93M/4E

REPORT ON AN INDUCED POLARIZATION SURVEY HAZELTON AREA, BRITISH COLUMBIA ON BEHALF OF CHAPPARAL MINES LIMITED

3463

by

Peter J. Fominoff, B.A.Sc.

December 22, 1971

CLAIMS:

Name	Record Numbers
LOUDEL 2	78475
LOUDEL 4 - 6	78477 - 78479
LOUDEL 7A	84240
LOUDEL 7	87241
LOUDEL 14	78480
LOUDEL 15	78481
LOUDEL 17	79304
LOUDEL 19	79306
LOUDEL 58 - 68	84897 - 84907
MANDON 91	L4273

LOCATION:

About 6 miles south of Hazelton, B. C.
East of Highway 16
Omineca Mining Division
55° 127° SW

DATES:

October 6 to October 22, 1971

TABLE OF CONTENTS

REPORT ON
AN INDUCED POLARIZATION SURVEY
HAZELTON AREA, BRITISH COLUMBIA
ON BEHALF OF
CHAPPARAL MINES LIMITED

INTRODUCTION

During the period October 6 to October 22, 1971, a geophysical field party under the direction of Mr. Christian Zogg executed an induced polarization survey in the Hazelton area, British Columbia on behalf of Chapparal Mines Limited.

As shown on Plate 1, the property lies just east of Highway 16 about 6 miles south of Hazelton and is reached by truck using an unimproved road eastwards from the Highway. Glacial drift covers most of the surface of the property and topographic relief is moderate. The elevation of the survey area is about 1500 feet above sea level.

The claims covered, in whole or part, by this survey are listed on the title page of this report and are shown on Plate 2 on the scale of 1 inch = 400 feet.

Scintrex Mk VII time-domain (pulse-type) induced polarization equipment has been employed on this property. The transmitting unit had a rating of 2.5 kilowatts and equal on and off times of 2.0 seconds. The receiving unit was a remote, ground-pulse type triggered by the rising and falling primary voltages set up in the ground by the transmitter. The integration of the transient polarization voltages takes place for 0.65 seconds after a 0.45 second delay time following the termination of the current on pulse.

The purpose of an induced polarization survey is to map the subsurface distribution of metallically conducting mineralization beneath the grids covered. In the present area such mineralization could include

chalcopyrite, molybdenite, pyrite and other metallic sulphide minerals. Metallic minerals such as graphite and magnetite as well as non-metallic minerals such as chlorite and sericite can give responses not always distinguishable from sulphide mineralization.

The three electrode array was employed for the survey. For this electrode array, one current electrode and two potential electrodes traverse the profiles with an interelectrode spacing called "a". The second or "infinite" current electrode is placed a distance greater than 5a from the measuring point which is defined as the midpoint between the moving current electrode and the near potential electrode. For the reconnaissance survey observations were taken for a = 200 feet and a = 400 feet, the distance between observations being 200 feet. For additional detail on some profiles observations were taken with a = 800 feet, 600 feet and 100 feet. Additional station intervals were 400 feet, 200 feet and 100 feet respectively.

The present grid consisted of two east-west base lines totalling about 6000 feet in length. Twelve grid lines were established perpendicular to it at 400 and in some cases 800 foot intervals. A 4700 foot test line was also surveyed along Highway 16 immediately north of the present grid. The induced polarization survey totalled about 14 line miles. A plan map of the grid and claim layout is shown on Plate 2.

GEOLOGY

A regional geological map on the scale of 1 inch = 1000 feet has been supplied by L. J. Manning and Associates Limited. From the map the northwestern portion of the grid area is seen to be covered by drift and alluvium. The southeastern part of the grid is underlain by the Upper Jurassic Brian Boru formation consisting of andesitic flows and volcanic sediments. The eastern central edge of the property is underlain by sediments

of the Red Rose formation consisting mainly of graywacke shale and siltstone. A fault is thought to cross the property diagonally from the from the southeastern corner to the northwestern corner.

An intrusive outcrop of quartz diorite occurs about 600 feet north of the northern edge of Denys Lake. Sulphide mineralization mainly pyrite and chalcopyrite is known to occur within the intrusive. Diamond drilling near the intrusive has confirmed the presence of pyrite and chalcopyrite.

Two grids, one immediately west of the present grid and one immediately south of the present grid have been covered by induced polarization surveying and reported by Jon G. Baird of Seigel Associates Limited in a report published on October 13, 1970.

The purpose of the present survey was to delimit anomalous responses detected in the previous survey and to locate any further sulphide mineralization that may exist to the north and east of the areas previously surveyed.

DISCUSSION OF RESULTS

Plate 2, on the scale of 1 inch = 400 feet shows the survey grid and claim locations. Areas of increased chargeability responses have also been outlined on the grid map.

Plate 3, is a chargeability profile map on the scale of 1 inch = 400 feet. The vertical scale is 1 inch = 10.0 milliseconds.

Plate 4, is the resistivity profile map on the scale of 1 inch = 400 feet. The vertical scale is 2 inches = 1 logarithmic cycle with line trace taken as 100 ohm-meters.

Plate 5, shows the chargeability and resistivity profiles of a

test line surveyed along Highway 16. The base scale and vertical scales are the same as on Plates 3 and 4. The background chargeabilities vary from about 1.0 millisecond with the 200 foot electrode spacings to about 10.0 milliseconds with the 600 and 800 foot electrode spacings. With this background a uniform dissemination of 1 percent sulphides by volume is expected to raise the chargeabilities by about 10.0 milliseconds. Areas exhibiting chargeabilities in excess of 10.0 milliseconds may be worthy of further investigations since low grade sulphide deposits of sufficient dimensions may be economically significant.

Four main areas of chargeability increases are evident. These four areas have been indicated on Plate 2. Since the 400 foot electrode spacing was the only spacing that was employed over the whole grid area, the areas of increased chargeability have been plotted on the basis of the 400 foot electrode spacing measurements. The chargeability increases in Area 1 extend diagonally from 16 N on Line 60 E to about 19 S on Line 20 E. The chargeability increases reach more than 35.0 milliseconds on Line 28 E between 20 and 22 S. The sharp chargeability increases reaching 50.0 milliseconds on Line 52 E and Line 60 E are thought to lie on or near a fault. The source of the chargeability increases in Area 1 may contain in excess of 3 percent by volume of metallically conducting material. On Lines 52 E and 60 E the source is steeply dipping and is interpreted to approach within about 25 feet of ground surface. Throughout all of Area 1 the source is interpreted to come within 100 feet of ground surface and to extend down to at least 400 feet below ground surface. The chargeability increases in Area 1 have not been delimited to the south from Lines 20 E to 44 E by the present survey.

In Area 2 the chargeability increases reach 40.0 milliseconds on Line 16 E at about 16 N. The area extends from Line 8 E down to 20 E and possibly 24 E. The source of the chargeability increases is interpreted to contain from 1 to 3 percent by volume of metallically conducting material. The source is interpreted to approach within about 30 feet of ground surface on Line 16 E between 12 + 50 N and 20 N and to extend down to at least 300 feet below ground surface. The chargeability increases have not been delimited on Lines 8 E, 12 E and 16 E. However, this portion of the grid is adjacent to the west grid of the 1970 induced polarization survey and the chargeability increases are seen to continue south of the present grid.

Area 3 extends from Line 12 E to 20 E on the northern ends of the lines. The chargeabilities are seen to increase significantly with wider electrode spacings. The reason for the increase may be a thick layer of overburden attenuating the chargeability responses from the narrower electrode spacings or increasing metallically conducting material content with depth. The source is interpreted to approach within 100 feet of ground surface and to extend down to at least 400 feet below ground surface. The source of the chargeability increases may contain up to 3 percent by volume of metallically conducting material.

Area 4 is seen only on one line and is not delimited to the west. Chargeability increases reach 20.0 milliseconds and may be indicative of 1 to 2 percent by volume of metallically conducting material. The source of the chargeability increases approaches to within 100 feet of ground surface and extends down to at least 300 feet below ground surface.

On some lines the background chargeabilities are seen to increase as much as 50 percent for each 200 foot increase of the electrode spacings.

The cause of the chargeability increases with wider electrode spacings may be a thick layer of non-chargeable overburden covering the bedrock or increasing metallically conducting material content with depth of the bedrock.

A test line run along Highway 16 has revealed chargeability increases reaching 20.0 milliseconds extending from about 4 W to about 16 W. This source has been detected on only one line and is open to both the north and south. The source may contain up to 2 percent by volume of metallically conducting material. Sharp chargeability increases together with sharp resistivity decreases occur on the eastern end of the test line. These increases have not been delimited to the east or to the north or south.

The resistivity responses range from a maximum of 1000 ohm-meters to a minimum of 10 ohm-meters. In Area 1 the resistivities generally range from about 100 to 1000 ohm-meters. On Lines 20 E to 36 E the resistivities generally increase together with the chargeabilities. However on Line 52 E there is a sharp resistivity decrease which is a mirror image of the sharp chargeability increase over the same area. This sharp resistivity decrease occurs only on the 100 and 200 foot electrode spacings. It is not evident on the 400, 800 and 600 foot spacings on either Lines 52 E or 60 E. This implies that the source of the low resistivities is narrow and near surface. The resistivities over Area 2 average around 300 ohm-meters. There appears to be no definite relationship between the chargeability increases and resistivity responses. There is a resistivity decrease over Area 3 corresponding to the chargeability increases. The lowest resistivities are found to be on the widest electrode spacings indicating that the source

of the low resistivities is not due to overburden but to higher conductivity within the bedrock. There is no definite correlation between the chargeability and resistivity responses over Area 4.

CONCLUSIONS AND RECOMMENDATIONS

The present induced polarization survey has revealed four areas of increased chargeability responses. Areas 1, 2 and 3 are underlain by sources containing from about 1 to 3 percent by volume of metallically conducting material. Diamond drilling has been carried out over Area 2 and the source of the responses was found to be disseminated pyrite and chalcopyrite. Areas 1, 3 and 4 have not yet been investigated by diamond drilling. It is recommended that Area 1 be investigated geologically and if overburden conditions should permit it, trenching should be carried out between 2 N and 8 N on Line 52 E and between 14 S and 22 S on Lines 28 E. Drill hole locations can be recommended in Area 1 based on the present induced polarization results. However the recommended geological investigations and trenching should first be carried out if possible.

The source of increased chargeabilities in Area 3 is believed to be covered by thick overburden thus trenching and geological investigations may not be feasible. The following drill hole is recommended to investigate the source of chargeability increases in Area 3:

COLLAR	DIP	DIRECTION	MINIMUM DEPTH
L 16 E; 42 N	-60°	North along Line	500 feet

It is recommended that Area 4 and the area of increased chargeabilities along the test line be investigated geologically. Further

SUMMARY

The induced polarization survey has revealed four areas of increased chargeability responses on the present grid. Areas 1, 2 and 3 are all interpreted to contain from 1 percent to 3 percent by volume of metallically conducting material. Area 4 is interpreted to contain about 2 percent by volume of metallically conducting material.

Area 2 has already been investigated by diamond drilling and the presence of sulphides has been confirmed. Trenching and geological investigations plus one diamond drill hole of 500 feet minimum depth have been recommended to investigate Areas 1 and 3. Further induced polarization surveying to delimit Area 4 and the areas of increased chargeability responses along the test line have been recommended.

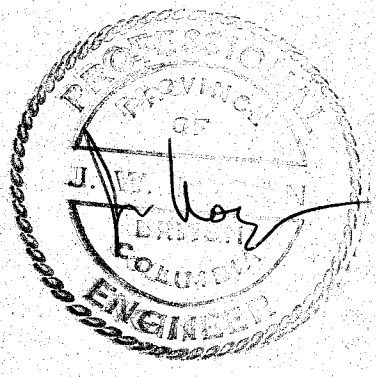
induced polarization surveying to delimit these areas is recommended before any drilling. Additional lines at 400 foot intervals are recommended west of Line 0 + 00 to delimit Area 4. Lines both north and south of the anomaly on the western portion of the Test Line are also recommended. The location of the additional lines should be based on considerations of local topographic conditions and the influence of the heavily travelled Highway 16.

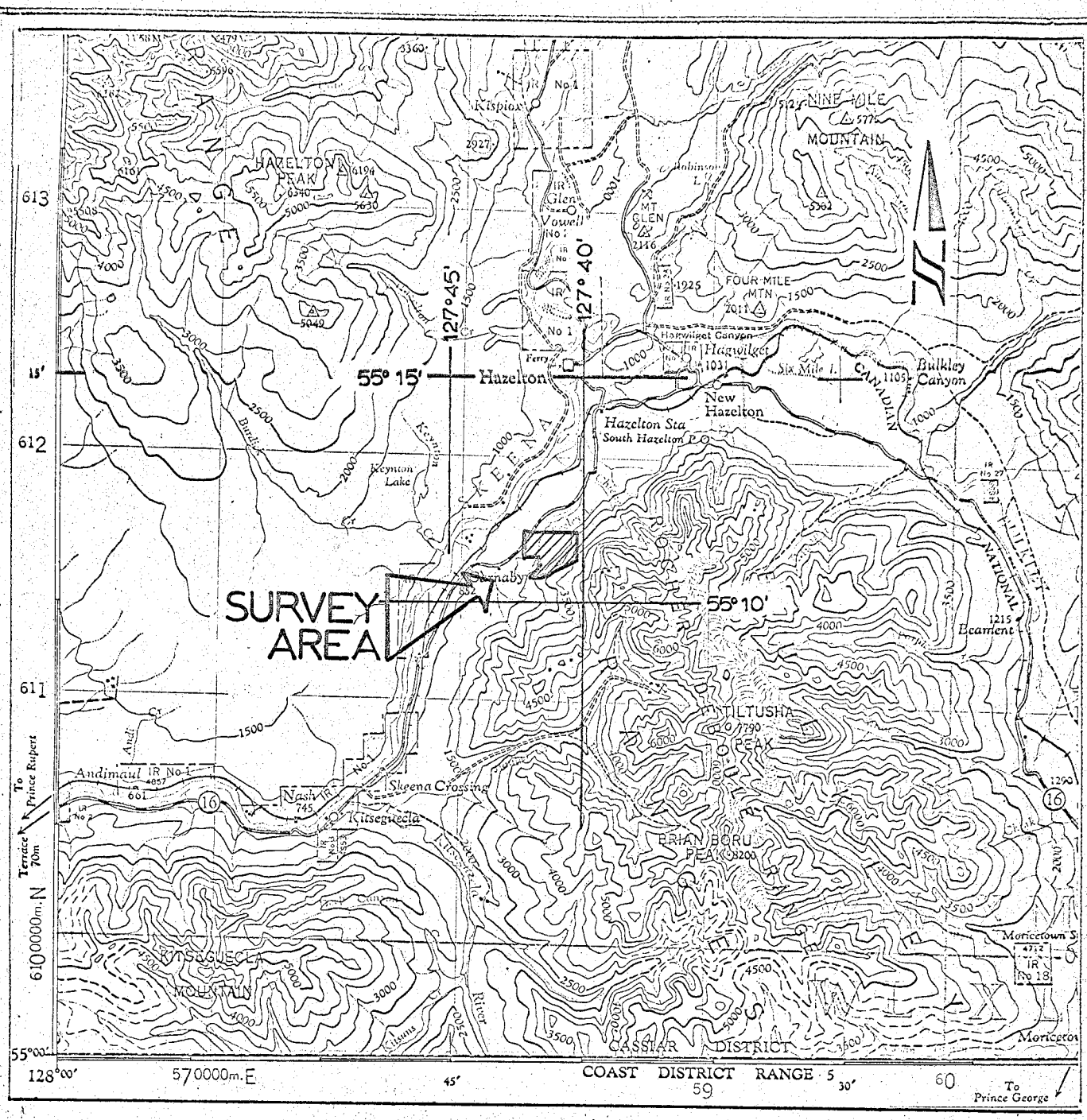
Respectfully submitted,

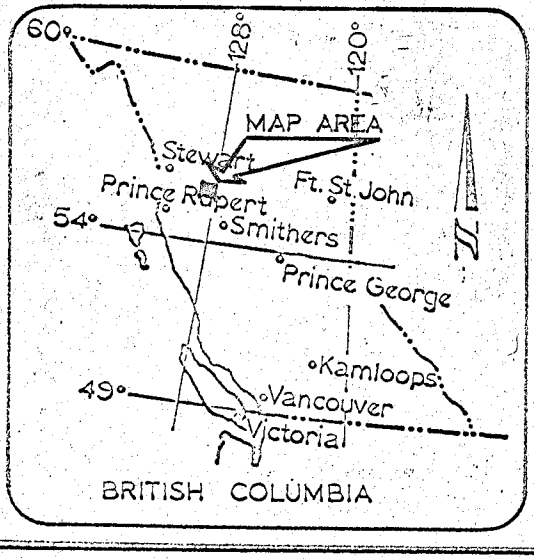
SEIGEL ASSOCIATES LIMITED

Peter J. Fominoff, B.A.Sc.
Geophysicist

Vancouver, B. C.
December 22, 1971







CHAPPARAL MINES LIMITED

LOCATION MAP

HAZELTON AREA - BRITISH COLUMBIA

SCALE 1 : 250,000

4 miles 0 4 miles

Survey by
SEIGEL ASSOCIATES LIMITED
October 1971

PLATE 1

L 12 W
L 0+00
L 4 E
L 8 E
L 12 E
L 16 E
L 20 E
L 24 E
L 28 E
L 36 E
L 44 E
L 52 E
L 60 E

56 N
52 N
48 N
44 N
40 N
36 N
32 N
28 N
24 N
20 N
16 N
13 N
8 N
4 N
0+00
4 S
8 S
12 S

52 N
48 N
44 N
40 N
32 N
28 N
24 N
20 N
16 N
12 N
8 N
4 N
4 S
8 S
12 S
16 S
20 S
24 S

TESTLINE 0+00
UP TO 3 MI
HWY 16 TO HAZELTON ~6 miles
24 W
HIGHWAY 16
TO TERRACE

Seeley Lake

1970 BASELINE WEST GRID
1970 BASELINE 0+00 WEST GRID
1971 BASELINE 0+00
1970 BASELINE 0+00 EAST GRID

Denys Lake

MANDON M-91

1 2
3 4
5 14
6 15
7 7A
57 58
59 60
61 62
63 64
65 66
67 68
17 19

1
2
3
4

LEGEND

- B/L — LINE OF THE 1970 GRID SYSTEM
- B/L — LINE OF THE 1971 GRID SYSTEM
- LINES COVERED WITH I.P. IN 1971
- 2 — CLAIM LIMIT AND NUMBER
- (2) — AREA OF INCREASED CHARGEABILITY

LOUDEL CLAIM GROUP

3463 M-2

TO ACCOMPANY A GEOPHYSICAL REPORT
BY P. J. FOMINOFF DATED DECEMBER 22, 1971

PLATE 2

CHAPPARAL MINES LTD.

LOUDEL CLAIMS
HAZELTON AREA, BRITISH COLUMBIA

INDUCED POLARIZATION SURVEY

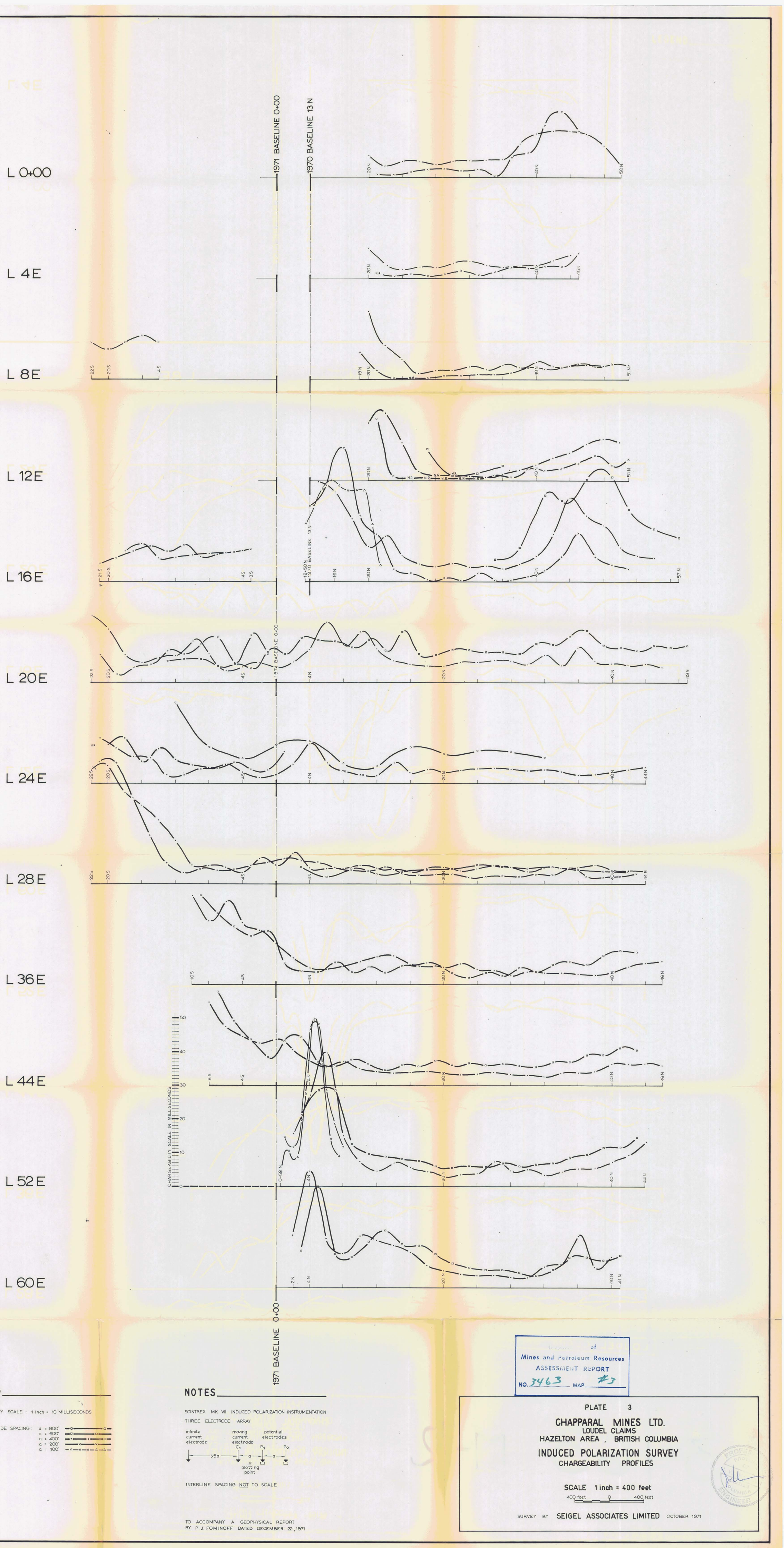
GRID, CLAIM AND INTERPRETATION

SCALE 1 inch = 400 feet

400 feet 0 400 feet

SURVEY BY SEIGEL ASSOCIATES LIMITED OCTOBER 1971

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA



LEGEND

CHARGEABILITY SCALE : 1 inch = 10 MILLISECONDS

ELECTRODE SPACING : a = 800'
a = 600'
a = 400'
a = 200'
a = 100'

NOTES

SCINTREX MK VII INDUCED POLARIZATION INSTRUMENTATION

THREE ELECTRODE ARRAY

INTERLINE SPACING NOT TO SCALE

TO ACCOMPANY A GEOPHYSICAL REPORT
BY P.J. FOMINOFF DATED DECEMBER 22, 1971

PLATE 3

CHAPPARAL MINES LTD.

LOUDEL CLAIMS
HAZELTON AREA , BRITISH COLUMBIA

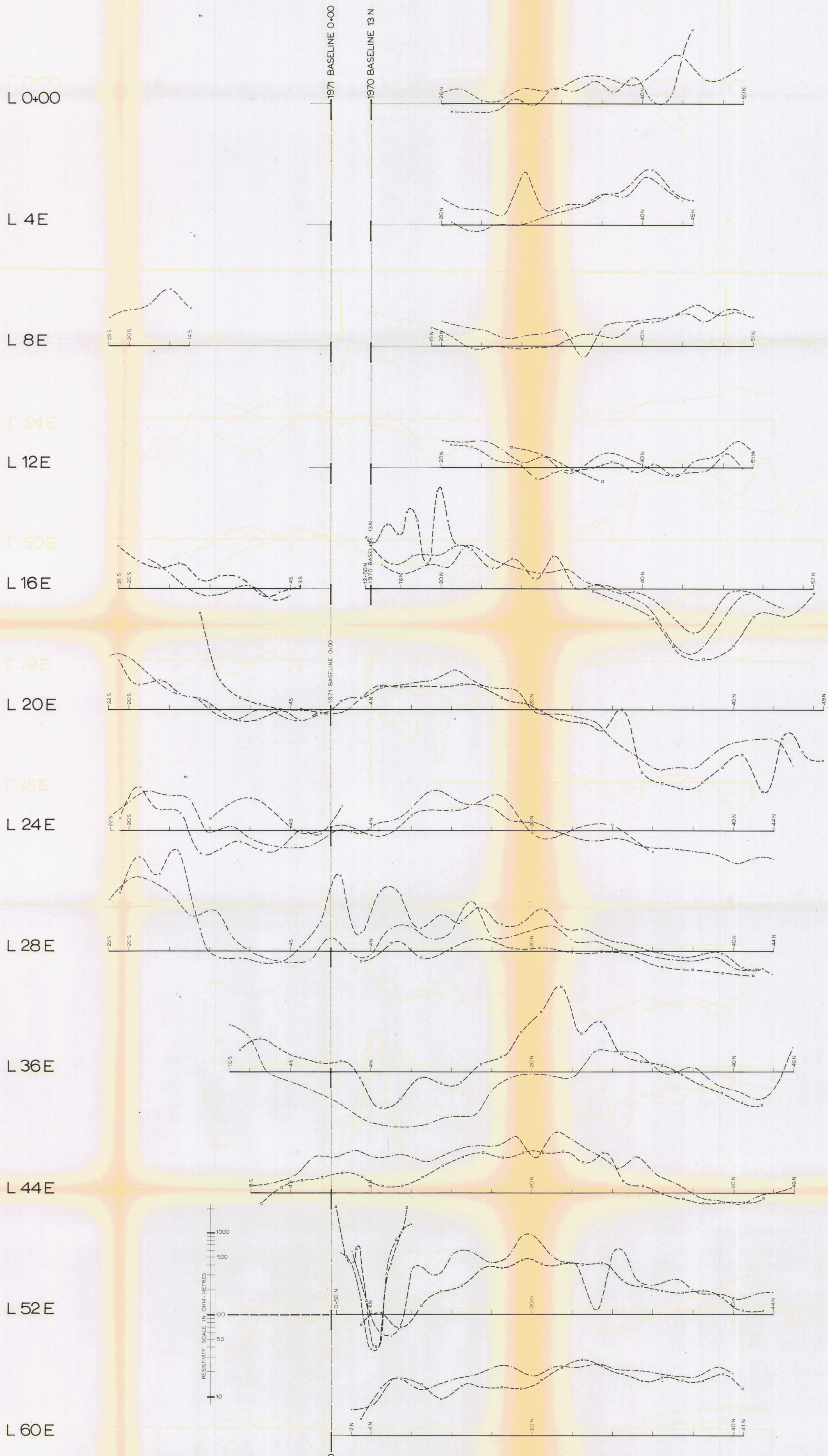
INDUCED POLARIZATION SURVEY

CHARGEABILITY PROFILES

SCALE 1 inch = 400 feet

400 feet 0 400 feet

SURVEY BY SEIGEL ASSOCIATES LIMITED OCTOBER 1971



LEGEND

RESISTIVITY SCALE : 2 inches = 1 LOGARITHMIC CYCLE WITH LINE TRACE TAKEN AS 100 OHM-METRES

ELECTRODE SPACING :
- a = 800'
- a = 600'
- a = 400'
- a = 200'
- a = 100'

NOTES

SCINTREX MK VII INDUCED POLARIZATION INSTRUMENTATION

THREE ELECTRODE ARRAY

INTERLINE SPACING NOT TO SCALE

TO ACCOMPANY A GEOPHYSICAL REPORT
BY P. J. FOMINOFF DATED DECEMBER 22, 1971

PLATE 4

CHAPPARAL MINES LTD.

LOUDEL CLAIMS
HAZELTON AREA, BRITISH COLUMBIA

INDUCED POLARIZATION SURVEY

RESISTIVITY PROFILES

SCALE 1 inch = 400 feet

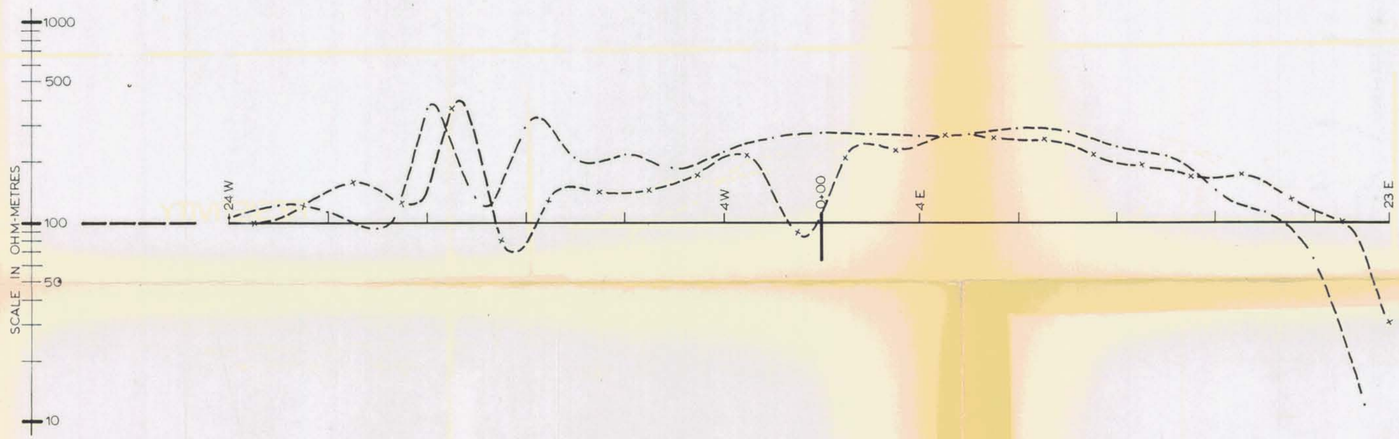
400 feet 0 400 feet

SURVEY BY SEIGEL ASSOCIATES LIMITED OCTOBER 1971

TESTLINE

CHARGEABILITY

RESISTIVITY



LEGEND

CHARGEABILITY SCALE : 1 inch = 10 MILLISECONDS

ELECTRODE SPACING : a = 400'
a = 200'

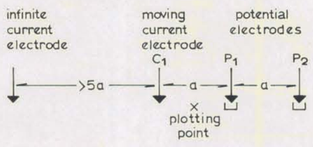
RESISTIVITY SCALE : 2 inches = 1 LOGARITHMIC CYCLE WITH LINE TRACE TAKEN AS 100 OHM-METRES

ELECTRODE SPACING : a = 400'
a = 200'

NOTES

SCINTREX MK VII INDUCED POLARIZATION INSTRUMENTATION

THREE ELECTRODE ARRAY



TO ACCOMPANY A GEOPHYSICAL REPORT
BY P.J. FOMINOFF DATED DECEMBER 22, 1971

PLATE 5

CHAPPARAL MINES LTD.

LOUDEL CLAIMS
HAZELTON AREA , BRITISH COLUMBIA

INDUCED POLARIZATION SURVEY

TESTLINE
CHARGEABILITY AND RESISTIVITY PROFILES

SCALE 1 inch = 400 feet

400 feet 0 400 feet

SURVEY BY SEIGEL ASSOCIATES LIMITED OCTOBER 1971