·79- #407- #7494

REPORT ON THE INDUCED POLARIZATION AND RESISTIVITY SURVEY

VIMY CLAIMS #100 & 200

NICOLA MINING DIVISION, B. C.

92I/7W 50° 20'N

FOR 120° 51'W

LAWRENCE MINING CORPORATION LTD.

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Date: Oct. 5, 1979

7494

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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 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) betwen 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 (ΔV)obtained at two operating frequencies. The voltage is the product of the current through the ground and the apparent resistivity of the ground. Therefore in field situations where the current is very low due to poor electrode contact, or the apparent resistivity is very low, or a combination of the two effects; the value of (ΔV) the change in potential will be too small to be measurable. The symbol "TL" on the data plots indicates this situation.

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

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

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

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

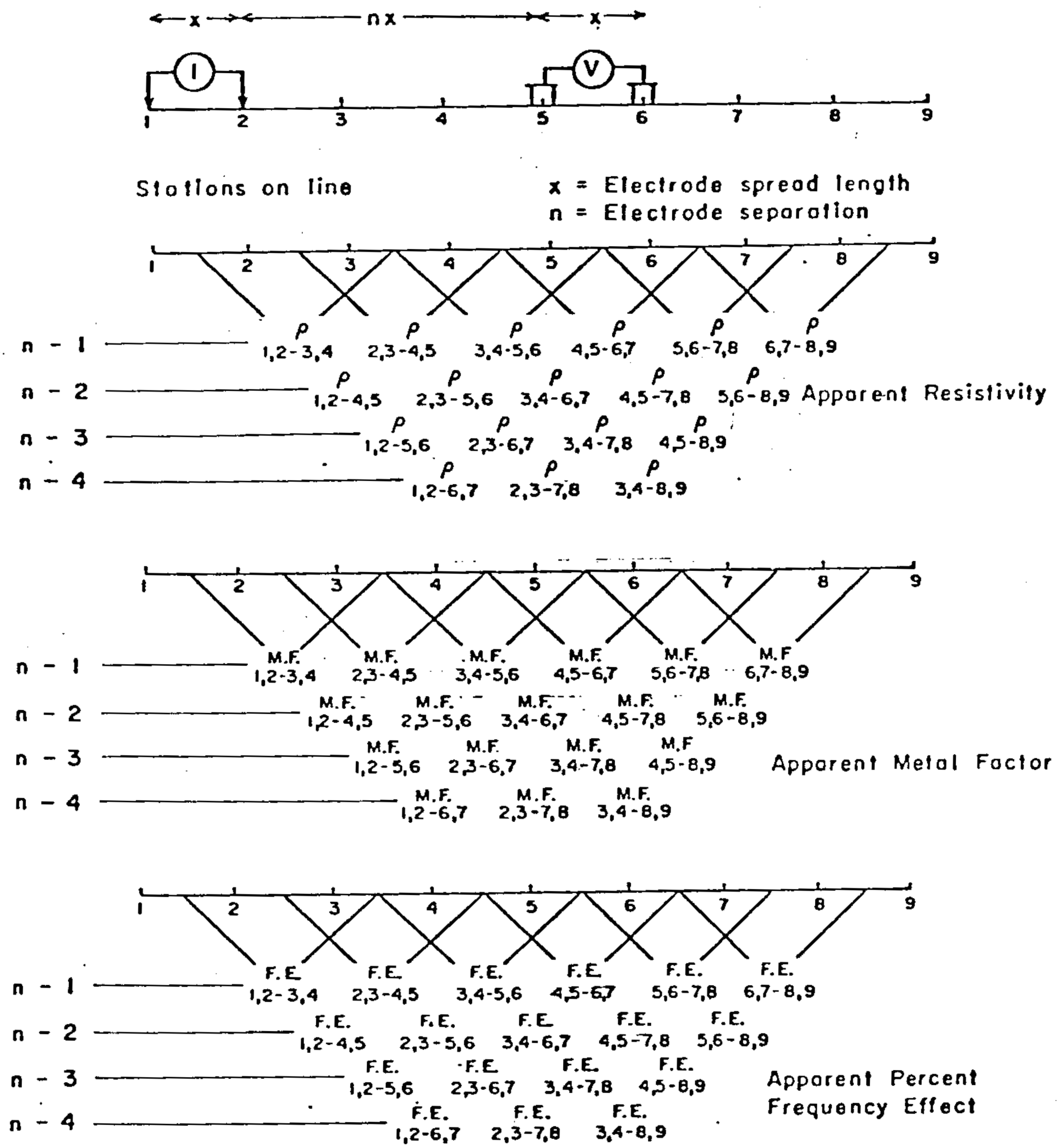


Fig. A

REPORT ON THE

INDUCED POLARIZATION

AND RESISTIVITY SURVEY

VIMY CLAIMS #100 & 200

NICOLA MINING DIVISION, B.C.

92I/7W

FOR

LAWRENCE MINING CORPORATION LTD.

1. INTRODUCTION

An Induced Polarization and Resistivity survey has been carried out on the Vimy Claims for Lawrence Mining Corporation Ltd.. The Claims are located 26 km. north of Merritt in the Nicola Mining Division, B.C.. The center of the property is positioned at about 50° 20' north latitude and 120° 51' west longitude.

Good road access is available from Lower Nicola on Highway #8, north on the Craigmont Mines road. The road which continues on to Chataway Lake bisects the property.

The object of the survey was to investigate the claims at depth in the vicinity of known mineral occurrences. This was achieved by carrying out the IP survey with 200 meter electrode intervals and the expanding electrode technique to four separations.

The survey was carried in early August, 1979 under the direction of Crew Leader Maurice Parent. His certificate of qualification is appended to this report.

A Phoenix Geophysics IP V-2 Phase domain IP system was used for the survey. The IP effect was measured as milli - radians of phase shift operating at 0.31 hertz.

2. DESCRIPTION OF CLAIMS

The VIMY property consists of the following two mining claims:

VIMY #100 - 6 units, Record No. 503 (8)
VIMY #200 - 6 units, Record No. 538 (3)

3. PRESENTATION OF RESULTS

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

LINE NO.	ELECTRODE INTERVAL	DRAWING NO.
500 W	200 METERS	IP 5165 - 1
650 W	200 METERS	IP 5165 - 2
800 W	200 METERS	IP 5165 - 3

Also enclosed with this report is Dwg. I.P.P. 4057, a plan map of the VIMY Claims Grid at a scale of 1 : 5000. 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 m electrode intervals the position of a narrow sulphide body can only be determined to lie between two stations 200 m 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 Claims and Grid information shown on Dwg. I.P.P. 4057 has been taken from maps made available by the staff of Lawrence Mining Corporation Ltd..

4. DESCRIPTION OF GEOLOGY

The general vicinity of the Vimy Claims is believed to be underlain by the Dot quartz monzonite phase of the Guichon Creek batholith. The Dot phase is apparently closely related to the Chataway variety of the intrusive.

A zone of fracturing and alteration strikes just west of north through the quartz monzonite. Copper mineralization in the form of fracture fillings, veins and disseminations occurs within this zone.

5. DISCUSSION OF RESULTS

Induced Polarization surveys have previously covered the area occupied by the Vimy Claims. The present survey was designed to look deeper than previous IP work by utilizing relatively large 200 meter electrode intervals and reading to four "N" separations. A survey carried out by Bralorne Pioneer Mines in 1966 used the 3 electrode method with an "A" spacing of 200 ft.. This survey would have explored less than half the depth of the first "N" separation of the current survey.

Three reconnaissance IP lines were run along the west side of the Vimy Claims using the dipole - dipole electrode configuration, 200 meter electrode intervals, and reading to four "N" separations.

Resistivity levels were mostly in the 130 to 250 ohm meter range, typical of much of the Highland Valley. Somewhat lower resistivities were encountered at the southeast end of line 500 W.. They may indicate a rock type change or a fault zone.

Very weak anomalous IP effects were recorded on all three lines. The survey results for each line are discussed below.

LINE 500 W, DWG IP 5165 - 1

Very weak IP effects showing some depth to the source were located between 0 + 00 and 8 N and appear to extend beyond the IP coverage in both directions.

The anomaly is best defined from 4 N south to 0 + 00 where it extends south of the survey coverage. The depth is estimated at 25 - 50 meters.

North of 4 N the anomaly appears to deepen and the IP effects are weaker.

LINE 650 W, DWG IP 5165 - 2

Weak IP effects that are shallow relative to the 200 meter electrode interval were detected between 2 N and 4 N. The anomaly probably extends to the north at depth and extends beyond the IP coverage.

LINE 800 W, DWG IP 5165 - 3

A weak shallow IP anomaly was located between 4 N and 6 N. Stronger phase angles on the 3rd and 4th separations suggest that the anomalous IP effects may extend at depth under the entire line.

6. SUMMARY AND CONCLUSIONS

An Induced Polarization and Resistivity survey hsa been completed on the west side of the Vimy Claims. The survey was carried out near several known copper showings including the Vimy and the Aberdeen. The purpose of the current IP survey was to explore at depth for evidence of widespread disseminated mineralization.

Very weak IP anomalies were obtained on all three lines. The anomalies, while weak, are not dissimilar to those previously recorded over knowndeposits in the Highland Valley.

The incomplete anomaly at the south end of line 500 W shows the best definition and warrants further investigation. It would be desireable to investigate a possible eastward extension of this anomaly by surveying one or two adjacent lines to the east. The anomaly could be investigated by drilling a vertical drill hole at 100 meters north on line 500 W to a depth of 200 meters. Such a hole would investigate both the phase angle anomaly and the deep lower resistivities.

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

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

ASSESSMENT DETAILS

PROPERTY:	VIMY Claims #100 & 200	MINING DIVISION:	Nicola
SPONSOR:	Lawrence Mining Corp. Ltd.	PROVINCE:	British Columbia
LOCATION:	Highland Valley		
TYPE OF SURVEY:	Induced Polarization and Resistivity		
OPERATING MAN DAYS:	6	DATE STARTED:	Aug. 1, 1979
EQUIVALENT 8 HR. DAYS:	9	DATE FINISHED:	Aug. 5, 1979
CONSULTING MAN DAYS:	2	NUMBER OF STATIONS:	29
DRAFTING MAN DAYS:	2	NUMBER OF READINGS:	159
TOTAL MAN DAYS:	19	KM OF LINE SURVEYED:	5.8

CONSULTANTS:

Ashton W. Mullan, 1440 Sandhurst Pl., West Vancouver, B.C.

FIELD TECHNICIANS:

Maurice Parent, 222 St. John St., St. Leonard, N. B.

Georges Loiselle, 9 Chadbourne Ave., Noranda, Que.

DRAUGHTSMEN:

R. C. Norris, 708 - 51 Parkwoods Village Dr., Don Mills, Ont.

PHOENIX GEOPHYSICS LTD.

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

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

DATED: Oct. 5, 1979

STATEMENT OF COST

LAWRENCE MINING CORPORATION LTD.

INDUCED POLARIZATION SURVEY

HIGHLAND VALLEY AREA, B. C.

PERIOD: Aug. 1 - Aug. 5, 1979

CREW: M. Parent - G. Loiselle

5.8 km. PHASE DOMAIN IP SURVEY

- 200 m DIPOLES @ $290.00/km		$1,682.00
	TOTAL	$1,682.00

PHOENIX GEOPHYSICS LTD.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN

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

DATED: Oct. 5, 1979

CERTIFICATE

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

1. That I am a geologist/geophysicist and a fellow of the Association of Canada, Geophysics Division, with a business address at 310 - 885 Dunsmuir Street, Vancouver, B.C.

2. That I am registered as a member of the Associaiton 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/ geophysicist for over twenty-five 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 Lawrence Mining Corp. Ltd., or any affiliate.

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

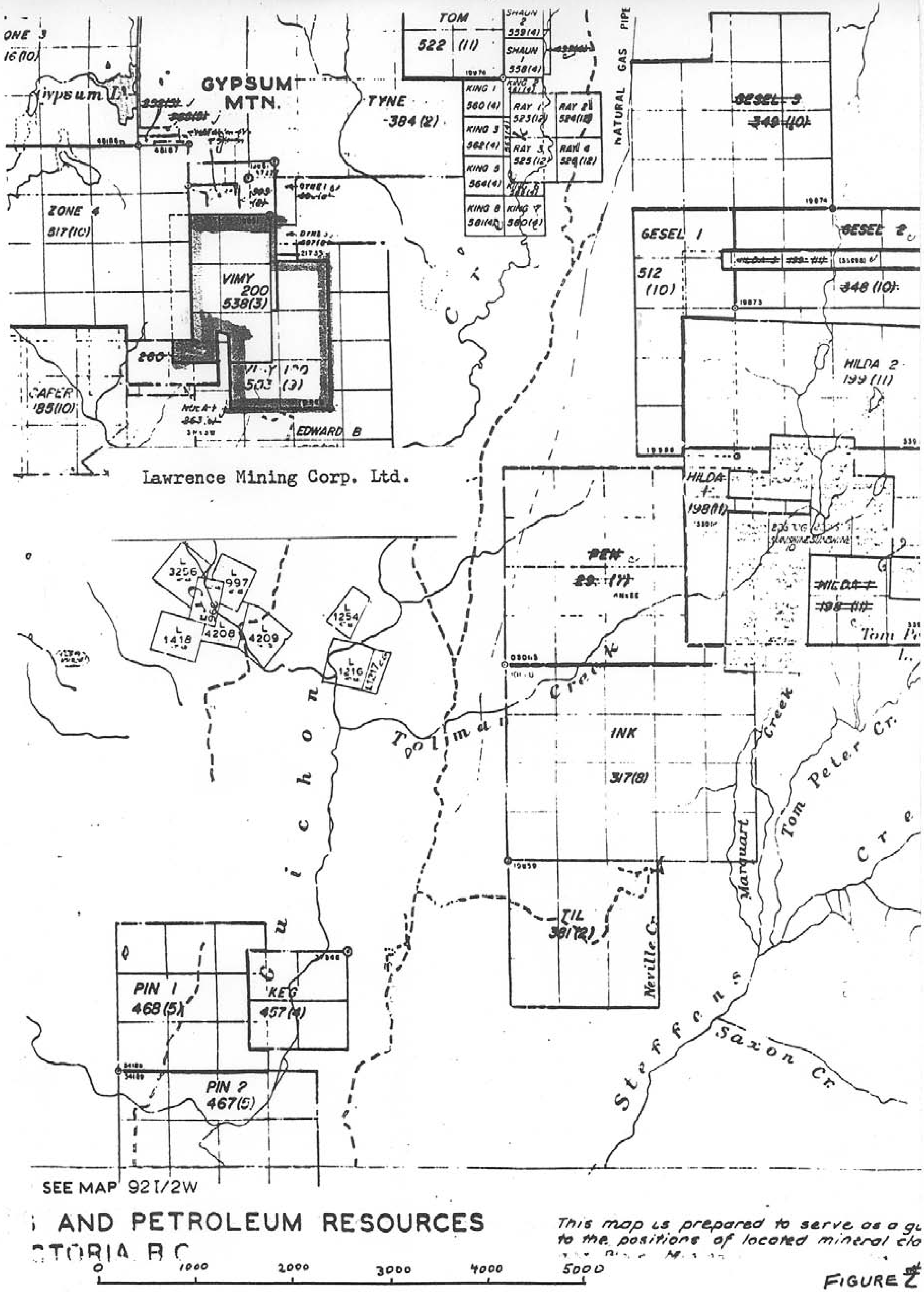
7. Permission is granted to use in whole or in part for assessment and qualification requirements but not for advertising.

Dated at Vancouver

This 5th day of October, 1979

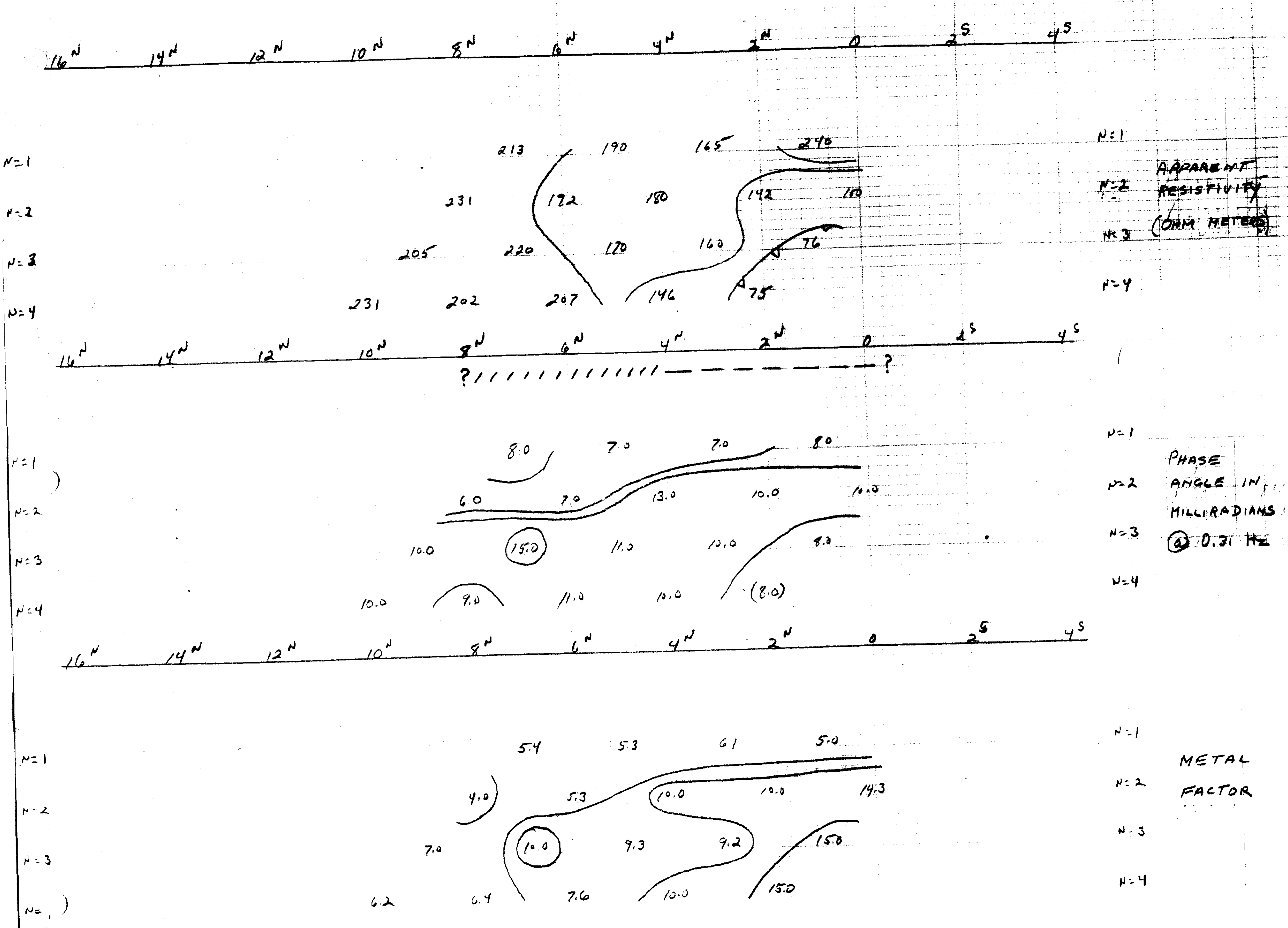
A. W. Mullan, P. Eng.

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



GYPSUM MTN.
Gypsum L.
TOM
522 (11)
SHAUN 2 559(4)
SHAUN 1 558(4)
TYNE
384 (2)
KING 1 560 (4)
KING 3 562(4)
KING 5 564(4)
KING 8 581(4)
RAY 1 523(12)
RAY 2 524(12)
RAY 3 525(12)
RAY 4 526(12)
NATURAL GAS PIPE
GESEL 3
349 (10)
GESEL 1
512 (10)
GESEL 2
348 (10)
ZONE 3
ZONE 4
817(10)
VIMY 200
538(3)
260
503 (3)
85(10)
EDWARD B
Lawrence Mining Corp. Ltd.
HILDA 2
199 (11)
HILDA 4
198(11)
HILDA 1
198 (11)
PEN
29 (1)
Tom Peter Cr.
L 3256
997
L 1418
L 4208
L 4209
L 1254
L 1216
L 1217
Tolman Creek
Guichon Creek
INK
317(8)
Creek
Marquart
TIL
381(12)
Neville Cr.
Steffens Creek
Saxon Cr.
PIN 1
468(5)
KEG
457(4)
PIN 2
467(5)
SEE MAP 92I/2W
AND PETROLEUM RESOURCES
TORIA B.C.
This map is prepared to serve as a gu
to the positions of located mineral cla
0
1000
2000
3000
4000
5000

FIGURE 2



PHOENIX GEOPHYSICS LTD

LAWRENCE MINING CORP.

AREA: HIGHLAND VALLEY, B.C.

LINE: 500W (VIMY SECTION)

SURVEY: DIPOLE - DIPOLE

SPREAD: 200 METERS

SCALE: 1" = 200 m

FREQUENCY: 0.31 Hz

INSTRUMENT: IPV-2

OPERATOR: M. PARENT

DATE: AUGUST 5 1979

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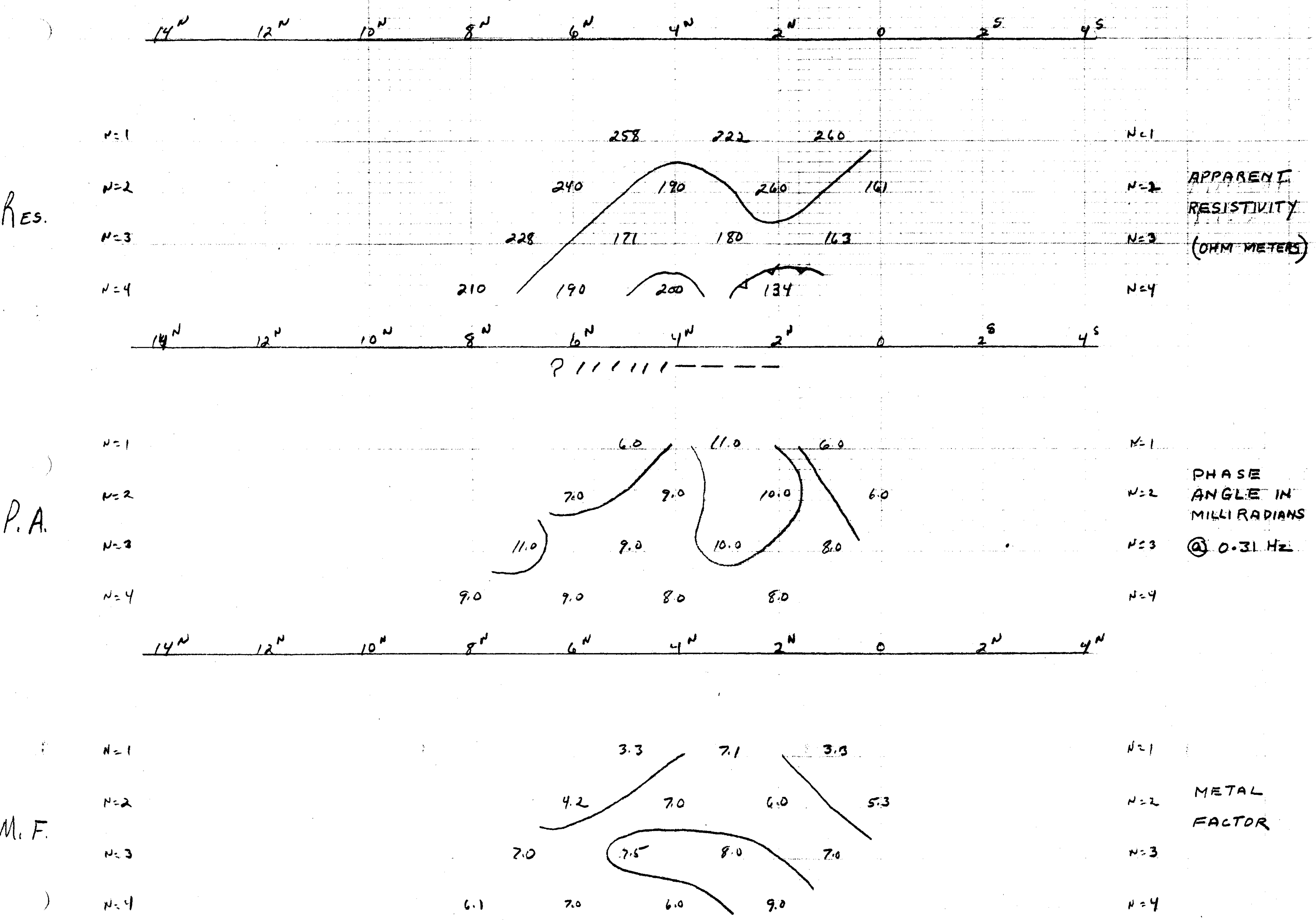
PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — A. W. MULLAN

Oct. 5 [signature]

DWG IP 5165 - I



PHOENIX GEOPHYSICS LTD
LAWRENCE MINING CORP.
AREA: HIGHLAND VALLEY, B.C.
LINE: 650W
SURVEY: DIPOLE – DIPOLE
SPREAD: 200 METERS
SCALE: 1" = 200 m
FREQUENCY: 0.31 Hz
INSTRUMENT: IPV-2

OPERATOR: M. PARENT
DATE: AUGUST 3/1979

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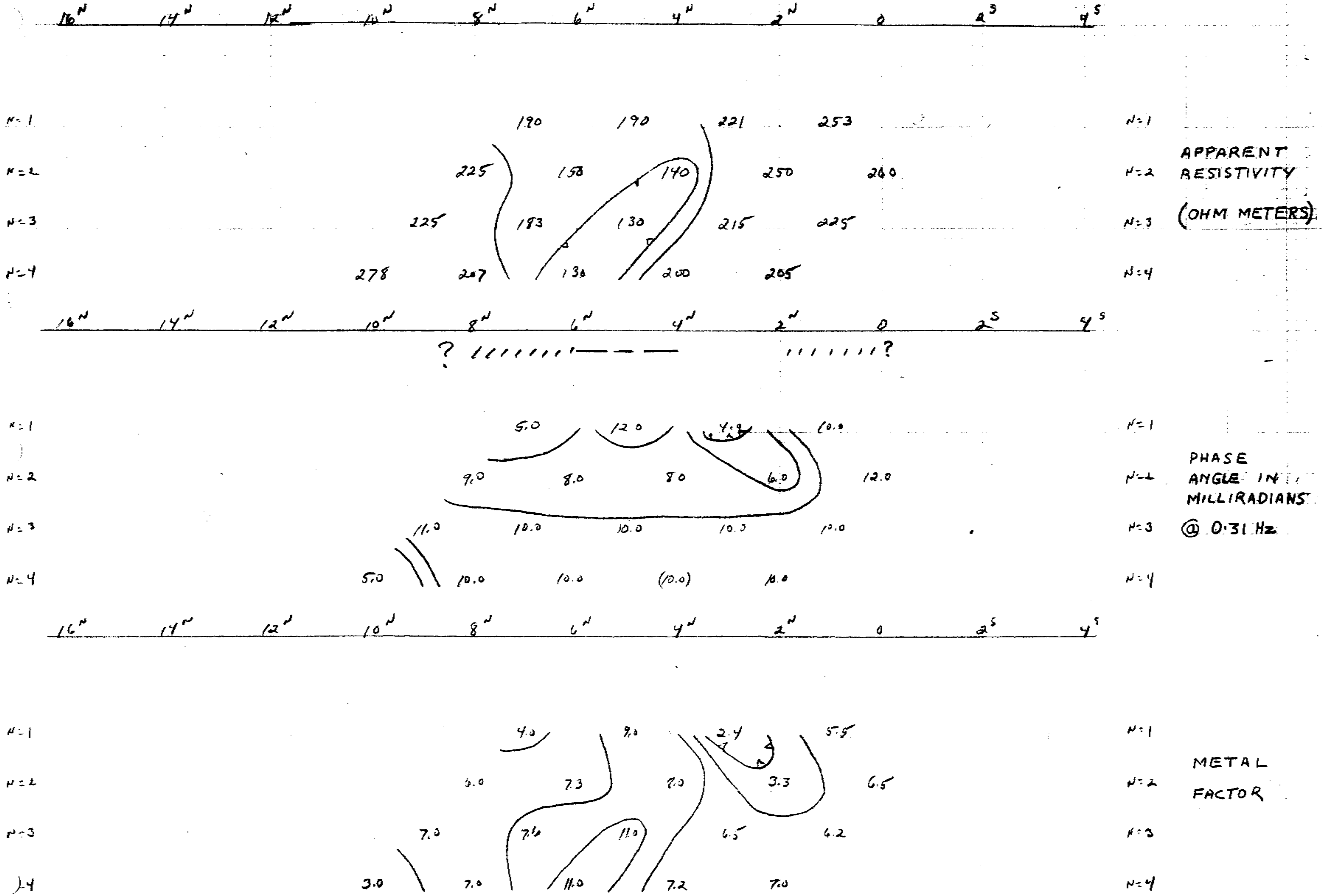
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN
Oct. 5 1979
AWMullan

DWG IP 5165-2



PHOENIX GEOPHYSICS LTD.
LAWRENCE MINING CORP.
AREA: HIGHLAND VALLEY B.C.
LINE: 800W
SURVEY: DIPOLE – DIPOLE
SPREAD: 200 METERS
SCALE: 1" = 200 m
FREQUENCY: 0.31 Hz
INSTRUMENT: IPV-2

OPERATOR: M. PARENT
DATE: AUGUST 2 / 1979

7494.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. W. MULLAN

Oct. 5, 1979
A W Mullan

DWG IP 5165-3

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
TO WIT:

In the ma.

7494

I, Leif Ostensoe, geologist,

of 558 Howe St.
VANCOUVER BC

in the Province of British Columbia, do solemnly declare that

I SUPERVISED THE LINE CUTTING AND SURVEYING OF THE GRID LINES FOR THIS SURVEY AND THAT WAGES ROOM AND BOARD AND SUPERVISION COST ONE HUNDRED DOLLARS PER MAN AND THAT TWENTY MAN DAYS WERE USED IN PREPARATION FOR THIS SURVEY. $2000.00

THAT TWO TRUCKS WERE USED FOR SUPPORT AT A COST OF $ 600.00

And THAT I SUPPLIED TWO MEN TO PHOENIX GEOPHYSICS DURING THE SURVEY A TOTAL OF TEN MAN DAYS AND THAT THEIR COSTS INCLUDING ROOM AND BOARD AT THE GRASSLANDS HOTEL TOTALLED $1000.00

$3600.00

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

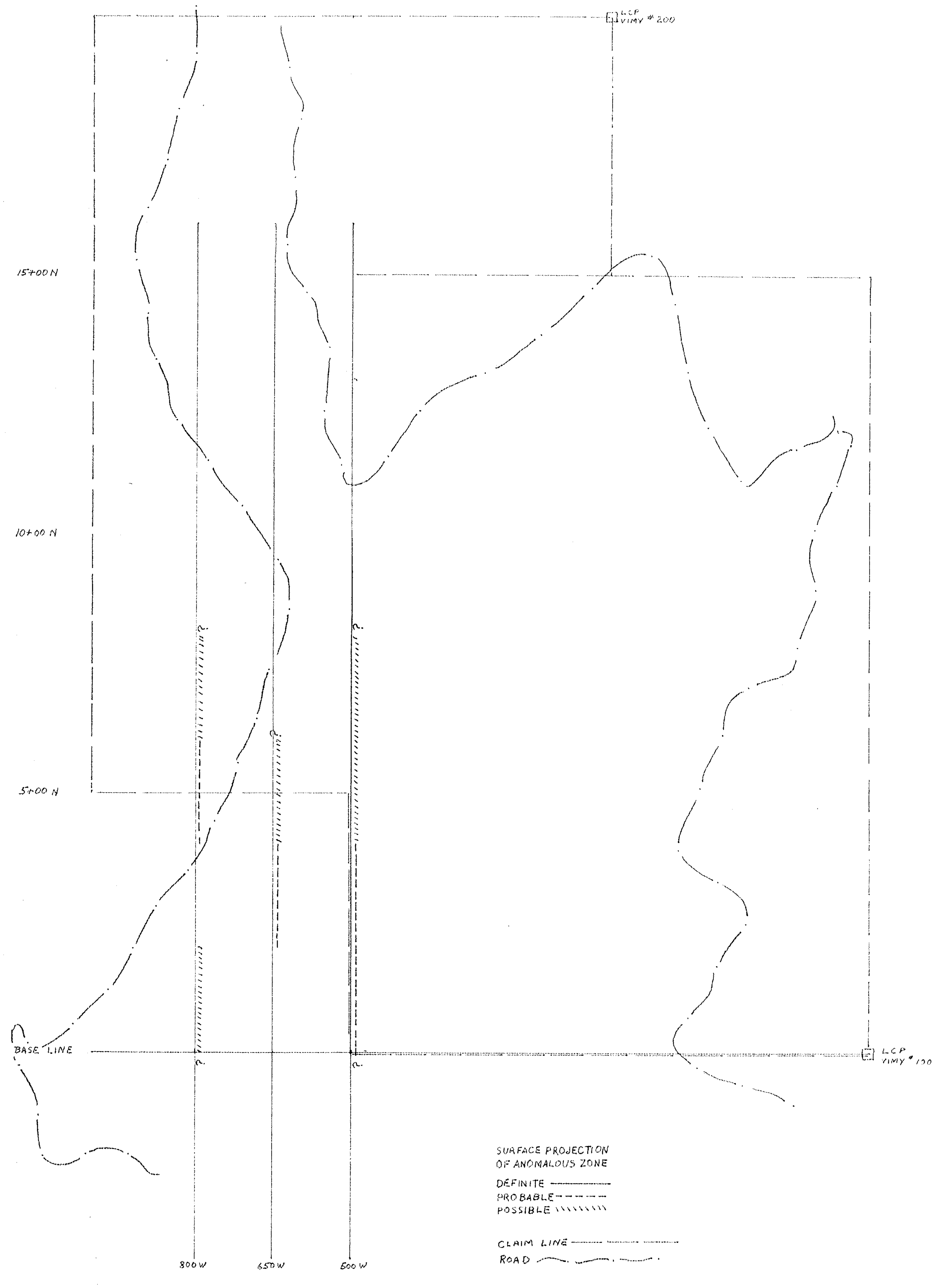
Declared before me at the TOWN of MERRITT, in the Province of British Columbia, this 16 day of OCTOBER 1979, A.D.

A Commissioner for taking Affidavits for British Columbia or
~~*A Notary Public in and for the Province of British Columbia.*~~

PHOENIX GEOPHYSICS LIMITED

INDUCED POLARIZATION AND RESISTIVITY SURVEY

PLAN MAP



PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA A. W. MULLAN

Oct. 5, 1979

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LAWRENCE MINING CORPORATION LTD.

VIMY CLAIMS #100 + 200

NICOLA MINING DIVISION, B.C.

92I/7W

SCALE

0 100 200 300 400 500 METERS

1:5000

A.W. MULLAN OCT. 4, 1979

DWG IPP 4057