LYELL E.Z. EXPLORATIONS
Queenstown

REPORT ON INDUCED POLARISATION & RESISTIVITY SURVEY IN 1959 – 1960 AT MOORE'S VALLEY & QUEENSTOWN

March 1960

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335002 GP30

4th March, x 60

To: Mr. G.F. Hudspeth

Induced Polarization Survey

1. South Edge of Moore's Valley

The accompanying report presents the results of the induced polarization survey which has recently been completed at the south end of Moore's Valley. The survey was carried out in order to delimit the easterly continuation of I.P. anomalies A, B and C which were located during the previous field season. The data on which the report is based is contained in plans and sections S~~12~~26, Q22 and Q49 which are included at the end of Dr. P. Hallof's report.

On all lines surveyed an electrode separation of 400 feet was found adequate enough to penetrate the Cainozoic cover of gravel, sand and clay.

The results of this survey fall into two parts:

A. Induced Polarization Data (Plan S~~12~~26/13)

In the previous field season (March 1959) three anomalies were located between lines 10W and 15E. The anomalies appeared to close to the west but remained open to the east and this season's work consisted of completing traverses over this easterly section on lines 20E, 30E, 40E, 50E, 60E and 12N. The continuation of anomalies B and C was confirmed with their joining by line 30E to form a single zone which was traced to 50E. However, on line 60E it is no longer apparent as a definite anomaly. Consequently, the I.P. anomalies form a lenticular zone shaped somewhat like an elongated "Y", opening to the west. This zone, which is placed between lines 10W and 60E, is approximately 6000 feet in length with a maximum width of 3600 feet on the Baseline and narrowing to 450 feet on 50E. The zone trends approximately W.N.W. and parallels the southern boundary fault to the Moore's Valley structure which is 1000 feet to the south. The anomaly zone is placed at right angles to the anticipated trend of the bedding in the basement of Moore's Valley.

B. Apparent Resistivity (Plan S15/13a)

The measurements of the apparent resistivity of the block of ground between the transmitting and receiving electrodes is an essential part of the I.P. survey. An apparent resistivity low indicates the presence of a good conductor, as discussed by Dr. Hallof in his report, and these can be correlated as shear zones in the basement of the Valley. Consequently a broad structural plan can be built up by a combination of these geophysical results.

The I.P. anomalies appear to be associated with two parallel shear zones which sub-parallel the W.N.W. strike of the southern boundary fault of the Moore's Valley structure in their central length but swing to the north and south at their western and eastern extremities respectively. This swing in strike at the eastern end brings the shear zones towards the southern boundary fault. They appear to be displaced by a third and narrower zone trending approximately N.N.E. and which has been traced as far north as line 76N. The results of the lines further to the north (108N, 128N and 156N) will clarify the continuation of this zone. The displacement appears to be left handed (i.e. west side moving south) and this direction of movement could also account for the distribution of the I.P. anomalies at their western end. The pronounced bend in the trend of anomaly "C" between lines 5E and 10E could be correlated with this displacement, with anomaly "A" being a faulted and horizontally offset portion of anomaly "B".

These results have allowed an interpretation which is shown to be a repetition of the regional favourability of the Moore's Valley structure, the intersection of a north-south fault by a north-west cross-cutting structure.

2. Great Lyell Area

The area contains known sulphide mineralisation which is located near the intersection of the Great Lyell Fault with a north-west trending fault system (the South Owen Fault) at the contact of the Owen Conglomerate and the Lyell Schists. In places the solid rock is obscured by a thin cover of rubble but an electrode separation of 100 feet was sufficient to penetrate this cover.

Three lines (24, 28 and 32) were completed across the Turam anomaly 56/57 and 57/57 which were located by the Bureau of Mineral Resources in the geophysical survey of January, 1957. The same two resistivity lows on either side of the ridge of Owen Conglomerate were detected as in the B.M.R. survey with the low to the east containing a favourable I.P. anomaly. The resistivity low on the west side of the ridge contains an appreciably weaker I.P. anomaly which is associated with the known sulphide mineralisation of the Great Lyell shaft and adits further to the south. Dr. Hallof makes a specific recommendation for further work on lines 20, 22 and 26.in order to delimit the extent of the I.P. anomaly and to find the most favourable section for possible testing.

J. Scott

Chief Geologist, L.E.E.

4th March, x60

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY IN 1959-60 AT MOORE'S VALLEY AND QUEENSTOWN FOR LYELL-E.Z. EXPLORATIONS

1. Introduction

The results described in this report are a continuation of the program discussed in the report dated April 1959 and entitled "Report on Moore's Valley Induced Polarization". This earlier report has file number GP24. The first pages of that report contain a general discussion of the induced polarization method and the method of plotting the data. This information will not be repeated here.

The continuation of the induced polarization tests made last year in Tasmania was begun in December, 1959 and the crew continued the survey into the first three months of 1960. During this time, measurements were made in the vicinity of last year's anomaly in Moore's Valley and in the Great Lyell area near Queenstown.

2. Presentation of Results

The results of the induced polarization and resistivity measurements on the following lines are included in this report.

		Drg. No.
Great Lyell Area		
Line 32	100' Spreads	Q49/13
Line 32	200' Spreads	Q49/13a
Line 28	100' Spreads	Q49/13b
Line 24	100' Spreads	Q49/13c
Moore's Valley South		
Line 20E	400' Spreads	Q22/13k
Line 30E	400' Spreads	Q22/13l
Line 40E	400' Spreads	Q22/13m
Line 50E	400' Spreads	Q22/13n
Line 60E	400' Spreads	Q22/13o
Line 12N	400' Spreads	Q22/13j

Also included is a plan map of the southern portion of the Moore's Valley Grid. The induced polarization anomalies indicated by all of the measurements to date are shown. The definite and indefinite anomalies are indicated by solid and broken bars respectively.

These bars represent the vertical projection of the source of the anomaly as indicated by the location of the current and potential electrodes when the anomalous value was measured. Since the induced polarization measurement is essentially an averaging process, it is frequently difficult to pinpoint exactly the source of an anomaly. Therefore, while the center of the indicated anomaly probably coincides with the source, the length of the indication along the line should not be taken to represent the exact edges of the source of the anomaly.

3. Discussion of Results

A. Great Lyell Area

The test survey in the Great Lyell area was made on three lines of a large grid previously covered in a geophysical survey by the Bureau of Mineral Resources geophysics staff. The Turam electromagnetic survey was made in an attempt to locate the extension of known disseminated sulphide mineralization, and the induced polarization tests were made to determine how well the I.P. method would locate the mineralization.

The three lines surveyed with induced polarization and resistivity are short, because of the steep sides to the valley. It was possible to take enough data to give patterns on the contoured data plots, although it would certainly be of interest to extend the lines to the east.

Line 32 The resistivity results along this line show a region of low resistivities centered at 0 to 1E. This zone of low resistivities is near surface, and correlates well with the axis of the electromagnetic anomaly. The presence of the disseminated sulphide mineralization is indicated by the low magnitude, but definite, induced polarization anomaly extending from 1E to about 1W.

The low resistivity zone is surrounded by rocks with much higher resistivity values. On this line, there is only a slight indication that there is another zone of higher polarization values to the east. The zone of very high resistivities at 2E to 5E is undoubtedly due to the conglomerate spur mapped at this point. The line would have to be

extended to the east to get more data.

Line 28 On this line the eastern edge of the resistivity low was not evident. Since the conglomerate ends before reaching this line, there is no localized high as there was on Line 32. Instead, there is a zone of even lower resistivities associated with the station 5E to 6E. The resistivities decrease from the western edge, at about 2W, as the measurements were made to the east. The low zone at 5E to 6E is very pronounced, and appears to come from a shallow, narrow zone.

The induced polarization anomaly associated with the western edge of the resistivity low is similar to that on Line 32, but smaller in magnitude, probably indicating the presence of less sulphides. However, there is a pronounced increase in the polarization effect at 5E to 6E. The anomaly appears to be due to a narrow zone that contains more sulphides than the zones further west. There is only enough data to give half of the anomalous pattern, and more data to the east would be necessary to complete the picture.

Line 24 On this line, the resistivity picture is very simple. The contact between the high resistivity rocks and the low resistivity rocks is at about 1W. The values decrease to the east, with the zone of lowest values at 5E to 6E being very similar to that on Line 28. The zone of high resistivities just east of station 0 caused by the conglomerate spur, which was very evident on Line 32 and only slightly indicated on Line 28, is completely absent.

The two induced polarization anomalies have merged into one, with values of five to ten extending from station 1E to station 4½E and a very definite anomaly associated with the interval 5E to 6E.

When the induced polarization and resistivity results are correlated with what is known of the geology in the great Lyell Area, some interesting conclusions can be drawn. The low magnitude induced polarization anomaly, with values of five to ten, lies just east of the baseline and correlates with the known sulphide mineralization that extends from the Great Lyell shaft to the Duke Lyell adit. The edge of the lower resistivity zone occurs just west of the baseline and correlates with the Turam anomalies 57/57 and 56/57 located by the Bureau of Mineral Resources geophysical survey.

On the southern part of the grid, the conglomerate spur which lies within the Dundas Group just east of the baseline caused the very high resistivities found along that part of Line 32. These high resistivities are not present on the lines further north, and it is this zone of high resistivities that causes the anomaly shown on the B.M.R. plot of the Turam Phase Contours to split. The zone of negative phase angles that lies east of the conglomerate spur is not large, or well developed, but it can be seen on the contour plot.

It is this eastern edge which has the largest induced polarization anomaly associated with it. The narrow zone at about 5E to 6E is quite definite, particularly on Line 24. The values are much larger than were measured over the known sulphide mineralization which probably indicates the presence of more metallic minerals. Since the anomaly is increasing to the north, it is recommended that Line 26, Line 22 and Line 20 be surveyed. When that section of the zone which gives the largest anomaly is located, it should be tested by drilling.

B. Moore's Valley, South

Following a study of last year's induced polarization and resistivity results in the southern portion of Moore's Valley and the available geologic information, it was decided to test Zone A by drilling. Two drill holes were located and the first is now being drilled. Because of the presence of Zone B and Zone C, and their probable continuation to the east, it was decided to extend the survey to the east during the early part of this season's program. The results of this extension are discussed in this section of the report.

Line 20E The results along this line are very similar to those on Line 15E, which is the easternmost line surveyed previously. Both Zone B and Zone C are evident and have the same characteristics as further west. Zone B is broad and at some depth, while Zone C is narrow and shallow. There is a region of low resistivities associated with each of the anomalies, but as was the case further west, the resistivity low does not always occur in the center of the I.P. anomaly.

Line 30E On this line, the character of the anomalies has changed. The two resistivity lows are still distinct, but there is really only one I.P. anomaly. The pattern of the induced polarization

anomaly is not clear, which is probably explained by the fact that the two zones converge at this point.

The apparent resistivity values measured along this line are very low, particularly at the southern end. In these areas of very low resistivity the induced polarization measurement will be less exact. Therefore, the induced polarization values measured in this area are not as definite as values of similar magnitude found to the west.

Line 40E The results along this line are similar to those on Line 30E, except that the induced polarization anomaly is becoming less definite. There are still two zones of very low resistivity, but the line has been extended far enough to show that high resistivities are found to the north and south.

Line 50E The survey here was not continued far enough to locate the southern resistivity anomaly. The northern anomaly is quite shallow and has a high apparent metal factor associated with it. Because of the uncertainties due to the low resistivities, it is difficult to evaluate the importance of this anomaly. However, it is shallow, and more definite results can be obtained with shorter spreads. A resurvey of the line with 200' or 300' spreads would give more information about this shallow zone.

Line 60E Both edges of the region of generally low resistivities were located on this line. The pattern is very similar to that shown on Line 40E, except that the region is somewhat narrower, and only contains one zone of low resistivity values.

There are no induced polarization zones on this line that could be considered anomalous.

Line 12N The results from the previous survey on Line 12N, as well as the extension made this year, are shown on the drawing. The anomaly across Zone A is unchanged, and it can be seen that another anomaly was located further east where the line crosses Zone B. This anomaly fades to the east, as the line gets further from the zone.

The results of the induced polarization and resistivity survey in southern Moore's Valley have been compiled onto two plan maps, Drg. No. S~~12~~26/13 shows the relative positions of the induced polarization

anomalies, the grid and topography. The other plan map, Drg. S15/13, is a composite map which shows the known geology in relationship to some structural features that can be interpreted from the resistivity data.

The information inferred from the resistivity data is that of rock type change and zones of fracturing or shearing. For instance, the location of the Hazell Fault is determined by the increase in apparent resistivity values at the southern end of the Baseline, Line 10E and Line 60E. There is some suggestion of the change on Line 40E.

The other features shown on Drg. S15/13 are the axes of the resistivity lows. These low values are caused by zones of increased porosity, and because of their length and the shape of the contour pattern these zones appear to be fractures or shears. They can be traced from line to line and in a few places can be seen to be discontinuous. Also, the confused resistivity picture at about station 0 on Line 5E and Line 10E can be seen to be a region where several of the structures intersect.

The results of the recent induced polarization and resistivity measurements in southern Moore's Valley show the continuation of Zone B and Zone C to the east, and their eventual termination. However, the anomalies that make up these zones are not as large, or definite, as those on Zone A so it was chosen for drilling. If the results of the drilling in Zone A show its source to be economic sulphide mineralization, the other zones should also be considered for drilling.

McPHAR GEOPHYSICS LTD.

sgd. Philip G. Hallof
Geophysicist

800 W

00

800 E

True North

11200 S

12000 S

12800 S

Conglomerate Creek

South Owen Creek

Gt. Lyell Shaft

B.M.R. ANOMALY 56/57

B.M.R. ANOMALY 57/57

Duke Lyell

Baseline

Line 20

22

24

26

28

32

?

5 cm

SCALE

0 FT. 200 FT. 400 FT. 600 FT. 800 FT.

LEGEND

Adit

Shaft

Line surveyed with I.P. anomaly

Line proposed

B.M.R. Turam anomaly

335011

References

1) Original from B.M.R. plan G 26 - 46

2) Mt. Lyell grid

LYELL E.Z. EXPLORATIONS

QUEENSTOWN

60-310

GREAT LYELL AREA

TURAM AND INDUCED POLARIZATION

Survey	Mt. Lyell		200 ft. to 1 inch	R 11
Geology				Sheet No.
Geophysics	B.M.R. & McPhar	1957/1960		
Geochemistry				
Drawn	B.S.	March 1960		2351
Traced	D.S.	March 1960		

Cainozoic

Wanderer River

Jones Ck.

Innes Ck.

Gunton Ck.

Ray Ck.

Long Ck.

Broad Zone

shallow

shallow

mod.

shallower

probable position of fault

Hazell Fault

Approximate contact

red m.s.

Cz. cg. with Dundas pebble

FLAT HILL

Owen Conglomerate

Cg.

ss.

Cainozoic

Cainozoic

Cainozoic

76 N
60 N
40 N
20 N
00
20 W
10 W
12 N
10 E
20 E
30 E
40 E
50 E
60 E
16 S
20 S
40 S
52 S

16000 N
14000 N
12000 N
10000 N
8000 N
6000 N

10000 E
12000 E
14000 E
16000 E
18000 E
20000 E
22000 E
24000 E

LEGEND

- Cleavage III
- Bedding
- Bedding Trend
- Fault
- Apparent Resistivity Trend
- Induced Polarization Anomaly

5 cm

References
Not result of precise topo. survey

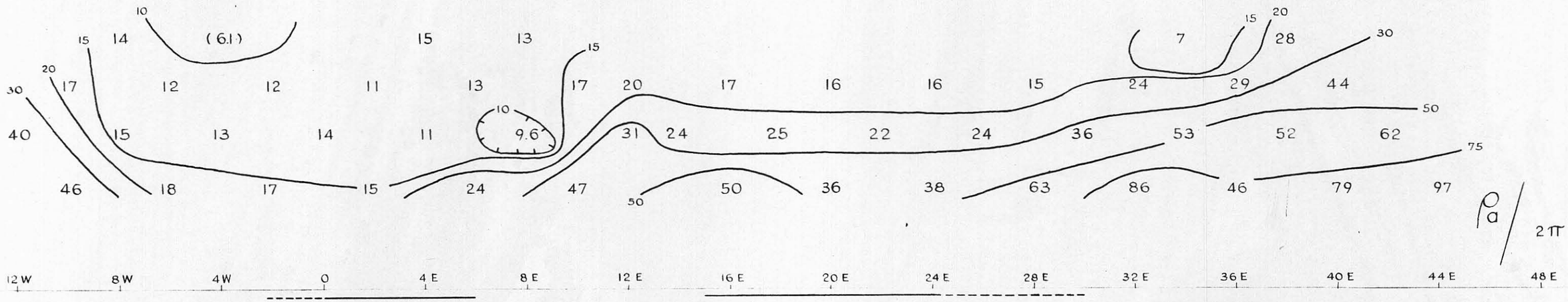
LYELL E.Z. EXPLORATIONS
QUEENSTOWN

MOORES VALLEY

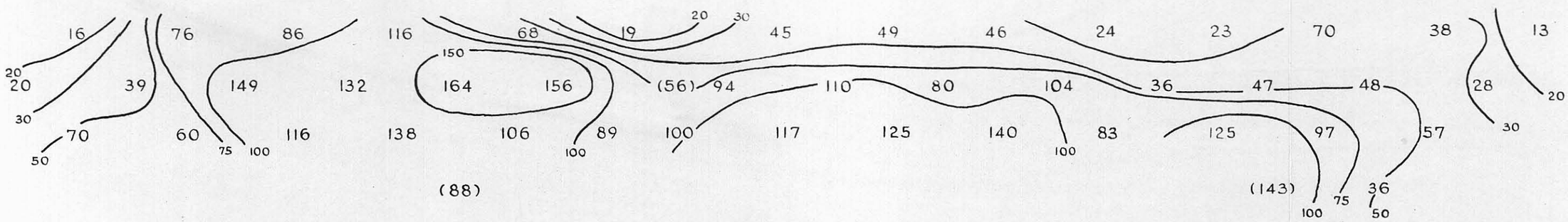
			Scale
Survey			
Geology	R.G.E., B.S.	1959/60	500 ft. to 1 inch
Geophysics	P.H., J.S., E.W.	1959/60	
Geochemistry			
Drawn	P.H., B.S.	Feb.'60	
Traced	D.S.	Feb.'60	

60-310
S 15 Sheet No. 13a
2350

335012



Apparent
Metal Factor



335013

5 cm

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

MOORES VALLEY

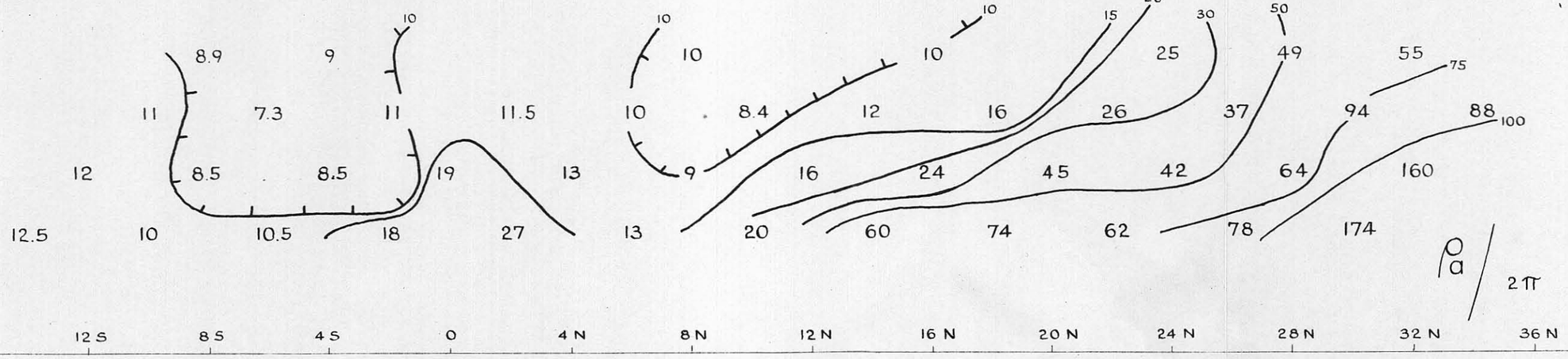
LINE 12 N — 400 FT. SPREADS — 60-310

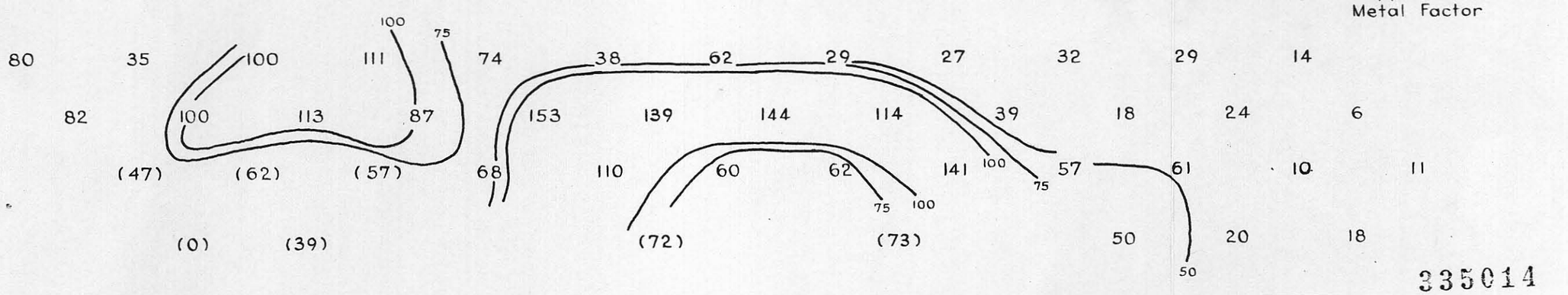
			Scale
Survey			
Geology			
Geophysics	E.W.	Dec.'59	400 ft. to 1 inch
Geochemistry			
Drawn	P. H.	Feb.'60	
Traced	D.S.	Feb.'60	

Q 22 — sheet no. 13j

2356

INDUCED POLARISATION





335014

5 cm

References

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

MOORES VALLEY

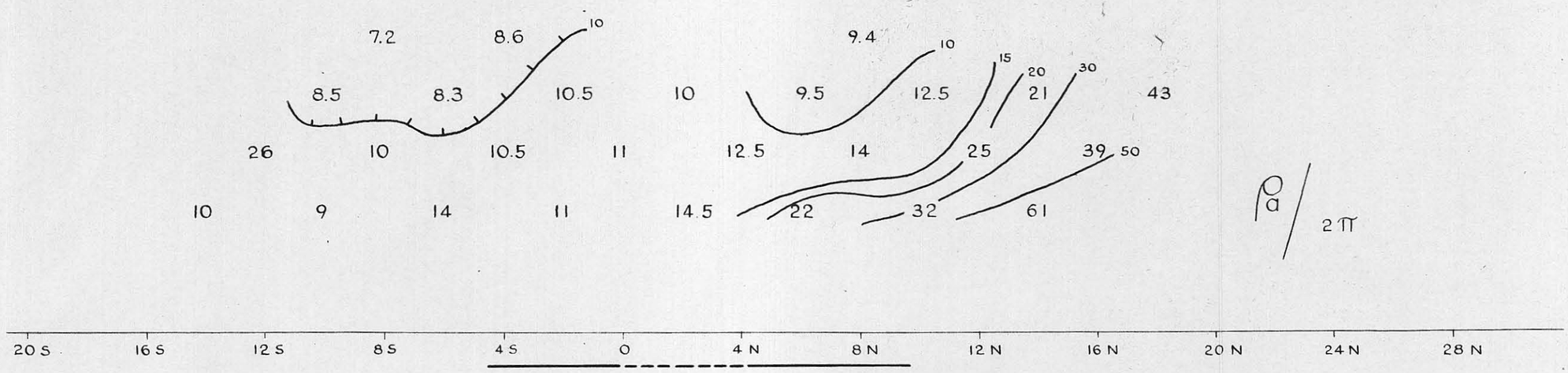
LINE 20 E — 400 FT. SPREADS — 60-310

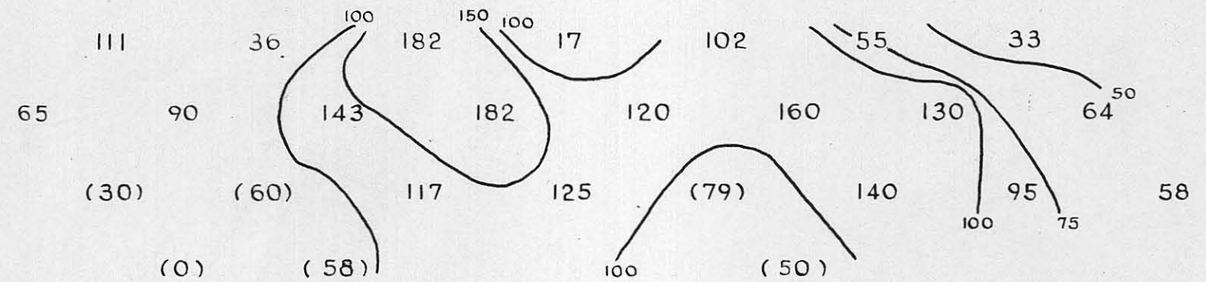
Survey			Scale
Geology			
Geophysics	E.W.	Dec.'59	400 ft. to 1 inch
Geochemistry			
Drawn	P.H.	Feb.'60	
Traced	D.S.	Feb.'60	

INDUCED POLARIZATION

Q 22 — Sheet No. 13k

2357





Apparent
Metal Factor

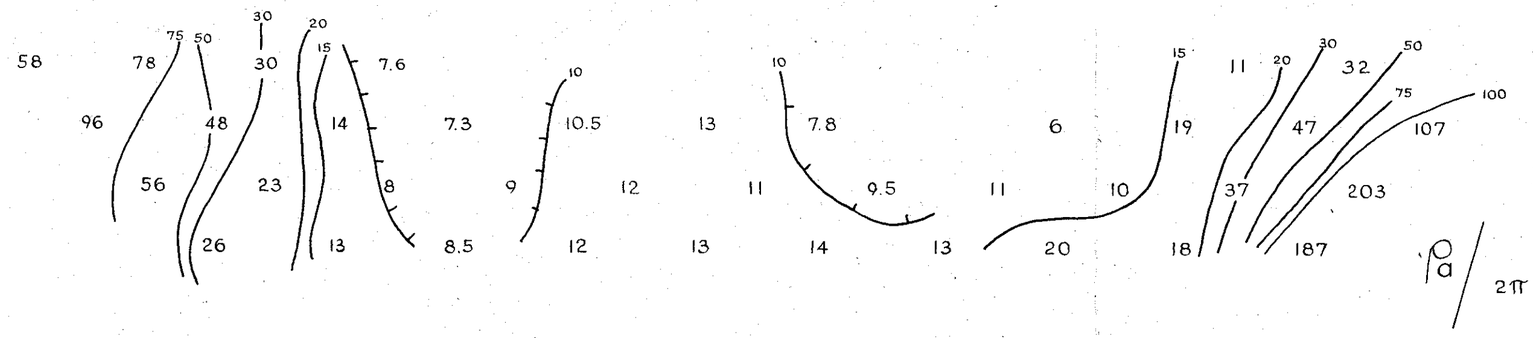
335015

5 cm

Prospectus	LYELL E.Z. EXPLORATIONS QUEENSTOWN			
	MOORES VALLEY			
	LINE 30E — 400 FT. SPREADS — 60-310			
	Survey			Scale: 400 ft. to 1 inch
	Geology			
	Geophysics	E.W.	Dec. '59	
	Geochemistry			
INDUCED POLARIZATION	Drawn	P.H.	Feb. '60	
	Traced	D.S.	Feb. '60	

Q 22 — Sheet No. 131

2358



40 S 36 S 32 S 28 S 24 S 20 S 16 S 12 S 8 S 4 S 0 4 N 8 N 12 N 16 N 20 N

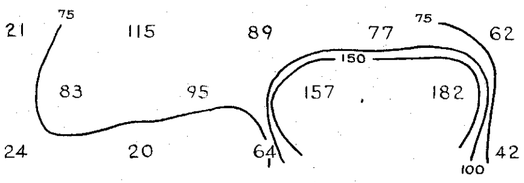
Apparent Metal Factor

58 42 117 21 115 89 77 62 55 7

13 44 64 59 83 95 157 182 -50 34 7

10 26 18 (-33) 24 20 64 42 60 21 9

13 13 8 0 25 46 77 31



335016

5 cm

References

INDUCED POLARIZATION

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

MOORES VALLEY

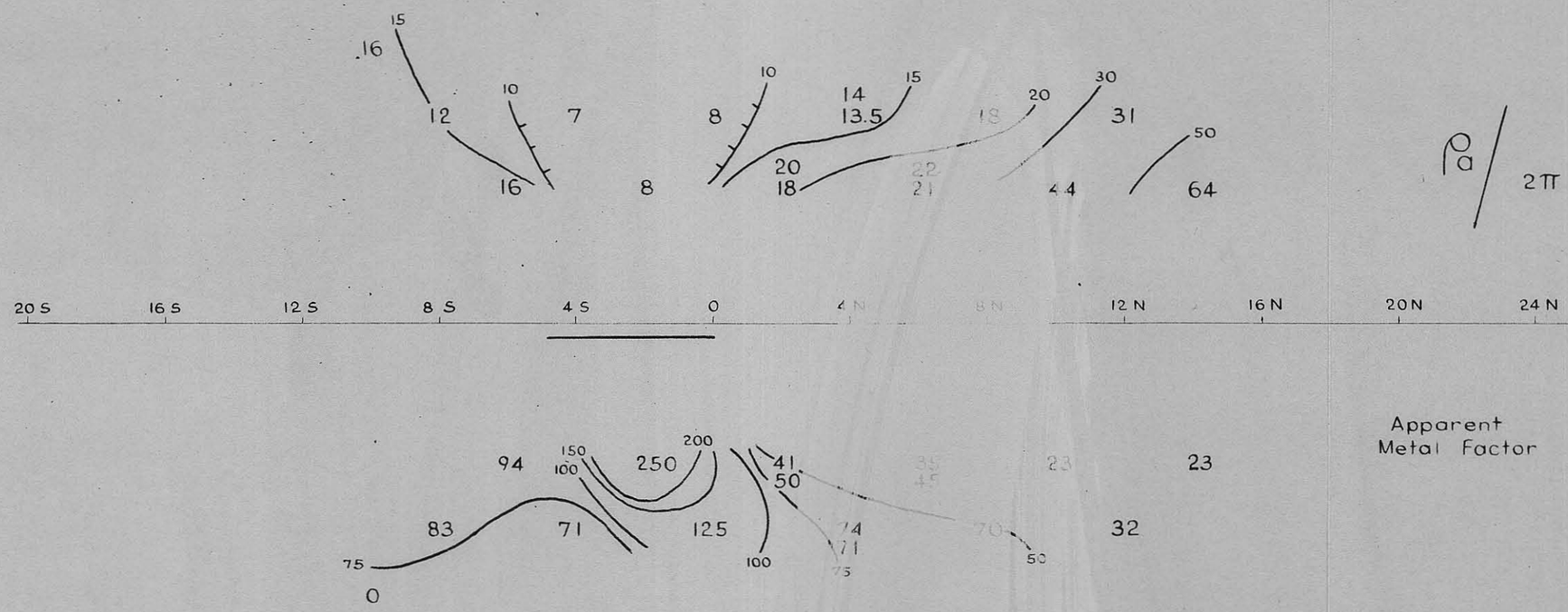
LINE 40 E — 400 FT. SPREADS

60-310

			Scale
Survey			
Geology			
Geophysics	E.W.	Dec.'59	400 ft. to 1 inch
Geochemistry			
Drawn	P.H.	Feb.'60	
Traced	D.S.	Feb.'60	

Sheet No. Q22 13m

2359



Apparent
Metal Factor

335017

5 cm

Rele ases

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

MOORES VALLEY

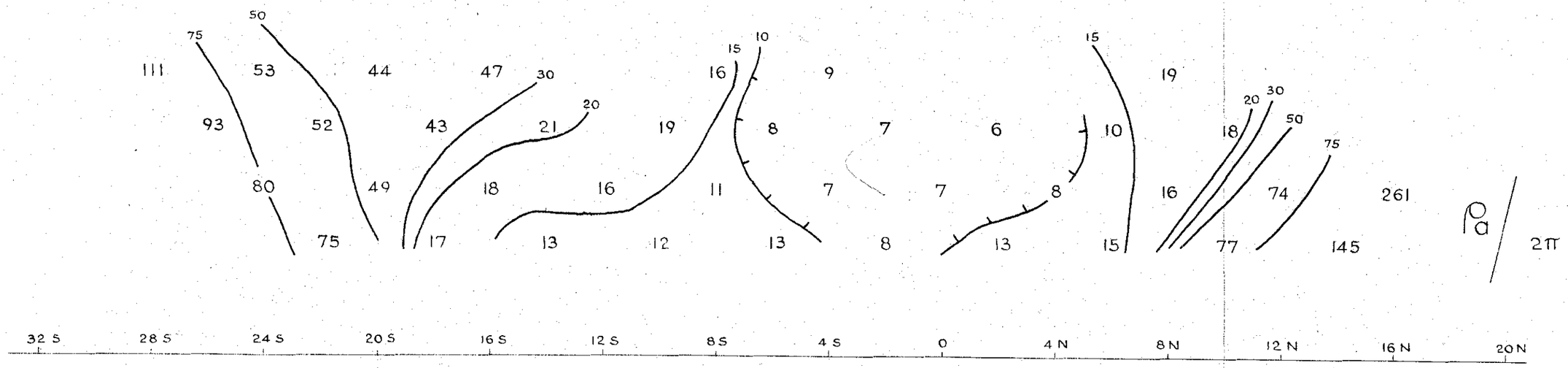
LINE 50 E — 400 FT. SPREADS — 60-310

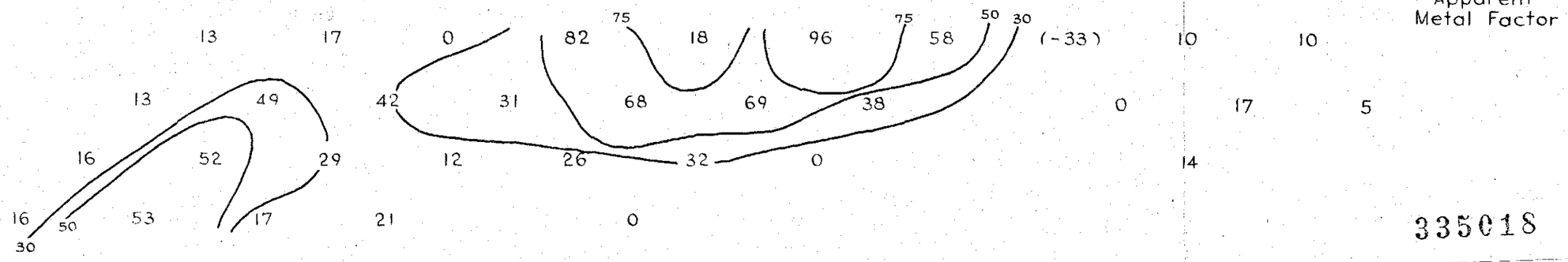
Survey			
Geology			
Geophysics	E.W.	Dec.'59	400 ft. to 1 inch
Geochemistry			
Drawn	P.H.	Feb.'60	
Traced	D.S	Feb.'60	

INDUCED POLARIZATION

Plan No. Q22 — Sheet No. 13n

2360





335018

5 cm

LYELL E.Z. EXPLORATIONS
QUIRINDI NSW

MOORES VALLEY

LINE 60E — 400 FT. SPREADS — 60-310

Surveyed			Scale
Computed			400 ft. to 1 inch
Plotted	E.W.	Dec.'59	
Checked	P.H.	Feb.'60	
Approved	D.S.	Feb.'60	

Reference

INDUCED POLARIZATION

Q 22 Sheet 130

2361

To 5600 ft.
145 N Extended
Colin Rvt
32W
180N
192N
R.
Conder
156N
182N
19E
AMG 380550mE, 5268100mN
Hales R.
128N
Hales R
36E
Conder R
93N Extended
108N
32W
To 8000 ft.
92N
100N
Cawthorne
76N Extended 22W
Cullen
80E
Jeep Road
Gunton Ck
76N
Hartwell
40E
92N
Ck
Ck
10W 5W
44N
5E 10E 15E
100E
AMG 378110mE, 5265500mN
'A'
LB
'B'
Wanderer
28N
24N
'C'
Innes Ck
Jones Ck
Ray Ck
Long Ck
FLAT
HILL
20S

LEGEND

Lines Covered — 1st Quarter 1959
Lines Covered — 1959 / 1960
Lines Proposed

5 cm

AMG REFERENCE POINTS ADDED

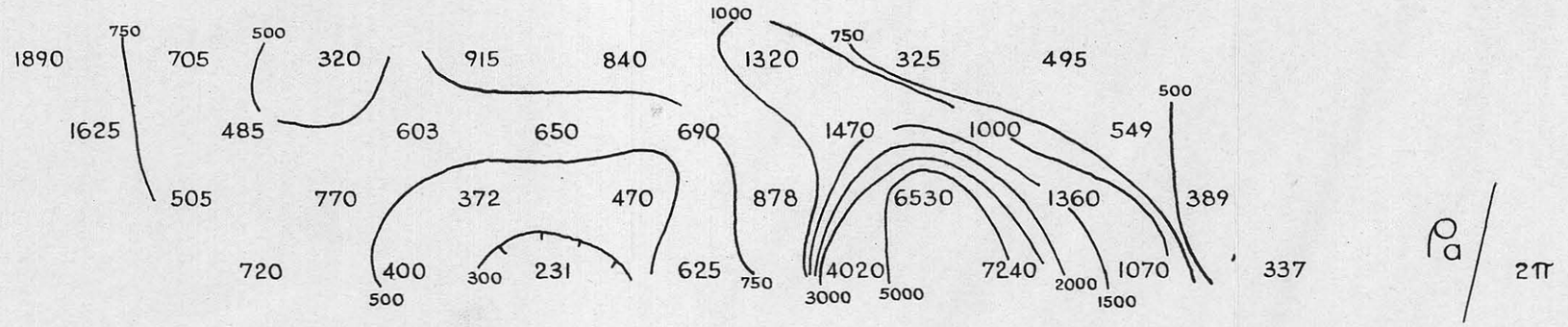
Photo N° 20/904/64
9 March 1960

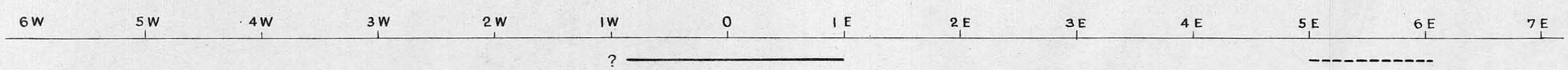
LYELL E/ EXPLORATIONS
QUEENSTOWN
60-310

MOORES VALLEY
INDUCED POLARISATION

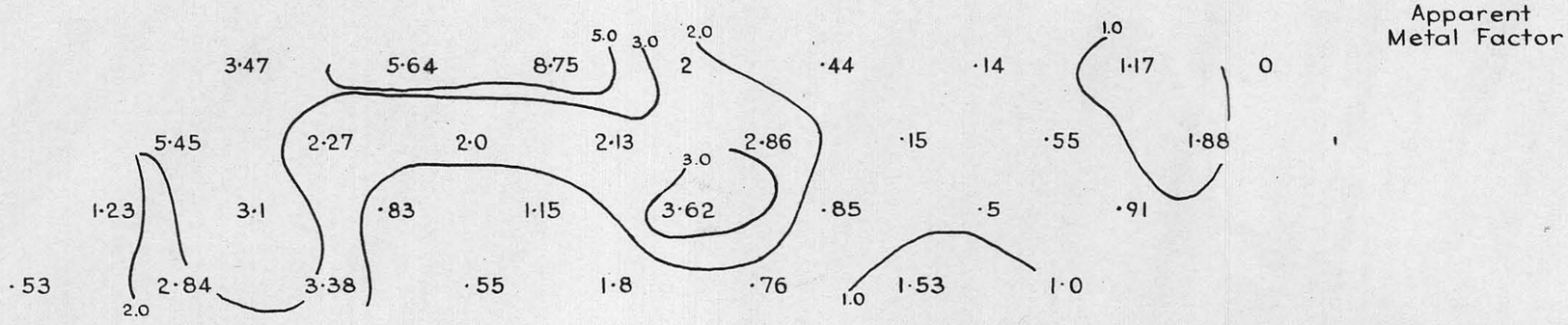
Scale: 975 ft. to 1 inch (approx)
Drawn: I. & G. July '59
Sheet No. 26 No. 13
2349

335019





Apparent Metal Factor



335020

5 cm

References

INDUCED POLARIZATION

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

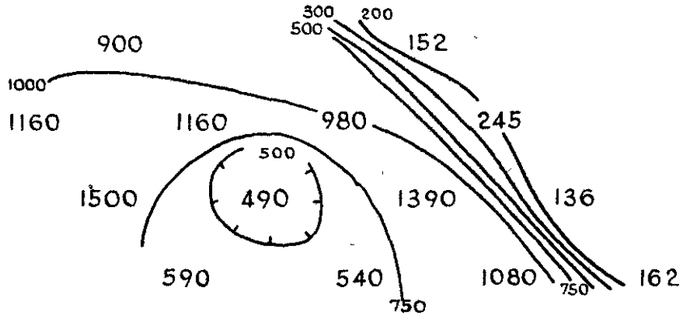
GREAT LYELL AREA

LINE 32 100 FT. SPREADS 60-310

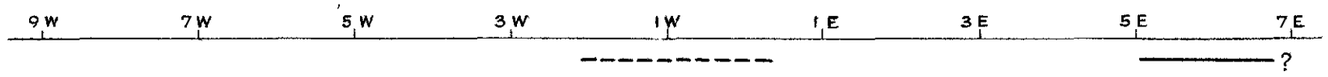
			Scale
Survey			
Geology			
Geophysics	E.W.	Jan.'60	100 ft. to 1 inch
Geochemistry			
Drawn	P.H.	Feb.'60	
Traced	D.S.	Feb.'60	

Q49 Sheet No. 13

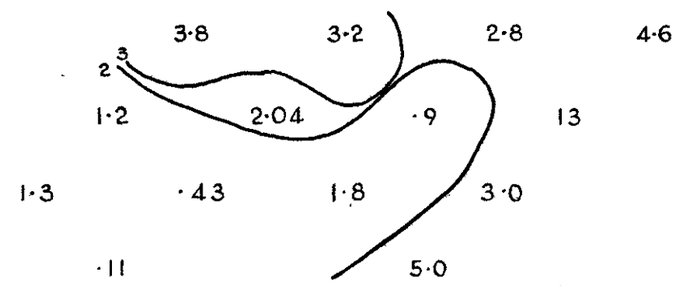
2352



$\rho_a / 2\pi$



Apparent Metal Factor



335021

5 cm

References

INDUCED POLARIZATION

LYELL E.Z. EXPLORATIONS
QUEENSTOWN

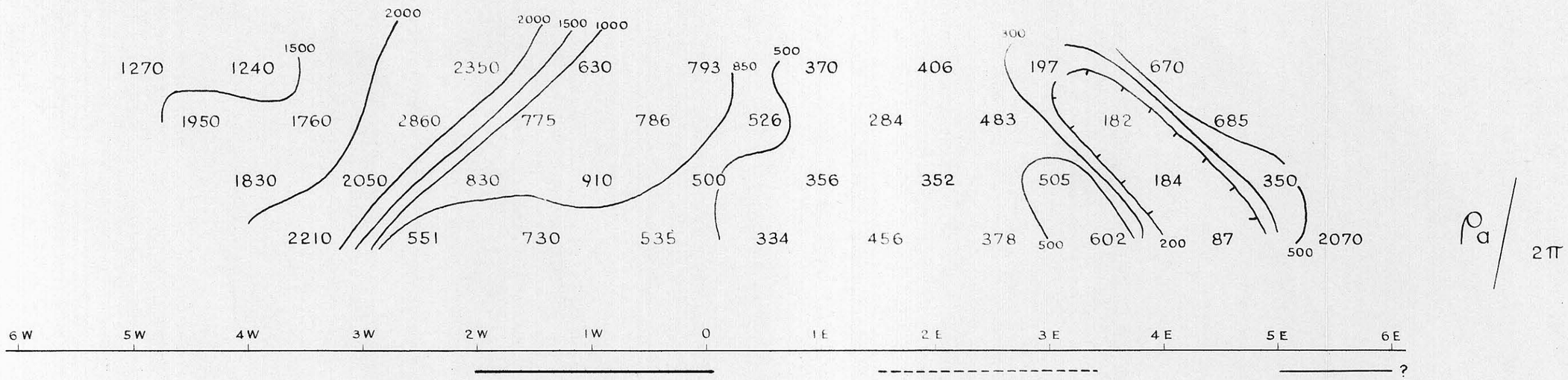
GREAT LYELL AREA

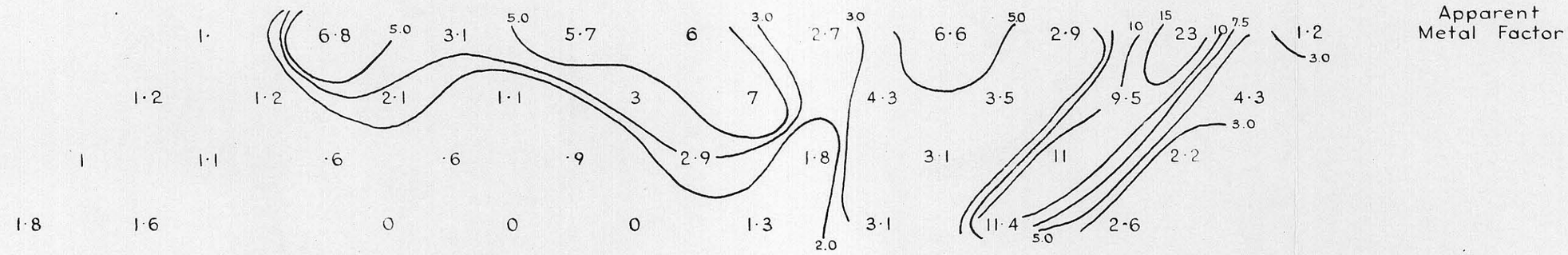
LINE 32 200 FT. SPREADS 60-316

			Scale
Survey			200 ft. to 1 inch
Geology			
Geophysics	E.W.	Jan.'60	
Geochemistry			
Drawn	P.H.	Feb.'60	
Traced	D.S.	Feb.'60	

Q49 Sheet No. 13a

2353





335022

5 cm

LYELL EZ EXPLORATIONS
QUEENSTOWN

GREAT LYELL AREA

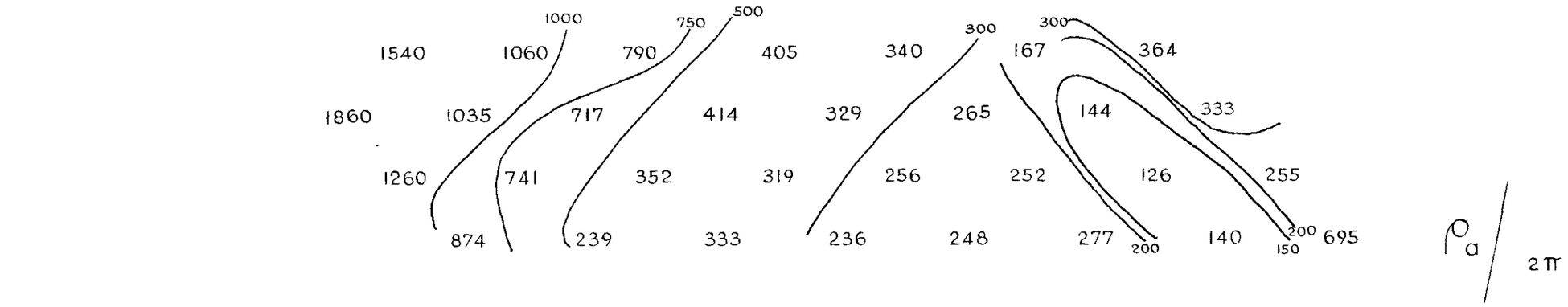
LINE 28 100 FT. SPREADS 60-310

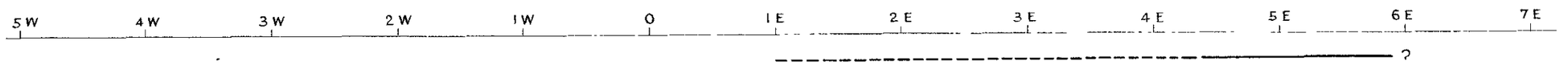
Survey			
Computed			
Plotted	E.W.	Jan.'60	100 ft to 1 inch
Checked			
Drawn	P.H.	Feb '60	
Traced	D.S.	Feb.'60	

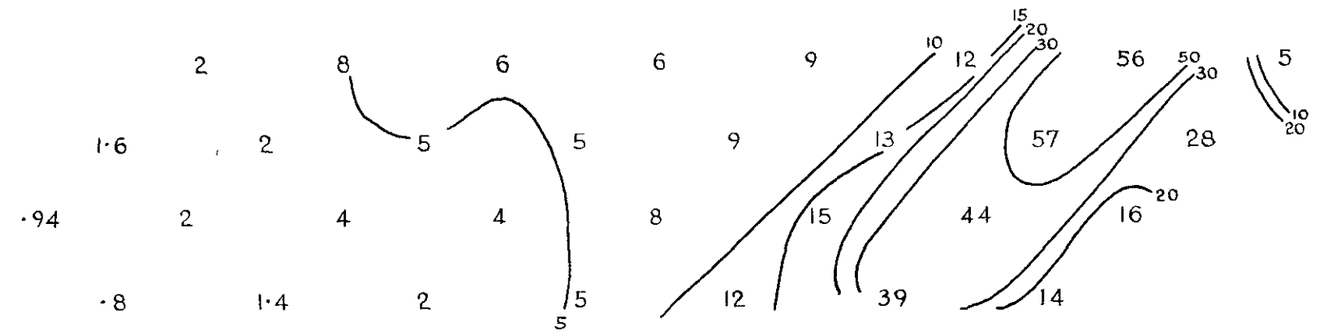
INDUCED POLARIZATION

Q49 Sheet 13b

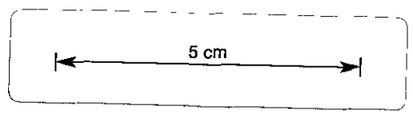
2354







335023



LYELL N.L. EXPLORATIONS

DIVISION

GREAT LYELL AREA

LINE 24 100 FT. SPREADS 60-310

	E W	Jan '60	100 ft to 1 inch
	P H	Feb '60	Q49 13c
INDUCED POLARIZATION	D.S	Feb.'60	2355