2282

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE DANSEY PROPERTY, NORTH PACIFIC OPTION HIGHLAND VALLEY AREA KAMLOOPS MINING DIVISION, BRITISH COLUMBIA FOR NORANDA EXPLORATION COMPANY, LIMITED

BY

DAVID K. FOUNTAIN, P.ENG.

NAME AND LOCATION OF PROPERTY:

DANSEY PROPERTY, NORTH PACIFIC OPTION

KAMLOOPS MINING DIVISION, B.C., 50°N, 120°W, NW

DATE STARTED: September 24, 1969

DATE FINISHED: October 21, 1969

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.

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

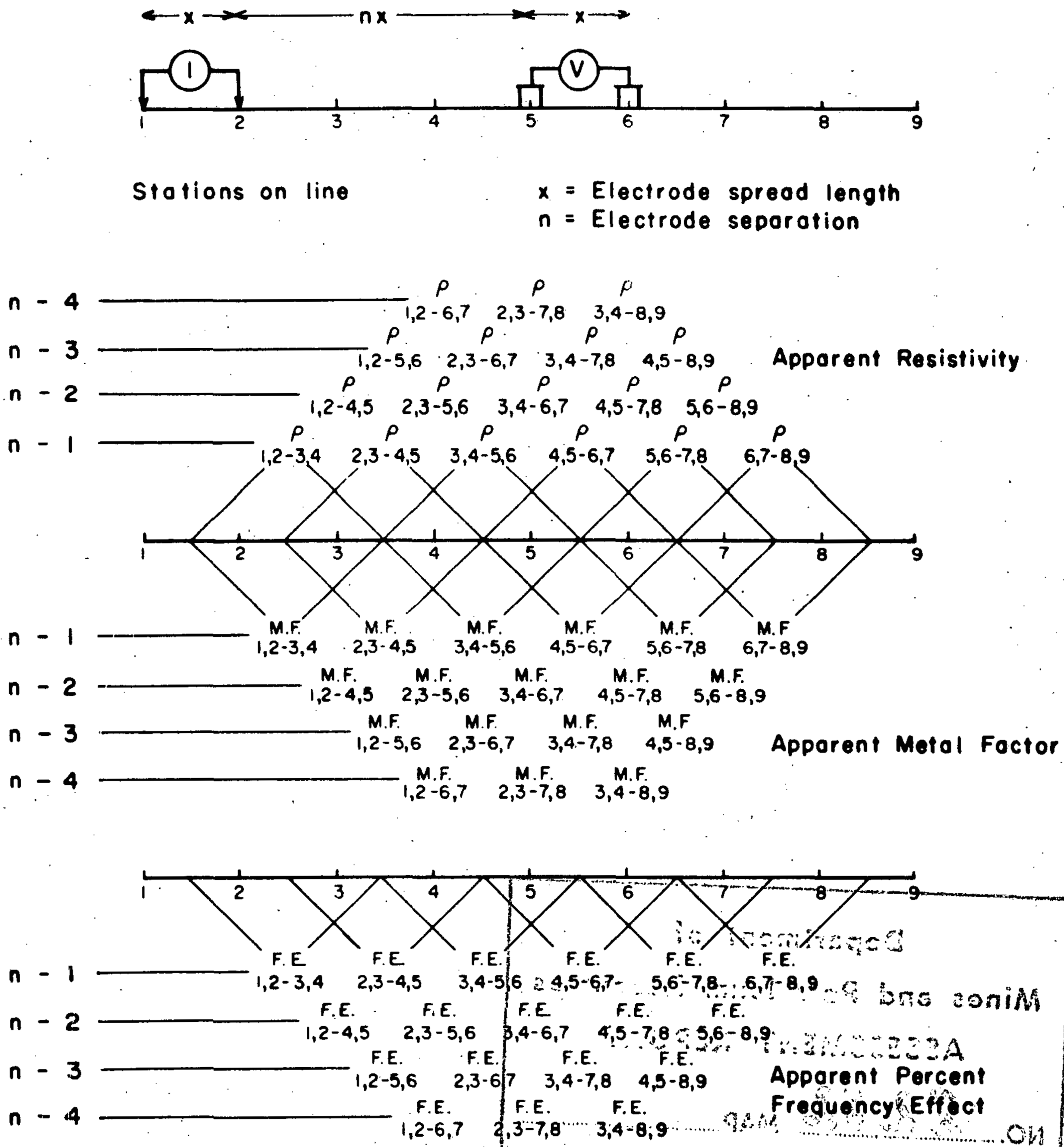

Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE DANSEY PROPERTY, NORTH PACIFIC OPTION HIGHLAND VALLEY AREA KAMLOOPS MINING DIVISION, BRITISH COLUMBIA FOR NORANDA EXPLORATION COMPANY, LIMITED

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1. INTRODUCTION

During the periods September 24, 1969 to October 6, 1969, and October 13, 1969 to October 21, 1969, an induced polarization and resistivity survey was carried out on the Dansey Property, North Pacific Option of Noranda Exploration Company, Limited in the Highland Valley Area, Kamloops Mining Division, British Columbia. The claim group is located approximately 20 miles southeast from the town of Ashcroft, British Columbia and approximately 16 miles south of Savona, British Columbia. It lies in the northwest quadrant of the one degree quadrilateral whose southeast corner is 50°N latitude and 120°W longitude. Access to the claims is by a loose-surface, all weather road to a turn-off approximately 3 miles north of the Mamit Lake - Witches Brook intersection which can be reached from Ashcroft, Merrit or Savona, British Columbia.

From this turn-off a four-wheel-drive road leads west and north to the claims.

The geophysical work discussed in this report was carried out on the following claims of the Dansey Property, North Pacific Option, all of which are located in the Kamloops Mining Division.

Tom 11
Tom 12
Tom 13
Tom 14
Tom 15
Tom 16
Tom 17
Tom 18
Tom 19
Tom 20
Tom 1
Tom 2

JB 11
JB 9
JB 7
JB 20
JB 21
JB 22
JB 23
JB 25
JB 26
JB 27
JB 28

Bill 1
Bill 2
Bill 3
Bill 4
Bill 5
Bill 6

Mike 1
Mike 2
Mike 3
Mike 4

AB 17
AB 18
AB 19
AB 20
AB 21

The claims are all owned by North Pacific Mines Ltd. (NPL) and are optioned to Thermochem Industries Limited (name recently changed to Brameda Resources Limited). The IP survey work was authorized and paid for by Noranda Exploration Company, Limited which has a working agreement with Thermochem Industries Limited.

The survey area is underlain mainly by intrusive rocks of the Guichon Creek Batholith. It is understood that previous work has been carried out on the property in the form of geological mapping, geochemical soil surveying, and limited geophysical surveying and diamond drilling. The present IP survey was carried out as part of a re-evaluation of the economic potential of the property and in particular to locate and evaluate any zones of disseminated sulphide mineralization which could exist on the property.

The IP survey was carried out employing a McPhar variable frequency induced polarization unit utilizing the dipole-dipole electrode configuration and both 200 and 400 foot dipoles. Three dipole separations (n = 1,2,3) 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 data plots listed below and are summarized on the plan map in the manner described in the notes preceding this report.

Line 68W	400 foot electrode intervals	Dwg. IP 5361-1
Line 60W	400 foot electrode intervals	Dwg. IP 5361-2
Line 56W	400 foot electrode intervals	Dwg. IP 5361-3
Line 52W	400 foot electrode intervals	Dwg. IP 5361-4
Line 48W	400 foot electrode intervals	Dwg. IP 5361-5
Line 44W	400 foot electrode intervals	Dwg. IP 5361-6
Line 16E	400 foot electrode intervals	Dwg. IP 5361-7
Line 24E	400 foot electrode intervals	Dwg. IP 5361-8
Line 28E	400 foot electrode intervals	Dwg. IP 5361-9
Line 32E	400 foot electrode intervals	Dwg. IP 5361-10
Line 36E	400 foot electrode intervals	Dwg. IP 5361-11
Line 40E	400 foot electrode intervals	Dwg. IP 5361-12
Line 68N	200 foot electrode intervals	Dwg. IP 5361-13
Line 72N	200 foot electrode intervals	Dwg. IP 5361-14
Line 76N	200 foot electrode intervals	Dwg. IP 5361-15
Line 80N	200 foot electrode intervals	Dwg. IP 5361-16
Line 84N	200 foot electrode intervals	Dwg. IP 5361-17
Line 88N	200 foot electrode intervals	Dwg. IP 5361-18

Enclosed with this report is Dwg. IPP 4582-1 and Dwg. IPP 4582-2, plan maps of the grid lines surveyed at a scale of one inch equals four hundred feet. The definite and possible induced polarization anomalies are indicated by solid and broken bars respectively on these plan maps 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 electrode interval; i.e. when using 400 foot electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 400 feet apart. 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 positions 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

The induced polarization and resistivity survey discussed in this report was carried out on three distinct groupings of lines, covering three portions of the Dansey Property claim group. The lines between these various areas were surveyed by Noranda Exploration Company, Limited with an induced polarization unit of their own design and manufacture. The results of this survey are discussed in a separate report. However, to properly evaluate the overall significance of the IP survey results on the Dansey Property, it would be necessary to compare the results of these two surveys.

The three areas of IP survey results discussed in this report are as follows:

<u>Line 68W to Line 44W</u>

This series of six north-south lines is located in the southwest portion of the property and is indicated on map Dwg. IPP 4582-1. The lines were all surveyed employing 400 foot dipoles.

<u>Line 16E to Line 40E</u>

Lying in the southeast portion of the property this series of six north-south lines is also indicated on map Dwg. IPP 4582-1. Again all lines were surveyed employing 400 foot dipoles.

<u>Line 68N to Line 88N</u>

These lines are indicated on map Dwg. IPP 4582-2 and occur in the north central portion of the property. They are east-west lines and were surveyed employing 200 foot dipoles.

The results of the survey indicate that a portion of the property is underlain by rocks having relatively high Apparent Resistivity (greater than 200 ohm feet/2π) while the other portion has lower values of Apparent Resistivity (less than 100 ohm feet/2π). This distinct difference in background values of Apparent Resistivity makes it difficult to compare absolute values of Apparent Metal Factor in terms of significant anomalous response.

Line 68W

The values of Apparent Resistivity on this line are quite high, although they do decrease, especially on the first and second separations, to the north of 2+00S. There are no significantly anomalous IP responses indicated on this line.

Line 60W

The survey results on this line correlate with those on Line 68W. Lower values of Apparent Resistivity are indicated on the first and second separation readings to the north of 0+00 resulting in increased values of Apparent Metal Factor with only slight increases in values of Apparent Frequency Effect. This may represent very weakly disseminated mineralization.

Line 56W

Resistivity values are high for the entire surveyed length of this line. A weak, shallow, narrow (less than 200 feet) anomaly is indicated centred between 18+00S and 22+00S.

Line 52W

Resistivity values are high for most of the length of this line, decreasing to the north of 6+00N. A weak, shallow anomaly is indicated between 6+00S and 2+00S. A broad, complex, weakly anomalous response is also indicated extending from 4+00N to at least 14+00N. The effective survey coverage would have to be extended to the north to determine if it represents a distinct anomaly or a change in background response.

Line 48W

The values of Apparent Resistivity on this line are complex with isolated high resistivity values on the first separation readings and lower values on the deeper separations. Weak, narrow anomalies are indicated between 14+00S and 18+00S, and between 2+00S and 6+00S.

Line 44W

Weak, broad, shallow responses are indicated from 28+00S to 18+00S and from 34+00S to at least 38+00S. Resistivity values are uniformly quite high.

Survey data would be required immediately to the east of Line 44W to properly evaluate the extent and possible significance of these weak responses.

Line 16E

All lines surveyed to the east, and Line 16E itself, indicate low values of Apparent Resistivity resulting in higher values of background Apparent Metal Factor.

Possible anomalies are indicated between 28+00S and 24+00S, between 20+00S and 16+00S, and between 8+00N and 12+00N.

Line 24E

Possible anomalies are centred at 28+00S and between 12+00N and 16+00N. A stronger response is indicated from 3+00N to 4+00S with weaker extension to 10+00S.

Line 28E

Above background response is indicated between 2+00S and 8+00N although some of the readings are questionable in this area.

Line 32E

The values of Apparent Resistivity on this line are quite low being generally less than 20 ohm feet/2π and less than 10 ohm feet/2π at the extreme north end.

A deep seated, probable anomaly is indicated from 18+00S to 32+00S, while a narrower, more distinct anomaly suggesting a shallower source is indicated between 4+00S and 2+00N. A broad zone of above background response extends from 10+00N to at least 28+00N.

Line 36E

There are several questionable or negative readings on this short line. However, anomalous IP response associated with extremely low values of Apparent Resistivity extend from 6+00N to about 20+00N.

Line 40E

Again values of Apparent Resistivity are quite low on this line. A distinct anomaly of moderate response is indicated from 14+00N to 2+00N with probable extension to 10+00S. Anomalous response is also indicated extending from 34+00S to at least 40+00S. The effective survey coverage would have to be extended to the south to properly evaluate this anomaly.

Line 68N

This is the most southerly of the group of east-west lines in the north central portion of the property. The lines of this group were surveyed utilizing 200 foot dipoles. The values of Apparent Resistivity measured are relatively high and more similar to those encountered on Line 68W through to Line 44W than on the eastern lines, Line 16E through Line 40E.

Moderate magnitude anomalies are indicated centred at 102+00W and 79+00W on this line. Narrow, shallow, possible anomalies are also indicated between 68+00W and 66+00W and from 58+00W to the east.

Line 72N

Narrow, weak responses are indicated from 111+00W to 108+00W, between 84+00W and 81+00W, and between 68+00W and 66+00W. The last of these responses is associated with a distinct resistivity low and has no significant increase in Apparent Frequency Effect.

Line 76N

The background IP response on this line is quite low. An isolated, shallow, single reading, weak response is indicated between 78+00W and 76+00W.

Line 80N

Weak, narrow, possible anomalies are indicated between 72+00W and 70+00W and between 60+00W and 58+00W.

Line 84N

Background IP response is quite low on this line. A weak, narrow source at depth is centred between 86+00W and 84+00W. To the east a broader weak source is indicated between 69+00W and 65+00W.

Line 88N

Background IP response is quite low, and no significant anomalous IP responses are indicated.

4. SUMMARY AND CONCLUSIONS

The results of the IP survey indicate two quite distinct resistivity environments. The north and west groups of lines surveyed (Line 68N through Line 88N, and Line 68W through Line 44W) indicated fairly high values of Apparent Resistivity. On the other hand the eastern lines, Line 16E through Line 40E, indicate quite low values of Apparent Resistivity. Since the lower values of Apparent Resistivity are continuous to the third separation employing 400 foot dipoles, the resistivity change suggests a change in rock type or at least a distinct change in rock texture (intense fracturing or alteration resulting in lower Apparent Resistivity) rather than a sharp increase in thickness of lower resistivity overburden cover. If the lower values of Apparent Resistivity are due to low resistivity overburden, then the pattern of the response would suggest a depth of cover greater than 500 feet.

Due to the distinct change in background resistivity, the background values of Apparent Metal Factor are higher in the lower resistivity environment. Detailed geologic information as well as survey coverage in the area from Line 48W to Line 16E would be necessary to evaluate the significance of the lower resistivity area and its relationship to the other areas surveyed.

Line 68W through Line 44W

Weak anomalies have been indicated on Line 56W, Line 52W, Line 48W and Line 44W. These weak responses do not appear to correlate into distinct zones. They would not warrant further investigation unless the geology suggests that narrow (less than 400 feet) zones of mineralization could be significant. If this were the case, then the shallow responses should be detailed using shorter electrode intervals.

The broader IP responses would at best represent weakly disseminated mineralization.

Line 16E through Line 40E

These lines all lie within the low resistivity environment, resulting in higher background Apparent Metal Factor responses. Information as to the rock type, and type and mode of dispersion of any metallic mineralization present would be necessary to properly evaluate the significance of the broad anomalies indicated on these lines. The more distinct patterns occur on Line 32E, 4+00S to 2+00N; Line 36E, 6+00N to 18+00N; and Line 40E, 2+00N to 14+00N. Further work should be carried out to investigate the source of these responses.

Line 68N through Line 88N

The values of Apparent Resistivity measured on these lines are relatively high, of the same order of magnitude as those obtained on Line 68W through Line 44W. Several weak, narrow sources have been indicated which would require supporting geological data to warrant further investigation.

McPHAR GEOPHYSICS LIMITED

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

ENGINEER

Expiry Date: April 25, 1970

Dated: December 23, 1969.

ASSESSMENT DETAILS

PROPERTY: North Pacific Option
Dansey Property

MINING DIVISION: Kamloops

SPONSOR: Noranda Exploration Company, Limited

PROVINCE: British Columbia

LOCATION: Highland Valley Area

TYPE OF SURVEY: Induced Polarization

OPERATING MAN DAYS:	33	DATE STARTED:	September 24, 1969
EQUIVALENT 8 HR. MAN DAYS:	132	DATE FINISHED:	October 21, 1969
CONSULTING MAN DAYS:	2	NUMBER OF STATIONS:	391
DRAUGHTING MAN DAYS:	10	NUMBER OF READINGS:	3060
TOTAL MAN DAYS:	144	MILES OF LINE SURVEYED:	20.9

CONSULTANT:
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FIELD TECHNICIANS:
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P. Makulowich, 44 Leahann Drive, Scarborough, Ontario.

EXTRA LABOUR:
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J. Beenan, 1120 Bentley Place, Kamloops, B.C.
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B. Marr, 19 KenewenCourt, Toronto 16, Ontario.
N. Lade, 1355 Lakefield Street, Oshawa, Ontario.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

McPHAR GEOPHYSICS LIMITED

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

Dated: December 23, 1969.

Expiry Date: April 25, 1970

STATEMENT OF COST

Noranda Exploration Company, Limited,
Dansey Property, North Pacific Option
Highland Valley Area

Crew

20 days Operating (2 men)	@ $220.00/day	4,400.00
3 days Operating (1 man)	@ $200.00/day	600.00
2 days Travel)		
2 days Bad Weather) 6 days	@ $ 85.00/day	510.00
2 days Preparation)		

Expenses (Crew)

Air Fare	64.83	
Taxis	31.55	
Freight & Brokerage	214.87	
Telephone & Telegraph	24.00	
Supplies	5.56	
Vehicle Expenses	67.17	
Rented Vehicles	375.33	
Mileage Allowance	17.40	
Meals & Accommodation	106.85	
	907.56	907.56
Extra Labour	1,247.50	
Plus 20%	249.50	
	1,497.00	1,497.00
		$7,914.56

McPHAR GEOPHYSICS LIMITED

David K. Fountain, P.Eng.
Geophysicist.

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

Expiry Date: April 25, 1970

Dated: December 23, 1969.

Declared before me at the City of Vancouver in the Province of British Columbia, this 13 day of March 1970, A.D.

W. W. Young

Joan Turner

A Commissioner for taking Affidavits within British Columbia.
A Notary Public in and for the Province of British Columbia.

SUB-MINING RECORDER

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 Provinces of British Columbia and Ontario, and have been practising my profession for nine 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 December 1969.

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

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. K. FOUNTAIN

Expiry Date: April 25, 1970

2282

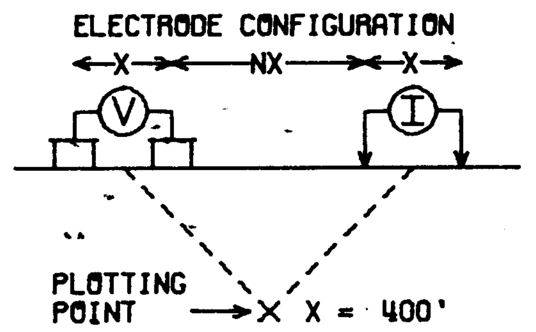
DWG. NO.- I.P.-5361-1

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 68W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED:

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

DATE:

PROFESSIONAL ENGINEER D. K. FOUNTAIN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-2

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY

HIGHLAND VALLEY AREA

KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 60W

ELECTRODE CONFIGURATION

PLOTTING POINT

X = 400'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED:

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

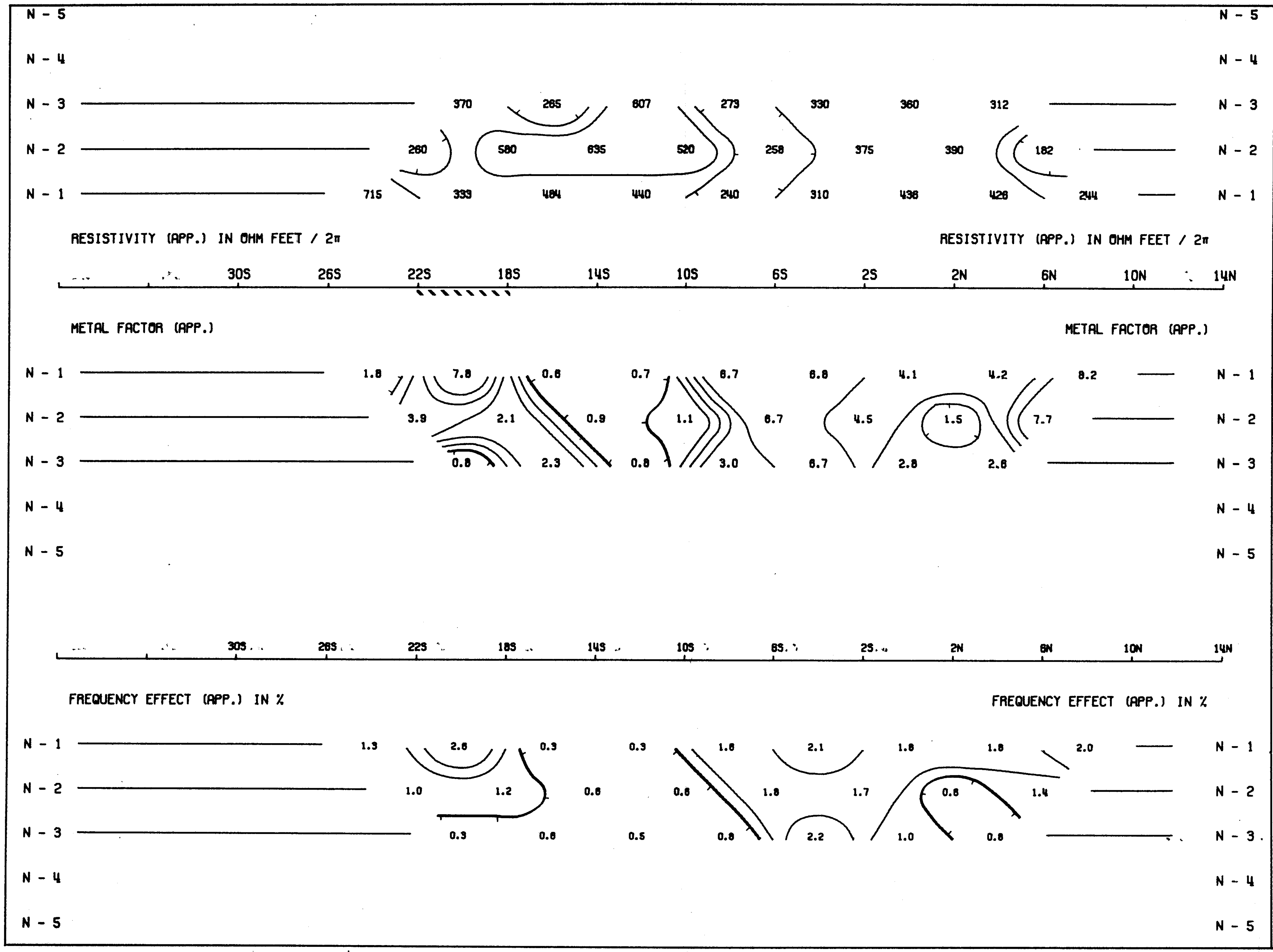
DATE:

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER



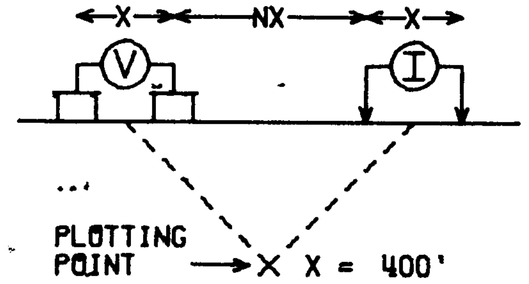
DWG. NO.- I.P.-5361-3

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 56W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: NOV 1969

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-4

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 52W

ELECTRODE CONFIGURATION

PLOTTING POINT X = 400'

SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED:

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

DATE:

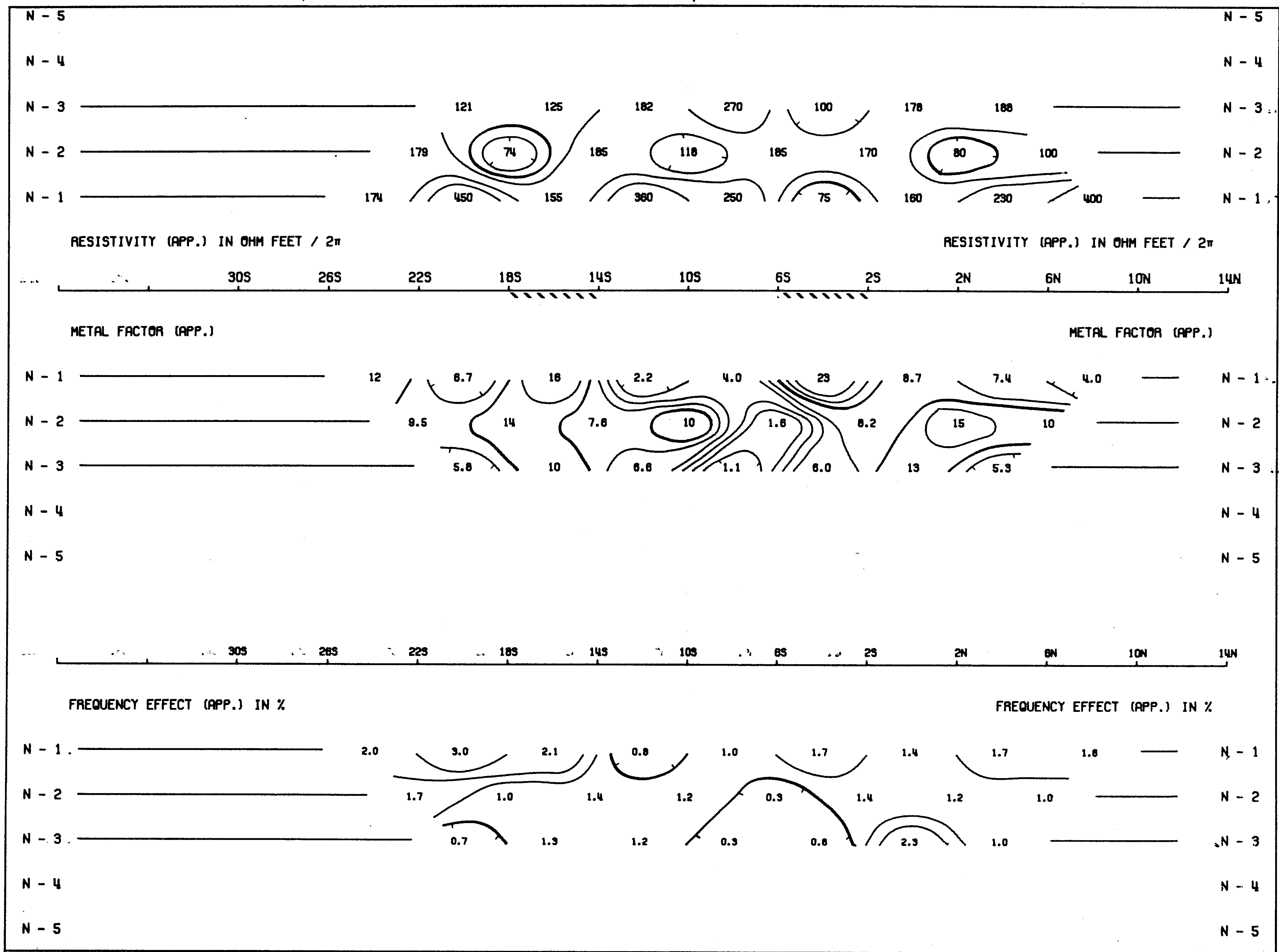
PROFESSIONAL ENGINEER D. K. FOUNTAIN

Expiry date: April 25, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER



DWG. NO.- I.P.-5361-5

NORANDA EXPLORATION COMPANY LIMITED

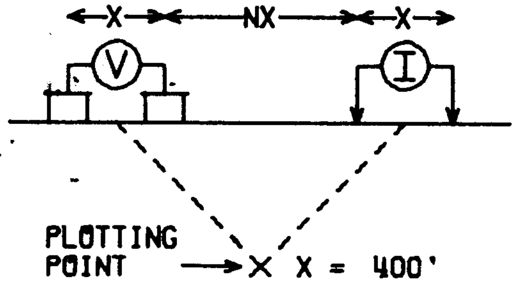
NORTH PACIFIC OPTION, DANSEY PROPERTY

HIGHLAND VALLEY AREA

KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 48W

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED:

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

Expiry Date: April 25, 1970

DATE:

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 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-6

NORANDA EXPLORATION COMPANY LIMITED

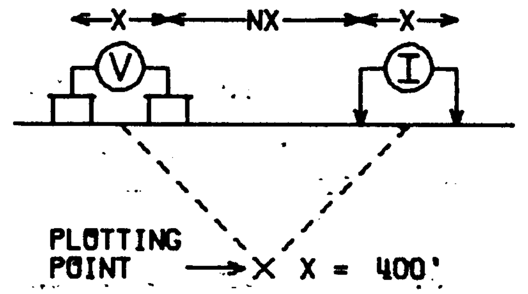
NORTH PACIFIC OPTION, DANSEY PROPERTY

HIGHLAND VALLEY AREA

KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 44N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE

PROBABLE

POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: SEPT '69

APPROVED:

DATE:

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 360/75 COMPUTER AND A CALCOMP PLOTTER

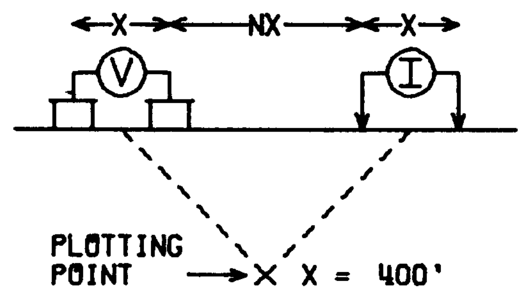
DWG. NO.- I.P.-5361-7

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 16E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: SEPT '69

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, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

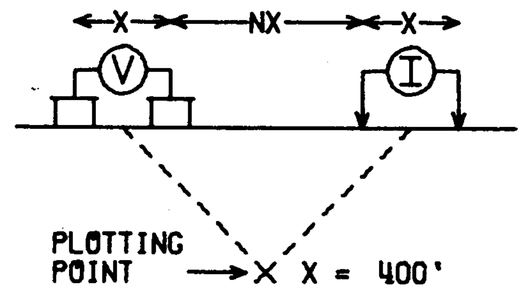
DWG. NO.- I.P.-5361-8

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 24E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: SEPT '69

APPROVED:

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

DATE:

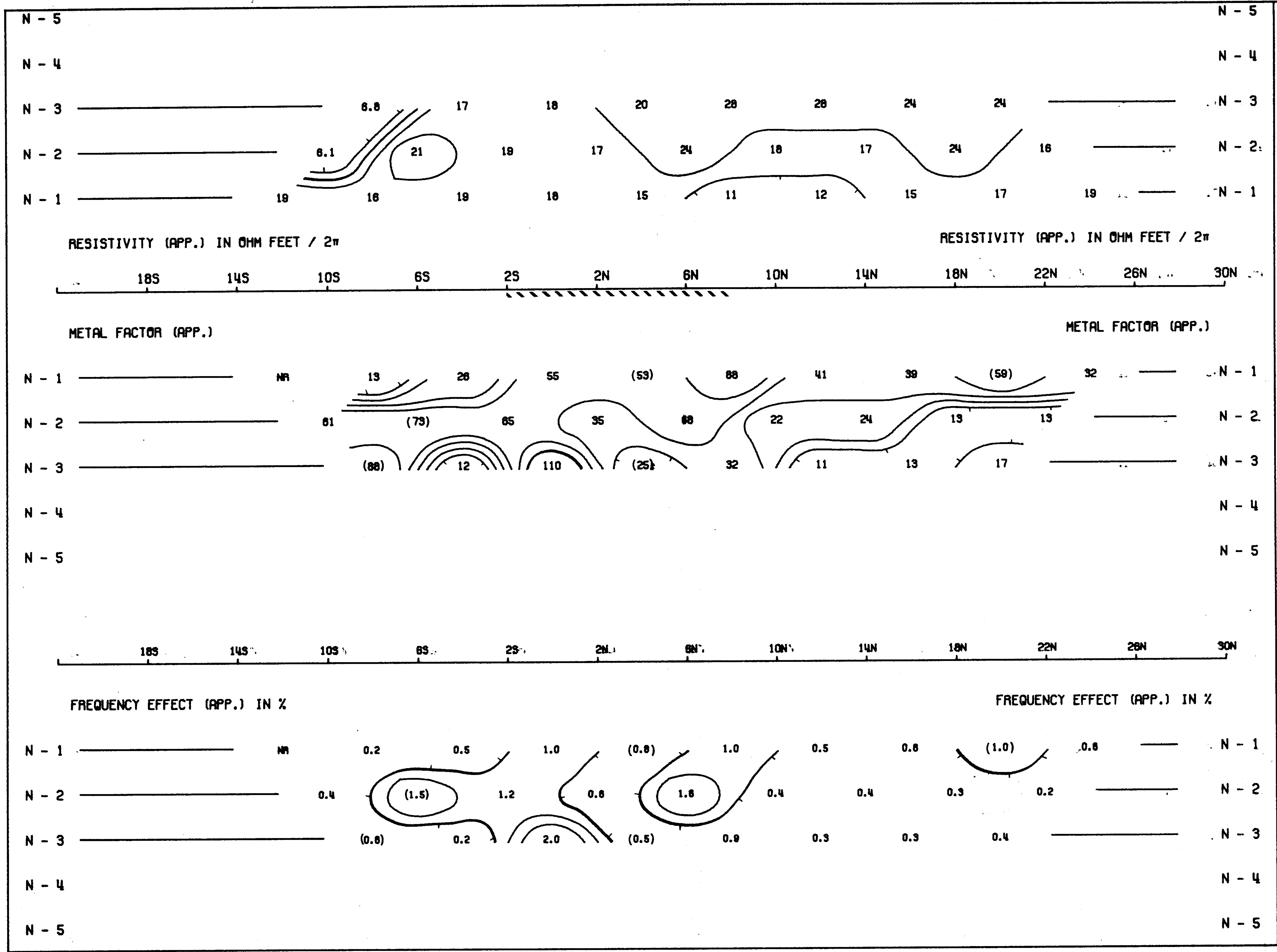
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. FOUNTAIN

Expiry Date: April 25, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER



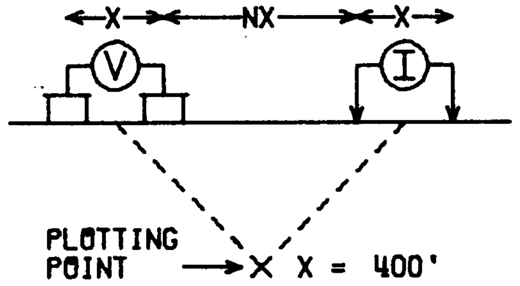
DWG. NO.- I.P.-5361-9

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 28E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

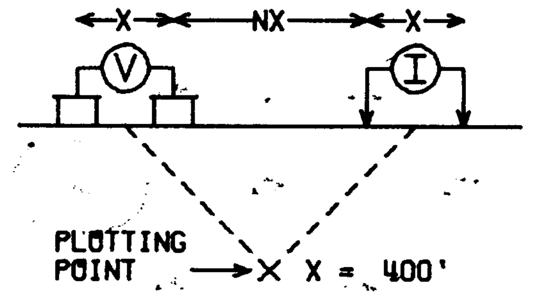
DWG. NO.- I.P.-5361-10

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 32E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: SEPT '69

APPROVED:

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

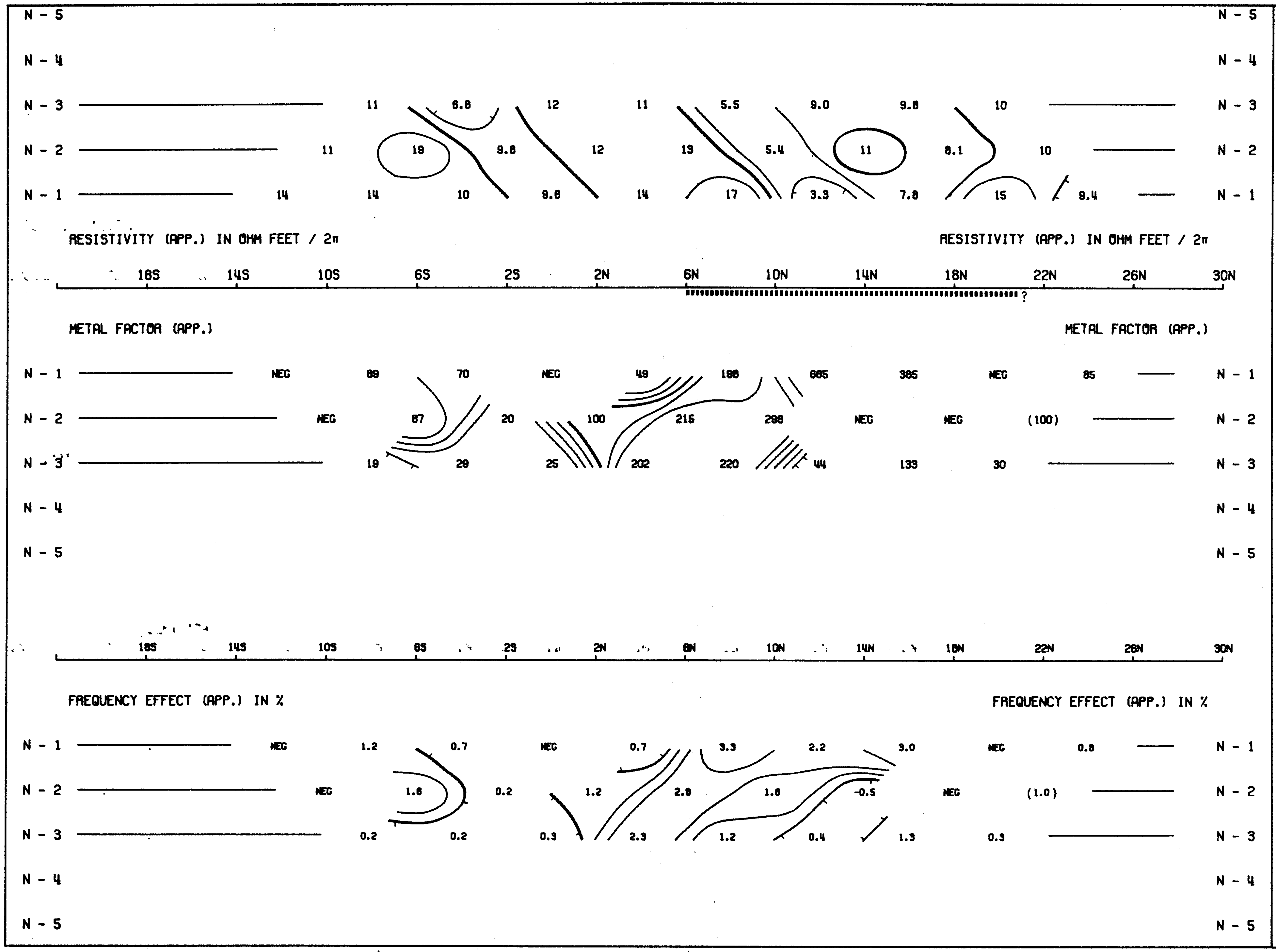
DATE:

PROFESSIONAL ENGINEER, PROVINCE OF B.C., D. FOUNTAIN
Expiry Date April 25, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER



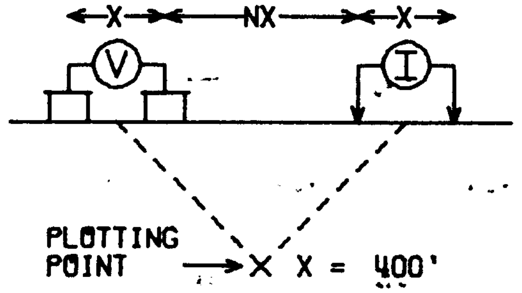
DWG. NO.- I.P.-5361-11

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 36E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-12

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 40E

ELECTRODE CONFIGURATION

PLOTTING POINT X = 400'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: SEPT '69

APPROVED:

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

DATE:

PROFESSIONAL ENGINEER
D. K. FOUNTAIN
PROVINCE OF ONTARIO

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-13

NORANDA EXPLORATION COMPANY LIMITED

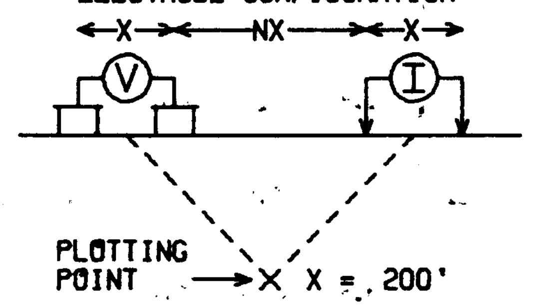
NORTH PACIFIC OPTION, DANSEY PROPERTY

HIGHLAND VALLEY AREA

KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 68N

ELECTRODE CONFIGURATION



PLOTTING POINT → X X = 200'

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

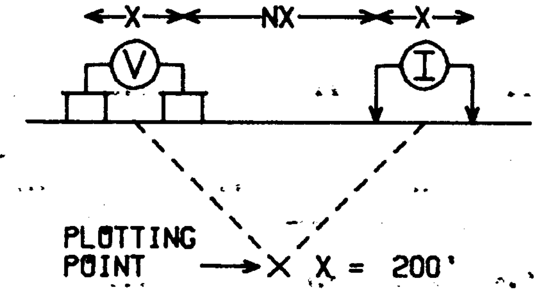
DWG. NO.- I.P.-5361-14

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 72N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬
PROBABLE |||||||||||||
POSSIBLE / / / / /

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED: David K. Fountain

DATE: Dec. 23/69

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

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 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-15

NORANDA EXPLORATION COMPANY LIMITED

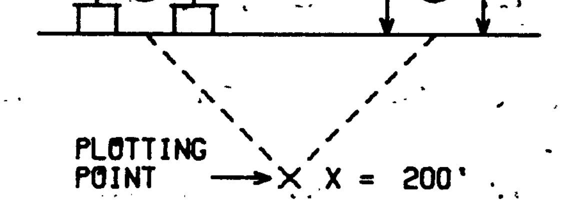
NORTH PACIFIC OPTION, DANSEY PROPERTY

HIGHLAND VALLEY AREA

KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 76N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

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, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

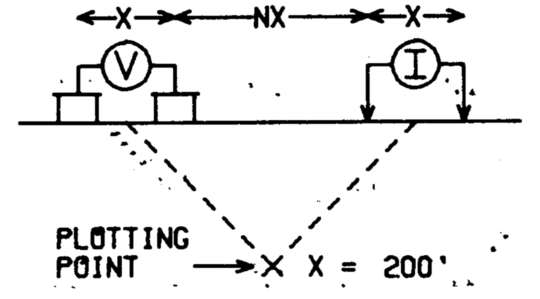
DWG. NO.- I.P.-5361-16

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 80N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED:

DATE:

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

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

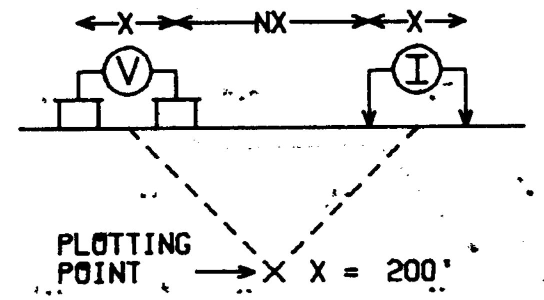
NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. NO.- I.P.-5361-17

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 84N



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE ▬▬▬
PROBABLE ||||||||||||
POSSIBLE / / / / /

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED: [signature]

DATE: [signature]

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

Expiry Date April 25, 1970

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 360/75 COMPUTER AND A CALCOMP PLOTTER

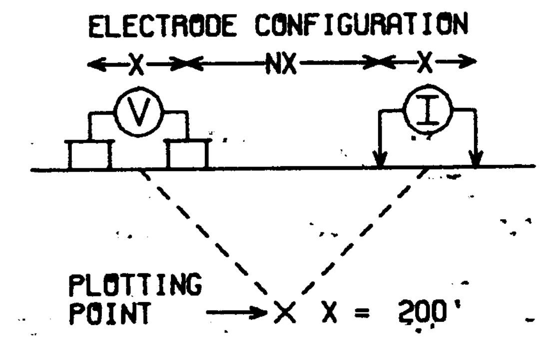
2282

DWG. NO.- I.P.-5361-18

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY
HIGHLAND VALLEY AREA
KAMLOOPS M.D., BRITISH COLUMBIA

LINE NO.- 88N



SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 CPS

DATE SURVEYED: OCT 1969

APPROVED: David K. Fountain

DATE: Dec 23/69

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 28, 1970

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

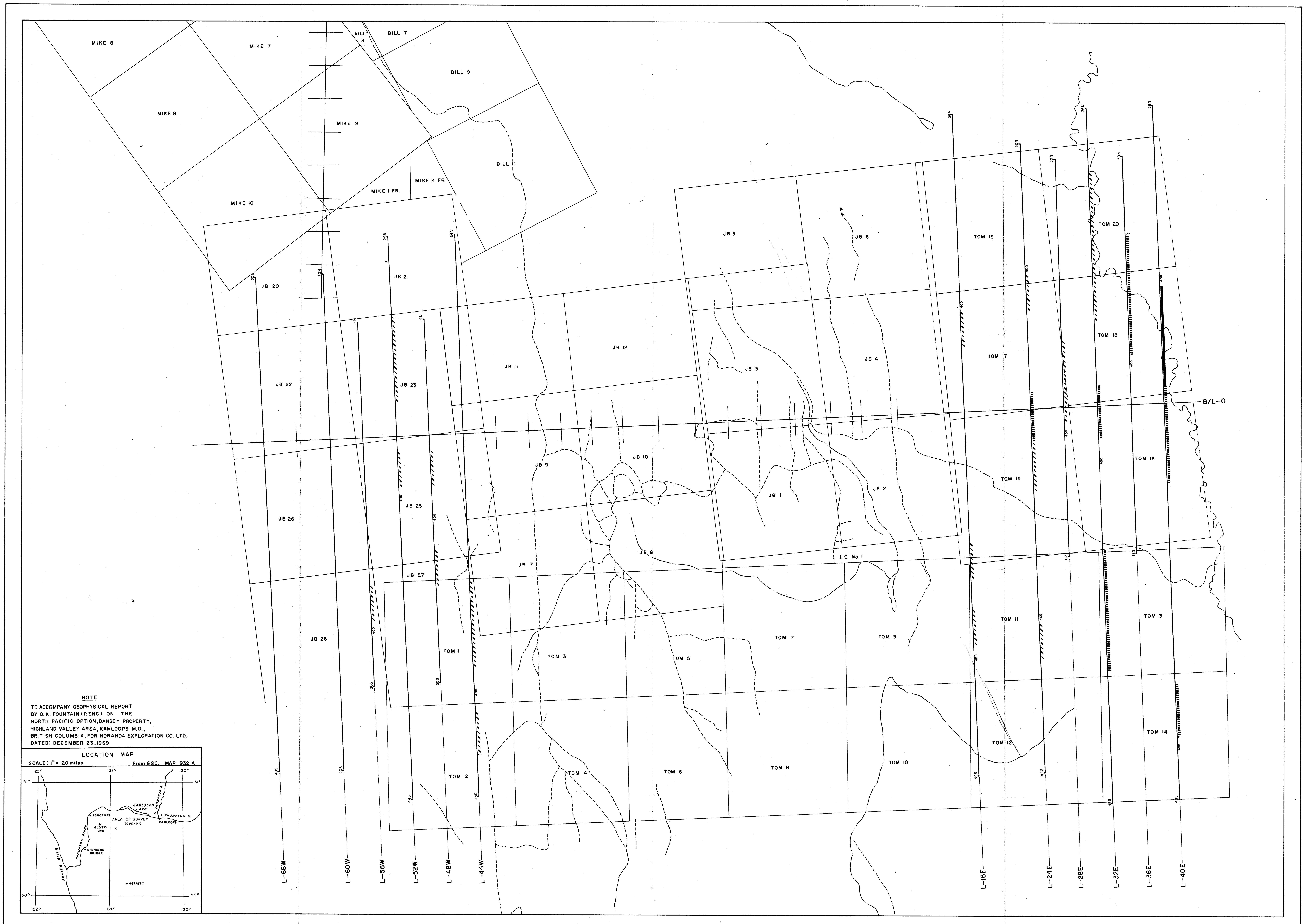
NOTE: THIS PLOT WAS PRODUCED WITH AN IBM 360/75 COMPUTER AND A CALCOMP PLOTTER

DWG. I.P.P.-4582-1

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2282 MAP #1

SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

Number at the end of anomaly indicates spread used.

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY, HIGHLAND VALLEY AREA, KAMLOOPS M.D., B.C.

SCALE

ONE INCH EQUALS FOUR HUNDRED FEET

SHEET INDEX
DWG. I.P.P.-4582-2
DWG. I.P.P.-4582-1

2282

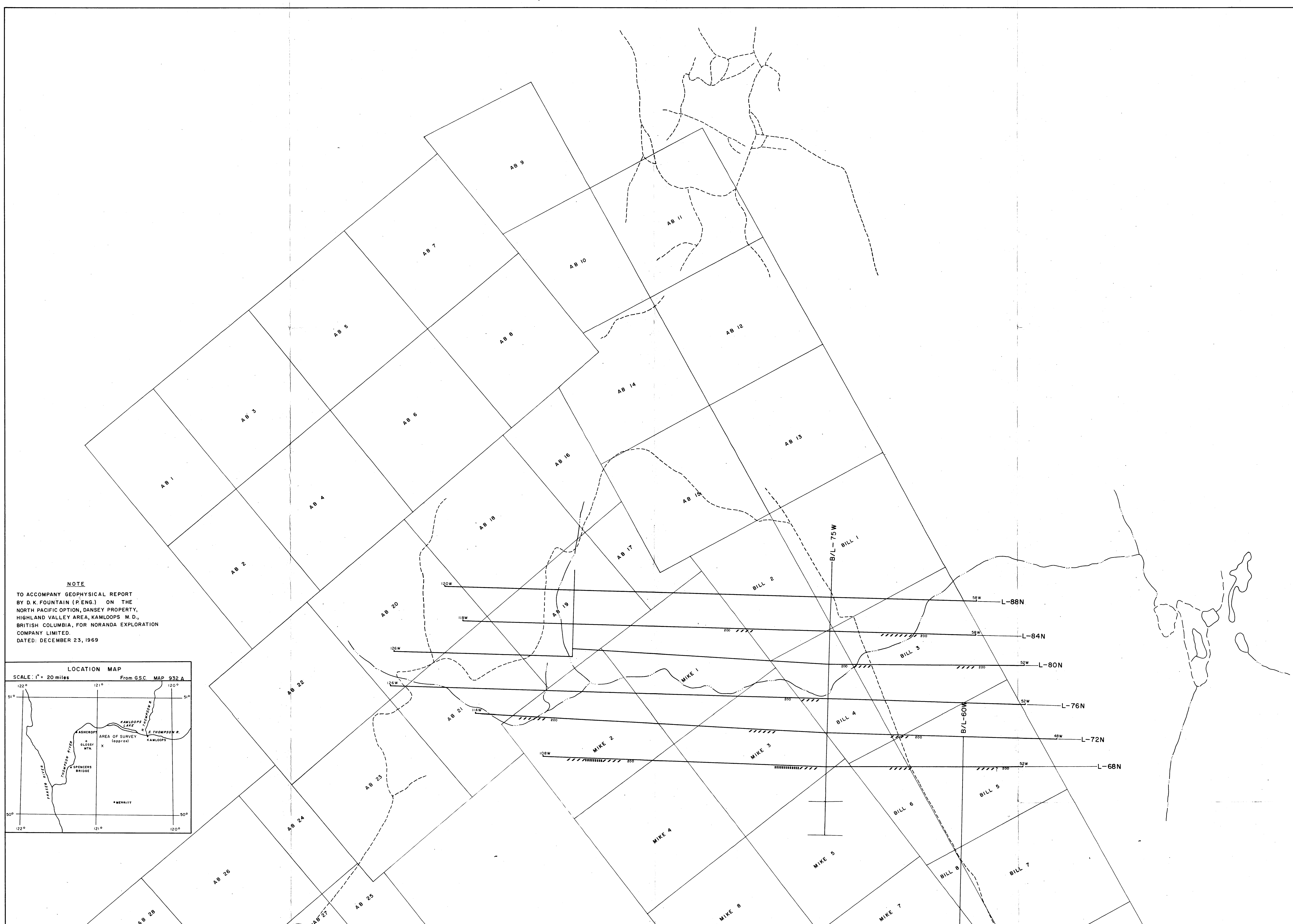
DWG. I.P.P.-4582-1

DWG. I.P.P.-4582-2

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2282 MAP #2

SURFACE PROJECTION
OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

Number at the end of anomaly indicates spread used.

NORANDA EXPLORATION COMPANY LIMITED

NORTH PACIFIC OPTION, DANSEY PROPERTY, HIGHLAND VALLEY AREA, KAMLOOPS M. D., B. C.

SCALE

ONE INCH EQUALS FOUR HUNDRED FEET

SHEET INDEX

DWG. I.P.P.-4582-2

DWG. I.P.P.-4582-1

2282

DWG. I.P.P.-4582-2