

OUTER-RIM EXPLORATION SERVICES

ABN 88 104 028 417

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(PO Box 3323)
NORMAN PARK, QLD. 4170

Geophysical Contracting Services

100% Australian Owned

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Email: mail@outer-rim.com.au

Volume 1 of 1

Client : Zinifex Limited

Prospect : High Point and Sock Creek

Area : Rosebery, Tas.

Survey : Borehole PEM Survey

Survey Period : 22nd September to 4th October, 2007

Operator : Adrian Page

DAILY LOG: Zinifex Limited - September, 2007

DATE	COMMENTS	CHARGES
08-09-07 to 11-09-07	We picked up the extra gear, drove to Melbourne from Queensland, caught the boat across to Devonport and drove to Rosebery. (Four days taken but only two days charged).	2 Mob. day \$2300.00

02-10-07

We drove out to the Zinifex office at Rosebery, tagged on, drove out to High Point and laid out the loop for BHD-008. We read the Z component, drove to BHD-007, dummied it, laid out the loop and read the Z component. We left the loops out in case we need to read the X-Y components.

SURVEY PARAMETERS:

Loop West :400 x 300m
386650E; 5393400N: 386415E; 5393055N:
386655E; 5392855N: 386870E; 5393210N:

Current :20 Amps
Time Base :20 ms
Ramp Time :0.5ms
Sync :Clock

Hole No. :**BHD-008**
386810E; 5393095N:

Depth :398m
Channels :21
Components :Z

Loop North :300 x 300m
385340E; 5392180N: 385425E; 5391940N:
385750E; 5392000N: 385630E; 5392275N:

Current :20 Amps
Time Base :20 ms
Ramp Time :0.5ms
Sync :Clock

Hole No. :**BHD-007**
385570E; 5391940N:

Depth :340m
Channels :21
Components :Z

1 Survey day \$2150.00
1 Field Assist. day \$ 300.00

03-10-07 We checked the email for a response from Jovan, then to the Zinifex office at 7.00am, but they hadn't heard from Jovan either. We decided to pull in sufficient wire for the loop for BHD-009 (we were short of wire because we had lost about 600m at the previous job). We took the wire from the BHD-007 loop as the response was very early time and discrete and, after the rain today, I suspect we will not be able to get back into this hole for sometime. We recovered the loop, laid out the loop for BHD-009 and read the Z component. While surveying, the Zinifex field crew started to recover the loop for BHD-008. That evening, Jovan sent an email requesting the X-Y for both BHD-007 and BHD-008.

SURVEY PARAMETERS:

Loop NW :300 x 300m
386330E; 5393025N: 386090E; 5392830N:
386320E; 5392620N: 386535E; 5392865N:
Current :20 Amps
Time Base :20 ms
Ramp Time :0.5ms
Sync :Clock

Hole No. :**BHD-009**
386430E; 5392750N:
Depth :400m
Channels :21
Components :Z

1 Survey day \$2150.00
1 Field Assist. day \$ 300.00

04-10-07 We drove out to BHD-008, laid out the remainder of the loop and read the X-Y components while the Zinifex field crew pulled in the loop for BHD-009. We finished the X-Y, recovered the loop for BHD-008, packed up all the gear. Craig arrived to accessed the EZ track section to BHD-007 and agreed not to attempt it again in its current condition.

SURVEY PARAMETERS:

Loop West :400 x 300m
386650E; 5393400N: 386415E; 5393055N:
386655E; 5392855N: 386870E; 5393210N:
Current :20 Amps
Time Base :20 ms
Ramp Time :0.5ms
Sync :Clock

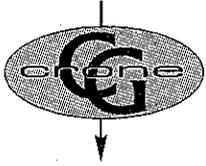
Hole No. :**BHD-008**
386810E; 5393095N:
Depth :398m
Channels :21

Components :X,Y

1 Survey day \$2150.00
1 Field Assist. day \$ 300.00

05-10-07	We drove to the Zinifex office, loaded up, used their wash down bay to clean the truck inside and out and got permission to stay at the house until Sunday when we board the boat back to the mainland.	1 Standby day	N/C
06-10-07	We stayed at the house at Rosebery and completed the logs etc.	1 Standby day	N/C
07-10-07	We drove from Rosebery to Burnie, boarded the Spirit of Tasmania for the return trip to the Mainland, leaving at 8.00pm.	1 Mob. day	\$1150.00
08-10-07	We arrived in Melbourne, refuelled and continued north to the next client in NSW.	1 Mob. day	\$1150.00

Appendix



CRONE GEOPHYSICS & EXPLORATION LTD.

3607 WOLFEDALE ROAD, MISSISSAUGA, ONTARIO, CANADA, L5C 1V8
Phone: (905) 270-0096 Fax: (905) 270-3472 www.cronegeophysics.com

3-D PULSE EM - SYSTEM DESCRIPTION

Name of System: Crone Pulse EM (PEM).

Method Employed: TDEM (Time-domain electromagnetics) or TEM (Transient EM).

Survey Types:

- **Surface** - DEEPEM, Large In-Loop, Moving Loop, Moving Coil - 3 components.
- **Borehole** - 3D Borehole PEM - 3 components are measured and oriented.
- **Underground** - 3D Borehole PEM - including flat or up-dipping holes.

Measured Quantity: Rate of change of magnetic field in nanoTesla/second (same as nV/m²).

Receiver: Fully digital (input is digitized before stacking) with 24 bit dynamic range.

Channels (Gates):

- Typically 20 logarithmic channels in off-time and 1 during ramp (PP).
- Operator can select from several built-in tables including:
 - 10, 20, or 30 channel system (single, double, triple density)
 - 45 channels 4.5 usec wide covering the end of ramp and start of off-time.
 - 42 channels and PP for 150 msec time base.
 - full sampling of ramp and off-time (8 on ramp and full off-time starting at 0 usec).
- Programmable channel positions in the field.

Stacking: 512 to 65536 stacks with spike rejection.

Gain Control: Automatic software control (no selection or correction required).

Rx Operation: Menu-driven software. Large 16x40 character LCD. Full alphanumeric keyboard.

Display: 256 x 128 pixel scrollable graphic LCD for decay curves and profiles in the field.

Data Handling: Solid state storage; multiple files; all files can be appended at any time. Plot, list, sort, delete data. RS232 transmission of all data or only certain files.

Synchronization: Radio, cable, or crystal clock

Current Waveform: Bipolar on-off square waveform with exponential turn-on and ramp off.

Time Base: Off-time plus ramp time.

- 8.33, 16.66, 50, 100 and 150 msec for 60 Hz noise rejection (equivalent base frequencies of 30, 15, 5, 2.5, 1.67 Hz.)
- 10.0, 20.0, 50.0, 100.0 and 150 msec for 50 Hz noise rejection (equivalent base frequencies of 25, 12.5, 5, 2.5, 1.67 Hz.)

Ramp Time: The time required for the current to turn off.

- 500, 1000, or 1500 usec selections for precisely controlled linear turn-off ramps.
- "fast ramp" option turns current off as quickly as possible for a given loop size and current (2 usec or less to a few hundred usec).

Transmit Loop:

- Single turn loop of any dimension (less than 100m x 100m to greater than 2km x 2km).
- Multi-turn 14m diameter loop for near-surface Moving Coil surveys.

Tx Output Current:

- 30 Amps maximum at 160 Volts for 4.8 kWatt system.
- 20 Amps maximum at 120 Volts for 2.4 kWatt system.

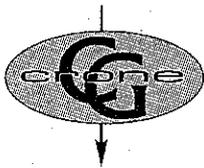
Tx Output Voltage:

- 48 to 240 Volts continuously adjustable for 4.8 kWatt system.
- 24 to 120 Volts continuously adjustable for 2.4 kWatt system.

Tx Safety features: Transmitter automatically shuts off when loop is opened. Also shuts off with high instrument temperature and overload. Fuse and circuit breaker overload protection.

Borehole Probes: 32 mm diameter.
Pressure-tested for depths of 2500m or more.

Operating Temperature: -40°C to 50°C



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3-D PULSE EM - SPECIAL FEATURES

High Power: A new 4.8 kWatt transmitter allows very large loops to be used while maintaining a high current.

Precise Current Ramps: Precisely- controlled linear ramps of fixed duration allow for proper comparisons to be made between data from different loop sizes, and also allows for the step response transformation.

Long Time Base (Low Frequency): A new long time base of 150 msec (1.67 Hz) ensures that very long time constant conductors can be seen in complicated environments.

Step Response: A new step response transformation allows even longer time-constant conductors to be seen by reproducing the response that would be seen in a direct measurement of the step response. Our controlled linear ramps and our standard Primary Pulse (PP) measurement on the ramp are necessary for this calculation.

Fast Ramp Option: A new "fast ramp" option duplicates the response seen from other pulse-type systems, but this does not allow for the step response calculation. We do not recommend fast ramps because they are not as linear as our controlled ramps, they drift in duration as the loop warms up, and there is no advantage in terms of power put into the ground since the area under the dB/dt pulse produced by the ramp is the same.

Calculation of Impulse Response: The "fast ramp" response can be calculated (as well as the true impulse response) from our standard linear ramp data.

True Digital Receiver: The Crone receiver is a true digital receiver in that the input is immediately digitized before stacking and binning. This produces the following feature (programmable gate positions).

Programmable Gate Positions: There is complete freedom of channel (or gate) positions and widths,

which can be programmed in the field. There are also numerous built-in tables.

Full Sampling: The entire ramp and off-time can be sampled with contiguous channels if desired.

Current Ramp always Sampled: A Primary Pulse (PP) measurement is always made on the current ramp, which is of great help to ensure proper polarities, and also is crucial for the step response transformation.

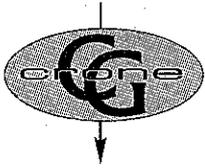
High Quality LCD Display: The 256 x 128 pixel LCD on the receiver allows for accurate plots of decay curves and line or borehole profiles on the receiver, and is of great assistance to the operator to monitor noise and anomaly build-up.

No Data Reduction: There is no data reduction for surface surveys and Z-component borehole surveys, so that what is seen on the receiver is what will be seen in the final plots. For 3-D borehole surveys, there is only the correction applied to the direction of the X and Y components to aid interpretation. Gain controls are automatic, so that the output is always in nanoTeslas/sec (= nV/m²).

Slim-line Probes: A 32 mm probe diameter ensures that virtually all holes can be surveyed with 3-component measurements.

Oriented X and Y Components: X-Y orientation tools accurately orient the X and Y components. This helps tremendously with giving direction to off-hole conductors and to the centre of in-hole conductors.

Reliable, Durable and Portable Equipment: The PEM system has been in use since the early 1970's under temperature extremes of -40°C to +50°C, in desert, jungle, arctic, mountainous, and underground mining conditions.



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3-D PULSE EM - APPLICATIONS

- **Base metals** ⇒ direct detection of:
 - ◊ volcanogenic massive sulphide (VMS) deposits
 - ◊ magmatic sulphide deposits
 - ◊ sedex massive sulphide deposits
 - ◊ higher grade ore within disseminated zones⇒ indirect detection of :
 - ◊ sphalerite and other non-conductors
 - ◊ galena and other poorly connected mineralsthrough detection of associated well-connected conductors.
⇒ detection of conductive marker zones related to deposits
- **Gold** ⇒ detection of associated conductors - e.g. pyrite/pyrrhotite
⇒ detection of the host - e.g. banded iron formations
- **Uranium** ⇒ detection of associated graphitic basement conductors
⇒ detection of associated conductive alteration zones
- **Diamonds** ⇒ detection and definition of clay-rich layer overlying kimberlites
⇒ locating kimberlites under locally thinned conductive cover

In the ore definition, delineation and production stages of a mining operation, Pulse EM can still be highly effective to:

- Define the boundaries of conductive ore
- Determine the size of intersected conductors and thereby determine whether they are connected to main ore zones.
- Reduce the number of necessary drillholes by exploring between holes.
- Survey underground drillholes - even flat or inclined holes.

Pulse EM can also be used for:

- General geological mapping of conductive structures
 - ⇒ shears, fractures, lineaments
 - ⇒ hydrothermal alteration
 - ⇒ graphite-rich rocks, including graphitic schist, shale, slate, and argillite
 - ⇒ clay alteration and zeolites
 - ⇒ differential and clay weathering
 - ⇒ conductive weathered layer at surface
- Groundwater exploration
- Mapping groundwater contamination plumes and freshwater-saltwater interface
- Geothermal exploration
- Mapping depth and thickness of horizontal strata
- Mapping permafrost thickness

CONTENTS

Plan No.	Plan Type	ID.	Description	Scale
1	Plan	MS-001	Drillhole Location plan	1:10000
2	Section		Primary Field plot	1:15000
3			Primary Field plot	1:15000
4	Header	MS-001	Header information	N/A
5	Profile	(East)	Z - Log plot	1:7500
6			- Linear, Ch1-10, 1:2000	1:7500
7			- Linear, Ch10-21, 1:250	1:7500
8	Header	MS-001	Header information	N/A
9	Profile	(West)	Z - Log plot	1:7500
10			- Linear, Ch1-10, 1:1500	1:7500
11			- Linear, Ch10-21, 1:400	1:7500
12	Plan	BHD-007	Drillhole Location plan	1:5000
13	Section		Primary Field plot	1:5000
14	Header	BHD-007	Header information	N/A
15	Profile	(North)	Z - Log plot	1:2000
16			- Linear, Ch1-10, 1:150	1:2000
17			- Linear, Ch10-21, 1:5	1:2000
18	Plan	BHD-008,9	Drillhole Location plan	1:10000
19	Section	BHD-008	Primary Field plot	1:5000
20		BHD-009	Primary Field plot	1:5000
21	Header	BHD-008	Header information	N/A
22	Profile	(West)	Z - Log plot	1:2000
23			- Linear, Ch1-10, 1:400	1:2000
24			- Linear, Ch10-21, 1:5	1:2000
25			X - Log plot	1:2000
26			- Linear, Ch1-10, 1:5000	1:2000
27			- Linear, Ch10-21, 1:5	1:2000
28			Y - Log plot	1:2000
29			- Linear, Ch1-10, 1:500	1:2000
30			- Linear, Ch10-21, 1:5	1:2000
31			Total Field plot	1:2000
32	Header	BHD-009	Header information	N/A
33	Profile	(NW)	Z - Log plot	1:2000
34			- Linear, Ch1-10, 1:200	1:2000
35			- Linear, Ch10-21, 1:5	1:2000

PLOTS

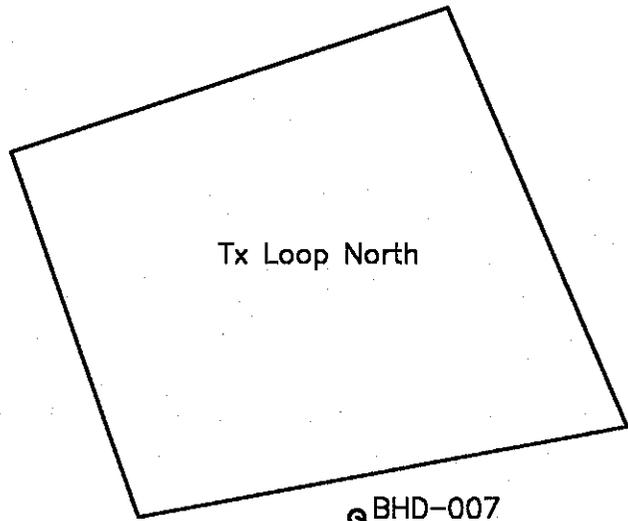
385400E 385500E 385600E 385700E

5392200N -

5392100N -

5392000N -

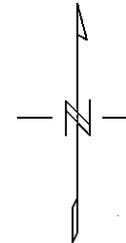
5391900N -



Tx Loop North

BHD-007

340m



Scale 1:5000
50 0 50 100
(metres)

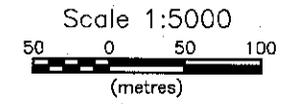
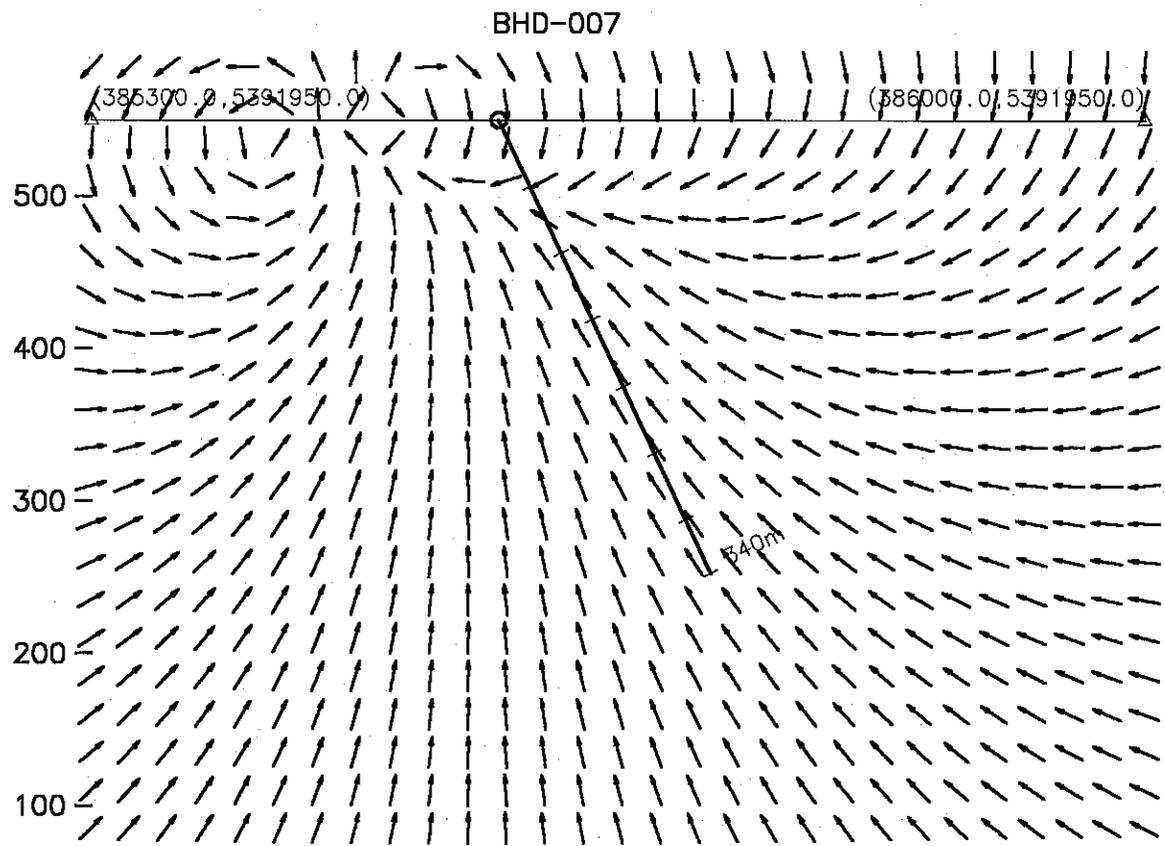
Zinifex Ltd
Sock Creek

**3-D Borehole Pulse EM Survey
Borehole & Loop Location Map**

Hole: BHD-007

Survey Date: Oct 2, 2007

Outer-Rim Exploration Services



Zinifex Ltd Sock Creek
3-D Borehole Pulse EM Survey Hole Section with Primary Field
Hole: BHD-007 Survey Date: Oct 2, 2007
Outer-Rim Exploration Services

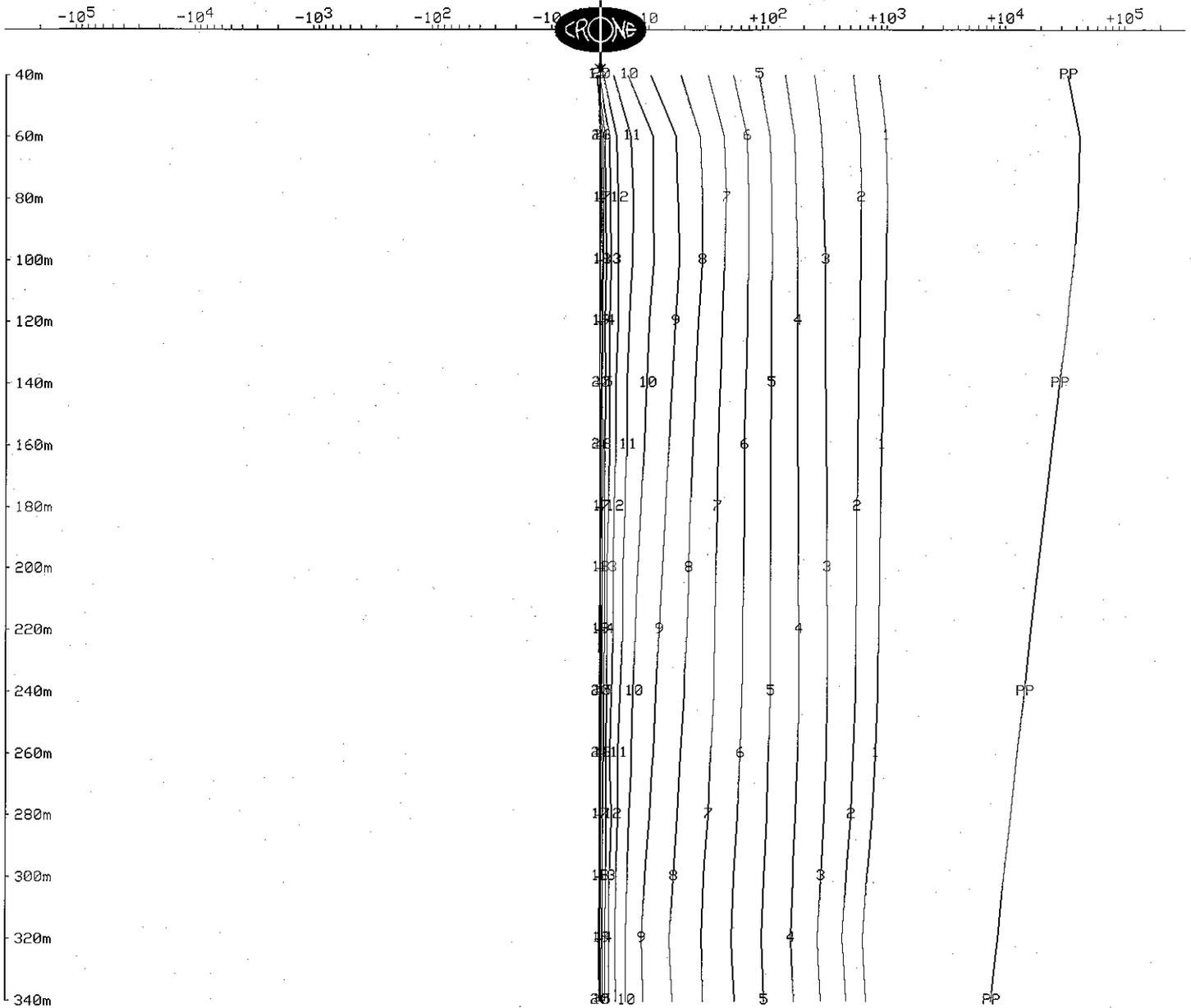
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
 Grid : Sock Creek
 Date : Oct 2, 2007

Hole : BHD-007
 Tx Loop : North
 File name : BHD7Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 21 of 21 channels and PP
 Scale: 1:2000



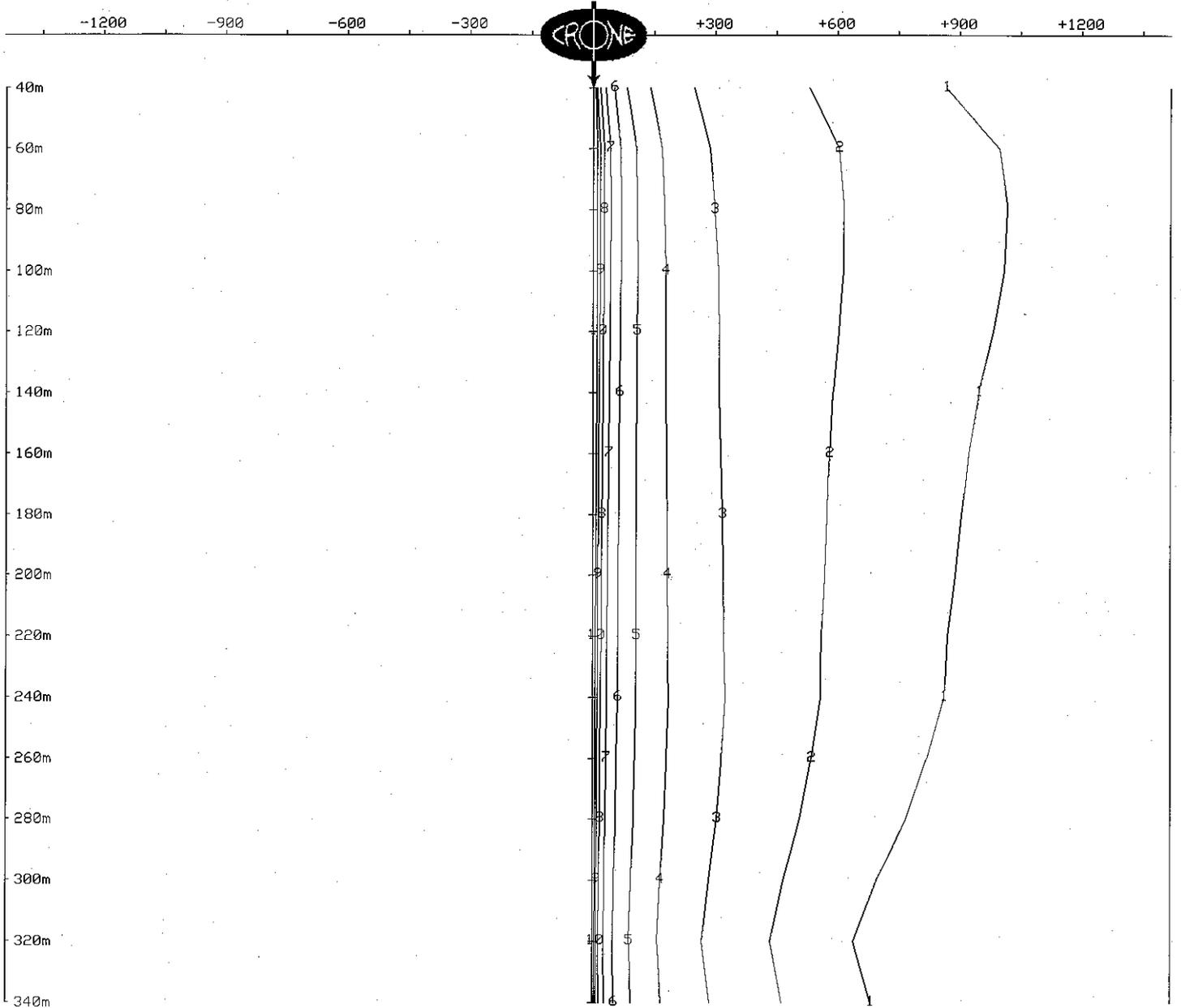
OUTER-RIM EXPLORATION SERVICES

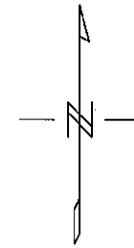
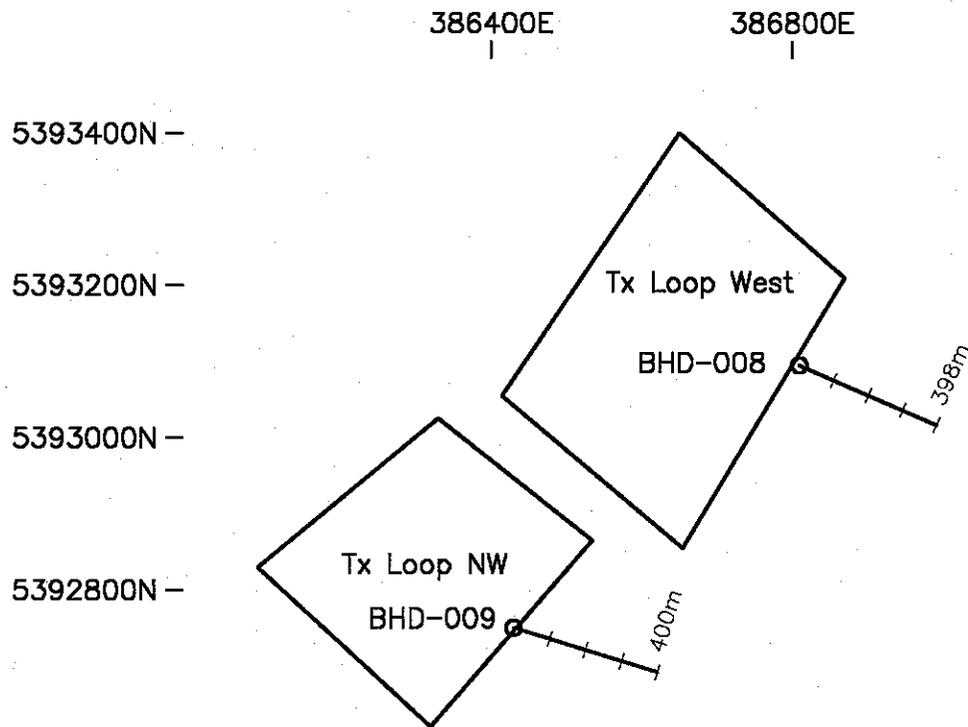
Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Oct 2, 2007

Hole : BHD-007
Tx Loop : North
File name : BHD7Z.PEM

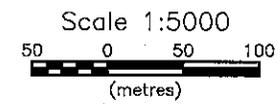
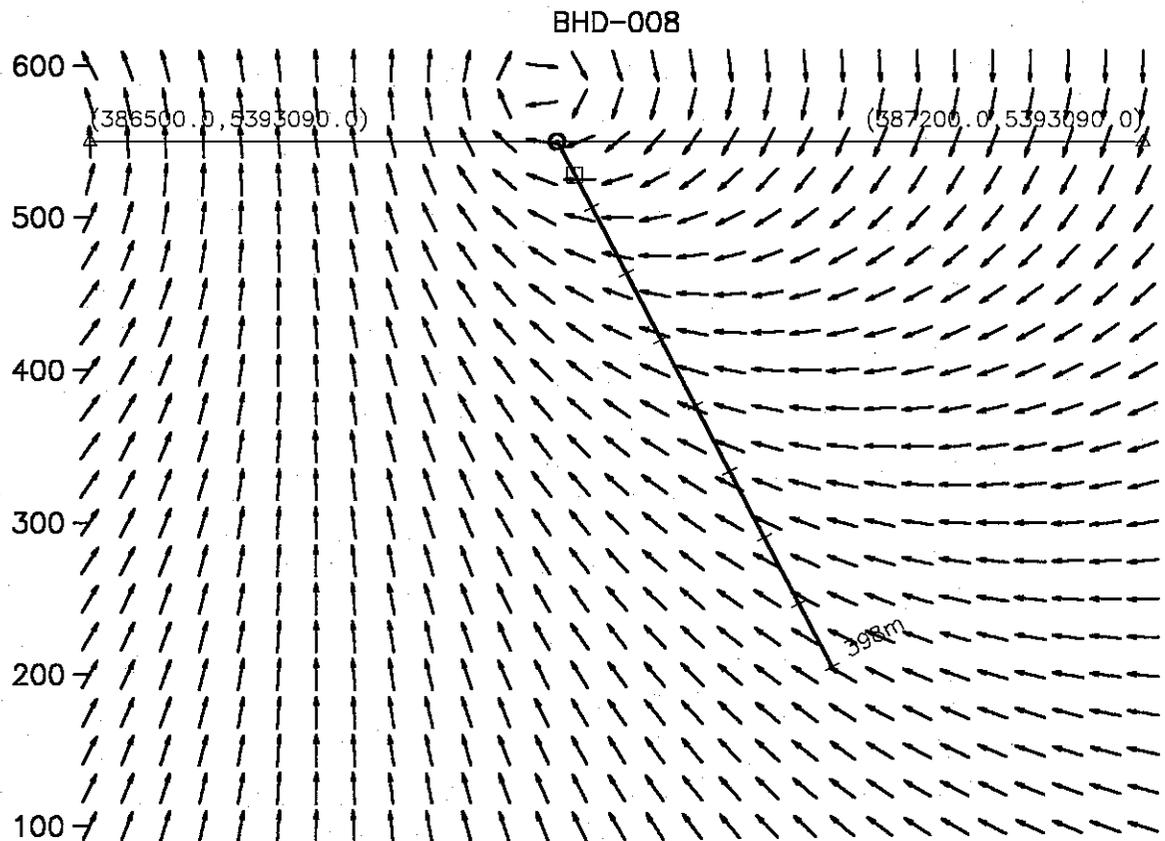
Z COMPONENT dBz/dt nanoTesla/sec - 10 of 21 channels and PP
Scale: 1:2000 Unit Scale: 1cm = 150 nT/s



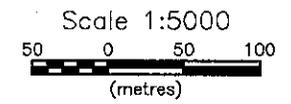
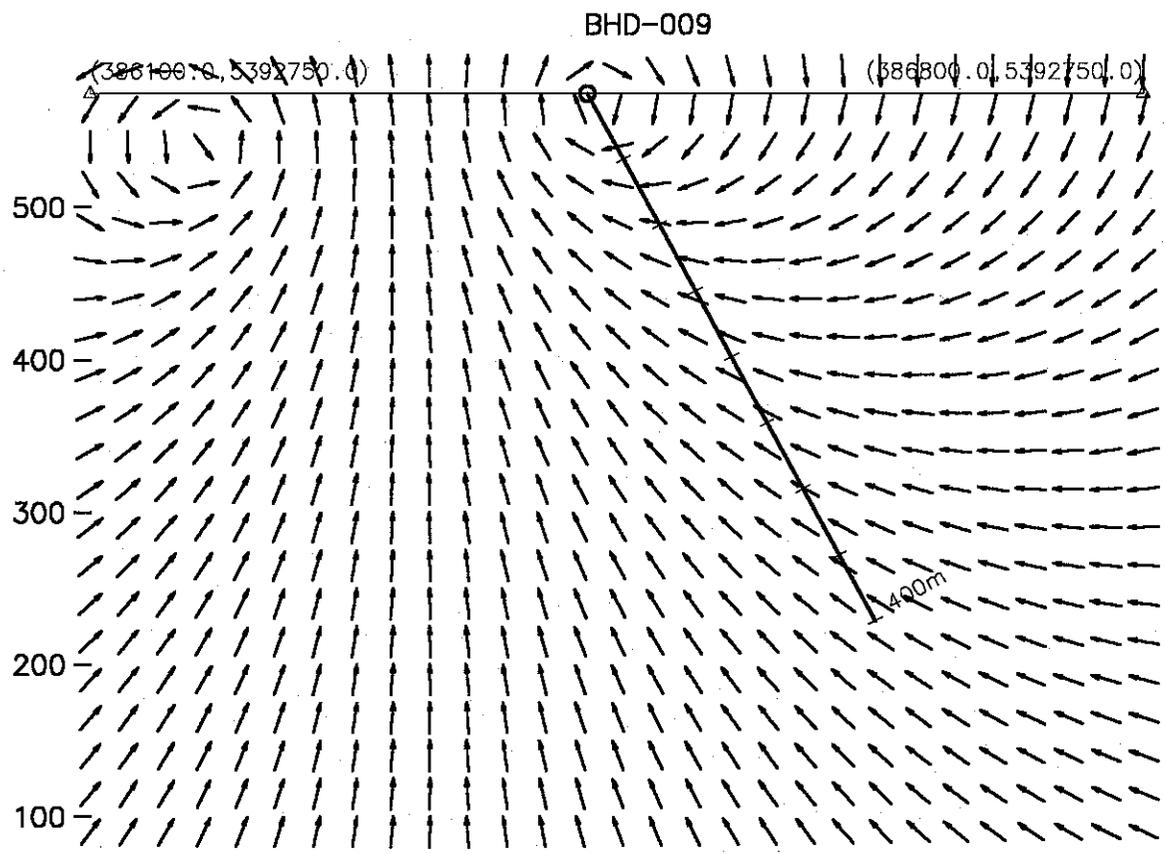


Scale 1:10000
250 0
(metres)

<i>Zinifex Ltd</i> Sock Creek
3-D Borehole Pulse EM Survey Borehole & Loop Location Map
Hole: BHD-008 & BHD-009 Survey Date: Oct 2/4, 2007
<i>Outer-Rim Exploration Services</i>



Zinifex Ltd Sock Creek
3-D Borehole Pulse EM Survey Hole Section with Primary Field
Hole: BHD-008 Survey Date: Oct 2, 2007
Outer-Rim Exploration Services



<i>Zinifex Ltd</i> Sock Creek
3-D Borehole Pulse EM Survey Hole Section with Primary Field
Hole: BHD-009 Survey Date: Oct 3, 2007
<i>Outer-Rim Exploration Services</i>

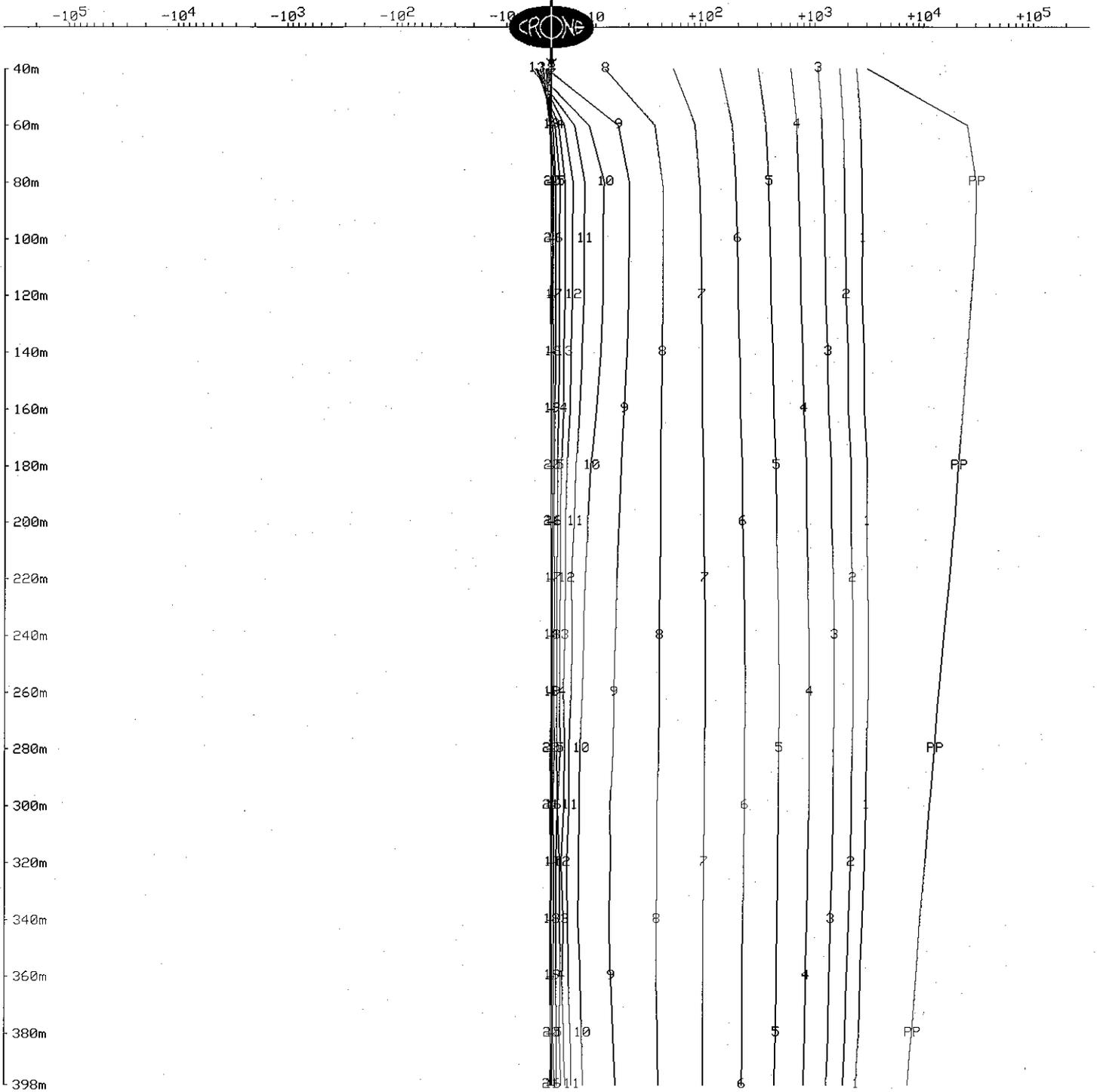
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Oct 2, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 21 of 21 channels and PP
Scale: 1:2000



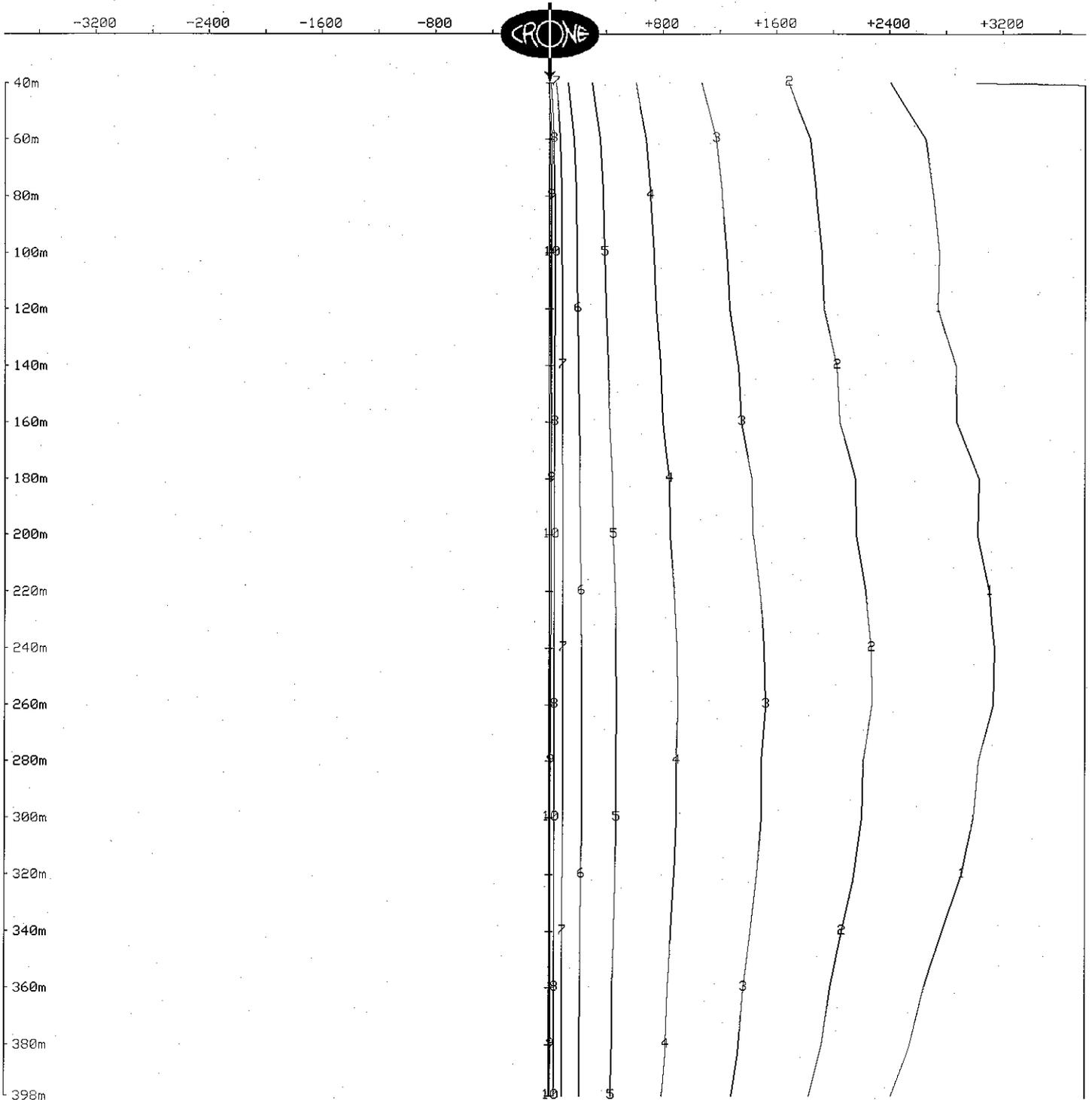
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Oct 2, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 10 of 21 channels and PP
Scale: 1:2000 Unit Scale: 1cm = 400 nT/s



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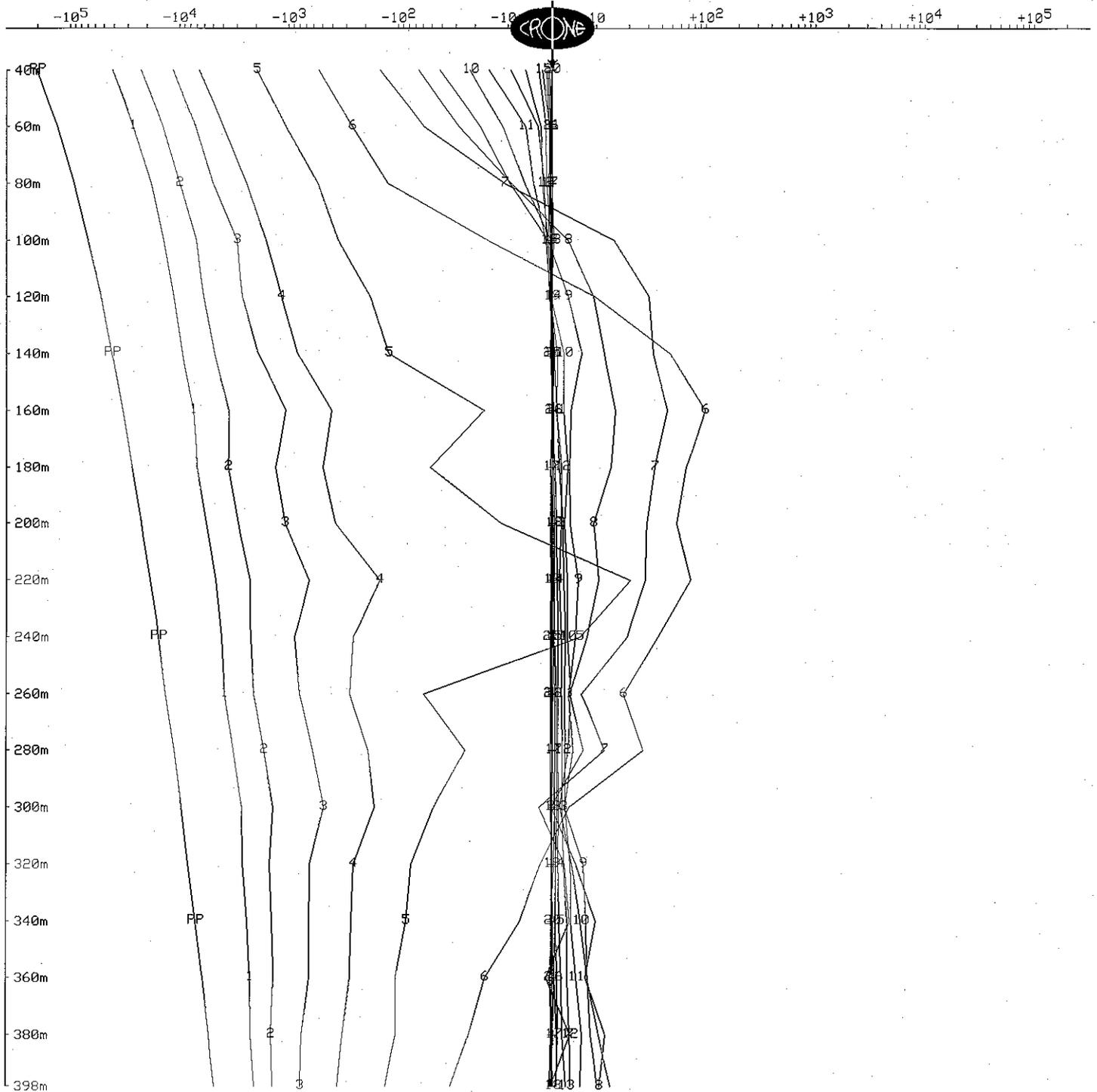
Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Apr 10, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #5
X COMPONENT dBx/dt nanoTesla/sec - 21 of 21 channels and PP

Scale: 1:2000



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

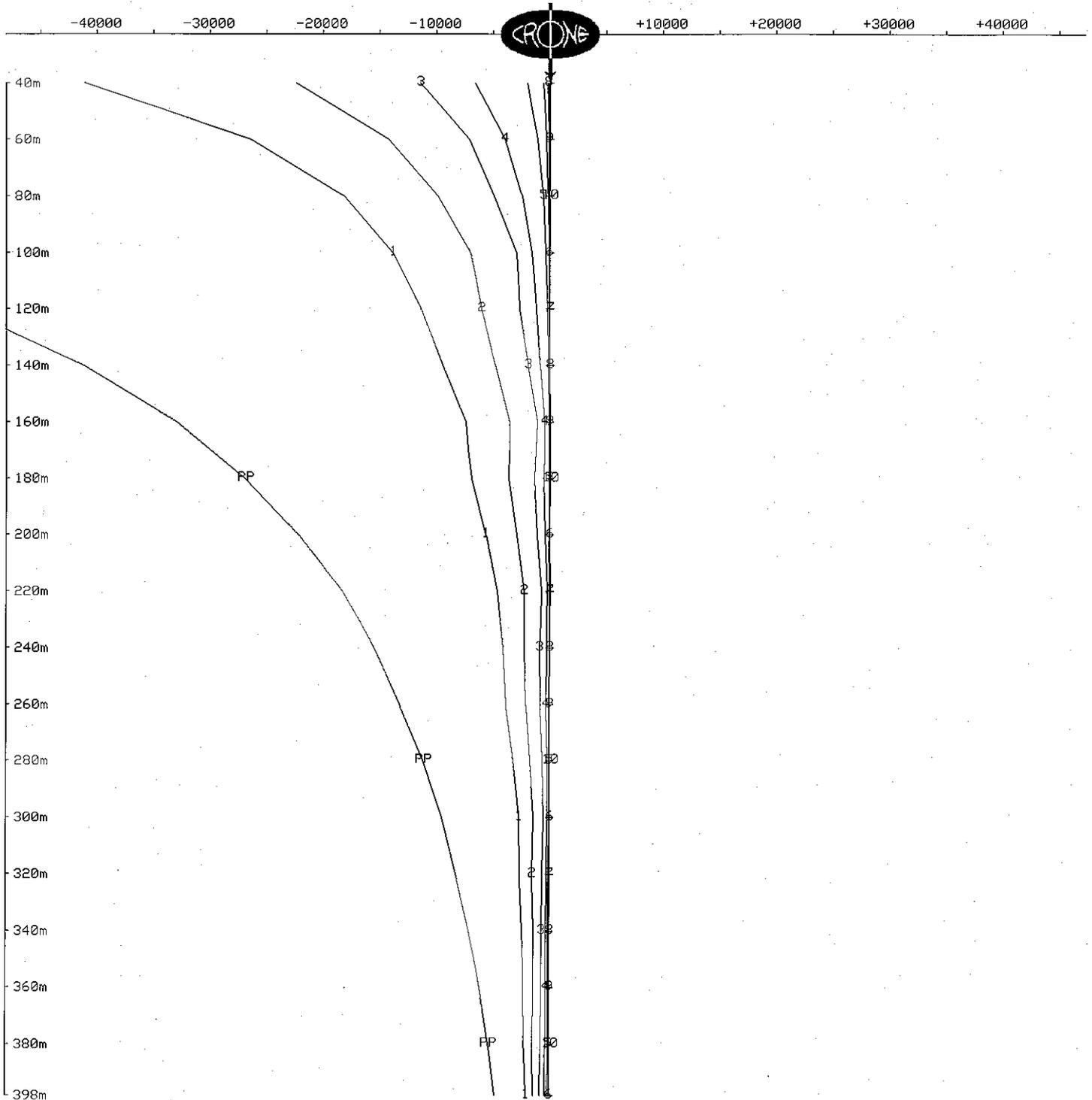
Client : Zinifex Ltd
Grid : Sock Creek
Date : Apr 10, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #5
X COMPONENT dBx/dt nanoTesla/sec - 10 of 21 channels and PP

Scale: 1:2000

Unit Scale: 1cm = 5000 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

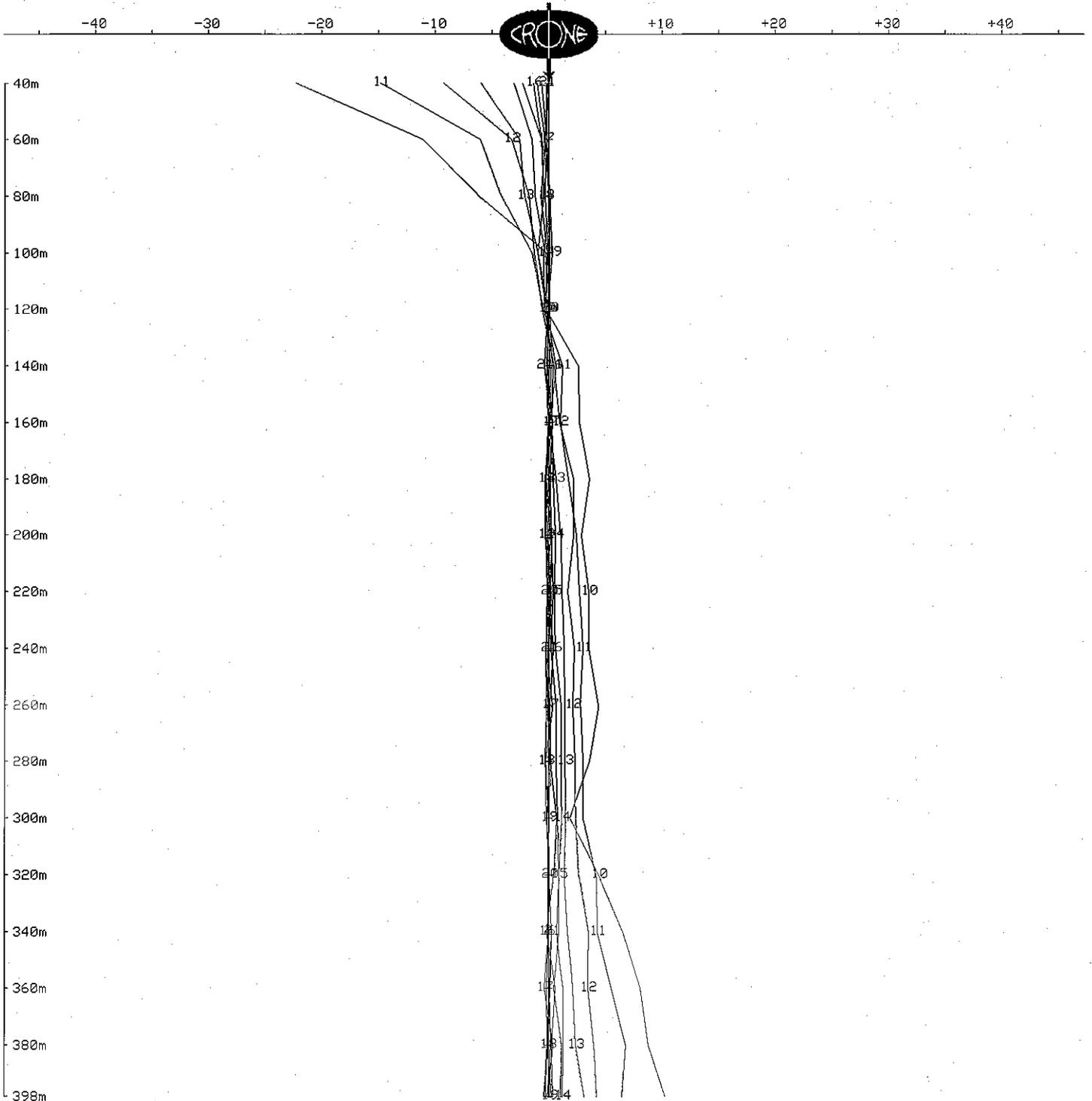
Client : Zinifex Ltd
Grid : Sock Creek
Date : Apr 10, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #5
X COMPONENT dBx/dt nanoTesla/sec - 12 of 21 channels

Scale: 1:2000

Unit Scale: 1cm = 5 nT/s



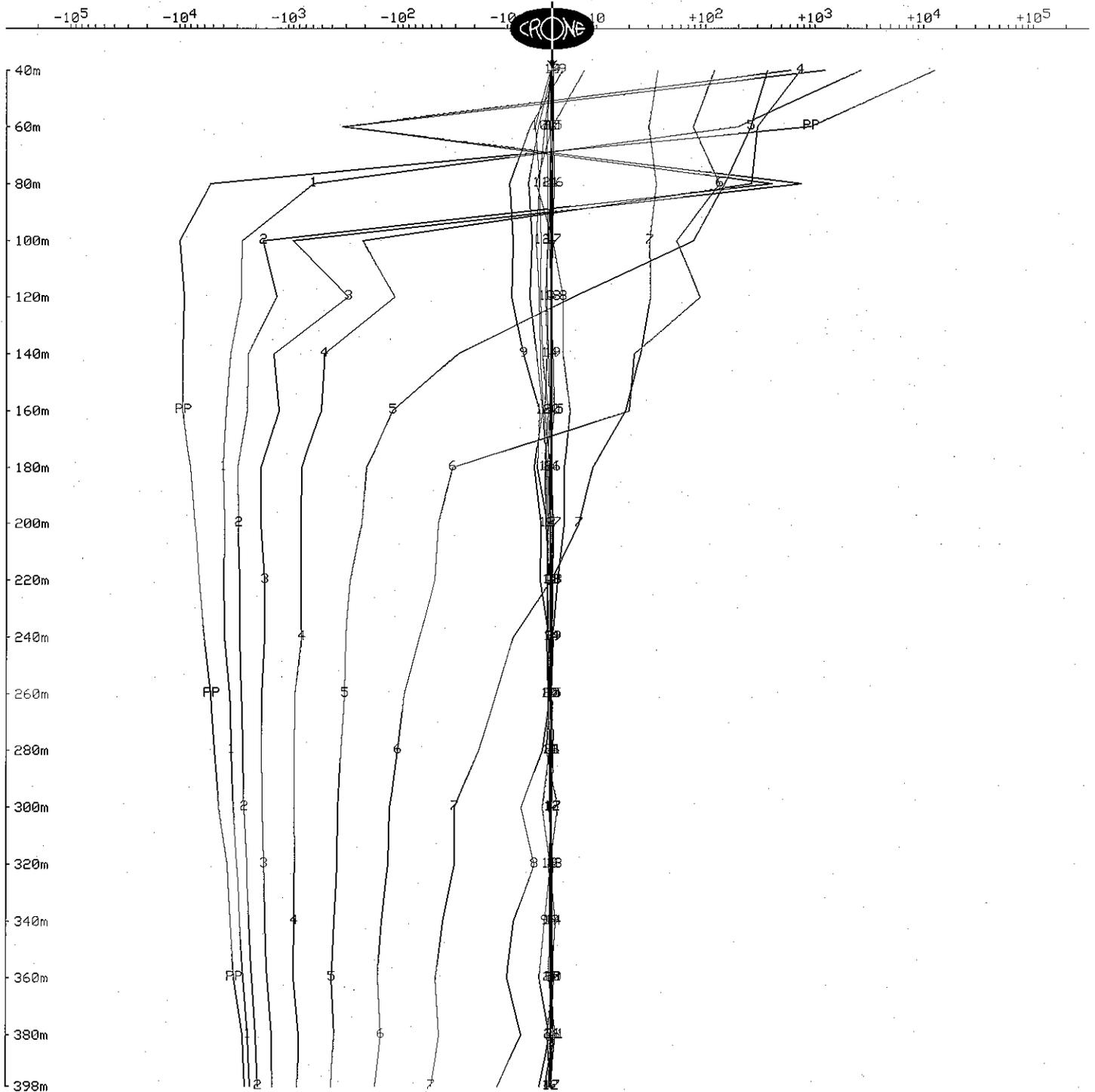
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Apr 10, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #5
Y COMPONENT dBy/dt nanoTesla/sec - 21 of 21 channels and PP
Scale: 1:2000



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

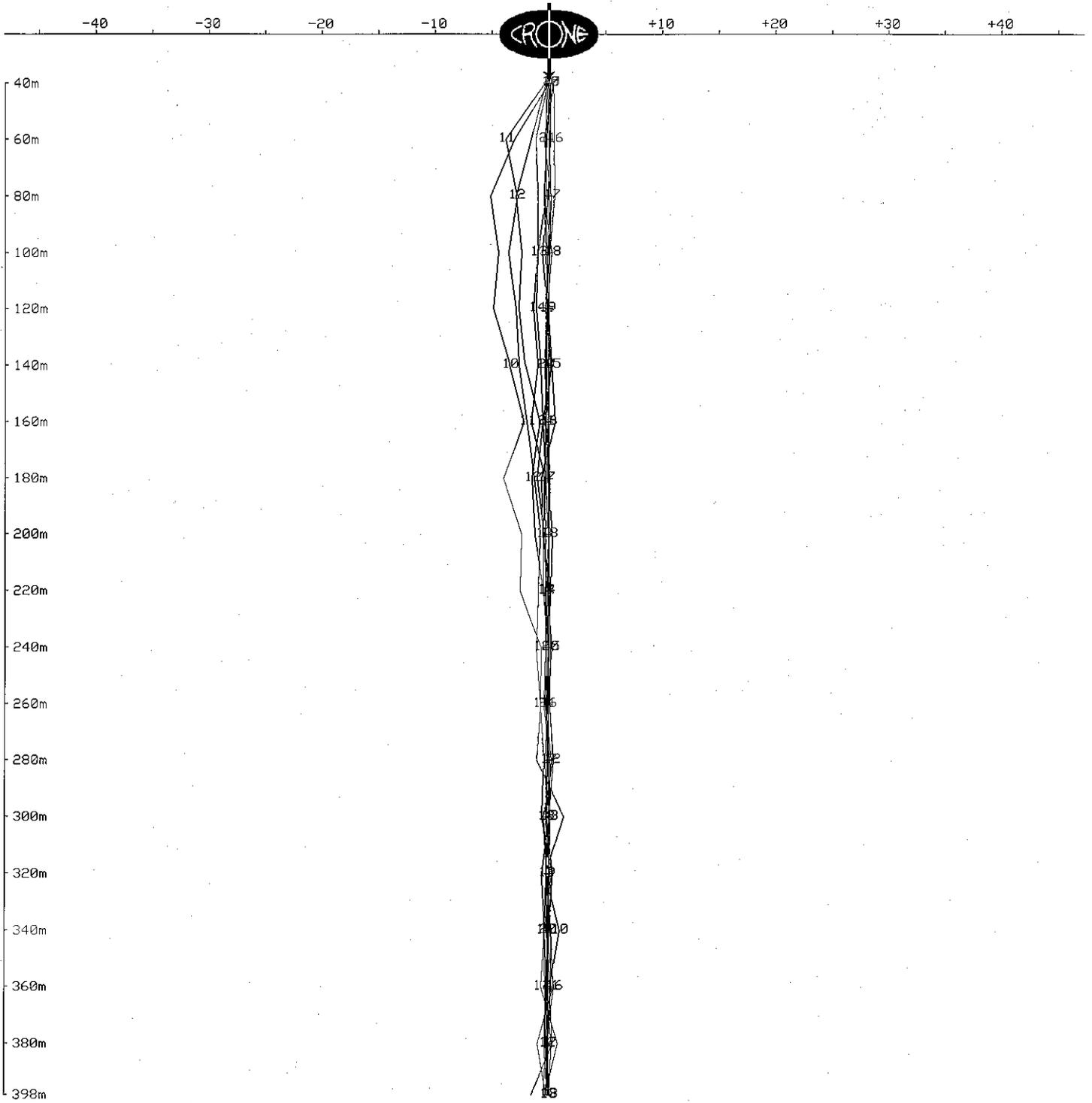
Client : Zinifex Ltd
Grid : Sock Creek
Date : Apr 10, 2007

Hole : BHD-008
Tx Loop : West
File name : BHD8XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #5
Y COMPONENT dBy/dt nanoTesla/sec - 12 of 21 channels

Scale: 1:2000

Unit Scale: 1cm = 5 nT/s



OUTER-RIM EXPLORATION SERVICES

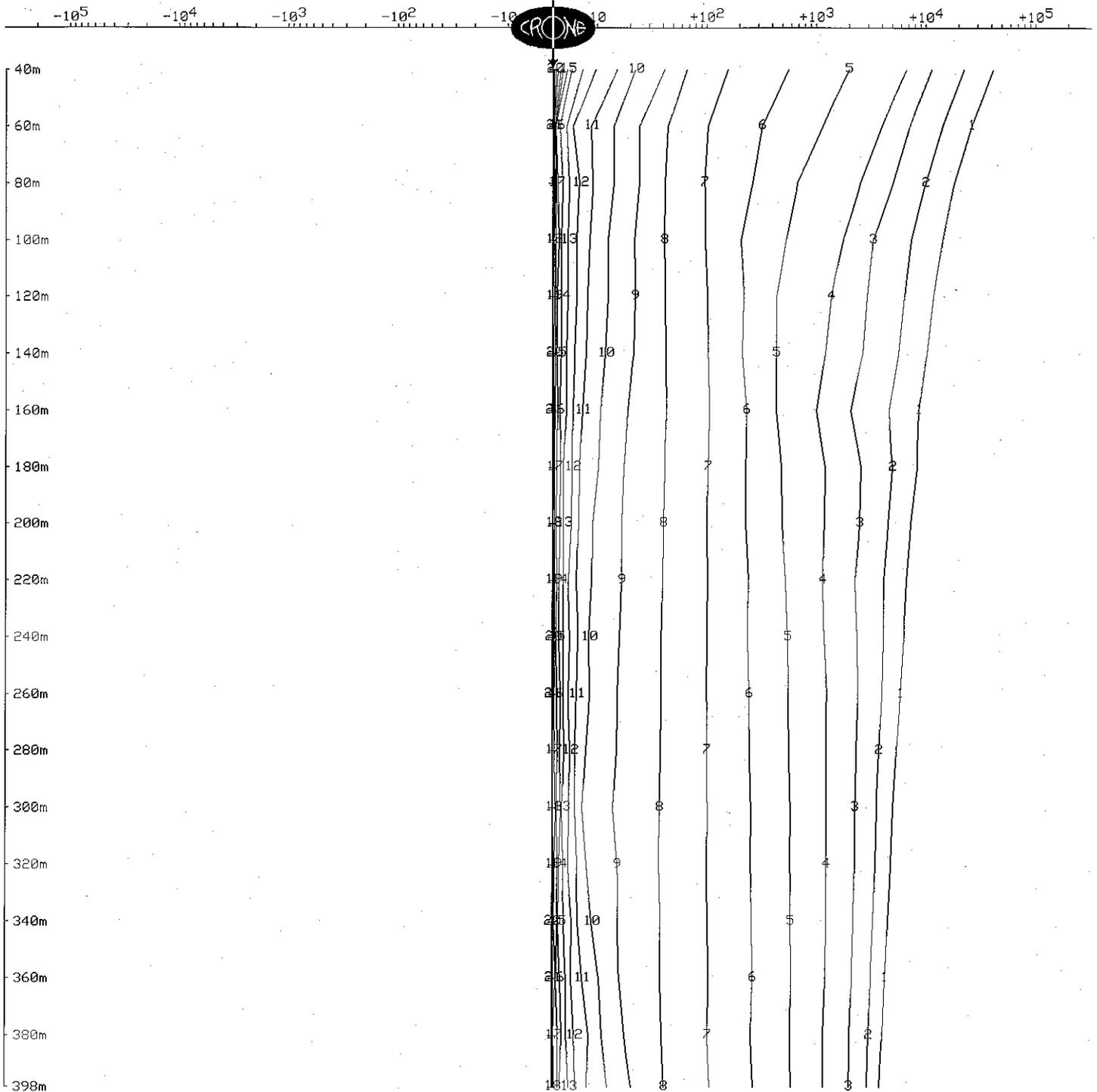
Borehole Pulse EM Survey

Client : Zinifex Ltd
 Grid : Sock Creek
 Date : Apr 10, 2007

Hole : BHD-008
 Tx Loop : West
 File name : BHD8XYZ.PEM

TOTAL FIELD dBxyz/dt nanoTesla/sec - 21 of 21 channels

Scale: 1:2000



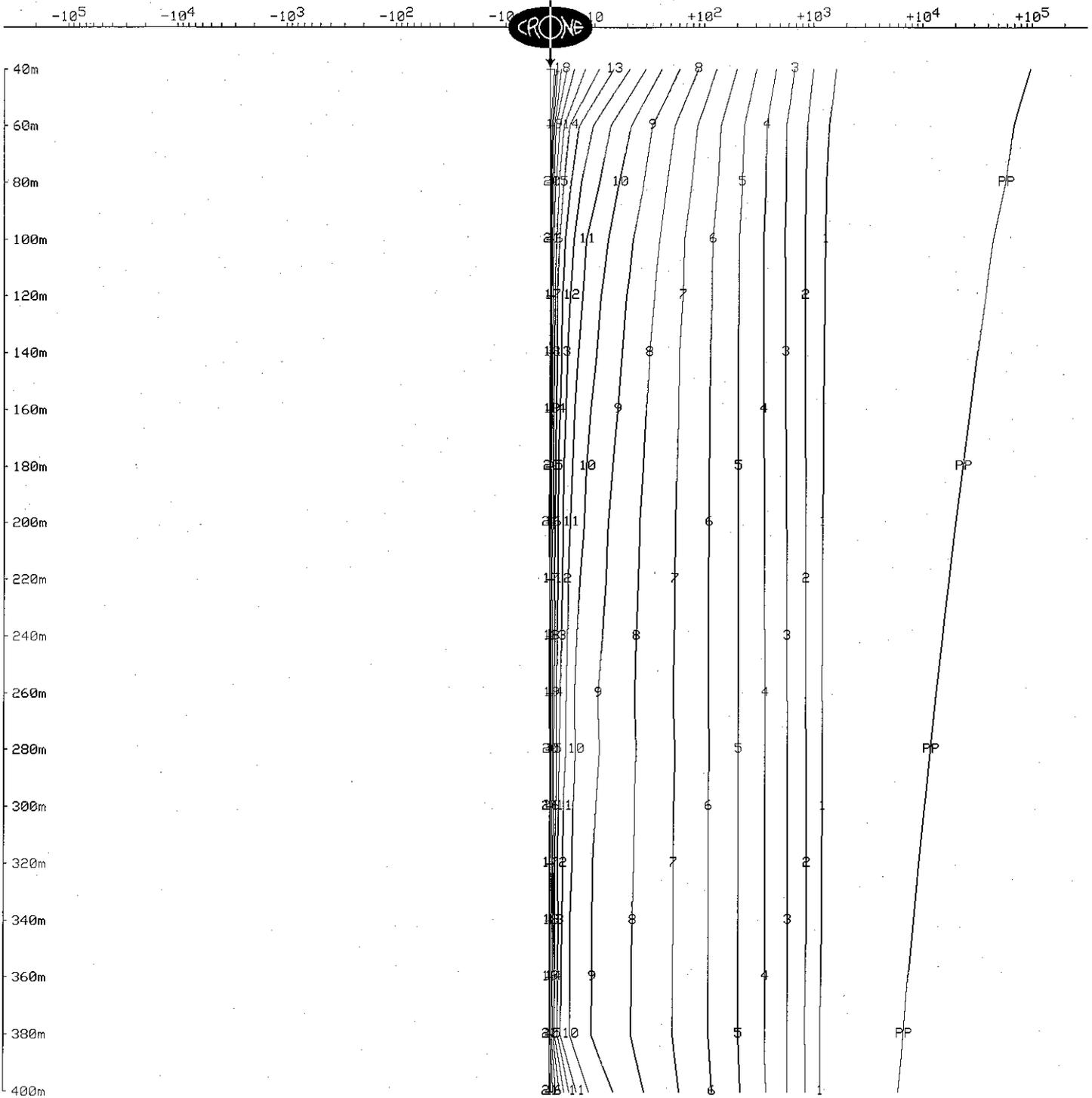
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
 Grid : Sock Creek
 Date : Oct 3, 2007

Hole : BHD-009
 Tx Loop : NW
 File name : BHD9Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 21 of 21 channels and PP
 Scale: 1:2000



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Zinifex Ltd
Grid : Sock Creek
Date : Oct 3, 2007

Hole : BHD-009
Tx Loop : NW
File name : BHD9Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 12 of 21 channels
Scale: 1:2000 Unit Scale: 1cm = 5 nT/s

