REPORT ON

INDUCED POLARIZATION SURVEY

FOR

AMOCO CANADA PETROLEUM COMPANY LIMITED

ON

THE "CC" CLAIM GROUP

139° 08'W, 62° 42'N

WHITEHORSE MINING DISTRICT

YUKON TERRITORIES

BY

GEOTERREX LIMITED

Project 85-386

August 2 - August 11, 1975

OTTAWA, ONTARIO
SEPTEMBER, 1975

L. WILSON, B.A.
Geophysicist

P. NORGAARD, P. Eng.
Senior Geophysicist

geoterrex ltd

90039

TABLE OF CONTENTS

...2

I. INTRODUCTION

In the period from July 2 to August 20, 1975, Geoterrex Limited of 2060 Walkley Road, Ottawa, Ontario, completed induced polarization surveys on three groups of claims located in the Coffee Creek Area of the Yukon Territory on behalf of Amoco Canada Petroleum Company Limited, Mining Division, Suite 2110, 65 Queen Street West, Toronto, Ontario.

The purpose of the induced polarization surveys was to map the subsurface distribution of polarizable material in areas of interest, within the three groups of claims, the locating of which were defined by geological and geochemical surveys.

The geophysical field programme was carried out by a five man crew under the supervision of David McManus, a Geoterrex staff geophysicist, and was further supervised by P. Norgaard, P. Eng., senior geophysicist and Geoterrex Vice-President.

Mr. Merv Tews, field geologist representing Amoco Canada Petroleum Company Limited, visited and assisted the crew during the course of the surveys.

A total of approximately 240,400 line feet of induced polarization survey including detailing, was completed in the above period. Of this total, 104,400 feet of survey was carried out on the "PATT" claim group, 64,800 feet on the "CC" claim group and 61,200 feet on the "DOYLE" claim group.

II. DESCRIPTION OF THE SURVEY AREAS AND CLAIMS COVERED

The claim groups are located in the Coffee Creek Area situated roughly 100 air miles north west of Carmacks, Yukon Territory. All three claim groups are located within the Whitehorse Mining District.

This report deals with the "CC" claims which are located at latitude 62° 42'N and longitude 139° 08'W at the headwaters of the Doyle and Coffee Creeks. Induced polarization work was completed on claims 1-36 inclusive. The grid layout on the claim group was cut and marked by Amoco Canada Petroleum Company Limited.

III. PERSONNEL AND TIME DISTRIBUTION

The following is a list of the Geoterrex personnel necessary to the completion of the induced polarization survey including field work, compilation, interpretation of data and reporting; the list also indicates the number of eight (8) - hour man days, both Production and Standby, spent by each person on the project.

Name and Address	Production Days	Standby Days	Office
David C. McManus, Geophysicist 2060 Walkley Road Ottawa, Ontario	8	1	
David Garrard, Transmitter Operator 2060 Walkley Road Ottawa, Ontario	8	1	
Lloyd M. Wilson, Geophysicist 905 - 2470 Southvale Cres. Ottawa, Ontario	-	-	1

Three geophysical field assistants and all camping facilities, subsistance, and transportation between Whitehorse and the Amoco field camp were provided by Amoco Canada Petroleum Company Limited at no expense to Geoterrex Limited.

The total Geoterrex charge to Amoco for the survey on the "CC" claim group is as follows:

i)	Mob Demob		373.33
ii)	Survey charge:	8 Production days @ $365	2920.00
		1 Standby day @ 275	275.00
iii)	Interpretation Report		400.00
		Total	3968.33

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IV. SURVEY INSTRUMENTS

Direct current, pulse-type induced polarization equipment was employed for the survey.

The following Geoterrex equipment was used:

SCINTREX IPR-2, 6 or 8	Induced Polarization Receivers
ELLIOT 1.5 KW or HUNTEC 2.5 KW	I.P. Transmitter

3 Johnson 5 watt CB Radio Transceivers, 3 DC sound powered hand telephones, reels, wire, stainless steel and porous pot electrodes and auxiliary equipment were also provided by Geoterrex Limited.

Detailed specifications for the Geophysical instruments employed are enclosed in the Appendix to this report.

V. SURVEY PROCEDURE

V.1 Survey Procedure

The induced polarization survey was completed using the pole-dipole electrode configuration which is illustrated in the Appendix to this report. The pole-dipole array is known as the equispaced three array when the three moving electrodes are spaced equidistant along the survey line for a particular reading.

For the reconnaissance coverage of the survey areas a 400 ft. dipole size employed with pole to dipole separations of 800 ft. and 1200 ft. The reading interval along the lines for the reconnaissance work was always 400 ft. for both of the pole-dipole separations.

For purposes of better definition and to aid in the interpretation, detailed work was completed on selected sections of lines using the equispaced three array and electrode spacings of 100 feet, 200 feet and 400 feet as required. For this detailed work the reading interval along the lines was equal to half the electrode spacing.

V.2 Data Observed

The field measurements taken are as follows:

i) The applied current, Ia, flowing through the two current electrodes.

ii) The primary voltage, Vp, which exists between the potential electrodes while the current is flowing.

iii) The apparent chargeability, Ma, which is the I.P. effect noted for one complete cycle; i.e. for two current pulses applied in opposite directions.

V.3 Data Reduction

From the observations of primary voltage, Vp, and the applied current, Ia, the apparent resistivity is calculated at each station as follows:

$$\rho a = \frac{Vp}{Ia} \cdot K$$

Where ρa is the apparent resistivity in ohm-metres
Vp is the primary voltage in volts
Ia is the applied current in amps
K is a constant dependent on the array geometry

For the pole-dipole electrode array

$$K = 29\ (n)\ (n+1)$$

where a is the dipole length and n=1, 2, 3...etc.; na is the distance between the potential dipole and the moving current electrode.

The apparent chargeability, Ma, in milliseconds for the IPR-2 and IPR-6 and in millivolts per volt for the IPR-8, is read directly on the I.P. receiver. As mentioned earlier in this report, the chargeability is measured for a complete cycle rather than per single pulse. The chargeability readings obtained with the IPR-8 mode employed for this survey are 0.7 times the readings obtained with the IPR-2 and IPR-6.

All the readings on the "PATT" claim group were obtained using the IPR-8 receiver reading the middle slice of mode 2.

VI. DATA PRESENTATION

The apparent chargeability and apparent resistivity data are presented in profile form on plates accompanying this report at a scale of 1 inch 800 feet. The apparent chargeability results are plotted at a vertical scale of 1 inch = 10.0 millivolts/volt or milliseconds and the apparent resistivities in ohm-meters at a logarithmic scale of 1 inch per cycle.

For the sake of clarity of presentation of the results, the lines are not spaced to scale on the profile plots.

The reconnaissance chargeability values are also presented in contoured form at a scale of 1 inch = 400 feet and with a contour interval of 2.0 milliseconds. The reconnaissance resistivity values are presented in contoured form at a scale of 1 inch = 400 feet and with a logarithmic contour interval as shown on the plates.

The apparent chargeability and apparent resistivity data for the detailed I.P. surveying over selected lines are also presented in profile form at varying horizontal and vertical scales as shown on the plates.

VII. DISCUSSION OF RESULTS

The background apparent chargeabilities on the "CC" grid as measured using the reconnaissance electrode configuration are of the order of 10.0 milliseconds with an apparent resistivity level of 500 - 1,000 ohm meters.

As indicated on the apparent chargeability contour plans of the "CC" grid a large percentage of the area covered exhibits polarization values in the 15.0 - 20.0 millisecond range suggesting the presence of some polarizable material distributed accordingly.

Detailing which was carried out according to the directions of the Amoco supervisory field personnel was completed along line 8W and line 0. Line 8W crosses the large anomaly situated in the north central portion of the grid and the detailed work suggests that the source material causing the anomalous response near the base line on line 8W is located quite close to the surface. The correlating increase in the apparent resistivity levels noted in the course of completing the detailed work is probably evidence of a relative thinning of the overburden in this locale.

The detailed results obtained in the area of 1N to 5N on line 8W indicates the depth to the top of the polarizable material to be of the order of 50 - 60 ft. here. A true chargeability of about 14.0 milliseconds is suggested for the anomalous zone at this point which could relate to source material of a concentration of the order of 0.5 - 1.0% coverage by volume.

Further north, line 8W crossed an anomaly which peaks at 21.0 milliseconds on line 12W (a=400, n=3). An analysis of the data obtained over this zone on line 8W suggests a depth to the source material here of the order of 300 - 400 ft. and a true chargeability of the anomalous zone of about 30.0 milliseconds. A concentration of polarizable material of 1.5 - 3.0% coverage by volume could yield this type of response.

Other concentrations of polarizable material of the same order as on the north end of line 8W are situated in the extreme south east corner of the grid and on lines 20W and 24W in the vicinity of the base line.

Line 0 which was also detailed does not cross any of the significant anomalies.

Respectfully submitted,

Lloyd M. Wilson

Lloyd Wilson, B.A.
Geophysicist.

Peer Norgaard, P. Eng.
Senior Geophysicist.

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THE INDUCED POLARIZATION METHOD

The Induced Polarization method is based on the electro-chemical phenomenon of "over-voltage", that is, on the establishment and detection of double layers of electrical charge at the interface between ionic and electronic conducting material when an electrical current is caused to pass across the interface.

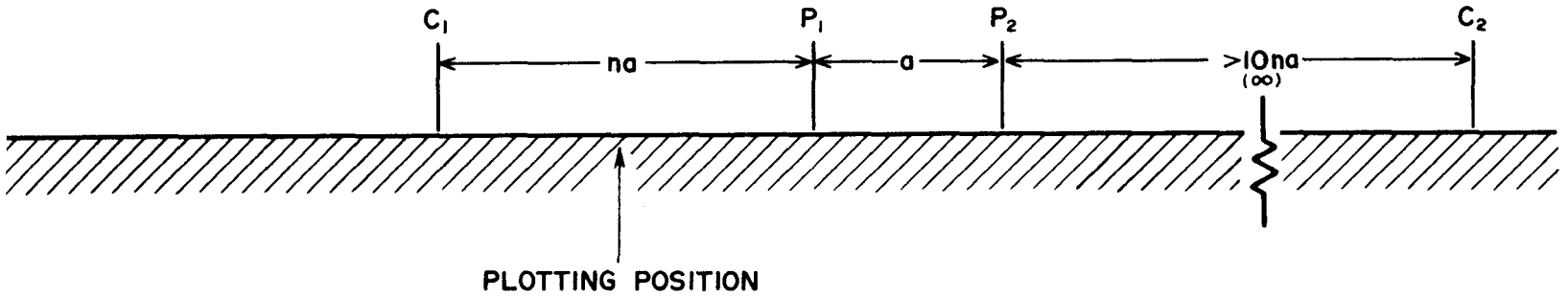
All naturally occurring sulphides of metallic lustre, some oxides and graphite, give marked induced polarization responses when present in sufficient volume even when such materials occur in low concentrations and in the form of discrete unconnected particles. Thus induced polarization is the only method available which has general application to the direct detection of disseminated sulphide deposits.

Each rock and soil type exhibits appreciable induced polarization response, usually confined to a relatively low amplitude range, which is characteristic of the mineral or soil. However certain clays and "laminar" minerals including serpentine, sericite and chlorite may give rise to anomalous response. These effects are attributed largely to "membrane" polarization.

In order to measure I.P. effects in a volume of rock a current is caused to flow through it via two current electrode contact points and resulting potential differences are measured across two potential electrode contact points.

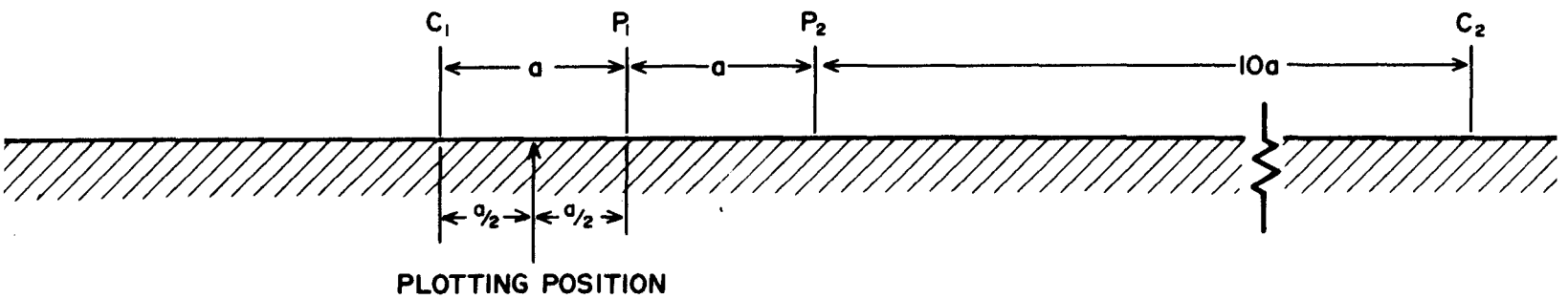
In practice two different techniques are used, namely "Time Domain" and "Frequency Domain". In the Time Domain technique which was employed for this survey a direct current is allowed to flow for several seconds and then cut off. The decay of the polarization voltages built up, during the passage of the current is then studied after the current is switched off. In the Frequency Domain technique a Sine wave current form of two low but well separated frequencies is used. Since polarization effects take an appreciable time to build up the response at the lower frequency will be greater so that apparent resistivities or transfer impedances between the current and measuring circuits will be larger at that lower frequency.

POLE-DIPOLE ELECTRODE ARRAY

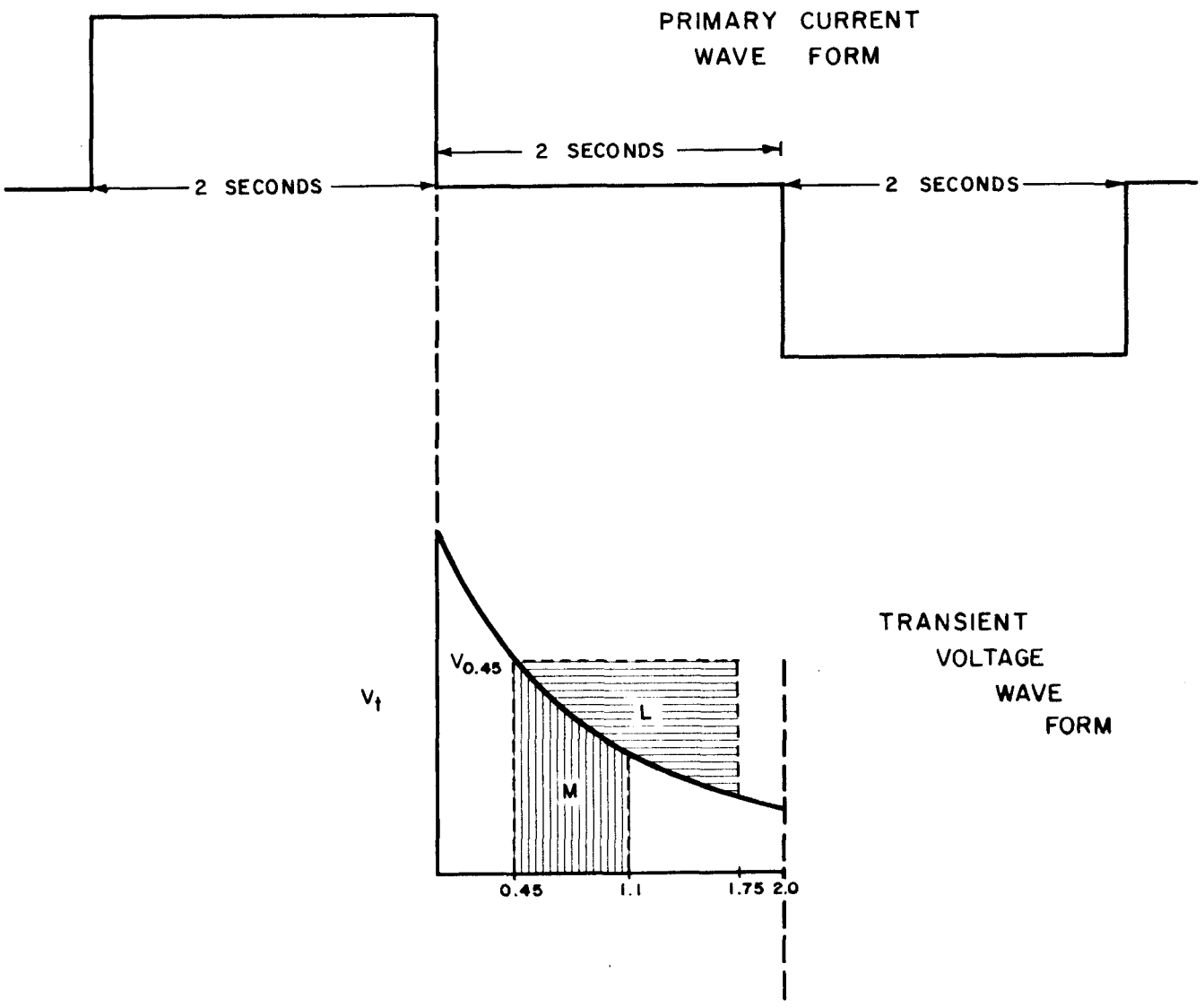


P_1 P_2 POTENTIAL ELECTRODES
C_1 C_2 CURRENT ELECTRODES
a DIPOLE LENGTH
n = 1, 2, 3, 4, ...

EQUISPACED THREE ELECTRODE ARRAY



POLE-DIPOLE ELECTRODE CONFIGURATIONS.

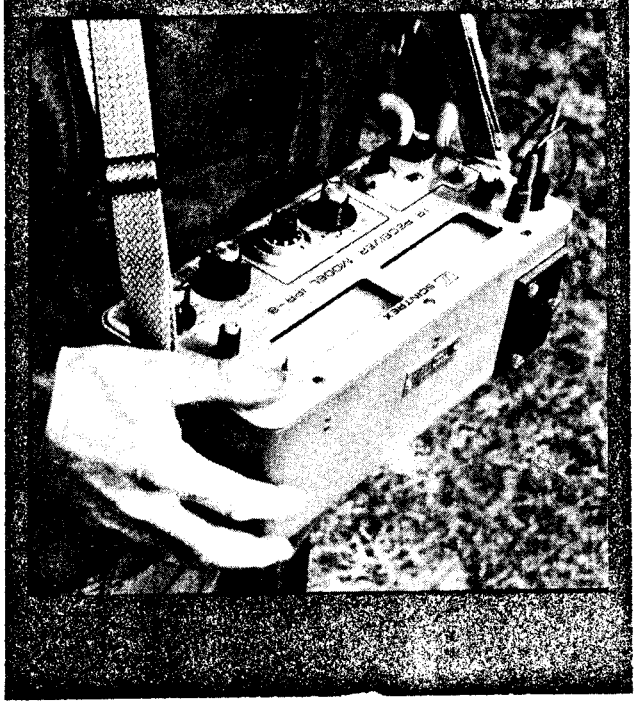


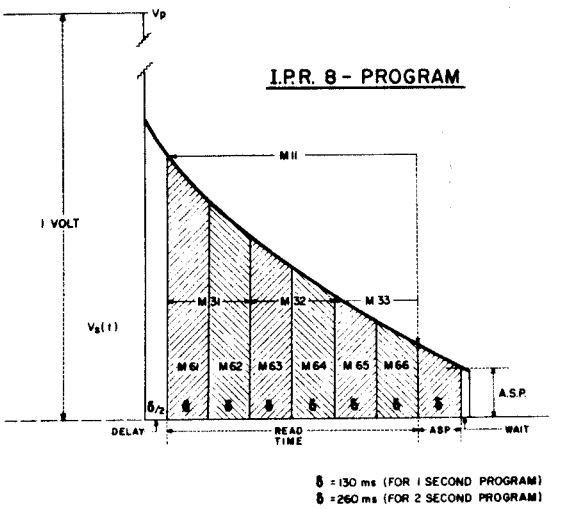
NEWMONT - TYPE TIME DOMAIN WAVE FORMS
AND QUANTITIES MEASURED

TECHNICAL DESCRIPTION OF IPR-8 RECEIVER

SCINTREX

Input Impedance	3.3 megohms
50 or 60 Hz Powerline Rejection	-50 db (300x)
Primary Voltage Range	300 microvolts to 40 volts in 10 ranges
Accuracy of Vp Measurement	± 3% of full scale
Vs/Vp Range	2% and 10% (20 and 100 per mil) full scale
Vs/Vp Accuracy	3% of full scale
Primary SP Buckout Range	± 1 volt
Automatic SP Tracking Range	6 x Vp, maximum ± 1 volt
Continuity Meter Reading	0 - 500 k ohms
Required Stability of Transmitter Timing	Need only exceed measuring program selected (1 second or 2 seconds)
Operating Temperature Range	-30°C to + 60°C
Dimensions	31 cm x 15 cm x 17 cm
Weight, Complete With Lid and Batteries	3.6 kg
Power Supply	4 D cells; estimated battery life 2 months intermittent duty at 25°C





δ = 130 ms (FOR 1 SECOND PROGRAM)
δ = 260 ms (FOR 2 SECOND PROGRAM)

IPR-2&6 NEWMONT TYPE RECEIVER SPECIFICATIONS

Electrical:

Primary Voltage Range	300 microvolts to 30V Accuracy ± 3%
Input Impedance	300 K ohms
Chargeability (M) Reading Range	0-100 and 0-3-- milliseconds Accuracy ± 5%
Curve Factor (L) Reading Range	0-100 and 0-300 milliseconds Accuracy ± 5%
Delay Time Before Integration	0.45 seconds
SP and VLF Noise Compensation	Manual: ± 1.5 millivolts Automatic: 1mV range ± 10mV total 30 mV range ± 1V total
Power Supply	Internal rechargeable nickel cadmium batteries. Rated life 45 hours/charge.
Temperature Range	-20° to 30°F (-29°C to +55°C)
Humidity Range	to 100% non-condensing

Mechanical:

Weight	13½ lb. (6.1 kg) including batteries
Dimensions	14"x11"x6½" (35.5 cm x 28 cm x 16.5 cm)

ELLIOTT GEOPHYSICAL COMPANY

1.5 KW I.P. TRANSMITTER

SPECIFICATIONS:

INPUT POWER	120 volt 400 Hz single phase at 1800 VA, relatively insensitive to input voltage/frequency regulation
OUTPUT POWER	1500 watts
OUTPUT VOLTAGE	200 to 3000 volts in 12 switch selected steps
OUTPUT CURRENT	5 amp. maximum
OUTPUT IMPEDANCE DRIVE	40 ohms to over 10,000 ohms
TIME CYCLE	On/off periods (symmetrical) adjustable at factory from 0.5 to 10 seconds
TEMPERATURE RANGE (AMBIENT)	$-15^{\circ}C$ to $+60^{\circ}C$ ($+5^{\circ}F$ to $140^{\circ}F$)
WEIGHT, COMPLETE WITH CASE	45 pounds
DIMENSIONS, INCASE	10.5 inches high by 16 inches wide by 11.5 inches deep

Power Supply for 1.5 KW IP Transmitter
Specifications

manufactured by McPhar Geophysics Limited

Output	voltage	125 volts
	frequency	400 Hz
	power	2.5 KVA
Engine		Briggs & Stratton 7 HP

INDUCED POLARIZATION TRANSMITTER

2.5 KW SYSTEM

Output	300-5000 volts DC in 8 steps 3 amps maximum
Input	3 phase 400 cps 115 volt 2.75 KVA
Output	2 ranges
Current Meter	0-1.5 amps and 0-3 amps $\pm$ 2%
Dummy Load	2 level - 1750 watts and 500 watts
Size	21" x 17" x 11½" (53.1 cm x 43.2 cm x 29.3 cm)
Weight	Console 50 lbs. (22.7 kg) Shipping weight 75 lbs. (34.0 kg).

MOTOR GENERATOR SET

Output	2.75 KW, 120 volts 400 cycle 3 phase 13.8 amps / phase
Engine	Briggs and Stratton 6 HP at 3600 RPM
Fuel	Capacity: 0.92 Imperial Gals. (4.1 litres). Consumption: Approximately 1.2 lbs / KWH (.5 kg / KWH)
Alternator	6000 RPM Belt Driven. Sealed bearing, rotating field, 70 lbs. approximately.

'CC' Group 115 J11

List 2

AMOCO CANADA PETROLEUM COMPANY LTD.
SUITE 2010 - 65 QUEEN ST. WEST
TORONTO 1, ONTARIO

Y90723	CC-1	Y90954	CC-9
24	2	55	10
25	3	56	11
26	4	57	12
27	5	58	13
28	6	59	14
29	7	60	15
30	CC-8	61	16
31	CC-33	62	17
32	~~7~~	63	18
33	~~5~~	64	19
Y907 34	CC-3~~6~~	65	20
		66	21
		67	22
		68	23
		69	24
		70	25
		71	26
		72	27
		73	28
		74	29
		75	30
		76	31
		Y909 77	CC-32

CC GROUP

36 claims 115 J11

LIST OF EXPENDITURES INCURRED

I. P. Survey (Geoterrex)	$ 3,968.00
Contract helpers (Larry Smith) 26% of $5880	1,528.00
Line Cutting (Larry Smith) 28 m. @ $125/	3,500.00
Aircraft 26% of 15 hrs. @ $300/hr.	1,170.00
Food 26% of $1141.	296.00
TOTAL APPLICABLE COSTS	$10,462.00
per Claim	$ 261.55

I hereby swear that the expenses incurred on this work as outlined in the report are accurate to the best of my knowledge.

Sworn before me at Toronto

this 19th day of September 1975

Notary Public

Paul Maingot

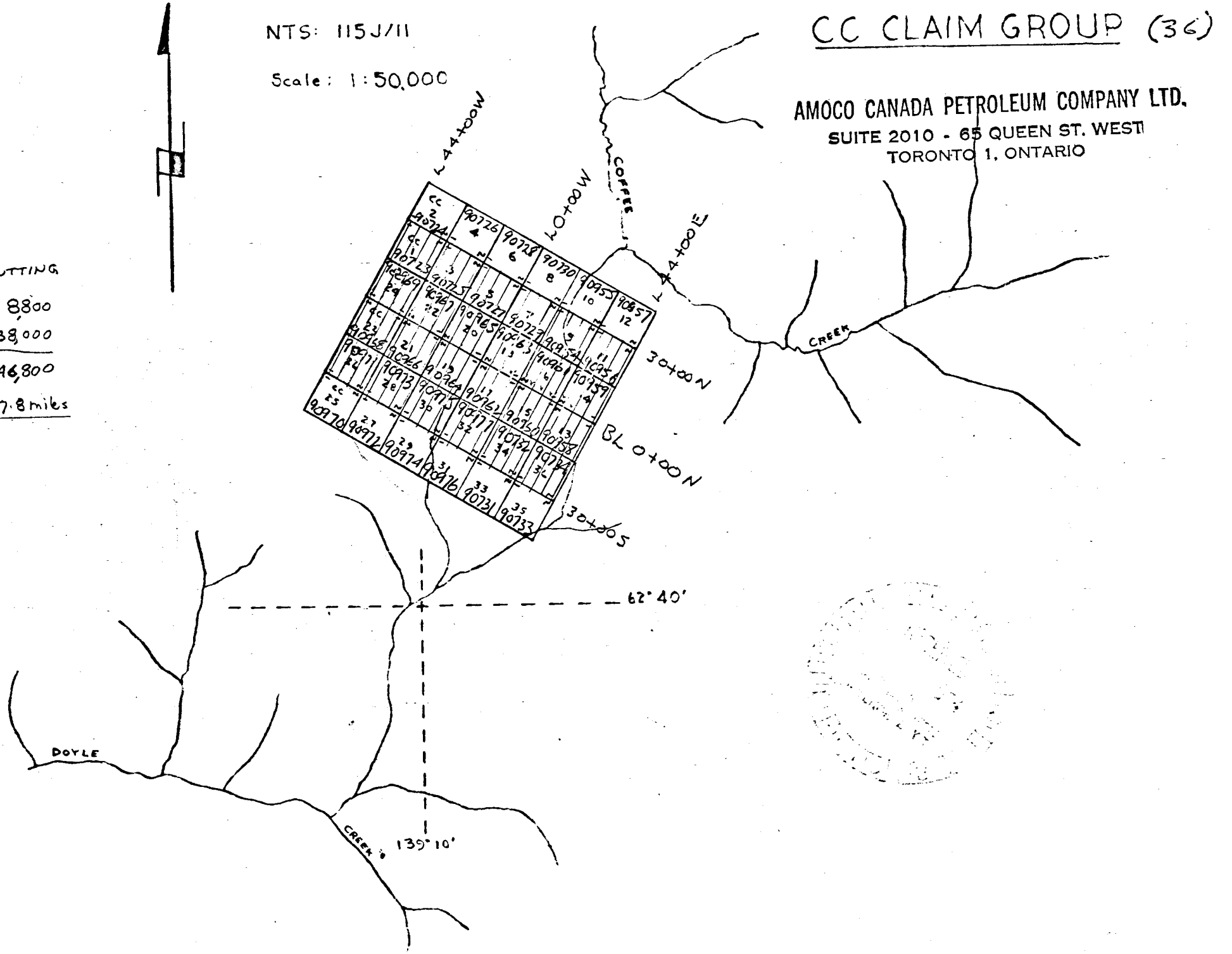
Paul Maingot
Regional Geologist
Amoco Canada Petroleum Co. Ltd.

CC CLAIM GROUP (36)

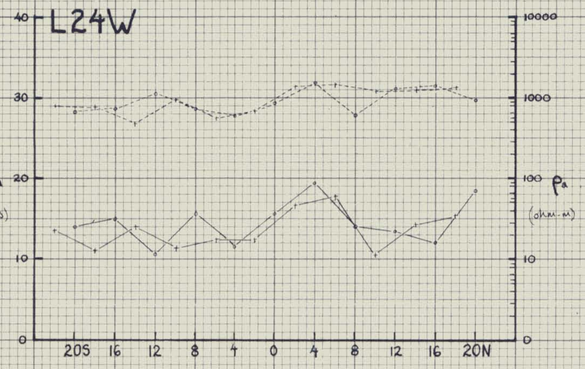
NTS: 115J/11

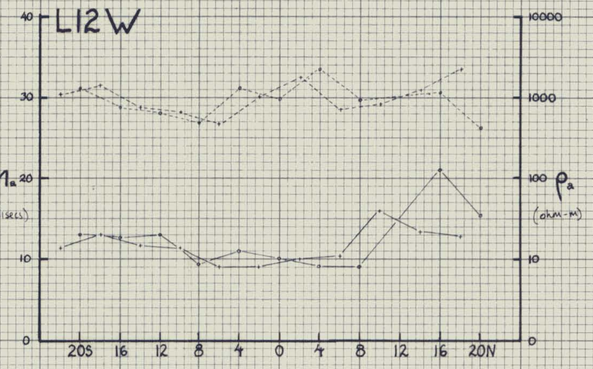
Scale: 1:50,000

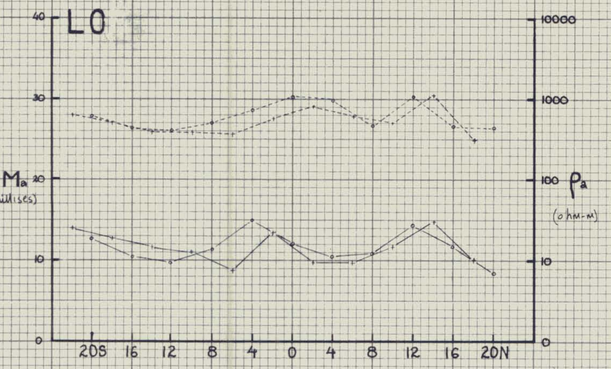
AMOCO CANADA PETROLEUM COMPANY LTD.
SUITE 2010 - 65 QUEEN ST. WEST
TORONTO 1, ONTARIO

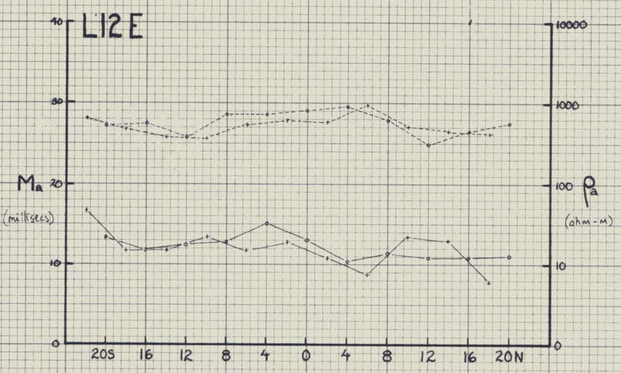


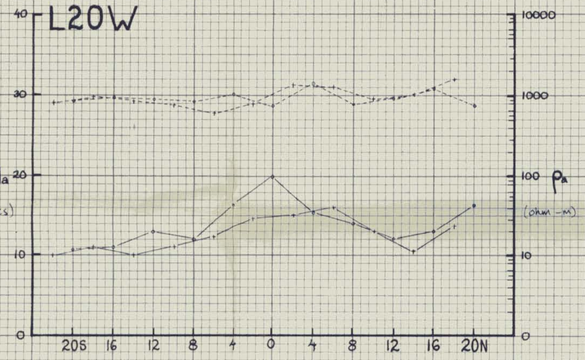
NE CUTTING
- 8,800
000 138,000
146,800
27.8 miles

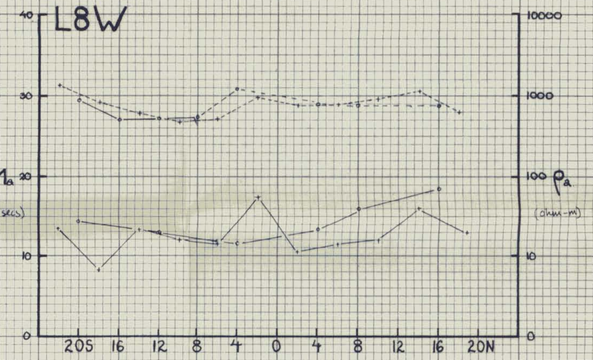


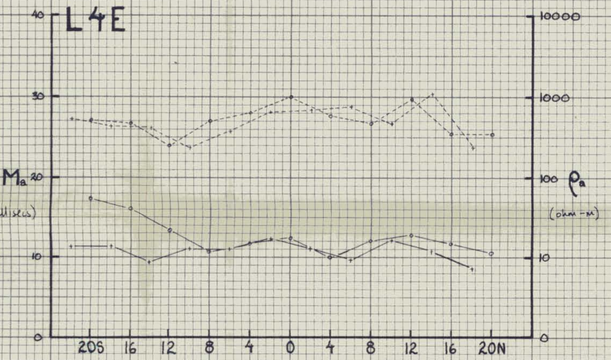


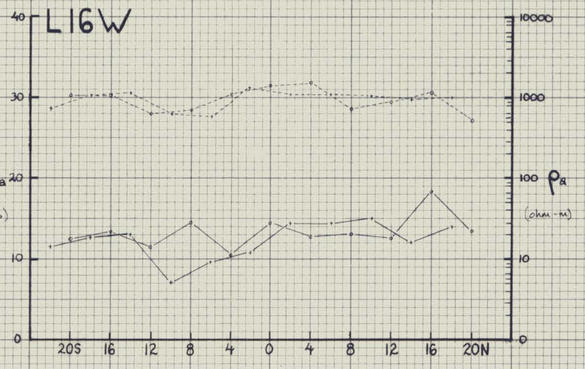


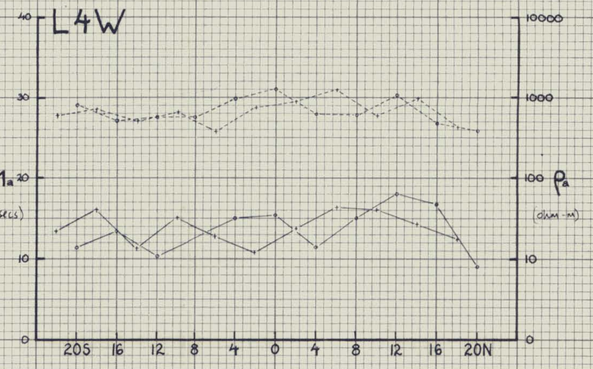


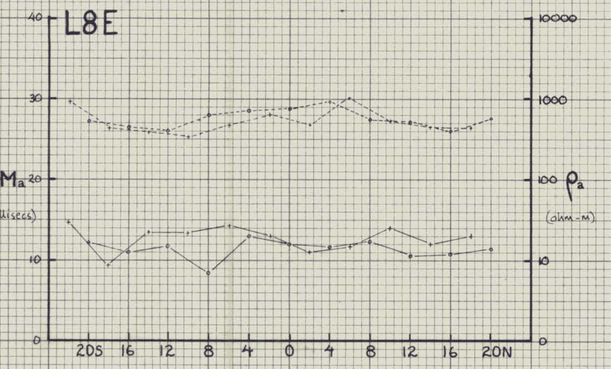


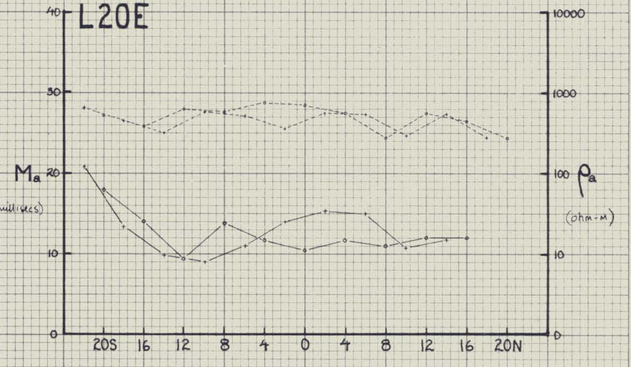












LEGEND

a = 400'

Ma — n=2 — ρa

Ma — n=3 — ρa

SURVEYED & COMPILED BY geoterrex ltd

FOR AMOCO CANADA PETROLEUM CO. LTD

POLE DIPOLE ARRAY RECONNAISSANCE LINES 24W to 20E

Scales: 1": 800'
1": 10 milliseconds
1": resistivity logarithmic cycle

Instruments:

"CC" CLAIM GROUP

PLATE I

SURVEY BY D.M.E.D.G. PLOTTED BY D.M.

DATE AUG. 1975 GEOTERREX PROJECT No. 85-386

LEGEND

M_a		ρ_a
+ —— +	n = 2	+ - - - - +
o —— o	n = 3	o - - - - o

SURVEYED & COMPILED BY
geoterrex ltd

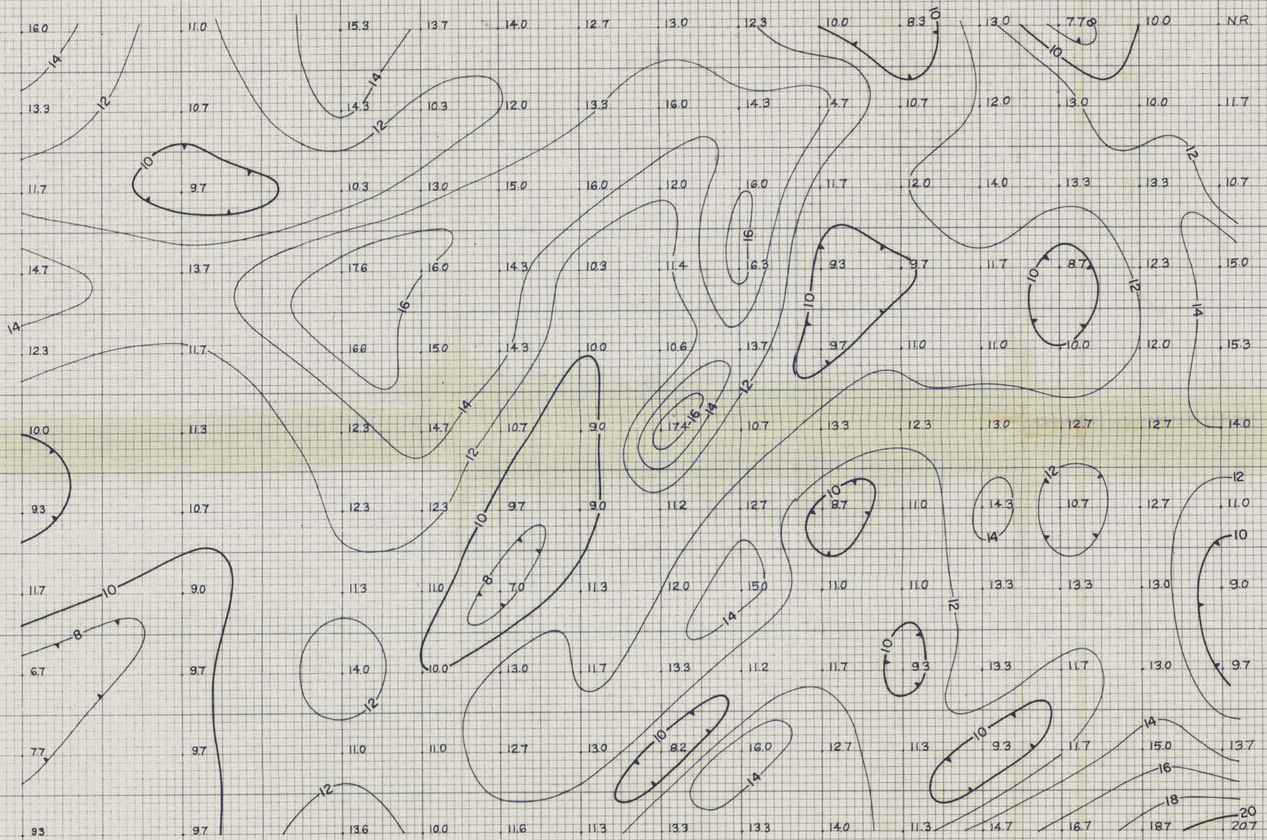
FOR
AMOCO CANADA
PETROLEUM CO. LTD

POLE DIPOLE RECONNAISSANCE LINES 32W AND 40W

Scales :
1" : 800'
1" : 10 milliseconds
1" : resistivity logarithmic cycle

"CC" CLAIM GROUP
PLATE II

SURVEY BY D.G.E.P.M. | PLOTTED BY D.M.
DATE AUG. 1975 | GEOTERREX PROJECT No. 85-396



SURVEYED & COMPILED BY geoterrex ltd

FOR AMOCO CANADA PET. CO. LTD. MINING DIVISION

CHARGEABILITY CONTOUR PLAN a = 400' n = 2

Scales: 1" = 400 FEET

CONTOUR INTERVAL: 2 Milliseconds

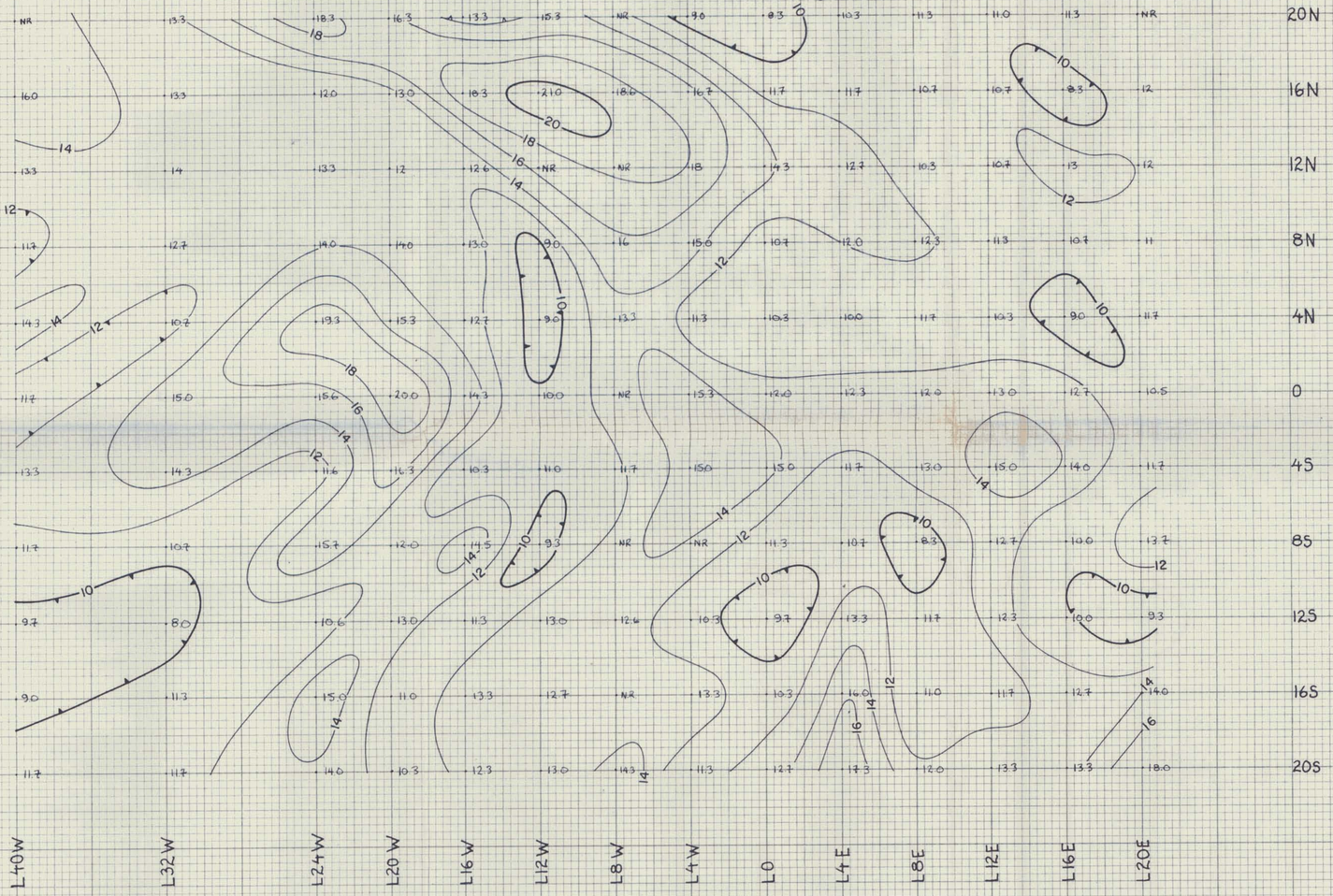
Instruments:

"CC" CLAIM GROUP

PLATE III

SURVEY BY D. M. E D G. | PLOTTED BY D. M.

DATE AUG., 1975 | GEOTERREX PROJECT No 80-306



SURVEYED & COMPILED BY
geoterrex ltd

FOR AMOCO CANADA PET. CO. LTD
MINING DIVISION

CHARGEABILITY CONTOUR PLAN a=400' n=3

Scales: 1" = 400 FEET

CONTOUR INTERVAL: 2 Milliseconds

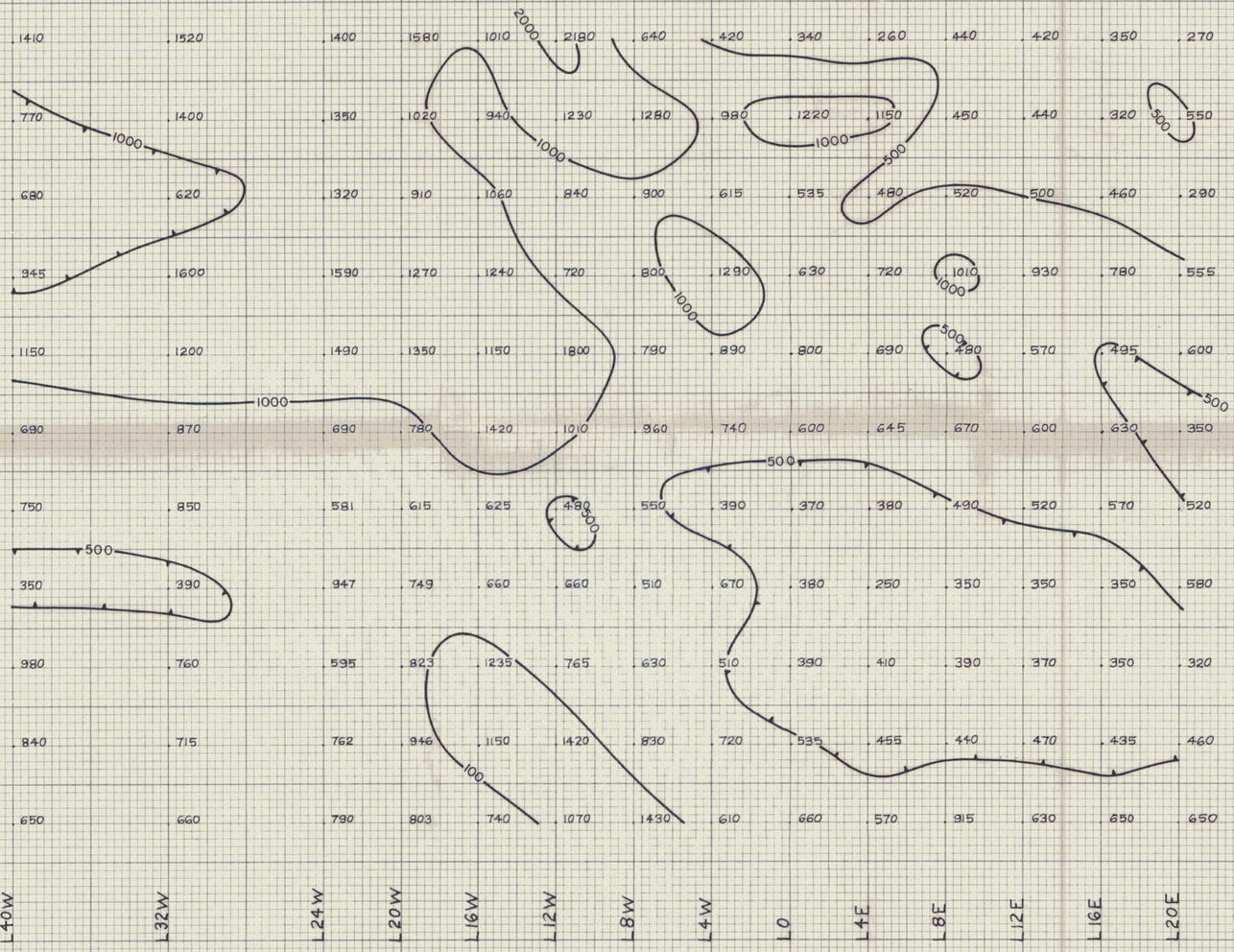
Instruments:

"CC" CLAIM GROUP

PLATE IV

SURVEY BY D.M. & D.G. | PLOTTED BY D.M.

DATE AUG. 1975 | GEOTERREX PROJECT No. 85-386



SURVEYED & COMPILED BY
geoterrex ltd

FOR
AMOCO CANADA PET. CO. LTD.
MINING DIVISION

RESISTIVITY CONTOUR PLAN a = 400' n = 2

Scales: 1" = 400 FEET

CONTOUR INTERVAL - LOGARITHMIC (1, 2, 5, 10, ...)

Instruments:

"CC" CLAIM GROUP

PLATE V

SURVEY BY D.M. & D.G. PLOTTED BY D.M.

DATE AUG. 1975 GEOTERREX PROJECT No 85-286

C.C.2.
90724

4
90726

6
90728

8
90730

10
90955

12
90957

C.C.1.
90723

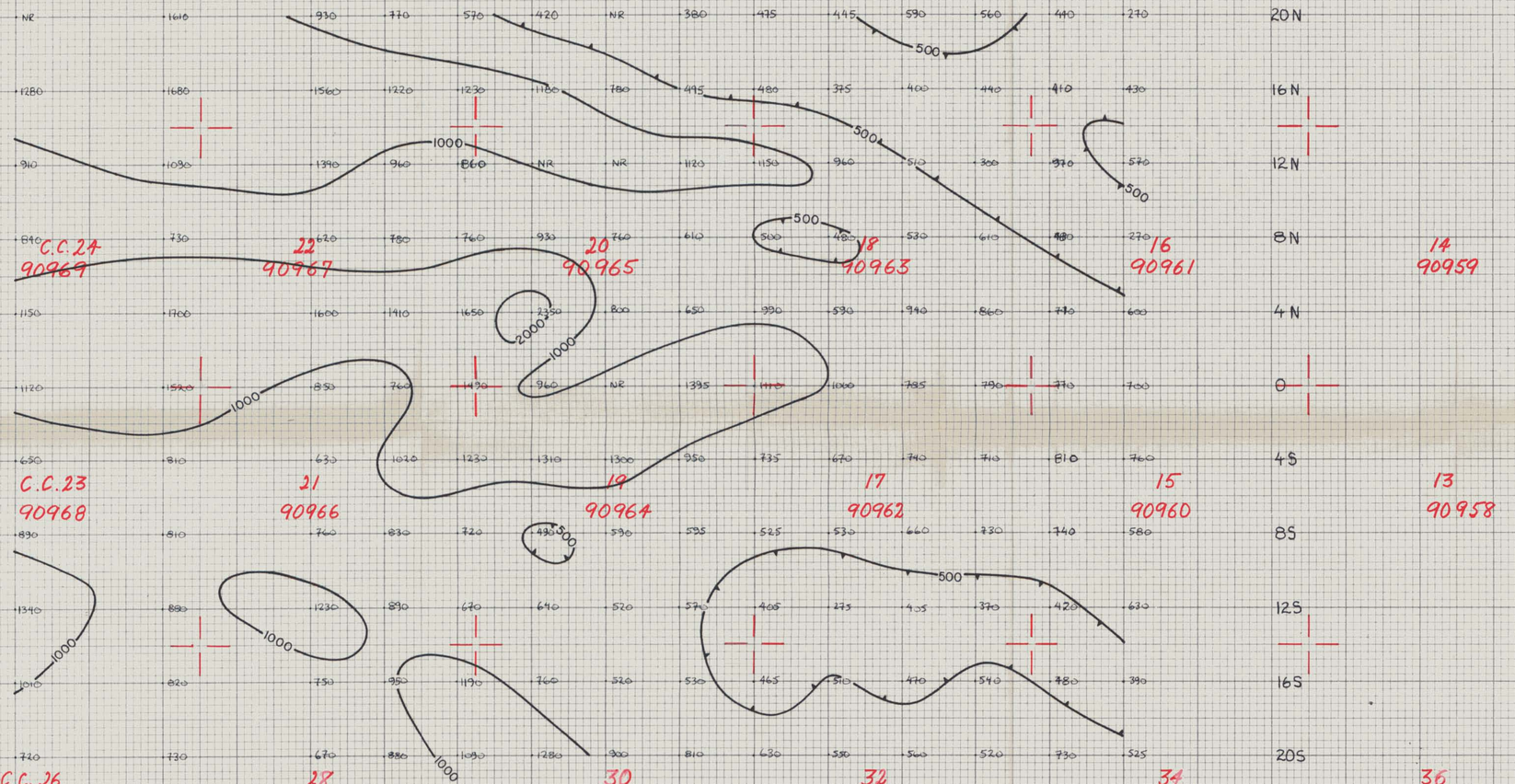
3
90725

5
90727

7
90729

9
90954

11
90956



C.C.24
90969

22
90967

20
90965

18
90963

16
90961

14
90959

C.C.23
90968

21
90966

19
90964

17
90962

15
90960

13
90958

C.C.26
90971

28
90973

30
90975

32
90977

34
90732

36
90734

C.C.25
90975

27
90972

29
90974

31
90976

33
90731

35
90733

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AMOCO CANADA PET. CO. LTD.
MINING DIVISION

RESISTIVITY CONTOUR PLAN a = 400' n = 3

Scales: 1" = 400 FEET

CONTOUR INTERVAL: LOGARITHMIC (1, 2, 5, 10, ...)

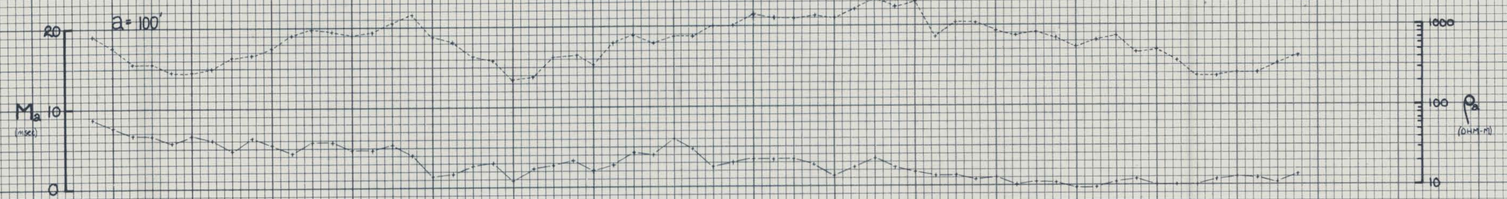
Instruments:

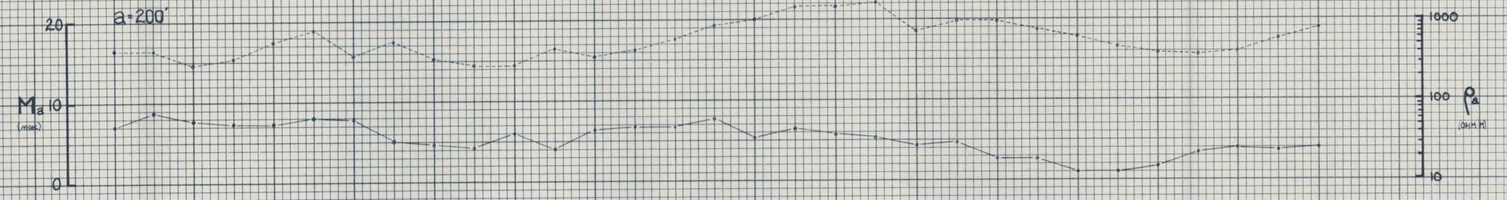
"CC" CLAIM GROUP

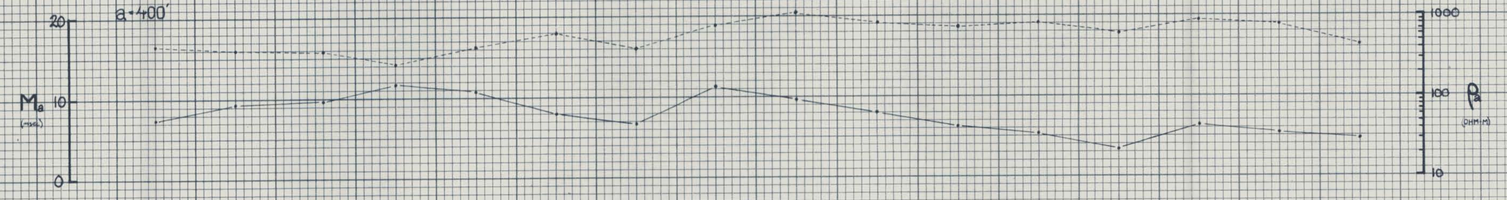
PLATE VI

SURVEY BY D.M. & D.G. PLOTTED BY D.M.

DATE AUG. 1975 GEOTERREX PROJECT No. 85-186







SURVEYED & COMPILED BY
geoterrex ltd

FOR
AMOCO CANADA
PETROLEUM CO. LTD.

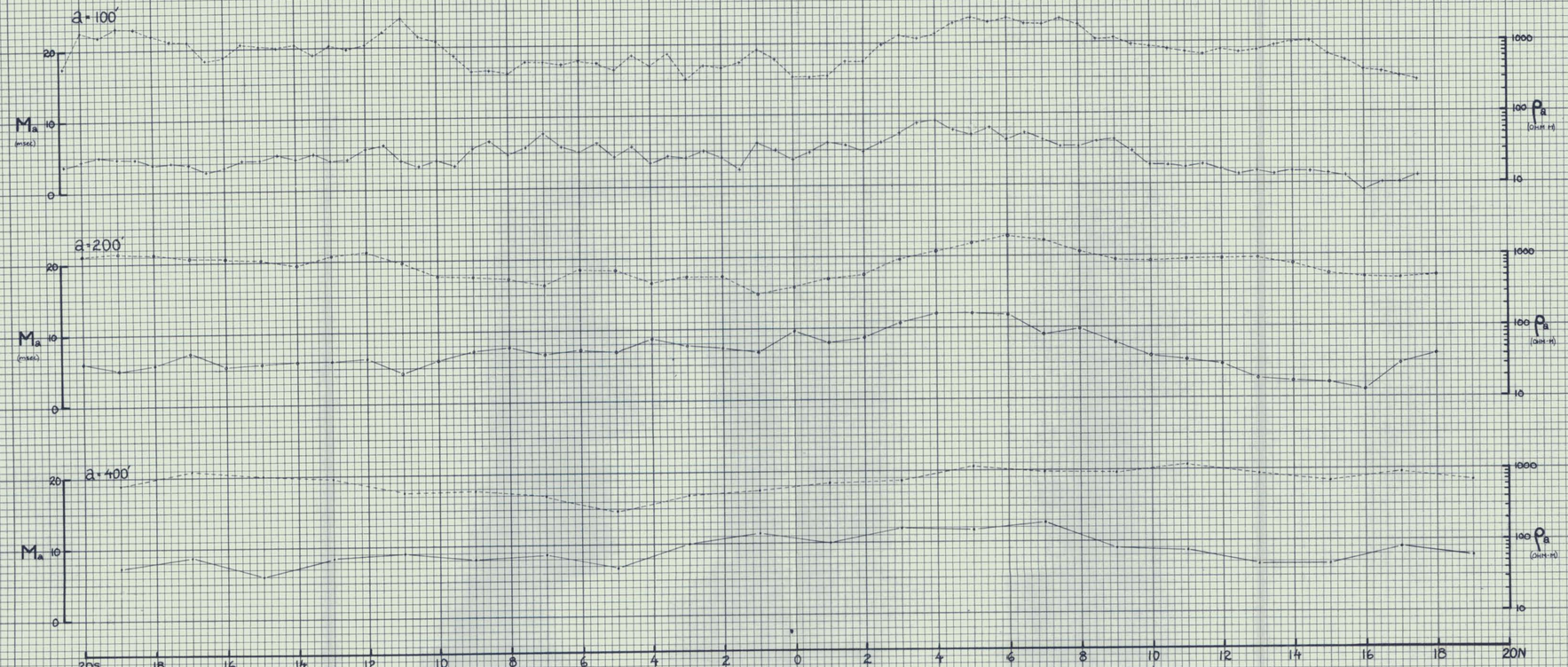
POLE DIPOLE ARRAY DETAILING n = 1 LINE 0

Scales: 1" : 200'
1" : 10 milliseconds
1" : resistivity logarithmic cycle

"CC" CLAIM GROUP

PLATE VII

SURVEY BY: P.G. & D.M. | PLOTTED BY: D.M.
DATE: AUG. 1975 | GEOTERREX PROJECT No. 85-386



SURVEYED & COMPILED BY
geoterrex ltd

FOR
AMOCO CANADA
PETROLEUM CO. LTD.

POLE DIPOLE DETAILING n=1

LINE 8W

Scales: 1": 200'
1": 10 milliseconds
1": resistivity logarithmic cycle

"CC" CLAIM GROUP

PLATE VIII

SURVEY BY: D.M. & D.G.
DATE: AUG. 1975

PLOTTED BY: D. M.
GEOTERREX PROJECT No. 80-38