

3639

REPORT ON THE 92I/7W
INDUCED POLARIZATION
AND RESISTIVITY SURVEY
ON THE
ORO PROPERTY
HIGHLAND VALLEY AREA
NICOLA AND KAMLOOPS M. D.
BRITISH COLUMBIA
FOR
NORANDA EXPLORATION COMPANY, LIMITED

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3639 MAP

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.

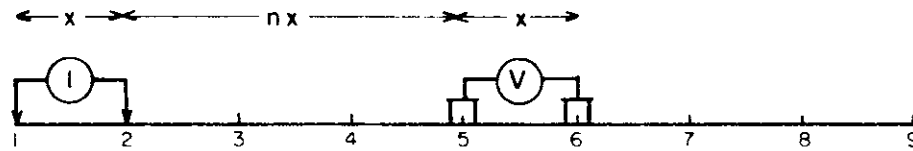
In some situations spurious noise, either man made or natural, will render it impossible to obtain a reading. The symbol "N" on the data plots indicates a station at which it is too noisy to record a reading. If a reading can be obtained, but for reasons of noise there is some doubt as to its accuracy,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

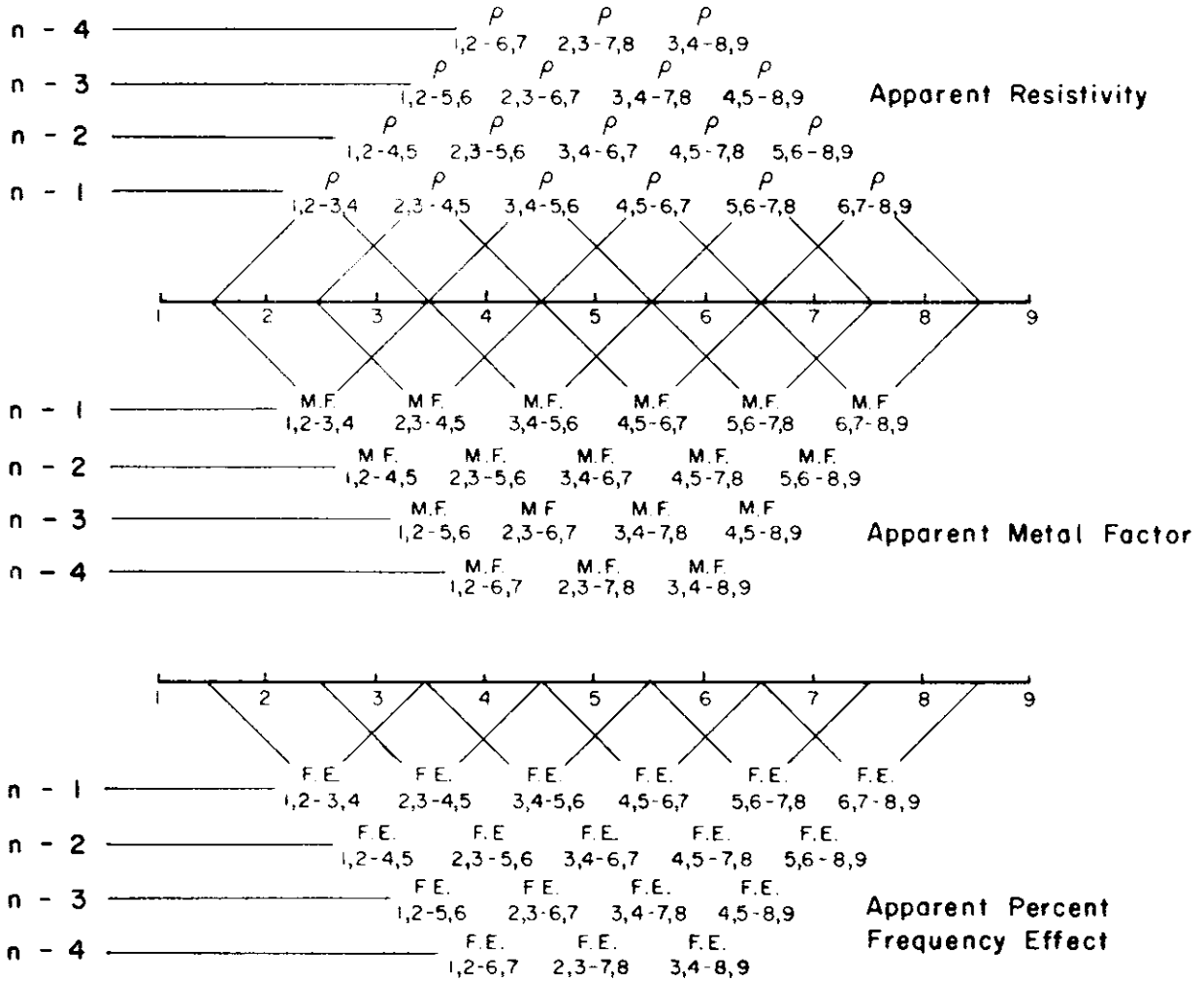


Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE
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ON THE
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HIGHLAND VALLEY AREA
NICOLA AND KAMLOOPS M.D.
BRITISH COLUMBIA
FOR
NORANDA EXPLORATION COMPANY, LIMITED

1. INTRODUCTION

During April and early May, 1972, an Induced Polarisation and Resistivity survey was carried out on the Oro Property of Noranda Exploration Company, Limited in the Highland Valley Area, Nicola and Kamloops Mining Divisions, British Columbia. The property is located in both the Nicola and Kamloops Mining Divisions at approximately $50^{\circ} 26' N$ latitude and $120^{\circ} 53' W$ longitude. Access to the property from Ashcroft, British Columbia is via the paved Highland Valley road to Indian Reserve No. 15 (approximately 30 miles), hence southeast by four-wheel drive power line road for three miles to the property.

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

<u>Claim</u>	<u>Record Number</u>	<u>Mining Division</u>
ACB 1	33497	Nicola
ACB 2	33498	Nicola
ACB 3	33499	Nicola
ACB 4	33500	Nicola
ACB 5	33501	Nicola
ACB 6	33502	Nicola
ACB 7	33503	Nicola
ACB 8	33504	Nicola
ACB 9	33505	Nicola
ACB 10	33506	Nicola
ACB 11	33507	Nicola
ACB 12	33508	Nicola
Price 45	76715	Kamloops
Price 46	76716	Kamloops
Price 81	49373	Nicola
Price 82	49374	Nicola
Price 83	49375	Nicola
Price 84	49376	Nicola
Price 85	49377	Nicola
Price 86	49378	Nicola
Price 195	41672	Nicola
Price 196	41673	Nicola
Price 197	41674	Nicola

<u>Claim</u>	<u>Record Number</u>	<u>Mining Division</u>
Price 198	41675	Nicola
Price 199	41676	Nicola
Price 200	41677	Nicola
Price 518 Fr.	26195	Nicola

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

The survey area is underlain by one or more phases of the Guichon Batholith. The IP survey was carried out in order to outline zones of metallic mineralization of possible economic significance, similar to those located to the west. The Highland Valley disseminated sulphide deposits are characterized by their overall low metallic sulphide content. Therefore, widespread zones of even weak to moderate anomalous IP response must be considered of possible significance.

The IP survey was carried out employing a McPhar variable frequency Induced Polarization unit utilizing the dipole - dipole electrode configuration and 400 foot dipoles. Two dipole separations ($n = 1, 2$) were recorded and the frequencies employed were 0.31 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.

<u>Line</u>	<u>Electrode Intervals</u>	<u>Dwg. No.</u>
1400W	400 feet	IP 5934-1
1000W	400 feet	IP 5934-2
600W	400 feet	IP 5934-3
200W	400 feet	IP 5934-4
200E	400 feet	IP 5934-5
600E	400 feet	IP 5934-6
1000E	400 feet	IP 5934-7
1400E	400 feet	IP 5934-8
1800E	400 feet	IP 5934-9
2200E	400 feet	IP 5934-10
2600E	400 feet	IP 5934-11A
2600E	400 feet	IP 5934-11B
3000E	400 feet	IP 5934-12
3400E	400 feet	IP 5934-13
3800E	400 feet	IP 5934-14
4600E	400 feet	IP 5934-15
5000E	400 feet	IP 5934-16
5400E	400 feet	IP 5934-17
5800E	400 feet	IP 5934-18
6200E	400 feet	IP 5934-19
6600E	400 feet	IP 5934-20
7000E	400 feet	IP 5934-21

Also enclosed with this report is Dwg. I.P.P. 4840, a plan map of the area surveyed 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.

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 names and relative position of the claims and the geologic data indicated on the maps and discussed in the report, are based upon information supplied by Noranda Exploration Company, Limited.

3. DISCUSSION OF RESULTS

Twenty-one lines at 400 foot intervals were surveyed with the IP method on a reconnaissance basis reading only two dipole separations ($n = 1, 2$). Some of the lines could not be surveyed for their full extent due to the lake ice being unsafe. In particular, these lines were: Line 600E, not extended to north; Line 3000E, not extended to the south; and, Line 4200E, not surveyed at all.

The IP survey results indicate typical Highland Valley area response of moderately high background apparent resistivity and low background IP response. No significantly large zones of anomalous IP results were indicated. On Line 1000W, a single reading anomaly is indicated on the $n = 2$ separation and centred at 72N. Detail surveying recording the $n = 3$ and $n = 4$ dipole separations would be required to further evaluate this anomaly.

Correlating anomalous responses are outlined at the extreme northern extent of Line 3000E and Line 3400E. On Line 3000E, the single anomalous reading is located between 76N and 80N. The anomaly pattern would suggest that it extends to the north. On Line 3400E, moderately anomalous response extends from 68N to at least 80N and again the anomaly pattern would suggest that it extends to the north beyond the effective survey coverage. In order to properly evaluate this anomaly, detail IP surveying recording $n = 3$ and $n = 4$ dipole separations should be carried out. In addition, the effective survey coverage should be extended to the northeast on Line 3000E, Line 3400E and at least Line 2600E and Line 3800E to

delimit the anomaly. Detailed geologic mapping in this area is warranted since the moderately anomalous IP response may indicate a change in background response due to a change of geologic environment.

4. SUMMARY AND CONCLUSIONS

No significantly large zone of anomalous IP response was outlined by the survey results. A moderate anomaly on Line 1000W and correlating anomalies at the northeastern extent of Line 3000E and Line 3400E were outlined. These anomalies would require additional IP surveying to properly evaluate and delimit them.

Any recommendations for further work in the form of diamond drilling or trenching would be dependent upon the results of the recommended detail IP and any detailed geologic information available in the area of the anomalies.

McPHAR GEOPHYSICS LIMITED

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



Dated: May 23, 1972.

Expiry Date: April 25, 1973

ASSESSMENT DETAILS

PROPERTY: Oro Property
SPONSOR: Noranda Exploration Company, Limited
LOCATION: Highland Valley Area
TYPE OF SURVEY: Induced Polarisation
MINING DIVISIONS: Nicola and Kamloops
PROVINCE: British Columbia
OPERATING MAN DAYS: 22
EQUIVALENT 8 HR. MAN DAYS: 33
CONSULTING MAN DAYS: 1
DRAUGHTING MAN DAYS: 3
TOTAL MAN DAYS: 37
DATE STARTED: April 23, 1972
DATE FINISHED: May 2, 1972
NUMBER OF STATIONS: 136
NUMBER OF READINGS: 636
MILES OF LINE SURVEYED: 9.62

CONSULTANTS:

David K. Fountain, 62 Patina Drive, Willowdale 428, Ontario.

FIELD TECHNICIANS:

J. Parker, Box 340, Choiceland, Saskatchewan.

G. Trefenanko, Box 923, Lac La Biche, Alberta.

Plus two helpers:

J. Smith, 956 Columbia Street, Kamloops, British Columbia.

D. Gordon, General Delivery, Kamloops, British Columbia.

DRAUGHTSMEN:

N. Lade, 299 Jasper Avenue, Oshawa, Ontario.

G. Hines, 114 Hillview Drive, Richmond Hill, Ontario.

B. Marr, 19 Kenewen Court, Toronto 16, Ontario.

Notes:- Only for work completed up to and including May 2, 1972.

McPHAR GEOPHYSICS LIMITED

David K. Fountain
Geophysicist.



Dated: May 23, 1972.

Expiry Date: April 25, 1973

SUMMARY OF COST

Oro Property

Total Survey Cost: 9.47 miles @ \$375.00 per mile = \$3,551.25

Breakdown of Cost

Crew - J. Parker, G. Trefenanko + two helpers

5½ days Operating	@ \$395.00/day	2,172.50
1 day Bad Weather)) 3 days @ \$100.00/day	300.00
2 days Standby		

Expenses

Meals & Accommodation	300.42	
Vehicle Expense-truck rental	254.91	
Supplies	166.26	
	<u>721.59</u>	
Plus 10%	<u>72.16</u>	793.75
<u>Extra Labour</u>	237.50	
Plus 20%	<u>47.50</u>	<u>285.00</u>
		<u>\$3,551.25</u>

Note:- Only for work completed up to and including May 2, 1972.

McPHAR GEOPHYSICIST

David K. Fountain
 D.K. FOUNTAIN
 Geophysicist.



Dated: May 23, 1972.

Expiry Date: April 25, 1973

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 23rd day of May, 1972


David Kirkman Fountain, B.A.Sc., P. Eng.
The seal is circular with a double-line border. The outer ring contains the text 'PROFESSIONAL ENGINEER' at the top and 'BRITISH COLUMBIA' at the bottom. The inner circle contains the text 'PROVINCE OF' at the top and 'OF' at the bottom.

Expiry Date: April 25, 1973

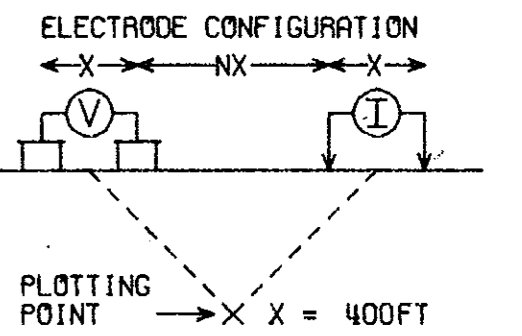
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NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.O. BRITISH COLUMBIA

LINE NO. - 1400W



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: APR 1972

APPROVED: *David G. Fountain*

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

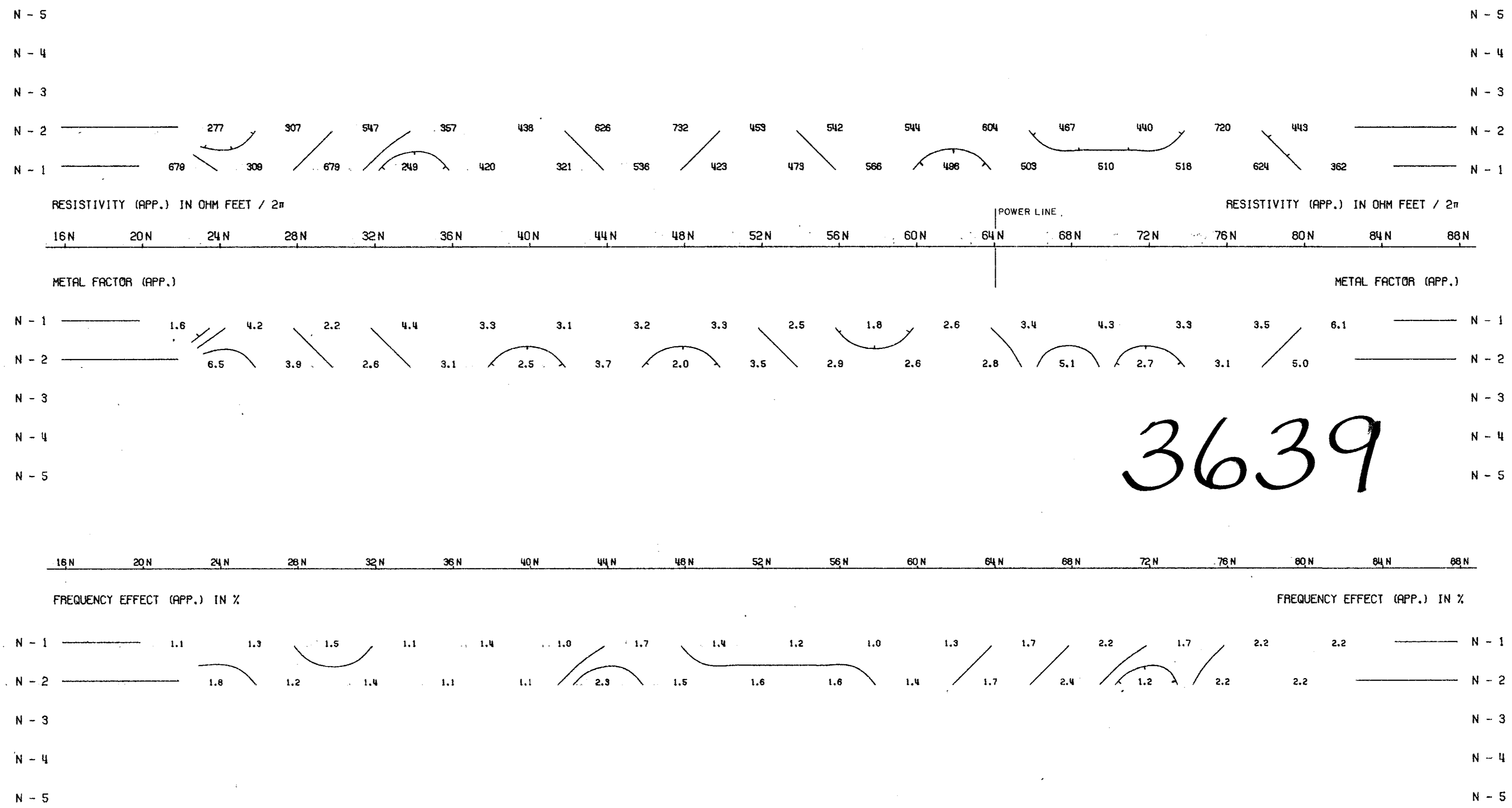
DATE: May 23/72

April 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

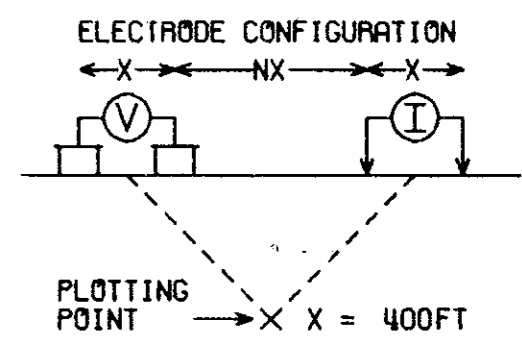
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NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 1000W



SURFACE PROJECTION OF ANOMALOUS ZONES
 DEFINITE **—————**
 PROBABLE **|||||**
 POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *D.K. Fountain*

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

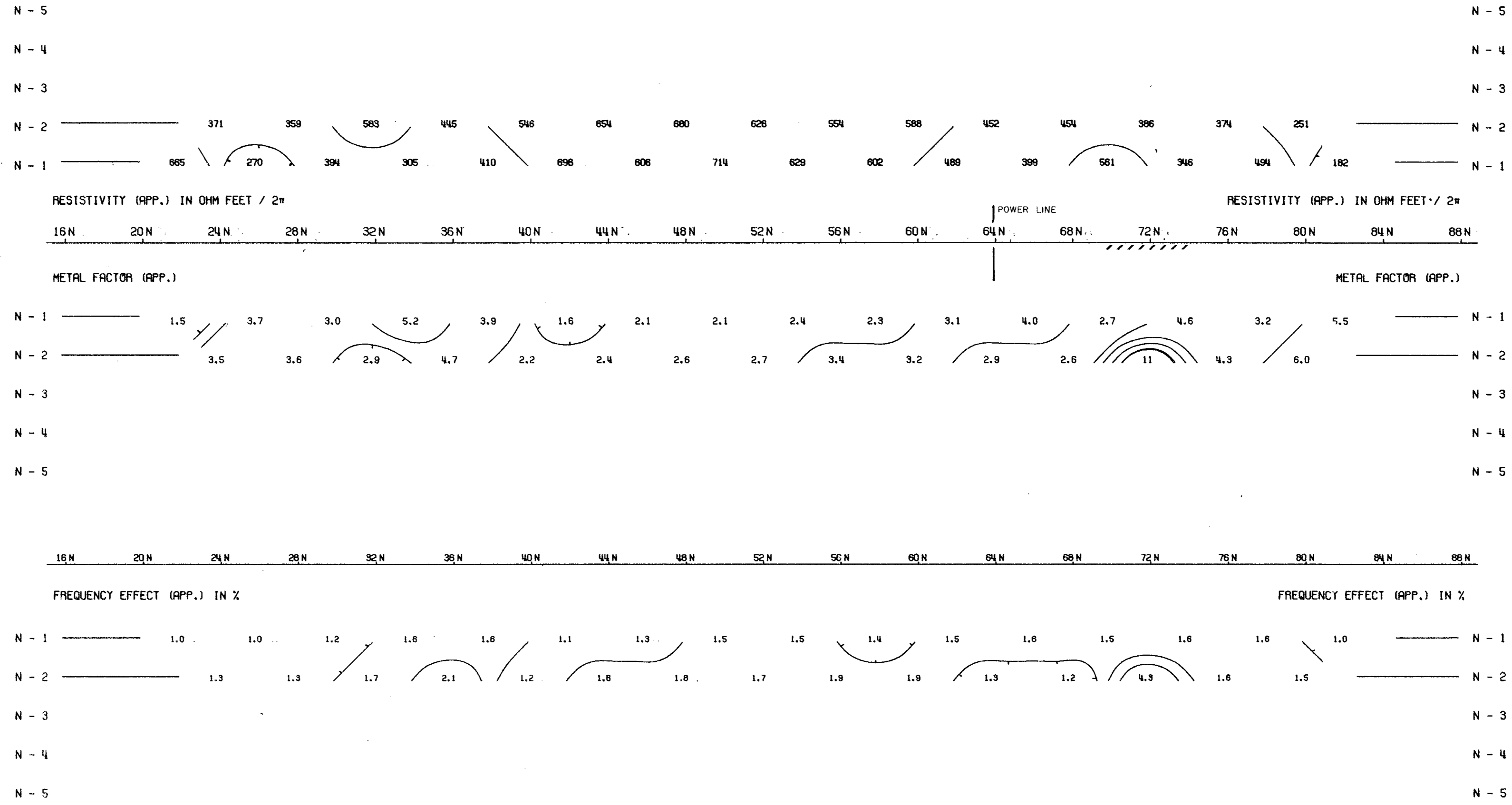
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Printed Date: April 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

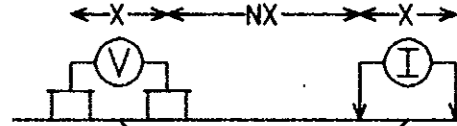


**NORANDA EXPLORATION
COMPANY LIMITED**

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 600W

ELECTRODE CONFIGURATION



PLOTTING POINT X = 400FT

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: APR 1972

APPROVED: *David H. Fountain*

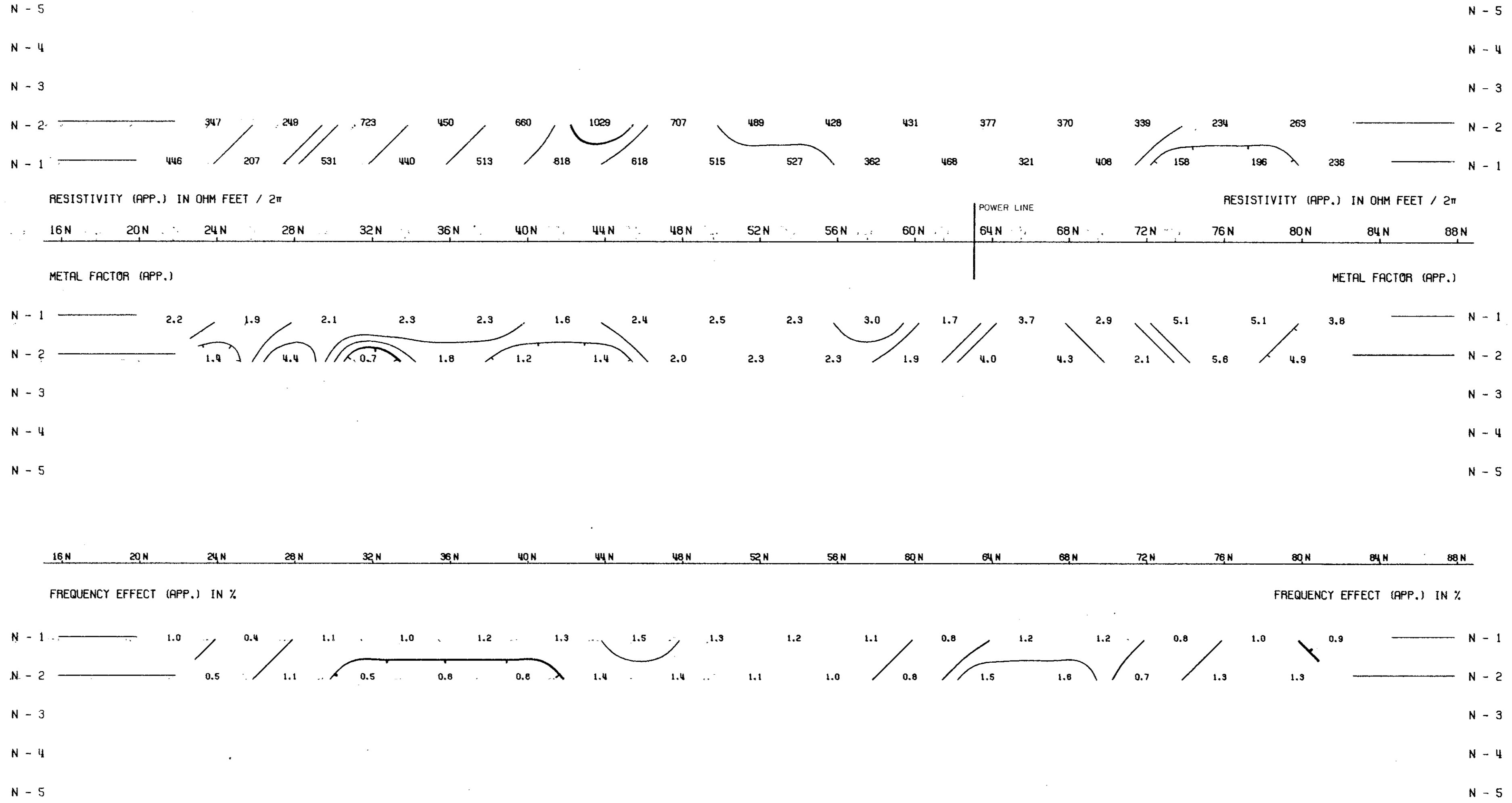
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DATE: May 23/72

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

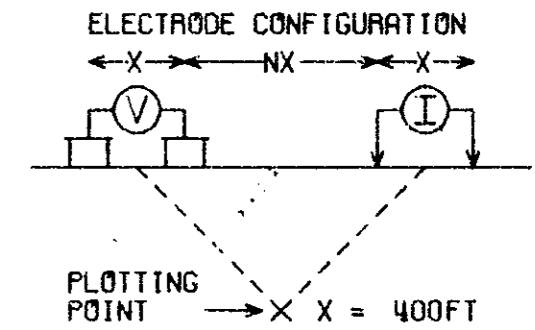
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ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 200W



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: D. K. FOUNTAIN

NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
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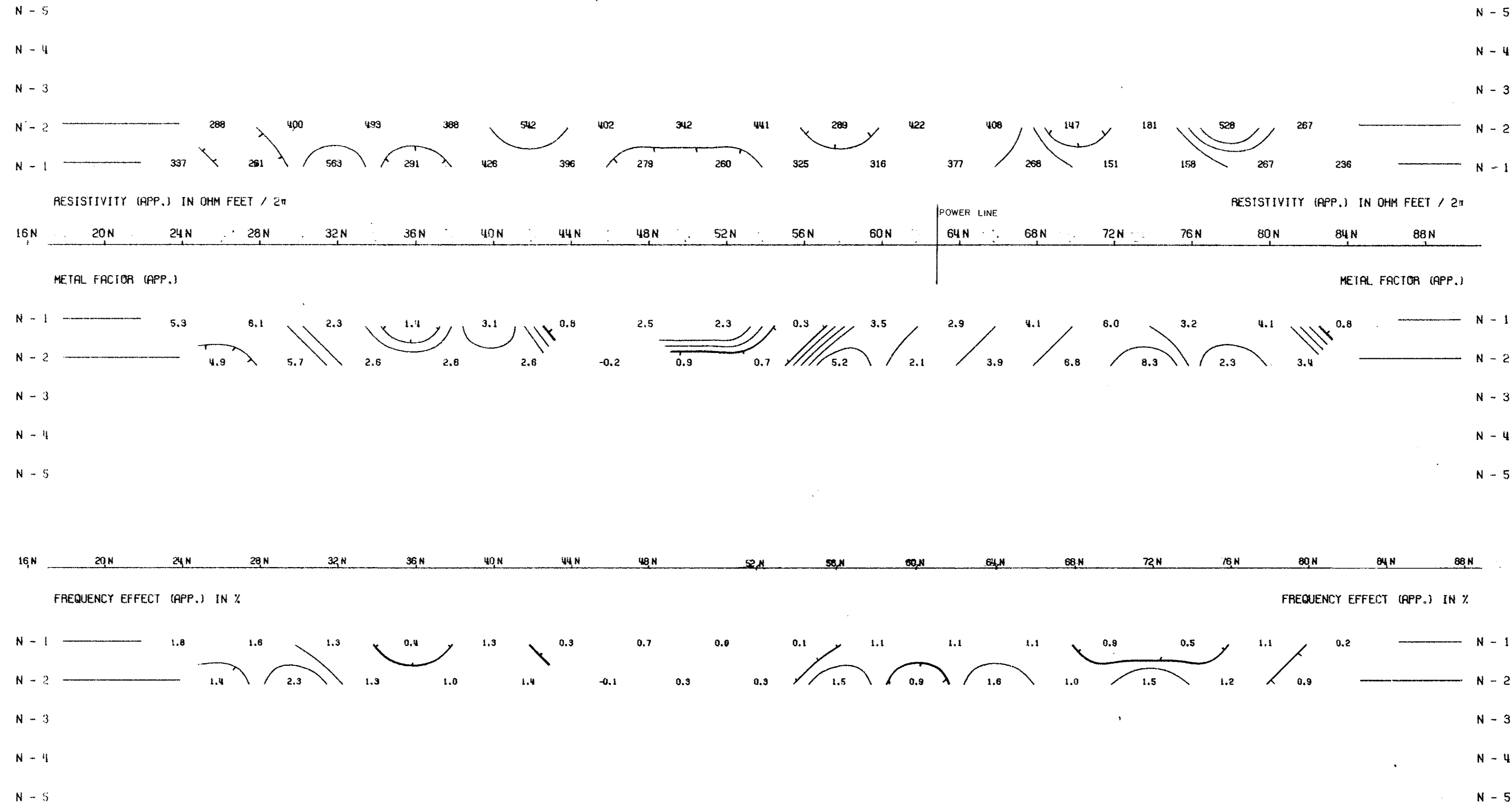
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McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

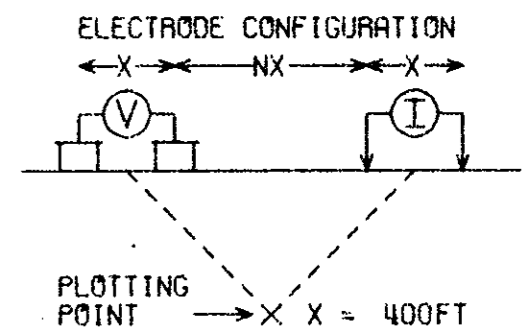
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**NORANDA EXPLORATION
COMPANY LIMITED**

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 200E



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **—————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

David H. Fountain

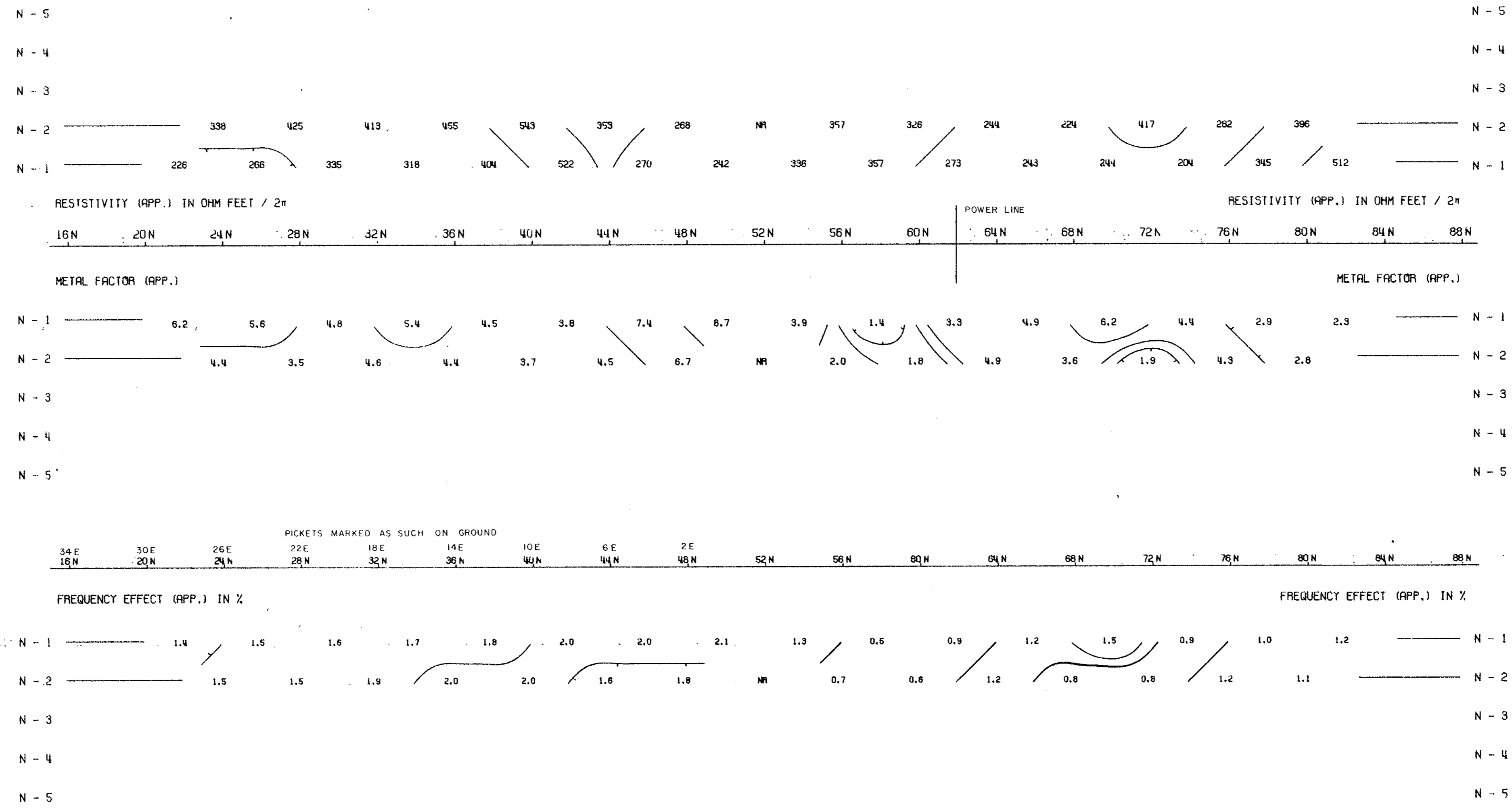
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NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1, -1.5, -2, -3, -5, -7.5, -10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

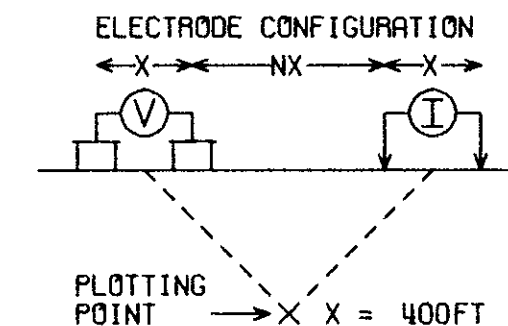
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NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO.- 600E



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE 
PROBABLE 
POSSIBLE 

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

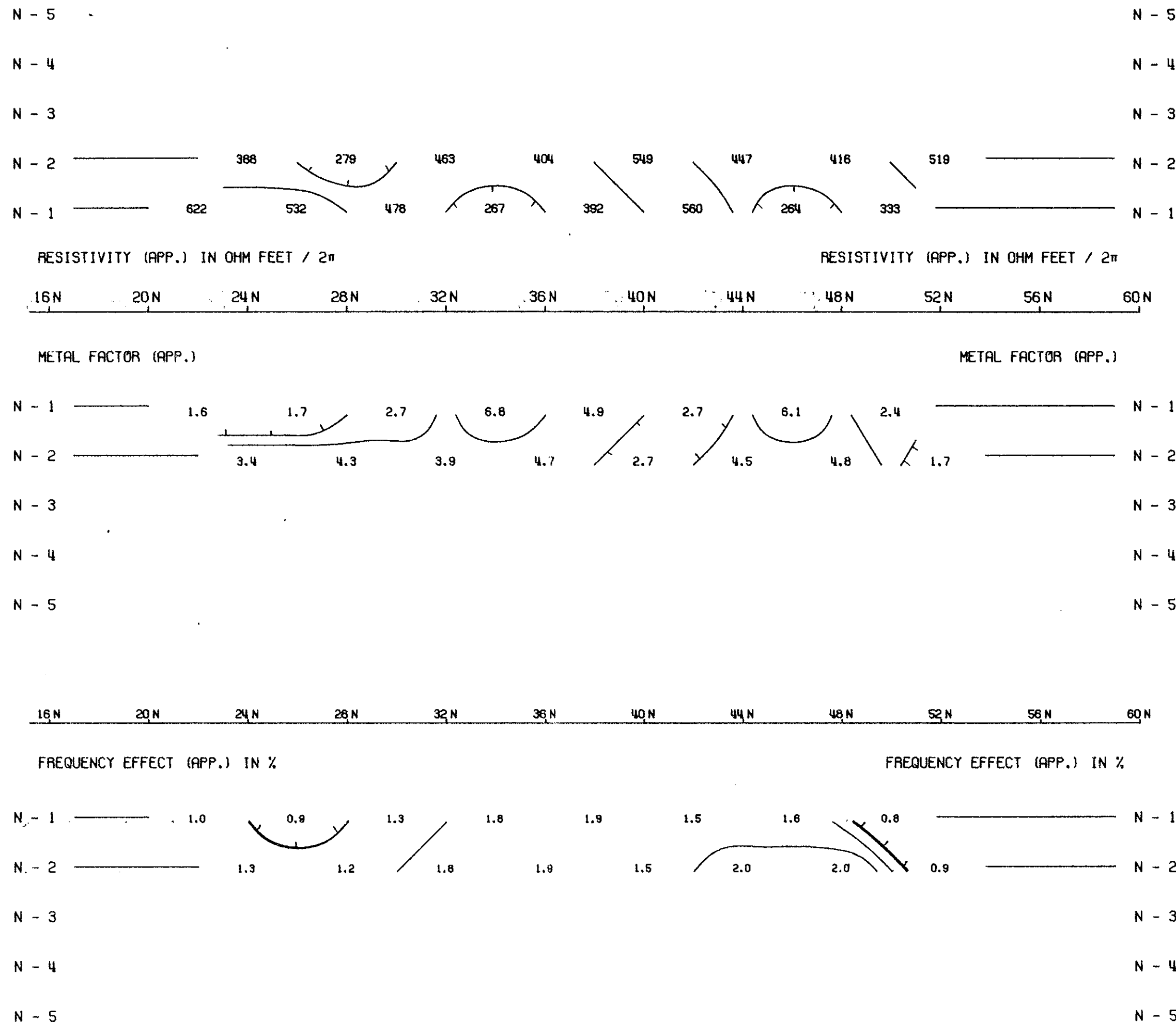
David K. Fountain
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NOTE: CONTOURS AT
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1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

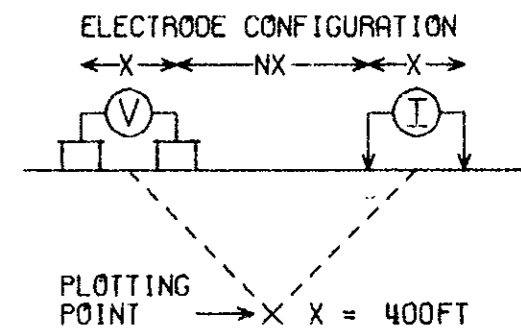
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



**NORANDA EXPLORATION
COMPANY LIMITED**

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.O. BRITISH COLUMBIA

LINE NO.- 1000E



SURFACE PROJECTION
OF ANOMALOUS ZONES
DEFINITE **————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: APR 1972

APPROVED: *David B. Fountain*
D. B. FOUNTAIN
ENGINEER
DATE: May 23/72

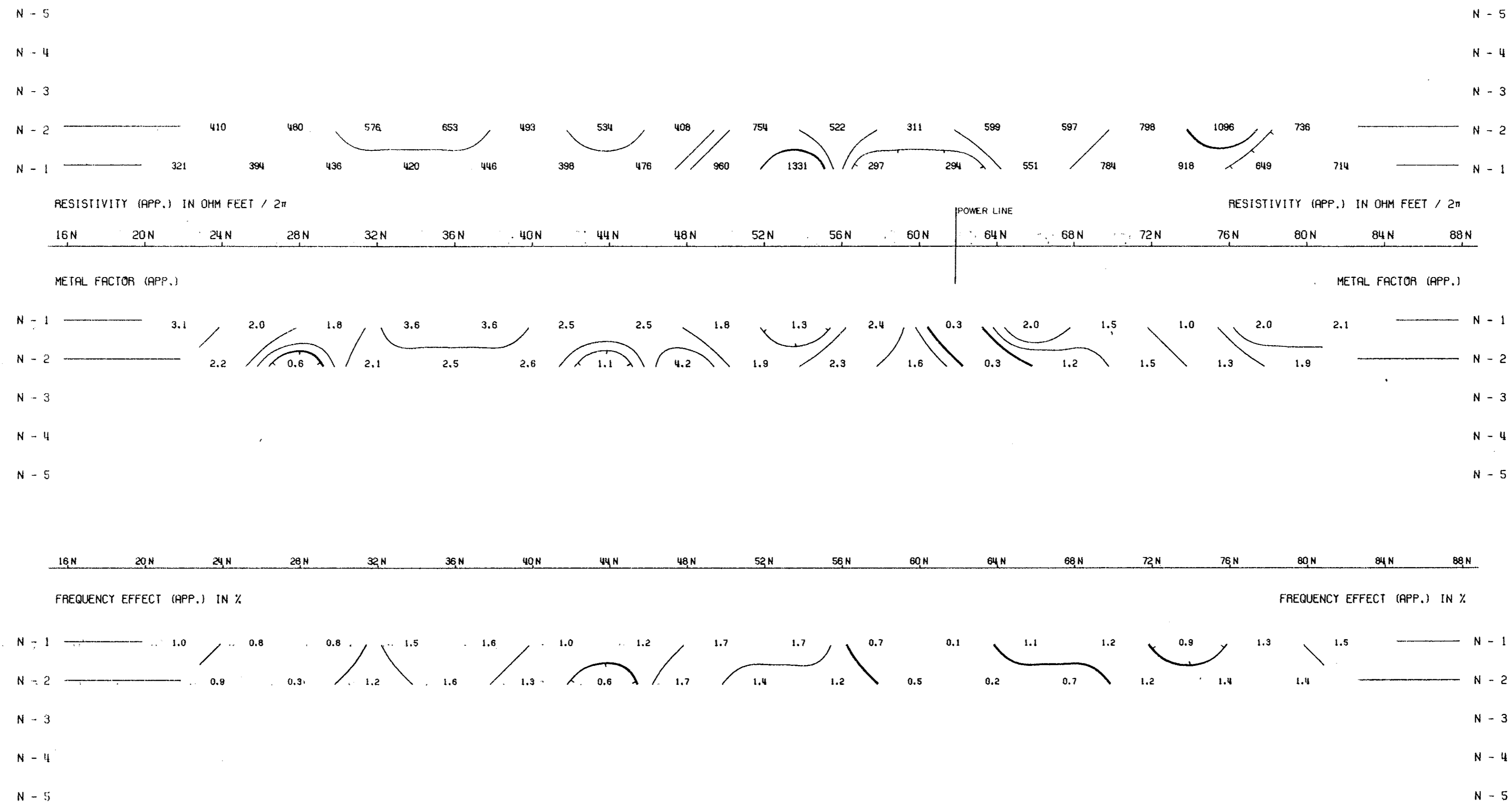
Expiry Date: April 25, 1973

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

McPHAR GEOPHYSICS

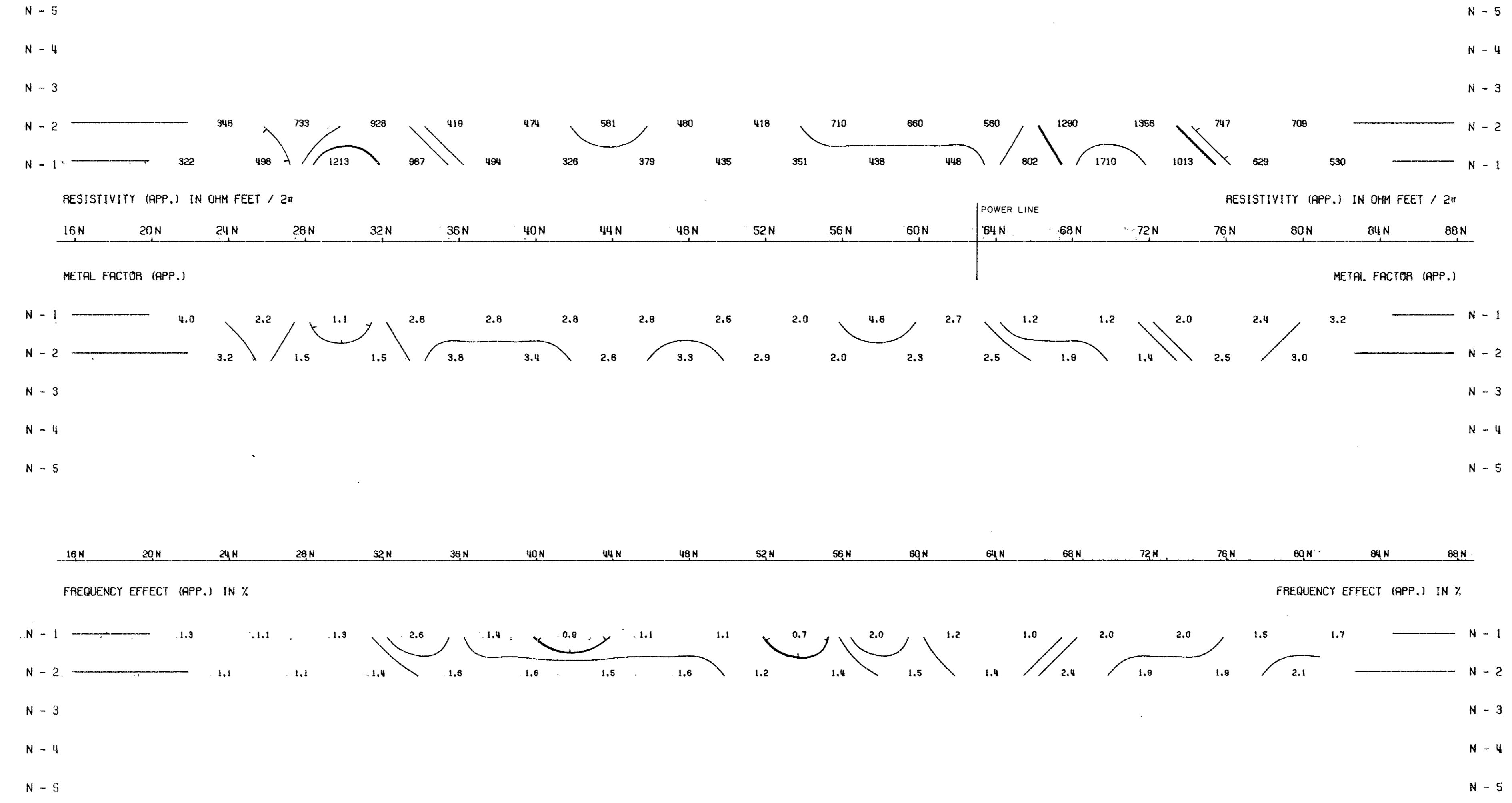
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

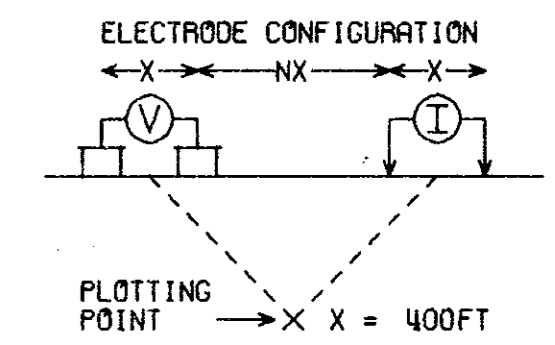


NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D., BRITISH COLUMBIA



LINE NO. - 1400E



SURFACE PROJECTION OF ANOMALOUS ZONES
 DEFINITE **————**
 PROBABLE **|||||**
 POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: APR 1972

APPROVED: *D. K. MOUNTAIN*

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

DATE: May 23 1972

Expiry Date: April 25, 1973

McPHAR GEOPHYSICS

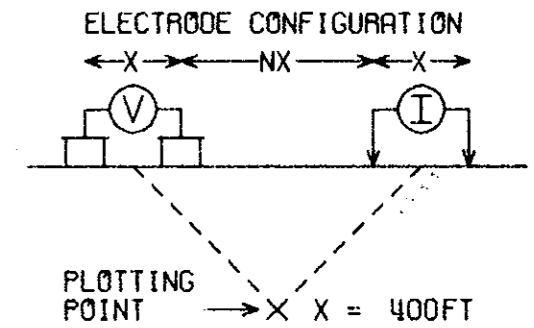
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

**NORANDA EXPLORATION
COMPANY LIMITED**

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 1800E



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

Sandra K. Fountain

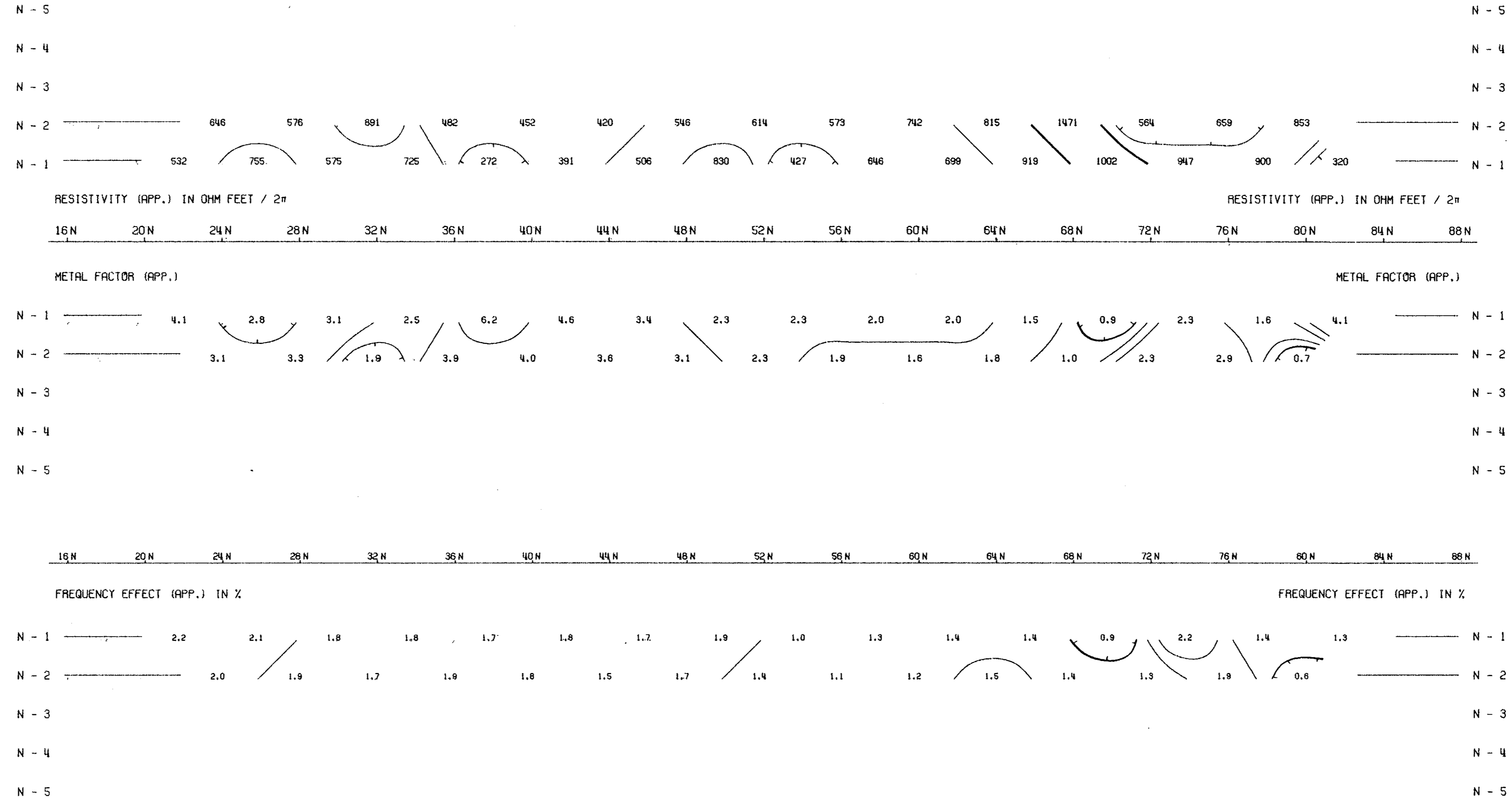
NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1.-1.5-2.-3.-5.-7.5-10

DATE: *May 23/72*

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

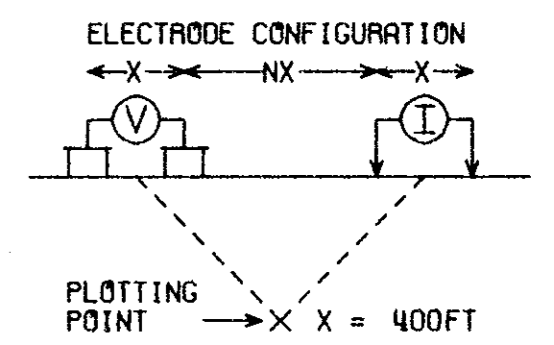
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 2200E



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **—————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

David B. Fountain

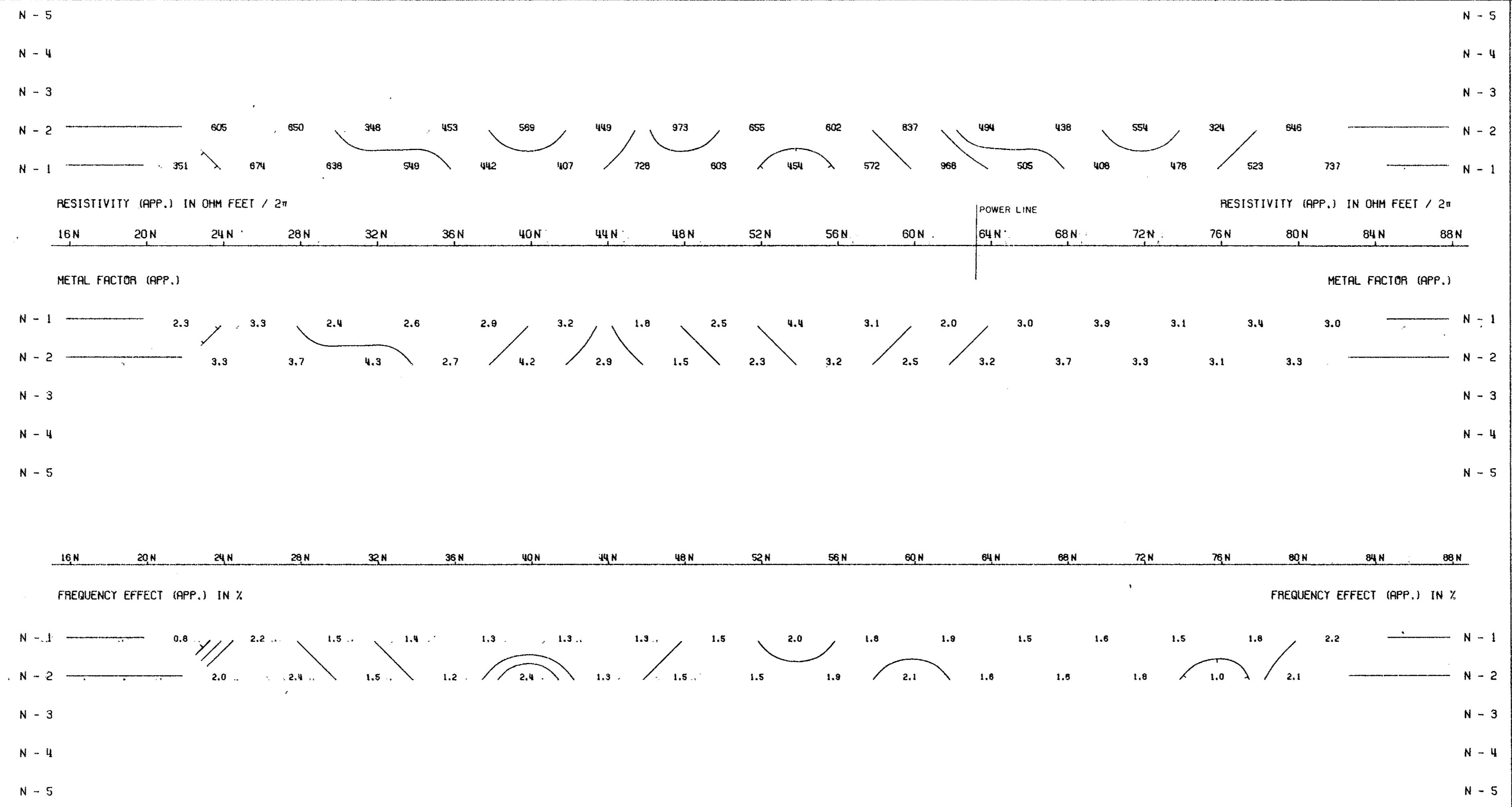
NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1.-1.5-2.-3.-5.-7.5-10

DATE: May 23/72

McPHAR GEOPHYSICS

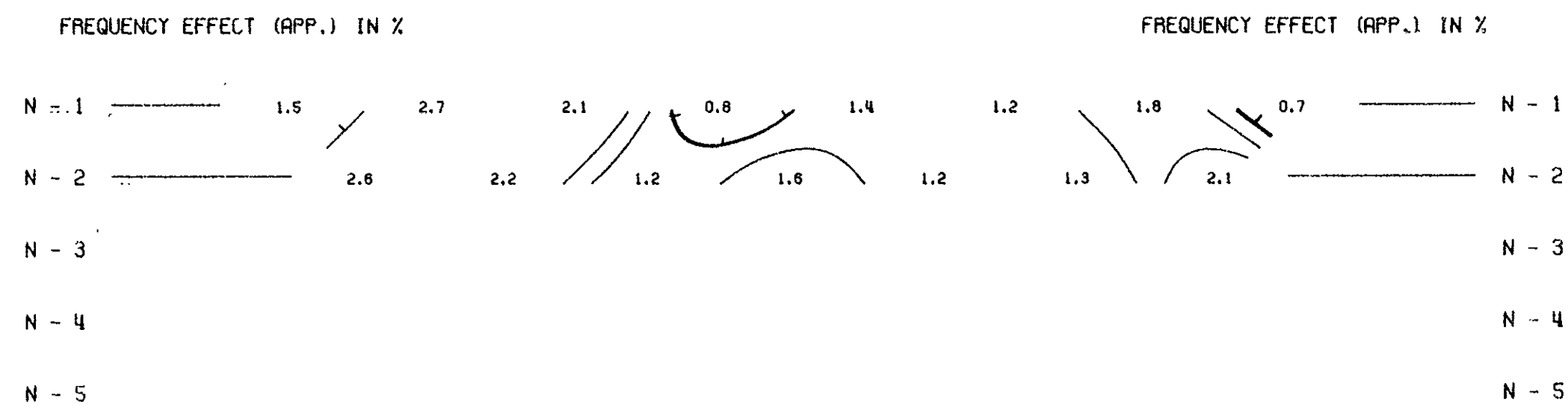
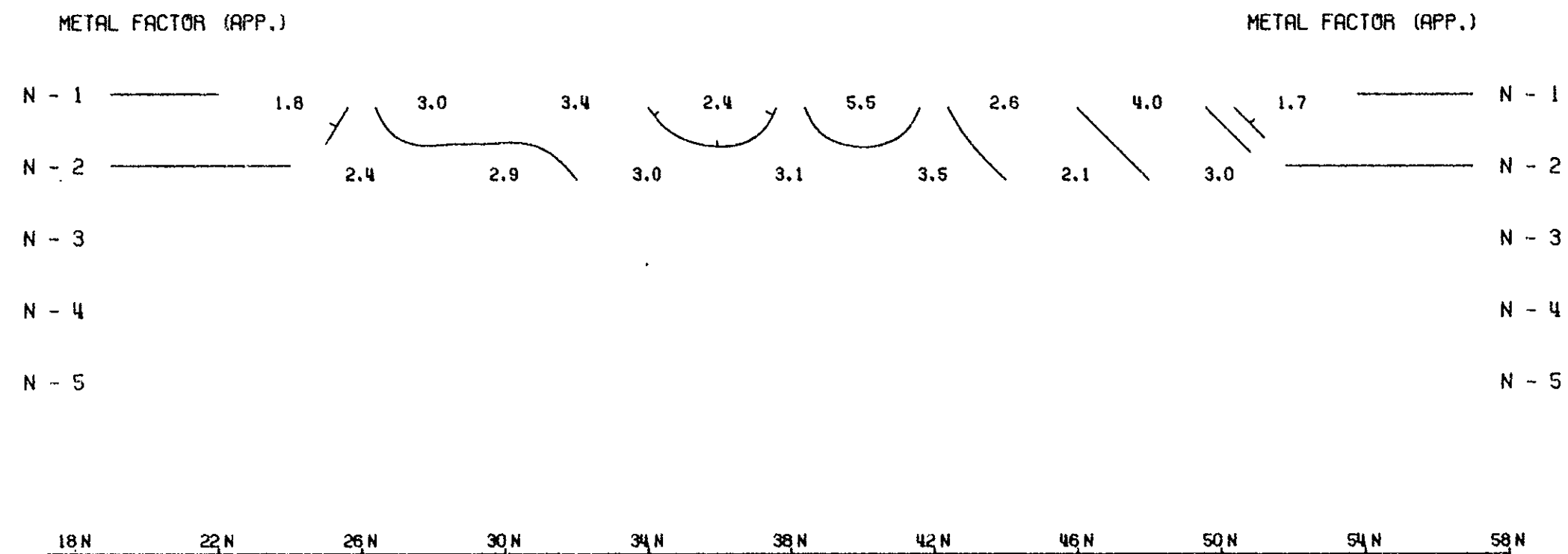
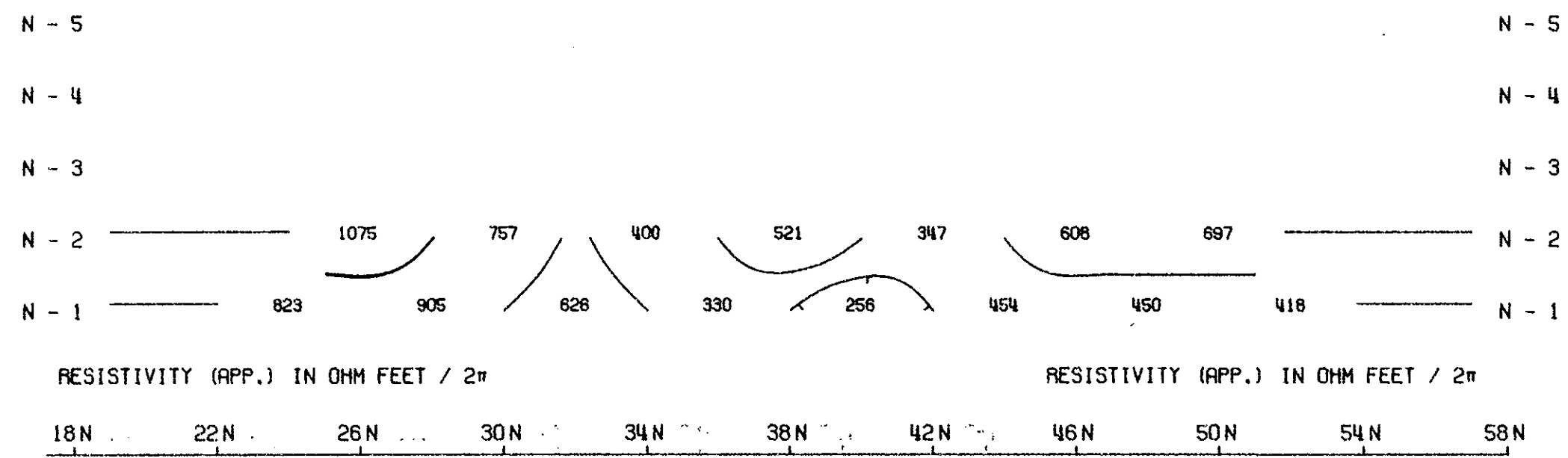
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

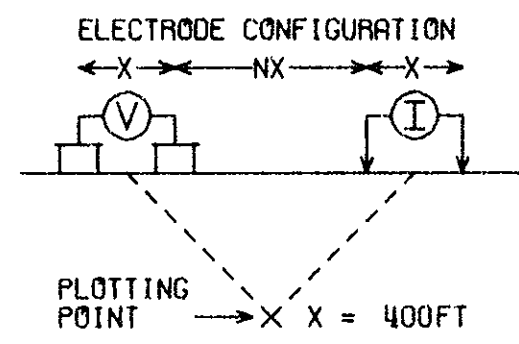


NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 2600E



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **————**

PROBABLE **|||||**

POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David G. Fountain*

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

DATE: May 23/72

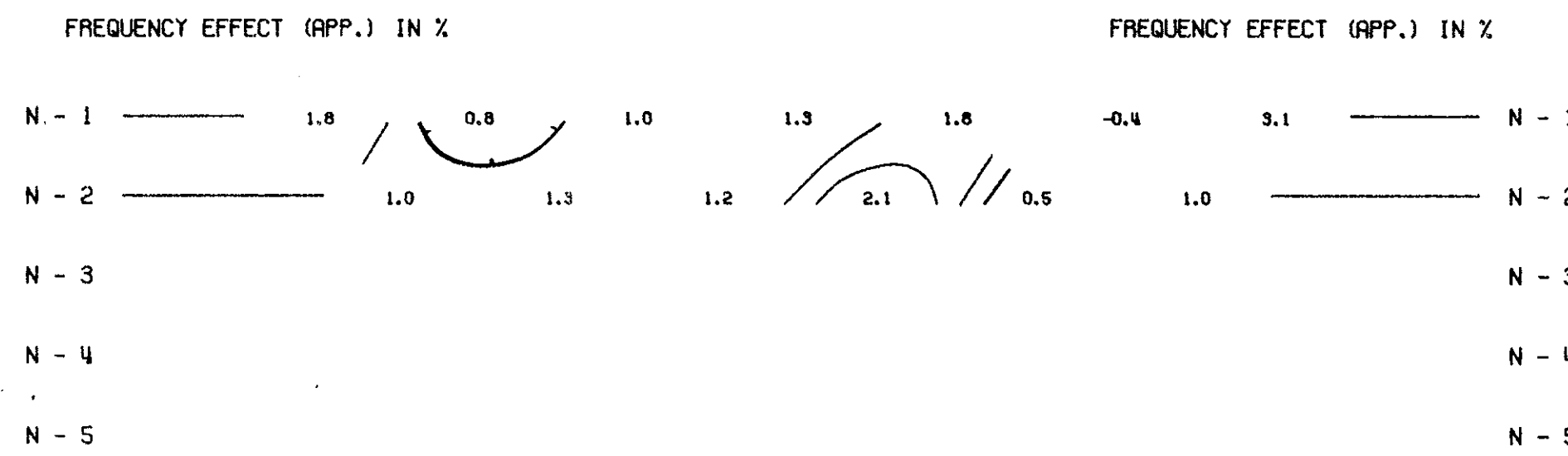
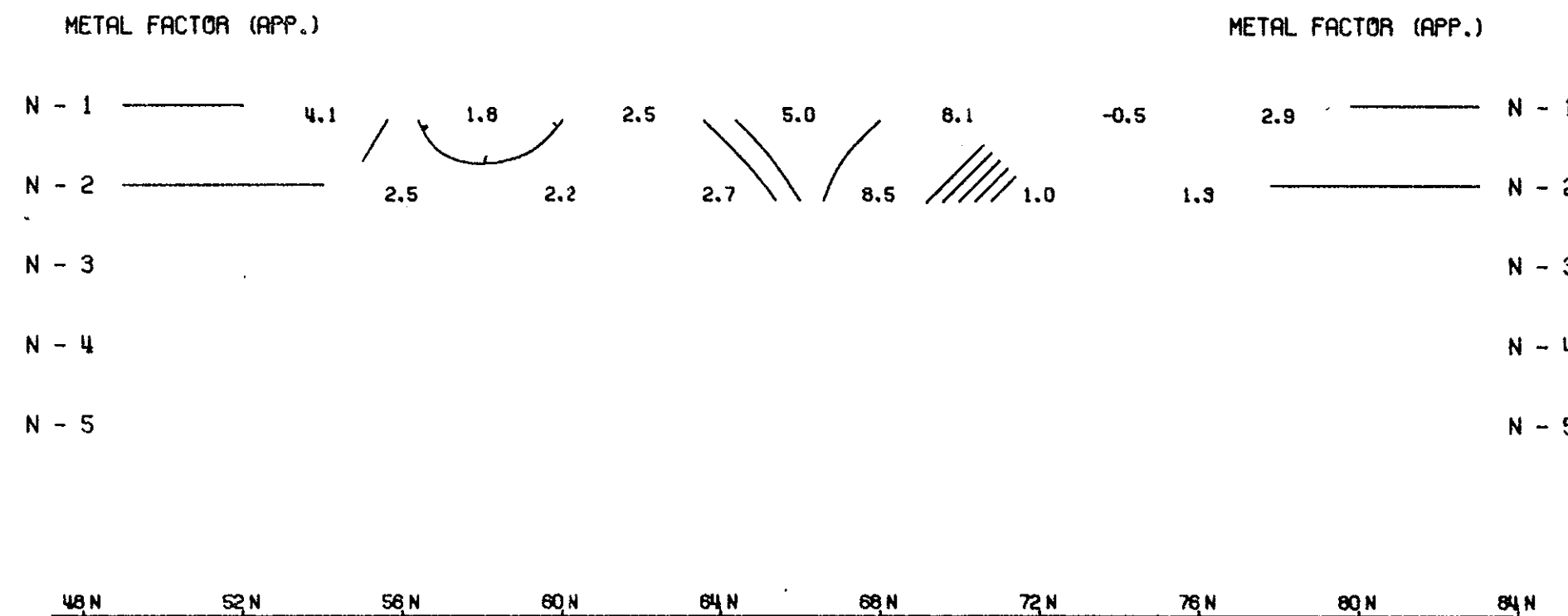
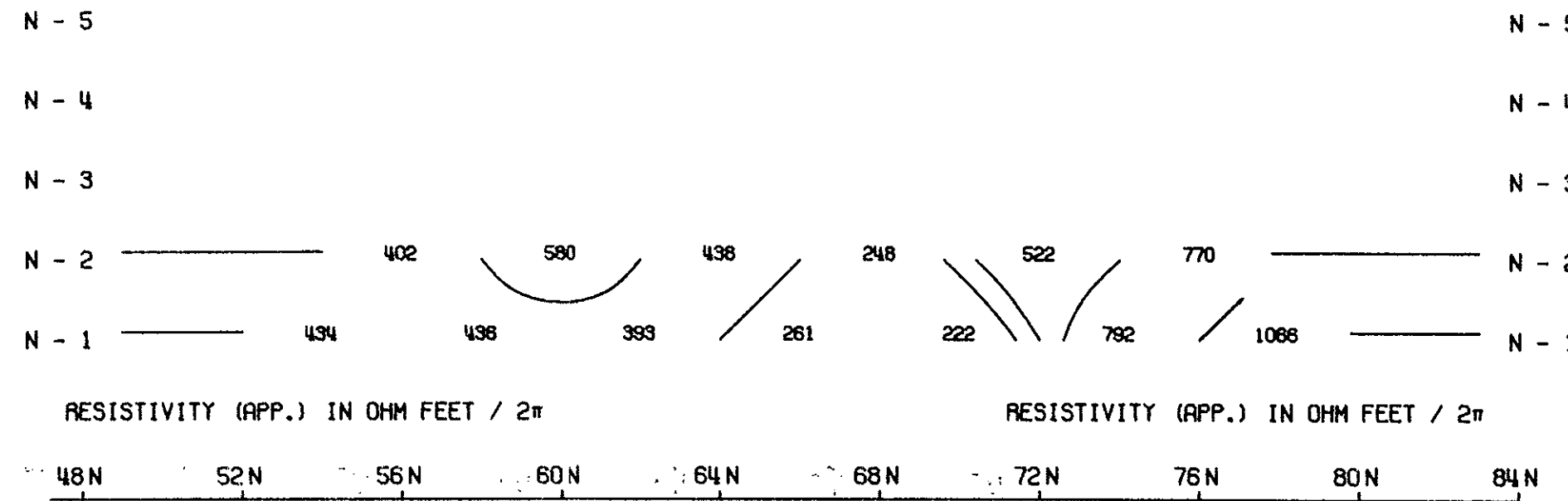
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

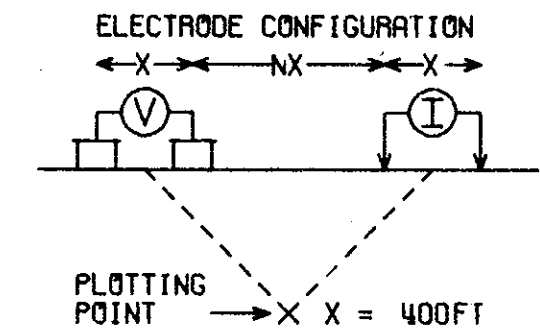
NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 2600E



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David K. Fountain*
D.K. FOUNTAIN
DATE: *May 23/72*

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

Expiry Date: April 25, 1973

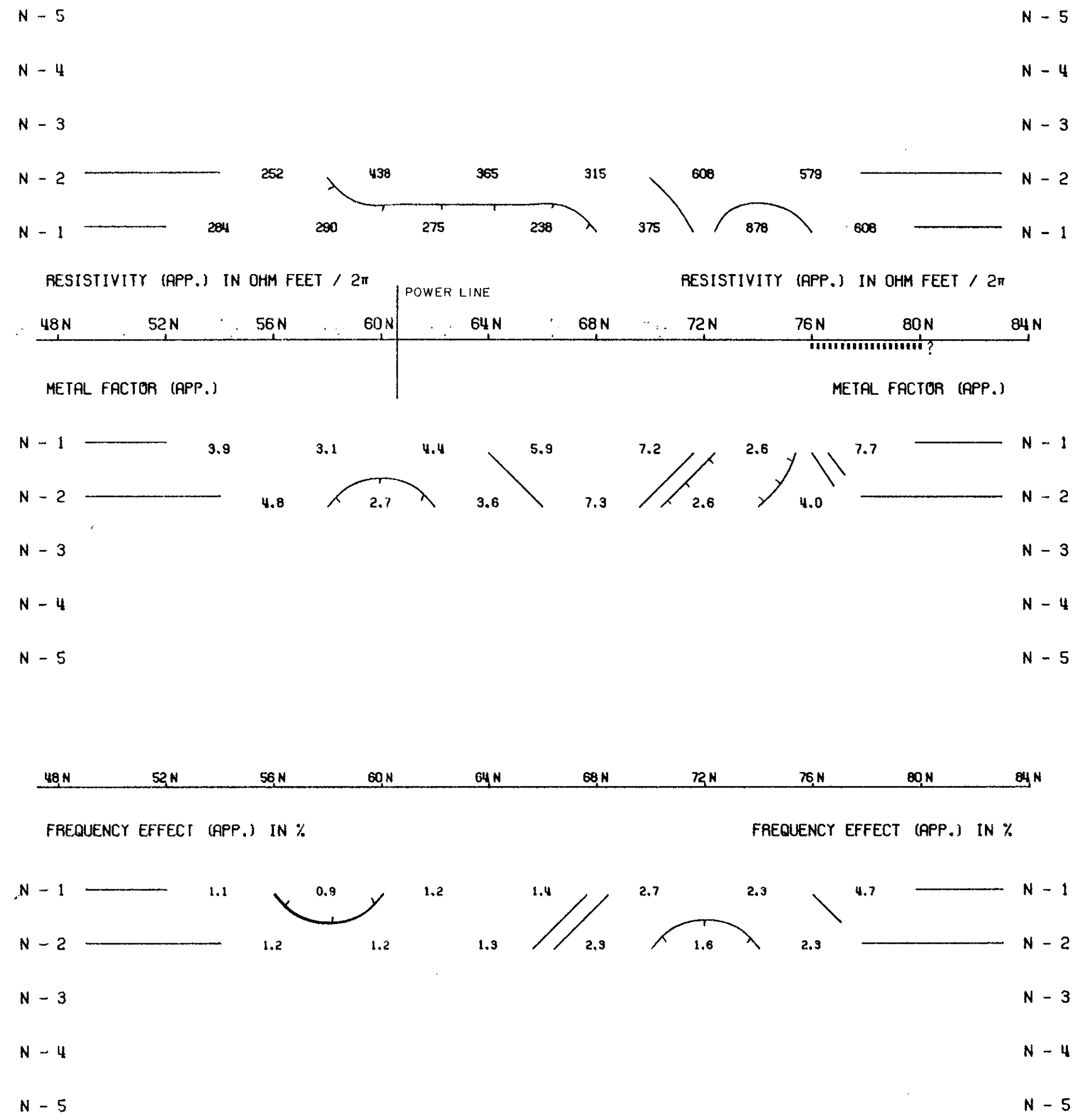
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

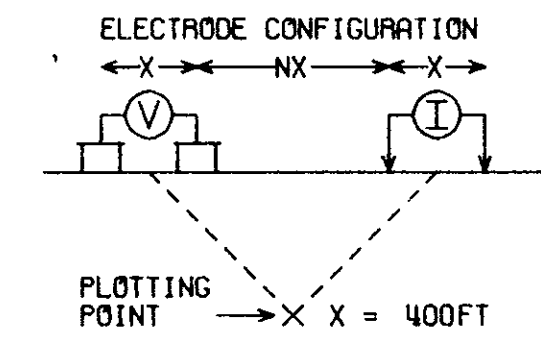
NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 3000E



SURFACE PROJECTION OF ANOMALOUS ZONES
 DEFINITE **—————**
 PROBABLE **|||||**
 POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *[Signature]*
 DATE: May 23/72

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

Expiry Date: April 25, 1973

McPHAR GEOPHYSICS

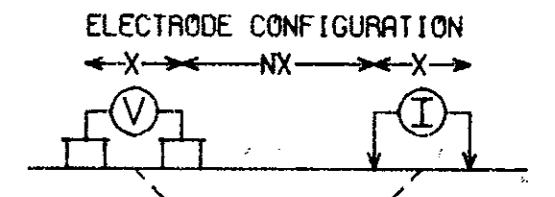
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO.- 3400E



PLOTTING POINT → X = 400FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE **————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *D. K. Fountain*

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

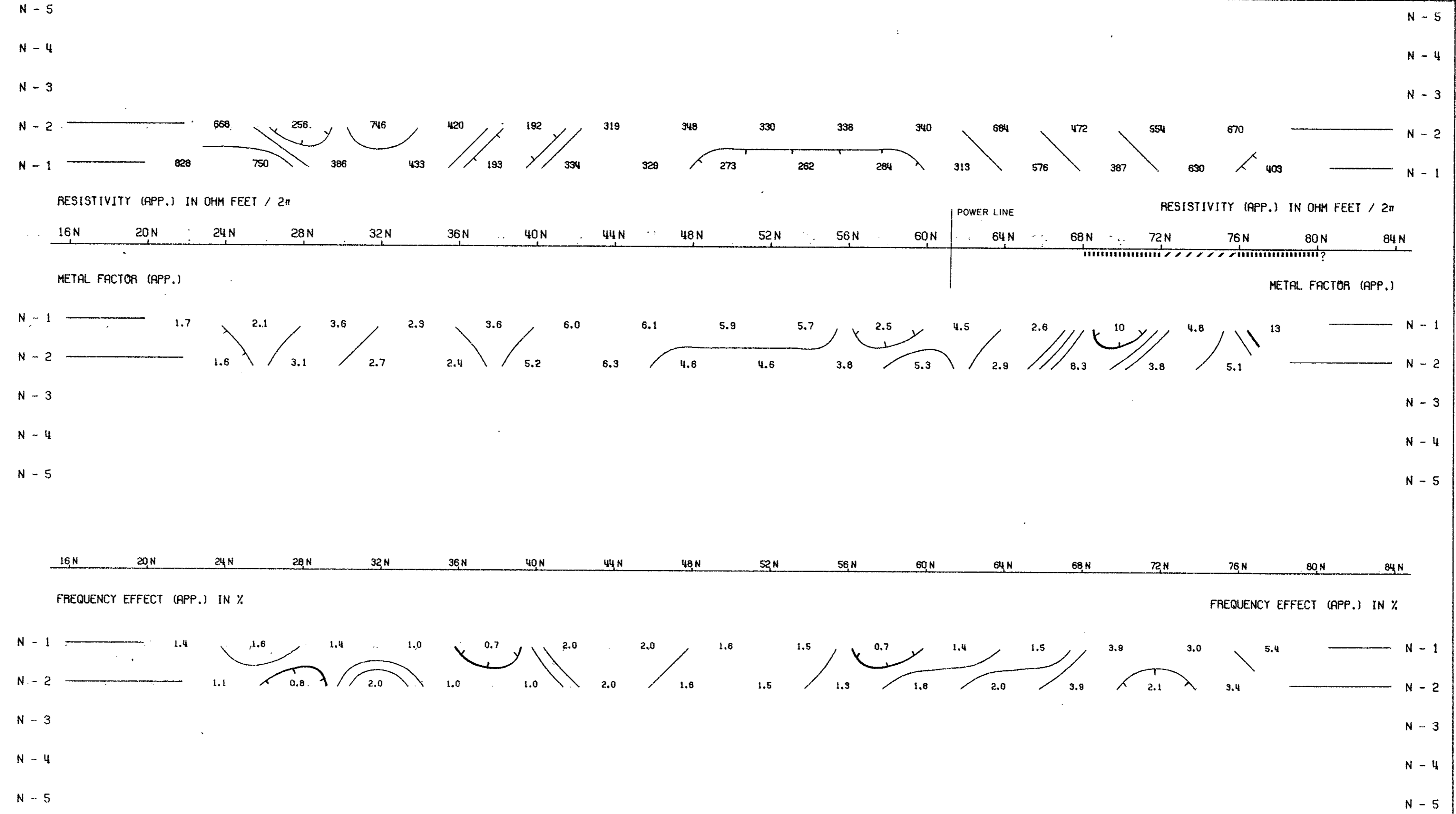
DATE: *May 23, 1972*

Expiry Date: April 25, 1973

McPHAR GEOPHYSICS

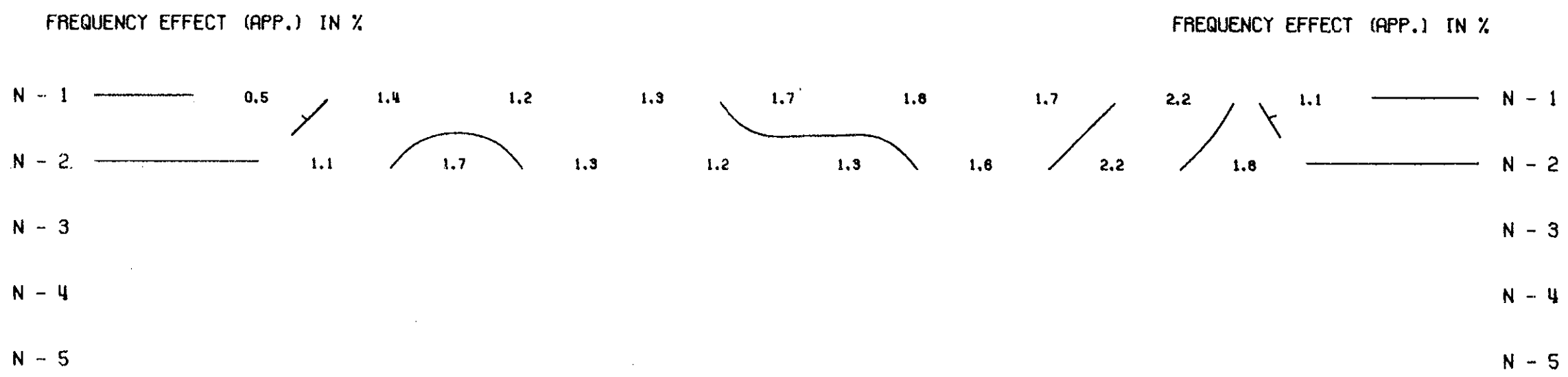
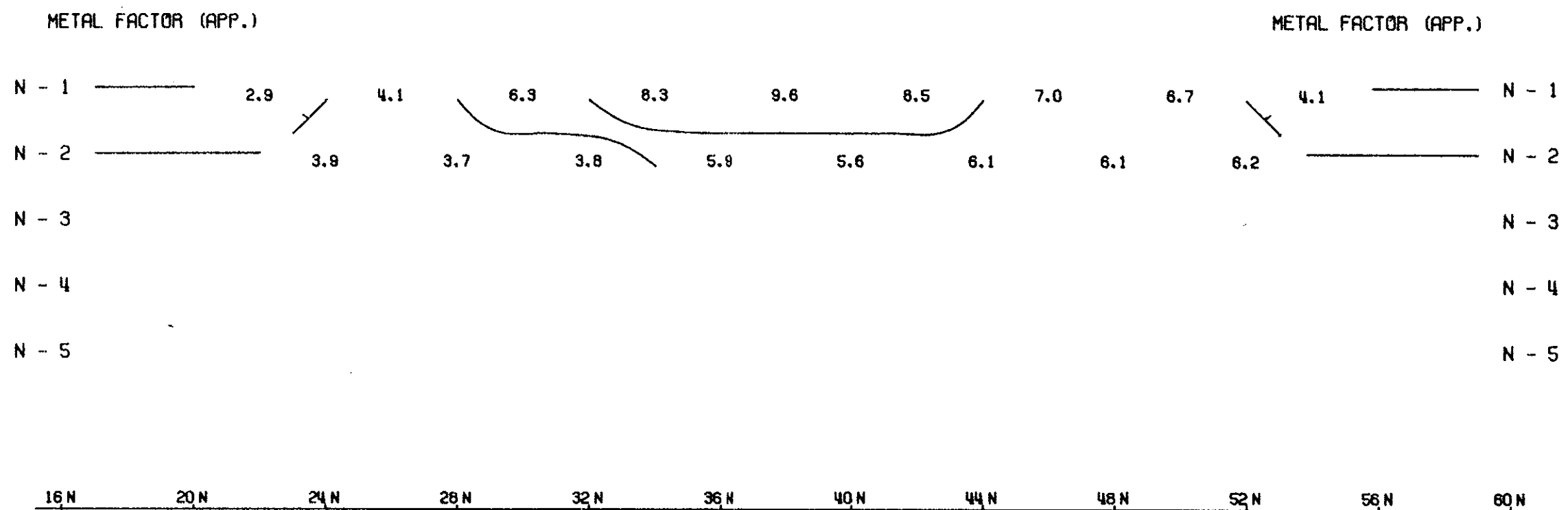
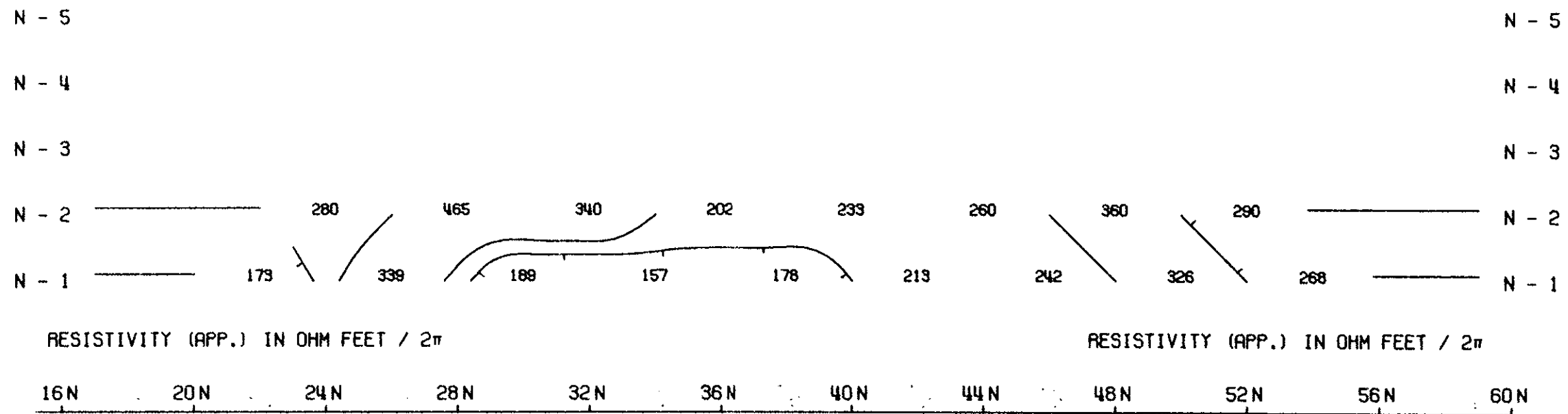
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

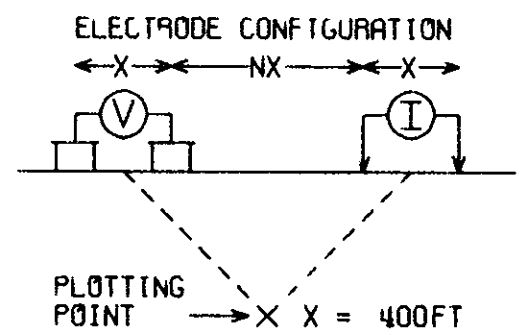


NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO.- 3800E



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE **————**

PROBABLE **|||||**

POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David K. Lountain*

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

DATE: May 23/72

McPHAR GEOPHYSICS

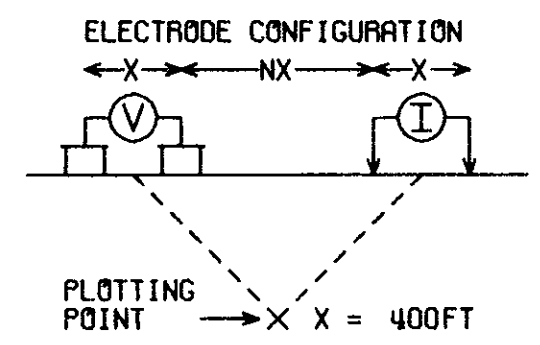
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.O. BRITISH COLUMBIA

LINE NO. - 4600E



SURFACE PROJECTION
OF ANOMALOUS ZONES
 DEFINITE **————**
 PROBABLE **.....**
 POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

David K. Fountain

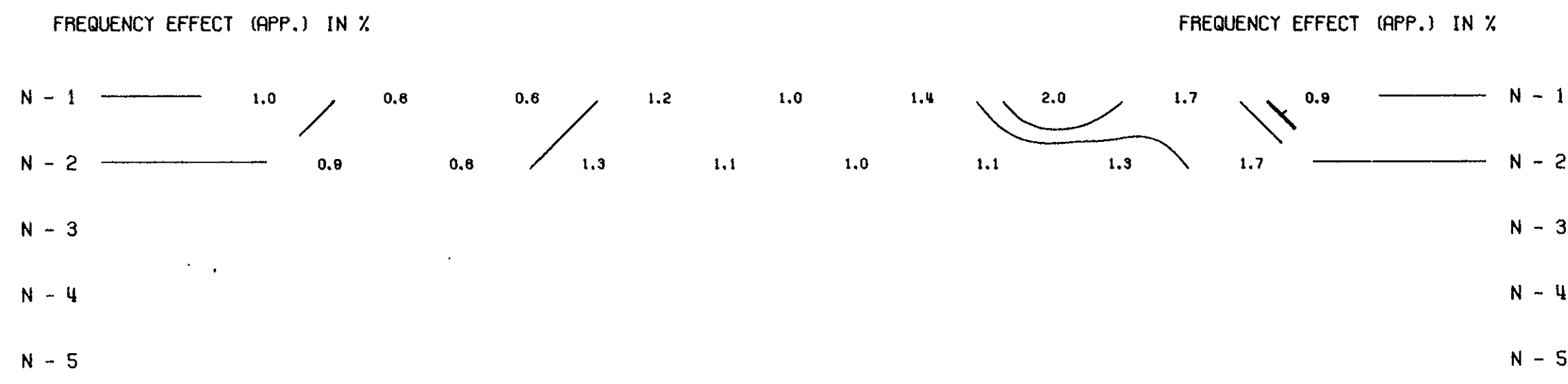
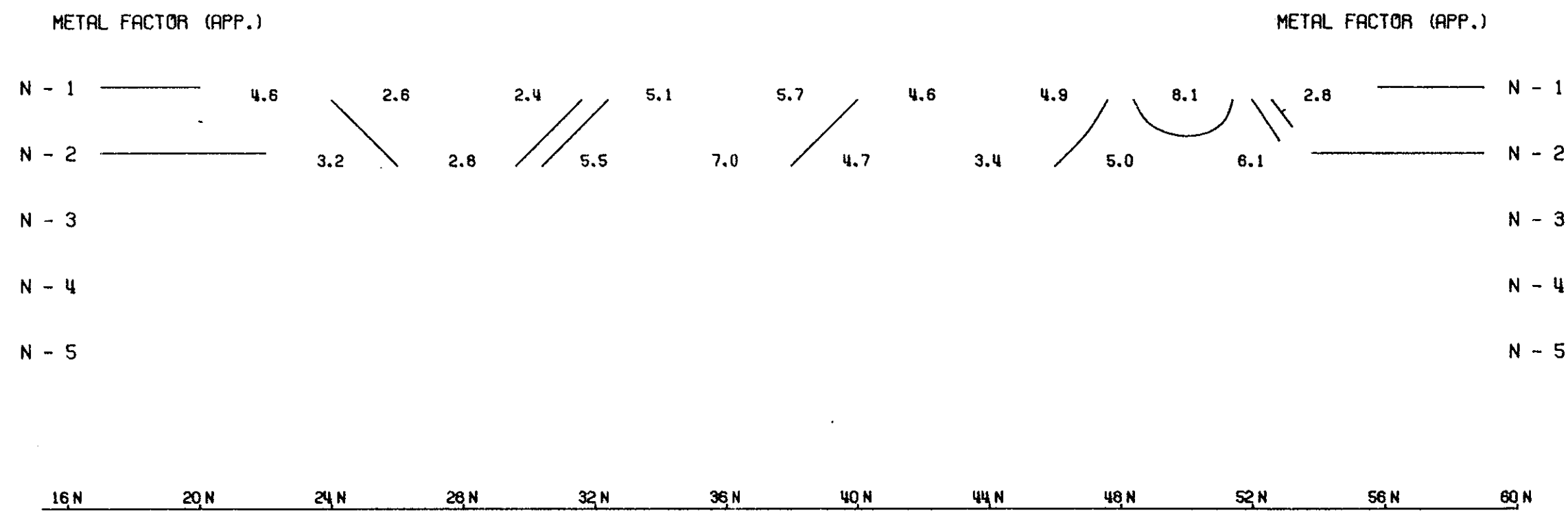
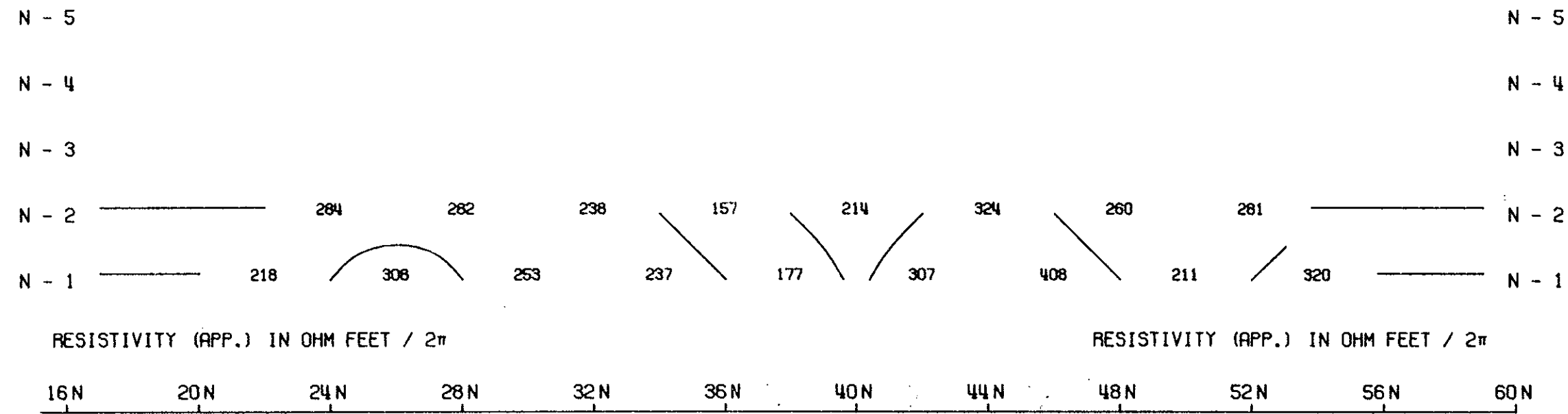
NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1.-1.5-2.-3.-5.-7.5-10

DATE: May 23, 1972

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

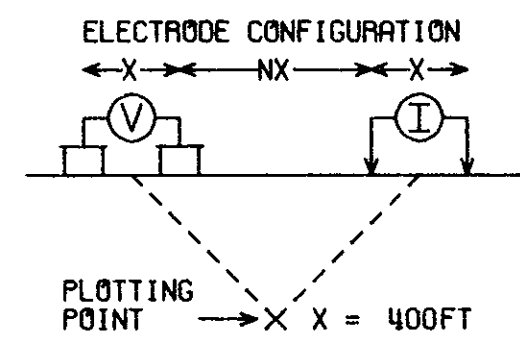
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA

LINE NO. - 5000E



SURFACE PROJECTION OF ANOMALOUS ZONES
 DEFINITE **—————**
 PROBABLE **.....**
 POSSIBLE **//////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David B. Fountain*
 DATE: May 23/72

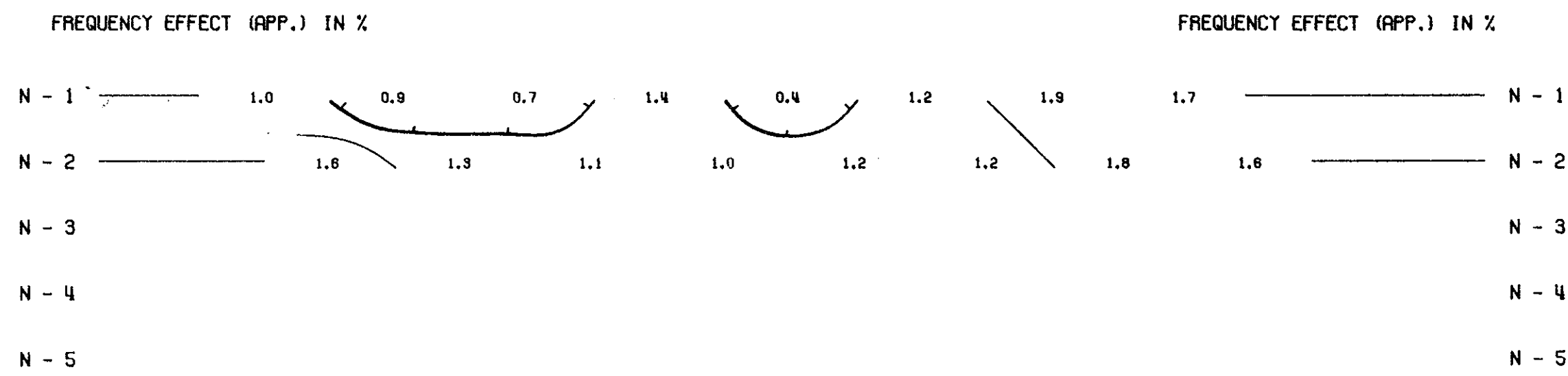
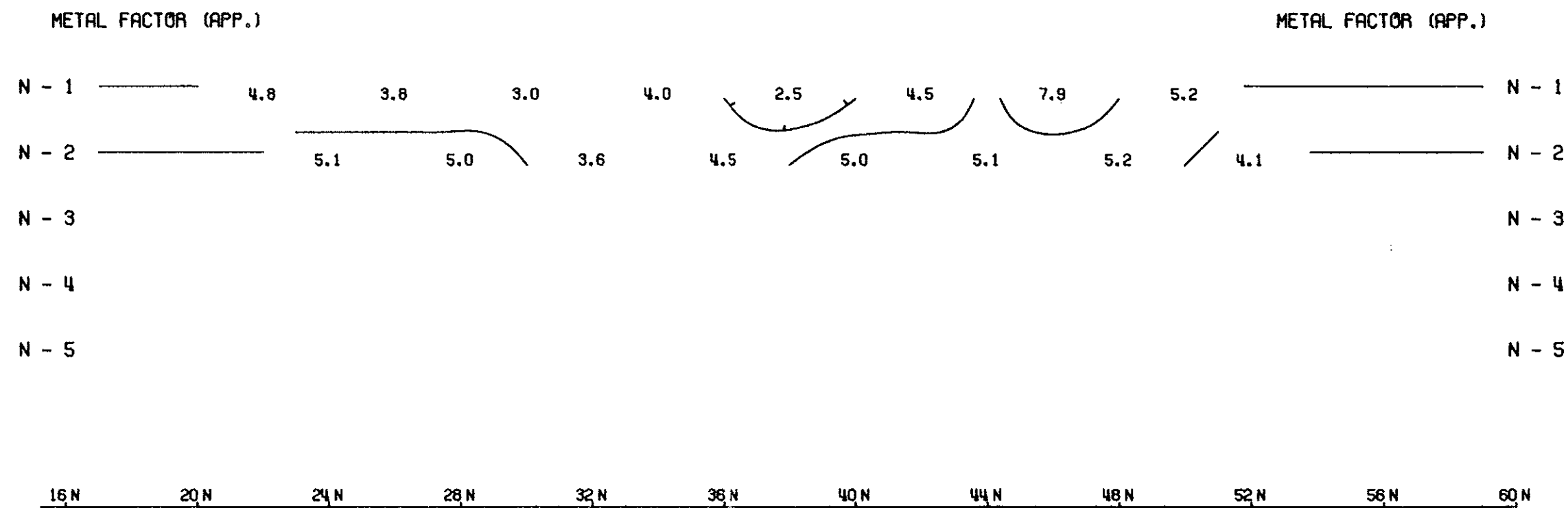
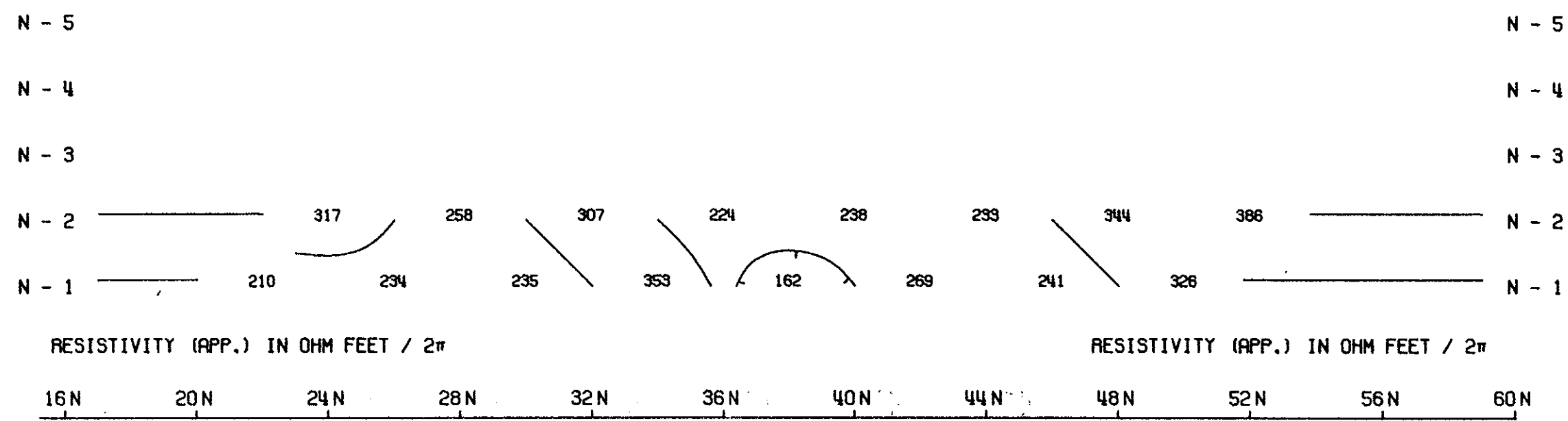
NOTE: CONTOURS AT LOGARITHMIC INTERVALS
 1.-1.5-2.-3.-5.-7.5-10

Expiry Date: April 23, 1973

McPHAR GEOPHYSICS

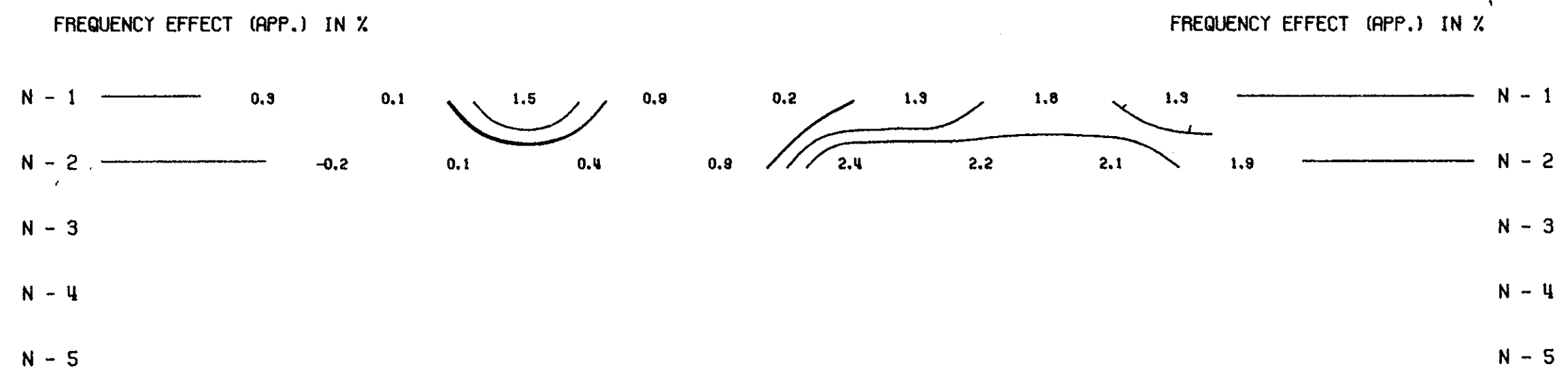
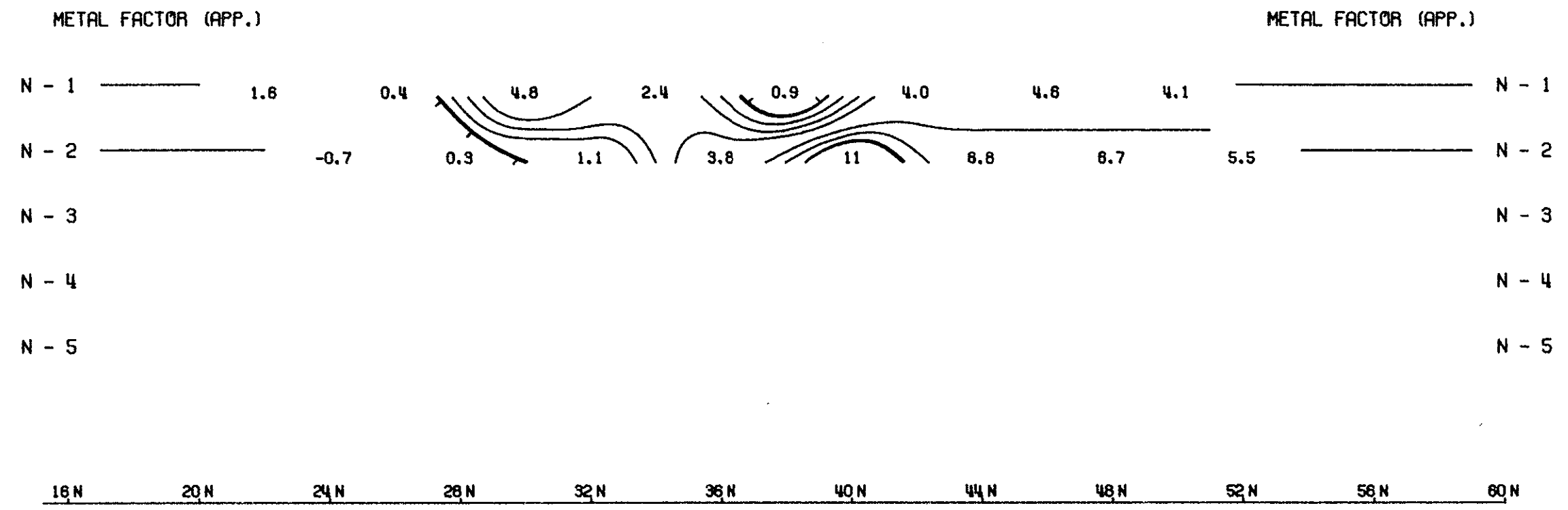
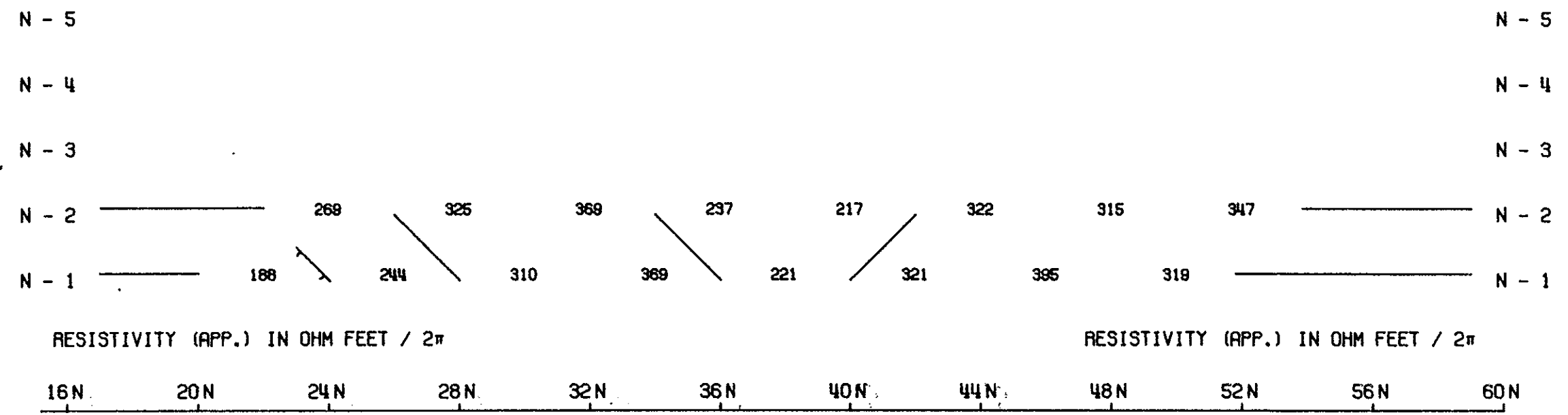
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

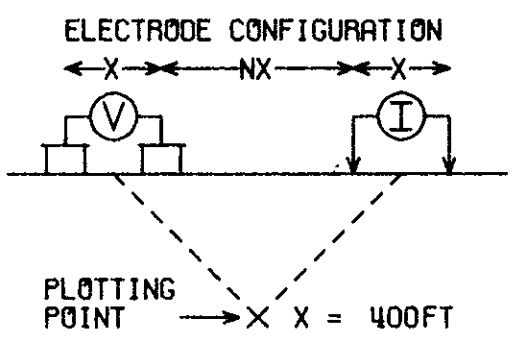


NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 5400E



SURFACE PROJECTION
OF ANOMALOUS ZONES
 DEFINITE **—————**
 PROBABLE **|||||**
 POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David K. Fountain*
 DATE: May 23/72

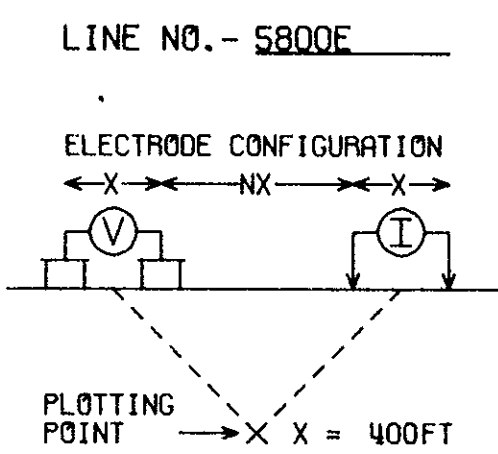
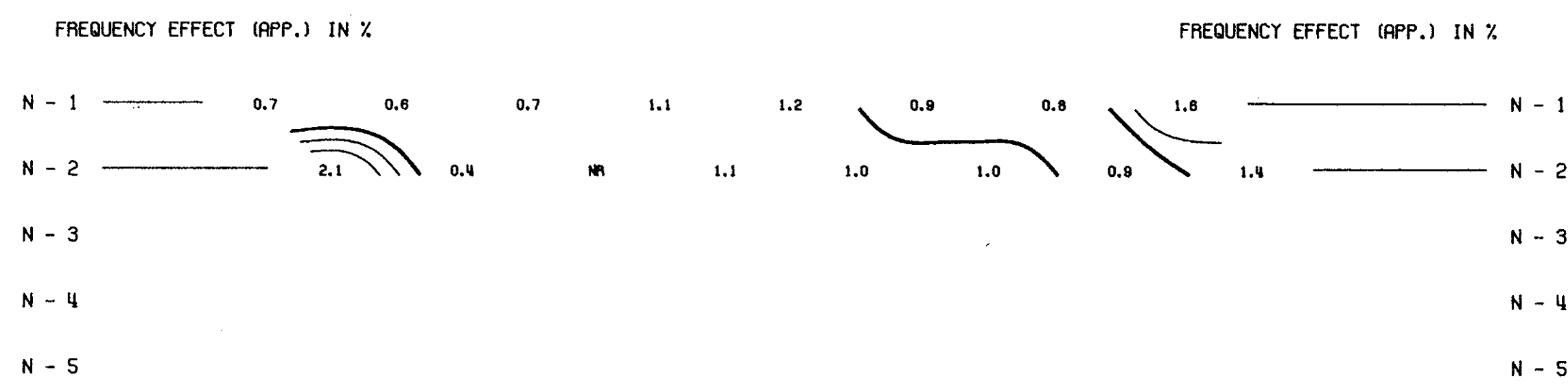
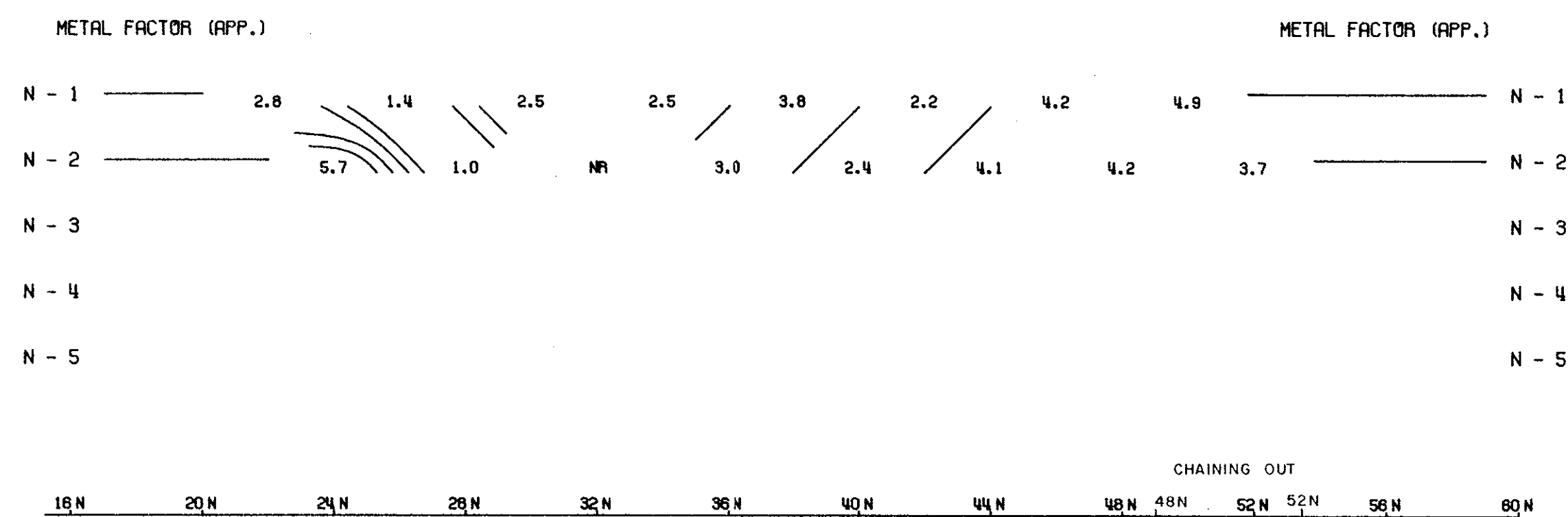
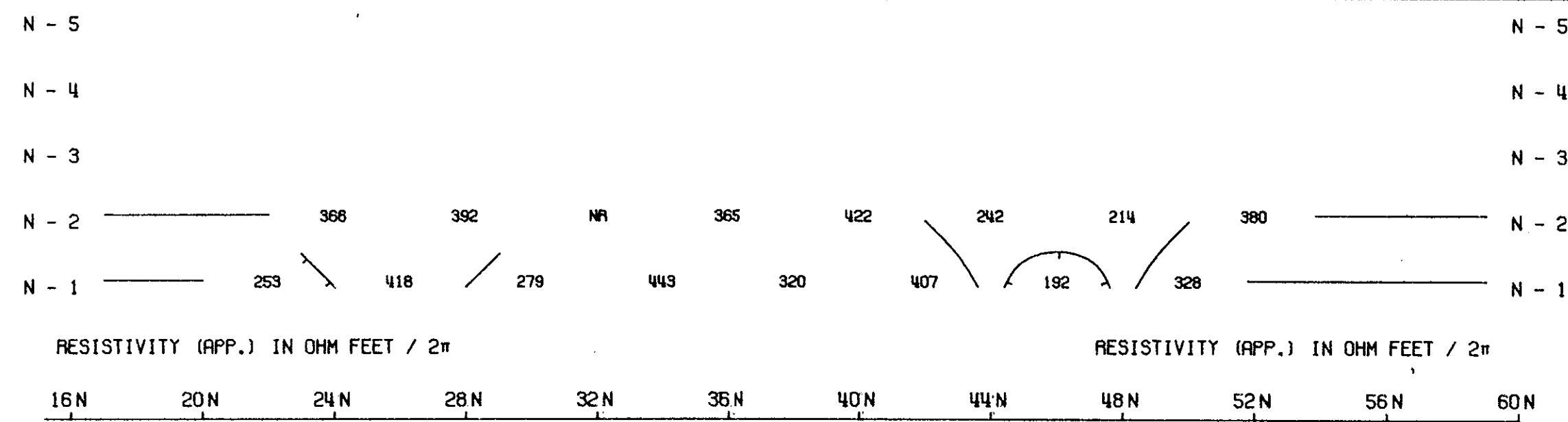
NOTE: CONTOURS AT
LOGARITHMIC INTERVALS
1.-1.5-2.-3.-5.-7.5-10

Expiry Date: April 25, 1973

McPHAR GEOPHYSICS
 INDUCED POLARIZATION AND RESISTIVITY SURVEY
 NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.O. BRITISH COLUMBIA



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **————**

PROBABLE **|||||**

POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David H. Fountain*

DATE: May 23/72

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

Expiry Date: April 25, 1973

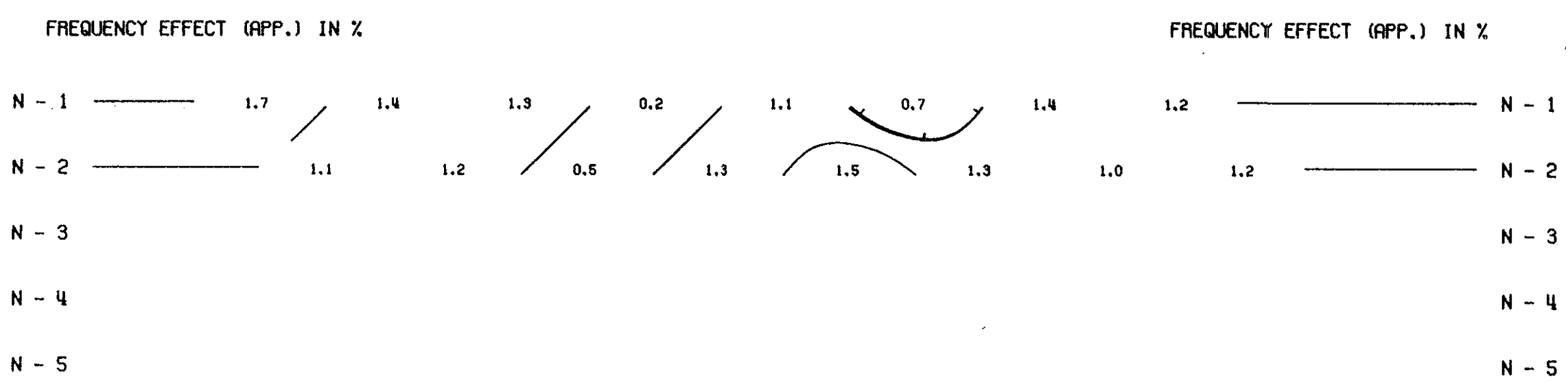
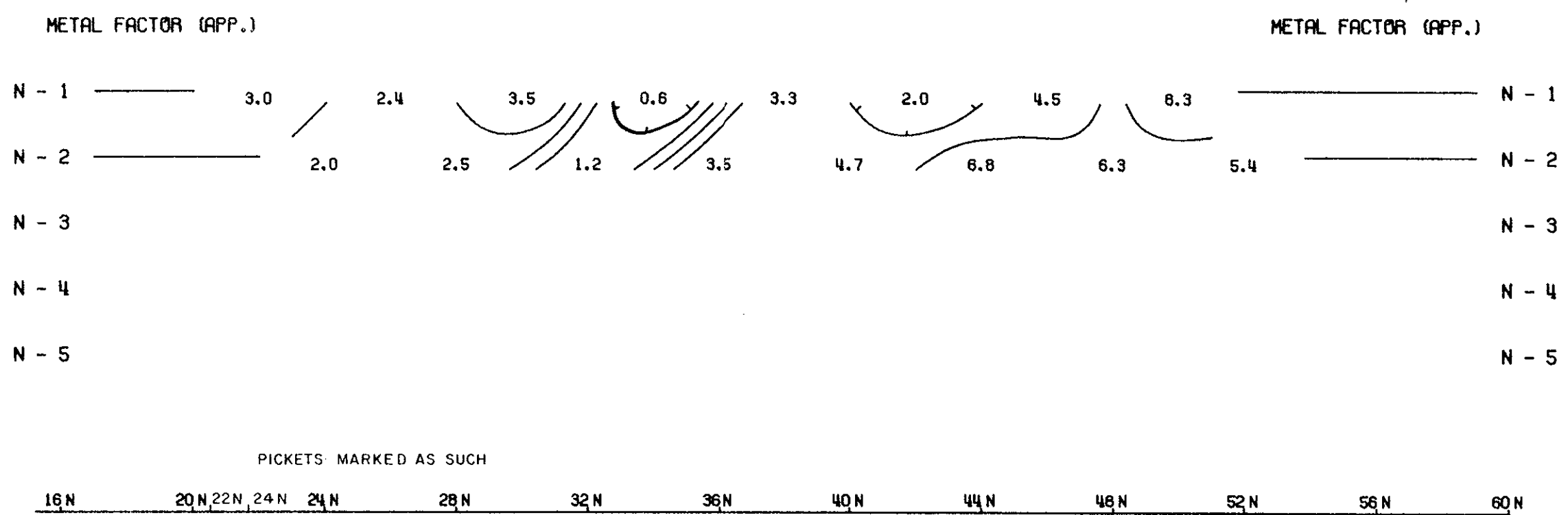
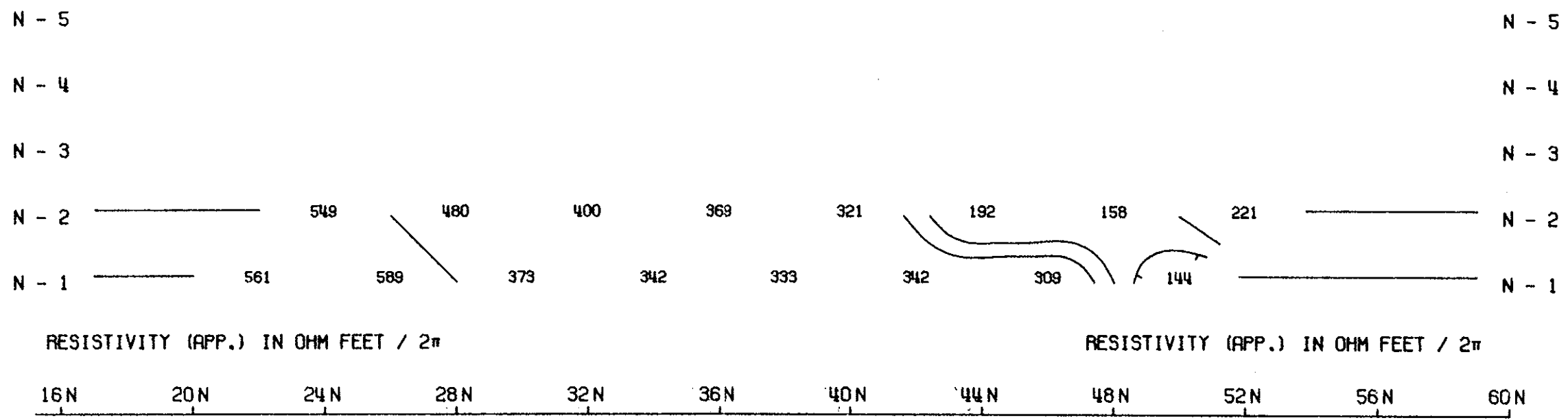
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

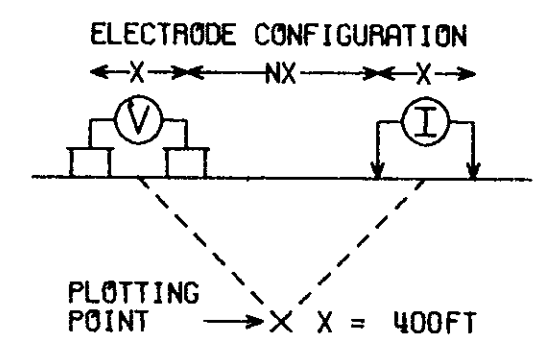
NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 6200E



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: *David H. Fountain*
D. K. FOUNTAIN
DATE: May 23, 1972

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

Expiry Date: April 25, 1973

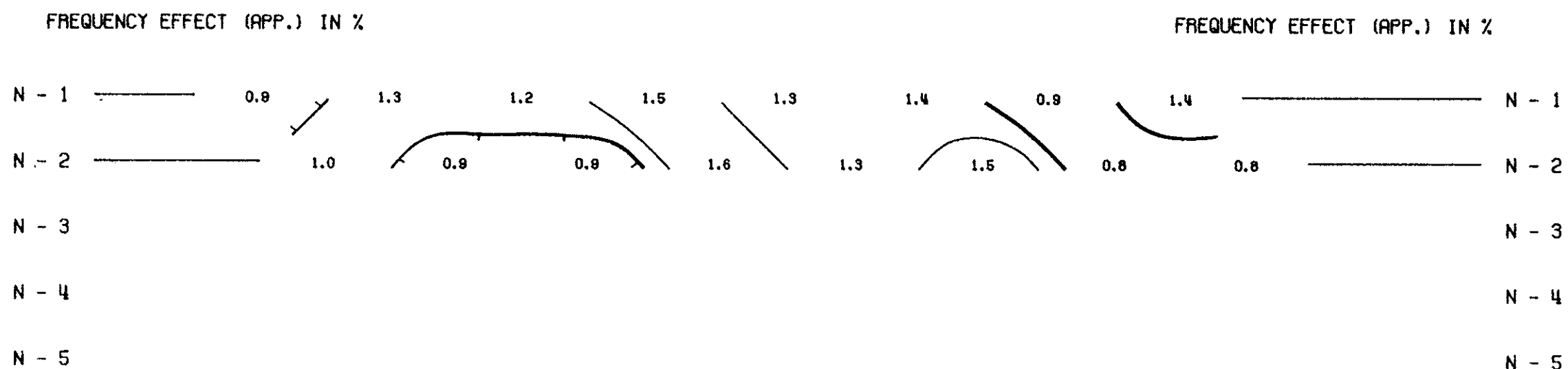
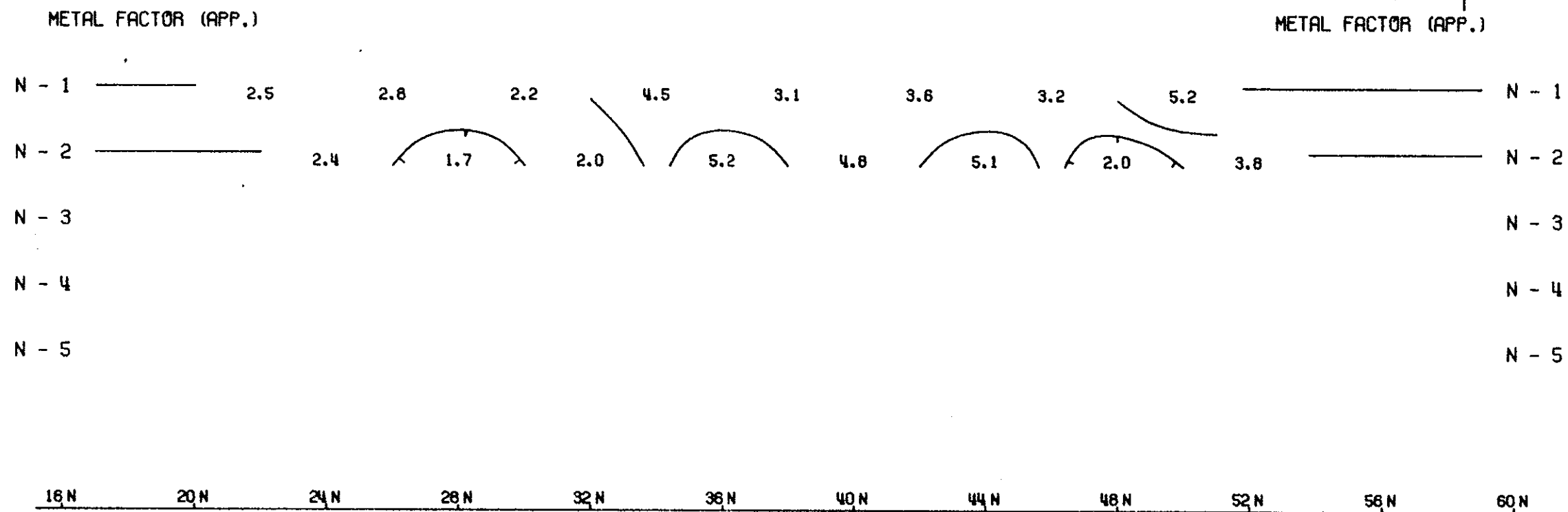
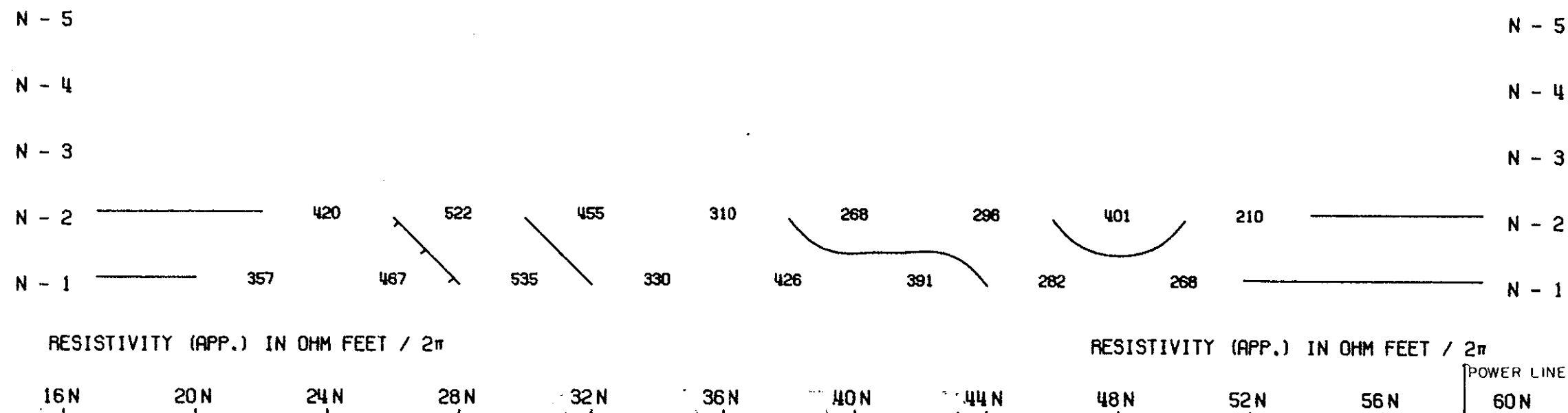
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

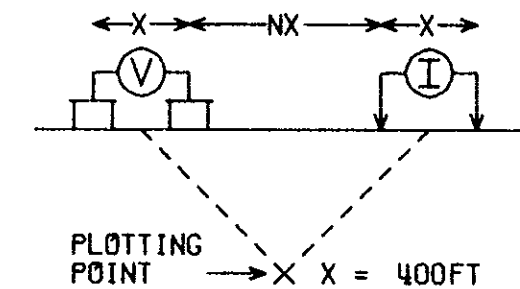
NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO. - 6600E

ELECTRODE CONFIGURATION



SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE **—————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED:

W. K. Fountain

DATE:

May 23/72

Expiry Date: April 25, 1973

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

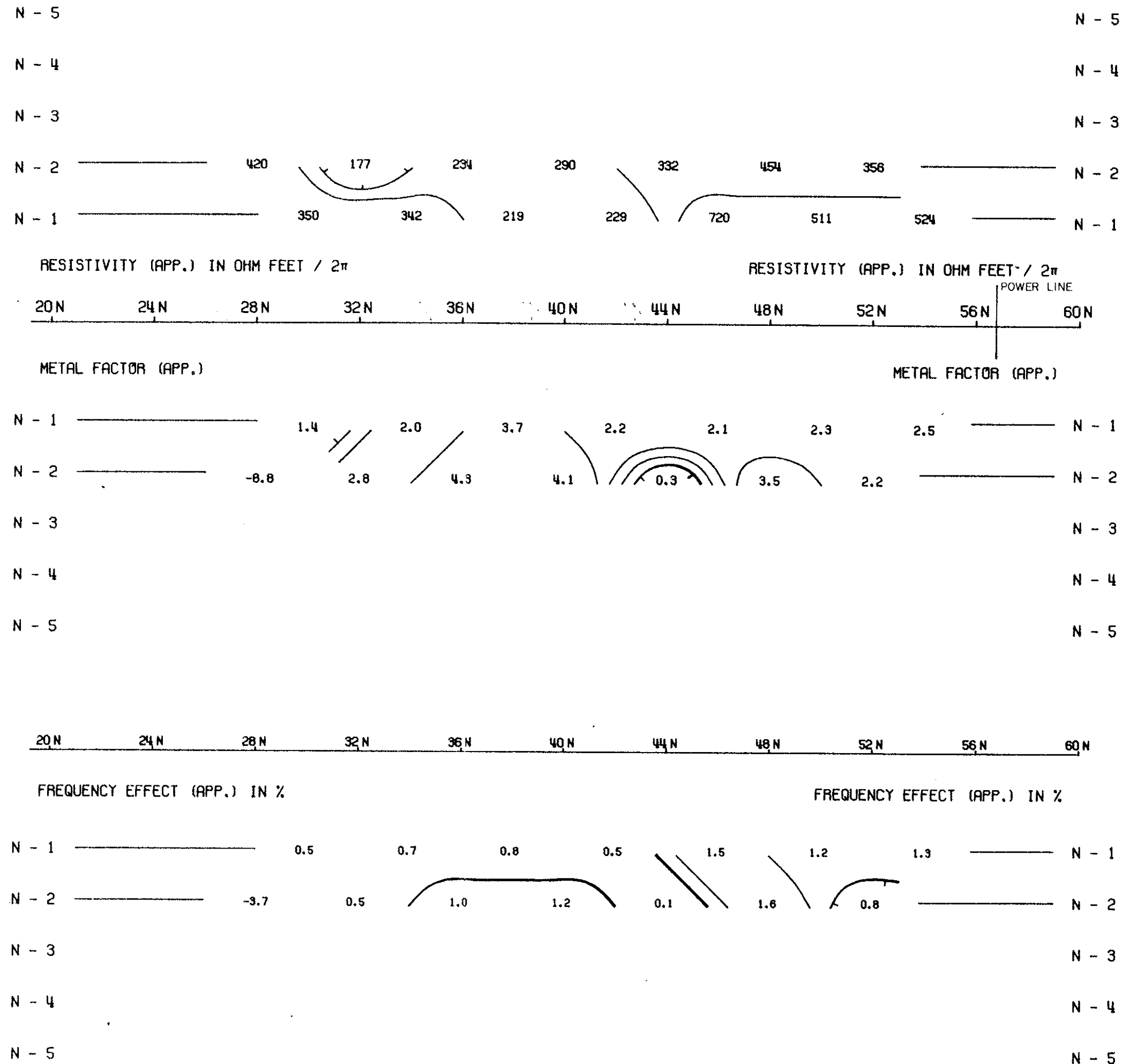
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

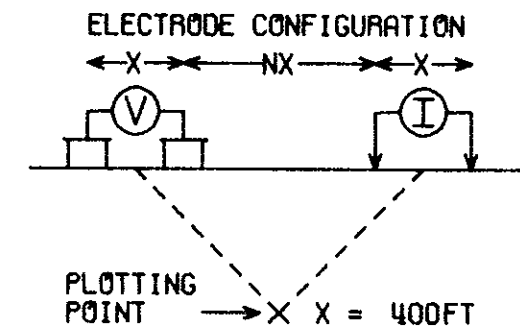
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

NORANDA EXPLORATION COMPANY LIMITED

ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D. BRITISH COLUMBIA



LINE NO.- 7000E



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE **—————**
PROBABLE **|||||**
POSSIBLE **////**

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: May 1978

APPROVED: *David G. Fountain*

DATE: May 23/78

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

Expiry Date: April 25, 1979

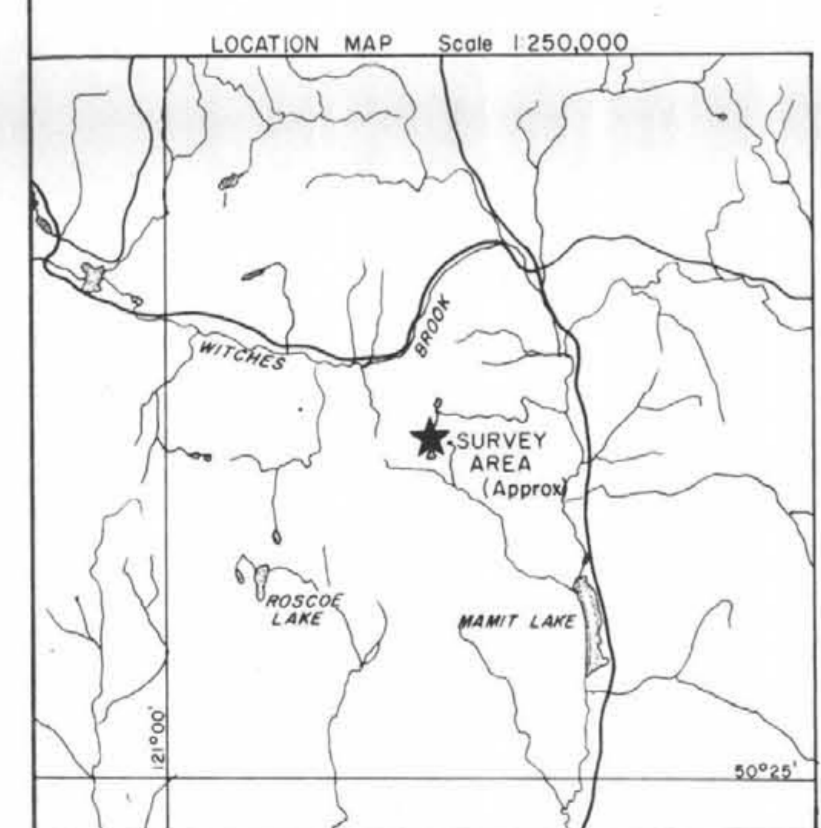
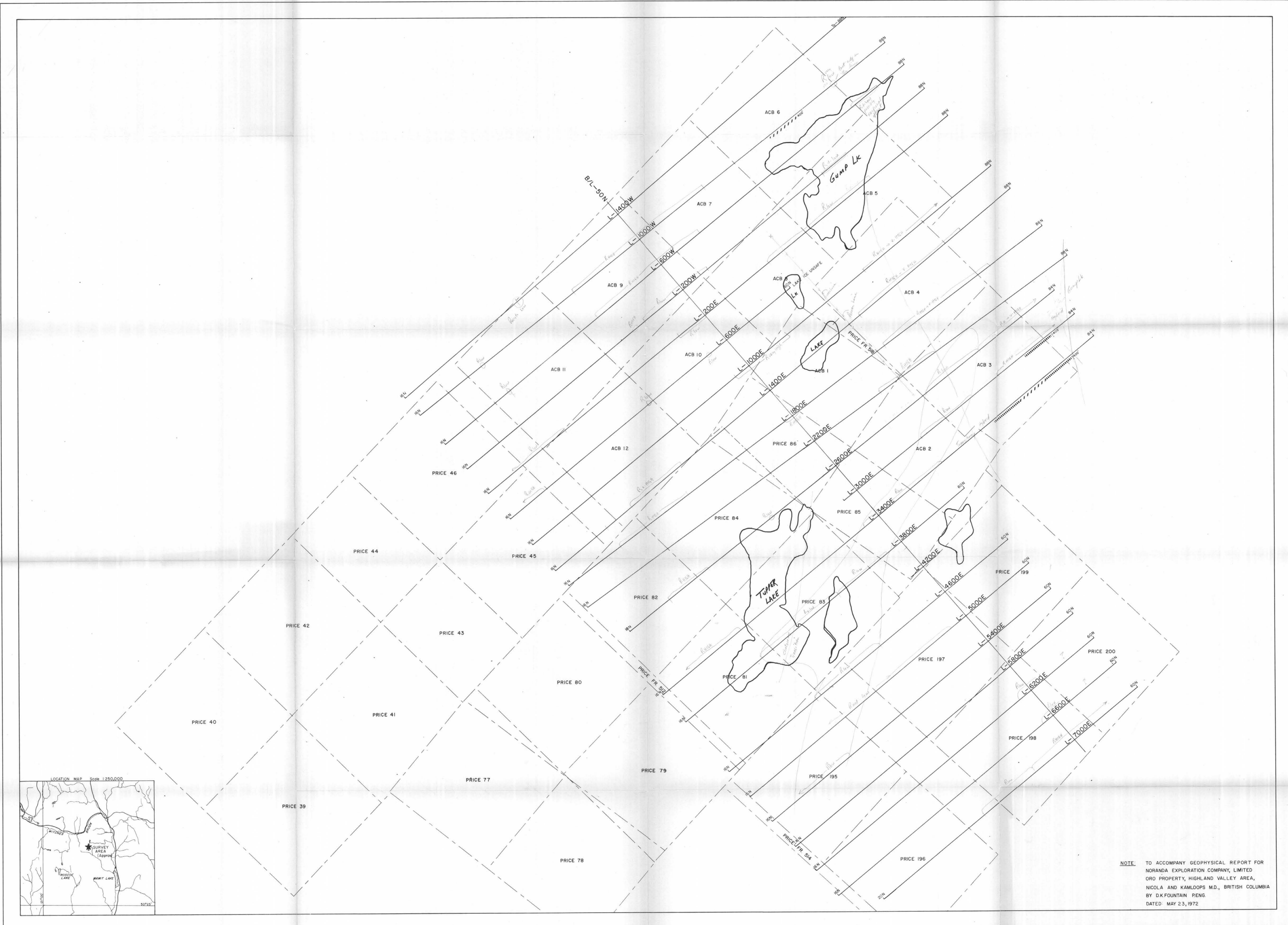
McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

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McPHAR GEOPHYSICS
INDUCED POLARIZATION AND RESISTIVITY SURVEY
PLAN MAP



SURFACE PROJECTION
OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE
Number at the end of anomaly
indicates spread used.

30308

NORANDA EXPLORATION COMPANY, LIMITED
ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D., BRITISH COLUMBIA.
SCALE
ONE INCH EQUALS FOUR HUNDRED FEET

3639 M-1

NOTE: TO ACCOMPANY GEOPHYSICAL REPORT FOR
NORANDA EXPLORATION COMPANY, LIMITED
ORO PROPERTY, HIGHLAND VALLEY AREA,
NICOLA AND KAMLOOPS M.D., BRITISH COLUMBIA
BY D.K.FOUNTAIN P.E.G.
DATED MAY 23, 1972

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3639 M.P. #1



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