COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,

GEOLOGY AND GEOPHYSICS

RECORDS 1958, No. 111

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MT. LYELL,

QUEENSTOWN, TASMANIA, 1948-9

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ABSTRACT

The results of geophysical surveys performed in 1948-9 over selected areas near Queenstown are described. Tests were made using the equipotential line, potential ratio, self potential, resistivity, magnetic and gravity methods. The areas selected were near Gormanston, and at the Comstock mine. Indications were obtained using the equipotential line method, which are possibly due to the presence of sulphide bodies. Three drill holes are recommended to test the indications.

The results of previous surveys made on behalf of the Mt. Lyell Co. by G. Douglas have been examined and it is recommended that they be tested by two drill holes.

1. INTRODUCTION

Mt.Lyell is situated near Queenstown on the west coast of Tasmania. It is 27 miles by road from the Port of Strahan and 158 miles by road from Hobart.

Mining operations are being conducted by the Mt.Lyell Mining and Railway Co. Ltd. Production during the past ten years or more has been mainly from the West Lyell Open Cut, the grade of ore being about 0.7 percent copper with a small amount of gold. Formerly bodies of richer ore have been mined by underground methods and the search for additional deposits of this kind was commenced in 1934 when geophysical surveys were made by E.L. Blazey and G.Douglas on behalf of the Company and were followed by intensive geological investigations under the direction of H.Connolly. After a break during the war years, geological investigations were resumed by H.Connolly and in 1946 the Bureau was approached by the Company and asked to carry out geophysical surveys on the Mt.Lyell area.

It was decided that the ore-seeking problem at Mt.Lyell was suitable for the application of geophysical methods and surveys were commenced in March, 1948. These were terminated in July when weather conditions became very unfavourable for field work. Operations were resumed in January, 1949, and again terminated in July.

Appreciation must be expressed for the co-operation received from the various officers of the Company and for assistance rendered by Messrs. H. Kennedy and G. Steele in attention to surveying requirements.

2. GEOLOGY AND NATURE OF THE PROBLEM

The geology of the Mt.Lyell mining field is well described, in brief form, by Edwards (1943). A summarised version of the geology as described in that publication is given below.

The rocks of the Mt.Lyell district form four well-defined series which occur in more or less parallel north-south trending tracts. The most westerly tract consists of closely folded sandstones and quartzites of Silurian Age (the Queen River Series), with minor intercalations of slate, shale and occasional lenses of limestone. East of this sedimentary tract, and intrusive into it, is a belt of porphyries, presumably of Devonian Age (Queen River Porphyries). On its eastern side, the porphyry belt has no sharp junction, but grades into schists, which abut on their eastern side against the Silurian conglomerates of the West Coast Range.

The copper ore-bodies and mineralised zones occur in these schists and appear to be almost entirely restricted to them. The schists extend for about four miles southwards from the Lyell Comstock mine, with an average width of half a mile. The schists are derived from the Queen River Porphyries and the greater part of them are altered felspar-porphyries. The change from porphyry to schist has been essentially one of hydration, accompanied by the introduction of potash, and in some places sulphides and barite. The felspars have been altered to sericite and the ferro-magnesians to chlorite. The schistosity resulted from the pressure set up by the volume increase accompanying hydration. The increase in the degree of alteration or "schistosity" towards the conglomerate contact on the east suggests that the hydrating solutions rose up along the contact and "soaked" outwards into the porphyries. Some of the porphyries were intruded after the period of hydration, and subsequent to the mineralisation of the schists, which suggests that the period of hydration coincides with the introduction of the sulphide minerals and that both resulted from the same hydrothermal solutions.

The work of the Geological Survey of Tasmania has revealed that the mineralisation of the field is restricted to several more or less well-defined zones in the schists. The mineralisation follows around the contact of the schists with the conglomerate and also occurs further out in the schists as a number of elongated zones striking at 325°. The sulphides lie in the cleavage planes of the schists. The dominant mineral is pyrite, but here and there copper minerals, chiefly chalcopyrite, with minor amounts of enargite, tennantite, tetrahedrite and bornite, accompany the pyrite in sufficient amount to be regarded as ore-bodies. Most of the ore-bodies are of this type. They are not at all sharply defined, but are merely disseminations of copper sulphides through the schist. The ore-bodies included in this category are West Lyell, Prince Lyell and Lyell Tharsis, all worked by open cut, and the Royal Tharsis, Crown Lyell and Lyell Comstock bodies which were mined by underground methods. The copper values present in these bodies ranged from 0.6 percent to 4.0 percent.

The North Lyell group of ore-bodies differed from the "disseminated ore-bodies" in that their dominant copper mineral was bornite, sometimes almost to the exclusion of chalcopyrite, and that the ore was sometimes massive. The bornite tended to associate with the more sericitic gangue, whereas chalcopyrite was more strongly developed where the ore was highly siliceous. Minor amounts of cubanite, enargite, tetrahedrite, galena and sphalerite accompanied the bornite. Large bodies of hematite and barite came in at the No.10 Level (1,000 feet), and the copper minerals died out with this change. The ore bodies had the shape of four irregular lenses, arranged en echelon. Irregularities in dip and shape arose from irregularities in the schist/conglomerate contact, which was adjacent to the deposit.

The two ore-bodies at the southern end of the field, the Mount Lyell and the South Lyell bodies, were of a third type, consisting for the most part of extremely fine-grained, massive pyrite, with a little chalcopyrite, and minor amounts of enargite, tetrahedrite, galena and sphalerite. Such gangue as was present consisted of quartz and barite, and occasional remnants of partially replaced schist, which indicated that the pyrite had replaced the schist in situ, rather than filled fissures. The copper content varied from 0.5 to 6.0 percent, averaging 2.5 percent. Occasional rich shoots ranged as high as 11 percent copper and in these bornite accompanied the chalcopyrite. The Mount Lyell ore-body also contained the famous Mt.Lyell Bonanza, which was 2 feet wide in places and consisted of stromeyerite with bornite, chalcopyrite and gold in a quartz matrix. It yielded 850 tons of ore averaging 1,011 oz. silver per ton. The Mt.Lyell ore-body was more or less elliptical in horizontal section and tapered downwards with a dip of 65° to 70° to the west. The ore-body outcropped at the surface as a mass of hematite (The Blow) which proved to be developed on the footwall of the pyrite body. It consisted of hematite and barite and was similar to the material found at depth in the North Lyell mine, and was not a gossan, although it had some surface enrichment in gold. The South Lyell ore-body did not outcrop, but was discovered during the sinking of a shaft. It appears to have consisted of two lenses of massive pyrite, separated by a narrow unpayable zone.

The difference in character of the three types of ore-body in the Mt.Lyell field is expressed in their chemical compositions as shown below,

CHEMICAL COMPOSITION OF THE COPPER ORE-BODIES OF THE MT.LYELL FIELD. (BULK SAMPLES).

Ore-body		Cu	Fe	S	SiO_2	Al_2O_3
Mt.Lyell	(1902)	2.35	40.30	46.50	4.42	2.04
North Lyell	(1902)	6.25	4.50	6.00	72.0	-
" "	(1938)	3.29	10.7	10.4	63.6	6.2
Royal Tharsis	(1902)	2.15	9.60	-	61.9	9.3
Lyell Tharsis	(1902)	4.1	3.7	4.3	-	-
Lyell Comstock	(1938)	2.07	10.7	8.2	50.9	16.5
Crown Lyell	(1938)	1.51	11.3	4.1	61.3	12.4
West Lyell	(1938)	1.31	9.5	6.1	58.8	13.1
Flotation Concentrates	(1938)	25.9	30.5	34.8	3.5	1.8

In addition to the elements shown, the flotation concentrates prepared from the composite ore contain minor amounts of gold, silver, lead, zinc, nickel, cobalt, molybdenum, arsenic, antimony, selenium and tellurium. The minerals which have been detected in the ore are magnetite, hematite, pyrite, enargite, sphalerite, chalcopyrite, bornite, berzelianite (?), cubanite, tennantite, tetrahedrite, linnaeite, pentlandite, molybdenite, galena, gold, electrum, native copper, melaconite, covellite, chalcocite and stromeyerite.

Oxidised minerals are relatively rare, and no oxidised zone occurred. Either it did not form, or the heavy rainfall and the Pleistocene glaciation were responsible for its removal.

Plate 1 shows the principal portion of the Mt.Lyell mining field and the positions of the features mentioned in the above summarised version of the geology.

The geological surveys and studies conducted during recent years by H.Connolly provided detailed geological information over the whole of the area of interest and led to the planning of a comprehensive diamond drilling programme to test for the existence of new deposits and repetition occurrences of certain known deposits. The localisation of these test sites has been determined by the intersection of certain structure lines and crossfold axes in some cases, and by the configuration of the schist/conglomerate contact plane in other cases.

Most of the more favoured tests involved drilling the targets at depths up to 2,000 ft. from the surface.

The planning of the geophysical surveys was guided by the recommendations of H.Connolly in respect of the relative favourability of areas for ore-occurrences. The areas suggested by Connolly were Gormanston and Comstock. It was indicated that at both these centres there has been considerable rupturing of the rocks adjacent to the schist-conglomerate contact, due to large-scale folding and faulting and that other favourable structure relationships existed. It was believed that these conditions would be favourable for the concentration of mineralisation. At both areas the contact passed under cover of glacial deposits of Recent origin.

The problems for geophysics on these areas were therefore (a) the detection of mineralisation centres in the schist at or near to the contact, over limited areas of outcropping schist and over larger areas covered by a considerable thickness of glacial material, (b) the determination of the course of the contact over the covered areas.

It was clear from the beginning that whatever geophysical method was used, the strongest anomalies due to mineralisation would be produced by those deposits richest in pyrite. In fact it appeared likely that the survey results would have little, if any, relation to the chalcopyrite or bornite content of the deposits, where these were of the type known to exist at Mt.Lyell.

The surveys by Blazey and Douglas covered practically the whole of the potentially ore-bearing part of the schist area, except the Gormanston section and part of the Comstock section. This work is regarded as a very substantial contribution to the geophysical needs of the field. The areas surveyed are shown on Plate 1. The results were examined by the Bureau and reports dated 13th May, 1948 and 3rd March, 1948, accompanied by composite plans showing all the equipotential line survey results, were submitted to the Company.

The work by Blazey led to the discovery of a small ore-body lying to the north of West Lyell and referred to as the Blazey ore-body; it is believed that Blazey's results on the West Lyell area played a part in the decision by the company to develop the West Lyell ore-body. The results of Douglas' work were found to exhibit some very pronounced and large anomalies which had not, in the Bureau's opinion, received proper recognition. It is believed that these anomalies are due to pyrite concentrations. They all occur within the mineralised zones. One of these anomalies, Indication Zone A (Plate 2) was investigated further by the Bureau using the self-potential method. The reports made to the company contain recommendations for testing some of these anomalies.

In view of the apparently favourable results given by the equipotential line surveys by Blazey and Douglas, it was decided to extend this type of survey to the Gormanston area as a reconnaissance survey and to follow with more detailed examination using other methods, particularly over any areas of interest revealed by the equipotential line surveys.

3. HISTORY OF OPERATIONS

Operations were commenced on the Gormanston area on 3rd March, 1948, by J.E. Webb, using the equipotential line method. The services of H.Kennedy were made available by the Company to give attention to the surveying requirements. Surveys were made using two electrode layouts and earth current surveys were also carried out.

W.G. Morgan, of the Bureau, joined the party on 22nd April as geophysical assistant and was responsible for most of the surveying field work thereafter, Mr.Kennedy continuing to assist by doing the survey office work and helping in the field when required.

A third equipotential line survey was commenced at the beginning of June to cover an area further to the north and included much of the area below the Razorback. Additional self-potential surveys were also carried out.

A short gravity survey was also conducted at the end of April by J.E. Webb and W.J. Langron.

Work was terminated on 6th July because of extremely bad weather conditions and the party returned to Melbourne to examine the results obtained.

Field operations were recommenced on the Gormanston Area, by J.E. Webb, in January 1949, with University students J.Baird, L.Adler and I.Mumme. These operations included self-potential, potential ratio, magnetic and resistivity surveys, over sections of the area surveyed during the 1948 season. The surveys on this area were completed during March and the party, after being joined by J.B. Boniwell, of the Bureau, moved to Comstock. After preliminary preparations, the first equipotential line survey was started on 28th March. A.J.Barlow joined the party on 5th May and took charge of most of the subsequent surveying requirements.

The first equipotential line survey was completed at the beginning of May and after tracks for three traverses had been cut across the centre of the main indication area, self-potential, magnetic and potential ratio surveys were made along these traverses.

A second equipotential line survey was started on 15th June.

After this had been completed and further self-potential and potential ratio work carried out, the party returned to Gormanston on 3rd July to complete the magnetic survey there. Operations were terminated on 5th July and the party returned to Melbourne.

4. TECHNICAL DETAILS

Brief descriptions of the methods used in the Mt.Lyell geophysical survey are given below.

A. EQUIPOTENTIAL LINE METHOD.

This method consists of passing a current through the ground between two electrodes and tracing on the surface the position of the equipotential lines existing between them.

For the Mt.Lyell surveys "point" electrodes were used. These consisted of 8 to 20 steel spikes, 3 ft. long, driven into the ground in a group at each end of the area to be surveyed and connected by cable to a 500-cycle alternator.

The equipotential lines are traced on the ground by means of a "flying circuit" consisting of two "rapier" electrodes connected through an amplifier and headphones by about a 100 feet of cable.

One rapier electrode is pushed into the ground at the starting point of a line to be traced and the operator, carrying the amplifier and headphones and other rapier electrode, advances 100 feet or thereabouts. By contacting the ground at various points with his electrode he can find the point where the potential difference between the two electrodes is a minimum and thus establish the direction of the equipotential line. This procedure is repeated until a complete line has been traced.

Because of varying phase conditions of the ground voltage a null point is seldom obtained and the line traced is not a true "in phase" equipotential line.

B. SELF-POTENTIAL METHOD.

This method is one in which no artificial excitation is required, as the potential distribution examined is that existing naturally due to earth currents.

This distribution will be influenced by broad geological features and under favourable conditions, the self-potential survey results may be used to determine such features.

When used for the detection of ore-bodies however, the method depends on the phenomenon of spontaneous polarisation of a sulphide body which may exist when the body is undergoing oxidation. The condition so created can be compared to that of a primary cell, the polarisation being such that a negative centre is produced above the ore-body and the resulting potential distribution can be detected at the surface, if strong enough.

The measurements are made using a potentiometer-type instrument and non-polarising electrodes for contacts. These electrodes consist of a metal centre immersed in a saturated solution of one of its salts contained in a porous vessel. Usually, copper and copper sulphate are used. This type of electrode reduces to negligible proportions the contact potential that would exist if a metal electrode was used in direct contact with the ground.

C. POTENTIAL RATIO METHOD.

In this method an A.C.Bridge instrument, referred to as a ratiometer, is used to measure the ratios of voltage drop between successive intervals of ground and the phase difference between them, when the ground is energised by an alternating current. The power supply is the same as that used in the equipotential line method and the amplifier and headphone equipment, used as a null indicator for the ratiometer, is also the same. When the voltage ratios are measured for ground intervals of equal length the results can be represented in the form of gradients and phase variations. In general, a conductive zone is one of low gradients and strong out-of-phase conditions and the ratiometer results are examined for such features when searching for sulphide ore-bodies.

The separation between the three contact electrodes can be varied to suit the occasion; intervals of 25 ft., 50 ft. and 100 ft. were used on the Mt.Lyell area.

The surveys can be carried out either over part of an equipotential line layout or in the immediate vicinity of one electrode, the other being sufficiently removed to make its effect negligible. In this latter case a correction is applied to each ratio measurement to remove the gradients due to the normal potential distribution about a point electrode.

D. GRAVITY METHOD.

The force of gravity at a point on the earth's surface is influenced by the density characteristics and the distribution of rocks and other deposits in the vicinity. A mass of high density, such as a sulphide ore-body, when enclosed in rocks of lower density, will produce a local increase in the gravitational force.

The instrument used for the Mt.Lyell survey was the Heiland Gravimeter No.53. Normally, during surveys, gravimeters of this type are carried by car to provide smooth transport and shelter from direct sunlight and wind. This was not possible at Mt.Lyell, with the result that, due to the man-handling over difficult terrain and the severe climatic conditions experienced, the accuracy of the measurements is such that the probable error of the final results is of the order $\pm$ 0.1 milligal.

In the reduction of the observations, corrections are applied for:-

(i) Instrumental drift and diurnal variation of gravity due to earth tide effects.

(ii) Elevation effects.

(iii) Latitude effects.

Where the topography of the area is rough, additional corrections for terrain are usually made. In view of the limited scope of the survey at Mt.Lyell it was considered that these were not necessary.

The gravimeter was available for two weeks only and its use was restricted to a survey over a part of the Gormanston area where some electrical results of interest had been obtained.

E. RESISTIVITY METHOD.

This method was used on the Gormanston area to determine the normal electrical resistivity of the rocks concerned and, if possible, to trace the distribution of the rock types on the areas covered by glacial material.

As distinct from most other electrical methods, the resistivity method has definite depth control and as used on the

Gormanston area could be considered to give a vertical search at definite points in contrast to the horizontal searching of the other methods. The Wenner arrangement of electrodes was used. This requires four equally-spaced electrodes along a line. Current of a required value is supplied to the outer pair of electrodes and the resulting voltage between the inner pair is measured by means of a potentiometer instrument similar to that used for the self-potential surveys.

For homogeneous ground conditions, the resistivity is given by the expression -

$$P = 2 \quad a R$$

where P = resistivity

a = electrode spacing

$$R = \frac{\text{observed voltage}}{\text{applied current}}$$

Where homogeneous conditions do not exist the resistivity measured is an apparent resistivity. In the special case where geological discontinuity in the form of horizontal layers exists, the change in apparent resistivity values with increasing electrode spacing is a function of the distribution and resistivity of these layers. It is therefore often possible to determine by means of resistivity surveys the thickness and resistivity of overburden material and the resistivity of the underlying rock.

F. MAGNETIC METHOD.

As far is known to date, the Mt.Lyell ore-bodies do not contain sufficient magnetic minerals to produce prominent anomalies in the geomagnetic field. However, some test surveys were made over parts of the Gormanston and Comstock areas and some specimens of ore were tested.

The Watts Vertical Force Variometer No.61519 was used, with a scale value of 29.5 gammas.

5. SURVEY RESULTS

A. GORMANSTON AREA.

Plate 3 shows the area surveyed and the principal geological features.

(i) Equipotential Line Survey.

Three electrode layouts were used on this area. For layouts Nos.1 and 2, the southern electrode was in the creek bed below the Waterfall. The positions of the northern electrodes and those used for No.3 layout are shown on the appropriate plates.

The equipotential lines of No.1 Layout are shown on Plate 4. In the southern part of the area these lines show no anomalies of interest and the pattern is not materially changed as the lines extend from the schist area to the part covered by glacial deposits. As the township of Gormanston is approached the effects of water reticulation pipes appear, and become strong to the north of the Gormanston Post Office. These effects appear to be due to the two 4-inch pipe lines shown on Plate 4. To investigate this area further, arrangements were made for the 4-inch pipes to be cut at various positions and the iron pipe replaced by rubber hose. These replacements were about 12 ft. in length. It was also intended to move the position of the northern electrode of Layout No.1 some distance, but it was found that there was insufficient cable to make substantial alteration and the electrode was actually moved only 350 ft. to the east for Layout No.2.

On Layout No.2 (Plate 5), some equipotential lines were traced before the pipes were cut, others after the pipes were cut in three places and one line after an additional cut in the pipes.

It will be noticed that the small alteration in electrode position produced a marked change in the potential distribution between the two pipe lines and that cuts in the pipe did likewise over that area. To the north of the pipes, the cutting of the pipes had little effect on the potential distribution. Definition of the equipotential points was very poor over the area between the pipes, due to out-of phase conditions and the existence of very low gradients. This was not so on parts immediately surrounding this area.

It is considered that the equipotential surveys made on this area have failed to prove whether the disturbance is wholly or partly due to the pipes. It seems likely that the pipes are responsible, but it is possible that a concealed conductive body is present within the conductive zone outlined on the plan and marked Anomaly Zone No.1. In an effort to clarify the position in relation to this feature, self-potential, potential ratio, magnetic and some gravity surveys were conducted over the area of interest. The results of these surveys are described later in this report.

The equipotential lines of Layout No.3 (Plate 6) were entirely on conglomerate and glacial deposits. As far as is known, the schist does not underlay any of this area.

The extensive anomaly area near Bores 9, 10, 11 and 12 is the major feature of the results. The lines could not be traced further west due to the presence of large rock dumps.

A geological section through Bores 9, 10, 11 and 12 is shown on Plate 3. The occurrence of clay proved by these bores is considered to be responsible for the equipotential anomaly, the broadness of the anomaly being due largely to the widespread surface extent of this clay deposit.

The origin of the clay is not known, although considerable thought has been given to the subject over recent years because the clay contains an appreciable amount of native copper. The distribution of the anomaly suggests that the central part of the clay deposit will be found at about 4600S/1500E.

There is a clay deposit also near the bends in the equipotential line terminating at 3000S/1760E.

While it seems reasonable to assume that the superficial and deep-seated clay deposits are responsible for the main anomaly centred at 4600S/1500E, it is not clear how the known deposits of clay could be responsible for the eastern part of this anomaly. Consequently, it is considered that the zone marked Anomaly Zone No.2 should be examined closely for favourable geological evidence, and consideration then given to testing the zone by drilling.

(ii) Self-Potential Survey.

The area from 4200S to 6400S and 1500E to 4000E was surveyed, readings being taken at 50-ft. intervals on traverses 200 ft. apart. The self-potential profiles obtained are shown on Plate 7 together with contours based on smoothed profiles. No negative centres were found at the positions of the equipotential line survey anomalies, which could be expected if these anomalies were due to sulphide bodies which were undergoing oxidation and in a state of spontaneous polarisation. The pattern of the potential distribution is probably related to the trend of geological features.

(iii) Gravity Survey.

During the short time that the gravimeter was available, observations were made along parts of Traverses 4800S, 5000S, 5200S, 5400S, 5600S and 5800S. The results, in the form of profiles and contours, are shown on Plate 8.

The terrain was particularly rugged for this type of work and as the instrument had to be man-handled, the operating conditions were not favourable for obtaining the maximum accuracy possible with this type of instrument; consequently, some substantial miscloses were present in the results.

Traverse 5800S crossed the equipotential line Anomaly Zone No.1 but gave no pronounced gravity anomaly in that position.

An anomaly was found on Traverses 5200S, 5400S and 5600S, of a type which could be attributed to a fairly shallow-seated, dense body. The axis of this anomaly is shown on the contour plan.

(iv) Potential Ratio Survey.

A local electrode survey was carried out on Traverses 4200S, 4400S, 4600S and 4800S, with the near power electrode at 4600S/1600E. The ratiometer electrode spacing was 50 ft. The potential gradient profiles obtained are shown on Plate 9. They show that the gradients decrease rapidly from east to west, towards the centre of the broad equipotential anomaly which has been assumed to be due to the clay deposits in this area.

A second electrode layout was used on the pipe anomaly area, the near power electrode being located at 6400S/1550E. Surveys were made along traverses 6200S, 6400S and 6600S, using 50-ft. ratiometer electrode separations. Waterpipes made large sections of these traverses unworkable and the only satisfactory results obtained were those shown on Plate 9 on Traverses 6200S and 6400S. These results do not give confirmation of the equipotential line anomaly No.1.

(v) Resistivity Survey.

The resistivity determinations were made at points 500 ft. apart along traverses 6400S and 7200S and at 4400S/2000E. The results are shown on Plate 10. The purpose of the work was to determine the resistivity characteristics of the schist, conglomerate and glacial deposits and, if possible, to determine the distribution of the schist and conglomerate where covered by the glacial deposits.

The results indicate that the resistivities of the schist, conglomerate and glacial deposits are of similar order and in the range 20,000 to 200,000 ohm-cms. These conditions are not favourable for the use of this method in tracing the schist/conglomerate contact where it is obscured by glacial deposits because there is no consistent contrast of sufficient order between the resistivities of the schist and conglomerate.

The results at 4400S/2000E indicate that the near-surface clays etc. have a resistivity of 5000 ohm-cms or less and that with increasing depth the resistivity value increases to that typical of the schist and conglomerate.

(vi) Magnetic Survey.

This survey was conducted over the same traverses as used for the self-potential survey, and the results are shown on Plate 11.

Much of the work at the southern end of the area was rendered of little value by the magnetic materials present, such as houses, waterpipes and scrap iron.

An anomaly was located on traverse 5200S at 2100E and traverses 2000E and 2200E were surveyed to check this indication. Weather conditions prevented the completion of this work, leaving the results inconclusive. However, it is apparent from the work completed to date that there is an anomaly of irregular form centred on the hill-side at about 5400S/2200E and possibly related to a ferruginous formation cropping out nearby.

Samples from the main Lyell ore-bodies and one from the outcropping rock referred to above were brought back to Melbourne for magnetic tests. The ore samples were all non-magnetic, while the rock sample was weakly magnetic.

B. COMSTOCK AREA.

Plate 12 shows the area covered by the surveys and the principal geological features present.

(i) Equipotential Line Survey.

Two separate electrode layouts were used on the Comstock area. A section of this area was surveyed by G.Douglas in 1938.

The equipotential lines of Layout No.1 are shown on Plate 13. These lines show a centre of interest, the position of which corresponds, at its eastern part, with

Douglas' Anomaly Zone F, (vide Plan No.G26-2 accompanying Report dated 3/3/49), but which extends further to the west. A line of small indications extending across the area from the mouth of No.3 Tasman Tunnel to the edge of the breccia outcrop was noted. No features of interest were found around the breccia outcrop itself.

As the equipotential lines of Layout No.1 were approximately parallel to the western part of the main indication, a second electrode layout was used to give a more favourable orientation of equipotential lines. Provision was also made for the survey on this layout to extend easterly to the position of H.Connolly's Target No.3.

The results of Layout No.2 are shown on Plate 14. It will be noticed that the anomaly area of No.1 Layout is included in a widespread anomalous area extending some distance westerly, but lacking good definition as to boundaries.

On this layout several equipotential lines show strong effects where they cross the primary cable. A section of the cable was relaid at a new position and one of the disturbed lines was retraced.

No indication whatsoever was obtained in the position of Connolly's Target No.3. At this position it is likely that there is a considerable thickness of glacial overburden.

(ii) Self-Potential Survey.

Surveys were made along Traverses 1, 2 and 3 (see Plate 12 for position of traverses) across the equipotential line anomaly zone and were extended as far as was readily practicable up the side of Mt.Lyell over the mullock quarry. The results are shown on Plate 15.

No anomalies of interest were found over the equipotential line anomaly area, but a marked decrease in potential is present at the southern end of each traverse on the steep hillside portion. The survey was not taken far enough to the south to determine whether the feature is part of a negative centre, such as could be produced by the spontaneous polarisation of a sulphide body, or whether it is due to some other phenomenon. It is considered that the survey should be extended southwards to determine this point, as it is possible that the feature is due to a sulphide body of substantial dimensions.

Some reconnaissance self-potential investigations were made on the north side of the breccia outcrop and extended to Traverse P. No anomalies of interest were found.

(iii) Potential Ratio Survey.

This method was used to obtain greater detail over areas of interest outlined by the equipotential line survey. Three separate electrode layouts were used. The positions of the traverses referred to are shown on Plate 12.

The first survey was carried out along Traverses 1, 2 and 3, on the No.1 equipotential line electrode layout, with ratiometer electrode separation of 50 ft. The results are shown on Plate 16. Indications in both gradient and phase were obtained on each traverse in the position of the main equipotential line anomaly of the first layout, particularly on Traverse 2.

The second survey was carried out along the same traverses and on intermediate ones, using the local electrode method and ratiometer electrode separation of 25 feet. For Traverses 1 to 3 the near power electrode was located at S500 on Traverse 2 for Traverses 3A and 3B at S500 on Traverse 3A. The profiles, shown on Plate 17, are corrected for the normal decrease in potential with increase of distance from the power electrode and have been related to each other by means of cross ties. Contours have been drawn for equi-gradient points for Traverses 1 - 3 but because the results on the other two traverses (3A and 3B) are from another electrode, they have not been included. However, the continuation of the centre line of the conductive zone has been shown.

The potential ratio results between Traverses 1B and 3B show the existence of a conductive zone, which is responsible for the equipotential line anomalies present on No.1 and No.2 equipotential line layouts. The lines of No.2 layout suggest that this zone extends westerly beyond Traverse 3B.

The third potential ratio survey was carried out along traverses 3, 3B and P, with 100-ft. ratiometer electrode separations, and using the power electrodes of No.2 equipotential layout. The results are shown on Plate 16. Indication of the conductive zone is present on Traverses 3 and 3B but is not well marked on Traverse P.

(iv) Magnetic Method.

This method, using Vertical Force Variometer No. 61519, was applied on Traverses 1, 2 and 3. The results are shown on Plate 15. No anomalies were found which could reasonably be attributed to ore-bodies. The results at the southern end of the traverses were affected by scrap iron, etc.

C. INDICATION ZONE A (by Douglas)

A traverse was pegged across the centre position of this large equipotential line anomaly and natural earth potentials were measured at 50-foot intervals. Plate 18 shows the position of the traverse, some of the equipotential lines (by Douglas) and the self-potential profile.

It will be noticed that a very strong negative centre is present over the full width of the anomaly zone. This is believed to be due to shallow-seated polarisation of a sulphide body of substantial width and this evidence tends to support the belief that the equipotential line anomaly is due to a concentration of pyrite.

6. SUMMARY OF RESULTS

A. GORMANSTON AREA.

The equipotential line anomaly near to the 4-inch pipes is the only feature present in the results over, or near, the schist area. The origin of this anomaly could be due entirely to the pipes. However, it is believed that there is some possibility that it is also related to a concealed conductive zone which could be a sulphide deposit of the nature of the Mt.Lyell or South Mt.Lyell ore-bodies. Self-potential and magnetic surveys over this area gave no confirmation of the existence of sulphides. However, this need not be regarded as unfavourable evidence, because the presumed sulphides could be below water level and therefore not undergoing the oxidisation necessary for the production of spontaneous polarisation; the sulphides could also be free of magnetic minerals. The gravity work carried out is not adequate for a complete test of this anomaly, but no results were obtained by this method on Traverse 5800S which could reasonably be attributed to the type of sulphide body envisaged. However, on this traverse, which crosses one end of the anomaly zone, the mass of the supposed anomaly body could be too small and/or too deep to produce a pronounced gravity anomaly. The anomaly area, outlined as "Anomaly Zone No.1" on Plate 3, lies close to a region favoured by Connolly for ore occurrences and a drill site for testing ground near to this area has been selected by Connolly on purely geological grounds. In the light of all evidence available at the time of writing, it is believed that this anomaly area should be tested by drilling, although the anomaly cannot be classed as a satisfactory one from the geophysicist's point of view.

The broad anomaly in the equipotential lines of layout No.3 has been tested to a degree by vertical drill holes Nos. 9, 10, 11 and 12. These reveal the existence of clay and sand deposits containing native copper, which are of substantial thickness in drill hole No.12. The conglomerate was reported to be at a depth of 436 feet in drill hole No.12. Presumably, the above mentioned clay deposits have contributed to the anomaly under discussion and could possibly be solely responsible. It seems that the only other possible explanation for the existence of the anomaly is that there is a very large conductive body lying below the limits of the drill holes mentioned above and centred a little to the south of the line of drill holes, at about 4650S/1700E. This rather unlikely possibility could be tested by drilling vertically to a depth of say 600 to 800 ft. at the position 4650S/1700E. This site is virtually on the conglomerate but it is possible that at depth the schist lies under the conglomerate at this position.

Although it seems likely that clay deposits are responsible for the major part of the above-mentioned anomaly, it is not too likely that such deposits are responsible for the eastern part of the anomaly where no deposits are known to exist. The part referred is that marked as "Anomaly Zone No.2" on Plate 3. The greater part of this zone lies on till-covered ground and it is possible that a conductive zone of interest is present at depth along this zone.

It should be noted that Anomaly Zone No.2 is located on a part of the field which has been regarded as probably consisting of conglomerate underlying glacial till, and that Anomaly Zone No.1 seems likely to extend into the conglomerate. The conglomerates have previously been regarded as unfavourable host rocks for mineralisation, but recent geological investigations by Connolly have led to the belief that promising target areas exist within the conglomerates as well as within the schist. In any case, it is possible that the schist exists at no great depth in the anomaly areas mentioned. In a later section of this report specific recommendations are made for testing the anomaly areas. At this stage it is suggested that, before the testing is carried out, the area embraced by, and adjacent to, the above-mentioned anomalies should be subjected to a close geological examination in search of mineralisation. The results of such an examination might aid the interpretation of the geophysical results and bring about more effective testing of the geophysical features.

It is considered that the geological examination should be extended to include the area around 5400S/2200E, where a magnetic anomaly was found.

B. COMSTOCK AREA.

At the commencement of the surveys at Comstock, attention was focussed on the area of Anomaly Zone F (by Douglas). This suggested the presence of a relatively small conductive area which might be related to the mineralisation penetrated in the No.3 tunnel adjacent to the position of this anomaly. Layouts and traverses were arranged to obtain more detailed information about the anomaly zone, as well as to search for more anomalies of interest on the Comstock area, particularly in or near the mineralised zone and in the vicinity of the breccia mass which Connolly believed to be possibly a type of capping to a mineralised body similar to that which was found at North Lyell.

However, as the results of the equipotential layout No.2 became available, it seemed that a conductive zone much larger than that of Anomaly Zone F was present and extended some distance westerly. Consequently, some of the earlier operations, including the potential ratio work, were not suitably planned to examine completely the area covered by this much larger anomaly. As the party had to withdraw from the field, due to the prevailing inclement weather, when Layout No.2 was completed, the survey of this area should be regarded as incomplete.

A review of the available results suggests that there is present, in the position shown on Plate No.14, an anomaly zone of considerable dimensions which occurs at the end of the mineralised zone, and which could be due to a large mineralised body near to the schist/conglomerate contact at depth and at about the position where that contact seems to make a pronounced bend. Such a mineralised body could also be related to the breccia outcrop which has interested Connolly.

7. RECOMMENDATIONS FOR TESTING

A. GORMANSTON AREA

(i) Anomaly Zone No.1

No.1 Drill Hole, collared at 6130S/2080E, depressed 50 degrees in the direction 70 degrees (Grid Azimuth). Length of hole about 800 feet.

(ii) Anomaly Zone No.2

No.2 Drill Hole, collared at 4600S/2160E, depressed 50 degrees in the direction 90 degrees (Grid Azimuth). Length of hole about 800 feet.

B. COMSTOCK AREA

(i) Anomaly Zone No.1

No.3 Drill Hole, collared at 7000N/730W, depressed 45 degrees in the direction 200 degrees (Grid Azimuth). Length of hole about 1000 feet or whatever is needed to reach the schist/conglomerate contact.

C. LYELL CONSOLS AREA. (Surveys by G. Douglas)

(i) Indication Zone A. (Plate 2)

No.4 Drill Hole, collared at 580S/3270W, depressed 40 degrees in the direction 53 degrees (Grid Azimuth). Length of hole about 1500 feet, or probably more if drilling is to be continued to the schist/conglomerate contact.

(ii) Indication Zone B. (Plate 2)

No.5 Drill Hole, located at 1270N/3230W, depressed 40 degrees in the direction 43 degrees (Grid Azimuth). Length of hole about 1000 feet, or probably more if drilling is to be continued to the schist/conglomerate contact.

Various factors will no doubt affect the company's views on the priority of drilling the above-mentioned holes. However, from the geophysicist's point of view it is considered that the priority should be in the following order, Nos.4, 5, 3, 2 and 1.

8. GENERAL CONCLUSIONS

A major portion of the potentially ore-bearing areas at Mt.Lyell has now been covered by A.C. equipotential line surveys carried out by E.L. Blazey (1933-1935), G.Douglas (1935-1938) and the Bureau of Mineral Resources (1948-1949). This work may be regarded as a reconnaissance examination. On certain parts it has been supplemented by potential ratio, gravity, self-potential, magnetic and resistivity surveys carried out by the Bureau and potential ratio work carried out by E.L. Blazey.

Several equipotential line anomalies are present in the results and a few of those found by Blazey have been tested by the company with some favourable results. Others, from the work of the Bureau and Douglas have been selected by the Bureau for testing in accordance with the recommendations set out in the previous section of this report.

It is believed that at least some of these anomalies will be found to be due to concentrations of pyrite mineralisation, which may have useful amounts of copper in association. These anomalies are to be tested by the company as soon as suitable portable drilling equipment becomes available.

The surveys completed by the Bureau were conducted over areas which were largely covered by glacial till, and the equipotential line method was used for the preliminary examination because it was considered to be the most suitable for the problem and the terrain concerned.

It is considered that detailed surveys over the outcropping mineralised zones in the schist would serve well to trace the distribution of concentrated sulphide mineralisation within these zones. The problem would be well suited to potential ratio and self-potential methods and in some limited parts, where the topography is not too rough, it is likely that electromagnetic methods would give satisfactory results. More magnetic work should be carried out to test the possibilities of this method.

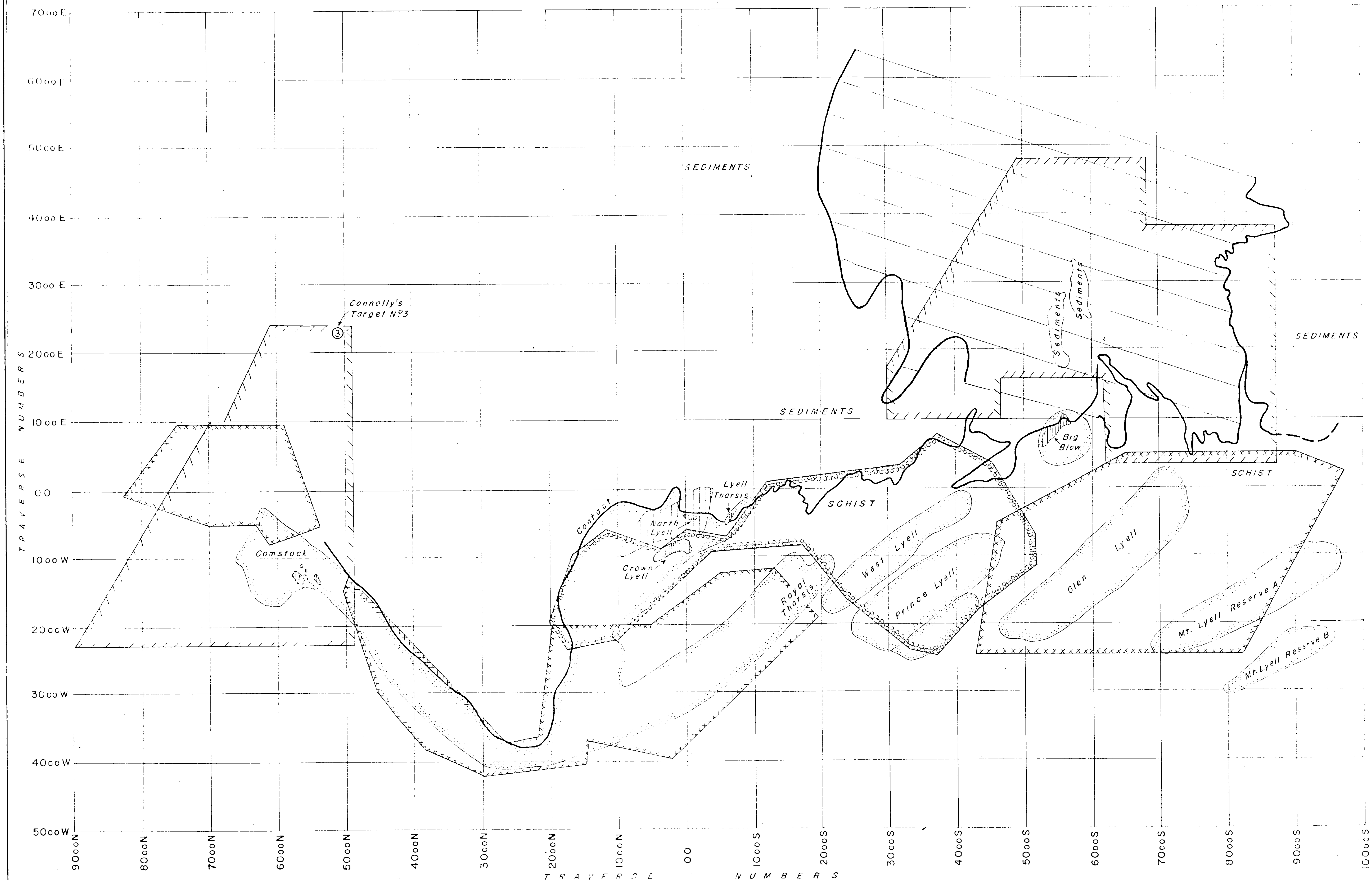
The configuration of the schist/conglomerate contact is an important factor in the localisation of mineralisation and it is possible that specially designed seismic surveys would help to determine this configuration in certain parts.

It is desired to acknowledge with thanks the assistance and excellent co-operation provided by company officials during the course of the survey and to indicate appreciation of the geological advice and data as supplied by Mr. H. Connolly.

9. REFERENCE

EDWARDS, A.B., 1943 - The Copper Deposits of Australia Proc.Aust.Inst.Min.Met.,130, p.105.

PLATE I



LEGEND

Orebodies

Glacial Deposits

Mineralised Zones as mapped by P.B. Nye

Areas covered by Geophysical Survey

Bureau (1948-1949)

E.L. Blazey (1933-1935)

G. Douglas (1935-1938)

Approx North (Mag.)

G. E. Webb
GEOPHYSICIST

SCALE IN FEET

1000 0 1000 2000 3000

GEOPHYSICAL SURVEY AT MT. LYELL, TASMANIA

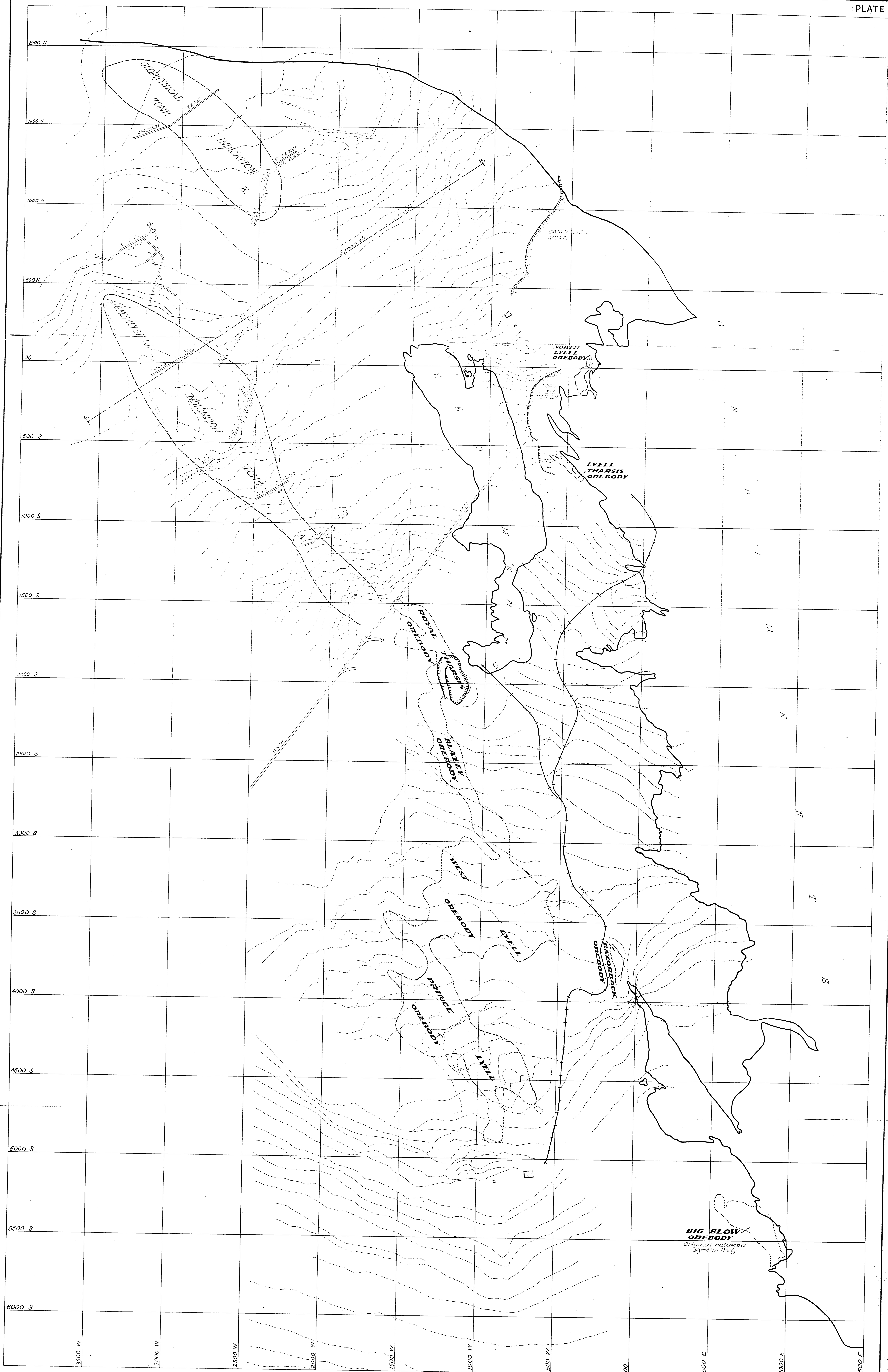
PRINCIPAL GEOLOGICAL FEATURES AND AREAS COVERED BY GEOPHYSICAL SURVEYS

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics

G 26-18

To accompany Records 1950 Nº 111

PLATE 2



MT LYELL - CENTRAL AREA

PLAN SHOWING POSITION OF PRINCIPAL KNOWN COPPER OREBODIES
AND
RESULTS OF GEOPHYSICAL SURVEYS BY E.L.BLAZEY & G.DOUGLAS DURING 1933-38
ON BEHALF OF MT. LYELL MINING & RLY. COY..

SCALE
0 100 200 300 400 500 600 700 800 900 1000 FEET

COMPILED BY GEOPHYSICAL SECTION, BUREAU OF MINERAL RESOURCES, FROM DATA SUPPLIED BY MT. LYELL COY..
TO ACCOMPANY REPORT BY L.A.RICHARDSON

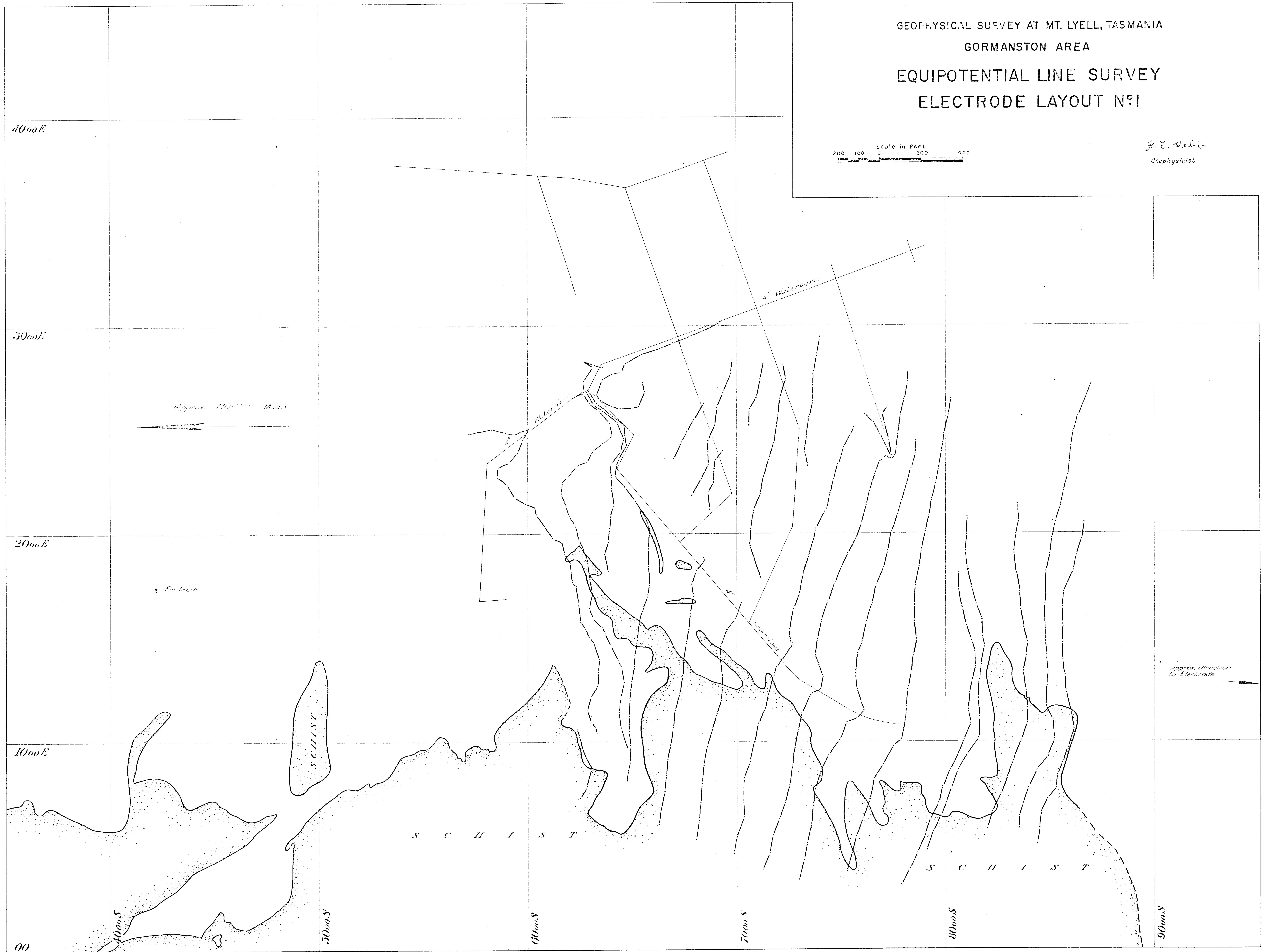
GEOPHYSICAL SURVEY BY EQUIPOTENTIAL LINE METHOD.

G26-1

PLATE 3
GEOPHYSICAL SURVEY AT MT. LYELL, TAS.
GORMANSTON AREA
PLAN SHOWING
AREA COVERED BY GEOPHYSICAL SURVEY AND
LOCATION OF GEOPHYSICAL ANOMALIES
Geophysicist
Scale
200 0 200 400 Feet
G26/4
GEOLOGICAL SECTION A-B
Schist
Sediments
Creek
Surface
Shaft in gossan (projected)
Siliceous Limestone
COPPER LINE
ESTATES STRUCTURE LINE
OWEN SPUR STRUCTURE
GORMANSTON TOWNSHIP
Outline of Area Covered by Equipotential Line Survey
ANOMALY ZONE NO. 2
ANOMALY ZONE NO. 1
Conglomerate
Gossan
Shaft in Gossan
Great Southern Shaft
No. 12 Bore (Bottom in Cong.)
Shaft all in Pug
No. 11 Bore (Bottom in Cong.)
No. 10 Bore
No. 9 Bore
No. 8 Bore
No. 5 Tunnel
Limonite
King Lyell
Schist
Proprietry Shaft
Airshaft
Adit
Big Blow Ore Body
Open Cut
South Lyell Shaft
West Shaft
Kelly's New Shaft
Kelly's Shaft
Razor-back Tunnel
Underlay Shaft
Conglomerate
Schist
Contact
GORMANSTON - QUEENSTOWN ROAD
NORTH LYELL ROAD
South Lyell Tunnel
Glen Tunnel
South Lyell Adits
Shaft
Track to Lynchford
Mt. Lyell Copper Estates Adit
Creek
Linda Creek
Geological Section
50ooE
40ooE
30ooE
20ooE
10ooE
10ooE
20ooE
30ooE
00
20ooS
30ooS
40ooS
50ooS
60ooS
70ooS
80ooS
90ooS
To accompany Records 1958 No.111

PLATE 4

GEOPHYSICAL SURVEY AT MT. LYELL, TASMANIA
GORMANSTON AREA
EQUIPOTENTIAL LINE SURVEY
ELECTRODE LAYOUT No. 1



Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26-5

To accompany Records 1958 No 111

PLATE 5

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

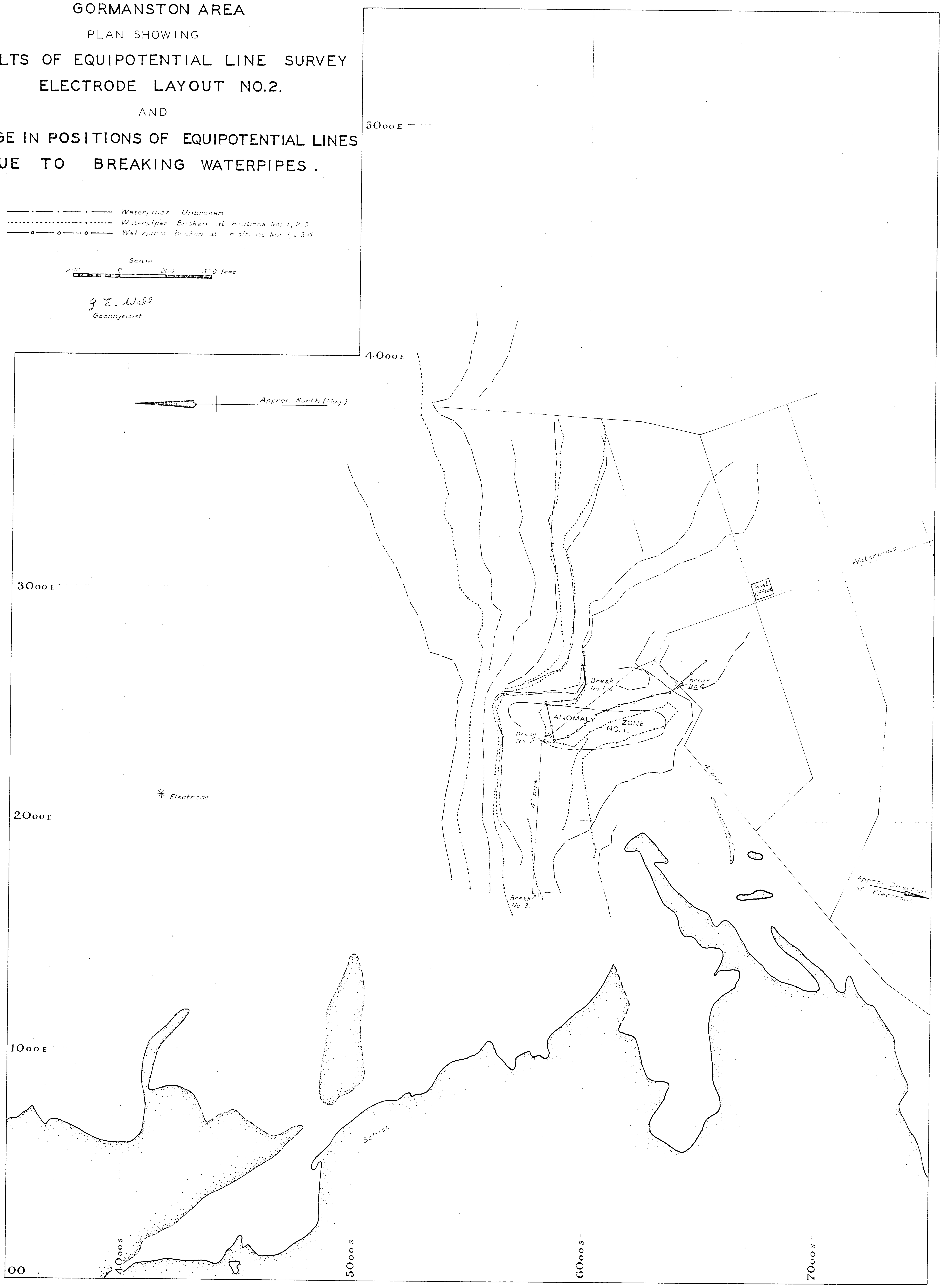
GORMANSTON AREA

PLAN SHOWING

RESULTS OF EQUIPOTENTIAL LINE SURVEY ELECTRODE LAYOUT NO.2.

AND

CHANGE IN POSITIONS OF EQUIPOTENTIAL LINES DUE TO BREAKING WATERPIPES.



G. E. Webb
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Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics G 26-10

To accompany Records 1958, No 111

PLATE 6

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

GORMANSTON AREA

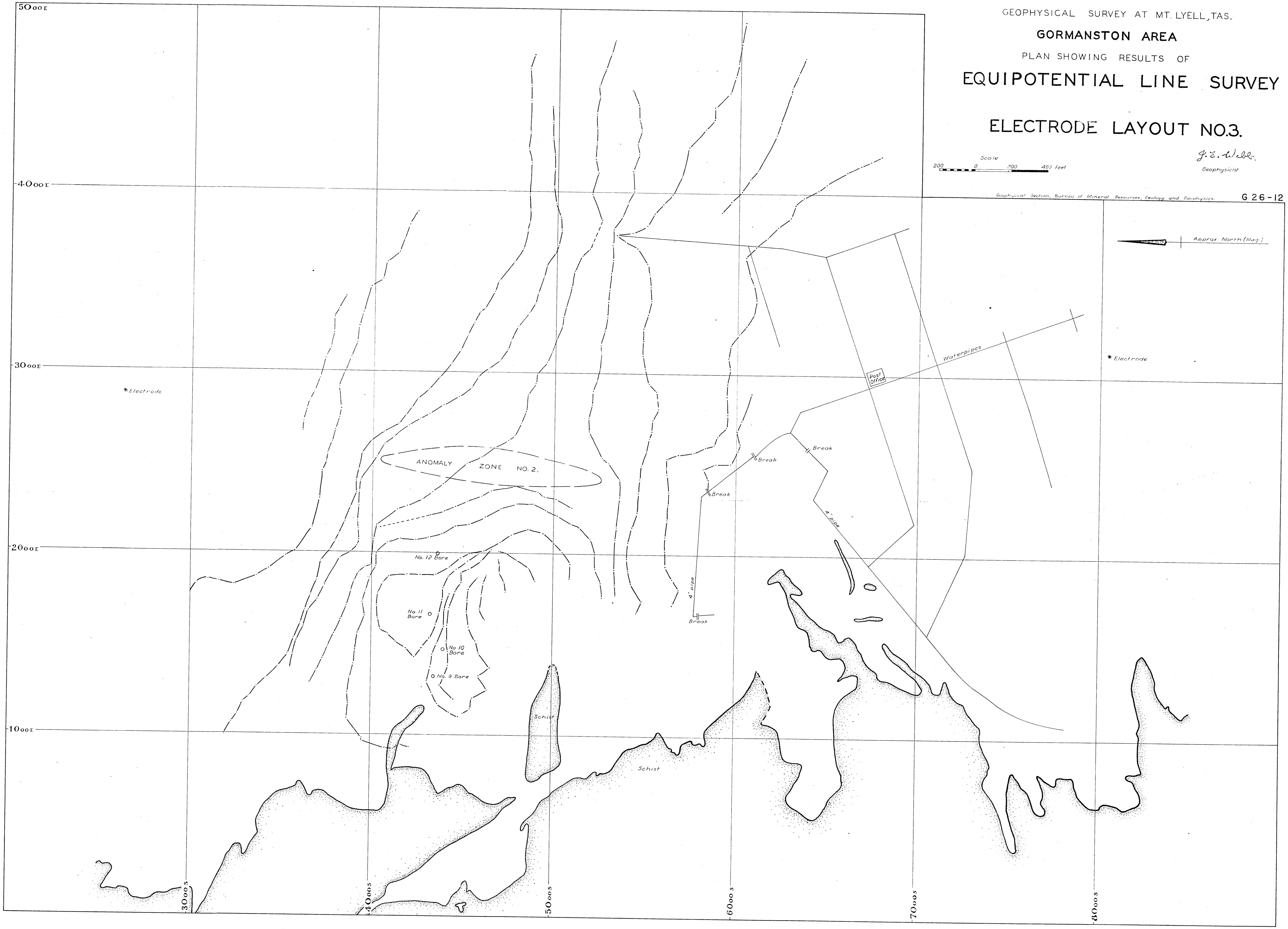
PLAN SHOWING RESULTS OF

EQUIPOTENTIAL LINE SURVEY

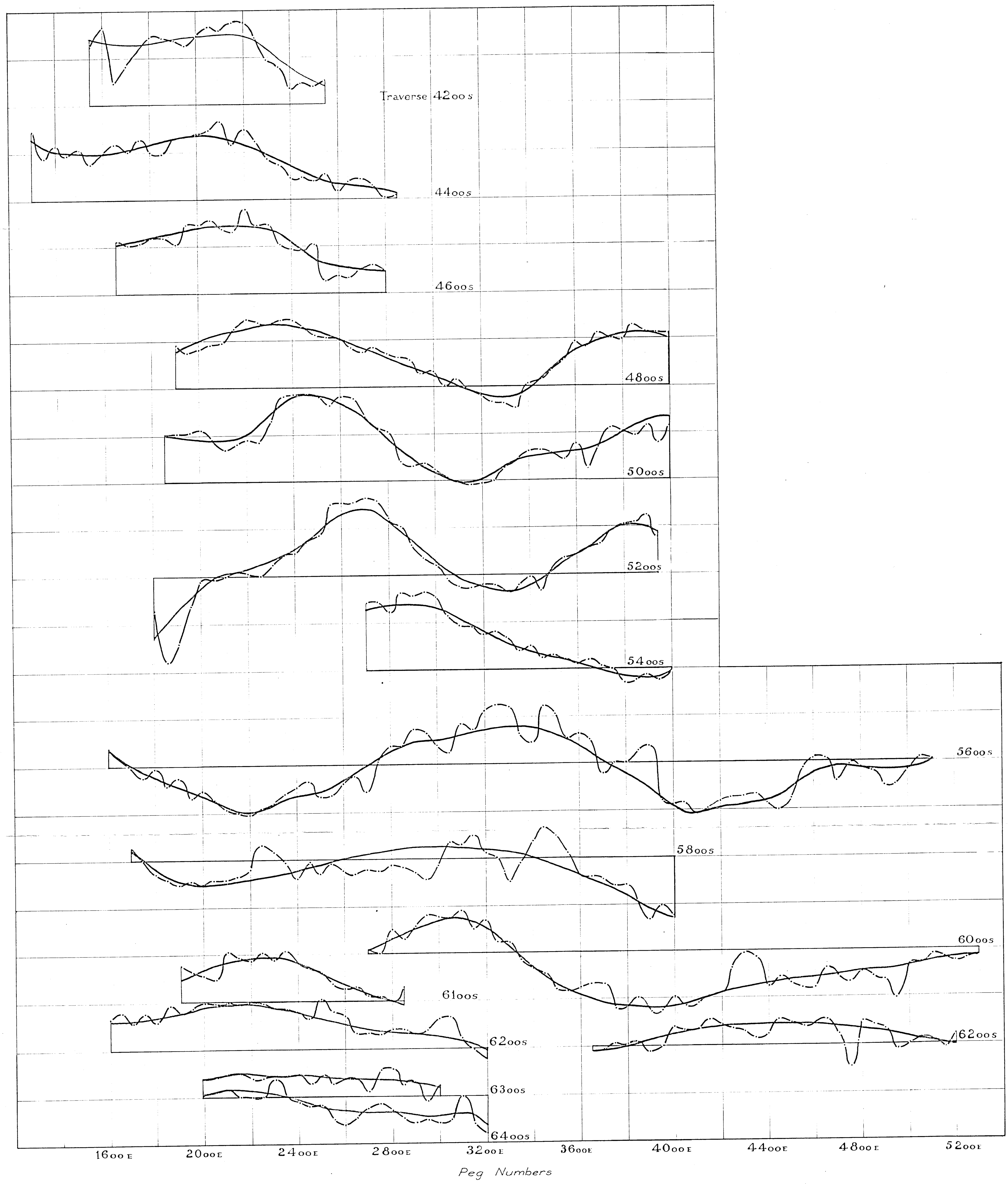
ELECTRODE LAYOUT NO.3.

Geophysicist

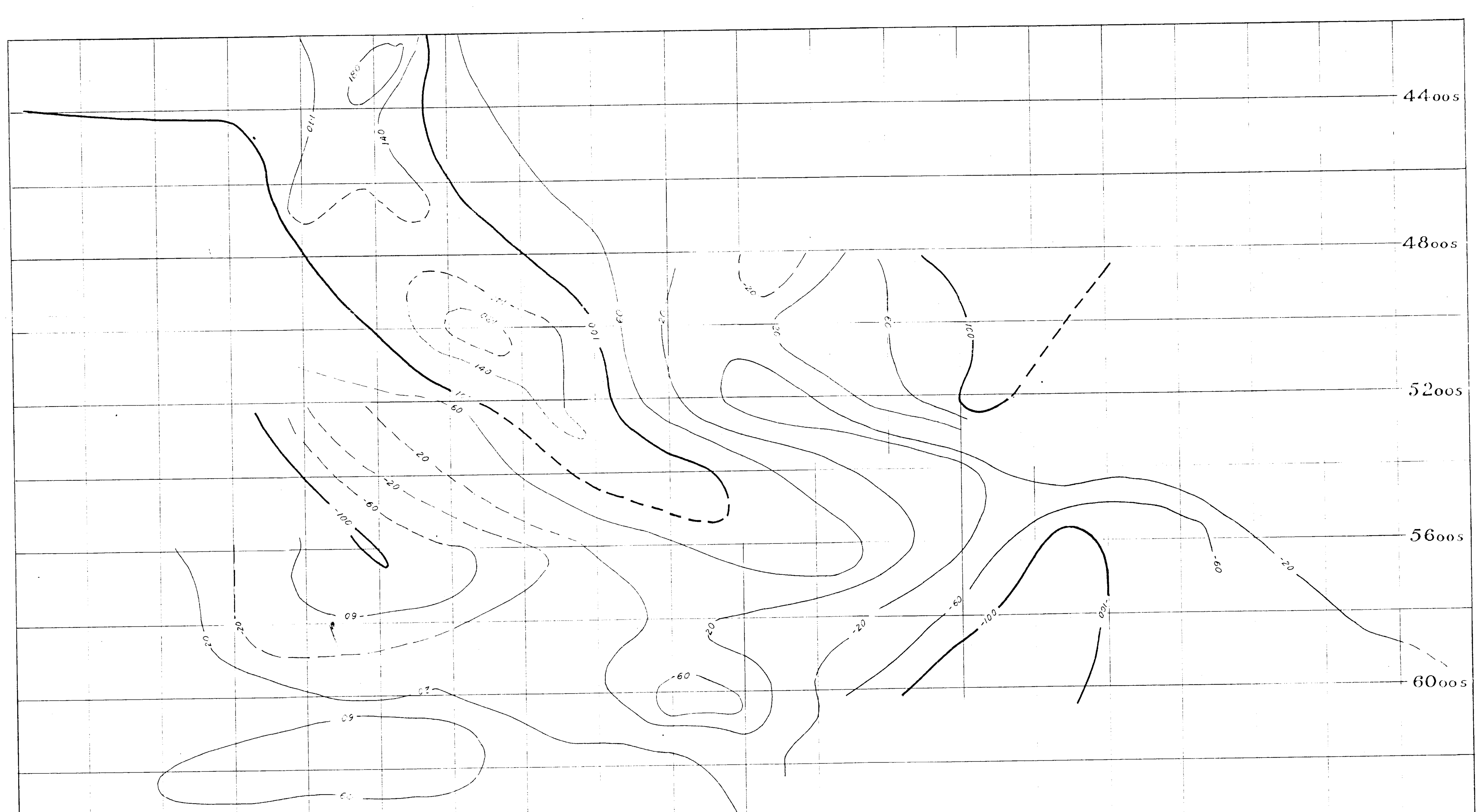
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. G 26-12



To accompany Records 1958, No 111



SELF POTENTIAL PROFILES SHOWING SMOOTHING USED FOR CONTOURS



SELF POTENTIAL CONTOURS AT 40mV INTERVALS

GEOPHYSICAL SURVEY AT MOUNT LYELL, TASMANIA

GORMANSTON AREA

Scale
200 0 200 400 feet
100 0 100 200 millivolts

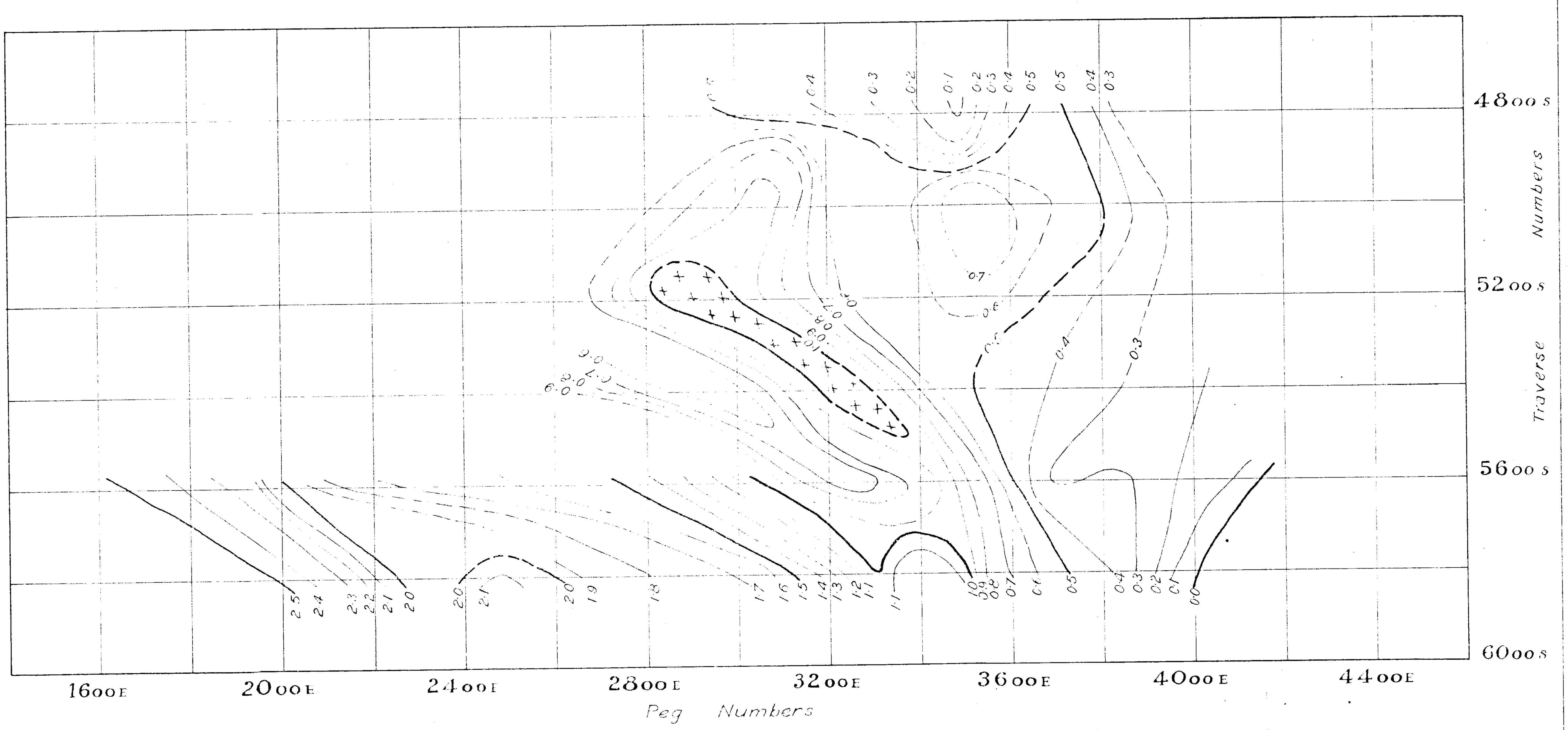
Geophysicist

SELF POTENTIAL PROFILES AND CONTOURS

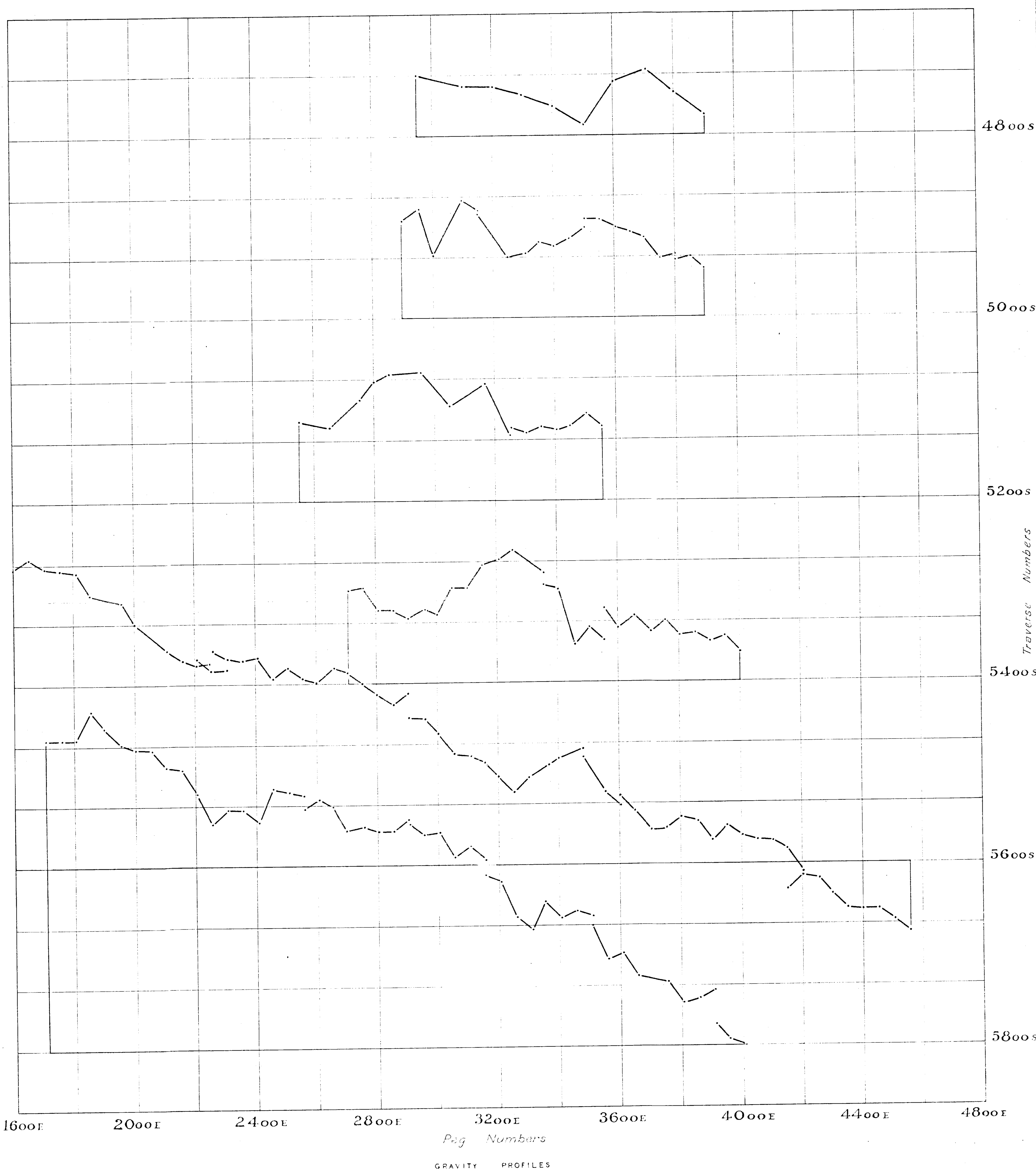
G.26/8

Bureau of Mineral Resources, Geology and Geophysics.

To accompany Records 1958 No 111



GRAVITY CONTOURS AT 0·1 MILLIGAL INTERVALS



GRAVITY PROFILES

GEOPHYSICAL SURVEY AT MT.LYELL, TAS.

GORMANSTON AREA

GRAVITY PROFILES & CONTOURS

Scale

Horiz. 200 0 200 400 feet

Vert. 0·5 0 0·5 1·0 milligals

G. E. Webb
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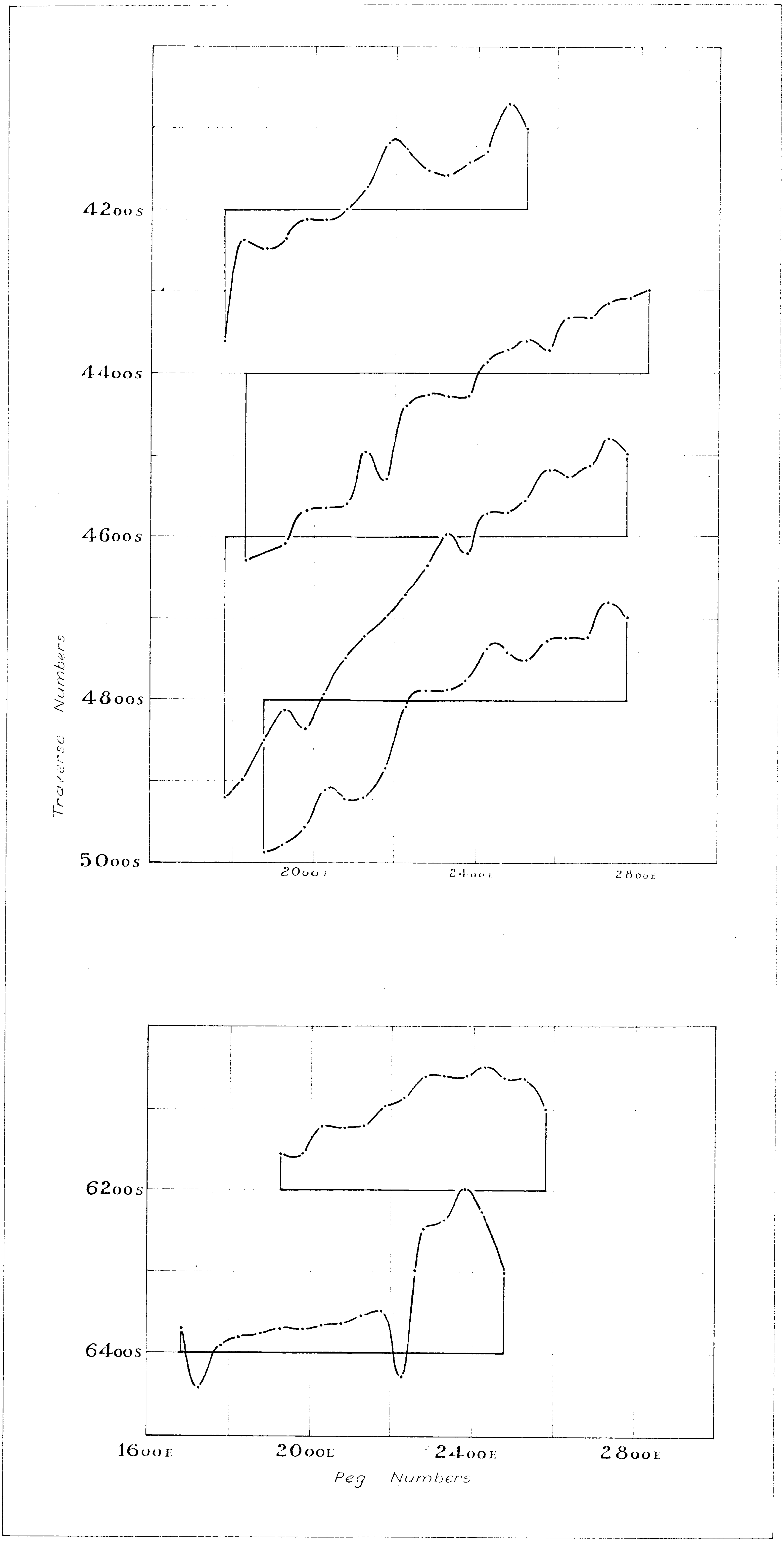
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics

G 26-9

To accompany Records 1958 No 111

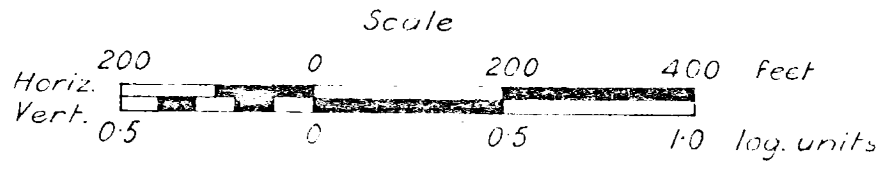


GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

GORMANSTON AREA

PROFILES OF POTENTIAL GRADIENTS

(Logarithms)



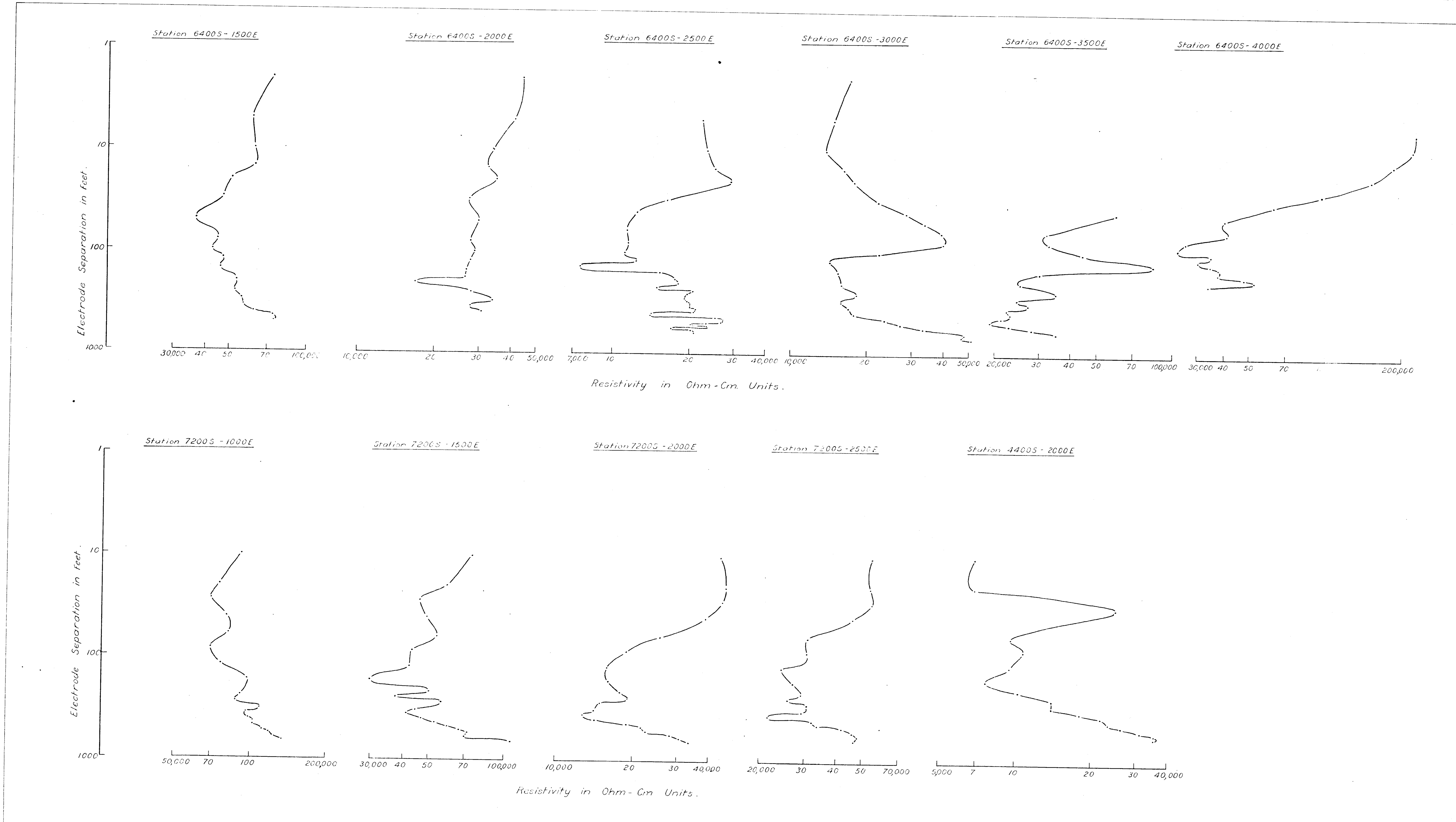
G. E. Webb.
Geophysicist

G26/7

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics

To accompany Records 1958, Nº 111

PLATE 10



GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

Scale

Horiz. 0·2 0 0·2 0·4 Log. units Resistivity
Vert. 0·5 0 0·5 1·0 Log. units Feet

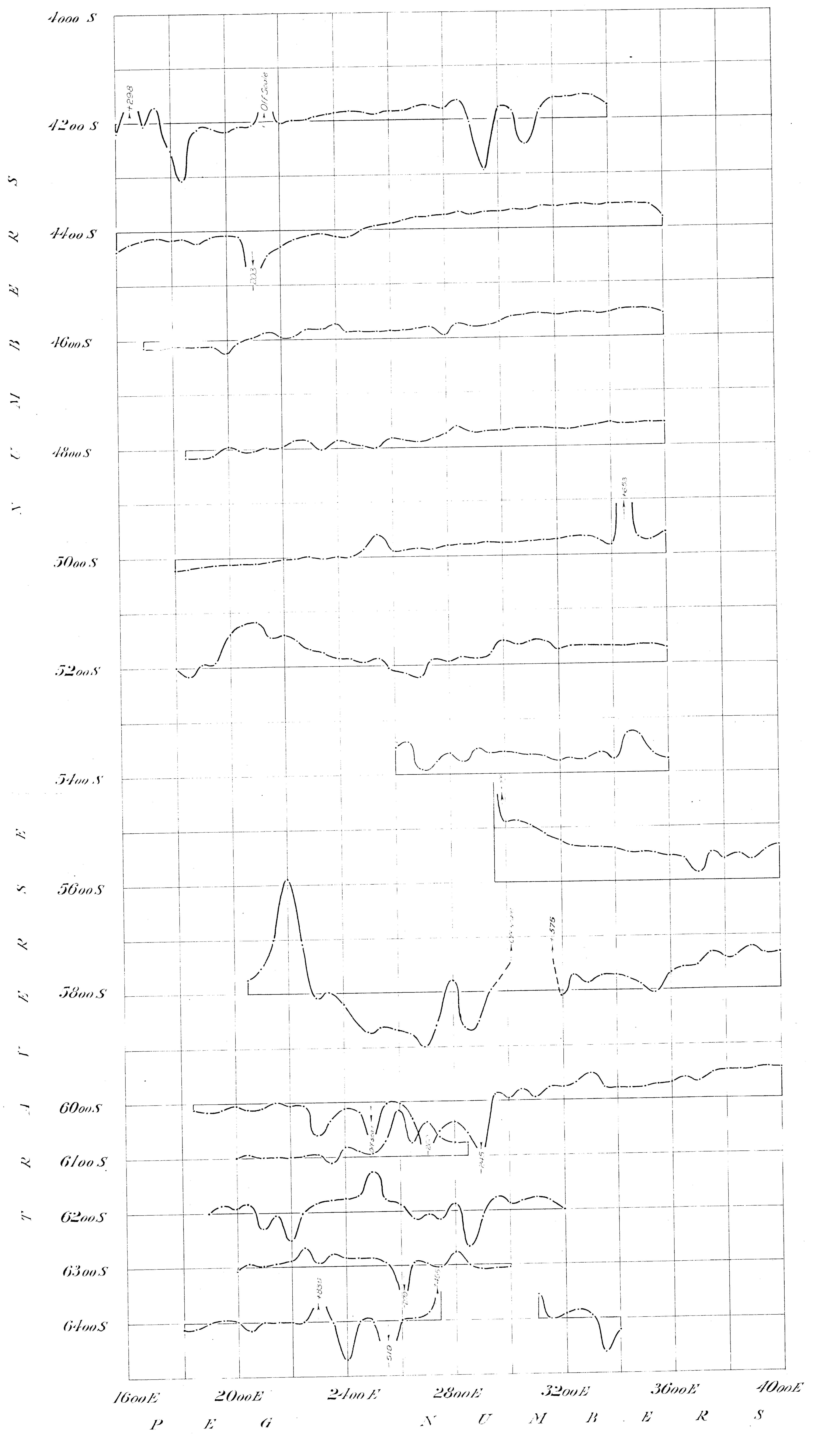
GORMANSTON AREA

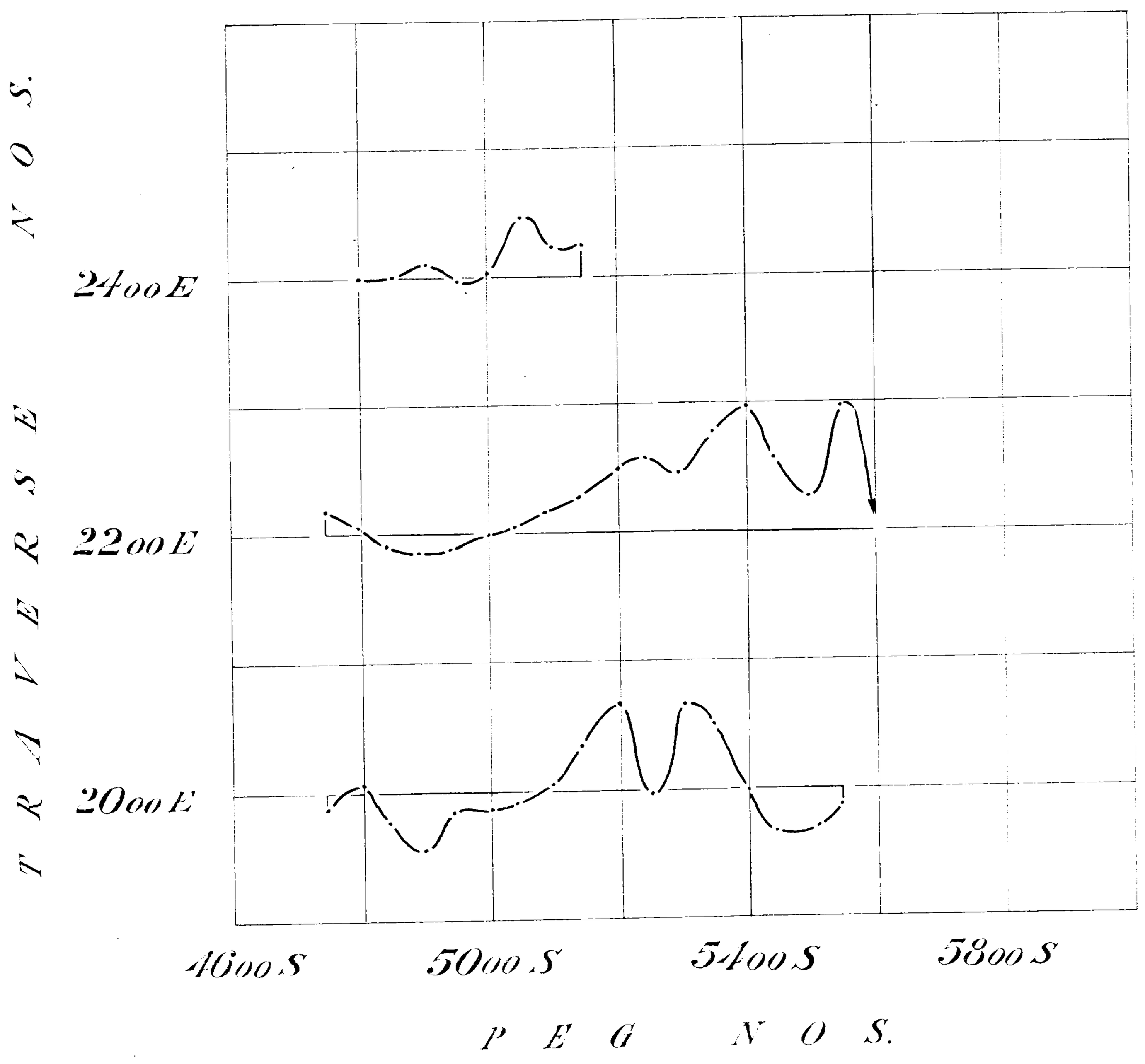
J. Webb
Geophysicist

GROUND RESISTIVITY CURVES

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. G 26 – 11

To accompany Records 1958 No 111



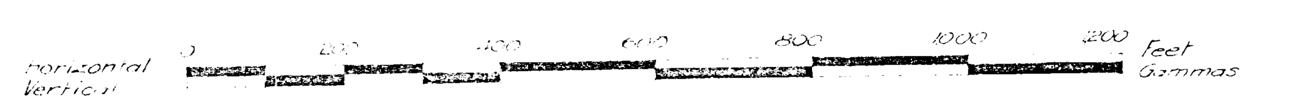


MT LYELL GEOPHYSICAL SURVEY

GORMANSTON AREA

PROFILES OF GEOMAGNETIC VERTICAL FORCE

J. E. Webb
Geophysicist



G 26-6

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics.

To accompany Records 1958, No 111

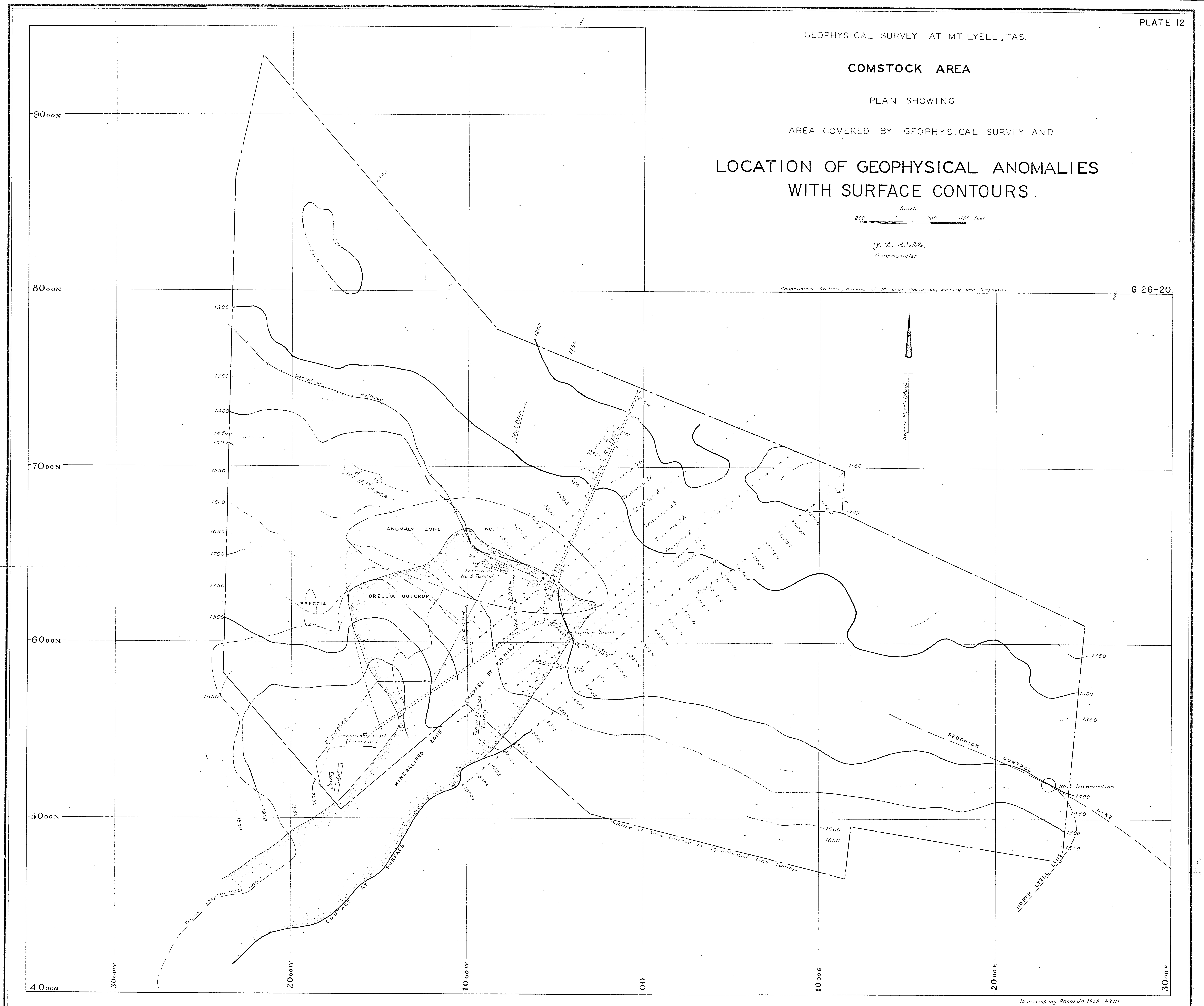
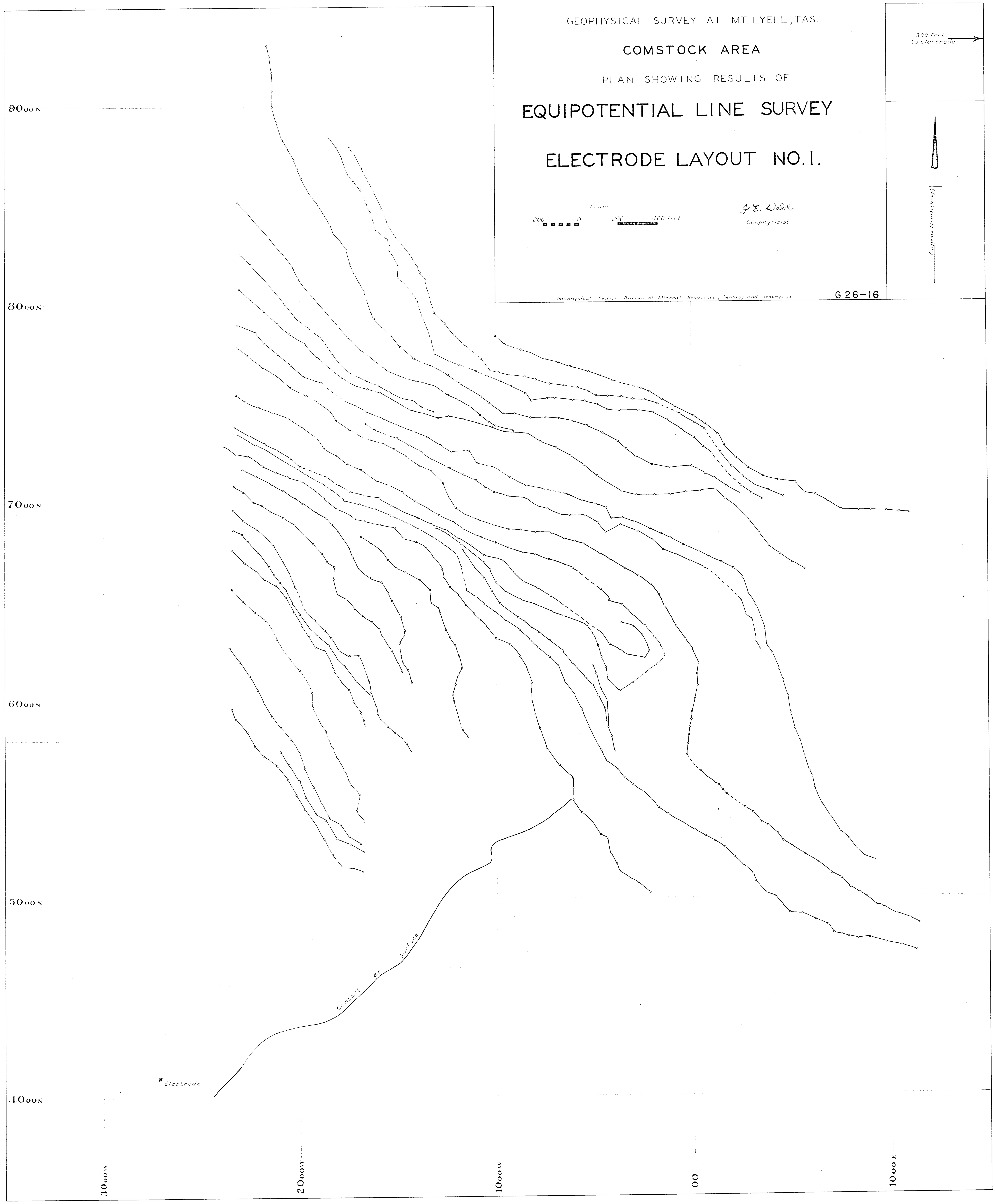


PLATE 12
GEOPHYSICAL SURVEY AT MT. LYELL, TAS.
COMSTOCK AREA
PLAN SHOWING
AREA COVERED BY GEOPHYSICAL SURVEY AND
LOCATION OF GEOPHYSICAL ANOMALIES
WITH SURFACE CONTOURS
Scale
200 0 200 400 feet
J. L. Wells
Geophysicist
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics
G 26-20
Approx North (Mag)
ANOMALY ZONE NO. 1.
BRECCIA OUTCROP
BRECCIA
Comstock Railway
Entrance No. 5 Tunnel
Tasman Shaft
Comstock Shaft (Internal)
2" pipeline
MINERALISED ZONE
(MAPPED BY P.B. NYE)
Top of Mitchell Quarry
CONTACT AT SURFACE
Track (approximate only)
SEDGWICK CONTROL LINE
No. 3 Intersection
NORTH LYELL LINE
Outline of Area Covered by Equipotential Line Surveys
90₀₀N
80₀₀N
70₀₀N
60₀₀N
50₀₀N
40₀₀N
30₀₀W
20₀₀W
10₀₀W
00
10₀₀E
20₀₀E
30₀₀E
To accompany Records 1958, No 111


GEOPHYSICAL SURVEY AT MT. LYELL, TAS.
COMSTOCK AREA
PLAN SHOWING RESULTS OF
EQUIPOTENTIAL LINE SURVEY
ELECTRODE LAYOUT NO. I.
Scale
200 0 200 400 feet
J. E. Webb
Geophysicist
Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics
G 26-16
300 feet to electrode
Approx. North (true)
9000N
8000N
7000N
6000N
5000N
4000N
Electrode
Contact at Surface
3000W
2000W
1000W
00
1000E

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

COMSTOCK AREA

PLAN SHOWING RESULTS OF

EQUIPOTENTIAL LINE SURVEY

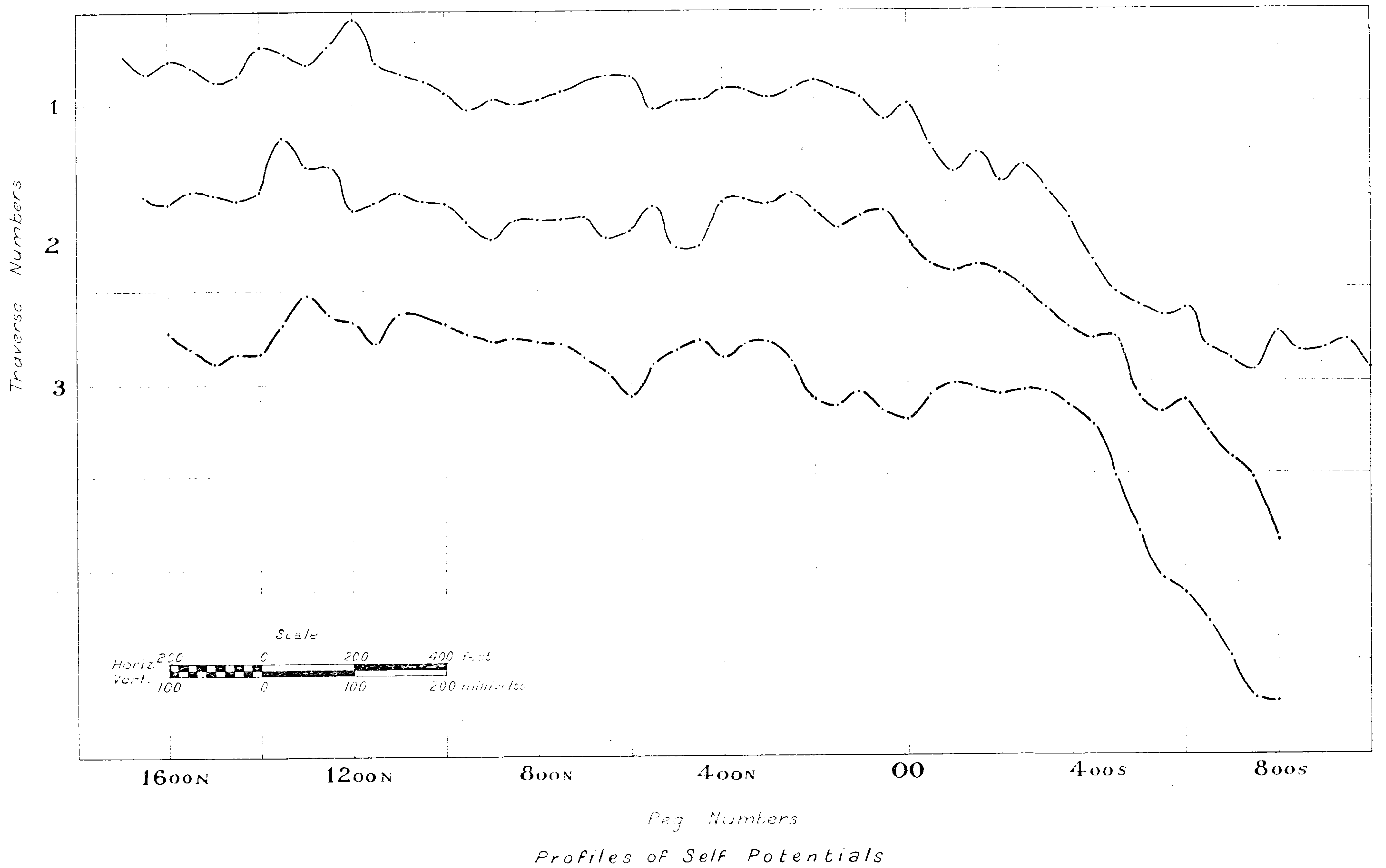
ELECTRODE LAYOUT NO. 2.

Scale

200 0 200 400 Feet

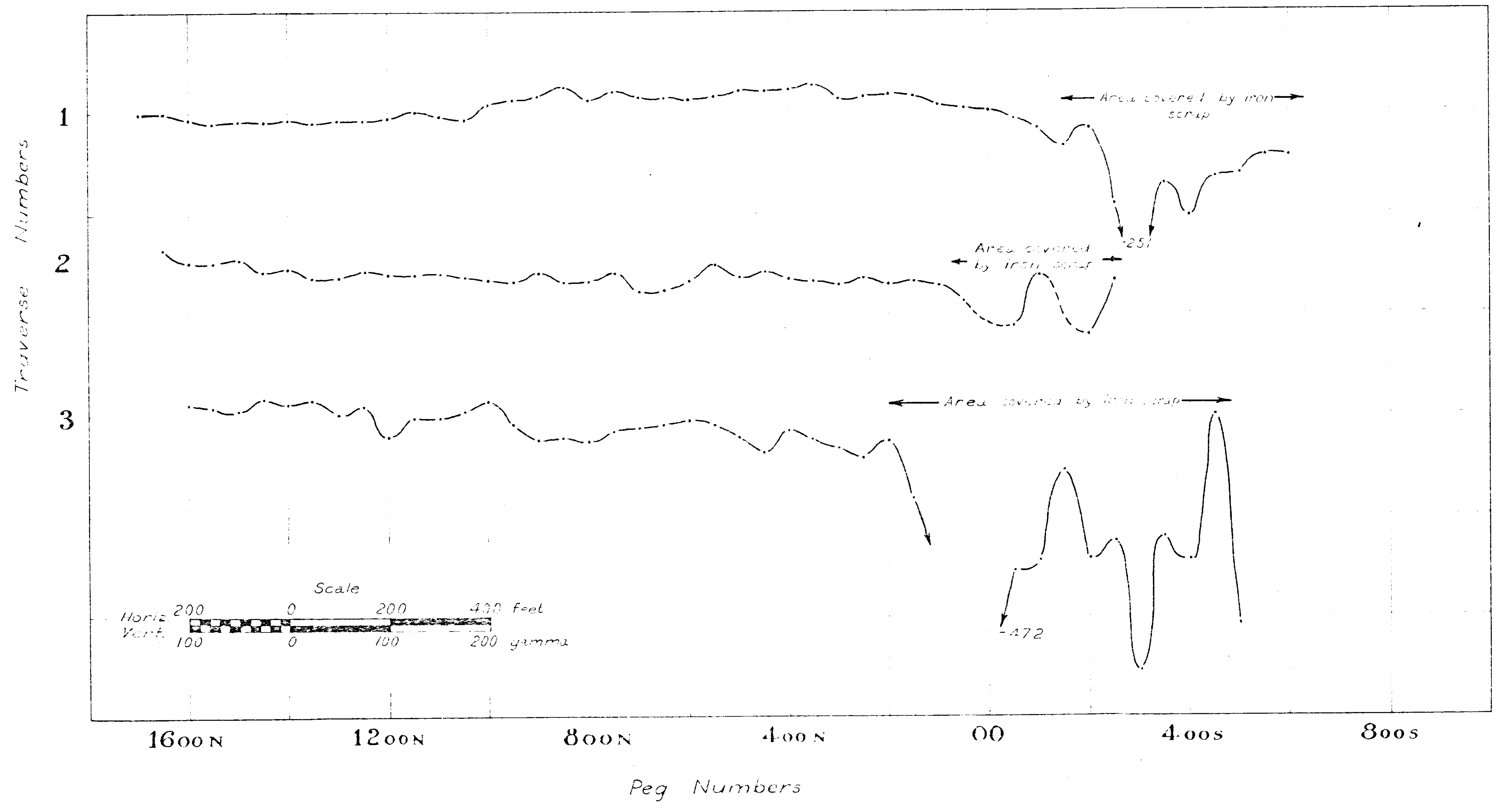
J. E. Webb.
Geophysicist

To accompany Report [illegible] No 111



Peg Numbers

Profiles of Self Potentials



Peg Numbers

Geomagnetic Vertical Force Profiles.

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

COMSTOCK AREA

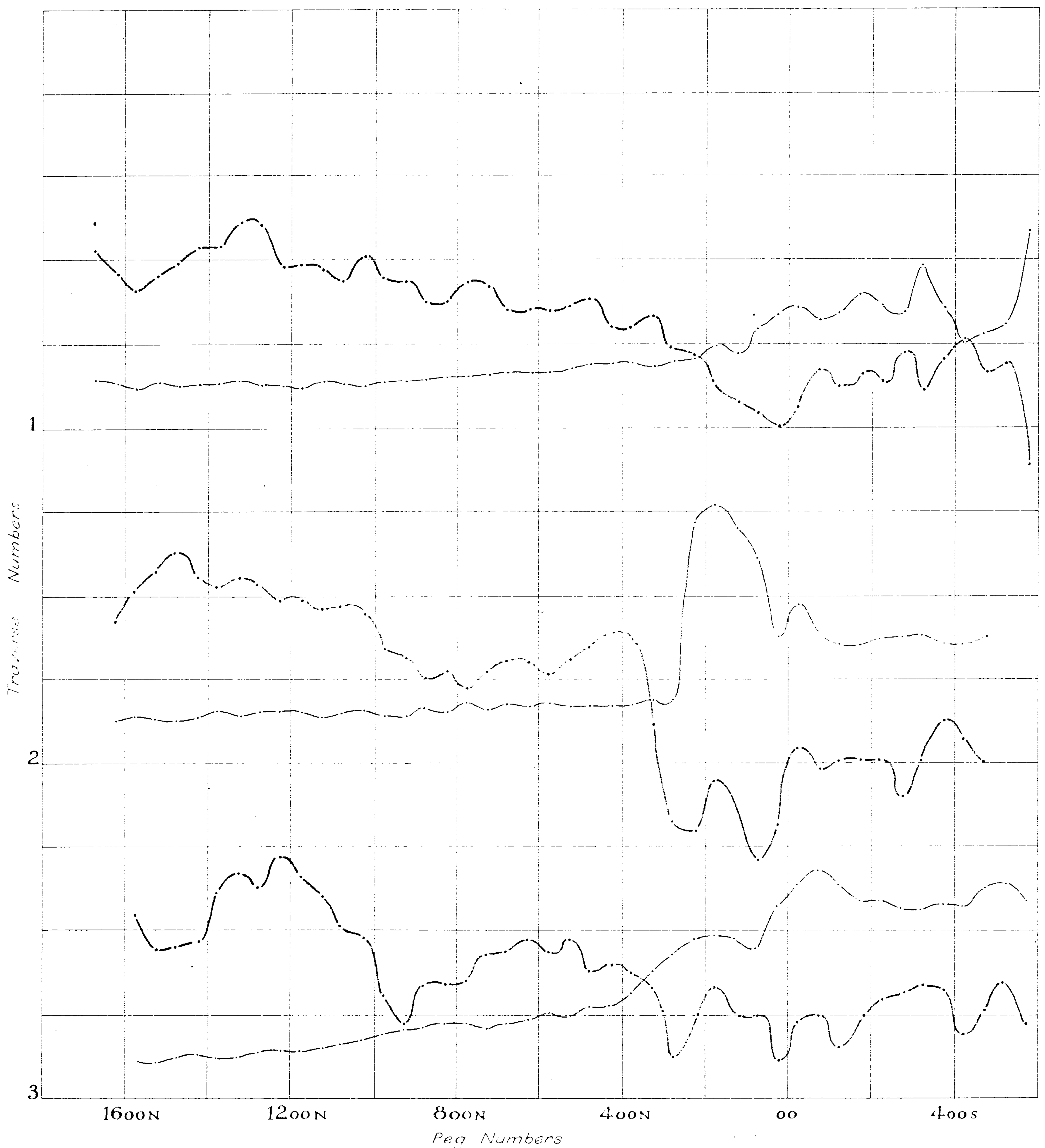
PROFILES OF GEOMAGNETIC VERTICAL FORCE AND SELF POTENTIALS

J. E. Webb
Geophysicist

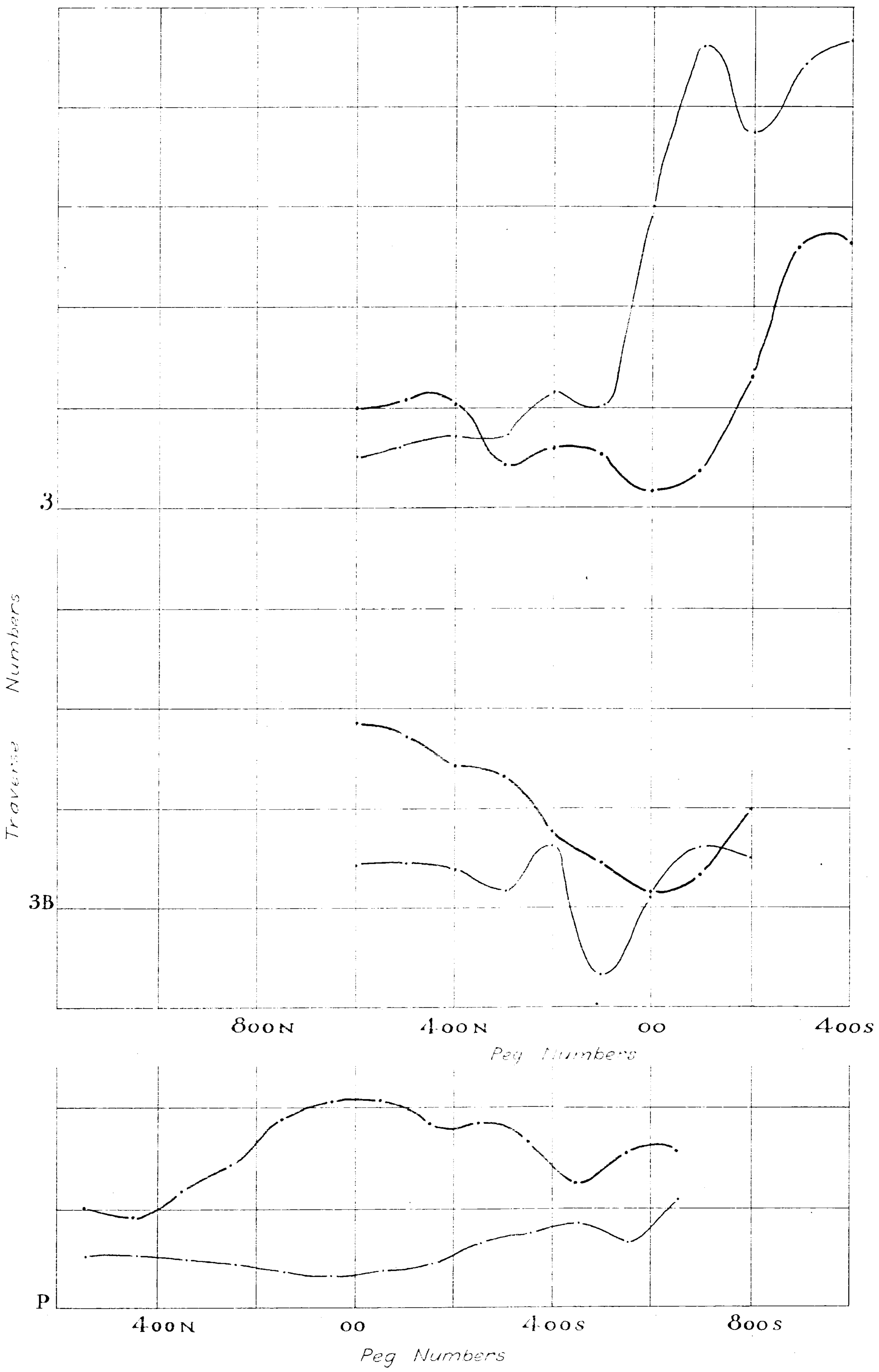
G[illegible]physical Section, Bureau of Mineral Resources, [illegible]

G26-15

To accompany Records 1958, No 111



PROFILES OF RELATIVE POTENTIAL GRADIENTS (LOGARITHMS) AND PHASE ANGLE VARIATIONS ON EQUIPOTENTIAL LINE ELECTRODE LAYOUT NO.1. ———— 50 FEET ELECTRODE INTERVALS



PROFILES OF RELATIVE POTENTIAL GRADIENTS (LOGARITHMS) AND PHASE ANGLE VARIATIONS ON EQUIPOTENTIAL LINE ELECTRODE LAYOUT NO.2. ———— 100 FEET ELECTRODE INTERVALS.

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

COMSTOCK AREA

PROFILES OF RELATIVE POTENTIAL GRADIENTS (LOGARITHMS) AND PHASE ANGLE VARIATIONS.

—·—·— Relative Potential Gradients

—·—·— Phase Angle Variations

Scale

Horiz. 200 0 200 400 feet

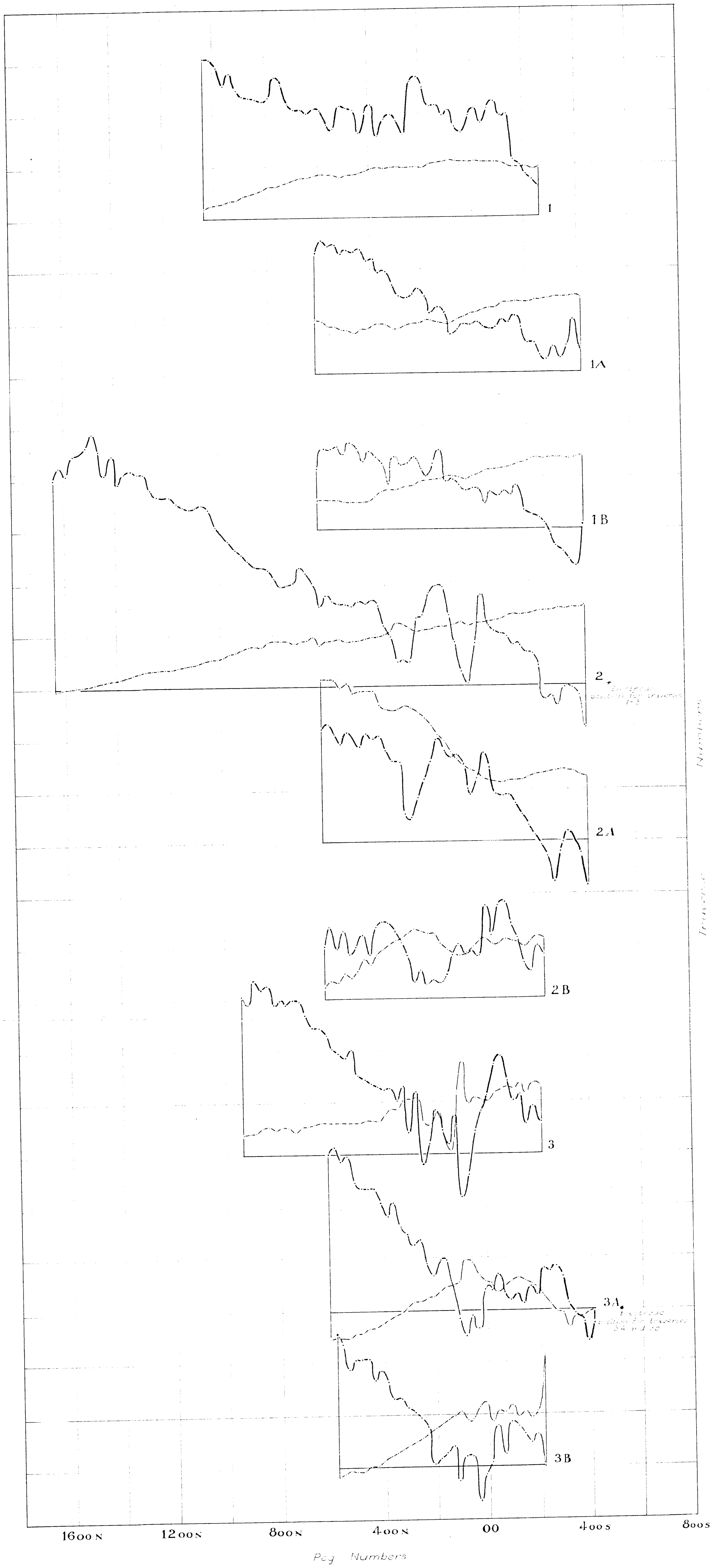
Vert. 0.5 0 0.5 1.0

J. E. Webb.
Geophysicist

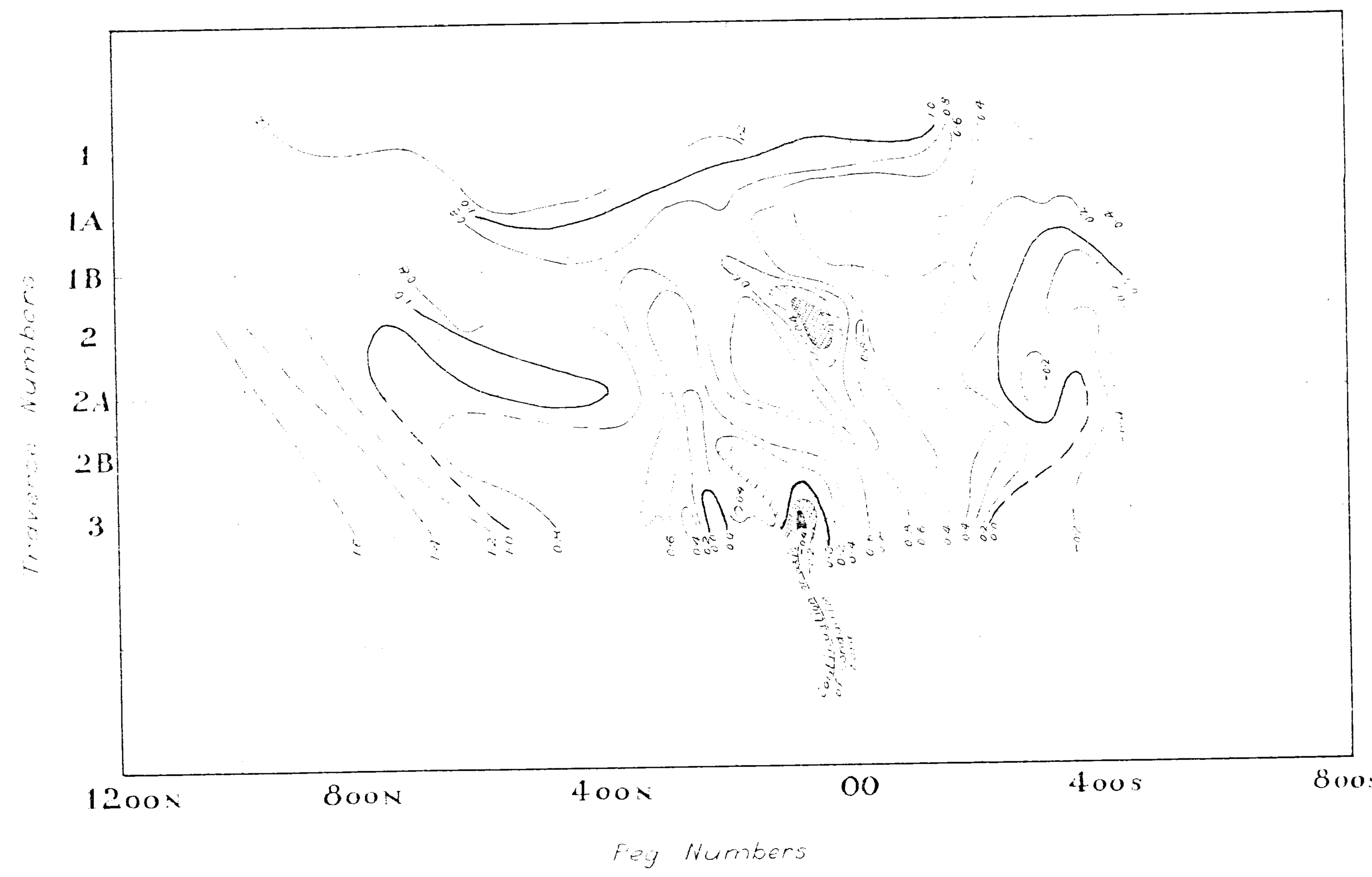
Bureau of Mineral Resources, Geology and Geophysics

To accompany Records 1958, Nº 111

PLATE 17



PROFILES OF RELATIVE POTENTIAL GRADIENTS (LOGARITHMS) AND PHASE ANGLE VARIATIONS.



CONTOURS OF RELATIVE POTENTIAL GRADIENTS (LOGARITHMS) AT INTERVALS OF 0.2 LOG UNITS.

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

COMSTOCK AREA

PROFILES OF RELATIVE POTENTIAL GRADIENTS (Logarithms) AND PHASE ANGLE VARIATIONS & CONTOURS OF RELATIVE POTENTIAL GRADIENTS (Logarithms) FOR 25 FT. ELECTRODE INTERVALS.

—·— phase angle variations
—·— relative potential gradients

Geophysicist

Scale

Horiz. 200 0 200 400 feet

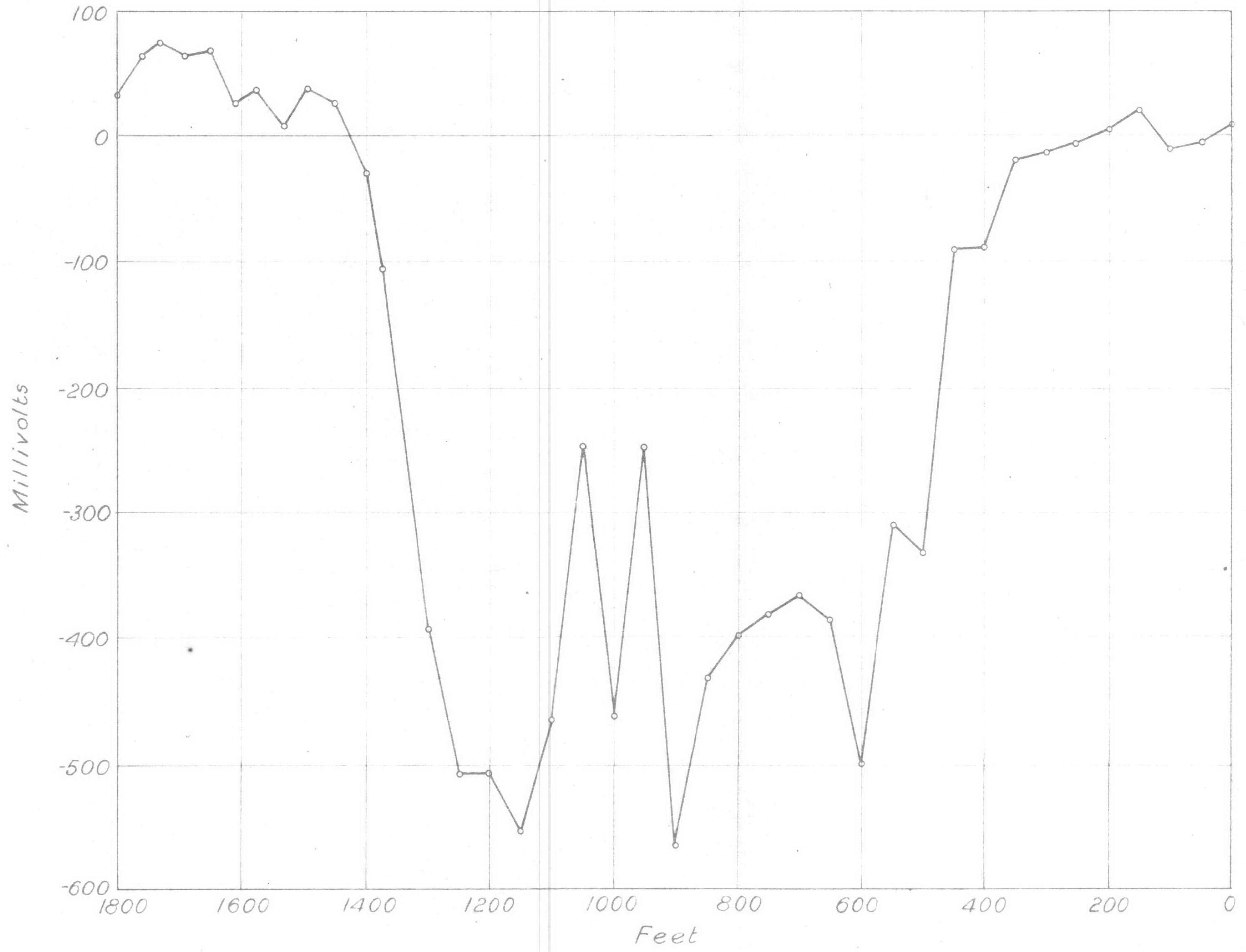
Vert. 0.5 0 0.5 1.0 log units

40 0 40 80 degrees

G26/17

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics.

To accompany Records 1955, No. 111



Self Potential Profile along Test Traverse N° 1.

GEOPHYSICAL SURVEY AT MT. LYELL, TAS.

PLAN SHOWING

EQUIPOTENTIAL LINE ANOMALY ZONE A

BY G. DOUGLAS

AND POSITION OF

TEST TRAVERSE NO. 1 FOR SELF POTENTIAL SURVEY

BY THE BUREAU

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G 26-19

To accompany Records 1958, N° 11