

OUTER-RIM EXPLORATION SERVICES

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Geophysical Contracting Services

100% Australian Owned

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Volume 1 of 1

Client

AusQuest Limited

Prospect

Plenty River

Area

Alice Springs, NT

Survey

LANDTEM PEM Survey

Survey Period

29th June to 12th July, 2009 Tian Xu

Operator

DAILY LOG: AusQuest Limited - June/July, 2009

DATE **COMMENTS CHARGES Operator:** Tian Xu Field Assistant: Aaron Rear, Bradley Feodorovs 24-06-09 We left the office in Kalgoorlie at 3:00pm and got to the motel in Laverton at 7:00pm. ½ Mob. day \$ 675.00 25-06-09 We left Laverton at 7:00am and got to Warakurna at 6:30pm. 1 Mob. day \$1350.00 26-06-09 We left Warakurna at 6:30 and got to Erldunda at 4:30pm. 1 Mob. day \$1350.00 27-06-09 We left Erldunda at 7:00am and drove to Alice Springs and did the food shopping in the afternoon. 1 Mob. day \$1350.00 28-06-09 We left Alice Springs at 4:00am, arrived at Jervois Station at 8:40am, filled up the fuel and drinking water and then drove to the site at Plenty River, arriving at 12:00pm. We couldn't set up the camp near the survey site, due to a boggy dry creek which we couldn't cross. We finished setting up the camp at 4:30pm. 3/4 Mob. day \$1012.50 1/4 Standby day \$ 412.50 29-06-09 We left the camp at 6:30am, due to the distance between the camp site and the survey site. It took use close to three hours to get to the survey site. We only have time to put out the loop, did a few test readings and read four stations on the line before we have to leave the site. **SURVEY PARAMETERS:** Loop Moving: 200 x 200m Current :16 Amps Resistance :3.1 Ohms Time Base :150 ms Ramp Time :1.5 ms Sync :Cable Line No. :#14

609420E, 7379682N to 609637E, 7379888N

(300m @ 100m stations)

:42(+9 Channels)

:Z,Y

Channels
Components

30-06-09 Due to the ridiculous driving distance between our camp and the survey site, we decided to move the camp site. We unloaded almost everything, drained half of our drinking water, to reduce the weight on the trailers and used two utes to tow them across the creek. We arrived and finished setting up the new camp at 4:30pm.

1 Standby day \$1650.00

01-07-09 We left the camp at 6:30am and continued the survey of line #14. We completed line #14, moved to line#12 and completed this line to before returning to camp.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m
Current: 16 Amps
Resistance: 3.1 Ohms
Time Base: 150 ms
Ramp Time: 1.5 ms
Sync: Cable

Line No. :#14

609963E, 7379888N to 610198E, 7380460N

(800m @ 100m stations)

Line No. :#12

609102E, 7379930N to 609879E, 7380708N

(1100m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

1 Survey day \$2700.00 2 Field Assist. day \$ 600.00

02-07-09 We left the camp at 4:30am, drove out to site and completed lines #10 and #8. We then packed up and returned to the camp at 4:30pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#10

608607E, 7380000N to 609526E, 7380920N

(1400m @ 100m stations)

Line No. :#8

608288E, 7380248N to 609208E, 7381167N

(1400m @ 100m stations)

Channels

:42(+9 Channels)

Components :Z,Y

1¼ Survey day \$3375.00 2½ Field Assist. day \$ 750.00

03-07-09 We left the camp at 4:30am, drove out to site, set up and read lines #6 and #4. We then packed up and returned to camp at 4:30pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m
Current: 16 Amps
Resistance: 3.1 Ohms
Time Base: 150 ms
Ramp Time: 1.5 ms
Sync: Cable

Line No. :#4

607723E, 7380814N to 608642E, 7381733N

(1400m @ 100m stations)

Line No. :#6

608006E, 7380531N to 608925E, 7381450N

(1400m @ 100m stations)

Channels

:42(+9 Channels)

Components : Z,Y

1¼ Survey day \$3375.00 2½ Field Assist. day \$ 750.00

04-07-09 We left the camp at 5:00am, drove to Area 1, set up and completed the last line, #2, for this area. We then packed up and moved to Area 2, laid out the loop and read three stations before returning to camp at 5:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m
Current: 16 Amps
Resistance: 3.1 Ohms
Time Base: 150 ms
Ramp Time: 1.5 ms
Sync: Cable

Line No. :Line2

607440E, 7381079N to 608218E, 7382157N

(1400m @ 100m stations)

Line No. :Line16

613617E, 7376819N to 613768E, 7376959N

(300m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

1¼ Survey day \$3375.00 2½ Field Assist. day \$ 750.00

05-07-09 We left camp at 5:00am, drove out to Area 2 and read lines #16, #17 and part of line #18. We then packed up and returned to camp at 5:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#16

613768E, 7376959N to 614334E, 7377526N

(1100m @ 100m stations)

Line No. :#17

614476E, 7377384N to 613769E, 7376677N

(1400m @ 100m stations)

Line No. :#18

613839E, 7376465N to 614474E, 7377102N

(1400m @ 100m stations)

Channels :42(+9 Channels)

Components :Z,Y \$3375.00

1¼ Survey day \$ 750.00

2½ Field Assist. day

We left camp at 5:00am, drove out to Area 2, completed lines #18, #19, #20 and part of line #21. We then packed up and returned to camp at 5:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#18

614474E, 7377102N to 614617E, 7377243N

(200m @ 100m stations)

Line No. :#19

614758E, 7377101N to 613981E, 7376324N

(1400m @ 100m stations)

Line No. :#20

614087E, 7376147N to 614794E, 7376854N

(1400m @ 100m stations)

Line No. :#21

614900E, 7376677N to 614474E, 7376253N

(600m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

1¼ Survey day \$3375.00 2½ Field Assist. day \$ 750.00

07-07-09 We left the camp at 5:00am, drove out to Area 2 and completed line #21. We then moved back to Area 1 and read line #1. We then packed up and returned to camp at 5:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current

:16 Amps

Resistance

:3.1 Ohms

Time Base

:150 ms

Ramp Time

:1.5 ms

Sync

:Cable

Line No.

:#21

677261

614474E, 7376253N to 614193E, 7375970N

(400m @ 100m stations)

Line No. :#1

607298E, 7381238N to 608218E, 7382157N

(1400m @ 100m stations)

Channels

:42(+9 Channels)

Components :Z,Y

1¹/₄ Survey day \$3375.00 2¹/₂ Field Assist. day \$ 750.00

08-07-09 We left camp at 5:00am, drove out to Area 1 and read line #15. We then packed up, moved to Area 3 and read line #22. We then packed up and returned to camp at 5:30pm.

SURVEY PARAMETERS:

Loop Moving :200 x 200m

Current

:16 Amps

Resistance :3.1 Ohms
Time Base :150 ms
Ramp Time :1.5 ms
Sync :Cable

Line No. :#15

609561E, 7379541N to 610339E, 7380319N

(1200m @ 100m stations)

Line No. :#22

621971E, 7376606N to 622607E, 7377243N

(1000m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

1¼ Survey day \$3375.00 2½ Field Assist. day \$ 750.00

09-07-09 We left camp at 4:45am, drove out to Area 3 and read lines #23 and #24. We packed up, moved to Area 5, read lines #28 and #29, packed up and returned to camp at 5:30pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#23

622819E, 7377172N to 622183E, 7376536N

(900m @ 100m stations)

Line No. :#24

622324E, 7376394N to 622961E, 7377031N

(900m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 50 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#28

620981E, 7374839N to 620415E, 7374273N

(800m @ 100m stations)

:#29 Line No.

620557E, 7374132N to 621122E, 7374697N

(800m @ 100m stations)

Channels

:36(+9 Channels)

Components : Z, Y

11/4 Survey day \$3375.00 2½ Field Assist. day \$ 750.00

10-07-09 We left camp at 5:00am, drove out to Area 5 and read line #30. We then drove to Area 4, read lines #25 and #26, packed up and returned to camp at 5:10pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current

:16 Amps

Resistance

:3.1 Ohms

Time Base

:50 ms

Ramp Time

:1.5 ms

Sync

:Cable

Line No.

:Line30

621264E, 7374556N to 620698E, 7373990N

(800m @ 100m stations)

Line No.

:Line25

623951E, 7372293N to 624587E, 7372929N

(900m @ 100m stations)

Line No.

:Line26

624764E, 7372823N to 624128E, 7372187N

(900m @ 100m stations)

Channels

:36(+9 Channels)

Components : Z,Y

11/4 Survey day \$3375.00

2½ Field Assist. day \$ 750.00

11-07-09 We left camp at 5:00am, drove to Area 4, read line #27 and moved to Area 2. We laid out the loop for line #21A and read ten stations before packing up and returning to camp at 5:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current

:16 Amps

Resistance

Time Base

:3.1 Ohms

:50 ms

Ramp Time

:1.5 ms

Sync

:Cable

Line No.

:#27

624303E, 7372081N to 624941E, 7372717N

(900m @ 100m stations)

Channels :36(+9 Channels)

Components : Z,Y

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#21A

614334E, 7375829N to 614937E, 7376463N

(900m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

1¹/₄ Survey day \$3375.00 2¹/₂ Field Assist. day \$750.00

We left camp at 5:00am, drove to Area 1 and completed line #21A. We then extended lines #20 and #21, packed up and returned to camp at 1:00pm.

SURVEY PARAMETERS:

Loop Moving: 200 x 200m

Current: 16 Amps

Resistance: 3.1 Ohms

Time Base: 150 ms

Ramp Time: 1.5 ms

Sync: Cable

Line No. :#21A

614937E, 7376463N to 615324E, 7376819N

(500m @ 100m stations)

Line No. :#21

615183E, 7376960N to 614900E, 7376819N

(500m @ 100m stations)

Line No. :#20

614794E, 7376854N to 615077E, 7377137N

(500m @ 100m stations)

Channels :42(+9 Channels)

Components : Z,Y

³/₄ Survey day \$2025.00 1½ Field Assist. day \$ 450.00 ½ Standby day \$ 412.50

13-07-09	We started to pack up the camp site at 4:00am and then drove to Alice Springs, arriving at 2:00pm.
	l Mob. day \$1350.00
14-07-09	We left Alice Springs at 4:00am and arrived in Port Augusta at 6:30pm.
	1½ Mob. day \$2025.00
15-07-09	We left Port Augusta at 7:00am and got to the WA-SA border village at 5:00pm.
	l Mob. day \$1350.00
16-07-09	We left the WA-SA border village at 5:30am and got back to the office in Kalgoorlie at 4:00pm.
	1 Mob. day \$1350.00

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 <u>area</u> 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 offhole 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
 - \Rightarrow 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



































































































