4426

93L/16E, 93M/1E&W

GEOPHYSICAL REPORT
of the
INDUCED POLARIZATION SURVEY
on the
HATCHERY ARM AND HAWTHORNE BAY PROPERTIES
Babine Lake Area, B. C.

Longitude: 126°15'W
Latitude : 55°00'N

N.T.S. 93L/16 and 93M/1

on behalf of

QUINTANA MINERALS CORPORATION LTD.

on some

TONJA, IDC, NDI, NED, BAB, R, RR
CLAIMS

By:

P. P. NIELSEN, B.Sc., GEOPHYSICIST
G. C. GUTRATH, B.Sc., P.Eng., GEOLOGIST
ATLED EXPLORATION MANAGEMENT LTD.
Vancouver, B. C.

May, 1973

TABLE OF CONTENTS

	Page
INTRODUCTION	1
LOCATION AND ACCESS	2
CLAIMS	3
PREVIOUS WORK	4
GENERAL GEOLOGY	5
LINECUTTING	6
THE INDUCED POLARIZATION SURVEY	7
Theory of Method Used	7
Theory of the 3-array Electrode Configuration	8
Field Procedure	10
Equipment Description and Specifications	11
DATA PRESENTATION	12
Calculations	12
Contours	13
Discussion of Results and Interpretation	13

APPENDICES

Statement of Author's Qualifications

Engineer's Certificate

Personnel

Costs

.....continued.....

TABLE OF CONTENTS.....

ILLUSTRATIONS

Location Maps..... After Page 2

Waveform Diagram..... After Page 7

Profile Example ..... After Page 8

Hatchery Arm

#1 *1. Claim and Line Location Map..... In Map Pocket*

#2 *2. Apparent Risistivity Map..... "*

#3 *3. Apparent Chargeability Map..... "*

Hawthorn Bay

#4 *4. Claim and Line Location Map..... "*

#5 *5. App. Res. Map..... "*

#6 *6. App. Charg. Map..... "*

#7 Location map

#8 " " 1"=1 1/4 mi.

INTRODUCTION

Commencing April 9, 1973 a linecutting and reconnaissance Induced Polarization Survey program was conducted on the Babine Lake properties owned by and on behalf of Quintana Minerals Corporation.

The work was executed by Atled Exploration Management Ltd. under the general supervision of P. P. Nielsen, B.Sc., Geophysicist and was operated and field supervised by A. Scott, B.Sc., Geophysicist.

The purpose of the survey was to test for favourable rock-types, structures and sulphide mineralization on a broad reconnaissance scale using wide electrode separations and high-powered instrumentation over roads, trails, frozen lake shores and cut-lines.

A total of 25.4 line-miles of Induced Polarization Survey was carried out using the three-electrode array with an electrode separation of 1,000 feet.

5.3 line-miles of grid lines were installed on the west side of Hatchery arm and 2.65 miles of trails and roads were brushed out and the stations chained and flagged.

The survey was concluded May 2, 1973.

LOCATION AND ACCESS

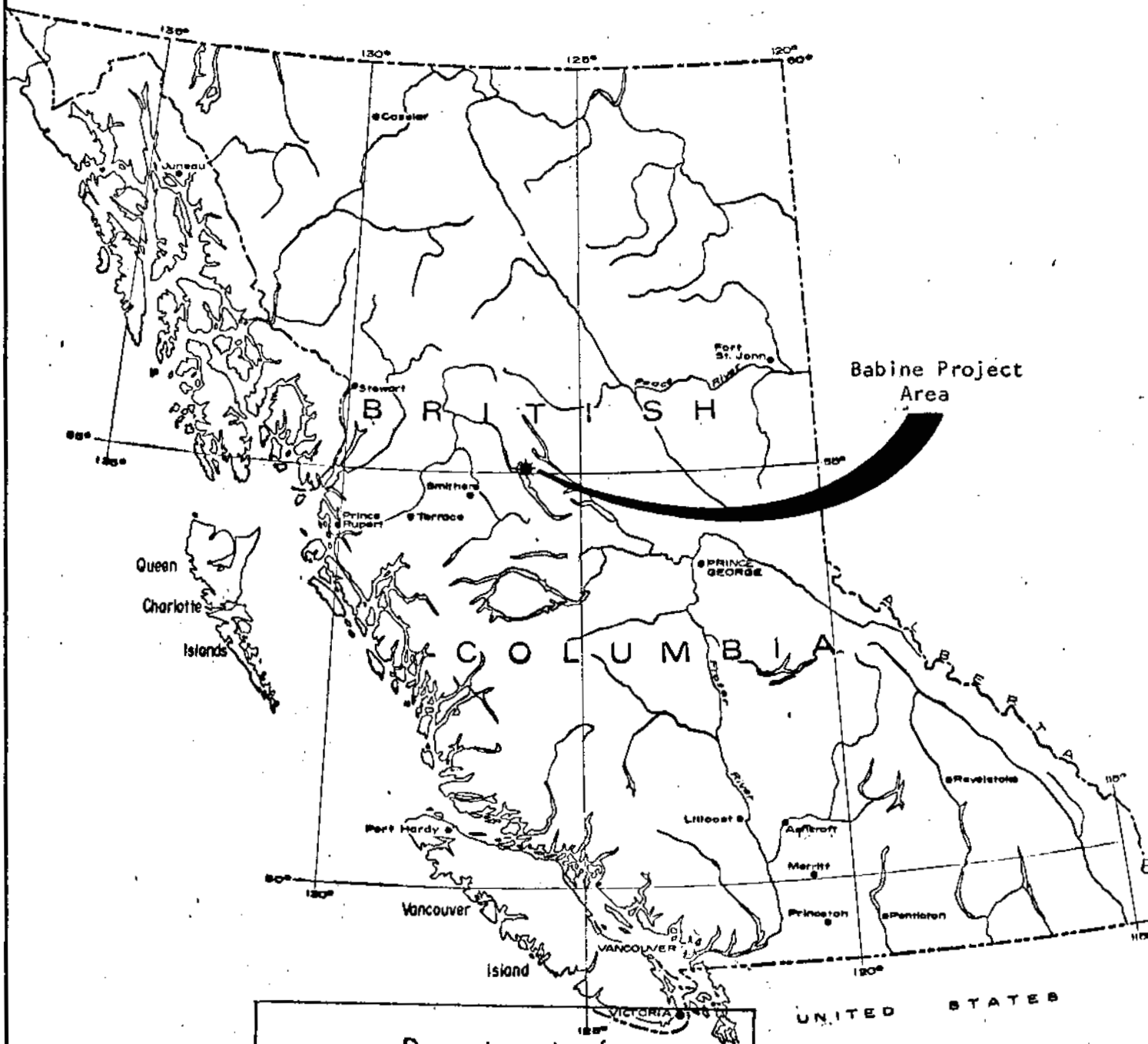
The survey area is on the east side of Babine Lake which is about 35 airmiles northeast of Smithers, B. C.

The first half of the survey was conducted on Hatchery Arm, north of the Bell Copper mine at Newman Penninsula and is approximately 10 miles north of the north end of the Granisle-Topley road. The other area is at Hawthorn Bay which is immediately east of the Granisle Copper Mine on McDonald Island and is six miles east of the Granisle townsite.

Access is good by way of an all winter gravel road from Highway #16 at Topley to Granisle some 34 miles north. A private road is then taken 8 miles further north along the west shore of Babine Lake to the Bell Copper ferry landing.

The remainder of the distance is covered by skidoo, lake-boat, floatplane, ski-plane or helicopter depending upon the season and freight requirements.

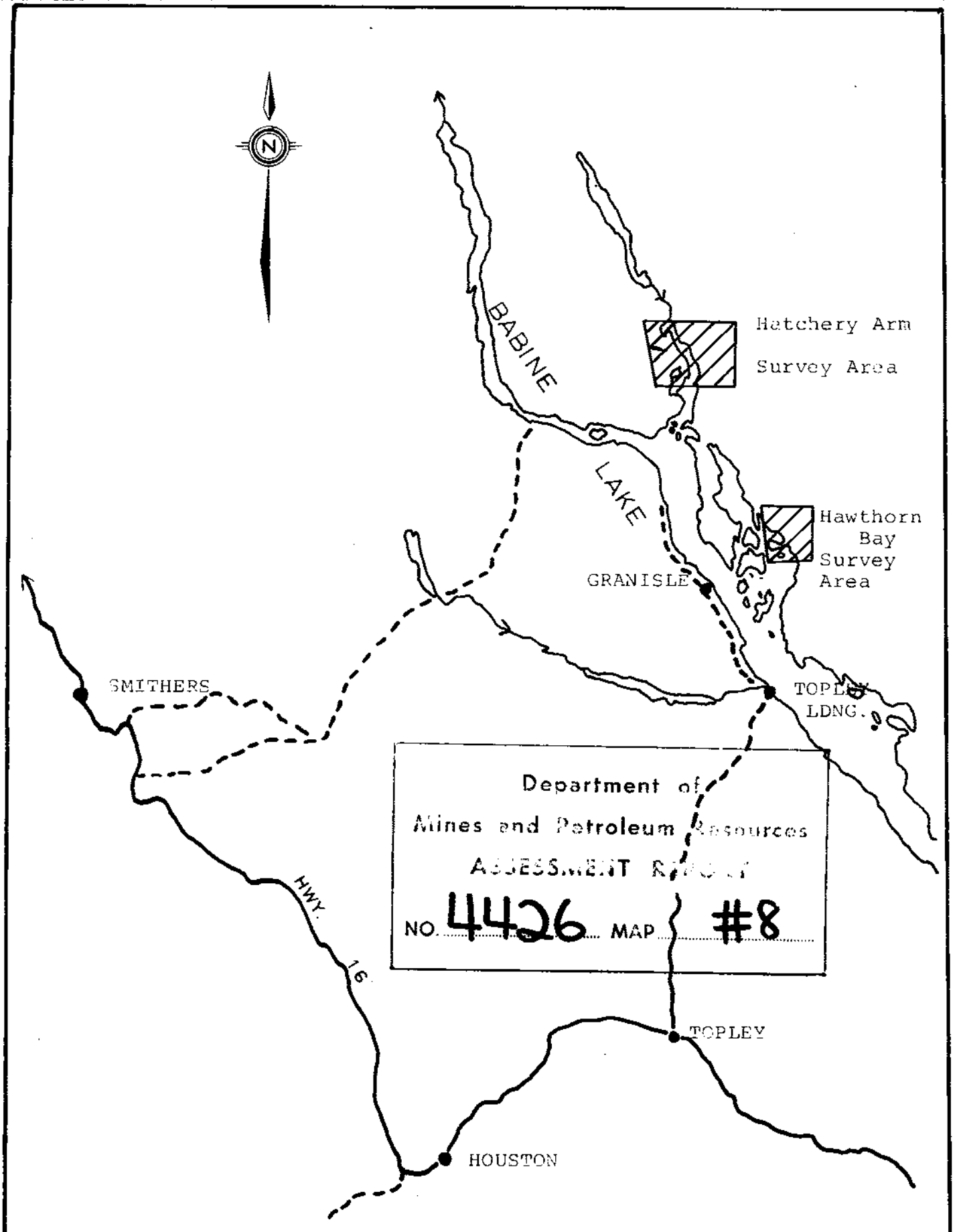
Due to the poor ice-conditions at the time of this survey, local access was restricted to skidoos and helicopter.



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4426 MAP #7

QUINTANA MINERALS CORPORATION LTD.

LOCATION MAP



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4426 MAP #8

QUINTANA MINERALS CORPORATION LTD.

BABINE PROJECT AREA

LOCATION MAP

Scale: 1" = 1 1/4 Mi.

CLAIMS

The I.P. Survey and linecutting program was carried out over areas occupied by the following mineral claims owned by Quintana Minerals Corporation.

CLAIM NAME	*RECORD NUMBER*
1. Hatchery Arm	
TONJA 4,6,33,34,52 and 102	111647,111649,111658,111659,111677 and 111727 respectively.
TONJA 23 - 26 and 27 - 31	112582 - 112585 and 111652 - 111656
TONJA 57 - 59 and 75 - 80	111682 - 111684 and 111700 - 111705
IDC 1 - 6	111400 - 111405
NDI 1 - 11	111388 - 111398
NED 1 - 5	111388 - 111392
NED 41 - 46	112079 - 112084
BAB 61,62,141 and 142	106803,106804,112075 and 112076,106843 and 112076
BAB 101 - 110	106843 - 106852
2. Hawthorn Bay	
R 18 - 22	109210 - 109214
R 114 - 136	109306 - 109328
R 188 - 207	109380 - 109399
R 139, 141 and 210	109331, 109333 and 109402
RR 77 - 90	114721 - 114734
RR 102 - 106	114736 - 114740
RR 111 - 134	114745 - 114768
RR 211 Fr.	114844

PREVIOUS WORK

Portions of the two properties appear to have been staked and possibly worked on by various individuals and companies in the past.

Recent work by the present owners include prospecting, geology, and a reconnaissance gravity survey.

For further background on the area the reader is referred to the following literature.

(1) Annual Reports by Minister of Mines and Petroleum Resources of B. C.

(2) G.S.C. Geological Maps 93L and 93M (Scale 1" = 4 miles)

(3) G.S.C. Aeromagnetic Series (Scale 1" = 1 mile)

(4) Case Histories of the Bell Copper Mine and the Granisle Copper Mine.

GENERAL GEOLOGY

The Hatchery Arm claims cover a relatively flat area with very few bedrock exposures. Overburden could be up to 300 feet thick in places.

The property is believed to be underlain by a succession of interbedded sedimentary and volcanic rocks of the Hazelton group consisting of dense black argillites, light-to-grey banded argillaceous siltstones, andesites, tuffs, and breccias.

Quartz diorite stocks, dykes and sills are known to intrude these rocks at Old Fort Mountain and at Hearne Hill. Varying amounts of disseminated pyrite and chalcopyrite are associated with these rocks.

A prominent north-south lineament called the Hearne Fault is believed to be an important structural control. The copper deposits of Granisle, Newman and Morrison appear to occur along this trend and are possibly further controlled by NW and NE cross faulting.

The Hawthorne Bay property is just east of the Granisle copper deposit on McDonald Island. This area is almost totally covered by overburden resulting in little geological information. The geological setting is assumed to be similar to that discussed above. There is a reasonable likelihood that Granisle type intrusive rocks occur along a northeast trend from McDonald Island through the claim area.

LINECUTTING

The present program included the installation of a small grid consisting of 5.3 line miles of cross-lines and a baseline between the west shore of Hatchery Arm and a small un-named lake (see map in pocket).

The grid was established to test by I.P. a coincident aero-magnetic high anomaly and a reconnaissance gravity "high" thought to be the geophysical expression of an intrusive plug or stock.

Due to a lack of time and inaccessability as a result of extremely deteriorating lake ice conditions the I. P. investigation on this grid was deferred to some future time.

Lines were installed 400 feet apart with a station interval of 100 feet using the "topofil" chain method, blazing, brushing and flagging.

An additional 2.65 line miles of blazing, brushing and flagging was carried out along existing logging roads, trails and old baselines to assist in the efficient execution of the I. P. survey.

THE INDUCED POLARIZATION SURVEY

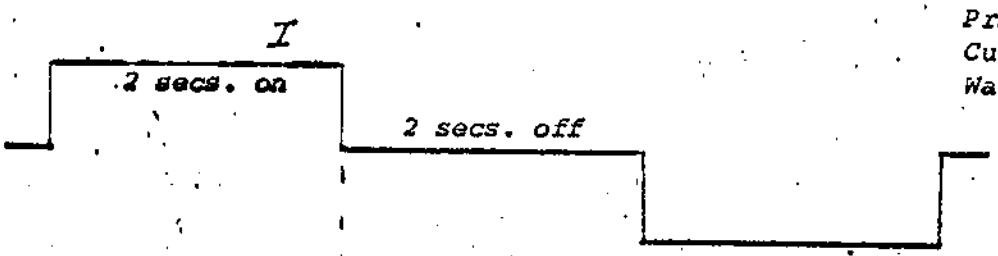
(a) Theory of Method Used

Induced Polarization refers to the polarized distribution of electrical charges throughout a medium to which an electric field has been applied.

When current is passed across an interface between an electrolyte and a metallic conducting body, double layers of charge build up at the interface creating the phenomenum known as "overvoltage" or the "I.P. effect".

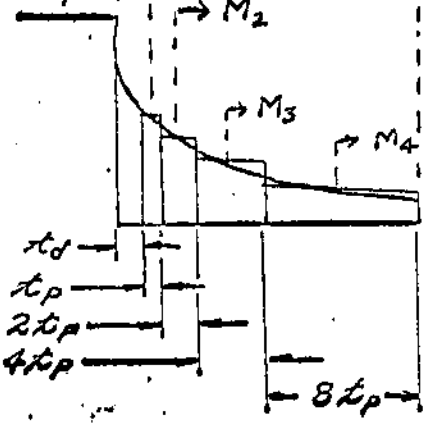
This effect can be used for the detection of conducting metallic material such as disseminated sulphides ("porphyry" copper deposits) or massive sulphides containing appreciable amounts of non-conducting sphalerite. Other materials likely to give rise to anomalous responses are pyrite, magnetite, specular hematite, graphite and certain clay-micas such as montmorillonite, vermiculite, saponite and bentonite.

In time-domain (Pulse) I.P., a transmitter injects an alternating square wave signal into the ground at two electrodes C_1 and C_2. The signal seen by the receiver at two other electrodes P_1 and P_2 provides an indication of the apparent chargeability (M_a). By observing the input current (I) and primary "on-time" voltage, (V_p) the apparent resistivity ρ_a is calculated using Ohm's Law and a geometric factor dependent upon the electrode array used and the units (ohm-meters or ohm-feet) desired.



Primary Current Waveform

$$M_1 = \sum_{1}^{N} \frac{\int_{t_d}^{(t_d+t_p)} V_s \, dt}{V_p t_p}$$



Transient Voltage Waveform

The polarization voltages established during the current "on" time decay (discharge) slowly during the current "off" time. The receiver amplifies and integrates the decay curve at four pre-selected positions in time, normalizes these amplitudes with respect to the primary voltage Vp and presents the results as M_1, M_2, M_3, and M_4 readings on digital display for logging.

The times at which the decay curve is sampled, are selected by means of a switch making it possible to obtain up to 56 distinct points on the decay curve.

This allows one to obtain the actual decay curve shape and to better estimate the size, depth and type of the causative source.

A further step which can be taken is to factor the decay curve to separate the unwanted electromagnetic transient coupling effects and background effects from the true overvoltage effects. This extends the usefulness of the I. P. method in areas of high overburden conductivity. It also assists the geophysicist in distinguishing between effects of metallic and nonmetallic conductive material, between oxides and sulphides, between large and fine-grained particules, and between massive and disseminated portions of a polarizable body.

(b) Theory of the 3-array Electrode Configuration

The I. P. response due to a particular distribution of polarizable material is dependent upon the electrode array employed, the geometry of the polarized body and its location relative to the array, and on the resistivity and polarization contrast between the body and surrounding environment.

The polarization voltages established during the current "on" time decay (discharge) slowly during the current "off" time. The receiver amplifies and integrates the decay curve at four pre-selected positions in time, normalizes these amplitudes with respect to the primary voltage Vp and presents the results as M_1, M_2, M_3, and M_4 readings on digital display for logging.

The times at which the decay curve is sampled, are selected by means of a switch making it possible to obtain up to 56 distinct points on the decay curve.

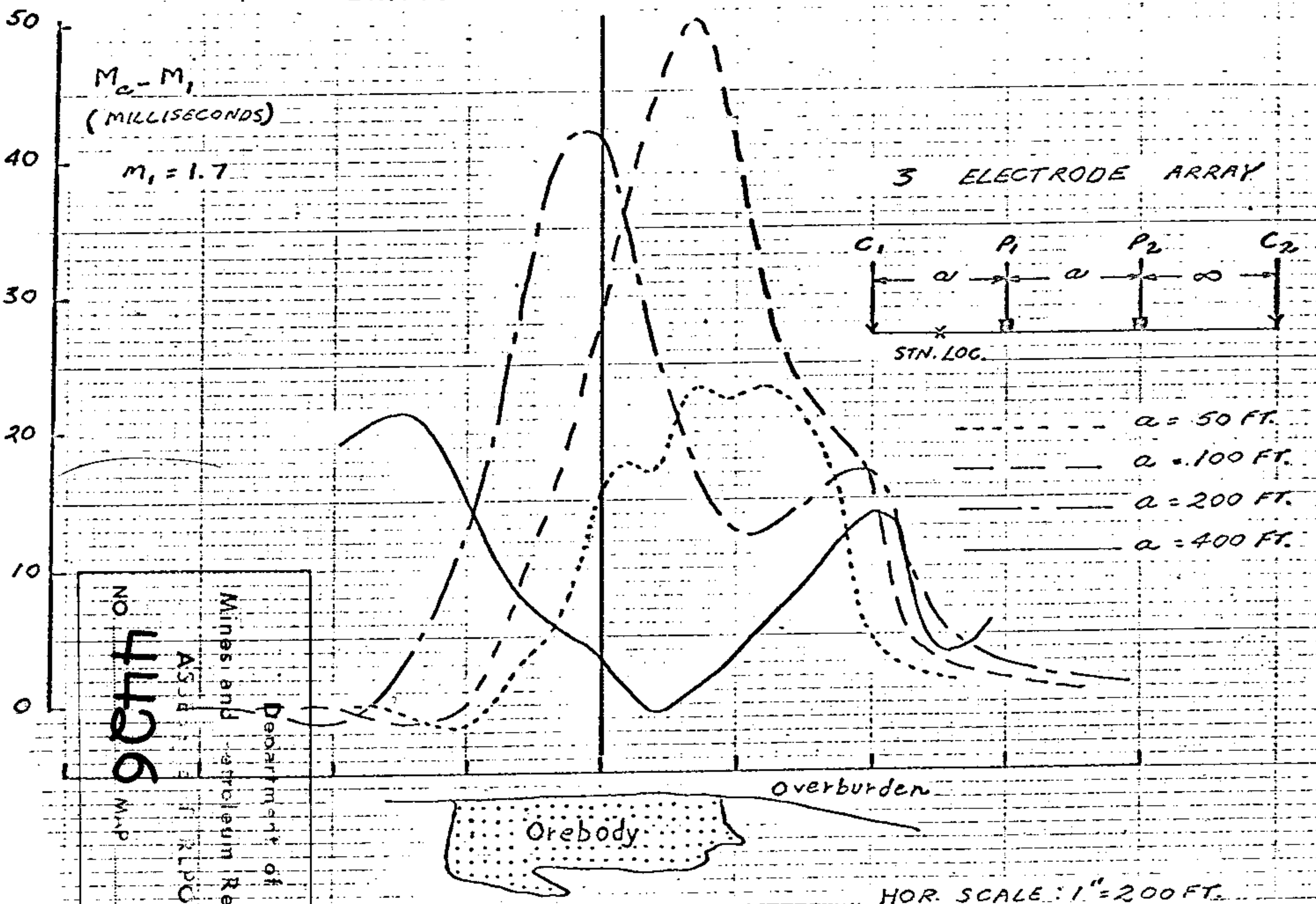
This allows one to obtain the actual decay curve shape and to better estimate the size, depth and type of the causative source.

A further step which can be taken is to factor the decay curve to separate the unwanted electromagnetic transient coupling effects and background effects from the true overvoltage effects. This extends the usefulness of the I. P. method in areas of high overburden conductivity. It also assists the geophysicist in distinguishing between effects of metallic and nonmetallic conductive material, between oxides and sulphides, between large and fine-grained particules, and between massive and disseminated portions of a polarizable body.

(b) Theory of the 3-array Electrode Configuration

The I. P. response due to a particular distribution of polarizable material is dependent upon the electrode array employed, the geometry of the polarized body and its location relative to the array, and on the resistivity and polarization contrast between the body and surrounding environment.

CHARGEABILITY PROFILE EXAMPLE



Although anomalies are asymmetrical and the anomaly peaks do not always fall directly over the center of the causative source, the advantages of the 3-array more than outweigh this one disadvantage This array requires only three men on the survey line, has good depth penetration, responds well to both flat-lying and steeply-dipping bodies and permits a minimum number of electrode spacings to be used during reconnaissance surveying resulting in faster coverage.

As mentioned above, contour maps of the data should be treated with caution and are used to enhance the interpretation made primarily from the profiles. An example of a typical multiple electrode spacing response over a sulphide lens is included to illustrate the asymmetrical nature of this array as well as to point out the phenomenum of "double-peaking" which occurs when the electrode spacing is larger than the depth to the center of the body. The larger peak occurs when the first potential electrode (P_1) is in the vicinity of the body.

The maximum anomaly is obtained for the spacing equal to the depth to the center of an idealized sphere, although spacings of 3/4 to 1 1/2 times the depth give at least 90% of the maximum likely anomaly.

The use of two or more spacings gives a more reliable estimate of depth, attitude and continuity with depth. An accurate estimate of resistivity and polarization of the body cannot be made since the variables of size, conductivity, and polarizability cannot be separated, hence the term "apparent" chargeability is used.

(c) Field Procedure

(i) Electrode Configuration Used

A 3-electrode array was used whereby the current electrode C_1 and two potential electrodes, P_1 and P_2, were separated by a distance "a" from each other and moved in unision along the survey lines taking measurements at regular intervals. The second current electrode C_2 is fixed at "infinity" (∞) which is a minimum distance of 5a to the nearest station measured.

The station location is halfway between the current electrode C_1 and the nearest potential electrode P_1. All lines were surveyed with C_1 lagging the potential electrodes as the three men moved along the survey lines.

(ii) Measurements Taken in the Field

1. The Primary voltage Vp between the measuring (potential) electrodes during "current on".
2. The current flowing through the current electrodes C_1 and C_2.
3. Four pre-selected gates called M factors (M_1, M_2, M_3 and M_4) using timing settings of:
   (a) delay time t_d = 240 msecs.
   (b) Basic integration time t_p = 60 msecs.
   (c) Total integration time t_t = 900 msecs.
   (d) Basic period t_c = 8 secs. (2 secs. On and 2 secs. Off).

(d) Equipment Description and Specifications

(i) Receiver

The Huntec MKIII Receiver is a portable, remote sensing pulse-type instrument incorporating the following features:

- Adjustable timing cycle.
- Up to 56 distinct sample points measured on the decay curve.
- Automatic S.P. buck-out.
- Direct digital read out of Vp and M factors including sign.
- High noise rejection allows operation in Vp levels down to 30 micro volts with 0.1 micro volt resolution.
- Greater than 10 megohm input impedance.

Specifications

- Sensitivity: Vp = 10^{-7} to 10^{-6} volts for low noise 1% resolution.
  Vp = 10^{-6} to 10 volts for 0.1% resolution.
  Total Range 30 X 10^{-6} volts to 10 volts in 11 ranges.
- Self Potential: MAXIMUM $\pm$ 1 volt.
- Power consumption: 0.7 ampere at 12 volts.
- Dimensions: 16" x 9" x 5 3/4".
- Weight: 12.5 lbs. (without battery pack).

(ii) Transmitter - Alternator

The Huntec Pulse type transmitter alternator is a high-powered, 7.5 Kilowatt system utilizing the following:

- Solid state power control and switching mechanism.
- Produces high currents into low resistance loads.
- Accurate and adjustable timing using Crystal Clock.
- Voltage regulator with push-button field energizer.
- Dummy Load.
- 2 cylinder ONAN engine driving a Bendix alternator.

Specifications

1. *Transmitter*

   - *Output: 100 to 3,250 volts in 10 steps*
     16 amps maximum.
   - *Cycling Rates: Normally 2 sec. ON, 2 sec. OFF.*
   - *Dimensions: 21 in. x 17 in. x 17 in.*
   - *Weight: 75 lbs.*

2. *Alternator*

   - *Output: 18 K.V.A. 120/208 volts 3 phase 400 Hz.*
     52 amps/phase.
   - *Engine: 2 cylinder, 4 cycle, air-cooled 16.5 H.P.*
     ONAN at 3,600 R.P.M.
   - *Alternator: 3,600 R.P.M. direct driven Bendix with sealed bearings and rotating field.*
   - *Dimensions: 42 in. x 17 in. x 26 in.*
   - *Weight: 225 lbs.*

DATA PRESENTATION

(a) Calculations

(i) The apparent resistivity ρ_a *is calculated by dividing Vp by I and multiplying by a factor appropriate to the electrode array used and the ohm-meter units desired.*

(ii) The four M factors were weighted and added to obtain a single apparent chargeability parameter (called M_a *) for contouring purposes.*

$$M_a \begin{matrix} t_f \\ t_d \end{matrix} = t_p\,(M_1 + 2M_2 + 4M_3 + 8M_4)\times .01$$

where M_a = *milliseconds*

t_d = *initial delay time*

t_f = *final time at end of* $M_4 = t_d + 15\ t_p$

t_p = *integrating time of* M_1

(b) Contours

All apparent resistivity and apparent chargeability values for electrode separations of 1,000 feet have been plotted on the values and contour maps at a horizontal scale of 1" = 2,000 feet.

The reader is cautioned as to the errors inherent within this type of data presentation which include:

1. Upslope displacement of readings over steep terrain.
2. Bias or contour elongation due to irregular sampling interval used.
3. "Double peaking" phenomenum in which causative source is located between "highs".
4. Some skewness of anomaly peaks due to assymetrical array used.
5. Topographic or terrain effects in resistivity data.

(c) Discussion of Results and Interpretation

General Comments

The survey parameters were chosen so that large volumes of bedrock chould be sampled over a large number of claims quickly before "break-up" to determine favourable areas for further detailed investigations using grid sampling techniques.

Due to the limitations of the technique whereby the various traverses might cross the corner or run parallel to and outside of a significant sulphide deposit and because of the integrating effects of small strong conductors over large volumes, it was appreciated that even sub-anomalous chargeability readings in the order of 8 to 10 milliseconds might merrit further investigation.

Although the rate of survey coverage was good, logistics problems did hinder progress to some extent. These included the necessity of changing the infinite electrode (C_2) location frequently, the positioning of iron rods to penetrate ground frost, loss of time "reeling in", and normal mechanical and access problems encountered using small snow-mobiles during break-up.

The I. P. results have been contoured to determine in a general way the areas requiring further I. P. detailed coverage and the higher chargeability contours crossing two or more survey lines are interpretive due to the coarse and irregular sampling intervals used.

Hatchery Arm Survey Area

The resistivity results indicate very low apparent resistivities along the lakeshore which are to be expected due to increased thicknesses of water soaked silty gravels.

The resistivity values are slightly higher along the west shore of Hatchery Arm.

The higher ρ_a's at the eastern end of Line T are believed to be due to a change in rock-type and perhaps partially due to a thinning of the overburden. A fault-contact is thought to be coincident with the 200 ohm. meter contour.

The chargeability results vary from a high of 10.6 milliseconds at Stn. A3 + 500 feet to a low of 0.9 milliseconds at Stn. R4 + 500 feet.

Background chargeability is about 5.0 msecs. and values over 8.0 msecs. are worthy of further investigations and are presently considered anomalous for reasons mentioned above.

Although the two hachered areas on the west shore are single line anomalies, each consists of two or more adjacent Ma's greater than 8 msecs. and could be the eastern extent of a large volume of conductive sulphides.

There is no significant correlation between the resistivity data and the higher chargeability values on the west shore although sub-anomalous Ma's do occur at or near the higher ρ_a values on Line T. A small percentage by volume sulphides could be present in this eastern area.

Hawthorn Bay Survey Area

The resistivity results vary from 1369 ohm. meters at 500 feet west of Stn C1 to 22 ohm meters at Stn. F3 + 500 feet for a total relief of 1347 ohm meters.

Due to the closer but still irregular sampling intervals in this area, a clearer picture exists as to the geological trends. The resistivity contours indicate a northeasterly striking structure and/or contact approximately along the 400 ohm meter contour. Although the three traverses are sub-parallel to these contours it appears that the survey area is transected by a northeast fault zone.

The higher chargeability values southeast of the 300 ohm meter contour suggests that these areas are underlain by a sulphide bearing rock-type different from those to the northwest.

The northeast resistivity trend correlates well with the G.S.C. Aeromagnetic Sheet 93L and high resistivity values appear to coincide with higher chargeability values in this area.

The Chargeability map illustrates two areas above 8 msecs. The narrow northwest trending feature barely qualifies as anomalous and probably is caused by a mineralized fault or dike covered by in excess of 200 feet of overburden.

The higher Ma's at the eastern end of Line B and crossing Line C are of definite interest. This feature could continue and widen to the north and south. An aeromagnetic "high" to the north could be related to sulphide bearing intrusive rocks of economic importance.

CONCLUSIONS AND RECOMMENDATIONS

1. Hatchery Arm

Although a large area east of the arm between Line C and Line T was not tested by the I. P. survey it is felt that further investigation should presently be confined to the west side of the lake and possibly in the area surrounding the east end of Line T.

These two areas should be further investigated using cut grid lines and detailed I. P. techniques.

The small grid on the west shore should be extended north to cover the northern Ma anomaly and west to cover the coincident aeromagnetic and gravity highs believed to be caused by an intrusive stock.

The western grid layout and low ground resistivities will make it possible to use the gradient array and it is hereby recommended using an "a" spacing of 200 feet for the initial coverage. Depth sounding should be carried out over selected high Ma areas to locate drill targets.

2. Hawthorn Bay

Two grids are recommended in this area as a result of the present I. P. coverage.

The first should cover the narrow Ma feature near the lake shore. Lines should be installed on a northeast bearing from the lake shore and be 4,000 feet long. Station intervals of 100 feet and line spacings of 400 feet should be used. A gradient array I. P. survey can be carried out on this grid.

The second grid should be installed centered on the Ma anomaly at the east end of Line B with similar grid specifications except that the bearing of the lines should be normal to the interpreted northeasterly geological strike.

Access problems might prevent the use of the gradient array in this area. If so, the three array or pole-dipole array is recommended with two "a" separations being used. The wider separation should be capable of testing a depth of 600 feet.

It might be advisable to extend every third line for further reconnaissance coverage using 1,000 foot electrode separations during this proposed program.

Respectfully submitted,
ATLED EXPLORATION MANAGEMENT LTD.

P. P. Nielsen

P. P. Nielsen, B.Sc., Geophysicist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. C. GUTRATH

G. C. Gutrath, B.Sc., P.Eng., Geologist

APPENDICES

STATEMENT OF AUTHOR'S QUALIFICATIONS

I DO HEREBY STATE THAT:

1. I am the author of this report.

2. I have been actively and responsibly involved in mining exploration using airborne, ground and computer applied geophysics in Western Canada and the United States for the past seven years.

3. I graduated with a B.Sc., degree in Geophysics from the University of British Columbia in 1969.

4. I am presently Manager, Geophysical Division, Atled Exploration Management LTD., at #420 - 475 Howe Street, Vancouver, B. C.

5. I am a member of the Society of Exploration Geophysicists, the Canadian Institute of Mining and Metallurgy and the B. C. Geophysical Society.

Signed P.P.Nielsen

P.P.Nielsen

Date May 25/73

ENGINEER'S CERTIFICATE

I, GORDON C. GUTRATH, of 3636 Lakedale Avenue, in the Municipality of Burnaby, in the Province of British Columbia, DO HEREBY CERTIFY:-

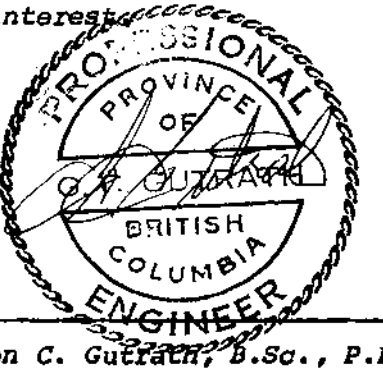
1. *That I am a consulting geologist with a business address of #420-475 Howe Street, Vancouver 1, B. C.*

2. *That I am a graduate of the University of British Columbia where I obtained my B.Sc., in geological science in 1960.*

3. *That I am a registered Professional Engineer in the Geological Section of the Association of Professional Engineers in the Province of British Columbia.*

4. *That I have practised my profession as a geologist for the past twelve years, and*

5. *That I have no interest in the property with which this report is concerned, nor do I expect to receive any such interest.*



Gordon C. Gutrath, B.Sc., P.Eng.

DATED at the City of Vancouver, Province of British Columbia, this 25 day of May, 1973.

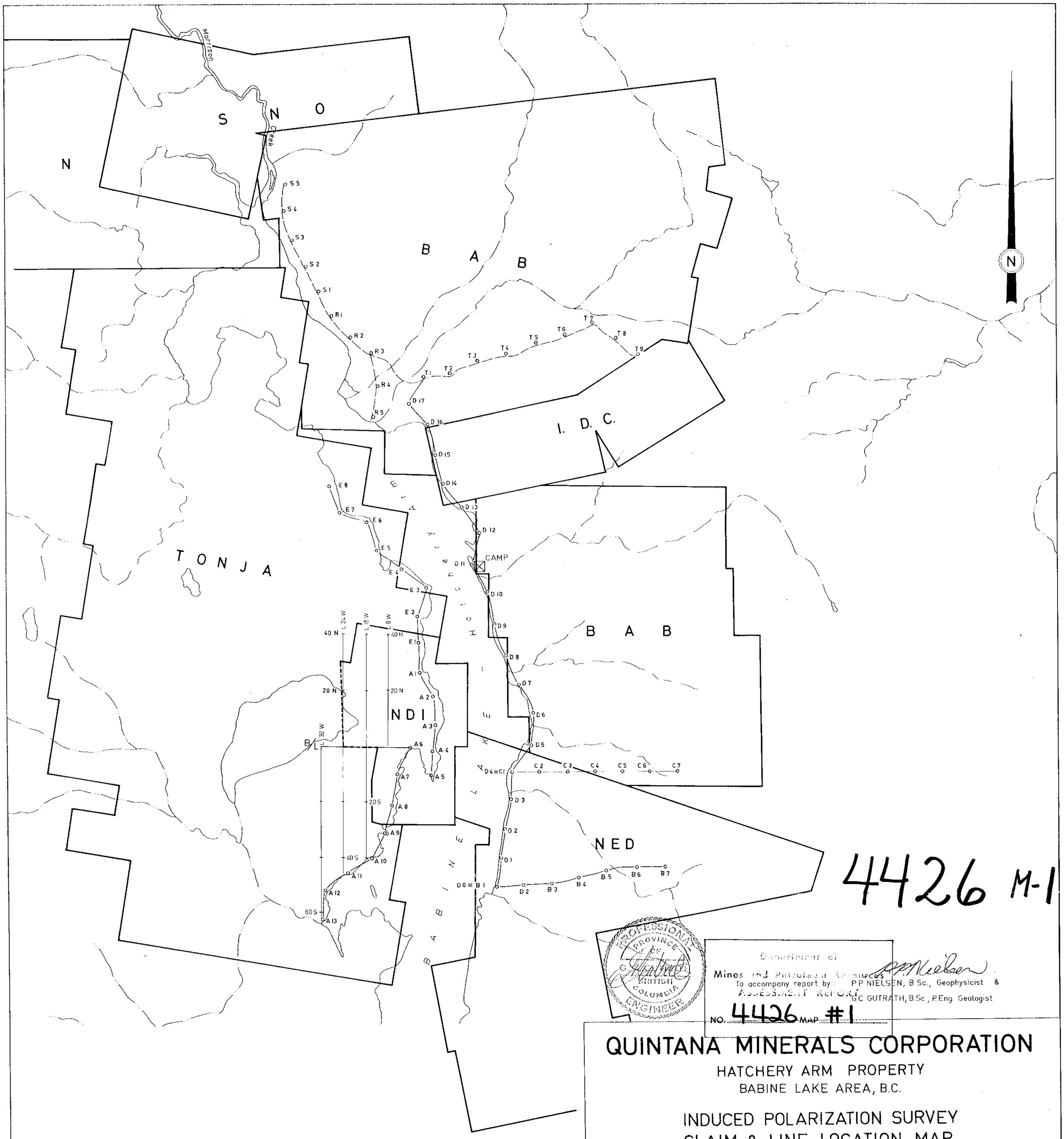
PERSONNEL

P. P. Nielsen - *Geophysicist - Supervisor*

A. Scott - *Geophysicist - I. P. operator*

R. Klanjscek)
G. Baker) - *I. P. crewmen, linecutters*
W. Clarke)

L. Mamosar - *Rod pounder, mechanic, expediter and linecutter.*



4426 M-1

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4426 MAP #1

To accompany report by: P.P. NIELSEN, B.Sc., Geophysicist &
G.C. GUTRATH, B.Sc., P.Eng. Geologist

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

QUINTANA MINERALS CORPORATION

HATCHERY ARM PROPERTY

BABINE LAKE AREA, B.C.

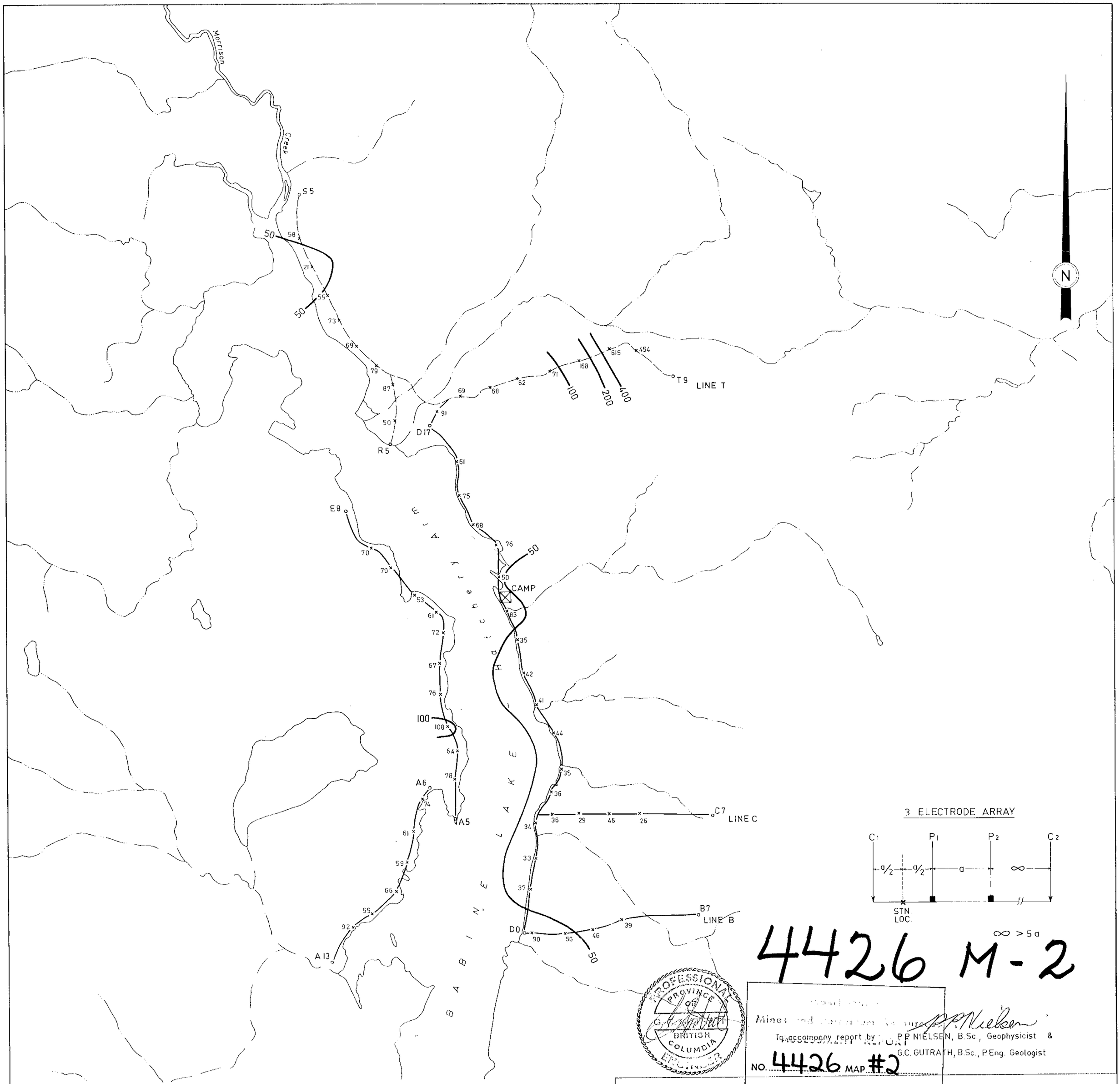
INDUCED POLARIZATION SURVEY
CLAIM & LINE LOCATION MAP

OMENICA M.D. N.T.S. 93 M/1

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

2000 1000 0 2000 4000
Scale in feet

DATE: MAY, 1973 DRAWN BY: NCL



SURVEY PARAMETERS

INSTRUMENT USED

HUNTEC MK III R_X
with 7.5 KW. POWER SOURCE

SPECIFICATIONS

Transmitter Timing:	2 secs. ON & 2 secs. OFF
Receiver Delay Time:	240 msecs.
Total Integrating Time:	900 msecs.
Electrode Separation "a"	= 1000 feet
Station Interval	= 1000 feet

LEGEND

A1 — Electrode stn.

— Reading stn.

— I.P. Traverse Location

Resistivity Values (ρa) in ohm meters.

Contour Interval — logarithmic
(μ. 50, 100, 200, 400 ohm meters)

3 ELECTRODE ARRAY

∞ > 5a

4426 M-2

Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 4426 MAP #2

To accompany report by: P.P. NIELSEN, B.Sc., Geophysicist &
G.C. GUTRATH, B.Sc., P.Eng. Geologist

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA

QUINTANA MINERALS CORPORATION

HATCHERY ARM PROPERTY

BABINE LAKE AREA, B.C.

INDUCED POLARIZATION SURVEY
APPARENT RESISTIVITY

OMENICA M.D. NTS 93 M/1

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

2000 1000 0 2000 4000
Scale in feet

DATE: MAY, 1973.

DRAWN BY:

Morrison Creek

Hatchery Arm

LAKE

BABINE

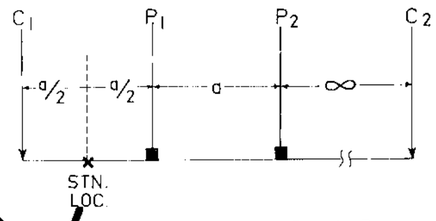
S5 2.9 4.8 3.6 3.7 2.2 2.3 2.3 0.9 R5 3.0 2.8 3.8 3.8 1.4 CAMP 3.2 3.2 3.4 2.2 5.2 4.4 3.8 C7 5.1 1.3 4.3 1.6 3.4 1.6 2.8 B7 1.6 1.9 5.4 5.0 D0

T9 4.7 7.8 4.4 6.5 2.6 1.5 1.2 1.4 D17

E8 8 9.2 8.5 8.9 8 5.7 4.9 4.2 5.8 7.0 8 9.5 10.6 8 A6 2.3 3.7 2.6 1.9 3.9 4.8 A13 A5

N

3 ELECTRODE ARRAY



4426 M-3

Department of Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 4426 MAP #3

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA G. C. GUTRATH

SURVEY PARAMETERS

INSTRUMENT USED

HUNTEC MK III R_x
with 7.5 KW. POWER SOURCE

SPECIFICATIONS

Transmitter Timing:	2 secs. ON & 2 secs. OFF
Receiver Delay Time:	240 msecs.
Total Integrating Time:	900 msecs.
Electrode Separation "a"	= 1000 feet
Station Interval	= 1000 feet

LEGEND

8 — Probable areas above 8 secs. Ma

A_1 — Electrode stn.

Reading stn.

I.P. Traverse Location

Chargeability Values (Ma) in mseconds

To accompany report by P.R. NIELSEN, B.Sc., Geophysicist & G.C. GUTRATH, B.Sc., P.Eng. Geologist

QUINTANA MINERALS CORPORATION

HATCHERY ARM PROPERTY

BABINE LAKE AREA, B.C.

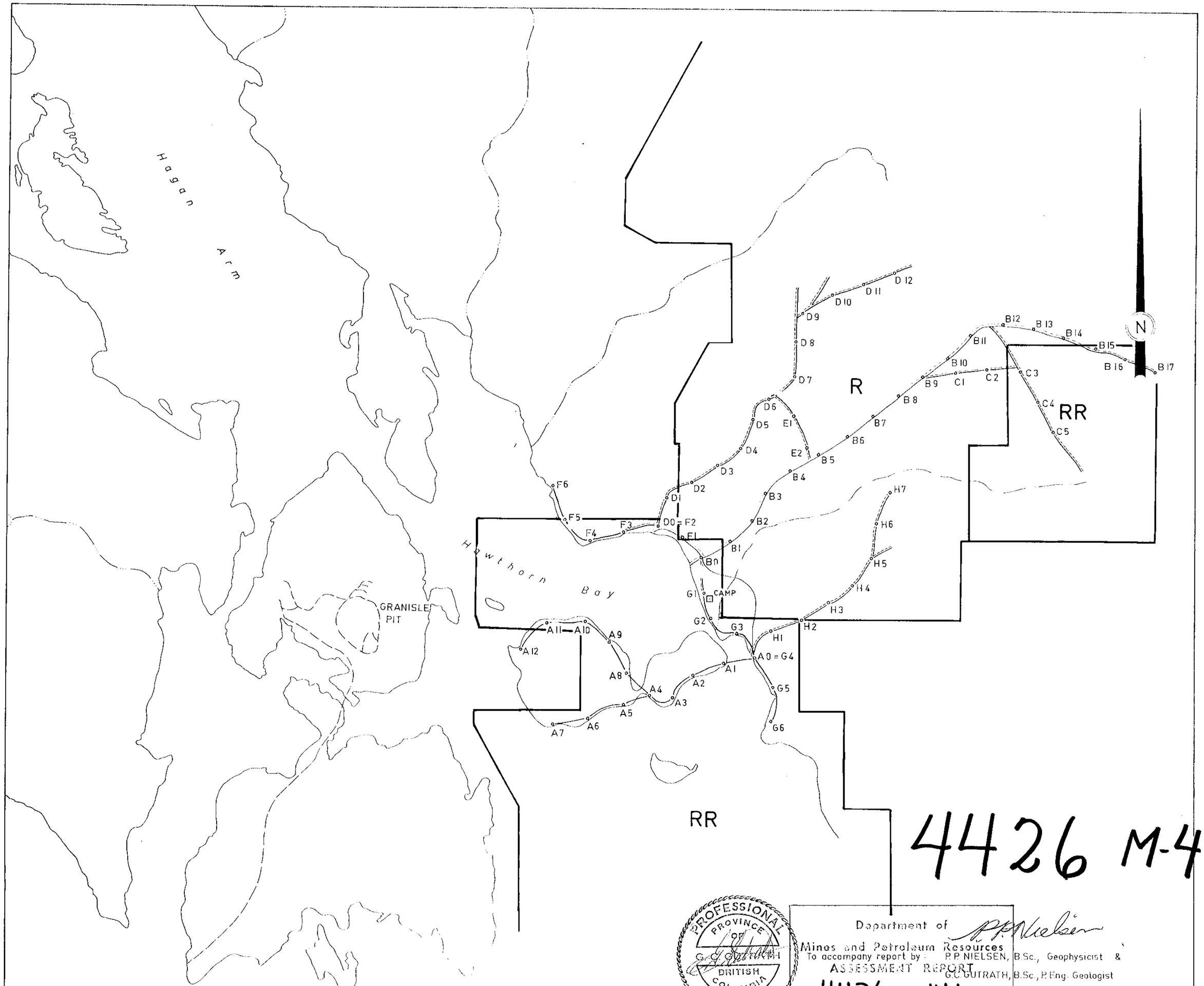
INDUCED POLARIZATION SURVEY
APPARENT CHARGEABILITY

OMENICA M.D. N.T.S. 93 M/1

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

2000 1000 0 2000 4000
Scale in feet

DATE: MAY, 1973. DRAWN BY: NCL



4426 M-4

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

Department of Mines and Petroleum Resources

To accompany report by: P.P. NIELSEN, B.Sc., Geophysicist & G.C. GUTRATH, B.Sc., P.Eng. Geologist

ASSESSMENT REPORT NO. 4426 #4

QUINTANA MINERALS CORPORATION

HAWTHORN BAY PROPERTY
BABINE LAKE AREA, B.C.

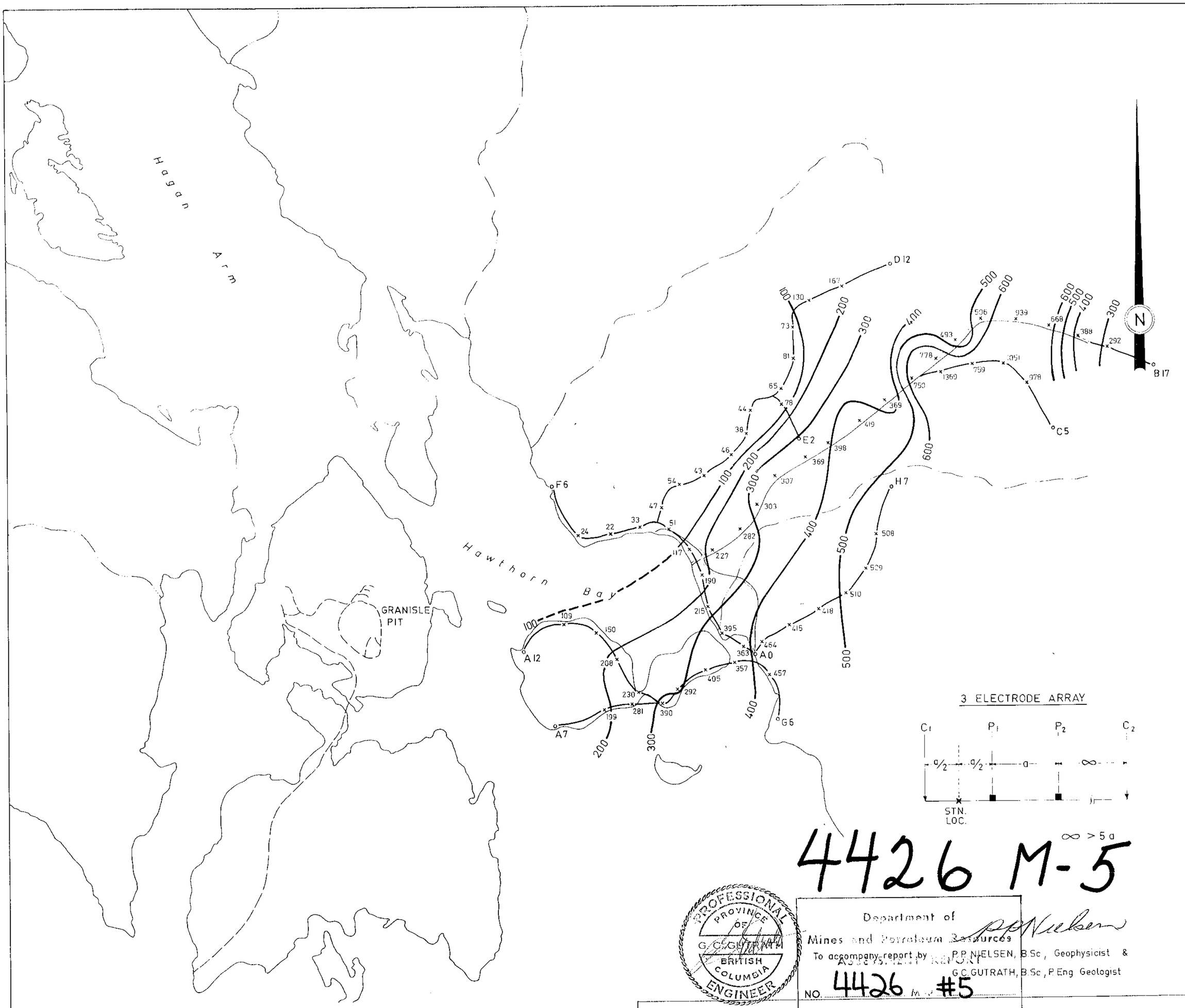
INDUCED POLARIZATION SURVEY
CLAIM & LINE LOCATION MAP

OMENICA M.D. N.T.S. 93 L / 16

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

2000 1000 0 2000 4000
Scale in feet

DATE MAY, 1973 DRAWN BY NCL



4426 M-5

SURVEY PARAMETERS

INSTRUMENT USED

HUNTEC MK III R_x
with 7.5 KW. POWER SOURCE

SPECIFICATIONS

Transmitter Timing:	2 secs. ON & 2 secs. OFF
Receiver Delay Time:	240 msecs.
Total Integrating Time:	900 msecs.
Electrode Separation "a"	= 1000 feet
Station Interval	= 1000 feet

LEGEND

o A1 — Electrode stn.

x — Reading stn.

— — I.P Traverse Location

Resistivity Values (ρa) in ohm meters.

Contour Interval — 100 ohm meters

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — G. C. GUTRATH

Department of Mines and Petroleum Resources

ASSESSMENT REPORT NO. 4426 MAP #5

To accompany report by P.P. NIELSEN, B.Sc, Geophysicist &
G.C. GUTRATH, B.Sc, P.Eng Geologist

QUINTANA MINERALS CORPORATION

HAWTHORN BAY PROPERTY
BABINE LAKE AREA, B.C.

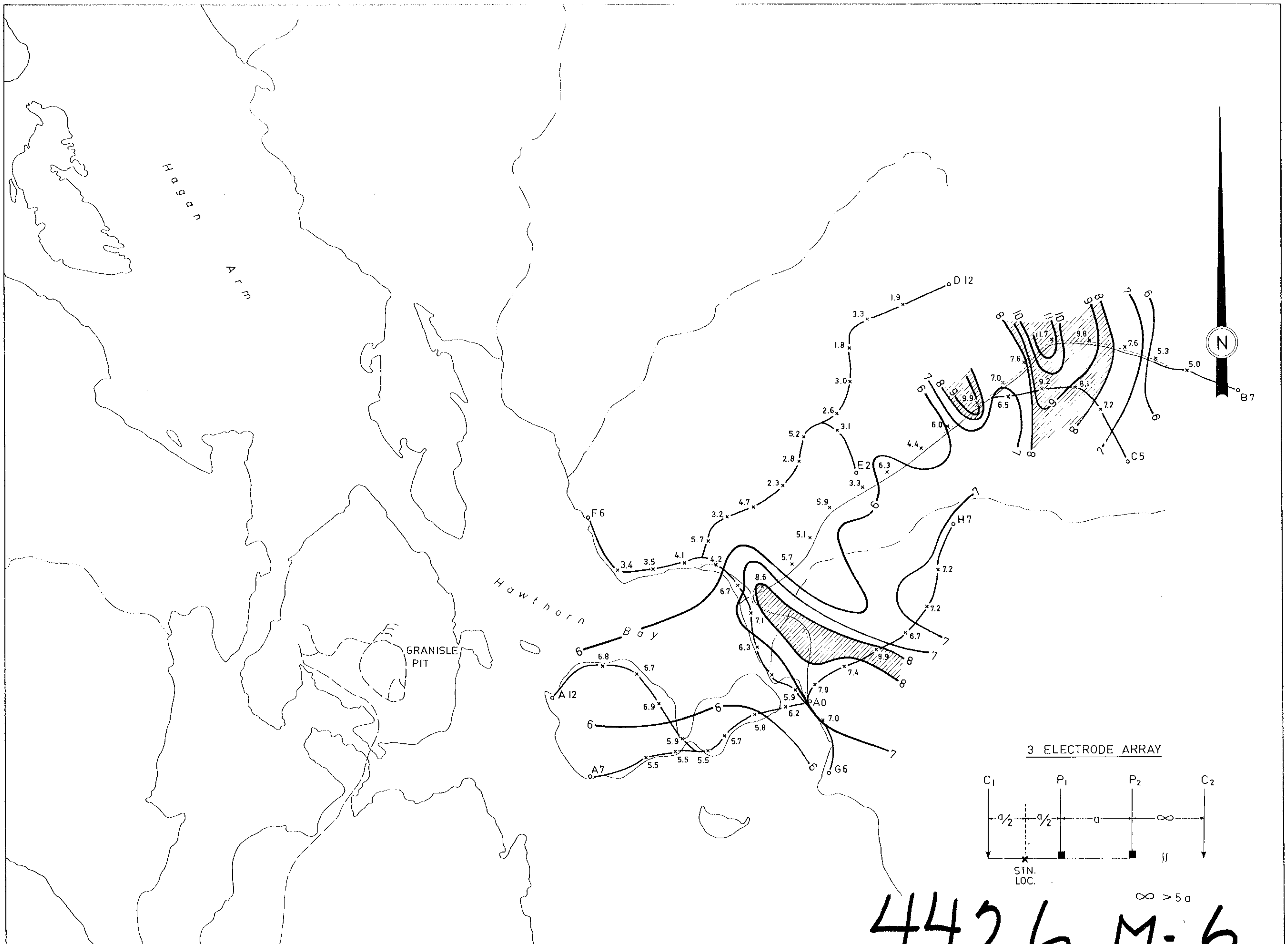
INDUCED POLARIZATION SURVEY
APPARENT RESISTIVITY

OMENICA M.D. — N.T.S. 93 L / 16

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

2000 1000 0 2000 4000
Scale in feet

DATE: MAY, 1973 — DRAWN BY: NCL



4426 M-6

To accompany report by P. P. NIELSEN, B.Sc., Geophysicist & G. C. GUTRATH, B.Sc., P.Eng. Geologist

QUINTANA MINERALS CORPORATION

HAWTHORN BAY PROPERTY
BABINE LAKE AREA, B.C.

INDUCED POLARIZATION SURVEY
APPARENT CHARGEABILITY

OMENICA M.D. N.T.S. 93 L / 16

ATLED EXPLORATION MANAGEMENT LTD.
VANCOUVER, B.C.

Scale in feet: 2000 1000 0 2000 4000

DATE: MAY, 1973. DRAWN BY: N.G.

SURVEY PARAMETERS

INSTRUMENT USED
HUNTEC MK III R_x
with 7.5 KW. POWER SOURCE

SPECIFICATIONS
Transmitter Timing: 2 secs. ON & 2 secs. OFF
Receiver Delay Time: 240 msecs.
Total Integrating Time: 900 msecs.
Electrode Separation "a" = 1000 feet
Station Interval = 1000 feet

LEGEND

Probable areas above 8 secs. Ma
o A1 — Electrode stn.
x — Reading stn.
— I.P. Traverse Location

Chargeability Values (Ma) in mseconds