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COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1955, No. 16

GEOPHYSICAL TEST SURVEY AT
MT. GALENA MINE,
WELLINGROVE, N. S. W.



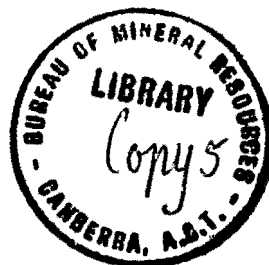
by

K. H. TATE

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ABSTRACT

Self-potential measurements were made in October 1953 in the area of the Mt. Galena Mine, near Wellingrove, N.S.W., over a group of leases held by the Inverell Lead Syndicate. Geophysical surveys made over adjacent areas had shown that the self-potential method was likely to yield more information than any other geophysical method.

Although surveying conditions were good, no significant anomalies were recorded. As the lode has good outcrops, and extensive prospecting work in the past has failed to locate any workable deposits, it is considered that further geophysical work is not warranted.

1. INTRODUCTION.

The Mt. Galena Mine is situated about 12 miles south-west of Emmaville, New South Wales, about 12 miles north-north-west of Wellingrove, and 1½ miles south-east of Webb's Consols Mine (Plate 1). The Mt. Galena Mine, on leases ML4983 and ML4984, is not to be confused with the Mt. Galena which is on ML1013 and which is adjacent to Webb's Consols Mine. In June, 1952, the Inverell Lead Syndicate of Inverell, N.S.W. applied to the Bureau of Mineral Resources for a geophysical survey of the mine area to be made. The property was inspected by Dr. J. Horvath, a senior geophysicist of the Bureau and, on the basis of his report, it was decided to make a test electrical survey while a geophysical party was based at Emmaville during the 1953 field season. The survey was carried out in October 1953, by K.H. Tate (party leader) and M.J.O'Connor, geophysicists of the Bureau. The pegging and surveying of traverses, etc., was done by P.O'Reilly Surveyor of the Department of the Interior, New South Wales.

The mine is on leases which are part of the old Wellingrove group of leases covering a line of mineralisation in quartz-porphyry rocks which was worked unsuccessfully before 1900. There is no record of any substantial production from the mine. In sinking a new shaft the syndicate located a small body of fairly high-grade lead ore, and the purpose of the test survey was to ascertain whether geophysical methods could assist in developing the property.

Experience in adjacent areas indicated that the geophysical method most likely to be successful was the self-potential method. Because the deposits appeared to be very small, short spacing of observation points was planned. Readings were taken at intervals of 25 feet. The area near the mine is fairly open and presented no practical problems in carrying out the survey.

2. GEOLOGY.

The area is described by Pitman (1901), and in a report by the Department of Mines, New South Wales (1939). A line of lode in quartz porphyry trends south from a contact of acid granite and porphyry at a point where the contact is intersected by the Severn River (Plate 1). The lode dips steeply to the east and can be traced on the surface for about one mile, the outcrop being very conspicuous north of the shaft in the old ML33 (the present ML4984), although there is little evidence of good mineralisation. Further south, the outcrop is discontinuous but is on the same direction of strike. The shaft in ML4984 was sunk to 150 feet in a 3-foot wide lode, with streaks, veins and bunches of galena, and a small quantity of zinc blende.

A second group of shafts is concentrated on the old ML3 (the present ML4983) and recent mining operations were confined to this lease. Other openings in the area are small and closely grouped. It is probable that any ore lenses located by the prospecting operations were too small to encourage further work. The only record of ore having been treated relates to 18 tons of lead carbonate ore, treated at Cockle Creek before 1900. This is likely to have come from the shaft in ML4984. Some lead ore was

produced from the main shaft on ML4983 during the most recent campaign and is still lying at grass. According to a representative of the Inverell Lead Syndicate, this parcel of ore assayed 21 per cent lead, mainly as oxide. Water in the workings made them inaccessible at the date of the survey.

3. SELF-POTENTIAL SURVEY.

Self-potential measurements rely on electro-chemical action within sulphide bodies undergoing oxidation. The weak electric currents produced are detected by measuring variations in potential on the earth's surface at various points laid out on a grid.

Three traverses were surveyed and pegs were placed at 100 ft intervals (Plate 2). Traverse 100E intersected the shaft from which high-grade galena was reported to have been recovered and the other traverses crossed the lode at points close to prospecting trenches and shafts in which traces of lead and copper mineralisation were visible.

Profiles of the self-potential measurements made along each traverse are shown on Plate 3.

4. DISCUSSION OF RESULTS.

As can be seen from the profiles, no significant anomalies were located. This indicates that either -

- (a) the mineralisation is too sparse to affect the results, or
- (b) there is a lack of electrochemical activity around the ore bodies.

The spontaneous polarisation of a sulphide ore body arises from differences between the solutions surrounding the upper and lower portions of the ore body. These differences are usually caused by variations in oxidation, because near the surface atmospheric agencies form a zone rich in oxygen but the solutions below ground water level are poor in oxygen. Some sulphide bodies lack any electrochemical activity and would not, therefore, give rise to a self-potential anomaly, but these cases are relatively rare. Also, no electrochemical activity can be expected if the upper portion of the sulphide ore body does not extend above the ground-water level. Absence of self-potential anomalies therefore, does not necessarily mean the absence of sulphide ore bodies, but under the conditions observed at Mt. Galena it is unlikely that large ore bodies have been overlooked, because (i) at other mines in the district, bodies of ore similar to that at Mt. Galena have shown self-potential anomalies, and (ii) lode formation and mineralisation can be seen on the surface, and it is unlikely that sulphides would not reach above ground-water level.

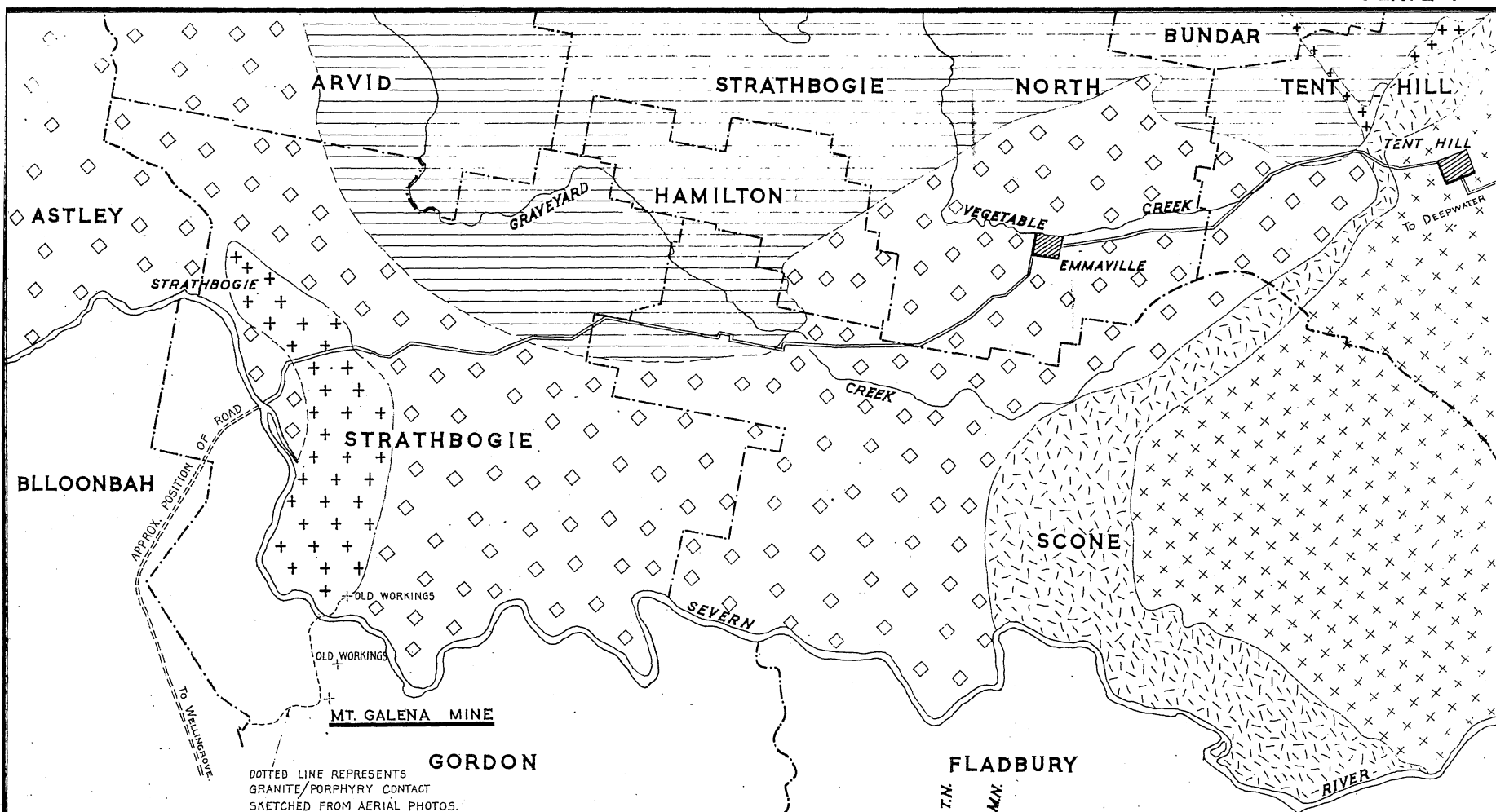
5. CONCLUSIONS.

No significant self-potential anomaly was recorded over, or in the neighbourhood of, workings which are reported to have located a small, rich, galena body. It is considered that there is insufficient mineralisation for it to be detected by geophysical methods.

As the lode outcrops prominently, and has been well prospected in the past with disappointing results, it is considered that further geophysical prospecting would not be warranted.

6. REFERENCES.

- | | |
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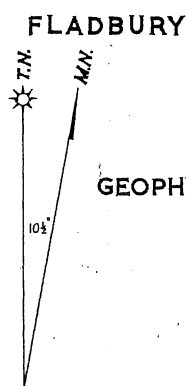


DOTTED LINE REPRESENTS
GRANITE/PORPHYRY CONTACT
SKETCHED FROM AERIAL PHOTOS.

LEGEND

- SEDIMENTS
- COARSE GRAINED ACID GRANITE
- QUARTZ PORPHYRIES AND PORPHYROIDS
- PORPHYRITE
- "BLUE" GRANITE

- RIVER
- CREEK
- FENCED ROAD
- PARISH BOUNDARY

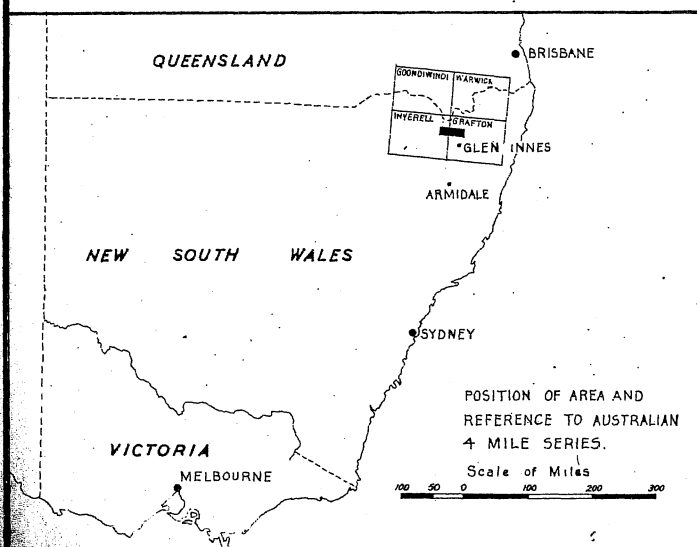


GEOPHYSICAL TEST SURVEY AT

MT. GALENA MINE,
WELLINGROVE, N.S.W.

LOCALITY MAP

SHOWING GENERALISED GEOLOGICAL BOUNDARIES
AFTER GEOLOGICAL MAP BY CARNE 1911



POSITION OF AREA AND
REFERENCE TO AUSTRALIAN
4 MILE SERIES.

Scale of Miles
0 100 200 300

MILES
YARDS
0 1000 2000 3000 4000 5000

G 175-3

PARISH OF GORDON

COUNTY OF GOUGH

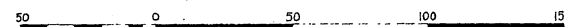
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M.L. 3
NOW M.L. 4983

GEOPHYSICAL TEST SURVEY AT
MT. GALENA MINE,
WELLINGROVE, N.S.W.
SURFACE PLAN

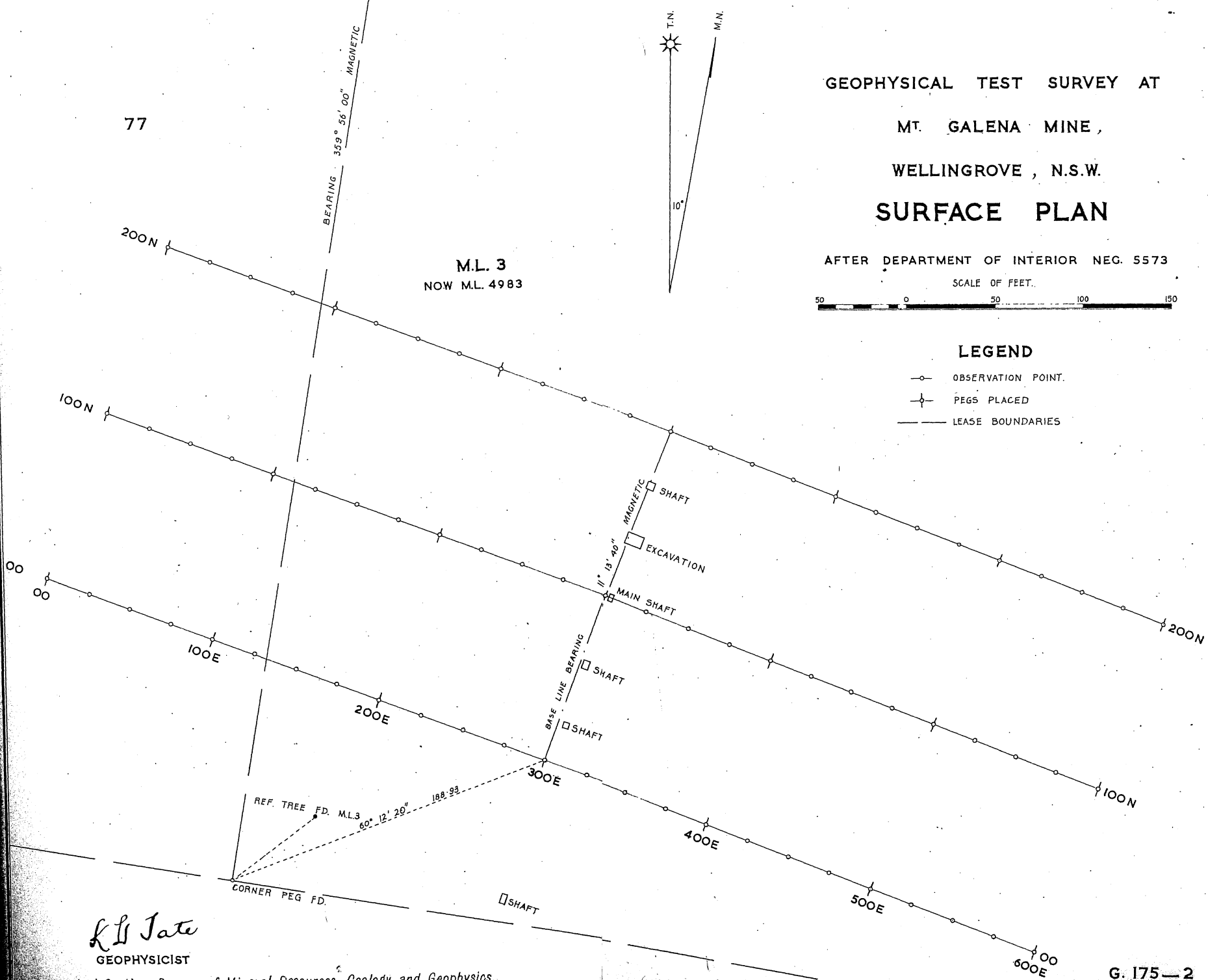
AFTER DEPARTMENT OF INTERIOR NEG. 5573

SCALE OF FEET.

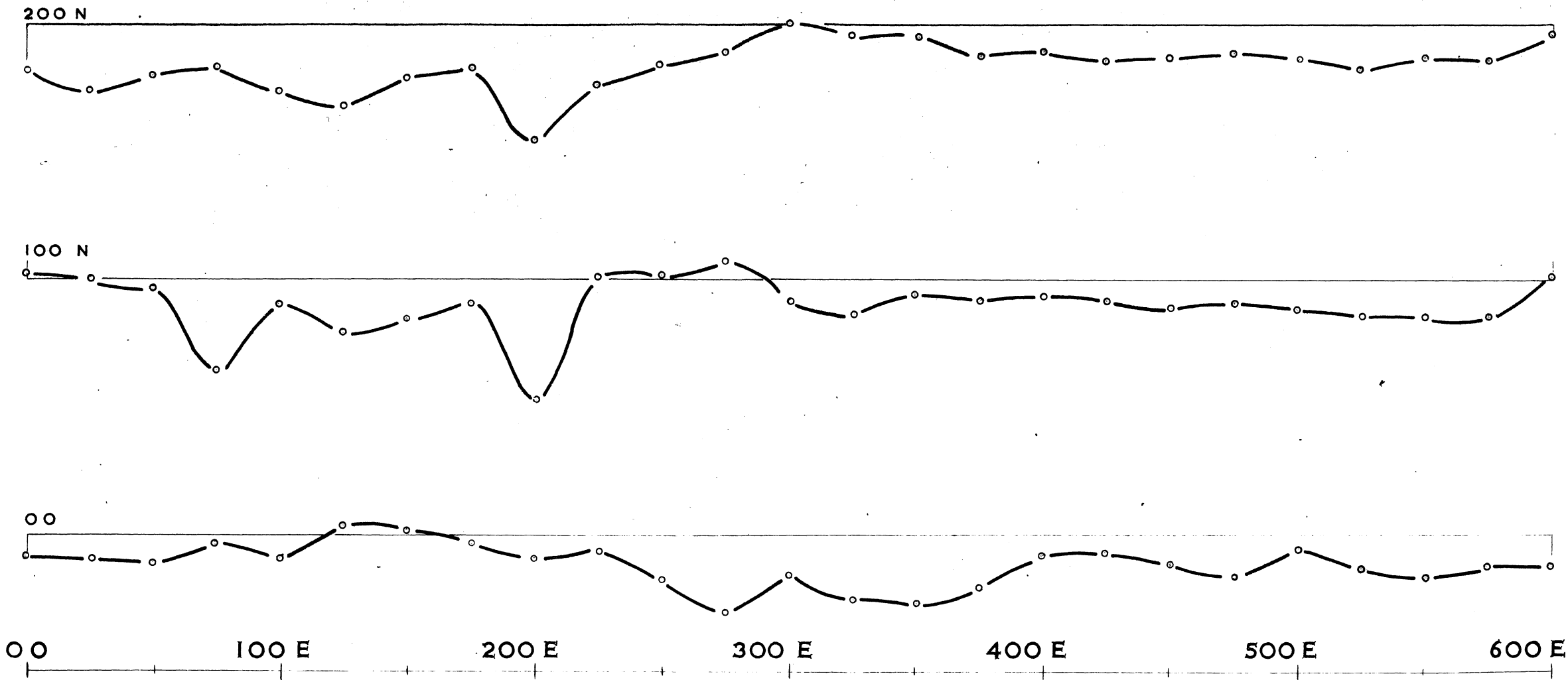


LEGEND

- OBSERVATION POINT.
- ⊕ PEGS PLACED
- LEASE BOUNDARIES



L. L. Tate
GEOPHYSICIST



SCALES.

HORIZONTAL 50 0 50 100 150 FEET
 VERTICAL 50 0 50 100 150 MILLIVOLTS

K. B. Tate
 GEOPHYSICIST

GEOPHYSICAL TEST SURVEY AT MT GALENA MINE,
 WELLINGROVE, N.S.W

SELF POTENTIAL PROFILES
 G175-1