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REPORT ON
EXPLORATION OF E.L.2/78
DURING 1980
VOLUME I

OPEN FILE

ALCOA OF AUSTRALIA LIMITED
Exploration Division

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Project Report No. 23
October 1980

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INTRODUCTION

Alcoa of Australia was granted an extension of Exploration Licence E.L. 2/78 in November 1979, and a further extension in June 1980. The new expiry date is 12th November 1980.

This report summarises exploration work carried out during the past eleven months and presents proposals to accompany an application for a further six-month extension of the licence.

Field work took place during the period November 1979 to April 1980. Since November 1979 the company has undertaken the following exploration activities :

- 1) Interpretation of airborne geophysics
- 2) Completion of photogeological interpretation
- 3) Continuation of stream sediment sampling programme with attendant mineralogical and analytical work
- 4) Gridding of two target areas followed by soil sampling, ground magnetics and geological mapping along the grid lines
- 5) Petrographic studies
- 6) Compilation and drafting of all field data.

During the summer field season two geologists and up to four field assistants were employed on the project full-time. In addition a contract geologist and assistant were employed for a lengthy period.

PHOTOGEOLOGY

The contract let to Hunting Geology and Geophysics for photogeological interpretation over the Granite Tor area was completed during late 1979. Their report is included here as Appendix A and the final plans as Plates I and II.

The interpretation was carried out in two stages using 1:40 000 black and white photographs over the whole area and 1:20 000 colour photographs over the areas of granite outcrop.

The major results of the work included :

- 1) Differentiation of quartzitic and pelitic units within the Precambrian metamorphics
- 2) Attempted differentiation of intrusive phases within the granite body itself
- 3) The recognition of several vegetation anomalies which could be related to mineralisation
- 4) Recognition of a north-north-west trending fracture direction which pre-dates granite emplacement.

INTERPRETATION OF AIRBORNE GEOPHYSICS

As an adjunct to the photogeological interpretation Hunting carried out a brief interpretation of Alcoa's airborne magnetic and radiometric data. This took the form of a rapid scan of analogue magnetic and spectrometric records and of the magnetic contour plan. The northern and southern granite contacts were modelled and the intrusive is predicted to take the form of a northerly-dipping thick prism.

Other results of the study include :

- 1) The recognition of major fault zones
- 2) A zone of possible potassium alteration on the north-western margin of the granite
- 3) Subdivision of the granite into zones considered likely to be of differing composition.

The report on this work is included as Appendix B and a plan showing details of the interpretation as Plate III.

STREAM SEDIMENT SAMPLING AND GEOLOGICAL RECONNAISSANCE

A further 85 stream sediment samples were taken during the field season. These were all from the southern part of the licence area near the Murchison River. A plan of the sample locations is included as Plate IV in this report. The samples were treated in much the same manner as described in the October 1979 report, although a slightly different method was used for mineralogical scanning. The results of the mineralogical work as well as chemical analyses appear in table form as Appendix C.

One major and a few minor tin anomalies occurred in this area. In addition high zinc and moderately high tungsten values were found in several streams. None of these anomalies has been explained to date. Geological reconnaissance in the area revealed a thick limestone horizon underlying the major magnetic anomalies shown by the airborne survey. Several boulders of skarn-type rocks were found in nearby creek beds indicating the possible occurrence of granitic intrusive rocks and environments favourable for mineralisation.

BLUFF GRID

This area lies on the eastern margin of the exploration licence and is bounded on the south by the Bluff River. It was selected for detailed ground examination for the following reasons :

- i) Tin mineralisation occurs in greisen veins near the Bluff River
- ii) Significant stream tin anomalies occur in the area with some of these streams crossing a major fault structure
- iii) Skarn rocks were discovered beneath a small airborne magnetic anomaly. The existence of two stronger magnetic anomalies and the results of stream sediment sampling indicated that calc-silicate rocks could have a more extensive occurrence.

Some thirty kilometres of grid-line have been cut and pegged. Soil sampling, ground magnetics and grid-mapping have been carried out over most of these lines (see Plate VIII).

Geological mapping in this area indicates that calc-silicate horizons are interbedded with quartzites and minor pelitic rocks. This sequence is contained in a graben structure bounded by two north-north-west-trending faults which can be seen on Landsat imagery to be major structures. Granitic rocks lie on either side of the graben and they probably dip southward beneath the metasedimentary sequence.

4.

The calc-silicate formations (at least four are known) are easily detected by magnetics and give slightly anomalous base metal values in the soil samples.†

The area of greisen veining is somewhat more extensive than indicated by the old workings and responds well to soil sampling.

There is a suggestion from the soil sampling data that a tin-rich phase of the granite may exist on the western side of the area.

† Note : Soil samples were collected by posthole digger from the "C" horizon just above bedrock. This is generally at a depth of between 20 and 100cm. The samples invariably have a high organic content which causes some problems with chemical analyses.

SWALLOW GRID

This area lies on the Brougham River directly east of Mount Swallow. It was selected for detailed ground examination for the following reasons :

- i) Stream sediment samples have generally anomalous contents of tin and tungsten and in some cases copper lead or zinc
- ii) An airborne magnetic anomaly occurs over metasediments close to the granite contact and this coincides with a strong tin/tungsten stream anomaly
- iii) A zone of possible potassium alteration interpreted from airborne radiometric data occurs over part of the area
- iv) The granite contact was thought to dip shallowly beneath the metasediments and at least one aplitic dyke has been recorded in the vicinity
- v) Sulphide-rich hornfelsed sediments were detected during stream sampling.

Some ten kilometres of grid-line have been cut and pegged. Soil sampling, ground magnetics and grid-mapping have been carried out over most of these lines (see Plate IX).

Geological mapping in this area has shown that the granite dips at a low angle beneath pelitic sediments. The granite margin is chilled and the nearby sediments are hornfelsed. Granitic dykes occasionally with greisenous margins penetrate the country rocks and may be associated with localised magnetic anomalies. Small quartz veins, which are common in this area, may carry sparse patches of wolfram, bismuth and sulphides,

5.

Soil sampling results show that soils on the flanks of Mount Swallow carry anomalous amounts of tungsten, zinc and lead. The underlying rocks appear to be chloritic schists with minor fine-grained quartzites and some quartz veining.

PETROGRAPHIC STUDIES

Some 75 rock samples were examined in thin section by Central Mineralogical Services. Their report containing brief petrological descriptions is included here as Appendix D.

PROPOSALS FOR FURTHER EXPLORATION

The following work is proposed for the next six month period if a further extension is granted for E.L. 2/78 :

- 1) Continuation of the stream sediment sampling programme
- 2) Completion of soil sampling, magnetics and mapping on both the Swallow and Bluff Grids
- 3) Extensive geological traversing to investigate magnetic anomalies, vegetation anomalies and geochemical anomalies outlined by the work so far
- 4) Field checking of photogeology.

APPENDIX A :

A PHOTOGEOLOGICAL STUDY OF E.L. 2/78
BY HUNTING GEOLOGY AND GEOPHYSICS

A PHOTOGEOLOGICAL STUDY OF EXPLORATION
LICENCE 2/78, GRANITE TOR AREA
WESTERN TASMANIA

Undertaken on behalf of

ALCOA OF AUSTRALIA LIMITED

February 1980

ABSTRACT

Photogeological studies in the Granite Tor area, based upon 1:40 000 black and white and 1:20 000 colour aerial photographs, have been successful in differentiating quartzitic and pelitic sequences within the Precambrian Tyennan Block, and in differentiating various granite phases in the Devonian Granite Tor Batholith and clarifying its contacts with the surrounding rocks. An integrated geophysical study of airborne magnetic and scintillometer data suggests that the granite body has a moderate northerly dip. This study also outlined areas of high potassic alteration both within the granite and in the rocks along its western contact. The latter corresponds to a photo-geological vegetation and tone anomaly, and may represent altered or greisenised zones within the contact rocks. Two interpreted zones of alteration or greisenisation were also recognised within the granite. These zones warrant further investigation for tin-tungsten mineralisation. Two vegetation anomalies in correlates of the Cambrian Mt. Read Volcanics are visually similar to the pyritic andesite horizons at the Que River Mine.

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REFERENCES CITEDAPPENDICES

APPENDIX 1	LIST OF AERIAL PHOTOGRAPHS
APPENDIX 2	GRANITE TOR AREA - GEOPHYSICAL INTERPRETATION (Letter Report) (<i>Included as appendix B of the main text</i>)

1. INTRODUCTION

A photogeological study over Exploration Licence 2/78 and its surrounds, an area of 322km², was carried out during 1979. The study area, which is located between Tullah and Cradle Mountain National Park in Western Tasmania, is referred to by Alcoa of Australia Limited as the "Granite Tor Area" (see Figures 1 and 2).

The specified objectives of the study were:

- (a) Closer definition of lithological boundaries, especially with regard to the granite intrusive contact, and the differentiation of quartzites and pelites in the Precambrian sequence.
- (b) Detailed identification of structural features, particularly faulting and fracturing, the identification of any pre-intrusive structures being particularly important.
- (c) The recognition of different intrusive phases within the granite.

The study was carried out in two phases. The whole Exploration Licence area and its surrounds were first mapped using the smaller-scale 1:40 000 black and white aerial photographs. This initial phase produced very good results, especially with regard to the differentiation of the sediments and recognition of regional structure, and it was considered that little additional, useful information would be gained by remapping these rocks using the larger scale 1:20 000 colour aerial photographs.

Although it proved possible to partially differentiate the granite using the black and white photographs, experience dictated that the colour and tonal variation, together with the greater resolution of the colour photographs, would greatly assist in the differentiation of the various granite phases. For these reasons the granite was remapped

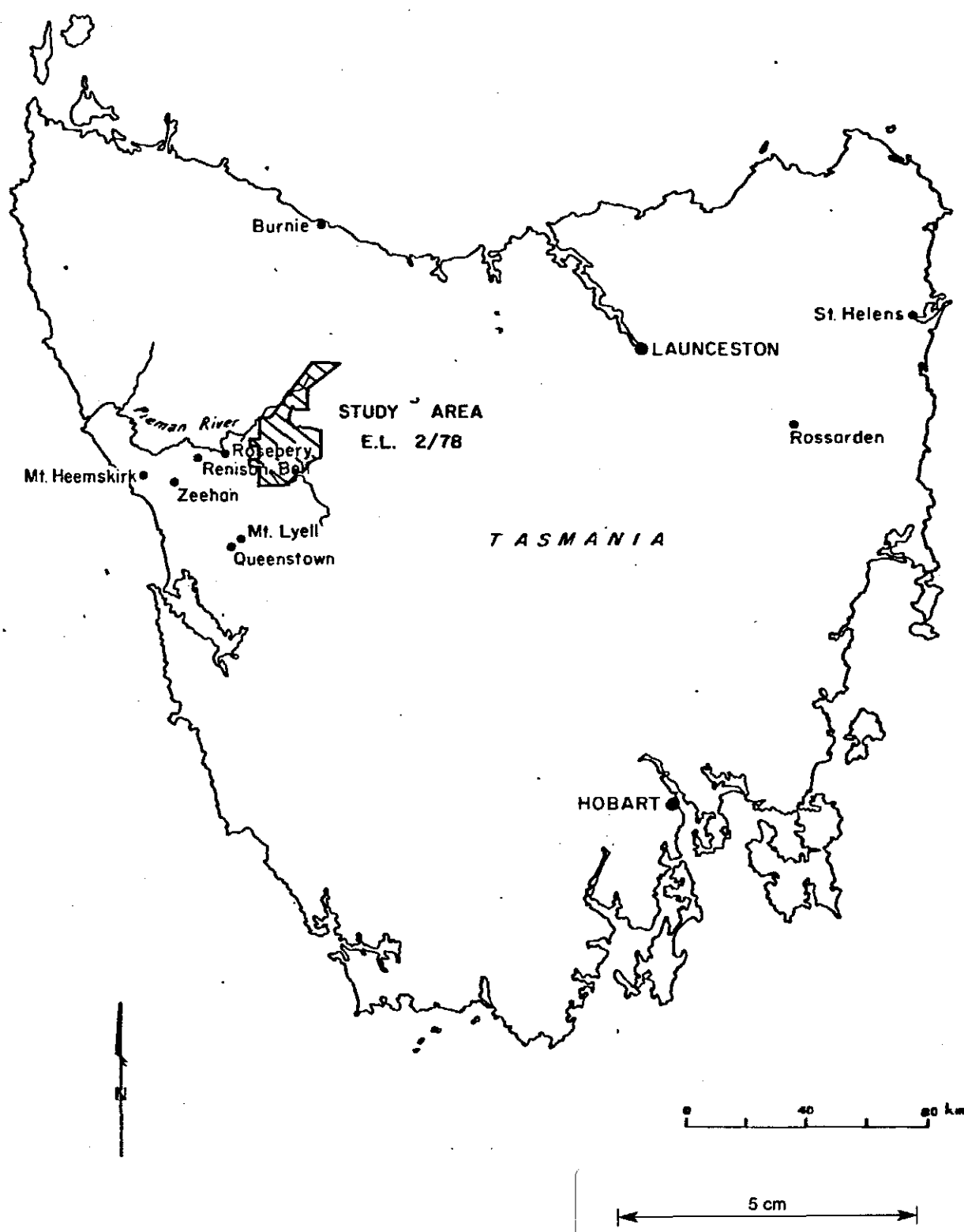


Fig. I. LOCALITY DIAGRAM

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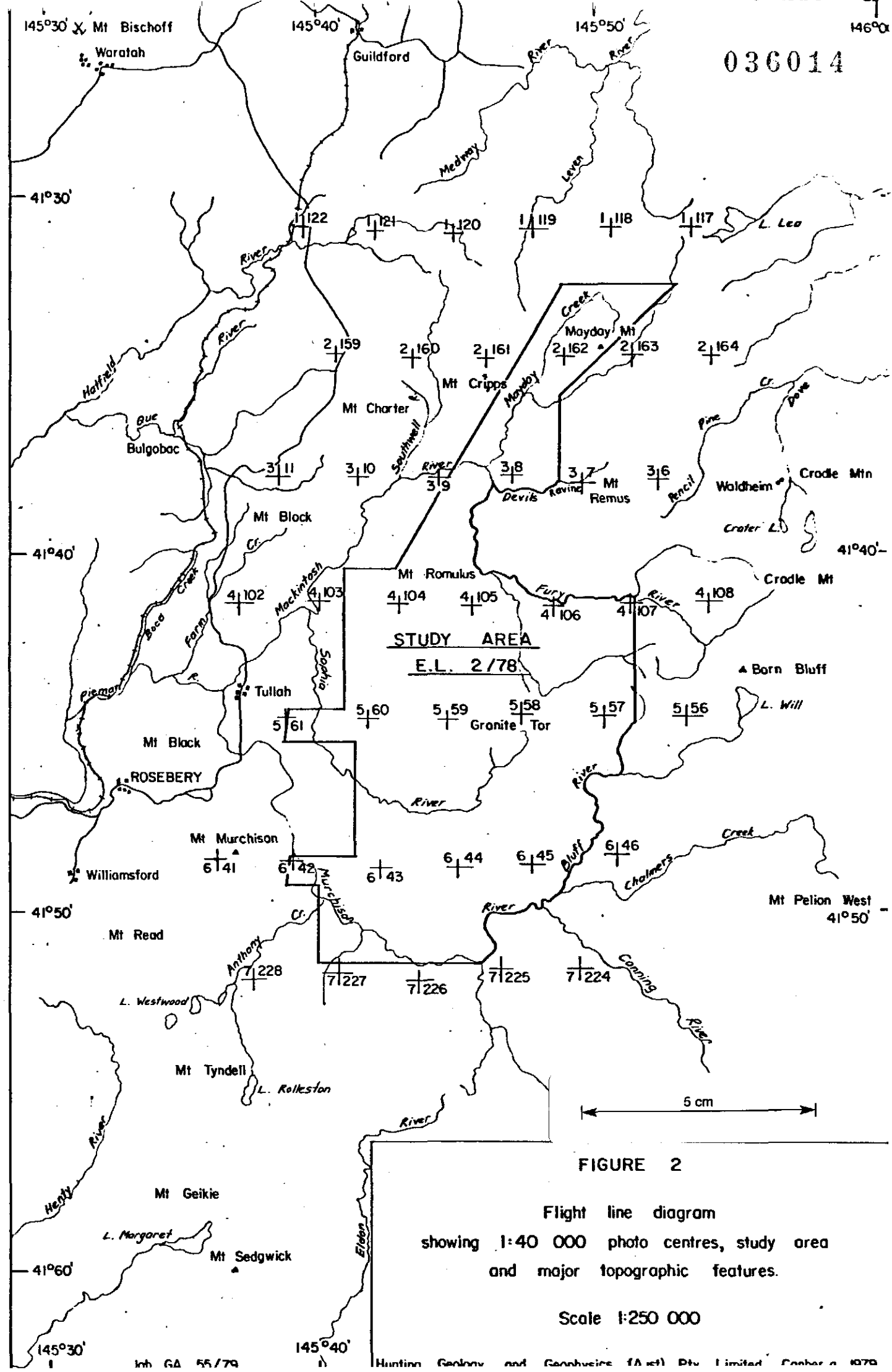


FIGURE 2

Flight line diagram
showing 1:40 000 photo centres, study area
and major topographic features.

Scale 1:250 000

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using the 1:20 000 colour photographs. Both phases involved the annotation of forty 23cm x 23cm square aerial photographs respectively.

Drainage bases for both phases of the study were produced on transparent acetate film from a respective reduction and enlargement of a 1:40 000 scale drainage map supplied by Alcoa. Photogeological information was annotated directly onto the overlay using a Zeiss N2 mirror stereoscope fitted with a six-power binocular head. Great difficulty was experienced in fitting the drainage base to the 1:20 000 scale colour aerial photographs due to extreme topographic distortion caused by the great and rapid changes in the relief of the country. This necessitated much time-consuming adjustment of the drainage base, a circumstance necessitating the request for an extension of the project by ten days.

In all the project took 59 days, seven of which were spent in the field. However only one day was spent actually field-checking geological information due to inclement weather and non-availability of a helicopter.

2. REGIONAL SETTING

Prior to the present study, the only regional mapping carried out in the area was over the northern half, this information being published by Barton et. al. (1966) as the Mackintosh One Mile Geological Map. Only the Precambrian (Gee et. al., 1970) and Permian (Gee and Burns, 1968) appear to have been mapped in any detail. Other published information is contained on the Burnie 1:250 000 Geological Sheet (Williams and Turner, 1974).

Little if any mapping has been carried out in the southern half of the area. The only published information is contained on the Queenstown 1:250 000 scale Geological Sheet (Corbett and Brown, 1976).

Rocks of the Precambrian Tyennan geanticlinal nucleus outcrop in the central and southern portions of the area. They consist of deformed, predominantly interbedded, siltstone and orthoquartzite sequences that have been metamorphosed to a maximum of upper greenschist facies. Minor occurrences of calc-silicate rocks are reported from the area (Alcoa pers. com.).

Three periods of regional metamorphism, and two phases of deformation are attributed to the Frenchman Orogeny of Upper Proterozoic age (Spry, in Spry and Banks, 1962) which formed a rifted trough to the west (the Dundas Trough).

The Precambrian is overlain, apparently unconformably, by the eastern correlates of the Cambrian-age Mt. Read Volcanics, consisting mainly of quartz and quartz-felspar porphyries, with occasional sedimentary intercalations and intrusive porphyry bodies. Apart from minor fracturing and faulting those rocks do not appear to be greatly deformed.

The Cambrian rocks are unconformably overlain by the Ordovician Junee Group correlates, namely the Owen Conglomerate and Gordon Limestone.

These rocks occupy a trough formed by orogenic movements at the close of the Cambrian (Jukesian Faulting and Folding).

Following the Benambran Orogeny at the end of the Ordovician, the Siluro-Devonian clastic and argillaceous sediments of the Eldon Group correlates were deposited. Towards the close of the Devonian, these were deformed by the Tabberabberan Orogeny, which was followed by the emplacement of the Granite Tor (and other) batholiths. The intrusives are typically two-phase with an early adamellite followed by a later granite phase. (Spry, in Spry and Banks, 1962).

Following the emplacement of the granites there followed a long period of erosion which ended with the deposition of a thick Permian freshwater sequence. This can be seen to outcrop in the central-eastern portion of the area in the vicinity of Mount Inglis, where it unconformably overlies the Precambrian and probably part of the Granite Tor Batholith. These rocks are part of the Upper Carboniferous-Permian-Triassic Parmeener Super-Group.

The northern portion of the area is partially obscured by Tertiary plateau basalts. Much of the eastern portion of the area was subjected to glaciation during the Pleistocene, and extensive fluvial and moraine deposits of varying thickness cover much of this area.

3. RESULTS OF THE PHOTOGEOLOGICAL STUDY

3.1 INTRODUCTION

Only the geology of the Precambrian and Cambrian sequences, together with the Granite Tor Batholith, are discussed in detail in this section. The remaining units have been adequately described by other authors, and this study has merely clarified minor discrepancies concerning their geological contacts, stratigraphy and structure.

3.2 STRATIGRAPHY

3.2.1 Precambrian Tyennan Group

By extrapolating the mapping of Gee et. al. (1970) north-east of Granite Tor into the remaining southern and western portions of the area, it proved possible to differentiate the various rock types on the aerial photographs. As was to be expected the quartzites displayed a positive relief whilst the pelitic rocks generally exhibited flat to negative relief. A detailed traverse of a ridge east of Sophia Peak confirmed that these criteria were correct. The only exception to the abovementioned criteria were found in areas of extensive, but thin glacial cover; where the lithotypes were so finely interbedded that differentiation would only lead to excessive detail; and along the western margin of the Tyennan Block (Nucleus) where the rocks were found to be very strongly deformed and silicified, i.e. at Alexandra Hills and by inference the rocks to the south, and also in the region of Mt. Romulus and Romulus Pup.

The photogeological mapping showed that the quartzites and pelites generally occur in approximately equal proportions throughout the area, with the only really thick individual sequences occurring northeast of Granite Tor. Individual units ranged from tens of metres to approximately 500m in thickness. Bedding was interpreted to be vertical to steeply north-and northwest-dipping, with local overturning in places. The stratigraphy south-southeast of Granite Tor is complex due to strong deformation.

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The rocks in general display a northeasterly strike throughout the area which tends to become northerly approaching the edge of Tyennan Block in the west. This deflection is interpreted to be due to a massive, obscured basement fault along the western edge of the block. Folding is isoclinal, and because of the lack of well-exposed fold closures, the indicated anticlines and synclines are speculative in places.

Gee et. al. (1970) report that metamorphic grade ranges up to greenschist facies, although metamorphic assemblages range from garnet schist in the northeast, outside the study area, to phyllite in the southwest. Pelitic rocks observed in the area were quartz-mica schists and phyllites, while the quartzites seen by the author, and also reported by Gee et. al. (1970) are either well-bedded and platy or schistose quartzites. Generally the thinner the quartzite unit the more schistose it is. Although not recognisable on the aerial photographs, calc-silicate rocks have been reported (Alcoa - pers. comm.) to outcrop near the southeastern contact of the granite along the upper reaches of the Bluff River.

Gee et. al. recognised three schistositities and two generations of folding within the Precambrian north of Granite Tor, viz:

- S₁ - bedding foliation
- S₂ - crenulation schistosity (largely obscures S₁)
- S₃ - strain-slip cleavage
- F₁ - initial metamorphism (pre-kinematic)
- F₂ - second phase metamorphism (syn-kinematic)

It was not possible to differentiate between S₁ and S₂ on the aerial photographs, though S₃ could be recognised in certain areas in the northeast and west.

3.2.2 Cambrian Volcanic Sequence (Mt. Read Volcanics and Correlates)

Apart from the Murchison Volcanics in the southwest, these rocks were not differentiated apart from what was indicated on the Mackintosh One Mile Geological Sheet. Small reported porphyry intrusions were recognised with difficulty in the area immediately west of Mount Romulus. Layering was also noted in the volcanics north and west of Mount Remus as were two distinct vegetation anomalies which possibly may be caused by sulphides (pyrite?) within the rocks. Though no comparison is inferred, the vegetation anomalies are similar in appearance to those associated with the pyritic horizons within the Que River Volcanics near the Que River deposit.

3.2.3 Granite Tor Batholith

A biotite-muscovite granite sample from this body was dated at 355my by McDougall and Leggo, (1965). This puts its age as early Carboniferous, however this author considers that the adamellite phase will date as late Devonian. This will conform with dates from other granites in the region, namely the Heemskirk and Meredith Granites. (McDougall and Leggo, 1965; Brooks 1966).

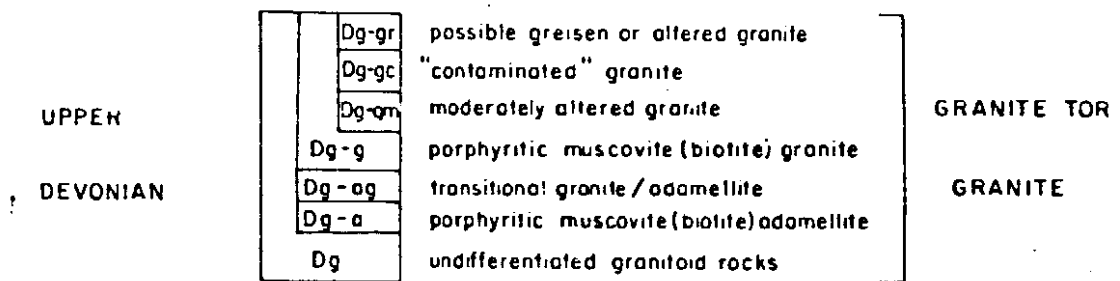
Though the Granite Tor Batholith is reported as a biotite-muscovite granite by McDougall and Leggo (1965), petrological work done by Pontifex and Associates (1979) for Alcoa shows that both adamellite and granite occur, together with a transitional granitoid of intermediate composition.

Using the location of these petrological descriptions as a guide, an attempt was made to differentiate the batholith into its various phases. Results from a contemporaneous geophysical interpretation project of airborne magnetic and scintillometer data were also integrated into this differentiation study (see Appendix 11). An approximate differentiation was attempted using the 1:40 000 scale black and white photography, however a later study of the 1:20 000 colour aerial photographs gave a more satisfactory breakdown.

Following a very brief investigation of the granite types in the field, it was considered that the granitoids could be differentiated on the basis of fine fracture patterns. The adamellites have predominantly northerly-trending fractures, whilst the granites display very intense northeast- to easterly-trending fractures. Colour, tone and vegetation were found to display insufficient variation between granitoids to be used successfully as differentiation criteria. These results are consistent with photogeological studies carried out by Hunting's on other West Coast batholiths. It should be pointed out that contacts within the granite are only inferred, and in many cases the latter will be found to be transitional when investigated on the ground.

Modelling studies using the airborne magnetic data suggests that the batholith as a whole has a moderate dip to the north. Photogeological evidence would agree with this, however there is a suggestion that the southern contact may be vertical or even dip to the south at the surface. Though a geophysical model was not compiled for an east-west plane, the photogeological evidence suggests the contacts may dip moderately to steeply west. This is particularly apparent along the contact east of High Tor, and is further backed up by the geophysical and photogeological evidence for the alteration and possible greisenisation of the Pre-cambrian rocks between High Tor and the Alexandra Hills.

Based on petrological and photogeological evidence, the granite has been sub-divided as follows:



The granites as described by Pontifex (1979) consist of "essentially quartz and microperthitic potash felspar with subordinate

oligoclase plagioclase, minor to accessory biotite and muscovite. Microcline is absent. The microperthitic potash felspar forms greater than 60% of total felspar".

The division between moderately-altered (Dg-gm) and unaltered granite (Dg-g) was based on a combination of petrological, geophysical and photogeological criteria. The moderately altered granite has a pale fawnish tone and also displays more intense fracturing on the coloured aerial photographs. Alteration is confined to minor sericitisation of the plagioclase felspar with minor chloritisation of the biotite. Alteration regarded by Pontifex to be supergene was not included in the altered granite subdivision.

The criteria used to differentiate the contaminated granite (Dg-gc) were based on the photogeological extrapolation of a field observation noted by the author on the southern flank of Granite Tor. This rock type was recognised by Klominsky (1972) at the top of the Heemskirk Granite and was found to be an impure granite with only partially assimilated roof material. The inference from this observation is that the granite has only just been unroofed at the top of Granite Tor. A remnant block of roof can be seen 2kms west of Granite Tor.

The indicated possible greisen or altered granite (Dg-gr) is based purely on photogeological evidence, and relies on experience gained in photogeological mapping over both the Meredith and Heemskirk Granites, where strongly tourmaline-altered granites exhibited a similar morphology and vegetation pattern. As none of the indicated areas were visited by the author, and also as no petrological description is available, it should be emphasised that these are only tentative identifications, which may prove spurious on field investigation. Another possibility is that they could represent a fine-grained micro-granite phase.

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The adamellite suite (Dg-a) has "essentially the same composition with variation in minor phases as in the granites, but is distinguished on the basis of feldspar abundances, i.e. where potash feldspar forms 40% and 60% of the total feldspar". Pontifex (1979).

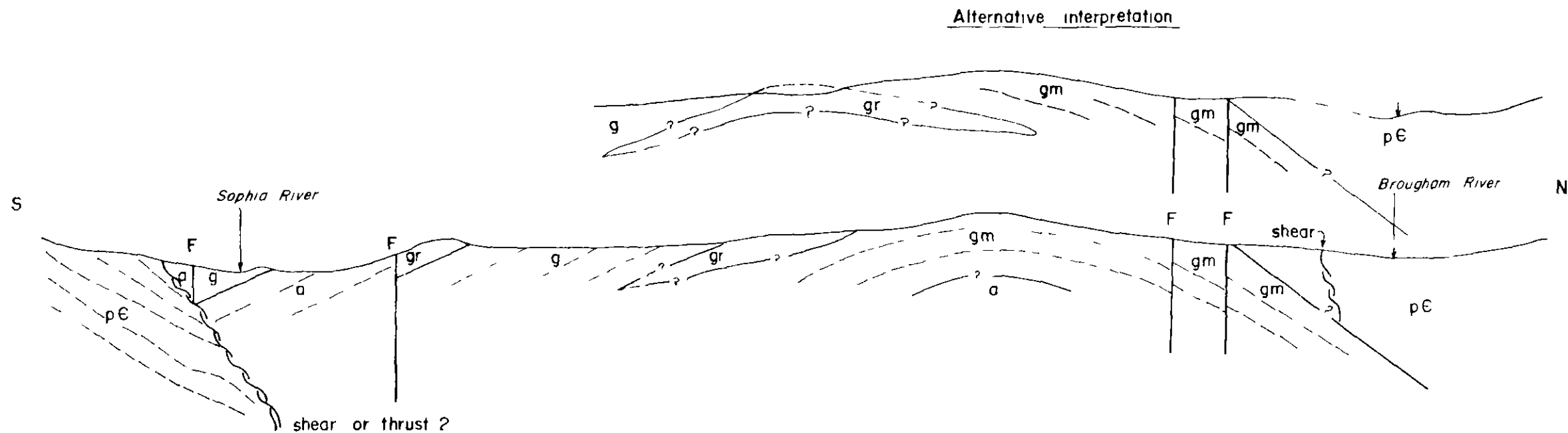
Although the Granite Tor Batholith is similar and contemporaneous with the Heemskirk and Meredith Batholiths, in that they all appear to be two-phase, (granite intruding adamellite), layered intrusives, the former differs in that there appears to be very little tourmaline alteration. In the Heemskirk and Meredith Batholiths, tourmaline veins and nodules are almost ubiquitous in the upper levels; in the case of the Heemskirk granite, tin mineralisation is always associated with quartz-tourmaline-topaz veins or tourmaline breccia pipes, within or near microgranite. Minor microgranite was noted south of Granite Tor and north of the Bluff River, although no tourmaline alteration was seen in the field by the author.

The photogeological and geophysical studies have significantly altered the known outcrop extent of the batholith. Additional granitoid rocks are interpreted to exist in the central-southern, southeastern and eastern portions of the area; in all these localities the outcrop may be thin remnants of roof material. The latter appears to be the case for the southern-central area. Suggested internal morphologies of the Granite Tor Batholith are shown in the cross sections in Figure 3.

3.3 STRUCTURE

The main fracture direction is oriented N to NNW with secondary directions trending WNW and ENE. Only the northerly-trending fractures and faults appear to post-date the granite emplacement, as they are seen to displace the granite. This direction is also the main orientation for fracturing within the granite.

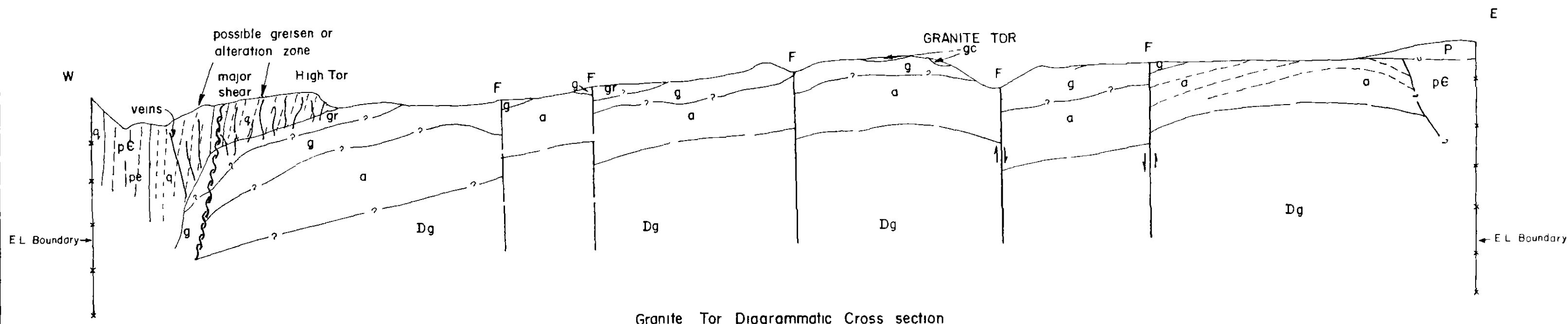
The other two directions pre-date the granite. The ENE direction, which is parallel to the main bedding and cleavage in the Precambrian,



Diagrammatic section through far western portion of
Granite Tor Batholith

Scale 1 40 000 (vertical = horizontal)

5 cm



Granite Tor Diagrammatic Cross section

appears to have been reactivated following granite emplacement, as it is the main fracture direction within the granitic phase of the batholith.

Major northerly-trending faults can be seen in the Precambrian to the west of the granite; two other such faults displace the batholith into three separate blocks east of Granite Tor. The former faults are sub-parallel to the edge of the Tyennan Block, and were probably initiated during rifting at the close of the Precambrian. The faults have been reactivated at various times up to at least early Carboniferous since they fault Silurian sediments as well as the granite. The faults do not however displace the Permian in the east, though jointing parallel to this direction can be traced through the latter.

Fold axes in the Precambrian trend NE. The style of folding is isoclinal with steep to vertical limbs and associated local overturning. Other fold axes in younger sediments are parallel to the edge of the Tyennan Block, i.e. N-trending in the Silurian in the central west and NE-trending in the Ordovician to the north.

4. ECONOMIC GEOLOGY

Only minor mineralisation is recorded from the study area. Small tin mines were located in the upper reaches of the Brougham River along the northern contact of the granite, and were also associated with quartz veins in granite near the Bluff River. Two hematite occurrences are shown on the One Mile Map in the Cambrian sediments west of High Tor and a mine working is indicated in Cambrian volcanics in the upper reaches of Fleece Creek, though the type of mineralisation is unknown. A small mine (Silver Hawk) was also located in Silurian sediments at the confluence of the Brougham River and Silver Hawk Creek. The type of mineralisation is unknown.

Specific targets resulting from this study are:

- (a) Two vegetation anomalies in Cambrian volcanics east of Fury Flats and the Reynolds Falls respectively. They resemble the vegetation anomalies seen associated with pyritic andesites near the Que River Mine, however no direct comparison is inferred.
- (b) Six distinct vegetation and topographic anomalies in Precambrian sediments. Four are between the northwest corner of the granite and Mount Romulus. Aplite and greisen veins are reported from along the northwestern contact of the granite (Alcoa - pers. comm.). As the granite is interpreted to dip moderately to the north, these anomalies could be due to alteration or greisenisation caused by the granite. Anomalous stream geochemistry results for tin and tungsten have been recorded by Alcoa in streams draining from the granite and sediments in this area.

A large area, with anomalous vegetation consisting of dense low scrub, and an outcrop pattern interpreted to be possibly due to alteration or greisenisation, was noted on the aerial photographs to occur in Precambrian sediments along the western contact of the granite, in the vicinity of High Tor.

The associated geophysical study delineated an area of potassic alteration occurring over this same area.

Another very small vegetation anomaly similar to the above was noted 1½kms west of Sophia Peak.

- (c) Three zones of possible greisenisation or alteration were interpreted within the granite to the south and southwest. As emphasised previously these zones are only interpretations based on comparisons with other, similar granites in western Tasmania, and will need to be ground-checked to ascertain the validity of the interpretation. The westernmost zone presents the most favourable target as the overlying sediments appear to be altered. As mentioned above, a potassic alteration zone was delineated in the area during the geophysical interpretation of airborne scintillometer data.
- (d) Though not recognised on the aerial photographs, calc-silicate rocks have been reported by Alcoa to occur along the Bluff River near the small southeastern lobe of the granite. There may thus be the possibility of skarn development in this area or carbonate replacement tin lodes similar to those at Renison Bell, Cleveland and Mt. Bischoff. This could be important considering the known tin mineralisation in the granite to the east of the calc-silicates.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusions reached from this study are:

- (a) The detailed photogeological study of the Granite Tor area, using 1:40 000 scale black and white and 1:25 000 scale colour aerial photographs, together with an integrated interpretation of airborne magnetometer and scintillometer data, has resulted in the differentiation of quartzites and pelites in the Precambrian and various granitoid phases within the Granite Tor Batholith. Verification of these interpretations was limited to only one day in the field due to inclement weather and non-availability of a helicopter.
- (b) The Precambrian Tyennan Block consists of interbedded quartzite and pelite units that have been metamorphosed to a maximum of upper greenschist facies within the study area. These beds, after deformation, metamorphism and rifting, were overlain to the west by correlates of the Cambrian Mt. Read Volcanics, the Ordovician Owen Conglomerate and Gordon Limestone. The Precambrian was intruded during the late Devonian-early Carboniferous by the Granite Tor granite/adamellite.

Following erosion, the flat-lying Permian sediments at the base of the Parmeener Supergroup were deposited in the west. Much of the northern portion of the area was covered by Tertiary flood basalts. Finally the eastern portion was glaciated during the Pleistocene, covering large areas in superficial glacial deposits of variable thickness.

- (c) Three main fracture direction were noted. One pre-dates granite emplacement (trending N or NNW), while the remaining two were post-emplacment (trending WNW and ENE). At least four periods of deformation are known from the study area.

- (d) Minor potential exists for possible Que River-type base metal mineralisation at two locations within correlates of the Mt. Read Volcanics.

It is recommended that all vegetation anomalies together with indicated greisen/alteration zones be investigated on the ground. The area around the northwestern contact of the granite with the sediments also warrants careful investigation because of the interpreted shallow dip of the northern and western contacts of the granite.

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APPENDIX 1 - LIST OF AERIAL PHOTOGRAPHSGRANITE TOR AREA - LIST OF BLACK AND WHITE AERIAL PHOTOGRAPHS

Scale of photography: 1:40 000

Source: Tasmanian Lands Dept.

Type: Black and white contact prints 23 x 23 format.
Glossy, unglazed, double weight.

Forward overlap: 60%

Side overlap: 20%

Topo sheet: Sophia 1:100 000 (8014)

Alcoa 1:40 000 drainage base.

Negative No.	Date of Photo	Run No.	Print Nos.	No. of Photos	Quality
T.679	17.4.75	1	117-120	4	Good
T.679	17.4.75	2	160-164	5	Good
T.679	17.4.75	3	6-10	5	Good
T.679	17.4.75	4	102-108	7	Good
T.679	17.4.75	5	56-62	7	Good
T.679	17.4.75	6	41-47	7	Good
T.679	17.4.75	7	224-228	5	Good
Total				40	

GRANITE TOR AREA - LIST OF COLOUR AERIAL PHOTOGRAPHS

Scale of photography: 1:20 000
 Source: Tucana Air Systems
 Type: Colour contact prints, 23 x 23 format.
 Glossy, unglazed, double weight
 Forward overlap: 50-60%
 Side overlap: 15-20%
 Topo Sheet: Sophia 1:100 000 (8014)
 Alcoa 1:40 000 drainage base

Negative No.	Date of Photo	Run No.	Print Nos.	No. of Photos	Quality
TAS. 700105	19.1.79	2	022-030	9	Good
TAS. 790105	19.1.79	3	037-043	7	Fair
TAS. 790105	22.1.79	4	102-109	8	Good
TAS. 790105	22.2.79	5	075-082	8	Good
TAS. 790105	22.1.79	6	089-096	8	Good
Total				40	

APPENDIX B :
GRANITE TOR AREA GEOPHYSICAL INTERPRETATION
BY HUNTING GEOLOGY AND GEOPHYSICS



Our Ref. DNH/bg/2/80

Your Ref.

Postal Address: P.O. Box 365,
Fyshwick, A.C.T. 2609

Business Address: CentreCourt,
1 Pirie Street,
Fyshwick, A.C.T. 2609
Telephone (062) 80 4277
Telex 62677
Telegrams: Astereo Canberra

APPENDIX II

14th January, 1980

Mr. D.C. Speijers
Alcoa of Australia Limited
Exploration Division
Murdoch House
5, The Esplanade
MOUNT PLEASANT W.A. 6153

Dear Mr. Speijers,

GRANITE TOR AREA
GEOPHYSICAL INTERPRETATION

Please find below my Letter Report discussing the results of the geophysical study of the Granite Tor Area, Tasmania. The project was completed in four days in December 1979.

On the basis of my interpretation, four main areas for ground follow-up are recommended:

- (i) The interpreted "lobes" of granite to the southeast of the main granite body.
- (ii) The major K-rich zones interpreted in the centre and southeast of the granite.
- (iii) The interpreted potassium alteration along the northwestern contact of the granite.
- (iv) The major east-northeast-trending fault zone to the north of the granite particularly where it affects the granite contact.

Ground follow-up should, if possible, include the use of a magnetometer and scintillometer, providing access is available, as both instruments are likely to provide data which will aid in differentiating between granite types and in defining zoning away from the granite contact.

.../...

APPLIED GEOLOGICAL SERVICES

Specialist interpretation of Imagery, Aerial Photography and Geophysical data
Integration of Geochemical data in Association with N. J. Marshall & Associates

1. Introduction

An interpretation of helicopter-borne magnetic and spectrometric data from the Granite Tor area of western Tasmania was undertaken on behalf of Alcoa of Australia Limited, by Hunting Geology and Geophysics (Australia) Pty. Limited. The objectives of the study were to assist in the production of an accurate photogeological map of the prospect area, to attempt to differentiate between granite types on geophysical grounds and to define major structural features affecting the granites.

The geophysical study was required to be subordinate to a concurrent photogeological study and was completed in a total of four days including reporting. Given this constraint, the geophysical study took the form of a rapid scan of analogue magnetic and spectrometric records and of a magnetic contour map.

The results of the study are presented in the form of an interpretation map of magnetic and spectrometric data at 1:40 000 scale, and an interpreted north-south cross-section through the centre of the granite.

The granite itself is interpreted to form a thick north-dipping prism having an irregular outcrop pattern controlled by north-west, north-east and east-northeast structural directions. Differentiation within the granite is reflected mainly by variations in spectrometric data.

2. Discussion of Results

2.1 Model Study

The initial stage in the geophysical study took the form of an attempt to model the dip of the granite contact at its northern and southern extremities. The model adopted was that of a "step contact" having the following constraints:

Total field intensity:	62626 nano Teslas
Total field inclination:	-71.5°
Recording height:	150m above model
Strike of Contact:	Geographic east-west
Thickness of intruded sequence:	Varied from 500 to 2,500m
Dip of contact:	Varied from 15° north to 15° south
Susceptibility contrast:	Varied from 1×10^{-4} to 3×10^{-4} cgs units

Only north-south profiles were considered and the model dimensions were scaled to approximate those of the granite outcrop. In order to minimize the effect of magnetic horizons in the metasediments adjacent to the granite, a composite magnetic profile was constructed and model results fitted to this profile.

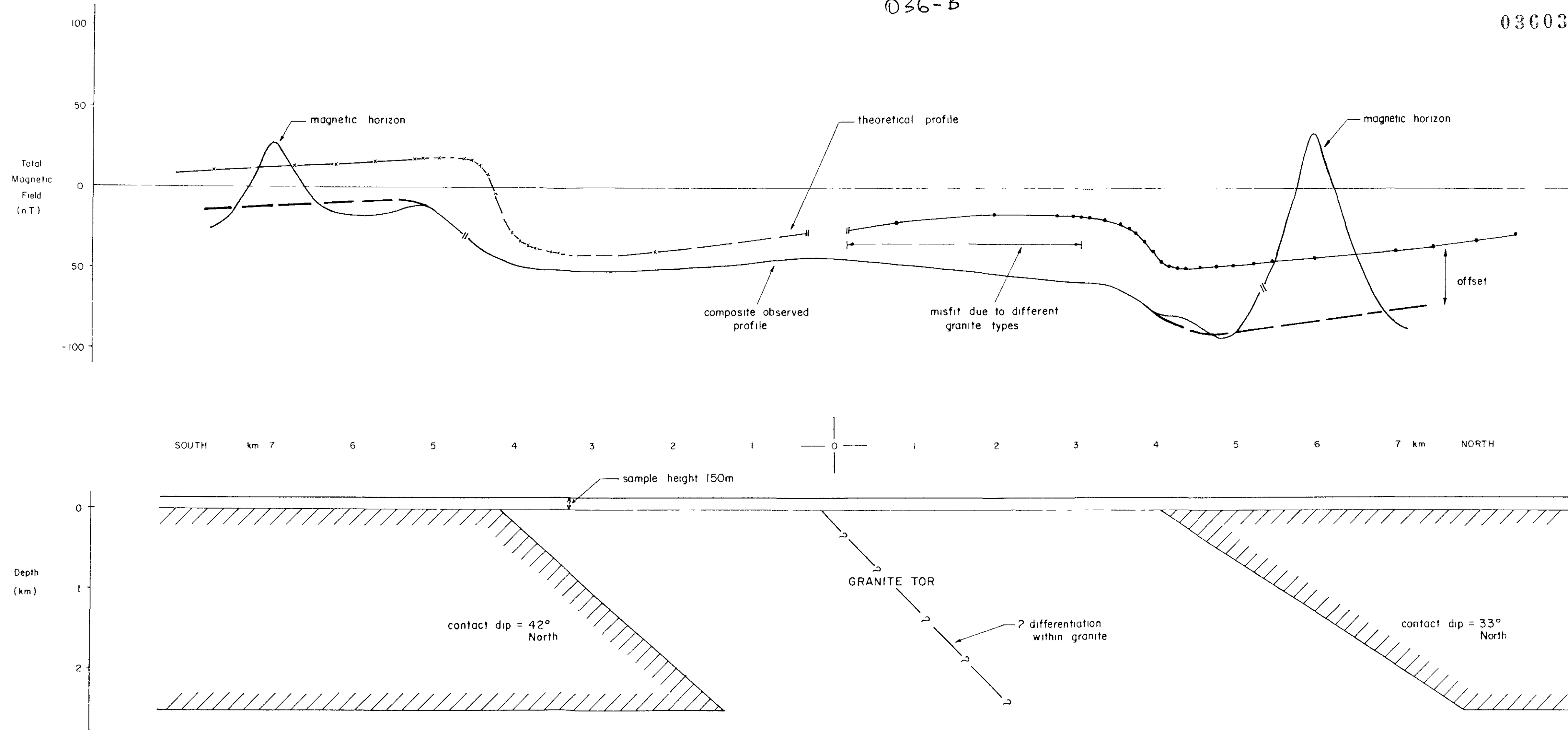


Figure 1 GRANITE TOR AREA, TASMANIA
Magnetic interpretation
MODEL RESULTS

It is stressed that no attempt has been made to rigorously match the model and field data, for example by an iterative curve-matching technique, as this was beyond the scope of the commissioned project. The resultant model and corresponding theoretical profile are considered however to represent a good approximation to the observed data (see Figure 1).

2.1.1 Northern Contact

The following model parameters were found to yield the best approximation to the contact anomaly:

- (a) Thickness of intruded sequence = 2,500m
- (b) Dip of contact = 33° north
- (c) Susceptibility contrast = 1×10^{-4} cgs units

The model data fit the observed data quite well (see Figure 1) except for a broad negative magnetic gradient across the northern half of the granite outcrop. This was considered likely to be due to differentiation within the granite, and was studied in the second stage of the interpretation.

2.1.2 Southern Contact

The model results at this contact were less satisfactory than those at the northern contact due to the interfering effects of adjacent magnetic horizons within the intruded metasediments. A more complex model would undoubtedly account for the observed differences. The final model had the following parameters:

- (a) Thickness of intruded sequence = 2,500m
- (b) Dip of contact = 42° north
- (c) Susceptibility contrast = 1×10^{-4} cgs units

2.2 Conclusion

The form of the granite in north-south cross-section, predicted from the model study, is that of a large north-dipping prism. This result is in good agreement with geological mapping at the northern contact, however the southern contact has been mapped as dipping to the south. This apparent contradiction may be overcome by the granite dipping south to shallow depth before turning to a northerly dip.

The eastern and western granite contacts were not investigated during this study; the eastern "contact" because the granite appears to continue east beneath Permian cover, out of the study area, and the western contact because of the interfering affect of a strongly magnetic north-northeast-trending magnetic horizon. This horizon is interpreted to dip steeply to the north-west however, and may reflect a similar dip in the granite contact.

3. Study of Analogue Records

3.1 Magnetic data

The granite body forms a distinctive and characteristic "flat" magnetic zone on the magnetic contour map (Alcoa of Australia Limited, Plan iv). Differentiation within the granite, as suggested by the model study, proved difficult to assess from the analogue records owing to the relatively coarse recording scale. Northwest- and northeast-trending boundaries were recognised however and correspond closely to spectrometric boundaries.

Other features of the magnetic data are:

- (i) Relatively small susceptibility contrast between the granite and Precambrian metasedimentary country rock, reflected in the low amplitude anomalies associated with these contacts.
- (ii) Clearly defined folded northeast-trending magnetic horizons within the metasediments to the southeast of the granite.
- (iii) A strongly magnetic north-northeast-trending horizon along the western margin of the granite, apparently related to basalt intruded into a major fault zone sub-parallel to the Henty Fault.
- (iv) Areas of basalt flows reflected by intense anomalies of short and variable strike length, to the north of the granite.
- (v) Two magnetic horizons bisected by a major east-northeast-trending fault zone to the north of the granite. These horizons are sufficiently close together that their magnetic anomalies appear as one anomaly on the magnetic contour map. They were differentiated from the analogue records.
- (vi) Northeast, northwest and east-northeast-trending faults which clearly affect the interpreted outcrop pattern of the granite. In particular a northwest-trending "horst-type structure has been hypothesized across the centre of the granite.

In interpreting the sub-crop pattern of the granite body, two "lobes" were outlined at the southern contact. These are apparently controlled by faulting, and require field checking to determine their extent and relative importance to the location of mineralisation.

The magnetic interpretation north of the granite outcrop area was restricted to rapid delineation of the contact between the Mount Read Volcanic equivalents and the Gordon Limestone/Owen Conglomerate.

3.2 Spectrometric Data

The spectrometric data was in the form of four-channel analogue records of total count, potassium, uranium and thorium radioactivity. The exact "window" widths and setting for each of these channels were not made available to the interpreter.

The objective in studying the spectrometer data was to assess whether the different rock types in the area, particularly different granite types, could be differentiated on the basis of their differing radioactivity. It should be noted that the relatively small detector crystal volume (255 cubic inches) and the height at which the survey was flown (500 feet) made the task relatively difficult, particularly as the rugged terrain resulted in considerable variation in height of the helicopter above ground.

The major features of the spectrometer data were:

- (i) Zones of quite variable potassium radioactivity, particularly within the granite. On the basis of this variation the granite was sub-divided into zones considered likely to reflect differing granite composition. The most significant of these appears to be a northeast-trending zone crossing the centre of the granite outcrop. In the centre of this zone is a smaller area, possibly extending also to the southeast which is apparently considerably enriched in potassium. A rock-chip sample (12207) taken from this area has a higher percentage of K-felspar than any other known to the interpreter to have been taken on the granite. There is a partial correlation between areas exhibiting increased potassium activity and outcrop of adamellite, however this association is not completely clear and will require field checking. The two small areas of major potassium activity lie within the northwest-trending "horst-type" structure interpreted from the magnetic data.
- (ii) A zone of increased potassium activity adjacent to the north-western contact of the granite, and coinciding partially with weakly magnetic horizons within the intruded metasediments. This zone, which is probably considerably affected by faulting, is interpreted to reflect contact metamorphism and as such may be an important locus for mineralization.
- (iii) Zones of increased thorium activity, apparently associated with basalt intrusives and flows. These zones lie to the north of the granite and their significance has not been determined. The possibility that they may be associated with some form of base metal mineralisation should be checked during routine ground follow-up exploration.

4. Conclusions

This brief study of geophysical data over the Granite Tor Area was commissioned by Alcoa in order to assess whether differentiation within the granite body, and structural features controlling it could be delineated.

It is considered that by combining a study of both the magnetic and spectrometric data, the objectives have been broadly achieved.

The granite is interpreted to form a broadly north-dipping prism-shaped body, the eastern contact of which has yet to be defined,

040

and the western contact of which may dip steeply to the northwest. In detail the shape of the granite is controlled by northwest, northeast and east-northeast faulting, and in particular a northeast-trending zone and intersecting northwest-trending "horst-type structure" may define areas of different granite composition. An interpreted contact zone at the northwestern margin of the granite is considered a priority target for ground follow-up exploration.

I trust that the above report and accompanying interpretation map meet your requirements and look forward to any comments which you may have.

Yours faithfully,
HUNTING GEOLOGY AND GEOPHYSICS (AUSTRALIA) PTY. LIMITED

D.N. Hopgood
(Geophysicist)

c.c. Mr. P. Rix (Exploration Manager)

Encl.

APPENDIX C:
RESULTS OF STREAM SEDIMENT SAMPLING

LIST OF ABBREVIATIONS

Am	amphibole	Pg	pigeonite
An	andalusite	Py	pyrite
Ap	apatite	Qz	quartz
At	anatase	Rt	rutile
CaS	calc-silicate rock fragments	Sap	sapphirine
Cl	chlorite	Sch	scheelite
Cm	cummingtonite	Sl	sillimanite
Cs	cassiterite	Sn	sphene
Cz	clinozoisite	Sp	spinel
Dp	diopside	Sr	staurolite
Du	dumortierite	Tm	tourmaline
Ep	epidote	Tp	topaz
Eu	euclase	Tr	tremolite
Go	goethite	Uk	unknown high R.I. mineral
Gt	garnet	Zc	zircon
Gt(sk)	garnet (skarn-type, Ca-Fe)	Zs	zoisite
Hb	hornblende	X	below limit of detection
Hm	hematite	-	insufficient sample
Id	idocrase	()	minor mineral
Il	ilmenite	H.M.	heavy mineral
Ky	kyanite	AMG	Australian Metric Grid
Li	limonite	XRF	X-ray fluorescence
Lx	leucoxene	AAS	atomic absorption spectrometry
Mc	mica	/	and/or
Mt	magnetite		
Mz	monazite		
Op	opaques (mainly ilmenite)		

FINE FRACTION STREAM SEDIMENT (-355 μm)																					
Sample Number	A M G CO-ORDS	Total Wgt (gms)	Percent HM	HM MINERALOGY (In order of abundance)					XRF ANALYSES OF HM								AAS ANALYSES OF HM				
				DOM >60%	MAJOR 30-60%	MINOR 10-30%	ACCESSORY 1-10%	TRACE < 1 %	Al ₂ O ₃	SiO ₂	TiO ₂	Fe ₂ O ₃	CaO	ZrO ₂	Sn	W	Ce	Cu	Pb	Zn	Li
17341	9284 6620	1377	0 81	Gt		Lx Il Rt Am/Px	Tm Zc Id Gt		11 1	34 2	10.8	18 3	5 9	0 95	0 009	x	0 056				
17342	9288 6636	1517	0 73	Am/Px		Lx Il Zc	Tm Rt	Gt An Sr	4 1	42 9	10 3	14 2	6 6	1 60	0 005	x	0 095				
17343	9308 6648	1389	0 53		Am/Px	Lx Il Zc	Gt Tm Rt	An	7 1	39 7	12 5	14 1	5 5	1 90	0 010	x	0 083	21	17	76	4
17344	9328 6688	1533	0 35		Lx Am/Px		Tm Rt Zc	Gt Sr													
17345	9690 6496	1537	0 78		Il/Hm Am/Px		Gt Tm	Rt Zc Gt(sk) An	9 0	39 2	9 4	17 6	4 6	1 50	0 027	x	0 064	19	21	81	6
17346	9656 6508	1556	0 50	Il		Tm Am/Px	Zc Qz	Rt Cs?	6 9	30 8	24 5	17 5	3 0	1 80	0 023	0 006	0 090	26	46	141	3
17347	9784 6558	1442	0 83	Il/Lx		Tm	Gt Zc Am/Px	Id Gt(sk) An	9 1	25 1	38 2	15 0	1 1	1 65	0 014	x	0 172	31	60	55	2
17348	9756 6636	1618	0 32		Zc	Il	Gt Tm Rt Am/Px An	Ky Sp	19 3	32 2	11 4	9 1	0 7	14 6	0 048	0 011	0 060				
17349	9756 6666	1470	0 29		Am/Px	Il	Gt Tm Zc An	Rt Gt(sk)	10 4	36 8	9 8	17 5	5 3	2 30	0 017	0 016	0 046	72	26	115	6
17350	9556 6508	1387	0 63	Am/Px	Il		Tm/Zc	Gt Rt Gt(sk) An Py	3 4	37 5	14 4	17 1	6 3	1 00	0 004	x	0 165	27	34	119	4
17351	9540 6508	1687	0 11	Il/Lx	Zc		Gt Tm Am/Px	Rt Gt(sk) At	8 6	27 5	30 4	12 9	1 9	4 00	0 197	0 022	0 422				
17352	9510 6504	1565	0 49	Am/Px	Lx		Tm Rt Zc	Gt Sr At	4 6	38 0	13 7	12 7	6 6	1 55	0 006	x	0 076	13	25	84	3
17353	9496 6508	1743	0 52	Px		Lx Il	Gt Zc	Tm Rt Gt(sk) An Sr	4 9	43 1	5 6	15 8	6 7	1 05	0 009	x	0 040	12	13	87	4
17354	9420 6400	1497	0 23		Am/Px	Lx Il Tm Rt Zc	Ep	Gt Id Gt(sk) At	8 1	30 8	21 8	14 2	4 1	2 40	0 006	0 010	0 234				
17355	9416 6396	1465	0 52		Lx/Il/Hm	Gt Tm Zc Gt(sk)	Rt Am/Px	Id Ky Py	14 9	30 3	18 5	25 1	1 9	1 20	x	x	0 156	38	43	68	7
17356	9424 6444	1519	1 12		Hm/Lx	Gt(sk)	Gt Tm Zc Am/Px Ky Mc	Rt Py	13 1	28 5	12 7	31 4	1 8	1 25	0 005	0 014	0 169	40	32	66	8
17357	9276 6502	1476	0 14		Lx Zc		Gt Tm Rt Am/Px Ep	Ky Py	9 0	31 4	27 9	9 7	2 6	4 35	0 019	0 018	0 406				
17358	9260 6506	1348	0 35		Op Px		Tm Rt Zc	Gt Gt(sk) An Sp Py	5 8	38 7	19 5	13 5	4 5	1 55	0 015	0 016	0 437	19	81	110	4
17359	9226 6594	1521	0 36		Lx	Gt Rt Am/Px	Tm Zc Mc	Ep Ky An Eu Py	12 6	36 0	21 1	16 0	3 0	0 65	0 021	0 012	0 221	26	42	84	6
17360	9124 6626	1610	0 18	Lx		Zc	Tm Rt Am/Px	Gt Py	7 7	29 9	29 2	17 7	0 9	3 80	0 004	x	0 294	57	160	137	3
17361	9120 6664	1529	0 47	Lx		Zc	Tm Rt Am/Px	Gt Ep Sr At	7 0	29 0	47 1	6 5	1 6	2 45	0 014	x	0 262	12	69	40	2
17362	9124 6688	1667	0 12	Lx		Hm Tm	Rt Zc Am/Px	Gt Gt(sk) An													
17363	9160 6684	1650	0 18	Am/Px		Lx Zc	Hm Gt Tm Rt	An Py	6 4	42 0	10 0	16 4	5 9	2 00	0 042	0 020	0 079	23	11	76	5
17364	9142 6642	1659	0 39	Px			Op Gt	Tm Rt Zc Ep An	5 8	43 7	8 1	16 5	5 7	0 90	0 121	x	0 068	10	12	87	5
17365	9092 6676	1550	0 05	Lx/Qz			Am/Px	Gt Tm Rt Zc An At Qz	5 8	36 3	41 7	5 0	1 0	1 10	0 070	0 008	1 22				
17366	9084 6672	1550	0 21		Lx Am/Px		Gt Tm	Rt Zc Ep	4 4	39 8	25 5	11 9	3 8	0 95	0 034	x	0 330	15	36	120	3
17367	9052 6670	1528	0 20	Lx		Am/Px	Tm Zc	Gt Rt An	7 3	38 7	25 1	9 0	3 0	1 30	0 013	0 009	0 432	19	35	63	3
17368	9012 6692	1628	1 38		Lx Am/Px		Gt Qz	Tm Rt Zc	5 4	44 5	15 3	13 4	4 8	1 35	0 033	0 006	0 105	10	12	70	3
17369	8956 6788	1611	0 55	Mt/Hm		Rt Zc		Gt Tm Am/Px Ep Py	3 3	13 6	22 3	45 4	0 6	3 90	0 006	0 017	0 113	45	170	940	7
17370	8936 6912	1537	0 29	Lx/Hm		Zc Am/Px	Tm	Gt Rt An At Py	5 7	31 2	32 0	15 9	1 2	2 25	0 013	0 008	0 278	59	95	220	3
17371	8926 6804	1401	2 14	Px			Op	Gt Tm Rt Zc Ep At	4 8	46 3	2 3	18 7	7 6	0 55	0 037	x	0 061	21	27	92	5
17372	8972 6812	1536	0 42	Lx/Qz			Zc Am/Px	Gt Tm Rt Ep	5 7	38 5	39 6	5 5	1 2	0 60	0 008	0 012	0 142	28	21	33	3

043-A

043-B

03604

Sample Number	A M G CO-ORDS	FINE FRACTION STREAM SEDIMENT (-355 μ m)																			
		Total Wgt (gms)	Percent HM	HM MINERALOGY (In order of abundance)					XRF ANALYSES OF HM									AAS ANALYSES OF HM			
				DOM >60%	MAJOR 30-60%	MINOR 10-30%	ACCESSORY 1-10%	TRACE <1%	Al ₂ O ₃	SiO ₂	TiO ₂	Fe ₂ O ₃	CaO	ZrO ₂	Sn	W	Ce	Cu	Pb	Zn	Li
17287	9280 6870	1772	1 29		Gt Tm	Il Lx Rt Am/Px		Ep Sn Gt(sk) Ky Eu Ap	14 9	33 0	14 9	18 5	2 7	0 64	0 006	0 009	0 145	19	22	56	5
17288	9300 6860	1420	0 27		Rt	Lx Zc Px		Gt(sk) Qz	8 1	28 0	44 4	4 3	1 0	2 20	0 038	0 040	0 160	31	220	60	2
17289	9308 6870	1488	0 28		Tm Rt Am/Px		Gt Tm	Gt	9 9	30 6	33 5	5 6	1 9	2 05	0 007	0 022	0 250	1040	32	395	2
17290	9356 6860	1298	0 40		Lx	Tm Rt	Lx Zc	Gt Zc Am/Px Sl Ky	11 4	29 6	44 4	2 6	0 2	1 10	0 007	0 015	0 409				
17291	9380 6852	1614	0 61		Tm	Lx Gt Rt Px Am	Zc	Gt(sk)	12 6	31 9	15 1	14 8	2 1	1 45	0 006	0 006	0 122	137	37	78	5
17292	9368 6876	1244	0 75		Tm Rt	Lx Am/Px	Gt Zc Gt(sk)	Ep Id At	10 9	25 2	46 0	5 0	1 4	1 70	0 007	0 017	0 207	36	27	48	2
17293	9352 6886	1801	0 78		Lx Tm	Rt Zc Am/Px	Gt	Gt(sk) At	13 5	33 5	15 7	8 3	1 8	1 42	0 006	0 006	0 177	16	17	48	2
17294	9406 6868	1445	1 50		Rt	Il Lx Tm Am	Gt Zc Id Gt(sk)		13 8	33 0	18 4	13 1	5 0	0 65	0 007	x	0 083	13	20	63	6
17295	9406 6856	1586	0 40		Gt Rt	Lx Tm Am/Dp		Zc Id Gt(sk) Eu? Du?	14 4	27 1	14 4	20 2	2 6	0 80	0 005	x	0 074	25	19	59	5
17296	9326 6892	1217	0 81		Tm Rt	Lx Gt Am/Px		Zc Id Gt(sk) Ky	12 3	28 2	28 6	8 0	3 4	0 70	0 006	x	0 234	132	19	76	4
17297	9326 6908	1289	0 43		Lx Am/Px	Gt Tm Rt		Zc Cz Gt(sk)	9 8	30 2	30 0	7 8	2 3	0 80	0 007	0 015	0 336	41	26	64	4
17298	9276 6890	1440	0 64		Lx Gt	Tm Rt Px	Zc Gt(sk)	Mc	11 2	27 8	21 6	15 3	2 2	0 55	0 008	0 011	0 230	15	31	52	6
17299	9282 6990	1345	0 54		Lx Am/Px	Gt	Tm Rt Zc Gt(sk) Qz	Ep	13 5	32 3	26 8	12 4	0 8	1 10	0 010	0 014	0 278	370	86	185	6
17300	9272 6980	1345	0 77		Gt	Op Tm Rt Px		Zc Ep Mc Gt(sk)	15 3	32 5	25 2	17 3	1 4	0 50	0 009	0 013	0 253	57	22	44	5
17301	9296 6972	1667	0 63		Rt	Op Gt Tm Cm		Zc Eu	12 1	35 2	35 9	7 1	1 0	0 95	0 005	0 014	0 266	13	35	32	4
17302	9308 6934	1321	0 51		Gt(sk)	Lx/Hm Tm Rt	Gt Am	Zc Id Ep Mc	14 7	31 2	25 8	14 1	2 4	0 65	0 004	0 009	0 224	21	22	58	6
17303	9282 6906	1461	0 75		Lx Gt		Gt(sk) Tm Rt Zc Am/Px	Eu At	16 2	33 2	19 1	16 6	1 3	0 65	0 004	0 030	0 164	58	19	48	7
17304	9260 6876	1420	0 51	Lx		Gt Tm Rt Zc	Am/Px	Gt(sk) Eu	11 0	24 2	36 0	7 0	0 5	2 85	0 013	0 013	0 327	13	41	38	4
17305	9268 6860	1455	0 13		Rt Zc	Lx	Tm Am/Px Eu	Gt Ky	9 9	24 3	44 8	5 2	0 2	6 90	0 022	0 039	0 112				
17306	9264 6846	1594	0 13		Rt Zc	Lx		Gt(sk) An Am/Px Gt Tm Eu	8 3	25 6	36 9	8 5	0 8	7 00	0 013	0 019	0 129				
17307	9240 6852	1450	0 21		Lx	Rt Zc	Gt Tm Am/Px	Gt(sk) Id An Cs?	8 3	26 9	36 6	6 0	1 1	1 30	0 006	0 014	0 512	25	40	41	3
17308	9260 6802	1620	0 14		Rt Zc	Lx Am/Px	Tm	Gt Ep At	7 5	27 6	38 7	5 3	0 6	9 10	0 020	0 026	0 197				
17309	9260 6780				NOT LOCATED									NOT LOCATED							
17310	9246 6776	1435	0 56		Gt Rt	Lx	Tm Zc Am/Px	Gt(sk) Cl Id Eu	12 4	30 3	22 7	16 7	2 6	0 65	0 008	0 013	0 217	38	27	62	5
17311	9232 6832	1428	0 34		Rt	Lx Tm	Gt Zc Am/Px Qz	Mc	8 2	23 4	51 4	3 6	0 3	0 75	0 037	0 024	0 242	24	46	8550	3
17312	9232 6772	1460	0 36		Tm Rt	Lx	Gt Zc Am/Px	Mc Qz	8 9	26 5	34 6	5 0	1 0	1 30	0 030	0 010	0 144				
17313	9260 6752	1414	0 19		Zc Pg	Lx Rt	Tm	An	5 9	39 1	18 4	9 5	5 6	3 95	0 013	0 007	0 160	24	61	79	3
17314	9252 6732	1386	0 06		Lx Tm	Rt Px	Zc	Gt(sk) An Qz Py													
17315	9428 6680	1300	0 09	Zc	Rt	Lx Tm	Am/Px	Gt An Ap Py													
17316	9428 6696	1350	1 73		Am/Px Gt(sk)	Gt	Hm/Lx Tm Rt Zc Id	Ep An	12 9	36 0	6 9	17 6	7 2	0 35	x	0 014	0 017	14	20	84	9
17317	9462 6676	790	0 04	Zc	Rt		Op Tm Am/Px Qz	Gt An Py													
17318	9462 6712	1381	0 16		Rt Zc	Tm Am/Px Hm/Lx		Gt Id Gt(sk) An Sr Sp													
17319	9456 6724	1459	2 30		Gt Gt(sk)	Am/Px	Hm Tm Rt Zc	Id Sr Cs?	16 0	35 7	7 9	19 7	7 3	0 35	x	x	0 019	16	21	92	10
17320	9454 6742	1462	0 36		Gt(sk)	Gt Am/Px	Hm Tm Rt Zc Id		15 6	34 9	6 8	22 4	5 8	0 25	0 005	x	0 028	17	27	88	9
17321	9480 6750	1290	1 67		Cm	Gt Gt(sk)	Hm Rt	Tm Zc Id	17 0	33 9	9 9	24 7	6 3	0 20	0 004	x	0 031	17	14	77	8
17322	9494 6744	1274	0 43		Tm Zc	Hm/Lx Gt Rt Am/Px	Gt(sk)	Id An	13 4	32 4	15 1	11 5	3 7	2 40	0 007	0 010	0 091	12	16	52	4
17323	9520 6704	1507	1 38	Pg			Il Rt Zc	Gt Tm An	2 3	46 8	3 0	16 8	7 2	0 95	0 004	x	0 008	9	7	101	3
17324	9520 6696	1945	0 03		Rt Zc		Op Tm Am/Px	Gt An													
17325	9352 6648	1436	0 88		Gt	Hm/Lx Am/Px Gt(sk)	Tm Rt Zc	Id An	12 7	33 5	11 0	23 9	6 1	0 95	x	x	0 055	35	30	76	8
17326	9332 6672	1552	0 26	Lx		Hm Tm Rt Zc Am/Px		Gt Id	9 2	29 3	34 4	11 7	2 6	3 30	0 007	0 008	0 118	16	41	66	7
17327	9362 6732	1460	0 22		Gt	Hm Tm Rt Am/Px Il Lx	Zc Gt	Eu Sr Id Ep	11 4	26 9	30 3	20 8	3 0	1 30	0 059	0 014	0 098				
17328	9438 6646	1210	0 15	Rt	Zc	Tm	Lx	Am/Px Gt(sk) Sr An At													
17329	9376 6628	1542	0 13	Zc	Rt		Lx Tm	Am/Px Ep Gt(sk) An	9 0	28 1	32 9	8 2	2 4	9 20	0 010	0 022	0 112				
17330	9362 6620	1398	0 07		Rt Zc		Op Tm Am/Px An Qz	Id Ky													
17331	9336 6620	1443	0 13		Rt Zc		Op Tm Am/Px An		7 6	22 5	50 0	4 0	0 8	10 4	0 011	0 027	0 062				
17332	9306 6608	1495	0 21		Zc Px	Rt	Op Tm An	Gt Py													
17333	9276 6592	1387	0 20		Zc Px	Rt	Op Tm	Gt Id An Sp													
17334	9646 6780	1408	0 43		Il	Tm Rt Zc	Am/Px Ep	An	11 6	25 7	27 2	13 4	2 4	7 85	0 025	x	0 104				
17335	9666 6794	1440	0 63		Il Am/Px	Tm Zc	Rt	An At Py													
17336	9632 6796	1264	1 48		Gt Dp	Tm Rt	Op Zc Gt(sk)	Id Ky An	13 2	27 3	21 5	14 5	4 1	0 60	0 007	x	0 117	22	17	75	7
17337	9628 6788	1581	0 87	Gt		Rt An Am/Px	Op Tm Zc Gt(sk)	Id An	13 5	35 4	10 4	17 1	6 9	0 85	x	x	0 077	23	29	80	7
17338	9602 6776	1468	2 04	Gt		Rt Cm	Op Tm Gt(sk)	Zc Id	13 7	36 4	14 2	14 1	7 5	0 45	0 006	0 009	0 048	19	19	93	7
17339	9608 6774	1512	0 21	Go		Am	Gt Tm Zc Gt(sk)	Rt	5 2	20 5	8 0	43 4	2 0	1 50	0 008	x	0 078				
17340	9276 6626	1591	1 59	Px		Lx Il	Rt Zc	Gt Tm Gt(sk)	3 6	43 2	6 9	15 0	7 2	2 20	0 015	x	0 151	12	12	84	4

APPENDIX D:
PETROLOGICAL REPORT BY
CENTRAL MINERALOGICAL SERVICES

046

036047

Central Mineralogical Services



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Mr. D.C. Speijers
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3rd June, 1980

REPORT CMS 80/5/20

YOUR REFERENCE: Letter dated 8.5.1980
DATE RECEIVED: 12th May, 1980
SAMPLE NOS.: 12446 - 12500
13901 - 13920
SUBMITTED BY: D.C. Speijers
WORK REQUESTED: Petrology


H.W. Fander, H. Sc.

047

036048

REPORT CHS 80/5/20Notes:

As discussed with D.C. Speljers, brief petrological descriptions were compiled in tabulated form. These incorporate data from stereobinocular and petrological microscopic examination of thin-sections and related offcuts, together with subsidiary information derived from, for example, K-feldspar and carbonate staining tests. Comments are made on possible correlations, metamorphic effects and, where relevant, on probable primary rock types, partly by analogy with less altered examples.

Igneous rocks are classified following Hatch and Wells, and metamorphic facies classification is that of Turner and Verhoogen. It should be noted that a few sample bags were found to include more than one rock type (e.g. 12486 contains a specimen of skarn (described) and a presumably closely related talc schist), and descriptions should be read in this context.

D. Cowan, B. Sc.

Central Mineralogical Services				
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12446 (T.S. 31770)	Altered Porphyry. Sericitised ?plagioclase and phlogopitised ?K-feldspar phenocrysts in groundmass of phlogopite-stained alkali feldspar laths with quartz mesostasis.	Phenocrysts mean 1 mm, evenly disseminated. Groundmass laths mean 100 μ .	Traces magnetite (primary).	Typical minor or marginal intrusive fabric. Composition rather obscure, but felsic intermediate (?quartz monzonite). Evidently pre-Devonian.
12447	Alkali Microgranite. Weakly sericitised orthoclase-microperthite (40 %), quartz (30 %), sericitised/kaolinised albite (30 %).	Medium-grained, granitic mean 750 μ with variations in grain size defining crude banding.	Disseminated apatite and schorl. Minor chlorite.	Schorl grades into dravite, late magmatic (i.e. primary). Rare chloritised biotite flakes. Fairly typical of Devonian minor intrusive (e.g. Pine Hill Porphyry).
12448	Mica Hornfels. Random to semi-orientated muscovite with subordinate biotite, quartz, de-graded cordierite, albite, disseminated, marginally sericitised andalusite.	Weakly stressed. Medium-grained, weakly directed with porphyroblastic andalusite. Faintly banded.	Sparsely disseminated magnetite, leucoxenised opaques. Minor chlorite (after biotite).	Hornblende-hornfels facies and slightly retrograde (sericite, muscovite after cordierite, andalusite). Pelitic composition. Hornfelsing appears to overprint low-grade gneiss.
12449	Mineralised Vein-Quartz. An- to subhedral vein-type quartz with sparse intergranular arsenopyrite, chalcopyrite, pyrrhotite, pyrite. Disseminated coarse blades of wolframite.	Quartz mildly stressed, widely variable sizing.	Minor limonite, covellite, digenite (after chalcopyrite).	Stress postdates sulphides. Pyrite is locally conspicuous, develops as late replacement of pyrrhotite.
12450	Quartz-Muscovite-Andalusite Rock. Subpolygonal/directed quartz, subordinate to minor muscovite, disseminations and crosscutting zones of andalusite.	Schistose with stressed andalusite (-quartz) veination.	Patchy sericite (after andalusite). Minor pale phlogopite. Rare grains monazite.	Andalusite as accessory component and segregations in quartz-muscovite (greisen) vein. Sericitisation related to late shearing, stress.
12451	Alkali Microgranite. Sparse phenocrysts of quartz, sanidine, rare albite and frequent quartz-sanidine vugs in muscovite-stained quartzofeldspathic groundmass with biotite.	Phenocrysts mean 400 μ , vugs 1 mm, in weakly directed, aplitic groundmass (mean 75 μ).	Chlorite-vermiculite (after biotite). Minor traces apatite, rare oxidised pyrite cubes.	Weak, but semi-pervasive greisen, muscovitisation. Vugs may be graphic-textured, late-magmatic. Similarities with 12447.
12452	Retrograde Quartz-Mica Schist. Fine schistose quartz and semi-random sericite. Subordinate, schistose muscovite, minor chloritised biotite. Crosscutting chlorite films, adularia veinlets.	Distinct lenticular quartz/mica banding. Adularia veins to 2.5 mm transect chlorite films.	Disseminated oxidised/leucoxenised opaques. Minor pyrite films, disseminations (adularia veins).	Fabric consistent with sericitised, weakly porphyroblastic, hornfelsed schist with minor reshearing. Considered as closely related to 12448. Metasedimentary.
12453	Phosphatic Quartzite. Generally subpolygonal/weakly interlocking quartz with intergranular sericite aggregates, minor apatite. Sporadic bands of apatite-sericite rock.	Phosphatic bands 500 μ to 2 mm+. Weakly stressed, microfractured. Incipient cleavage.	Minor chloritised biotite. Traces pelitic muscovite. Minor sericitised clastic feldspar.	Apatite shows graded distribution in quartzite adjacent to phosphatic pelite interbeds. Similar rocks known, but not common in N.W. Tasmania.
12454 (T.S. 31778)	Quartz-Sericite Rock. Fine granular to polygonal/weakly directed quartz and weakly orientated sericite. Disseminated chloritised biotite flakes, leucoxenised/oxidised opaques.	Faint crenulated micro-scale banding. Vague relict quartz and feldspar "phenocrysts".	Sparse crenulated, segmented, partly de-graded veinlets of sphene.	?Phenocrysts to 2.5 mm of quartz (re-crystallized) and feldspar (sericitised) interpreted as altered biotite rhyolite or porphyry, but evidence is sketchy.

				Central Mineralogical Services
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12455 (T.S. 31779)	Porphyritic Alkali Microgranite. Phenocrysts of quartz, sericitised talc, sanidine-microperthite, chloritised biotite in weakly sericite-stained quartz. K-spar-minor albite groundmass.	Phenocrysts <1-5 mm in granitic-textured, even-grained (mean 150 μ) groundmass.	Minor oxidised opaques. Patchy weathering, Fe-staining, kaolinisation.	Sectioned area includes rare quartz-sanidine vugs. Very similar to 12451, but more strongly porphyritic, less vuggy, slightly coarser-grained, less altered.
12456	Retrograde Quartz-Mica Schist. Microschistose quartz and random to semi-orientated sericite, minor sericitised biotite. Semi-pervasive sericitised degraded K-feldspar.	Weakly crenulated, phyllitic. Faintly banded with vague relict clastic fabric.	Disseminated fine, partly oxidised magnetite. Rare zircon, tourmaline. Minor chlorite.	Not unlike 12454, but more distinctly metasedimentary (resheared, sericitised, low-grade meta-arkose). No obvious contact effects.
12457	Porphyritic Microgranite. Phenocrysts of quartz variably chloritised Ti-biotite, orthoclase-microperthite, sericitised oligoclase in weakly sericite-phlogopite-stained, quartzofeldspathic groundmass.	Very similar to 12455.	Sporadic vugs (to 2.5 mm) of weakly leucogenised ilmenite, metamict allanite, rare	Very similar to 12455, but less alkaline (trend adamellite), slightly more altered. Unusual vug-filling assemblage includes rare microscopic wolfram.
12458	Porphyritic Micro-Adamellite. Phenocrysts of orthoclase-microperthite, quartz, sericite-stained oligoclase in quartz-orthoclase-oligoclase-minor biotite groundmass.	Similar to 12455, 12457, but less strongly porphyritic, slightly coarser-grained.	Minor chlorite (after biotite, rare veinlets with quartz). Rare clots of leucogenised ilmenite.	Very similar to 12455, 12457, but relatively basic (adamellite) composition. Only incipiently altered.
124559	Tourmalinised Quartzite. Weakly stressed, sub-polygonal, weakly interlocking quartz, minor sericitised feldspar. Intergranular sericite aggregates grading into green schorl.	Similar to 12453, but slightly finer-grained, unbanded. Locally fractured, granulated.	Sparse zoisitic epidote, cloudy semi-opaques. Patchy ilmenite, thinly disseminated pyrite.	Tourmaline introduced in veinlets, replaces sericite matrix, sericitised feldspar and predates late, brittle deformation. Assay for Sn warranted.
12460	Fractured Quartz-Sericite Phyllite. Relict clastic, splintery to angular, subangular quartz and semi-orientated sericite. Sporadic quartz-sericite veins, breccia healings.	Faintly laminated, fine sandy silty clastic fabric. Patchy brecciation.	Minor metasomatic green schorl (sim. 12459). Traces detrital opaques, leucox. semi-opaques.	Quartz grain-shapes suggestive of devitrified/abraded shards in part (tuffaceous psammopelite). Brecciation postdates incipient cleavage. Weakly tourmalinised.
12461	Rhyolitic Tuff. Frequent quartz, subordinate K-feldspar crystals/crystal fragments in sericite-stained, cryptocrystalline K-feldspar matrix with relict microshard textures.	Extensively fractured, healed with sericite films. Locally eutaxitic.	Disseminated pyrite (subhedral, mean 100 μ), traces secondary rutile.	Sericitic microfractures postdate pyritisation. Vitric-crystal tuff, probably ignimbritic, but finer detail obliterated.
12462	Fractured Quartz-Sericite Phyllite. Relict clastic, splintery to subangular quartz in incipiently sheared quartz-sericite matrix. Patchy quartz-sericite-healed fractures.	Similar to 12460.	Traces relict detrital, and minor traces metasomatic schorl. Sparsely disseminated pyrite.	This rock is virtually identical to 12460.
12463 (T.S. 31787)	Rhyolitic Tuff. Splintery to angular quartz and rare feldspar crystal fragments in pervasively sericite-stained, cryptocrystalline, felsic matrix with patchy relict shards.	Crystal fragments (mean 250 μ), faintly banded. Flow-structured, very incipiently sheared.	Sparse leucogenised opaques. Trace fine oxidised pyrite.	Essentially similar to 12461, ignimbritic vitric-crystal tuff. Minor late limonite-healed microfracturing (weathering).

				Central Mineralogical Services
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12464 (T.S. 31788)	Quartz-Mica-Andalusite Schist. Subpolygonal, weakly directed quartz, subordinate fine muscovite, Ti-biotite, poikilitic andalusite, disseminated colour-variable schorl.	Fine-grained, banded, schistose, weakly crenulated. Discordant quartz-muscovite vein-	Albite, blue schorl and dravite (vein). Sparsely disseminated magnetite.	Similarities with 12448, 12452, but relatively siliceous, more distinctly schistose. ? Sheared hornfels. Tourmaline and Ti-biotite of metasomatic character.
12465	Quartz-Mica-Andalusite Schist. Quartz, fine muscovite and sericite in varying proportions, disseminated, marginally sericitised, poikilitic andalusite. Patchy Ti-Biotite.	Sim. 12464, with ^{ing.} coarser-scale banding, patchy concordant quartz-mica veining.	Thinly disseminated magnetite, sparse colour-variable schorl.	Ti-biotite introduced in (recrystallized) quartz veins. Sericite is retrogressive after muscovite, andalusite. ? Sheared hornfels, similar to 12448, 12452, 12464.
12466	Quartz-Mica-Andalusite Schist. Polygonal quartz with slightly subordinate sericite/fine muscovite, sparse, variably sericitised poikilitic andalusite, minor Ti-biotite.	Very similar to 12464. Weak secondary cleavage at high angle to 1 foliation, banding.	Disseminated fine magnetite. Minor traces pyrrhotite.	Closely related to 12448, 12452, 12464, 12465. Metasedimentary, resheared ? hornfels, retrogressive.
12467	Mica-Quartz-Andalusite Schist. Mainly fine muscovite, sericite, slightly subordinate quartz, disseminated poikilitic, marginally degraded andalusite, minor Ti-biotite.	Fine-grained, schistose, distinctly crenulated. quartz/mica banding.	Disseminated fine magnetite. Sparse pyritised pyrrhotite.	Strong similarities with 12448, 12452, 12464, 12465, 12466.
12468	Quartz-Mica-Andalusite Hornfels. Very fine random muscovite and polygonal quartz in varying proportions, abundant poikiloblastic andalusite, minor Ti-biotite.	Hornfelsic, unsheared, but incipiently stressed. Faint relict banding.	Disseminated opaques (magnetite, ilmenite), traces chlorite (after biotite), rutile.	Vague relict sandy clastic fabric, strong compositional similarity with 12448 etc., but unsheared. Biotite metasomatic in vague discontinuous veins
12469	Quartz-Mica-Andalusite Schist. Microschistose quartz and sericite/fine muscovite in near-equant proportions, sparse, variably sericitised poikilitic andalusite, minor Ti-biotite.	Fine-grained (strictly phyllitic) with quartz/mica banding. Crenulated.	Disseminated magnetite, ilmenite, sparse green schorl. Minor trace pyritised pyrrhotite.	Very similar to 12448, 12452, 12464, 12465, 12466, 12467.
12470	Quartz-Mica Schist. Fine schistose (polygonal/directed) quartz, subordinate fine muscovite, minor Ti-biotite, albite, sparse, marginally sericitised andalusite.	Weakly crenulated, schistose. Micas in thin foliae. Relatively coarse-grained.	Sparse opaques, leuc-xenic semi-opaques. Trace chlorite (after biotite), rare schorl.	Similar to 12448, etc., but relatively siliceous, slightly feldspathic (meta-subarkose).
12471	Mica-Quartz Schist. Fine muscovite and sericite with slightly subordinate quartz. Extensively chloritised Ti-biotite, minor andalusite, albite and cordierite.	Fine-grained, weakly banded schistosity, weakly crenulated with sporadic fractures.	Disseminated magnetite, leucogenised ? ilmenite. Minor traces pyritised pyrrhotite.	Late, brittle phase of deformation. Otherwise very similar to 12448 etc. Micas, andalusite typically partly retrogressed (sericite, chlorite).
12472 (T.S. 31796)	Mica-Quartz-Cordierite-Andalusite Schist. Fine muscovite with slightly subordinate quartz, relatively abundant, partly chloritised Ti-biotite, disseminated porphyroblasts andalusite cordierite.	Weakly banded, fine-grained, weakly crenulated. Minor recrystallized vein-quartz.	Semi-pervasive ultra-fine carbonaceous matter. Minor opaques, leucogenised ilmenite.	Sim. 12448 etc., but distinctly carbonaceous. Originally very finely laminated as indicated by relict films of carbonaceous matter in cordierite blasts.

				Central Mineralogical Services
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12473 (T.S. 31797)	Mica-Quartz-Cordierite-Andalusite Hornfels. Fine, semi-orientated muscovite, slightly subordinate quartz. Disseminated biotite, cordierite and minor poikiloblastic andalusite.	Weakly banded on sub-millimetric scale. Faintly microschistose.	Chlorite (after biotite) and minor sericite (after cordierite). Disseminated opaques.	Very similar to 12472. Weakly carbonaceous, partly as inclusions (sim. 12472) in cordierite porphyroblasts. Weakly sheared hornfels. Hornblende-hornfels facies.
12474	Sericite-Quartz Phyllite. Orientated sericite, slightly subordinate, closely intergrown quartz, sparse degraded cordierite and rare andalusite porphyroblasts. Minor opaques, Ti-biotite.	Faint, fine-scale laminations. Phyllitic with penetrative crenulations on closely spaced planes.	Conspicuous disseminated opaques. Minor, but pervasive carbonaceous matter.	Carbonaceous matter largely remobilised into crenulation slip planes. Porphyroblasts largely retrogressed (sericitised). Essentially similar to 12472, 73.
12475	Quartz-Chlorite-Muscovite Schist. Semi-orientated Mg-chlorite, muscovite, subordinate quartz and pale phlogopite. Sparse (layered) cordierite porphyroblasts.	Schistose, foliated planes. with concordant lenses, boudinages of quartz-chlorite vein material.	Sparse opaques. Thinly disseminated oxidised pyrite.	Generally similar to 12472, 73, but with bands of muscovite-phlogopite schist representing probable chemical sedimentary intercalations. Chlorite 2° after
12476	Quartz-Mica Phyllite. Microschistose quartz, sericite, fine muscovite in near-equant proportions, minor degraded Ti-biotite, disseminated fine porphyroblastic cordierite.	Phyllitic, weakly banded. Pervasively crenulated on closely spaced planes.	Disseminated opaques. Minor, very fine authigenic schorl. Traces carbonaceous matter.	Cordierite weakly sericitised. Crenulation planes are closely spaced surfaces in hand specimen. Contorted bedding is roughly normal to these
12477	Quartz-Mica-Andalusite Hornfels. Quartz, fine to sericitic muscovite, extensively muscovitised, sericitised, poikiloblastic andalusite and polygonised feldspar. Minor Ti-biotite.	Fine- to medium-grained, weakly directed, hornfelsic. Weakly crenulated.	Thinly disseminated opaques (magnetite, leuc. ilmenite). Minor chlorite (after biotite)	Sim. 12448 etc. Andalusite is partly replaced pseudomorphously by poikilitic muscovite. Suggestive of retrogressive contact phase. Subsequently weakly
12478	Quartzofeldspathic Hornfels. Quartz and variably sericitised polygonised alkali feldspar in varying proportions. Subordinate muscovite, poikiloblastic andalusite, minor Ti-biotite.	Medium-grained with fine-scale relict banding. Incipiently sheared.	Typical disseminated opaques, semi-opaques. Minor traces schorl, degraded cordierite, fine pyrite.	Very similar to 12477. These rocks can be contrasted with 12448 etc. in being distinctly feldspathic. There is a vague metamorphic aspect, but no positive evidence.
12479	Quartzofeldspathic Hornfels. Quartz with subordinate sericite-stained, untwinned albite, muscovite. Minor chloritised biotite, extensively muscovitised poikiloblastic andalusite.	Very similar to 12478.	Typical disseminated opaques, semi-opaques. Minor traces schorl, muscovitised cordierite.	Similar and closely related to 12478, but with albite in contrast to dominantly K-feldspar.
12480	Quartzofeldspathic Hornfels. Polygonal quartz, subordinate, completely sericitised feldspar, muscovite and minor Ti-biotite.	Medium-grained (mean 100μ), hornfelsic with vague deformed banding. Incipiently stressed.	pyrite, pyrrhotite. Leucoxenised ilmenite. Minor traces magnetite, schorl, chlorite (after biotite)	Conspicuous absence of andalusite, but may have been completely sericitised. Otherwise similar to 12477, 12478, 12479.
12481 (T.S. 31805)	Porphyritic Micro-Adamellite. Sparse phenocrysts of quartz, orthoclase in quartz-oligoclase-orthoclase groundmass with disseminated, variably chloritised/muscovitised biotite flakes.	Phenocrysts to 7.5 mm in even-grained, granitic-textured groundmass (mean 600μ).	Semi-pervasive fine muscovite (after oligoclase). Minor zircon.	Moderately marked greisenizing alteration. Similar to 12451 etc. and fairly typical of the Devonian intrusives.

				Central Mineralogical Services
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12482 (T.S. 31806)	<u>Vein Quartz</u> . Stressed, anhedral, vein-type quartz with sparse muscovite flakes and irregular aggregates of green schorl with minor chloritised ?phlogopite and sulphide.	Muscovite as inclusions in quartz. Tourmaline aggregates are intergranular.	?Monazite as micro-inclusions in chloritised phlogopite. Minor trace rutile.	Sulphides intergranular to tourmaline - pyritised pyrrhotite (with accessory marcasite), accompanied by frequent particles of bismuth, largely replaced by bismuthinite. Trace chalcocopyrite.
12483	<u>Retrograde Schist</u> . Quartz and muscovite with frequent, variably chloritised porphyroblastic garnets ("almandine"). Minor, poorly twinned oligoclase.	Resheared, schistose. Garnets to 2 mm, but generally < 200 μ , incipiently helicitic.	Minor ultrafine opaques. Evenly disseminated pyrite particles, films.	Distinctly regional metamorphic with no contact effects. Thus contrasted with 12448, etc.
12484	<u>Retrograde Schist</u> . Quartz and muscovite with frequent, completely chloritised garnets, minor oligoclase, degraded biotite. Specular hematite in crosscutting vein.	Resheared, schistose. Garnets evenly sized.	Minor opaques, leucox. semi-opaques. Minor trace oxidised pyrite.	Very similar and closely related to 12483, more extensively chloritised. Hematite appears to predate late shearing/recrystallization phase.
12485	<u>Microgabbro</u> . Coarse, anhedral augite in ground-mass of random, weakly zoned labradorite laths. Sparse albite-K-feldspar mesostasis.	Pyroxene phenocrysts, mean 1.5 mm with subophitic margins. Doleritic fabric.	Primary magnetite. Minor mesostasis chlorite, rare pyrite particles.	Essentially unaltered, unstressed. Minor or marginal intrusive.
12486	<u>Skarn</u> . Sub- to euhedral, weakly poikilitic almandine and cummingtonite in near-equant proportions, slightly subordinate quartz and disseminated random talc flakes.	Granular, even-grained (mean 400 μ), incipiently banded, unstressed.	Minor fine, intergranular pyrrhotite and cloudy, semi-opaque rutile.	Unusual ferromagnesian composition suggests pyrometamorphism of Mg-Fe silica-carbonate facies. High-grade, probable pyroxene-hornfels facies.
12487	<u>Quartz-Carbonate Schist</u> . Subpolygonal/weakly interlocking quartz and dolomite-ankerite, very minor chlorite.	Stressed, fine-grained, schistose (mean 75 μ), weakly banded. Minor late calcite-healed fractures.	Thinly disseminated pyrite with incipient pressure shadows.	Green colouration (hand specimen) due to accessory chlorite, partly as ultrafine inclusions in carbonate. Probable precursor to 12486.
12488	<u>Phlogopite Gneiss</u> . Gneissic-textured quartz with subordinate oligoclase, very pale phlogopite, minor orthoclase.	Resheared with stressed, segmented porphyroblastic oligoclase (to 4 mm), gneissic foliation.	Minor traces zircon, magnetite, leucoxenic semi-opaques.	Polymetamorphic, but no retrograde features (possibly a reflection of composition). Upper greenschist/low amphibolite facies. Zircon appears to be relict detrital.
12489	<u>Quartz-Chlorite Schist</u> . Pervasively leucoxene-stained Fe-Mg-chlorite, subordinate, stressed, schistose and segmented veinlet-quartz, minor oxidised pyrite.	Strongly crenulated, disharmonically folded, segmented, fine-scale schistosity.	Segmented, vein-type adularia and sericite-stained albite. Ultrafine rutile, sphene.	Chlorite in part represents degraded mica and ?tremolite-actinolite. Conceivably a thoroughly unaltered, subsequently sheared, chloritised basic, but no positive evidence.
12490 (T.S. 31814)	<u>Skarn</u> . Poikilitic almandine and granular to subprismatic cummingtonite, subordinate diopside-hedenbergite, quartz, disseminated talc flakes.	Granular to granulitic (weakly directed). Garnet, mean 1.5 mm. Minor late fractures, stress.	Thinly disseminated cloudy rutile inclusions in silicates. Traces albite, adularia.	Similarities with 12486, pyroxene hornfels facies. Stress effects related to late albite-adularia-healed fractures.

				Central Mineralogical Services
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12491 (T.S. 31815)	Quartz-Mica Phyllite. Subpolygonal, weakly interlocking, directed quartz; relatively minor orientated muscovite (2-10 %), conspicuous fine to very fine orientated tourmaline.	Fine-scale, relict banding paralleled by cleavage. Minor late stress.	Rare garnet porphyroblasts, detrital zircons, tourmaline. Minor Fe-staining.	Upper greenschist/low amphibolite facies metasediment. Detrital tourmaline is overgrown. Finer material (green schorl) evidently authigenic. Quartzose meta-
12492	Dolomitised Quartzite. Relict framework of subangular to rounded, fine to medium sand-sized quartz and granular quartz cement, thoroughly corroded/replaced by dolomite-ankerite.	Very faintly bedded, very incipiently stressed with rare chloritic microfractures	Sparse sub- to euhedral pyrite. Minor trace brown schorl, detrital zircon, leucox. semi-	?Diagenetic dolomitisation of poorly sorted, weakly bedded orthoquartzite. Tourmaline is authigenic, partly as overgrowths. 12487, possibly sheared equi-
12493	Skarn. Granular to subhedral diopside-hedenbergite with included and intergranular poikilitic almandine, intergranular quartz, minor talc, bronzite.	Relict coarse poikilitic fabric (hedenbergite), now essentially granular mean 600 μ .	Relatively abundant cloudy rutile inclusions. Minor trace schorl, pyrrhotite, albite	Incipient albite-healed fracturing. Bronzite as rare coarse poikilitic grains (5 mm), clinopyroxene originally similar, recrystallized. Tourmaline as rare
12494	Dolomite-Quartz Schist. Granular to subpolygonal weakly interlocking, directed dolomite-ankerite, relatively minor, similarly-textured quartz. Sporadic stressed/partially recrystallized zones	Schistose, weakly stylolitic. Minor late quartz-calcite veining.	Sparse to clustered pyrite in, and marginal to, stressed quartz veins.	Inclusions in garnet. Sim. 12486, 12490. Similarities with 12487, 12492, essentially a sheared, fine-grained siliceous dolomite marble.
12495	Carbonaceous Quartz-Mica Phyllite. Micro-schistose quartz, sericite, minor degraded biotite, pervasive ultrafine carbonaceous matter. Irregular, deformed veins of quartz, chlorite,	Relict, fine-scale laminations. Pervasively stressed, crenulated, microfolded, segmented.	Oxidised pyrite associated with adularia-chlorite veins	Veins in two generations, initially quartz parallel to primary cleavage, subsequently crosscutting adularia-chlorite(-quartz). Both types predate
12496	Hypersthene Microgabbro. Phenocrystal grains of pigeonite with cores of hypersthene, diallagite mantles in groundmass of random labradorite laths with sparse alkali feldspar mesostasis.	Pyroxenes mean 600 μ , with weakly subophitic margins. Groundmass mean 75 μ . Doleritic	Disseminated magnetite, minor mesostasis chlorite. Minor ultrafine Fe-sulphide.	Very similar texturally and compositionally to 12485, but with relatively complex pyroxene assemblage, finer-grained. Unstressed, only very incipiently
12497	Carbonaceous Dolomite Phyllite. Microschistose dolomite, relatively minor quartz, sericite, pervasive carbonaceous matter in discontinuous microscopic films.	Fine-grained, weakly crenulated, schistose, incipiently banded.	Thinly disseminated, fine-grained pyrite; rare relict detrital tourmaline, zircon,	Similarities with 12487, 12492, 12494, but finer, relatively dolomitic, distinctly carbonaceous. Recrystallized, sheared, quartzose silty dolomite (or
12498	Metasomatised Microgneiss. Fine gneissic quartz untwinned plagioclase, K-feldspar in varying proportions. Lenses and crosscutting zones of diopside, tremolite-actinolite.	Distinctly banded with relict grading. Disharmonically folded, subsequently veined,	Disseminated very fine cloudy sphene. Traces tourmaline. Minor trace Fe-sulphide.	Diopside introduced in veins, replaces with tremolite selvages. Probably replaces micas (7biotite)-contact metasomatic, predates late reshearing.
12499 (T.S. 31823)	Quartz-Tourmaline Rock. Anhedral, weakly interlocking quartz with slightly subordinate intergranular schorl (blue), minor fine muscovite.	Quartz mean 750 μ . Essentially granular, unbanded, unstressed.	Rare albite (locally pseudomorphed by muscovite). Traces hematite, semi-opaques,	"Granitic" vein or segregation. Similar rocks not uncommon around the Devonian mineralising intrusives (e.g. Pine Hill)
			sphene.	

Central Mineralogical Services				
Sample No.	Classification - Composition	Fabric	Accessories	Comments
12500 (T.S. 31824)	Garnetiferous Micro-Adamellite. Orthoclase-perthite and quartz in near-equant proportions, slightly subordinate oligoclase, disseminated, variably muscovitised biotite flakes.	Even-grained, granitic, mean 750 μ , rare quartz phenocrysts. Unstressed.	Thinly disseminated garnet. Minor chlorite (after relict biotite), rare muscovitised topaz.	Primary high Ti-biotite. Oligoclase near albite (trend alkali granite). Weakly greisenized with muscovitisation biotite, some feldspar, weak sericitisation.
13901	Metasomatised Arkose. Relict framework of silt- to fine sand-sized quartz, K-feldspar, albite-oligoclase, microcrystalline quartzofeldspathic matrix interspersed with granular hedenbergite.	Coarse, millimetric-scale banding. Weakly hornfelsed. Minor pelitic partings.	Sericite, very fine sphene, trace Ti-biotite, rutile, pelitic partings. Minor trace oxidised.	Incipiently graded, relict planar to lenticular bedding. Hedenbergite selectively replaces matrix in certain bands, probably dolomitic originally.
13902	Diopside Skarn. Granular to coarse, ragged poikilitic diopside with subordinate interspersed lenses of pale Ti-phlogopite, microgranular tremolite. Patchy late talc.	Relict sub- to millimetric scale planar to lenticular bedding. Talc on late fractures.	Disseminated cloudy pyrrhotite, rutile, sphene, rare rounded zircons. Minor trace ultrafine pyrrhotite.	A thoroughly metasomatised labile clastic sediment. By analogy with very similar metasomatised Crimson Creek Formation probably a tuffaceous grey-wacke.
13903	Garnetiferous Granite. Weakly muscovitised perthite, quartz, subordinate zoned oligoclase-albite, disseminated, variably muscovitised biotite flakes.	Granitic, uneven-grained with coarse perthite.	Sparsely disseminated garnets (pink almandine), rare muscovitised topaz.	Very similar to 12500, but relatively alkaline, verges on alkali granite. Alteration near-identical to that in 12500.
13904	Alkali Granite. Weakly but variably muscovitised perthite, quartz, subordinate sericite-stained albite, disseminated sericitised, silicified biotite flakes.	Uneven-grained, coarse granitic. Sim. 13903, but coarser-grained. Weak sericitic fracturing.	Leucogenic TiO ₂ staining altered biotite. Minor veinlet quartz.	Coarser-grained, devoid of garnet, slightly more alkaline, but very similar to 12500, 13903 and similarly altered (greisenized).
13905	Muscovite Granite. Alkali microgranite with disseminated primary muscovite flakes in gradational contact with orthoclase-albite rock with minor muscovitised biotite.	Granitic-textured microgranite (mean 300 μ), grading into coarsely banded segregation.	Minor muscovitised biotite (microgranite). Minor quartz greisenizing muscovite (segregation).	Coarse-grained, feldspathic segregation or vein with quartz restricted to intergranular vugs. Trends to, and may grade into zoned pegmatite.
13906	Muscovite Alkali Microgranite. Microperthite, quartz and albite in near-equant proportions, disseminated muscovite and rare biotite flakes.	Medium-grained, granitic with weak modal sizing, banding.	Sparsely disseminated tourmaline, topaz. Minor sericite, Ti-phlogopite.	Tourmaline, topaz, muscovite of late-magmatic character. Weak greisenizing (sericite, phlogopite) alteration of feldspar, biotite, topaz.
13907	Pyroxene Hornfels. Granular, weakly poikilitic hedenbergite with intergranular, untwinned plagioclase, orthoclase.	Faintly banded, even-grained, granular, mean 250 μ .	Traces quartz. Minor trace sphene.	Metasomatic, skarn-like. Similarities with metasomatised bands in 13901, but massive, rather featureless. Thus, original rock type obscure.
13908 (T.S. 31832)	Metasomatised "Arkose". Micrograined/directed quartz, untwinned plagioclase, K-feldspar in varying proportions. Semi-pervasive microgranular to poikilitic diopside, tremolite.	Laminated on sub- to millimetric scale. Weakly schistose. Diopside partly discordant.	Disseminated cloudy sphene, minor fine to ultrafine pyrrhotite. Rare rounded zircons.	Strong similarities with 13901, but finer-grained. Tremolite in part as late replacement of diopside, probably contemporaneous with shearing.

Central Mineralogical Services				
Sample No.	Classification - Composition	Fabric	Accessories	Comments
13909 (T.S. 31833)	<u>Greisened Granite/Greisen Vein</u> . Alkali granite with accessory muscovite, muscovitised biotite, progressively muscovitised in contact with quartz-muscovite vein material.	Medium to coarse, granite-textured. Vein is coarse-grained, stressed, locally fractured/quartz-healed.	Minor trace ilmonitised ?Fe-carbonate. Very thinly disseminated cassiterite.	Fractures healed with comb-structured and microcrystalline quartz. Cassiterite as 20-150 μ grains in muscovite aggregates, partly granulated, quartz-cemented.
13910	<u>Chloritic Subarkose</u> . Relict framework of sub-angular to rounded quartz, subordinate to minor alkali feldspar. Chlorite-stained, microgranular quartzofeldspathic matrix.	Poorly sorted in silt to medium sand range. Extensively recrystallized/directed.	Relict detrital tourmaline, rare zircon, apatite. Semi-pervasive limonite (after chlorite).	Bedded on coarse millimetric scale. Chlorite probably after biotite. Grades into weakly feldspathic metaquartzite. Similar to 13901, 13908, but unmetasomatized.
13911	<u>Metasiltstone</u> . Microgranular, directed alkali feldspar, subordinate quartz, sericite, poikilitic muscovite. Disseminated opaques, leucox. semi-opaques, zircon, tourmaline.	Finely laminated (thin shaly partings) with concordant slaty cleavage.	Minor degraded biotite, ?garnet. Minor trace pyrite.	Disseminated patches of quartz and poikilitic muscovite probably represent retrogressed cordierite.
13912	<u>Phlogopitic Quartzite/Vein-Quartz</u> . Polygonal/weakly directed quartz with fine degraded phlogopite on grain boundaries. Stressed, vein-type quartz with disseminated schorl.	Quartzite, medium- and even-grained. VEIN recrystallized in irregular zones.	Fine detrital/authigenic tourmaline, rare zircon (quartzite). Minor muscovite (vein).	Recrystallized orthoquartzite. Phlogopite probably metasomatic (?after sericite). Vein-contact is concordant to weak tectonic fabric.
13913	<u>Metasomatized Arkose</u> . Subpolygonal/weakly directed quartz and K-feldspar, minor fine muscovite. Frequent small poikiloblasts of tremolite. Fine disseminations cloudy sphene.	Weakly banded (sporadic shaly bands). Faint relict silty, fine sandy clastic fabric.	Relict detrital zircon, trace tourmaline. Sparse oxidised pyrite cubes.	Similar to 13911 in terms of relict features, but only weakly banded. Metasomatism similar to 13901, 13908, but lower grade.
13914	<u>Dioptside Skarn</u> . Granular to coarse, subhedral diopside-hedenbergite with steatitised inclusions of ?tremolite. Patchy intergranular K-feldspar (adularia).	Weakly banded variations in wide sizing range. Incipiently stressed.	Minor pale Ti-phlogopite. Disseminated fine cloudy sphene. Minor quartz.	Coarse intergranular adularia apparently developed as late, low-temperature vug-fillings. Similarities with 12486 etc., but non-garnetiferous.
13915	<u>Greisen</u> . Coarse, anhedral quartz with intergranular aggregates of pale green hydro-muscovite. Sparsely disseminated cassiterite.	Vague relict, very coarse granitic fabric. Unstressed.	Minor traces tourmaline, partly muscovitised topaz. Rare biotite inclusions in quartz, garnet in mica.	Biotite, garnet tend to confirm greisenized granite interpretation. Cassiterite as 50 μ to 2 mm subhedral, dark red brown grains in muscovite aggregates.
13916	<u>Metasomatized Arkose</u> . Microgranular K-feldspar, subordinate quartz, untwinned plagioclase, semi-pervasive microgranular to strongly poikilitic diopside, minor tremolite.	Hornfelsic, weakly banded, incipiently directed. Minor quartz, adularia veining.	Traces sphene, pyrrhotite, chlorite, sericite.	Similar to 13913, but reflects higher-grade metasomatism, more distinctly hornfelsed.
13917 (T.S. 31841)	<u>Mica Micro-Adamellite</u> . Orthoclase-perthite, oligoclase and quartz in near-equant proportions. Disseminated muscovite and rare, partly muscovitised biotite flakes.	Even-grained, granitic, mean 750 μ , unstressed.	Minor sericite (weak alteration oligoclase and in rare vugs with quartz).	Fairly typical of the mica granitoids, but with relatively basic oligoclase, only very incipiently greisenized.

Central Mineralogical Services				
Sample No.	Classification - Composition	Fabric	Accessories	Comments
13918 (T.S. 31842)	Olivine Basalt. Disseminated phenocrysts of labradorite, serpentinised pyroxene, olivine in groundmass of feldt plagioclase microlaths, pigeonite granules, montmorillonitic mesostasis.	Phenocrysts mean 350 μ . Basaltic fabric, weakly amygdaloidal. Unstressed.	Chalcedony (amygdales). Minor ilmenite. Sparse, fine to ultrafine pyrrhotite.	Deuteric style of alteration. Strong similarities with Tertiary basalts of E. Australia.
13919	Quartz-Mica Phyllite. Polygonal, weakly directed quartz, subordinate fine muscovite, dark biotite, disseminated tourmaline.	Distinct quartz/mica foliation. Resheared parallel to primary cleavage.	Rare, partly degraded garnets. Minor bleached carbonaceous matter.	Upper greenschist/low amphibolite facies. Resheared with minor late crenulations. No retrograde features (as distinct from weathering).
13920 (T.S. 31844)	Olivine Basalt. Disseminated phenocrysts of labradorite, variably serpentinised pigeonite and completely serpentinised olivine in weakly amygdaloidal basaltic groundmass.	Virtually identical to 13918	Minor pyritised pyrrhotite.	Very similar to 13918, but relatively fresh (pyroxene feldspar). Amygdales rare, montmorillonitic.

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REPORT ON
EXPLORATION OF E.L.2/78
DURING 1980
VOLUME II

ALCOA OF AUSTRALIA LIMITED
Exploration Division

MICROFILMED

Prepared by :
D.C. Speijers

Project Report No. 23
October 1980



0 0.5 10 15 20 kms

Intense photographic distortion in this area could well be a generalised

Undertaken on behalf of Alcoa of Australia Limited
by Hunting Geology and Geophysics (Australia) Pty Limited
Canberra February 1980
Job No GA 55/79

80-1490 2/3

QUATERNARY

TEPTIARYPERMIAN

SILURIAN

ORDOVICIAN

CAMBRIAN

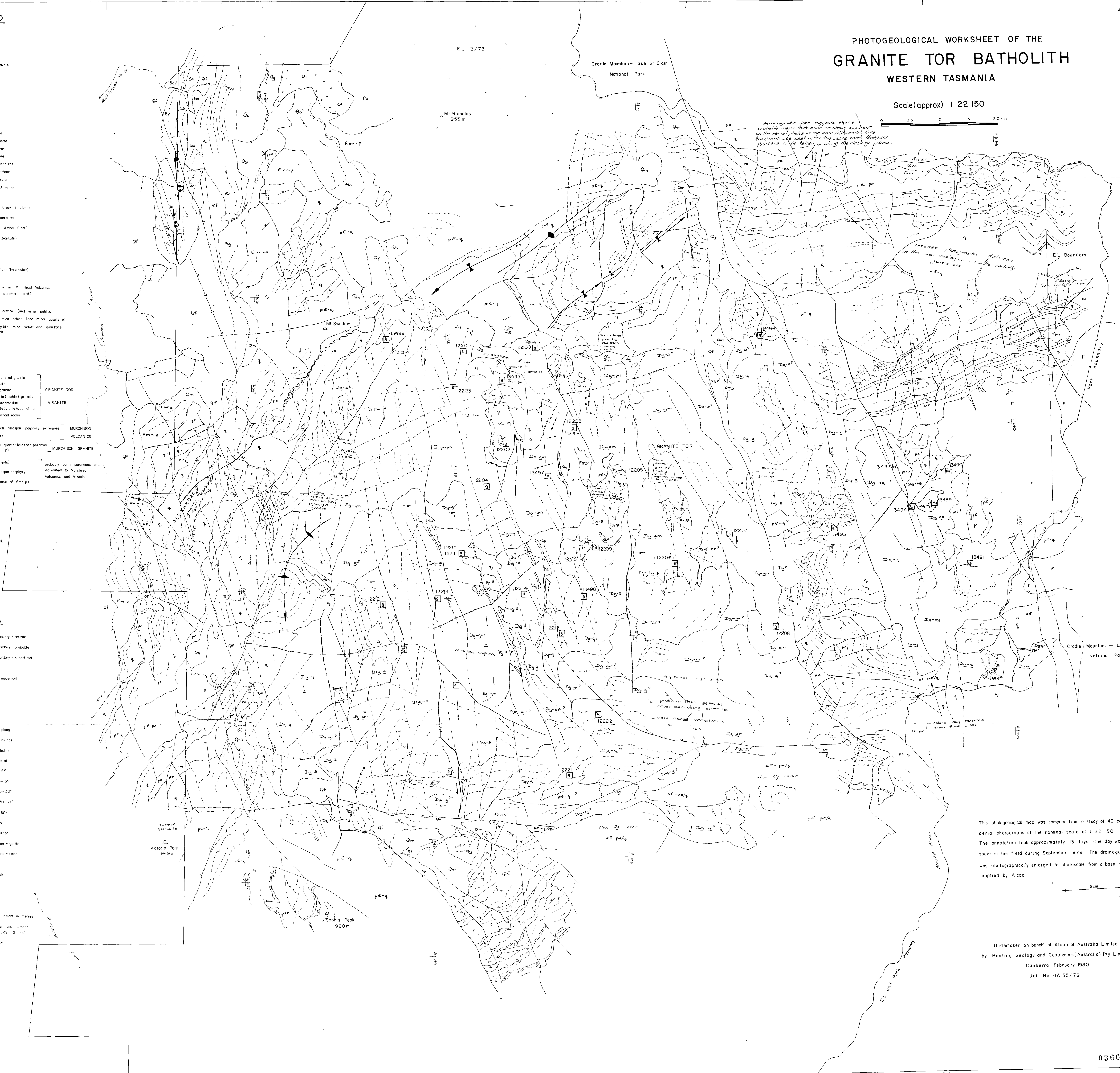
PRE - CAMBRIAN

TERTIARY

CAMBRIAN

LINEWORK SYMBOLS

	geological boundary - definite
	geological boundary - probable
	geological boundary - superficial
	bedding trend
	fault showing movement
	possible fault
	fracture
	joint
	shear
	anticline with plunge
	syncline with plunge
	overturned anticline
	bedding horizontal
	bedding - dip 5°
	bedding - dip 5-15°
	bedding - dip 15-30°
	bedding - dip 30-80°
	bedding - dip 60°
	bedding - vertical
	bedding - overturned
	slope of marine - gentle
	slope of marine - steep
	dike
	river and creek
	settled road
	vehicle track
	foot track
	trap plant pole height in metres
	photo centre run and number
	(POLYTHIC ROCKS SENSU)



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GRANITE TOR AREA
PLAN

GEOPHYSICAL INTERPRETATION

5 cm

Scale 1:40,000

LEGEND

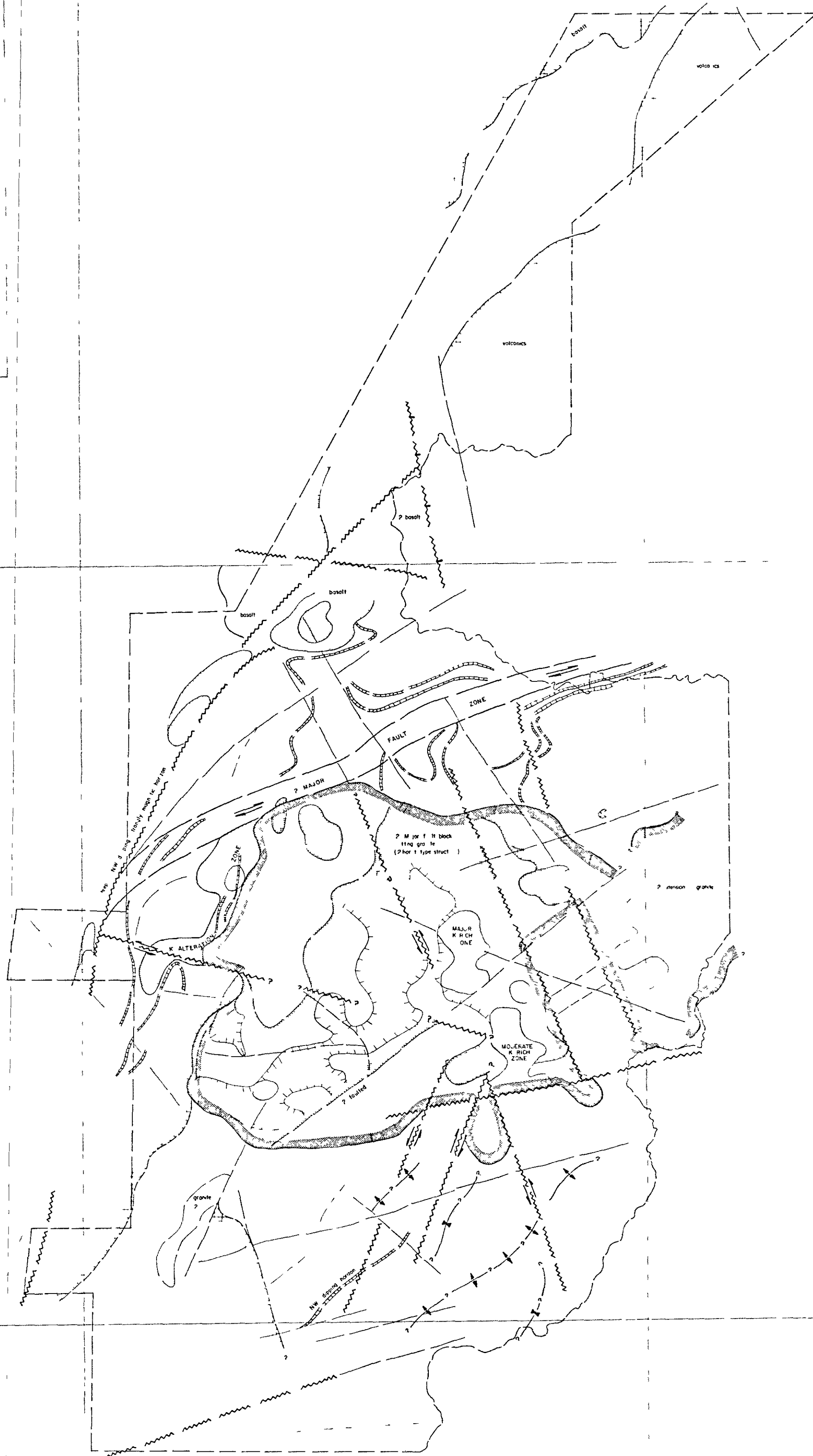
MAGNETIC INTERPRETATION

- Probable fault (movement indicated)
- Other lineament
- Magnetic horizon
- Other geological contact

SPECTROMETRIC INTERPRETATION

- Unaltered granite contact
- Boundary of unaltered granite
- Unaltered potassium alteration zone
- Thick unaltered zone
- Potassium high zone
- Zone of weakly altered potassium

Prepared by:
Mining Geology and Geophysics
Department of Geology
Code: DGM-77
Date: 9/79



036061

80-1490 23

PLATE III

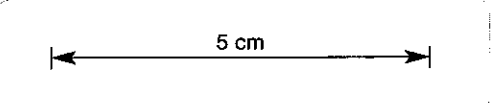
2364

ALCOA OF AUSTRALIA LIMITED

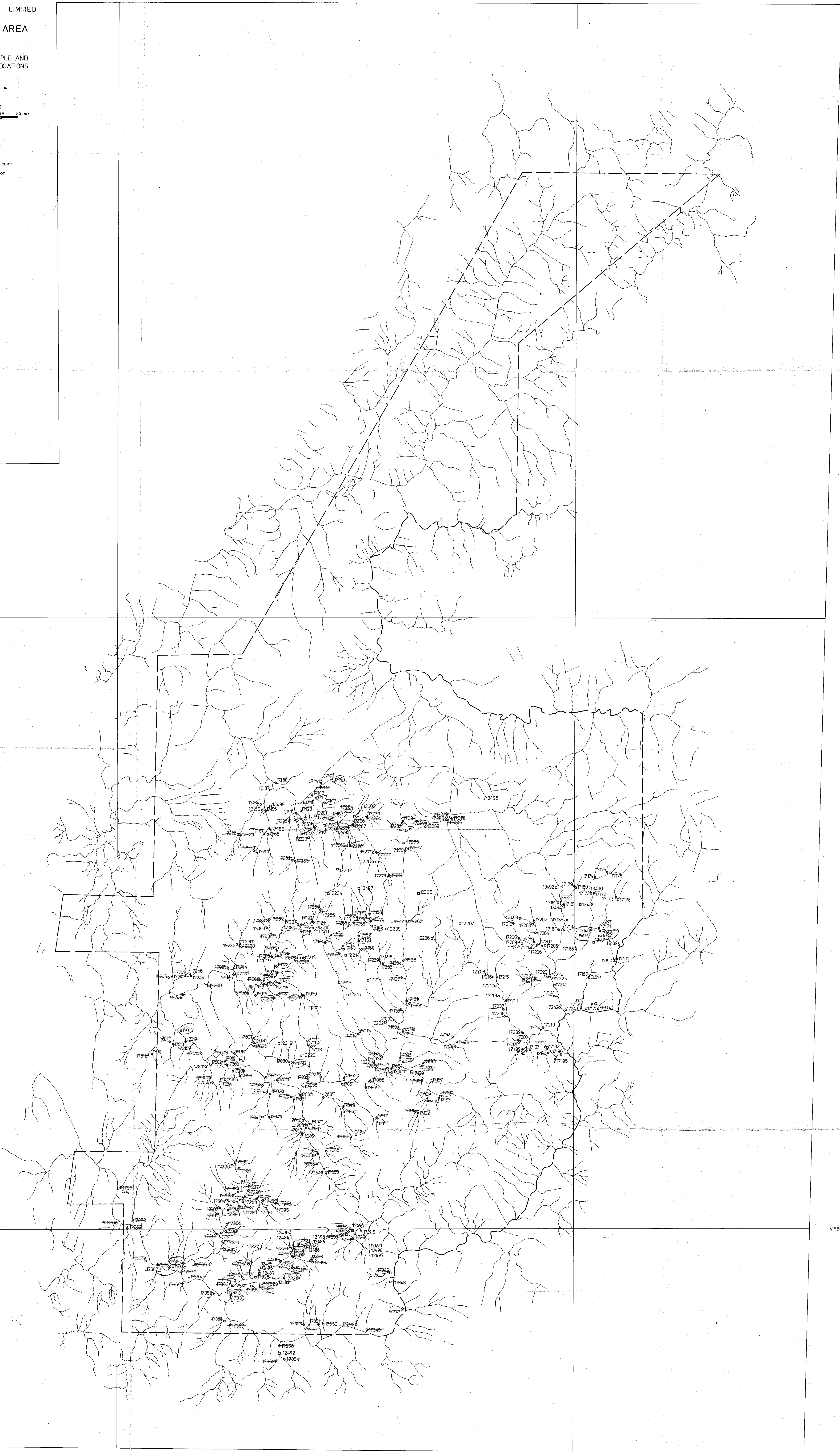
GRANITE TOR AREA

PLAN VI

STREAM SEDIMENT SAMPLE AND
ROCK CHIP SAMPLE LOCATIONS



- LEGEND
- Boundary of E.L. 2/78
 - Stream sediment sample point
 - Rock chip sample location



2966

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GRANITE TOR AREA

PLAN XXIX

TOPOGRAPHIC BASE PLAN
SHOWING LOCATION OF GRIDS

Scale 1:40 000

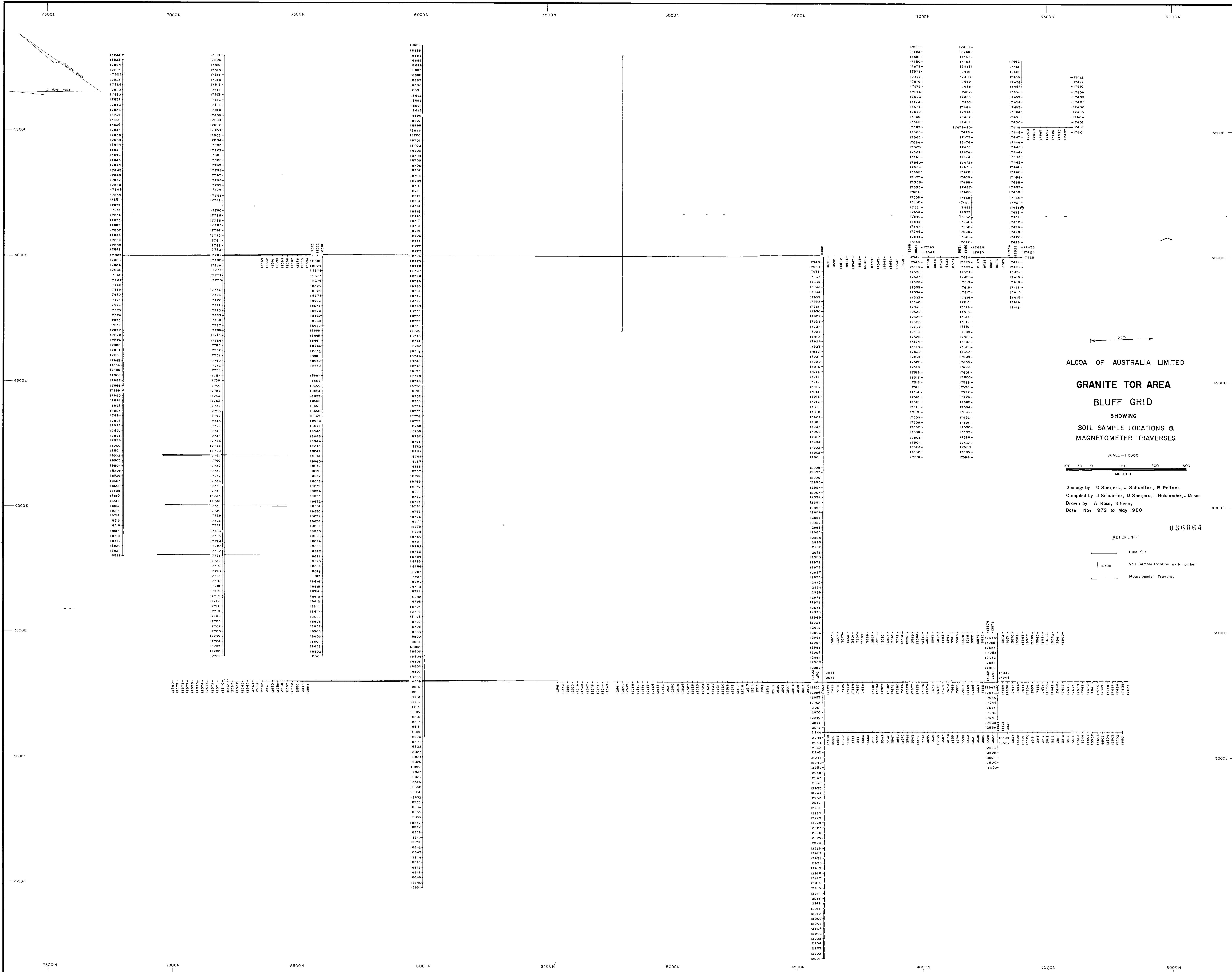


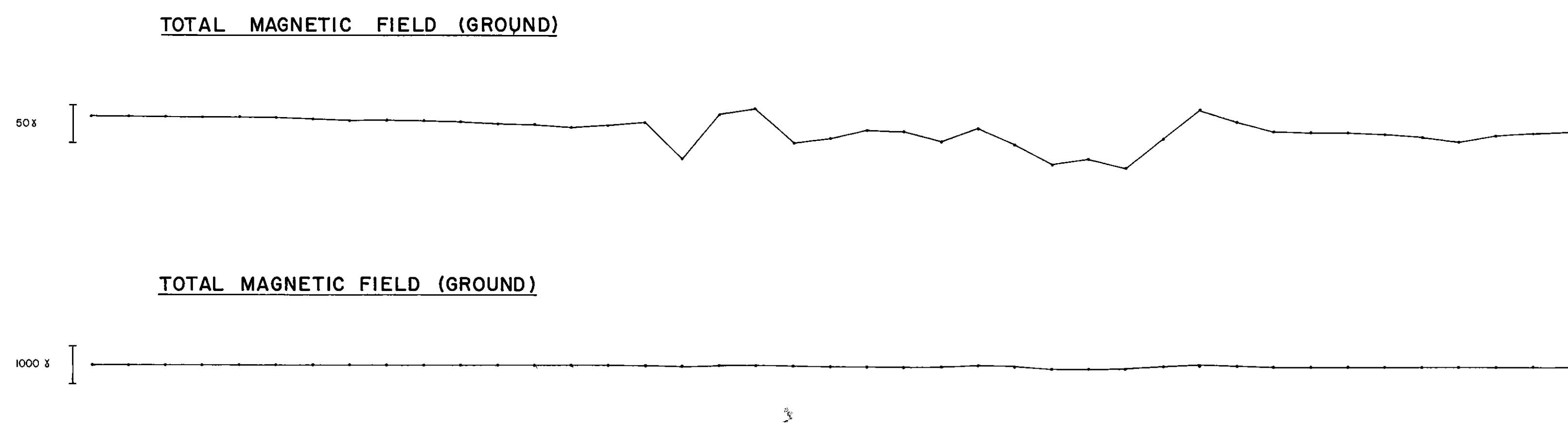
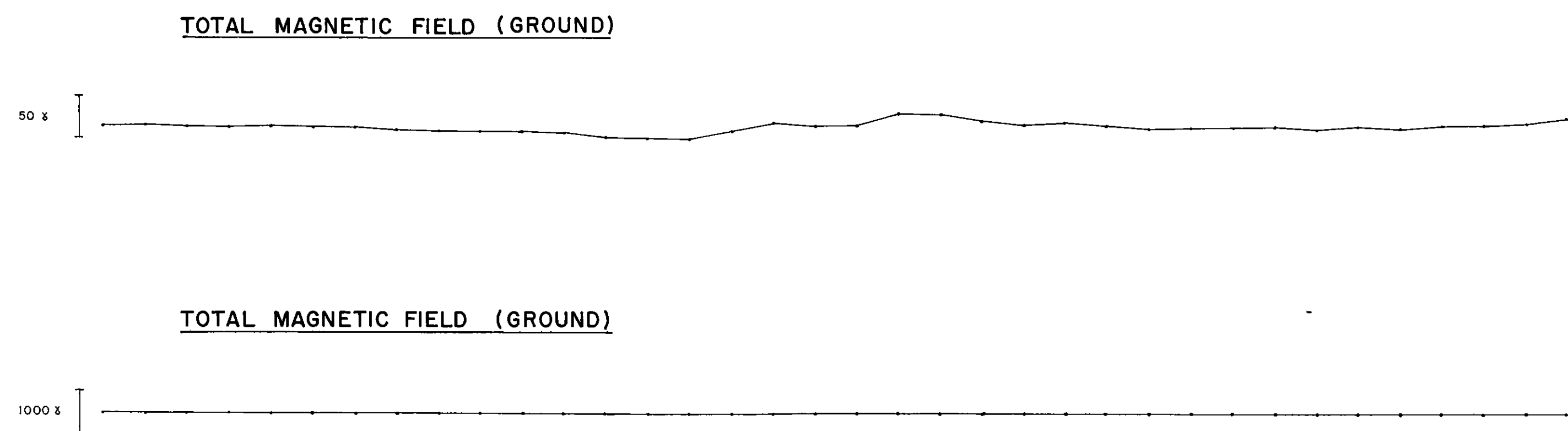
Contour interval - 50 feet

- 5/59 - photo centre run/frame
- [ref Conical Rocks - Sophia
- F423 1974-1975]
- < - Boundary of E.L. 2/78

Compiled by HEC Tasmania
Peter Livings & Assoc
D Speijers





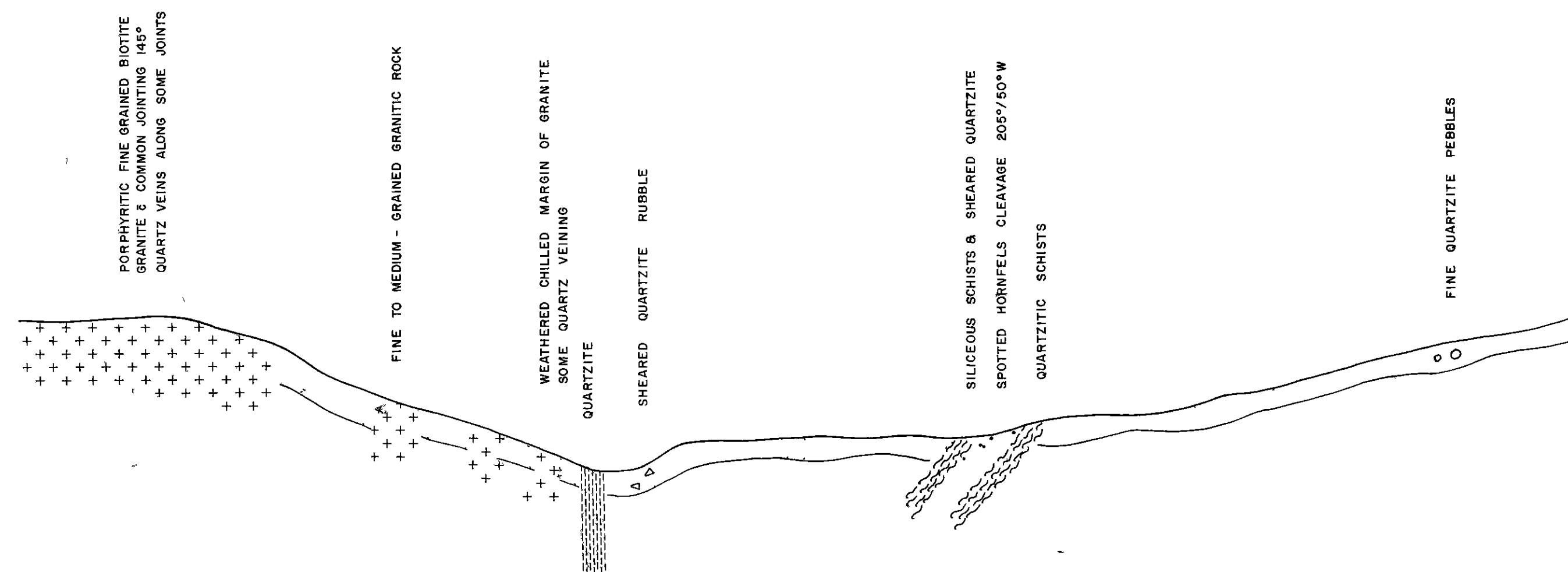


NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE.

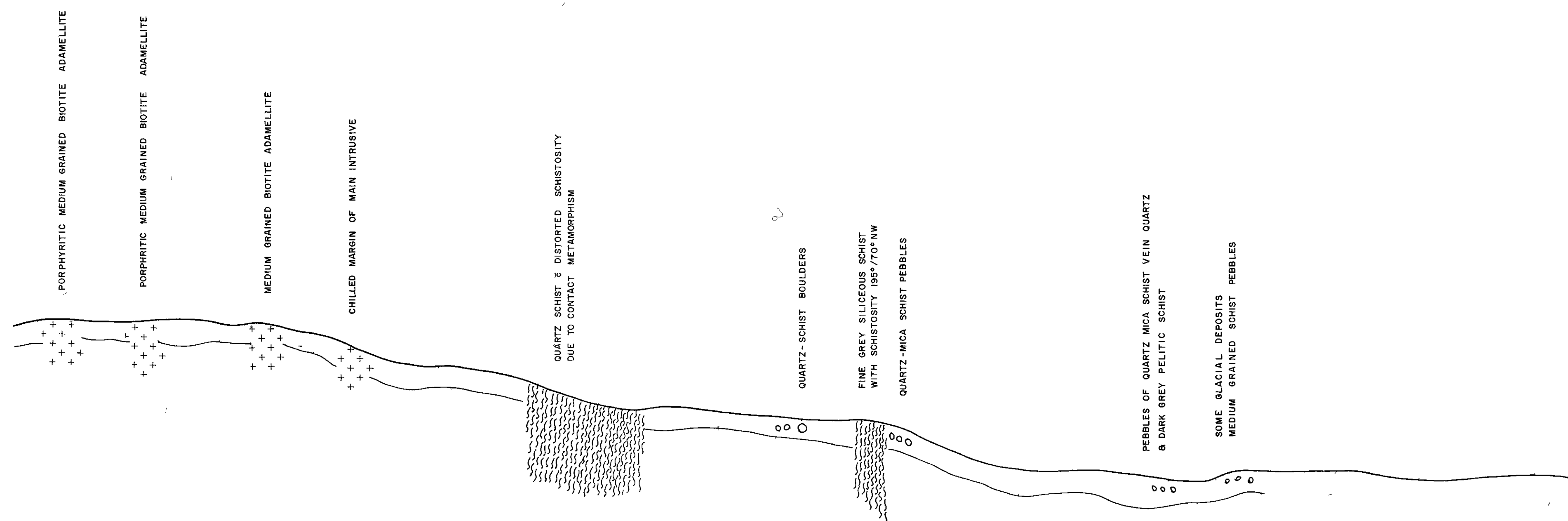
LEGEND

- RECENT DEPOSITS
- Sand and gravel (alluvial and glacial)
 - Sand or soil
 - Scree or angular gravels
- DEVONIAN INTRUSIVES
- Granites and Adamellites
- PRECAMBRIAN METASEDIMENTS
- Quartzites
 - Calc. Silicates
 - Schists
 - Hornfels
- Boulders
- Fault
- Strike and dip
- Jointing

SURFACE GEOLOGY



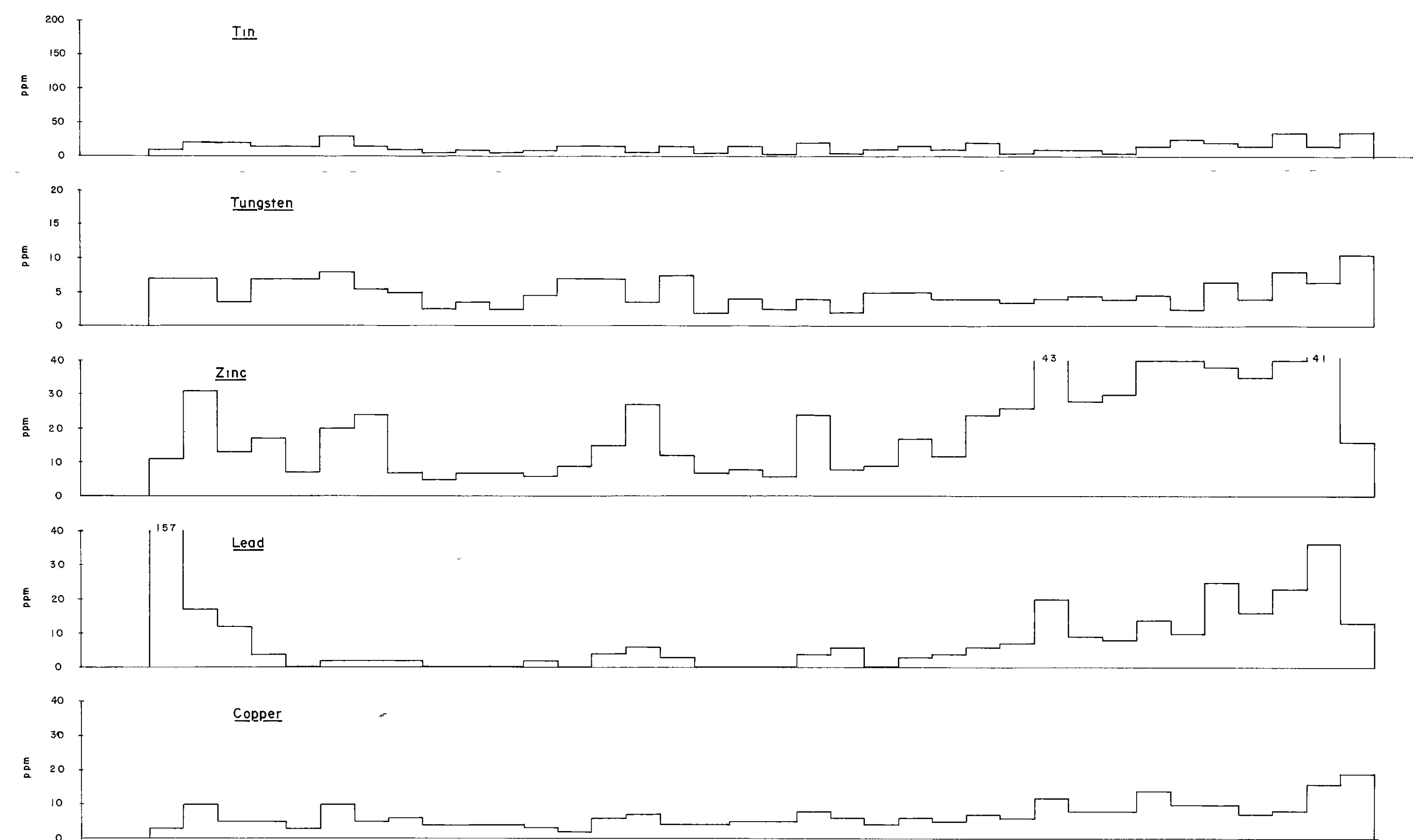
SURFACE GEOLOGY



SURFACE GEOLOGY

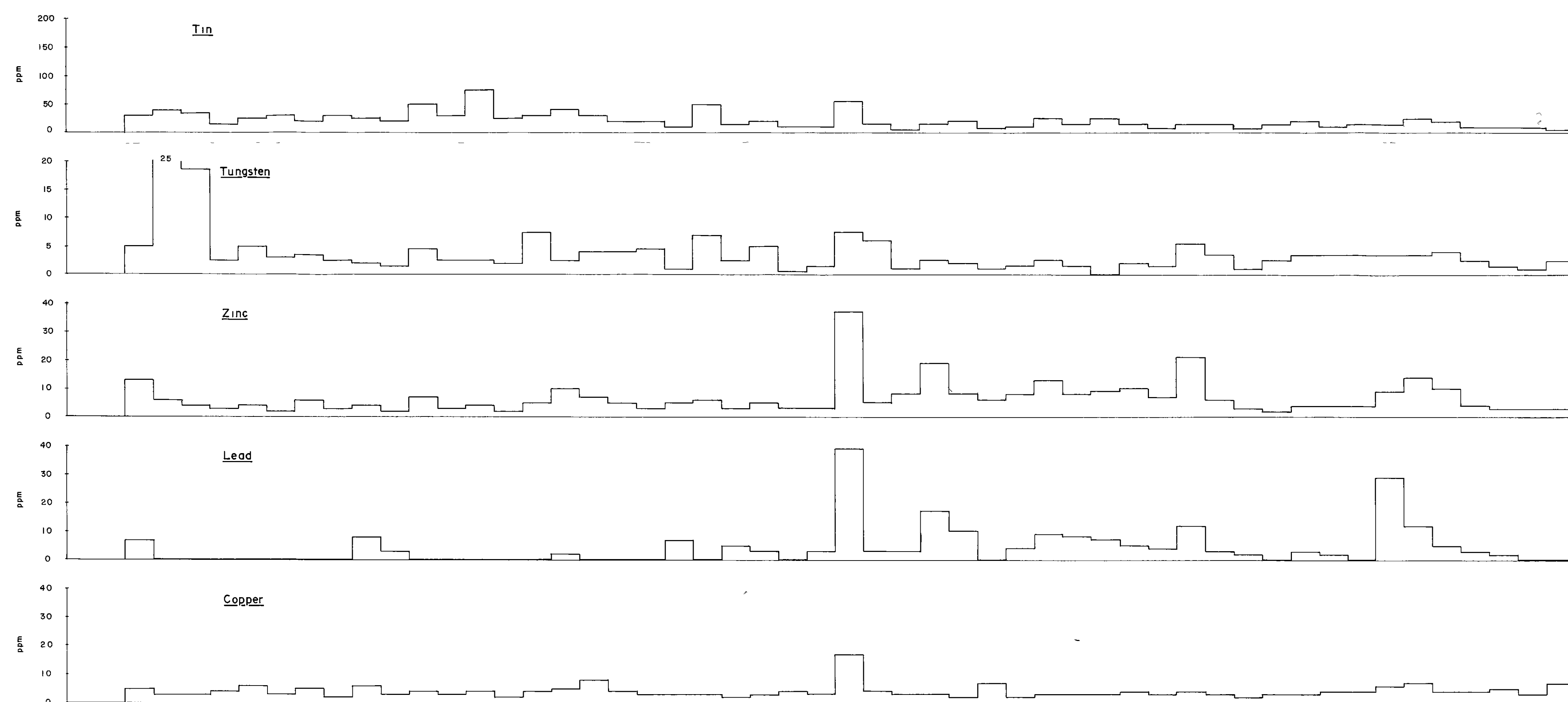


SOIL SAMPLING RESULTS



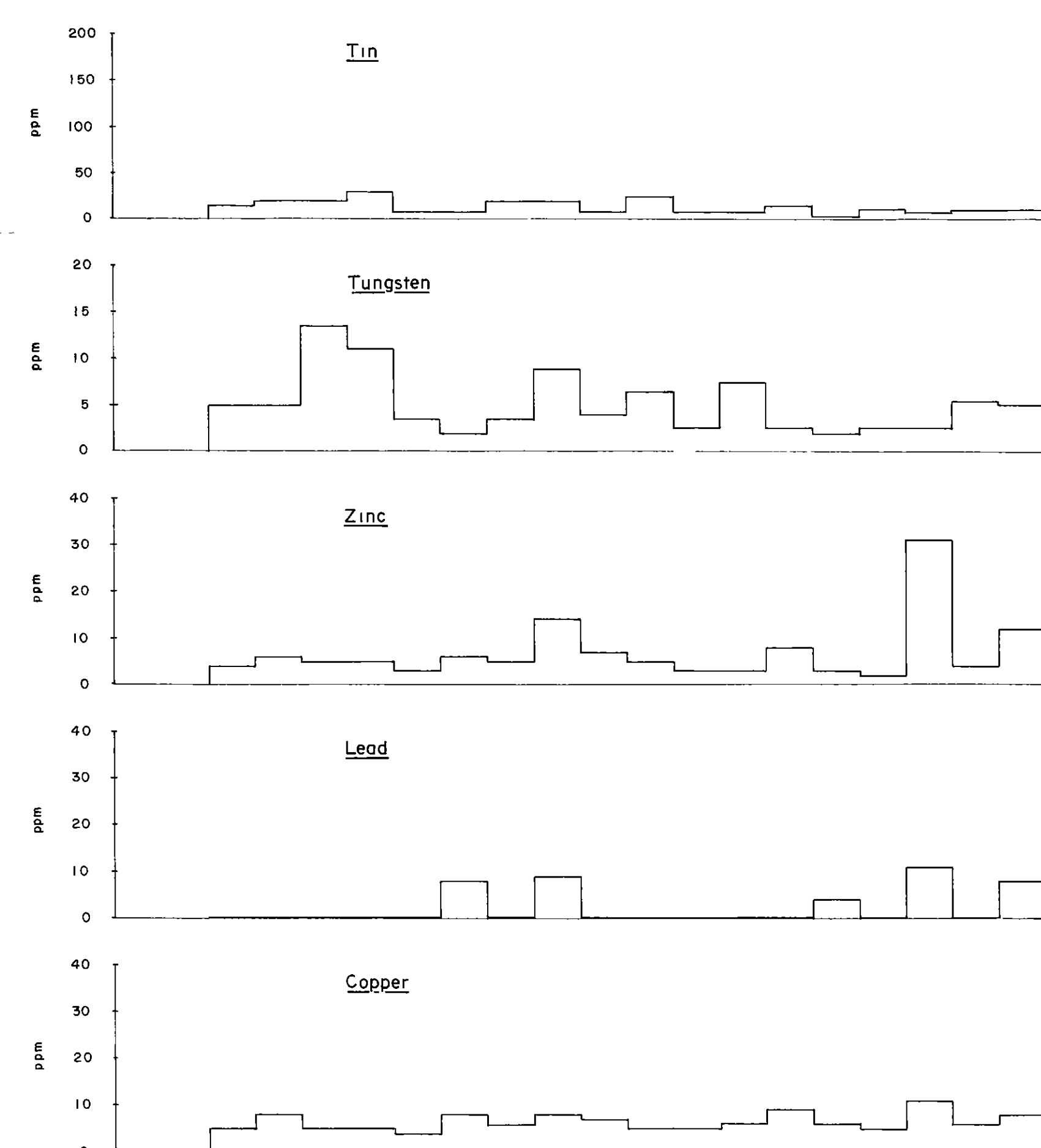
LINE 3800E

SOIL SAMPLING RESULTS



LINE 4600E

SOIL SAMPLING RESULTS



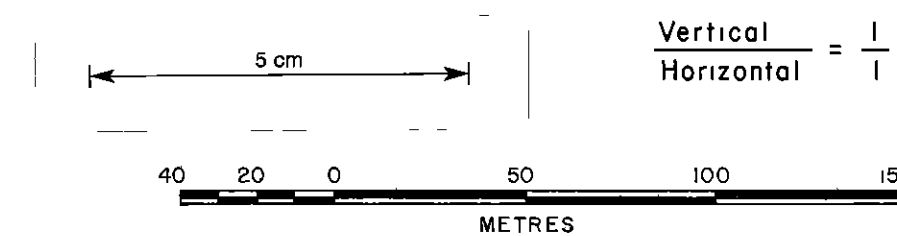
LINE 4200E

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

SWALLOW GRID CROSS SECTION

LINES 3800E, 4200E & 4600E



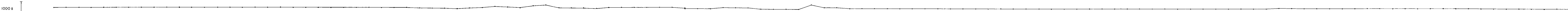
Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holabroek, J Mason
Drawn by A. Ross
Date Nov 1978 to May 1980

03606

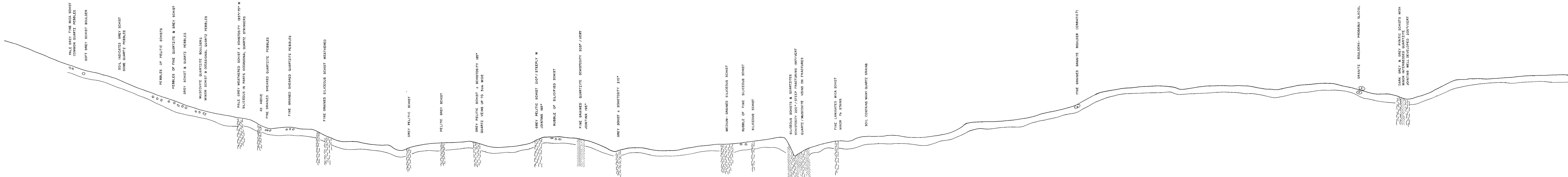
TOTAL MAGNETIC FIELD (GROUND)



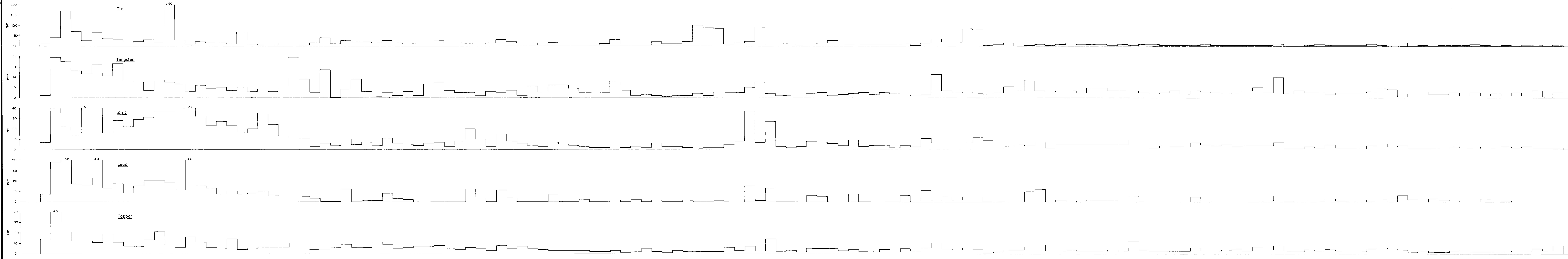
TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS



LINE 5000N

NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc. Silicates
- Schists
- Hornfels

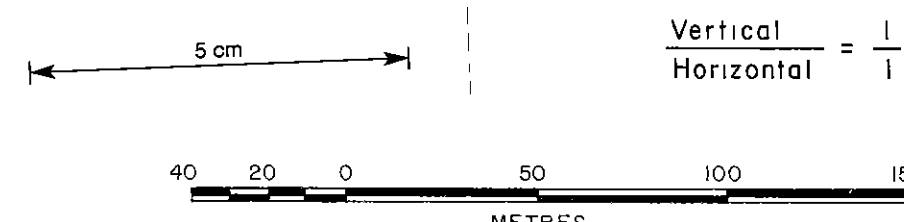
- Boulders
- Fault
- 100°/80°SW Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

SWALLOW GRID CROSS SECTION

LINE 5000N



Geology by D Speijers, J Schoeffer, R Pollock
Compiled by J Schoeffer, D Speijers, L Holbrooke, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

036067 2982

TOTAL MAGNETIC FIELD (GROUND)

50 X

TOTAL MAGNETIC FIELD (GROUND)

1000 X

SURFACE GEOLOGY

SOIL SAMPLING RESULTS

Tin

Tungsten

Zinc

Lead

Copper

LINE 5000E

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc. Silicates
- Schists
- Hornfels

- Boulders

- Fault

- Strike and dip

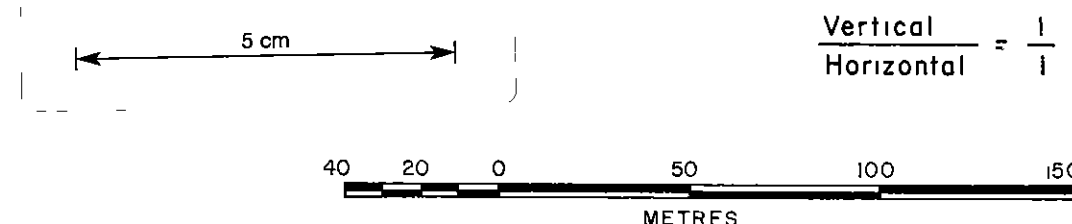
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

SWALLOW GRID CROSS SECTION

LINE 5000E



Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

036068

2983

30-1490 2/3

PLATE IX c

TOTAL MAGNETIC FIELD (GROUND)

50 x

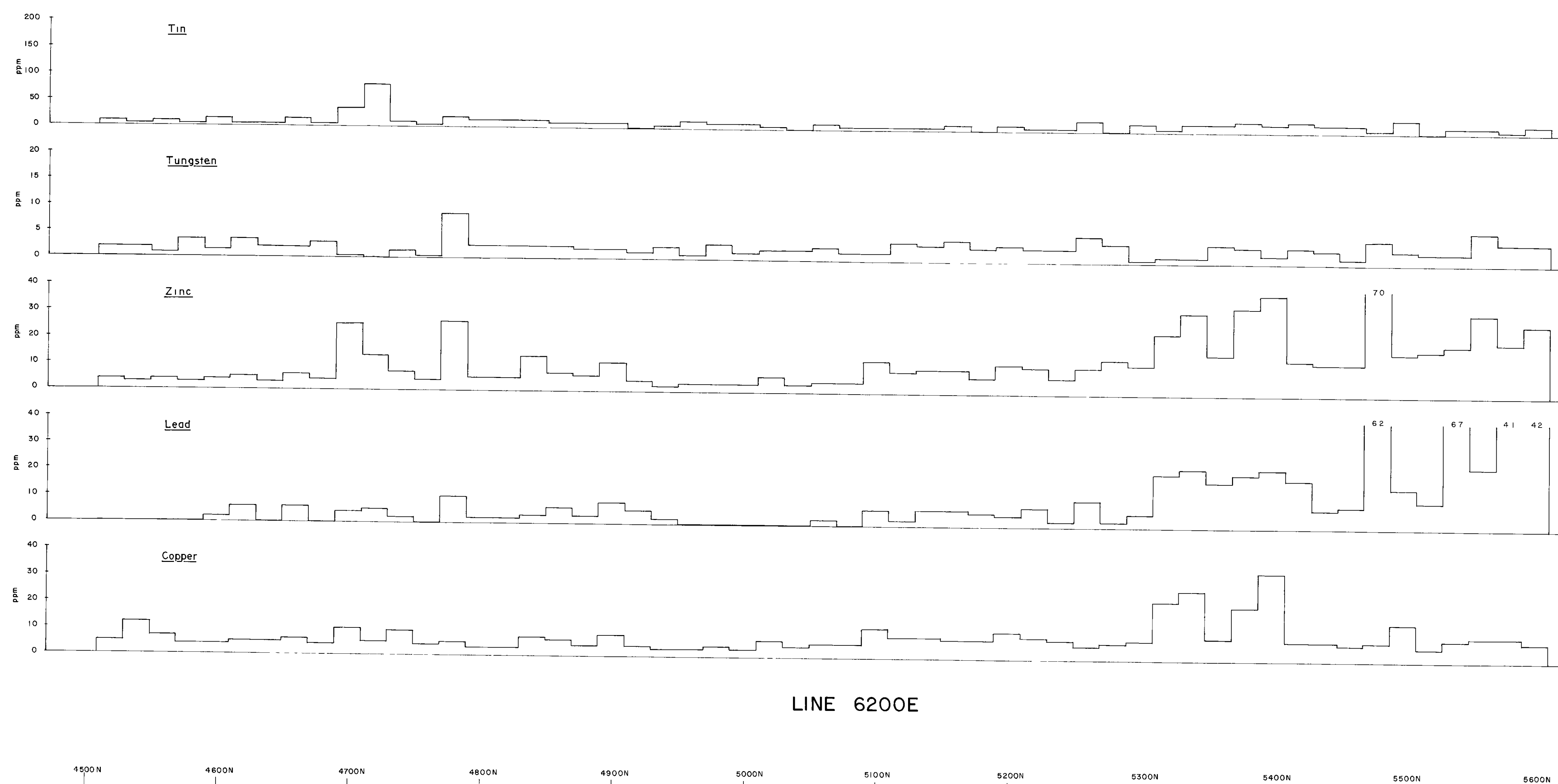
TOTAL MAGNETIC FIELD (GROUND)

1000 x

SURFACE GEOLOGY

BLUISH GRANITE
GREY MICA SCHIST 220° VERT
BLUISH GRANITE

SOIL SAMPLING RESULTS



TOTAL MAGNETIC FIELD (GROUND)

50 x

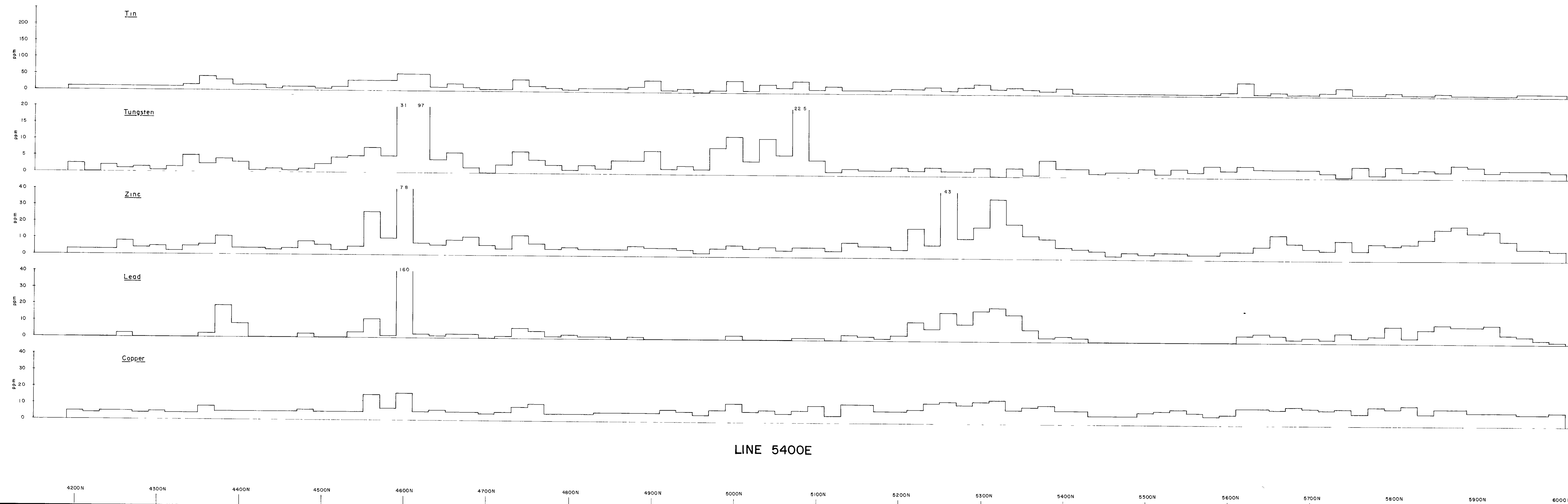
TOTAL MAGNETIC FIELD (GROUND)

1000 x

SURFACE GEOLOGY

INDURATED SCHIST PEBBLES
V. QUARTZ PEBBLES
PEBBLES OF QUARTZ COARSE
A. SILICONS AND SCHIST
QUARTZITE & SILICONS SCHIST
200° VERT
QUARTZITE PEBBLES
GRANITE BOULDERS (CONTINUES?)
LIGHT GREY SCHIST 4° STAIN
200° VERT
HAND GREY SCHIST PEBBLES
HALE GREY MICA SCHIST PEBBLES
LEPHE GRANITE BOULDERS
HALE GRANITE BOULDERS
SOUTHERLY GRANITE
SMALL GRANITE & QUARTZ BOULDERS

SOIL SAMPLING RESULTS



NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc Silicates
- Schists
- Hornfels

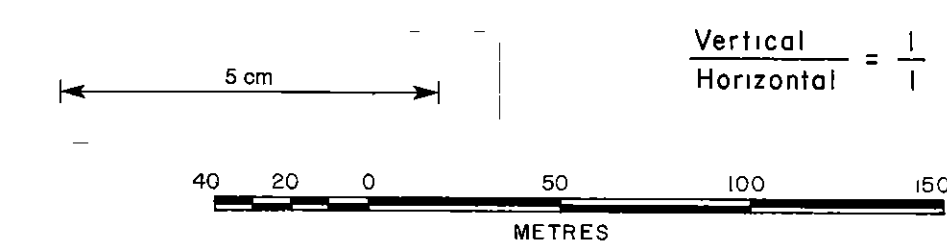
- Boulders
- Fault
- Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

SWALLOW GRID CROSS SECTION

LINES 6200E & 5400E



Geology by: D. Speijers, J. Schoeffer, R. Pollock
Compiled by: J. Schoeffer, D. Speijers, L. Holabrook, J. Mason
Drawn by: A. Ross
Date: Nov 1979 to May 1980
036069

036070

802054

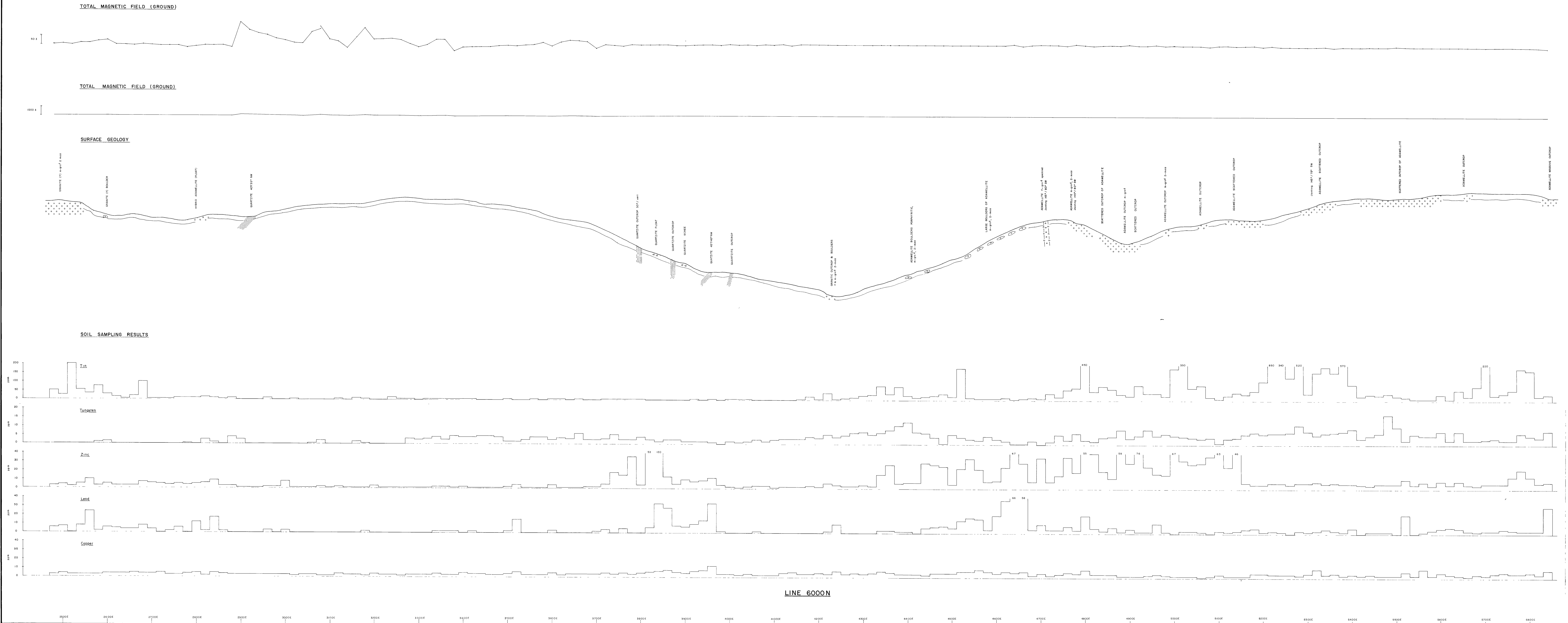
REPORT ON
EXPLORATION OF E.L.2/78
DURING 1980
VOLUME III

ALCOA OF AUSTRALIA LIMITED
Exploration Division

RECEIVED

Prepared by :
D.C. Speijers

Project Report No. 23
October 1980



NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

- LEGEND
- RECENT DEPOSITS
- Sand and gravel (alluvial and glacial)
 - Sand or soil
 - Gravel or angular gravels
- DEVONIAN INTRUSIVES
- Granites and Adamellites
- PRECAMBRIAN METASEDIMENTS
- Quartzites
 - Calc Silicates
 - Schists
 - Hornfels
- Boulders
- Fault
- Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINE 6000N

Geology by: D Speijers, J Schoeffler, R Pollock
Compiled by: J Schoeffler, D Speijers, L Holabrook, J Mason
Drawn by: A Ross
Date: Nov 1979 to May 1980

036071

80-1490 3/3 2969 PLATE VIII

NOTE MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

[illegible]

The figure displays five stacked gamma-ray spectra plots for different elements, showing counts per second (cps) on the y-axis and energy in keV on the x-axis. The x-axis is labeled 'LINE 6400N'.

- Tin (Sn):** The y-axis ranges from 0 to 200 cps. A prominent peak is labeled '300' at approximately 300 keV.
- Tungsten (W):** The y-axis ranges from 0 to 20 cps. A prominent peak is labeled '42' at approximately 42 keV.
- Zinc (Zn):** The y-axis ranges from 0 to 40 cps. A prominent peak is labeled '56' at approximately 56 keV.
- Lead (Pb):** The y-axis ranges from 0 to 40 cps. A prominent peak is labeled '56' at approximately 56 keV.
- Copper (Cu):** The y-axis ranges from 0 to 40 cps. A prominent peak is labeled '250' at approximately 250 keV.

LEGEND

RECENT DEPOSITS

- | | |
|---|--|
|  | Sand and gravel (alluvial and glacial) |
|  | Sand or soil |
|  | Scree or angular gravels |

DEVONIAN INTRUSIVES

-
- Granites and Adamellites**

PRECAMBRIAN METASEDIMENTS

- | | |
|---|----------------|
|  | Quartzites |
|  | Calc Silicates |
|  | Schists |
|  | Hornfels |

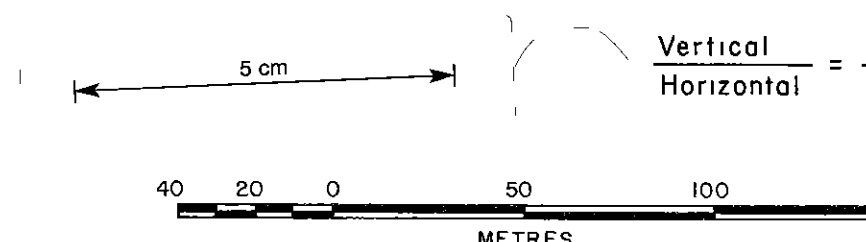
-  Boulders
 Fault
 180°/60° NW Strike and dip
 Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINE 6400 N

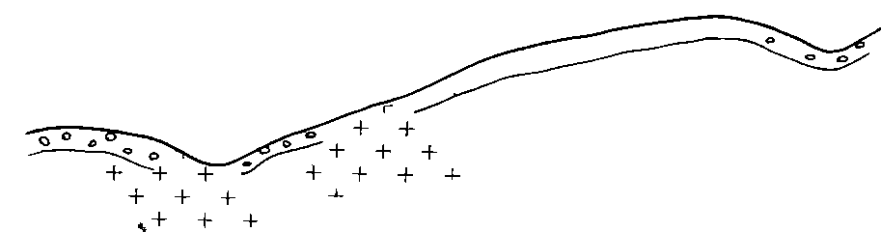


Geology by D Speijers, J Schaeffer, R Polrock
Compiled by J Schaeffer, D Speijers, L Holobradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

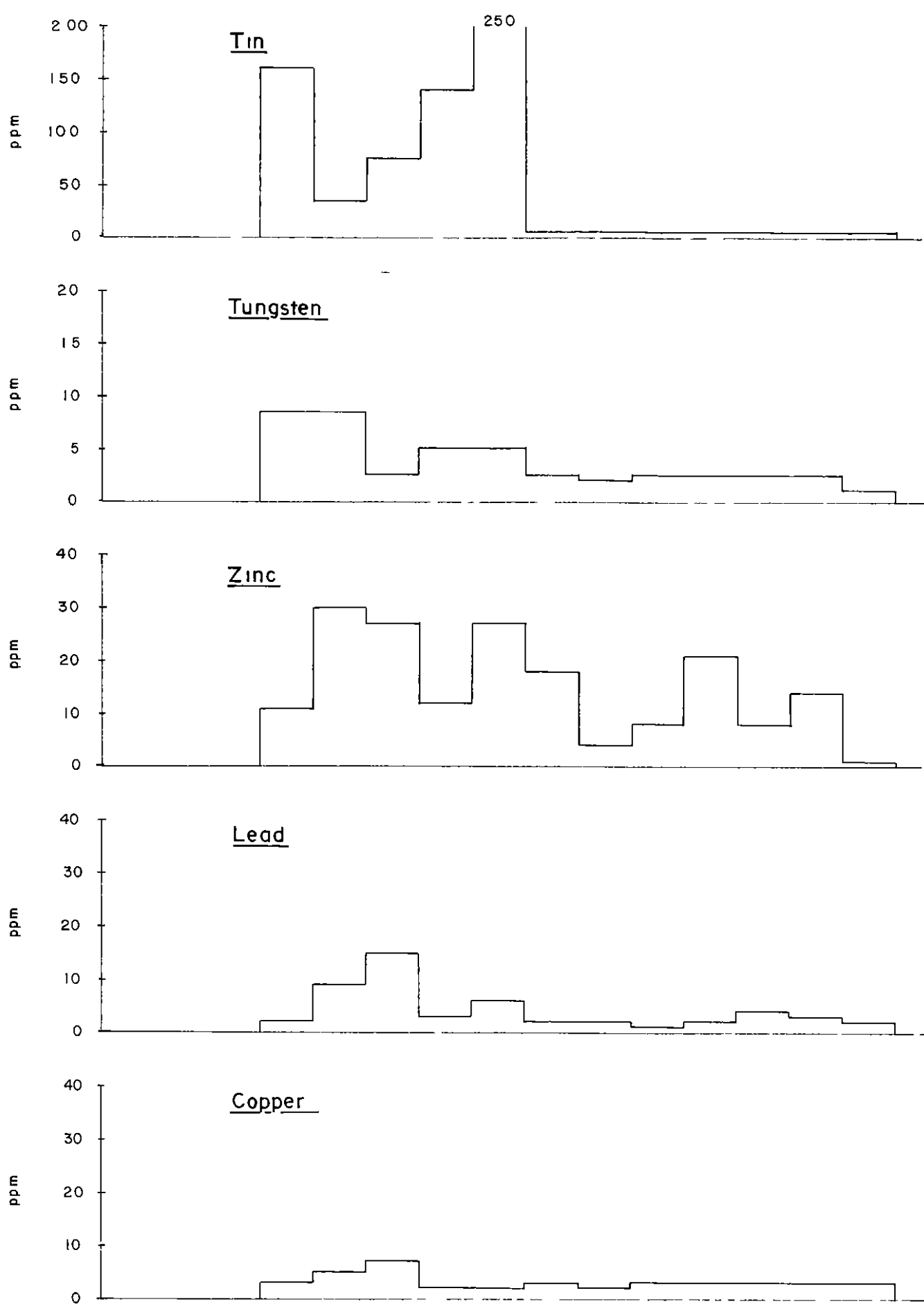
036072

NOTE MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

SURFACE GEOLOGY



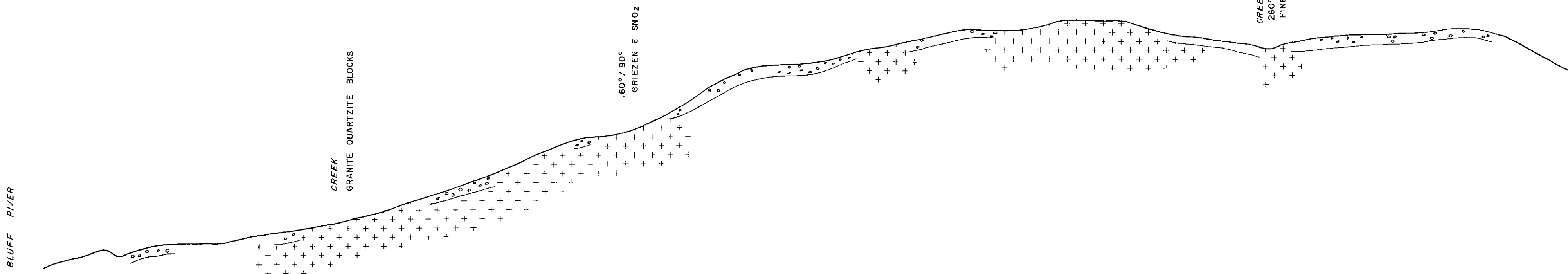
SOIL SAMPLING RESULTS



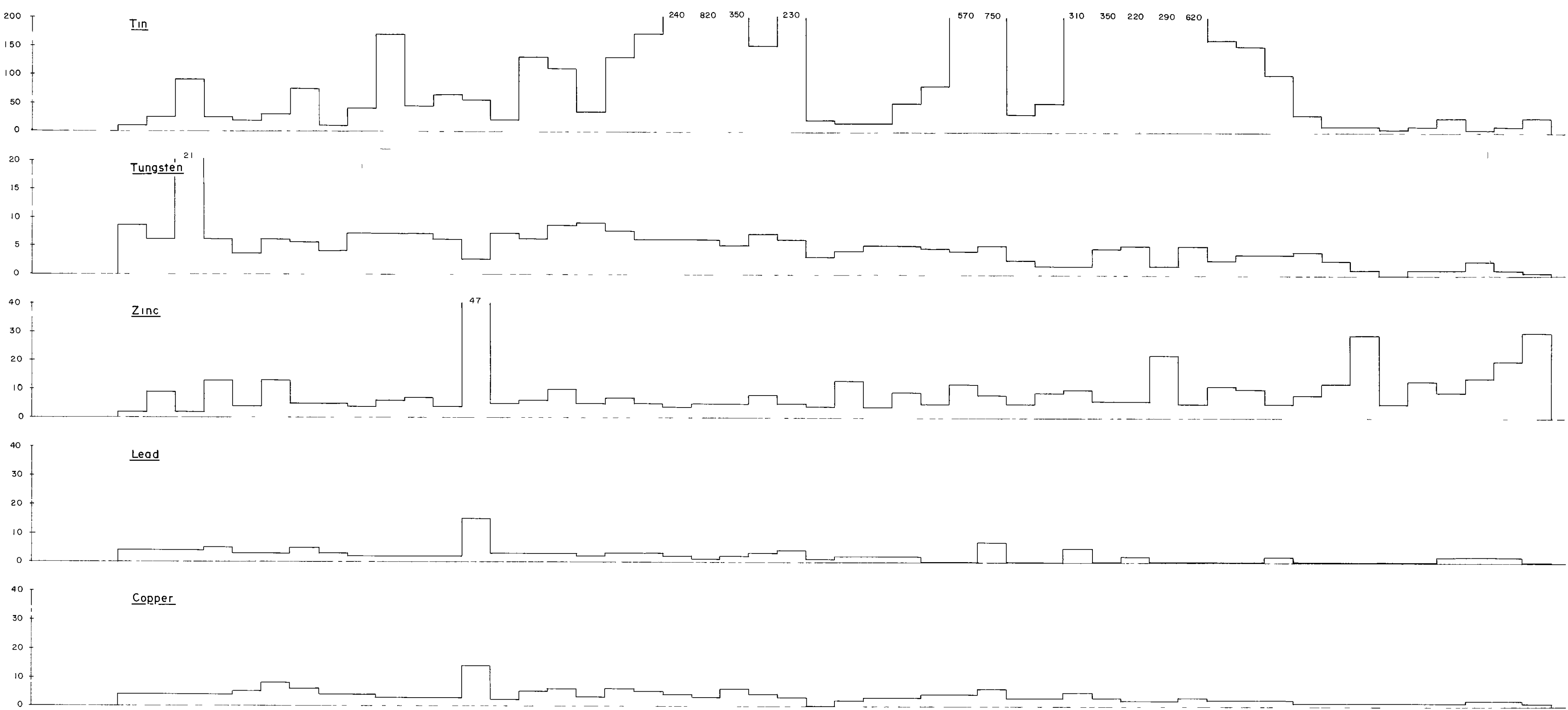
LINE 3400N

5500E 5600E 5700E

SURFACE GEOLOGY



SOIL SAMPLING RESULTS



LINE 3600N

4800E 4900E 5000E 5100E 5200E 5300E 5400E 5500E 5600E 5700E 5800E

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc Silicates
- Schists
- Hornfels

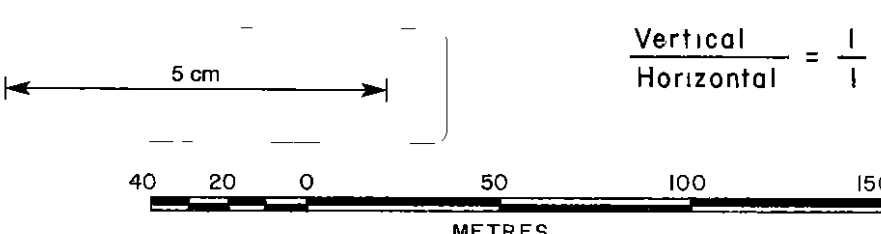
- Boulders
- Fault
- Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINES 3400N & 3600N



Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

036073

NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

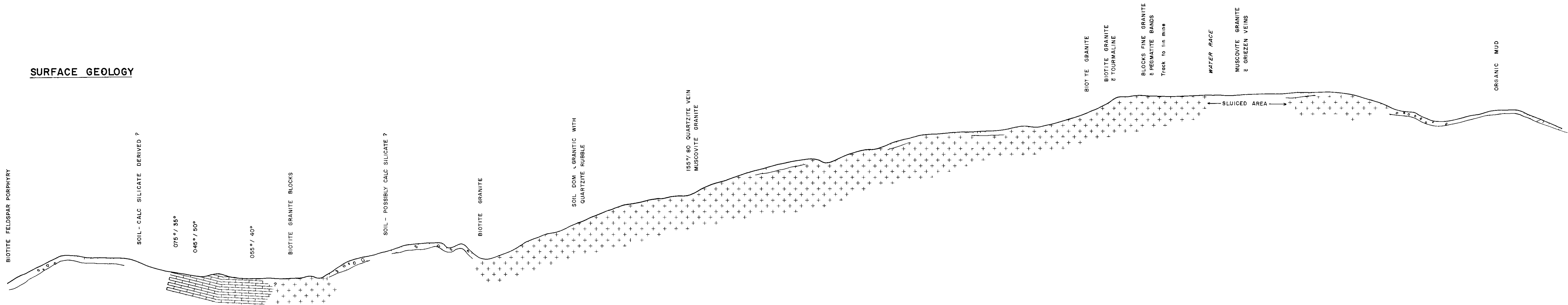
- RECENT DEPOSITS
- Sand and gravel (alluvial and glacial)
 - Sand or soil
 - Scree or angular gravels

- DEVONIAN INTRUSIVES
- Granites and Adamelites

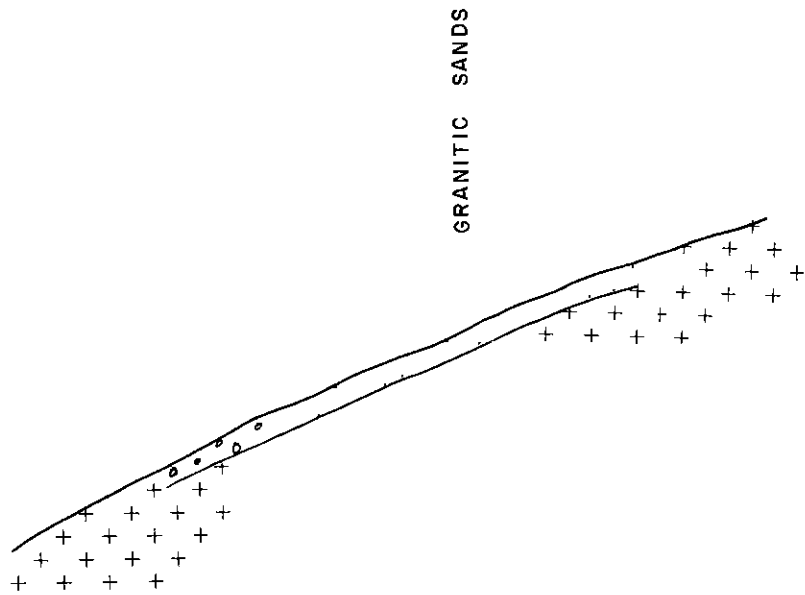
- PRECAMBRIAN METASEDIMENTS
- Quartzites
 - Calc Silicates
 - Schists
 - Hornfels

- Boulders
- Fault
- 180°/80°NW Strike and dip
- Jointing

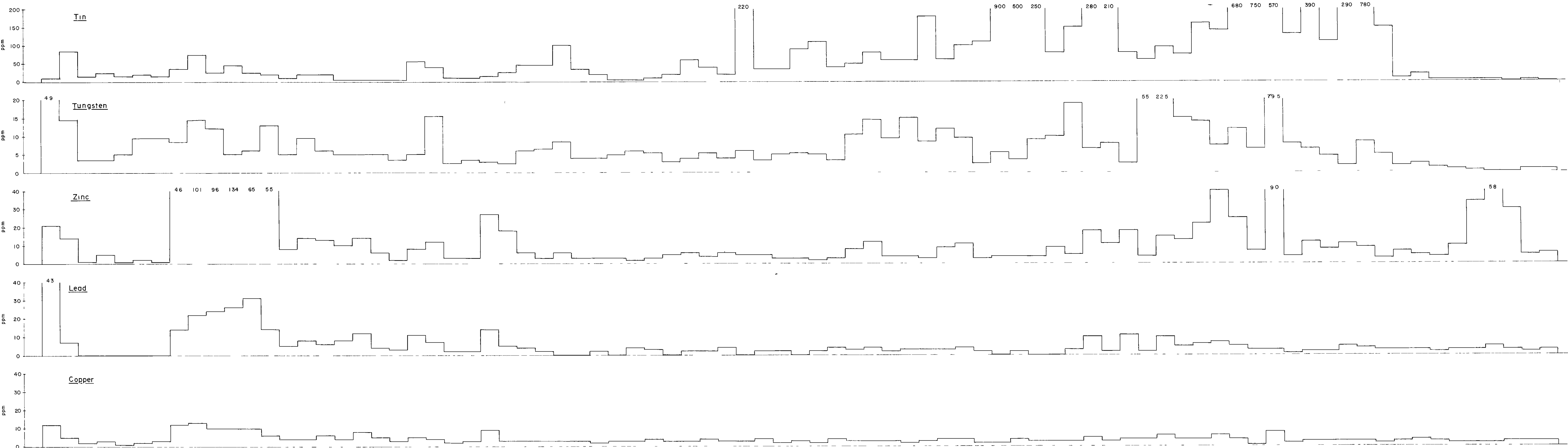
SURFACE GEOLOGY



SURFACE GEOLOGY

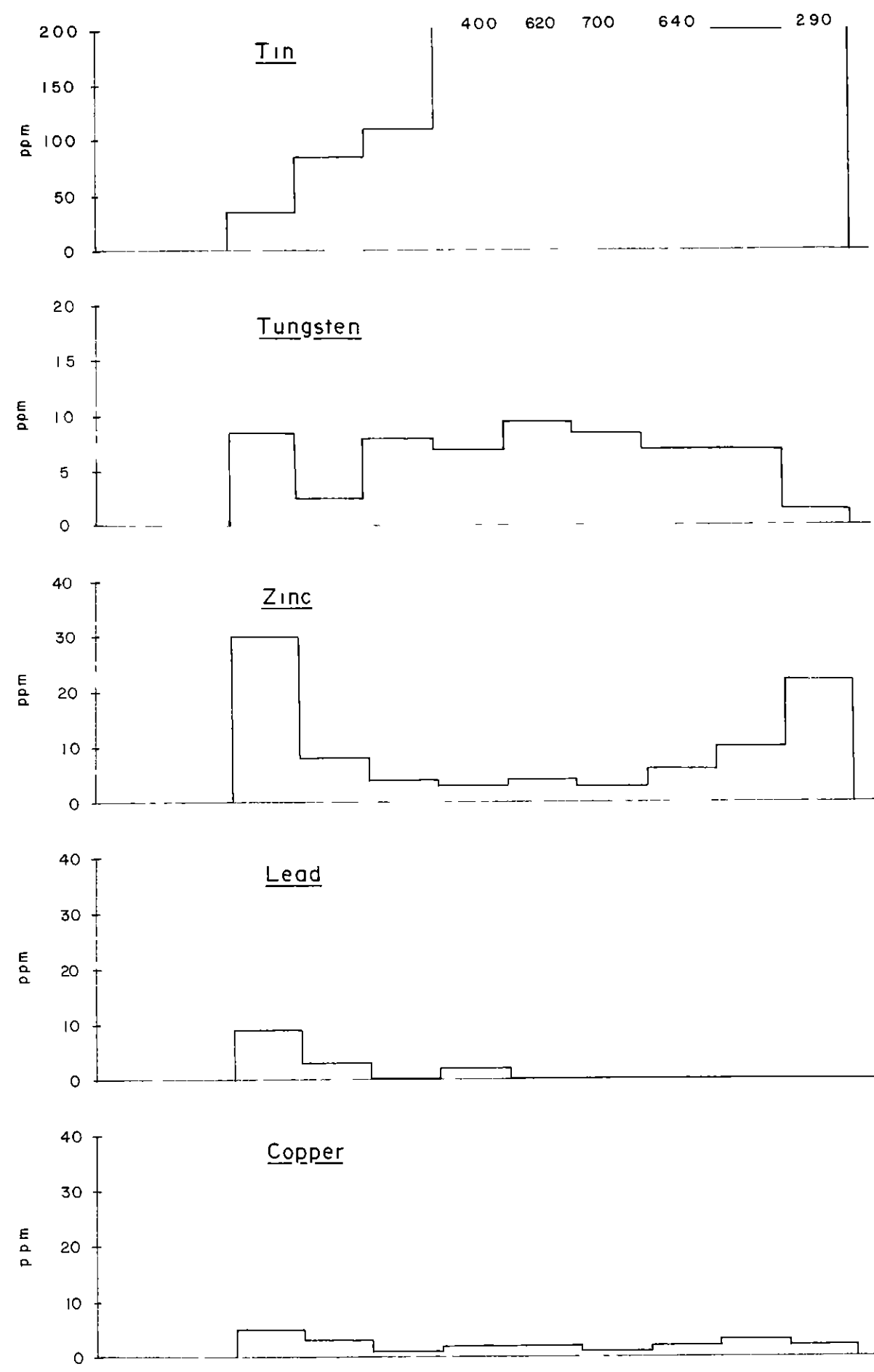


SOIL SAMPLING RESULTS



LINE 3800N

SOIL SAMPLING RESULTS



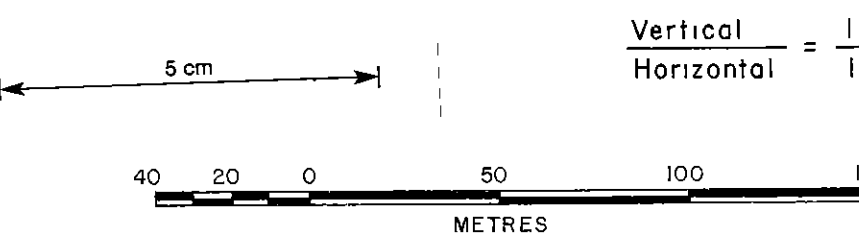
LINE 5520E

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

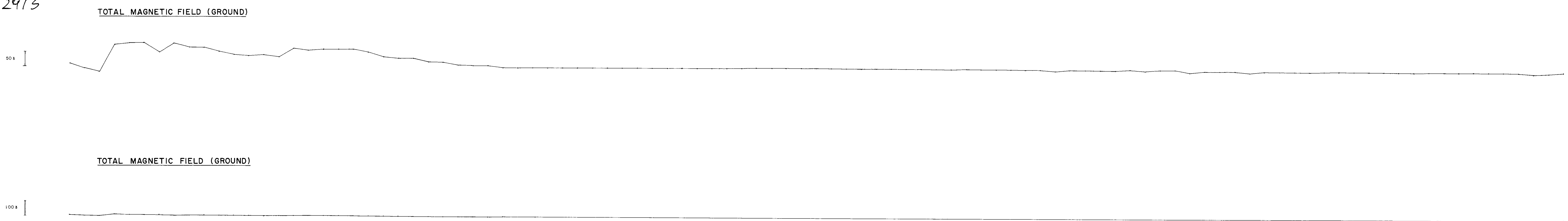
BLUFF GRID CROSS SECTION

LINES 3800N & 5520E

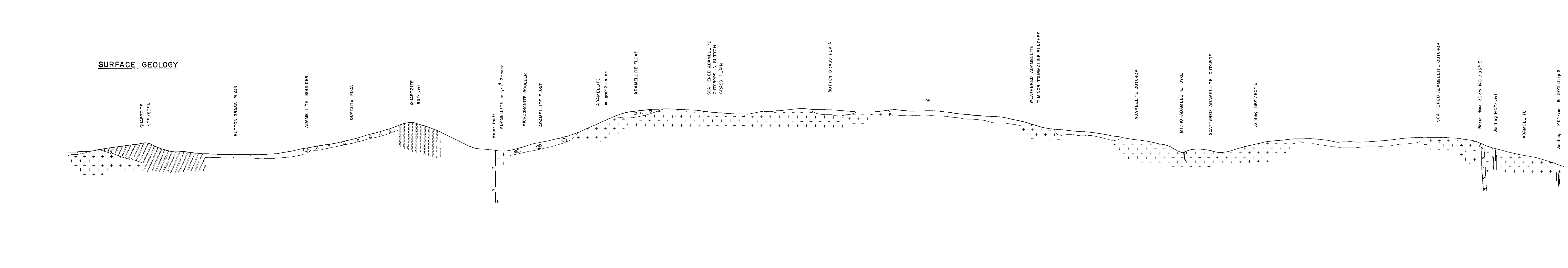


Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobrodek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

036074



NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE



LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamelites

PRECAMBRIAN METASEDIMENTS

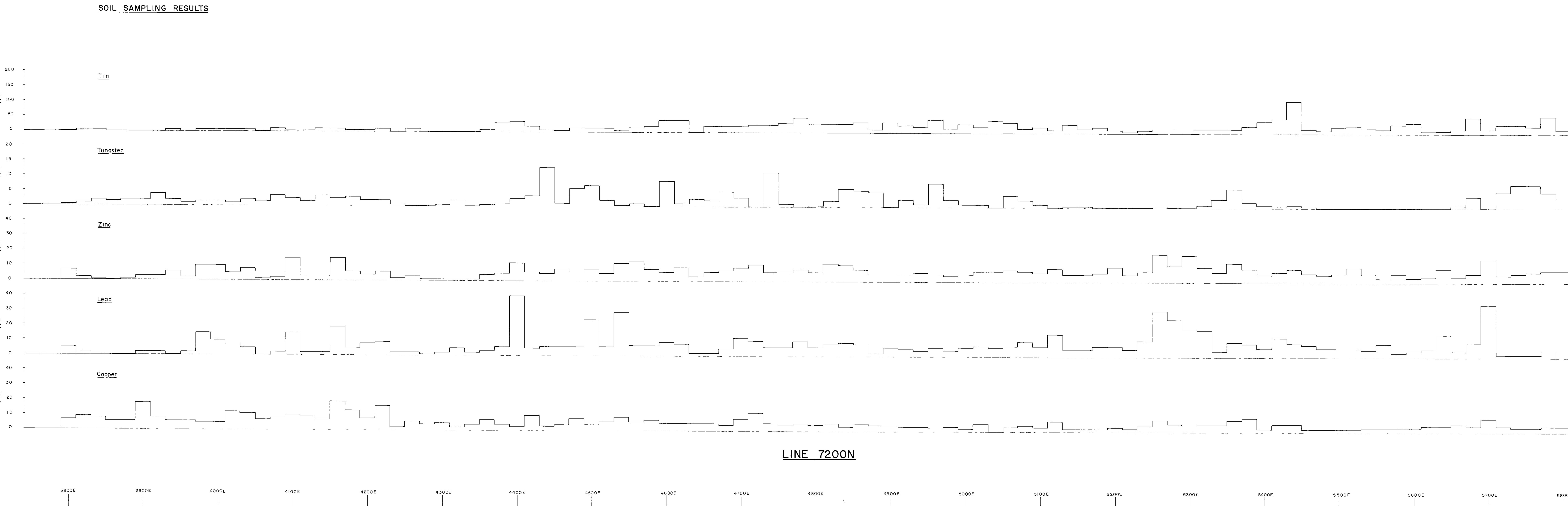
- Quartzites
- Calc Silicates
- Schists
- Hornfels

Boulders

Fault

180°/80°NW Strike and dip

Jointing



ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINE 7200N

5 cm

Vertical = 1
Horizontal = 1

40 20 0 50 100 150 METRES

Geology by D Speijers, J Schoeffer, R Pollock
Compiled by J Schoeffer, D Speijers, L Holabradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

03075

TOTAL MAGNETIC FIELD (GROUND)



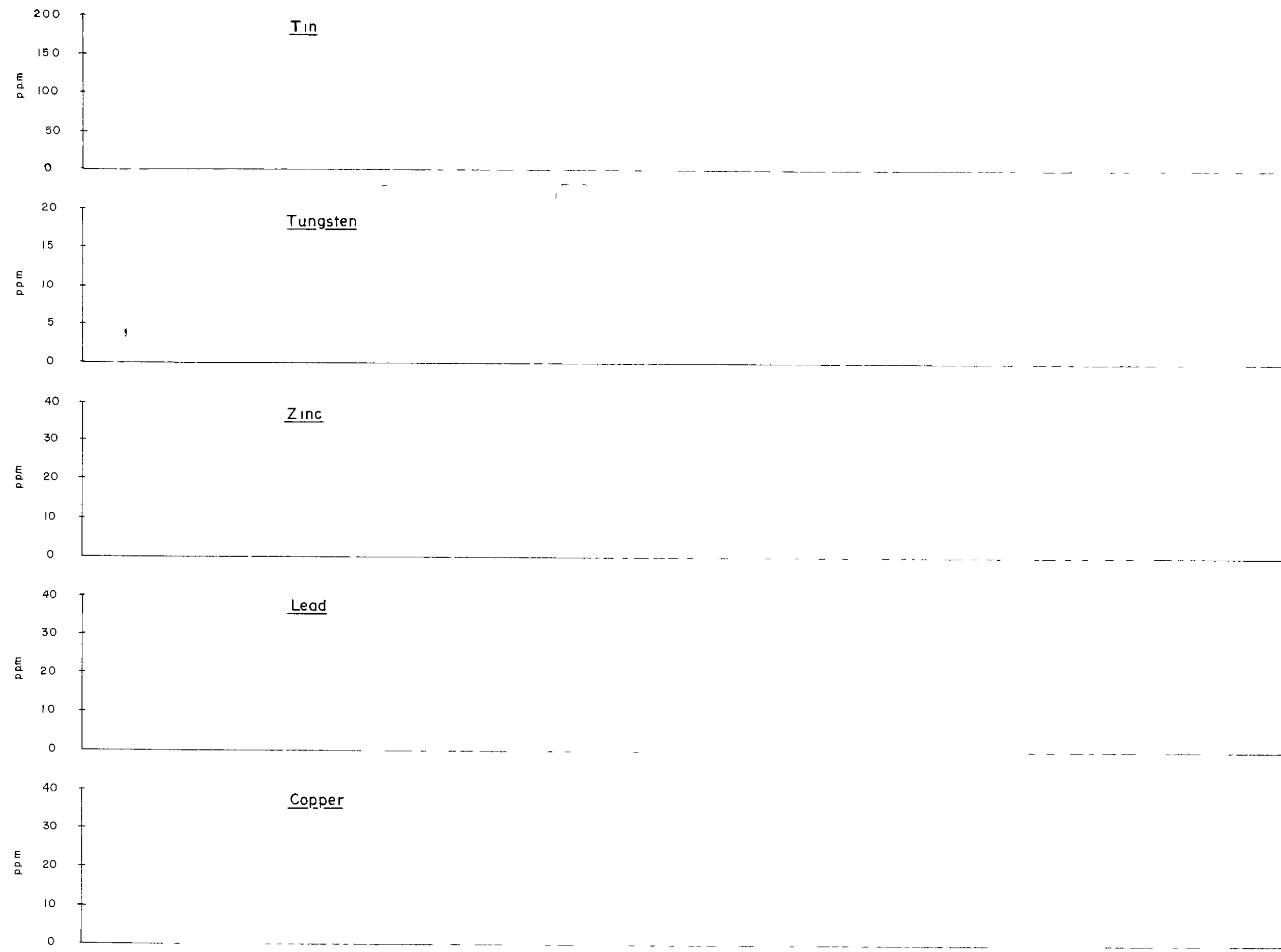
TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS

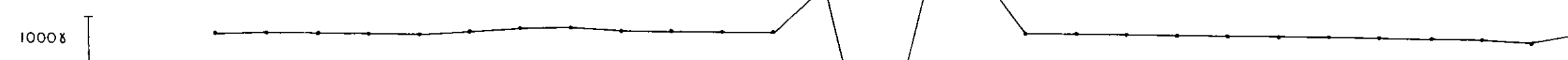


LINE 3800E

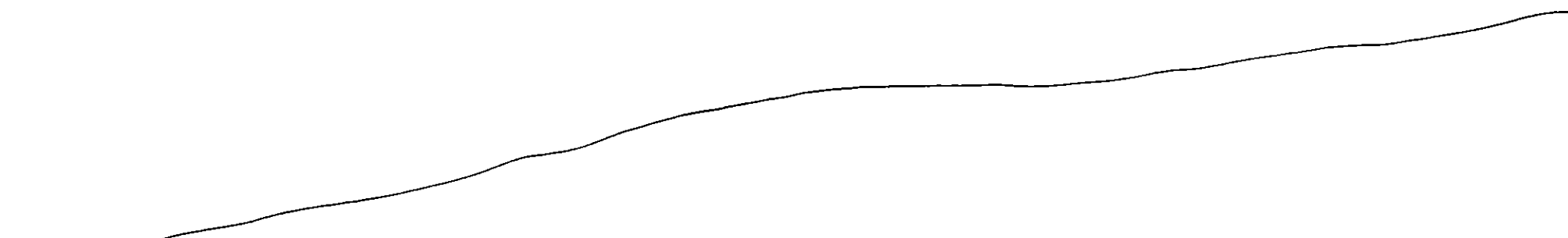
TOTAL MAGNETIC FIELD (GROUND)



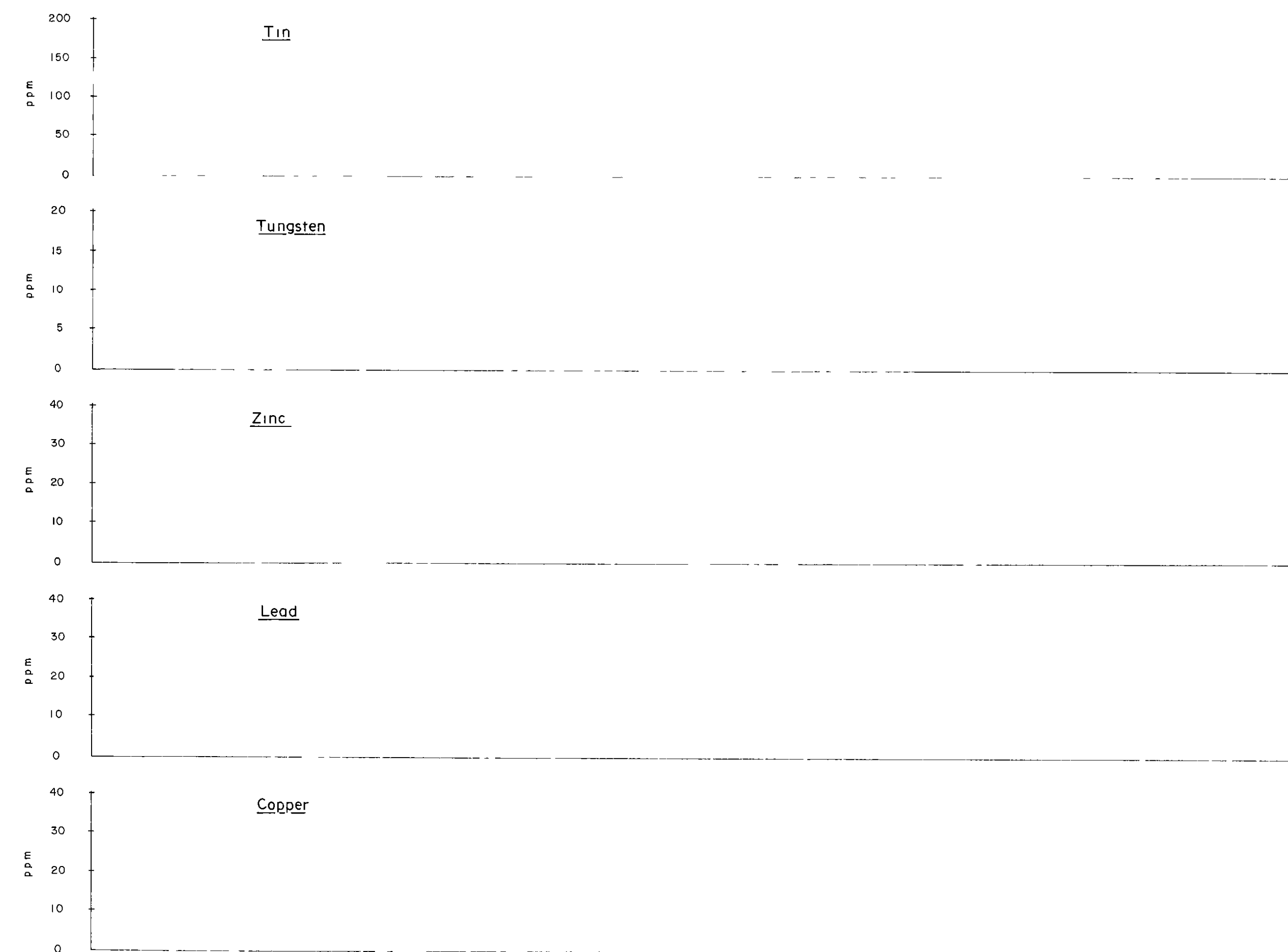
TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS

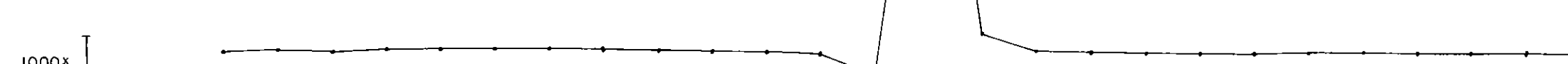


LINE 4000E

TOTAL MAGNETIC FIELD (GROUND)



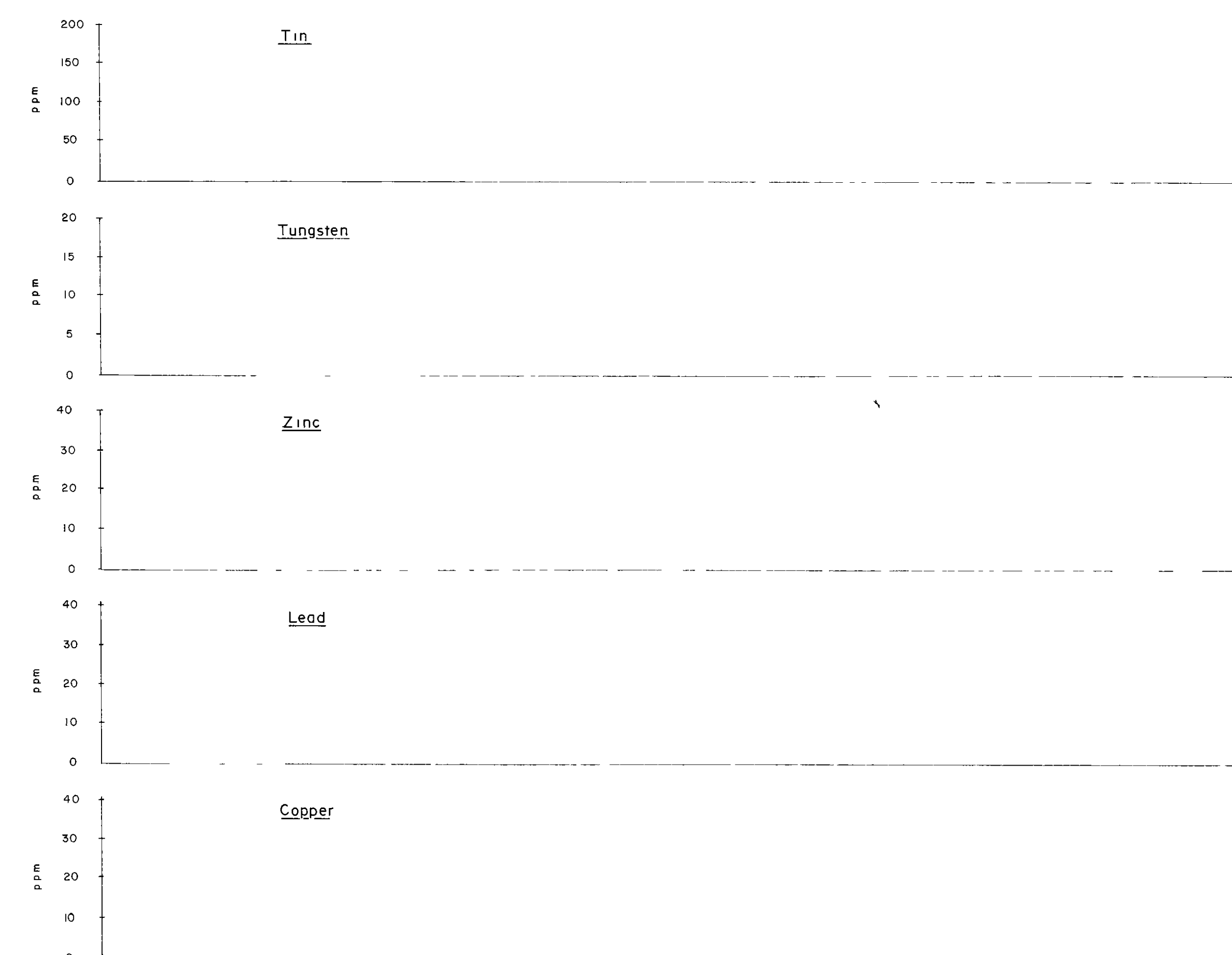
TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS



LINE 4200E

NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE.

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc. Silicates
- Schists
- Hornfels

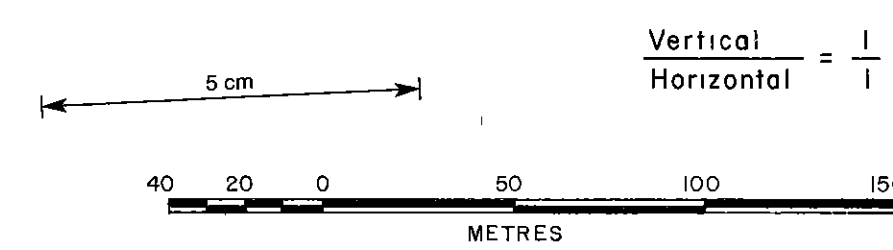
- Boulders
- Fault
- Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINES 3800E, 4000E & 4200E

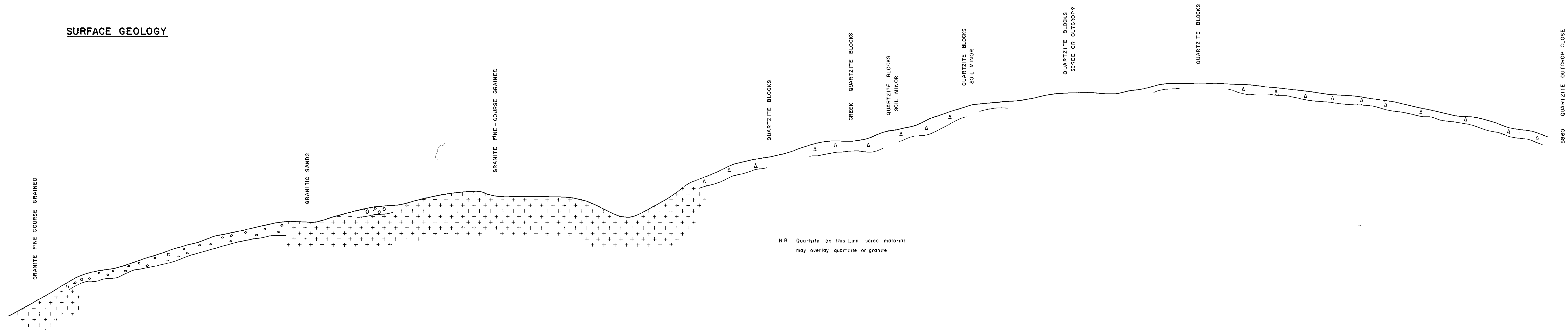


Geology by D. Speijers, J. Schaeffer, R. Patrock
Compiled by J. Schaeffer, D. Speijers, L. Holabroek, J. Mason
Drawn by A. Ross
Date: Nov 1979 to May 1980

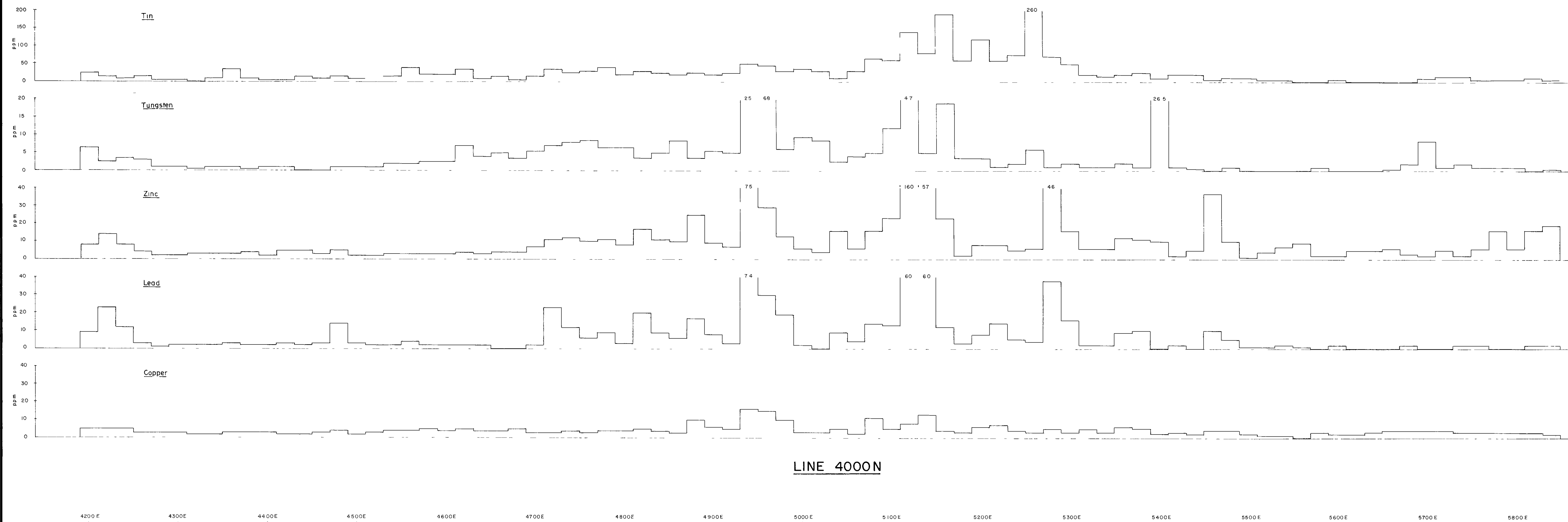
036076

2975

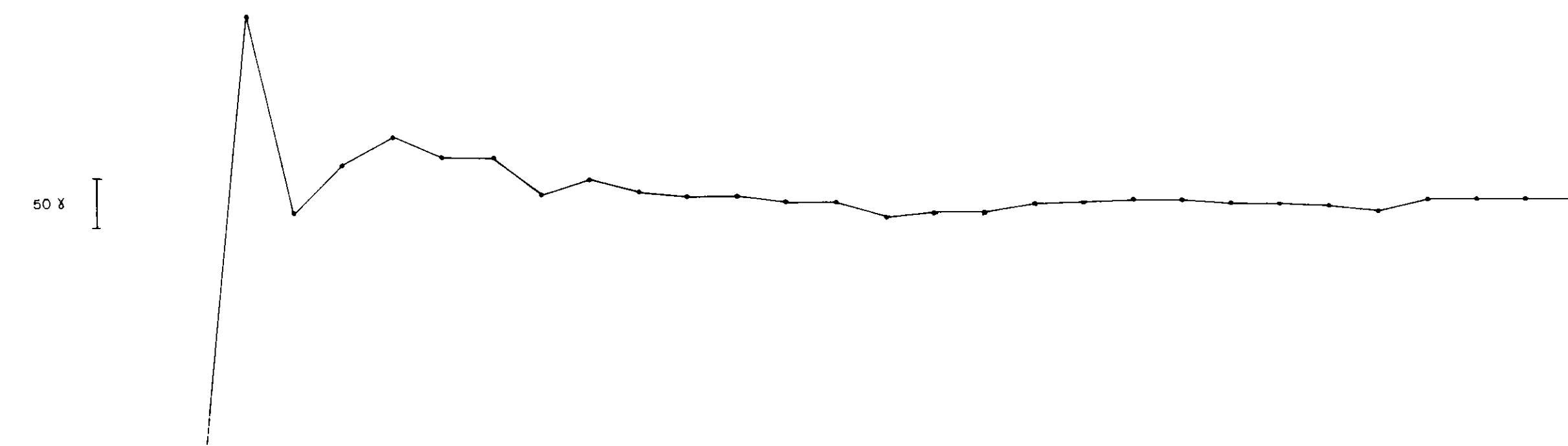
SURFACE GEOLOGY



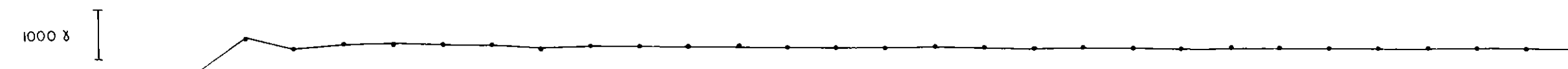
SOIL SAMPLE RESULTS



TOTAL MAGNETIC FIELD (GROUND)



TOTAL MAGNETIC FIELD (GROUND)



NOTE MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

RECENT DEPOSITS

- | | |
|---|--|
|  | Sand and gravel (alluvial and glacial) |
|  | Sand or soil |
|  | Scree or angular gravels |

DEVONIAN INTRUSIVES

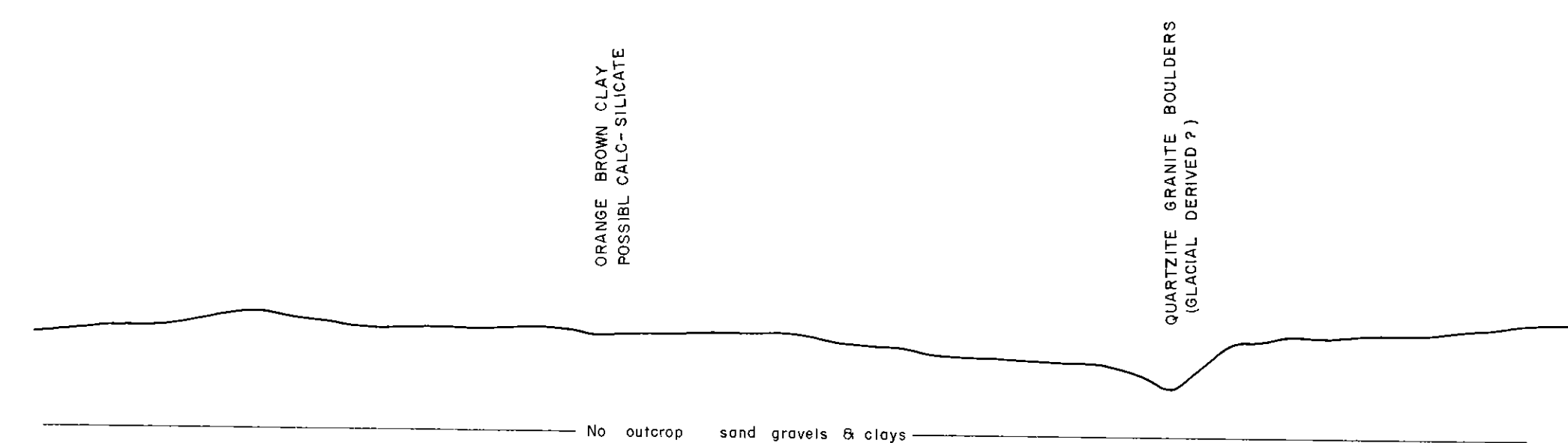
-  Granites and Adamellites

PRECAMBRIAN METASEDIMENTS

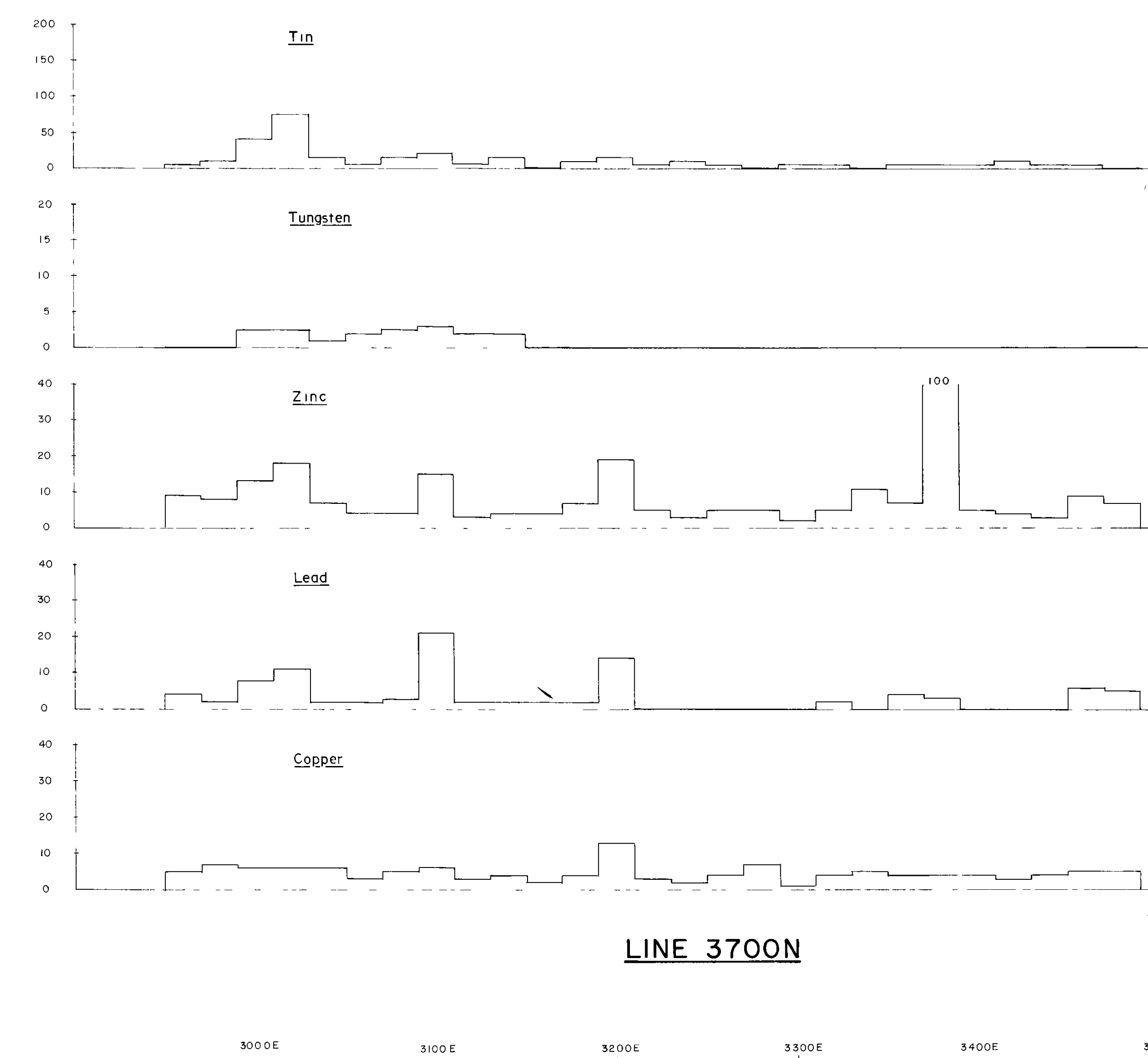
- | | |
|---|----------------|
|  | Quartzites |
|  | Calc Silicates |
|  | Schists |
|  | Hornfels |

-  Boulders
 Fault
 180°/80°NW Strike and dip
 Jointing

SURFACE GEOLOGY



SOIL SAMPLE RESULTS

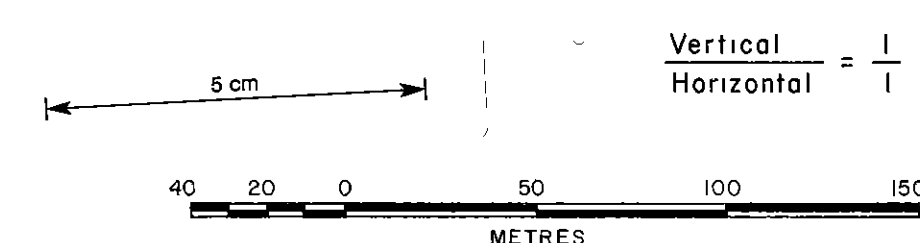


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GRANITE TOR AREA

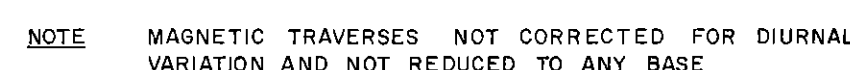
BLUFF GRID CROSS SECTION

LINES 4000N & 3700N



Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

036077



LEGEND

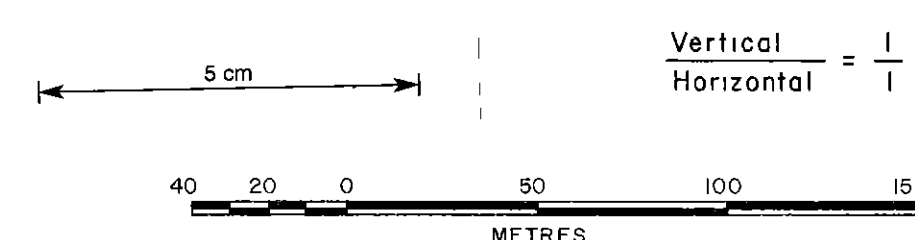
- | <u>RECENT DEPOSITS</u> | |
|---|--|
| | Sand and gravel (alluvial and glacial) |
| | Sand or silt |
| | Scree or angular gravels |
| <u>DEVOLCAN INTRUSIVES</u> | |
| | Granites and Adamelites |
| <u>PRECAMBRIAN METASEDIMENTS</u> | |
| | Quartzites |
| | Calc Silicates |
| | Schists |
| | Hornfels |
| Boulders
Fault
Strike and dip
Jointing | |

ALCOA OF AUSTRALIA LIMITED

GRANITE TOR AREA

BLUFF GRID CROSS SECTION

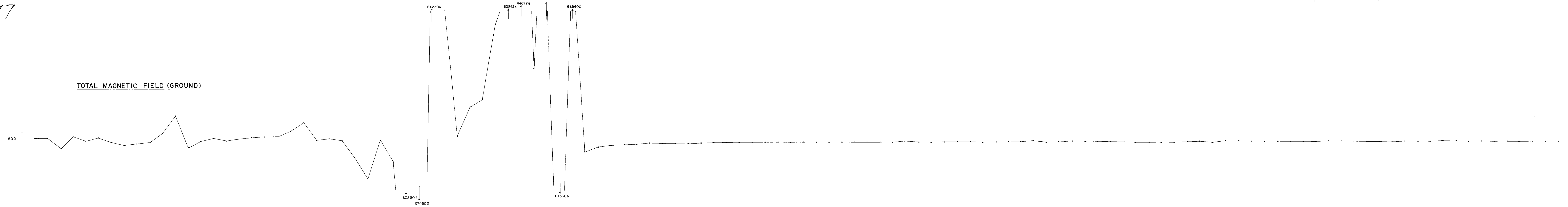
LINE 4400N



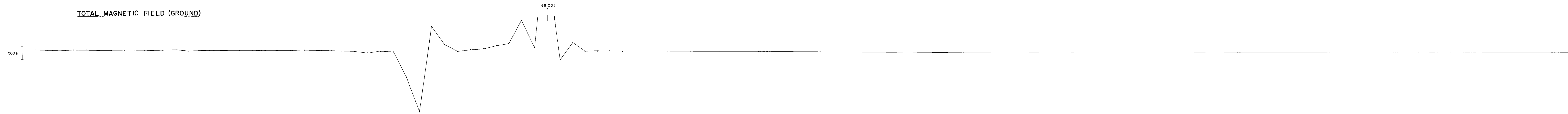
Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobrodek, J Masor
Drawn by A Ross
Date Nov 1979 to May 1980

036078 2976

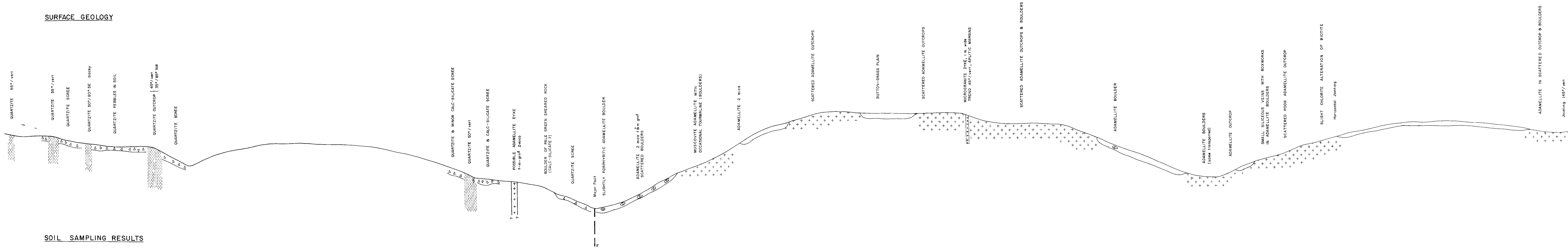
TOTAL MAGNETIC FIELD (GROUND)



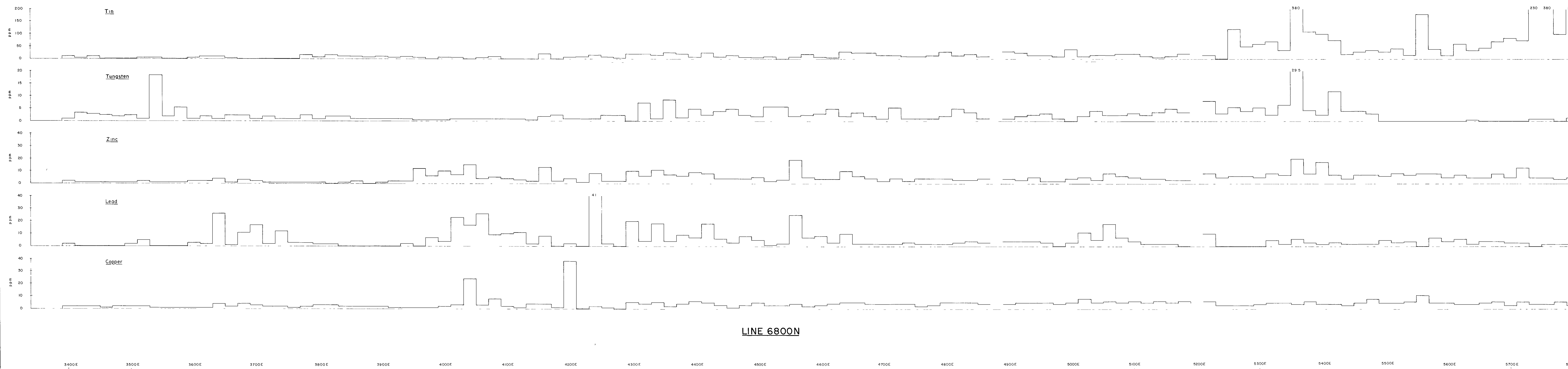
TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS

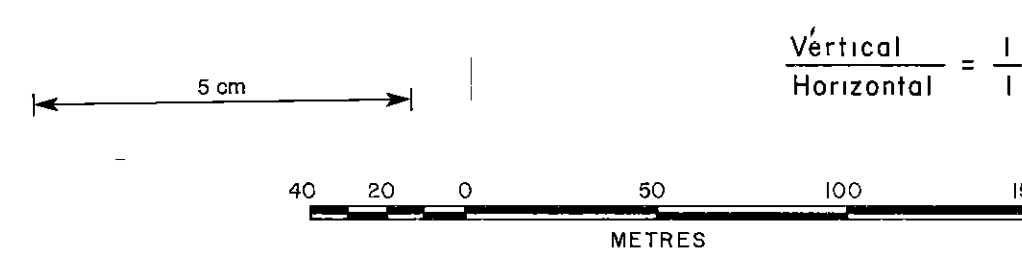


NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

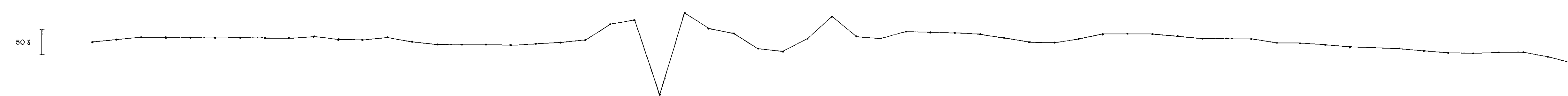
- RECENT DEPOSITS
 - Sand and gravel (alluvial and glacial)
 - Sand or soil
 - Scree or angular gravels
- DEVONIAN INTRUSIVES
 - Granites and Adamellites
- PRECAMBRIAN METASEDIMENTS
 - Quartzites
 - Calc Silicates
 - Schists
 - Hornfels
- Boulders
- Fault
- Strike and dip
- Jointing

ALCOA OF AUSTRALIA LIMITED
GRANITE TOR AREA
BLUFF GRID CROSS SECTION
LINE 6800N

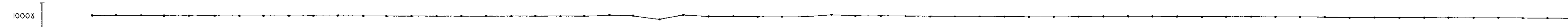


Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobradec, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980

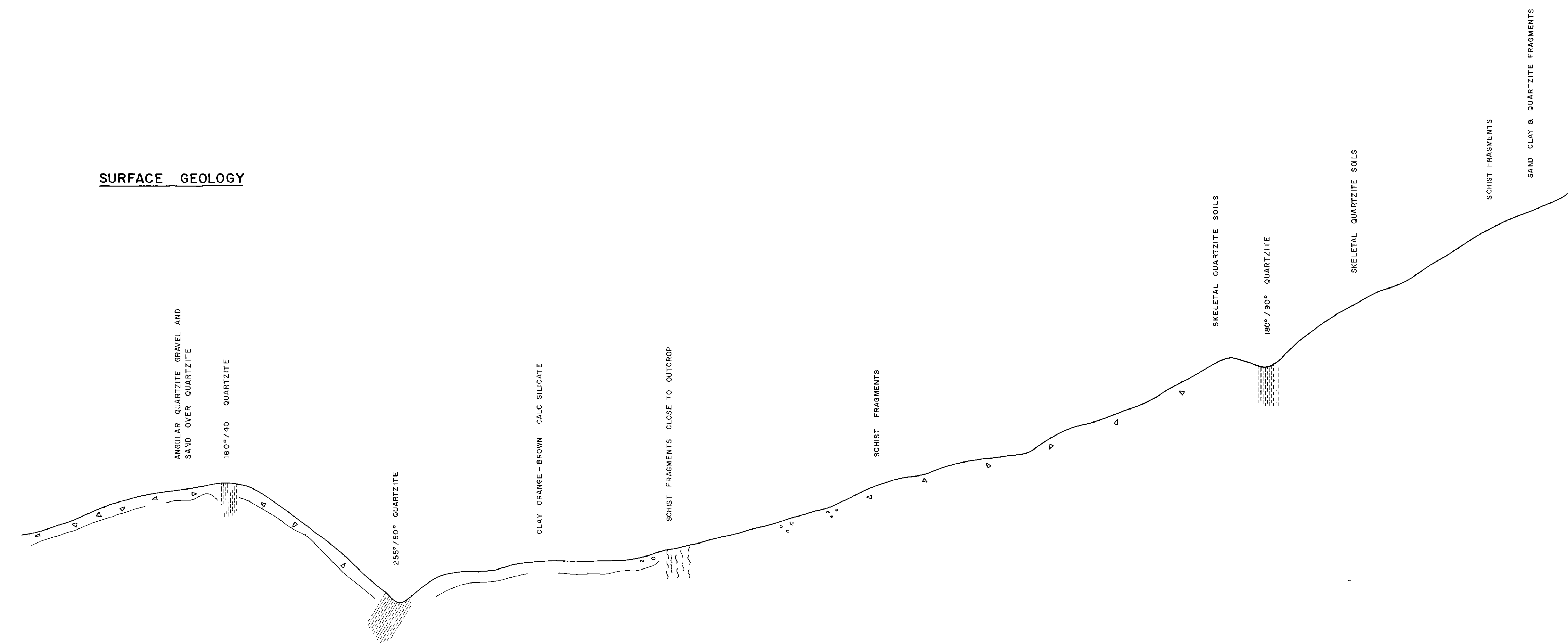
TOTAL MAGNETIC FIELD (GROUND)



TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS

Tin

Tungsten

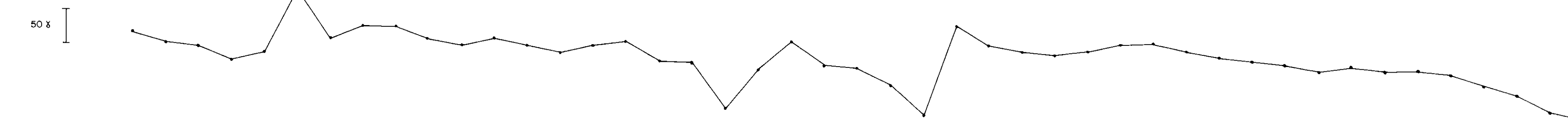
Zinc

Lead

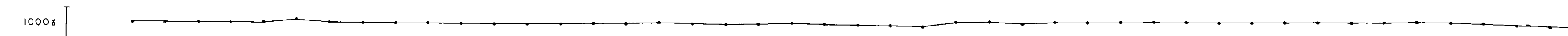
Copper

LINE 3100E

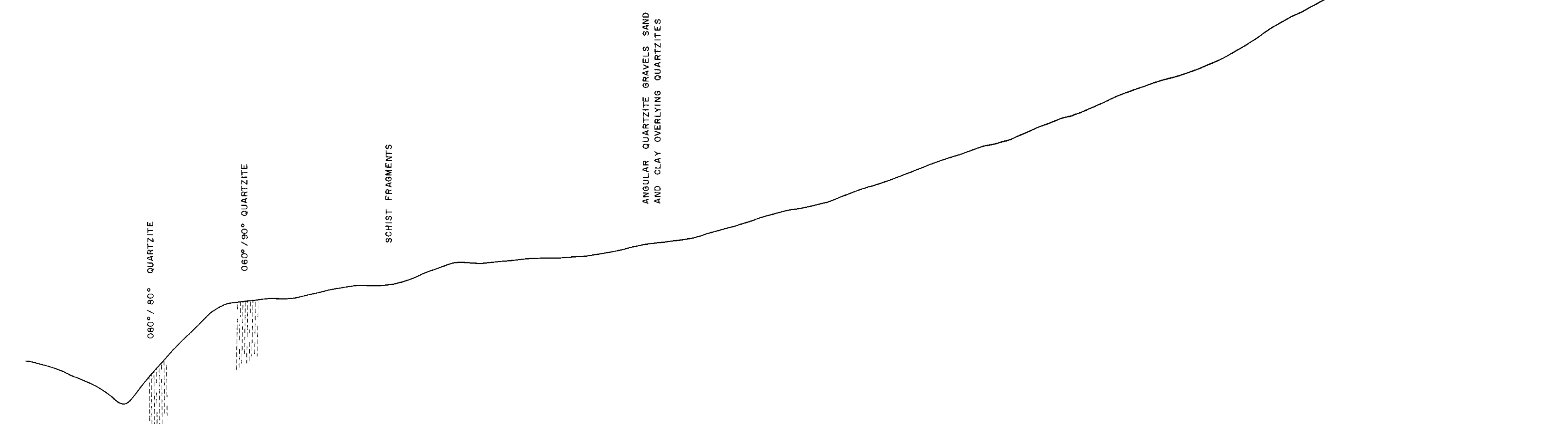
TOTAL MAGNETIC FIELD (GROUND)



TOTAL MAGNETIC FIELD (GROUND)



SURFACE GEOLOGY



SOIL SAMPLING RESULTS

Tin

Tungsten

Zinc

Lead

Copper

LINE 3500E

NOTE: MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

RECENT DEPOSITS

- Sand and gravel (alluvial and glacial)
- Sand or soil
- Scree or angular gravels

DEVONIAN INTRUSIVES

- Granites and Adamelites

PRECAMBRIAN METASEDIMENTS

- Quartzites
- Calc Silicates
- Schists
- Hornfels

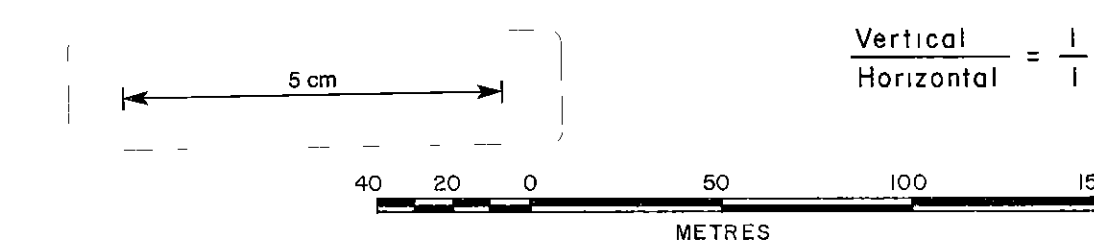
- Boulders
- Fault
- Strike and dip
- Jointing

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GRANITE TOR AREA

BLUFF GRID CROSS SECTION

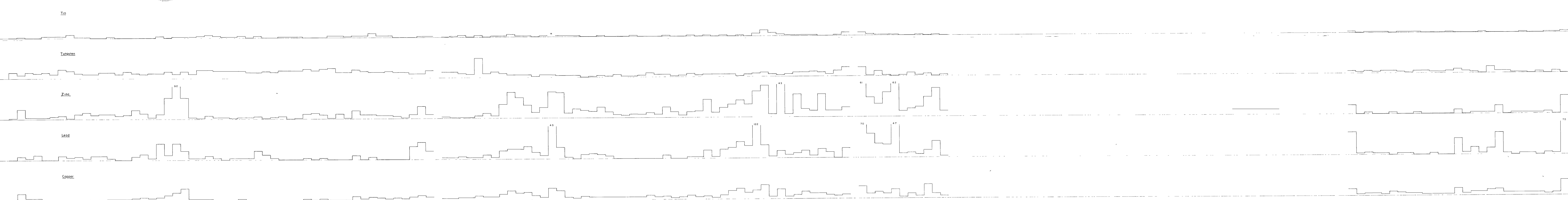
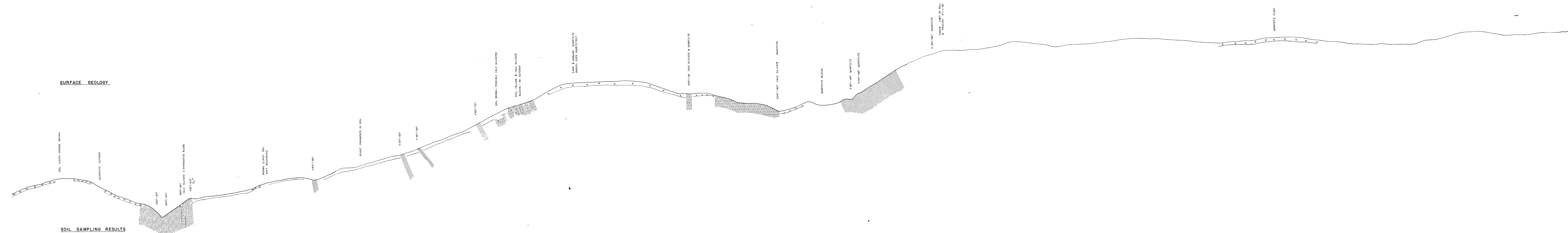
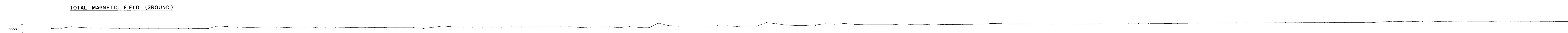
LINES 3100E & 3500E



Geology by: D Speijers, J Schaeffer, R Pollock
Compiled by: J Schaeffer, D Speijers, L Haldrup, J Mason
Drawn by: A Ross
Date: Nov 1979 to May 1980

036080

2979

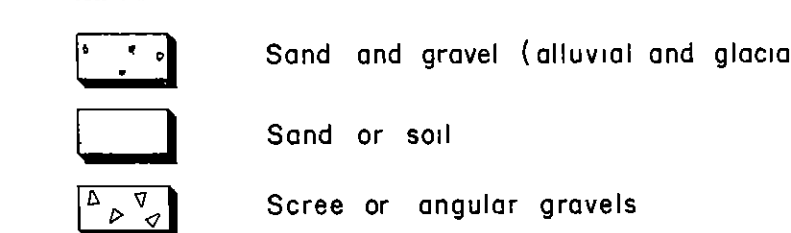


LINE 3300E

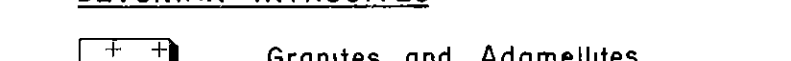
NOTE MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

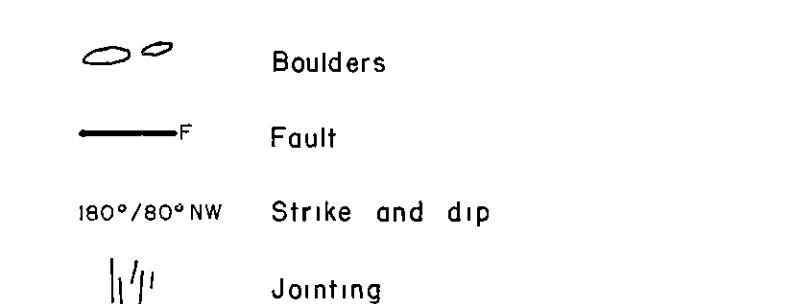
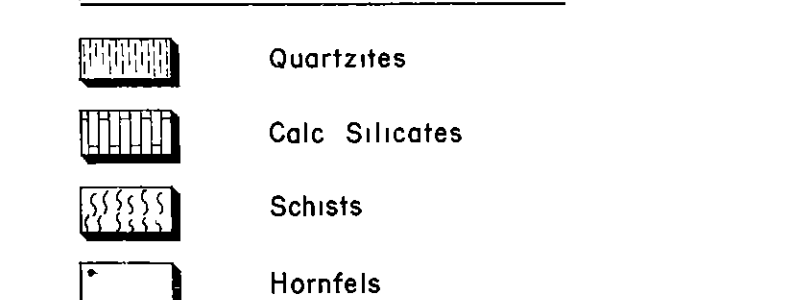
RECENT DEPOSITS



DEVONIAN INTRUSIVES



PRECAMBRIAN METASEDIMENTS

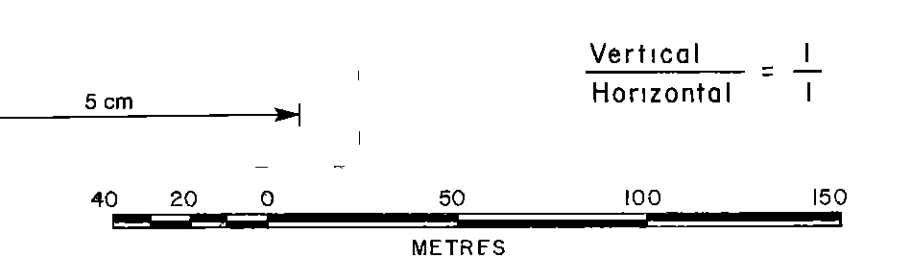


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GRANITE TOR AREA

BLUFF GRID CROSS SECTION

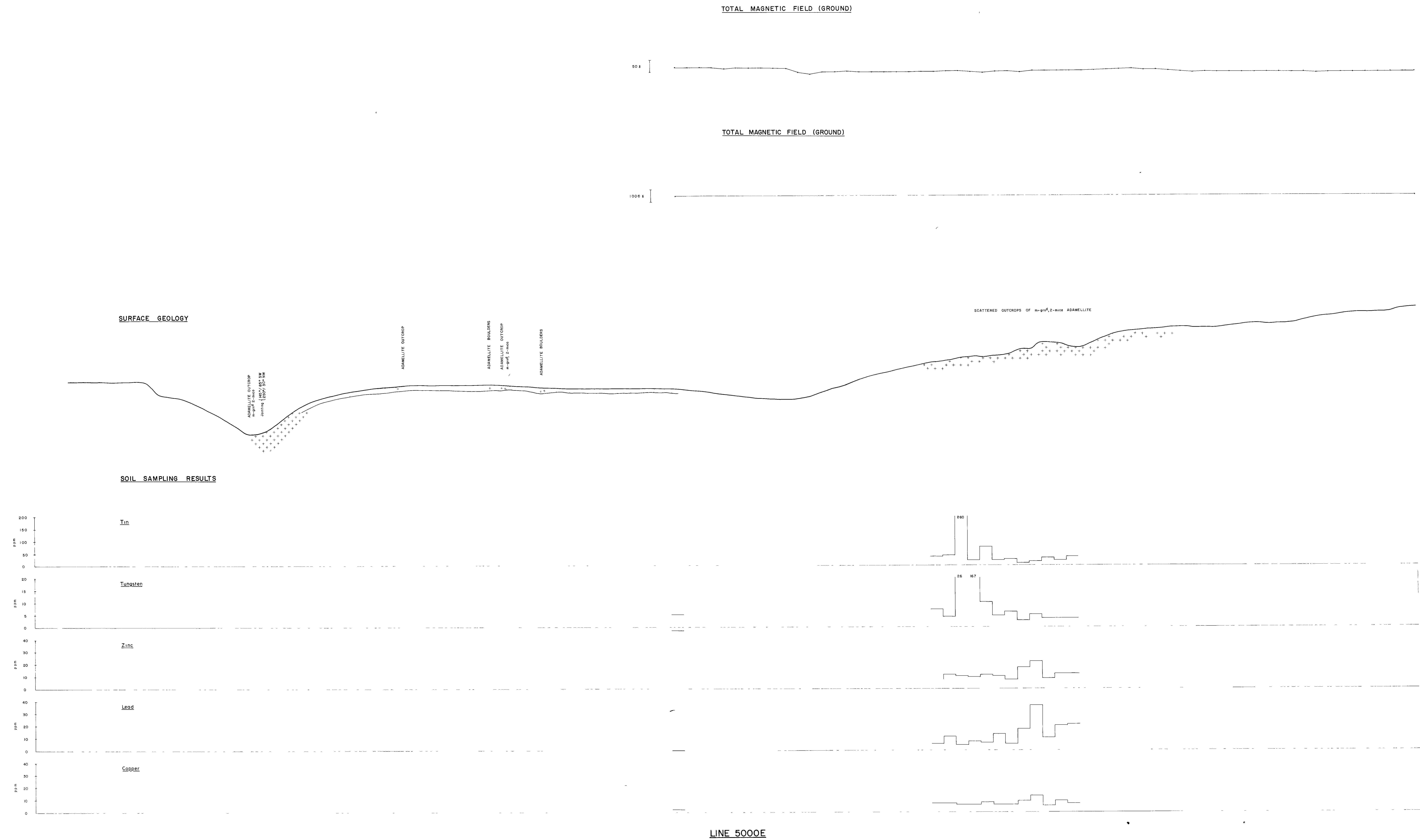
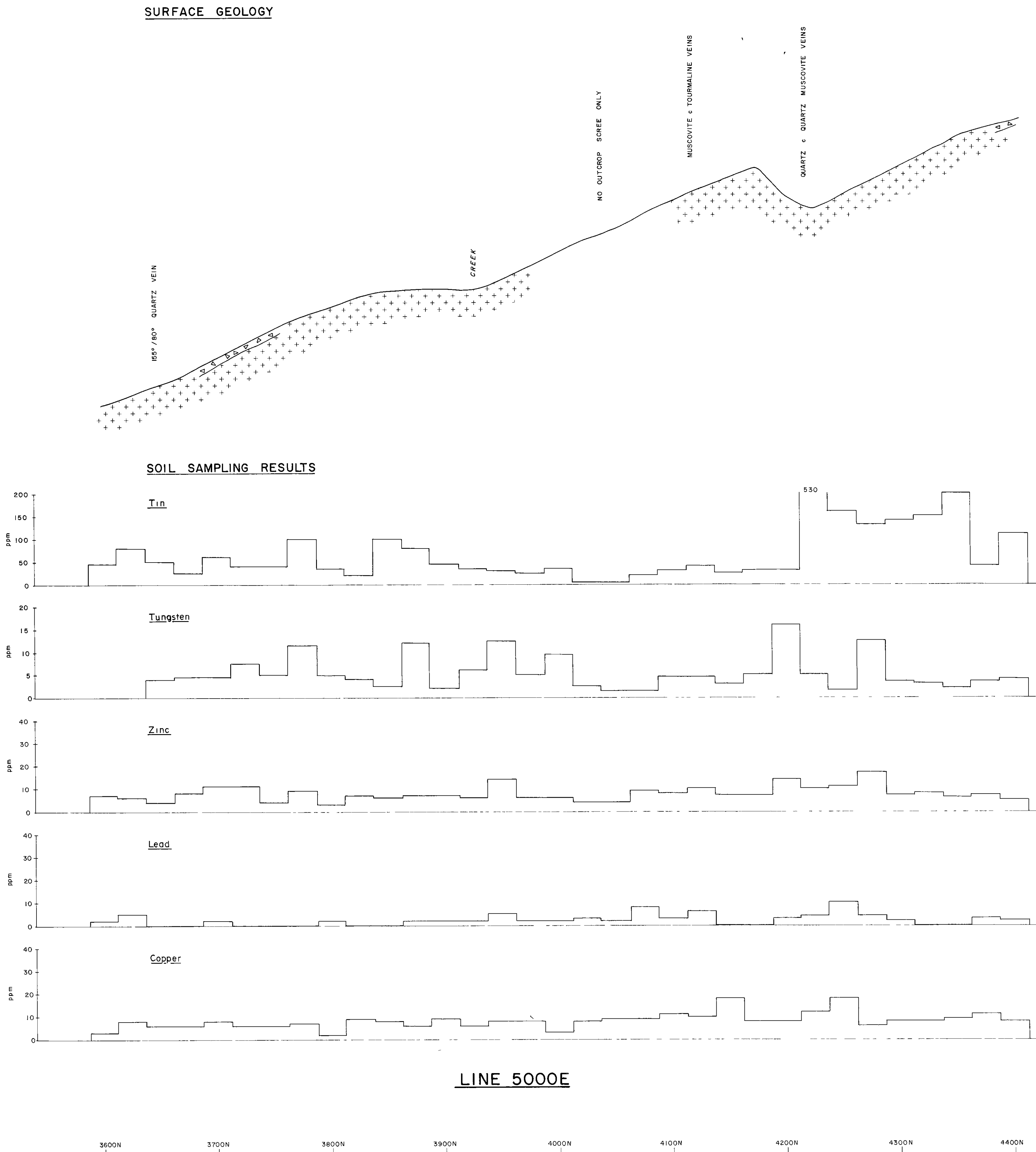
LINE 3300E



Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobródek, J Moss
Drawn by A Ross
Date Nov 1979 to May 1980

036081

80-1490 3/3 2973 PLATE VI



NOTE MAGNETIC TRAVERSES NOT CORRECTED FOR DIURNAL VARIATION AND NOT REDUCED TO ANY BASE

LEGEND

RECENT DEPOSITS

- | | |
|---|--|
|  | Sand and gravel (alluvial and glacial) |
|  | Sand or soil |
|  | Scree or angular gravels |

DEVONIAN INTRUSIVES

- Granites and Adomellites

PRECAMBRIAN METASEDIMENTS

- | | |
|---|----------------|
|  | Quartzites |
|  | Calc Silicates |
|  | Schists |
|  | Hornfels |

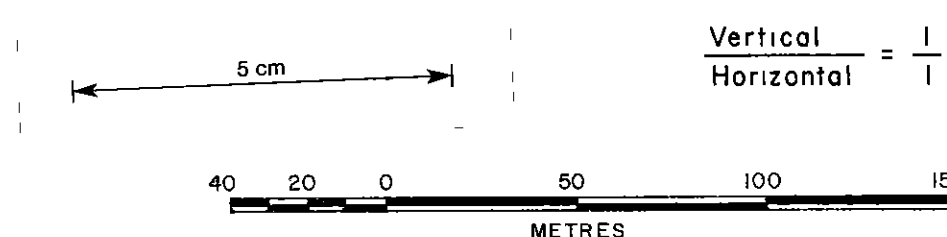
- | | |
|---|----------------|
|  | Boulders |
|  | Fault |
|  | Strike and dip |
|  | Jointing |

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GRANITE TOR AREA

BLUFF GRID CROSS SECTION

LINE 5000E



Geology by D Speijers, J Schaeffer, R Pollock
Compiled by J Schaeffer, D Speijers, L Holobradek, J Mason
Drawn by A Ross
Date Nov 1979 to May 1980