

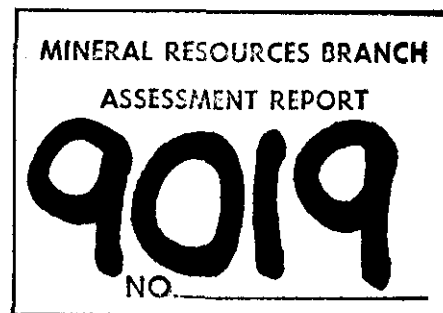
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9019  
REPORT ON THE  
INDUCED POLARIZATION  
AND RESISTIVITY SURVEY  
ON THE  
DL CLAIM GROUP  
KAMLOOPS MINING DIVISION, B.C.  
FOR  
KERR, DAWSON & ASSOCIATES LTD.

2 of 2

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part 2  
of 2



# PHOENIX GEOPHYSICS LIMITED

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

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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 cannot 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 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 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 at the top of the data profile, above the metal factor values. On a third line, below the metal factor values, are plotted the values of the percent frequency effect. 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 the 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.

The IP measurement is basically obtained by measuring the difference in potential or voltage ( $\Delta V$ ) 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 ( $\Delta V$ ) the change in potential will be too small to be measurable. The symbol "TL" on the data plots indicates this situation.



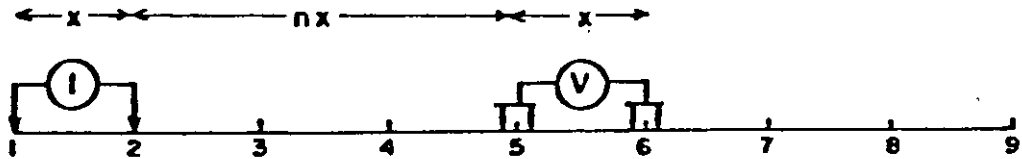
In some situations spurious noise, either man made or natural, will render it impossible to obtain a reading. The symbol "N" on the data plots indicates a station at which it is too noisy to record a reading. If a reading can be obtained, but for reasons of noise there is some doubt as to its accuracy,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

In certain situations negative values of Apparent Frequency Effect are recorded. This may be due to the geologic environment or spurious electrical effects. The actual negative frequency effect value recorded is indicated on the data plot, however, the symbol "NEG" is indicated for the corresponding value of Apparent Metal Factor. In contouring negative values the contour lines are indicated to the nearest positive value in the immediate vicinity of the negative value.

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

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



Stations on line

$x$  = Electrode spread length  
 $n$  = Electrode separation

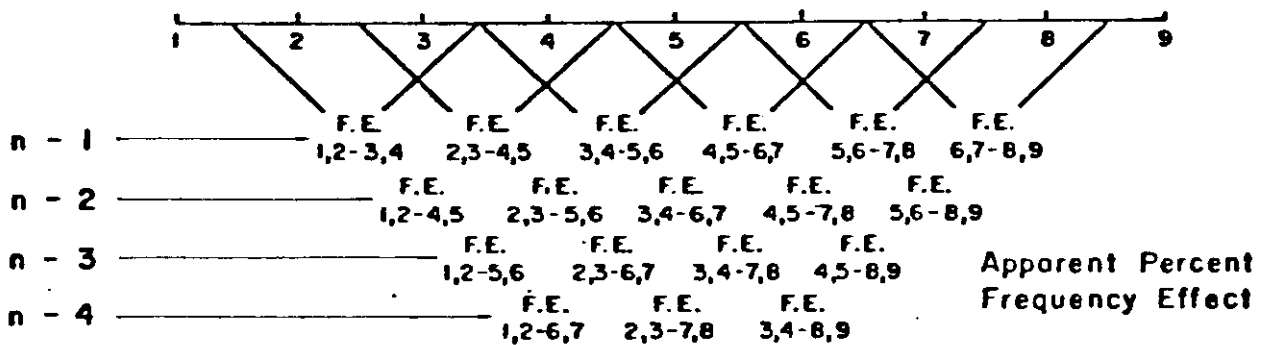
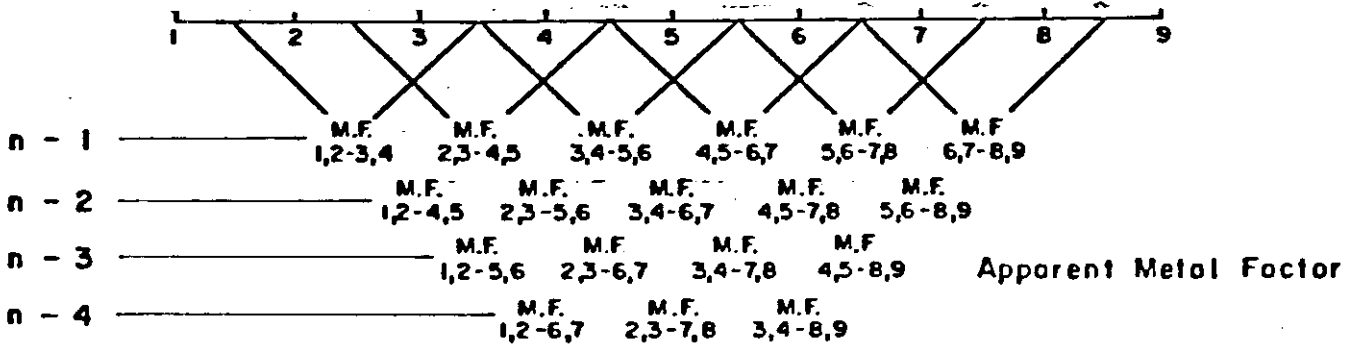
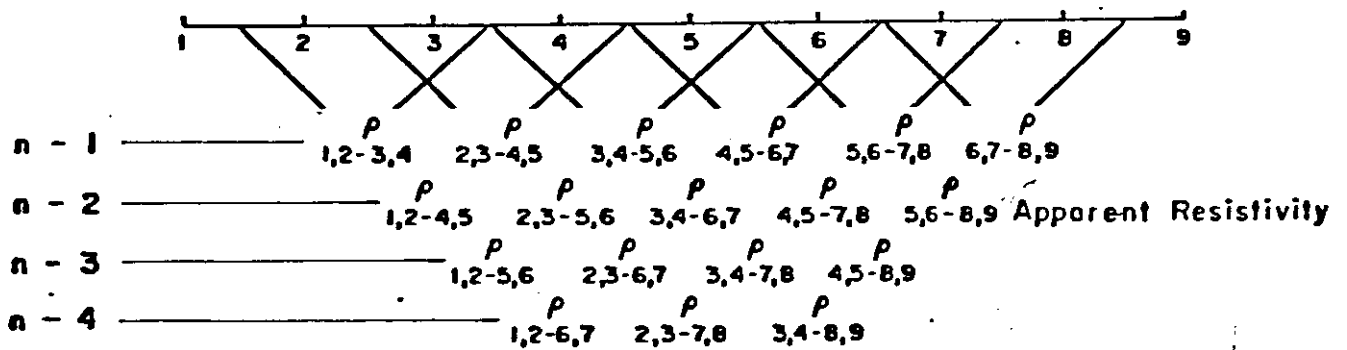


Fig. A

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REPORT ON THE  
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FOR  
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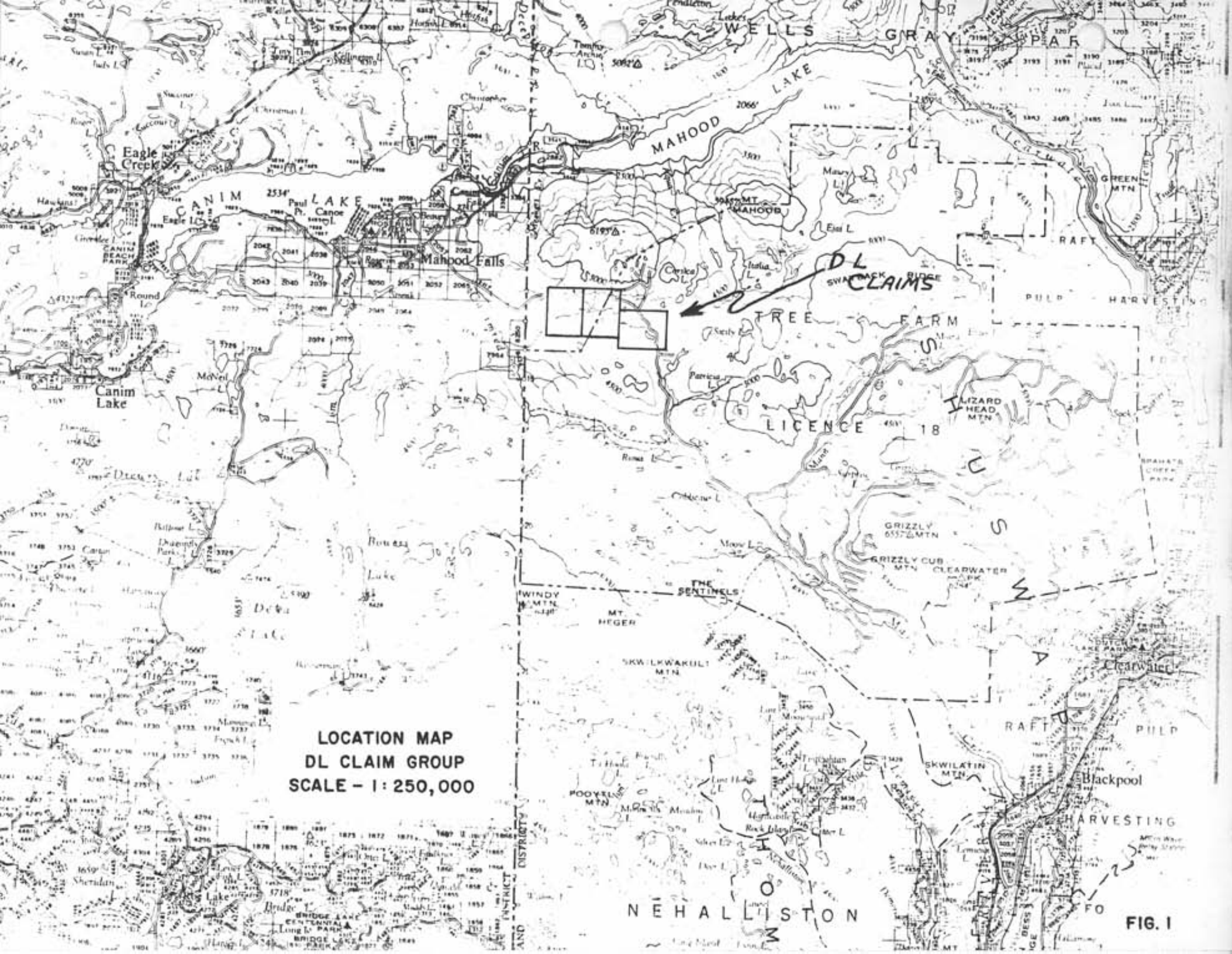
1. INTRODUCTION

An Induced Polarization and Resistivity survey has been completed on the DL claim group for Kerr, Dawson and Associates. Ltd.

The property is situated in the Corsica Lake Area, Kamloops Mining Division, at approximately  $51^{\circ}48'$  north latitude and  $120^{\circ}28'$  west longitude. (Fig.1). Access is via road from Clearwater, B.C.

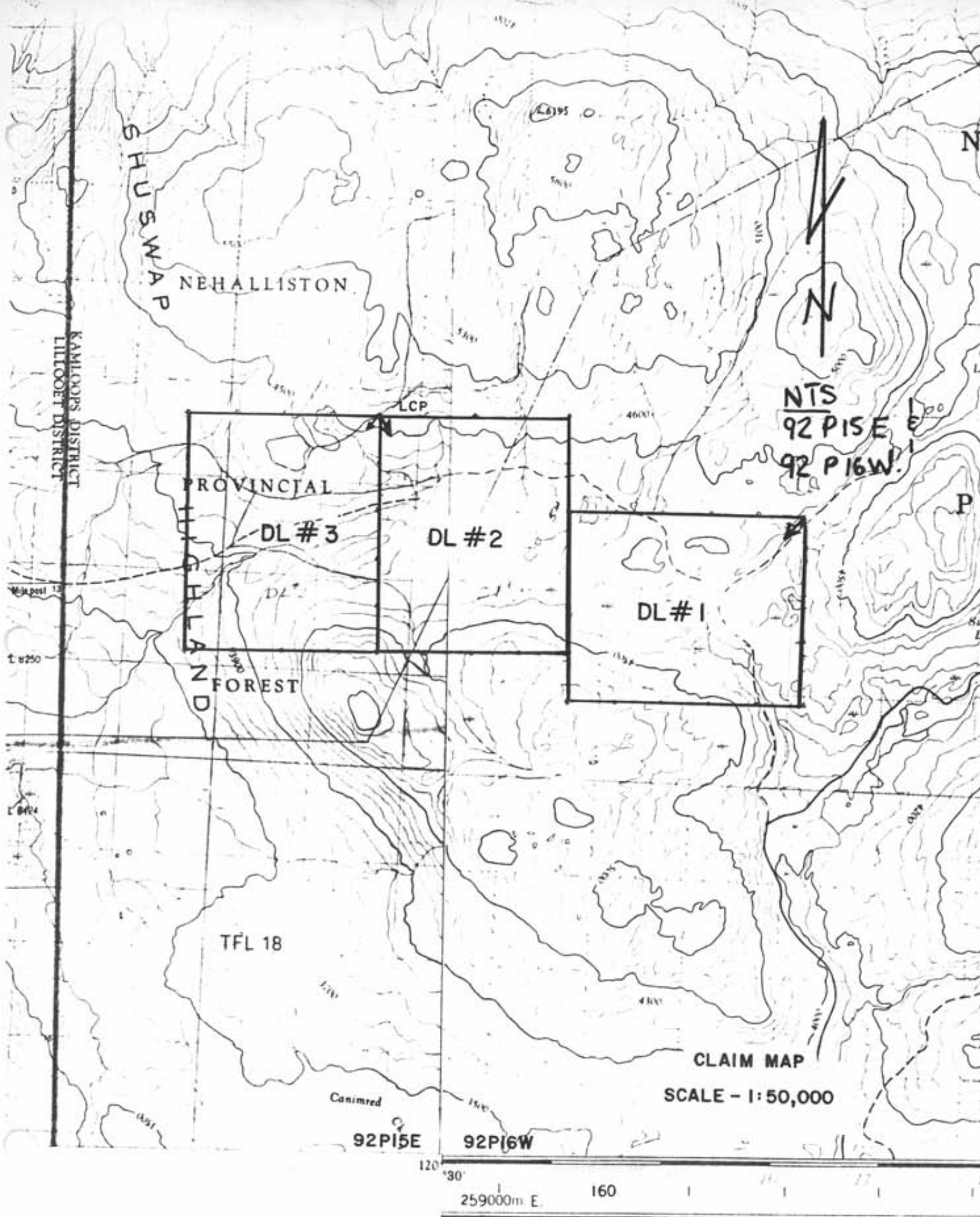
Previous geological and geochemical prospecting on the DL property has discovered occurrences of molybdenite. Also, Induced Polarization anomalies are known to have been discovered coincident with molybdenum geochemical anomalies, at least on the DL claim #1.

The present survey was undertaken to delineate IP and Resistivity anomalies which may indicate the presence of metallic mineralization. Dipole-dipole array was employed using a basic inter-electrode spacing of 100 meters,



LOCATION MAP  
DL CLAIM GROUP  
SCALE - 1: 250,000

FIG. 1



Révisée en 1965 par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DES TERRES, FORÊTS ET RESSOURCES HYDRAULIQUES DE LA COLOMBIE BRITANNIQUE. d'après des photographies aériennes prises en 1951-52; levés sur le terrain en 1958-59; vérifications de bornages en 1962. Établi par la Direction des Levés et de la Cartographie, Ministère de l'Énergie, des Mines et des Ressources, en 1976.

FIG. 2

and reading to four separations (n = 4). A Phoenix Model IPV-1 receiver and Phoenix Model IPT-1 transmitter operating at frequencies of 5.0 and 0.3 Hz. were used.

The survey was completed during October 1980. The geophysical crew leader for this survey was Mr. P. Gardner.

## 2. DESCRIPTION OF CLAIMS

The DL claim group is comprised of three adjoining claim blocks, DL #1, DL #2 and DL #3, as seen on Figure 2.

The record numbers are as follows:

DL #1	Record No. 1763	20 units
DL #2	Record No. 2607	20 units
DL #3	Record No. 2608	20 units

## 3. PRESENTATION OF RESULTS

The following pseudo-section plots of the field data are included with this report.

<u>Line</u>	<u>Electrode Interval</u>	<u>Dwg. No.</u>
5W	100 meters	IP 5253-1
10W	100 meters	IP 5253-2
15W	100 meters	IP 5253-3
20W	100 meters	IP 5253-4
30W	100 meters	IP 5253-5
40W	100 meters	IP 5253-6
46W	100 meters	IP 5253-7
50W	100 meters	IP 5253-8
60W	100 meters	IP 5253-9

Also included with this report is Dwg. No. I.P.P. 3093, a plan map of the DL claims grid at a scale of 1:10,000. On this plan map, as well as on the pseudo-section plots, the Induced Polarization and Resistivity anomalies are indicated by bars in the manner shown in the legend. These bars represent the surface projection of the anomalous zones as interpreted from the location of the transmitter and receiver electrodes when the anomalous values were measured.

The grid information shown on Dwg. No. I.P.P.3093 has been taken from maps made available by the staff of Kerr, Dawson and Associates Ltd.

#### 4. DISCUSSION OF RESULTS

A number of weak to moderate strength Induced Polarization anomalies are evident on the data. In addition, one strong IP anomaly has been indicated on Line 60W centered at station 3+50N. It must be kept in mind that the strength of an IP anomaly does not necessarily correlate directly to its economic significance. For example, economic minerals such as sphalerite and molybdenite are not polarizable. However, in nearly all cases these types of deposits are associated with polarizable mineralization such as pyrite.

Resistivities are quite variable in the area of the grid. IP anomalies occur within several different resistivity environments. A number of conditions influence the recorded resistivities. The more important of these are rock type, alteration, metallic mineral content, depth and type of surficial cover.

The centers of several anomalous zones have also been marked on plan map Dwg. No. I.P.P. 3093. It is most probable that these zones

are not as continuous as indicated, however with such widely spaced survey lines they are a best first approximation. The marked anomalous zones strike in a basically east-west direction. The depth to the top of the sources for all the anomalies, including those not zoned, is interpreted to be less than 100 meters (i.e. one dipole spacing). Without additional information no more can be said about the possible zoning.

##### 5. SUMMARY AND RECOMMENDATIONS

Induced Polarization anomalies were found on all lines surveyed over the DL claim group.

An attempt has been made to place most of the anomalies into possible zones. The trend of these zones is basically east-west.

The zoning of the IP anomalies is very tentative because of the long distance between survey lines. Infill lines should be put in and surveyed using 100 meter dipole spacing so that the extent and possible significance of the anomalies can be determined. Specifically, the anomalies on the western side of the grid are the most interesting and should be given first priority. Infill lines at 250 meter intervals between Line 60W and Line 50W are recommended. Also, if at all possible, the grid should be extended to the west in order to delineate the anomalous trend.

The present geophysical information should be integrated with any geological and geochemical data available. In regions of favourable geology or coincident IP and geochemical anomalies further work is recommended. Additional lines surveyed should be no more than 250 meters from previously surveyed lines.



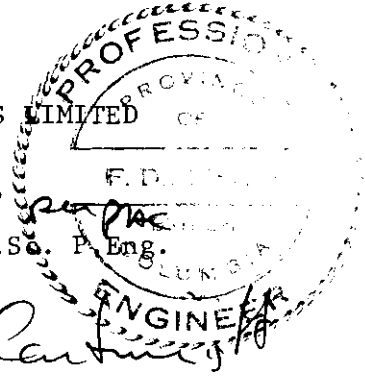
PHOENIX GEOPHYSICS LIMITED

*F. Di Spirito*

F. Di Spirito, B.A.Sc. P. Eng.  
Geophysicist

*Paul A. Cartwright*

Paul A. Cartwright, B.Sc.  
Geophysicist



Dated: February 18, 1981



STATEMENT OF COST

Kerr-Dawson & Associates Ltd. - IP Resistivity Survey  
DL Claims - Clearwater, B.C.

---

PERIOD: October 5 - 18, 1980

CREW: P. Gardner - M. Cornett

11 Operating days	@ \$590.00/day	\$6,490.00
2 Organization	@ \$225.00/day	450.00

EXPENSES:

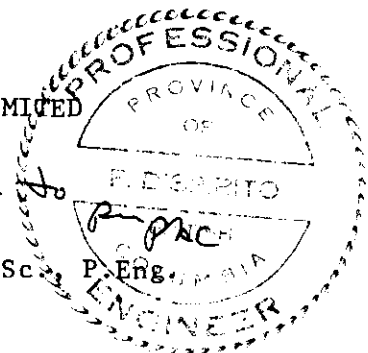
Meals & Accommodation	\$286.33	
Misc. Supplies	23.29	
Telephone	25.00	
	<hr/>	
	\$334.62	
+ 15%	50.19	
	<hr/>	
		384.81

<u>Mobilization</u> (pro-rated)		500.00
		<hr/>
		\$7,824.81
		<hr/>

PHOENIX GEOPHYSICS LIMITED

*Frank DiSpirito*

Frank DiSpirito, B.A.Sc.  
Geophysicist



Dated: February 18, 1981

CERTIFICATE

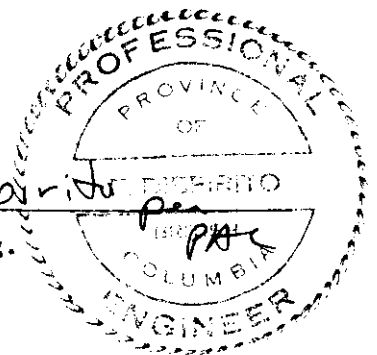
I, Frank DiSpirito, of the City of Vancouver, Province of British Columbia, do hereby certify that:

1. I am a geophysicist residing at 2748 Oxford Street, Vancouver, B.C.
2. I am a graduate of the University of British Columbia, B.C. with a B.A.Sc. Degree in Geological Engineering.
3. I have been practising my profession about 6 years.
4. I have no direct or indirect interest, nor do I expect to receive any interest directly or indirectly, in the property or securities of Kerr, Dawson & Associates Ltd., or any affiliate.
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 Vancouver

This 18th day of November, 1981

*Frank DiSpirito*  
Frank DiSpirito, P.Eng.



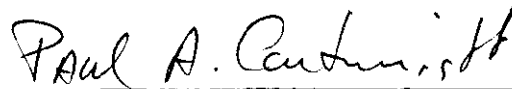
CERTIFICATE

I, Paul A. Cartwright, of the City of Vancouver, Province of British Columbia, do hereby certify that:

1. I am a geophysicist residing at 4238 West 11th Avenue, Vancouver, B.C.
2. I am a graduate of the University of British Columbia, B.C. with a B.Sc. Degree.
3. I am a member of the Society of Exploration Geophysicists.
4. I have been practising my profession about 10 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 Kerr, Dawson & Associates Ltd., or any affiliate.
6. The statements made in this report are based on a study of published geological literature and unpublished private reports.
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Dated at Vancouver

This 18th day of November, 1981

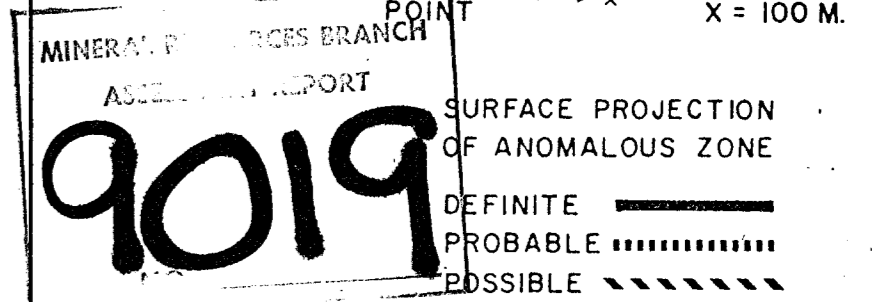
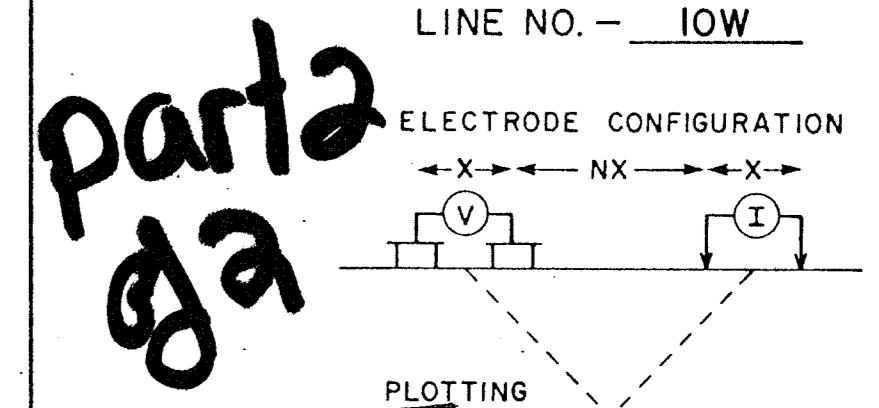


Paul A. Cartwright, B.Sc.

KERR, DAWSON AND ASSOC. LTD.

DL CLAIM GROUP, KAMLOOPS M.D.

BRITISH COLUMBIA



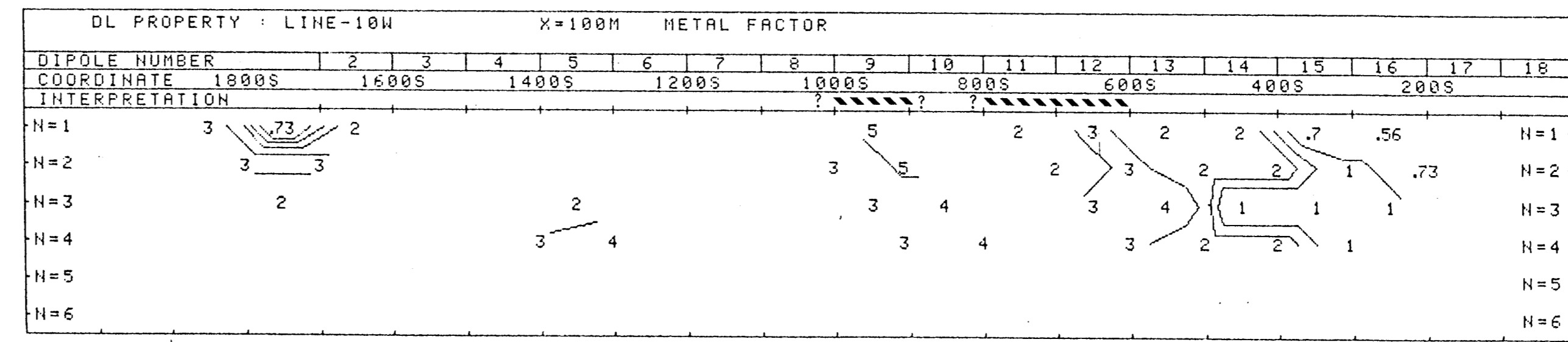
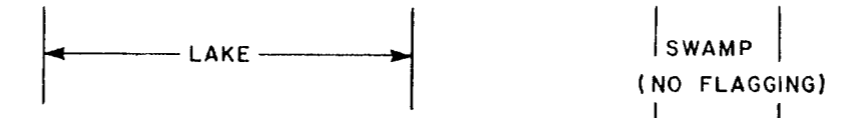
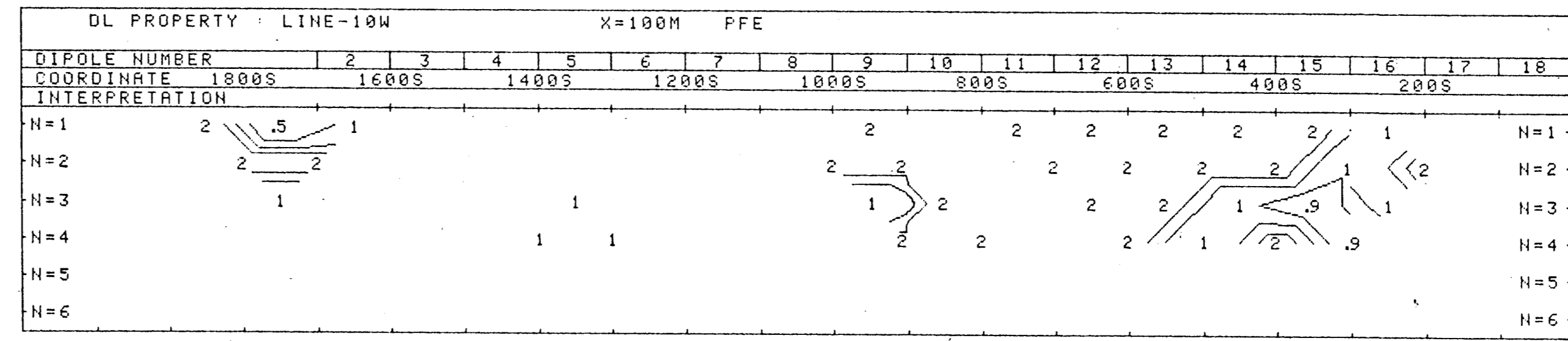
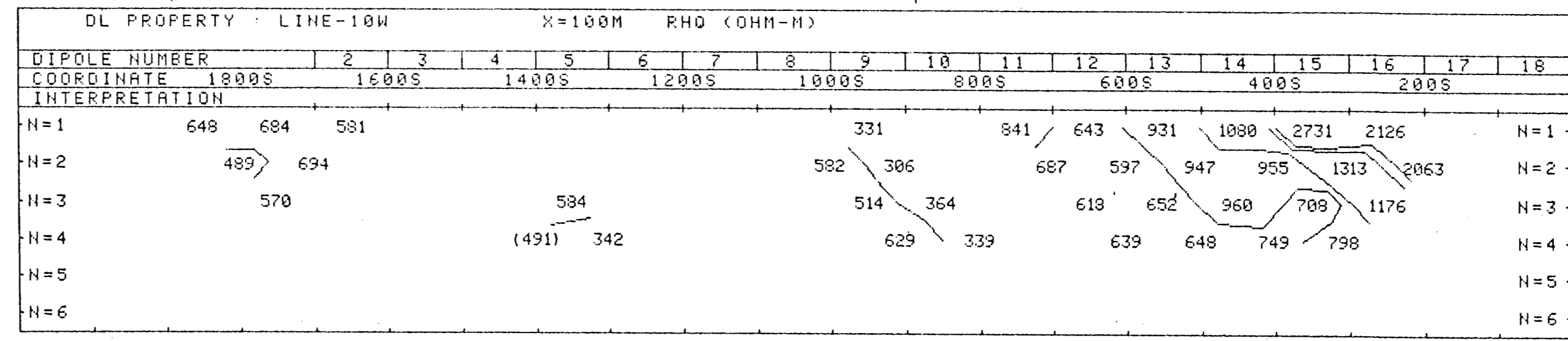
FREQUENCIES 0.3-5.0 HZ. DATE SURVEYED OCT. 1980

APPROVED *PAc*

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

DATE Feb. 18/81

PHOENIX GEOPHYSICS LIMITED  
INDUCED POLARIZATION AND RESISTIVITY SURVEY



*part 2 ga*



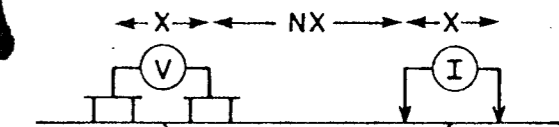
KERR, DAWSON AND ASSOC. LTD.

DL CLAIM GROUP, KAMLOOPS M.D.

BRITISH COLUMBIA

LINE NO. - 15W

ELECTRODE CONFIGURATION



PLOTTING POINT X = 100 M.

*Part 1 of 2*

9019

SURFACE PROJECTION OF ANOMALOUS ZONE

DEFINITE PROBABLE POSSIBLE

FREQUENCIES 0.3-5.0 HZ.

DATE SURVEYED OCT. 1980

APPROVED

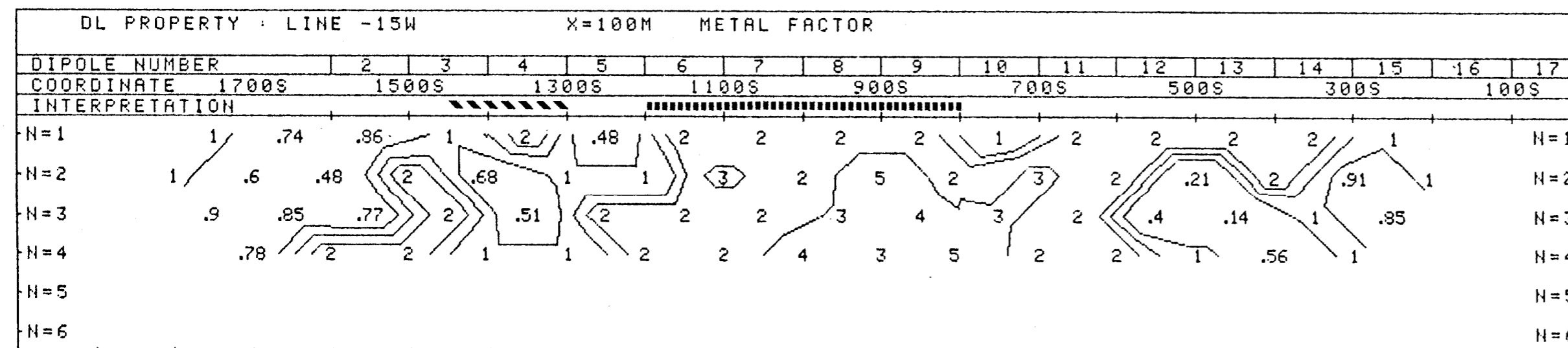
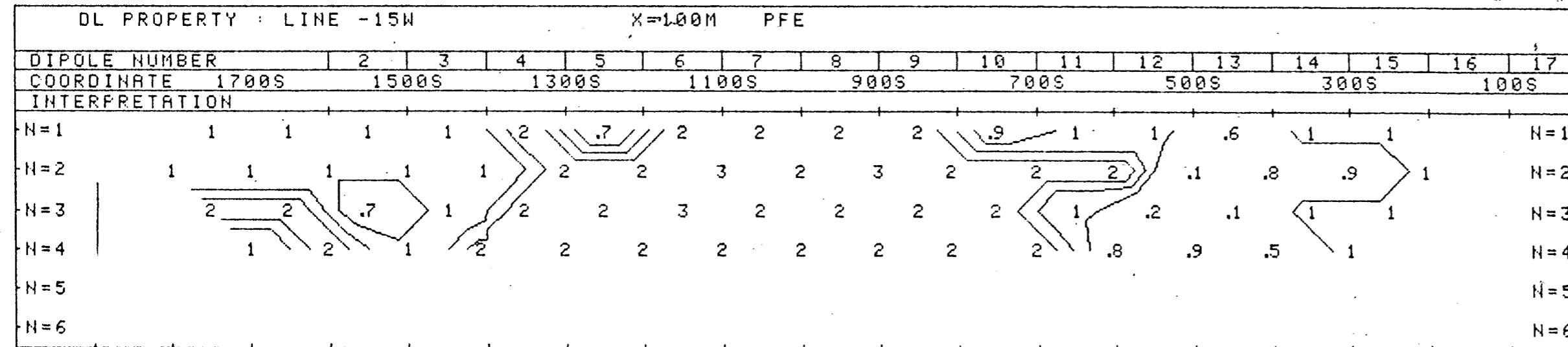
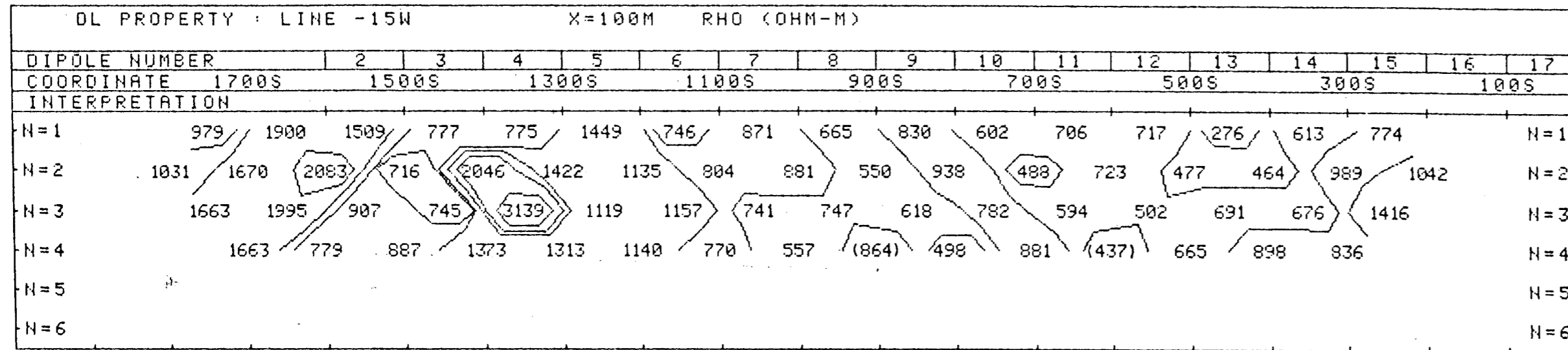
*PAC*

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

DATE *Feb. 18/81*

PHOENIX GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY









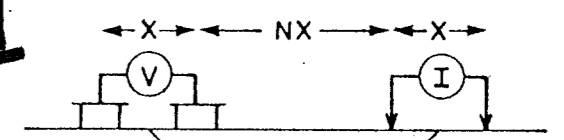
KERR, DAWSON AND ASSOC. LTD.

DL CLAIM GROUP, KAMLOOPS M.D.

BRITISH COLUMBIA

LINE NO. - 40W

ELECTRODE CONFIGURATION



PLOTTING POINT X = 100 M.

*part 1 ga*

MIN. AREA SURVEYED INCH  
 9019  
 NO.

SURFACE PROJECTION OF ANOMALOUS ZONE  
 DEFINITE ———  
 PROBABLE ·····  
 POSSIBLE - - - - -

FREQUENCIES 0.3-5.0 HZ.

DATE SURVEYED OCT. 1980

APPROVED

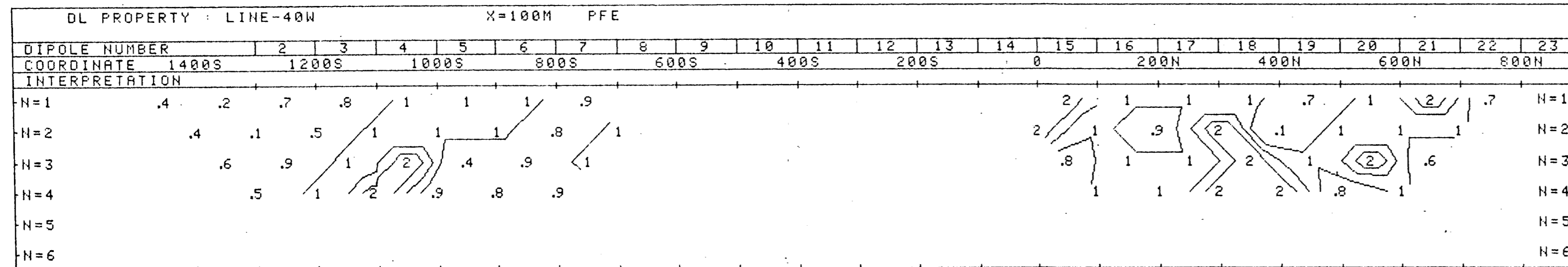
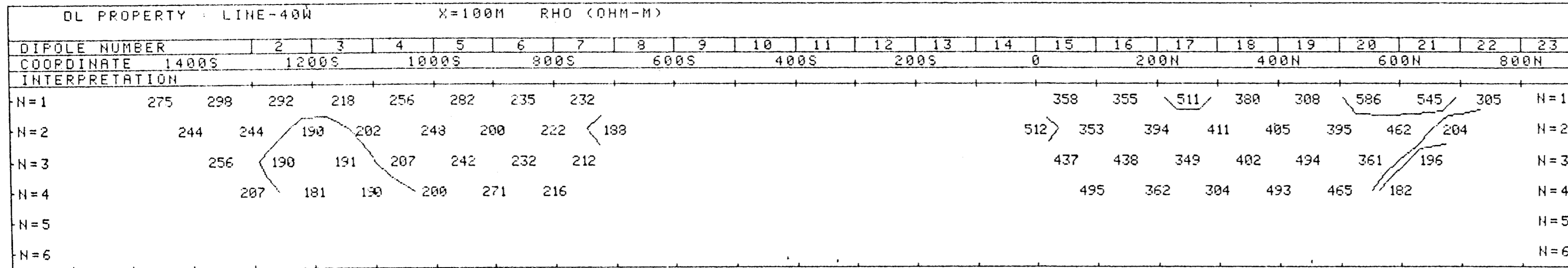
*PAC*

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

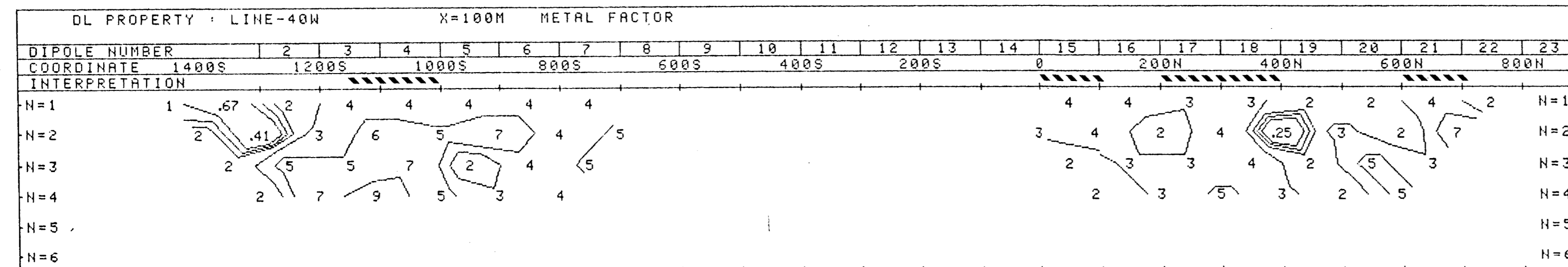
DATE Feb. 18/81

PHOENIX GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY



SWAMP (NO FLAGGING)









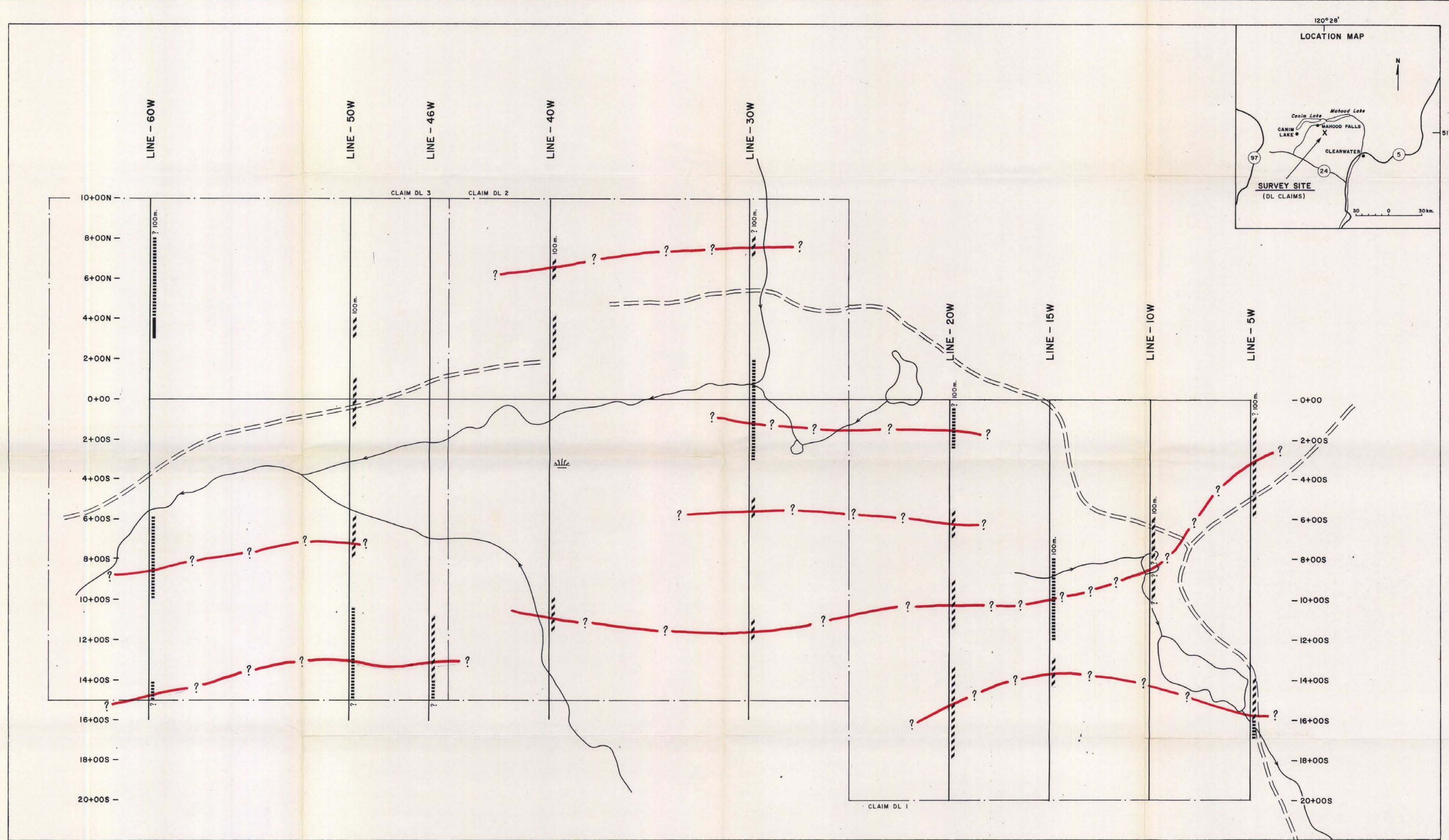
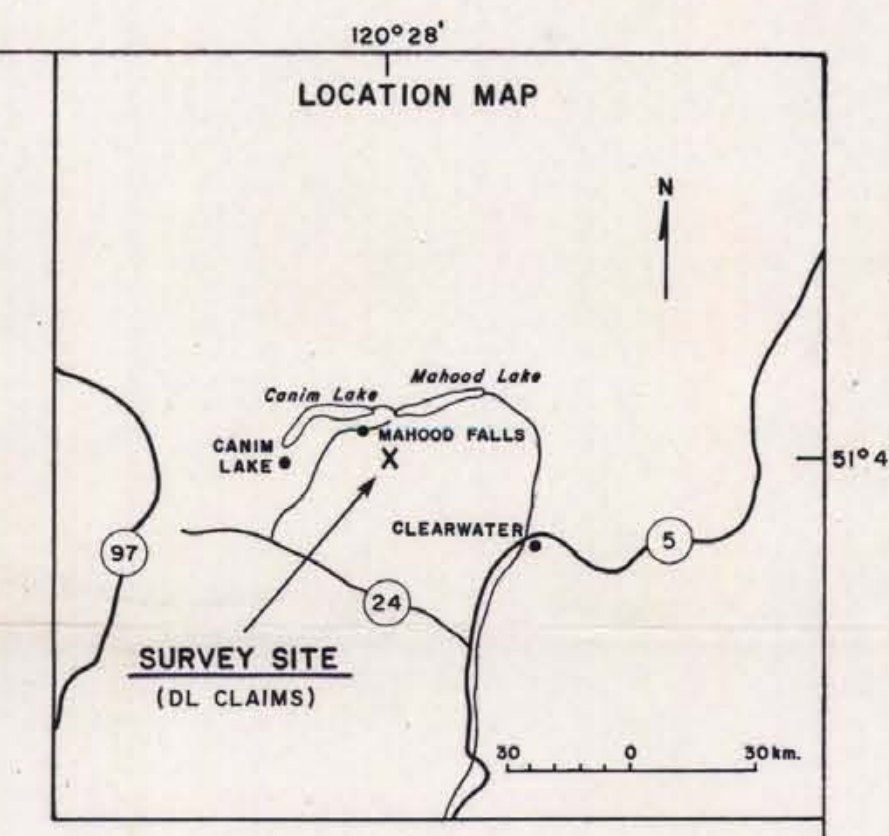


PHOENIX GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP

DWG. NO. - I.P.R. - 3093



SURFACE PROJECTION OF ANOMALOUS ZONE  
 DEFINITE   
 PROBABLE   
 POSSIBLE   
 NUMBER AT END OF ANOMALIES INDICATE SPREAD USED.

CENTER OF ANOMALOUS I.P. ZONE

KERR, DAWSON AND ASSOC. LTD.  
 DL CLAIM GROUP, KAMLOOPS M.D.  
 BRITISH COLUMBIA  
 SCALE  
  
 1:10,000

NOTE -  
 TO ACCOMPANY GEOPHYSICAL REPORT FOR KERR, DAWSON AND ASSOCIATES LIMITED ON DL CLAIMS, KAMLOOPS M.D., B.C., BY FRANK DISPIRITO, P. ENG. GEOPHYSICIST AND PAUL A. CARTWRIGHT, B.Sc. GEOPHYSICIST.  
 DATE: FEB. 18, 1981.

MINERAL RESOURCES BRANCH  
 ASSESSMENT REPORT  
**9019**  
 NO.

*part 2 of 2*

DRAWN: M.W.R.  
 DATE: FEB. 1981  
 APPROVED: *PAC*  
 DATE: Feb. 18/81