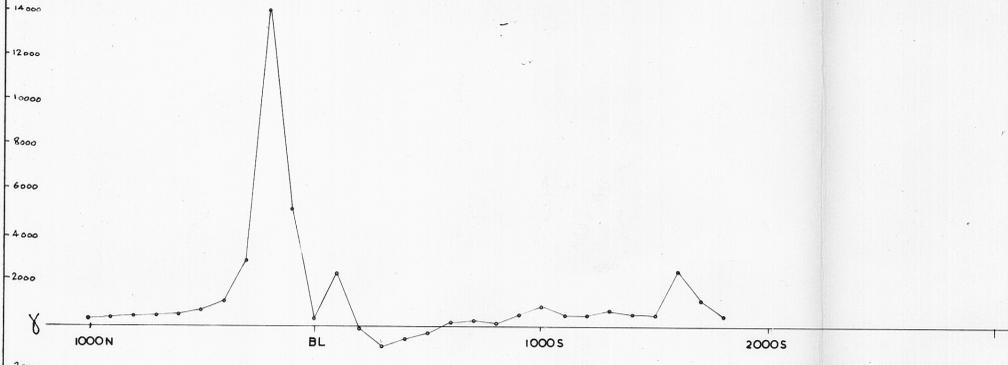
— GEOLOGICAL BOUNDARY - OBSERVED.  
 - - - GEOLOGICAL BOUNDARY - APPROXIMATE.  
 + BEDDING - FACE KNOWN.  
 - BEDDING - FACE UNKNOWN.  
 - - - FAULT - APPROXIMATE.  
 - ? FAULT - INFERRED  
 = GOSSAN  
 X PROSPECT  
 O DRILL HOLE

**LEGEND.**

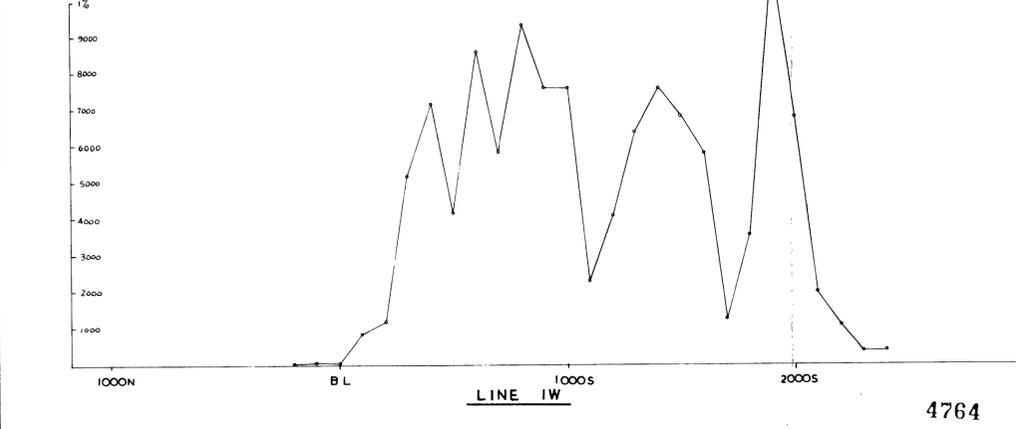
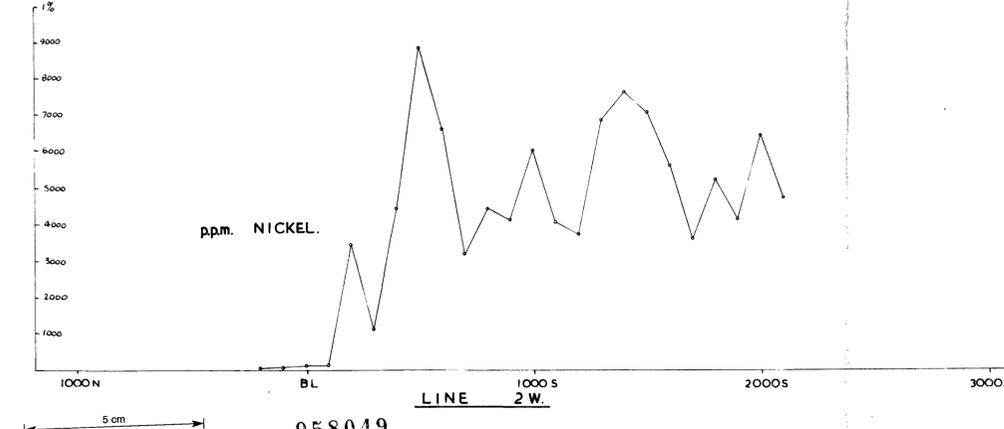
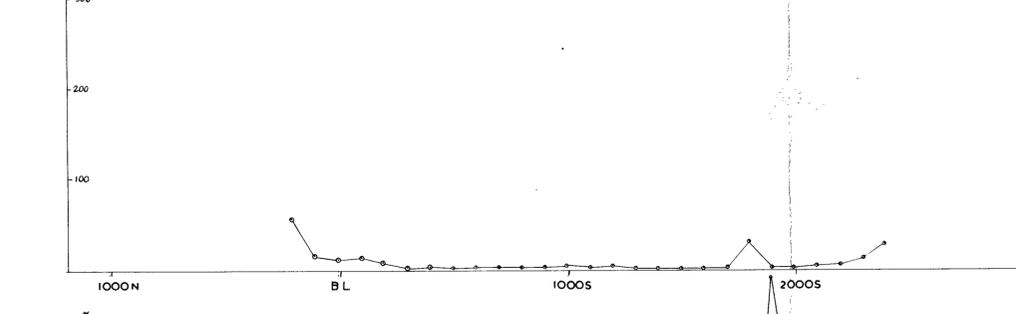
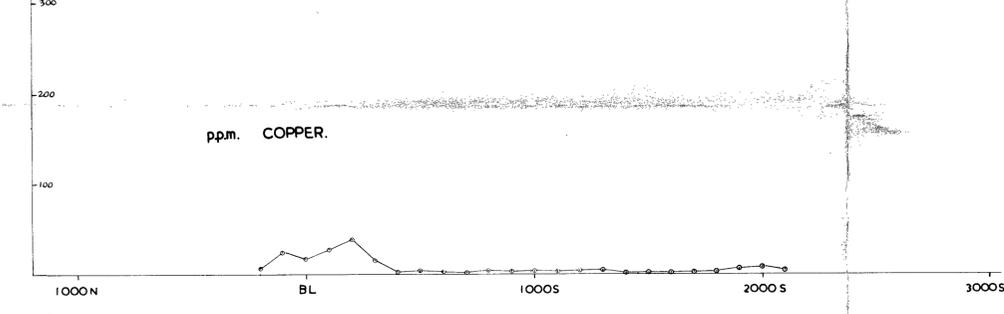
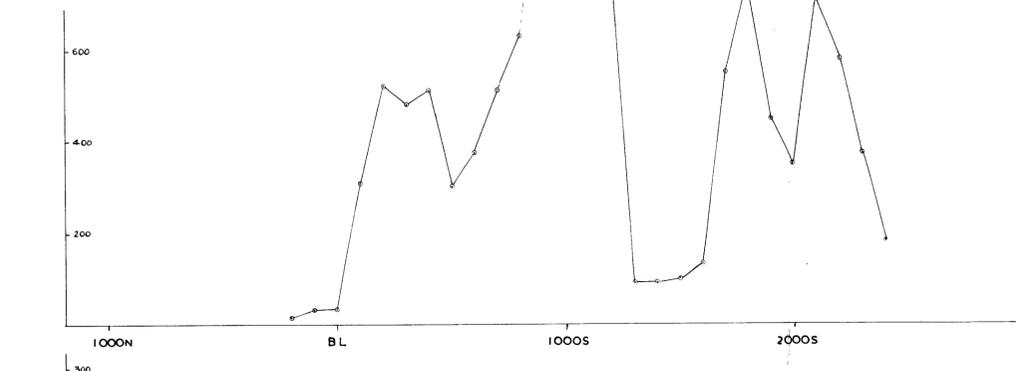
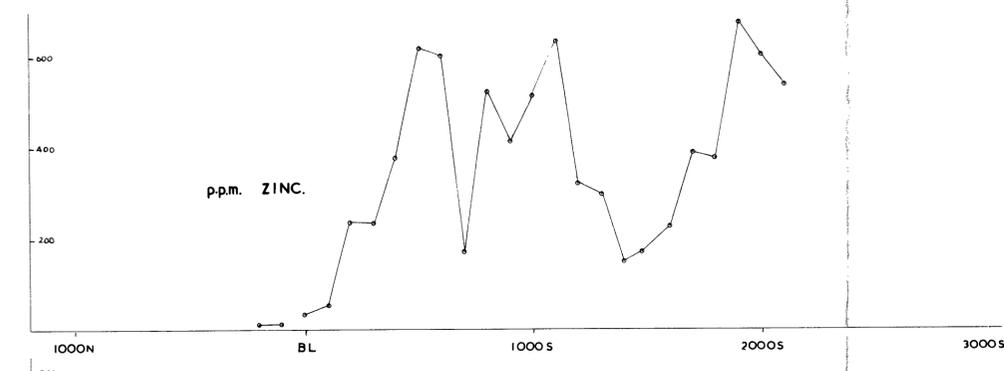
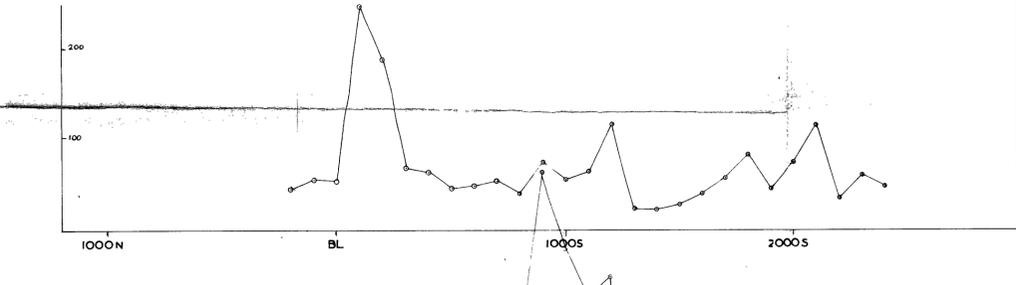
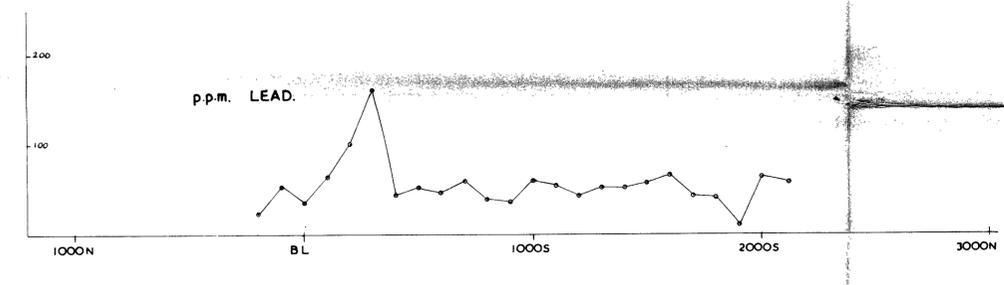
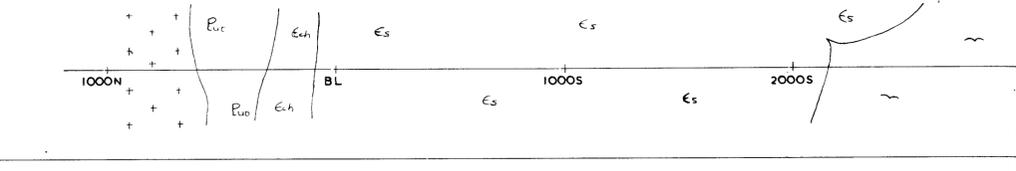
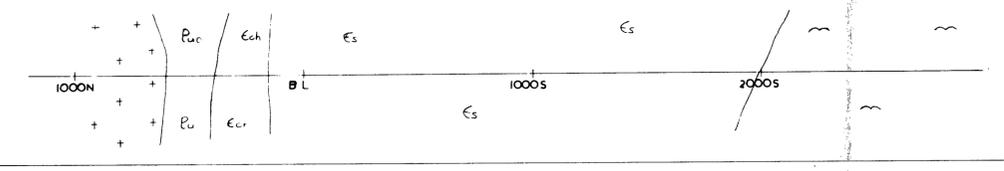
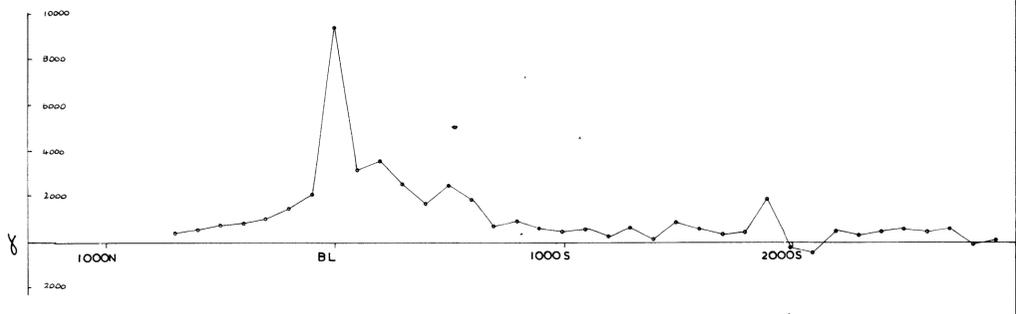
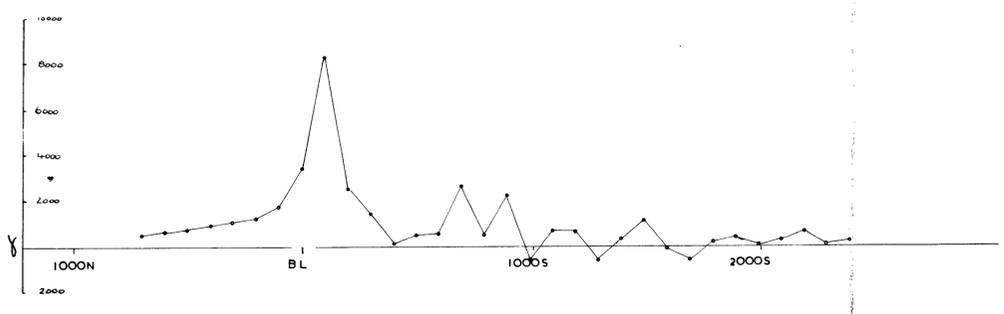
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t	SAND & GRAVEL.	- TERTIARY.
l	LIMONITE OVER SERPENTINITE.	- TERTIARY.
s	CROTTY QUARTZITE & AMBER SLATES.	- SILURIAN
Ec	CRIMSON CREEK FORMATION - HORNFELS & ARGILLITE.	- CAMBRIAN
p	ODNAH QUARTZITE & SLATE	- PRECAMBRIAN
<b>IGNEOUS ROCKS.</b>		
d	HEEMSKIRK GRANITE.	- DEVONIAN
Es	SERPENTINITE	- CAMBRIAN
Ess	SILICIFIED SERPENTINE.	- CAMBRIAN

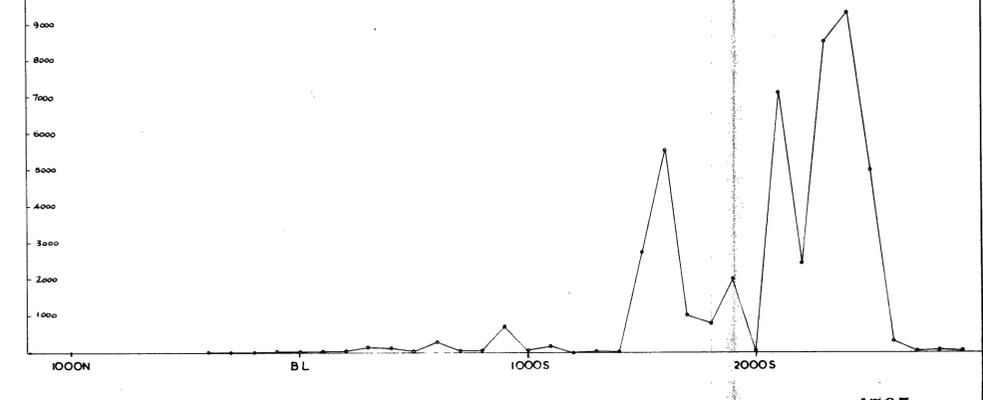
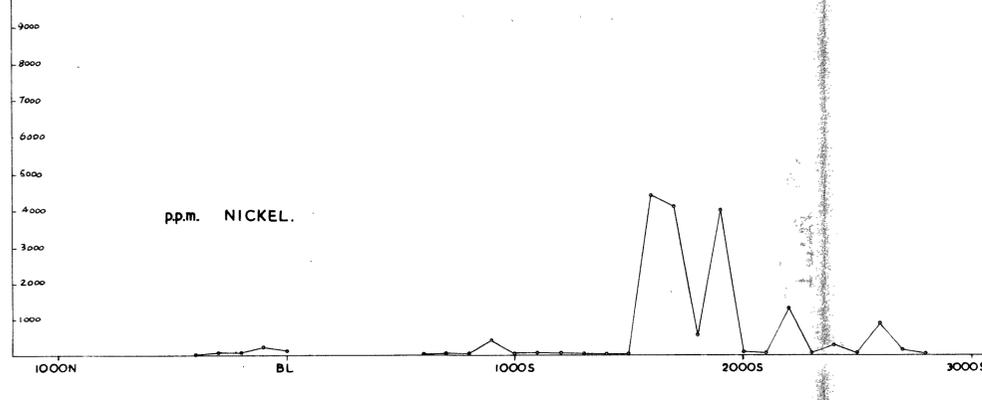
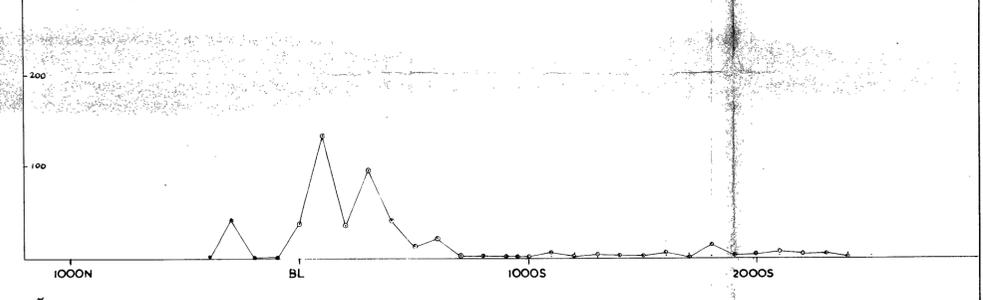
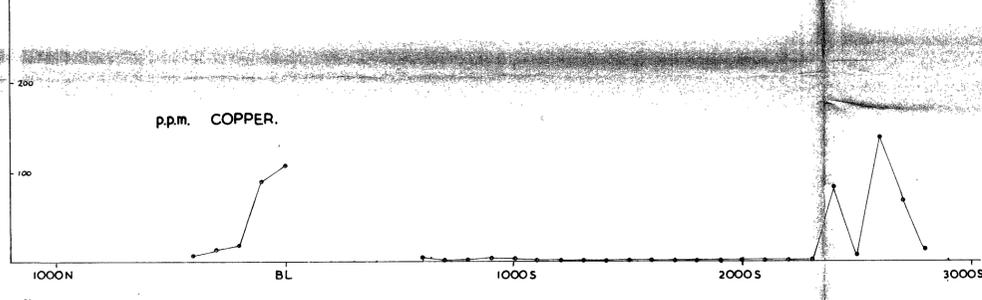
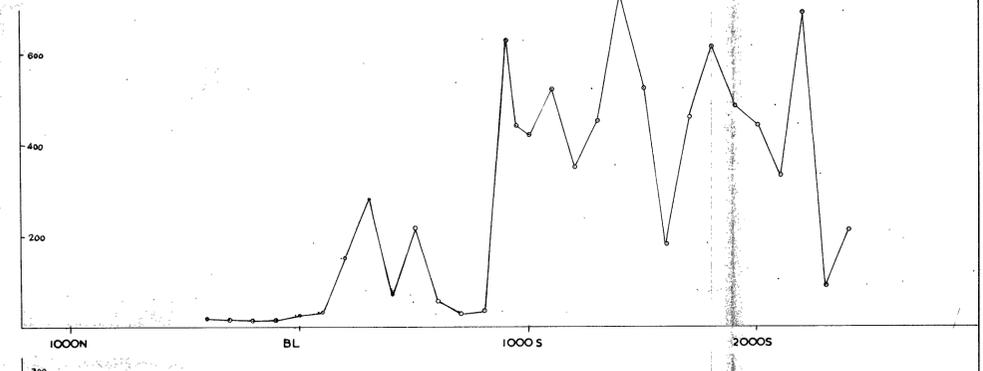
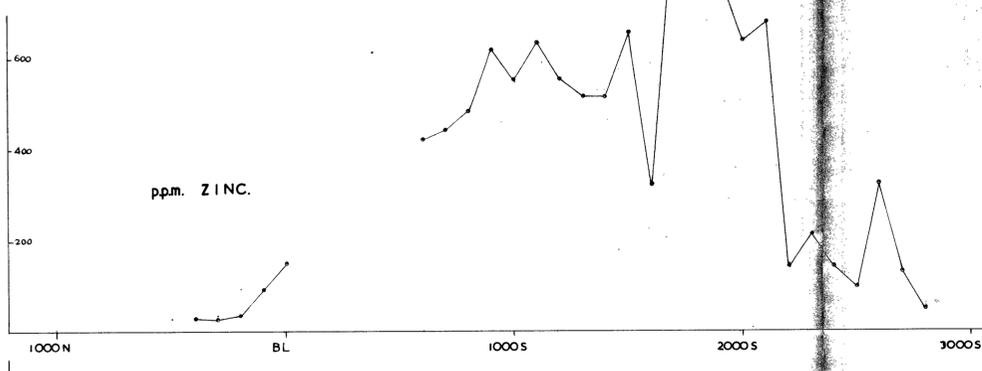
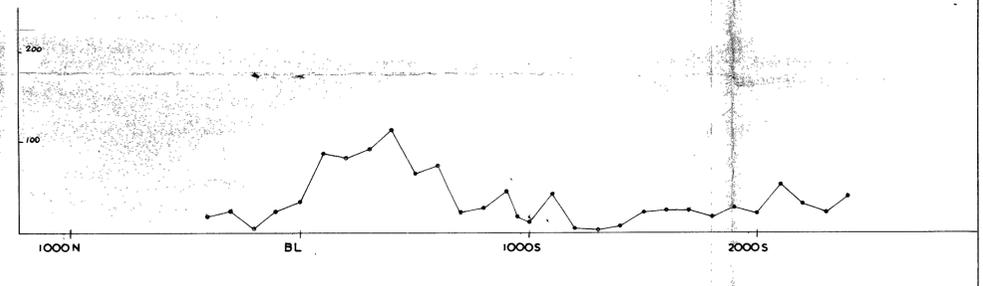
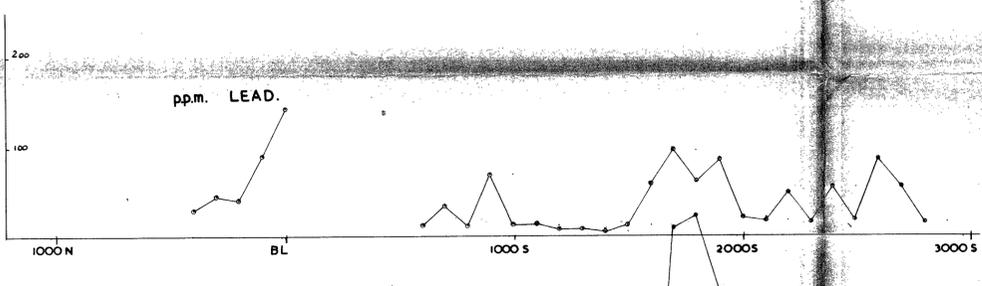
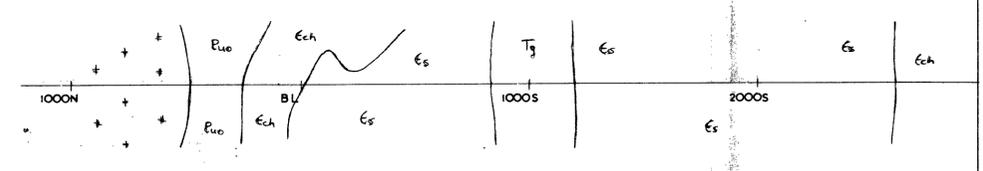
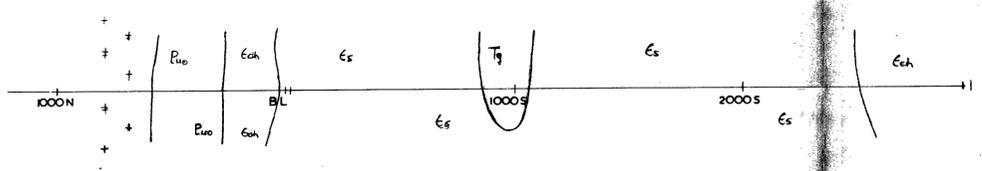
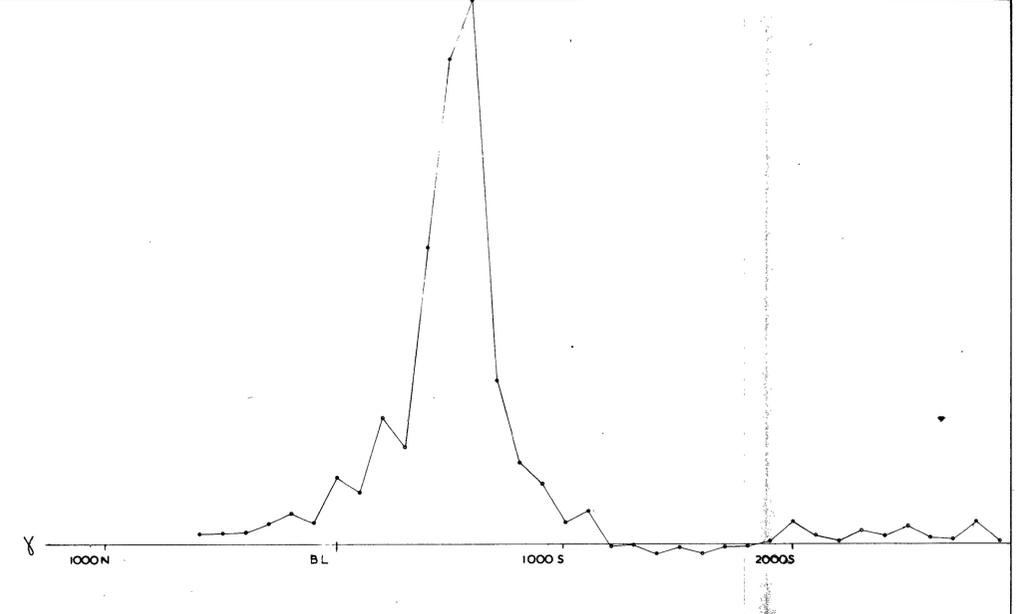
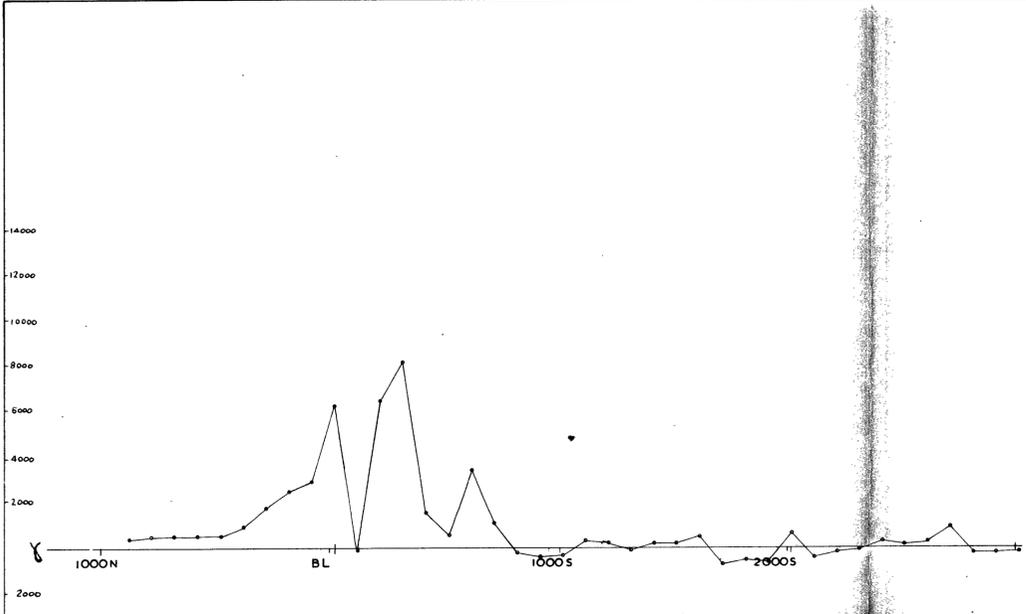
TRIAL HARBOUR  
 SPECIAL PROSPECTORS LICENCE 22.  
 PLAN SHOWING GEOLOGY AND I.P. ANOMALIES.  
 SCALE 1" = 400'.  
 DATE 15/7/70.

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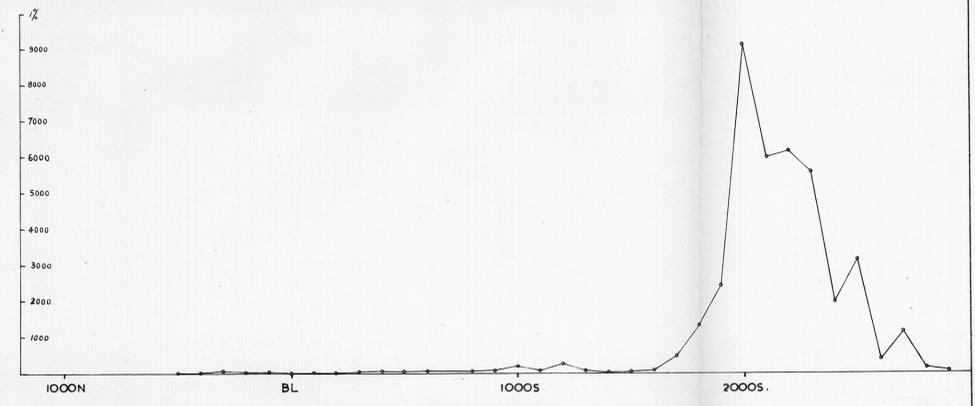
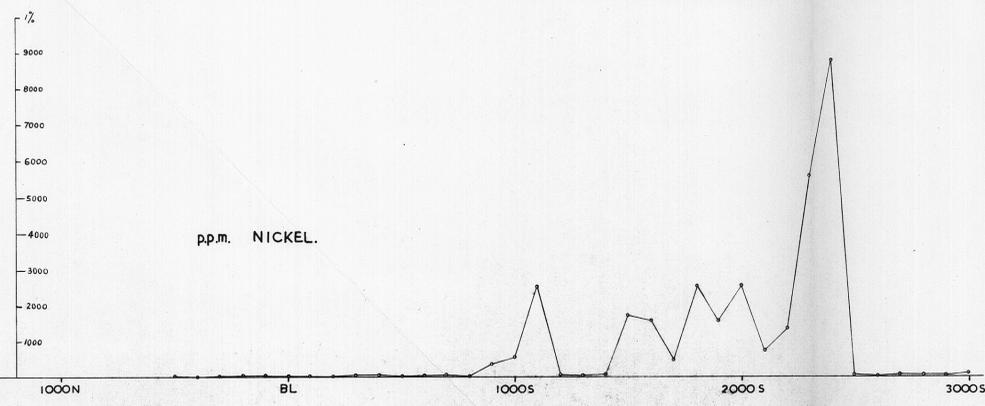
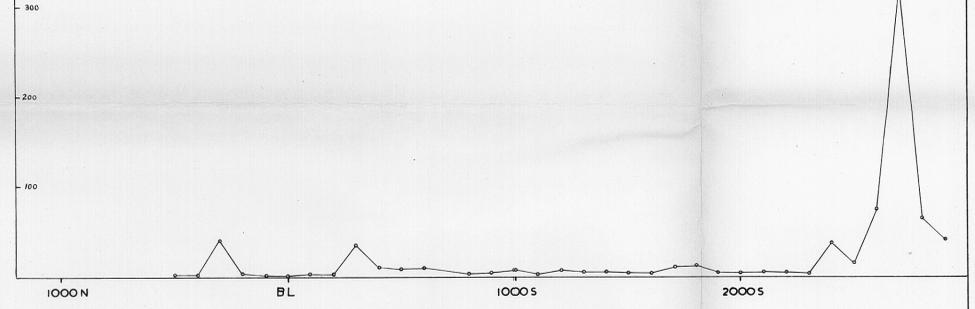
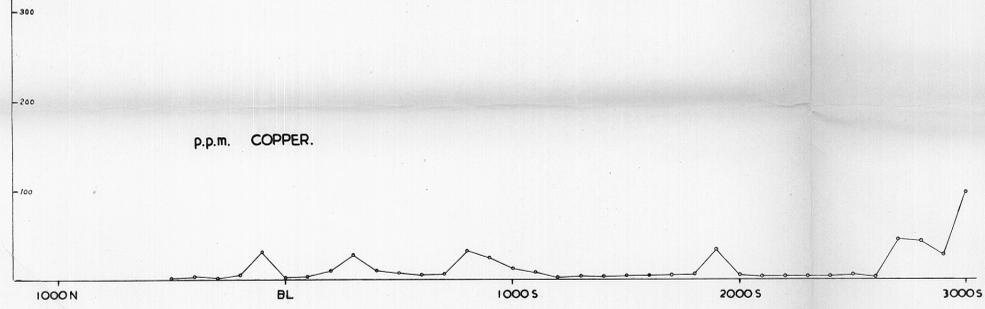
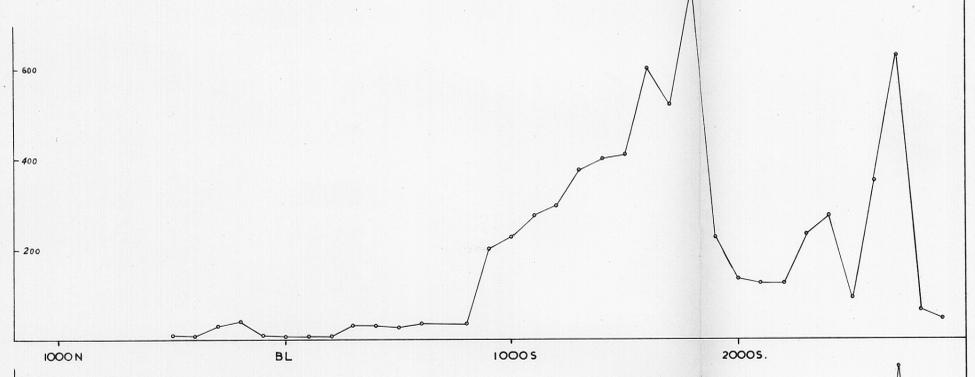
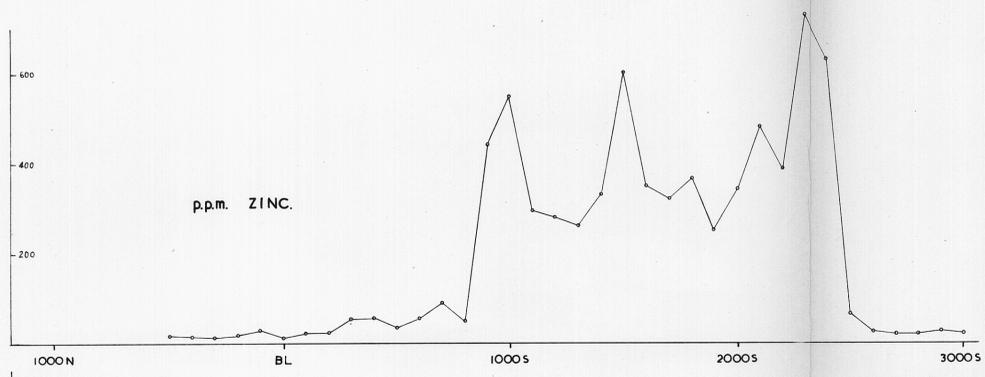
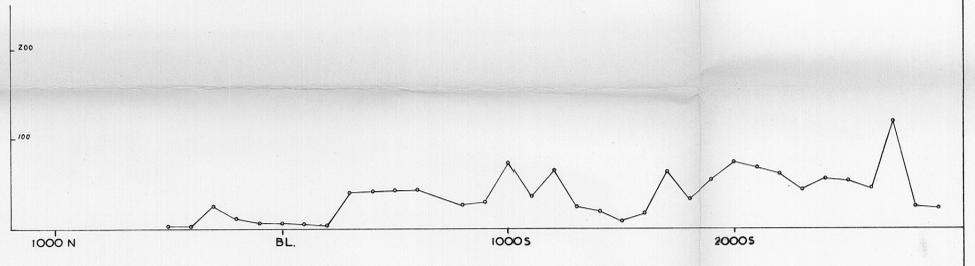
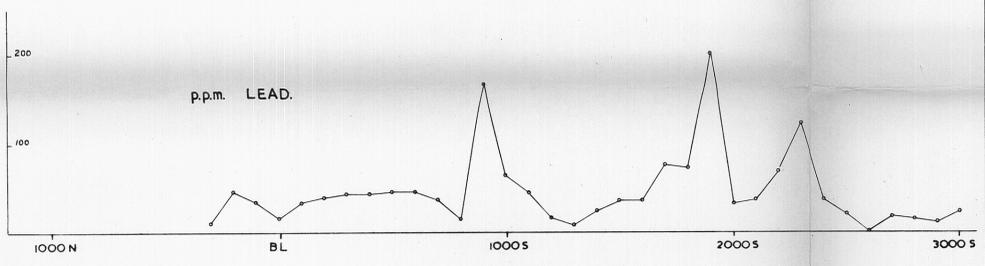
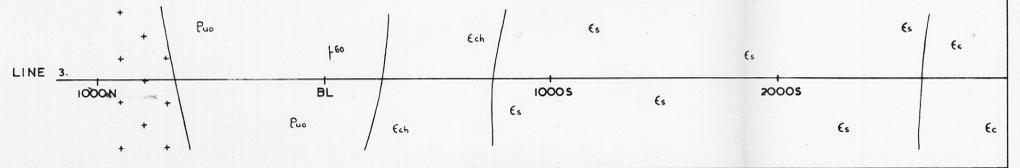
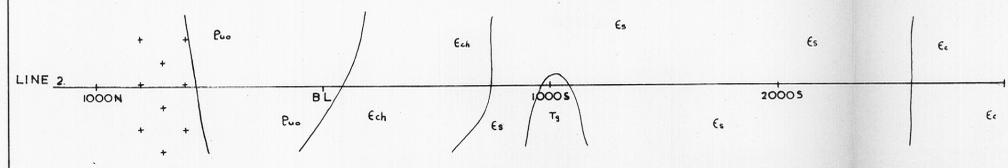
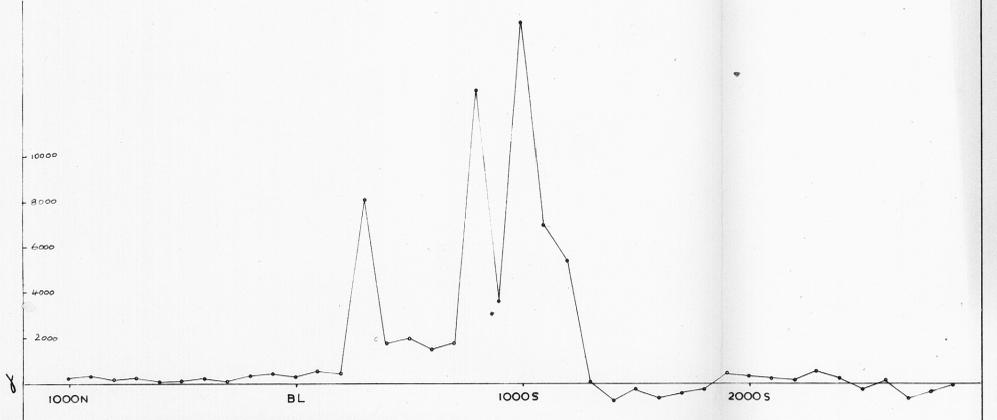
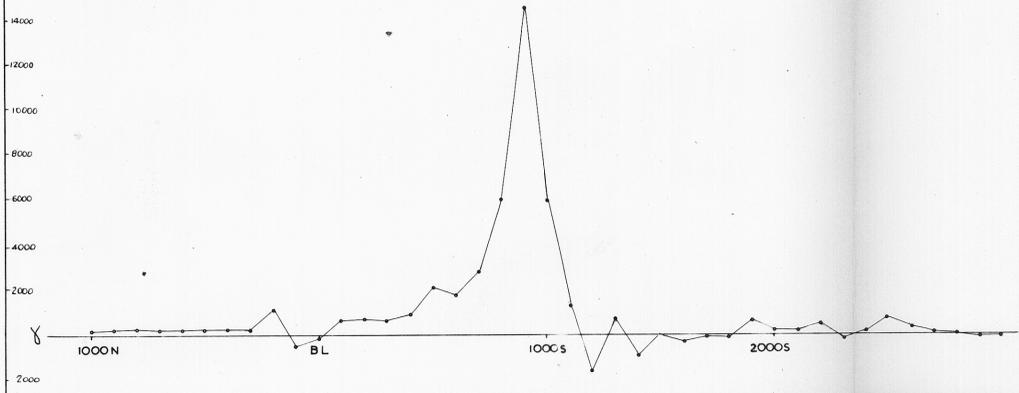


5 cm

958050 LINE 00.

LINE 1E.

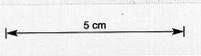
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W.C.D. 10-10-10

PLATE 9

TRIAL HARBOUR S.P.L. 22.  
DATA PLOT  
LINES 2 & 3E



958051 LINE 2 E

LINE 3 E

4766

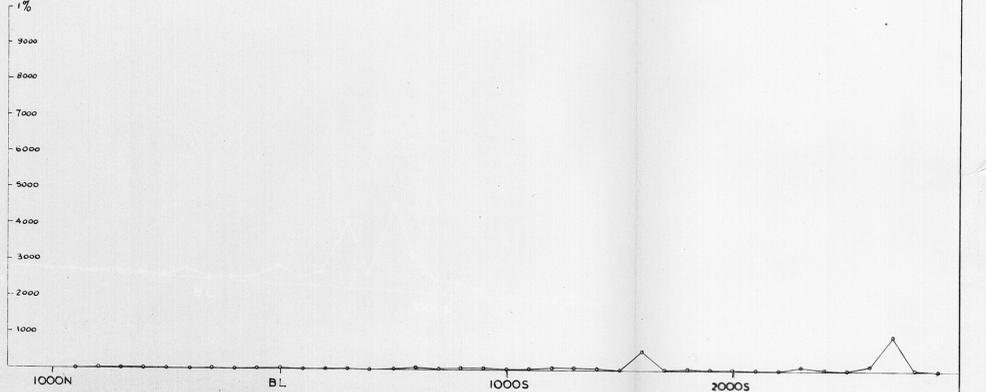
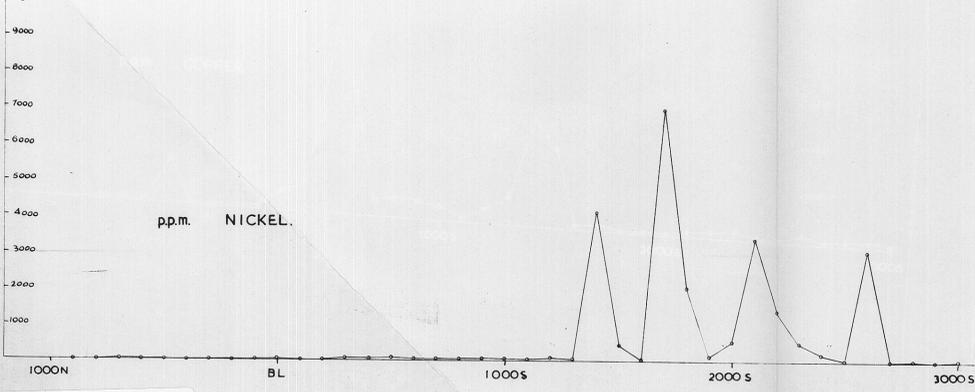
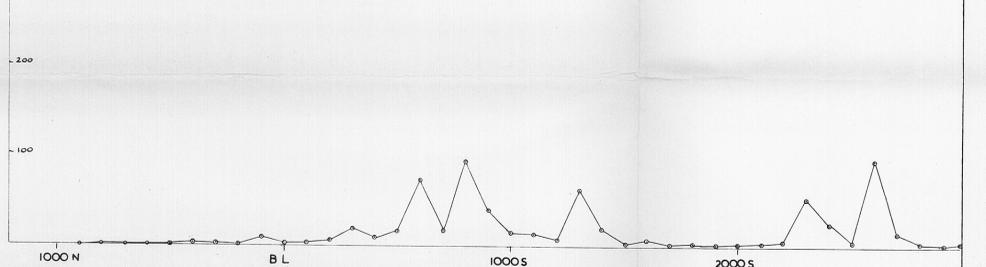
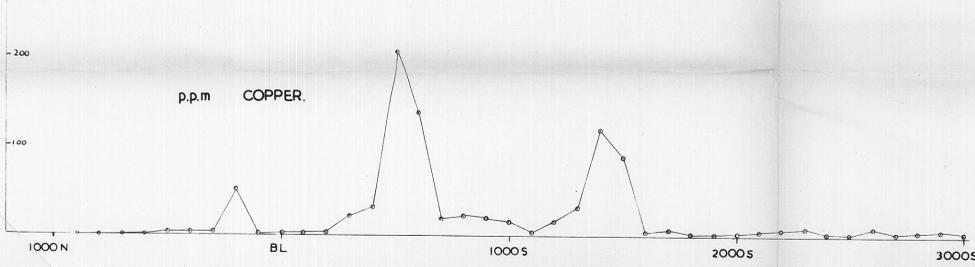
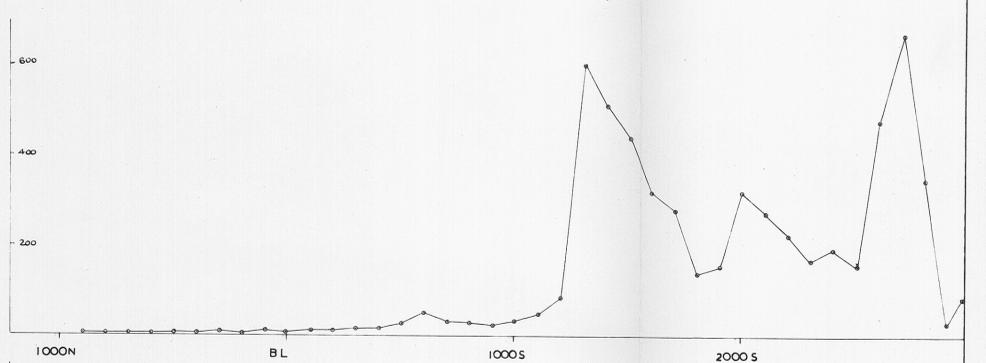
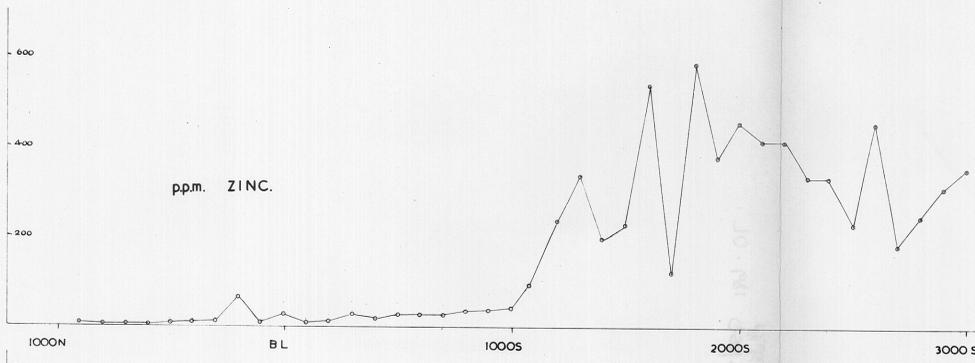
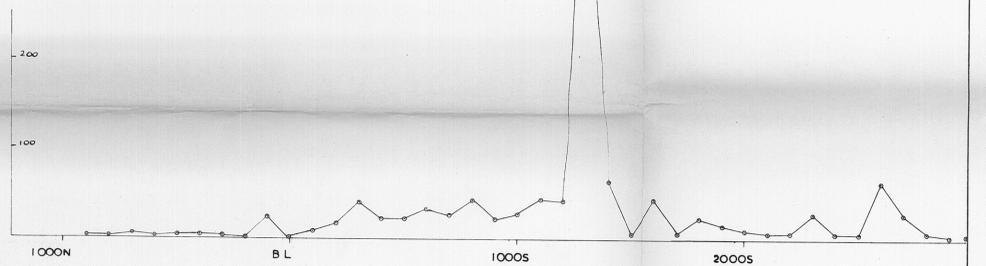
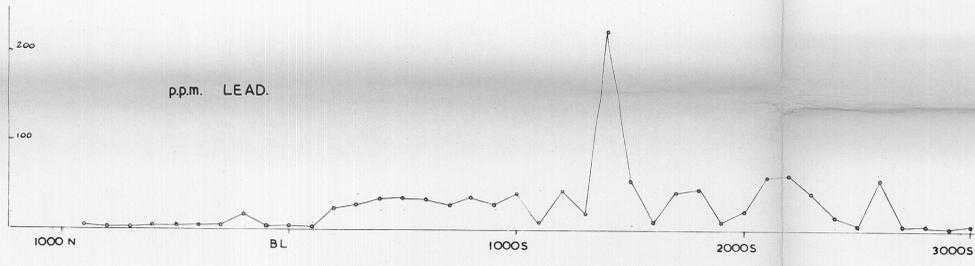
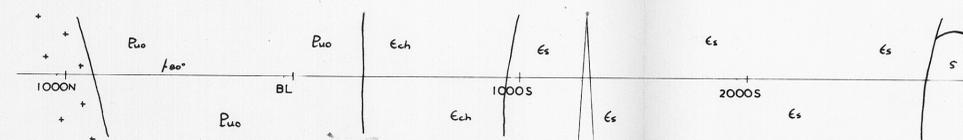
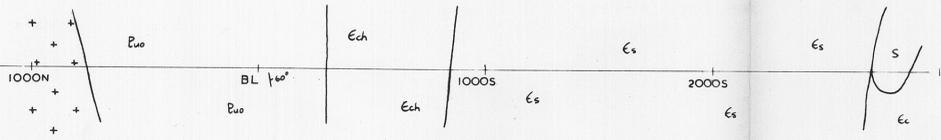
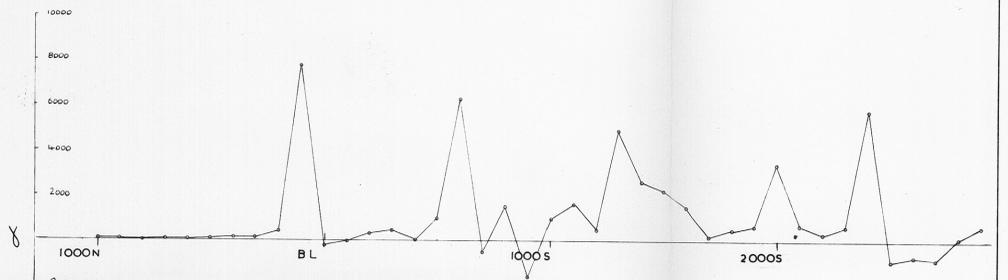
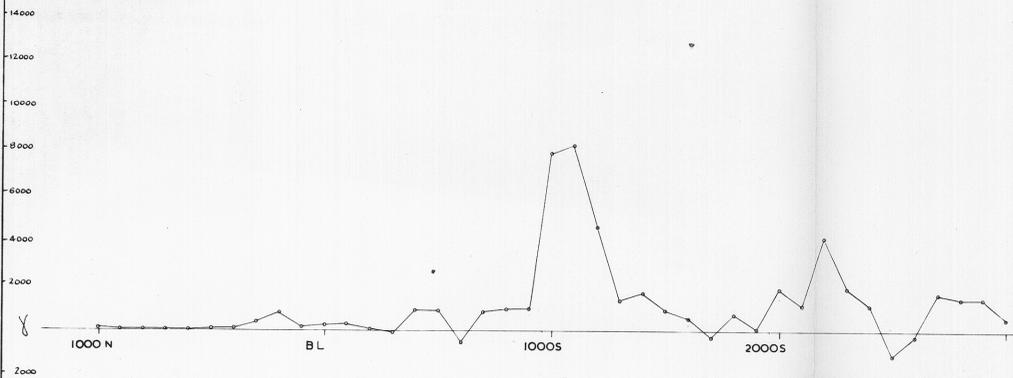


PLATE 10.

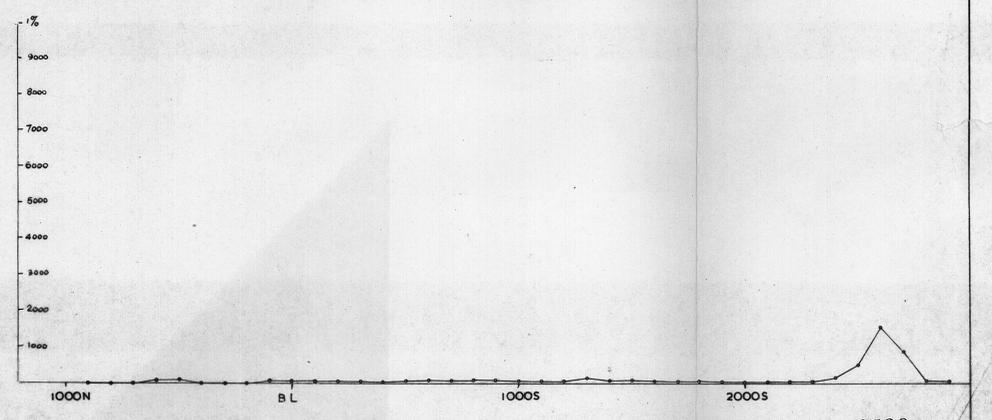
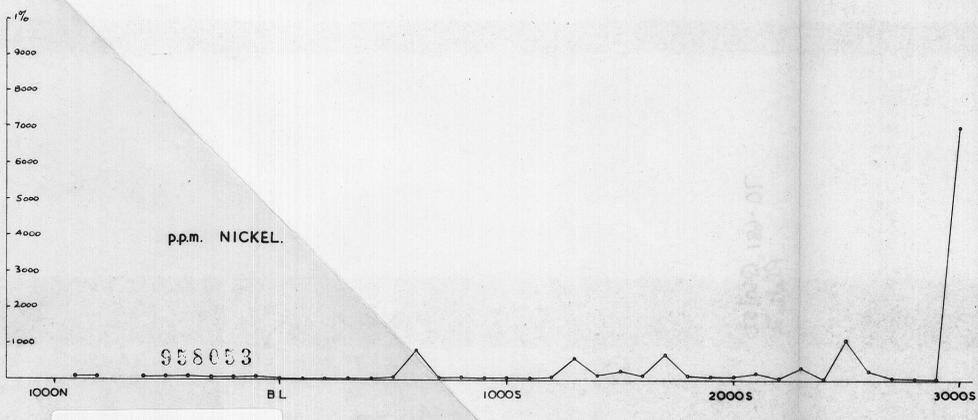
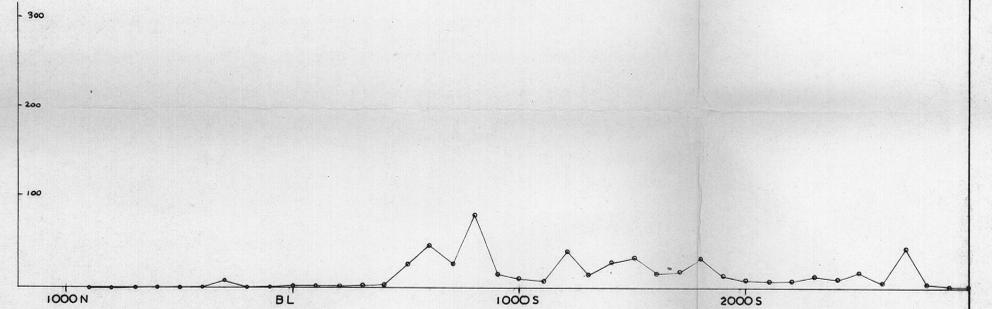
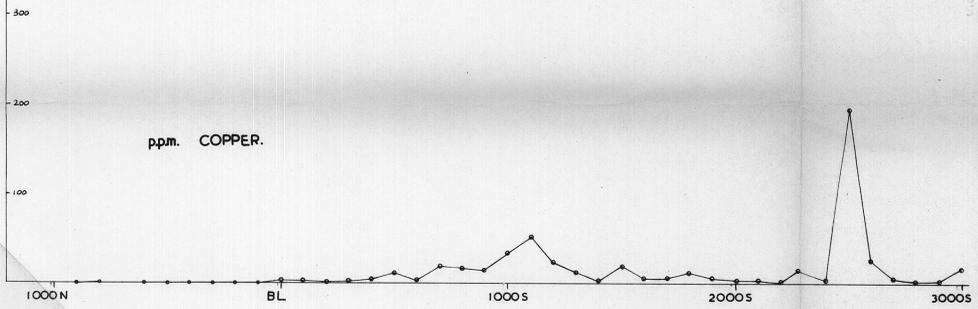
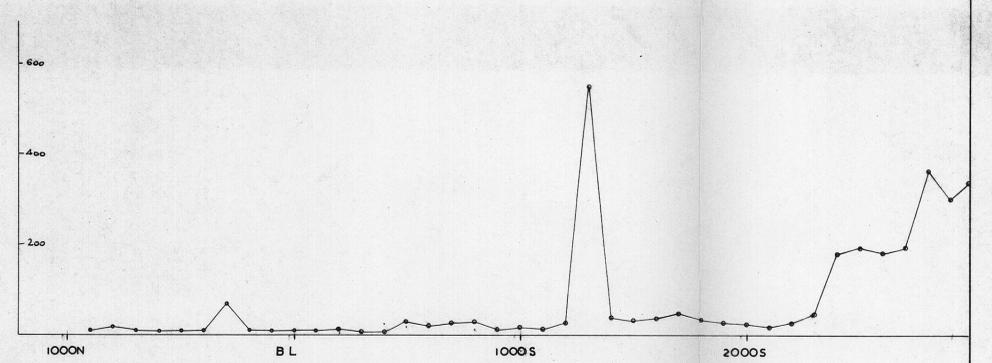
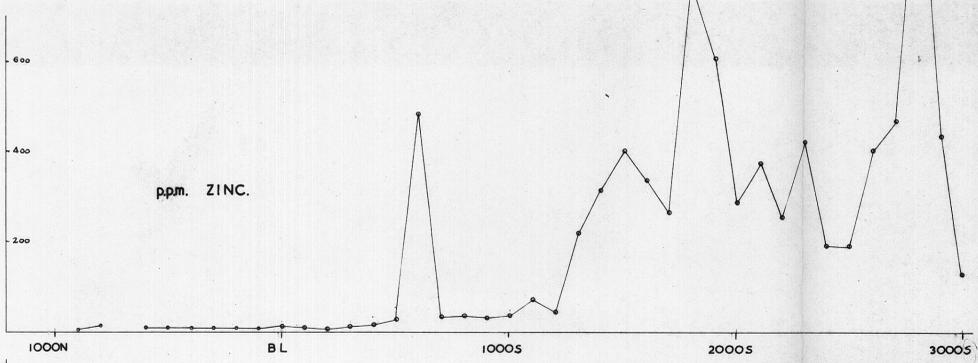
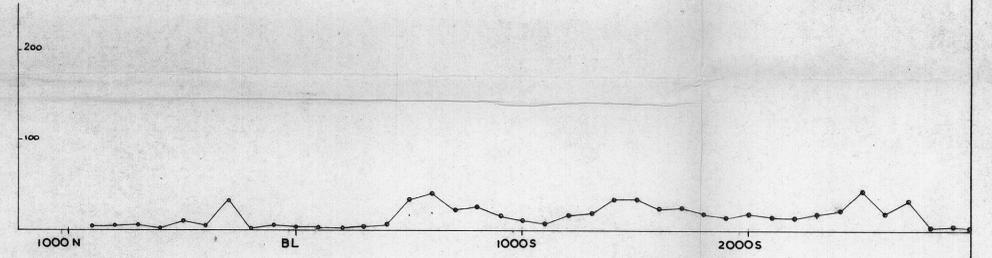
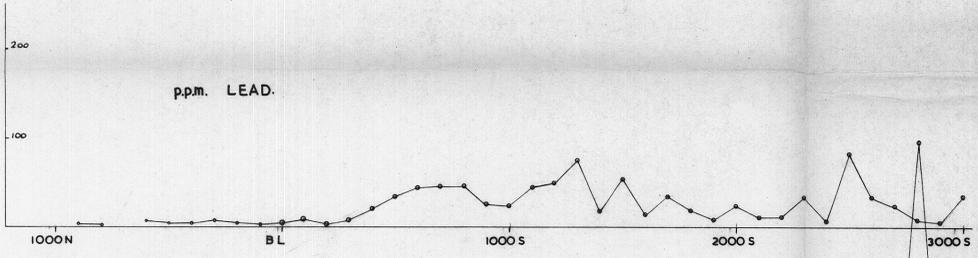
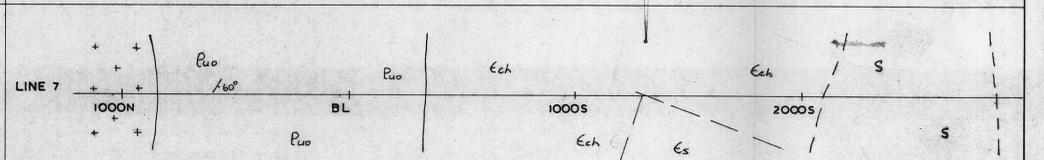
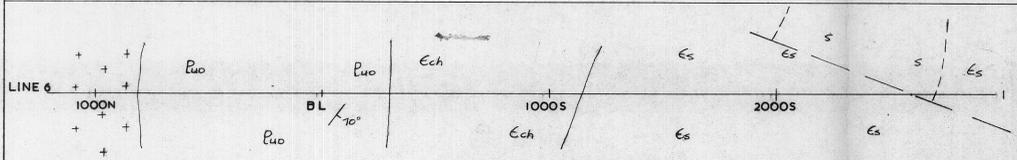
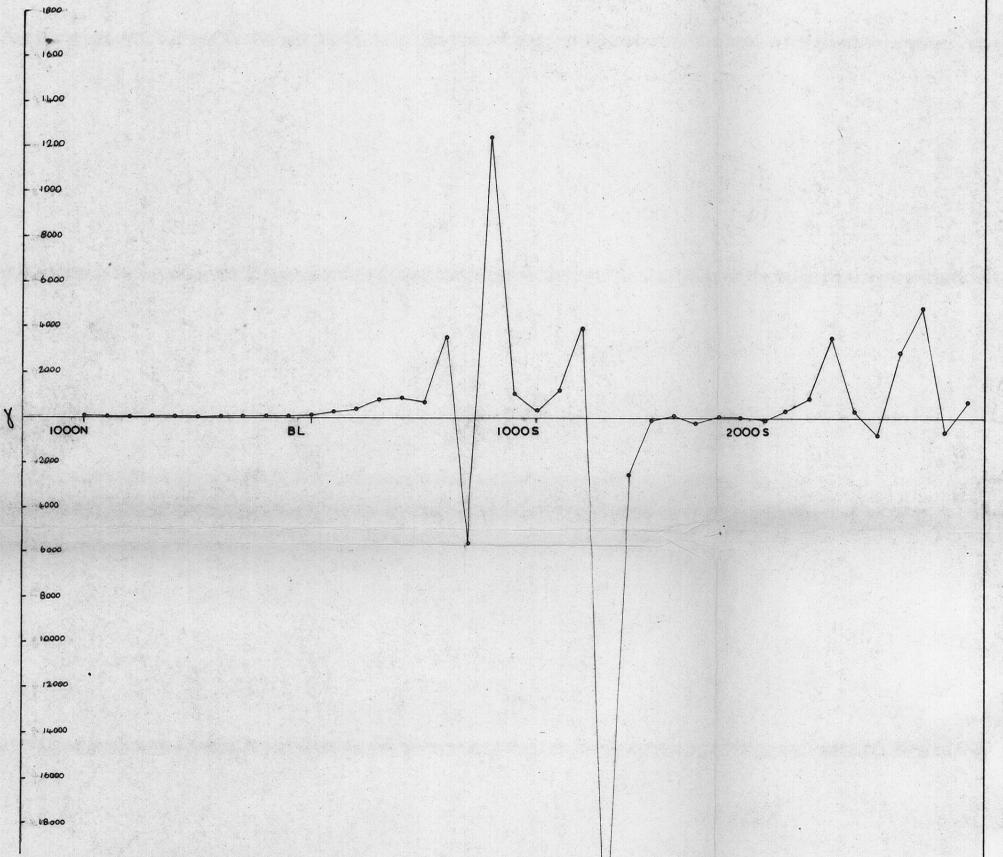
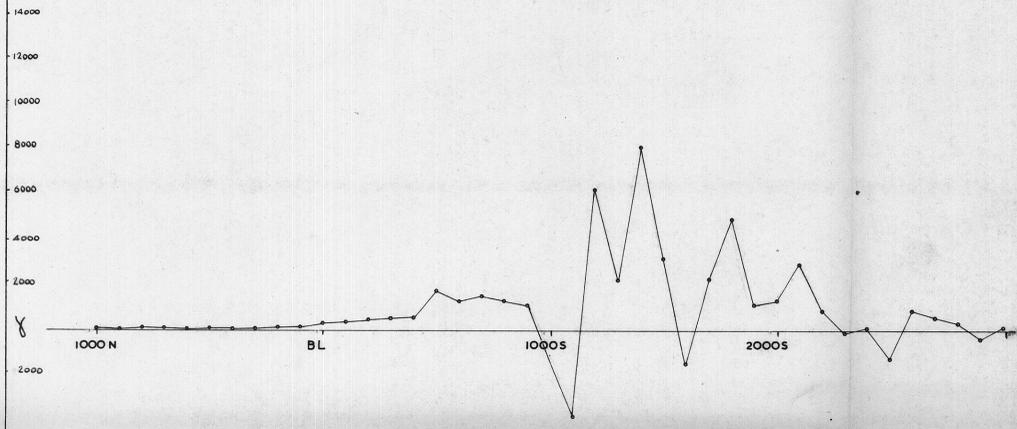
TRIAL HARBOUR S.P.L. 22. DATA PLOT. LINES 4 & 5E.

5 cm

958052 LINE 4E

LINE 5E

4767

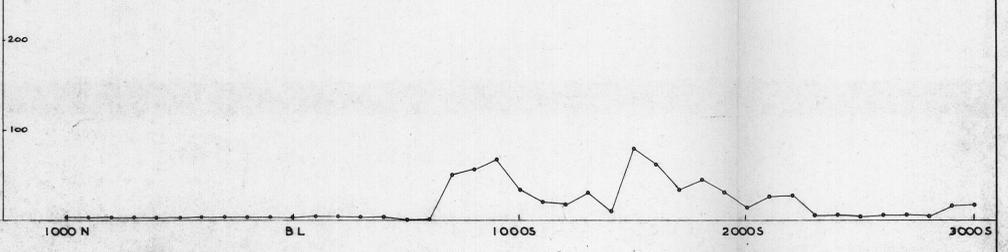
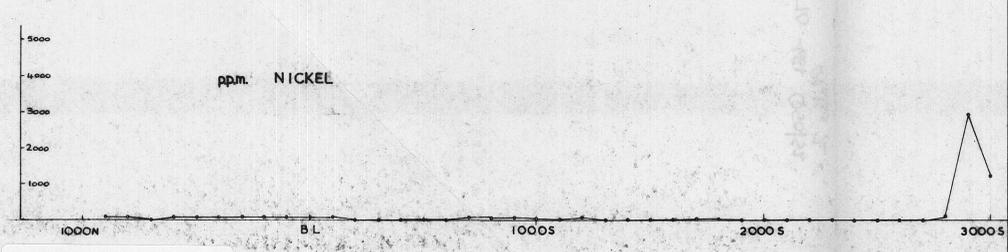
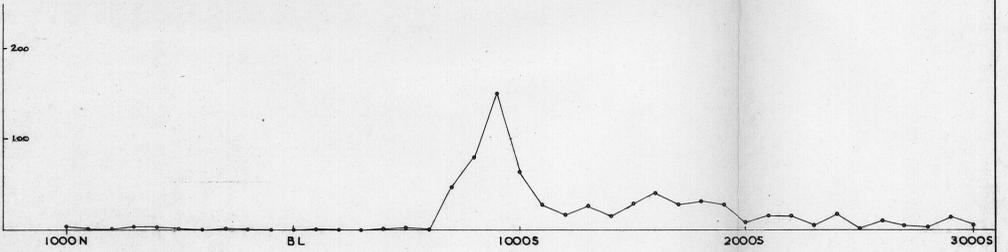
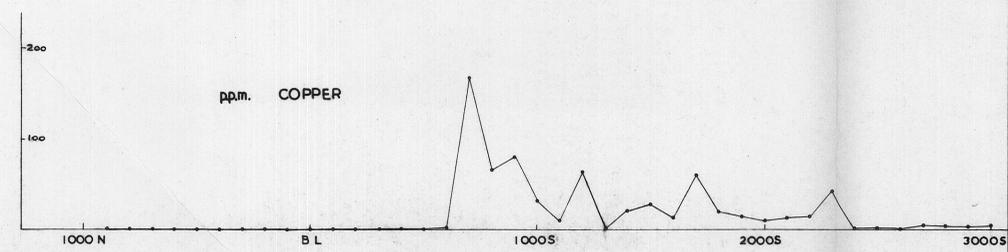
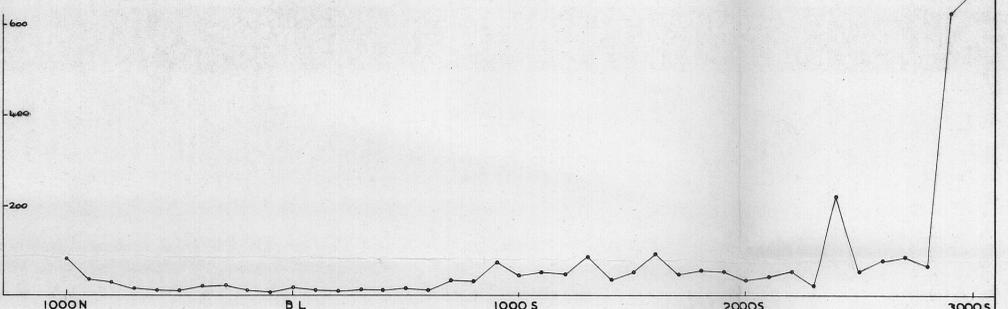
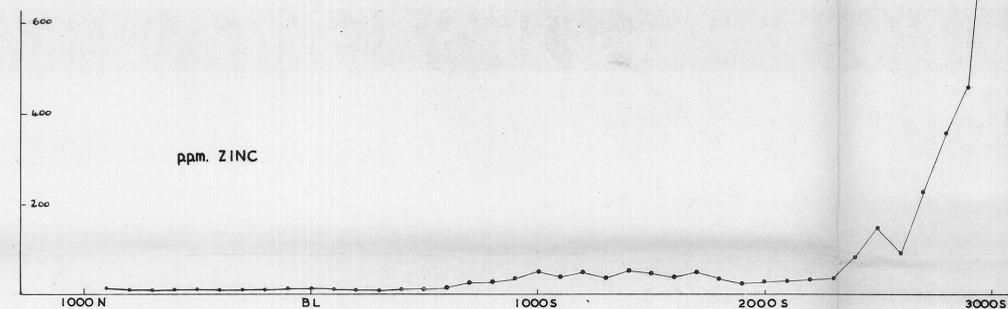
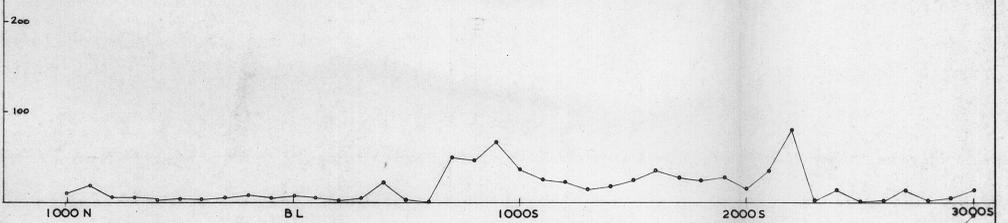
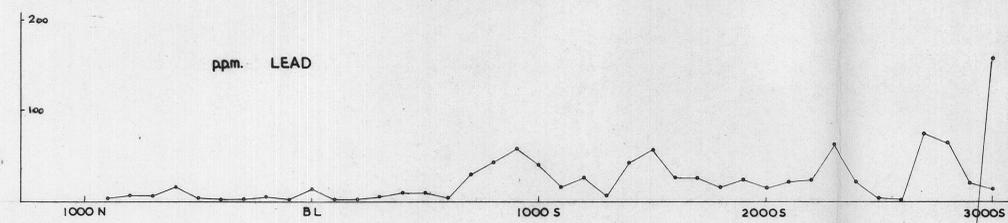
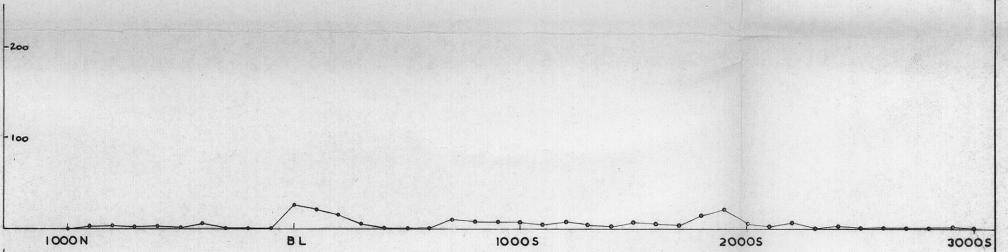
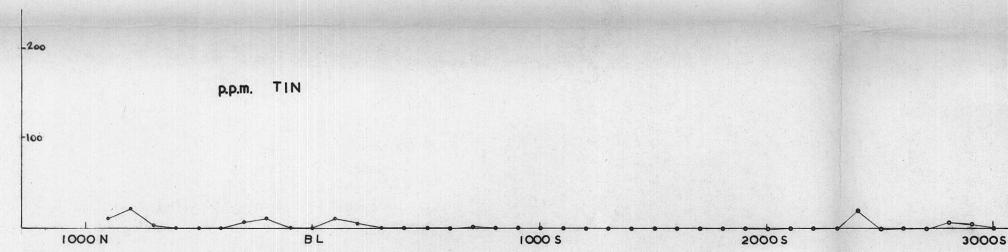
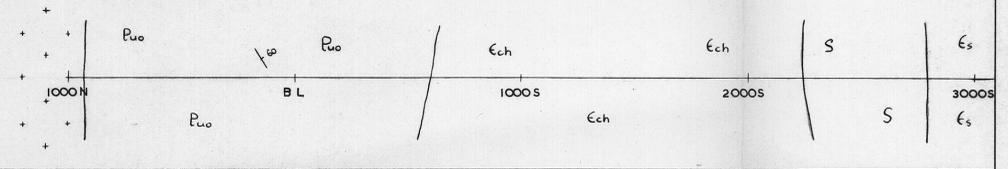
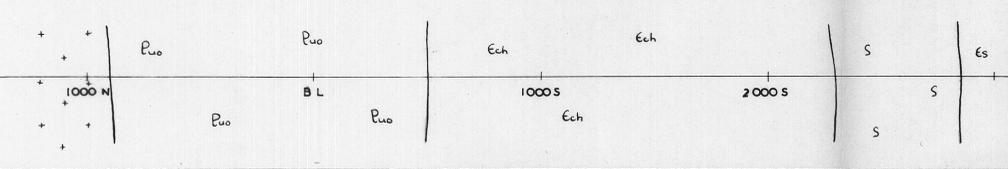
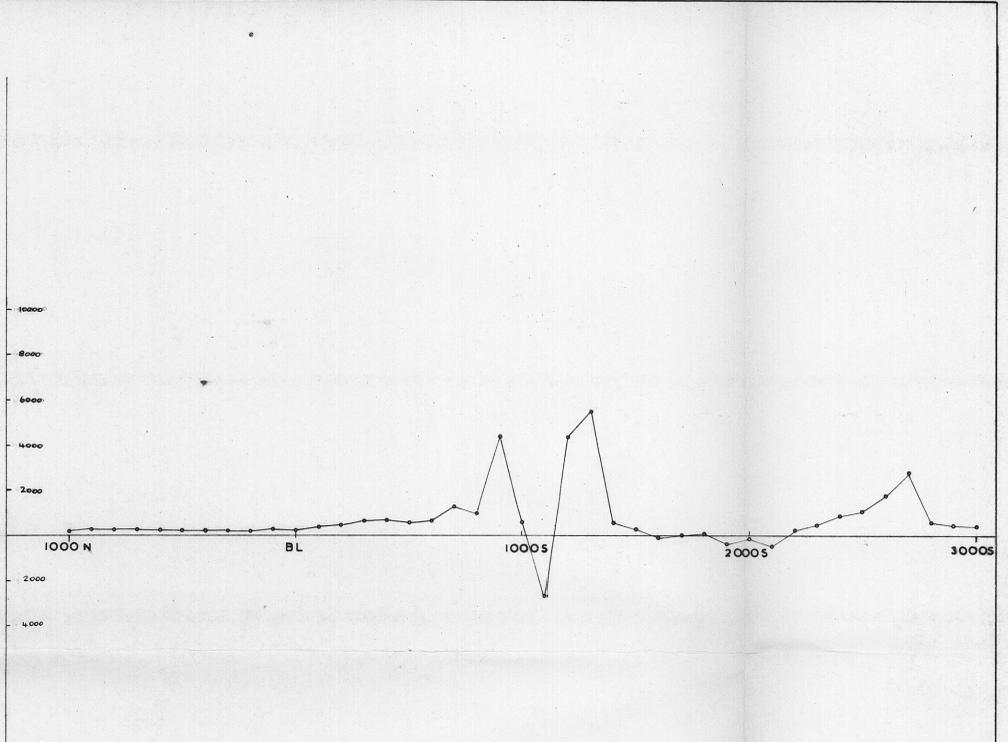
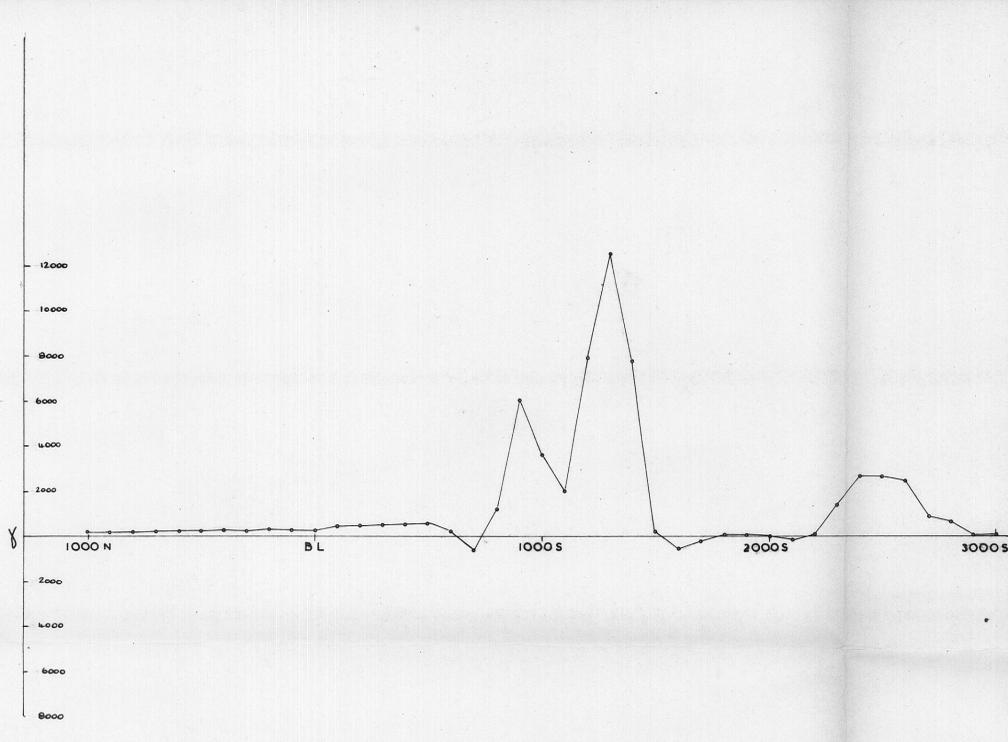


5 cm

LINE 6 E.

LINE 7 E.

4768



5 cm

LINE 8 E.

LINE 9 E.

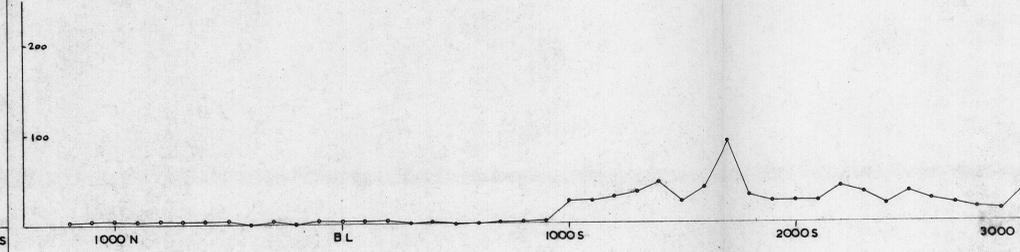
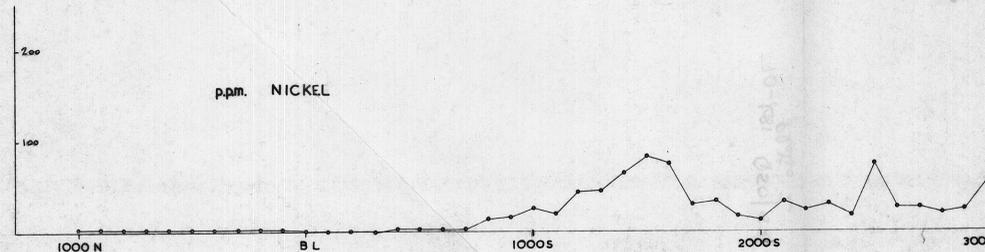
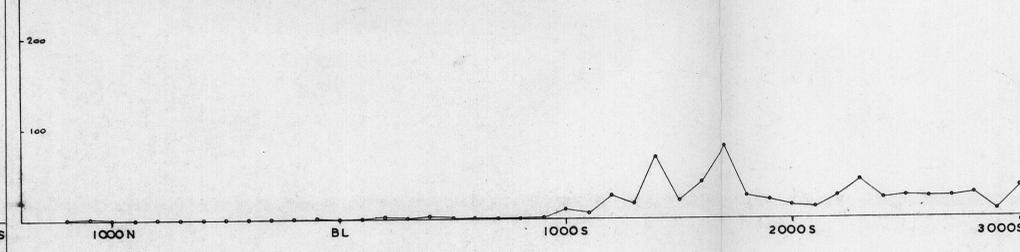
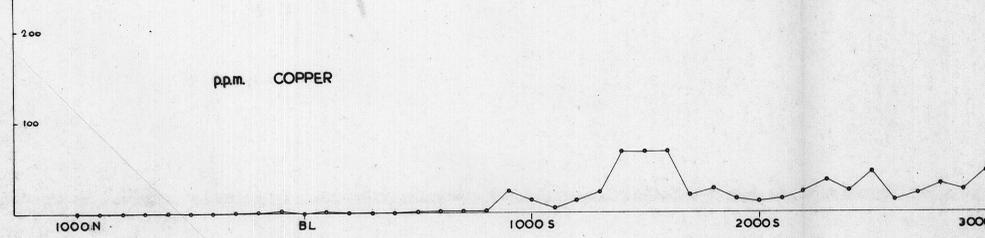
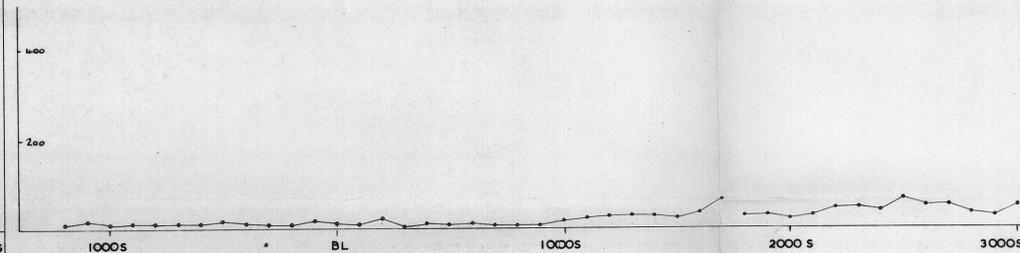
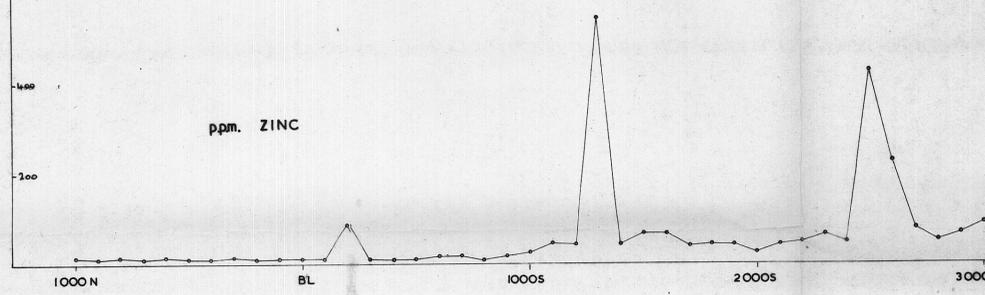
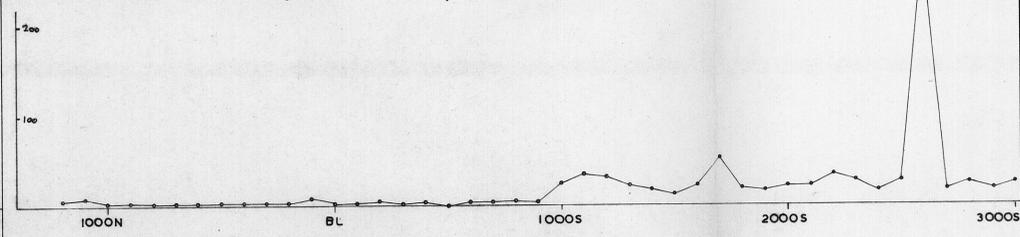
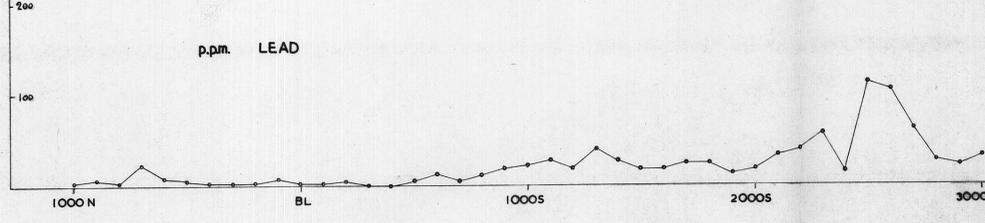
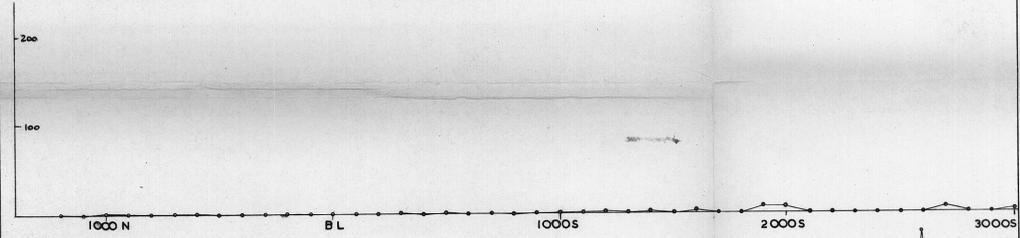
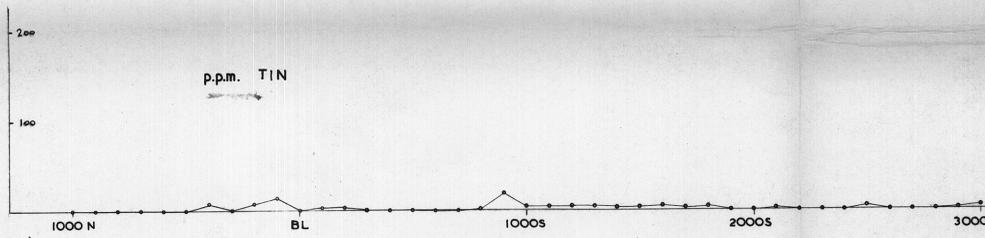
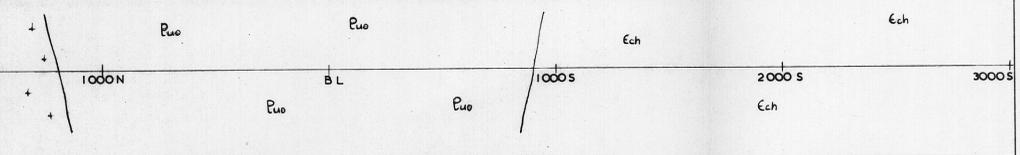
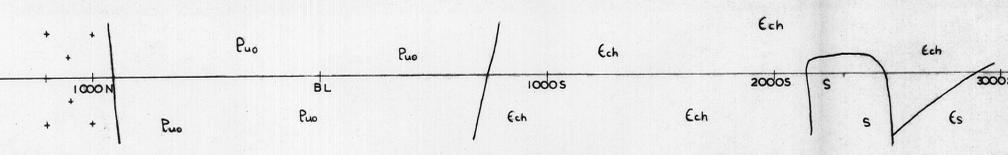
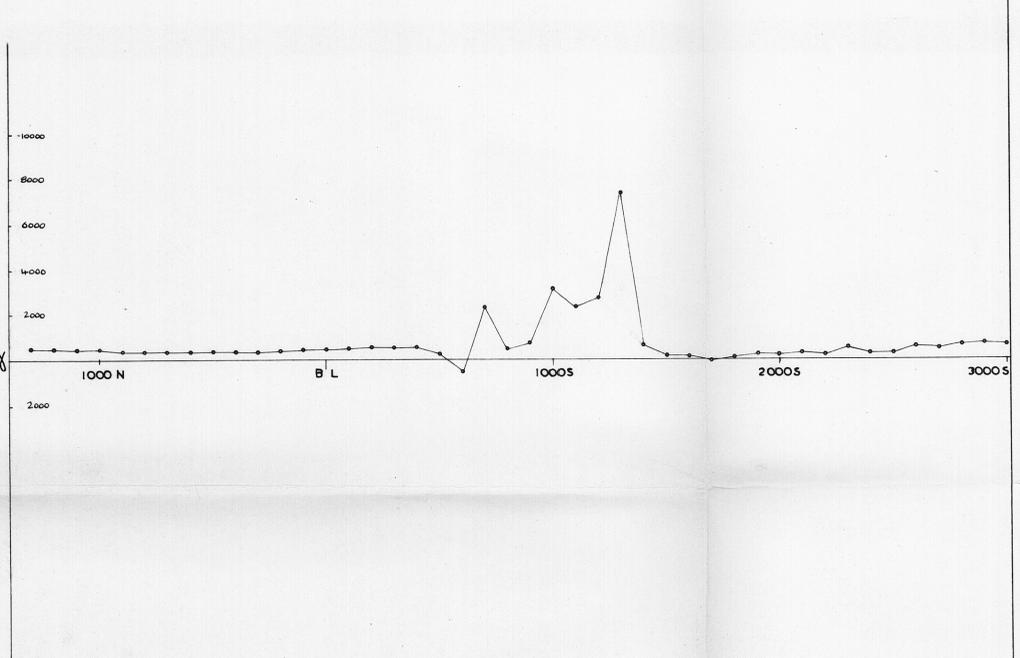
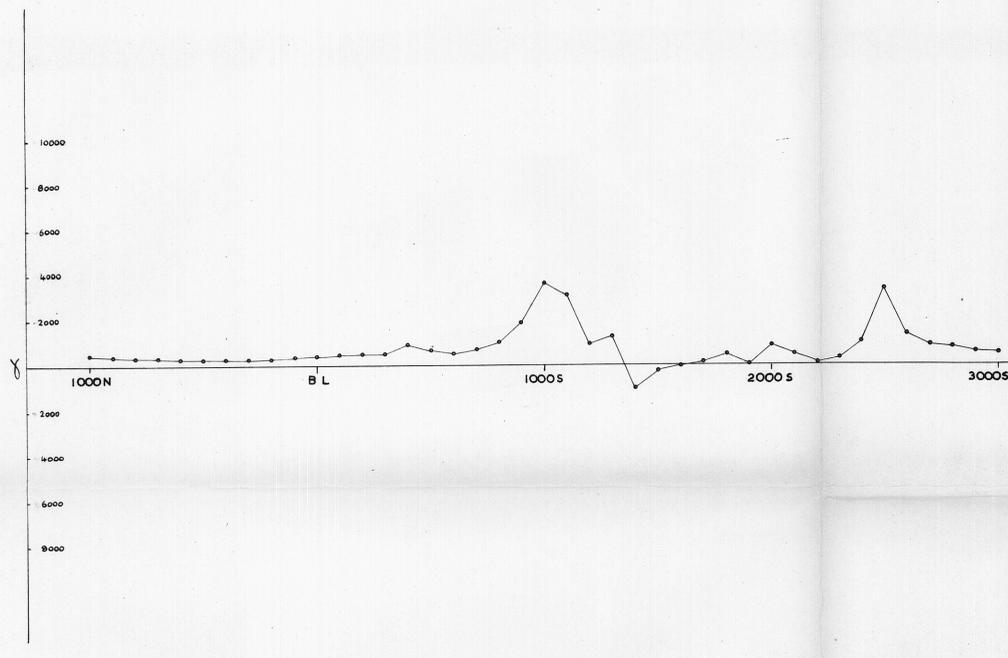


PLATE 13. TRIAL HARBOUR S.P.L. 22. DATA PLOT. LINES 10 & 11 E.

5 cm

LINE 10E

LINE 11E

4770

558055

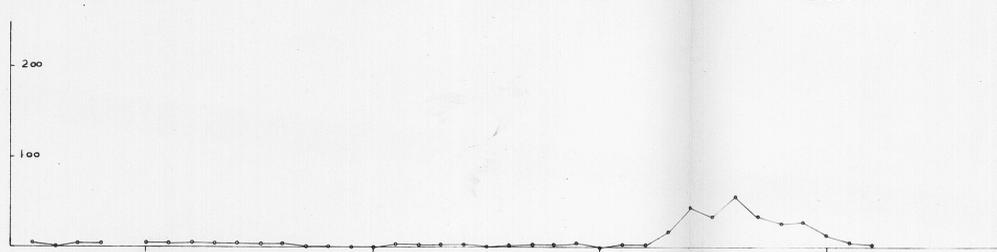
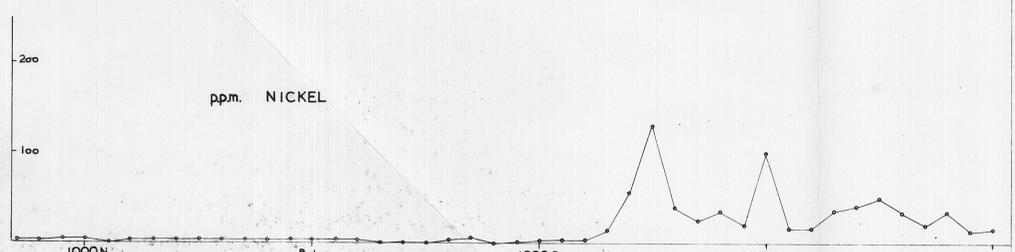
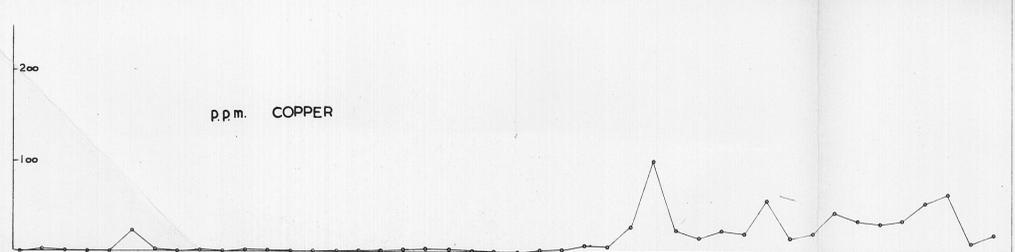
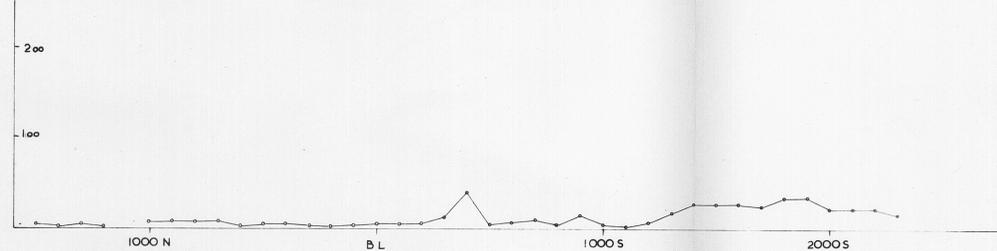
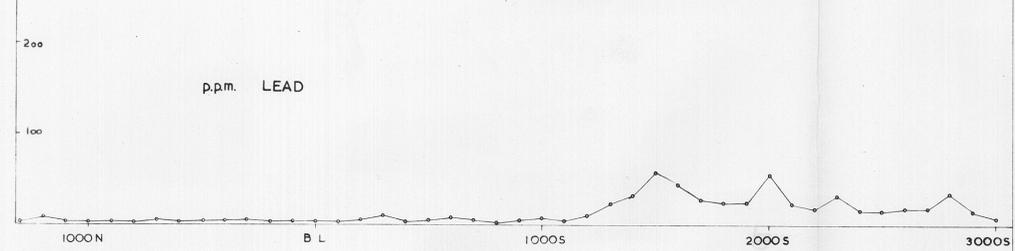
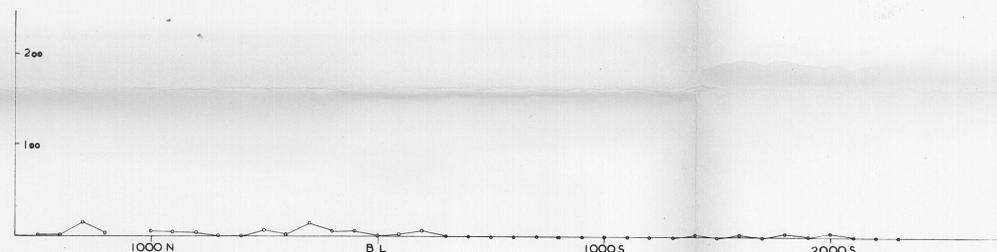
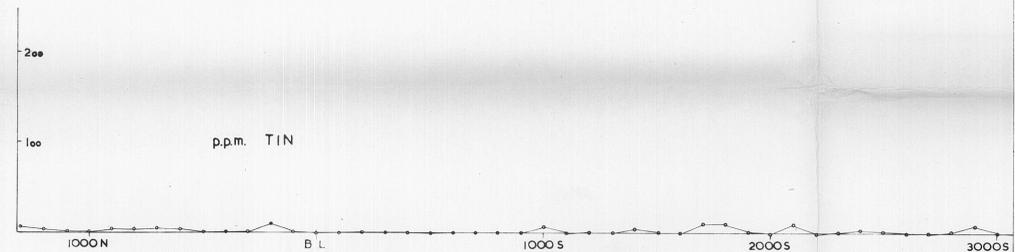
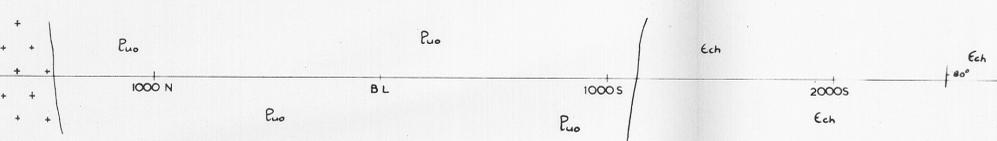
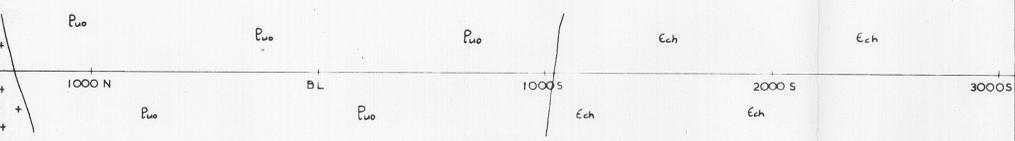
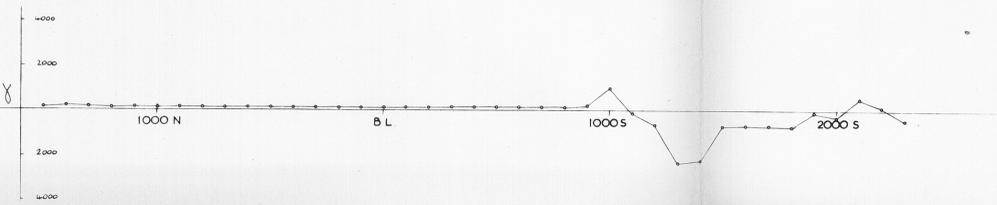
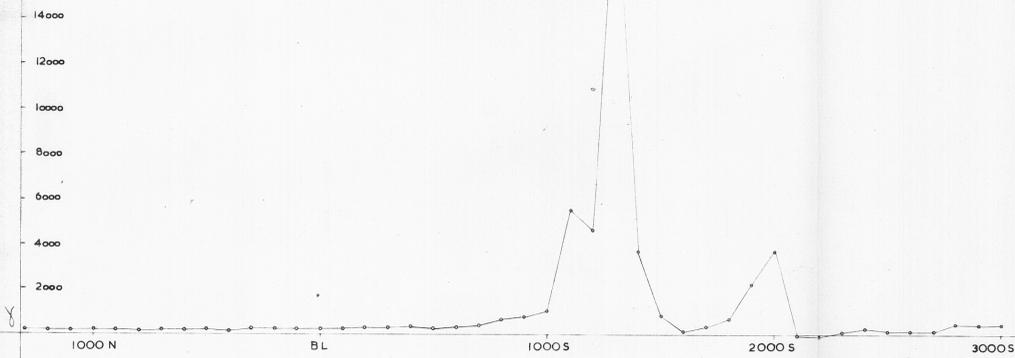


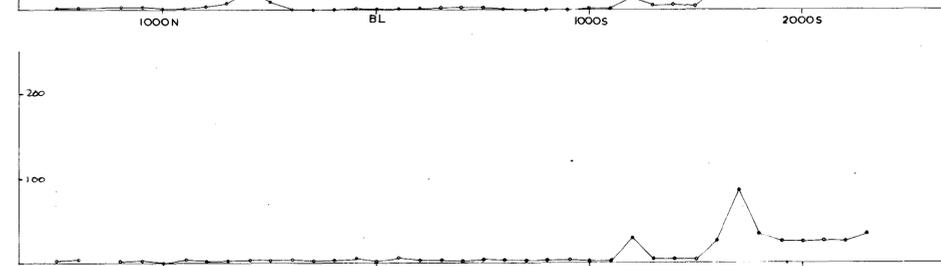
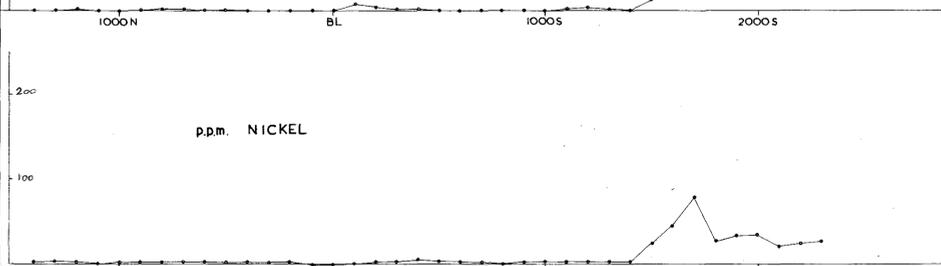
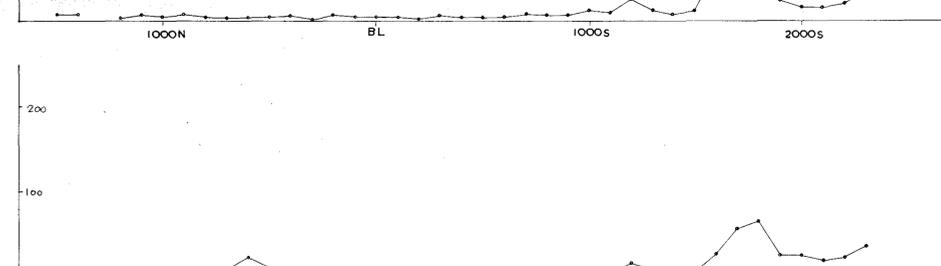
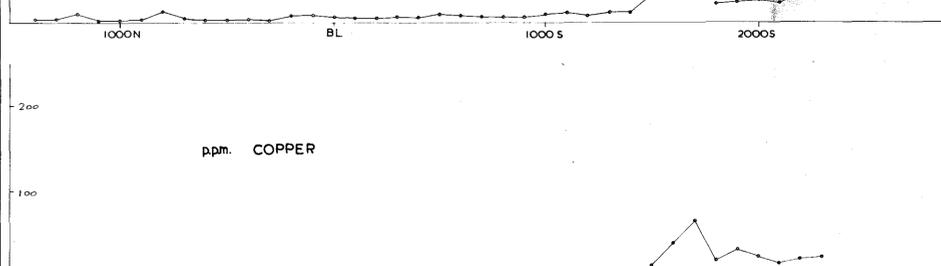
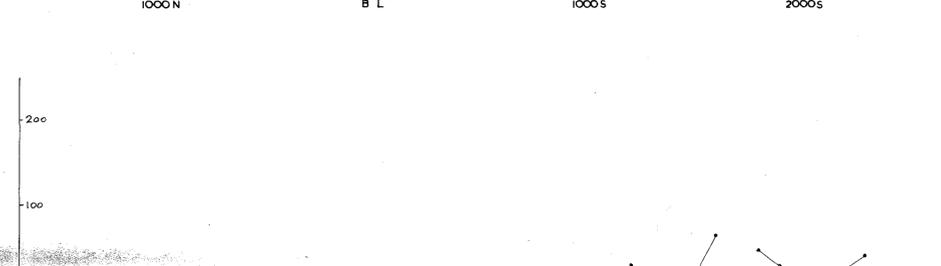
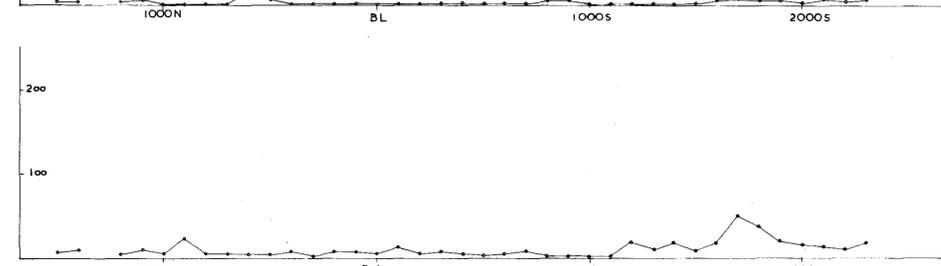
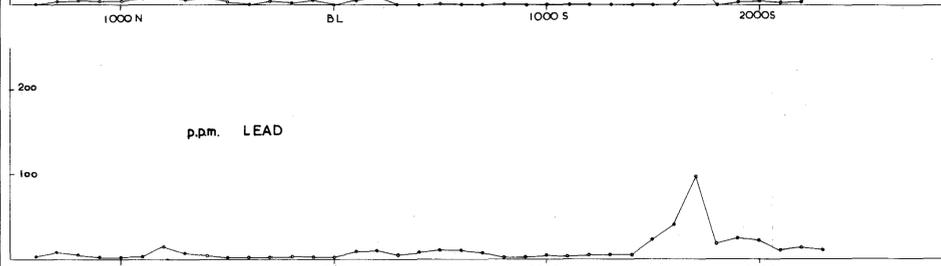
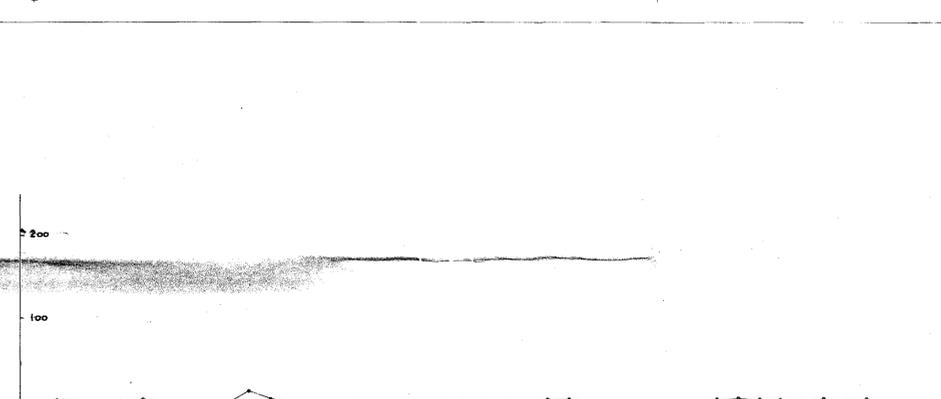
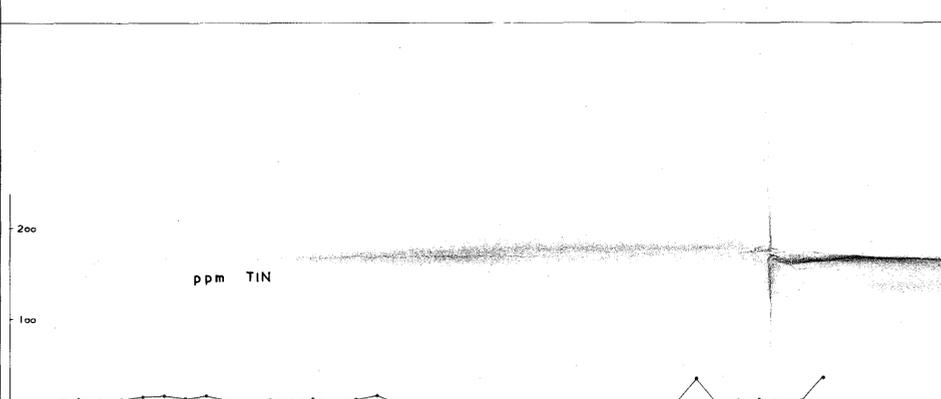
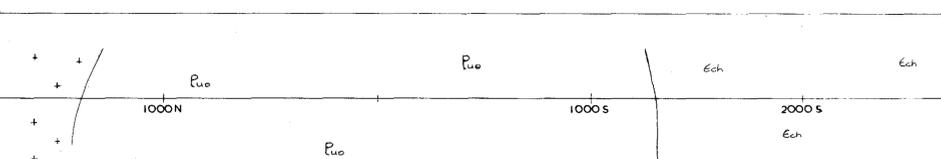
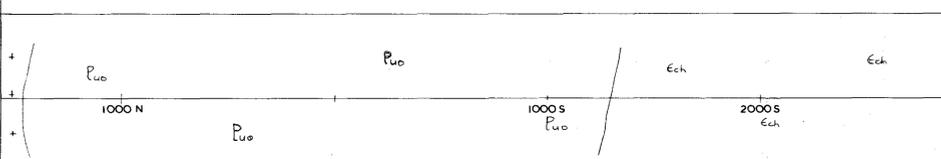
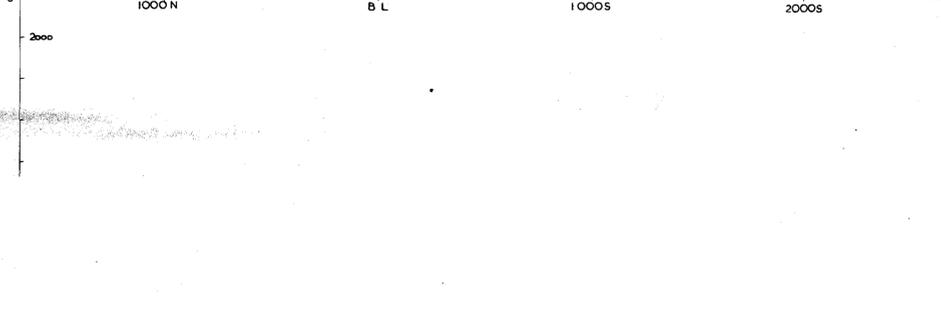
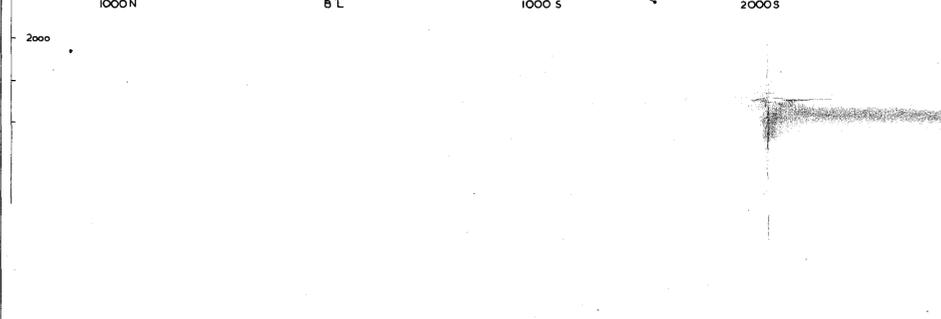
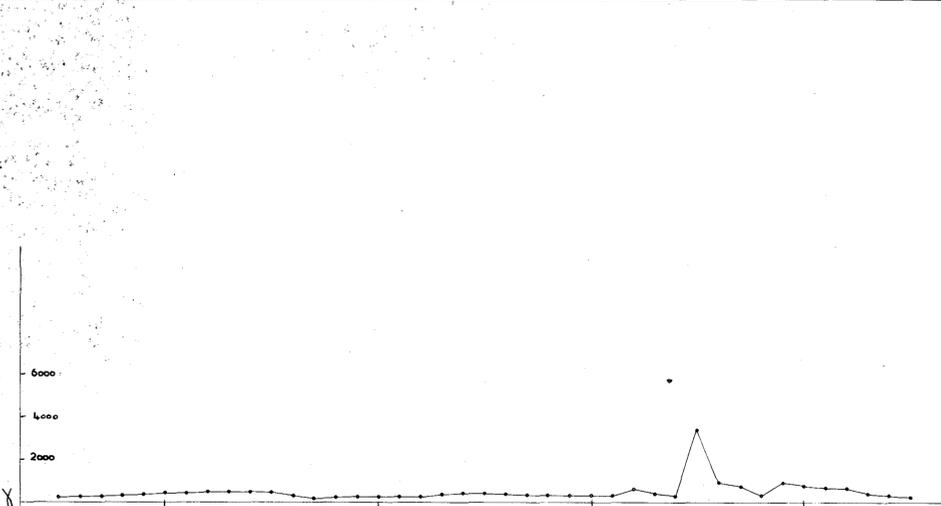
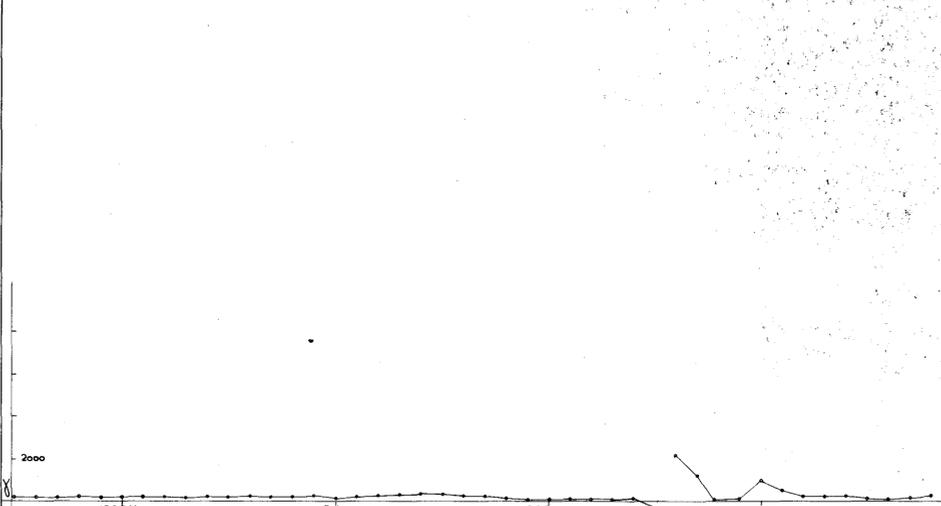
PLATE 14. TRIAL HARBOUR SPL. 22. DATA PLOT. LINES 12 & 13 E

5 cm

958056 LINE 12E

LINE 13E

4771



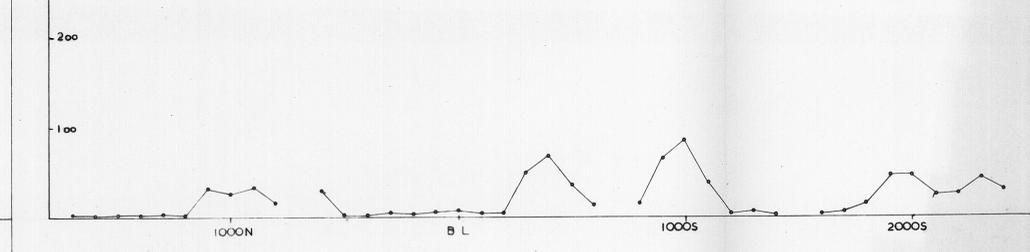
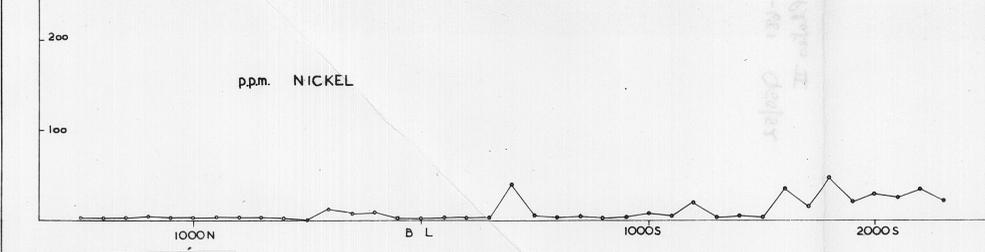
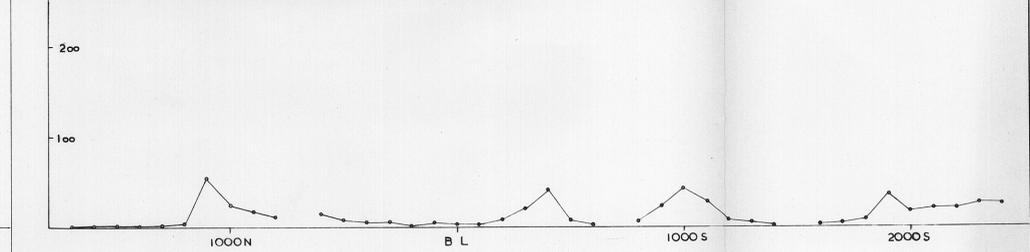
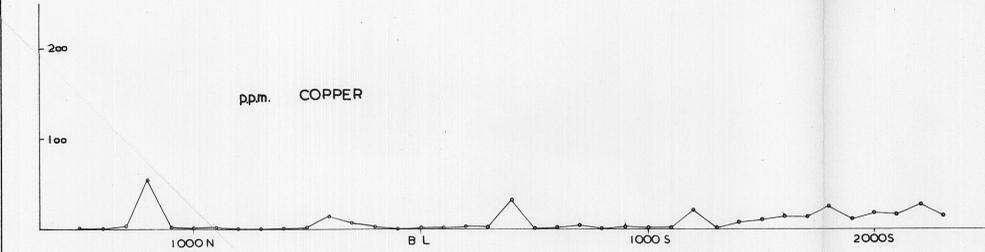
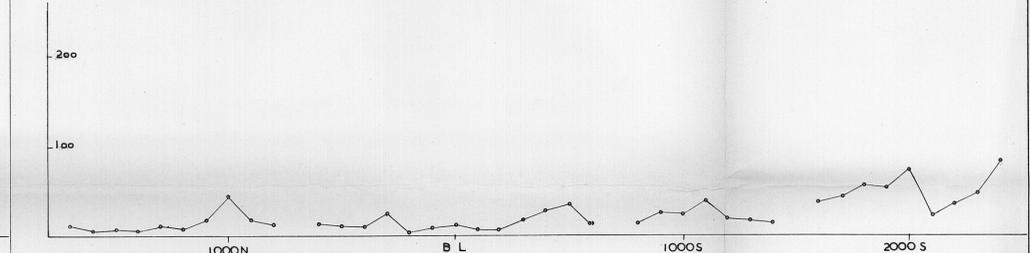
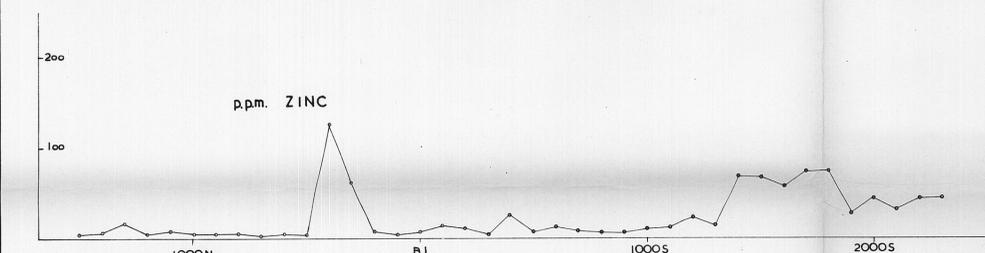
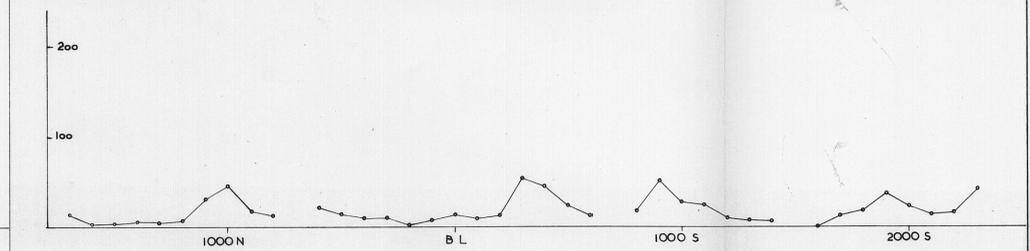
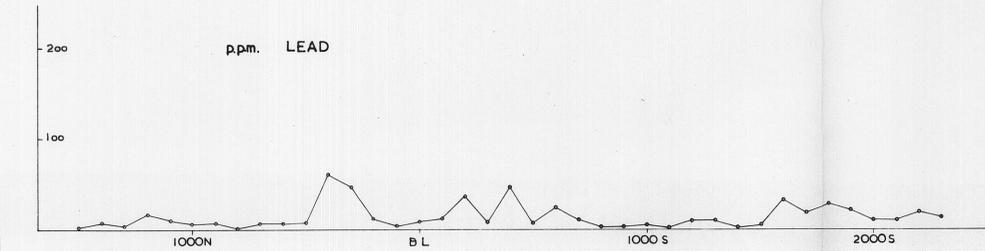
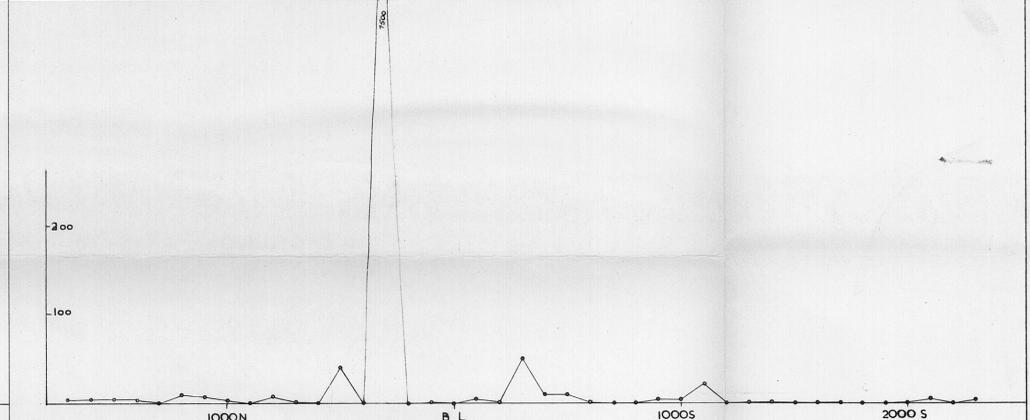
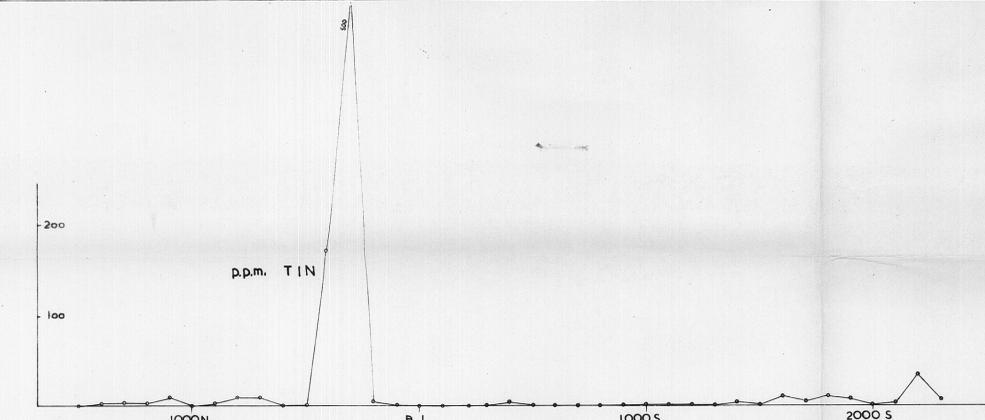
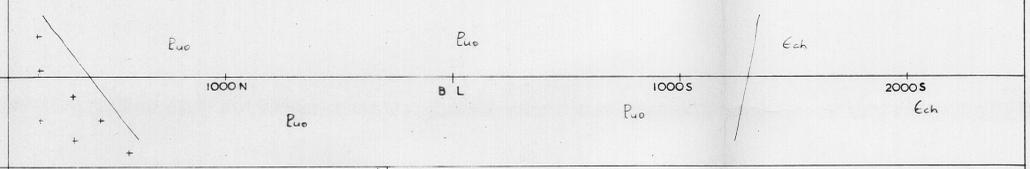
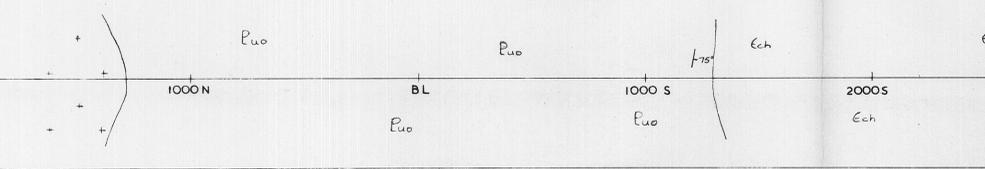
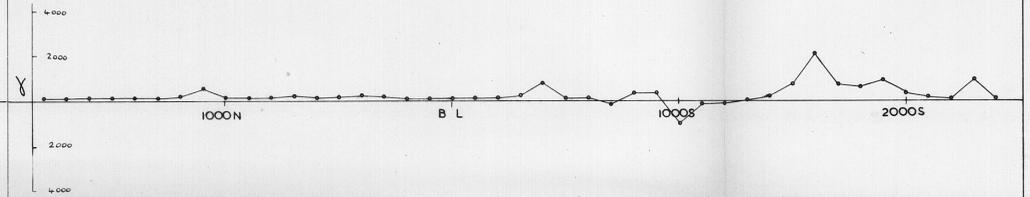
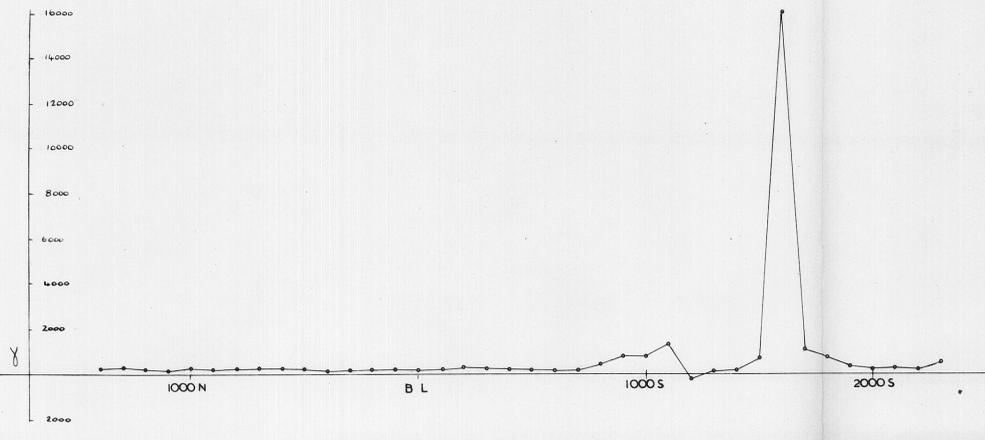
5 cm

958057 LINE 14E

LINE 15E

4772

PLATE 15. TRIAL HARBOUR SPL. 22. DATA PLOT. LINES 14 & 15E



30-40m depth

PLATE 16. TRIAL HARBOUR SPL. 22. DATA PLOT. LINES 16 & 17E.

5cm

958058 LINE 16E

LINE 17E

4773

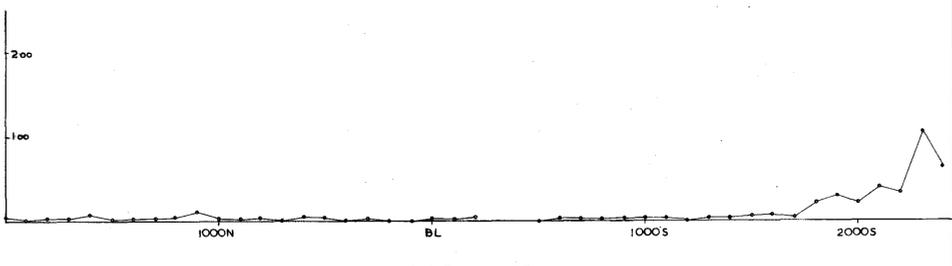
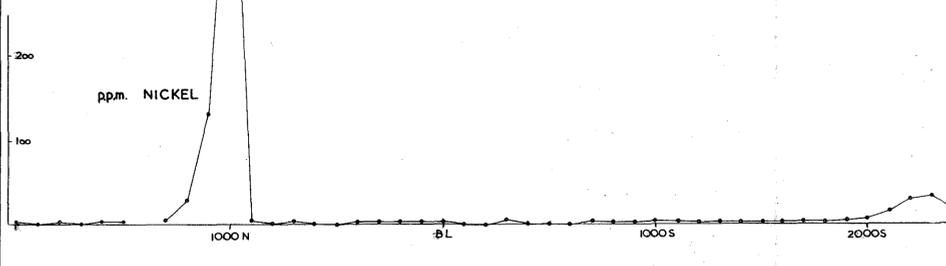
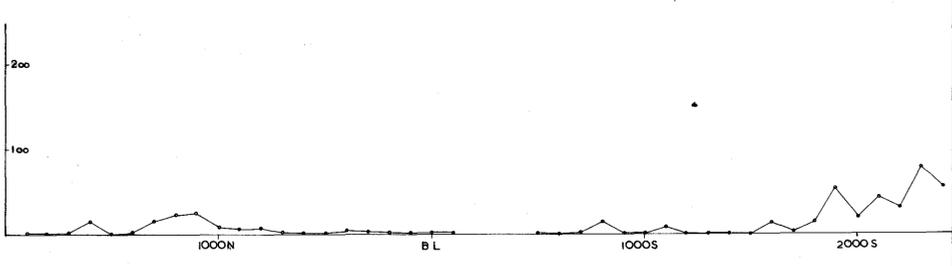
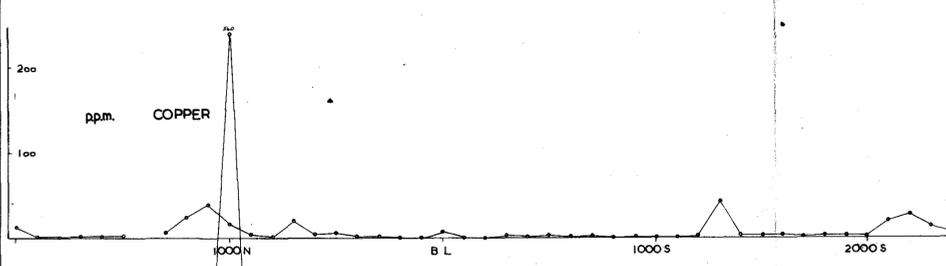
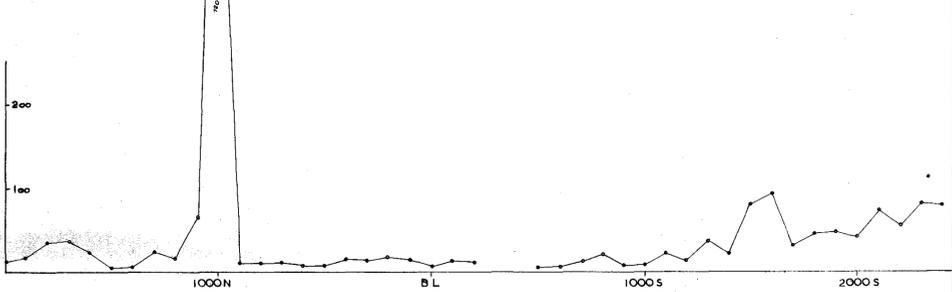
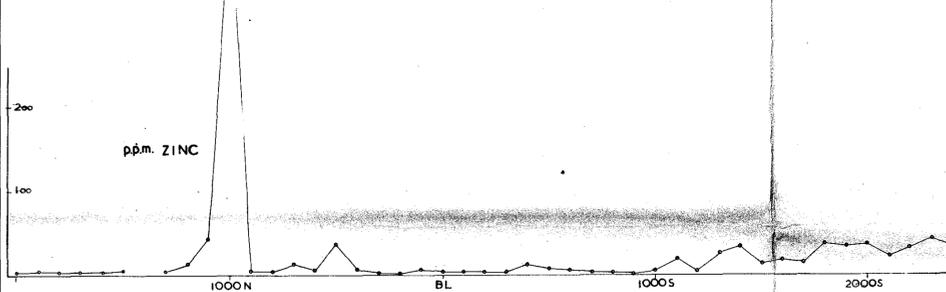
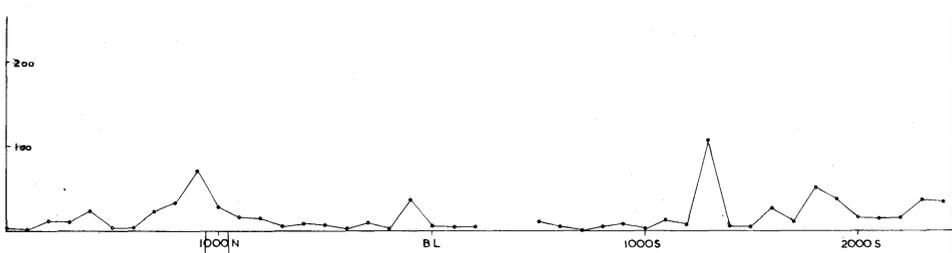
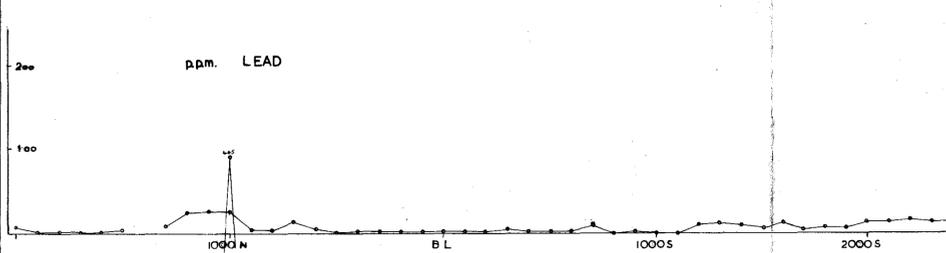
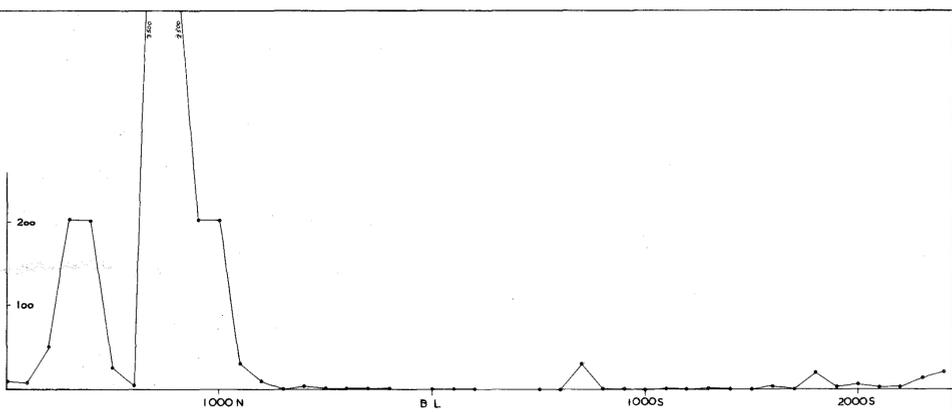
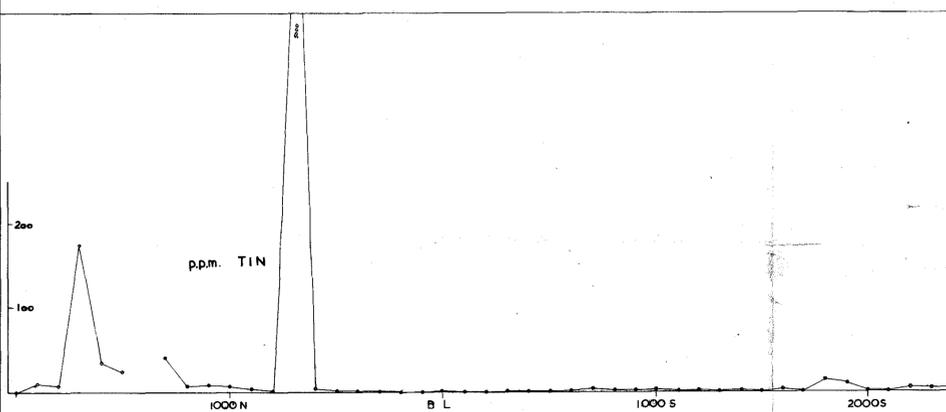
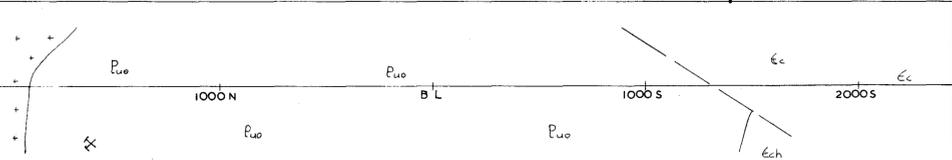
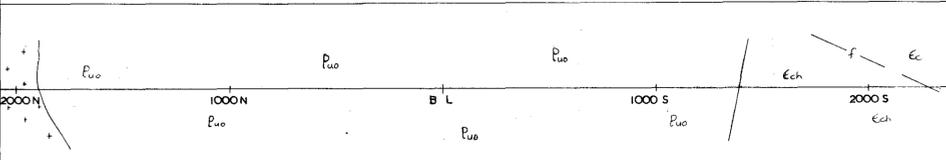
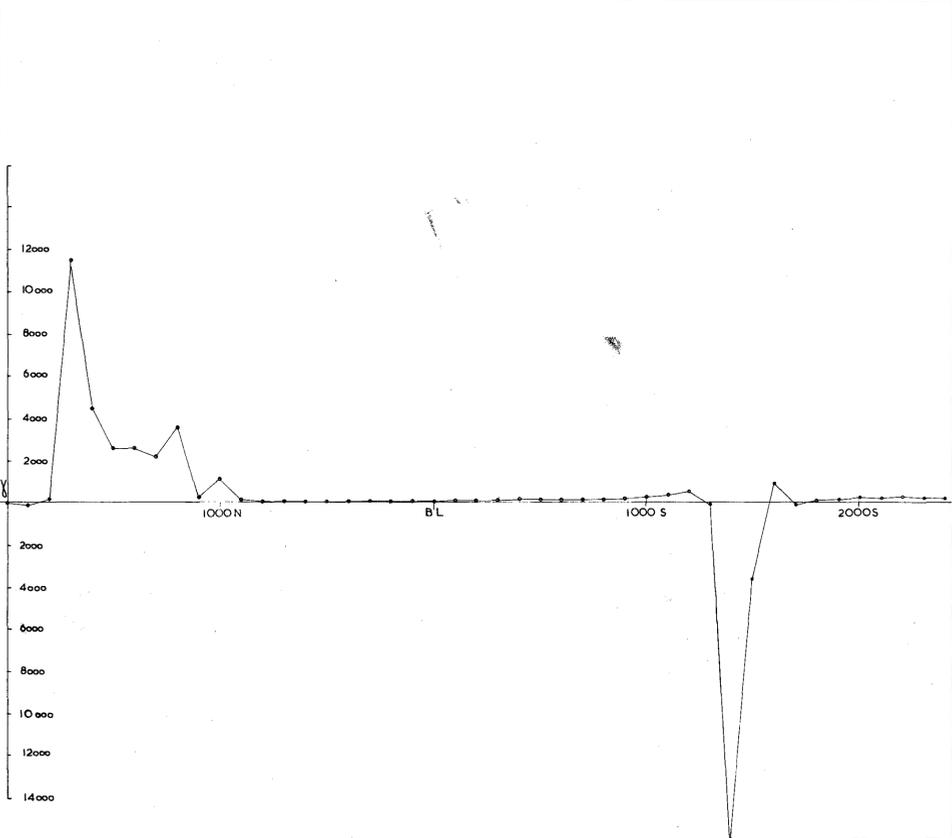
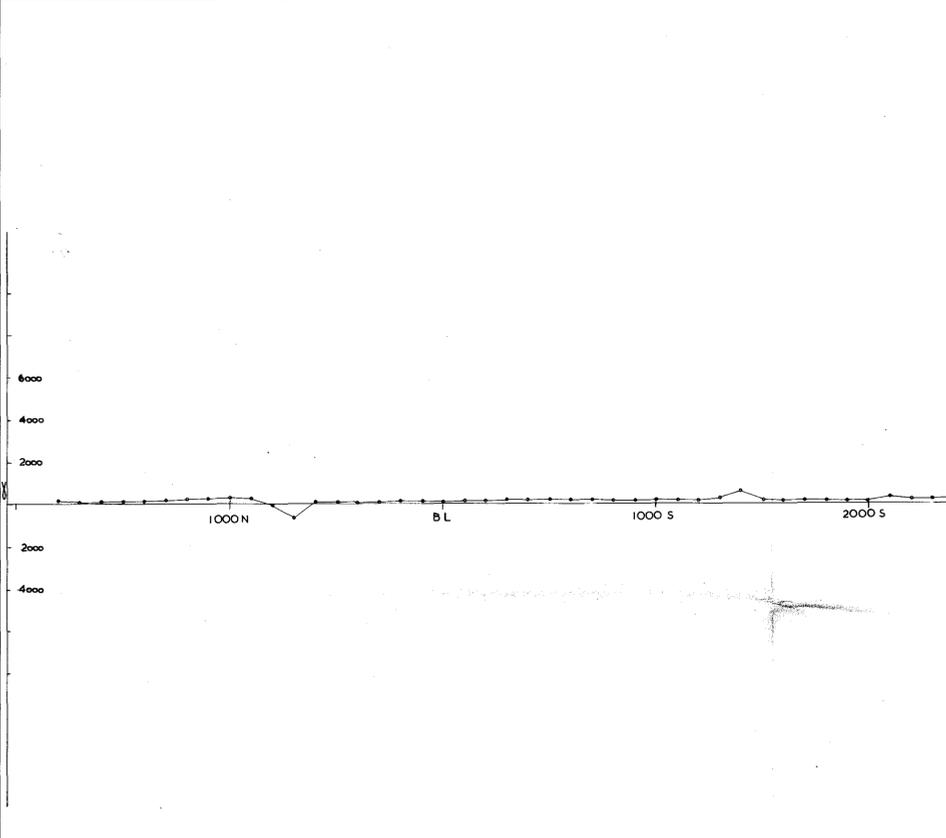


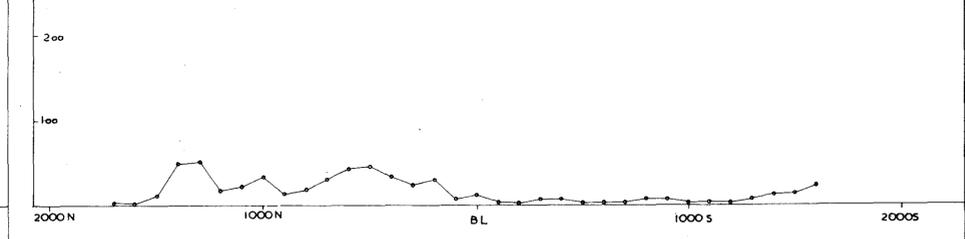
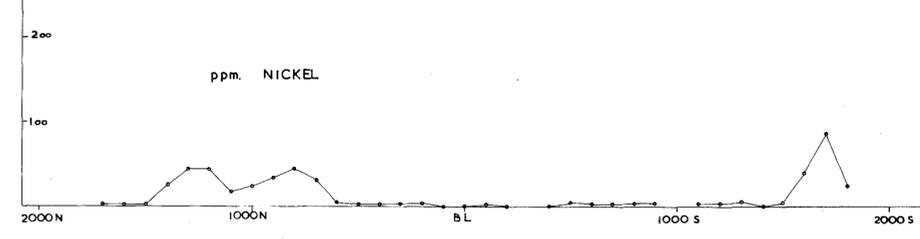
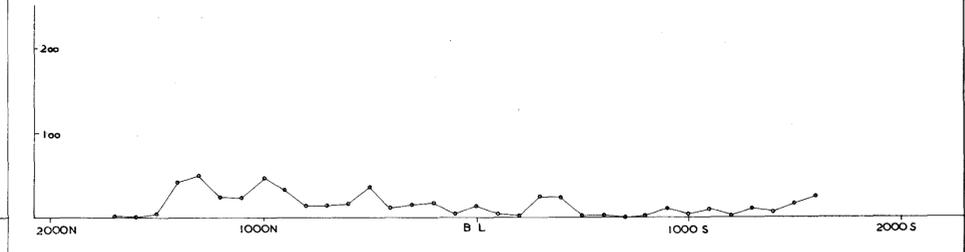
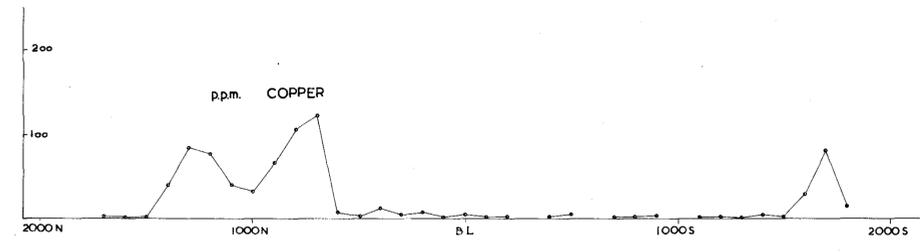
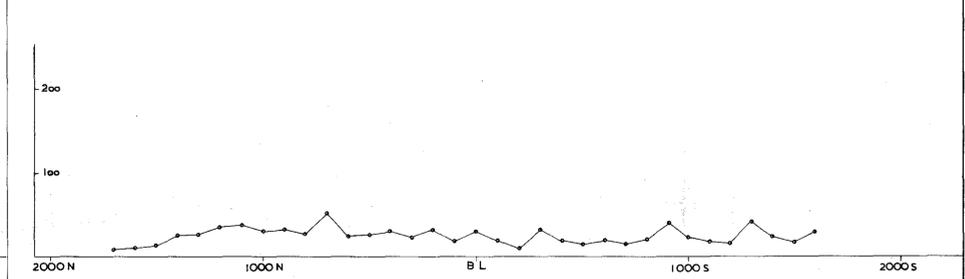
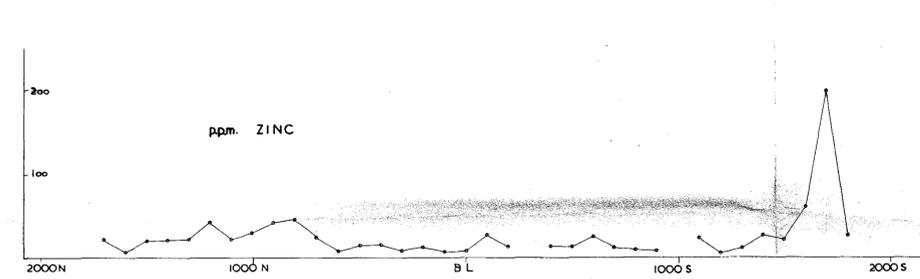
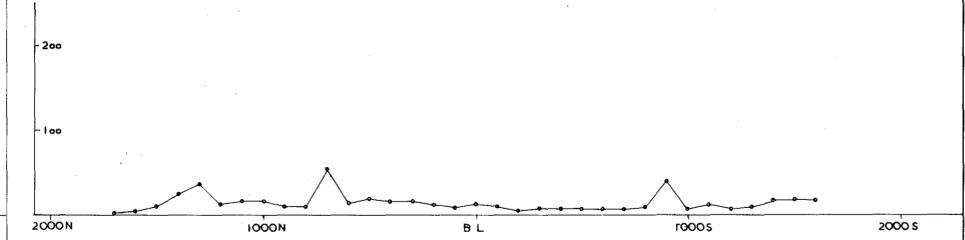
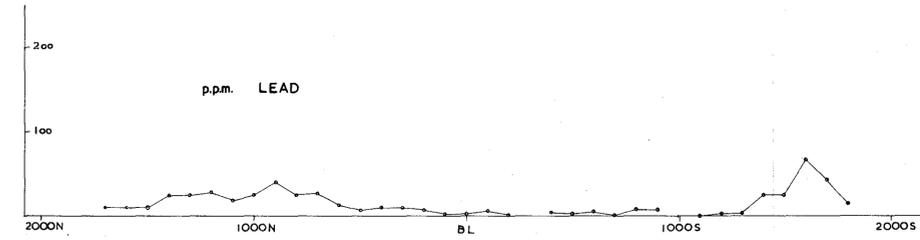
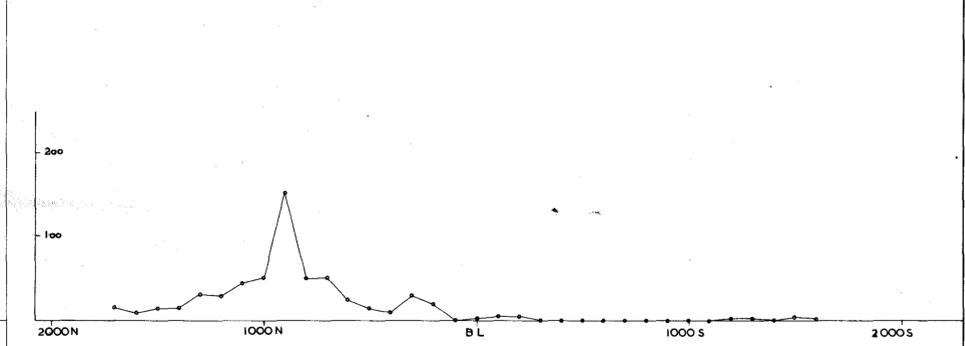
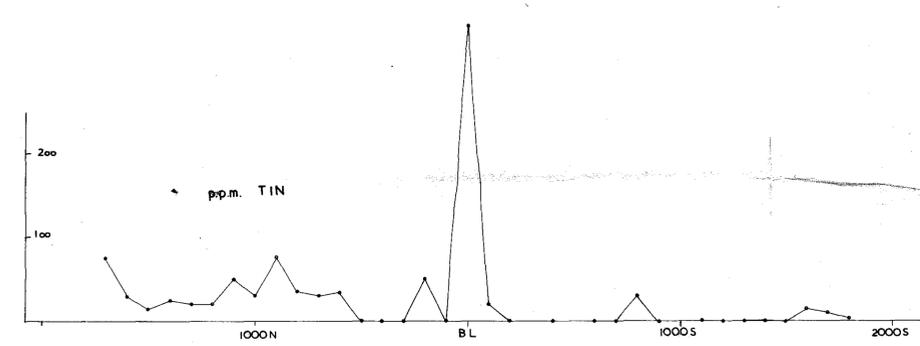
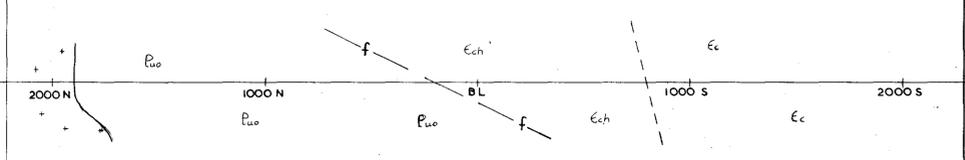
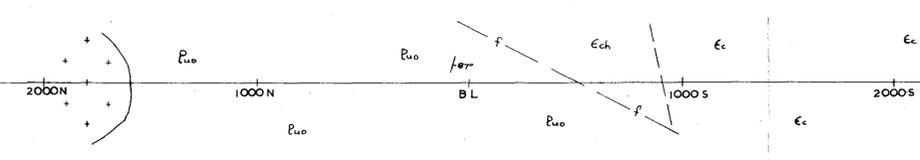
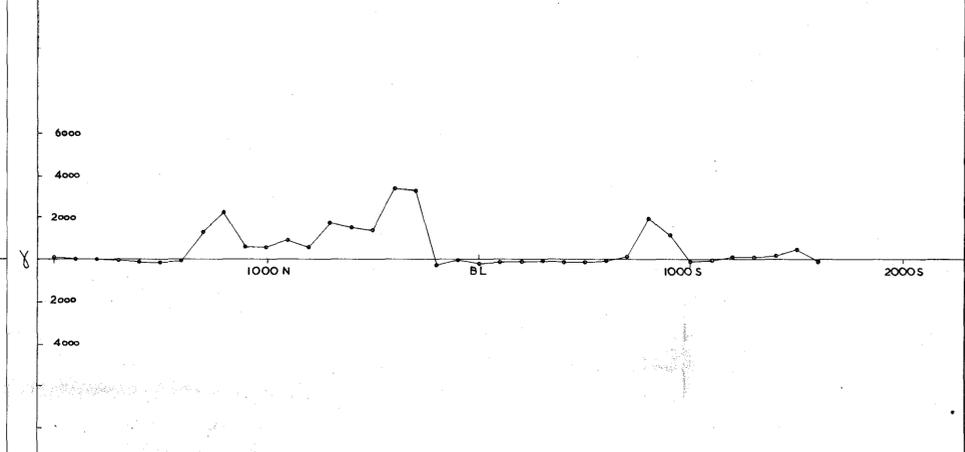
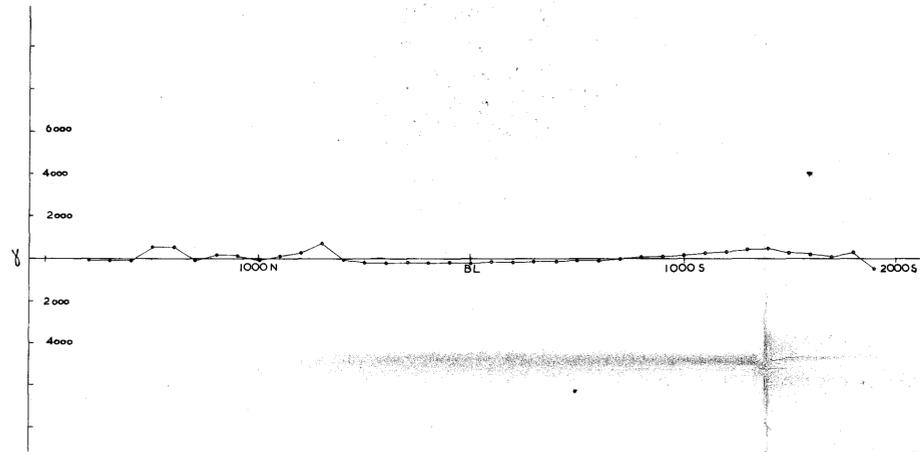
PLATE 17. TRIAL HARBOUR S.R.L. 22. LINES 18 & 19E.

5 cm

958059 LINE 18E

LINE 19E

4774



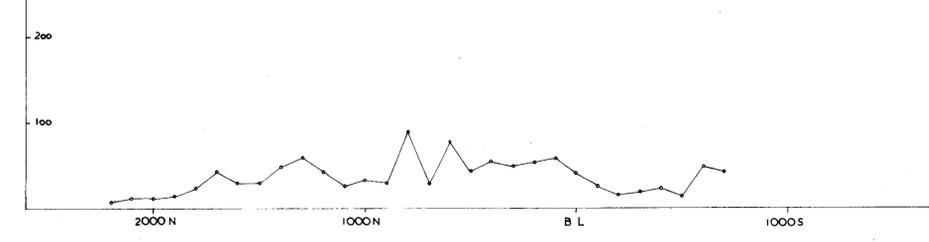
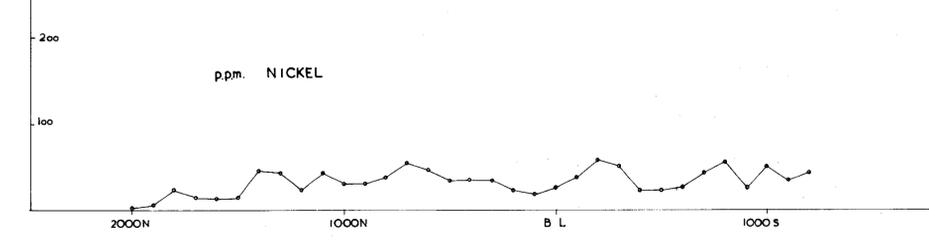
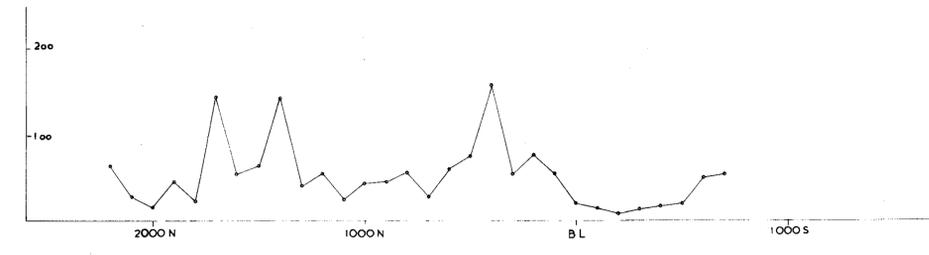
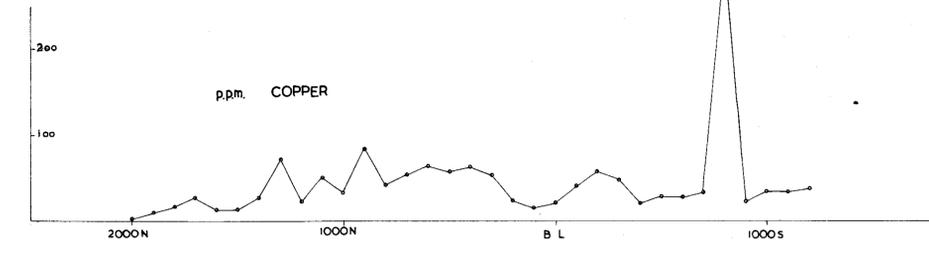
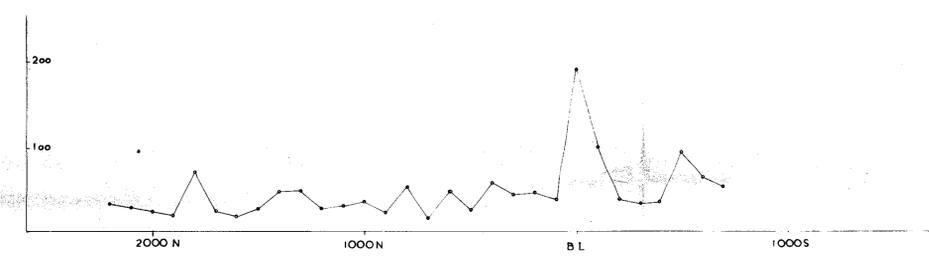
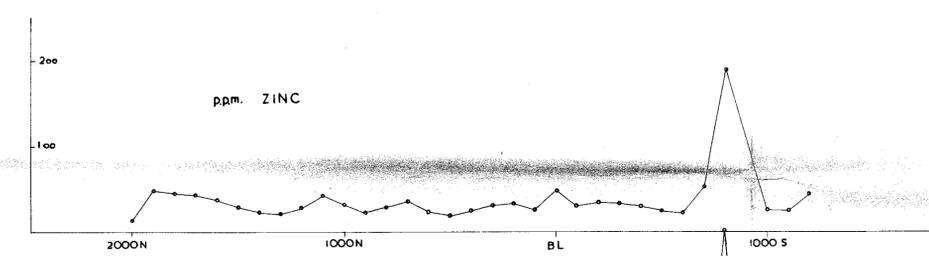
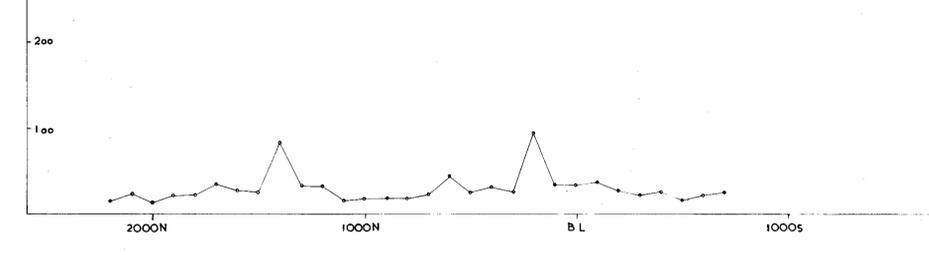
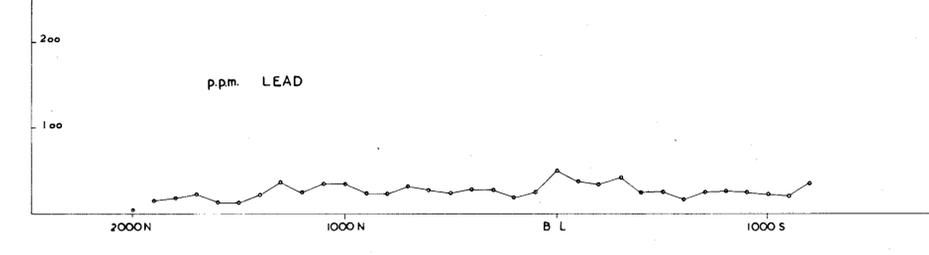
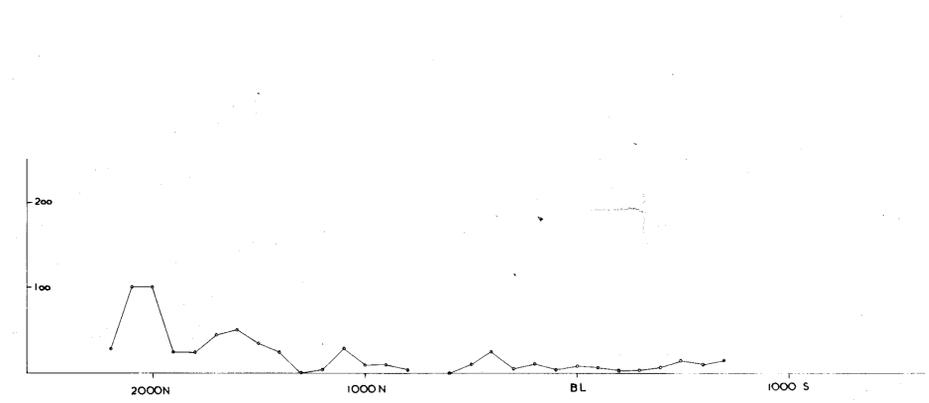
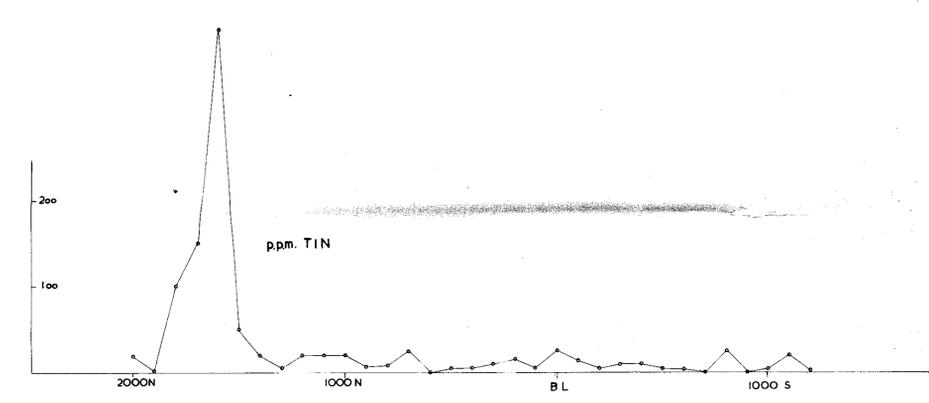
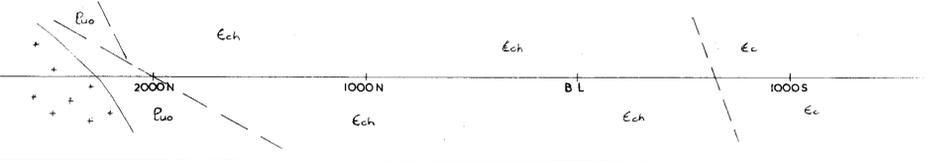
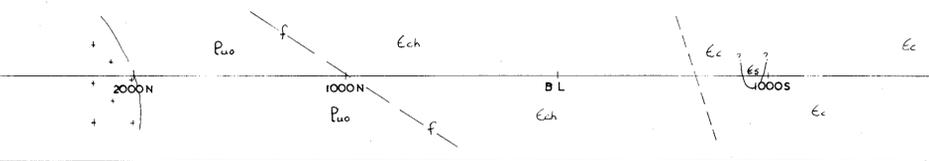
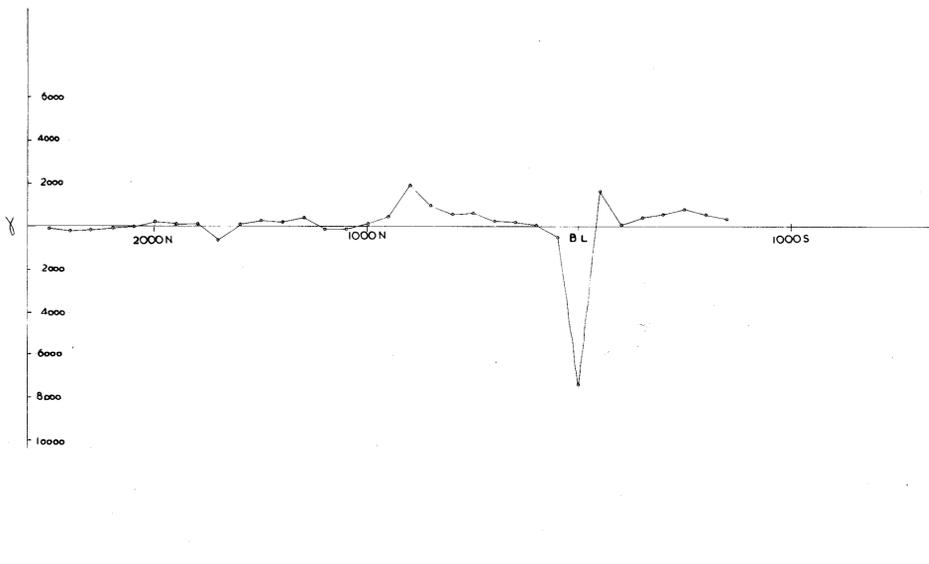
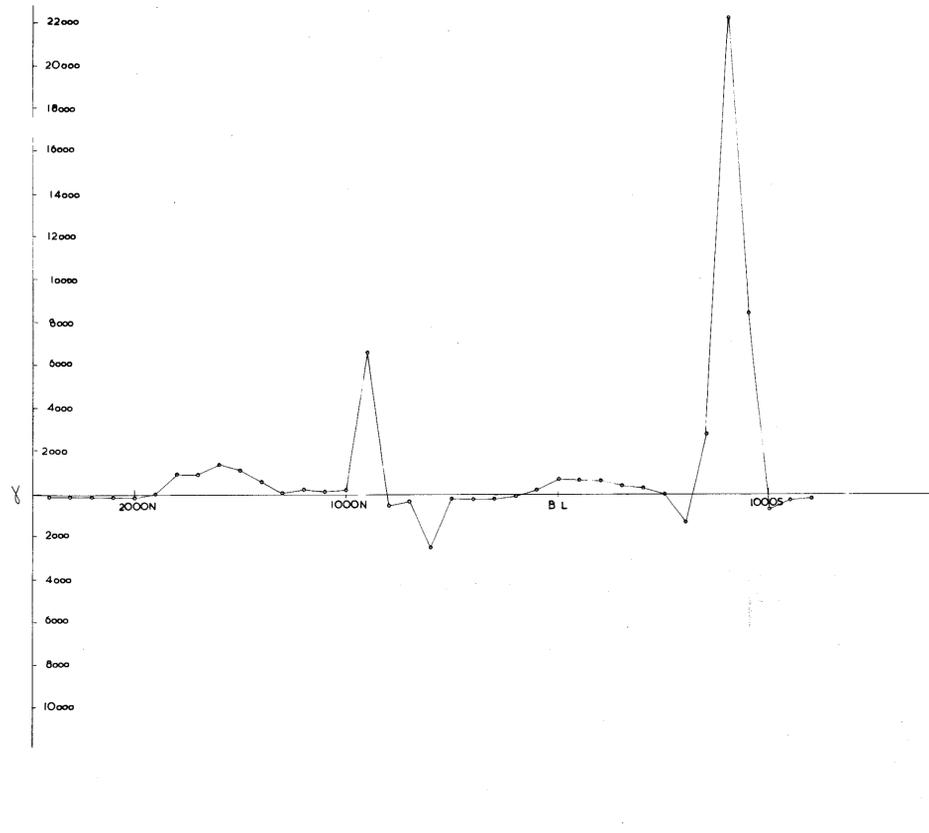
5 cm

958060 LINE 20E

LINE 21E

4775

PLATE 18. TRIAL HARBOUR S.P.L. 22. DATA PLOT. LINES 20 & 21E.



5cm 958061 LINE 22E

LINE 23E 4776

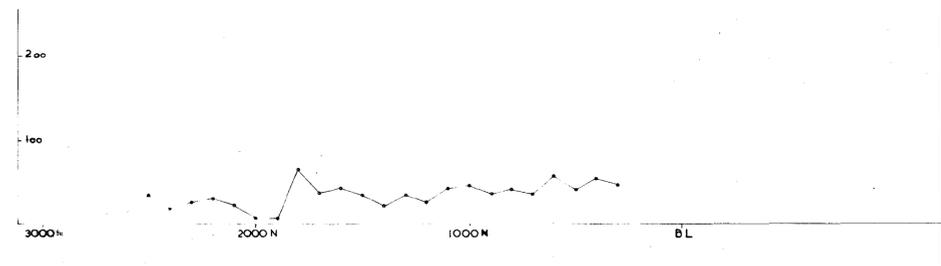
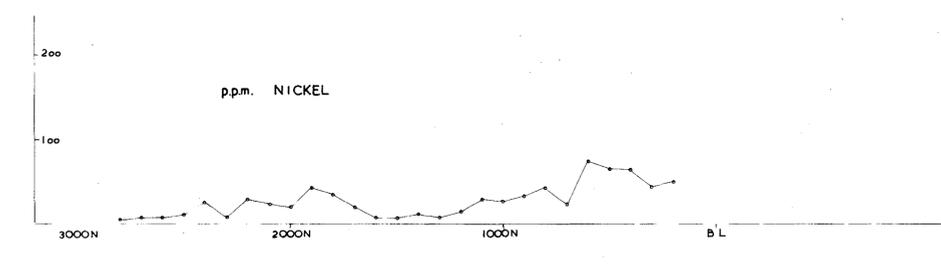
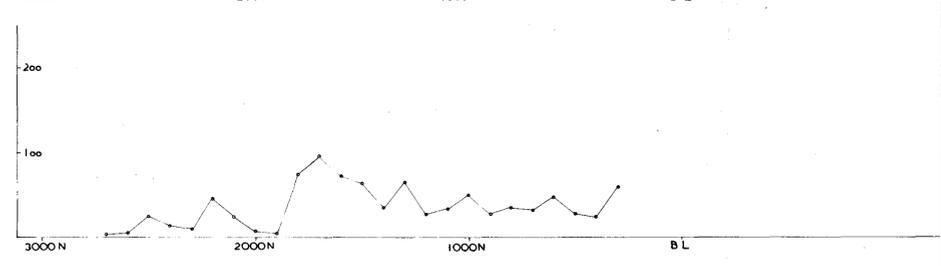
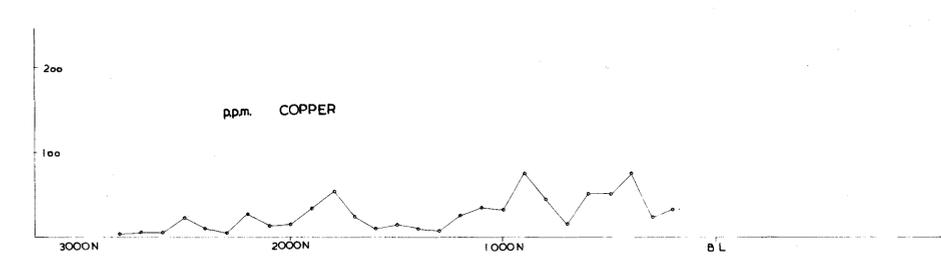
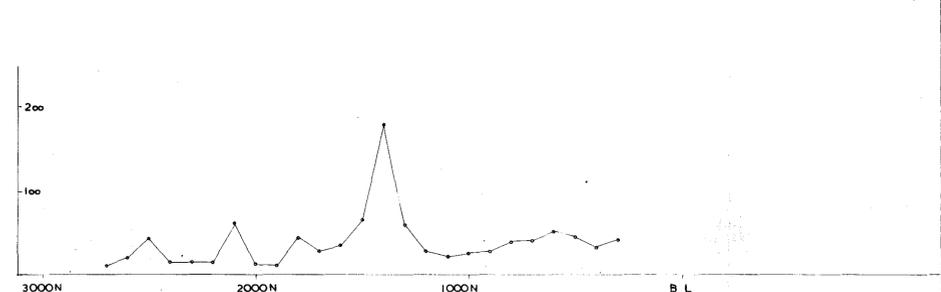
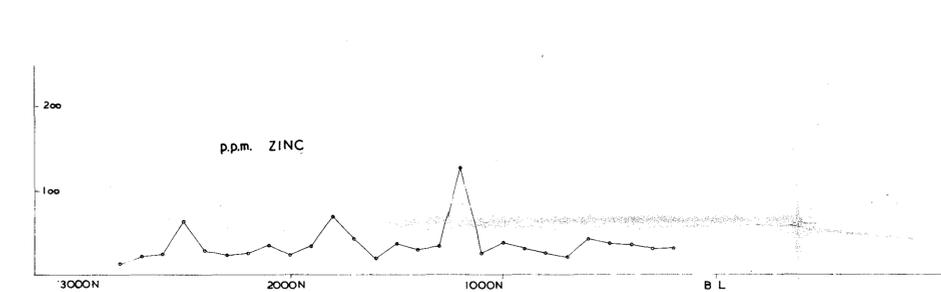
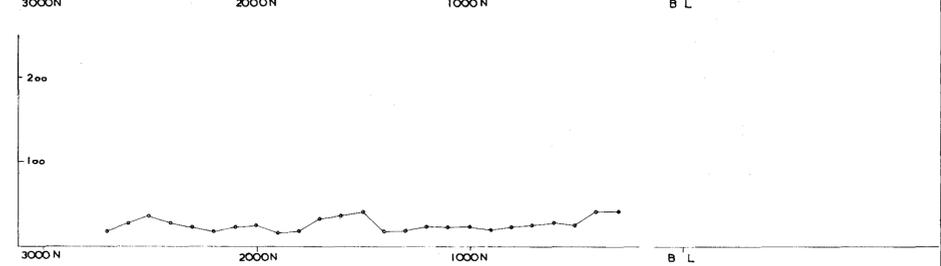
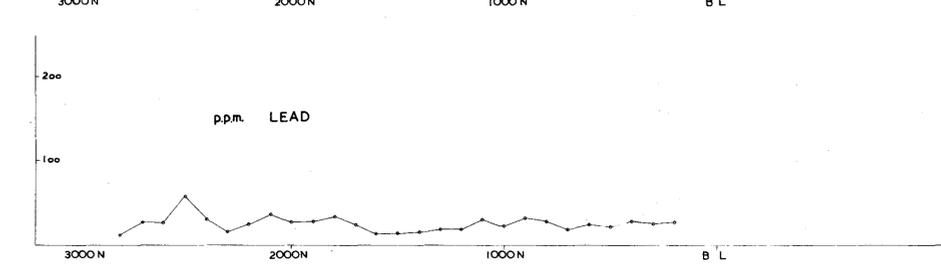
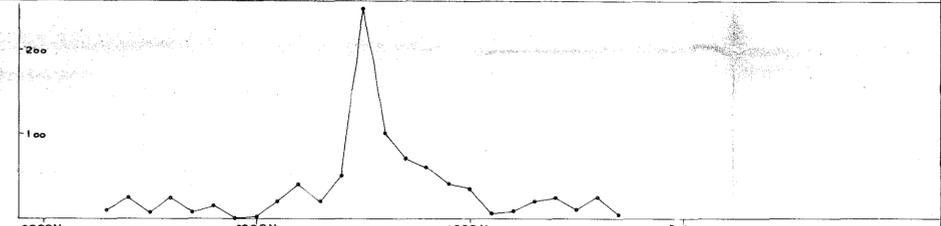
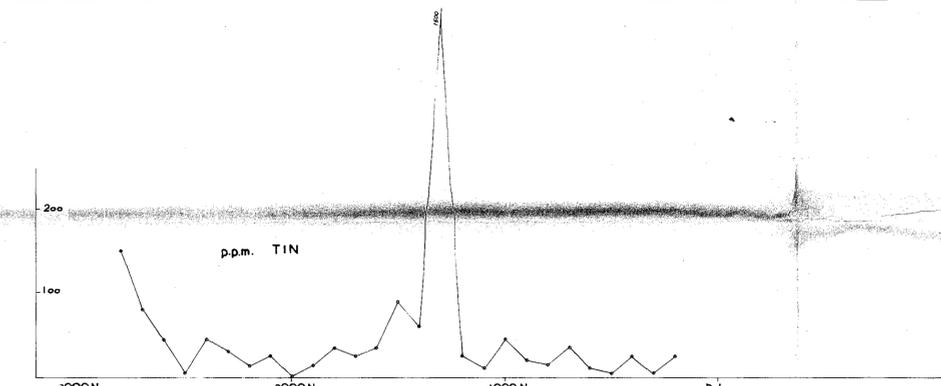
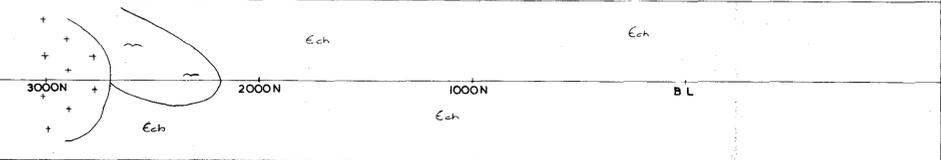
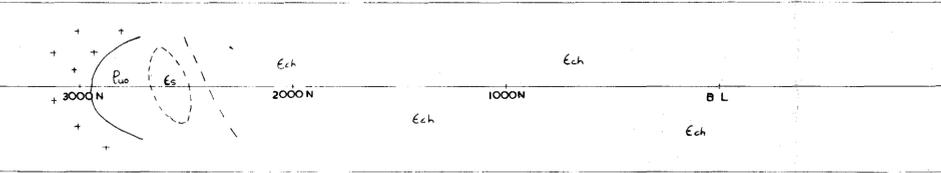
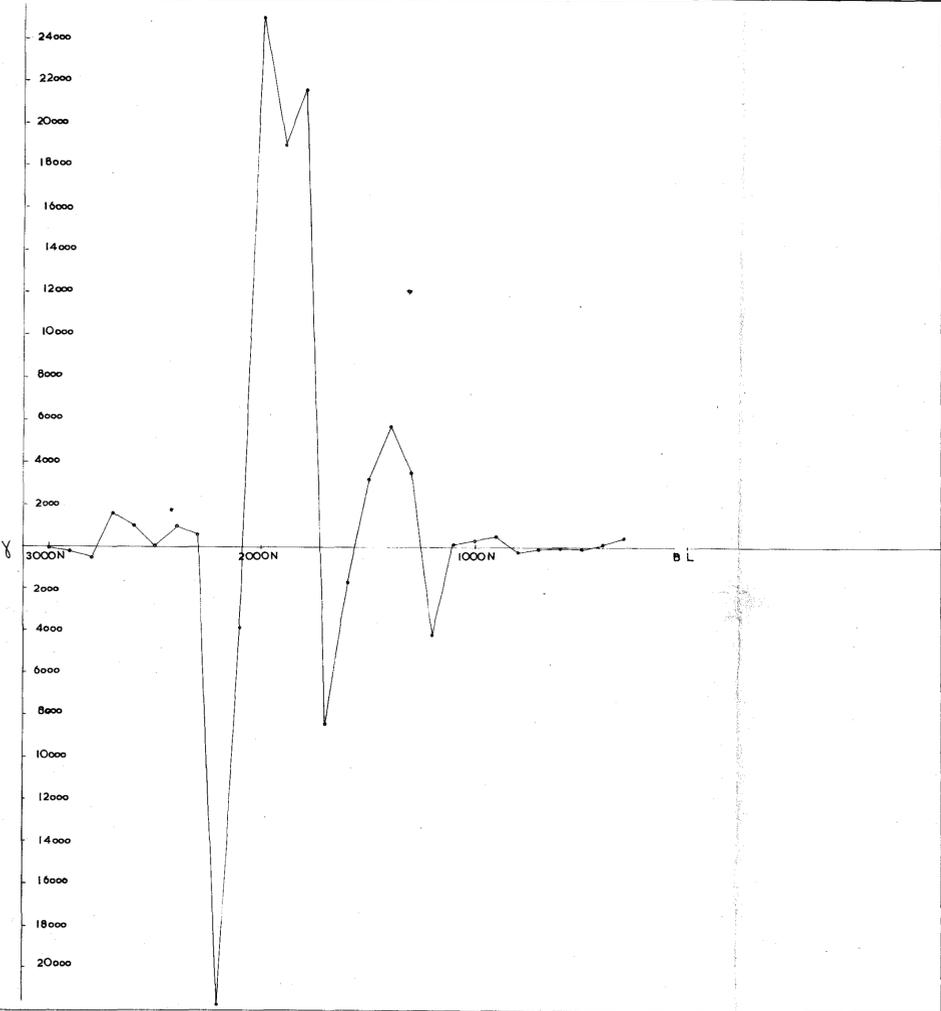
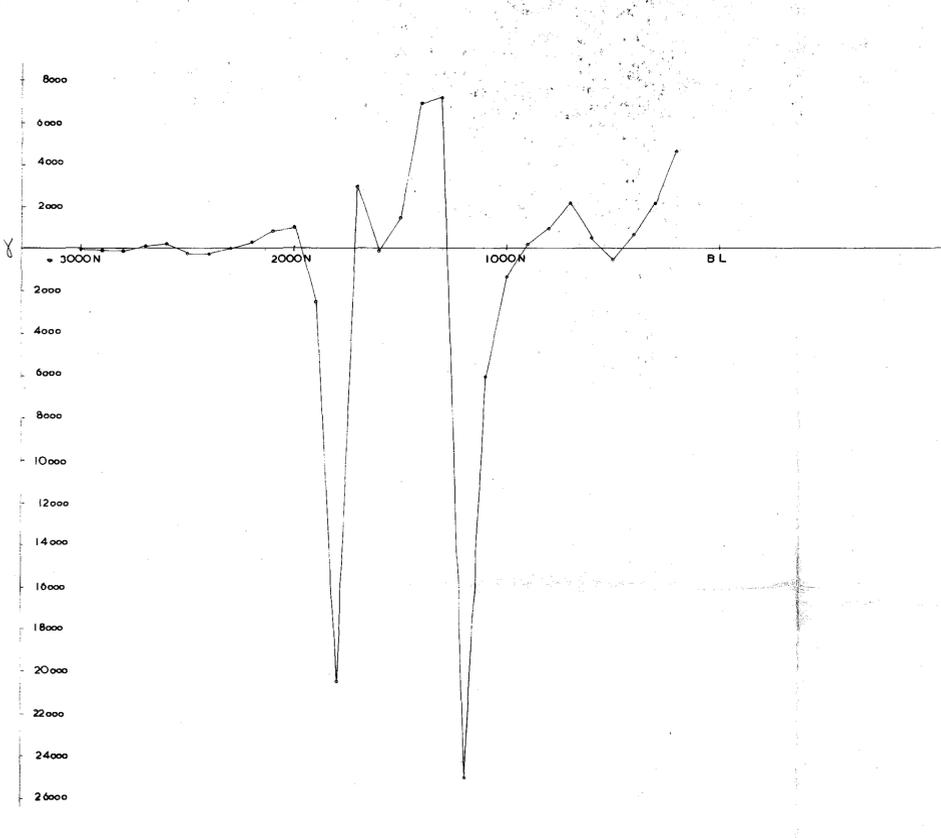


PLATE 20.  
TRIAL HARBOUR S.P.L. 22.  
DATA PLOT  
LINES 24 & 25E.

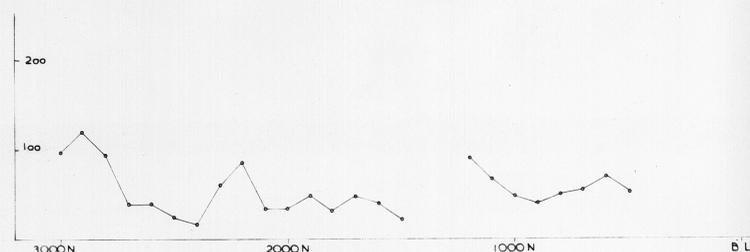
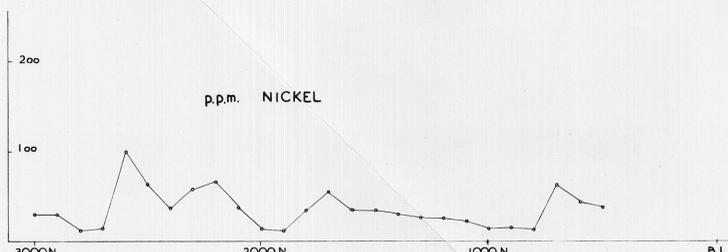
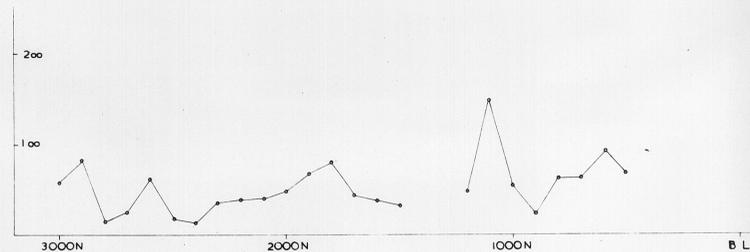
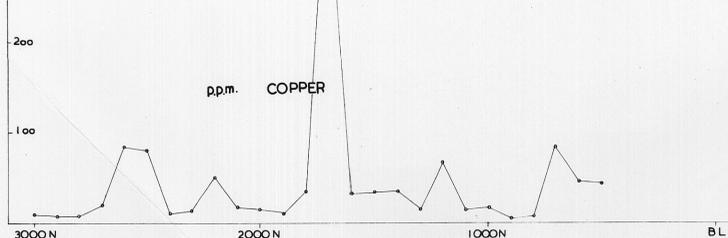
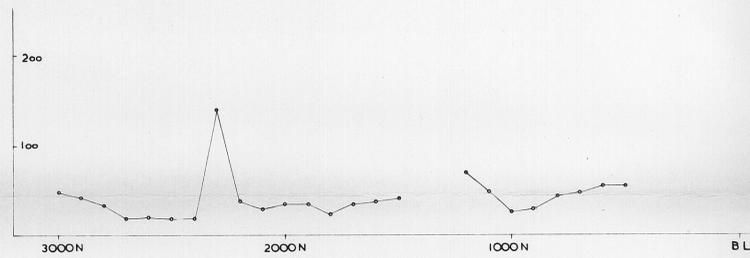
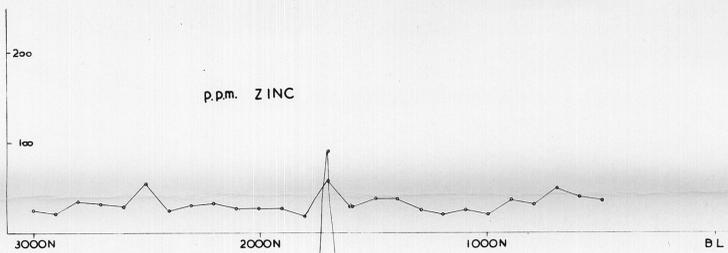
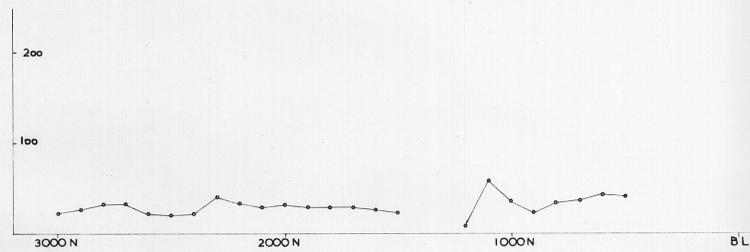
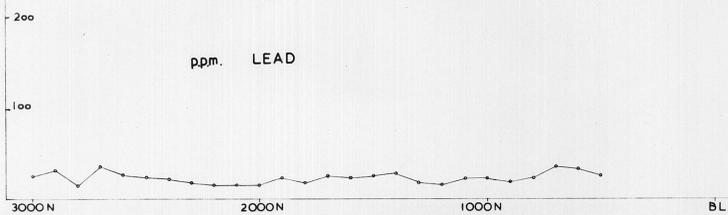
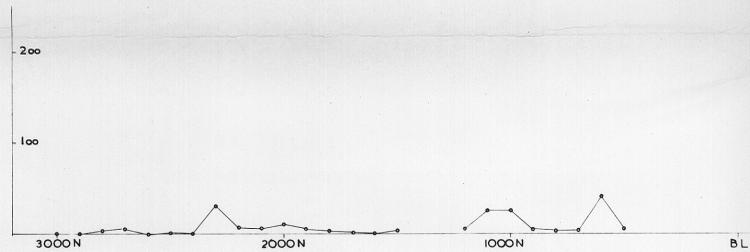
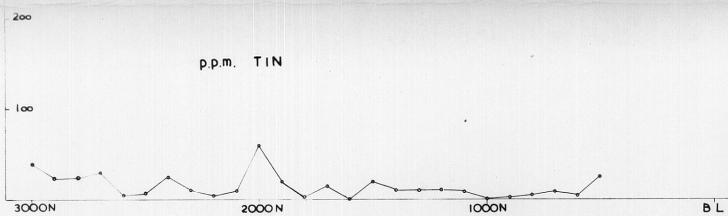
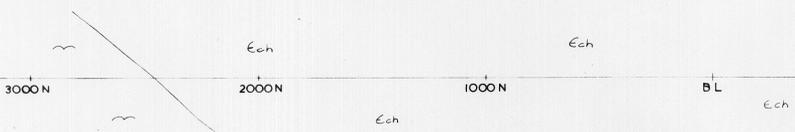
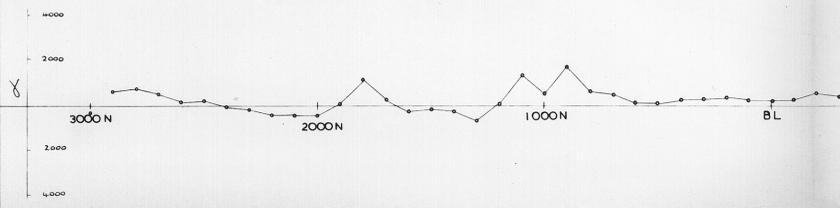
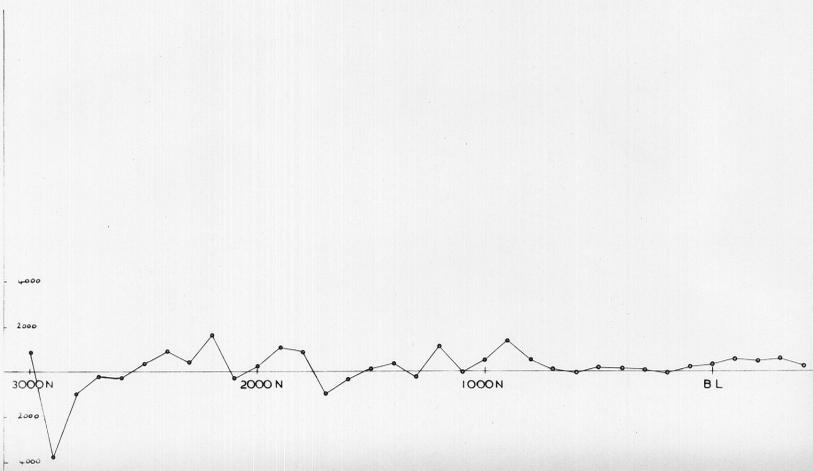
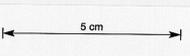


PLATE 21

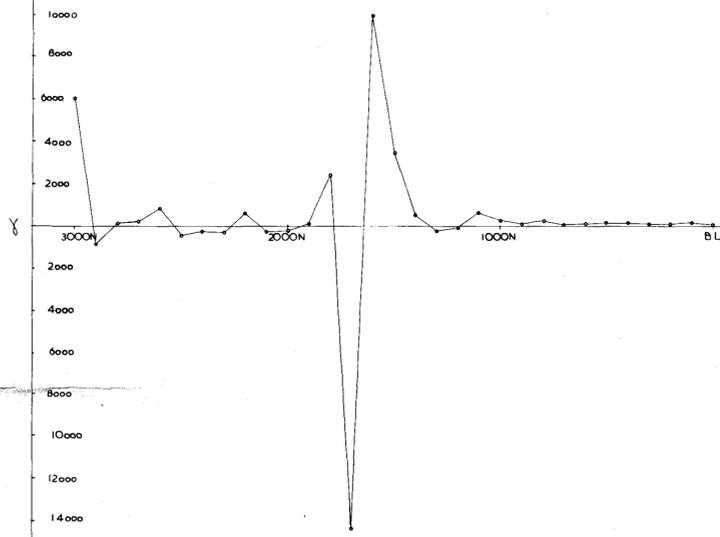
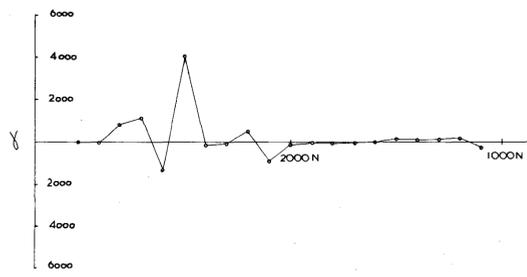
TRIAL HARBOUR SPL. 22  
DATA PLOT  
LINES 26 & 27E



958063 LINE 26 E

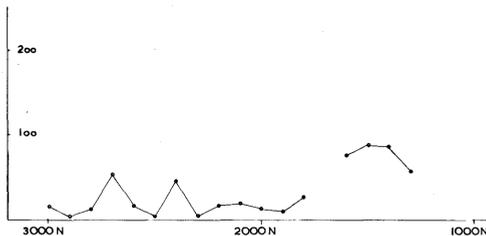
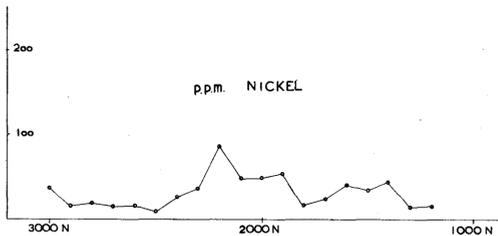
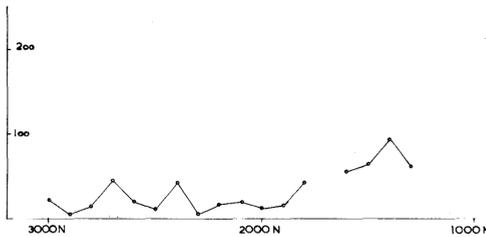
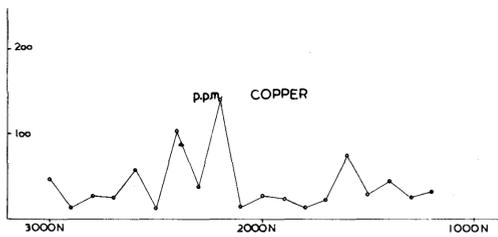
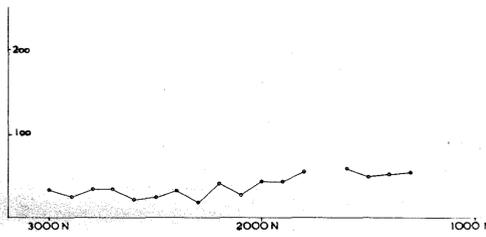
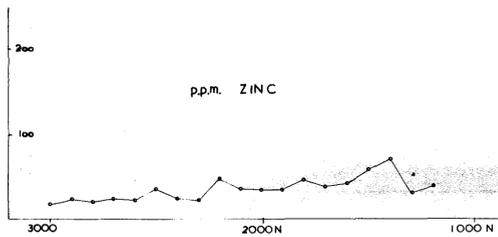
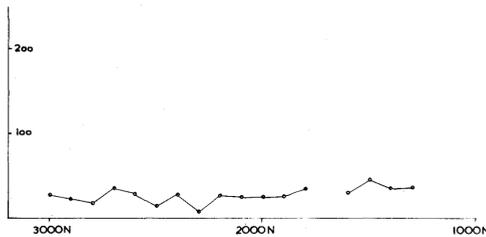
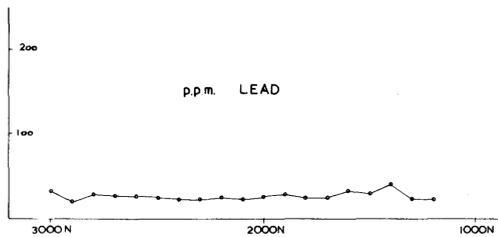
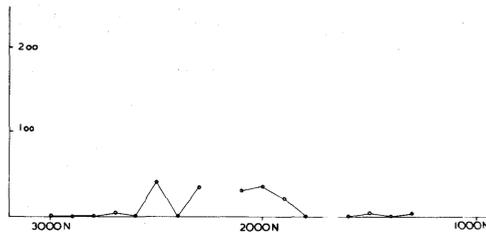
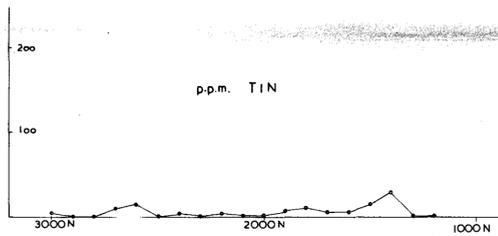
LINE 27 E

4778



Ech  
3000N 2000N 1000N

Ech  
3000N 2000N 1000N BL  
Es



5 cm

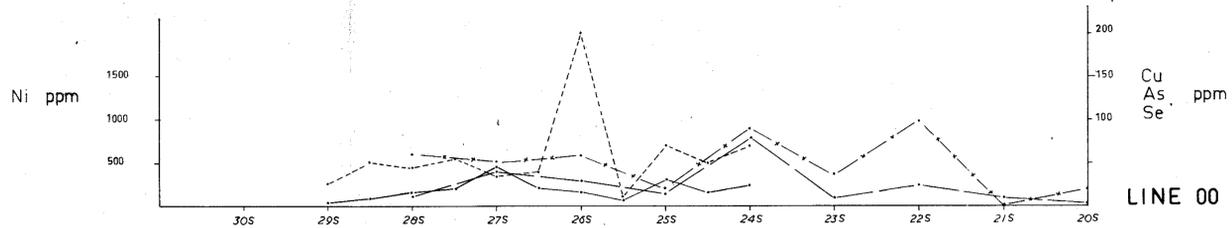
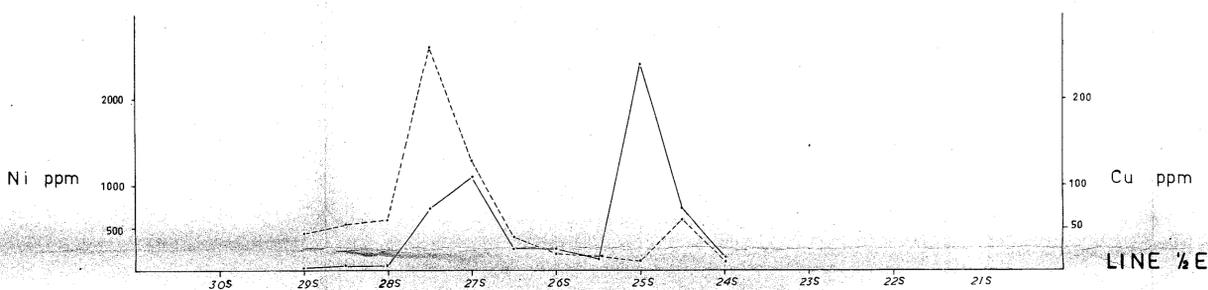
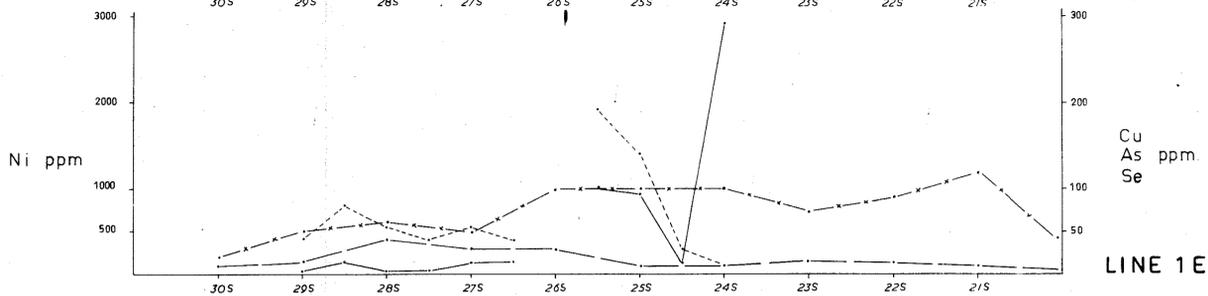
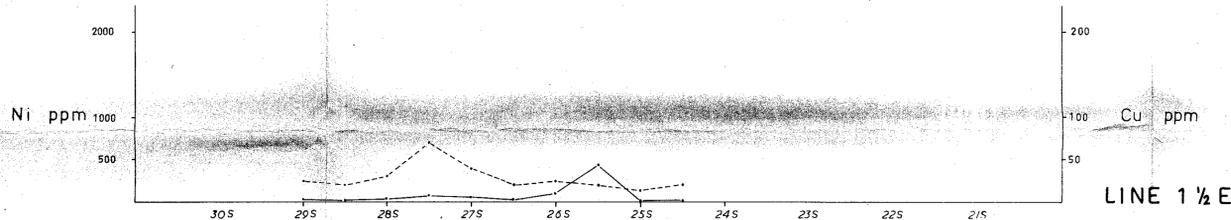
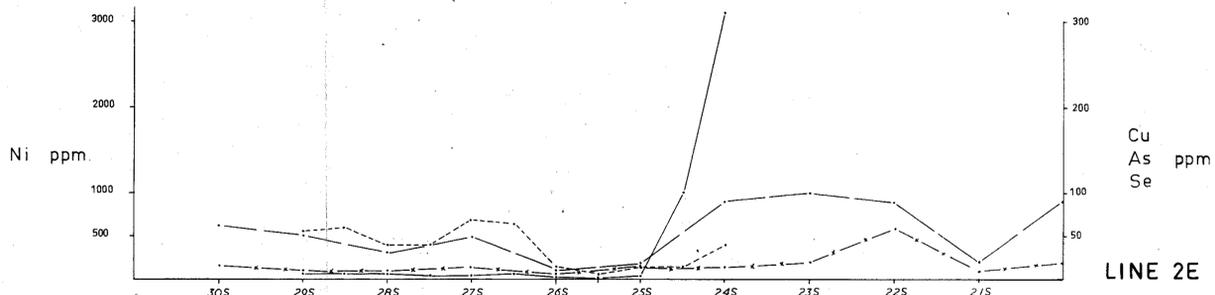
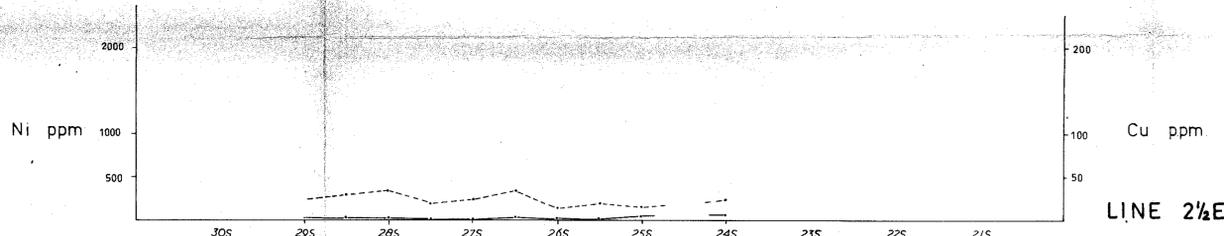
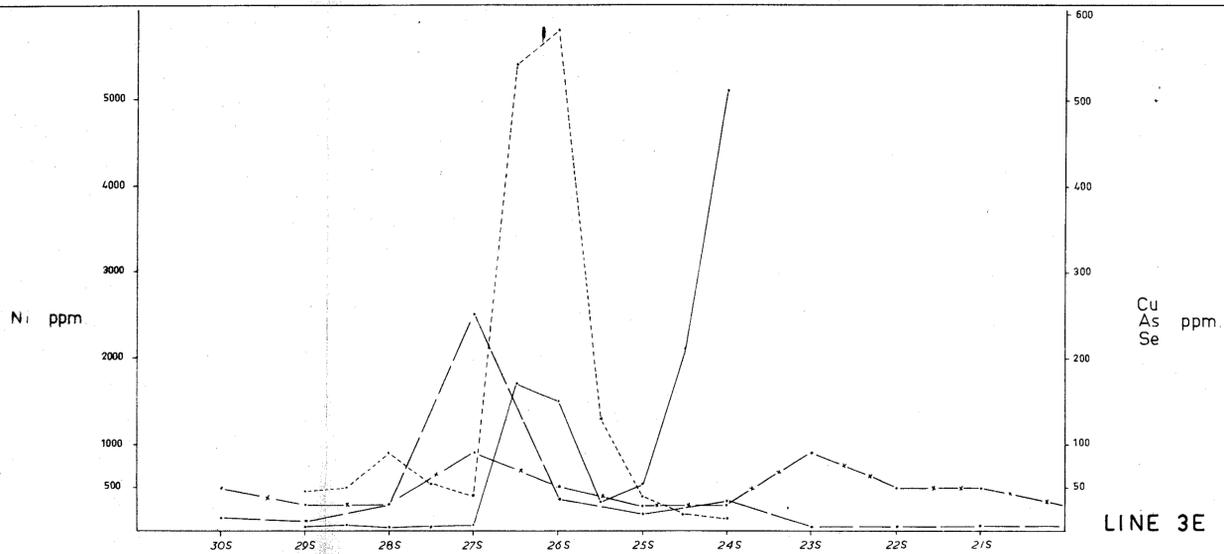
958064 LINE 28 E

LINE 29 E

4779

PLATE 22.

TRIAL HARBOUR S.P.L. 22.  
DATA PLOT  
LINES 28 & 29E



LEGEND

- Cu
- Ni
- .-.- Se
- .-.- As

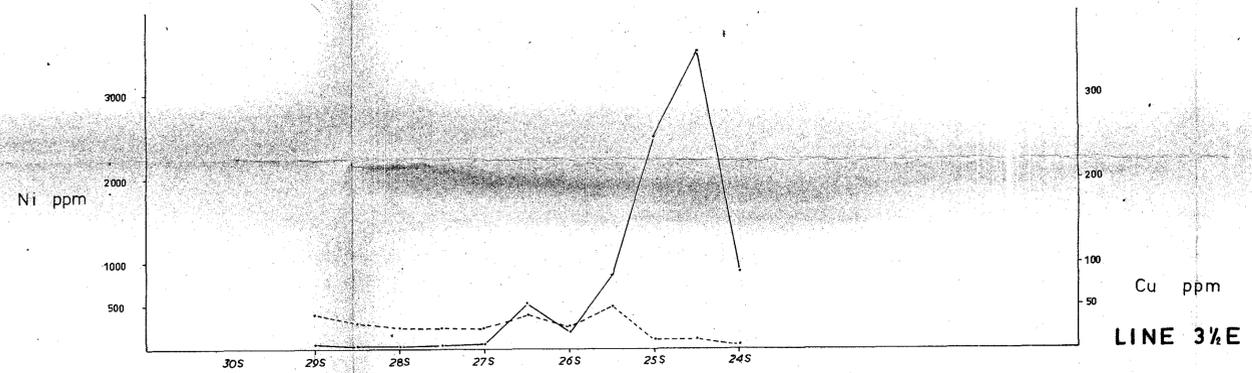
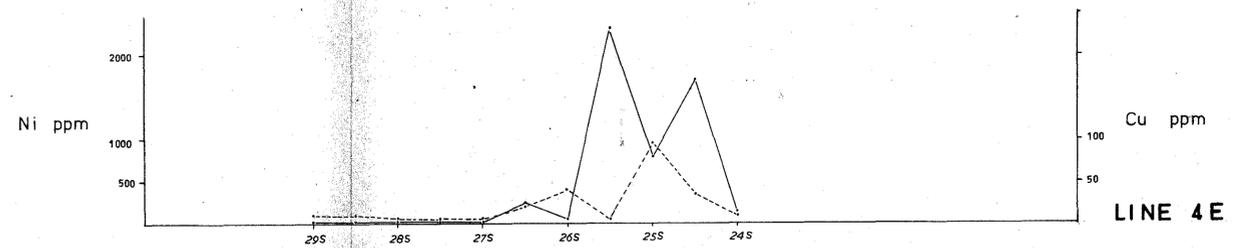
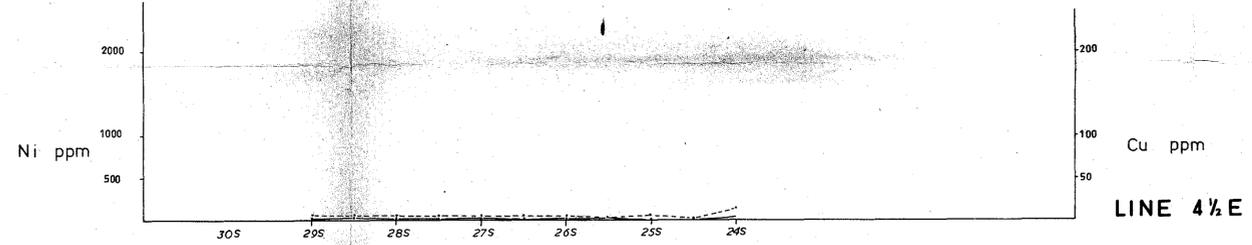
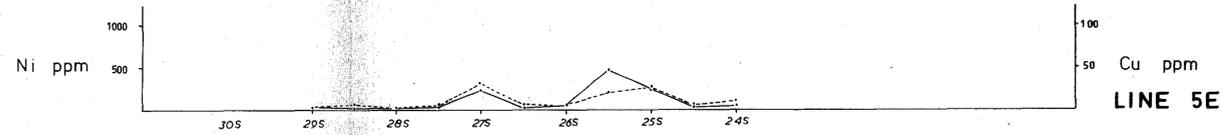
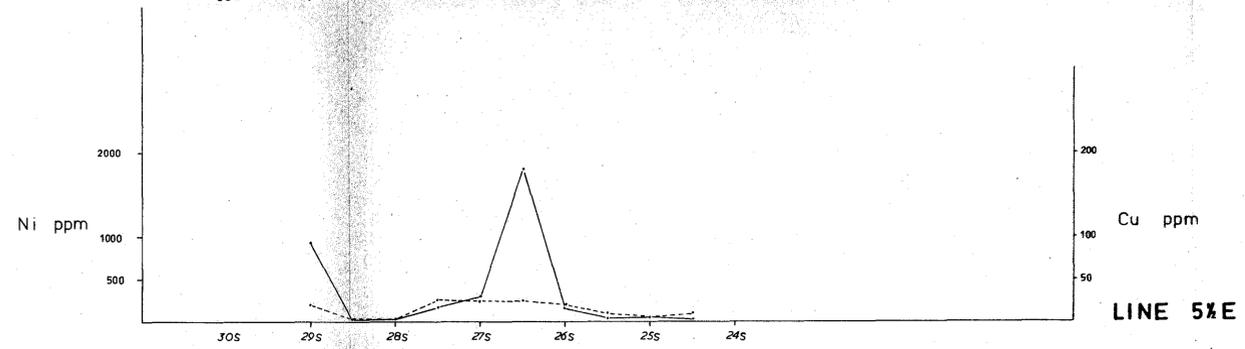
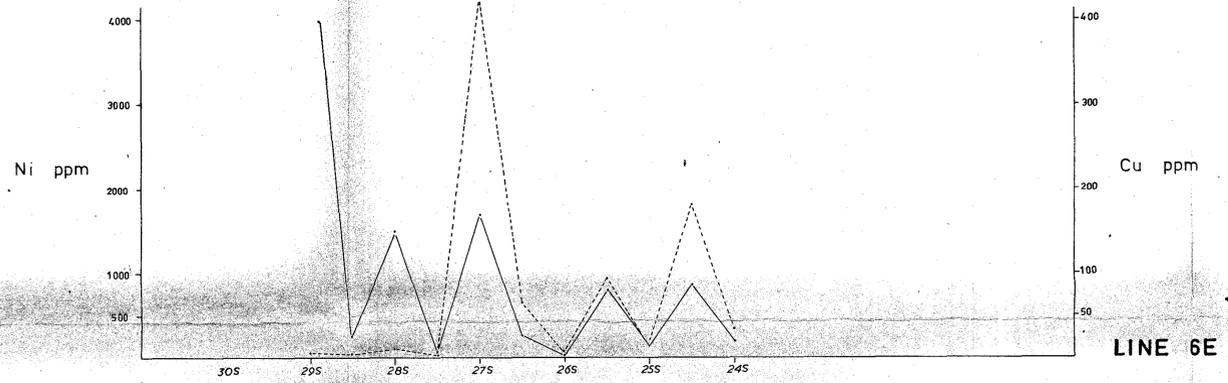
5 cm

S.PL.22. TRIAL HARBOUR

GEOCHEMICAL PROFILES.

LINES 00 - 3E 2000 - 3000S.

SCALE 1" = 100'



LEGEND

- Cu
- Ni
- - - Se
- - - As

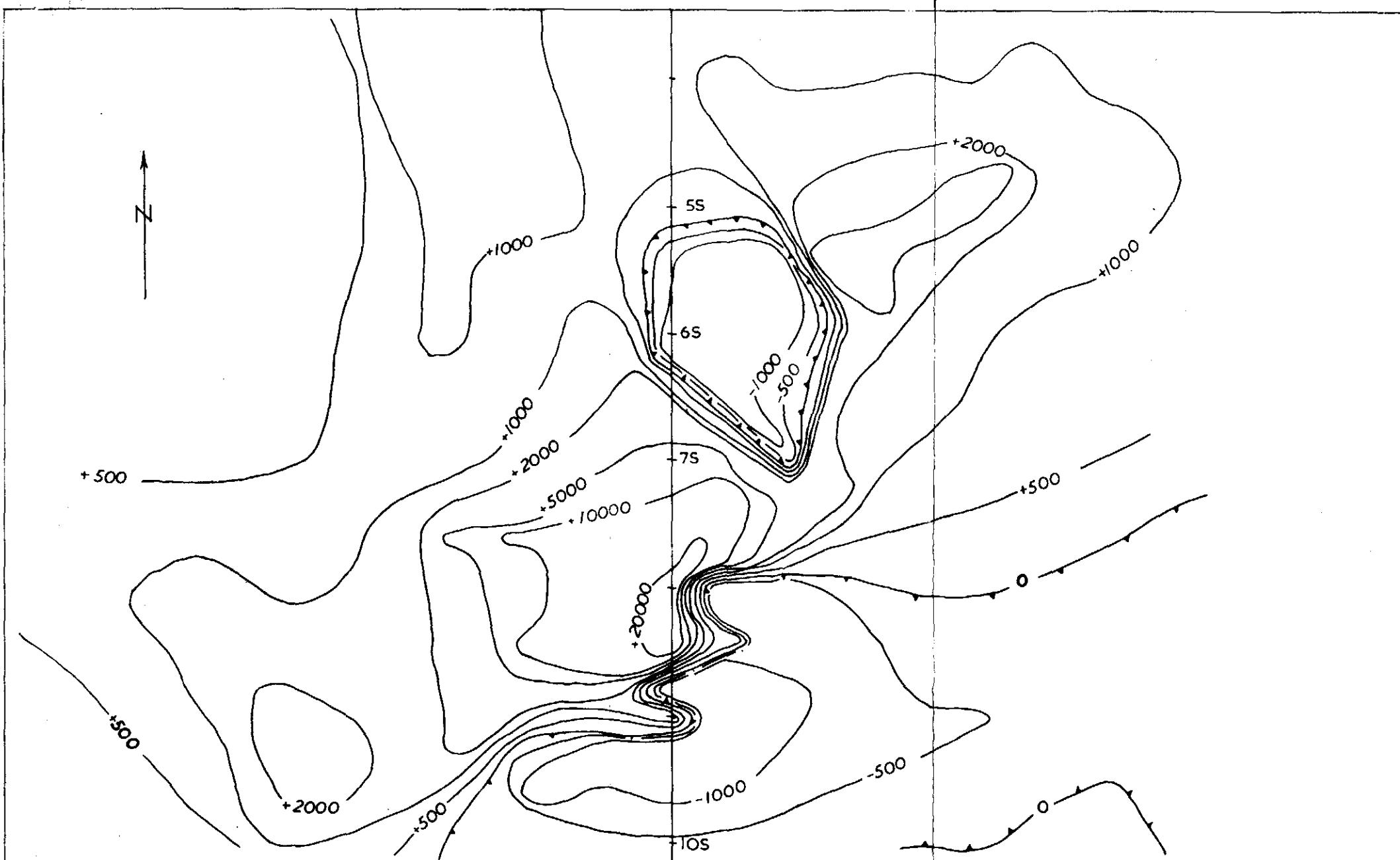
S.P.L. 22. TRIAL HARBOUR.

GEOCHEMICAL PROFILES.

LINES 3 1/2 - 6E. 2000 - 3000S.

SCALE 1" = 100'





LINE 22E

958067

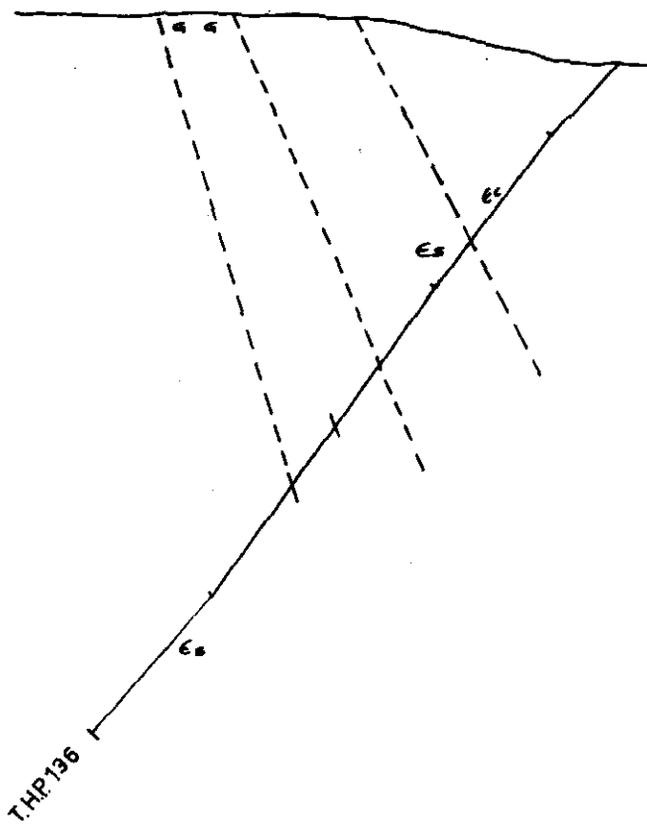
SPL. 22. TRIAL HARBOUR.  
Magnetic Anomaly Contour  
Plan on Line 22E.

Scale 1" - 100'

CONTOUR INTERVALS.

-1000x, -500x, 0, +500x, +1000x, +2000x,  
+5000x, +10000x, +20000x.

4782



958068

ASSAY RESULTS				
From	To	Ni	Fe	S
129	130	0.75	1.9	0.8
200	205	0.37	3.1	0.3
205	210	0.60	2.9	0.5
210	215	1.42	3.7	0.9
215	220	0.35	2.9	0.3
220	225	0.35	3.1	0.3
225	230	0.42	2.9	0.4
230	235	0.41	3.5	0.5
235	240	0.34	3.5	0.5
240	245	0.23	2.7	0.25
245	252	0.27	2.8	0.20
252	254	0.23	2.6	0.20
256	259	0.29	2.5	0.25
268	273	0.29	3.1	0.40
273	278	0.26	3.0	0.35
278	280	0.25	2.3	0.25
AVERAGES				
200	240	0.54	3.2	0.5
205	215	1.05	3.3	0.7

- $E_c$  Crimson Creek Formation.
- $E_s$  Serpentinite
- $G$  Sulphide Mineralisation.
- $G$  Gossan.

**SPL. 22. TRIAL HARBOUR.**

CROSS SECTION OF T.H.P. 136.

Collar. 2910'S 120'W 50'A.S.L (Approx)

Direction 025° T.

Inclination -45° 4783

Scale 1" = 100'

