GEOPHYSICAL REPORT

on the

Toe Group of Claims

Centered 2 miles West of Paradise Lake

2 miles Northeast of The Wart Mountain

Nicola M.D.

British Columbia

N.T.S. 92H/16W

Latitude 120°20' West: Longitude 49°55' North

Owned by

Work done between July 9 and July 7, 1968.

Ву

D.R. Cochrane, P.Eng.

Vancouver, B. C.

July 15, 1968.



GEO-X SURVE

VANCOUVER, CANADA

1589

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INTRODUCTION

Between June 9 and July 7, 1968 a Geo-X Surveys field crew completed just over 12 line miles of coincident induced polarization, resistivity and self potential surveys on the Toe Group of mineral claims owned by Consolidated Skeena Mines Ltd.

This report describes the instrumentation - field procedures and discusses the results of the surveys.

LOCATION AND ACCESS

The Toe Group is centered 2 miles west of Paradise

Lake and 2 miles northeast of The Wart Mountain, Nicola
Merritt area. Normal access is by truck proceeding northeast

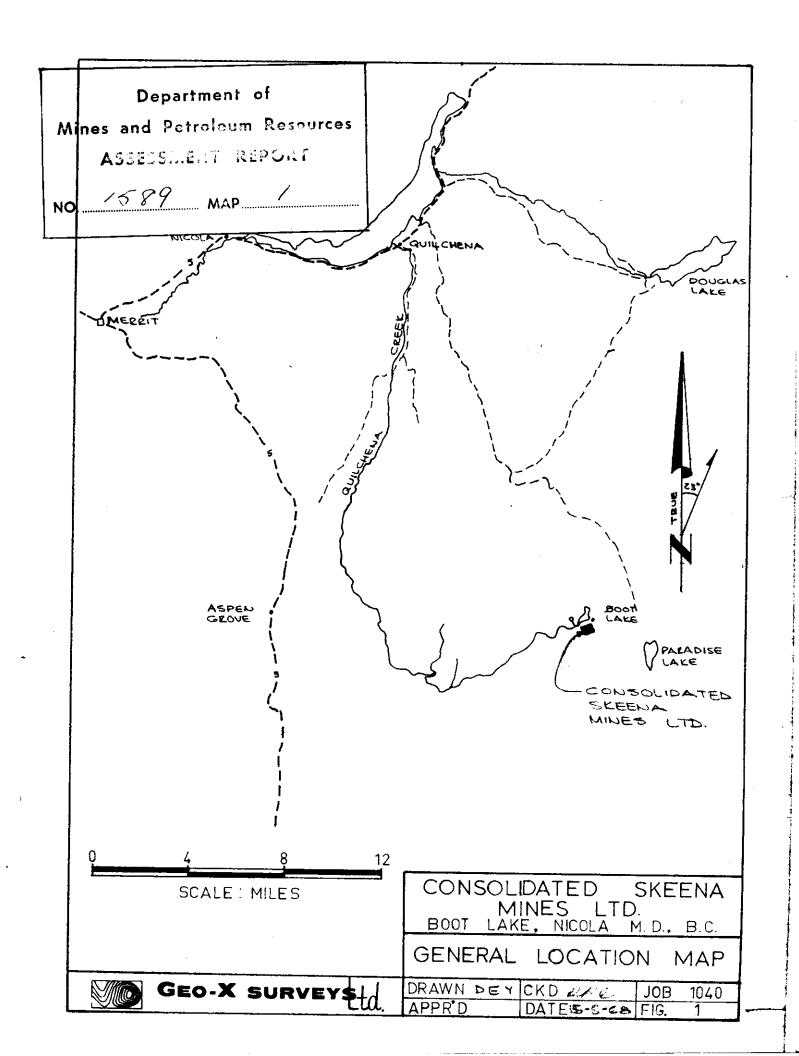
from Merritt, B.C. on Highway No. 5 for approximately 14 miles

to Quilchena; thence south on the Paradise gravel road to the

property.

CLAIMS AND OWNERSHIP

The Toe Group, Toe #1 to 81 inclusive, and Toe #1 to 5 Fractions form a contiguous block of mineral claims and are owned by Consolidated Skeena Mines Ltd. (N.P.L.), 1st Floor - 1033 West Pender Street, Vancouver, B.C. The claims, situated in the Nicola M.D. have the following record numbers:



<u>Claims</u>	Record Number
Toe #1 to 23, incl.	32702 to 32724, incl.
Toe #24 to 37, incl.	35336 to 35349, incl.
Toe #38 to 49, incl.	35550 to 35361, incl.
Toe #50 to 59, incl.	35378 to 35387, incl.
Toe #60 to 65, incl.	35464 to 35469, incl.
Toe #66 to 81, incl.	35874 to 35889, incl.
Toe #1 Fract., Toe #2 Fract.	35362 and 35363
Toe #3 Fract.	35470
Toe #4 Fract., Toe #5 Fract.	35890 and 35891

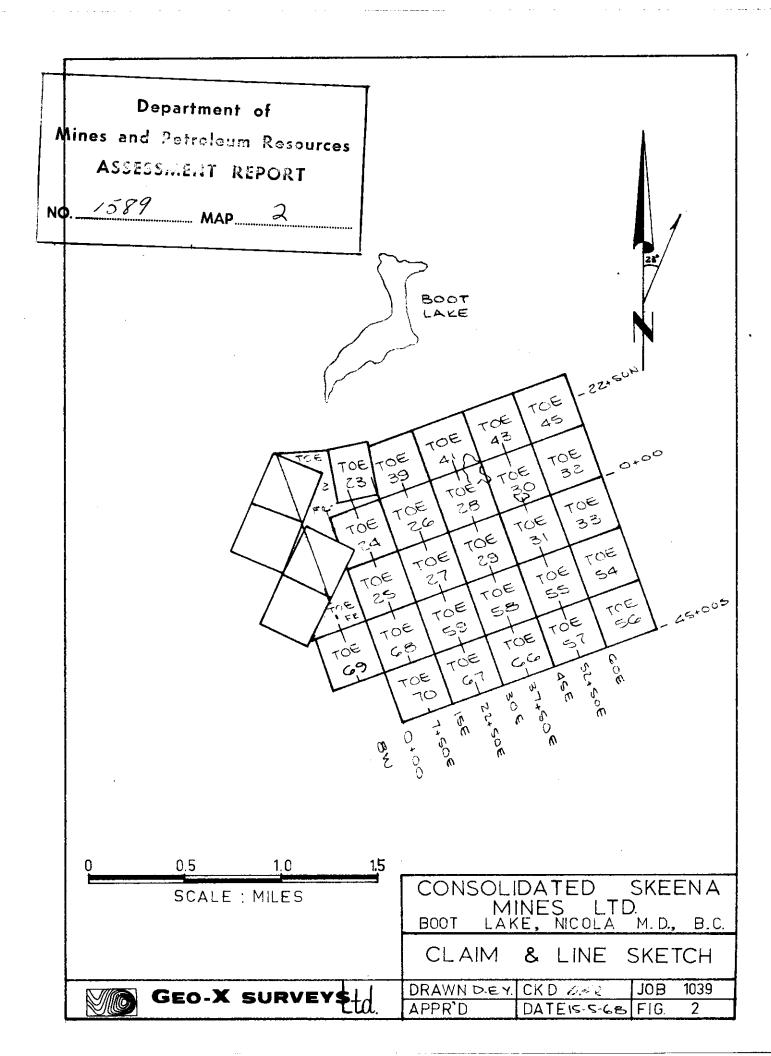
GEOMORPHOLOGY

The Toe Group lies within the Thompson Plateau subdivision of the Interior Plateau physiographic province of British Columbia. It is characterized by gently rolling uplands of relatively low relief. Prominences of more resistant rock rise to elevations of just over 5,500 feet above sea level in the general area - e.g. The Wart, Culmination Point. The plateau represents a late Tertiary erosion surface disected by rivers and streams.

Much of the area in and around the Toe Group is underlain by Upper Triasic Nicola Group intermediate volcanic rocks, intruded by Jurassic - Cretaceous Coast Acidic Intrusions.

To the east, this bedrock complex is overlain by relatively flatlying Miocene (?) sediments.

A thick mantle of glacial drift covers the majority of bedrock near the Toe Group. The specific area is characterized



by numerous pot hole lakes, eskers, moraines and sand-gravel drift that may have been caused by interlobate Pleistocene ice deposition.

The writer received the impression that there is considerable bedrock palaeotopographic relief, and considerable variation in the thickness of glacial drift.

GROUND CONTROL

A base line, running approximately 70° (true azimuth) was chained, flagged and numbered through the center of the claim group, and is coincident with the Toe 24 - 25 to Toe 32 - 33 claim location line. Cross lines were constructed at right angles, and at 7+50 foot intervals along the base line these lines were flagged, chained and stations numbered to approximately 20+00 North and to a maximum of 50+00 South. The induced polarization survey was completed within the above described ground control grid.

INDUCED POLARIZATION FIELD PROCEDURE

A Hewitt Enterprises pulse type induced polarization unit (HEW100) was used exclusively on the project. Instrument specifications are described in Appendix IV.

The standard Wenner electrode arrangement was employed with an "a" spacing (one third the distance between the current electrodes) of 200 feet. The field procedure is described over page.

Prior to voltage application, the self potential is observed and recorded (between the two pots, 200 feet apart).

Normally a voltage of 250, 500, or 1000 volts is impressed between the front and back aluminum electrodes which are spaced 600 feet apart. During the four second voltage application, the dV (impressed EMF in millivolts) and the I (current in milliamperes) is read and recorded.

0.3 seconds after the cessation of pulse, the residual voltage is integrated for 0.8 seconds, during which time the IP decay (in millivolts) is recorded. From these data, the self potential, apparent resistivity, and normalized induced polarization may be calculated, as described in Appendix V (Sample Calculations).

A number of pulses and subsequent readings were recorded at each station on standard field note forms. The results were compared and at least two complete sets of readings had to agree within 10% before the crew moved to the next set-up. The transit (station) interval was 200 feet along all cross lines, except in anomalous areas where 100 foot stations were established.

The field results were calculated, compared, and the most frequent and probable values at each station were tabulated, plotted and contoured.

Due to the varying thickness of overburden, several areas (especially the north ends of lines) necessitated double integration to obtain satisfactory I.P. During tandem integration

the signal is integrated for .8 or 1.6 seconds in one direction and for the same length of time in the opposite direction and then compared. Double or tandem integration allows the operator to measure the residual decay voltage, even though the balance point voltage may have shifted.

DISCUSSION OF RESULTS

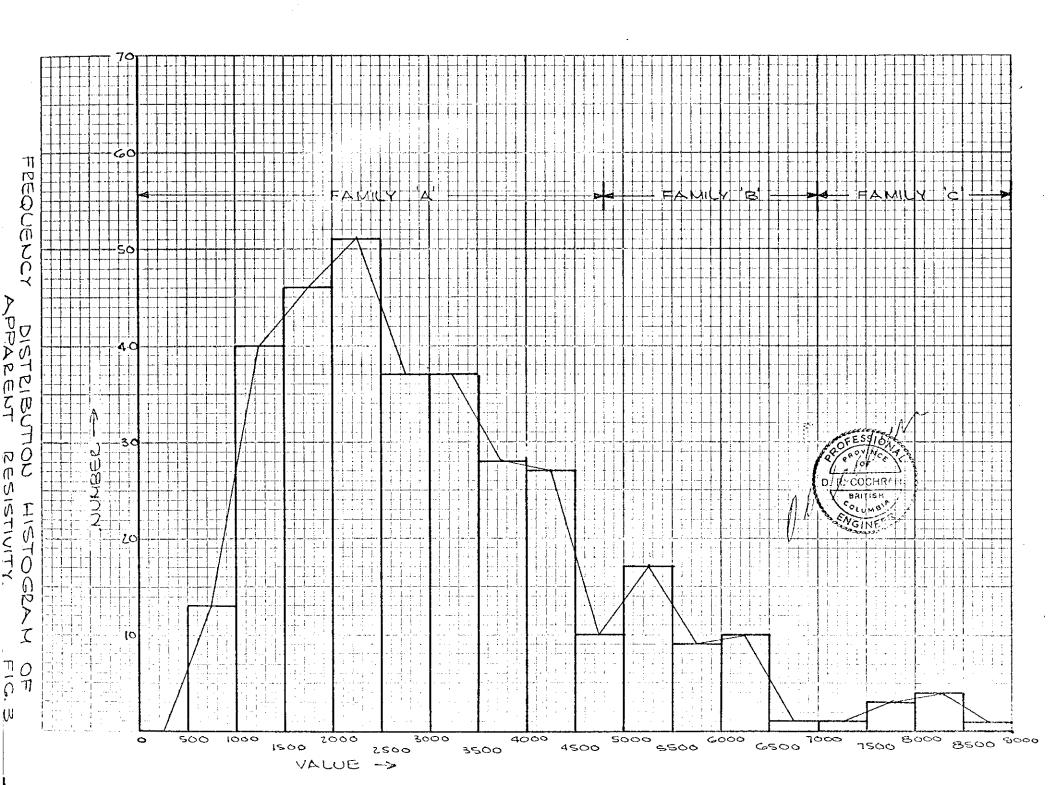
A discussion of the resistivity, self potential and induced polarization results follows:

(a) Resistivity

A total of 330 apparent resistivity values are plotted and contoured in Figure 5. The arithmetic mean of the total is 3,069 ohm feet. The minimum value was 586 ohm feet and the maximum value 8,800 ohm feet. A frequency Histogram is presented as Figure 3. Distribution is trimodal and positively skewed. For descriptive purposes the apparent resistivities can be grouped into three families, defined as follows:

<u>Family</u>	Range (in ohm feet)	Mode (in ohm feet)
A	0 to 5000	2001 to 2500
B	5001 to 7000	5001 to 5500
C	7001 to 9000	8001 to 8500

The apparent volume resistivity families separate
the area surveyed into three classes of rocks: Family
A representing rock types of good to moderate conductivity;



family B representing rocks of moderate to poor conductivity; and family C representing rocks of very poor conductivity.

The final apparent resistivity values are plotted, contoured and presented in the Map Pocket on Figure 5. General resistivity trends are east-west with a well developed intersecting north-south trend apparent along line 30+00 East. The majority of family B and C apparent resistivities lie in the southwest corner of the grid. Smaller patches of these high resistivities fall near 45+00 East and 12+00 South on line 45+00 East.

Low resistivity values less than 1000 ohm feet (high conductivity areas) are classed as anomalous. The most widespread resistivity low, designated resistivity Anomaly #1, is situated at the north end of lines 15+00 and 22+50 East. The lowest apparent resistivity value recorded (586 ohm feet) is situated immediately south of the main body of resistivity Anomaly #1.

Resistivity Anomaly #2 is centered on line 0+00 at 4+00 North. Two values recorded in this area were 945 and 860 ohm feet, and recheck values of 655 and 950 ohm feet were recorded later. Depth probing in this area revealed that the apparent resistivity values decrease at depth (rocks become more conductive).

Resistivity Anomaly #3 is centered at 30+00 north on line 8+00 west. Two consecutive values obtained were 860 and 867 ohm feet.

Six additional one reading low resistivity values were encountered, and are situated as follows:

Value (ohm feet)	$\underline{\mathtt{Line}}$	Station
910	8+00W	15+00N
961	15+00E	13+00N
586	15+00E	10+00N
838	60+00E	1+00N
966	60+00E	9+00S
878	60+00E	43+00S

(b) Self Potential Results

The self potential results (in millivolts) are plotted, contoured and presented in Figure 6 (Map Pocket).

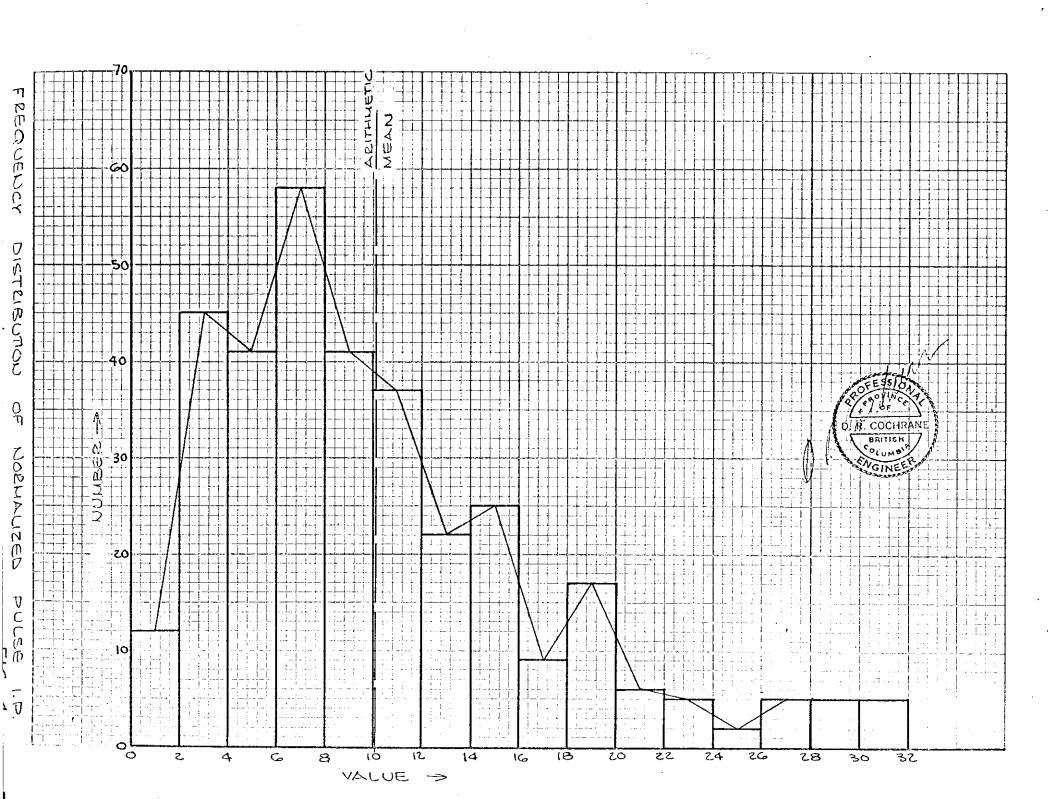
These values are relative, and represent the difference in potential (either positive or negative) between two stations 200 feet apart. Readings are plotted midway between the two stations.

Several first derivative (rapid rate change) anomalies were encountered, one of the largest between 25+00 and 27+00 North on line 22+50 east. Similar self potential rate change anomalies are plotted in conjunction with generalized I.P. and resistivity data in Figure 8.

(c) Induced Polarization Results

Normalized I.P. data are presented in contoured plan in Figure 7 (Map pocket). A frequency Histogram of values is shown in Figure 4.

The arithmetic mean of the normalized I.P. results is 10.1, (which may be considered background) and values



range from 0.0 to 40.0 millivolt seconds per volt (milliseconds). The frequency distribution of I.P. values is multimodal, with modes at 6.1 to 8.0; 14.1 to 16.0; 18.1 to 20.0; and 28.1 to 30.0. The standard deviation (root mean square of the deviations from the arithmetic mean) is 6.4. Thus, values above 16.5 milliseconds are considered possibly to probably The contoured I.P. data features strong anomalous. east-west lineation, with only minor cross trends situated along line 8+00 West and the north half of line 60+00 East. Above background I.P. response is somewhat sporatic, however, the wide cross line separation must be considered. The overall pattern is a birds eye effect, often quite typical response within intermediate volcanic bedrock areas. A total of seven areas of above background I.P. response have been numbered and priority rated. Several others are unnamed. The priority rating of I.P. anomalies depends on S.P., resistivity and observed frequency effect in addition to normalized I.P. response.

The area designated I.P. Anomaly 1 (A) is situated around 6+00 North on line 0+00. Anomaly 1 exhibits a coincident resistivity low (Resistivity Anomaly #2) and was the only area in which a perceptible frequency effect was observed (the latter often indicative of sulphides). Depth probing in the area revealed the I.P. response

increased with depth (maximum of 21.0 m/s at 100 feet, to 24.3 at 200 feet). I.P. Anomaly 1 (B) exhibits many of the characteristics of 1 (A), however distinct frequency effect was not observed.

- I.P. Anomaly 2 is centered immediately south of the base line between lines 37+50 and 45+00 East.

 Although the resistivity is moderately high, the maximum I.P. response (40.0 m/s) was the highest obtained on the property.
- I.P. Anomaly 3, centered near the south end of line 7+50 East contains three I.P. values above 20 milliseconds. The shape of this I.P. high is similar to the shape of a relative resistivity low. The highest I.P. value in Anomaly 3 (30.0 m/s) is coincident with the lowest resistivity value in the general area (1571 ohm feet). A self potential anomaly is situated immediately north. I.P. Anomaly #4 is centered near 35+00 South on line 60+00 East. The coincident resistivity is moderately low and a self potential low flanks the I.P. high to the south.
- I.P. Anomaly #5 is situated north of the base line on lines 37+50 East and 45+00 East. Maximum I.P. response (26.5 m/s) corresponds with minimum resistivity, (1616 ohm feet).
- I.P. Anomaly #6 is roughly 1000 feet north of #4 and contains three I.P. values of 20 milliseconds or

higher, is just south of a self potential low and has coincident apparent resistivity less than 2000 ohm feet.

I.P. Anomaly #7 is located at the extreme south end of line 15+00 East. Four consecutive I.P. values are above 16.4 milliseconds; however, the apparent resistivity and self potential response is normal.

Several other areas of above 16.4 milliseconds were discovered and are outlined in Figure 7.

SUMMARY AND CONCLUSIONS

Between June 9 and July 7, 1968 a Geo-X Surveys Ltd. field crew completed over 12 line miles of coincident induced polarization, resistivity and self potential surveys on the Toe Group of claims, Nicola Mining Division. The 81 claims and 5 fractions forming a contiguous block are owned by Consolidated Skeena Mines Ltd.

The claim group is apparently underlain predominantly by Nicola Group intermediate volcanics, with sections of what appears to be fairly thick glacial till (characterized by pot hole lakes, eskers, and sand-gravel moraines).

The survey was completed on a grid whose base line runs 70° (true azimuth) with cross lines at right angle to the base line spaced 7+50 feet apart.

A Hewitt Time Domain Pulse Type I.P. unit was utilized throughout the survey, with a Wenner electrode array. The "a" spacing was fixed at 200 feet, and the transit interval 200 or 100 feet.

Normally single pulse integration (0.8 seconds) was sufficient to obtain a series of satisfactory I.P. values; however, in certain areas of the Toe Group, double integration (at 1.6 seconds) was necessary due to field conditions. These areas were rechecked early in July.

A total of seven I.P. and three resistivity anomalies are discussed. The most interesting, geophysically, is I.P.

Anomaly #1 and coincident resitivity Anomaly #2. A depth probe in this area revealed increasing normalized I.P. and decreasing resistivity with depth.

Investigation of the causes of the seven I.P. anomalies is recommended.

Respect fully submitted,

D.R. Cookaro, P.Eng., Vancouver, B.C.

July 18, 1968.

APPENDIX I

PERSONNEL

Name:

COCHRANE, Donald Robert

Education:

B.Sc. - University of Toronto M.Sc.(Eng.) - Queen's University

Professional Associations:

Professional Engineer of British Columbia, Ontario and Saskatchewan.

Jr. member of C.I.M.M., member of G.A.C., M.A.C. Geological Engineer.

Experience:

Engaged in the profession since 1962 while employed with Noranda Exploration Co. Ltd., Quebec Cartier Mines Ltd., Meridian Exploration Syndicate.

Presently employed as Engineer with Geo-X Surveys Ltd.

Experience in West Indies, Latin America, South America, United States and Canada.

APPENDIX I

PERSONNEL

Name:

LEE, Wilfred Kwong

Education:

B.Sc.(Eng.) - Queen's University

M.Sc.(Geol.) - University of Washington,

Seattle.

Professional Associations:

Professional Engineer of British Columbia

and Ontario.

Member of G.S.A. Geological Engineer.

Experience:

Engaged in the profession since 1962 while employed with Earl-Jack Exploration Syndicate,

PreCambrian Mining Services Ltd., Inland

Copper Ltd., Westland Mines Ltd.

Presently employed as Engineer with Geo-X

Surveys Ltd.

Experience in Mexico, United States and Canada.

APPENDIX V

SAMPLE CALCULATIONS:

On standard field note forms, the following is recorded:

- 1. Property, data, operator, job number, page number, "a" spacing, transit interval and remarks;
- The line (X) and station (Y);
- R.C. (resistor-capacitor switch);
- 4. S.P. (self potential reading) either + or -
- 5. 1 (ma) current in milliamps
- 6. dV (mv) the impressed emf in millivolts;
- 7. IP (mv) the induced potential decoy voltage in millivolts

From the above field data (a) the apparent resistivity, and (b) the normalized IP is calculated as follows:

(a) Apparent Resistivity:

$$p = 2 TT \times "a" \times dV(mv)$$

$$I (ma)$$

from field data, line 0, station 10+00W:

$$2 \text{ TT x "a" where "a" = } 200' = 1257 \text{ dV(mv)} = 209$$

$$1 \text{ (ma)} = 50$$

$$p = 1257 \times 209 = 5250 \text{ ohm-feet}$$

(b) Normalized IP:

Normalized IP =
$$\frac{IP (mv) \times 100}{dV}$$

Sample Calculations - con't

(b) Normalized IP:

from field data, line 0, station 10+00W

1P
$$(mv) = 54$$

dV $(mv) = 209$

Normalized IP =
$$\frac{54 \times 100}{209}$$
 = 25.8 millivolts milliseconds or

APPENDIX IV

GENERAL SPECIFICATIONS OF THE HEWITT PULSE TYPE INDUCED POLARIZATION UNIT

Transmitter Unit

Current pulse period (D.C.Pulse Manual initiated timer	1 - 10 seconds
Current measuring ranges	0 - 500 0 - 1000 Milliamperes 0 - 5000
Internal voltage converter 27 volt D.C. 350 watt output with belt pack bayteries	250 volts D.C. 1000 Nominal

500 watts using 27 volt aircraft batteries.

Transmitter can switch up to 3 cmps at 1000 volts from generator or battery supply with resistive load. The switching is done internally in the transmitter unit. Remote control output can switch up to 10 kilowatts of power by using a separate control unit. A remote control cord is supplied with auxiliary equipment.

Receiver Unit

Self Potential Range	0 - 1000 millivolts 1 millivolt resolution
Impressed EMF ranges	0 - 30 0 - 100 millivolts 0 - 300 0 - 1000
Input terminals with three combination	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Induced Polarization ranges	0 - 30 0 - 60 millivolt 0 - 90 seconds
Integration time periods	.8 seconds 1.6 seconds

Appendix IV Page 2

Tandem Integration time periods

1.6 seconds

3.2 seconds

Input Filtering

3 ranges plas 4 integra-

tion combinations

Delay time from cessation of current

pulse .3 seconds

(Combined Photo Electric Coupled Receiver and Transmitter)

Operation Temperature

-25° F - 120° F

POWER SUPPLY

Receiver Unit

4 Eveready El36 Mercury Batteries

2 Eveready El34 Mercury Betteries

2 Eveready E401 Mercury Datteries

Transmitter Unit

Sealed Rechargeable 8 amp. hr. belt pack capable of driving the converter

at 350 watts for a minimum of one day's operation before recharge.

Manufactured by Hewitt Enterprises, Box 978A, Sandy, Utah, 84070 Phone: 801 571-0157

APPENDIX I

PERSONNEL

NAME:

MARK, David

EDUCATION:

Graduate of Lord Tweedsmuir Senior Secondary School in Surrey, B. C. - 1964.

B. Sc. with Geophysics Major - University of British Columbia - 1968.

EXPERIENCE:

1965 - Assistant Prospector four summer months for Tulsequah Syndicate (New Taku Mines & Homestake Mineral Development).

1966 - Magnetometer Operator and Assistant Prospector during four summer months for Mastodon Highland Bell Mines Ltd.

1967 - Party Chief during four months of summer work for Anaconda Co. (Canada) Ltd. doing soil sampling, prospecting, claim staking and geological mapping.

APPENDIX I

PERSONNEL

Name:

WILSON, Norman George Robert

Education:

Junior Matriculation equiv., Grade 13 Math. 2nd Year National Electrical Engineering

Experience:

12 years Royal Air Force - Radar Fitter. 6 months British Government Communications -Radio Technician.

Presently employed by Geo-X Surveys Ltd. since October 22, 1967 doing Induced Polarization, Electromagnetic and Magnetometer Surveys under Professional supervision.

APPENDIX II

Personnel and Dates Worked

The following Geo-X Surveys Ltd. personnel were employed on the Toe Group survey on the dates set out below.

Name	<u>Occupation</u>	Dates Worked
D.R. Cochrane	P.Eng. Supervision (Field) " " " Report preparation	June 9 and 10/68 July 5 to 7, incl. June 18, July 16, 17, and 18/68.
W.K. Lee	P.Eng. Report preparation	July 18/68
N. Wilson	Instrument Operator, Party Chief	June 9 to 15/68
D. Mark	Geophysicist, Field Helper Data Processing	July 5 to 7/68
M. Shue	Field Helper	July 5 to 7, incl.
D. Yip	Draughtsman	June - 23 hrs.

APPENDIX III

Cost Breakdown

As per Contract between Geo-X Surveys Ltd., 627 Hornby Street, Vancouver 1, B.C., and Consolidated Skeena Mines Ltd., 1st Floor, 1033 West Pender Street, Vancouver, B.C., and dated June 5, 1968 for Toe Group claims.

12.00 Line Miles I.P. Survey @ \$345.00/line mile \$4,140.00

0.27 Line Miles I.P. Survey @ \$325.00/line mile <u>\$ 87.75</u>

Total: 12.27 Line Miles \$4,227.75

S.L. Sandner, President. GEO-X SURVEYS LTD.

