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ANNUAL REPORT

E.L. 9/66

(MT. TYNDALL)

1974-75

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The Mount Lyell Mining and Railway Co. Ltd.

DRAUGHTING: R. G. Wilson

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SUMMARY

The main activity during the year was a five hole diamond drilling programme, totalling 4,420 ft. (1 346 m). Two holes (H.F.Z. 7 and 8) were drilled in the Henty Fault Zone, one hole (T. 2) was drilled in Zone A, near the Southern licence boundary and two holes (T. 3 and H.A. 3) drilled at Howard's Anomaly. With the exception of H.A. 3 which failed to explain the geophysical anomaly, all the holes intersected pyritic black shales carrying minor base metals. The best intersection was 8 feet of 0.31% Cu, 0.25% Pb, 0.53% Zn and 8.1% FeS₂ in H.F.Z. 7. Although no economic grade mineralisation was intersected, the drilling programme continued to outline an environment considered to be suitable for the development of Rosebery-type mineralisation.

Elsewhere on the licence area geological mapping, soil geochemistry and gradient array I.P. surveys were undertaken in the Howard's Anomaly and Zone A areas. Geological mapping, soil geochemical sampling and ground magnetics were also undertaken in the White Spur area, South of the Hercules Mine.

A re-appraisal of all the information collected to date, West of the Tyndall Range shows that further work is justified in the area particularly in the Henty Fault Zone, Mt. Read and Red Hills/Gooseneck areas where extensive geophysical anomalies coincide with known mineralisation. A re-appraisal of all the data from East of the Tyndall Range in the Selina, Rolleston and Dora areas is now required.

1. INTRODUCTION

During the 1974-75 season exploration has been concentrated on the area West of the Tyndall Ranges. Five diamond drill holes were completed without locating significant mineralization..

Geological mapping has indicated seven distinct areas or blocks, Figs. 1 and 2, which may be treated as separate entities. A comprehensive re-examination of all the data, old and new, appertaining to blocks A to E and the Henty Fault Zone has been undertaken and the data re-organized and presented in this report.

2. ACKNOWLEDGEMENTS

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Discussion of geostatistical methods with P. Brophy have proved invaluable.

Draughting was carried out by R. G. Wilson.

3. EXPLORATION ACTIVITY 1974-75 - WESTERN PORTION OF E.L. 9/66

3.1 The table below lists the work carried out in 1974-75 on the various blocks or areas, figures are estimates.

TABLE 1

Area	A	B	C	D	E	H.F.Z.	Totals
Line Cutting	-	27,000'	3,000'	-	-	-	30,000'
Regridding	16,000'	34,500'	45,000'	-	-	-	95,500'
Geology	45,000'	80,000'	98,000'	12,000'	-	-	235,000'
Magnetics	6,000'	62,000'	-	-	-	-	68,000'
I.P.	6,500'	62,000'	-	-	-	-	68,500'
Soil Geochemistry	6,000'	29,500'	48,000'	-	-	3,000'	86,500'
Surveying	-	-	30,000'	-	-	-	30,000'
Bulldozing	4 days	5 days	-	-	-	-	9 days
Drilling	1,615	2,940'	-	-	-	-	4,555'

Magnetic surveys were carried out with a proton-magnetometer, readings were taken every 50'. Soil sampling was of the 'C' horizon with samples taken every 50'. I.P. was gradient array with 100' or 50' interval and readings every 50'. Surveying was tape and compass traverses.

3.2 The table below gives estimates of the remaining work to be done on the Western portion of the lease.

TABLE 2 - Estimates of Work Remaining

Area	A	B	C	D	E	H.F.Z.	Totals
Line Cutting	2,000'	-	103,000'	-	-	5,000'	110,000'
						Contract (44 man days)	
Regridding	2,000'	-	22,500'	10,000'	5,000'	-	29,500'
						12 man days	
Geology	2,000'	1,000'	100,000'	-	15,000'	15,000'	133,000'
						With magnetics	
Magnetics	10,000'	-	110,000'	-	-	5,000'	125,000'
						24 man days	
I.P./E.M.	2,000'	1,000'	150,000'	-	5,000'	7,000'	165,000'
						Contract	
Soil Geochemistry	2,000'	-	166,000'	5,000'	5,000'	7,000'	185,000'
						120 man days	
Surveying	-	-	-	-	-	-	-
Bulldozing	1 day	6 days	3 days†	-	3 days	3 days	16 days†
Drilling	1 hole	3 holes	?	-	2 holes	2 holes†	8 holes†

NORTH OF HENTY FAULT

	<u>Maximum Thickness</u>
<u>Dundas Group (DG)</u> Shale siltstone greywacke minor crystal-tuff	?
<u>Pyroclastic Volcanics</u>	
<u>Unit V (PVv)</u> Acid crystal, feldspar, lithic tuffs, rarely welded	500 m
<u>Unit IV (PViv)</u> Shales, siltstones, greywacke, fine waterlain tuffs	380 m
<u>Unit III (PViii)</u> Acid, crystal, quartz, feldspar, lithic, tuffs; agglomerates, mud flow breccias pyritic black shales	625 m
<u>Unit II (PVii)</u> Acid welded tuffs, basic intrusives	1 000 m
<u>Unit I (PVi)</u> Acid lavas, feldspar phyric; welded tuffs; abundant basic intrusives and ?extrusives; andesitic volcanics	2 000 m

TABLE 3 - STRATIGRAPHY

SOUTH OF HENTY FAULT

	<u>Maximum Thickness</u>
<u>Owen Conglomerate</u>	
<u>OCii</u> Conglomerate; sandstone	
<u>OCI</u> (Newton Creek Formation) Shale siltstone sandstone conglomerate	
<u>Tyndall Group</u>	
<u>Unit III (TGiii)</u> (Jukes Formation) Volcanoclastic sediments	150 m
<u>Unit II (TGii)</u> (Comstock Tuff Equivalent) Quartz porphyry lavas, agglomerates, crystal tuffs, banded tuff, minor shales	750 m
<u>Basal Unit (TGi)</u> Haematitic carbonates and crystal tuffs, magnetite rich lavas, carbonates. Intermediate and acid volcanics	150 m
<u>Queenstown Pyroclastics</u>	
<u>Unit IV (QPiv)</u> Intermediate pyroclastics, siltstone shale and carbonates, minor acid volcanics	380 m
<u>Unit III (QPiii)</u> Intermediate lavas and intrusives, quartz, feldspar, hornblende phyric types	1 500 m
<u>Unit II (QPii)</u> Intermediate pyroclastics; greywackes shales, minor acid volcanics	450 m
<u>Unit I (QPI)</u> Acid pyroclastics, fine grained; minor lavas and sediments	750 m
<u>Dundas Group (DG)</u> Greywackes, siltstones and shales; mafic and ultramafic intrusives	1 500 m

RED HILLS - GOSSENCK

<u>Owen Conglomerate</u>	
<u>OCii</u> Conglomerate oligomict, sandstone	
<u>Tyndall Group</u>	
<u>TGii</u> Volcanoclastic sediments	
<u>Central Lavas?</u>	
<u>Unit II (Gi)</u> Acid lavas pyroclastics, shales	
<u>Unit I (Gi)</u> Darwin-type rhyolite, quartz porphyry	

PRIMROSE VOLCANICS

	ACID LAVAS	ACID WELDED TUFFS	QUARTZ FELDSPAR CRYSTAL TUFFS	FELDSPAR CRYSTAL TUFFS	AGGLOM.	SILTSTONE GREYWACKE F.GRAIN TUFF	BLACK SHALES	BASIC INTRUSIVES	ANDESITIC VOLC.	AERIAL CONDITION OF DEPOSITION	ALTERNATING SUBAERIAL SUBMARINE CONDITIONS OF DEPOSITION
UNIT V											
UNIT IV											
UNIT III											
UNIT II											
UNIT I											

TABLE 4

To complete the majority of the field programme - regriding, soil sampling, magnetics and mapping will require five field assistants/students for ten weeks with no breaks for bad weather, holidays, etc. Completion of the above within one year is probably not feasible.

4. GENERAL COMMENTS ON THE WESTERN PORTION OF E.L. 9/66

4.1 Geology

The geology of this area, Figs. 1 and 2, consists of two major sequences; firstly the Dundas Group and the Primrose Volcanics to the North of the Henty Fault and second the Tyndall Group, Queenstown Pyroclastics and the Dundas Group to the South of the Henty Fault. The Red Hills-Gooseneck succession has not as yet been correlated with the main succession South of the Henty Fault and is presented separately. Table 1 shows the stratigraphy. The thicknesses quoted only take into account major folding and hence the figures are maxima.

4.1.1 North of the Henty Fault (Block C, Fig. 2)

Primrose Volcanics

The Primrose Volcanics exhibit a clear trend in acid volcanic activity from lavas at the earliest stage through welded tuffs to non-welded pyroclastics at the end, i.e. an increasing amount of explosive activity with time and probably a movement of the centre of activity from East to West. Table 2 indicates diagrammatically the rock types present in the stratigraphy. Also shown on Table 2 is probable distribution of aerial and alternating subaerial to submarine conditions.

Units PViii, iv and v generally speaking dip and face West. Only very limited amount of data is available from units PVi and ii. The distribution of basalt, dolerite intrusives may be related to the core of a tightly folded anticline, the basics being intruded into the prestressed core in the Cambrian. The structural data from PVi and PVii is compatible with this interpretation. Fig. 3 is an idealized section from East to West across the Primrose Volcanics.

PViii becomes more sedimentary to the South, the Northern portion containing agglomerates and mud flow breccias. The shallow dips recorded in PViv may reflect slightly disconformable relationships with PViii and PVv.

PVi and ii represent a period of alternating subaerial extrusion of lavas and ignimbrites with the centre of

activity towards the Eastern margin. FViii represents explosive activity centered to the North West and an alternating subaerial submarine regime.

Dundas Group

The Dundas Group, a thick succession of greywackes and shales, would appear to conformably overlie the Primrose Volcanics.

4.1.2 South of the Henty Fault (Blocks A, B, D, Fig. 2)

Dundas Group

The Dundas Group or equivalent underlies and may be in part stratigraphically equivalent to the Queenstown Pyroclastics. It consists of a thick sequence of greywackes and shales which in Block D has been intruded by large mafic to ultramafic bodies of presumed Cambrian age. The mafics and ultramafics range from quartz gabbro to pyroxenite and have been serpentized in some areas.

The Queenstown Pyroclastics

QPi, Block A consist of fine grained acid pyroclastics and is a probable time stratigraphic equivalent of QPi-iv in Block B.

QPi, iii, iv are a pile of andesitic volcanics which extend South of E.L. 9/66 towards Basin Lake. The lavas which form the predominant part of the stratigraphy are typically autobrecciated and carbonated. A large range of composition is present from feldspar, hornblende feldspar to quartz hornblende feldspar phyrlic types. The pyroclastic varieties are mainly feldspar crystal tuffs with some ignimbrite units. Intrusives with large euhedral hornblende phenocrysts occur within QPiii.

Shales, minor greywackes and acid volcanics are found in QPii and QPiv.

Tyndall Group

The Tyndall Group overlies with partial unconformity the Queenstown Pyroclastics.

TGi, the basal unit, is a section of haematitic crystal tuffs with associated carbonate sediments. It is transitional in the Howard's Anomaly area from QPiv to TGii. The volcanism is also transitional over the three units, QPiv, TGi, TGii, from andesitic to acid volcanicity. The break TGi being

characterized by the addition of Ca, Co_3 and Fe, presumably from fumarolic sources, into the submarine environment. This 'chemical' break may be inferred from the presence of magnetite and carbonate associated with the lower-most acid lavas of TGii, where TGii directly overlies the Queenstown Pyroclastics.

TGii equivalent to the Comstock Tuff of the Queenstown area consist of quartz porphyry lavas, characteristically autobrecciated and flow banded, agglomerates, intermediate crystal tuffs, banded keratophyric tuffs, ignimbrites, fine grained acid tuffs, shales and volcanoclastic sediments. An extreme variation of lithology in vertical and areal extent. The only rock types which are consistently mappable over large areas are the banded 'keratophyre' tuffs and the quartz porphyry lavas.

TGiii, a correlate of the Jukes Formation, consists of volcanoclastic sediments, shales and polymict conglomerate. The unit has a very wide distribution and represents a period when volcanism had ceased, subsidence occurred, marine conditions prevailed over a large area and the volcanic piles were being rapidly eroded.

Owen Conglomerate

OCi, the Newton Creek sandstone formation, consists of shale siltstone sandstone and oligomict conglomerates. The sedimentation is devoid of volcanic material and in some areas conformably overlies TGiii. OCi conformably grades into OCii, the Owen Conglomerate, in some areas but is absent in others.

4.1.3 Red Hills-Gooseneck (Block E, Fig. 2)

Gi Darwin-type rhyolites, with network type veining of magnetite haematite and chalcopryrite and pyrite occurs in the rhyolites.

Gii, agglomerate tuffs and two thick units of interbedded shales and siltstones are exposed in the East, while lavas are present in the West of the area. Fig. 4 indicates diagrammatically, possible alternative structural interpretations for the area.

4.2 Geophysics

All the valid geophysical results for Blocks A to E have been plotted on Figs. 12, 13, 14 and 15. Ground magnetic profiles, both fluxgate and proton results, have been plotted on a vertical scale of 1,000 feet to the inch. Induced polarization anomalies from surveys by McPhar and Scintrex have been classified as geophysical first, second and third order and are plotted on the same plans as the magnetics. The results are considered in detail with the geochemical and geological data under their Block areas.

4.3 Geochemistry

The reconnaissance data obtained during 1966-69 has been studied for each Block and treated statistically using a probability technique. Appendix B describes the method used. Detailed soil sample results have been processed in a similar manner. First and second order anomalies derived from the statistical analysis have been plotted, Figs. 15, 16, 17 and 18, on the interpretative geological maps. Data from residual and non-residual soils have been processed separately.

5. BLOCK A, HENTY FAULT ZONE - SOUTH

5.1 Introduction

Exploration on Block A commenced with regional I.P. and geochemical surveys. Detailed I.P. coverage and soil sampling of I.P. anomalies located in the early I.P. surveys on lines 34N - 40N resulted in the drilling of two diamond drill holes, on lines 40N and 38N. Minor Cu Pb Zn mineralization was intersected in H.F.Z. 7, line 40N.

5.2 Geology Figs. 1, 6 and 11

The Queenstown Pyroclastics, the main exploration locus, are a wedge of fine grained pyroclastics and minor lavas which steeply dip and face East. The pyroclastic wedge thickens to the South and is probably a reflection of a basinal area of deposition, probably subaerial in character as no significant sedimentary lenses have been located within the formation.

5.3 Geophysics Fig. 13

Induced Polarization

Several anomalous zones are present in the area and are discussed below.

Zone A1 : The anomalies appear to be caused by shales in OC1, the Newton Creek Sandstone. No geochemical anomalies are associated with it and the zone is considered to have little potential.

Zone A2 - A3 : A2 occurring at the base of Queenstown Pyroclastics and associated with anomalous geochemical results was drilled on lines 40N and 38N. The Western anomalies in part are located above black pyritic shales, part of the Dundas Group sedimentary sequence. The Eastern anomalies are above weakly mineralized pyroclastics near the base of QPi. The best intersection was five feet of 0.31% Cu, 0.25% Pb, 0.53% Zn and 8.1% FeS₂ in hole H.F.Z. 7 on line 40N. Geochemistry on lines 36N and 34N produced no anomalous results associated with I.P. zone A3. Geochemical anomalies at the base of QPi on lines 28N and 30N have no associated geophysical anomalies.

Zone A4 : Is polarizable and conductive and is situated at the base of the Tyndall Group/top of QPi, it continues into Block B. In Block A A4 is not associated with any geochemical anomalies and is not considered to warrant any further work.

No other significant I.P. anomalies occur in Block A.

Magnetics

A series of minor anomalies occurring at the base of TGii are useful in geological interpretation and are due to magnetite in the lower lavas of TGii.

5.4 Geochemistry Fig. 17

Apart from the anomalies mentioned above in 5.3 no other anomalous area has been identified.

5.5 Recommendations

5.5.1 A limited amount of line cutting, I.P. magnetics and soil sampling is probably justified on lines 37N and 39N to define possible targets in I.P. zone A2.

5.5.2 Magnetic coverage of line 28N is justified as an aid to geological interpretation.

6. BLOCK B, INCLUDING 'HOWARD'S ANOMALY' AND 'ZONE A' OF PREVIOUS REPORTS

6.1 Introduction

Initial exploration consisted of regional I.P. and soil geochemical surveys. Detailed surveys resulted in the drilling of diamond drill holes TYN. 1, H.A. 1, H.A. 2. Further detailed surveys this year resulted in drill holes TYN. 2, TYN. 3, H.A. 3. Only minor mineralization was encountered in these six holes. It is considered that no further detailed surveys are required but that a re-interpretation of existing data by a competent independent

geophysicist may define one or two more drill targets.

6.2 Geology Figs. 1, 5, 6 and 11

The Dundas Group, Queenstown Pyroclastics and Tyndall Group steeply dip and face East. Fig. 11 indicates the general relationship of the rock units in Blocks A and B. Drill holes are located on targets in QPii (TYN. 2), QPiv (TYN. 1, TYN. 3, H.A. a, H.A. 2) and TGi (H.A. 3).

6.3 Geophysics Figs. 12 and 13

Induced Polarization

I.P. Zone B1 : A long broad discontinuous zone of polarizable 'lenses' in QPiv. TYN. 1 and TYN. 3 anomalies were due to disseminated pyrite and pyrrhotite in black shales. H.A. 1 and H.A. 2 intersected heavily disseminated pyrite in intermediate and acid volcanics the best assay being five feet of 0.35% Cu, 0.22% Pb, 0.66% Zn and 19.2% pyrite.

With Zone B1A, Zone B1 forms a complex geophysical zone which will benefit, as mentioned above, from further interpretation by a geophysicist.

Zone B2 : A weak zone of I.P. response in QPiii, no geochemical anomalies are associated with it except for a second order Cu anomaly on 10N and a second order Pb anomaly on 4N. If no encouragement is received from work on E.L. 41/71, then no further work is warranted on this zone.

Zone B3 : A broad I.P. zone 2,000' x 500' trending slightly across strike is associated with geochemical anomalies on 5N two first order Pb and a second order Pb, on line 6N a second order Zn anomaly, on line 7N a second order Zn and a first order Pb on line 8N. The soils are generally thick glacial and peat materials (i.e. non residual). Disseminated pyrite in intermediate volcanic (QPiii) is present, within the zone, outcropping on the road may be a halo to more substantiat mineralization.

Zone B4 : Drill hole TYN. 2 on line 4N intersected pyritic black shales with low base metal values. The original geophysical interpretation suggested this anomaly on lines 2N and 4N was part of anomaly B3, hence the proposed target was not intersected. Zone B4 does not require further work.

I.P. Zone B5A : I.P. response is probably due to a black shale, a weak I.P. response on line 5N with first order Cu Pb anomalies is

probably worth costeaning. The extremely high I.P. chargeability on line 8N in this zone will also require costeaning.

B5B has no geochemical anomalies associated with it and does not require further work.

B5C a moderate I.P. response, with first order Pb and second order Cu anomalies, should be costeaned on line 2N.

I.P. Zone B6 : This anomaly is coincident with a geochemically anomalous zone and was drilled (H.A. 3) on line 23N, where it is located over a manganese rich ironstone containing barite. However, no polarizable body was intersected except for a pyritic shale, 200' East of the I.P. response. It was suggested that a recording error had been made in the field data. However, Scintrex Pty. Ltd. state that the anomaly is correctly positioned and is not due to the black shale and recommend a "down the hole" I.P. survey to check on the location of the polarizable response.

I.P. Zone B7 : A narrow moderate to weak polarizable zone and associated strong magnetic anomaly does not have any associated geochemical response. The anomaly may be due to magnetite.

A number of isolated I.P. anomalies are present in Block B, few however are associated with anomalous geochemistry, and may be assigned a low priority.

Magnetics

QPiv, TGi and in part TGii show strong magnetic relief; in contrast to QPi, ii and iii. The strong magnetic response is probably caused by the presence of remnant magnetite in some of the tuffs and sediments and magnetite in some of the lavas.

6.4 Geochemistry Figs. 16 and 17

In the southern part of Block B, Cu, Pb and Zn soil anomalies in non residual soils (A and B horizons where C was not collected) are occasionally associated with stream courses and swamp areas. This association suggests the anomalies are hydromorphic and causes the interpretation of their significance to be almost impossible.

The distribution of soil anomalies clearly shows a strong correlation with the contact zone between the Queenstown Pyroclastics and the Tyndall Group. An area 2,000' wide centered on the inferred contact between QPiv and TGi along Block B contains 55 anomalous results compared to 91 anomalous results outside, yet it represents 12.5%

of the regional soil samples and 35% of the detailed soil sampling. The detailed soil sampling for the "Howard's Anomaly" area also shows higher background values than background results from "Zone A" - Table 3 below.

TABLE 3

Mean Background Values - C Horizon Soil Samples

	<u>Howard's Anomaly</u>	<u>Zone A</u>
	Residual Soils	Residual Soils
Cu	32 ppm	12 ppm
Pb	24 ppm	16 ppm
Zn	32 ppm	6 ppm

6.5 Recommendations

- 6.5.1 Diamond drilling of anomaly B3 on lines 6N or 7N.
- 6.5.2 Interpretation by an independent geophysicist of I.P. data for the "Howard's Anomaly" area to be followed by drilling.
- 6.5.3 Costeaming of I.P. zone B5A on lines 8N and 5N.
- 6.5.4 Costeaming of I.P. zone B5C on line 2N.
- 6.5.5 Completion of costean on 18N located on an I.P. anomaly and coincident geochemical anomaly.
- 6.5.6 A down-the-hole I.P. survey of H.A. 3 to determine if the anomaly was intersected. If not some applied potential work should better identify the source for further drilling.

7. BLOCK C, WHITE SPUR AND MT. READ

7.1 Introduction

Exploration at White Spur prior to 1974 consisted of limited geological mapping, ground magnetic surveys, a regional geochemical survey and I.P. coverage in the South. On Mt. Read detailed geological mapping, ground magnetics, a VHEM survey, detailed I.P. surveys, a small Turam survey, regional geochemistry surveys, and some detailed soil geochemistry have been undertaken in previous seasons. During 1974-75 detail geological mapping was extended to cover the whole area and detailed soil geochemistry was carried out on the White Spur area North of the I.P. coverage.

7.2 Geology Figs. 1, 2, 3, 7, 8, 9 and 10

This has been described above in Section 4.1.1 in some detail. The most prospective unit would appear to be PViii. The unit overlies a thick sequence of acid lavas and ignimbrites which are fairly continuous and were probably subaerial in nature; a change in style of volcanicity and possibly chemistry then occurred and led to the deposition of PViii which consists of acid crystal lithic tuffs, agglomerates and fine grained tuffs; fluctuations in deposition conditions from subaerial to submarine occurred and the availability of Fe, S and carbon resulted in the formation of pyritic black shales. Classic conditions for the formation of stratiform Zn, Pb and Cu deposits of the Rosebery and Hercules type.

7.3 Geophysics

Magnetics

The ground magnetics are primarily of use in the interpretation of the geological mapping and the anomalies themselves are not thought to be of any economic significance. Present coverage is adequate for geological purposes, although part of the White Spur grid repegged this season may require repeating over any I.P. or E.M. anomalies.

VHEM

A VHEM survey was carried out on Mt. Read in 1967. The results show obvious effects of terrain problems, i.e. false anomalies due to variations in distance and height between receivers. These variations have resulted in very erratic, unreliable readings, and for this reason they have not been presented.

I.P. - White Spur

The Southern portion of the White Spur area has been covered with I.P. The area as a whole has high chargeabilities, due to the extensive black shales, and discrimination between anomalies and types of anomalies is difficult. Completion of the geophysical coverage is necessary, probably gradient array I.P. to accurately locate all the anomalous zones, followed by E.M. (Turam) or M.I.P. to differentiate the types of anomalous zones.

I.P. - Mt. Read

A detailed gradient array I.P. survey on the Eastern flanks of Mt. Read produced a large number of weak, moderate and strong I.P. anomalies, especially on lines 42N to 50N. Geochemical surveys of this area in 1969 indicate a broadly anomalous zone from 42N to 48N; further detailed geochemistry is required in this area. The isolated I.P. anomalies North of line 50N also require limited amounts of detailed geochemical work.

7.4 GeochemistryWhite Spur

Thin, immature residual soils are developed over the majority of the area. However, the limited amount of time since the last glaciation (11,000 years b.p.) has been insufficient for the dispersion of metals within the soil. In addition, research by the Tasmanian Mines Department indicates that, the soils, developed in the wet, cold West Coast climate contain strong humic acids which leach any base metals from the soil, again preventing the development of dispersion patterns and precluding the development of substantial gossans over any sulphides.

Consequently the detailed soil geochemical programme has been designed to sample two size fractions of the 'C' horizon : the -10+85 mesh fraction and the -85 mesh fraction. Analysis of the -10+85 mesh fraction, consisting essentially of small fragments of weathered rock which have to be pulverised before analysis, is designed to detect primary rock geochemical haloes associated with mineralisation. The -85 mesh fraction, it is anticipated, should detect secondary soil dispersion patterns and essentially measures base metal values within and adsorbed onto the clay fractions in the 'C' horizon sample. Both fractions have been analysed for : Cu, Pb and Zn using a standard perchloric, nitric and hydrochloric acid attack followed by A.A.S. Anomalies have been identified using analysis of log probability curves (Appendix B) are shown in Fig. 18.

The primary rock geochemical haloes associated with stratiform deposits of the Rosebery type, may be very restricted in size and there is a need for close spaced sampling. All the detailed sampling has been undertaken at 50' intervals along the lines. However, the present line spacing of 1,200' - 1,300' is considered to be too great and intermediate lines will be necessary to complete the soil geochemistry coverage.

Follow up of anomalies identified will consist of : (i) collection of cluster samples at original location to guard against random variations in rock assays, (ii) close spaced sampling along the lines across anomalies to identify dispersion and primary haloes more clearly. This together with a binocular microscope examination of rock chips from the C horizon soil samples and study of geophysical data available should ensure that any zone of mineralization with economic potential is identified.

Mt. Read

The anomalies plotted on Fig. 18 are from data collected in 1969. The survey was a regional one of 200' x 1,200' sampling. B horizon -80 mesh material was collected and for reasons stated above this survey may have failed to outline some anomalous zones, although any anomalies found are still significant. The area South of line 50N has on geophysical grounds been recommended for detailed soil sampling and any geochemical anomalies North of this should be followed up by limited detail sampling. The availability of complete geophysical data North of 50N precludes the need for a complete detailed soil geochemistry survey in the area.

7.5 Recommendations

- 7.5.1 White Spur, detailed geochemistry should be extended to the Western edge of the lease and intermediate lines cut such that detail coverage from 18N is complete.
- 7.5.2 Carry out a suitable ground E.M. survey and/or further gradient array I.P. at White Spur, dependent on the recommendation of an independent geophysicist.
- 7.5.3 Mt. Read detailed soil geochemistry of the area from line 42N to 50N.
- 7.5.4 Follow up all geophysical anomalies and geochemical anomalies North of line 50N by limited detailed soil geochemistry.
- 7.5.5 Follow up and definition of anomalous zones found in detailed soil geochemical programmes by (i) collection of cluster samples, and (ii) collection of close spaced samples along the lines, prior to drilling.
- 7.5.6 Log and assay D.D.H. W.S. 1 which was drilled in the White Spur area by Rio Tinto in the early 1960's.

8. BLOCK D. S.W. AREA OF LEASE8.1 Geology Figs. 1, 2, 8 and 9

This is a relatively poorly known area in terms of detailed geology. Essentially it consists of a thick monotonous sequence of greywackes and shales. No firm conclusions can be drawn from the limited amount of structural data available. However, the area is bounded to the North-West by the Henty Fault and a general anticlinal structure may be tentatively inferred from facings obtained throughout the area.

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The mafic to ultramafic bodies show a distinct spatial relationship to the Henty Fault and may reflect the position of a related zone of weakness. The bodies are intrusive and some evidence of contact metamorphic effects has been seen.

From an economic viewpoint the mafic to ultramafic intrusives are probably the most prospective zones of Block D, although they are still considered to have a low priority. The two Northern ultramafics are too small and although the larger Southern body could be a host for Ni/Cu sulphides and/or asbestos, its largely gabbroic nature and lack of overall serpentinisation reduces the prospect for asbestos deposits. The Ni sulphides which occur in this type of ultramafic are typically low grade and are not an attractive target.

8.2 Geophysics Figs. 12 and 13

Dipole-dipole I.P. surveys were carried out and anomalous zone D1 with coincident anomalous magnetics is probably a response to the serpentinised and magnetite rich part of the ultramafic. Surveys were terminated at the Henty River, hence the 2,000' on each line adjacent to the river has no reliable I.P. coverage. High Ni soil geochemistry was reported in the 1970-71 annual report but the results are no longer available. A limited amount of soil geochemistry over the I.P. zone is justifiable.

8.3 Geochemistry

The regional soil programme on 200' x 1,200' grids resulted in several Cu, Pb and Zn anomalies and an area in the Henty Gorge on lines 4N and 6N of very strong Pb with minor Cu, Zn results is probably worthy of follow up. Access problems probably dictate a low priority for this area.

8.4 Recommendations

- 8.4.1 Follow up I.P. zone D1 with detailed soil geochemistry and costearing if high Cu and Ni values are found.
- 8.4.2 Detail soil geochemistry of the Eastern ends of lines 4N and 6N.

9. BLOCK E, RED HILLS-GOOSENECK

No further exploration activity was undertaken in the area during 1974-75. Previously three diamond drill holes have been drilled in the Gooseneck area by R.T.Z. in 1957. At Red Hills R.T.Z. diamond drilled one hole in 1959 and the Consolidated Syndicate drilled several percussion holes and three short diamond drill holes in 1970-71.

The Consolidated Syndicate originally approached Red Hills as a bulk low-grade copper prospect and the percussion holes and three short diamond drill holes (400') were designed to test the upper 200' of the hill. Apart from some haematite-magnetite and very minor pyrite no mineralization was intersected and in fact the extensive I.P. anomalies are largely unexplained. The possibility of a smaller higher grade copper body remains.

At Gooseneck R.T.Z. drilled geophysical anomalies within the lava/pyroclastic, sedimentary unit Gii. Minor mineralization was intersected in a black shale, the best result being 2.5' of 0.6% Cu, 0.4% Pb, 0.15% Zn and 4.1% Fe. Extensive I.P. anomalies together with some geochemical anomalies (see Section 9.2, Zone E5) make this a high priority zone.

9.1 Geology Figs. 1 and 18

Detailed geological data available from different sources provides conflicting interpretations of outcrops especially in the Gooseneck area. Remapping is necessary as is the precise location of E.Z. and Rio Tinto drill holes.

9.2 Geophysics Figs. 14 and 15

I.P., S.P. and magnetic surveys have been carried out by the Consolidated Syndicate. Rio Tinto and E.Z. undertook E.M. and magnetic surveys.

Induced Polarization

I.P. Zone E1 : A long, linear zone with an associated magnetic high is situated in a broad chargeable area. The anomaly is probably due to haematite, magnetite and chalcopyrite within Darwin-type rhyolites. A coincident S.P. anomaly and high Cu soil geochemical values at the Northern end of I.P. Zone E1 is an obvious diamond drill target. Two shallow holes R.H. 2 and R.H. 3 were drilled further South on this zone without intersecting significant mineralization.

I.P. Zone E2 : A short I.P. zone with a high magnetic response, similar geologically to zone E1 but without any geochemical response. R.H. 1 was drilled on this zone and failed to intersect significant mineralization. No further work is recommended on this zone at the present time.

I.P. Zone E3 : Only low magnetic response and no significant geochemical response is coincident with this long I.P. zone. Ground examination only is recommended for this zone.

Zone E4 : a short zone occurring in tuffs, agglomerates and shales with no significant geochemical response. R.H.P. 95 (E.Z.) is thought to be situated on the Southern extension of this anomaly.

Zone E5 : The chargeable response is due to black pyritic shales in agglomerates and tuffs. Two diamond drill holes were drilled by Rio Tinto on the Southern conductive extension of this zone and intersected minor copper, lead zinc mineralization. Strong Pb and Zn anomalies on line 40S and Cu anomalies on line 16S may be significant.

9.3 Geochemistry

Samples were taken of rock (Red Hills), thin residual soils and swamp materials. The original soil assay results are missing or inadequately identified and only 'anomalous' figures are available. 'Anomalous' was defined as values of 100 ppm and above for Cu, Pb and Zn, this obviously limits the usefulness of the geochemical data. A large number of Cu 'anomalies' are present over the Red Hills where outcropping haematite, magnetite and chalcopyrite veins are present. A group of Pb anomalies at the South of Gooseneck are probably transported hydromorphic in character being located in a swamp area. Isolated 'anomalous' results away from the I.P. zones cannot be assessed until the area has been remapped.

9.4 Recommendations

9.4.1 Geological mapping of the area and logging of holes drilled by E.Z. and Rio Tinto is the first priority.

9.4.2 A limited amount of geochemistry to define drill targets on I.P. zones E1 and E5.

10. HENTY FAULT ZONE

10.1 Introduction

Gradient array I.P., geological mapping, limited soil geochemistry, costeaming and diamond drilling have been undertaken prior to 1975. Costeaming of an I.P. anomaly on line 49N revealed 8' of massive stratabound sulphides assaying 1.8% Cu, 1.76% Pb, 0.2% Zn and 37.89% FeS₂. Diamond drilling on line 49N intersected 14½' of 0.34% Cu and 4.2% FeS₂, diamond drilling on line 48N of the same I.P. zone intersected 2' of 1.11% Cu, 4.0% Pb, 7.0% Zn and 15.7% S.

10.2 Geology Figs. 1, 36 and 37

The area is bounded to the West by the Henty Fault. East of the Henty Fault the sequence consists of steeply dipping acid volcanics which probably face East. The interpretation of the stratigraphy is open to debate. Fig. 36 indicates one possible interpretation. It is envisaged that a restricted basin existed in the vicinity of 49N during the period of formation of the Queenstown Pyroclastics and the Tyndall Group. The occurrence of chert/jasper fragments in the sulphides exposed on line 48N and the presence of cherty layers between lava flows in the river North of Henty Camp suggests a restricted basin with chemical deposition of Fe, S, SiO₂ and base metals with intermittent additions of lavas and pyroclastics during the Queenstown Pyroclastics and Tyndall Group periods. A room problem was thought to exist North of 49N because of the Henty Fault; however an interpretation of the geophysical data available by the author suggest that the I.P. zone of line 49N may extend from 47N to 53N. Detailed geological mapping is required to check this out, possibly drilling may be necessary if sufficient outcrop cannot be found.

10.3 Geophysics

Fig. 39 shows the available magnetic and I.P. data in profile form plotted on a plan of the grid. An anomalous I.P. zone is inferred to be continuous from 47N to 53N. The Henty Fault lies to the West of this zone and its position is accurately known on lines 42N, 43N, 48N, 49N, 54N, 55N and 56N; its location on other lines has been inferred from the fact that it appears to be associated with a small high resistivity zone. A. Howland-Rose of Scintrex Pty. Ltd. has recommended the use of an applied-potential method to determine the continuity and geometry of the sulphides exposed in the costean on 49N. This would entail grounding one electrode on the sulphide outcrop and grounding two electrodes, at say 2,000', (East and West of the outcrop). The sulphide zone should then be extremely chargeable and should be easy to trace North and South from its I.P. effect.

10.4 Geochemistry Fig. 38

The sulphide body on 49N shows up as a distinct anomaly in Cu, Pb and Zn. The shales on 42N and 43N also responded well. Completion of coverage of the I.P. zones is required.

10.5 Recommendations

10.5.1 An applied-potential I.P. survey to be carried out centered on the sulphide exposure on 49N.

10.5.2 Completion of soil geochemical coverage of the possible I.P. zone.

10.5.3 Drilling of two to three holes dependent upon results of the work suggested above.

11. DIAMOND DRILLING RESULTS

A brief summary of the location, geophysical and geochemistry data for each drill hole is given. Sections of these holes are also presented. Holes drilled by E.Z. and Rio Tinto have not been presented as it is proposed to relog these holes and assay suitable sections of these holes. Drill logs are also included in Appendix C for holes TYN. 1 (1968), TYN. 2, TYN. 3, H.A. 3, H.F.Z. 7 and H.F.Z. 8.

11.1 Tyndall 1 (1968) Fig. 2

(a) Location 12N, 2650E Tested 2650E - 2000E

(b) Geophysical Data :

I.P. Percentage frequency effect 11.0% Dipole-Dipole Survey
n = 3 results

Resistivity 120 ohm metres "

Metal Factor 242 "

Magnetics - no magnetic anomaly.

(c) Geochemistry :

Coincident 140 ppm Zn anomaly.

(d) Drilling Results :

The hole intersected acid pyroclastics, intermediate pyroclastics and lavas, siltstone, shale and black shale units. Disseminated pyrite up to 2% was present in several sections. This hole was relogged in January 1974 and the new log is presented in Appendix C. No economically significant mineralization.

11.2 Tyndall 2 (1975) Fig. 21

(a) Location 4N, 1160W Tested 450W - 1160W

(b) Geophysical Data :

I.P. Chargeability 50 milliseconds Gradient Array

Resistivity 1500 ohm metres

Magnetics - no magnetic anomaly.

(c) Geochemistry :

Non-residual soils, peat swamp, are present over the anomaly area, the -80 fraction has one Cu 'anomaly' of 85 ppm and a coincident -10+80 fraction Cu 'anomaly' of 35 ppm. This suggest the origin of the Cu is hydromorphic in origin and may be some distance from its source.

(d) Drilling Results :

The complete drill log is presented in Appendix C. A summary is given below:

0 - 631' Volcanoclastic sediments of intermediate composition interbedded with argillite and carbonate units.

631 - 837' Intermediate pyroclastics interbedded with black shales containing syngenetic pyrite.

837 - 845' Fault.

845 - 885' Acid lavas.

The best 5' section assayed:

685 - 690' Cu 300 ppm, Pb 550 ppm, Zn 1550 ppm.

The pyritic black shales 655 - 686' are the probable cause of the I.P. anomaly. No economically significant mineralization was encountered in the hole.

11.3 Tyndall 3 (1975) Fig. 22

(a) Location - collared 16N, 1700W Tested 1700W - 800W

(b) Geophysical Data :

I.P. Chargeability 53 milliseconds Gradient Array
Resistivity 450 ohm metres

(c) Soil Geochemistry :

No data is available for line 16N.

(d) Drilling Results :

The complete drill core log is presented in Appendix C, a summary is given below:

0 - 216' Intermediate crystal tuffs.
216 - 369' Siliceous crystal tuffs.
369 - 776' Hornblende feldspar pyritic pyroclastic and brecciated lavas.
776 - 1162' Crystal tuffs with interbedded pyritic black shales.
1162 - 1200' Hornblende feldspar crystal tuff, possibly welded.

The pyritic black shale 918 - 964' assayed 5.1% pyrite with very low base metal values. This is the probable source of the I.P. anomaly.

The best 5' section assayed:

Pyritic black shale 1060 - 1065' Cu 1200 ppm, Pb 100 ppm, Zn trace, FeS₂ 3.7%.

No economically significant mineralization was encountered in the hole.

11.4 H.A. 1 and H.A. 2 (1971) Fig. 23

(c) Location 20N+200S, 1650W Tested 1650W - 2230W

H.A. 1 was stopped early due to excessive flattening of the hole and redrilled H.A. 2.

(b) Geophysical Data :

I.P. P.F.E. 30% Dipole-Dipole frequency domain
 n = 4 Resistivity 6000 ohm metres
 Magnetics - A 50-100 magnetic anomaly is coincident with the main sulphide zone intersected in the drill holes.

(c) Geochemical Data :

A major Zn, Pb, Cu (600 ppm, 165 ppm, 75 ppm) anomaly centered on 2200W was tested at a depth of 550', which was too deep to correlate, with any certainty, with the geochemical data.

(d) Drilling Results :

Each hole, as would be expected, intersected similar lithologies. An altered agglomerate with disseminated pyrite in the matrix was intersected in H.A. 1 and H.A. 2. From 20 - 120', H.A. 1, averaged 9.0% FeS₂, 0.08% Cu, 0.04% Pb, 0.10% Zn, this is the probable source of the major I.P. anomaly.
 The best 5' section was:
 H.A. 1 80 - 85' 0.35% Cu, 0.22% Pb, 0.66% Zn, 19.2% FeS₂.
 This mineralization is of geological significance although not of economic tenor.

11.5 H.A. 3 (1975) Fig. 25

(a) Location 23N, 1400W Tested 1400W - 2000W

(b) Geophysical Data :

I.P. Chargeability 34 milliseconds Gradient Array
 Resistivity 5000 ohm metres

Magnetics - H.A. 3 is located on the western flank of a major magnetic, 1200' in width 2000 amplitude, anomaly centered on 1200W, probably a west dipping dyke-like source; this anomaly effectively masks any magnetic response related to the I.P. anomaly.

(c) Geochemical Data :

Soil geochemistry revealed two major anomalies, Fig. 25, one Cu anomaly with minor Pb, Zn coincident with the I.P. anomaly and a Cu Pb Zn anomaly coincident with low resistivity but no chargeability.

(d) Drilling Results :

The drill complete core log is presented in Appendix C, a summary is given below:

7 - 103' Acid agglomerates and lapilli tuffs.
 103 - 118' Pyritic black shale - 2.3% FeS₂
 118 - 436' Intermediate pyroclastics, extensive haematitic

zones, carbonate units and minor pyrite.

436 - 800' Interbedded carbonate beds, crystal tuffs and fine tuffs.

No apparent explanation of the I.P. anomaly was detected.

11.6 H.F.Z. 1 (1974) Fig. 26

(a) Location 63N, 2480E Tested 2480E - 1900E

(b) Geophysical Data :

I.P. Chargeability	17 milliseconds	}	Gradient Array
Resistivity	3200 ohm metres		
Chargeability	42 milliseconds	}	Pole-dipole
Resistivity	250 ohm metres		

n = 50

Magnetics - a coincident 400 magnetic anomaly.

(c) Geochemistry :

A broad soil geochemical anomaly of 300 ppm Cu, with a 700 ppm peak, and a broad coincident 200 ppm Zn anomaly; is coincident with the I.P. and magnetic anomalous zones.

(d) Drilling Results :

The hole intersected a dark green chloritic rock with pyrite, minor quartz veins and minor chalcopyrite. The Ni values 0.04% over the section 250 - 500', and the moderate magnetic anomaly, suggest that a sheared dolerite is the main rock type in the section. This section assayed: 250 - 500' 0.11% Cu, 1.45% FeS₂.

11.7 H.F.Z. 2 (1974) Fig. 27

(a) Location 65N, 2500E Tested 2550E - 1750E

(b) Geophysical Data :

I.P. Chargeability	18 milliseconds	Gradient Array
Resistivity	2800 ohm metres	

Magnetics - no obvious magnetic anomaly.

(c) Geochemical Data :

A 200 ppm Zn anomaly with no Cu or Pb response is coincident with the I.P. anomaly.

(d) Drilling Results :

A summary is given below:

0 - 235' Dark grey green sheared chloritic tuff.
 235 - 242' Pink acid lava, sheared.
 242 - 278' Sheared chloritic tuff.
 278 - 388' Fine-medium grained chloritic tuff, sheared.
 388 - 535' Siliceous acid lava.
 535 - 542' Fault.
 542 - 663' Brecciated acid lavas and tuffs.
 663 - 1013' Fine-medium grained chloritic tuff.

No sulphide mineralization was visible in the core, which was not assayed. No explanation of the I.P. anomaly was intersected in the hole.

11.8 H.F.Z. 3 (1974) Fig. 28

(a) Location 43N, OE Tested OE - 300E

(b) Geophysical Data :

I.P. Chargeability 21 milliseconds Gradient Array

Resistivity 6000 ohm metres

Magnetics - no coincident magnetic anomaly.

(c) Geochemistry :

Two soil anomalies lie upslope of the I.P. anomaly.

	<u>West</u>	<u>East</u>	<u>Background</u>
Cu	90	45	20 ppm
Pb	95	105	20 ppm
Zn	120	40	30 ppm

(d) Drilling Results :

A summary is given below:

0' - 244' Acid lavas and tuffs.

Fault

244 - 380' Shale siltstones becoming more shaley and finally black shales. Fault zone from 335 - 380'.

380 - 416' Badly broken and sheared acid lava with pyrite, quartz, minor barite and hydromica.

416 - 552' Fresh massive lavas and crystal lithic tuff.

The black shale and sheared pyritic lava are the probable I.P. source.

Section 380 - 416' assayed 0.08% Cu, 0.01% Pb, 0.01% Zn, 3.2% FeS₂.

No economically significant mineralization.

11.9 H.F.Z. 4 (1974) Fig. 29

(a) Location 42N, OOE Tested OE - 400E

(b) Geophysical Data :

I.P. Chargeability 15 milliseconds Gradient Array

Resistivity 5000 ohm metres

Magnetics - broad magnetic zone, with a peak of 300 above background coincident with I.P. anomaly.

(c) Geochemistry :

Soil anomalies coincident with the I.P. zone.

Cu 110 ppm, Pb 120 ppm, Zn 225 ppm, background values

Cu 15 ppm, Pb 25 ppm, Zn 40 ppm.

(d) Drilling Results :

A summary of the drill log is given below:

- 0 - 343' Acid pyroclastics and lavas interbedded with intermediate lavas.
- 343 - 479' Tuffaceous shale and siltstone, strongly broken - fault.
- 479 - 541' Fine grained acid tuff or siltstone.
- 541 - 626' Shales some graphitic, small quartz and barite veins, minor sulphides.
- 626 - 640' Acid lavas, minor tuffs.
- 640 - 642' Fault zone.
- 644 - 708' Acid lavas and tuffs.

The shales are the probable cause of the I.P. anomaly.

No economically significant mineralization was intersected.

11.10 H.F.Z. 5 (1974) Fig. 30

(a) Location 49N, 1050E Tested 1050E - 1550E

(b) Geophysical Data :

I.P. Chargeability 50 milliseconds Gradient Array

Resistivity 2000 ohm metres

Magnetics - no magnetic response.

(c) Soil Geochemistry :

	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>
Anomaly	65	65	80 ppm
Background	10	10	15 ppm

A distinct anomaly coincident with the I.P. anomaly, (note: the use of 100' sample spacing would have missed the anomaly).

(d) Drilling Results :

The I.P. anomaly was costeamed prior to drilling and 8' of 37.9% FeS₂, 1.8% Cu, 1.76% Pb, 0.20% Zn was exposed. The best intersection in the drill hole was 14½' of 4.2% FeS₂ and 0.34% Cu with minor Pb and Zn values. A summary of the drill core log is given below:

- 0 - 370' Intermediate lavas, acid pyroclastics and lavas.
- 370 - 404' Major fault zone.
- 404 - 429½' Fine grained siliceous acid volcanics. Minor disseminated pyrite and chalcopyrite.
- 429½ - 445' Acid tuffs and lava, minor disseminated pyrite.
- 445 - 668' Acid lavas, massive silicified and brecciated; interbedded coarse tuffs becoming more sedimentary towards the end of the section.
- 668 - 678' Massive polymict conglomerate.

Significant mineralization:

404 - 415' 0.01% Cu, 1.1% FeS₂
 415½ - 429½' 0.34% Cu, 4.2% FeS₂

11.11 H.F.Z. 6 (1974) Fig. 31

(a) Location 48N, 1100E Tested 1100E - 1470E

(b) Geophysical Data :

I.P. Chargeability 12 milliseconds Gradient Array

Resistivity 3000 ohm metres

Magnetics - no magnetic anomaly.

(c) Geochemistry :

No coincident soil geochemical anomaly with the I.P. anomaly.

(d) Drilling Results :

Drill core log summary is given below:

0 - 353' Mixed acid and intermediate volcanics.
 353 - 375' Soft clays, major fault zone.
 375 - 376' Fine grained acid rock.
 376 - 378' Massive sulphides, minor quartz veins and magnetite.
 378 - 435' Acid lava and tuff, minor sulphides.
 435 - 467' Acid pyroclastics and lava.
 467 - 523' Green brown tuff breccia, fragments of acid lava.

The sulphides are the probable cause of the I.P. anomaly.

Significant mineralization:

376 - 378' 1.11% Cu, 4.0% Pb, 7.0% Zn, 30.2% FeS₂
 378 - 425' 0.01% Cu, 0.02% Pb, 0.02% Zn, 3.1% FeS₂
 425 - 435' 0.46% Cu, 0.03% Pb, 0.03% Zn, 10.6% FeS₂

11.12 H.F.Z. 7 (1975) Fig. 32

(a) Location 40N, 300W Tested 300W - 1150W

(b) Geophysical Data :

I.P. - a broad double peaked anomaly.

West Peak East Peak

Chargeability 34 18 milliseconds

Gradient Array

Resistivity 4000 1800 ohm metres

Magnetics - 100 anomaly across I.P. zone.

(c) Soil Geochemistry :

A coincident, with the I.P., double peaked soil anomaly in both -10+80 and -80 fractions.

<u>-80 fraction</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	
West	65	65	115	ppm
East	745	60	70	ppm
Background	15	20	20	ppm

(d) Drilling Results :

The complete drill core log is presented in Appendix C, a summary is given below:

- 30 - 109' Intermediate tuffs.
- 109 - 257' Acid pyroclastics, up to 8% pyrite towards the end of the interval.
- 257 - 434' Volcanoclastic sediments.
- 434 - 480' Pyritic black shale, 3-4% pyrite.
- 480 - 662' Shales and siltstone.
- 662 - 679' Major fault zone.
- 679 - 855' Mixed acid pyroclastics and lava with dolerite.

Significant mineralization:

- 247 - 255' 0.31% Cu, 0.25% Pb, 0.53% Zn, 8.1% FeS₂
- 195 - 255' 0.07% Cu, 0.02% Pb, 0.06% Zn, 2.2% FeS₂

Mineralized zone from 195 - 255' and pyritic black shale from 434 - 480' are the probable cause of the I.P. geochemical anomalies.

11.13 H.F.Z. 8 (1975) Fig. 33

(a) - Location 38N, 1500W Tested 1500W - 900W

(b) Geophysical Data :

I.P. - a broad double peaked anomaly.

	<u>West Peak</u>	<u>East Peak</u>	
Chargeability	30	40	milliseconds
			Gradient Array
Resistivity	4000	2200	ohm metres

Magnetics - a broad 150 anomaly overlaps the I.P. anomalous zone.

(c) Geochemical Data :

A small soil geochemical anomaly is coincident with the eastern peak of the I.P. anomaly.

Soil

<u>-80 mesh fraction</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	
Anomaly	50	30	80	ppm
Background	15	15	20	ppm

(d) Drilling Results :

The complete drill core log is presented in Appendix C, a summary is given below:

- 0 - 72' Shales.
- 72 - 185' Greywackes.
- 185 - 296' Shale and siltstones.
- 296 - 460' Acid, medium to coarse lapilli tuff.
- 460 - 642' Acid pyroclastics, minor disseminated pyrite increasing towards the end of the hole.

642 - 645' Minor fault.

645 - 765' Autobrecciated acid lava, minor carbonate units.

	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>FeS₂</u>
Section 460 - 645' assayed	280	180	575	2.0%
625 - 645'	290	820	2675	2.6%

The sulphides from 460 - 645'. probably caused the 40 millisecond I.P. anomaly. No obvious explanation was seen in the core for the 30 millisecond peak to the west.

11.14 Red Hills No. 1 (1971) Fig. 34

(a) Location - collared at 1600S, 3110E Tested from 3110E to 3440E

(b) Geophysical characteristics of anomaly drilled:

I.P. Chargeability (1) 22.5 milliseconds Pole-Dipole Arrays
 (2) 13.0 milliseconds (1) A M N
 (2) M N A

Resistivity (1) 2200 ohm metres
 (2) 4000 ohm metres

S.P. 10 millivolts

Magnetics - 2000 peak, background 600 .

The I.P. data infers a shallow source.

(c) Soil sampling - no results for Cu, Pb or Zn greater than 100 ppm were found.

(d) Drilling - minor magnetite, pyrite and rare chalcopyrite 'splashes' were intersected in acid lavas.
 No economically significant mineralization.

11.15 Red Hills No. 2 (1971) Fig. 35

(a) Location 1600S, 2500E Tested from 2500E - 2800E

(b) Geophysical characteristics of anomaly drilled:

I.P. Chargeability (1) 28.2 milliseconds Pole-Dipole Data
 (2) 29.5 milliseconds

Resistivity (1) 2450 ohm metres Background 4000
 (2) 1660 ohm metres ohm metres

S.P. 37 millivolts

Magnetics - 19020 peak, background 600 .

I.P. source has depth as well as shallow characteristics.

(c) Soil sampling - a Cu peak value of 147 ppm, all other values were less than 100 ppm.

(d) Drilling - located Fe stained broken lavas adjacent to a shear zone. No economically significant mineralization.

11.16 Red Hills No. 3 (1971) Fig. 36

- (a) Location - collared at 2900S, 2400E Tested 2400E to 2660E
 (b) Geophysical characteristics - Data is not available from this line and is projected from 2400S.

I.P. Chargeability (1) 27.0 milliseconds Pole-Dipole Data
 (2) 26.8 milliseconds
 Resistivity (1) 2800 ohm metres Background 7000 o/m
 (2) 3900 ohm metres " 6000 o/m
 S.P. 60 millivolts
 Magnetics - 3000 , background 600 .

- (c) Soil geochemistry - no results available for line 29N but strike projection are given from lines 24S and 32N.

24S - a copper peak of 3900 ppm

32N - a copper peak of 1100 ppm

- (d) Drilling - brecciated acid lavas with haematite, magnetite and very minor pyrite were encountered.
 No significant mineralization.

12. ROCK GEOCHEMISTRY

Samples collected during the 1974-75 season were assayed for Cu, Pb, Zn, and in some cases for Na, K, Mg, Ca, SiO₂. The sample location sites are plotted on Fig. 41, the assay data and identification of each sample are presented in Table 5, the rock type code is the same as used on 1:6000 scale geological plans.

Trace Element Chemistry

Mean values, \bar{x} , and ranges have been calculated for the major rock types. σ is the standard deviation from the mean (i.e. geometric mean).

<u>Acid Volcanics</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>
$\bar{x} - \sigma$	0 ppm	0	0
\bar{x}	70	40	60
$\bar{x} + \sigma$	165	90	140
<u>Intermediate Volcanics</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>
$\bar{x} - \sigma$	15 ppm	5	35
\bar{x}	45	25	70
$\bar{x} + \sigma$	75	45	105
<u>Basic Volcanics</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>
$\bar{x} - \sigma$	0 ppm	0	60
\bar{x}	90	35	105
$\bar{x} + \sigma$	180	75	150

The main feature to be noted is the relatively restricted range of assay values for all trace elements in the intermediate volcanics. The reason for this type of study is to enable some quantification to be made of any individual rock assay, samples which report assay values outside of their expected ranges may be considered as geochemical 'anomalies'. The significance of these 'anomalies' may not be apparent. It is hoped to extend this type of approach to data from the Cambrian Volcanics of the West Coast in order to determine if regional variations within and between different areas are present and whether any relationship to mineralization exists. Samples are collected as part of routine field mapping programmes, collection of 'normal' samples as well as unusual rock types is necessary.

Major Element Chemistry

All the rocks assayed so far and data from Solomon 7 at Rosebery and Mt. Lyell when plotted on a $\text{Na}_2\text{O} + \text{K}_2\text{O}$ vs SiO_2 diagram, plot in the field of subalkaline volcanics. This diagram is also indicative of the nature of the alteration types in rocks associated with mineralization. At Mt. Lyell the main alteration is chloritic and sericitic, at Rosebery the major alteration sericitic, at Hercules the main alteration is silicification. Major element studies of this type may lead to development of a technique for the recognition and identification of potentially mineralized provinces in the Tasman Geosyncline of New South Wales for example. The majority of 'Academic' research into this type of field is either too localized or too regional in its scope, although it is obviously a valuable source of raw data. As with trace element studies, this type of study can be carried out as part of normal field mapping programmes.

One inference that may be drawn from the data available suggest that at Rosebery, Hercules and Mt. Lyell $\frac{\text{K}_2\text{O}}{\text{Na}_2\text{O}} > 1$.

13. CONCLUSIONS

1. To date exploration by Mt. Lyell on the Western part of E.L. 9/66 has resulted in 16 drill holes of which five, H.A. 1, H.A. 2, H.F.Z. 5, H.F.Z. 6, H.F.Z. 7, and one costean have intersected significant mineralization. Although none of the intersections was of economic grade over any significant width all could be associated with an economic target.

All the mineralization located so far, lies stratigraphically very close to the contact between the Queenstown Pyroclastics and the Tyndall Group. This locus should be further tested by drilling.

2. The White Spur area of Block C has excellent potential on geological evidence, but a lot of work prior to drilling is required in this area.
3. The various areas have been grouped as to priority for further expenditure and are listed below:

1st Priority	Henty Fault Zone Howard's Anomaly (Block B) White Spur (Block C)
2nd Priority	Mt. Read (Block C) Red Hills-Gooseneck (Block E)
3rd Priority	Block A Block B other than Howard's
4th Priority	Block D
4. Rock geochemical programmes have considerable potential and co-operation with Universitys and Mining Companies should be sought to accumulate more data.
5. The re-organization and re-interpretation of available data required to re-assess the programme West of the Tyndall Ranges has been useful. A similar exercise undertaken for the Selina, Rolleston-Dora areas may indicate further potential.

14. RECOMMENDATIONS

Block A

- (i) Cut and grid lines 37N and 39N to carry out small soil sampling and I.P. programme.
- (ii) Repeg line 26N to complete magnetic coverage.

Block B

- (i) Drill I.P. zone B3.
- (ii) Costean I.P. zone B5A on lines 5N and 8N.
- (iii) Costean I.P. zone B5C on line 2N.
- (iv) Conduct down-the-hole I.P. survey on drill hole H.A. 3.
- (v) Consult a geophysicist on the selection of further target related to H.A. 1 and possibly H.A. 3.

Block C White Spur Area

- (i) Extend present grid and cut intermediate lines.
- (ii) Extend soil geochemistry programme to cover new grid.
- (iii) Coverage of complete area with gradient array I.P. or E.M., dependent upon the recommendation of an independent geophysicist.
- (iv) Log and assay W.S. 1 drilled by Rio Tinto in the White Spur area.

Block C Mt. Read

- (i) Soil geochemistry of lines 42N - 50N.
- (ii) Limited soil geochemistry of I.P. anomalies and soil anomalies North of line 50N.

Block D

- (i) Soil sampling of I.P. zone D1.
- (ii) Detailed soil geochemistry on the soil anomalies on line 4N and 6N close to the Henty Gorge.

Block E

- (i) Geological mapping of the area and the logging of drill core from holes by E.Z. and Rio Tinto.
- (ii) Drill I.P. zone E1 at Northern end.

Henty Fault Zone

- (i) Detailed geological mapping.
- (ii) An applied potential survey to be centered on the coastline on 49N.
- (iii) Complete the soil geochemistry programme.
- (iv) Drill at least two more holes in the zone, the first to be collared on line 50N.

H. P. [Signature]

TABLE 5

* See Fig. for Key

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Sample No.	Area	Co-ordinates	Rock Type*	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
9906	Block C	42N	lapfq	20	30	70	2.56	3.43	0.80	0.54	74.26	Acid lava? pyroclastic K
9907	"	"	2apf	95	145	190	3.50	2.17	5.04	4.48	52.32	Basaltic andesite lava
9908	"	"	3a/b	15	165	195	4.72	0.52	4.00	3.23	59.12	
9909	"	40N	lapfq pyritic	85	220	140	3.78	3.19	0.55	0.71	70.54	
9910	"	"	li	5	15	60	4.85	1.99	0.31	1.04	69.18	
9911	"	38N	3a/b pyritic	30	20	140						
9912	"	37N	3b	15	25	90						
9914	Block A	28N	li	5	10	35						
9915	"	"	2t?	5	25	75						
9916	"	"	lapfq	10	80	45						
9917	"	"	lt?w	15	85	20						
9918	Block D	"	la/ltw	20	245	60						
9919	"	"	lt coarse	40	10	45						
9920	Block A	"	lapfq	5	10	40	3.91	2.95	0.08	0.16	77.96	
9921	"	"	lt	10	10	25						
9922	"	34-36N	lapfq	5	10	5	3.24	3.37	0.06	0.05	80.26	
9923	"	"	ltl	85	35	45	2.83	3.79	0.10	0.56	76.24	
9924	"	"	ltl	5	10	50	3.10	3.25	0.10	0.41	77.58	
9926	"	37N	ltlw/a au	10	15	50						
9927	"	"	2t/a	5	10	45						
9928	"	32N	lt/a	5	110	15						
9930	"	"	la flow banded/li	60	190	675						Shale/volcanic fragments
9931	"	"	pseudo gossan	15	25	150	Cr 120, Ni 295, Co 60, Mn 2600					

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Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
9932	Block A	40N	1a au pfq	30	10	60						
9933	"	28N	2/ltxe	10	20	75						
9934	"	"	1apfq	5	175	25						
9935	Block C	38N	1apfq	5	15	20						
9936	"	"	2t/apfq	10	15	85						
9937	Block A	40N	1a/twpqv	35	20	25						
9938	"	"	1tq	160	15	25						Xstal tuff/Sed. Na
9939	"	"	3a	90	70	80						
9940			1Tqf	30	10	30						
9941			2T?w	55	10	25						
9942			1apqf	15	25	75						
9943	Henty Camp Bridge		2/3t	15	50	95						
9944	Block A	41N	5a	20	60	160						
9945	Henty Camp	40N	2t	60	90	90						
9946	Block B	26N	2t/a	80	75	240						
9947	Henty Camp		1apq	25	30	75	5.94	0.54	1.82	2.49	76.70	
9948	"		2t1	20	55	120						
9949			2/1tw	15	20	75						
9950	Block B	2N	1t	40	50	40						
9951	"	"	2tpf	50	35	45						
9952	"	4N	2tpf	40	10	70						
9953			2a/tpf	130	10	20						
9954	"	"	1t siliceous	35	10	5						
9955	"	6N	1t	165	10	5						
9957	"	8N	pseudo gossan	45	10	95	Ag 0.5, Cr 80					

Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
9958			2apf pyritic	35	10	10	Ni 30, Co 50, Mn 2320				Andesitic tuff. Na	
9959			2tx	65	10	215						
9960			2t	55	15	625						
9961	Henty River	40N		35	10	65						
9962	"	"	3b	85	10	75						
9963	"	"										
9964	Block B	9N	2tx1	55	10	40						Andesitic lithic tuff. K
9965	"	"	2tpf	45	10	65						Andesitic pyroclastic. M
9966	"	"	2tpf	95	10	50						
9967	"	"	2t	50	15	140						
9968	"	"	2/1t	60	10	15						
9969	"	"	2t	30	30	20						Silicified acid volcanic.
9970	"	10N	2t?w	60	20	120						
9971	"	16N	1t/apqf	35	15	15						Crystal tuff. K
9972	"	"	1tv	70	10	115						
9974(3)	"	20N	2/1t haematitic	40	10	115						
9975	"	26N	1t pyritic	205	200	70						
9976	"	"	lapq	65	20	150						
9977	"	"	1a flow diff.	35	10	65						
9978	"	"	1c	20	10	105						
9979	"	19N	1tw? altered zone	57	34	87						1t Xstal tuff. Na
9980	"	21N	Haematitic silica tuff int. sulphide blebs	151	4820	197						

Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
9981	Block B	21N	lTxfp?w	110	28	94						
3				5	10	20	1.21	3.37	0.15	0.99	71.52	Welded vitric tuff. Na
9984			lapfq	30	18	34						
9985	White Spur	29N	lapq silicified	23	28	14	3.91	4.30	1.05	0.46	73.24	
9986			lapfq	27	14	16						
9987	"	18N	lTxfpq	16	14	25						
9988	"	"	lt/axpfq	9	4	28						
9989	"	"	5b/lTx	56	48	72						
9990			li/apfq	28	22	25						
9991			lapfq	407	126	36						
9993	"	24N	li/apflxl	22	46	66	4.43	1.86	0.56	0.90	71.40	
9994	"	28N	li/a/Tpf	19	76	21						
9995	"	24N		13	30	30						
9996	Block B	23N 17E					Ba 16.3%, Ag 31.1, Au 0.2					
0100	Mt. Read	Transmitter	la/i	54	16	30	2.46	1.98	0.92	0.35	83.48	
0101	"	"	la/i	101	24	123	2.89	2.16	0.76	0.99	83.00	
0102	"	"	la/i	88	16	20	2.91	1.98	0.63	0.13	86.16	
0103	"		li	64	14	27	1.70	4.19	0.04	0.48	76.42	
0104	"	"		18	10	41						
0105	"		li	56	8	41	2.24	3.19	0.06	0.43	77.56	
0106	"		li	46	14	17	0.35	5.10	0.01	0.45	76.46	
0107	"			32	22	242						Acid pyroclastic. Na
0108	"		li	65	44	159	1.63	3.98	0.01	0.41	77.60	
0109	"			149	18	71						Vitric tuff. Na

Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
0110	Mt. Read	Hercules	li/Tpf	101	74	48	0.09	4.54	0.01	0.53	77.90	
0111	"	"	5a	134	78	85	1.38	1.95	0.06	1.49	74.30	Carbonaceous shale with chert 'globules'
0112	"	"	la/ipfq	47	8	37	4.25	1.12	0.18	0.31	83.64	Acid volcanic. Na
0113	"	"	lTl/la au	42	32	38	0.09	2.61	0.01	0.46	45.32	
0114	"	White Spur	li	80	32	49	0.47	6.18	0.03	0.08	83.10	Ash flow tuff. K
0115	"	"	la/Twpcf	38	6	15	1.83	3.30	0.17	0.24	78.16	
0116	"	"	gossanous	21	468	1191						
0117	"	"	lapf	39	8	82	2.95	2.50	0.14	0.96	72.34	
120	Block D	36N 28W	5a	7	26	99						
121	"	36N 24W	5a	30	10	66						
0118	Mt. Read - Dundas			90	76	21						
20701	Mt. Read		la/?i	84	30	26						
20702	"		la/vl+gossan material	138	622	51						
20703	"		lTv/a	40	12	51						
20704	"		li	641	108	130						
20705	"	42N	la	124	32	56						
20706	White Spur	40N	ltv	51	30	47						
20707	"	38N	li/a fine grained	96	52	23						
20708	"	"		22	32	67	1.29	4.17	0.11	0.19	82.16	Ash flow tuff. K
20709	"	"		109	34	76	Ni 3, Cr 600, Mn 352, Ag 2					
20718	"	28N+	ltxpfw	254	5900	245	Mn 10.28%, Ni 96					Acid vitric tuff. K

Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
20719			Mn Wad lapf	70	129	5	Ni 5					
20720	Block C	45N	lapfq	216	20	41	3.78	3.73	0.29	0.32	78.02	Ni 5
20721	"	46N	ltxpfw	93	20	63	1.89	2.65	0.10	0.18	72.12	Acid tuff-lava. Na
							Ni 5					
20722	"	48N	la/t	188	40	103	4.18	0.36	7.56	2.49	60.96	Ni 5
20723	"	52N	3apf silicified	99	10	12	1.48	2.83	0.07	0.13	75.70	Ni 5
20724	H.F.Z.	52N	lapfq/t	94	40	60	1.89	4.23	0.20	0.45	75.64	Ni 5
20725	Mt. Read	60N	2pf spotted	193	20	131	0.59	2.19	0.11	0.90	56.94	Ni 17
20726	"	"	2/3pf	162	50	106	1.46	2.53	0.11	1.16	60.76	Andesite? pyroclastic. Na
							Ni 12					
20728	"	"	la/t	101	20	43	0.45	2.53	0.08	0.31	82.86	Ni 5
20729	"		lapf/t	137	40	55	0.86	3.19	0.06	0.28	78.62	Ni 5
20730	"		la?/ltpf altered	404	40	42	2.38	2.75	0.07	0.28	75.70	Acid pyroclastic. Na
							Ni 5					
20731			ltxpflw	25	4	36						
20732			ltxppflw	43	12	26						
20733	White Spur	24N	lapf/lwt	25	-	28	3.48	3.23	0.62	0.25	80.02	Ignimbrite. K
20734	"	38N	lapf/lwt	223	-	22						
20735	"	36N	ltxpfw	32	-	28						
20736	"	38N	ltpflw	28	10	36	1.96	2.94	0.18	0.53	77.61	
20737	"	40N	ii	152	166	25	3.77	2.14	0.42	0.45	77.80	
20738	"	42N	ltpflw	33	-	48						
20739	"	"	la/i	35	24	29	2.11	3.45	0.59	1.52	76.52	
20740	"	"	lapfq	34	14	22	2.09	4.24	1.04	1.19	73.02	

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Sample No.	Area	Co-ordinates	Rock Type	Cu	Pb	Zn	Na ₂ O	K ₂ O	CaO	MgO	SiO ₂	Thin Section
20741	White Spur	42N	1a au/li	38	24	120	3.99	1.90	0.99	1.14		Lava/pyroclastic? Na
20742	"	38N	1apf	43	36	19	0.07	1.29	0.24	0.38	71.54	
20744	"	36N	1i	41	4	9	0.16	2.87	0.14	0.33	78.78	
20745	Block D	10N 18N	5bv	49	-	50						
20746	"	14N	5/1t	31	4	100						
20747	"	16N	5bv	19	8	82						
20748	"	18N	1/2pf	51	12	46						
20749	" Henty River	20N	3b	47	2	36						
20750	" "	26N	3b	127	8	130						
20752	" "	28N	4 altered	15	2	103						
20753	White Spur	42N (W)	5e cht shale	307	36	54	2.16	2.71	0.13	0.05	82.86	
20754	Block D	16N	tuffite 5d									
20755	"	18N	5/1t									
20757	"	18N	1txpf									
20759	"	18N	5bv									
20760	"	6N	3pqf									
20762	"	6N	3p									
20727	H.F.Z.	57N					0.81	2.47	0.22	0.91	63.70	
20743	White Spur	36N		72	52	18	0.29	3.79	0.06	0.33	77.00	
20763	"	40N		198	8	45						
20761	Block D	6N										

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APPENDIX AREFERENCES

1. Annual Reports - available from 1967 to 1974.
2. Geophysical Contractors Reports
 - (a) McPhar 1968 and 1969 - Frequency domain dipole dipole I.P. surveys of Blocks A, B, D.
 - (b) C.G.G. 1970, 1971 - Pole-dipole I.P. surveys, S.P. and Resistivity of Block E and Selina, Rolleston.
 - (c) Scintrex 1973, 1974, 1975 - Gradient-array I.P. surveys of Henty Fault Zone, Blocks A, B, C. Turam survey Mt. Read. Turair survey at Lake Selina. Drill hole logging. Soil mercury vapour analysis.
 - (d) Irvine 1974 - Re-interpretation of McPhar's Geophysical Data.
3. Rio Tinto Southern Exploration - Reports, geological and geophysical, on Red Hills, Gooseneck, Lake Dora and Howard's.
4. Corbett et al. 1974 - J. Geol. Soc. Aust. Vol. 21, pt. 2, pp. 173-186.
5. Electrolytic Zinc Co. - Drill logs of holes R.H.P. 94 and 95, Red Hills-Gooseneck.
6. Baker (Dept. of Mines, Tasmania) G.S.A. Abstracts Brisbane 1974.
7. M. Solomon - Spilites, Keratophyres and the Mt. Lyell and Rosebery Ores. Ph.D. Thesis.

APPENDIX BANALYSIS OF GEOCHEMICAL DATA : PROBABILITY CURVES, THEIR CONSTRUCTION AND USEINTRODUCTION

Geochemical data is collected to find anomalous populations, which may be related to different rock types, differing soil or sediment regimes and mineralization. The majority of geological data is thought to have a lognormal rather than a normal distribution, hence the lognormal case will be discussed, but other types of distribution, e.g. Normal or Gaussian distributions, may be treated in a similar manner.

CONSTRUCTION OF A LOG PROBABILITY CURVE

- (i) The first step is to construct a histogram, i.e. count the number of individuals within the population under study which fall into each class interval. Each class interval is then expressed as a percentage of the total population. Then integration is applied to the results, i.e. each interval is given the value of the sum of all the preceding percentages plus its own, (individual numbers may be summed and percentages then calculated, as in example - Table I).

The probability is then plotted against the class interval on log probability paper. The mid point of the class interval should be plotted, if a log interval is used for classes then the logarithmic mid point should be used.

- (ii) Selection of class interval :

In the example given, classes were selected by inspection, this is not always possible, e.g. with a range of say 0 - 60 ppm. It is desirable to have between 10 and 20 classes, so we take the logarithm of 60 = 1.4, divide by 14 and take antilogs of 0.1, 0.2, 0.3 - 1.4, this gives 14 class intervals when rounded off:

0, 1, 2, 4, 6, 8, 10, 13, 16, 20, 25, 32, 40, 60 ppm

This more vigorous selection of class interval is probably desirable but is in most cases not necessary.

- (iii) Size of population :

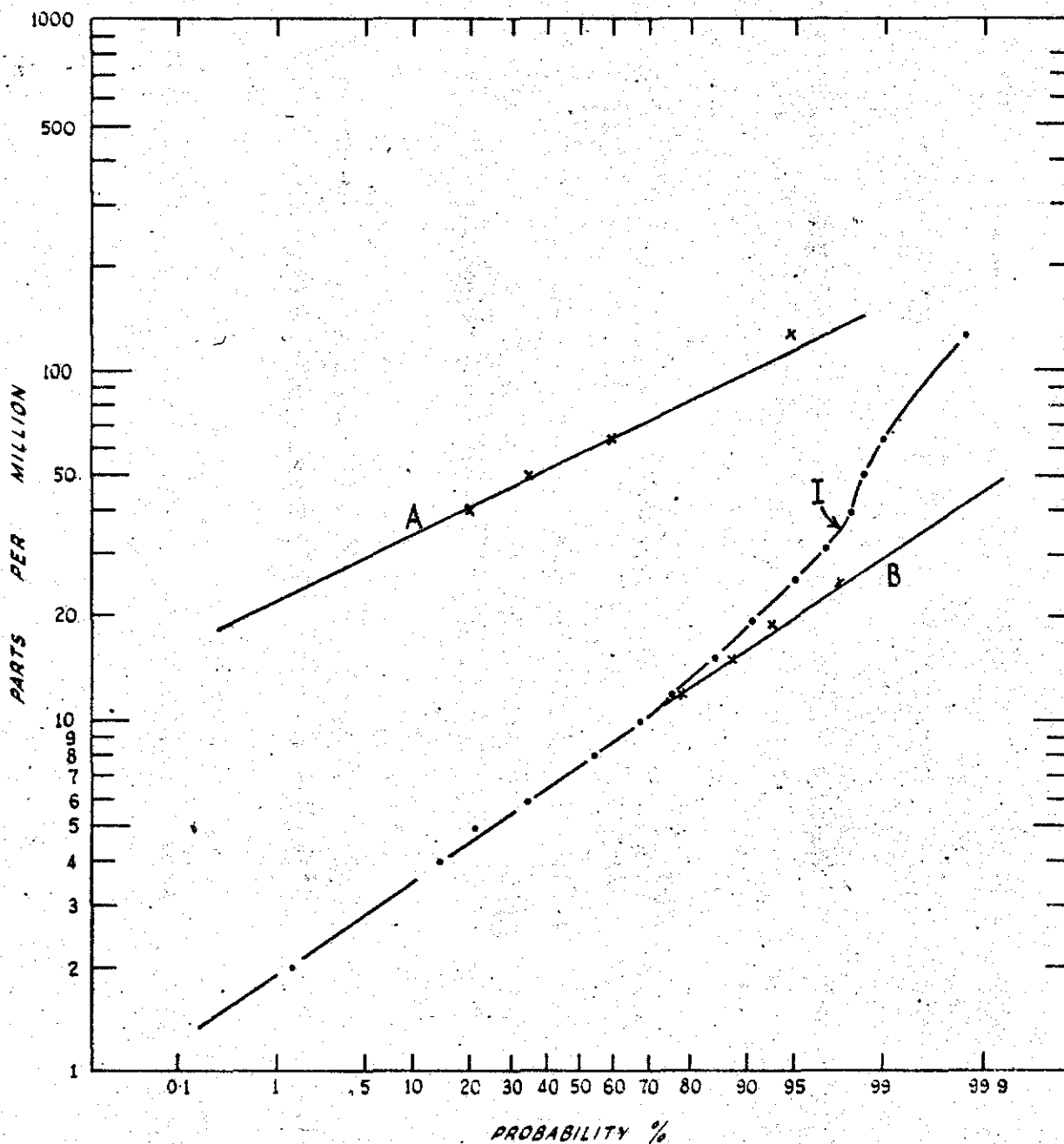
It is possible to treat populations with as low as 50 samples, however, if less than 100 samples are treated it is recommended that the points be plotted with their 95% confidence limits shown (a simple nomogram can be found in Lepeltier, Econ. Geol. Vol. 64, pp. 542) to allow a visual estimate of the significance of the curve produced by limited populations.

TABLE I

Interval	0 ppm	5	10	20	30	40	50	60	70	80	90	100	125	150	175	200	300
No.	4	53	117	26	11	4	3	2	1	2	2	3	-	2	1		1
Σ No. (Cumulative frequency)	4	57	174	200	211	215	218	220	221	222	224	227		229	230		231
Σ N % or Probability Forward	1.72	24.57	75.0	86.2	90.9	92.6	94.0	94.8	95.3	96.1	97.0	98.3		99.1	99.57		100
Probability Reverse %	100	98.3	75.3	25.0	13.8	9.1	7.4	6.0	5.2	4.7	3.9	3.0		1.7	0.9		0.43

121

B1



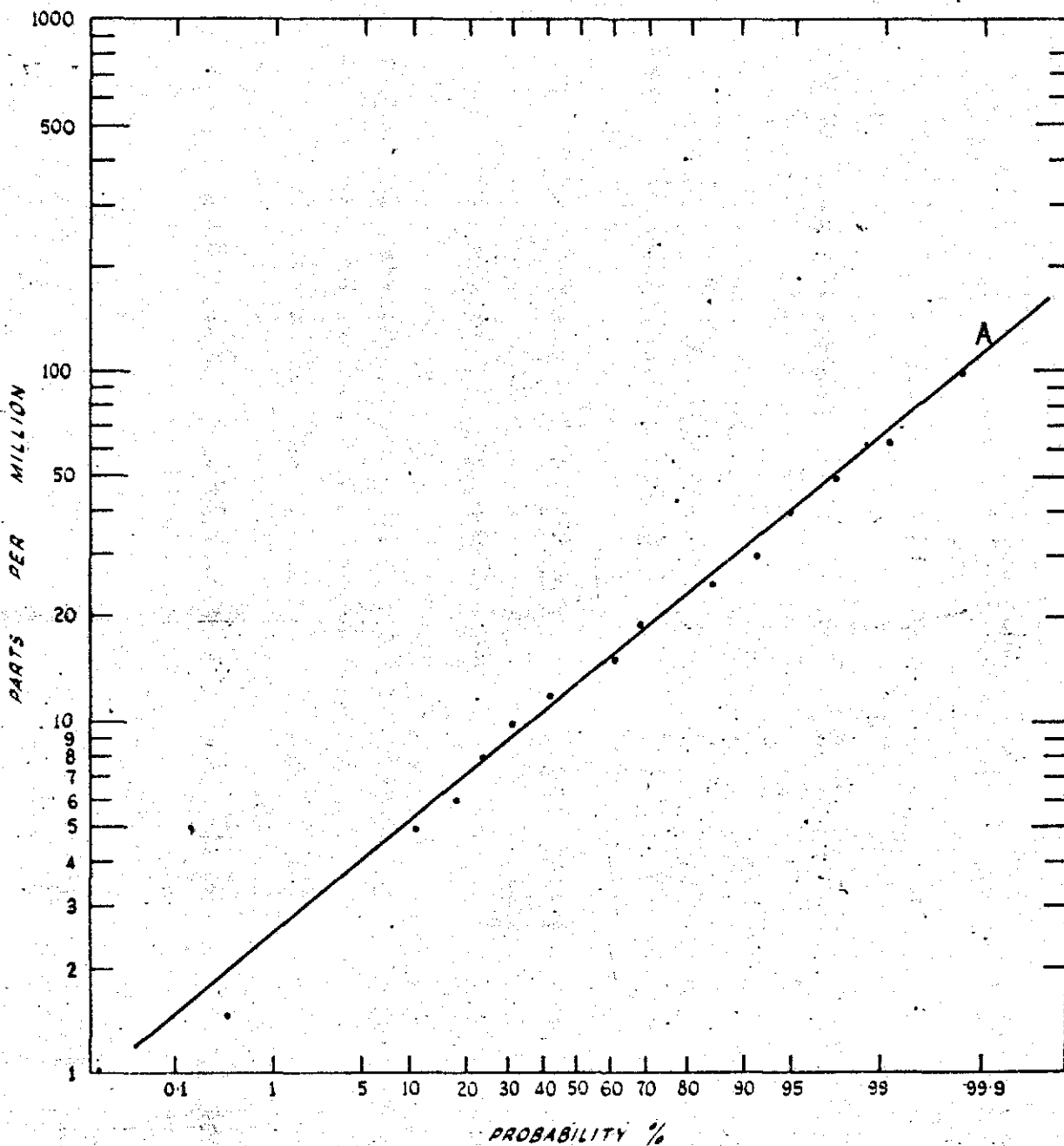
N^o OF SAMPLES n = 615
 METAL Cu
 SAMPLE TYPE SOIL
 HORIZON 'c'
 FRACTION -80

1st ORDER THRESHOLD 30 p.p.m.
 2nd ORDER THRESHOLD 23 p.p.m.
 3rd ORDER THRESHOLD p.p.m.
 BACKGROUND MEDIAN 8 p.p.m.

I - POINT OF INFLECTION
 A - POPULATION A 2.3%
 B - POPULATION B 97.7%
 C - POPULATION C
 95% CONFIDENCE LIMIT ----

THE POPULATION RESOLVES INTO TWO LOGNORMAL DISTRIBUTIONS A & B. THRESHOLDS ARE TAKEN AT 1% A & 99% B.

THE MT. LYELL M. & R. COY. LTD.	TRACED. R.G.W.
MT. TYNDALL AREA	CHECKED. N.S.H.
E.L. 9/66	DATE. July '75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SFUR	APPENDIX B



Nº OF SAMPLES $n = 615$
 METAL Pb
 SAMPLE TYPE SOIL
 HORIZON 'c'
 FRACTION -80

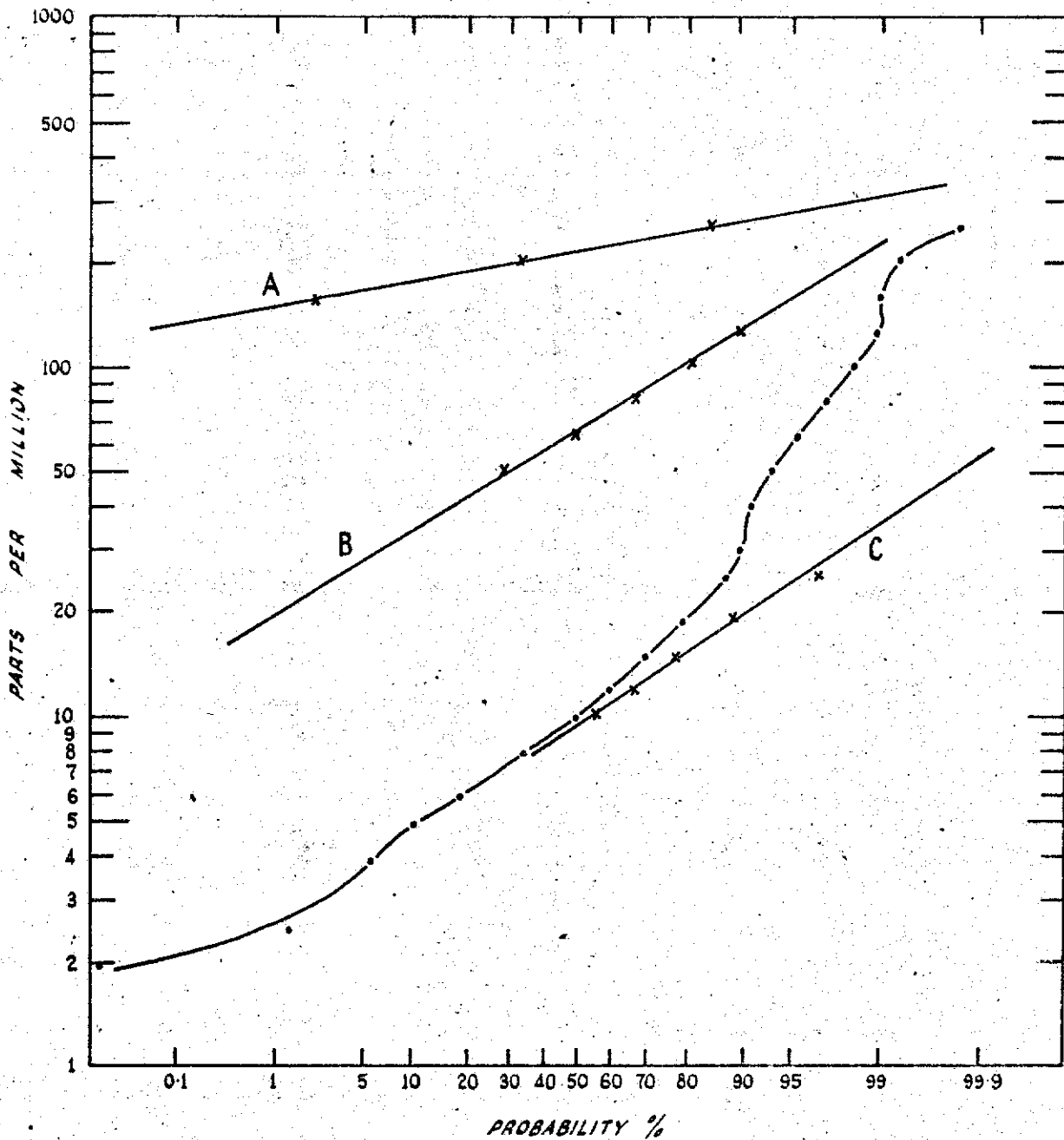
1ST ORDER THRESHOLD 60 p.p.m.
 2ND ORDER THRESHOLD 30 p.p.m.
 3RD ORDER THRESHOLD p.p.m.
 BACKGROUND MEDIAN 13 p.p.m.

I - POINT OF INFLECTION
 A - POPULATION A 100%
 B - POPULATION B
 C - POPULATION C
 95% CONFIDENCE LIMIT $\equiv \equiv$

ONE LOGNORMAL POPULATION IS PRESENT, THRESHOLDS HAVE BEEN CHOSEN AT 97.5% AND 99% OF $\bar{x} + 2\sigma, \bar{x} + 3\sigma$

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STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SPUR	APPENDIX B

B3

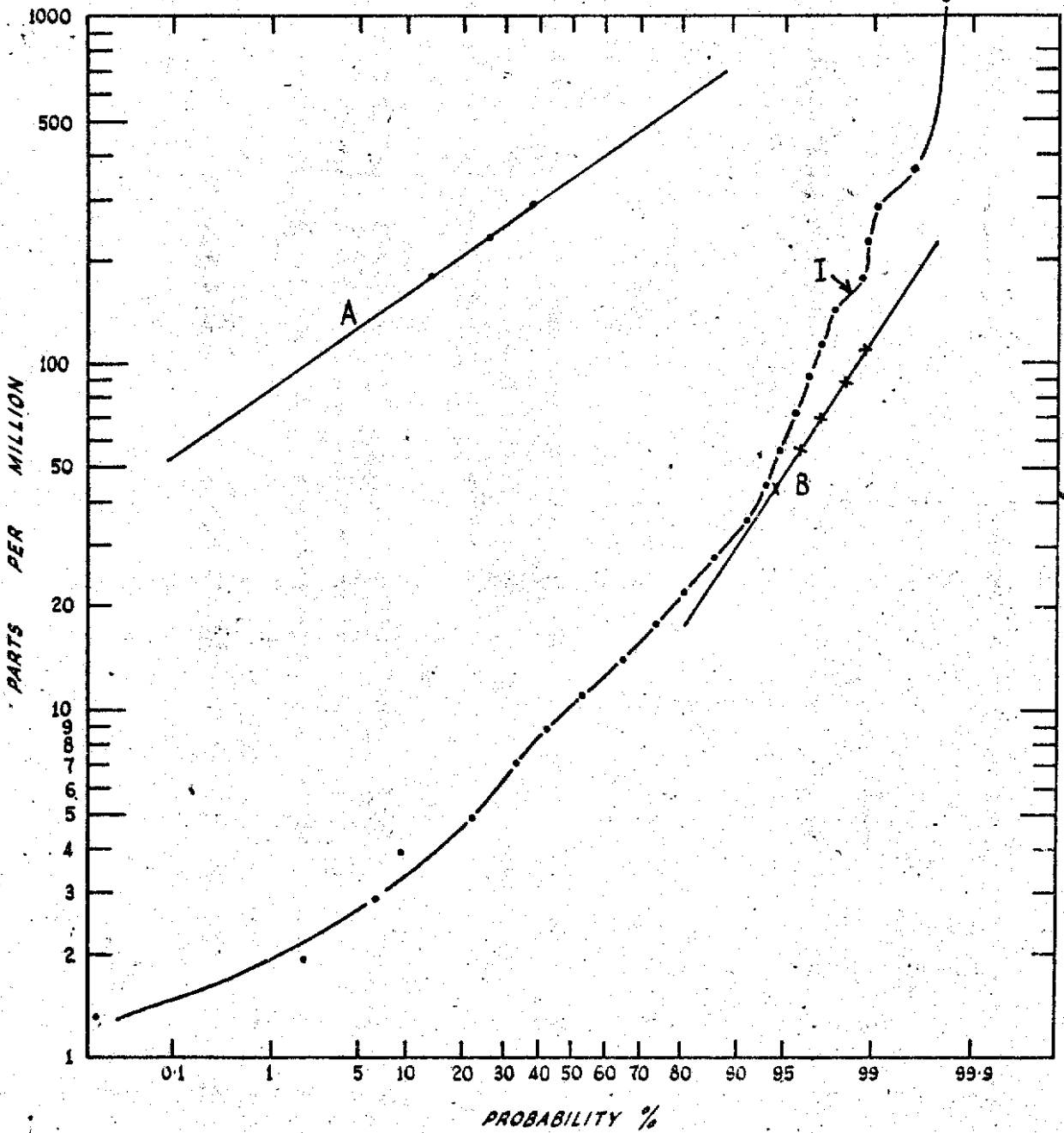


N° OF SAMPLES n =	615	1 st ORDER THRESHOLD 150 p.p.m.	I - POINT OF INFLECTION
METAL	Zn	2 nd ORDER THRESHOLD 35 p.p.m.	A - POPULATION A 1%
SAMPLE TYPE	SOIL	3 rd ORDER THRESHOLD p.p.m.	B - POPULATION B 9%
HORIZON	'C'	BACKGROUND MEDIAN 10	C - POPULATION C 90%
FRACTION	-80			95% CONFIDENCE LIMIT - - - -

THE POPULATION RESOLVES INTO THREE LOGNORMAL DISTRIBUTIONS. THRESHOLDS HAVE BEEN SET AT 99% C & 1% A.

THE MT. LYELL M. & R. COY. LTD.	TRACED. R.G.W.
MT. TYNDALL AREA	CHECKED. N.S.H.
E.L. 9/66	DATE: July '75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SPUR	APPENDIX B

B4

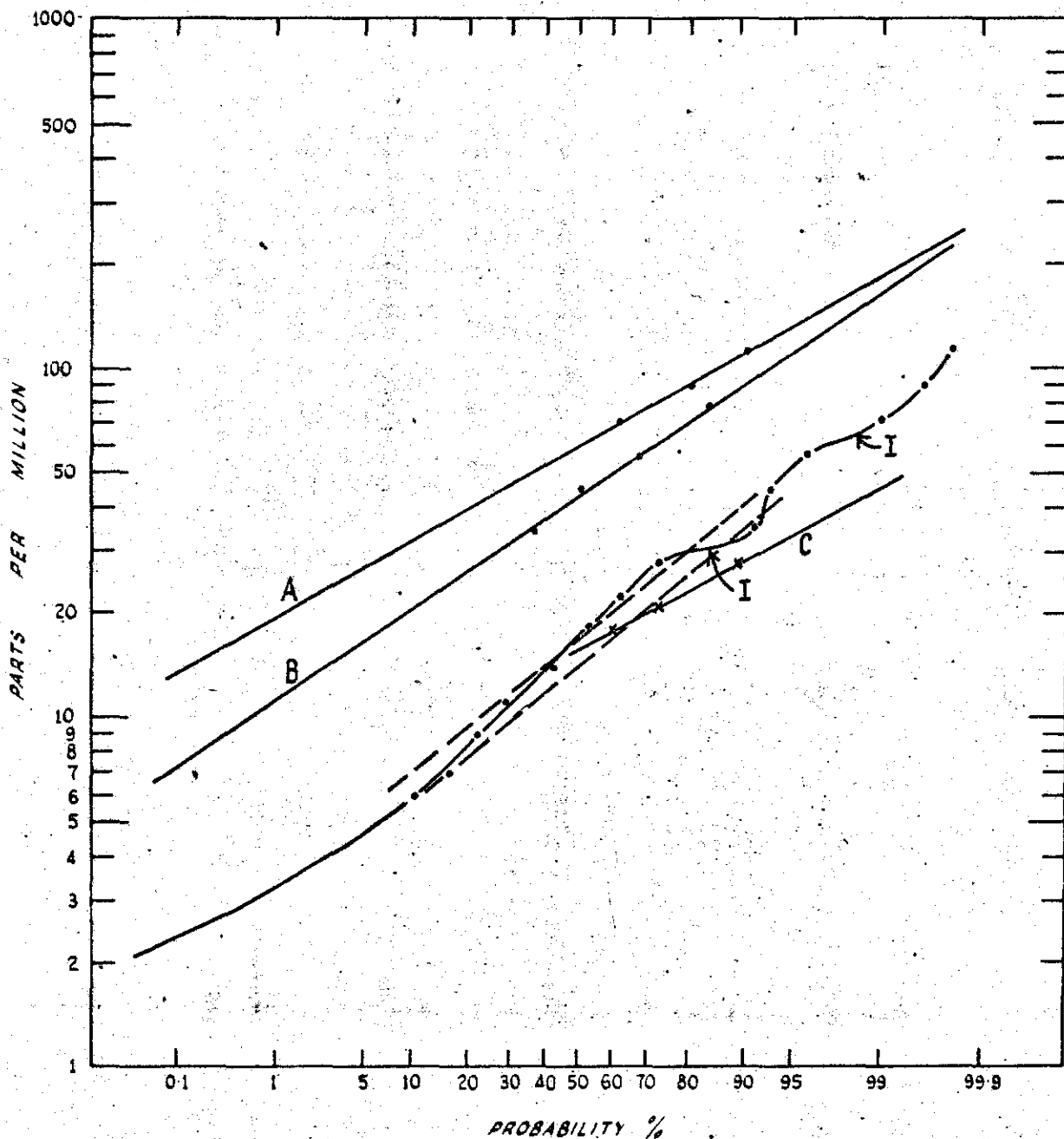


Nº OF SAMPLES n = 515	1 ST ORDER THRESHOLD 120 p.p.m.	I - POINT OF INFLECTION
METAL Cu	2 ND ORDER THRESHOLD 100 p.p.m.	A - POPULATION A 1.5%
SAMPLE TYPE SOIL	3 RD ORDER THRESHOLD p.p.m.	B - POPULATION B 98.5%
HORIZON 'C'	BACKGROUND MEDIAN 10 p.p.m.	C - POPULATION C
FRACTION -10+80		95% CONFIDENCE LIMIT ---

THE POPULATION RESOLVES INTO A LOGNORMAL POPULATION 'A' AND A LOGNORMAL FRACTION 'B'. THRESHOLDS HAVE BEEN FIXED AT 99% OF B AND 1% OF A.

THE MT. LYELL M. & R. Coy. LTD.	TRACED. R.G.W.
MT. TYNDALL AREA	CHECKED. M.S.H.
E.L. 9/66	DATE. July '75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SPUR	APPENDIX B

B5

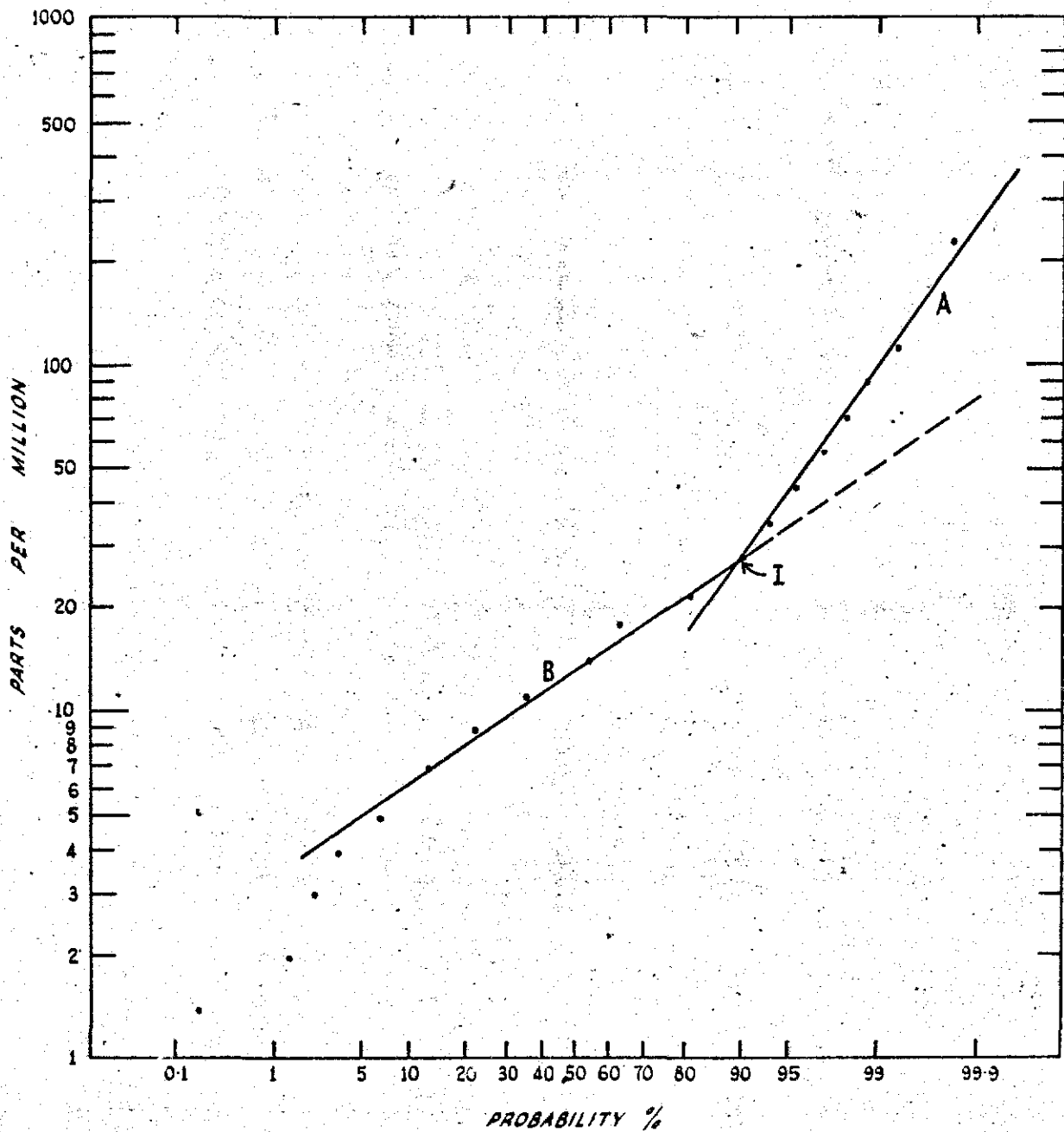


N° OF SAMPLES n = 515	1 ST ORDER THRESHOLD 60 p.p.m.	I - POINT OF INFLECTION
METAL Pb	2 ND ORDER THRESHOLD 30 p.p.m.	A - POPULATION A 2%
SAMPLE TYPE SOIL	3 RD ORDER THRESHOLD p.p.m.	B - POPULATION B 13%
HORIZON 'c'	BACKGROUND MEDIAN 15 p.p.m.	C - POPULATION C 85%
FRACTION -10+80		95% CONFIDENCE LIMIT ----

RESOLUTION OF THRESHOLDS FOR CALCULATED CURVES A,B,C IS NOT SATISFACTORY. THRESHOLDS HAVE BEEN CHOSEN AT THE POINTS OF INFLECTION.

THE MT. LYELL M. & R. Coy. LTD.	TRACED. R.G.W.
MT. TYNDALL AREA	CHECKED. N.S.H.
E.L. 9/66	DATE July 75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SPUR	APPENDIX B

B6

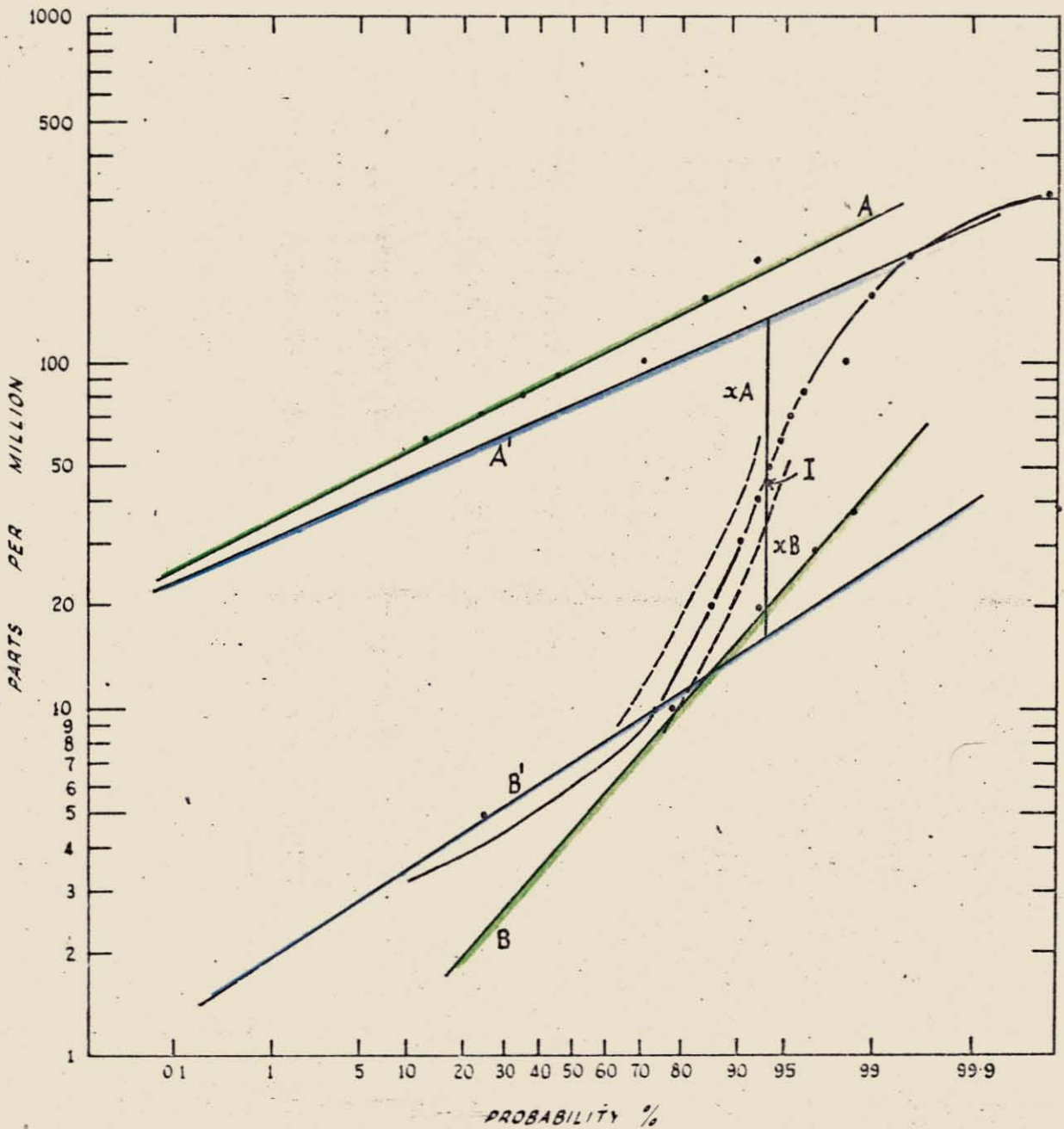


N° OF SAMPLES n = 515	1 ST ORDER THRESHOLD 50 p.p.m.	I - POINT OF INFLECTION
METAL Zn	2 ND ORDER THRESHOLD 30 p.p.m.	A - POPULATION A 10%
SAMPLE TYPE SOIL	3 RD ORDER THRESHOLD p.p.m.	B - POPULATION B 90%
HORIZON 'C'	BACKGROUND MEDIAN 15 p.p.m.	C - POPULATION C
FRACTION -10+80		95% CONFIDENCE LIMIT ----

THE POPULATION RESOLVES INTO TWO POPULATIONS SEVERELY TRUNCATED AT I. THRESHOLDS HAVE BEEN CHOSEN AT I AND 99% OF B.

THE MT. LYELL M. & R. Coy. Ltd.	TRACED: R.G.W.
MT. TYNDALL AREA	CHECKED: N.S.H.
E.L. 9/66	DATE: July '75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA WHITE SPUR	APPENDIX B

B7



N° OF SAMPLES $n = 231$

METAL

SAMPLE TYPE

HORIZON

FRACTION

1ST ORDER THRESHOLD

2ND ORDER THRESHOLD

3RD ORDER THRESHOLD

BACKGROUND MEDIAN

ppm.

ppm.

ppm.

I - POINT OF INFLECTION

A - POPULATION A

B - POPULATION B

C - POPULATION C

95% CONFIDENCE LIMIT ---

A', B' - GRAPHICAL SOLUTION.

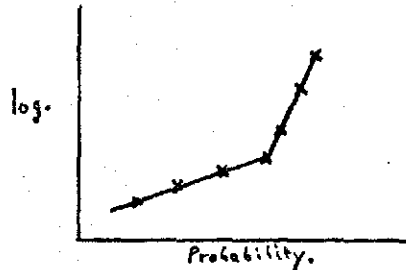
A, B - CALCULATION METHOD SOLUTION.

THE MT. LYELL M. & R. Coy Ltd.	TRACED R.G.W.
MT. TYNDALL AREA	CHECKED. N.S.H.
E.L. 9/66	DATE July '75
STATISTICAL ANALYSIS OF GEOCHEMICAL DATA	APPENDIX B

ANALYSIS OF THE CURVE(i) By Inspection

Case (1) The straight line may indicate - a lognormal distribution none or all of which is anomalous.

Case (2) Two straight lines.



Two population which are truncated, i.e. show no overlap, inadequate precision in the assay laboratory may result in truncated tails.

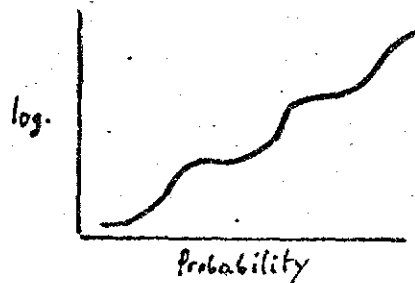
Case (3) The sigmoidal curve.



I = point of inflection or point at which curvature changes from positive to negative.

In the simple case, represents two overlapping populations, one of which we may designate background, the other anomalous, A and B.

Case (4) Polymodal curves.



The polymodal curve is composed of more than two overlapping populations.

- (e) To check the accuracy of A and B, i.e. that we have not missed population C, D.... we may recalculate from our new population the original population and check for goodness of fit.

e.g. at 50 ppm we have 99.2% of population B

5.0% of population A

Thus probability at 50 ppm = $.99.2 \times 94 \%$

+ $5.0 \times 6.0 \%$

= 92.5% (94% = Original value from data. This is within 95% confidence limits).

Plot point.

Repeat for remaining points.

The fit in this case is not exceptionally good, possibly the original inflection point should have been at 95% or 93%, it is however adequate.

- (f) The ranges of populations A and B may be estimated from curves A and B

at	$\bar{x} - \sigma$	\bar{x}	$\bar{x} + \sigma$	\bar{x} Mean geometric.
	17%	50%	83%	σ Geometric deviation.

- (g) The accuracy of fit of green curve A is better than that of B, this is the result of truncation error which may result from assay bias or unsuitable choice of interval, i.e. 5, 10, 20 ppm.

A correction can be applied:

$$\text{New Value } P = \frac{\text{Value from Table } P^1}{100} - \frac{\text{Truncation Value } P^2}{100} = \frac{P^1 P^2}{100}$$

P^2 is estimated, say 10%, and a trial and error method used until a good fit is obtained.

- (h) Polymodal curves may be treated in the same manner.

FACTORS AFFECTING CURVES

(i) Analytical Errors

A chemists preference for 7 to say 6 will result in bias in results. Similarly rounded results may result in bias, it is preferable to receive assay values unrounded, although individual precision may be low, with a large number of results, a better estimate of the populations present is possible.

(ii) Choice of Inflection Point or Points

This is more critical around the 50% probability level than say at 95% and in high values of probability error from this source may be ignored.

- (iii) Truncation errors have been mentioned under calculated analysis, but probably have more serious affects in the case of the graphical method.
- (iv) The graphical method, estimates the A and B populations on the basis of the points furtherest from the point of inflection, the reverse is true in the calculation method.
- (v) Plotting point - mid point of sample interval is desirable; note that if a log interval scale is used this is not the arithmetic mid point.

CONCLUSIONS

1. The main benefit of log probability analysis over the arithmetic mean + 2 standard deviation method is that the latter will underestimate an anomalous population of 20% of the samples and overestimate anomalies when an anomalous population is not present.
2. The calculation method of analysis is superior to the graphical, but in some polymodal curves, cannot always be used; the graphical method may then be tried.
3. For the vast majority of cases it is unnecessary to calculate intervals, goodness of fit of calculated A and B curves, or to make allowances for truncation errors. The technique then becomes simple and rapid to apply.

REFERENCES

- GREEN : Some Comments on Bi-normal Frequency Distribution.
Geochimica Cosmochimica Acta Vol. 27, pp. 1071 - 1075
- HARDING : The Use of Probability Paper for Graphical Analysis of
Polymodal Frequency Distribution.
Marine Biological Assoc. (U.K.) Jul. V.28, 1949, pp. 141 - 153
- LEPELTIER : Econ. Geol. Vol. 64, 1969, pp. 538 - 550.
A Simplified Statistical Treatment of Geochemical Data by
Graphical Representation.
- PARSLOW : Determination of Background and Thresholds in Exploration
Geochemistry.
J. of Geochem. Expl. 3 (1974) 319 - 336
- SINCLAIR : Selection of Threshold Values in Geochemical Data Using
Probability Graphs.
J. Geochem. Expl. 3 (1974) 129 - 149

000

APPENDIX C

Drill Core Logs - Tyndall 1
" 2
" 3
H.A. 3
H.F.Z. 7
" 8

DIAMOND DRILL RECORD

Hole Number	Tyndall No. 1						Purpose	To test the strong I.P. anomaly on Line 12 between 2300 E and 2500 E.												
Location																				
Level																				
Co-ordinates	2650 East on Line 12, East Tyndall																			
Collar R.L.																				
Length	734'																			
Survey Depth																				
Bearing	270°																			
Inclination	40°																			
Rod Size	0 - 399' Bx wire line						Comments	Relogged, January, 1974.												
	399 - 734' Bx																			
Machine																				
Re Logged by	Bruce Craven																			
1:500 Plans																				
1:500 Sections																				
							Commenced	11th June, 1968												
							Completed	4th September, 1968												

473062

001

		DESCRIPTION	REMARKS
0	- 98'	No core - glacial deposits.	
98'	- 104'	Fine grained rhyolitic ? ash-flow tuff. Alternating white (albitic) and green bands ($\approx 65-70^\circ$ to C.A.) of the order of 1-2 cm thickness. Minor quartz and hornblende phenocrysts present. Unit becomes coarser grained and greener down the hole. Increasing content of feldspars (plagioclase), chlorite and shale fragments, i.e. appears to grade into the underlying tuff sequence.	
104'	- 175'4"	Massive coarse grained crystal lithic acid tuff. Dominant constituents - quartz, feldspar + ? chlorite with black shale, acid volcanic and sediment fragments. 104' - 133' - Relatively coarse grained with abundant lithic fragments (up to 5 cm diameter) in an equigranular matrix of quartz, plagioclase and chlorite. Relatively porous and altered. Grades into underlying welded, strongly consolidated unit. 133' - 160' - Basically similar rock, but has a much smaller lithic fragment content. Has a glassy, welded appearance. Massive, equigranular quartz-feldspar-chlorite rock. Chlorite may be localized along shears. 160' - 175'4" - Similar to 104' - 133' - "boundary" gradational - changes in lithic fragment content.	
175'4"	- 242'	Dark grey-black siltstone-shale sequence - conformable with the tuff sequence (104' - 175'4"). Initial B.C.A. $\approx 60-70^\circ$. Shale units consist of finely laminated light (green-white) and dark beds - very fissile, especially the more graphitic units. Siltstones more massive, competent. Some thin (< 1 mm) sulphide veinlets. Bright yellowish-green oxidation product may indicate fine sulphides within the sediments. 204' - 205' - Thin quartz vein. 212'6" - Several thin (up to 2 mm) white graded tuff beds. B.C.A. = 65° . 230' - 238' - B.C.A. flattens - bedding parallel to core axis between 232' - 236'. 240' - B.C.A. = 60° .	
242'	- 256'	Medium-coarse grained crystal lithic tuff similar to unit between 133' - 160'. Towards base becomes much coarser - increasing content of large rock fragments. Upper and lower contacts appear to be conformable - some slight disruption at lower content.	
256'	- 261'	Siltstone-shale ? bedded tuff sequence - a well bedded unit of fine-medium grained grey black predominantly sedimentary unit. B.C.A. $\approx 70^\circ$. Minor sulphides present.	
261'	- 263'	Medium-coarse grained crystal lithic tuff. Reasonably laminated - contains black shale, sediment and volcanic fragments up to 1 cm diameter. Contacts with units above and below at approximately $80-85^\circ$ to C.A. Minor sediment bands present.	
263'	- 272'	Siltstone - fine sandstone - fine grained tuff unit. Well bedded initially (B.C.A. $70-80^\circ$ - variable). 264' - 272' -	
272'	- 280'	B.C.A. $\approx 20^\circ$. Fine tuff bed $\approx 266'$. Medium grained massive crystal lithic andesitic tuff containing very minor sediment bands. Contact with overlying unit is vague - possibly gradational.	
280'	- 280'6"	Thin bedded fine grained acid intermediate lava.	
280'6"	- 282'	Similar to unit 272'-280', with possibly another lava member towards 282'.	
282'	- 303'	Tuff-agglomerate unit - greyish coarse grained acid-intermediate crystal lithic tuff with coarser agglomeratic units. Contains abundant black shale sediment and volcanic fragments. Pyrite present in places. Generally non-porous, well consolidated. 282' - 284' - Very altered agglomeratic unit. 294'6" - 295' - More acid (?) highly porous sheared unit. B.C.A. of both contacts $\approx 45^\circ$.	
303'	- 308'	Fine grained dacitic lava - massive, light grey in colour - no obvious textural or structural features. Contains some pyrite. Contact with overlying tuff unit gradational.	
308'	- 340'	Massive dark siltstone - fine sandstone unit with extensive quartz-calcite veining. Minor sulphides present (associated with the veins). 330' - B.C.A. $\approx 20^\circ$.	
340'	- 353'	Well bedded sandstone unit, generally medium-light grey in colour. Individual beds of the order of 1 cm thick. Individual beds may show some weak grading. B.C.A. averages 70° . Unit less extensively quartz and calcite veined than preceding unit. From 352', grades into underlying tuff unit.	
353'	- 374'	Medium-coarse grained lithic crystal tuff similar to 133' - 160'. Blue grey massive welded tuff. 360' - 369' - Tends to become more altered and coarser grained - contains large fragments of black shale sedimentary and volcanic lithic fragments. 369' - 374' - Very brachiated, altered and quartz-calcite veined.	
374'	- 389'	Graded tuffaceous unit. Initially a black fine grained bedded crystal tuff (B.C.A. $\approx 70^\circ$). Strongly veined altered etc.	

062

473063

	DESCRIPTION	REMARKS
	from effects of fault near base of preceding unit. Contains fine veinlets of sulphides along tension gashes etc. Gradually becomes coarser grained and andesitic with minor lithic fragments.	
389' - 410'	Fine grained andesitic (?) tuff or feldspathic sandstone. Greyish fine-medium grained sheared rock containing minor sulphides (pyrite, chalcopyrite and pyrrhotite). Minor quartz calcite veining. B.C.A., where visible $\approx 60^\circ$.	
410' - 422'	Medium-coarse grained andesitic lithic crystal tuff - coarse grained near the top (up hole). Some sulphides, mainly on fracture planes. Quartz and calcite veining present.	
422' - 430'	Transition zone from tuffaceous unit to a predominantly sedimentary (siltstone) unit. Interbedded andesitic crystal tuffs and dark siltstones.	
430' - 514'	Siltstone unit - grey-black well bedded siltstone - tuffaceous siltstone sequence with minor interbedded coarser tuffaceous units. B.C.A. averages 60° - fairly constant. Pyrite and pyrrhotite are unevenly distributed throughout - some syngenetic, others introduced along fractures etc. with quartz and calcite. 461' - 468' - Major quartz veining - no sulphides. Becomes more siliceous towards base (down the hole) of the unit.	
514' - 530'	Fine-medium grained andesitic-dacitic tuff-lava sequence containing abundant disseminated pyrite (and ? pyrrhotite) mineralization. Numerous sediment bands (B.C.A. $\approx 50^\circ$) cut the tuffaceous sequence.	
530' - 540'	Coarser grained version of preceding unit - no obvious sedimentary bands. Has become agglomeratic. Crystal mush or lithic crystal tuff. Abundant pyrite - pyrrhotite disseminations.	
540' - 572'	Massive porphyritic andesitic. Abundant white feldspar phenocrysts (average diameter ≈ 2 mm) in a green-grey fine grained andesitic groundmass. Contact with overlying unit vague - fairly similar rock type compositionally. Sulphide mineralization continues throughout unit. 550' - 551' - Quartz vein - containing well formed crystalline pyrite.	
572' - 615'	Similar porphyritic andesite unit (abundant feldspars, no hornblende phenocrysts) that has been strongly brecciated throughout most of the interval. Result is fragments of porphyritic andesite floating in a lighter grey (?) andesitic matrix. Brecciated zones separated by zones of massive porphyritic andesite. Some minor sulphide disseminations present. Minor quartz stringers present.	
615' - 638'	Similar to 540' - 572'.	
638' - 647'	Similar to interval 572' - 615', but has a definite tuffaceous component - contains rock fragments other than of the porphyritic andesite. Otherwise similar texturally and compositionally to interval 572' - 615'.	
647' - 734 (end)	Porphyritic Andesite Sequence. Massive andesites (some may be more acid) with abundant hornblende and feldspar phenocrysts in a variable but mainly intermediate to slightly more acid in composition. Brecciated zone about 665' - 675'. Sequence consists of a vague irregular alternation of an andesite with abundant pink feldspar phenocrysts (rock is pink-green in colour) and a more basic darker green andesite with abundant white feldspars. Hornblendes present in both rock types. Abundant veining (quartz, epidote, calcite, chlorite and possibly barite) and fracturing throughout - though more common in initial 30 - 40 feet of unit. Major shear 664' - 665'.	
	END OF HOLE	

003

473064

DIAMOND DRILL RECORD

Hole Number	Tyndall 2										Purpose										
Location	Mt. Tyndall E.L. 9/66 Zone A										To test an I.P. anomaly in the lower clastic and Pyroclastic section of the Howard Andesite.										
Level	Surface																				
Co-ordinates	4N 11.6 W																				
Collar R.L.																					
Length	85'																				
Survey Depth	00																				
Bearing	090°																				
Inclination	65° Depression																				
Rod Size	NQ 0-100' , BQ 100'-855'										Comments										
Machine											Mineralization associated with black shales carbonates and ignimbrites, a possible McArthur River analogue on a small scale.										
Logged by	N. P. Stevens-Hoare																				
1:500 Plans																					
1:500 Sections																					
											Commenced	24th January 1975									
											Completed	30th January 1975									

DIAMOND DRILL RECORD — SURVEY SHEET

HOLE NUMBER *Mt Lyell 2.*

Survey Depth	20 ft	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440 ft
Bearing	<i>Correct to 100'</i>					92°	92	92	91	90	90	89	89	89	88	88	88	88	86	86	89	89
Inclination	-59°	-54	-52½	-53	-52½	-52	-51½	-51	-50	-49	-49½	-47	-46	-44½	-43	-41	-39½	-37½	-35½	-34½	-33½	-32°

Add 8½° to bearing for State Grid.

Survey Depth	460 ft	480	500	520	540	560	580	600	620	640	660	680	700	720	740 ft							
Bearing	86°	86	89	90	90	85	82	82	82	82	84	84	84	84°								
Inclination	-30½°	-28½	-26½	-25	-23	-21	-19½	-18½	-17½	-17	-15	-13	-10½	-8°								

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

DIAMOND DRILL RECORD

HOLE NUMBER Tyndall 2

266

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS							Sample Number	BULK ASSAYS							REMARKS
From	To	cm	%		From	To	Ft.	% Cu.	% FeS ₂	Pb ppm	Zn ppm		From	To	Ft.	% Cu.	% FeS ₂	P. %	Z. %	
0	105'				Dark grey medium grained volcanoclastic sediments. Very little quartz grains. Tuffs and lapilli tuffs interbedded.	605	610	5	0.03		70		70	605	620	25'	0.05	<0.01	<0.01	
					615	"	0.01		120	78	630	835	205'	0.03	0.01	0.01				
105	317			Mid grey volcanoclastic sediments. Carbonate rich sections at 192', 200' and other areas. Carbonate containing sections appear more tuffaceous.	620	"	0.01		70	70	655	685	30'	0.01	<0.01	0.01				
					625	"	0.16		60	92	635	685								
					635	"	0.05		50	58	685	690	5'	0.03	0.04	0.16		Bedding 30° tca, faces east.		
					640	"	0.02		50	50										
317	415			Mid grey medium grained volcanoclastic, moderately siliceous fine grained from 360' on.	645	"	0.02		40	56										
415	422			Tuffaceous unit high carbonate content.	650	"	0.01		60	50										
422	555			Fine grained tuffaceous sediments low sulphide content. Carbonate high. Bedding fine.	655	"	0.03		30	54										
555	631			Mid/pale grey finely bedded sediment. Abundant pale white carbonate units.	660	"	0.02		80	150										
					665	"	0.01		70	90										
631	633			Crystal tuff, welded intermediate composition up to 3% pyrite.	670	"	0.01		50	88										
					675	"	0.03		70	126										
633	655			Pale grey carbonate rich chaotic sediments.	680	"	0.01		85	120										
655	662			Dark grey finely bedded shale and carbonate minor sulphides.	685	"	0.01		300	550										
					690	"	0.03		550	1550										
662	665			Chert unit, recrystallized chemical sediment or silicified f.g. tuff.	695	"	0.01		90	110										
					700	"	0.01		180	58										
655	686			Black shale and syngenetic pyrite units interbedded with minor carbonate. 10% sulphides.	705	705	5	0.01		70	140									
					705	710	"	0.01	1.9	60	104									
					715	"	0.02	0.6	30	79										
686	785			Intermediate crystal lithic welded tuffs with chert units or possible recrystallized glass (glow bottoms) at 724' - 726', 734' - 737', 768' - 785'. Pyrite up to 5%.	720	"	0.01	0.4	20	48										
					725	"	0.09	0.2	10	32										
					730	"	0.08	0.6	20	31										
					735	"	0.03	0.2	<10	34										
					740	"	0.03	0.2	10	19										
					745	"	0.07	0.2	20	36										
785	800			Green, grey ignimbrite units.	750	"	0.03	0.2	20	31										
800	805			Black shale unit with carbonate and minor pyrite.	755	"	0.01	0.2	10	40										
					760	"	0.02	0.4	20	74										
805	820			Green ignimbrite unit.	765	"	0.04	0.4	20	35										
820	830			Black sulphide rich carbonate rich sediment.	770	"	0.18	0.2	40	40										
830	837			Green ignimbrite unit.	775	"	0.03	0.4	40	46										
837	845			Quartz vein mottled white, pale cream (felspar?) dark green (chlorite?)	780	"	0.07	0.2	170	48										
					785	"	0.08	0.6	50	56										
845	885			Mid-dark green acid lava minor quartz veining with sulphide developed in cleavage.	790	"	0.01	0.4	50	66										
					795	"	0.02	0.4	50	41										
					800	"	0.05	0.8	100	154										
				Summary	800	805	5	0.07	2.6	190	151									
				0-631 Volcanoclastic sediments of intermediate composition interbedded with carbonate and argillite units which increase with depth.	810	"	0.03	0.2	60	103										
				631-837 Intermediate pyroclastics with black shales interbedded and syngenetic pyrite.	815	"	0.06	0.2	30	77										
					820	"	0.01	0.6	10	50										
					825	"	0.09	1.1	120	370										
					830	"	0.03	2.1	110	96										
					835	"	0.03	0.8	40	60										
					840	"	0.02	0.2	20	55										
				837-845 Fault small quartz vein.																
				845-885 Acid lavas.																

473067

057

DIAMOND DRILL RECORD

Tyndall 3

Hole Number	Tyndall 3						Purpose															
Location							To test a major I.P. anomaly associated with a black shale sequence in the															
	E.L. 9/66 Mt. Tyndall						Howards Andesites.															
Level																						
Co-ordinates	16N, 1700W																					
Collar R.L.																						
Length	1200 feet																					
Survey Depth																						
Bearing	090° magnetic																					
Inclination	60° depression																					
Rod Size							Comments															
	0-260 ft NQ ; 260 - 1200 ft BQ																					
Machine							The black shales were encountered on target and were slightly pyritic. No mineralization was present.															
Logged by	N. P. Stevens-Hoare.																					
1:500 Plans																						
1:500 Sections																						
						Commenced																
						Completed						7th February, 1975.										

473068

DIAMOND DRILL RECORD — SURVEY SHEET

HOLE NUMBER *Mt Lyell 3*

Survey Depth	20 ft	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440 ft
Bearing	°		cond	to	260									90°	89	89	90	91	90	90	90	89°
Inclination	-59°	-58	-58	-57½	-57	-56½	-56	-56	-55½	-55½	-55	-54	-53½	-52½	-52½	-52	-51½	-51	-51	-50	-49½	-49

Add 8½° to bearing for State Grid.

Survey Depth	460 ft	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760	780	800	820	840	860	880 ft
Bearing	89°	91	91	91	90	90	89	89	89	89	89	90	90	89	88	89	87	88	87	90	88	86
Inclination	-49°	-47½	-47	-46½	-45½	-44½	-44	-42½	-41½	-40	-38½	-37	-36	-34	-33	-32	-32	-31	-30	-30	-29	-28

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

008

473069

DIAMOND DRILL RECORD

HOLE NUMBER Tyndall 3

009

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS				Sample Number	ASSAYS							REMARKS	
From	To	cm	%		From	To	Ft	% Cu		% FeS	Oz. Au	Oz. Ag	From	To	Ft.	% Cu		% FeS
0	55'			Overburden, glacial clays and debris.							850	855	5'	0.01	3.6	0.02	T	
55'	216'			Intermediate crystal tuffs, fairly rapid variations in grain size-								860		T	1.4	0.02	T	
				55-60 Coarse, lithic								865		T	0.5	0.01	T	
				60-87 Fine, siliceous								870		0.04	0.2	T	T	
				87-106 Medium								875		T	0.7	T	T	
				106-206 Lapillic to agglomerate								880		T	0.8	0.01	T	
				206-216 Medium.								885		T	0.8	0.01	T	
												890		T	1.3	0.02	T	
216	369			Intermediate, tuffaceous, silicified pyroclastics, with minor chemical silica units. Dimensionated pyrite as very fine crystals. Δ 1-2%.							895		0.02	0.8	T	T		
				216-276 Fine grained siliceous								900		0.02	1.0	T	T	
				276-315 Bedded, banded, chert units							901	905	5'	0.01	0.7	T	T	
				315-332 Siliceous very fine grained tuffs, sediment								910		0.02	1.5	T	T	
				332-369 Tuff, silicified medium grained.								915		0.02	1.2	T	T	
369	776			Hornblende felspar phytic pyroclastics and lavas extensive carbonate development some carbonate beds, minor pyritic zone. Epidote? alteration extensive.								920		0.01	4.6	0.01	0.01	
				369-431 Blue grey? lava carbonate veins give an autobrecciated appearance.								925		0.03	5.7	0.01	0.01	
				431-561 Mid to apple green, pale matrix. Carbonate veining altered lava.								930		0.03	6.2	0.01	0.02	
				561-614 Extensive carbonate development broken and altered in appearance.								935		0.07	5.3	0.01	0.01	
				614-617 Brecciated, carbonated slightly pyritic minor disseminated pyrite.								940		0.04	4.9	0.01	0.01	
				617-622 Carbonate 'bed' white.								945		0.05	5.2	0.02	0.02	
				622-717 Agglomerate or brecciated lava extensive carbonate veins.							950	955	5'	0.01	4.2	0.01	0.01	
				717-730 As above with pyrite veins up to 15% pyrite.								960		0.01	5.2	0.01	0.01	
				730-776 Lava, carbonate veins, Epidote in patchy areas. 2% pyrite disseminated.								965		0.01	3.9	0.01	0.01	
776	806			Feldspar and hornblende feldspar phytic lavas up to 5% disseminated sulphide.								970		0.01	0.3	0.01	T	
806	848			Acid, quartz feldspar crystal tuff silicified.								975		0.01	0.7	0.01	T	
848	856'9"			Black shale, pyritic disseminated and in bedding 10% sulphide.								980		0.01	0.9	0.04	T	
856'9"	918'			Dark grey quartz feldspar crystal lithic tuff with fragments of shale. Less than 5% disseminated pyrite.								985		T	0.2	0.01	T	
918'	964'			Finely bedded black shale and pyrite. Occasional blebs of ? chalcopryrite and quartz less than 1%.								990		0.02	0.4	0.01	T	
964	995			Quartz feldspar crystal lithic tuff, poorly bedded some shale fragments.								995		0.02	1.6	0.01	T	
											1000	1005	5'	0.01	5.2	0.02	0.01	
												1010		0.03	3.4	0.02	0.01	
												1015		0.02	1.9	0.01	T	
												1020		0.01	1.9	0.01	0.01	
												1025		0.01	2.2	0.01	T	
												1030		0.01	3.9	0.02	0.01	
														< 0.01 = T				
											1030	1035	5'	0.03	4.5	0.02	T	
												1040		0.03	1.4	T	T	
												1045		0.02	0.2	T	T	
												1050		0.04	0.5	T	T	Bedding TCA 45°
												1055		0.01	0.4	0.02	T	
												1060		0.05	2.5	0.01	T	
												1065		0.12	3.9	0.01	T	
												1070		0.03	3.7	0.01	T	
												1075		0.02	2.7	0.02	T	
												1080		0.03	2.0	0.02	0.02	
												1085		0.02	4.5	0.03	0.03	NB 806'-1083' no carbonate in tuffs but small amount in shales.
											1085	1090	5'	0.02	1.7	0.02	T	

473070

DIAMOND DRILL RECORD

HOLE NUMBER Tyndall 13

070

FOOTAGE		RECOVERY		DESCRIPTION	Bulk. ASSAYS				PURE ASSAYS				REMARKS						
From	To	Ft.	%		From	To	Ft.	% Cu.	% FeS.	% Pb.	% Zn.	From		To	Ft.	% Cu.	% FeS.	% Pb.	% Zn.
					From	To	Ft.	% Cu.	% FeS.	% Pb.	% Zn.	From		To	Ft.	% Cu.	% FeS.	% Pb.	% Zn.
995'	1003'			Black shale.															
1003	1021			Quartz feldspar crystal lithic tuff, fragments of shale and tuff.								1090	1095	5'	0.05	1.2	0.07	T	
1021	1035			Black shale.									1100		0.03	0.7	0.01	T	
1035	1057			Quartz feldspar crystal lithic tuff, poorly bedded some shale fragments.									1105		0.02	0.7	0.01	T	
1057	1083			Black shale interbedded with fine/medium grained clastic units. Slightly brecciated in appearance with carbonate veins.									1110		0.07	0.3	0.01	0.01	
1083	1106			Mid green feldspar crystal tuff. Intermediate composition. Carbonated and altered appearance, some hematite staining. Very minor disseminated pyrite.									1115		T	0.5	0.01	T	
1106	1158			Dark green feldspar crystal tuff more more fine grained sediment than above unit.									1120		0.05	0.1	0.01	0.01	
1158	1162			Carbonate unit, pale green blue colour with some hematite staining.									1125		0.02	0.5	0.02	0.02	
1162	1200			Hornblende feldspar crystal tuff fresh appearance possibly welded. Minor carbonated beds and veins.									1130		0.01	0.2	0.01	0.01	
													1135		0.01	0.1	0.01	0.01	
													1140		T	NIL	0.01	0.01	
													1145		T	0.3	0.03	0.04	
													1150		0.02	0.2	T	0.01	
													1155	5'	T	NIL	T	T	
													1160		T	NIL	0.01	T	
													1165		0.05	0.1	0.02	T	
													1170		0.02	NIL	T	T	
													1175		T	NIL	T	T	
													1180		0.01	NIL	T	T	
													1185		T	NIL	T	T	
													1190		T	NIL	0.01	T	
													1195		T	0.2	T	T	
													1200	5'	0.05	0.3	T	T	
855	915	60'		Intermediate lava				0.01	1.0	0.01	<0.01								
915	965	50'		Black shale				0.03	5.1	0.01	0.01								
965	995	30'		Intermediate pyroclastic				0.01	0.7	0.01	<0.01								
995	1005	10'		Black shale				0.01	5.0	0.01	0.01								
1005	1020	15'		Intermediate pyroclastic				0.01	2.7	0.01	0.01								
1020	1035	15'		Black shale				0.01	3.5	0.01	<0.01								
1035	1055	20'		Intermediate pyroclastic				0.03	0.6	<0.01	<0.01								
1055	1085	30'		Black shale				0.04	3.2	0.03	0.01								
1085	1200	115'		Intermediate pyroclastic				0.01	0.3	0.01	<0.01								

473071

071

DIAMOND DRILL RECORD

Hole Number	Howards Anomaly 3						Purpose													
Location	E.L. 9/66 Mt. Tyndall						To test weak 19 anomaly, and a non coincident soil geochemical anomaly; also a surface outcrop of MnO ₂ carrying barite.													
Level																				
Co-ordinates	23N 1400W																			
Collar R.L.																				
Length	800'																			
Survey Depth																				
Bearing	270° magnetic																			
Inclination	60° depression																			
Rod Size	0-228' NQ ; 228'-800' BQ						Comments													
Machine							A black shale was intersected but 200' east of the Z.P. anomaly. No other explanation of the Z.P. anomaly was encountered in the hole.													
Logged by	N. P. Stevens-Hoare																			
1:500 Plans																				
1:500 Sections																				
							Commenced	8th February, 1975												
							Completed	16th February, 1975												

473072

DIAMOND DRILL RECORD — SURVEY SHEET

HOLE NUMBER HA3

Survey Depth	6.1m	12.2m	18.3	24.4	30.5m	36.6m	42.7	48.8	54.9	61.0	67.1	73.2	79.2	85.4	91.5	97.6	103.7	109.8	115.9	122.0	128.1	134.2m
Bearing		cased	to	70.2 m.									267°	267°	266°	266°	265°	265°	264°	264°	266°	263°
Inclination	-59½°	-59°	-59°	-58½°	-58°	-57°	-50°	-49°	-47½°	-47½°	-46°	-45°	-42°	-40°	-39°	-37°	-36°	-34°	-32°	-32°	-30°	-29°

Add 8½° to all bearings to give State Grid.

Survey Depth	140.2m	146.3	152.4	158.5	164.6	170.7	176.8	182.9	189.0	195.1	201.2	207.3	213.4	219.5	225.6	231.7	237.8	243.9				
Bearing	255°	252°	263°	264°	267°	267°	267°	267°	271°	273°	266°	266°	266°	268°	271°	271°	256°	252°				
Inclination	-29°	-29°	-29°	-29°	-32°	-35°	-38°	-42°	-38°	-35°	-30°	-33°	-28°	-29°	-26°	-26°	-26°	-24½°				

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

073

DIAMOND DRILL RECORD

HOLE NUMBER

Howards Anomaly 3

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS				Sample Number	ASSAYS				* < 0.01 %	REMARKS						
From	To	Ft.	%		From	To	Ft.	% Cu		% FeS	Oz. Au	Oz. Ag	From			To	Ft.	% Cu	% FeS	Grav. Zn	Grav. Pb
0	7 1/2			Overburden no core recovered.								100	105	5	0.01	*	0.01	1.83			
7 1/2	103'			Acid pyroclastic lapilli tuff to agglomerate pale mid grey fragments of feldspar phytic acid lava.									110		*	*	0.02	2.39			
				7 1/2-46' Agglomerate									115		0.01	*	0.02	2.34			
				46-74 Lapilli lithic tuff									120		*	*	0.01	2.23			
				74-103 Agglomerate or brecciated lava.									125		*	*	0.04	0.54			
				Black, dark grey shale. Minor vein quartz, disseminated pyrite.									130		*	*	0.24				
103	118			Intermediate pyroclastics, crystal, lithic lapilli and welded types. Minor carbonate 'blebs' and veins extensive hematite zones. Minor pyrite less than 2%.									135		*	*	0.11				
				118-156 Lapilli lithic tuff mid green									140		*	*	0.04	0.21			
				156-163 Altered mid pale green lithic? welded tuff.									145		*	*	0.01	0.36			
				163-170 Hematitic lithic tuff.									150	5	*	*	0.02	2.11			
				170-180 Altered mid/pale green lithic tuff.									155		*	*	0.02	0.30			
				180-193 Mildly hematitic lithic tuff.									160		0.01	*	0.02	0.02			
				193-223 Lithic welded tuff small stringer of quartz and pyrite.									165		0.03	*	0.03	0.21			
				223-326 Mid pale green crystal lithic lapilli tuff									170		*	*	0.03	0.15			
				326-436 Crystal lithic tuff, slightly hematitic Carbonate veins up to 10% of rock.									175		0.02	*	0.02	0.15			
				Carbonate units interbedded with crystal lithic intermediate tuffs and minor fine grained tuffs. Carbonate mottled pale pink to white with green/pink crystall tuff and blue green fine tuffs. No pyrite in carbonate units, very minor in non carbonates. Bedding typically of less than 10cm units.									180		0.02	*	0.11	0.17			
				436-556 Carbonate 60%, 30% fine tuffs, 10% crystal tuff									185		0.06	*	0.08	0.28			
				556-700 50% carbonate, 30% crystal tuff, 20% fine tuffs.									190		0.02	0.02	0.05	0.12			
				700-800 Minor hematitic alteration, apple green crystal tuffs, 50% Carbonate 40% crystall tuffs, 10% fine tuffs.									195	5	0.04	0.02	0.27	1.94			
													200		0.02	0.19	0.16	3.06			
													205		0.01	0.09	0.09	1.39			
													210		0.02	*	0.02	1.29			
													215		0.02	*	0.02	0.63			
													220		0.01	0.01	0.07	0.19			
													225		0.01	0.05	0.11	0.13			
													230		0.05	0.06	0.14	1.11			
													235		0.01	0.01	0.06	*			
													240		0.02	0.04	0.06	0.16			
													245		0.01	0.01	0.05	0.15			
													245	5	0.01	0.61	0.05	0.15			
													250		*	0.01	0.06	0.24			
													255		0.01	0.61	0.04	0.25			
													260		0.02	0.02	0.06	1.11			
													265		0.01	0.06	0.09	1.79			
													270		0.01	0.09	0.16	1.76			
													275		0.02	0.05	0.07	0.94			
													280		*	0.01	0.02	0.43			
													285		*	0.01	0.04	0.95			
													290		*	0.01	0.04	1.58			
													295	5	*	0.03	0.04	0.21			
													300		*	0.01	0.01	0.54			
													305		0.01	0.01	0.12				
													310		0.01	0.01	0.11	1.37			
													315		0.01	0.05	0.11	1.79			
													320		0.02	0.03	0.08	1.79			
													325		0.02	0.03	0.10	1.04			
													330		0.01	0.01	0.01	0.50			
													335		0.01	*	0.02	0.51			
													340		0.02	0.01	0.03	0.41			
													345		*	*	0.02	0.41			
													350	5	*	*	0.01	0.10			

Foliation
Assay 50° t.c.a.

Bedding ICA 60°

473074

DIAMOND DRILL RECORD

HOLE NUMBER

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS							Sample Number	ASSAYS							REMARKS
From	To	Ft.	%		From	To	Ft.	% Cu.	% Pb.	% Zn.	% Ag.		From	To	Ft.	% Cu.	% Pb.	% Zn.	% Ag.	
					350	355	5	*	*	0.01	+			600	605	5	*	*	*	
					360		0.01	*	0.01	0.04			610		0.01	*	*	<0.1		
					365		*	*	0.02	0.30			615		0.01	*	*	"		
					370		+	0.01	0.03	0.47			620		0.01	*	*	"		
					375		-	*	0.02	*			625		0.01	*	*	"		
					380		*	*	0.02	0.03	0.01		630		*	*	*	"		
					385		*	*	0.02	0.15			635		0.01	*	*	*		
					390		*	*	0.01	0.15			640		0.01	*	*	*		
					395		*	0.01	0.01	0.21			645		*	*	*	*		
				395	400	5	*	*	0.01	0.15			650		0.02	*	*	*		
					405			0.01	0.01	0.19			655		*	*	*	"		
					410			0.10	0.02	0.03	1.33		660		*	*	*	0.8		
					415			0.16	0.02	0.04	0.89		665		0.02	*	*	<0.1		
					420			0.02	0.01	0.06	0.28		670		0.02	*	*	<0.1		
					425			0.02	*	0.02	0.08		675		0.02	*	*	0.5		
					430			0.18	0.01	0.02	<0.01		680		0.02	*	*	0.1		
					435			0.01	0.01	0.02			685		*	*	*	<0.1		
					440			0.04	*	0.06			690		*	*	*	0.4		
					445			0.02	*	0.11			695		*	*	*	<0.1		
				445	450	5	*	*	0.02			700		0.02	*	*	1.3			
					455			0.02	*	0.01			705		0.02	*	*	1.0		
					460			0.01	*	0.02			710		*	*	*	1.2		
					465			0.06	*	0.04			715		*	*	*	5.1		
					470			0.11	0.01	0.05			720		0.01	*	*	3.6		
					475			0.03	*	0.01			725		0.02	*	*	1.1		
					480			*	*	0.01			730		*	*	*	0.3		
					485			0.06	*	*			735		0.01	*	*	0.3		
					490			0.01	*	0.01			740		0.11	*	*	0.5		
					495			0.02	*	0.01			745		0.22	*	*	1.5		
				495	500	5	*	*	0.01	0.06		745		0.03	*	*	0.1			
					505			0.04	*	*			750		*	*	*	<0.1		
					510			*	*	*			755		*	*	*	2.1		
					515			0.04	*	*			760		*	*	*	<0.1		
					520			*	*	*			765		0.01	*	*	1.4		
					525			*	*	*			770		0.01	*	*	0.9		
					530			0.05	*	*			775		0.06	*	*	0.8		
					535			*	*	*			780		0.01	*	*	<0.1		
					540			0.04	*	*			785		0.01	*	*	0.8		
					545			*	*	*			790		0.01	*	*	0.7		
					550			*	*	*			795		0.01	*	*	<0.1		
				545	550	5	0.15	*	*	*		795		0.01	*	*	<0.1			
					555			0.04	*	*			800		0.02	*	*	<0.1		
					560			*	*	*										
					565			*	*	*										
					570			*	*	*										
					575			*	*	*										
					580			0.01	*	*										
					585			0.05	*	*										
					590			0.02	*	*										
					595			0.05	*	*										
				595	600	5	*	*	*	*										

BACK ASSAYS

105	120	15'	<0.01	<0.01	0.02	2.3
120	430	310	0.02	0.01	0.05	0.5
435	800	365'	0.02	<0.01	0.01	
190	200	10'	0.04	0.10	0.20	1.9
265	275	10'	0.10	0.07	0.12	1.5
405	415	10'	0.13	0.02	0.02	1.1
735	745	10'	0.16	0.01	0.10	1.0

075

DIAMOND DRILL RECORD

Hole Number	HFZ7						Purpose												
Location	Mt. Tyndall E.L. 9/66						To test a combined geophysical and geochemical anomaly at the top of the Queenstown Pyroclastics.												
Level	Surface																		
Co-ordinates	40 N 300 W																		
Collar R.L.																			
Length	855 feet																		
Survey Depth																			
Bearing	270° magnetic																		
Inclination	45° depression																		
Rod Size	NQ 0-100 ft., BQ 100-855 ft.						Comments												
Machine							Minor mineralization encountered in acid pyroclastic rocks encountered .												
Logged by	N. P. Stevens-Hoare																		
1:500 Plans																			
1:500 Sections																			
							Commenced	6th January, 1975											
							Completed	16th January, 1975											

473076

DIAMOND DRILL RECORD — SURVEY SHEET

076

HOLE NUMBER HFZ 7.

C.R. 44

Survey Depth	20 ft	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440 ft
Bearing	Contd. to	100'				272°	272	272	274	272	275	276	276	275	276	276	276	274	272	275	275	272°
Inclination	-43½°	-43½	-44	-44	-43½	-43½	42	-42	-41½	-41	-42	-42	-42	-41	-38	-36	-35	-34	-33	-31	-29	-28°

Survey Depth	460 ft	480	500	520	540	560	580	600	620	640	660	680	690 ft									
Bearing	276°	274	276	271	271	271	271	269	270	266	269	276	270°									
Inclination	-26½°	-25	-24	-22½	-22	-20½	-19	-18	-17	-16½	-15	-14	-14°									

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

473077

DIAMOND DRILL RECORD

HOLE NUMBER HFZ7

077

Table with columns: FOOTAGE (From, To), RECOVERY (Ft, %), DESCRIPTION, ASSAYS (From, To, Ft, % Cu, % FeS, Pb, Zn), Sample Number, ASSAYS (From, To, Ft, % Cu, % FeS, Pb, Zn), REMARKS. Includes handwritten notes at the bottom: Dolomite: 679-688, 747-805, 691-715, 714-724.

473078

DIAMOND DRILL RECORD

HOLE NUMBER HFZ7

078

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS						Sample Number	BULK ASSAYS						REMARKS
From	To	Ft.	%		From	To	Ft.	% Cu.	% FeS	% Pb		% Zn	From	To	Ft.	% Cu.	% FeS	
805'	821'			Acid pyroclastic, lithic tuff? welded, splotchy pink green colour.	530	535	5'	0.01	0.5	*	0.02	770	775	5	0.02	0.1	240	290
821'	855'			Acid lava, brecciated, large irregular pink quartz rich zones mid green matrix. (? Pyroclastic) Oolitic 821'-827', 831'-834' 841'-842 1/2'	540	"	"	0.01	0.5	*	0.01	780	"	"	0.02	1.7	200	175
				END OF HOLE.	545	"	"	0.01	0.5	*	0.02	785	"	"	0.01	0.1	160	140
					550	"	"	0.3	0.01	0.05		790	"	"	0.01	0.2	160	95
					555	"	"	0.02	0.8	0.10	0.18	795	"	"	0.01	-	140	310
					560	"	"	0.01	0.5	*	*	800	"	"	*	0.1	140	415
					565	"	"	0.01	0.4	0.03	0.02	805	"	"	0.01	0.2	100	160
					570	"	"	0.01	0.4	*	0.01	805	810	5	*	-	80	65
					575	"	"	0.02	0.5	*	0.01							
					580	"	"	0.01	0.2	*	0.01							
0	109'			SUMMARY. Comstock tuff equivalent.	585	"	"	0.03	0.4	*	0.01	N.B.	Values expressed in % done by titration values in ppm by A.A.S.					
109'	257'			Queenstown pyroclastics.	590	"	"	0.02	0.2	*	0.01							
257'	662'			Dundas Group Sediments.	595	"	"	0.01	0.1	*	0.02							
662'	679'			Henty Fault.	600	"	"	0.04	0.2	*	0.01							
679'	855'			White Spur Volcanics. (Primrose Volcanics)	605	"	"	0.03	0.3	*	0.01							
					610	"	"	0.04	0.4	*	0.01							
					615	"	"	0.04	0.3	*	0.02	810	815		*	0.4	*	*
					620	"	"	0.01	0.2	*	0.01	820	"	"	0.01	0.2	0.01	*
					625	"	"	0.11	0.7	*	0.02	825	"	"	0.01	0.1	*	0.02
					630	"	"	0.03	0.1	*	0.01	830	"	"	0.02	0.1	*	0.01
					635	"	"	0.03	0.2	*	0.01	835	"	"	0.01	0.1	*	0.01
					640	"	"	0.03	0.3	*	0.01	840	"	"	0.02	0.3	*	0.01
					645	"	"	0.10	0.4	230	285 ppm	845	"	"	0.01	0.1	*	0.01
					650	"	"	0.03	-	65	150	850	"	"	*	NIL	*	*
					655	"	"	0.02	-	80	120	850	853		*	NIL	*	*
					662	662	7	0.02	-	70	100							
					662	670	8	0.05	0.6	70	80							
					670	679	9	0.05	0.2	80	130							
					679	685	6	0.01	-	90	150							
					685	688	3	0.02	0.7	70	185							
					688	692	4	0.15	-	85	90							
					692	700	8	0.02	-	120	100							
					700	710	10	0.01	0.1	120	115							
					710	715	5	0.02	0.2	90	105							
					715	719	4	*	0.2	60	60							
					719	724	5	0.02	0.5	70	270							
					724	730	6	*	0.1	60	75							
					730	735	5	*	-	60	75							
					740	"	"	*	0.1	120	60							
					745	"	"	*	-	80	65							
					750	"	"	0.01	-	70	50							
					755	"	"	0.03	0.1	90	155							
					760	"	"	0.01	-	100	315							
					765	"	"	0.02	0.2	120	155							
					770	770	5'	0.02	-	150	155							
					780	785	5	*	-	60	75							
					790	795	5	*	-	80	65							
					800	805	5	*	-	70	50							
					810	815	5	*	-	60	65							
					820	825	5	*	-	60	65							
					830	835	5	*	-	60	65							
					840	845	5	*	-	60	65							
					850	855	5	*	-	60	65							

473079

DIAMOND DRILL RECORD

HFZ8

Hole Number	HFZ 8							Purpose															
Location	Mt. Tyndall E.L. 9/66							To test extension of mineralization in HFZ 7, and a similar I.P. anomaly.															
Level	Surface																						
Co-ordinates	38N 1500W																						
Collar R.L.																							
Length	710'																						
Survey Depth																							
Bearing	090°																						
Inclination	55° Depression																						
Rod Size	NQ 0-100' ; BQ 100'-710'							Comments															
Machine								Minor mineralization was encountered at the stratigraphic top of the Queenstown Pyroclastics, probably related to a minor fault.															
Logged by	N.P. Stevens-Hoare																						
1:500 Plans																							
1:500 Sections																							
								Commenced					17th January, 1975										
								Completed					23rd January, 1975										

DIAMOND DRILL RECORD — SURVEY SHEET

HOLE NUMBER HFZ 8

Survey Depth	20 ft	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440 ft
Bearing		Cased	to	100 ft		98°	96	97	95	96	104	107	97	96	101	112	102	103	97	97	95	97°
Inclination	-52½°	-52	-51½	-50	-49	-48	-47	-46	-45	-44	-43	-41	-40	-37	-34	-33½	-32	-32	-30	-30	-29°	-27½°

Add 8½° to bearing to get Strike find.

Survey Depth	460 ft	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760 ft						
Bearing	95°	95	95	95	95	95	95	95	95	97	97	98	98	99	100°							
Inclination	-26°	-25	-23	-21	-20	-19	-17	-16	-15	-14	-13	-12	-12	-9	-8½°							

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

Survey Depth																						
Bearing																						
Inclination																						

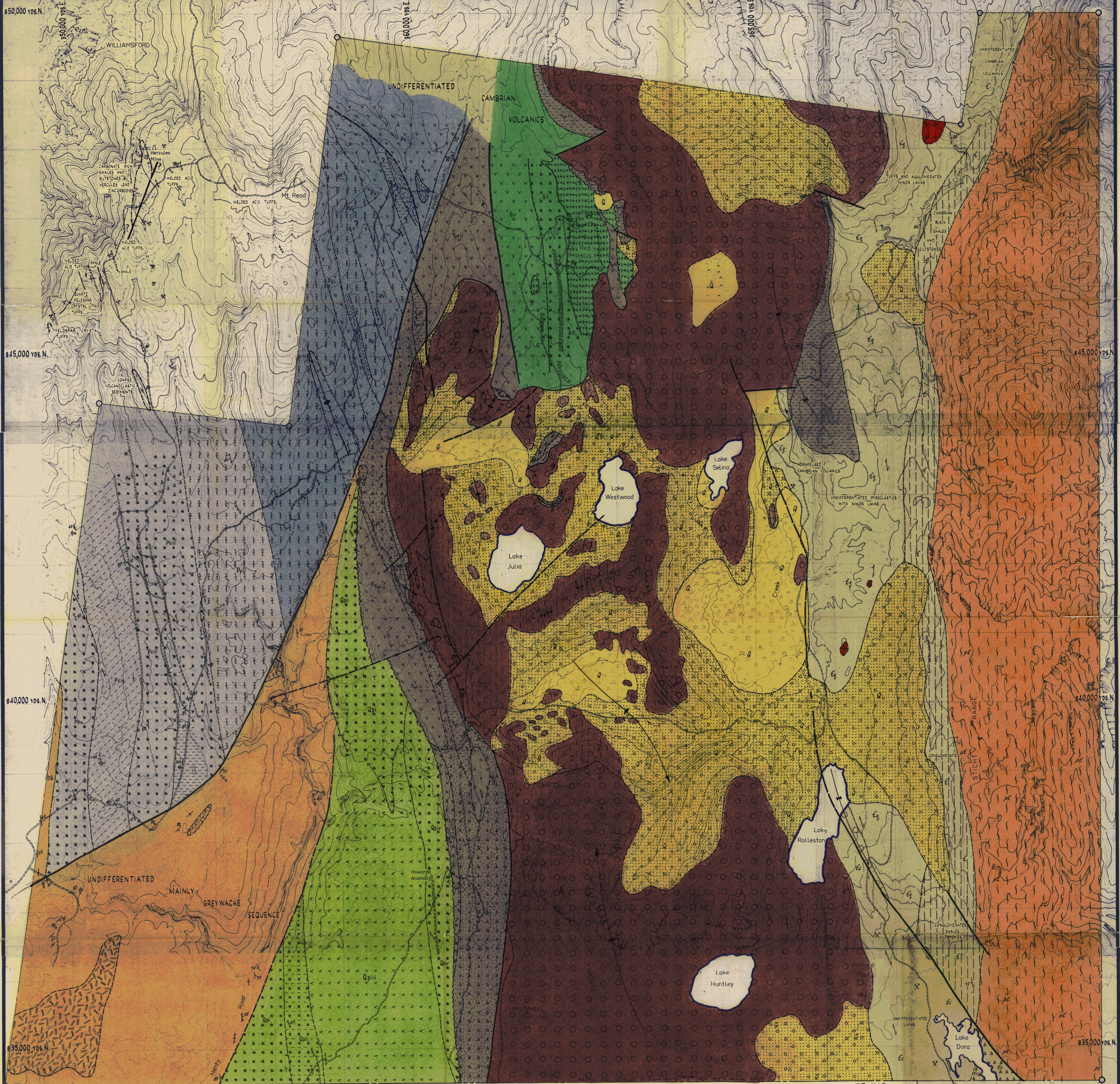
081

DIAMOND DRILL RECORD

HOLE NUMBER HFZ8

FOOTAGE		RECOVERY		DESCRIPTION	ASSAYS					Sample Number	BRICK ASSAYS					REMARKS				
From	To	GM	%		From	To	Ft.	% Cu.	% FeS		Oz. Au.	Oz. Ag.	From	To	Ft.		% Cu.	% FeS	Oz. Au.	Oz. Ag.
0	72'6"				Purple grey shales.								390	395	5		1.04	0.2	20	35
72'6"	185'			Coarse dark green graywacke some graded units.								400			1.04	1.0	40	40	Bedding 50° tea	
												405			0.15	0.8	40	60	foliation 50° tea	
185'	296'			Pale green grey finely interbedded argillites and arenites. Minor quartz veins very occasional pyrite.								410			0.07	0.4	20	65	faces East	
												415			0.04	0.4	60	115		
296'	460'			Acidic medium to coarse lapilli tuff, pale green to white in colour. Bedding absent but grain size variations are present. Subaerial deposit is probable. Sulphide less than 1%.								420			0.07	0.5	110	35	390-460	
												425			0.11	0.5	40	140	Cu Pb Zn FeS	
460'	545'			Fine grained acid pyroclastic, pale mid green, slightly altered appearance. Sulphides ≈ 3% blebs of chalcopyrite and sphalerite at 485'.								430			0.07	0.1	40	65	0.06% 0.01 0.01 0.4	
												435			0.04	0.6	20	60		
545'	605'			Grey green fine grained acid pyroclastic. Pyrite associated with small quartz veins, 2% sulphides. Possible ignimbrite.								440			0.10	0.4	40	120		
604'	631'			Pale grey cream acid pyroclastic altered brecciated 604-612. Sulphides up to 5%.								445			0.05	0.2	40	65		
631'	642'			Altered ignimbrite, bright green hydro-mica? in matrix. Pyrite up to 10%								450	455	5	0.04	0.1	10	45		
642'	645'			Clay fault gouge material.								455			0.05	0.2	10	35		
645'	658'			Pale cream/green altered quartz porphyritic Acid lavas.								460			0.03	0.2	40	55		
658'	710'			Acid lavas green and pink mottled, quartz phenocrysts; autobrecciated and differentiated. Red brown and cream zones of carbonate. Less sulphide content compared to pyroclastics above.								465	470	10mg	235	1.3	45	65		
												470			105	1.3	45	70		
												475			115	0.4	5	85		
												480			135	0.4	45	115		
												485			735	1.4	115	100		
												490			215	1.9	40	555		
												495			160	2.3	30	200		
												500	505	5	250	2.4	105	225		
												510			315	2.1	45	125	Fault zone.	
												515			245	3.0	15	90		
												520			345	1.4	50	125		
												525			135	1.7	50	170	460-645	
												530			130	1.1	60	70		
												535			235	2.1	395	120	Cu Pb Zn FeS	
												540			200	2.7	50	120	282 130 573 2.0	
												545			260	3.8	40	100	0.03% 0.02% 0.01%	
												550			800	7.4	60	110		
												555			310	1.7	50	100		
												560	565	5	210	2.1	10	80		
												565			330	1.5	30	110		
												570			220	1.0	120	210		
												575			260	1.8	510	260		
												580			210	2.2	40	80		
												585			240	2.3	40	270		
												590			350	4.3	390	1490		
												595			160	0.4	70	120		
												600			280	0.4	70	130		
												605			310	0.4	50	125		
												610	615	5	280	0.7	240	60		
												615			490	1.3	610	310	625H-645H	
												620			120	2.2	70	220		
												625			490	3.1	70	90	Cu Pb Zn FeS	
												630			140	1.8	50	75		
												635			245	1.5	1250	3100	286 818 3075 2.6	
												640			475	4.5	160	520		
												645	650	5	220	2.3	260	120	0.03% 0.08% 0.27%	
												650			155	2.0	760	680		

473082



NORTH OF HENTY FAULT

DUNDAS GROUP
 SHALE, SILTSTONE, GREYWACKE, MINOR CRYSTAL TUFF.

PRIMROSE VOLCANICS
 ACID CRYSTAL FELDSPAR LITHIC TUFFS, OCCASIONALLY WELDED. SHALES, SILTSTONES, FINE GRAINED TUFFS. ACID QUARTZ FELDSPAR LITHIC TUFFS, OCCASIONALLY WELDED. AGGLOMERATES.

MT. READ VOLCANICS
 PYRITIC BLACK SHALES. SHALES, GREYWACKES, FINE TUFFS. ACID WELDED TUFFS. BASIC INTRUSIVES. ACID LAVAS, FELDSPAR PHYRIC. ACID WELDED TUFFS. BASIC TO INTERMEDIATE INTRUSIVES AND EXTRUSIVES. VOLCANICLASTIC SEDIMENTS.

SOUTH OF HENTY FAULT

TYNDALL GROUP
 (JUNES) VOLCANICLASTIC SEDIMENTS (LONGSTOCK TUFF) CRYSTAL TUFFS. AGGLOMERATES, BANDED TUFF SHALES. QUARTZ PORPHYRY AUTOBRECCIATED LAVAS. MENIATITIC CARBONATES, CRYSTAL TUFFS. CARBONATE SEDIMENTS, MAGNETITE RICH LAVAS.

QUEENSTOWN PYROCLASTICS
 INTERMEDIATE PYROCLASTICS, SILTSTONES, SHALES, CARBONATES, MINOR ACID VOLCANICS. INTERMEDIATE LAVAS AND INTRUSIVES, QUARTZ, FELDSPAR, HORNBLende PHYRIC TYPES. INTERMEDIATE PYROCLASTICS, GREYWACKES, SHALES, MINOR ACID VOLCANICS. ACID PYROCLASTICS, MINOR LAVAS AND SEDIMENTS. PYRITIC BLACK SHALES.

DUNDAS GROUP
 GREYWACKES, SILTSTONES AND SHALES. MAFIC AND ULTRAMAFIC INTRUSIVE.

RED HILLS - GOOSENECK

QUATERNARY
 SWAMP. MORAINES AND SCREE.

OWEN CONGLOMERATE
 CONGLOMERATE, SANDSTONE, SILTSTONE, SHALE AND CONGLOMERATE.

TYNDALL GROUP
 (JUNES) VOLCANICLASTIC SEDIMENTS. ACID LAVAS. CENTRAL LAVAS. ACID LAVAS. ACID PYROCLASTICS, AGGLOMERATES. DARWIN RHYOLITE.

SELINA - ROLLESTON

QUATERNARY
 SWAMP. MORAINES AND SCREE.

OWEN CONGLOMERATE
 CONGLOMERATE, SANDSTONE, SILTSTONE AND SHALE.

CAMBRIAN
 TYNDALL GROUP. UNDIFFERENTIATED TUFFS, LAVAS AND AGGLOMERATES. UNDIFFERENTIATED CAMBRIAN VOLCANICS. AGGLOMERATES. PRECAMBRIAN. STICHT QUARTZITE.

FAULT
ANTICLINE
SYNCLINE
STRIKE AND DIP OF BEDDING
STRIKE OF SCHISTOSITY AND DIP
OLD WORKINGS

ANG COORDINATES

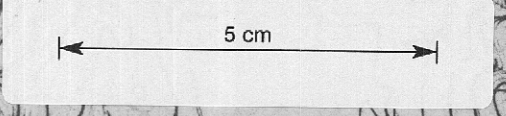
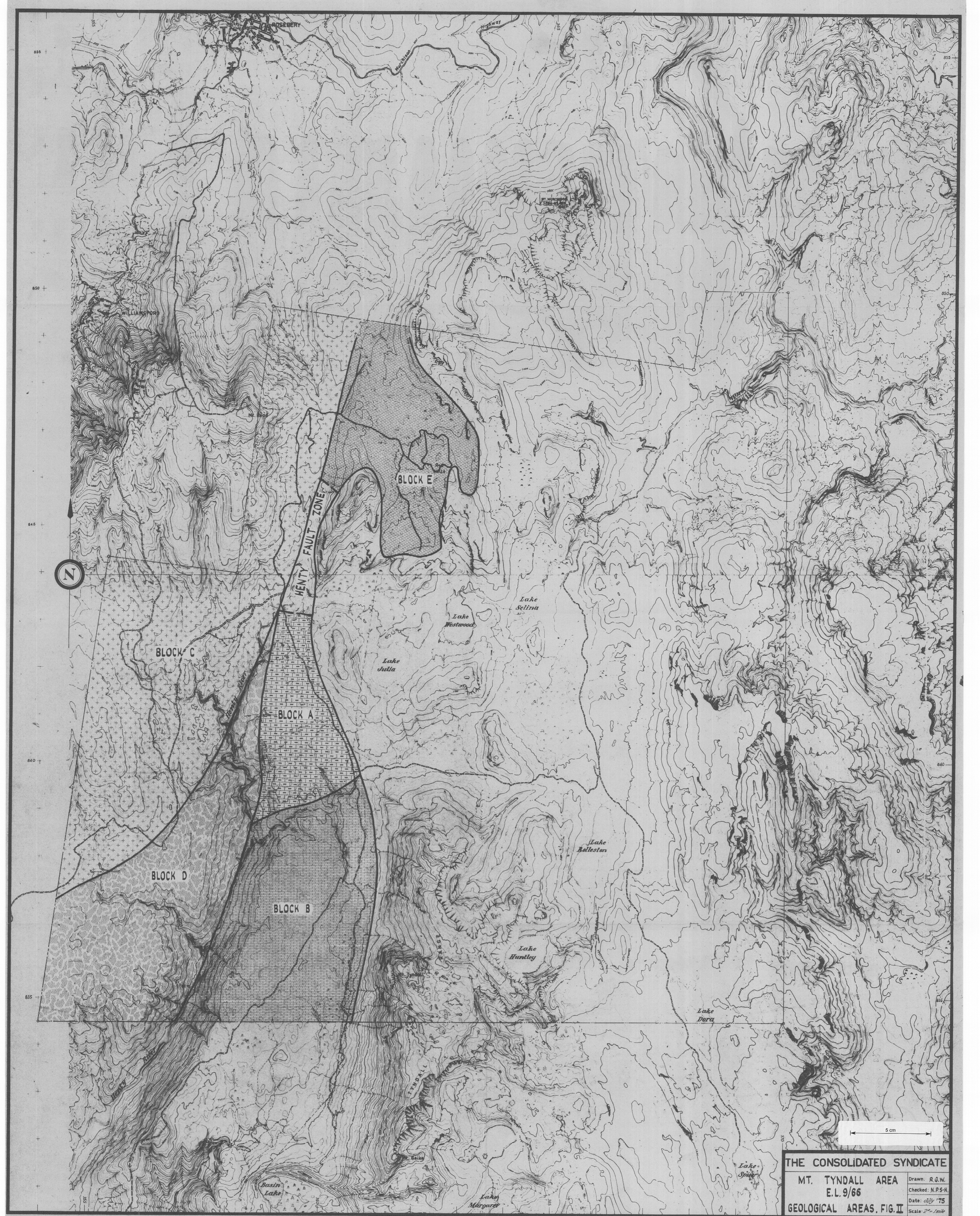
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THE CONSOLIDATED SYNDICATE
MT. TYNDALL AREA
E.L. 9/66
GEOLOGICAL MAP

FIG I

DRAWN: N.P.S.H.
 TRACED: A.G.W.
 CHECKED:
 DATE: 19-6-75
 SCALE: 1:15,840

75-1149 2V2 473083



THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA
 E.L. 9/66
 GEOLOGICAL AREAS, FIG. II

Drawn: R.G.W.
Checked: N.P.S.H.
Date: 02/11/75
Scale: 2" = 1 mile

75-1149 473084

Base map by Lands and Surveys Department, Hobart. "Murchison" 40 chain to 1 inch sheets.

W.

E.

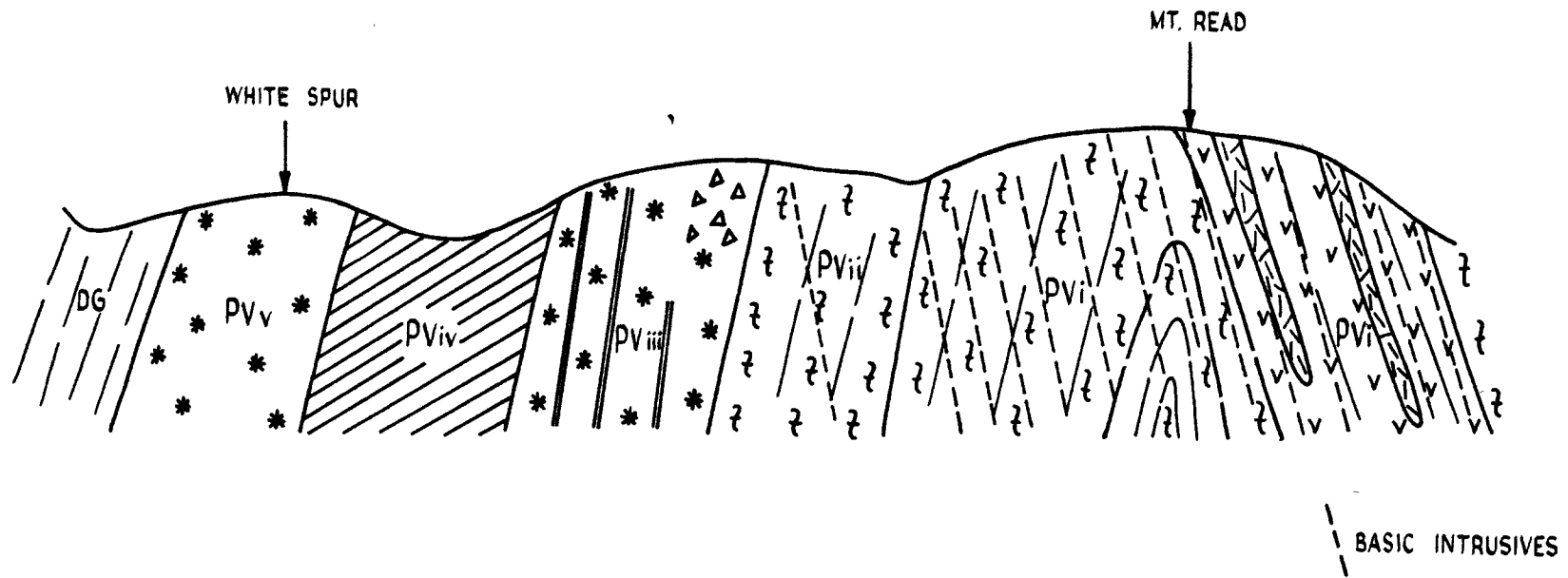
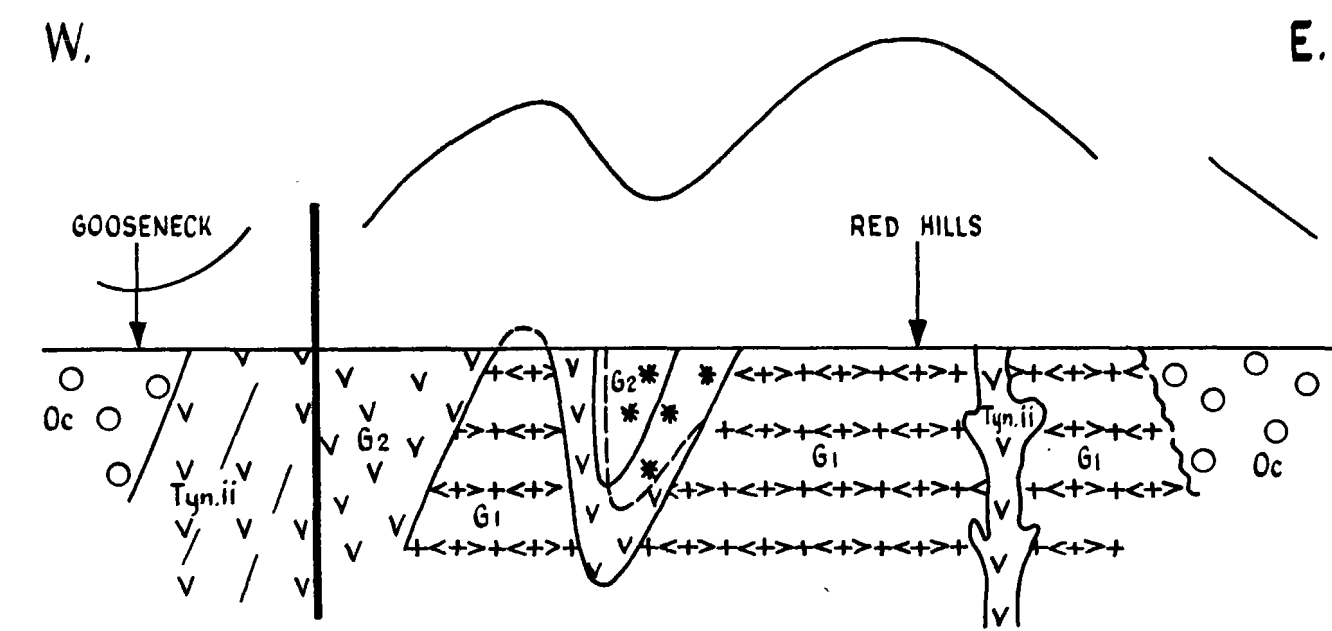


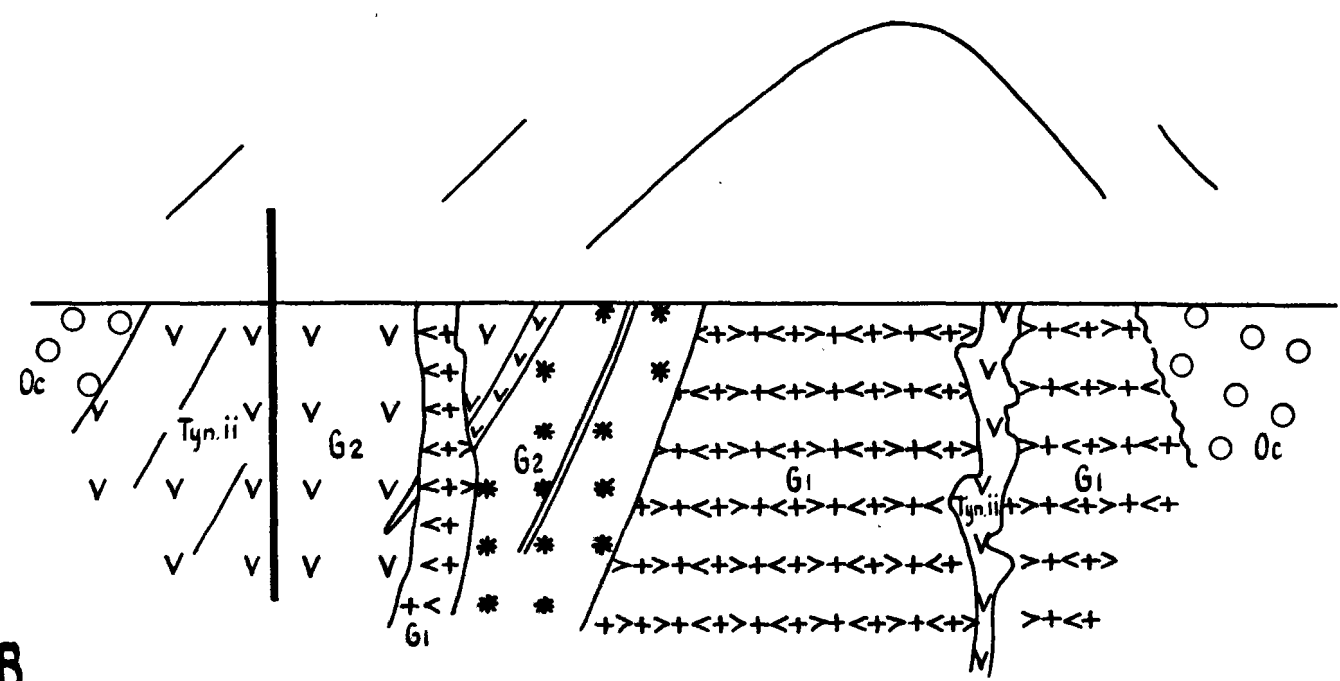
FIG. 3

DIAGRAMMATIC SECTION OF THE PRIMROSE VOLCANICS
WHITE SPUR MT. READ AREA.

75-1149 v.2



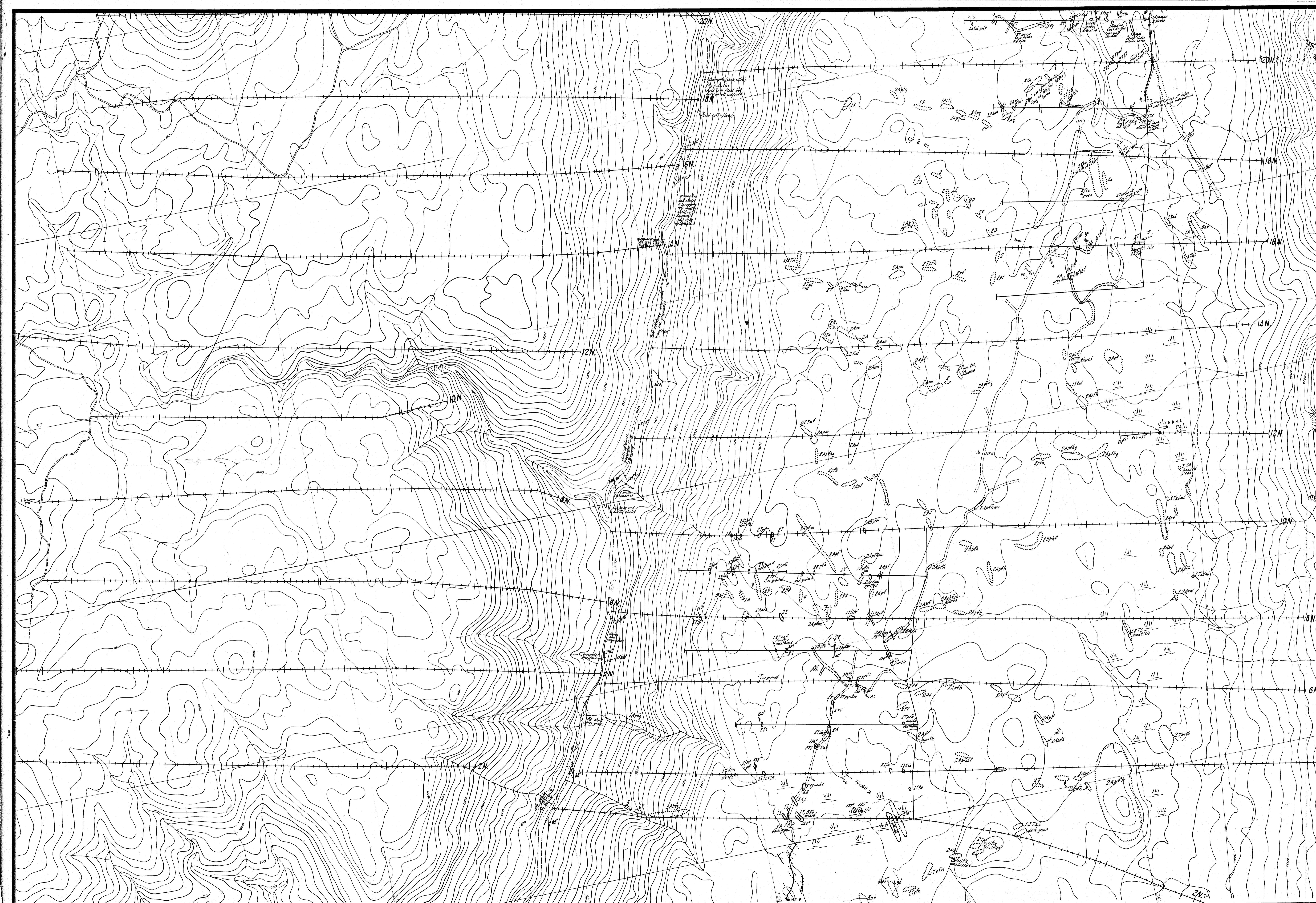
A.



B.

473086

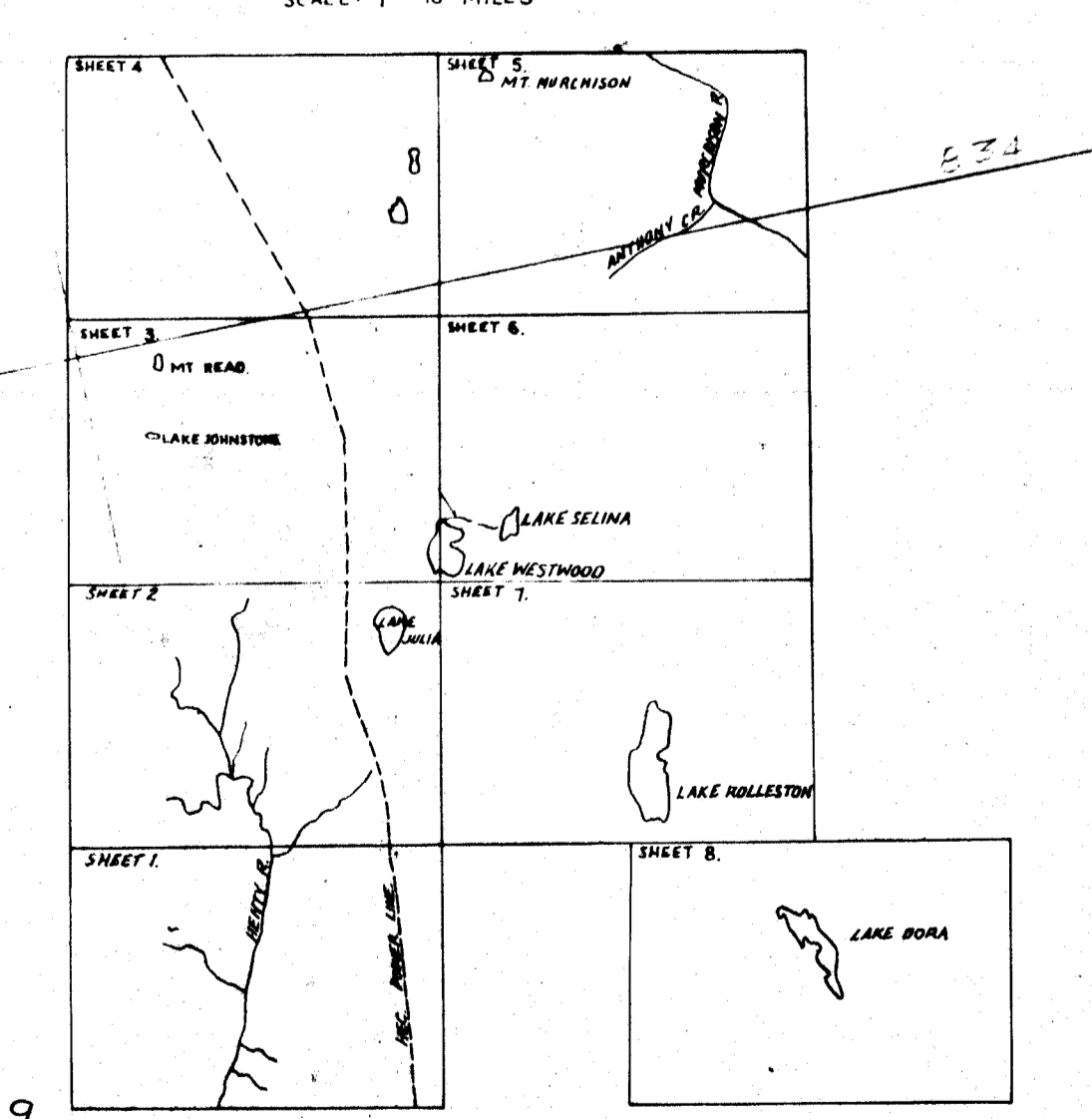
DIAGRAMMATIC SECTION OF THE REDHILLS GOOSENECK AREA
SHOWING ALTERNATIVE STRUCTURAL INTERPRETATIONS.



KEY

- | | | |
|----------------|---------------|-------------------|
| 1 ACID | A EXTRUSIVE | W WELDED |
| 2 INTERMEDIATE | B HYPABYSMAL | X CRYSTAL |
| 3 BASIC | P PLUTONIC | L LITHIC |
| 4 ULTRABASIC | T PYROCLASTIC | V VITRIC |
| | I IGNEERITE | 44 AUTOBRECCIATED |
| | | 45 AGGLOMERATE |
| | | 46 PHENOCRYSTS |
| | | 47 FELDSPAR |
| | | 48 HORNBLENDE |
| | | 49 ALBITE |
| | | 50 QUARTZ |
-
- SEDIMENTS:
- | | |
|-------------------------------|-----------------|
| 5 a ARGILLACEOUS | c CLASTS |
| b ARENACEOUS | QUARTZ |
| c RUDACEOUS | FELDSPAR |
| d POLYMICT | CLASTS |
| e OLIGOMICT | VOLCANIC CLASTS |
| f CHEMICAL | SEDIMENT CLASTS |
| 7 SURFACE ALTERATION PRODUCTS | |
| A FERUGINOUS | |
-
- OUTCROP
- 00
- FAULT
- FAULT ?
- UNCONFORMITY
- BEDDING, DIP
- FOLIATION
- JOINTS
- LINEATION
- LINEATION VERTICAL
- FACING

LOCATION DIAGRAM



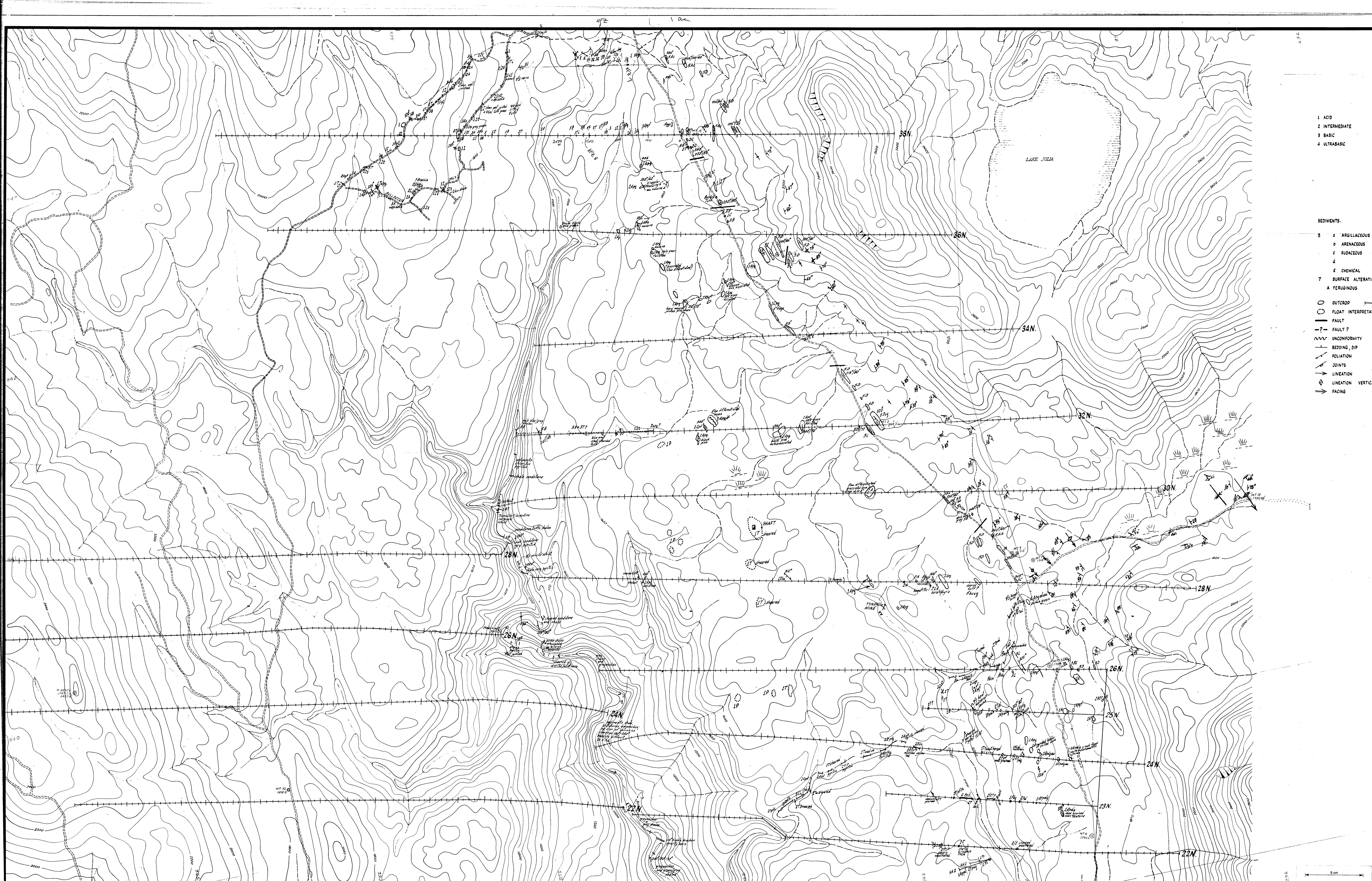
75-1149

THE CONSOLIDATED SYNDICATE

OUTCROP GEOLOGY
 MT. TYNDALL AREA
 E.L. 9/66
 Sheet 1

DRAWN BY: N.S.H.
 CHECKED BY: G.G.W.
 DATE: 12-18-72
 SCALE: 1"=500'

FIG. 5



KEY

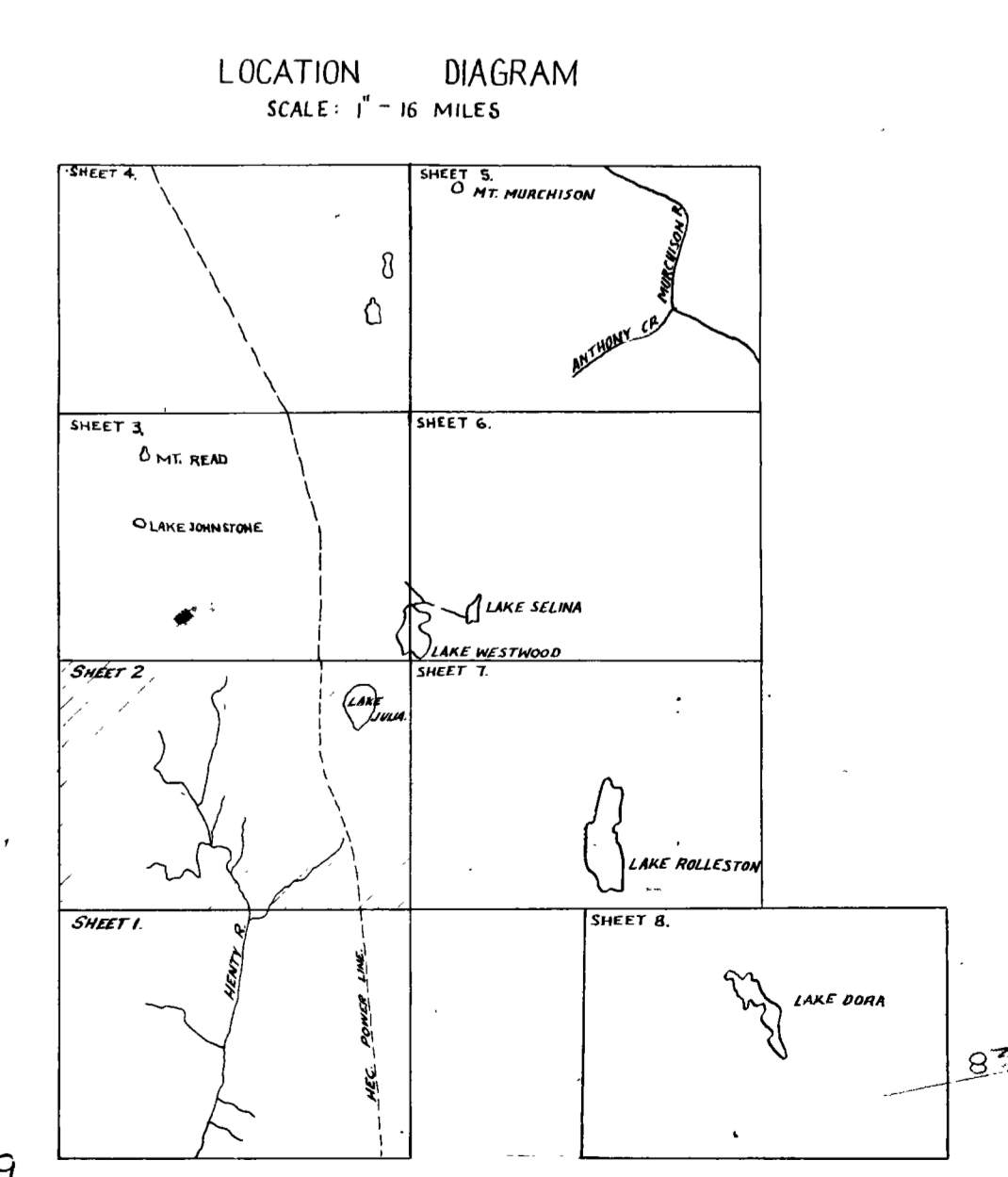
1 ACID	A EXTRUSIVE	W WELDED
2 INTERMEDIATE	B HYPABYSSAL	X CRYSTAL
3 BASIC	P PLUTONIC	L LITHIC
4 ULTRABASIC	T PYROCLASTIC	V VITRIC
	I IGNIMBRITE	44 AUTOBRECCIATED
		45 AGGLOMERATE
		P PHENOCRYSTS
		F FELDSPAR
		H HORNBLENDE
		al ALBITE
		q QUARTZ

SEDIMENTS:

5 a ARGILLACEOUS	c CLASTS
b ARENACEOUS	Q QUARTZ
c RUDACEOUS	F FELDSPAR
d POLYMICT	V VOLCANIC CLASTS
e OLIGMICT	S SEDIMENT CLASTS
f CHEMICAL	
7 SURFACE ALTERATION PRODUCTS	
A FERUGINOUS	

SYMBOLS:

○ OUTCROP	— I —
□ FLOAT INTERPRETATIONS	--- I ---
— FAULT	
— FAULT ?	
~ UNCONFORMITY	
— BEDDING, DIP	
— FOLIATION	
— JOINTS	
— LINEATION	
— LINEATION VERTICAL	
— FACING	



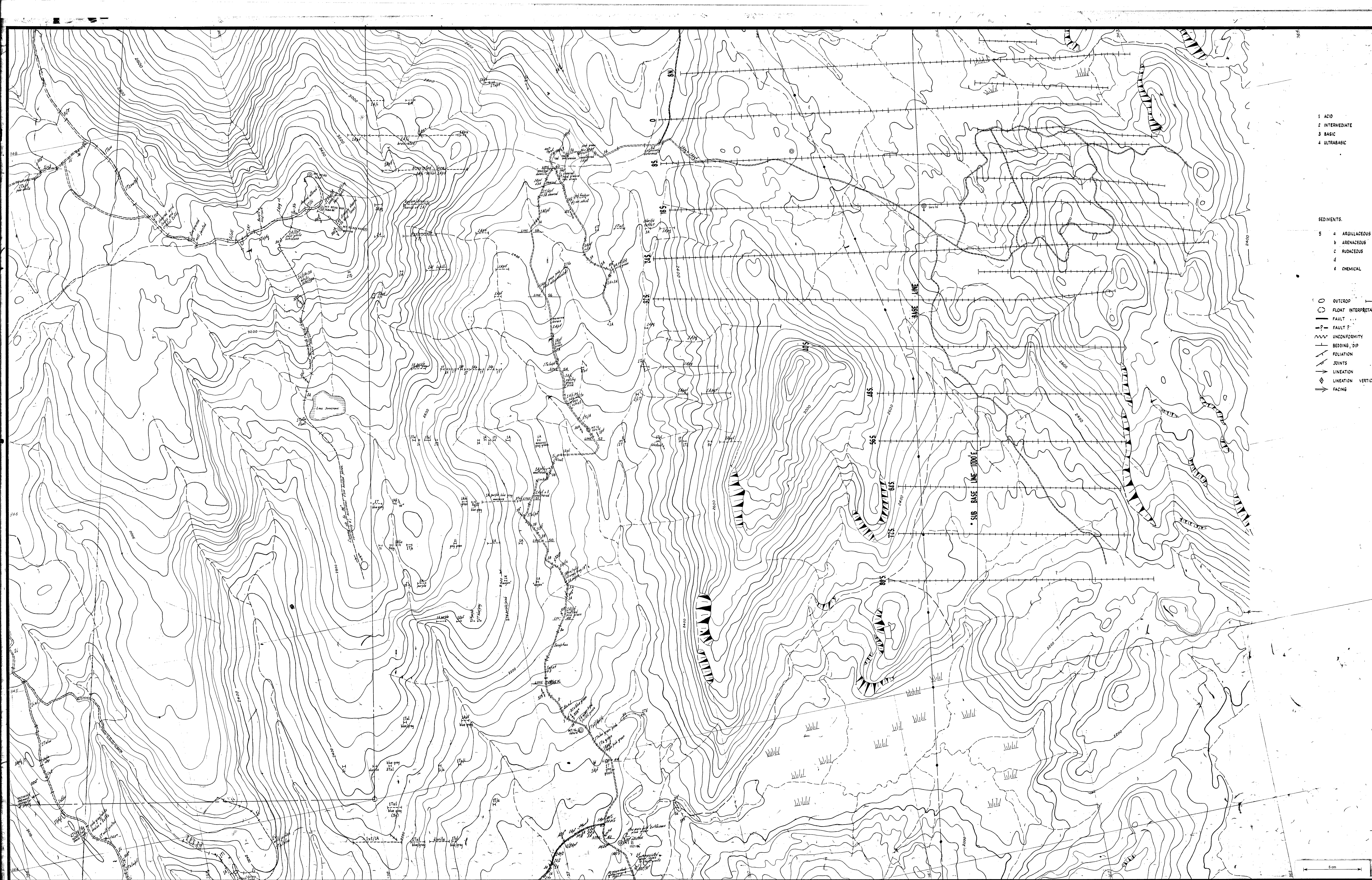
75-1149.

THE CONSOLIDATED SYNDICATE

OUTCROP GEOLOGY
MT. TYNDALL AREA
EL. 9/66
Sheet 2

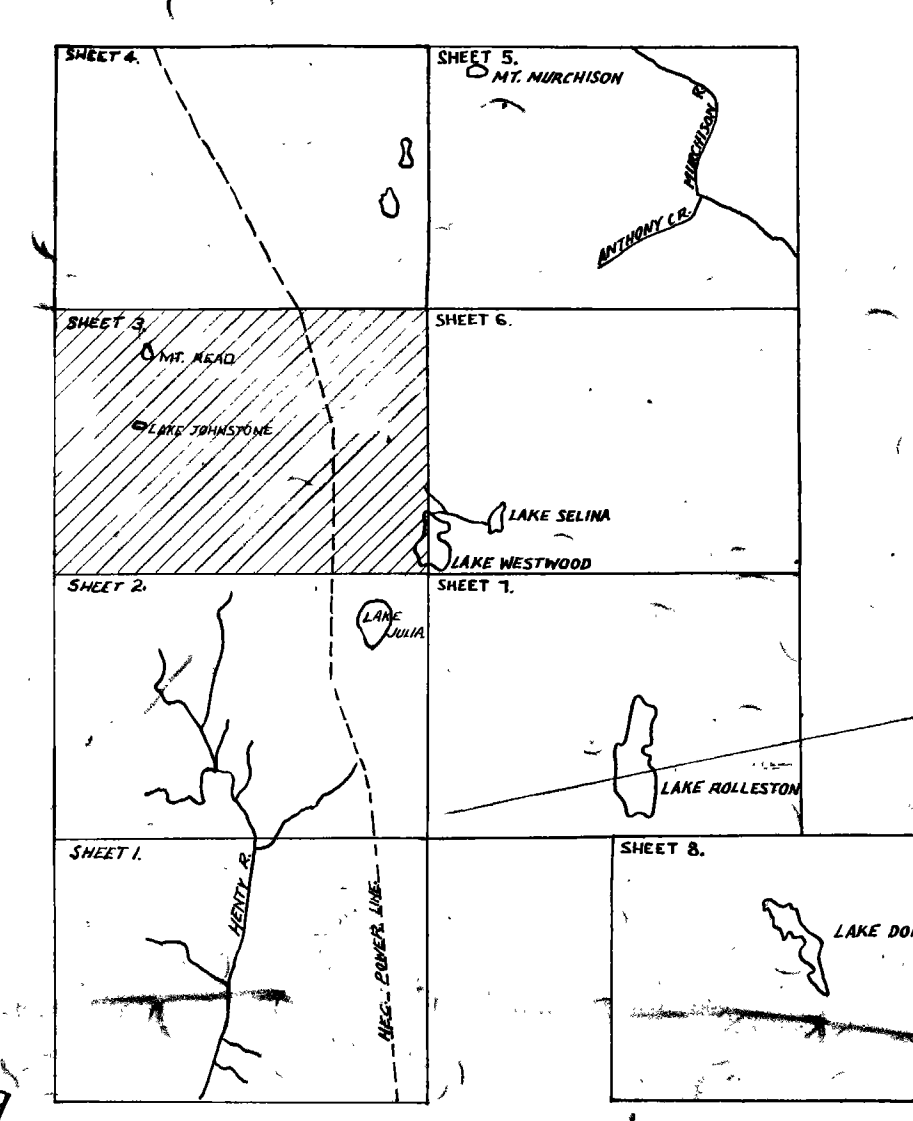
DRAWN BY: N.S.H.
TRACED BY: R.S.W.
CHECKED BY:
DATE: 12-12-74
SCALE: 1" = 500'

FIG. 6



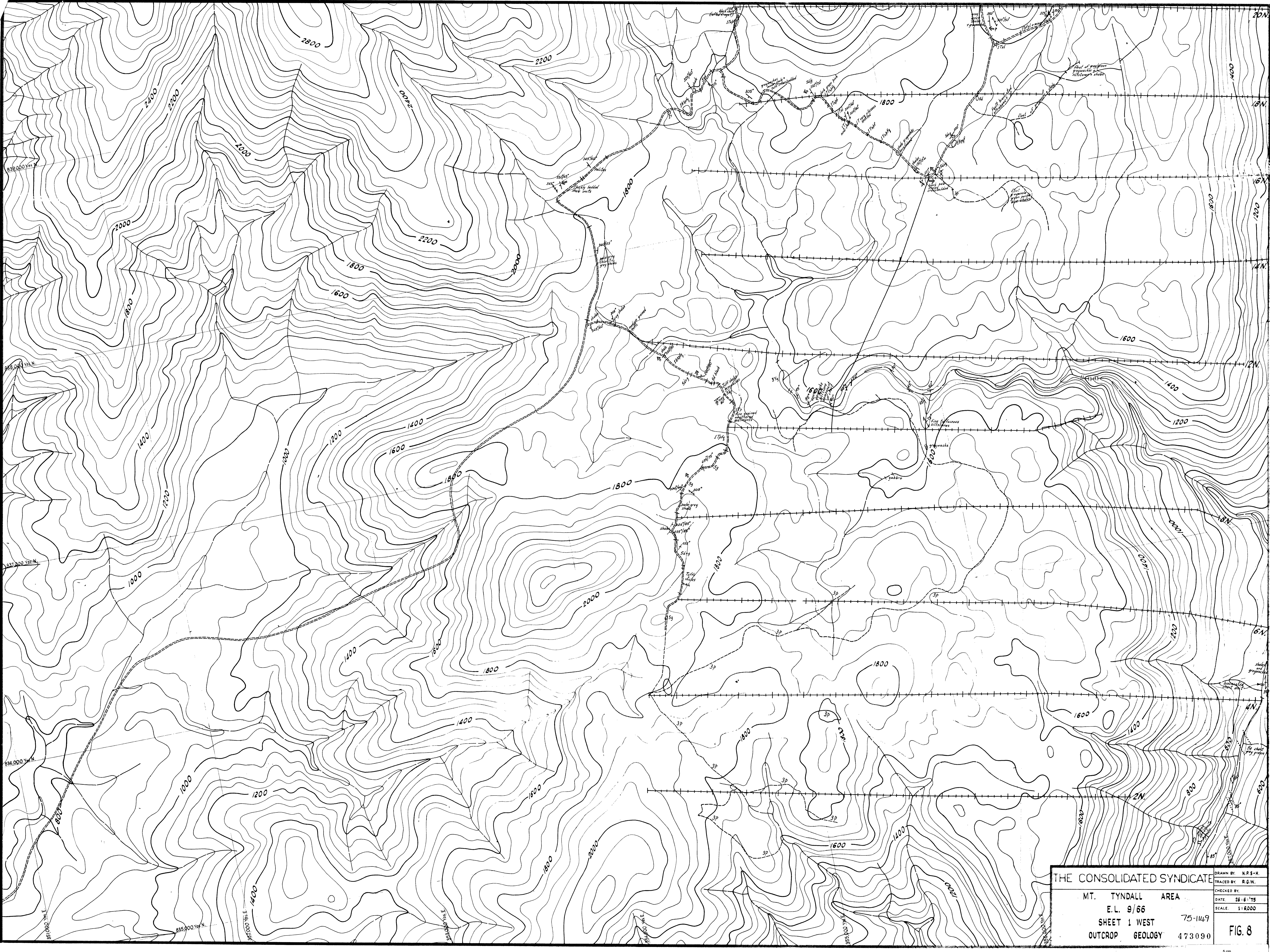
- KEY**
- | | | |
|----------------|---------------|-------------------|
| 1 ACID | A EXTRUSIVE | W WELDED |
| 2 INTERMEDIATE | B HYBASSAL | X CRYSTAL |
| 3 BASIC | P PLUTONIC | L LITHIC |
| 4 ULTRABASIC | T PYROCLASTIC | V VITRIC |
| | I IGNEOUS | AA AUTOBRECCIATED |
| | | c AGGLOMERATE |
| | | p PHENOCRYSTS |
| | | f FELDSPAR |
| | | h HORNBLENDE |
| | | al ALBITE |
| | | q QUARTZ |
- SEDIMENTS.**
- | | |
|------------------|-------------------|
| 5 a ARGILLACEOUS | CLASTS |
| b ARENACEOUS | QUARTZ |
| c RUFACEOUS | FELDSPAR |
| d POLYMICT | V VOLCANIC CLASTS |
| e OLIGIMICT | S SEDIMENT CLASTS |
| f CHEMICAL | |
- SYMBOLS:**
- OUTCROP
 - FLOAT INTERPRETATIONS
 - FAULT
 - - - FAULT ?
 - ~ UNCONFORMITY
 - BEDDING, DIP
 - FOLIATION
 - JOINTS
 - LINEATION
 - LINEATION VERTICAL
 - FACING

LOCATION DIAGRAM
SCALE: 1" = 1/4 MILES

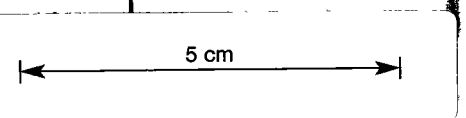


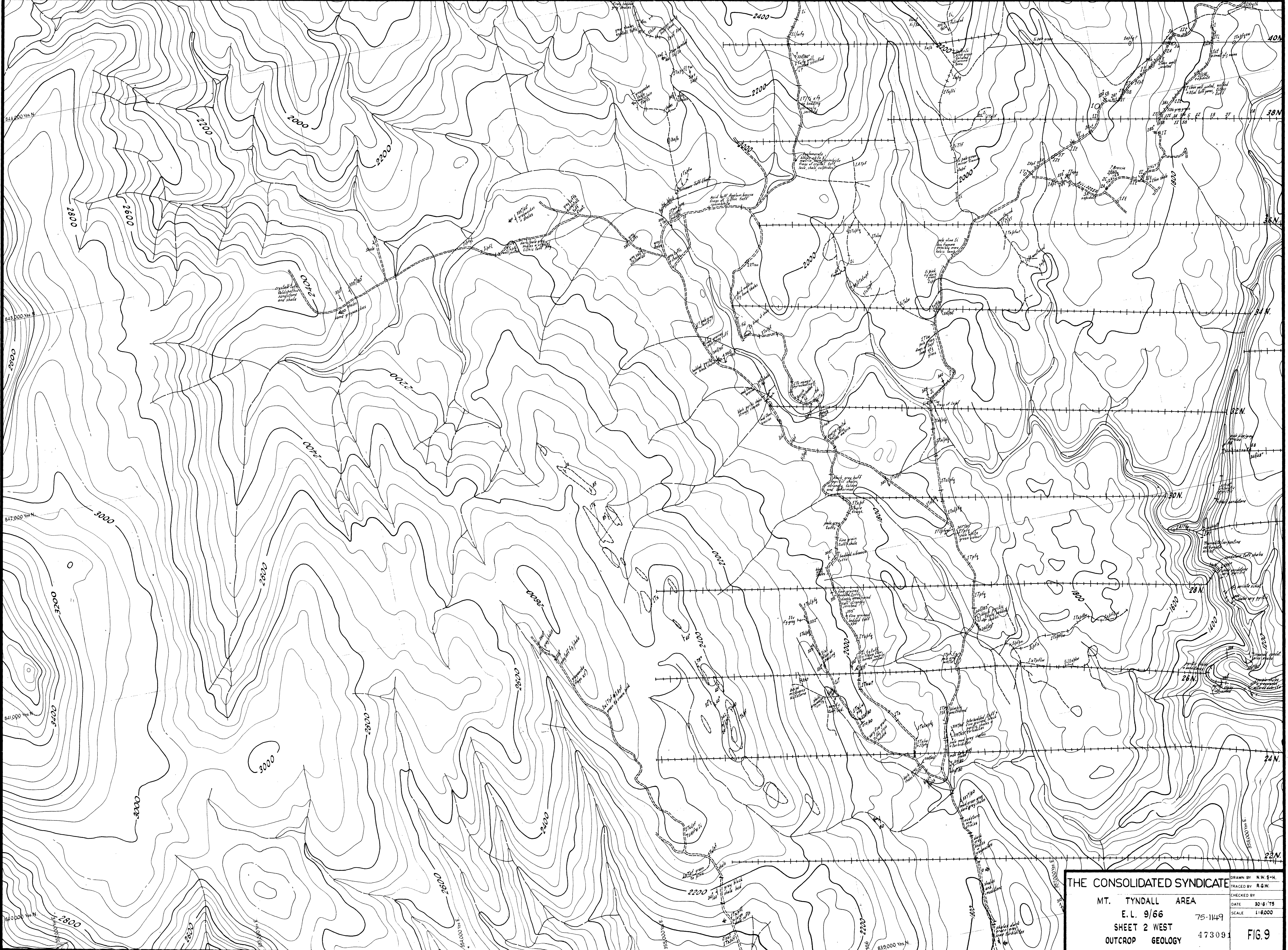
75-1149

THE CONSOLIDATED SYNDICATE		DRAWN BY: N.S.H.
OUTCROP GEOLOGY		CHECKED BY: R.B.W.
MT. JYNDALL AREA		DATE: 12/12/74
EL. 9/66		SCALE: 1" = 500'
Sheet 3	473089	FIG. 7

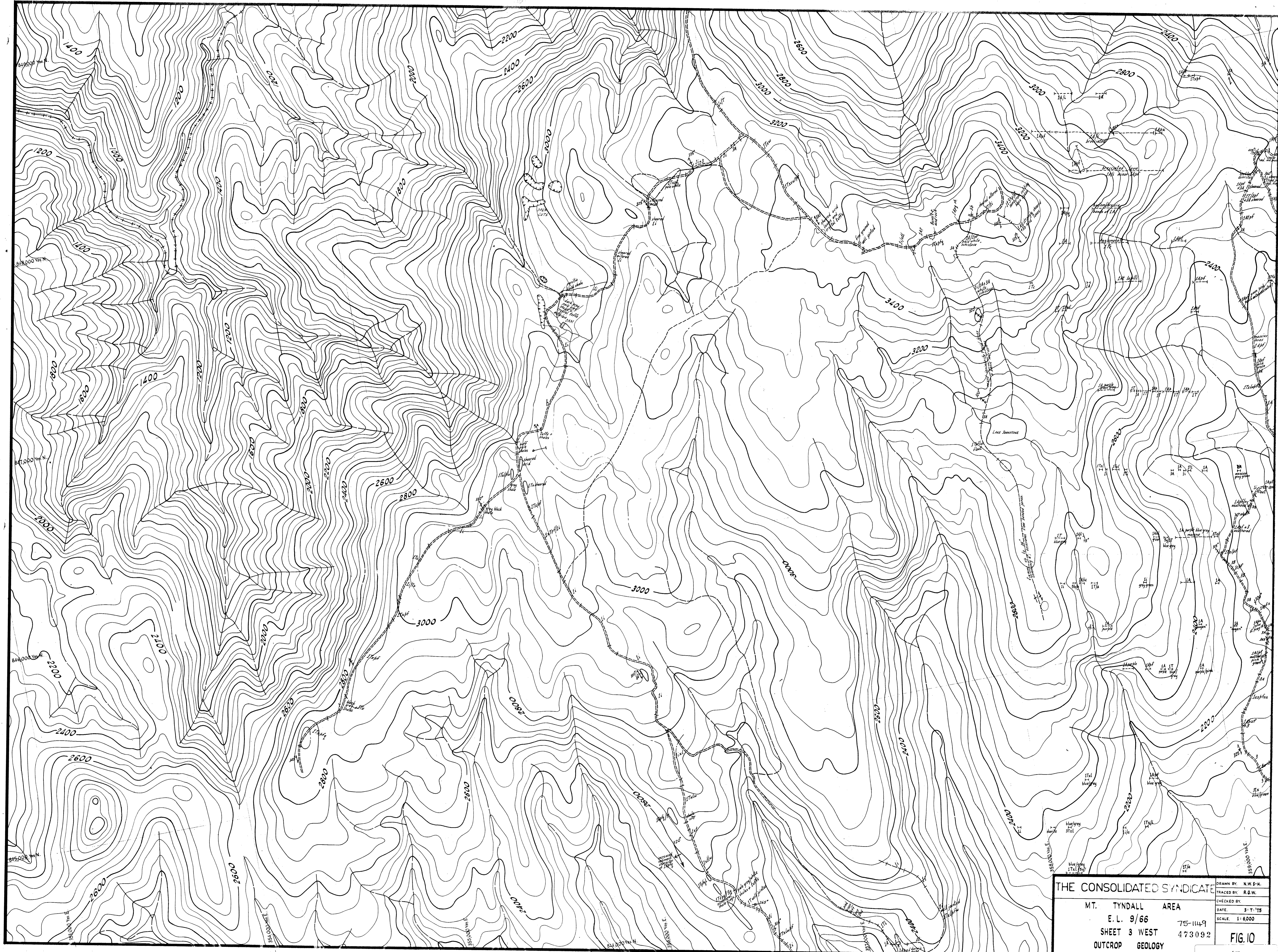


THE CONSOLIDATED SYNDICATE		DRAWN BY: N.P.S.-H.
MT. TYNDALL AREA		TRACED BY: R.G.W.
E.L. 9/66		CHECKED BY:
SHEET 1 WEST		DATE: 26-6-75
OUTCROP GEOLOGY		SCALE: 1:6000
75-1149	473090	FIG. 8



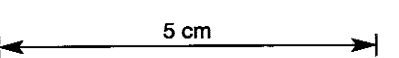


THE CONSOLIDATED SYNDICATE		DRAWN BY N.W. S-H.	
MT. TYNDALL AREA		TRACED BY R.G.W.	
E.L. 9/66	75-1149	CHECKED BY	
SHEET 2 WEST	473091	DATE	30/6/75
OUTCROP GEOLOGY		SCALE	1:6,000
		FIG	9



THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA
 E.L. 9/66
 SHEET 3 WEST
 OUTCROP GEOLOGY

DRAWN BY: N.W.S.H.
 TRACED BY: R.G.W.
 CHECKED BY:
 DATE: 3/7/73
 SCALE: 1:6000
 FIG. 10



N.

473093

S.

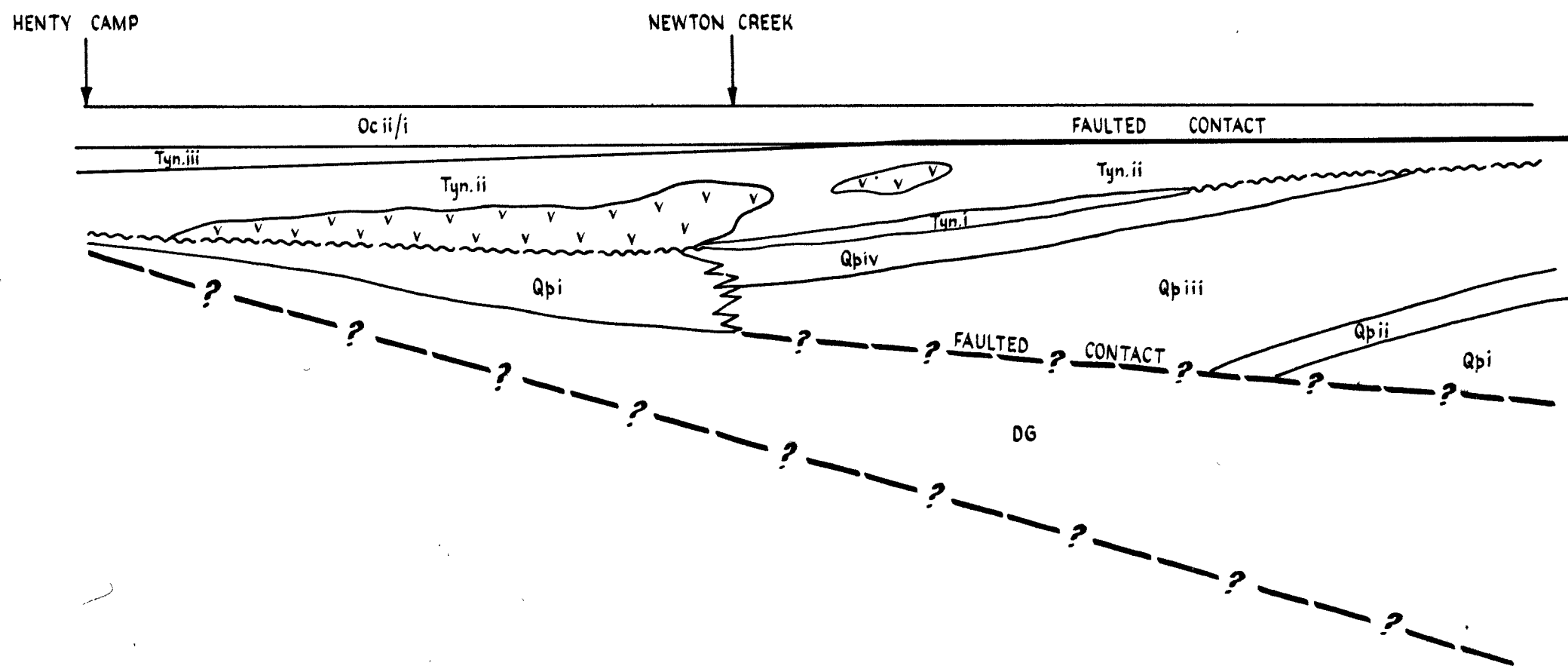
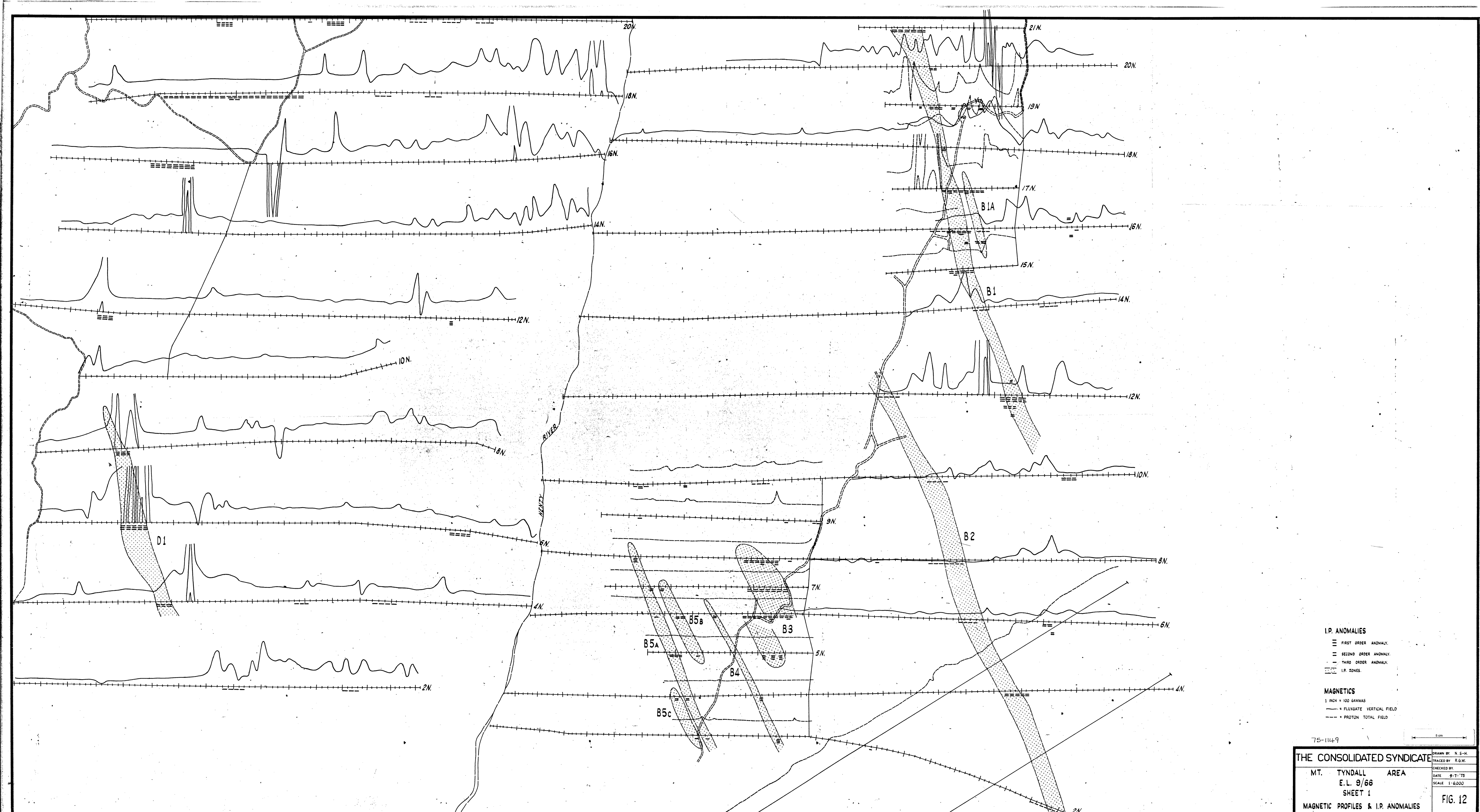


FIG. 11

DIAGRAMMATIC SECTION OF BLOCK A & B
 SHOWING DEPOSITIONAL RELATIONSHIP BETWEEN ROCK UNITS.

(SEE FIGURE 1 FOR KEY)

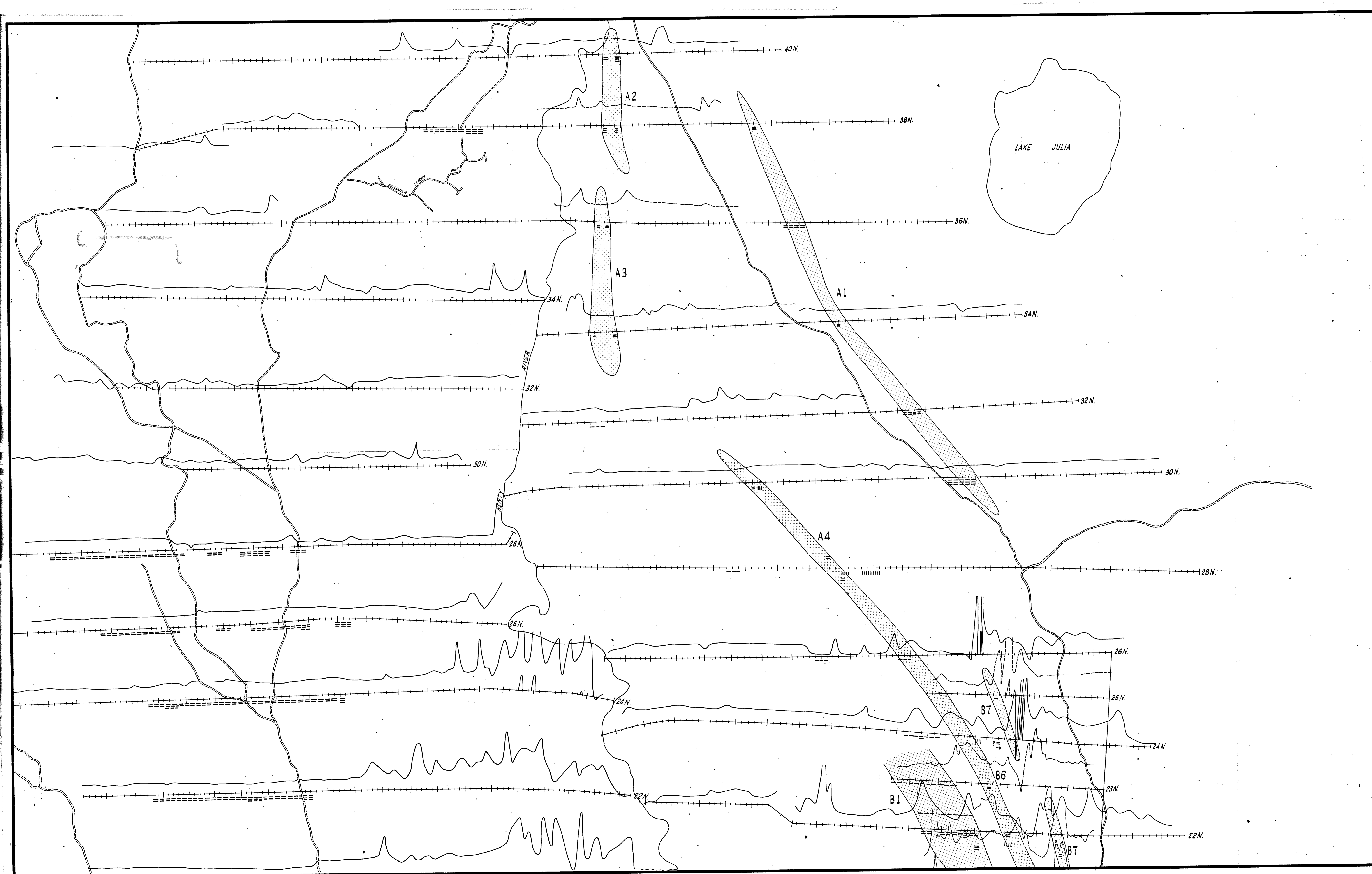


I.P. ANOMALIES
 ≡ FIRST ORDER ANOMALY.
 ≡ SECOND ORDER ANOMALY.
 ≡ THIRD ORDER ANOMALY.
 ≡ I.P. ZONES.

MAGNETICS
 1 INCH = 100 GAMMAS
 — FLUXGATE VERTICAL FIELD
 - - - PROTON TOTAL FIELD

75-114-9 5 cm

THE CONSOLIDATED SYNDICATE		DRAWN BY: N.S.H.
MT. TYNDALL AREA		CHECKED BY: R.G.W.
E.L. 9/66		DATE: 9-7-75
SHEET 1		SCALE: 1:6000
MAGNETIC PROFILES & I.P. ANOMALIES		FIG. 12



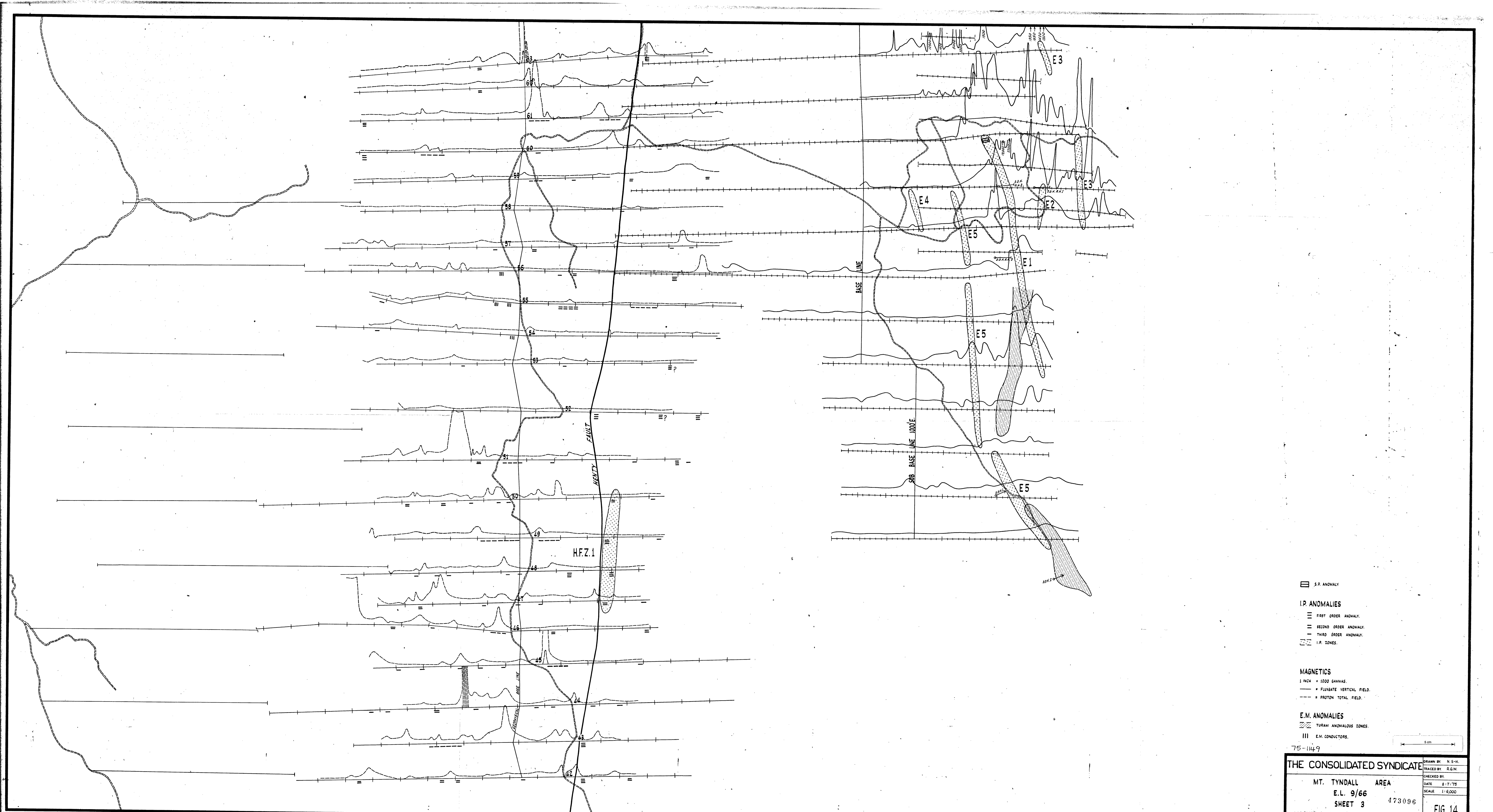
I.P. ANOMALIES
 = FIRST ORDER ANOMALY.
 = SECOND ORDER ANOMALY.
 = THIRD ORDER ANOMALY.
 = I.P. ZONES.

MAGNETICS
 1 INCH = 1000 GAMMAS.
 = FLUXGATE VERTICAL FIELD.
 = PROTON TOTAL FIELD.

E.M. ANOMALIES
 = E.M. CONDUCTORS - RIOTINTO

47305
 5cm

THE CONSOLIDATED SYNDICATE		DRAWN BY: N.S.H.
MT. TYNDALL AREA		TRACED BY: R.G.W.
E.L. 9/66		CHECKED BY:
SHEET 2		DATE: 9-7-75
MAGNETIC PROFILES & I.P. ANOMALIES		SCALE: 1:6,000
		FIG. 13



S.P. ANOMALY

I.P. ANOMALIES

- ≡ FIRST ORDER ANOMALY
- ≡ SECOND ORDER ANOMALY
- ≡ THIRD ORDER ANOMALY
- ⊞ I.P. ZONES

MAGNETICS

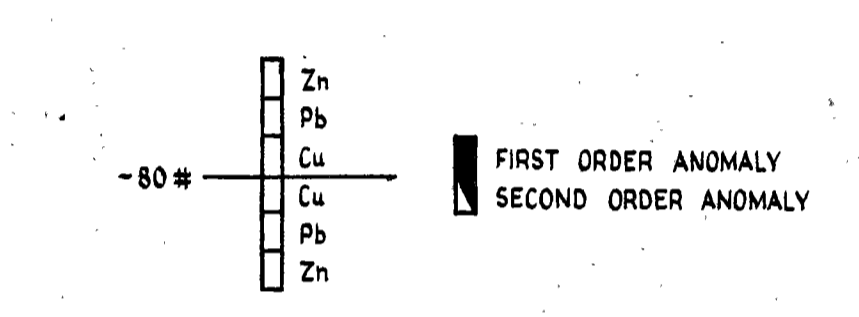
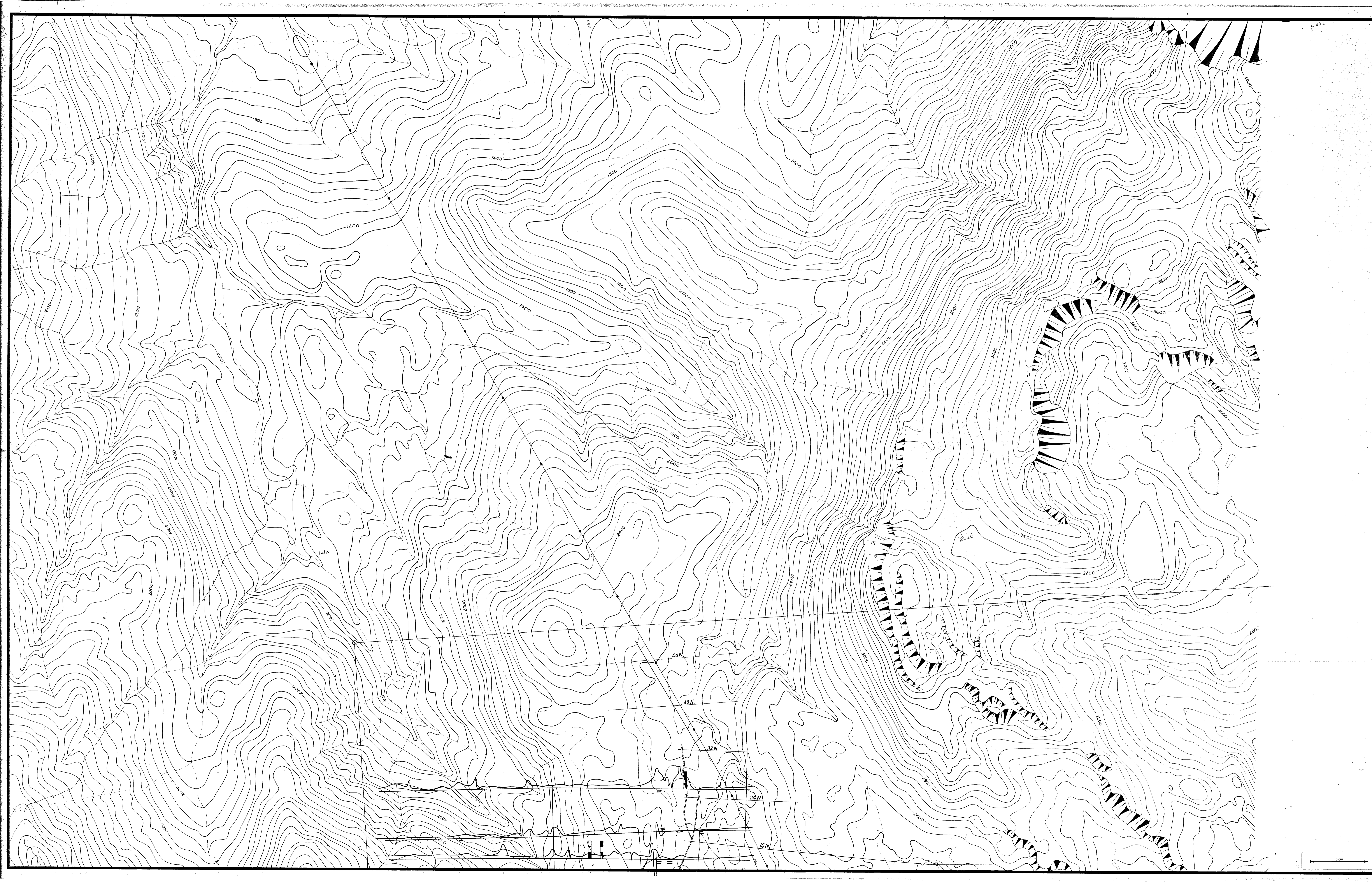
- 1 INCH = 1000 GAUSS
- FLUXGATE VERTICAL FIELD
- - - PROTON TOTAL FIELD

E.M. ANOMALIES

- ▨ TURAM ANOMALOUS ZONES
- ≡ E.M. CONDUCTORS

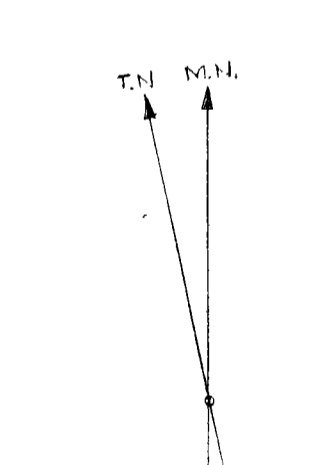
75-1149 5 cm

THE CONSOLIDATED SYNDICATE		DRAWN BY: N.S.H.
		TRACED BY: R.G.W.
		CHECKED BY:
MT. TYNDALL AREA		DATE: 8-17-75
E.L. 9/66		SCALE: 1:6,000
SHEET 3 473096		FIG. 14
MAGNETIC PROFILES & I.P. ANOMALIES		

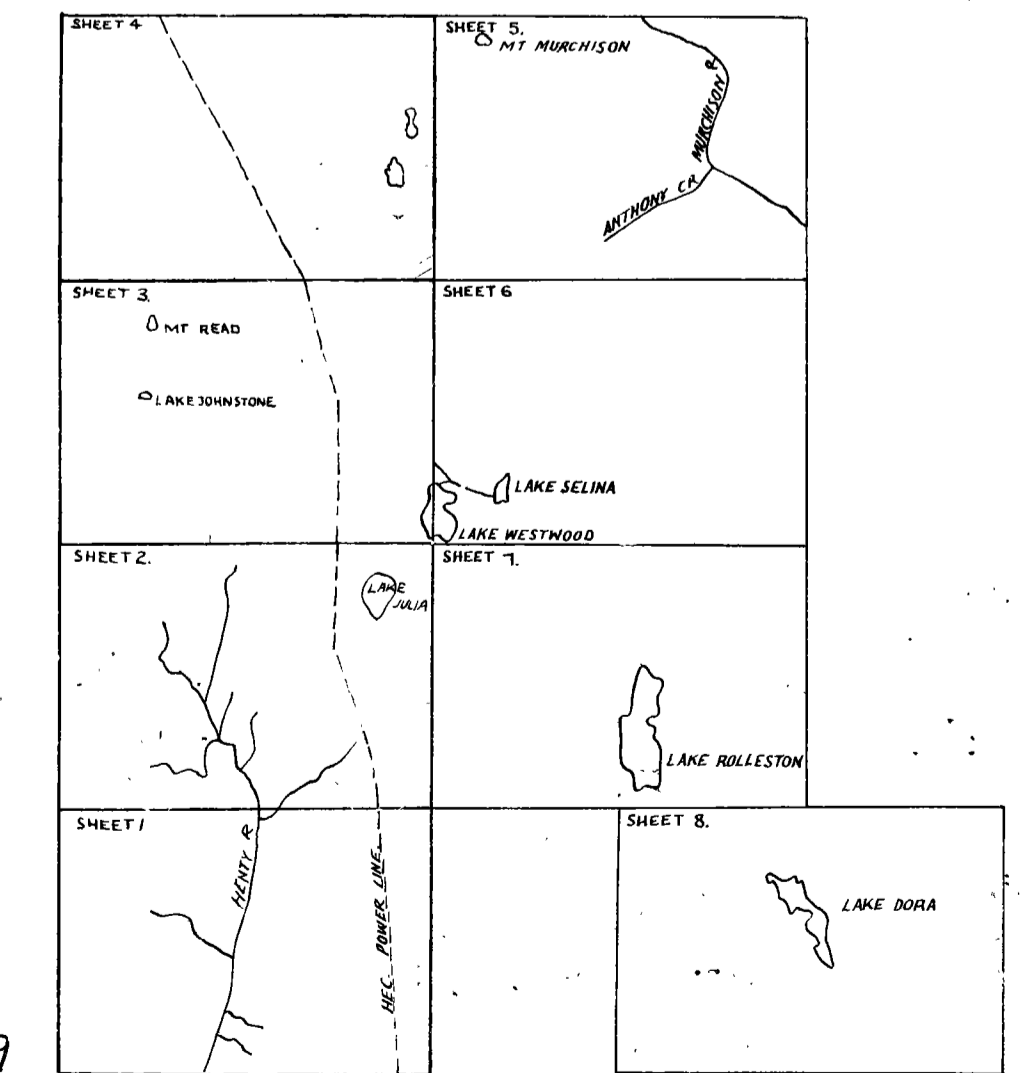


I.P. ANOMALIES
 ||| FIRST ORDER ANOMALY.
 || SECOND ORDER ANOMALY.
 - THIRD ORDER ANOMALY.

MAGNETICS
 1 INCH = 1000 GAMMAS.
 — FLUXGATE VERTICAL FIELD.
 - - - PROTON TOTAL FIELD.

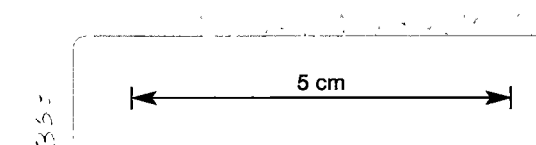


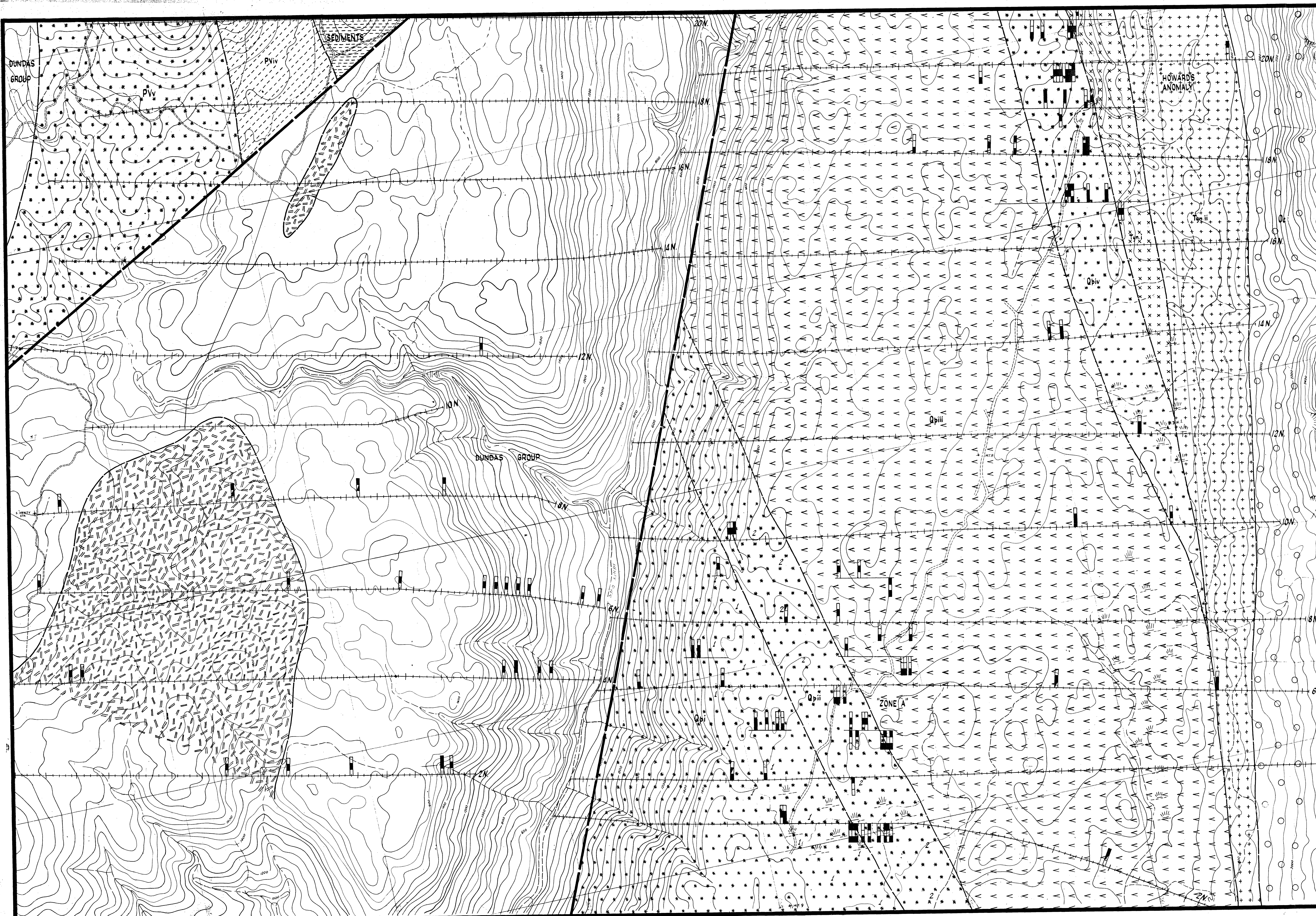
LOCATION DIAGRAM
 SCALE 1" = 1/4 MILES



75-1149

THE CONSOLIDATED SYNDICATE		DRAWN BY N.S.H.
GEOCHEM. ANOMALIES & GEOPHYSICAL DATA		TRACED BY R.G.W.
MT. TYNDALL AREA		CHECKED BY
EL. 9/66.		DATE 8-11-75
Sheet 4		SCALE 1" = 500'
473097		FIG. 15



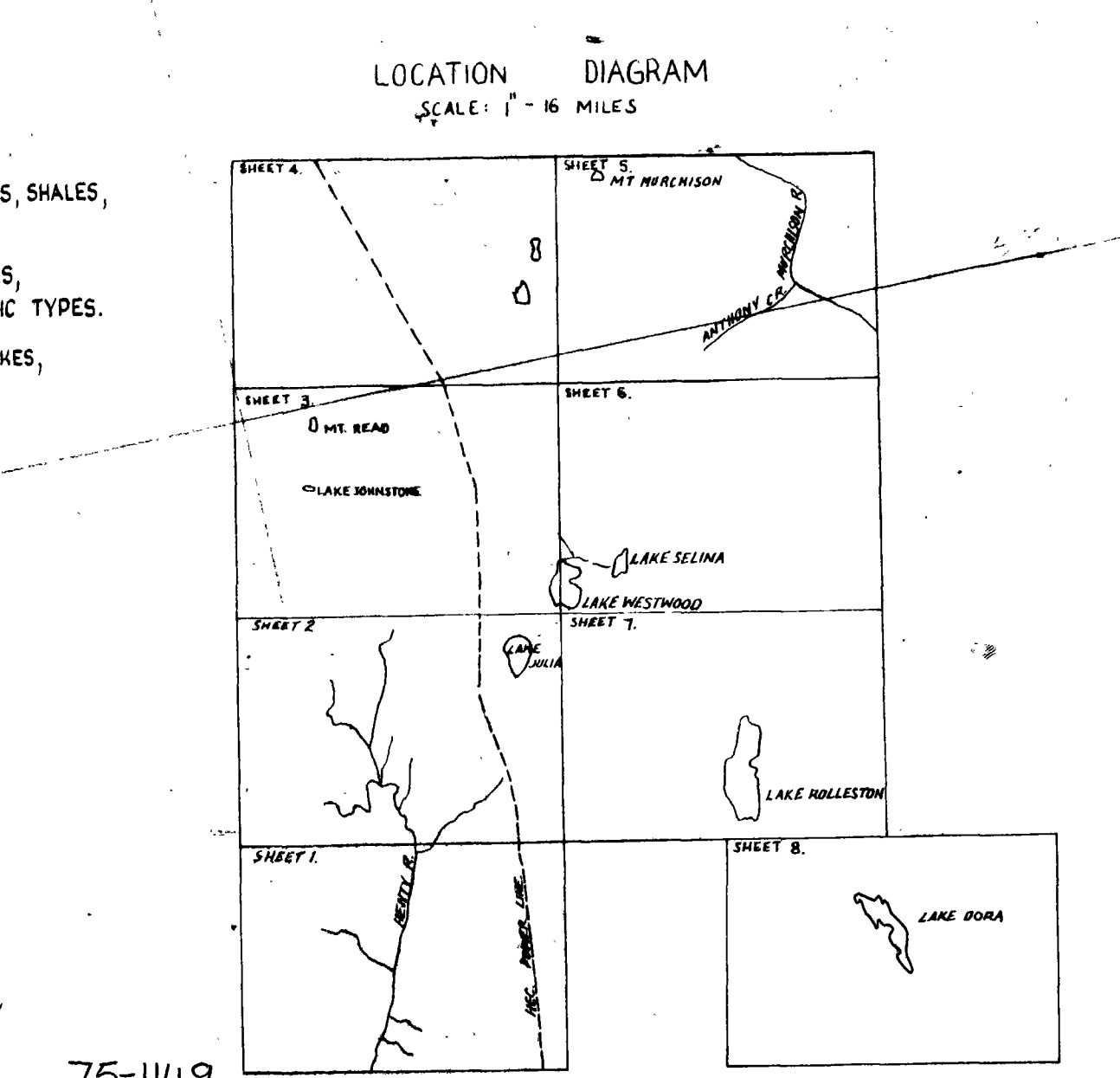


- OWEN CONGLOMERATE
- SHALES, SANDSTONE, CONGLOMERATE
- TYNDALL GROUP
- CONASTOCK TUFFS, AGGLOMERATES, TUFFS, AUTOBRECCIATED LAVAS
- BASAL UNIT, INTERMEDIATE TO ACID PYROCLASTICS
- QUEENSTOWN PYROCLASTICS
- INTERMEDIATE PYROCLASTICS, SILTSTONES, SHALES, CARBONATES, MINOR ACID VOLCANICS
- INTERMEDIATE LAVAS AND INTRUSIVES, QUARTZ FELDSPAR, HORNBLende PHYRIC TYPES
- INTERMEDIATE PYROCLASTICS, GREYWACKES, SHALES, MINOR ACID VOLCANICS
- ACID PYROCLASTICS, MINOR LAVAS AND SEDIMENTS
- DUNDAS GROUP
- SEDIMENT SHALE, MUDSTONE
- MAFIC AND ULTRAMAFIC INTRUSIVE

-108 +804 Zn
 -804 Pb
 -804 Cu
 -804 Pb
 -804 Zn

■ FIRST ORDER ANOMALY
 ■ SECOND ORDER ANOMALY

5 cm



75-1149

THE CONSOLIDATED SYNDICATE

GEOCHEM. ANOMALIES & INTERPRETIVE GEOLOGY

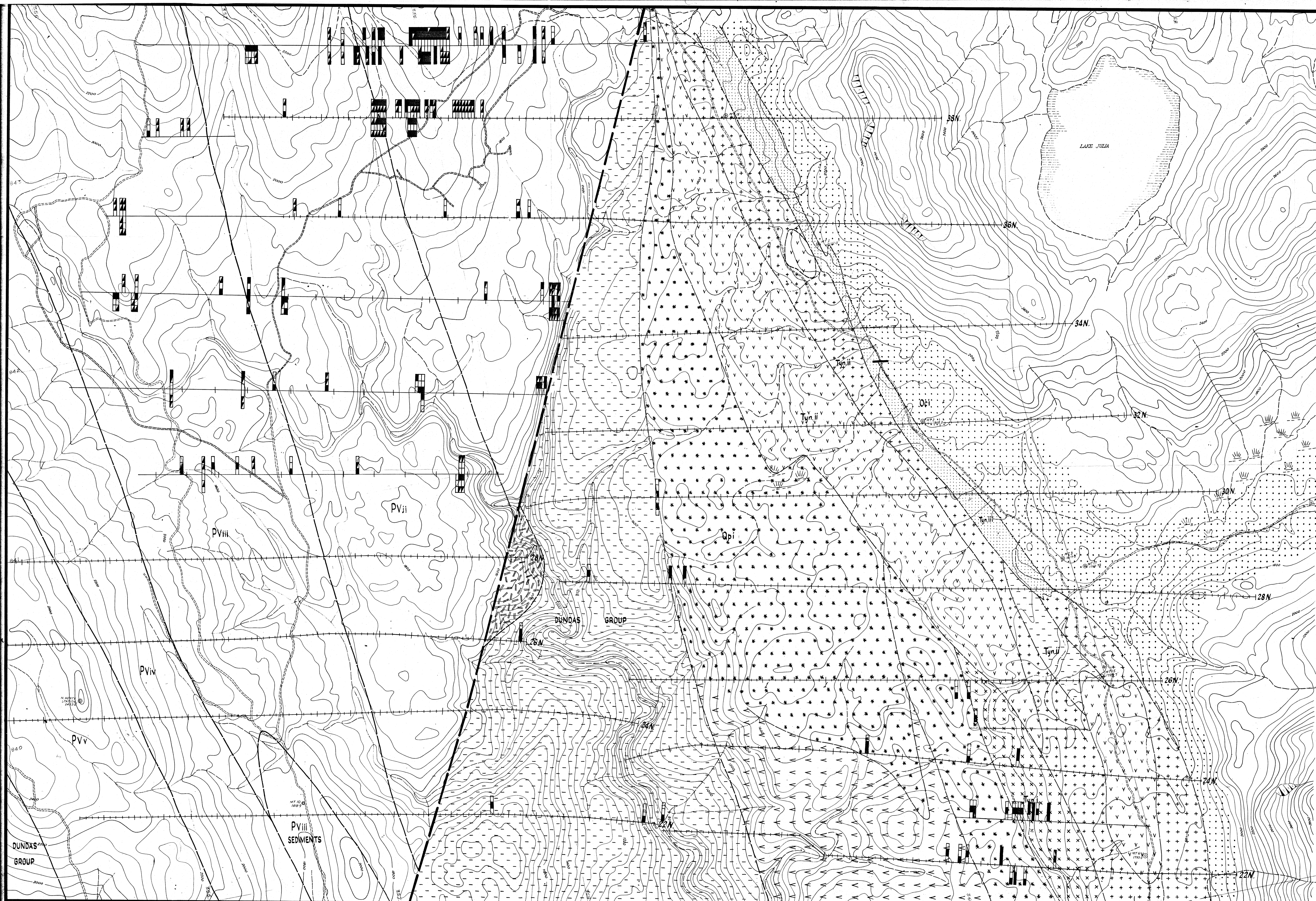
MT. TYNDALL AREA

EL.9/66

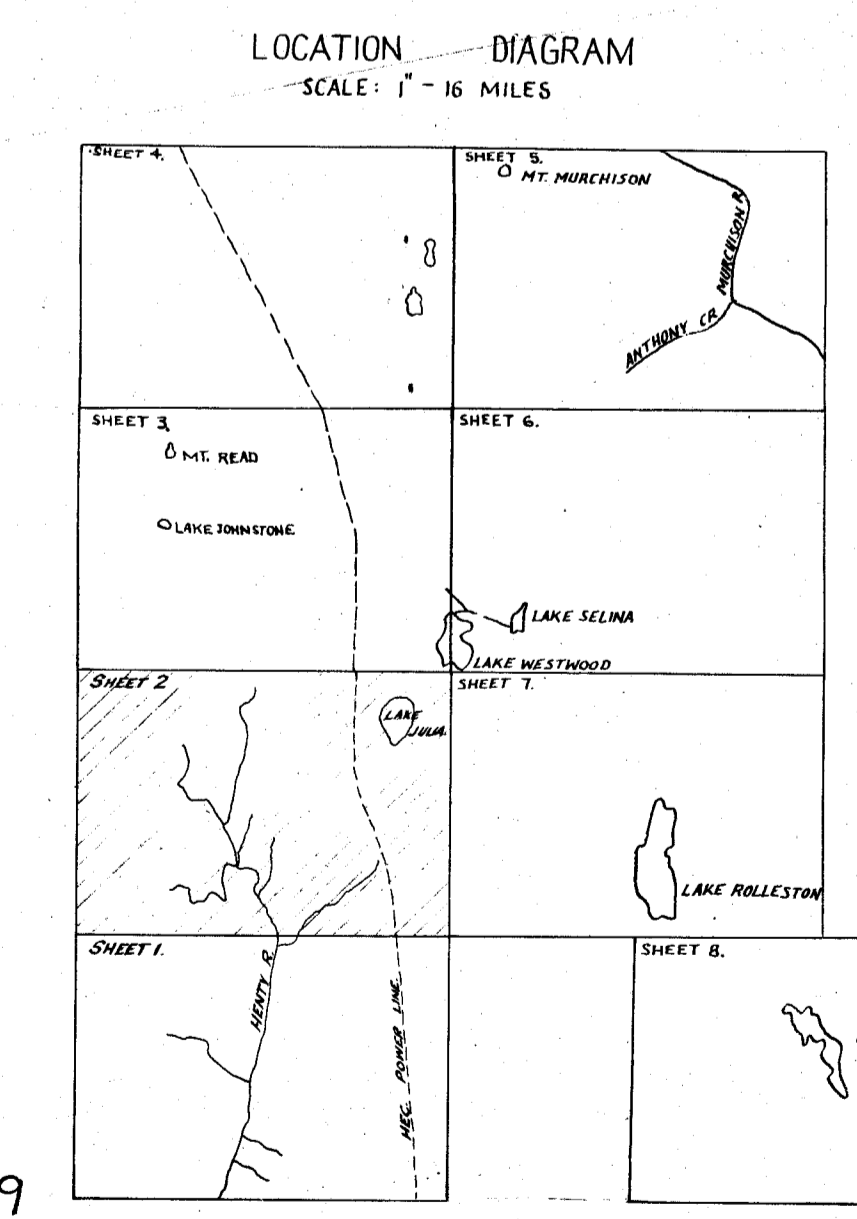
Sheet 1 473098

DRAWN BY N.S.M.
 TRACED BY R.G.W.
 CHECKED BY
 DATE 22/1/75
 SCALE 1" = 500'

FIG. 16



- SOUTH OF HENTY FAULT**
- Qc1 CONGLOMERATE
 - Qc2 SEDIMENTS, SANDSTONE, SHALE, OLIGOMICT CONGLOMERATE
 - Tyn1 GROUP
 - Tyn2 SEDIMENTS, SANDSTONE, SHALE, POLYMICT CONGLOMERATE
 - Qp1 COMSTOCK TUFFS, AGGLOMERATES, TUFFS.
 - Qp2 AUTOBRECCIATED LAVAS.
 - Qp3 BASAL UNIT.
 - Qp4 QUEENSTOWN PYROCLASTICS
 - Qp5 ACID LAVAS, QUARTZ FELDSPAR, PHYRIC, AUTOBRECCIATED.
 - Qp6 ACID PYROCLASTICS, TUFFS, HORNBRITES, MINOR ARGILLITES.
 - Qp7 VOLCANOCLASTIC SEDIMENTS.
 - Qp8 INTERMEDIATE PYROCLASTICS, SILTSTONES, SHALES, CARBONATES, MINOR ACID VOLCANICS.
 - Qp9 INTERMEDIATE LAVAS AND INTRUSIVES, QUARTZ FELDSPAR, HORNBLENDE PHYRIC TYPES.
 - Qp10 INTERMEDIATE PYROCLASTICS, GREYNAKES, SHALES, MINOR ACID VOLCANICS.
 - Qp11 ACID PYROCLASTICS, MINOR LAVAS AND SEDIMENTS.
 - DUNDAS GROUP
 - DUNDAS SEDIMENT SHALE, MUDSTONE.
 - Qp12 MAFIC AND ULTRAMAFIC INTRUSIVE.
- NORTH OF HENTY FAULT**
- DUNDAS GROUP
 - SEDIMENT SHALE, MUDSTONE.
 - PRIMROSE VOLCANICS
 - Pv1 ACID CRYSTAL, FELDSPAR LITHIC TUFFS, OCCASIONALLY WELDED.
 - Pv2 SHALES, SILTSTONES, FINE GRAINED TUFFS.
 - Pv3 ACID QUARTZ, FELDSPAR LITHIC TUFFS, OCCASIONALLY WELDED.
 - Pv4 ACID WELDED TUFFS, BASIC INTRUSIVES.
 - Pv5 ACID LAVAS, FELDSPAR PHYRIC.



Zn -108 ± 80#
Pb
Cu
Cl
Zn -80#

FIRST ORDER ANOMALY
SECOND ORDER ANOMALY

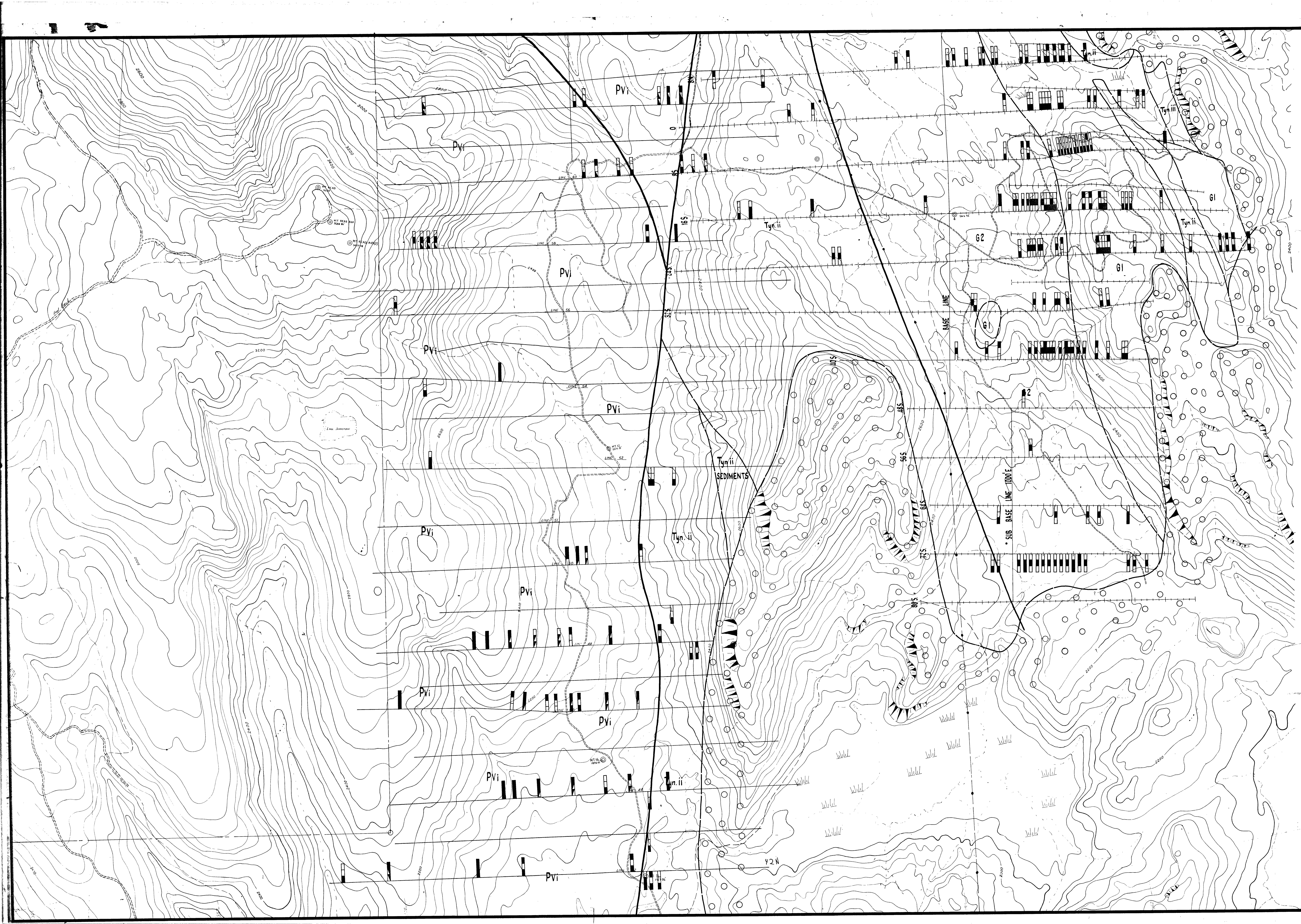
5 NOV 1975

75-1149

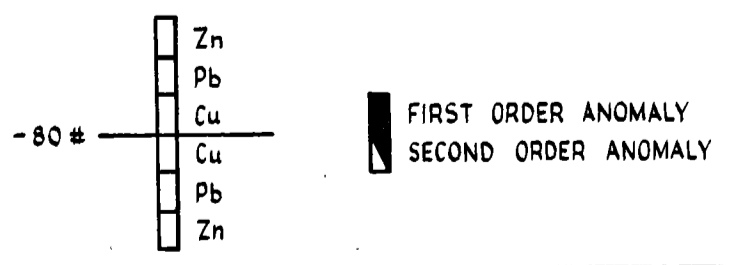
THE CONSOLIDATED SYNDICATE
GEOCHEM. ANOMALIES & INTERPRETIVE GEOLOGY
MT. TYNDALL AREA
EL. 9/66
Sheet 2 473099

DRAWN BY: N.S.H.
CHECKED BY: R.B.W.
DATE: 2/11/75
SCALE: 1" = 500'

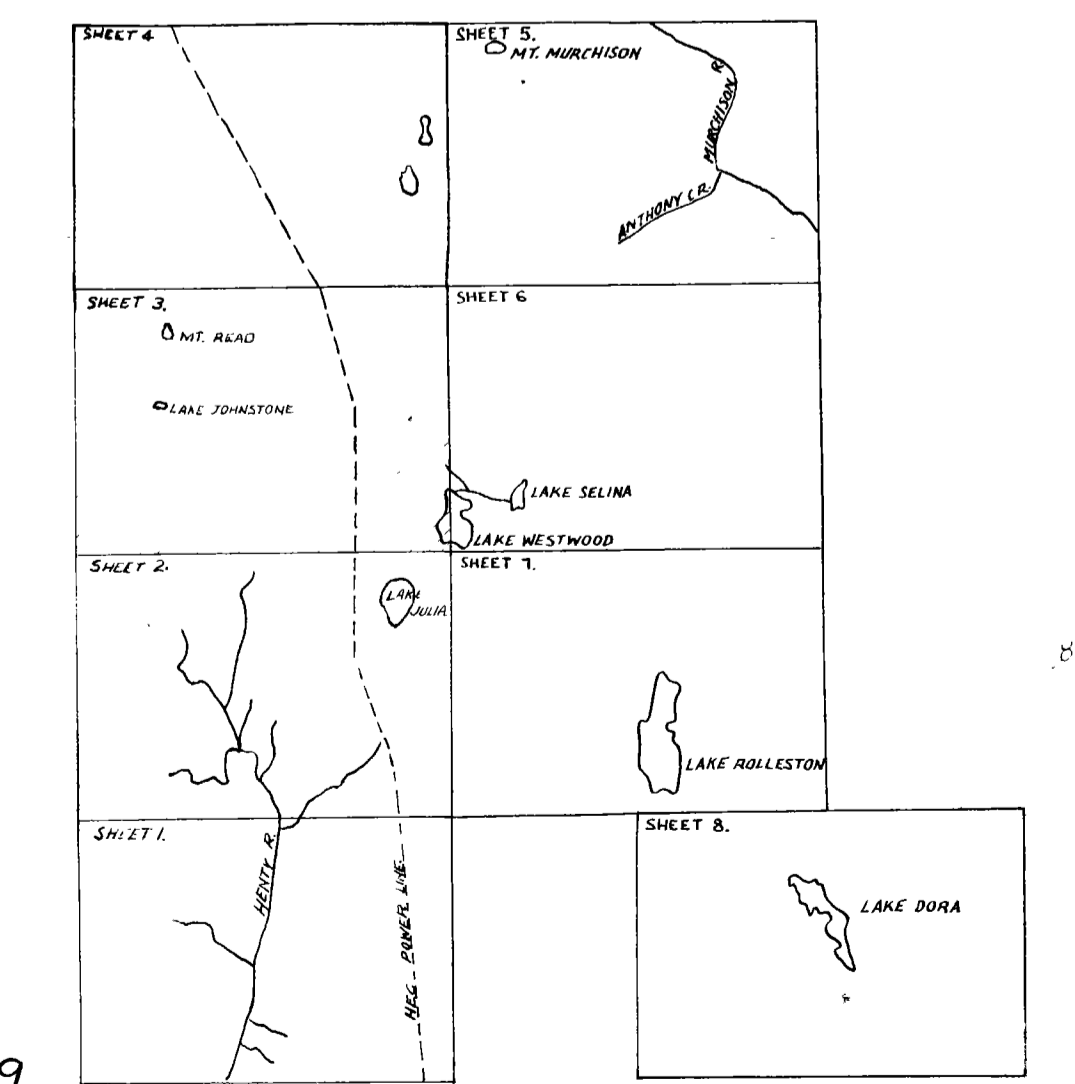
FIG. 17



- OWEN CONGLOMERATE
- SHALES, SANDSTONE, CONGLOMERATE.
- TYNDALL GROUP
- Tyn.iii VOLCANOCLASTIC SEDIMENTS.
- Tyn.ii COMSTOCK TUFF EQUIVALENT, ACID LAVAS.
- Tyn.i PRIMROSE VOLCANICS.
- Pvi ACID LAVAS AND PYROCLASTICS, INTERMEDIATE AND BASIC VOLCANICS.
- G2 MT. READ VOLCANICS.
- G1 ACID LAVAS, PYROCLASTICS AND SEDIMENTS.
- DARWIN TYPE RHYOLITES.



LOCATION DIAGRAM
SCALE: 1" = 16 MILES

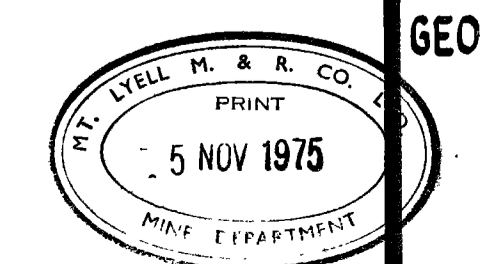


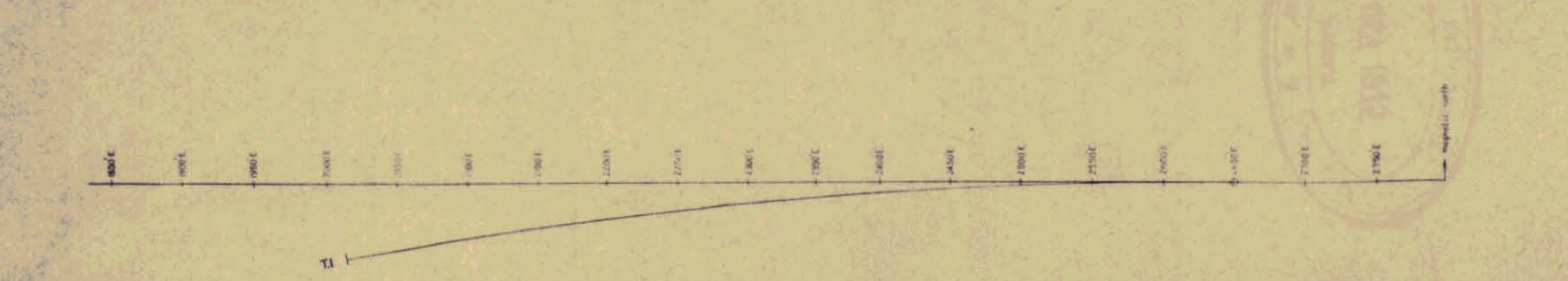
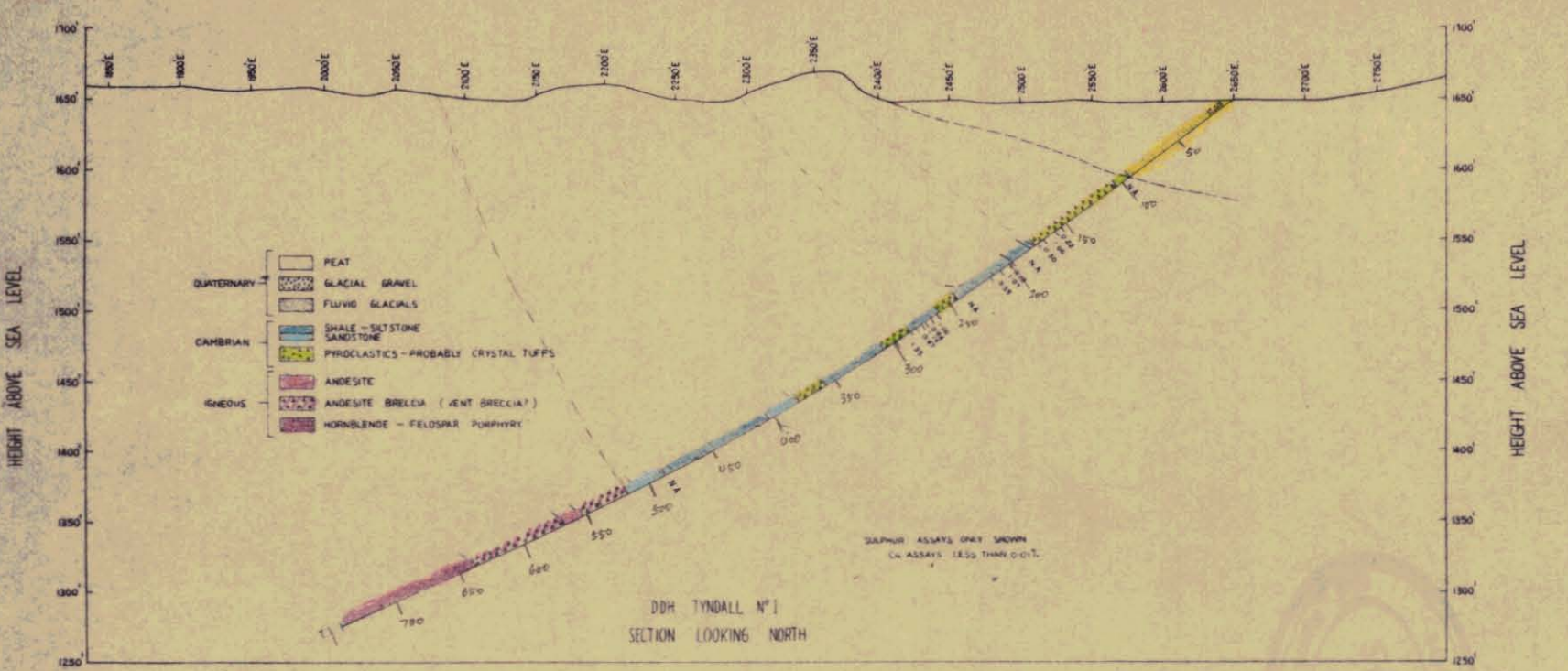
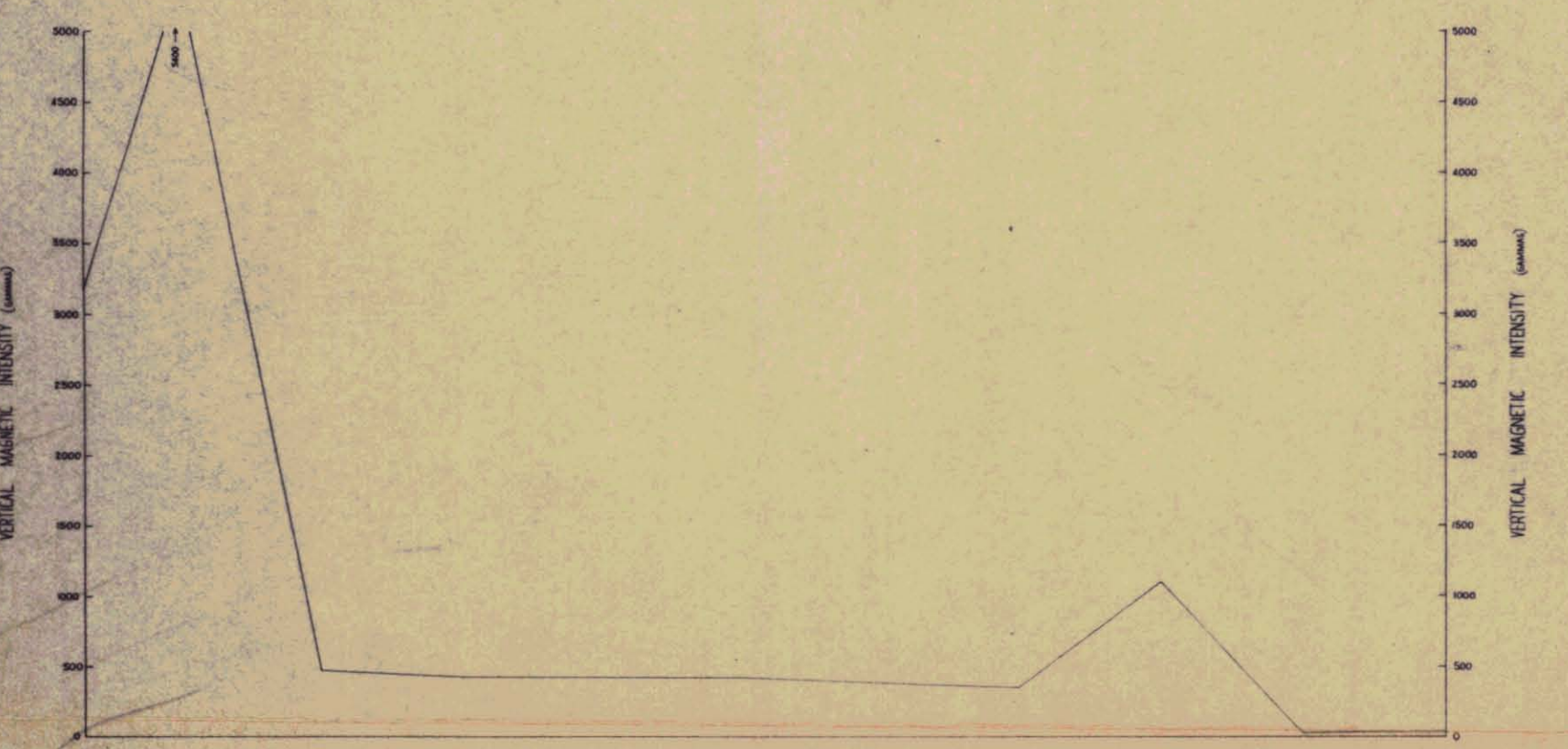
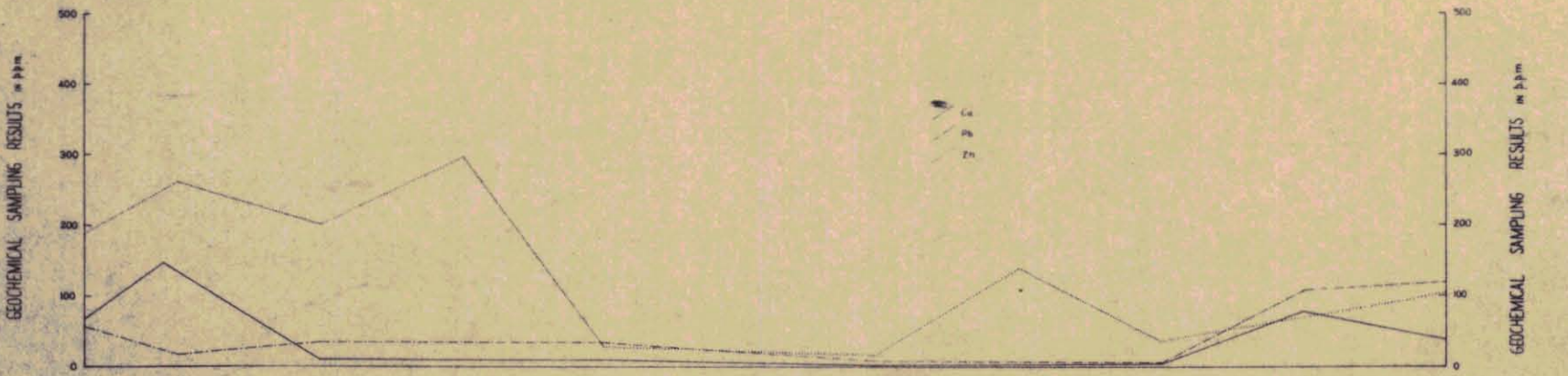
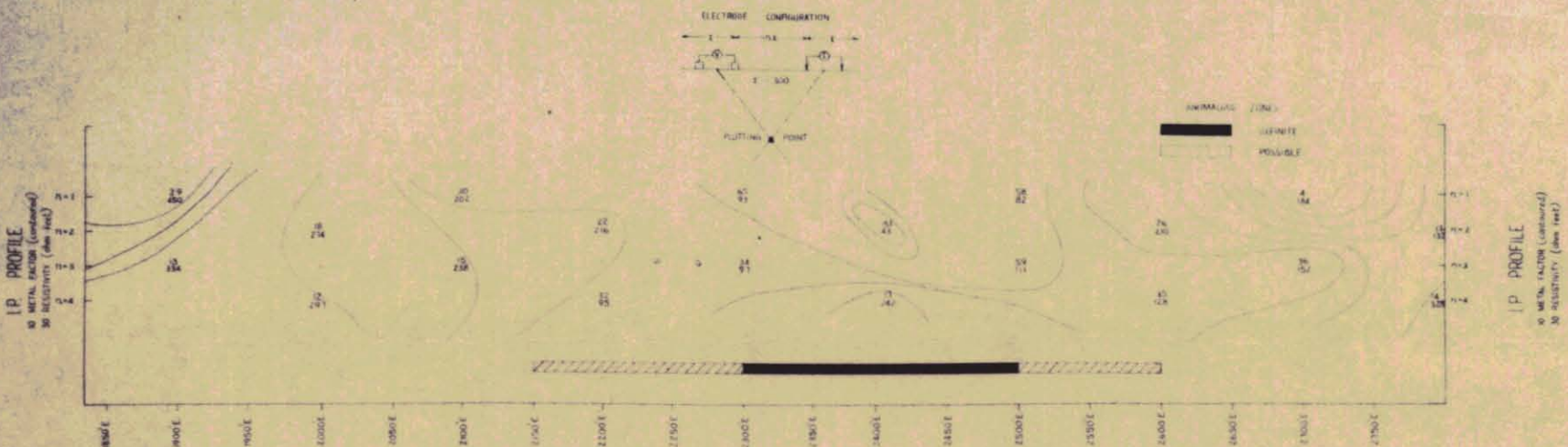
75-1149

THE CONSOLIDATED SYNDICATE
GEOCHEM. ANOMALIES & INTERPRETIVE GEOLOGY
MT. TYNDALL AREA
EL. 9/66
Sheet 3. 473100

DRAWN BY N.S.H.
TRACED BY R.G.W.
CHECKED BY
DATE 28.11.75
SCALE 1" = 500'

FIG. 18





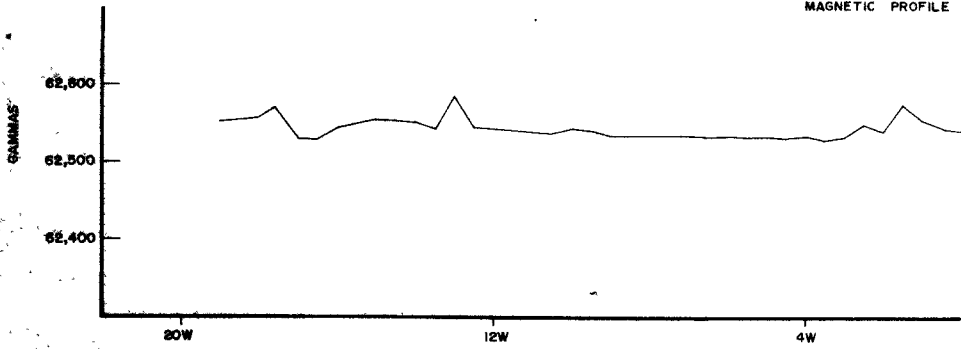
801

5 cm

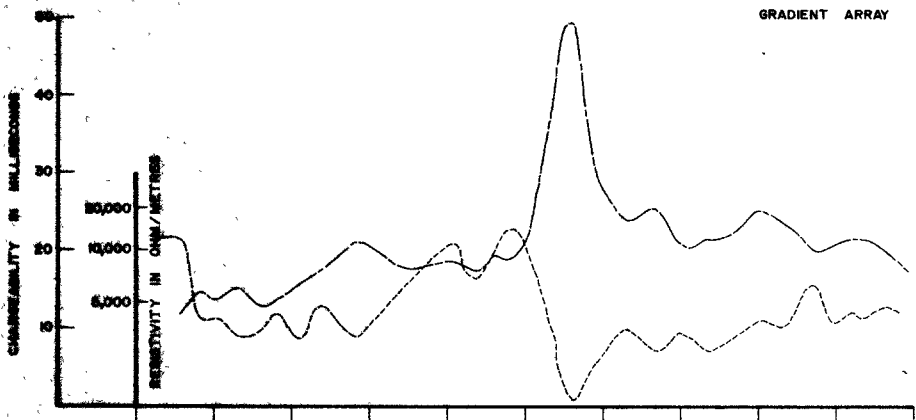
THE CONSOLIDATED SYNDICATE
 HENTY GRID
 LINE 12E
 GEOPHYSICAL, GEOCHEMICAL & DRILLING RESULTS. FIG. 20

473101

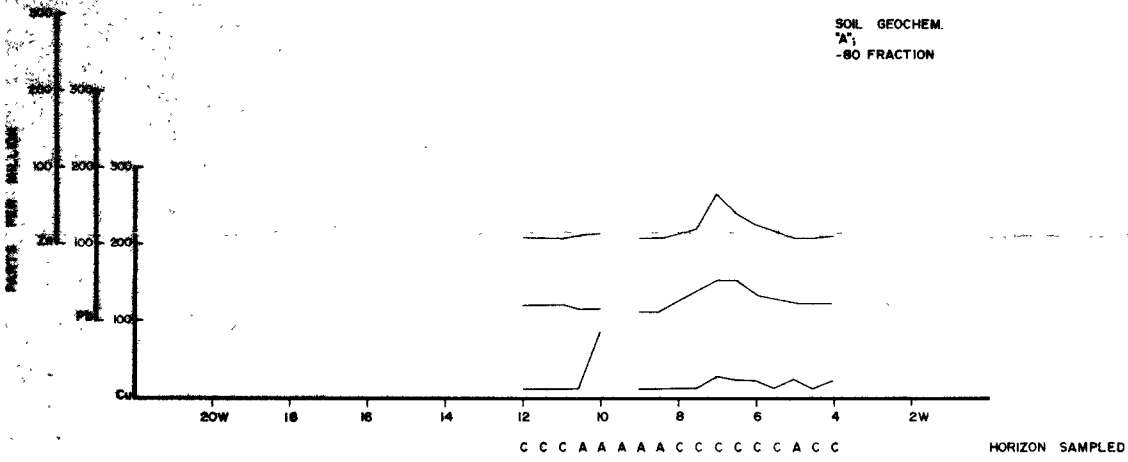
MAGNETIC PROFILE



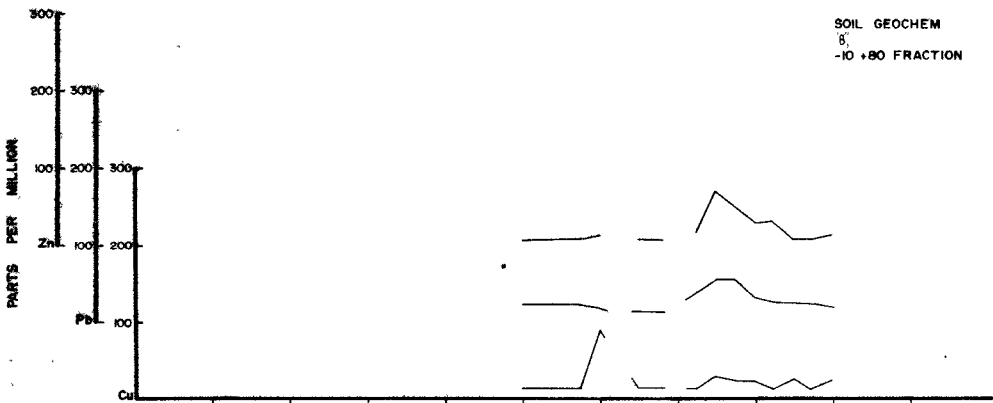
GRADIENT ARRAY



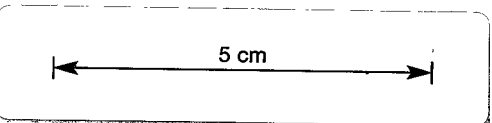
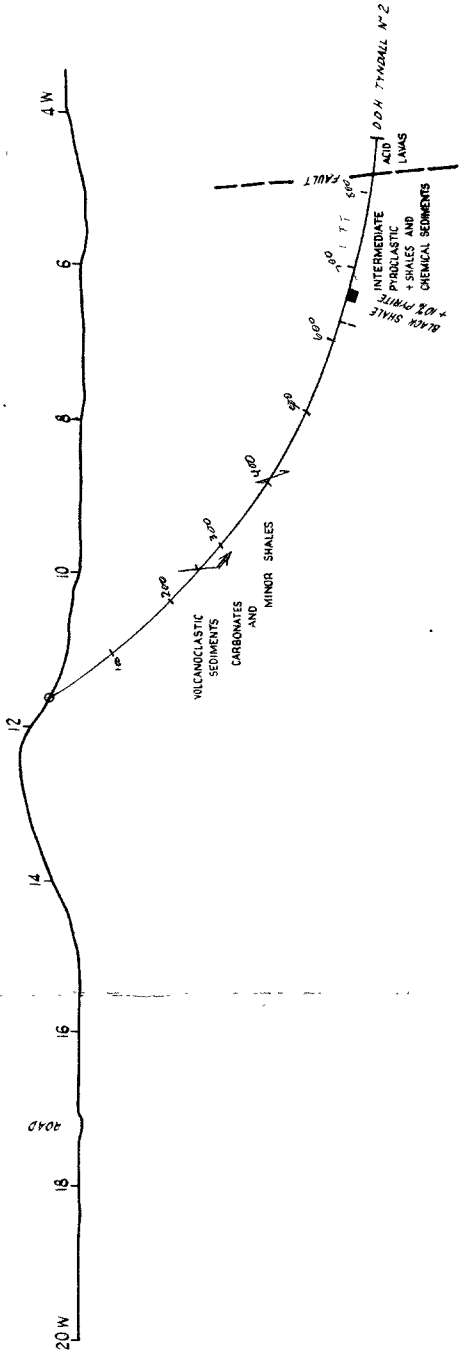
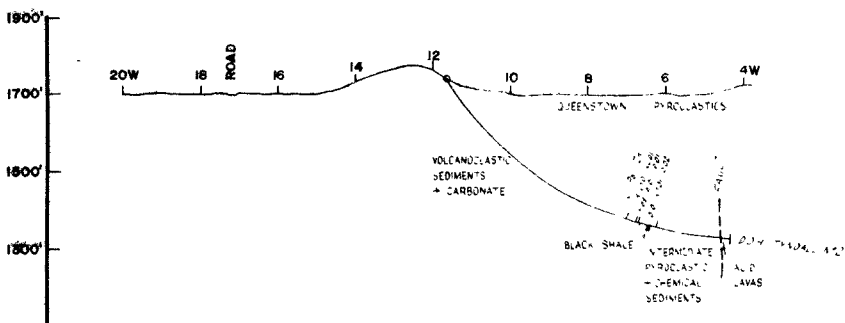
SOIL GEOCHEM. 'A' -80 FRACTION



SOIL GEOCHEM. 'B' -10 +80 FRACTION



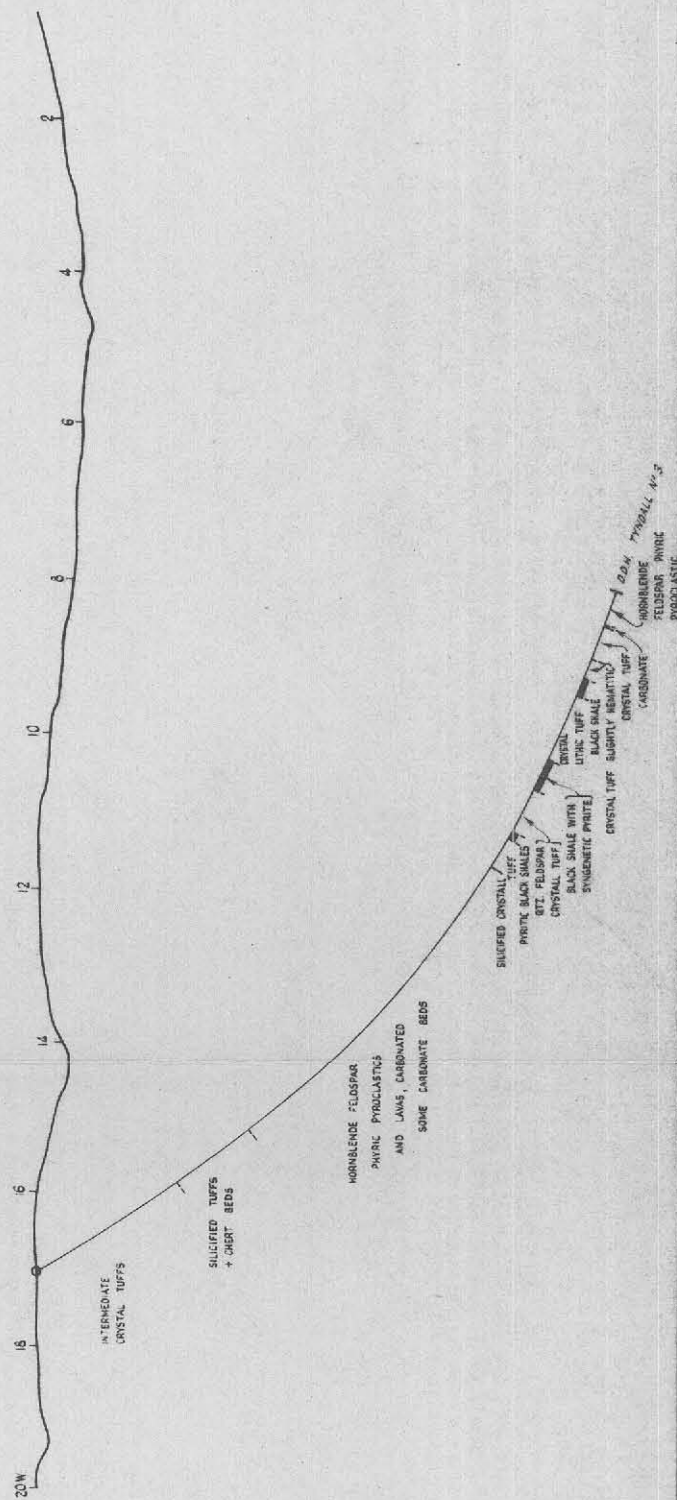
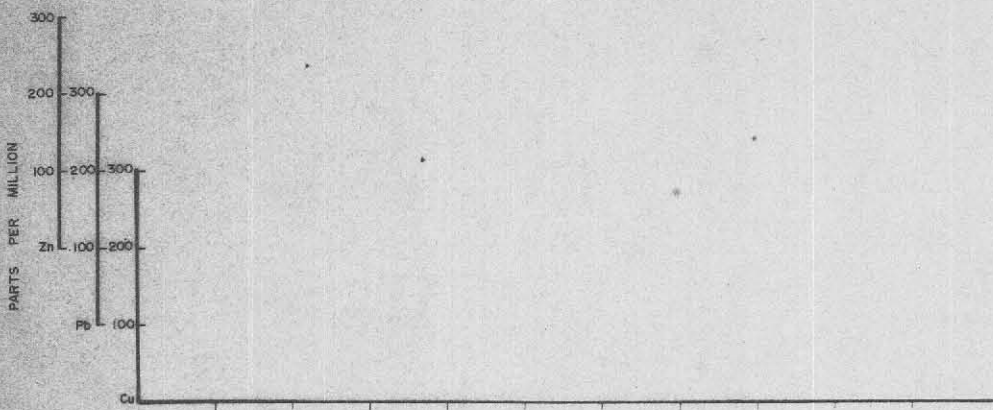
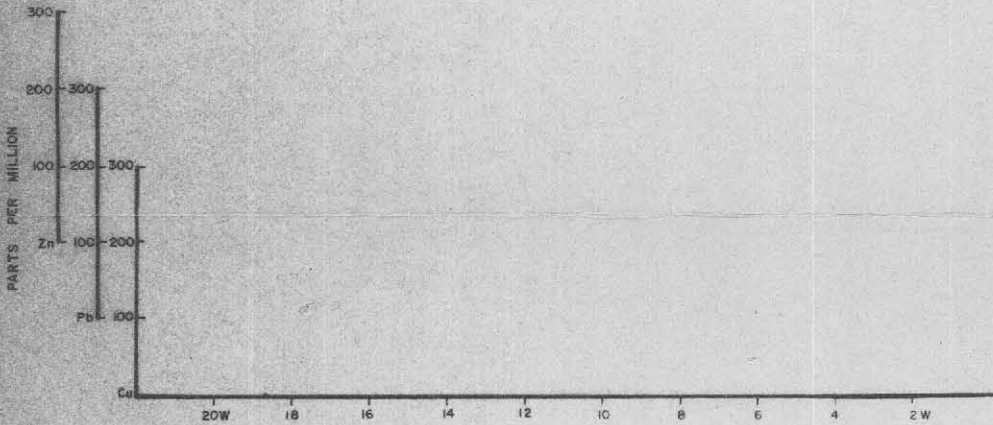
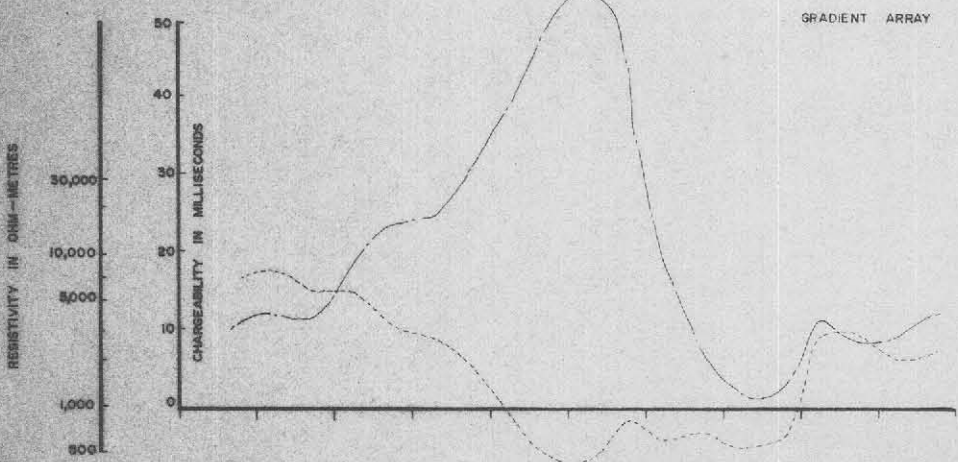
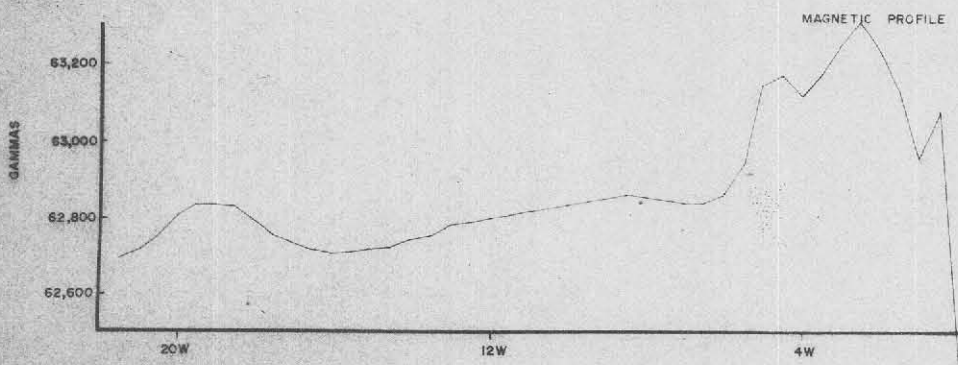
PROFILE AND GEOLOGY



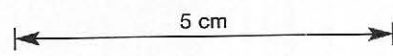
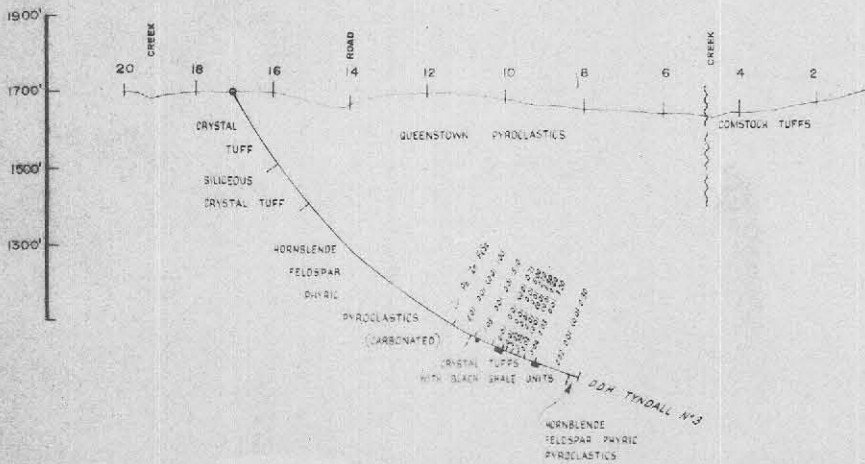
THE CONSOLIDATED SYNDICATE
 MT TYNDALL AREA E.L. 9/66
 ZONE "A" - LINE 4N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

DRAWN V-SH
 TRACED RGN
 CHECKED
 DATE 10 2 '75
 SCALE AS SHOWN

FIG. 21



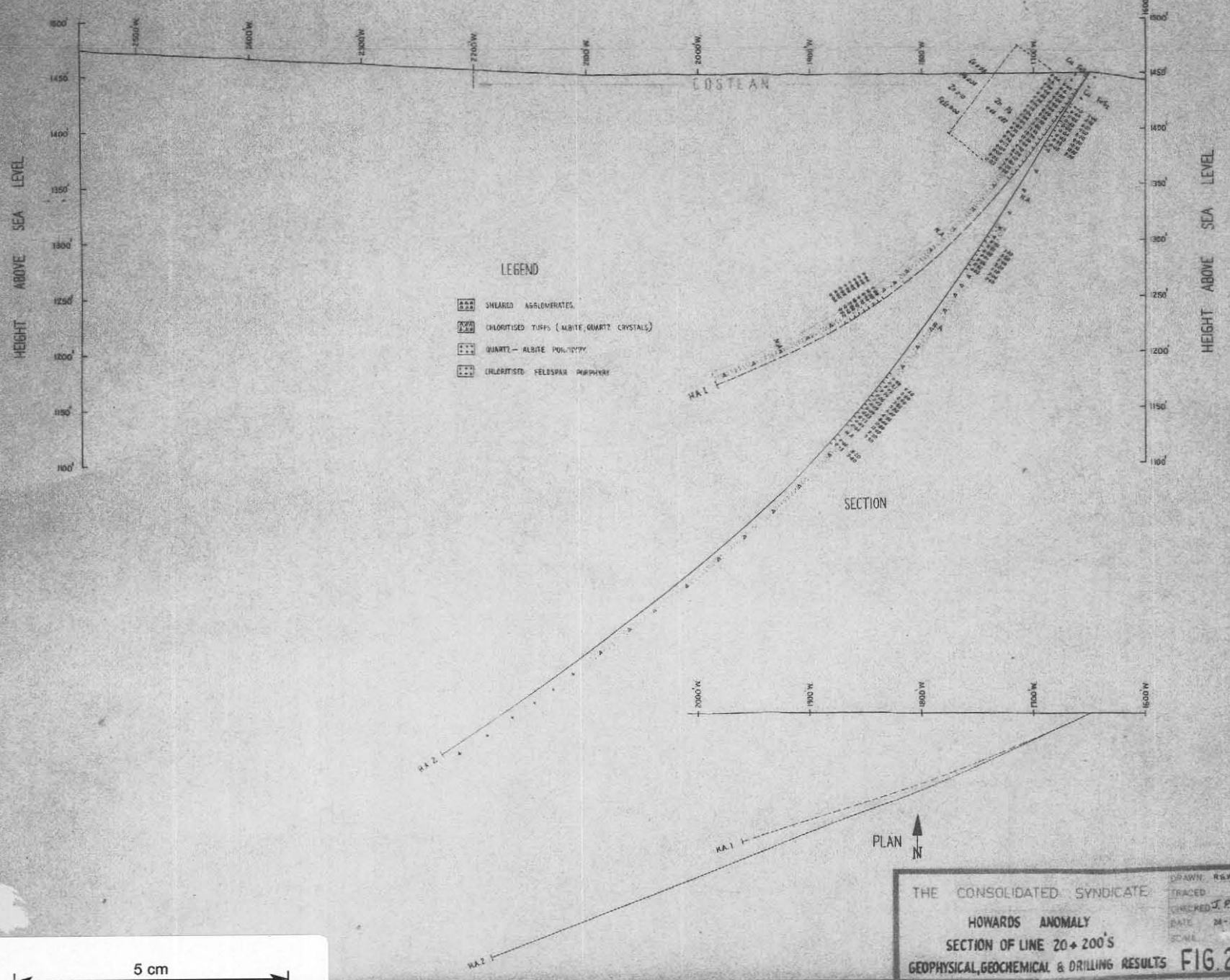
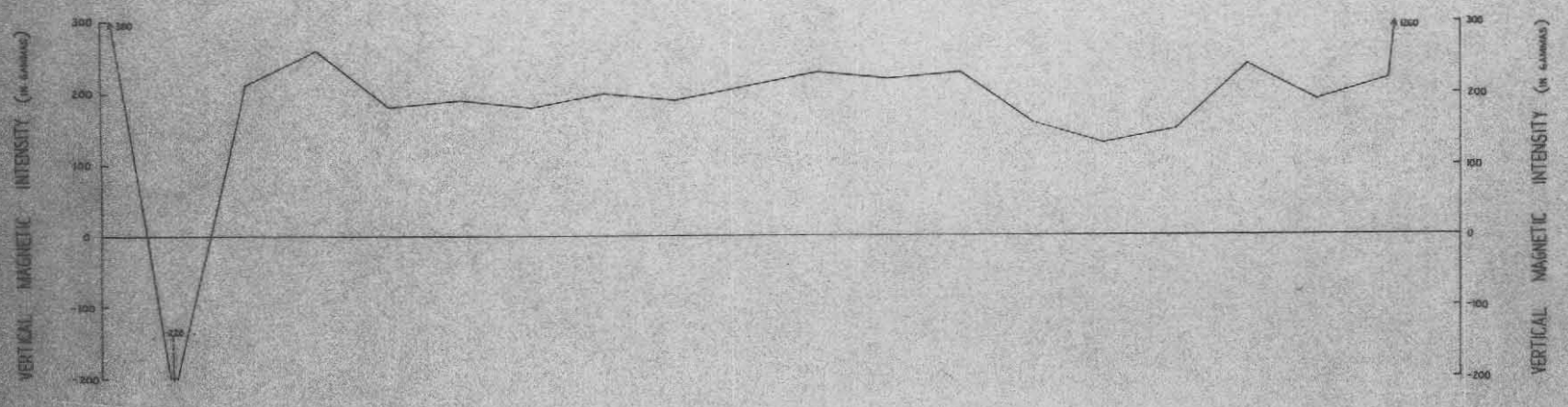
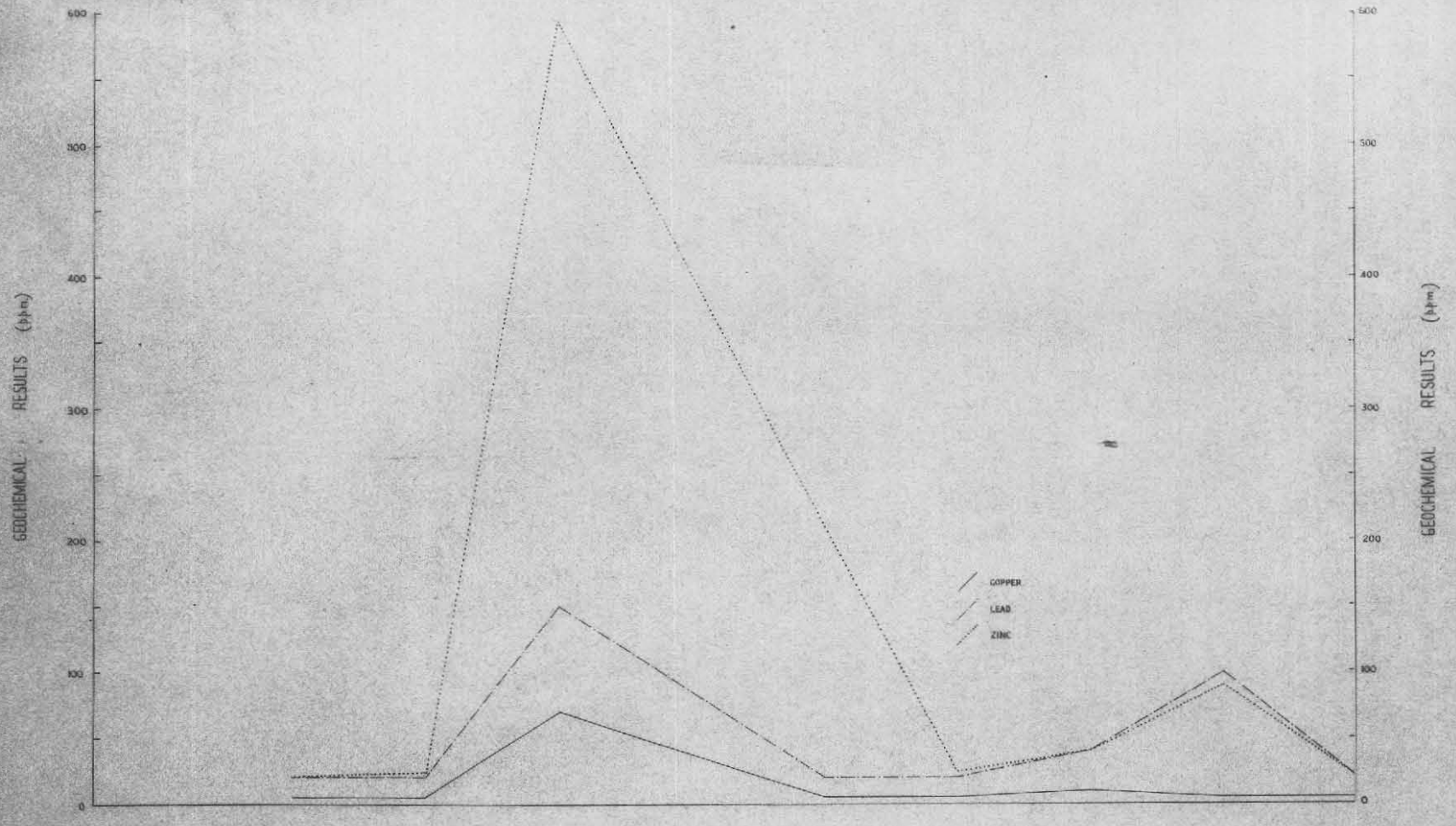
PROFILE AND GEOLOGY



THE CONSOLIDATED SYNDICATE
 MT. TYNDAL AREA E.L. 3/65
 HOWARD'S ANOMALY - UNIT 15N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

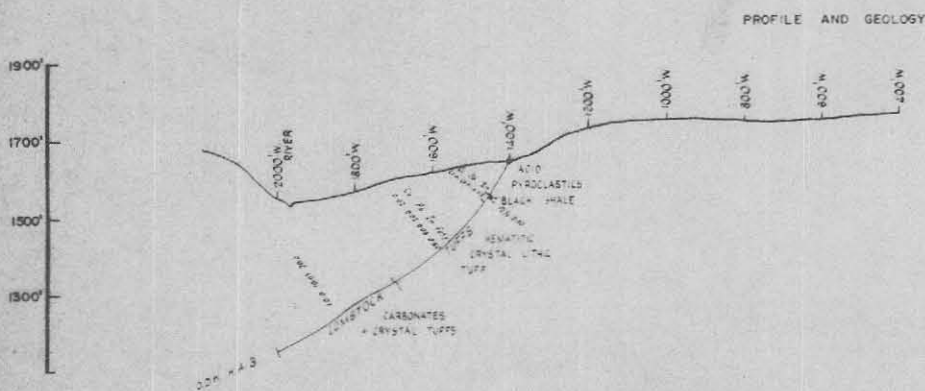
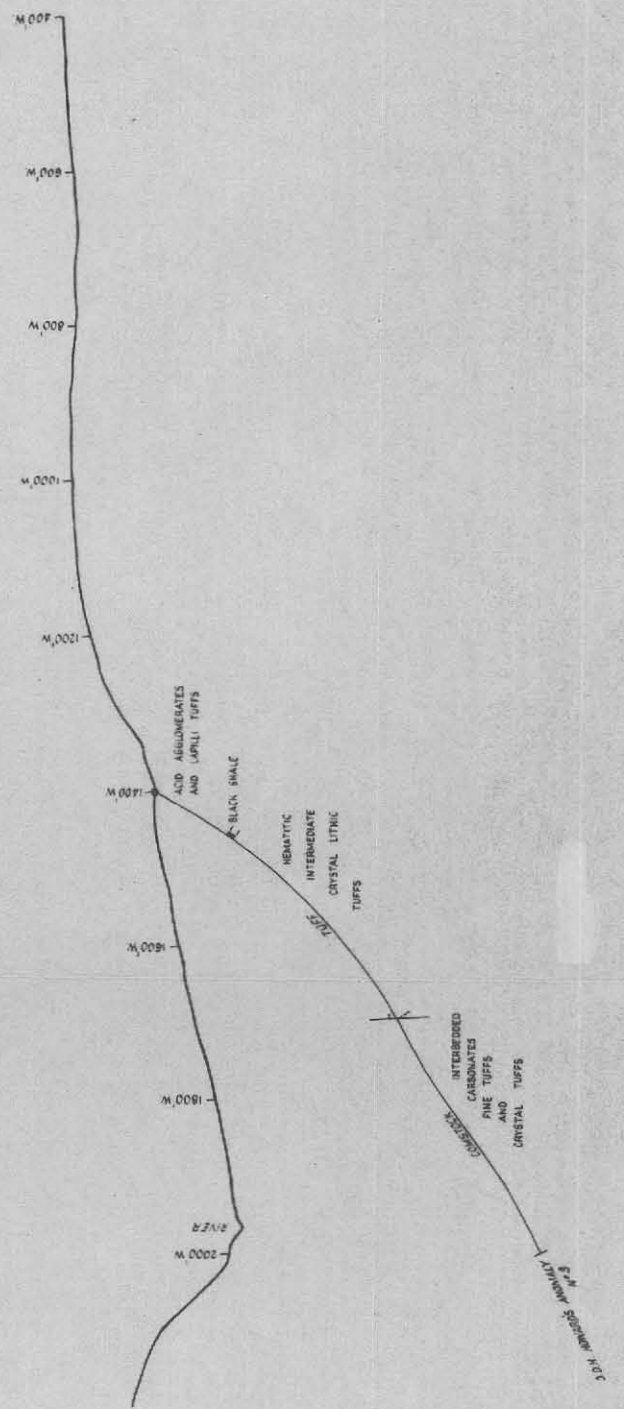
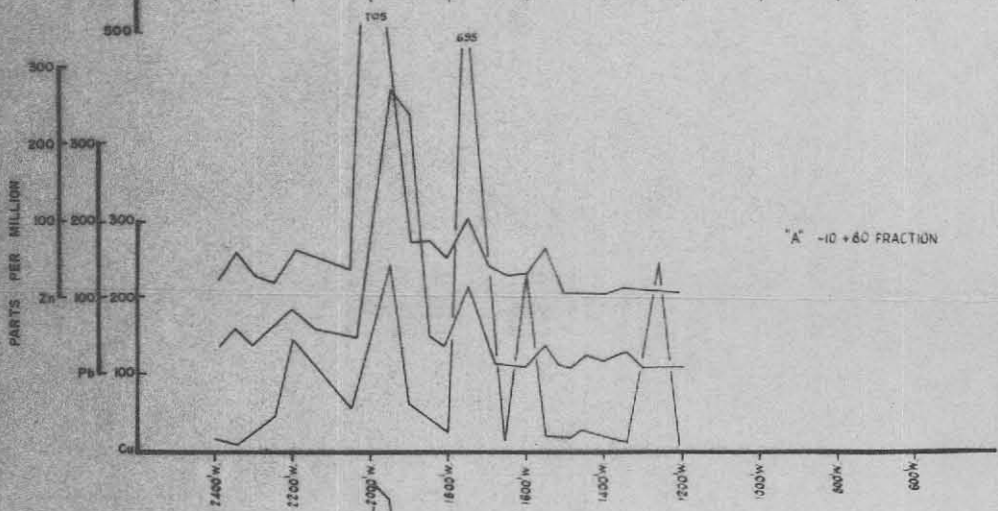
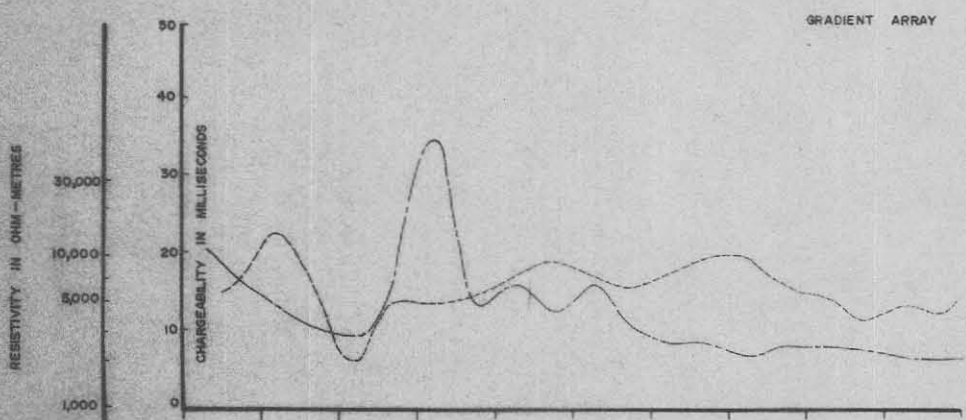
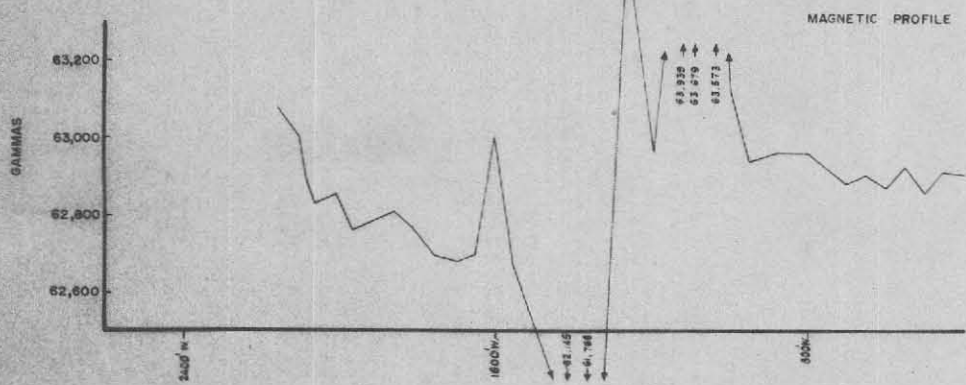
DRAWN N.S.-M.
 TRACED R.G.W.
 CHECKED
 DATE 10.2.75
 SCALE AS SHOWN

FIG. 22



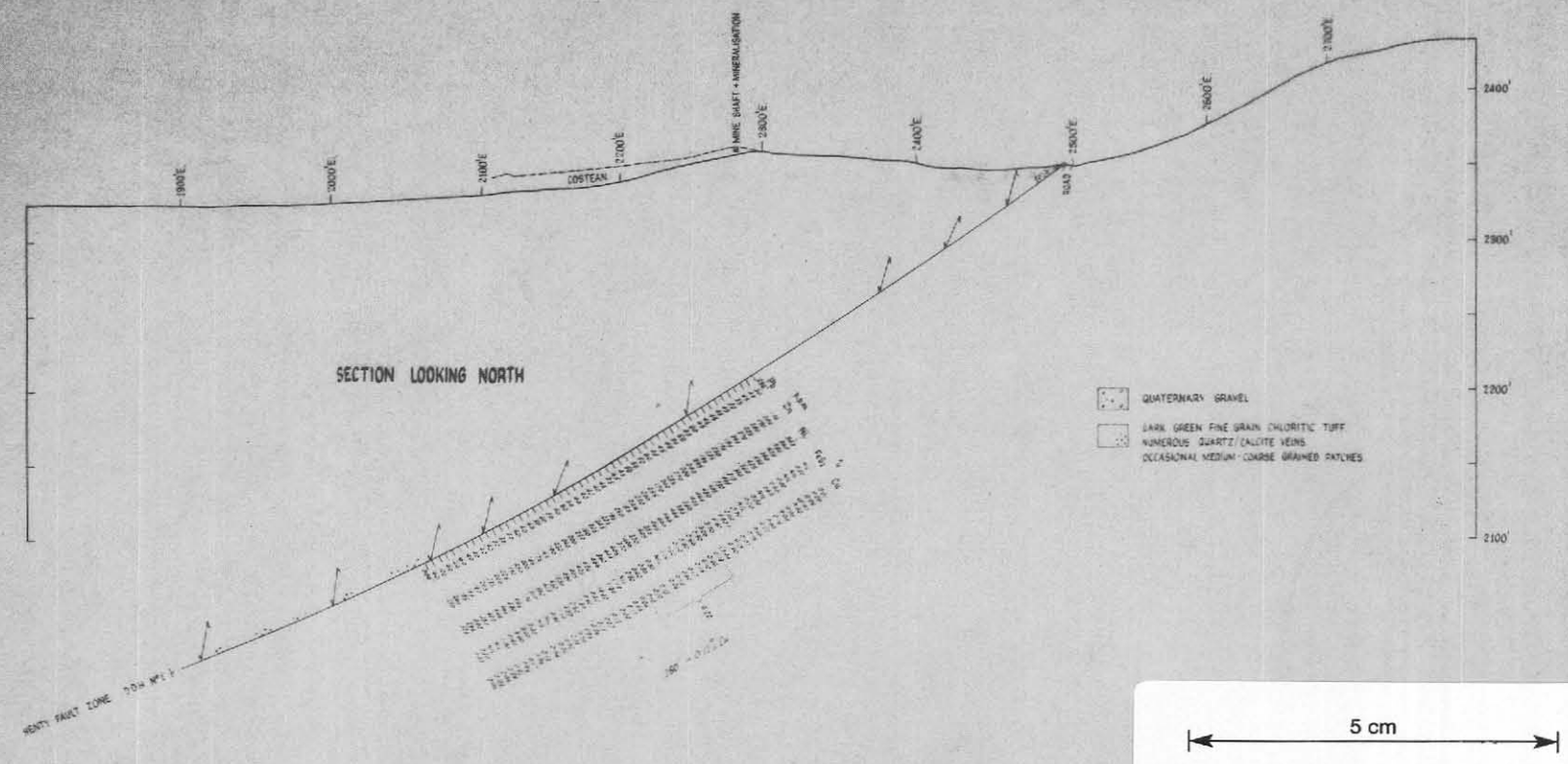
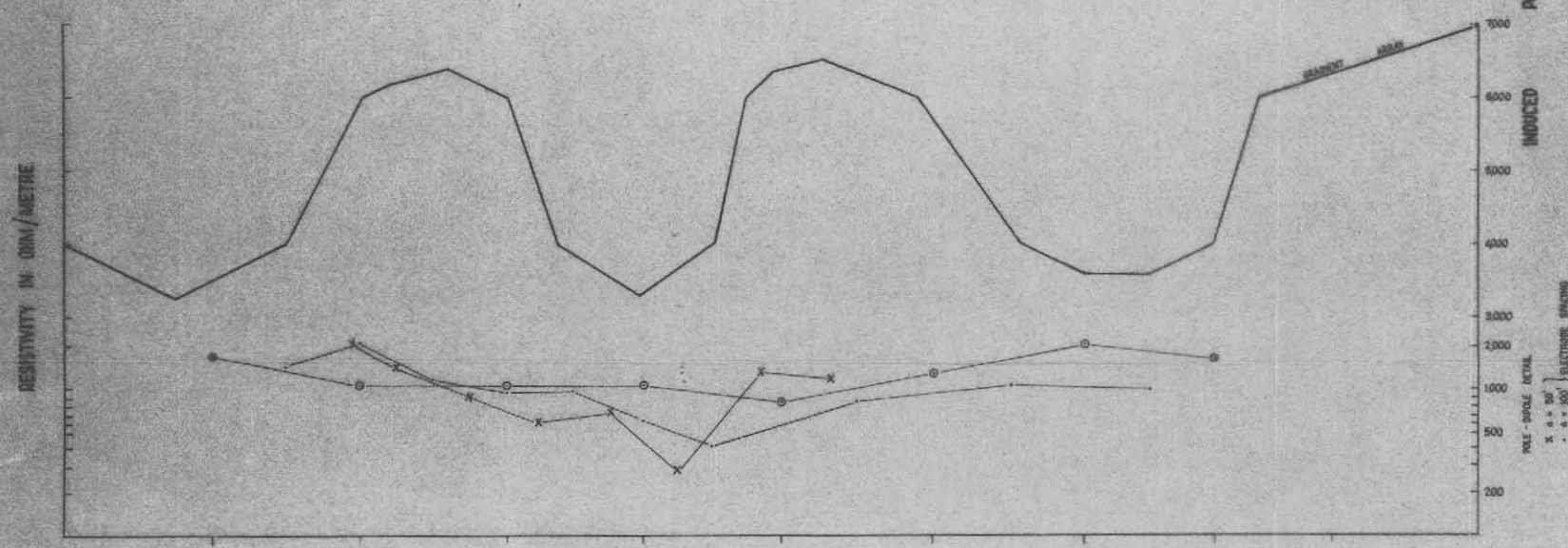
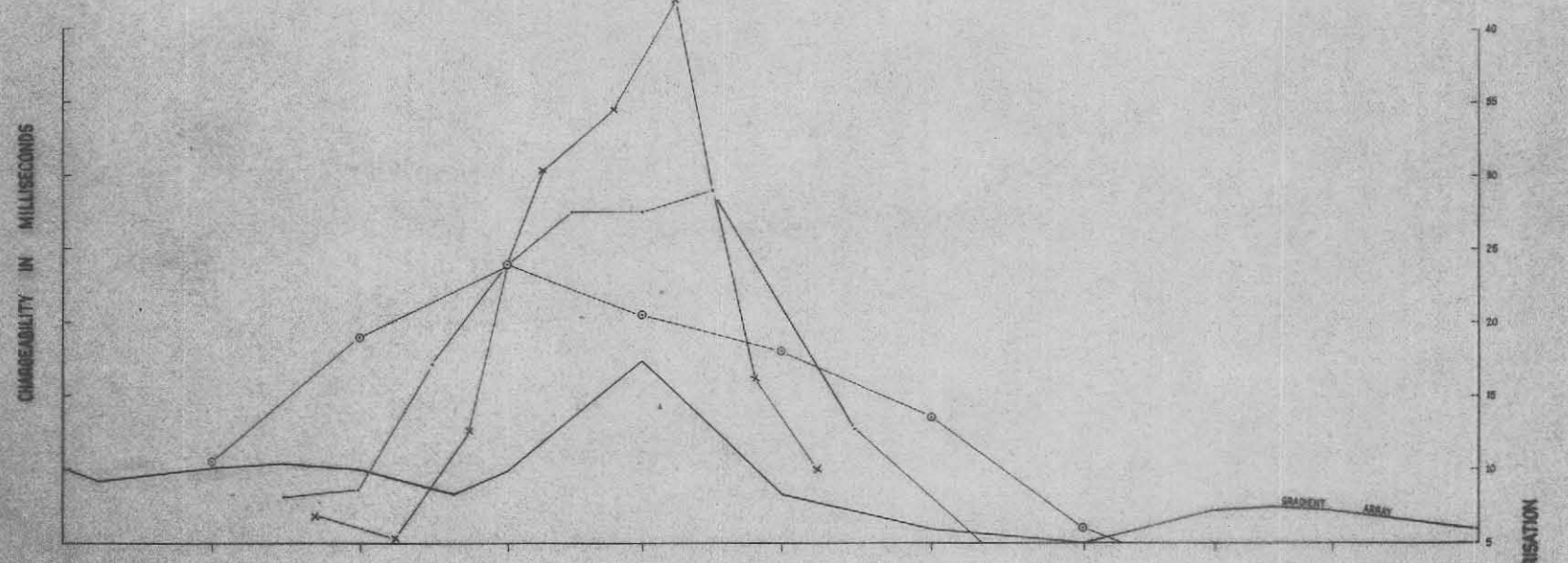
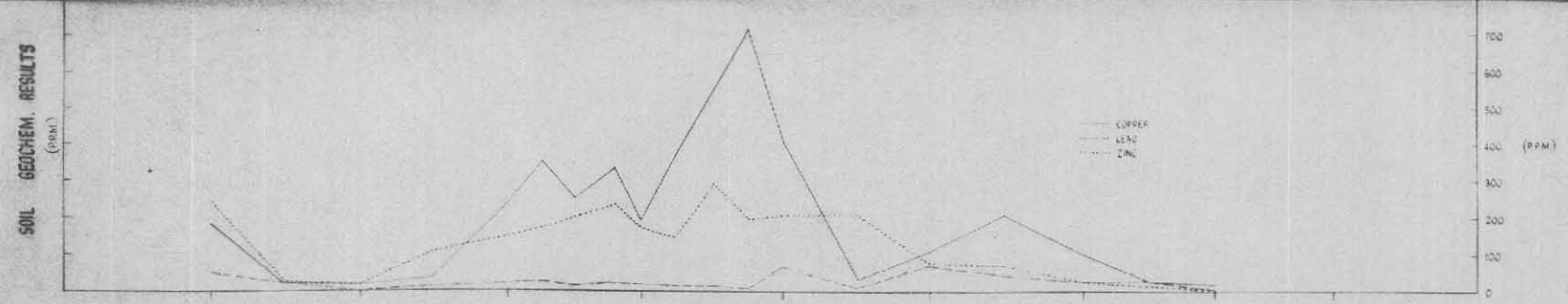
THE CONSOLIDATED SYNDICATE
 HOWARDS ANOMALY
 SECTION OF LINE 20+200'S
 GEOPHYSICAL, GEOCHEMICAL & DRILLING RESULTS
 DRAWN: R.W.M.
 TRACED:
 CHECKED: J.P.M.K.
 DATE: 11-3-75
 SCALE:
FIG. 23

5 cm



5 cm

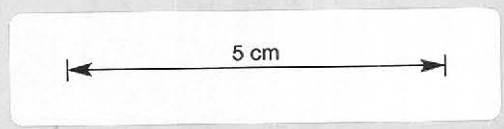
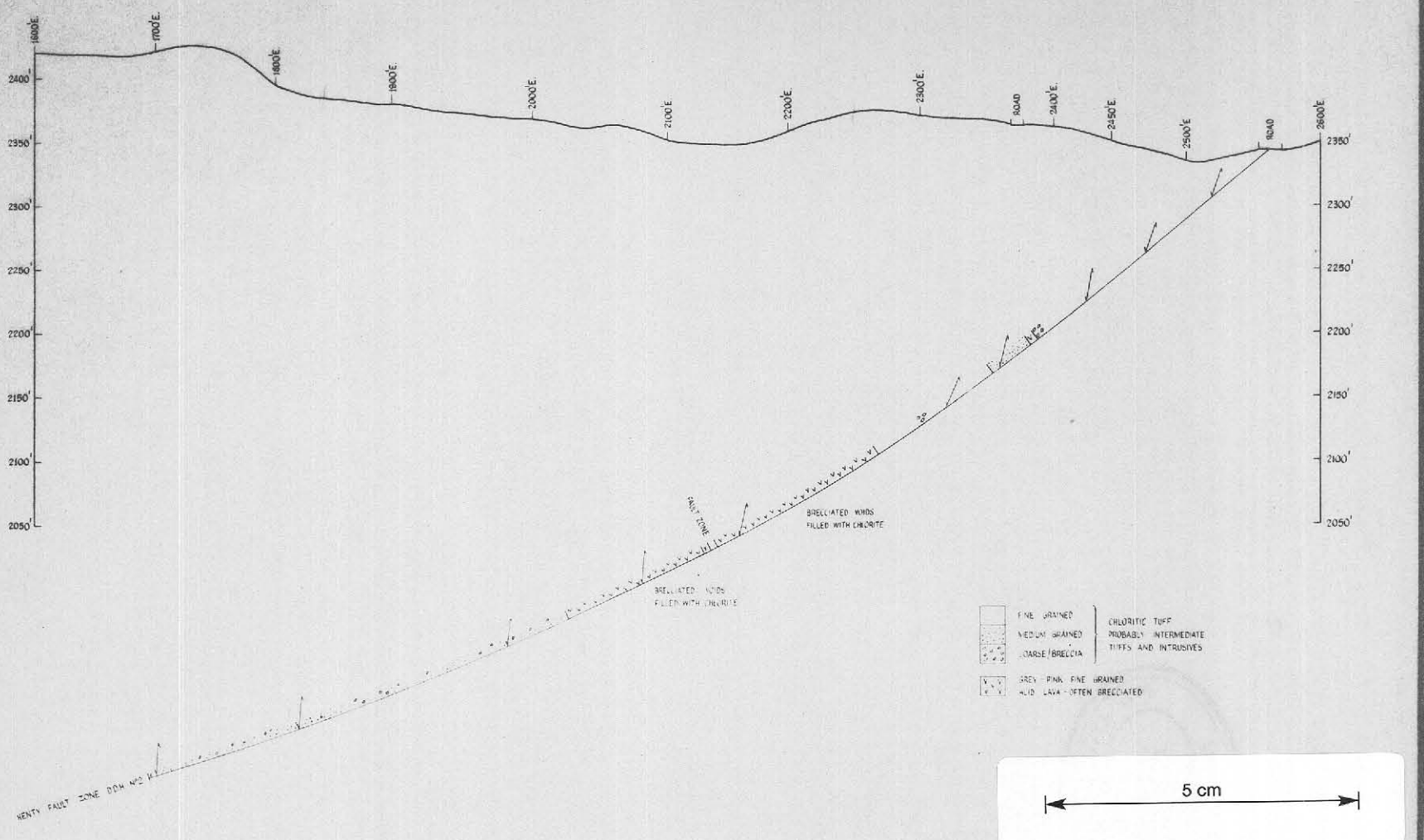
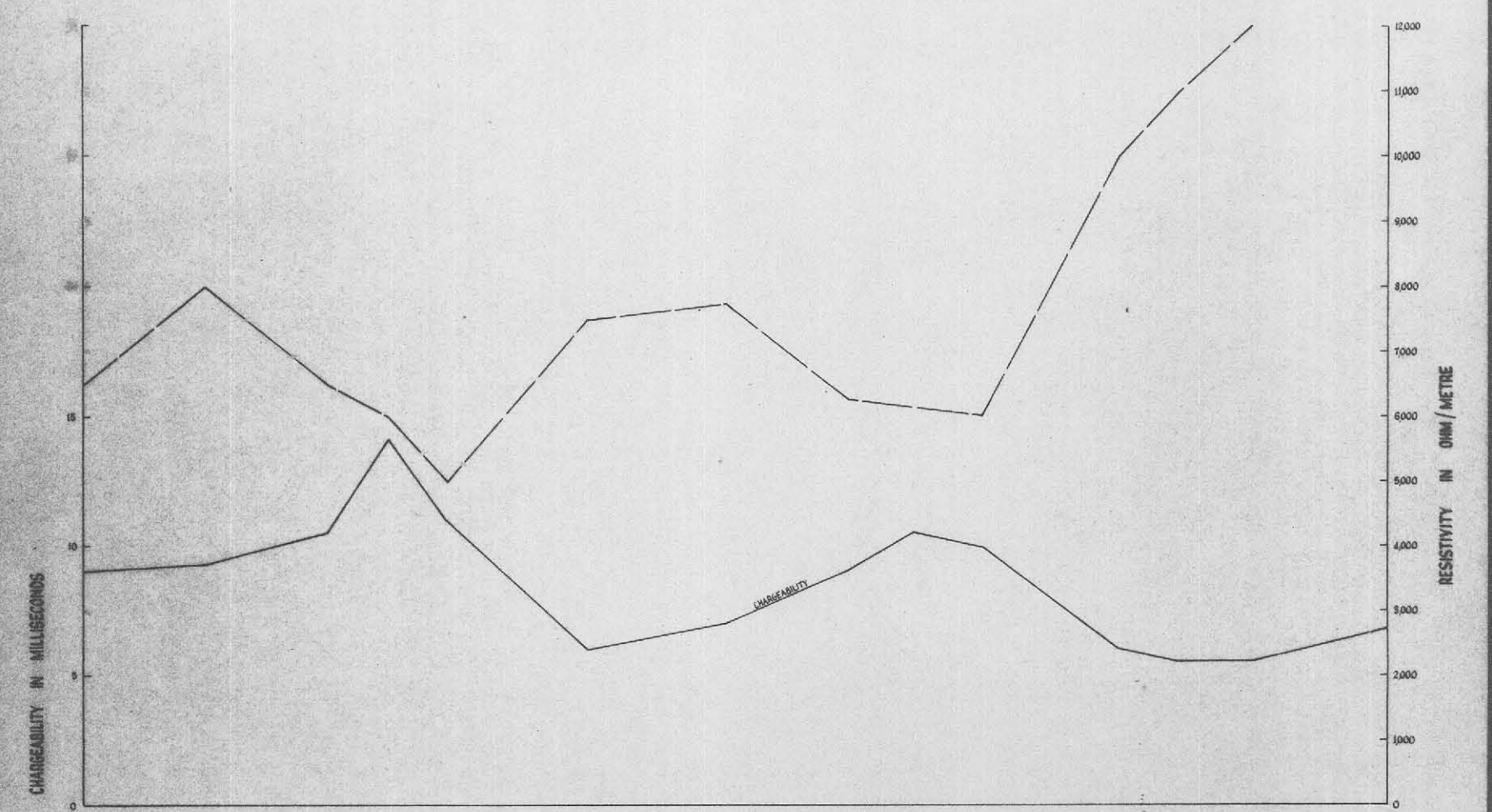
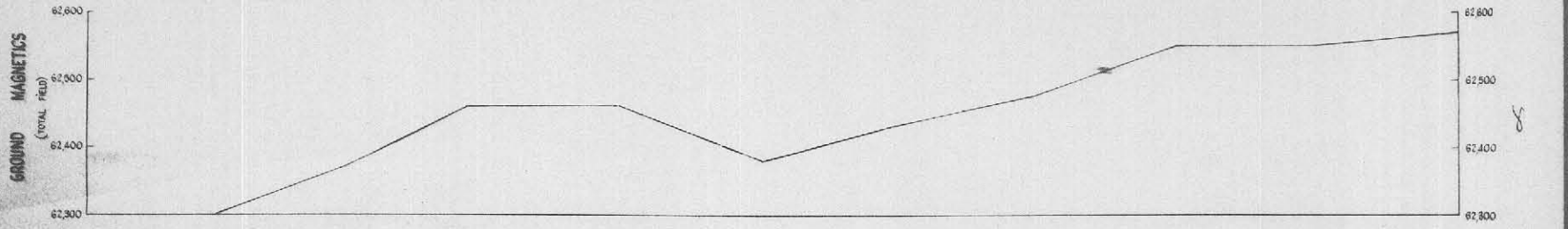
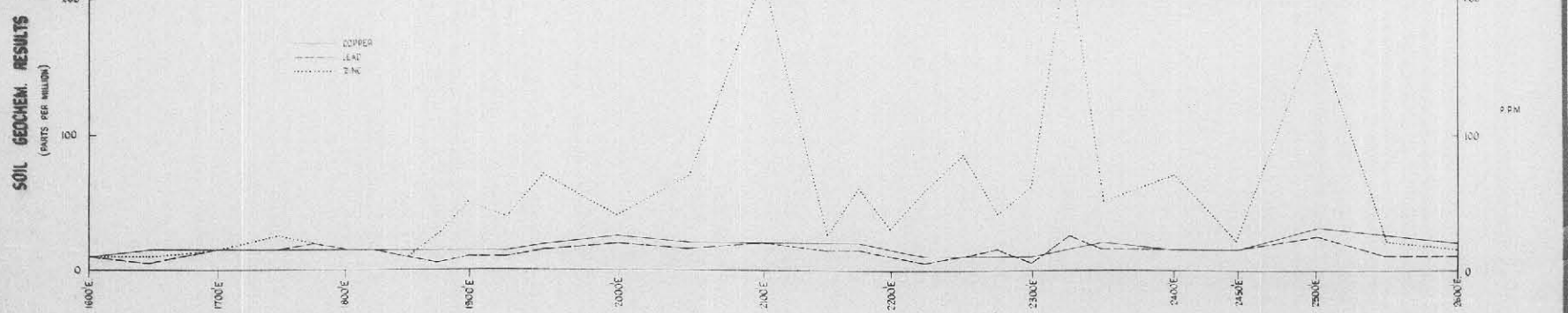
THE CONSOLIDATED SYNDICATE	DRAWN: N.S.H.
M.T. TYNDALL AREA E.L. 9/66	TRACED: R.G.W.
HOWARD'S ANOMALY - LINE 23N.	CHECKED:
GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS	DATE: 10/2/73
	SCALE: AS SHOWN
	FIG. 25



THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 63N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

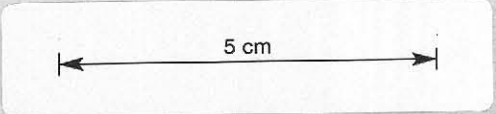
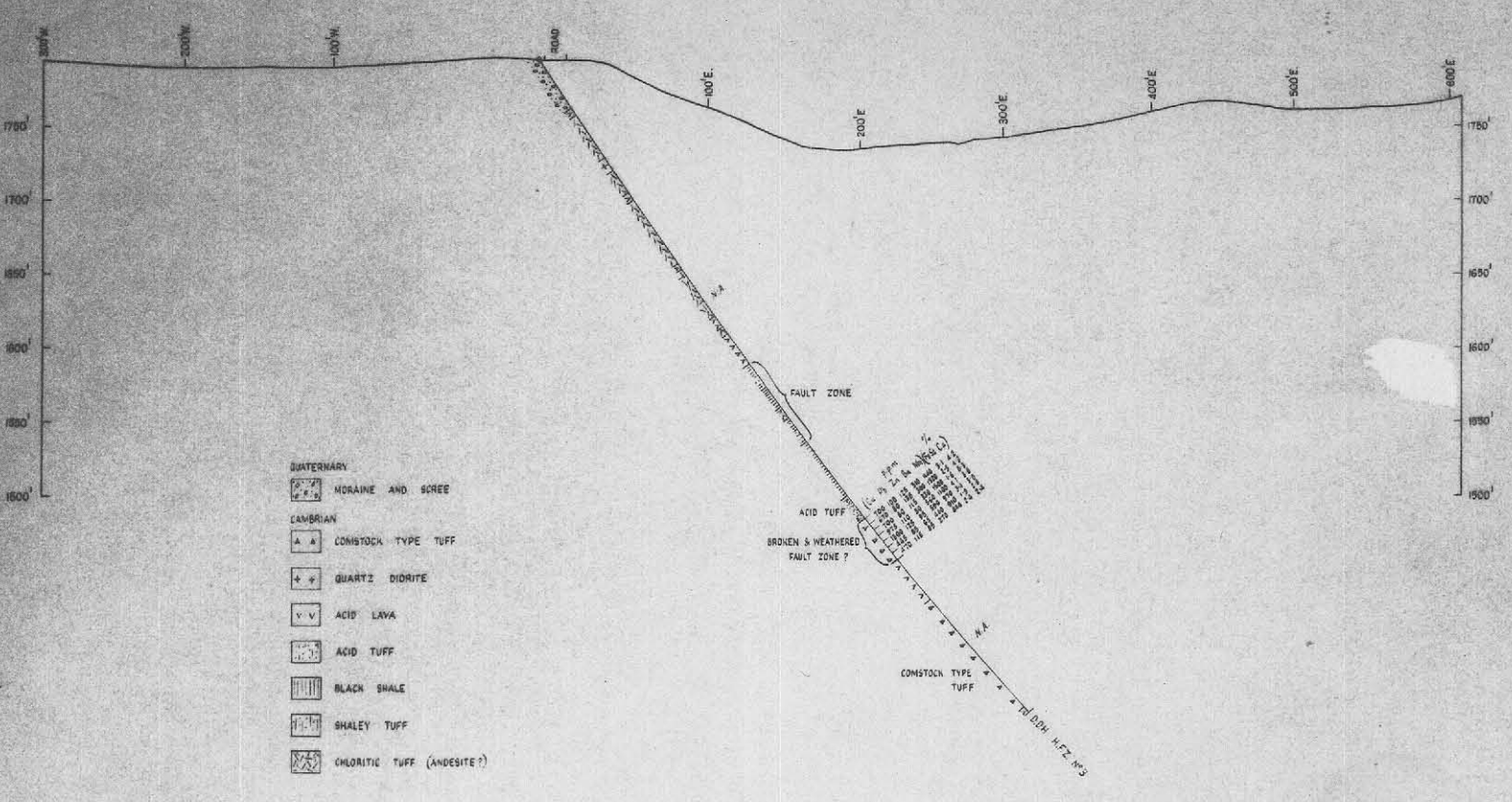
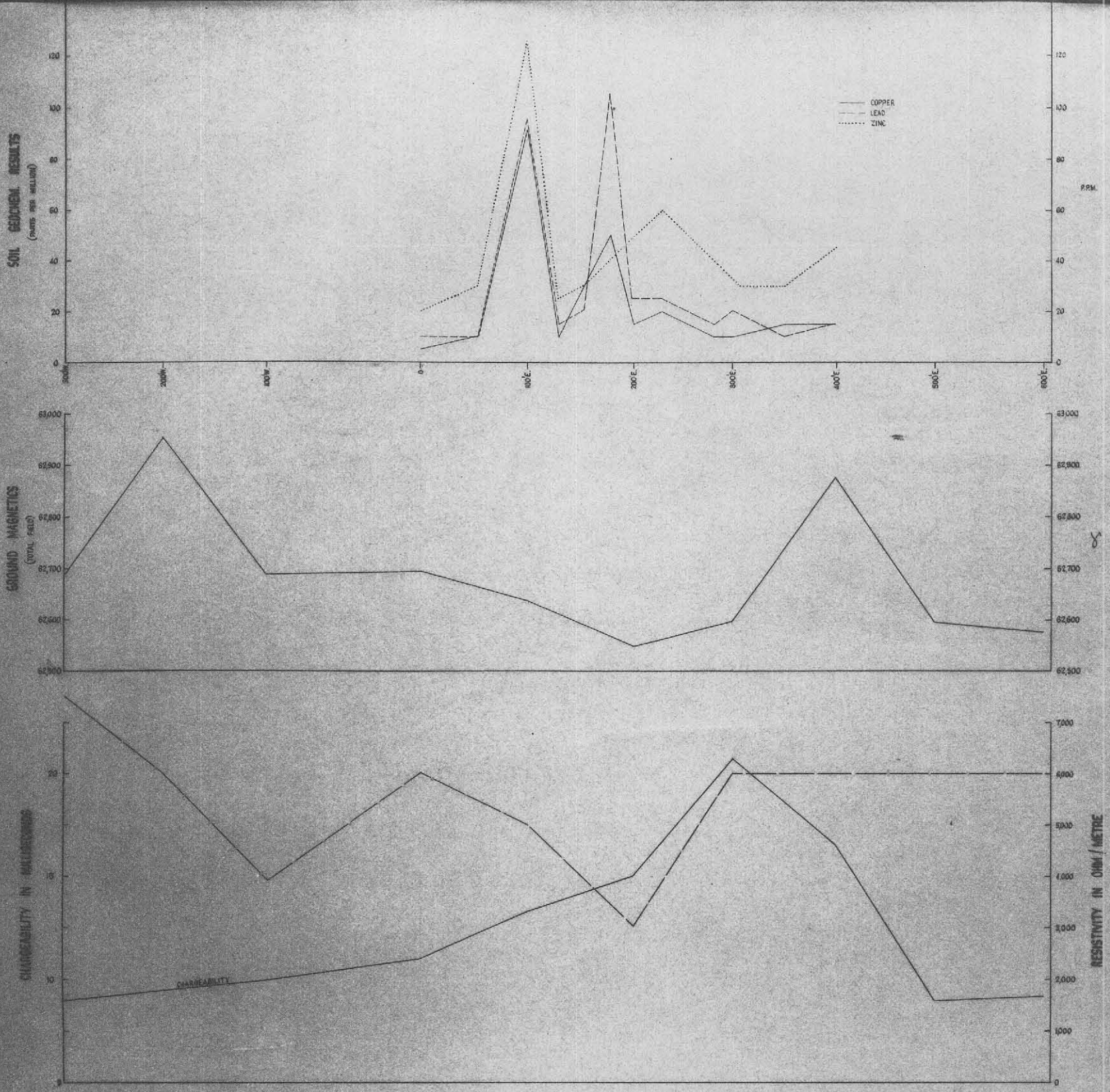
DRAWN R. WILSON
 CHECKED K. HILLIS
 DATE 21.9.72
 SCALE

FIG. 26



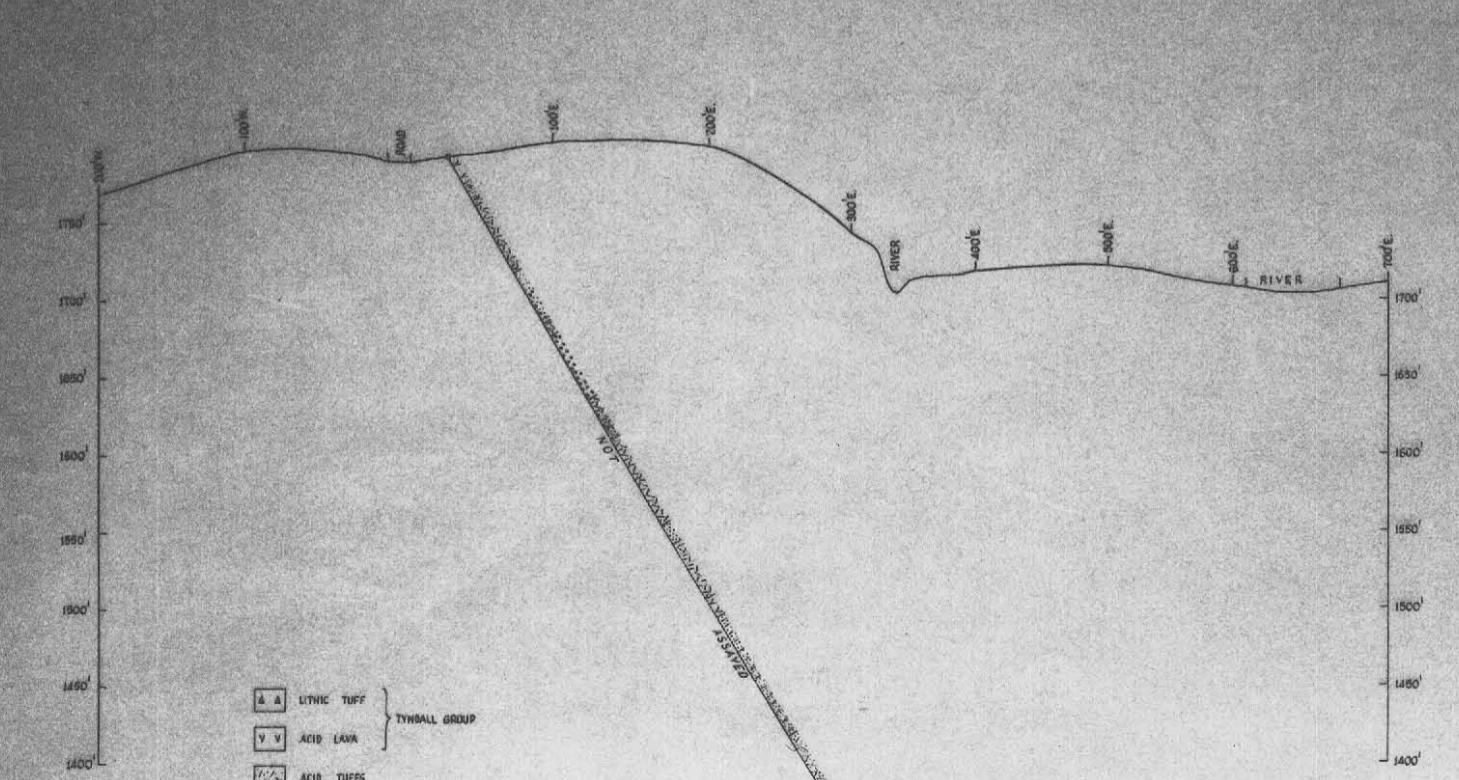
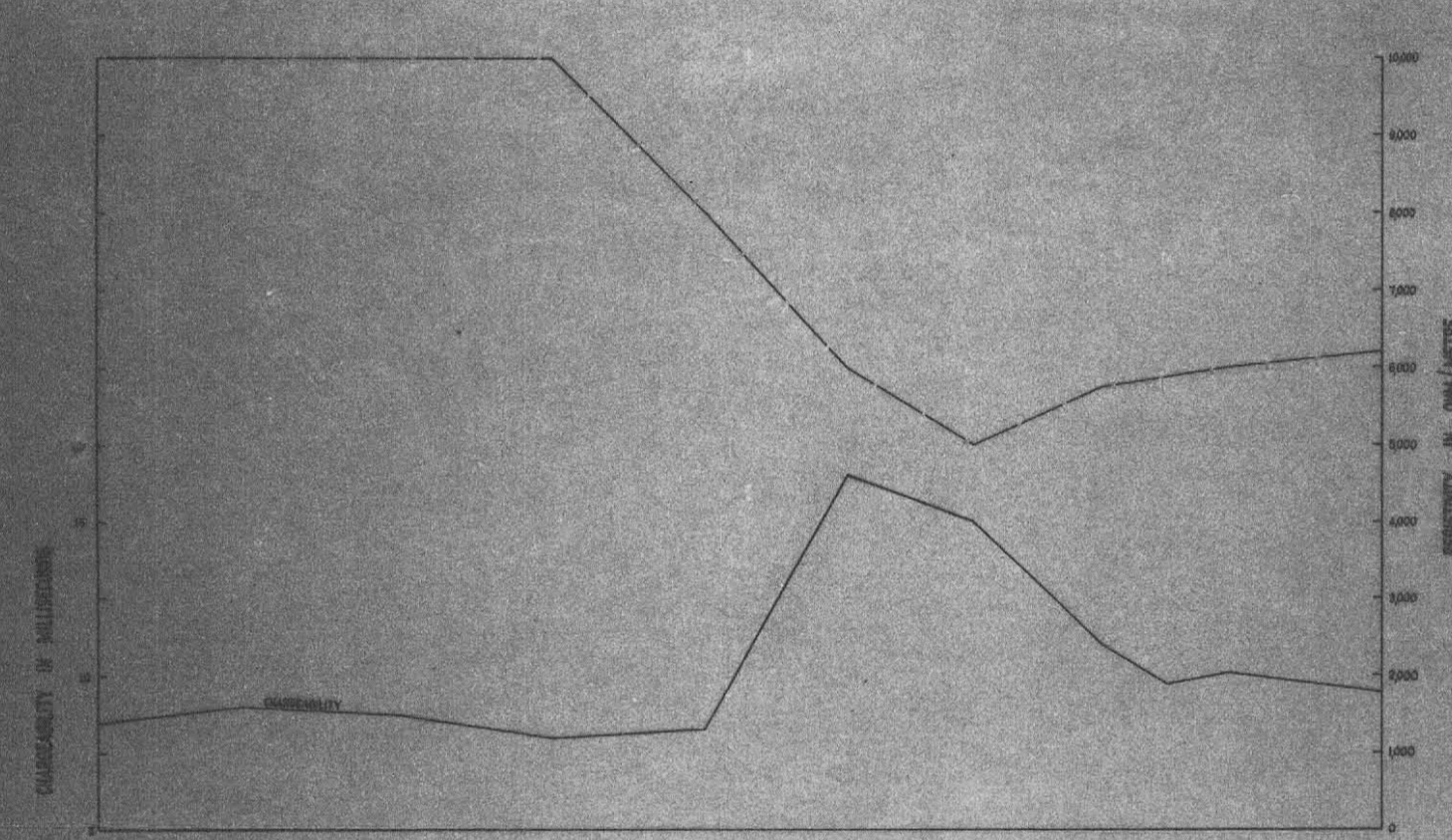
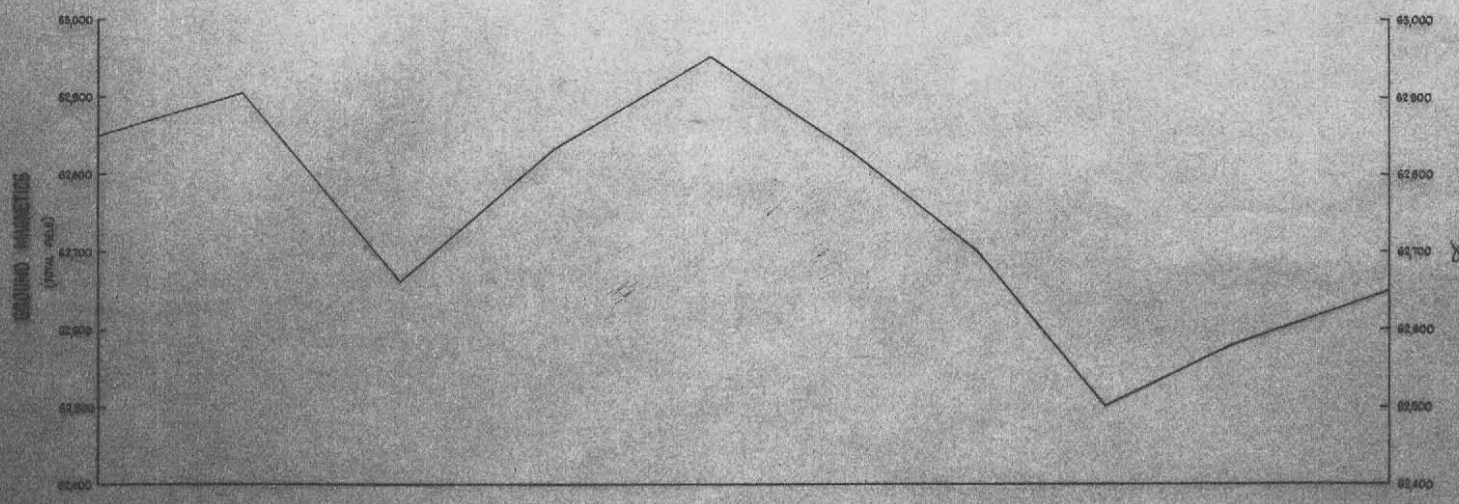
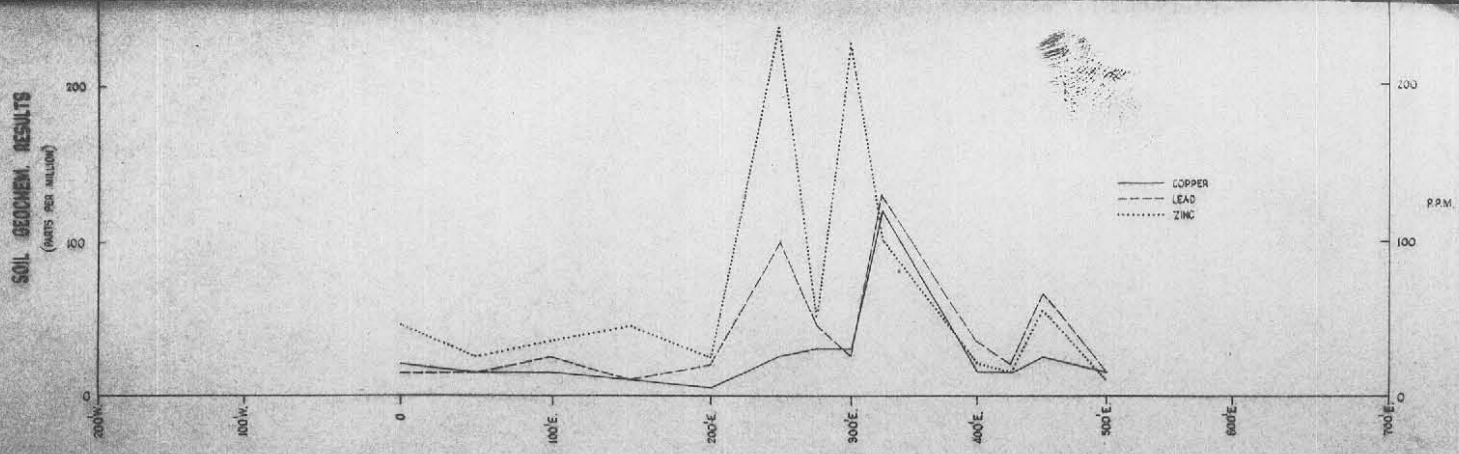
THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA, E.L. 9/66
 HENTY FAULT ZONE - LINE 65N.
 GEOPHYSICAL, GEOCHEMICAL AND PETROLOGICAL RESULTS

DRAWN: RENSLOW
 TRACED: R. G. NELSON
 CHECKED: A. WELLS
 DATE: 20.11.78
 SCALE: **FIG. 27**

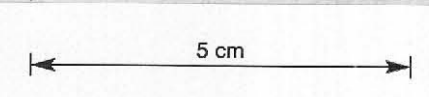


THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 43N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

DRAWN: R. J. WILSON
 TRACED: R. J. WILSON
 CHECKED: S. WELLS
 DATE: 20/11/76
 SCALE: 1:1000
FIG. 28



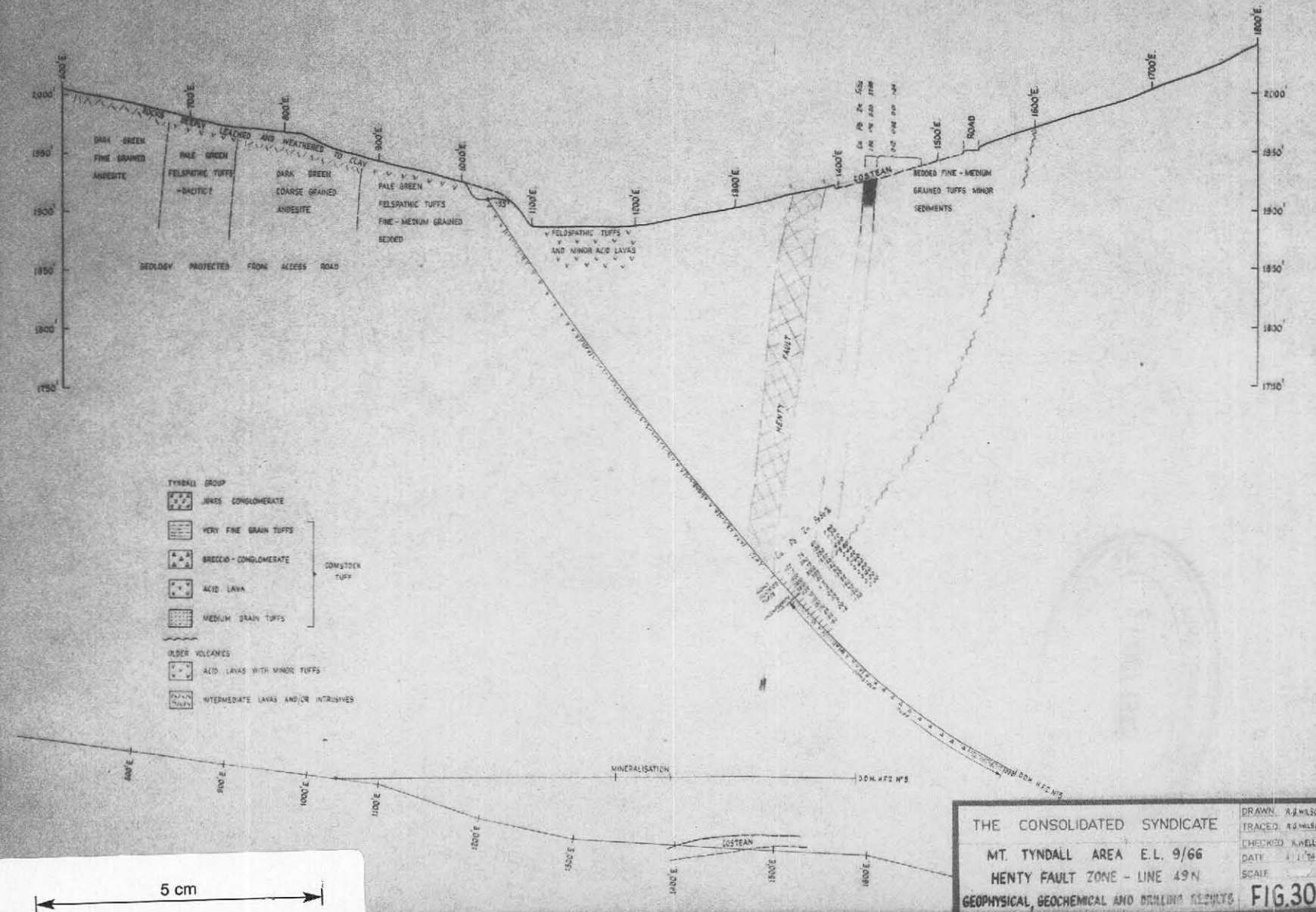
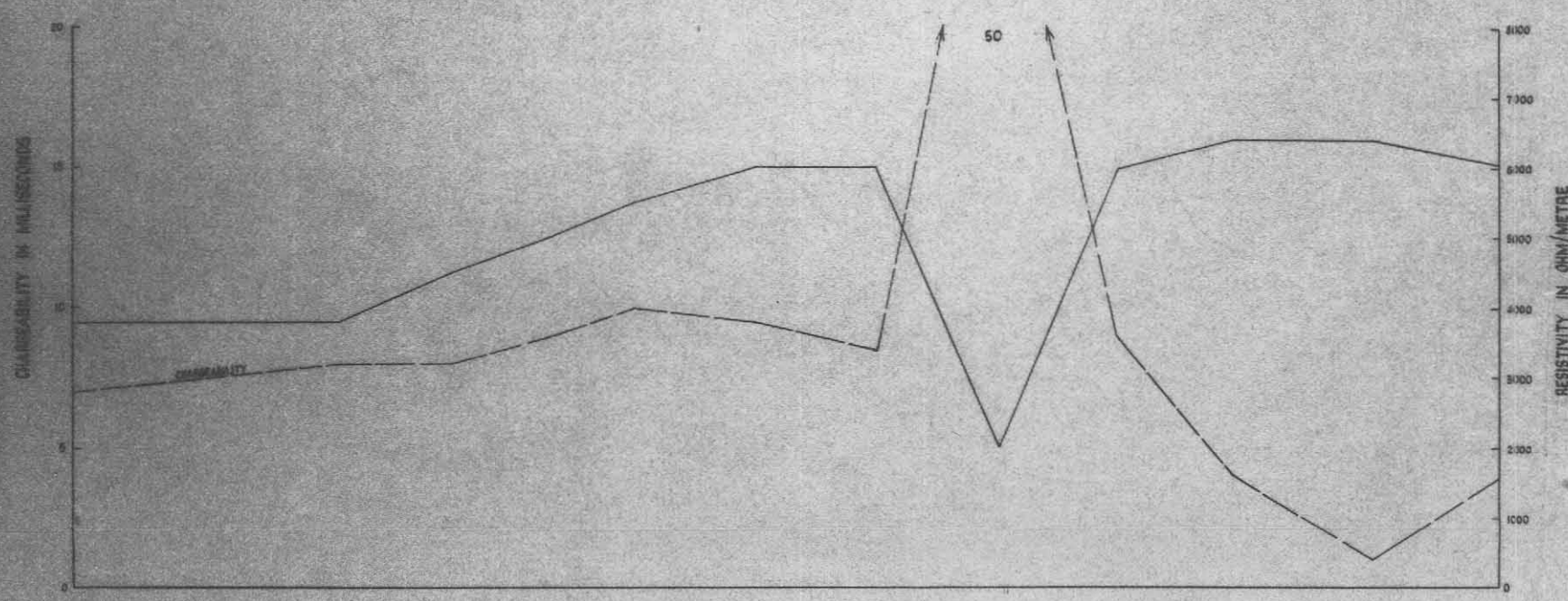
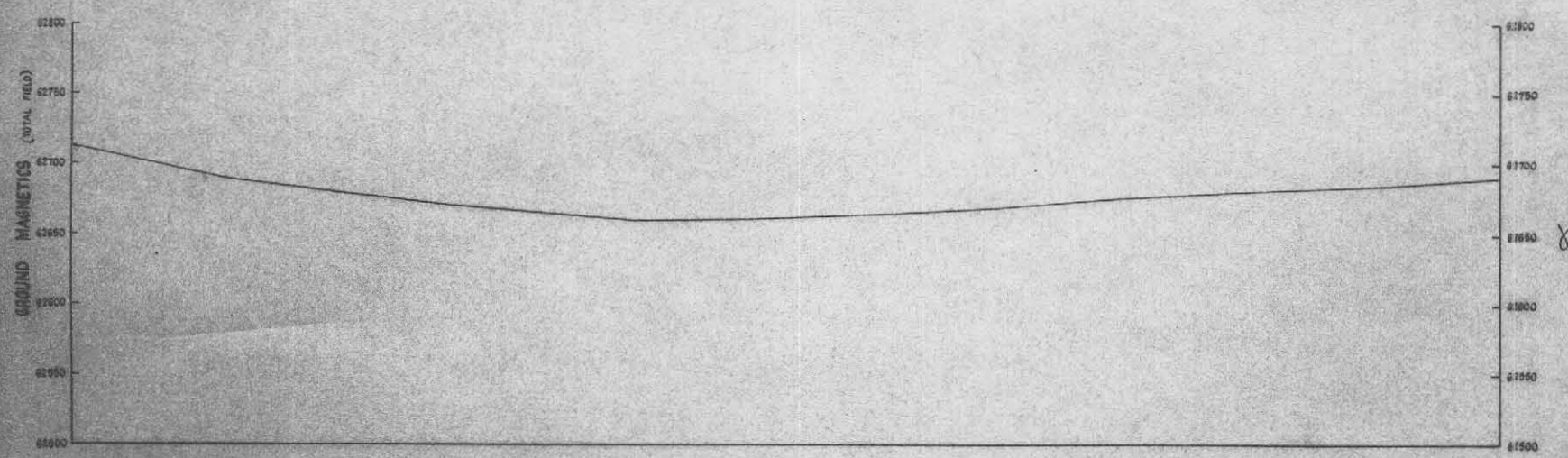
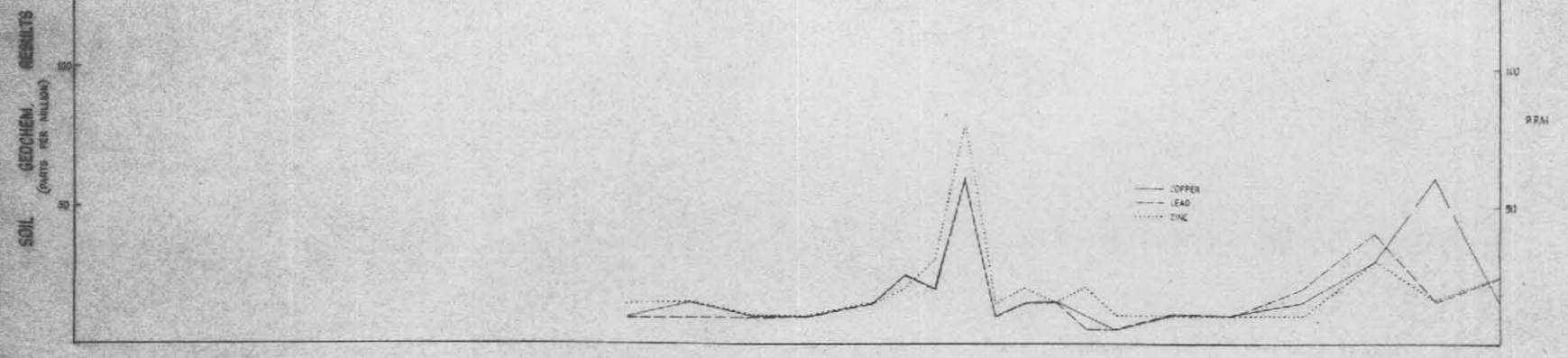
- ▲▲ LITHIC TUFF } TYNDALL GROUP
- ▼▼ ACID LAVA }
- ▨ ACID TUFFS
- ▨ TUFFACEOUS SHALES AND SILTSTONES
- ▼▼ ACID LAVA
- ▨ ANDESITE
- ◆◆ QUARTZ DIORITE
- ▨ MEDIUM-COARSE } CRYSTAL-LITHIC TUFF
- ▨ VERY COARSE }



THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 42N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

DRAWN: R. WILSON
 TRACED: S. WILSON
 CHECKED: S. WILSON
 DATE: 20-11-78
 SCALE:
FIG. 29

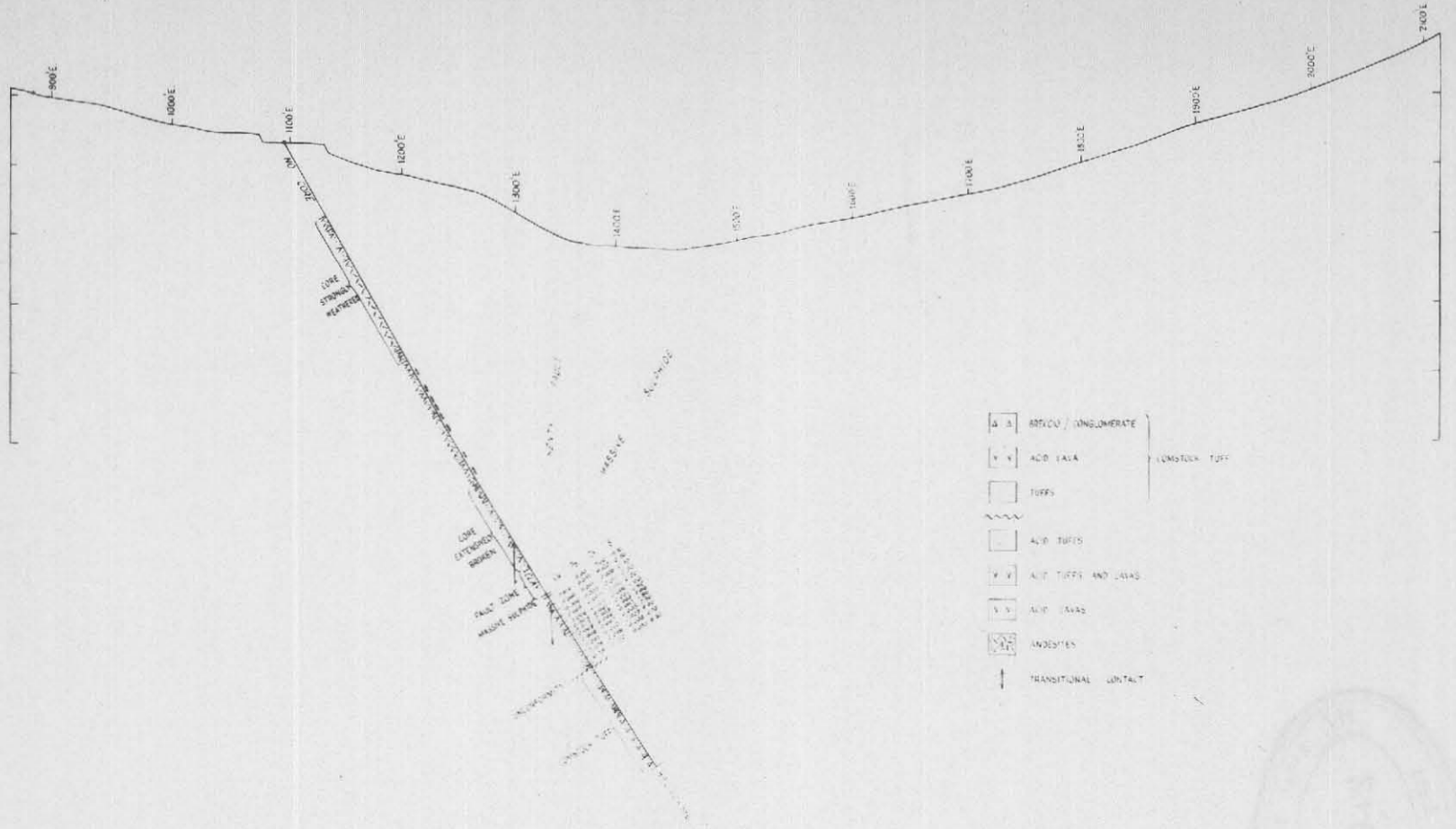
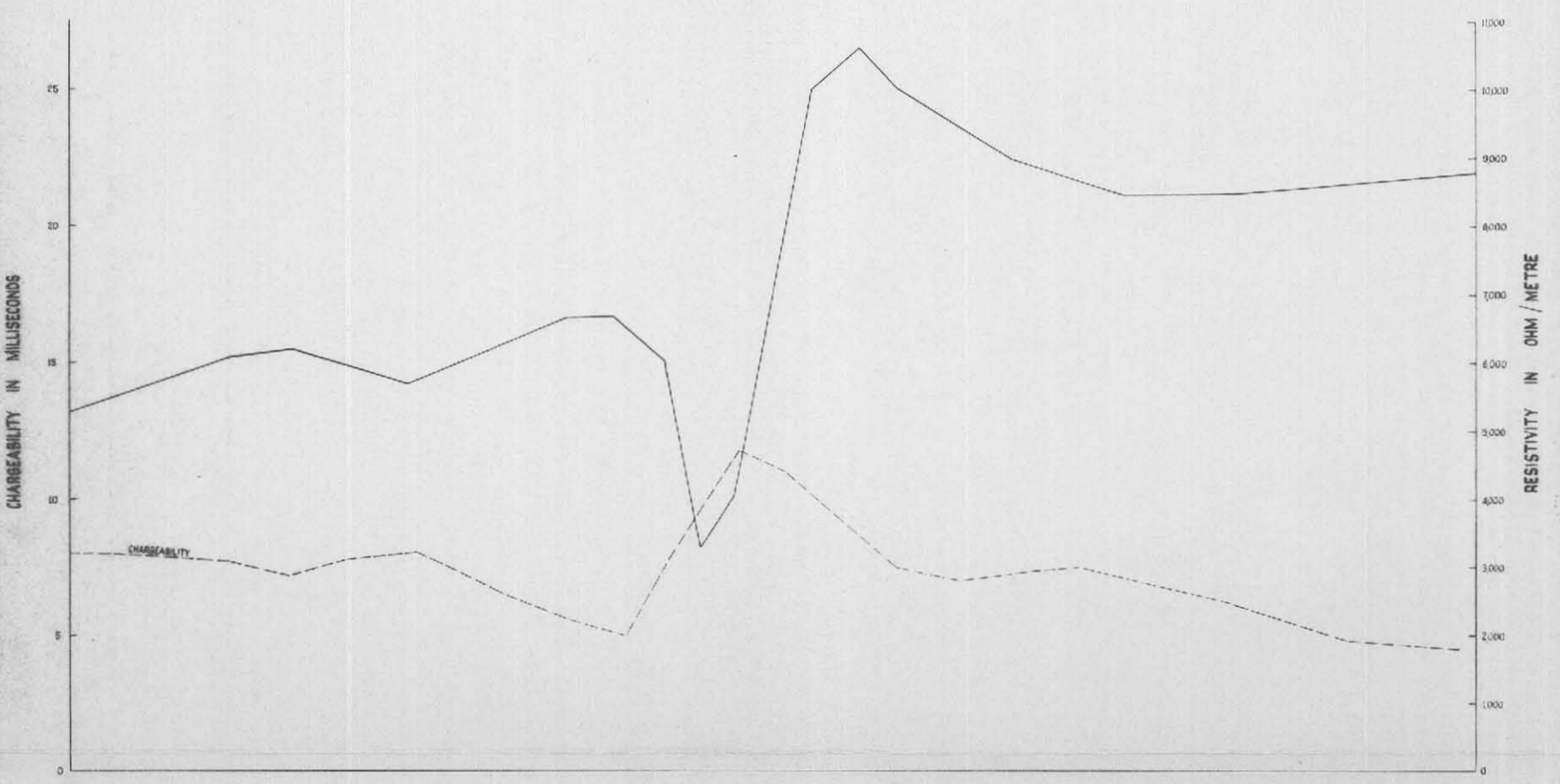
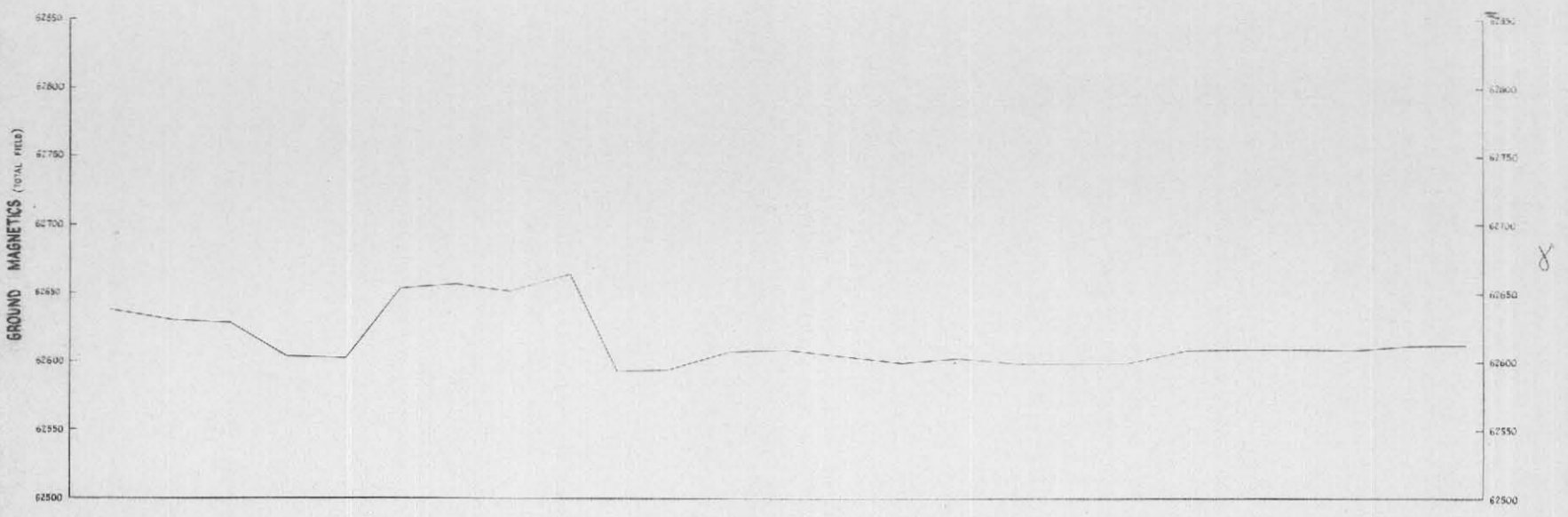
75-1149



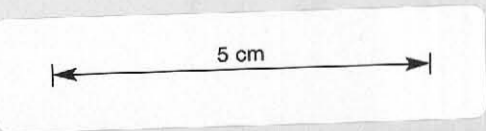
THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 49N
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS **FIG.30**

DRAWN: R.J. WILSON
 TRACED: R.J. WILSON
 CHECKED: A. WELLS
 DATE: 11/74
 SCALE:

473110



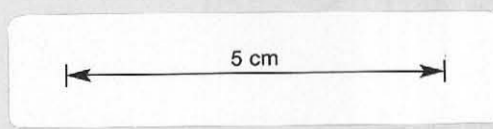
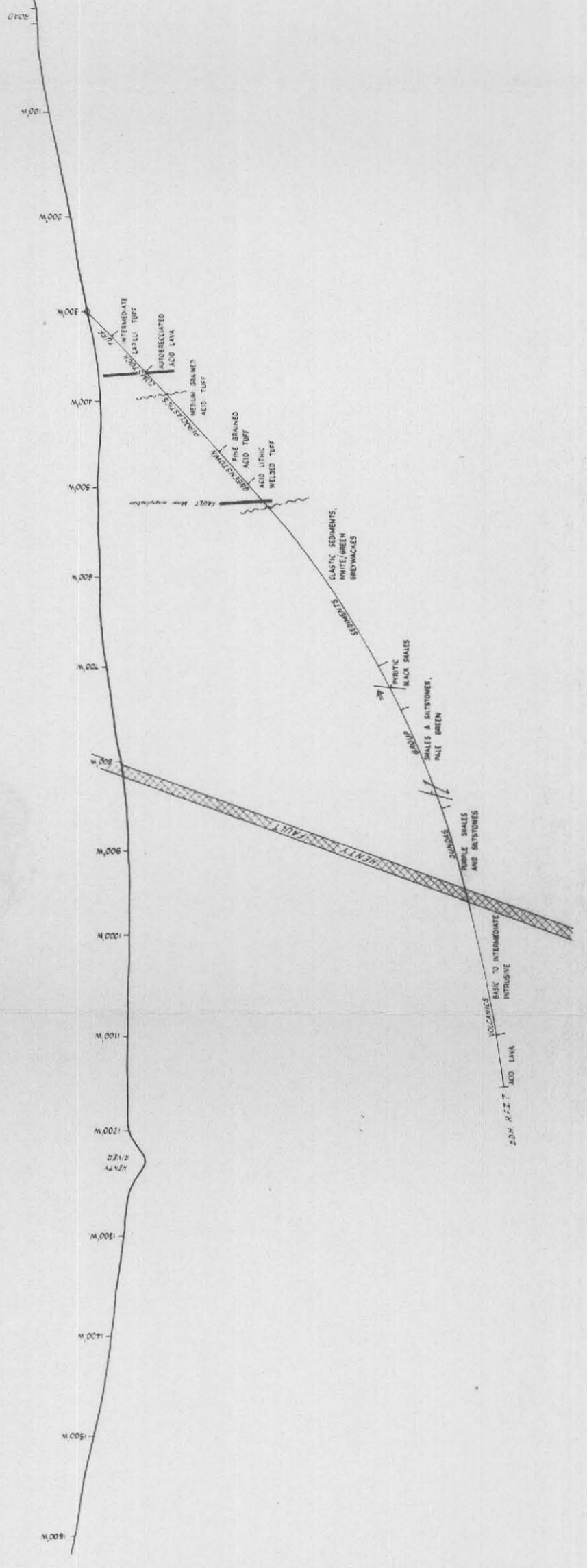
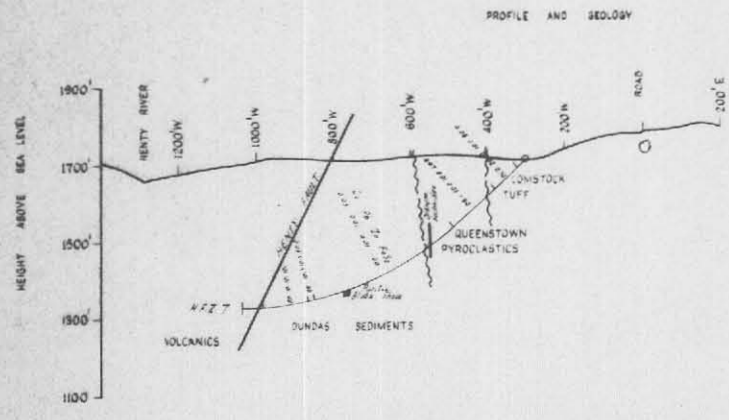
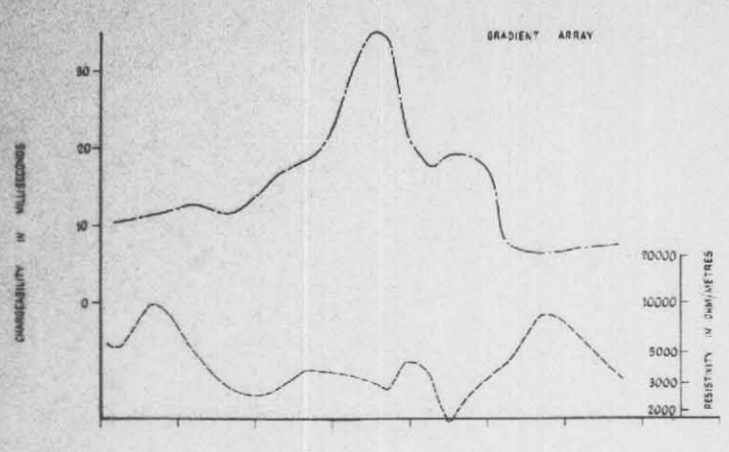
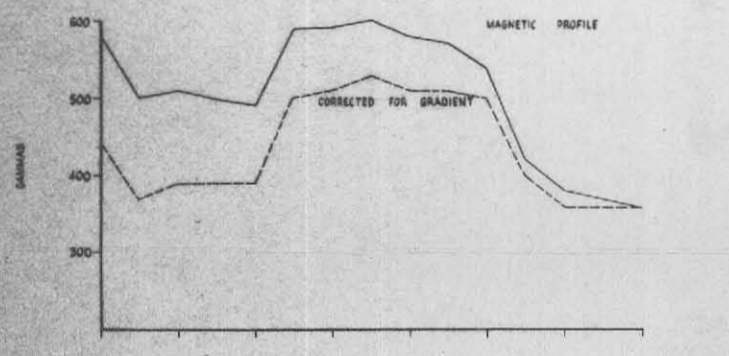
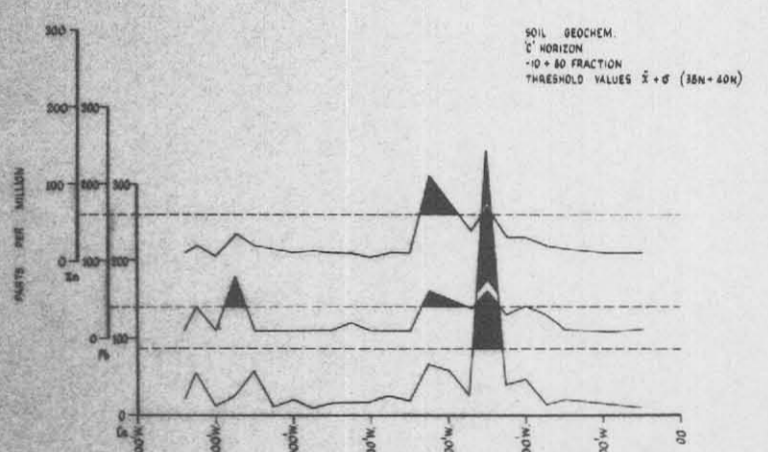
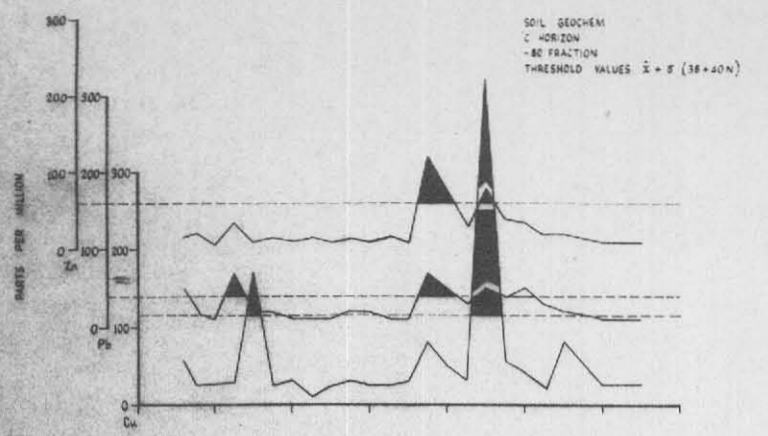
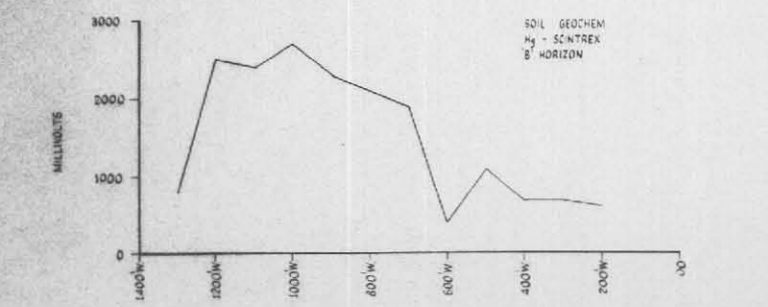
- ANDALUSITE
- ACID TUFFS
- TUFFS
- ACID TUFFS
- ACID TUFFS AND LAGS
- ACID LAGS
- ANDESITES
- ↑ TRANSITIONAL CONTACT



THE CONSOLIDATED SYNDICATE
 MT TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 48N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

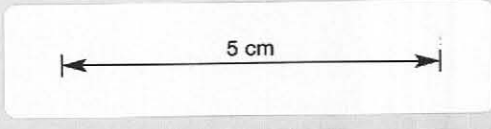
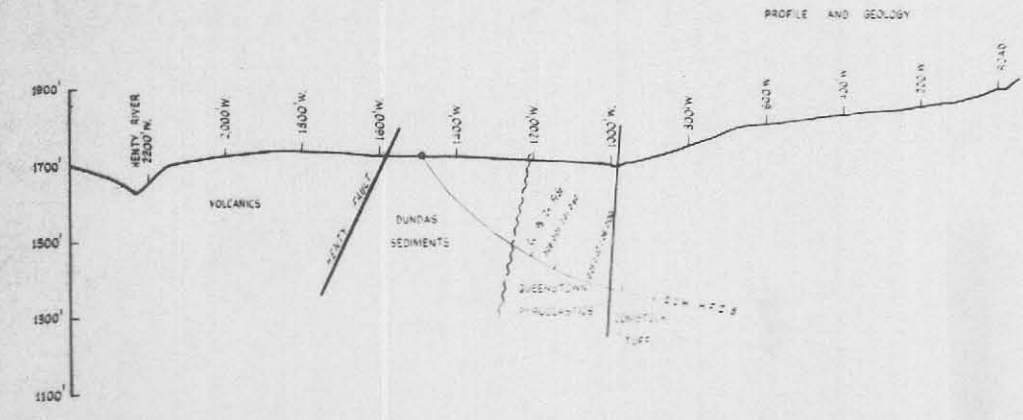
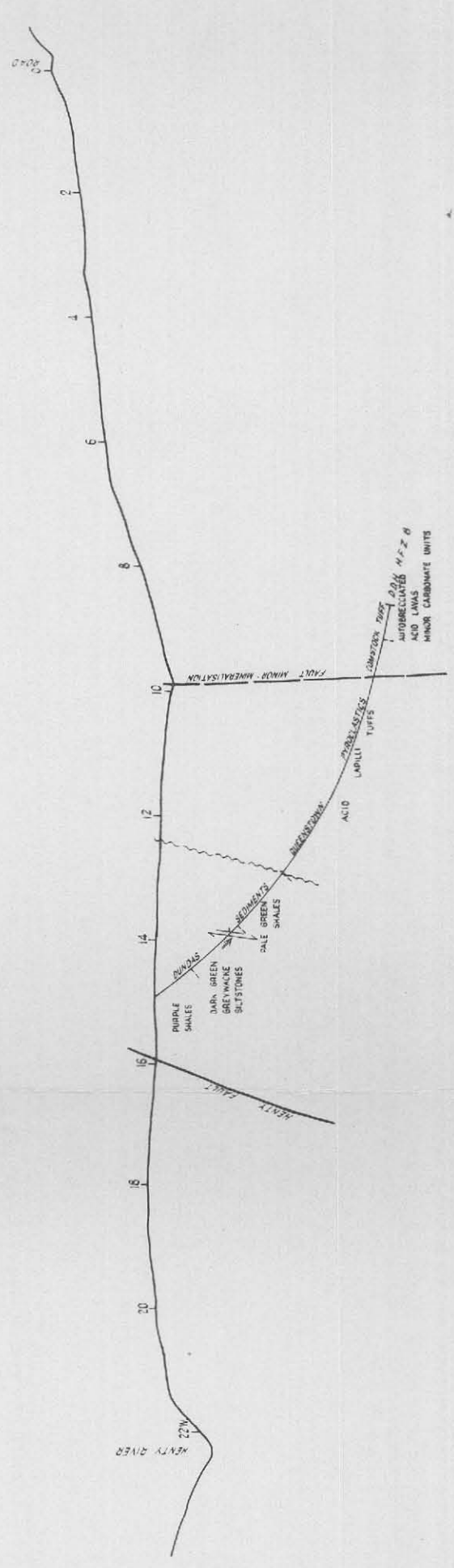
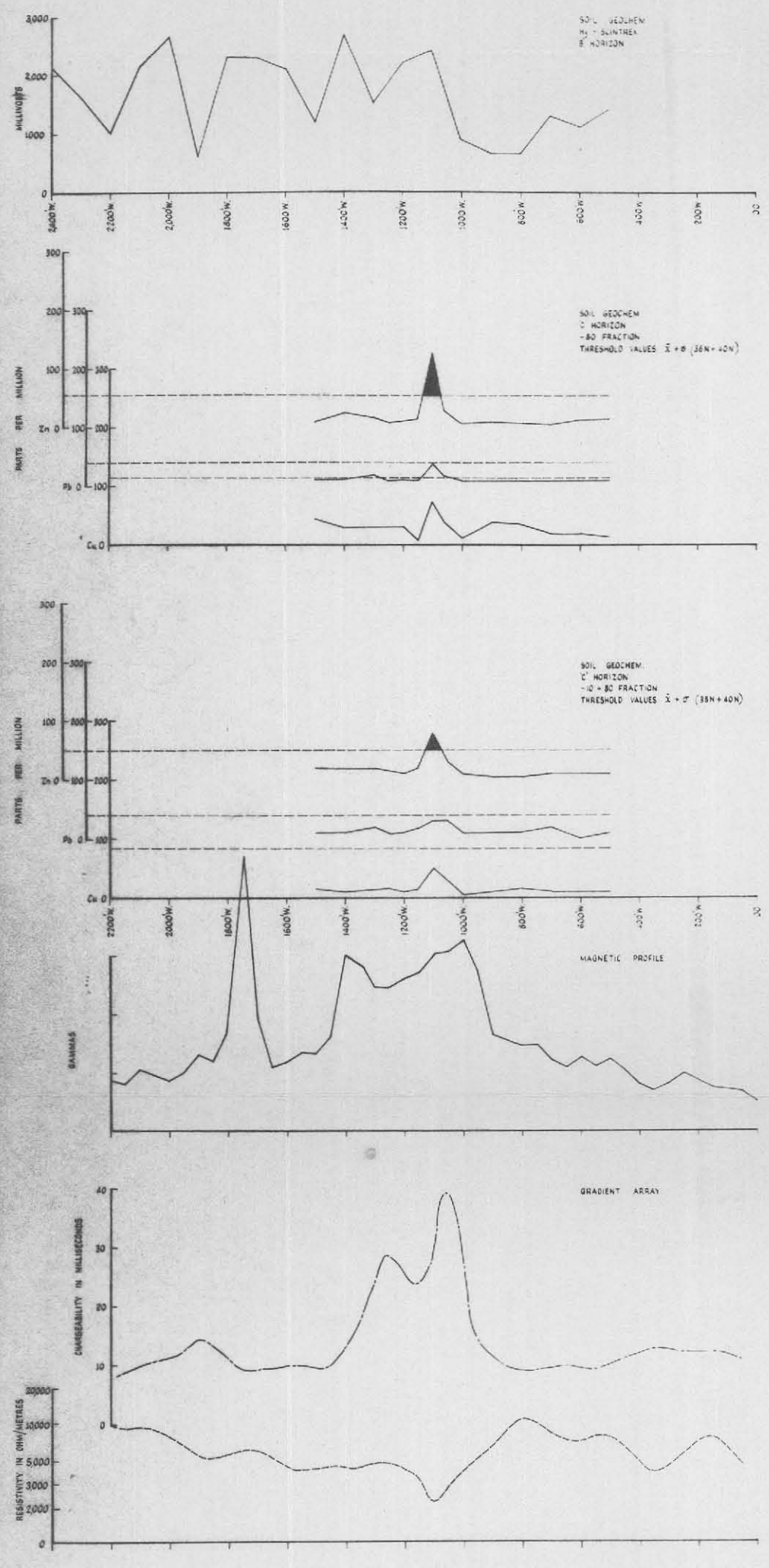
DRAWN: R. NELSON
 CHECKED: R. WILSON
 DATE: 5 5 14
 SCALE: 1" = 100'

FIG. 31



THE CONSOLIDATED SYNDICATE
MT TYNDALL AREA E.L. 9/66
HENTY FAULT ZONE - LINE 40N.
GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

DRAWN N.S.M.
TRACED R.G.W.
CHECKED
DATE 2.12.74
SCALE AS SHOWN
FIG. 32



THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA E.L. 9/66
 HENTY FAULT ZONE - LINE 38N.
 GEOPHYSICAL, GEOCHEMICAL AND DRILLING RESULTS

DRAWN V. J. W.
 TRACED R. WILSON
 CHECKED
 DATE 2 11 74
 SLAKE AS SHOWN

FIG 33

FIG. 34

473114

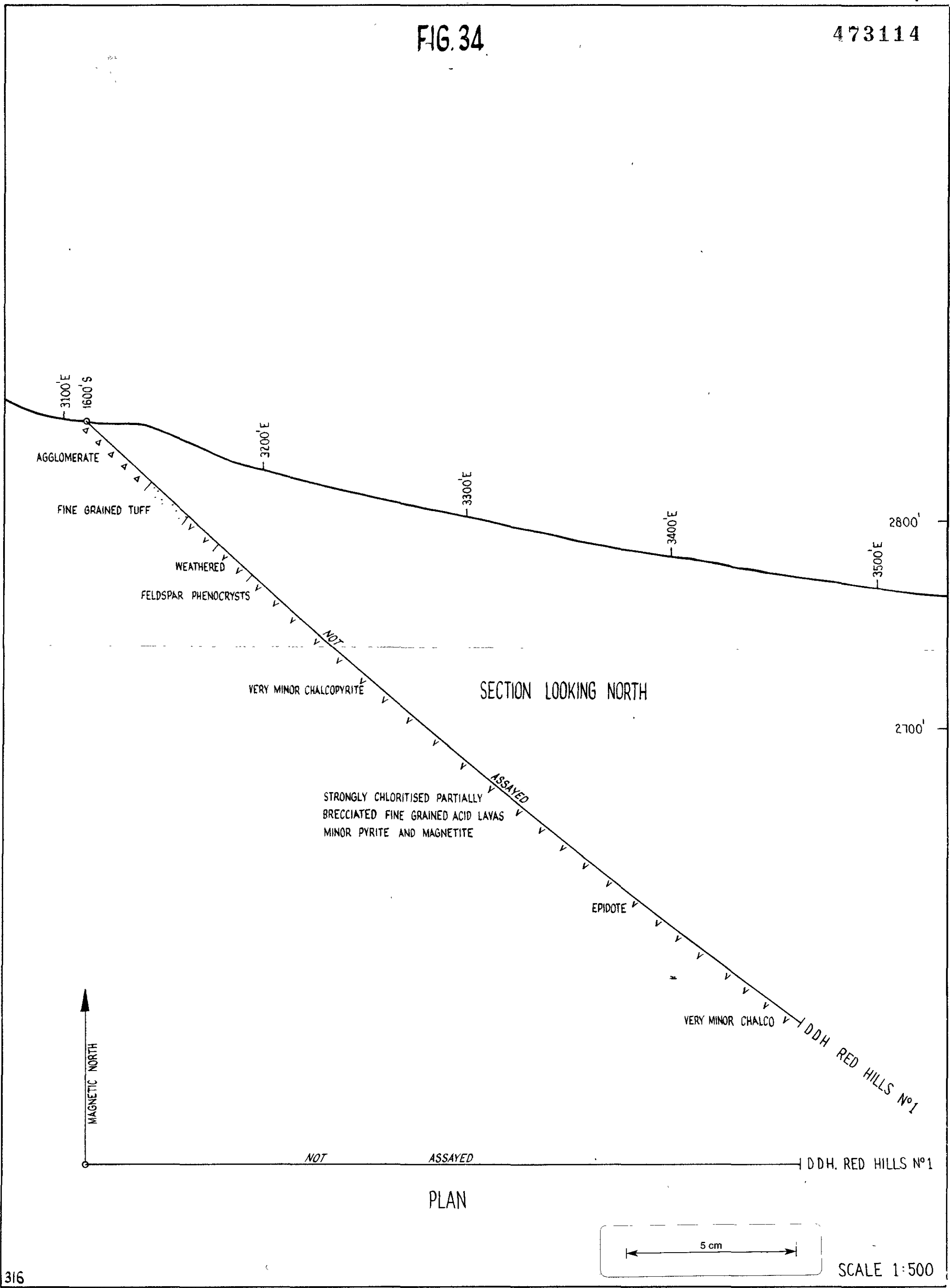
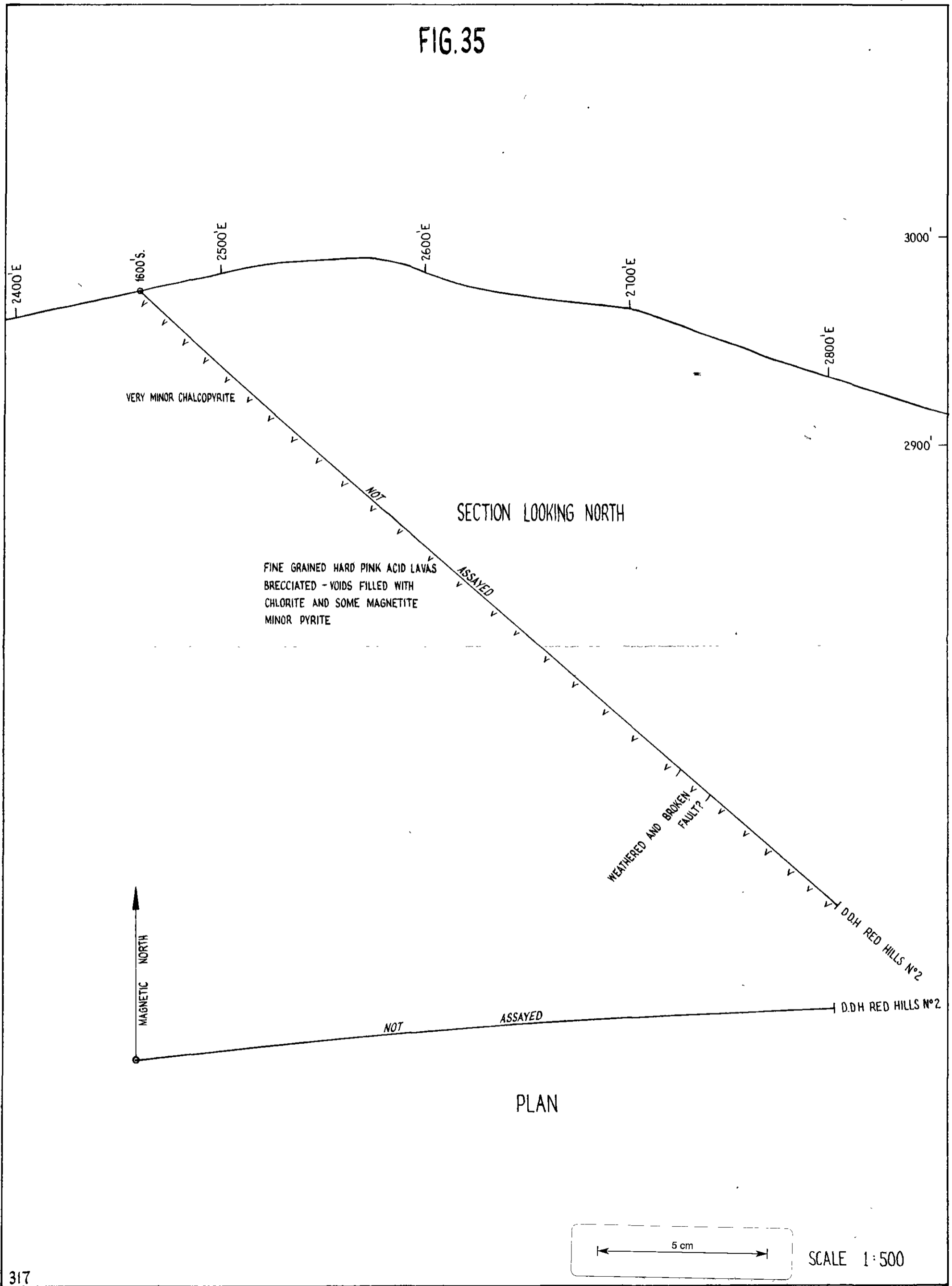


FIG.35



VERY MINOR CHALCOPYRITE

SECTION LOOKING NORTH

FINE GRAINED HARD PINK ACID LAVAS
BRECCIATED - VOIDS FILLED WITH
CHLORITE AND SOME MAGNETITE
MINOR PYRITE

WEATHERED AND BROKEN
FAULT?

D.D.H. RED HILLS N°2

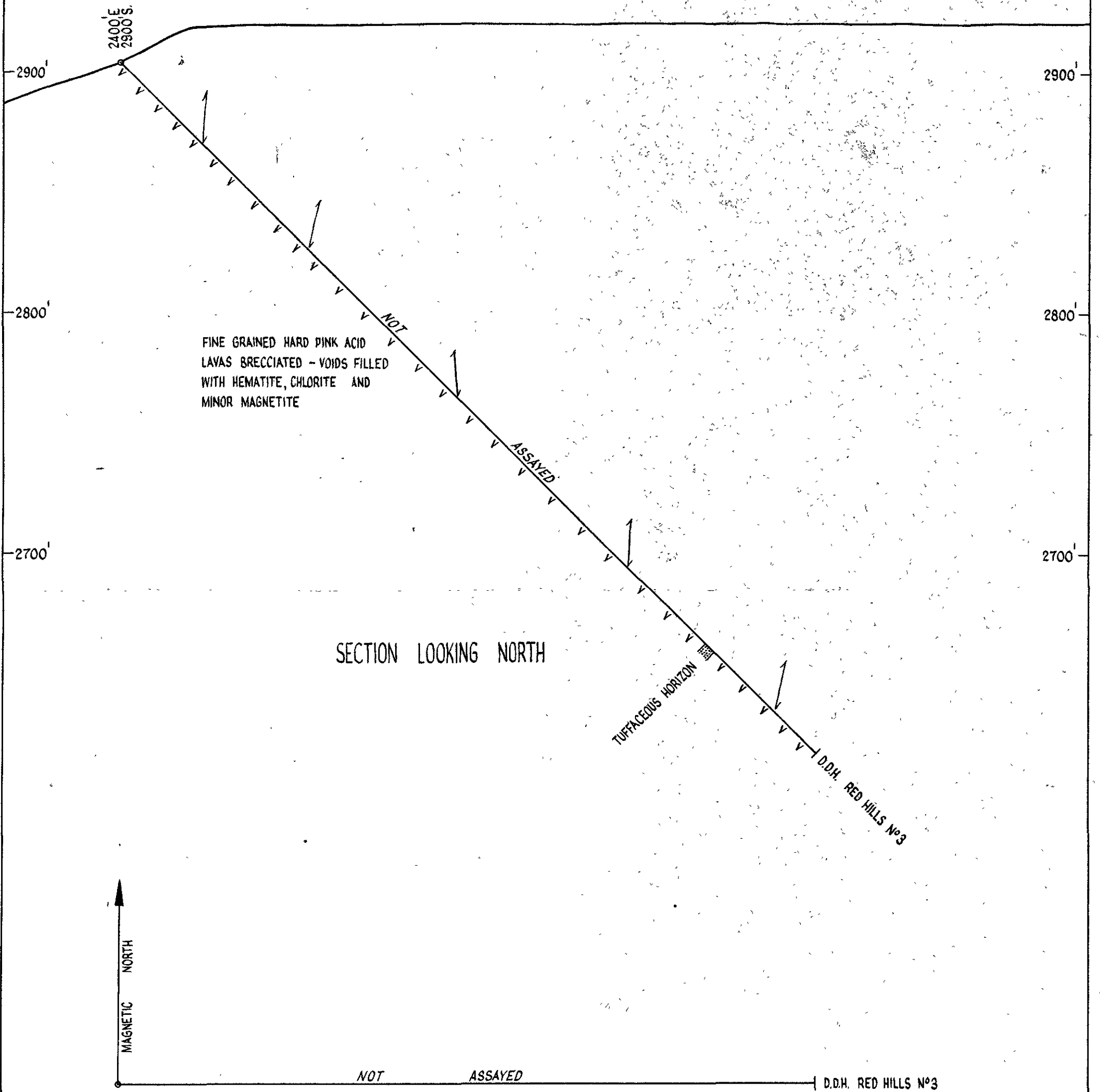
D.D.H. RED HILLS N°2

PLAN

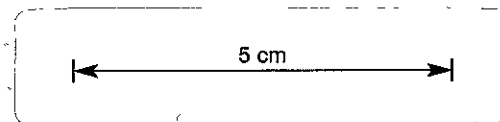
5 cm

SCALE 1:500

FIG. 36



PLAN



SCALE 1:500

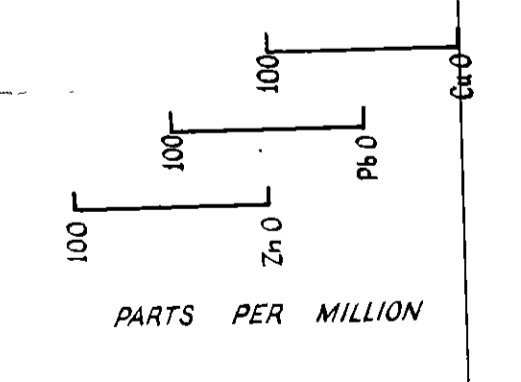
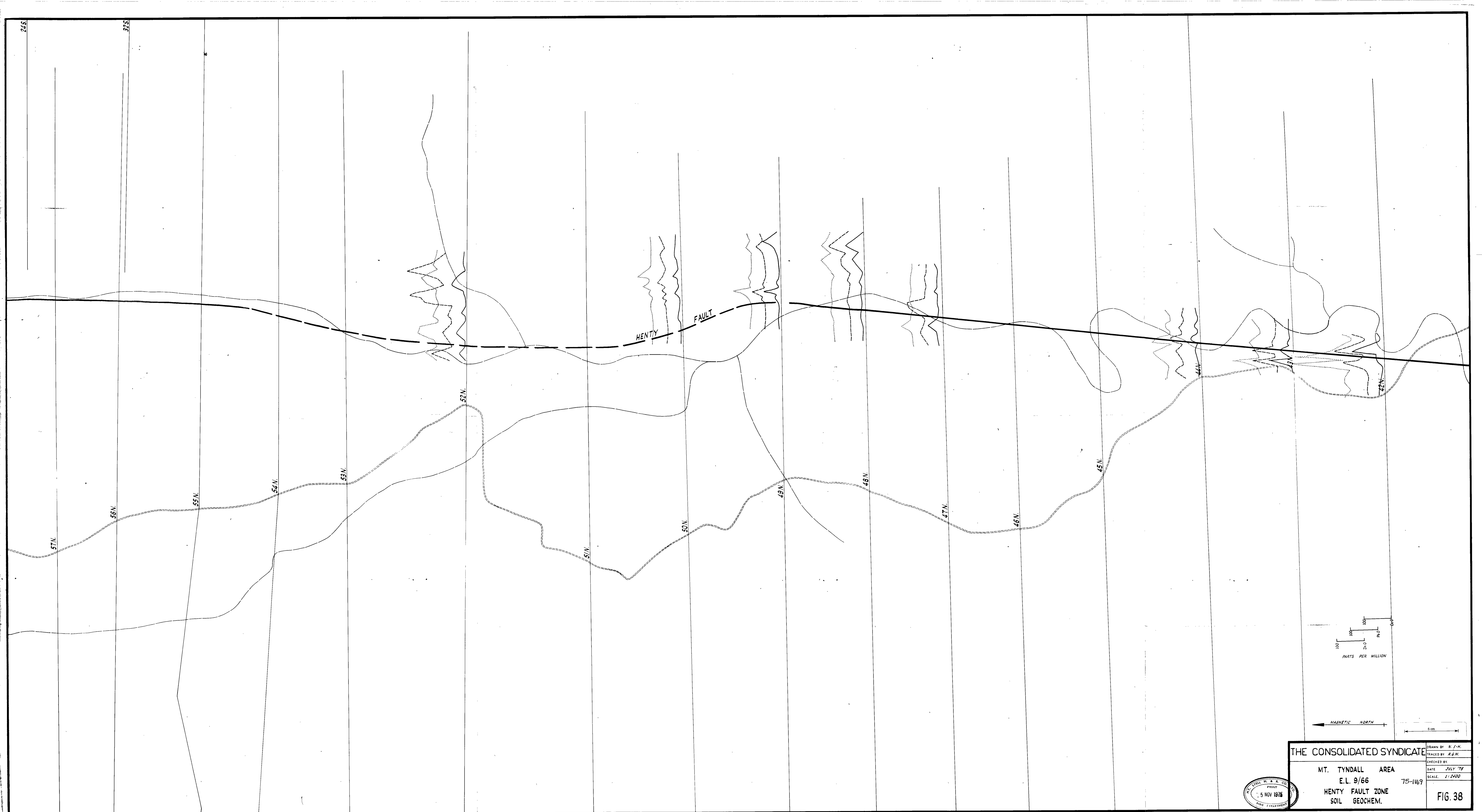


THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA
 E.L. 9/66
 HENTY FAULT ZONE
 OUTCROP GEOLOGY



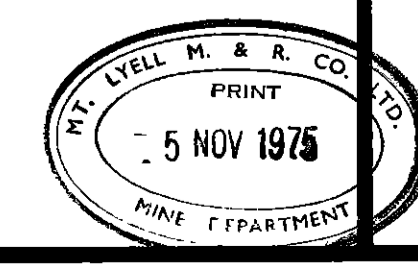
DRAWN BY N.F.H.
 TRACED BY A.G.M.
 CHECKED BY
 DATE JULY 75
 SCALE 1:2400

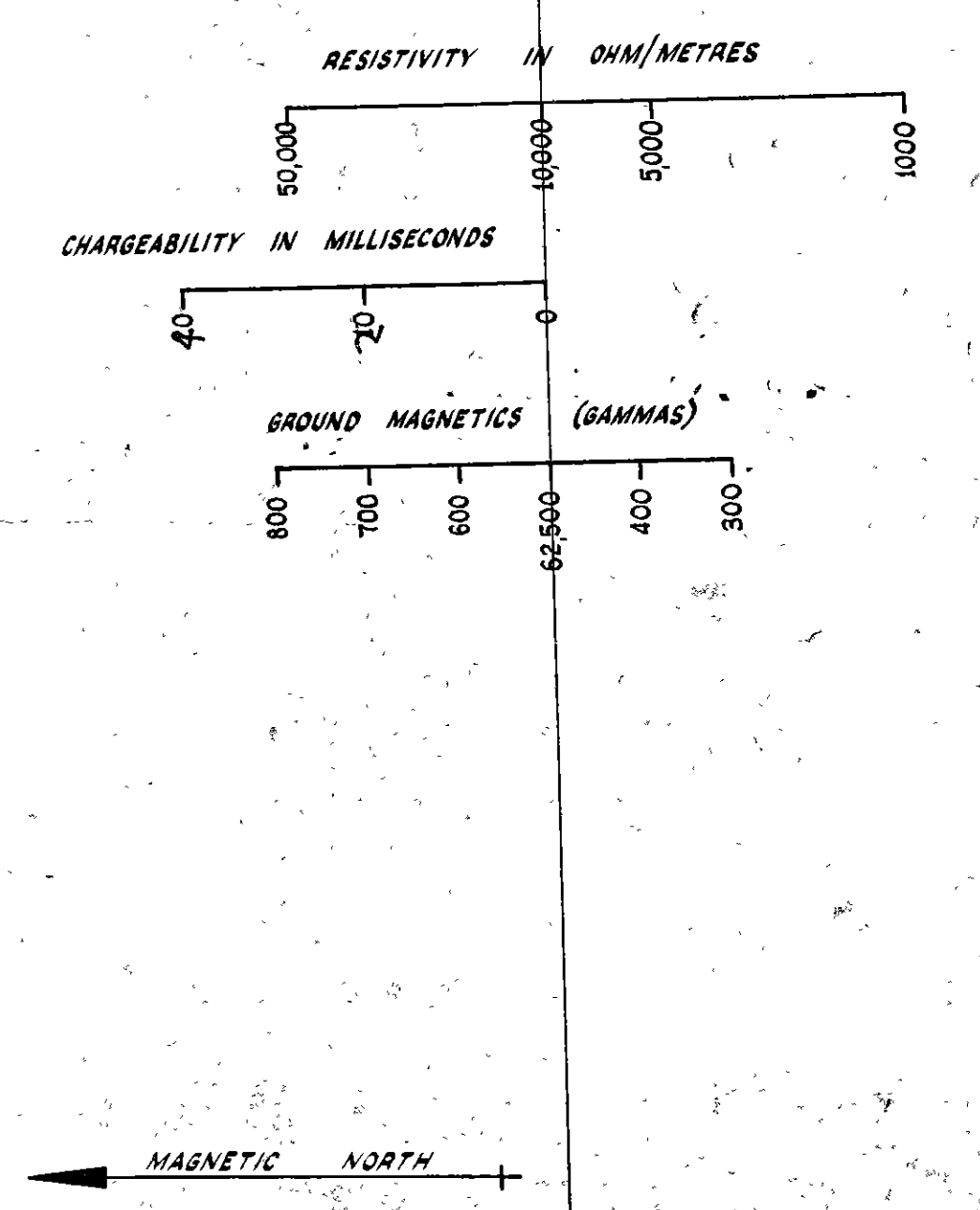
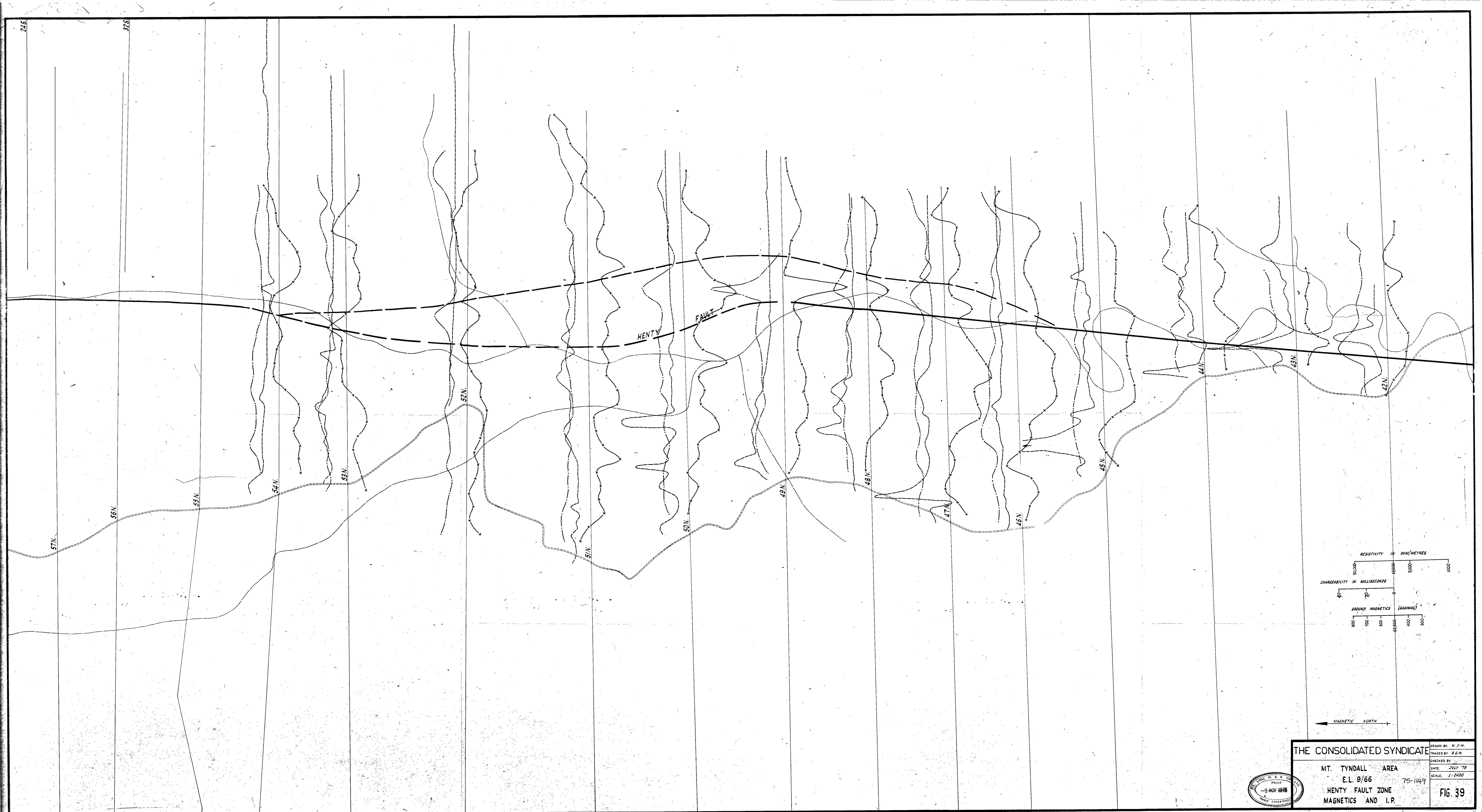
FIG. 37



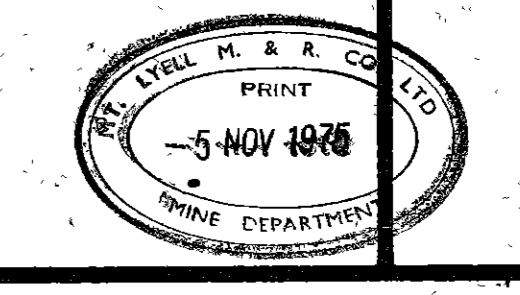
MAGNETIC NORTH

THE CONSOLIDATED SYNDICATE		DRAWN BY N. J. H.
MT. TYNDALL AREA		TRACED BY A. G. M.
E.L. 9/66		DATE JULY '75
HENTY FAULT ZONE		SCALE 1:2500
SOIL GEOCHEM.		FIG. 38





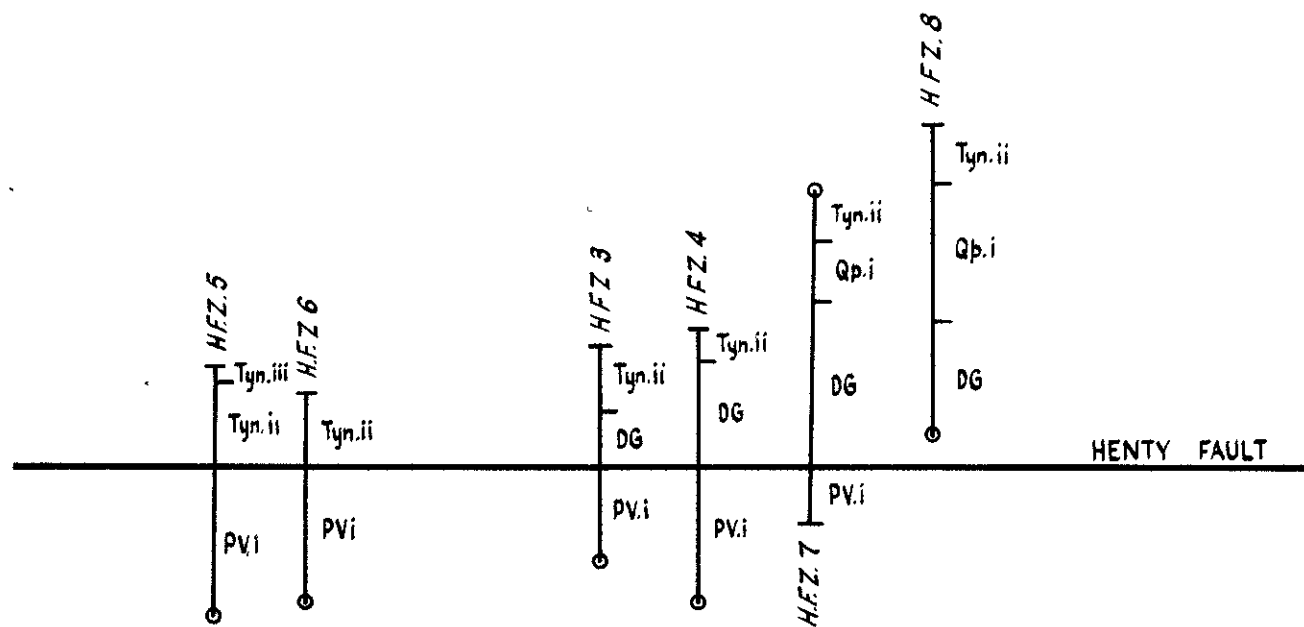
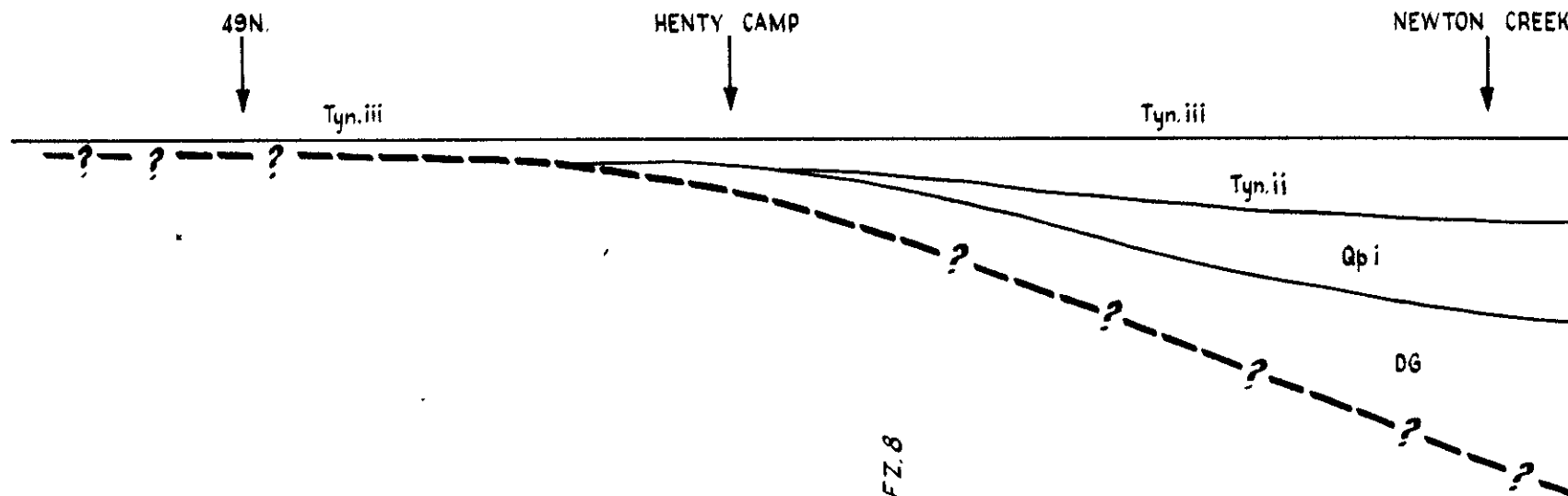
THE CONSOLIDATED SYNDICATE
 MT. TYNDALL AREA
 E.L. 9/66
 HENTY FAULT ZONE
 MAGNETICS AND I.P.



DRAWN BY: N.F.H.
 CHECKED BY: A.G.H.
 DATE: JULY 76
 SCALE: 1:2500
 FIG. 39

N.

S.



- Tyn.iii TYNDALL GROUP
- Tyn.ii " "
- Qp.i QUEENSTOWN PYROCLASTICS
- DG DUNDAS GROUP
- PV.i PRIMROSE VOLCANICS

FIG. 40

DIAGRAMMATIC N.-S. STRATIGRAPHIC SECTION OF THE HENTY FAULT ZONE.



THE CONSOLIDATED SYNDICATE
MT. TYNDALL AREA
E.L. 9/66
ROCK SAMPLE LOCATIONS

DRAWN: N.P.S.-H.
TRACED: R.G.W.
CHECKED:
DATE: 5-8-'75
SCALE: 1:15,840

75-1149
473121
FIG. 41

ANG COORDINATES