REPORT
on
INDUCED POLARIZATION
and
RESISTIVITY SURVEYS
GUESS CREEK PROPERTY
OMINECA MINING DIVISION
BRITISH COLUMBIA
for
TEESHIN RESOURCES LTD.

QUANTECH CONSULTING INC.

18734

ARIS SUMMARY SHEET

District Geologist, Smithers Off Confidential: 90.03.22

ASSESSMENT REPORT 18734 MINING DIVISION: Omineca

PROPERTY: Ralph
LOCATION: LAT 54 49 00 LONG 126 34 00
UTM 09 6076889 656355
NTS 093L15E

CAMP: 043 Babine Range

CLAIM(S): Stim 1-3
OPERATOR(S): Teeshin Res.
AUTHOR(S): Nickson, R.
REPORT YEAR: 1989, 22 Pages
KEYWORDS: Jurassic,Hazelton Group,Rhyolite
WORK DONE: Geophysical,Physical
IPOL 3.7 km
LINE 28.0 km
MINFILE: 093L 289

LOG NO: 0516 RD.
ACTION:
FILE NO:

FILMED

REPORT
on
INDUCED POLARIZATION
and
RESISTIVITY SURVEYS
GUESS CREEK PROPERTY
OMINECA MINING DIVISION
BRITISH COLUMBIA
for
TEESHIN RESOURCES LTD.

GEOLOGICAL BRANCH
ASSESSMENT REPORT

18,734

Toronto, Ontario
December 1988
QCI Project C117

Randall Nickson, B.Sc.
Quantech Consulting Inc.

SUMMARY

During the period November 5 to November 11, 1988 a limited program of Induced Polarization and Resistivity surveying was carried out by Quantech Consulting Inc. on behalf of Teeshin Resources Ltd. The surveys were carried out over the latter's Guess Creek property in northcentral B.C.

The surveys were carried out with the objective of delineating targets with economic mineralization potential for diamond drill testing. The surveys were successful in clarifying the exploration environment on the property and providing direction for further exploration efforts.

In particular:

A thick layer of overburden, which may be on the order of 100 meters thick, is interpreted to be present. Numerous survey techniques were attempted to provide reasonable depth of exploration, survey speed and resolution, including :

1. Double - dipole array ; a = 20, 40 and 80 meters

2. Pole - dipole array ; a = 40 and 80 meters

3. Gradient array ; a = 20 and 40 meters

Initial survey specifications called for a dipole - dipole array with a dipole length of 20 meters. As inadequate penetration of the overburden was achieved, a 40 meter dipole was used. Again, inadequate penetration of the overburden was indicated. These results prompted use of an 80 meter dipole - dipole setup, followed by pole - dipole measurements with 40 and 80 meter dipoles. Depth of exploration is adequate with 80 meter dipoles, however, it was felt that resolution of polarizable zones would not be sufficient. The 40 meter dipole setups provided a depth of exploration insufficient to penetrate the overburden.

Given the limited information available regarding the property, thick overburden cover, 4.5 kilometer line length and 500 meter line spacing used, a gradient array was selected. Unfortunately, insufficient signal could be generated to make measurements more than 700 to 800 meters from a transmitting electrode.

The survey was finally abandonned due to budget constraints.

This report documents in detail the survey techniques employed and provides recommendations pertinent to evaluating the economic potential of the property.

TABLE OF CONTENTS

List of Maps

1.0 INTRODUCTION

This report discusses the results of a program of Induced Polarization and Resistivity surveying carried out by Quantech Consulting Inc. of Toronto, Ontario on behalf of Teeshin Resources Ltd of Oakville, Ontario. The surveys were carried out over the latter's Guess Creek property in northcentral B.C. during the period November 5 to November 11, 1988.

The purpose of the surveys was to delineate targets with economic mineralization potential for diamond drill testing. These surveys form part of an ongoing exploration program on this and other properties in the area by Teeshin Resources Ltd.

This report outlines the geophysical techniques employed and the instrumentaion and field procedures used and discusses in detail the results and interpretation of the field work. Conclusions and recommendations for further exploration are presented pertinent to assessing the economic potential of the property.

2.0 LOCATION, ACCESS and CLAIMS

The Guess Creek property is located roughly 40 km east of the town of Smithers, northcentral Britsh Columbia. (see figure 2). The property can be accessed from Smithers via Highway 16 for 4 km south, followed by 35 km east on the Babine Lake Road, and 15 km south on the Chapman Forest Service Road. The Guess Creek East Road, located between kilometer 75 and 76 on the Chapman Forest Road, leads directly into the property. Numerous logging roads provide good access to most of the property. Alternatively, the property can be accessed by helicopter. Property coordinates are:

Latitude	Longitude
54.75 Degrees N	126.57 Degrees W

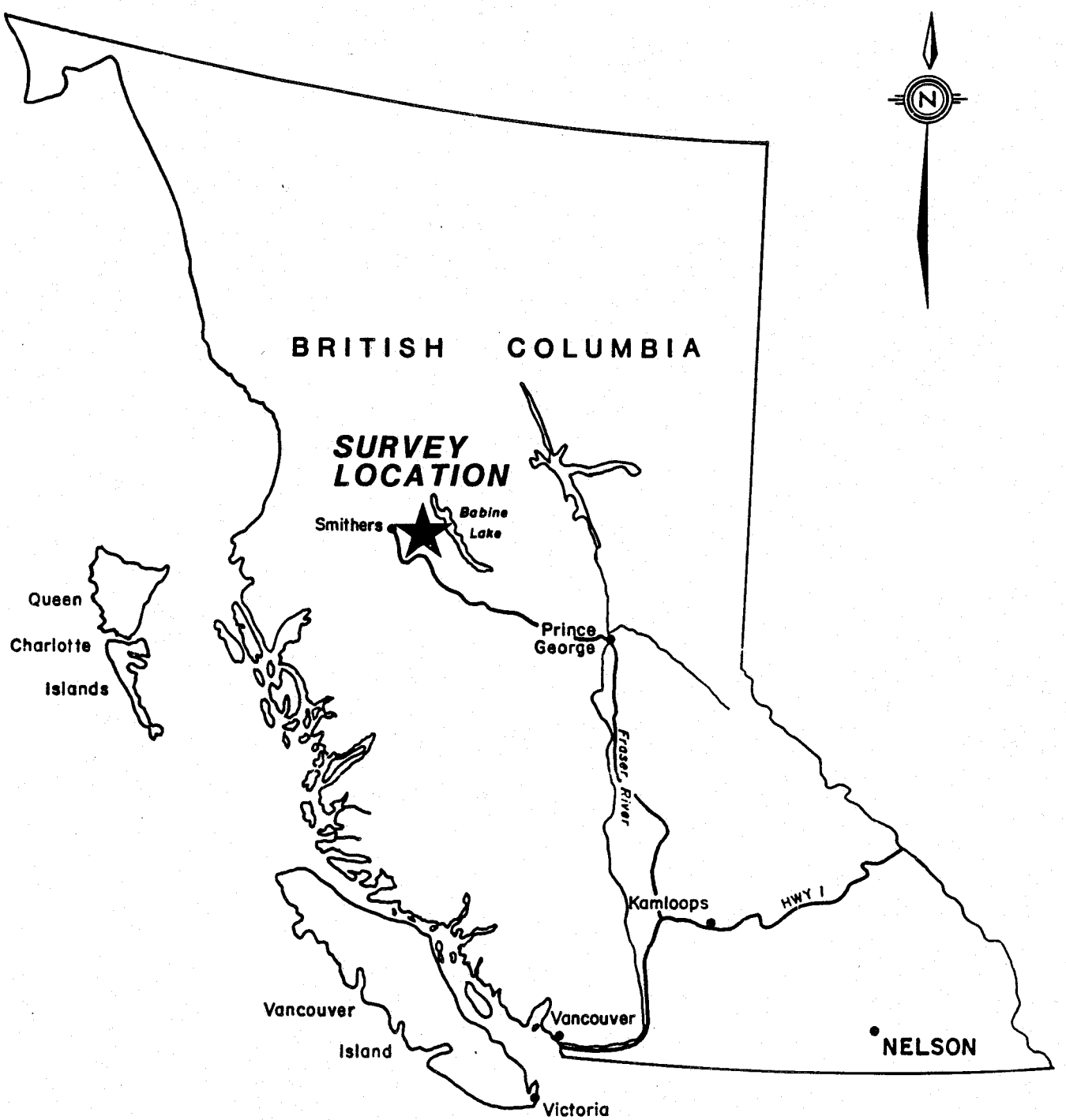
Topography on the property is subdued, except in the vicinity of Guess Creek. The southern half, and portions of the north half, of the property are swampy. Guess Creek bisects the property in a north - south direction in the vicinity of L4+00E. The property is topographically mapped at a scale of 1:250,000 on NTS 93L.

The Guess Creek property consists of 3 claims in the Omineca Mining Division acquired by Teeshin under option in August 1988 as enumerated below:

Claim Name	No. of Units	Record Number
Stim 1	20	9334
Stim 2	20	9340
Stim 3	20	9341

SUMMARY GEOLOGY (lithology, age, structure, alteration, mineralization, size, and attitude):

. THE UNDERLYING GEOLOGY OF THE PROPERTY HAS NOT YET BEEN DETERMINED SINCE NEITHER A . GEOLOGICAL RECONNAISSANCE NOR A DIAMOND DRILLING PROGRAMME HAS BEEN COMPLETED. RHYOLITIC ROCKS HAVE BEEN OBSERVED IN GUESS CREEK (R. KEEFE, PERS. COMM., TELKWA, B.C. 1988). . OTHERWISE, THE PROPERTY IS BELIEVED TO BE COVERED BY A THICK MANTLE OF OVERBURDEN. .

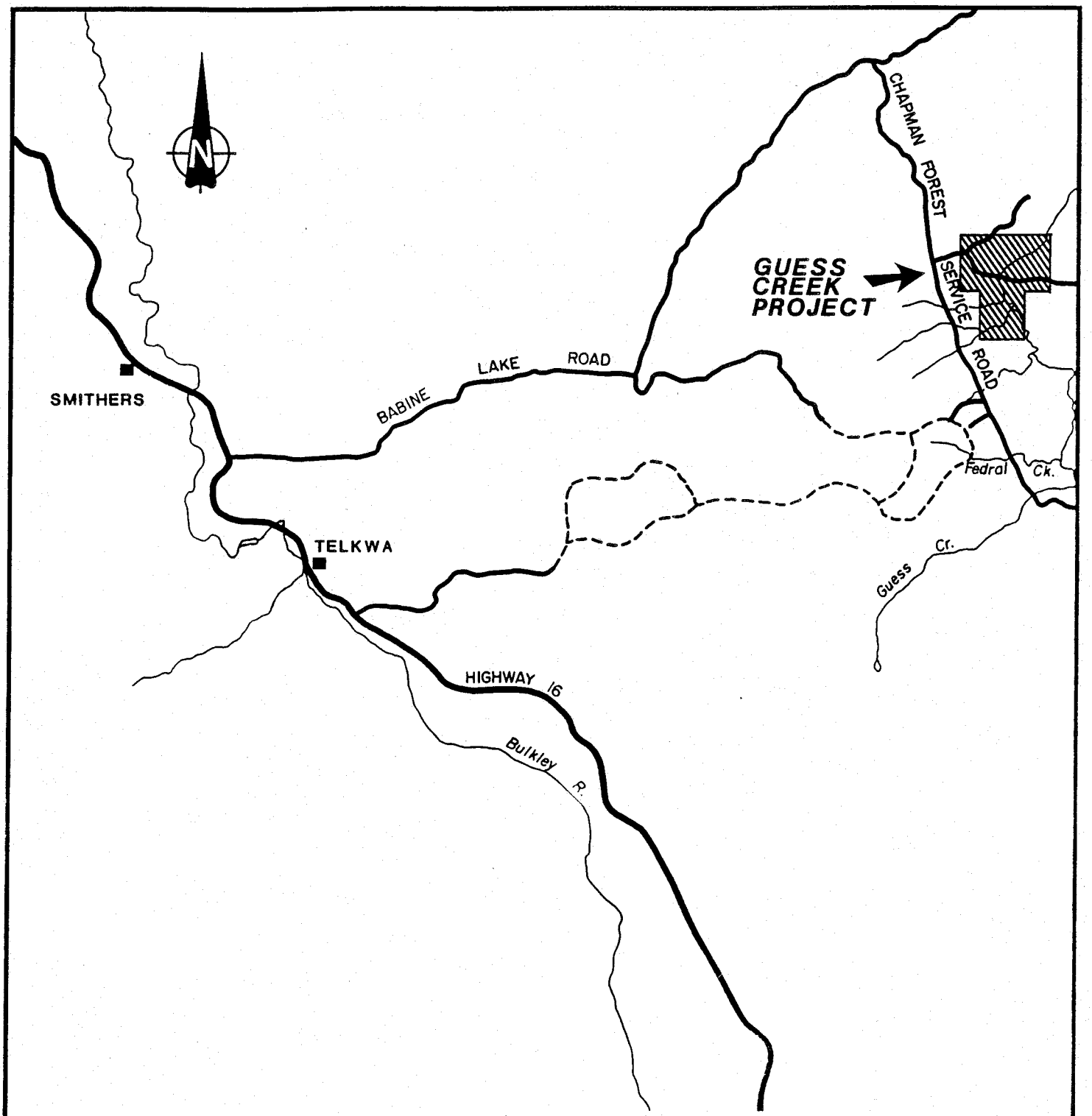


Kilometres
0 50 100 150 200 250 300

0 50 100 150 200 250 300
Miles

MAP #1

TEESHIN RESOURCES LTD.
GUESS CREEK PROJECT
SURVEY LOCATION MAP
SCALE : 1:7,500,000 | DATE : Nov. 1988
QUANTECH CONSULTING INC.



Kilometres

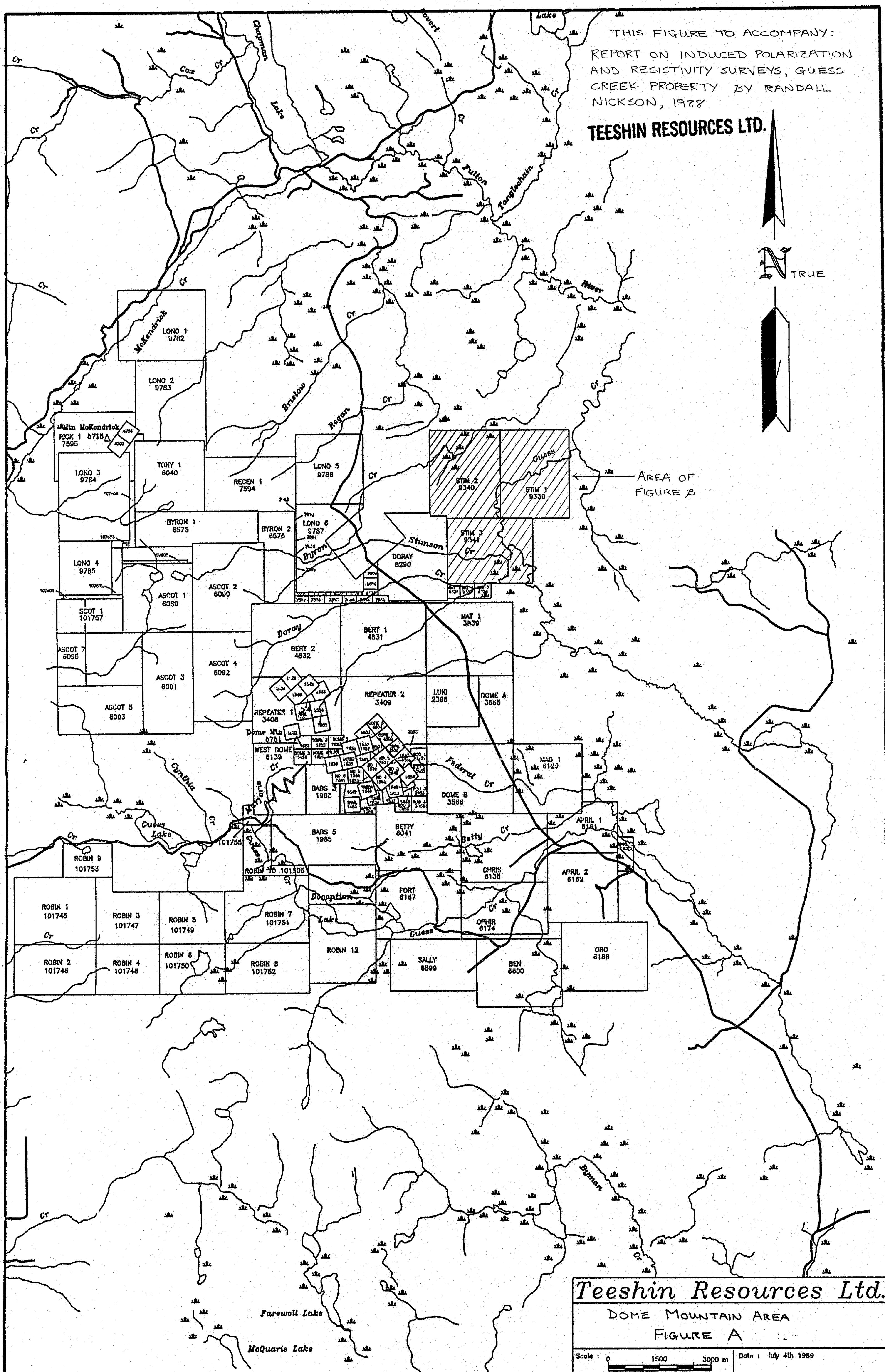
0 5 10 15 20

0 5 10

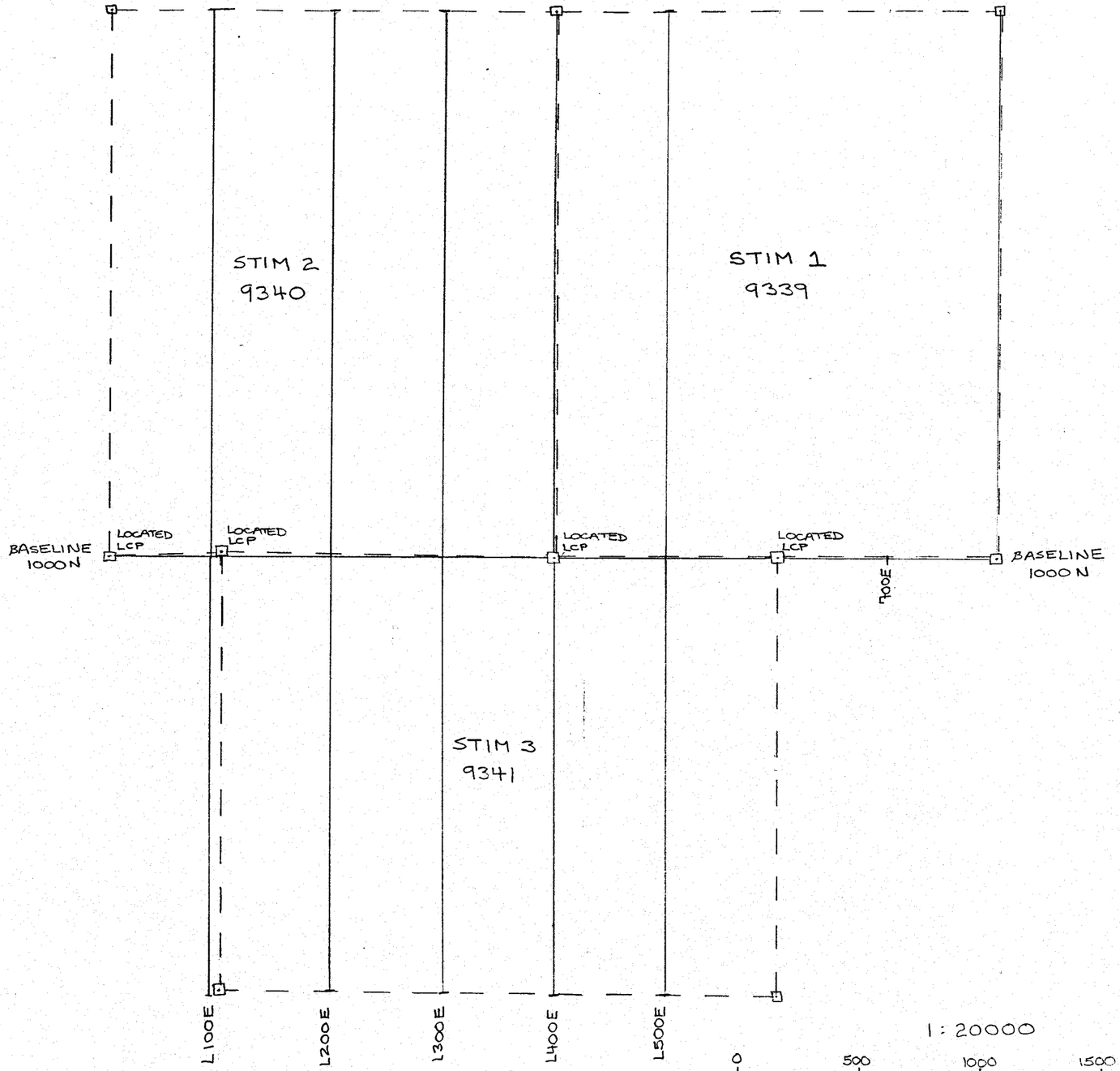
Miles

MAP#2

TEESHIN RESOURCES LTD.	
GUESS CREEK PROJECT	
SURVEY LOCATION MAP	
SCALE : 1:250,000	DATE : Nov. 1988
QUANTECH CONSULTING INC.	



THIS FIGURE TO ACCOMPANY:
REPORT ON INDUCED POLARIZATION AND RESISTIVITY SURVEYS, GUESS CREEK PROPERTY BY RANDALL NICKSON, 1988
TEESHIN RESOURCES LTD.
TRUE
AREA OF FIGURE B
Chapman Lake
Cox Cr
Fulton
Tanglechain
River
McKendrick
Bristow
Regan Cr
Byron
Stimson Cr
Guess
Doray
Federal Cr
Cynthia Cr
Guess Lake
Deception Lake
Betty Cr
Byman Cr
Farewell Lake
McQuarie Lake
Mtn McKendrick 5715
RICK 1 7595
LONO 1 9782
LONO 2 9783
LONO 3 9784
LONO 4 9785
LONO 5 9788
LONO 6 9787
TONY 1 6040
REGEN 1 7594
BYRON 1 6575
BYRON 2 6576
STIM 1 9339
STIM 2 9340
STIM 3 9341
DORAY 8290
ASCOT 1 6089
ASCOT 2 6090
ASCOT 3 6091
ASCOT 4 6092
ASCOT 5 6093
ASCOT 7 6095
SCOT 1 101757
MAT 1 3839
BERT 1 4831
BERT 2 4832
REPEATER 1 3408
REPEATER 2 3409
LUKI 2398
DOME A 3565
DOME B 3566
Dome Mtn 5751
WEST DOME 6139
BABS 3 1983
BABS 5 1985
MAG 1 6120
BETTY 6041
APRIL 1 6161
APRIL 2 6162
CHRIS 6135
FORT 6167
OPHIR 6174
ORO 6188
SALLY 6599
BEN 6600
101755
ROBIN 9 101753
ROBIN 10 101305
ROBIN 1 101745
ROBIN 2 101746
ROBIN 3 101747
ROBIN 4 101748
ROBIN 5 101749
ROBIN 6 101750
ROBIN 7 101751
ROBIN 8 101752
ROBIN 12
Teeshin Resources Ltd.
DOME MOUNTAIN AREA
FIGURE A
Scale : 0 1500 3000 m
Date : July 4th 1989



NOTES: THIS MAP PREPARED FROM FIELD NOTES BY GLENN FOERSTER, 1988. NUMBERING SYSTEM OF NORTH-SOUTH CUT LINES IS NOT BASED ON ACTUAL DISTANCE OF SEPARATION WHICH IS APPROXIMATELY 457 METRES FROM ONE LINE TO THE NEXT. BASELINE IS BELIEVED TO BE LOCATED AT 1000 N. BASELINE AND ALL CUT LINES ARE PICKETED AT 20 METRE INTERVALS.

MAGNETIC DECLINATION ~26° E
NTS 93L 15E

THIS FIGURE TO ACCOMPANY:
REPORT ON INDUCED POLARIZATION AND RESISTIVITY SURVEYS, GUESS CREEK PROPERTY BY RANDALL NICKSON, 1988.

TEESHIN RESOURCES LTD.
CERTIFIED TRUE COPY
[redacted]

TEESHIN RESOURCES LTD

GUESS CREEK PROPERTY
STIM CLAIMS
1988 I.P. CUT GRID
FIGURE B

AUGUST, 1989

3.0 SURVEY PROCEDURES AND EQUIPMENT

3.1 IP Survey

Induced Polarization and Resistivity measurements were carried out in the time domain on 3 lines on the Guess Creek property. A rectangular bipolar pulse train at .125 Hz was transmitted using a 2000 watt Phoenix IPT-1 / MG-2 transmitter - motor generator system grounded to stainless steel electrodes. An EDA IP-2 receiver was used to measure potentials at n=1 through n=4 separations of the current and potential dipoles. Stainless steel rods served to ground the potential wires.

Double - dipole, pole - dipole, and gradient electrode arrays were employed for measurements on the property in an attempt to penetrate the thick cover of overburden on the property, while providing the most useful information at the greatest rate of coverage.

Double - dipole measurements were carried out on part of L1+00E. Pole - Dipole readings were made on part of L1+00E and L4+00E, while Gradient array data was collected on part of L2+00E (note that L2+00E is 500 meters from L1+00E).

In light of the variety of arrays and parameters employed on this property, a table of the comparative attributes of each array, as applicable to this property, is provided below.

Array	Depth of Exploration	Resolution	Intepret-ability	Survey Speed	Signal/ Noise
Dipole - Dipole	A	A	A	C	C
Pole - Dipole	A+	B	B	B	B
Gradient	A+	B	C	A	B

Additionally, it should be noted that increasing the dipole spacing of an array improves depth of exploration, but at the cost of poorer resolution.

3.2 Survey Personnel

The following Quantech Consulting personnel were involved in the surveys:

Randall Nickson, B.Sc.,	Geophysicist; Toronto, Ontario
David Gray,	Operator; Vancouver, B.C.
Bruce Friesen,	Assistant; Prince Albert, Sask.
Mike Evans,	Assistant; Port Hope, Ontario

4.0 DATA PRESENTATION

4.1 Pseudosections

Contoured apparent resistivity, chargeability and metal factor for Pole - dipole and double - dipole data is presented in pseudosection format at a scale of 1:2500 in Appendix B. Standard logarithmically spaced contours were used to compensate for the dynamic range of the data.

Due to the limited data collected on the Guess Creek property, coloured pseudosections have not been provided.

Gradient array data is presented in profile form at a scale of 1:2500. Resistivity, chargeability and metal factor values are profiled on the same axis with different vertical scales.

4.2 Filter Profiles

To facilitate interpretation of the pseudosections, filtered values of resistivity, chargeability and metal factor have been calculated for the pole - dipole and double dipole data. The filtered values present a convenient method of contouring the data in plan form, and provide a data set which is more easily interpreted than pseudosections.

The filter used was a triangular equal weighted average of the readings at a given point, as shown below.

n = 1, w1 = 1 *

n = 2, w2 = 2 * *

n = 3, w3 = 3 * * *

n = 4, w4 = 4 * * * *

One problem with this sort of filter is that a deep, narrow target will be deemphasized with respect to a wide or shallow target. The weights can be adjusted to best suit the expected target, however, other anomalies of different character may then be similarily deemphasized.

Due to the small size of the data set for the Guess Creek property, plan maps have not been prepared.

5.0 INTERPRETATION

The Induced Polarization and Resistivity surveys on the Guess Creek property indicate an area covered by a thick layer of overburden. Overburden could be as thick as 100 meters on parts of the property.

Initial survey measurements were carried out using a double - dipole array with a dipole spacing of 20 meters as requested by Teeshin Resources Ltd.. Analysis of the data indicted that these parameters were insufficient to penetrate an interpreted thick layer of overburden. The same portion of the grid was then retested utilizing a 40 meter dipole - dipole array. The pseudosection is shown in Appendix B. The data again indicate a thick layer of overburden. Resistivity values vary only slightly from n = 1 to n = 4, being generally on the order of 100 ohm - meters. Where thick overburden cover is indicated by horizontal layering of contours and low resistivity values, an increase in resistivity values from n = 1 to n = 4 of at least 100% is desireable to provide confidence that an adequate depth of exploration is being attained. Due to the observed inadequacy of the 40 meter dipole, an 80 meter dipole - dipole configuration was then attempted. Resistivity values at n = 4 increased to roughly 250 ohm - meters indicating penetration of the overburden was sufficient to explore the property. However, it was felt that this large dipole would not provide sufficient resolution and the technique was abanndoned. Since only one transmitting dipole was read, the data has not been provided.

A pole - dipole array provides superior depth of exploration and signal to noise ratio than the dipole - dipole array. Measurements with an "a" spacing of 40 meters were attempted. Again, penetration of the overburden is indicated to be inadequate. The section is shown in Appendix B. Little increase in resistivity at greater separations of current and potential dipoles is observed. Resistivity values are low, on the order of 100 ohm - meters.

The large 500 meter line spacing, 4500 meter line length, lack of success with other arrays and limited information available on the Guess Creek property prompted use of the Gradient array. The array is best suited to reconnaissance surveys due to the speed at which measurements can be made. However, in areas of conductive overburden, and with long line lengths, poor signal to noise/ratio characteristics hamper use of the technique. Not surprisingly, insufficient signal could be generated with current electodes at 200E/2+700N and 200E/2+040S for measurements on L200E. Consequently, an additional current electrode site was established on L200E at 4+20N. The gradient data collected using these electode sites are shown in Appendix B. The data display relatively flat resistivity and chargeability response. No significant anomalies are detected. The increase in resistivities at the south end of the profile is interpreted to be due to proximity of the potential dipoles to the current electrode at 4+20N.

Another current electrode location was established at 200E/16+20N due to further signal/noise ratio problems encountered. The data collected using the electrodes at 16+20N and 4+20N are shown in Appendix B.

Again, no significant anomalous values were recorded. The increase in resistivity values near 16+00N is again attributed to proximity of the measurements to the current electrodes.

In light of the low voltages observed at distances more than 500 meters from a transmitting electrode site, an attempt was made to obtain measurements on L300E and L400E. Observed voltages were within the noise envelope of the system and the survey was abandonned.

Discussions with Teeshin Resources Ltd. indicated that overburden might be thinner in the vicinity of Guess Creek, roughly 1500 meters to the east of L100E. Pole - dipole measurments with an "a" spacing of 40 meters were carried out on L4+00E beside Guess Creek as a comparison with the data collected on L1+00E previously. The section is shown in the appendix. Resistivity values are in the 150 ohm - meter range. Again, some horizontal layering of the contours is observed. An increase in resistivity values to around 200 ohm - meters closer to Guess Creek supports the notion that overburden cover is thinner in that area of the property. However, as only L400E is located in the creek valley, a 40 meter pole - dipole survey would be of limited usefulness. At this point, a generator breakdown precipitated termination of the project by Teeshin Resources due to budget constraints.

6.0 CONCLUSIONS

The geophysical surveys on the Guess Creek property were successful in clarifying the exploration environment.

1. Overburden cover on the property is very thick, possibly up to 100 meters. An increase in resistivity values near Guess Creek indicates that the overburden is somewhat thinner than elsewhere on the property.

2. The limited IP survey on the property failed to detect anomalous chargeability values. However, coverage is incomplete and further work is required to assess the property.

3. More complete geologic and regional scale geophysical data is required to determine which geophysical technique will provide the optimal data set.

7.0 RECOMMENDATIONS

In light of the preceding discussion and conclusions, it is recommended that assessment of the Guess Creek property be undertaken as follows:

1. All available data should be compiled and correlated, including airborne geophysical data, and assessment reports on nearby properties.

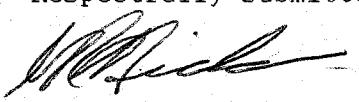
2. Geologic mapping be carried out to determine the geologic environment of the property and the nature of any sulphide mineralization present.

3. A Total Field Magnetic survey be carried out as an aid to geologic mapping. A line spacing of 100 meters, with a station spacing of 25 meters, is recommended.

4. Geochemical sampling be carried out. This recommendation is based on the demonstrated success of the method on Dome Mountain.

5. Further recommendations can be made after completion of the above program pertinent to the assessment of the property.

Respectfully submitted,



Toronto, Ontario
December 1988

Randall Nickson, B.Sc.
Quantech Consulting Inc.

CERTIFICATE

I, Randall Nickson, of Toronto, Ontario do hereby certify that:

1. I hold a Bachelor of Science degree in Engineering Geophysics from Queen's University at Kingston, Ontario.

2. I have practised my profession in exploration continuously since graduation.

3. I have based my conclusions and recommendations contained in this report on my knowledge of this area, my previous experience, and on the results of the field work conducted by me on the property during 1988.

4. I hold no interest, directly or indirectly in this property other than professional fees, nor do I expect to receive any interest in the property or in Teeshin Resources Ltd. or in any of its subsidiary companies.

APPENDIX A

Equipment Specifications

IP-2
Two Dipole
Time Domain IP Receiver

EDA

Major Benefits

- Two Dipoles Simultaneously Measured
- Solid State Memory
- Automatic Primary Voltage Ranging
- Automatically Calculates Apparent Resistivity
- Computer Compatible
- Software Packages Available

IP-2
Two Dipole Time Domain IP Receiver

Description

The IP-2 is a time domain induced polarization receiver that simultaneously measures two dipoles and as a result significantly increases survey production.

The induced polarization (IP) technique is commonly used in precious and base metal exploration, especially for those occurrences described as disseminated sulphides, such as porphyry copper and carbonate-hosted deposits. More recently, IP is increasingly used in a variety of exploration applications including massive sulphide, groundwater, geothermal and structural studies.

The IP-2 system was designed and is manufactured under a license from BRGM Instruments of Orléans, France.

Features

The IP-2 Time Domain Receiver, packaged in an impact-resistant and weather-proof case, features:

- A two-line, 32-character alpha-numeric liquid crystal display and a 28-key keyboard to enable operator interaction with the system
- A standard heater to enable the operator to use the liquid crystal display at temperatures as low as −25°C
- Input protection against transient overvoltages and surges
- A running average of the voltage and chargeability status
- Grounding resistance measurements
- Automatic compensation of self potential, telluric drift and electrode polarization
- Automatic battery check

Major Benefits

• Two Dipoles Simultaneously Measured

The IP-2 measures two dipoles simultaneously. For each dipole, the IP-2 measures and calculates:

- self potential, in mV
- apparent resistivity, in ohm-m
- primary voltage (Vp), in mV
- standard deviation of Vp (E), in %
- total apparent chargeability (M), in mV/V
- individual chargeability windows beneath the decay curve, in mV/V

These provide important time-saving survey features, that significantly increase daily survey production.

• Solid State Memory

The IP-2 uses solid state memory instead of conventional cassette recorders avoiding their inherent electrical and mechanical reliability problems.

The IP-2 can record up to 600 sets of readings. Each set of readings includes:

- individual chargeability windows
- primary voltage (Vp) and its standard deviation
- current intensity
- self potential
- time parameter
- station number
- array parameter

• Automatic Primary Voltage Ranging

Faster and more reliable readings are achieved by the IP-2's automatic primary voltage (Vp) ranging. This capability saves a step in operational procedures since the operator no longer needs to manually adjust Vp ranges.

• Automatically Calculates Apparent Resistivity

The IP-2 automatically calculates and displays the apparent resistivity for one of the following sounding and/or profiling electrode arrays:

- Schlumberger
- Wenner
- Gradient
- Dipole-dipole
- Pole-dipole
- IP-buried electrode

The selection of arrays offered allows the operator survey versatility depending on the type and depth of the target. The IP-2 automatically calculates the apparent resistivity by using the geometry of that chosen array, its electrode separation, the amount of current transmitted and the amount of voltage measured.

• Computer Compatible

Data can be transferred directly into most computers or recorders through the RS-232C Serial I/O interface. Data can also be transmitted directly into a compatible printer. This capability facilitates quick field evaluation of the results obtained.

• Software Programs Available

For easier IP data interpretation, EDA offers easy-to-use software programs to enable the operator to process, plot and contour IP field data collected by the IP-2 into pseudo-section format. These programs can interface with IBM PC and compatible computers.

Other Benefits

Compatible With Most Time Domain Transmitters

The IP-2 may be used with any time domain waveform transmitter with a pulse duration of one or two seconds and a crystal timing stability of 100 ppm.

The microprocessor-controlled synchronization process of the receiver with the transmitter is performed through the measured signal itself. This allows for resistivity and time domain IP measurements without any link with the transmitter. Such synchronization also permits more rugged handling of the instrument as well as increased reliability over more elaborate crystal oscillator based systems. This IP-2 ability to synchronize with an external transmitter at a primary voltage level as low as 40 microvolts can satisfy survey requirements in extremely low resistivity ground.

Improved Correction For Self Potential

Self potential (SP) is the naturally occurring DC voltage difference present in the ground. The IP-2 uses both zero and first order correction techniques to automatically compensate for steady voltage and linear drift, often encountered in more complex SP responses as well as in low frequency telluric noise conditions. This allows for more accurate chargeability measurements under many varied operating conditions.

Signal Averaging

The IP-2 automatically averages voltages and chargeabilities up to a maximum of 99 cycles. The signal stacking and averaging improves data quality, especially in low resistivity environments and in low signal-to-noise conditions.

Multi-Window IP Chargeability Measurements

Three or four individual chargeability windows are measured depending on pulse duration. For a one second pulse, three fixed individual chargeability windows are measured, displayed and stored while, for a two second pulse, four chargeability windows are measured, displayed and stored. A delay time of 160 milliseconds is followed by window widths of 120, 220, 420 and 820 milliseconds. These chargeability windows are semi-logarithmically spaced to achieve better resolution of the shape of the decay curve. All chargeability window measurements are normalized by the width of the window.

The information obtained from the total and individual chargeabilities is useful for recognizing electromagnetic coupling which can generate responses often obscuring anomalies of interest.

The analysis of these three or four individual chargeability windows can be equated to a first order spectral analysis.

Compact and Lightweight

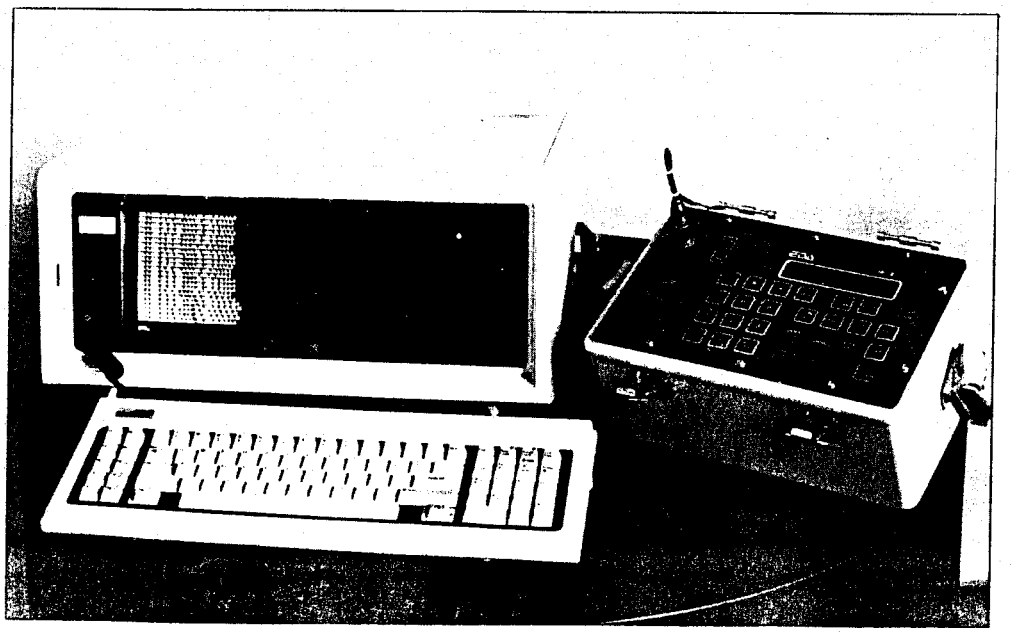
The IP-2 is housed in a lightweight, impact resistant case weighing only 5.5 kg. The system portability simplifies survey logistics, reduces manpower and improves productivity.

Grounding Resistance Check

The IP-2 monitors the resistance of each of the electrodes by using a separate grounding plug which allows the operator to quickly identify any poorly grounded receiving electrode or broken wire.

Self Test Software

The operating software of the IP-2 includes a set of messages to immediately warn the operator of any procedural errors.



IP-2 data results displayed on IBM PC compatible computer.

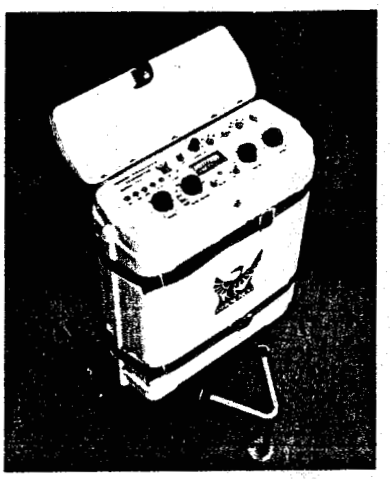
Specifications

Dipoles	Two simultaneous input dipoles.
Input Voltage (Vp) Range	40 microvolts to 4 volts, with automatic ranging and overvoltage protection.
Vp Resolution	10 microvolts.
Vp Accuracy	0.3% typical; maximum 1% over temperature range.
Chargeability Resolution	1 %.
Chargeability Accuracy	0.3% typical; maximum 1% over temperature range for Vp > 10 mV.
Automatic SP Compensation	± 1 V with linear drift correction up to 1 mV/s.
Input Impedance	1 Megohm.
Sample Rate	10 milliseconds.
Automatic Stacking	3 to 99 cycles.
Synchronization	Minimum primary voltage level of 40 microvolts.
Rejection Filters	50 and 60 Hz power line rejection greater than 100 dB.
Grounding Resistance Check	100 ohm to 128 kilo-ohm.
Compatible Transmitters	Any time domain waveform transmitter with a pulse duration of 1 or 2 seconds and a crystal timing stability of 100 ppm.
Programmable Parameters	Geometric parameters, time parameter, intensity of current, type of array and station number.
Display	Two line, 32-character alphanumeric liquid crystal display protected by an internal heater for low temperature conditions.
Memory Capacity	600 sets of readings.
RS-232C Serial I/O Interface	1200 baud, 8 data bits, 1 stop bit, no parity.
Console Power Supply	Six- 1.5V "D" cell disposable batteries with a maximum supply current of 70 mA and auto power save.
Operating Environmental Range	−25°C to +55°C; 0–100% relative humidity; weatherproof.
Storage Temperature Range	−40°C to +60°C.
Weight and Dimensions	5.5 kg, 310x230x210 mm.
Standard System Complement	Instrument console with carrying strap, batteries and operations manual.
Available Options	Stainless steel transmitting electrodes, copper sulphate receiving electrodes, alligator clips, bridge leads, wire spools, interface cables, rechargeable batteries, charger and software programs.

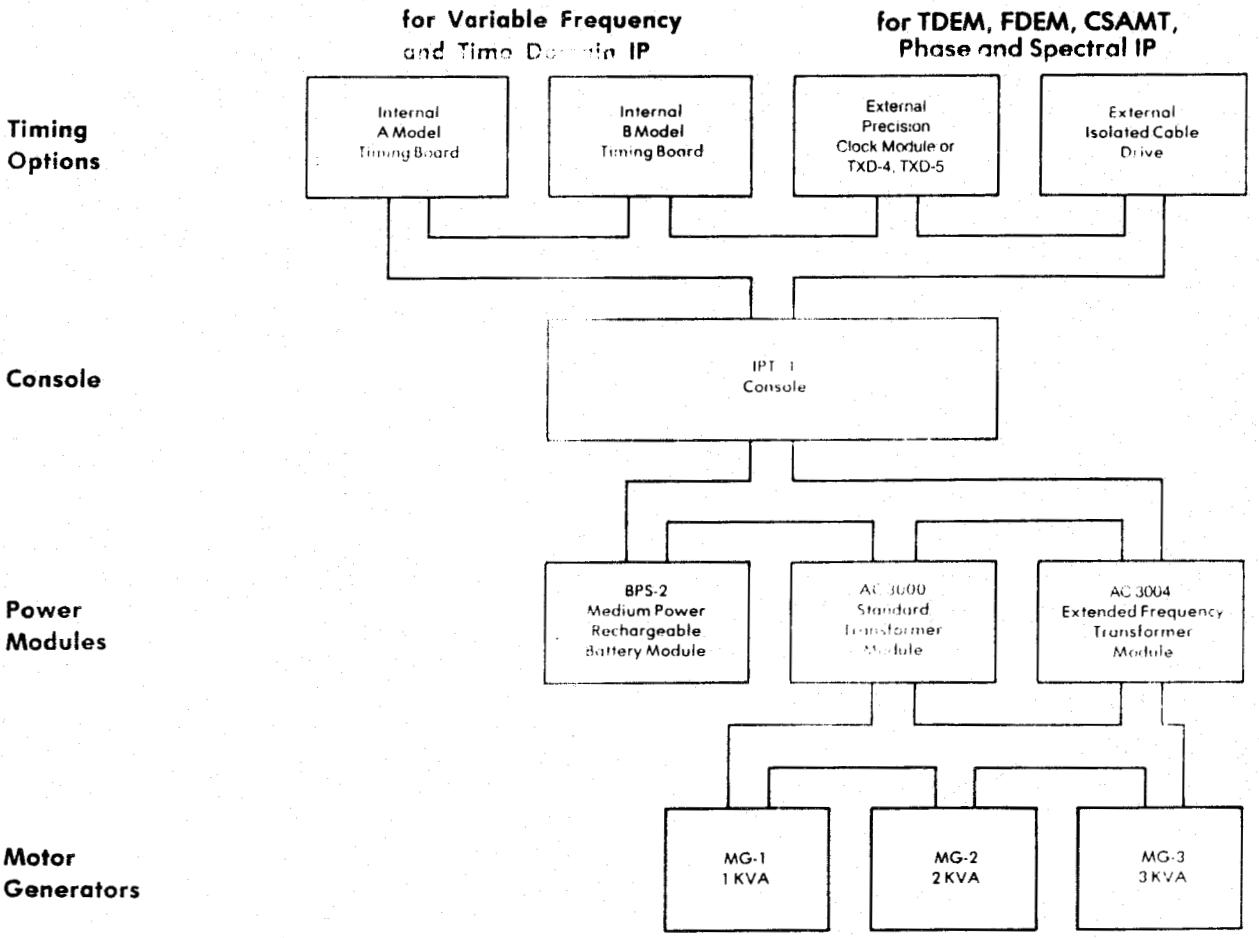
IPT-1

Variable Frequency Transmitter for Time Domain and Phase IP, TDEM, FDEM, CSAMT

- Reliable: Backed by thirty 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, phase angle IP measurements; with AC3004 module for TDEM, FDEM, CSAMT
- **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.

7100 Warden Ave., Unit 7, Unionville, Ontario, Canada L3R 8B5
Tel.: (416) 477 - 8588 Fax: (416) 477 - 9231 Telex: 06 - 986856 PHEXCO MKHM

Timing Options

INTERNAL TIMING BOARD

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

Model A :

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 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 TIMING SOURCES

The IPT-1 may be driven by external timing modules. Phoenix supplies the TXD-3 high precision clock module (stability 10^{-7}/day, or 2.26 mrad/hr at 1 Hz) for use in phase IP. For CSAMT or Time Domain IP, Phoenix offers the TXD-4 and TXD-5 modules. These have a lower precision than the TXD-3, since extremely high frequency and phase stability is not required for either CSAMT or TDIP.

EXTERNAL ISOLATED CABLE DRIVE

The isolated cable drive option allows the IPT-1 to be driven by the timing circuitry of the V4 or V5 receivers. 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 V4 measures the current plus seven voltage dipoles (n = 1,7) 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-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 (max.)

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 3004 TRANSFORMER POWER MODULE

Same as AC 3000 except for:

Output Voltage : 60V, 150V, 300V, 600V, 800V (max.)

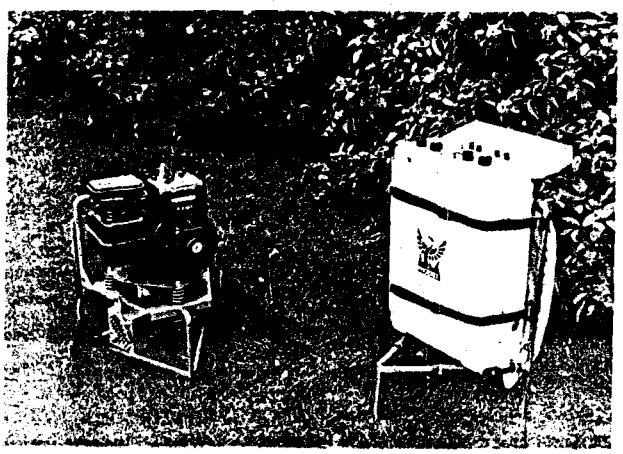
Frequency Range : DC to 8192 Hz under external drive (all other power modules have a maximum frequency of 5 Hz).

General

Dimensions : 20 x 40 x 55 cm (9 x 16 x 22 in).

Weight : 13 kg (29 lb) with BPS-2.
17 kg (37 lb) with AC-3000.
18 kg (40 lb) with AC-3004.

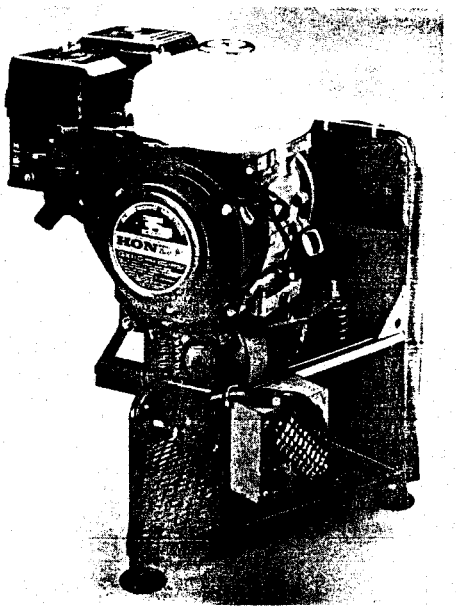
Standard Accessories : Pack frame, manual, At least one of the four possible power modules is required. The transformer power modules in turn require one of the three external 1KVA, 2KVA, 3KVA, motor generators and a connecting cable.



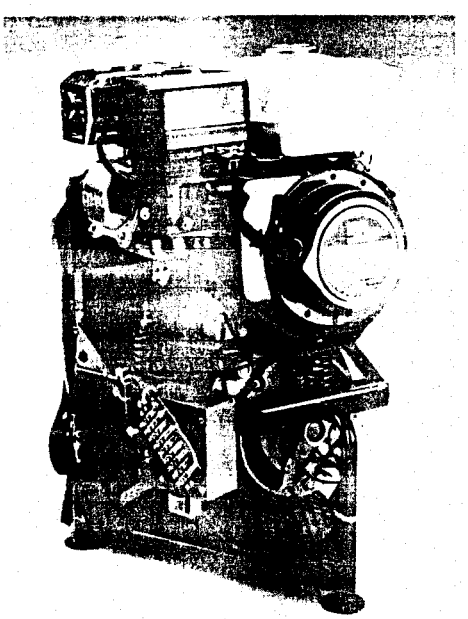
Motor Generators

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 600 Hz), 60V (45V to 80V). The voltage is regulated by feedback from the transmitter.

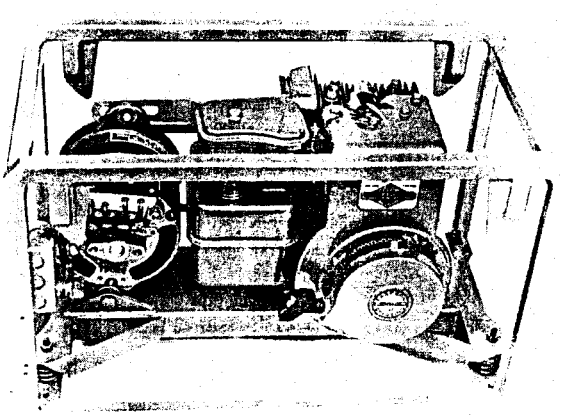
MG - 1 : This lightweight unit is designed for easy portability in areas of moderately high resistivity. It is well suited for massive sulfide exploration in Northern Canada, Europe and Asia, as well as general IP and resistivity surveys in rugged, mountainous areas around the world. The motor is a 4-cycle Honda 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 Honda 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).

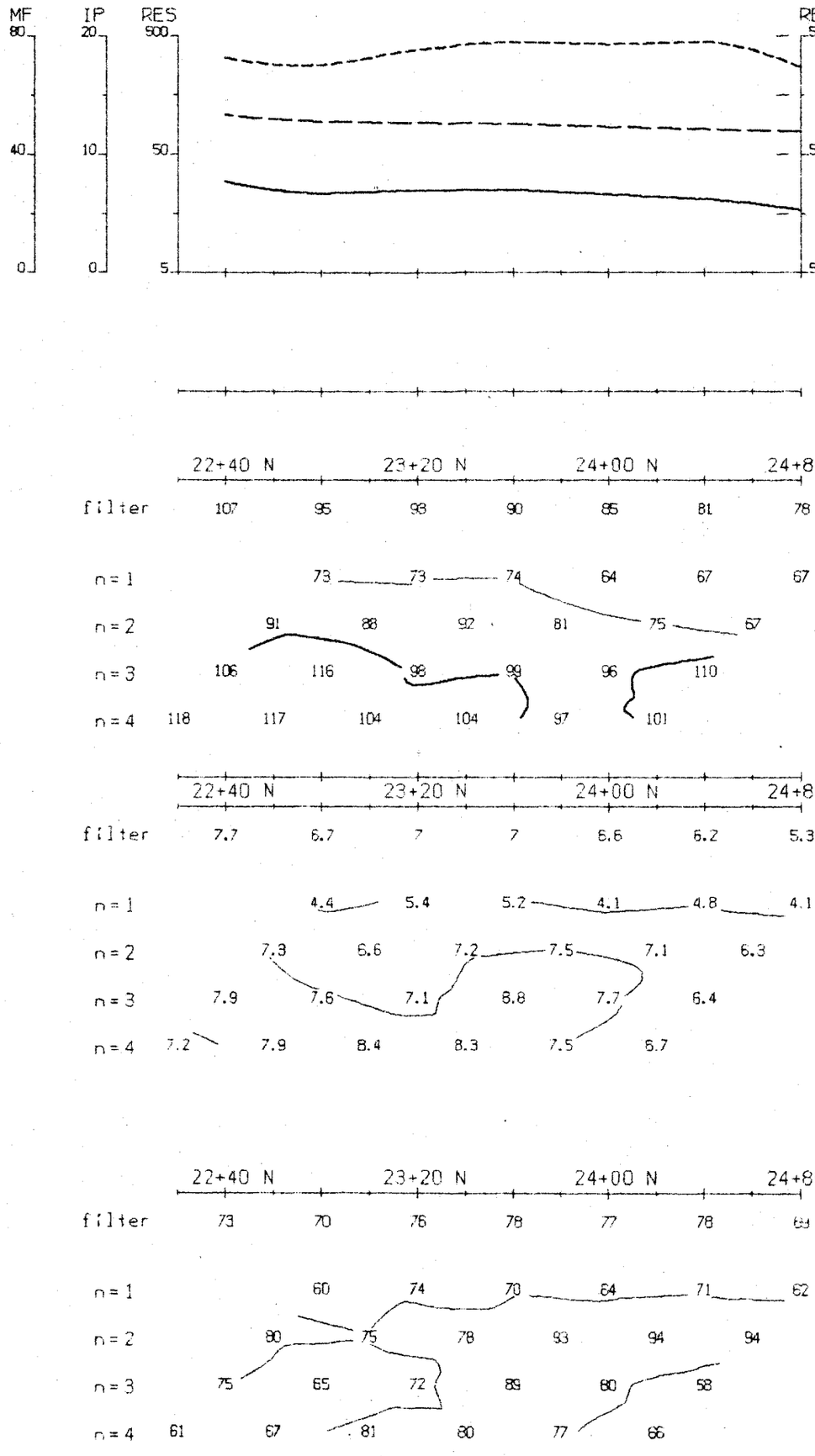


MG - 3 : 3KVA motor generator. This two-man portable unit is designed for surveys in areas which require additional power. The motor is a 4-cycle Briggs and Stratton which produces 8 HP at 3600 rpm. The unit is mounted in a square frame with dimensions 40 x 48 x 75 cm (16 x 19 x 29) in). Total weight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



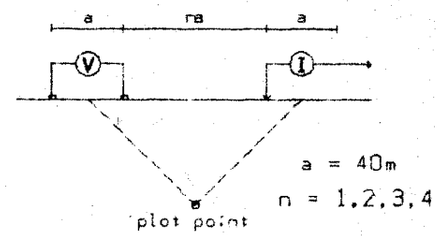
APPENDIX B

PseudoSections



Line 100 E

Dipole-Pole Array



Filtered Profiles

		filter
Resistivity	— — — —	1
Polarization	———	1 1
Metal Factor	- - - - - -	1 1 1
		1 1 1 1

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

Instrument: IP-2 , IPT-1
Frequency: TIME DOMAIN .125 Hz.
Geophysicist: R. Nickson

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Poorly defined polarization increase
- ? ? ? Questionable Feature
- ▼ ▽ Resistivity feature: Low, Moderate

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TIME DOMAIN IP SURVEY

GUESS CREEK PROPERTY

Smithers, B.C.

Date: 88/12/07 N.T.S.: 93 L/10

Scale: 1:2500

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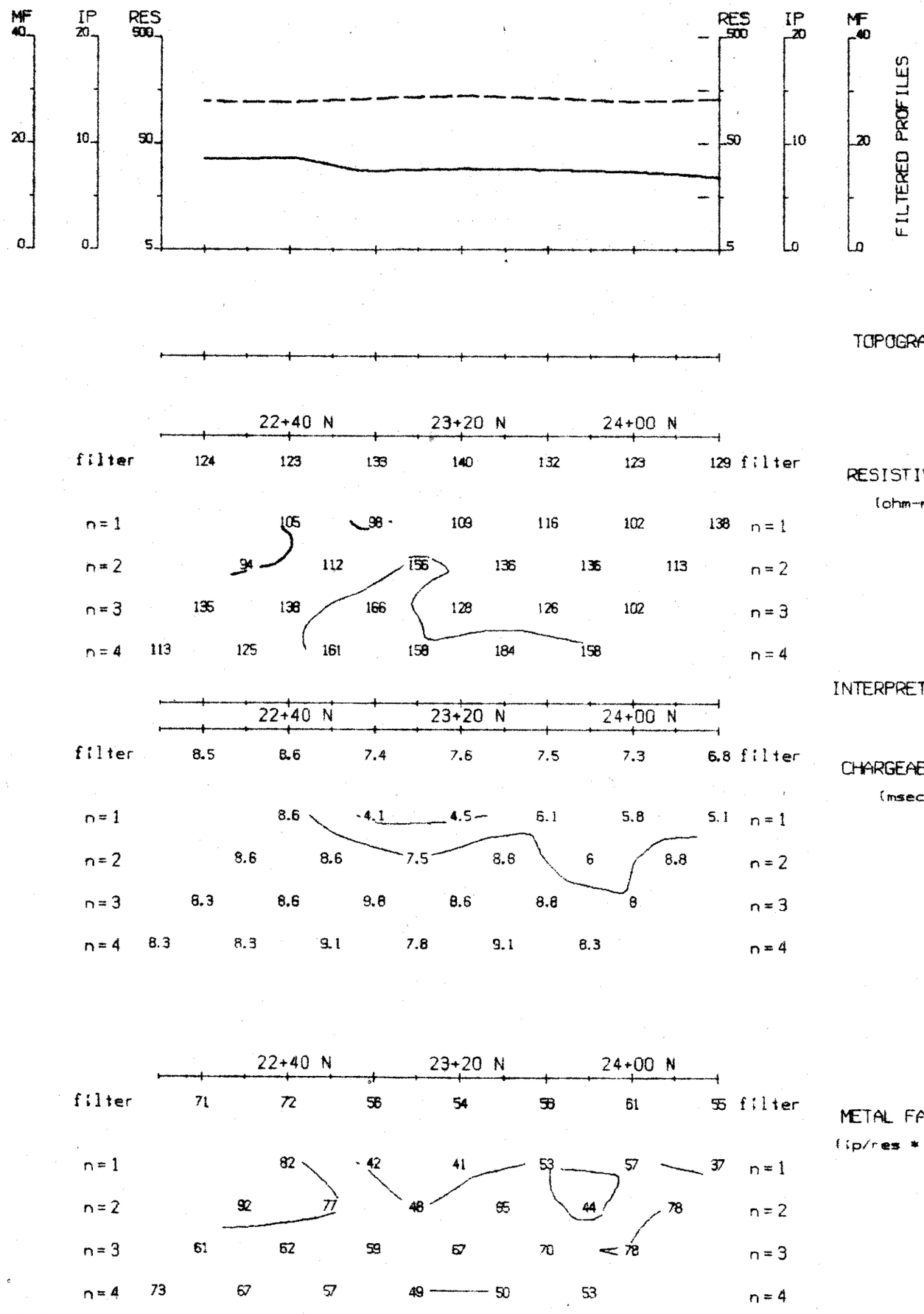

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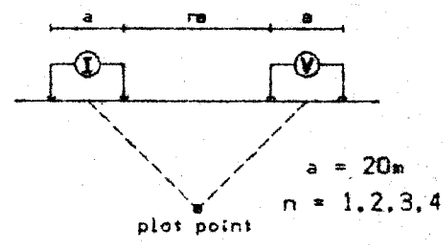
Line 100 E

Dipole-Dipole Array



Filtered Profiles

		filter
Resistivity	————	1
Polarization	————	1 1
Metal Factor	- - - - - - - -	1 1 1
		1 1 1 1

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GUESS CREEK PROPERTY

Smithers, B.C.

Date: 88/12/18 N.T.S.: 93 L/10

Scale: 1:2500

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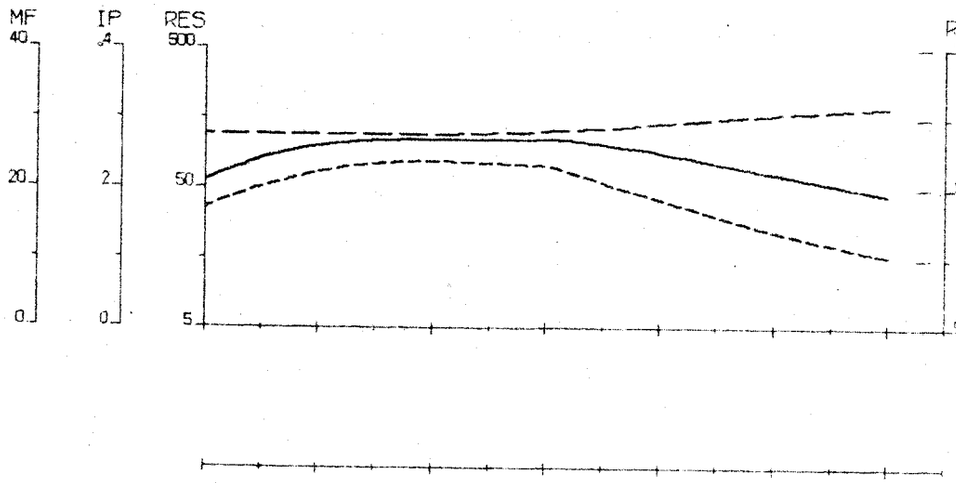

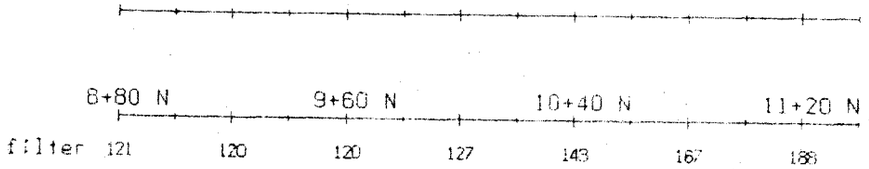

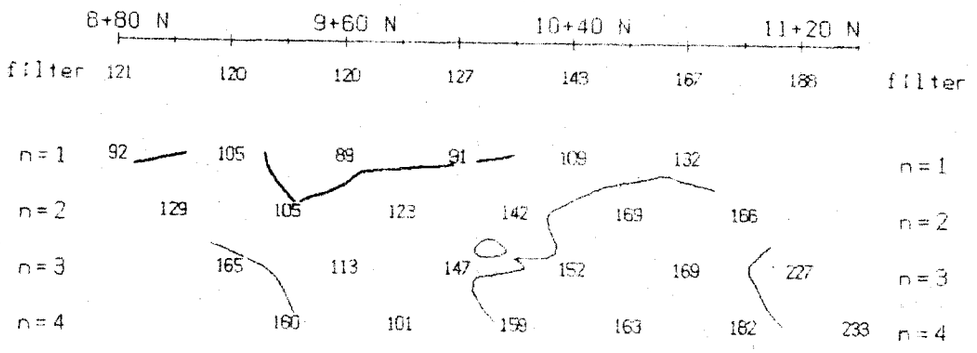

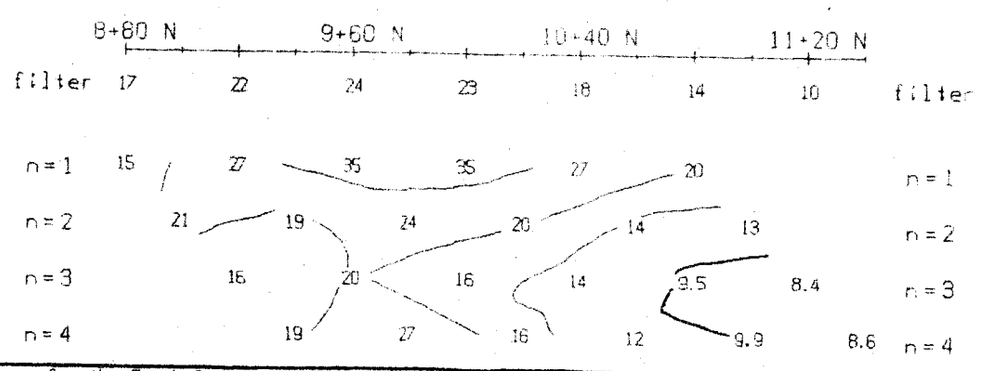

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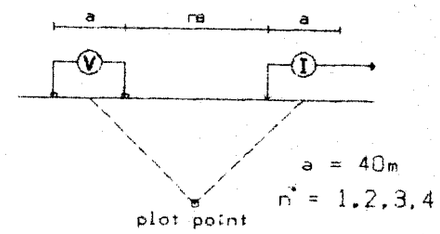
Line 400 E

Dipole-Pole Array



Filtered Profiles

	filter
Resistivity ————	1
Polarization ————	1 1
Metal Factor - - - - - - - -	1 1 1
	1 1 1 1

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

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Frequency: TIME DOMAIN .125 Hz.
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INTERPRETATION

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- ▼ ▽ Resistivity feature; Low, Moderate

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TIME DOMAIN IP SURVEY

GUESS CREEK PROPERTY

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Date: 88/12/06 N.T.S.: 93 L/10

Scale: 1:2500

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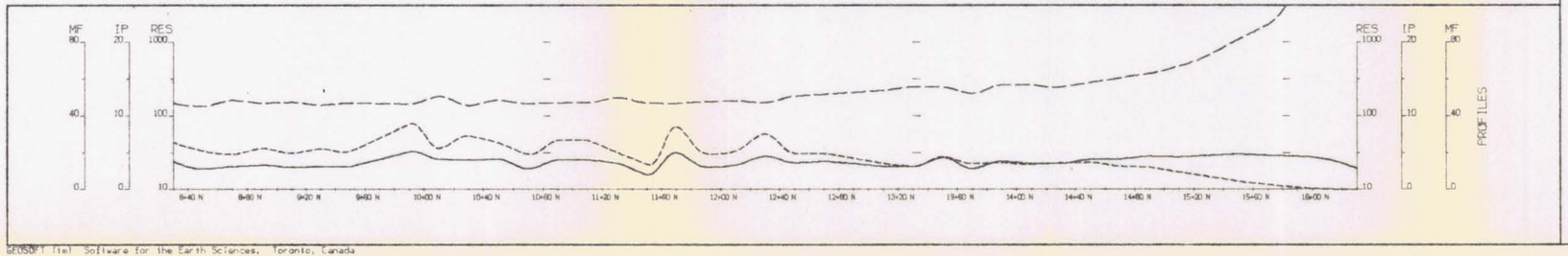

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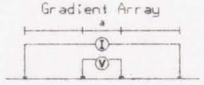
Line 200 E

Gradient Array

a = 20m



plot point

Gradient Profiles

Resistivity
Polarization
Metal Factor

Instrument: IP-2 , IPT-1
Frequency: TIME DOMAIN .125 Hz.
Geophysicist: R. Nickson

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TIME DOMAIN IP SURVEY
GUESS CREEK PROPERTY
Smithers, B.C.

Date: 88/12/18 N.T.S.: 93 L

Scale: 1:2500

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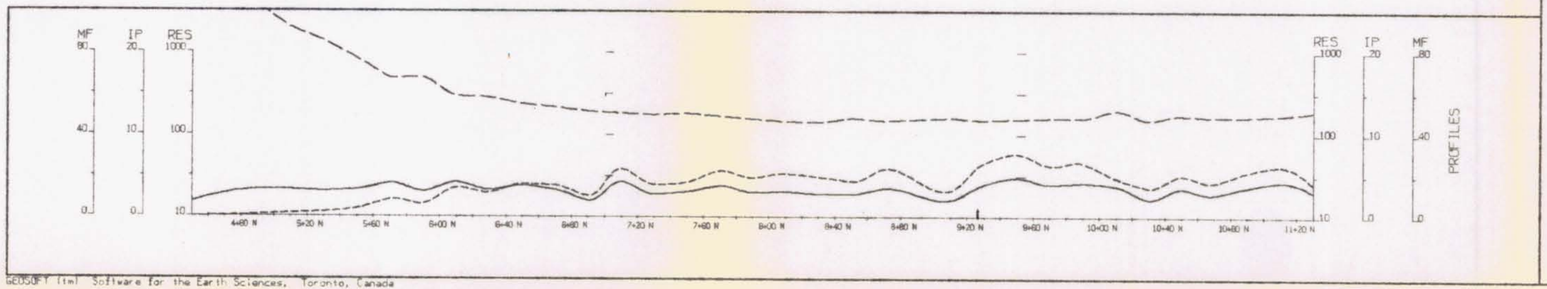

GEOSOFT (tm) Software for the Earth Sciences, Toronto, Canada

Line 200 E

Gradient Array

a = 20m

plot point

Gradient Profiles

Resistivity
Polarization
Metal Factor

Instrument: IP-2 , IPT-1
Frequency: TIME DOMAIN .125 Hz.
Geophysicist: R. Nickson

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TIME DOMAIN IP SURVEY
GUESS CREEK PROPERTY
Smithers, B.C.

Date: 88/12/18 N.T.S.: 93 L

Scale: 1:2500

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