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GEOPHYSICAL SURVEYS HOWARD, TASMANIA.

by

J.B. Boniwell

MAGNETIC SURVEY, MT. BISCHOFF AREA.

by

N.G. Mattocks

GEOPHYSICS

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Geophysical Surveys, Howard / Magnetic Survey, Mt Bischoff Area by J.B. Boniwell by N.C. Mattocks 3/5/59

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By N.G. Mattocks.

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GEOPHYSICAL SURVEYS - HOWARD TASMANIA

by

J.B. Boniwell

An area of Dundas Group volcanics, juxtaposed against the Owen conglomerates by virtue of the Owen Rift Fault (known locally as the Tyndall Thrust), was covered by geophysical surveys in the two seasons 1957-58 and 1958-59. The area is distinguished, apart from its favoured regional environment, by two prospects, the so-called Tyndall Mine and a lead showing further north. Thus, the coverage extended well north of the Tyndall Range, and was, for convenience, collectively designated the Howard survey.

The Surveys

The primary coverage was undertaken by the Turam dual frequency horizontal loop method (using a grounded reference cable) on traverses cut at 400 feet intervals, pegged at every 100 feet. The grid was controlled by two parallel base-lines bearing 342 degrees azimuth. Only the lower operating frequency (440 cps.) data have been compiled into plans. Auxiliary gravimetric and magnetic sampling of electrically anomalous zones succeeded this primary phase.

Electromagnetic

Four dominant linears were disclosed in the electrical survey. Lesser and more discrete anomalies were resolved on lines 40S-44S and 48S-52S east of the B.L. Elsewhere, zones of inductive phase shifts were ill-defined and, consequently, rather vague, e.g. at 0/750E, 4S/3350W, and in the extreme west of the grid area between lines 4N and 20N.

Intrinsically, only the four linears and those anomalies closely associated with them can be considered meritorious. One of these, that in the south and east of the B.L. is coincident with the faulted western contact of the Owen. Its termination north, therefore, circa line 20S, could well be a significant reflection of structural dispositions. As a conductive sheet, it is near-vertical, dipping steeply west at about 80 degrees, and apparently quite narrow, less than 50 feet. The two weak expressions immediately west seemingly have the same characteristics, and are considered, therefore, as associates to the main anomaly.

The most prominent electrical axis of the coverage, certainly the most prolonged, occurs to the south and west of the B.L. It extends at least from line 8S for an undefined distance south; and for much of this strike length, it coincides with a steep creek valley. A weaker parallel axis, approximately 400 feet west, although largely overshadowed by its neighbour, can be traced from circa line 40S north to line 4S and beyond, where it intensifies. This second axis, on the evidence of increasing magnitudes north, could well be an en echelon member, but the very fact of its strike persistence is more suggestive of a simple parallelism. Dips to both these horizons are apparently steeply east, 70-80 degrees.

In the north, and west of the sub-B.L. a less intense linear persists from 24N to 44N. This, too, exhibits an apparent east dip of the same order.

All these electrical disturbances arise from bedrock sources beneath a shallow cover, 20 feet and less.

Gravimetric

Gravimetric profiling was confined to representative sampling of the major and more note worthy electrical zones. Reduction of the observed data to Bouguer values was based on the proven figure of 2.65 gms./cc. for near-surface density. Removal of inherent regional effects has been undertaken in one sub-area only.

Virtually all the Bouguer profiles are marked, often strikingly so, by contrasts in density implicit to structure and/or geological contacts. As these density boundaries conduct, it is clear that the four main electrical linears arise from zones of bedrock shearing, presumably water-impregnated. Correlating gravity lows at many points, implying local mass-deficiencies, add substance to this interpretation.

Such recognition of wide spread shearing allows some representation of structure, although sufficient control does not exist in a N-S direction to provide detail of cross-movements, if any. Through delineation of axes of gravimetric similitude, shear strike behaviours may be depicted (Plan No. T.585) that are in accordance, it is seen, with mapped schistosities. That such strike patterns should be at variance with the electromagnetic contouring around line 4N is not the incompatible event it would seem once it is considered that a sub-B.L. cable lay-out would mitigate against the detection of an electrical zone almost coincident with it. It is noted, too, particularly in this immediate area, that as the density contrast becomes more marked, so does the corresponding electrical expression intensify. This rather appears to confirm the parallel continuity of the two shear zones at least in this area, and possibly up to line 28N.

Of the four electrical linears, the Owen contact anomaly, on the gravimetric, appears the most important economically. Here, some positive gravimetric correlation is manifest, not of a large order and not well resolved, it is true, but sufficiently consistent to demand consideration. The regional trends reflect the deep seated extent of the fault movement; and their removel, perforce, is a direct function of the Owen mass distribution. As this can only be an empirical procedure, uncertainties are consequent to the residual values. The best apparent suite of values is presented in Plan No. T.586.

Minor gravimetric correlations apparently exist on the "creek" linear at 28S and 32S. However, it is difficult to gauge the reality of these expressions in profiles where overburden to bedrock relationships may vary drastically (outcrops exist in the valley bottom). In fact, it is considered more than possible that the positive sense has been merely induced by a local return to the regional datum between two flanking gravity "lows".

A one station positive departure on line 36N is the only gravimetric indication of mineralization on the northern conductor. This reading, by itself, can not be given much weight in a profile that is somewhat irregular, but, on the other hand, it can not be entirely discarded as some magnetic activity exists (see below), and as a suppressed extension south may occur on line 32N at 5W. Nonetheless, the implied potential is dishearteningly small.

The Tyndall Mine mineralization displays no gravity expression, and is non-conducting although clearly on a shear zone. The lead mineralization at 24N/6W is also non-conducting, but may be giving rise to a minor mass effect. Neither of these prospects, therefore, can be regarded as other than a superficial manifestation of minor mineralization to be associated with the shearing.

Magnetic

Considerable and diverse magnetic activity persists throughout much of the area. At most times, centres of activity do not bear any direct correlation with the electromagnetic linears, although, in some instances, an association is undoubted, e.g. the zone of high magnetics that roughly parallels the electrical axes along the creek valley. Here, minor magnetite, possibly some pyrrhotite, crudely zoned by reason of the faulting, appears the likely incidence.

The one correlation that could be described as such occurs on line 36N, but even this is not consistent on strike to the north. Nonetheless, on this one line, the magnetic anomaly is of the form and order to suggest the bedding of 5-10% pyrrhotite along the shear planes.

At the Tyndall Mine, a narrow, very local magnetic linear strikes through the actual mine mineralization, although the peak intensity has most probably been magnified by surface scrap iron about the workings. The main point of interest in this feature is that it confirms the previously postulated shear trend in this area.

The magnetic activity that occurs in the vicinity of the Owen contact anomaly is clearly not related to the fault itself, yet is in some apparent association with the gravimetric expressions. This raises the possibility that, at least at some points, the magnetic and gravity anomalies are reflections of a facies change in the porphyry country rock, i.e. reflections of an increase in ferric iron content giving rise to increased susceptibilities and densities.

Further, it might be expected that the weathering of inherent ferrous iron to magnetic ferric iron would be implicit to porphyry outcrop conditions, these, in turn, to be reflected in the topographic relief. And near outcrop variations can be correspondingly reflected in the gravity profiles. Thus, it should be noted that, in fact, such a magnetic-cum-gravimetric-cum-topographic relationship actually exists on three lines, 36S at 13E, 40S at 14E, 44S at 13E. But, elsewhere, it does not hold true, e.g. 48S at 10E. Therefore while it might be considered that some of the geophysical anomalies are satisfactorily explained, others are not.

Conclusions and Recommendations

It has become clear that, in the sum, the one feature that can be regarded as sufficiently interesting to warrant more study is the Owen contact and the geophysical anomalies associated with it. Yet, the uncertainties in significance preclude positive recommendations. Thus, it is suggested that this area would serve as an excellent base for any scout drilling of the rift structure. There are good arguments in favour of such a project:

(a) The Lyell Shear has not been drilled north of Comstock.

(b) There is room in the geophysical results for substantial amounts of disseminated mineralization.

(c) It is a similar physical setting to that of the Corridor ore-body at Mt. Lyell.

(d) Geological and geophysical control data could be derived to the benefit of future evaluations.

For this purpose, the following drill hole has been sited: line 48S at station 8E, bearing east along line of sight of traverse, depression minus 45 degrees, estimated length 1,000 feet.

Alternatively, or conjointly, further geophysical coverage south might be considered as rewarding.

Zeehan, Tas.
8th May, 1959.

J.B. Boniwell,
Geophysicist.

4232

RIO TINTO AUSRALIAN EXPLORATION PTY. LIMITED

N. W. TASMANIA

LINES OF EQUAL PHASE DIFFERENCE

HOWARD AREA

E. M. SURVEY

CONTOUR INTERVAL 20°y PHASE

Scale : 1 inch to 400 feet.

GEOPHYSICIST : J. BONIWELL | AUTHORITY : PRP/7/100

PLAN. T 476

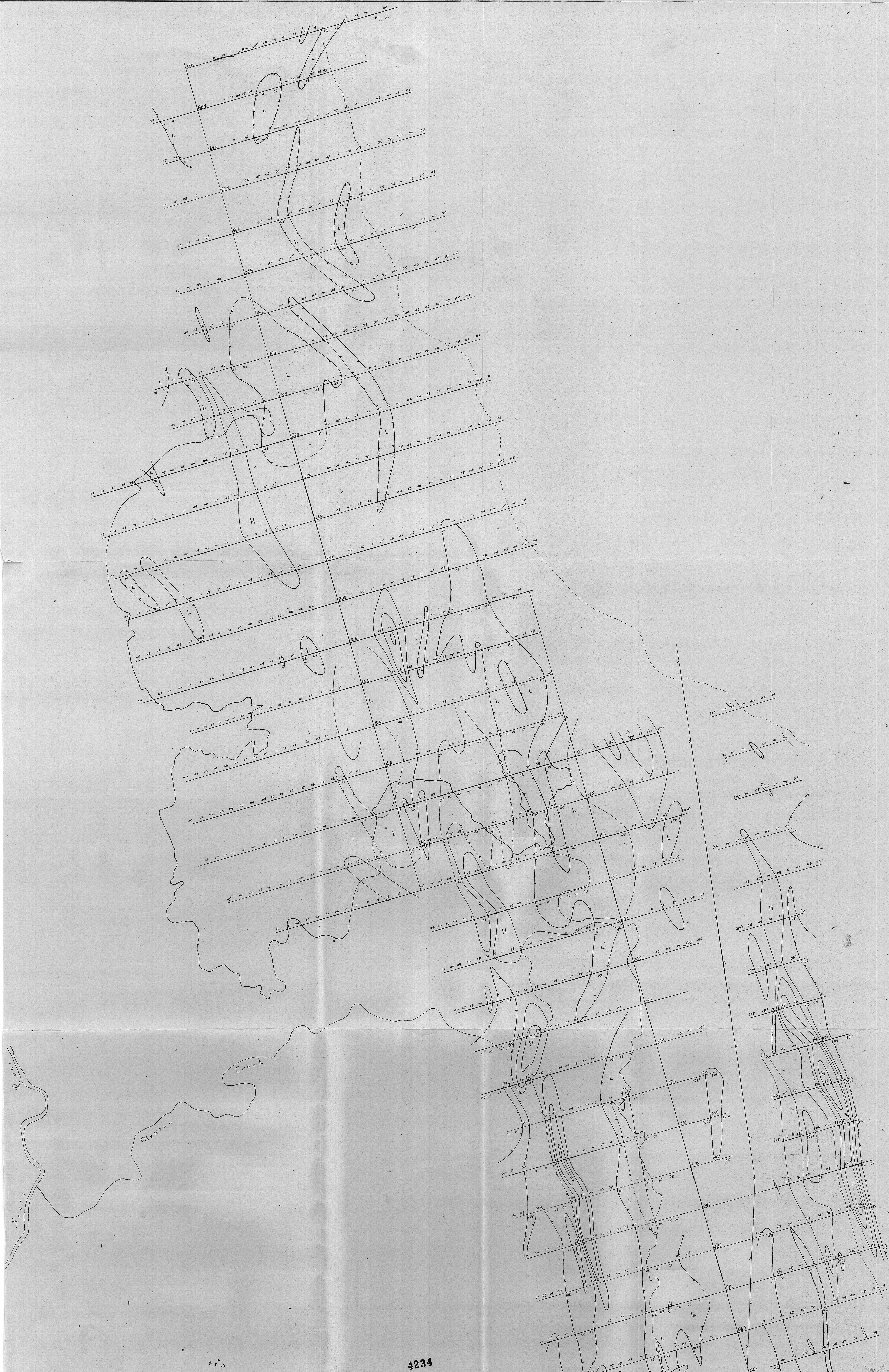
373007

RIO TINTO AUSTRALIAN EXPLORATION PTY. LTD.

HOWARD AREA - Tas.
MAGNETIC CONTOURS.

SCALES: PLAN 1 inch - 400 feet; Contour Interval 200γ

June 1959.	PRP/7/100	Plan № T477



4234

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

N. W. TASMANIA

LINES OF EQUI-RATIO CONTOURS
HOWARD AREA

CONTOUR INTERVAL 0·10

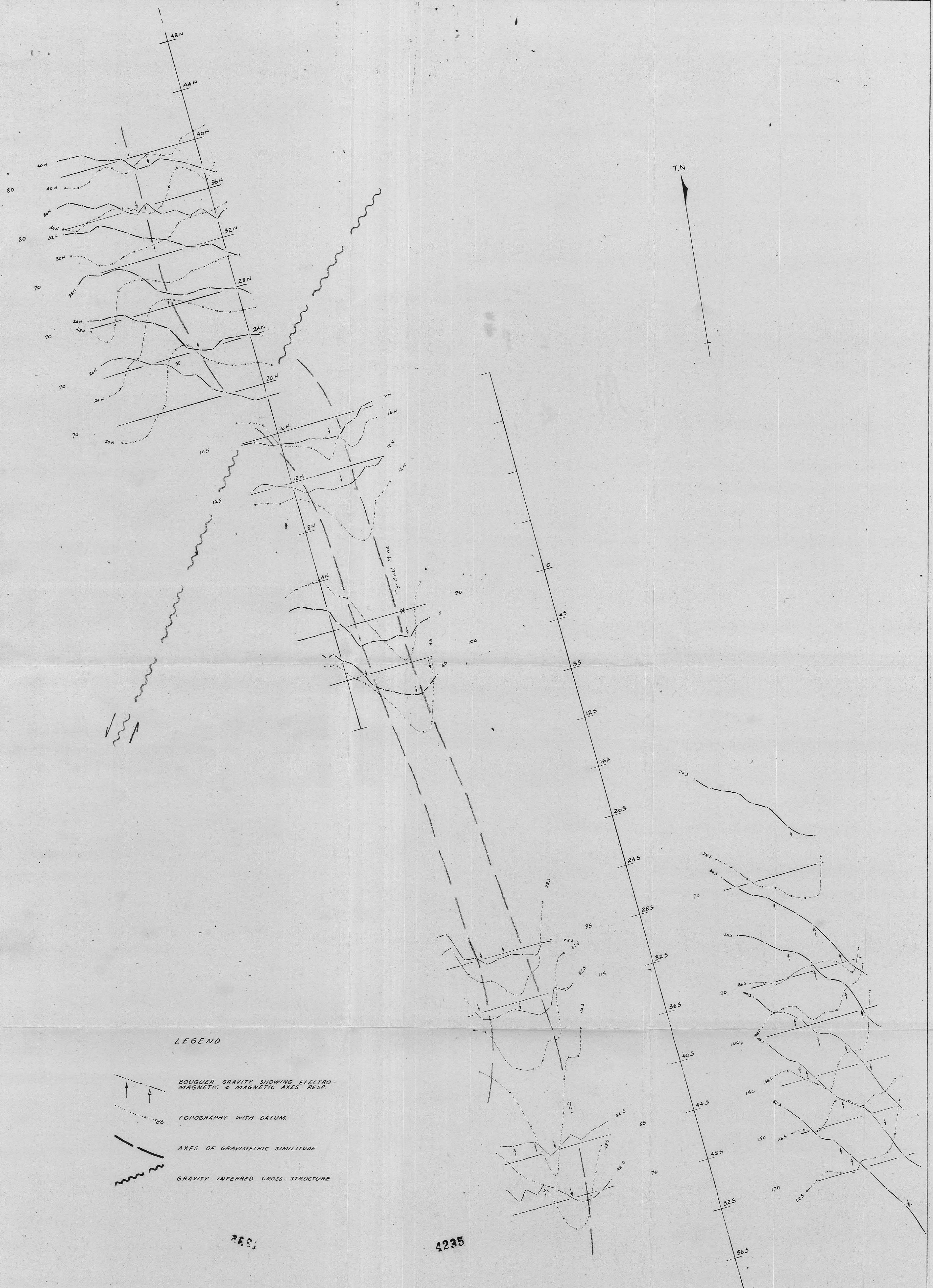
SCALE : 400FT. TO 1 INCH

PRP 7/100

PLAN. No. T479

5 cm

373009



4235

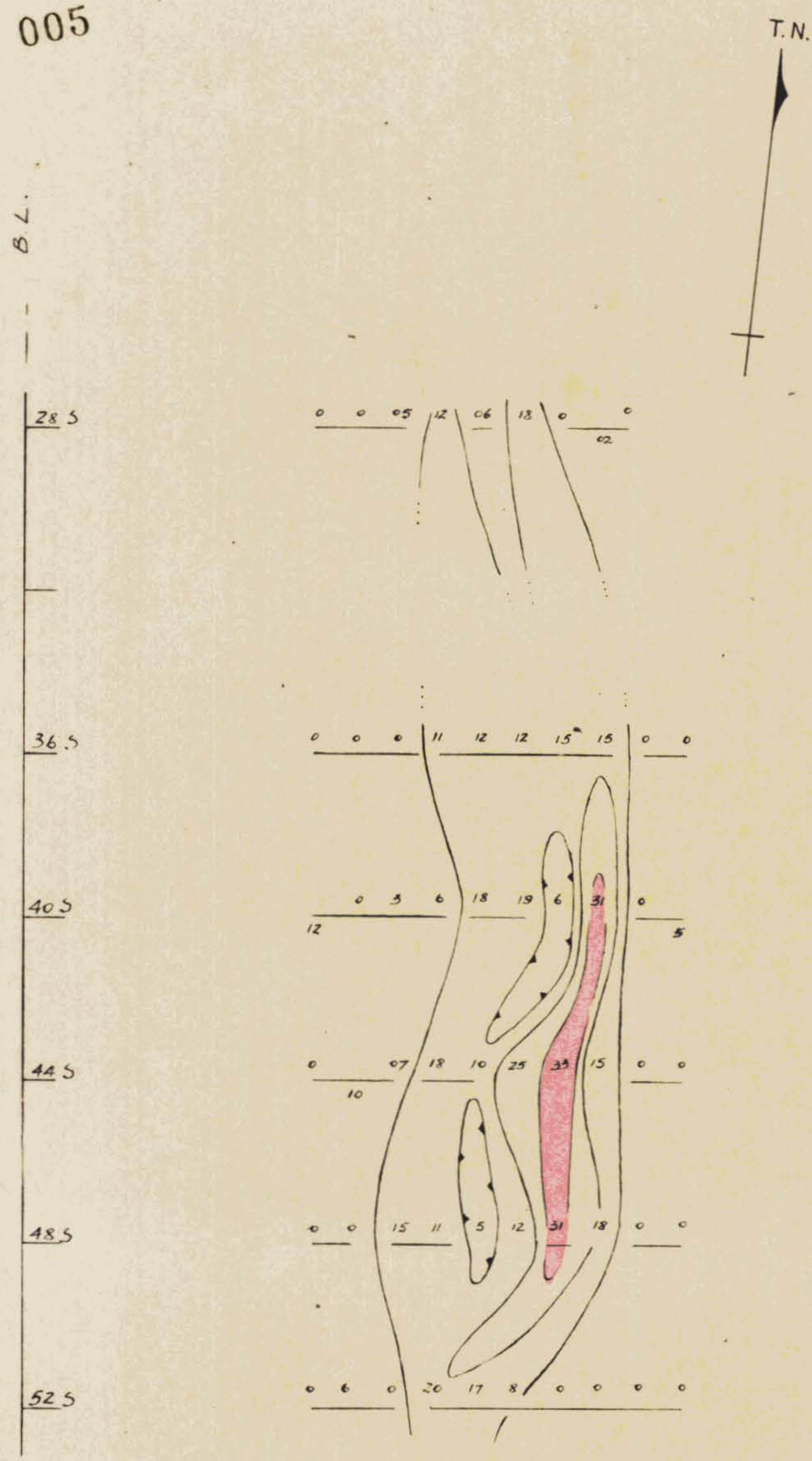
RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

HOWARD AREA, Tas.
BOUGUER GRAVITY PROFILES

June 1959.	SCALES: Plan : 1in. - 400 feet Topog. : 1in. - 50 feet ΔG : 1in. - 1.0 mgal.	PRP/7/100	PLAN Nº T 585

373010

005



373011

RIO TINTO AUSTRALIAN EXPLORATION PTY. LTD.

HOWARD AREA - Tas.

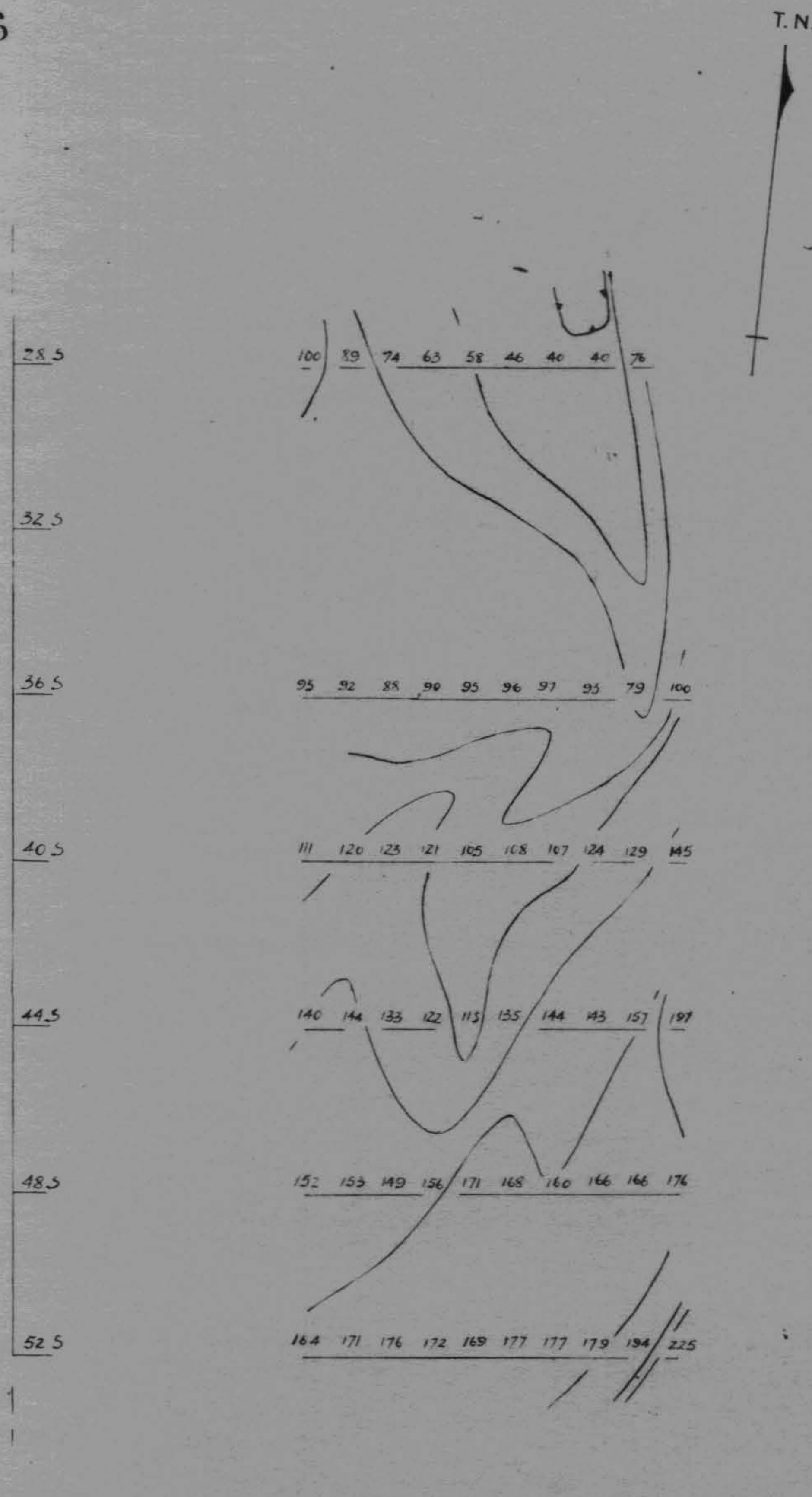
RESIDUAL GRAVITY CONTOURS.

SCALES: Plan 1 in - 400 ft., Contour Interval 0.10 mgal.

June 1959.	PRP/7/100	Plan Nº T 586

5 cm

006



373012

RIO TINTO AUSTRALIAN EXPLORATION PTY LTD

HOWARD AREA - Tas.
TOPOGRAPHIC CONTOURS

SCALES : Plan : 1in - 400ft, Contour Interval 20'

June 1959	PRP/7/100	Plan Nº T 587

5 cm

MAGNETIC SURVEY

MT. BISCHOFF NORTH AREA.

12th May 59.

A dolomite horizon representing the northern continuation of the dolomite formation at the Mt. Bischoff mine was identified by geologist M. Solomon. A magnetic survey was employed to search for pyrrhotite bodies in this horizon.

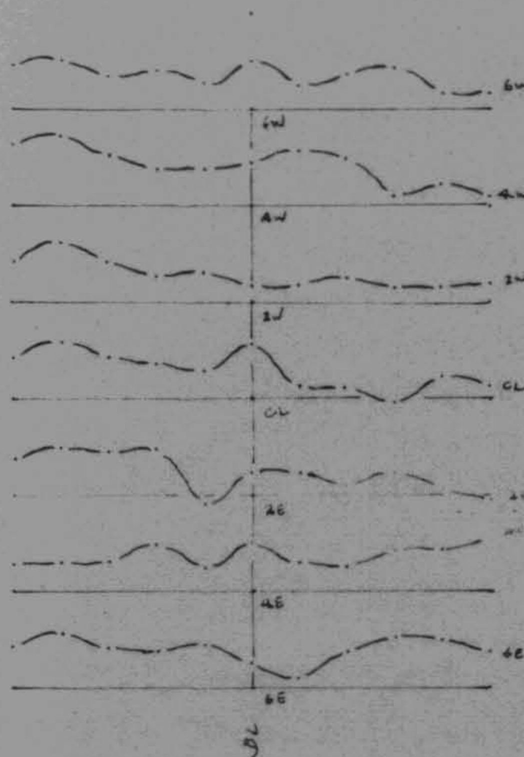
7 traverses at 200 ft. intervals were done from a base line striking magnetic east along the dolomite outcrop. Readings were taken at 100 ft. spacings along traverses.

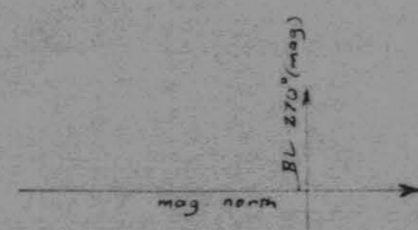
The observed magnetic profiles do not allow any significant occurrences of pyrrhotite mineralisation.

N. G. Mattocks.

373014

008





5 cm

Rio Tinto Australian Exploration

N.W. Tasmania

Mt BISCHOFF NORTH
MAGNETIC PROFILES

Scale – vert. 1" = 200 γ plan. 1" = 400'	PRP/7/100 PLAN NºT588

MAGNETIC SURVEY MT. BISCHOFF SOUTH AREA.

009

by

N.G. Mattocks.

At the Mt. Bischoff mine, the significant tin ore is associated with pyrrhotite and replaces a sedimentary Precambrian dolomite. Geologist M.Solomon reported the possible southward continuation of this dolomite host under a Precambrian cover, of up to 500 ft. This survey attempted to locate any sizeable pyrrhotite bodies in this horizon.

Unfortunately results were negative.

The recommended area was gridded with traverses at 200 ft. intervals from a base line bearing magnetic east. Vertical intensity magnetic readings were taken at 100 ft. intervals along traverses.

Features of the results were -

(a) spurious effects due to abandoned ore trucks, discarded iron, dumps, roads, etc. Where the cause of these was apparent the results were ignored. They are indicated on the profiles by broken extrapolation lines.

(b) disturbed magnetics at the southern extremities of traverses. To the west these are in basalt and to the east in the Cambrian. A swing to the north in the cambrian on line 20E is reflected in the magnetics.

(c) a regional gradient to the north and east of approximately 100 gammas.

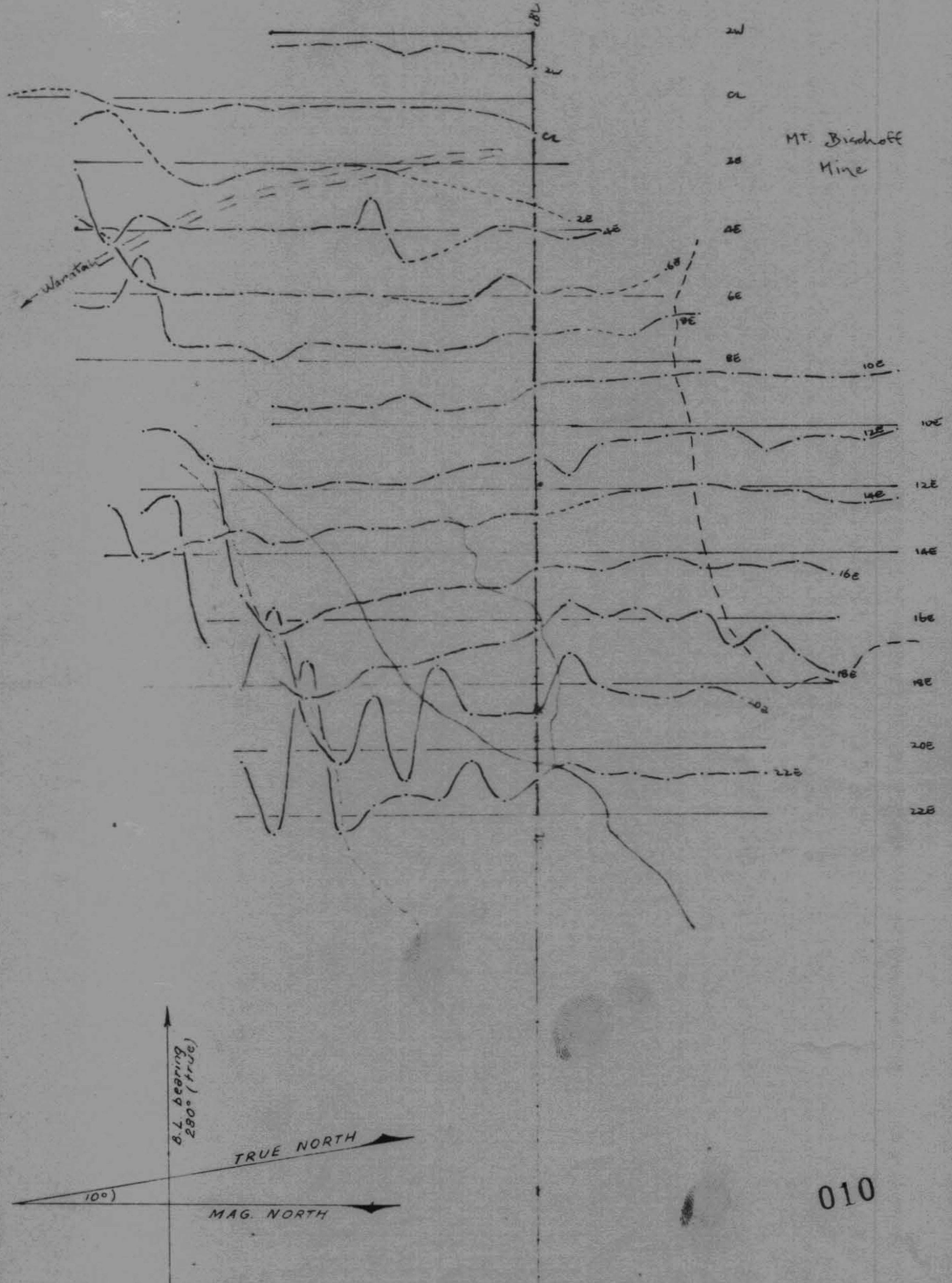
The remaining small peaks are not significant. Calculations by the Senior Geophysicist indicated that, allowing for the expected thickness of cover, a reasonable pyrrhotite lode would produce a broad anomaly of at least 300 gammas.

The presence of an undetected pyrrhotite body of significant proportions within the expected depth, is unlikely.

Zeehan, Tas.
27th April, 1959.

N. G. Mattocks,
Geophysicist.

373016



010

RIO TINTO AUSTRALIAN EXPLORATION PTY. LTD.

MT. BISCHOFF SOUTH
MAGNETIC PROFILES

June 1959	SCALES: Plan: 1in. - 400ft. Vert: 1in. - 200γ	PRP/7/100	PLAN No T589

5 cm