GEOLOGICAL AND GEOCHEMICAL INVESTIGATIONS OF THE SOUTH EVELYN AREA, NORTHERN TERRITORY, FOR UNITED URANIUM N.L.

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SUMMARY AND RECOMMENDATIONS

1. A geological mapping programme of a six square mile area south of the Evelyn Silver - Lead - Zinc Mine and west of the Northern Hercules Gold Mine was undertaken in an endeavour to determine the structure of the area and delineate possible metalliferous areas.

2. The geological evolution of the general area has been well documented. The South Evelyn Area is but a small part of the Katherine - Darwin metalliferous province. This province is roughly co-extensive with the Pine Creek Geosyncline which existed in the Lower Proterozoic.

3. Only limited success was achieved in providing a detailed geological map of the South Evelyn Area. Nevertheless, a picture of the geology of the area was determined.

4. In the South Evelyn Area, sediments of the Golden Dyke Formation — a limestone - chert - psammitic - pelitic - carbonaceous and calcareous shale assemblage — are conformably overlain by sediments of the Burrell Creek Formation — a greywacke - greywacke - siltstone — siltstone assemblage. These formations developed in the Central Basin of the Pine Creek Geosyncline. Low grade regional dynamic metamorphism affected some of the sediments in these formations.

5. Throughout the period of deposition of the sediments contemporaneous deformation caused individual beds and groups of beds to be tightly folded.

6. Mild tensional stress resulted in the sediments being folded into east - south - east plunging symmetrical and asymmetrical anticlinal and synclinal structures. East - west orientated undulations and crenulations were contemporaneously imposed upon some of these structures. Subsequent east - west compressional forces resulted in the superimposition of north - south orientated fold axes on the previous structures.

7. Faulting continued penecontemporaneously with sedimentation. The effects of the faults — primarily high angle normal faults or high angle diagonal slip faults — on the sediments was not severe. The overall dislocations were small. No extensive mineralogical alterations resulted from the faulting.

8. Jointing and cleavage was strongly developed throughout the area.

9. In the Middle Proterozoic, granite — the Cullen Granite, a hornblende - biotite granite — and associated microgranitic and aplitic phases were intruded into the sediments of the Golden Dyke and Burrell Creek Formations: a fairly extensive contact metamorphic aureole developed.

10. The geological survey of the South Evelyn Area failed to delineate any possible metalliferous areas apart from those areas that were previously known, namely the Stockyard Prospect and the limestone terrains. The limestone terrains were selected only because the Evelyn Silver - Lead - Zinc Mine is located in a limestone terrain.

11. It is considered that regional geological mapping is unlikely to result in the discovery of any mineralisation of economic significance. A geochemical copper - lead - zinc stream sediment survey should be initiated to delineate any possible metalliferous areas. Such a survey should be under the direct control of a Geochemist. In addition, a systematic search of the Cullen Granite and the contact between the granite and the sediments should be initiated to determine the presence, or otherwise, of tin, tungsten and molybdenum.

12. An evaluation of the Stockyard Prospect, where gold - silver - copper - lead - zinc mineralisation has been discovered and partially investigated by United Uranium N. L., was not undertaken. However, it is recommended that this prospect should be thoroughly evaluated.

13. The limestone terrains were subjected to detailed geological and geochemical rock and soil surveys in an attempt to delineate metalliferous areas. These surveys indicated two areas where further more detailed investigations should be undertaken.

1. INTRODUCTION

On the 21st August, 1969, Watts, Griffis & McOuat (Australia) Pty. Ltd. received instructions from Mr. J. Taylor, Chief Geologist, United Uranium N.L., to undertake a geological mapping programme, at airphoto scale (1:16000 approximately), of a six square mile area south of the Evelyn Silver - Lead - Zinc Mine and west of the Northern Hercules Gold Mine in order to delineate possible metalliferous areas.

The terms of reference included the provision that should any areas of interest be indicated as a result of this geological mapping programme then detailed geological and geochemical surveys should be undertaken in such areas of interest.

2. ACKNOWLEDGEMENTS

Mr. J. Taylor, Chief Geologist, United Uranium N.L., aided the writer by providing pertinent plans and reports whenever necessary. In addition, he afforded constructive criticism during discussion periods. The writer, Mr. T. O. Veit, wishes to record his appreciation of Mr. J. Taylor's assistance and interest.

The Drafting Office of United Uranium N.L. has been responsible for the drafting of many of the plans incorporated in this report. The writer wishes to thank Mr. B. Harding, Chief Draftsman, for his ready co-operation.

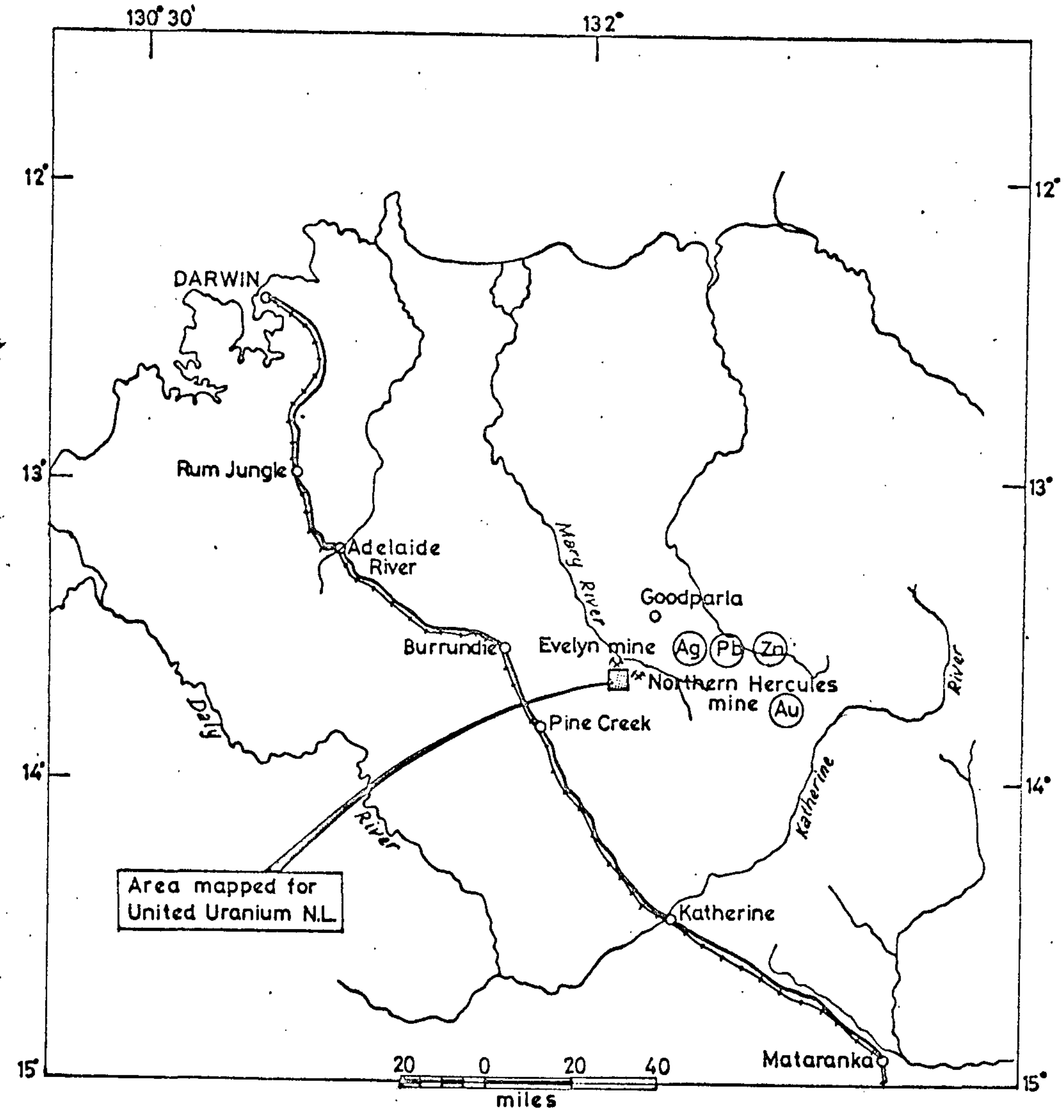
The writer would also like to record his appreciation of the co-operation provided by Mr. and Mrs. Van de Linden, Chemists.

The writer wishes to thank the Management of United Uranium N.L. for the accommodation and messing facilities afforded him.

3. GEOGRAPHY

3.1. Geography

3.1. Location and Access



Stuart Highway

Darwin – Birdam Railway

North Hercules mine – now the mining township of Moline

WATTS, GRIFFIS & McOUAT (AUSTRALIA) PTY. LIMITED CONSULTING GEOLOGISTS & ENGINEERS 1ST FLOOR — 56 PITT STREET, SYDNEY	
UNITED URANIUM N.L. — SOUTH EVELYN AREA — LOCATION MAP	
SCALE: As shown DATE: 8.12.69	FIG. 1.
DRAWN: SB. APPROVED:	

The Evelyn Silver - Lead - Zinc Mine is approximately 30 miles north-east of Pine Creek, at the junction of the roads to Goodparla and the Northern Hercules Gold Mine or the mining township of Moline as it is now known. Pine Creek is linked to Darwin, 158 miles to the north by the Stuart Highway and the Darwin - Birdum railway (See Figure 1.).

Access to Moline is good. The road is trafficable throughout the year except immediately after heavy rains.

The area mapped lies immediately to the south of the Evelyn Silver - Lead - Zinc Mine and to the west of Moline. Access throughout the area mapped is good, except again immediately after heavy rains. The area is of fairly mature topography and steep slopes are rare, hence access can be obtained without difficulty.

3.2. Climate and Natural Vegetation

The climate of the area is monsoonal, with a hot wet season from December to April and a relatively cool dry season throughout the rest of the year. The average annual rainfall is approximately 60 inches.

The natural vegetation is mostly open woodland.

3.3. Physiography and Drainage

Generally the relief is of the mature type. Typically the relief consists of fairly wide soil-covered flats separated by low ridges and rounded hills.

The flats are cut by numerous shallow meandering watercourses which invariably are dry or consist of small billabongs during the winter months. The Evelyn and O'Neill "Rivers" dominate the drainage of the area mapped.

4. PREVIOUS INVESTIGATIONS

In 1949 Noakes reviewed and summarised various reports dealing with the then known geology of the area. These reports deal mainly with reconnaissance trips and/or mineral occurrences.

In 1953, 1954, 1955 and 1957 the Bureau of Mineral Resources carried out geological investigations in the general area.

Several writers — Elliston (1954), Larson and Healey (1964), and others — have described various aspects of the mineralisation at the Evelyn and Northern Hercules mines. United Uranium N.L. have also reported —

published and unpublished — on various aspects of the general geology and mineralisation at, and in the vicinity of, the Evelyn and Northern Hercules mines.

In 1960 Walpole studied the geological evolution of the general area.

These investigations assisted in the preparation of this report.

PART I

GEOLOGICAL INVESTIGATION OF THE SOUTH EVELYN AREA

1. INTRODUCTION

The geology of the general area has been well documented by the Bureau of Mineral Resources, Geology and Geophysics. Following a period of extensive field mapping, aerial reconnaissance and photo - geological interpretation, a geological map (with Explanatory Notes) — Goodparla South, Northern Territory, 1 mile Geological Series Sheet D 53-5-71 — of the area was published. Subsequently, other geological maps covering this general area of the Northern Territory have been published.

Only limited success was achieved in providing a detailed geological map of the South Evelyn Area. Geological mapping of the area was severely handicapped by the fact that outcrop was virtually non-existent over large areas — soil, debris and boulder-scree blankets extensive tracts of the area. The creeks often fail to cut through the alluvium of the flats, consequently bedrock is often not exposed. Another handicap was the apparent lack of any distinctive marker horizons in the predominently monotonous sedimentary sequence. Finally, ground control was too poor for the type of map that was required; only in the areas where detailed geological and geochemical surveys were performed on grids (See Part II) did success result.

A plan showing the field data accumulated was prepared (See Plan No. 1.). In addition a simplified plan showing the general geology, with cross-sections, was prepared (See Plans No.'s 2 and 2X.). This information in effect only modifies the information already provided by the Bureau of Mineral Resources, Geology and Geophysics.

2. GEOLOGY

2.1. Geological Setting

It is considered that an understanding of part of the geological history of the Katherine - Darwin region, as outlined by Walpole (1960), and others, is paramount to an understanding of the geology of the South Evelyn Area.

The South Evelyn Area is but a small part of the Katherine - Darwin metalliferous province. This province is roughly co-extensive with the Pine Creek Geosyncline (Walpole, 1960), which existed in the Lower Proterozoic, i.e. in the Agicondian System.

The Pine Creek Geosyncline was a composite, fairly shallow, intracratonic structure which developed in stages. Each stage is typified by distinctive facies assemblages which overlap in time and space.

The primary structure of the geosyncline — the Central Basin — was an asymmetrical trough, deepest in the west. The bulk of the sedimentation in this primary structure was from the east. An arkosic assemblage — the Mount Partridge Formation — was initially deposited. This assemblage grades vertically and laterally to the west into initially a quartz greywacke, carbonaceous siltstone and siltstone sequence — the Masson Formation —, and then into a dominantly carbonaceous siltstone and chert sequence with numerous lenses of pyritic carbonaceous shale — the Golden Dyke Formation. Bands, lenses and nodules of dolomite and/or chert are widespread within the carbonaceous shale member of the Golden Dyke Formation. These three formations form the Goodparla Group: only the Golden Dyke Formation outcrops in the South Evelyn Area.

The second stage in the development of the geosyncline was vertical movement along the western flank causing regression of the surface of deposition to the west. These movements resulted in the deposition of the Finnis River Group, of which the Burrell Creek Formation is the only unit represented in the South Evelyn Area. The basal sediments of this group — a greywacke and siltstone assemblage — are commonly admixed with the sediments of the Golden Dyke Formation, thus indicating that material from the east was still being deposited.

Shortly after the development of the greywacke — siltstone assemblage — a ridge developed along the line of what is now the South Alligator Valley. This appears to have cut off the easterly-derived sediments from the Central Basin and deposited them in a secondary structure — the Eastern Trough. These sediments, which are not to be found in the South Evelyn Area, belong to the South Alligator Group. They mark the close of the Agicondian System and the final sedimentation of the Pine Creek Geosyncline.

The Lower Proterozoic rocks are probably not more than 20,000 feet thick in the deepest part of the Central Basin. Faulting continued penecontemporaneously with sedimentation throughout the history of the geosyncline. The sediments were folded in the Upper Lower Proterozoic; however, the folding was not severe.

Prior to this period of folding, sills of dolerite and amphibolite and a later suite of basic to intermediate rocks intruded the sediments of the geosyncline. Regional dynamic metamorphism is of the low green-schist facies only and in many places is virtually non-existent.

In the Lower Middle Proterozoic large bodies of granite, e.g. the Cullen Granite of the South Evelyn Area, and small comagmatic stocks were intruded into the sediments of the geosyncline.

The subsequent geological history of the Katherine - Darwin region does not appear to have any relevance to the geology of the South Evelyn Area. The Bureau of Mineral Resources, Geology and Geophysics, have shown that only sediments belonging to the Golden Dyke and Burrell Creek Formations, which have been intruded by the Cullen Granite, are present in the South Evelyn Area.

2.2. Stratigraphy

The stratigraphy is summarised in Table 1.

Lower Proterozoic, i.e. Agicondian System

The Golden Dyke Formation is the only member of the Goodparla Group represented in the South Evelyn Area.

The lithologies of this formation that appear to be exposed in the South Evelyn Area are summarised in Table 1. (During the regional geological survey of the area, the relationship between the various lithologies was not apparent – only very rarely could any of these lithologies be considered as mappable units. The relationship between the lithologies was recognised during the geological and geochemical investigations of the limestone terrains (See Part II)).

In the South Evelyn Area it appears as though the lowest lithological unit exposed is a massive, largely structureless limestone, dolomitic in greater part. Occasional bands or beds of argillaceous material are intercalated with this limestone. Overlying this massive limestone unit is either an interbedded limestone (often dolomitic) – chert unit, which contains some interbedded carbonaceous and calcareous shale beds, or a psammitic – pelitic unit, which contains occasional interbedded dolomitic limestone beds. It is considered that the interbedded limestone – chert unit grades laterally into the psammitic – chert unit. These two units exhibit numerous sedimentary structures. Vertically these two units grade into a psammitic – pelitic unit which exhibits considerable lateral variations. An interbedded dolomitic limestone – chert unit, again with some interbedded carbonaceous and calcareous shale beds, overlies the psammitic – pelitic unit. This unit, like the preceding interbedded limestone – chert unit, exhibits numerous sedimentary structures. It is considered to be lenticular in shape. It is overlain by a comparatively thick carbonaceous and calcareous shale unit which in turn is overlain by a psammitic – pelitic unit. The final lithology deposited in the Golden Dyke Formation is a comparatively thick carbonaceous shale unit. This unit, and the previous carbonaceous shale unit, does not appear to exhibit any sedimentary structures that are readily visible apart from the presence of slump overfolds.

Era	Age	Group	Formation	Lithology	Metamorphic Equivalent	Stratigraphy in the Geochemical Prospect Areas
Cainozoic	Quaternary			Alluvium.		
	Middle Proterozoic			Cullen Granite and associated micrigranitic and aplitic phases.		
Proterozoic	Lower Proterozoic	Finnis River Group	Burrell Creek Formation	Greywacke, siltstone and greywacke - siltstone.	Hornfels.	
		Goodparla Group	Golden Dyke Formation	Carbonaceous shales.	Cordierite - andalusite hornfels and/or chiastolite hornfels.	
				Psammites and pelites.	Quartzites and hornfels.	
				Carbonaceous and calcareous shales.	Hornfels.	No. 4.
				Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales.	Calc - silicate hornfels, tremolitic and dolomitic marbles, cherts and hornfels.	No. 1.
				Psammites and pelites.	Quartzites and hornfels.	
				Psammites and cherts with some interbedded limestones (often dolomitic).	Quartzites, cherts and marbles.	No. 3.
				Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales.	Calc - silicate hornfels, tremolitic and dolomitic marbles, cherts and hornfels.	No. 2.
				Massive limestones (often dolomitic).	Marbles (tremolitic and dolomitic).	

The predominant lithologies exposed in the South Evelyn Area appear to be the upper three units. All of the units exposed appear to be conformable, as far as can be ascertained, one with another.

In the Pine Creek Geosyncline the Goodparla Group occupies the Central Basin. The bulk of the sedimentation in this basin was from the east. Vertical movement along the western flank caused repression of the surface of deposition to the west and resulted in the deposition of the Finnis River Group. The basal sediments of this group, the Burrell Creek Formation, are admixed with sediments of the Golden Dyke Formation.

In the South Evelyn Area the Burrell Creek Formation, a monotonous quartz greywacke — greywacke-siltstone — siltstone assemblage, conformably overlies the Golden Dyke Formation. The boundary between these formations has been mapped purely on the basis of the dominance of the typical rock types.

Walpole (1960) considers that weathering of the rocks of the Golden Dyke and Burrell Creek Formations appears to have produced in some places considerable difference between the appearance of the rocks in outcrop and at depth. If this is the case, then it is considered that probably the same rocks show considerable variation from location to location.

Cainozoic

Soil and alluvium covers large tracts of the area.

Igneous Rocks

The only igneous rock exposed in the South Evelyn Area is the discordant Cullen Granite, a hornblende-biotite granite, and its associated microgranitic, aplitic and pegmatitic phases. It has a fairly extensive microgranitic marginal phase and is bordered by a hornfelsic contact aureole.

It is suspected, from the otherwise unaccountable distribution of hornfelsic rocks in the South Evelyn Area, that a number of small stocks and/or apophyses of the Cullen Granite underlie the sediments of the area.

2.3. Metamorphism

Regional dynamic metamorphism of the Lower Proterozoic is of the low green-schist facies only and in many places is virtually non-existent. The pelites have been altered to shales, the psammites to quartzites and the limestones to marbles. It is considered the chert horizons have resulted from colloidal processes associated with diagenesis rather than metamorphism.

The intrusion of the Cullen Granite has resulted in the development of a fairly extensive contact metamorphic aureale. The sediments bordering the granite mass have invariably been altered — the limestones to marbles and calcium - magnesium - silicate rocks rich in tremolite, diopside, garnet, ? chrysatile, ? anthophyllite, ? antigorite, etc.; the carbonaceous shales to cordierite - andalusite and/or chiastolite hornfels; the greywacke — greywacke-siltstone — siltstone assemblage and the psammites and pelites to a variety of hornfels.

The distribution of hornfelsic rocks in the South Evelyn Area away from the Cullen Granite is considered to be possibly due to the intrusion of a number of small stocks and/or apophyses of the Cullen Granite that as yet have not been exposed.

2.4. Structural Geology

2.4.1. Folding

Individual beds and groups of beds, particularly in the limestone — chert and calcareous shale units, have been tightly folded. Often these folds are truncated by younger beds of the same sedimentary unit. Invariably they have a rather irregular and unsystematic distribution. It is postulated that during the deposition of the sediments contemporaneous deformation occurred, probably as a result of gravity sliding tectonics.

The sediments of the Golden Dyke and Burrell Creek Formations were folded, in the Lower Proterozoic, prior to the intrusion of the Cullen Granite. The folding does not appear to have been severe. Walpole (1960) is of the opinion that there has been little foreshortening of the geosyncline and that the fold pattern has resulted from a dominance of torsion produced by tensional stress rather than by compression.

Two major east - south - east plunging anticlinal structures transgress the South Evelyn Area. The fold axis of one of these anticlines, an asymmetrical anticline, north limb pitching steeper than the south limb (30° - 40°), is situated immediately to the south of the Moline - Pine Creek Highway. East - west orientated undulations or crenulations are superimposed on the south limb of this anticline. The fold axis of the other anticline, a symmetrical or concentric anticline in the west but possibly tending towards an isoclinal anticline in the east, is situated in the extreme south of the area under investigation. The axis of the intervening syncline is situated to the north of Geochemical Prospect No. 3 and to the south of the Stockyard Prospect (See Plans No.'s 1. and 2.).

Subsequently, east - west compressional forces modified this structural picture. North - south orientated fold axes were superimposed upon the earlier east - west oriented fold axes and crenulations. This has resulted in the formation of basins and domes on the major east - south - east plunging anticlines.

2.4.2. Faulting

Faulting continued penecontemporaneously with sedimentation throughout the history of the geosyncline (Walpole, 1960).

The South Evelyn Area is transgressed by a number of faults (See Plans No.'s 1. and 2.); however the effects of these faults are not generally severe. The overall dislocation, vertical and/or horizontal, is small and has not greatly affected the topography of the area.

The majority of the faults which appear to be high angle faults of the diagonal slip type, i.e. they appear to possess both strike slip and dip slip components, trend in either a N.N.W. - S.S.E. or a N.N.E. - S.S.W. direction. They have the effect of cutting the strata into blocks.

To the west of Geochemical Prospect No. 4. (See Plans No.'s 1. and 2.) the sediments of the Golden Dyke Formation, but apparently not the overlying Burrell Creek Formation, have been intensively faulted. A series of N. - S. trending, high angle, normal faults have been cut by two "E.N.E. - W.S.W." trending high angle diagonal slip faults. No major dislocation of the sediments resulted from these faults.

To the east of Geochemical Prospect No. 3. (See Plans No.'s 1. and 2.) the antinclinal structure has been transgressed by a thrust which appears to dip south at 30^{o} - 40^{o}. The shear appears to be of the pivotal type — greatest movement to the east. No major dislocation of the sediments appears to have resulted from this shear.

A major "E - W", high angle, normal fault, with a downthrow to the south, terminates the exposure of the Golden Dyke Formation in the extreme south of the area mapped.

No extensive mineralogical alteration associated with the faulting has been observed.

2.4.3. Jointing and Cleavage

Jointing is well developed throughout the area in all but the limestone terrains. The joints have developed in response to each of the different stages of folding and also to the faulting in the area.

In the South Evelyn no attempt was made to interpret the different joint patterns.

Within the pelitic rocks cleavage is strongly developed and movement along the cleavage planes, which are coincidental with the bedding planes, has resulted in contortion of the bedding to a minor scale.

2.5. Economic Geology

The Katherine - Darwin region contains many small mines. Of the several hundred occurrences most are in quartz veins, fissure lodes, greisens and pegmatites, most of which can be directly related to the Middle Proterozoic intrusions of the area. Many of the mineral deposits are localised in shears and fractures, some within the granites but most in the Agicondian sediments close to the granite margins. During the regional geological survey of the South Evelyn Area no mineralisation of any economic significance was located apart from that already known. Occasional cappings of gossanous haematite were discovered (See Plan No. 1.) but upon investigation none could be related to possible economic mineralisation.

Prior to the regional geological survey; gold - silver - copper - lead - zinc mineralisation had been discovered by United Uranium N.L. at the Stockyard (See Plan No. 1.). To date, this mineralisation has been only partially investigated. It is considered that this mineralisation, and the associated parallel mineralisation immediately to the east, should be thoroughly evaluated. It is recommended that the following plan be adopted to evaluate the mineralisation:-

(1) A rectangular, "east-west" orientated grid, centres at 100 feet intervals, should be surveyed in (distances and relative levels) over the entire eastern portion of the spur upon which the mineralisation occurs. This grid should include the alluvial flats to the south and north of the spur.

(2) Detailed geological mapping should be undertaken on this gridded area.

(3) Several costeans should be cut, using the geological map as a guide, to obtain additional geological information. Detailed geological mapping of these costeans should be carried out.

(4) Several costeans should be cut to a pattern across the exposed line of gossanous outcrops. Detailed geological mapping and sampling of these costeans should be carried out.

(5) Percussion drilling to a set pattern should be carried out if a review of the preceding stages suggests that it is warranted.

It is considered that in this country regional geological mapping is unlikely to result in the discovery of any mineralisation of economic significance. ? syngenetic ore deposits of the Macarthur River type could easily be overlooked. It is strongly recommended that a geochemical copper - lead - zinc stream sediment survey be carried out in the area. This survey should be conducted at the close of the wet season. It is recommended that samples be taken at 400 feet intervals along the main streams and tributary streams or creeks. Samples should also be collected upstream of all stream/creek junctions. The pH of any running water should be determined by using Universal Indicator whenever a sample is collected. This survey should include a systematic search of the Cullen Granite and the contact between the granite and the sediments to determine the presence, or otherwise, of tin, tungsten and molybdenum. The survey should be carried out under the direct control of a Geochemist who should plan the programme and perform the interpretation.

PART II

GEOLOGICAL AND GEOCHEMICAL INVESTIGATIONS OF THE LIMESTONE TERRAINS

1. INTRODUCTION

The silver - lead - zinc mineralisation in the Evelyn Mine, which is situated immediately to the north of the general area under consideration, occurs in a limestone terrain similar to the limestone terrains located during the regional geological survey. In the belief that other similar mineral deposits might be located in these other limestone terrains, it was decided that they should be subjected to further, more detailed investigations. Consequently, upon completion of the regional geological survey, the four principal areas of limestone outcrop, (See Plan No. 1.) and their immediate surroundings, were subjected to detailed geological and geochemical — soil and rock — surveys.

Each of the four areas was gridded. Acceptable grids were laid out using compass and tape and ranging poles: wooden pegs were used to identify the location points on the grids. Subsequent to the gridding, detailed geological maps of the areas were produced, on a scale of 1" to 100', and geochemical soil and rock surveys were conducted over the areas.

1.1. An Introduction to the Geochemical Soil Surveys

Detailed geochemical soil surveys were conducted over the four principal areas of limestone outcrop.

1.1.1. Methods

1.1.1.(a). Field Procedures

Sample locations were identified in the field. At each location point a sample of the sediment lying immediately above the bedrock was collected and details of the type of sediment were noted. An appraisal of the different floaters and bedrock at the location point was also made. In addition, topographical detail was recorded sufficiently to enable those areas which exhibit a mechanical dispersion of the semi-mobile elements to be differentiated from those areas which exhibit a chemical or hydromorphic dispersion of the semi-mobile elements.

1.1.1.(b). Sample Preparation

Each sample was dried, when necessary, and then placed in a - 80 mesh sieve. The - 80 fraction, collected after several seconds of agitation, was poured into a prenumbered bag and dispatched to the laboratory for copper, lead and zinc analyses. The remainder of the sample was also poured into a prenumbered bag and dispatched to the laboratory for pH determination.

1.1.1.(c). Analytical Procedures

The - 80 fractions were analysed for copper, lead and zinc by atomic absorption spectrophotometry. The limits of precision usually for this type of analysis are ±5% at the 95% confidence level. PH values for each sample were obtained by using a pH analyser. All analyses were performed by United Uranium N.L.'s laboratory.

1.1.2. Results

1.1.2.(a). Interpretation

1.1.2.(a).i. Introduction

The semi-mobile elements, copper, lead and zinc, occur to a minor degree in the lattices of the rock-forming minerals, where the bonding is usually within a silicate framework. The primary dispersion of these elements is usually fairly low in sedimentary rocks, except in black shales.

During the weathering processes, these elements are dispersed. This secondary dispersion is related to the primary dispersion of the elements within the unweathered rocks, and is usually affected to only a relatively small degree, either accentuated or diminished by the atmospheric agencies. As the dispersion involves a large primary source, then the sequence of values should be fairly regular for unmineralised bedrock.

In mineral deposits, the semi-mobile elements, copper, lead and zinc, occur in the form of sulphides. The sulphide lattice is much more prone to oxidation than is the silicate lattice, and consequently these elements will dissolve more readily. Moreover, when these metal-bearing solutions move into an oxygenated environment at the surface, there will be a tendency for the metallic cations to be precipitated. Accordingly, in the vicinity of such sulphide deposits, there will be a greater concentration of total metal than in the case near a non-mineralised source.

The mobility of the semi-mobile elements varies considerably both in their facility to dissolve and also in their secondary dispersion. Lead sulphides do not dissolve as readily as do copper and zinc sulphides, and tend to be found in some weathered rocks, e.g. limestones, near the surface. The dispersion of copper and zinc is governed to a great extent by the acidity of the environment. Copper tends to be precipitated at pH 5.5., whereas zinc precipitates at pH 7.0. It follows, therefore, that where there is an alkaline environment, as in a limestone terrain, the mobility of copper is severely restricted, whereas zinc could be expected to occur in anomalous proportions over a much greater distance.

In a terrain which is neutral or slightly acid in pH, zinc is an excellent pathfinder mineral, and copper slightly less so. Lead is relatively immobile and rarely contributes an anomaly of any magnitude.

1.1.2.(a).ii. Computation of Thresholds

In order to define what constitutes an anomaly, it is necessary to establish the threshold or upper limit of normal background fluctuations. To assist in the determination of this upper limit of normal background fluctuations, geochemical orientation surveys should be conducted, when possible, across both areas of known mineralisation and areas of barren bedrock. The only area of relevant mineralisation in the district is the silver - lead - zinc mineralisation at the Evelyn Mine. (See Plan No. 1.). Unfortunately, it was considered that this area was unsuitable for such surveys due to contamination resulting from the present mining operation. As a result no orientation surveys could be conducted.

The methods of computation of threshold values have been disputed for several years. For the purposes of work conducted for United Uranium N.L. an attempt has been made to establish a simple standard procedure, although not always successfully. Graphs, showing the frequency distribution of a single unmineralised population, were prepared for all elements on an arithmetic scale. Each area was tackled separately, and allowance was made, where possible, for the different rock types encountered. In the ideal case, a bell-shaped curve was obtained, which conformed to the normal distribution of values. The threshold value was defined as that point separating the highest $2\frac{1}{2}\%$ of values within that population.

It was inevitable that irregular curves were obtained. In most cases it was clear that insufficient samples were collected to obtain a full curve. In addition, samples from different populations, whose thresholds vary considerably, were invariably intermixed. To assist in providing reasonably shaped curves the samples were differentiated into 20 p.p.m. divisions. In addition, the downward shape of the curve was made equal to the upward shape, which is normally unaffected by additional populations. This method tends to reduce the threshold values as determined by most authorities but nevertheless it appears to be beneficial under most Australian conditions.

Where reasonably shaped curves could not be obtained due to the intermixing of several populations or where the statistical distribution was irregular, the threshold value was estimated as either that value which was exceeded by approximately $2\frac{1}{2}\%$ of the total number of observations, excluding the high erratic values for these belong to mineralised population suites, or that value which provided a marked break in the shape of the curve. This method also tends to reduce the threshold value as determined by most authorities.

Semiquantative and quantative statistical approaches have a considerable field of application in the interpretation of geochemical data. However, statistical methods have only been used as a disciplinary guide. The final determination of threshold values has been based on a visual assessment and comparison of the geochemical patterns given by a series of tentative threshold values correlated with the known distribution of metal in the bedrock.

1.1.2.(b). Presentation

For each area, the analytical results for each element were plotted onto separate transparent overlays to the base plan, i.e. to the plan showing the geology and rock geochemical survey.

Following the calculation of threshold values, the data were grouped into ranges of concentration. In order to bring out the pattern and relative significance of the geochemical anomalies, these ranges were represented by isograds, i.e. geochemical contours, and by a set sequence of symbols.

The contour intervals or group concentration ranges were selected as factorial multiples of the threshold values: a method adopted by most authorities. The below threshold values were divided into low background values, 0 to $\frac{1}{2}$ x threshold (blank), and high background values $\frac{1}{2}$ to 1 x threshold (stippled). Possibly anomalous and probably anomalous values vary between 1 to 2 x threshold (squared) and 2 to 4 x threshold (widely spaced cross-hatching) respectively. The anomalous values were divided into near peak values, 4 to 8 x threshold (closely spaced cross-hatching), and peak values, 8 to 16 x threshold (blacked out). Each value in p.p.m. fell into one of these divisions.

1.2. An Introduction to the Geochemical Rock Surveys

In the areas where the geochemical soil surveys were conducted, rock samples, either chip samples from actual outcrops or scree samples that were considered to be related directly to the subsurface bedrock, were collected to assist in establishing the copper, lead and zinc threshold values in the associated soils and in the interpretation of the geochemical soil surveys.

Each sample, after being identified and logged, was pulverised and then placed, like the geochemical soil samples, in a - 80 mesh sieve. The - 80 fraction was collected and analysed for copper, lead and zinc: the analyses being performed under exactly the same conditions as for the geochemical soil samples.

The analytical results and the locations of the rock samples were noted on the relevant geological plans.

2. GEOCHEMICAL PROSPECT NO. 1 — SOUTH EVELYN AREA

The prospect area is located immediately to the south of the 27 mile post on the Moline - Pine Creek Highway in an area of undulating terrain which rises to the south and south-east. Two small creeks drain the area.

A grid, consisting of 10 parallel "east-west" lines, each 1,000' long with "stations" located at 100' intervals, was laid out over the area of limestone outcrop.

2.1. Geology (See Plan No. 3., and Figure 2.)

Outcrop, except for the area of limestone outcrop, is poor: debris and boulder-scree cover much of the area.

The stratigraphy is summarized in Table 2.

The strata appear to have been gently folded into a small, very open, anticlinal structure, the axial plane being vertical and trending "east-west". The anticlinal structure, which plunges to the "east", appears to have been disrupted by two parallel "north-south" faults. These faults appear to be of the diagonal slip type, i.e. they appear to possess both strike slip and dip slip components (See Figure 2.). In addition, in the east, the anticlinal structure appears to have superimposed upon it a small basin or synclinal structure which is represented by intensively fractured or brecciated carboniferous shales and cordierite - andalusite and/or chiastolite hornfels, cemented with limonite.

2.2. Geochemistry (See Plans No. 3, 3 Cu., 3 Pb., 3 Zn., and Figure 3).

2.2.1. Rock Survey

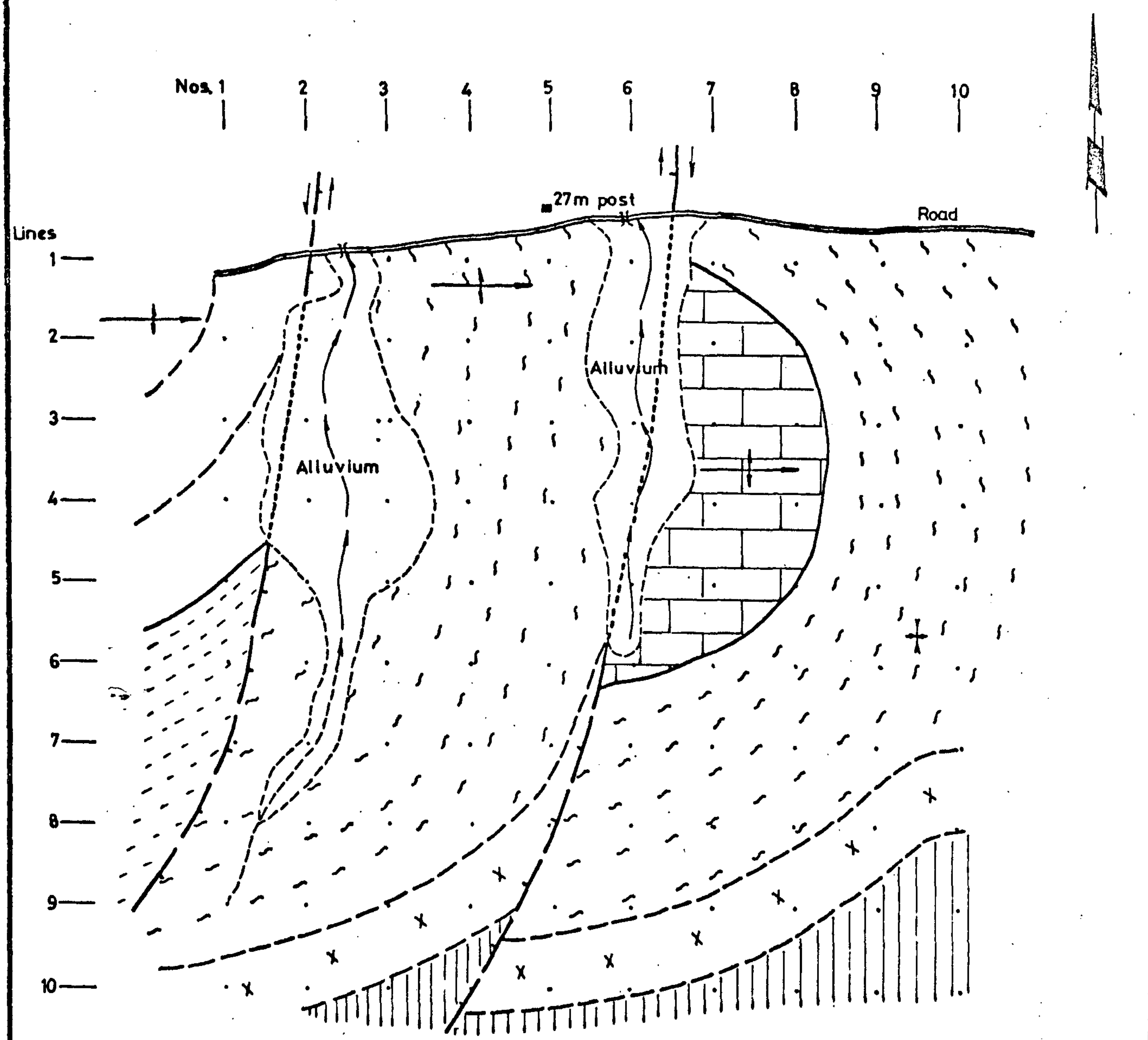
112 rock samples, chip samples from actual outcrop or scree samples that were considered to be related directly to the subsurface bedrock, were collected in the area to assist in establishing the copper, lead and zinc threshold values in the associated soils and in interpreting the geochemical soil surveys. They were used to provide an indication of the normal and abnormal primary, and hence secondary, dispersion variations. Of particular interest were the following samples:-

(a) Outcrop samples No.'s 1, 70 and 71 — anomalous lead values — carbonaceous shales. Scree sample No. 69 could be related to the outcrop samples — anomalous copper and lead

TABLE 2.

Summary of Stratigraphy: Geochemical Prospect No. 1.

Age – Rock Unit	Lithology	Metamorphic Equivalent	Remarks
Lower Proterozoic – Golden Dyke Formation	Carbonaceous shales.	Cordierite - andalusite hornfels and/or chiastolite hornfels.	Unmetamorphosed strata highly cleaved (slatey, fracture and bedding cleavages).
	Psammites and pelites.	Quartzites and hornfels.	Unmetamorphosed strata highly cleaved.
	Carbonaceous and calcareous shales.	Hornfels.	Unmetamorphosed strata highly cleaved.
	Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales.	Calc-silicate hornfels, tremolitic and dolomitic marbles, cherts and hornfels.	Abundant current and oscillation ripple marks, slump and minor fold features.
	Psammites and pelites.	Quartzites and hornfels.	Unmetamorphosed strata highly cleaved.
	Psammites and cherts with some interbedded limestones (often dolomitic).	Quartzites, cherts and marbles.	



Stratigraphic Column

- Carbonaceous shales, (Hornfels)
- Psammites and pellites, (Quartzites and hornfels).
- Carbonaceous and calcareous shales, (Hornfels)
- Limestones and cherts, (Calc-silicate hornfels, marbles and cherts).
- Psammites and pellites, (Quartzites and hornfels)
- Psammites, cherts and limestones (Quartzites, cherts and marbles).

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— SOUTH EVELYN AREA —
Geological Interpretation of Geochemical Prospect No. 1

SCALE: 1" = 50'.0"	DATE: 6.12.69.	FIG. 2.
DRAWN: SPD.	APPROVED:	

values — ferruginous quartzite. These samples could possess an economic significance.

(b) Outcrop sample No. 112 — anomalous silver, lead and zinc values — ferruginous laterite. Considered to be of no economic significance — fully investigated by United Uranium N.L. in 196?.

(c) Scree samples No.'s 89, 90 and 99 — anomalous copper, lead and zinc values — fractured or brecciated carbonaceous shales and hornfels. Scree derived from the fault zone to the west — considered to be of no economic significance.

(d) Outcrop samples No.'s 45 and 46 and scree sample No. 47 — anomalous zinc, and variable copper and lead values — fractured or brecciated carbonaceous shales and cordierite - andalusite and/or chiastolite hornfels. Considered to be of no economic significance.

(e) Outcrop samples No.'s 5 and 6 — anomalous copper, lead and zinc values — ferruginous pelites. Considered to be of no economic significance.

2.2.2. Soil Survey

96 soil samples were collected in this area. The - 80 fractions were analysed for copper, lead and zinc. The greater than - 80 fractions were subjected to pH determinations.

The soils proved to be slightly acid to acid in pH, the acidity increasing, reason undetermined, to the east. Under such conditions zinc is an excellent pathfinder mineral and copper slightly less so: the mobility of copper does not appear to have been restricted by the presence of limestone. Lead is relatively immobile and would not be expected to contribute to an anomaly of any magnitude.

The threshold values for copper (120 p.p.m.) and lead (140 p.p.m.) were determined by considering the graphs showing the frequency distribution of the elements on an arithmetic scale, and the background fluctuations of these elements in the rock samples. The threshold value for zinc (500 p.p.m.) was based upon a consideration of the geochemical patterns given by experimenting with a series of tentative threshold values and a consideration of the primary distribution of zinc in the rock samples. In the calculation of the threshold values no allowance could be made for the different rock types encountered because insufficient samples were collected and because of

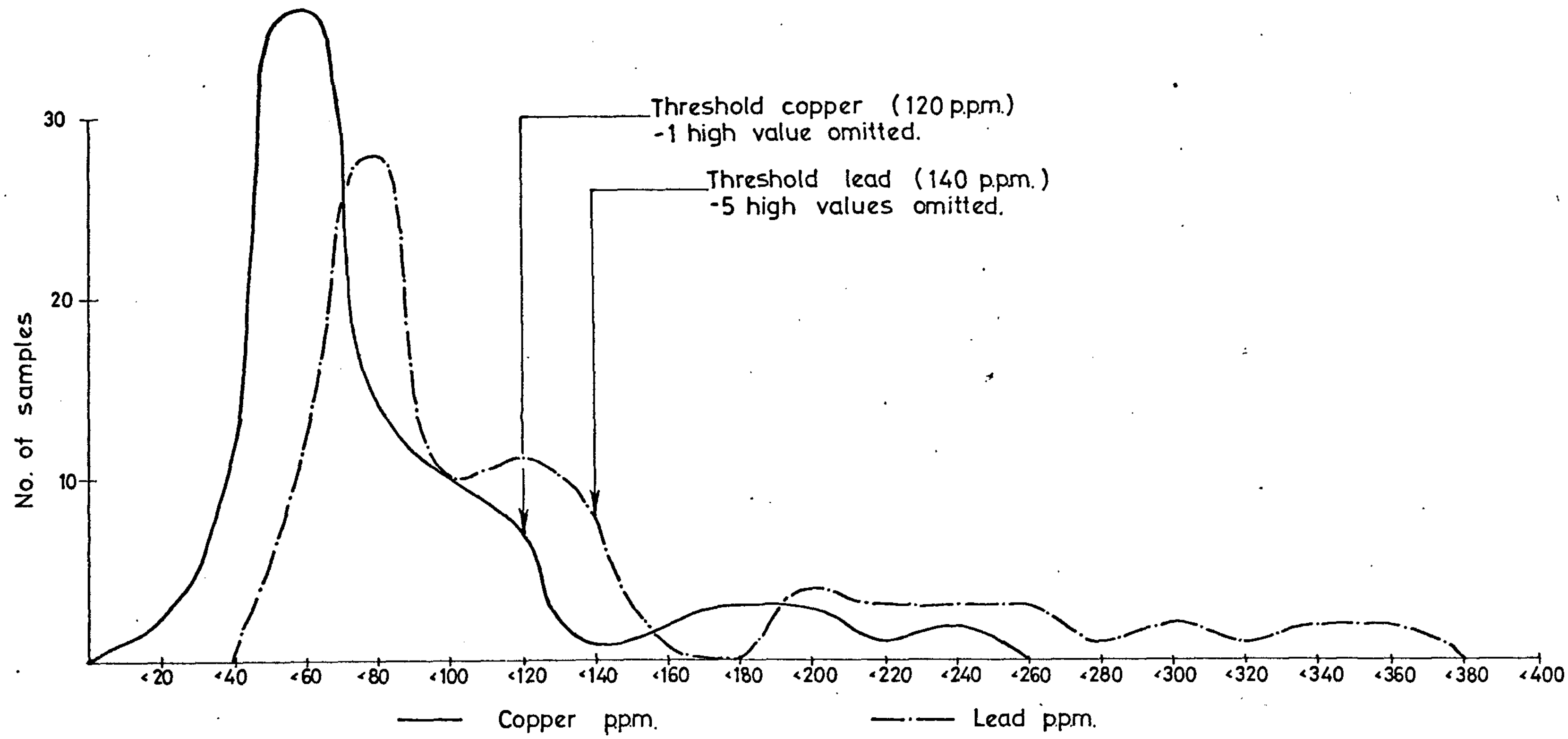


FIG. 3. Frequency distribution of copper and lead in soils

Geochemical Prospect No. 1.

Watts, Griffis & McOuat (Australia) Pty. Limited the considerable amount of intermixing of different population suites.

The soil surveys delineated several areas of interest, namely:-

(a) A very significant lead anomaly, 8 - 10 x threshold, but no associated zinc and/or copper anomaly, is centred at Line 1.5, No. 4.8. This anomaly is considered to have originated from rock survey anomaly (a). The "strike" of the anomaly parallels the strike of the strata. Additional investigations are required to determine whether any mineralisation of economic significance is responsible for the anomaly.

(b) A very significant zinc anomaly, 14 x threshold, with associated copper and lead anomalies, is centred at Line 10, No. 1. This anomaly is considered to have originated from rock survey anomaly (b) and hence to be of no economic significance.

(c) A lead anomaly, 6 x threshold, but no associated zinc and/or copper anomaly, is centred at Line 7, No. 1. This anomaly is considered to have originated from rock survey anomaly (c) and hence to be of no economic significance.

(d) A lead anomaly, 5 x threshold, with an associated zinc anomaly, is centred at Line 5, No. 10. This anomaly is considered to have originated from rock survey anomaly (d) and hence to be of no economic significance.

(e) A weak lead anomaly, 2 x threshold, but no associated zinc and/or copper anomaly, is centred at Line 1, No. 8. The source of this anomaly has not been defined but it is believed to be a hydromorphic anomaly and hence to be of no economic significance.

(f) A weak zinc anomaly, 2 x threshold, and an associated weak copper anomaly, is centred at Line 2, No. 9. This anomaly is considered to have originated from rock survey anomaly (e) and hence to be of no economic significance.

(g) Weak hydromorphic anomalies, of no economic significance, are located in the creek draining anomalies (b), (c) and (a).

2.3. Recommendation

The source of the combined rock survey anomaly (a) and soil survey anomaly

(a) should be defined. Geochemical rock and soil surveys should be conducted to the north of the Highway to determine the full extent of the anomaly. Subsequently, a costean should be cut across the anomaly to determine whether there is any trace of mineralisation at depth. If positive results are obtained a drilling programme should be undertaken.

3. GEOCHEMICAL PROSPECT NO. 2. – SOUTH EVELYN AREA

The prospect area is located immediately to the west of Geochemical Prospect No. 1. and to the south of the Moline - Pine Creek Highway in an area of gently undulating terrain.

A grid, consisting of 7 parallel "east-west" lines, each 1,000' long with "stations" located at 100' intervals, was laid out over the area of limestone outcrop.

3.1. Geology (See Plan No. 4., and Figure 4.)

Outcrop is very good despite the fact that debris and boulder-scree cover much of the area.

The stratigraphy is summarized in Table 3.

The strata have been folded into a small, very open, dome-like structure which is elongated in an "east-west" direction. The structure has been disrupted by a "north-south" fault which appears to be of the diagonal slip type (See Figure 4.). Subsequent to the period of folding, the strata were intruded by a granite mass – the Cullen Granite – and its associated micrograntic and aplitic phases; the strata in contact with the granite being extensively metamorphosed (See Table 3.).

3.2. Geochemistry (See Plans No. 4,4 Cu, 4 Pb., 4 Zn., and Figure 5.)

3.2.1. Rock Survey

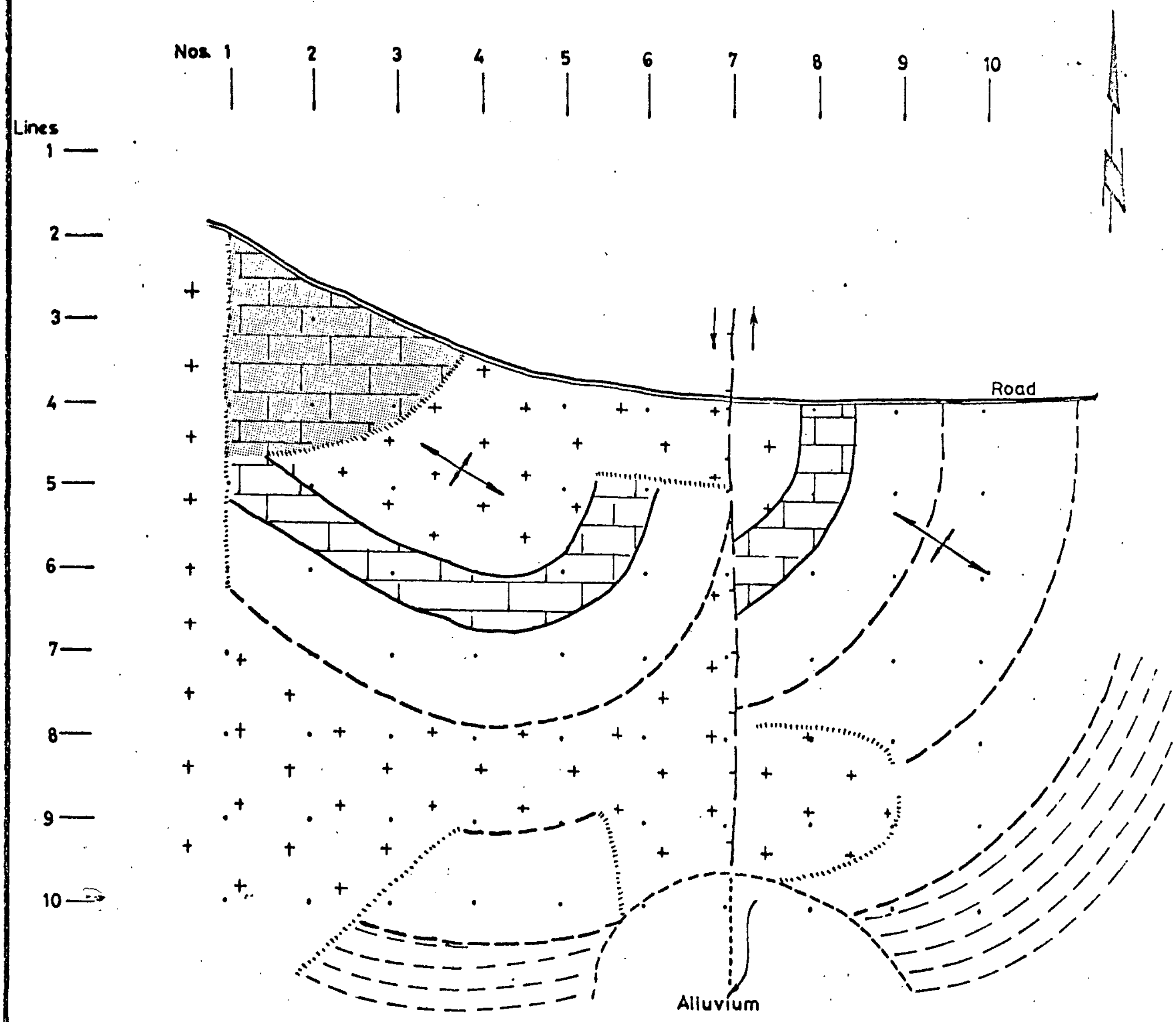
95 rock samples were collected in the area for the same reasons as outlined in Geochemical Prospect No. 1. Of interest were the following samples:-

(a) Outcrop samples No.'s 57, 58, 59, 60, 61, 67 and 68 – ? anomalous copper, lead and zinc values – interbedded cherty siltstones, quartzites, tremolitic and serpentinised limestones and calc-silicate hornfels. The ? anomalous values

TABLE 3

Summary of Stratigraphy: Geochemical Prospect No. 2.

Age — Rock Unit	Lithology	Metamorphic Equivalent	Remarks
? Middle Proterozoic	Cullen Granite and associated microgranitic and aplitic phases.		Essentially a hornblende - biotite granite with minor microgranitic and aplitic differentiates.
Lower Proterozoic — Golden Dyke Formation	Psammites and pelites.	Quartzites and hornfels.	Unmetamorphosed strata highly cleaved.
	Psammites and cherts with some interbedded limestones (often dolomitic).	Quartzites, cherts, and marbles.	
	Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales.	Calc-silicate hornfels, tremolitic and dolomitic marbles, cherts and hornfels.	Abundant current and oscillation ripple marks, slump and minor fold features.
	Massive Limestones (often dolomitic).	Marbles (tremolitic and dolomitic).	Marbles largely structureless.



Stratigraphic Column

- Cullen Granite, microgranitic and aplitic phases.
- Psammites and pellites; (Quartzites and hornfels).
- Psammites, cherts and limestones; (Quartzites, cherts and marbles).
- Limestones and cherts; (Calc-silicate hornfels, marbles and cherts).
- Massive limestones; (Marbles).

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— SOUTH EVELYN AREA —

Geological Interpretation of Geochemical Prospect No. 2

SCALE: 1" = 60'.0"	DATE: 8.12.69.	FIG. 3.
DRAWN: JB.	APPROVED:	

are considered to be metamorphic phenomena and hence to be of no economic significance.

(b) Outcrop samples No.'s 4 and 5 — anomalous copper, lead and zinc values — ferruginous laterite. Considered to be of no economic significance.

(c) Scree samples No.'s 44, 45, 46, 49, 92 and 93 — ? anomalous lead and zinc values — carbonaceous shales. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

Throughout the collection of the rock samples a systematic survey of the contact between the Cullen Granite and the hornfels, etc., was made to determine whether tin, tungsten and molybdenum minerals were present: no evidence was observed that indicated the presence of such minerals.

3.2.2. <u>Soil Survey</u>

66 soil samples were collected in this area and analysed for copper, lead and zinc. PH determinations were also made.

The soils again proved to be slightly acid to acid in pH with the result that neither the mobility of copper nor the mobility of zinc is adversely affected. Lead, however, is relatively immobile under such conditions.

The threshold values for copper (80 p.p.m.), lead (180 p.p.m.) and zinc (300 p.p.m.) were determined in exactly the same manner as for Geochemical Prospect No. 1. Again, as in Geochemical Prospect No. 1., no allowance could be made for the different rock types encountered because insufficient samples were collected and because of the considerable amount of intermixing of different population suites.

The soil surveys delineated three areas of minor interest, namely:-

(a) A weak lead anomaly, 2 x threshold, but no associated zinc and/or copper anomaly, is centred at Line 4, No. 4. This anomaly is considered to have originated from rock survey anomaly (b) and hence to be of no economic significance.

(b) A weak copper anomaly, 2 x threshold, but no associated zinc and/or lead anomaly, is centred at Line 10, No. 5. The source of this anomaly has not been defined but it is considered to be of no economic significance.

(c) A weak zinc anomaly, 2 x threshold, with an associated very

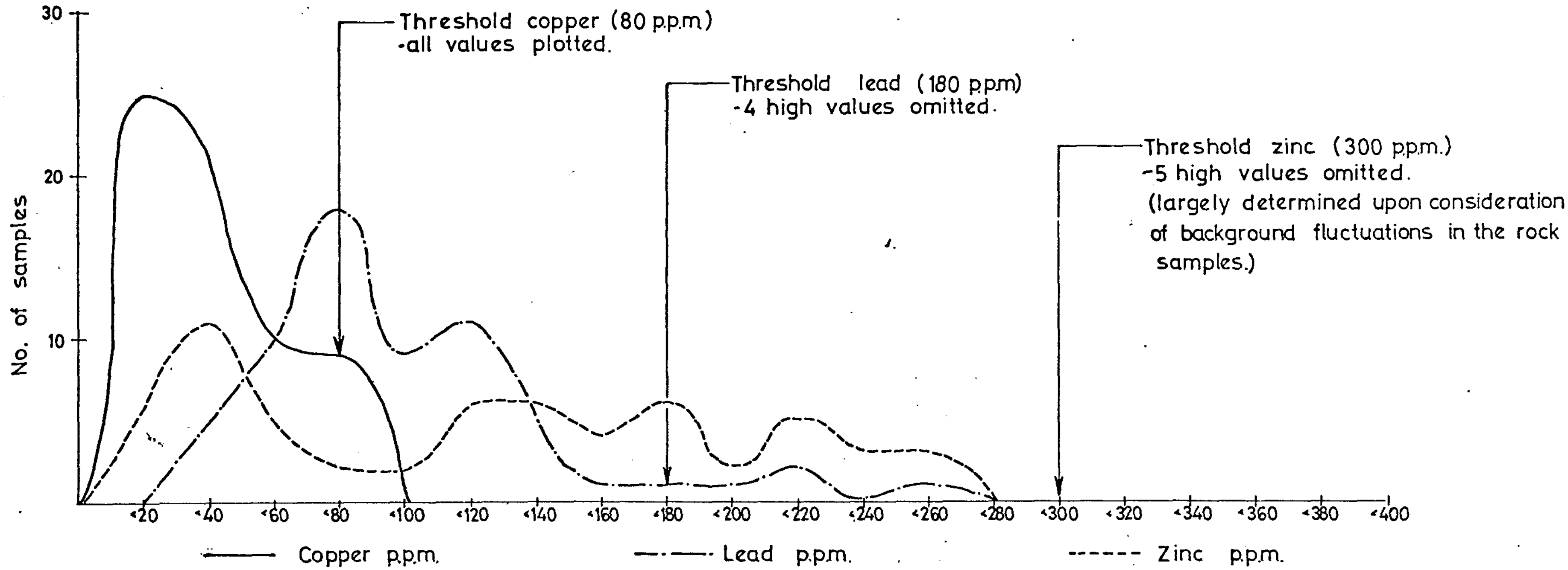

FIG. 5. Frequency distribution of copper, lead and zinc in soils
Geochemical Prospect No. 2.

Watts, Griffis & McOuat (Australia) Pty. Limited.

weak lead anomaly, is centred at Line 8, No. 10. This anomaly is believed to be a hydromorphic anomaly derived from rock survey anomaly (c) and hence to be of no economic significance.

3.3. Recommendation

No further work should be contemplated in this area.

4. GEOCHEMICAL PROSPECT NO. 3. – SOUTH EVELYN AREA

The prospect area is located, in the extreme south of the area mapped during the regional geological survey, at the top of a ridge in an area of otherwise generally undulating terrain. Several small creeks drain the area.

A grid, consisting of 10 parallel "east-west" lines, each 2,000' long with "stations" located at 100' intervals, was laid out over the area of limestone outcrop.

4.1. Geology (See Plan No. 5.)

Outcrop, except for the area of limestone outcrop, is poor: debris and boulder-scree cover much of the area.

The stratigraphy is summarised in Table 4.

The strata have been folded into a dome-like structure which is elongated in an "east-west" direction. This structure has been disrupted by a subsequent shear thrust which strikes "east-west" and dips south. Following this period of folding and faulting, the strata were subjected to metamorphism and were intruded by numerous quartz dykes.

4.2. Geochemistry (See Plans No. 5, 5 Cu., 5 Pb., 5 Zn., and Figures 6 Cu., 6 Pb., and 6 Zn.).

4.2.1. Rock Survey

141 rock samples were collected in the area for the same reasons as outlined in Geochemical Prospect No. 1. Of interest were the following samples:-

TABLE 4.

Summary of Stratigraphy: Geochemical Prospect No. 3.

Age — Rock Unit	Lithology	Metamorphic Equivalent	Remarks
? Middle Proterozoic	Quartz dykes.		Discordant bodies invariably trending "east-west". Probably a differentiate from the Cullen Granite.
Lower Proterozoic — Golden Dyke Formation	Psammites and pelites.	Quartzites and hornfels (cordierite - andalusite hornfels and/or chiastolite hornfels).	Unmetamorphosed strata highly cleaved.
	Carbonaceous and calcareous shales.	Hornfels.	Unmetamorphosed strata highly cleaved.
	Psammites and pelites.	Quartzites and hornfels (cordierite - andalusite hornfels and/or chiastolite hornfels).	Unmetamorphosed strata highly cleaved.
	Psammites.	Quartzites.	Structureless.
	Massive limestones (often dolomitic).	Marbles (tremolitic and dolomitic).	Marbles largely structureless.

(a) Outcrop samples No.'s 1 and 4 — anomalous copper values — ferruginous quartzites, possibly quartz veins. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

(b) Outcrop samples No.'s 44 and 45 and scree sample No. 49 — anomalous zinc values — fractured or brecciated ferruginous quartzites and siliceous siltstones. Considered to be of no economic significance.

(c) Scree sample No. 60 — anomalous zinc value — ferruginous quartzite, possibly quartz vein. Scree sample No. 42 could be related to scree sample No. 60 — anomalous copper value — siliceous siltstone. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

(d) Outcrop samples No.'s 19 and 20 — anomalous lead and zinc values — siliceous dolomitic limestone. These samples could possess an economic significance but the values are more likely to be inherent high primary dispersion values.

(e) Outcrop sample No. 99 — anomalous lead value — siliceous siltstone. Scree sample No. 90 could be related to the outcrop sample — anomalous copper, lead and zinc values — ferruginous siliceous siltstone. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

(f) Outcrop sample No. 111 — anomalous zinc value — ferruginous laterite. Considered to be of no economic significance.

(g) Scree sample No. 112 — anomalous copper, lead and zinc values — quartzite. Scree sample No. 113 could be related to scree sample No. 112 — anomalous lead value — siliceous siltstone. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

4.2.2. Soil Survey

200 soil samples were collected in this area. The - 80 fractions were analysed for copper, lead and zinc. The greater than - 80 fractions were subjected to pH determinations.

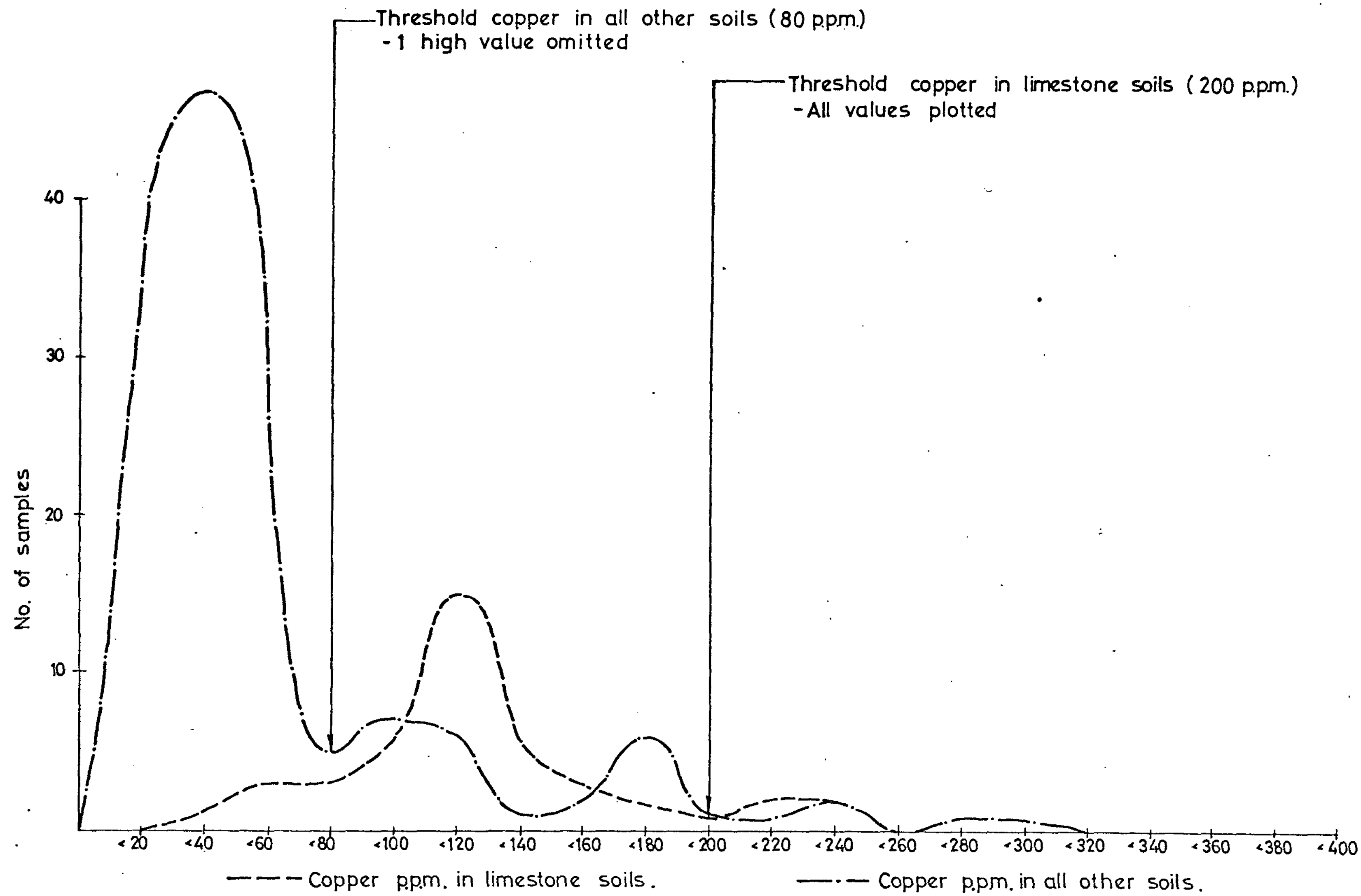

FIG. 6.
(copper)

Frequency distribution of copper in soils
Geochemical Prospect No. 3.

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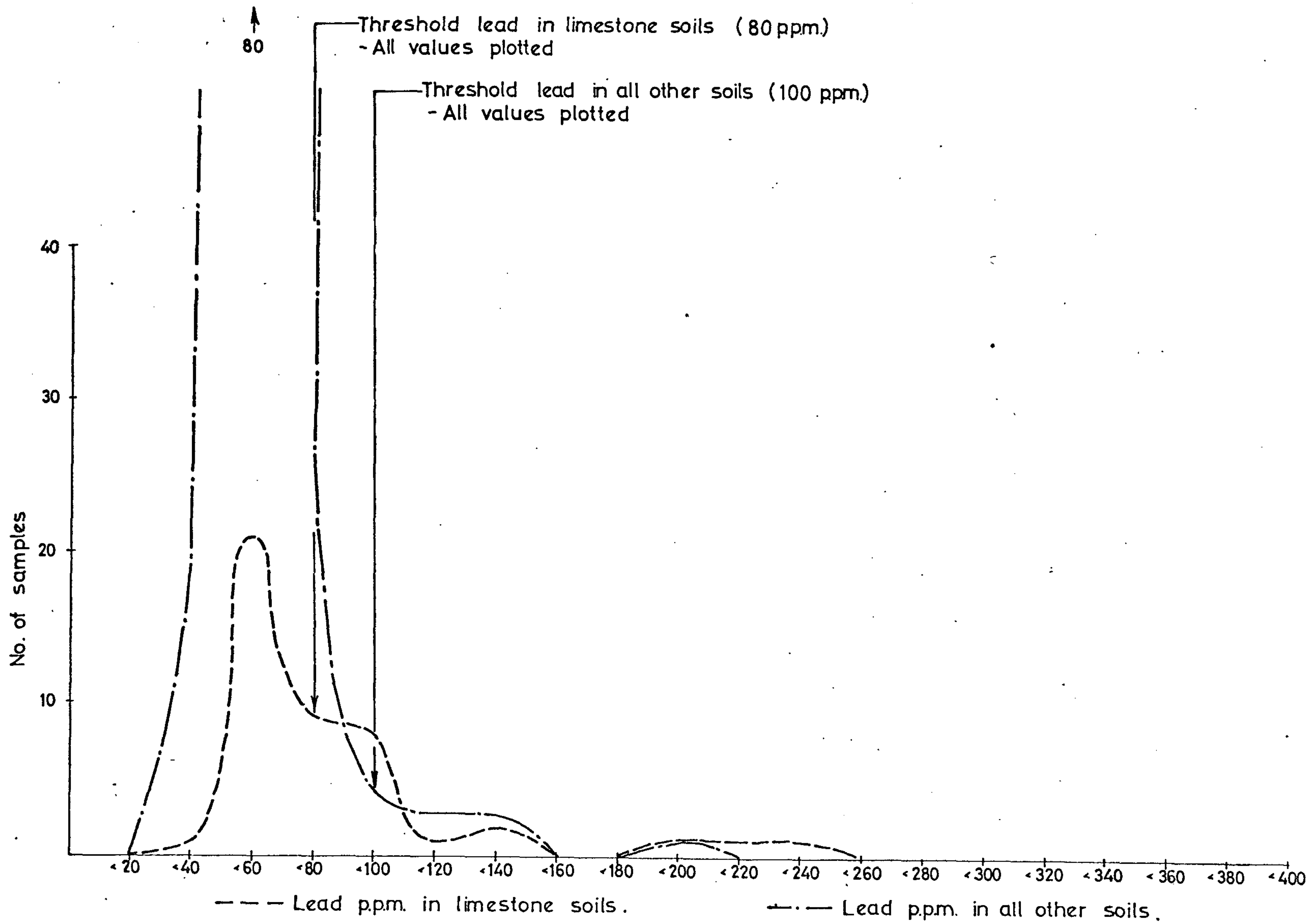

FIG. 6.
(lead)

Frequency distribution of lead in soils
Geochemical Prospect No. 3.

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As in Geochemical Prospects No.'s 1 and 2, the soils proved to be slightly acid to acid in pH. A surprising feature was the acidity of the limestone soils (5.5 - 6.5) — unmineralised limestone in this area has a pH of 8.9. Lead is relatively immobile under such conditions and would not be expected to contribute to an anomaly of any magnitude. The mobility of zinc does not appear to have been restricted and it can still be regarded as an excellent pathfinder mineral. However, it is apparent that the mobility of copper has been restricted — the threshold value for copper in the limestone soils is 200 p.p.m., as against 80 p.p.m. in all the other types, i.e. there has been a build up of copper in the limestone soils. No longer can copper be regarded as a pathfinder mineral.

In the calculation of the threshold values for this area, allowance has been made, as far as possible, for the different rock types encountered; e.g., the limestone soils were considered separately from the other soil types. The threshold values for copper (200 p.p.m. for limestone soils, 80 p.p.m. for all other soil types), lead (80 p.p.m. for limestone soils, 100 p.p.m. for all other soil types) and zinc (120 p.p.m. for all soil types) were determined by considering the graphs showing the frequency distribution of the elements on an arithmetic scale, and the background fluctuations of these elements in the rock samples.

The soil surveys delineated several areas of interest, namely:-

(a) A number of isolated lead - zinc anomalies, 2 - 3 x threshold, centred at Line 3, No. 17; Line 4, No. 11; Line 5, No. 15; and Line 6, No. 13, are linked together by weak hydromorphic lead - zinc anomalous values. The sources of these anomalies have not been defined. However, the anomalies are considered to be of no economic significance.

(b) A weak anomalous copper zone, 1 - 3 x threshold, extends from Line 8, No. 14, to Line 6, No. 20 — i.e. along the fault zone. An associated zinc anomaly, 5 x threshold, is centred at Line 7, No. 17. Hydromorphic copper and zinc anomalies have developed away from the fault zone. This anomaly is considered to be of no economic significance.

(c) A fairly strong copper anomaly, 7 x threshold, but no associated zinc and/or copper anomaly, is centred at Line 7, No. 9. The source of this anomaly has not been defined. As only one isolated soil sample has been responsible for this anomaly no economic significance is attached to it.

(d) A very weak lead anomaly, 1.5 x threshold, but no

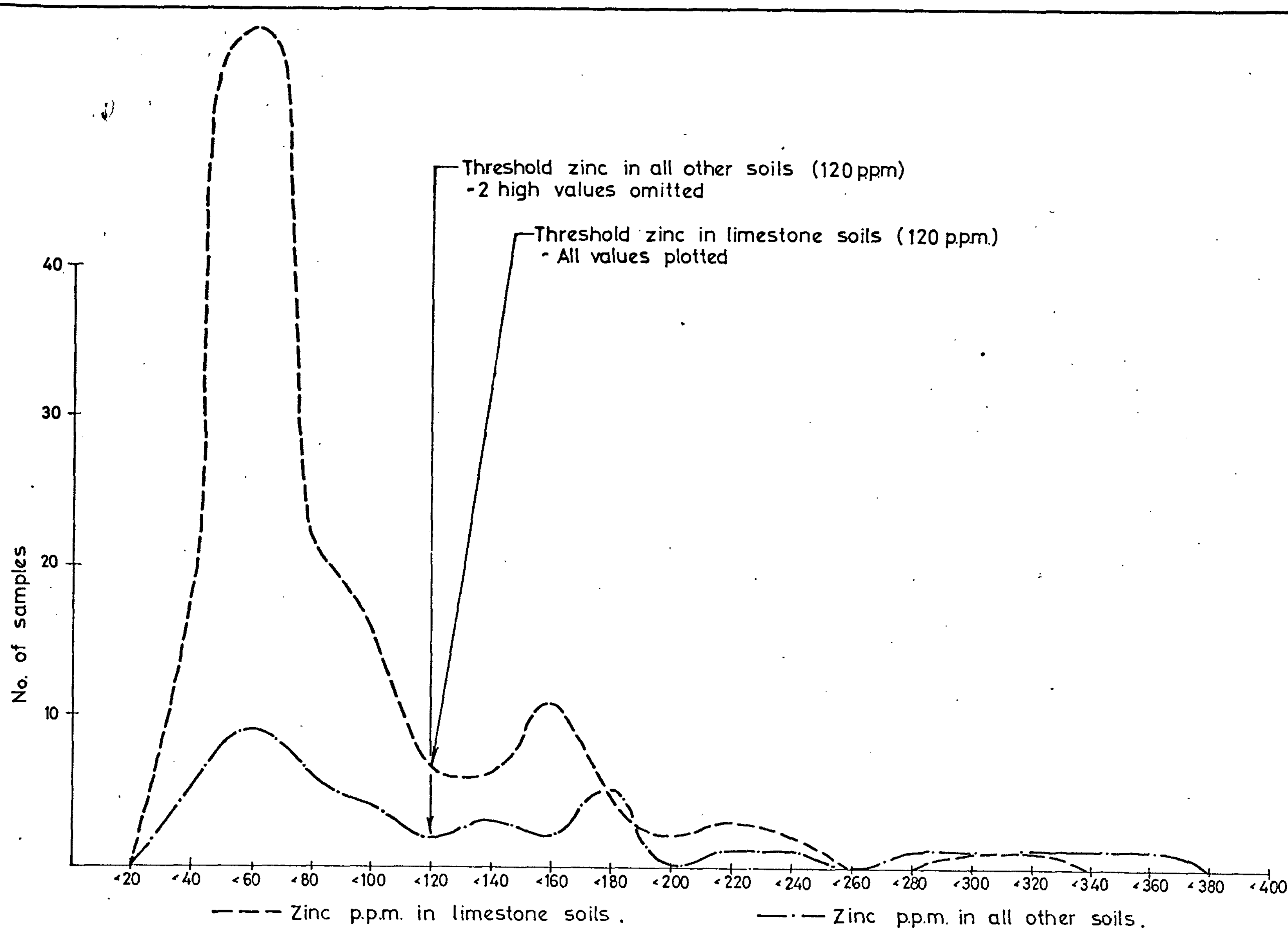

FIG. 6.
(zinc)

Frequency distribution of zinc in soils
Geochemical Prospect No. 3.

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associated zinc and/or copper anomaly, is centred at Line 8, No. 10. This anomaly is considered to have originated from rock survey sample No. 89 and hence to be of no economic significance.

(e) A very weak zinc anomaly, but no associated lead and/or copper anomaly is centred at Line 6, No. 5. This anomaly is considered to have originated from rock survey anomaly (f) and hence to be of no economic significance.

(f) A weak zinc anomaly, 3 x threshold, but no associated copper and/or lead anomalies, is centred at Line 6, No. 8. The source of this anomaly has not been defined. However, the anomaly is considered to be of no economic significance.

(g) A weak zinc anomaly, 2 x threshold, with an associated very weak lead anomaly, is centred at Line 9, No. 7. The source of this anomaly has not been defined. However, the anomaly is considered to be of no economic significance.

4.3. Recommendation

No further work should be contemplated in this area.

5. GEOCHEMICAL PROSPECT NO. 4. – SOUTH EVELYN AREA

The prospect area is located in the "centre" of the area mapped during the regional geological survey in an area of gently undulating terrain. The Evelyn River and several small creeks drain the area.

Part of a grid, consisting of 20 parallel "north-east – south-west" lines, each 2,000' long with "stations" located at 200' intervals, was laid out over the area of limestone outcrop.

5.1. Geology (See Plan No. 6.)

Outcrop is reasonably good although debris and boulder-scree cover much of the area.

The stratigraphy is summarised in Table 5.

The strata appear to have been folded into a very open, dome-like structure which is elongated in an "east-west" direction. Intense minor folding has occurred on this structure. In addition, this structure appears to have been disrupted by a "north-west — south-east" fault of the diagonal slip type. Following this period of folding and faulting, the strata were subjected to metamorphism.

5.2. Geochemistry (See Plans No. 6, 6 Cu., 6 Pb., 6 Zn., and Figures 7 Cu., 7 Pb., and 7 Zn.)

5.2.1. Rock Survey

183 rock samples were collected in the area for the same reasons as outlined in Geochemical Prospect No. 1. Of interest were the following samples:-

(a) Outcrop sample No. 150 — anomalous copper, lead and zinc values; outcrop samples No.'s 133, 134 and 151 — anomalous lead values; outcrop samples No.'s 131 and 132 — anomalous copper and zinc values — a zone of dolomitic limestones. Unusual — considered to be inherent high primary dispersion values and hence to be of no economic significance.

(b) Outcrop sample No. 2 — anomalous copper, lead and zinc values — siliceous siltstone. Considered to be of no economic significance.

(c) Outcrop sample No. 16 — anomalous copper value — quartzite. Considered to be inherent high primary dispersion value and hence to be of no economic significance.

(d) Outcrop sample No. 18 — anomalous copper, lead and zinc values — ferruginous siliceous siltstone. Scree sample No. 17 — anomalous zinc value — siliceous siltstone: scree sample No. 38 — anomalous copper and lead values — siliceous siltstone: scree sample No. 15 — anomalous copper, lead and zinc values — ferruginous siltstone: — all could be related to the outcrop sample. Considered to be of no economic significance.

(e) Outcrop samples No.'s 125 and 126 — anomalous copper and lead values — fractured or brecciated ferruginous,

TABLE 5

Summary of Stratigraphy: Geochemical Prospect No. 4

Age – Rock Unit	Lithology	Metamorphic Equivalent	Remarks
Lower Proterozoic – Golden Dyke Formation	Carbonaceous shales.	Cordierite - andalusite hornfels and/or chiastolite hornfels.	Unmetamorphosed strata highly cleaved (slatey, fracture and bedding cleavages).
	Psammites and pelites.	Quartzites and hornfels.	Unmetamorphosed strata highly cleaved.
	Carbonaceous and calcareous shales.	Hornfels.	Unmetamorphosed strata highly cleaved.
	Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales.	Calc-silicate hornfels, tremolitic and dolomitic marbles, cherts and hornfels.	Abundant current and oscillation ripple marks, slump and minor fold features.
	Psammites and pelites.	Quartzites and hornfels.	Unmetamorphosed strata highly cleaved.

carbonaceous shales. Considered to be of no economic significance.

(f) Outcrop sample No. 18 — anomalous copper, lead and zinc values — ferruginous laterite. Scree sample No. 17 could be related to the outcrop sample — anomalous zinc value — siliceous siltstone. Also, scree sample No. 38 could be related to the outcrop sample — anomalous copper and lead values — ferruginous quartzite. Considered to be of no economic significance.

(g) Outcrop samples No.'s 81, 82 and 100 — anomalous copper values — fractured or brecciated ferruginous siliceous siltstones/shales. Scree samples No.'s 72, 73 and 83 could be related to the outcrop samples — anomalous copper values — siliceous siltstones/shales. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

(h) Scree sample No. 93 — anomalous copper value — ferruginous siltstone. Considered to be of no economic significance.

(i) Outcrop samples No.'s 99, 104, 106, 109, 118, 119 — anomalous copper values — siltstones, siliceous siltstones, shales, siliceous shales, etc. Scree samples No.'s 114 and 117 could be related to the outcrop samples — anomalous copper values — siliceous siltstones/shales, etc. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

(j) Scree samples No.'s 51, 54, 58, 59, 60, 64, 65, 66, 67, 68, 69, 75, 77, 121 and 128 — a zone of anomalous copper values and occasional lead and/or zinc values — siltstones, siliceous siltstones, shales, siliceous shales, etc. Considered to be inherent high primary dispersion values and hence to be of no economic significance.

5.2.2. Soil Survey

109 soil samples were collected in this area. The - 80 fractions were analysed for copper, lead and zinc. The greater than - 80 fractions were subjected to pH determinations.

As in Geochemical Prospects No.'s 1, 2 and 3, the soils proved to be slightly acid to acid in pH. However, the limestone soils proved to be more alkaline

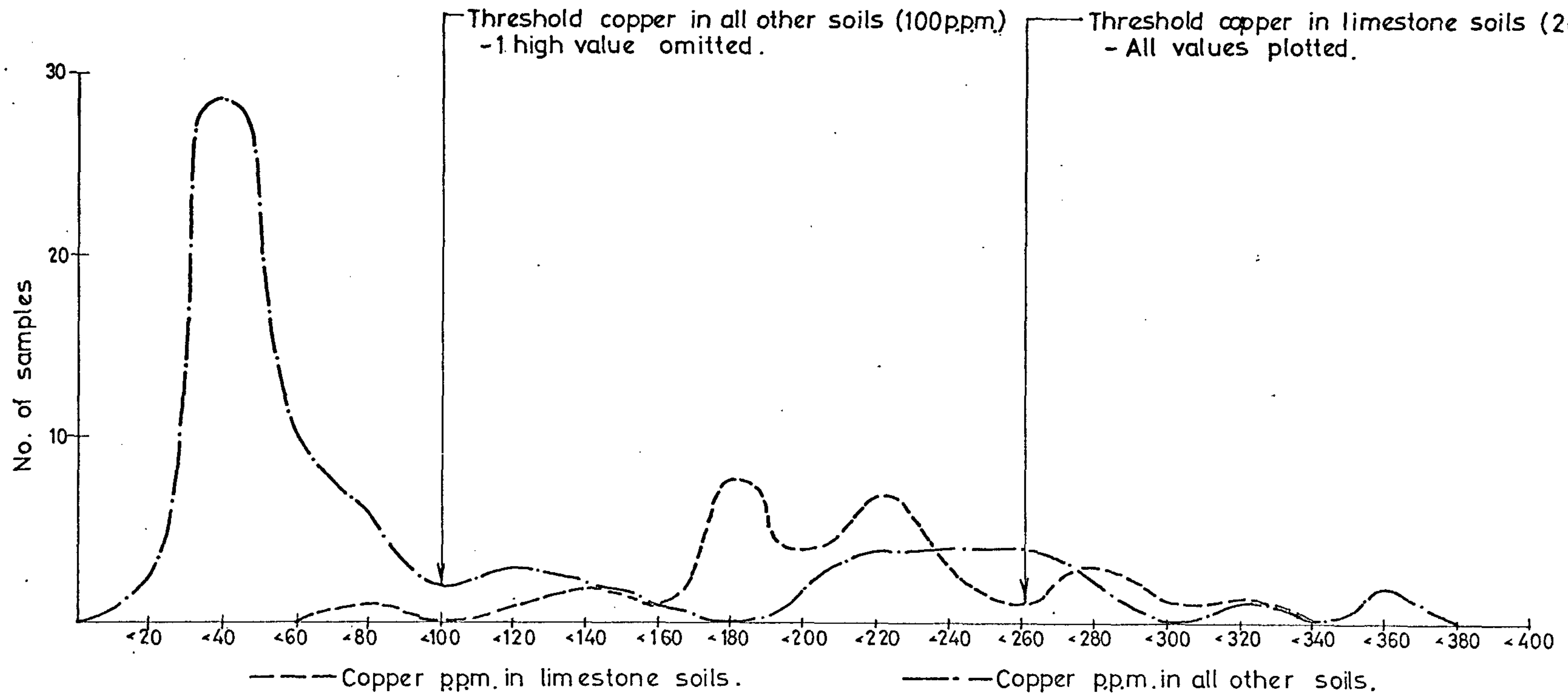

FIG. 7.
(copper)

Frequency distribution of copper in soils
Geochemical Prospect No.4.

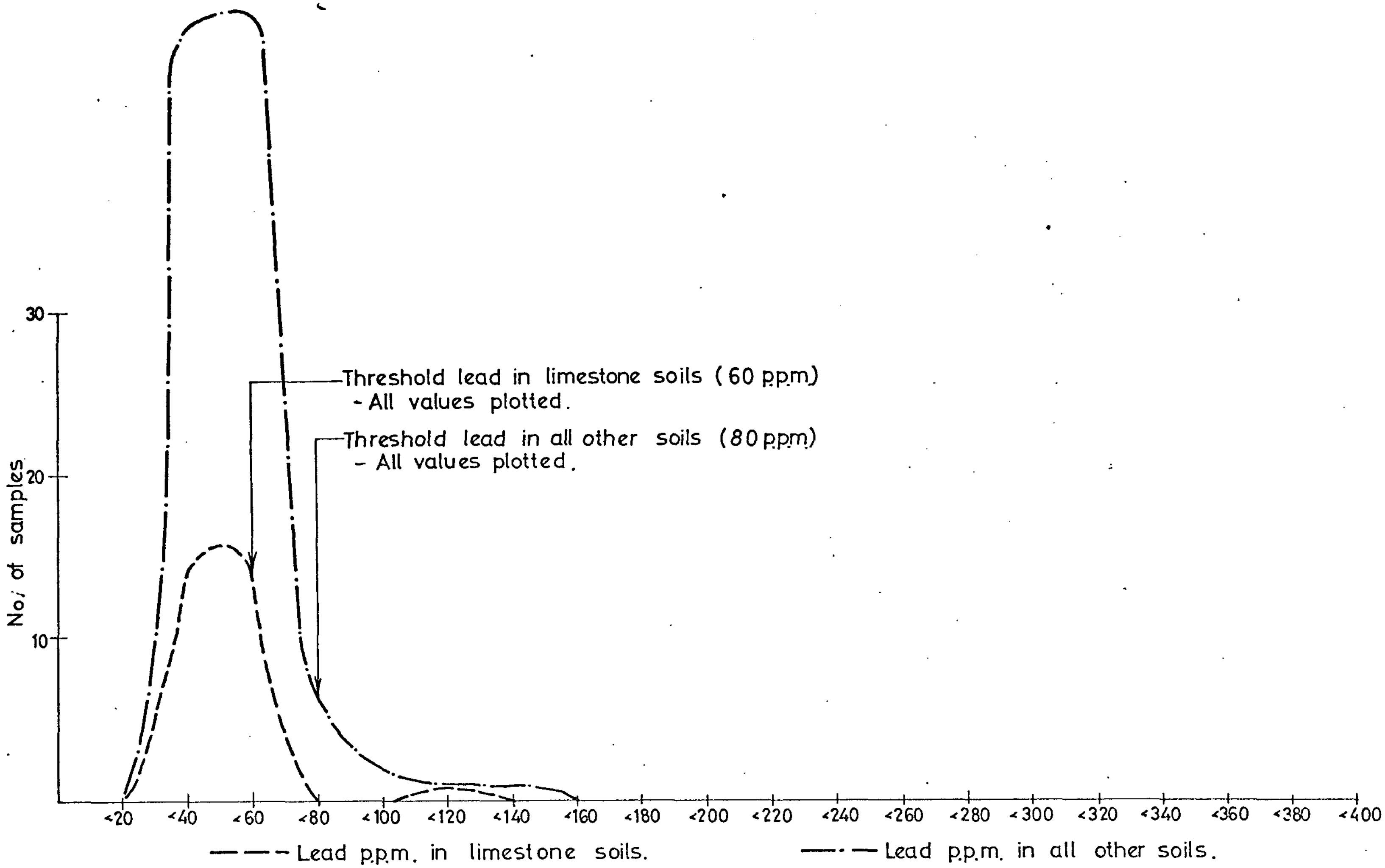

FIG. 7.
(lead)

Frequency distribution of lead in soils
Geochemical Prospect No. 4.

Watts, Griffis & Mc Ouat (Australia) Pty. Limited

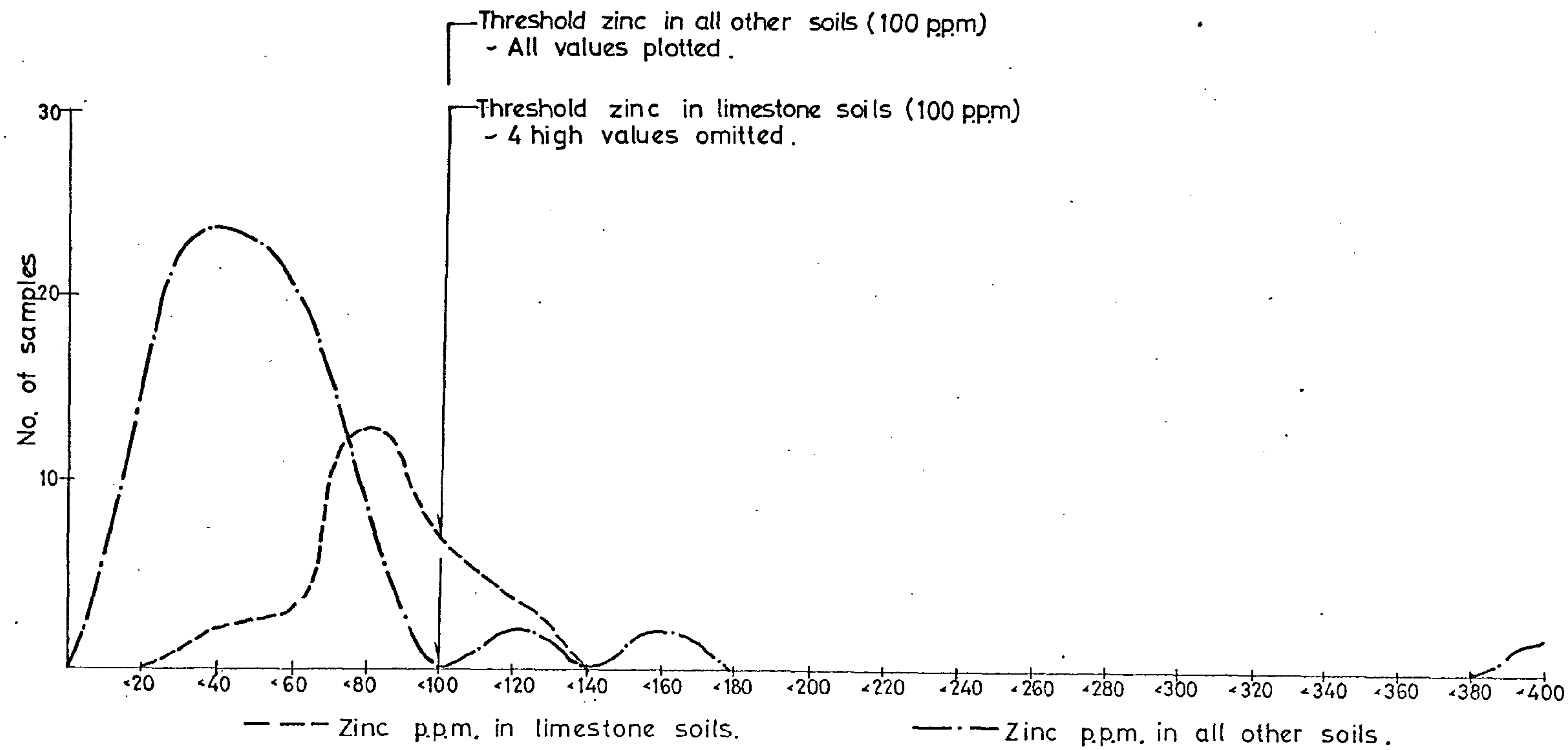

FIG. 7.
(zinc)

Frequency distribution of zinc in soils
Geochemical Prospect No.4.

than was the case in Geochemical Prospect No. 3. Lead is still relatively immobile and hence would not be expected to contribute an anomaly of any magnitude. The mobility of zinc does not appear to have been restricted and it can still be regarded as an excellent pathfinder mineral. However, as was the case in Geochemical Prospect No. 3, it is apparent that the mobility of copper has been restricted — the threshold value for copper in the limestone soils is 260 p.p.m., as against 100 p.p.m. in all the other types, i.e. there has been a build up of copper in the limestone soils. Copper cannot be regarded as a pathfinder mineral.

In the calculation of the threshold values for this area, allowance has been made, as far as possible, for the different rock types encountered, e.g. the limestone soils were considered separately from the other soil types. The threshold value for copper (260 p.p.m. for limestone soils, 100 p.p.m. for all other soil types), lead (60 p.p.m. for limestone soils, 80 p.p.m. for all other soil types) and zinc (100 p.p.m. for all soil types) were determined in exactly the same manner as they were for Geochemical Prospect No. 3.

The soil surveys delineated several areas of interest, namely:-

(a) A strong zinc anomaly, 12 x threshold, and an associated fairly strong lead anomaly, 6 x threshold, is centred at Line 10, No. 17. This anomaly is connected by a fairly strong anomalous zinc - lead zone to a similar strong zinc anomaly, 10 x threshold, and an associated fairly strong lead anomaly, 4 x threshold, centred at Line 8, No. 19. A weak anomalous copper anomaly is situated in the same area. The sources of these anomalies have not been defined. Additional investigations are required to determine whether any mineralisation of economic significance is responsible for this zinc - lead - copper anomaly.

(b) A weak copper anomaly, 2 - 4 x threshold, but no associated zinc and/or lead anomaly is centred at Line 9.5, No. 2. This anomaly is considered to be a hydromorphic anomaly which originated from rock survey anomaly (i). This anomaly is considered to be of no economic significance.

(c) A weak anomalous copper zone, 1 - 4 x threshold, but no associated zinc and/or lead anomaly, extends along the fault zone and the contact between the limestones (often dolomitic) and the overlying strata. This anomaly is considered to be of no economic significance.

5.3. Recommendation

The source of the soil survey anomaly (a) should be defined. Geochemical rock and soil surveys should be conducted to the "north-west" to determine the full extent of the anomaly. Subsequently, a costean should be cut across the anomaly to determine whether there is any trace of mineralisation at depth. If positive results are obtained a drilling programme should be undertaken.

CONCLUSIONS – PARTS I AND II

1. Only limited success was achieved in providing a detailed geological map of the South Evelyn Area.

2. The South Evelyn Area is but a small part of the Katherine - Darwin metalliferous province. This province is roughly co-extensive with the Pine Creek Geosyncline – a composite, fairly shallow, intracratonic structure – which existed in the Lower Proterozoic, i.e. Agicondian System.

3. The only rocks found to outcrop in the South Evelyn Area are sediments belonging to the Golden Dyke and Burrell Creek Formations and granite with its associated microgranitic and aplitic phases. The Golden Dyke Formation, a member of the Goodparla Group, and the Burrell Creek Formation, a member of the Finnis River Group, developed in the Central Basin of the Pine Creek Geosyncline. Granite – the Cullen Granite, a hornblende - biotite granite – was intruded into these formations in the Middle Proterozoic.

4. The Golden Dyke Formation consists of a limestone - chert - psammitic - pelitic - carbonaceous and calcareous shale assemblage, whereas the Burrell Creek Formation, which conformably overlies the Golden Dyke Formation, consists of a greywacke – greywacke - siltstone – siltstone assemblage (See Table I). The sediments have occasionally suffered from the effects of low-grade, regional dynamic metamorphism.

5. The intrusion of the Cullen Granite resulted in the development of a fairly extensive contact metamorphic aureole. The sediments bordering the granite mass have invariably been altered to a variety of hornfels. The occurrence of hornfelsic rocks in the South Evelyn Area away from the Cullen Granite is considered to be due to the intrusion of a number of small stocks and/or apophyses of the Cullen Granite that as yet have not been exposed.

6. Throughout the period of deposition of the sediments contemporaneous deformation occurred, probably as a result of gravity sliding tectonics. As a result, individual beds and groups of beds have been tightly folded.

7. Prior to the intrusion of the Cullen Granite in the Middle Proterozoic, the sediments were subjected to mild tensional stress. This resulted in the development of east - south - east plunging symmetrical and asymmetrical anticlinal and synclinal structures. East - west orientated undulations or crenulations were contemporaneously

imposed upon some of these structures. Subsequent east - west compressional forces modified this structural picture — north - south orientated fold axes were superimposed upon the "east - west" orientated fold axes and crenulations.

8. Faulting continued penecontemporaneously with sedimentation. The South Evelyn Area is transgressed by a number of faults — primarily high angle normal faults or high angle diagonal slip faults — however their effect upon the sediments is not severe. The overall dislocation, whether vertical and/or horizontal, is small. No extensive mineralogical alteration resulted from the faulting.

9. Jointing and cleavage is well developed throughout the area.

10. The regional geological survey of the South Evelyn Area failed to detect the presence of any mineralisation of economic significance apart from that already known at the Stockyard Prospect.

11. The gold - silver - copper - lead - zinc mineralisation at the Stockyard Prospect, discovered and partially investigated by United Uranium N. L., should be evaluated thoroughly.

12. It is considered that regional geological mapping is unlikely to result in the discovery of any mineralisation of economic significance.

13. The detailed geological investigations of the areas of limestone outcrop failed to indicate the presence of any mineralisation of economic significance.

14. The detailed geochemical rock and soil surveys of the areas of limestone outcrop indicated only two areas where further investigations should be undertaken, namely:-

(a) In Geochemical Prospect No. 1. where a very significant geochemical rock and soil lead anomaly, paralleling the strike of the strata, was located.

(b) In Geochemical Prospect No. 4. where a significant geochemical soil zinc - lead, and associated weak copper, anomaly was located.

15. A geochemical copper - lead - zinc stream sediment survey of the South Evelyn Area should be initiated. This survey should be under the direct control of a Geochemist.

16. A systematic search of the Cullen Granite and the contact between the granite and the sediments should be made to determine the presence, or otherwise, of tin, tungsten and molybdenum.

RECOMMENDATIONS FOR FUTURE EXPLORATION

1. It is considered that regional geological mapping is unlikely to result in the discovery of any mineralisation of economic significance. It is strongly recommended that a geochemical copper - lead - zinc stream sediment survey should be carried out in the area. This survey should be conducted at the close of the wet season. It is recommended that samples be taken at 400 feet intervals along the main streams and tributary streams or creeks. Samples should also be collected upstream of all stream/creek junctions. The pH of any running water should be determined by using Universal Indicator whenever a sample is collected. This survey should be carried out under the direct control of a Geochemist who should plan the programme and perform the interpretation.

2. A systematic search of the Cullen Granite and the contact between the granite and the sediments should be made to determine the presence, or otherwise, of tin, tungsten and molybdenum.

3. It is recommended that the gold - silver - copper - lead - zinc mineralisation, discovered and partially investigated by United Uranium N.L., at the Stockyard, and the associated parallel mineralisation immediately to the east, should be evaluated thoroughly. It is recommended that the plan outlined in Part I, Section 2.5 of this report should be adopted to evaluate the mineralisation.

4. It is considered that additional geochemical rock and soil surveys should be conducted in the vicinity of the geochemical rock and soil lead anomaly partly outlined in Geochemical Prospect No. 1 (See Part II, Sections 2.2.1. (a) and 2.2.2. (a)) and in the vicinity of the geochemical soil zinc - lead, and associated weak copper, anomaly partly outlined in Geochemical Prospect No. 4 (See Part II, Sections 5.2.2. (a)). An attempt should be made to determine the full extent of these anomalies. Subsequently, costeans should be cut across them to determine whether there is any trace of economic mineralisation beneath the immediate surface area. If positive results are obtained a drilling programme should be undertaken.

APPENDIX

1. Bibliography

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Woolf, D. L. 1968 Instructions and Procedures for Geochemical Surveys used by North Broken Hill Limited. Report No. G.47., North Broken Hill Ltd., Geological Department.

2. <u>Figures</u> — attached

3. Plans – attached

Plan No. 1.	–	"Geological Map" of the South Evelyn Area.
Plan No. 2.	–	Geological Map of the South Evelyn Area showing the Stratigraphy and Structure.
Plan No. 2X.	–	Geological Cross-sections of the South Evelyn Area.
Plan No. 3.	–	Geochemical Prospect No. 1. – South Evelyn Area. Geology and Rock Geochemical Survey.
Plan No. 3 Cu.	–	Geochemical Soil Survey – Copper.
Plan No. 3 Pb.	–	Geochemical Soil Survey – Lead.
Plan No. 3 Zn.	–	Geochemical Soil Survey – Zinc.
Plan No. 4.	–	Geochemical Prospect No. 2. – South Evelyn Area. Geology and Rock Geochemical Survey.
Plan No. 4 Cu.	–	Geochemical Soil Survey – Copper.
Plan No. 4 Pb.	–	Geochemical Soil Survey – Lead.
Plan No. 4 Zn.	–	Geochemical Soil Survey – Zinc.
Plan No. 5.	–	Geochemical Prospect No. 3. – South Evelyn Area. Geology and Rock Geochemical Survey.
Plan No. 5 Cu.	–	Geochemical Soil Survey – Copper.
Plan No. 5 Pb.	–	Geochemical Soil Survey – Lead.
Plan No. 5 Zn.	–	Geochemical Soil Survey – Zinc.
Plan No. 6.	–	Geochemical Prospect No. 4. – South Evelyn Area. Geology and Rock Geochemical Survey.
Plan No. 6 Cu.	–	Geochemical Soil Survey – Copper.
Plan No. 6 Pb.	–	Geochemical Soil Survey – Lead.
Plan No. 6 Zn.	–	Geochemical Soil Survey – Zinc.

4. Analytical Results — attached

Geochemical Rock Survey Sheets.
Geochemical Soil Survey Sheets.

LEGEND

STRATIGRAPHY

CAINOZOIC

- QUATERNARY ALLUVIUM

LOWER PROTEROZOIC

- CULLEN GRANITE - hornblende - biotite granite.
- BURREL CREEK FORMATION - graywacke, siltstone, graywacke-siltstone, etc.
- GOLDEN DYKE FORMATION - chert, carbonaceous siltstone, thin bedded dolomite, shales, carbonaceous shales, mudstones, etc.

LITHOLOGY

- Alluvium.
- Conglomerate (Con.)
- Hornfels (H.) - Calc - Silicate hornfels (Hcs.) - Cordierite-Andalusite hornfels (Hca.)
- Dolomitic Limestone (L.) - Serpentinised Limestone (Ls.) - Tremolitic Limestone (Lt.)
- Intercolated limestone & shales (LS.)
- Shales (S.) - Siliceous shales (Ss.) - Carbonaceous shales (Sc.)
- Mudstones (M.) - Siliceous mudstones (Ms.) - Carbonaceous mudstones (Mc.)
- Graywacke (G.) - Graywacke siltstone (Gs.)
- Siltstones (St.) - Siliceous siltstones (Sts.) - Cherty siltstones (Stc.)
- Chert (C.)
- Quartzite (Q.)

LITHOLOGY (Continued)

- Biotite - Hornblende Granite (Gr.)
- Microgranite (Mg.)
- Vein Quartz (Vq.)
- Quartz breccia (Bq.) - cemented with Haematite (Bqh.) - cemented with Limonite (Bqh.) - cemented with Manganese (Bqm.)
- Breccia (B.) - cemented with Haematite (Bh.) - cemented with Limonite (Bl.) - cemented with Manganese (Bm.)

SYMBOLS

- Outcrops.
- Geological boundary - observed.
- Geological boundary - located approximately.
- Geological boundary - located very approximately.
- Gradational contact.
- Fault.
- Fault, located approximately.
- Fault, existence uncertain.
- Fault, projected beneath mapped units.
- Fault, possible - as located from aerial photographs.

SYMBOLS (Continued)

- Anticline, showing trace of axial plane & plunge of axis.
- Syncline, showing trace of axial plane & plunge of axis.
- Asymetric Anticline, (steeper limb to south)
- Minor Anticline, showing axial trend.
- Minor Syncline, showing axial trend.
- Axial trend of folds that are too small to plot individually, pattern shows general shapes of folds in profile.
- Strike & dip of bedding.
- Strike & dip of overturned bedding.
- Undulatory or crumpled beds.
- Horizontal bedding.
- Strike & dip of bedding uncertain.
- Strike of bedding certain but dips uncertain.
- Strike & dip of joints.
- Strike & dip of foliations.
- Costeans & prospect pits.

Base Map compiled from Aerial Photographs of the KATHERINE - SOUTH ALLIGATOR RIVER AREA.

Run No. 69 W	No.'s. 5148-5150
Run No. 70	No's. 5203-5206
Run No. 71	No's. 5031-5034

SCALE: (very approximate only)

1" to 660 feet.

660′ 0 660′ 1320′

CR69/73B

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

UNITED URANIUM N. L.

"GEOLOGICAL MAP" OF THE SOUTH EVELYN AREA.

(Essentially a field data plan)

Geology: T.O. VEIT.
Drawn: E.M. Albertoni
Date: 15.10.1969.

PLAN No.1.

SCALE: (very approximate only)
1" to 1320 feet.

1320' 0 1320' 2640'

STRATIGRAPHY

CAINOZOIC

QUATERNARY ALLUVIUM

LOWER PROTEROZOIC

CULLEN GRANITE - hornblende biotite granite - and the microgranitic marginal phase.

BURREL CREEK FORMATION - graywacke, siltstone, graywacke-siltstone etc.

GOLDEN DYKE FORMATION - chert, carbonaceous siltstone, thin bedded dolomite, shales, carbonaceous shales, mudstones, etc.

SYMBOLS

Geological boundary, located approximately.

Geological boundary, located very approximately.

Gradational contact.

SYMBOLS (continued)

Fault.

Fault, located approximately.

Fault, existence uncertain.

Anticline, showing trace of axial plane & plunge of axis.

Syncline, showing trace of axial plane & plunge of axis.

Anticline, existence uncertain.

Syncline, existence uncertain.

Representative (typical) strike and dip of bed.

Dome.

Basin.

CR69/73B

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CONSULTING GEOLOGISTS AND ENGINEERS.

GEOLOGICAL MAP OF THE

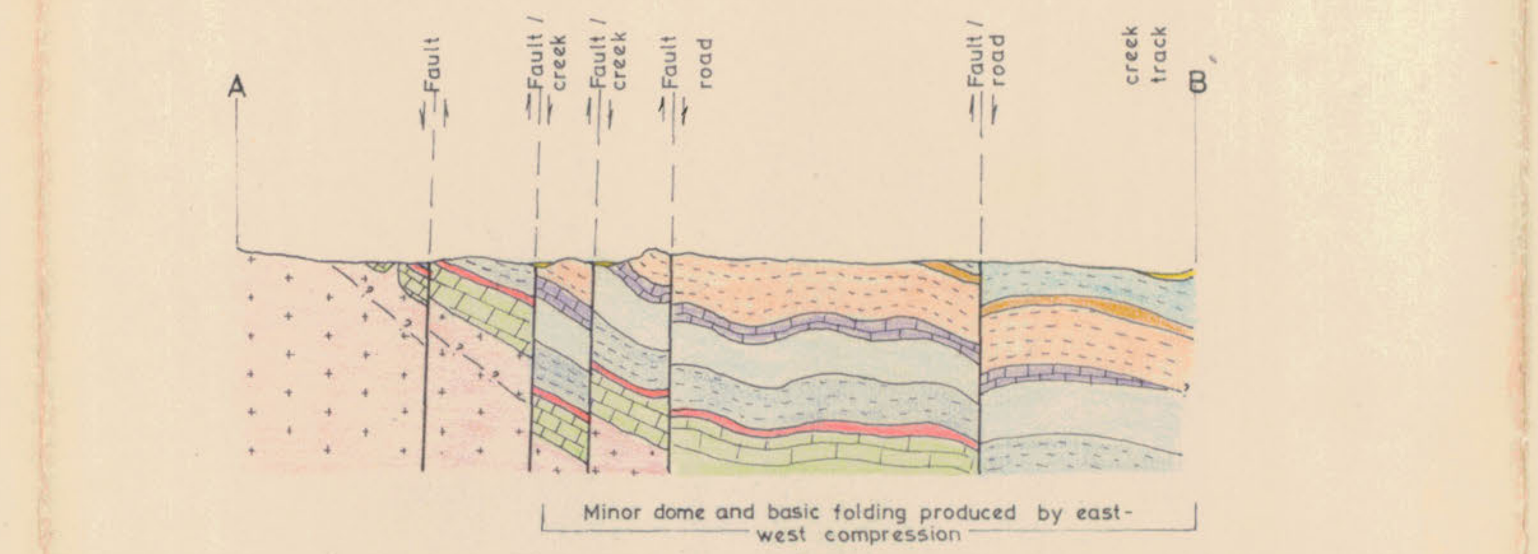
SOUTH EVELYN AREA

SHOWING THE STRATIGRAPHY & STRUCTURE.

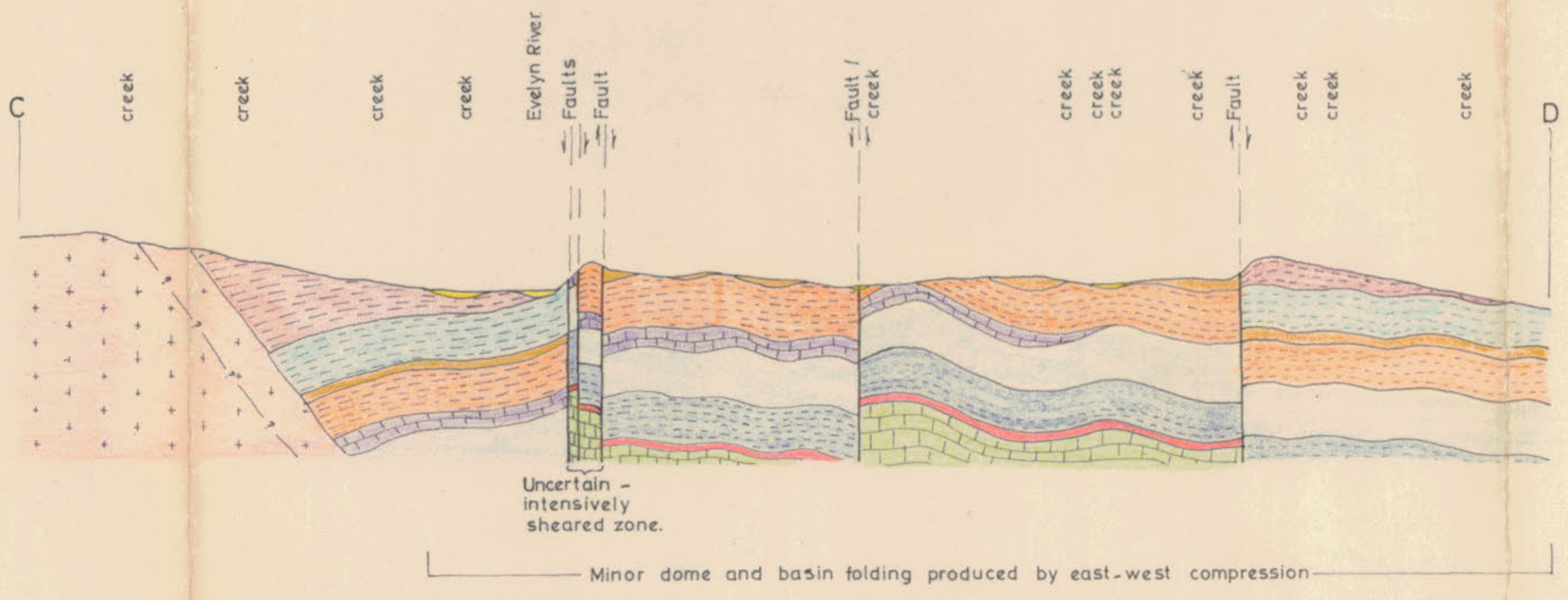
Geology: T. O. VEIT.

Drawn: E. M. A. Date: 15.10.1969.

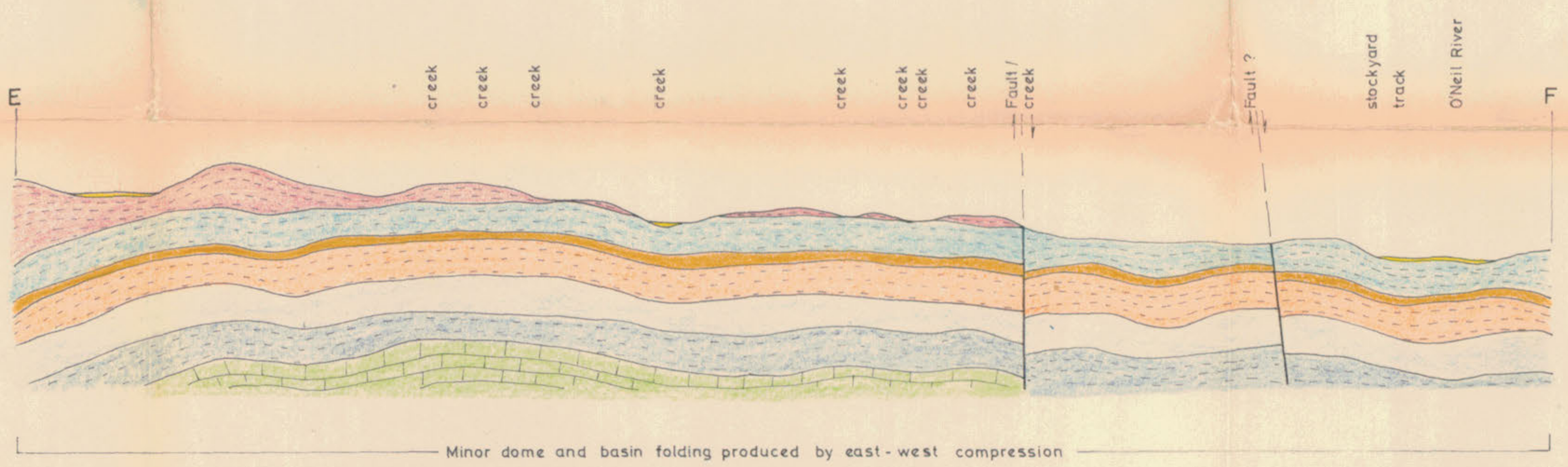
PLAN No. 2.



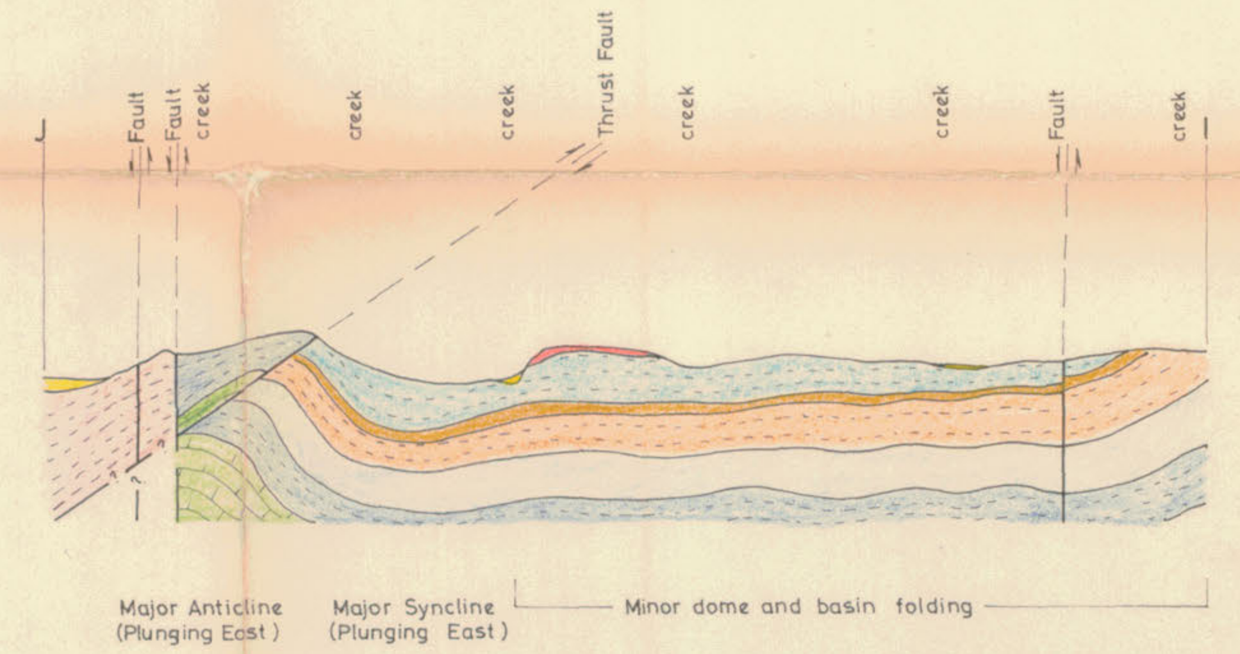
Section A-B looking North, i.e. looking towards the axis of a major anticline which plunges towards the East, - semi theoretical.



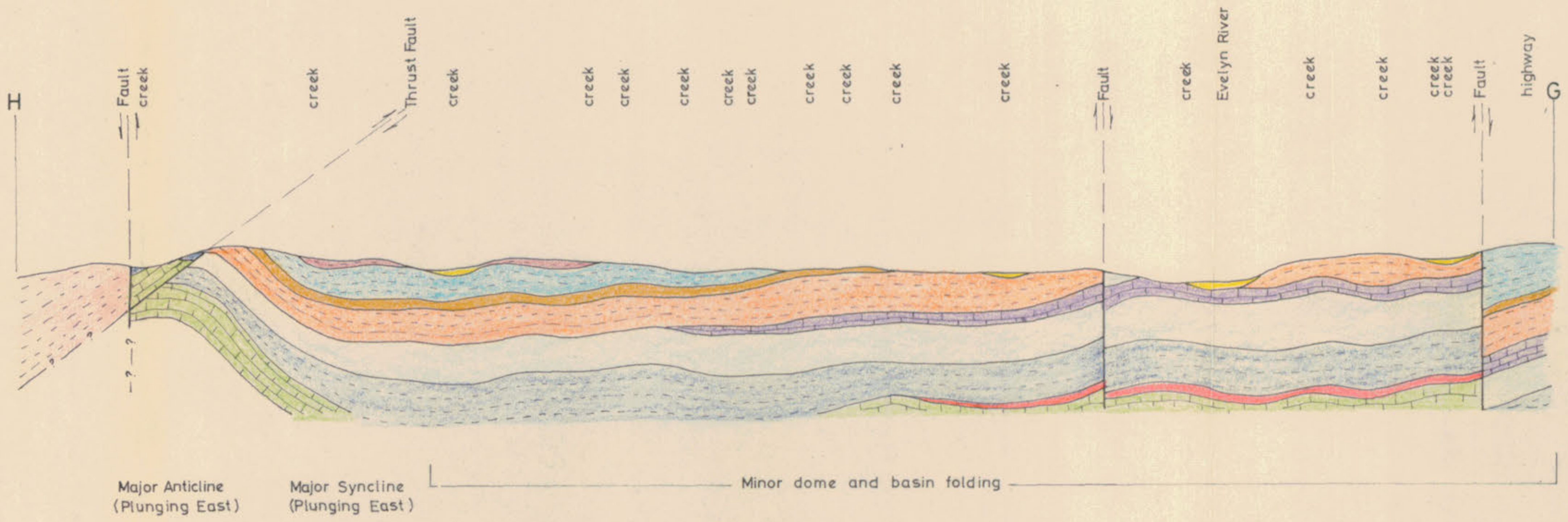
Section C-D looking North; largely theoretical and diagrammatic



Section E-F looking North, largely theoretical and diagrammatic.



Section I-J looking West, largely theoretical and diagrammatic



Section G-H looking West; largely theoretical and diagrammatic.

LEGEND

ERA	AGE	GROUP	FORMATION	LITHOLOGY	METAMORPHIC EQUIVALENT
Cainozoic	Quaternary			Alluvium.	
Proterozoic	Middle Proterozoic			Cullen Granite and associated micrognanitic and aplitic phases.	
	Lower Proterozoic	Finnis River Group	Burrell Creek Formation	Greywacke, siltstone and greywacke-siltstone.	Hornfels.
		Goodparla Group	Golden Dyke Formation	Carbonaceous shales.	Cordierite-andalusite hornfels and/or chiastolite hornfels.
				Psammites and pellites.	Quartzites and hornfels.
				Carbonaceous and calcareous shales.	Hornfels.
				Limestones (often dolomitic) and cherts, interbedded. Some interbedded carbonaceous and calcareous shales	Calc-silicate hornfels tremolitic and dolomitic marbles, cherts and hornfels.
				Psammites and pellites.	Quartzites and hornfels.
				Psammites and cherts with some interbedded limestones (often dolomitic).	Quartzites cherts and marbles.
				Limestones (often dolomitic) and cherts interbedded. Some interbedded carbonaceous and calcareous shales	Calc silicate hornfels, tremolitic and dolomitic marbles cherts and hornfels
				Massive limestones (often dolomitic).	Marbles (tremolitic and dolomitic).

Thickness of Lithologies unknown.

SCALE (very approximate only)
1" = 1320 feet

1320 0 1320 2640 feet

CR69/73B

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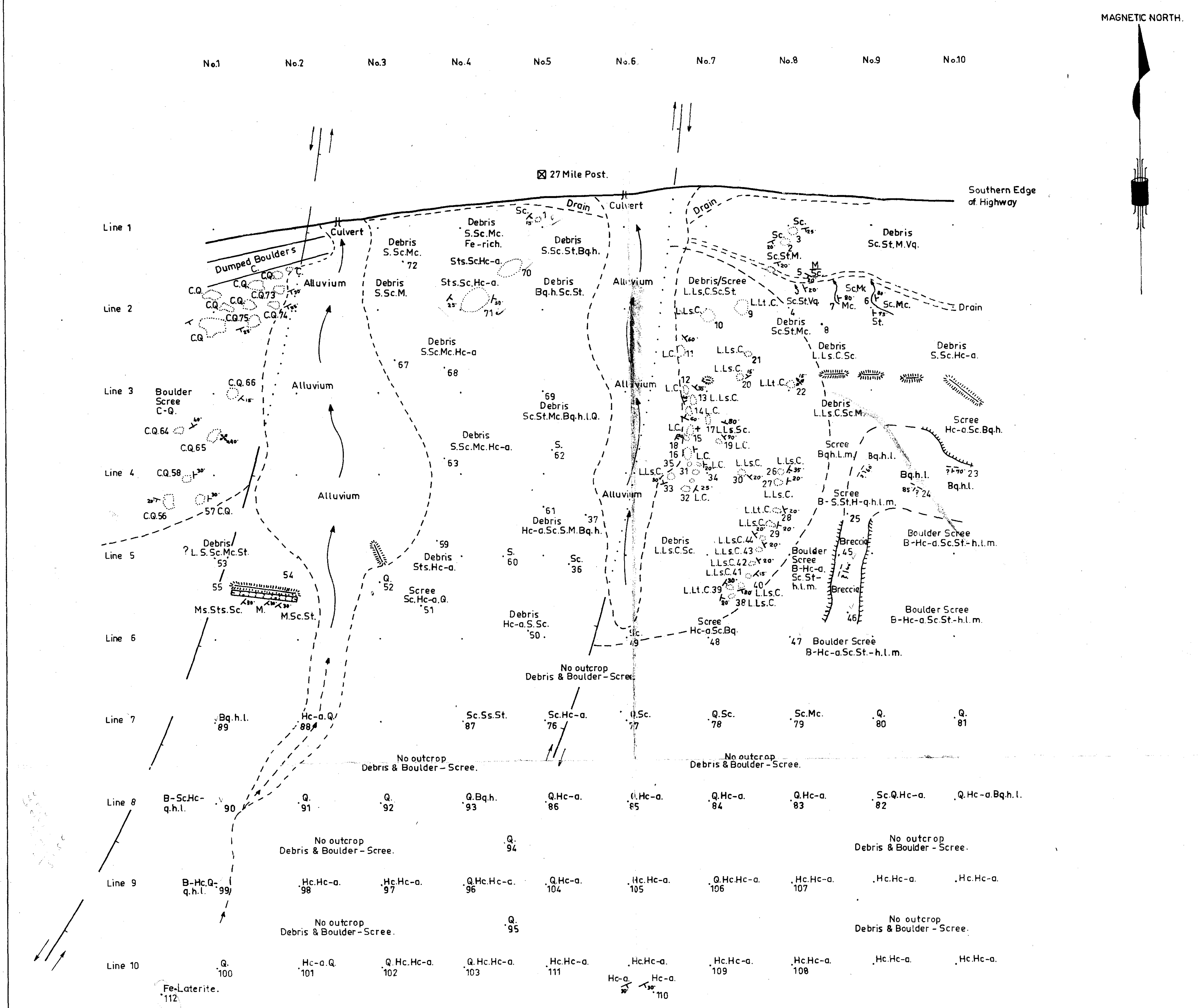
CONSULTING GEOLOGISTS & ENGINEERS

GEOLOGICAL CROSS SECTIONS OF
THE SOUTH EVELYN AREA

Geology: T O VEIT		PLAN No. 2X
Drawn:	Date 22-12-69	



LEGEND

Lithology - same as on Plan No.1.

Symbols - same as on Plan No.1.

$\cdot_{88}$ Geochemical Rock Samples.

GEOCHEMICAL ROCK SAMPLES - ASSAY RESULTS.

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
1	115	560	63
2	70	89	45
3	32	49	33
4	70	44	39
5	103	1350	845
6	235	114	975
7	23	84	45
8	130	81	87
9	120	55	96
10	18	31	96
11	32	50	63
12	17	70	45
13	22	82	72
14	25	59	66
15	37	52	65
16	26	55	96
17	25	64	141
18	65	104	102
19	21	48	56
20	56	112	99
21	39	91	129
22	38	71	99
23	18	69	36
24	110	89	540
25	11	61	87
26	9	60	54
27	57	64	48
28	24	85	129
29	60	70	96
30	28	69	105

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
31	18	147	69
32	35	70	81
33	18	65	75
34	31	79	126
35	15	75	60
36	23	112	42
37	23	61	36
38	68	54	54
39	69	66	150
40	81	34	99
41	57	46	216
42	43	49	132
43	25	50	93
44	14	70	75
45	208	91	855
46	320	249	1365
47	67	374	102
48	22	50	42
49	9	247	30
50	17	112	42
51	95	431	93
52	7	25	18
53	25	52	111
54	18	43	162
55	106	60	90
56	13	49	189
57	19	39	75
58	16	42	33
59	8	34	15
60	32	199	18

Sample No.	p.p.m. Cu.	p.p.m. Pb	p.p.m. Zn.
61	24	41	15
62	18	43	12
63	12	35	12
64	16	34	39
65	24	59	102
66	22	56	69
67	24	62	20
68	21	85	14
69	300	900	57
70	74	1300	18
71	80	350	51
72	36	381	14
73	28	281	240
74	15	75	60
75	12	46	33
76	11	200	33
77	8	21	12
78	6	11	9
79	15	56	27
80	14	23	12
81	8	19	9
82	73	70	144
83	24	32	15
84	7	29	12
85	32	41	33
86	42	149	27
87	25	74	78
88	25	95	24
89	245	598	465
90	205	331	405

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
91	14	94	36
92	10	59	42
93	11	70	30
94	8	45	33
95	93	166	99
96	14	300	90
97	30	76	111
98	62	202	292
99	205	1560	1620
100	63	86	75
101	16	195	36
102	43	88	156
103	175	329	240
104	19	70	30
105	18	209	20
106	33	32	44
107	46	81	24
108	27	148	12
109	16	73	12
110	14	70	9
111	13	78	12
112	300	4400	2100
	p.p.m. Ag. — 2000		

Scale: 1" to 100 feet.

100' 0 100' 200'

CR69/73B

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No.1.—

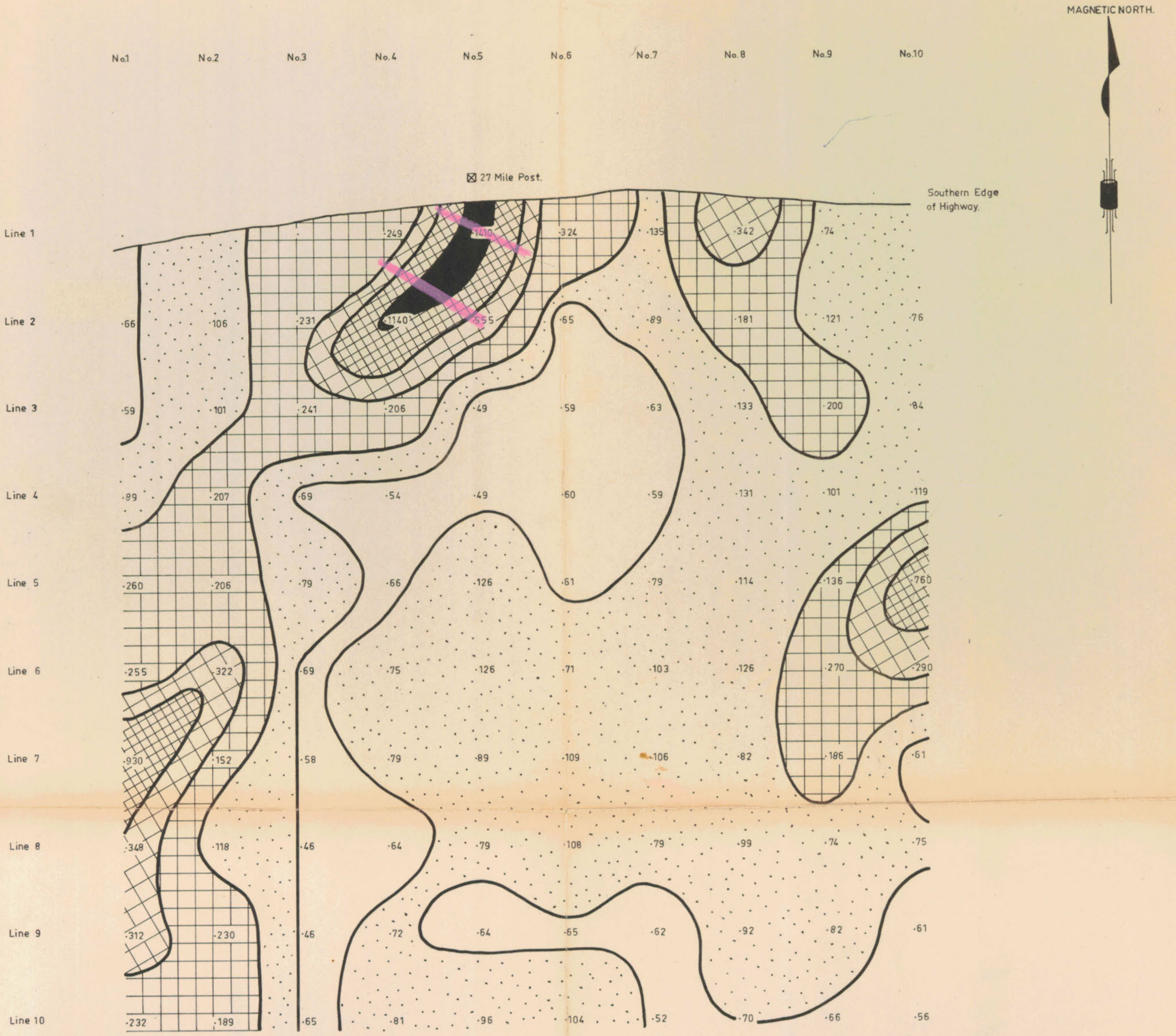
SOUTH EVELYN AREA.

GEOLOGY & ROCK GEOCHEMICAL SURVEY.

Geology: T. O. VEIT.

Drawn: E.M.A. Date: 15.10.1969.

PLAN No. 3.



LEGEND.

·10 – 10 p.p.m. Lead

THRESHOLD – 140 p.p.m. – statistically defined.

- 8 to 16 × threshold – anomalous (1120 to 2240 p.p.m.).
- 4 to 8 × threshold – anomalous (560 to 1120 p.p.m.).
- 2 to 4 × threshold – probably anomalous (280 to 560 p.p.m.).
- 1 to 2 × threshold – possibly anomalous (140 to 280 p.p.m.).
- 1/2 to 1 × threshold – high background (70 to 140 p.p.m.).
- 0 to 1/2 × threshold – low background (0 to 70 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

CR69/73B

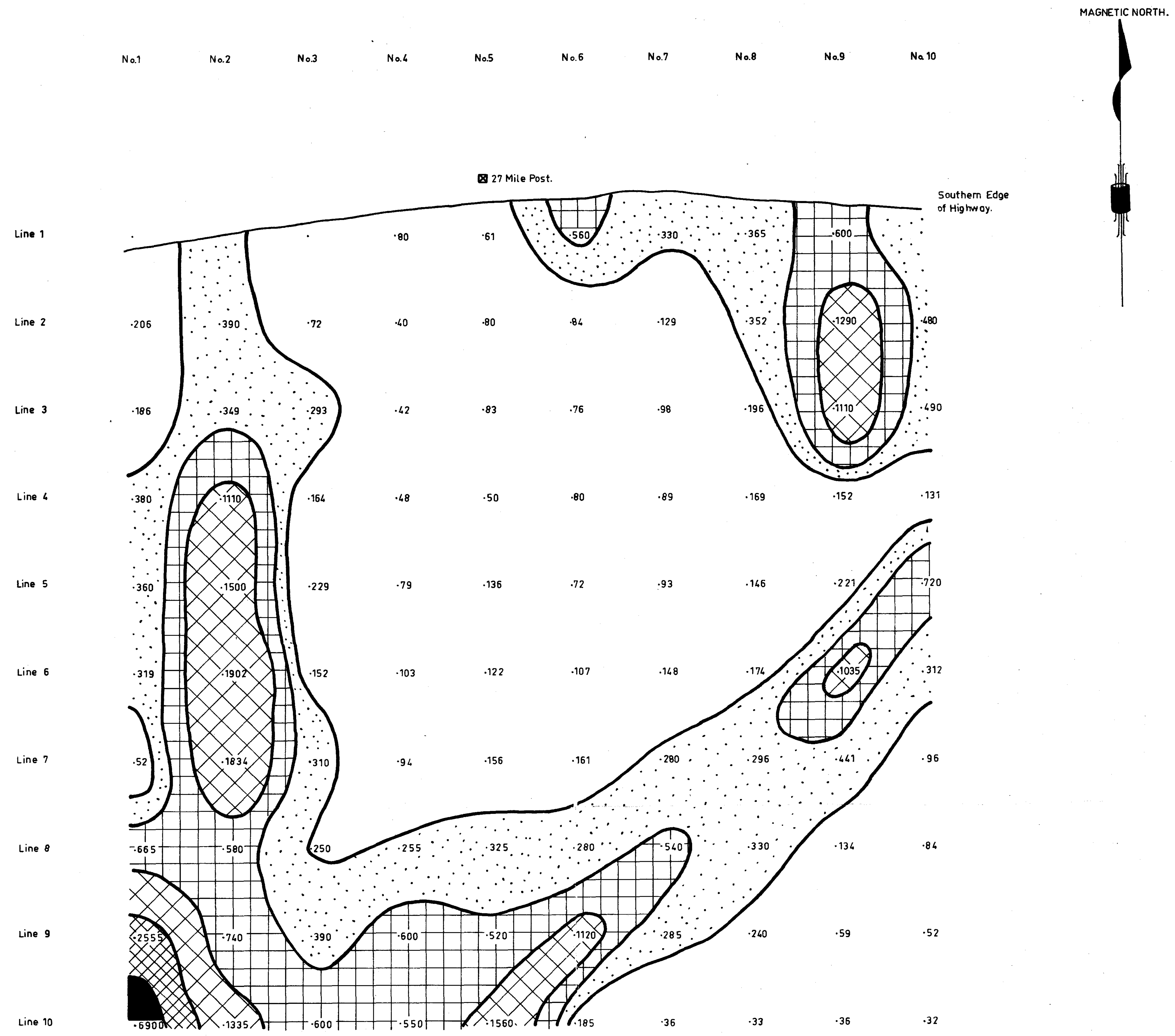
WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 1. –

SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY – LEAD.

Geochemistry, T.O. VEIT.	PLAN No. 3. Pb.
Drawn. E.M.A. Date: 15.10.1969.	



LEGEND

·10 – 10 p.p.m. Zinc.

THRESHOLD – 500 p.p.m. – arbitrarily defined.

8 to 16 × threshold – anomalous (4000 to 8000 p.p.m.).

4 to 8 × threshold – anomalous (2000 to 4000 p.p.m.).

2 to 4 × threshold – probably anomalous (1000 to 2000 p.p.m.).

1 to 2 × threshold – possibly anomalous (500 to 1000 p.p.m.).

1/2 to 1 × threshold – high background (250 to 500 p.p.m.).

0 to 1/2 × threshold – low background (0 to 250 p.p.m.).

Scale: 1" to 100 feet.

100′ 0 100′ 200′

CR69/73B

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GEOCHEMICAL PROSPECT No.1.–

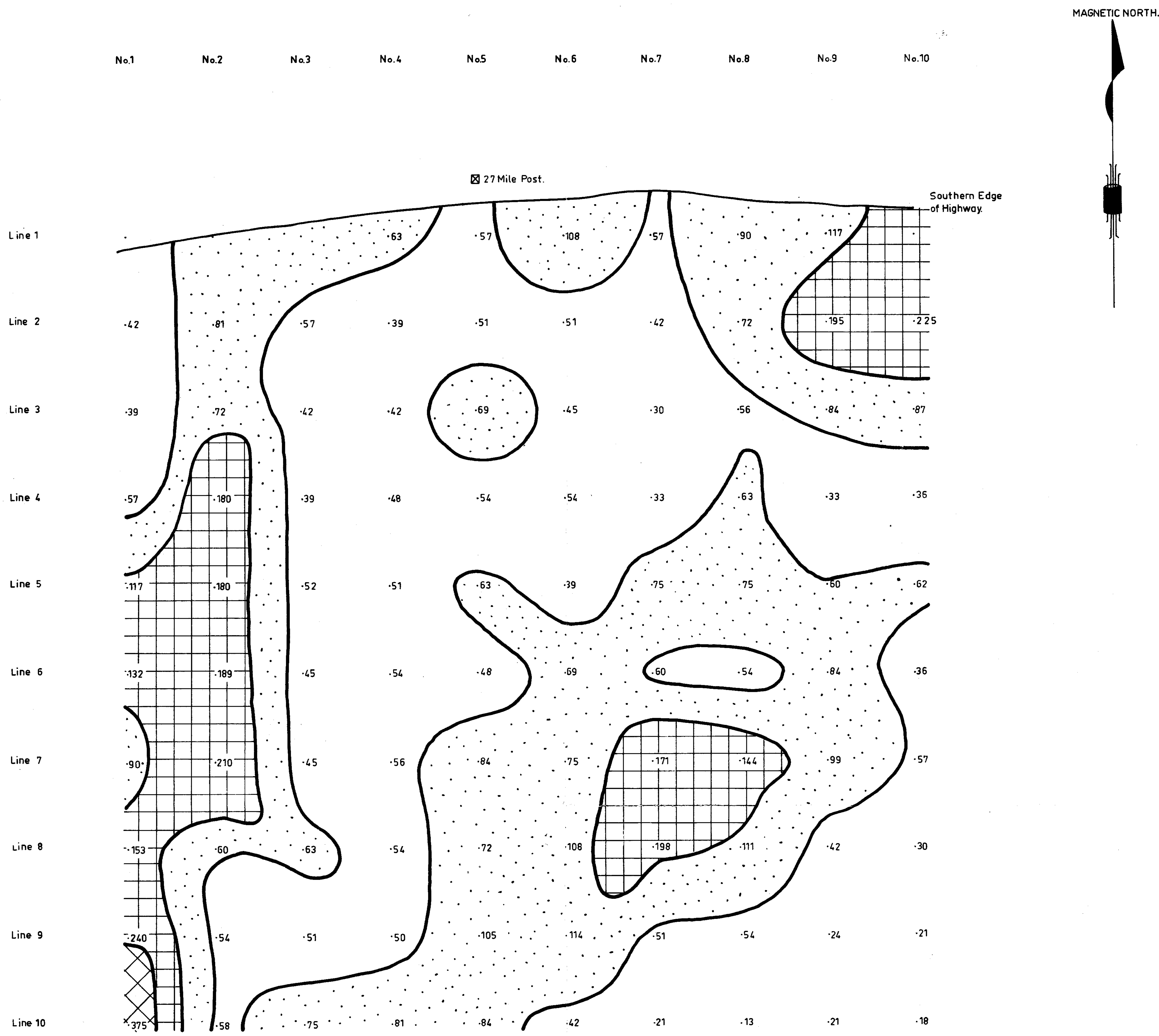
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY–ZINC.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 15.10.1969.

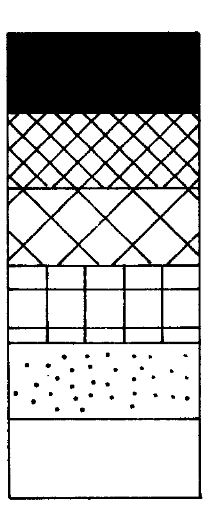
PLAN No. 3 Zn.



LEGEND

·10 – 10p.p.m. Copper.

THRESHOLD – 120p.p.m. – statistically defined.



8 to 16 × threshold – anomalous (960 to 1920 p.p.m.).

4 to 8 × threshold – anomalous (480 to 960 p.p.m.).

2 to 4 × threshold – probably anomalous (240 to 480 p.p.m.).

1 to 2 × threshold – possibly anomalous (120 to 240 p.p.m.).

1/2 to 1 × threshold – high background (60 to 120 p.p.m.).

0 to 1/2 × threshold – low background (0 to 60 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

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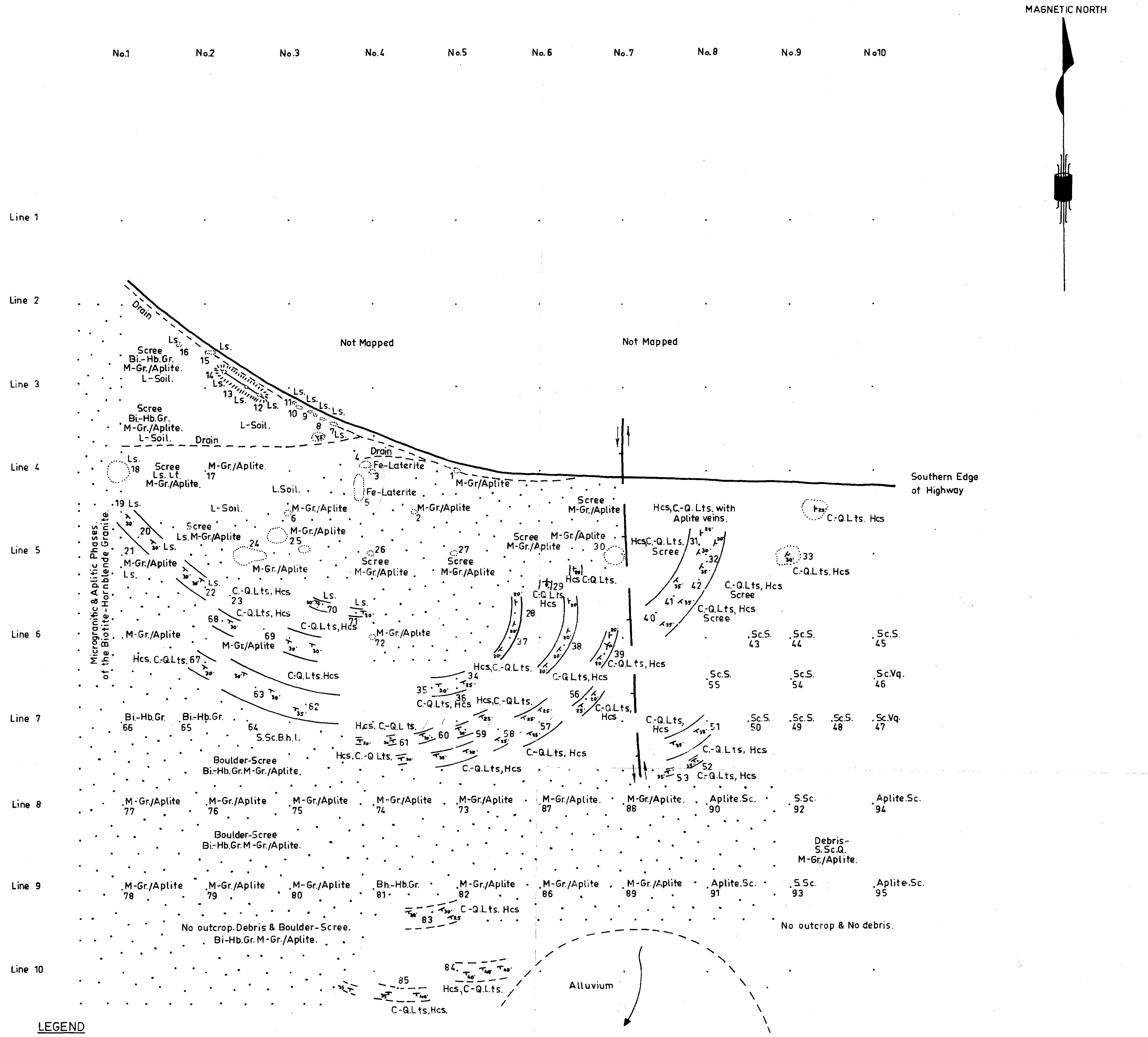
GEOCHEMICAL PROSPECT No.1.–

SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY–COPPER.

Geochemistry: T.O. VEIT.	PLAN No. 3 Cu.
Drawn: E.M.A. Date: 15.10.1969.	



LEGEND

Lithology- same as on Plan No.1.

Symbols- same as on Plan No.1.

•88 Geochemical Rock Samples.

GEOCHEMICAL ROCK SAMPLES - ASSAY RESULTS.

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
1	18	260	108
2	9	71	34
3	7	29	18
4	165	302	97
5	750	9720	170
6	14	109	21
7	12	104	27
8	9	84	26
9	7	76	20
10	9	89	29
11	9	94	36
12	7	91	35
13	11	61	32
14	5	73	23
15	6	87	30
16	5	80	34
17	6	36	20
18	9	69	73
19	10	80	74
20	12	65	44
21	7	35	21
22	12	71	78
23	12	72	56
24	7	34	32
25	4	29	30
26	12	106	44
27	4	56	31
28	9	57	54
29	9	71	46
30	9	30	32
31	16	96	50
32	18	43	45
33	15	46	52
34	10	106	90
35	12	71	48
36	14	51	55
37	14	54	59
38	18	80	107
39	26	49	72
40	20	44	73
41	23	65	76
42	17	50	60
43	17	114	50
44	33	253	90
45	14	88	109
46	57	1500	1200
47	12	25	39
48	24	43	75
49	36	158	90
50	28	48	105
51	24	62	39
52	30	43	65
53	17	60	83
54	21	47	75
55	21	35	89
56	26	62	52
57	156	116	51
58	420	64	84
59	28	149	149
60	390	180	330
61	80	140	186
62	26	75	71
63	12	66	45
64	12	76	35
65	9	48	86
66	18	35	52
67	18	96	121
68	9	65	665
69	8	54	46
70	8	94	43
71	8	95	45
72	12	80	108
73	5	19	40
74	5	20	26
75	6	42	61
76	5	29	43
77	5	36	50
78	5	30	41
79	5	35	40
80	3	24	42
81	3	28	41
82	3	26	37
83	9	91	126
84	9	60	59
85	21	56	86
86	9	21	30
87	6	24	59
88	8	51	45
89	6	92	43
90	8	12	21
91	9	16	30
92	20	154	73
93	21	340	43
94	14	27	25
95	14	30	26

Scale: 1" to 100 feet.

100′ 0 100′ 200′

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GEOCHEMICAL PROSPECT No.2 -

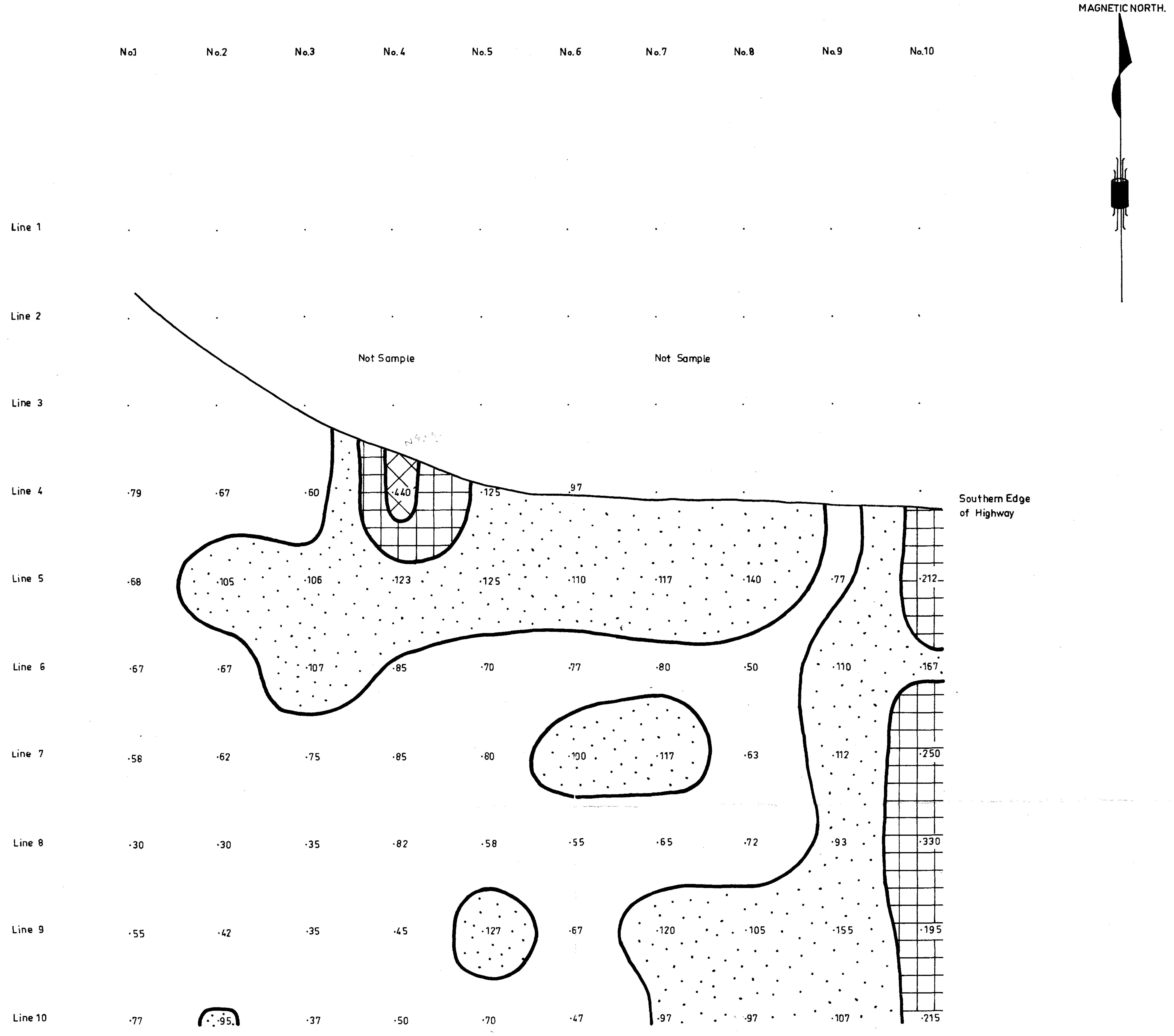
SOUTH EVELYN AREA.

GEOLOGY & ROCK GEOCHEMICAL SURVEY.

Geology: T. O. VEIT.

Drawn: E.M.A. Date: 15.10.1969.

PLAN No. 4.



LEGEND.

·10 – 10p.p.m. Lead.

THRESHOLD - 180p.p.m.- statistically defined.

8 to 16 × threshold - anomalous (1440 to 2880 p.p.m.).

4 to 8 × threshold - anomalous (720 to 1440 p.p.m.).

2 to 4 × threshold - probably anomalous (360 to 720 p.p.m.).

1 to 2 × threshold - possibly anomalous (180 to 360 p.p.m.).

½ to 1 × threshold - high background (90 to 180 p.p.m.).

0 to ½ × threshold - low background (0 to 90 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

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WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No.2.–

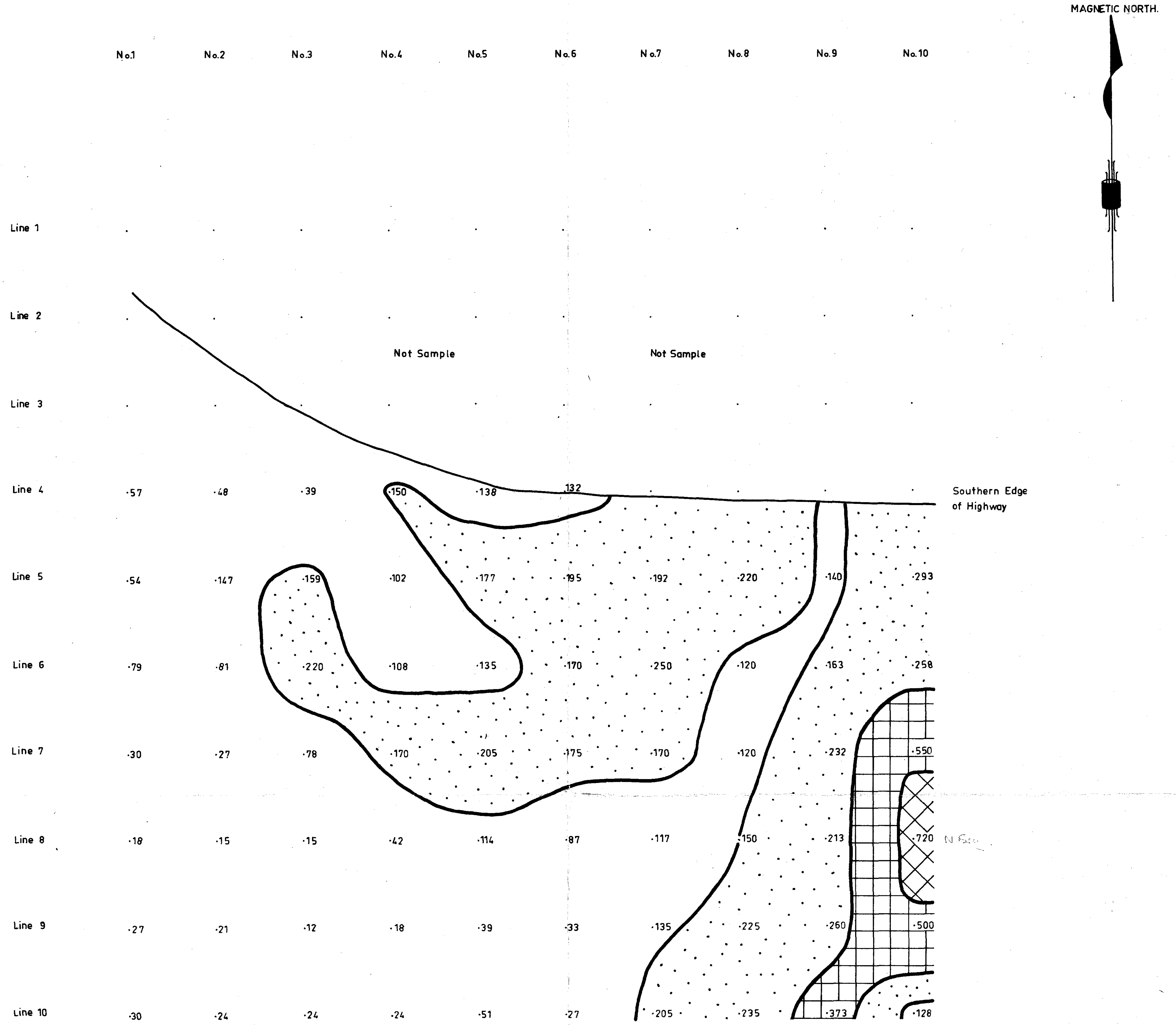
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY - LEAD.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 18.10.1969.

PLAN No. 4.Pb.



LEGEND.

·10 – 10 p.p.m. Zinc.

THRESHOLD – 300p.p.m – arbitrarily defined.

- 8 to 16 × threshold – anomalous (2400 to 4800 p.p.m.).
- 4 to 8 × threshold – anomalous (1200 to 2400 p.p.m.).
- 2 to 4 × threshold – probably anomalous (600 to 1200 p.p.m.).
- 1 to 2 × threshold – possibly anomalous (300 to 600 p.p.m.).
- 1/2 to 1 × threshold – high background (150 to 300 p.p.m.).
- 0 to 1/2 × threshold – low background (0 to 150 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

CR69/73B.

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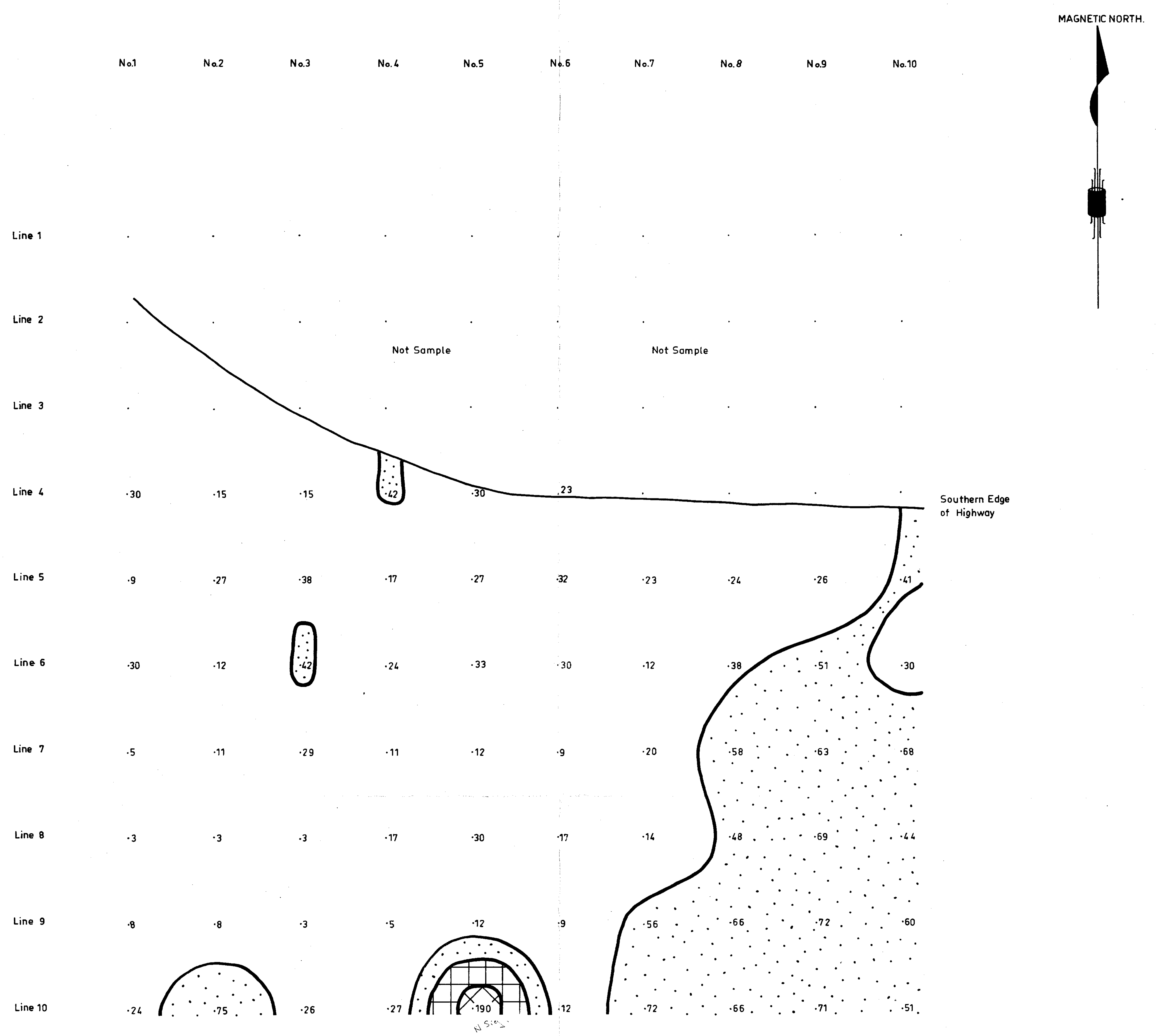
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 2. –

SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY – ZINC.

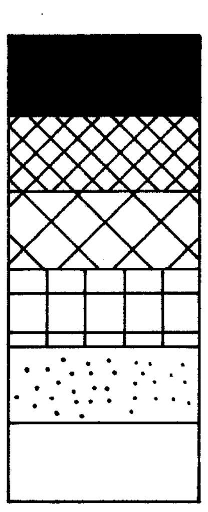
Geochemistry: T.O. VEIT.		PLAN No. 4 Zn.
Drawn: E.M.A.	Date: 18.10.1969.	



LEGEND.

·10 = 10 p.p.m. Copper.

THRESHOLD - 80 p.p.m.- statistically defined.



8 to 16 × threshold - anomalous (640 to 1280 p.p.m.).

4 to 8 × threshold - anomalous (320 to 640 p.p.m.).

2 to 4 × threshold - probably anomalous (160 to 320 p.p.m.).

1 to 2 × threshold - possibly anomalous (80 to 160 p.p.m.).

1/2 to 1 × threshold - high background (40 to 80 p.p.m.).

0 to 1/2 × threshold - low background (0 to 40 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

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CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No.2.–

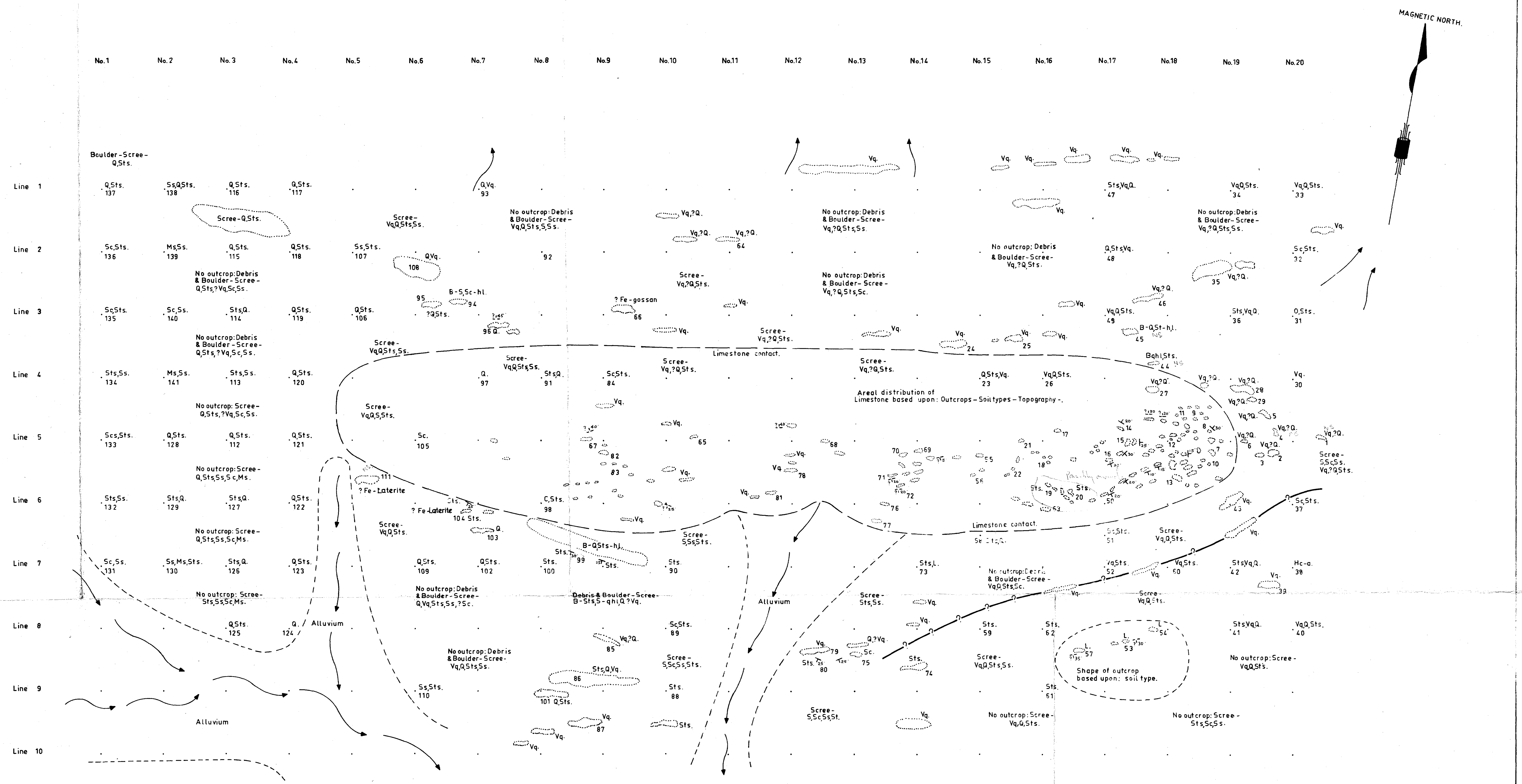
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY-COPPER.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 18.10.1969.

PLAN No. 4 Cu.



LEGEND

Lithology- same as on Plan No.1.
Symbols- same as on Plan No.1.
·88 Geochemical Rock Samples.

GEOCHEMICAL ROCK SAMPLES - ASSAY RESULTS.

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
1	250	44	46
2	60	22	21
3	69	28	18
4	192	27	15
5	30	23	11
6	54	16	19
7	21	82	18
8	21	83	26
9	12	86	22
10	11	80	16
11	6	84	20
12	24	87	18
13	20	80	20
14	18	90	16
15	29	89	30
16	48	96	26
17	5	74	18
18	5	89	23
19	9	230	113
20	11	620	176
21	42	82	19
22	33	91	36
23	21	103	96
24	14	44	95
25	17	109	38
26	9	36	34
27	8	19	31
28	6	16	14
29	18	13	16
30	41	134	23

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
31	26	20	11
32	14	52	48
33	26	20	13
34	5	29	15
35	8	28	20
36	14	39	34
37	84	66	22
38	66	41	46
39	42	20	15
40	24	28	13
41	33	29	20
42	126	87	101
43	51	32	21
44	114	92	153
45	24	95	435
46	9	37	30
47	10	86	98
48	12	62	80
49	57	66	125
50	6	80	30
51	45	30	20
52	6	48	74
53	23	78	32
54	15	84	24
55	3	81	21
56	3	83	25
57	7	77	21
58	18	32	50
59	23	30	16
60	7	40	114

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
61	39	166	114
62	60	35	20
63	21	107	98
64	3	91	30
65	6	80	68
66	72	85	40
67	12	83	20
68	7	88	16
69	9	55	23
70	4	87	18
71	4	84	13
72	7	84	16
73	3	106	195
74	17	40	27
75	48	79	8
76	5	110	23
77	9	107	24
78	6	56	23
79	30	32	9
80	69	30	12
81	6	101	36
82	9	106	21
83	12	37	9
84	162	119	96
85	15	27	23
86	15	21	26
87	18	25	17
88	51	69	90
89	78	181	72
90	375	186	141

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
91	62	86	89
92	24	84	110
93	14	59	65
94	68	86	66
95	26	76	90
96	17	65	73
97	14	40	60
98	33	39	56
99	90	136	88
100	57	82	85
101	39	144	132
102	14	49	58
103	21	30	55
104	24	46	62
105	14	35	64
106	8	46	55
107	14	140	118
108	18	34	60
109	8	17	53
110	18	25	55
111	51	72	620
112	310	297	1708
113	14	230	58
114	5	50	18
115	5	50	15
116	5	46	13
117	5	43	11
118	5	56	10
119	5	52	22
120	3	37	13

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
121	12	45	15
122	5	40	14
123	3	41	15
124	11	35	23
125	2	31	11
126	35	68	35
127	7	24	12
128	10	49	44
129	10	65	82
130	5	38	14
131	12	32	14
132	9	30	30
133	9	24	11
134	21	71	88
135	15	21	15
136	18	40	42
137	9	25	9
138	15	42	14
139	15	39	12
140	11	42	11
141	11	53	13

Scale: 1" to 100 feet.

100' 0 100' 200'

CR69/73B

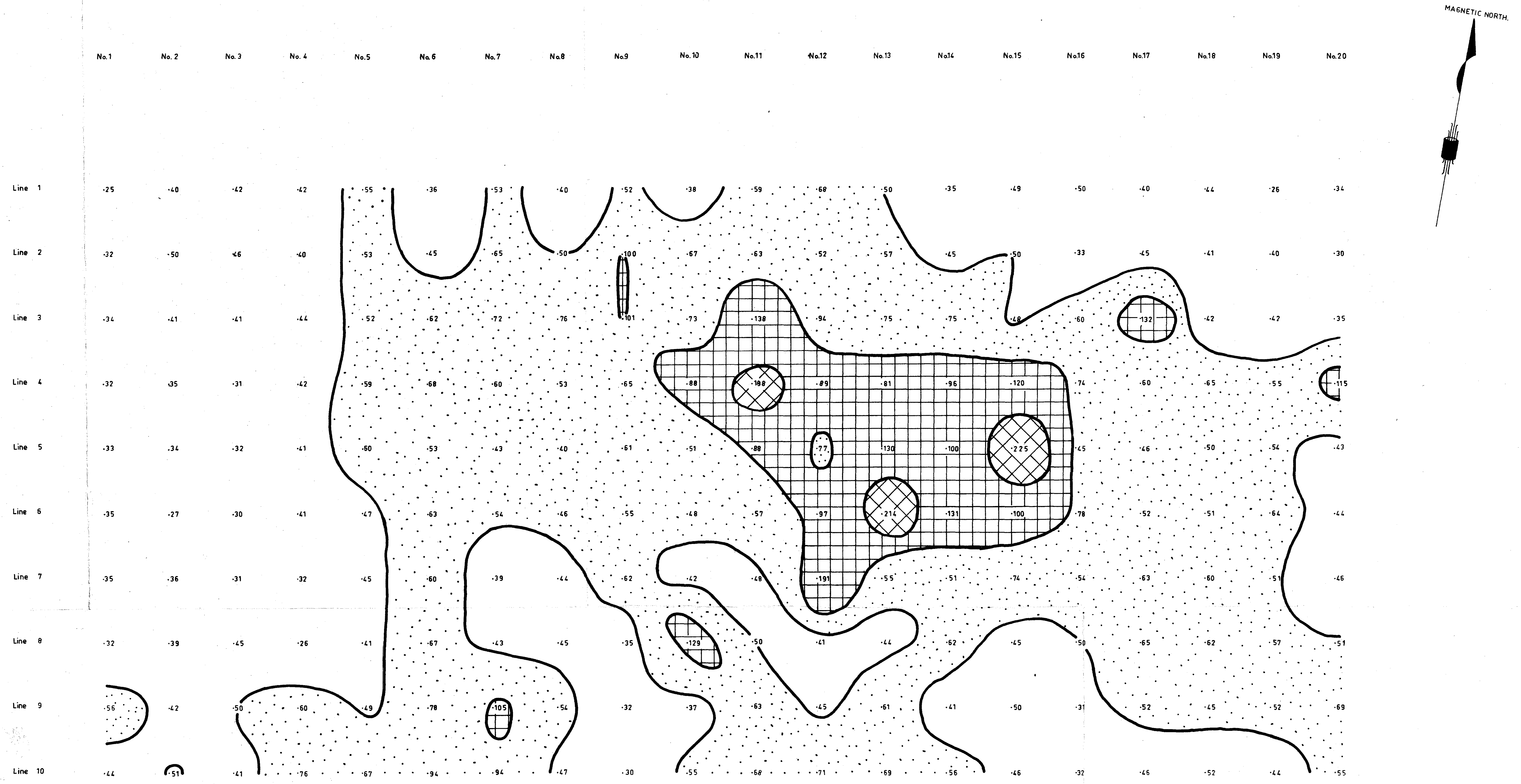
WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 3.-

SOUTH EVELYN AREA.

GEOLOGY & ROCK GEOCHEMICAL SURVEY.

Geology: T. O. VEIT.		PLAN No. 5.
Drawn: E.M.A.	Date: 20.10.1969	



LEGEND

·10 - 10 p.p.m. Lead.

THRESHOLD - 80 p.p.m. for limestone soils, 100 ppm for all other soil types. Statistically defined.

8 to 16 × threshold - anomalous (640 to 1280 p.p.m. for limestone; 800 to 1600 p.p.m. for all other rock types.).

4 to 8 × threshold - anomalous (320 to 640 p.p.m. for limestone; 400 to 800 p.p.m. for all other rock types.).

2 to 4 × threshold - probably anomalous (160 to 320 p.p.m. for limestone; 200 to 400 p.p.m. for all other rock types.).

1 to 2 × threshold - possibly anomalous (80 to 160 p.p.m. for limestone; 100 to 200 p.p.m. for all other rock types).

1/2 to 1 × threshold - high background (40 to 80 p.p.m. for limestone; 50 to 100 p.p.m. for all other rock types.).

0 to 1/2 × threshold - low background (0 to 40 p.p.m. for limestone; 0 to 50 p.p.m. for all other rock types.)

Scale: 1" to 100 feet.

100' 0 100' 200'

CR69/738

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 3.-

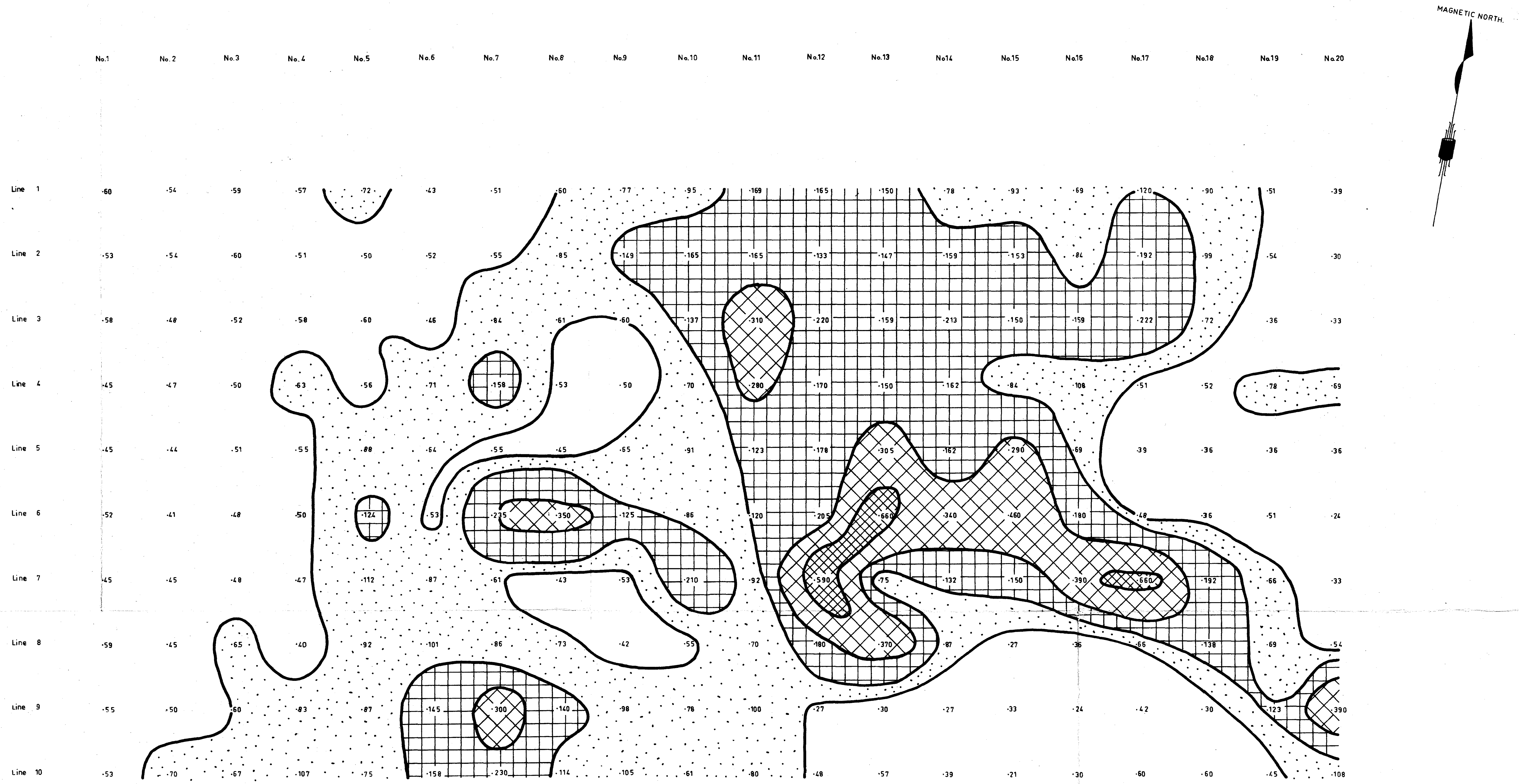
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY - LEAD.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 20.10.1969

PLAN No. 5 Pb.



LEGEND

·10 - 10 p.p.m. Zinc.

THRESHOLD - 120 p.p.m. for all soil types. Statistically defined.

8 to 16 × threshold - anomalous (960 to 1920 p.p.m.).

4 to 8 × threshold - anomalous (480 to 960 p.p.m.).

2 to 4 × threshold - probably anomalous (240 to 480 p.p.m.).

1 to 2 × threshold - possibly anomalous (120 to 240 p.p.m.).

1/2 to 1 × threshold - high background (60 to 120 p.p.m.).

0 to 1/2 × threshold - low background (0 to 60 p.p.m.).

Scale: 1" to 100 feet.

100' 0 100' 200'

CR 69/73B

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINNERS.

GEOCHEMICAL PROSPECT No.3 -

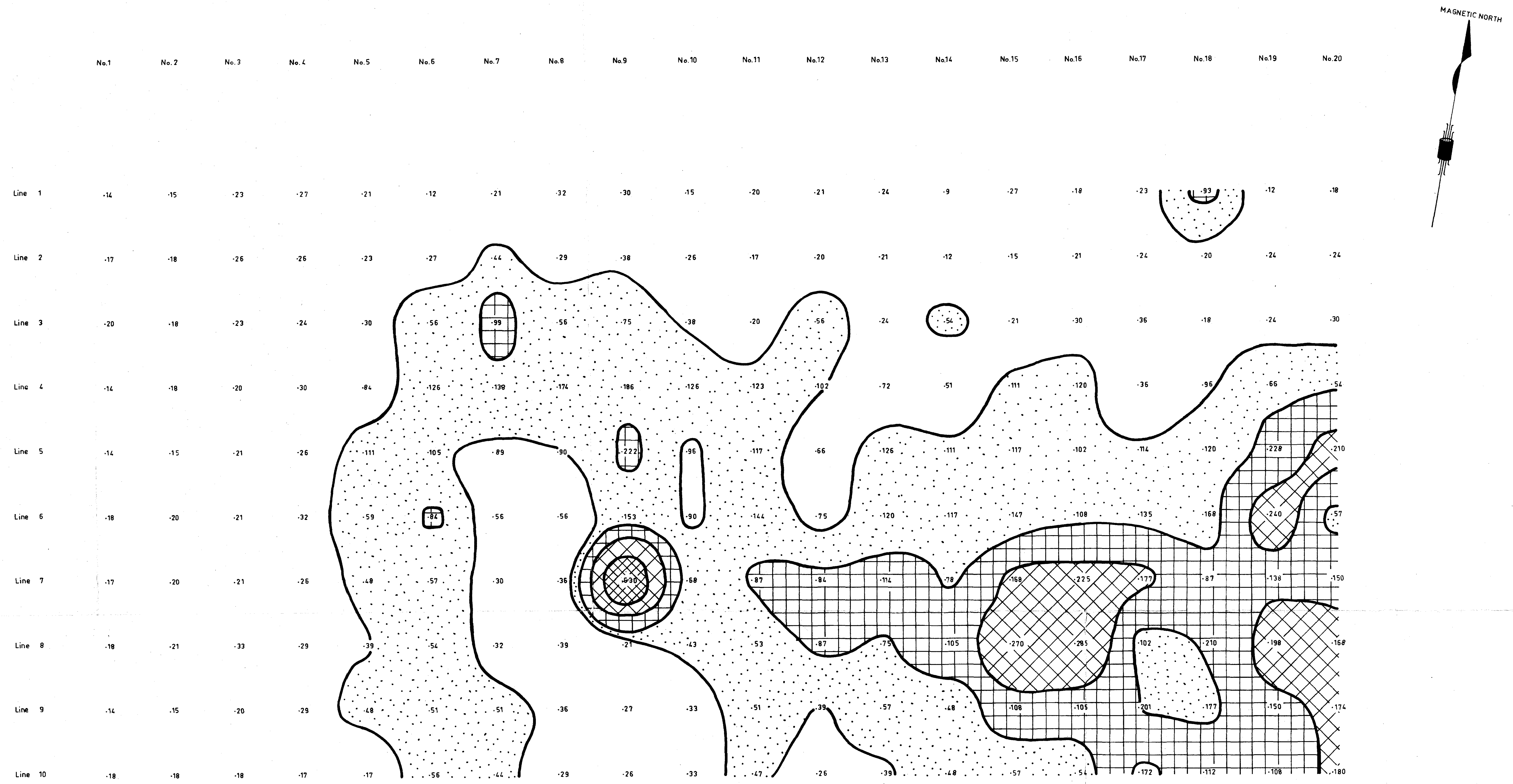
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY - ZINC.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 20.10.1969

PLAN No.5 Zn.



LEGEND

·10 – 10 p.p.m. Copper.

THRESHOLD – 200p.p.m. for limestone soils; 80 p.p.m. for all other soil types. Statistically defined.

8 to 16 × threshold - anomalous (1600 to 3200p.p.m. for limestone; 640 to 1280 p.p.m. for all other rock types.).

4 to 8 × threshold - anomalous (800 to 1600 p.p.m. for limestone; 320 to 640p.p.m. for all other rock types.).

2 to 4 × threshold - probably anomalous (400 to 800p.p.m. for limestone; 160 to 320p.p.m. for all other rock types.).

1 to 2 × threshold - possibly anomalous (200 to 400p.p.m. for limestone; 80 to 160p.p.m. for all other rock types.).

1/2 to 1 × threshold - high background (100 to 200p.p.m. for limestone; 40 to 80p.p.m. for all other rock types.).

0 to 1/2 × threshold - low background (0 to 100 p.p.m for limestone; 0 to 40 p.p.m. for all other rock types.).

Scale: 1" to 100 feet.

100' 0 100' 200'

CR 69/73B

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY. LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No.3. –

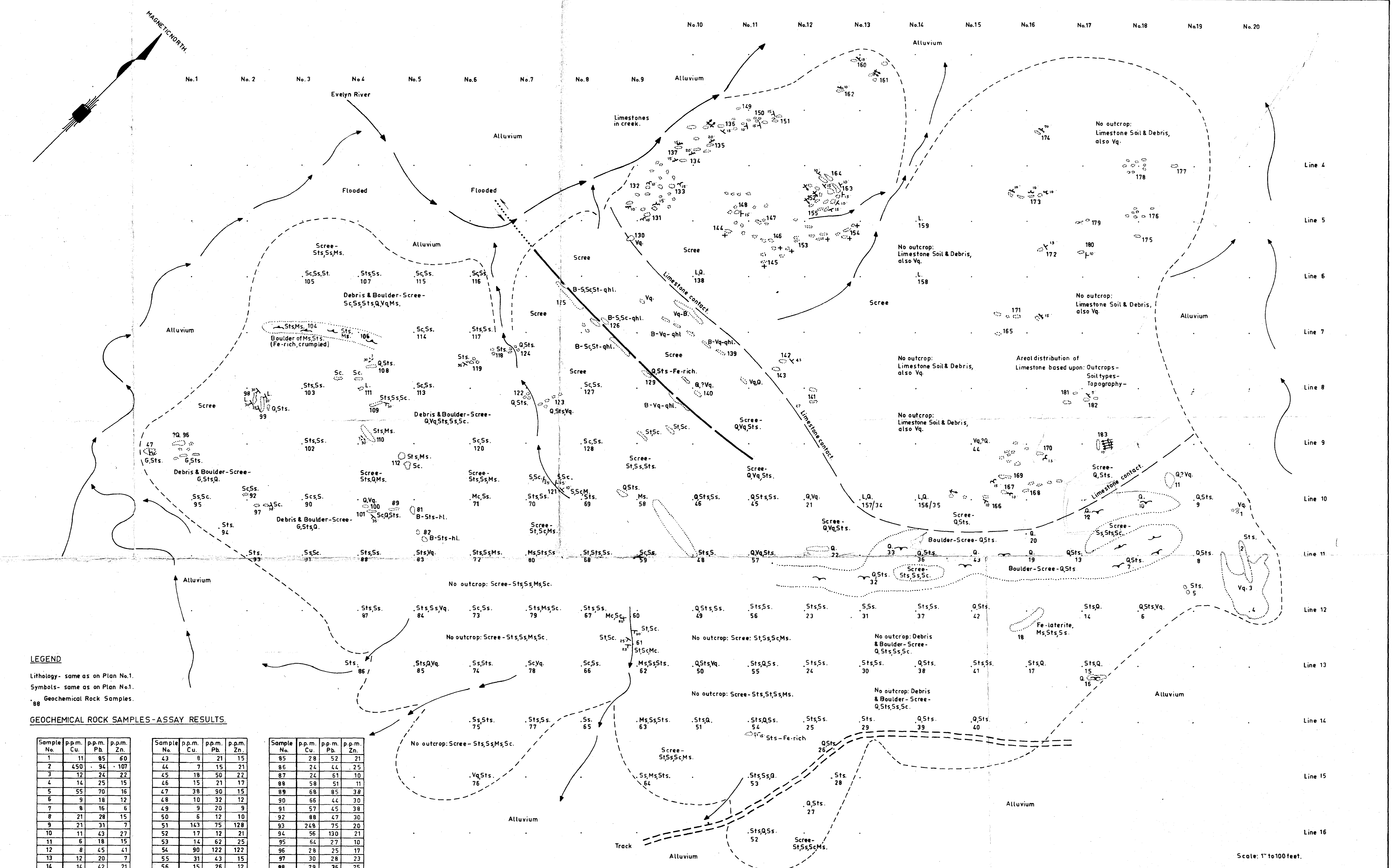
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY - COPPER.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 20.10.1969

PLAN No.5 Cu.



LEGEND

Lithology- same as on Plan No.1.

Symbols- same as on Plan No.1.

.88 Geochemical Rock Samples.

GEOCHEMICAL ROCK SAMPLES-ASSAY RESULTS.

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
1	11	85	60
2	450	94	107
3	12	24	22
4	14	25	15
5	55	70	16
6	9	18	12
7	8	16	6
8	21	28	15
9	21	31	7
10	11	43	27
11	6	18	15
12	8	45	41
13	12	20	7
14	14	42	21
15	112	85	292
16	375	45	14
17	66	91	181
18	165	260	710
19	28	20	11
20	20	17	7
21	12	43	35
22	20	25	8
23	83	125	45
24	16	55	12
25	18	41	13
26	19	38	21
27	67	75	75
28	17	51	36
29	16	67	35
30	23	60	21
31	14	90	36
32	13	17	15
33	17	19	6
34	23	20	6
35	33	26	9
36	12	25	12
37	20	48	20
38	129	120	45
39	38	60	52
40	17	45	26
41	31	80	34
42	38	87	28

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
43	8	21	15
44	7	15	21
45	18	50	22
46	15	21	17
47	38	90	15
48	10	32	12
49	9	20	9
50	6	12	10
51	143	75	128
52	17	12	21
53	14	62	25
54	90	122	122
55	31	43	15
56	15	26	12
57	20	17	28
58	300	98	65
59	172	54	40
60	72	162	16
61	18	39	43
62	46	53	107
63	31	36	57
64	62	100	92
65	64	98	98
66	108	72	110
67	112	65	40
68	100	70	35
69	96	90	117
70	44	75	35
71	40	50	14
72	102	166	92
73	86	70	73
74	54	61	50
75	59	115	520
76	11	35	28
77	144	191	1330
78	39	65	18
79	36	65	24
80	28	55	25
81	90	40	21
82	98	45	8
83	124	45	24
84	29	50	22

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
85	28	52	21
86	24	44	25
87	24	61	10
88	58	51	11
89	68	85	38
90	66	44	30
91	57	45	38
92	88	47	30
93	248	75	20
94	56	130	21
95	64	27	10
96	28	25	17
97	30	28	23
98	29	36	25
99	216	75	28
100	84	60	36
101	22	11	8
102	20	55	35
103	13	45	55
104	176	65	20
105	34	39	12
106	96	48	15
107	32	35	21
108	36	34	12
109	188	35	28
110	68	62	30
111	70	60	310
112	65	45	34
113	55	65	16
114	98	62	22
115	85	280	335
116	78	130	100
117	92	62	36
118	400	48	15
119	1160	44	43
120	56	51	28
121	84	63	75
122	77	115	55
123	8	22	21
124	11	26	12
125	248	110	106
126	120	102	75

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
127	43	55	70
128	60	70	97
129	52	62	24
130	25	35	16
131	104	75	85
132	148	52	97
133	6	105	24
134	6	112	34
135	51	81	62
136	88	51	68
137	68	32	102
138	39	35	27
139	17	24	11
140	14	17	9
141	87	68	71
142	90	73	68
143	33	91	30
144	9	88	48
145	8	100	57
146	7	90	28
147	6	91	48
148	13	95	25
149	80	80	83
150	164	440	265
151	8	115	47
152	11	96	32

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
153	17	95	14
154	5	88	31
155	5	61	22
156	8	14	5
157	10	9	6
158	18	24	23
159	6	16	6
160	57	75	86
161	5	71	14
162	14	76	24
163	12	77	21
164	5	73	13
165	99	26	45
166	17	52	50
167	36	39	43
168	9	72	25
169	15	78	41
170	18	76	27
171	54	25	60
172	48	51	35
173	11	66	43
174	24	72	35
175	45	76	48
176	66	64	12
177	57	67	23
178	36	49	11

Sample No.	p.p.m. Cu.	p.p.m. Pb.	p.p.m. Zn.
179			
180	45	66	20
181	18	69	19
182	8	70	11
183	63	26	52

CR69/73B

WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 4 –

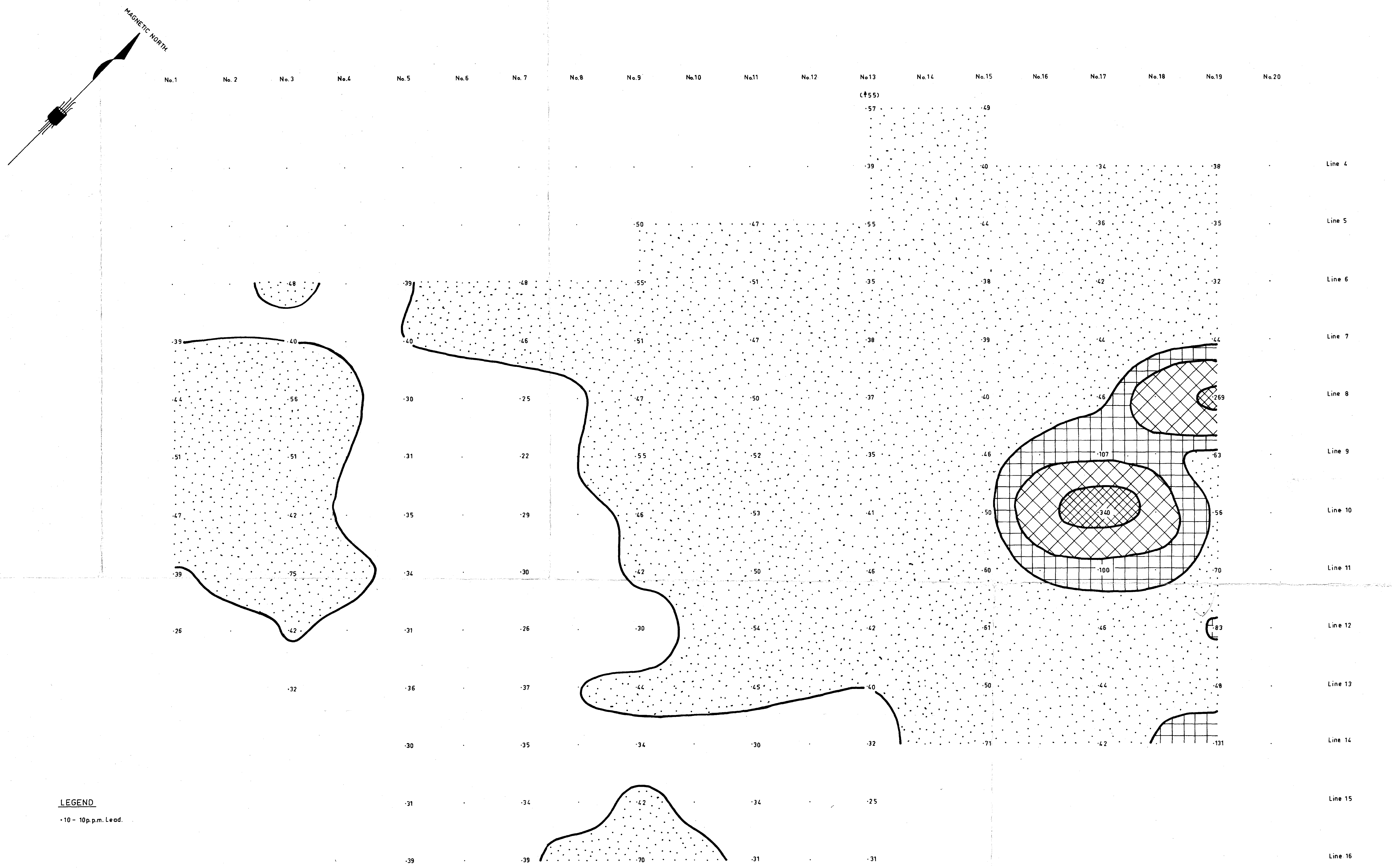
SOUTH EVELYN AREA.

GEOLOGY & ROCK GEOCHEMICAL SURVEY.

Geology: T. O. VEIT.

Drawn: E.M.A. Date: 25.10.1969.

PLAN No.6.



THRESHOLD - 60p.p.m. for limestone soils; 80 ppm for all other soil types. Statistically defined.

(solid black)	8 to 16 × threshold - anomalous (480 to 960 p.p.m. for limestone ; 640 to 1280 p.p.m. for all other rock types.).
(fine cross-hatch)	4 to 8 × threshold - anomalous (240 to 480 p.p.m. for limestone ; 320 to 640 p.p.m. for all other rock types.).
(coarse cross-hatch)	2 to 4 × threshold - probably anomalous (120 to 240 p.p.m. for limestone ; 160 to 320 p.p.m. for all other rock types.).
(grid)	1 to 2 × threshold - possibly anomalous (60 to 120 p.p.m. for limestone ; 80 to 160 p.p.m. for all other rock types.).
(dots)	1/2 to 1 × threshold - high background (30 to 60 p.p.m. for limestone ; 40 to 80 p.p.m. for all other rock types.).
(blank)	0 to 1/2 × threshold - low background (0 to 30 p.p.m. for limestone ; 0 to 40 p.p.m. for all other rock types.).

CR69/73 B

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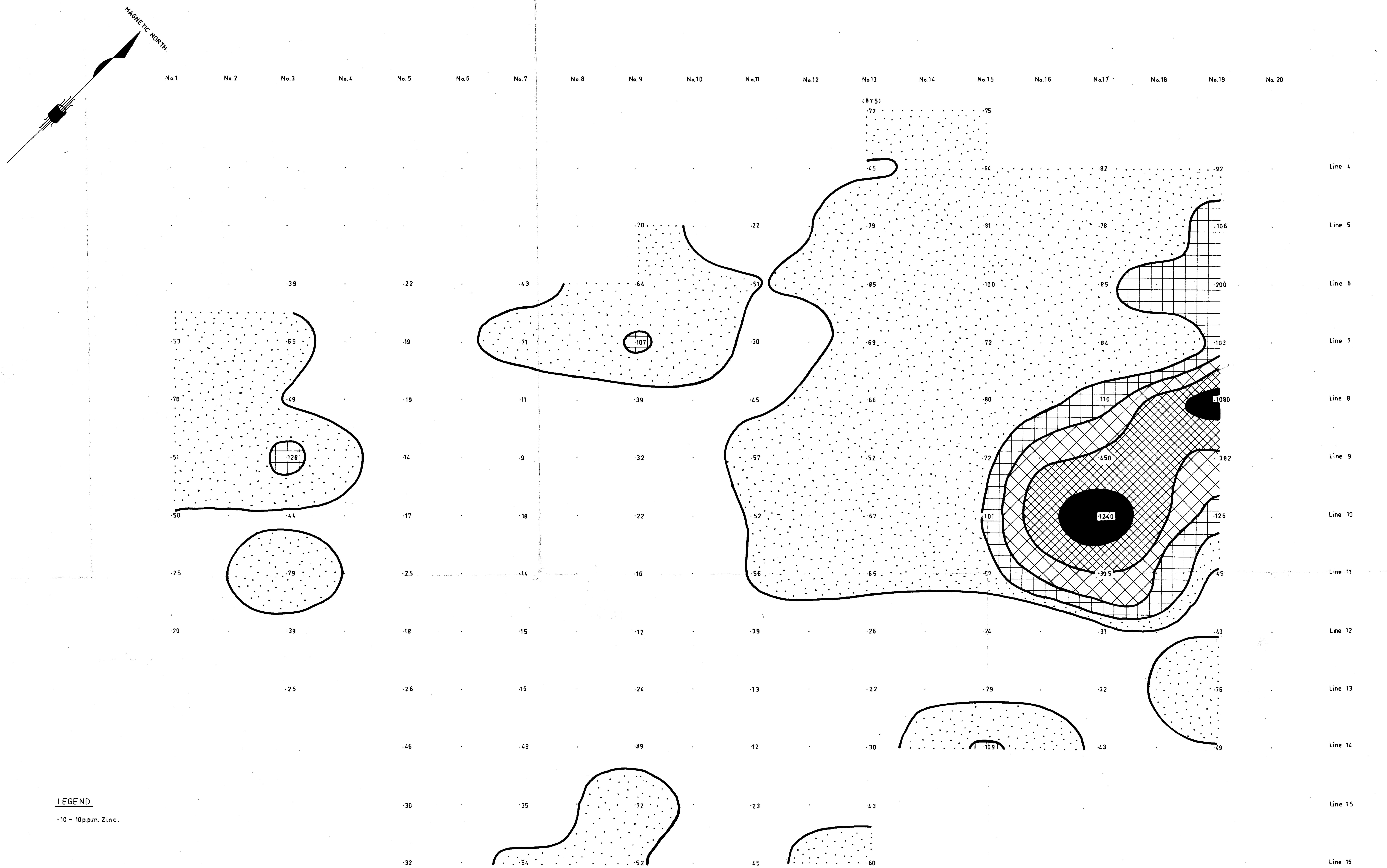
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 4 -
SOUTH EVELYN AREA.
GEOCHEMICAL SOIL SURVEY - LEAD.

Geochemistry: T.O. VEIT.
Drawn: E.M.A. Date: 25.10.1969.

PLAN No.6 Pb.



LEGEND

·10 - 10 p.p.m. Zinc.

THRESHOLD - 100 p.p.m. for all soil types. Statistically defined.

(solid black)	8 to 16 × threshold - anomalous (800 to 1600 p.p.m.).
(fine cross-hatch)	4 to 8 × threshold - anomalous (400 to 800 p.p.m.).
(coarse cross-hatch)	2 to 4 × threshold - probably anomalous (200 to 400 p.p.m.).
(grid)	1 to 2 × threshold - possibly anomalous (100 to 200 p.p.m.).
(stipple)	1/2 to 1 × threshold - high background (50 to 100 p.p.m.).
(blank)	0 to 1/2 × threshold - low background (0 to 50 p.p.m.).

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WATTS, GRIFFIS AND McOUAT (AUSTRALIA) PTY LIMITED.
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 4 -

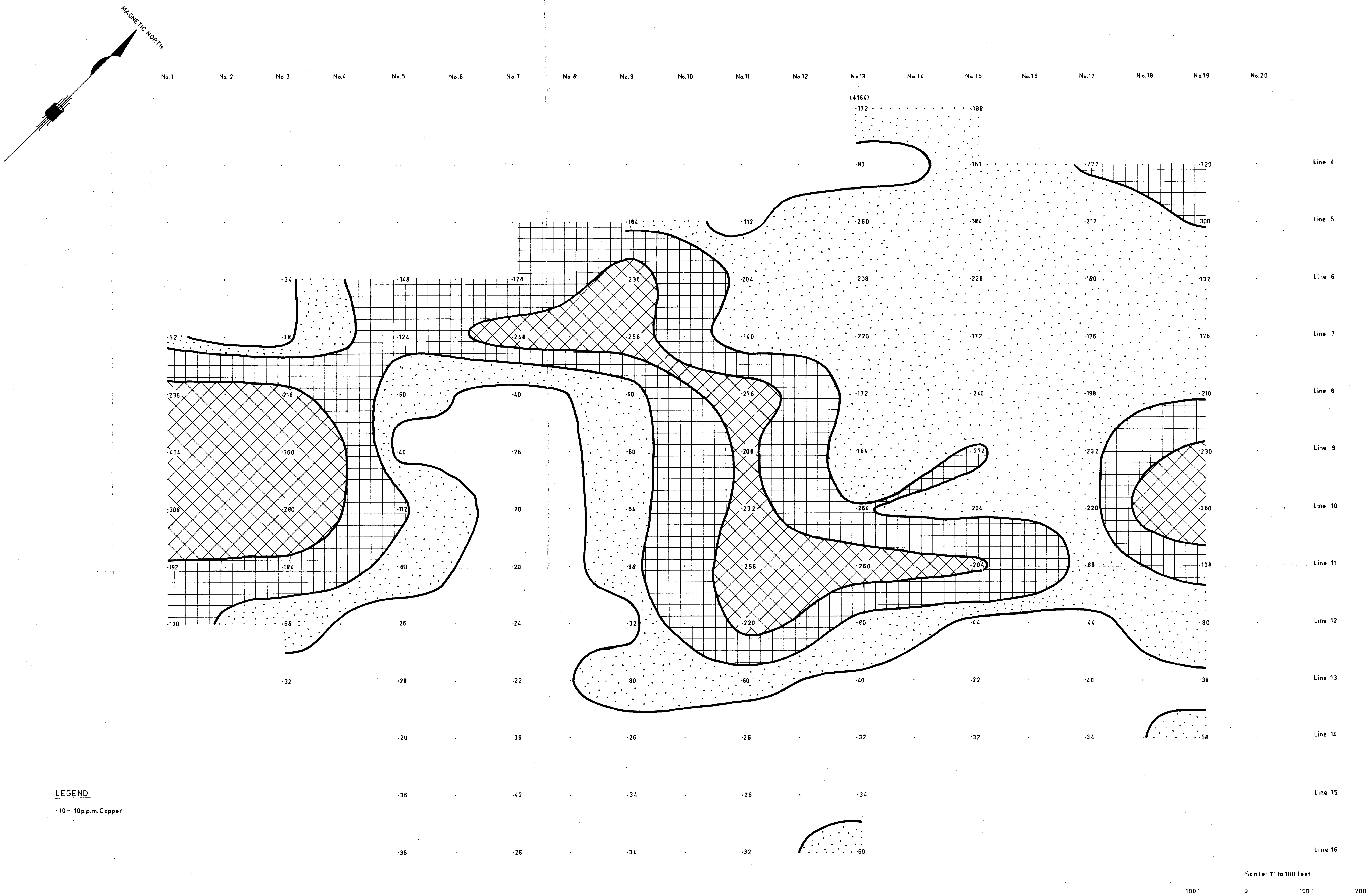
SOUTH EVELYN AREA.

GEOCHEMICAL SOIL SURVEY - ZINC.

Geochemistry: T.O. VEIT.

Drawn: E.M.A. Date: 25.10.1969.

PLAN No.6 Zn.



LEGEND

·10 – 10 p.p.m. Copper.

THRESHOLD – 260 p.p.m. for limestone soils; 100 ppm for all other soil types. Arbitrarily defined.

- 8 to 16 × threshold - anomalous (2080 to 4160 p.p.m. for limestone; 800 to 1600 p.p.m. for all other rock types.).
- 4 to 8 × threshold - anomalous (1040 to 2080 p.p.m. for limestone; 400 to 800 p.p.m. for all other rock types.).
- 2 to 4 × threshold - probably anomalous (520 to 1040 p.p.m. for limestone; 200 to 400 p.p.m. for all other rock types.).
- 1 to 2 × threshold - possibly anomalous (260 to 520 p.p.m. for limestone; 100 to 200 p.p.m. for all other rock types.).
- $\frac{1}{2}$ to 1 × threshold - high background (130 to 260 p.p.m. for limestone; 50 to 100 p.p.m. for all other rock types.).
- 0 to $\frac{1}{2}$ × threshold - low background (0 to 130 p.p.m. for limestone; 0 to 50 p.p.m. for all other rock types.).

CR69/73B

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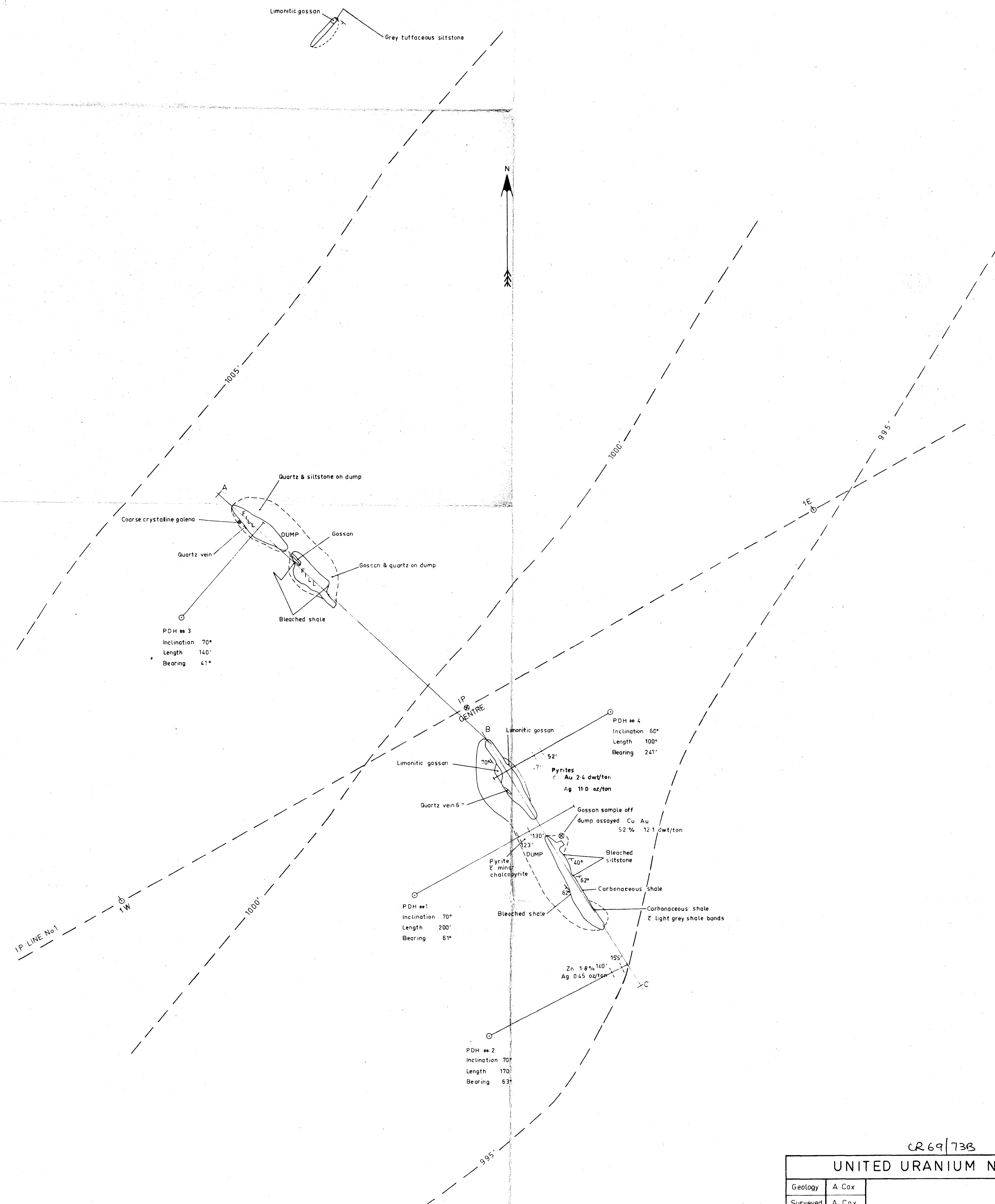
CONSULTING GEOLOGISTS AND ENGINEERS.

GEOCHEMICAL PROSPECT No. 4 –

SOUTH EVELYN AREA.

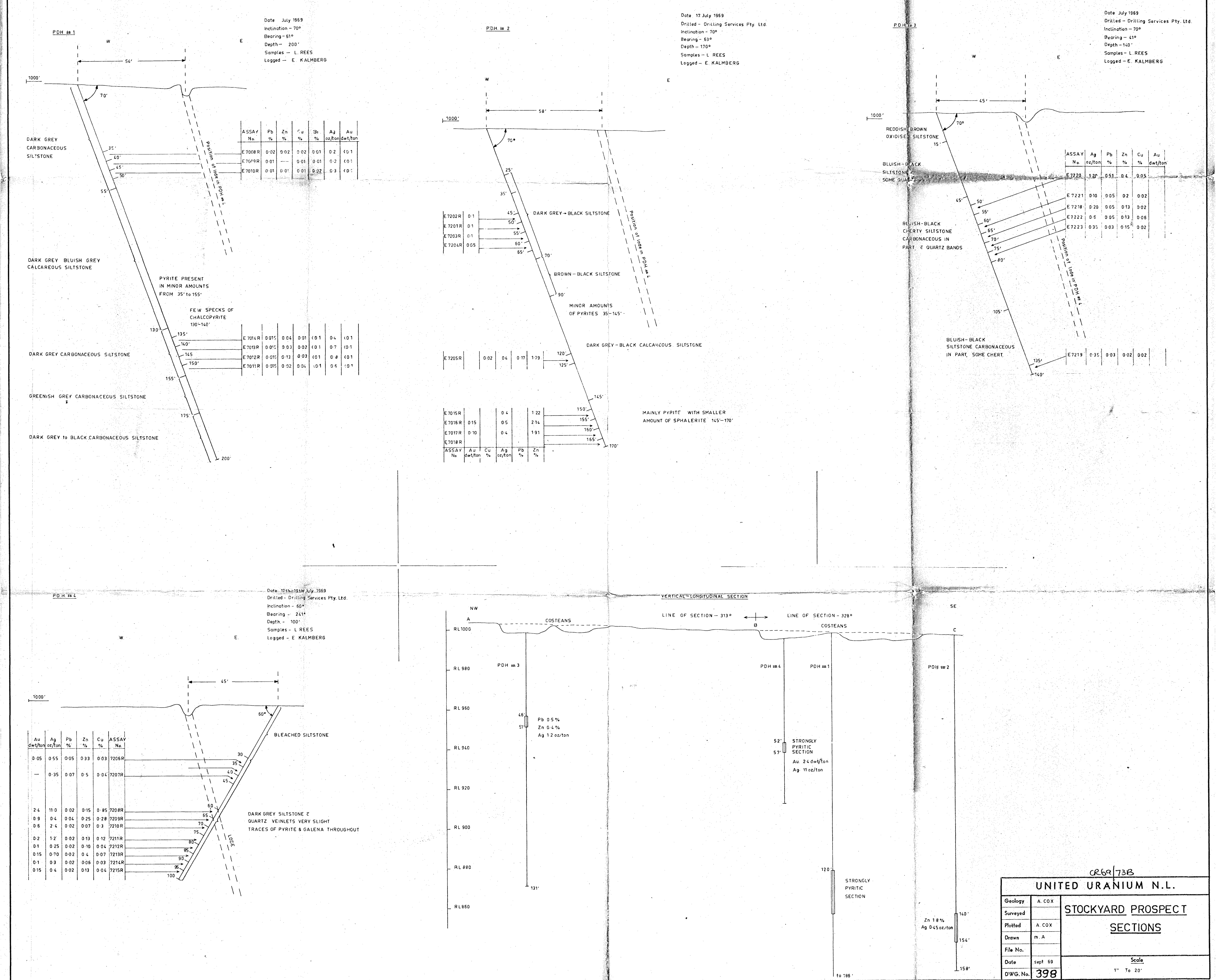
GEOCHEMICAL SOIL SURVEY - COPPER.

Geochemistry: T.O. VEIT.	PLAN No. 6 Cu.
Drawn: E.M.A. Date: 25.10.1969.	



CR 69/73B

UNITED URANIUM N.L.		
Geology	A. Cox	STOCKYARD PROSPECT
Surveyed	A. Cox	
Plotted		
Drawn	m. A	P.D.H. LOCATIONS
Date	sept. 69	Scale 20' 0 20' 40'
DWG No.	397	



PDH # 1

ASSAY No.	Pb %	Zn %	Cu %	Bi %	Ag oz/ton	Au dwt/ton
E 7008 R	0·02	0·02	0·02	0·01	0·2	<0·1
E 7009 R	0·01	---	0·01	0·01	0·2	<0·1
E 7010 R	0·01	0·01	0·01	0·02	0·3	<0·1
E 7014 R	0·015	0·04	0·01	<0·1	0·4	<0·1
E 7013 R	0·015	0·03	0·02	<0·1	0·7	<0·1
E 7012 R	0·015	0·13	0·03	<0·1	0·8	<0·1
E 7011 R	0·015	0·02	0·04	<0·1	0·6	<0·1

PDH # 2

ASSAY No.	Au dwt/ton	Cu %	Ag oz/ton	Pb %	Zn %
E 7202 R	0·1				
E 7201 R	0·1				
E 7203 R	0·1				
E 7204 R	0·05				
E 7205 R		0·02	0·4	0·17	1·79
E 7015 R			0·4		1·22
E 7016 R	0·15		0·5		2·14
E 7017 R	0·10		0·4		1·91
E 7018 R					

PDH # 3

ASSAY No.	Ag oz/ton	Pb %	Zn %	Cu %	Au dwt/ton
E 7220	1·20	0·51	0·4	0·05	
E 7221	0·10	0·05	0·2	0·02	
E 7218	0·20	0·05	0·13	0·02	
E 7222	0·5	0·05	0·13	0·06	
E 7223	0·35	0·03	0·15	0·02	
E 7219	0·35	0·03	0·02	0·02	

P.D.H. # 4

Au dwt/ton	Ag oz/ton	Pb %	Zn %	Cu %	ASSAY No.
0·05	0·55	0·05	0·33	0·03	7206R
—	0·35	0·07	0·5	0·04	7207R
2·4	11·0	0·02	0·15	0·85	7208R
0·9	0·4	0·04	0·25	0·28	7209R
0·6	2·4	0·02	0·07	0·3	7210R
0·2	1·2	0·02	0·13	0·12	7211R
0·1	0·25	0·02	0·10	0·04	7212R
0·15	0·70	0·02	0·4	0·07	7213R
0·1	0·3	0·02	0·06	0·03	7214R
0·15	0·4	0·02	0·13	0·04	7215R

CR69/73B

UNITED URANIUM N.L.

STOCKYARD PROSPECT SECTIONS

Geology	A. COX	
Surveyed		
Plotted	A. COX	
Drawn	m. A	
File No.		
Date	sept 69	Scale 1" To 20'
DWG. No.	398	