Q-58,51

Q58 No 1

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

MELBOURNE, AUSTRALIA

PROJECT:— PRP/7/100

REPORT No.:— Miscellaneous 1958

COMSTOCK AREA.

58-197

Notes on Geophysical Surveys in
North West Tasmania.

E. McCarthy
J. B. Boniwell

Geophysical Surveys in the Comstock Area, North West Tasmania by E McCarthy & J.B. Boniwell 6/2/58

FILE REFERENCE:— 8D/20A

MAP REFERENCE:—

DATE:— 6/2/58

(1)

440

CONTENTS

MICROFILMED

Geophysical Survey - North West Tasmania
by E. McCarthy.

Report on Electromagnetic Surveys - Comstock Area, Tasmania
by J. Boniwell.

Plates		Scale
T.338	Electromagnetic Survey, Comstock Area Lines of Equal Phase Difference.	1" = 200 ft.
T.339	Electromagnetic Survey, Comstock Area Equi-ratio Contours.	1" = 200 ft.
T.346	Preliminary Geological map of the area west of Lake Dora, showing zone of anomalous E.M. Readings along the eastern edge of the "Owen Rift Valley".	4" = 1 mile.

Addendum

Gravimetric survey, Comstock

Plates

T498 Topographic contouring gravity survey

T499 Comstock gravity profiles

MICROFILMED

GEOPHYSICAL SURVEYS - N.W. TASMANIA

The writer spent a period in January inspecting the progress of the geophysical survey work in our N.W. Tasmanian area. Generally, the progress of the survey is slow, but the results obtained to January 24th were encouraging.

Geophysical work started at the Comstock area on December 2nd, 1957, under the direction of Mr. J.B. Boniwell on loan from Riocanex. Progress of this survey was retarded due to slow progress of track cutting through dense scrub and protracted periods of rain. The survey at Lake Dora was started during December, was interrupted for the Christmas stand-down, and delayed by bad weather during January. Progress at both Comstock and Lake Dora is good, considering the arduous conditions under which the work has been carried out. Geophysicists Boniwell and Mattocks, and men under their control, should be complimented on the work done under poor field conditions.

The results achieved to date at Comstock are described in the attached report by J. Boniwell. Work has been suspended at Comstock east, as is recommended in the last paragraph of the report by J. Boniwell.

At Lake Dora, a small electrical conductor was located by the Turam, E.M. Unit. At the time of the writer's visit to the area, the full extent of this conductor system was not delineated. Survey work to outline the extent of the conductor was in progress. The environment of this conductor system is considered favourable for accumulation of an ore body. Copper and iron bearing minerals have been found in the locality. See attached geological and panoramic sketch maps which have been prepared by Dr. Campana.

At Lake Dora, as at Comstock, the area of the recorded electrical disturbance should be checked by other geophysical methods before any recommendations for use of other exploratory tools, other than geochemistry, are made. Both areas should be checked by magnetometer and gravity methods.

The electrical conductors found could be due to a number of causes; sulphide ore, carbonaceous material, conducting clays, etc. If there is any correspondence of magnetic anomaly with the electrical conductor, it could be assumed that the minerals of pyrrhotite and/or magnetite are associated with the conductor. Should there be a gravity anomaly over the area, corresponding in position with the electrical conductor, it can be assumed that the electrical conductor is due to mineralisation. It is imperative then that all electrical conductors found should be checked by both magnetic and gravimetric methods. The geophysical party are equipped to carry out magnetic surveys, and conductors at both Comstock and Lake Dora will be checked magnetically.

The Company does not possess a gravity meter, and until one is acquired, some valuable data on recorded electrical conductors is not available.

It is not claimed that geophysics alone can find ore bodies, but geophysics can be a very useful tool to help the Geologist in his search, and it is claimed that, under favourable conditions, ore bodies can be delineated by use of the three geophysical methods mentioned above.

Unfortunately, these favourable conditions are not always present. It could happen that the small broad E.M. anomalies recorded both at Comstock and Lake Dora may be due to disseminated sulphide bodies or bodies deeply buried, 200 to 400 feet, which may be important ore bodies but will show very little magnetic or gravity effects at the surface. In the Comstock Valley the topographic effects could obscure a small significant gravity increase over an ore body or at Lake Dora a gravity disturbance along a fault line could be more pronounced than any effect over an ore body, but if in any area of an E-M anomaly there is a coincident gravity and/or magnetic anomaly, much more reliability can be placed upon results obtained.

It is strongly recommended that all E-M anomalies be checked by both gravity and magnetic methods, along with geochemistry, geological mapping, etc., and it is recommended that the Company acquire a gravimeter to be available at all times to carry out check work.

Progress of Survey

The target area in Tasmania, as set down by the Company Geologists, is extensive. Most of this area is in country where geophysics could play a very important role; soil or scree covered country with few rock exposures. It is now evident that coverage of such a large area will be a long and arduous job, with the limited amount of geophysical equipment and staff available. I feel that the rate of coverage could be increased two to three fold if two additional units of E-M equipment were available. These should be of the light weight portable vertical loop type which can be used mostly in areas of relatively sparse vegetation, such as an area around Lake Dora or between Upper Henty and Lake Margaret. In these cleared areas, planimetric surveying requirements are almost negligible for use of the vertical loop methods. In country where tracks need to be cut, the present Turam equipment would be more applicable.

It is strongly recommended that the following geophysical equipment be purchased:-

(a) 1 only Vertical loop E-M unit Type Sharpe SE100.
(b) 1 only Vertical loop E-M unit Type AE-E35.
(c) 1 only Gravity Meter, Worden or Atlas type
(d) 1 only Torsion type Vertical Force Magnetic Variometer, Askania type (required if Variometer owned by E-Z Co. is not available to R.T.A.E).
(e) 1 only Quick set level, and staff.

It is pointed out that all the equipment listed above could be used effectively in the Cloncurry district when not required for use in Tasmania.

STAFF.

Track cutting and pegging of lines is the cause of the slow progress of the survey to date. Further teams of field assistants should be employed to speed up this phase of the work. It is recommended that the following teams be used:- In the southern section of "Straight Edge" three teams of 3 men each, for the Lake Tyndall-Upper Henty, one team of 2 men. The three teams working in the south could come under direct supervision of J. Boniwell or N. Mattocks, and the team further north could be supervised by J. Behan. Five extra field assistants would need to be employed. I think that we could not supervise and service more than these four teams of track cutters.

General supervision of all the work would be undertaken by J. Boniwell. N. Mattocks could supervise work in one area and J. Behan could control work in another. This will require that J. Behan be trained to operate and service geophysical equipment. For other Instrument Operators, University students D. Johnstone, D. Ayres and E. Lilley could be used. When these leave the field, field assistants may be trained to take over the operation of instruments. Further field assistants could be employed to replace them from the track cutting teams.

Further personnel would be required as geophysical helpers. The structure of the geophysical group should be:-

General Supervisor
J. Boniwell

Area Supervisors

N. Mattocks			J. Behan		
Instrument Observers	Geophysical Helpers	Track Cutters	Instrument Observers	Geophysical Helpers	Track Cutters
2	4	3 teams of 3 men	1	1	2

This structure is based, not on the recommended list of equipment to be used, but rather on the equipment which may be available by the end of February, namely:-

(a) 1 only Turam unit
(b) 1 only Vertical loop unit AR-EM5
(c) 1 only Gravimeter
(d) 1 only Vertical force magnetometer
(e) 1 only S.P. unit

The present strength of the geophysical team is:-

J. Boniwell
N. Mattocks
J. Behan
3 University students
6 Field assistants (when at full strength)
1 Cook

This team would need to be reinforced by five Field assistants and five geophysical helpers. The position now filled by the cook will be vacant soon. As work progresses north from Comstock, there will not be the need to maintain the Comstock camp.

(Note: Geophysical helpers and field assistants listed above should be all classed under Field Assistants, with equal status and salary).

It is recommended that 10 extra field assistants be employed immediately, and that people be recruited, as staff personnel, to be trained as Instrument Operators. Some of these may come from our present strength of field assistants.

E. McCarthy
Senior Geophysicist

004

REPORT ON ELECTROMAGNETIC SURVEYS

COMSTOCK AREA, TASMANIA

440005

INTRODUCTION

An area roughly ½ mile by ¾ mile immediately east of the Comstock mine workings of the Mt. Lyell Mining & Railway Co. was covered electromagnetically by a dual frequency horizontal loop method (Turam).

WORK

A grid of lines, controlled by a base-line striking approximately 80 degrees azimuth, was cut at 400' intervals and picketed in the first instance at 25' intervals and subsequently at 50'. Despite meticulous controls, some large inaccuracies remain in this work, but for the purposes of this report, the grid has been idealised.

Two plans have been compiled from field observations afforded by the grid; one depicting the distribution of phase differences recorded between two reference points operating in tandem at a 100' separation, and one illustrating the behaviour of the ratio of signal amplitudes, obtained contemporaneously, between these points. These plans pertain to the lower, viz: 440 cps. frequency only.

DISCUSSION OF RESULTS

Four inductive anomalies have been indicated within the grid area, only two of which are associated with significant and correlating ratio anomalies and are shown shaded in the accompanying plans. Of the last, one is clearly the extension east of the electromagnetic anomaly detected by the Bureau of Mineral Resources in an earlier survey over the mine workings. Qualitatively, it would be classed as a fair order electrical disturbance only, but this system, by virtue of its apparent association with the Comstock mineralisation, must perforce retain a significance incommensurate with its electrical properties. The anomaly dips flatly to the north and shows every indication of being formational in character, that is, conformable with the bedding, as witnessed by the parallel behaviour of two axes joining points of similitude in the resultant field to the north. No magnetic activity is associated with the system, and in view of this, it is thought that if it is in fact a mineralised zone, then the mineralisation is essentially pyritic and disseminated.

The second anomaly remains open to the east. It is comparable in order to that of the first, but is more symmetrical in attitude. However, two unknown factors must appreciably affect the final evaluation, to wit, dip and depth of cover. The local geologic dip is, in all probability, near-horizontal, and there is some intrinsic evidence to suggest that the anomaly is flatly dipping to the south. But of the depth of cover, no determination can be made from the present data, and it is partly to this end that gravimeter checking of this and like anomalies should be undertaken as a routine measure prior to embarking upon more costly and possibly unnecessary means of evaluation.

RECOMMENDATIONS

Failing gravimeter checks, no further work is recommended in this area at this time, particularly if, as widely believed, Mt. Lyell are considering drilling their part of the first system. Complete delineation of the second anomaly ought to be considered in the light of later developments.

J. B. Boniwell

Zeehan, Tas.
16.1.58

440006

R.T.A.E.
Mt. LYELL

Base Line

Tasman Shaft

COMSTOCK MINE

LEGEND

- Lines of Equal Phase Difference. Contour Interval : -2·0°
- 10 / 05 — Negative Station Values (x10) in degrees Positive.
- Electrode position on base line
- Axis of Similitude
- Phase Anomaly plotted by B.M.R.
- Survey pegs on Lease Boundary

Note :- Station values in each case ascribed to furthest reference point from primary cable.

5 cm

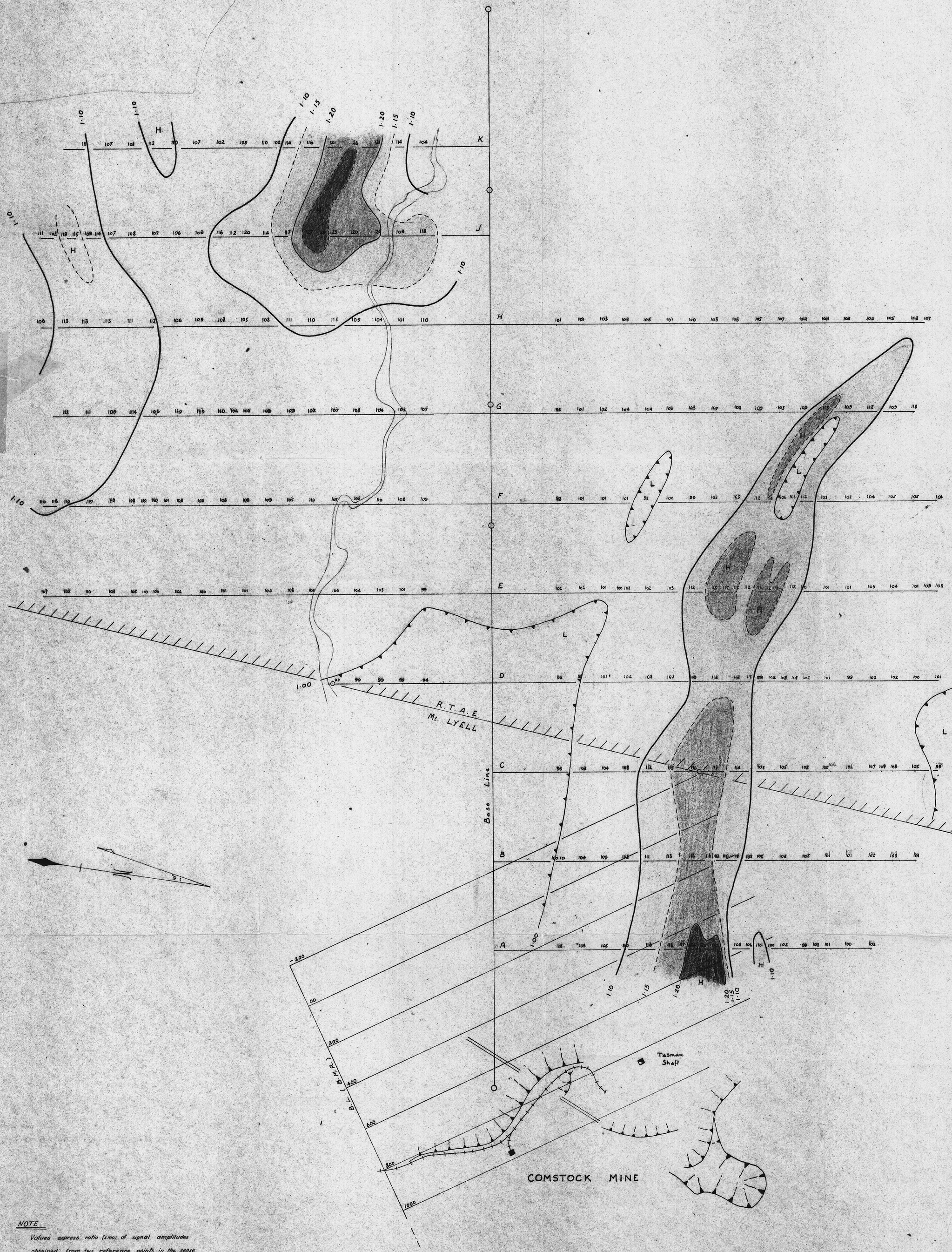
58-197

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

ELECTROMAGNETIC SURVEY
COMSTOCK AREA 006
LINES OF EQUAL PHASE DIFFERENCE

SCALE 1" = 200'

P.R.P. 7/100 Plan No. T 338



NOTE:

Values express ratio (x100) of signal amplitudes obtained from two reference points in the sense the nearer: the further from the primary cable, and are corrected for normal attenuation of the primary signal with distance. Values are ascribed in each case to the reference point furthest from the primary cable.

Contour interval : 0·10

005

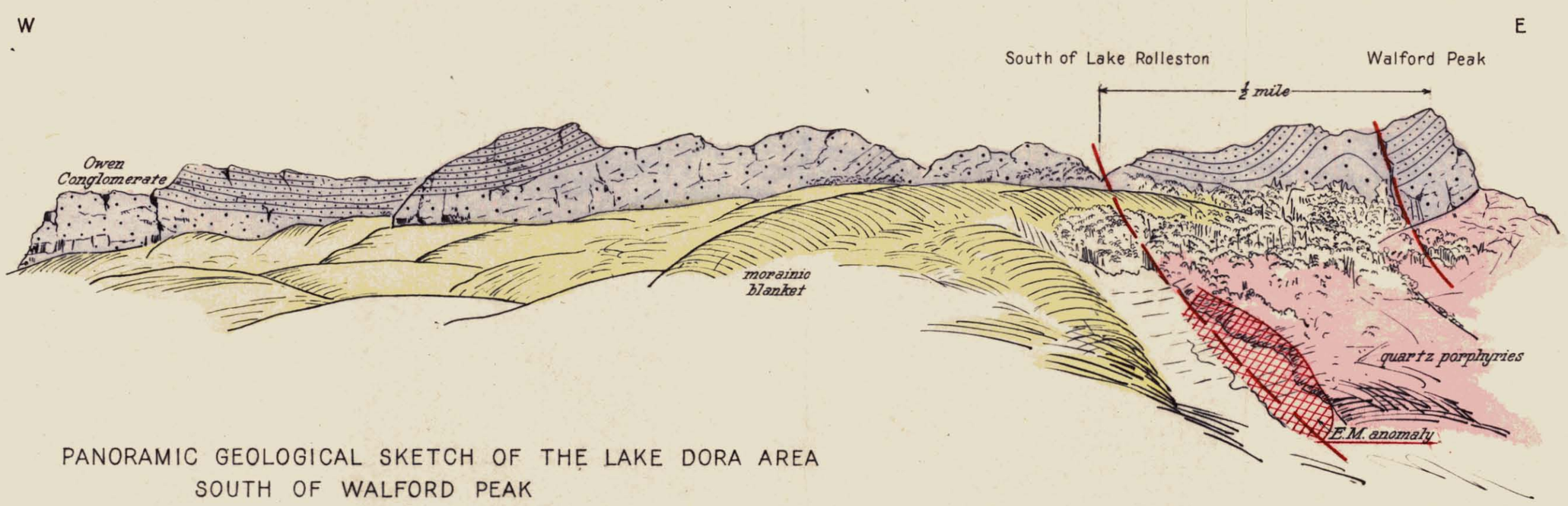
S8 - 197

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

ELECTROMAGNETIC SURVEY
COMSTOCK AREA
EQUI-RATIO CONTOURS

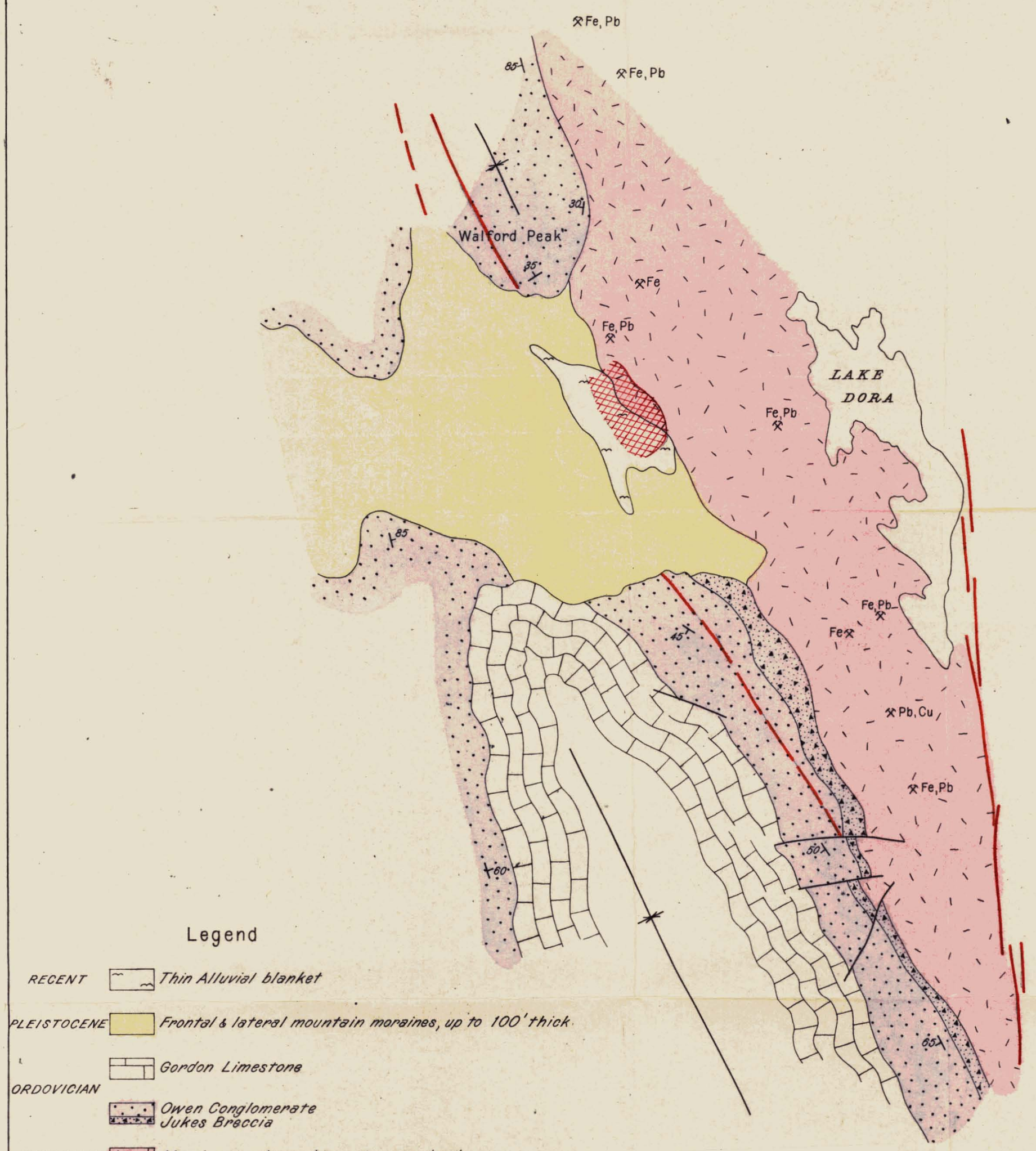
SCALE 1" = 200'

Geophysicist	J. Boniwell		
Draftsman	J.L.R.	P.R.P. 7/100	Plan No. T339



PANORAMIC GEOLOGICAL SKETCH OF THE LAKE DORA AREA
SOUTH OF WALFORD PEAK

SHOWING AREA OF ANOMALOUS E.M. READINGS



Legend

RECENT — Thin Alluvial blanket

PLEISTOCENE — Frontal & lateral mountain moraines, up to 100' thick

Gordon Limestone

ORDOVICIAN — Owen Conglomerate
Jukes Breccia

CAMBRIAN — Massive or sheared quartz-porphyries

Area of E.M. ground anomaly (full extent not defined as yet)

Major faults (marginal faults of the eastern edge of the Owen graben)

T45 Strike and dip of bedding

Syncline

Pb,Cu,Fe Mineralized exposure (lead, copper, iron)

5 cm

58-197

RIO TINTO AUSTRALIAN EXPLORATION PTY LIMITED

PRELIMINARY GEOLOGICAL MAP OF
THE AREA WEST OF LAKE DORA 007

SHOWING ZONE OF ANOMALOUS E.M. READINGS
ALONG THE EASTERN EDGE OF THE "OWEN RIFT-VALLEY"

Date : January, 1958	Scale : 4 inchs to 1 mile	
Geologist : B. Campana	Authority : P.R.P./7/100	Plan № T346

008

ADDENDUM

GRAVIMETRIC SURVEY, COMSTOCK

Gravimetric profiling of the two main electromagnetic anomalies indicated in the Comstock Valley survey of 1957-58 was carried out mid-December, 1958.

The field observations were reduced to the Bouguer value on the assumption of a uniform near-surface density of 2.65 gms/cc., and in view of the lack of consistent interrelationship between the resulting gravity profiles and topography, this assumption is considered valid.

Despite this, the regional effects are so variable that their removal is no simple unique procedure. However, assuming that the gravity profile for line D is characteristic of the regional expression over the major anomalous zone striking East from the Comstock Mine, then it is possible to curve-fit this expression to the gravity profiles for lines G to C fairly consistently - the gravity profiles for lines A and B are distorted to the South owing to the near proximity of the Owen Conglomerates of Mt. Lyell. It is interesting to note that the axis about which the curve-fit is most reasonable forms a locus quite similar to the axes of similitude noted from the electromagnetic work. It would appear, therefore, that the prior conclusion of a bedded electrical horizon has been confirmed gravitmetrically.

Some positive gravity expressions correlate with both electrical systems. The correlations, however, are spasmodic and largely non-definitive, and with the exception of line E, broad and poorly resolved. Nonetheless, the possibility that mineralisation is the cause of the electrical effects has thus been strengthened by the gravity results, although it is quite clear that the dissemination of this mineralisation along the anomalous zones is far from homogeneous.

Therefore, it is recommended that the gravity anomaly on line E at station 12S be used as the criterion for any future evaluation of the area's potential.

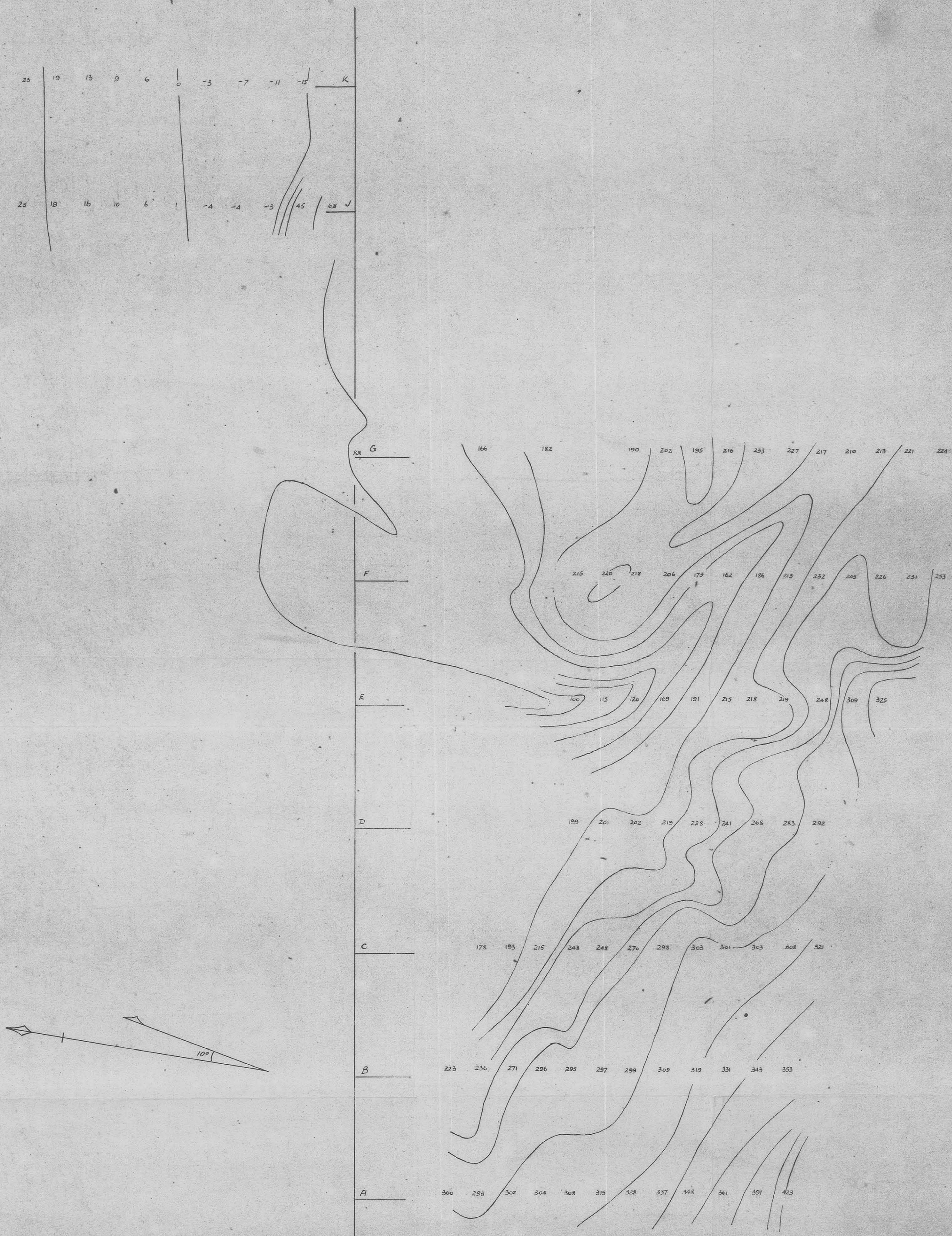
As diamond drilling, on Mt. Lyell experience, is likely to be, if not abortive, at least costly to an extent incommensurate with the apparent potential of the target, it is suggested that, in view of the thin cover implied, trenching and blasting be at first tried in an endeavour to readily expose the bedrock source of the geophysical anomalies at a fraction of the cost. Failing this, a vertical drill hole, percussion or churn drill, seems the more likely alternative.

Zeehan, Tas.
13th January, 1959.

J.B. Boniwell.

440C10

B.L.



B.L.

CONTOUR INTERVAL 20 FEET

5 cm

58 – 197

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

COMSTOCK AREA, Tasmania

TOPOGRAPHIC CONTOURING
GRAVITY SURVEY

009

J. Boniwell Febr. 59.	SCALE : 1 inch = 200 Ft.	PRP/7/100	Plan No T 498

B.L.

150 K

150 J

G

F

E

D

C

B

A

210

200

210

250

250

300

340

Topographic Data

N

10°

LEGEND

- BOUGUER GRAVITY
- INFERRED REGIONAL GRAVITY GRADIENTS
- TOPOGRAPHY
- AXIS OF SIMILITUDE
- VERTICAL MAGNETIC PROFILES
- ELECTROMAGNETIC CENTRES

5 cm

B.L.

58 - 195

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

COMSTOCK AREA

GRAVITY PROFILES

010

J. Boniwell Febr. 1959.	SCALES: ΔG: 1" - 1.0mgal. / ΔZ: 1"-200gm. Topogr.: 1" - 50' / In plan: 1"-200'	PRP/7/100	Plan Nº T499