COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORDS 1954 No. 7

GEOPHYSICAL SURVEY AT MT. CLEVELAND MINE, WARATAH, TASMANIA

by

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C O N T E N T S

ILLUSTRATIONS

ABSTRACT

Self-potential and magnetic surveys made in the vicinity of the Mount Cleveland Tin Mine, near Waratah, Tasmania, are described and discussed. The first survey, which is described in Part 1 of this report, was made in April and May, 1953, at the request of the Department of Mines, Tasmania. The object of the survey was to ascertain whether geophysical methods could detect the known areas of mineralisation and, if so, whether any additional areas of mineralisation could be discovered.

Results of the first survey show that the geophysical anomalies, particularly the self-potential ones, coincide with the old mine workings. The anomalies over Luck's and Hall's workings, however, cover larger areas than the actual mine workings, thus indicating that further sulphide mineralisation may exist beyond these old workings. Anomalies not related to the old workings appear in an area north-west of Deep Creek, between traverses O and R. Both self-potential and magnetic methods revealed anomalies along these traverses between 350.E and 650.E, where geological investigation has also shown mineralisation to exist.

Based on the results of the first survey, the grid was extended and surveyed to the north-east and south-west in March and April, 1954. This second survey, which is described in Part 2 of the report, shows that the anomaly connected with Henry's workings does not extend to the north-east, but terminates sharply between traverses P and Q. Some additional anomalies were recorded in the north-eastern extension of the grid, but in the south-western extension there was no geophysical evidence of mineralisation.

It is suggested that further mining exploration work should be concentrated mainly near the former mine workings and in the area to the north-west of Deep Creek, between traverses O and R. Some prospecting trenches should also be put down to test the minor anomalies in the north-eastern part of the area.

PART 1. GEOPHYSICAL SURVEY, APRIL/MAY, 1953.

by O. KEUNECKE.

1. INTRODUCTION

The Mt. Cleveland tin mining area is situated on the southern slope of Crescent Hill, a long spur trending south-westerly from the Magnet Range, and rising from the junction of Deep Creek and the Whyte River to a height of 1,700 feet. The area is most conveniently reached by travelling eight miles from Waratah, along the Waratah-Corinna road, and then branching south for 2½ miles along an old tramway which runs along the south side of Crescent Hill (Plate 1). The small town of Waratah lies at the foot of Mt. Bischoff in N.W. Tasmania; it was founded about 1870, shortly after the Mt. Bischoff tin-ore deposit was discovered.

The Mt. Cleveland ore bodies were discovered about 50 years ago and, during the period 1908-1917, 35,000 tons of ore were produced, with a recovery of about 350 tons of tin (Hughes, 1953).

Unsuccessful efforts to re-work the field were made by the Mt. Bischoff Co. in 1935, but some of this development work revealed tin-bearing sulphides. Interest in the area has been revived recently and, in May, 1952, the Tasmanian Department of Mines requested the Bureau of Mineral Resources to consider making a geophysical survey. After a preliminary investigation of the area the request was agreed to, the object being to discover if geophysical methods could detect the known areas of mineralisation. If so, additional mineralised areas might be discovered. The Department of Mines selected for the survey an area measuring 1,800 feet by 1,000 feet, covering all the mine workings.

The area surveyed is in very rough country, overgrown with dense forest, although near the mine workings most of the original timber has been cut down and much of the scrub burnt off. Slopes of up to 50° result in differences in altitude of 600 feet within the area surveyed.

The geophysical work, consisting of self-potential and magnetic surveys, was done during April and May, 1953, by Dr. O. Keunecke (party leader) and M.J. O'Connor, geophysicists.

2. GEOLOGY.

The country rocks in the vicinity of the mine workings are of the Cambrian Group (Dundas Series) and are mainly slates, tuffs and lavas, silicified mostly to cherts and quartzites. Mineragraphic investigations by Everard (Hughes, 1953) gave evidence that the tuff is a greywacke and the lava a dolerite. The dolerite lava is of greenish-grey colour and outcrops mainly on both sides of Deep Creek (Plate 3). The main part of the area, on the eastern slope of Crescent Hill, where the old mine workings are situated, is formed of greyish-blue tuff and slate. Tuff crops out only on the western slope of Crescent Hill (Hughes, 1953).

The strata are strongly folded along axes trending to the north-east. Deep Creek runs approximately along the crest of an anticline, the adjoining synclinal axis being located near the top of Crescent Hill (Carey, 1945 and Hughes, 1953).

Although there is no evidence of a major fault, the region between the anticlinal and synclinal axes has been subject to intense shearing, numerous minor faults being visible, not only in the workings, but also in the outcrops.

The tin mineralisation occurs in tuff beds ranging in width from one to 30-40 feet, between the anticlinal and synclinal axes, i.e. on the slope between Deep Creek and Crescent Hill. The tuffs have been partly replaced by sulphides containing a small percentage of cassiterite. The principal sulphide minerals are pyrrhotite and pyrite, with lesser amounts of chalcopyrite and arsenopyrite. No reference is made in the geological reports as to which mineral is favoured by the tin.

The ore has been mined in Hall's, Luck's, Henry's and Battery workings, and is said to have contained up to 4 per cent tin (Reid, 1923), but more recent estimates (Carey, 1945) put the average value at only 1 per cent, or even slightly less.

Mining has proved two mineralised tuff beds separated by shale in both Luck's and Battery workings, but in the other workings only one mineralised bed appears to have been mined. Due to strong folding and faulting, the mineralised beds are not continuous along the strike. Tuff and slate form well pronounced synclines in Luck's, Hall's and Henry's workings (Carey, 1945), and the mineralisation appears in the troughs as well as in the adjacent limbs of the tuff beds. The structural form of Battery workings has not yet been clearly recognised, and it is uncertain whether the two lodes are only opposing limbs of an overturned syncline, or belong to another structure.

Carey (1945) estimates the probable ore reserves in the area of the old workings to be about 200,000 tons of sulphides, containing nearly 1 per cent tin. The majority of these reserves lies in Hall's and Luck's lodes.

Igneous rocks outcrop near the surveyed area in the form of basic and ultrabasic plutonic rocks in the Whyte River valley about one mile to the south, and in the form of granite about 3 miles south-east and $3\frac{1}{2}$ miles south-west of the area. Oxidation, decomposition and weathering are not mentioned in any of the geological reports.

For additional details of the geology of the area, the reader is referred to the reports by Reid (1923), Carey (1945) and Hughes (1953).

3. SELF-POTENTIAL SURVEY

(a) Method.

Sulphide ore bodies which are enclosed in barren country rock, and which project from the zone of ground-water-saturated rocks into the zone of weathering, ~~are~~ subject to oxidation processes. ~~accompanied by~~ This electro-chemical activity, ~~thus~~ produces electric currents which pass into the surrounding rock and return to the ore body. A resultant potential distribution occurs at the ground surface and differences in potential can be measured between any two points. The presence of a centre of negative potential can be indicative of a sulphide ore body undergoing oxidation. The interpretation of self-potential anomalies must be made with caution however, because anomalies can result not only from sulphide ore bodies undergoing oxidation, but also from pyritised fault and shear zones, graphitic slates, etc. It should also be stressed here that if the anomaly is caused by an ore body undergoing oxidation, the method will of course show only the oxidised portion of the deposit, and not its possible continuation in depth below ground-water level.

The presence of sulphides in the ore of the Mt. Cleveland area, and their possible oxidation, made the application of the self-potential method advisable.

(b) <u>Work done and results obtained</u>.

A base-line 1,800 feet in length was laid out along the crest of Crescent Hill, varying a little in direction, but with an average bearing of 44° magnetic. Traverses from 800 feet to 1,000 feet in length were laid out towards Deep Creek at intervals of 100 feet, perpendicular to the base-line, with observation points pegged every 25 feet along each traverse (Plate 3).

One station was maintained as a fixed reference station and at every point on the grid a reading was taken of the potential difference relative to the fixed station.

The self-potential profiles along each traverse are shown on Plate 2, Sheet 1, and the self-potential contour map constructed from the profiles is shown on Plate 3. It is pointed out here that Plate 3 shows the area covered by both the first and second surveys, but in this section of the report, reference is made to the central area only, i.e. the area between traverses AA and R inclusive.

(c) <u>Discussion of results</u>.

The self-potential contour map (Plate 3) indicates that the anomalies correspond fairly well with the former mine workings and that they tend to follow the strike of the strata and mineralisation. The most pronounced anomalies were recorded over the old workings and the strongest of the other anomalies coincide with other areas of mineralisation shown on the geological map (Hughes, 1953).

The values of the most pronounced anomalies range from more than -250 millivolts over Battery workings to more than -500 millivolts over Henry's workings, whilst those of the less pronounced anomalies range from -100 to -200 millivolts. The configuration of the contours on Plate 3 suggests that the mineralisation associated with the old workings is in the form of several separate bodies.

The anomaly recorded over Battery workings on traverses AA to D strikes north-north-east and indicates that, at the northern end, the mineralisation terminates between traverses D and E. At the southern end, however, the mineralisation may continue outside the area covered by this first survey, as the anomaly still exists on the southernmost traverse, AA. The geophysical results suggest that the termination of the mineralised tuff beds between traverses D and E may possibly be caused by a fault striking approximately north-west.

The anomaly over Luck's workings covers a greater area than the known mineralisation. It contains two small centres of more than -400 millivolts on traverse G, the north-west one being associated with the known deposits. The contours representing this anomaly are roughly circular and show no pronounced strike.

The anomaly over Hall's workings is the largest in the area and shows a distinct north-east strike, with three centres of more than -400 millivolts. The first centre, which crosses traverses I and J is about 200 feet long; the second centre is smaller and lies north of a crosscut on traverse L; the third is on traverse N, north-east of an old opencut. Further mining exploration might possibly reveal new areas of mineralisation near these centres.

Over Henry's workings an anomaly of more than -500 millivolts coincides closely with the area of known mineralisation.

Besides the above anomalies associated with the old workings, the only other anomalies of importance were recorded east of Henry's workings. These anomalies, with centres of more than -300 millivolts, are irregular in shape and extend from about 350.E to 650.E, between traverses O and R. No sulphide ore has been produced from this area, but the geological map (Hughes, 1953) shows mineralisation at 500.E on traverse Q, which is quite close to one of the centres of more than -500 millivolts. The anomalies are still well-pronounced on traverse R, which was the end traverse of this first survey.

Some smaller and weaker anomalies, with centres of approximately -100 millivolts, were recorded where volcanic rocks occur, but they are of no interest as regards tin-bearing sulphide mineralisation.

4. MAGNETIC SURVEY

(a) Method.

Variations in the strength of the earth's magnetic field are caused by the presence of minerals such as magnetite, pyrrhotite, ilmenite, etc., and of ores and rocks containing these minerals. The tin ore of the Mt. Cleveland area contains pyrrhotite, and therefore can probably be detected by a magnetic survey. It is known, however, that dolerite lava also occurs in the surveyed area and, as this can also cause magnetic anomalies, it does not necessarily follow that any anomalies recorded are due to pyrrhotite mineralisation either with or without associated tin minerals.

Although it is possible to measure both the horizontal and vertical components of the earth's magnetic field, experience has shown that measurement of the vertical component is sufficient, and this method was used in the present survey.

The instrument used was a Watts vertical magnetic force balance.

(b) Work done and results obtained.

The traverses and observations points laid out for the self-potential survey were also used for the magnetic survey.

The magnetic profiles along each traverse are shown on Plate 4, Sheet 1, and from these the magnetic contour map on Plate 5 was constructed. The unit of magnetic intensity is the gauss, but for convenience the gamma (10^{-5} gauss) is usually used in field measurements. The contours on Plate 5 are drawn at intervals of 500 gammas, but where it is considered useful for interpretation the 250 gammas contour is also included. These values are purely relative ones, being referred to an arbitrary zero station.

(c) Discussion of results.

The magnetic contours also tend to follow the strike of the strata, but the anomalies are more widely distributed over the area than the self-potential anomalies are. In general, however, they correspond fairly well with the mine workings.

Two types of anomaly can be observed on Plate 5, the first comprising extreme maxima and minima close together, as over Battery and Hall's workings, and the second type showing positive values of various but smaller magnitudes with still smaller negative values, as over Luck's and Henry's workings. It is assumed that this variation in the character of the anomalies is due to differences in the geological features of the several mineralised areas. Where the mineralisation forms steep, trough-shaped ore bodies with a large vertical extent on steep topographical slopes, as is known to be the case in Hall's workings, strong magnetic anomalies with high maxima and minima appear. Where the trough is fairly broad, but of no great depth, as it is understood to be in Henry's workings, only fairly strong positive anomalies appear. Weaker anomalies arise where the mineralisation occurs in the limbs of a syncline, as in Luck's workings.

An alternative interpretation is that, where the magnetic anomalies show extremely large maxima and minima, some magnetically susceptible ore (e.g. pyrrhotite) lies near the surface. On the other hand, where the anomalies are broader and less intense the magnetic material is probably at greater depth.

The area over Battery workings shows quite abnormal magnetic disturbances, the contours being randomly distributed, with high maxima and minima close together. This is possibly due to the complicated structure of this particular deposit, but may also be due to variations in the polarity or susceptibility of the ore. However, neither the geophysical nor the mineragraphic and structural investigations provide a sufficient basis for a satisfactory explanation of the abnormal magnetic anomalies. Although further detailed magnetic work might help to explain the phenomenon, it is unlikely that it would produce any additional data which would assist in the interpretation of the results regarding the presence of mineralisation.

Over the Battery workings the magnetic anomalies, as well as the self-potential ones, end on traverse D in the north. However, in the south, the magnetic anomaly finishes on the boundary traverse AA whereas the self-potential one, as previously mentioned, crosses this boundary.

The position of the magnetic anomalies in the area of Luck's workings does not correlate well with that of the workings. In this particular area it is not possible therefore to draw any conclusions, from magnetic results alone, concerning the extent of pyrrhotite mineralisation. It is considered that the strong but very concentrated magnetic anomaly of about 3,000 gammas at 400.E on traverse F, which coincides with an area of mineralisation shown on the geological map (Hughes, 1953), may not be connected with Luck's workings, but may be the south-western extension of the lode exposed in Hall's workings.

The anomaly centred at 350.E on traverse H, with a maximum of nearly 1,000 gammas, may be associated with a structural feature only, separating Luck's and Hall's workings. It appears to be unrelated to any sulphide mineralisation.

Over Hall's and Henry's workings, the magnetic anomalies show approximate agreement with the self-potential results, the main difference being that, at the south-western end of Hall's workings the magnetic anomaly does not extend as far as the self-potential one nor as far as the known mineralisation. Farther to the east there is better agreement as regards both shape and strike. Although the anomaly over Hall's workings shows a high maximum and minimum, the north-eastern continuation shows a positive value only, of more than 2,000 gammas.

The anomaly which shows on traverses O and P with a north-north-west strike, and with a negative centre of more than 2,000 gammas, may indicate the end of the mineralised area of Henry's workings.

Strong anomalies also appear on traverses P and Q, coinciding approximately with, but more extended than, a mineralised area shown on the geological map at 500.E on traverse Q, and also showing close correlation with self-potential anomalies in the area.

A widespread anomaly, with a maximum of more than 500 gammas and a minimum of more than -1000 gammas, occurs in the south-east, between traverses F and K, where dolerite is present.

5. CONCLUSIONS AND RECOMMENDATIONS

The presence of self-potential and magnetic anomalies in the Mt. Cleveland area indicates the presence of sulphide mineralisation. Pyrite is probably the principal mineral causing the self-potential anomalies, whilst the magnetic anomalies point mainly to the presence of pyrrhotite.

The anomalies obtained by both methods show, in general, a north-east strike, and appear mainly over the old mine workings between Crescent Hill and Deep Creek. Luck's and Battery workings are distinctly separated from Hall's and Henry's workings. The limited extent of the anomalies indicate that there is no interconnection between the mineralisation associated with Luck's, Hall's and Battery workings. The self-potential anomalies and, to a lesser degree, the magnetic anomalies, over Hall's and Henry's workings are not distinctly separated. This disturbed part of the area continues farther to the north-east beyond the workings as shown by the anomalies between traverses O and R.

Although the main anomalies coincide approximately with the positions of the old mine workings, they cover larger areas than the known mineralisation in the case of Luck's, Hall's and Henry's lodes. It is possible therefore that additional sulphide mineralisation worthy of mining exists in these places. From the geophysical results alone, it is not possible, however, to delineate the boundary of economic mineralisation. The successful operation of the mine depends on the tin content of the sulphides, which cannot be determined by applied geophysical methods.

Besides the anomalies recorded near the old workings, the only others worthy of note are north-west of Deep Creek, between traverses O and R. The geological map shows mineralisation to exist in this area at 500.E on traverse Q.

The results of this first part of the survey suggest that further mining exploration work should be concentrated on Luck's and Hall's lodes and in the area north-west of Deep Creek, between traverses O and R. Such exploration work might first be done by trenches positioned as follows:-

Trench	Traverse	Co-ordinates	Length
1	G	150E to 200E	50ft.
2	L	300E to 350E	50ft.
3	P	375E to 440E	65ft.
4	Q	460E to 500E	40ft.
5	Q	575E to 600E	25ft.
		Total -	230ft.

The trenches must reach the solid rock, in order that the economic value of any mineralisation may be judged.

Because the full extent of the old stopes, drives and cross-cuts is not known, recommendations for underground development by adits or by drilling cannot be given. Such exploration work would be better decided upon after closer study of the geophysical results, mine plans and sections. An examination of these should form a good basis upon which to decide a programme for the investigation of additional ore supplies. The rather limited extent of the geophysical indications suggests, however, that only relatively small additional ore reserves will be found.

The survey covered by this report was confined to the vicinity of the mine workings. The geophysical anomalies, particularly those obtained by the self-potential method, coincide closely with the old workings. There was little scope for the discovery of new deposits but the results suggest that an extension of the survey beyond the boundary of the area covered by this report, particularly to the north-east, may result in the discoverey of new deposits.

6. REFERENCES

Carey, W.S.,1945- Geological report on the Mt. Cleveland Tin Mine, Dept.of Mines, Tas.

Hughes, T.D.,1953-The Mt. Cleveland Mine, Dept. of Mines, Tas.

Reid, A.M., 1923 -The Mt. Bischoff Tin Field, Dept.of Mines,Tas., Geol.Surv.Bull.No.34.

PART 2. GEOPHYSICAL SURVEY, MARCH/APRIL, 1954.

by K.H. TATE.

1. INTRODUCTION

As a result of the recommendations made by O. Keunecke in Part 1 of this report, some additional work was done by the Geophysical Section of the Bureau of Mineral Resources, at the request of the Tasmanian Mines Department, from 17th March to 5th April, 1954. The area covered by the previous survey was extended to the north-east and south-west. The syndicate interested in the mine arranged for the difficult surveying of the two additional blocks of traverses, this work being done under the direction of Mr. T.D. Hughes, geologist of the Tasmanian Mines Department. Mr. Hughes made a geological survey of the two areas covered by this part of the report (Hughes, 1954) and the geophysical work was done by K.H. Tate. The survey was hindered by the difficult terrain and involved traversing steep, timbered slopes, but weather conditions were favourable.

2. GEOLOGY

A description of the geology of the area is given by Hughes (1953) and has been summarised in Part 1, but a few additional remarks are added here, based on the survey of the two additional areas by Hughes (1954).

He notes that the same thin-bedded host rocks (tuffs) occur in the newly traversed areas, but no outcrops were found of either the lavas or the intrusive igneous rocks which were conspicuous in the area examined in 1953. Further, the rocks in the two new areas are not as folded as those in the area first surveyed and, apart from weak marmatite and arsenopyrite mineralisation in tension cracks, no evidence of the occurrence of large sulphide bodies has been found either by previous prospecting campaigns or by the latest geological mapping.

3. SELF-POTENTIAL SURVEY

A description of the method is given in Part 1 and will not be repeated here. The traverses surveyed in the second stage of the work comprised AB to AK in the south-west of the area and S to Z and BA to BN in the north-east.

The self-potential profiles of traverses AB to AK (Plate 2, Sheet 2) show no significant anomalies, being smooth and devoid of features, except at 750.E on traverse AB where there is a very small negative anomaly of about -30 millivolts. The geophysical results do not give any encouragement for further prospecting in the south-western part of the surveyed area.

Self-potential profiles of traverses S to Z and BA to BN are plotted on Plate 2, Sheet 3 in such a way as to allow for irregularity in the direction of the base-line, which followed the strike of Crescent Ridge. The profiles show numerous but relatively weak, negative anomalies. On Plate 3 the self-potential contours resulting from the work described in Part 1 have been extended to the south-west and north-east to cover this second survey. Some self-potential anomalies of the order of -150 millivolts were recorded. These occur in three groups, as described below.

Group 1 is a series of anomalies which was recorded between traverses R and S, and is connected with the anomalies recorded in the first survey near the Hall's and Henry's zones of mineralisation. An isolated negative anomaly of -200 millivolts is centred at S/375.E. The strong anomaly over Hall's workings extends to the north-east and meets traverse S at 575.E. Another anomaly parallel to, and south of, the Hall's anomaly, is present on traverse R at 625.E. These three anomalies terminate along a line extending from about R/700.E to about T/300.E. An insignificant isolated anomaly of about -100 millivolts is found at U/475.E. The only evidence of prospecting near this group of anomalies is a trench near 525.E on traverse S, in which no mineralisation was discovered.

Group 2 is really one elongated anomaly of nearly -150 millivolts, striking north-east and cutting traverse T at 825.E, traverse U at 775.E and traverse V at 830.E. A trench near 825.E on traverse V is the only evidence of prospecting in this area.

Group 3 extends from traverse BB to traverse BM. Negative centres occur near BE/450.E (nearly 100 millivolts), at BG/600.E (75 millivolts), and at BK/600.E (about 75 millivolts). The strike of these anomalies is similar to that of anomalies recorded by Keunecke. Although much prospecting has been done, the only area where a trench is found near a pronounced anomaly is in the vicinity of BE/450.E.

It will be noted that the zero contour line joining Z/0 and S/700.E divides the contour plan into two parts in which the base levels of the self-potential results are about minus 50 millivolts respectively. This change occurs between traverses R and X, the contours showing a potential gradient in the direction of strike of the geological features. The possible significance of the change is discussed below in Section 5.

4. MAGNETIC SURVEY

Because the 1954 self-potential survey located some additional anomalies, it was decided to carry out some check magnetic traverses. These were made using a Watts Vertical Force Variometer (No.57139), adjusted to a sensitivity of 68 gammas per scale division. Traverses S,T,U and BA to BL were surveyed and the resulting profiles are shown on Plate 4, Sheet 2, in such a way as to allow for the irregular direction of the base line. The profiles are smooth compared with those obtained by Keunecke in the 1953 survey, and it is clear that no igneous intrusives, volcanic rocks or pyrrhotite bodies occur near the surface in the areas where the self-potential anomalies were recorded.

5. DISCUSSION OF RESULTS

The results described show that some self-potential effects occur in the area traversed to the north-east of that surveyed by Keunecke, but the intensity of the anomalies diminishes from traverse R to traverse BN. The potential gradient near the negative centres is usually greater on the uphill side of the anomaly. From theoretical considerations, this steeper gradient in the profiles shows that if the anomalies are caused by tabular ore bodies, the dip of such bodies is into the hill. This conclusion is in accordance with the general observation that the main ore bodies dip in a similar manner, following beds on the southern limb of a syncline whose axis is as shown on Plate 3.

The change in the base value of the self-potential from traverse R to traverse X might be caused by a regional variation in earth potentials in the area or by the lower level of the potentials in the area of Hall's and Henry's workings where strong negative self-potential anomalies were recorded by Keunecke. It might also be caused by some major geological discontinuity striking across the area in the vicinity of the zero self-potential contour line. Taking into account the facts that the anomalies in Hall's area are sharply terminated on this line, that magnetic anomalies do not occur north-east of the line, and that there are no outcrops of igneous rocks north-east of the line, there is justification for further local geological examination of the area to find the cause of the change in the self-potential values.

The absence of magnetic anomalies in the areas where self-potential anomalies were recorded appears to indicate that if the latter are caused by sulphide mineralisation, then the minerals concerned are pyrite or arsenopyrite and not pyrrhotite. The possibility that such mineralisation contains tin without pyrrhotite should therefore be examined by geological study.

The self-potential anomalies in the north-eastern area (Group 3) are small and might only be caused by the filling-in of tension cracks with arsenopyrite or pyrite, as described by Hughes (1954). Only one of the anomalies can be considered to have been tested by previous trenching, and some further trenching is recommended, even though the prospects are not encouraging.

6. CONCLUSIONS AND RECOMMENDATIONS

In the area south-west of Battery workings, self-potential and magnetic methods gave no anomalies. In the north-eastern area the anomalies connected with Hall's and Henry's workings, as described in Part 1, terminate sharply. Some additional anomalies found farther to the north-east are small but may be worthy of testing.

It is recommended that prospecting trenches be dug as tabulated below. Because of the irregularity of the grid it is desirable that the trenches be positioned along known traverses.

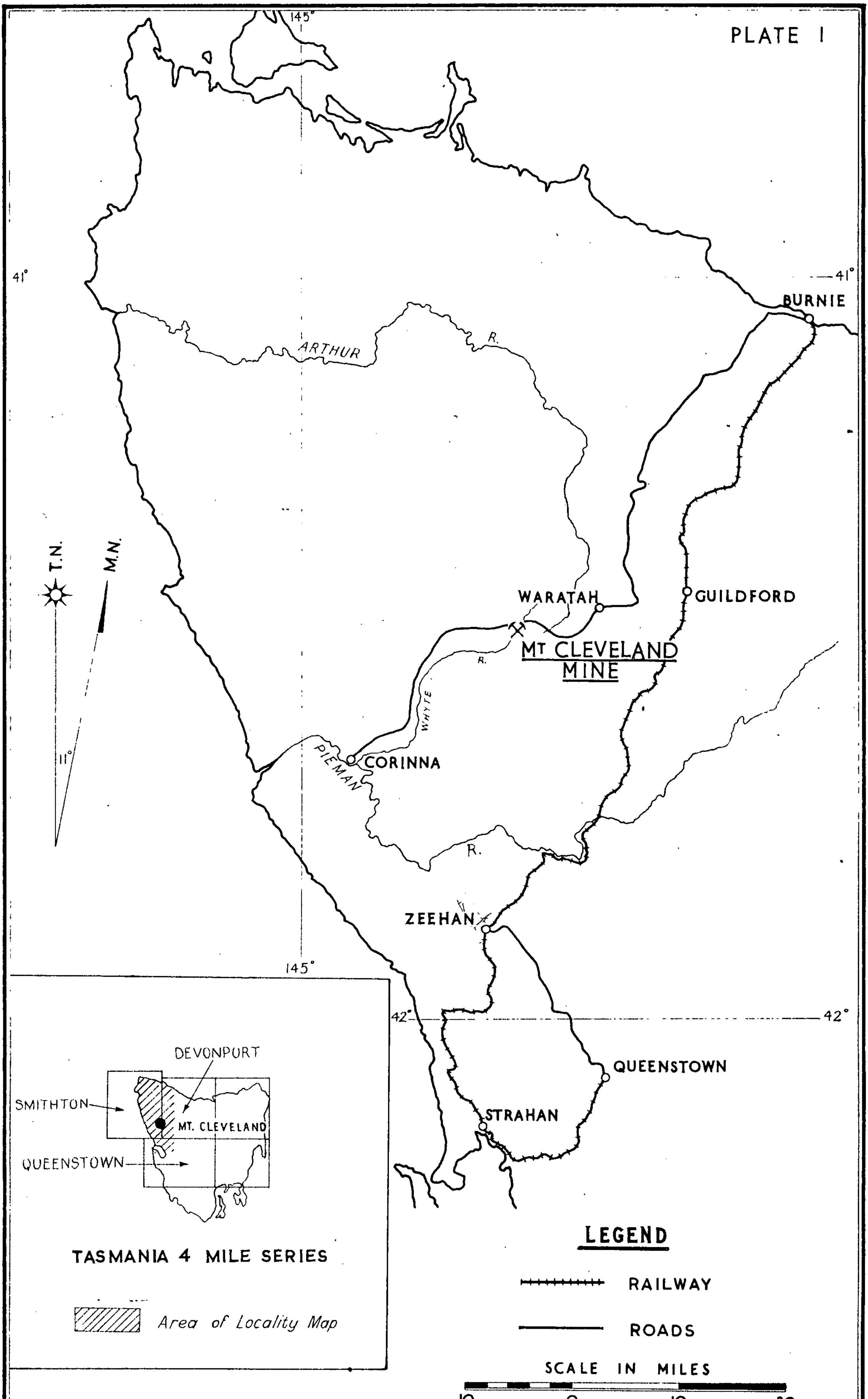
Trench	Traverse	Co-ordinates	Length
1	S	350E to 400E	50ft.
2	U	450E to 490E	40ft.
3	U	750E to 775E	25ft.
4	BG	585E to 620E	35ft.
5	BK	575E to 625E	50ft.
		Total -	200ft.

7. REFERENCES

Hughes, T.D.,1953 - The Mt. Cleveland Mine, Dept. of Mines, Tas.

Hughes, T.D.,1954 - The Mt. Cleveland Mine, Supplementary Report, Dept. of Mines, Tas.

PLATE I



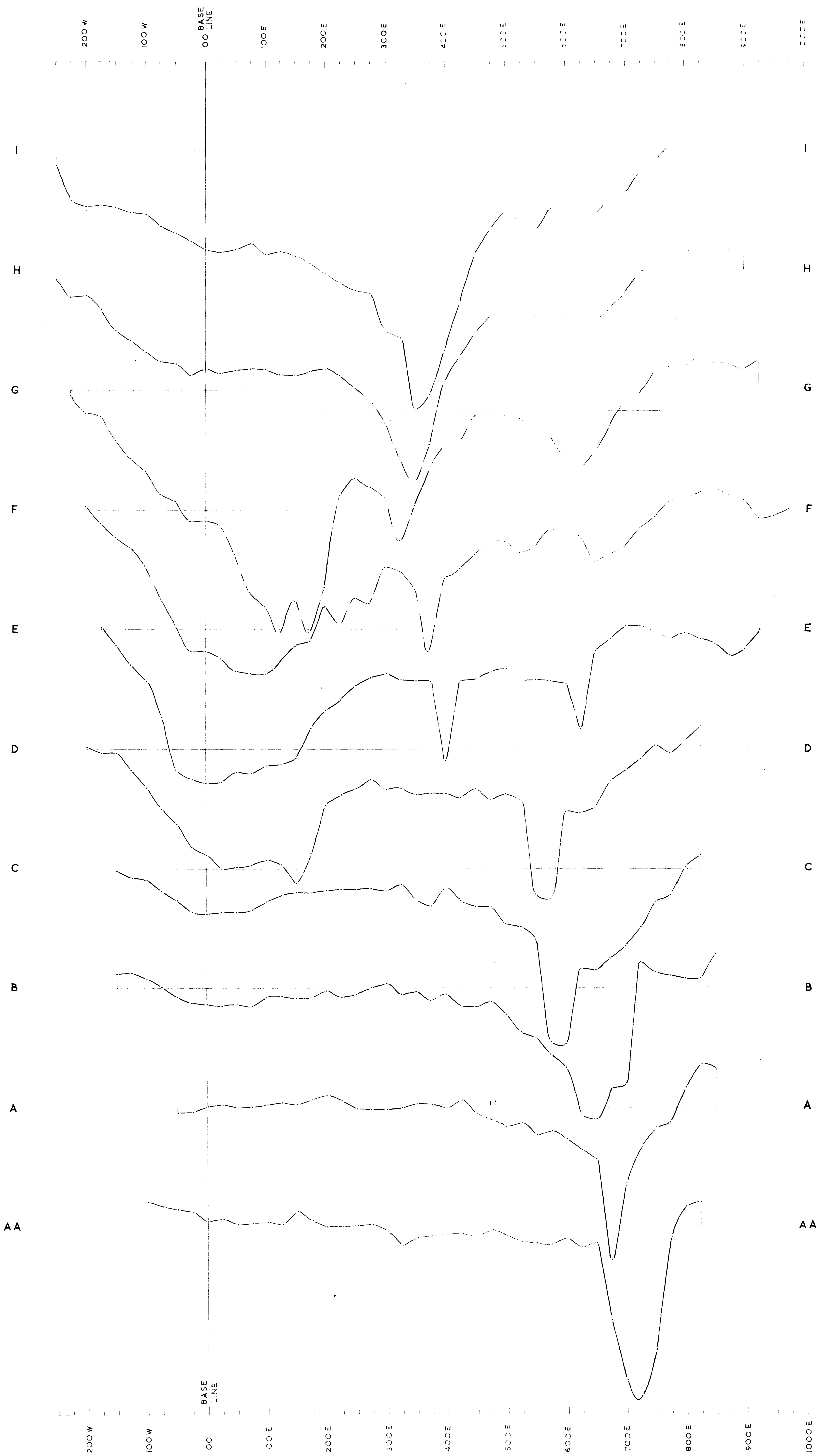
GEOPHYSICAL INVESTIGATIONS AT MT. CLEVELAND TIN MINE AREA, NEAR WARATAH, TASMANIA

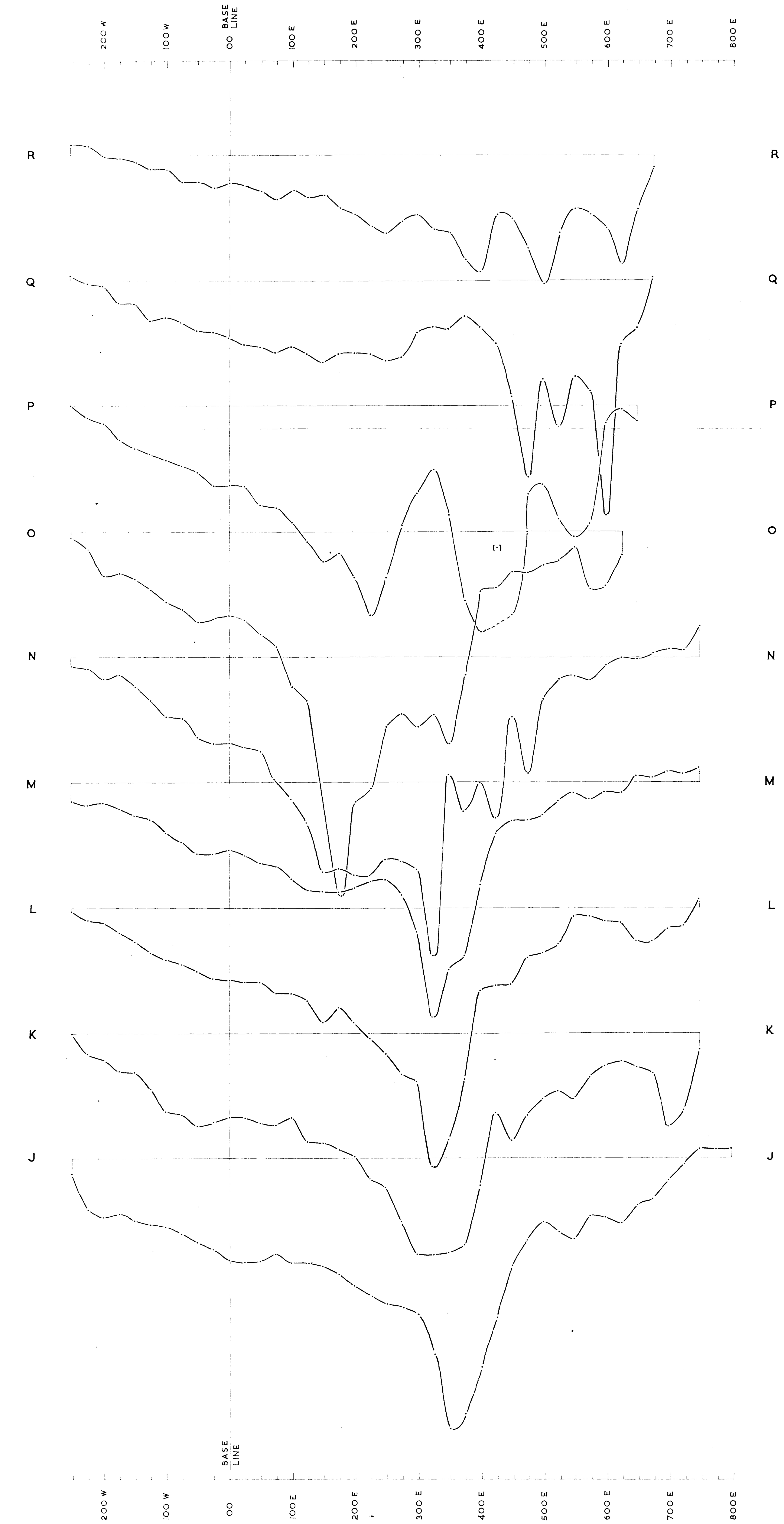
LOCALITY MAP

G.153 – 1

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

PLATE 2.
SHEET I





SCALES

HORIZONTAL	100	0	100	200	300	400	FEET
VERTICAL	100	0	100	200	300	400	MILLIVOLTS

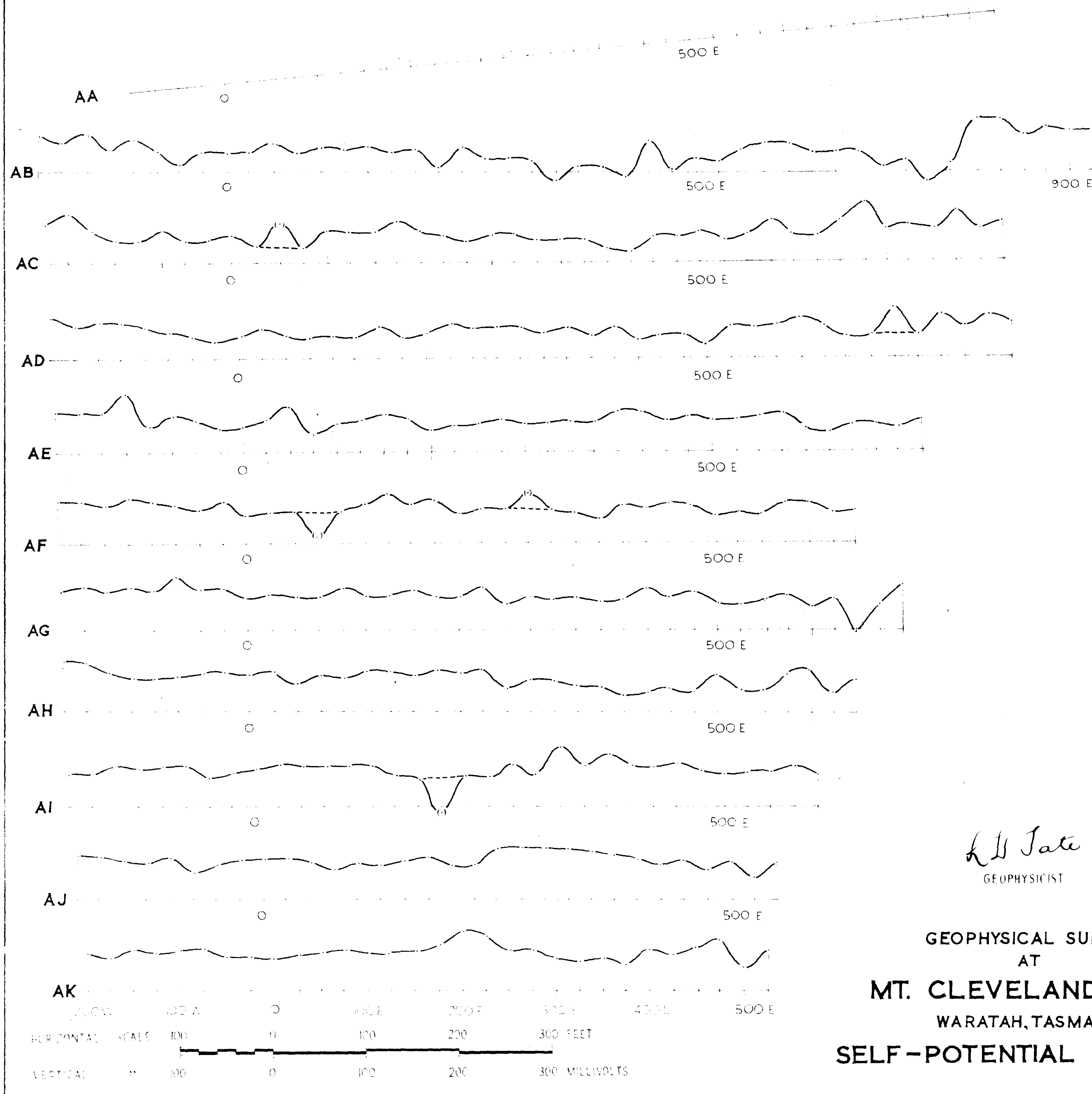
GEOPHYSICIST

GEOPHYSICAL INVESTIGATIONS AT

MT CLEVELAND TIN MINE AREA, NEAR WARATAH, TASMANIA

SELF-POTENTIAL PROFILES

PLATE 2
SHEET 2

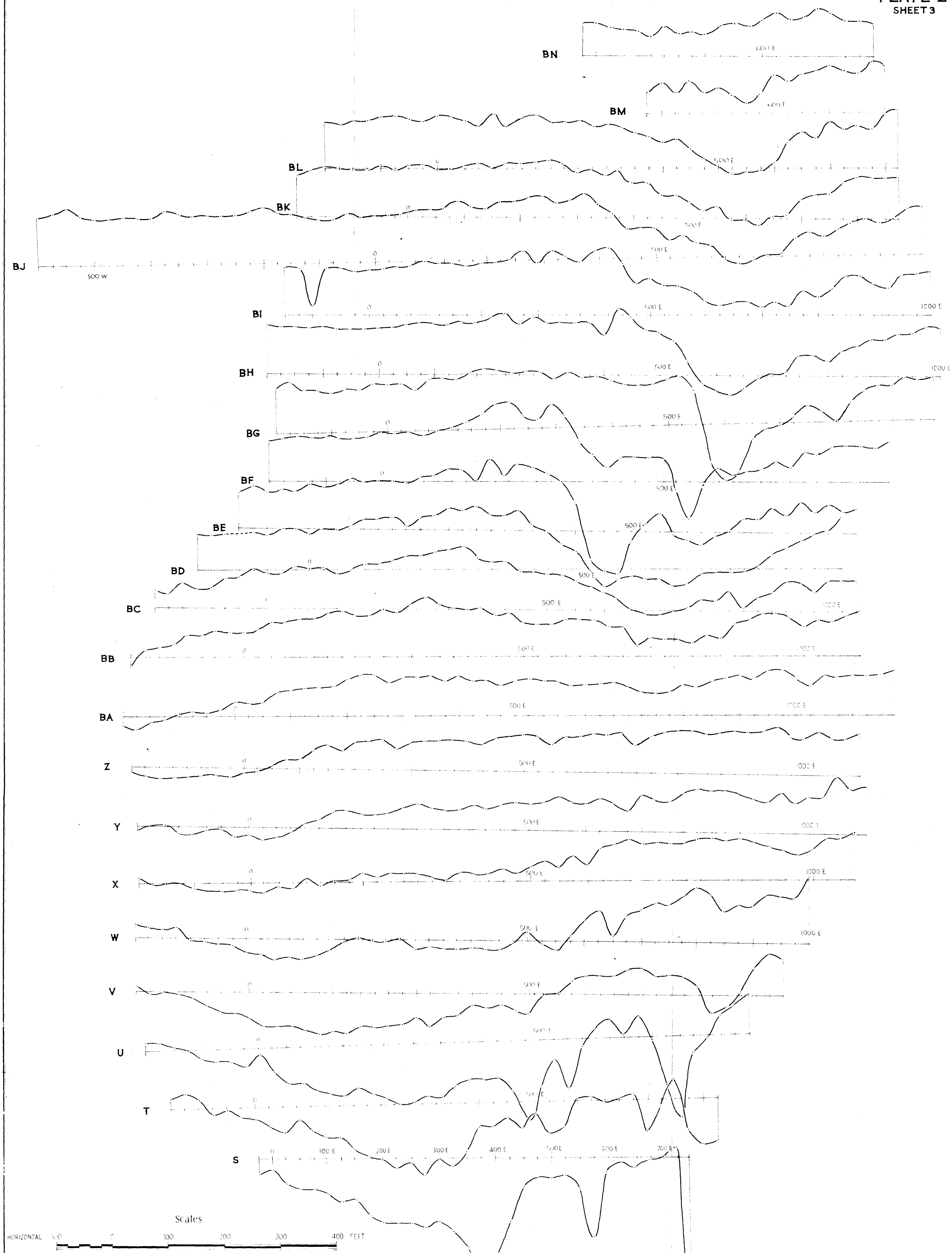


L W Tate
GEOPHYSICIST

GEOPHYSICAL SURVEY
AT
MT. CLEVELAND MINE
WARATAH, TASMANIA
SELF-POTENTIAL PROFILES

G 153-8

PLATE 2
SHEET 3



GEOPHYSICAL SURVEY
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SELF-POTENTIAL PROFILES

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MT. CLEVELAND MINE
WARATAH, TASMANIA
SELF-POTENTIAL CONTOURS

Surface information and geology after Hughes, Dept. of Mines, Tasmania, 31st May 1954

GEOPHYSICISTS

PLATE 4
SHEET 1

SCALES
HORIZONTAL 100 0 100 200 300 400 FEET
VERTICAL 1000 0 1000 2000 3000 4000 GAMMAS

GEOPHYSICIST

GEOPHYSICAL INVESTIGATIONS AT

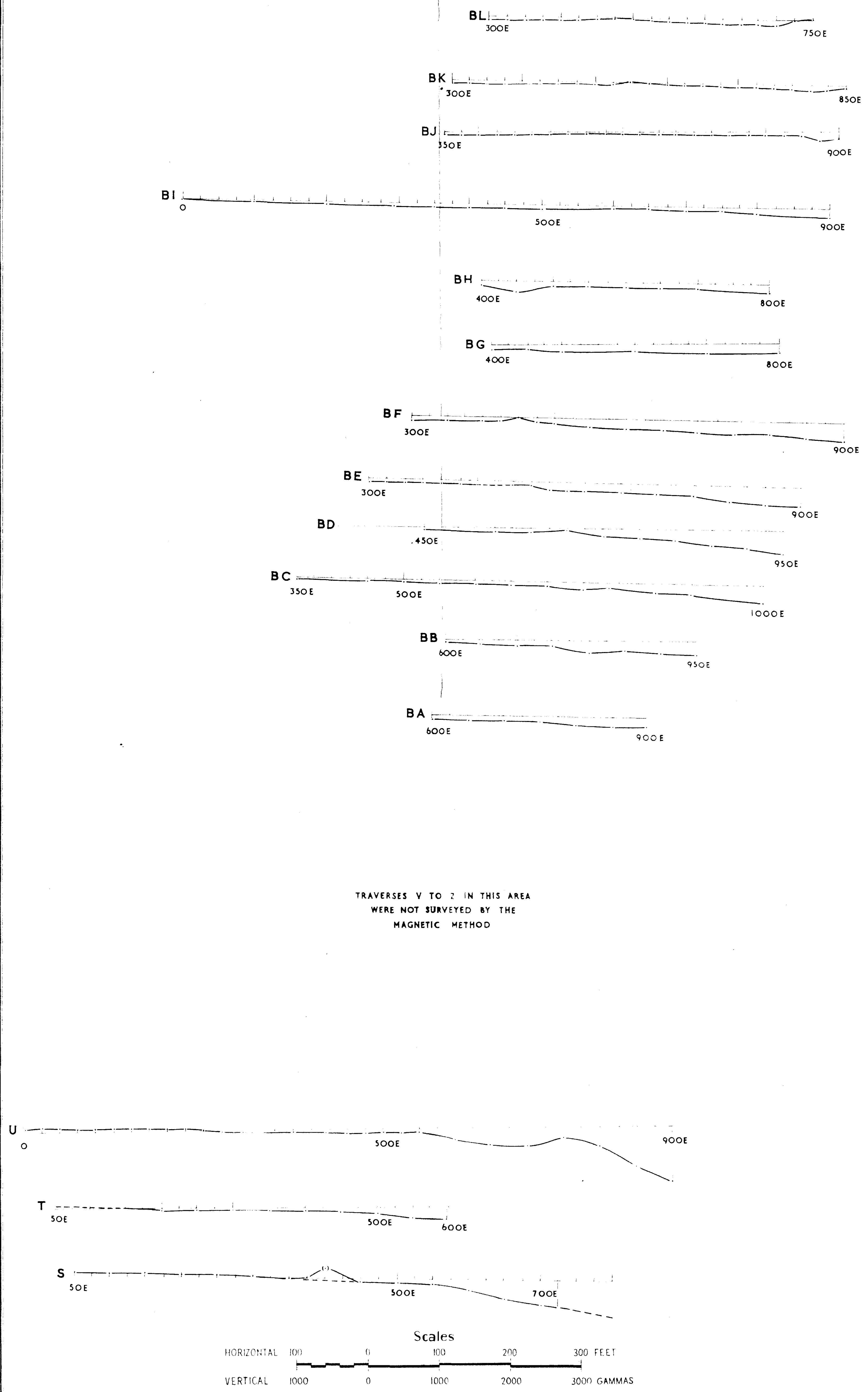
MT CLEVELAND TIN MINE AREA, NEAR WARATAH, TASMANIA.

MAGNETIC VERTICAL FORCE PROFILES

G153-4

Geophysical Section Bureau of Mineral Resources, Geology & Geophysics

PLATE 4
SHEET 2



L. W. Tate

GEOPHYSICIST

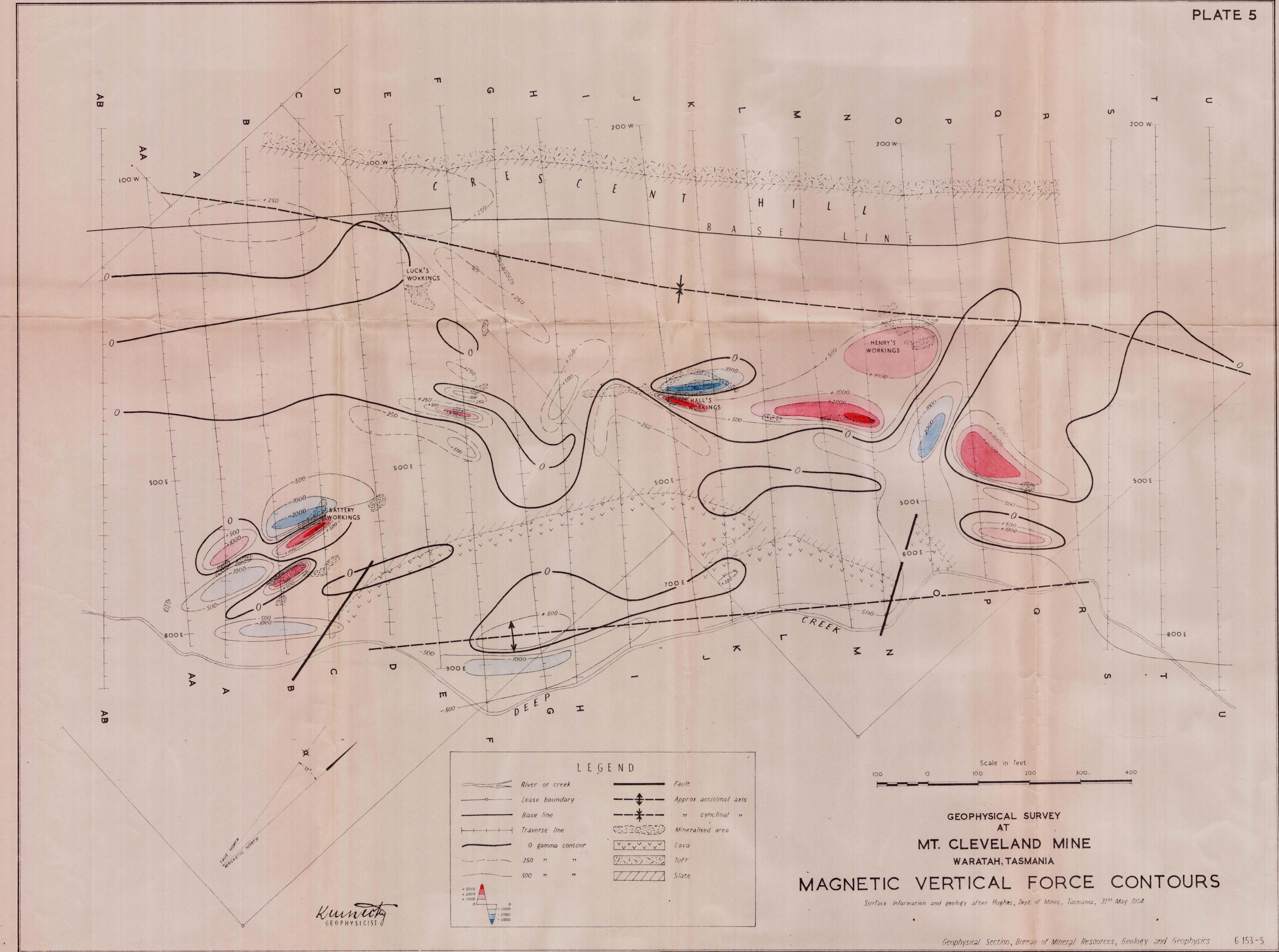
GEOPHYSICAL SURVEY
AT

MT. CLEVELAND MINE,

WARATAH, TASMANIA

MAGNETIC VERTICAL FORCE PROFILES

PLATE 5


CRESCENT HILL
BASE LINE
LUCK'S WORKINGS
HENRY'S WORKINGS
HALL'S WORKINGS
BATTERY WORKINGS
DEEP CREEK
100 W
200 W
500 E
600 E
700 E
800 E
900 E
LEGEND
River or creek
Lease boundary
Base line
Traverse line
0 gamma contour
250 " "
500 " "
Fault
Approx anticlinal axis
" synclinal "
Mineralised area
Lava
Tuff
Slate
Scale in feet
100 0 100 200 300 400
TRUE NORTH
MAGNETIC NORTH
GEOPHYSICIST
GEOPHYSICAL SURVEY
AT
MT. CLEVELAND MINE
WARATAH, TASMANIA
MAGNETIC VERTICAL FORCE CONTOURS
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