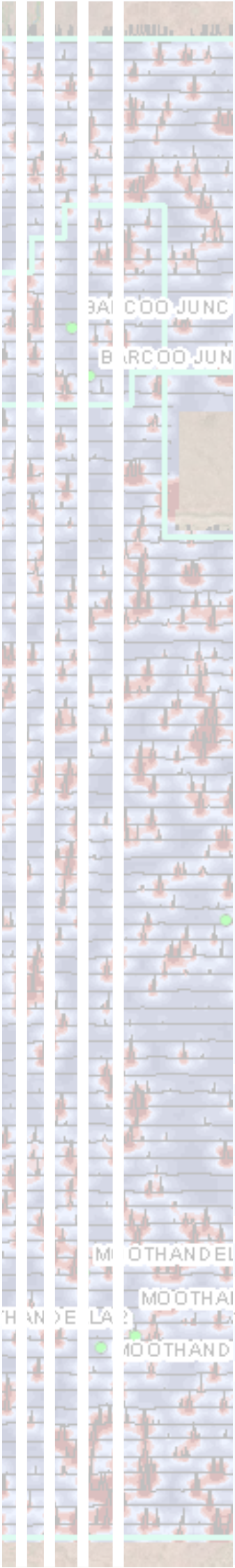
AEM-PTP Survey Acquisition Report

ATP794, ATP 948, ATP 944, and PEL 630
Queensland & South Australia
Bridgeport Energy



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INTRODUCTION

Commencing on the 8th of December 2014, Pinemont Technologies Australia (PTA) collected Audio Electro Magnetic Passive Transient Impulse (AEM-PTP) data over exploration permits in both South Australia and Queensland for Bridgeport Energy. The airborne survey data was collected over 25 flying days during the months of December and January. Approximately a total of 7000 line nautical miles (nm) {12,964 kilometres} were flown over with half nautical mile flight line spacing.

The survey acquired data over the following permits:

- Queensland Permits: ATP 944 (3,034nm/5,619km flown), ATP 948 (1471nm/2,724km flown), ATP 794 Barcoo, and ATP 794 Barcoo Jcn (1841nm/3,409km flown).
- South Australia Permits: PEL 630 (456nm/844km flown).

In addition to the survey data, calibration data was collected over a number of analogue hydrocarbon accumulations (Bargie, Bodalla South, Kenmore, Endeavour, Utopia, Gilmore, Bauer, Growler, Mustang and Fly Lake)

This report documents the acquisition of AEM-PTP data over these permits.

Survey Location

The AEM-PTP survey provided coverage of permits located in the Cooper-Eromanga basin in central Australia from both Queensland and South Australia. The map below shows the location of the permits surveyed with respect to Australia.

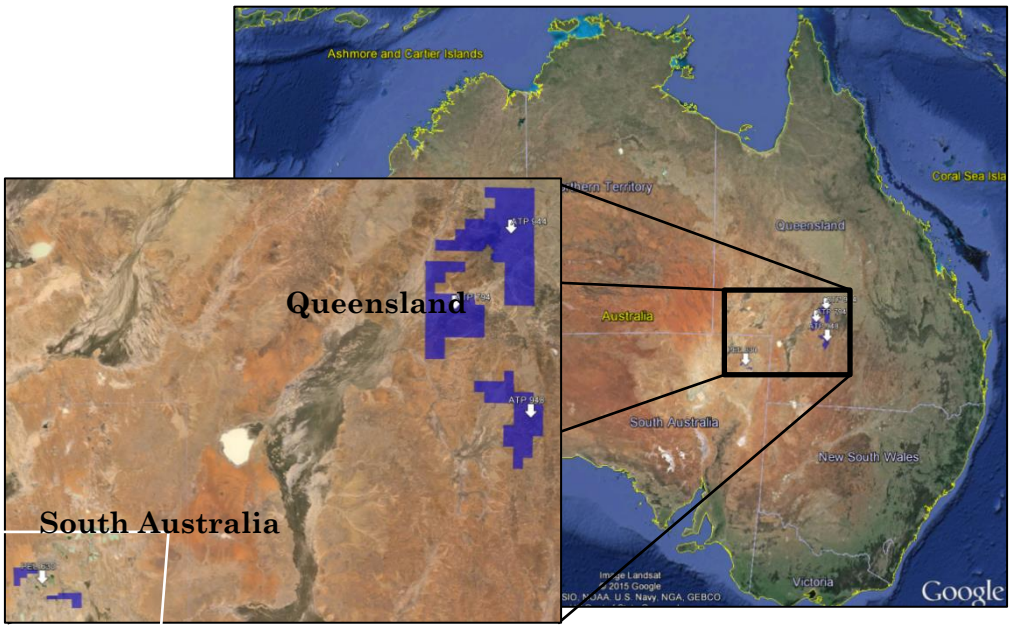

Figure 1- Location map of the permits to be flown over with the A-EM PTP survey with respect to Australia.

BACKGROUND/ THEORY

Pinemont technology measures variability in the earth's passive electromagnetic field either at the earth's surface or from low-flying aircraft. Vertical components of this field contain transient impulses of energy varying across a wide frequency range, including the audio range.

This passive apparent resistivity method used by Pinemont Technologies uses similar methodologies to those described in the AFMAG technique developed by Mr. S.H. Ward. The proprietary system developed can be seen conceptually as an E field adaptation of AFMAG.

The source of the Earths electromagnetic fields is thought to be related to lightning strike activity combined with naturally occurring seismo-electric streaming potentials resulting from micro passive seismic activity occurring worldwide. As passive seismic events occur, seismo-electric potentials and associated magnetic fields are energized at depth and radiate to the surface.

When these impulses interact with REDOX cells (Pirson 1969), like those created by vertical fluid flow such as hydrocarbon micro-seepage, there is a measureable increase in the density of these transients. It is this increase in transient density which we are measuring.

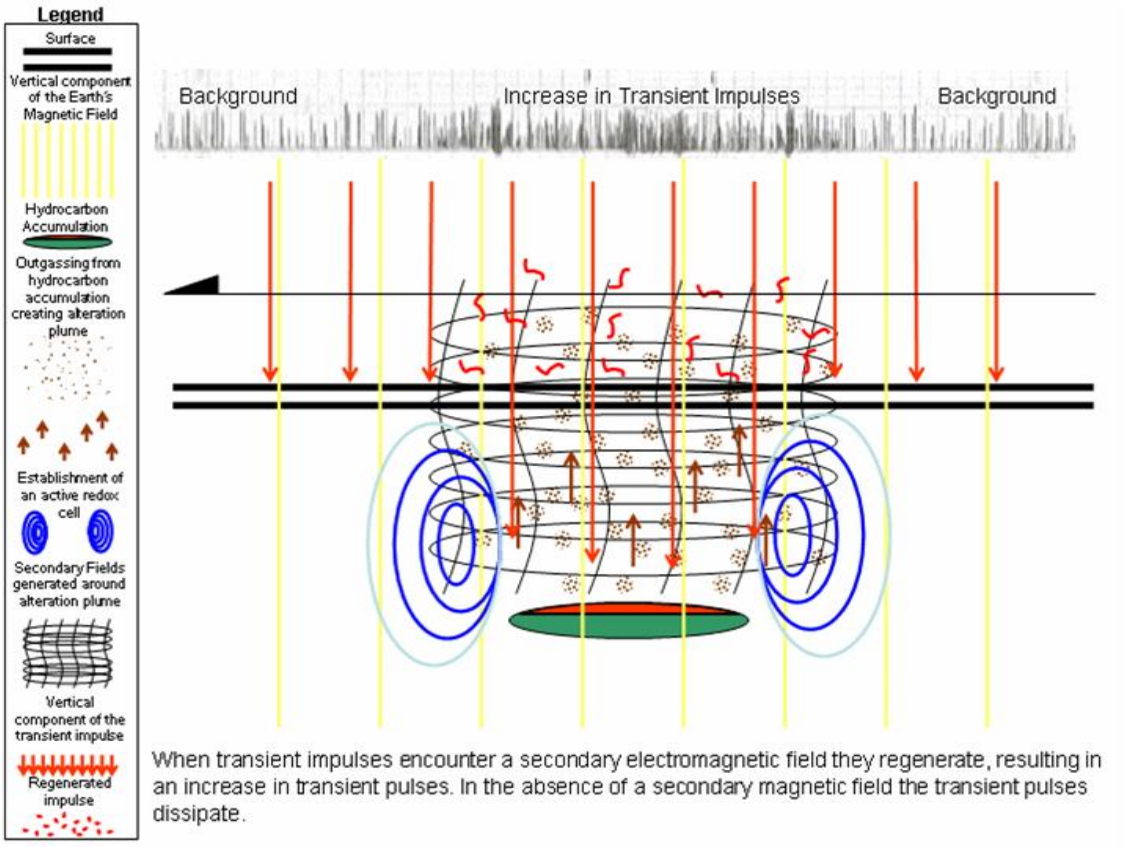

***Figure 2**- Schematic of the impact REDOX cells have on the transient impulses detected in the Earths E-field.*

Pinemont Technologies method of measuring the electromagnetic field, is a breakthrough, both in terms of the compact nature of the equipment and the ability to measure field variations associated with hydrocarbon reservoirs at depth from airborne measurements

AEM-PTP Survey

Recent technological improvements have provided the ability to measure subsurface transient anomalies. As opposed to the earlier P-TEM technology, the current technology, Airborne "Audio-Frequency Electromagnetics" or (A-EM), can record, the earth's passively-generated transient pulses that are believed to be associated with REDOX cells.

A-EM measures from an airborne platform, apparent conductivity as a function of depth in the earth. We note that the higher the conductivity of any given horizon, the fewer the number of transient pulses emanating from that horizon.

Relationships can be derived from empirical evidence relating inherent frequency of the pulse energy to the depth beneath the surface from which the pulses emanated.

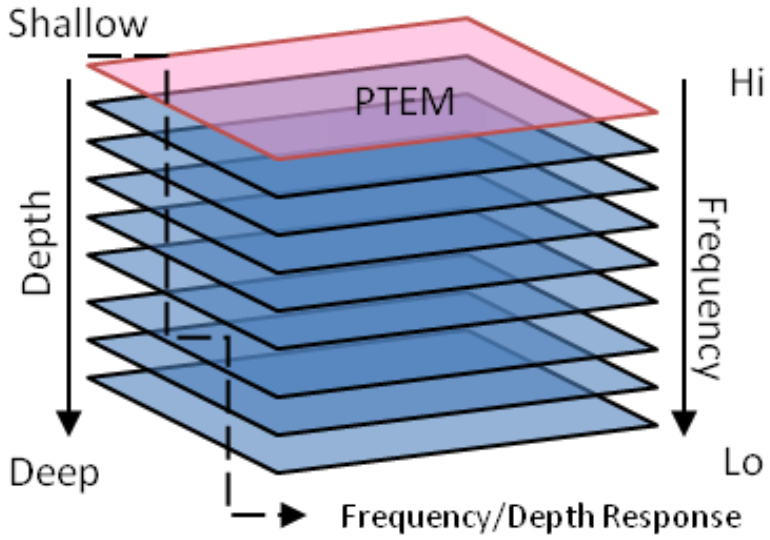

***Figure 3**- New A-EM PTP survey method showing the relationship between frequency and depth.*

OBJECTIVES OF THE AEM-PTP SURVEY

- Detect transients of secondary electromagnetic fields associated with upward fluid flow associated with REDOX activity. REDOX cells are known to form in under the following conditions:
    - Micro-seepage plumes above hydrocarbon accumulations.
    - Migration of fluids associated hydrocarbon charge.
    - Migration of hydrothermal fluids associated to minerals deposits (i.e. Carlin Style Gold deposits, Lead-Zinc, Uranium, Geothermal fluids).
- The areas of higher E field transient density would help provide focus for Bridgeport Energy's exploration efforts.
- Collect data in the safest possible manner with minimal environmental impact.
- Collect the data in a cost-effective and timely manner.

Data Acquisition

The airborne survey was conducted using a small plane (CESSNA 210) flying low (500 feet) and slow (ground speed of ~85 nautical miles per hour) along a grid. East-West survey lines were acquired at a one-half nautical mile spacing with tie lines acquired at a nominal spacing of between six to eight nautical miles.

Survey Design

The survey was conducted in two states over several petroleum permits and a number of analogue fields. In Queensland permits ATP794 Barcoo and ATP794 Barcoo Jcn, ATP944, and ATP 948 and the analogue fields Bargie, Bodalla South, Kenmore, Endeavour, Utopia and Gilmore were flown. In South Australian permit PEL 630 and the analogue fields Bauer, Growler, Mustang and Fly Lake were flown.

Queensland Survey Area

The Queensland survey area took 23 flying days to complete and was based out of Windorah airport.

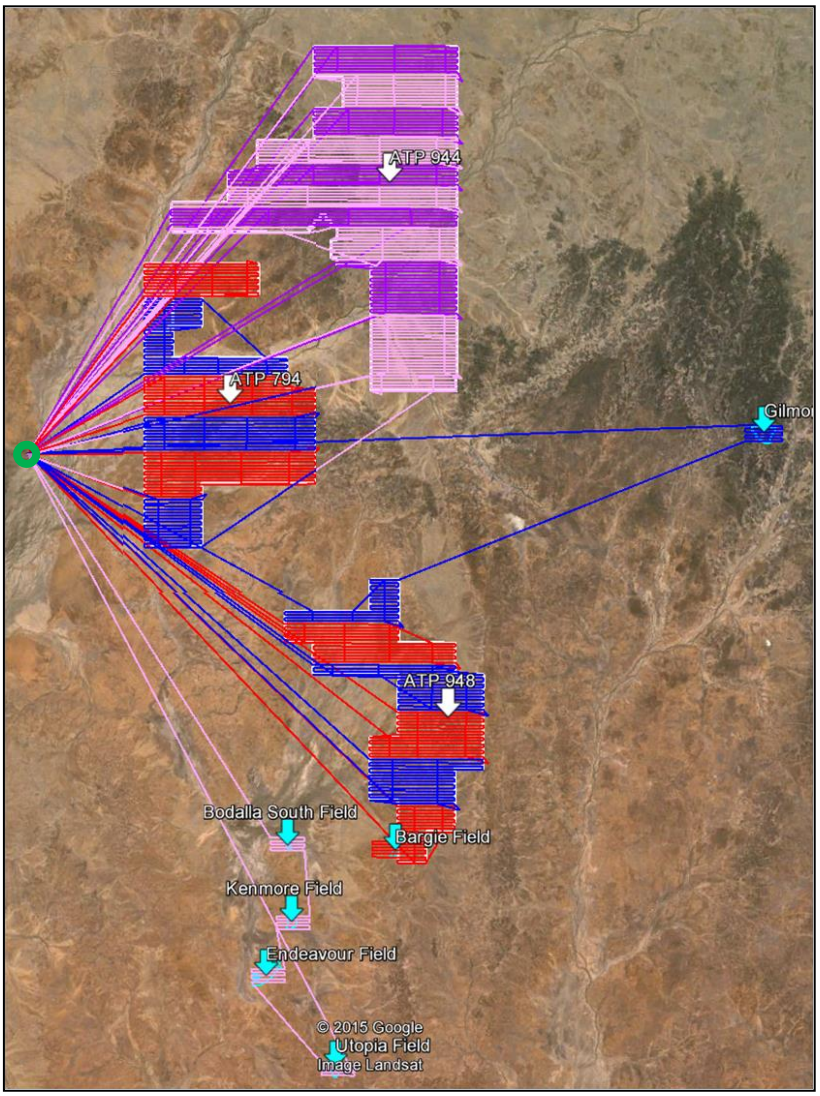

Figure 4- *Map showing the Queensland Survey Area and the flight lines flown to conduct the survey.*

The flight lines in pink and purple were collected from the 8th to the 20th of December before the Christmas break. The blue and red set of flight lines represents the surveys conducted after Christmas from the 13th of January to the 26th of January.

The alternating colour displays (pink and purple) or (blue and red) show the amount of surveying completed in a single day.

South Australian Survey Area

The South Australian survey area took 2 flying days to complete and was based out of Birdsville airport.

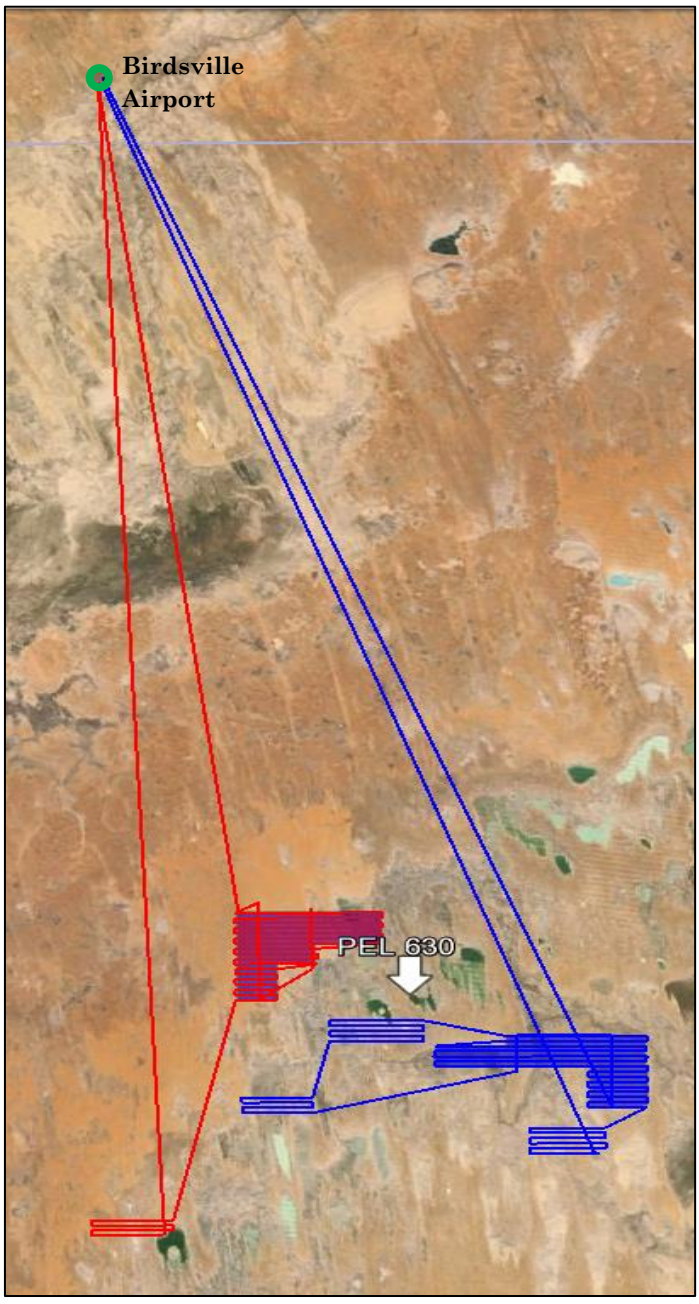

***Figure 5**-South Australian Survey Area showing flight lines.*

Personnel and Equipment

For this project Pinemont Technologies partnered with Meandarra Aerial Spraying Pty. Ltd. (CAN 087 259 283) (MAS). MAS provided both the aircraft and pilots for the project. Both pilots had low level flying clearance certification with Justin Browne also having agricultural spraying certification.

In 2014 Meandarra Aerial Spraying was audited by Flight Safety Australia once on behalf of Aerial Improvement Management System (AIMS) and again on behalf of Origin Energy. The first audit is a requirement of the AIMS accreditation program and the second audit resulted in the award of multiple contracts from Origin Energy for aerial water-bombing services.

Pinemont Technologies Australia field technician (R.C. Taylor) operated the surveying equipment and oversaw the field operations from the project beginning through to the safe and successful completion of the project.

Personnel Table

Personnel	**Company**	**Role**
Jim Dirstein	Pinemont Technologies Australia	Overseeing Project
Clark Taylor	Pinemont Technologies Australia	Field Technician
Jason Dirstein	Pinemont Technologies Australia	Data QC/Processing
Alistair J Stanley	Pinemont Technologies Australia	Geophysicist
Peter Southwell	Bridgeport Energy	Client
Cameron Fink	Bridgeport Energy	Client
Justin Browne	Meandarra Aerial Spraying	Pilot
Cameron Brookes	Meandarra Aerial Spraying	Pilot
Lachlan Hill	Meandarra Aerial Spraying	Director

Table 1- Table detailing the personnel who worked on the survey and the role they undertook

Airplane- Cessna 210

A Cessna 210 aircraft owned and operated by Meandarra Aerial Spraying was used exclusively throughout the survey. The benefits of a Cessna 210:

- The ability to fly at the slow speeds required for the survey with a safe margin of error with respect to its stall speed.
- It has a higher cruise speed compared to other single engine airplanes (decrease transit times).
- The most cost-effective solution.

Figure 6- Image of the Cessna 210 airplane and the hangers.

Onboard Survey Equipment

The Survey Equipment consists of a laptop computer, antenna and bluetooth GPS unit which are situated on the backseats of the aircraft. A yoke mounted Garmin 296 GPS is placed with the pilot.

***Figure 7**- Onboard Survey Equipment*

1-GPS Unit

On board the aircraft there are two GPS units used independently for navigation. There are also two bluetooth GPS units on the aircraft that transfer co-ordinate information to the onboard computer in real time for data acquisition.

2-Antenna

The Earths passive E-field response is received by the Antenna and is recorded onto the computer.

3-Computer and Program

The parsed pulse frequency data is recorded on the onboard laptop computer, which in turn processes the parsed pulse frequency data into ten segregated bands, providing an indication of depth of the increased transient activity. The fuller each bin, the more recorded pulses per unit time. This pulse data is collected along with Latitude, Longitude, ground speed, and time.

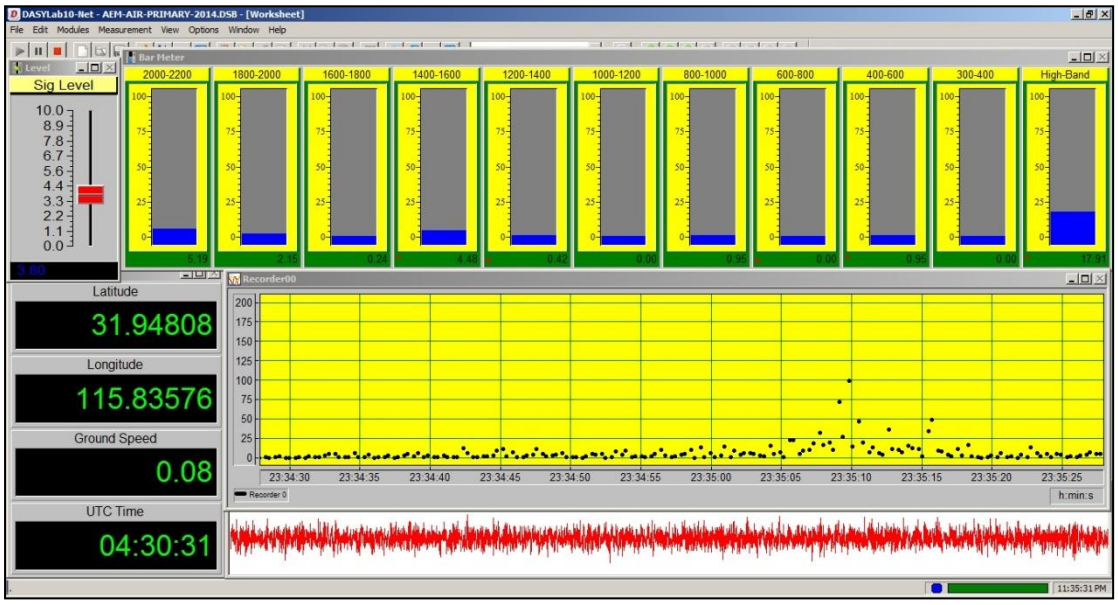

***Figure 8**- Example of an onboard computer display (not real data).*

In summary, the airborne system is very portable (less than 5 Kg), cost-effective and an environmentally friendly exploration tool for application both onshore and offshore. The acquisition system collects data in ten frequency bands providing an indication of depth of the increased transient activity. The resulting data is presented in terms of relative signal strength for a designated segment of the subsurface. GPS, UT Time, Date, and survey time are recorded simultaneously in the file.

Field Operations

The survey was conducted between the 8th of December to the 26th of January with a break for Christmas, below is a table detailing the main activities conducted during the survey.

Operations Timetable

Date	Activity
8/12/2014 Fly Day 1	Based out of Windorah, Queensland conducted Survey Calibration Tests over analogue fields Bargie, Bodalla South, Endeavour, Kenmore and Utopia.
9/12/2014- 20/12/2014 Fly Days 2 to 11	Based out of Windorah, Queensland conducted ATP 944 Survey. Note two days of flying were lost due to weather conditions.
	Christmas Break
13/01/2015-18/01/2015 Fly Days 12 to 17	Based out of Windorah, Queensland and begun conducting the ATP794 Barcoo and ATP794 Barcoo Jcn Survey
18/01/2015-20/01/2015 Fly Days 18 to 20	Based out of Birdsville, South Australia conducted PEL 630 Survey and also fly over the analogue fields Bauer, Growler, Mustang and Fly Lake.
21/01/2015- 26/01/2015 Fly Days 21-25	Based out of Windorah, Queensland conducted ATP 948 Survey. Fly over Gilmore analogue wells.

Figure 9- *Timetable of Main Survey Events*

Daily Tasks

Overview of tasks undertaken to complete field operations:

- On each fly day, the weather conditions are assessed and a decision is made as to whether to fly or not.
- A pre-flight check is undertaken on the airplane to ascertain airworthiness of the aircraft.
- Operations begin an hour after sunrise and the data is collected typically between the hours of 7 a.m. and 12 p.m.
- The survey equipment is tested each day to check that the recorded signal strength is within the calibrated tolerance range before operations begin.
- Data was collected at an altitude between 500 above ground level (AGL) at a ground speed of 85 Nautical Miles per hour.
- Navigation was provided using two separate GPS systems.
- Observation notes were recorded by the onboard field technician.

- The onboard field technician monitors the recorded signal and optimizes the recording apparatus appropriately during operations.
- Return to the base airport and close survey operations for the day.
- Preparation for the next day begins by checking weather forecasts, charging equipment and refueling.
- The raw data collected is sent to the processing centre in Perth for QC.

Instrument Calibration and Proof of Concept

- For QC purposes small preliminary surveys were flown to check that the instruments were calibrated and optimized for the specific area.
- Known fields within close proximity were flown over to provide analogue results that can be used for comparison with the final results, aiding the interpretation.

RESULTS (OUTPUT)

The digital data output from computer is in a standard ASCII file format (CSV/txt) X, Y, Z dataset that is compatible with almost all mapping software packages.

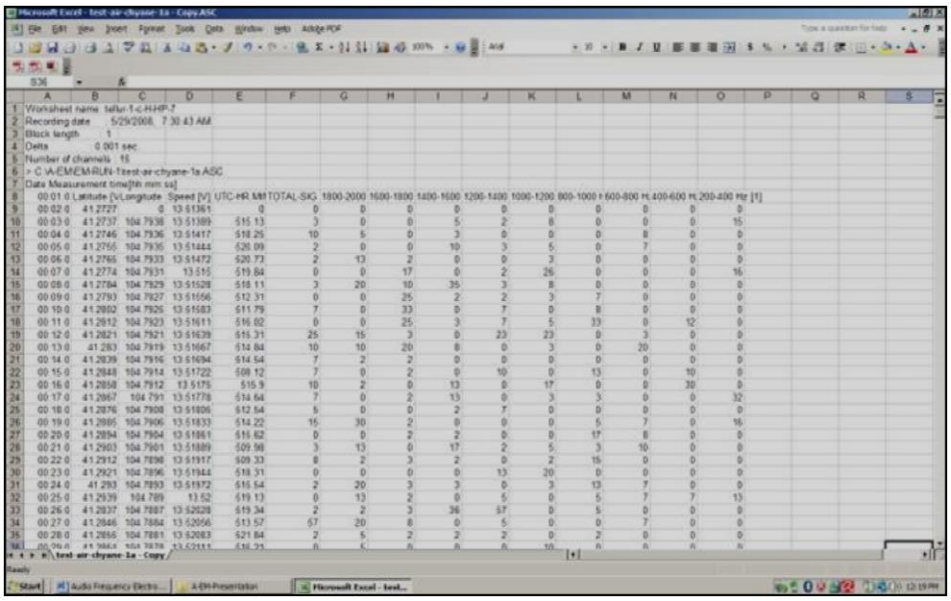

Figure 10- Example output csv file generated from survey acquisition.

The raw collected survey data can undergo further processing or be used directly.

SUMMARY

Overview

- Pinemont Technologies Australia has successfully acquired AEM-PTP data over the permits requested by Bridgeport Energy.
- The AEM-PTP survey took a total of 25 flying days to complete.
- Pinemont Technologies Australia partnered with Meandarra Aerial Spraying to complete the survey.
- The raw collected data is stored in ascii files (.csv format).

Comments

- The data was then processed to delineate more clearly between noise and anomalous transient responses.
- The processed data is best used to help provide exploration focus.

DELIVERABLES

- KMZ files detailing the day by day progress of the flight survey.
- Raw Field data in Ascii file format.

APPENDICES

- PTA Meandarra Bridgeport COCs.pdf
- PTA Meandarra Risk Management System.pdf

DISCLAIMER

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