4432

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE BOX CLAIMS, DISCOVERY PROPERTY GERMANSEN LANDING AREA, OMINECA MINING DIVISION, B.C. FOR NORANDA EXPLORATION COMPANY, LIMITED

93N/14E

BY

PETER K. SMITH, B.Sc.

AND

DAVID K. FOUNTAIN, P.ENG.

NAME AND LOCATION OF PROPERTY

BOX CLAIMS, DISCOVERY PROPERTY
GERMANSEN LANDING AREA

OMINECA MINING DIVISION, B.C. 55°50'N, 125°50'W

DATE STARTED: OCTOBER 16, 1972

DATE FINISHED: OCTOBER 26, 1972

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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.

The actual data plots included with the report are prepared utilizing an IBM 360/75 Computer and a Calcomp 770/763 Incremental Plotting System. The data values are calculated, plotted, and contoured according to a programme developed by McPhar Geophysics. Certain symbols have been incorporated into the programme to explain various situations in recording the data in the field.

The IP measurement is basically obtained by measuring the difference in potential or voltage (ΔV) obtained at two operating frequencies. The voltage is the product of the current through the ground and the apparent resistivity of the ground. Therefore in field situations where the current is very low due to poor electrode contact, or the apparent resistivity is very low, or a combination of the two effects; the value of (ΔV) the change in potential will be too small to be measurable. The symbol "TL" on the data plots indicates this situation.

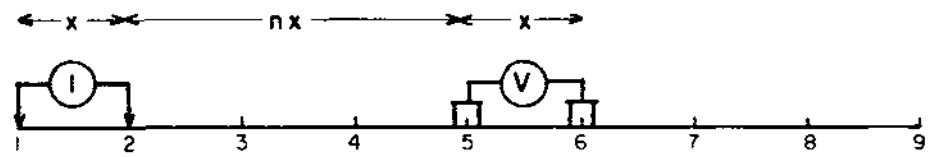
In some situations spurious noise, either man made or natural, will render it impossible to obtain a reading. The symbol "N" on the data plots indicates a station at which it is too noisey to record a reading. If a reading can be obtained, but for reasons of noise there is some doubt as to its accuracy, the reading is bracketed in the data plot ( ).

In certain situations negative values of Apparent Frequency Effect are recorded. This may be due to the geologic environment or spurious electrical effects. The actual negative frequency effect value recorded is indicated on the data plot, however the symbol "NEG" is

indicated for the corresponding value of Apparent Metal Factor. In contouring negative values the contour lines are indicated to the nearest positive value in the immediate vicinity of the negative value.

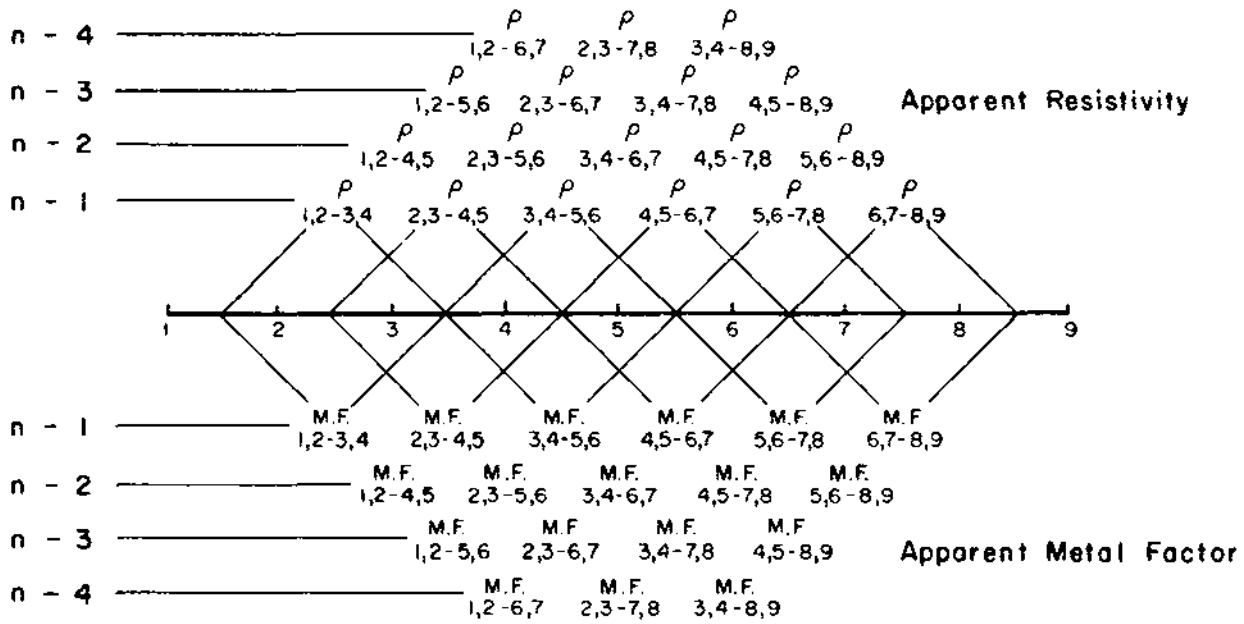
The symbol "NR" indicates that for some reason the operator did not attempt to record a reading although normal survey procedures would suggest that one was required. This may be due to inaccessible topography or other similar reasons. Any symbol other than those discussed above is unique to a particular situation and is described within the body of the report.

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



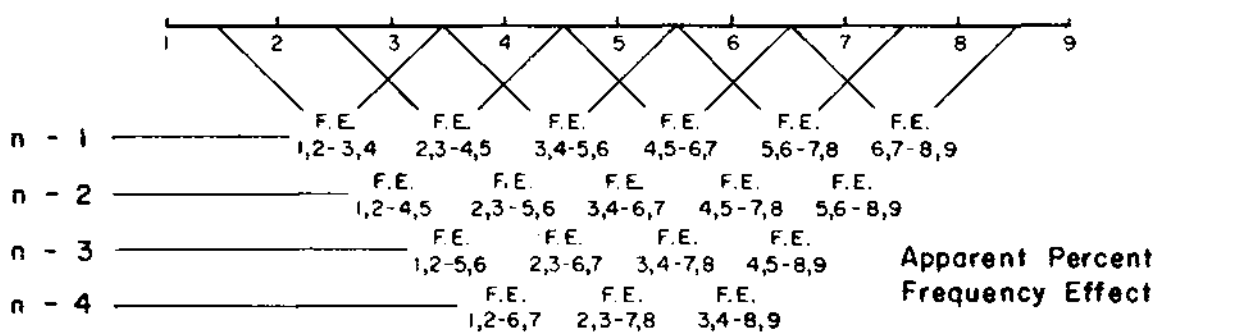
Stations on line

x = Electrode spread length
n = Electrode separation



Apparent Resistivity

Apparent Metal Factor



Apparent Percent Frequency Effect

Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE BOX CLAIMS, DISCOVERY PROPERTY GERMANSEN LANDING AREA, OMINECA MINING DIVISION, B.C. FOR NORANDA EXPLORATION COMPANY, LIMITED

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1. INTRODUCTION

During October 1972, an Induced Polarization and Resistivity survey was carried out on the Box Claims, Discovery Property of Noranda Exploration Company, Limited in the Germansen Landing Area, Omineca Mining Division, British Columbia. The property is located approximately 21 miles west of Germansen Landing, B.C., on a tributary of Discovery Creek at 55°50'N latitude and 125°50'W longitude.

Access to the property is by truck to mile 27 on the Germansen Landing-Aiken Lake road. Most of the claim group lies in a relatively flat and swampy valley bottom, which is the divide for a north-flowing tributary of Discovery Creek and an un-named creek flowing southward into Omineca River. Elevations on the property range from 3,400 feet to 4,000 feet above sea level.

The geophysical survey work discussed in this report was carried out on the following claims of the Discovery Property.

Claim		Mining Division
Box	43	Omineca
	44	"
	45	"
	46	"
	47	"
	48	"
	49	"
	50	"
	55	"
	56	"
	57	"
	58	"
	59	"
	60	"
	61	"
	62	"
	19 Fr	"
	20 Fr	"
	21 Fr	"
	24 Fr	"
	25 Fr	"
	26 Fr	"

The claims are registered in the name of Noranda Exploration Company, Limited (No Personal Liability).

The Discovery property is mostly covered by unconsolidated glacial debris which is presumably underlain by Takla volcanic rocks. The surface is primarily muskeg and sandy ridges. No bedrock outcrops on the property, but granitic dikes cutting volcanic and sedimentary rocks are exposed to the east of the property.

Two months prior to this survey a reconnaissance IP survey was also carried out over adjoining western claims. The results of this work have been described in a report by D.K. Fountain, P.Eng., of McPhar Geophysics Limited dated October 6, 1972. Other previous work has consisted of geochemical stream sediment sampling, a geochemical soil survey and limited

geological prospecting.

The Induced Polarization survey was carried out in order to gain further information on zones outlined by the previous survey and to outline further possible metallic sulphide zones to the east and to the south. A McPhar variable frequency IP unit was employed utilising the dipole-dipole electrode configuration and 400' dipoles. Two dipole separations (n = 1,2) were recorded and the frequencies employed were 0.3 Hz and 5.0 Hz.

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	Electrode Intervals	Dwg. No.
23200N	400 feet	IP 6052-1
22400N	400 feet	IP 6052-2
21600N	400 feet	IP 6052-3
20800N	400 feet	IP 6052-4
20000N	400 feet	IP 6052-5
19200N	400 feet	IP 6052-6
18400N	400 feet	IP 6052-7
17600N	400 feet	IP 6052-8

Also enclosed with this report is Dwg. I.P.P. 4892, a plan map of the Discovery Property grid at a scale of 1" = 400'. The definite, probable and possible Induced Polarization anomalies are indicated by bars, in the manner shown on the legend, on this plan map as well as on 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. The anomalies shown by thin bars are those outlined by the previous survey.

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 electrode interval length; i.e. when using 400' electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 400' apart. In order to definitely locate, and fully evaluate, a narrow, shallow source it is necessary to use shorter electrode intervals. In order to locate sources at some depth, larger electrode intervals 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.

The location of survey lines relative to claim boundaries, the name and relative positions of the claims and the topographic data indicated on the maps are based upon information supplied by Noranda Exploration Company, Limited.

3. DISCUSSION OF RESULTS

Eight lines were surveyed with the Induced Polarization method on a reconnaissance basis reading only two dipole separations (n = 1, 2). Lines are at 800' intervals. As in the area to the west, background IP response is relatively high.

Line 23200N

Strong IP response was recorded over the surveyed portion of Line 23200N lying west of station 296E and weaker anomalous responses extend east to 300E. The results suggest a broad zone of disseminated mineralization.

Line 22400N

Most of the area covered by this line is considered anomalous. Strongest IP responses are centred at 286E and at 296E. The former suggests a relatively shallow source, while the latter outlines a source at a depth in the order of 200'.

Line 21600N

IP coverage on Line 21600N was extended to the west into the region previously surveyed. A probable anomaly lies east of 296E. A broad zone of disseminated mineralization, which continues east of the present grid, is indicated while weaker mineralization is suggested from 296E to 276E. The anomalous low resistivity zones outlined between 272E and 264E, between 256E and 252E, and from 240E to 236E are considered less interesting as there is no corresponding strong frequency effect expression. An anomaly, possible from 232E to 228E and probable from 228E to 224E suggests a zone of mineralization at depth.

The results from this line show excellent agreement with those from the previous survey on adjacent lines.

Line 20800N

An IP response was recorded east of 296E which may indicate a broad zone of disseminated metallic mineralization continuing east of the grid. The

strength of the IP response increases to the east. An anomaly is indicated between 280E and 288E which defines the extent of the anomalous response previously recorded.

Line 20000N

Anomalous IP responses were recorded to either end of Line 20000N. A strong near-surface source is suggested between 304E and 308E.

Line 19200N

This portion of Line 19200N is considered anomalous. Relatively strong IP response was recorded east of station 300E. Anomaly strength increases to the east and the source appears to extend past the present grid boundary. To the west, a broad anomalous zone is centred at 290E.

Line 18400N

Line 18400N is anomalous east of 288E. An anomalous IP response was recorded from 280E to 264E. The strongest response within this zone suggests a source at depth between 264E and 268E. A narrower, possible anomaly was outlined between 252E and 256E.

Line 17600N

Line 17600N is considered anomalous east of 264E. Within this broad anomalous region, two stronger zones are outlined between 268E and 280E and from 292E to 304E. The highest IP responses recorded in this survey lie within the latter zone.

4. SUMMARY AND CONCLUSIONS

This work extended the IP coverage on the Box Claims south and east

of the previous survey area.

Most of the region showed anomalous IP response to some extent. The results from lines south of Line 22400N suggest that the anomalous region extends further east and south of the present grid.

Further information on the underlying geology would be necessary to properly evaluate the significance of the IP anomalies indicated by the survey.

McPHAR GEOPHYSICS LIMITED

Peter K. Smith,
Geophysicist

David K. Fountain, P.Eng.
Geophysicist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1973

Dated: February 15, 1973

ASSESSMENT DETAILS

PROPERTY: Box Claims - Discovery Property

MINING DIVISION: Omineca

SPONSOR: Noranda Exploration Company, Limited

PROVINCE: British Columbia

LOCATION: Germansen Landing Area

TYPE OF SURVEY: Induced Polarization

OPERATING MAN DAYS:	20	DATE STARTED:	October 16, 1972
EQUIVALENT 8 HR. MAN DAYS:	30	DATE FINISHED:	October 26, 1972
CONSULTING MAN DAYS:	3	NUMBER OF STATIONS:	125
DRAUGHTING MAN DAYS:	3	NUMBER OF READINGS:	594
TOTAL MAN DAYS:	36	MILES OF LINE SURVEYED:	8.86

CONSULTANTS:

Peter K. Smith, 650 Parliament Street, Apt. 2212, Toronto, Ontario.
David K. Fountain, 62 Patina Drive, Willowdale 428, Ontario.

FIELD TECHNICIANS:

R. Mertens, 304 Holmes Avenue, Willowdale, Ontario.
J. Wowchuck, 4238 Winifred Street, Burnaby, B.C.
Plus Extra Labour:
J. Remillard, 288 Gildford Street, St. James, Assinaboyn, Winnipeg, Manitoba.
R. Bing, 174 W. Seymour Street, Kamloops, B.C.
R. Pesklevits, c/o Ron Birk, 262 Cherry Street, Kamloops, B.C.

DRAUGHTSMEN:

B. Boden, 58 Glencrest Blvd. Toronto 16, Ontario.
N. Lade, 299 Jasper Avenue, Oshawa, Ontario.
V. Young, 703 Cortez Avenue, Bay Ridges, Ontario.

McPHAR GEOPHYSICS LIMITED

David K. Fountain, P. Eng.
Geophysicist

PROFESSIONAL ENGINEER OF BRITISH COLUMBIA

Dated: February 15, 1973

Expiry Date: April 25, 1973

STATEMENT OF COST

Noranda Exploration Company, Limited
Box Claims - Discovery Property, Germansen Landing Area
Omineca Mining Division, B.C. - IP Survey

Crew: R. Mertens & J. Wowchuck

5 days	Operating	@ $240.00/day		$1,200.00
1½ days	Travel			
2 days	Bad Weather	5½ days @ $100.00/day		550.00
2 days	Standby			

Expenses - prorated on elapsed days @ 10½/58

Air Fares	34.97	
Excess Baggage	7.56	
Taxi	2.32	
Vehicle Expense	1.25	
Meals & Accommodation	47.98	
Freight & Brokerage	75.29	
Supplies	4.47	
Telephone & Telegraph	8.71	
	182.55	
Plus 10%	18.25	
		200.80
Extra Labour (prorated as above)	380.17	
Plus 20%	76.03	
		456.20
		$2,407.00

McPHAR [illegible] LIMITED

David [illegible] M.A.Sc.
Geophysicist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

Dated: February 15, 1973

Expiry Date: April 25, 1973

CERTIFICATE

I, Peter K. Smith, of the City of Toronto, in the Province of Ontario, hereby certify:

1. That I am a geologist/geophysicist with a business address at 139 Bond Avenue, Don Mills, Ontario.

2. I am a graduate of the University of British Columbia with a B.Sc. Degree in Honours Geology and Geophysics (1970).

3. I am a member of the Society of Exploration Geophysicists.

4. I have been practising my profession for 2 years.

5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Noranda Exploration Company, Limited or any affiliate.

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

7. 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 February 1973.

Peter K. Smith, B.Sc.

CERTIFICATE

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

1. I am a geophysicist residing at 62 Patina Drive, Willowdale 428, 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 Provinces of British Columbia, Manitoba and Ontario, a Registered Professional Geophysicist in the Province of Alberta and a Registered Professional geologist in the State of California, and have been practising my profession for eleven 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 February 1973

PROFESSIONAL ENGINEER PROVINCE OF BRITISH D.K. FOUNTAIN

David Kirkman Fountain, B.A.Sc. P.Eng.

Date. April 25 1973

DOMINION OF CANADA:

PROVINCE OF BRITISH COLUMBIA.

TO WIT:

In the Matter of a statement of exploration expenses on 36 contiguous mineral claims in the Omineca Mining Division, having record numbers; 94118 to 94120; 94143; 94144; 116212; 111989; 111986; 94121; 94122; 94117; 111985; 111987; 111988; 116219 to 116234; 116213 to 116218 BOX Claims

I, John E. Harrison, (F.M.C. 109121 issued April 28th, 1972) of P.O. Box 2169, Smithers, B. C. agent for Noranda Exploration Company, Limited (No Personal Liability) (F.M.C. 109102 issued April 28th, 1972) of 1050 Davie Street, Vancouver 5, B. C.

of

in the Province of British Columbia, do solemnly declare that the costs of line preparation and an induced polarization survey between October 16, 1972 and October 26, 1972 were:

1. Line Preparation (contract)		
- contract (P. Bland & F. Bland)	$1,008.00	
- field costs		
- 20 man days @ $10.00/ man day	200.00	
- transportation		
- Trans-Provincial Airlines (Otter)	200.00	
- Okanagan Helicopters (206 B)	559.99	
		1,967.99
2. Induced Polarization Survey		
- McPhar statement	2,407.00	
- field costs		
- 42 man days @ $10.00/ man day	420.00	
- transportation		
- Trans-Provincial Airlines (Otter)	400.00	
- Okanagan Helicopters (Bell 206 B)	994.00	
		4,221.00
3. Supervision		
- G. E. Dirom 2 days @ $75.00/day		150.00
		$6,338.99

Of this amount $4,100.00 is claimed for assessment credit.

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the Town of Smithers, in the Province of British Columbia, this 28th day of May, 1973, A.D.

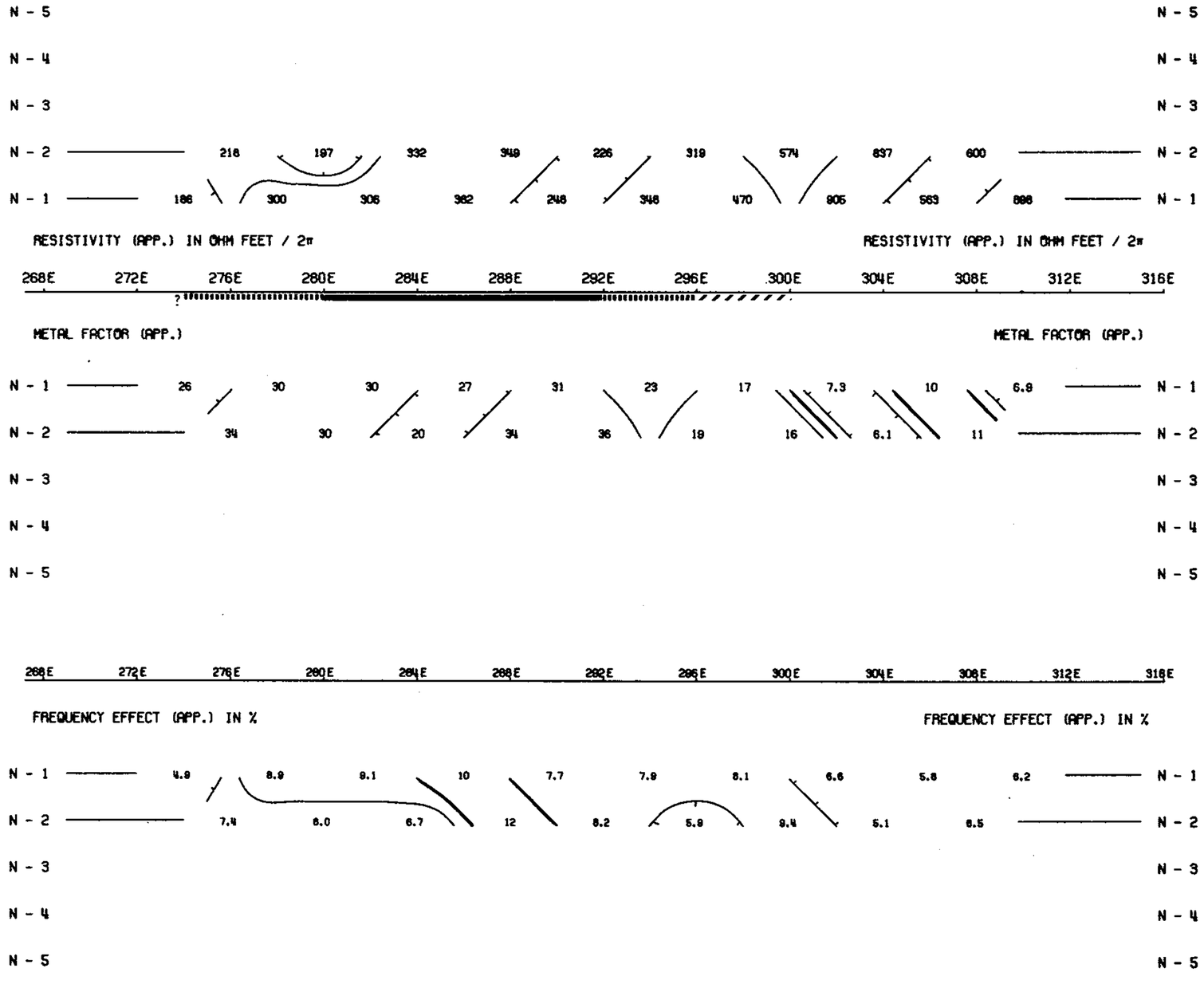
John Harrison

A Commissioner for taking Affidavits for British Columbia or ~~*A Notary Public in and for the Province of British Columbia.*~~

In the Matter of

Statutory Declaration

(CANADA EVIDENCE ACT)



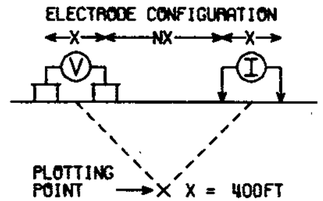
DWG. NO.- I.P.- 6052 - I

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 23200N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

APPROVED

DATE:

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

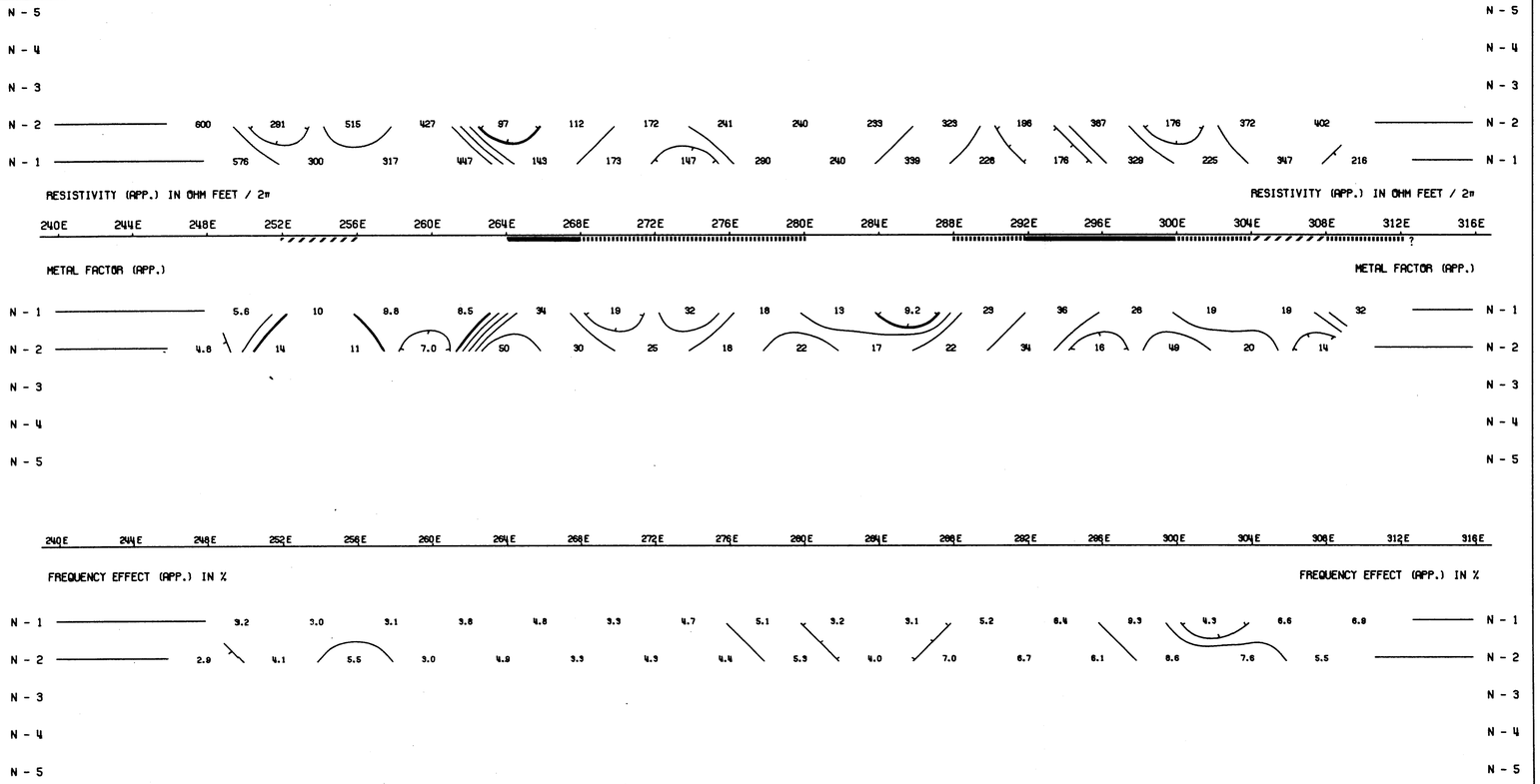
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

Survey Date: April 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



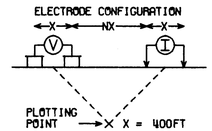
DWG. NO.- I.P.- 6052-7

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 18400N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

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

APPROVED

D. K. FOUNTAIN
BRITISH COLUMBIA
PROFESSIONAL ENGINEER
PROVINCE OF

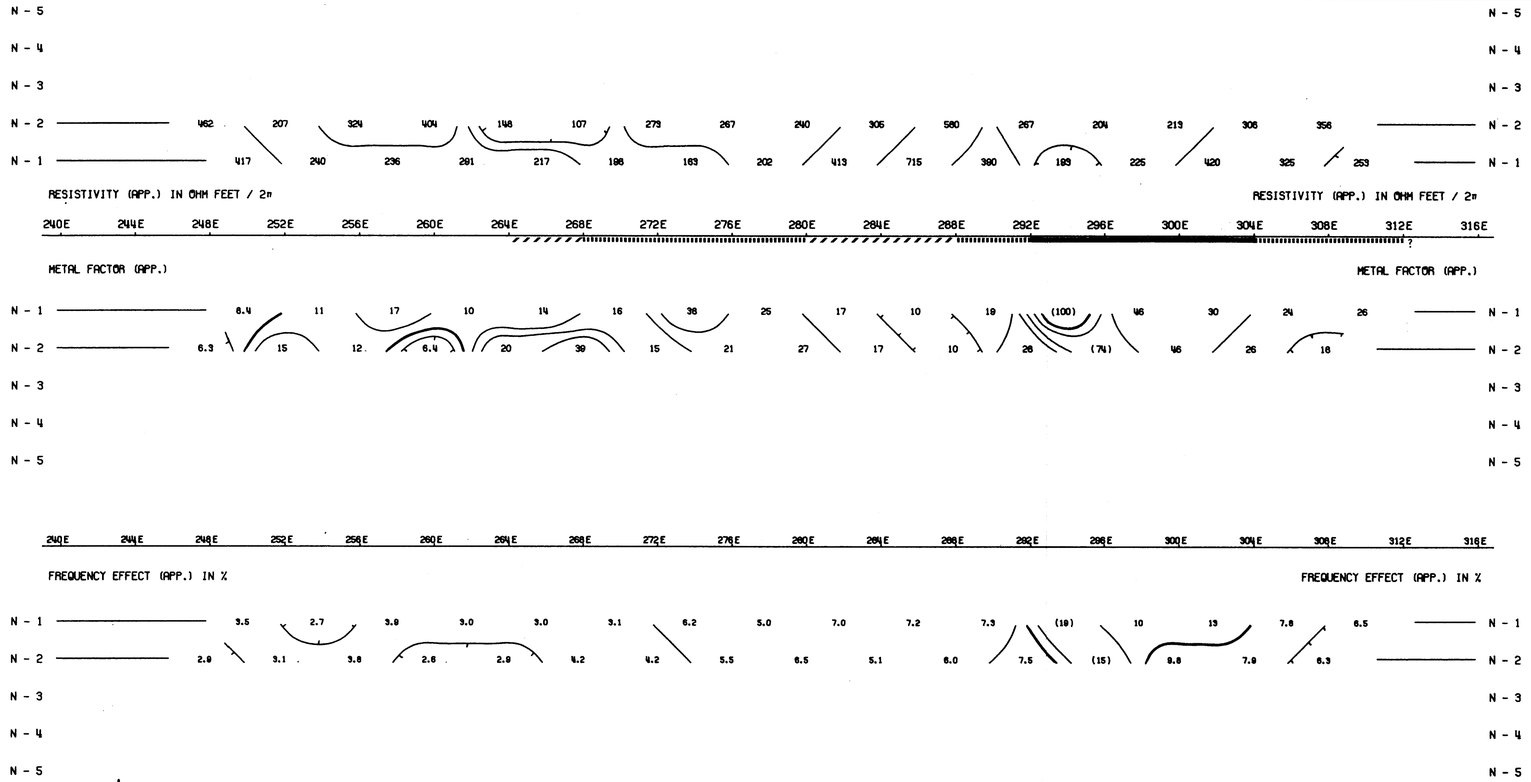
DATE

Eight Date April 25 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



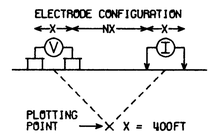
DWG. NO.- I.P.- 6052-8

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 17600N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

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

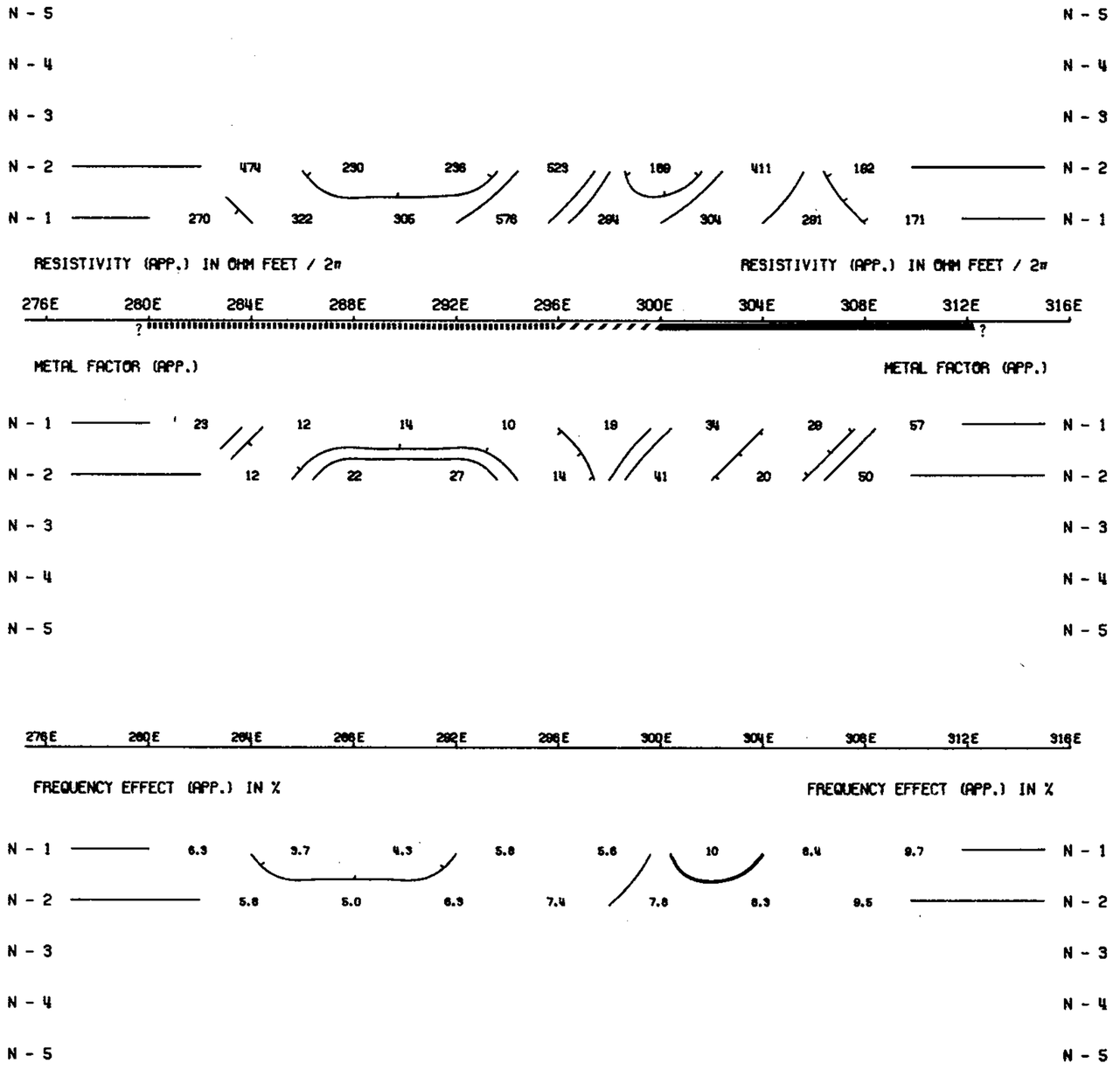
APPROVED:

DATE:

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



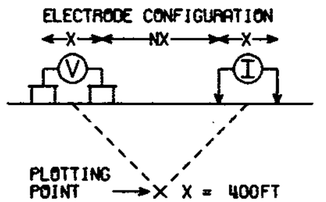
DWG. NO.- I.P.- 6052-6

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 19200N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ——
PROBABLE ....
POSSIBLE ////

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

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

APPROVED:

DATE:

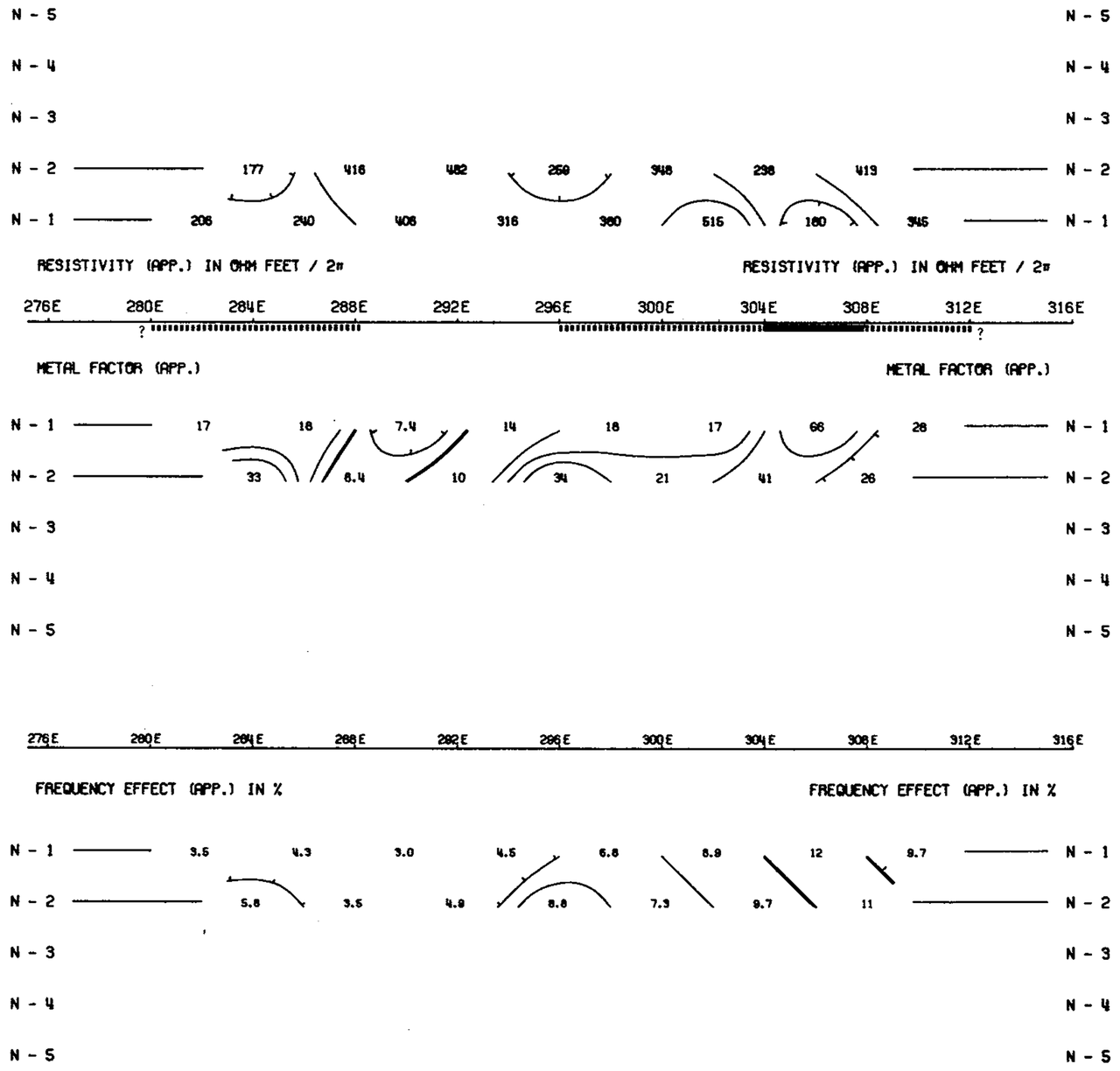
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date April 25 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



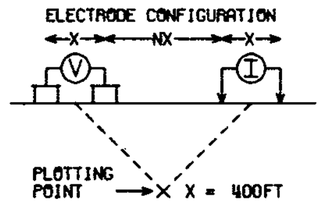
DWG. NO.- I.P.- 6052 - 5

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 20000N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

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

APPROVED:

DATE: JANUARY 1973

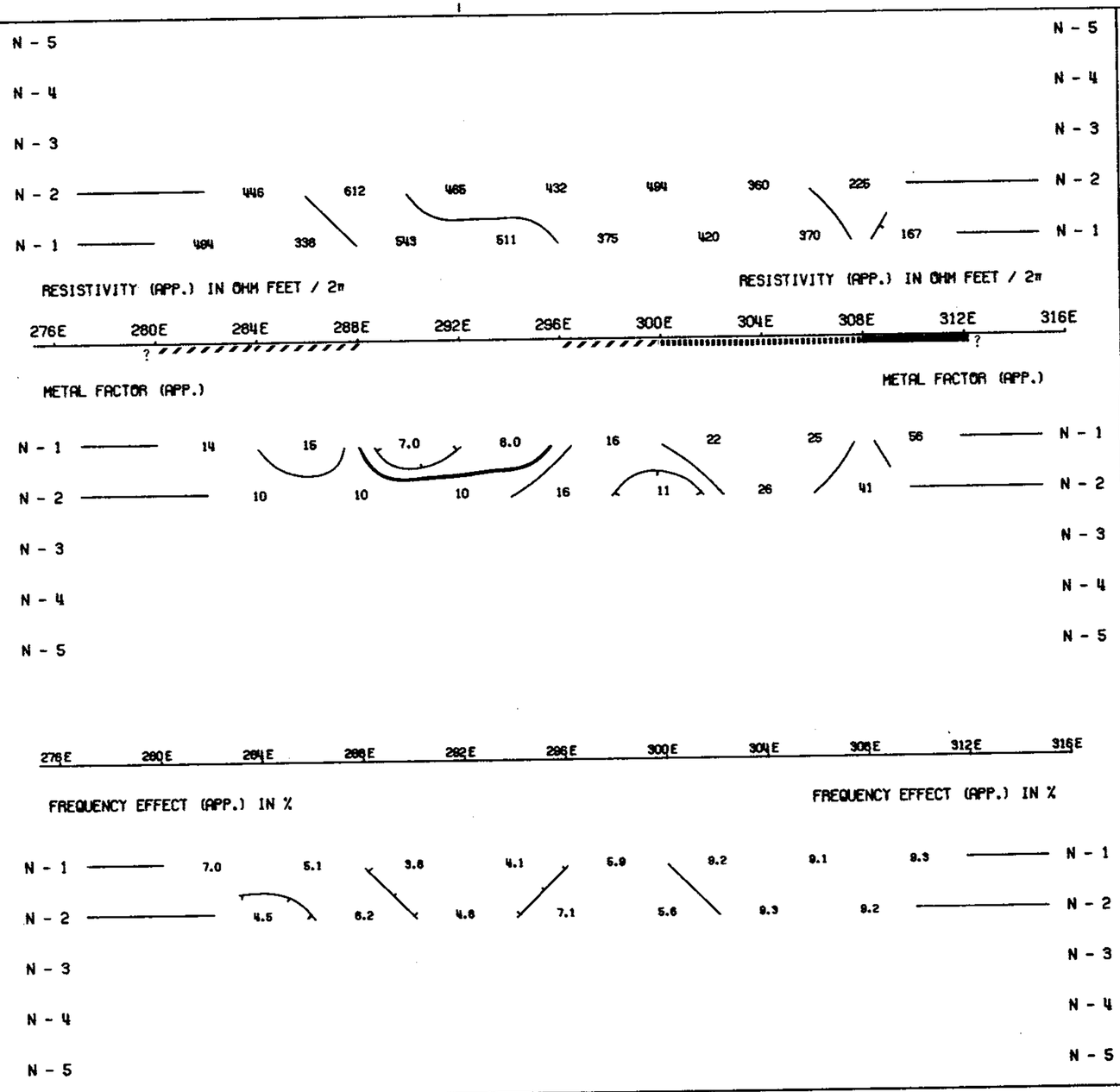
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

Expiry Date April 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



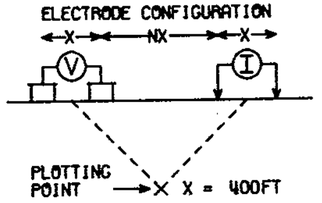
DWG. NO.- I.P.- 6052-4

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 20800N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT 1972

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

APPROVED: D.R. FOUNTAIN

DATE: Dec. 4/73

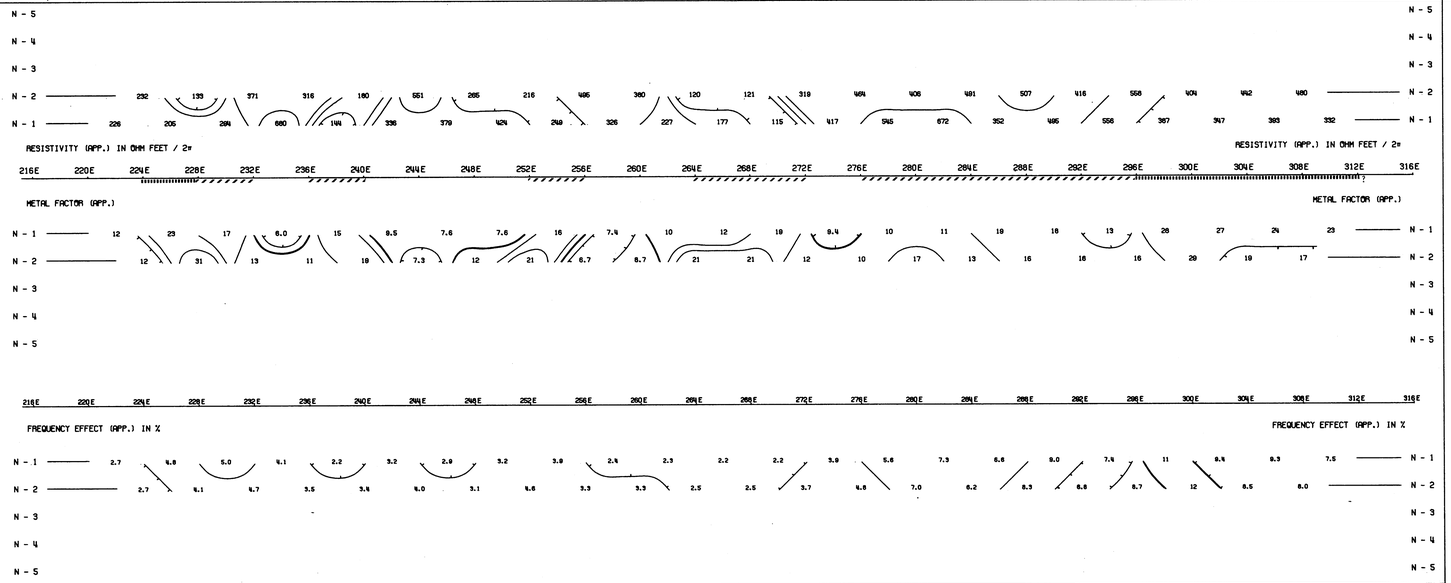
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

Signed Date April 25 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



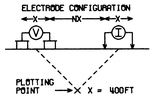
DWG. NO.- I.P.- 6052-3

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 21600N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: OCT. 1972

APPROVED

DATE

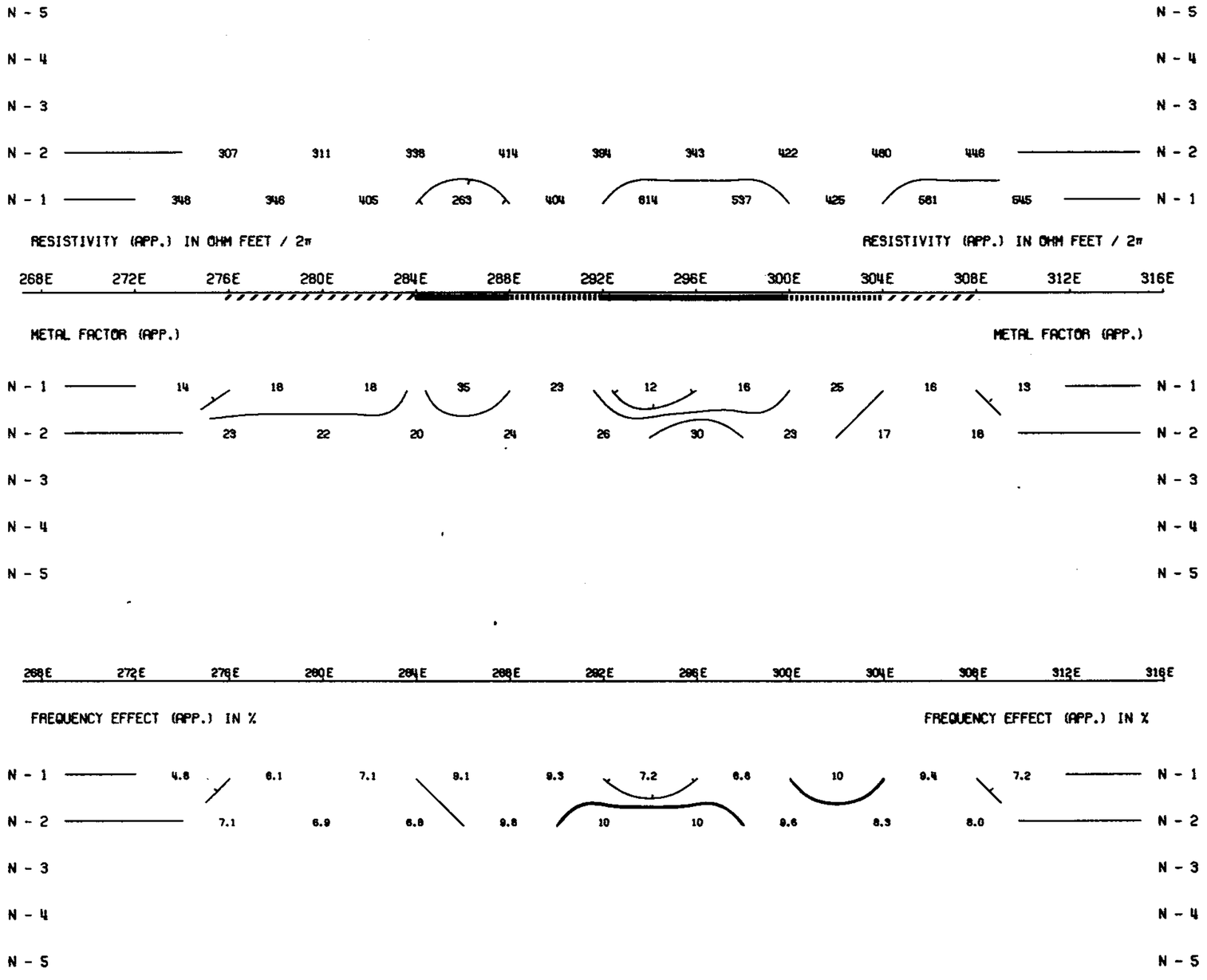
NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



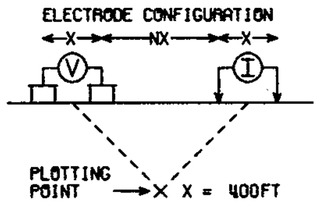
DWG. NO.- I.P.- 6052-2

NORANDA EXPLORATION COMPANY LIMITED.

DISCOVERY PROPERTY, BOX CLAIMS,
GERMANSEN LANDING AREA, OMINECA M.D., B.C.

LINE NO.- 22400N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ——
PROBABLE ··········
POSSIBLE / / / / /

4432

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: DEC 1972

APPROVED:

DATE:

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

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

Expiry Date April 25 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

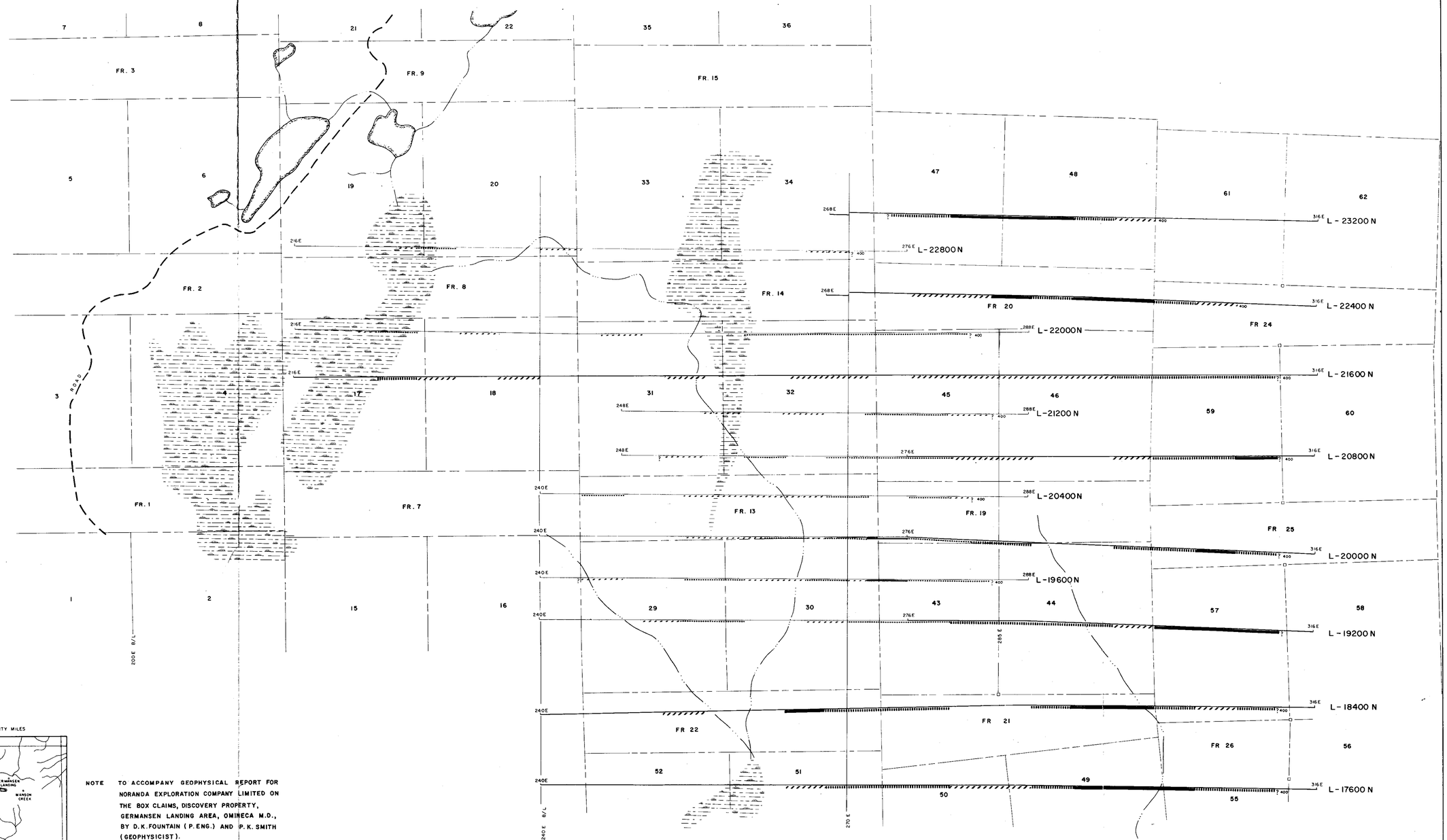
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

DWG. IPP - 4892

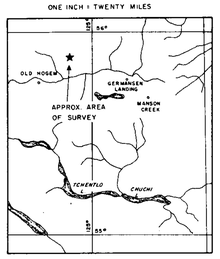
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



ONE INCH = TWENTY MILES



NOTE TO ACCOMPANY GEOPHYSICAL REPORT FOR NORANDA EXPLORATION COMPANY LIMITED ON THE BOX CLAIMS, DISCOVERY PROPERTY, GERMANSEN LANDING AREA, OMINECA M.D., BY D.K. FOUNTAIN (P. ENG.) AND P.K. SMITH (GEOPHYSICIST).

DATED FEB. 14, 1973

SURFACE PROJECTION OF ANOMALOUS ZONES

1973 REPORT

DEFINITE
PROBABLE
POSSIBLE

1972 REPORT

DEFINITE
PROBABLE
POSSIBLE

Number at the end of anomaly indicates spread used.

NORANDA EXPLORATION COMPANY LIMITED

BOX CLAIMS, DISCOVERY PROPERTY – GERMANSEN LANDING AREA,

OMINECA M.D. – B.C.

SCALE

One inch = 400 feet

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

4432 M-1

DWG. IPP. 4892