GEOPHYSICAL REPORT

CUISSON LAKE PROPERTIES

NORTH BLOCK NTS 93B 09W
SOUTH BLOCK NTS 93B 08W/E

CARIBOO MINING DIVISION, BRITISH COLUMBIA

FOR

GRANDE PORTAGE RESOURCES LTD.

BY

DELTA GEOSCIENCE LTD.

APRIL 13, 1992. GRANT A. HENDRICKSON, P.GEO.

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INTRODUCTION

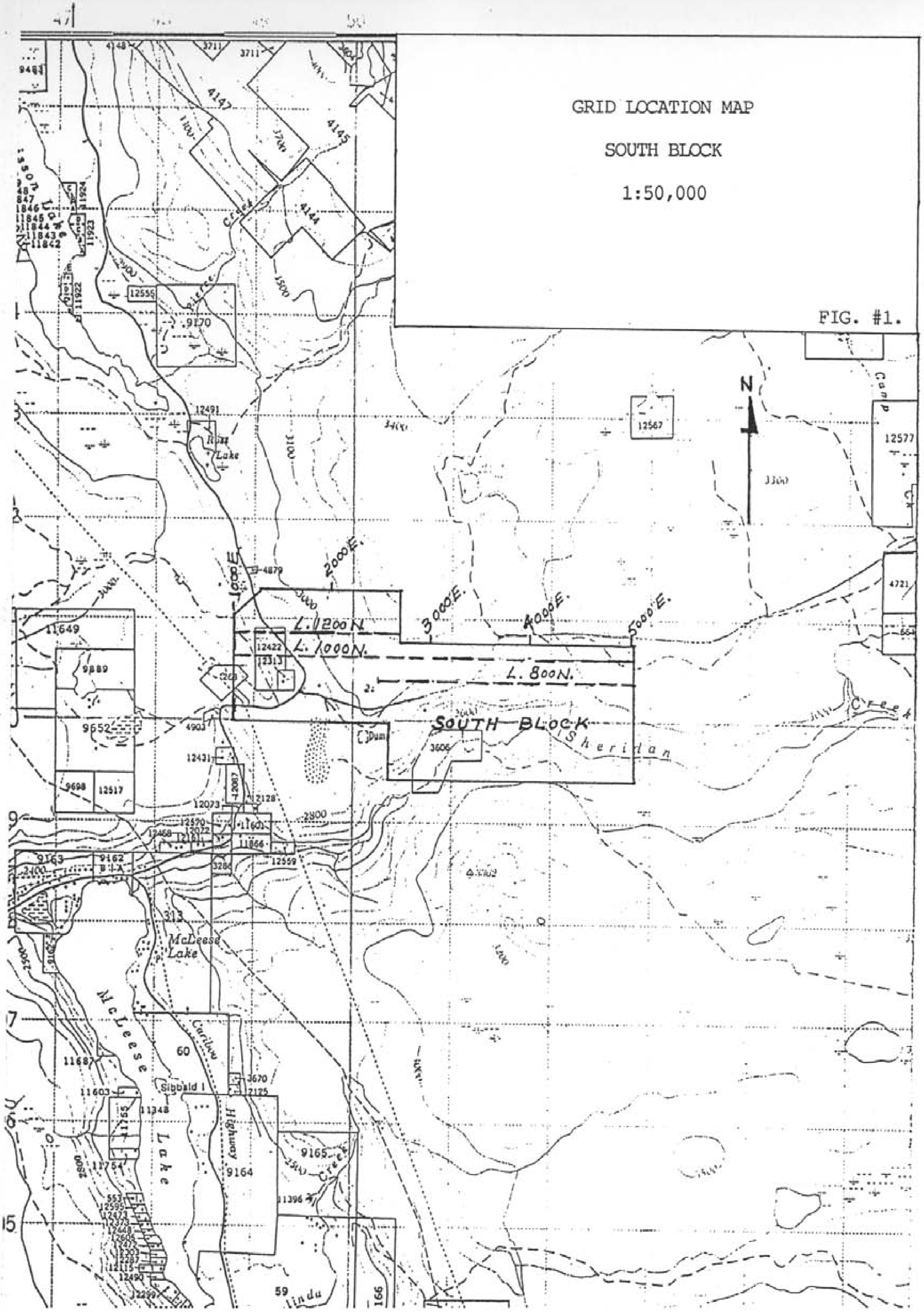
At the request of Grande Portage Resources Ltd., Delta Geoscience Ltd conducted ground geophysical surveys on the Cuisson Lake properties, north and south blocks. These surveys took place during the period March 30 to April 7, 1992.

The Cuisson Lake properties are located within the Caribou Mining Division of north central British Columbia, near the village of McLeese Lake. The south block is approximately 3 km northeast of this village, whereas the north block is approximately 8 km north of the village.

The exploration target is porphyry copper style mineralization similar to the nearby Gilbraltar mine of Placer Dome Inc. The Gilbraltar mine lies within foliated quartz diorite of the Granite Mountain Pluton. The Grande Portage claims are located near the contact or peripheral areas of this pluton. This pluton intruded the Cache Creek group, a mixed sequence of volcanics and sediments.

The geophysical survey techniques employed on this project include Induced Polarization/Resistivity, VLF-EM and Magnetics. In total 12.5 km of survey were completed on the two blocks.

The survey areas have little topographical relief and are characterized by relatively open forest. The north block unfortunately contains numerous large swamps. These swamps tended to be associated with small lakes. Numerous areas of open water made it difficult to establish a grid on the North Block.

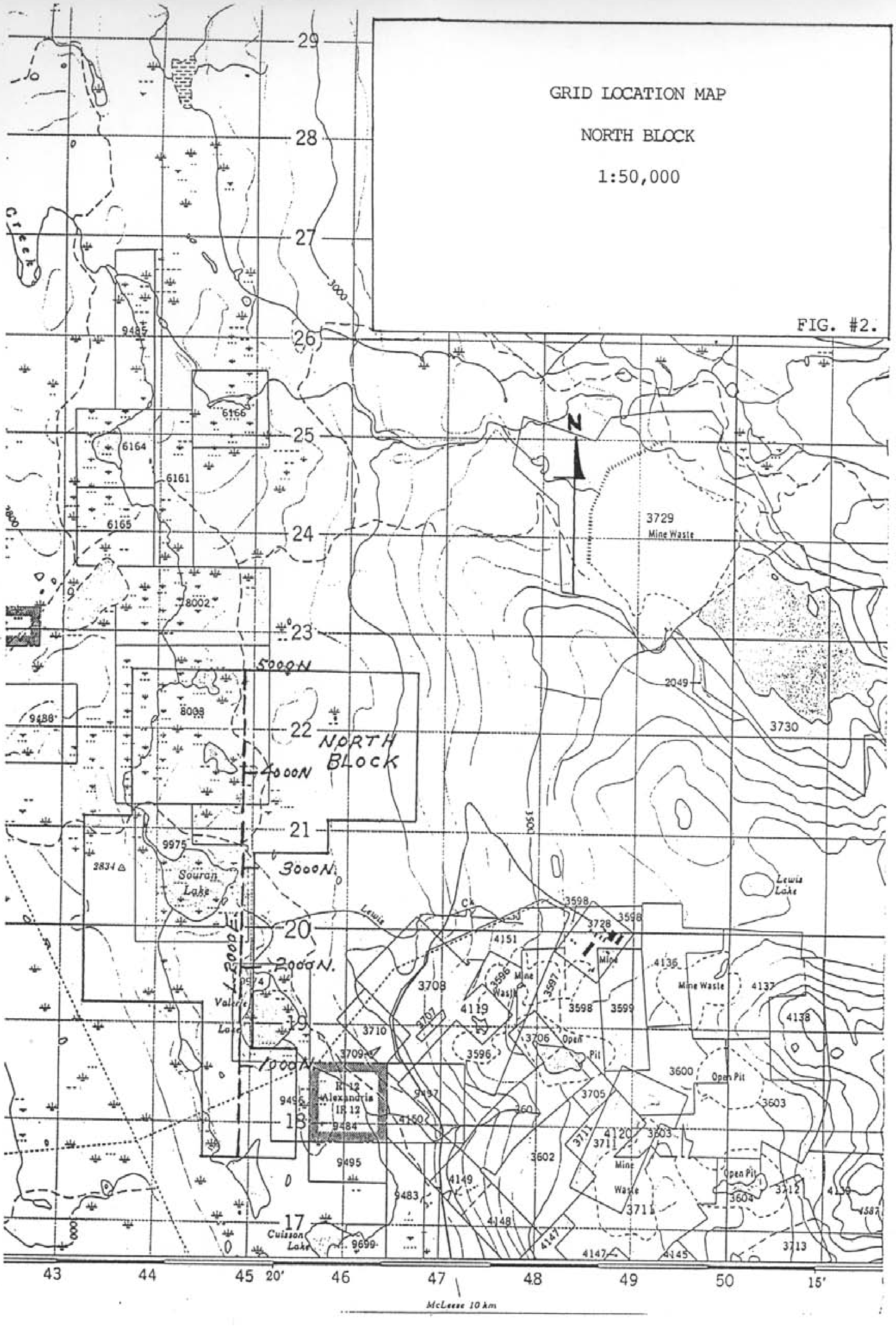


GRID LOCATION MAP

SOUTH BLOCK

1:50,000

FIG. #1.


GRID LOCATION MAP
NORTH BLOCK
1:50,000
FIG. #2.
NORTH BLOCK
5000N
4000N
3000N
2000N
1000N
L 2000
Souran Lake
Valerie Lake
Cuisson Lake
Lewis Lake
Lewis Ck
3729 Mine Waste
3730
Mine Waste
Open Pit
Alexandria IR 12
McLeese 10 km
20'
15'
43
44
45
46
47
48
49
50

PERSONNEL

Craig Raynes	- Geophysicist
Barry Knight	- Geologist
Tom Peregoodoff	- Geophysicist
Chris Slind	- Geophysicist
Grant Hendrickson	- Senior Geophysicist/Supervisor

Scott Clarke of Grande Portage Resources assisted the geophysical crew throughout the survey.

EQUIPMENT

2 - BRGM IP-6 Induced Polarization Receivers.
1 - Huntec 7.5 kva Induced Polarization Transmitter.
2 - Scintrex I.G.S. VLF-EM/MAG Receivers.
1 - Scintrex Base Station Magnetometer.
6 - Motorola VHF Radios.
1 - Toshiba T3100SX Field Computer.
1 - Fujitsu DL2600 Printer/Plotter.
2 - Toyota 4x4 Trucks.

DATA PRESENTATION

Maps of the Induced Polarization/Resistivity, VLF-EM and Magnetic data are presented as stacked profile plans, all at a scale of 1:5000.

The Induced Polarization Pole-Dipole data is also presented in the standard pseudosection format, also at 1:5000. Metal factor on these sections is defined as Chargeability divided by Resistivity times 1000. This factor has no physical basis, however is often an interesting way of presenting the data. Caution must be used when using the M.F. data, since low resistivity zones (surface weathering or overburden) can enhance the product.

Profile plans aid in interpretation, since the profile shape (the wavelength) is directly related to the depth, attitude and width of an anomalous area. Profile data is presented increasing to the north or east from a base level (value at the line position). Contour plans have not been produced due to the lack of a sufficient number of closely adjoining lines.

A triangular shaped filter was applied to the pseudosection data to obtain an average value for each station. This filter helps to overcome the problem of double peaking that occurs with shallow depth limited bodies. The filter value is calculated as follows:

$$\text{Filter} = \frac{avg(n=1)w1 + avg(n=2)w2 + avg(n=3)w3 + avg(n=4)w4}{N}$$

Where avg(n=1) is the average of the points indicated by the asterisk in the filter diagram (shown on the pseudosections) for each "n" spacing, w1, w2 etc are the relative weights for each expansion and "N" is the total number of "n" spacings. This type of filter unfortunately results in some loss of horizontal resolution. The calculated filter value is posted just above the corresponding pseudosection.

SURVEY PROCEDURE

South Block:

Three flagged lines spaced 200 meters apart and oriented due E-W were established on this block. Station separation was set at 50 meters (Fig. #1).

Induced Polarization and Resistivity readings were taken at 50 meter intervals using the pole-dipole array. This array was set up with a dipole spacing of 50 meters, with readings at N=1 to 6. The infinite electrode was set off to the west.

VLF-EM and magnetic readings were taken at 12.5 meter intervals. The VLF station NLK @ 24.8 khz was chosen for this block since the location of this station is approximately on strike with the expected strike of the geological feature of interest (a northwest trending shear zone).

North Block:

One flagged line 4.5 km long and oriented due N-S was established on this block. Station separation was set at 50 meters (Fig. #2).

Induced Polarization and Resistivity readings were taken using two arrays, the pole-dipole array and the gradient array.

All of L.2000E was read with the pole-dipole array using a dipole spacing of 50 meters with readings at N=1 to 6. The infinite electrode was set off to the north.

The gradient array I.P. work was carried out with a current electrode separation "AB" of 3200 meters and a potential electrode separation "MN" of 100 meters. Readings were taken at 50 meter intervals. Current electrodes were placed at 1000N and 4200N respectively on L.2000E.

The pole-dipole array as laid out for this survey provided detailed I.P. information from the zero to 120 meter depth. The gradient array data was focused at the 100 to 400 meter depth range.

The pole-dipole array generally provides detailed near surface depth information (to 150m), however at the expense of horizontal resolution and productivity. This array involves numerous moves of the current electrode, in comparison to the gradient array, therefore is a much slower array to implement.

The gradient array can provide high horizontal resolution of anomalies and a deep depth of investigation. The wavelength of the gradient array responses provide an indication of the target depth. The dip of the geology is generally well revealed by the gradient array survey, particularly when compared to the other arrays.

VLF-EM and Magnetic readings were also taken at 12.5 meter intervals in the north block. The VLF station NAA @ 24.0 khz was chosen for this block since this station was approximately on strike with the expected strike of the known mineralization trend within the Granite Mountain Pluton.

Note that for optimum electromagnetic coupling (detection ability), the conductive features of interest should strike directly towards the VLF-EM transmitter.

Three components of the VLF-EM field were measured: the horizontal field strength, vertical in-phase and vertical quadrature. Eventually, all of the vertical in-phase data should be filtered using the filtering technique referenced at the back of this report. These filtering techniques help to define the spatial position of conductive zones and minimizes any topographical effects in the data.

Skin depth is an important parameter of VLF-EM surveying which should be considered. It is a useful term used to describe the depth of penetration of electromagnetic waves, A good conductor buried at one skin depth will yield a signal at the surface with an amplitude equal to approximately 10% of the incident signal. Accurate detection of this weak a signal is difficult. Skin depth decreases with an increase in frequency, or a decrease in the resistivity of the bedrock and/or overburden. Skin depth for the low resistivity areas of the two survey blocks is estimated to be 40 meters, whereas for the most resistive areas (south block) it is around 80 meters.

Magnetic field measurements were corrected for any diurnal variation and to a common datum, through the use of the MP-3 base station magnetometer which sampled the field each minute for the duration of the magnetic survey. The mag base station was located at 6+50N on line 2000E of the north block. A base field of 57750 nt was selected.

The geophysical surveys carried out in this survey have been designed to collectively help evaluate the two claim blocks for:

a) spatial position and strength of any disseminated sulphide mineralization.

b) spatial position of major structures.

c) respond to the different lithologies to assist in geological mapping (very little outcrop in the survey area).

d) cost effective surveying.

The Induced Polarization (chargeability) was expected to respond primarily to disseminated sulphide mineralization and only moderately to lithology.

The Resistivity survey was expected to respond primarily to the lithology. Areas where there is a correlation of high chargeability with moderately low resistivity would be significant exploration targets. Disseminated sulphide mineralization generally has to be quite concentrated (>10%) in order to substantially reduce the bulk resistivity of the host rock.

The VLF-EM survey was expected to respond primarily to any mineralized shear zones and moderately to geologic contacts.

The magnetic survey was expected to respond primarily to near surface magnetite mineralization, a common constituent of intrusive rocks. There is often a moderate response to changes in lithology due to slight changes in the magnetic susceptibility of the bedrock. Mafic extrusive and intrusive rocks normally have a stronger magnetic response than their felsic counterparts. The magnetic response of intrusives depends largely on the amount of disseminated magnetite mineralization present - something which varies considerably between intrusives and may result from the rock type being invaded and subsequent alteration processes.

DISCUSSION OF THE DATA

South Block:

Induced Polarization/Resistivity:

L.1200N - no significant chargeability response was detected on this line, although there is an indication of an increased response beginning at the extreme east end of this line (2600E).

- the resistivity data indicates a geologic contact at approx. 1900E with shallow intrusives or volcanics to the east and mafic sediments (Cache Creek Group?) to the west. Overburden thickness at the east end of the line is minimal, whereas the western portion of the line may have 10 to 20 meters of cover (gravels and clay).

L.1000N - a broad zone of increased chargeability (sulphide?) response exists from approx. 2700E to 4100E. This broad chargeability response improves with depth, which suggests there may be near surface oxidation of sulphides.

- the resistivity data suggests most of this line is underlain by metasediments of the Cache Creek Group. The high resistivity area between 1900E and 2400E is probably indicative of shallow volcanics. Other relatively small areas of high resistivity exist, particularly at 3100E, which may indicate an apophysis of a deeper intrusive body. This postulated intrusive body may be the real cause of the broad increase in chargeability.

L.800N - a broad significant chargeability response has been detected, centered at 3400E and 3600E. Depth to the top of this zone is approx. 60 meters, however the overall response is improving with depth.

- the above chargeability response is flanked to the west by a broad near surface zone of high resistivity centered at 3000E, that may be indicative of an intrusive body. Note that at approx. 3100E there is an outcropping of fractured quartz diorite. These outcrops are located within a shallow trench adjacent to the Forestry access road immediately south of line 800N at approx. 3100E.

- the shallow low resistivity response that is coincident with the buildup in chargeability is probably largely related to Cache Creek Group sediments. These postulated sediments may have been intensely altered by the proposed underlying intrusive rocks.

The magnetic response of the south block has numerous one or two station spikes which undoubtedly are caused by very near surface high magnetic susceptibility sources, such as large mafic boulders, culverts, fences or erratically disseminated magnetite within shallow bedrock. The overall higher magnetic background at the far west end of the lines may be indicative of interbedded basalts and sediments.

The broad buildup in the magnetic field centered at 3500E is an interesting feature that could be caused by a small buried intrusive stock. Modelling of this broad response suggests the source is dipping to the east at 40 degrees and is at a depth of 130 meters. Width appears to be in excess of 300 meters, depth extent in the order of 300 meters (see Fig. #3). This magnetic feature correlates well with the Chargeability anomaly.

The VLF-EM survey of the south block detected numerous near surface conductive zones. The strongest responses are due to the powerlines that cross the survey lines adjacent to the major roads. The large number of responses and their erratic nature also suggest the area is underlain by shallow sediments of the Cache Creek Group. These sediments are probably intruded by numerous dykes. Near surface surficial conductivity is also responsible for some of the VLF-EM noise.

The axis of the better VLF conductors are illustrated by dashed lines on the profile plans that accompany this report.

North Block:

Pole-dipole Induced Polarization/Resistivity:

L.2000E - the data from this line suggests that most of the immediate area is underlain by sediments, likely the Cache Creek Group. The overall low resistivity and low chargeability response along this line is discouraging. Much of the line is underlain by thick overburden and weakly conductive swamps, which tend to mask the bedrock response. Overburden thickness in many areas will exceed 50 meters. In general, the overburden thickness increases from the north to the south.

- the resistivity of much of the Cache Creek Group sediments appears similar to the resistivity of the overburden, thus it can be difficult to distinguish between the two reliably. The lack of any real improvement in the N=5 and 6 data was disappointing. In an effort to increase the depth of investigation, a line of gradient I.P. was also recorded over the area where the possible northwest extension of the Granite Mountain mineralization might be located. The chargeability values obtained from the gradient array work are more typical of bedrock values and suggest there is a broad zone of increased chargeability (sulphide?) response centered around 2300N. This chargeability increase appears to be minor, however the responses are partially masked by the thick overburden and surficial conductivity. Clearly, much more work will need to be done to thoroughly evaluate the porphyry potential of the north block.

- the numerous swamps and lakes of the north block, combined with the thick overburden, present a survey access problem. Additional gradient array surveys could easily fill in the areas around the lakes, however some gaps in the coverage would remain. Any future pole-dipole work would be operationally difficult to carry out and some of the work would have to be done in the winter when the lakes were frozen. The dipole size should be increased to 100 meters, to increase the depth of investigation.

- the magnetic response of line 2000E has numerous one or two station spikes that are probably caused by magnetic boulders within the overburden. The large amplitude spike at 31+50N is due to the steel culvert located near where the access road crosses the line. The bedrock underlying the north central part of this line has a slightly higher magnetic susceptibility than the southern portion of the line.

- the VLF-EM for L.2000E appears noisy due to the surficial conductivity and weak signal strength of the Cutler (NAA) transmitter. A strong VLF-EM response was detected however, at approx. 3950N, which probably indicates a major steeply dipping fault zone. This proposed fault zone also shows up well on the resistivity pseudosection.

- the axis of significant VLF-EM conductors are shown on the accompanying profiles as a thick dashed line.

- the signal strength for the southern portion of the line was not adequate for reliable data, thus this data has been deleted (from approx. 3000N to 500N).

CONCLUSIONS AND RECOMMENDATIONS

South Block:

The significant broad chargeability and magnetic response found in surveying this block is an interesting feature that requires more geological and geophysical exploration. This large geophysical anomaly appears to be improving to the south into the Sheridan Creek Valley. This type of response could be caused by a relatively small intrusive body containing two to three percent sulphides at depth, in addition to minor disseminated magnetite. Sulphide mineralization also appears to exist peripheral to the intrusive body. The emplacement of this proposed intrusive may have been controlled by a major N-S trending structure cutting through the Sheridan Creek Stock.

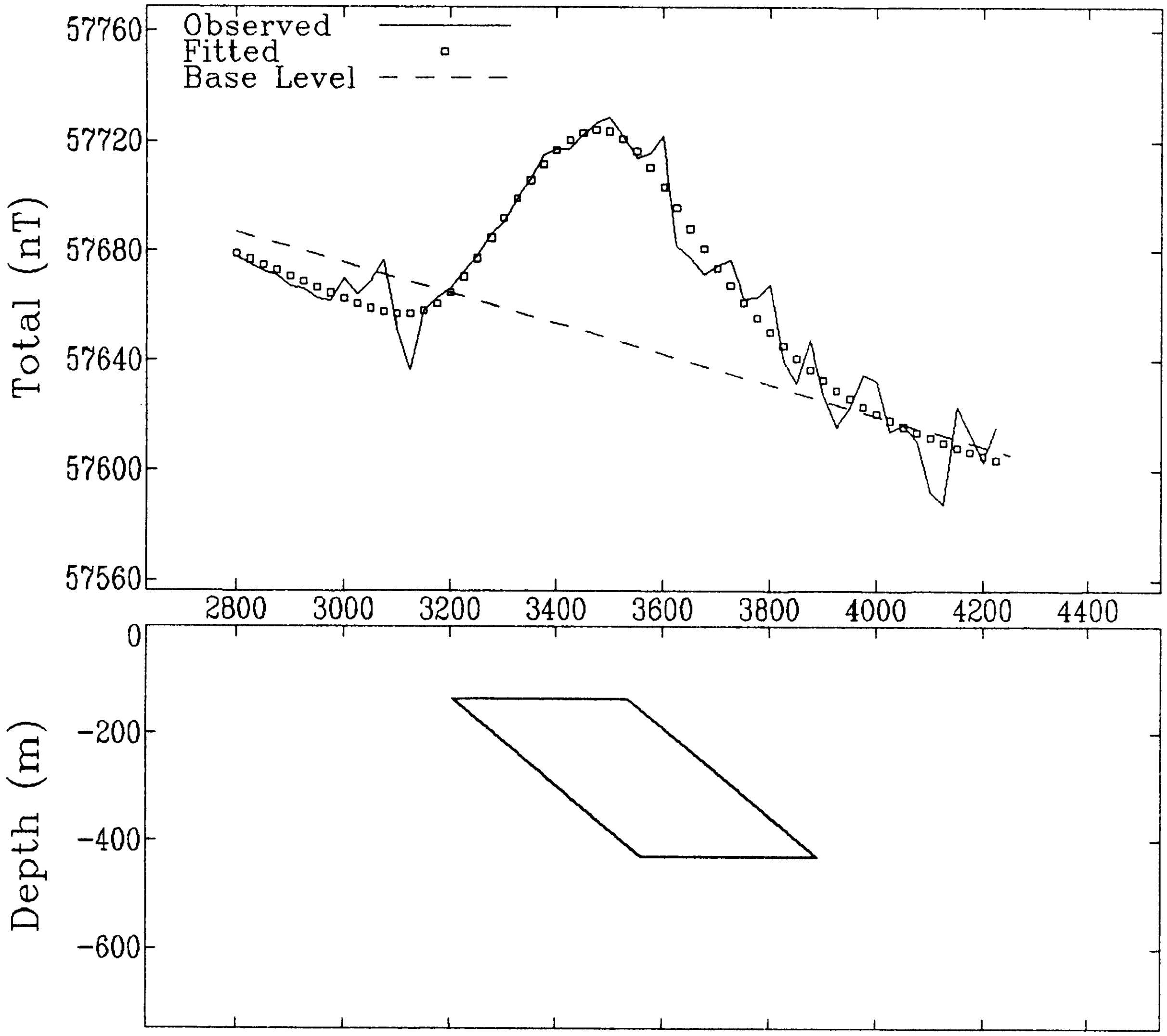
North Block:

More geophysical work is required on this claim group before any relevant comments can be made regarding its mineral potential. The one long line that has been completed is at best only moderately encouraging. Complications due to lakes, swamps and thick overburden make this a difficult claim group to survey. To minimize these complications and remain cost effective, any future I.P. surveys should utilize the gradient array approach.

Grant A. Hendrickson, P.Geo.

MAGNETIC MODEL L.800N

SOUTH BLOCK



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	136 m
Half Width	F	165 m
Half Length	X	713 m
Offset	X	0 m
Dip	F	40 deg
Thickness	F	294 m
Susceptibility	F	0.000739 emu
Remnance Ratio	X	0
Remnance Incl	X	0 deg
Remnance Decl	X	0 deg
Main Position	F	3368.863 m
Cross Position	X	800 m
Base Level	F	57655.14 nT
Base Slope	F	-.0561123 nT/m

GEOMAGNETIC FIELD:

Field Strength	57600 nT
Inclination	78 deg
Declination	-22 deg

COORDINATES:

Sensor Height	2 m
Strike Perp	90 deg
Line Direction	90 deg
Main Direction	90 deg
Main Offset	
Cross Direction	
Cross Offset	

FIG. #3

Geosoft MAGMOD-3 Modeling Result 92/04/13

REFERENCES

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Coggon, J.H., 1973: A Comparison of I.P. Electrode Arrays: Geophysics, Vol.38, 737-761.

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Fraser, D.C., 1969: Contouring of VLF-EM data: Geophysics 34. 958-967.

Karous, M., and Hjelt, S.E., 1983: Linear Filtering of V.L.F. Dip-Angle Measurements: Geophysical Prospecting.

Malmqvist, L., 1978: Some Applications of IP-Technique for Different Geophysical Prospecting Purposes: Geophysical Prospecting 26, 97-121.

Ward, Stanley H., 1990: Resistivity and Induced Polarization Methods, from "Geotechnical and Environmental Geophysics", Pages 147 to 190, published by the Society of Exploration Geophysics.

STATEMENT OF QUALIFICATIONS

Grant A. Hendrickson

- B.Science, University of British Columbia, Canada, 1971, Geophysics option.
- For the past 21 years, I have been actively involved in mineral exploration projects throughout Canada, the United States, Europe and Central and South America.
- Registered as a Professional Geoscientist with the Association of Professsional Engineers and Geoscientists of the Province of British Columbia, Canada.
- Registered as a Professional Geophysicist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, Canada.
- Active member of the Society of Exploration Geophysicists, European Association of Exploration Geophysicists and the British Columbia Geophysicial Society.

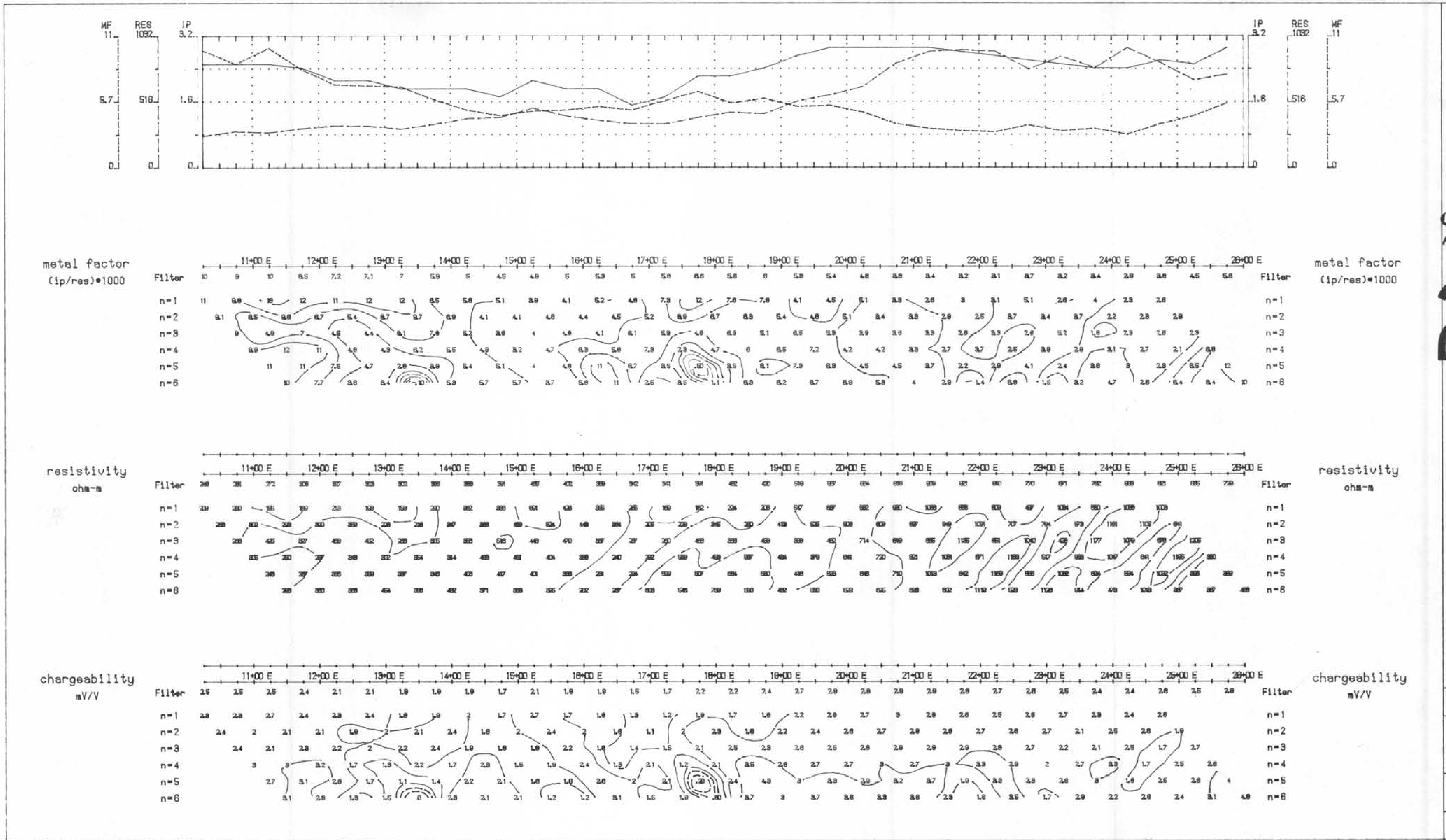
Dated at Delta, British Columbia, Canada, this 3 day of MAY, 1992.

G Hendrickson

Grant A. Hendrickson, P.Geo.

STATEMENT OF COSTS

Geophysical Survey	$ 12,150.00
Technical Report on Geophysical Survey	800.00
Client's Costs: to room & board crew	1,777.00
Field Supervision	1,575.00
Subtotal	$ 16,302.00
7% GST on $ 12,950.00	906.50
TOTAL COST	$ 17,208.50



Line 1200 N

Pole-Dipole Array

Filter

a = 50 M

plot point

GEOLOGICAL BRANCH ASSESSMENT REPORT

22,363

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

INTERPRETATION

- Strong increase in polarization accompanied by marked decrease in resistivity.
- Well defined increase in polarization without marked resistivity decrease.
- Poorly defined polarization increase with no resistivity signature.
- ▼ Low resistivity feature.

Scale 1:5000

50 0 50 100 150 200 250 (metres)

GRANDE PORTAGE RESOURCES LTD

INDUCED POLARIZATION SURVEY
CUISSON LAKE PROPERTY
SOUTH BLOCK

Date: 92/04/14
Interpretation: GH

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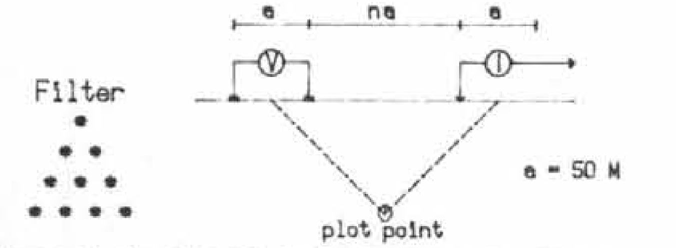
FIG. 4

Geosoft Software for the Earth Sciences

Geosoft Software for the Earth Sciences

Line 1000 N

Pole-Dipole Array



GEOLOGICAL BRANCH ASSESSMENT REPORT

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Scale 1:5000

50 0 50 100 150 200 250 (metres)

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INDUCED POLARIZATION SURVEY
CUISSON LAKE PROPERTY
SOUTH BLOCK

Date: 92/04/14
Interpretation: GH

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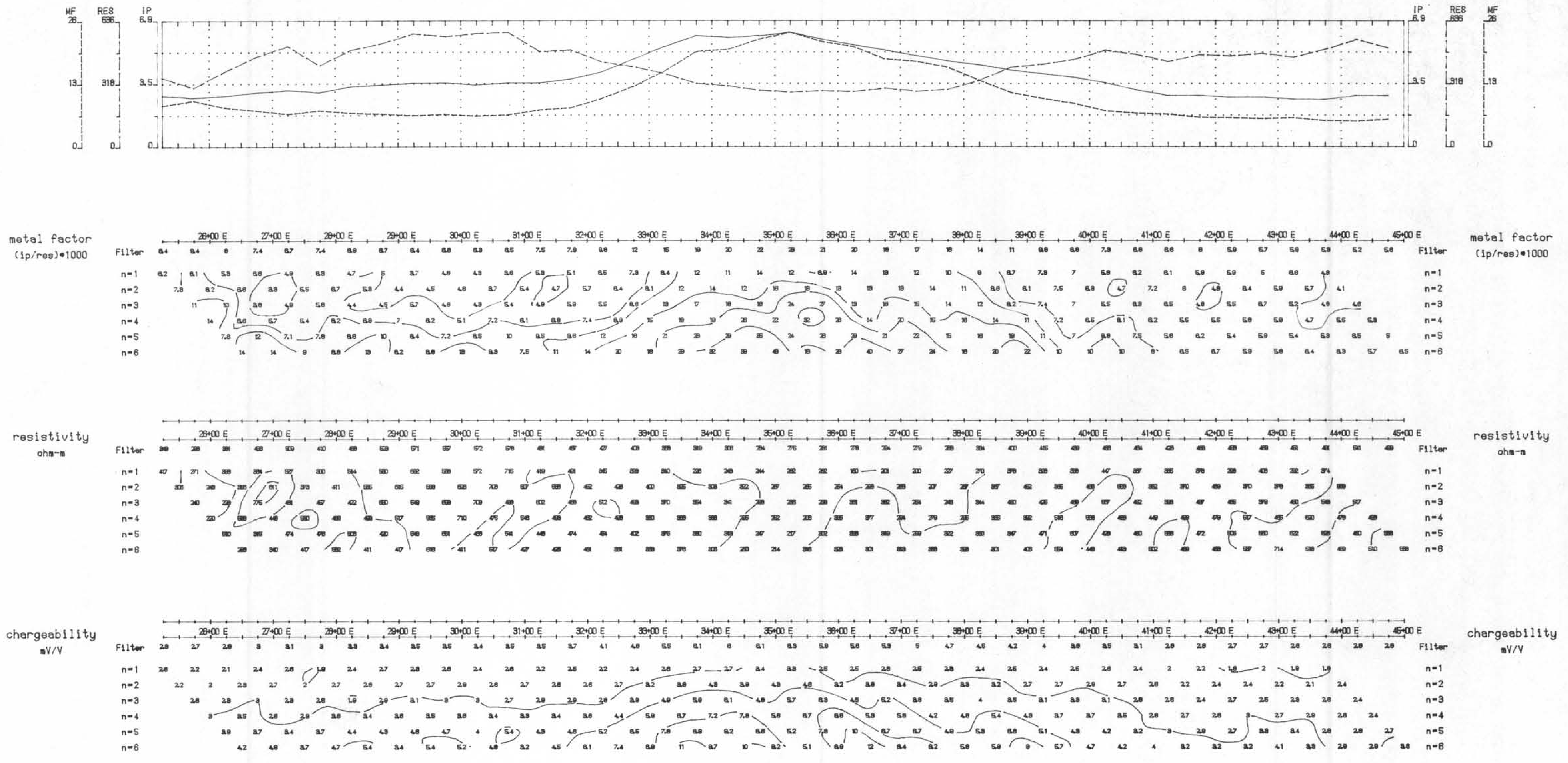
FIG. 5



Line 800 N

Pole-Dipole Array

a — na — a

Filter

plot point

a = 50 M

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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

INTERPRETATION

- Strong increase in polarization accompanied by marked decrease in resistivity.
- Well defined increase in polarization without marked resistivity decrease.
- Poorly defined polarization increase with no resistivity signature.
- ▼ Low resistivity feature.

Scale 1:5000

50 0 50 100 150 200 250
(metres)

GRANDE PORTAGE RESOURCES LTD

INDUCED POLARIZATION SURVEY
CUISSON LAKE PROPERTY
SOUTH BLOCK

Date: 92/04/14
Interpretation: GH

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FIG. 6

Geosoft Software for the Earth Sciences

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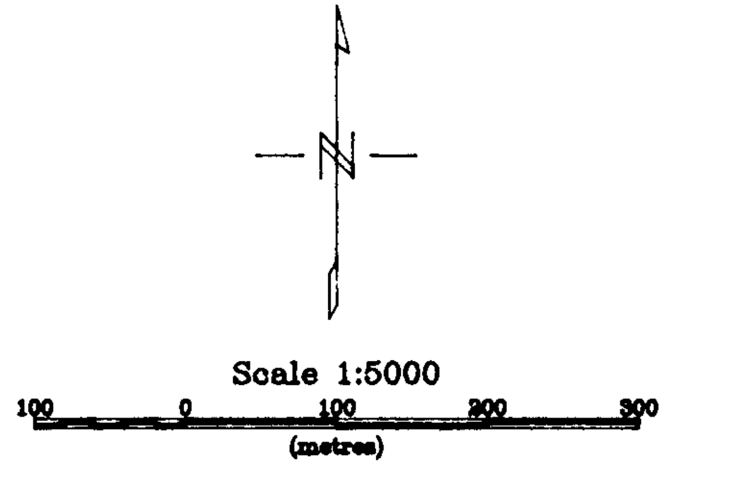

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CUISSON LAKE PROPERTY, SOUTH BLOCK
TOTAL FIELD MAGNETIC PROFILES

1 cm = 50 nt, base 57700 nt
Scintrex IGS systems
March/April, 1992

Delta Geoscience Limited

FIG. 7

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CUISSON LAKE PROPERTY, SOUTH BLOCK
VLF-EM PROFILES

inphase solid line @ 1 cm = 20 %, base 0 %
horizontal field strength dash line @ 1 cm = 20, base = 90
transmitter Seattle, NLK, @ 24.8 khz

Delta Geoscience Limited

FIG. 8

Line 2000 E

Pole-Dipole Array

Filter

a = 50 M

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

INTERPRETATION

- ▣ Strong increase in polarization accompanied by marked decrease in resistivity.
- ▫ Well defined increase in polarization without marked resistivity decrease.
- □ Poorly defined polarization increase with no resistivity signature.
- ▼ Low resistivity feature.

Scale 1:5000

50 0 50 100 150 200 250 (metres)

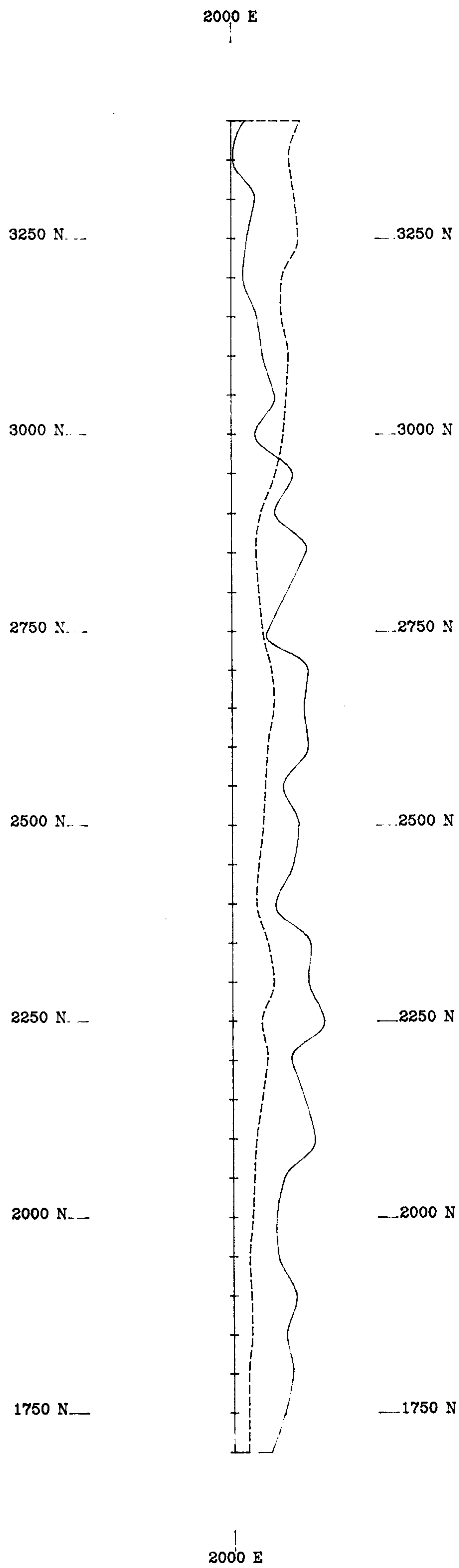
GRANDE PORTAGE RESOURCES LTD

INDUCED POLARIZATION SURVEY
CUISSON LAKE PROPERTY
NORTH BLOCK

Date: 92/04/14
Interpretation: GH

DELTA GEOSCIENCE LTD

FIG. 9



GEOLOGICAL BRANCH
ASSESSMENT REPORT

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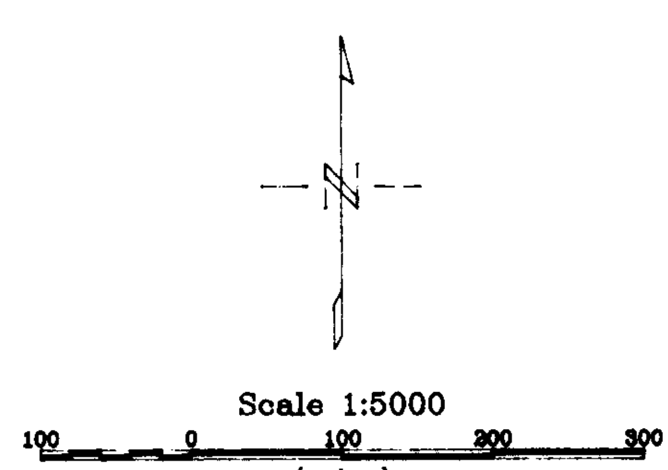

GRANDE PORTAGE RESOURCES LTD

CUISSON LAKE PROPERTY, NORTH BLOCK
INDUCED POLARIZATION / RESISTIVITY PROFILES

Chargeability solid line @ 1 cm = 2 mV/V, base 5 mV/V
Resistivity dash line @ 1 cm = 200 ohm-m, base = 100 ohm-m
Gradient Array, AB = 3200m, MN = 100m

Delta Geoscience Limited

FIG. 10

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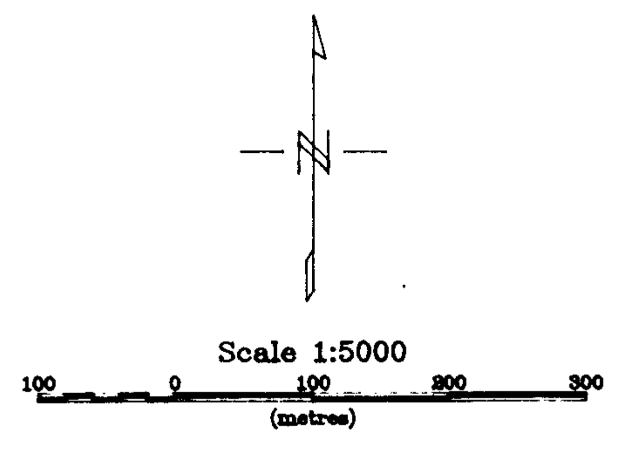

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CUISSON LAKE PROPERTY, NORTH BLOCK
TOTAL FIELD MAGNETIC PROFILES

1 cm = 50 nt, base 57750 nt
Scintrex IGS systems
March/APRIL 1992

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FIG. 11

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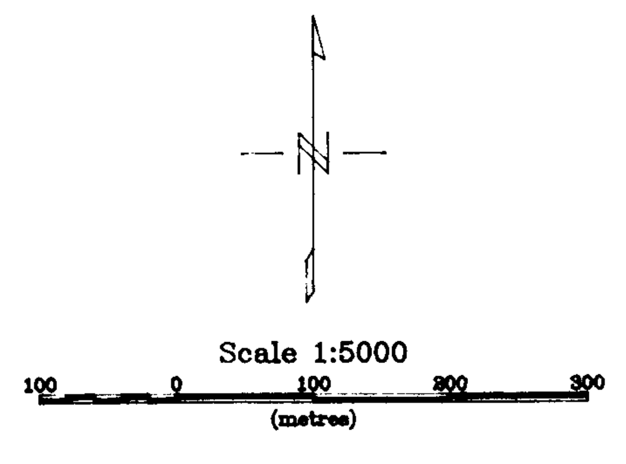

GRANDE PORTAGE RESOURCES LTD
CUISSON LAKE PROPERTY, NORTH BLOCK VLF-EM PROFILES
inphase solid line @ 1 cm = 20 %, base 0 % horizontal field strength dash line @ 1 cm = 2, base = 5 transmitter Culter, NAA, @ 24.0 khz
Delta Geoscience Limited

FIG. 12