MAR 19890004: MAYBELLE RIVER

Received date: Apr 30, 1989

Public release date: May 01, 1990

REPORT ON
GEOPHYSICAL SURVEYS
POINT BASSE PROJECT
NTS 74 L/15

FOR

HUDSON'S BAY OIL & GAS COMPANY LTD.

BY

CANADIAN MINING GEOPHYSICS LTD.

A. R. KING
MAY, 1980

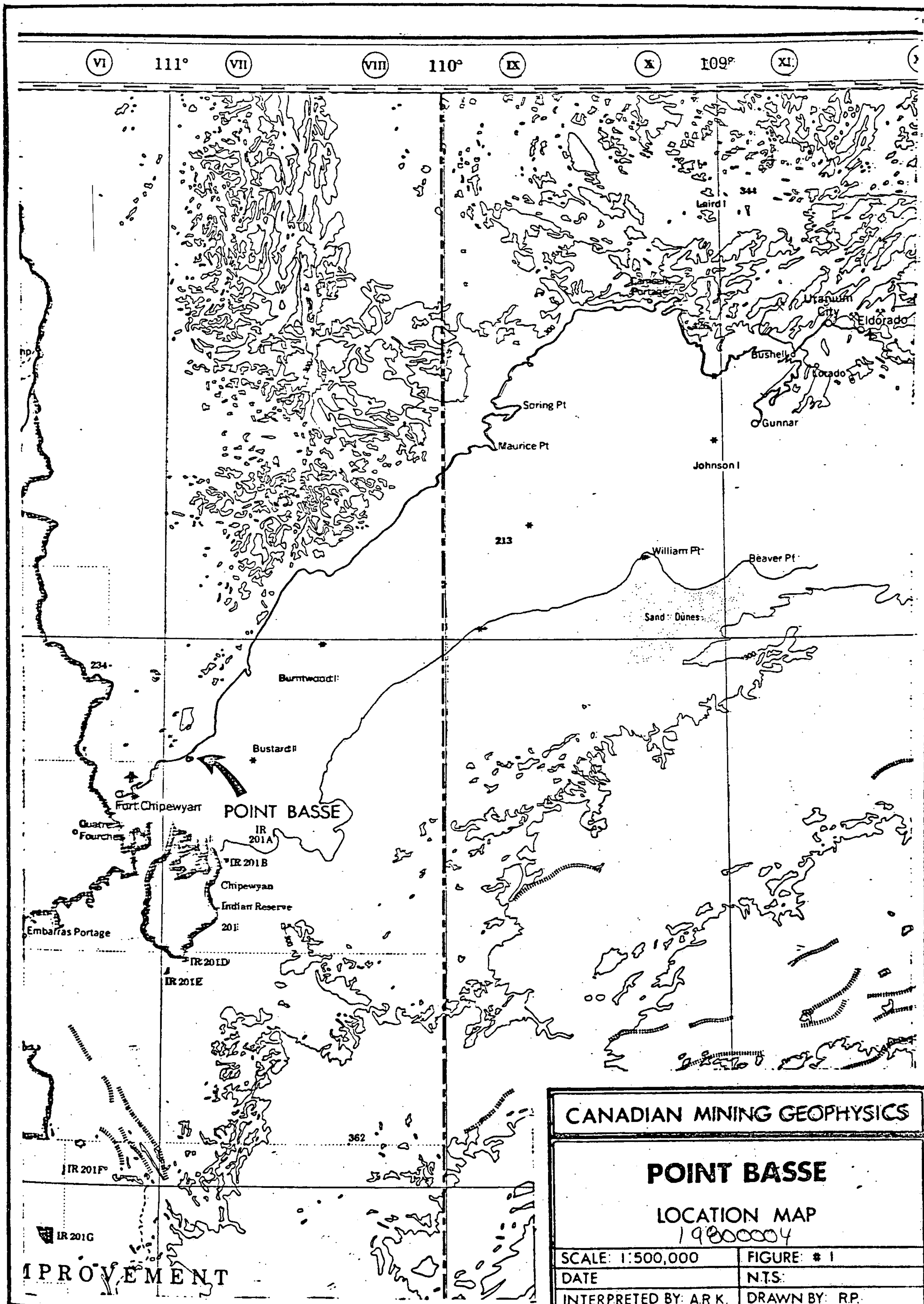
INDEX

LIST OF FIGURES

1.0 INTRODUCTION

The survey area is located on the North shore of Lake Athabasca, approximately 15 km north-east of Fort Chipewyan in Northern Alberta. (Figure 1).

A winter road was plowed from Fort Chipewyan and the crew stayed in town and drove out to the grid. From the northern shore of the lake the lines extended from 0.4 to 0.6 km out over the lake. The base line was located over the lake bearing 62^{o}. The lake is thought to be underlain by sedimentary rocks of the Athabasca formation while the rocks to the north on shore are older basement rocks.



CANADIAN MINING GEOPHYSICS

POINT BASSE

LOCATION MAP

19800004

SCALE: 1:500,000	FIGURE: # 1
DATE	N.T.S.
INTERPRETED BY: A.R.K.	DRAWN BY: R.P.

2.0 DESCRIPTION OF WORK

The survey work was undertaken from February 25 to March 28, 1980. In that period, a total of 20.3 km of grid was established. On this grid 9.5 km of detail IP using rectangular or Schlumberger arrays and 16.6 km of Mag surveying were done. Considerable test work was required to find suitable equipment and arrays for the IP resistivity surveys.

2.1 IP & RESISTIVITY

It was intended to use a pole-dipole array to survey the grid with a Crone time-domain IP resistivity reciever and a Huntec 2.5 KW time-domain transmitter. However, due to quite conductive lake bottom sediments, the pole-dipole array could not provide a sufficiently high signal levels. Attempts were made to improve the signal level using various arrays including square and rectangular without success. Eventually the transmitter was overloaded and broke down.

A Phoenix frequency domain system with a 2 KW motor generator was then brought in. This system, using rectangular arrays, provided sufficient signal to survey the grid.

For the rectangular array, receiver and transmitter electrode spacings of 200 m were used. Both the reciever and transmitter spreads are oriented at 90^{o} to the survey line rather than along the line as is the case with the in-line dipole-dipole array. The rectangular array is moved parallel to to the line. The receiver and transmitter spreads started out over the lake 400 m apart moving towards the shore with the transmitter on the shore side of the array. When the transmitter spread reached the shore it was stopped and the receiver spread was brought up in 100 m steps until the reciever and transmitter spreads were 100 m apart.

The apparent resistivity and frequency effect were read at each station. Frequencies of 1.3 and 5 Hz were used to measure the frequency effect. The frequency effect was corrected using values measured in calibrating the receiver. The resistivity values were reduced using the proper geometric factors to apparent resistivities.

Schlumberger soundings were taken over the area of lowest resistivity with an array centered at Line 10 East at 0+50 South and over the area of highest resistivities with an array centered at Line 30 East at 1+50 North. The Schlumberger arrays were expanded parallel to the base line. The results are plotted in Figures 6 and 7.

2.2 MAGNETOMETER SURVEY

Readings were taken over the entire grid at 25 m intervals using a Barringer proton field magnetometer. A Canadian Mining Geophysics MR 10 digitally recording base station was used to nomitor diurnal variations. The field data was corrected for diurnal variations using the base station values and the results were plotted in profile form in Figures 4 and 5.

3.0 DISCUSSION OF RESULTS

3.1 IP & RESISTIVITY

There is little to no IP response on the grid. The frequency effect exceeds 1.0% in a few scattered locations. The most continuous zone of frequency effects above 1.0% is along Line 32 East. This could be due to the higher apparent resistivities along this line.

The Schlumberger soundings indicate a thin conductive surface layer underlain by a thick resistive layer, presumably the Athabasca formation, which is in turn underlain by a conductive layer. The sounding at Line 10 East; 0+50 South shown in Figure 6 suggests that that third conductive layer is thin and that it is underlain by a resistive layer to the limits of detection of the sounding.

Rough interpretations on these soundings using two and three layer resistivity type curves gave the following results:

	LAYER 1	LAYER 2	Layer 3	LAYER 4
LOCATION 1				
LINE 10 East; 0+50 South				
Resistivity (ohm m)	30	1,500	90	Relatively high
Thickness (m)	17	272	thin	
LOCATION 2				
LINE 30 East; 1+50 North				
Resistivity (ohm m)	120	4,800	120	
Thickness (m)	28	224	?	

Layer 1 corresponds to the conductive lake bottom sediments which are unusually conductive in this area due to the deltaic environment with its abundant clays.

Layer 2 represents the sub-cropping rocks, presumably the Athabasca formation. The resistivity of Layer 2 at sounding Location 1 may not be entirely accurate. Variations in the curve suggest that Layer 2 may consist of two or more layers of different resistivities.

Both sounding curves show a distinct break at 200 m separations indicating a lower resistivity layer at a depth of about 270 m. This could be a conductive layer in the Athabasca formation or at the base of the Athabasca formation. The sounding curve at Location 1 indicates that this conductive layer is relatively thin and is underlain by a more resistive layer to the limits of the detection of this sounding.

This layering fits the overburden-Athabasca formation-conductive regolith-basement rock model. It could also be due to variations in resistivity within the Athabasca formation itself as relatively conductive shales have been reported in the western part of the basin.

The resistivities obtained from profiling with a rectangular array were interpreted with the aid of the Schlumberger soundings.

The apparent resistivities increase gradually, from 150 to 200 ohm m, over the western part of the grid to 600 to 1,000 ohm m around Line 30 East. The Schlumberger soundings indicate that this is due to increases in the resistivity of the surface layer and possibly of the second layer or second combination of layers.

In general, the apparent resistivities do not increase with increasing receiver-transmitter separation out into the lake as might be expected from the resistivity layering. Examining the Schlumberger curves, it can be seen that the 100 to 500 m separation section of the curve is relatively flat. It is likely that the rectangular array sounding curve has a similar plateau. This would explain the relatively flat response with increasing separation between 100 and 400 m.

No discrete conductive zones were indicated by this survey. There is a distinct drop in apparent resistivities between Lines 31 East and 33 East which is not explained.

3.2 MAGNETOMETER SURVEY

The magnetic values are quite uniform over most of the grid. A consistent drop of about 50 gammas is apparent at the ends of Lines 0 to 8 East along the shore. This may indicate rock of slightly lower magnetic susceptibility on the shore to the north of the grid, but more data over the shore would be required to confirm this. The ground data is consistent with government magnetic sheet #7159 which shows the grid to be located in the area of low magnetic relief.

CERTIFICATE OF QUALIFICATIONS

I, the undersigned, certify that:

1. I graduated from the University of Toronto with a degree in Geology and Physics in 1976; and
2. That I have three years experience in the field of mining geophysics; and
3. That I have prior experience in the use of the methods herein described.

Signed,

[redacted]

Alan R. King, B.Sc.

BIBLIOGRAPHY

KOEFOED, O., "Geosounding Principles, 1" Elsevier, 1979.

VAN DAM, J.C., MEULENKAMP, J.J.,
"Standard Graphs for Resistivity Prospecting"
European Society of Exploration Geophysicists, 1969.

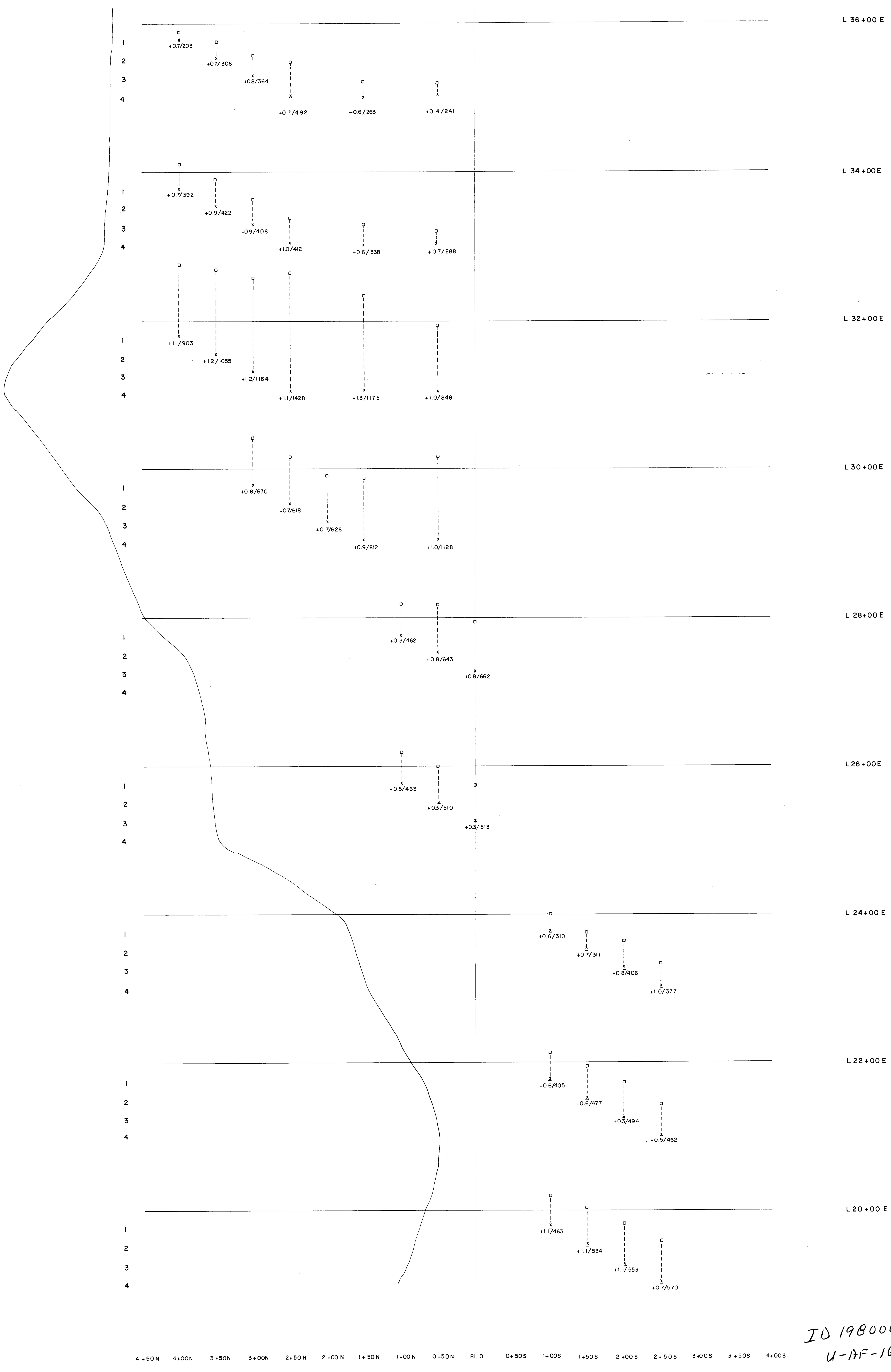
Department of Mines and Technical Surveys,
"Geophysics Paper 7159 Chipewyan 74L".

APPENDIX I

PERSONNEL

NAME	POSITION	DATES
John Johnston	Geophysical Technician	Feb. 28 - Mar. 15/80
Dave Jarecki	Geophysical Operator	Feb. 25 - Mar. 28/80
Daryl Cain	Helper	Feb. 25 - Mar. 28/80
Terry Hyland	Helper	Feb. 25 - Mar. 28/80
Dan Dahms	Helper	Feb. 25 - Mar. 28/80
Cathy Harvie	Cook	Feb. 25 - Mar. 28/80


L18 + 00E
+0.8/360
+0.5/351
+0.7/353
+0.7/383
L 16 + 00E
+1.0/309
+0.9/328
+0.9/347
+1.0/390
L14 + 00E
+0.2/240
+0.5/236
+0.6/218
+0.8/211
+1.0/215
L 12 + 00 E
+0.6/208
+0.3/233
+0.5/228
+0.2/212
+0.8/232
L 10 + 00E
0.0/184
+0.2/189
+0.3/166
+0.9/166
+0.8/174
L 8 + 00 E
+0.1/169
+0.2/204
+0.2/194
+0.2/226
+0.7/214
L 6 + 00 E
+0.4/152
+0.3/153
+0.8/149
+0.7/159
+0.5/126
+0.8/126
L 4 + 00E
+0.4/162
0.0/190
+0.4/214
+0.4/220
+0.3/138
+0.8/110
L2 + 00E
+0.6/142
0.0/179
+1.1/222
+1.2/240
+0.6/154
+0.8/126
1
2
3
4
4+50 N
4+00N
3+50N
3+00 N
2+50N
2+00 N
1+50N
1+00N
0+50N
BL.0
0+50S
1+00S
1+50S
2+00S
2+50S
3+00S
3+50S
4+00S
LEGEND
RESISTIVITY (1cm = 200 Ω.m)
CHARGABILITY (1cm. = 5.0 %)
BASE VALUE (0% FE; 100 Ω.m)
FREQUENCIES: 1.3 Hz AND 5 Hz
ARRAYS: 100 x 200 m - 1
200 x 200 m - 2
300 x 200 m - 3
400 x 200 m - 4
ID 19800004
U-AF-164(2)
#2
CANADIAN MINING GEOPHYSICS
POINT BASSE
IP - RESISTIVITY
SCALE: 1:2,500
FIGURE: 2
DATE:
N.T.S.:
INTERPRETED BY: A.R.K.
DRAWN BY: Poli Art Design & Reproduction Ltd.
28



ID 19800004
U-AF-164(2)
#3

LEGEND

RESISTIVITY (1cm. = 200 Ω.m.)

CHARGABILITY (1cm. = 5.0%)

BASE VALUE (0% FE; 100 Ω.m)

FREQUENCIES: - 1.3 Hz AND 5 Hz

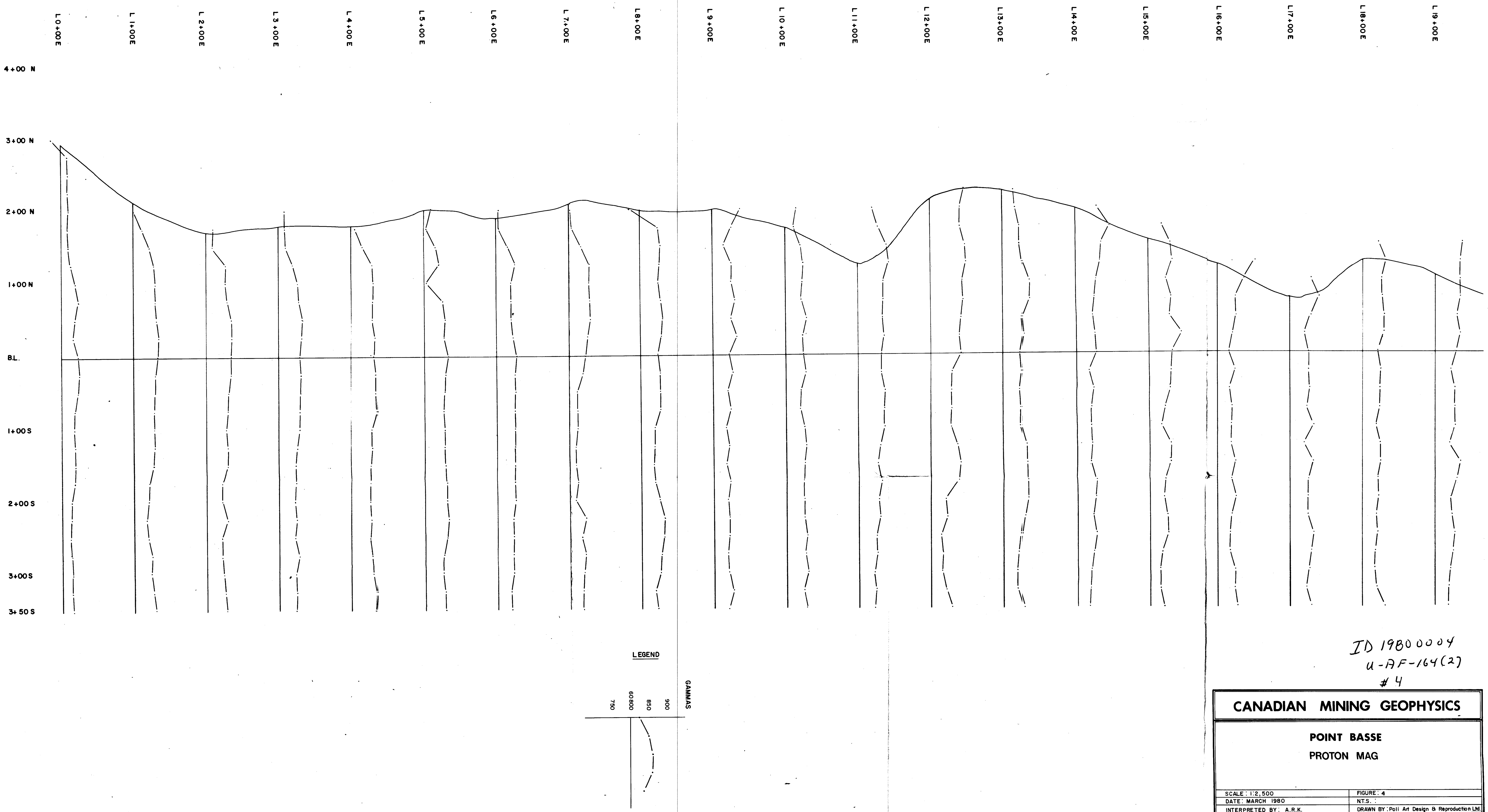
ARRAYS:		
100 x 200 m	-	1
200 x 200 m	-	2
300 x 200 m	-	3
400 x 200 m	-	4

CANADIAN MINING GEOPHYSICS

POINT BASSE

IP- RESISTIVITY

SCALE: 1:2,500	FIGURE: 3
DATE:	N.T.S.
INTERPRETED BY: A.R.K.	DRAWN BY: Poli Art Design & Reproduction Ltd.



ID 19800004
u-AF-164(2)
#4

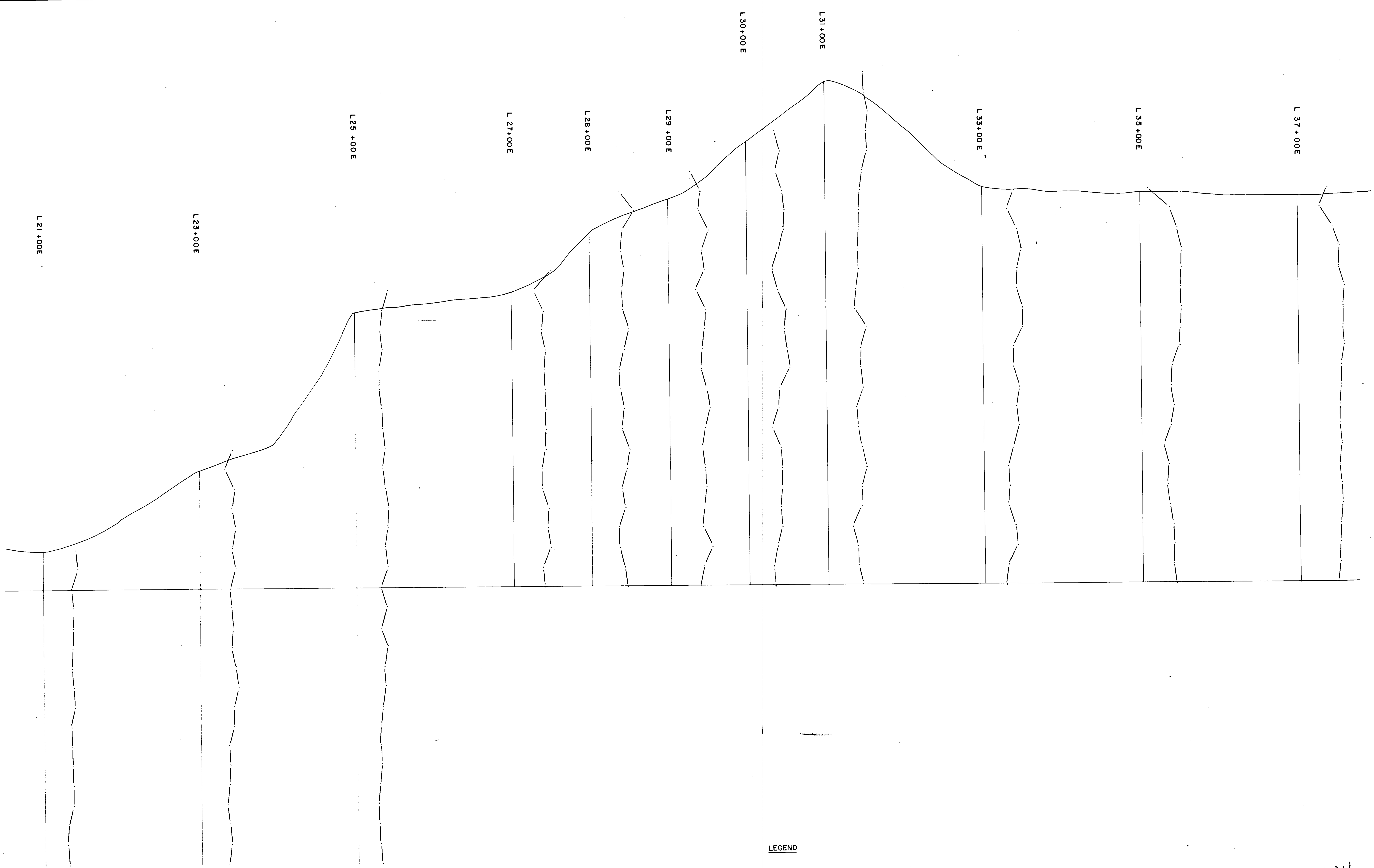
CANADIAN MINING GEOPHYSICS

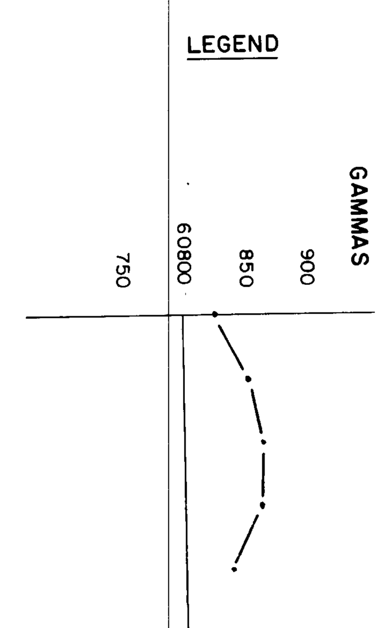
POINT BASSE

PROTON MAG

SCALE: 1:2,500	FIGURE: 4
DATE: MARCH 1980	N.T.S.:
INTERPRETED BY: A.R.K.	DRAWN BY: Poli Art Design & Reproduction Ltd.

30

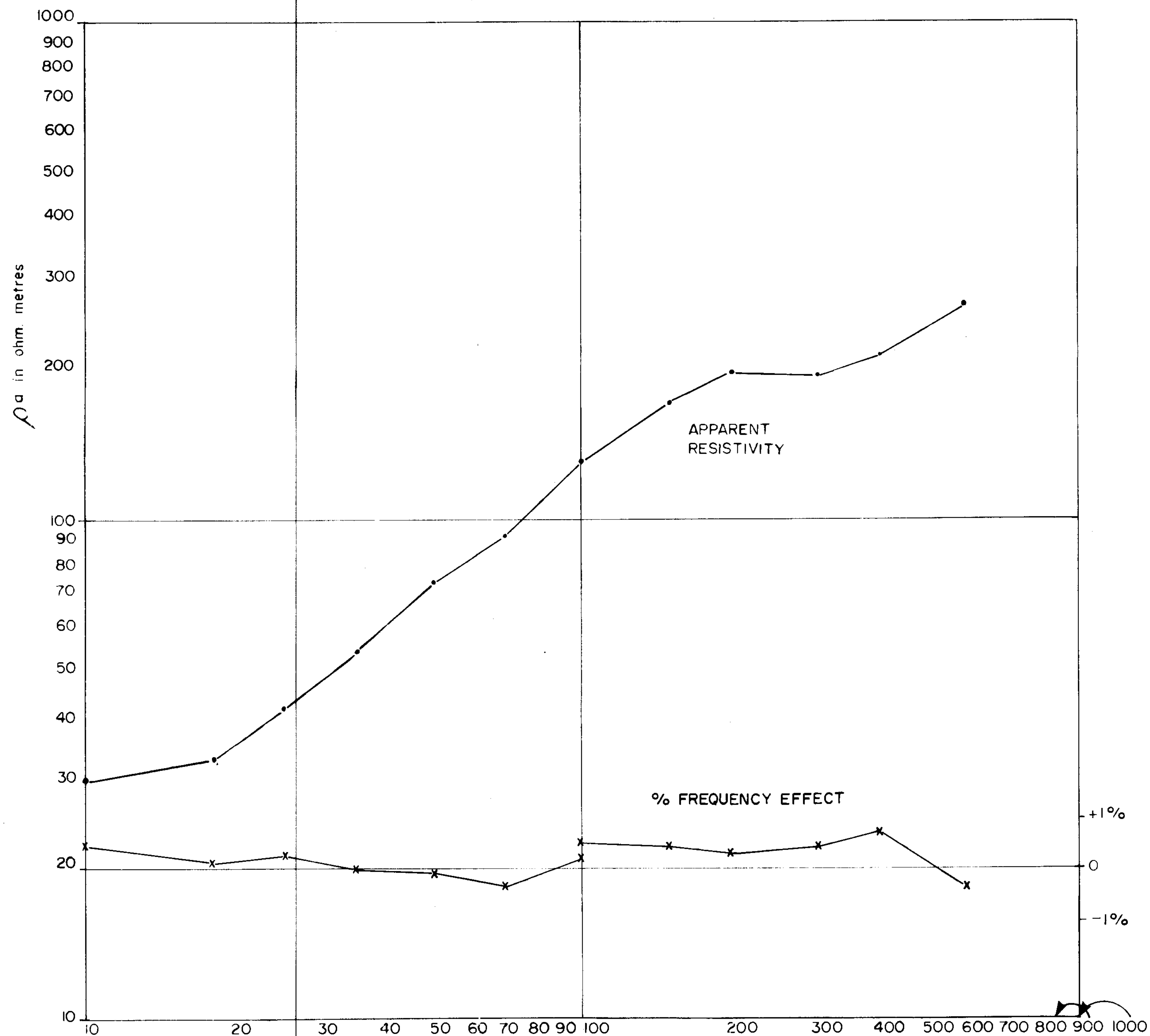




ID 19800004
U-AF-164 (2∅)
#5

CANADIAN MINING GEOPHYSICS	
POINT BASSE PROTON MAG	
SCALE: 1:2500	FIGURE: 5
DATE: MARCH 1980	N.T.S.:
INTERPRETED BY: A.R.K.	DRAWN BY: Poli Art Design & Reproduction Ltd.

(31)



1:25:3

t_2 = 8

Separation a
in metres

ID 19800004

U-AF-164 (2)

#6

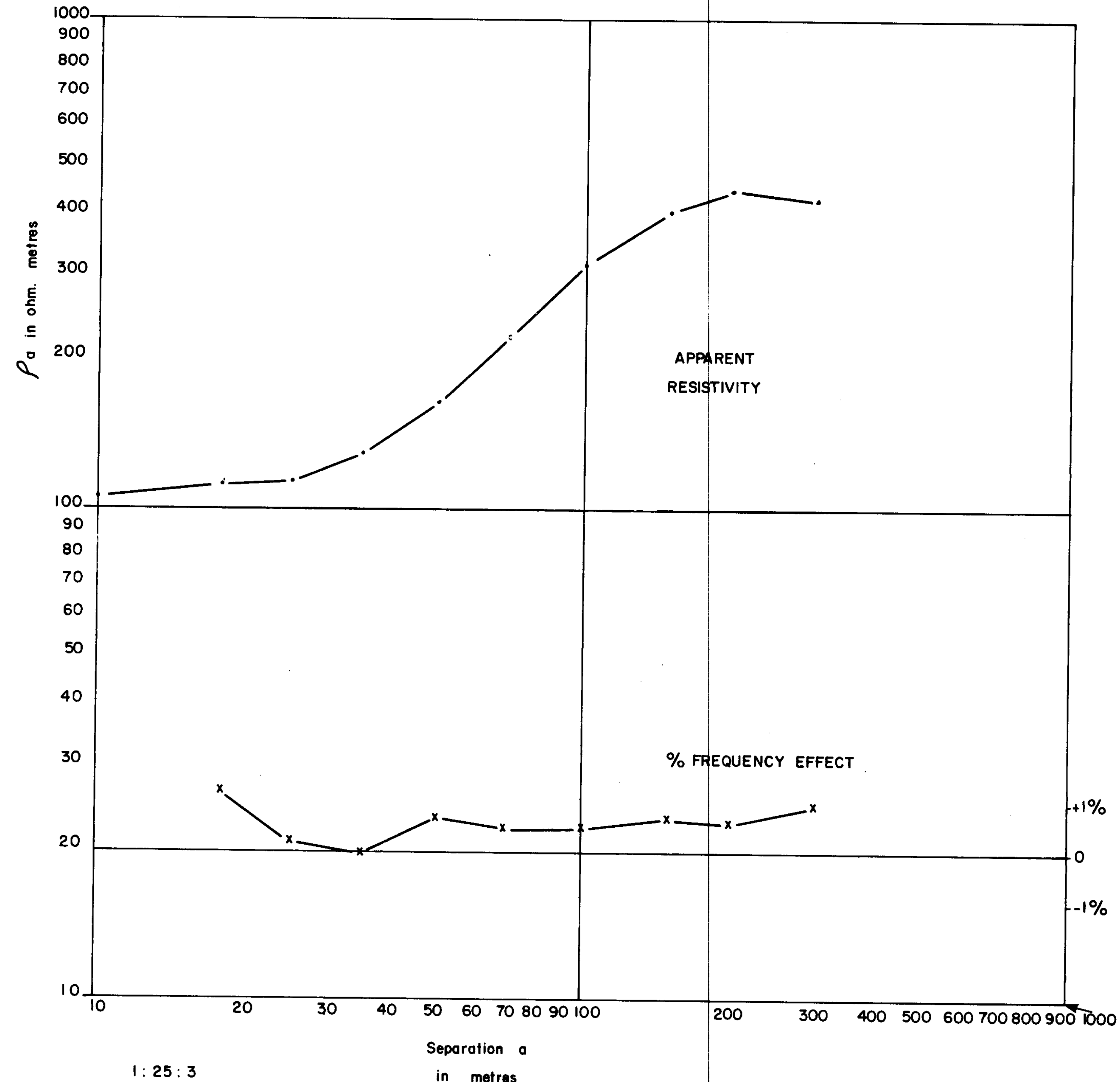
CANADIAN MINING GEOPHYSICS

POINT BASSE

SCHLUMBERGER SOUNDING (1)

L 10E 1 + 50S

SCALE:	FIGURE: 6
DATE: MAY, 1980	N.T.S.:
INTERPRETED BY: A.R.K.	DR. BY: PoliArt Design Ltd.



1 : 25 : 3

$t_2 = 8$

ID 19800004

U-AF-164 (2)

#7

CANADIAN MINING GEOPHYSICS	
POINT BASSE SCHLUMBERGER SOUNDING (2) L30E 1 + 50 N	
SCALE:	FIGURE: 7
DATE: MAY , 1980	N.T.S.:
INTERPRETED BY: A.R.K.	DR.BY: PoliArt Design Ltd.