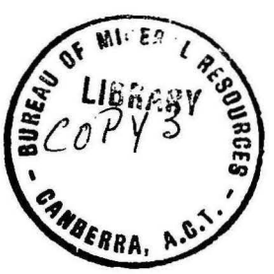
COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1956, No. 119

GEOPHYSICAL SURVEY OF THE SOUTHERN PROSPECT (MT. NOVIT AREA), MT. ISA, QUEENSLAND



by

W. J. LANGRON

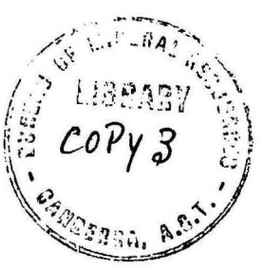
COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS

RECORDS 1956, No. 119

GEOPHYSICAL SURVEY OF THE SOUTHERN PROSPECT (MT. NOVIT AREA), MT. ISA, QUEENSLAND



by

W. J. LANGRON

CONTENTS

ILLUSTRATIONS

ABSTRACT

A small test area south of Mt. Isa was surveyed by electromagnetic, self-potential and magnetic methods. This work was conducted during the geophysical prospecting programme on the Mt. Isa Mines Ltd's Northern Lease.

The results of the tests were disappointing as the self-potential and magnetic methods gave no indications which could be due to mineralisation. The indications obtained with the electromagnetic method are considered to be too weak to warrant any recommendations for testing.

Although the tests were conducted over an area which contains a high lead geochemical anomaly, the geophysical methods used give no encouragement for the use of electrical methods in this area.

1. INTRODUCTION

During 1953, geophysical test surveys were carried out by the Bureau of Mineral Resources at the request of Mt. Isa Mines Ltd., to determine whether geophysical methods would be of use in detecting ore bodies, under the geological conditions prevailing in the company's Northern Prospect (Horvath and Langron, 1956). During the course of that survey, the company suggested that the tests be extended to the Southern Prospect, near Mt. Novit, about 12 miles south of Mt. Isa (Plate 1), where the geological structure, although similar in some respects to that at the Northern Prospect, is considerably different in detail. A brief survey was accordingly made during November, 1953, by a geophysical party comprising W.J. Langron (party leader) and D.L. Rowston, geophysicists, and two field assistants from Mt. Isa Mines Ltd.

2. GEOLOGY

The geology of Mt. Isa and its immediate surroundings has been described broadly by Carter (1950) and Sullivan (1952). A convenient summary, including unpublished information supplied by geologists of Mt. Isa Mines Ltd., is given by Debnam (1953), on whose report the following brief notes are based.

The succession of rocks in the Southern Prospecting Area is as follows, beginning at the western side :-

(i) A prominent quartzite ridge which strikes generally north, but locally north-west over considerable lengths.

(ii) A band of siliceous shales striking north. The thickness of this band ranges from 300 to 2,000 feet as a result of the variation in the strike of the quartzite ridge.

(iii) A mineralised zone of shales, cropping out as ridges of ferruginous jasper, brecciated in places.

(iv) Another band of siliceous shales.

(v) The "footwall quartzite", the boundary of which gradually transgresses the shales, and also the mineralised zone. Although the "footwall quartzite" has been generally regarded as barren, positive geochemical tests for lead were obtained over it, suggesting the possibility of mineralisation. The surveyed area shown on Plate 1, contains portion of zones (ii), (iii) and (iv).

All beds dip steeply to the west.

A geochemical survey by Debnam (1953) gave positive lead and copper indications over the area, but not in general over the mineralised zone.

3. METHODS USED

The methods employed were those used in the more extensive survey at the Northern Prospect, namely electromagnetic, self-potential and magnetic. Details of the methods are given in the report on that survey (Horvath and Langron, 1956).

..2

The lay-out covering the mineralised zone was surveyed twice by the electromagnetic method, with the primary cable on the footwall and hanging-wall sides respectively. The cable was earthed by line electrodes.

4. RESULTS

(a) Electromagnetic method

A selection of measurements of the horizontal component of the electromagnetic field, plotted in the form of vector diagrams, is shown on Plate 2. An analysis of the profiles and vector diagrams of the vertical component of the electromagnetic field has also been made, but no illustrations of these results are included in the report.

The vector diagrams of the horizontal component show that the general ground conductivity is high, but there are also indications of bodies of higher conductivity. These indications appear on the vector diagrams of the surveys from both the hanging-wall and footwall sides. It is interesting to note from the results of the survey from the footwall side (cable on 00), that there are usually two distinct indications (good conductors) on each traverse. On traverse 3, for example, the indication centred near 500 probably arises from the oxidised zone and the indication at 700 probably originates from the part of the mineralised zone below ground-water level.

The positions of the electromagnetic indications are shown on Plate 1.

(b) Self-Potential method.

The results of the self-potential survey are shown as profiles on Plate 3, Fig. 1. No indications likely to be due to sulphide bodies were found. The poorly-defined positive indications on traverses 4, 6 and 8 are near-surface effects. It is noticeable that they are present only over the unbrecciated jasper formation and not over the brecciated portion.

(c) Magnetic method.

Traverse 2 was read with a vertical component magnetic balance. The profile obtained (Plate 3, Fig. 2) shows a definite relief which is probably connected with the regional geology, but no indication could be definitely correlated with the mineralised zone.

5. CONCLUSIONS AND RECOMMENDATIONS

Of the three methods used, only the electromagnetic method gave indications which could be due to the mineralised zone. However, these indications are so weak that they do not warrant any recommendations for testing, and, in fact, give no encouragement for the use of electrical methods in this area.

If detailed structural investigation were considered desirable, useful information of this type might be obtained from a magnetic survey.

Some testing of the area has been carried out by Mt. Isa Mines Ltd. since the date of the geophysical survey, but this failed to reveal encouraging prospects, and the company relinquished its interest in the area.

...3

6. ACKNOWLEDGEMENT

It is desired to express appreciation to Mt. Isa Mines Ltd., which, through its Chief Geologist (Mr. S.R. Carter), gave every assistance to the geophysical party.

7. REFERENCES

Carter, S.R., 1950 - Mt. Isa Geology, Paragenesis and Ore Reserves, Int. Geol. Cong. 18th Sess., Gr. Britain, Part VII.

Debnam, A.H., 1953 - Geochemical Prospecting at Mt. Isa, Queensland. Bur. Min. Resour. Aust., Records 1953/90.

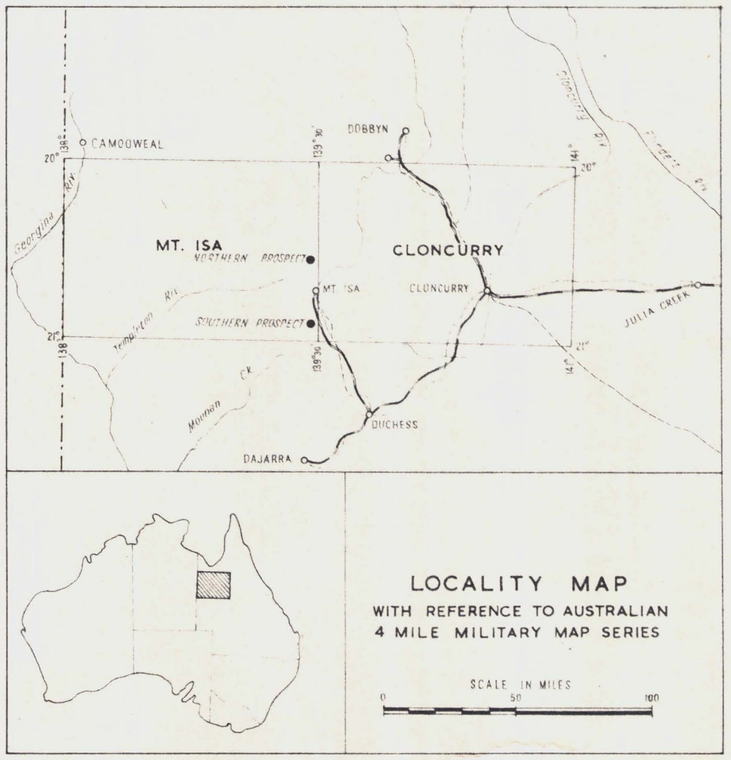
Horvath, J., and Langron, W.J., 1956 - Geophysical Survey of the Northern Prospect (Tombstone Hill Area) Mt. Isa, Queensland. Bur. Min. Resour. Aust., Records 1956/118.

Rayner, J.M., and Nye, P.B. - 1937 - Geophysical Report on the Croydon - Golden Gate area. A.G.G.S.N.A. Report Queensland No.9.

Sullivan, C.J., 1952 - Possibility of Discovery of new Lead-Zinc and Copper Deposits, Mt. Isa district Queensland. Bur. Min. Resour. Aust. Records 1952/48.

Weiss, O., 1953 - Results of Geophysical Survey South of Mt. Isa - Report to Zinc Corporation.

PLATE I



LOCALITY MAP

WITH REFERENCE TO AUSTRALIAN 4 MILE MILITARY MAP SERIES

SCALE IN MILES 0 50 100

LEGEND

- Ferruginous shale
- Calcareous "
- Siliceous "
- Quartz
- Jasper
- Breccia
- Costean
- ● ● ● Electromagnetic indication
- × × × Self- potential "

Geological data supplied by Mt Isa Mines Ltd.

12° 11' — 5° 30'

M.V. — MINE GRID

M. J. Langdon.
GEOPHYSICIST

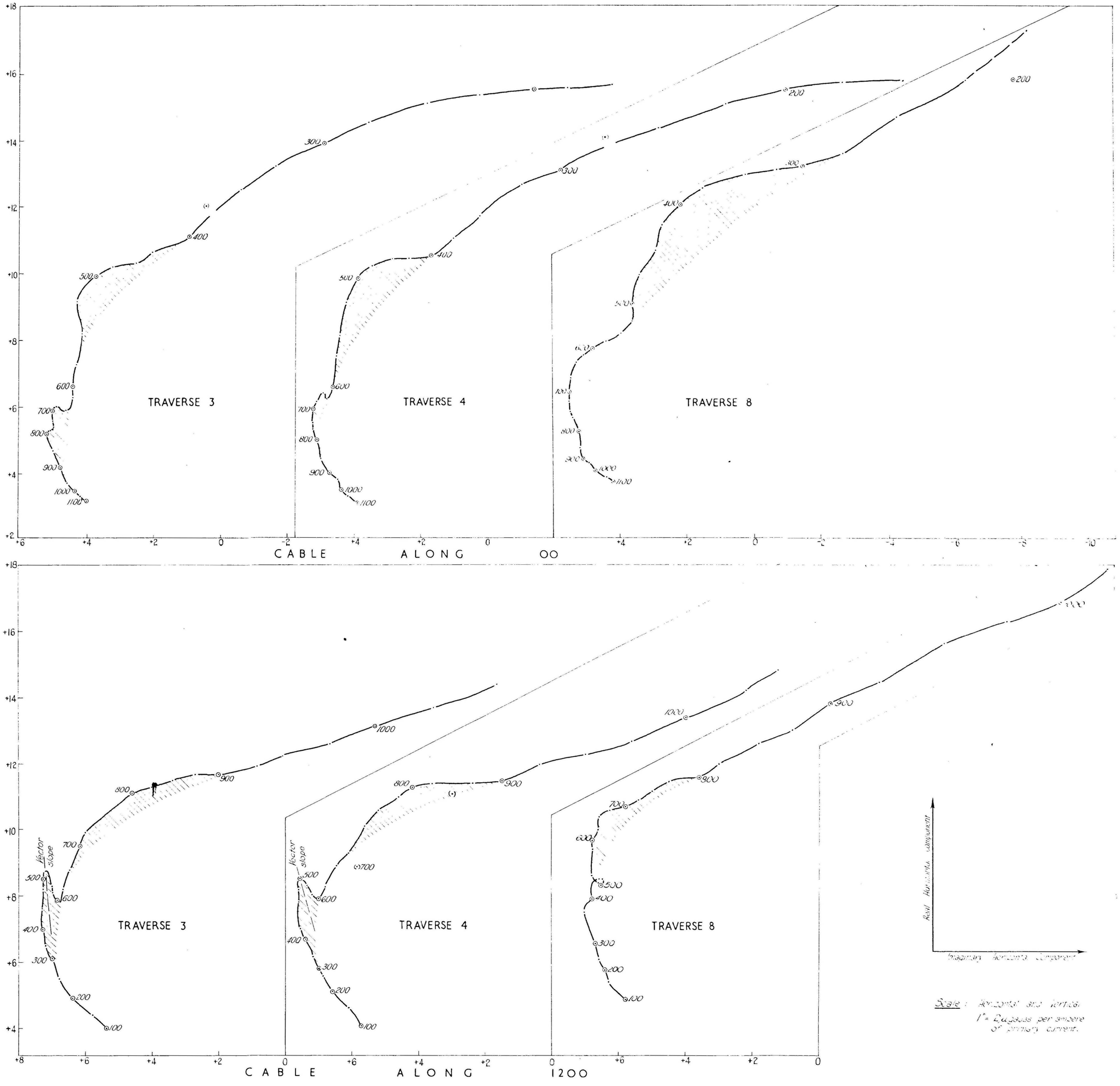
GEOPHYSICAL SURVEY OF THE SOUTHERN PROSPECT (MT. NOVIT AREA), MT. ISA, QLD.

GEOLOGY, GEOPHYSICAL GRID AND SURVEY RESULTS

SCALE IN FEET

100 0 100 200 300 400 500

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics. G127 - 8



GEOPHYSICAL SURVEY OF THE SOUTHERN PROSPECT (MT NOVIT AREA),
MT ISA, QUEENSLAND.

SELECTION OF ELECTROMAGNETIC VECTOR DIAGRAMS

W. J. Kingdon
GEOPHYSICIST

PLATE 3

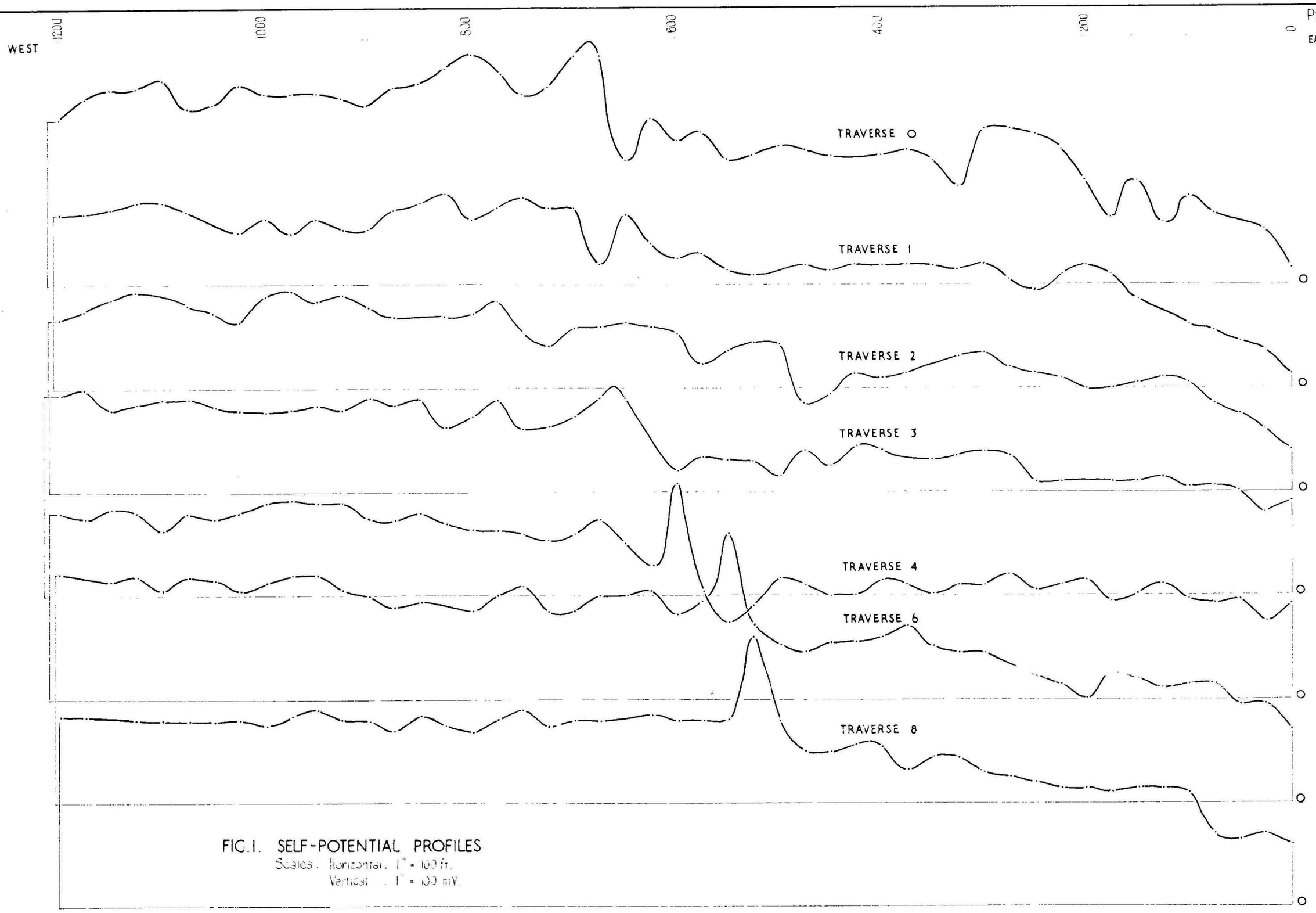


FIG.1. SELF-POTENTIAL PROFILES
Scales. Horizontal. 1" = 100 ft.
Vertical . 1" = 100 mV.

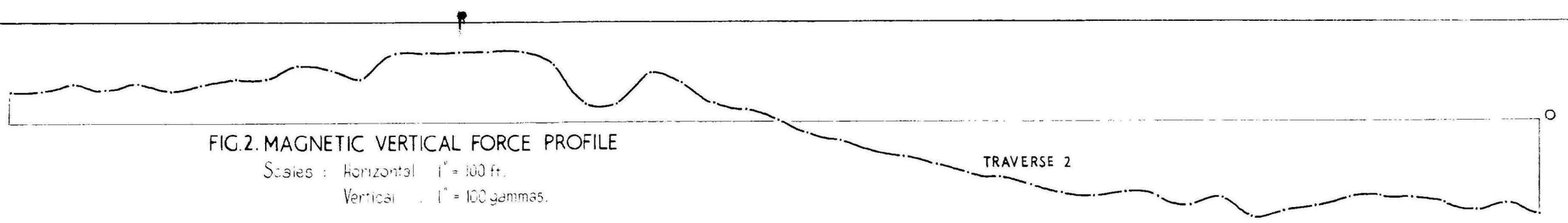


FIG.2. MAGNETIC VERTICAL FORCE PROFILE
Scales : Horizontal 1" = 100 ft.
Vertical . 1" = 100 gammas.

GEOPHYSICAL SURVEY OF THE SOUTHERN PROSPECT (MT NOVIT AREA),
MT ISA, QUEENSLAND.

SELF-POTENTIAL & MAGNETIC VERTICAL FORCE PROFILES

W. J. Longson.
GEOPHYSICIST

G127-10