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Quantec Geoscience Inc.

Geophysical Survey Interpretation Report

2.21427

Quantec

Regarding the
FIXED LOOP TRANSIENT ELECTROMAGNETIC
and TOTAL FIELD MAGNETIC SURVEYS
over the HUTT 12 PROJECT,
HUTT Twp., ON,
on behalf of
FALCONBRIDGE LTD.,
Timmins, ON

RECEIVED
MAY 22 2001
GEOSCIENCE ASSESSMENT OFFICE

QGI QGI QGI QGI QGI

DEastcott
DMacGillivray
JMLegault
November, 2000
Project QG-131

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES AND FIGURES

1. INTRODUCTION

- **QGI Project No:** QG-131
- **Project Name:** Hutt 12 Project
- **Survey Period:** October 16th to October 21st 2000
- **Survey Types:** Fixed In-Loop Transient EM, Total Magnetic Field
- **Client:** FALCONBRIDGE LTD.
- **Client Address** P.O Box 1140, Kidd Creek Minesite
  Timmins, ON, Canada
  P4N 7H9
- **Representatives:** Dean Rogers
  Sharon Taylor
- **Objectives:**

  a) Using surface TEM, to detect deeply buried conductors relating to massive sulphides from surface to 250-350m depths. The Off-Loop profiling configuration was chosen based on its line-km efficiency and its ability to optimally energize targets which are generally subvertical to steeply dipping.

  b) Using ground magnetics to map lithology and structure, and to characterize possible TEM conductive responses.

- **Report Type:** Summary interpretation, suitable for assessment

2. GENERAL SURVEY DETAILS

2.1 LOCATION

- **Township:** Hutt Twp.
- **Province:** Ontario
- **Country:** Canada
- **Nearest Settlement:** Town of Matachewan (40km east)
- **NTS Map Reference #:** 42 A/3

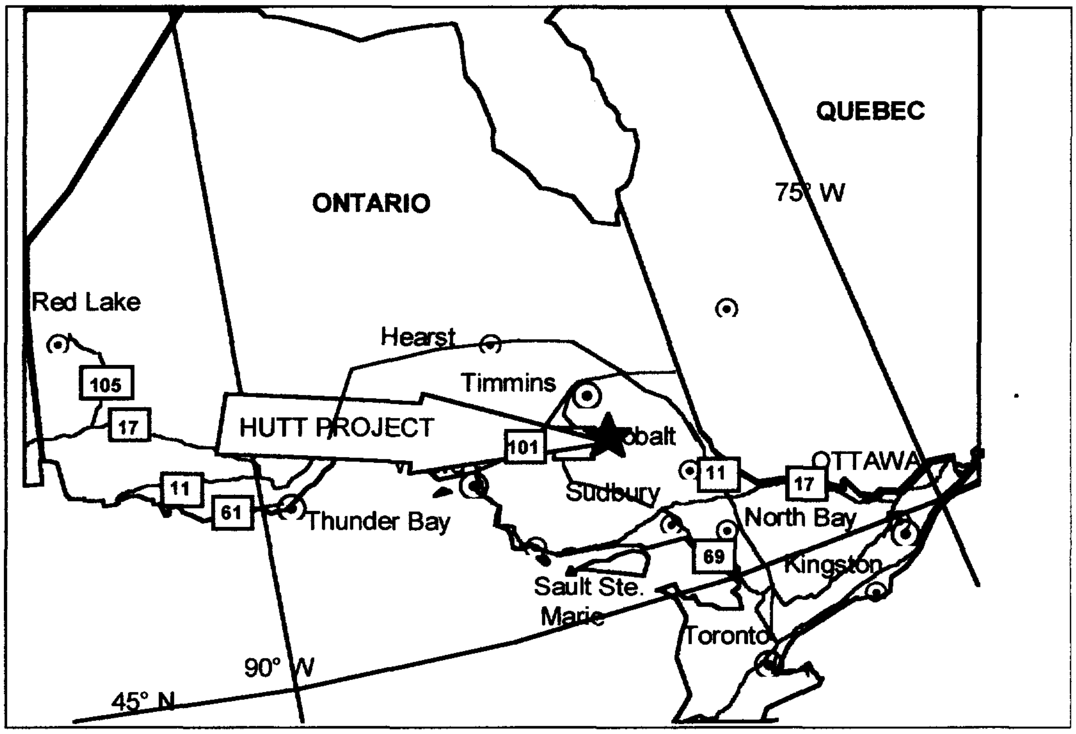


Figure 1: General Location of the Hutt Project.

2.2 ACCESS

- **Base of Operations:** Saw Mill Café, Semple Twp., ON
- **Mode of Access:** 4x4 Truck
- **Property Access:** Approx. 7km east from the base of operations to hydro lines, then south approximately 7.5km.

2.3 SURVEY GRIDS

- **Coordinate Reference System:** Local exploration grid
- **UTM Reference:** Grid 0E/0N = 485,658mE / 5,310,135mN (Line Direction ϕ = N-15.3degW)
- **Established:** prior to survey execution, by client
- **Line Direction** Approx. 344.5 degrees East (Astronomic)
- **Line Separation:** 100 metres
- **Station Interval:** 20 metres-TEM, 10 metres-TFM
- **Method of Chaining:** Metric, slope distance

2.4 SURVEY CLAIMS

- **Claims Covered by Survey[1]** 1227824 1227825 1236371 1236372

[1] Claim numbers and UTM reference from digital DWG basemap (Hutt_Top.DWG), provided by Falconbridge (09/00).

3. SURVEY WORK UNDERTAKEN

3.1 GENERALITIES

- **Survey Dates:** October 16th to October 21st 2000
- **Survey Period:** 6 days
- **Survey Days (read time):** 3 days
- **Survey Coverage:** TEM =3.58 Line-kilometers
  TFM =11.4 Line-kilometers

3.2 PERSONNEL

- **Project Manager:** David MacGillivray, Porcupine, ON
- **Technicians** Denis Pressault, Notre Dame du Nord, QB

3.3 SURVEY SPECIFICATIONS

3.3.1 TEM Survey

- **Configuration:** Off-loop profiling
- **Output Power Stage:** Low Power
- **Dimension:** 3 Component (X,Y and Z)
- **Loop Size and Location:** 600 x 800 metres, 14+00E-22+00E & 0+00S-6+00S
- **Line Interval:** 100 metres
- **Sampling Interval:** 20 metres

3.3.2 Magnetic Survey

- **Method:** Base Station, Diurnal Drift Corrected
- **Configuration:** Total Magnetic Field profiling
- **Line Interval:** 100 metres
- **Sampling Interval:** 10.0 metres
- **Magnetic Datum:** approx. 56,000nT
- **Base Station Location:** 13+50E, 7+00S
- **Base Station Sampling:** 10 seconds

3.4 Survey Coverage

Loop	LINE	SOUTHERN EXTENT	NORTHERN EXTENT	TOTAL (m)
1	14+00E	15+00S	6+00S	900
1	15+00E	15+00S	5+00S	1000
1	16+00E	15+00S	8+20S	680
1	17+00E	15+00S	5+00S	1000
			Total	**3580**

Table I: Fixed Loop TEM Survey Coverage.

LINE	SOUTHERN EXTENT	NORTHERN EXTENT	TOTAL (m)
14+00E	5+00S	15+00S	1000
15+00E	5+00S	15+00S	1000
16+00E	5+00S	15+00S	1000
17+00E	5+00S	15+00S	1000
18+00E	5+00S	15+00S	1000
19+00E	5+00S	15+00S	1000
20+00E	5+00S	15+00S	1000
21+00E	5+00S	15+00S	1000
22+00E	5+00S	15+00S	1000
TIE-LINES			
15+00S	14+00E	22+00E	800
10+00S	14+00E	22+00E	800
5+00S	14+00E	22+00E	800
		Total	**11400**

Table II: Ground TFM Survey Coverage.

3.5 Instrumentation

3.5.1 TEM Survey

- **Receiver:** Geonics Digital Protem + 3D-3 coil (200 m^2 effective area)
- **Transmitter:** Geonics EM-37(2.8 kW output)
- **Power Supply:** Geonics EM-37

3.5.2 Magnetic Survey

- **Magnetometers:** Scintrex-EDA model OMNI IV proton-precession (Base and mobile)

3.6 Parameters

Pulse repetition frequency:	30Hz
Gain: (x,y,z)	1 to 5
Integration time:	15sec
Approximate Loop Sizes:	600mx800m,
Current:	15.5 Amps,
Turn-off times:	378 μs
Gate positions	80-6136us (see Appendix D)
Synchronization mode:	Crystal

Table II: System Parameters for TEM Survey

- **Coil Conventions:** (see Appendix C)

COMPONENT	COIL ORIENTATION
Z	Positive Up (Vertical)
X	Positive North and Horizontal
Y	Positive West (left) and Horizontal, according to right hand rule

Table III: Coil Conventions for TEM Survey.

- **Measured Parameters:** dB_{XYZ}/dt (millivolts)
- **Data Reduction**[2]**:** nanoVolts/Ampere-metre^2 (using Geonics DATEM™ software)

3.7 Measurement Accuracy and Repeatability

3.7.1 TEM Survey

- **Number of Repeats per Station:** 0-4
- **Number of Repeats per Day:** approx. 15
- **Number of Repeats per Grid:** approx.15
- **Average Repeatability:** 0-5% in early channels
- **Worst Repeatability:** 6%

3.7.1 Magnetic Survey

- **Number of Repeats per Station:** 0 to 5
- **Number of Repeats per Day:** 5 to 30
- **Number of Repeats per Grid:** 20 to 30

[2] Equivalent to Crone units of nanoTesla/second normalized to a unit current.

- **Average Repeatability:** ± 4 nT (low-mod gradients)
- **Worst Repeatability:** ± 150 nT (high gradients)

3.8 Data Presentation

3.8.1 TEM Survey

- **Plan maps:** 1) Posted/contoured plan map of X-Component (Ch. 5) TEM Field (1:5000)
  2) Interpretation plan over X-Component (Ch. 5) Contours (1:5000)
- **Cross-Sections**: Interpreted multi-component TEM profiles (Ch. 5) for L16+00E (1:5000).
- **Profiles:**

Profile Format	4-Axis (see Fig. 2)
# of Profiles:	16
Horizontal Map Scale:	1:5000
Vertical Profile Scales:	Varies to best display data for each component (see profiles in Appendix G)
Components Profiled:	3D survey: Total Field,[3] X, Y and Z

Table IV: Surface TEM Profile Specifications.

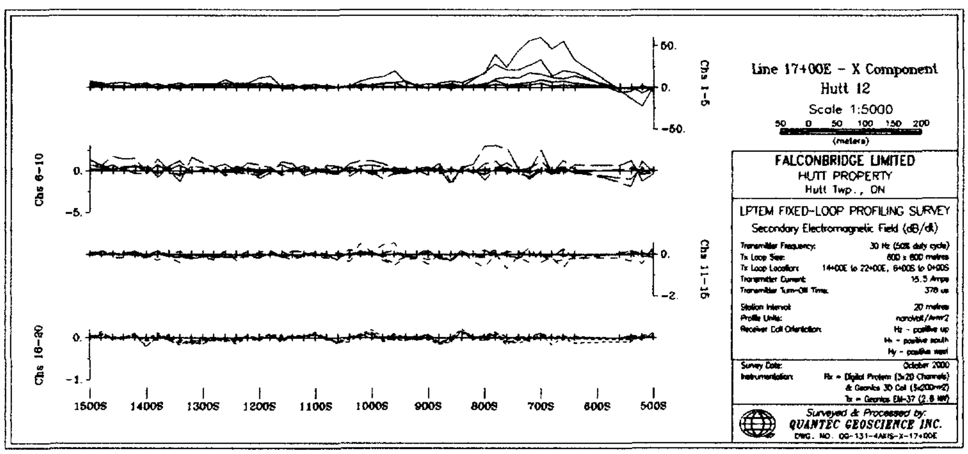


Figure 2: 4-Axis Surface TEM Profile Format.

- **Digital Data:** Daily raw files and processed data (Geosoft .XYZ format) on 3.5 inch HD (1.44 Mbytes) diskettes

a) raw data dump files, according to acquisition date (DDMMYY.RAW i.e. 210299.raw) Geonics Digital Protem format (refer to Protem manual)

b) Reduced XYZ ASCII data files, according to line number and component (i.e. l1900ek.xyz where, k=component – Z, X, Y or T for Total Field).

[3] TF = SQRT { $(dB_X/dt)^2 + (dB_Y/dt)^2 + (dB_Z/dt)^2$ }, using Quantec Geoparse™

Column 1: N-S Line/E-W Station number (metres) or UTM EW (for plan maps)
Column 2: E-W Station/N-S Line number (metres) or UTM NS (for plan maps)
Column 3: Primary pulse (millivolts) or Station number (metres - for plan maps)
Column 4: Channel 1 secondary rate of decay of TEM field (nanoVolt/ampere*m^2)
Column 5: Channel 2
⇓
Column 23: Channel 20 secondary rate of decay of TEM field (nanoVolt/ampere m^2)

3.7.1 Magnetic Survey

Plan maps: 1) Posted contour plan map of Total TFM Field (1:5000)
2) Posted profile plan map of Total TFM Field (1:5000)

Plan Map Types:	Posted/Contoured and Posted/Profiled Total Magnetic Field
Map Scale:	1:5000
Grid Cell Size:	10 meters
Gridding Method:	Random
Contour Interval:	100, 500, 2000 nanoTesla
Profile Scale	100 nanotesla/cm

Table V: Plan Map Specifications for TFM Survey

- **Digital Data:** Daily raw files and processed data (Geosoft .XYZ format) on 3.5 inch HD (1.44 Mbytes) diskettes

c) raw data dump files, according to acquisition date and instrument (DDMMYY.MAG, i.e. DAY19.mag for mobile and DAY19.bas for base-station)
OMNI-IV format (refer to manual)

d) Reduced XYZ ASCII data files, according to property (i.e., hutt.xyz).

Column 1: UTM E-W Position (metres)
Column 2: UTM N-S Position (metres)
Column 3: Station (metres NS or EW)
Column 4: Diurnally-corrected Total Magnetic Field (nanotesla)

4. INTERPRETATION AND CONCLUSION

4.1 OVERVIEW

At the request of **Falconbridge Ltd.**, the following interpretation summarizes the results of ground geophysical surveys over the **Hutt 12 Project**, in Hutt Twp., 60km south of Timmins, obtained in October, 2000 by Quantec Geoscience Inc. The surveys consisted of time-domain electromagnetic surveys, using the surface Fixed Off-Loop profiling (FLTEM) technique, and ground magnetics. The survey objectives were to provide ground follow-up to anomalies identified in previous airborne geophysical surveys, which are potentially associated with volcanogenic massive sulphide deposits, and which remain undiscovered due to their depth of burial.

The transient electromagnetic (TEM) and magnetic (TFM) surveys at the **Hutt 12** property were designed to detect and delineate conductors, relating to massive sulphides, to depths up to or exceeding 150-250 metres. The surface Fixed Loop TEM technique was chosen based on its deep penetration and rapid reconnaissance characteristics - with the Off-Loop technique selected for its ability to detect subvertical to moderate dipping conductor geometries. However, the TEM portion of the surveys was curtailed due to strong anthropogenic electromagnetic interference from the NNW-SSE trending powerline which cross-cuts the survey area, along L1500E – resulting in only 4 of nine profiles surveyed and the results questionable (see Appendix C+D). The TFM magnetics were chosen to provide a lithologic and structural mapping capability, and to characterize the nature of mineralization associated with potential TEM conductors. In contrast with the TEM survey, except for L1500E, the magnetic results were shown relatively unaffected to the powerline – with good quality and repeatability.

The bedrock geology at **Hutt 12** is not well known at the grid scale, owing to the blanket of overburden cover, but existing compilations (ref. Pyke et al., Timmins Kirkland Lake Geological Compilation, ODM/MNR Map 2205, 1971) indicate that the property is underlain by ENE to NE trending, intermediate to mafic volcanics, mixed with felsic pyroclastic intercalations. Structurally, the area is cross-cut by NNW-SSE and NE-SW oriented, regional tectonic faults which host Mattachewan Swarm and late-Precambrian diabases, and also form well-defined topographic lineaments – notably controlling the Grassy River which surrounds the claim group. The property contains no known mineral deposits, however, a copper occurrence is indicated south-east of the survey area (IBID). The full extent of exploration on the property is not fully known by the authors, however, airborne magnetic and electromagnetic survey results were used in situating the grids for the follow-up in the present surface TEM study. Previous FLTEM surveys in Hutt Township were undertaken on adjoining grids (ref. QCI Project C454, Falconbridge Ltd., FLTEM Surveys on Hutt Twp. Property, October, 1999).

4.2 SURVEY RESULTS

The interpreted TEM anomalies and corresponding axes are identified on the interpretation plan (see also Appendix F), along with possible faults, geologic/geomagnetic contacts, magnetic lineaments and zones of high magnetic susceptibility, which are cross-hatched. The major NNW-SSE powerline which transects the western edge of the property is the strongest influence on the TEM results on the property – as shown on the TF-component plan, where elevated secondary fields and reversed polarities for H_Y and H_Z are obtained along L14E-16E. In contrast, however, the X-component is least affected, presumably due to its null-coupling with the powerline-source, and in early-mid channels, which benefits from better signal to noise, provides the best indicator for bedrock conductivity. Irregardless, however, the transient electromagnetic surveys over **Hutt 12** do not appear reveal no late-channel conductors of significance on the property, which might relate to semi-metallic, massive sulphide mineralization of exploration interest. In fact, the weak early-channel signal levels (avg. 50 nV/Am^2), indicative of high bulk resistivities, suggest shallow or resistive glacial overburden cover and low porosity bedrock, which are consistent with the intermediate to felsic volcanic lithology. More significantly, the weak and erratic late-channel EM fields indicate an absence of large area, high conductance bodies within detectable depths (50-250m).

Indeed of the relatively small number of coherent TEM responses identified on the (**Axis A, B, C**), all are of characteristically weak quality, corresponding either to:

a) Moderate area (<100m wavelength) but early channel/short time-constant (6-10ch) features, consistent with fault-fracture zones – either overburden filled or clay-rich low-conductivity thickness structures. These include **Axis A**, which encompasses 1-2 weak to questionable ESE axis occurring near the transmit-loop edge, from L15E/575S to L17E/775S. Although it is partly coincident with a narrow magnetic lineament, its discordance suggests a fault-like source – possibly controlling the probable Mattachewan Swarm dyke. **Axis B** is also discordant, ESE trending but lies within a magnetic-high adjacent to the geomagnetic contact, which is interpreted to potentially represent a mafic to felsic volcanic contact. Extending from L14E/900S to L17E/1000S, this weak quality conductor also coincides with a TFM-interpreted structure, and could easily be fault-related, it could also potentially represent a weakly mineralized exhalative zone – lying at 50m depths, with a +100m vertical extent, as shown on the interpreted multi-component section for L16E (see Appendix H).

b) Mid-late channel (12-16ch) but small area (<50m wavelength) conductors, consistent with weakly mineralized volcanic units or faults, i.e. near-surface features with limited vertical extent and low exploration interest. These are also ESE trending and include **Axis B'**, which a weak to questionable conductor, which extends across the mafic-felsic volcanic contact, from L15E/1075S to L17E/1200S; and **Axis C** which lies furthest south, from L14E/1375S to L16E/1500S, and is poorly resolved. Neither of these minor responses exhibits significant magnetism, yet these parallel weak, narrow magnetic lineaments, which likely represent fault-infilling Mattachewan dykes.

5. CONCLUSION AND RECOMMENDATIONS

The surface Transient Electromagnetic and ground Magnetic profiling surveys over the **Hutt 12 Project** did not identify geophysical signatures consistent with possible massive sulphide deposits of exploration significance – in fact, in spite of the noticeable effects of a grid-transecting powerline, the absence of coherent late-channel TEM responses of sufficient size/depth extent indicates that the property does not host favourable potential for large py-po-cp sulphide bodies within 150m depths. Coherent TEM responses are limited to either: a) early channel features (**Axes A+B**) indicative of poor conductivity-thickness and are more easily ascribed to overburden or fault-like sources; or b) small area conductors (**B'-C**), which describe bodies of limited depth extent and, hence, low exploration interest. Of the weak quality responses, only the magnetic high nature of **Axis B** and its position along an inferred volcanic contact might make this moderate-area, poor quality conductor a possible low priority target as a weakly mineralized exhalative zone. The ground magnetics have identified a well-defined ENE-trending geomagnetic contact, along which **Axis B** is situated, as well as an overprinting, ESE pattern of narrow magnetic high lineaments which likely identify fault-infilling Mattachewan Swarm diabases. Several ESE-WNW fault structures are also interpreted. Nevertheless, based on the present the FLTEM and Magnetic results, however, no targets can be specifically recommended for diamond-drilling.

We recommend that these data be combined with the existing geoscientific database and the results carefully considered prior to proceeding to the next exploration stage. In spite of the unsuccessful TEM measurements, consideration should nevertheless be given in expanding the current area of coverage using additional offset loops. Irregardless, because TEM is inherently designed to detect large-area, metallic-type sulphides, the presence or absence of sphaleritic or disseminate sulphide bodies cannot be ruled out on the property. As a result, deep penetrating Induced Polarization, preferably using Gradient-Realsection, could therefore prove useful in establishing a sulphide-source and in identifying poorly conductive Zn-rich targets – including the validation of **Axis B**. Following diamond-drilling, 3D Borehole TEM is recommended in order to establish the size and geometry of possible massively mineralized intersections, or to detect other zones lying within a +150m radius – thereby extending the depth of penetration below 150m. Borehole IP may also prove useful in delimiting the extent, and direction of matrix to disseminate mineralization, using both peripheral and radial-directional arrays. Borehole physical property work should be used to cross-correlate the geologic and geophysical signatures. Finally, these results should be combined into a common earth model, using GOCAD, in order to provide better corroboration between the measured physical parameters and the geology.

RESPECTFULLY SUBMITTED
QUANTEC GEOSCIENCE INC.

David MacGillivray
Project Manager

David Eastcott
Technical Services

Kevin Blackshaw
Project Supervisor

Jean M Legault, P.Eng.
Dir. Technical Services

Porcupine, ON

APPENDIX A

STATEMENT OF QUALIFICATIONS

I, Jean M. Legault, declare that:

1. I am a consulting geophysicist with residence in Waterdown, Ontario and am presently employed in this capacity with Quantec Geoscience Inc. of Waterdown, Ontario.

2. I obtained a Bachelor's Degree, with Honors, in Applied Science (B.A.Sc.), Geological Engineering (Geophysics Option), from Queen's University at Kingston, Ontario, in Spring 1982.

3. I am a registered professional engineer, since 1985, with license to practice in the Province of Ontario (#90534542).

4. I have practiced my profession continuously since May,1982, in North-America, South-America and North-Africa.

5. I am a member of the Association of Professional Engineers of Ontario, the Prospectors and Developers Association of Canada, and the Society of Exploration Geophysicists.

6. I have no interest, nor do I expect to receive any interest in the properties or securities of **Falconbridge Ltd.**

7. I have reviewed the survey results and the maps contained, which I have interpreted and evaluated in this report. The statements made represent my professional opinion based on my consideration of the information available to me at the time of writing this report.

Porcupine, Ontario
November, 2000

Jean M. Legault, P.Eng.
Chief Geophysicist
Dir. Technical Services
Quantec Group

APPENDIX A

STATEMENT OF QUALIFICATIONS

I, David Eastcott, hereby declare that:

1. I am a geophysical technologist with residence in South Porcupine, Ontario and am presently employed in this capacity with Quantec Geoscience Ltd. of Waterdown, Ontario.

2. I have practiced my profession continuously since 1996, in Canada, the United States, Mexico and Mongolia.

3. I have no interest, nor do I expect to receive any interest in the properties or securities of **Falconbridge Ltd.**

4. I am the co-author of logistics portion of this report, and prepared the final map products included. The statements made in this report represent my professional opinion based on my consideration of the information available to me at the time of writing this report.

Porcupine
November, 2000

David Eastcott
Staff Geophysicist, QGI

APPENDIX A

STATEMENT OF QUALIFICATIONS

I, David MacGillivray, declare that:

1. I am a geophysical operator, with residence in Porcupine, ON, and am currently employed by Quantec Geoscience Inc. of Waterdown, Ontario.

2. I have continuously been employed in this field since August of 1996 in Canada, Cuba, Mexico, Mongolia and Panama.

3. I have no interest nor do I expect to receive any interest in the properties or securities of **Falconbridge Limited.**

4. I was the project manager and was responsible for the data acquisition, validation and plotting in the field. I am the author of this logistical report. The statements made in this report represent my professional opinion based on my consideration of the information available to me at the time of writing this report.

Porcupine, ON
September, 2000

David MacGillivray
Geophysical Operator

APPENDIX B

THEORETICAL BASIS AND SURVEY PROCEDURES

TEM SURFACE PROFILING

TEM profiling is conducted on lines either adjacent to (Off-Loop mode) or surrounded by (In-Loop mode) a large fixed rectangular transmit loop. Current is passed through the loop which following the Turn-Off, produces a primary magnetic field (H) both inside and outside (Figure 9). This primary field induces a vortex current pattern, which energizes conductors and which in turn create their own secondary magnetic field (Bs). The rate of change of the decaying secondary magnetic flux (dBs/dt) is measured as the vertical (**Hz**), in-line horizontal (**Hx**) and/or cross line horizontal (**Hy**) vector components on surface using an air-core sensor coil. These measurements of the TEM decay (20 log-time slices) are taken during the "Off-Time", using a 30 cycle/sec, base repetition rate.

In keeping with the industry standard, the primary field is always considered positive up inside the loop and negative down outside. Similarly, for secondary EM fields, the receiver coil is oriented positive vertical up for the **Hz** component. The convention for In-Loop surveys, has the in-line component, **Hx** oriented either positive east (for grid EW lines) or north (for grid NS lines). The Off-Loop survey convention differs, with the receiver coil orientation for **Hx** pointing positive away from the transmit loop (for EW or NS lines). Finally, the sign convention in all cases, has the **Hy** component pointing positive orthogonal to the left of the **Hx**, according to the right-hand-rule.

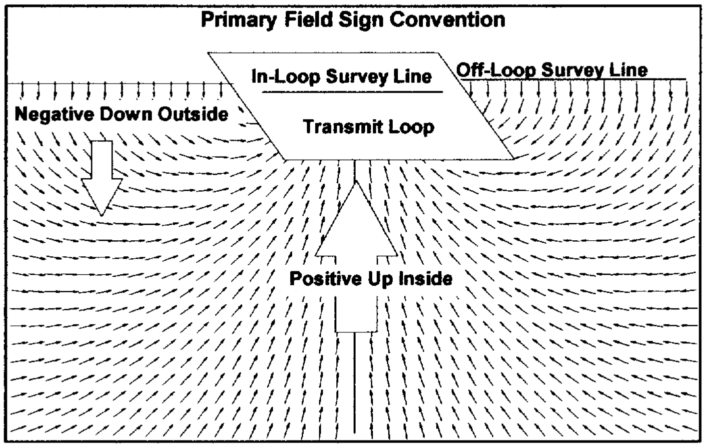


Figure B1: Primary field sign convention for TEM surveys.

At the end of each survey day, the stored data are transferred to a microcomputer where they corrected for the turn-off time, loop area, system gain and current, and converted from millivolts to nanoVolts per ampere meter squared or nanoVolts per meter squared. The data are then transferred to disk for storage and processing. Report quality field plots are generated on site, using a 24-pin printer in order to monitor the data characteristics and to provide a preliminary interpretation capability.

The following equations govern the transient EM response for buried plate-like conductive bodies[1]

Target Response to Transmitter Current Waveform:

$$emf = \frac{1}{\tau} e^{-t/\tau}$$

where: t = *fixed time*

e = *exponential decay*

τ = *time constant of conductor*

Equation B1: Conductor Response to the Transient EM Waveform

The time constant of the response is alternatively defined as the slope of the lin-log decay curve (Geonics) or, more exactly, as the time channel where the amplitude of the decay collapses to 37% (1/e) of its maximum value. Both τ and the analogous decay strength (ie., the number of anomalous channels above background), are commonly used as indicators of conductor quality. This relationship between decay-strength and the conductivity-thickness can easily be demonstrated in the following equation for a vertically dipping conductive sheet:

$$\tau = \frac{\sigma \mu t h}{\pi^2} \text{ for a thin plate}$$

where σ = *conductivity of target*

μ = *magnetic susceptibility*

t = *thickness of plate*

h = *vertical extension of plate*

Equation B2: Transient EM Decay Time Constant

thereby giving, for an infinite vertical sheet:

$$\sigma t = \frac{\pi^2}{\mu h} \tau \approx \tau/0.31 \text{ mhos / metre (siemens)}$$

Equation B3 Conductivity Thickness

From these equations and relationships, it therefore becomes obvious of the common use of the anomaly strength of decay as a simple, rule-of thumb indicator of the relative conductivity-thickness product for TEM surveys.

In addition, the total secondary field is calculated using the three components (Hx, Hy and Hz) in the following formula

$$Htot = \sqrt{Hx^2 + Hy^2 + Hz^2} \, nanoVolt / Am^2.$$

Equation B4: Transient EM Total Secondary Field

[1] From Geonics Limited, EM-37 TEM System Design Parameter, Mississauga, Ont., 1982.

APPENDIX B

SURVEY PROCEDURES AND GENERAL THEORY

Magnetics

Base station corrected Total Field Magnetic surveying is conducted using at least two synchronized magnetometers of identical type. One magnetometer unit is set in a fixed position in a region of stable geomagnetic gradient, and away from possible cultural effects (moving vehicles) to monitor and correct for daily diurnal drift. This magnetometer, given the term 'base station', stores the time, date and total field measurement at fixed time intervals over the survey day. The second, remote mobile unit stores the coordinates, time, date, and the total field measurements simultaneously. The procedure consists of taking total magnetic measurements of the Earth's field at stations, along individual profiles, including Tie and Base lines. A 2-meter length staff is used to mount the sensor, in order to optimally minimize localized near-surface geologic noise. At the end of a survey day, the mobile and base-station units are linked, via RS-232 ports, for diurnal drift and other magnetic activity (ionospheric and spheric) corrections using internal software.

APPENDIX C

PRODUCTION LOG

QUANTEC GEOSCIENCE INC.
101 King Street
Porcupine, Ontario
(705) - 235 - 2166

Client:	**Falconbridge Limited**
Client Representative:	**Sharon Taylor & Dean Rogers**
Project Supervisor:	**Jeff Warne**
Project Manager:	**David MacGillivray**
Project #:	**QG-131**
Project Title:	**Hutt Property**
Project Location:	**Hutt Twp.**
Survey Type:	**LPTEM OFF-LOOP PROFILING**
Sampling Interval:	**20 metres**
Survey Type:	**Total Field Magnetics**
Sampling Interval:	**10 metres**
Survey Date:	**October 16th to October 21st, 2000**

Date	Description	Line	Min Extent	Max Extent	Total Survey (metres)
16-Oct	Performed maintenance to the J6				
	Packed equipment and purchased supplies				
	Discussed logistics with Jeff Warren				
	Mob to Saw Mill Café				
17-Oct	Located grid, we can drive to the grid, J6 is not				
	required, Established 600 x 800 metre loop				
	14+00E to 22+00E, 0+00S to 6+00S				
18-Oct	Survey-TEM	14+00E	6+00S	15+00S	900
	Data is very noisy	15+00E	15+00S	5+00S	1000
	Power line interfering with the loop, turn off time				
	is fluctuating, 2 hrs lost				
	con't survey	17+00E	5+00S	15+00S	1000
	Some hunters decided to remove half the loop	16+00E	15+00S	8+20S	680
	for us, survey suspended, unable to check turn				
	off time				3580

Date	Description	Line	Min Extent	Max Extent	Total Survey (metres)
19-Oct	Reinstalled loop, turn off time still fluctuating				
	Established 150 x 150 metre loop away from				
	the power line, equip. works fine				
	Moved loop edge from line 14+00E to line 16+00E				
	so the loop is all on one side off the power line				
	Turn off time is still fluctuating. Returned to				
	camp to retrieve mag units. Began Mag survey				
	while waiting for the turn off time to settle down				
	MAG Line	17+00E	5+00S	15+00S	1000
	Base station @13+50E and 7+00S				1000
	Standby rate for TEM				
20-Oct	Tested EM gear in the morning and throughout				
	the day, still fluctuating				
	MAG line	22+00E	5+00S	15+00S	1000
	Base station @13+50E and 7+00S	21+00E	5+00S	15+00S	1000
		20+00E	5+00S	15+00S	1000
		19+00E	5+00S	15+00S	1000
		18+00E	5+00S	15+00S	1000
		16+00E	5+00S	15+00S	1000
		15+00E	5+00S	15+00S	1000
		14+00E	5+00S	15+00S	1000
		5+00S	14+00E	22+00E	800
		10+00S	14+00E	22+00E	800
		15+00S	14+00E	22+00E	800
					10400
21-Oct	Tested equip, the power line is still interfering				
	Survey suspended until a meeting with Falcon-				
	bridge to determine if alternate loop locations				
	away from the power line might satisfy their				
	exploration objectives. Removed loop and				
	demob to Timmins, 1/2 day Standby Rate				
	Total Survey				**14980**

APPENDIX D

OPERATOR COMMENTS

Due to interference from the powerline with the loop (Tx turn-off time fluctuations, increased and decreased in frequency throughout the day), the surface TEM component of the survey was suspended. Tried alternate loop locations to test the equipment and see if a steady turn off time could be achieved (outlined in detail in the production log) with no success. As a result, only 4 of 8 profiles were completed. Unlike the TEM, the ground magnetic surveys proceeded normally – except for L1500E, which was immediately below the powerline and was visibly distorted and eliminated from contour/profile plots, entirely.

David MacGillivray
Project Manager
pers. comm., 10/00

APPENDIX E

INSTRUMENT SPECIFICATIONS

GEONICS LIMITED Digital Protem Receiver

Digital Protem Ground Transient Electromagnetic System
Technical Specifications

Receiver

Measured Quantity:	Time rate of decay of magnetic flux along 3 axes
Sensors:	
1. (L.F.):	Air-cored coil of bandwidth 60 kHz; 100 cm diameter
2. (H.F.):	Air-cored coil of bandwidth 850 kHz; 100 cm diameter
3. (3D-3):	Three orthogonal component sensor; simultaneous operation
4. (3D-1):	Three orthogonal component sensor; sequential operation
Time channels:	20 geometrically spaced time gates for each base frequency gives range from 6 μ sec to 800 msec.
Repetition Rate: (Base Frequency)	0.3 Hz, 0.75, 3, 7.4, 30, 75 or 285 Hz for 60 Hz power-line networks
Synchronization:	1) reference cable. 2) high stability (oven controlled) quartz crystals. (Switch selectable)
Integration time:	2, 4, 8, 15, 30, 60, 120, 240 sec.
Calibration:	Internal self calibration External Q coil calibration (optional)
Keyboards:	Two 3 x 4 matrix sealed key pads with positive tactile feedback
Gain:	Automatic or manual control
Dynamic Range:	23 bits (132 dB)
Display Quantity:	(1) Table of time rate of decay of magnetic flux (dB/dt) (2) Curve of rate of decay of magnetic flux (dB/dt) (3) Table of apparent resistivity (ρ_a) (4) Curve of apparent resistivity (ρ_a) (5) Profile of dB/dt (6) Real time noise monitor (7) Calibration curve (8) Data acquisition statistics (real time)
Storage:	Solid state memory with capacity for over 3000 data sets
Display:	8 lines by 40 character (240 x 64 dot) graphic LCD
Data Transfer:	Standard RS-232 communications port.

Processor: CMOS 68HC000 8 MHz CPU

Receiver Battery: 12 volts rechargeable battery for 8 hours continuous operation. 6 hours in XTAL mode

Receiver Size: 34 x 38 x 27 cm

Receiver Weight: 15 kg

Operating Temp.: -40°C to +50°C

Transmitters: (1) Geonics TEM47
(2) Geonics TEM57
(3) Geonics TEM37

GATE	285/237.5 Hz			75/62.5 Hz			30/25 Hz			GATE
1	6.000	6.813	1.625	32.00	35.25	6.500	80.00	88.13	16.25	1
2	7.625	8.688	2.125	38.50	42.75	8.500	96.25	106.9	21.25	2
3	9.750	11.13	2.750	47.00	52.5	11.00	117.5	131.3	27.5	3
4	12.50	14.19	3.375	58.00	64.75	13.50	145.0	161.9	33.75	4
5	15.88	18.07	4.375	71.5	80.25	17.50	178.8	200.6	43.75	5
6	20.25	23.06	5.625	89.00	100.3	22.50	222.5	250.6	56.25	6
7	25.88	29.44	7.125	111.5	125.8	28.50	278.8	314.4	71.25	7
8	33.00	37.56	9.125	140.0	158.3	36.50	350.0	395.6	91.25	8
9	42.13	47.94	11.63	176.5	199.8	46.50	441.3	499.4	116.3	9
10	53.75	61.13	14.75	223.0	252.5	59.00	557.5	631.3	147.5	10
11	68.50	77.94	18.88	282.0	319.8	75.50	705.0	799.4	188.8	11
12	87.38	99.38	24.00	357.5	405.5	96.00	893.8	1014	240.0	12
13	111.4	126.7	30.63	453.5	514.8	122.5	1134	1287	306.3	13
14	151.7**	166.4	29.38	576.0	654.3	156.5	1440	1636	391.3	14
15	181.1	206.0	49.88	732.5	832.3	199.5	1831	2081	498.8	15
16	231.0	262.8	62.63	932.0	1059	254.5	2330	2648	636.3	16
17	294.6	335.2	81.25	1187	1349	325.0	2966	3373	812.5	17
18	375.9	427.7	103.6	1512	1719	414.5	3779	4297	1036	18
19	479.5	545.6	132.1	1926	2190	528.5	4815	5475	1321	19
20	611.6	695.9	168.5	2455	2792	674.0	6136	6978	1685	20
21*	780.1			3129			7821			21*

Table VI:Digital Protem Gate Locations

* End of Gate 20
** A Gap of 9.7 μsec exists between Gate 13 and Gate 14 in the micro-frequency range/

This Table applies to both synchronization modes regardless of which of TEM37, TEM47 and TEM57 transmitters is used, provided that correct Tx model is selected in Header (2.4).

Note: 7.5/6.25 and 0.75/0.625 Hz proportional to 75/62.5 Hz
3/2.5 and 0.3/0.25 Hz proportional to 30/25 Hz

APPENDIX E

INSTRUMENT SPECIFICATIONS

GEONICS LIMITED EM-37 TRANSMITTER

EM-37 Transmitter
Technical Specifications

Current Wave form:	bipolar square wave.
Repetition Rate:	3Hz, 7.5Hz or 30Hz in countries using 60Hz power line frequency; 2.5Hz, 6.25Hz or 25Hz in countries using 50Hz power line frequency; all six base frequencies are switch selectable.
Turn-off Time(t):	fast linear turn-off maximum of 450 μsec. at 30 amps into a 300x600 meter loop. Decreases proportionally with current and the root of the loop area to a maximum of 20 μsec. Actual value of t read on front panel meter.
Transmitter Loop:	any dimensions from 40x40 meters to 300x600 meters maximum at 30 amps. Larger dimensions at reduced current. Transmitter output voltage switch adjustable for smaller loops. Value of loop resistance read from front panel meter; resistance must be greater than 1 ohm on lowest setting to prevent overload.
Protection:	circuit breaker protection against input over voltage; instantaneous solid state protection against output short circuit; automatically resets on removal of short circuit. Input voltage output voltage and current indicated on front panel meter.
Output voltage:	24 to 160 volts (zero to peak) maximum
Output power:	2800 watt maximum
Motor generator:	5 HP Honda gasoline engine coupled to a 120 volt, three phase, 400 Hz alternator. Approximately 8 hours continuous operation from built-in fuel tank.

Component Dimensions and Weights

Transmitter Console :	20 by 42 by 32 cm, 20 kg
GPU:	44 by 32 by 21 cm, 65 kg

APPENDIX E

INSTRUMENT SPECIFICATIONS:

GSM-19
(from GSM-19 0verhauser Magnetometer Operating Manual)

Weather proof case

Dimensions:	Console 223 mm x 69 mm x 240 mm Sensor 170 mm x71mm diameter cylinder	
Weight:	Console 2.1 kg; Sensor 2.2 kg (staff included)	
Operating temperature:	-40°C to 60°C	
Power supply:	12V 1.9 Ah sealed lead acid battery	
Power Consumption:	2 Ws per reading	
Resolution:	0.01 nT	
Relative Sensitivity:	0.02 nT	
Absolute Accuracy:	0.2 nT	
Range:	20,000 to 120,000 nT	
Gradient Tolerance:	Over 10,000 nT/m	
Operating Modes:	Base station -	time/date reading stored 3 to 60 sec
	Walking-	time/date reading stored at coordinates of fiducial with 0.5 to2 sec. cycle time
Memory Capacity:	Base station-	43,000 readings standard
	Walking-	131,000 readings
Data transfer:	Serial link @ 300 to 19200 baud; remote control capability through serial link @ 19200 baud	

APPENDIX F

TEM ANOMALY TABLE

LINE	STATION	# CHANNELS	DEPTH	QUALITY	COMMENTS
1400E	1375S	12	60	Weak	Subvertical
1400E	1300S	18	40	Questionable	Subvertical (no Z)
1400E	900S	16	20	Weak	Subvertical
1500E	1412S	16	60	Weak	Subvertical
1500E	1250S	16	60	Weak	Subvertical
1500E	1075S	16	20	Questionable	Subvertical (Z reverse polarity)
1500E	950S	16	60	Weak	Subvertical
1500E	575S	16	60	Questionable	Subvertical (Z reverse polarity)
1600E	1500S	16	60	Weak	Subvertical
1600E	1150S	16	40	Weak	Subvertical
1600E	1050S	18	60	Weak	Subvertical
1600E	950S	8	100	Weak	Subvertical
1700E	1450S	8?	40	Questionable	Subvertical (no Z)
1700E	1200S	8	40	Questionable	Subvertical (no Z)
1700E	1000S	6	50	Weak	Subvertical
1700E	775S	8	40	Weak	Subvertical
1700E	700S	6	100	Weak	Subvertical

APPENDIX G

LIST OF MAPS

- **Surface LPTEM Profiles:** **Multi-Channel 4-Axis Profile Plots:** showing time rate of decay of the secondary electromagnetic field, for X, Y Z and Total Field components, 1:5000 scale, ch. 1-20 divided according to 4 vertical (linear) axes, nanoVolts per Ampere-metre^2.

Drawing **#s=QG131-4AXIS-K-Line#**, where K=Z, X, Y, TF (Total Field).

LOOP	SURVEY LINES	# LINES	# PLOTS
1	14+00E to 17+00E	4	16
	TOTALS	**4**	**16**

- **TFM Magnetic Plans:** **Posted Profiles and Contour Plan Maps** showing Total Field magnetic component, at 1:5000 scale, overlain onto UTM topographic base, units of nanotesla.

NO.	DESCRIPTION	DRAWING NUMBER
1	TFM Total Magnetic Field Contour Map	# QG131-HUTT12-MAGCONT-TF-HUTT 12
2	TFM Total Magnetic Field Profile Map	QG131-HUITT12-MAGPROF-TF-HUTT 12
	TOTALS	2

- **LPTEM Plan Maps:** **Posted/Contoured Plan Maps**, of early-channel (5) TEM secondary EM fields (TF or X Component), with Interpretation overlay, UTM translated and rotated, and overlain onto digital topographic claim basemap[4], 1:5000 scale, in units of nanoVolts per Ampere-metre^2.

NO.	DESCRIPTION	DRAWING NUMBER
1	TEM Total Field Component (Ch 5) Contour Map	QG-131-HUTT12-TEM-CONT-ROT-5TF
2	TEM X Component (Ch 5) Contour Map	QG-131-HUTT12-TEM-CONT-ROT-5X
3	TEM X Component (Ch 5) and Interpretation Map	QG-131-HUTT12-TEM-INT-ROT-5X
	TOTALS	3

- **LPTEM Interpreted Cross-Sections**: **Stacked Profiles** of Early-channel (ch 5) Multi-component (TF, Hz, Hy, Hx) TEM secondary EM fields, along profile trace, including interpreted cross-section with conductors, and comments, at 1:5000.

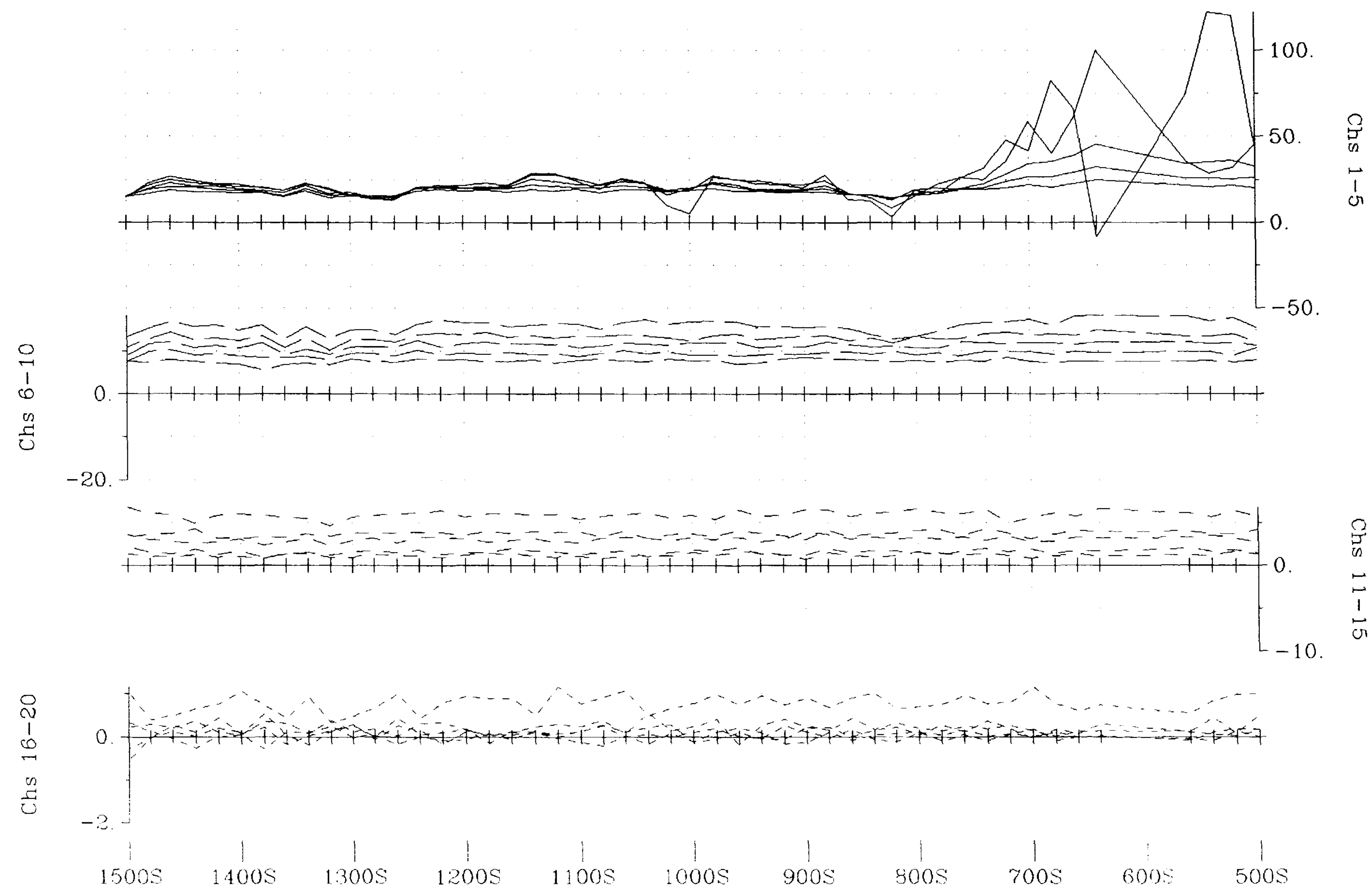
NO.	DESCRIPTION	DRAWING NUMBER
1	Line 16+00E Channel 5 Interpreted Cross-Section	QG1131-HUTT12-TEM-Multicomp-1600E-CH5-I
	TOTALS	1

TOTAL MAPS = 22

[4] The UTM reference and rotation angle used for the XYZ translation onto digital topographic base and claim maps supplied by Falconbridge Ltd. (HUTT_TOP.DXF; S.Taylor, email comm., 10-2000) were: X_O = 485,658mE / Y_O = 5,310135mN and ϕ = N-015.3^{o}W

APPENDIX H

PLAN MAPS AND SECTIONS



Line 17+00E - Z Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

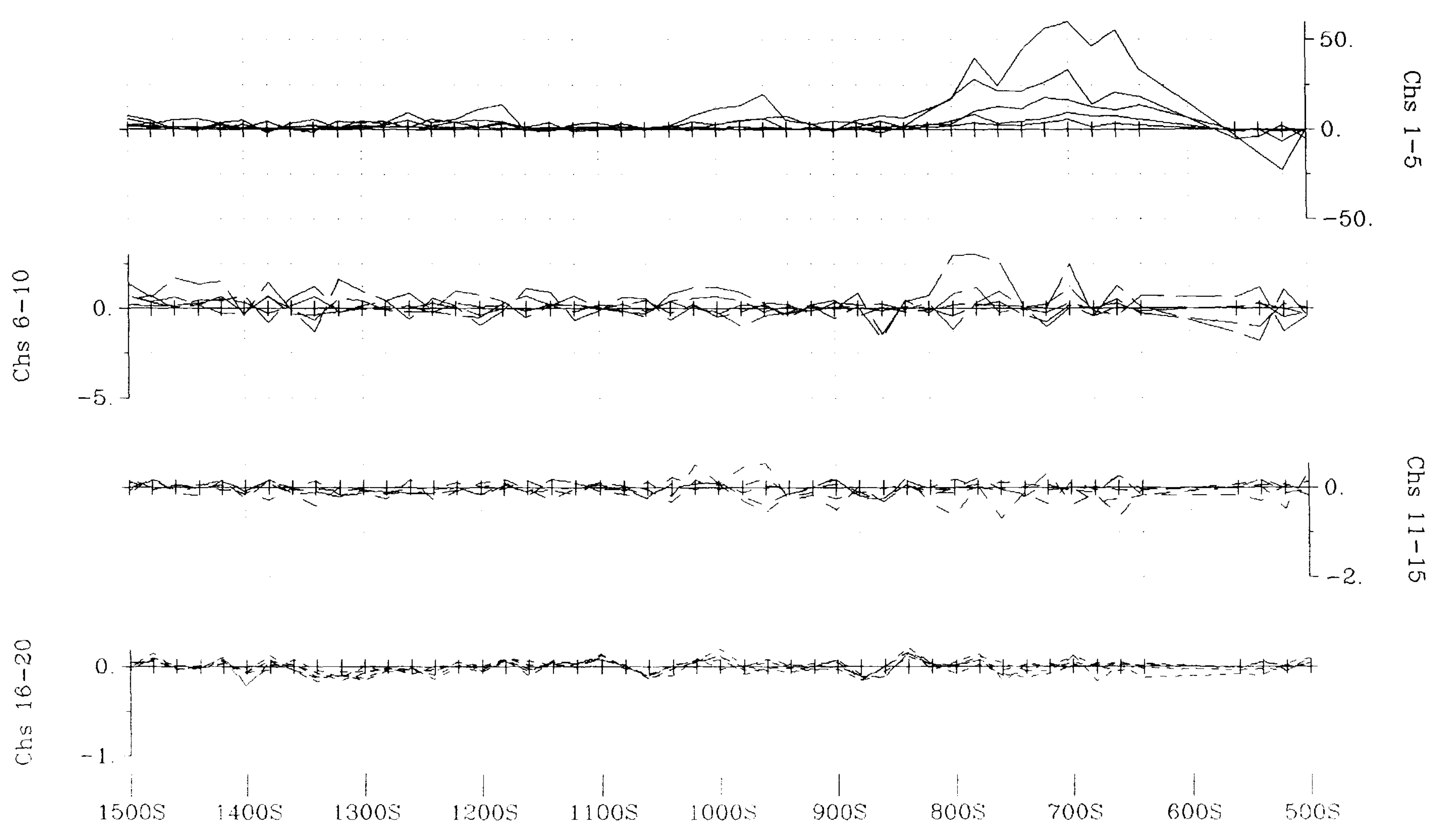
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131 4AXIS-Z-17+00E



Line 17+00E - X Component
Hutt 12

Scale 1:5000

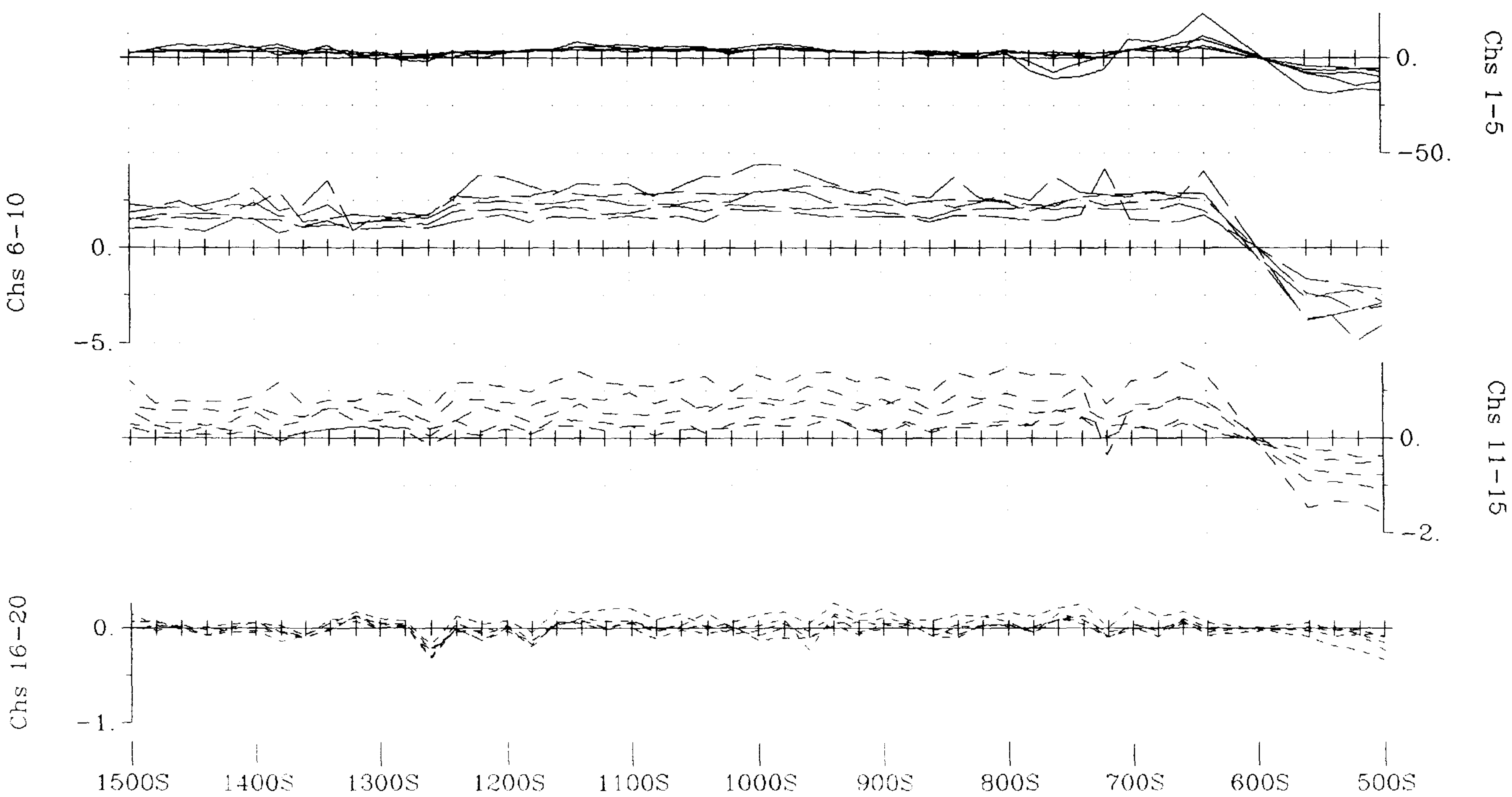
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-X-17+00E



Line 17+00E – Y Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up Hx - positive south Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels) & Geonics 3D Coil (3x200m^2) Tx = Geonics EM 37 (2.8 kW)

Surveyed & Processed by:
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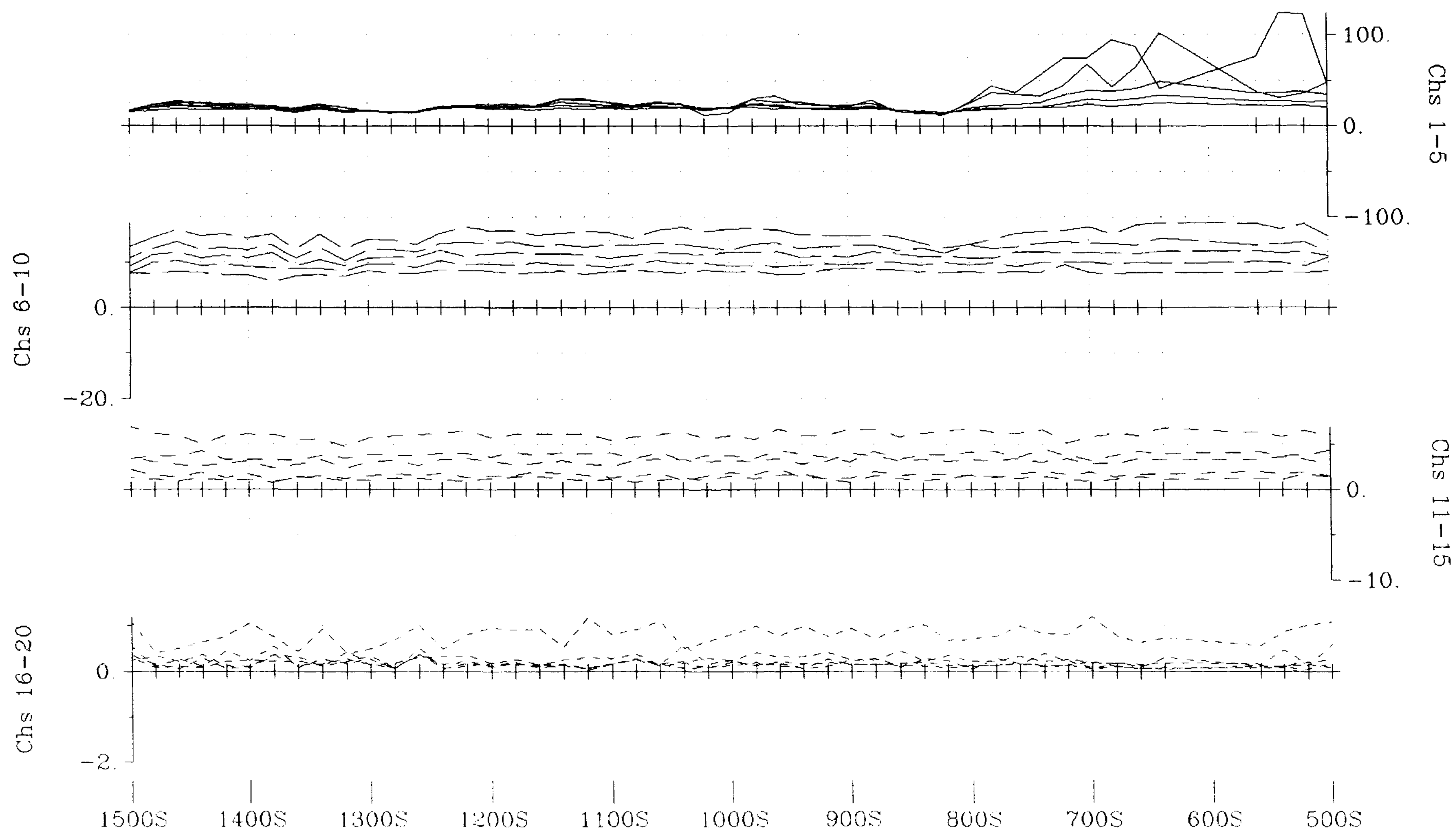
DWG NO. QG-131-4AXIS Y-17+00E



Line 17+00E – Total Field
Hutt 12

Scale 1:5000

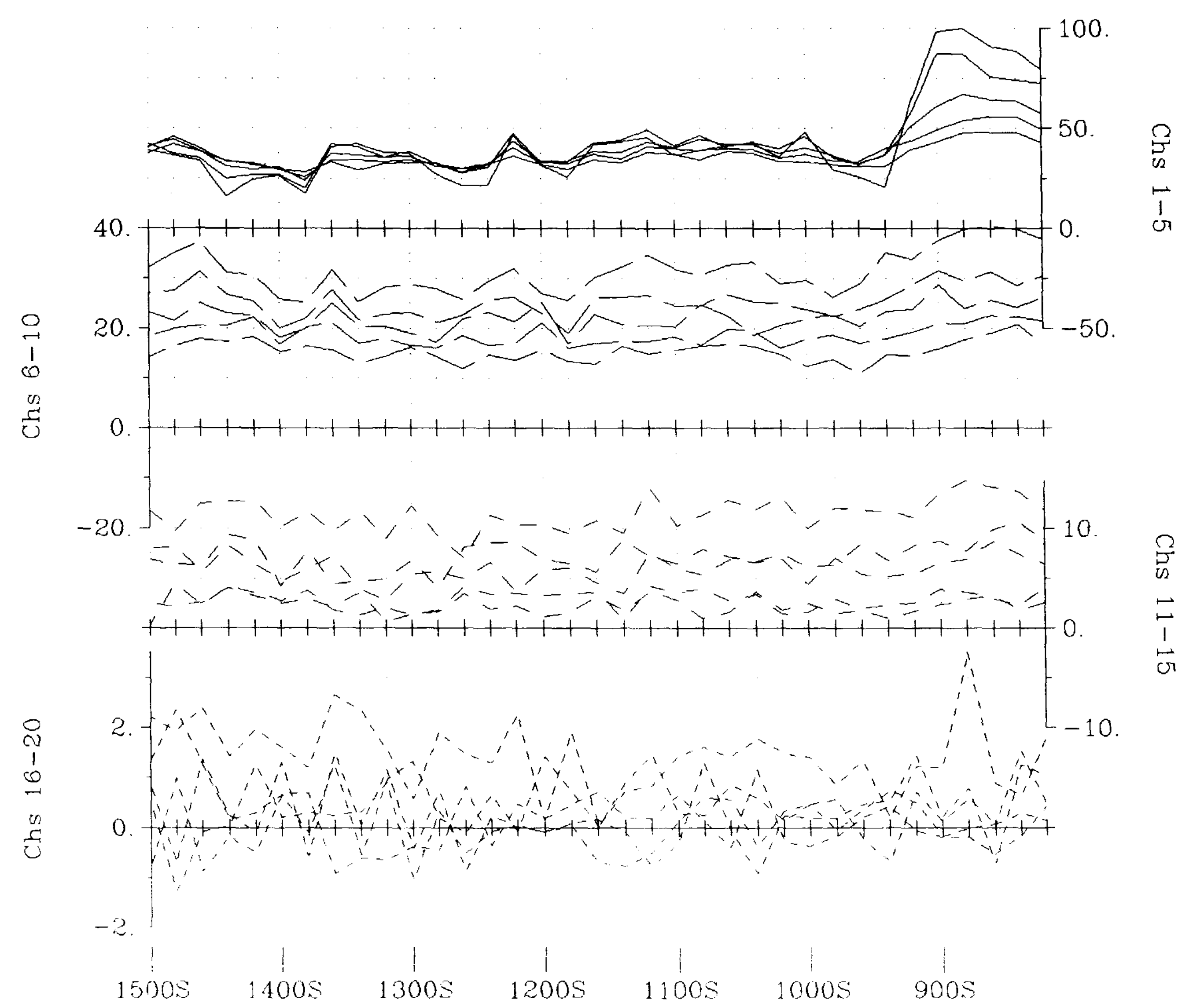
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-TF-17+00E



Line 16+00E - Z Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

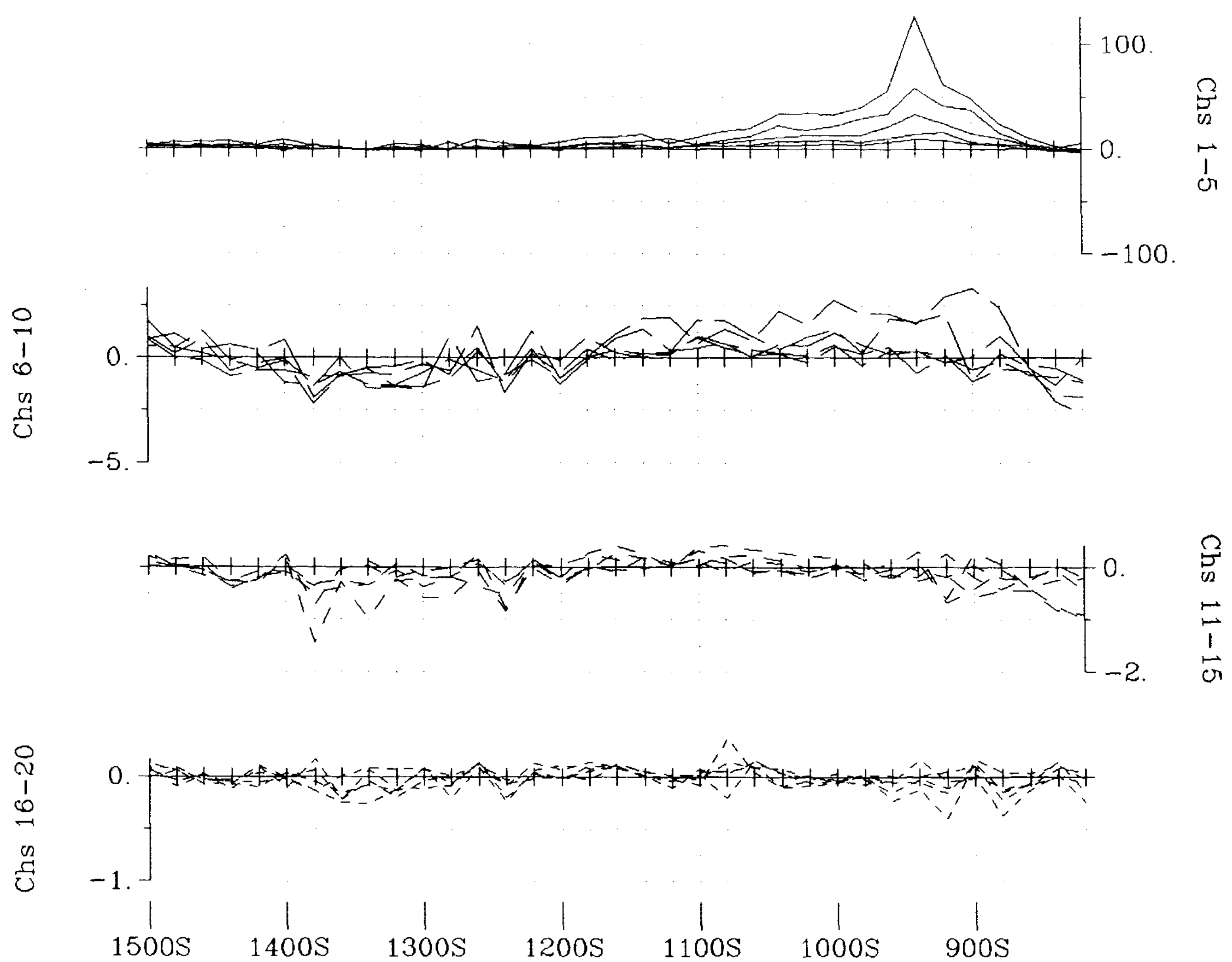
LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation.	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG NO QG-131-4AXIS-Z-16+00F



Line 16+00E – X Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

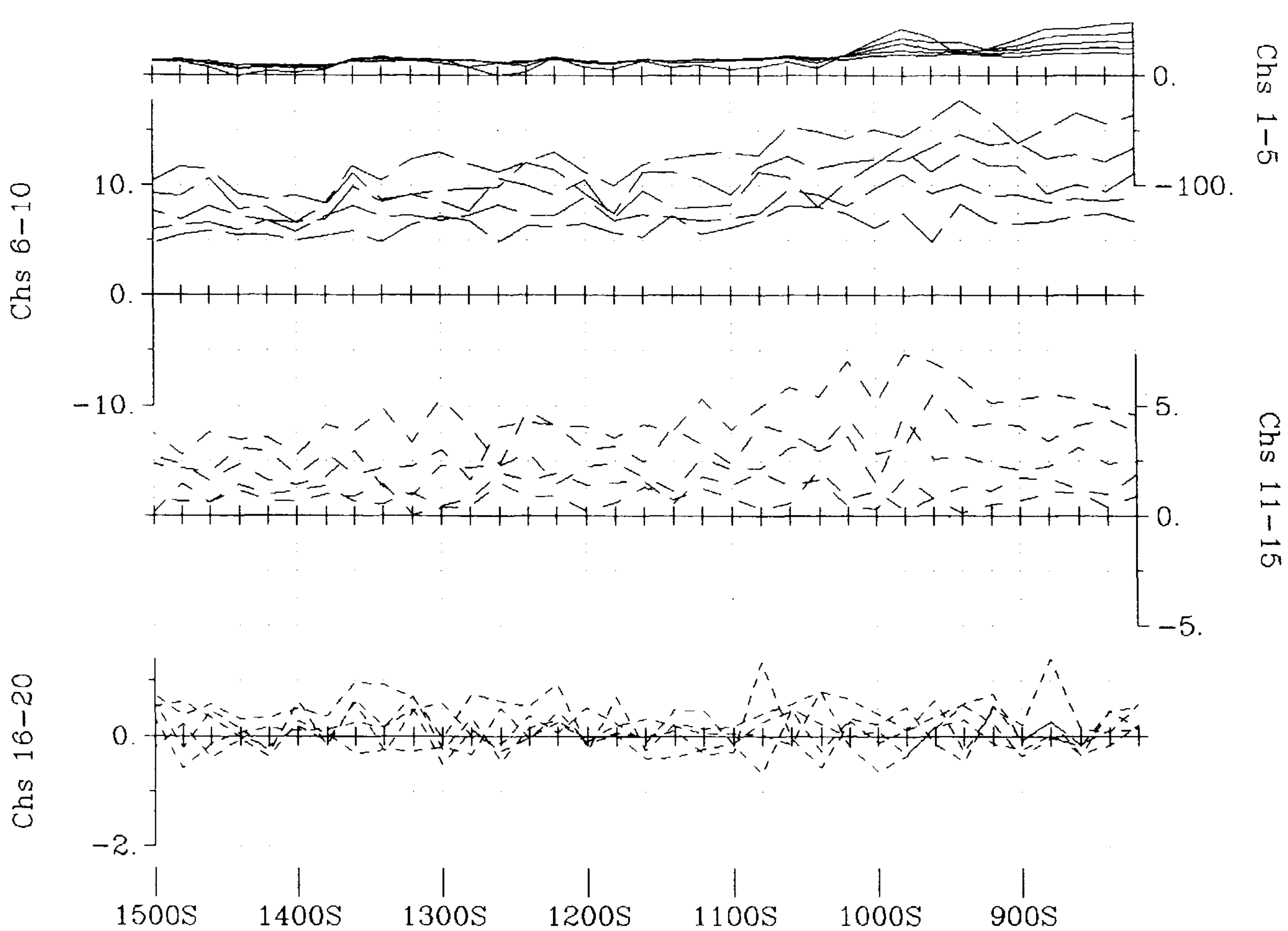
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-X-16+00E



Line 16+00E - Y Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

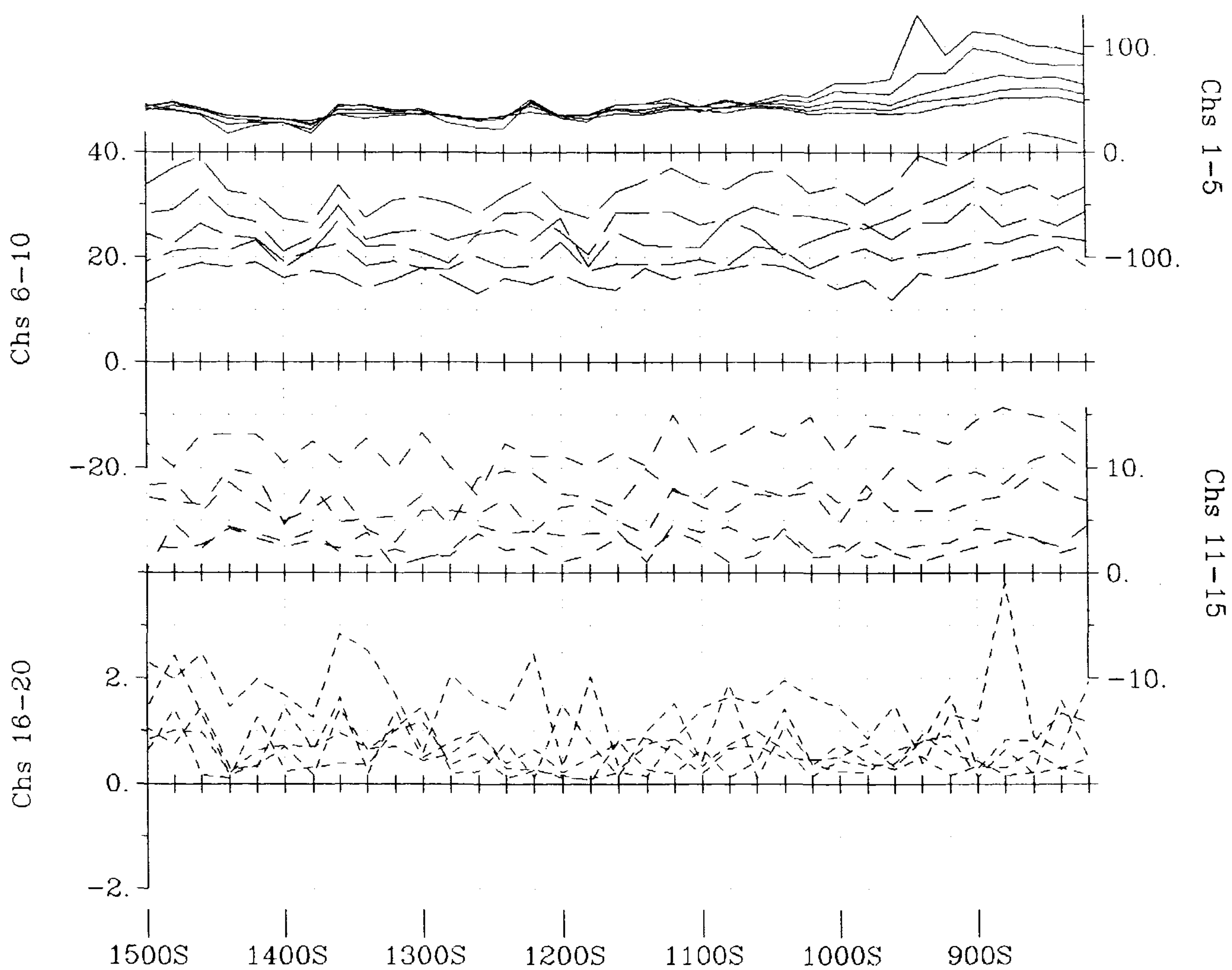
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-Y-16+00E



Line 16+00E – Total Field

Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

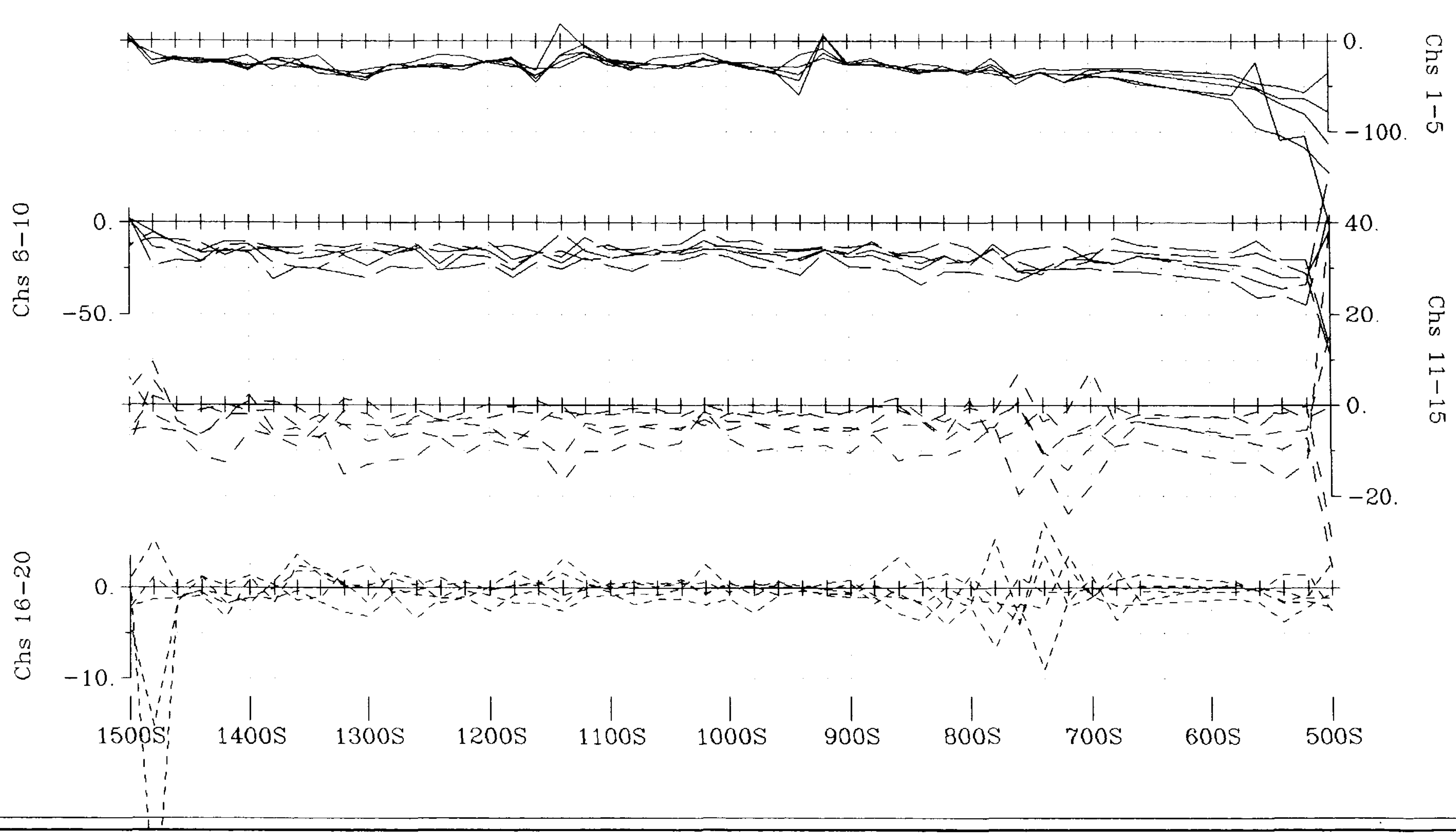
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-TF-16+00E



Line 15+00E - Z Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

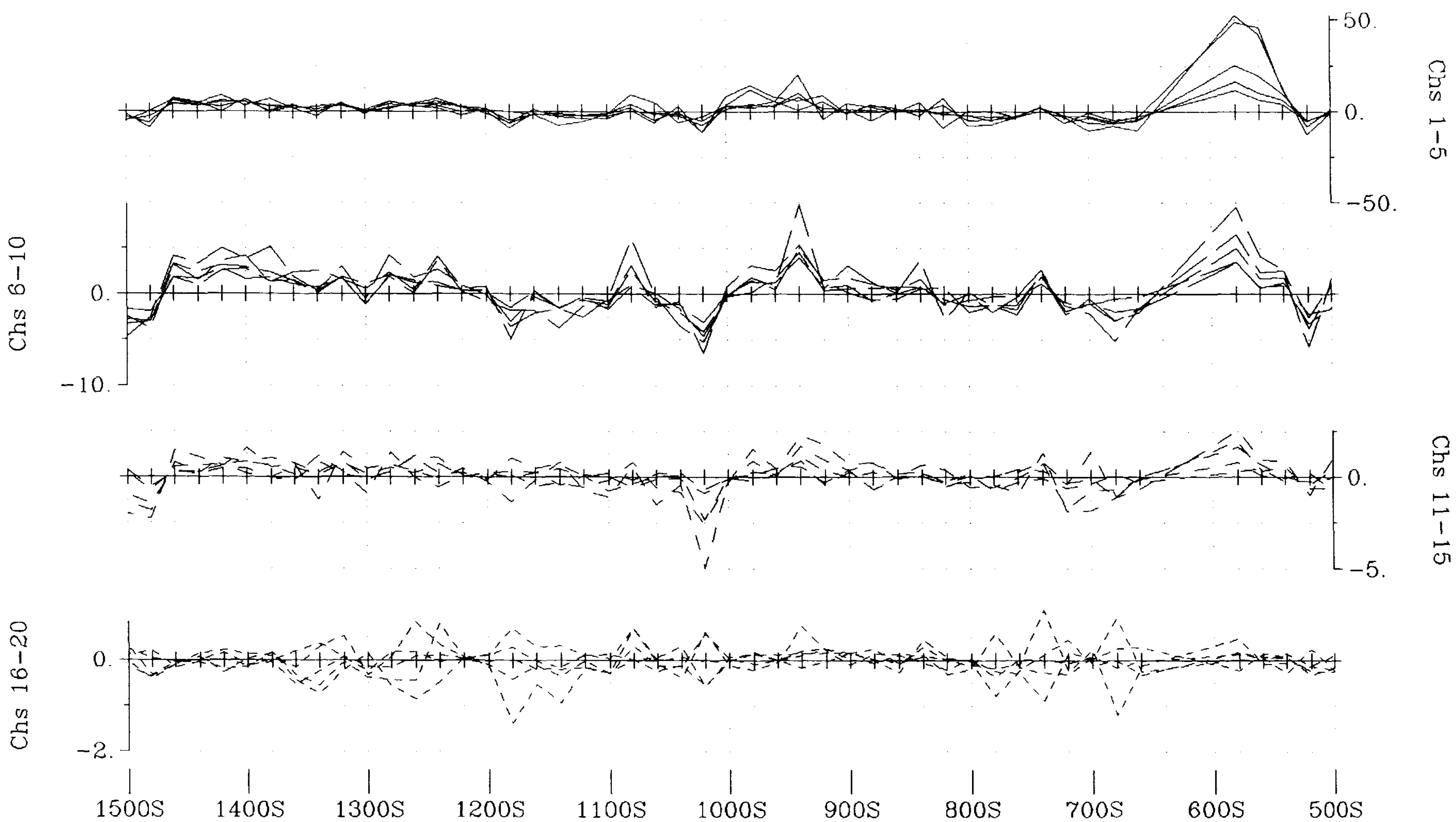
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up Hx - positive south Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels) & Geonics 3D Coil (3x200m^2) Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-Z-15+00E



Line 15+00E – X Component
Hutt 12

Scale 1:5000

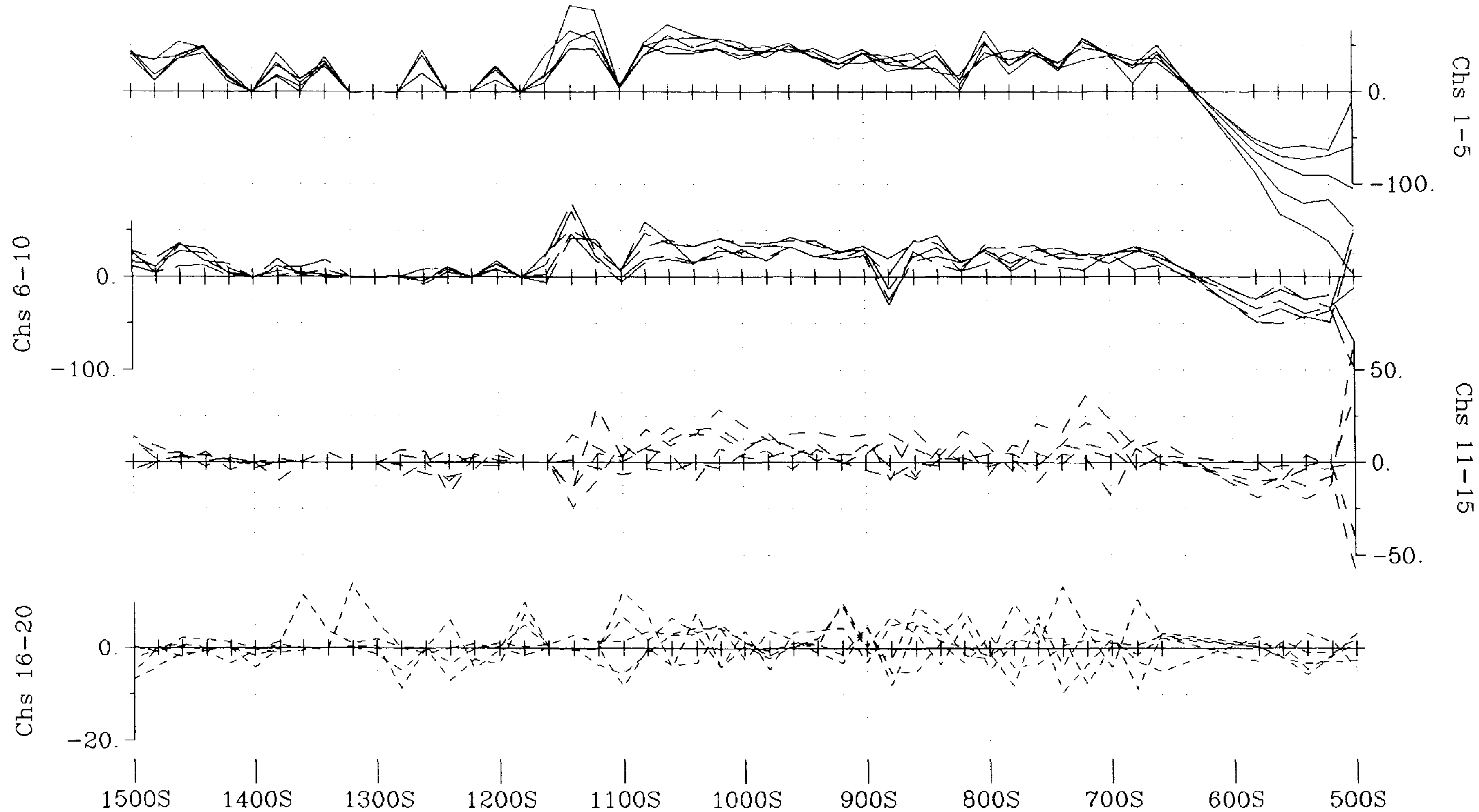
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz – positive up
	Hx – positive south
	Hy – positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-X-15+00E



Line 15+00E - Y Component
Hutt 12

Scale 1:5000

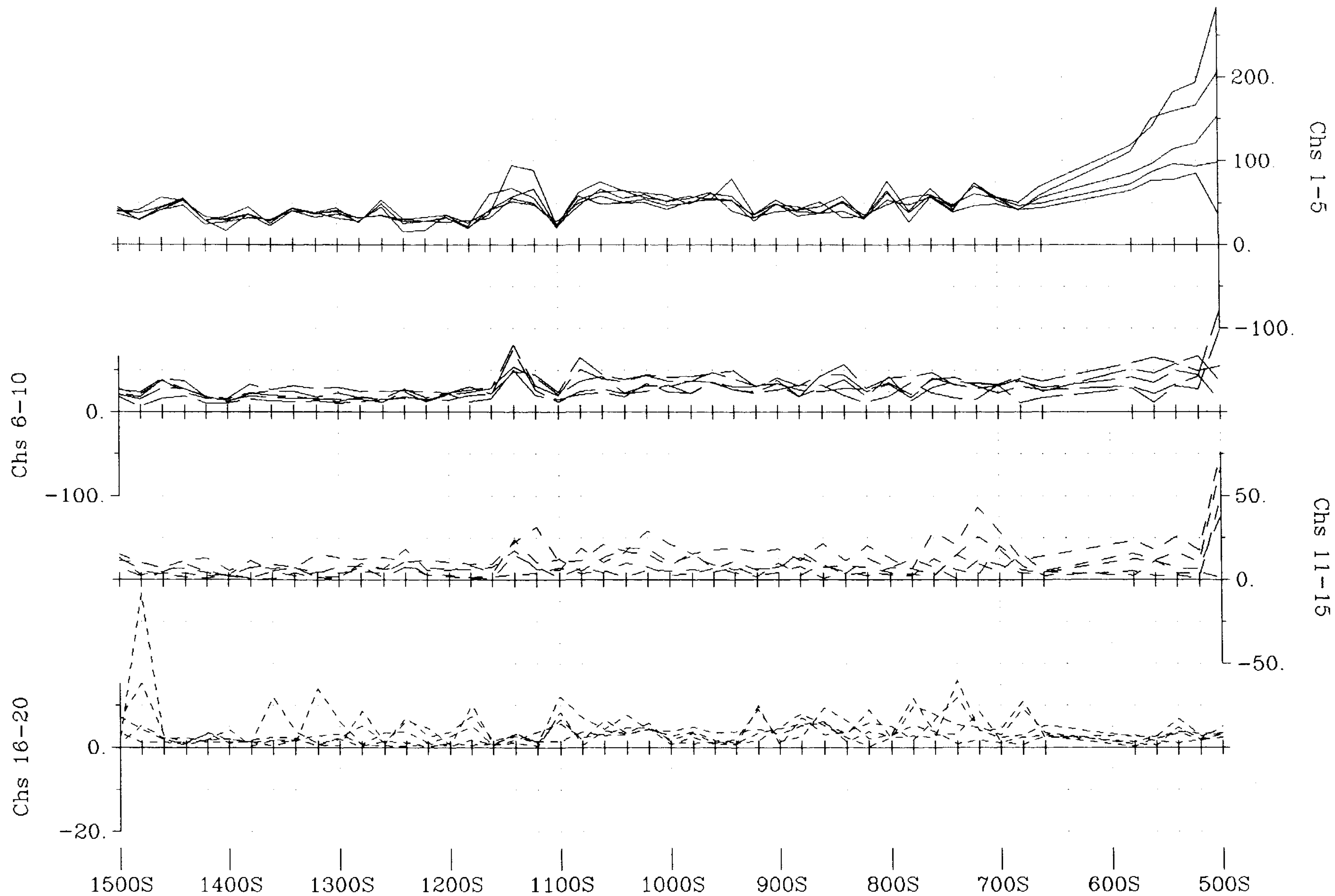
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-Y-15+00E



Line 15+00E – Total Field
Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

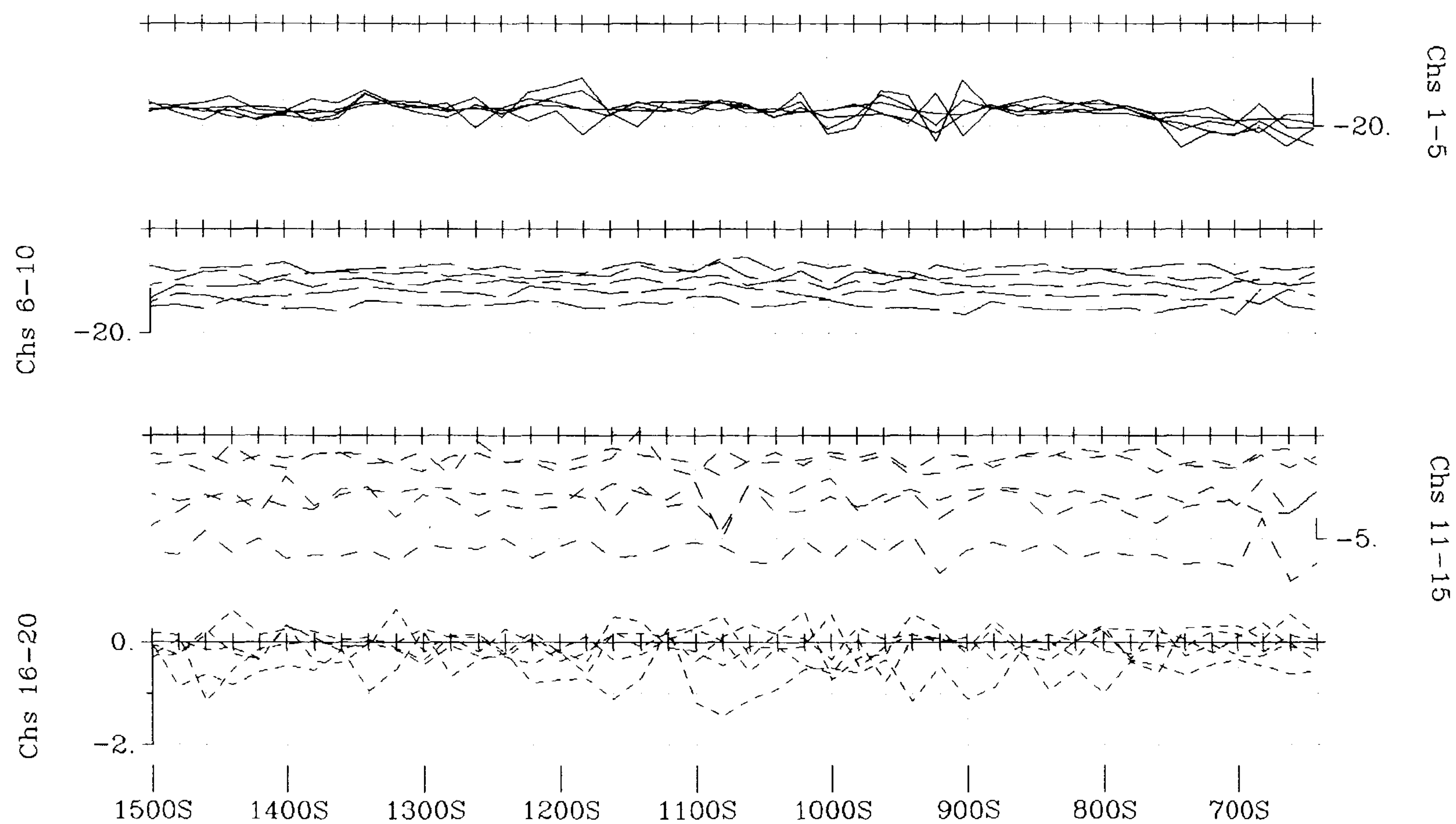
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up Hx - positive south Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels) & Geonics 3D Coil (3x200m^2) Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-TF-15+00E



Line 14+00E – Z Component
Hutt 12

Scale 1:5000

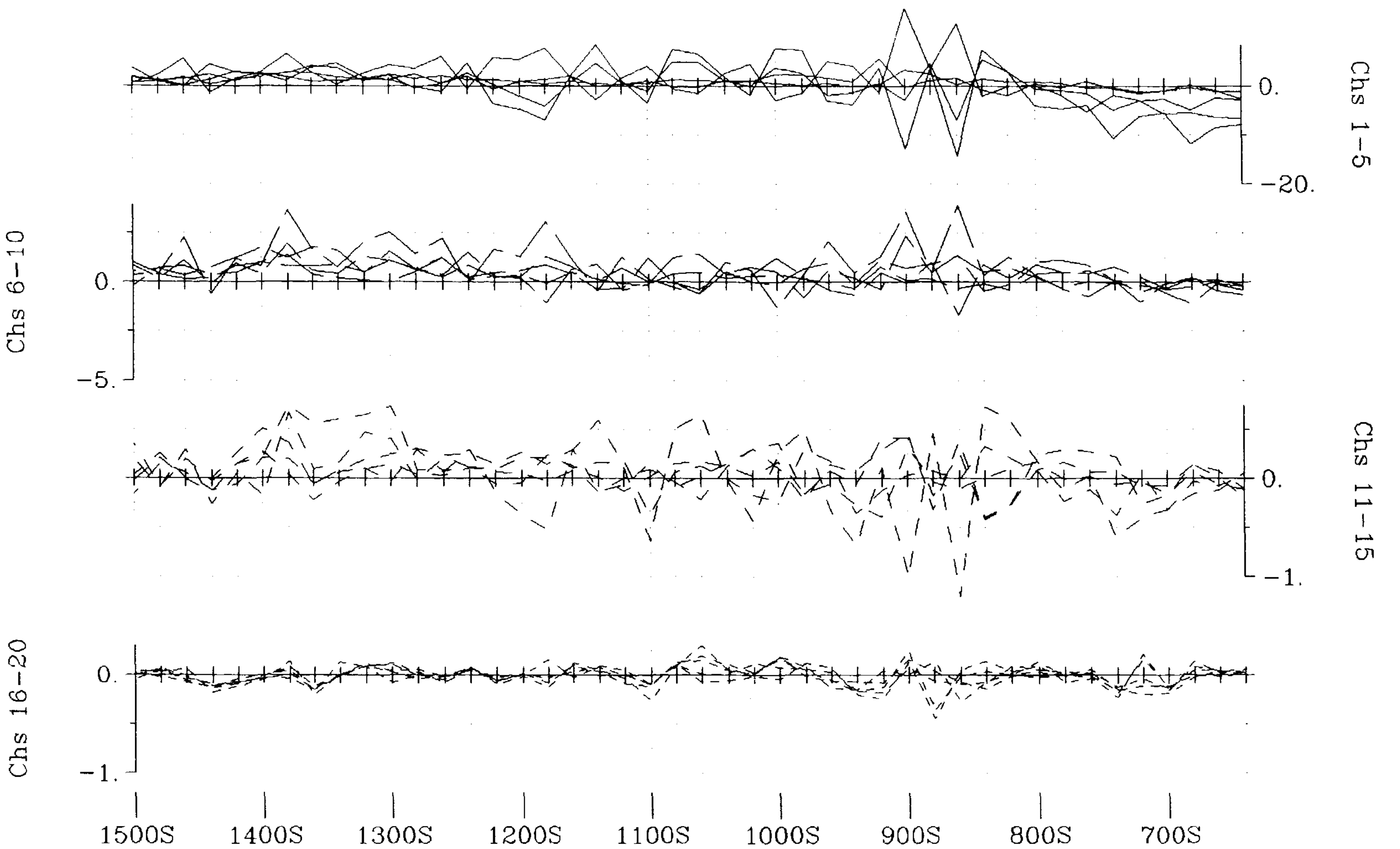
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-Z-14+00E



Line 14+00E – X Component
Hutt 12

Scale 1:5000

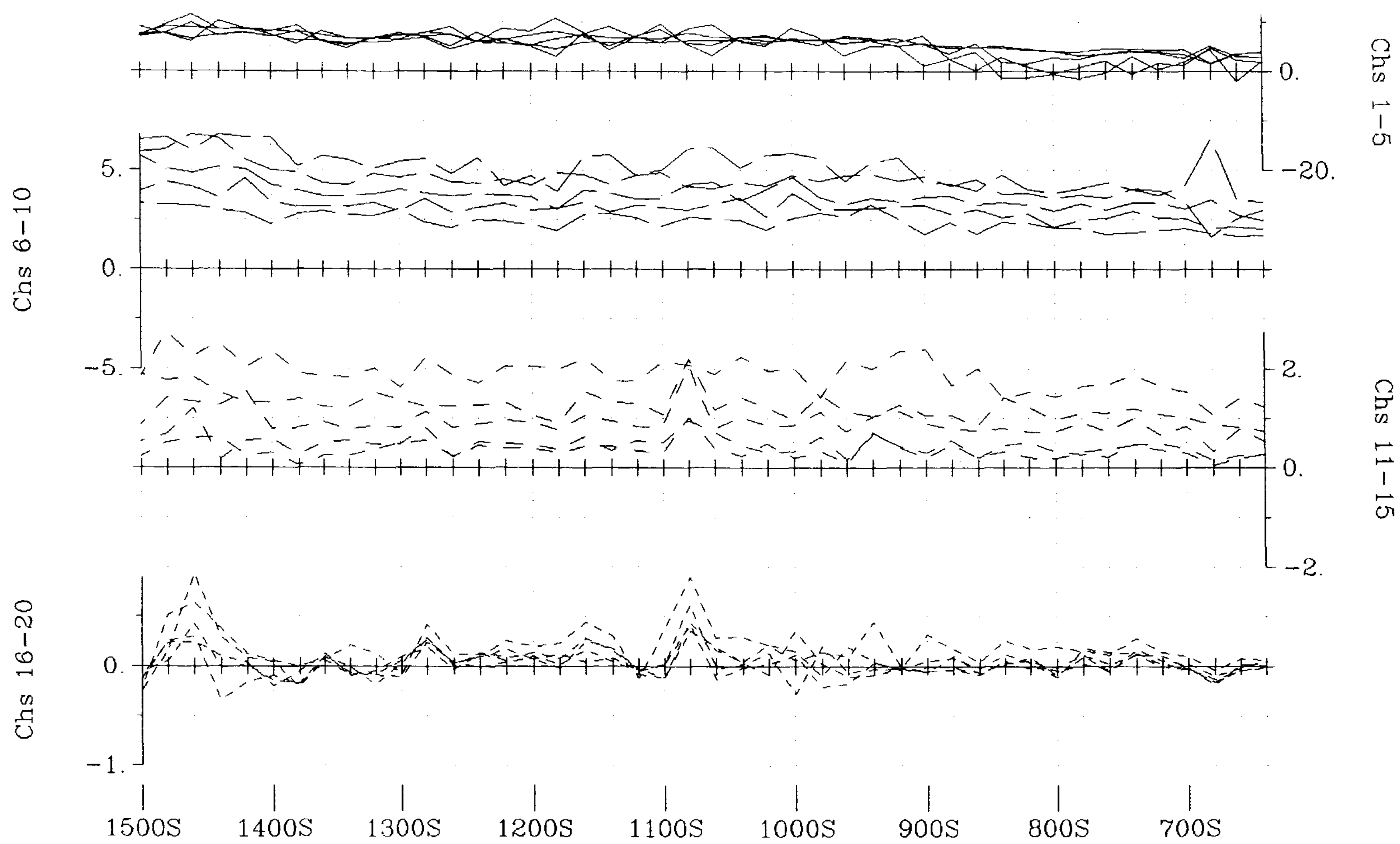
50 0 50 100 150 200
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-X-14+00E



Line 14+00E – Y Component
Hutt 12

Scale 1:5000

50 0 50 100 150 200

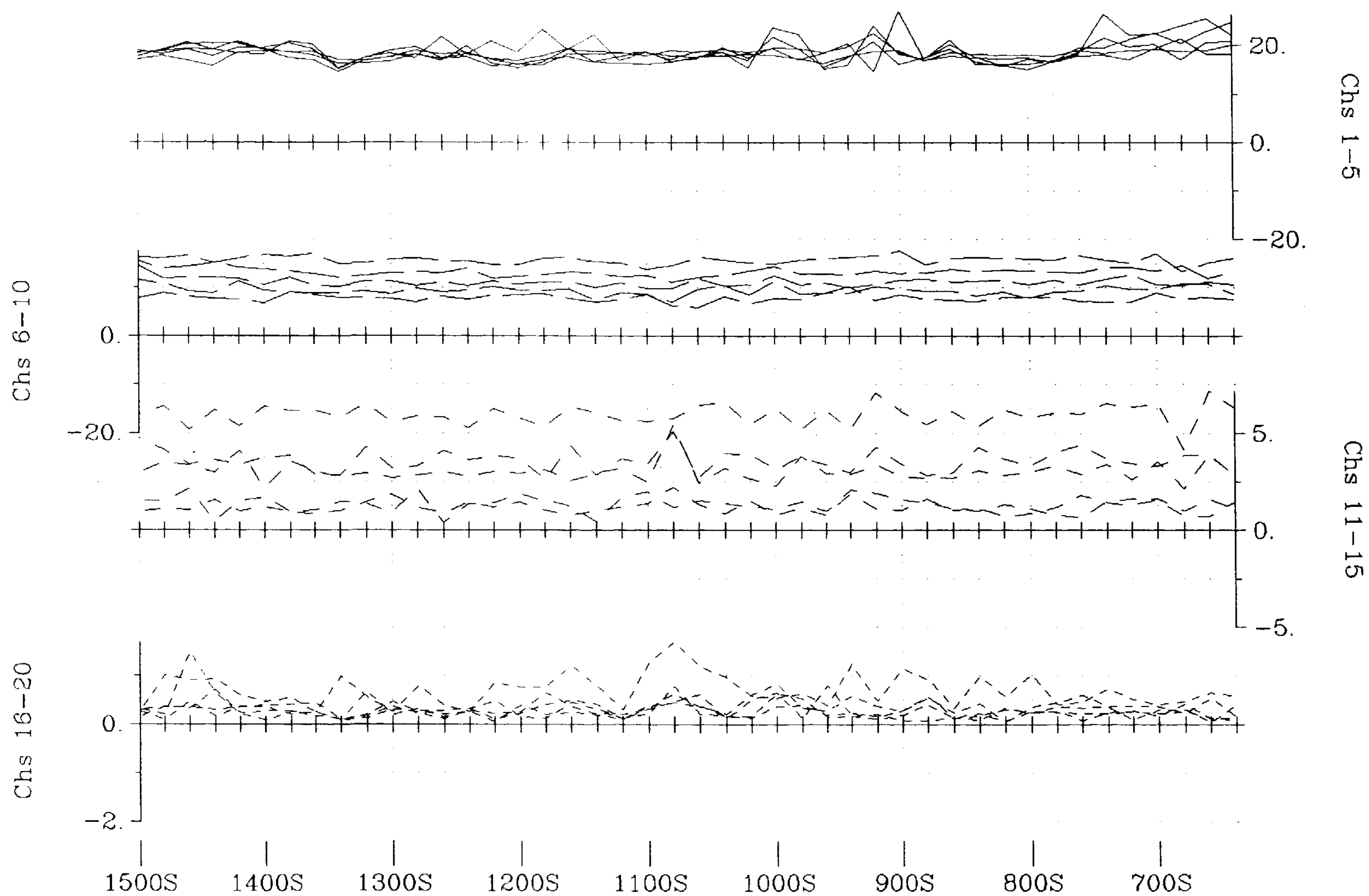
(meters)

FALCONBRIDGE LIMITED
HUTT PROPERTY
Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC.
DWG. NO. QG-131-4AXIS-Y-14+00E



Line 14+00E - Total Field

Hutt 12

Scale 1:5000

50 0 50 100 150 200

(meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Twp., ON

LPTEM FIXED-LOOP PROFILING SURVEY

Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600 x 800 metres
Tx Loop Location:	14+00E to 22+00E, 6+00S to 0+00S
Transmitter Current:	15.5 Amps
Transmitter Turn-Off Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up
	Hx - positive south
	Hy - positive west
Survey Date:	October 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels)
	& Geonics 3D Coil (3x200m^2)
	Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC.

DWG. NO. QG-131-4AXIS-TF-14+00E

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Ontario

Date: 2001-JUL-24

GEOSCIENCE ASSESSMENT OFFICE
933 RAMSEY LAKE ROAD, 6th FLOOR
SUDBURY, ONTARIO
P3E 6B5

Tel: (888) 415-9845
Fax:(877) 670-1555

FALCONBRIDGE LIMITED
SUITE 1200, 95 WELLINGTON STREET WEST
TORONTO, ONTARIO
M5J 2V4 CANADA

Submission Number: 2.21427
Transaction Number(s): W0160.30131

Dear Sir or Madam

Subject: Approval of Assessment Work

We have approved your Assessment Work Submission with the above noted Transaction Number(s). The attached Work Report Summary indicates the results of the approval.

At the discretion of the Ministry, the assessment work performed on the mining lands noted in this work report may be subject to inspection and/or investigation at any time.

If you have any question regarding this correspondence, please contact LUCILLE JEROME by email at lucille.jerome@ndm.gov.on.ca or by phone at (705) 670-5858.

Yours Sincerely,

Ron Gashinski
Supervisor, Geoscience Assessment Office

Cc: Resident Geologist

Falconbridge Limited
(Claim Holder)

Dean Rogers
(Agent)

Assessment File Library

Falconbridge Limited
(Assessment Office)

41P14NE2007 2.21427 HUTT 900

Work Report Summary

Transaction No: W0160.30131 **Status:** APPROVED
Recording Date: 2001-MAY-18 **Work Done from:** 2000-OCT-16
Approval Date: 2001-JUL-23 **to:** 2000-OCT-21

Client(s):

130679 FALCONBRIDGE LIMITED

Survey Type(s):

EM LC MAG

Work Report Details:

Claim#	Perform	Perform Approve	Applied	Applied Approve	Assign	Assign Approve	Reserve	Reserve Approve	Due Date
P 1227824	$1,270	$1,270	$1,644	$1,644	$0	0	$0	$0	2001-MAY-22
P 1236371	$6,774	$6,774	$6,400	$6,400	$374	374	$0	$0	2002-MAY-20
P 1236372	$423	$423	$423	$423	$0	0	$0	$0	2001-MAY-20
	$8,467	$8,467	$8,467	$8,467	$374	$374	$0	$0	

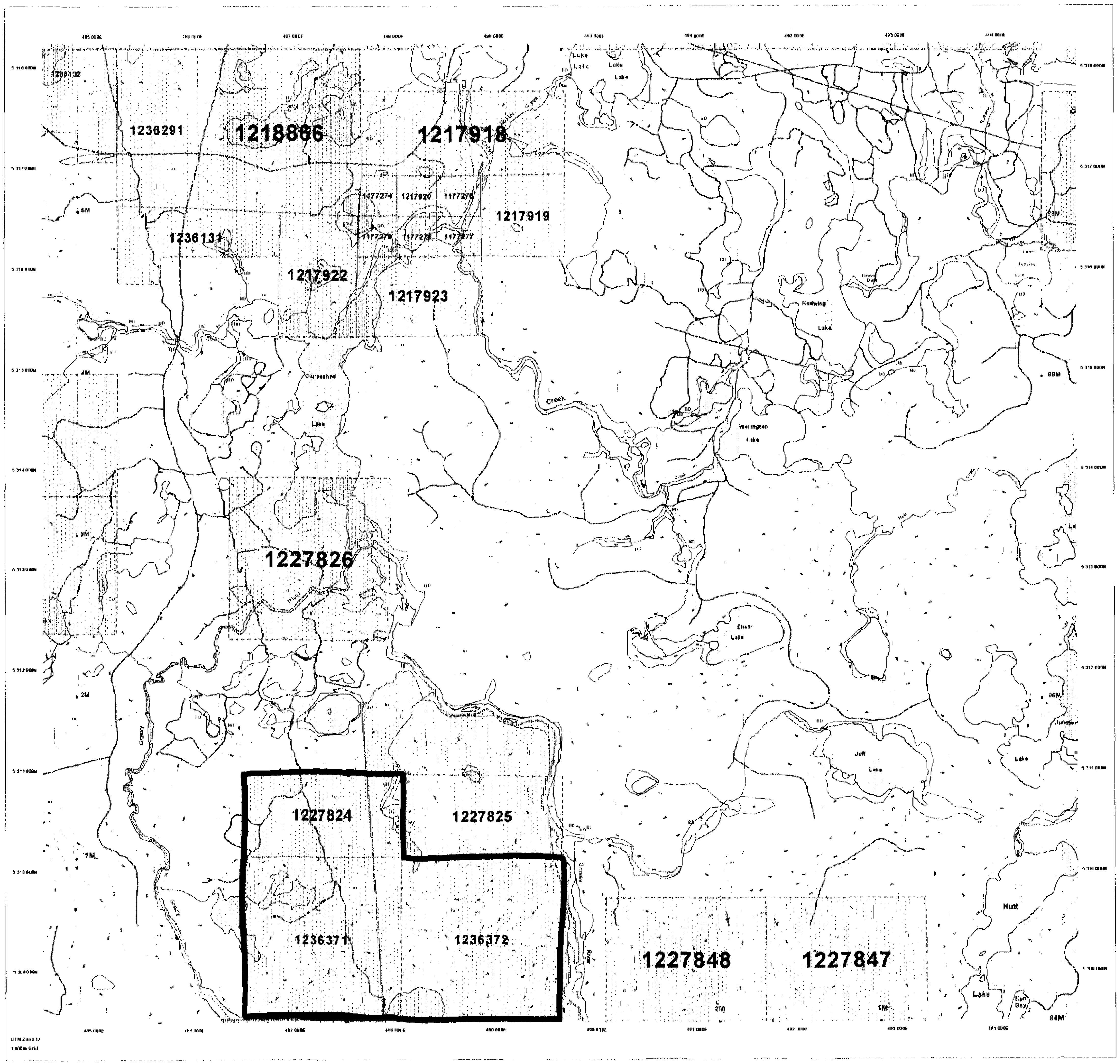
External Credits: $0

Reserve:

$0 Reserve of Work Report#: W0160.30131

$0 Total Remaining

Status of claim is based on information currently on record.



MINING LAND TENURE MAP

Date / Time of Issue May 18 2001 11:57h Eastern

TOWNSHIP / AREA	PLAN
HUTT	G-3948

ADMINISTRATIVE DISTRICTS / DIVISIONS

Mining Division	Porcupine
Land Titles/Registry Division	SUDBURY
Ministry of Natural Resources District	TIMMINS

TOPOGRAPHIC

LAND TENURE

LAND TENURE WITHDRAWALS

IMPORTANT NOTICES

LAND TENURE WITHDRAWAL DESCRIPTIONS

IMPORTANT NOTICES

2.21427

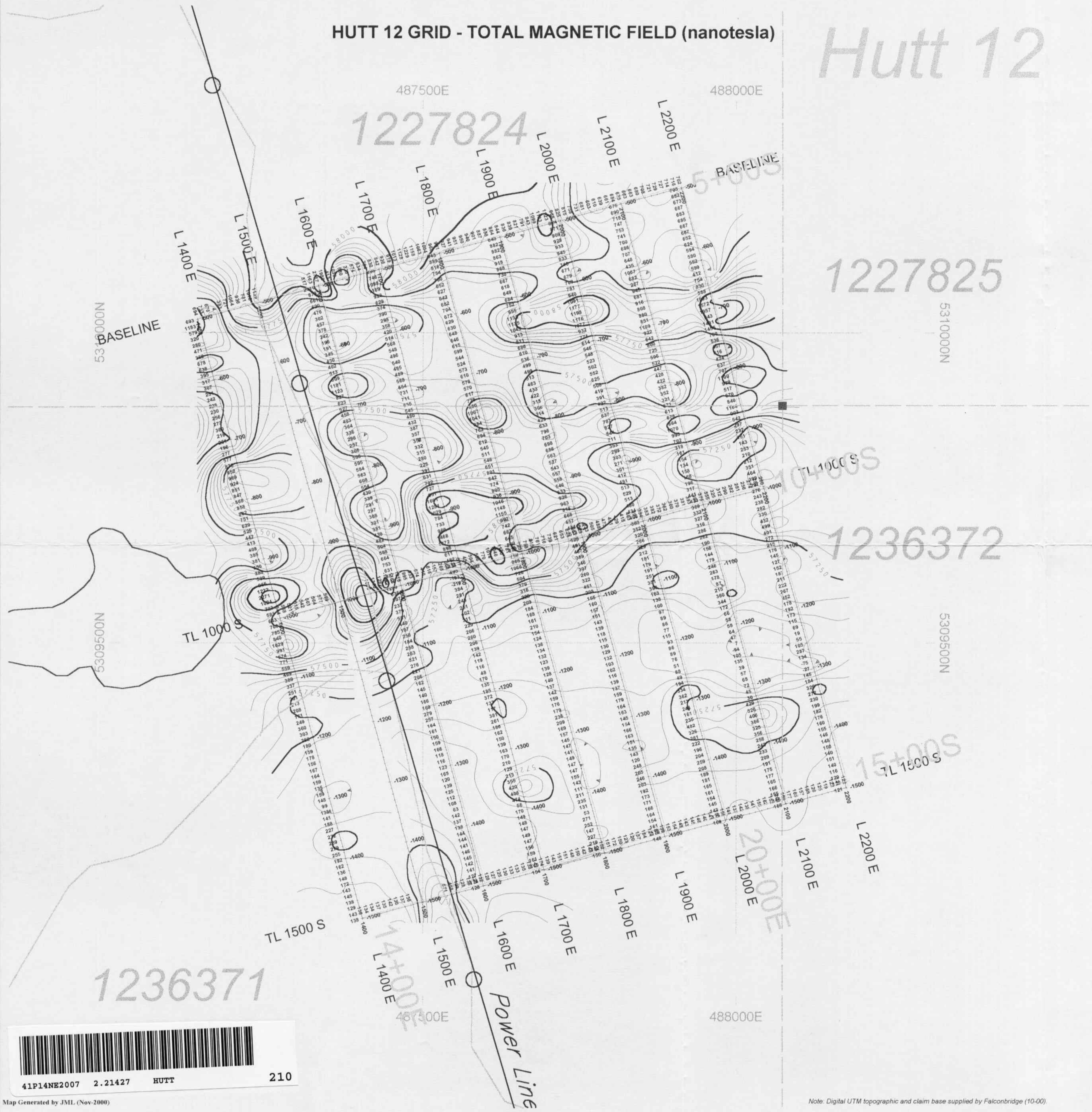
MAG
EM

41P14NE2007 2.21427 HUTT

200

General Information and Limitations

HUTT 12 GRID - TOTAL MAGNETIC FIELD (nanotesla)



Note: Digital UTM topographic and claim base supplied by Falconbridge (10-00).

Map Generated by JML (Nov-2000)

HUTT 12 GRID

Scale 1:5000

100 0 100 200

(meters)

FALCONBRIDGE LIMITED

HUTT 12 PROPERTY

Hutt Twp., ON

GROUND MAGNETIC SURVEY

TOTAL MAGNETIC FIELD CONTOURS

(Base Station Corrected)

Field Datum:	56000 nanotesla
Field Inclination:	74degN
Field Declination:	11degW
Diurnal Correction:	Base Station (10 sec/cyc)
Base Station Position:	1350E/700S
Station Interval:	20 metres
Base Level Removed from Postings:	57000 nanotesla
Gridding Method:	Rangrid
Grid Cell Size:	10m (Desampling=2)
Contour Interval:	50, 250, 1000 nanotesla
Colour Zoning:	Equal Area / Colour.tbl
Survey Date:	October, 2000
Instrumentation:	Terraplus-EDA OMNI-IV System (Proton-precession)
Operator:	QGI - DMacGillivray

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC

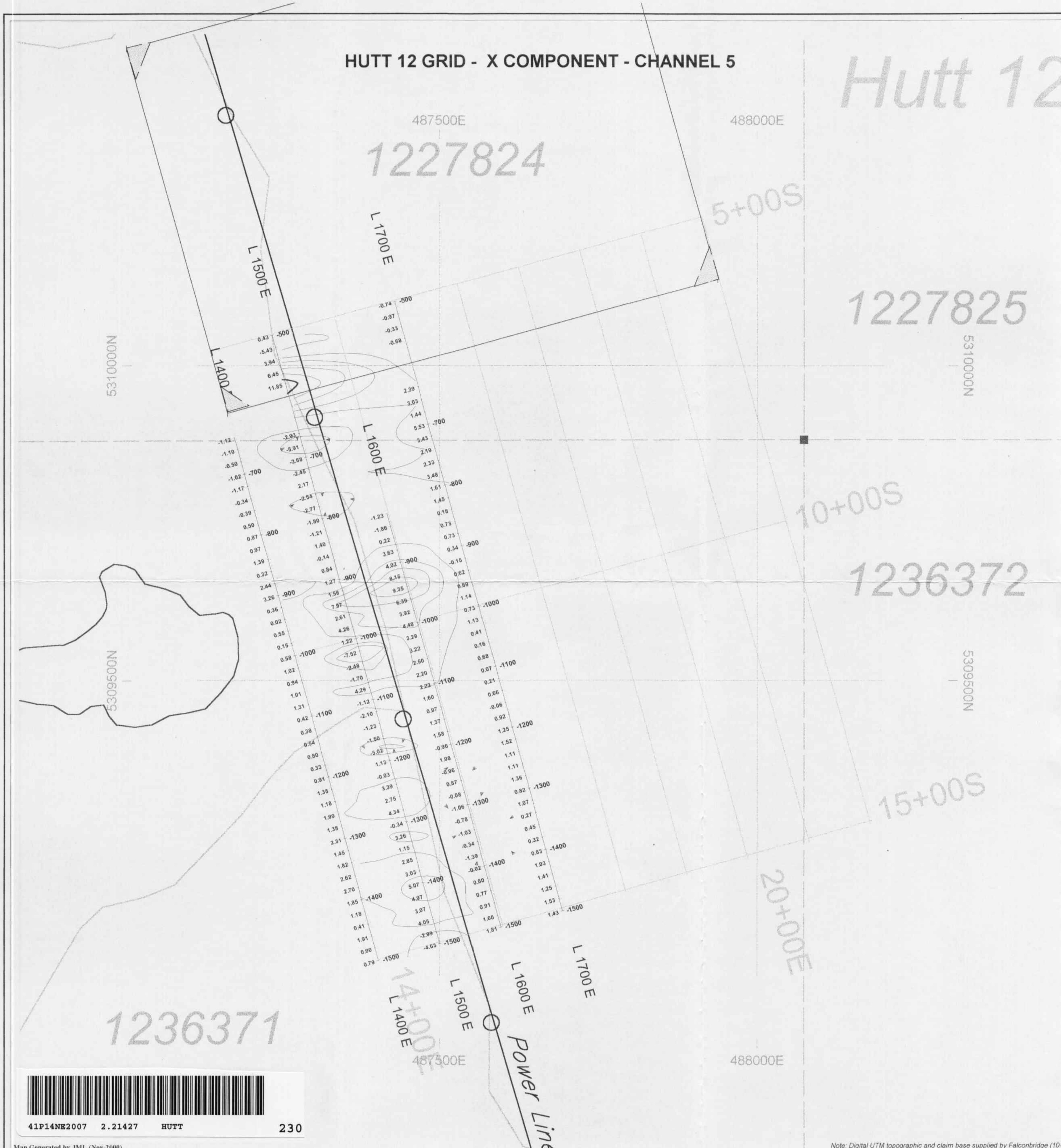
DWG. NO. QG131-HUTT12-MAGCONT-TF-ROT-HUTT 12 GRID

FALCONBRIDGE LIMITED
HUTT 12 PROPERTY
Hutt Twp., ON

GROUND MAGNETIC SURVEY
TOTAL MAGNETIC FIELD PROFILES
(Base Station Corrected)

Field Datum:	56000 nanotesla
Field Inclination:	74degN
Field Declination:	11degW
Diurnal Correction:	Base Station (10 sec/cyc)
Base Station Position:	1350E/700S
Station Interval:	20 metres
Postings:	nanotesla=Left/Top;Right/bottom=Station
Posting Base Level:	57000 nanotesla
Profile Base Level:	57000 nanotesla
Vertical Profile Scale:	1000 nanotesla per cm
Survey Date:	October, 2000
Instrumentation:	Terraplus-EDA OMNI-IV System (Proton-precession)
Operator:	QGI - DMacGillivray

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC
DWG. NO. QG131-HUTT12-MAGPROF-TF-HUTT 12 GRID



41P14NE2007 2.21427 HUTT 230

Map Generated by JML (Nov-2000)

HUTT 12 GRID
X COMPONENT - CHANNEL 5

Scale 1:5000

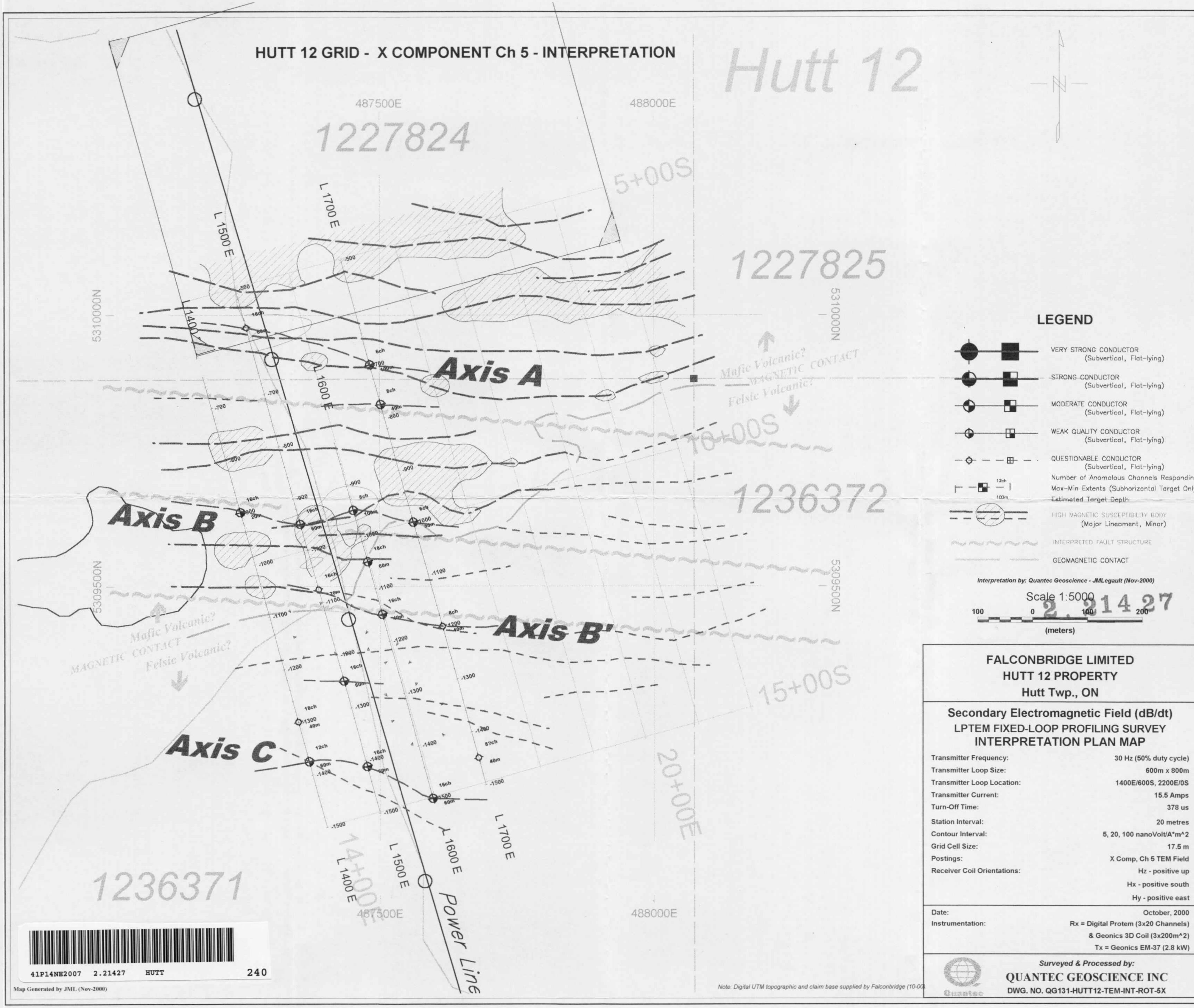
100 0 100 200
(meters)

FALCONBRIDGE LIMITED
HUTT 12 PROPERTY
Hutt Twp., ON

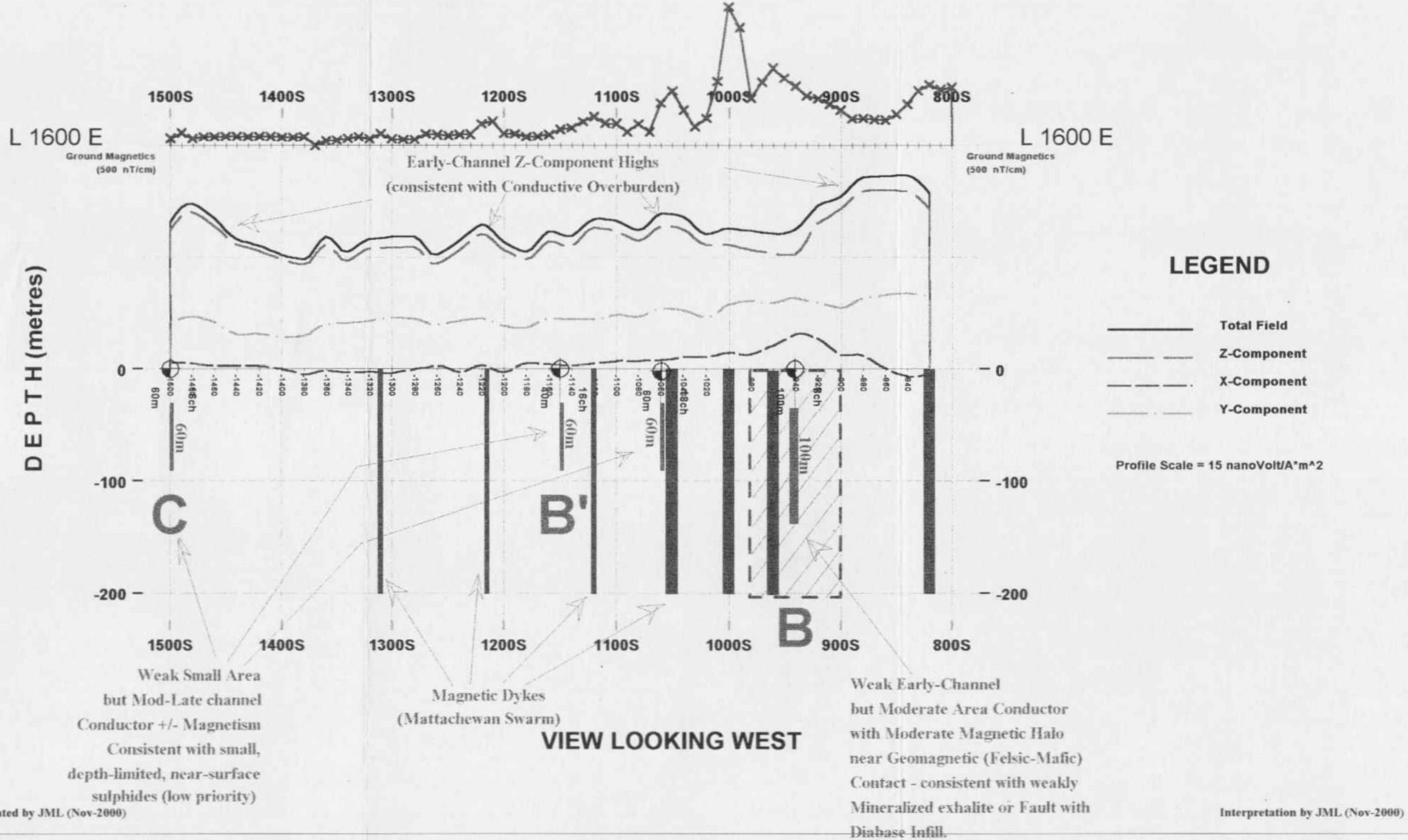
LPTEM FIXED-LOOP PROFILING SURVEY
X Component Contour Map - Ch 5
Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Transmitter Loop Size:	600m x 800m
Transmitter Loop Location:	1400E/600S, 2200E/0S
Transmitter Current:	15.5 Amps
Turn-Off Time:	378 us
Station Interval:	20 metres
Contour Interval:	2, 10, 50 nanoVolt/A*m^2
Grid Cell Size:	17.5 m
Postings:	X Comp, Ch 5 TEM Field
Receiver Coil Orientations:	Hz - positive up Hx - positive south Hy - positive east
Survey Date:	October, 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels) & Geonics 3D Coil (3x200m^2) Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:
QUANTEC GEOSCIENCE INC
DWG. NO. QG131-HUTT12-TEM-CONT-ROT-5X


HUTT 12 GRID - X COMPONENT Ch 5 - INTERPRETATION
Hutt 12
487500E
488000E
1227824
1227825
1236372
1236371
5+00S
10+00S
15+00S
20+00E
14+00
5310000N
5309500N
L 1400
L 1500 E
L 1600 E
L 1700 E
L 1400E
Power Line
Axis A
Axis B
Axis B'
Axis C
Mafic Volcanic?
MAGNETIC CONTACT
Felsic Volcanic?
LEGEND
VERY STRONG CONDUCTOR (Subvertical, Flat-lying)
STRONG CONDUCTOR (Subvertical, Flat-lying)
MODERATE CONDUCTOR (Subvertical, Flat-lying)
WEAK QUALITY CONDUCTOR (Subvertical, Flat-lying)
QUESTIONABLE CONDUCTOR (Subvertical, Flat-lying)
Number of Anomalous Channels Responding
Max-Min Extents (Subhorizontal Target Only)
Estimated Target Depth
HIGH MAGNETIC SUSCEPTIBILITY BODY (Major Lineament, Minor)
INTERPRETED FAULT STRUCTURE
GEOMAGNETIC CONTACT
Interpretation by: Quantec Geoscience - JMLegault (Nov-2000)
Scale 1:5000
100 0 100 200
(meters)
2.21427
FALCONBRIDGE LIMITED
HUTT 12 PROPERTY
Hutt Twp., ON
Secondary Electromagnetic Field (dB/dt)
LPTEM FIXED-LOOP PROFILING SURVEY
INTERPRETATION PLAN MAP
Transmitter Frequency: 30 Hz (50% duty cycle)
Transmitter Loop Size: 600m x 800m
Transmitter Loop Location: 1400E/600S, 2200E/0S
Transmitter Current: 15.5 Amps
Turn-Off Time: 378 us
Station Interval: 20 metres
Contour Interval: 5, 20, 100 nanoVolt/A*m^2
Grid Cell Size: 17.5 m
Postings: X Comp, Ch 5 TEM Field
Receiver Coil Orientations: Hz - positive up
Hx - positive south
Hy - positive east
Date: October, 2000
Instrumentation: Rx = Digital Protem (3x20 Channels)
& Geonics 3D Coil (3x200m^2)
Tx = Geonics EM-37 (2.8 kW)
Surveyed & Processed by:
QUANTEC GEOSCIENCE INC
DWG. NO. QG131-HUTT12-TEM-INT-ROT-5X
Note: Digital UTM topographic and claim base supplied by Falconbridge (10-00)
41P14NE2007 2.21427 HUTT 240
Map Generated by JML (Nov-2000)

LINE 16+00E - CHANNEL 5 TEM SECONDARY FIELDS



Map Generated by JML (Nov-2000)

Interpretation by JML (Nov-2000)

HUTT 12 GRID

MULTI-COMPONENT - CHANNEL 5 PROFILES

Scale 1:5000

50 0 50 100 150 200 (meters)

FALCONBRIDGE LIMITED

HUTT PROPERTY

Hutt Township, ON

LPTEM FIXED-LOOP PROFILING SURVEY

Secondary Electromagnetic Field (dB/dt)

Transmitter Frequency:	30 Hz (50% duty cycle)
Tx Loop Size:	600m x 800m
Tx Loop Location:	1400E/600S, 2200E/0S
Transmitter Current:	15.5 Amps
Tx Turn-Off-Time:	378 us
Station Interval:	20 metres
Profile Units:	nanoVolt/A*m^2
Receiver Coil Orientation:	Hz - positive up Hx - positive south Hy - positive east
Survey Date:	October, 2000
Instrumentation:	Rx = Digital Protem (3x20 Channels) & Geonics 3D Coil (3x200m^2) Tx = Geonics EM-37 (2.8 kW)

Surveyed & Processed by:

QUANTEC GEOSCIENCE INC

DWG. NO. QG131-HUTT-TEM-MULTCOMP-16+00E-CH5

HUTT 12 GRID - TOTAL FIELD COMPONENT - CHANNEL 5
Hutt 12
1227824
1227825
1236372
1236371
487500E
488000E
5310000N
5309500N
5+00S
10+00S
15+00S
20+00E
14+00E
L 1400 E
L 1500 E
L 1600 E
L 1700 E
Power Line
HUTT 12 GRID
TOTAL FIELD COMPONENT - CHANNEL 5
Scale 1:5000
100 0 100 200
(meters)
FALCONBRIDGE LIMITED
HUTT 12 PROPERTY
Hutt Twp., ON
LPTEM FIXED-LOOP PROFILING SURVEY
TOTAL FIELD Component Contour Map - Ch 5
Secondary Electromagnetic Field (dB/dt)
Transmitter Frequency: 30 Hz (50% duty cycle)
Transmitter Loop Size: 600m x 800m
Transmitter Loop Location: 1400E/600S, 2200E/0S
Transmitter Current: 15.5 Amps
Turn-Off Time: 378 us
Station Interval: 20 metres
Contour Interval: 5, 20, 100 nanoVolt/A*m^2
Grid Cell Size: 17.5 m
Postings: TF Comp, Ch 5 TEM Field
Receiver Coil Orientations: Hz - positive up
Hx - positive south
Hy - positive east
Survey Date: October, 2000
Instrumentation: Rx = Digital Protem (3x20 Channels)
& Geonics 3D Coil (3x200m^2)
Tx = Geonics EM-37 (2.8 kW)
Surveyed & Processed by:
Quantec
DWG. NO. QG131-HUTT12-TEM-CONT-ROT-5TF
Note: Digital UTM topographic and claim base supplied by Falconbridge (10-00).
Map Generated by JML (Nov-2000)
2.21427
41P14NE2007 2.21427 HUTT
260