



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION & RESISTIVITY SURVEY

ON THE

RAM CLAIM GROUP

WHITEHORSE MINING DISTRICT, YUKON TERRITORY

FOR

UNITED KENO HILL MINES LIMITED

NTS 105-D-4

090405

Toronto, Ontario  
August 21, 1978

P. A. Smith

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\* Note: Original field plots at a scale of 1" = 100' have been reduced to approximately 1" = 151'

## 1. INTRODUCTION

At the request of R. E. Van Tassell, Exploration Manager for United Keno Hill Mines Limited, a geophysical test survey was carried out over a geochemical anomaly on the RAM claim group. Initial results indicated that additional work was warranted and a 5-man geophysical crew was remobilized to the property. The survey commenced on July 23 and was completed on July 30, 1978.

Geophysical work consisted of Induced Polarization and Resistivity coverage of ten lines for a total of 2.56 miles or 740 geophysical observations.

The RAM property comprises 8 contiguous mineral claims which were optioned to UKHM on October 31, 1977 by Mr. Irwin Kreft, who discovered sphalerite mineralization in the area in 1976.

## 2. GENERAL INFORMATION

A report \* by R. J. Joy and R. E. Van Tassell, dated September 11, 1977, gives a detailed description of the RAM property. The following is a brief summary of the information contained in that report.

The claim group is located 42 miles (67 km) southwest of Whitehorse and two miles northeast of Primrose Lake, about 14 miles (22 km) north of the Yukon/BC border. (60° 12'N - 135° 44'W). Access is by helicopter from Whitehorse or Carcross, or by fixed wing to Primrose Lake.

\* 1977 Geological & Geochemical Report on the RAM 1-8 Mineral Claims.

The property was examined by Van Tassell and Joy on July 30 and August 22, 1977, and several soil samples were taken. Several Pb-Zn showings occur in metasediments of the Yukon Group. One sample from Showing "C" was sent to Toronto for a physical properties test. The sample was described as a metasomatized siliceous marble of probable sedimentary origin which assayed 1.75% Pb, 0.75% Zn and 2.58 oz./ton Ag. Its resistivity was quite high (48,000 ohm meters) and the frequency effect quite low (less than 1.0%).

During June and July 1978, additional work on the property consisted of geological mapping, soil sampling and trenching, followed by the IP survey described herein.

Geochemical results outlined an area of anomalous lead-zinc values over a length of 1200 feet in a northwesterly direction. A second, smaller anomaly, located northeast of the main zone, appeared to suggest a second separate zone of mineralization.

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

The following is in large part taken from the manuals of McPhar Geophysics Ltd; manufacturers of the geophysical equipment used for the survey.

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 normal 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 causes 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.

In the pseudo-section plots, three sets of data are recorded. The apparent resistivity ( $\rho_a/2\pi$ ) is a calculation of the resistivity in the rock mass and is usually based on the potential difference observed at the higher of the two selected operating frequencies. The apparent frequency effect (P.F.E.) is a measurement of the percentage change in apparent resistivity that occurs due to polarization with a change in the applied frequency. Since the degree of polarization is related to the apparent resistivity of the rock, it is generally found that the apparent metal factor (M.F.) values are the most useful in illustrating the induced polarization effect. The apparent metal factor is calculated from the combined resistivity and frequency

effect parameters using the formula  $\frac{\text{PFE} \times 1000}{\text{RESISTIVITY}} = \text{M.F.}$

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 I.P. 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 I.P. method under proper geological conditions.

The greatest application of the I.P. 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 I.P. method a useful tool in checking EM anomalies which are suspected of being due to these causes.

In normal field applications the I.P. 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 I.P. 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 at 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 obtained 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. 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 vertical 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.

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. 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 I.P. 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 —

on the data plots indicates this situation.

In some situations spurious noise, either man made or natural, will rend 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 usually 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.

#### 4. DESCRIPTION OF GEOPHYSICAL SURVEY

A grid was established from the existing geochemical base line with 100-foot station intervals on lines 200 ft. apart. The Induced Polarization and Resistivity survey was carried out by UKHM employees D. Oulette, K. Dieckman, J. Culbert and P. Stirton under the direction of P. A. Smith.

A McPhar Model P-660 frequency domain transmitter was used in conjunction with a Phoenix IPV1 receiver. The transmitter was powered by a 2.5 KVA motor generator which outputs a single phase 400 hz regulated voltage of 130 VAC. Operating frequencies were 0.3 and 5.0 hz. A 100-ft. dipole-dipole array was employed throughout with readings taken to n-4 where possible.

Currents were generally poor (less than 0.2 amperes) due to contact problems in the coarse talus and the high resistivities of the siliceous bedrock. In order to reduce the contact impedances to acceptable levels, it was necessary to prepare each transmitter electrode site using sheets of aluminum foil and water. Electrodes in the potential circuit consisted of non-polarizing porous pots filled with a super-saturated solution of copper sulphate. An abnormally high level of spheric (sunspot) activity during the latter part of July, combined with the low currents and poor contacts, adversely affected the signal to noise ratio. The time required to obtain accurate observations, particularly in anomalous areas, was often excessive. Unfortunately, the high noise levels precluded the use of 200-ft. dipole intervals which would have allowed for faster and more complete coverage of the area of interest.

The IP data have been plotted in pseudo-section format according to the procedure described in the foregoing section. Figures 4 through 8 are plan maps at a scale of 1" = 200 ft. which show the anomalous area and the contoured values of the apparent resistivity, metal factor and frequency effect. These plans have been presented to provide a general indication of the resistivity and chargeability trends over the property, but should not be interpreted as being representative of horizontal sections.

#### 5. DISCUSSION OF RESULTS

The induced polarization measurement is essentially an averaging process, as are all potential methods, and it is therefore difficult to locate the exact position of an anomaly. No anomaly can be located with more accuracy than the spread length. When using a 100-ft. electrode interval the position of a narrow body can only be determined to lie between two stations 100-ft. apart. This margin can be reduced considerably by using shorter electrode intervals (less than the width of the conductor) although the effective depth of penetration is proportionately less. In order to locate zones at greater depths, larger spreads must be used, with a corresponding increase in the uncertainty of location. Therefore, while the center of the indicated anomaly probably corresponds fairly well with the source, the length of the anomaly should not be taken to represent the exact edges of the anomalous material.

Following is a line-by-line description of the IP results:

##### Line 26NW

The n-3 and n-4 resistivities at 12-13NE are suspect, and may be due to an open connection or poor contact in the receiver circuit. No frequency effects were obtained due to high noise levels. The possible

anomaly between 12-13NE could be due to a deep narrow zone of conductivity or could be the "end effect" of a remote conductor.

#### Line 28NW

Line 28NW was the first test line which was centered over the strongest portion of the Pb geochemical anomaly with peak values at 3+50 and 5+50NE. The geochemical highs are displaced about 200-400 feet southwest from the IP anomaly (incomplete) which appears to be centered near 8NE. The high Pb values occur in what appears to be a highly resistive non polarizable rock unit and are probably due in part to down-slope migration. The resistivity contrast and corresponding frequency effect change at 6NE suggests a probable contact between moderately conductive rocks to the northeast and a more resistive (siliceous?) unit to the southwest. However, the results of the lab tests on one sample indicated that Pb, Zn, Ag mineralization can occur in a highly resistive host. As sphalerite is essentially non-conductive, one cannot rule out the possibility of economic sulphides occurring in what appears to be a non-conductive, non-polarizable area. The IP anomaly is incomplete and is open to the northeast.

#### Line 30NW

A strong anomaly extends from 6+50NE to beyond 15NE. A comparison of the resistivity and frequency effect parameters indicates the mineralization over this broad area comprises both massive and disseminated sections. The zone of high chargeability situated near surface at 7NE probably represents disseminated mineralization which becomes more massive at depth, as evidenced by the coincident high frequency effect and low resistivity at the n-4 level beneath 8NE. Northeast of this zone, the frequency effects are somewhat

less but a zone of low resistivity sub-crops at 11+50NE continues to the end of the line. The anomaly is still open to the northeast.

It is difficult to determine whether the deep anomaly at 8NE and the shallow zone at 11+50NE are separate zones, or if they represent a "U-shaped" trough, the limbs of which are connected at depth. The peak Pb and Zn values on this line occur near stations 4+25NE and 1NE respectively, approximately 200 to 500 feet down slope from the interpreted southwest limit of the IP anomaly. The resistivity contrast (contact?) on this line occurs near 5+50NE.

#### Line 32NW

The complex pattern on line 32NW appears to confirm the interpretation of line 30N, i.e. that the anomaly results from a broad zone of mineralization which contains two or more highly conductive sheets or lenses. The entire line is anomalous northeast of station 5NE, and remains open in this direction.

The southwest portion of the anomaly at 5-6NE is stronger and closer to surface than on the previous line, yet the most conductive zone still appears to be deep, with resistivities of less than 10 ohm-feet. This portion of the anomaly appears to fit quite well with the frequency effect patterns shown in scale model cases for a dipping sheet. (See Figures 3a and 3b). However, the pattern is undoubtedly influenced by the more conductive zone of lower chargeability which extends from 10NE to the end of the line and may represent a multiple conductor source. (see Figure 3c).

The anomaly appears to be due to a concave sheet which flattens out or rolls over to the northeast. The Pb and Zn peak values are located near 3+50NE and 1+50NE respectively. The lead anomaly is approximately 100 feet down slope from the southwestern limit of the IP anomaly, but

coincident with the contact interpreted from the resistivity values.

Line 34NW

The trough shaped pattern persists on this line, although the resistivity anomaly is still open to the northeast. The southwest limit of the zone occurs at 4-5NE and appears to improve at depth towards the northeast. The sharp resistivity contrast at 3+50NE coincides with the peak Pb value on this line.

Line 36NW

The results are very similar to those of the previous line. The strongest anomaly occurs near surface between 3-4NE, appears to dip to the northeast and return to surface near 10NE.

Line 38NW

The anomaly on line 38NW extends from 2+50NE to 10NE in the typical "U-shaped" pattern observed on the previous lines.

Line 40NW

On 40NW, the anomaly extends from 2+50NE to 9NE. The concave pattern is clearly evident in the resistivity and metal factor pseudo sections. This line was selected as being a representative cross section of the mineralized zone, and four holes have been spotted to check the cause of the anomaly.

Line 44NW

The line differs from the previous lines in two respects. The resistivity anomaly at the southwest end is much stronger, but deeper, than on previous lines. Three readings indicate a highly conductive zone of less than 6 ohm-feet at a depth of about 150 feet. A similar zone of high

conductivity occurs at the northeast end of the line.

The anomaly limits have been located at 1NE and 12NE but may be open at depth on both ends. Larger spreads would be required to properly define the true extent of the anomalous area.

#### Line 10NE

A cross line was run from 23NW to 34NW to try to determine the eastern limits of the anomalous area and to aid in interpretation of the complex and incomplete anomalies at that end of the grid. Surprisingly, the line was non-anomalous relative to the other lines. There is a very weak moderately deep response between 28-29NW. This would suggest that the southwestern limit of the anomaly does not extend beyond 30NW and that the anomaly on line 28NW is probably an end effect. However, the line 10NE was run roughly parallel to the strike of the anomaly, through the non-anomalous central portion, and therefore would not give as strong a response as would a line perpendicular to the axis of the conductor. There are three possibilities: 1) either the anomaly consists of two parallel but separate conductors which terminate near 29NW, or 2) the deepest part of the assumed "trough-shaped" conductor is too deep to be seen with 100 ft. spreads, or 3) the conductor is tightly folded or distorted by a non-conductive unit at its eastern end.

Figure 4 shows the limits of survey coverage and the surface projection of the IP anomaly, although the zone is open to the north and west. Superimposed on this plan is the 200 ohm-feet  $n-1$  contour which outlines the near surface zones of conductive material.

Figures 5, 6, 7 and 8 are contoured plans of the  $n-1$  resistivity,

n-2 resistivity, n-2 metal factor and n-2 frequency effect which are largely self explanatory. However, as previously mentioned, these plans should not be interpreted as being representative of a horizontal sections at any given depth.

#### 6. CONCLUSIONS AND RECOMMENDATIONS

A strong IP anomaly extends from 28NW to at least line 44NW, and is open to the north and west. The pattern observed on most lines suggests the source is a broad concave sheet (synclinal trough) of mineralization which appears to steepen at the southwestern edge and flattens out or rolls over on the northeastern side. The frequency effects associated with the southwestern portion are generally better defined and stronger than those at the northeast end of the line where the resistivity pattern suggests a broad zone of high conductivity and low chargeability, the limits of which have not been clearly defined. The zone has an interpreted strike length of more than 1500 feet and a minimum width of 800 feet.

Interpretation is difficult due to the complexity of the anomaly and differences between the resistivity and frequency effect patterns. This is attributed to variations in sulphide concentration from disseminated to massive within the anomalous area. An alternate interpretation would suggest two or more flat dipping, parallel sheets, the dips of which are difficult to determine, but are probably to the north.

The geophysical anomaly occurs up-slope from a moderately strong Pb-Zn-Ag geochemical anomaly. There is no evidence to date of any other conductive material such as graphite or pyrite in the immediate vicinity, which would indicate that the IP anomaly is related to Pb or Pb-Zn sulphides.

Sphalerite, which is non-conductive, will not give an IP effect unless it is associated with other (conductive or polarizable) sulphides. It is possible therefore, that the limits of Zn mineralization could be much more extensive than is inferred from the geophysical data.

Chances for a large Pb-Zn-Ag orebody on the property appear to be excellent.

It has been recommended that a series of four or five holes be drilled across a representative section of the anomaly. (Memo to PLM from PAS dated August 3, 1978). Following is a list of proposed holes based on the assumption that the anomaly is due to a concave sheet of mineralization rather than the alternate interpretation of two or more flat-dipping parallel sheets:

| <u>Hole</u> | <u>Station</u> | <u>Depth</u> | <u>Comments</u>  |
|-------------|----------------|--------------|--|
| 1           | 2+50NE         | 50 ft.       | Drill -45°SW from Station 3+00NE to intersect shallow portion of zone. Minimum recommended length - 150 ft.  |
| 2           | 4+00NE         | 200 ft.      | Drill -45°SW from station 6+00NE to intersect down-dip extension of 1. Minimum length - 400 ft.  |
| 3           | 7+50NE         | 150 ft.      | Drill -45°NE from station 6+00NE to intersect zone at approximately 250 ft. Minimum length - 350 ft.   |
| 4           | 9+00NE         | 100 ft.      | Drill -45°NE from station 8+00NE. Minimum length - 200 ft.   |
| 5           | 10+00NE        | 250 ft.      | On line 44+00NW. Second deep zone occurs beneath 10NE on this line. Appears to be separate from main zone and is incomplete to northeast. Currently low priority but should be checked if holes 1 through 4 are encouraging. |

The foregoing collar locations and angles are submitted as a guide to the initial drilling, and should be revised according to the results of the first holes. Additional targets can be spotted on existing data should the drill results prove encouraging.

Due to poor contacts and high levels of spheric activity, the IP survey was relatively slow. Spread lengths were restricted to 100-foot intervals and several n-4 readings could not be obtained with an acceptable degree of accuracy. The anomalies are incomplete on many lines. At the time of the survey, the feasibility of expending additional time and money to try to obtain data under a combination of unfavourable circumstances was questionable. Based on the apparent resistivity contrast, it appears as though a less expensive technique such as VLF-EM should be attempted for further reconnaissance work in the immediate area. It is therefore recommended that a VLF test be carried out over the property when convenient. If necessary, additional IP work could be carried out in 1979, when spheric activity is expected to be at a lower level.

It is also recommended that a few lines of IP data be submitted to Phoenix Geophysics for "inversion". This is a technique developed by W. Pelton which generates a model of a conductor and its host. This treatment of the data, although still largely in the experimental stage, should give a fairly good idea of the true shape, attitude, resistivity and frequency effect of these conductive zone(s) and the surrounding rock.

The method of exploration carried out by UKHM appears to be extremely effective and should be continued in the surrounding area.

A handwritten signature in black ink, appearing to read 'P. A. Smith', with a large, stylized initial 'P' and 'S'.

P. A. Smith

APPENDIX I

Geophysical Equipment (Induced Polarization)

Transmitter - McPhar Model P-660 (Frequency Domain)

Receiver - Phoenix IPV1

Power Supply - McPhar 2.5 kva motor generator, 130 VAC-400 Hz

Electrodes - Tx - Aluminum Foil 18" x 36"

- Rx - Non polarizing porous pots (Copper Sulphate)

Electrode Array - Dipole-dipole, readings to n-4

Electrode Separation 100 Ft.

Operating Frequencies - 0.3 & 5.0 Hz.

Scale Ranges - Tx - 0 to 5 amp max. (5 scale positions)

- Rx - 10 volts to 0.0 millivolts

- -10% to +20% frequency effect

Accuracy -  $\pm 0.2\%$

APPENDIX II

Statistical Data

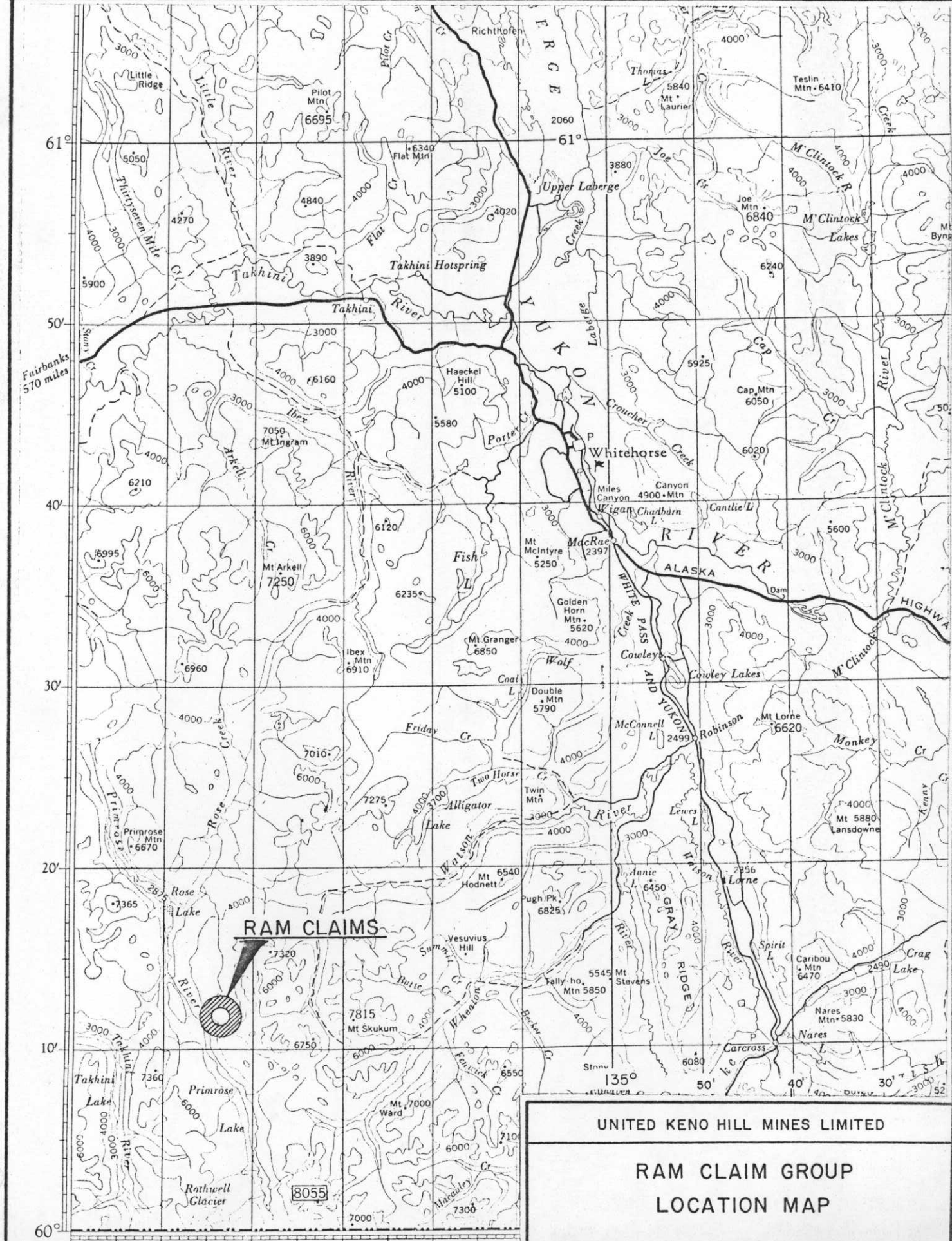
| <u>Line</u> | <u>Spread</u> | <u>Observations</u> | <u>From-To</u> | <u>Distance</u> |
|-------------|---------------|---------------------|----------------|-----------------|
| 44NW        | 100'          | 84                  | 1SW - 14NE     | 1500'           |
| 40NW        | 100'          | 84                  | 1SW - 14NE     | 1500'           |
| 38NW        | 100'          | 76                  | 00 - 14NE      | 1400'           |
| 36NW        | 100'          | 70                  | 00 - 13NE      | 1300'           |
| 34NW        | 100'          | 74                  | 1SW - 13NE     | 1400'           |
| 32NW        | 100'          | 96                  | 1NE - 17NE     | 1600'           |
| 30NW        | 100'          | 100                 | 00 - 17NE      | 1700'           |
| 28NW        | 100'          | 58                  | 00 - 11NE      | 1100'           |
| 26NW        | 100'          | 44                  | 7NE - 16NE     | 900'            |
| 1ONE        | 100'          | 54                  | 23NW - 34NE    | 1100'           |

Total: 10 lines, 740 observations, 13,500 feet (2.56 miles)

APPENDIX III

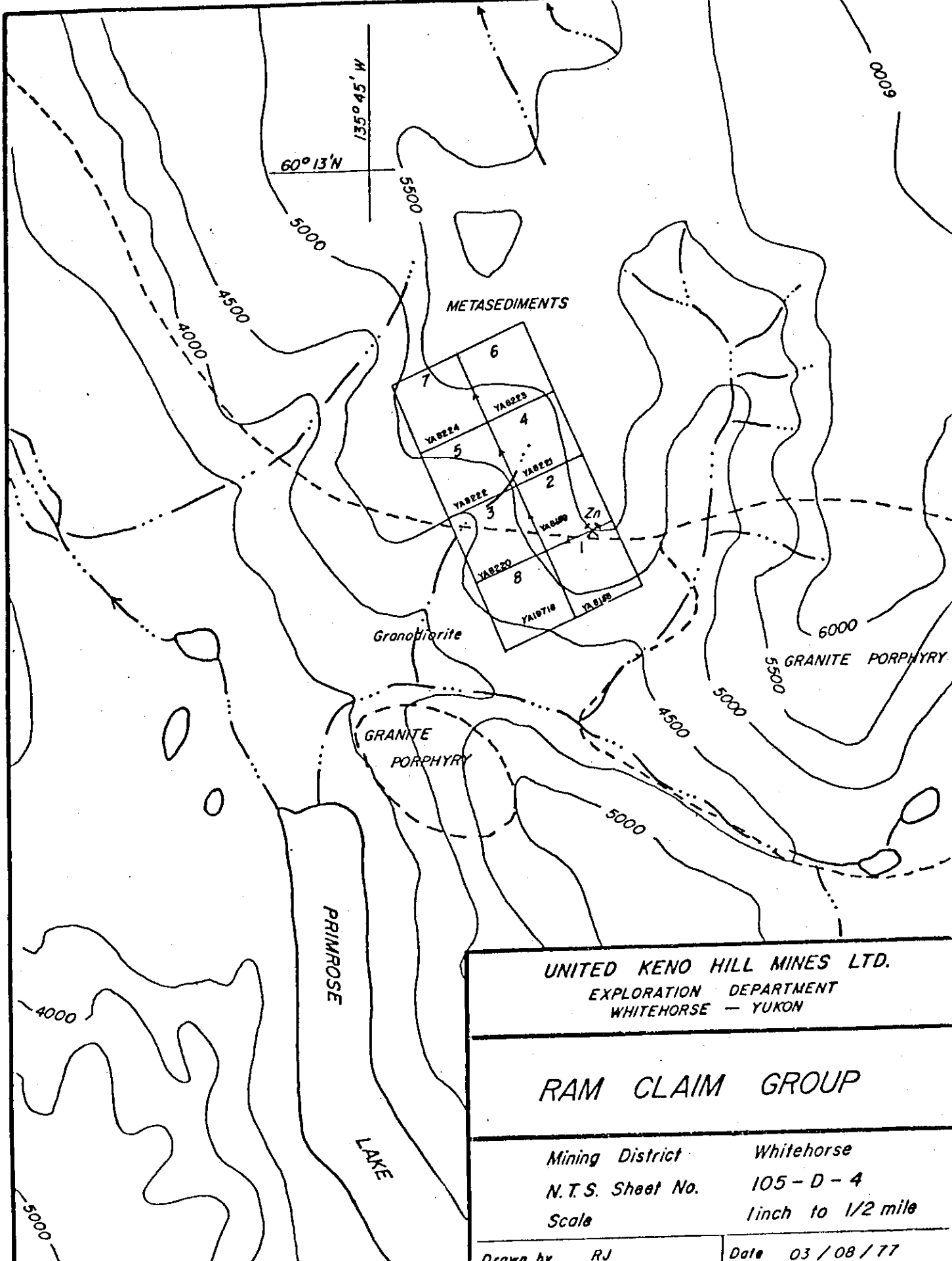
List of Claims

| <u>Claim Name</u> | <u>Grant #</u> | <u>Record Date</u> |
|-------------------|----------------|--------------------|
| RAM 1             | YA 8188        | 13 September, 1976 |
| 2                 | YA 8199        | 13 September, 1976 |
| 3                 | YA 8220        | 28 September, 1976 |
| 4                 | YA 8221        | 28 September, 1976 |
| 5                 | YA 8222        | 28 September, 1976 |
| 6                 | YA 8223        | 28 September, 1976 |
| 7                 | YA 8224        | 28 September, 1976 |
| 8                 | YA 19718       | 26 August, 1977    |



|                                |                  |
|--------------------------------|------------------|
| UNITED KENO HILL MINES LIMITED |                  |
| RAM CLAIM GROUP                |                  |
| LOCATION MAP                   |                  |
| SCALE 1 : 500,000              | DRAWN            |
| DATE August 1978               | N.T.S. - 105-D-4 |

Figure 1



UNITED KENO HILL MINES LTD.  
 EXPLORATION DEPARTMENT  
 WHITEHORSE — YUKON

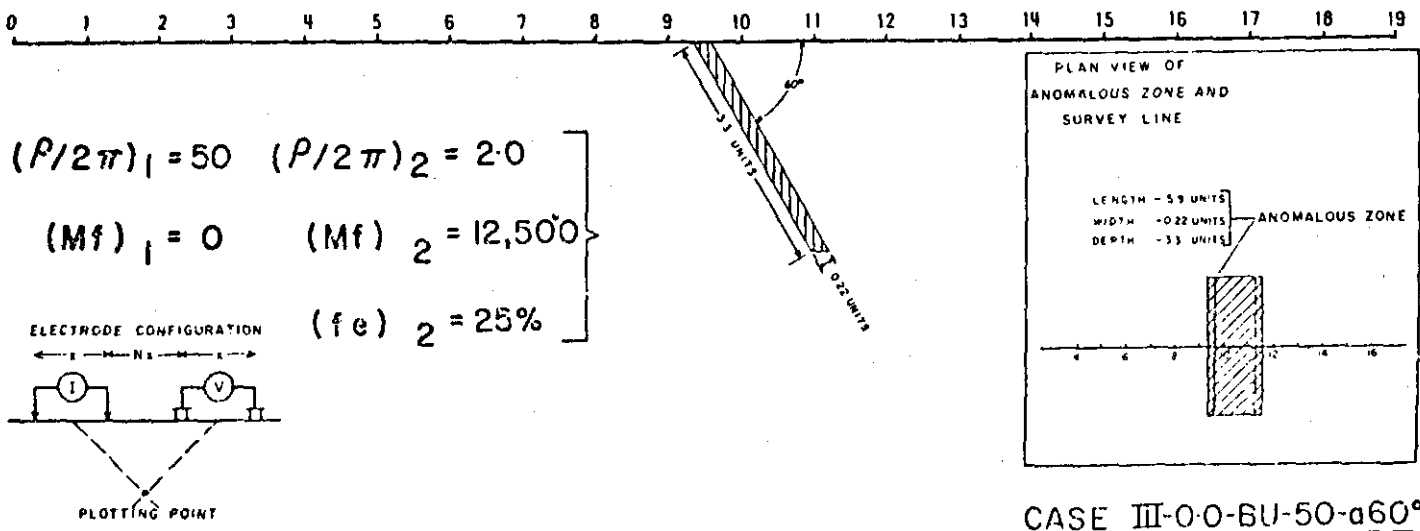
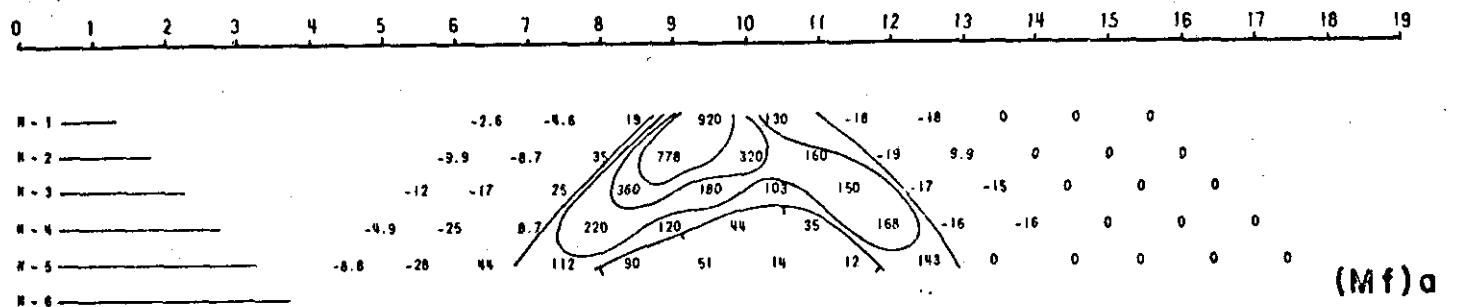
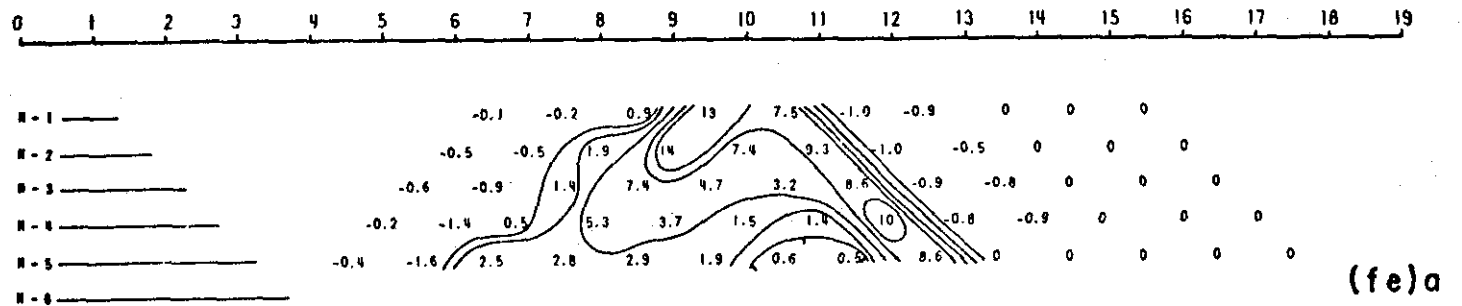
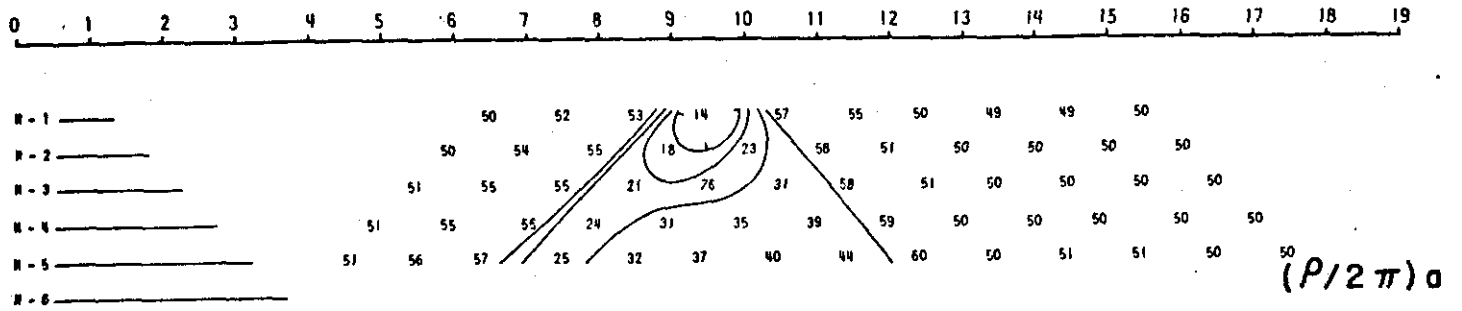
**RAM CLAIM GROUP**

Mining District Whitehorse  
 N.T.S. Sheet No. 105 - D - 4  
 Scale 1 inch to 1/2 mile

Drawn by RJ Date 03 / 08 / 77

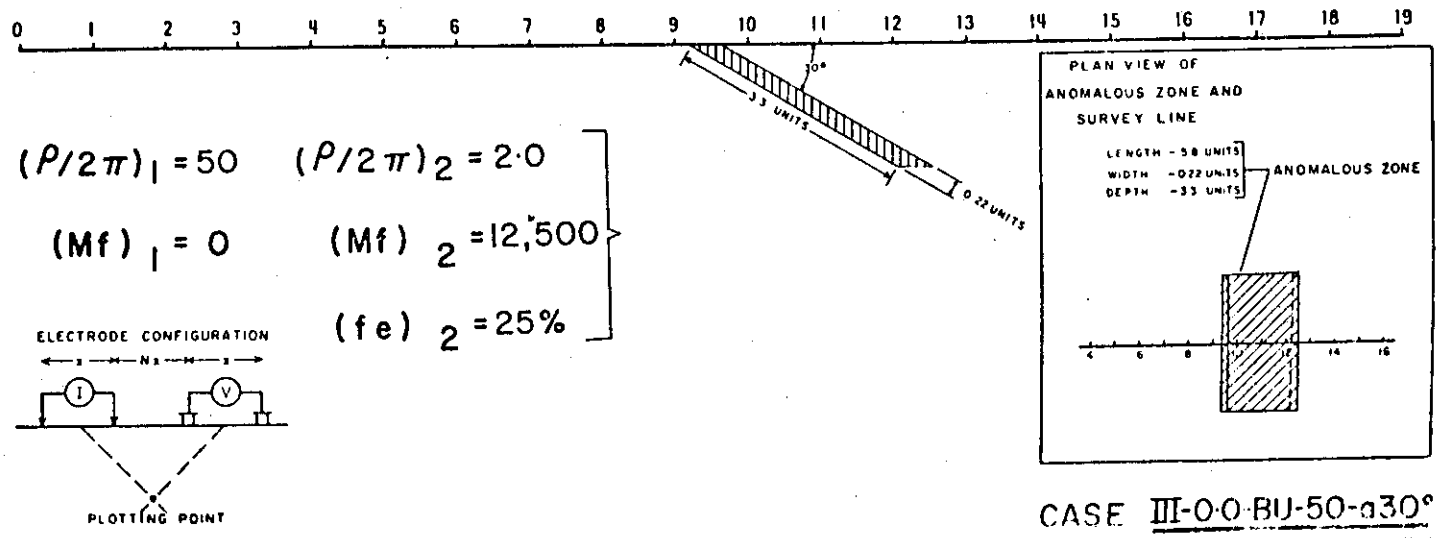
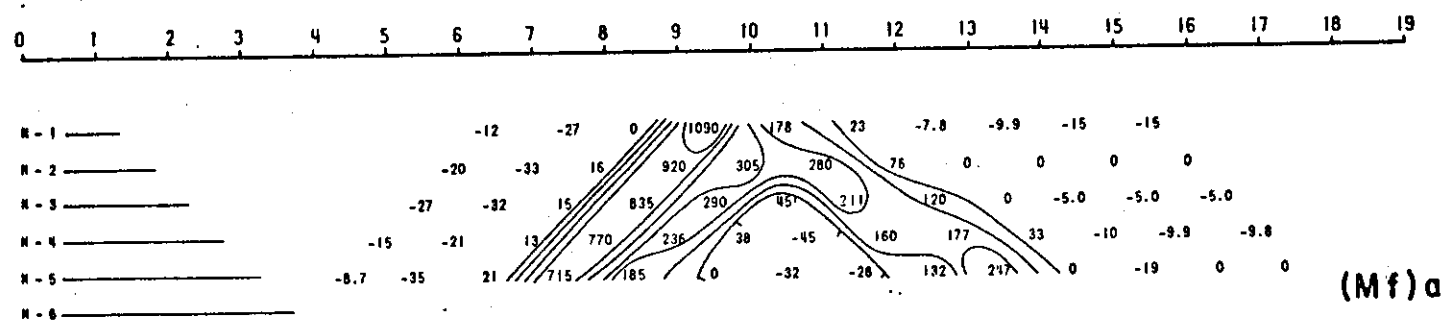
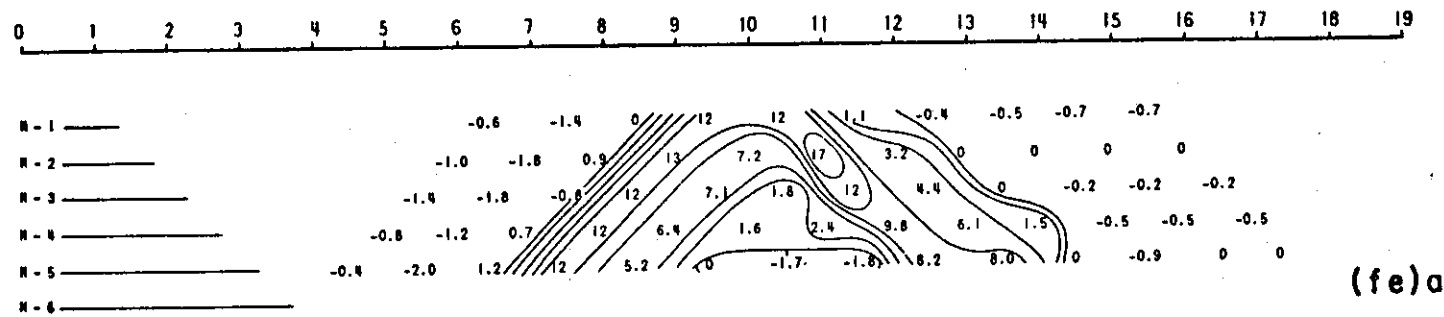
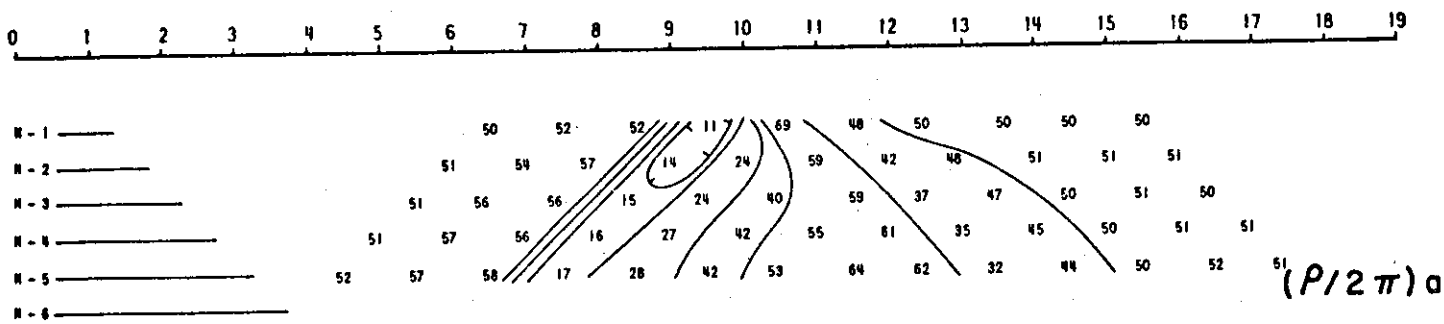
## Theoretical Induced Polarization and Resistivity Studies

### Scale Model Cases



## Theoretical Induced Polarization and Resistivity Studies

### Scale Model Cases

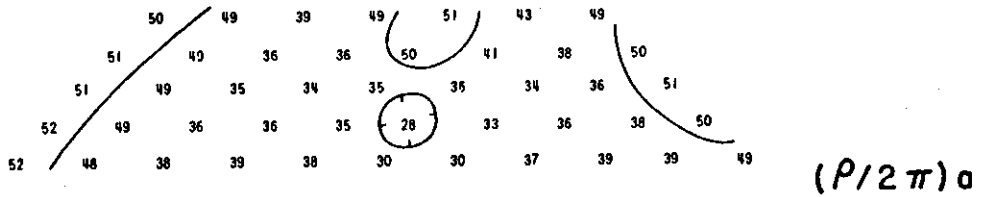


## Theoretical Induced Polarization and Resistivity Studies

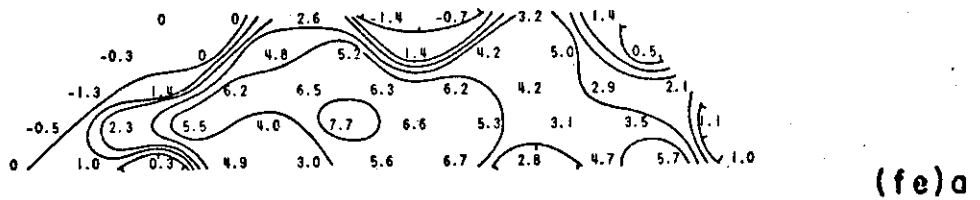
### Scale Model Cases



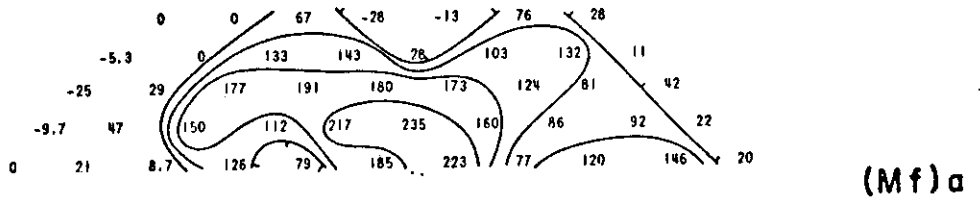
- N-1 \_\_\_\_\_
- N-2 \_\_\_\_\_
- N-3 \_\_\_\_\_
- N-4 \_\_\_\_\_
- N-5 \_\_\_\_\_
- N-6 \_\_\_\_\_



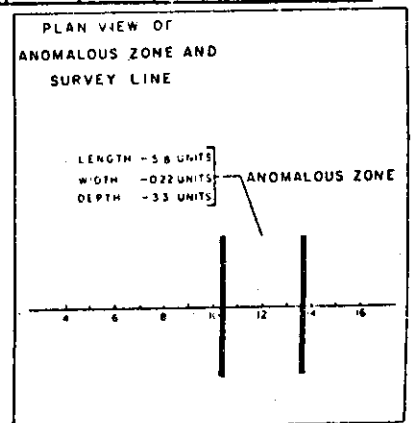
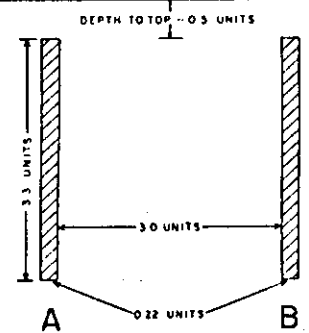
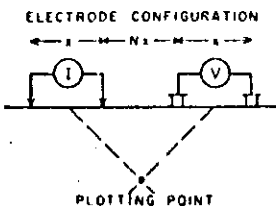
- N-1 \_\_\_\_\_
- N-2 \_\_\_\_\_
- N-3 \_\_\_\_\_
- N-4 \_\_\_\_\_
- N-5 \_\_\_\_\_
- N-6 \_\_\_\_\_



- N-1 \_\_\_\_\_
- N-2 \_\_\_\_\_
- N-3 \_\_\_\_\_
- N-4 \_\_\_\_\_
- N-5 \_\_\_\_\_
- N-6 \_\_\_\_\_



$(P/2\pi)_1 = 50$      $(P/2\pi)_2 = 2.5$   
 $(Mf)_1 = 0$      $(Mf)_2 = 9,900$   
 $(fe)_2 = 25\%$   
 $(P/2\pi)_2 = 2.0$   
 $(Mf)_2 = 12,500$   
 $(fe)_2 = 25\%$



CASE MI-0-5-S3-0-50-b

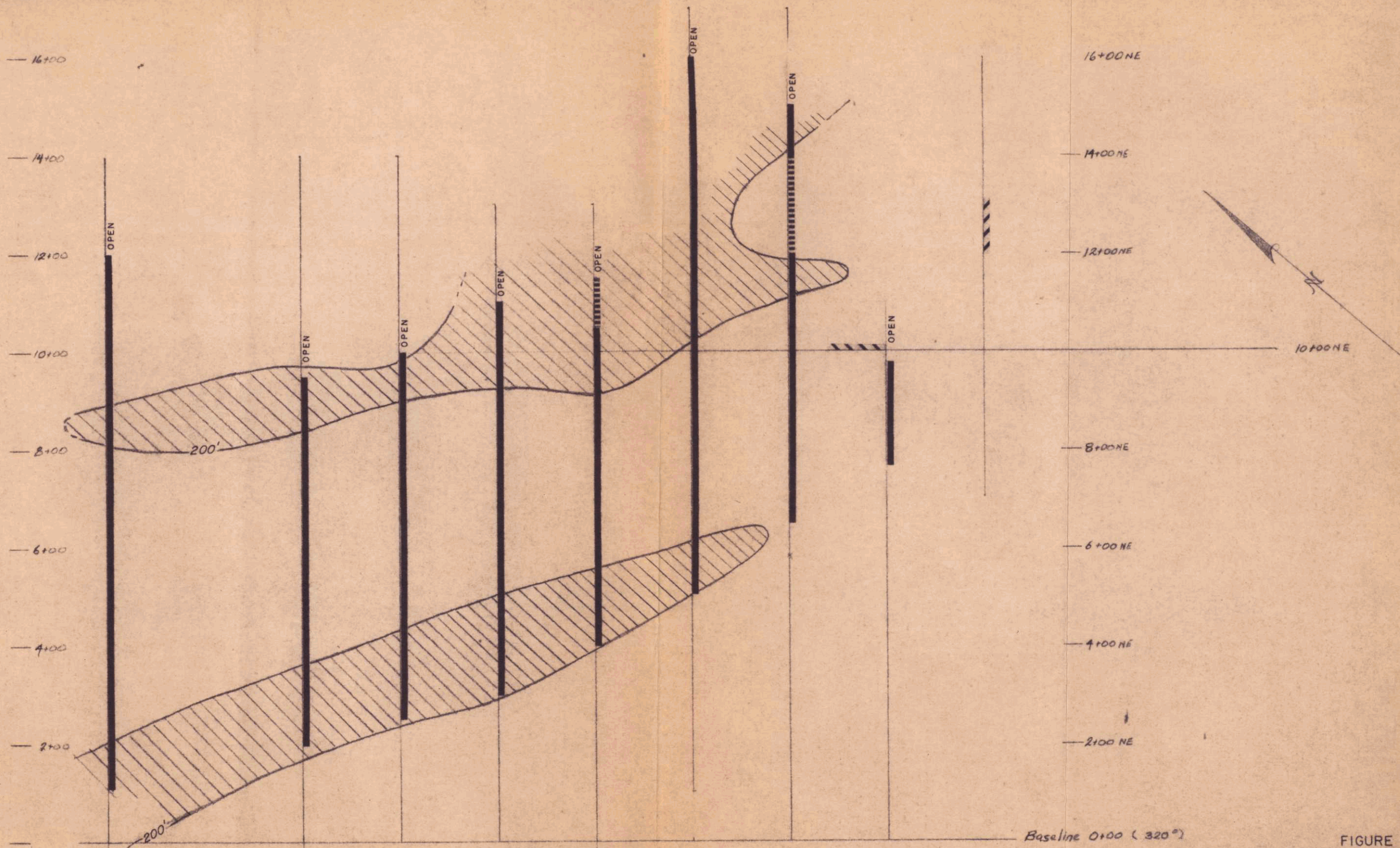


FIGURE 4

|   |                |
|---|----------------|
| UNITED KENO HILL MINES LIMITED  |                |
| <b>RAM CLAIM GROUP<br/>IP SURVEY COVERAGE &amp;<br/>ANOMALOUS AREAS</b> |                |
| SCALE 1" = 200'   | DRAWN          |
| DATE 14 Aug. 1978   | DATA BY P.A.S. |



16+00

14+00

12+00

10+00

8+00

6+00

4+00

2+00

0+00

16+00 NE

14+00 NE

12+00 NE

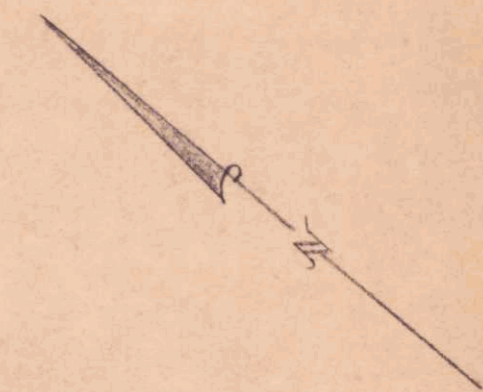
8+00 NE

6+00 NE

4+00 NE

2+00 NE

0+00 Baseline (320°)



44+00 NW    42+00 NW    40+00 NW    38+00 NW    36+00 NW    34+00 NW    32+00 NW    30+00 NW    28+00 NW    26+00 NW

FIGURE 6

|  |                |
|--|----------------|
| UNITED KENO HILL MINES LIMITED                                   |                |
| RAM CLAIM GROUP<br>RESISTIVITY PLAN<br>100' DIPOLE - DIPOLE, n=2 |                |
| SCALE 1" = 200'  | DRAWN          |
| DATE 14 Aug. 1978  | DATA BY P.A.S. |

16100

16100 NE

14100

14100 NE

12100

12100 NE

10100

8100

6100

4100

2100

0100

8100 NE

6100 NE

4100 NE

2100 NE

BASELINE 0100 (320')

FIGURE 7

UNITED KENO HILL MINES LIMITED

RAM CLAIM GROUP  
METAL FACTOR PLAN  
100' DIPOLE - DIPOLE, n = 2

SCALE 1" = 200'

DATE 14 Aug. 1978

DRAWN

DATA BY P.A.S.



44100 40100 38100 36100 34100 32100 30100 28100 26100

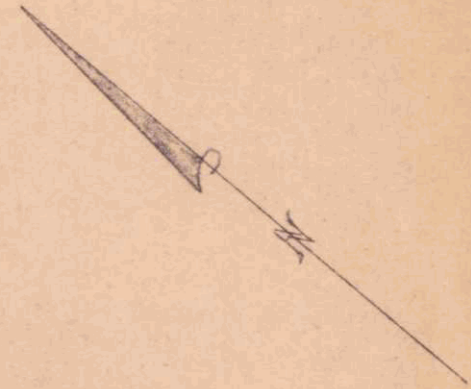
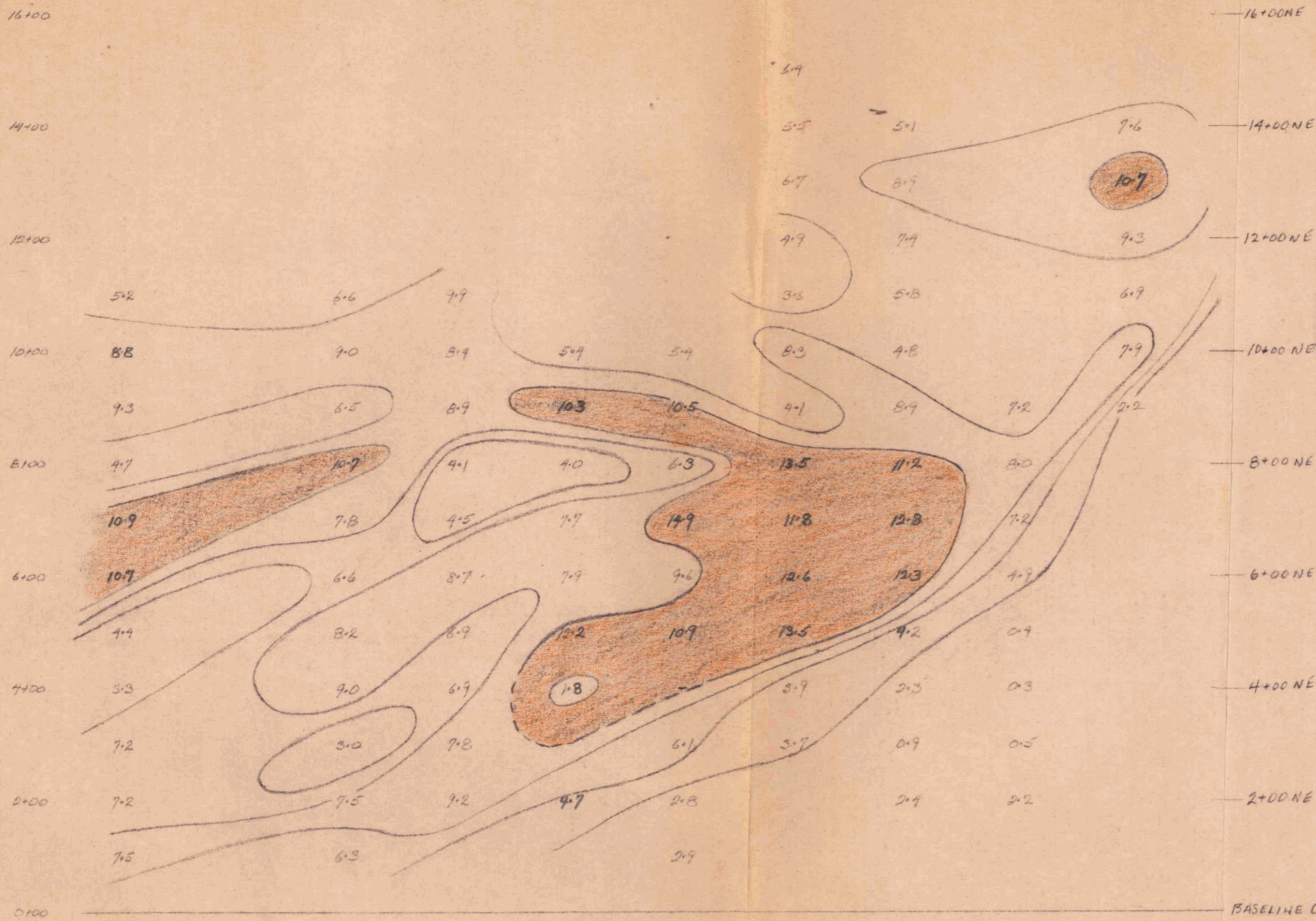


FIGURE 8

|   |                |
|---|----------------|
| UNITED KENO HILL MINES LIMITED  |                |
| RAM CLAIM GROUP<br>FREQUENCY EFFECT PLAN<br>100' DIPOLE - DIPOLE, n = 2 |                |
| SCALE 1" = 200'   | DRAWN          |
| DATE 14 Aug. 1978   | DATA BY P.A.S. |

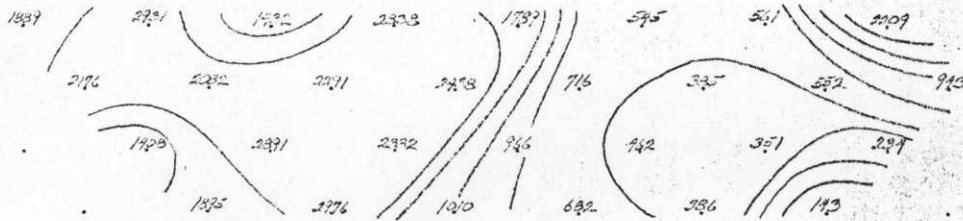


STATIONS

00 1NE 2NE 3NE 4NE 5NE 6NE 7NE 8NE 9NE 10NE 11NE

RESISTIVITY ( $\rho_a/2\pi$  ohm-feet)

FALCONBRIDGE NICKEL MINES LIMITED

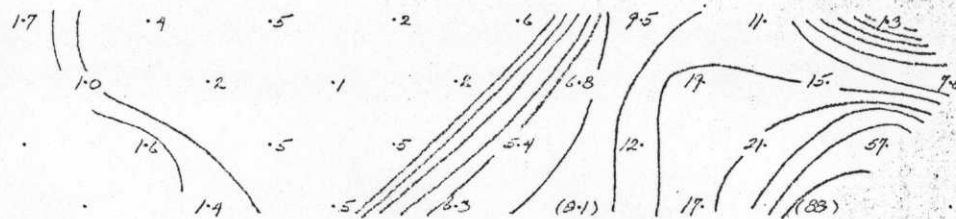


INDUCED POLARIZATION SURVEY

RAM PROJECT

LINE 23-00 AW

METAL FACTOR (M.F.)



LEGEND

ARRAY: DIPOLE-DIPOLE

UNIT: P-630

FREQUENCIES: 0.3, 5.0 Hz

SCALE: 1 Inch = 151 ft

DATE: 23 July 73

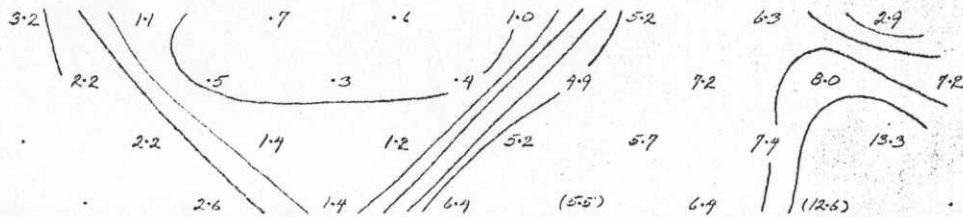
DATA BY: D. Smith

REMARKS:




1800 ppm Pb.

±800 ppm Pb.

% FREQUENCY EFFECT (P.F.E.)



LOGARITHMIC CONTOURS - 1.0, 1.5, 2, 3, 5, 7.5

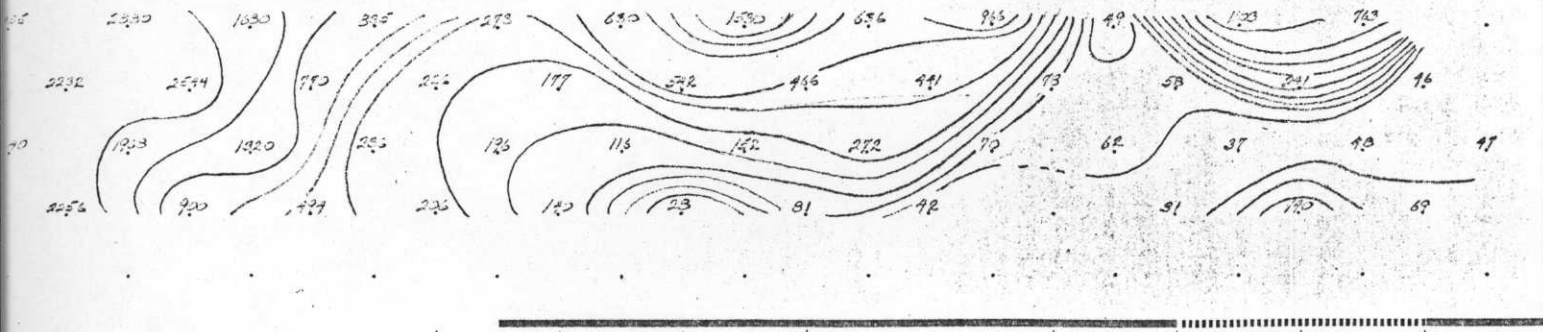
I.P. ANOMALY - STRONG   
 MODERATE   
 WEAK 

DWG. No. \_\_\_\_\_

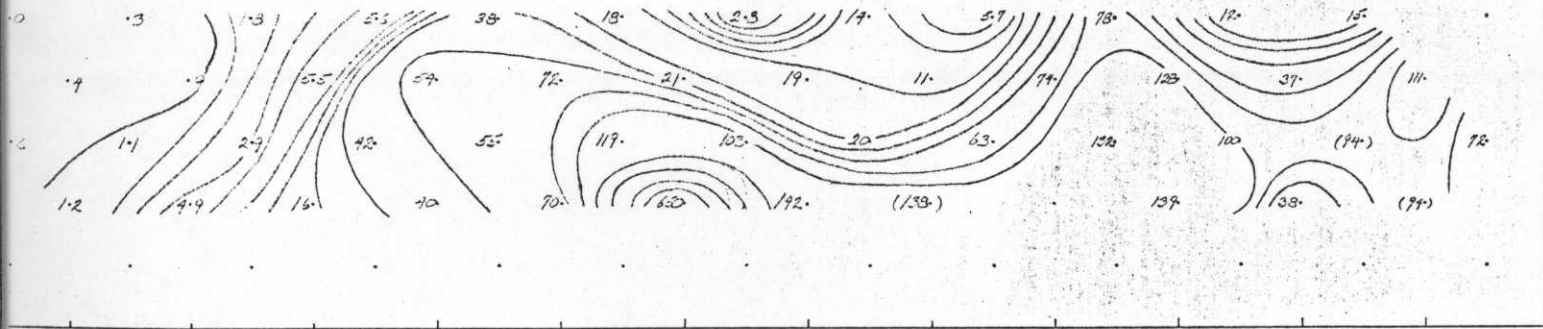
STATIONS

31E 41E 51E 61E 71E 81E 91E 101E 111E 121E 131E 141E

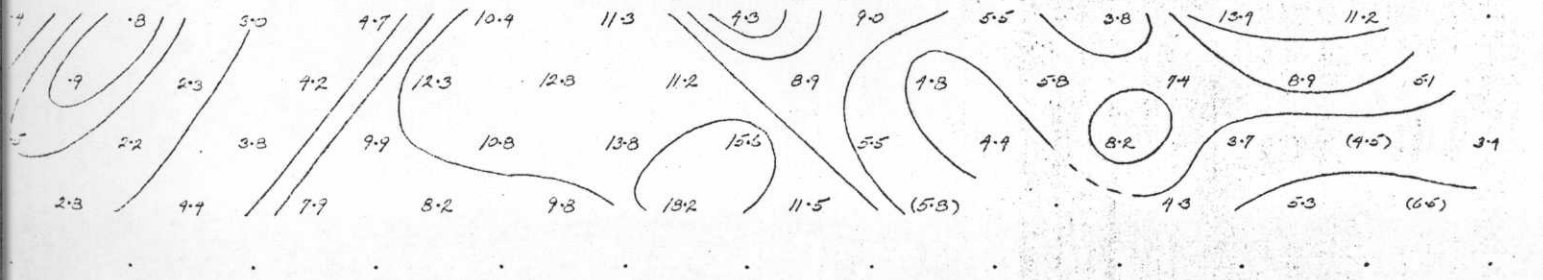
RESISTIVITY ( $\rho_0/2\pi$  ohm-feet)



METAL FACTOR (M.F.)



% FREQUENCY EFFECT (P.F.E.)



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

RAM PROJECT

LINE 30400 NW

LEGEND

ARRAY: DIPOLE - DIPOLE

UNIT: P-640

FREQUENCIES: 0.25-50 Hz

SCALE: 1 inch = 151 ft.

DATE: 25 July, 1973

DATA BY: [Signature]

REMARKS: Extended 27 July.

LOGARITHMIC CONTOURS - 1.0, 1.5, 2, 3, 5, 7.5

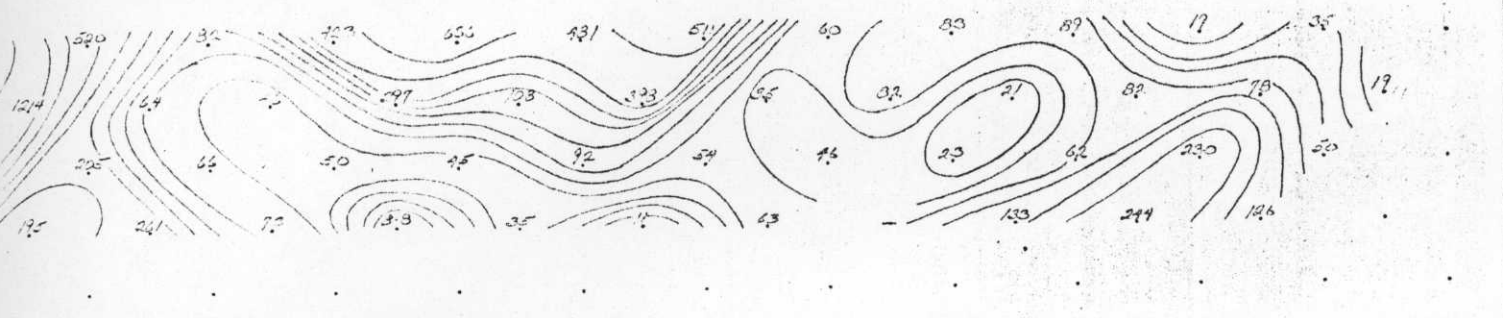
I.P. ANOMALY - STRONG  
 MODERATE  
 WEAK

DWG. No.

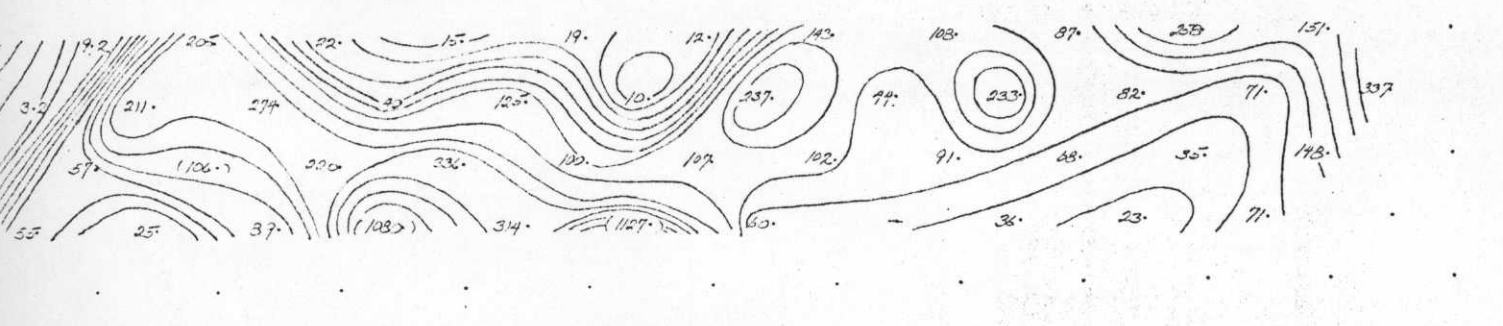
STATIONS

4NE 5E 5NE 7E 9NE 9NE 10NE 11NE 10NE 10NE 11NE 12NE

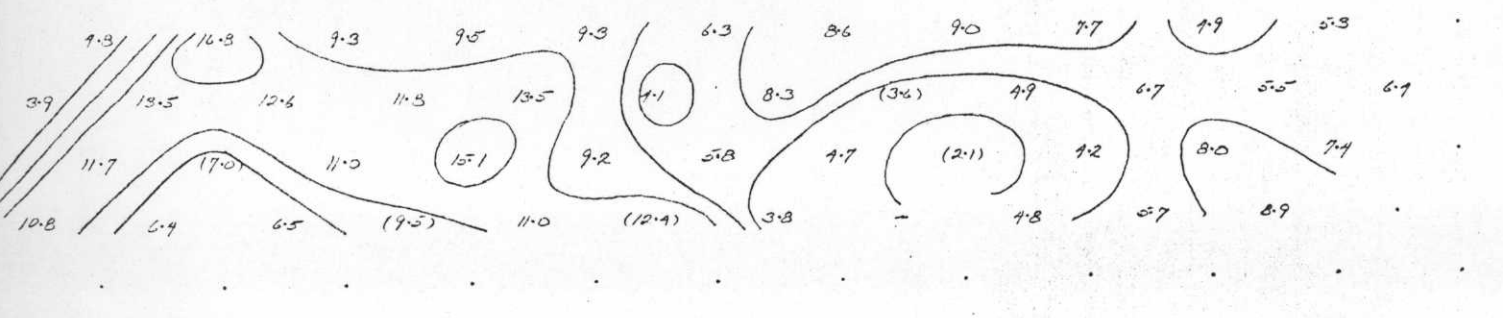
RESISTIVITY ( $\rho_0/2\pi$  ohm-feet)



METAL FACTOR (M.F.)



% FREQUENCY EFFECT (P.F.E.)



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

RAM PROJECT

LINE 32-0000

LEGEND

ARRAY: DIPOLE - DIPOLE

UNIT: P-40

FREQUENCIES: 22.504

SCALE: 1 inch = 151.2'

DATE: 30 July 1988

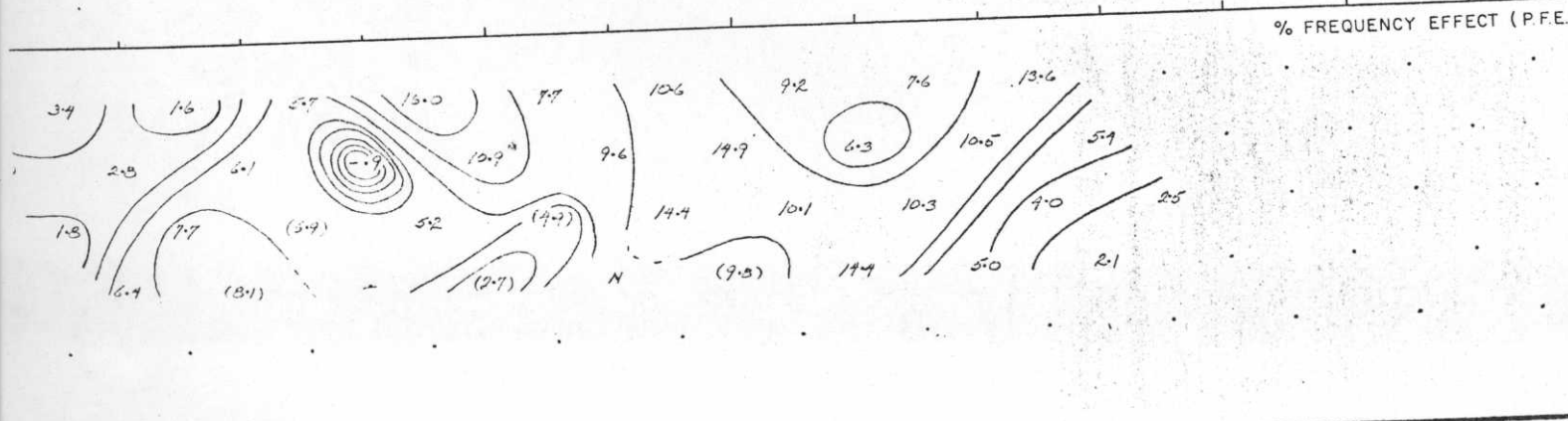
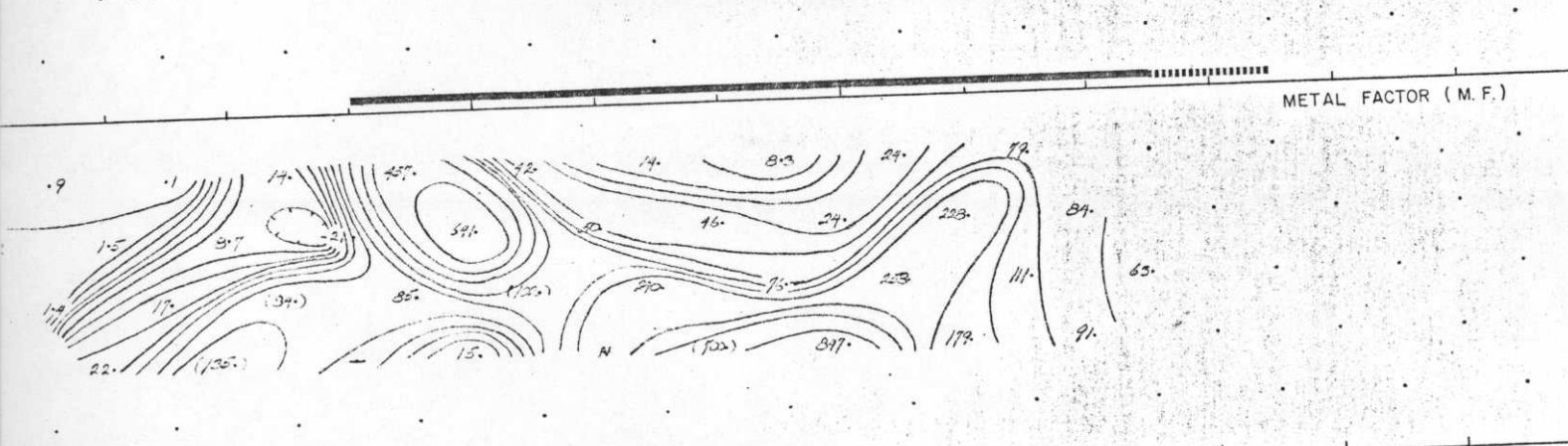
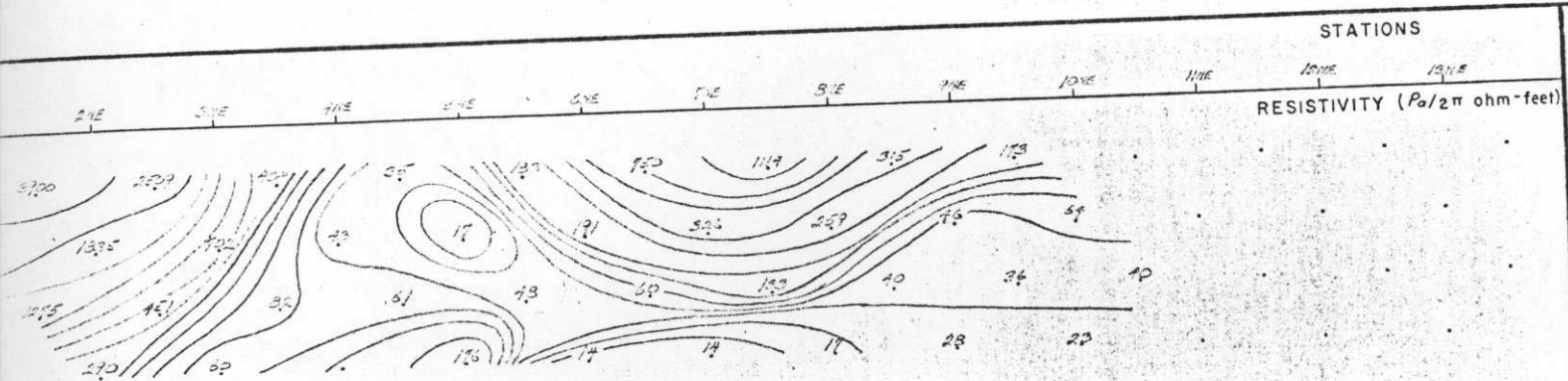
DATA BY: [Signature]

REMARKS:

LOGARITHMIC CONTOURS - 1.0, 1.5, 2, 3, 5, 7.5

I.P. ANOMALY - STRONG  
 MODERATE  
 WEAK

DWG. No



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

\_\_\_\_\_ PROJECT

LINE 3A1021W

LEGEND

ARRAY: ·DIPOLE - DIPOLE  
 UNIT: P-650  
 FREQUENCIES: 0.2, 0.5, 1, 2, 5, 10 Hz  
 SCALE: 1 Inch = 151 Ft.  
 DATE: 24 July 1973  
 DATA BY: CS  
 REMARKS:

LOGARITHMIC CONTOURS — 1.0, 1.5, 2, 3, 5, 7.5  
 I.P. ANOMALY — STRONG   
 MODERATE   
 WEAK

DWG. No. \_\_\_\_\_

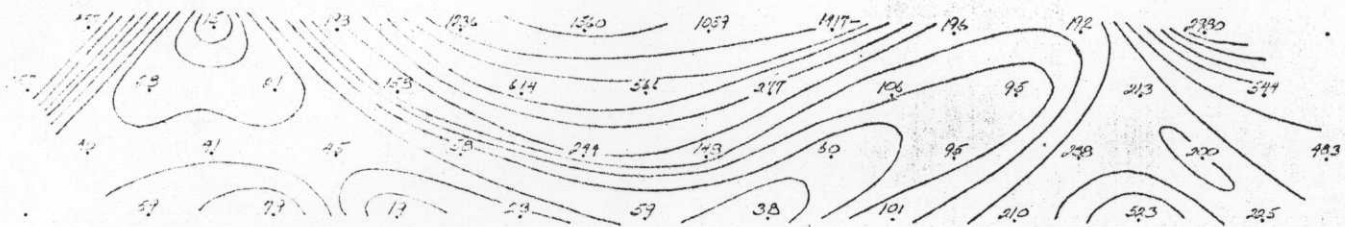




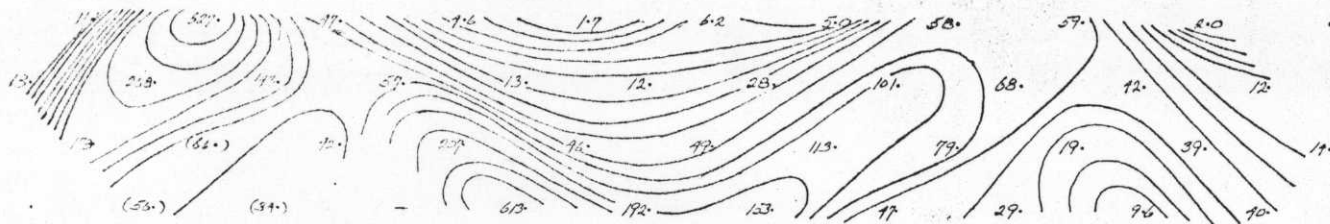
STATIONS

11F 6E 21E 41E 57E 69E 71E 81E 91E 101E 111E

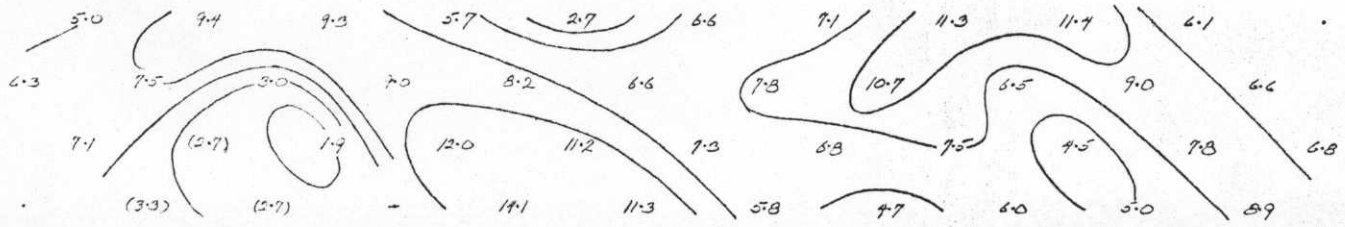
RESISTIVITY ( $\rho_a/2\pi$  ohm-feet)



METAL FACTOR (M.F.)



% FREQUENCY EFFECT (P.F.E.)



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

1 RAM PROJECT

LINE 40-02

LEGEND

- ARRAY: DIPOLE - DIPOLE
- UNIT: P-660
- FREQUENCIES: 0.2, 0.5, 1, 2, 4, 8
- SCALE: 1 Inch = 151 ft
- DATE: 09 July 1978
- DATA BY: FA [Signature]
- REMARKS:

LOGARITHMIC CONTOURS - 1.0, 1.5, 2, 3, 5, 7.5  
 I.P. ANOMALY - STRONG   
 MODERATE   
 WEAK

DWG. No. \_\_\_\_\_

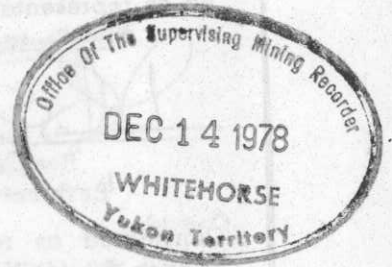




A F F I D A V I T



I, Robert E. Van Tassell, of Whitehorse, in the Yukon Territory, Exploration Superintendent, do solemnly declare:



1.

That I am duly appointed agent of United Keno Hill Mines Limited, and except where otherwise stated have a personal knowledge of the facts and matters herein, and swear to the value of work contained in Appendix A.

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.

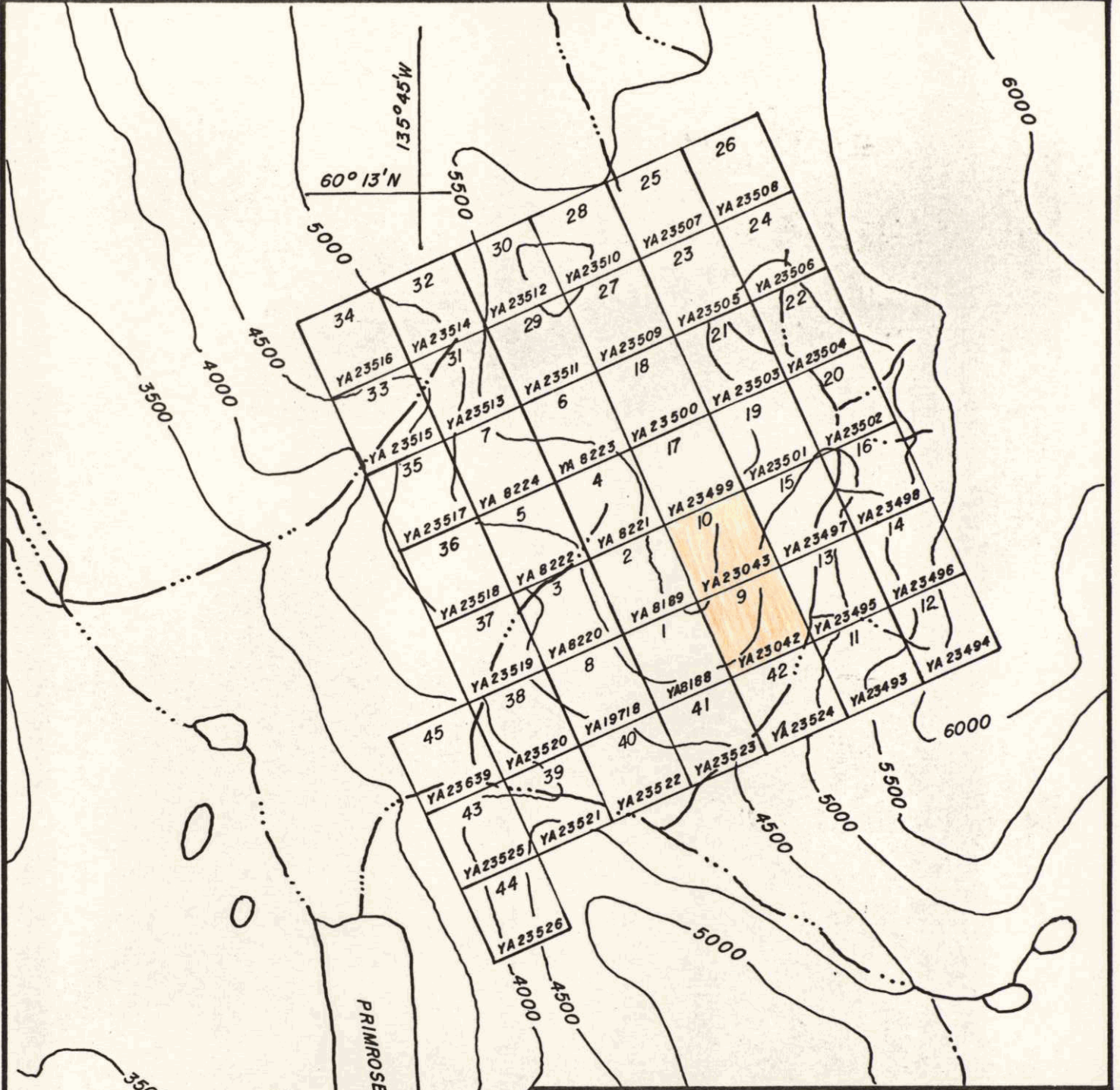


Declared before me at  
WHITEHORSE, in  
The Yukon Territory,  
this 12 day of  
DECEMBER 1978.

Robert E. Van Tassell

Richard Jay  
Notary Public

090405



|  |                    |
|--|--------------------|
| <b>UNITED KENO HILL MINES LTD.</b><br>EXPLORATION DEPARTMENT<br>WHITEHORSE — YUKON |                    |
| <b>RAM CLAIM GROUP</b>   |                    |
| Mining District  | Whitehorse         |
| N.T.S. Sheet No.   | 105 - D - 4        |
| Scale  | 1 inch to 1/2 mile |
| Drawn by   | R. E. V.           |
| Date   | 21 / 11 / 78       |