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REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS, GREENWOOD AREA, GREENWOOD MINING DIVISION, B.C. FOR BONUS RESOURCES LTD. (N.P.L.)

82E/2W

BY

PHILIP G. HALLOF, Ph.D.

AND

MARION A. GOUDIE, B.Sc.

NAME AND LOCATION OF PROPERTY

WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS

GREENWOOD AREA

GREENWOOD MINING DIVISION, B.C. 49°02'N, 118°51'W

DATE STARTED: NOVEMBER 19, 1972

DATE FINISHED: NOVEMBER 27, 1972

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McPHAR GEOPHYSICS

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

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

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

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

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

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

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

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

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

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

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

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

In plotting the results, the values of the apparent resistivity, apparent per cent frequency effect, and the apparent metal factor measured for each set of electrode positions are plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes. (See Figure A.) The resistivity values are plotted above the line as a mirror image of the metal factor values below. On a second line, below the metal factor values, are plotted the values of the per cent frequency effect. In some cases the values of per cent frequency effect are plotted as superscripts of the metal factor value. In this secon d 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

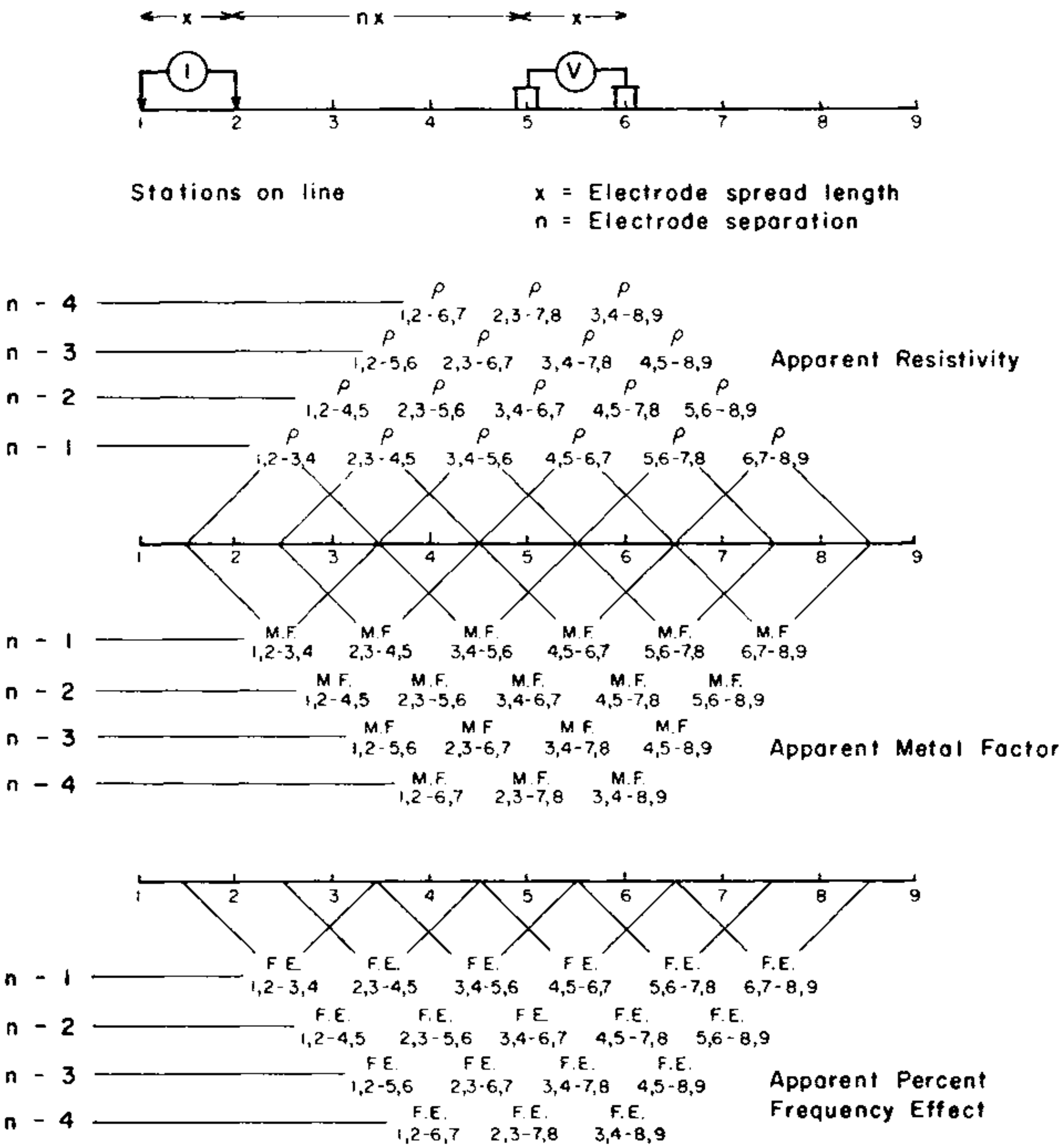

Fig. A

McPHAR GEOPHYSICS LIMITED

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY ON THE WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS, GREENWOOD AREA, GREENWOOD MINING DIVISION, B.C. FOR BONUS RESOURCES LTD. (N.P.L.)

1. INTRODUCTION

At the request of Mr. C.A.R. Lammle, consultant to the client, we have completed an Induced Polarization and Resistivity survey on the Way Mineral Claim Group, which includes the Granada and Texas Crown Grants, in the Greenwood Mining Division, British Columbia, for Bonus Resources Ltd. (N.P.L.). The claim group is situated at 49°02'N latitude and 118°51'W longitude. The property, which lies 4 miles northwest of the village of Midway, B.C., is accessible by B.C. Highway #3, 16 miles west from Greenwood, B.C.

Previous work consisted of detailed geological, soil copper and ground magnetic surveys. The country rocks in the area belong to the Triassic Anarchist Group of sedimentary and volcanic rocks which have been invaded by a succession of Mesozoic to Tertiary granitic rocks. These are overlain by Tertiary sedimentary rocks and volcanics. The Brooklyn Formation, a skarned impure limestone unit of the Anarchist group, is the host rock for irregular replacement bodies of chalcopyrite, pyrite and magnetite. The Sharpstone conglomerate, a distinctive chert-pebble conglomerate, lies above and below the limestone.

Pyrite is the common mineral forming part of the skarn, but the limestone has also been replaced by magnetite, specularite, haematite and chalcopyrite.

The IP survey was carried out to test two areas of relatively high soil copper, the Granada Texas zone and the Way 13 zone. The work was completed in the latter half of November, 1972, using a McPhar P660 high power variable frequency IP unit operating at 0.3 and 5 Hz over the following claims:

Way 1 to 4, 13, 17 to 26, 28; Granada and Texas Crown Grants.

These claims are owned by Bonus Resources Ltd. (N.P.L.).

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.
1200N	200 feet	IP 6033-1
800N	200 feet	IP 6033-2
J	300 feet	IP 6033-3
H	300 feet	IP 6033-4
G	300 feet	IP 6033-5

Line	Electrode Intervals	Dwg. No.
F	300 feet	IP 6033-6
E	300 feet	IP 6033-7
D	300 feet	IP 6033-8
B	300 feet	IP 6033-9
A	300 feet	IP 6033-10

Also enclosed with this report is Dwg. I. P. P. 3564, a plan map of the Way Mineral Claim Grid at a scale of 1" = 400'. The definite, probable and possible Induced Polarization anomalies are indicated by bars, in the manner shown on the legend, on this plan map as well as on the data plots. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

Since the Induced Polarization measurement is essentially an averaging process, as are all potential methods, it is frequently difficult to exactly pin-point the source of an anomaly. Certainly, no anomaly can be located with more accuracy than the electrode interval length; i.e. when using 300' electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 300' 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 geochemistry information shown on Dwg. I.P.P. 3564 has been taken from maps made available by Mr. C.A.R. Lammle.

3. DISCUSSION OF RESULTS

The IP survey investigated two geochemical anomalies for copper, the Way 13 anomaly and the Granada-Texas anomaly. Two lines crossed the former and 8 lines were surveyed the length of the latter.

I Way 13 Anomaly

Weak anomalies which suggest very weakly disseminated mineralization were located on Line 1200N and Line 800N. The anomaly on Line 1200N from 47E to 54E may represent a multiple source or the source may consist of irregular concentrations of mineralization within a very weakly disseminated source.

The anomaly on Line 800N from 44E to 48E reflects a relatively shallow source. The anomaly from 50E to 54E is probable and the source appears to improve with depth. The data are insufficient to predict any strike extent or correlation for these anomalies.

II Granada-Texas Anomaly

A zone of weak to moderately strong anomalies was located southeast of the Granada-Texas geochemical anomaly. The source of the anomalies is variable in depth and magnitude and the anomalies suggest rather weakly disseminated metallic mineralization. The zone is open to the northeast and may extend to the Way 13 zone. It may also extend to the south and southeast, since the anomalies on Line D, Line E, Line F, Line H and Line J are all incomplete at the end of the line.

Line J

A possible to probable anomaly extends from 6S to 12N. The top of the source is shallow relative to the electrode interval and some depth extent is indicated. The source could be tested below 3N at a vertical depth of 150'.

A possible anomaly is indicated at the end of the line.

Line H

An anomaly varying from possible to definite extends from 6S to 12N. The anomaly should improve with detail with shorter electrode intervals, since the source is relatively shallow, particularly from 6N to 9N. A possible drill hole location from the present data would be a hole collared at 10N drilled to the south to cross beneath 6N.

These two lines are fairly typical of the zone.

Two weak anomalies with no strike extent were located on Line F and Line D and are not considered important at this time.

A probable, incomplete anomaly was located on Line E extending from 39N to the north. This line should be extended to the north to complete definition of the anomaly. The source could extend to the northeast.

4. CONCLUSIONS AND RECOMMENDATIONS

The survey partially outlined an anomalous IP zone to the southeast of the Granada-Texas geochemical anomaly and also located anomalies over the

Way 13 geochemical anomaly. The Granada-Texas IP zone may extend to the east, south and southwest. Since data is incomplete in these directions, it is recommended that the survey should be extended, since both float and outcrop indicate the presence of chalcopyrite and malachite in addition to pyrite. If drilling is planned at this time, possible drill hole locations have been suggested in the discussion.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

Marion A. Goudie,
Geologist.

Dated: December 18, 1972

ASSESSMENT DETAILS

PROPERTY: Way Claim Group		MINING DIVISION: Greenwood
SPONSOR: Bonus Resources Ltd. (N.P.L.)		PROVINCE: British Columbia
LOCATION: Greenwood Area		
TYPE OF SURVEY: Induced Polarization		
OPERATING MAN DAYS:	28	DATE STARTED: Nov. 19, 1972
EQUIVALENT 8 HR. MAN DAYS:	42	DATE FINISHED: Nov. 27, 1972
CONSULTING MAN DAYS:	2	NUMBER OF STATIONS: 157
DRAUGHTING MAN DAYS:	7	NUMBER OF READINGS: 1134
TOTAL MAN DAYS:	51	MILES OF LINE SURVEYED: 7.97

CONSULTANTS:

Philip G. Hallof, 15 Barnwood Court, Don Mills, Ont.
Marion A. Goudie, 739 Military Trail, West Hill, Ont.

FIELD TECHNICIANS:

G. Trefenanko, Box 923, Lac La Biche, Alberta.
J. McNeil, 14 Gail Street, Apt. 2, Galt, Ont.
Plus 2 Helpers:
G. Silver, General Delivery, Kamloops, B.C.
N. Osborne, 2270 Ottawa Avenue, West Vancouver, B.C.

DRAUGHTSMEN:

B. Boden, 58 Glencrest Blvd. Toronto 16, Ont.
V. Young, 703 Cortez Avenue, Bay Ridges, Ont.
F. Hurst, 230 Woburn Avenue, Toronto 12, Ont.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

Dated: December 18, 1972

*INTERIM STATEMENT OF COST

Bonus Resources Ltd. (N.P.L.) IP Survey
Way Mineral Claim Group, Granada and Texas Crown Grants
Greenwood Area, Greenwood Mining Division, B.C.

Crew: G. Trefenanko & J. McNeil

Total Survey Cost:

7.97 miles	@ $470.00 per line mile	$3,745.90

Breakdown of Cost

7 days	Operating		@ $373.05	$2,611.35
½ day	Preparation	) 1½ days	@ $100.00	150.00
1 day	Travel	)		
½ day	Off			N.C.

Expenses

Bus Fare	10.85	
Vehicle Expense	30.19	
Meals and Accommodation	430.99	
	$472.03	
Plus 10%	47.20	
		519.23
Extra Labour	387.75	
Plus 20%	77.55	
		465.30
		$3,745.88

* Note: This statement reflects at least 90% of the total cost; there may be a few minor charges not yet received by us and hence not included in the foregoing.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof
Philip G. Hallof,
Geophysicist.

Dated: December 18, 1972

INTERIM STATEMENT OF COST

Bonus Resources Ltd. (N.P.L.) IP Survey
Way Mineral Claim Group, Granada and Texas Crown Grants
Greenwood Area, Greenwood Mining Division, B.C.

Crew: G. Trofemenko & J. McNeil

Total Survey Cost:

7.97 miles @ $470.00 per line mile — $3,745.90

Breakdown of Cost

7 days	Operating		@ $373.05	$2,611.35
1/2 day	Preparation	1 1/2 days	@ $100.00	150.00
1 day	Travel			
1/2 day	Off			N.C.

Expenses

Bus Fare	10.85	
Vehicle Expense	30.19	
Meals and Accommodation	430.99	
	$472.03	
Plus 10%	47.20	519.23
Extra Labour	387.75	
Plus 20%	77.55	465.30
		$3,745.88

* Note: This statement reflects at least 90% of the total cost; there may be a few minor charges not yet received by us and hence not included in the foregoing.

McPHAR GEOPHYSICS LIMITED

Philip G. Hallof,
Geophysicist.

Dated: December 18, 1972

Declared before me at the VANCOUVER, B.C., in the of Province of British Columbia, this day of JAN 2 1973, 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, Philip George Hallof, of the City of Toronto, Province of Ontario, do hereby certify that:

1. I am a geophysicist residing at 15 Barnwood Court, Don Mills, Ontario.

2. I am a graduate of the Massachusetts Institute of Technology with a B.Sc. Degree (1952) in Geology and Geophysics, and a Ph.D. Degree (1957) in Geophysics.

3. I am a member of the Society of Exploration Geophysicists and the European Association of the Exploration Geophysicists.

4. I am a Professional Geophysicist, registered in the Province of Ontario, the Province of British Columbia and the State of Arizona.

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 Bonus Resources Ltd. (N.P.L.) 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 18th day of December 1972.

Philip G. Hallof, Ph.D.

[illegible] 1973

CERTIFICATE

I, Marion A. Goudie, of the City of Toronto, Province of Ontario, do hereby certify that:

1. I am a geologist residing at 739 Military Trail, West Hill, Ontario.

2. I am a graduate of the University of Western Ontario with a B.Sc. Degree (1950) in Honours Geology.

3. I am a member of the Geological Society of America.

4. I have been practising my profession for 23 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 Bonus Resources Ltd. (N.P.L.) 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 18th day of December 1972. Marion A. Goudie

Marion A. Goudie, B.Sc.

APPENDIX
THE INTERPRETATION OF INDUCED POLARIZATION ANOMALIES FROM RELATIVELY SMALL SOURCES

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

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

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

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

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

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

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

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

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

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

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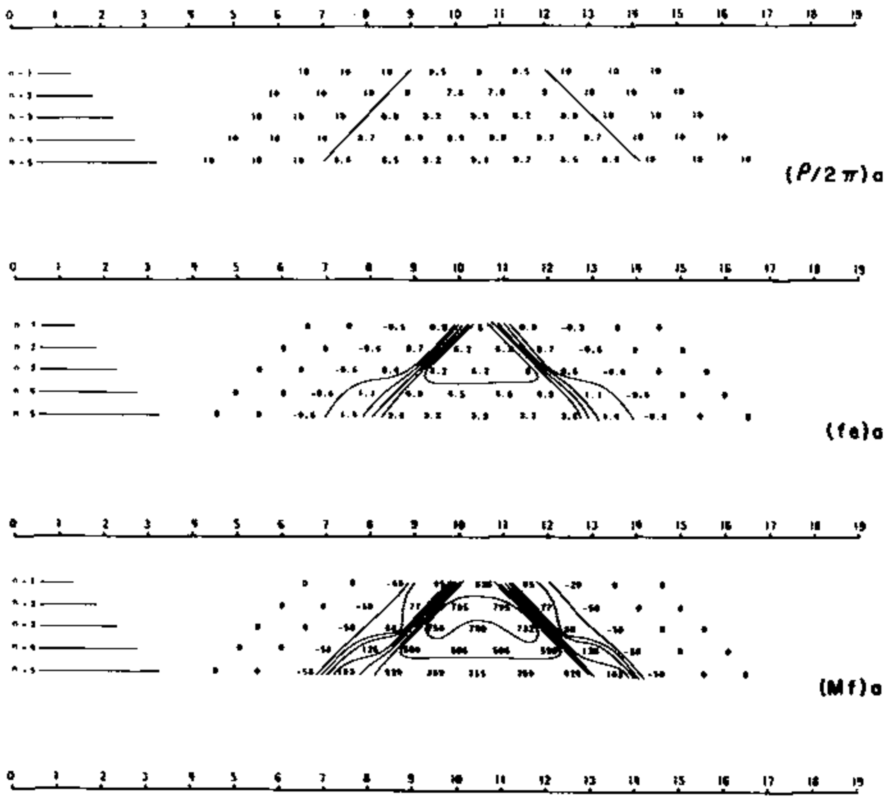
Theoretical Induced Polarization and Resistivity Studies

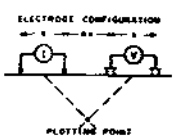
Scale Model Cases



$(\rho/2\pi)_1 = 10$ $(\rho/2\pi)_2 = 2.51$

$(Mf)_1 = 0$ $(Mf)_2 = 10000$

$(fe)_2 = 25\%$



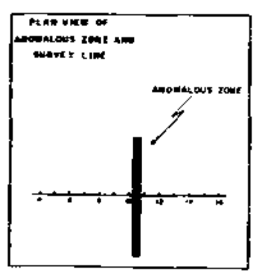


FIG 1

CASE II-0.5-BU-10-a

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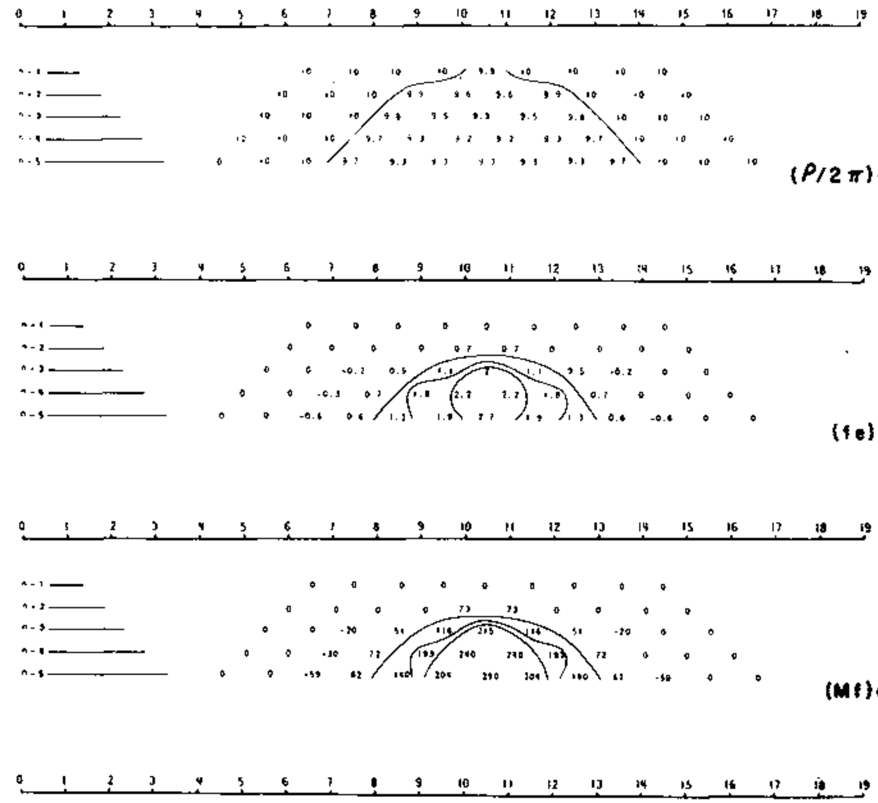
Theoretical Induced Polarization and Resistivity Studies

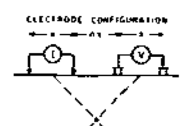
Scale Model Cases



$(\rho/2\pi)_1 = 10$ $(\rho/2\pi)_2 = 2.6$

$(Mf)_1 = 0$ $(Mf)_2 = 9250$

$(fe)_2 = 24\%$



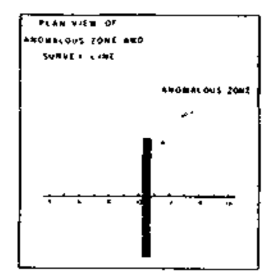


FIG 2

CASE II-1.5-BU-10-a

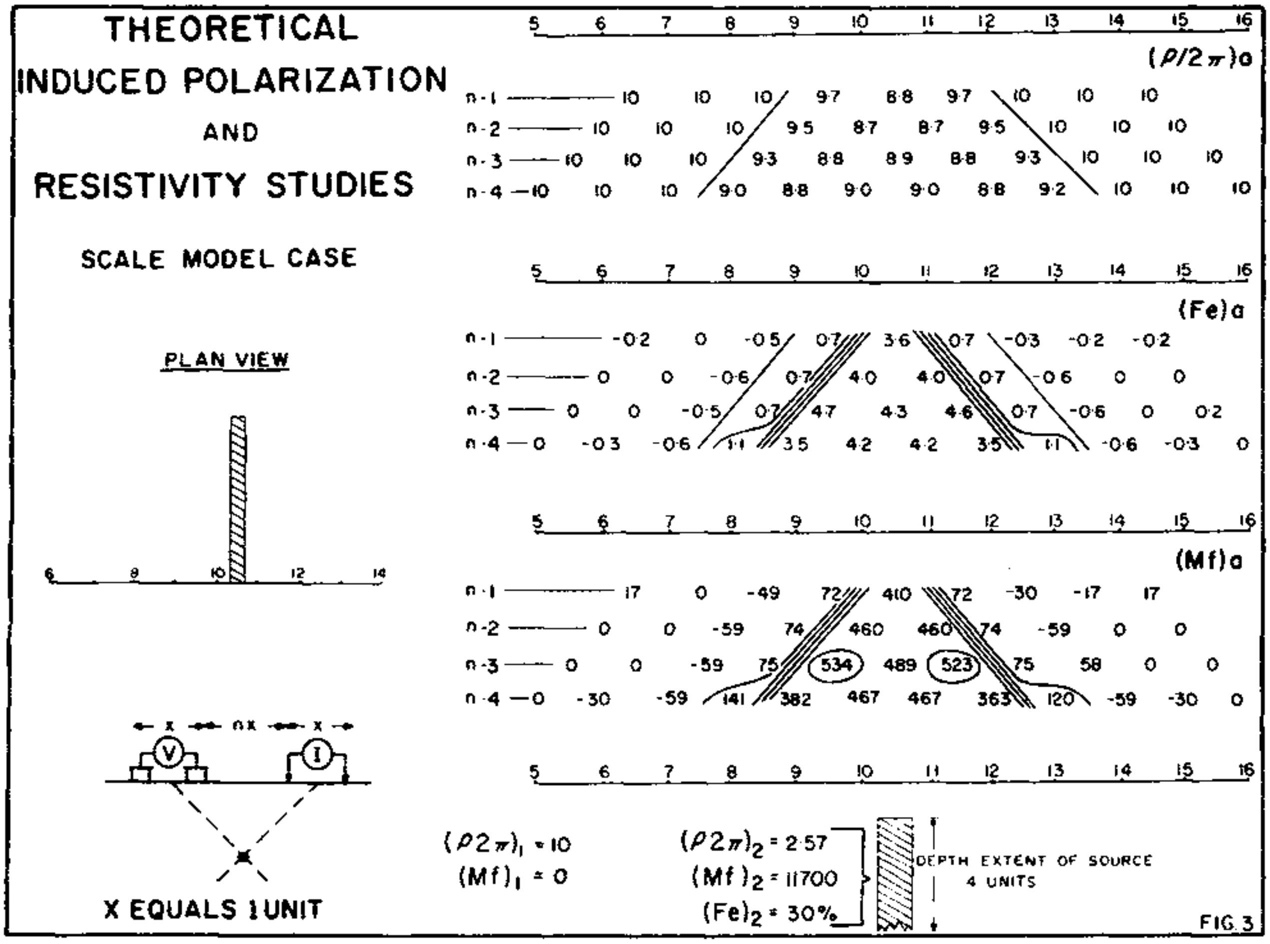

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 10 10 10 9.7 8.8 9.7 10 10 10
n-2 10 10 10 9.5 8.7 8.7 9.5 10 10 10
n-3 10 10 10 9.3 8.8 8.9 8.8 9.3 10 10 10
n-4 10 10 10 9.0 8.8 9.0 9.0 8.8 9.2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

FIG. 3

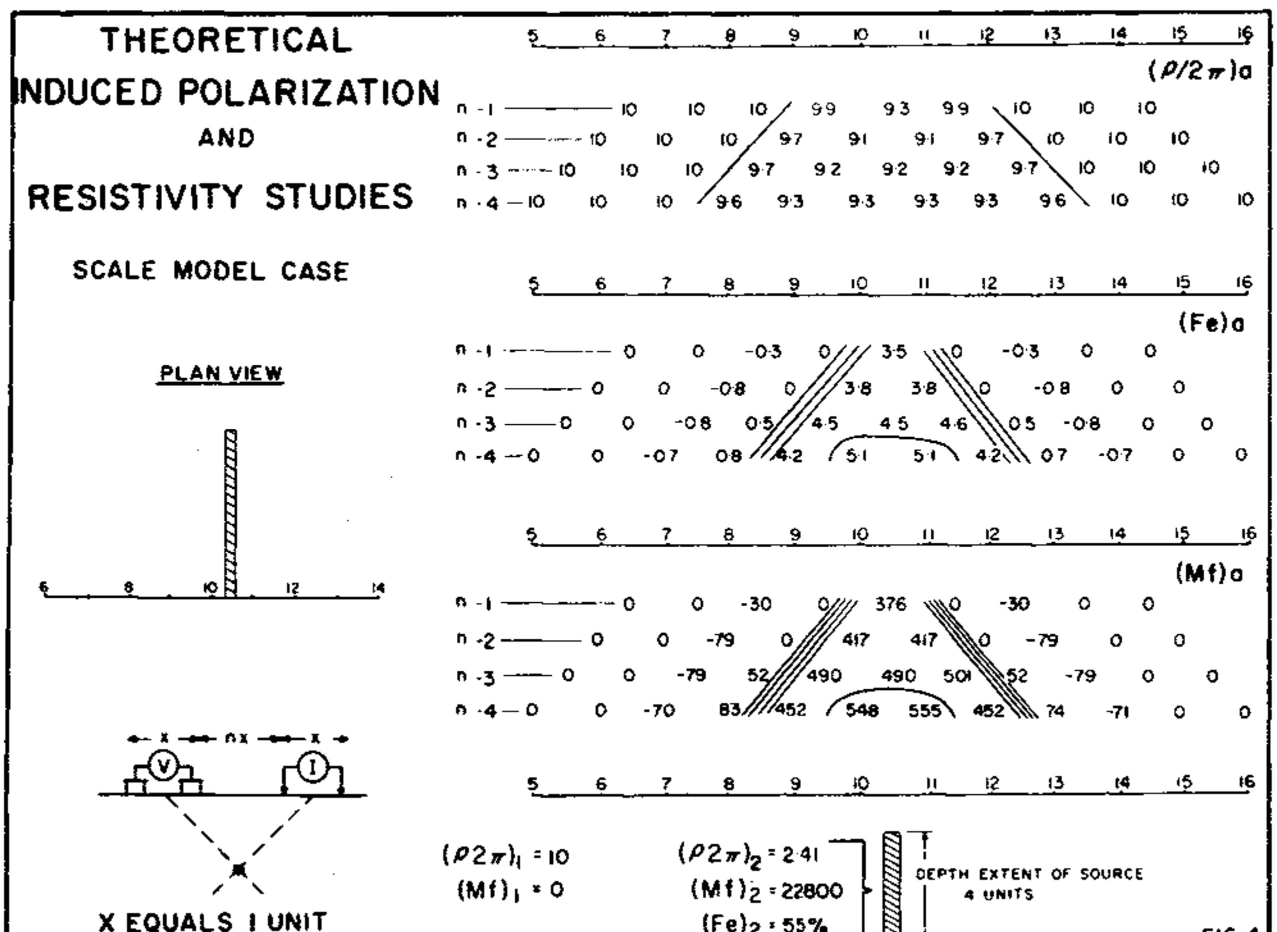

THEORETICAL
INDUCED POLARIZATION
AND
RESISTIVITY STUDIES
SCALE MODEL CASE
PLAN VIEW
6 8 10 12 14
X EQUALS 1 UNIT
5 6 7 8 9 10 11 12 13 14 15 16
(ρ/2π)a
n-1 10 10 10 9.9 9.3 9.9 10 10 10
n-2 10 10 10 9.7 9.1 9.1 9.7 10 10 10
n-3 10 10 10 9.7 9.2 9.2 9.2 9.7 10 10 10
n-4 10 10 10 9.6 9.3 9.3 9.3 9.3 9.6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

FIG. 4

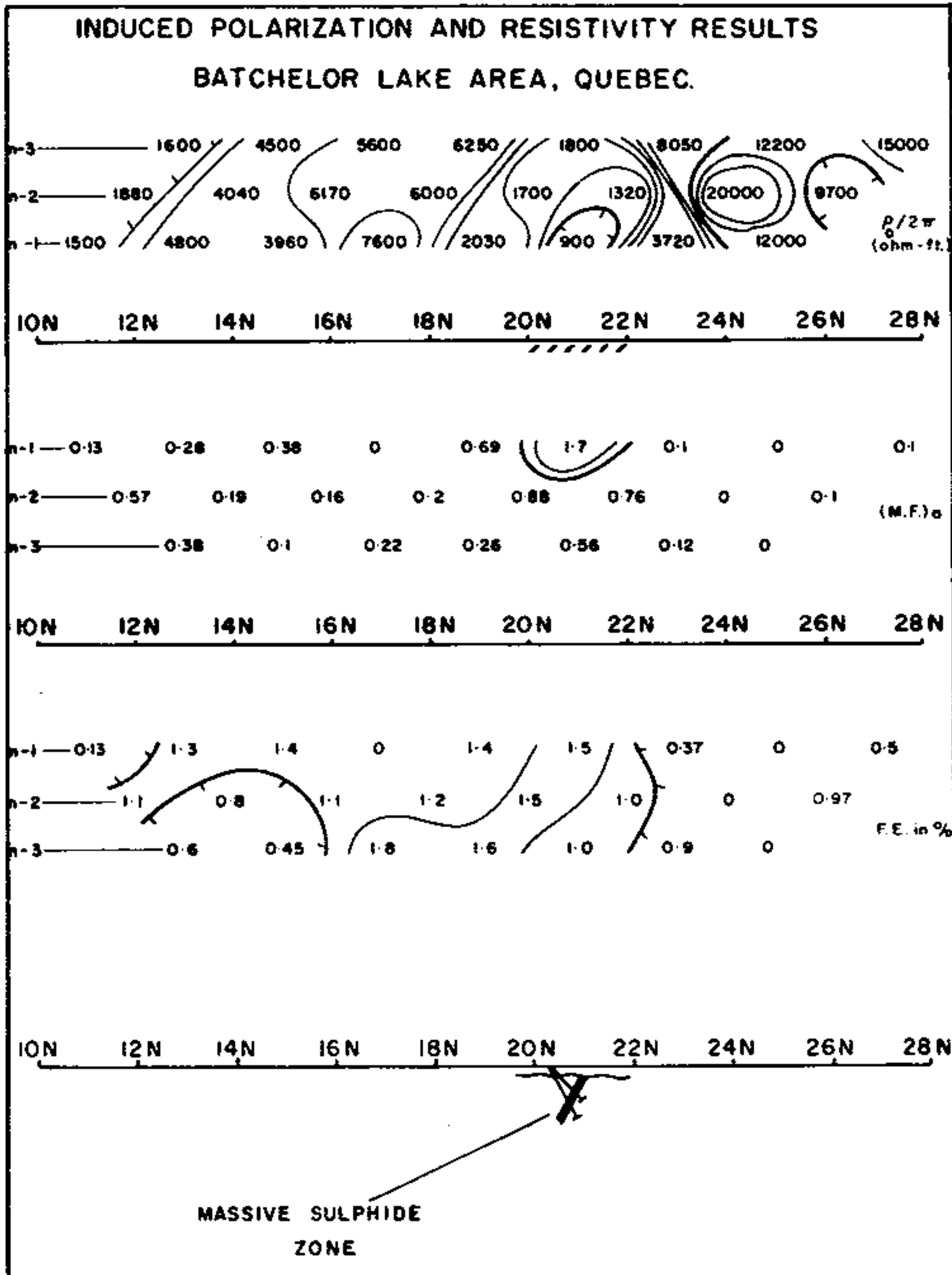

INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
n-3 1600 4500 5600 6250 1800 8050 12200 15000
n-2 1880 4040 6170 6000 1700 1320 20000 9700
n-1 1500 4800 3960 7600 2030 900 3720 12000
ρ/2π (ohm-ft.)
10N 12N 14N 16N 18N 20N 22N 24N 26N 28N
n-1 0·13 0·28 0·38 0 0·69 1·7 0·1 0 0·1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

FIG. 5

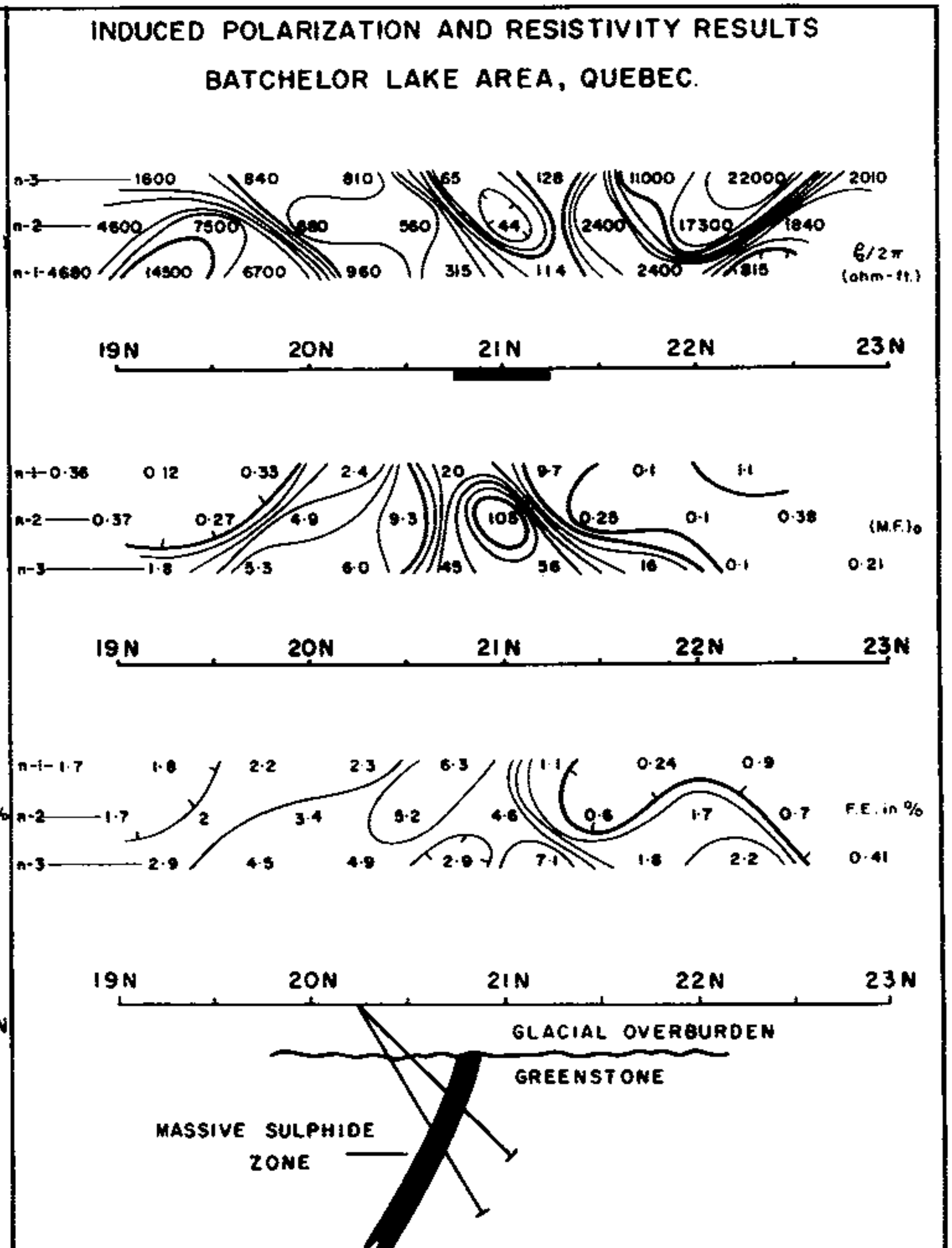
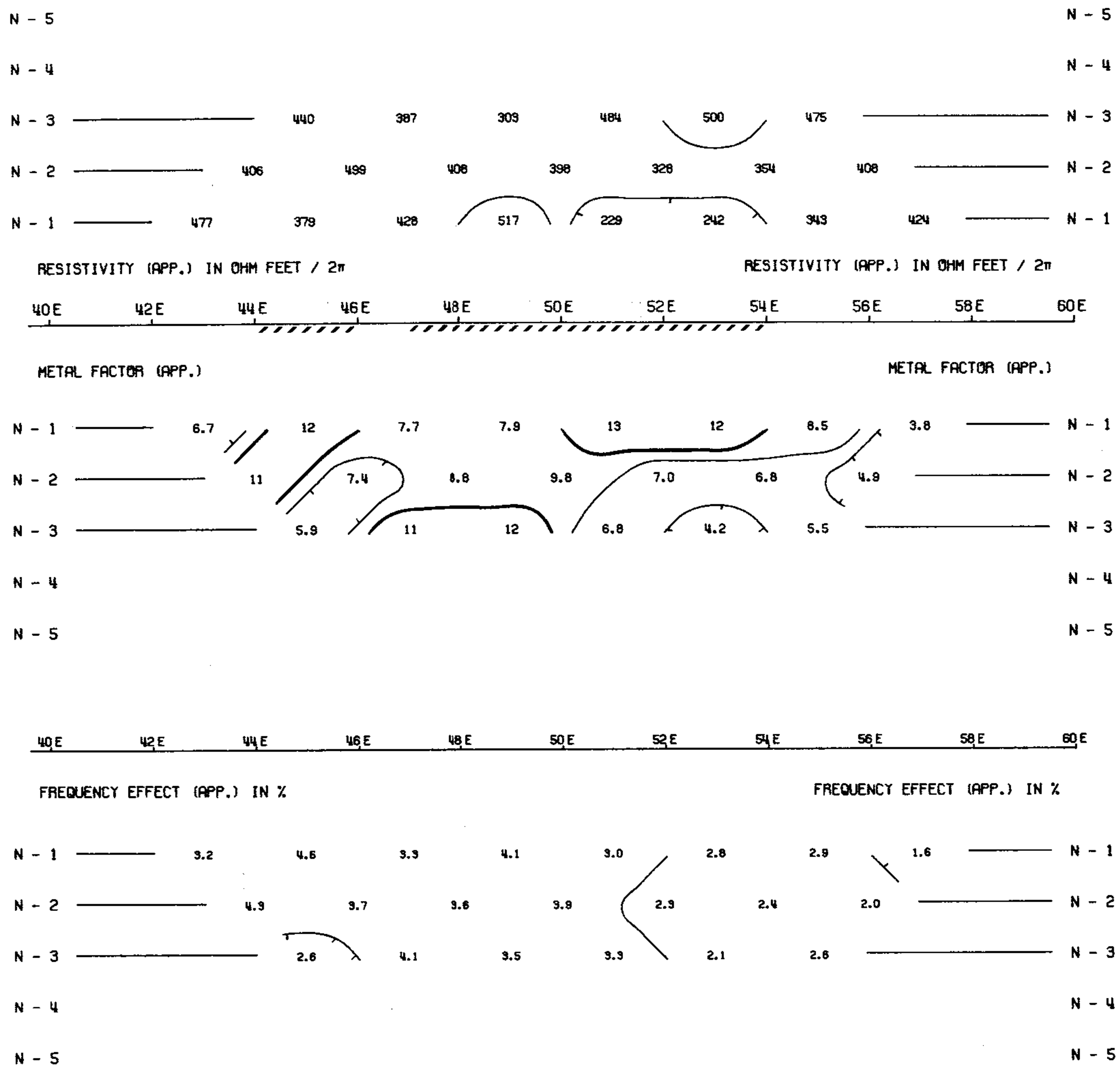

INDUCED POLARIZATION AND RESISTIVITY RESULTS
BATCHELOR LAKE AREA, QUEBEC.
n-3 1600 840 810 65 128 11000 22000 2010
n-2 4600 7500 880 560 44 2400 17300 1840
n-1 4680 14500 6700 960 315 114 2400 1815
ρ/2π (ohm-ft.)
19N 20N 21N 22N 23N
n-1 0·36 0·12 0·33 2·4 20 9·7 0·1 1·1
n-2 0·37 0·27 4·9 9·3 105 0·28 0·1 0·38
n-3 1·8 5·3 6·0 145 56 16 0·1 0·21
(M.F.)o
19N 20N 21N 22N 23N
n-1 1·7 1·8 2·2 2·3 6·3 1·1 0·24 0·9
n-2 1·7 2 3·4 5·2 4·6 0·6 1·7 0·7
n-3 2·9 4·5 4·9 2·9 7·1 1·6 2·2 0·41
F.E. in %
19N 20N 21N 22N 23N
GLACIAL OVERBURDEN
GREENSTONE
MASSIVE SULPHIDE ZONE

FIG. 6



4124

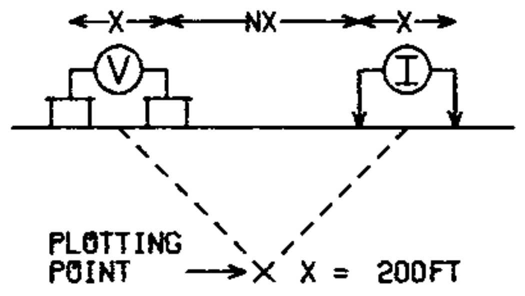
DWG. NO.- I.P.- 6033 - 1

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD 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: NOV-1972

APPROVED:

DATE:

Expiry Date: February 25, 1

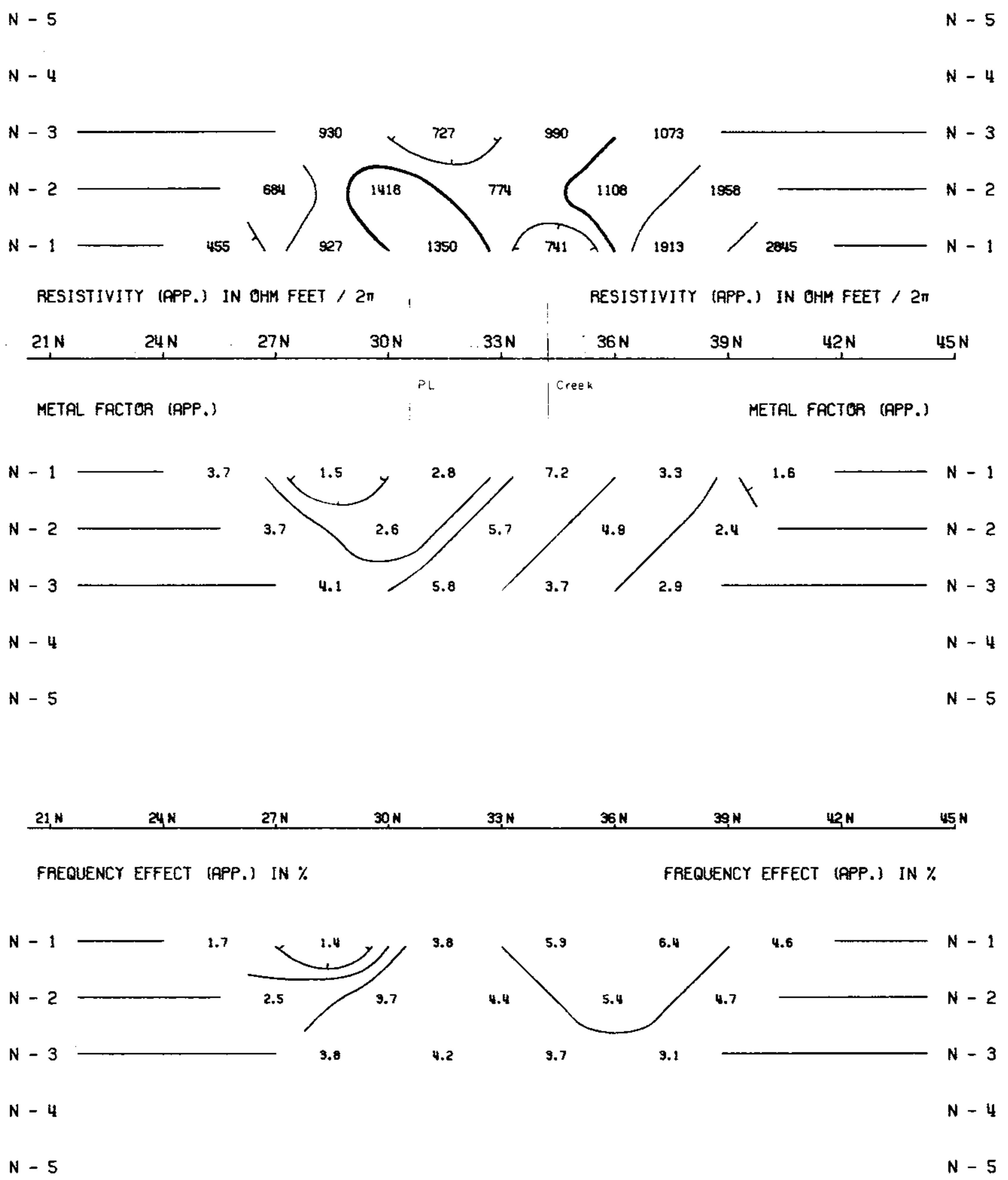
NOTE: CONTOURS AT LOGARITHMIC INTERVALS 1.-1.5-2.-3.-5.-7.5-10

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

DWG. NO.- I.P.- 6033-10

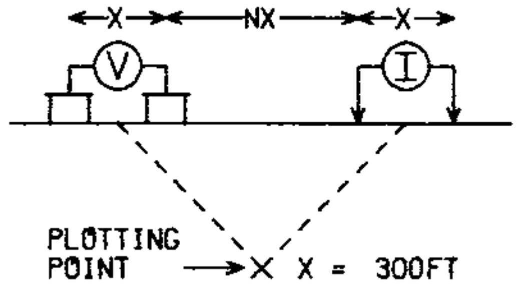


BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS, GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- A

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV. 1972

APPROVED:

DATE:

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

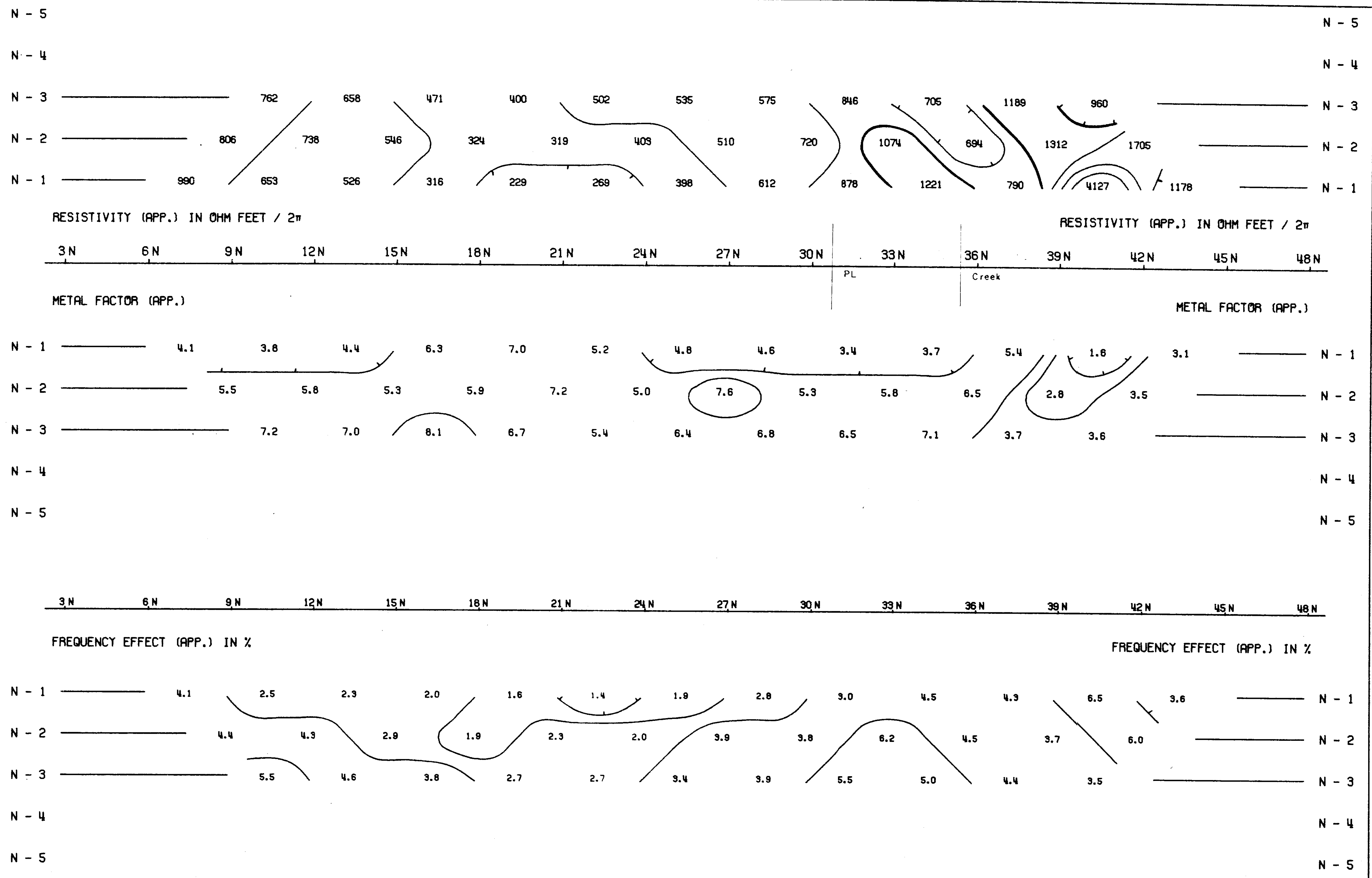
PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, PHILIP G. HALLOF

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



DWG. NO.- I.P.- 6033-9

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- B

ELECTRODE CONFIGURATION

PLOTTING POINT → X X = 300FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED:

DATE:

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

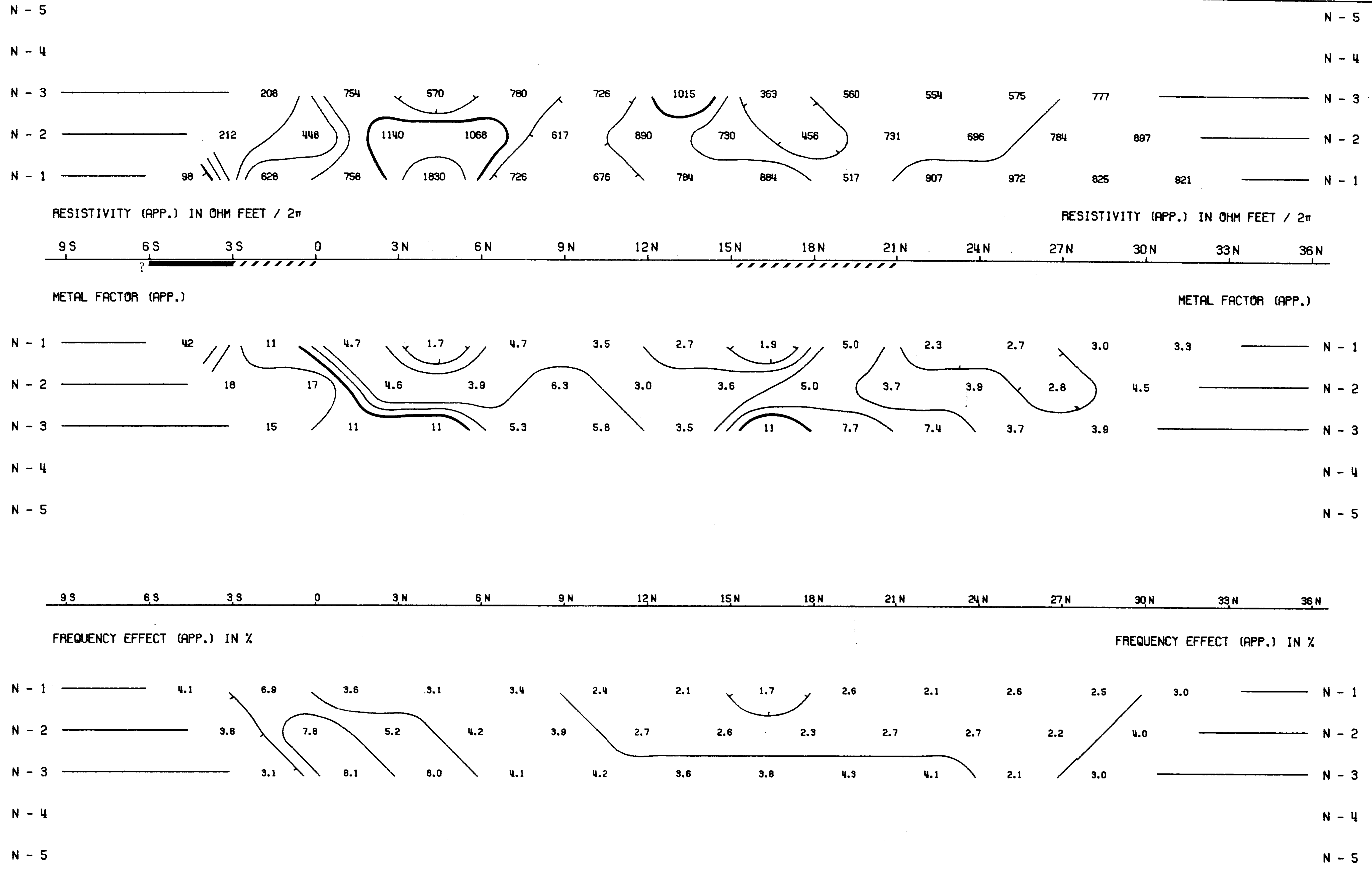
PROFESSIONAL ENGINEER PROVINCE OF ... 12/18/72

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



4124

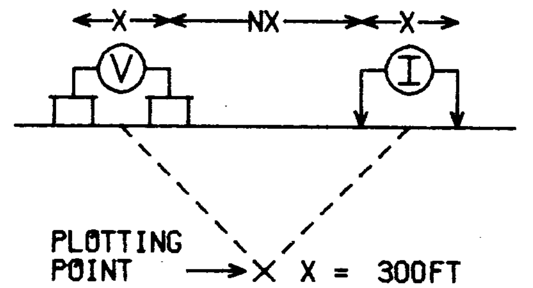
DWG. NO.- I.P.- 6033-8

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- D

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED

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

DATE:

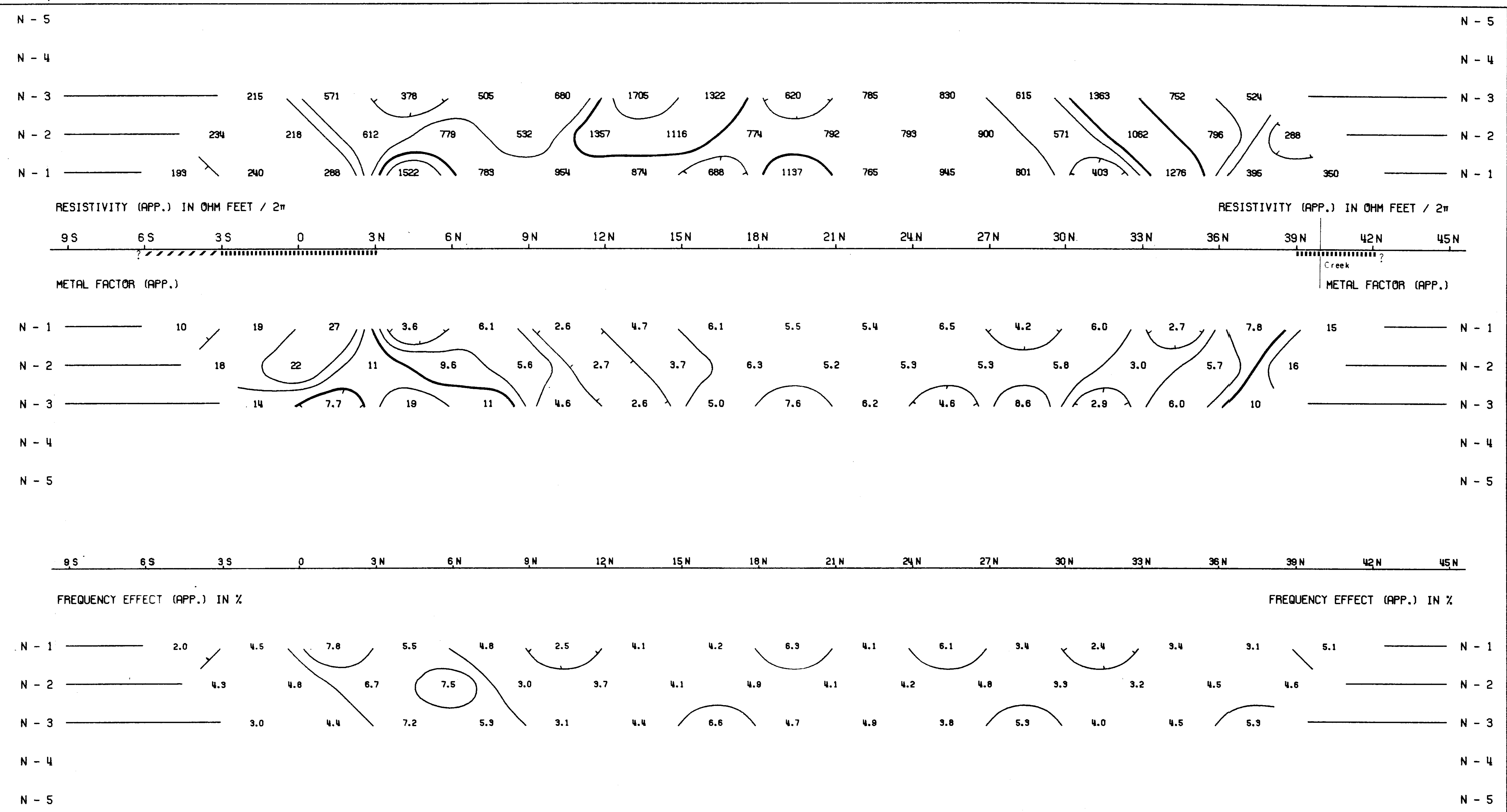
PROFESSIONAL ENGINEER — PHILIP G. HALLOF — PROVINCE OF BRITISH COLUMBIA

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



4124

DWG. NO.- I.P.- 6033-7

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- E

ELECTRODE CONFIGURATION

PLOTTING POINT → X = 300FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED:

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

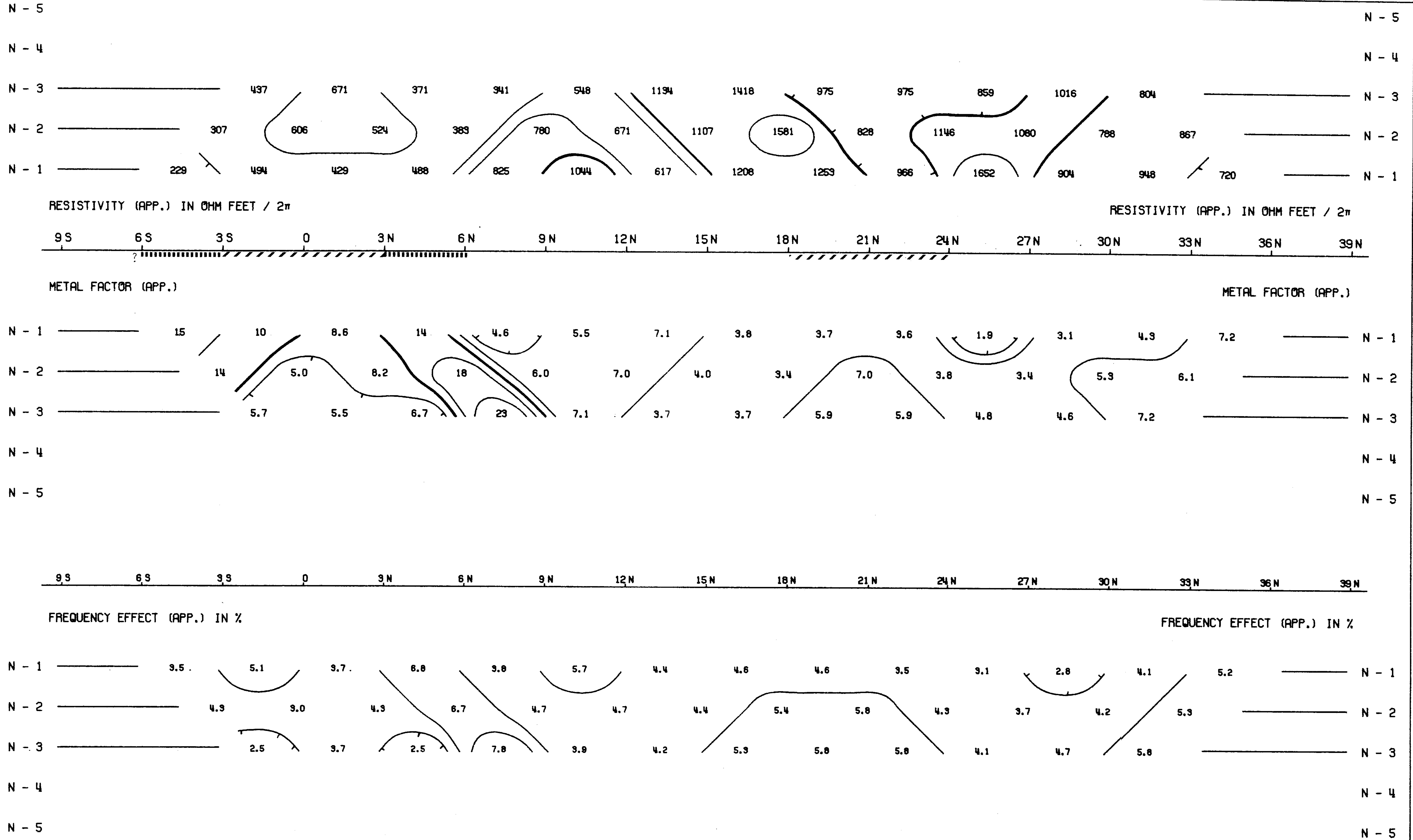
DATE:

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION



4124

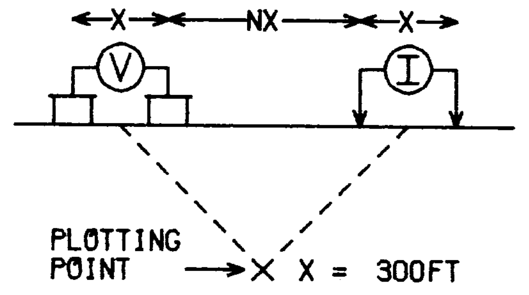
DWG. NO.- I.P.- 6033-6

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- E

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED:

DATE:

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

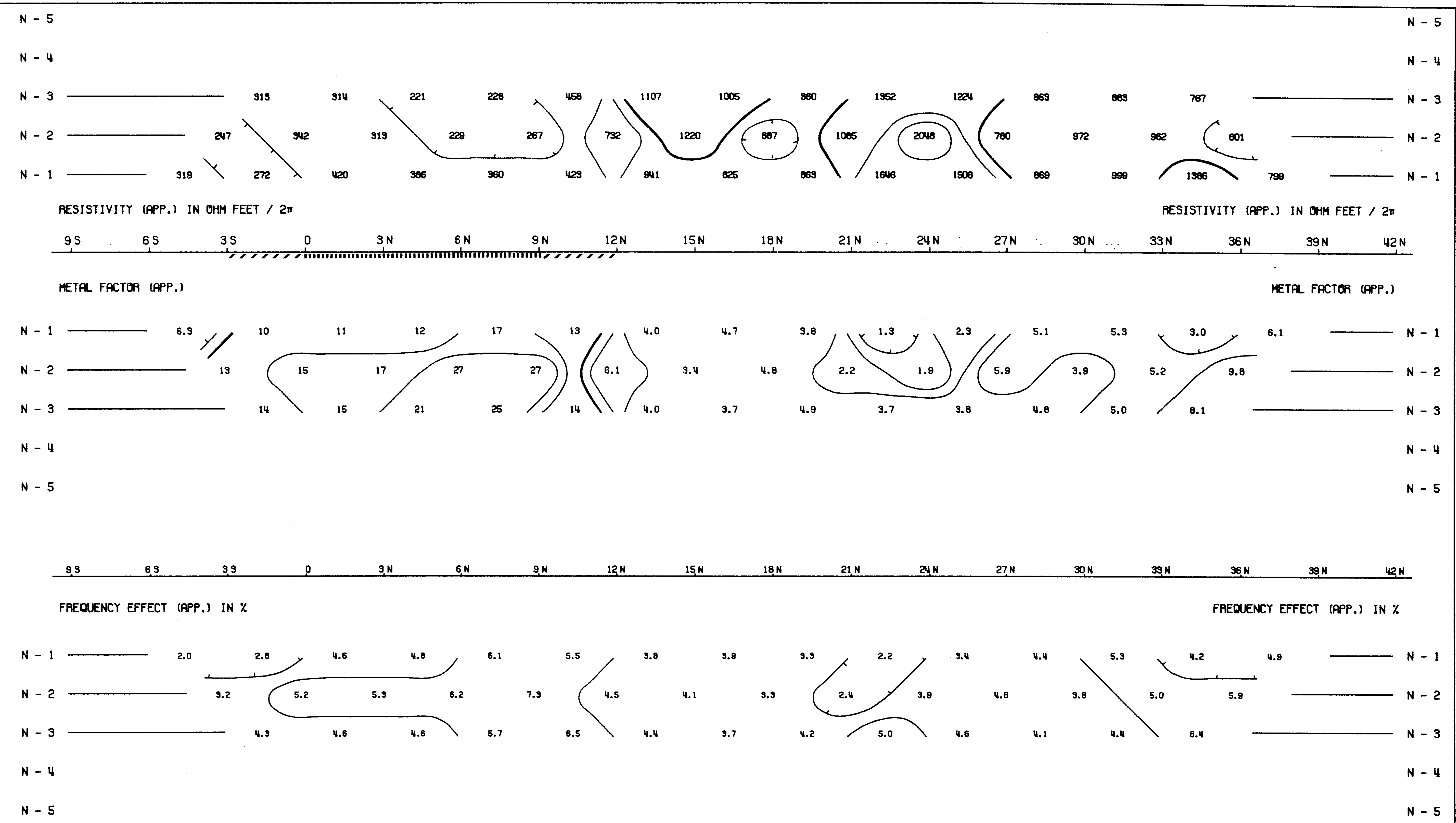
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA PHILIP G. HALLOF

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION



4124

DWG. NO.- I.P.- 6033-5

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- G

ELECTRODE CONFIGURATION

X — NX — X

PLOTTING POINT → X = 300FT

SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV. 1972

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

APPROVED:

DATE:

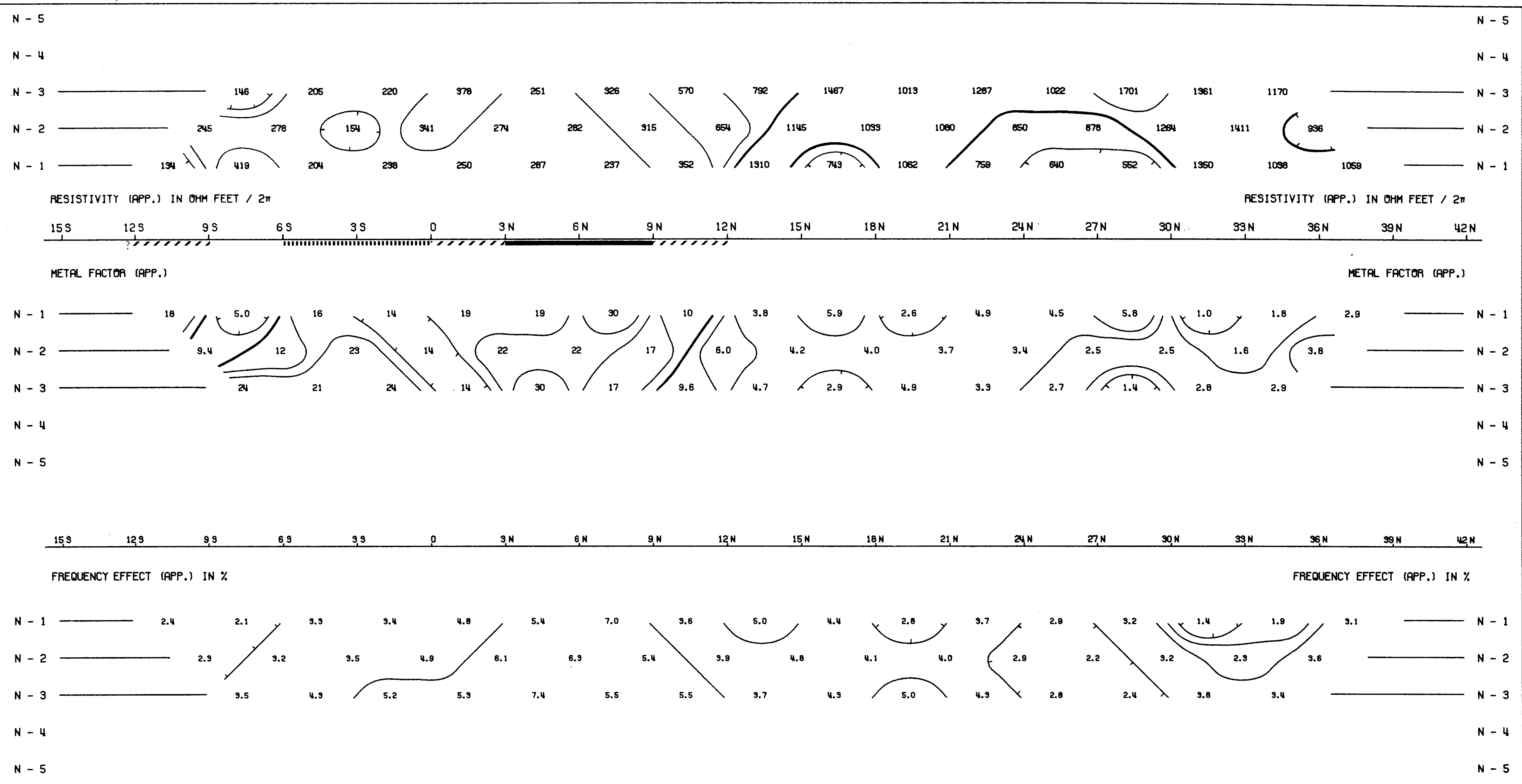
PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA

Expiry Date: February 23, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



424

DWG. NO.- I.P.- 6033-4

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- H

ELECTRODE CONFIGURATION

PLOTTING POINT → X   X = 300FT

SURFACE PROJECTION OF ANOMALOUS ZONES
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED:

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

DATE:

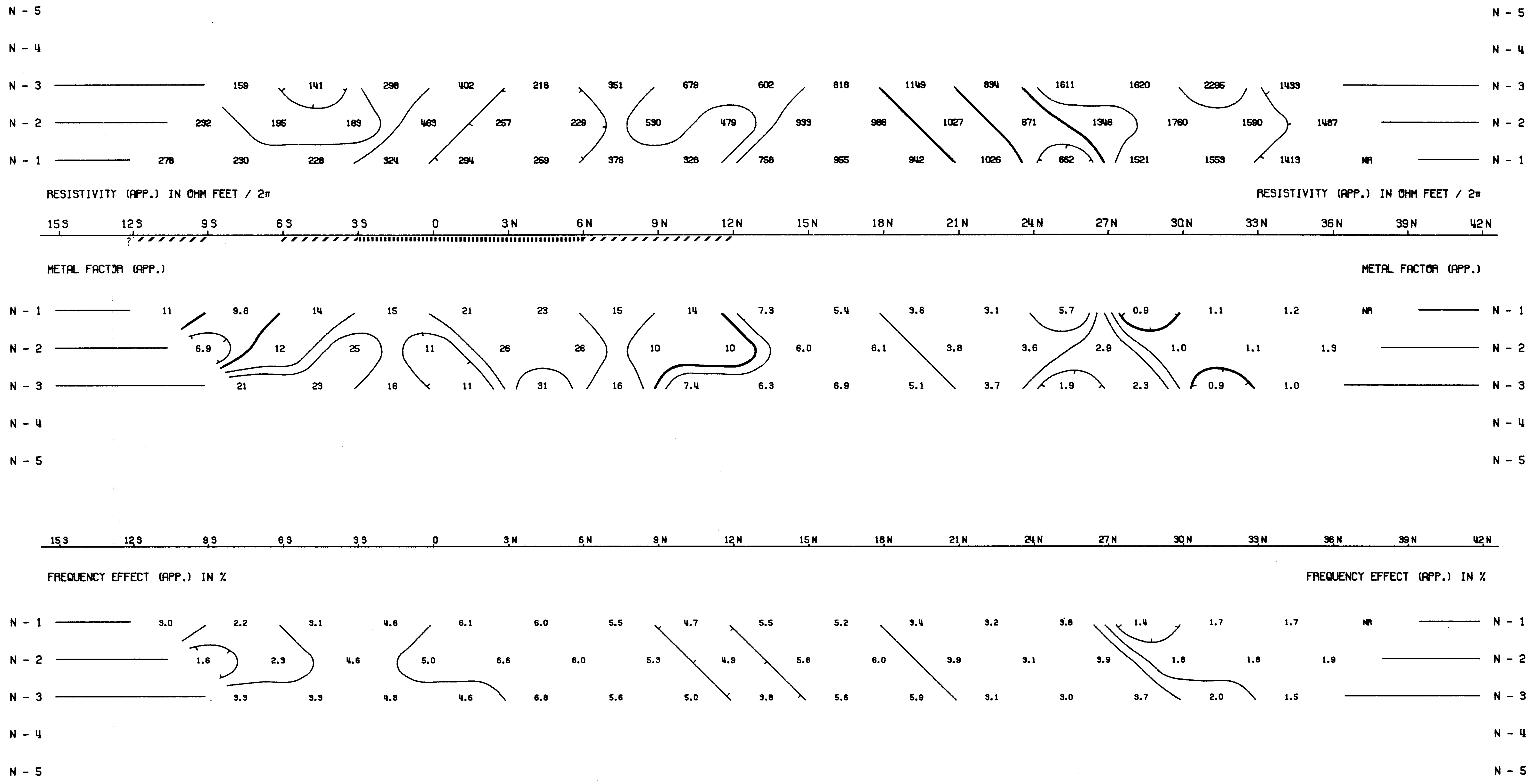
PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION



4124

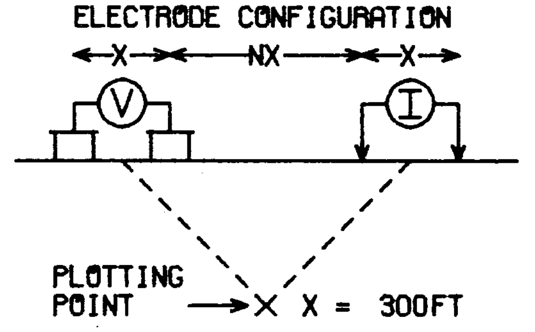
DWG. NO.- I.P.- 6033-3

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- J

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: MAY 1972

APPROVED: PHILIP G. HALLOF

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

DATE:

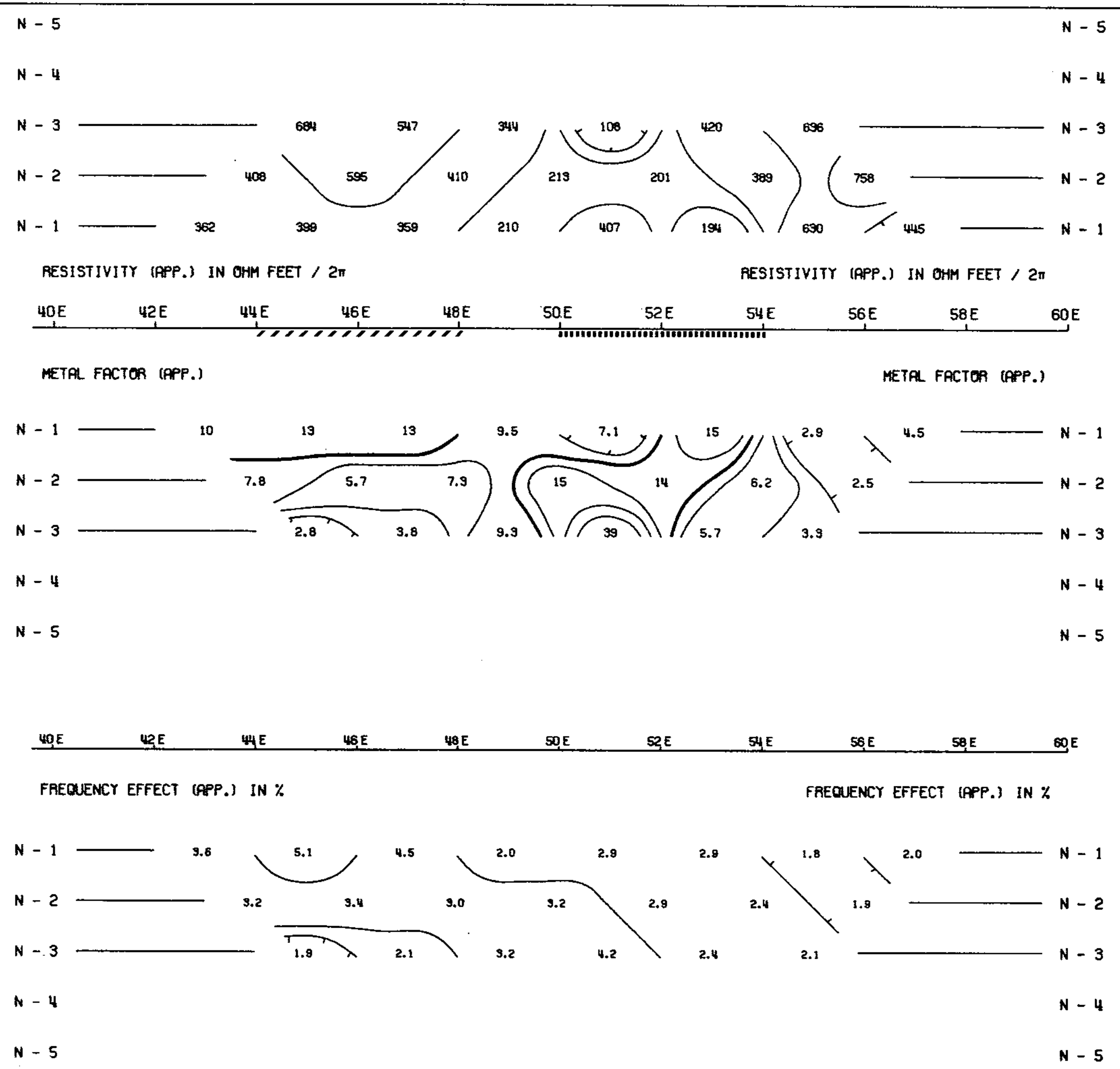
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

NOTE: THIS PLOT WAS PRODUCED BY McPHAR COMPUTER DIVISION



4124

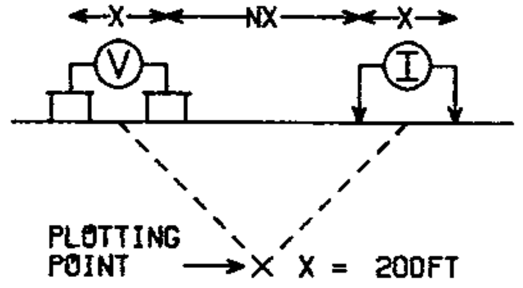
DWG. NO.- I.P.- 6033-2

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP,
GRANADA AND TEXAS CROWN GRANTS,
GREENWOOD AREA, GREENWOOD M.D., B.C.

LINE NO.- 800N

ELECTRODE CONFIGURATION



SURFACE PROJECTION OF ANOMALOUS ZONES

DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.31-5.0 HZ

DATE SURVEYED: NOV 1972

APPROVED:

DATE: 12/8/72

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

PROFESSIONAL ENGINEER — PROVINCE OF ... — Expiry Date: February 25, 1973

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

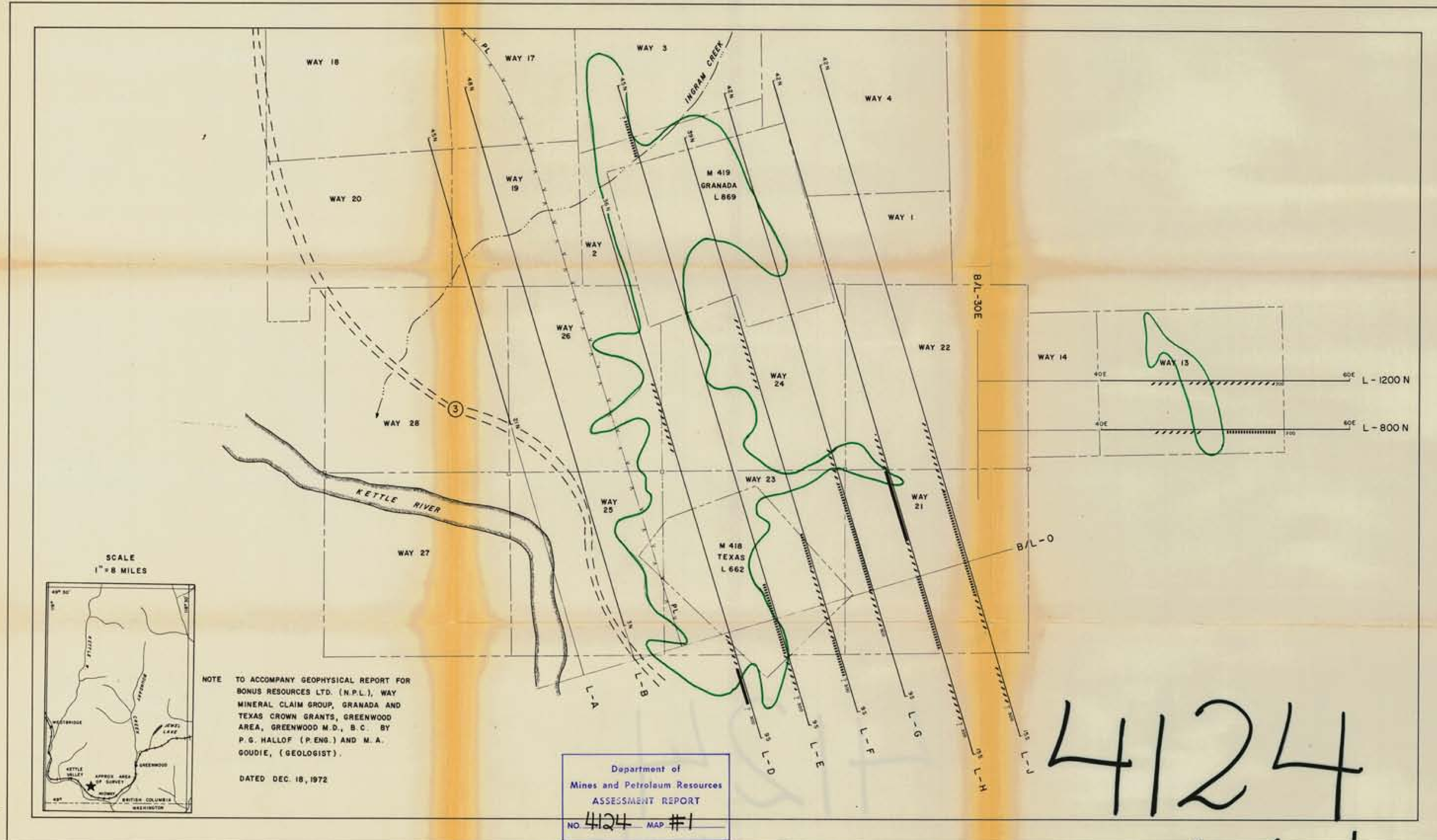
NOTE: THIS PLOT WAS PRODUCED BY MCPHAR COMPUTER DIVISION

DWG. IPP-3564

McPHAR GEOPHYSICS

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



NOTE TO ACCOMPANY GEOPHYSICAL REPORT FOR BONUS RESOURCES LTD. (N.P.L.), WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS, GREENWOOD AREA, GREENWOOD M.D., B.C. BY P.G. HALLOF (P.ENG.) AND M.A. GOUDIE, (GEOLOGIST).

DATED DEC. 18, 1972

4124

M-1

SURFACE PROJECTION OF ANOMALOUS ZONES

- DEFINITE
- PROBABLE
- POSSIBLE

Number at the end of anomaly indicates spread used.

BONUS RESOURCES LTD. (N.P.L.)

WAY MINERAL CLAIM GROUP, GRANADA AND TEXAS CROWN GRANTS

GREENWOOD AREA, GREENWOOD M.D., B.C.

SCALE

1" = 400'

SOIL COPPER ANOMALIES

12/18/72

DWG. IPP-3564