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	:	Widhspur and Boco
Area	:	Rosebery, Tas.
Survey	:	Borehole PEM Survey
Survey Period	:	27th February to 3rd March, 2006
Operator	:	Muhamad Humam

DAILY LOG: Zinifex Limited - February/March, 2006

DATE	COMMENTS	CHARGES
24-02-06	We drove to Kingaroy and arrived at 8.00pm.	1 Mob. day N/C
25-02-06	We drove from Kingaroy to Dubbo.	1 Mob. day $1000.00
26-02-06	We drove from Dubbo to Melbourne, then to Tasmania by ferry in the evening and arrived in Tasmania in the morning.	1 Mob. day $1000.00
27-02-06	We left the Spirit of Tasmania at 8.00am, drove to Rosebery and arrived around 11.00am. We then drove to site, dummied the test hole and read the Z and X-Y to ensure the system was working. We finished the survey at 7.30pm and returned to Rosebery by 9.00pm.	

SURVEY PARAMETERS

Loop W1 :400 x 400m
376926E, 5360187N; 377454E, 5360197N
376980E, 5359790N; 377448E, 5359802N.
Current :16 Amps
Time Base :20 ms
Ramp Time :1.0 ms
Sync :Cable

Hole No. **:YWS-001**
377227E, 5360064N
Depth :430m
Channels :31
Components :Z,X,Y

½ Mob. day $ 500.00
1 Survey day $2000.00
1 Field Assist. day $ 300.00

28-02-06 We drove to office at 7.00am, attended a safety meeting, then Jovan Silic (geophysicist) checked the data and we went out to site at 9.00am. We moved the gear to the next hole, dummied it, set up and read the Z component at 25m spacing and 2048 stacks. We finished the survey at 3.15pm and, based on the Z data Jovan decided not to read the X-Y. We then packed up and returned to Rosebery by 5.15pm.

SURVEY PARAMETERS

Loop W2 :400 x 400m
377288E, 5358998N; 377350E, 5358864N
377298E, 5358603N; 377654E, 5358994N.

Current :20 Amps
Time Base :20 ms
Ramp Time :1.0 ms
Sync :Cable

Hole No. **:WSP-014**
377350E, 5358864N
Depth :495m
Channels :20
Components :Z

1 Survey day $2000.00
1 Field Assist. day $ 300.00

01-03-06 Following the safety meeting, we went out to site at 9.00am, dummied BOC-003 and BOC-004, set up and read the Z component for BOC-003 and some of BOC-004, at 25m spacing. We finished up at 5.30pm, packed up and drove back to Rosebery by 6.30pm.

SURVEY PARAMETERS

Loop B1 :400 x 400m
379161E, 5384538N; 379458E, 5384689N
379340E, 5384210N; 379643E, 5384369N.
Current :20 Amps
Time Base :20 ms
Ramp Time :1.0 ms
Sync :Cable

Hole No. **:BOC-003**
379480E, 5384413N
Depth :540m
Channels :20
Components :Z (25-540m by 25m spacing, 2048 stks)

Hole No. **:BOC-004**
379480E, 5384413N
Depth :690 - 250m
Channels :20
Components :Z

1 Survey day $2000.00
1 Field Assist. day $ 300.00

02-03-06 We drove out to site at 7.00am, completed the Z component for BOC-004 by 9.30am, then packed up and moved to BOC-006. We dummied the hole, set up and read the Z component until 4.00pm. Because we found no obvious anomaly, we packed up and headed out. Unfortunately, we got bogged on the way back. We spent about one and half hours getting out, then drove back to Rosebery at 6.30pm.

SURVEY PARAMETERS

Loop B1 :400 x 400m
379161E, 5384538N; 379458E, 5384689N
379340E, 5384210N; 379643E, 5384369N.
Current :20 Amps
Time Base :20 ms
Ramp Time :1.0 ms
Sync :Cable

Hole No. **:BOC-004**
379480E, 5384413N
Depth :25 to 250m
Channels :20
Components :Z

Loop B2 :400 x 400m
383000E, 5389000N; 383400E, 5389000N
383000E, 5388600N; 383400E, 5388600N.
Current :20 Amps
Time Base :20 ms
Ramp Time :1.0 ms
Sync :Cable

Hole No. **:BOC-006**
383120E, 5388825N
Depth :670m
Channels :20
Components :Z

1 Survey day $2000.00
1 Field Assist. day $ 300.00

03-03-06 We got to the office at 7.00am, attended the safety meeting, then drove out to site at 7.30am. We recovered loop B2 (it was very difficult) and finished at 12.00pm. We then packed up, drove to Davenport, arrived at about 5.00pm and got in the boat at 7.00pm.

½ Survey day $1000.00
½ Field Assist. day $ 150.00
½ Mob. day $ 500.00

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:

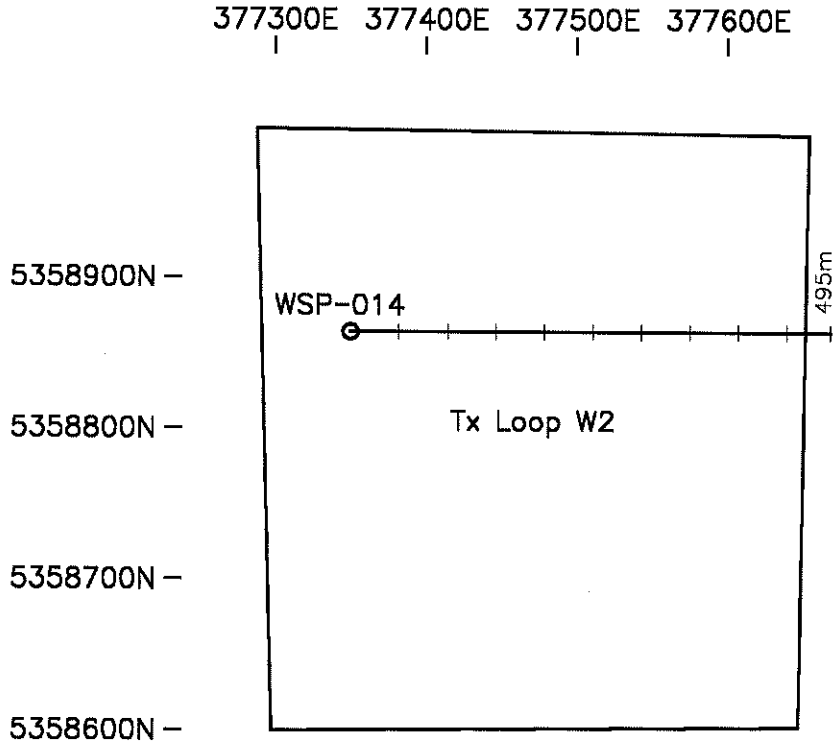
- Define the boundaries of conductive ore
- Determine the size of intersected conductors and thereby determine whether they are connected to main ore zones.
- Reduce the number of necessary drillholes by exploring between holes.
- Survey underground drillholes - even flat or inclined holes.

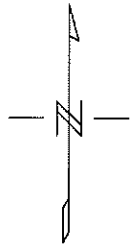
Pulse EM can also be used for:

- 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





Scale 1:5000

50 0 50 100

(metres)

Zinifex Ltd

Widhspur

3-D Borehole Pulse EM Survey

Borehole & Loop Location Map

Hole: WSP-014

Survey Date: Feb 28, 2006

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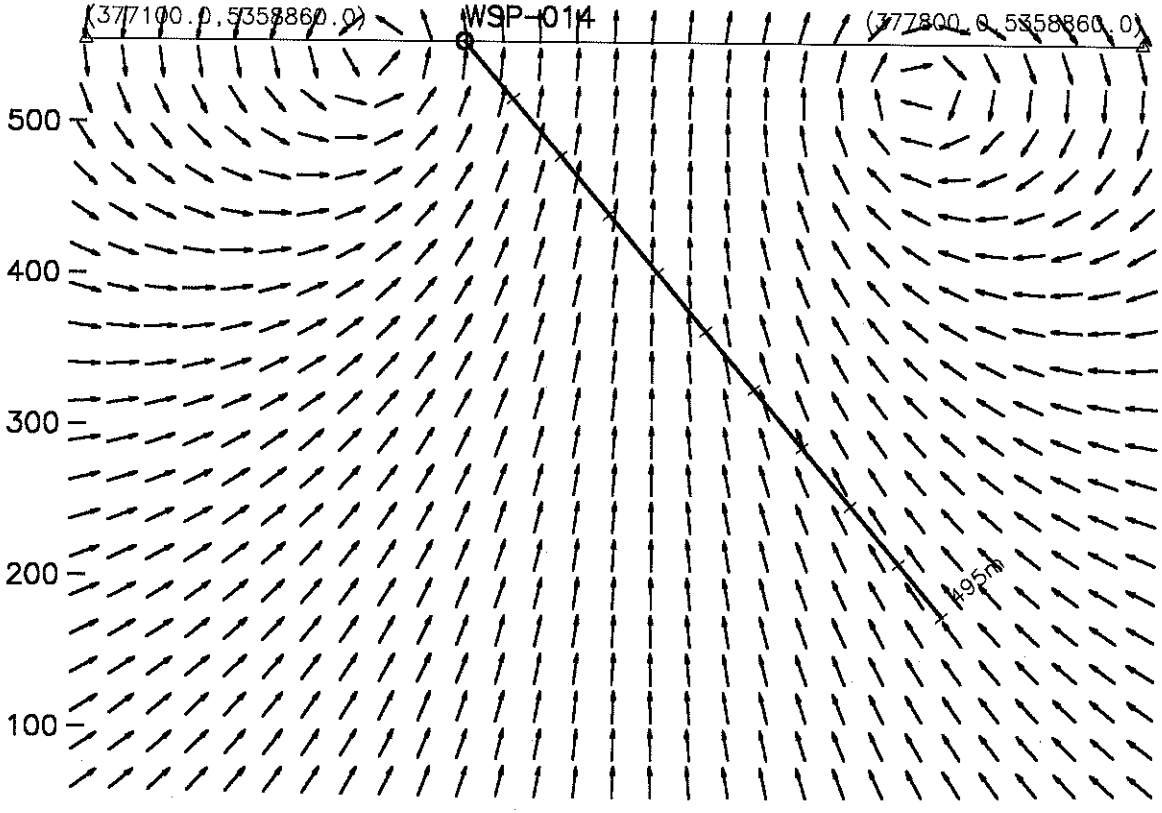

Scale 1:5000

50 0 50 100

(metres)

Zinifex Ltd

Widhspur

3-D Borehole Pulse EM Survey

Hole Section with Primary Field

Hole: WSP-014

Survey Date: Feb 28, 2006

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OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **WSP-014**
Grid	: **Widhspur**	Tx Loop	: **W2**
Date	: Feb 28, 2006	File name	: WSP14Z.PEM
Time Base	: 20.00 ms	# Readings	: 20
Ramp Time	: 1.00 ms	Stn Units	: Metric
# Channels	: 20	Coil Area	: 6500 sq m
Sync Type	: Cable	Polarity	: +
Loop Size	: 400m X 400m	Receiver	: Digital #109
Current	: 20 Amps	Operator	: Humam

Loop Coordinates (X,Y,Z)

1. 377288m, 5.359e+06m, 550m
2. 377298m, 5.3586e+06m, 545m
3. 377647m, 5.3586e+06m, 565m
4. 377654m, 5.35899e+06m, 500m

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

1. 377350m, 5.35886e+06m, 555m
2. 90deg, 50deg, 495m

Channel Times (usec)

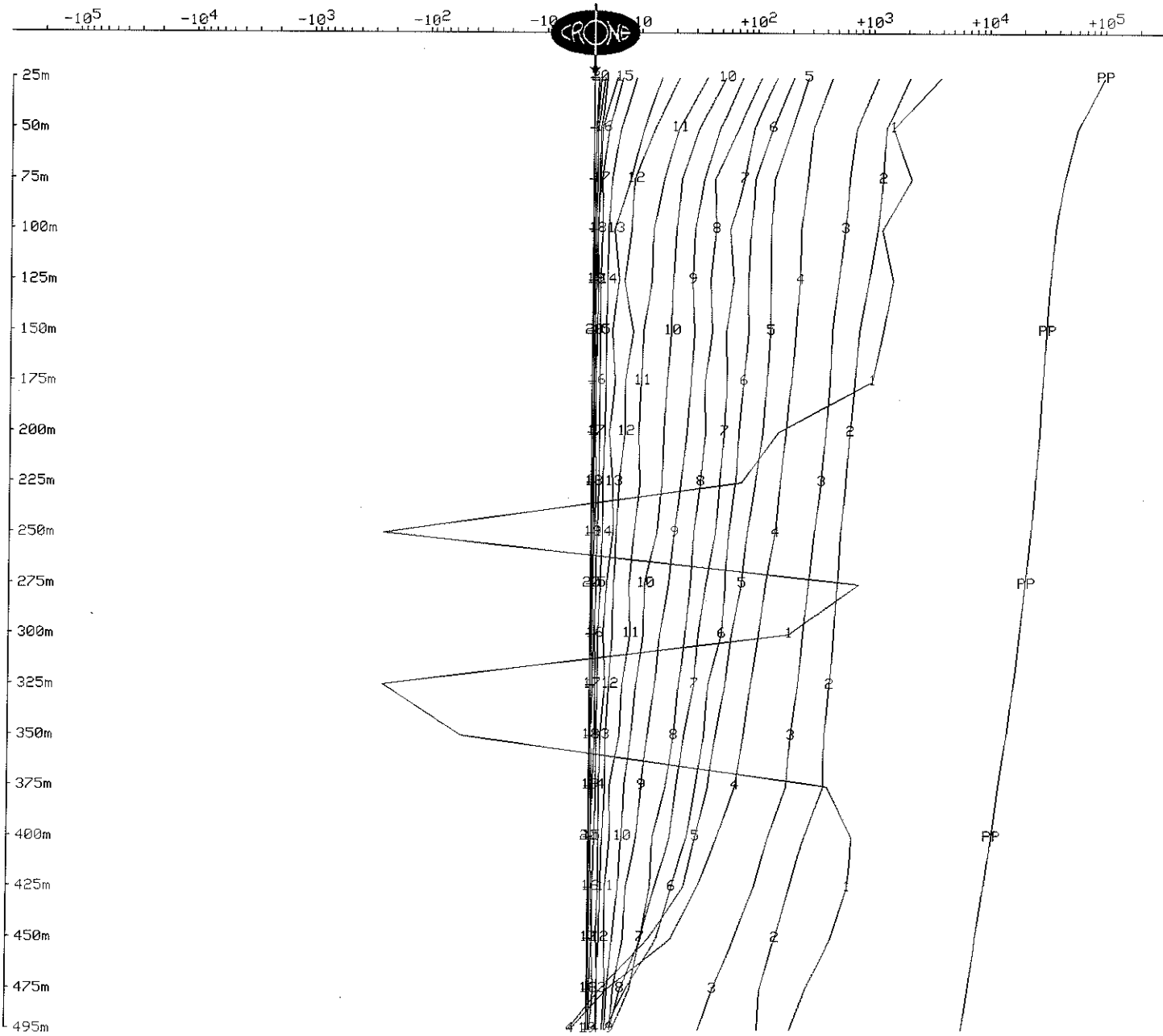
Ch	Start	End	Center	Ch	Start	End	Center	Ch	Start	End	Center
PP	-198	-99	-149	1	50	63	56	2	63	86	74
3	86	112	99	4	112	153	133	5	153	203	178
6	203	270	236	7	270	360	315	8	360	482	421
9	482	639	560	10	639	850	745	11	850	1129	990
12	1129	1498	1314	13	1498	1993	1746	14	1993	2646	2320
15	2646	3514	3080	16	3514	4666	4090	17	4666	6192	5429
18	6192	8221	7206	19	8221	10910	9566	20	10910	14490	12700

OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **WSP-014**
Grid	: **Widhspur**	Tx Loop	: **W2**
Date	: Feb 28, 2006	File name	: WSP14Z.PEM

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

Scale: 1:3000

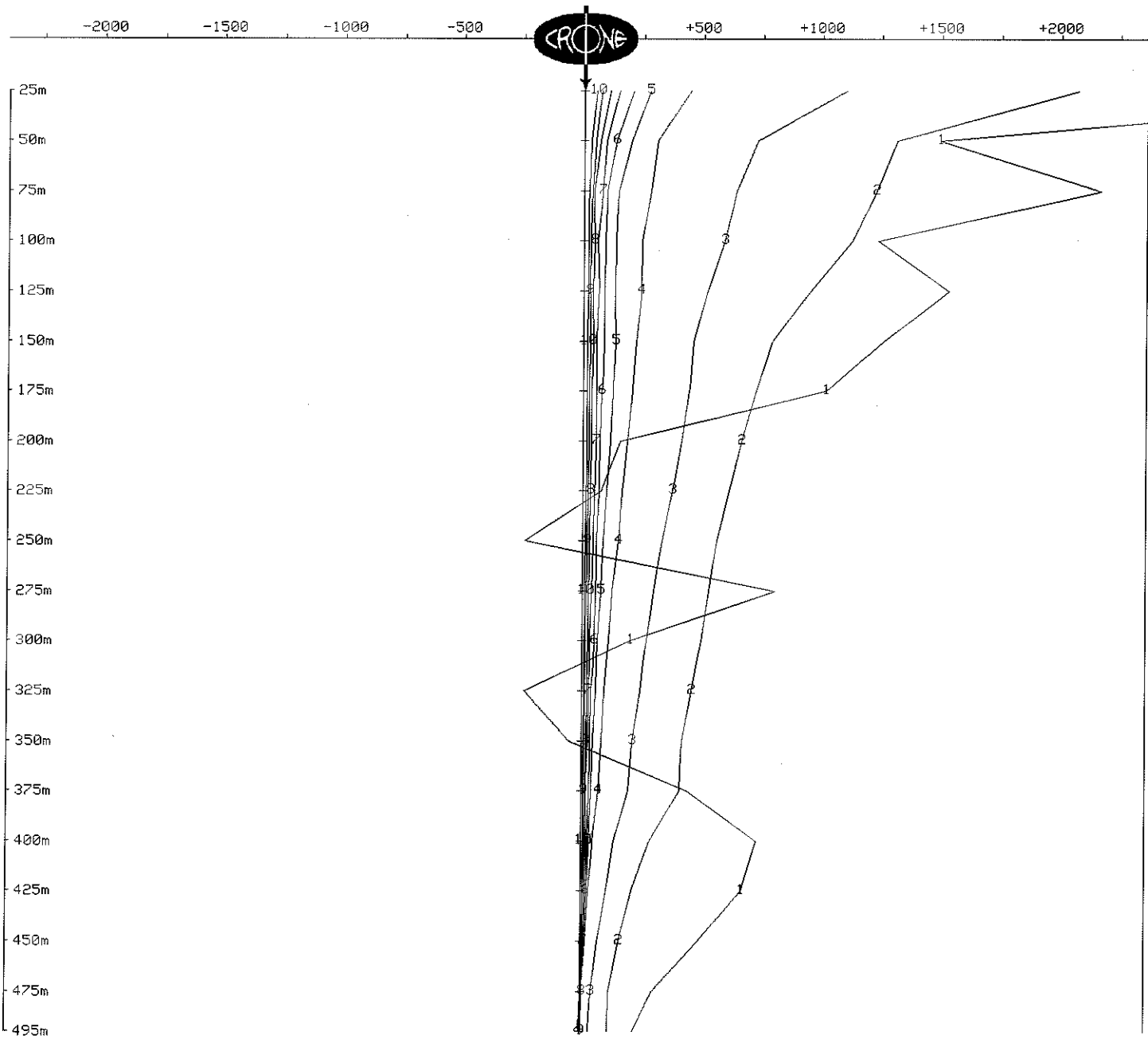


OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **WSP-014**
Grid	: **Widhspur**	Tx Loop	: **W2**
Date	: Feb 28, 2006	File name	: WSP14Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 10 of 20 channels and PP

Scale: 1:3000 Unit Scale: 1cm = 250 nT/

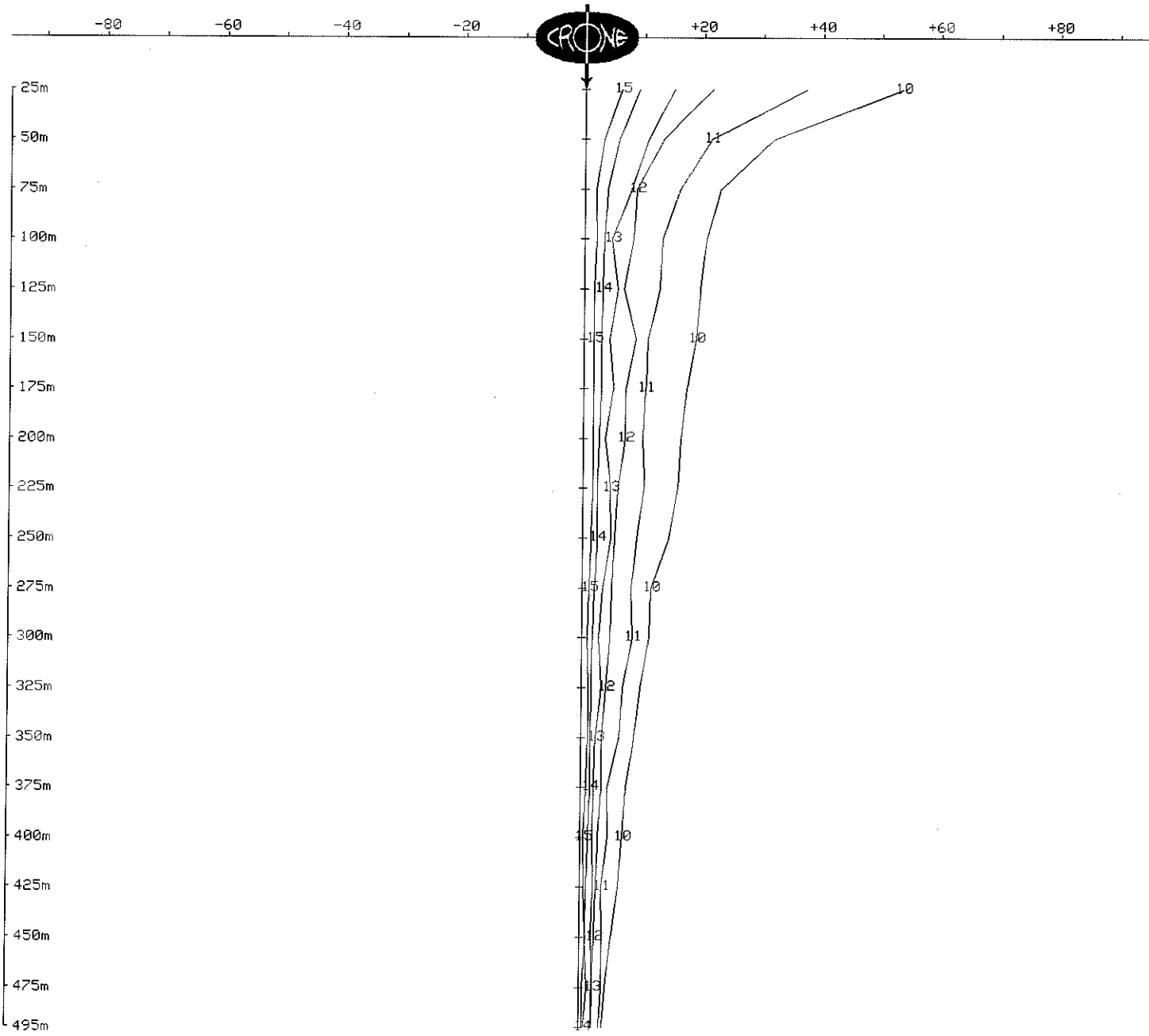


OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **WSP-014**
Grid	: **Widhspur**	Tx Loop	: **W2**
Date	: Feb 28, 2006	File name	: WSP14Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 6 of 20 channels

Scale: 1:3000 Unit Scale: 1cm = 10 nT/



OUTER-RIM EXPLORATION SERVICES
Borehole Pulse EM Survey

Client	: **Zinifex Ltd**	Hole	: **WSP-014**
Grid	: **Widhspur**	Tx Loop	: **W2**
Date	: Feb 28, 2006	File name	: WSP14Z.PEM

Z COMPONENT dBz/dt nanoTesla/sec - 6 of 20 channels

Scale: 1:2500 Unit Scale: 1cm = 2 nT/