3989

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY PROJECT 114, COSEKA GRID (RUN CLAIMS) SCHAFT CREEK AREA LIARD MINING DIVISION, B.C. FOR PHELPS DODGE CORPORATION OF CANADA LTD.

104G/7W

BY

ASHTON W. MULLAN, B.Sc. P.Eng.

AND

PETER K. SMITH, B.Sc.

NAME AND LOCATION OF PROPERTY:

PROJECT 114, COSEKA GRID (RUN CLAIMS)

SCHAFT CREEK AREA

LIARD MINING DIVISION, B.C. 57°18'30" N - 130°54' W

DATE STARTED: JULY 18, 1972

DATE FINISHED: AUGUST 10, 1972

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

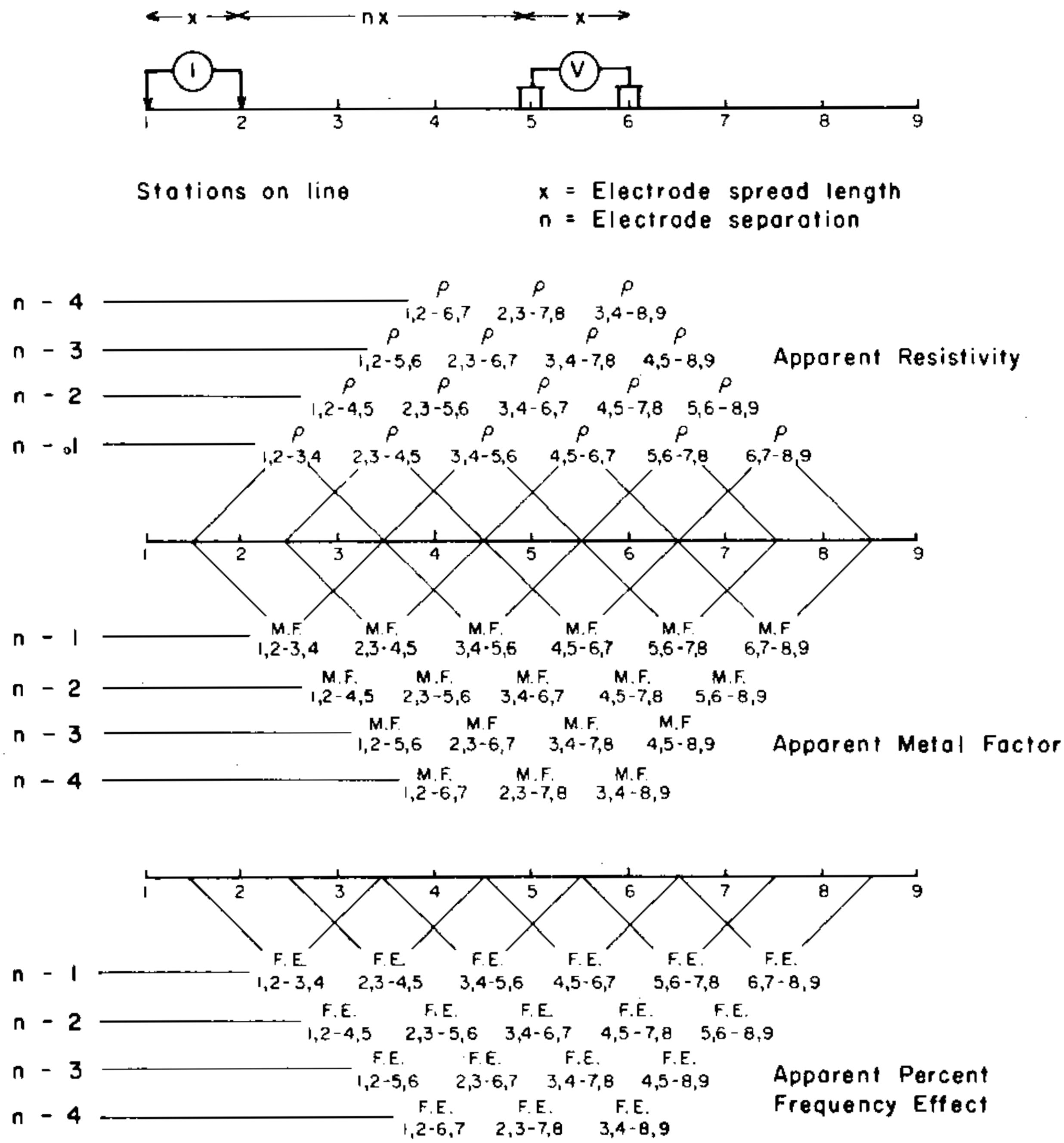


Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE

INDUCED POLARIZATION

AND RESISTIVITY SURVEY

PROJECT 114, COSEKA GRID

(RUN CLAIMS)

SCHAFT CREEK AREA

LIARD MINING DIVISION, B.C.

FOR

PHELPS DODGE CORPORATION OF CANADA LTD.

---

1. INTRODUCTION

At the request of the company, McPhar Geophysics Limited have completed an Induced Polarization and Resistivity survey on the Coseka Grid, Project 114, for Phelps Dodge Corporation of Canada Ltd. The grid lies at 57°18'30" N latitude and 130°54' W longitude in the Schaft Creek area, approximately 40 miles south of Telegraph Creek and is in the Liard Mining Division of British Columbia. This work was carried out during July and August of 1972.

Access to the grid is by helicopter from the Schaft Creek camp.

The purpose of the survey was to detect and outline any zones of sulphide mineralization which may be of economic significance in the area surveyed.

Detailed geologic information was not available at the time that this report was compiled.

A McPhar P660 frequency IP unit was used for the survey operating at 0.3 Hz and 5.0 Hz. Measurements were recorded on four dipole separations, (n = 1,2,3 and 4) using 200' dipoles.

The survey was conducted over the following claims, believed to be owned or held under option by Phelps Dodge Corporation of Canada Ltd.

RUN - 1,2,3,4,5

RUN - 10,11,12,13,14

Seven east-west lines were surveyed along with two north-northeast striking lines in the northern portion of the grid.

2. PRESENTATION OF RESULTS

The Induced Polarization and Resistivity results are shown on the following data plots in the manner described in the notes preceding this report.

Line	Electrode Intervals	Dwg. No.
3200N	200 feet	IP 6027-1
2800N	200 feet	IP 6027-2
2400N	200 feet	IP 6027-3
2000N	200 feet	IP 6027-4
1600N	200 feet	IP 6027-5
1200N	200 feet	IP 6027-6
400N	200 feet	IP 6027-7
'Y'	200 feet	IP 6027-8
'Z'	200 feet	IP 6027-9

Also enclosed with this report is Dwg. I.P.P. 4881, a plan map of the Project 114, Coseka Grid at a scale of 1" = 200'. 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 200' electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 200' 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 claim boundary information shown on Dwg. I.P.P. 4881 has been taken from maps made available by the staff of Phelps Dodge Corporation of Canada Ltd.

3. DISCUSSION OF RESULTS

In general, the anomalous IP responses of interest fall into three categories. There are responses of moderate amplitude from discrete, localized sources; broader anomalous zones, usually of lower amplitude and often flanking the stronger responses; as well as broad IP zones indicated by 'Frequency Effect' expression but lying in high resistivity areas.

A geochemical survey has also been carried out on the Coseka grid.

Data recorded on each line will be discussed briefly.

Line 3200N

A definite anomaly is outlined between 2E and 4E. The anomaly pattern indicates a shallow source, which continues to depth. Anomalous readings of lower magnitude extend west to 4W and a possible extension east to 6E is suggested.

Line 2800N

On Line 2800N, definite anomalies extend from 2W to 4W and from 0 to 2E with weaker anomalous results continuing to 8E. A source at depth is indicated by the former anomaly while a broader, near surface source, which continues to depth, is suggested for the latter definite anomaly.

A weakly anomalous zone which is outlined by 'Frequency Effect' response within a high resistivity area extends west of 10W to the end of the line. Although this response may be related to the higher resistivity, the zone should be checked by diamond drilling.

A possible weak anomaly extends from 16E to 22E, where it is incomplete. Further exploration would be dependent on encouraging results from the main anomalies to the west.

Results from Line 2800N outline several good targets to test the different IP responses encountered on the Coseka grid.

Line 2400N

The distinct anomaly between 2W and 6W outlines a source at an approximate depth of 50'.

The near surface resistivity low from 0 to 4E is likely due to the adjacent creek and swamp region.

Line 2000N

On Line 2000N, two probable anomalies centred at 0 and 5W, are outlined at depth by the 'Frequency Effect' response. Both anomalies are in the vicinity of above background copper geochemical values but correlate with a low lying area.

Line 1600N

An anomaly, possible from 0 to 2E and probable from 2E to 4E outlines a near surface source which continues to depth. The anomaly has high associated 'Frequency Effect' response.

Line 1200N

A resistivity low was recorded between 10W and 12W. Due to lack of associated frequency response and generally low soil copper values in the area, the response is not considered significant. (Note: Two lines were marked 1200N on the grid. This line is actually 1050N with reference to the Base Line).

Line 400N

A strong anomaly from a source at an approximate depth of 50' was outlined between 10W and 14W. Further investigation is warranted. The possible anomaly, which continues east to 4W, is primarily due to the effect of a surface resistivity low and is of less interest.

Line 'Y'

A near surface anomaly was outlined between 12N and 14N. High copper values were recorded in this vicinity on the geochemical line to the south.

A broad zone of anomalous 'Frequency Effect' response at depth extends from 16N to 22N in an area where copper geochemical results have exceeded 1000 ppm. The zone lies on the side of a hill of moderate slope.

Line 'Z'

A possible anomaly has been outlined by 'Frequency Effect' readings at depth centred on 10N.

A similar, but broader, anomaly extends from 18N to 24N in a swampy region to the north. High copper values were obtained in the swamp at 21N.

4. SUMMARY AND CONCLUSIONS

The Induced Polarization and Resistivity results have outlined several good diamond drill targets on the Coseka Grid. It may be found that the strongest responses are due to concentrations of pyrite mineralization while weaker to moderate anomalies are of more interest. Therefore, drill hole recommendations have been made to test each type of anomalous response encountered.

The following drill holes will serve to evaluate the anomalies.

Hole	Location of Collar	Dip	Direction	Length
DDH-1	Line 2800N 4E	45^{o}	grid west	350'
DDH-2	Line 2800N 6E	45^{o}	grid west	350'
DDH-3	Line 2800N 13W	45^{o}	grid east	350'
DDH-4	Line 3200N 1E	45^{o}	grid east	350'
DDH-5	Line 2400N 3W	45^{o}	grid west	200'
DDH-6	Line 400N 13W	45^{o}	grid east	200'
DDH-7	Line 'Y' 18N	45^{o}	grid north	350'

Examples of IP results from porphyry type deposits are illustrated in the Appendix.

McPHAR GEOPHYSICS LIMITED

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN

Ashton W. Mullan,
Geologist

Peter K. Smith,
Geophysicist

Dated: November 28, 1972

ASSESSMENT DETAILS

PROPERTY:	Project 114, Coseka Grid	MINING DIVISION:	Liard
SPONSOR:	Phelps Dodge Corporation of Canada Ltd.	PROVINCE:	British Columbia
LOCATION:	Schaft Creek		
TYPE OF SURVEY:	Induced Polarization		
OPERATING MAN DAYS:	28	DATE STARTED:	July 18, 1972
EQUIVALENT 8 HR. MAN DAYS:	42	DATE FINISHED:	August 10, 1972
CONSULTING MAN DAYS:	2	NUMBER OF STATIONS:	124
DRAUGHTING MAN DAYS:	5	NUMBER OF READINGS:	1032
TOTAL MAN DAYS:	49	MILES OF LINE SURVEYED:	4.35

CONSULTANTS:

Ashton W. Mullan, 1440 Sandhurst Place, West Vancouver, B.C.
Peter K. Smith, 650 Parliament Street, Apt. 2212, Toronto, Ontario.

FIELD TECHNICIANS:

J. MacNeil, 14 Gail Street, Apt. 2, Galt, Ontario.
E. Lalonde, 18 Chapel Street, Thorold, Ontario.
Plus 2 Helpers: supplied by client

DRAUGHTSMEN:

G. Hines, 114 Hillsview Drive, Richmond Hill, Ontario.
R. Koenig, 508 Cosburn Avenue, Toronto 6, Ontario.
F. Hurst, 230 Woburn Avenue, Toronto 12, Ontario.

McPHAR GEOPHYSICS LIMITED

A. W. Mullan
Geologist

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

Dated: November 28, 1972

STATEMENT OF COST

Phelps Dodge Corporation of Canada Ltd.
Project 114
Coseka Grid

Crew: J. MacNeil - E. Lalonde

6-3/4 days	Operating	@ $250.00/day	$1,687.50
3/4 day	Preparation)		
1 day	Bad Weather) 2¼ days	@ $100.00/day	225.00
½ day	Standby)		

Expenses - prorated @ 6-3/4/21-3/4

Air Fare	69.20	
Air lift	144.35	
Taxis	10.59	
Meals and Accommodation	35.10	
Freight and Brokerage	70.29	
Supplies	15.43	
	344.96	
+ 10%	34.50	
		379.46
		$2,291.96

Note: Helicopter transport, food and room and 2 Helpers supplied by Phelps Dodge Corporation of Canada Ltd.

McPHAR GEOPHYSICS LIMITED

A.W. Mullan,
Geologist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN

Dated: November 28, 1972

Declared before me at the VANCOUVER, B.C.
of , in the
Province of British Columbia, this
day of DEC 11 1972 A.D.

Sub - Mining Recorder
A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

CERTIFICATE

I, Ashton W. Mullan, of the City of Vancouver, in the Province of British Columbia, hereby certify:

1. That I am a geologist and a fellow of the Geological Association of Canada with a business address at Suite 811, 837 West Hastings Street, Vancouver, B.C.

2. That I am registered as a member of the Association of Professional Engineers of the Provinces of Ontario and British Columbia.

3. That I hold a B.Sc. degree from McGill University.

4. That I have been practising my profession as a geologist for about twenty years.

5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Phelps Dodge Corporation of Canada Ltd., or any affiliate.

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

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

Dated at Toronto

This 28th day of November 1972

PROFESSIONAL PROVINCE OF A. W. MULLAN BRITISH COLUMBIA ENGINEER

A.W. Mullan, B.Sc., P.Eng.

CERTIFICATE

I, Peter Kinsmen Smith, of the city of Toronto, in the Province of Ontario, hereby certify:

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

2. I am a graduate of the University of British Columbia with a B.Sc. degree in Honours geology and geophysics, (1970).

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

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

5. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Phelps Dodge Corporation of Canada Ltd., or any affiliate.

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

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

Dated at Toronto

This 28th day of November 1972

Peter K. Smith, B.Sc.

APPENDIX

EXPECTED IP ANOMALIES FROM "PORPHYRY COPPER" TYPE ZONES OF DISSEMINATED SULPHIDE MINERALIZATION

Our experience in other areas has shown that the induced polarization method can be successfully used to locate, and outline, zones of disseminated sulphide mineralization of the "porphyry copper" type. In most cases the interpretation of the IP results is simple and straightforward. The results shown in Figure 1 and Figure 2 are typical.

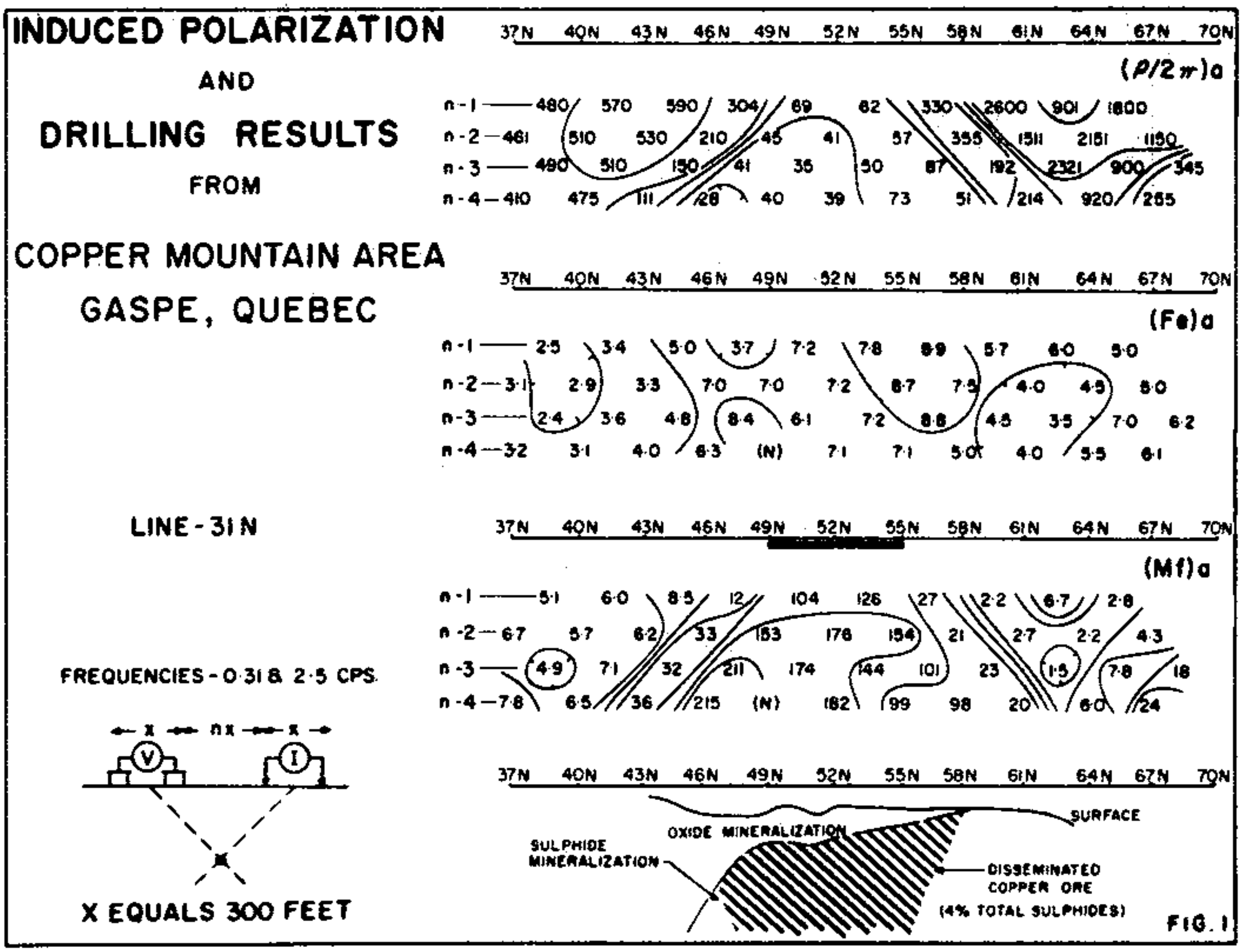


FIG. 1

The source of the moderate magnitude IP anomaly shown in Figure 1 contains approximately 4% metallic mineralization. The zone is of limited lateral extent and enough copper is present to make the mineralization "ore grade". The presence of the surface oxidation can be seen in the fact that the apparent IP effects increase for n = 2.

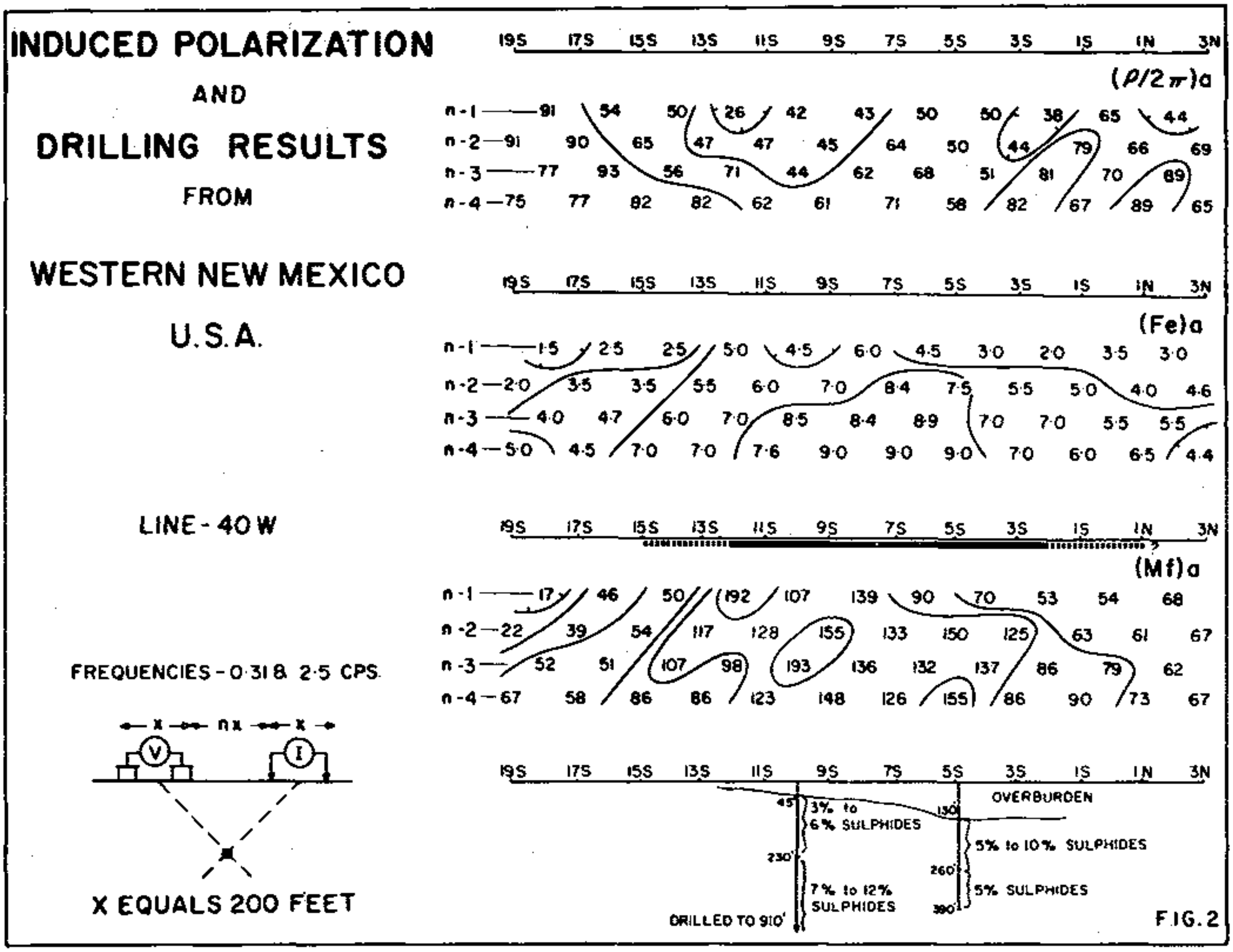


FIG. 2

The IP anomaly shown in Figure 2 has about the same magnitude as that described above. It should be noted that appreciably greater concentrations of metallic mineralization are present; further, there is little or no copper present. These results illustrate the fact that IP results can not be used to determine the exact amount of metallic mineralization present or to determine the economic importance of a mineralized zone. In some geologic situations zoning is present; the zones of mineralization of greatest economic value may contain less total metallic mineralization than other zones in the same general area.

In the proper geologic environment, the method will detect even very low concentrations of metallic mineralization. The IP results shown in Figure 3 located the ore zone at the Brenda Property near Peachland, B. C. The zone contains 1. 0 to 1. 5 per cent metallic mineralization; however, the mineralization is "ore grade" because only molybdenite and chalcopyrite are present.

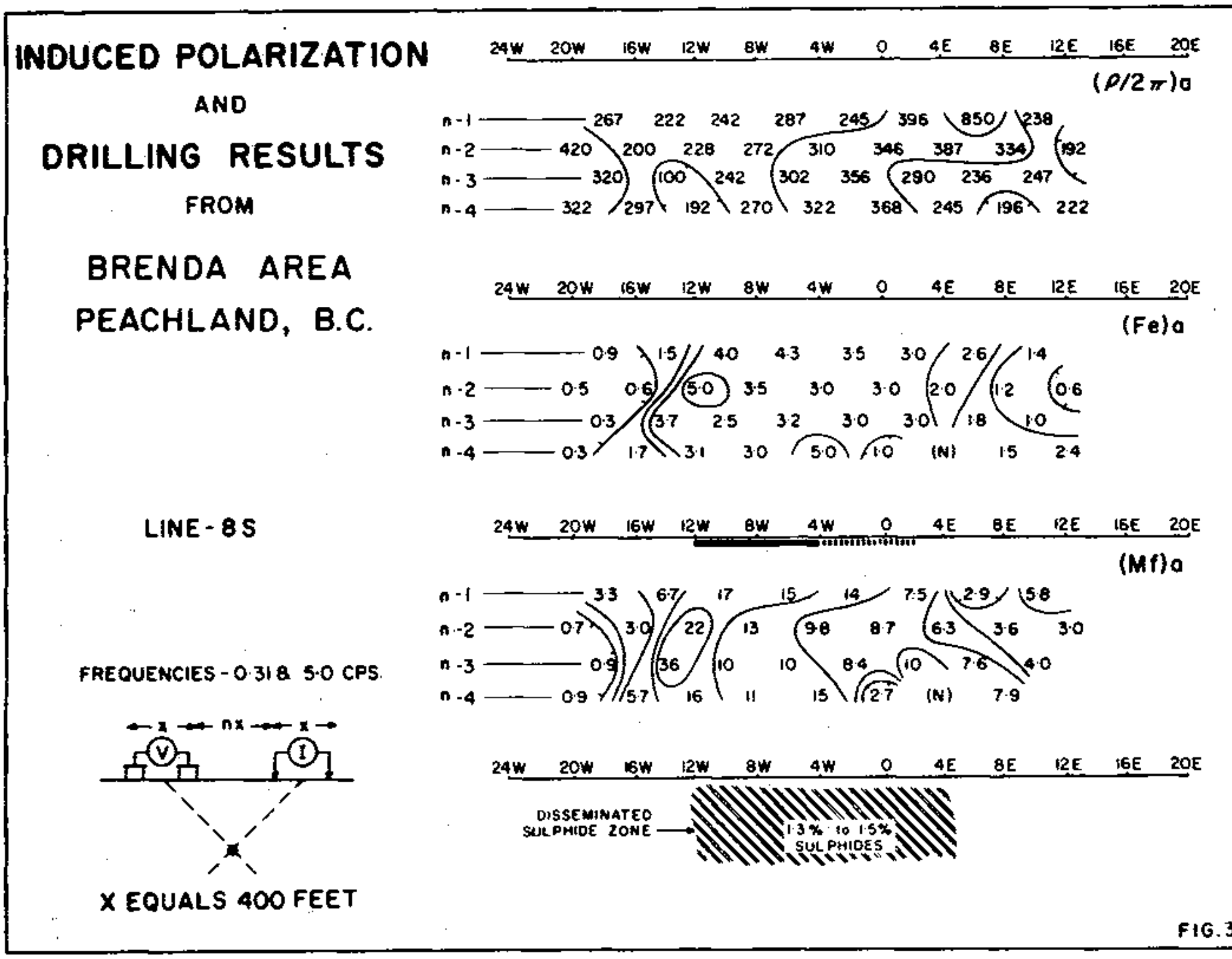


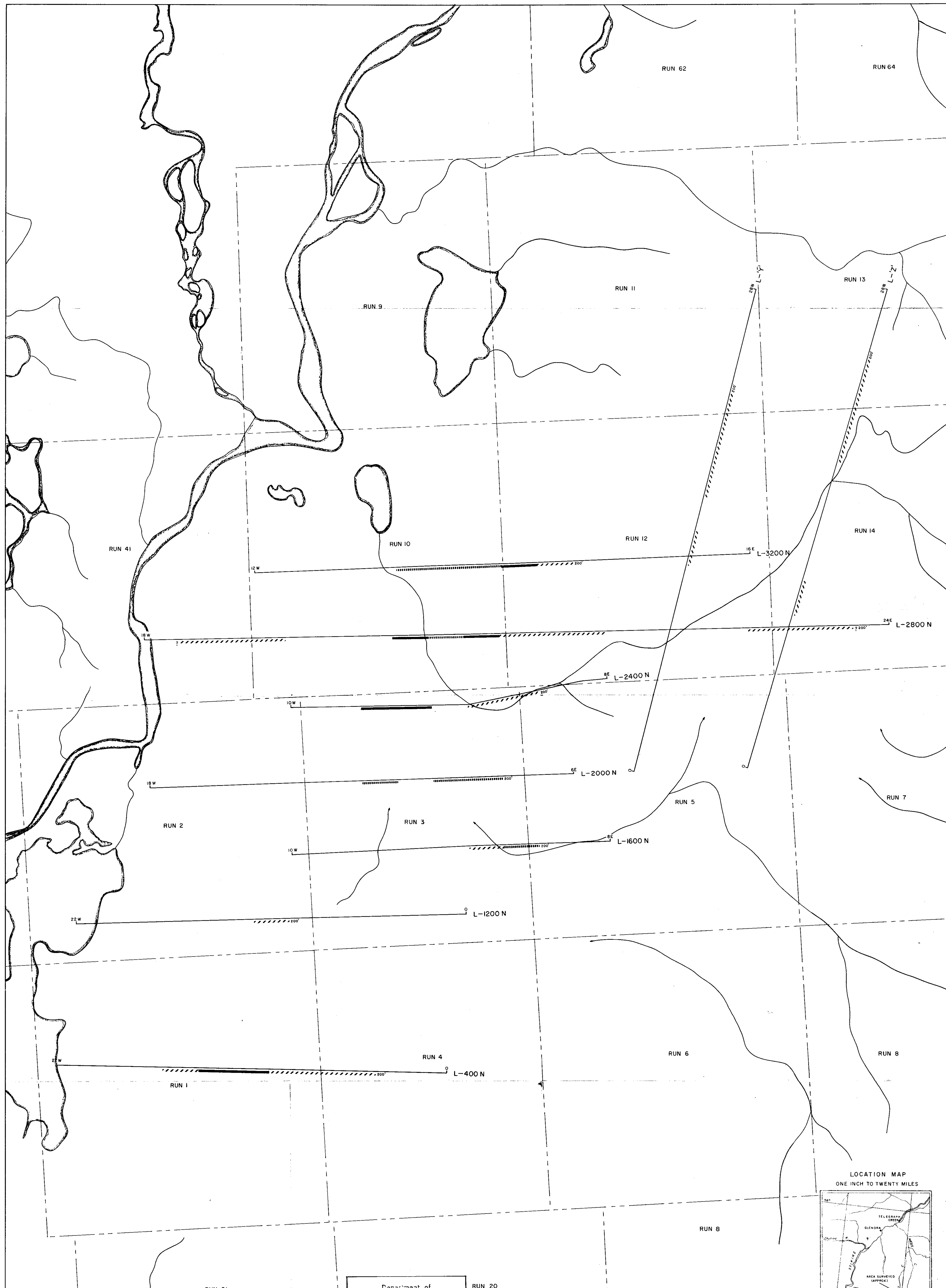
FIG. 3

DWG. I.P.P.-4881

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3989 MAP #1

NOTE: TO ACCOMPANY GEOPHYSICAL REPORT FOR PHELPS DODGE CORPORATION OF CANADA LTD., PROJECT 114, COSEKA GRID, SHAFT CREEK AREA, LIARD M.D., B.C. BY A.W. MULLAN (P. ENG.) AND P.K. SMITH (GEOPHYSICIST)
DATED – NOV. 28, 1972.

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

Number at the end of anomaly indicates electrode interval

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA, GRID
SCHAFT CREEK AREA, LIARD M.D., B.C.

SCALE
ONE INCH EQUALS TWO HUNDRED FEET

3989 M-1

PROFESSIONAL ENGINEER A.W. MULLAN BRITISH COLUMBIA
Nov. 28, 1972

DWG. I.P.P.-4881

DWG. NO.- I.P.-6027-2

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 2800N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X X = 200FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: 1972

APPROVED:

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

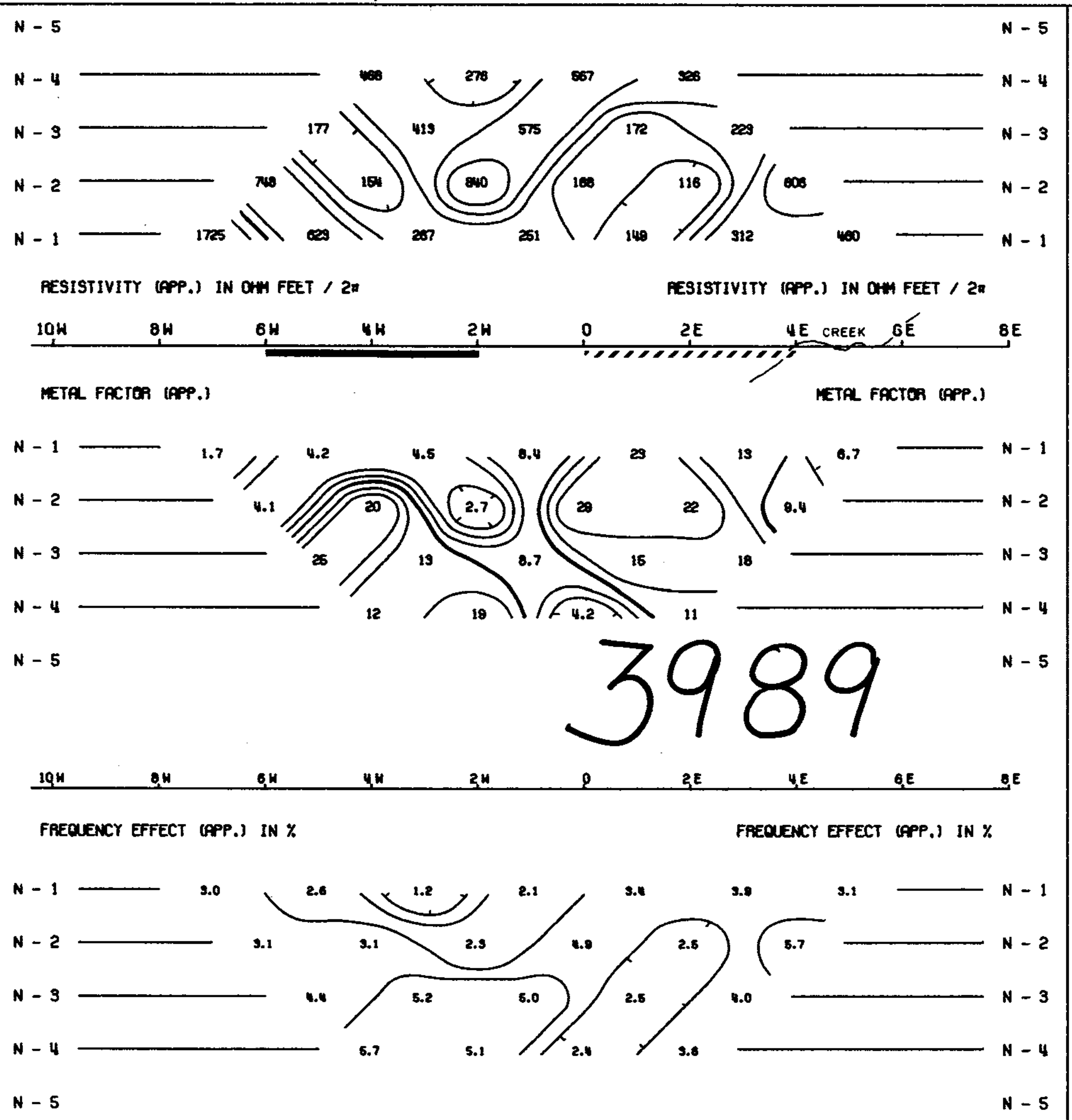
DATE:

PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN — PROFESSIONAL ENGINEER

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



DWG. NO.- I.P.-6027-3

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 2400N

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X   X = 200FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: AUG 1972

APPROVED:

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

DATE:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN

McPHAR GEOPHYSICS

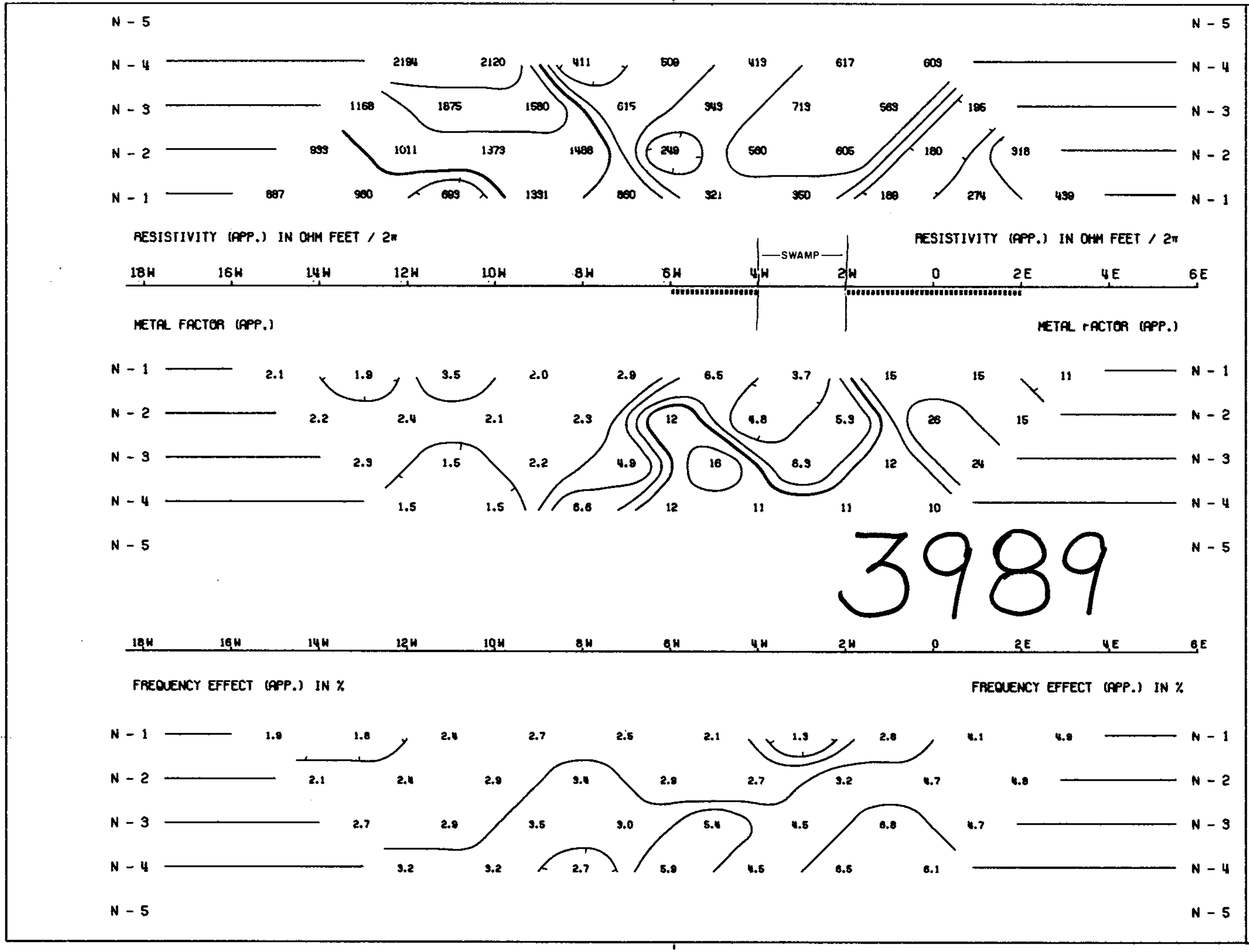
INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION

DWG. NO.- I.P.-6027-4

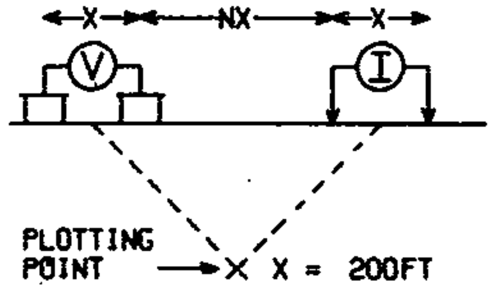
PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.



LINE NO.- 2000N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: JUL 1972

APPROVED:

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

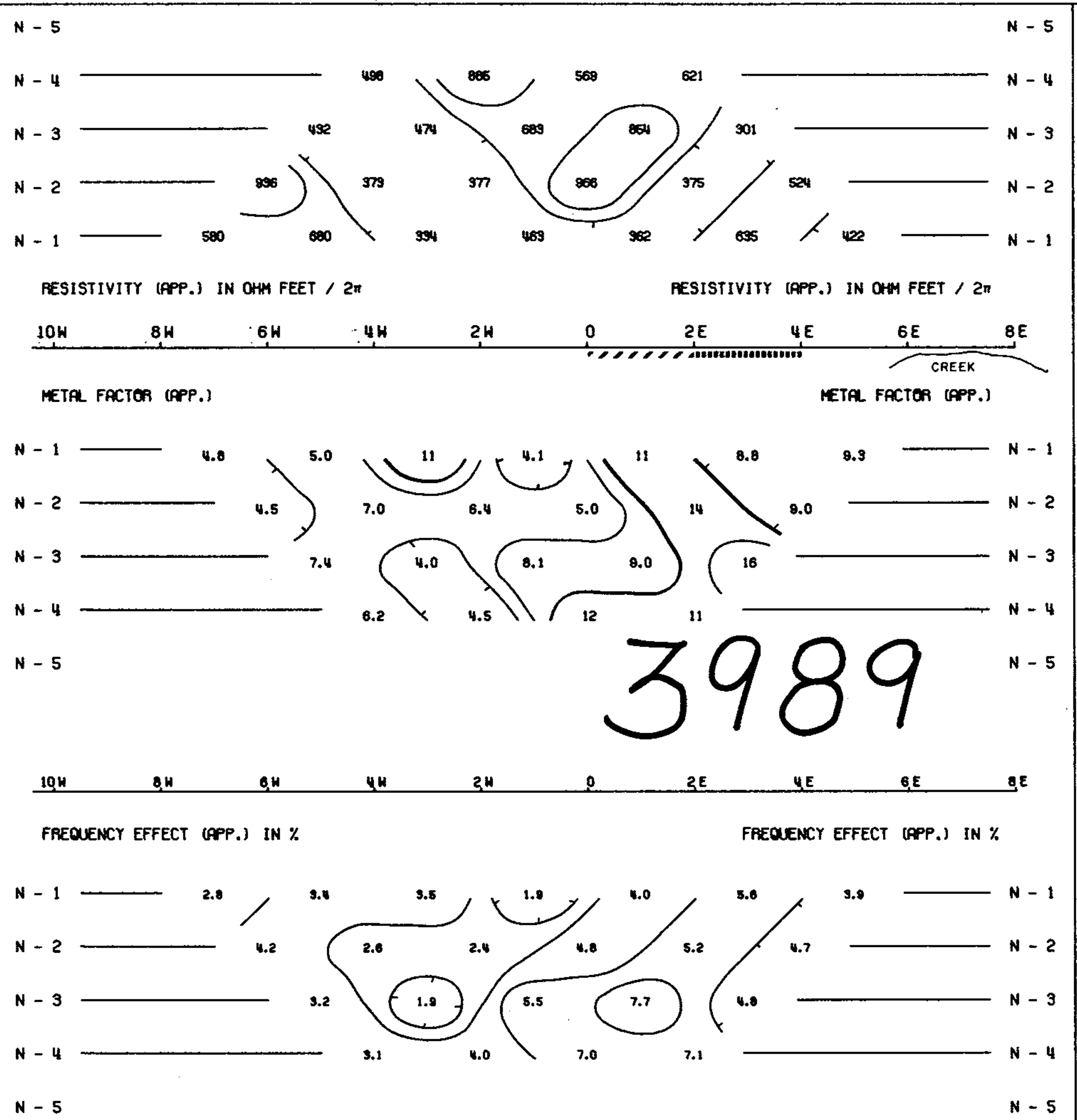
DATE: Nov. 28/1972

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



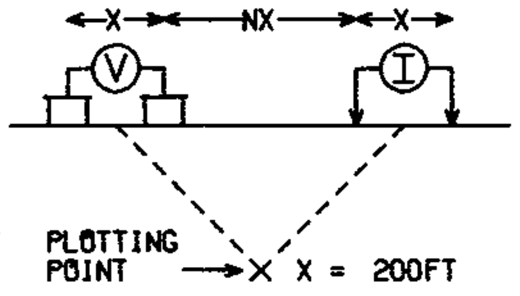
DWG. NO.- I.P.- 6027-5

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 1600N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: AUG 1972

APPROVED:

DATE:

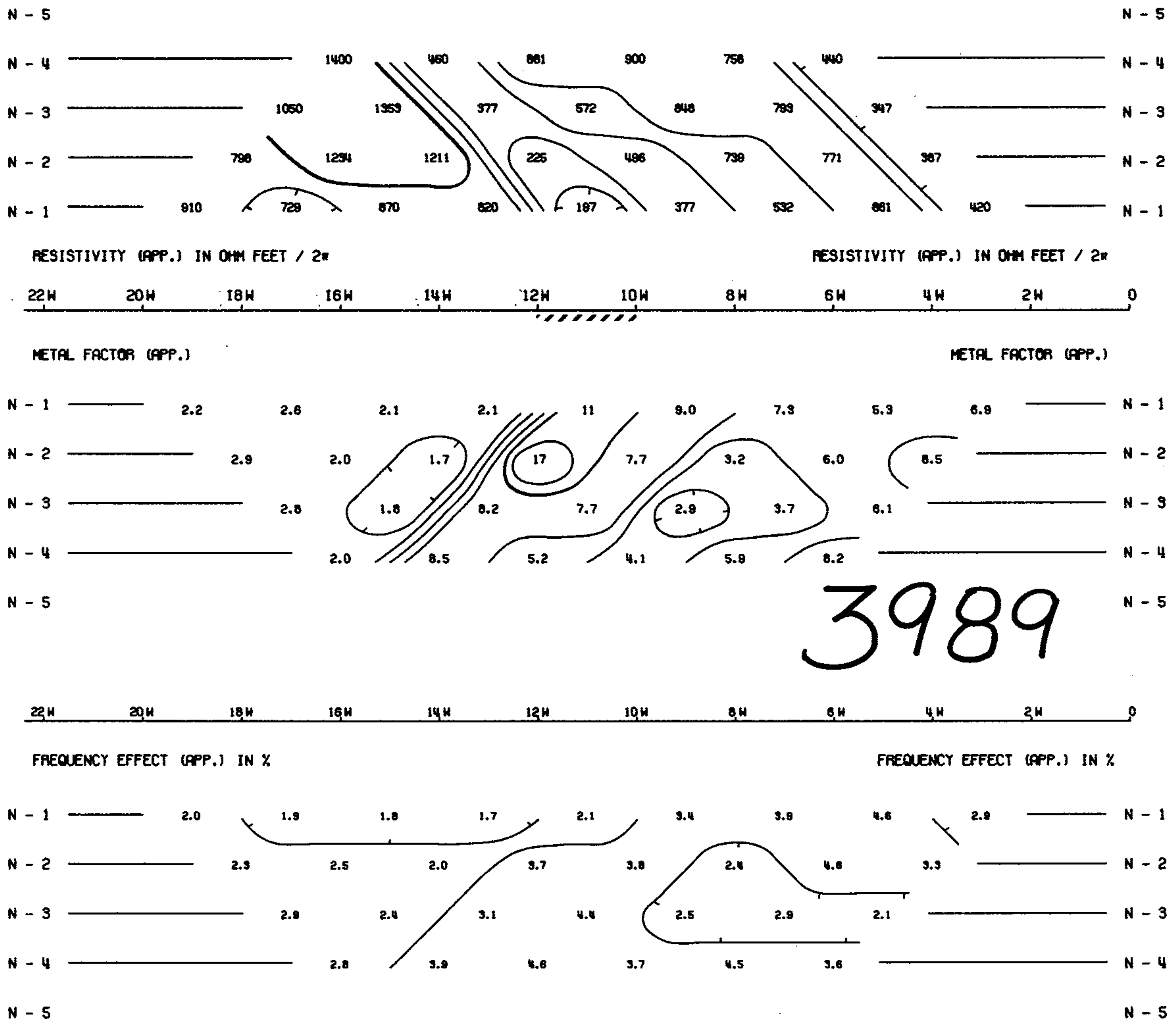
NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



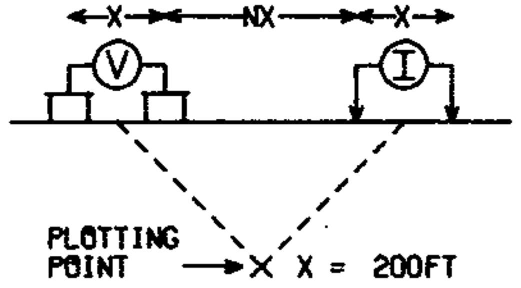
DWG. NO.- I.P.-6027-6

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 1200N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: JUL 1972

APPROVED:

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

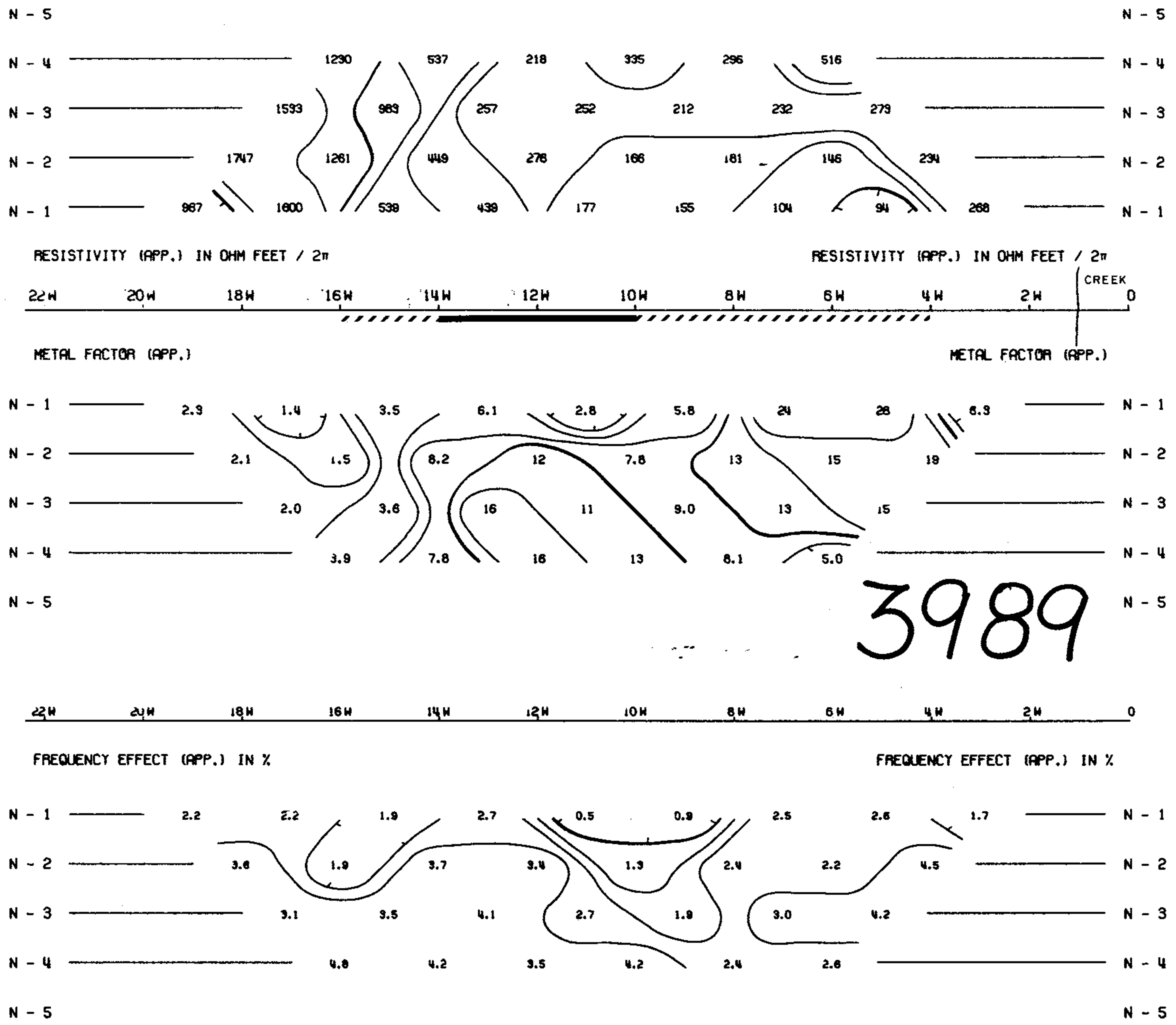
DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



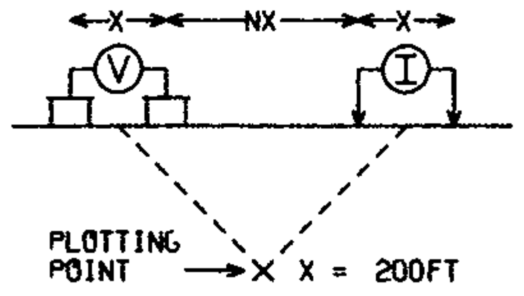
DWG. NO.- I.P.- 6027-7

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 400N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31 5.0 HZ

DATE SURVEYED: JUL 1972

APPROVED:

DATE:

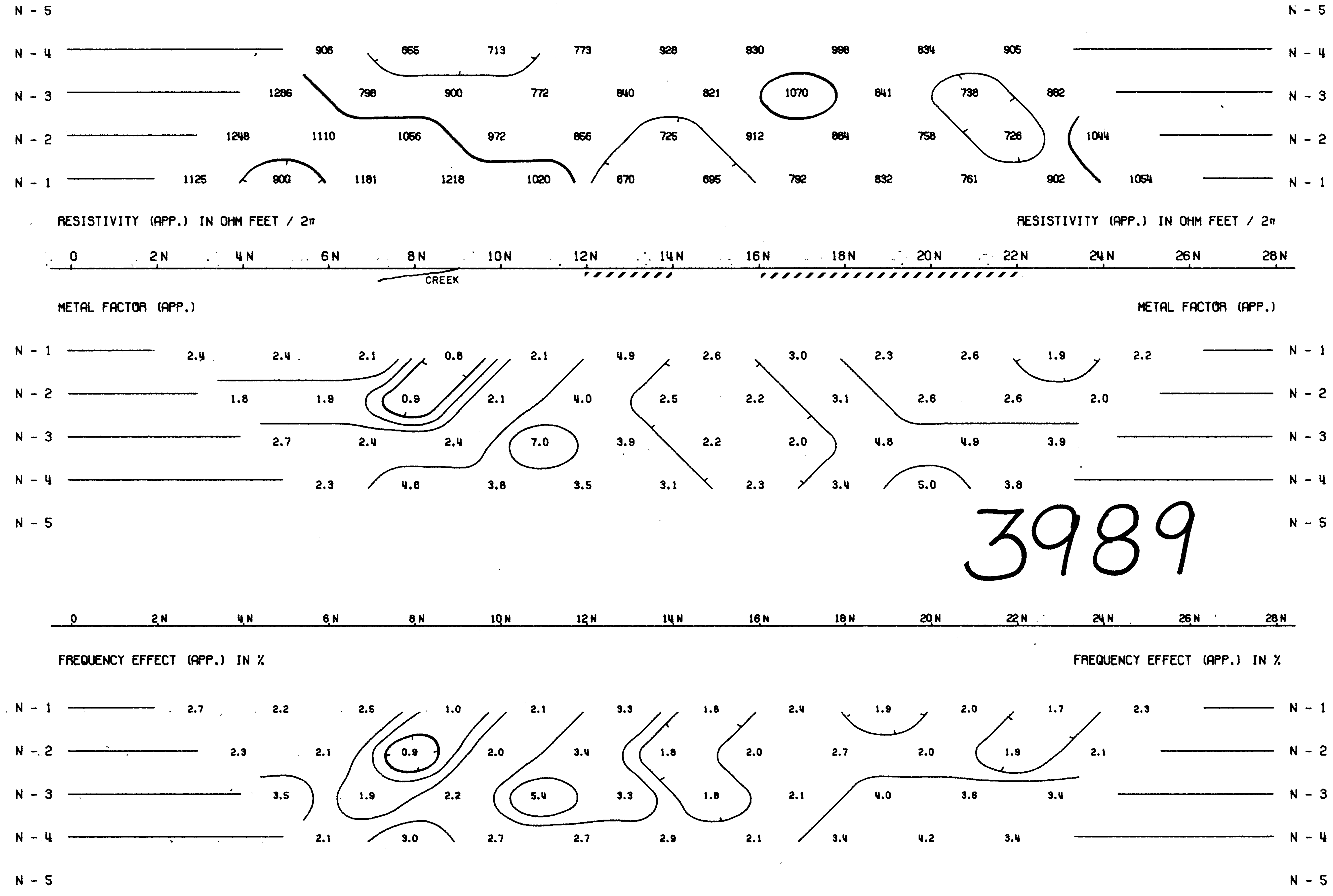
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A.W. MULLAN

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



DWG. NO.- I.P.-6027-8

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- Y

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X   X = 200FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: JUL 1972

APPROVED

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

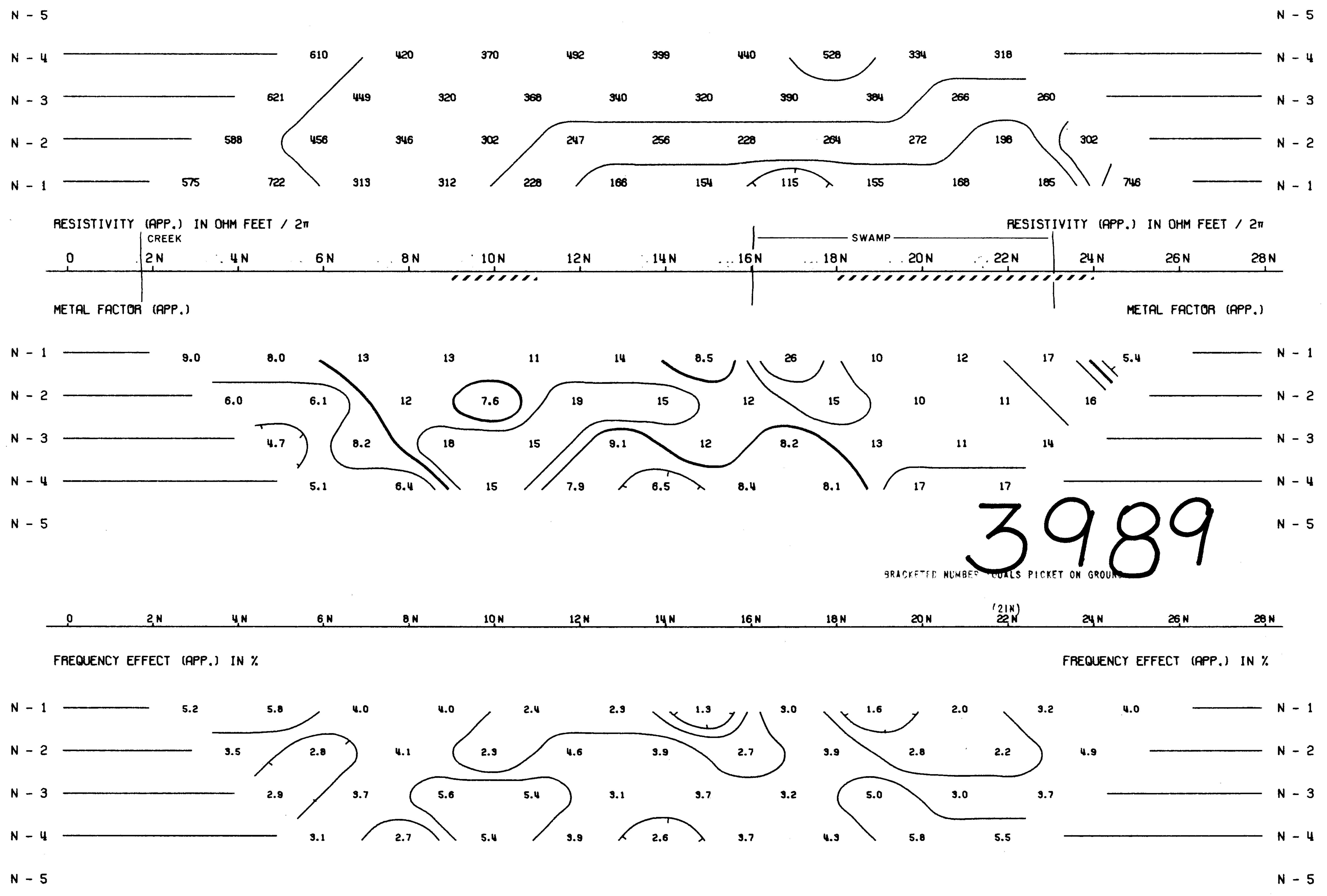
DATE

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, A. W. MULLAN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION



DWG. NO.- I.P.-6027-9

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- Z

ELECTRODE CONFIGURATION

PLOTTING POINT → X X = 200FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: JUL 1972

APPROVED

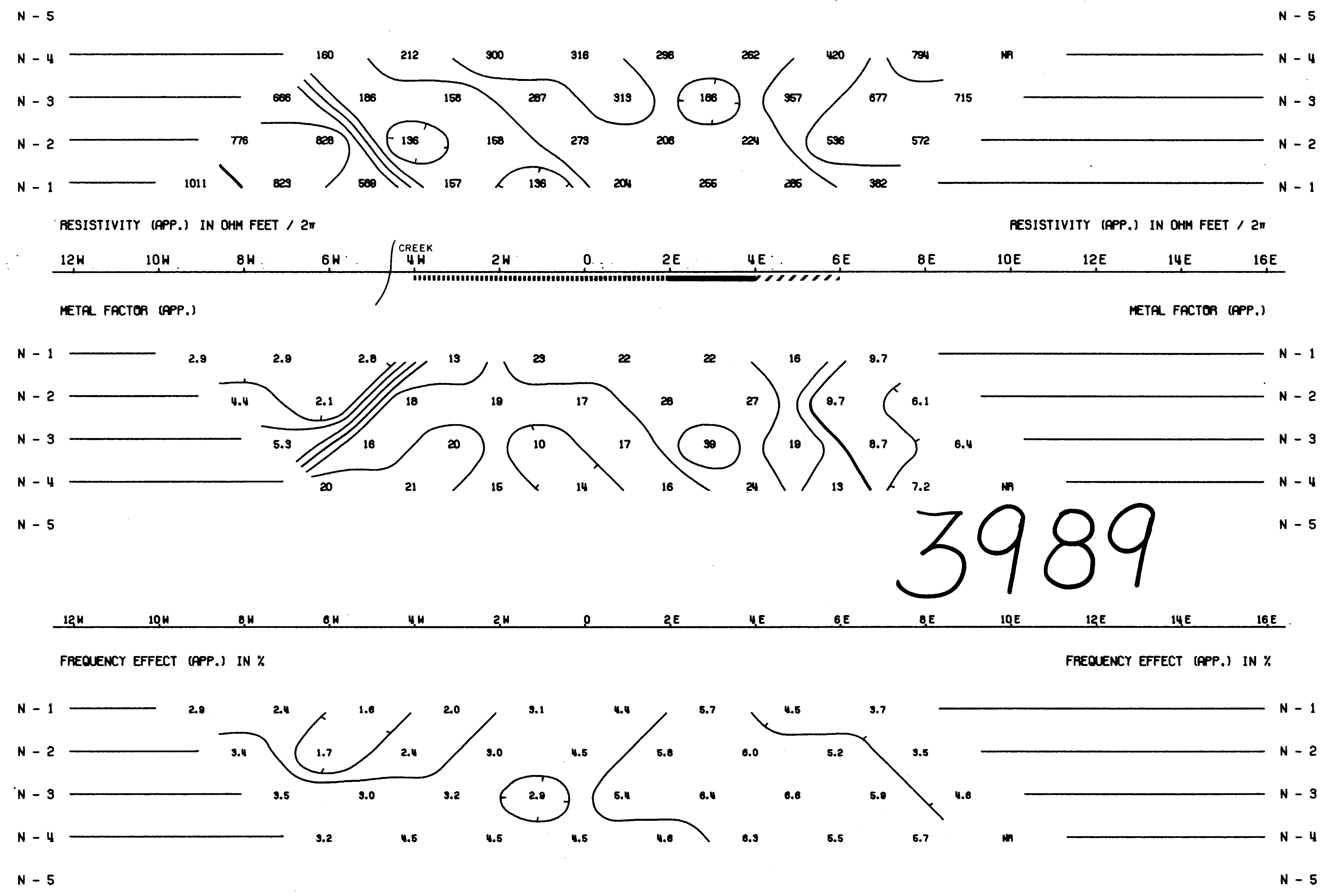
DATE

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 BY McPHAR COMPUTER DIVISION



DWG. NO.- I.P.-6027-1

PHELPS DODGE CORPORATION OF CANADA LTD.

PROJECT 114, COSEKA GRID,
SCHAFT CREEK AREA, LIARD M.D., B.C.

LINE NO.- 3200N

ELECTRODE CONFIGURATION

X NX X

PLOTTING POINT → X = 200FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: AUG 1972

APPROVED:

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

DATE:

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION