REPORT ON

INDUCED POLARIZATION SURVEY

FOR

AMOCO CANADA PETROLEUM COMPANY LIMITED

ON

THE "PATT" CLAIM GROUP
138° 35'W, 62° 30'N

WHITEHORSE MINING DISTRICT
YUKON TERRITORIES

BY

GEOTERREX LIMITED

Project 85-386

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $15,996.00

July 8, 1975

L. WILSON, B.A.
Resident Geologist

P. NORGARD, P. Eng.
Geophysicist

Considered as representation work under Section 53 (4)(a) of the Quartz Mining Act.

OTTAWA, ONTARIO
SEPTEMBER, 1975

Supervising Mining Recorder

for Commissioner of Yukon Territory
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ACCOMPANYING THIS REPORT

"PATT" CLAIM GROUP

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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 "PATT" claims which are located at latitude 62° 30'N and longitude 138° 35'W at the headwaters of Pattison Creek. The property is at an elevation of about 4500 feet. Induced polarization work was completed on claims 1-48 inclusive. The grid layout on the claim groups 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.

<table>
<thead>
<tr>
<th>Name and Address</th>
<th>Production Days</th>
<th>Standby Days</th>
<th>Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>David C. McManus, Geophysicist</td>
<td>16</td>
<td>2½</td>
<td></td>
</tr>
<tr>
<td>2060 Walkley Road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ottawa, Ontario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David Garrard, Transmitter Operator</td>
<td>3</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2060 Walkley Road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ottawa, Ontario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lloyd M. Wilson, Geophysicist</td>
<td>13</td>
<td>2½</td>
<td>1</td>
</tr>
<tr>
<td>905 - 2470 Southvale Cres.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ottawa, Ontario</td>
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<td></td>
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</tbody>
</table>

In addition Mr. Peer Norgaard, Geoterrex manager of Ground Geophysics spent one day on a supervisory visit to the field operation.
Three geophysical field assistants and all camping facilities, subsistence, 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 Patt claim group is as follows:

i) Mob-Demob 746.67
ii) Survey charge: 16 Production days @ $365 5840.00
    2½ Standby Days @ 275 687.50
iii) Interpretation Report 400.00

Total 7674.17
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
ELLIOIT 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:

$$\rho_a = \frac{V_p}{I_a} \cdot K$$

Where

- $\rho_a$ is the apparent resistivity in ohm-metres
- $V_p$ is the primary voltage in volts
- $I_a$ 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 \( n=1, 2, 3 \ldots \) etc.; \( n \) is the distance between the potential dipole and the moving current electrode.

The apparent chargeability, \( M_a \), 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

Lines 0 through 44N which extend east to station 45E all cover part of a zone of very high apparent chargeabilities located east of station 32E. Apparent chargeabilities as high as 50.0 milliseconds were noted within this zone but as this anomalous area apparently corresponds to a formation of sericite schist and the polarization values thus could be caused by a "membrane" effect it is of little interest considering the exploration objective here. Throughout the remainder of the area two distinct levels of chargeabilities are apparent namely a background level of 8.0 - 9.0 milliseconds and a zone located in the central and extreme northern and southern areas of 10.0 - 14.0 milliseconds. A change in level of this order is rather subtle to be classified as definitely anomalous since such a change could be caused merely by a change in lithology or by a thinning of the overburden. The latter phenomenon is suggested at least in the central portion of the grid where apparent resistivities of 15,000 - 20,000 ohm meters are noted in places. Detailed work as specified by Amoco completed along line 12S indeed suggests a depth of overburden of less than 50 ft. in the region of 4E - 6E.

The detailed work on line 4N clearly shows the two apparent chargeability levels especially on the higher resolution data obtained using the 100 ft. and 200 ft. electrode arrays which shows a distinct step occurring at about 1 + 50E.
The depth to the material west of 1+50E responsible for this "step" is estimated to be of the order of 100 ft.

Respectfully submitted,

Lloyd Wilson, B.A.
Geophysicist.

Peer Norgaard, P. Eng.
Senior Geophysicist.
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

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

POLE-DIPOLE ELECTRODE CONFIGURATIONS.
NEWMONT - TYPE TIME DOMAIN WAVE FORMS AND QUANTITIES MEASURED
Input Impedance
50 or 60 Hz Powerline Rejection
Primary Voltage Range
Accuracy of Vp Measurement
Vs/Vp Range
Vs/Vp Accuracy
Primary SP Buckout Range
Automatic SP Tracking Range
Continuity Meter Reading
Required Stability of Transmitter Timing
Operating Temperature Range
Dimensions
Weight, Complete With Lid and Batteries
Power Supply

3.3 megohms
-50 db (300x)
300 microvolts to 40 volts in 10 ranges
± 3% of full scale
2% and 10% (20 and 100 per mil) full scale
3% of full scale
± 1 volt
6 x Vp, maximum ± 1 volt
0 - 500 k ohms
Need only exceed measuring program selected (1 second or 2 seconds)
-30°C to + 60°C
31 cm x 15 cm x 17 cm
3.6 kg
4 D cells; estimated battery life
2 months intermittent duty at 25°C
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°C to +60°C (+5°F to 140°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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Output voltage</td>
<td>125 volts</td>
</tr>
<tr>
<td>frequency</td>
<td>400 Hz</td>
</tr>
<tr>
<td>power</td>
<td>2.5 KVA</td>
</tr>
</tbody>
</table>

Engine

Briggs & Stratton 7 HP
**INDUCED POLARIZATION TRANSMITTER**

**2.5 KW SYSTEM**

<table>
<thead>
<tr>
<th><strong>Output</strong></th>
<th>300-5000 volts DC in 8 steps 3 amps maximum</th>
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</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td>3 phase 400 cps 115 volt 2.75 KVA</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>2 ranges</td>
</tr>
<tr>
<td><strong>Current Meter</strong></td>
<td>0-1.5 amps and 0-3 amps ± 2%</td>
</tr>
<tr>
<td><strong>Dummy Load</strong></td>
<td>2 level - 1750 watts and 500 watts</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>21&quot; x 17&quot; x 11(\frac{1}{2})&quot; (53.1 cm x 43.2 cm x 29.3 cm)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Console 50 lbs. (22.7 kg)  Shipping weight 75 lbs. (34.0 kg)</td>
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<tr>
<td><strong>MOTOR GENERATOR SET</strong></td>
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<tr>
<td><strong>Output</strong></td>
<td>2.75 KW, 120 volts 400 cycle 3 phase 13.8 amps / phase</td>
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<tr>
<td><strong>Engine</strong></td>
<td>Briggs and Stratton 6 HP at 3600 RPM</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>Capacity: 0.92 Imperial Gals. (4.1 litres). Consumption: Approximately 1.2 lbs / KWH (.5 kg / KWH)</td>
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<tr>
<td><strong>Alternator</strong></td>
<td>6000 RPM Belt Driven. Sealed bearing, rotating field, 70 lbs. approximately.</td>
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<tr>
<td>PATT GROUP 1 to 48</td>
<td>LIST 2</td>
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<tr>
<td>Y 907 35</td>
<td>PATT 17</td>
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<td>36</td>
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<td>15</td>
</tr>
<tr>
<td>Y 909 93</td>
<td>PATT 16</td>
</tr>
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</table>
LIST OF EXPENDITURES INCURRED

I. P. Survey (Geoterrex) $  7,674.17

Contract helpers (Larry Smith) 50% of $5880. 2,940.00

Line Cutting (Larry Smith) 20.5 m. @ $125. 2,562.50

Aircraft 50% of 15 hrs. @ $300/hr. 2,250.00

Food 50% of $1,141.03 570.00

TOTAL APPLICABLE COSTS $ 15,996.00

Survey Cost per claim (48 claims) $ 333.25

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

[Signature]
Notary Public

[Signature]
Paul Maingot
Regional Geologist
Amoco Canada Petroleum Company