

42A11SW0237 2.7358 TISDALE

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REPORT ON AN INDUCED POLARIZATION SURVEY

on

Part of the HOLLINGER ARGUS LTD. Property  
for  
Labrador Exploration

Tisdale Township, Group #1  
Porcupine Mining Division  
Ontario

by

R.S. Middleton, P.Eng.

October 26, 1984

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P4N 7W8



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## INTRODUCTION

An induced polarization - resistivity survey was carried out during August 1984 over a group of 12 claims in Tisdale Township held by Hollinger Argus Ltd. The survey was carried out by Robert S. Middleton Exploration Services Inc. of Timmins using a sophisticated Scintrex IPR-11 receiver and a Scintrex TSQ-3, 3 kw generator.

The survey was undertaken to verify some of the previously detected horizontal loop electromagnetic anomalies and to test for the presence of disseminated sulfide zones which might have associated gold mineralization.

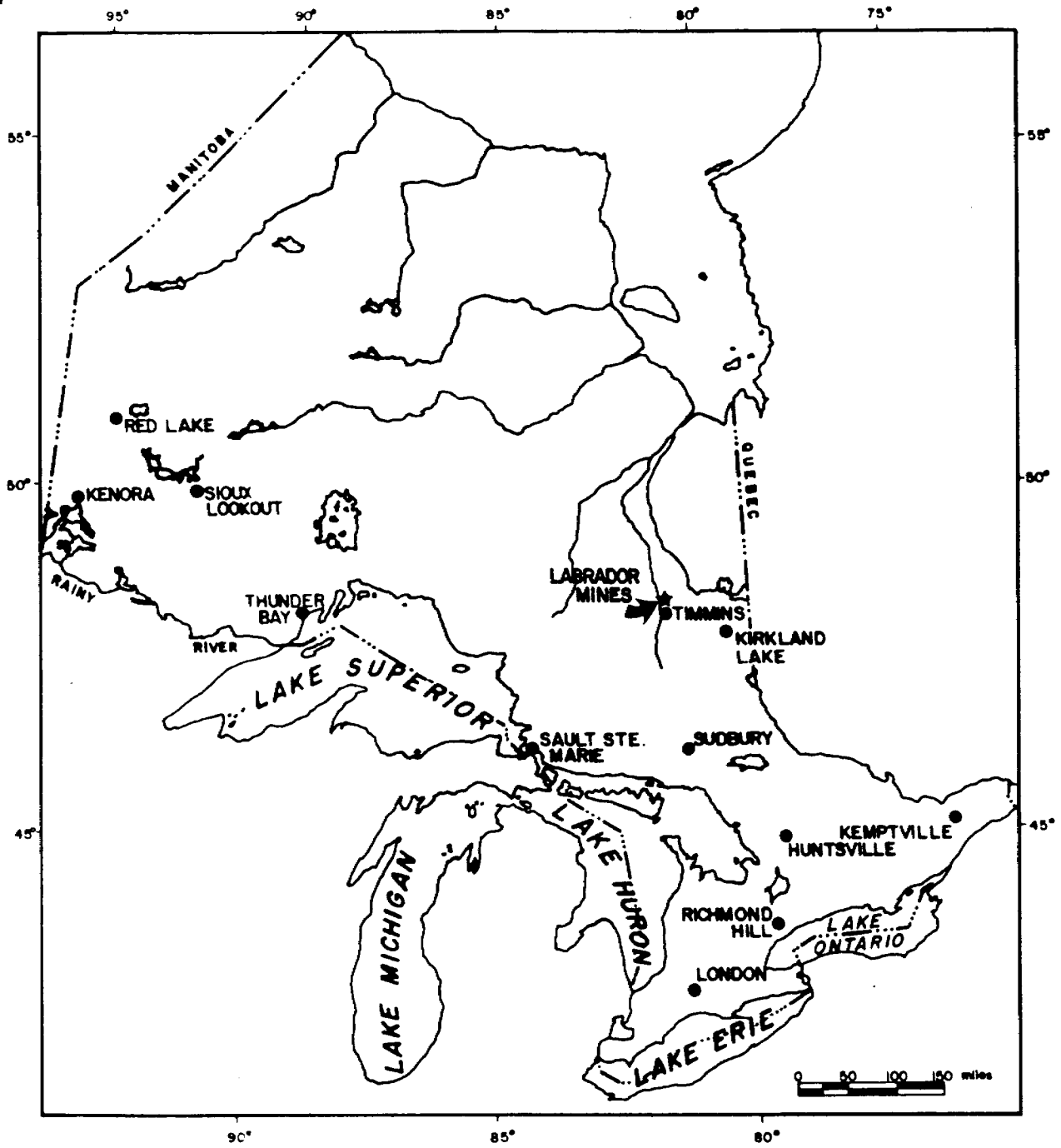
The survey was successful in confirming the horizontal loop EM anomalies and actually gave a better understanding as to their source. With the exception of conductors D, K, and L from Hollingers VLF EM survey, none of the VLF-EM anomalies were detected. These conductors correspond to main horizontal loop anomalies.

### Property

While Hollinger has extensive land holdings in the area, the claims covered by this survey were P594781 - 85 inclusive, 594788 - 93 inclusive.

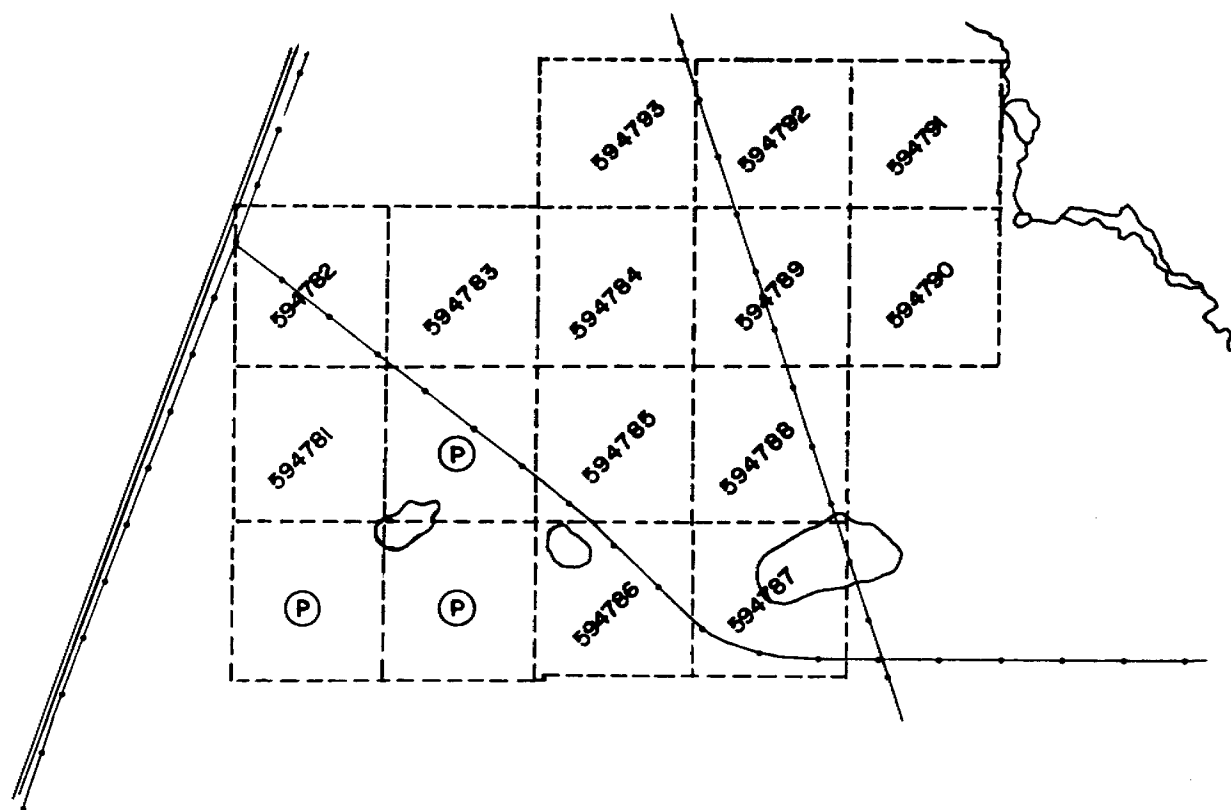
### Location and Access

Very good access to the property is afforded by travelling north along Highway 655 for 7 km from its junction with Highway 101 between Timmins and Schumacher. A network of gravel roads



PROVINCE OF ONTARIO

REVISIONS	<b>ROBERT S. MIDDLETON EXPLORATION SERVICES INC.</b>		
	for	<b>LABRADOR MINES</b>	
	Title	Tisdale Township	
		<b>PROPERTY LOCATION MAP</b>	
		Fig. 1	
	Date: Oct. 1984	Scale: 1:100,000 N.T.S.	
	Drawn: C.G.	Approved:	File: M-66



REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for	LABRADOR MINES	
	Title	TISDALE TOWNSHIP CLAIM LOCATION MAP	
			Fig. 2
	Date July 1984	Scale 1:20,000	N.T.S.
	Drawn c.g.	Approved	File M-66

traverse most of the western part of the property while the eastern is traversed by a major north trending power line.

#### Topography & Vegetation

The majority of the property is covered by a moderately thick sequence of glacial sands and gravels.

#### Previous Exploration

No attempt was made to document the previous work carried out in the area, however, it is known that the Hollinger Argus have undertaken horizontal loop EM and VLF EM surveys over the same grid area as was covered by this survey.

#### PROPERTY GEOLOGY

Tisdale Township in which the property lies was mapped by S.A. Ferguson on behalf of the Ontario Department of Mines between 1956 and 1958. The published map (2075) shows that little is known about the bedrock geology due to the paucity of outcrops. It does show one outcrop of basalt occurs on the property and shows a probable band of ultramafic rocks based on interpretation of available geophysical data. Diamond drilling and other exploration work has expanded the understanding of the geology of this part of the township but it is not within the scope of this report to expand on this work.

## SURVEY PROCEDURE, INSTRUMENTATION & STATISTICS

The induced polarization survey was carried out using a Scintrex IPR-11 receiver and a Scintrex TSQ-3 (3kw) transmitter. An "a" spacing of 25m was used and dipoles n=1, 2, 3, 4 were read in a pole dipole array. This gave coverage to a theoretical depth of approximately 50 metres which certainly appears to have been sufficient to explore to the bedrock surface in all parts of the property. The only significant problem encountered in the course of the survey was caused by very high contact resistance caused by the dry and porous sand.

The IPR-11 records a series of 10 time windows after the shut off of the pulse and the 7th time window was plotted on the pseudo sections which accompany this report. This time window is the 690-1050 millisecond time window after the shut off of the pulse. Copies of the instrument specifications are given in the appendix.

A total of 2,223 readings were taken at 560 stations. A total of 14,450 metres of line was covered in the course of the survey. Lines were read over all claims at 100 metre intervals and readings were taken at 25 metre intervals.



#### INTERPRETATION AND RECOMMENDATIONS

An eastward trending chargeability anomaly which corresponds in part with a horizontal loop EM conductor is located on the south central part of the property, one quarter to one half mile from the southern boundary. The broad chargeability zone (8-20 mv/v) is due to a wide unit of graphitic argillite that has resistivities in the 100-200 ohm metre range. In the vicinity of the conductor itself, the resistivities decrease to 50-100 ohm metres (see line 9E, 500N) to 12E on 5N.

The mafic volcanics to the side of the argillite zone have resistivities in the order of 1000 - 2000 ohm metres. The main chargeability anomaly extends east through line 13E/500 - 600N, 14E/600 - 675N, 15E/600 - 700N, 16E/550 - 775N, and 17E/500N. The anomaly splits on 17E with a branch occurring at 650N in an area of moderate resistivities. This part may be a carbonate-pyrite zone and could be drilled at 7N/L17E, -45° south. The argillite continues east (ie) 19E/8N where it shows as a low resistivity zone moderate chargeabilities. The zone may terminate at L21E/8N.

A second chargeability anomaly trend occurs parallel to the main IP trend at 3N/L10E, 350N-4N/L11E, 350N/L12E. This zone could represent another argillite zone or a disseminated pyrite zone in sediments and/or tuffs. Since the corresponding resistivities are in the 300 ohm metre range, this zone could be

considered to be argillite. A drill hole on line 11E/425N drilled south -45° would test this horizon.

A second hole is recommended at 600N - 625N on 11E to complete a cross section of the main argillite horizon and test for the possibility of a carbonate horizon on the north side of the argillite. The possibility exists that a gold bearing pyrite horizon may occur between the two IP anomalies so the drill section should be planned to properly cover this stratigraphy.

A power line effect occurs on line 19E 900-950N.

Respectfully Submitted,

A handwritten signature in cursive script, appearing to read 'R. Middleton'.

R.S. Middleton, P.Eng.

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1957 Mountjoy Township; Ontario Department of Mines  
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G.R. 58, 177p. accompanied by Map 2075,  
Scale 1" = 1000 feet.
- Pyke, D.R.  
1982 Geology of the Timmins Area, District of Cochrane,  
Ontario Geology Survey, Report 219, 141p.  
accompanied by Map 2455, Scale 1:50,000.

CERTIFICATION

I, Robert S. Middleton, P.Eng., of 136 Cedar Avenue South, in the City of Timmins, Province of Ontario, certify as follows concerning the Hollinger Argus Ltd. property and dated October 26, 1984:

- 1) I am a member in good standing of:
  - a) Geological Association of Canada (FGAC)
  - b) The Association of Professional Engineers of Ontario
  - c) European Association of Exploration Geophysicists
  - d) Society of Exploration Geophysicists
  - e) Canadian Institute of Mining and Metallurgy
- 2) I am a graduate of the Michigan Technological University, Houghton, Michigan, U.S.A. with a B.S. degree in Applied Geophysics obtained in 1968, and an M.S. degree in Geophysics in 1969.
- 3) I have been practising my profession in Canada, occasionally in the United States, Central America, Europe and South Africa for the past 14 years.

Dated this October 26, 1984  
TIMMINS, Ontario



Robert S. Middleton, P.Eng.

A P P E N D I X

New from Scintrex  
for the 1980 SEG

# IPR-11

Broadband Time Domain  
IP Receiver

## Function

The IPR-11 Broadband Time Domain IP Receiver is principally used in electrical (EIP) and magnetic (MIP) induced polarization surveys for disseminated base metal occurrences such as porphyry copper in acidic intrusives and lead-zinc deposits in carbonate rocks. In addition, this receiver is used in geoelectrical surveying for deep groundwater or geothermal resources. For these latter targets, the induced polarization measurements may be as useful as the high accuracy resistivity results since it often happens that geological materials have IP contrasts when resistivity contrasts are absent. A third application of the IPR-11 is in induced polarization research projects such as the study of physical properties of rocks.

Due to its integrated, microprocessor-based design, the IPR-11 provides a large amount of induced polarization transient curve shape information from a remarkably compact, reliable and flexible format. Data from up to six potential dipoles can be measured simultaneously and recorded in solid state memory. Then, the IPR-11 outputs data as: 1) visual digital display, 2) digital printer profile or pseudo-section plots, 3) digital printer listing, 4) a cassette tape record or 5) to a modem unit for transmission by telephone. Using software available from Scintrex, all spectral IP and EM coupling parameters can be calculated on a desk top or mainframe computer.

Because it can measure, record, calculate resistivity and output useful, broadband data in the field which are compatible with later computer processing using Scintrex software, the IPR-11 is the heart of a new, highly efficient, integrated system for conducting spectral induced polarization surveys.

The IPR-11 is designed for use with the Scintrex line of transmitters, primarily the TSQ series current and waveform stabilized models. Scintrex has been active in induced polarization research, development, manufacture, consulting and surveying for over thirty years and offers a full range of time and frequency domain instrumentation as well as all accessories necessary for IP surveying.

## Major Benefits

Following are some of the major benefits which you can derive through the key features of the IPR-11.

**Speed up surveys.** The IPR-11 is primarily designed to save you time and money in gathering spectral induced polarization data

For example, consider the advantage in gradient, dipole-dipole or pole-dipole surveying with multiple 'n' or 'a' spacings, of measuring up to six potential dipoles simultaneously. If the specially designed Multidipole Potential Cables are used, members of a crew can prepare new dipoles at the end of a spread while

measurements are underway. When the observation is complete, the operator walks only one dipole length and connects to a new spread leaving the cable from the first dipole for retrieval by an assistant.

Simultaneous multidipole potential measurements offer an obvious advantage when used in drillhole logging with the Scintrex DHIP-2 Drillhole IP/Resistivity Logging Option.

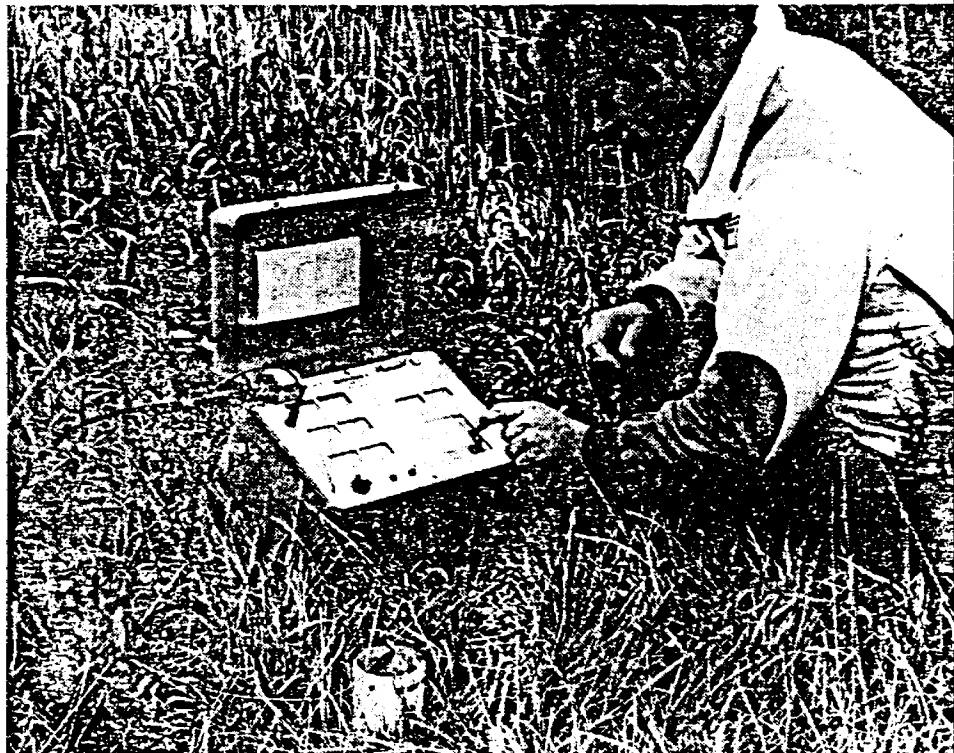
The built-in, solid state memory also saves time. Imagine the time that would be taken to write down line number, station number, transmitter and receiver timings and other header information as well as data consisting of SP, Vp and ten IP parameters for each dipole. With the IPR-11, a record is filed at the touch of a button once the operator sees that the measurement has converged sufficiently.

The IPR-11 will calculate resistivity for you. Further time will then be saved when the IPR-11 begins plotting your data in profile or pseudo-section format in your base camp on a digital printer. The same printer can also be used to make one or more copies of a listing of the day's results. If desired, an output to a cassette tape recorder can be made. Or, the IPR-11 data memory can be output directly into a modem, saving time by transmitting data to head office by telephone line and by providing data which are essentially computer compatible.

If the above features won't save as much time as you would like, consider how the operator will appreciate the speed in taking a reading with the IPR-11 due to: 1) simple keyboard control, 2) resistance check of six dipoles simultaneously, 3) fully automatic SP buckout, 4) fully automatic Vp self ranging, 5) fully automatic gain setting, 6) built-in calibration test circuits, and 7) self checking programs. The amount of operator manipulation required to take a great deal of spectral IP data is minimal.

Compared with frequency domain measurements, where sequential transmissions at different frequencies must be made, the time domain measurement records broadband information each few seconds. When successive readings are stacked and averaged, and when the pragmatic window widths designed into the IPR-11 measurement are used, full spectral IP data are taken in a minimum of time.

**Improved interpretation of data.** The quasi-logarithmically spaced transient windows are placed to recover the broadband information that is needed to calculate the standard spectral IP parameters with confidence. Scintrex offers its SPECTRUM software package which can take the IPR-11 outputs and generate the following standard spectral IP parameters: m, chargeability; T, time constant and C, exponent.



# IPR-11

## Broadband Time Domain IP Receiver

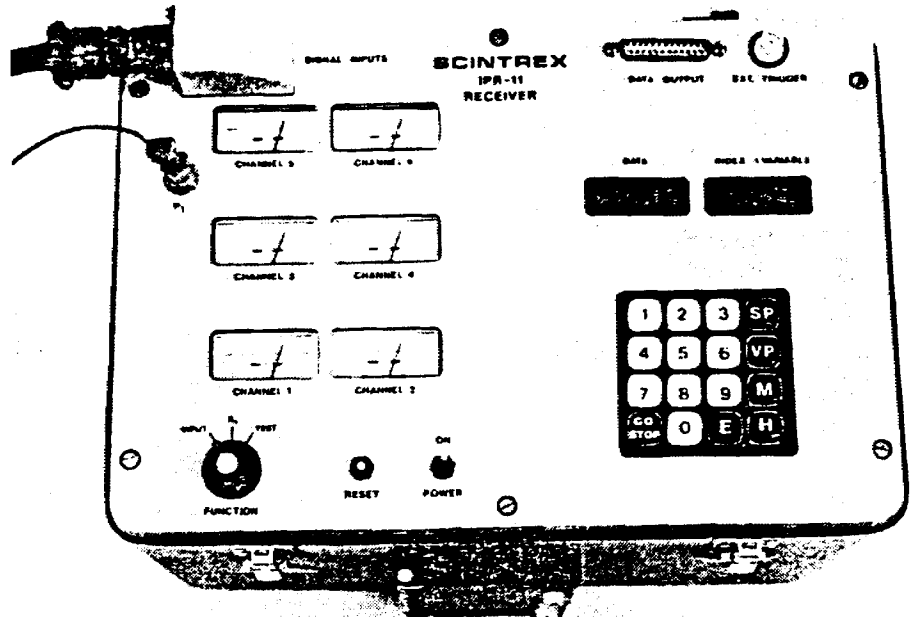
Interpretability of spectral IP data are improved since time domain measurements are less affected by electromagnetic coupling effects than either amplitude or phase angle frequency domain measurements, due to the relatively high frequencies used in the latter techniques. In the field, coupling free data are nearly always available from the IPR-11, by simply using chargeability data from the later transient windows. Then, in the base camp or office, the Scintrex SPECTRUM computer program may be used to resolve the EM component for removal from the IP signal. The electromagnetic induction parameters may also be interpreted in order to take advantage of the information contained in the EM component.

A further advantage of the IPR-11 in interpreting spectral IP responses is the amount of data obtainable due to the ability to change transmitted frequencies (pulse times) and measurement programs by keypad entry.

**Enhance signal/noise.** In the presence of random (non-coherent) earth noises, the signal/noise ratio of the IPR-11 measurements will be enhanced by  $\sqrt{N}$  where N is the number of individual readings which have been averaged to arrive at the measurement. The IPR-11 automatically stacks the information contained in each pulse and calculates a running average for Vp and each transient window. This enhancement is equivalent to a signal increase of  $\sqrt{N}$ , or a power increase of N. Since N can readily be 30 or more (a 4 minute observation using a 2 second on/off waveform), the signal/noise improvement realized by the IPR-11 cannot be practically achieved by an increase in transmitter power. Alternatively, one may employ much lower power transmitters than one could use with a non-signal enhancement receiver.

The automatic SP program bucks out and corrects completely for linear SP drift. There is no residual offset left in the signal as in some previous time domain receivers. Data are also kept noise free by: 1) automatic rejection of spheric spikes, 2) 50 or 60 Hz powerline notch filters, 3) low pass filters and 4) radio frequency (RF) filters. In addition, the operator has a good appreciation of noise levels since he can monitor input signals on six analog meters, one for each dipole. Also, with the Optional Statistical Analysis Program, he can monitor relative standard error continuously on the digital display and then file these calculations in the data memory when the observation is complete.

Noise free observations can usually be made using the self-triggering feature of the IPR-11. The internal program locks into the waveform of the signal received at the first dipole (nearest a current electrode) and prevents mistripping at any point other than within the final 25 percent of the current on time. In particularly noisy areas, however, synchronization of



the IPR-11 and transmitter can be accomplished either by a wire link or using a high stability. Optional Crystal Clock which fits onto the lid of the instrument.

**Reduce Errors.** The solid state, fail-safe memory ensures that no data transcription errors are made in the field. In base camp, data can be output on a digital printer or a read-after-write cassette tape deck and played back onto a digital printer for full verification. The fact that the IPR-11 calculates resistivity from recorded Vp and I values also reduces error.

The self check program verifies program integrity and correct operation of the display, automatically, without the intervention of the operator. If the operator makes any one of ten different manipulation errors, an error message is immediately displayed.

The Multidipole Potential Cables supplied by Scintrex are designed so there is no possibility of connecting dipoles to the wrong input terminals. This avoids errors in relating data to the individual dipoles. The internal calibrator assures the operator that the instrument is properly calibrated and the simple keypad operation eliminates a multitude of front panel switches, simplifying operation and reducing errors.

### Features

**Six Dipoles Simultaneously.** The analog input section of the IPR-11 contains six identical differential inputs to accept signals from up to six individual potential dipoles. The amplified analog signals are converted to digital form, multiplexed and recorded with header information identifying each group of dipoles. Custom-made multidipole cables are available for use with any electrode array.

**Memory.** Compared with tape recording, the IPR-11 solid state memory is free from problems due to dirt, low temperatures, moving parts, humidity and mechanical shock. A battery installed on the memory board ensures memory retention if main batteries are low or if the main batteries are changed. The following data are automatically recorded in the memory for each potential dipole: 1) receiver timing used, 2) transmitter timing used, 3) number of cycles measured, 4) self potential (SP), 5) primary voltage (Vp) and 6) ten transient IP windows (M<sub>i</sub>). In addition, the operator can enter up to seventeen, four digit numerical headers which will be filed with each set of up to six dipole readings. Headers can include, for example, line number, station number, operator code, current amplitude, date, etc.

In the standard data memory, up to 200 potential dipole measurements can be recorded. Optional Data Memory Expansion Blocks can be installed in the IPR-11 to increase memory capacity in blocks of about 200 dipoles each to a total of approximately 800 dipoles. Memory capacities will be reduced somewhat if the Optional Statistical Analysis Program is used.

**Memory Recall.** Any reading in memory can be recalled, by simple keypad entry, for inspection on the visual display. For example, the operator can call up sequential visual display of all the data filed for the previous observation or for the whole data memory.

**Carefully Chosen Transient Windows.** The IPR-11 records all the information that is really needed to make full interpretations of spectral IP data, to remove EM coupling effects and to calculate EM induction parameters. Ten quasi-logarithmically spaced transient windows are measured simultaneously for each potential dipole over selectable total receive times of 0.2, 1.0, 2.0 or 4.0 seconds.

After a delay from the current off time of  $t$ , the width of each of the first four windows is  $t$ , of the next three windows is  $6t$  and of the last three windows is  $12t$ . The  $t$  values are 3, 15, 30 or 60 milliseconds. Thus, for a given dipole, up to forty different windows can be measured by using all four receive times. The only restriction is, of course, that the current off time must exceed the total measuring time. Since  $t$  is as low as 3 milliseconds and since the first four windows are narrow, a high density of curve shape information is available at short times (high frequencies) where it is needed for confident calculation of the spectral IP and EM coupling parameters.

**Calculates Resistivity.** The operator enters the current amplitude and resistivity geometry (K) factors in header with each observation. If the K factors remain the same, only a code has to be entered with each observation. Then, using the recorded  $V_p$  values, the IPR-11 calculates the apparent resistivity value which can be output to the printer or cassette tape recorder.

**Normalizes for time and  $V_p$ .** The IPR-11 divides the measured area in each transient window by the width of the window and by the primary voltage so that values are read out in units of millivolts/volt (mils).

**Signal Enhancement.**  $V_p$  and M values are continuously stacked and averaged and the display is updated for each two cycles. When the operator sees that the displayed values have adequately converged, he can terminate the reading and file all values in memory.



Time domain IP transmitted waveform

**$V_p$  Integration.** The primary voltage is sampled over 50 percent or more of the current on (T) time (depending on receive time) and the result is normalized for time. This long integration helps overcome random noise. On standard Scintrex transmitters, T can be 1, 2, 4 or 8 seconds.

**Digital Display.** Two, four digit LCD displays are used to display measured or manually entered data, data codes and alarm codes.

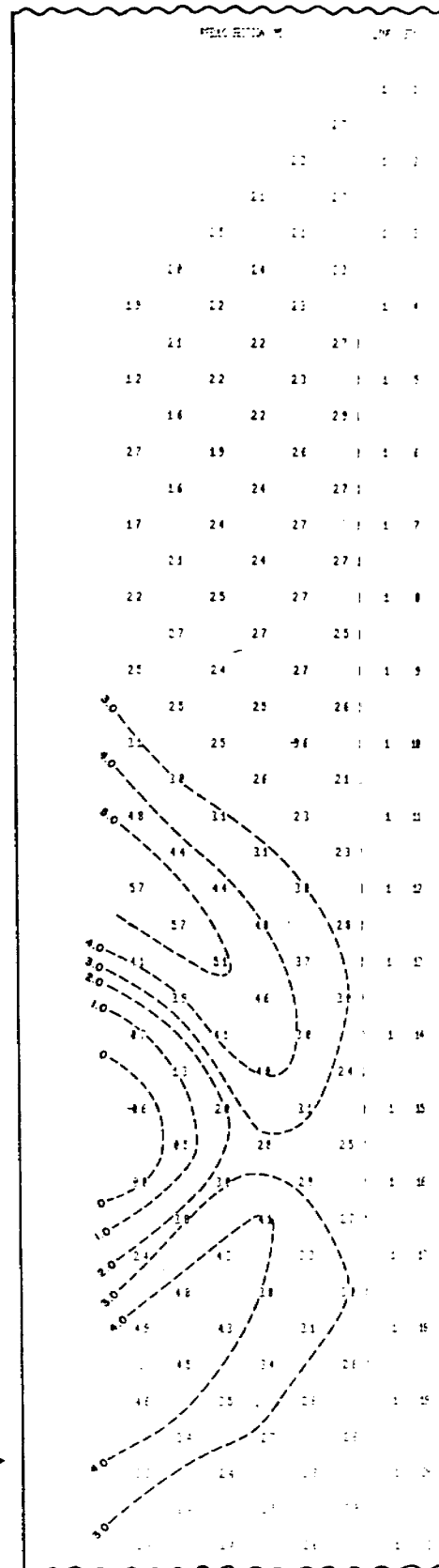
**Automatic Profile Plotting.** When connected to a digital printer such as the Scintrex DP-4 having an industry standard RS-232C, 7 bit ASCII serial data port, data can be plotted in a base camp. The IPR-11 is programmed to plot any selected transient window and resistivity in pseudo-section or profile form. Line orientation is maintained consistent, that is station numbers on profiles are sorted in ascending number. In the profile plot, the scale for resistivity is logarithmic with 1 to 10,000 ohm-meters in four decades with another four decades of overrange both above and below. The chargeability scale is keypad selectable. In the pseudo-section plot, any one chargeability window can be presented in conventional pseudo-section form.

**Printed Data Listing.** The same digital printer can be used to print out listings of all headers and data recorded during the day's operation. Several copies can be made for mailing to head office or for filing in case copies are lost. Baud rate is keypad selectable at 110, 300 or 1200 baud, depending on the printer used.

**Cassette Tape Output.** A cassette recorder having an industry standard RS-232C, 7 bit ASCII serial interface may be used for storing data directly from the IPR-11. If all six dipoles are used, then 16, 80 character blocks of data per observation are transferred at a rate of 1200 baud. The storage capacity of one side of cassette tape is approximately 1400 blocks or about 90 six dipole observations. The MFE Model 2500 is recommended since it has a read-after-write feature for data verification.

The recording format is compatible with the Texas Instruments 'Silent 700' terminals and records are made on standard digital grade cassettes. Once a cassette tape record is made, the tape can be played back onto the DP-4 Digital Printer for an additional verification that the data on tape are correct.

*Pseudo-section printout on DP-4 Digital Printer. Chargeability data are shown for the sixth transient window ( $M_6$ ) for the dipole-dipole array and six 'n' spacings. Line number and station number are also recorded. The contours have been hand drawn. Resistivity results can be plotted in a similar manner.*





# IPR-11

## Broadband Time Domain IP Receiver

SENE: 0 2MAV/DIV CHL:3 SLO:5

4.0	- 0 +	4.0	0.0	LINE	STN
E+1	E+2	E+3	E+4		
:	R	0	:	1	1
:	R	0	:	1	2
:	R	0	:	1	3
:	R	0	:	1	4
:	R	0	:	1	5
:	R	0	:	1	6
:	R	0	:	1	7
:	R	0	:	1	8
:	R	0	:	1	9
:	R	0	:	1	10
:	R	0	:	1	11
:	R	0	:	1	12
:	R	0	:	1	13
:	R	0	:	1	14
:	R	0	:	1	15
:	R	0	:	1	16
:	R	0	:	1	17
:	R	0	:	1	18
:	R	0	:	1	19
:	R	0	:	1	20

Profile printout on DP-4 Digital Printer.

K:	1	3	00	8292	1893	3773	6265	9423	1304	8292
	14									
1:	8.2	6.3	5.3	4.6	3.4	2.3	1.7	1.3	0.9	0.7
	728.2	-3	5.71E+3							
2:	8.5	6.4	5.2	4.6	3.3	2.3	1.7	1.3	0.9	0.7
	281.6	0	4.7E+3							
3:	7.9	6.0	5.0	4.4	3.3	2.2	1.7	1.2	0.9	0.7
	73.55	-4	3.46E+3							
4:	7.7	5.9	4.9	4.3	3.2	2.2	1.7	1.3	0.9	0.7
	44.57	4	3.43E+3							
5:	7.1	5.8	4.1	3.5	2.5	1.6	1.1	1.0	1.2	1.0
	22.43	-2	2.64E+3							
6:	9.5	7.8	5.8	5.1	3.7	2.7	2.2	1.5	0.6	0.4
	13.45	0	3.2E+3							

**Modem.** Data in the IPR-11 memory can be output directly into a modem near the field operation and transmitted by telephone through a modem terminal in or near head office, where data can be output directly onto a digital printer or tape recorder. In this way a geophysicist in head office can receive regular transmissions of data to improve supervision and interpretation of the data from field projects and no output device other than the modem is required in the field.

**External Circuit Check.** Six analog meters on the IPR-11 are used to check the contact resistance of individual potential dipoles. Poor contact at any one electrode is immediately apparent. The continuity test uses an AC signal to avoid electrode polarization.

**Self Check Program.** Each time the instrument is turned on, a check sum verification of the program memory is automatically done. This verifies program integrity and if any discrepancy is discovered, an error signal appears on the digital display. Part of the self check program checks the LCD display by displaying eight ones followed sequentially by eight twos, eight fours and eight eights.

**Manipulation Error Checks.** Alarm codes appear on the digital display if any of the following ten errors occur: tape dump errors, illegal keypad entry, out of calibration or failed memory test, insufficient headers, header buffer full, previous station's data not filed, data memory full, incorrect signal amplitude or excessive noise, transmit pulse time incorrect and receiver measurement timing incorrect.

**Internal Calibrator.** By adjustment of the function switch, an internal signal generator is connected across the inputs to test the calibration of all six signal inputs for SP, Vp and all M windows simultaneously. Then the software checks all parameters. If there is an error in one or more parameters, an alarm code appears on the display. The operator can then push a key to scan all parameters of all input channels to determine where the error is.

◀ Data listing output on DP-4 Digital Printer. Header information is shown in the first two lines. In this case, data are for Line 1, Station 3. Transmitted current is 80 mA. Next are the resistivity K factors for the six dipoles. 8292 indicates that receive and transmit times are each 2 seconds. The last header item records that fact that 14 cycles were stacked. Following the header are the geophysical data for six dipoles which were measured simultaneously. For each dipole, the values for the 10 transient windows are shown on one line. The next line shows Vp and SP in mV/V and resistivity. 5.71 E + 3 indicates that the calculated resistivity is 5.71 x 10<sup>3</sup> ohm-metres

**Automatic SP Correction.** The initial self potential buckout is entirely automatic - no adjustment need be made by the operator. Then, throughout the measurement, the IPR-11 slope correction software makes continual corrections, assuming linear SP drift during a transmitted cycle. There is no residual SP offset included in the chargeability measurement as in some previous time domain receivers.

**Automatic Vp Self Ranging.** There is no manual adjustment for Vp since the IPR-11 automatically adjusts the gain of its input amplifiers for any Vp signal in the range 100 microvolts to 6 volts.

**Spheric Noise Rejection.** A threshold, adjustable by keypad entry over a linear range of 0 to 99, is used to reject spheric pulses. If a spheric noise pulse above the set threshold occurs, then the IPR-11 rejects and does not average the current two cycles of information. An alarm code appears on the digital display. If the operator continues to see this alarm code, he can decide to set the threshold higher.

**Powerline and Low Pass Filter.** An internal switch is used to set the IPR-11 for either 50 or 60 Hz powerline areas. The notch filter is automatically switched out when the 0.2 second receive time is used since the filters would exclude EM signals.

**RF Filter.** An additional filter in the input circuits ensures that radio frequency interference is eliminated from the IPR-11 measurement.

**Input Protection.** If signals in excess of 6 V and up to 50 V are applied to any input circuit, zener diode protection ensures that no damage will occur to the input circuits.

**Synchronization.** In normal operation, the IPR-11 synchronizes itself on the received waveform, limiting triggering to within 2.5% of the current on time. However, for operation in locations where signal/noise ratios are poor, synchronization can be done either by running a cable from the transmitter or by using the Optional Crystal Clock which can be installed in the lid of the IPR-11.

**Optional Statistical Analysis.** As an option, the IPR-11 can be provided with software to do statistical analysis of some parameters. The relative standard error is calculated, displayed on the LCD display and may be recorded in data memory. The total capacity of data memory will be reduced, depending on the extent of statistical data recorded. If the Optional Statistical Analysis Program is chosen, some thought should be given to purchasing one or more blocks of Data Memory Expansion.

**Software for EM Coupling Removal.** In transient measurements, the EM coupling component occurs closest to the current off time (i.e. it is primarily in the early windows). Thus, it is

usually possible to obtain coupling-free IP data simply by using the later windows of the IPR-11 measurement program. If, however, full spectral information is desired, the data from the early windows must be corrected for the EM component. This can be done with confidence using a desk top or mainframe computer and the Scintrex SPECTRUM program.

**Software for Spectral IP Parameters.** Using the chargeability data from the ten quasi-logarithmically spaced IPR-11 windows, a desk top or mainframe computer and the Scintrex SPECTRUM program, spectral IP parameters can be calculated. The basis for this calculation as well as for the EM coupling removal calculation is discussed in a technical paper by H.O. Seigel, R. Ehrat and J. Brcic, given at the 1980 Society of Exploration Geophysicists Convention, entitled "Microprocessor Based Advances in Time Domain IP Data Collection and In-Field Processing".

#### Operation

In relation to the efficiency with which it can produce, memorize, calculate and plot data, the IPR-11 is quite simple to operate, using the following switches and keypad manipulations.

**Power On-Off.** Turned on to operate the instrument.

**Reset.** Resets the program to begin again in very poor signal/noise conditions.

**Function Switch.** Connects either the potential dipoles or the internal test generator to the

input amplifiers or connects the external circuit resistance check circuitry to the potential dipoles.

**Keypad.** The ten digit and six function keys are used to: 1) operate the instrument, 2) enter information, 3) retrieve any stored data item for visual display, and 4) output data on to a digital printer, cassette tape deck or modem. Examples of some of these manipulations, most of which are accomplished by three key strokes, follow. E is the general entry key.

A concise card showing the keypad entry codes is attached inside the lid of the IPR-11.

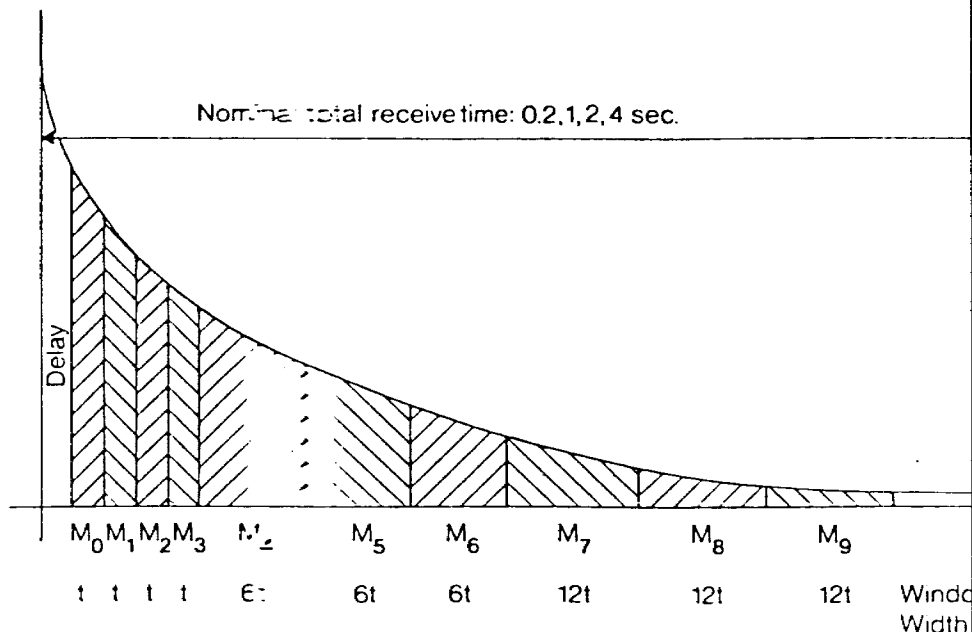
**Example 1.** Keying 99E commands the battery test. The result is shown on the digital display.

**Example 2.** Keying 90E tells the IPR-11 to use the 0.2 second receive time. 91, 92 and 94 correspond to the three other times.

**Example 3.** Keying 12M results in the display of the chargeability of the first dipole, window number 2, during the measurement. Similarly 6SP or 4 Vp would result in the display of the SP value in the sixth dipole or Vp in the fourth dipole respectively.

**Example 4.** Keying NNNNH, where N is a variable digit, records an item of header information. Seventeen such items can be entered with each file of up to six dipoles of data.

**Example 5.** 73E, 74E or 75E are used to output the data from the memory to the digital printer or modem at 110, 300 or 1200 baud respectively.



IPR-11 transient windows

# IPR-11

## Broadband Time Domain IP Receiver

### IPR-11 Options

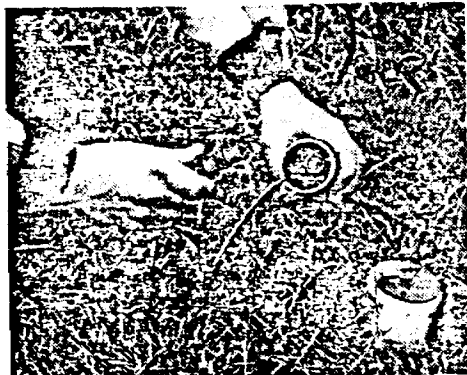
The following options are available for purchase with the IPR-11.

**Multidipole Potential Cables.** These cables are custom manufactured for each client, depending on electrode array and spacings which are to be used. They are manufactured in sections, with each section a dipole in length and terminated with connectors. For each observation, the operator need only walk one dipole length and connect a new section, in order to read a new six dipole spread. There is no need to move the whole spread. The connectors which join the cables are designed so that there is no possibility of connecting the wrong dipole to the wrong input amplifier. The outside jacket of these cables is rubber which is flexible at low temperatures. About 5 percent extra length is added to each section to ensure that the cable reaches each station.

**Data Memory Expansion Blocks.** The standard data memory of the IPR-11 allows for data for up to 200 dipole measurements to be recorded, assuming a common header for six dipoles. Up to three additional memory blocks can be installed in the instrument, each of about 200 dipole capacity.

**Statistical Analysis Program.** Scintrex can provide, in EPROM, a statistical program to give real time calculations of relative standard error of one or more parameters.

**Crystal Clock.** Scintrex can provide a high stability clock to synchronize the IPR-11 with a similar clock in the transmitter. This option is, however, only required for work in extremely noisy and/or low signal environments.



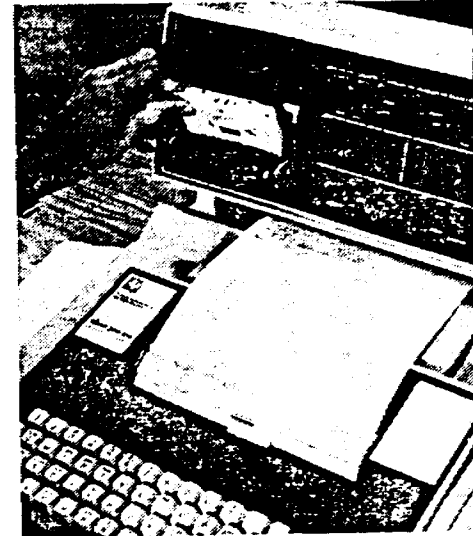
The takeouts of the Multidipole Potential Cables allow for connection to a porous pot or other electrode as well as for connection of the next section of cable, usually one dipole in length.

**Software.** Scintrex offers its SPECTRUM programs for EM coupling removal, calculation of EM induction factors and calculation of the spectral IP parameters.

**Digital Printer.** The Scintrex DP-4 Digital Printer is a modified Centronics Microprinter with an RS-232C, 7 bit ASCII serial port. It is a self contained module, including 110/230 V power supply, control electronics and printing mechanism. It produces copy on aluminum coated paper by discharging low voltages through tungsten styli. Characters are formed from the appropriate dots of a 5 x 7 dot matrix. All 96 standard ASCII characters are available, the paper width is 120 mm and 80 characters can be printed per line at a rate of up to 150 lines per minute.

**Cassette Tape Recorder.** The MFE Model 2500 with read-after-write verification is recommended. It has an RS-232C, 7 bit ASCII serial interface with a recording format compatible with the Texas Instruments 'Silent 700' terminals.

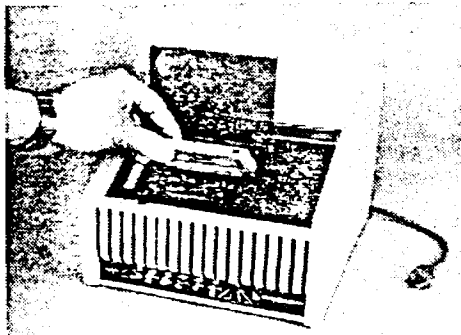
**Modem.** A number of modem units are available on the market which are compatible with the IPR-11. Scintrex would be pleased to recommend or supply such equipment if required.



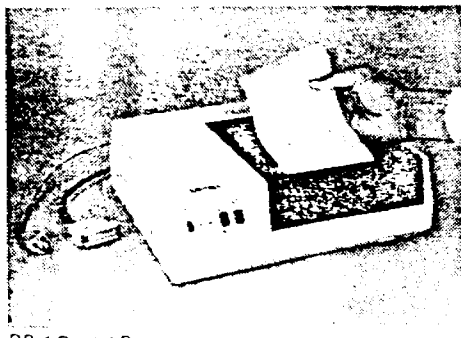
The cassette tape recording format of the IPR-11 is compatible with the Texas Instruments 'Silent 700' terminals which can be used for printing out, editing - copying tapes or transmitting data to a similar terminal using telephone lines.

# Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Input Potential Dipoles	1 to 6 simultaneously
Input Impedance	4 megohms
Input Voltage (Vp) Range	100 microvolts to 6 volts for measurement. Zener diode protection up to 50 V
Automatic SP Bucking Range	$\pm 1.5$ V
Chargeability (M) Range	0 to 300 mV/V (mils or 0/00)
Absolute Accuracy of Vp, SP and M	$\pm 3$ %
Resolution of Vp, SP and M	0.1%
IP Transient Program	Ten transient windows per input dipole. After a delay from current off of t, first four windows each have a width of t, next three windows each have a width of 6t and last three windows each have a width of 12t. The total measuring time is therefore 58t. t can be set at 3, 15, 30 or 60 milliseconds for nominal total receive times of 0.2, 1, 2 and 4 seconds.
Vp Integration Time	In 0.2 and 1 second receive time modes; 0.51 sec In 2 second mode; 1.02 sec In 4 second mode; 2.04 sec
Transmitter Timing	Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4 or 8 seconds with $\pm 2.5$ % stability are required.
Header Capacity	Up to 17 four digit headers can be stored with each observation.
Data Memory Capacity	Depends on how many dipoles are recorded with each header. If four header items are used with 6 dipoles of SP, Vp and 10 M windows each, then about 200 dipole measurements can be stored. Up to three Optional Data Memory Expansion Blocks are available, each with a capacity of about 200 dipoles.
External Circuit Check	Checks up to six dipoles simultaneously using a 31 Hz square wave and readout on front panel meters, in range of 0 to 200 k ohms.
Filtering	RF filter, spheric spike removal; switchable 50 or 60 Hz notch filters, low pass filters which are automatically removed from the circuit in the 0.2 sec receive time.
Internal Calibrator	1000 mV of SP, 200 mV of Vp and 24.3 mV/V of M provided in 1 sec pulses
Digital Display	Two, 4 digit LCD displays. One presents data, either measured or manually entered by the operator. The second display; 1) indicates codes identifying the data shown on the first display, and 2) shows alarm codes indicating errors.
Analog Meters	Six meters for; 1) checking external circuit resistance, and 2) monitoring input signals.
Digital Data Output	RS-232C compatible. 7 bit ASCII, no parity, serial data output for communication with a digital printer, tape recorder or modem.
Standard Rechargeable Power Supply	Eight Eveready CH4 rechargeable NiCad D cells provide approximately 15 hours of continuous operation at 25°C. Supplied with a battery charger, suitable for 110/230 V, 50 to 400 Hz, 10 W.



Industry standard cassette recorders such as this MFE-2500 can be connected directly to the IPR-11.



DP-4 Digital Printer

# Technical Description of the IPR-11 Broadband Time Domain IP Receiver

<b>Disposable Battery Power Supply</b>	At 25°C, about 40 hours of continuous operation are obtained from 8 Eveready E95 or equivalent alkaline D cells.  At 25°C, about 16 hours of continuous operation are obtained from 8 Eveready 1150 or equivalent carbon-zinc D cells.
<b>Dimensions</b>	345 mm x 250 mm x 300 mm, including lid.
<b>Weight</b>	10.5 kg, including batteries.
<b>Operating Temperature Range</b>	-20 to +55°C, limited by display.
<b>Storage Temperature Range</b>	-40 to +60°C.
<b>Standard Items</b>	Console with lid and set of rechargeable batteries, 2 copies of manual, battery charger.
<b>Optional Items</b>	Multidipole Potential Cables, Data Memory Expansion Blocks, Statistical Analysis Program, Crystal Clock, SPECTRUM Program.
<b>Shipping Weight</b>	25 kg includes reusable wooden shipping case.

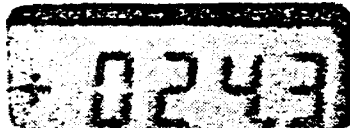
## SCINTREX

222 Snidercroft Road  
Concord Ontario Canada  
L4K 1B5

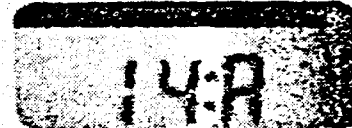
Telephone: (416) 669-2280  
Cable: Geoscint Toronto  
Telex: 06-964570

Geophysical and Geochemical  
Instrumentation and Services

DATA



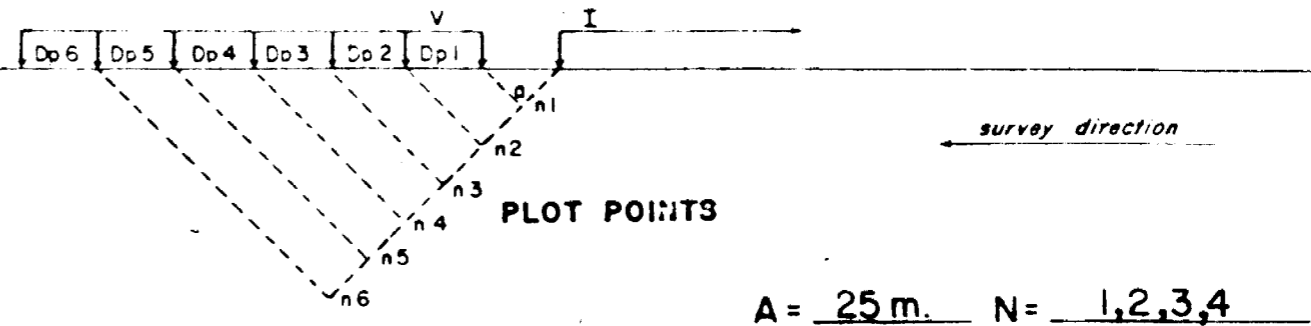
INDEX | VARIABLE



*IPR-11 LCD displays, actual size*

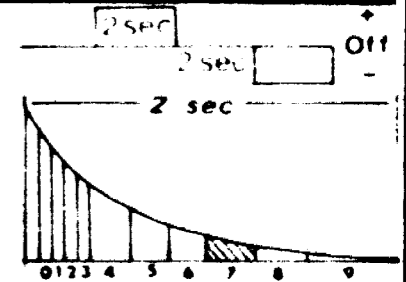
INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 50'

Total Reading: 12



REVISIONS

ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.

for

LABRADOR MINES

Title TISDALE PROPERTY  
Porcupine Mining Division  
L 4 E

550N-600N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: C.G.

Approved:

File: M-66

RESISTIVITY ohm/m

600N

800N

343 418 312  
604 616 643 500  
875 848 829  
924 117 113 500

CHARGEABILITY mv/v

600N

800N

0.8 0.9 1.0  
0.8 0.9 1.1  
1.1 1.2 1.2  
0.9 1.1 1.1

RE

600N

12

CH

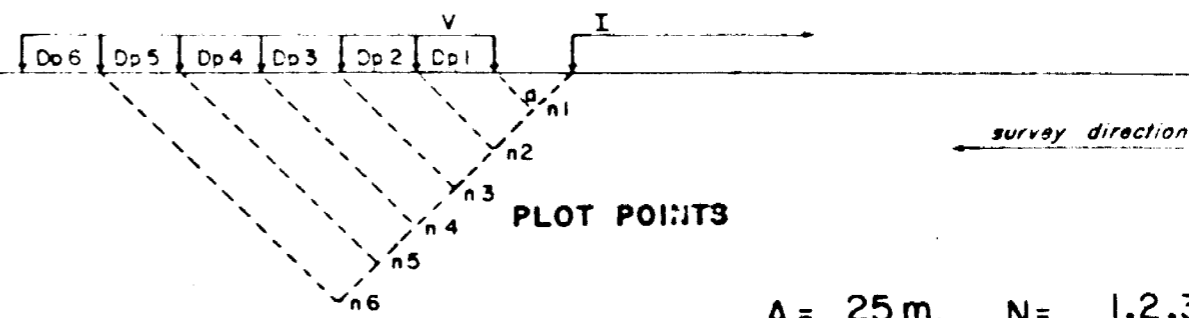
600N

1-  
0



INDUCED POLARIZATION

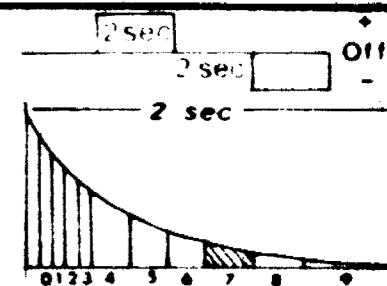
time domain mode  
POLE DIPOLE ARRAY



A = 25 m. N = 1,2,3,4

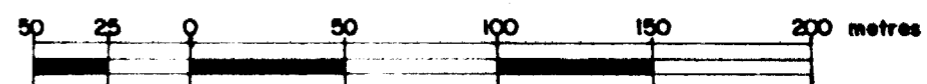
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 175

Total Reading: 32



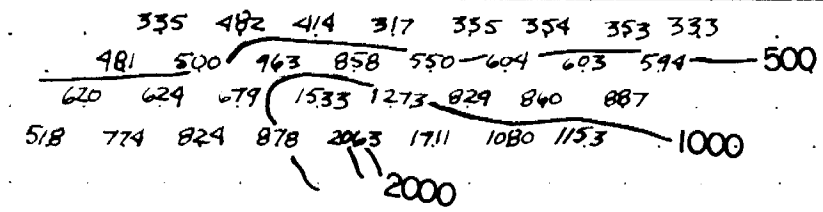
REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for LABRADOR MINES		
	Title TISDALE PROPERTY Porcupine Mining Division L 5 E		
	400N-575N		
	Date: AUG. 1984	Scale: 1:2500	N.T.S.:
	Drawn: C.G.	Approved:	File: M-66

RESISTIVITY ohm/m

400N

600N

800N

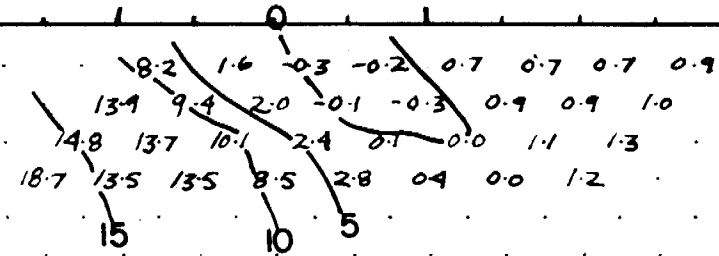


CHARGEABILITY mv/v

400 N

600N

800N



RE

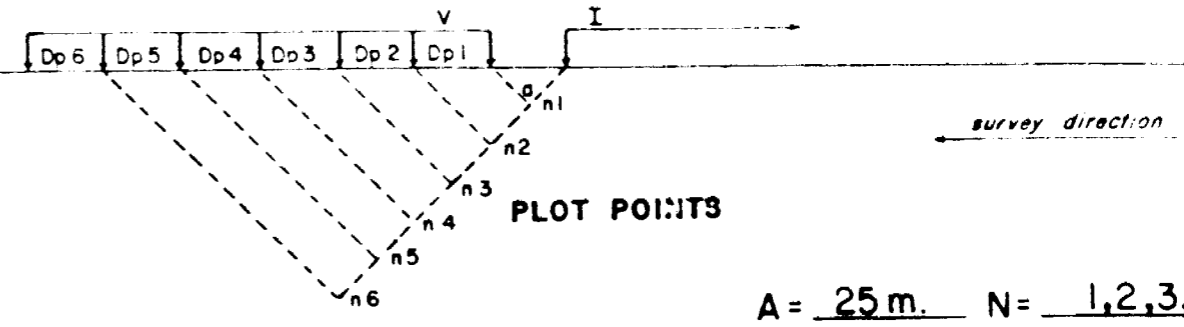
400N

CH

400 N

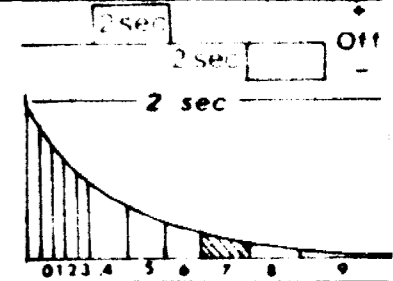
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



Total Line: 225

Total Reading: 32



## REVISIONS

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title **TISDALE PROPERTY  
Porcupine Mining Division  
L 6 E**

650N - 875N

Date: **AUG. 1984**

Scale: **1:2500**

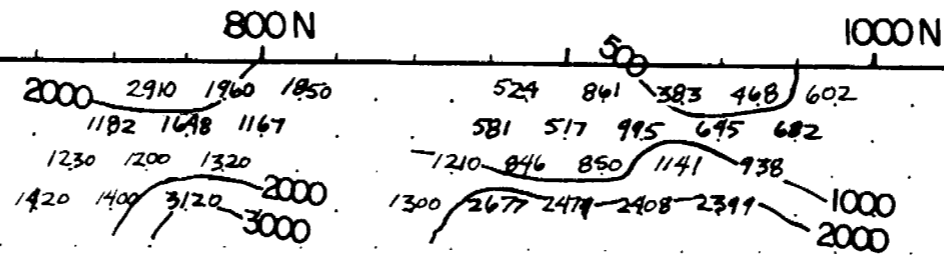
N.T.S.:

Drawn: **C.G.**

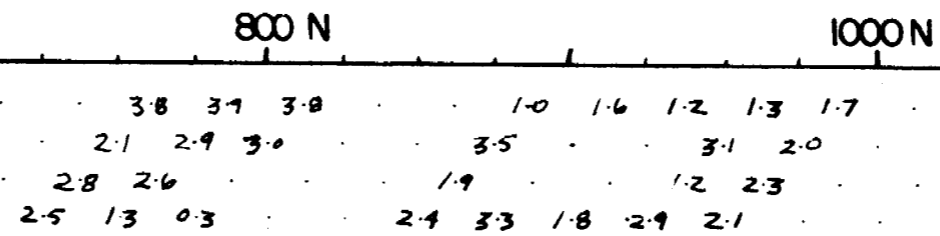
Approved:

File: **M-66**

RESISTIVITY ohm/m



CHARGEABILITY mv/v



RES

800 N

2000 2910 1960 1850  
 1182 1648 1167  
 1230 1200 1320  
 1420 1400 3120 2000  
 3000

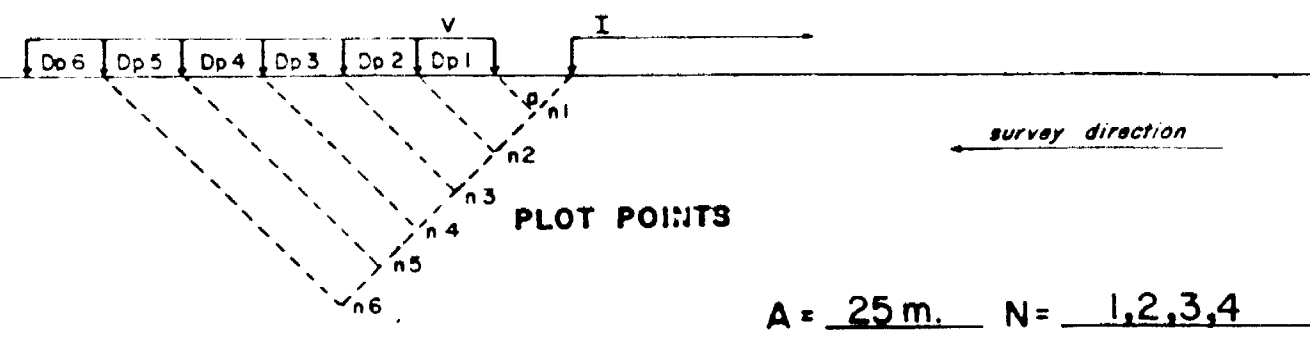
CHA

800 N

3.8 3.7 3.8  
 2.1 2.9 3.0  
 2.8 2.6  
 2.5 1.3 0.3

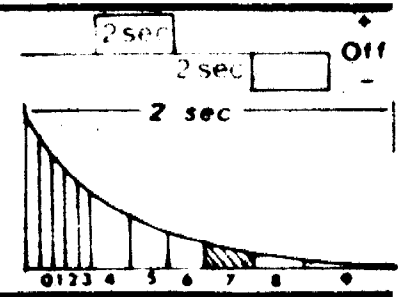
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 475' Total Reading: 28



REVISIONS	<b>ROBERT S. MIDDLETON EXPLORATION SERVICES INC.</b>		
	for <b>LABRADOR MINES</b>		
	Title <b>TISDALE PROPERTY Porcupine Mining Division L 7 E</b>		
	<b>300N - 775 N</b>		
	Date: <b>AUG. 1984</b>	Scale: <b>1:2500</b>	N.T.S.:
	Drawn: <b>C.G.</b>	Approved:	File: <b>M-66</b>

RESISTIVITY ohm/m

400 N

600 N

800 N

1000 N

380 363  
253 210  
239 180  
484 279

555 755  
167 282 500  
100 2 307  
259 267

1780 1700 1348  
930 945 755 1000  
1250 1810 1700 1000  
2000  
3000  
4000  
5000  
6000  
1410 1445 2020  
2000

?

CHARGEABILITY mv/v

400 N

600 N

800 N

1000 N

5 3.2 4.9  
10 11.5 10.2  
10 8.6 4.0  
12.3 12.4 5  
10 4.8 2.7 5  
17.9 23.3 20 15  
11.1 11.5 15

2.3 2.5 3.6  
12.0 9.7 15.2  
11.5 0.9 0.5  
3.2 -3.0 0.1



RES

400 N

	380	363	555	7
	253	210	167	282
	239	180	100	2
	484	279	259	267
				307

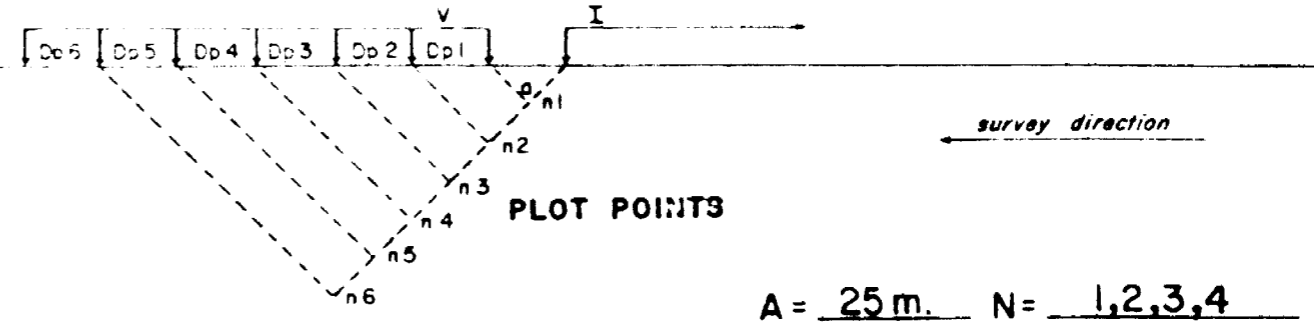
CHA

400N

5	3.2	4.9	10	4.8	2.3
10	11.5	10.2		17.9	23.3
10	8.6	4.0			
	12.3	12.4	5	17.1	11.5
					15

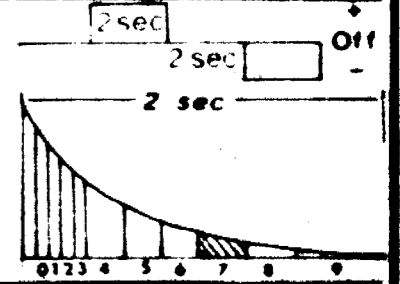
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



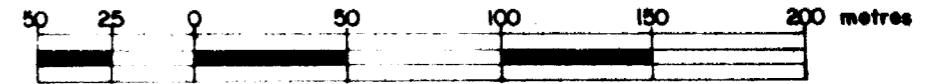
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 125

Total Reading: 20



## REVISIONS

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title

**TISDALE PROPERTY  
Porcupine Mining Division  
L 8 E**

425N-550N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: C.G.

Approved:

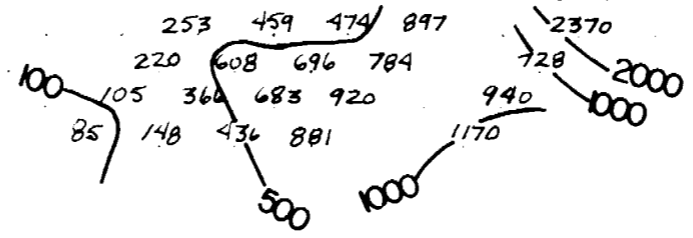
File: M-66

RESISTIVITY ohm/m

400N

600N

800N

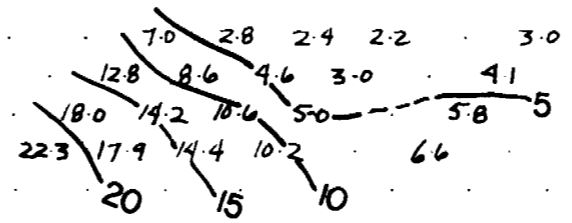


CHARGEABILITY mv/v

400N

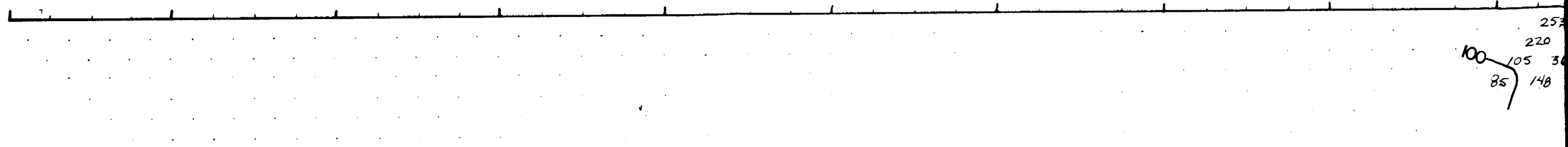
600N

800N



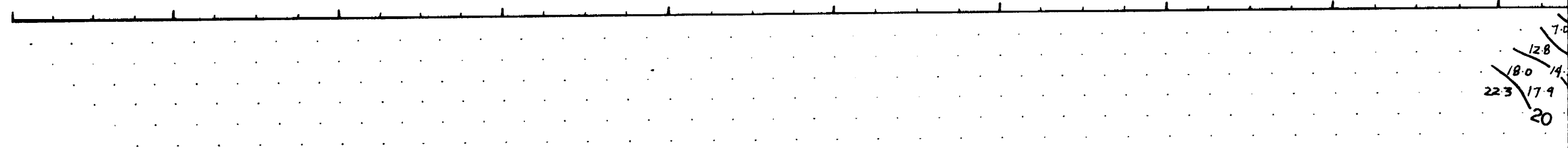
RES

400N



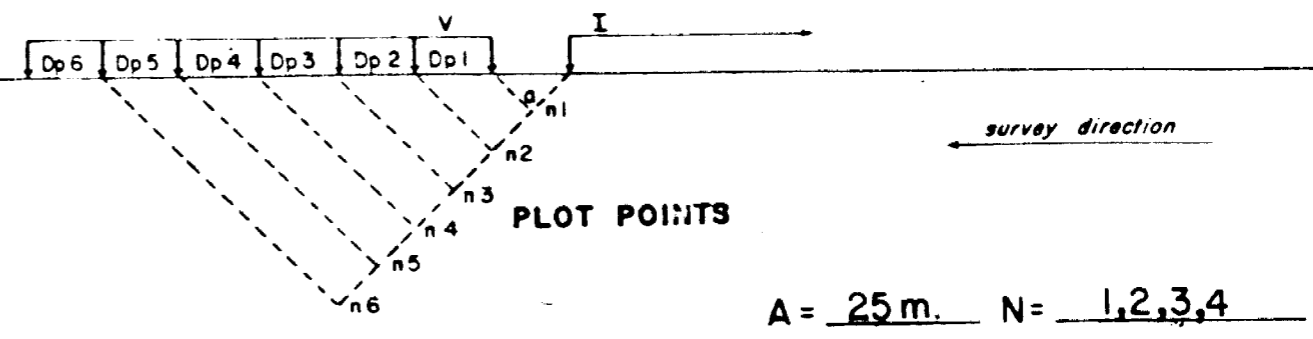
CHA

400N



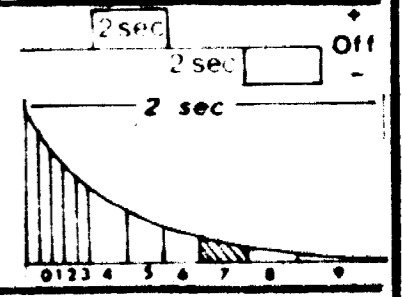
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY

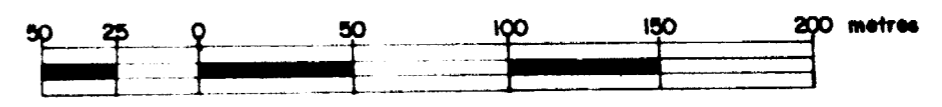


Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 450 Total Reading: 60

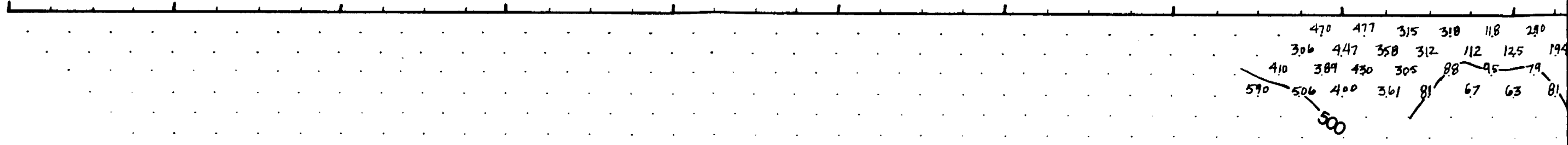


<b>REVISIONS</b>	<b>ROBERT S. MIDDLETON EXPLORATION SERVICES INC.</b>	
	for <b>LABRADOR MINES</b>	
	Title <b>TISDALE PROPERTY Porcupine Mining Division L 9 E</b>	
	<b>275N-725N</b>	
	Date: <b>AUG 1984</b>	Scale: <b>1:2500</b> N.T.S.:
	Drawn: <b>C.G.</b>	Approved: <b>File: M-66</b>



RE

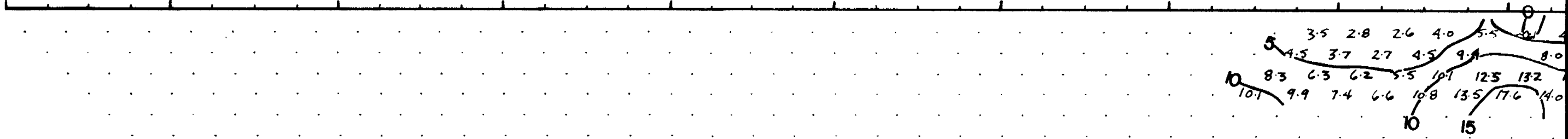
400 N



?

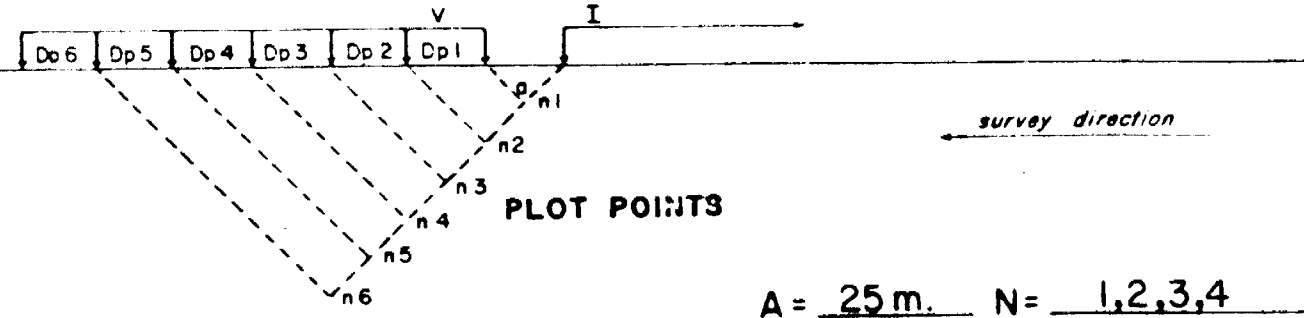
CHA

400 N



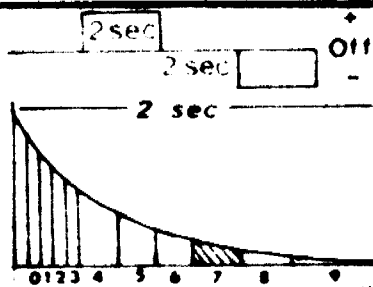
INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY

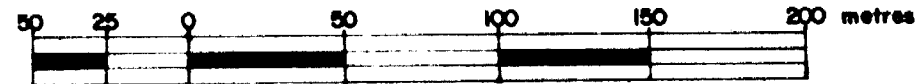


Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 400 Total Reading: 68



REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for LABRADOR MINES		
	Title TISDALE PROPERTY Porcupine Mining Division L I O E		
	150N-550N		
	Date: AUG. 1984	Scale: 1:2500	N.T.S.:
	Drawn: C.G.	Approved:	File: M-66

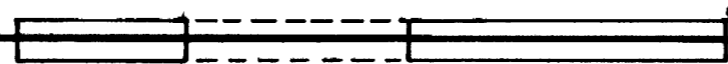
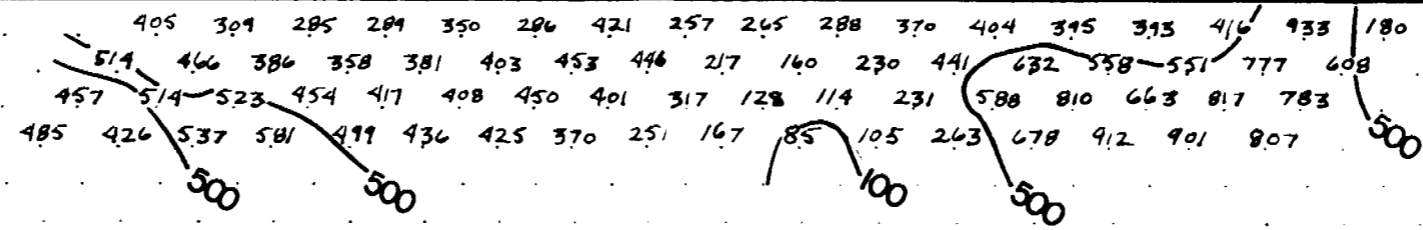


# RESISTIVITY ohm/m

200N

400N

600N

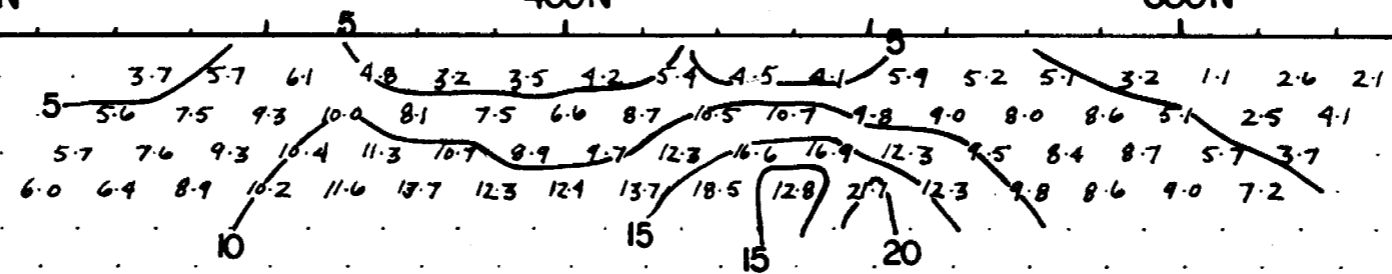


# CHARGEABILITY mv/v

200N

400N

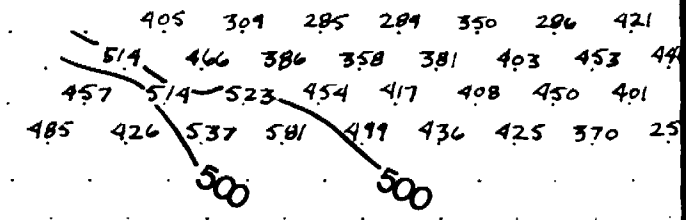
600N



RE

200N

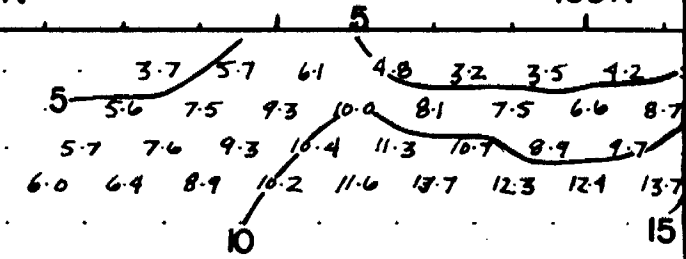
400N



CH

200N

400N

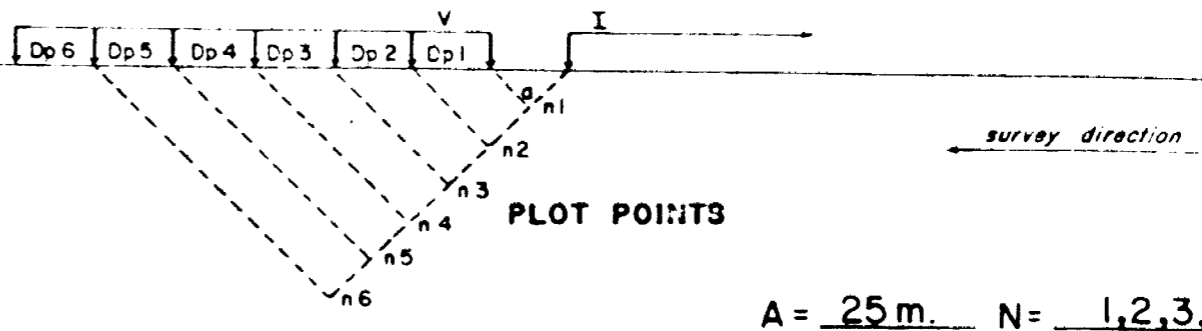


1200N

322 229 299  
392 492 440  
44-597 713 500  
742 795

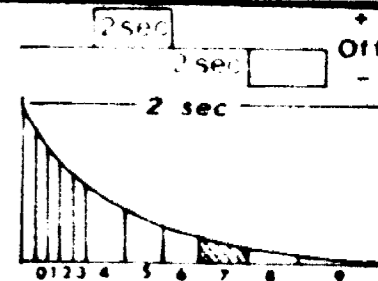
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



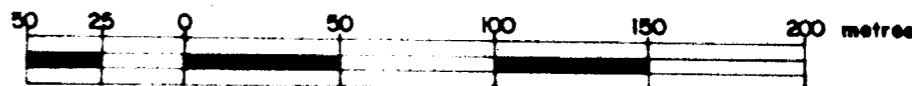
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



Total Line: 950

Total Reading: 120



1200N

0.9 1.2 1.4  
1.8 1.3 1.2  
2.3 2.2 2.0  
2.4 1.6

## REVISIONS

ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.

for

LABRADOR MINES

Title

TISDALE PROPERTY  
Porcupine Mining Division  
L I E

150N-1100N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: C.G.

Approved:

File: M-66

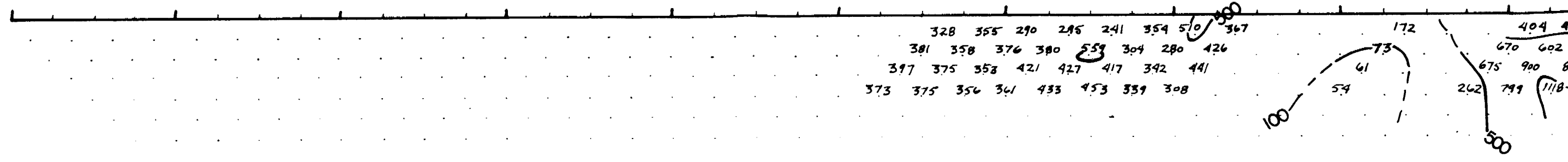


RES

200 N

400 N

600 N

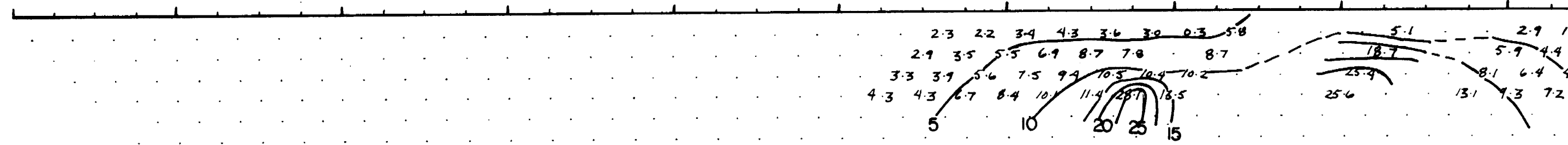


CHA

200 N

400 N

600 N

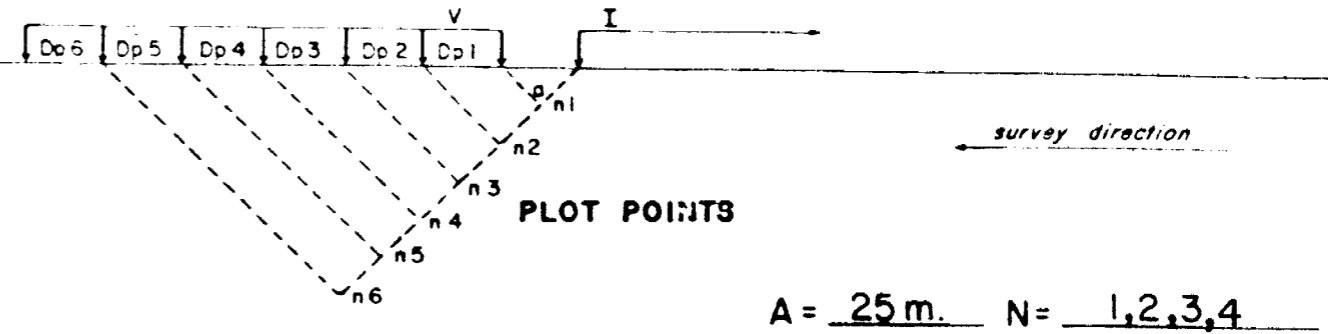


1200 N

220 237 215 273  
509 595 419 414  
970 599 655 500  
617 658 870

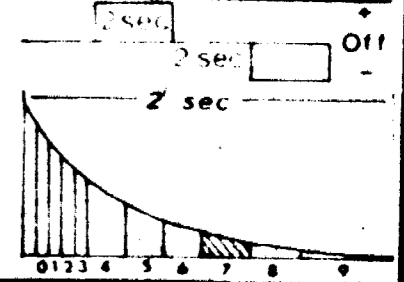
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7

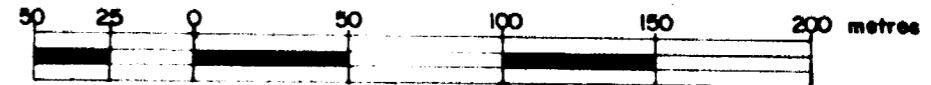


1200 N

5 12 14 14 14  
19 15 18 18  
7 20 16 18  
17 11 15

Total Line: 950

Total Reading: 156



## REVISIONS

ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.

for

LABRADOR MINES

Title TISDALE PROPERTY  
Porcupine Mining Division  
L 12 E

175N-1125N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: C.G.

Approved:

File: M-66

# RESISTIVITY ohm/m

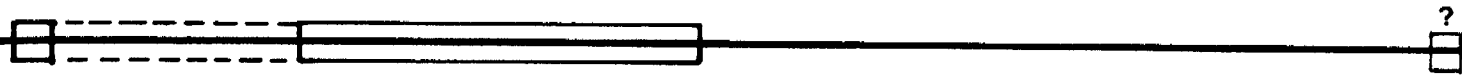
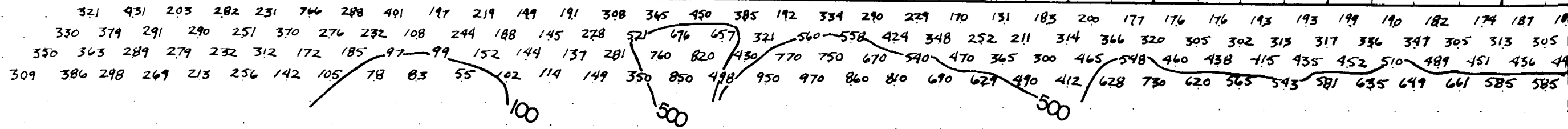
200 N

400 N

600 N

800 N

1000 N



# CHARGEABILITY mv/v

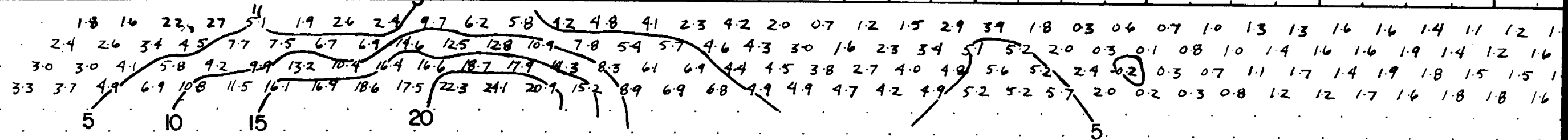
200 N

400 N

600 N

800 N

1000 N

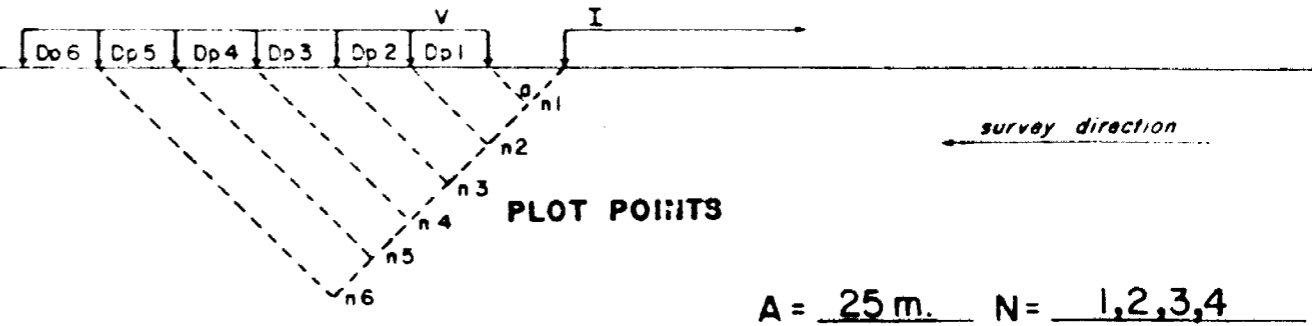






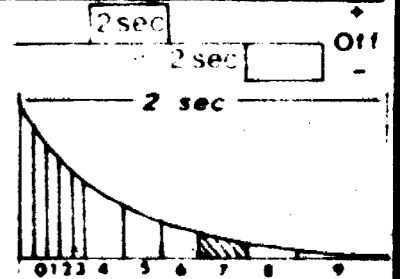
INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



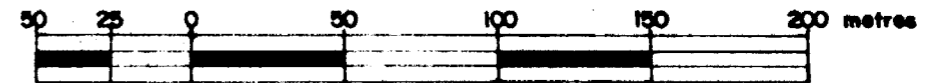
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 1125

Total Reading: 148



REVISIONS

ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.

for

LABRADOR MINES

Title TISDALE PROPERTY  
Porcupine Mining Division  
L 13 E

375N-1500N

Date: AUG. 1984	Scale: 1:2500	N.T.S.:
Drawn: W.P. / C.G.	Approved:	File: M-66

1600N

401 467 429 339  
576 620 688 469  
550 600 694 814 500  
851 577 843 954

1600N

0.9 1.1 0.5 0.5  
3.5 1.6 1.7 3.2  
1.6 2.4 2.4 2.8  
0.2 0.2 1.6 3.7

# RESISTIVITY ohm/m

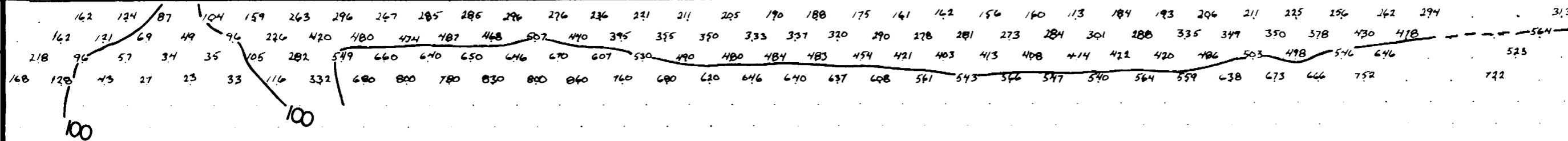
600 N

800 N

1000 N

1200 N

1400 N



# CHARGEABILITY mv/v

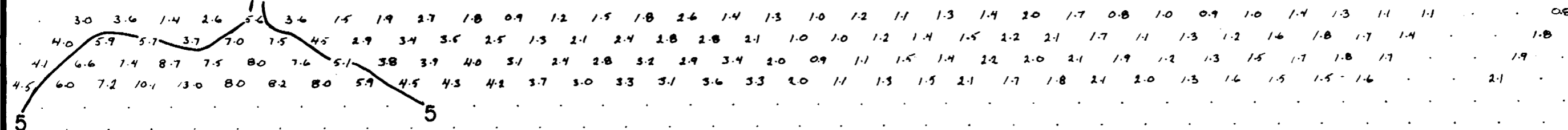
600 N

800 N

1000 N

1200 N

1400 N

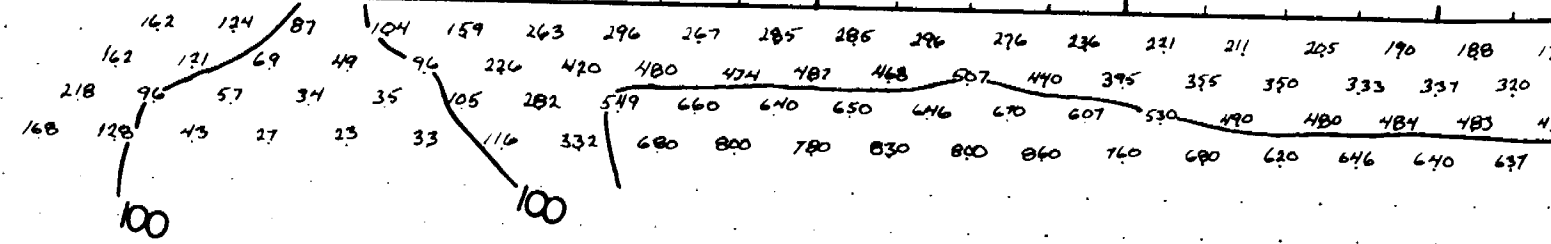


RES

400 N

600 N

800 N

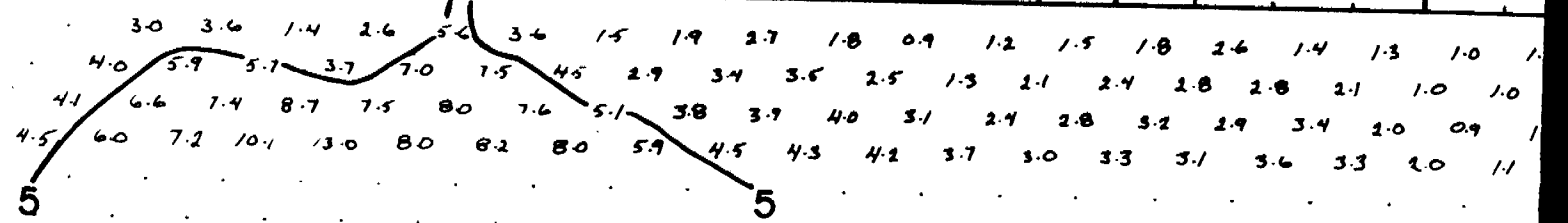


CHA

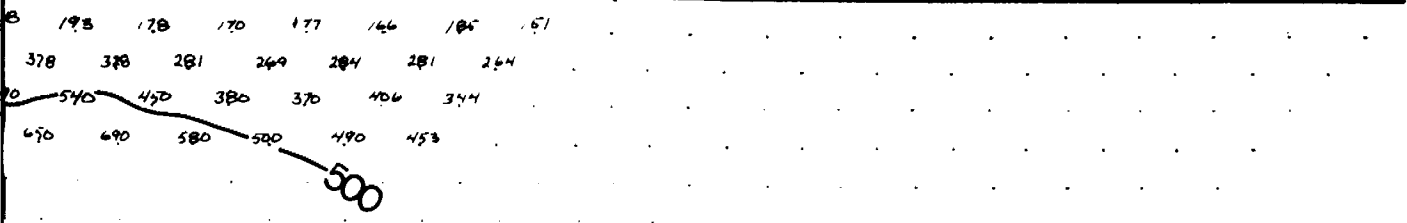
400 N

600 N

800 N

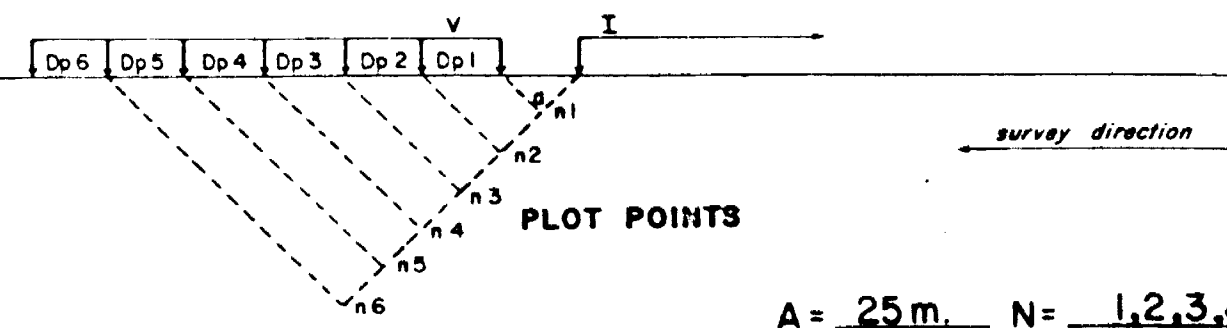


1600 N



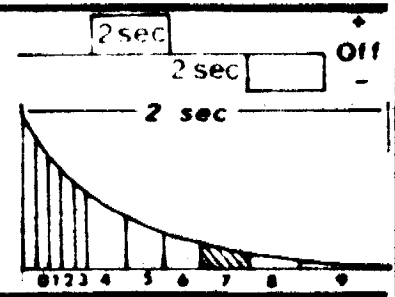
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7

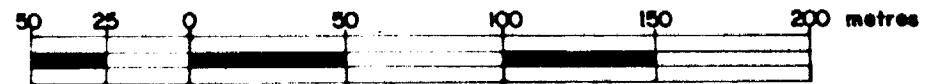


1600 N



Total Line: 1175

Total Reading: 163



REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for LABRADOR MINES		
	Title TISDALE PROPERTY Porcupine Mining Division L 14 E		
	325N-1500N		
	Date: AUG 1984	Scale: 1:2500	N.T.S.:
	Drawn: W.P./C.G.	Approved:	File: M-66

# RESISTIVITY ohm/m

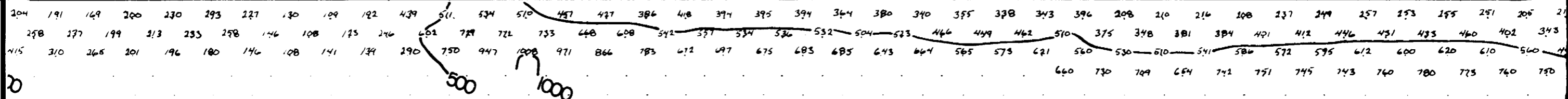
600 N

800 N

1000 N

1200 N

1400 N



# CHARGEABILITY mv/v

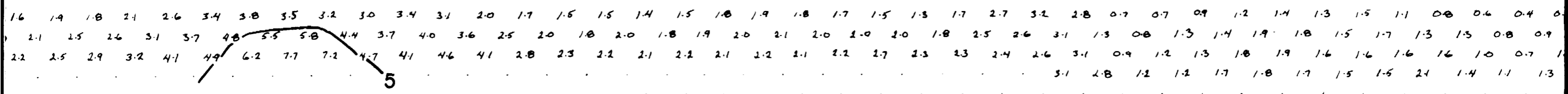
600 N

800 N

1000 N

1200 N

1400 N

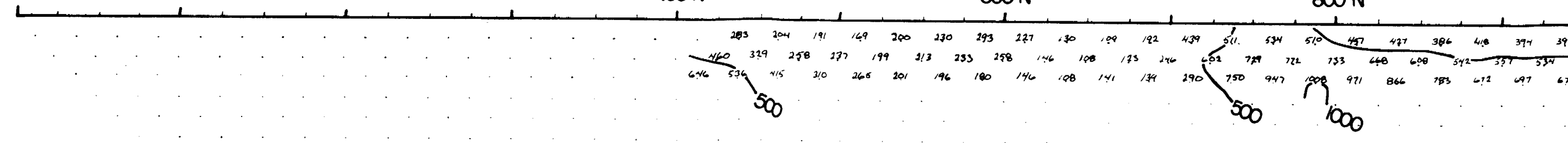


RES

400 N

600 N

800 N

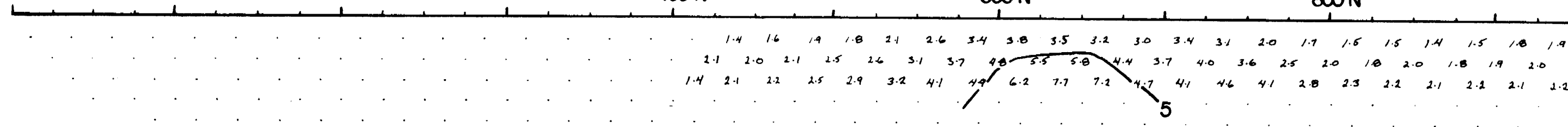


CHAR

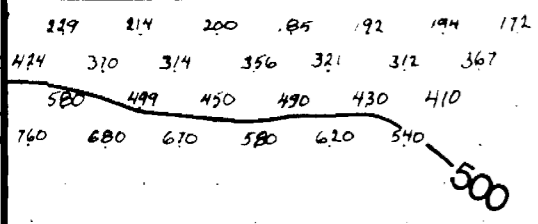
400 N

600 N

800 N

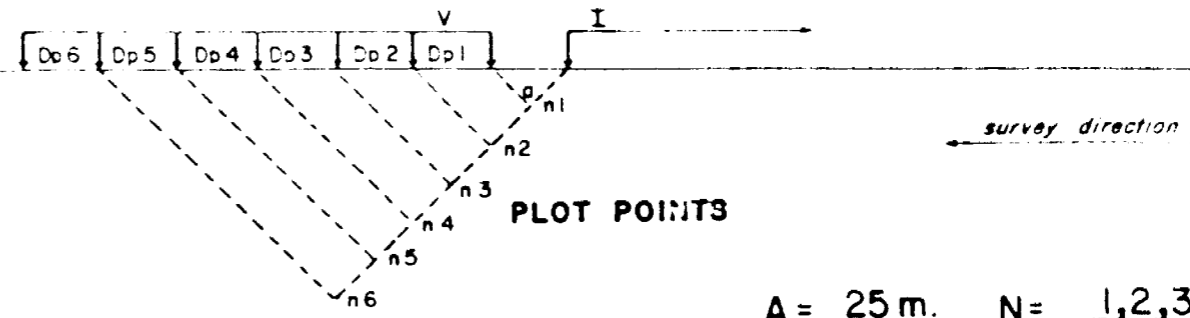


1600N



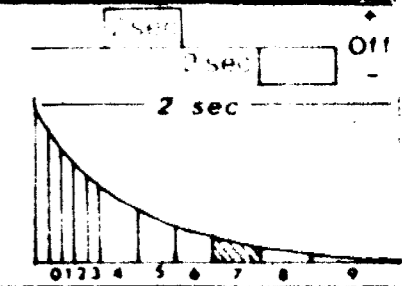
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



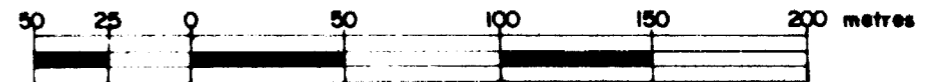
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7

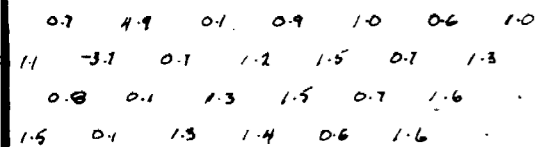


Total Line: 1175

Total Reading: 196



1600N



## REVISIONS

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title **TISDALE PROPERTY  
Porcupine Mining Division  
L 15 E**

325N-1500N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: W.P./C.G.

Approved:

File: M-66



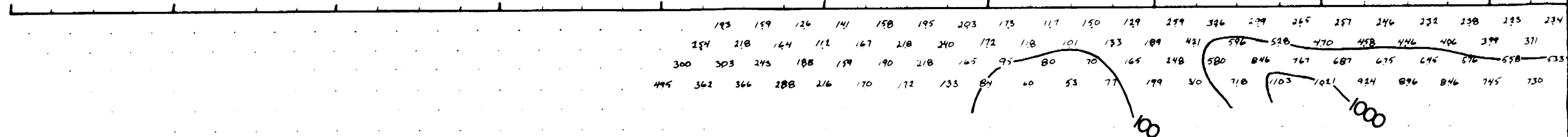


RESA

400 N

600 N

800 N

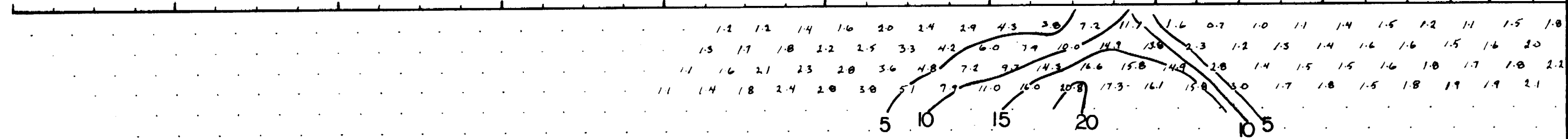


CHAR

400 N

600 N

800 N

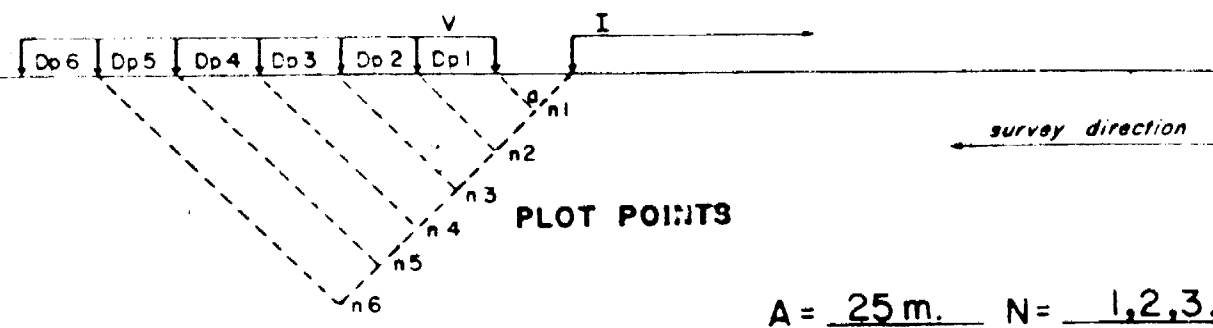


1600N



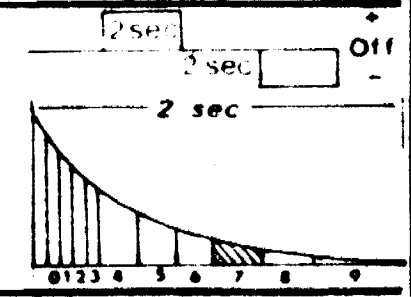
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



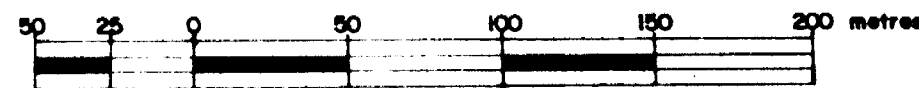
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 1175

Total Reading: 196



1600N



REVISIONS

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title **TISDALE PROPERTY  
Porcupine Mining Division  
L 16 E**

325N-1500N

Date: AUG. 1984

Scale: 1:2500

N.T.S.:

Drawn: W.P./C.G.

Approved:

File: M-66

# RESISTIVITY ohm/m

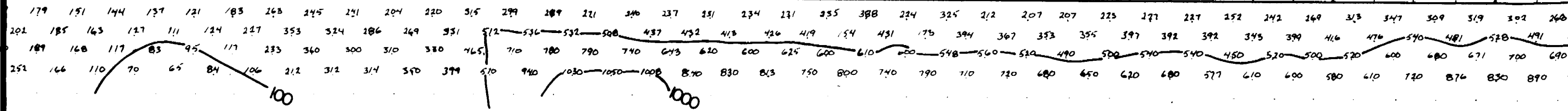
600 N

800 N

1000 N

1200 N

1400 N



# CHARGEABILITY mv/v

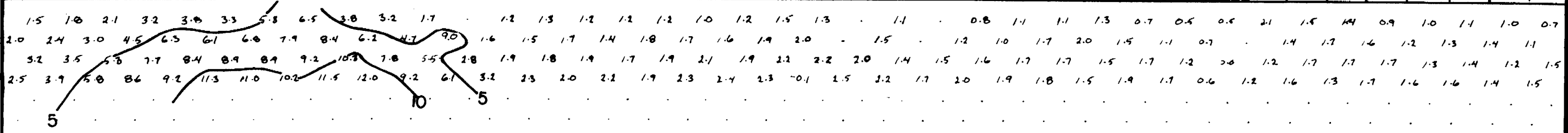
600 N

800 N

1000 N

1200 N

1400 N

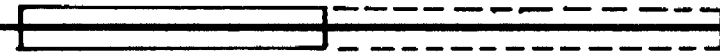
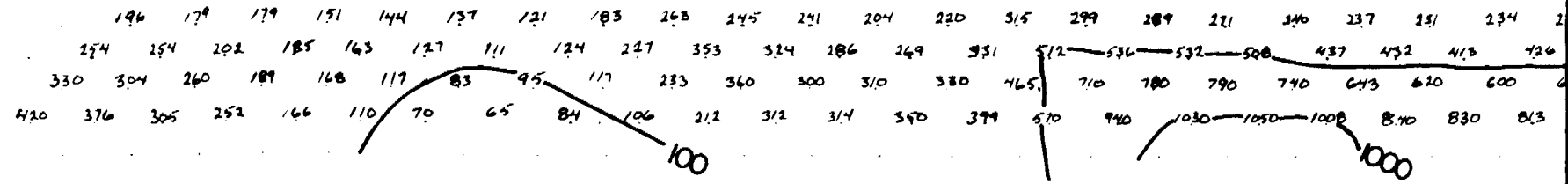


RESIS

400 N

600 N

800 N

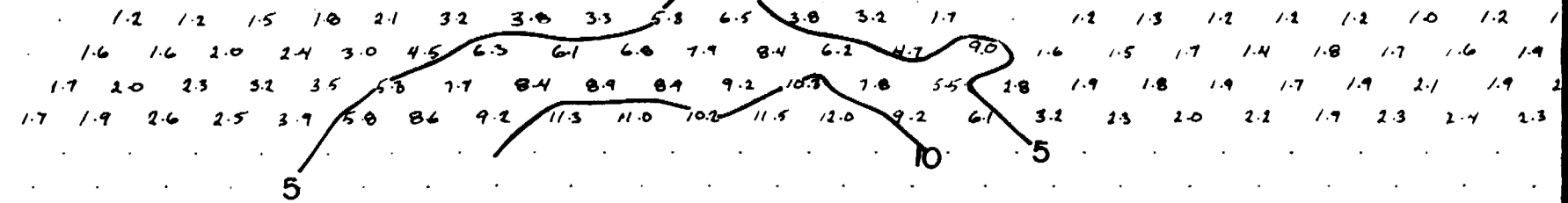


CHARG

400 N

600 N

800 N

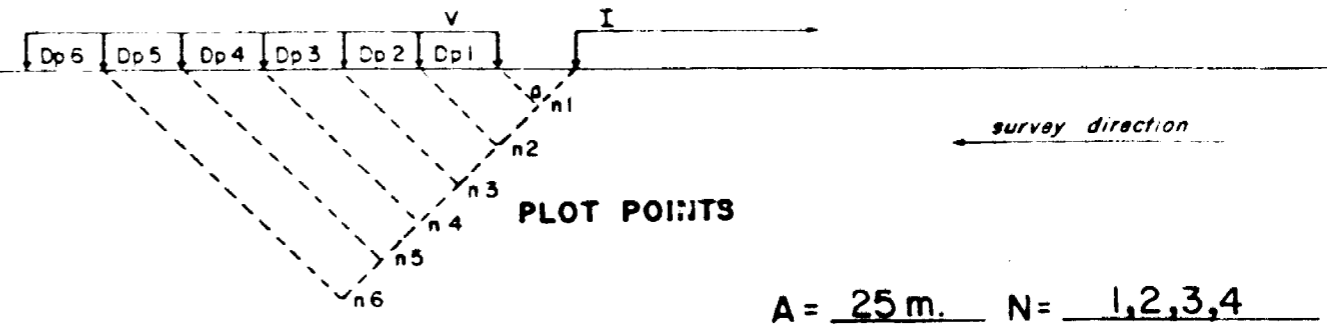


1600N

282	294	235	242	231	196	208
523	487	399	407	392	337	
680	720	640	540	540	550	500
860	890	800	460	710		

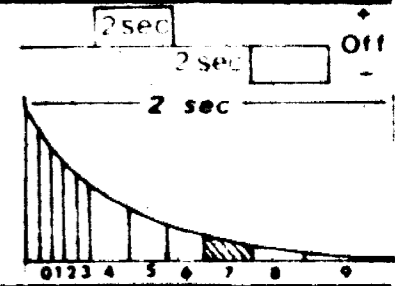
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7

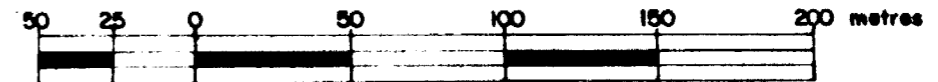


Total Line: 1175

Total Reading: 196

1600N

1.0	1.1	1.0	1.0	1.3	1.2	1.2
1.4	1.3	1.1	1.6	1.5	1.8	
1.5	1.5	1.2	1.7	1.4	1.4	
1.5	1.2	1.6	1.3	1.9		



## REVISIONS

ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.

for

LABRADOR MINES

Title TISDALE PROPERTY  
Porcupine Mining Division  
L 17 E

325N-1500N

Date: AUG. 1984	Scale: 1:2500	N.T.S.:
Drawn: WP/C.G.	Approved:	File: M-66

# RESISTIVITY ohm/m

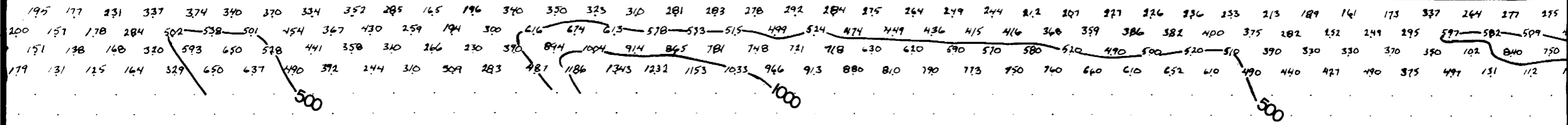
600 N

800 N

1000 N

1200 N

1400 N



# CHARGEABILITY mv/v

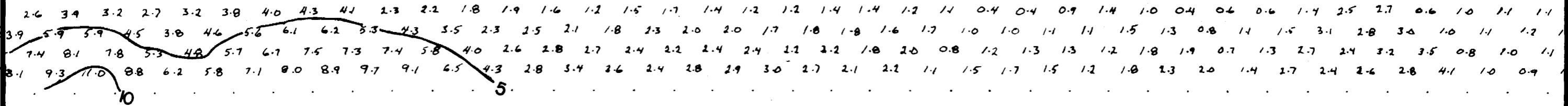
600 N

800 N

1000 N

1200 N

1400 N

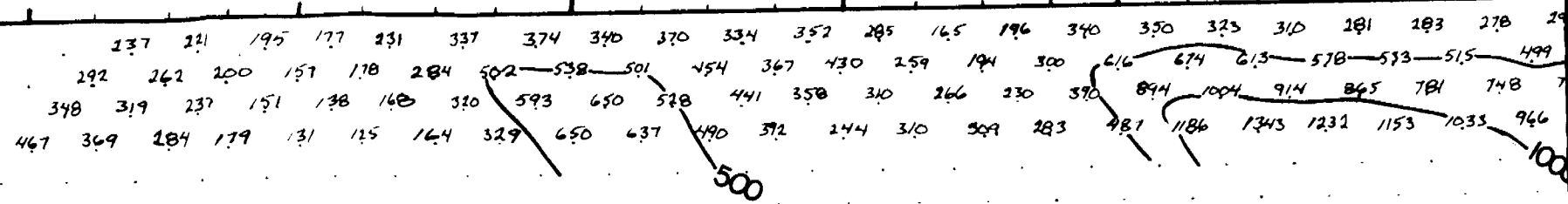


RESIS

400 N

600 N

800 N

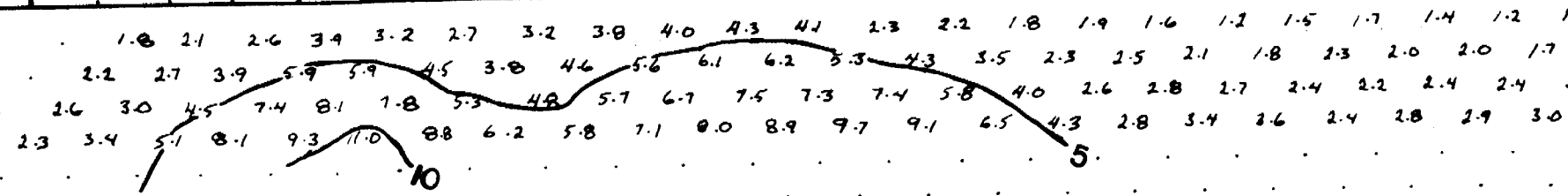


CHARG

400 N

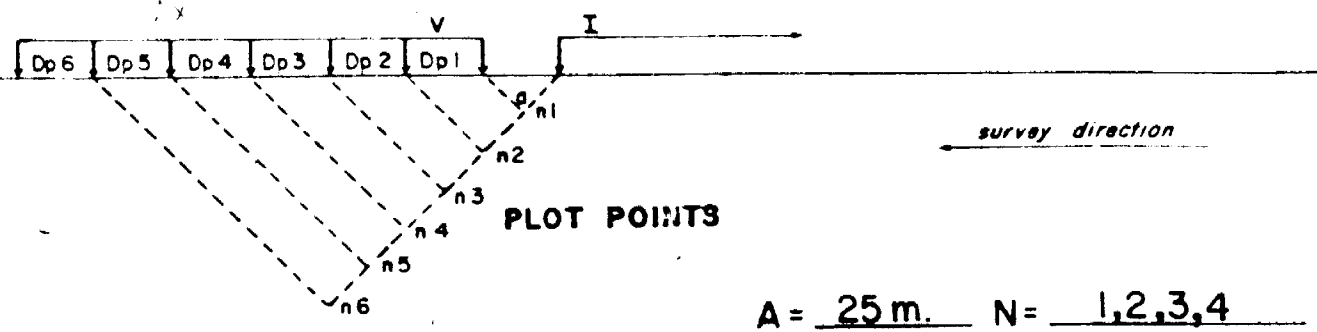
600 N

800 N



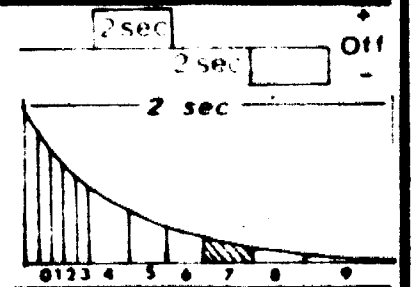
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



Total Line: 1125

Total Reading: 184



**REVISIONS**

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title **TISDALE PROPERTY  
Porcupine Mining Division  
L 18 E**

375N-1500N

Date: AUG. 1984	Scale: 1:2500	N.T.S.:
Drawn: W.P. / C.G.	Approved:	File: M-66

1600N

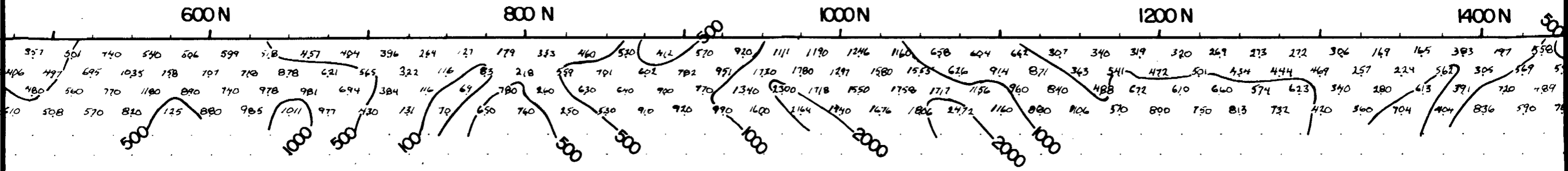
104 520 750 850 670 544 (470) 500  
899 935 1180 1162 896 776  
1041 1280 1170 1333 1258 1030  
1340 1480 1230 1359 1370 1000

1600N

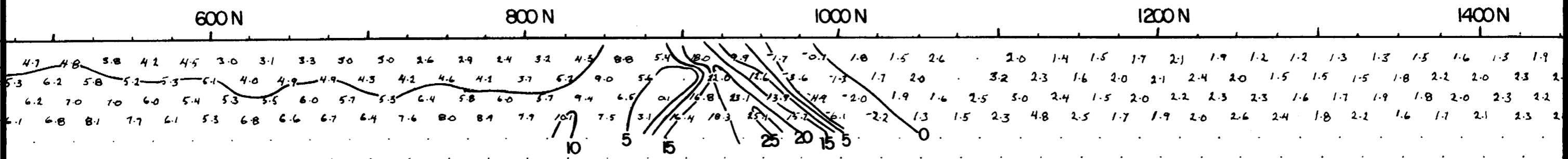
1.8 1.7 2.4 2.1 2.3 2.1 1.8  
2.1 2.3 2.6 2.3 2.3 2.4  
2.3 2.3 2.4 2.5 2.3 2.5  
2.5 2.1 2.2 2.2 2.0



# RESISTIVITY ohm/m



# CHARGEABILITY mv/v

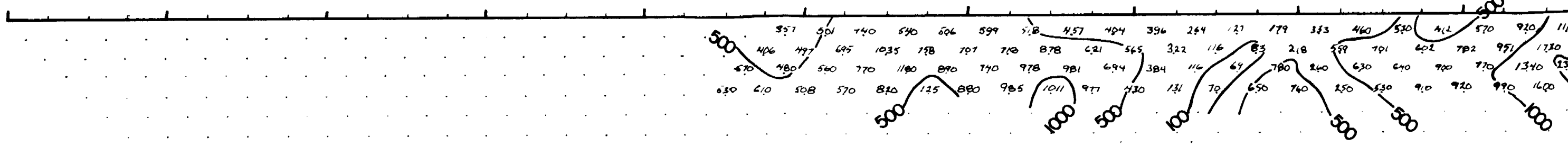


RESIST

400 N

600 N

800 N

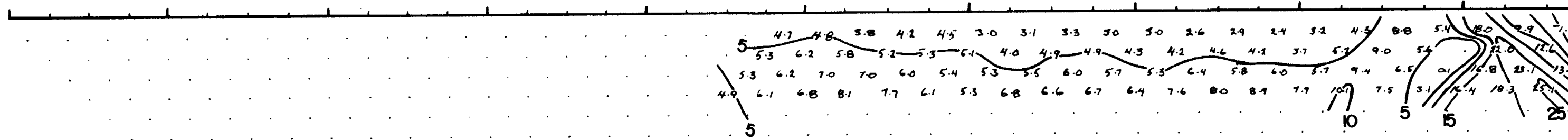


CHARGE

400 N

600 N

800 N



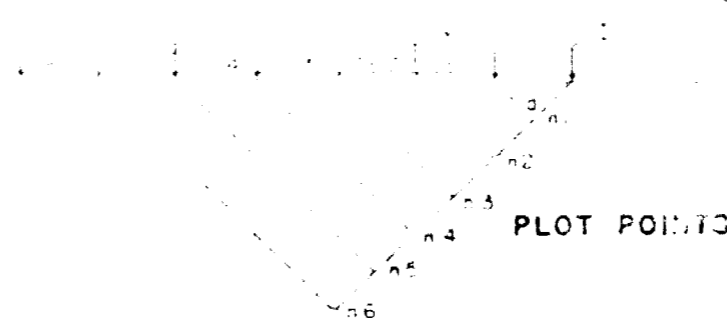
1600 N

44 407 391 371 47 305 312  
 27 780 699 539 540 734 559 500  
 960 150 920 710 720 980  
 1280 1430 140 850 840

# INDUCED POLARIZATION

time domain mode

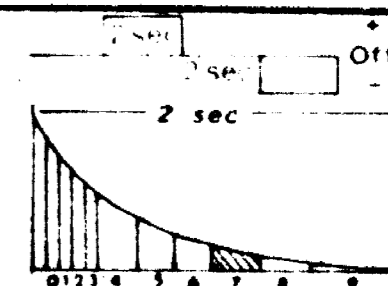
POLE DIPOLE ARRAY



A = 25 m. N = 1,2,3,4

Tx. SCINTREX model, TSQ-3 (3 Kw)  
 2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
 2 sec. mode, mv/V Slice #7

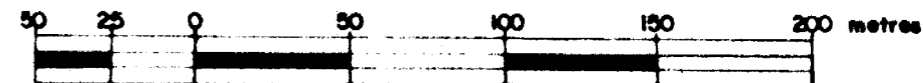


1600 N

15 19 18 17 15 16 20  
 20 17 22 21 21 18 11  
 19 17 23 21 17 21  
 20 21 19 22 20 21

Total Line: 1025

Total Reading: 168



## REVISIONS

**ROBERT S. MIDDLETON**  
**EXPLORATION SERVICES INC.**

for

# LABRADOR MINES

Title **TISDALE PROPERTY**  
**Porcupine Mining Division**  
 L 19 E

475N-1500N

Date: AUG. 1984

Scale: 1:2500

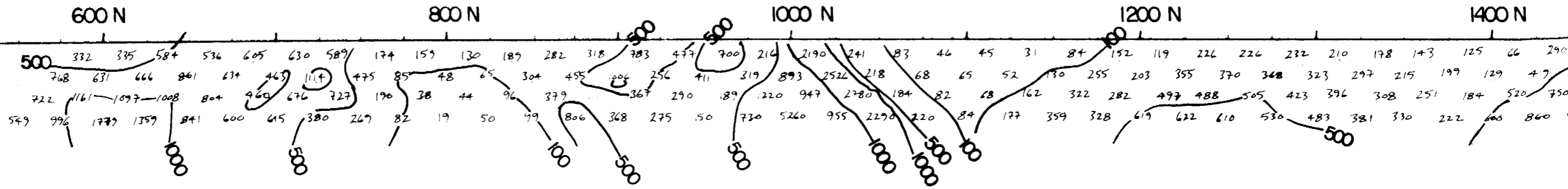
N.T.S.:

Drawn: W.P. / C.G.

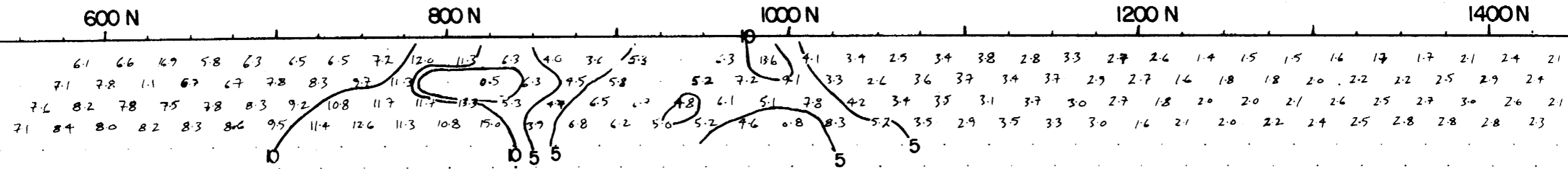
Approved:

File: M-66

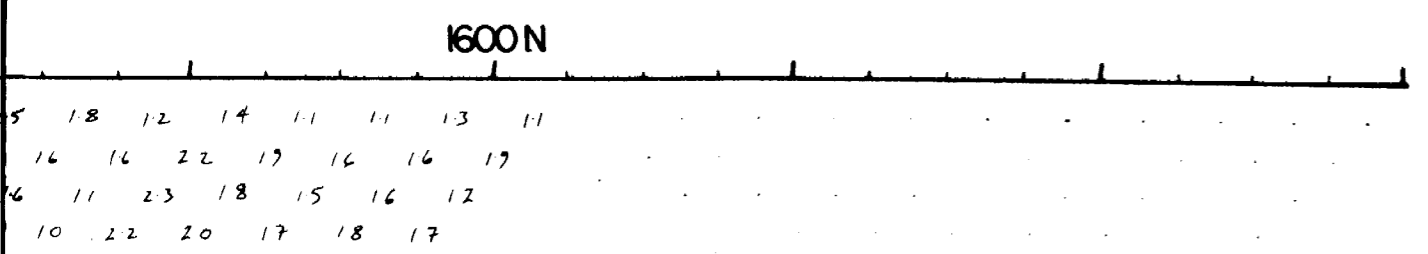
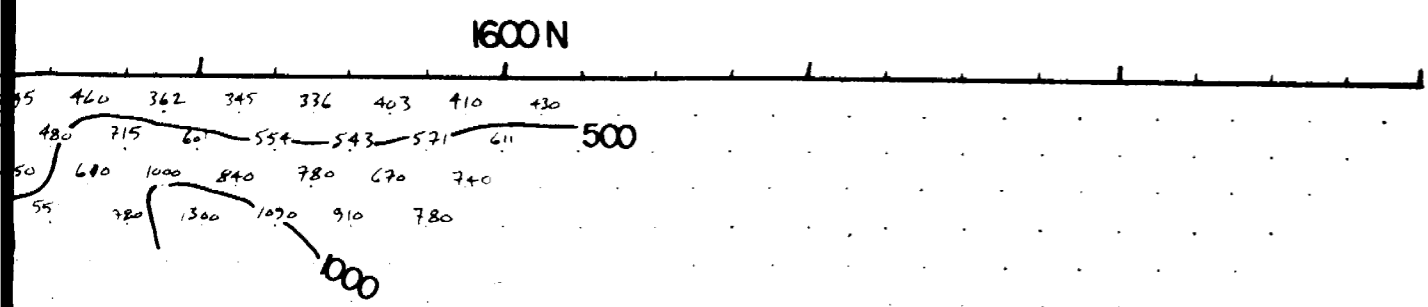
# RESISTIVITY ohm/m



# CHARGEABILITY mv/v

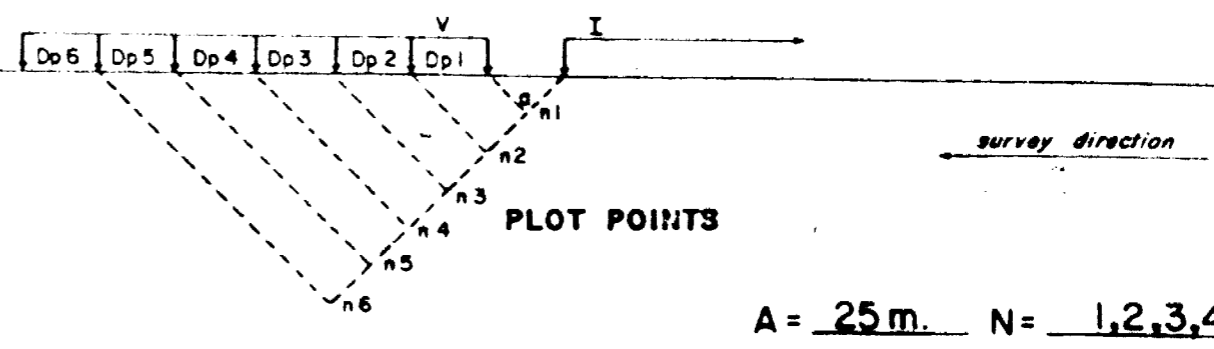






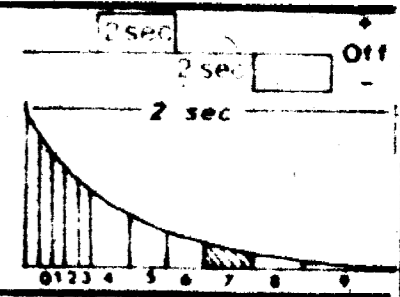
INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



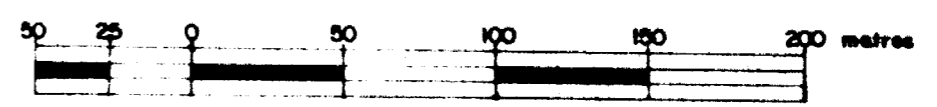
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



Total Line: 875

Total Reading: 144

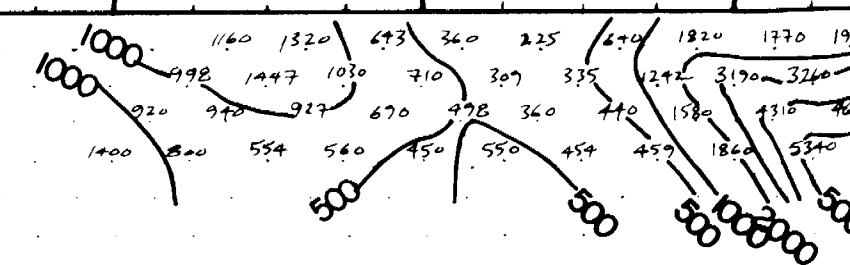


REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for LABRADOR MINES		
	Title TISDALE PROPERTY Porcupine Mining Division L 20 E		
	625N-1500N		
	Date: AUG 1984	Scale: 1:2500	N.T.S.:
	Drawn: W.P./C.G.	Approved:	File: M-66



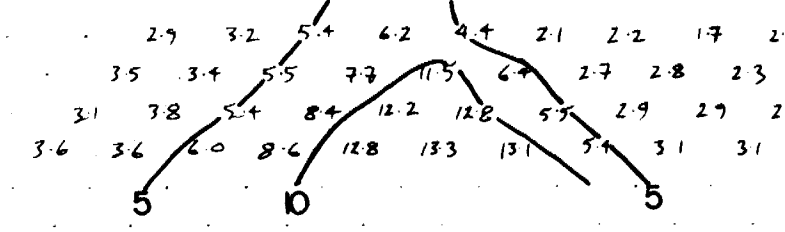
RES

800N



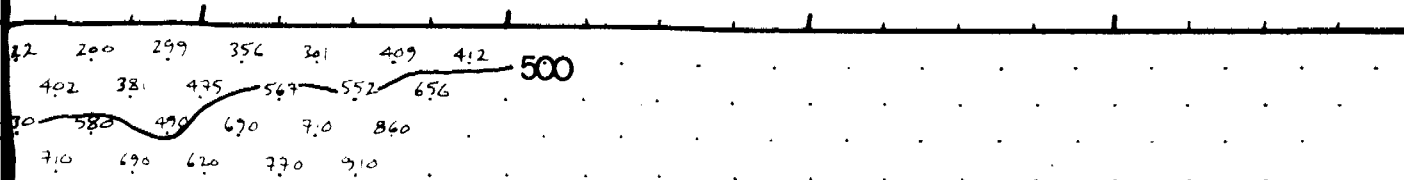
CHA

800 N



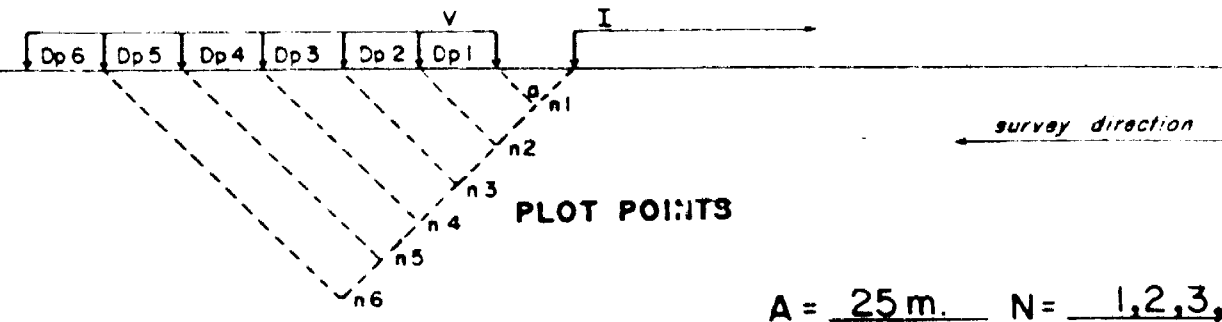


1600N



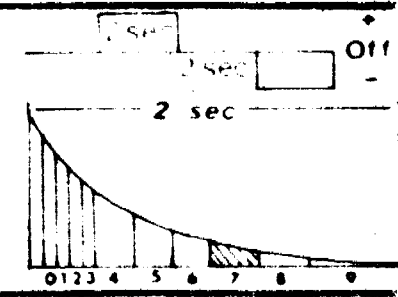
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY

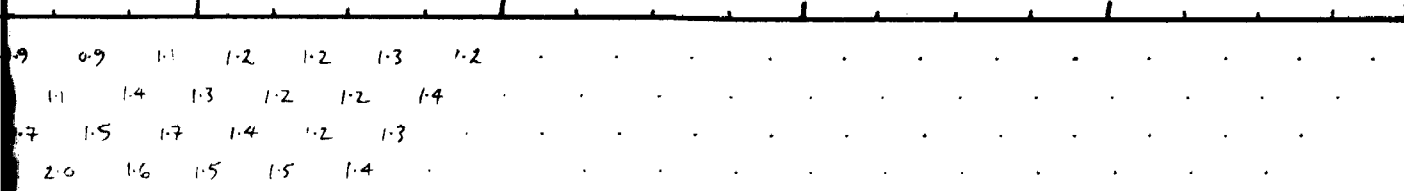


Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

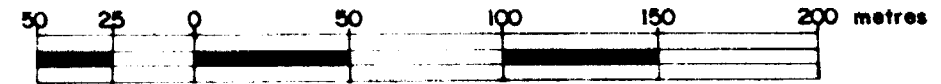
Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



1600N



Total Line: 725 Total Reading: 120



REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for LABRADOR MINES		
	Title TISDALE PROPERTY Porcupine Mining Division L 21 E		
	750N-1475N		
	Date: AUG 1984	Scale: 1:2500	N.T.S.:
	Drawn: W.P./C.G.	Approved:	File: M-66

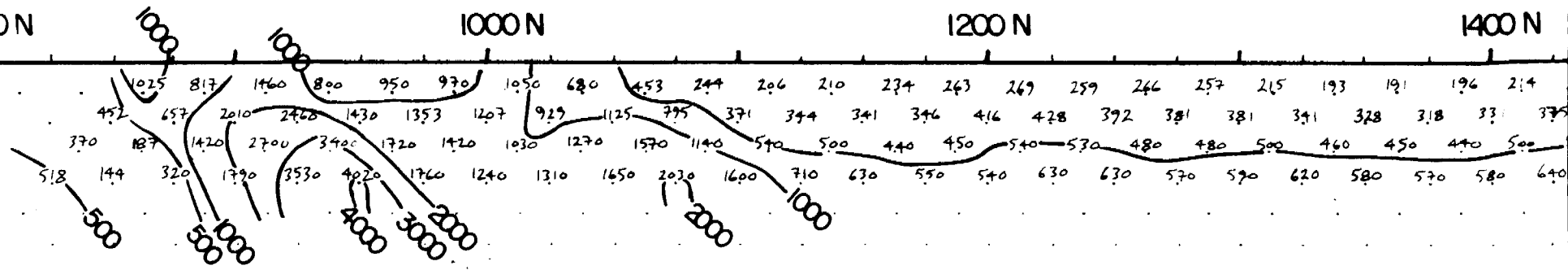
# RESISTIVITY ohm/m

800 N

1000 N

1200 N

1400 N



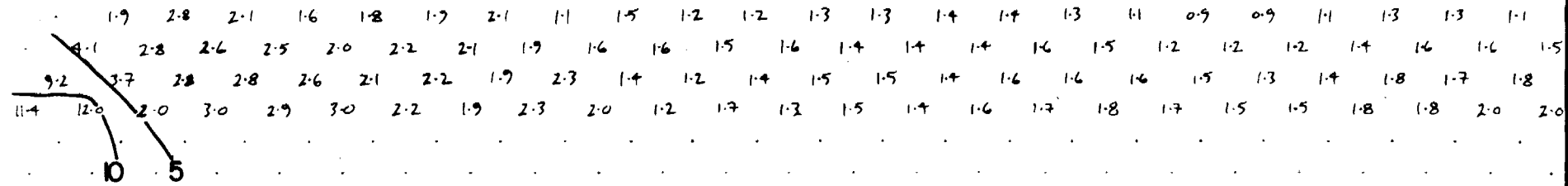
# CHARGEABILITY mv/v

800 N

1000 N

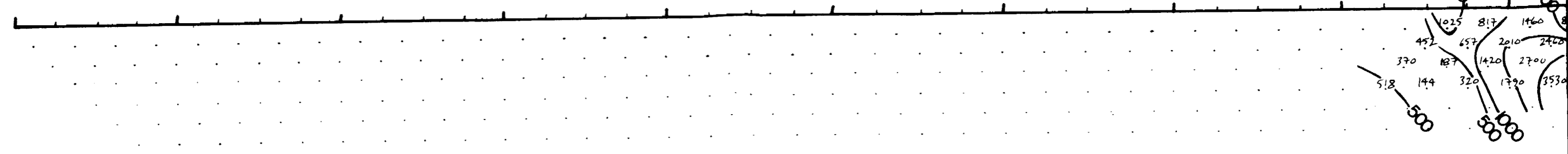
1200 N

1400 N



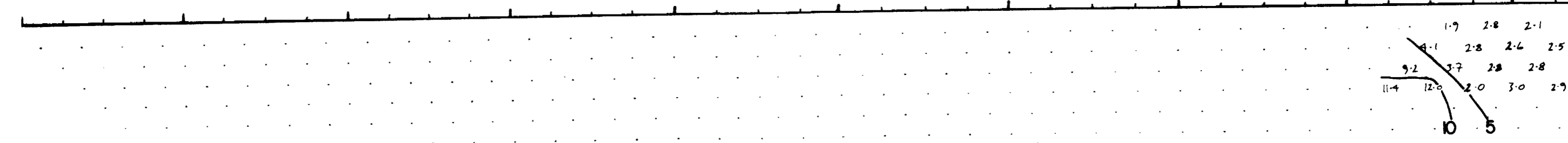
RE

800 N



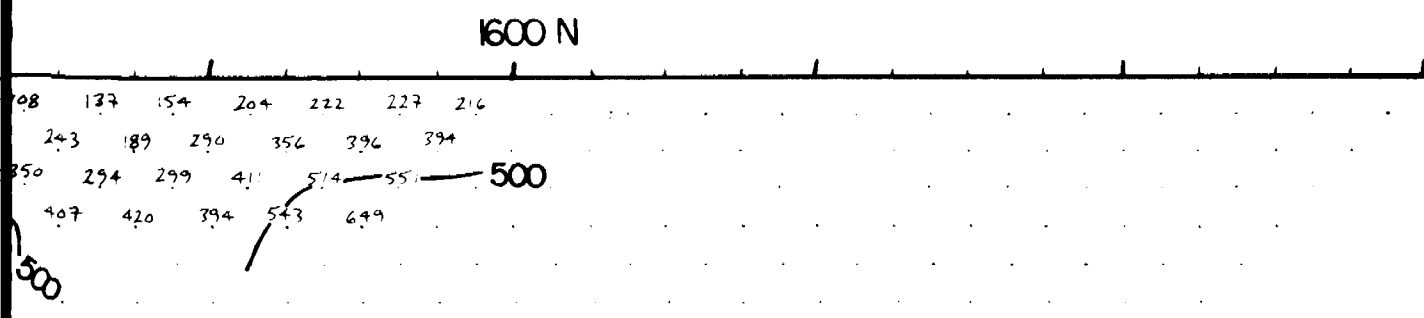
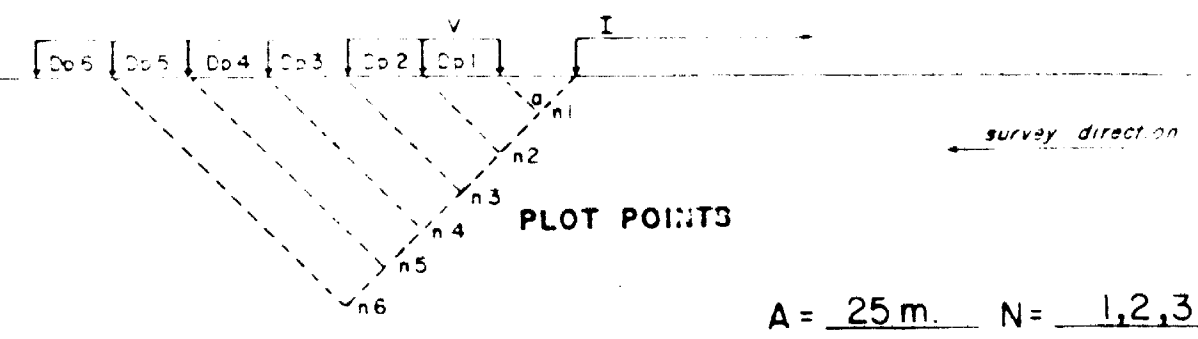
CHA

800 N



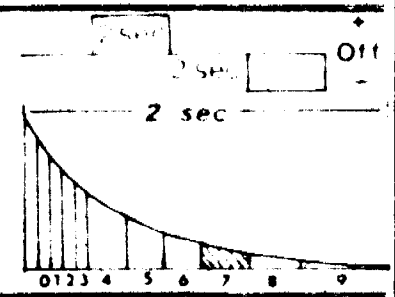
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY

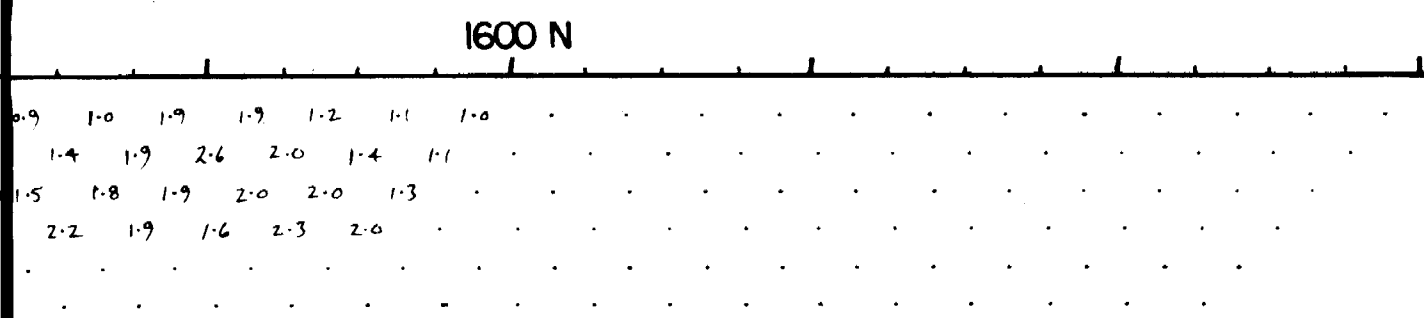
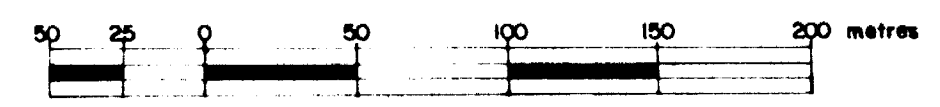


Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice\*7



Total Line: 400 Total Reading: 68

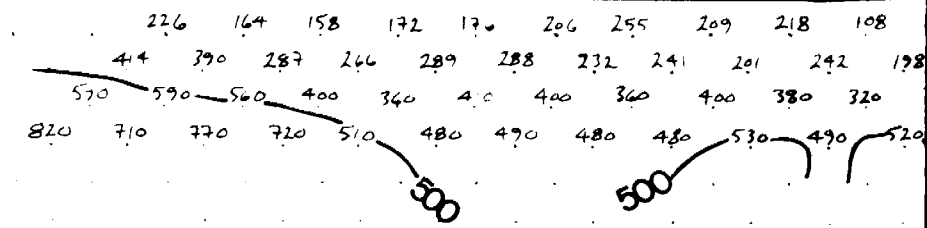


<b>REVISIONS</b>	<b>ROBERT S. MIDDLETON EXPLORATION SERVICES INC.</b>		
	for <b>LABRADOR MINES</b>		
	Title <b>TISDALE PROPERTY Porcupine Mining Division L 22 E</b>		
	<b>1075N-1475N</b>		
	Date: <b>AUG. 1984</b>	Scale: <b>1:2500</b>	N.T.S.:
	Drawn: <b>W.P. / C.G.</b>	Approved:	File: <b>M-66</b>

RESISTIVITY ohm/m

1200 N

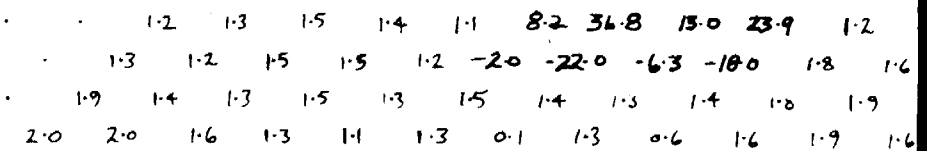
1400 N



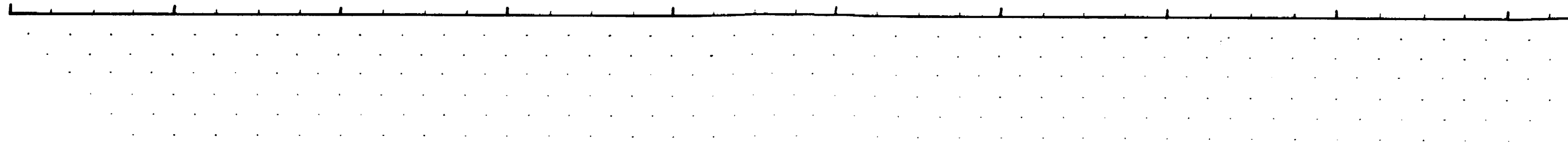
CHARGEABILITY mv/v

1200 N

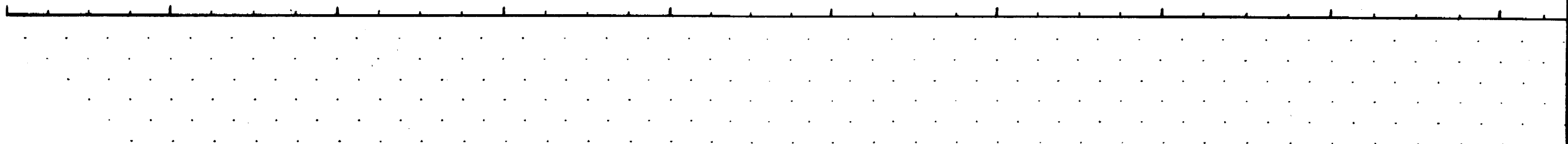
1400 N



RES



CHA

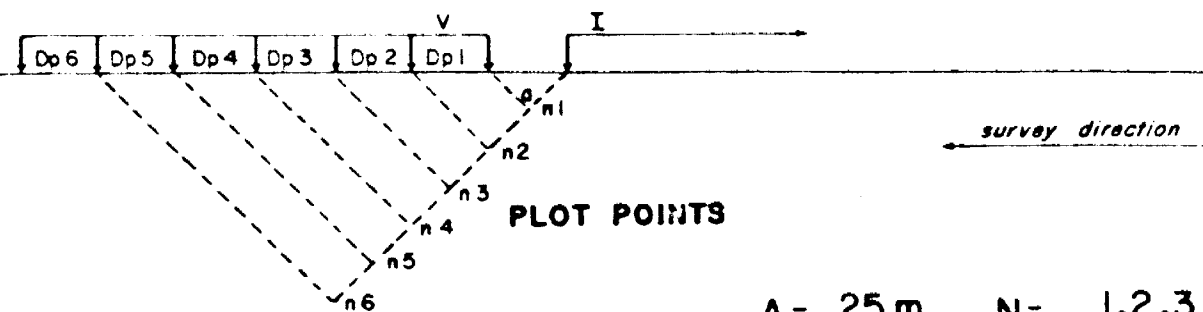


1600 N

146 162 192 218 235 251  
 233 250 302 348 374  
 363 371 352 424 485  
 572 414 430 542 500

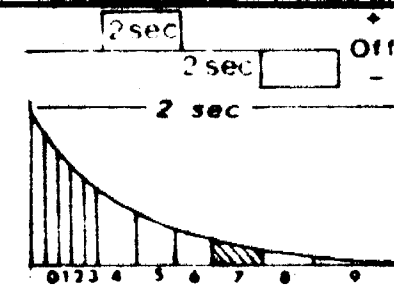
# INDUCED POLARIZATION

time domain mode  
POLE DIPOLE ARRAY



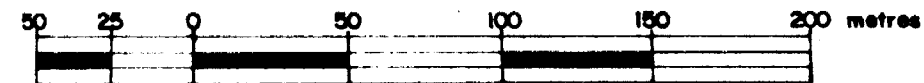
Tx. SCINTREX model, TSQ-3 (3 Kw)  
2 sec. on, 2 sec. off

Rx. SCINTREX model, IPR-II  
2 sec. mode, mv/V Slice #7



Total Line: 675

Total Reading: 112



1600 N

1.0 1.0 1.1 1.1 0.9 1.1  
 1.4 1.5 1.5 1.3 1.1  
 1.8 1.7 1.5 1.6 1.4  
 N-R 1.9 1.8 1.9

## REVISIONS

**ROBERT S. MIDDLETON  
EXPLORATION SERVICES INC.**

for

**LABRADOR MINES**

Title **TISDALE PROPERTY  
Porcupine Mining Division  
L 23 E**

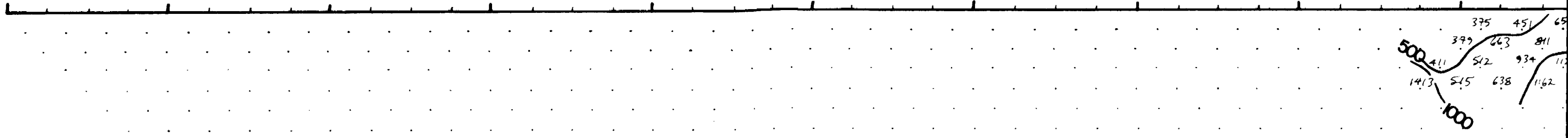
800N-1475N

Date: AUG. 1984	Scale: 1:2500	N.T.S.:
Drawn: W.P./ C.G.	Approved:	File: M-66

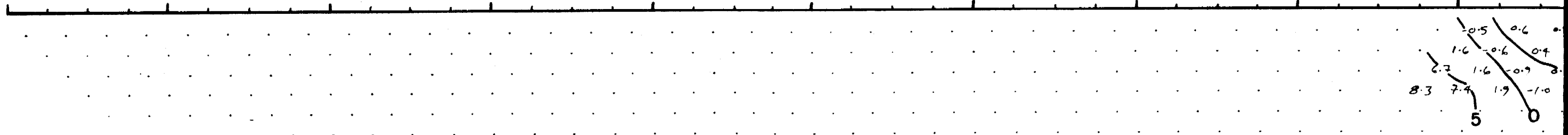




RESIST



CHARGE





42A11SW0237 2.7358 T1SDALE

900

Mining Lands Section

File No 2-7358

Control Sheet

TYPE OF SURVEY

- GEOPHYSICAL
- GEOLOGICAL
- GEOCHEMICAL
- EXPENDITURE

MINING LANDS COMMENTS:

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*lga.*

*LD*

*Dang*

Signature of Assessor

*7/11/84*

Date





Ministry of  
Natural  
Resources

Report of Work  
(Geophysical, Geological,  
Geochemical and Expenditures)

W.R. 158  
# 346/84

Instructions: - Please type or print.  
- If number of mining claims traversed exceeds space on this form, attach a list.  
Note: - Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.  
- Do not use shaded areas below.

Oct 30th

The Mining Act

Type of Survey(s) <b>Geophysical-Induced Polarization</b>		Township or Area <b>Tisdale Township</b>	
Claim Holder(s) <b>Hollinger Argus Limited</b>		Prospector's Licence No. <b>A-20822</b>	
Address <b>P.O.Box 320, Timmins, Ontario P4N 7E2</b>			
Survey Company <b>Robert S. Middleton, Exploration Services Inc.</b>		Date of Survey (from & to) <b>15 08 84 31 08 84</b> Day Mo. Yr. Day Mo. Yr.	
Total Miles of line Cut			
Name and Address of Author (of Geo-Technical report) <b>Robert S. Middleton, P.O.Box 1637, Timmins, Ontario P4N 7W8</b>			

Credits Requested per Each Claim in Columns at right

Special Provisions	Geophysical	Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	
	Geochemical	
Man Days Complete reverse side and enter total(s) here	Geophysical	Days per Claim
	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other I.P.	40 maximum reached 42.6
	Geological	
	Geochemical	
Airborne Credits <b>MINING LANDS SECTION</b> Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	Days per Claim
	Magnetometer	
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim		Expend. Days Cr.	Mining Claim		Expend. Days Cr.
Prefix	Number		Prefix	Number	
P	594781				
	594782				
	594783				
	594784				
	594785				
	594788	max. reached			
	594789				
	594790				
	594791				
	594792				
	Plus one				
	Patented				
	claim for				
	cost only.				

**RECEIVED**  
SEP 07 1984

**RECORDED**  
AUG 31 1984  
Receipt No. R.H.

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits

Total Expenditure Days Credits  $\div$  15 = Total Days Credits

Instructions  
Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

Total number of mining claims covered by this report of work. **10**

Date **Aug. 31, 1984**

Recorded Holder or Agent (Signature) *W. H. King*

For Office Use Only

Total Days Cr. Recorded **360**

Date Recorded **Aug. 31/84**

Date Approved as Recorded **Nov 9/84**

Mining Recorder *[Signature]*

Assistant Recorder *[Signature]*

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work on the mining claim during a period of at least 10 days, and the above report is true

Name and Address of Person Certifying  
**Robert S. Middleton**  
**P.O.Box 1637, Timmins, Ont. P4N 7W8**

Date Certified **Aug, 31, 1984**

Certified by (Signature) *[Signature]*



1984 11 05

Your File: 346/84  
Our File: 2.7358

Mining Recorder  
Ministry of Natural Resources  
60 Wilson Avenue  
Timmins, Ontario  
P4N 2S7

Dear Sir:

We received reports and maps on October 29, 1984 for a Geophysical (Induced Polarization) Survey submitted under Special Provisions (credit for Performance and Coverage) on Mining Claims P 594781 et al in the Township of Tisdale.

This material will be examined and assessed and a statement of assessment work credits will be issued.

Yours sincerely,

S.E. Yundt  
Director  
Land Management Branch

Whitney Block, Room 6643  
Queen's Park  
Toronto, Ontario  
M7A 1W3  
Phone: (416)965-4888

S. Hurst:sc

cc: Hollinger Argus Limited  
P.O. Box 320  
Timmins, Ontario  
P4N 7E2

cc: R.S. Middleton  
P.O. Box 1637  
Timmins, Ontario  
P4N 7W8



GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS - If more than one survey, specify data for each type of survey

Number of Stations 560 Number of Readings 2223  
Station interval 25m Line spacing 100m  
Profile scale data plotted in pseudo section form  
Contour interval variable

MAGNETIC

Instrument \_\_\_\_\_  
Accuracy - Scale constant \_\_\_\_\_  
Diurnal correction method \_\_\_\_\_  
Base Station check-in interval (hours) \_\_\_\_\_  
Base Station location and value \_\_\_\_\_

ELECTROMAGNETIC

Instrument \_\_\_\_\_  
Coil configuration \_\_\_\_\_  
Coil separation \_\_\_\_\_  
Accuracy \_\_\_\_\_  
Method:  Fixed transmitter  Shoot back  In line  Parallel line  
Frequency \_\_\_\_\_  
(specify V.L.F. station)  
Parameters measured \_\_\_\_\_

GRAVITY

Instrument \_\_\_\_\_  
Scale constant \_\_\_\_\_  
Corrections made \_\_\_\_\_  
Base station value and location \_\_\_\_\_  
Elevation accuracy \_\_\_\_\_

INDUCED POLARIZATION  
RESISTIVITY

Instrument Scintrex IPR-11  
Method  Time Domain  Frequency Domain  
Parameters - On time 2sec Frequency \_\_\_\_\_  
- Off time 2sec Range \_\_\_\_\_  
- Delay time 870ms  
- Integration time 1.02sec  
Power Scintrex T50-3 (3kw)  
Electrode array pole dipole  
Electrode spacing 25m(a)  
Type of electrode stainless steel stakes  
porous pits - copper sulfate filled



SELF POTENTIAL

Instrument \_\_\_\_\_ Range \_\_\_\_\_

Survey Method \_\_\_\_\_

Corrections made \_\_\_\_\_

RADIOMETRIC

Instrument \_\_\_\_\_

Values measured \_\_\_\_\_

Energy windows (levels) \_\_\_\_\_

Height of instrument \_\_\_\_\_ Background Count \_\_\_\_\_

Size of detector \_\_\_\_\_

Overburden \_\_\_\_\_

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey \_\_\_\_\_

Instrument \_\_\_\_\_

Accuracy \_\_\_\_\_

Parameters measured \_\_\_\_\_

Additional information (for understanding results) \_\_\_\_\_

AIRBORNE SURVEYS

Type of survey(s) \_\_\_\_\_

Instrument(s) \_\_\_\_\_

(specify for each type of survey)

Accuracy \_\_\_\_\_

(specify for each type of survey)

Aircraft used \_\_\_\_\_

Sensor altitude \_\_\_\_\_

Navigation and flight path recovery method \_\_\_\_\_

Aircraft altitude \_\_\_\_\_ Line Spacing \_\_\_\_\_

Miles flown over total area \_\_\_\_\_ Over claims only \_\_\_\_\_

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken \_\_\_\_\_

Total Number of Samples \_\_\_\_\_

Type of Sample \_\_\_\_\_  
(Nature of Material)

Average Sample Weight \_\_\_\_\_

Method of Collection \_\_\_\_\_

Soil Horizon Sampled \_\_\_\_\_

Horizon Development \_\_\_\_\_

Sample Depth \_\_\_\_\_

Terrain \_\_\_\_\_

Drainage Development \_\_\_\_\_

Estimated Range of Overburden Thickness \_\_\_\_\_

**SAMPLE PREPARATION**

(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis \_\_\_\_\_

General \_\_\_\_\_

**ANALYTICAL METHODS**

Values expressed in: per cent   
p. p. m.   
p. p. b.

Cu, Pb, Zn, Ni, Co, Ag, Mo, As, (circle)

Others \_\_\_\_\_

Field Analysis (\_\_\_\_\_ tests)

Extraction Method \_\_\_\_\_

Analytical Method \_\_\_\_\_

Reagents Used \_\_\_\_\_

Field Laboratory Analysis

No. (\_\_\_\_\_ tests)

Extraction Method \_\_\_\_\_

Analytical Method \_\_\_\_\_

Reagents Used \_\_\_\_\_

Commercial Laboratory (\_\_\_\_\_ tests)

Name of Laboratory \_\_\_\_\_

Extraction Method \_\_\_\_\_

Analytical Method \_\_\_\_\_

Reagents Used \_\_\_\_\_

General \_\_\_\_\_

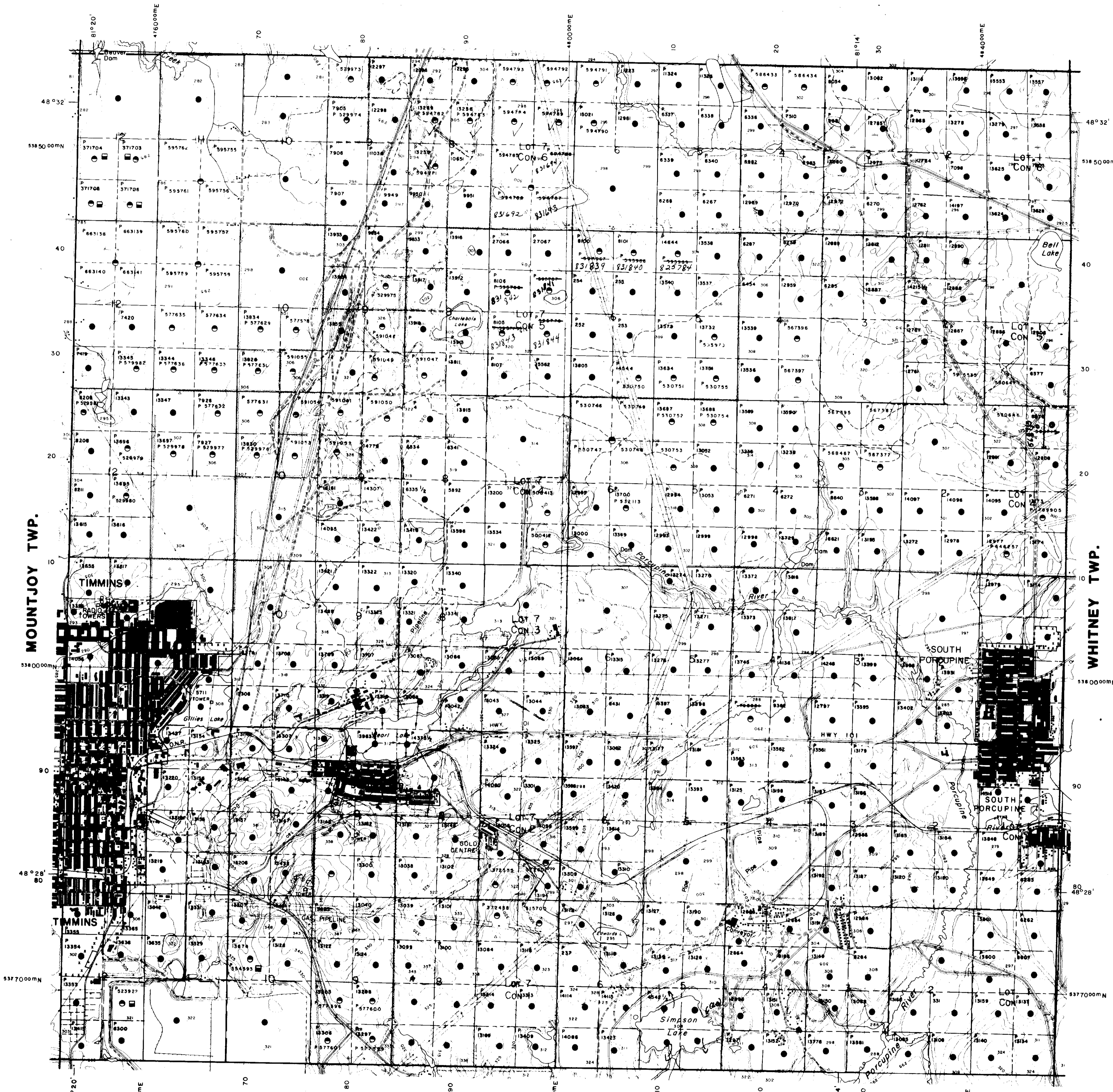
MAP SYMBOLOGY

Aerial Cableway	Pipeline (above ground)
Boundary	Railroad
Intermittent	Single Track
Direct, Permanent	Double Track
Intermittent	Abandoned
Approximate	Traffic
Lot, Contention	Road
Approximate	Municipal, County
Post Boundary	Township
Bridge	Access Road of doubtful
Rock, Railroad	importance of
Building	Highway (dashed)
Chimney	Trail, Back Road
Cliff, Pit, Pile	(dotted line)
Contours	Rapids
Intermittent	Double line river
Approximate	with multiple rapids
Depression	Reservoir
Control Points	River, Stream, Canal
Horizontal	Approximate
Vertical	position of flow
Culvert	Lock
Falls	Spot Elevation
Double line river	(above ground)
Fence, Hedge, Wall	Transmission Line
Feature Outline	Power
(Construction Features, etc.)	Telephone
Flooded Land	Tunnel
Lock	Utility Poles
Marsh or Swamp	Wharf, Dock, Pier
Mast	Wooded Area
Mine Head Frame	
Outcrop	

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. - MINING RIGHTS ONLY	
S.R.O. - SURFACE RIGHTS ONLY	
M.S. - MINING AND SURFACE RIGHTS	
Description	Order No. Date Disposition File

MURPHY TWP.



DELORO TWP.

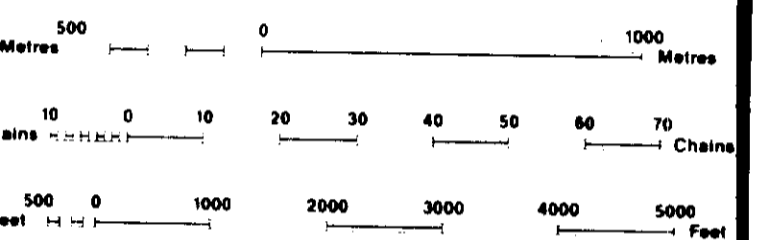
LEGEND

HIGHWAY AND ROUTE No.	
OTHER ROADS	
TRAILS	
SURVEYED LINES	
TOWNSHIPS, BASE LINES, ETC.	
LOTS, MINING CLAIMS, PARCELS, ETC.	
UNSURVEYED LINES	
LOT LINES	
PARCEL BOUNDARY	
MINING CLAIMS ETC.	
RAILWAY AND RIGHT OF WAY	
UTILITY LINES	
NON-PERENNIAL STREAM	
FLOODING OR FLOODING RIGHTS	
SUBDIVISION OR COMPOSITE PLAN	
RESERVATIONS	
ORIGINAL SHORELINE	
MARSH OR MUSKEG	
MINES	
TRAVERSE MONUMENT	

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
... SURFACE RIGHTS ONLY	○
... MINING RIGHTS ONLY	○
LEASE, SURFACE & MINING RIGHTS	■
... SURFACE RIGHTS ONLY	□
... MINING RIGHTS ONLY	□
LICENCE OF OCCUPATION	○
ORDER-IN-COUNCIL	OC
RESERVATION	○
CANCELLED	○
SAND & GRAVEL	○

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1912, VESTED IN ORIGINAL PATENTEES BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 83, SUBSEC. 1



SCALE 1:20 000  
GRID ZONE 17

NOTES

REGISTERED PLAN OF SUBDIVISION

TOWNSHIP

TISDALE

M.N.R. ADMINISTRATIVE DISTRICT

TIMMINS

MINING DIVISION

PORCUPINE

LAND TITLES / REGISTRY DIVISION

COCHRANE



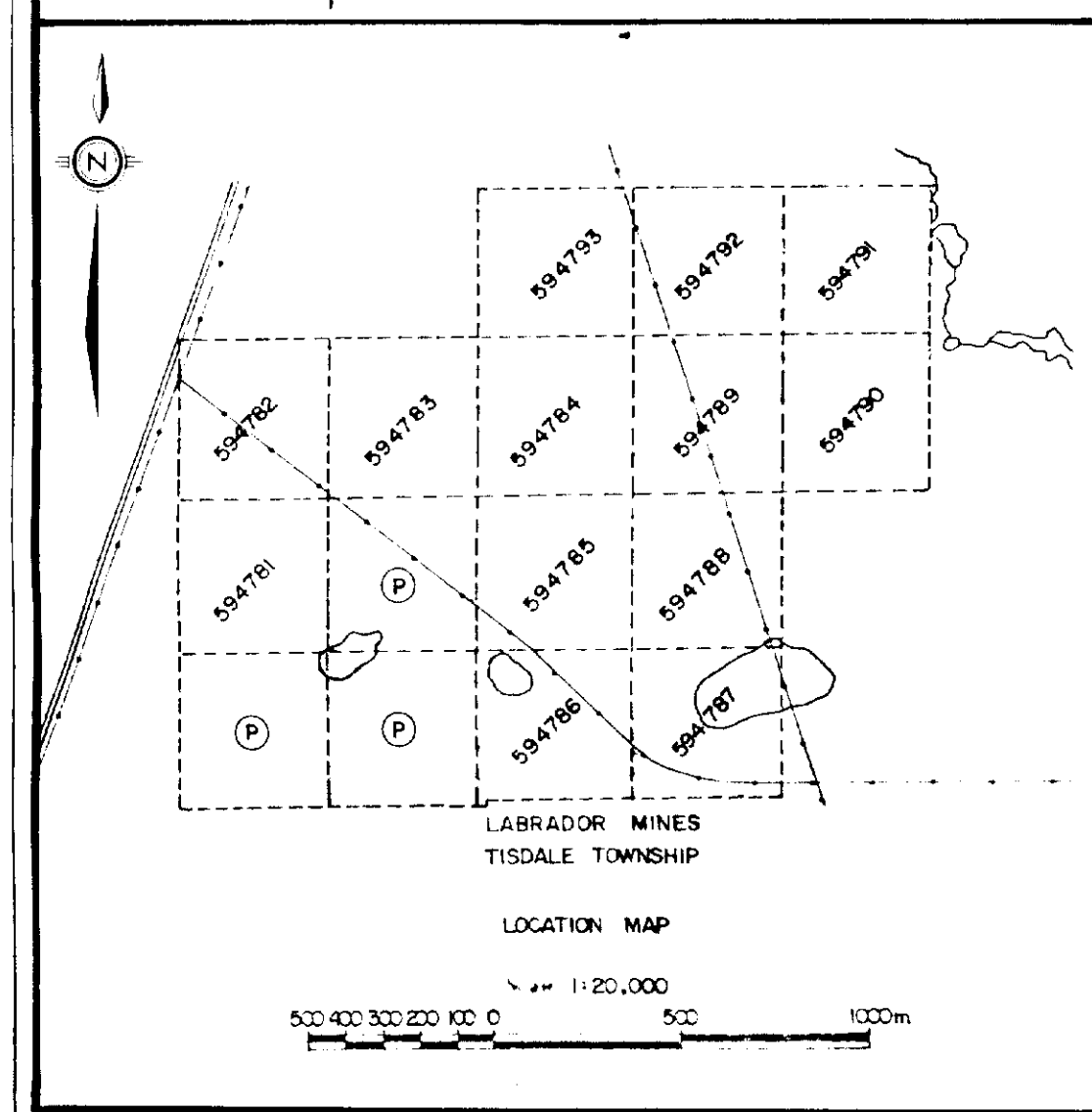
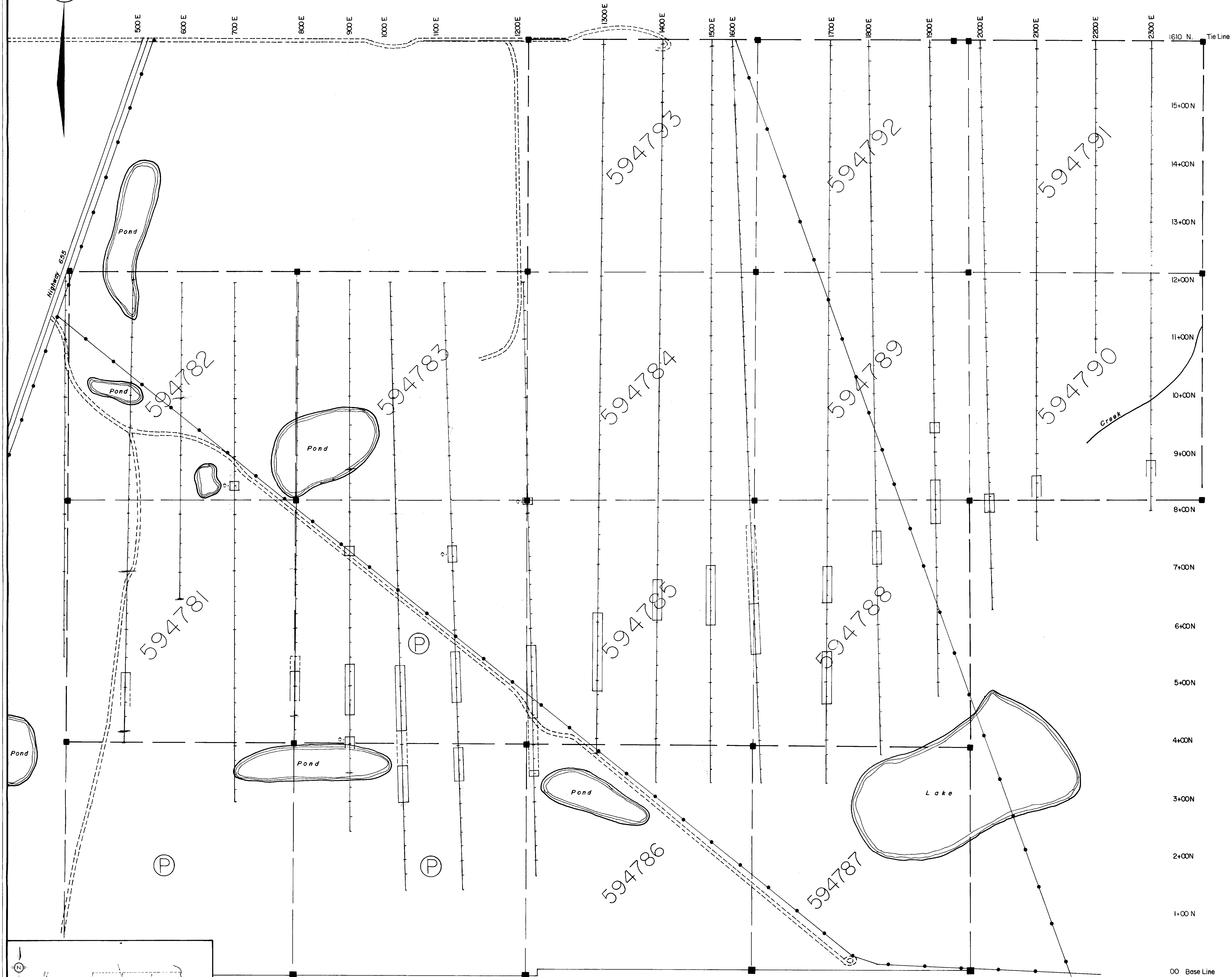
Land Management Branch

ORIGINAL COMPILATION JULY 1984

Number: G-3976

REVISED





210



*R. Middleton*

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for	LABRADOR MINES	
	Title	TISDALE TWP. I.P. ANOMALY MAP	
	Date: OCT 1984	Scale: 1:2500	N.T.S.:
	Drawn: C.G.	Approved:	File: M-66

Figure 3

27358