93-K

Report on the Induced Polarization and Resistivity Survey on the Tachek Option Property Topley Landing Area, B.C.

January 1969.

David K. Fountain
P. Eng.

REPORT ON THE
INDUCED POLARIZATION
AND RESISTIVITY SURVEY
ON THE
TACHEK OPTION
OF
NORANDA EXPLORATION COMPANY, LIMITED
IN THE
TOPLEY LANDING AREA
OMINECA M. D., BRITISH COLUMBIA

BY

DAVID K. FOUNTAIN, P. Eng.

NAME AND LOCATION OF PROPERTY:

TACHEK OPTION PROPERTY, TOPLEY LANDING AREA

OMINECA MINING DIVISION, B. C. 54°N, 126°W, SE

DATE STARTED: NOVEMBER 1, 1968

DATE FINISHED: NOVEMBER 23, 1968

TABLE OF CONTENTS

McPHAR GEOPHYSICS

NOTES ON THE THEORY, METHOD OF FIELD OPERATION, AND PRESENTATION OF DATA FOR THE INDUCED POLARIZATION METHOD

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conduction.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains metallic minerals such as base metal sulphides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock, or soil, i.e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The group of minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization mentioned above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a d. c. current is allowed to flow through the rock; i. e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually, there is enough polarization in the form of excess ions at the interfaces, to appreciably reduce the amount of current flow through the metallic particle. This *polarization takes place at each of the infinite number of solution-metal* interfaces in a mineralized rock.

When the d. c. voltage used to create this d. c. current flow is cut off, the Coulomb forces between the charged ions forming the polarization cause them to return to their normal position. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference.

From an alternate viewpoint it can be seen that if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed. This is a consequence of the fact that the amount of current flowing through each metallic interface depends upon the length of time that current has been passing through it in one direction.

The values of the per cent frequency effect or F. E. are a measurement of the polarization in the rock mass. However, since the measurement of the degree of polarization is related to the apparent resistivity of the rock mass it is found that the metal factor values or M. F. are the most useful values in determining the amount of polarization present in the rock mass. The MF values are obtained by normalizing the F. E. values for varying resistivities.

The induced polarization measurement is perhaps the most powerful geophysical method for the direct detection of metallic sulphide mineralization, even when this mineralization is of very low concentration. The lower limit of volume per cent sulphide necessary to produce a recognizable IP anomaly will vary with the geometry and geologic environment of the source, and the method of executing the survey. However, sulphide mineralization of less than one per cent by volume has been detected by the IP method under proper geological conditions.

The greatest application of the IP method has been in the search for disseminated metallic sulphides of less than 20% by volume. However, it has also been used successfully in the search for massive sulphides in situations where, due to source geometry, depth of source, or low resistivity of surface layer, the EM method can not be successfully applied. The ability to differentiate ionic conductors, such as water filled shear zones, makes the IP method a useful tool in checking EM anomalies which are suspected of being due to these causes.

In normal field applications the IP method does not differentiate between the economically important metallic minerals such as chalcopyrite, chalcocite, molybdenite, galena, etc., and the other metallic minerals such as pyrite. The induced polarization effect is due to the total of all electronic conducting minerals in the rock mass. Other electronic conducting materials which can produce an IP response are magnetite, pyrolusite, graphite, and some forms of hematite.

In the field procedure, measurements on the surface are made in a way that allows the effects of lateral changes in the properties of the ground to be separated from the effects of vertical changes in the properties. Current is applied to the ground at two points in distance (X) apart. The potentials are measured at two other points (X) feet apart, in line with the current electrodes is an integer number (n) times the basic distance (X).

The measurements are made along a surveyed line, with a constant distance (nX) between the nearest current and potential electrodes. In most surveys, several traverses are made with various values of (n); i.e. (n) = 1, 2, 3, 4, etc. The kind of survey required (detailed or reconnaissance) decides the number of values of (n) used.

In plotting the results, the values of the apparent resistivity, apparent per cent frequency effect, and the apparent metal factor measured for each set of electrode positions are plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes. (See Figure A.) The resistivity values are plotted above the line as a mirror image of the metal factor values below. On a second line, below the metal factor values, are plotted the values of the per cent frequency effect. In some cases the values of per cent frequency effect are plotted as superscripts of the metal factor value. In this second case the frequency effect values are not contoured. The lateral displacement of a given value is determined by the location along the survey line of the center point between the current and potential electrodes. The distance of the value from the line is determined by the distance (nX) between the current and potential electrodes when the measurement was made.

The separation between sender and receiver electrodes is only one factor which determines the depth to which the ground is being sampled in any particular measurement. The plots then, when contoured, are not section maps of the electrical properties of the ground under the survey line. The interpretation of the results from any given survey must be carried out using the combined experience gained from field results, model study results and theoretical investigations. The position of the electrodes when anomalous values are measured is important in the interpretation.

In the field procedure, the interval over which the potential differences are measured is the same as the interval over which the electrodes are moved after a series of potential readings has been made. One of the advantages of the induced polarization method is that the same equipment can be used for both detailed and reconnaissance surveys merely by changing the distance (X) over which the electrodes are moved each time. In the past, intervals have been used ranging from 25 feet to 2000 feet for (X). In each case, the decision as to the distance (X) and the values of (n) to be used is largely determined by the expected size of the mineral deposit being sought, the size of the expected anomaly and the speed with which it is desired to progress.

The diagram in Figure A demonstrates the method used in plotting the results. Each value of the apparent resistivity, apparent metal factor, and apparent per cent frequency effect is plotted and identified by the position of the four electrodes when the measurement was made. It can be seen that the values measured for the larger values of (n) are plotted farther from the line indicating that the thickness of the layer of the earth that is being tested is greater than for the smaller values of (n); i.e. the depth of the measurement is increased. When the F.E. values are plotted as superscripts to the MF values the third section of data values is not presented and the F.E. values are not contoured.

METHOD USED IN PLOTTING DIPOLE-DIPOLE
INDUCED POLARIZATION AND RESISTIVITY RESULTS

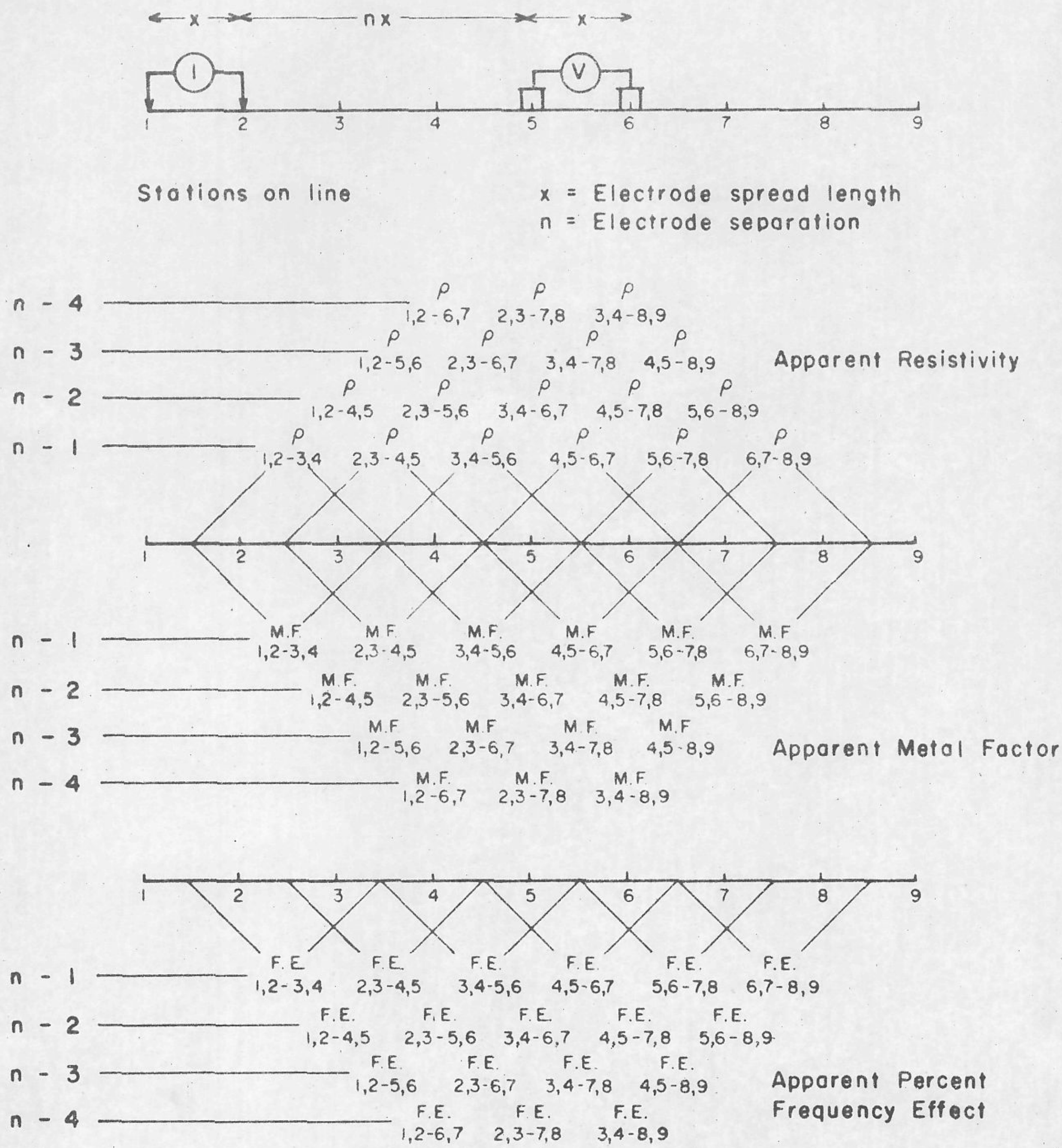


Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE TACHEK OPTION OF NORANDA EXPLORATION COMPANY, LIMITED IN THE TOPLEY LANDING AREA OMENICA M.D., BRITISH COLUMBIA

---

1. INTRODUCTION

An induced polarization and resistivity survey was carried out on the Tachek Option of Noranda Exploration Company, Limited in the Topley Landing Area, Omineca Mining Division, British Columbia during November, 1968.

The Tachek Option is located approximately six miles southwest from the settlement of Topley Landing on the road from Topley Landing on Babine Lake to the Village of Topley. The property lies in the northeast quadrant of the one degree quadrilateral whose southeast corner is 54° north latitutde and 126° west longitude. Access to the property is via road north from Topley which is located on provincial highway number 16 and the CNR line between Prince George and Smithers.

Prospecting and reconnaissance geological work has indicated showings of sulphide mineralization of possible economic significance within Tachek Creek. The IP survey was carried out over a portion of the property to attempt to outline the metallic mineralization and indicate the most favourable areas for further work. The property is mainly covered by overburden with only limited rock exposure occurring within portions of the creek bed where the showings were located.

2. PRESENTATION OF RESULTS

The induced polarization and resistivity results are shown on the following data plots in the manner described in the notes preceding this report.

Line 28N	200 foot spreads	Dwg. IP 5241-1
Line 32N	200 foot spreads	Dwg. IP 5241-2
Line 36N	200 foot spreads	Dwg. IP 5241-3
Line 40N	200 foot spreads	Dwg. IP 5241-4
Line 44N	200 foot spreads	Dwg. IP 5241-5
Line 48N	200 foot spreads	Dwg. IP 5241-6
Line 52N	200 foot spreads	Dwg. IP 5241-7
Line 56N	200 foot spreads	Dwg. IP 4241-8
Line 60N	200 foot spreads	Dwg. IP 5241-9
Line 64N	200 foot spreads	Dwg. IP 5241-10
Line 68N	200 foot spreads	Dwg. IP 5241-11
Line 72N	200 foot spreads	Dwg. IP 5241-12

Line 76N 200 foot spreads Dwg. IP 5241-13

The IP survey was carried out using a McPhar Variable Frequency IP unit. The dipole-dipole electrode configuration was employed using 200 foot dipoles and reading three dipole separations (n=1, 2, 3). Frequencies of 0.3 cps and 5.0 cps were used throughout the survey.

Enclosed with this report is Dwg. I.P.P. 3349, a plan map of the area surveyed at a scale of 1"=400'. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on this plan map as well as the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the induced polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pinpoint the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the spread length; i.e. when using 200 foot spreads the position of a narrow sulphide body can only be determined to lie between two stations 200 feet apart. In order to locate sources at some depth, larger spreads must be used, with a corresponding increase in the uncertainties of location. Therefore, while the centre of the indicated anomaly probably corresponds fairly well with source, the length of the indicated anomaly along the line should not be taken to represent the exact edges of the anomalous material.

3. DISCUSSION OF RESULTS

The results of the IP survey have not outlined any distinct anomalies on the area surveyed which would indicate relatively large concentrations of disseminated metallic mineralization. Several weak anomalies have been indicated which would suggest sources either containing a low percentage of metallic mineralization or being narrow relative to dipole size (i.e. less than 200 feet in width).

Line 28N

A weak, possible anomaly is indicated between 66+00E and 64+00E. The anomaly pattern is not complete to the west due to lack of effective survey coverage.

Line 32N

Weak, possible anomalies are indicated centred at 70+00E and between 80+00E and 82+00E. The latter pattern would indicate a shallow source and detail surveying employing shorter dipoles would assist in evaluating the source of the anomaly.

Line 40N

A probable, narrow (relative to dipole size) anomaly is indicated centred between 66+00E and 68+00E. The pattern suggests a shallow source and detail surveying employing shorter dipoles would be required to properly evaluate the source. A weak, possible anomaly apparently related to a source in or near the creek is indicated between 61+00E and 74+00E.

A shallow, narrow, possible anomaly occurs between 92+00E and 94+00E which would require detail surveying employing shorter dipoles to properly evaluate it.

Line 44N

A probable anomaly is indicated between 87+00E and 91+00E. The anomaly pattern suggests a source buried about 100 feet.

Above background Metal Factor values occur in the area of 66+00E to 70+00E. However lack of significant apparent frequency effect response suggests that they are not due to metallic mineralization.

Line 48N

A weak, shallow, possible anomaly occurs centred at 70+00E with a possible deeper source indicated between 72+00E and 74+00E.

Line 52N

A probable source at a depth of about 100 feet is indicated beneath 66+00E. A second weak, shallow, possible anomaly is indicated centred at 70+00E. Both anomalies lie adjacent to Tachek Creek.

Line 56N

A probable anomaly is indicated between 62+00E and 67+00E. The stronger IP response occurs on the larger separations suggesting a source at depth. Surveying employing larger (300 foot) dipoles and reading four dipole separations (n=1, 2, 3, 4) would be required to test this.

Line 60N

A broad, possible anomaly is indicated between 65+00E and 70+00E. A narrow, distinct resistivity low centred between 68+00E and 70+00E suggests the possibility of a section of more concentrated metallic mineralization within the broader section of weakly disseminated mineralization.

Line 64N

A broad complex anomaly pattern is indicated between 71+00E and 75+00E which correlates with the anomaly on the line to the south. A narrow, probable anomaly occurs between 81+00E and 83+00E near Tachek Creek.

Line 68N

Due to the rugged terrain on this line there is some discrepancy between the station locations on the grid based upon horizontal chaining and the actual IP station locations which are determined by slope distance. The two station locations are indicated on the data strip for this line. Anomaly location is referred to as per the grid station location.

A probable anomaly is indicated between 68+00E and 71+00E which straddles the road. The anomaly pattern would indicate either a depth to the source of about 100 feet or a source lying off the line.

Shallow anomalies are indicated between 75+00E and 78+00E and between 88+00E and 90+00E.

Line 72N

A weak, shallow, possible anomaly is indicated between 86+00E and 88+00E which correlates with the creek.

Line 76N

A possible anomaly is indicated on this line centred between 66+00E and 68+00E. The anomaly pattern suggests a depth to the source of about 100 feet.

4. SUMMARY AND CONCLUSIONS

The results of the IP survey have not outlined any distinct anomalies which would indicate relatively large concentrations of disseminated metallic mineralization. Several weak anomalies have been located which would indicate sources either containing a low percentage of metallic mineralization or being narrow relative to dipole size. Detail surveying employing shorter dipoles would be required to properly evaluate these anomalies. See Appendix at the end of this report on "The Interpretation of Induced Polarization Anomalies from Relatively Small Sources".

One anomalous zone has been indicated which lies west of Base Line 80E and trends approximately northeast-southwest from about 76+00E on Line 68N to about 64+00E to 66+00E on Line 56N for an overall strike length of about 2, 300 feet. The magnitude of the anomalous IP response is not great suggesting only small percentages of disseminated metallic mineralization. The anomaly pattern on Line 56N suggests some depth to the source and detail surveying employing 300 foot dipoles and four dipole separations (n=1, 2, 3, 4) would appear warranted. Diamond drilling to test the area between 62+00E and 66+00E on Line 56N and the area between 72+00E and 75+00E on Line 64N would evaluate the significance of this anomalous IP zone.

McPHAR GEOPHYSICS LIMITED,

David K. Fountain, ~~P. Eng.~~,
Geophysicist.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1969

Dated: January 15, 1969.

APPENDIX
THE INTERPRETATION OF INDUCED POLARIZATION ANOMALIES FROM RELATIVELY SMALL SOURCES

The induced polarization method was originally developed to detect disseminated sulphides and has proven to be very successful in the search for "porphyry copper" deposits. In recent years we have found that the IP method can also be very useful in exploring for more concentrated deposits of limited size. This type of source gives sharp IP anomalies that are often difficult to interpret.

The anomalous patterns that develop on the contoured data plots will depend on the size, depth and position of the source and the relative size of the electrode interval. The data plots are not sections showing the electrical parameters of the ground. When the electrode interval (X) is appreciably greater than the width of the source, a large volume of unmineralized rock is averaged into each measurement. This is particularly true for the large values of the electrode separation (n).

The theoretical scale model results shown in Figure 1 and Figure 2 indicate the effect of depth. If the depth to the top of the source is small compared to the electrode interval (i. e. d X) the measurement for n = 1 will be anomalous. In Figure 1 the depth is 0. 5 units (X = 1. 0 units) and the n = 1 value is definitely anomalous; the pattern on the contoured data plot is typical for a relatively shallow, narrow, near-vertical tabular source. The results in Figure 2 are for the same source with the depth increased to 1. 5 units. Here the n = 1 value is not anomalous; the larger values of (n) are anomalous but the magnitudes are much lower than for the source at less depth.

When the electrode interval is greater than the width of the source, it is not possible to determine its width or exact position between the electrodes. The true IP effect within the source is also indeterminate; the anomaly from a very narrow source with a very large true IP effect will be much the same as that from a zone with twice the width and 1/2 the true IP effect. The theoretical scale model data shown in Figure 3 and Figure 4 demonstrate this problem. The depth and position of the source are unchanged but the width and true IP effect are varied. The anomalous patterns and magnitudes are essentially the same, hence the data are insufficient to evaluate the source completely.

The normal practise is to indicate the IP anomalies by solid, broken, or dashed bars, depending upon their degree of distinctiveness. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured. As illustrated in Figure 1, Figure 2, Figure 3 and Figure 4, no anomaly can be located with more accuracy than the spread length. While the centre of the solid bar indicating the anomaly corresponds fairly well with the source, the length of the bar should not be taken to represent the exact edges of the anomalous material.

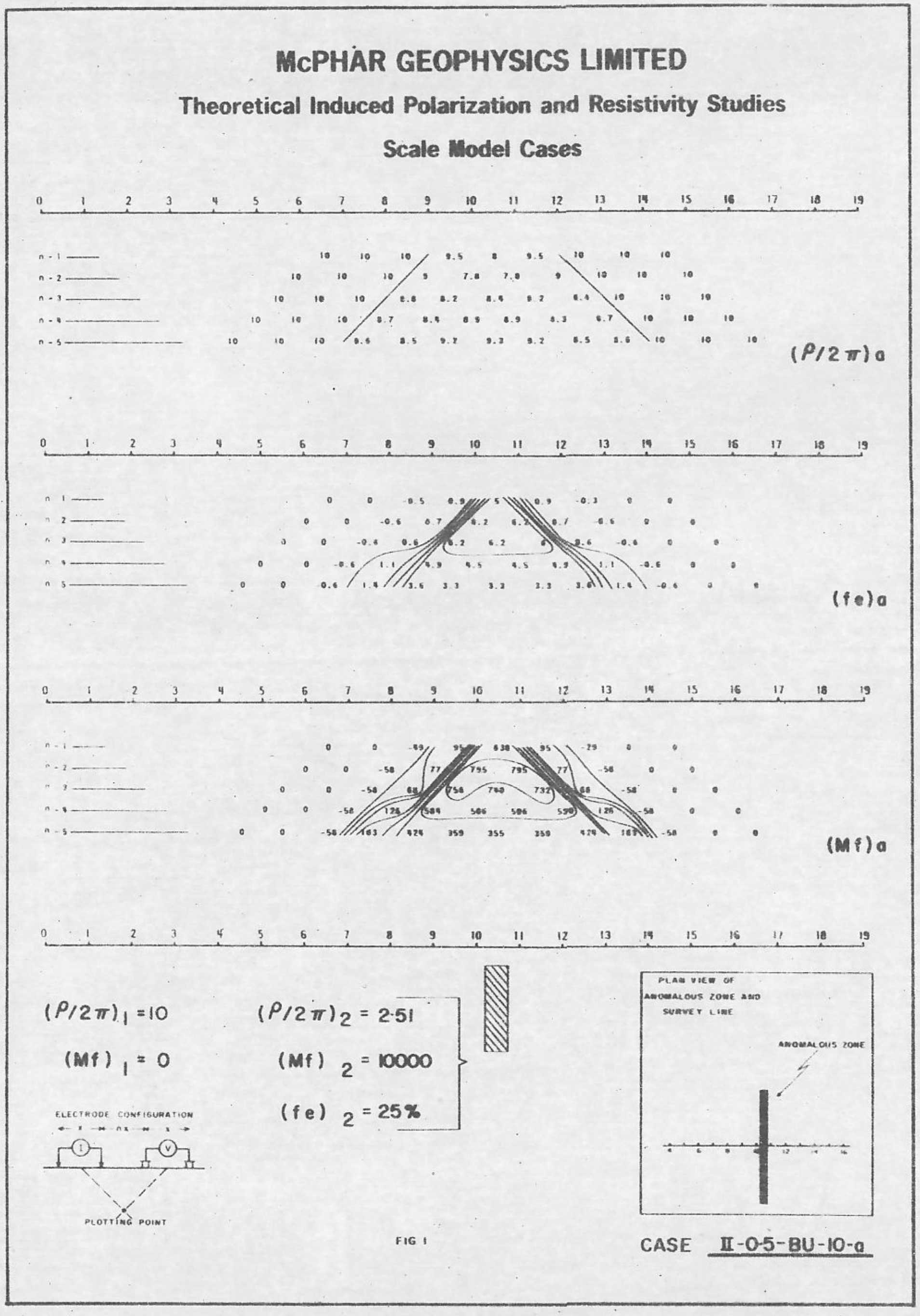
If the source is shallow, the anomaly can be better evaluated using a shorter electrode interval. When the electrode interval used approaches the width of the source, the apparent effects measured will be nearly equal to the true effects within the source. When there is some depth to the top of the source, it is not possible to use electrode intervals that are much less than the depth to the source. In this situation, one must realize that a definite ambiguity exists regarding the width of the source and the IP effect within the source.

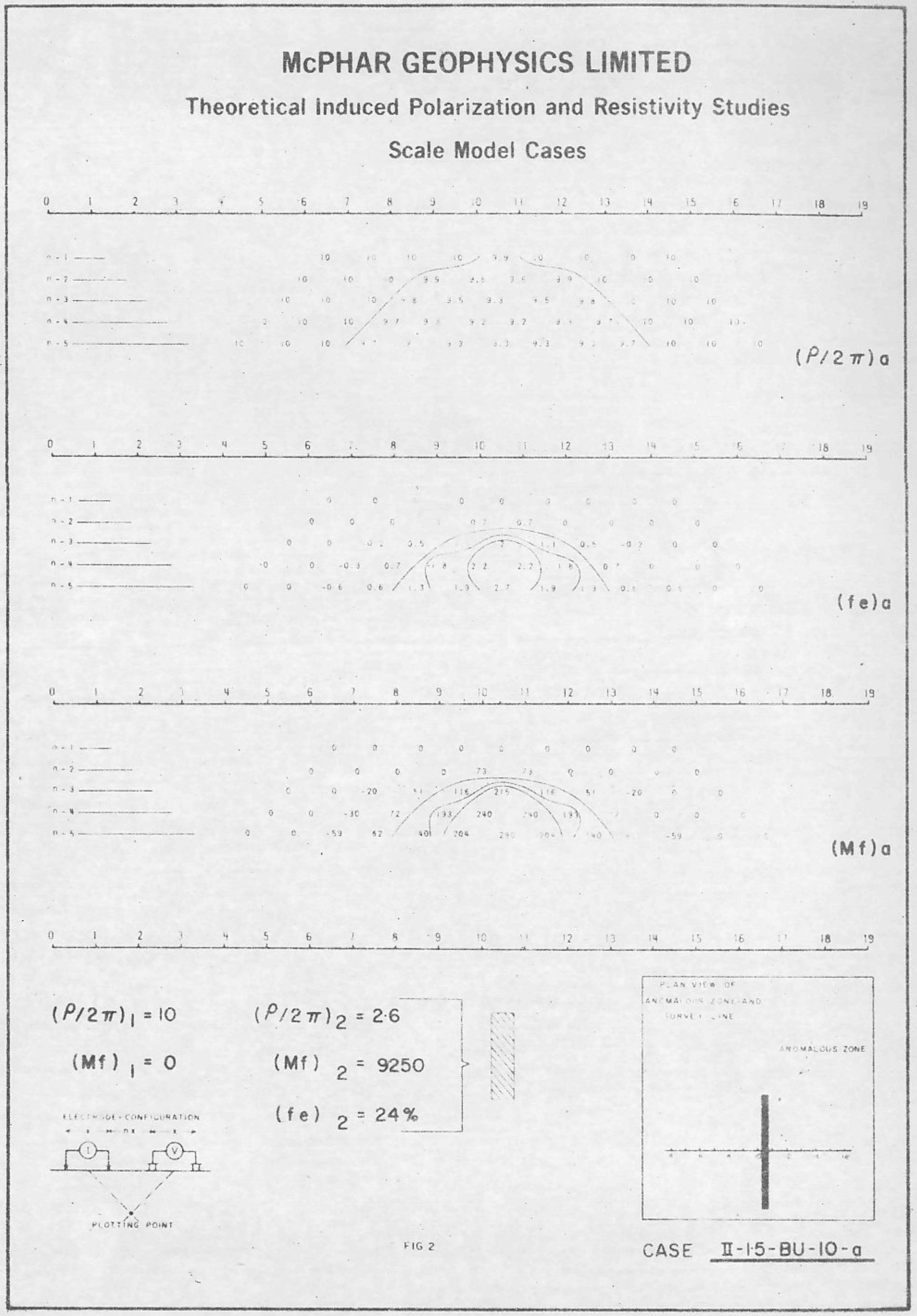
Our experience has confirmed the desirability of doing detail. When a reconnaissance IP survey using a relatively large electrode interval indicates the presence of a narrow, shallow source, detail with shorter electrode intervals is necessary in order to better locate, and evaluate, the source. The data of most usefulness is obtained when the maximum apparent IP effect is measured for n = 2 or n = 3. For instance, an anomaly originally located using X = 300' may be checked with X = 200' and then X = 100'. The data with X = 100' will be quite different from the original reconnaissance results with X = 300'.

The data shown in Figure 5 and Figure 6 are field results from a greenstone area in Quebec. The expected sources were narrow (less than 30' in width) zones of massive, high-grade, zinc-silver ore. An electrode interval of 200' was used for the reconnaissance survey in order to keep the rate of progress at an acceptable level. The anomalies located were low in magnitude.

The very weak, shallow anomaly shown in Figure 5 is typical of those located by the X = 200' reconnaissance survey. Several anomalies of this type were detailed using shorter electrode intervals. In most cases the detail measurements suggested broad zones of very weak mineralization. However, in the case of the source at 20N to 22N, the measurements with shorter electrode intervals confirmed the presence of a strong, narrow source. The X = 50' results are shown in Figure 6. Subsequent drilling has shown the source to be 12.5' of massive sulphide mineralization containing significant zinc and silver values.

The change in the anomaly that results when the electrode interval is reduced is not unusual. The X = 50' data more accurately locates the narrow source, and permits the geophysicist to make a better evaluation of its importance. The completion of this type of detail is very important, in order to get the maximum usefulness from a reconnaissance IP survey.


McPHAR GEOPHYSICS LIMITED
Theoretical Induced Polarization and Resistivity Studies
Scale Model Cases
(ρ/2π)a
(fe)a
(Mf)a
(ρ/2π)₁ = 10
(Mf)₁ = 0
(ρ/2π)₂ = 2·51
(Mf)₂ = 10000
(fe)₂ = 25%
PLAN VIEW OF ANOMALOUS ZONE AND SURVEY LINE
ANOMALOUS ZONE
ELECTRODE CONFIGURATION
PLOTTING POINT
CASE II-0·5-BU-10-a
FIG 1


McPHAR GEOPHYSICS LIMITED
Theoretical Induced Polarization and Resistivity Studies
Scale Model Cases
(ρ/2π)a
(fe)a
(Mf)a
(ρ/2π)₁ = 10
(Mf)₁ = 0
(ρ/2π)₂ = 2·6
(Mf)₂ = 9250
(fe)₂ = 24%
PLAN VIEW OF ANOMALOUS ZONE AND SURVEY LINE
ANOMALOUS ZONE
ELECTRODE CONFIGURATION
PLOTTING POINT
CASE II-1·5-BU-10-a
FIG 2

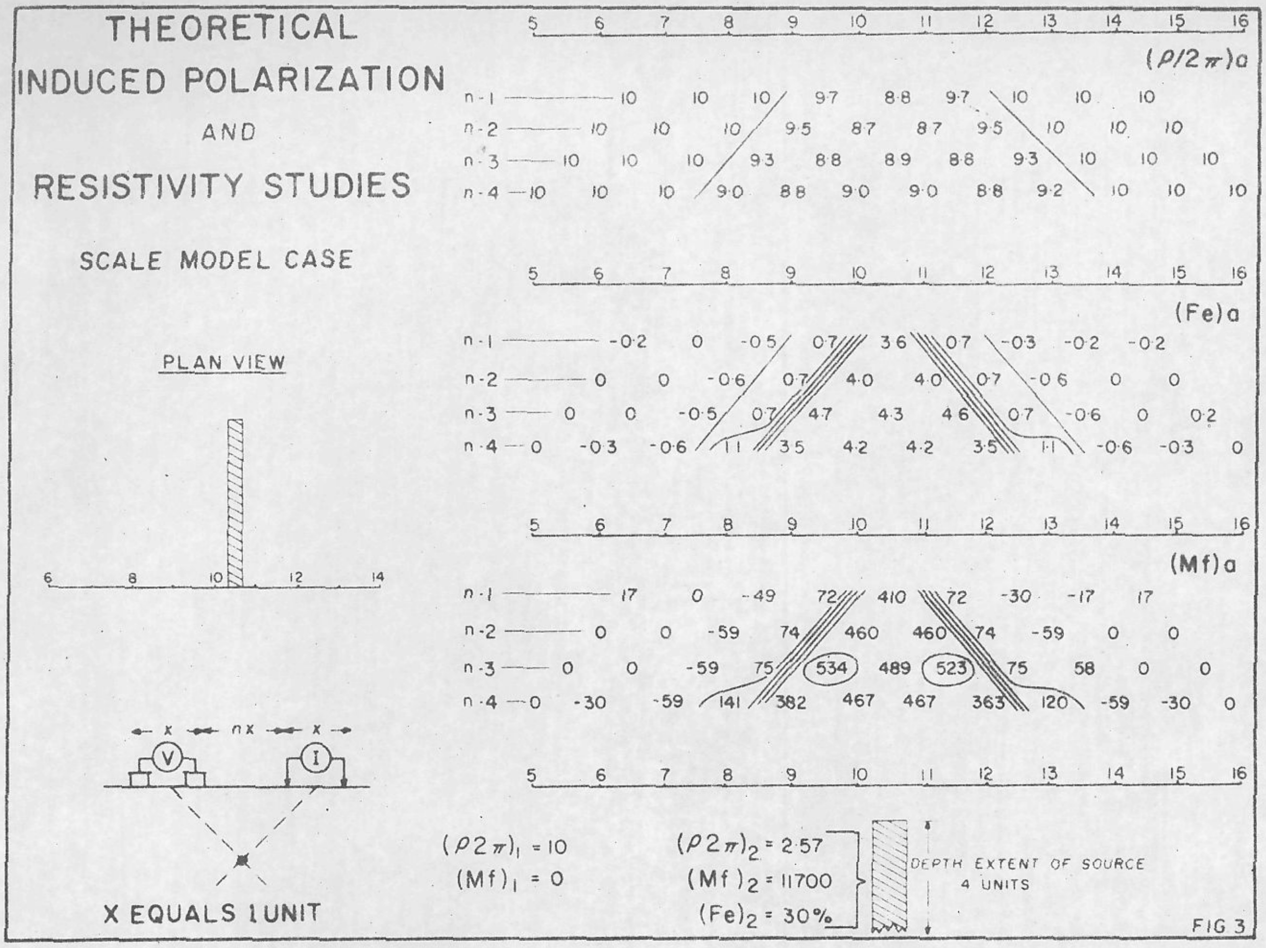

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 10 10 10 9.7 8.8 9.7 10 10 10
n-2 10 10 10 9.5 8.7 8.7 9.5 10 10 10
n-3 10 10 10 9.3 8.8 8.9 8.8 9.3 10 10 10
n-4 10 10 10 9.0 8.8 9.0 9.0 8.8 9.2 10 10 10
(Fe)a
n-1 -0.2 0 -0.5 0.7 3.6 0.7 -0.3 -0.2 -0.2
n-2 0 0 -0.6 0.7 4.0 4.0 0.7 -0.6 0 0
n-3 0 0 -0.5 0.7 4.7 4.3 4.6 0.7 -0.6 0 0.2
n-4 0 -0.3 -0.6 1.1 3.5 4.2 4.2 3.5 1.1 -0.6 -0.3 0
(Mf)a
n-1 17 0 -49 72 410 72 -30 -17 17
n-2 0 0 -59 74 460 460 74 -59 0 0
n-3 0 0 -59 75 534 489 523 75 58 0 0
n-4 0 -30 -59 141 382 467 467 363 120 -59 -30 0
(ρ2π)1 = 10
(Mf)1 = 0
(ρ2π)2 = 2.57
(Mf)2 = 11700
(Fe)2 = 30%
DEPTH EXTENT OF SOURCE
4 UNITS

FIG 3

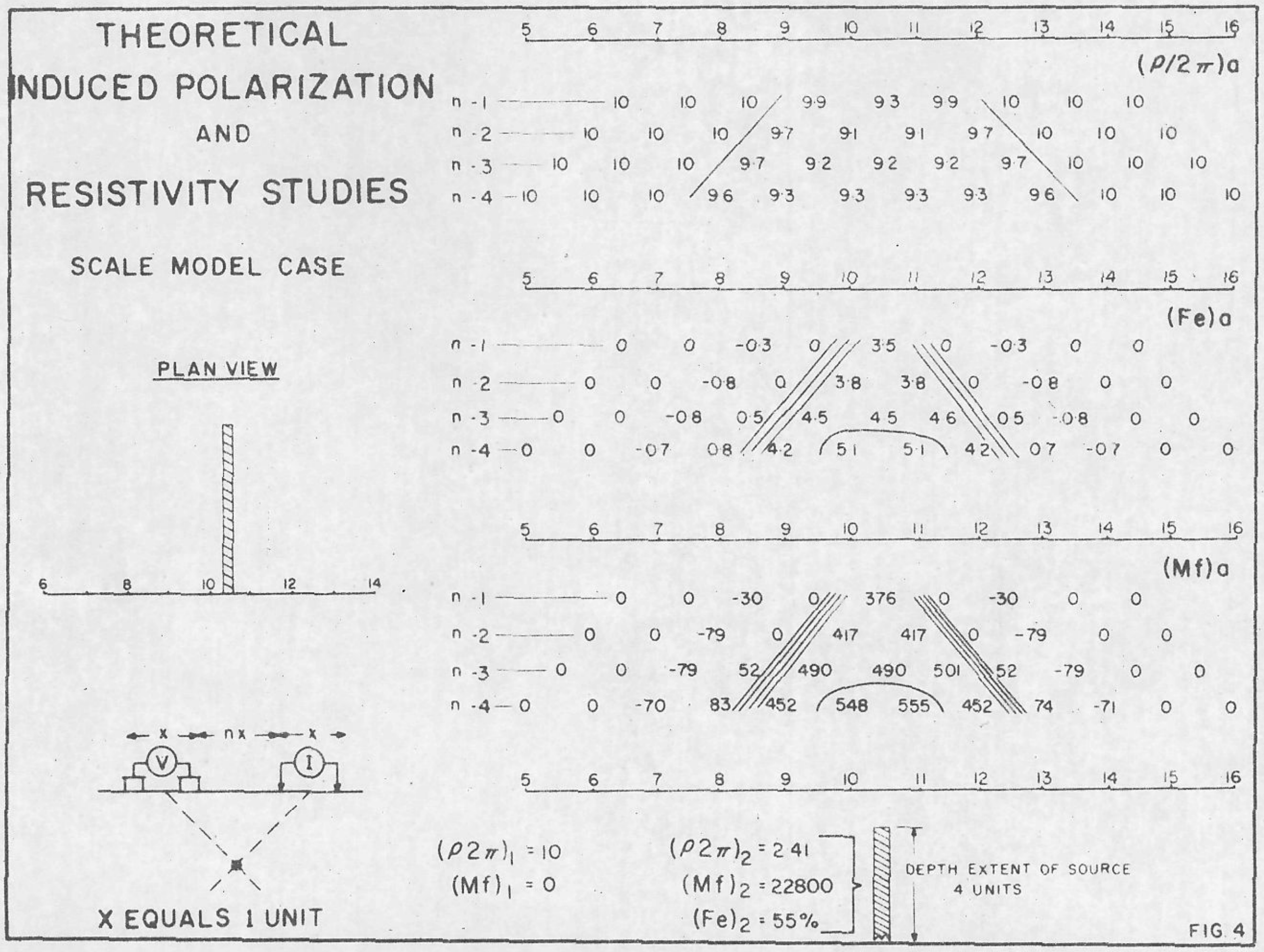
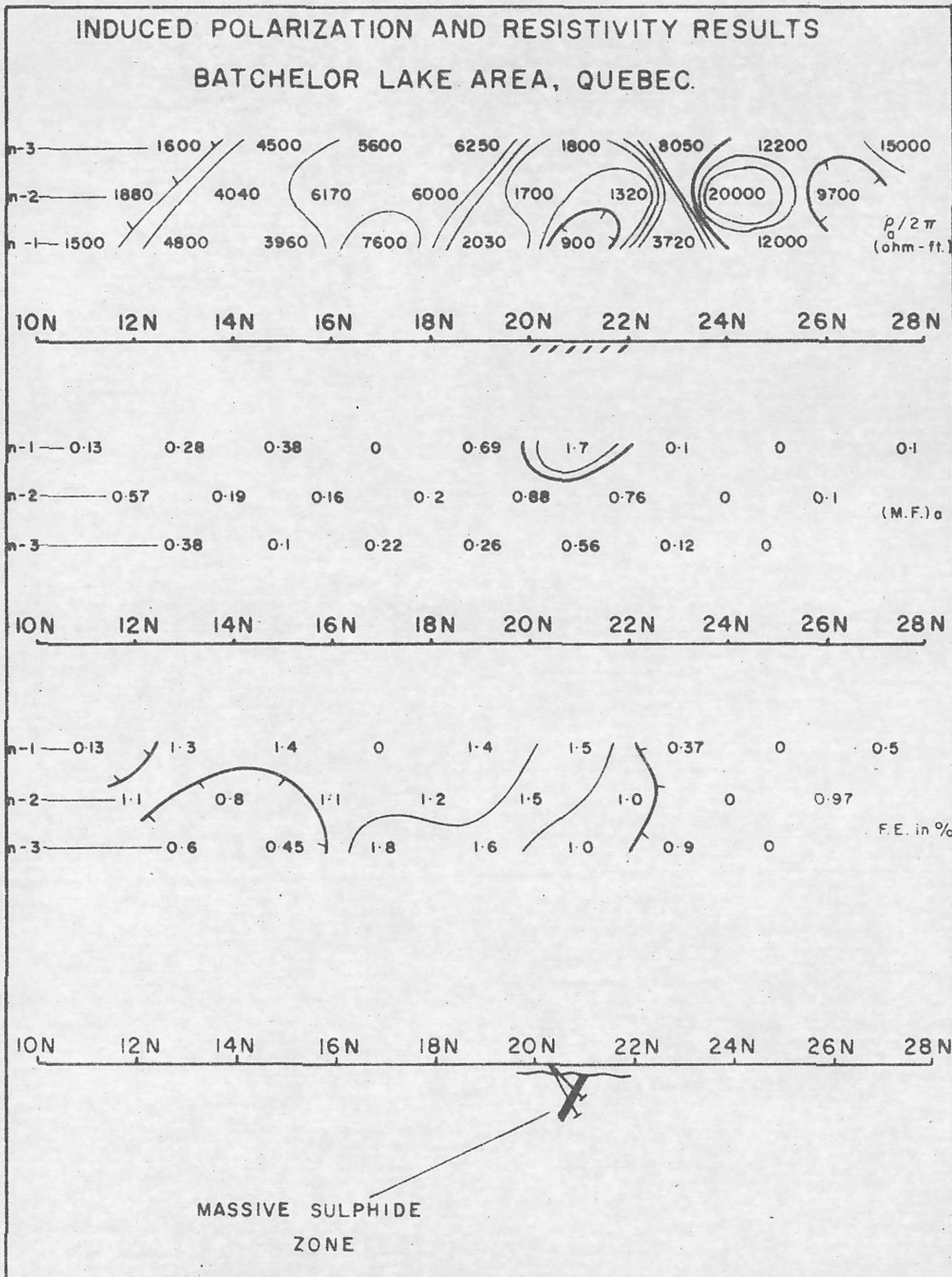
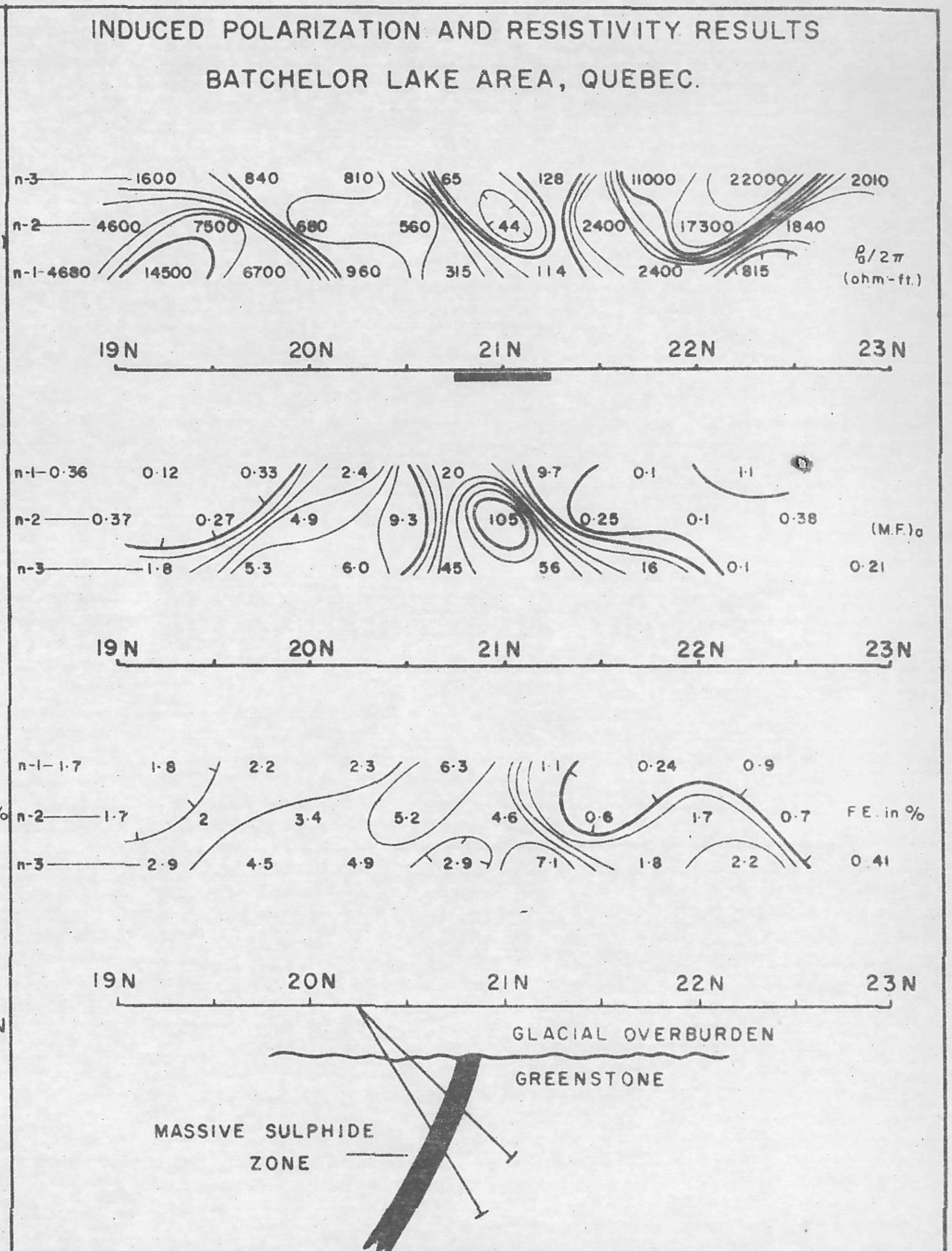

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 10 10 10 9.9 9.3 9.9 10 10 10
n-2 10 10 10 9.7 9.1 9.1 9.7 10 10 10
n-3 10 10 10 9.7 9.2 9.2 9.2 9.7 10 10 10
n-4 10 10 10 9.6 9.3 9.3 9.3 9.3 9.6 10 10 10
(Fe)a
n-1 0 0 -0.3 0 3.5 0 -0.3 0 0
n-2 0 0 -0.8 0 3.8 3.8 0 -0.8 0 0
n-3 0 0 -0.8 0.5 4.5 4.5 4.6 0.5 -0.8 0 0
n-4 0 0 -0.7 0.8 4.2 5.1 5.1 4.2 0.7 -0.7 0 0
(Mf)a
n-1 0 0 -30 0 376 0 -30 0 0
n-2 0 0 -79 0 417 417 0 -79 0 0
n-3 0 0 -79 52 490 490 501 52 -79 0 0
n-4 0 0 -70 83 452 548 555 452 74 -71 0 0
(ρ2π)1 = 10
(Mf)1 = 0
(ρ2π)2 = 2.41
(Mf)2 = 22800
(Fe)2 = 55%
DEPTH EXTENT OF SOURCE
4 UNITS

FIG 4


INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
n-3 1600 4500 5600 6250 1800 8050 12200 15000
n-2 1880 4040 6170 6000 1700 1320 20000 9700
n-1 1500 4800 3960 7600 2030 900 3720 12000
ρa/2π (ohm-ft.)
10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
n-1 0·13 0·28 0·38 0 0·69 1·7 0·1 0 0·1
n-2 0·57 0·19 0·16 0·2 0·88 0·76 0 0·1
n-3 0·38 0·1 0·22 0·26 0·56 0·12 0
(M.F.)a
10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
n-1 0·13 1·3 1·4 0 1·4 1·5 0·37 0 0·5
n-2 1·1 0·8 1·1 1·2 1·5 1·0 0 0·97
n-3 0·6 0·45 1·8 1·6 1·0 0·9 0
F.E. in %
10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
MASSIVE SULPHIDE
ZONE
FIG. 5


INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
n-3 1600 840 810 65 128 11000 22000 2010
n-2 4600 7500 680 560 44 2400 17300 1840
n-1 4680 14500 6700 960 315 114 2400 815
ρa/2π (ohm-ft.)
19N 20N 21N 22N 23N
n-1 0·36 0·12 0·33 2·4 20 9·7 0·1 1·1
n-2 0·37 0·27 4·9 9·3 105 0·25 0·1 0·38
n-3 1·8 5·3 6·0 45 56 16 0·1 0·21
(M.F.)a
19N 20N 21N 22N 23N
n-1 1·7 1·8 2·2 2·3 6·3 1·1 0·24 0·9
n-2 1·7 2 3·4 5·2 4·6 0·6 1·7 0·7
n-3 2·9 4·5 4·9 2·9 7·1 1·8 2·2 0·41
F.E. in %
19N 20N 21N 22N 23N
GLACIAL OVERBURDEN
GREENSTONE
MASSIVE SULPHIDE
ZONE
FIG. 6

ASSESSMENT DETAILS

PROPERTY: Tachek Option

MINING DIVISION: Omineca

SPONSOR: Noranda Exploration Company, Limited

PROVINCE: British Columbia

LOCATION: Topley Landing Area

TYPE OF SURVEY: Induced Polarization

OPERATING MAN DAYS:	75	DATE STARTED: November 1, 1968
EQUIVALENT 8HR. MAN DAYS:	112.5	DATE FINISHED: November 23, 1968
CONSULTING MAN DAYS:	2	NUMBER OF STATIONS: 256
DRAUGHTING MAN DAYS:	7	NUMBER OF READINGS: 1,836
TOTAL MAN DAYS:	121.5	MILES OF LINE SURVEYED: 9.2

CONSULTANTS:
David K. Fountain, 44 Highgate Road, Toronto 18, Ontario

FIELD TECHNICIANS:
T. Blackwell, 35 Duncan Woods Drive, Apt. 304, Weston, Ontario
B. Ruttan, R. R. #2, Bracebridge, Ontario
Helpers supplied by client:
B. Morgan, General Delivery, Smithers, British Columbia
D. Martin, General Delivery, Smithers, British Columbia
R. Collen, Box 475, Princeton, British Columbia

DRAUGHTSMEN:
V. Young, 703 Cortez Avenue, Bay Ridges, Ontario
F. Hurst, 230 Woburn Avenue, Toronto 12, Ontario
N. Lade, 662 Emerson Court, Oshawa, Ontario

McPHAR GEOPHYSICS LIMITED

David K. Fountain, P. Eng.,
Geophysicist.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

Dated: January 15, 1969

STATEMENT OF COST

Noranda Exploration Company, Limited
Tachek Option Property, B. C.

Crew

15 days Operating	@ $220.00/day	3,300.00
3-1/2 days Travel) 5 1-1/2 days Bad Weather)	@ $85.00/day	425.00

Expenses - Crew

Rented Vehicles	102.27	
Freight & Brokerage	35.43	
Meals & Accommodation	340.50	
Telephone & Telegraph	28.60	
Supplies	27.00	
Extra Labour $810.00 + 20%	972.00	1,505.80
		$5,230.80

McPHAR GEOPHYSICS LIMITED,

David K. Fountain

David K. Fountain, P. Eng.,
Geophysicist.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

Dated: January 15, 1969.

CERTIFICATE

I, David Kirkman Fountain, of the City of Toronto, Province of Ontario, do certify that:

1. I am a geophysicist residing at 44 Highgate Road, Toronto 18, Ontario.

2. I am a graduate of the University of Toronto with a Bachelor of Applied Science Degree in Engineering Physics (Geophysics).

3. I am a member of the Society of Exploration Geophysicists, the European Association of Exploration Geophysicists and the Canadian Institute of Mining and Metallurgy.

4. I am a registered Professional Engineer in the Province of British Columbia and Ontario, and have been practising my profession for seven years.

5. The statements made in this report are based on a study of published geological literature and unpublished private reports.

6. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising purposes.

Dated at Toronto

this 15th day of January, 1969

David Kirkman Fountain, P. Eng.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1969

DWG. NO.- I.P.- 5241-1

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 28N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31 — 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

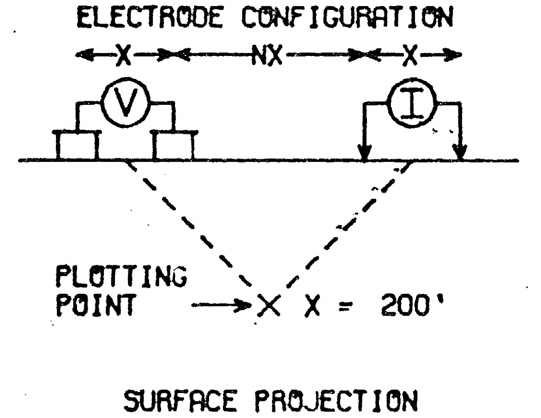
DWG. NO.- I.P.-5241-2

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 32N



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

D. K. FOUNTAIN

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA

DATE: January 1969

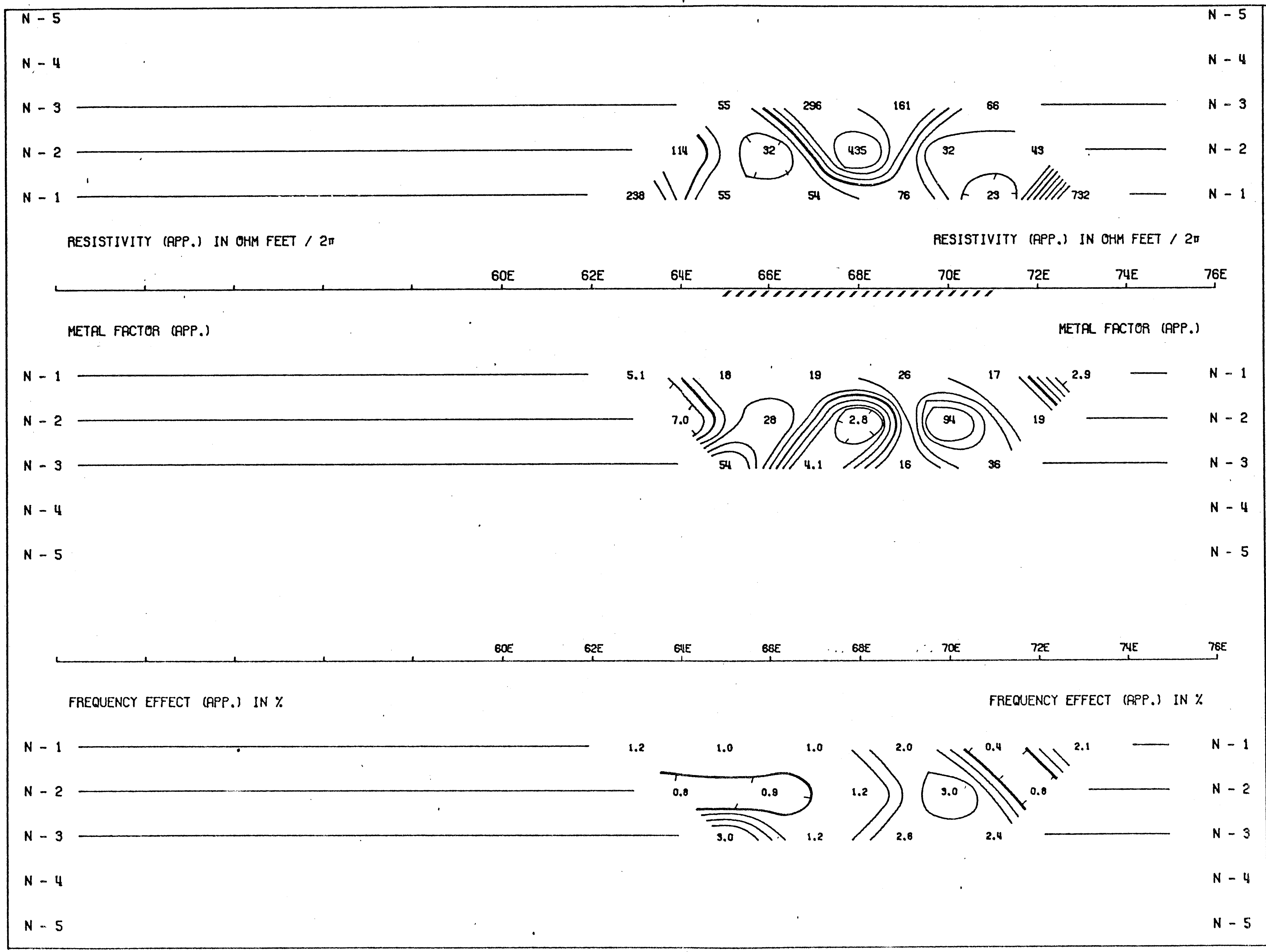
Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER



DWG. NO.- I.P.- 5241-3

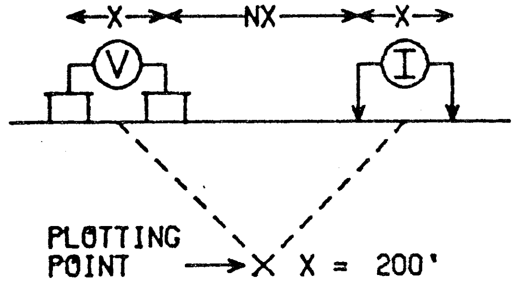
NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 36N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-4

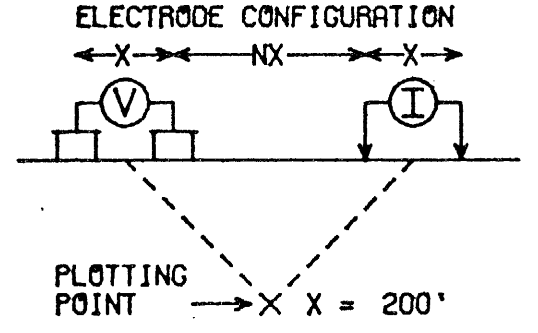
NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 40N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

DATE:

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-5

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 44N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT

X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31 — 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

DATE:

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. K. FOUNTAIN

Expiry Date: April 25 1969

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-6

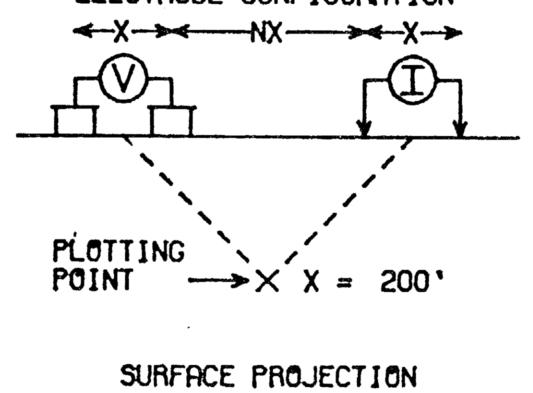
NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 48N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

DATE: January 13, 1969

PROFESSIONAL ENGINEER D. K. FOUNTAIN PROVINCE OF BRITISH COLUMBIA

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-7

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 52N

ELECTRODE CONFIGURATION

PLOTTING POINT → X X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1,-1.5-2,-3,-5,-7.5-10

DATE:

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, D.K. FOUNTAIN

Expiry Date: April 25, 1969

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-8

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 56N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31— 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

DATE:

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-9

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 60N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31 — 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-10

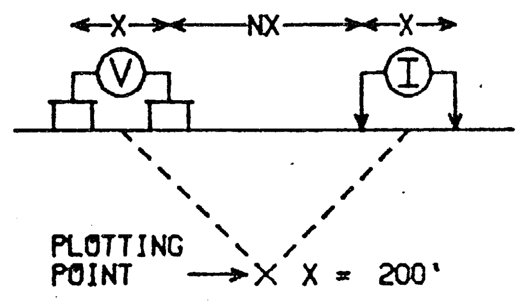
NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 64N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31 - 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

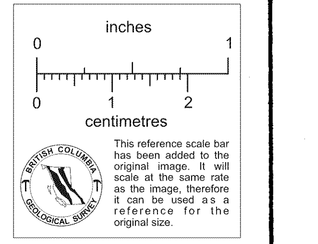
NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-11

NORANDA EXPLORATION COMPANY LIMITED

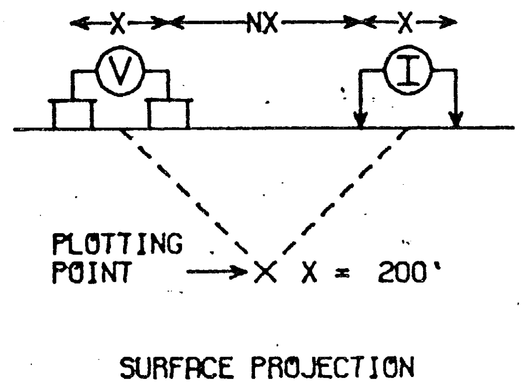
TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.



LINE NO.- 68N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31 - 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1,-1.5-2,-3,-5,-7.5-10

DATE:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1969

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-12

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 72N

ELECTRODE CONFIGURATION

PLOTTING POINT X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31 - 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

DATE:

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5241-13

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 76N

ELECTRODE CONFIGURATION

PLOTTING POINT X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31 - 5 CPS

DATE SURVEYED: NOV 1968

APPROVED:

D. K. FOUNTAIN — PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA

Expiry Date: April 25, 1969

NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

DATE:

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

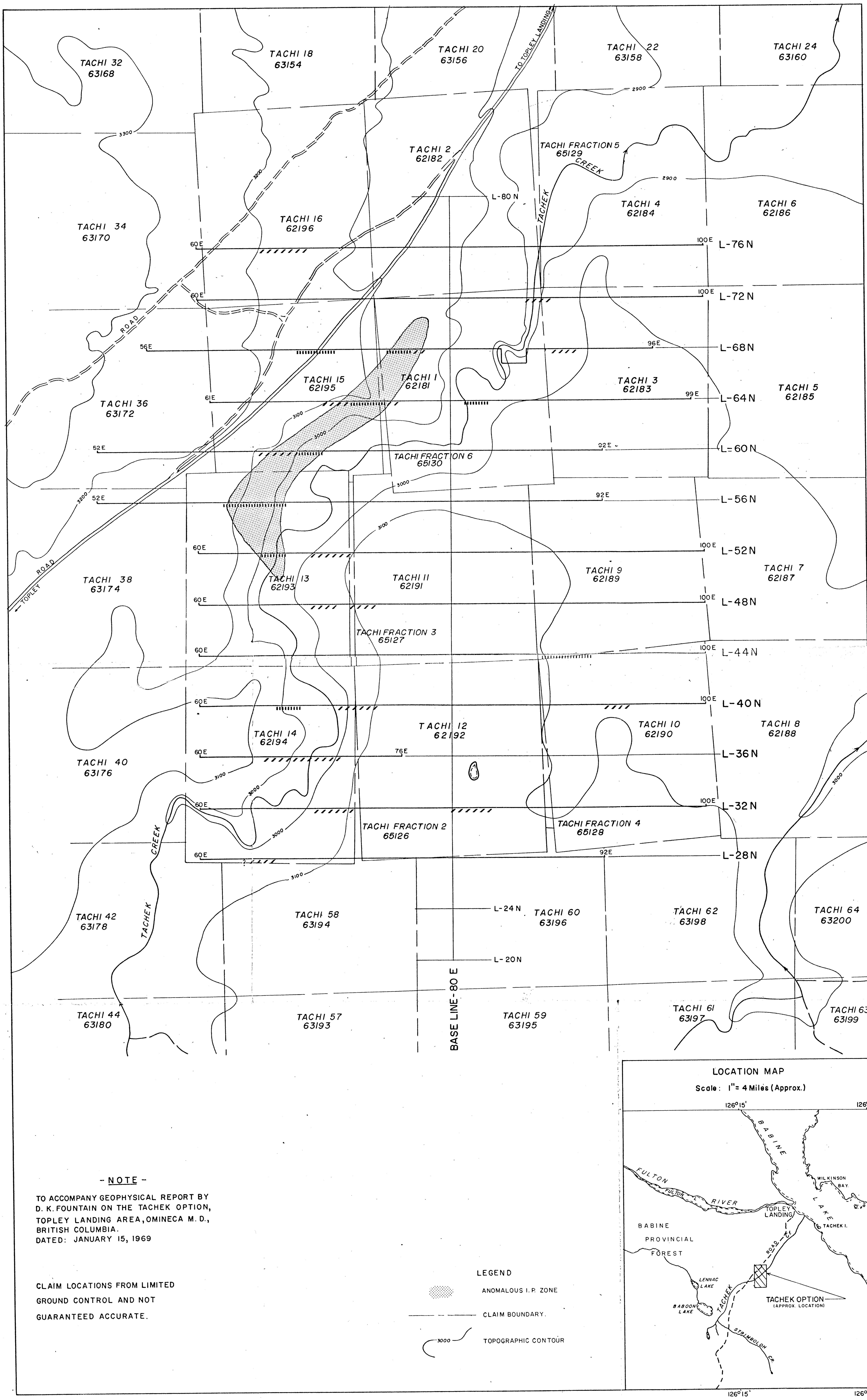
NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/40 COMPUTER AND A CALCOMP PLOTTER

DWG. I.P.P.-3349

McPHAR GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



N

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

NORANDA EXPLORATION COMPANY LIMITED

TACHEK OPTION

TOPLEY LANDING AREA, OMINECA M. D., B. C.

SCALE

ONE INCH EQUALS FOUR HUNDRED FEET.

DRAWN: V.T.

DATE: JANUARY 1969

APPROVED:

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA — D. K. FOUNTAIN

Expiry Date: April 25, 1969

DWG. I.P.P.-3349