



41015SE0048 2.11002 SWAYZE

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GEOPHYSICAL REPORT
on the
Topboot Lake Property
of
GLEN AUDEN RESOURCES LIMITED
by
Robert K. Abernethy, B.A.Sc.
Greg Hodges, B.Sc.
December, 1987

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TABLE OF CONTENTS

	PAGE
ABSTRACT.....	i
INTRODUCTION.....	1
LOCATION, ACCESS AND FACILITIES.....	1
PROPERTY.....	2
PREVIOUS WORK.....	2
GEOLOGY	
Regional Geology.....	6
Property Geology.....	6
SURVEY PROCEDURE	
INDUCED POLARIZATION/RESISTIVITY	
Theory.....	10
Field Method.....	12
PERSONNEL AND EQUIPMENT.....	12
SURVEY STATISTICS.....	13
INTERPRETATION.....	13
CONCLUSIONS AND RECOMMENDATIONS.....	15
REFERENCES.....	17
CERTIFICATIONS	
APPENDIX A: Equipment Specifications	
APPENDIX B: IP Pseudosections	

LIST OF FIGURES

- Figure 1 Property Location - Regional
- Figure 2 Claim Map
- Figure 3 Magnetic and IP Anomaly Map

ABSTRACT

An induced polarization survey was conducted on Glen Auden Resources' Topboot Lake property in June and July of 1987 by R.S. Middleton Exploration Services Inc. The survey identified numerous anomalies, several of which are considered significant in association with known magnetic and geological anomalies. Follow-up programs of power stripping in thin overburden and diamond drilling in deep overburden are recommended.

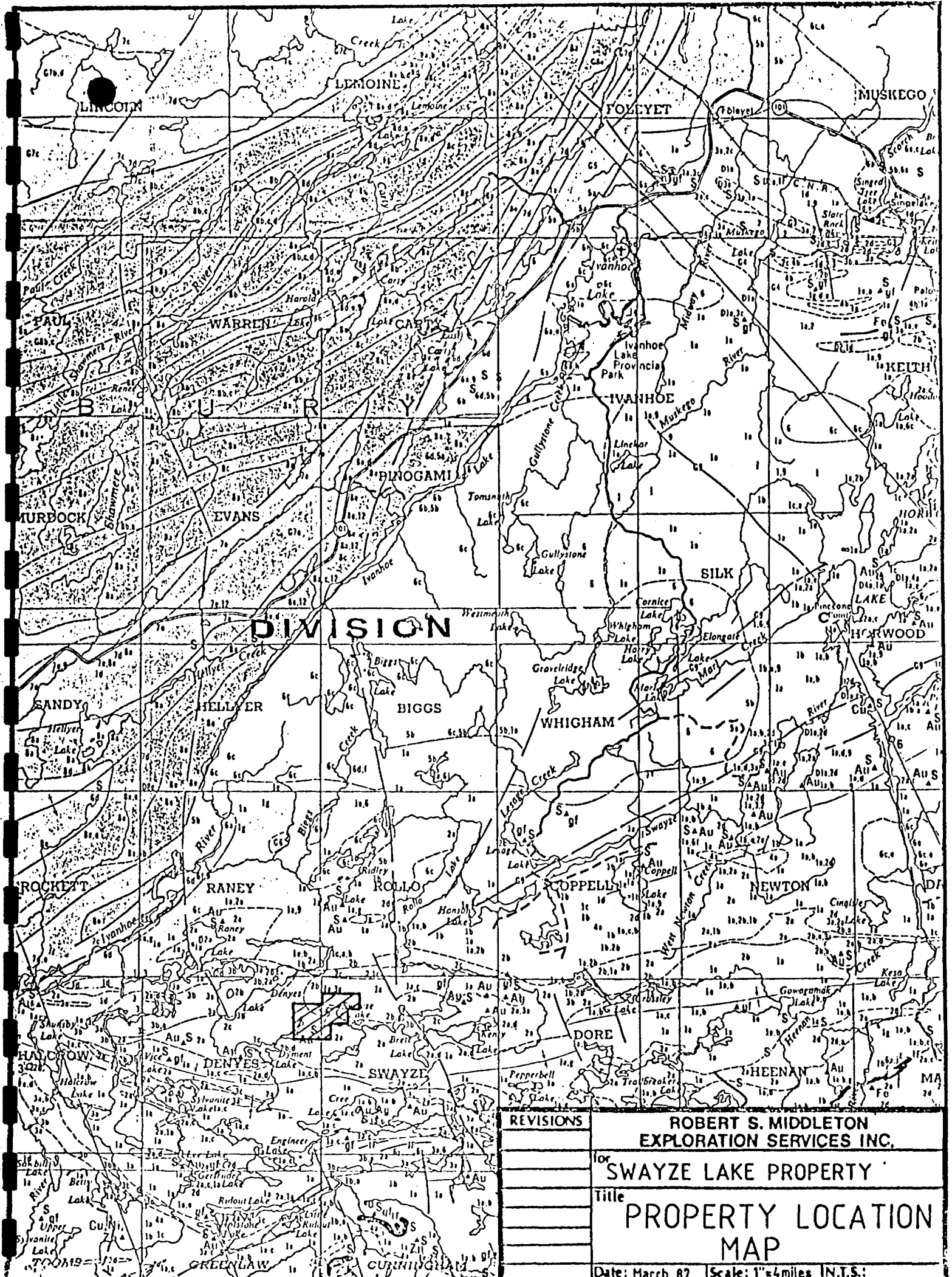
INTRODUCTION

This report summarizes the induced polarization survey performed on Glen Auden Resource Limited's Topboot Lake property by R.S. Middleton Exploration Services Inc. between June 25 and July 23, 1987.

LOCATION, ACCESS AND FACILITIES

The property straddles the boundary between north-western Swayze Township and northeastern Denyes Township, 54 air miles southwest of Foleyet, Ontario (see Figure 1). The property can be reached by float plane from the Ivanhoe Lake airbase by landing on Swayze or Topboot Lake. A gravel lumber road is presently under construction in eastern Swayze Township from which canoe access is possible via a series of lakes and portages. Helicopter service is available in Ramsey, 50km SE of the property, or Timmins.

The property is within reasonable travel time from the Timmins-Kirkland Lake mining centres where equipment and trained mine personnel are available. Sufficient water and aggregate resources are present if required on the property for construction and mine operation. An electrical power line is 25 miles to the north.



DIVISION

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.	
	for SWAYZE LAKE PROPERTY	
	Title PROPERTY LOCATION MAP	
Date: March 87	Scale: 1"=4miles	N.T.S.:
Drawn:	Approved:	File: 14-202

PROPERTY

The property consists of 39 unpatented claims as shown on the claim map of Swayze and Denyes Townships (Figure 2).

DENYES TOWNSHIP
CLAIM NUMBER

<u>CLAIM NUMBER</u>	<u>NO.</u>	<u>EXPIRY DATE</u>
932501-932502	2	June 12, 1989
932505	1	June 12, 1990
932506	1	June 12, 1989
932507-932510	4	June 12, 1988
866469-866471	3	June 12, 1988
932197-932199	3	June 12, 1988
931819	1	June 12, 1988
931820	1	June 12, 1989
931821	1	June 12, 1988

SWAYZE TOWNSHIP
CLAIM NUMBER

<u>CLAIM NUMBER</u>	<u>NO.</u>	<u>EXPIRY DATE</u>
932503	1	June 12, 1990
932504	1	June 12, 1989
932196	1	June 12, 1988
932511-932515	5	June 12, 1988
866466-866467	2	June 12, 1988
866468	1	June 12, 1989
866472-866475	4	June 12, 1988
930726-930727	2	June 12, 1988
931809-931812	4	June 12, 1988

The claims have been transferred from the stakers and are held by Glen Auden Resources Limited.

PREVIOUS WORK

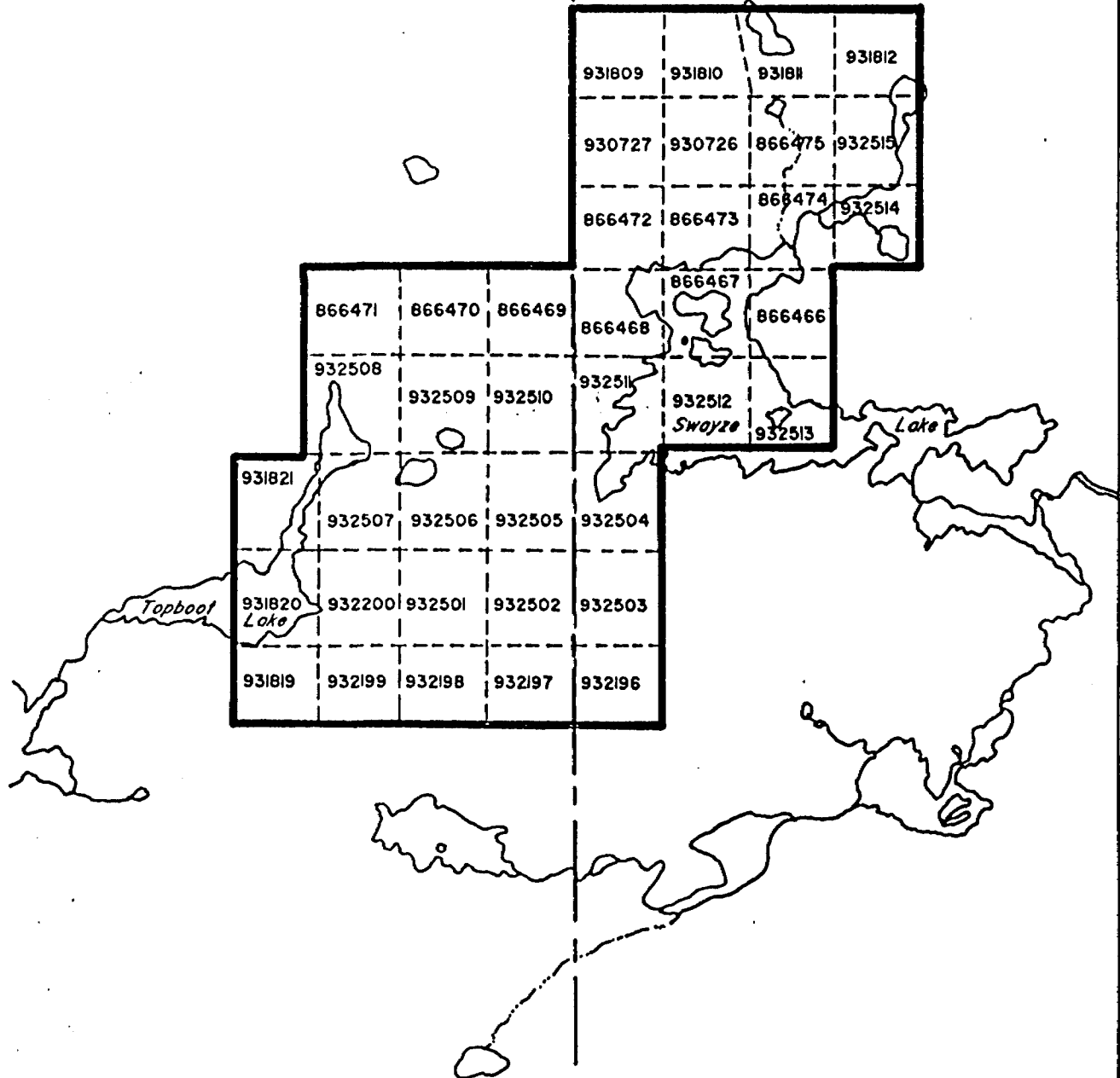
Assessment file examination reveals that several companies have been active in the area both on Glen Auden ground and properties surrounding it. Little work was done in the area

RANEY TWP.

ROCHE TWP.

DENYES TWP.

SWAYZE TWP.



REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for	GLEN AUDEN RESOURCES LTD.	
	Title	Swayze Lake Property	
	CLAIM LOCATION MAP		
	Date: Jan. 1987	Scale: 1"=1/2 mile	N.T.S.:
	Drawn: C.G.	Approved:	File: M-202

previous to 1931 when a promising discovery of gold bearing quartz was made by J.G. and J.L. Kenty on the northeast shore of Brett Lake, 4 miles to the east of the property. Considerable prospecting followed this discovery resulting in a number of gold discoveries, including two gold discoveries now located on the Glen Auden property. In the fall of 1932, J.E. Derrough staked 8 claims within the property boundary, adjoining the eastern boundary of Denyes Township. Trenching of the discovery vein exposed 220 feet of quartz veining and stockwork parallel to a fault striking almost due north and south. M.C. Rickaby examined the discovery in 1934 for the Ontario Department of Mines and described it as an "almost continuous vein of quartz with small quartz veinlets in the footwall. The quartz is in the form of lenses with widths up to 6 feet." A brecciated lamprophyre dike lies along the fault and quartz porphyry dikes intrude the sediments. "The quartz is mineralized with pyrite, chalcopyrite, a little galena, and carbonates. Lenses of vein material with considerable chalcopyrite carry big values in gold, though no native gold was seen." Chip samples taken continuously across the vein by Rickaby returned the following values in gold:

- | | |
|--|------------|
| a) 8 inches, quartz with heavy sulphides | 2.22oz/ton |
| b) 24 inches, chiefly quartz | .15oz/ton |
| c) 36 inches, altered wall rock | .03oz/ton |
| d) 56 inches, quartz | .24oz/ton |
| e) 24 inches, quartz | .32oz/ton |

As a result of encouraging gold values in this vein Kirkland Hudson Bay Gold Mines Limited put down a series of short diamond drill holes in the winter of 1932-33. A total of 2,000 feet of drilling was completed. Results of the drilling are not known but apparently did not warrant further work and the option was dropped.

Prospecting of the property continued for ten years following the original discovery and spotty records of trenching and blasting assessment exist. Regional airborne electromagnetic and magnetic surveys were flown by several companies and twice by the Ontario Government, in 1964 and 1977.

George Mangotich of Englehart, Ontario staked 21 claims on the present Glen Auden Property in 1975-76. VLF-EM, magnetometer, geological mapping and one diamond drill hole totalling 170' are recorded for assessment. The geological map presented by W.F. Gilman shows rhyolite and rhyolitic fragmentals over all of the Mangotich property. The diamond drill hole, drilled due north near the northern boundary of present claim 932508 encountered rhyolite, chert and graphite, with quartz/calcite veining and 1/4" to 1" massive pyrite, diabase and 60 feet of quartz-sericite-feldspar schist injected with quartz-calcite-tourmaline-pyrite stringers. Very little sampling was performed and no assays were given.

Norminex Limited staked three claims straddling the boundary

between Swayze and Denyes Townships in 1983. Norminex conducted 1"=400' geological mapping with detailed sampling of several old trenches and a 1"=200' magnetometer survey for assessment credit. The Norminex geologist, J.F. Davies, identified three main types of rocks; 1) massive fine rhyolite, 2) crystal tuff or porphyritic rhyolite and 3) quartz-sericite schist which probably represents a sheared rhyolite.

The re-sampling of the Derrough trench, revealed values as low as .01 oz/ton in diabase to 1.65 oz/ton over 24". Recommendations for systematic re-sampling, lithochemical sampling and soil geochemical surveys and four diamond drill holes were never followed up and the property was allowed to come open.

The Canadian Nickel Co. Ltd. staked a large block of claims in Swayze, Dore and Denyes Townships in 1983 covering the northern half of the Glen Auden Property. Geological mapping by B. Bell found variably altered and carbonatized mafic to felsic volcanics, mafic to felsic intrusives, quartzite and minor quartz-feldspar porphyry. Bell recognized a similarity between the carbonatized mafic volcanics north of Swayze Lake and those hosting the Kenty Mine Prospect and recommended further work.

GEOLOGY

Regional Geology

The rocks of the Glen Auden property are part of the east-west trending Swayze greenstone belt, approximately 28 miles long by 18 miles wide. The rocks are all Precambrian in age and are steeply dipping in fold structures, whose axis trend in a sinuous east-west path across the area. Faults and shear zones trend predominantly north to north-west.

The belt shows wide lithologic variety but mafic volcanic flows predominate with volcanic centre felsic rocks and sediments occupying long linear structures towards the centre of the belt. Diabase is rare but several long dikes traverse the belt with a north-northeasterly trending orientation. Ultramafic flows, granitic plugs and iron formation are also found in the belt.

The Swayze belt is truncated in the west by the Kapuskasing structure and to the east bifurcates with one arm trending towards the Porcupine gold camp and the other arm trending towards the Kirkland Lake gold camp.

Property Geology

A property geology map based on the mapping survey and various geophysical surveys is shown in Figure 3. Rocks on the property consist of mafic to intermediate tuffs, rhyolitic flows, felsic tuff, quartz-sericite schists, graphitic argillite, arkose, conglomerate, quartz feldspar porphyries and diabase.

The mafic volcanic rocks trend east-west and are part of a thick mafic unit that extends across the township and are stratigraphically equivalent to those hosting the Kenty Mine. The basalts are typically dark green to black, massive or weakly foliated, aphanitic, and occasionally pillowed or brecciated. Alteration consists of moderate to strong chloritic alteration, traces of pyrite with erratic concentrations of up to 1%, moderate to strong calcite alteration and occasional fractures and shears infilled with quartz or quartz-carbonate veining. Mafic ash tuffs were found intercalated with the flows in thin, non-continuous units. The tuffs were generally very fine grained with less than 10% angular, mafic, rock fragments in a dark, moderately foliate matrix. No sedimentary structures were observed in these tuffs.

Rocks of intermediate composition were recognized in several locations stratigraphically between the mafic flows and felsic tuffs and porphyries. These rocks were similar in appearance to the mafic rocks but were generally lighter in colour and were harder due to a more siliceous matrix. The intermediate volcanic rocks were without structure and conformable to the enclosing mafic volcanics.

Felsic volcanic rocks and porphyries of intermediate felsic composition were found in the southern two-thirds of the Glen Auden property which is part of a much thicker synform running

east-west through central Swayze, Denyes and Dore Townships. Rhyolitic flows were extremely rare. Rhyolites were recognized by their hard, siliceous, beige appearance and thin laminations which may represent flow banding. Felsic ash to lapilli tuffs were the most common lithologies found on the property. The fragment composition varied from less than 10% clasts to a crowded, fragment supported variety. The matrix composition varied from a beige brown colour to a pale green. Alteration varied greatly in the tuffs as distinct alteration zones were noted. Calcite alteration was most prevalent with widespread zones of calcite enrichment. Calcite composition varied from 1-2% in some rocks to an estimated 20-30% calcite in the most obviously altered zones. Usually synchronous with calcite alteration was sericite enrichment (0-10%), pyrite (1-4%) and structure such as pervasive foliation and local shearing. Chlorite alteration was rarely observed but did exist in the more intermediate tuff.

Crystal tuffs may have been present but were difficult to distinguish from porphyries. The quartz-feldspar porphyries were observed to be pink to beige, massive, medium to coarsely crystalline feldspar phenocrysts in an aphanitic pale green matrix. Close examination of the feldspar crystals reveals that they are subhedral to euhedral, zoned phenocrysts that are occasionally fractured and cracked. Pyrite is rare in the

porphyries.

A thin band of metasediments was found on the west shore of Swayze Lake. The outcrop was best described as an arkosic sandstone or a low density conglomerate, as rare pebble sized, sub-angular rock fragments were observed in an otherwise homogeneous feldspar rich sandstone. Clasts were heterogeneous and consisted of mafic rock fragments, felsic rock fragments, chert, quartz grains and a soft argillitic looking rock of uncertain composition. Long, thin non-magnetic, formational type conductors trend east-west through the central portions of Swayze Lake and are probably conductive graphite.

The major structural characteristic of the rocks is an east-west schistosity developed in the felsic volcanics and sediments. Weak or no schistosity was found in the mafic volcanics north of Swayze Lake. Pillow top directions indicate tops to be south which is consistent with the hypothesis that a volcanic vent located towards the south extruded a classic mafic to felsic volcanic pile.

All faults and shears and major lineations observed on the property trended in a northeasterly direction. This trend was also observed in the Derragh showing signifying the importance of north-south shears, faults and lineaments.

SURVEY PROCEDURE

INDUCED POLARIZATION/RESISTIVITY

Theory

The induced polarization (IP) and resistivity exploration methods are electrical methods based on measuring the response of the earth to an applied direct current.

The principle is to apply a known electric current to the earth, and measure the electric potential created by it at the survey location. The resistivity, a bulk property of the rock itself, is calculated from the difference between the applied current and the measured potential, corrected for the geometry of the current and potential electrode configuration.

The induced polarization measurement is based on the "over-voltage" effect. Most of the electric current carried by the earth is conducted by the flow of ions in the solutions filling the pore spaces in the rock. At the surface of any metallic particle in the path of current flow, the ionic flow in the solution is changed to an electronic flow in the metal. In the process of the change, an electric charge of trapped ions is built up at the surface of the metal, storing a small voltage. If the voltage increases, the apparent resistance of the rock also increases. If the applied current flow is decreased or stopped, the voltage will create a potential in the same direction to the original applied current.

In time domain induced polarization the applied current is abruptly stopped, and the reverse potential created by the over-voltage effect is measured over time as it quickly decays.

The definition of chargeability is:

$$M = \frac{V(t = \infty) - V(t = 0)}{V(t = \infty)}$$

where $V(t = 0)$ is the voltage at turnoff, and $V(t = \infty)$ is the late-time voltage. This is usually measured over a certain time period after turn-off as an integral of voltage over time, corrected for the length of the time period, and normalised to the voltage at time 0. It is usually expressed in millivolts per volt (mV/V).

The over-voltage charge takes time to build-up or decay, so that if the applied current is caused to oscillate more and more frequently, the apparent resistance will decrease, as the over-voltage does not have time to build at higher frequencies. This effect is used to measure the IP effect in frequency domain IP surveys, wherein the current is applied at two or more frequencies, and the "percent frequency effect" (PFE) is calculated from the change in resistivities (P) between the different frequencies.

$$PFE = \frac{P(\text{low freq}) - P(\text{high freq})}{P(\text{high freq})} \times 100 \%$$

Although not identical, for most purposes the PFE is

approximately equal to the chargeability.

Because the IP effect responds to effects on small metallic particles, it is particularly useful for detecting disseminated metallic minerals. Also because of this, it will respond strongly to the "membrane polarisation" created by the electric charges resident on clay particles or layered or fibrous minerals.

Field Method

The survey was conducted using a pole-dipole array with a dipole length of 50 m and array spacings of $n = 1, 2, 3, 4$ dipoles. This array configuration involves having a dipole for the receiver measuring V_p , the potential and a single current transmitter electrode on the grid, separated from the receiver dipole by each 'n' interval in turn. The other current electrode, 'the infinity' is situated 2 kilometers or more from the grid.

For this survey the measurements were taken in the time domain, so the transmitted current was a bipolar on-off square wave with each on or off lasting two seconds. Measurements of resistivity and chargeability were taken.

PERSONNEL AND EQUIPMENT

Robert S. Middleton Exploration Services Inc. provided four men to complete the induced polarization survey. The I.P.

equipment used was a Scintrex IPR-8 receiver and a 2kw IPT-1 transmitter. Specifications for the equipment may be found in Appendix A.

The crews were accomodated in camps provided by Middleton.

SURVEY STATISTICS

A total of 28 line km of grid were cut on which 10.025 km of IP survey was performed. The IP survey required 20 days, of which 9 1/2 were production days, 3 days were mobilization-demobilization, and 7 1/2 days were lost to inclement weather and breakdowns.

INTERPRETATION

The induced polarization survey indicated several anomalies. The two most outstanding anomalies were found in the north end of the grid on lines 1+00E and 1+00W. These two anomalies are broad, strong, deep, highly conductive and appear to be collinear. Geologically these anomalies lie at or near the contact of the mafic volcanic rocks to the north and the felsic pyroclastic rocks to the south and probably represent graphitic sediments formed during hiatuses between the volcanic and exhalitive events. The broad signature of these anomalies probably indicates the detection of several intercalated sedimentary beds over a 175m width. The field mapping of several

graphitic argillite horizons (Abernethy, 1987) along strike from these anomalies seems to confirm this interpretation. Still, the association of massive sulphide deposits with this geological environment, and the observed general enrichment of gold in carbonaceous sediments and their structural weakness in comparison to the wallrock makes these anomalies attractive targets for follow-up work.

Several weak, narrow anomalies were found adjacent to a topographic lineament trending NNE across the grid which had an associated magnetic anomaly and is interpreted to be a fault with mafic intrusion (Abernethy 1987, Hodges 1987). These anomalies may represent sulphides associated with the fault which would be significant targets for follow-up work. The most important of these anomalies is the weak anomaly centred at I0+00, 1+50S as this anomaly lies at the intersection of several lineaments and is in the vicinity of a known gold showing and related gold and trace element enrichments in the surrounding rock.

A good IP response was found centred at I4+00W, 0+50S. The anomaly is apparent across several lines but weakens to the east. No known causative mineralization exists to explain this which justifies future work.

The Derragh Showing consists of gold hosted in sulphides (galena, chalcopyrite and pyrite) which are disseminated within a 1-6 foot wide quartz-carbonate (ankerite) vein and disseminated

in the much altered and carbonatized wallrock. The IP response over this showing indicated a weak, shallow anomaly. A stronger, deeper anomaly exists north-east 125m along strike of this vein in the vicinity of where Dome Exploration Ltd. reportedly were finding gold values in the 1930's (Rickaby, 1933 unconfirmed). Thus, the area in and around the Derraugh Showing shows potential for mineralization.

Other IP anomalies are not related to any known or proposed mineralization. These anomalies may be caused by weak sulphide mineralization in porphyry bodies as was commonly observed on the property or other unknown sources but are considered only secondary targets at the moment.

CONCLUSIONS AND RECOMMENDATIONS

The IP survey in association with the magnetic, geological and lithogeochemical surveys has shown the gridded section of the Topboot Lake property to be very promising for further exploration. The existing information has delineated several zones of high potential for follow-up surface exploration including power stripping and trenching where overburden depths are amenable and diamond drilling in areas of deep, swampy overburden. As the original IP survey was limited, follow-up IP may also be considered.

Listed in order of importance, the five targets for

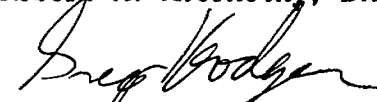
follow-up surface exploration are:

<u>Line</u>	<u>Station</u>	<u>Recommended Work</u>
1W	6+50S	Power stripping
0	5+50S	Power stripping
0	1+50S	Diamond drilling
4W	0+50S	Power stripping
1E	5+00N to 6+75N	Power stripping

Further diamond drilling will be dependent upon results from these original five targets.

Respectfully submitted


Robert K. Abernethy, B.A.Sc.


Greg Hodges, B.Sc.

REFERENCES

ABERNETHY, R.K.
1987

Report on the Property of Glen Auden Resources Limited, Swayze and Denyes Townships, Porcupine Mining Division District of Cochrane. Porcupine Mining Division Assessment Files.

HODGES, G.
1987

Report on the Magnetic Survey conducted on the Topboot Lake Property of Glen Auden Resources Limited, Swayze and Denyes Townships. Porcupine Mining Division Assessment Files.

CERTIFICATION

I, Robert K. Abernethy of R.R.#1 Dalton Road, Timmins, Ontario hereby certify that:

1. I am a graduate of the University of Toronto with a Bachelor of Applied Science degree, Geo-engineering discipline, 1985.
2. I have been practising my profession in Ontario and Quebec since graduation.
3. I retain a 1% NSR interest in the Topboot Lake property.
4. The report is based on literary reviews of all known pertinent information and personal field mapping of the property.

Dated this December 1, 1987
TIMMINS, Ontario

Rob Abernethy.
Robert Abernethy, B.A.Sc.

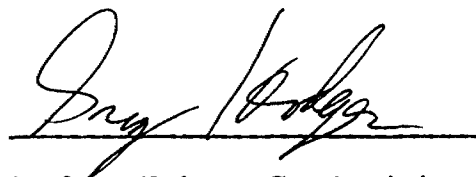
*Qual
2.9965*

CERTIFICATION

I, D. Greg Hodges, of 136 Cedar Street South, in the city of Timmins, Province of Ontario, certify as follows concerning my report on the Glen Auden Resources Limited Topboot Lake property in Swayze and Denyes Townships, Province of Ontario and dated December 1, 1987:

1. I am a member in good standing of the Society of Exploration Geophysicists
2. I am a graduate of Queen's University at Kingston, Ontario, with a B.Sc. (Hons.) Geological Sciences with Physics, obtained in 1980.
3. I have been practising in Canada, and occasionally in the United States, Europe, and Australia for the past seven years.
4. I have no direct interest in the properties, leases, or securities of Glen Auden Resources Limited, nor do I expect to receive any.
5. The attached report is a product of:
 - a) Examination of data included in the report which was collected on the property concerned.

Dated this December 1, 1987
Timmins, Ontario



D. Greg Hodges, Geophysicist

Qual
2.5919

A P P E N D I X A

Induced Polarization Time Domain Receiver

The basic equipment required for an Induced Polarization survey consists of a transmitter, a receiver, wire and electrodes.

Most time domain induced polarization transmitters transmit square waves with equal "on" and "off" times. Polarity is automatically changed between the pulses. The waveform shown in Figure 1 indicates how the current is usually transmitted. The pulse times usually range from T = 1 to 8 seconds.

The transmitter is powered by batteries (portable type units) or a motor driven generator. Scintrex manufactures various time domain induced polarization transmitters ranging in power from 250 watts to 15 kw. The choice of a transmitter depends on various factors such as: the electrode spacings to be employed, contact resistance and the resistivity of the sub-surface. The IPR-8 receiver is designed for use with any time domain induced polarization transmitter.

The IPR-8 time domain induced polarization receiver is packaged in a rugged and portable manner. Using integration and automatic normalization, it measures the characteristics of an induced polarization decay curve set up by overvoltage and other effects occurring in rocks. When induced polarization effects (such as due to metallic-nonmetallic interfaces in rocks) occur, the waveform received at the receiver is not the same square wave as transmitted by the transmitter. The waveform shown in Figure 2 indicates the sort of wave distortion which is caused by the induced polarization phenomena.

2. Specifications

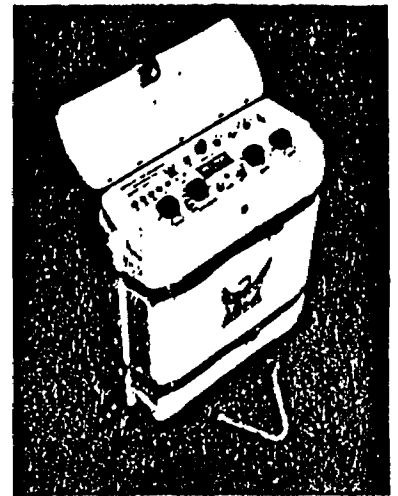
The IPR-8 has the following specifications:

Input Impedance	3 megohms
Primary Voltage (Vp) Range	300 microvolts full scale to 40 volts full scale in 10 ranges
Accuracy of Vp Measurement	±3% of full scale
Vs/Vp Ranges	20 and 100 mV/V full scale
Vs/Vp Accuracy	±3% of full scale
Primary SP Buckout Range	±1 volt
Accuracy of SP Measurement	±3%, ±5 mV
Automatic SP Tracking Range	6 x Vp, maximum ±1 volt
Continuity Meter Reading	0 - 500 k ohms
50 or 60 Hz Powerline Rejection	-50 db (300x) ⁴
Low Pass Filter	6 db/octave with fc = 20 Hz and 12 db/octave with fc = 36 Hz
Required Stability of Transmitter Timing	Need only exceed measuring program selected (1 or 2 seconds)
Operating Temperature Range	-30°C to +60°C
Dimensions	320 mm x 135 mm x 160 mm
Weight, Complete with Lid and Batteries	3.6 kg
Power Supply	4 D cells - Eveready No. 1050 or equivalent; estimated battery life 2 months intermittent duty at 25°C. 1 alkaline cell Eveready No. E91 or equivalent; estimated life 1 year

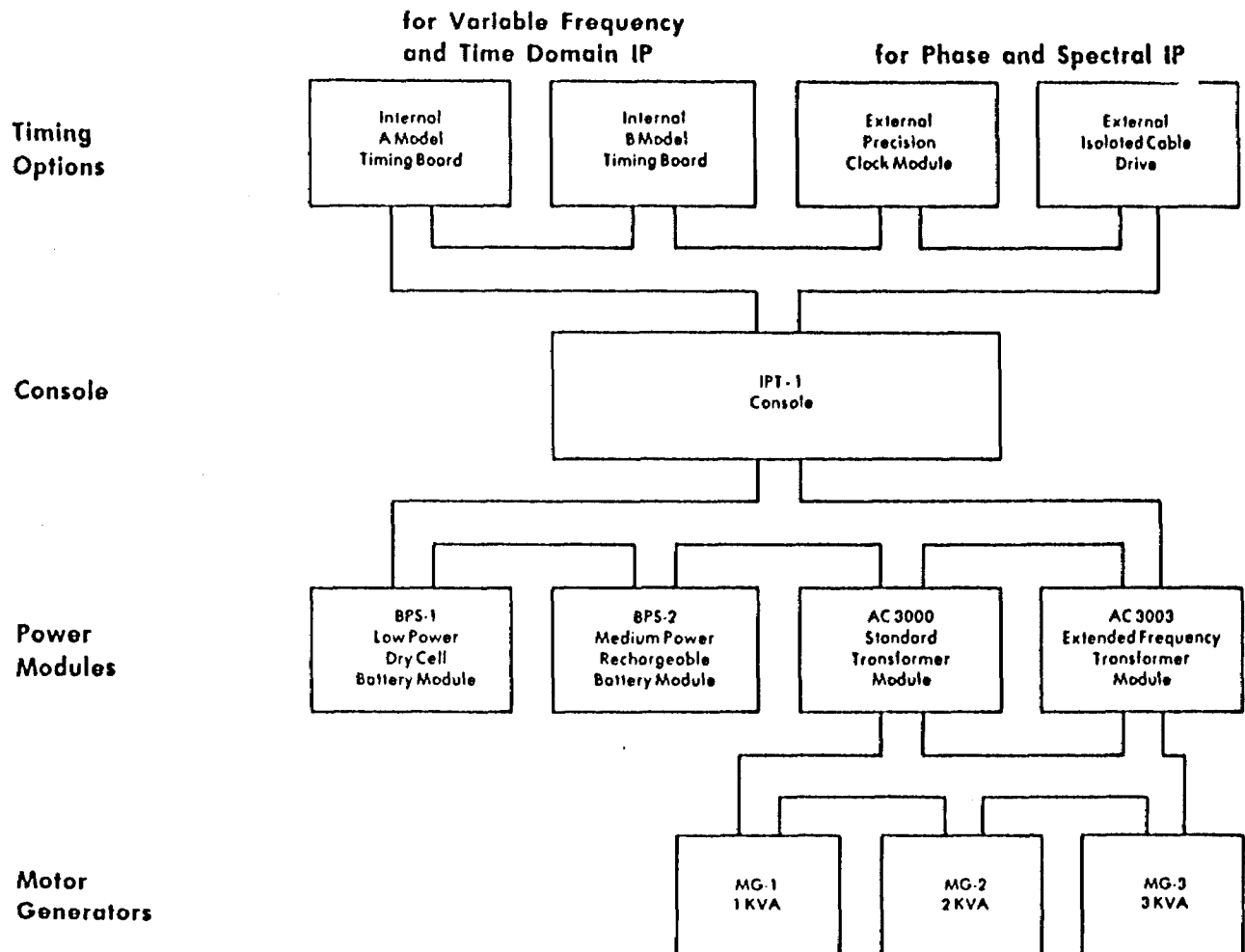
IPT-1

Variable Frequency, Time Domain and Phase IP Transmitter

- **Reliable:** Backed by twenty years experience in the design and worldwide operation of induced polarization and resistivity equipment
- **Versatile:** Can be used for resistivity, variable frequency IP, time domain IP or phase angle IP measurements
- **Stable:** Excellent current regulation
- **Lightweight, portable**
- **Wide selection of power sources**
- **Low cost**



Transmitter Configurations



PHOENIX GEOPHYSICS LIMITED

Geophysical Consulting and Contracting, Instrument Manufacture, Sale and Lease.

Head Office: 200 Yorkland Blvd., Willowdale, Ontario, Canada M2J 1R5
Tel.: (416) 493-6350 Telex: 06-986856 Cable: PHEXCO TORONTO

Vancouver Office: 214 - 744 West Hastings Street, Vancouver, B.C., Canada V6C 1A6
Tel.: (604) 669-1070

Denver Office: 4891 Independence St., Suite 270, Wheat Ridge, Colorado, 80033, U.S.A.
Tel.: (303) 425-9393 Telex: 450690

Timing Options

INTERNAL TIMING BOARD

There are three available internal timing boards. Both have the same internally mounted crystal oscillator with a stability of 50 PPM over the temperature range -40°C to +60°C.

STANDARD FREQUENCY SERIES

Frequency domain mode
±DC, .062, .125, .25, 1, 2 and 4 Hz.
Time domain mode
2 sec +, 2 sec off, 2 sec -, 2 sec off.
Simultaneous transmission mode
.25 and 4.0 Hz standard, other pairs available.

OPTIONAL FREQUENCY SERIES (change link on board)

Frequency domain mode
±DC, .078, .156, .313, 1.25, 2.5, and 5.0 Hz.
Time domain mode
1.6 sec +, 1.6 sec off, 1.6 sec -, 1.6 sec off.
Simultaneous transmission mode
.313 and 5.0 Hz standard, other pairs available.

Model A :

Model B :

The main difference between this timing board and the model A board is that the duty cycle is variable. Frequency domain operation is obtained by setting the duty cycle to 100% and selecting any of nine binary frequencies from 1/64 Hz to 4 Hz. Various time domain waveforms may be obtained by choosing any of the nine frequencies and a duty cycle of 25%, 50% or 75%. The standard 2 sec +, 2 sec off, 2 sec -, 2 sec off time domain waveform is chosen by selecting a duty cycle of 50% and a frequency of .125 Hz.

Model C :

Time domain: 1, 2, 4, 8 second cycle. Frequency domain: 0.1, 0.3, 1.0, 3.0 Hz.

EXTERNAL HIGH PRECISION CRYSTAL CLOCKS

The IPT-1 may be driven by external high precision crystal clock modules such as the CL-1 and transmitter driver or CL-2 and transmitter driver. These clock modules were designed for use as a time reference between the IPT-1 or IPT-2 transmitters and the Phoenix IPV-2 phase IP receiver. The aging rate of the CL-1 clock module is 5×10^{-10} /day (0.11 mrad/hr at 1 Hz) and the stability of the CL-2 clock module is 10^{-7} /day (2.26 mrad/hr at 1 Hz). These clock modules weigh 7.5 kg., however space is provided for as much as 5 kg of additional internal batteries for operating the CL-1 oven heated clocks all day at -40°C. Clock modules produced by other manufacturers of induced polarization receivers are also compatible with the IPT-1.

EXTERNAL ISOLATED CABLE DRIVE

The isolated cable drive option allows the IPT-1 to be driven by the timing circuitry of the IPV-3 spectral IP receiver. The maximum distance allowed between transmitter and receiver is 500m. For efficient spectral IP field surveying, the distance between the transmitter and receiver is always maintained at one electrode interval. Thus the maximum convenient electrode interval, using the isolated cable drive option, is 500m. The IPV-3 measures the current plus six voltage dipoles ($n=1,6$) simultaneously.

Console

Ammeter Ranges :

30 mA, 100 mA, 300 mA, 1A, 3A and 10A full scale.

Meter Display :

A meter function switch selects the display of current level, regulation status, input frequency, output voltage, control voltage and line voltage. An optional digital display presents all of the above, plus external circuit resistance.

Current Regulation :

The change in output current is less than 0.2% for a 10% change in input voltage or electrode impedance.

Protection :

The current is turned off automatically if it exceeds 150% full scale or if it is less than 5% full scale.



Internal Power Modules

BPS-1 DRY CELL BATTERY POWER MODULE

- Output Voltage** : 90V, 180V and 360V.
- Output Current** : 1 mA to 1A maximum.
- Output Power** : Recommended maximum output power is 30 watts. Absolute maximum output power is 100 watts.
- Power Supply** : 8x45V dry cell batteries (Eveready 482, Mallory 202 or equivalent). Normal field operation, with low output power, results in an average battery life expectancy of one month. Operation with the absolute maximum output power results in much shorter battery life.
- Control Supply** : 4 x 6V lantern batteries (Eveready 409, Mallory 908 or equivalent) connected in series/parallel are used to provide the 40 to 70 mA at 12V required for the control circuitry. Average battery life expectancy is six months.
- Operating Temperature** : 0°C to +60°C.

BPS-2 RECHARGEABLE BATTERY POWER MODULE

- Output Voltage** : 50V, 106V, 212V, 425V, and 850V.
- Output Current** : 3 mA to 3A.
- Output Power** : Maximum output power is 300 watts. Above this output power a protective cut-out is engaged to prevent battery and circuit damage.
- Batteries** : 4 x 12V rechargeable gell cell batteries connected in series/parallel have a capacity of 9 A-hr. External batteries (such as car or motorcycle batteries) may also be used. A special cord and plug are provided for this mode of operation. An adaptor cord connects the 12V batteries in parallel with the 12V charging unit.
- Operating Temperature** : -40°C to +60°C. Below 0°C the capacity of the batteries is significantly reduced (by 70% at -40°C).

AC 3000 TRANSFORMER POWER MODULE

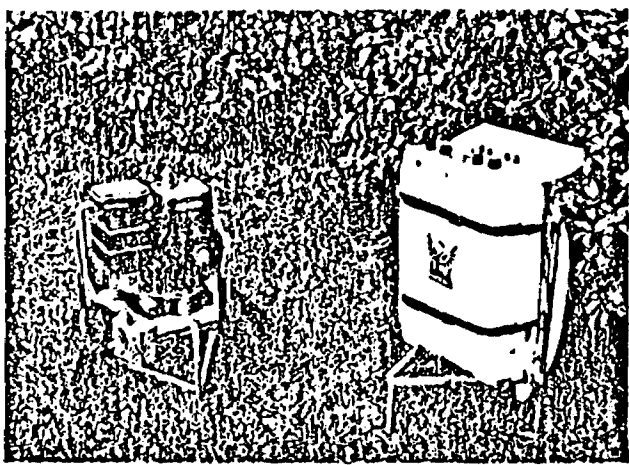
- Output Voltage** : 75V, 150V, 300V, 600V and 1200V.
- Output Current** : 3 mA to 10A.
- Output Power** : Maximum continuous output power is 3KW with MG-3 motor generator, 2KW with MG-2 motor generator and 1KW with MG-1 motor generator.
- Input Power** : Three phase, 400 Hz (350 to 1000 Hz), 60V (50V to 80V) is standard. Three phase, 400 Hz (350 to 1000 Hz), 120V (100V to 160V) is optional.
- Current Regulation** : Achieved by feedback to the alternator of the motor generator unit.
- Operating Temperature** : -40°C to +60°C.
- Thermal Protection** : Thermostat turns off at 65°C and turns back on at 55°C internal temperature.

AC 3003 TRANSFORMER POWER MODULE

- Same as AC 3000 except for:
- Output Voltage** : 44V, 87V, 175V, 350V and 700V.
- Frequency Range** : DC to 3000 Hz under external drive (all other power modules have a maximum frequency of 5 Hz).
- (Note: AC 3003 is not intended for extended time domain operation)

General

- Dimensions** : 20 x 40 x 55 cm (9 x 16 x 22 in).
- Weight** : 13 kg (29 lb) with BPS-1.
13 kg (29 lb) with BPS-2.
17 kg (37 lb) with AC-3000.
18 kg (40 lb) with AC-3003.
- Standard Accessories** : Pack frame, manual, At least one of the four possible power modules is required. The transformer power modules in turn require one of the three external 1KVA, 2KVA, 3KVA, motor generators and a connecting cable.

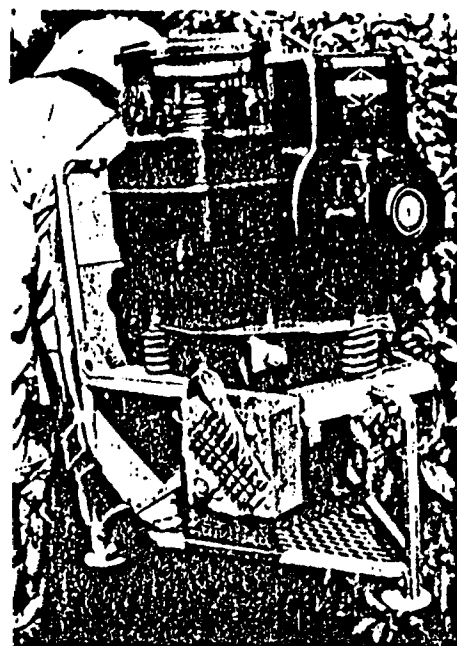


Motor Generators

There are three motor generators, differing in weight and power, which can be used with the transformer power modules. All three supply three phase, 400 Hz (350 to 450 Hz), 60V (45V to 80V). The voltage is regulated by feedback from the transmitter.

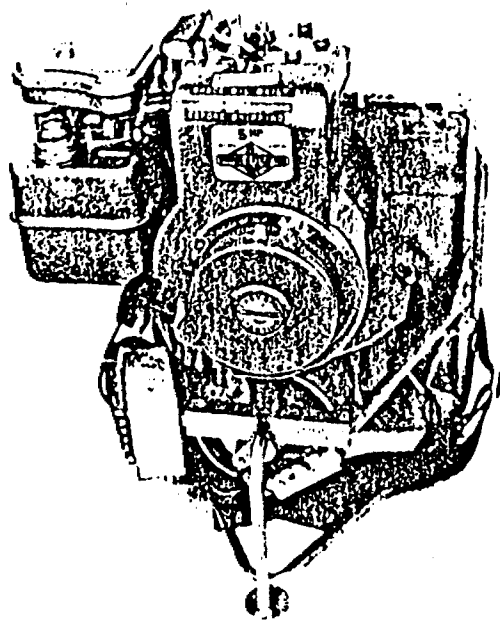
MG-1:

This lightweight unit is designed for easy portability in areas of moderately high resistivity. It is well suited for massive sulfide exploration in Northern Canada, Europe and Asia, as well as general IP and resistivity surveys in rugged, mountainous areas around the world. The motor is a 4-cycle Briggs and Stratton which produces 3 HP at 3600 rpm. The dimensions of the unit, including packframe, are 40 x 45 x 60 (16 x 18 x 24 in). Total weight is 25 kg (55 lb).



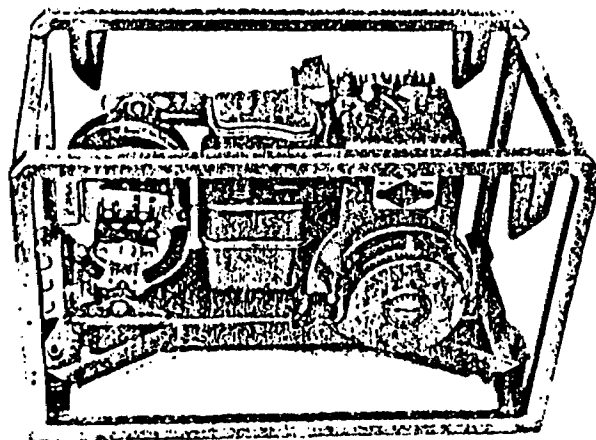
MG-2:

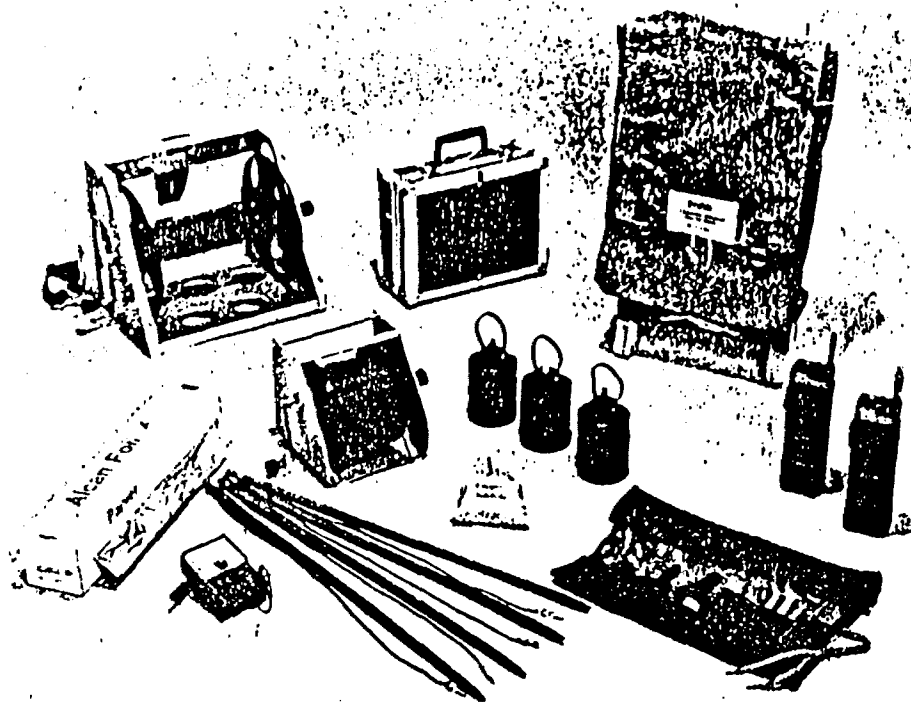
2KVA motor generator. This versatile unit is adequate for the vast majority of IP and resistivity surveys conducted worldwide. It is light enough to be carried by one man, yet powerful enough for most survey requirements. The motor is a 4-cycle Briggs and Stratton which produces 5 HP at 3600 rpm. The dimensions of the unit, including packframe, are 40 x 45 x 60 cm (16 x 18 x 24 in). Total weight is 34 kg (75 lb).



MG-3:

3KVA motor generator. This two-man portable unit is designed for surveys in areas which require additional power. The motor is a 4-cycle Briggs and Stratton which produces 8 HP at 3600 rpm. The unit is mounted in a square frame with dimensions 40 x 48 x 75 cm (16 x 19 x 29 in). Total weight is 55 kg (120 lb).





Accessory Packsack	:	Trapper Nelson #3 packboard with packsack.
Receiver Transport Case	:	Aluminum, foam lined, 13 x 32 x 44 cm.
Stake Electrodes	:	Mild steel rods with hard tapered end, 1.6 cm diameter, 75 cm or 120 cm long.
Foil Electrode Material	:	Heavy duty industrial aluminum foil, 0.0025 cm x 46 cm x 137 m.
Field Wire	:	Black, low friction, polyethylene plus nylon jacket. Four copper plus three steel strands. Tensile strength 40 kg. Total resistance 76 ohm/km. External diameter 0.213 cm.
Geo Reel	:	Two speed aluminum winder with packstraps, 35 x 40 x 50 cm.
Geo Reel Spool	:	Capacity for 3000m of field wire.
Speedwinder	:	Aluminum winder, 20 x 25 x 30 cm.
Speedwinder Spool	:	Capacity for 600m of field wire.
Porous Pots	:	Plastic with porous asbestos bottom. Coiled copper wire makes contact with saturated copper sulfate solution.
Copper Sulfate	:	450 g.
Multimeter	:	Resistance, voltage and current.
Tool Kit	:	Soldering iron, wrenches, screwdrivers.
Radios	:	Transmitter-receivers.

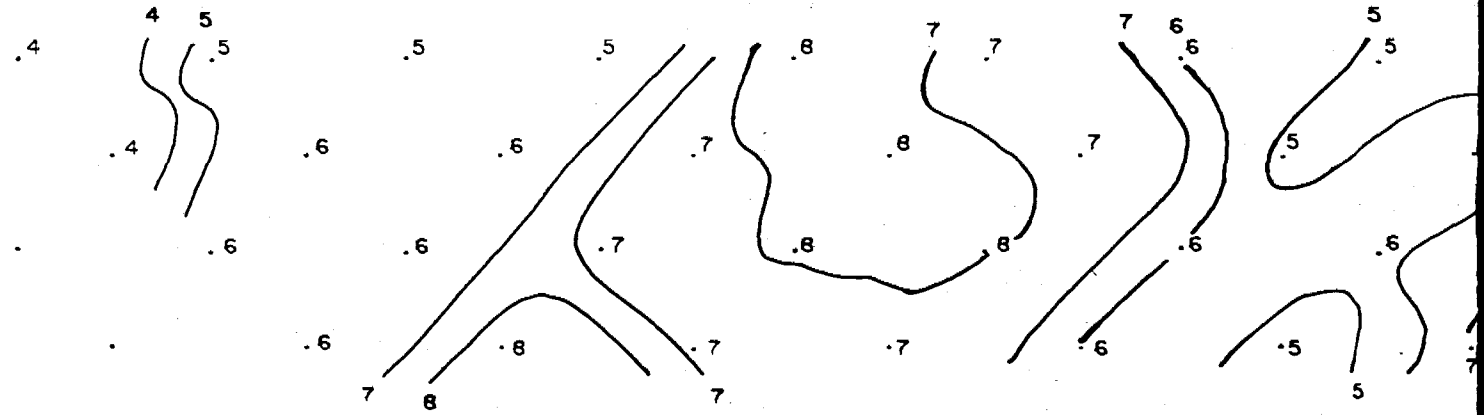
A P P E N D I X B

CHARGE

275S

175S

75S

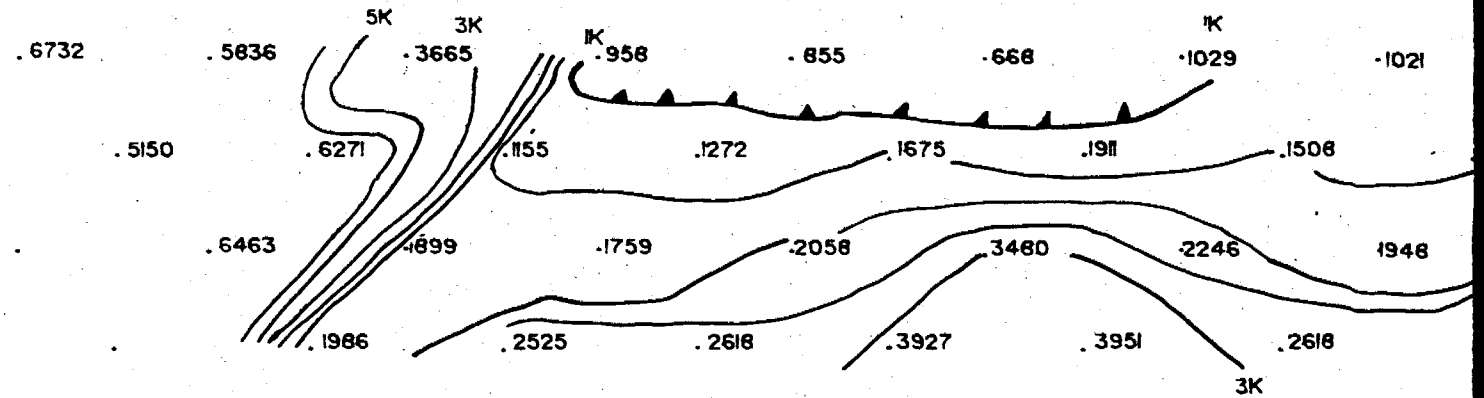


RESISTIV

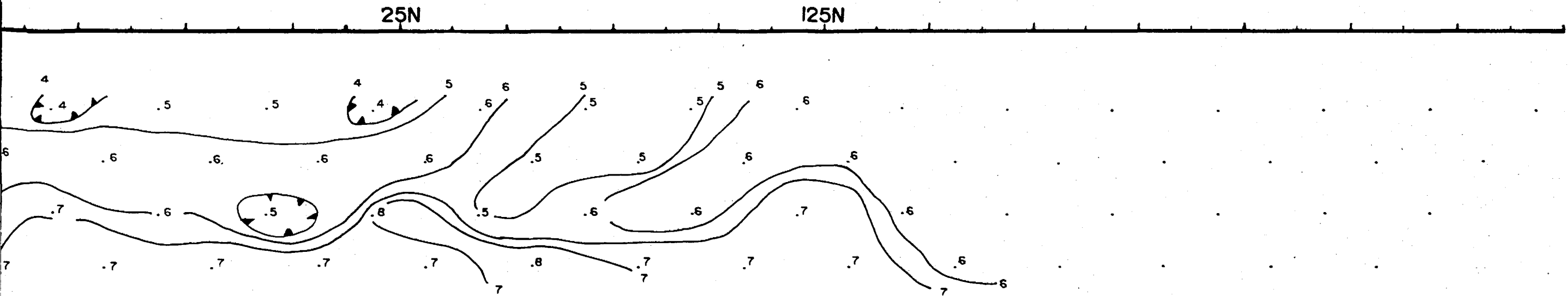
275S

175S

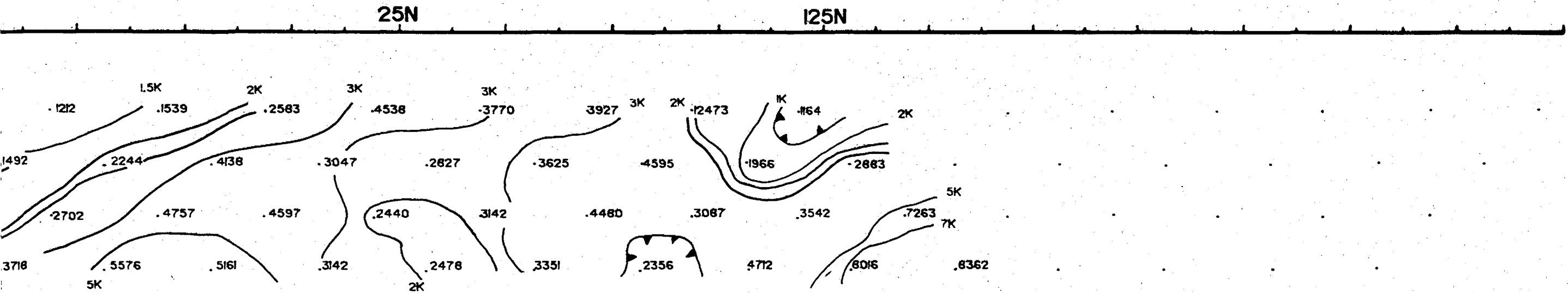
75S



BILITY (mv/v)

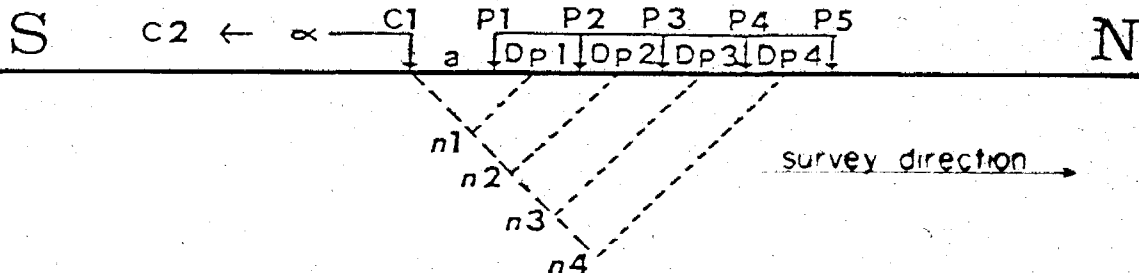


ITY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2. 11002

Tx : Phoenix IPT-1

Pulse Scheme: T T T + off

Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)

$T = 2 \text{ seconds}$

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25
30, 4, 4, 6, 7, 8, 9

depression contour
N.V. noisy value

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4 10, 20, 30, 60, 100, 200, 300, 600,
5 10, 15, 25, 40, 60, 100, 150, 250, 400,
6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,
7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

ROBERT S. MIDDLETON EXPLORATION SERVICES INC.

for
GLEN AUDEN RESOURCES LTD.

Title **Denyes & Swayze Twps**

TOPBOOT LAKE PROPERTY

L O

Date: June 87

Scale: 1:2500

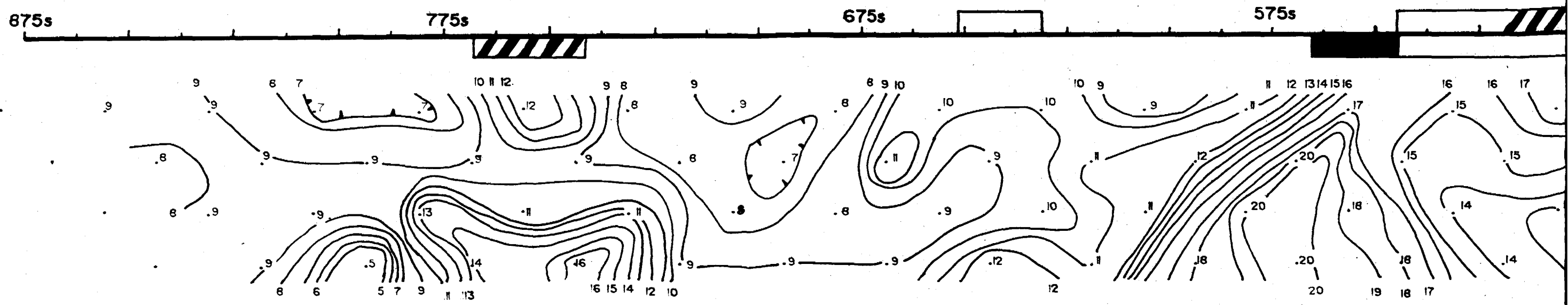
N.T.S.:

Drawn:

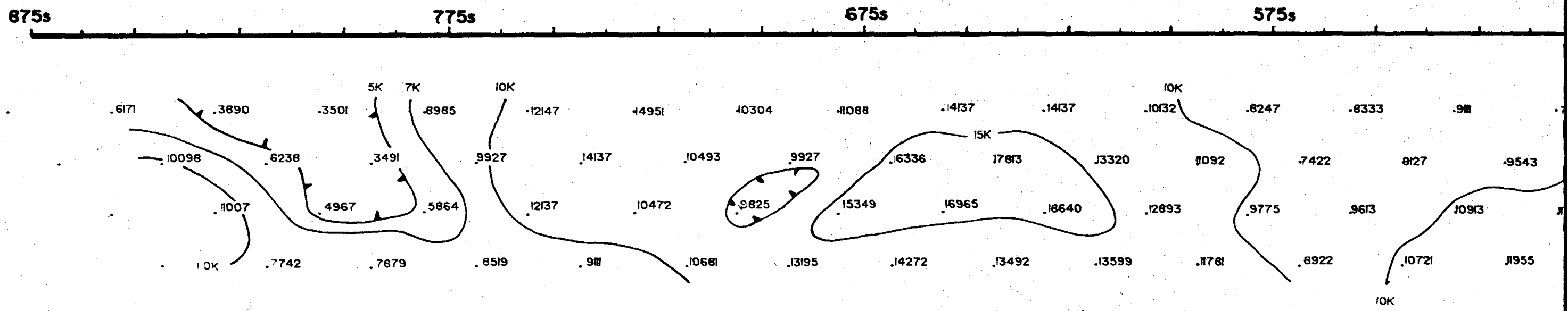
Approved:

File: M-202h

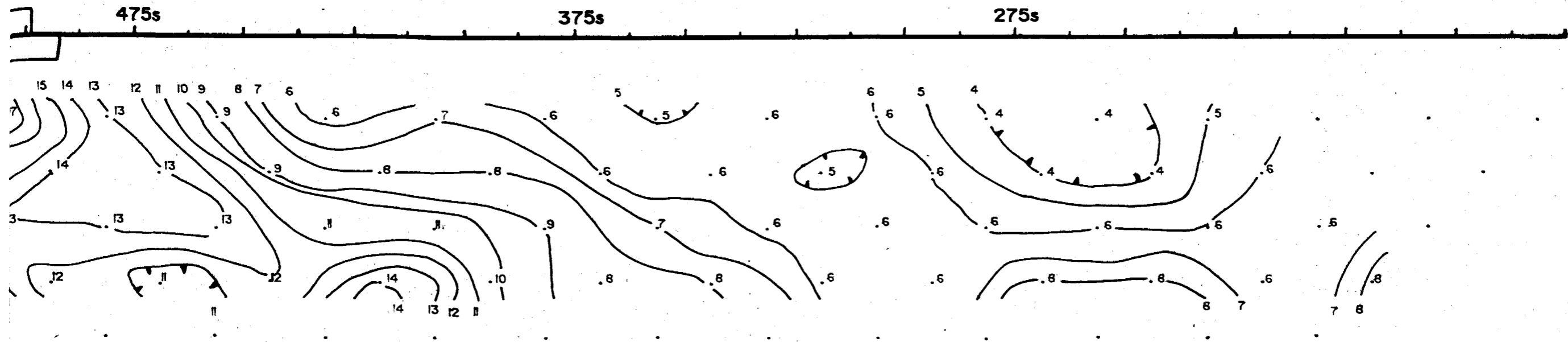
CHARGEABILITY



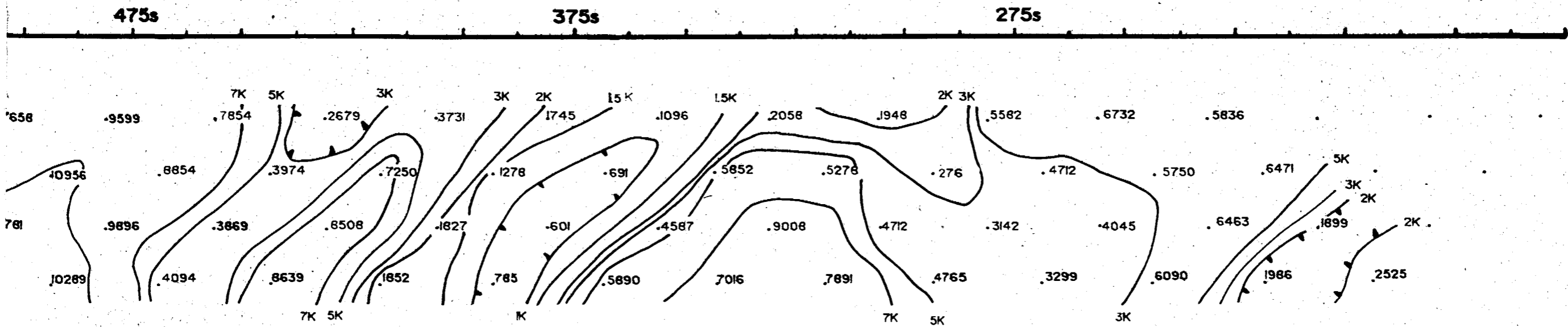
RESISTIVITY



ITY (mv/v)

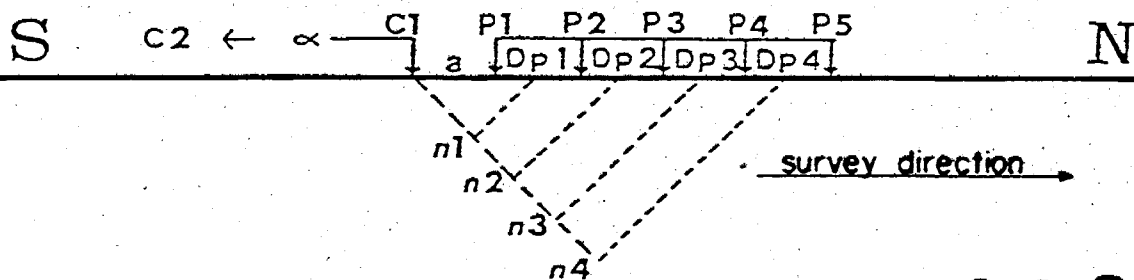


(ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1

Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)

Pulse Scheme

TOTAL LINE:

TOTAL READINGS:

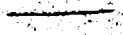
CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

1, 2, 3, 4, 6, 7, 8, 9

depression contour
N.V. - noisy value



N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

- 4 10, 20, 30, 60, 100, 200, 300, 600,
- 5 10, 15, 25, 40, 60, 100, 150, 250, 400,
- 6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,
- 7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for **GLEN AUDEN RESOURCES LTD.**

Title **Denyes & Swayze Twps**

**TOPBOOT LAKE PROPERTY
L O**

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved: *[Signature]*

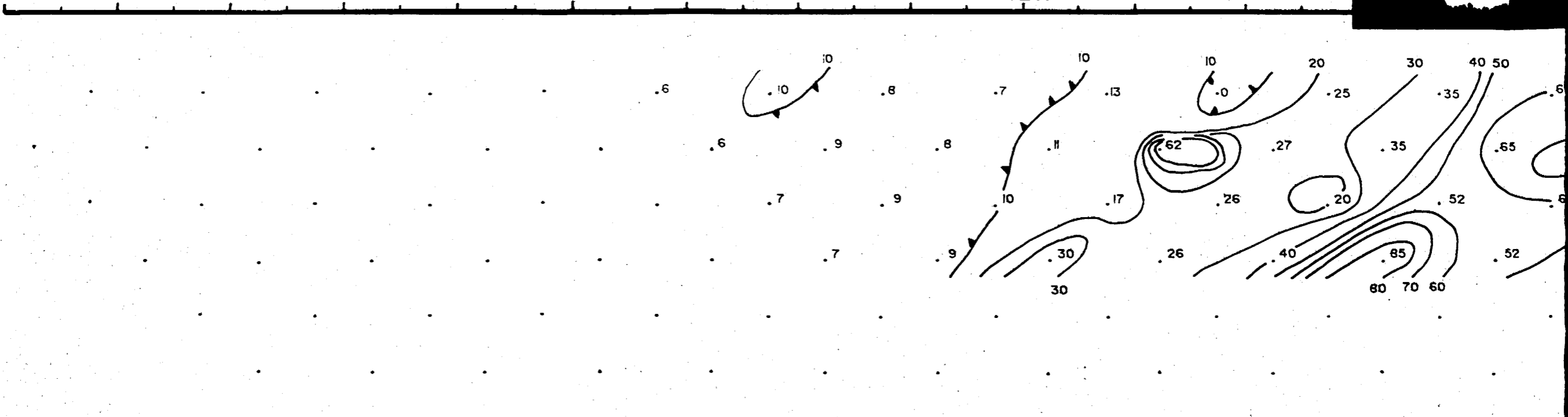
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CHARGE

325N

425N

525N

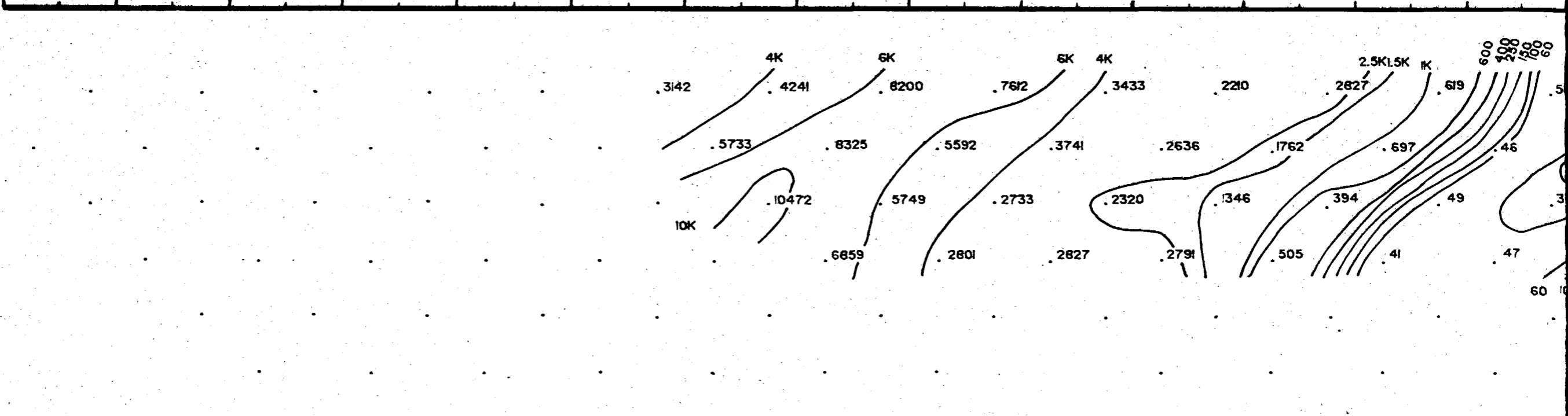


RESIST

325N

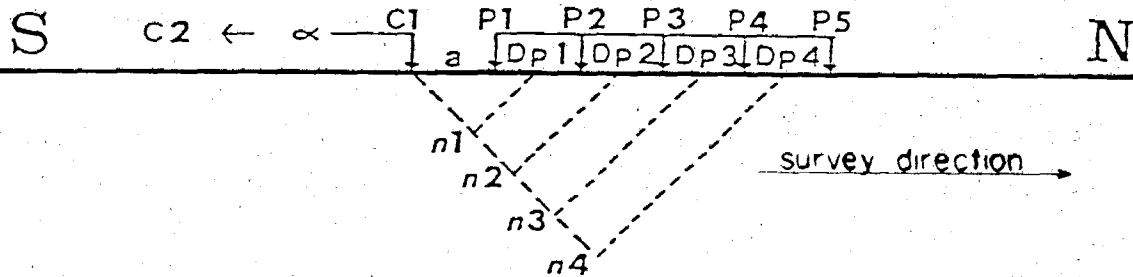
425N

525N



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1 Pulse Scheme T = 2 seconds

Rx : Scintrex IPR-8 plotting 3rd slice 4mid pt. 910 msec.)

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

1, 2, 3, 4, 6, 7, 8, 9

depression contour

NV - noisy value



N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4. 10, 20, 30, 60, 100, 200, 300, 600,

5. 10, 15, 25, 40, 60, 100, 150, 250, 400,

6. 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7. 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

GLEN AUDEN RESOURCES LTD.

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY
L IE**

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved:

File: M-202b

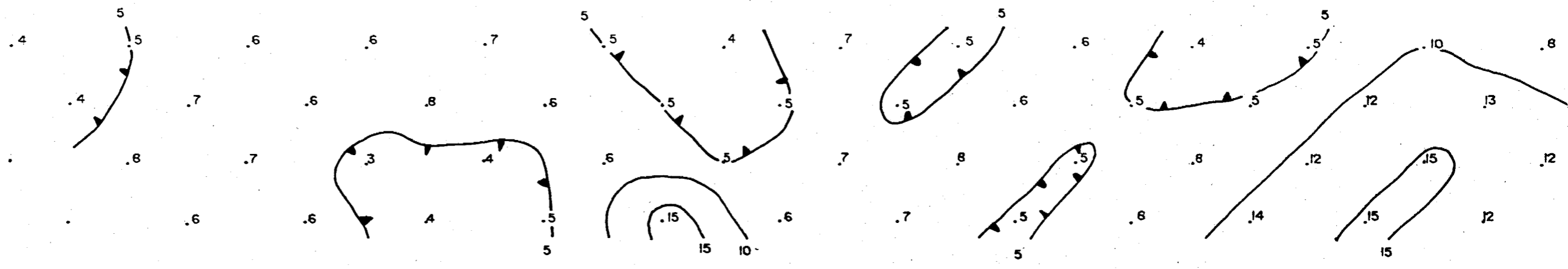
CHARGE

275S

175S

75S

25N



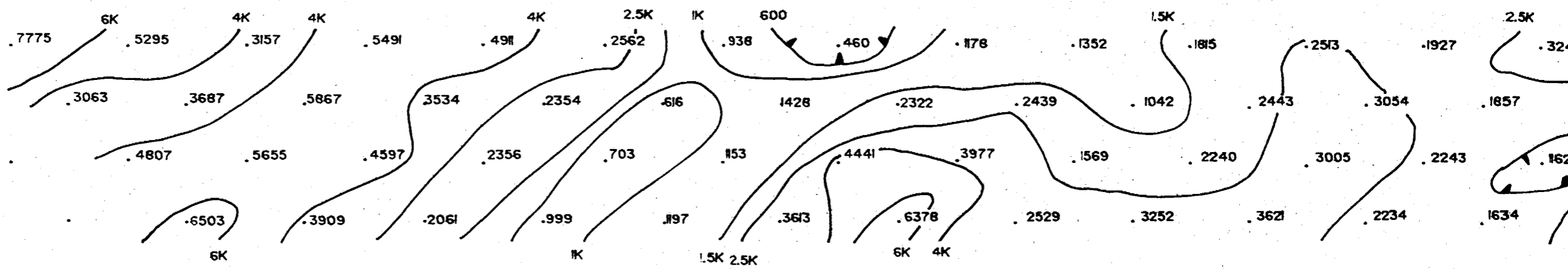
RESIST

275S

175S

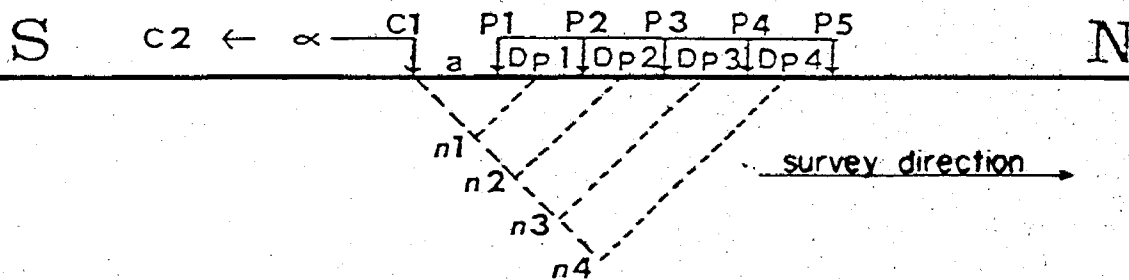
75S

25N



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1



Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)



TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

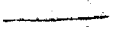
Chargeability

0, 5, 10, 15, 20, 25

1, 2, 3, 4, 6, 7, 8, 9

depression contour

N.V. - noisy value



N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4 10, 20, 30, 60, 100, 200, 300, 600,

5 10, 15, 25, 40, 60, 100, 150, 250, 400,

6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

**ROBERT S. MIDDLETON
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for

GLEN AUDEN RESOURCES LTD.

Title

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TOPBOOT LAKE PROPERTY

L IE

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved: *[Signature]*

File: M-202b

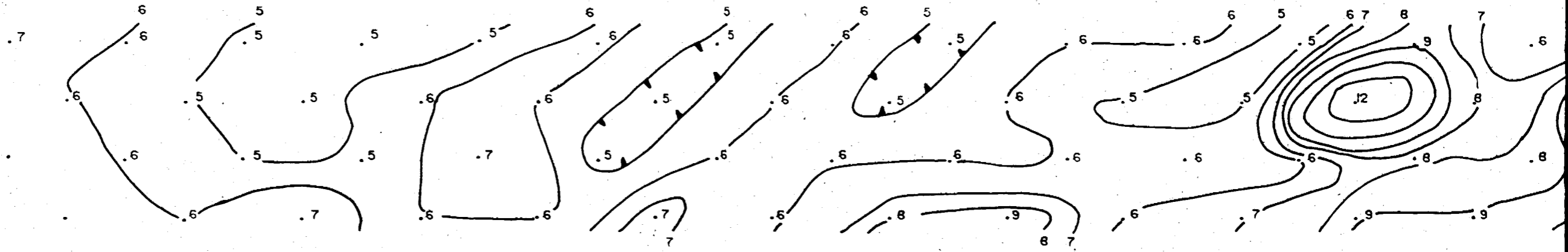
CHARGE

875s

775s

675s

575s



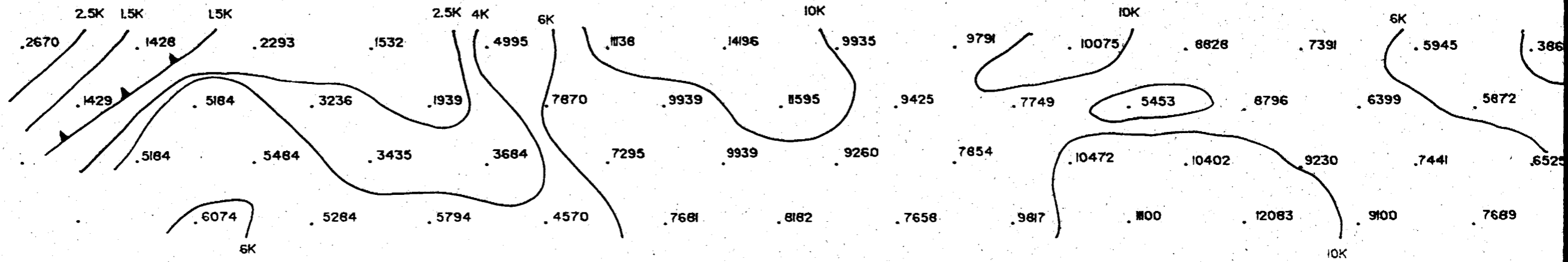
RESISTI

875s

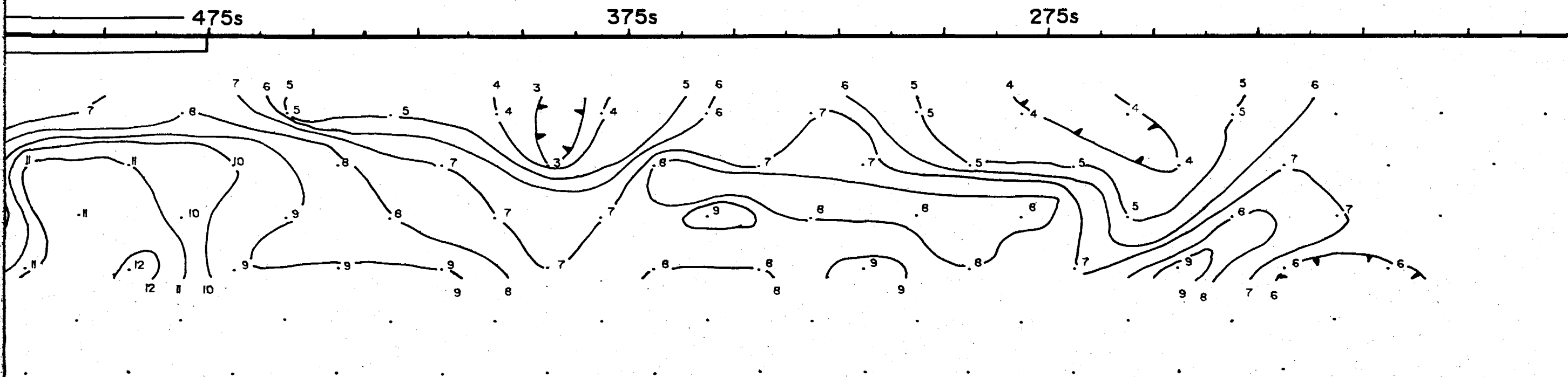
775s

675s

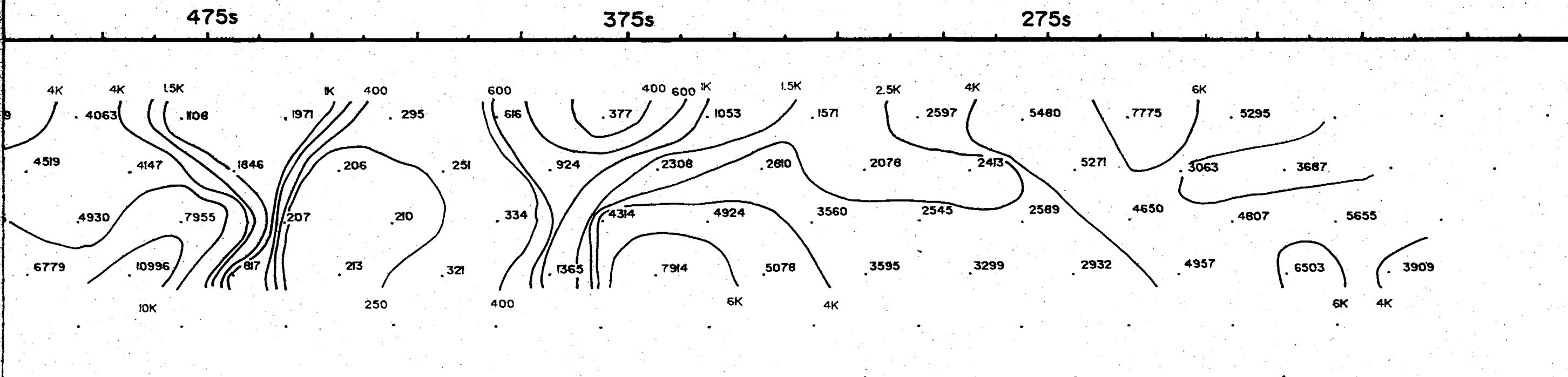
575s



ABILITY (mv/v)

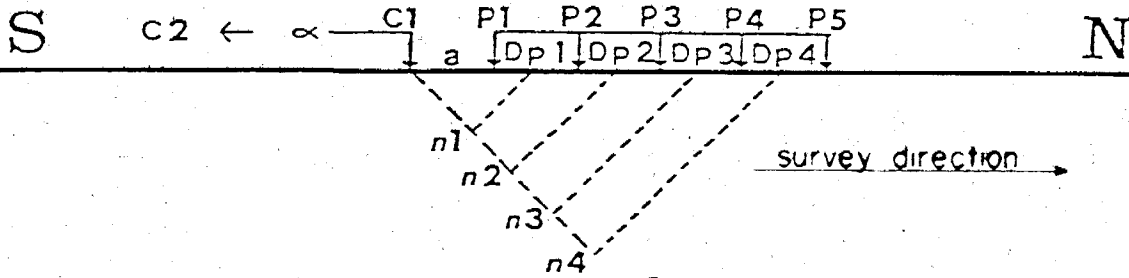


VITY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1

Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)

Pulse Scheme $T = 2 \text{ seconds}$

TOTAL LINE:

TOTAL READINGS:

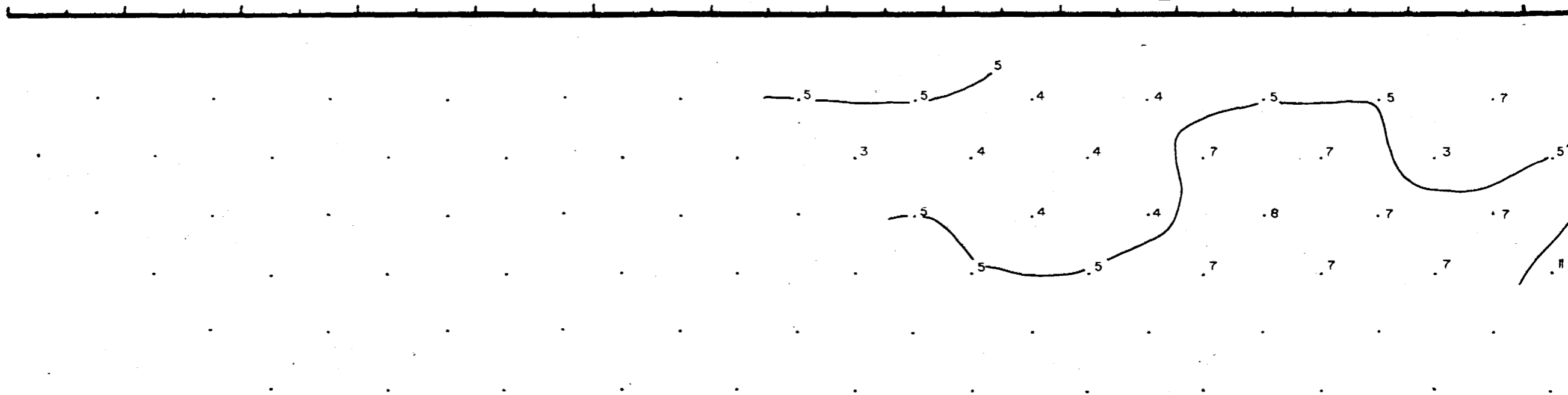
CONTOUR INTERVAL

<p>Chargeability</p> <p>0, 5, 10, 15, 20, 25</p> <p>1, 2, 3, 4, 6, 7, 8, 9</p> <p>depression contour</p> <p>N V - noisy value</p>	<p>N.R. - no reading</p>	<p>Resistivity</p> <p>(Logarithmic contouring)</p> <p>Contours Per Decade</p> <p>4 10, 20, 30, 60, 100, 200, 300, 600,</p> <p>5 10, 15, 25, 40, 60, 100, 150, 250, 400,</p> <p>6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,</p> <p>7 10, 15, 20, 30, 40, 55, 75, 100.</p>
--	--------------------------	--

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.	
	for GLEN AUDEN RESOURCES LTD.	
	Title Denyes & Swayze Twps	
	TOPBOOT LAKE PROPERTY	
	L IE	
	Date: June 87	Scale: 1:2500
	Drawn:	Approved:
		N.T.S.:
		File: M-202b

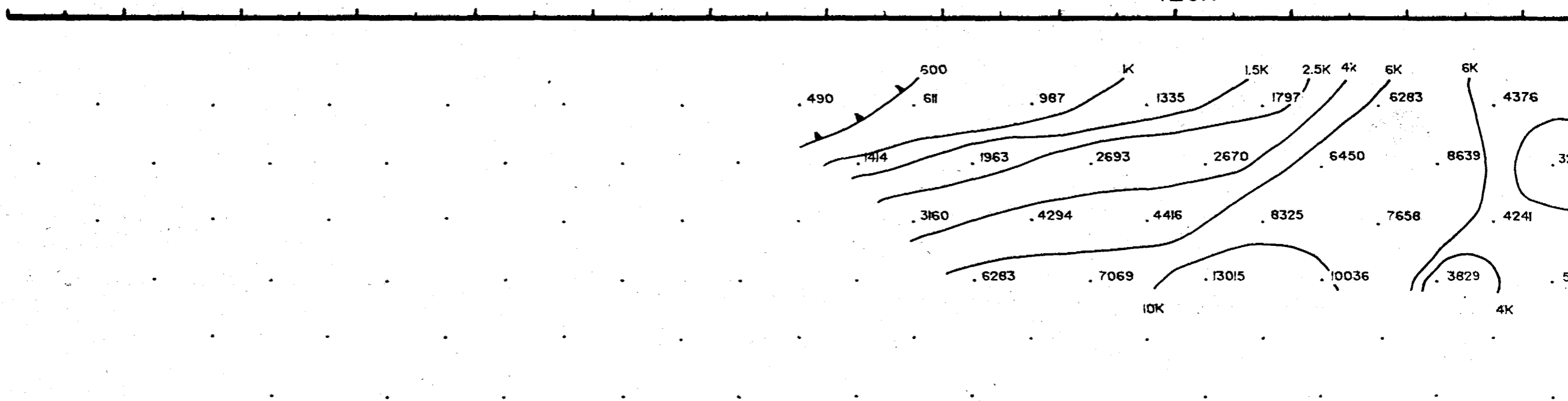
CHAI

425N



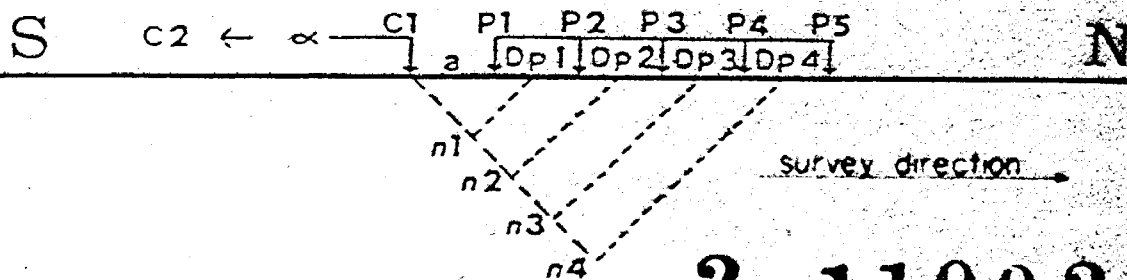
RES

425N



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



a = 25m

n = 1-4

2.11002

Tx : Phoenix IPT-1

Rx : Scintrex IPR-8

Pulse Scheme: T T T off T = 2 seconds

plotting 3rd slice (mid pt. 910 msec.)

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9

depression contour

N.V. - noisy value

Resistivity

(Logarithmic contouring)

Contours Per Decade

- 4 10, 20, 30, 60, 100, 200, 300, 600
- 5 10, 15, 25, 40, 60, 100, 150, 250, 400
- 6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300
- 7 10, 15, 20, 30, 40, 55, 75, 100

N.R. - no reading

REVISIONS

**ROBERT S. MIDDLETON
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for
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Title **Denyes & Swayze Trps**

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Date: June 87

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Approved:

File # 2005

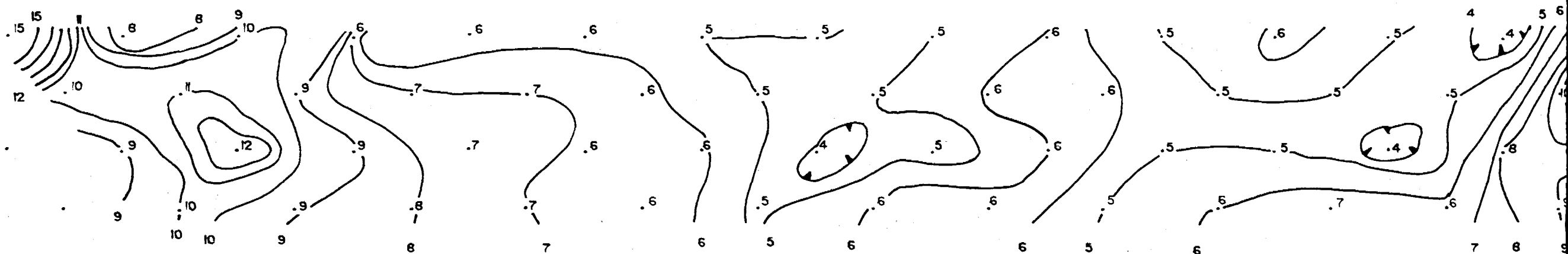
CHARGEA

275S

175S

75S

25N



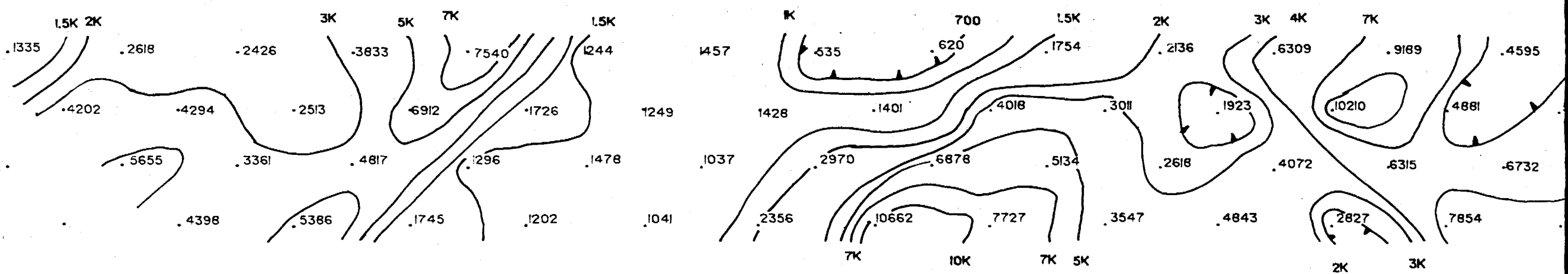
RESISTIV

275S

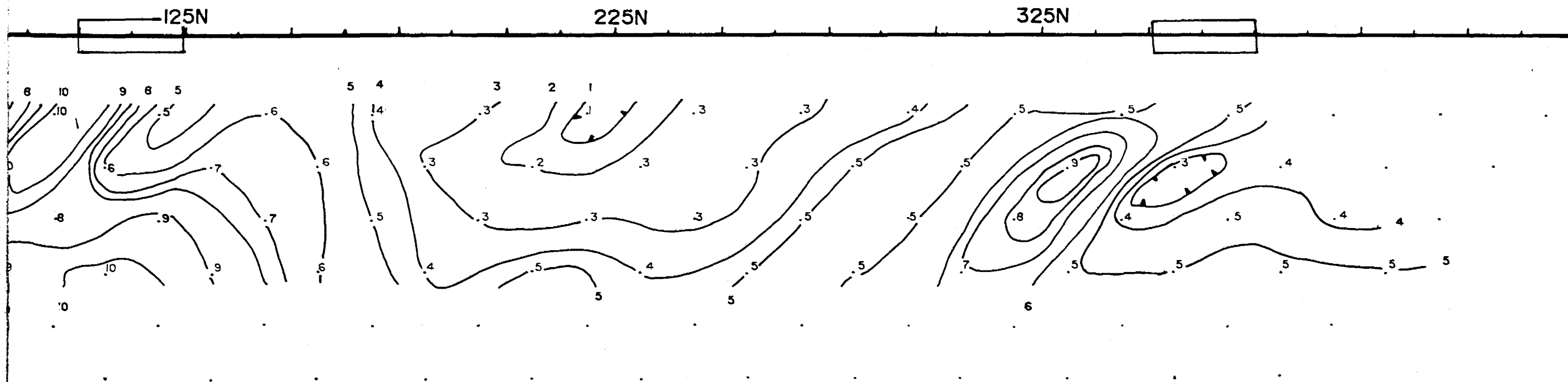
175S

75S

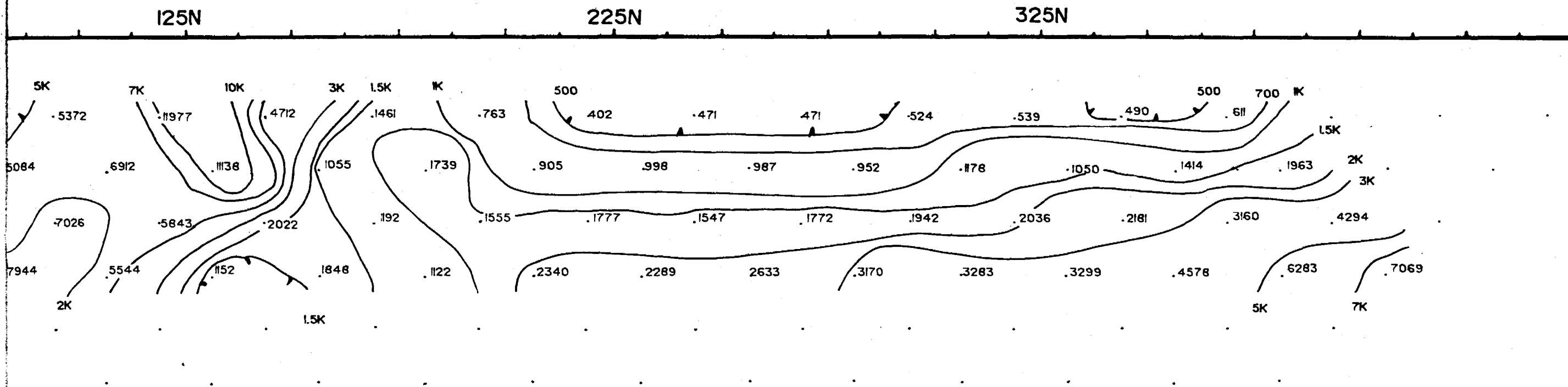
25N



BILITY (mv/v)

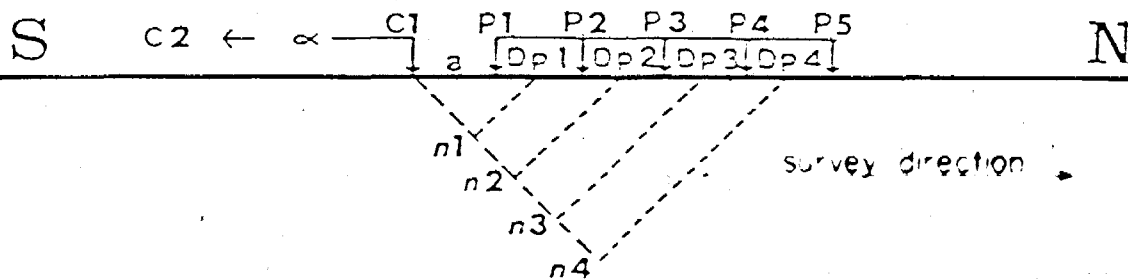


TY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2. 11002

Tx : Phoenix IPT-1 Pulse Scheme + off

Rx : Scintrex IPR-8 plotting 3rd slice (mid pt. 910 msec.)

$T = 2 \text{ seconds}$

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

Resistivity

(Logarithmic contouring)

Contours Per Decade

1 1, 2, 3, 4, 5, 6, 7, 8, 9

4 10, 20, 30, 60, 100, 200, 300, 600,

depression contour

▼ ▼ ▼

5 10, 15, 25, 40, 60, 100, 150, 250, 400,

N V noisy value

N R - no reading

6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

GLEN AUDEN RESOURCES LTD.

Title

Denyes & Swayze Twps

TOPBOOT LAKE PROPERTY

L IW

Date: June 87

Scale: 1:2500

N.T.S.:

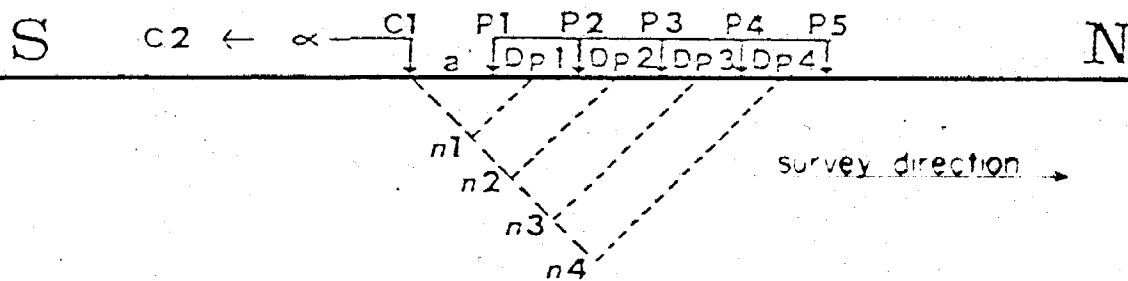
Drawn:

Approved:

File: M-202b

INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1 Pulse Scheme T = 2 seconds

Rx : Scintrex IPR-8 plotting 3rd slice (mid pt. 910 msec.)

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

1, 2, 3, 4, 5, 6, 7, 8, 9

depression contour
NV noisy value

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

- 4 10, 20, 30, 60, 100, 200, 300, 600,
- 5 10, 15, 25, 40, 60, 100, 150, 250, 400,
- 6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,
- 7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for **GLEN AUDEN RESOURCES LTD.**

Title **Denyes & Swayze Twps**

**TOPBOOT LAKE PROPERTY
L IW**

Date: June 87

Scale: 1:2500

N.T.S.:

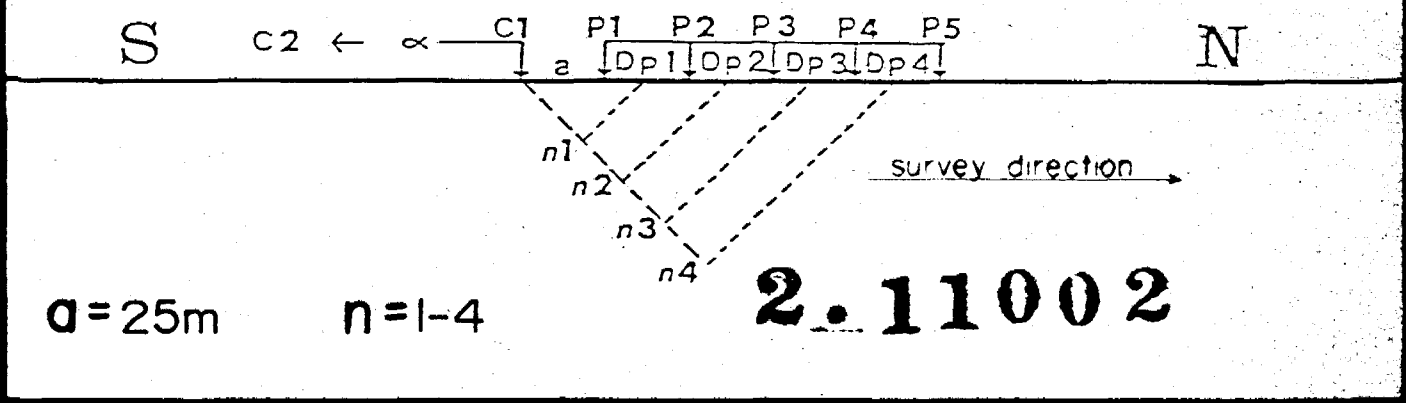
Drawn:

Approved: *RA*

File: M-202b

INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1 *Pulse Scheme*

Rx : Scintrex IPR-8 *plotting 3rd slice (mid pt. 910 msec.)*

T = 2 seconds

TOTAL LINE:

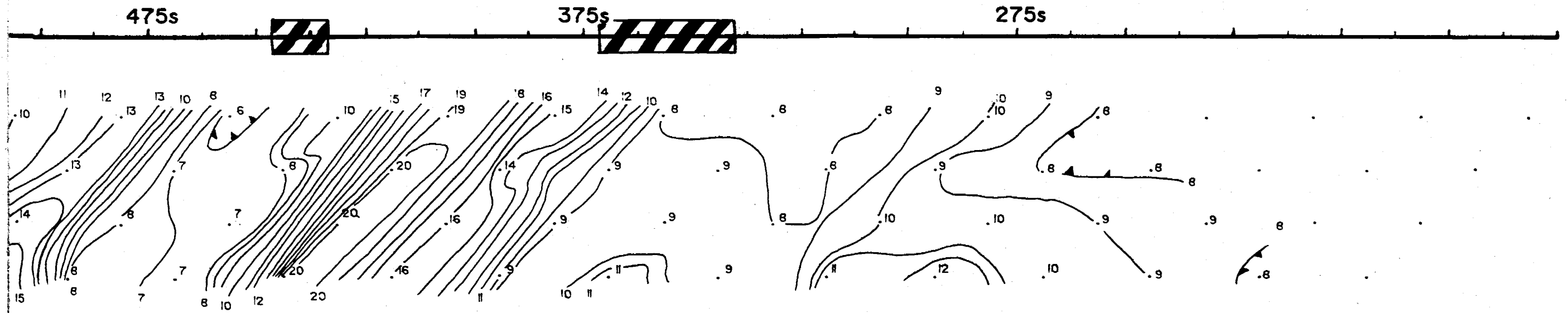
TOTAL READINGS:

CONTOUR INTERVAL

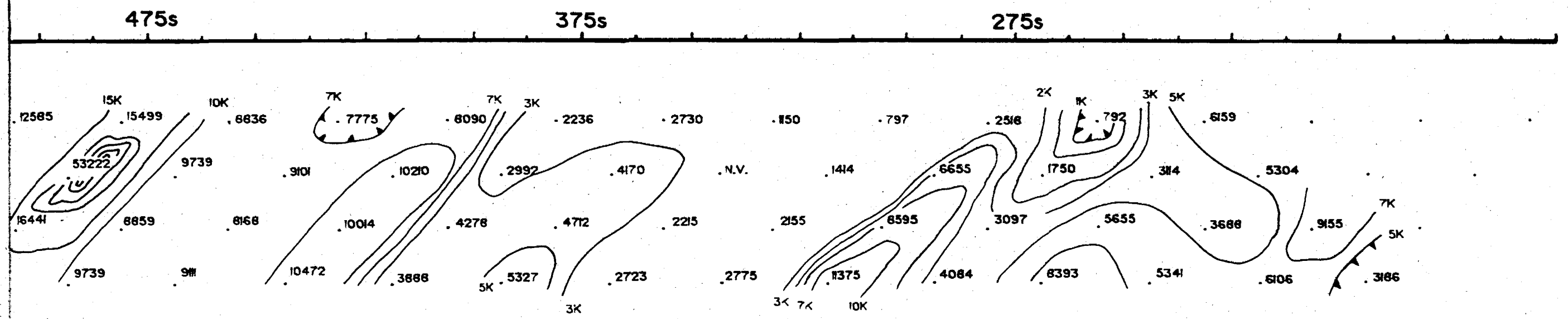
<p>Chargeability</p> <p>0, 5, 10, 15, 20, 25</p> <p>1, 2, 3, 4, 6, 7, 8, 9</p> <p>depression contour</p> <p>N.V. - noisy value</p>	<p>Resistivity (Logarithmic contouring)</p> <p>Contours Per Decade</p> <p>4 10, 20, 30, 60, 100, 200, 300, 600,</p> <p>5 10, 15, 25, 40, 60, 100, 150, 250, 400,</p> <p>6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,</p> <p>7 10, 15, 20, 30, 40, 55, 75, 100.</p>
---	---

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for GLEN AUDEN RESOURCES LTD.		
	Title Denyes & Swayze Twps		
	TOPBOOT LAKE PROPERTY L 2W		
	Date: June 87	Scale: 1:2500	N.T.S.:
	Drawn:	Approved: <i>RA</i>	File: M-202b

ITY (mv/v)

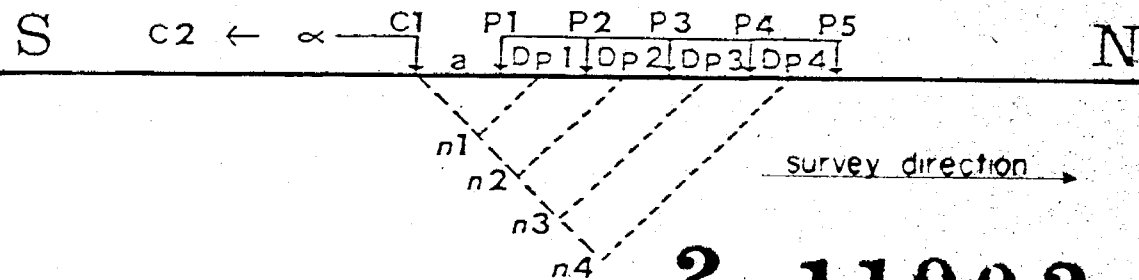


(ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



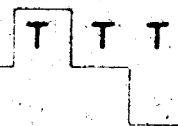
$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1

Pulse Scheme



+
- off - T = 2 seconds

Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)



TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

2, 3, 4, 6, 7, 8, 9

depression contour
N.V. - noisy value

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

- 4 10, 20, 30, 60, 100, 200, 300, 600.
- 5 10, 15, 25, 40, 60, 100, 150, 250, 400.
- 6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300.
- 7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

GLEN AUDEN RESOURCES LTD.

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY
L 2W**

Date: June 87

Scale: 1:2500

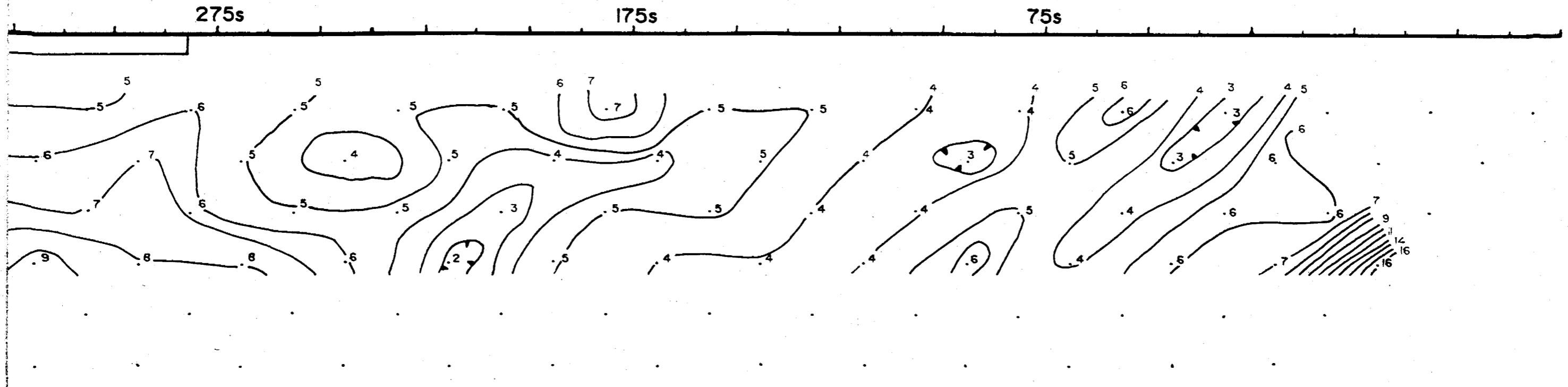
N.T.S.:

Drawn:

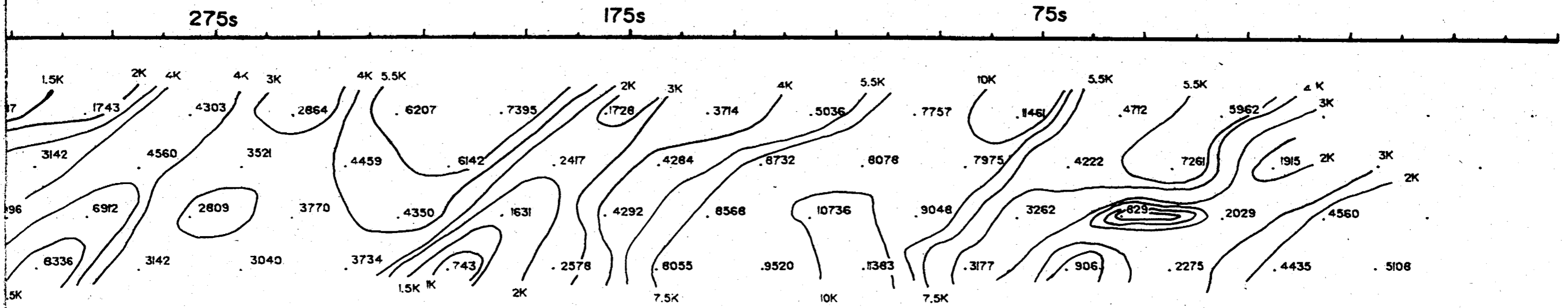
Approved: *RA*

File: M-202b

ABILITY (mv/v)

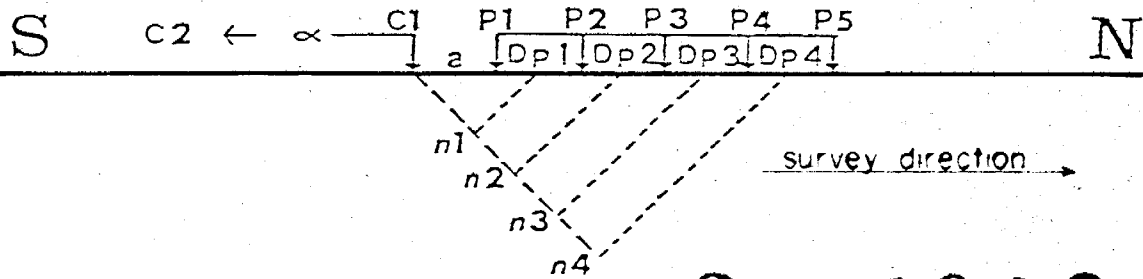


IVITY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1 Pulse Scheme +
Rx : Scintrex IPR-8 plotting 3rd slice (mid pt. 910 msec.) -

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability
0, 5, 10, 15, 20, 25
1, 2, 3, 4, 6, 7, 8, 9
depression contour
N.V. : noisy value

—————
▲▲▲
N.R. - no reading

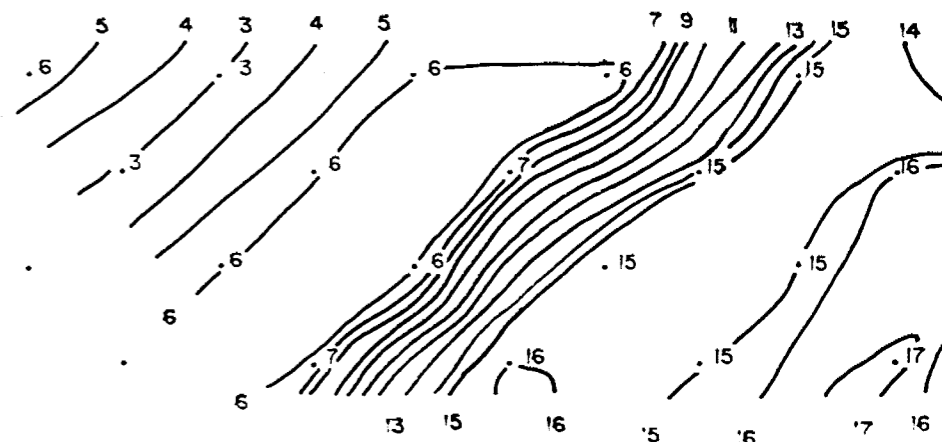
Resistivity
(Logarithmic contouring)
Contours Per Decade
4 10, 20, 30, 60, 100, 200, 300, 600,
5 10, 15, 25, 40, 60, 100, 150, 250, 400,
6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,
7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS	ROBERT S. MIDDLETON		
	EXPLORATION SERVICES INC.		
	for GLEN AUDEN RESOURCES LTD.		
	Title Denyes & Swayze Twps		
	TOPBOOT LAKE PROPERTY		
	L 2E		
	Date: June 87	Scale: 1:2500	N.T.S.:
	Drawn:	Approved: <i>RA</i>	File: M-202b

CHAF

75S

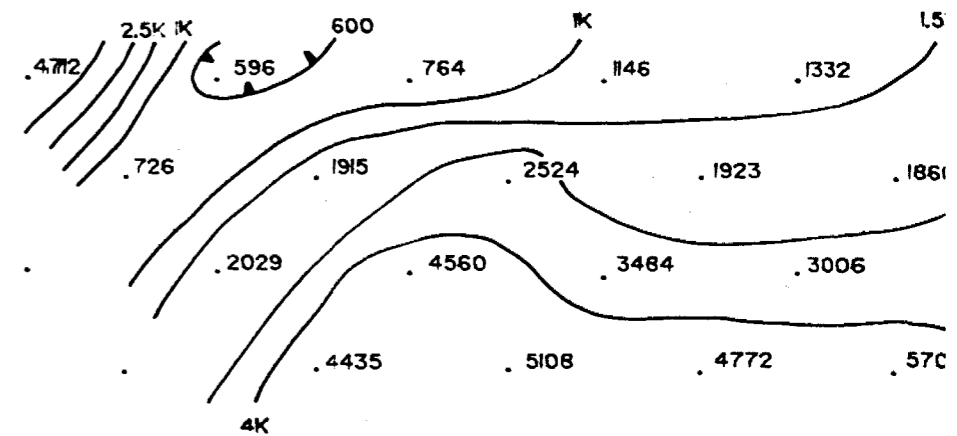
25N



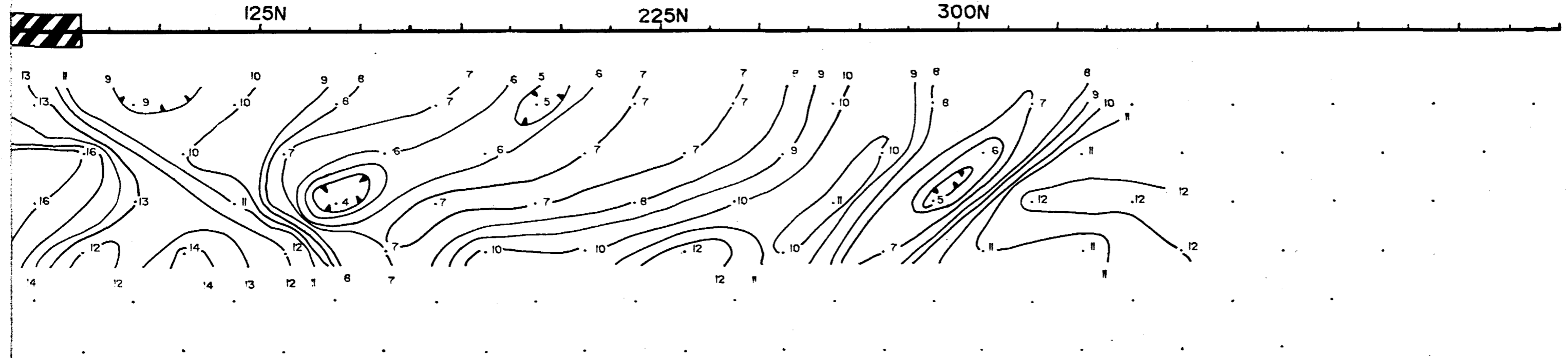
RESI

75S

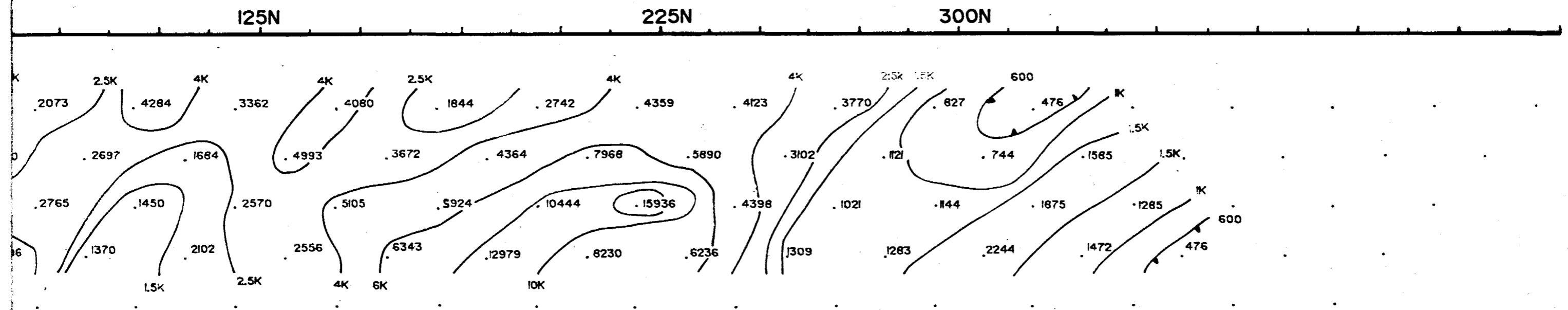
25N



RESISTIVITY (mv/v)

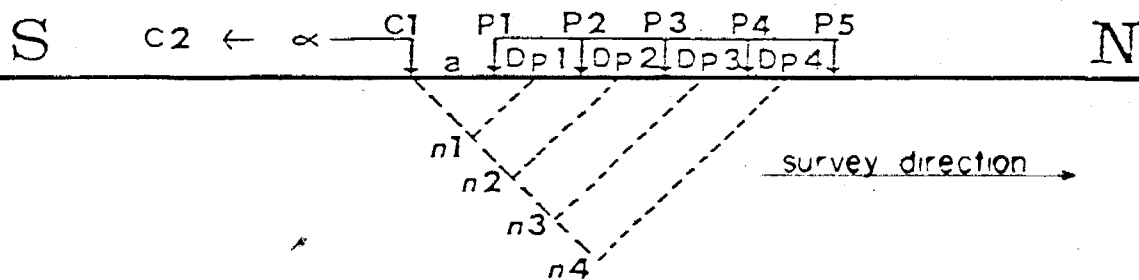


RESISTIVITY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

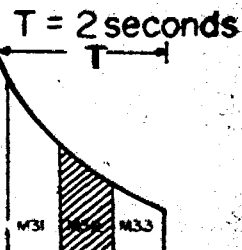
Tx : Phoenix

IPT-1



+

-



Rx : Scintrex

IPR-8

plotting 3rd slice (mid pt. 910 msec.)

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

.2, .3, .4, .6, .7, .8, .9

depression contour

N.V. - noisy value

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

- 4 10, 20, 30, 60, 100, 200, 300, 600,
- 5 10, 15, 25, 40, 60, 100, 150, 250, 400,
- 6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,
- 7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

GLEN AUDEN RESOURCES LTD.

Title

Denyes & Swayze Twps

TOPBOOT LAKE PROPERTY

L 2E

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

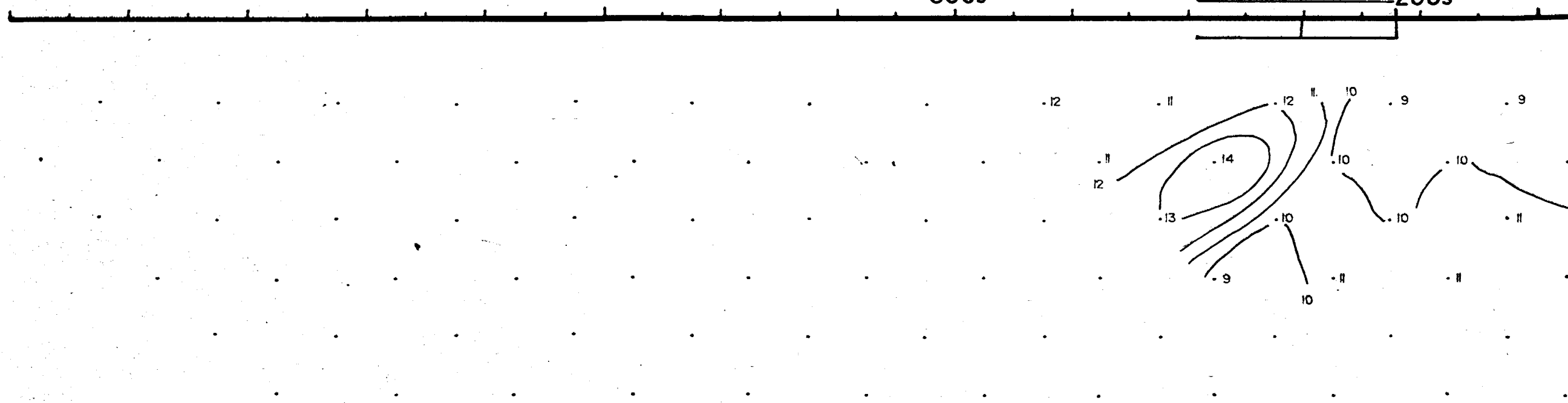
Approved: *RA*

File: M-202b

CHA

300s

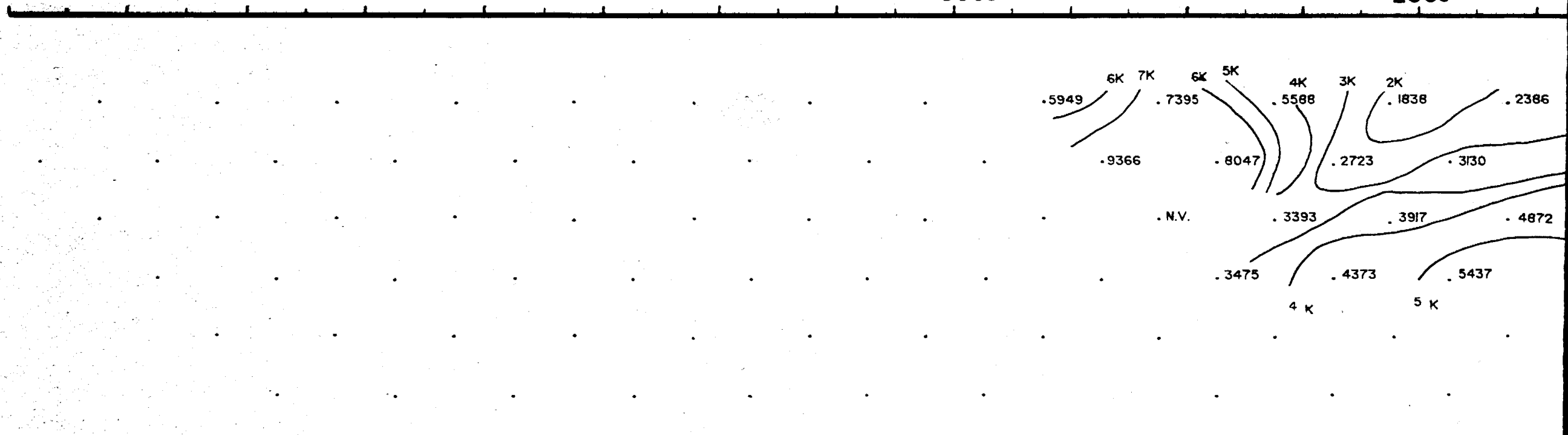
200s



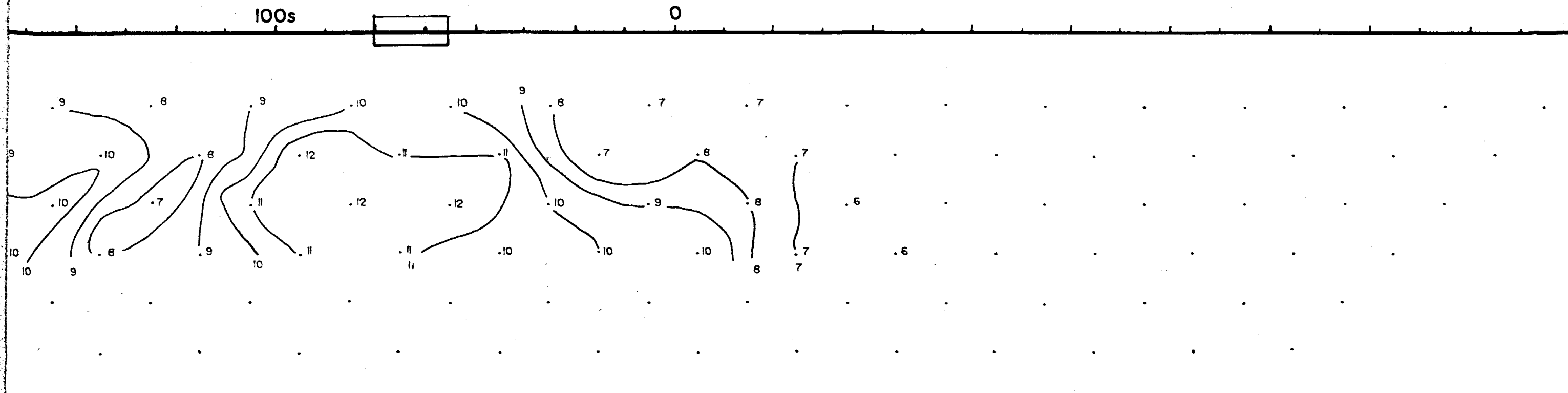
RES

300s

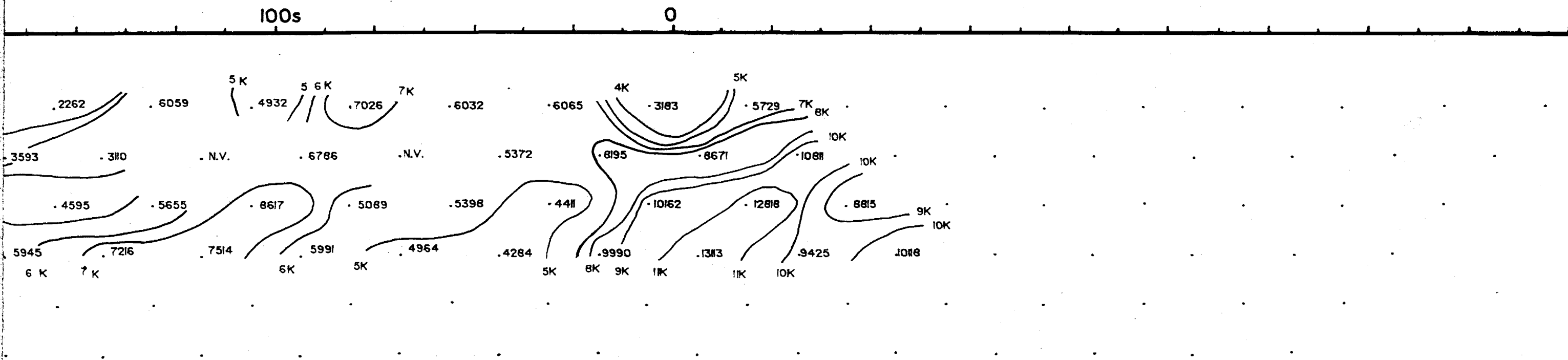
200s



PERMEABILITY (mv/v)

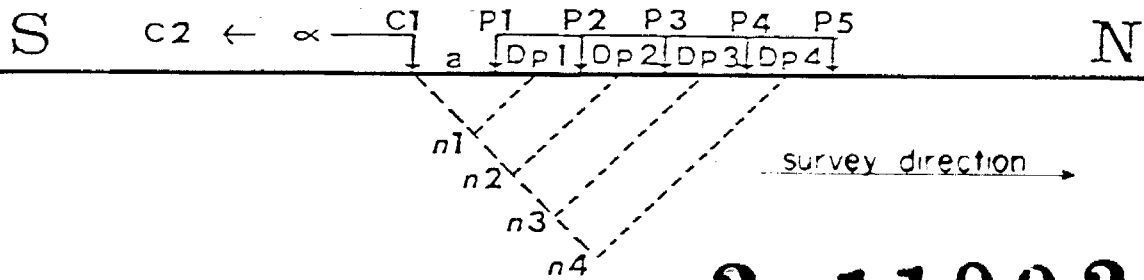


RESISTIVITY (ohm/m)



INDUCED POLARIZATION

TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

2.11002

Tx : Phoenix IPT-1 *Pulse Scheme* +
- T = 2 seconds

Rx : Scintrex IPR-8 *plotting 3rd slice (mid pt. 910 msec.)*

TOTAL LINE:

TOTAL READINGS:

CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

2, 3, 4, 6, 7, 8, 9

depression contour

NV - noisy value

—————

~~~~~

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4 10, 20, 30, 60, 100, 200, 300, 600,

5 10, 15, 25, 40, 60, 100, 150, 250, 400,

6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

**GLEN AUDEN RESOURCES LTD.**

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY**

L 3W

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved: *RA*

File: M-202b

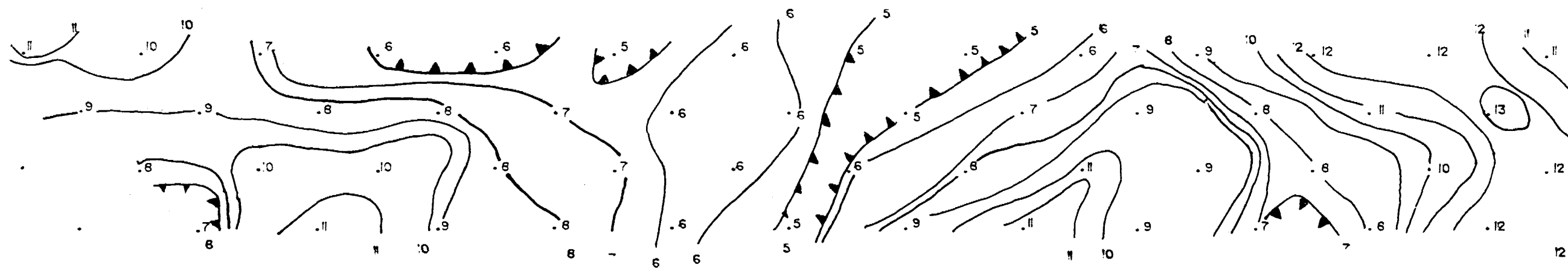
# CHARGE

875s

800s

700s

600s



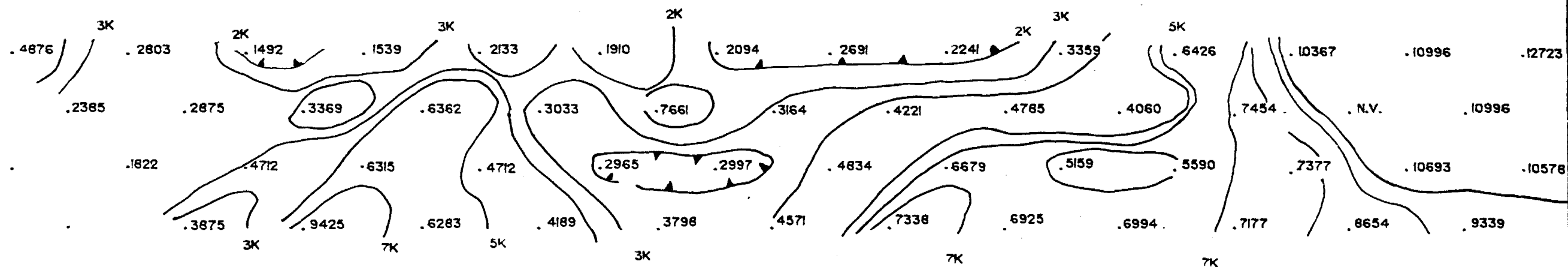
# RESISTIV

875s

800s

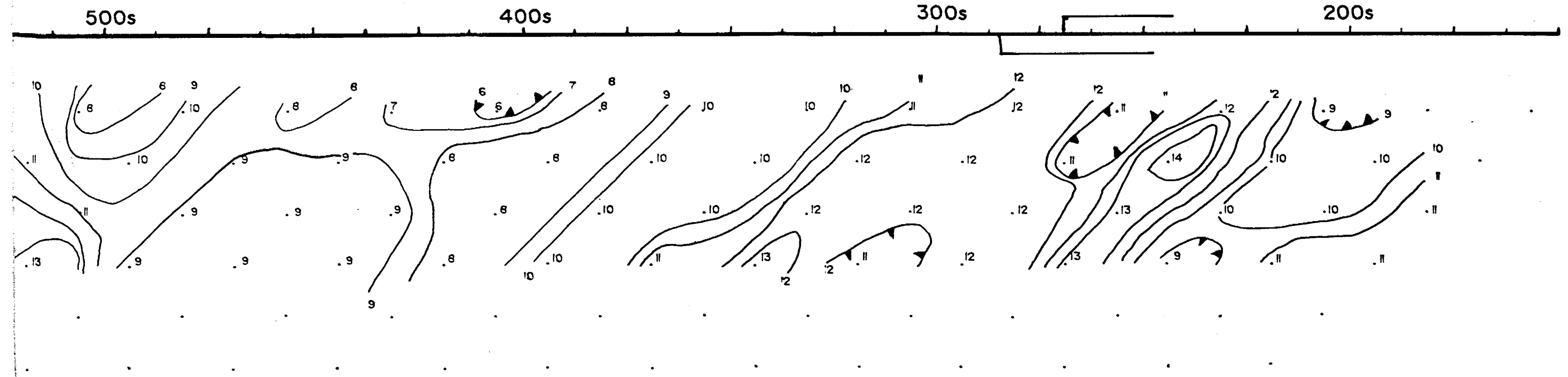
700s

600s

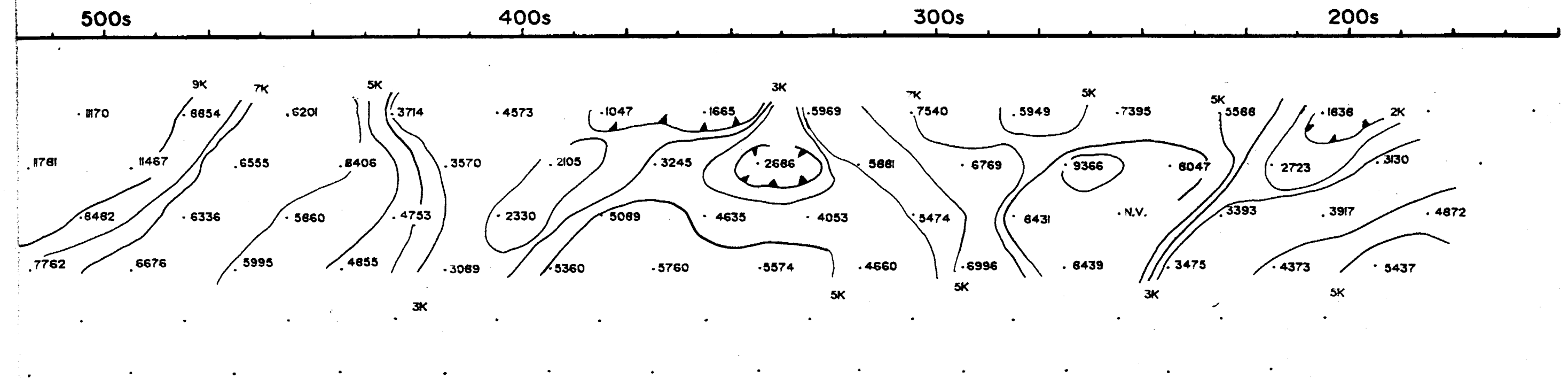




# ABILITY (mv/v)

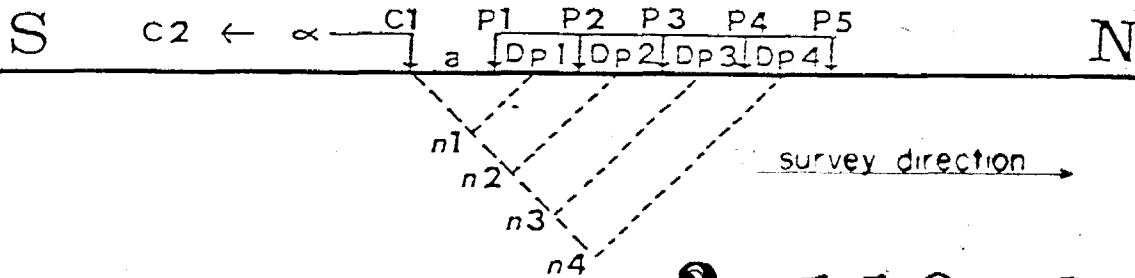


# VITY (ohm/m)



# INDUCED POLARIZATION

## TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

# 2.11002

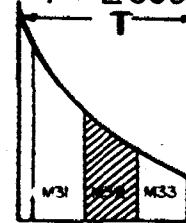
Tx : Phoenix IPT-1



+ T = 2 seconds  
- T

Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)



**TOTAL LINE:**

**TOTAL READINGS:**

### CONTOUR INTERVAL

**Chargeability**  
0, 5, 10, 15, 20, 25  
1, 2, 3, 4, 6, 7, 8, 9  
depression contour  
NV - noisy value

N.R. - no reading

**Resistivity**  
(Logarithmic contouring)  
**Contours Per Decade**  
4 10, 20, 30, 60, 100, 200, 300, 600,  
5 10, 15, 25, 40, 60, 100, 150, 250, 400,  
6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,  
7 10, 15, 20, 30, 40, 55, 75, 100.

**REVISIONS**

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

for

**GLEN AUDEN RESOURCES LTD.**

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY**

**L 3W**

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved: *RA*

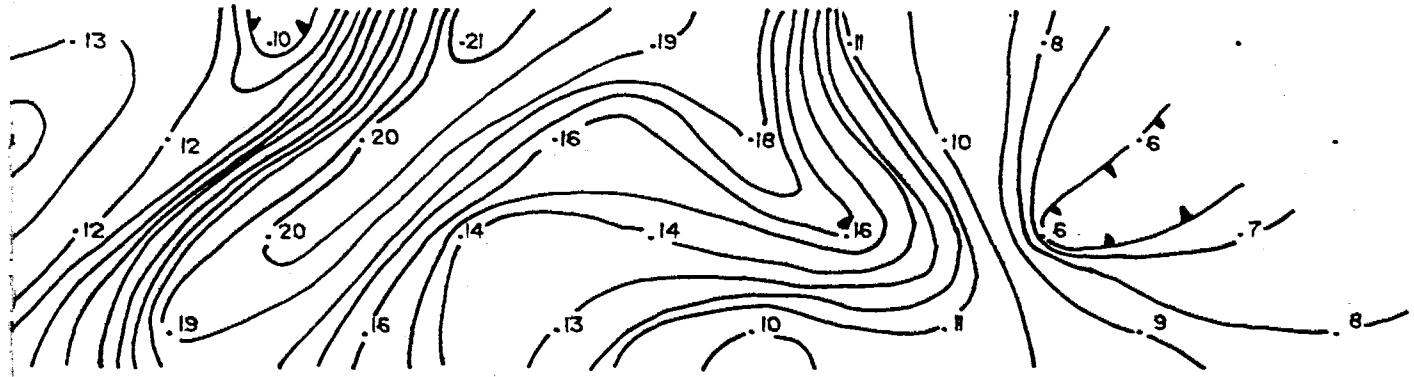
File: M-202b



BILITY (mv/v)

100S

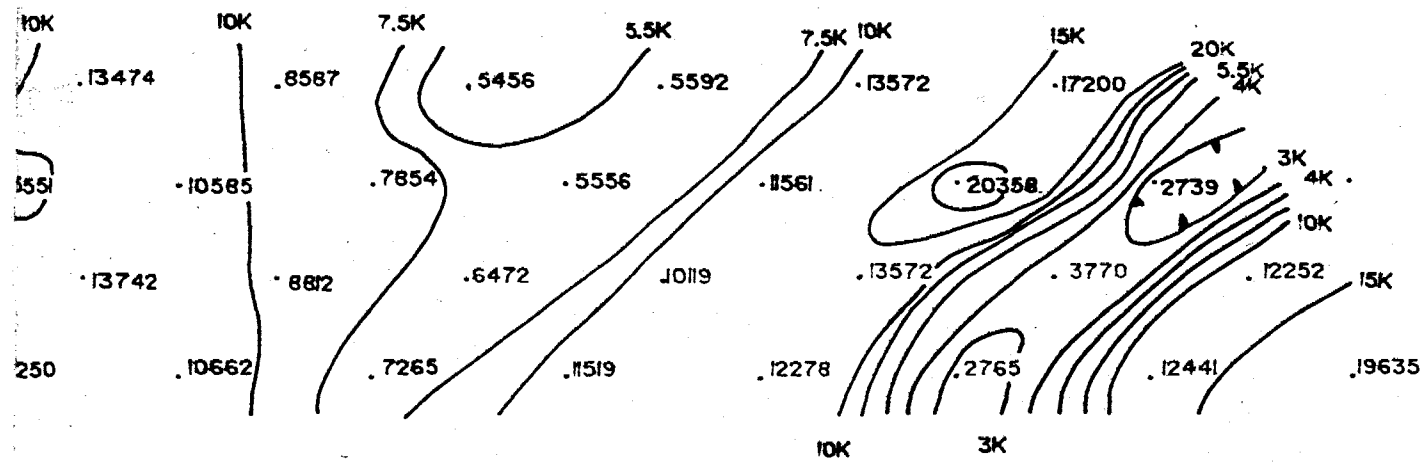
0



TY (ohm/m)

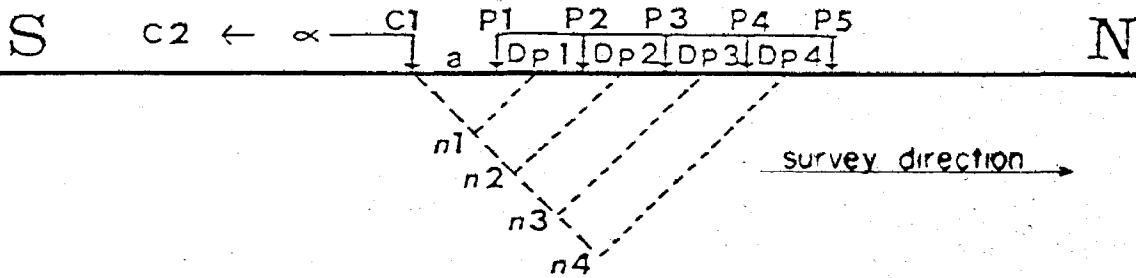
100S

0



# INDUCED POLARIZATION

## TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

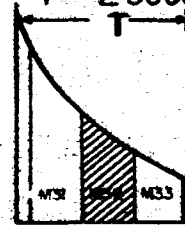
# 2.11002

Tx : Phoenix IPT-1



Rx : Scintrex IPR-8

plotting 3rd slice (mid pt. 910 msec.)



TOTAL LINE:

TOTAL READINGS:

### CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

1, 2, 3, 4, 6, 7, 8, 9

depression contour  
NV - noisy value



N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4 10, 20, 30, 60, 100, 200, 300, 600,

5 10, 15, 25, 40, 60, 100, 150, 250, 400,

6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

**GLEN AUDEN RESOURCES LTD.**

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY  
L 4W**

Date: June 87

Scale: 1:2500

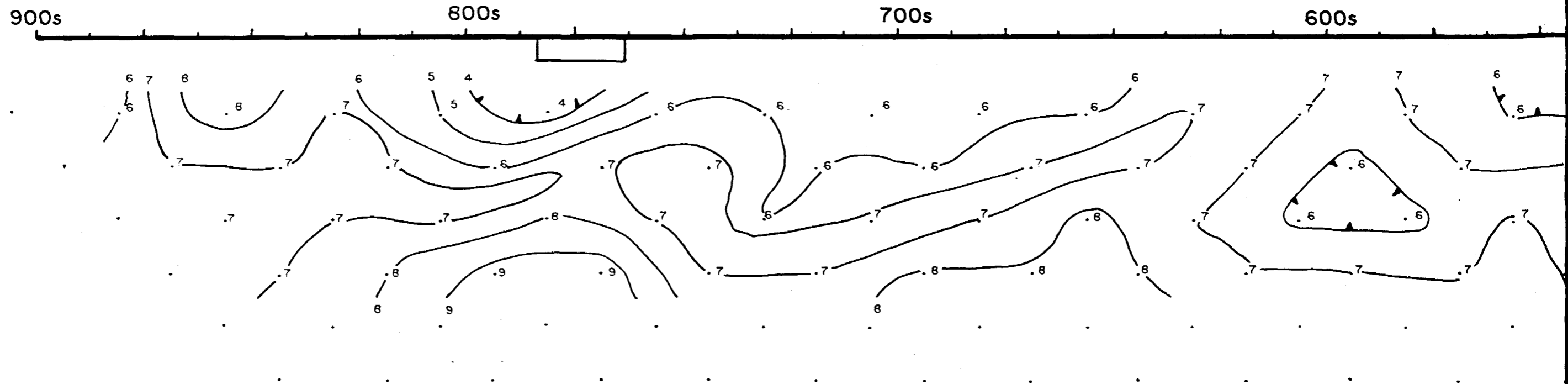
N.T.S.:

Drawn:

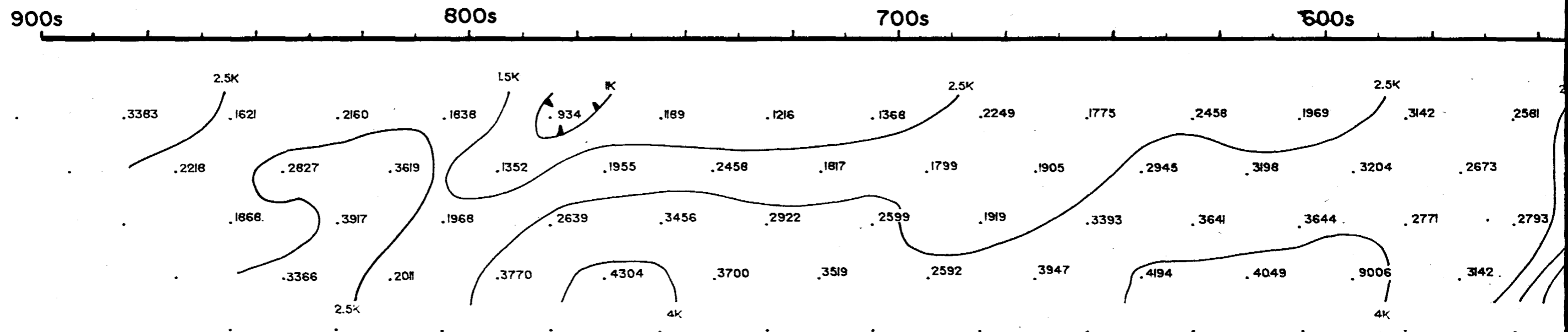
Approved: *RA*

File: M-202b

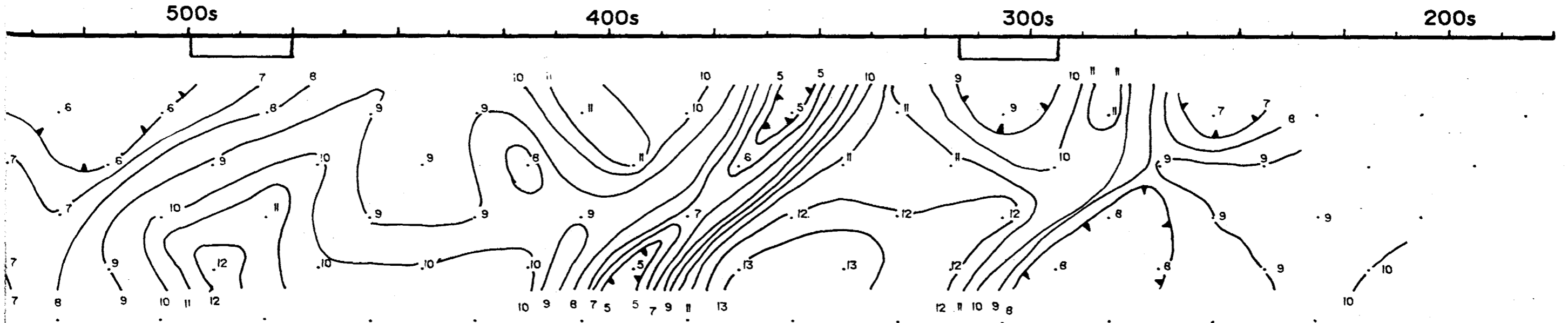
# CHARGE



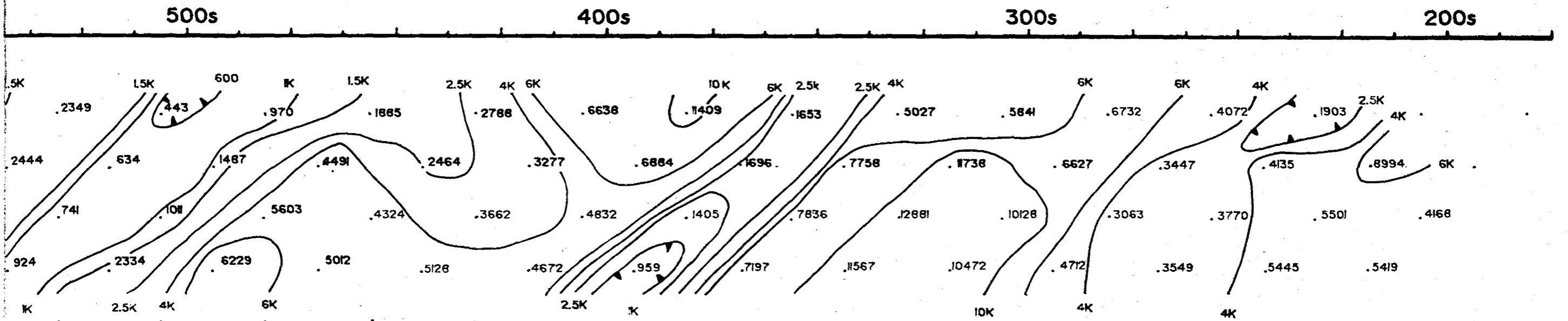
# RESISTIV



# ABILITY (mv/v)

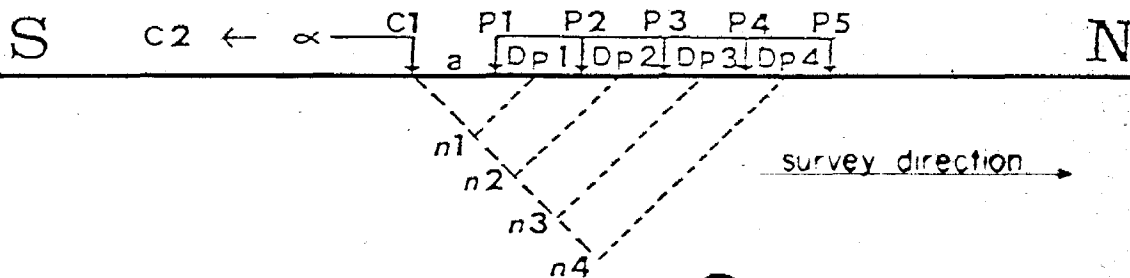


# ABILITY (ohm/m)



# INDUCED POLARIZATION

## TIME DOMAIN POLE - DIPOLE ARRAY



$a = 25m$

$n = 1-4$

# 2.11002

Tx : Phoenix IPT-1      Pulse Scheme      T = 2 seconds

Rx : Scintrex IPR-8      plotting 3rd slice (mid pt. 910 msec.)

**TOTAL LINE:**

**TOTAL READINGS:**

### CONTOUR INTERVAL

Chargeability

0, 5, 10, 15, 20, 25

1, 2, 3, 4, 6, 7, 8, 9

depression contour

NV - noisy value

N.R. - no reading

Resistivity

(Logarithmic contouring)

Contours Per Decade

4 10, 20, 30, 60, 100, 200, 300, 600,

5 10, 15, 25, 40, 60, 100, 150, 250, 400,

6 10, 15, 20, 30, 50, 70, 100, 150, 200, 300,

7 10, 15, 20, 30, 40, 55, 75, 100.

REVISIONS

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

for

**GLEN AUDEN RESOURCES LTD.**

Title

Denyes & Swayze Twps

**TOPBOOT LAKE PROPERTY**

L 4W

Date: June 87

Scale: 1:2500

N.T.S.:

Drawn:

Approved: *RA*

File: M-202b





W8806-025

Type of Survey(s) **INDUCED POLARIZATION** Township or Area **SWAYZE AND DENYES**  
 Claim Holder(s) **GLEN AUDEN RESOURCES** 2.11002 Prospector's Licence No. **T-1915**  
 Address **% P.O. Box 1637, TIMMINS ONT P4N 7W8**  
 Survey Company **R.S. MIDDLETON EXPLORATION SERVICES INC.** Date of Survey (from & to) **25 06 87 23 07 87** Total Miles of line Cut **N.A.**  
 Name and Address of Author (of Geo-Technical report) **ABERNETHY/HODGES % P.O. Box 1637 TIMMINS P4N 7W8**

Credits Requested per Each Claim in Columns at right

Mining Claims Traversed (List in numerical sequence)

| Special Provisions                                                                                                                | Geophysical       | Days per Claim |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------|
| For first survey:<br>Enter 40 days. (This includes line cutting)                                                                  | - Electromagnetic |                |
|                                                                                                                                   | - Magnetometer    |                |
| For each additional survey:<br>using the same grid:<br>Enter 20 days (for each)                                                   | - Radiometric     |                |
|                                                                                                                                   | - Other           |                |
|                                                                                                                                   | Geological        |                |
|                                                                                                                                   | Geochemical       |                |
| Man Days<br>Complete reverse side and enter total(s) here<br><b>RECEIVED</b><br><b>MAR 07 1988</b><br><b>MINING LANDS SECTION</b> | Geophysical       | Days per Claim |
|                                                                                                                                   | - Electromagnetic |                |
|                                                                                                                                   | - Magnetometer    |                |
|                                                                                                                                   | - Radiometric     |                |
|                                                                                                                                   | - Other (I.P)     | <b>63.8</b>    |
|                                                                                                                                   | Geological        |                |
|                                                                                                                                   | Geochemical       |                |
| Airborne Credits<br>Note: Special provisions credits do not apply to Airborne Surveys.                                            | Electromagnetic   |                |
|                                                                                                                                   | Magnetometer      |                |
|                                                                                                                                   | Radiometric       |                |

| Mining Claim |        |                  | Mining Claim |        |                  |
|--------------|--------|------------------|--------------|--------|------------------|
| Prefix       | Number | Expend. Days Cr. | Prefix       | Number | Expend. Days Cr. |
| -*           | 866469 |                  |              |        |                  |
| -*           | 866470 |                  |              |        |                  |
| ✓*           | 932196 |                  |              |        |                  |
| ✓*           | 932197 |                  |              |        |                  |
| -*           | 932501 |                  |              |        |                  |
| -*           | 932502 |                  |              |        |                  |
| -*           | 932503 |                  |              |        |                  |
| -*           | 932504 |                  |              |        |                  |
| -*           | 932505 |                  |              |        |                  |
| -*           | 932506 |                  |              |        |                  |
|              | 932510 |                  |              |        |                  |
|              | 932511 |                  |              |        |                  |

Expenditures (excludes power stripping)

Type of Work Performed **ONTARIO GEOLOGICAL SURVEY ASSESSMENT FILES**

Performed on Claim(s) **OFFICE**

**APR 20 1988**

Calculation of Expenditure Days Credits

Total Expenditures **\$** ÷ **15** =

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.

\* Credits Reduced as max. credits allowed are 30 days per claim

Total number of mining claims covered by this report of work. **12**

Date **Feb 10/88** Recorded Holder or Agent (Signature) **[Signature]**

For Office Use Only

Total Days Cr. Recorded **547.6** Date Recorded **Feb 10/88** Mining Reporter **[Signature]**

Date Approved as Recorded **14 April 88** Branch Director **[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 or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying **MR ABERNETHY #1 DALTON RD TIMMINS ONT**

Date Certified **Feb 10, 1988** Certified by (Signature) **[Signature]**

## Assessment Work Breakdown

Man Days are based on eight (8) hour Technical or Line-cutting days. Technical days include work performed by consultants, draftsmen, etc..

|                |   |   |   |                        |   |                   |   |               |   |               |   |                |
|----------------|---|---|---|------------------------|---|-------------------|---|---------------|---|---------------|---|----------------|
| Type of Survey |   |   |   |                        |   |                   |   |               |   |               |   |                |
| Technical Days | X | 7 | = | Technical Days Credits | + | Line-cutting Days | = | Total Credits | ÷ | No. of Claims | = | Days per Claim |
| 109.5          |   | 7 |   | 766.5                  |   | 0                 |   | 766.5         |   | 12            |   | 63.8           |

|                      |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
|----------------------|---|---|---|------------------------|---|----------------------|---|----------------------|---|----------------------|---|----------------------|
| Type of Survey       |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
| Technical Days       | X | 7 | = | Technical Days Credits | + | Line-cutting Days    | = | Total Credits        | ÷ | No. of Claims        | = | Days per Claim       |
| <input type="text"/> |   | 7 |   | <input type="text"/>   |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |

|                      |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
|----------------------|---|---|---|------------------------|---|----------------------|---|----------------------|---|----------------------|---|----------------------|
| Type of Survey       |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
| Technical Days       | X | 7 | = | Technical Days Credits | + | Line-cutting Days    | = | Total Credits        | ÷ | No. of Claims        | = | Days per Claim       |
| <input type="text"/> |   | 7 |   | <input type="text"/>   |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |

|                      |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
|----------------------|---|---|---|------------------------|---|----------------------|---|----------------------|---|----------------------|---|----------------------|
| Type of Survey       |   |   |   |                        |   |                      |   |                      |   |                      |   |                      |
| Technical Days       | X | 7 | = | Technical Days Credits | + | Line-cutting Days    | = | Total Credits        | ÷ | No. of Claims        | = | Days per Claim       |
| <input type="text"/> |   | 7 |   | <input type="text"/>   |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |   | <input type="text"/> |

REFERENCES

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

LEGEND

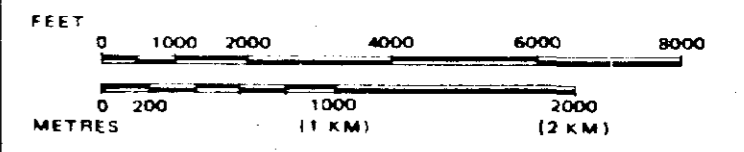
- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES:
  - TOWNSHIPS, BASE LINES, ETC.
  - LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES:
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING 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, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 63, SUBSEC. 1.

SCALE: 1 INCH = 40 CHAINS

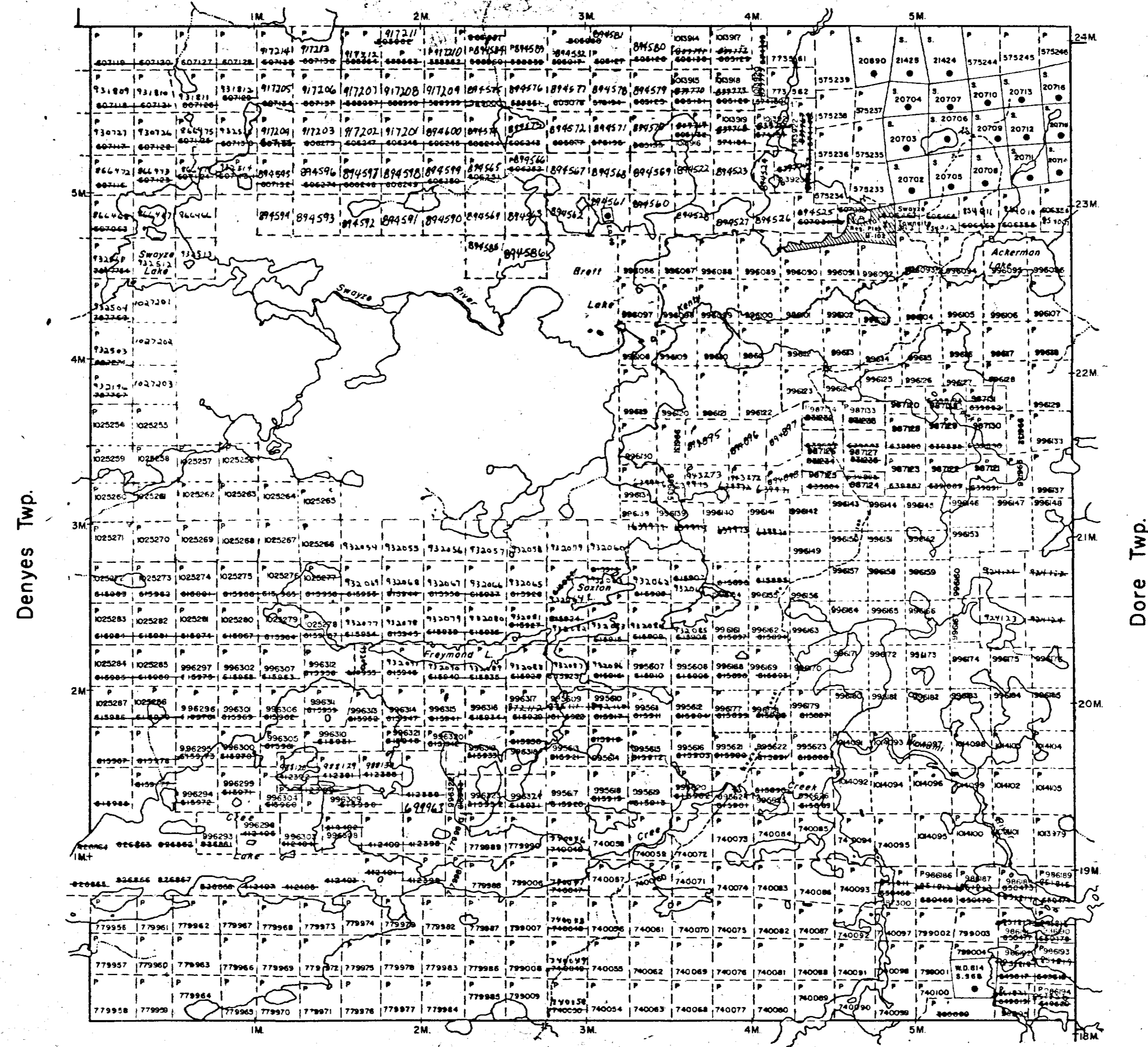


TOWNSHIP  
**SWAYZE**  
 M.N.R. ADMINISTRATIVE DISTRICT  
**CHAPLEAU**  
 MINING DIVISION  
**PORCUPINE**  
 LAND TITLES / REGISTRY DIVISION  
**SUDBURY**

Ministry of Natural Resources  
 Land Management Branch  
 Ontario

Date MARCH, 1985  
 Number **G-3249**  
 Checked J.P. E.H.  
 June 6/85

Rollo Twp.



Denyes Twp.

Dore Twp.

Cunningham Twp.



Raney Twp. - M.1069

THE TOWNSHIP OF

DENYES

DISTRICT OF SUDBURY

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

- PATENTED LAND Ⓟ
- CROWN LAND SALE C.S.
- LEASES Ⓞ
- LOCATED LAND Loc.
- LICENSE OF OCCUPATION L.O.
- MINING RIGHTS ONLY M.R.O.
- SURFACE RIGHTS ONLY S.R.O.
- ROADS —
- IMPROVED ROADS —
- KING'S HIGHWAYS —
- RAILWAYS —
- POWER LINES —
- MARSH OR MUSKEG —
- MINES \*
- CANCELLED C.
- PATENTED FOR S.R.O. Ⓢ

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

■ L. U. P.

RECEIVED  
MAR 7 1988

Received Can. 4180

PLAN NO. M.758

ONTARIO  
MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

Halcrow Twp. - M.906

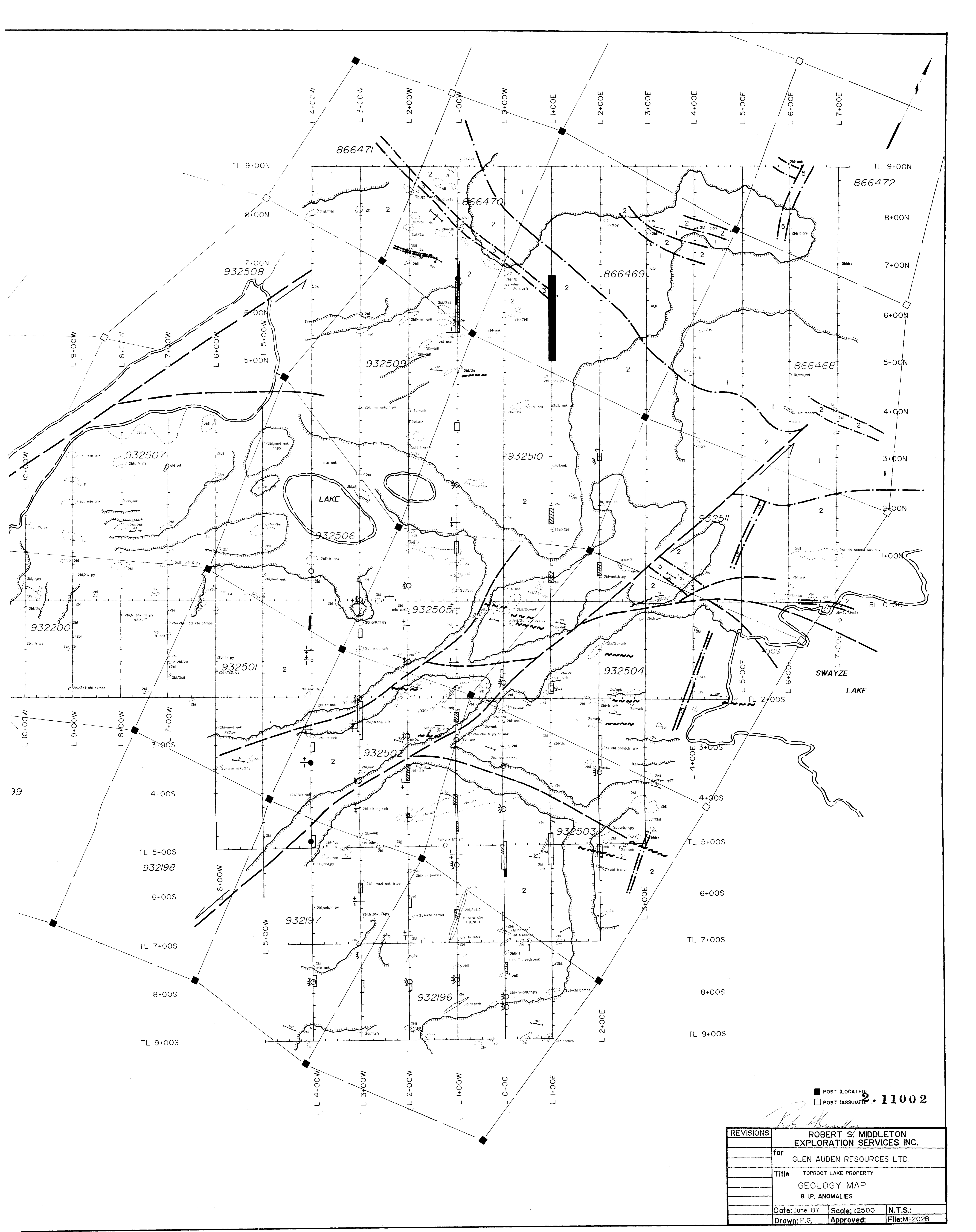
Swayze Twp. - M.1150

Greenlaw Twp. - M.895



410155E048 2:1002 SWAYZE

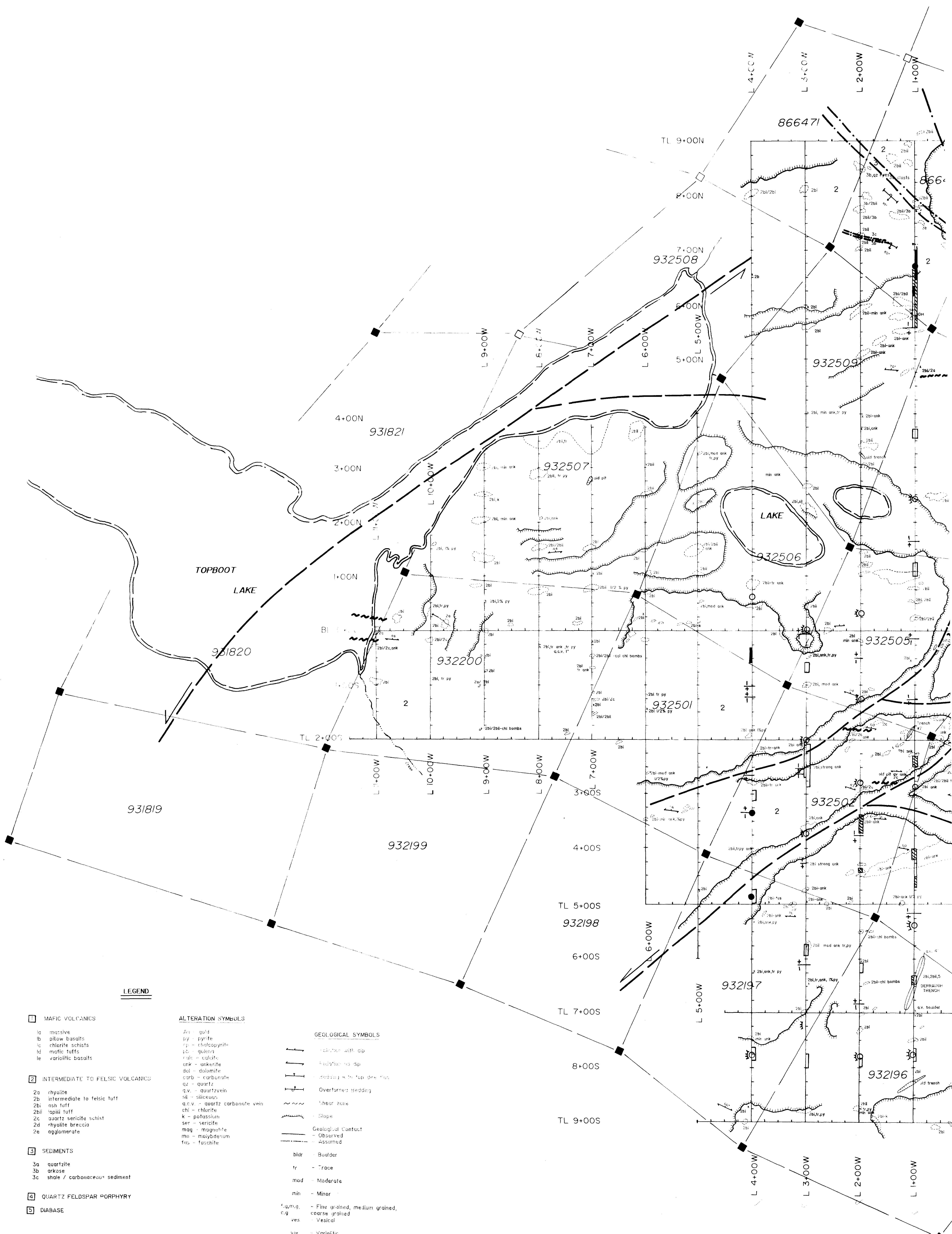




■ POST (LOCATED)  
 □ POST (ASSUMED)

2.11002

|               |                                                          |              |  |
|---------------|----------------------------------------------------------|--------------|--|
| REVISIONS     | ROBERT S. MIDDLETON<br>EXPLORATION SERVICES INC.         |              |  |
|               | for GLEN AUDEN RESOURCES LTD.                            |              |  |
| Title         | TOPBOOT LAKE PROPERTY<br>GEOLOGY MAP<br>& I.P. ANOMALIES |              |  |
| Date: June 87 | Scale: 1:2500                                            | N.T.S.:      |  |
| Drawn: P.G.   | Approved:                                                | File: M-202B |  |



**LEGEND**

**1 MAFIC VOLCANICS**

- 1a massive
- 1b pillow basalts
- 1c chlorite schists
- 1d mafic tuffs
- 1e variolitic basalts

**2 INTERMEDIATE TO FELSIC VOLCANICS**

- 2a rhyolite
- 2b intermediate to felsic tuff
- 2bi ash tuff
- 2bii opali tuff
- 2c quartz sericite schist
- 2d rhyolite breccia
- 2e agglomerate

**3 SEDIMENTS**

- 3a quartzite
- 3b arkose
- 3c shale / carbonaceous sediment

**4 QUARTZ FELDSPAR PORPHYRY**

**5 DIABASE**

**ALTERATION SYMBOLS**

- au - gold
- py - pyrite
- cp - chalcopyrite
- qtz - quartz
- calc - calcite
- ank - ankerite
- dol - dolomite
- carb - carbonate
- qz - quartz
- q.v. - quartz vein
- sil - siliceous
- q.c.v. - quartz carbonate vein
- chl - chlorite
- k - potassium
- ser - sericite
- mag - magnetite
- mo - molybdenum
- fus - fuschite

**GEOLOGICAL SYMBOLS**

- direction with dip
- direction no dip
- bedding N to top direction
- Overturned bedding
- Shear zone
- Slope
- Geological Contact
- Observed
- Assumed
- blbr - Boulder
- tr - Trace
- mod - Moderate
- min - Minor
- f.g.m.g. - Fine grained, medium grained, coarse grained
- c.g. - Vesical
- ves - Vesical
- var. - Variolitic

