OUTER-RIM EXPLORATION SERVICES

ABN 88 104 028 417

Geophysical Contracting Services

100% Australian Owned

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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
22-09-07	We drove out to site, picked up the gear, drove out to MS-001 and dummied it to 41m (EOH 1600m). The PVC was separated at this point - we made several attempts to get down the hole but kept going down the outside of the PVC and getting stuck at 185m where the NQ started. It took a while to realise what was happening, managed to marry up the PVC and dummied it OK. We also dummied the next hole, BRD-008 to 398m. We laid out the east loop for MS-001 but found an open loop. We couldn't find the problem so will have to check it again in the morning.	
	1 Survey day	$2150.00
	1 Field Assist. day	$ 300.00
23-09-07	We drove out to High Point, repaired the open loop and read the Z component. There was no obvious response noted so Jovan decided read the west loop next and not bother with the X-Y at this stage. We recovered the east loop, laid out the west loop and read the Z component again - there was still no obvious response noted. We then headed back to Rosebery.	

SURVEY PARAMETERS:

Loop East	**:**500 x 500m 388225E; 5393000N: 388185E; 5392495N: 388455E; 5392470N: 388775E; 5393000N:
Current	:20 Amps
Time Base	:20 ms
Ramp Time	:0.5ms
Sync	:Clock
Loop West	**:**500 x 500m 387700E; 5393000N: 387700E; 5392500N: 388185E; 5392495N: 388225E; 5393000N:
Current	:20 Amps
Time Base	:20 ms
Ramp Time	:0.5ms
Sync	:Clock
Hole No.	**:MS-001** 388222E; 5392744N:
Depth	:1470m
Channels	:21
Components	:Z

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

24-09-07 We drove out to High Point, used the Zinifex six wheel drive bike to recovered the borehole and transmitter gear, as well as the rest of the wire. Due to rain and muddy conditions, this took us until around midday. We returned the bike to Rosebery, and because of the weather, called the later half of the day a weather day.

½ Survey day $1075.00
½ Field Assist. day $ 150.00
½ Weather day $ 575.00

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/m^2).

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/m^2).

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 minerals

  through 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:

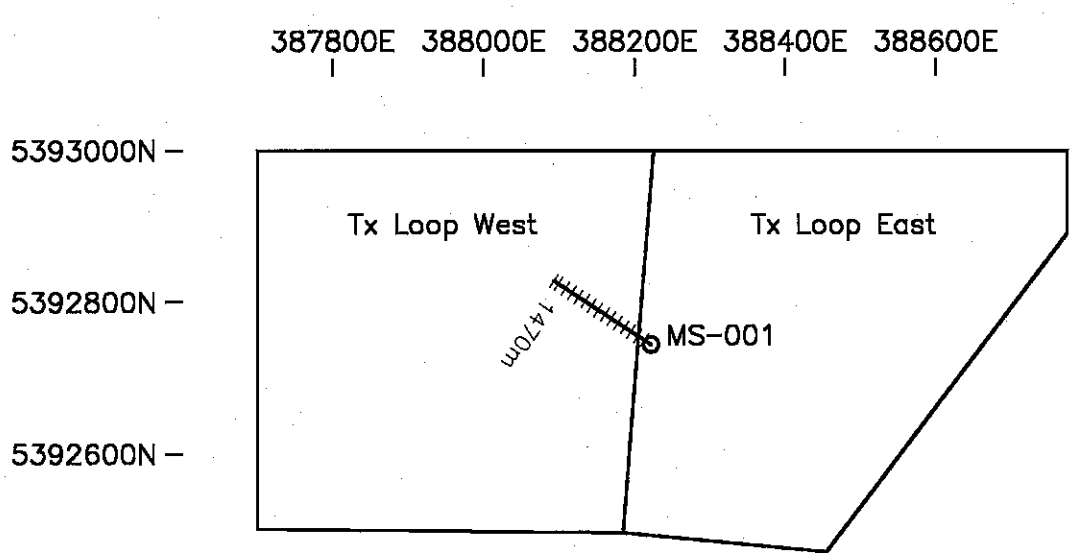
- Define the boundaries of conductive ore
- Determine the size of intersected conductors and thereby determine whether they are connected to main ore zones.
- Reduce the number of necessary drillholes by exploring between holes.
- Survey underground drillholes - even flat or inclined holes.

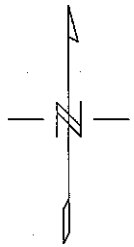
Pulse EM can also be used for:

- 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





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100 0 100 200

(metres)

Zinifex Ltd

High Point

3-D Borehole Pulse EM Survey

Borehole & Loop Location Map

Hole: MS-001

Survey Date: Sep 23, 2007

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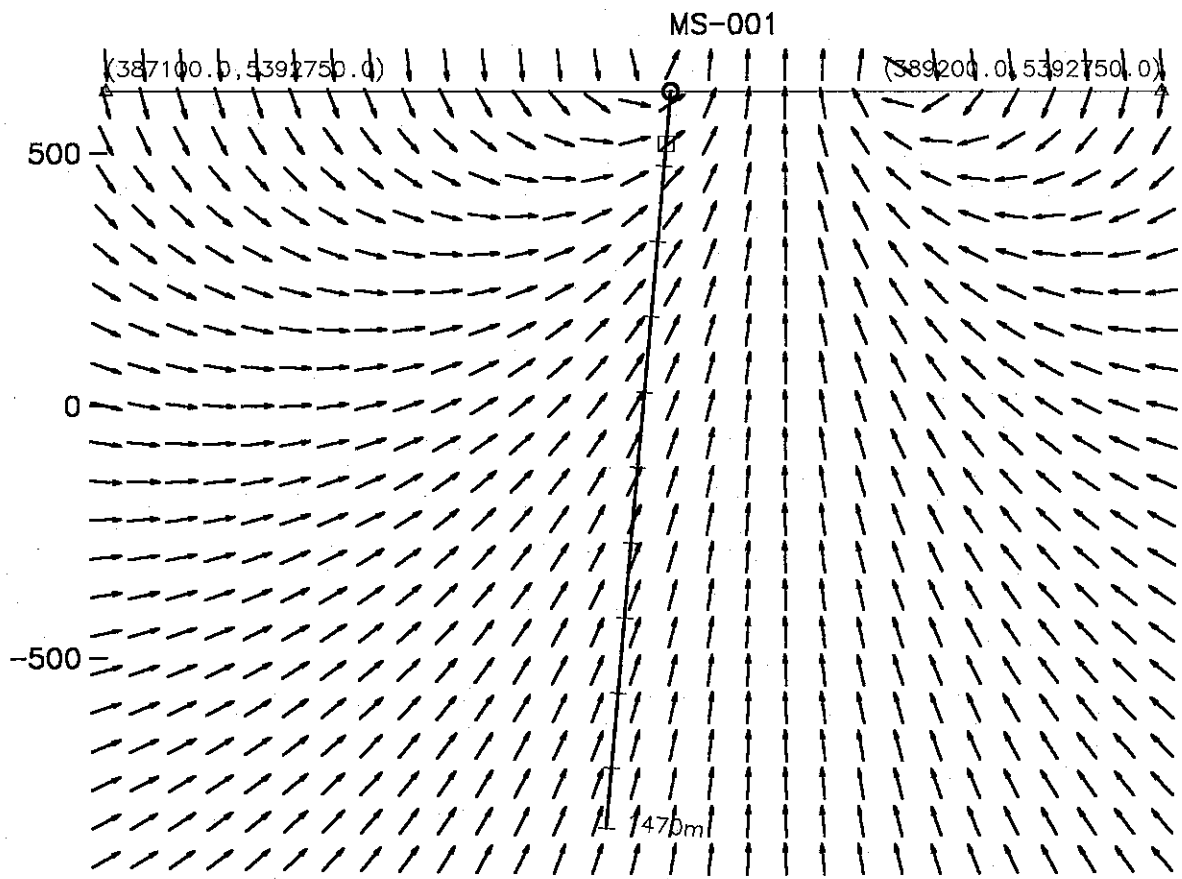
East Loop



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(metres)

Zinifex Ltd

High Point

3-D Borehole Pulse EM Survey

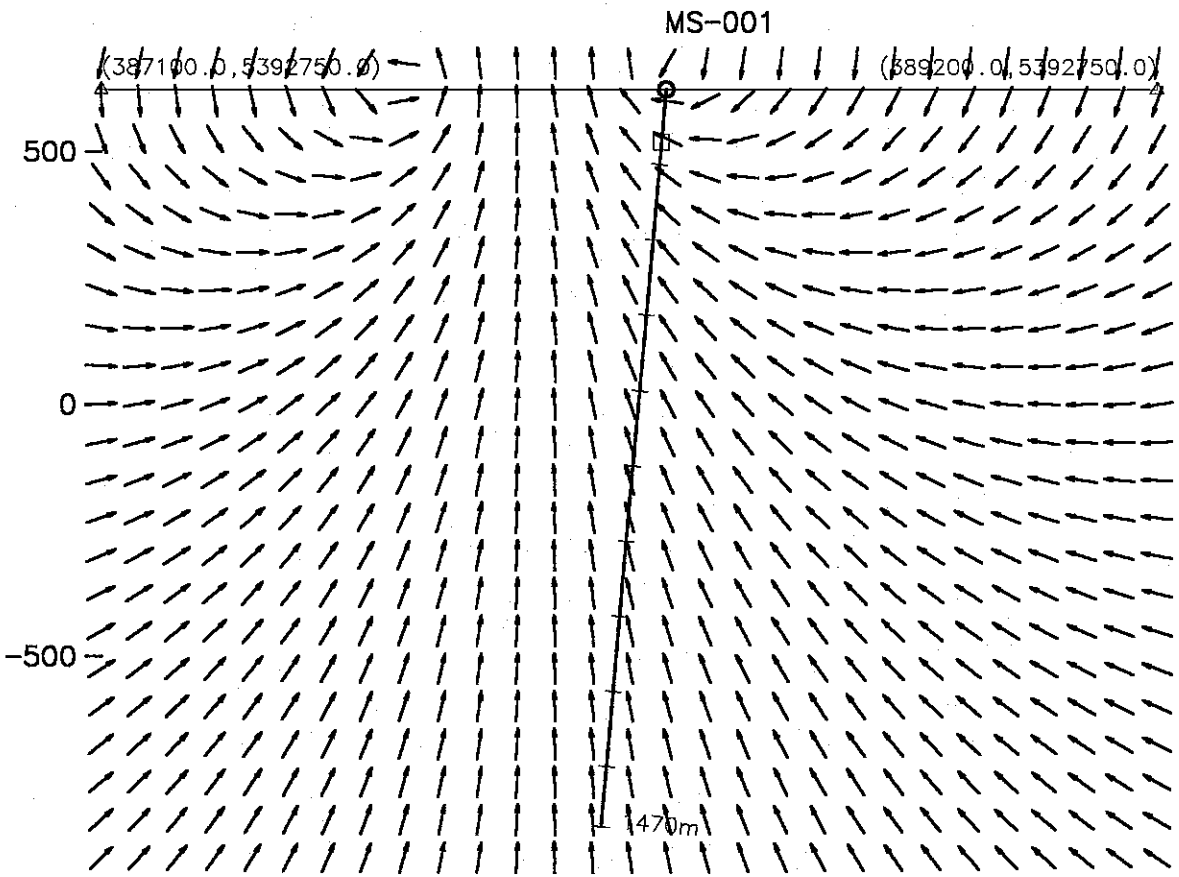
Hole Section with Primary Field

Hole: MS-001

Survey Date: Sep 23, 2007

Outer-Rim Exploration Services

West Loop



Scale 1:15000

250 0 250

(metres)

Zinifex Ltd

High Point

3-D Borehole Pulse EM Survey

Hole Section with Primary Field

Hole: MS-001

Survey Date: Sep 23, 2007

Outer-Rim Exploration Services

OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **East**
Date	: Sep 23, 2007	File name	: MS1ZE.PEM
Time Base	: 20.00 ms	# Readings	: 40
Ramp Time	: 0.50 ms	Stn Units	: Metric
# Channels	: 21	Coil Area	: 6500 sq m
Sync Type	: Crystal-Master	Polarity	: +
Loop Size	: 500m X 500m	Receiver	: Digital #105
Current	: 20 Amps	Operator	: Adrian Page

Loop Coordinates (X,Y,Z)

1. 388225m, 5.393e+06m, 680m
2. 388185m, 5.3925e+06m, 690m
3. 388455m, 5.39247e+06m, 675m
4. 388775m, 5.39289e+06m, 660m
5. 388775m, 5.393e+06m, 660m

Hole Coordinates (X,Y,Z) or (Azimuth,Dip,Length)

1. 388222m, 5.39274e+06m, 623m
2. 303deg, 84deg, 1470m

Channel Times (usec)

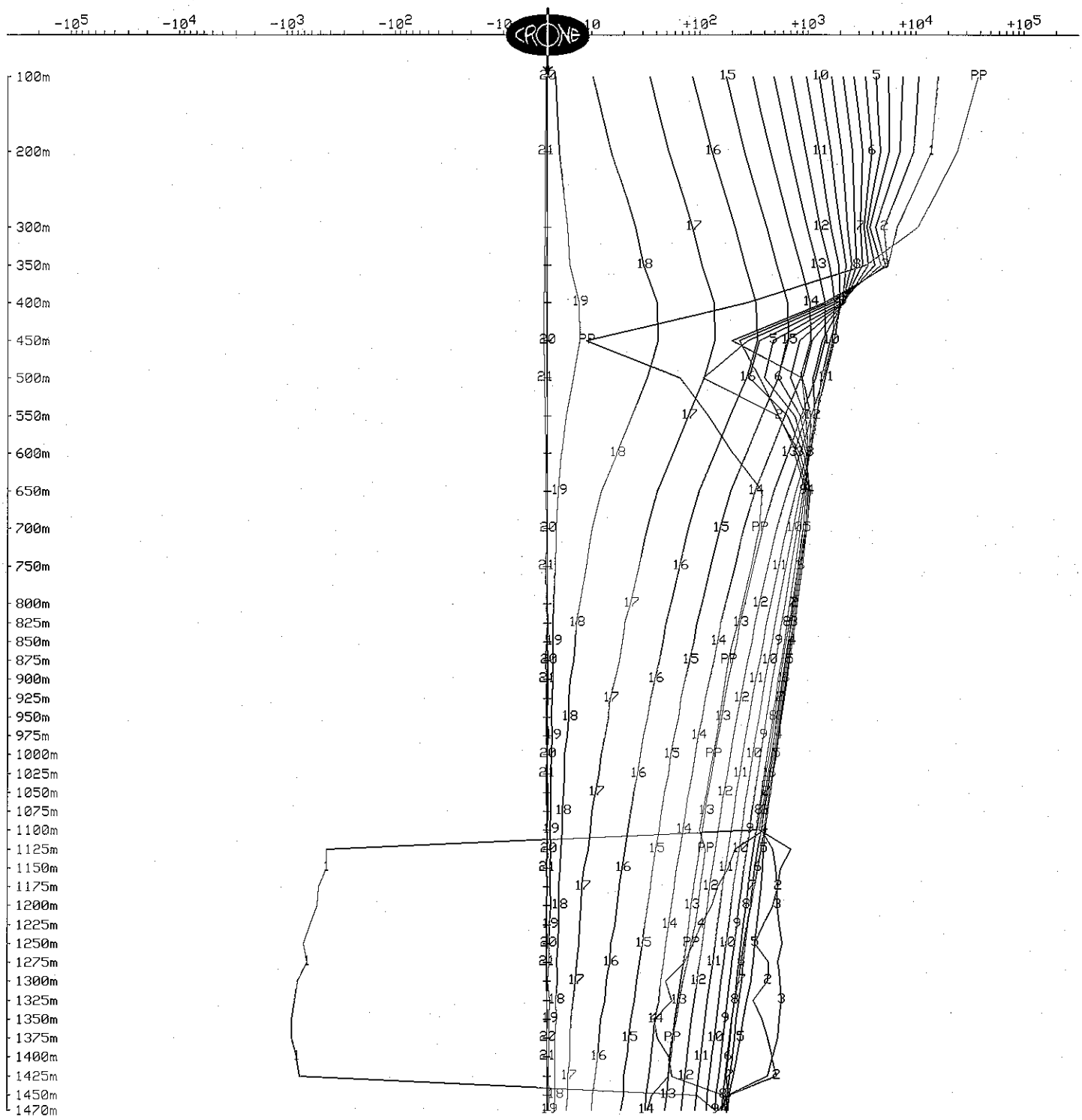
Ch	Start	End	Center	Ch	Start	End	Center	Ch	Start	End	Center
PP	-200	-100	-150	1	48	64	56	2	64	84	74
3	84	112	98	4	112	152	132	5	152	204	178
6	204	268	236	7	268	360	314	8	360	480	420
9	480	640	560	10	640	848	744	11	848	1128	988
12	1128	1496	1312	13	1496	1992	1744	14	1992	2644	2318
15	2644	3512	3078	16	3512	4664	4088	17	4664	6192	5428
18	6192	8220	7206	19	8220	10920	9570	20	10920	14400	12660
21	14400	17700	16050								

OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **East**
Date	: Sep 23, 2007	File name	: MS1ZE.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 21 of 21 channels and PP

Scale: 1:7500

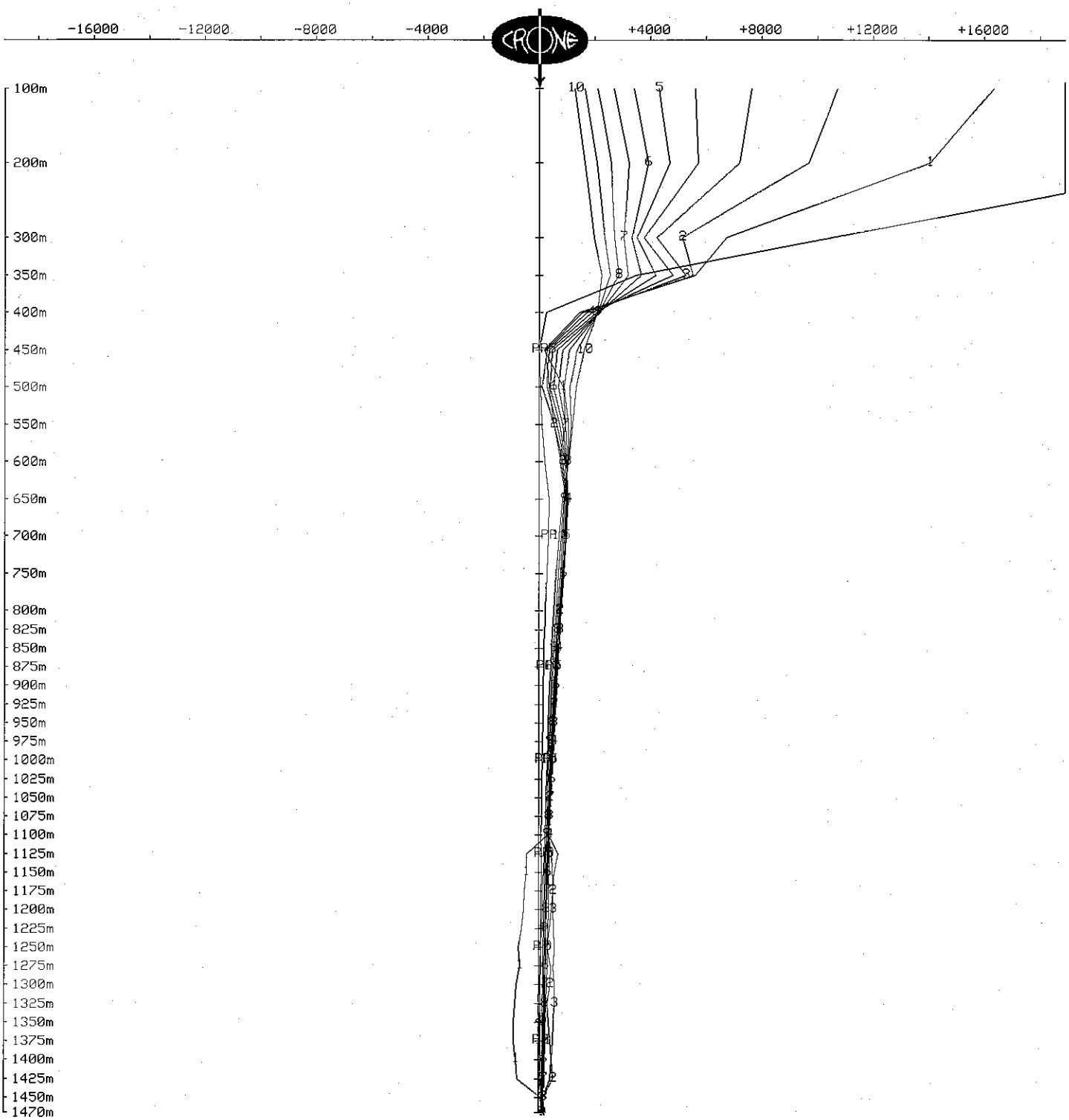


OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **East**
Date	: Sep 23, 2007	File name	: MS1ZE.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 10 of 21 channels and PP

Scale: 1:7500 Unit Scale: 1cm = 2000 nT/s

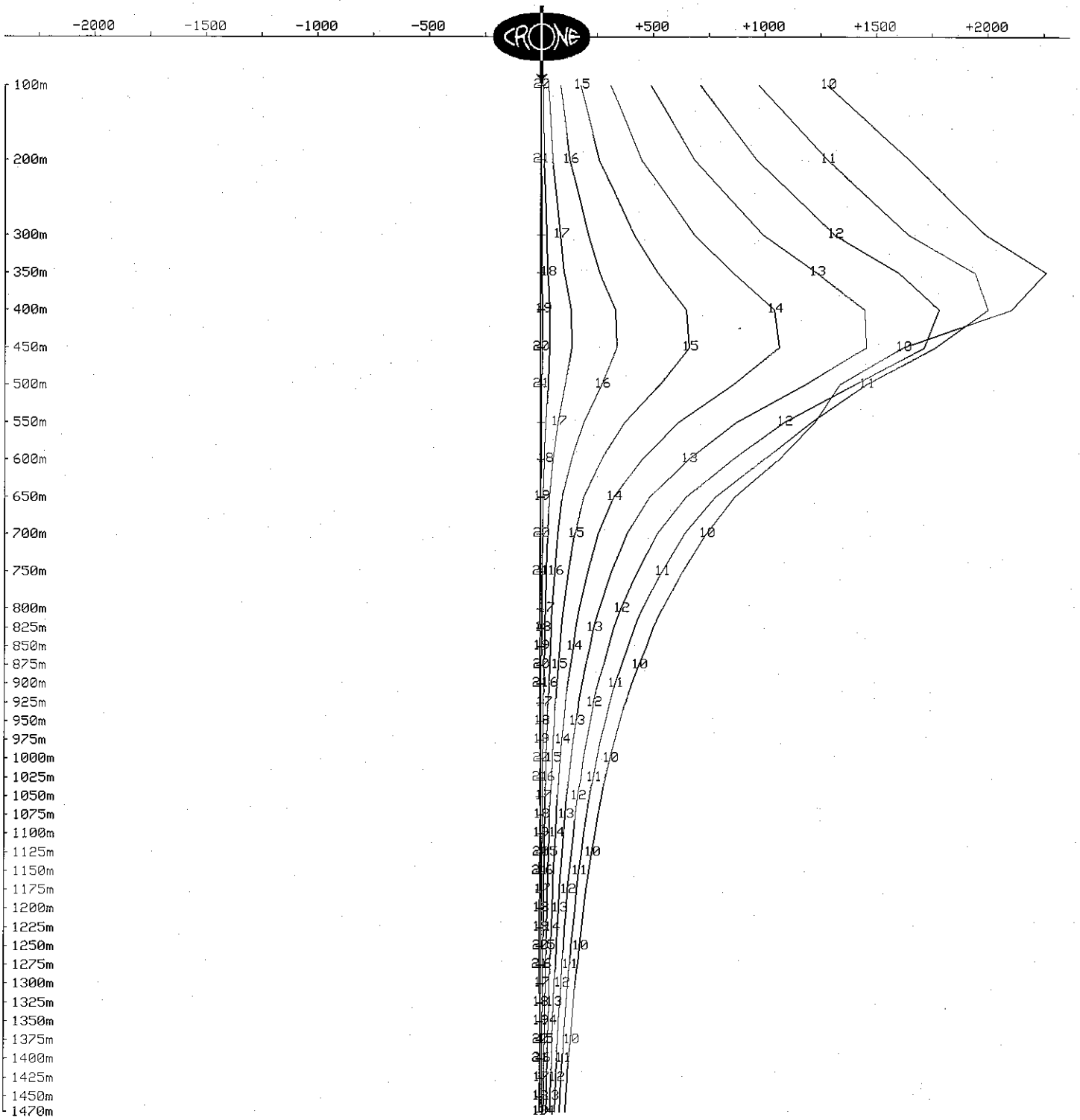


OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **East**
Date	: Sep 23, 2007	File name	: MS1ZE.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 12 of 21 channels

Scale: 1:7500 Unit Scale: 1cm = 250 nT/s



OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **West**
Date	: Sep 23, 2007	File name	: MS1ZW.PEM
Time Base	: 20.00 ms	# Readings	: 40
Ramp Time	: 0.50 ms	Stn Units	: Metric
# Channels	: 21	Coil Area	: 6500 sq m
Sync Type	: Crystal-Master	Polarity	: +
Loop Size	: 500m X 500m	Receiver	: Digital #105
Current	: 20 Amps	Operator	: Adrian Page

Loop Coordinates (X,Y,Z)

1. 387700m, 5.393e+06m, 630m
2. 387700m, 5.3925e+06m, 660m
3. 388185m, 5.3925e+06m, 690m
4. 388225m, 5.393e+06m, 680m

Hole Coordinates (X,Y,Z) or (Azimuth,Dip,Length)

1. 388222m, 5.39274e+06m, 623m
2. 303deg, 84deg, 1470m

Channel Times (usec)

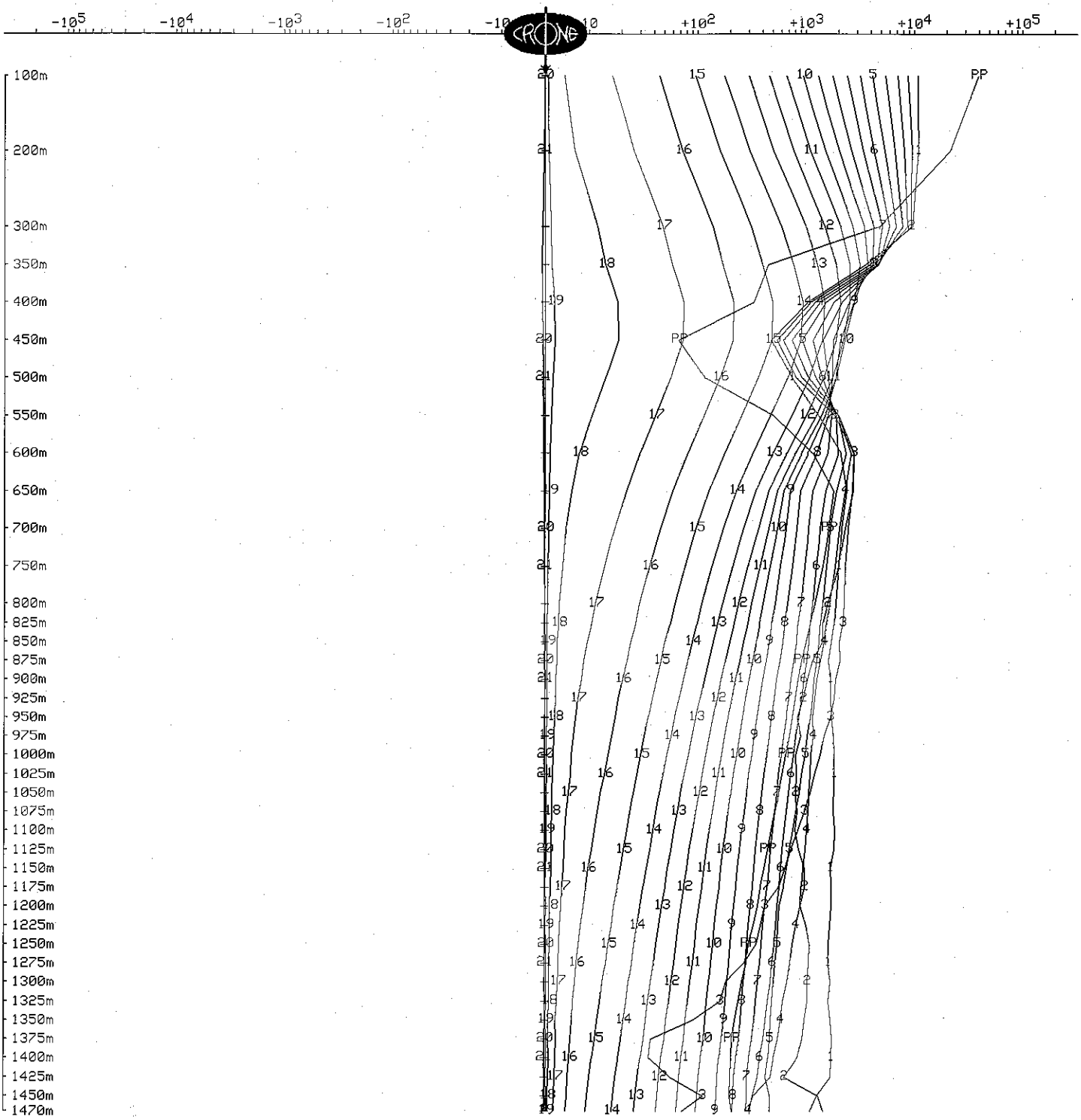
Ch	Start	End	Center	Ch	Start	End	Center	Ch	Start	End	Center
PP	-200	-100	-150	1	48	64	56	2	64	84	74
3	84	112	98	4	112	152	132	5	152	204	178
6	204	268	236	7	268	360	314	8	360	480	420
9	480	640	560	10	640	848	744	11	848	1128	988
12	1128	1496	1312	13	1496	1992	1744	14	1992	2644	2318
15	2644	3512	3078	16	3512	4664	4088	17	4664	6192	5428
18	6192	8220	7206	19	8220	10920	9570	20	10920	14400	12660
21	14400	17700	16050								

OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **West**
Date	: Sep 23, 2007	File name	: MS1ZW.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 21 of 21 channels and PP

Scale: 1:7500

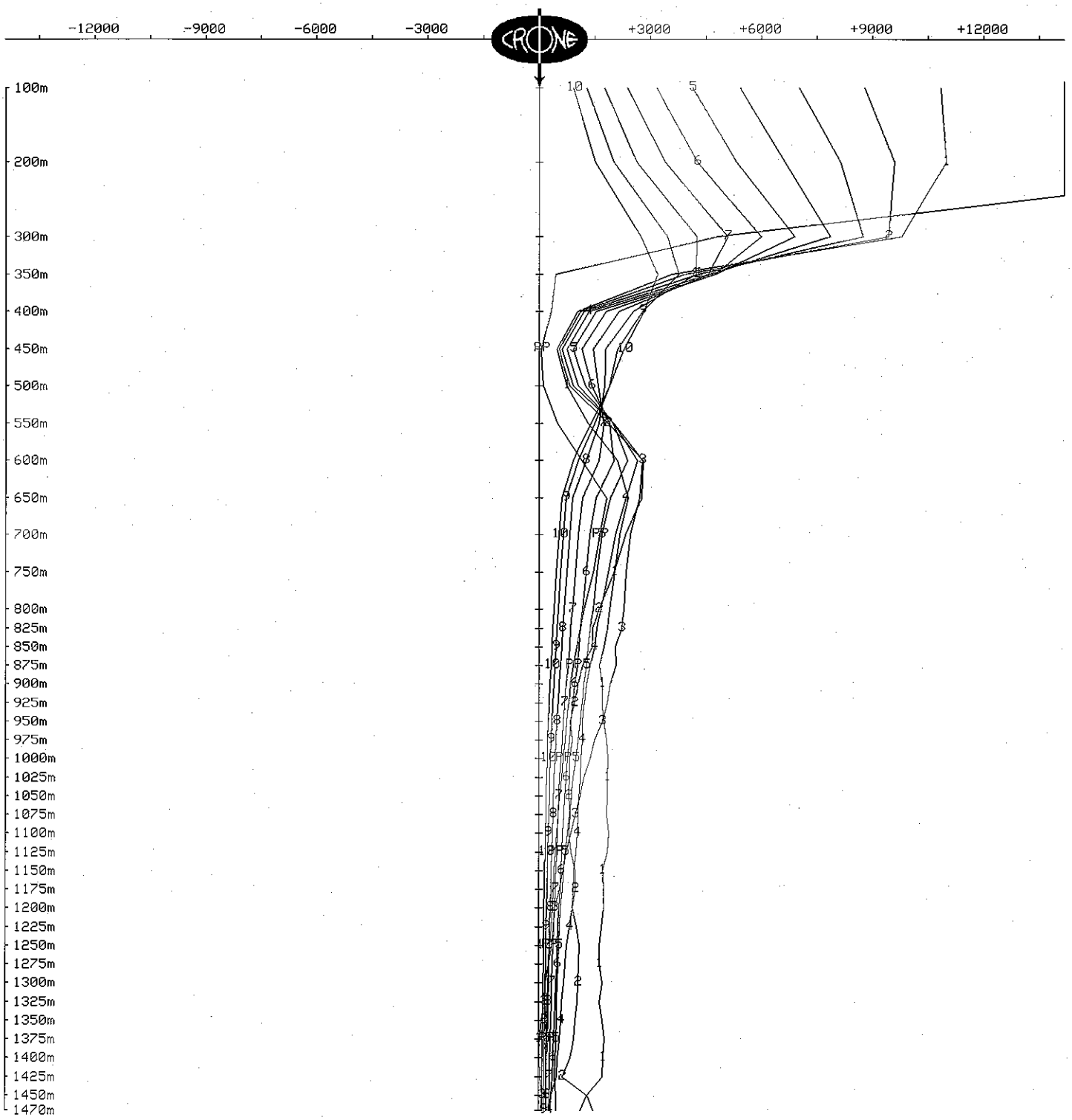


OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **West**
Date	: Sep 23, 2007	File name	: MS1ZW.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 10 of 21 channels and PP

Scale: 1:7500 Unit Scale: 1cm = 1500 nT/s



OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **MS-001**
Grid	: **High Point**	Tx Loop	: **West**
Date	: Sep 23, 2007	File name	: MS1ZW.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 12 of 21 channels

Scale: 1:7500 Unit Scale: 1cm = 400 nT/s