

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

Tel: 07 3843 2922
Fax: 07 3843 2966
Mob: 0412 54 9980
Email: mail@outer-rim.com.au

Volume 1 of 1

Client : Stonehenge Metals Ltd
Prospect : Stonehenge
Area : Zeehan, Tas.
Survey : Borehole PEM Survey
Survey Period : 5th to 8th February, 2008
Operator : Muhamad Humam

Current :20 Amps
Time Base :50 ms
Ramp Time :1ms
Sync :Cable

Hole No. :SDD-001
359451E, 5358711N
Depth :600m
Channels :36
Components :Z

Hole No. :SDD-002
358675E, 5359500N
Depth :420m
Channels :36
Components :Z

¾ Survey day \$1612.50
¾ Field Assist. day \$ 225.00

08-02-08 We drove out to site, set up and read the X-Y components for SDD-002. We finished the survey at 12.00pm, it was decided not to attempt loop STO3 without cut lines so we recovered loop STO2, packed up and drove home, arriving at 5:30pm.

SURVEY PARAMETERS

Loop STO2 :476 x 339m
358825E, 5359350N ; 359301E, 5359350N
358825E, 5359011N ; 359301E, 5359011N

Current :20 Amps
Time Base :50 ms
Ramp Time :1ms
Sync :Cable

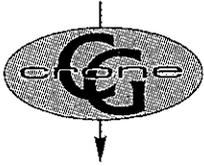
Hole No. :SDD-002
358675E, 5359500N
Depth :420m
Channels :36
Components :X,Y

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

Share of mob/demob to/from Tasmania.

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.

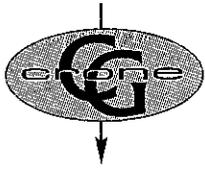
Tx Output Voltage:

- 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:

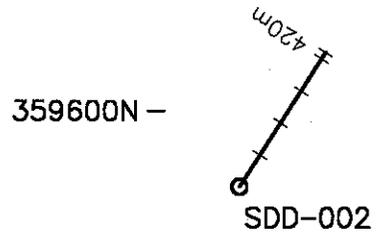
- General geological mapping of conductive structures
 - ⇒ shears, fractures, lineaments
 - ⇒ hydrothermal alteration
 - ⇒ graphite-rich rocks, including graphitic schist, shale, slate, and argillite
 - ⇒ clay alteration and zeolites
 - ⇒ differential and clay weathering
 - ⇒ conductive weathered layer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

PLOTS

CONTENTS

Plan No.	Plan Type	ID.	Description	Scale
1	Plan	SDD-001,2	Hole location plan	1:10000
2	Section	SDD-001	Primary Field plot	1:10000
3			Primary Field plot	1:10000
4	Header Profile	SDD-002	Primary Field plot	1:5000
5		SDD-001	Header information	N/A
6		(ST01)	Z - Log plot	1:4000
7			- Linear, Ch1-20, 1:1500	1:4000
8			- Linear, Ch20-30, 1:5	1:4000
9		- Linear, Ch30-36, 1:2	1:4000	
10	Header	SDD-001	Header information	N/A
11	Profile	(ST02)	Z - Log plot	1:4000
12			- Linear, Ch1-20, 1:200	1:4000
13			- Linear, Ch20-30, 1:5	1:4000
14			- Linear, Ch30-36, 1:2	1:4000
15	Header	SDD-002	Header information	N/A
16	Profile	(ST02)	Z - Log plot	1:2500
17			- Linear, Ch1-20, 1:150	1:2500
18			- Linear, Ch20-30, 1:5	1:2500
19			- Linear, Ch30-36, 1:2	1:2500
20			X - Log plot	1:2500
21			- Linear, Ch1-20, 1:250	1:2500
22			- Linear, Ch20-30, 1:5	1:2500
23			- Linear, Ch30-36, 1:2	1:2500
24			Y - Log plot	1:2500
25			- Linear, Ch1-20, 1:250	1:2500
26			- Linear, Ch20-30, 1:5	1:2500
27	- Linear, Ch30-36, 1:2	1:2500		
28		Total Field plot	1:2500	

358800E 359000E 359200E 359400E 359600E



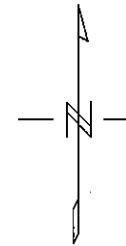
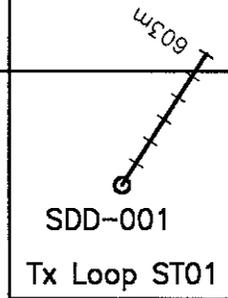
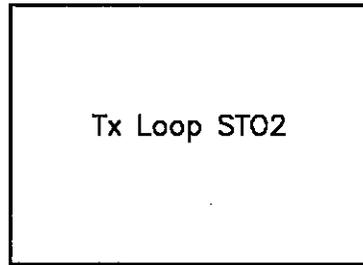
359600N -

359400N -

359200N -

359000N -

358800N -



Scale 1:10000
100 0 100 200
(metres)

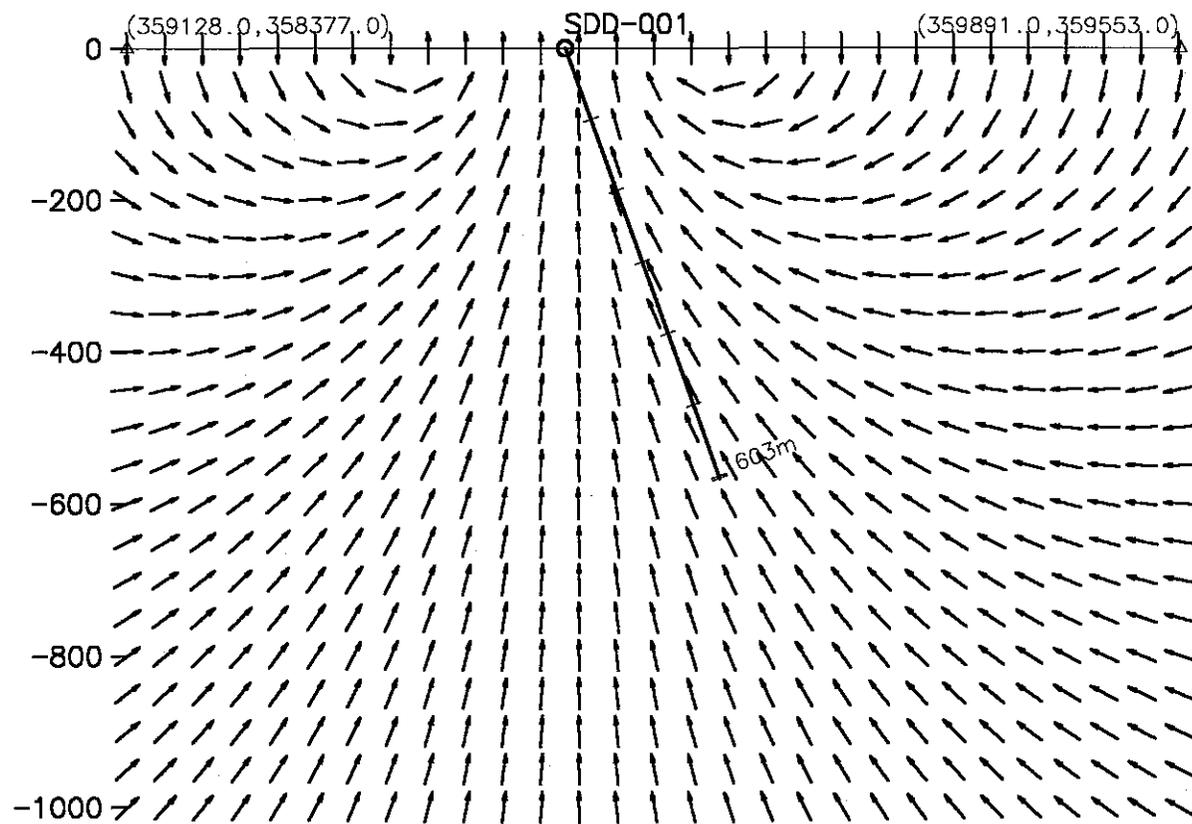
Stonehenge Metals Ltd
Stonehenge

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

Hole: SDD-001 & SDD-002
Survey Date: Feb 6/8, 2008

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Loop ST01



Scale 1:10000
100 0 100 200
(metres)

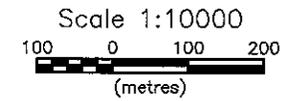
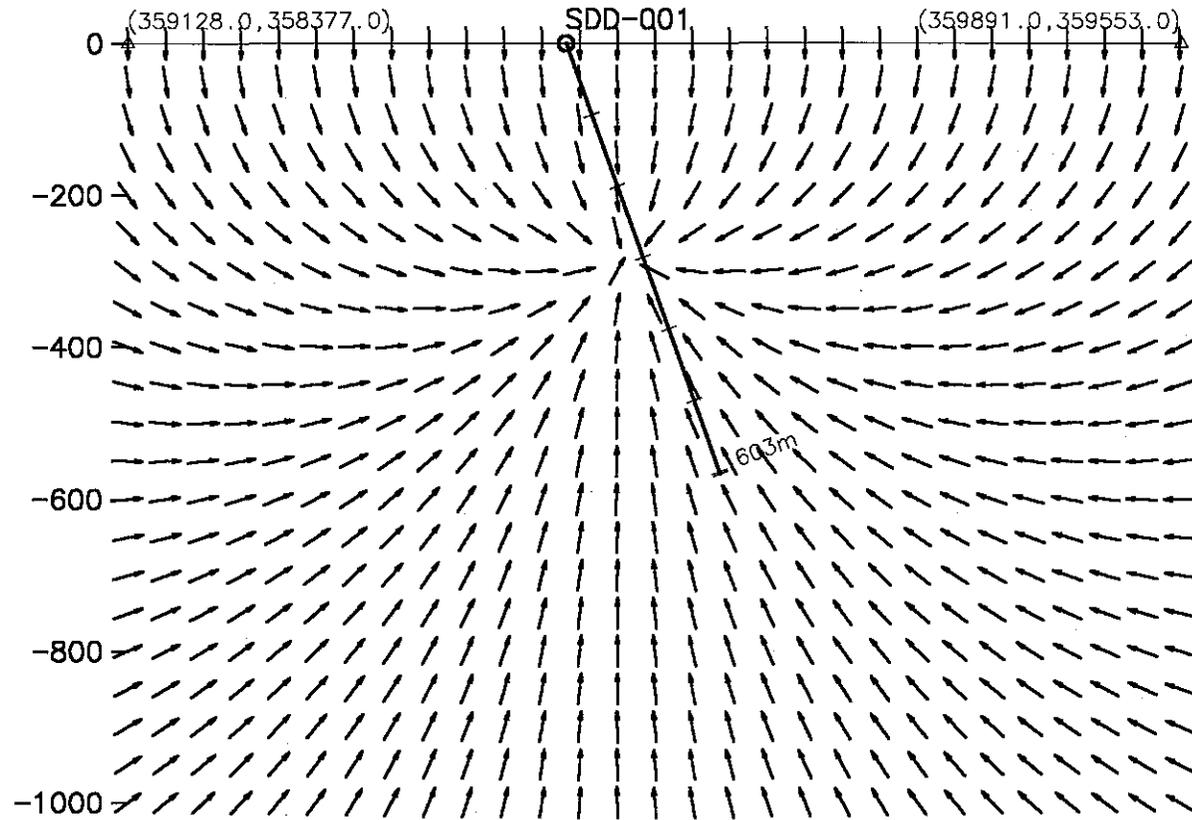
Stonehenge Metals Ltd
Stonehenge

3-D Borehole Pulse EM Survey
Hole Section with Primary Field

Hole: SDD-001
Survey Date: Feb 6, 2008

Outer-Rim Exploration Services

Loop ST02

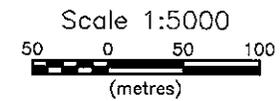
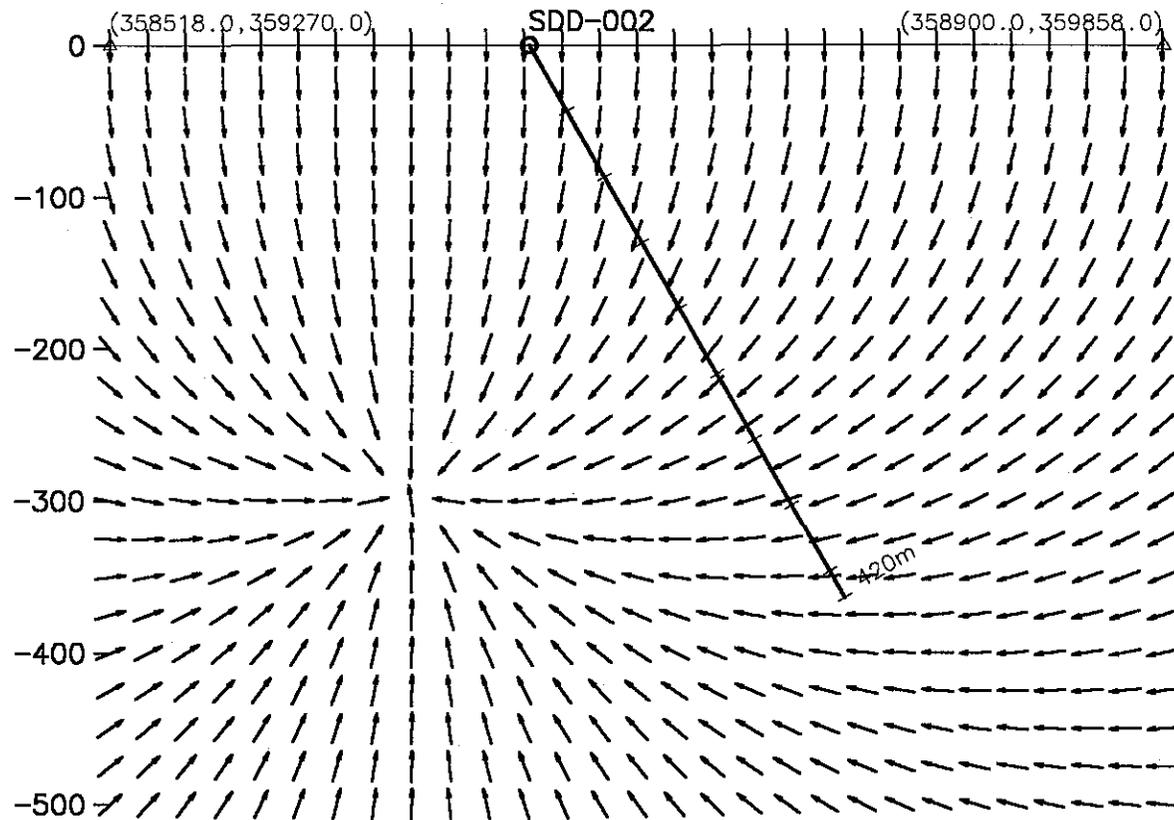


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Stonehenge

**3-D Borehole Pulse EM Survey
Hole Section with Primary Field**

Hole: SDD-001
Survey Date: Feb 7, 2008

Outer-Rim Exploration Services



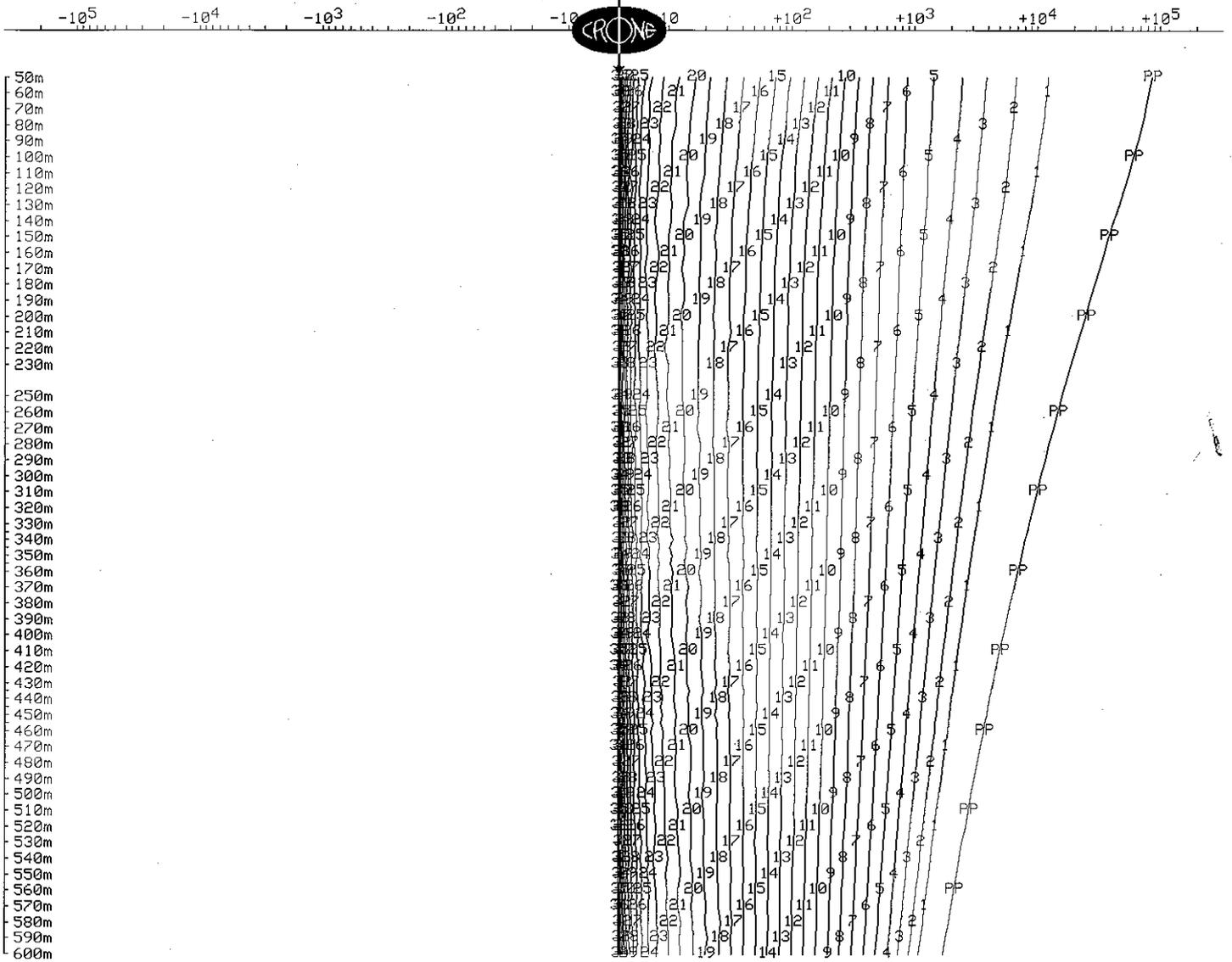
<p><i>Stonehenge Metals Ltd</i> Stonehenge</p>
<p>3-D Borehole Pulse EM Survey Hole Section with Primary Field</p>
<p>Hole: SDD-002 Survey Date: Feb 7, 2008</p>
<p><i>Outer-Rim Exploration Services</i></p>

OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-001
 Grid : Stonehenge Tx Loop : ST01
 Date : Feb 6, 2008 File name : SDD001Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 36 of 36 channels and PP
 Scale: 1:4000



OUTER-RIM EXPLORATION SERVICES

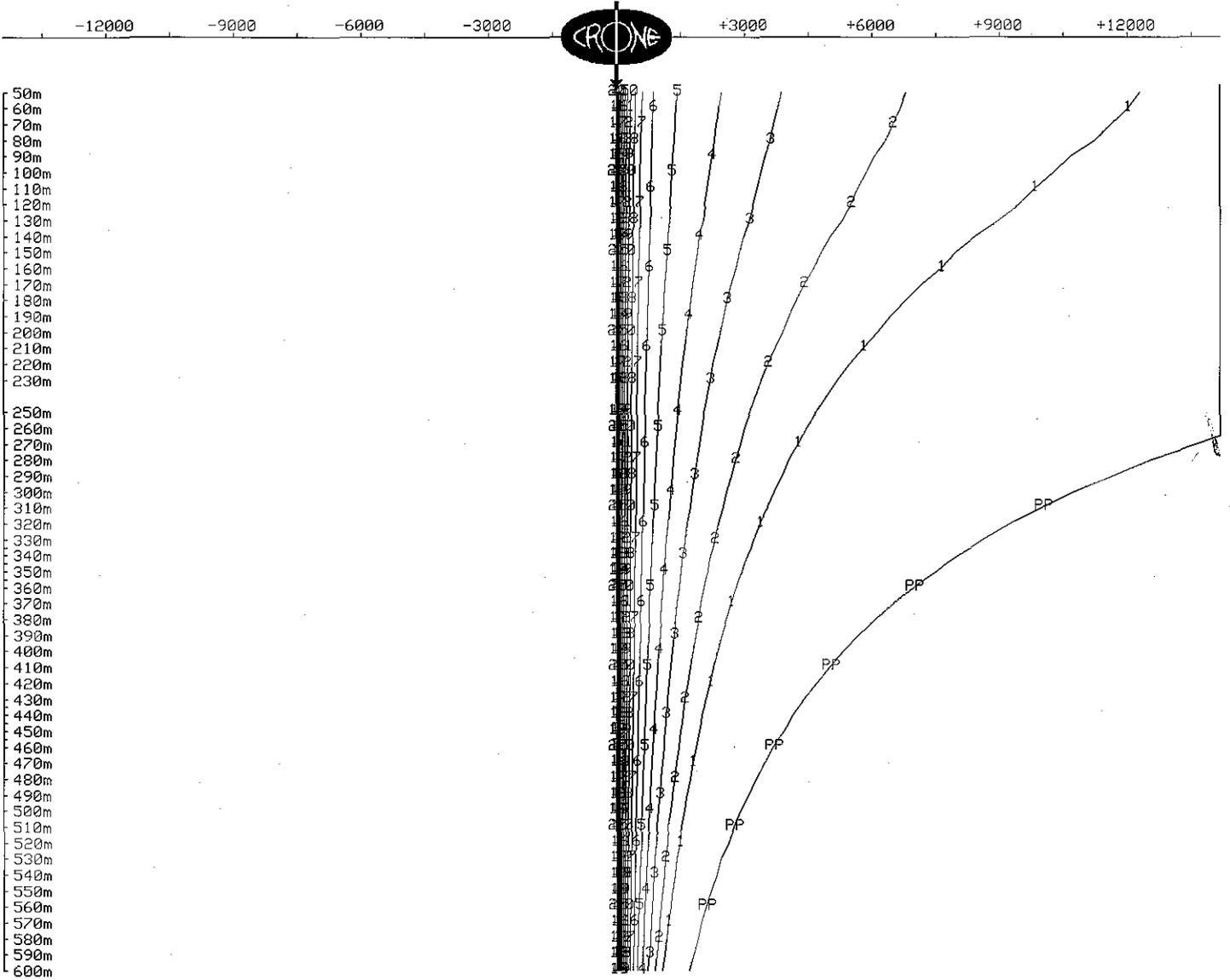
Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd
 Grid : Stonehenge
 Date : Feb 6, 2008

Hole : SDD-001
 Tx Loop : ST01
 File name : SDD001Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 20 of 36 channels and PP

Scale: 1:4000 Unit Scale: 1cm = 1500 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

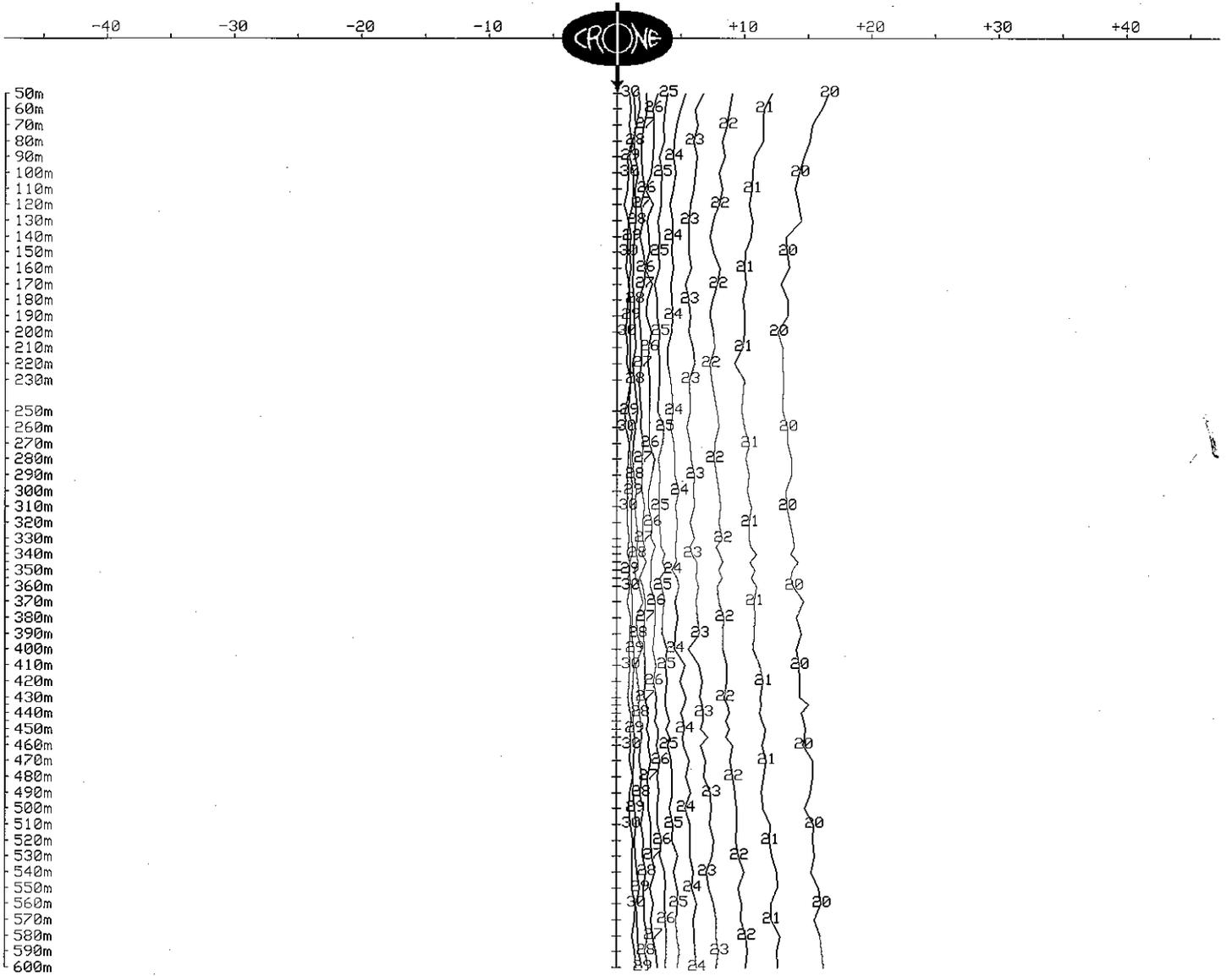
Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 6, 2008

Hole : SDD-001
Tx Loop : ST01
File name : SDD001Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 11 of 36 channels

Scale: 1:4000

Unit Scale: 1cm = 5 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

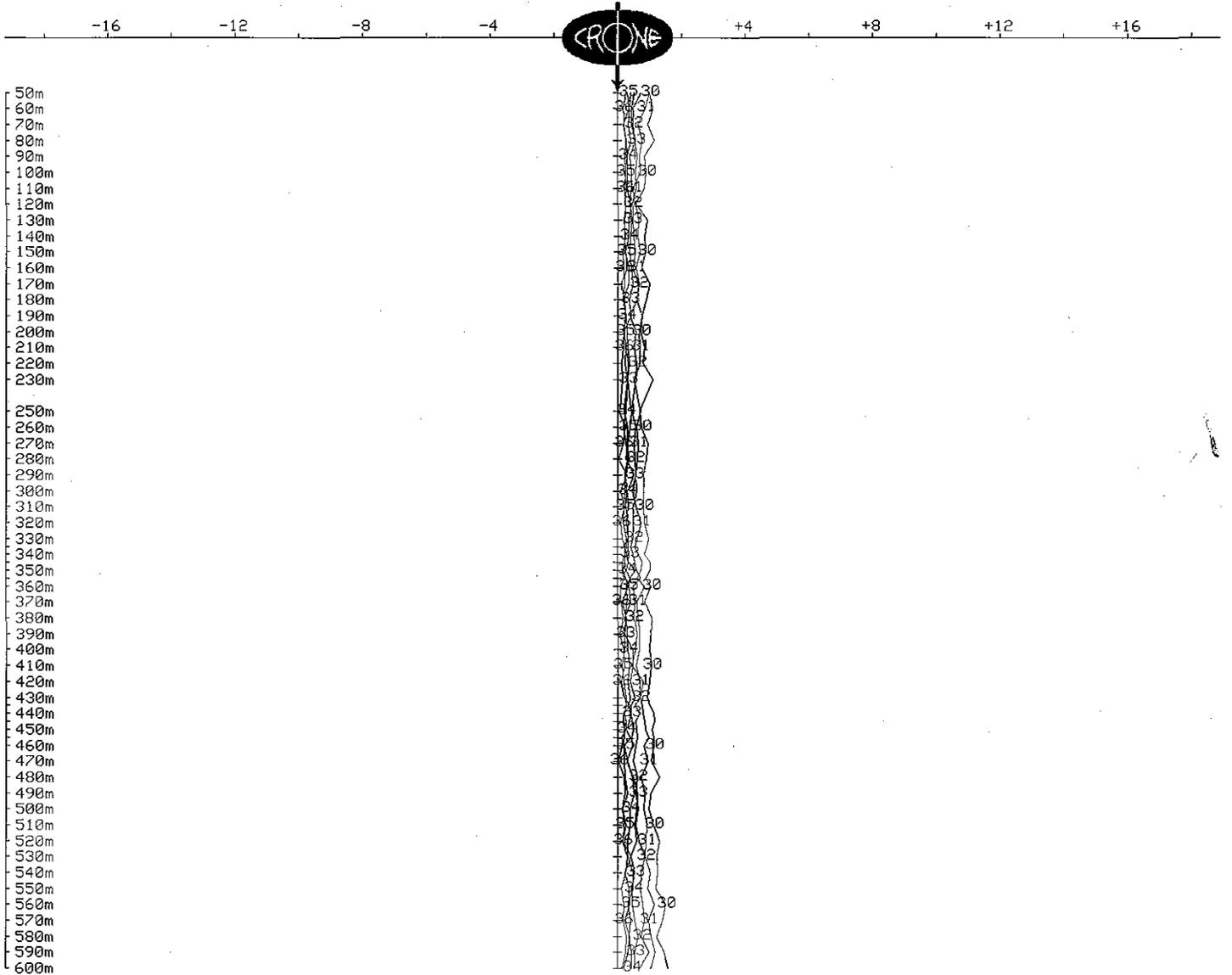
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Grid : Stonehenge
Date : Feb 6, 2008

Hole : SDD-001
Tx Loop : ST01
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Z COMPONENT dBz/dt nanoTesla/sec - 7 of 36 channels

Scale: 1:4000

Unit Scale: 1cm = 2 nT/s

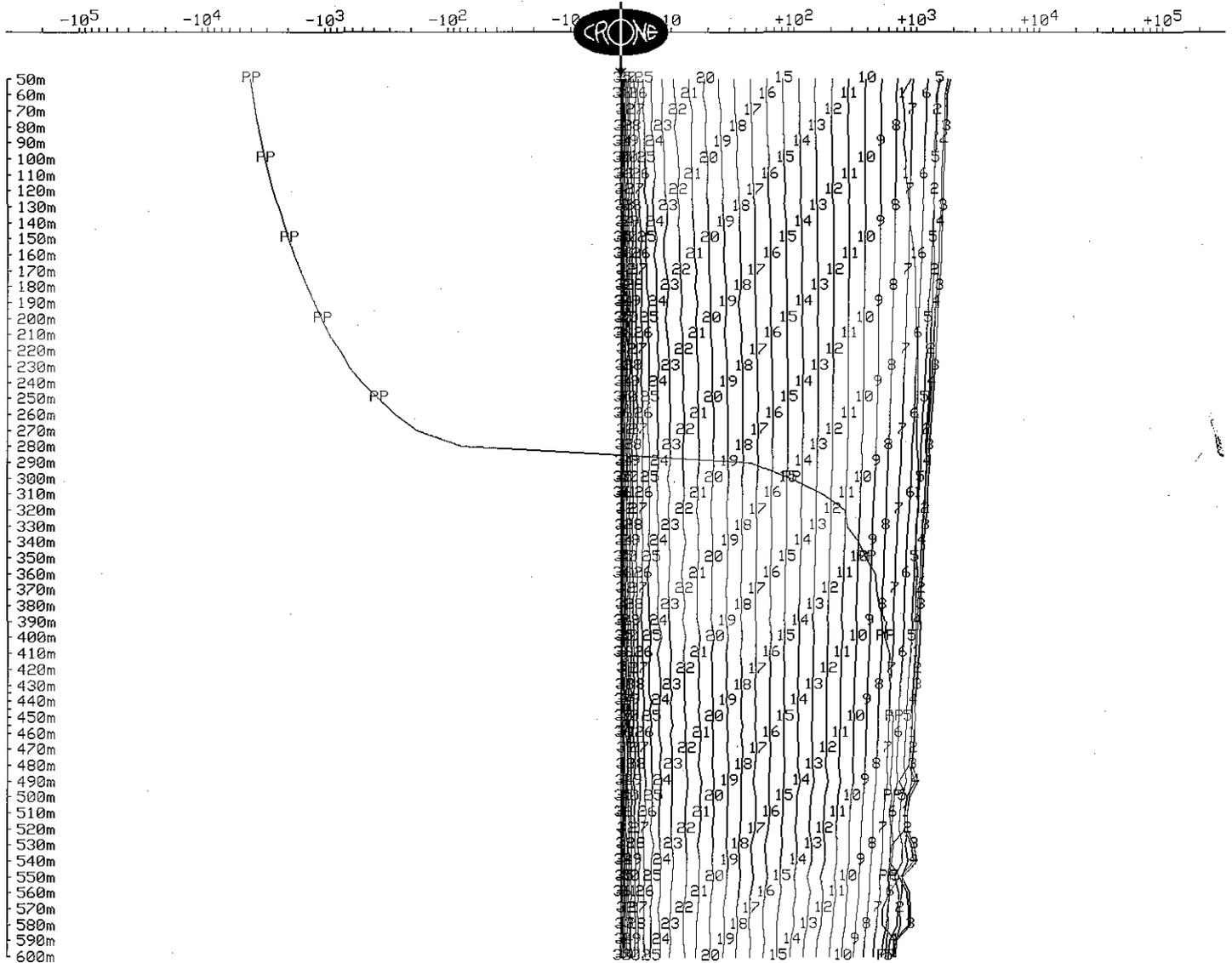


OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-001
 Grid : Stonehenge Tx Loop : ST02
 Date : Feb 7, 2008 File name : SDD01Z2.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 36 of 36 channels and PP
 Scale: 1:4000



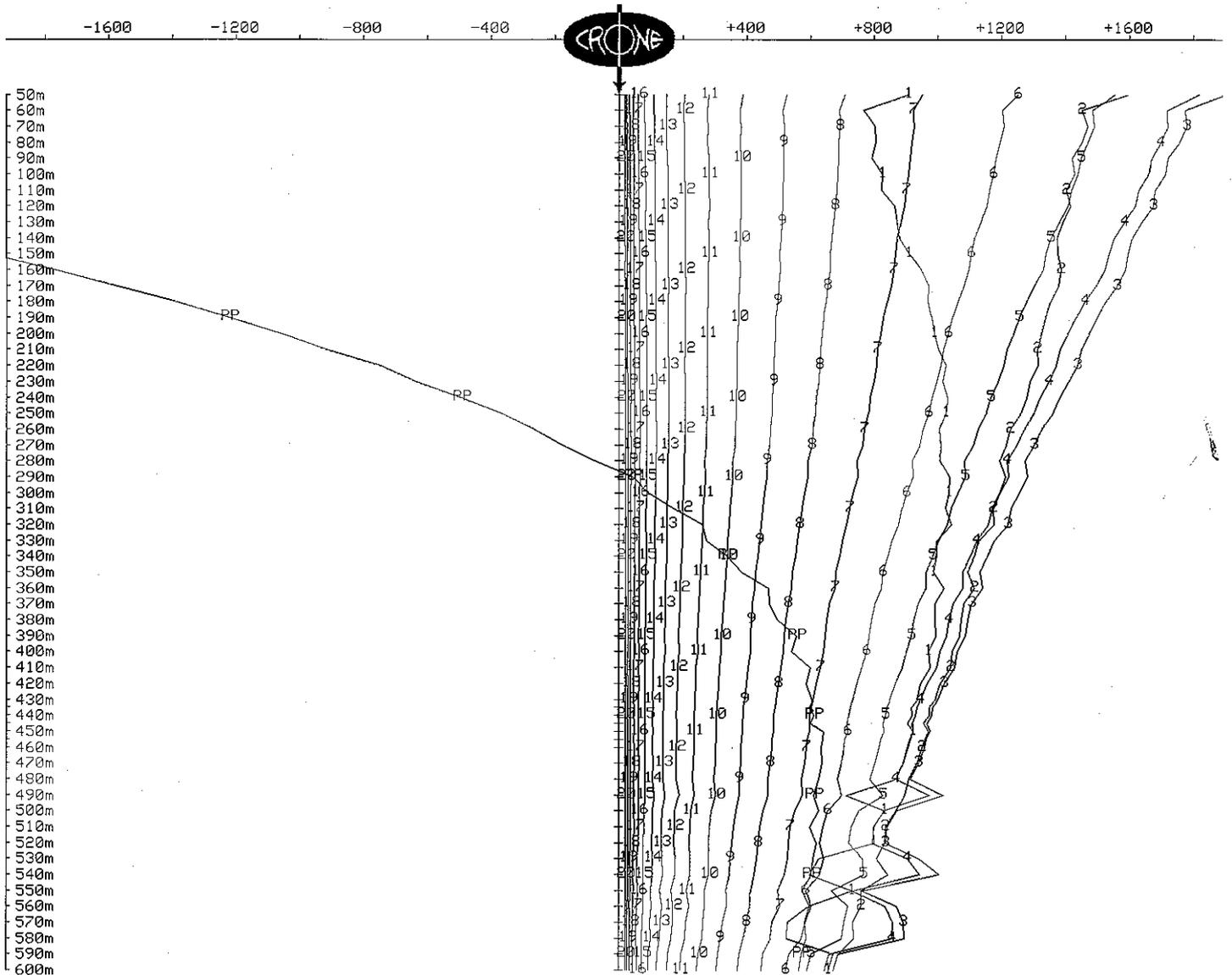
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 7, 2008

Hole : SDD-001
Tx Loop : ST02
File name : SDD01Z2.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 20 of 36 channels and PP
Scale: 1:4000 Unit Scale: 1cm = 200 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

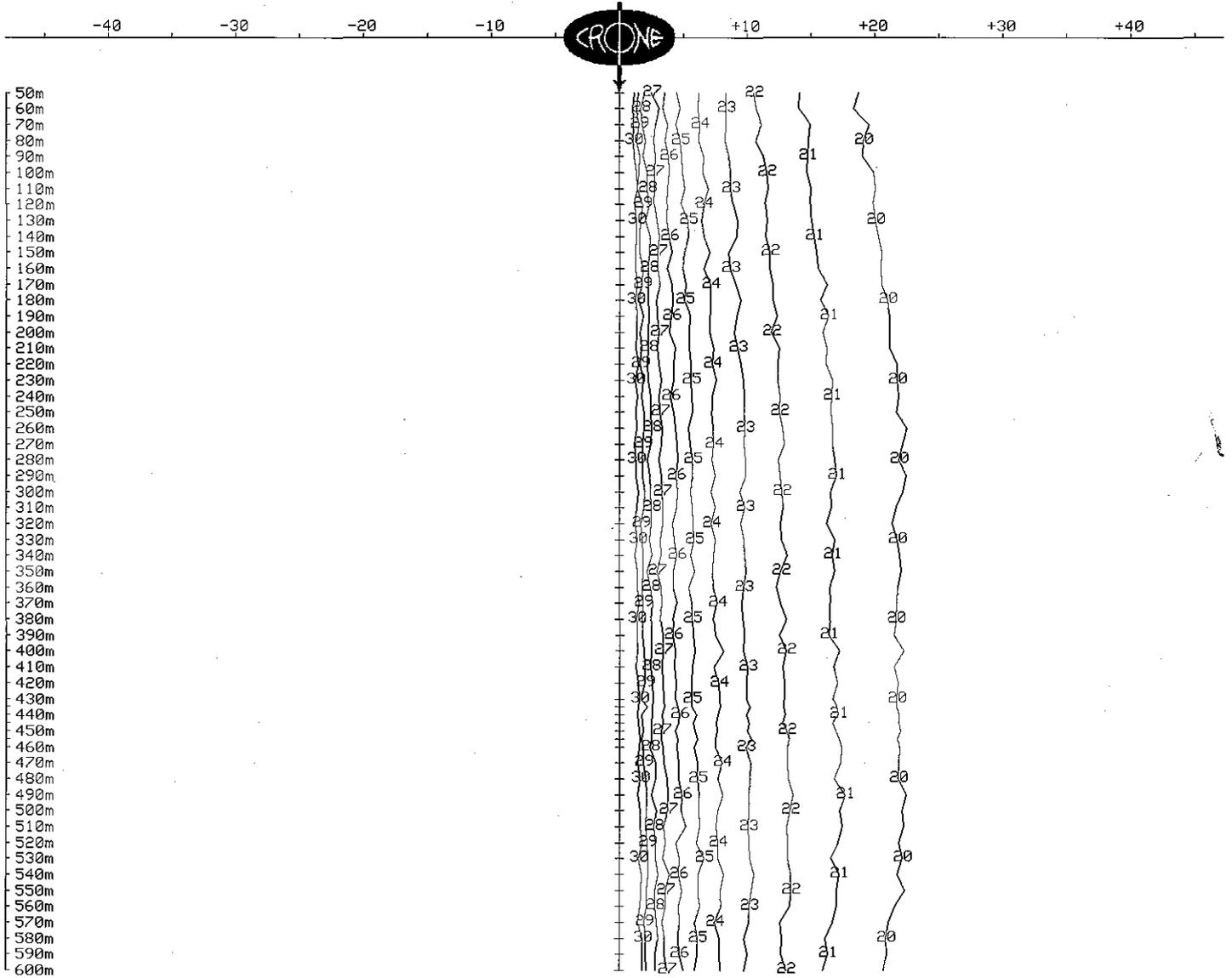
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 Grid : Stonehenge
 Date : Feb 7, 2008

Hole : SDD-001
 Tx Loop : ST02
 File name : SDD01Z2.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 11 of 36 channels

Scale: 1:4000

Unit Scale: 1cm = 5 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

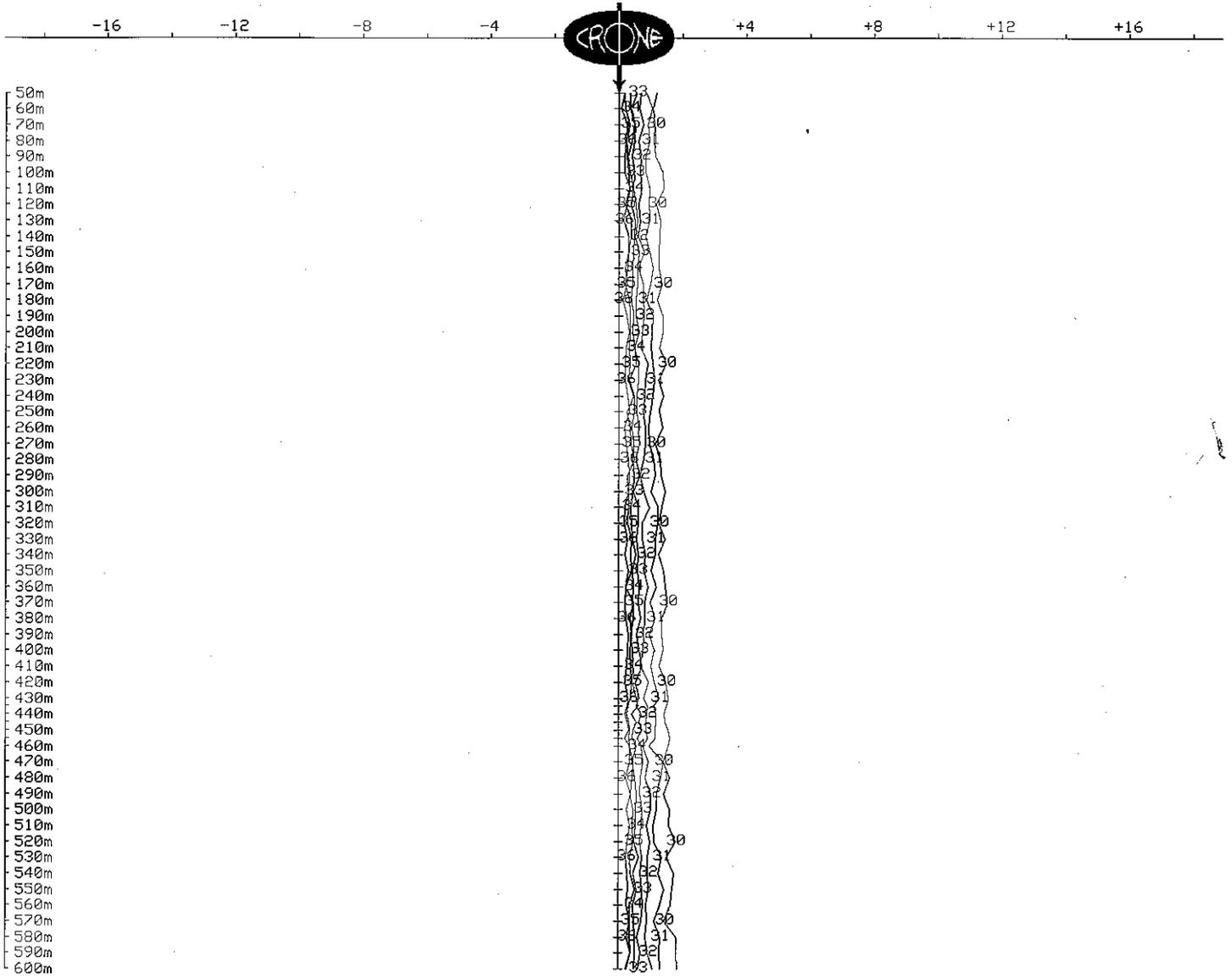
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 Grid : Stonehenge
 Date : Feb 7, 2008

Hole : SDD-001
 Tx Loop : ST02
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Z COMPONENT dBz/dt nanoTesla/sec - 7 of 36 channels

Scale: 1:4000

Unit Scale: 1cm = 2 nT/s

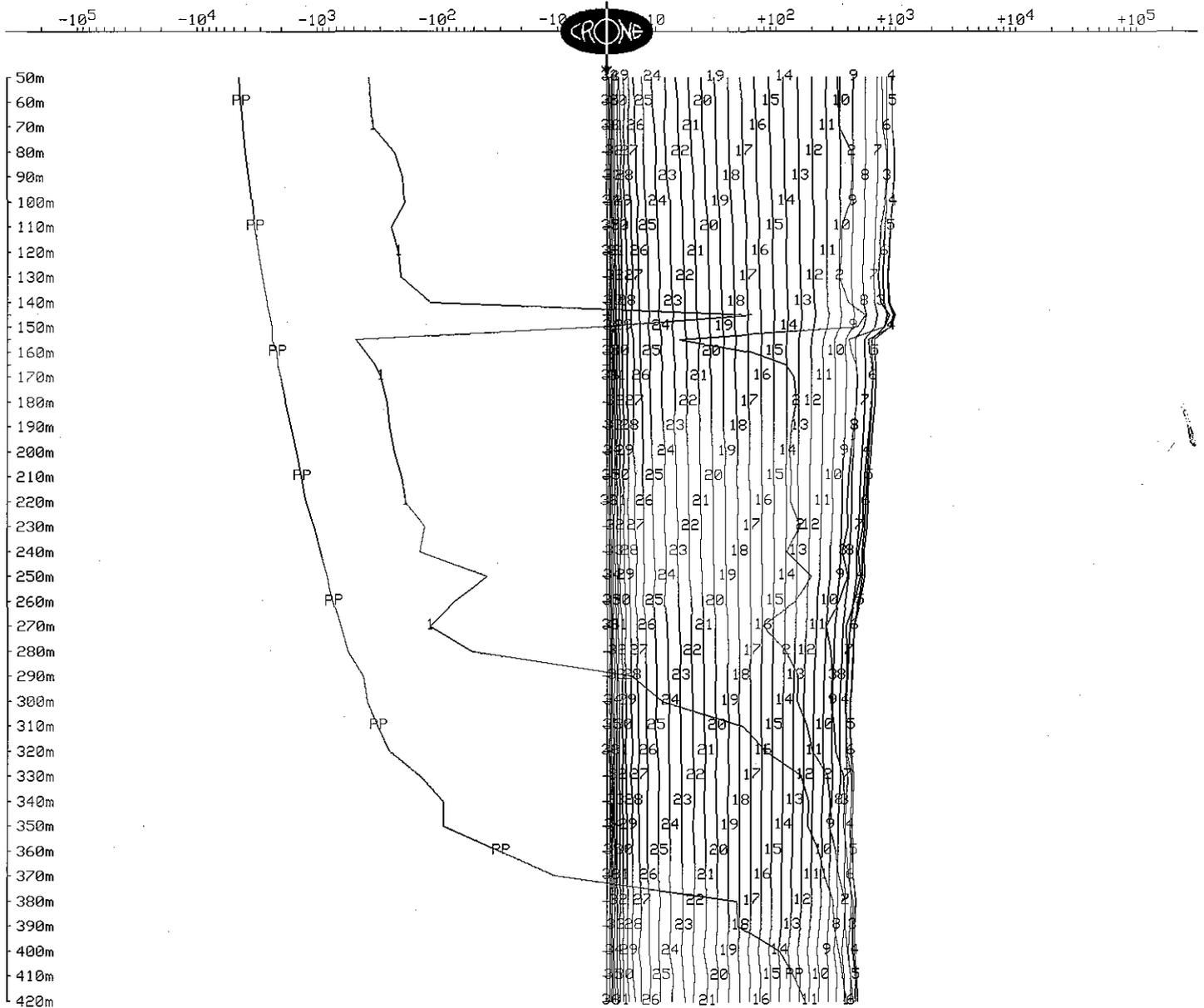


OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-002
 Grid : Stonehenge Tx Loop : ST02
 Date : Feb 7, 2008 File name : SDD02Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 36 of 36 channels and PP
 Scale: 1:2500



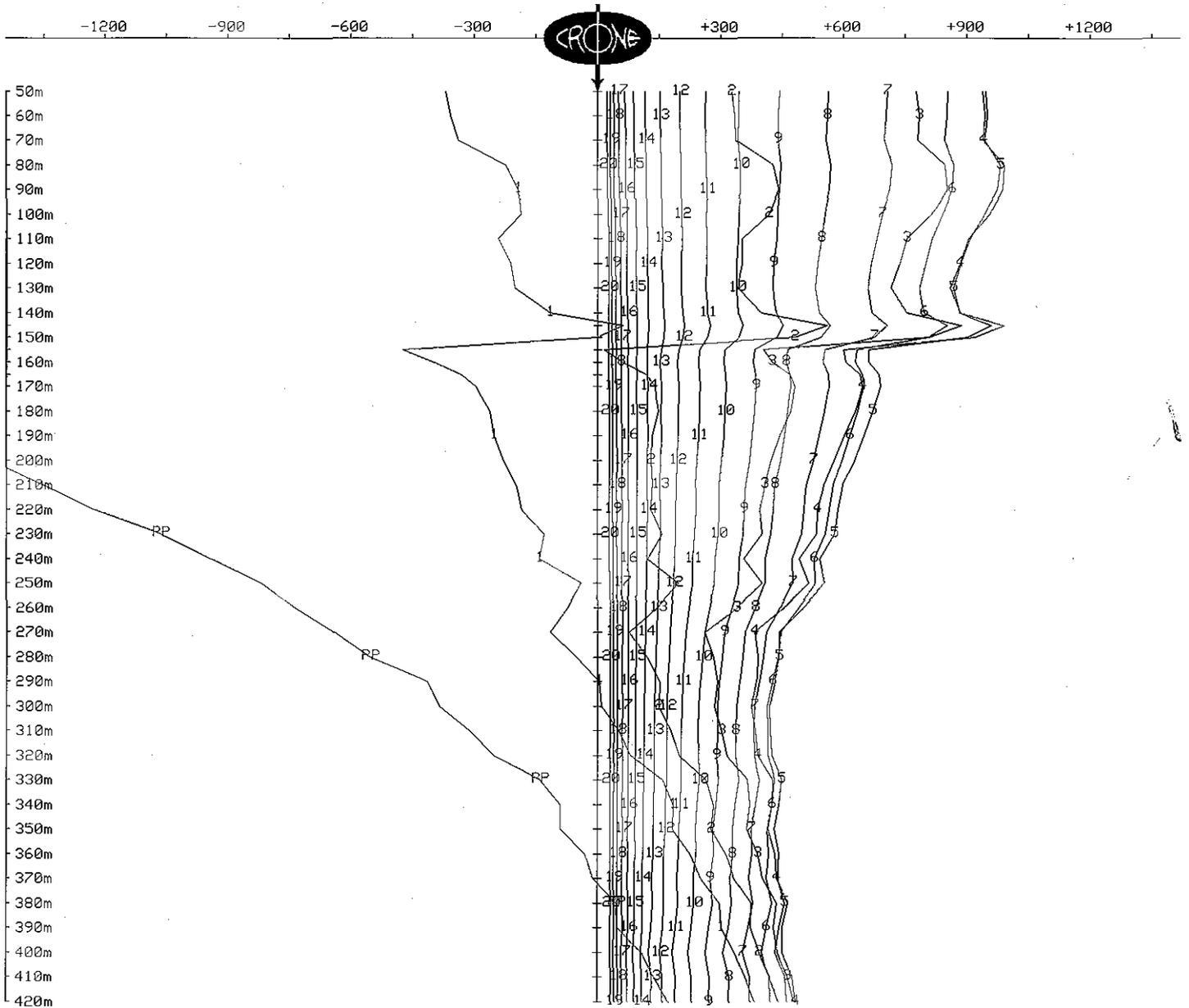
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 7, 2008

Hole : SDD-002
Tx Loop : STO2
File name : SDD02Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 20 of 36 channels and PP
Scale: 1:2500 Unit Scale: 1cm = 150 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

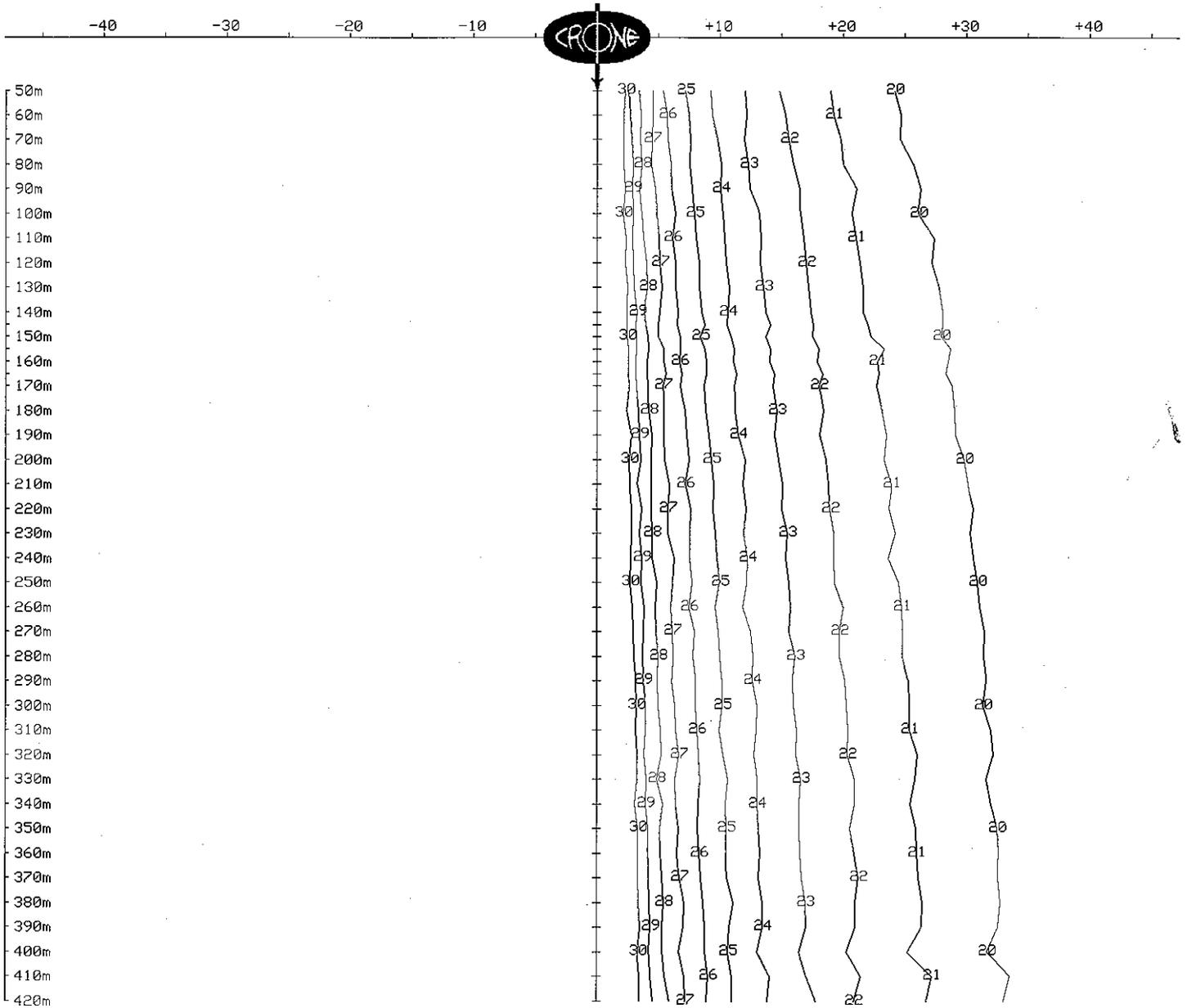
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Grid : Stonehenge
Date : Feb 7, 2008

Hole : SDD-002
Tx Loop : ST02
File name : SDD02Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 11 of 36 channels

Scale: 1:2500

Unit Scale: 1cm = 5 nT/s

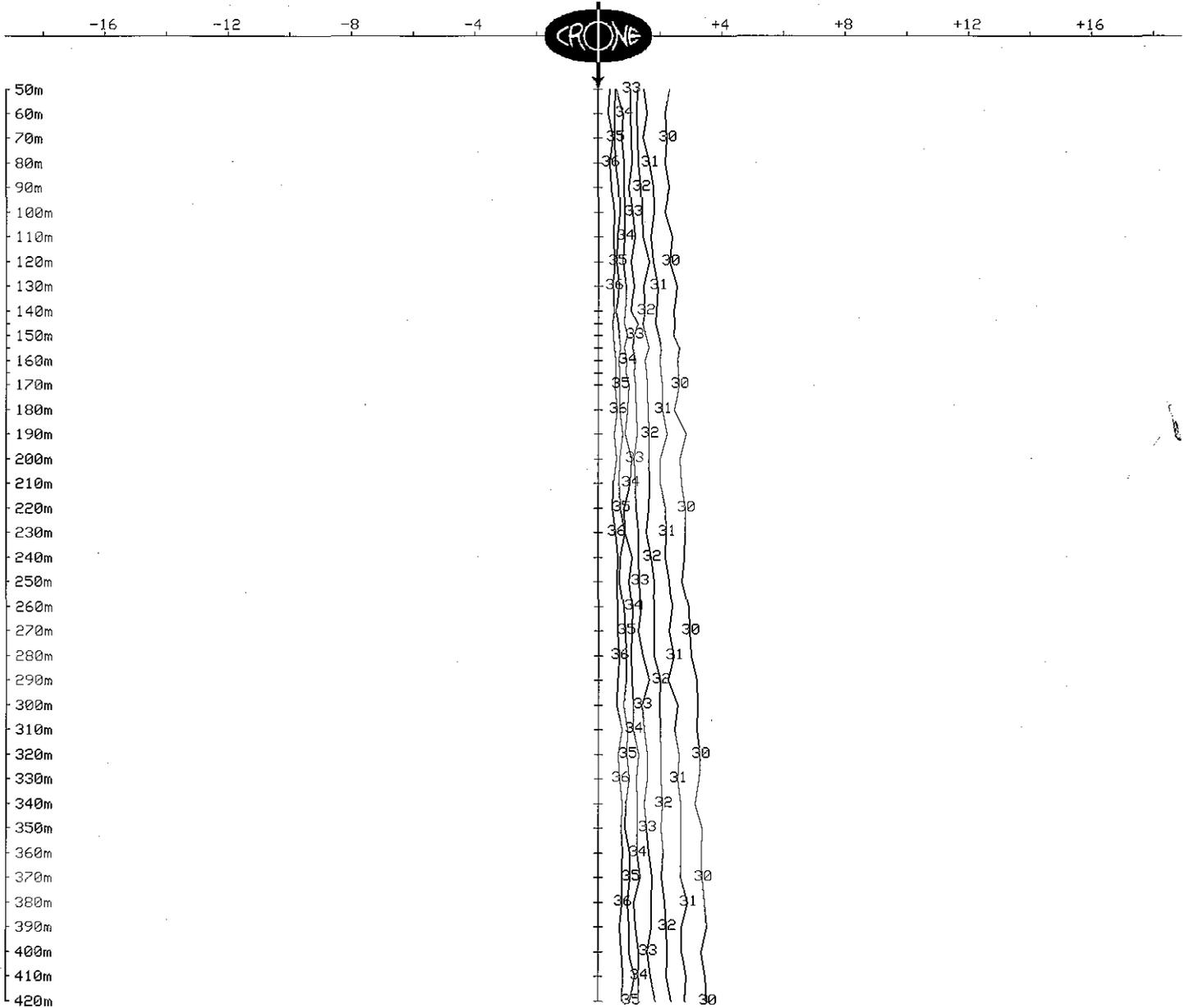


OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-002
Grid : Stonehenge Tx Loop : ST02
Date : Feb 7, 2008 File name : SDD02Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 7 of 36 channels
Scale: 1:2500 Unit Scale: 1cm = 2 nT/s



OUTER-RIM EXPLORATION SERVICES

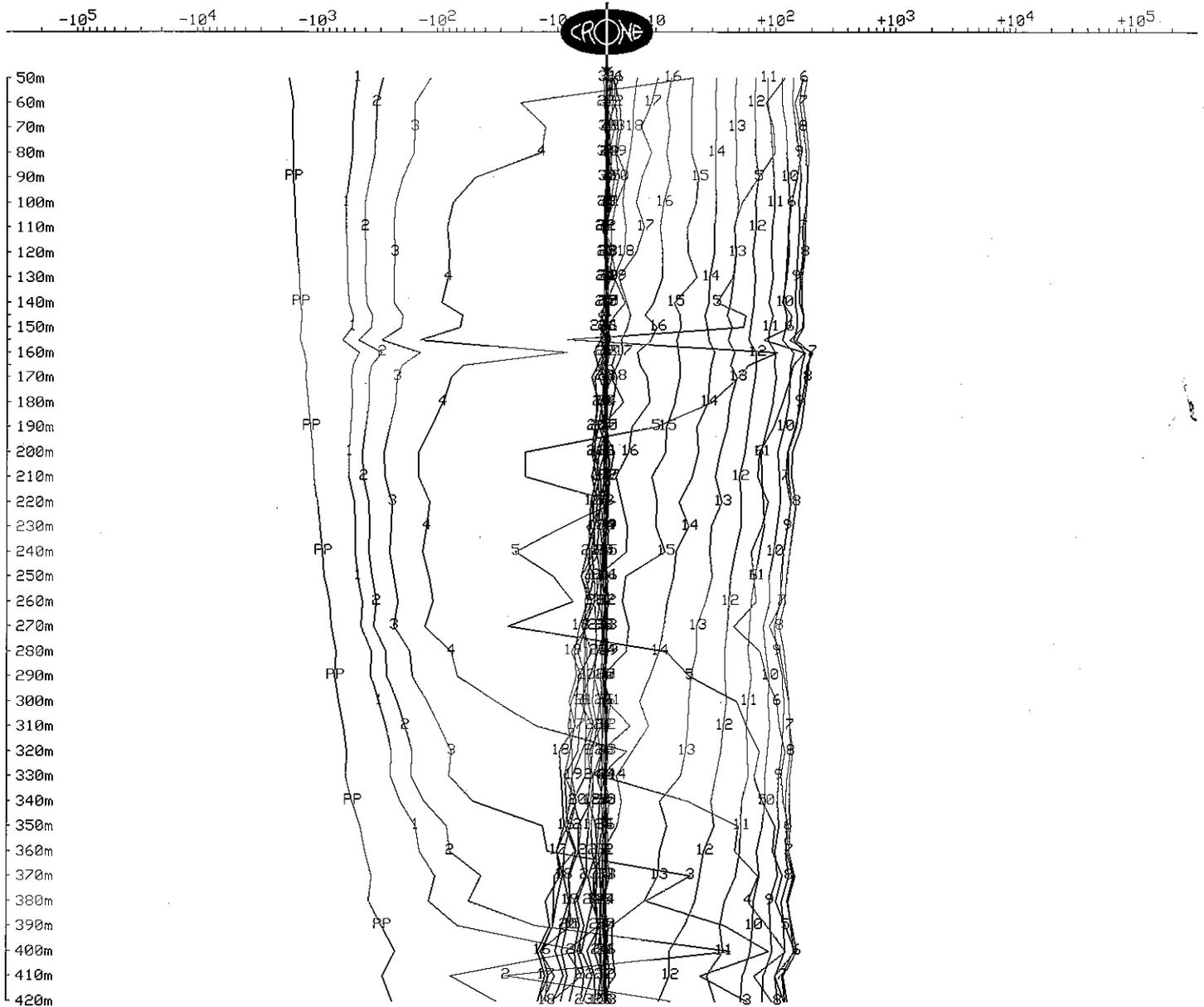
Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 8, 2008

Hole : SDD-002
Tx Loop : ST02
File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
X COMPONENT dBx/dt nanoTesla/sec - 36 of 36 channels and PP

Scale: 1:2500



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

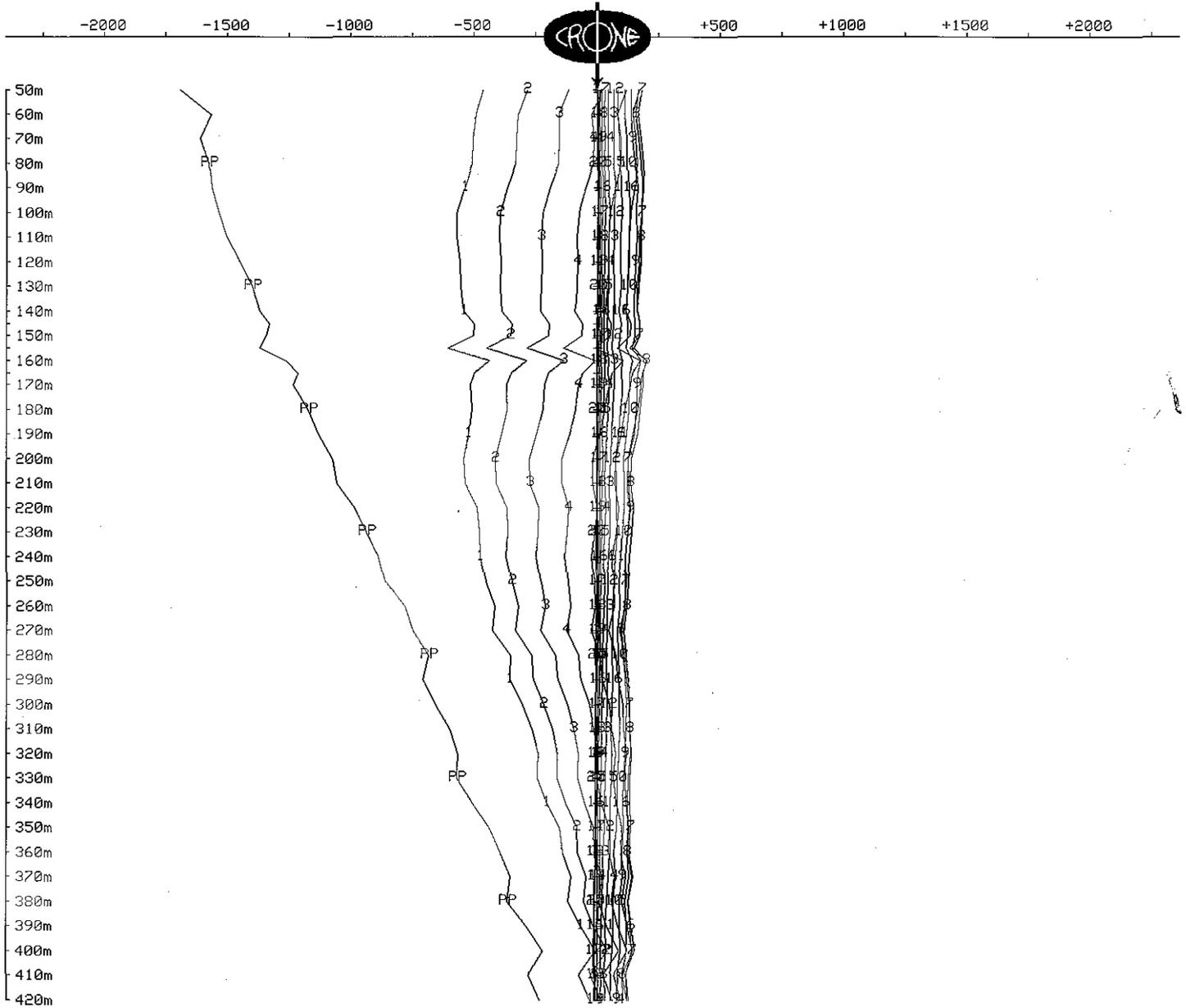
Client : Stonehenge Metals Ltd
 Grid : Stonehenge
 Date : Feb 8, 2008

Hole : SDD-002
 Tx Loop : ST02
 File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
 X COMPONENT dBx/dt nanoTesla/sec - 20 of 36 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 250 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

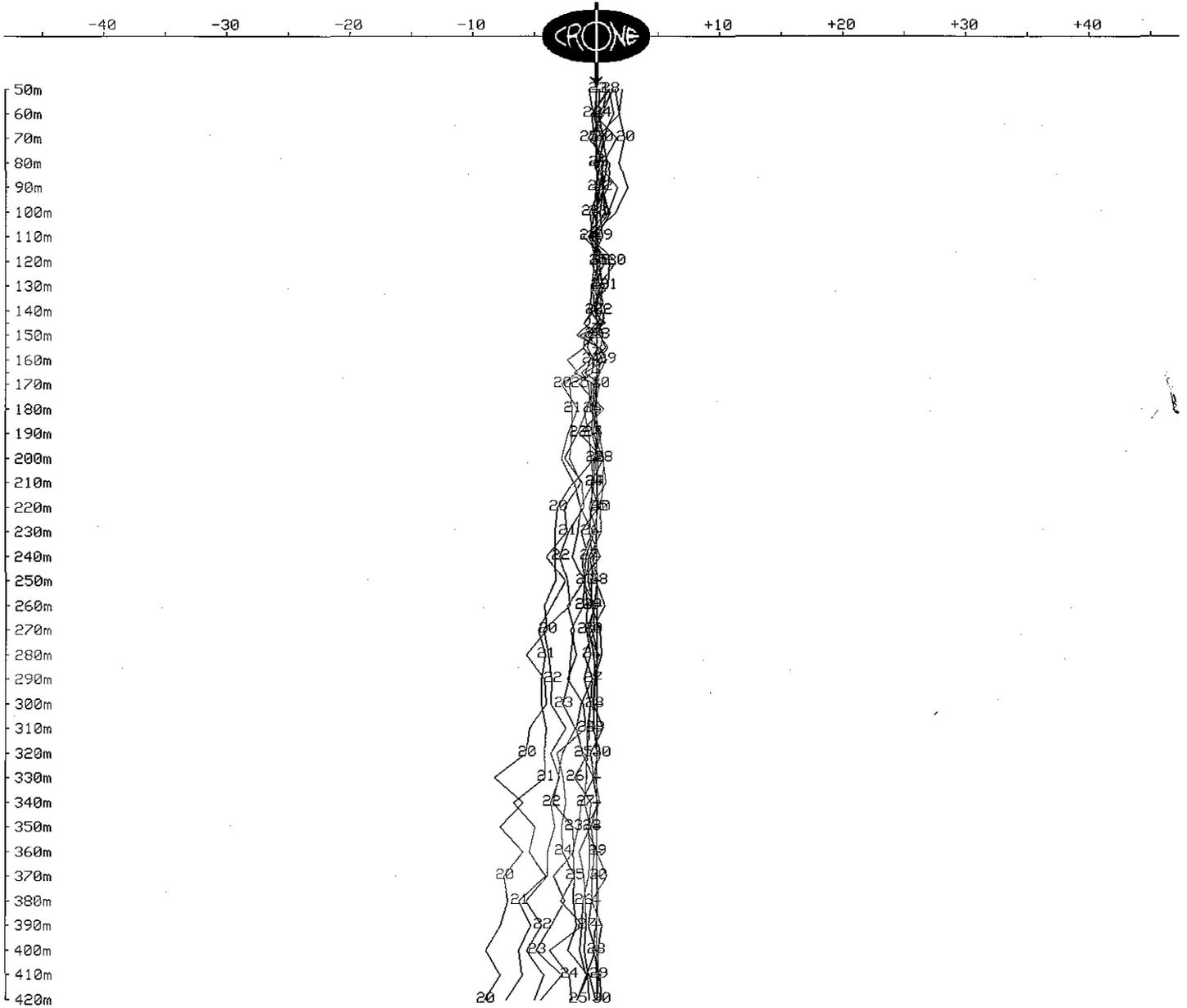
Client : Stonehenge Metals Ltd
 Grid : Stonehenge
 Date : Feb 8, 2008

Hole : SDD-002
 Tx Loop : ST02
 File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
 X COMPONENT dBx/dt nanoTesla/sec - 11 of 36 channels

Scale: 1:2500

Unit Scale: 1cm = 5 nT/s



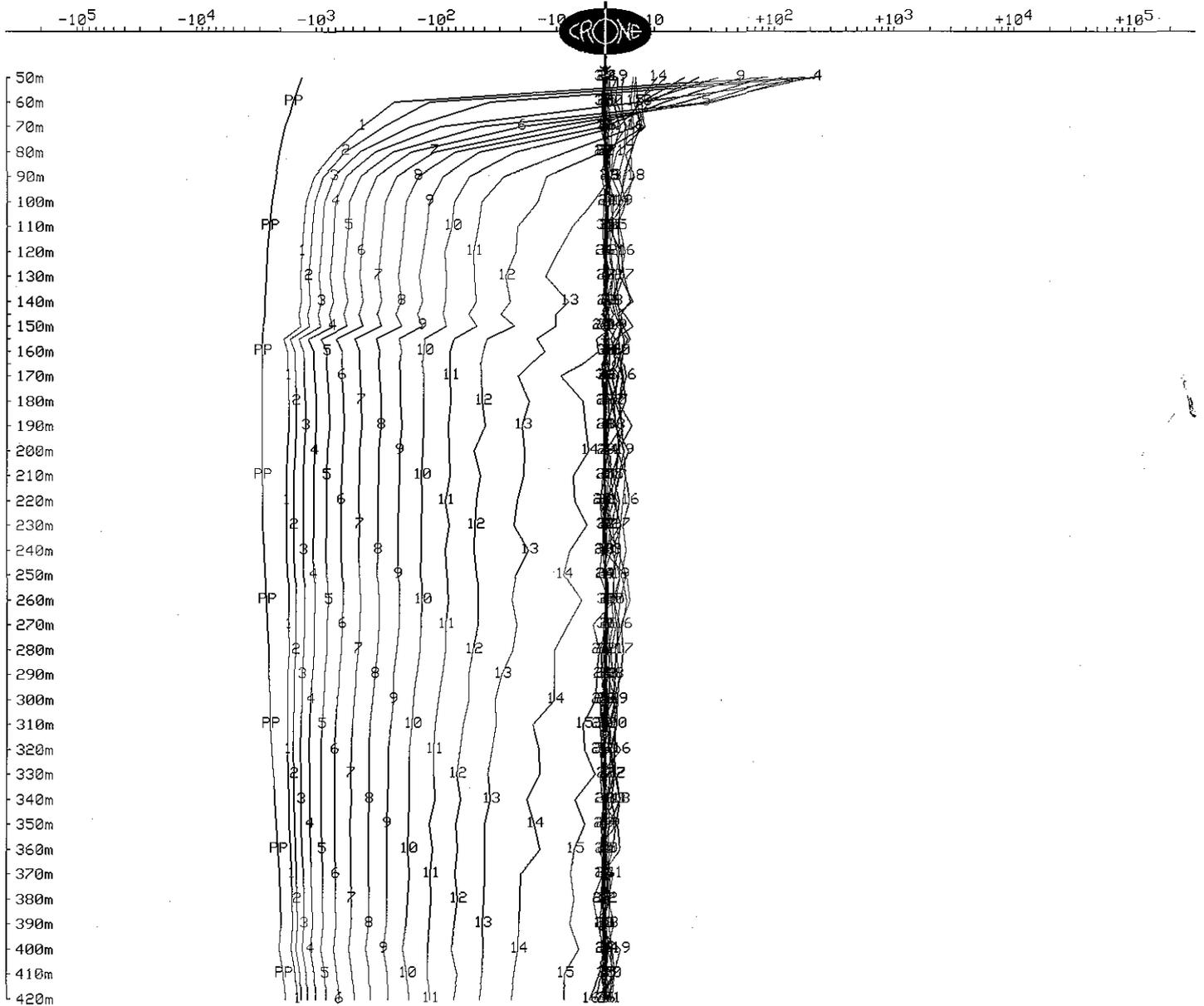
OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-002
Grid : Stonehenge Tx Loop : ST02
Date : Feb 8, 2008 File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 36 of 36 channels and PP

Scale: 1:2500



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

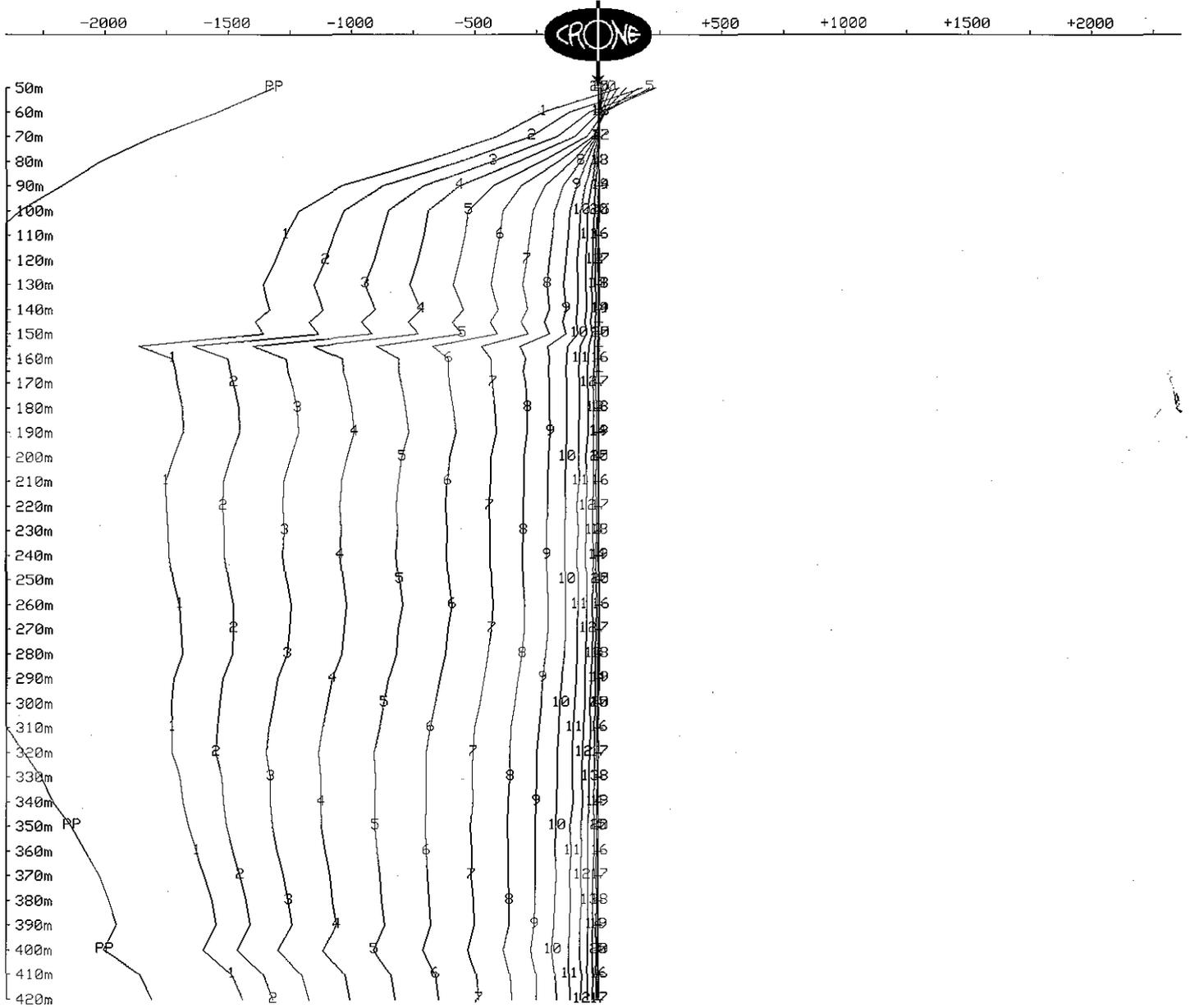
Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 8, 2008

Hole : SDD-002
Tx Loop : ST02
File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 20 of 36 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 250 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

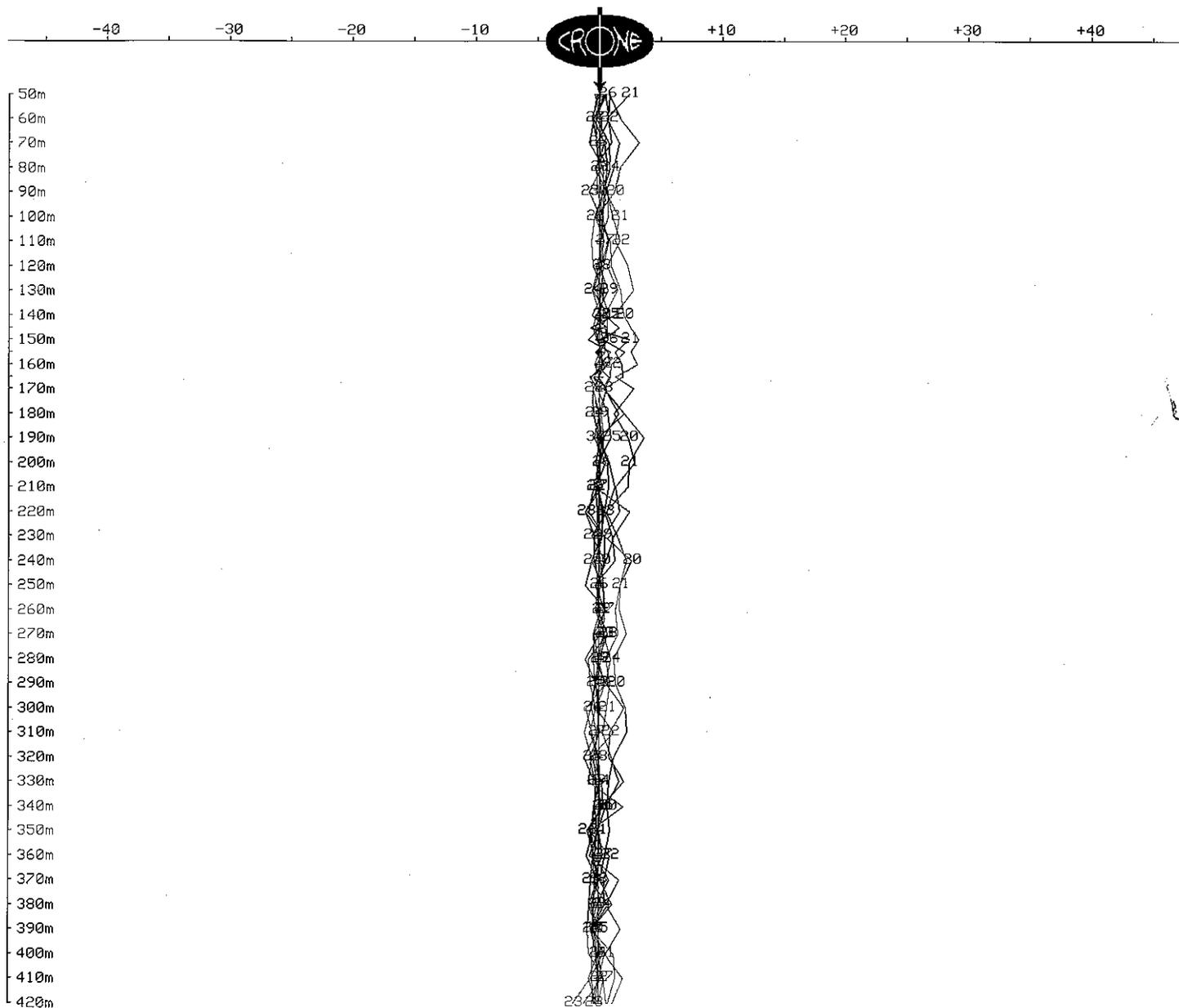
Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 8, 2008

Hole : SDD-002
Tx Loop : ST02
File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 11 of 36 channels

Scale: 1:2500

Unit Scale: 1cm = 5 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

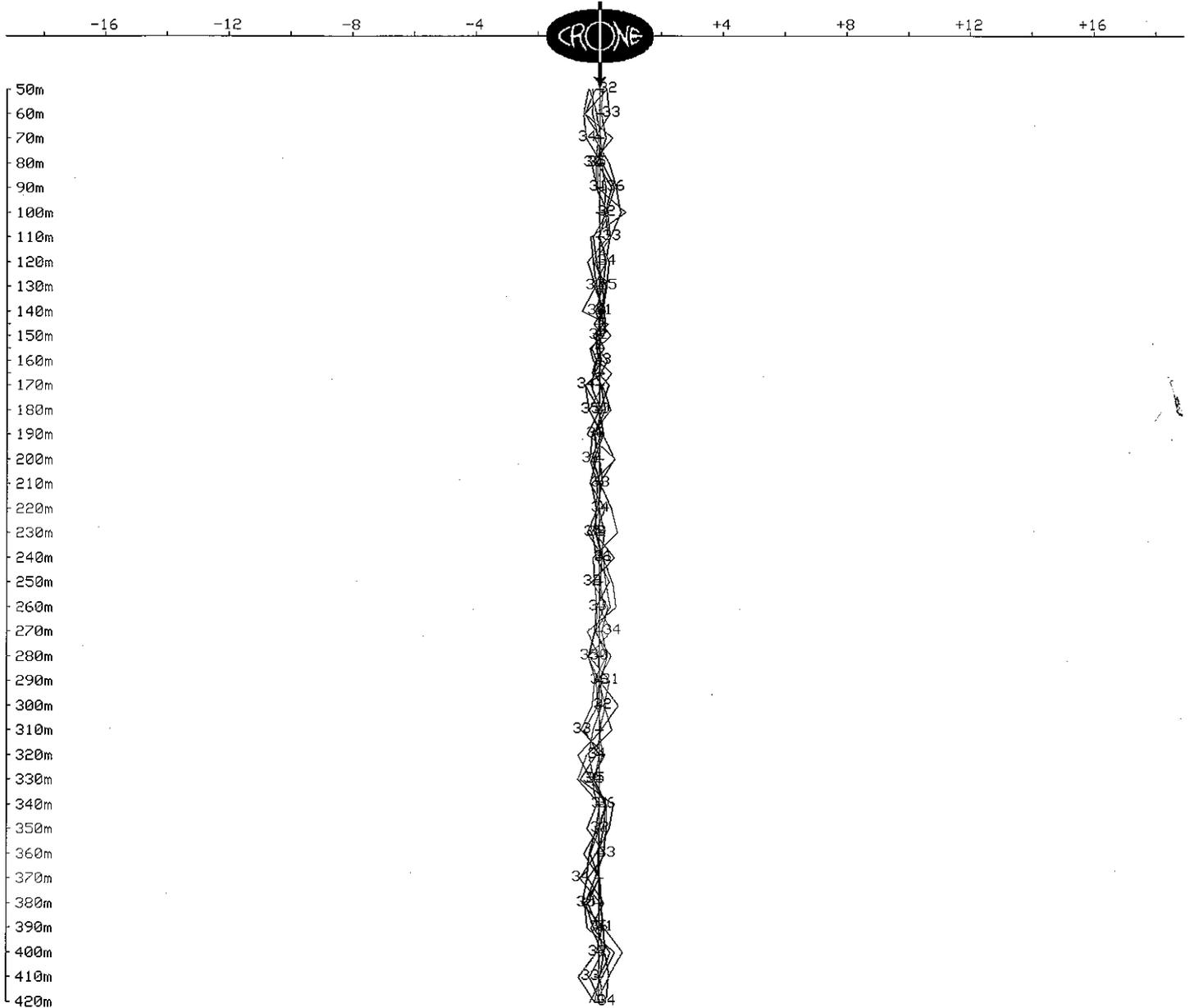
Client : Stonehenge Metals Ltd
Grid : Stonehenge
Date : Feb 8, 2008

Hole : SDD-002
Tx Loop : ST02
File name : SDD02XY.PEM

Data Corrected for Probe Rotation using Orientation Tool #2
Y COMPONENT dBy/dt nanoTesla/sec - 7 of 36 channels

Scale: 1:2500

Unit Scale: 1cm = 2 nT/s



OUTER-RIM EXPLORATION SERVICES

Borehole Pulse EM Survey

Client : Stonehenge Metals Ltd Hole : SDD-002
 Grid : Stonehenge Tx Loop : ST02
 Date : Feb 8, 2008 File name : SDD02XYZ.PEM

TOTAL FIELD dBxyz/dt nanoTesla/sec - 36 of 36 channels

Scale: 1:2500

