

REPORT ON THE

ARTER INDUCED POLARIZATION

AND RESISTIVITY SURVEYS

IN THE

MT. TYNDALL AREA, TASMANIA

FOR

MT. LYELL MINING AND RAILWAY CO. LTD.

1. INTRODUCTION

A previous report dated June 9, 1967, described the first induced polarization and resistivity results from the Mt. Tyndall Area. This work was confined to what is now called the Tyndall East Grid. The reconnaissance survey covered a strike length of approximately 4-1/2 miles, and only a small amount of detail was done.

The anomalies located by the previous survey were of variable magnitude. However, there were several anomalies that were large in magnitude, and definite. The detailed geology of the area is not known, but many of the IP anomalies are important enough to warrant detail.

In the survey to be described in this report, the detail recommended on the Tyndall East Grid has been completed. In addition, several additional reconnaissance lines have been surveyed west of the Henty River on the Tyndall West Grid.

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2. PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following data plots in the accompanying booklet. The results are plotted in the manner described in the notes preceding this report.

A) Tyndall West Grid

Line No.	Electrode Intervals	Dwg. No.
2	300 foot	IP _____ -1
4	300 foot	-2
6	300 foot	-3
8	300 foot	-4
10	300 foot	-5
12	300 foot	-6
14	300 foot	-7
16	300 foot	-8
18	300 foot	-9
20	300 foot	-10
22	300 foot	-11
24	300 foot	-12
26	300 foot	-13
28	300 foot	-14

B) Tyndall East Grid

4	100 foot	IP _____ -1
6+400S	200 foot	-2

Line No.	Electrode Intervals	Dwg. No.
6+200S	100 foot	-3
6	200 foot	-4
	100 foot	-5
6+200N	100 foot	-6
6+400N	200 foot	-7
10+200S	100 foot	-8
10	100 foot	-9
10+200N	100 foot	-10
12+300S	200 foot	-11
12+200S	100 foot	-12
12	100 foot	-13
12+200N	100 foot	-14
12+300N	200 foot	-15
14+300S	300 foot	-16
16+200S	100 foot	-17
16+200S	100 foot	-18
16+100S	100 foot	-19
16	100 foot	-20
16+100N	100 foot	-21
16+200N	100 foot	-22
16+200N	100 foot	-23
18+200S	100 foot	-24
18	100 foot	-25
18+200N	100 foot	-26

Line No.	Electrode Intervals	Dwg. No.
24+200S	100 foot	-27
24	100 foot	-28
24+200N	100 foot	-29
28+200S	100 foot	-30
28	100 foot	-31
28+200N	100 foot	-32
30	100 foot	-33
	100 foot	-34
32	100 foot	-35
34	100 foot	-36
36	100 foot	-37
38	200 foot	-38
	200 foot	-39
	100 foot	-40

The plan maps enclosed with the previous report on the reconnaissance data from the Tyndall East Grid were in error. The line interval is shown as 2640', while the actual interval is 1320'. Further, the direction shown for the lines is not correct. The plan has now been corrected using information forwarded by the staff of Mt. Lyell Mining and Railway Company Limited. Enclosed with this report is Dwg. IPP _____ a modified plan map of the two grids at a scale of 1" = 1,000'. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on this plan map as well as the data plots. These

bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. . Certainly, no anomaly can be located with more accuracy than the spread length; i. e. when using 200 foot spreads the position of a narrow sulphide body can only be determined to lie between two stations 200 feet apart. In order to locate sources at some depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

3. DISCUSSION OF RESULTS

A) Tyndall West Grid

The reconnaissance induced polarization and resistivity results from the Tyndall West Grid are very similar to those from the previous survey on the Tyndall East Grid. Several definite anomalies were located, and most of them may be correlated into zones. This has been done, as shown on Dwg. IPP _____.

Zone I

This anomaly is shown on only two lines; it is stronger on

Line No. 6 than on Line No. 8. The shallow, narrow, large magnitude anomaly centered at 18E on Line No. 6 should be checked using shorter electrode intervals. Closely spaced parallel lines should also be surveyed so that a drill hole may be spotted.

Zone II

This anomaly was located only on Line No. 12. The pattern suggests that the line passes approximately parallel to the source; therefore, closely spaced lines should be surveyed.

Zone III

This moderate magnitude zone is indicated to be shallow on Line No. 18; it should be checked using shorter electrode intervals.

Zone IV

This long zone extends beyond the north end of the grid. The source is shallow at some points (Line No. 22) and at depth on other lines (Line No. 24). The source for Zone IV is indicated to be shallow at Line No. 22, 0+00 to 3E and at Line No. 28, 15E. These anomalies should be checked using shorter electrode intervals. If the anomaly is confirmed, closely spaced, parallel lines should also be surveyed.

Zone V

This zone lies about one-quarter mile west of Zone IV. The source is very strong, and at depth on Line No. 22; it is shallow on Line No. 24, and on Line No. 26. The anomaly centered at Line No. 24,

8W to 5W should be checked with 200 foot electrode intervals and perhaps 100 foot electrode intervals. The much narrower anomaly centered at Line No. 26, 3E to 6E should also be checked using shorter spreads.

Zone VI

This zone is indicated to be at moderate depth at Line No. 26, 21E and Line No. 28, 21E to 24E. Both anomalies should be checked using 200 foot electrode intervals.

Zone VII

This zone extends to the north of the grid. The source is indicated to be at moderate depth on Line No. 26, 12W and at considerable depth at Line No. 28, 12W to 6W. The anomaly at Line No. 26, 12W should be checked using 200 foot electrode intervals, and lines 200 feet to the north and south should be surveyed.

Zone VIII

This anomalous zone occurs at the western end of two lines. The measurements would have to be extended to complete the anomaly.

B) Tyndall East Grid

The detailed measurements on the Tyndall East Grid have given additional information about the anomalies previously located. The anomalies have been correlated into zones, as shown on Dwg. IPP _____. Some of the zones appear to be of definite importance.

Zone A

This zone has been detailed at Line No. 6; the results suggest a relatively broad, moderate magnitude source at 3W to 1W. The anomaly is weaker on the lines 400 feet to the north and south. The strongest portion of the source is indicated to be at some depth.

Zone B

This zone has a considerable strike length. The anomaly is moderate in magnitude; on Line No. 4 the source is quite broad, or the line is running parallel to the source. In the vicinity of Line No. 6, the source has less width, and the strongest portion of the source is indicated to be at depth.

Zone C1

This is the southernmost of four zones that extend along strike, in a discontinuous manner, across the entire length of the Tyndall East Grid.

The 100 foot spread measurements show a very strong anomaly, at depth, centered at Line No. 12, 24E. The anomaly is also definite on the lines to the north and south. The pattern suggests that the top of the source may be at a depth of 200 feet.

Zone C2

This very strong anomaly has been detailed on two lines; in both cases there is some depth to the top of the source. The source is indicated to be quite narrow in the vicinity of Line No. 18, and somewhat broader in the vicinity of Line No. 16.

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Zone C3

This zone is located at depth, in a region of high apparent resistivities. Under these conditions it is difficult to fully evaluate its importance. The pattern shows a narrow source at depth at Line No. 24, 24W to 23W. The anomaly seems to be more definite on Line No. 24+200N, but the measurements do not extend far enough to complete the anomalous pattern.

Zone C4

This long zone extends beyond the northern edge of the grid. The anomaly is weaker than the other zones to the south. The source is indicated to be complex in the vicinity of Line No. 28 and the detail on Line No. 36 and Line No. 38 suggests a broad, weak source.

Zone D

This zone lies about one-half mile east of Zone C4. On Line No. 30, 4E, there is a narrow, shallow, large magnitude anomaly. The source could be better located using 50 foot electrode intervals.

Zone E

This zone was only detected on Line No. 38; it extends to the north off the grid. The 200 foot spread data shows a shallow, narrow source centered at 12W to 10W. The source could be better located, and evaluated, using shorter electrode intervals.

4. CONCLUSIONS AND RECOMMENDATIONS

The continued induced polarization and resistivity survey in

the Mt. Tyndall Area has confirmed the presence of several anomalous zones of definite interest. When some geologic information is available, the IP anomalies can be correlated. The resistivity zones shown on Dwg. R _____ may be of assistance in correlating the geologic data.

There are distinct contacts between high resistivity rocks (values greater than 1000) and low resistivity rocks (values less than 1000).

Even without geologic confirmation of the possible importance of the IP anomalies, further work is warranted unless geologic examinations have revealed the nature of the source.

A) Tyndall West Grid

The reconnaissance survey completed west of the Henty River has located several IP anomalies that are very similar to those previously outlined on the Tyndall East Grid. The necessary detailed measurements with shorter electrode intervals, and on intermediate lines, have been recommended above. When this data is available, drilling can be planned.

B) Tyndall East Grid

The detailed measurements on the Tyndall East Grid have been completed. The anomalous zones are well located, and some evaluation is possible. The characteristics of the various zones are different. However, until additional geologic information is available, it is difficult to know whether the strong IP anomalies or the weak IP anomalies are of the greater potential importance.

Zone A - There is now enough information to consider a drill hole to test this anomaly. An angle hole spotted to pass beneath Line No. 6 2+00W at a depth of 300 feet should intersect the source.

Zone B - This broad, complex source is also clearly outlined on Line No. 6. An angle hole drilled at -45° to the east from 44+50E should intersect the shallow source as well as the deeper portion to the east.

Zone C1 - A single angle drill hole located to pass beneath Line No. 12, 24+00E, at a depth of 175 feet to 200 feet, should intersect the source of this anomaly.

Zone C2 - Two drill holes are recommended to test this strong anomaly:
beneath Line No. 16+200N, 7+50E at depth of 150 feet to 175 feet
beneath Line No. 18+200N, 1+50W at depth of 125 feet to 150 feet

Zone C3 - The strongest anomaly from this zone is at the western end of Line No. 24+200N. However, it would be necessary to extend the measurements to the west, to complete the anomalous pattern, before a drill hole can be spotted. Alternately, it would be possible to drill a hole to test the weaker anomaly on Line No. 24. A hole spotted to pass beneath 23+50W at a depth of 125 feet to 150 feet should give some indication of the type of metallic mineralization causing the anomalous IP effects.

Zone C4 - The anomalies on this zone are much weaker than those to the south. Drilling is probably not warranted immediately, unless there is some other data (geological, geochemical, etc.) that suggests the area is

important. If the zone is to be tested by drilling, two locations are possible:

beneath Line No. 28+200N, 29+00W at depth of 125 feet to 150 feet
beneath Line No. 36, 23+00W at depth of 100 feet to 125 feet

Zone D - The shallow, narrow source at Line No. 30, 4E clearly locates this definite anomaly. The source could be better located using 50 foot electrode intervals, or an angle hole could be spotted to pass beneath 4+00E at a depth of 100 feet.

Zone E - The 200 foot spread measurements show a shallow, narrow source at 12W to 10W on Line No. 38. The anomaly should be detailed using 100 foot spreads, and closely spaced lines, so that a drill hole location can be chosen.

The need for further work will depend upon the results of the program outlined above.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

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PTY. LTD.
INCORPORATED IN VICTORIA

TELEPHONE
23-2915

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

February 10th, 1967.

The Mount Lyell Mining & Railway Co. Ltd.,
QUEENSTOWN.....TAS.

For the Attention of the Chief Geologist.

Dear Sir,

Please find enclosed the following Data Plots:-

MOUNT TYNDALL.	Line 2	Spread 300'	15W - 96E
	4	300'	12W - 84E

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

per *Lori Turner*

Mount Lyell Mining 2
c.c. Dr. Hallof 1
Mr. Matheson 1
File 1

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REF. No. 10,076/84				

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LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

February 15th, 1967.

MEMORANDUM TO :

MT. LYELL MINING & RAILWAY CO. LTD.
ATTENTION MR. R.G. ELMS.
CHIEF GEOLOGIST.

MEMORANDUM FROM :

E. BURNSIDE. MCPHAR GEOPHYSICS
PTY. LTD.

SUBJECT :

RESULTS OF INDUCED POLARISATION
SURVEY, MT. TYNDALL AREA, TASMANIA.

The following data plots have arrived in
Adelaide:

<u>AREA.</u>	<u>LINE.</u>	<u>FROM.</u>	<u>TO.</u>	<u>SPREAD.</u>
Mt. Tyndall	2	12W	84E	300'
	4	15W	96E	300'

Anomalies of definite interest have been located near the eastern and western end of the lines. The most impressive of the anomalies occurs on Line 4 at 54E and detailed measurements will be required to further define this zone. The positioning of the anomalies is difficult without a map showing correct footages, but it would appear that both zones lie within the Mt. Read volcanics. A number of possible weak anomalies are shown on the data plots. These anomalies could represent narrow zones of economic sulphides and the effects could increase appreciably with the use of shorter spread measurements. Certainly some of the weak zones should be checked.

DISCUSSION OF RESULTS.

The apparent resistivity background in the area of the two lines is high. The power line and telephone line do not appear to be influencing the measurements.

014

MEMORANDUM.

Page 2.

February 15th, 1967.

Line 2.

OK

Two anomalous zones are indicated at the western end of this line. The largest effects have been measured on n=1 at 12E, suggesting that the source is shallow using 300' spreads. An increase in IP effects at 3E to 6E suggests a second shallow, but weaker source. Both anomalies should be rechecked using shorter separations.

Leave this?

Weak anomalies occur at 27E - 30E and 39E - 42E. These anomalies can be significant in this environment and would be worth checking with shorter spreads.

A broad zone of anomalous IP effects extends from 54E to 75E and the largest effects have been measured on n=3, 4 at 63E - 66E. The source could be narrow and appears to be at some depth using the spreads.

A second source on the eastern edge of the anomaly is located at 75E. Shorter separations can be used at 57E - 60E to further resolve the anomalous effects on n = 1. Parallel lines on either side will be required to check the other zones, but possibly wider separation measurements could provide more information on the deep source at 63E - 66E.

Line 4.

The pattern has changed on the western anomaly on this line and a narrow source is indicated at 6E. Parallel lines either side will be necessary to further evaluate this zone since it is doubtful whether repeats using shorter or wider spreads would provide more information.

A weak, shallow source may exist at 30E - 33E.

MEMORANDUM.

Page 3.

February 15th, 1967.

A strong narrow source is indicated at 54E and the overall width of the anomalous zone has decreased on this line. The source is shallow using 300' separations and will require checking with shorter separation measurements. A possible second shallow source may be located at 48E - 51E.

RECOMMENDED DETAIL.Line 2.

1. Double setup 200' spreads centred at 12E. Extend west to 00 to cover weak anomaly centred at 4+50E.
2. Double setup 100' spreads centred at 41E.
3. Double setup, 200' spreads centred at 60E. Pick up deep centre readings on all detail.

Line 4.

1. Double setup 200' spreads centred at 54E. Add extra electrodes if edges of anomaly not well defined. Pick up deep centre readings on all detail.

The IP crew appear to be making good progress but they feel that extra footage could be achieved with one more helper in the more difficult areas.

If more detailed plan of the grid is available please forward two copies and we will forward one copy to Dr. Hallof in Toronto.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

E. Burnside
E. BURNSIDE.

Mr. R.G. Elms 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
File 1

0-16
McPHAR GEOPHYSICS

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INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

February 24th, 1967.

Mr. R.G. Elms,
Chief Geologist,
Mt. Lyell Mining & Railway Co. Ltd.,
QUEENSTOWN.....TAS.

RE MT. TYNDALL IP SURVEY.

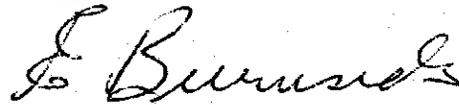
Dear Sir,

We have returned the prints of the following data plots and have indicated the positions of the anomalies. (A brief discussion of the results will follow by separate mail.)

<u>LINE.</u>	<u>FROM.</u>	<u>TO.</u>	<u>FREQUENCY.</u>	<u>DATE.</u>
12	30W	42E	.3 x 2.5 cps	18/2/67
10	36W	51E	.3 x 2.5	13/2/67
8	24W	60E	.3 x 2.5	11/2/67
6	21W	66E	.3 x 2.5	4/2/67

I understand that some delay in receiving equipment was caused by the recent fire in Hobart. Apparently the progress is satisfactory now.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.


E. BURNSIDE.

Mr. R.G. Elms 1
c.c. Mr. Matheson 1
Dr. Hallof 1
File 1

292018

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LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

March 13th, 1967.

MEMORANDUM TO :

MOUNT LYELL MINING AND RAILWAY
COMPANY LIMITED.
ATTENTION MR. R.G. ELMS.
CHIEF GEOLOGIST.

MEMORANDUM FROM :

E. BURNSIDE. MCPHAR GEOPHYSICS
PROPRIETARY LIMITED.

SUBJECT :

RESULTS OF INDUCED POLARISATION
SURVEY, MT. TYNDALL AREA,,
TASMANIA.

The following data plots have arrived in
Adelaide since my last memorandum dated February 18, 1967.

<u>AREA.</u>	<u>LINE.</u>	<u>FROM.</u>	<u>TO.</u>	<u>SPREAD.</u>
Mt. Tyndall	6	21W	66E	300'
	8	24W	60E	300'
	10	36W	51E	300'
	12	30W	42E	300'
	14	42W	39E	300'
	16	42W	33E	300'
	18	48W	30E	300'
	20	63W	18E	300'
	22	48W	15E	300'
	26	75W	30E	300'

MEMORANDUM.

Page 2.

March 13th, 1967.

The following detail is recommended on these lines.

- Line 6. *OK* Double setups, 200' separations centred at 00; at 46E; and at 32E.
- Line 8. *NO* Double setups, 200' separations centred at 33E; 51E and 11E.
- Line 10. *OK* Double setups, 200' separations centred at 38E and 15E. Line should be extended to the east to check build up in IP effects in this direction.
- Line 12. *OK* Double setup, 200' separations centred at 24E. Extra electrodes if western edge is not defined. Extension to the east should be considered on this line.
- Line 14. *NO* No detail at this time, the weak deep source at 15E may warrant checking with parallel lines 300' - 500' each side to see if the IP effects increase in magnitude.
- Line 16. *OK* Double setup 200' separations centred at 7E. *NO* The weak anomalous IP effects at 15W would require checking with parallel lines following a geologic examination of the area.
- Line 18. *OK* Double setups, 200' separations centred at 00. Add two electrodes to check anomalous values at 6E-9E; or possibly use long double centred at 2E.
- Line 20. *NO* Parallel lines either side of the anomaly at 12W will be required. Double setups using 300' spreads and centred at 12W. The anomalous value at 15W-18W can be checked with a double setup 200' spreads centred at 14W.
- Line 22. *OK* The pattern is very complex on this line and both shorter and wider separations are required.
- Make sure this is done.*
- (a) Long double setups, 200' separation centred at 20W to check the shallow source or sources and,
 - (b) Double setup 400' spreads centred 20W to check the apparently strong deep source below 18W-21W.

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MEMORANDUM.

Page 3.

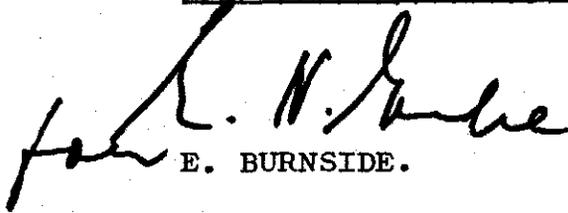
March 13th, 1967.

Line 26.

There are a number of possible weak anomalies on this line that may be significant when correlated with the geologic information.

The anomalous zone in the Mt. Tyndall area are apparently not continuous for any great distance. Intermediate lines are going to be required to determine the limits of the mineralisation in each anomalous area. These lines are best surveyed following the detail work with shorter or longer spreads in order that the appropriate electrode separation can be employed.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.


E. BURNSIDE.

Mr. R.G. Elms 1
c.c. Mr. R.S. Matheson 1
Dr. P.G. Hallof 1
Mr. J. Christie 1
File 1

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INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

March 20th, 1967.

MEMORANDUM TO :MOUNT LYELL MINING & RAILWAY
CO. LTD. ATTENTION MR. R.G. ELMS.
CHIEF GEOLOGIST.MEMORANDUM FROM :E. BURNSIDE. MCPHAR GEOPHYSICS
PTY. LTD.SUBJECT :RESULTS OF INDUCED POLARISATION
SURVEY - MT. TYNDALL AREA,
TASMANIA.

The following data plots have been received
in Adelaide.

<u>AREA.</u>	<u>LINE.</u>	<u>SPREAD.</u>	<u>FROM.</u>	<u>TO.</u>
Mt. Tyndall	28	300'	78W	30E
	30	300'	60W	36E
	32	300'	57W	36E

DISCUSSIONS OF RESULTS.

Line 28. A definite anomaly has been located at 30W-27W and should be repeated using shorter spreads. Possible anomalous sources are indicated at 39W and at 45W-48W.

Line 30. Two well defined anomalies have been located at 0-3E and 30W, respectively. Both anomalies indicate a shallow source using 300' separations, and will need to be detailed using shorter separations. A possible source at depth is located at 15W and a slight increase in IP effects is occurring at the extreme eastern end of the line.

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MEMORANDUM.

Page 2.

March 20th, 1967.

Line 32. W Weak anomalies are indicated at 6E-9E and at 21E-24E. The line will have to be extended to the west to check a possible anomaly at the extreme western end of the line.

The locations of the power line and Bradshaw's Road are not as shown on our plan in some areas and a more accurate plan will be required if the anomalies are to be correlated from line to line.

In many cases, the anomalous zones are limited in strike length since they do not occur on the adjoining lines. However, the lines spacing of $\frac{1}{2}$ mile would permit a sulphide occurrence 3000 feet in length to be located on only one line. One must also recognise that orebodies in the order of 500' in strike length can be missed using this line spacing.

The next step should be to select the anomalies located in the most geologically favourable environments and assign these zones first priority in the detailed IP followup. The followup should be carried out as follows:

1. Carry out detailed IP measurements over the established anomalies using the wider or narrower separations that have been recommended in the memoranda.

2. Parallel lines at suitable line spacing will be required to trace and delimit the anomalous zones. The electrode separation used on the parallel lines will be the separation which has provided the most definite information on the established anomaly after the detailed measurements have been completed. A summary of required detail follows:

<u>LINE.</u>	<u>SPREAD.</u>	<u>T. POSITION.</u>	<u>REMARKS.</u>
2	200'	12E	Add single to west.
	100'	41E	
	200'	60E	<u>Pick up all centre deep reading on all detail work.</u>

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022

292023

MEMORANDUM.

Page 3.

March 20th, 1967.

<u>LINE.</u>	<u>SPREAD.</u>	<u>T.POSITION.</u>	<u>REMARKS.</u>
4+500'	300'	6E	Parallel lines to check small definite anomaly.
4-500'	300'	6E	
4	200'	54E	Possibly two sources here and extra electrodes may be required to the west.
6	200'	0	Possibly require extra electrodes to the east to define edge of anomaly.
7	200'	46E	
8	200'	6W	Extend Line one double setup to east using 300' separations
10	200'	38E	Extend line to east with single setup.
12	200'	24E	Extend if necessary to define edges of anomaly.
16	200'	6E	Extend if necessary to define edges.
18	200'	0	Extend if necessary.
20	200'	15W	
22	200'	21W	Add single to east To check deep source which is apparently strong and not visible on Line 24. Some possible correlation to weak deep source on Line 20, 12W.
	400'	18W	
28	200'	30W	
30	200'	30W	
	200'	2E	
32	200'	8E	
		23W	

/Page 4.

McPHAR GEOPHYSICS

MOUNT ADDRESS
"PHARGEOP"
REELAND

MEMORANDUM.

Page 4.

March 20th, 1967.

There are a number of anomalies of low magnitude which are, however, definitely anomalous against the background IP effects in the area. Any of these anomalies can represent a narrow, massive sulphide source using 300' separations, since these separations could be obviously many times the width of the source. The increase in magnitude of the IP effects as the zones are repeated using narrower spreads can be quite dramatic as shown by the enclosed sample data plots. The 100' and 50' spread data reflects a narrow copper sulphide source varying from 10' to 15' in width; the 400', 200' and 100' data reflects a sulphide source approximately 50' wide. Drilling costs could have been reduced on the latter anomaly by the addition of even shorter 50' spreads since the source was still shallow using 100' spreads. All of the low magnitude anomalies marked on the data plots should be examined at the surface and correlated closely with the known geology. If they are of interest, detailed IP measurements plus parallel lines should be employed to provide a reliable drilling target.

A copy of this memorandum has been forwarded to Mr. J. Christie, the crew leader who will be able to provide a close estimate of the number of operating days required to complete the work outlined above.

With reference to the discussions between Mr. Murphy and our Mr. Eadie by telephone on March 14th, we wish to advise that we would be most willing to discuss the matter should the survey require less than 50 operating days on which the contract rate was based.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.



E. BURNSIDE.

General Manager.

Mt. Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
Mr. J. Christie 1
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INCORPORATED IN VICTORIA

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23-2915

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

March 20th, 1967.

MEMORANDUM TO :

MOUNT LYELL MINING & RAILWAY
CO. LTD. ATTENTION MR. R.G. ELMS,
CHIEF GEOLOGIST.

MEMORANDUM FROM :

E. BURNSIDE. MCPHAR GEOPHYSICS
PTY. LTD.

SUBJECT :

RESULTS OF INDUCED POLARISATION
SURVEY - MT. TYNDALL AREA,
TASMANIA.

The following data plots have been received
in Adelaide.

<u>AREA.</u>	<u>LINE.</u>	<u>SPREAD.</u>	<u>FROM.</u>	<u>TO.</u>
Mt. Tyndall	28	300'	78W	30E
	30	300'	60W	36E
	32	300'	57W	36E

DISCUSSIONS OF RESULTS.

Line 28. A definite anomaly has been located at 30W-27W and should be repeated using shorter spreads. Possible anomalous sources are indicated at 39W and at 45W-48W.

Line 30. Two well defined anomalies have been located at 0-3E and 30W, respectively. Both anomalies indicate a shallow source using 300' separations, and will need to be detailed using shorter separations. A possible source at depth is located at 15W and a slight increase in IP effects is occurring at the extreme eastern end of the line.

MEMORANDUM.

Page 2.

March 20th, 1967.

Line 32. Weak anomalies are indicated at 6E-9E and at 21E-24E. The line will have to be extended to the west to check a possible anomaly at the extreme western end of the line.

The locations of the power line and Bradshaw's Road are not as shown on our plan in some areas and a more accurate plan will be required if the anomalies are to be correlated from line to line.

In many cases, the anomalous zones are limited in strike length since they do not occur on the adjoining lines. However, the lines spacing of $\frac{1}{2}$ mile would permit a sulphide occurrence 3000 feet in length to be located on only one line. One must also recognise that orebodies in the order of 500' in strike length can be missed using this line spacing.

The next step should be to select the anomalies located in the most geologically favourable environments and assign these zones first priority in the detailed IP followup. The followup should be carried out as follows:

1. Carry out detailed IP measurements over the established anomalies using the wider or narrower separations that have been recommended in the memoranda.

2. Parallel lines at suitable line spacing will be required to trace and delimit the anomalous zones. The electrode separation used on the parallel lines will be the separation which has provided the most definite information on the established anomaly after the detailed measurements have been completed. A summary of required detail follows:

<u>LINE.</u>	<u>SPREAD.</u>	<u>T. POSITION.</u>	<u>REMARKS.</u>
2	200'	12E	Add single to west.
	100'	41E	
	200'	60E	<u>Pick up all centre deep reading on all detail work.</u>

/Page 3.

026

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MEMORANDUM.

Page 3.

March 20th, 1967.

<u>LINE.</u>	<u>SPREAD.</u>	<u>T. POSITION.</u>	<u>REMARKS.</u>
4+500'	300'	6E	Parallel lines to check small definite anomaly.
4-500'	300'	6E	
4	200'	54E	Possibly two sources here and extra electrodes may be required to the west.
6	200'	0	Possibly require extra electrodes to the east to define edge of anomaly.
	200'	46E	
8	200'	6W	Extend Line one double setup to east using 300' separation
10	200'	38E	Extend line to east with single setup.
12	200'	24E	Extend if necessary to define edges of anomaly.
16	200'	6E	Extend if necessary to define edges.
18	200'	0	Extend if necessary.
20	200'	15W	
22	200'	21W	Add single to east To check deep source which is apparently strong and not visible on Line 24. Some possible correlation to weak deep source on Line 20, 12W.
	400'	18W	
28	200'	30W	
30	200'	30W	
	200'	2E	
32	200'	8E	

/Page 4.

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ADDRESS

McPHAR GEOPHYSICS

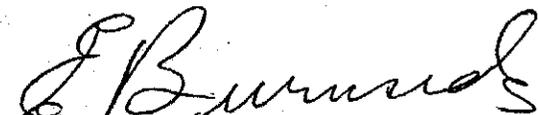
MEMORANDUM. Page 4. March 20th, 1967.

There are a number of anomalies of low magnitude which are, however, definitely anomalous against the background IP effects in the area. Any of these anomalies can represent a narrow, massive sulphide source using 300' separations, since these separations could be obviously many times the width of the source. The increase in magnitude of the IP effects as the zones are repeated using narrower spreads can be quite dramatic as shown by the enclosed sample data plots. The 100' and 50' spread data reflects a narrow copper sulphide source varying from 10' to 15' in width; the 400', 200' and 100' data reflects a sulphide source approximately 50' wide. Drilling costs could have been reduced on the latter anomaly by the addition of even shorter 50' spreads since the source was still shallow using 100' spreads. All of the low magnitude anomalies marked on the data plots should be examined at the surface and correlated closely with the known geology. If they are of interest, detailed IP measurements plus parallel lines should be employed to provide a reliable drilling target.

A copy of this memorandum has been forwarded to Mr. J. Christie, the crew leader who will be able to provide a close estimate of the number of operating days required to complete the work outlined above.

With reference to the discussions between Mr. Murphy and our Mr. Eadie by telephone on March 14th, we wish to advise that we would be most willing to discuss the matter should the survey require less than 50 operating days on which the contract rate was based.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.



E. BURNSIDE.

General Manager.

Mt. Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
Mr. J. Christie 1
File 1

028

292029

McPHAR GEOPHYSICS

CABLE ADDRESS
"PHARGEO"
ADELAIDE

PTY. LTD.

TELEPHONE
23-2915

INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

March 30th, 1967.

Mount Lyell Mining & Railway Co. Ltd.,
QUEENSTOWN.....TAS.

Attention Mr. R.G. Elms, Chief Geologist.

Dear Sir,

RE: MOUNT TYNDALL.

Please find enclosed the following Data Plots:-

MT. TYNDALL.	Line 24	Spread 300'	75W - 12E
	34	300'	45W - 36E
	36	300'	81W - 36E

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

per *John James*

Mt. Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. P.G. Hall of 1
File 1

292030

McPHAR GEOPHYSICS

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ADELAIDE

PTY. LTD.

TELEPHONE
23-2915

INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

March 30th, 1967.

Mount Lyell Mining & Railway Co. Ltd.,
QUEENSTOWN,.....TAS.

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Dear Sir,

RE: MOUNT TYNDALL.

Please find enclosed the following Data Plots:-

MT. TYNDALL.	Line 24	Spread 300'	75W - 12E
	34	300'	45W - 36E
	36	300'	81W - 36E

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

per *Lori Turner*

Mt. Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. P.G. Hallof 1
File 1

030

292031

McPHAR GEOPHYSICS

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ADELAIDE

PTY. LTD.
INCORPORATED IN VICTORIA

TELEPHONE
23-2915

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

April 4th, 1967.

MEMORANDUM TO :

MOUNT LYELL MINING & RAILWAY COMPANY
LIMITED, QUEENSTOWN. TASMANIA.
ATTENTION MR. R.G. ELMS,
CHIEF GEOLOGIST.

MEMORANDUM FROM :

E. BURNSIDE. MCPHAR GEOPHYSICS
PROPRIETARY LIMITED.

SUBJECT :

RESULTS OF THE I.P. SURVEY,
MT. TYNDALL AREA, TASMANIA.

The following data plots were received in Adelaide since my last memorandum dated March 13, 1967.

<u>AREA.</u>	<u>LINE.</u>	<u>FROM.</u>	<u>TO.</u>	<u>SPREAD.</u>
Mount	24	75W	12E	300'
Tyndall.	34	45W	36E	300'
	36	81W	36E	300'

The following detail is recommended on the above lines.

- Line 36 - Double setups, 200' spreads centred at 24W, 0, 9
- Line 34 - Double setups, 200' spreads centred at 8E, 19W.
Double setups, 400' spreads centred at 24W to test deep source. Alternatively, parallel lines using 300' spreads before detail with wider separations.
- Line 24 - Double setups, 200' spreads centred at 22W, 15W.

MCPHAR GEOPHYSICS

AD
RGE
ADLAV

MEMORANDUM. Page 2. April 4th, 1967.

As on the previous anomalies, parallel lines are recommended, if the anomalies improve with detail, in order to trace out the zones and to provide sufficient information for drill locations.

Yours sincerely,
MCPHAR GEOPHYSICS PTY. LTD.

E. Burnside
E. BURNSIDE.

General Manager.

Mount Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
File 1

03.
292033CABLE ADDRESS
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PTY. LTD.

TELEPHONE
23-2915

INCORPORATED IN VICTORIA

LKT, 253 SOUTH TERRACE, ADELAIDE, S.A.

April 4th, 1967.

MEMORANDUM TO :MOUNT LYELL MINING & RAILWAY COMPANY
LIMITED, QUEENSTOWN. TASMANIA.
ATTENTION MR. R.G. ELMS,
CHIEF GEOLOGIST.MEMORANDUM FROM :E. BURNSIDE. MCPHAR GEOPHYSICS
PROPRIETARY LIMITED.SUBJECT :RESULTS OF THE I.P. SURVEY,
MT. TYNDALL AREA, TASMANIA.

The following data plots were received in Adelaide since my last memorandum dated March 13, 1967.

<u>AREA.</u>	<u>LINE.</u>	<u>FROM.</u>	<u>TO.</u>	<u>SPREAD.</u>
Mount	24	75W	12E	300'
Tyndall.	34	45W	36E	300'
	36	81W	36E	300'

above lines.

The following detail is recommended on the

Line 36 -

Double setups, 200' spreads centred at 24W, 0, 9E

Line 34 -Double setups, 200' spreads centred at 8E, 19W.
Double setups, 400' spreads centred at 24W to
test deep source. Alternatively, parallel lines
using 300' spreads before detail with wider
separations.Line 24 -

Double setups, 200' spreads centred at 22W, 15W.

/Page 2.

MCPHAR GEOPHYSICS

PTY. LTD.

100 SOUTH WEST STREET, TORONTO, CANADA

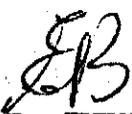
MEMORANDUM.

Page 2.

April 4th, 1967.

As on the previous anomalies, parallel lines are recommended, if the anomalies improve with detail, in order to trace out the zones and to provide sufficient information for drill locations.

Yours sincerely,
MCPHAR GEOPHYSICS PTY. LTD.


E. BURNSIDE.

General Manager.

Mount Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
File 1

McPHAR GEOPHYSICS

CABLE ADDRESS
"PHARGEO"
ADELAIDE

PTY. LTD.

TELEPHONE
23-2915

INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

April 7th, 1967.

MEMORANDUM TO :MOUNT LYELL MINING & RAILWAY
CO. LTD. ATTENTION MR. R.G. ELMS
CHIEF GEOLOGIST.MEMORANDUM FROM :E. BURNSIDE. MCPHAR
GEOPHYSICS PTY. LTD.SUBJECT :IP RESULTS - MOUNT TYNDALL
AREA, TASMANIA.

The following data plots arrived in Adelaide today:

<u>LINE.</u>	<u>SPREAD.</u>	<u>FROM.</u>	<u>TO.</u>	<u>REMARKS.</u>
4	200'	38E	68E	Detail
4	100'	65E	84E	"
6	200'	18E	60E	"
8	100'	41E	60E	"
10	200'	24E	50E	"
12	100'	27E	42E	"
16	100'	18E	33E	"
20	100'	3E	18E	"
38	300'	7W	36E	Reconnaissance

DISCUSSION OF RESULTS.Line 4.

shallow The 200' data over the anomalous area between 48E and 57E suggests two separate sources. The source is still close to surface on the western anomaly, and the mineralisation possibly extends close to surface on the eastern zone, although the main source of the anomaly appears to occur at depth.

035

A third source may exist at 46E-48E. The section should be repeated using 100' separations. Since the 100' spread extension shows anomalous IP effects increasing to the west, it would be best to extend this data over the major anomalies with setups centred at 66E, 60E, 54E and 48E. (100' spreads).

Line 6.

The 200' spread detail has confirmed the anomaly at 45E - 48E. The possible shallow source at 30E - 33E on the 300' spread data has not improved appreciably and could be caused by minor widespread mineralisation. The source of the anomaly at 46E is still shallow. A detail setup using 100' separations can be located at 46E.

Line 8.

We understand that the extensions of lines 4 to 20 using 100' separations are designed to locate the Cambrian - Ordovician contact.

The data suggests a change in rock type around 44E and a broad area of less porous rock is probably causing the high apparent resistivities to the east. Anomalous effects indicating sources at depth occur at 50E and at 55E - 56E.

Line 10.

The anomaly at 36E - 39E has been repeated using 200' separations. The anomaly is confirmed and the source is still shallow using 200' spreads, but may appear at depth when repeated using 100' separations. A possible separate source may be indicated at 42E. Detail should consist of a setup centred at 37E using 100' separations to be followed by close in, parallel lines.

Line 12.

The increase in apparent resistivity is not marked on this line as on Line 8, and the measurements would need to be extended more to the west. This would establish the background to the west and also cover the apparently shallow sources indicated on the 300' spread results.

MEMORANDUM.

Page 3.

April 7th, 1967.

We have enclosed a reprint of Line 12, 300' spreads. The two measurements with arrows have been found to be wrong on routine checks in Adelaide. Both errors are due to misplacement of the decimal point.

Line 16.

The 100' spread extension on this line has located a deep source at 23E, probably close to the contact. Wider separations (200' feet) will be required for further definition of this anomaly.

Line 20.

It is difficult to pinpoint the contact area with the limited data but 10E or 13E are possible contact locations. A weak IP anomaly occurs at 13E.

Line 38.

This is the northernmost line on the reconnaissance grid. Two definite IP anomalies have been located on the traverse at 36W - 39W and at 9W - 15W. Both sources are shallow using 300' separations and require detail using shorter separation.

We wish to acknowledge receipt of the telephone call from Mr. Murphy. We understand that the survey is being terminated at 45 operating days, rather than the 50 operating days on which the inclusive daily rate was calculated. We wish to advise that there will be no increase in the daily rate in this instance, but we feel that future contract of this type will require a compensating clause.

/Page 4.

McPHAR GEOPHYSICS

MEMORANDUM.

Page 4.

April 7th, 1967.

We would like to point out that a large number of definite, interesting, anomalies require detailed measurements before drilling. The few detail measurements carried out to date have indicated still shallow sources using shorter separations. Obviously more detail is going to reduce the drilling footage required at a fraction of the drilling costs. The remaining five operating days could be profitably employed in this direction.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

EB
 E. BURNSIDE.

Mount Lyell Mining 2
 c.c. Mr. R.S. Matheson 1
 Dr. Hallof 1
 File 1

McPHAR GEOPHYSICS

CABLE ADDRESS
"PHARGE0"
ADELAIDE

PTY. LTD.

TELEPHONE
23-2915

INCORPORATED IN VICTORIA

LKT. 253 SOUTH TERRACE, ADELAIDE, S.A.

April 7th, 1967.

MEMORANDUM TO :

MOUNT LYELL MINING & RAILWAY
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E. BURNSIDE. MCPHAR
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MEMORANDUM.

Page 3.

April 7th, 1967.

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It is difficult to pinpoint the contact area with the limited data but 10E or 13E are possible contact locations. A weak IP anomaly occurs at 13E.

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This is the northernmost line on the reconnaissance grid. Two definite IP anomalies have been located on the traverse at 36W - 39W and at 9W - 15W. Both sources are shallow using 300' separations and require detail using shorter separation.

We wish to acknowledge receipt of the telephone call from Mr. Murphy. We understand that the survey is being terminated at 45 operating days, rather than the 50 operating days on which the inclusive daily rate was calculated. We wish to advise that there will be no increase in the daily rate in this instance, but we feel that future contract of this type will require a compensating clause.

/Page 4.

292042

McPHAR GEOPHYSICS

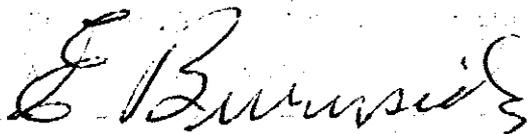
MEMORANDUM.

Page 4.

April 7th, 1967.

We would like to point out that a large number of definite, interesting, anomalies require detailed measurements before drilling. The few detail measurements carried out to date have indicated still shallow sources using shorter separations. Obviously more detail is going to reduce the drilling footage required at a fraction of the drilling costs. The remaining five operating days could be profitably employed in this direction.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.



E. BURNSIDE.

Mount Lyell Mining 2
c.c. Mr. R.S. Matheson 1
Dr. Hallof 1
File 1

292043

McPHAR GEOPHYSICS

PTY. LTD.

INCORPORATED IN VICTORIA

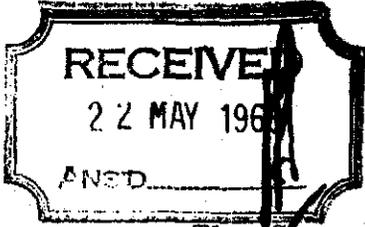
TELEPHONE

72 2133

CABLE ADDRESS
"PHARGEO"
ADELAIDE

LKE.

50 MARY STREET, UNLEY, S.A. 5081



May 21st, 1968.

The General Manager,
Mount Lyell Mining & Railway Company Ltd.,
QUEENSTOWN.....TAS. 7467.

Handwritten initials: VAC L.P.M.

Handwritten initials: RGE

Dear Sir,

We have enclosed 3 preliminary copies of
the report on the IP surveys in the Mt. Tyndall areas.
The bound report and plans will follow in a few days time.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.

Handwritten signature: E. Burnside

E. BURNSIDE.

Mt. Lyell Mining 1
c.c. Mr. R.S. Matheson 1
Toronto 1
File 1

McPHAR GEOPHYSICS

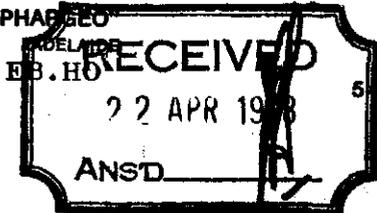
CABLE ADDRESS

"PHAR GEO"

PTY. LTD.

TELEPHONE

72 2133



INCORPORATED IN VICTORIA

5 MARY STREET, UNLEY, S.A. 5061

19th April, 1968

Mr. G.L. Hudspeth,
General Manager,
The Mount Lyell Mining and Railway Company Ltd.,
QUEENSTOWN...TAS. 7467

R.S.C.
*I want to talk with you about
agreed drilling as soon as your
own return on other*

Dear Mr. Hudspeth,

We refer to your letter of April 12th which we received on April 16th.

Dr. Hallof and I have reviewed the detailed IP results from the Mt. Tyndall grid and we have recommended the drill holes listed below. Some of the anomalies could be caused by relatively narrow sources, but others, as on Line 12 may be concentrations of metallics within a very broad mineralized zone. There are indications of zones of limited strike length. We have not received the results from Lines 20 and 22, but we will review the results from these lines when they arrive.

We have indicated the location of the drilling target and the recommended depth of intersection below this point. The location of the collar of the drill hole will depend on the topography and your interpretation of the geologic dip.

RECOMMENDED DRILL TARGETS

<u>Line</u>	<u>Centre of Source</u>	<u>Vertical Depth of Intersection</u>	
12	24E	175' - 200'	(1)
12 + 200N	24E	200' - 225'	
12 + 200S		No DDH without detail	
12 + 300S	24E	125' - 150'	
14 + 300S	13 + 50E	400' - 450'	(2)
16	7 + 50E	125' - 175'	
16 + 200N	7 + 50E	150' - 175'	
18 + 200N	1 + 50W	100' - 125'	
24	23 + 50W	125' - 150'	(3)
28 + 200N	29 + 00W	125' - 150'	

*Further data
to come*

...cont.

044

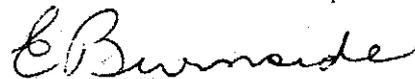
292045

2.

- (1) Could be broad mineralized zone. Western edge has not been defined.
- (2) Deep source, possibly dipping to the east. Check geology.
- (3) Anomaly is appreciably stronger on Line 24+ 200N but the data is incomplete.

The IP anomalies are definite and the results suggest strong concentrations of metallic material. The reconnaissance data from Mt. Tyndall west suggest even stronger sources. However, a complete interpretation of the geophysical data is not possible in the absence of available geological geochemical information. We feel that detailed discussions with one of your geological staff are necessary at this stage of the programme, either in Adelaide or in Tasmania.

Yours sincerely,
McPHAR GEOPHYSICS PTY. LTD.



E. BURNSIDE
General Manager.

G.L. Hudspeth
cc R. Matheson, N.C.G.F.
P. Hallof, Toronto.
File.