2D ENVIROVIBE SEISMIC TRIALS 2008
MILES (ATP-702P)
BOGANDILLA (ATP-973P)
EMU APPLE (ATP-702P)
SURAT BASIN, QLD
JANUARY/APRIL – MAY 2008

Contract No. 002/004

FIELD OPERATIONS REPORT

Prepared for Origin Energy Ltd

3rd November, 2009

Velseis Pty Ltd

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APPENDICES

ENCLOSURES: **ON DVD-ROM**

1. INTRODUCTION

1.1 GENERAL

Origin Energy Ltd contracted Velseis Pty Ltd of Brisbane, to conduct trials of the newly acquired 'Envirovibe' Vibroseis energy source. Trials were planned and carried out at three separate locations, to test the ability of the new source to successfully image reflectors at both coal seam gas and petroleum target depths. In each case, a Sercel 408 recording system was employed to record the data.

Origin Energy was responsible for permitting and de-permitting of councils and property owners whilst Velseis sub-contracted and managed line preparation, surveying, traffic control and general rehabilitation of the seismic lines. The contracts were administered by Neil Millar of Origin Energy.

The trial programs were conducted at three separate sites:

- Miles (ATP 702P) from January 25 to 28, 2008 – 7.18125km
- Bogandilla (ATP 973P) from April 30 to May 1, 2008 – 4.3km
- Emu Apple (ATP 702P) from May 2 to 4, 2008 – 11.62km

No lost time or restricted work injuries were recorded during the duration of the program.

1.2 'ENVIROVIBE' VIBROSEIS ENERGY SOURCE

In December 2007 Velseis Pty Ltd took delivery of two 'Envirovibe' Vibroseis units, intended initially for Coal Seam Gas (CSG) and shallow petroleum work. These are very compact units, each with a total mass of about 17,000 lbs. They are mounted on articulated buggies for high manoeuvrability and they have a small circular baseplate, with minimal environmental footprint. Noise levels are much lower than those associated with larger Vibrators.

Envirovibe electronics are SSC Force-Two, which employ latest generation phase and force control and a complete suite of sweep options.

Transport of these units is simple and economical, with two units being transportable on one low loader.

A primary overseas application for these units has been in situations where conventional, larger vibrators cannot be used for environmental or access reasons. It has been found that despite having a Peak Force and a hold down mass about one-third that of conventional units, the Envirovibe has consistently performed competitively in the CSG and shallow petroleum arena. (Where deeper targets are involved and access for larger Vibrators is not possible, up to four Envirovibes have been used in order to ensure penetration and to provide data previously unobtainable due to access being denied to large vibrators.)

In January 2008 the Envirovibe performance was tested on a prospect having CSG-depth coal seams, as well as a petroleum target.

The raw field records were of excellent quality with well-defined reflectors. The first-arrival events are very well defined by Vibroseis standards. This may partially relate to the compact base-plate design. The quality of these first-arrivals is critical for the calculation of refraction statics. Figure 1

shows the resultant Envirovibe stack (approximately 7km x 1.7 seconds). It exhibits excellent clarity over both the coal seam and petroleum targets.

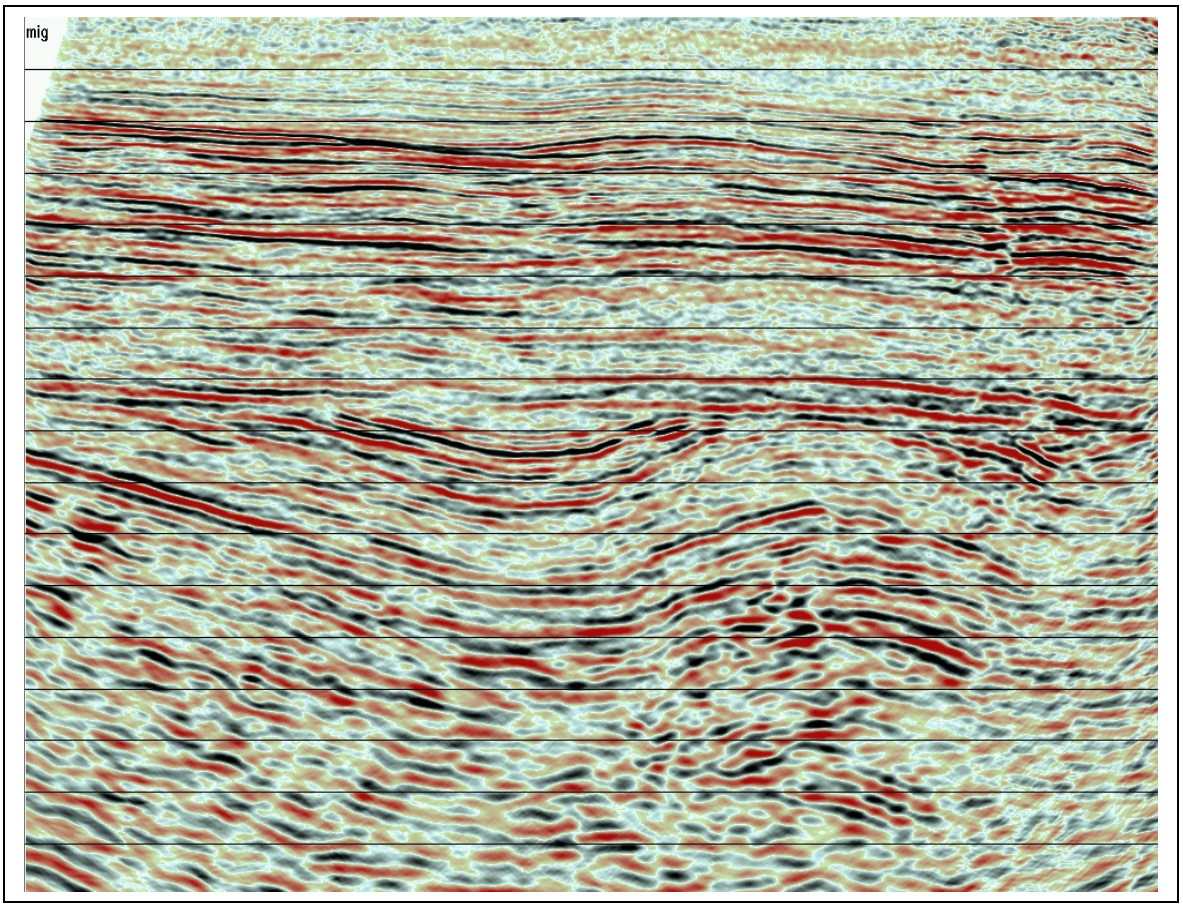


Figure 1. Final 'Envirovibe' stack over Miles survey prospect illustrating resolution at Coal-Seam Gas (CSG) and petroleum depths. Dimensions are approximately 7km x 1.7s.

Figures 2 and 3 show a direct comparison with an intersecting line recorded using conventional, heavier, vibrators. In each case, the Envirovibe stack is on the left. Detailed interpretation comparisons indicate that for this situation the Envirovibe result is a viable alternative to the conventional product.

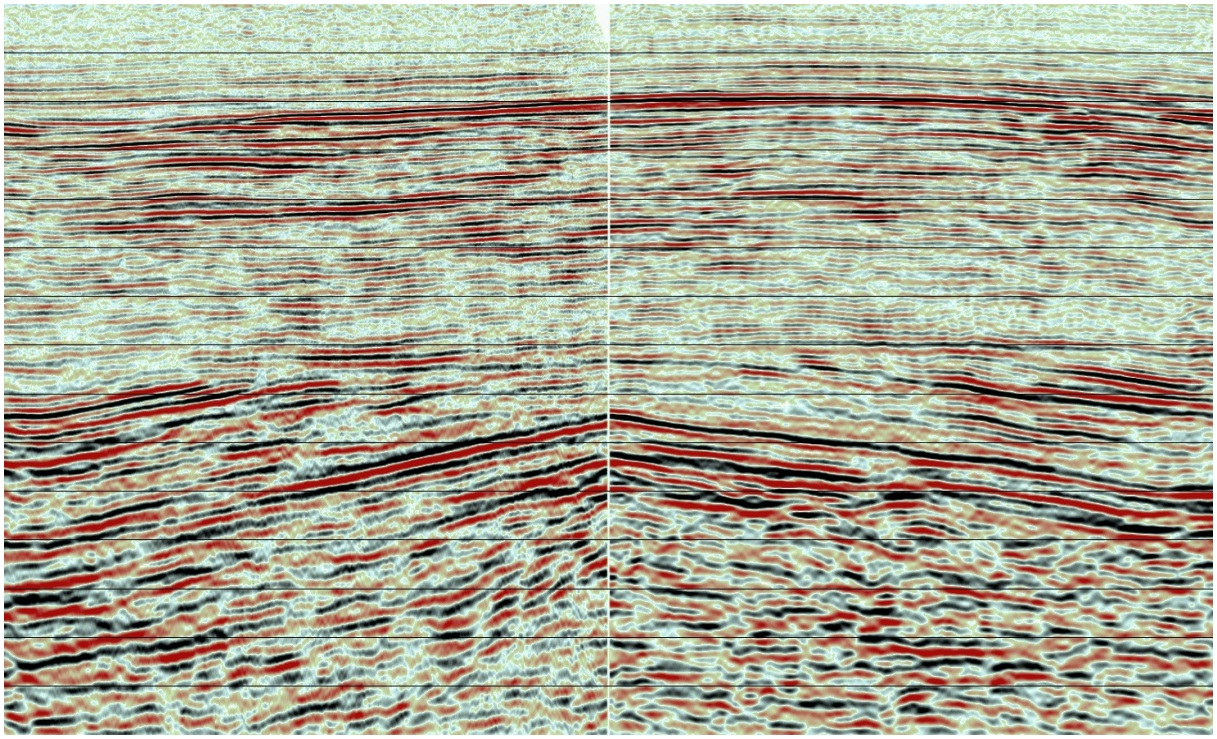


Figure 2. Stack comparison between Envirovibe energy source (left) and conventional, heavier, Vibroseis source (right). The lines corresponding to the left and right stacks are perpendicular to each other and the contact point is located at the line intersection point.

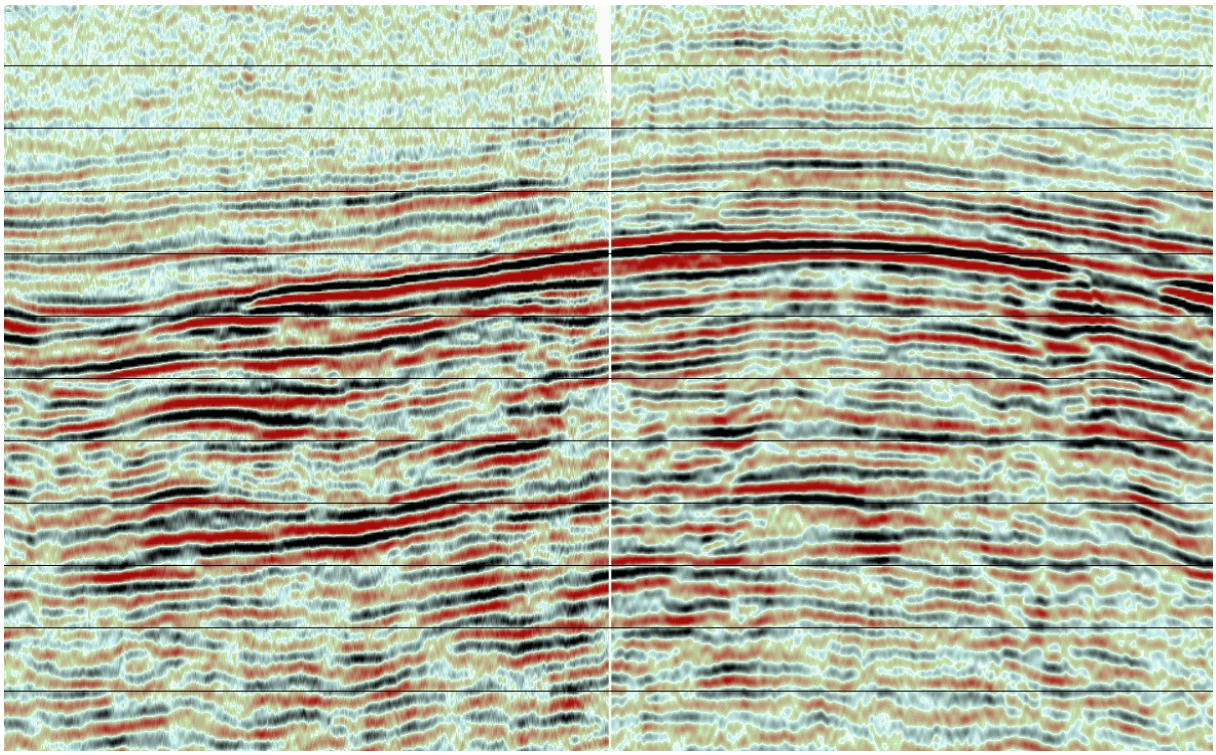


Figure 3. Stack comparison between Envirovibe energy source (left) and conventional, heavier, Vibroseis source (right). The lines corresponding to the left and right stacks are perpendicular to each other and the contact point is located at the line intersection point.

2. MILES SURVEY DETAILS

2.1 GENERAL

Recording of this trial was conducted in the period from 25 to 28 January 2008. One line was recorded, with a total length of 1149 stations at 6.25m intervals, i.e. 7.18125 km.

2.2 LOCATION/ACCESS

The trial line was located along Fairymeadow Road, between the Leichardt Highway and Old Cameby Road, approximately 15km south of Miles. Figure 4 shows the location of the trial line. The entire line was recorded on the side of the road reserve.

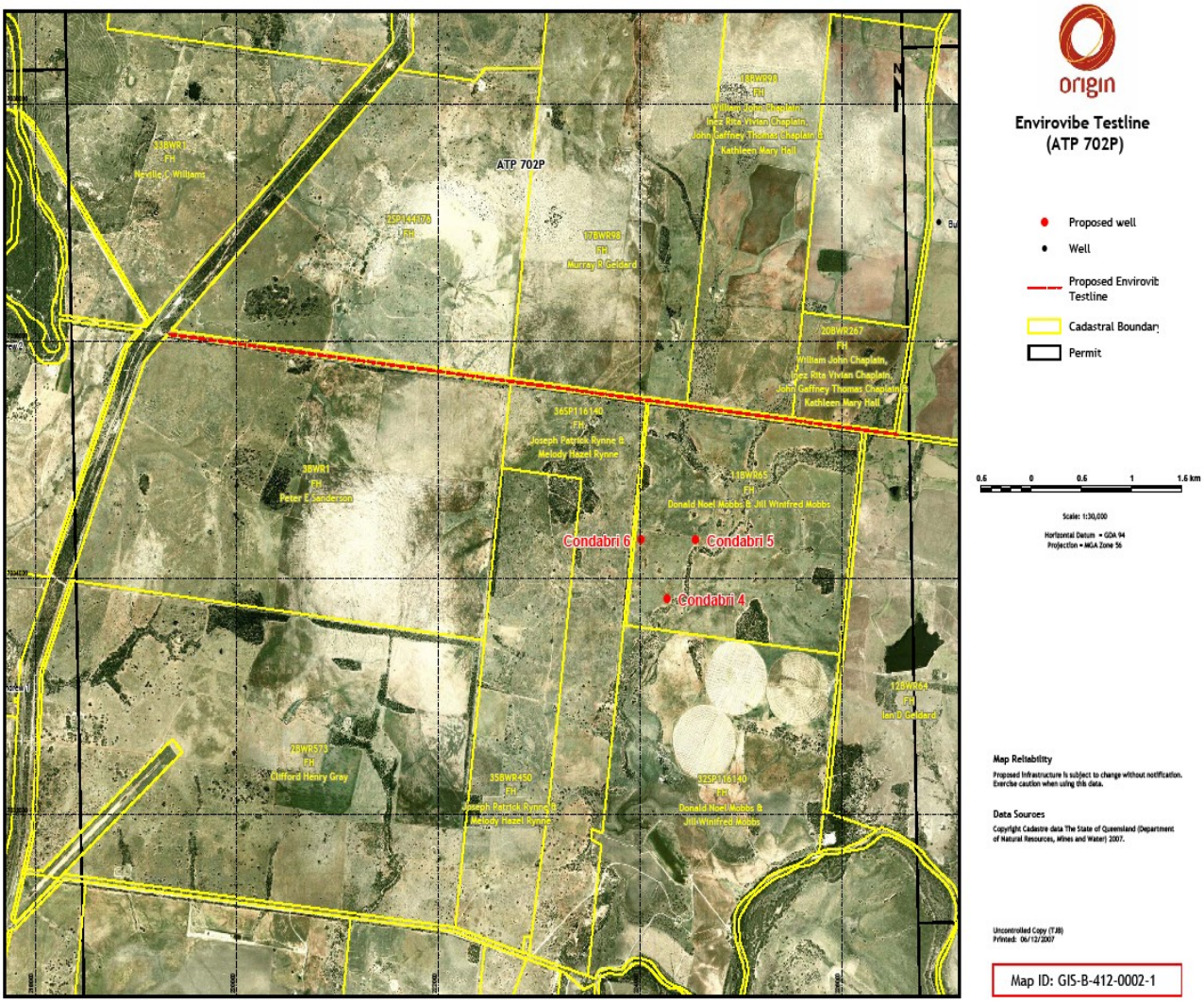


Figure 4. Location of first Envirovibe test line.

2.3 TERRAIN/WEATHER

Being on the road reserve, the terrain was generally flat or gently undulating. Several culverts had to be negotiated. The weather during the recording period was dry; however, many depressions and drains contained standing water as the result of recent rains.

2.4 LOGISTICS

All equipment was mobilised from Brisbane and incidentals were procured in Miles. External support was not required due to the very short nature of the survey

2.5 ACCOMMODATION

Accomodation and messing was provided by the Starline Motel in Miles. The travel time to the work site was approximately 20 minutes.

2.6 COMMUNICATIONS

Field communications for all phases of the fieldwork were by VHF radio (both vehicle mounted and hand held) using Velseis' discrete frequencies.

CDMA/NEXT-G and GSM mobile phone coverage was available over much of the site.

Communications between the field crew and Brisbane office were available by telephone and by Internet (from the accommodation, and by wireless network from the dogbox).

2.7 PERMITTING/SURVEYING/LINE PREPARATION/REHABILITATION

Permitting and landholder liaison were carried out by Neil Millar of Origin Energy Ltd.

Surveying services were provided by Conics Positioning, whose office is in Brisbane. Geophone stations were marked by wire pin flags, at 6.25m intervals. A copy of the final survey coordinates is included in the DVD-ROM enclosed.

The shire council provided slashing services to remove tall grass along the road verge. The recording crew removed survey markers after completion of recording.

2.8 RECORDING OPERATIONS

2.8.1 GENERAL

Recording operations began on 25th January, with sweep trials on the eastern end of the line (peg 100). Recording production continued until January 28th, with 7.18125km of line being covered.

2.8.2 RECORDING PARAMETERS

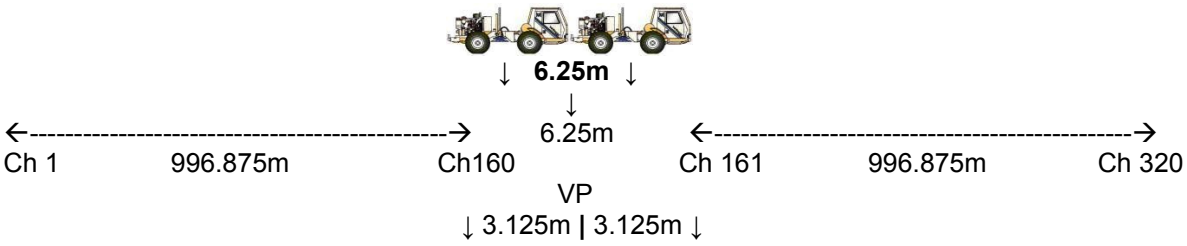
Recording parameters were developed with due regard to both geological targets and survey costs. A nominal CDP coverage of 160 fold was proposed to ensure that data quality was maintained despite possible changes in geological conditions and target depth.

The spread was symmetrical about the shot point. For each record, 320 live channels were recorded, i.e. 160-0-160 split spread.

A 6.25m geophone station interval was chosen so that data may be processed with high spatial sampling or decimated to 12.5m or 25m geophone station intervals, if desired.

Various linear and non-linear sweeps, sweep ranges and a vari-sweep combination were trialed as well as sweep lengths and a selection of force levels. Parameters selected for the trial are listed below.

2.8.3 SPREAD GEOMETRY



2.8.4 INSTRUMENT PARAMETERS

Number of recording channels	320
Auxiliary channel 1	Time-break
Auxiliary channel 2	True reference
Auxiliary channel 3	Wire-line correlation
Auxiliary channel 4	Autocorrelation
Sample rate	1.0 ms
Record length	3.0 seconds
Pre amplifier gain	24 dB
Filters: High Cut (anti alias)	0.8 Nyquist
Low cut	Nil
Recording media/format	3490-E data cartridge (SEG-D)
Archive/format	3490-E data cartridge (SEG-D)

2.8.5 SOURCE PARAMETERS

Vibrator	'Envirovibe'
Number of units	2, in line
VP interval	6.25m
Array length	6.25m (pad to pad)
Number of sweeps	1
Sweep frequency	10 to 120Hz
Force	70% (10,500lbs)
Sweep type	linear; 0.30 sec. taper
Sweep length	6 seconds
Record length (listen time)	3 seconds
CDP coverage (nominal)	160 fold

2.8.6 RECEIVER PARAMETERS

Geophone group interval	6.25m
Geophone stringing array	6 elements in series
Array layout	Equi-spaced in line, over 6.25m;
Array centre	on station
Element	Sensor SM-4UB, 14Hz

2.8.7 RECORDING SYSTEM DESCRIPTION

Recording system type	Sercel 408UL
Recording	24 bit
Sample rate	0.25, 0.5, 1.0, 2.0 or 4.0 milliseconds
Output media	36 track 3490-E type ½" data cartridge
Format	SEG-D demultiplexed; 4 byte per sample
High Cut Record Filters	0.8 Nyquist
Low Cut Record Filters	None
Noise editing options	Vertical or Diversity Stack

2.9 QUALITY CONTROL, HEALTH, SAFETY AND ENVIRONMENT (QHSE)

2.9.1 SITE SAFETY MANAGEMENT PLAN/SAFETY INDUCTION

Velseis Pty Ltd has developed a comprehensive safety management system, which has been mapped against the requirements of the Workplace Health and Safety Act (1995) and the Petroleum Act (1923) and the Petroleum Amendment Act (1996).

A site-specific safety management plan was developed by John Harris (OH&S Officer) from Origin Energy and Jason Parker (Safety Coordinator) from Velseis, with input from Simon McMonagle (Vibroseis Engineer).

Morning toolbox meetings, convened by Steve Hearn, were held at the accommodation each day, prior to driving to the work site. These meetings ran for a typical period of 15-20 minutes, and provided a forum for personnel to discuss operational and safety aspects of the survey.

Velseis' Fitness for Work procedures were also administered at this time, including random breath testing. Copies of inductions, toolbox meeting records and details of topics discussed, have been archived at Velseis' Brisbane office.

2.9.2 PERSONNEL AND SAFETY STATISTICS

Up to 19 personnel were on the field crew each operational day (including two Origin Energy staff). The crew was visited by Randall Taylor and Mathew Dorling from Origin Energy on the 25th of January. No lost time or restricted work injuries were recorded.

3. BOGANDILLA SURVEY DETAILS

3.1 GENERAL

Recording of this second trial line was conducted in the period from 30th April to 1st May 2008. The line was 4.3Km in length.

3.2 LOCATION/ACCESS

The second trial line was located along the Jackson-Wandoan Road, approximately 5km north of the intersection with the Warrego Highway. This intersection is located approximately 70km east of Roma. Figure 5 shows the location of the second trial line. The entire line was recorded on the side of the road reserve.

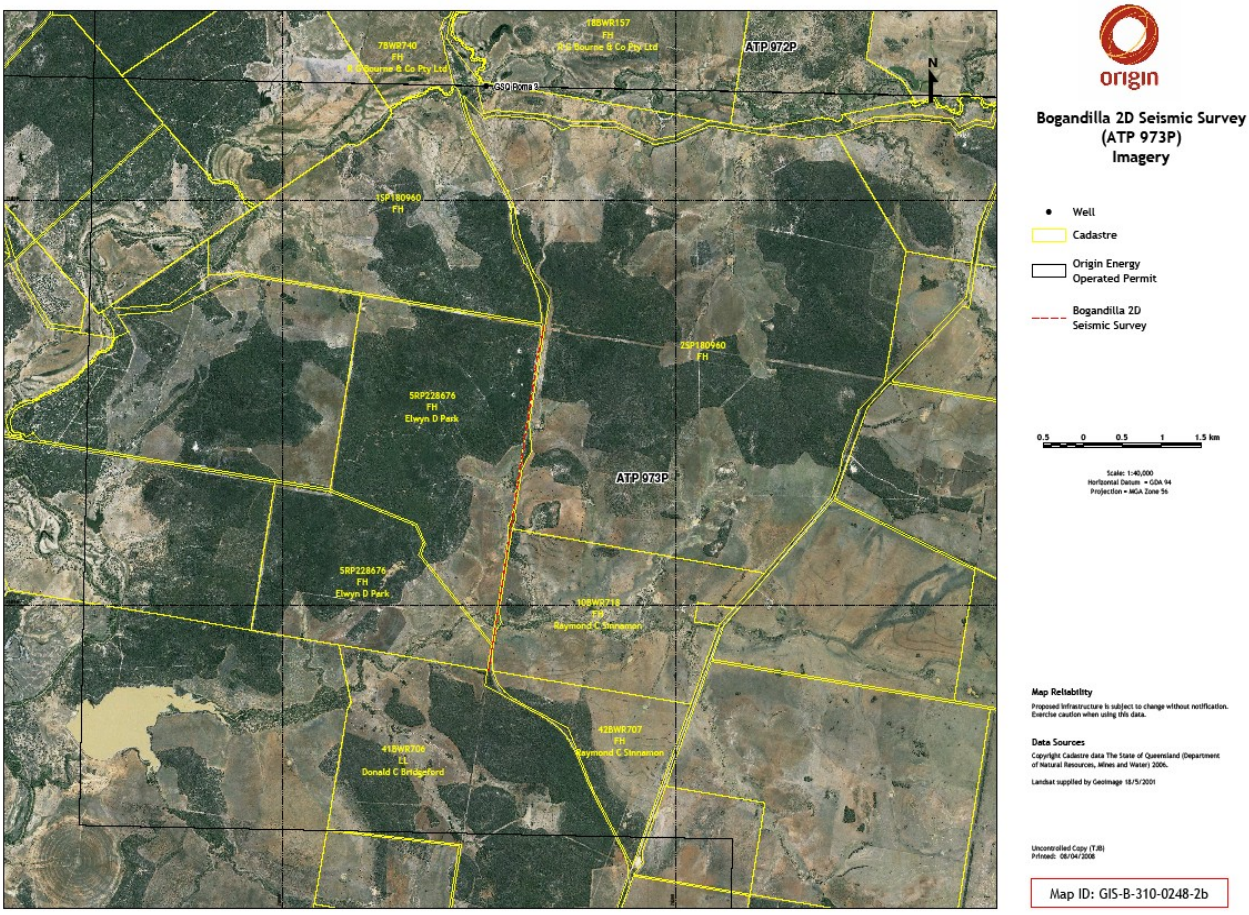


Figure 5. Location of second Envirovibe test line at Bogandilla

3.3 TERRAIN/WEATHER

Being on the road reserve of the Jackson-Wandoan road, the terrain was generally flat or gently undulating. Several culverts had to be negotiated. The weather during the recording period was dry.

3.4 LOGISTICS

All equipment was mobilised from Brisbane and incidentals were procured in Roma

3.5 ACCOMMODATION

Accommodation and messing for the field crew was provided at the Kings Hotel/Motel in Roma. Travel time from the accommodation to the work site was approximately 1 hour.

3.6 COMMUNICATIONS

Field communications for all phases of the fieldwork were by VHF radio (both vehicle mounted and hand held) using Velseis' discrete frequencies.

NEXT-G mobile phone coverage was available over much of the site.

Communications between the field crew and Brisbane office were available by telephone, and by Internet (from the accommodation, and by wireless network from the dogbox).

3.7 PERMITTING/SURVEYING/LINE PREPARATION/REHABILITATION

Permitting and landholder liaison was carried out by Mathew Dorling and Neil Millar of Origin Energy.

Surveying services were provided by Klau Geomatics of Bawley Point, NSW. Geophone stations were marked with pin flags. 4.3km were marked at 10m intervals. A copy of the final survey coordinates is included in the DVD-ROM enclosed.

The recording crew removed survey markers after completion of recording.

3.8 RECORDING OPERATIONS

3.8.1 GENERAL

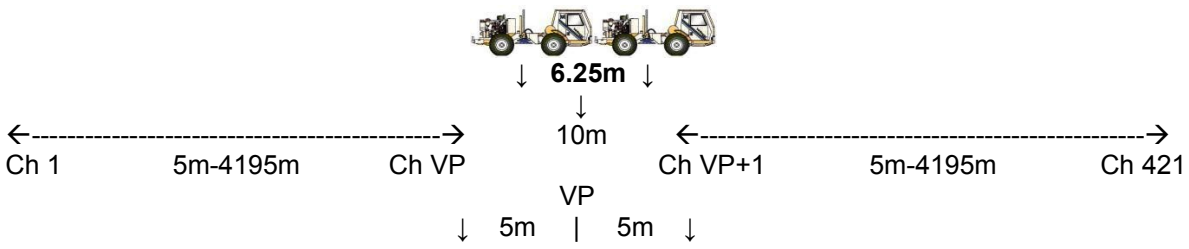
Recording operations began on April 30th, starting on the northern end of the line (Peg 100). Recording production continued until May 1st, with 4.2km of line being covered. Geophones were laid out along the line from peg 100 to peg 521, and remained static while the Envirovibe source moved through the spread from peg 100 to peg 521.

3.8.2 RECORDING PARAMETERS

Recording parameters were developed with due regard to both geological targets and survey costs. A nominal CDP coverage of up to 210 fold was proposed to ensure that data quality was maintained despite possible changes in geological conditions and target depth.

For each record, 421 live channels were recorded.

3.8.3 SPREAD GEOMETRY



3.8.4 INSTRUMENT PARAMETERS

Number of recording channels	421
Auxiliary channel 1	Time-break
Auxiliary channel 2	True reference
Auxiliary channel 3	Wire-line reference
Auxiliary channel 4	Auto correlation
Sample rate	1.0 ms
Record length	4.0 sec
Pre amplifier gain	24dB
Filters: High Cut (anti alias)	0.8 Nyquist
Low cut	Nil
Recording media/format	3490-E data cartridge (SEG-D format)
Archive	3490-E data cartridge (SEG-D format)

3.8.5 SOURCE PARAMETERS

Vibrator	'Envirovibe'
Number of units	2, in line
VP interval	10.0m
Number of sweeps	1
Sweep frequency	10-100Hz
Sweep length	6 seconds
CDP fold (nominal)	up to 210

3.8.6 RECEIVER PARAMETERS

Geophone group interval	10.0m
Geophone stringing array	6 elements in series
Array layout	Equispaced in line, over 5m
Array centre	on station
Element	Sensor SM-4UB, 14Hz

3.8.7 RECORDING SYSTEM DESCRIPTION

Recording system	Sercel 408CMXL
Recording	24 bit
Sample rate	0.5, 1.0, 2.0 or 4.0 milliseconds
Output media	3490-E data cartridge (SEG-D)

High Cut Record Filters	anti-alias - 0.8 Nyquist
Low Cut Record Filters	Out
Noise editing	diversity stack and other options

(Note: A detailed specification PDF for the Sercel 408 recording system will be provided if required)

3.9 **QUALITY CONTROL, HEALTH, SAFETY AND ENVIRONMENT (QHSE)**

3.9.1 SITE SAFETY MANAGEMENT PLAN/SAFETY INDUCTION

Velseis Pty Ltd has developed a comprehensive safety management system which has been mapped against the requirements of the Workplace Health and Safety Act (1995) and the Petroleum Act (1923) and the Petroleum Amendment Act (1996).

Site inductions were conducted by Origin Energy on April 30th prior to the commencement of field operations.

Morning toolbox meetings were held at the accommodation each day by Steve Hearn and Mathew Dorling (Origin Energy), prior to driving to the work site. These meetings ran for a typical period of 15-20 minutes, and provided a forum for personnel to discuss operational and safety aspects.

Velseis' Fit for Work procedures were also administered at this time, including random breath testing. Copies of inductions, toolbox meeting records, and details of topics discussed, have been archived at Velseis' Brisbane office.

3.9.2 SAFETY STATISTICS

Up to 21 personnel were on the field crew each operational day. No lost time or restricted work injuries were recorded.

4. EMU APPLE SURVEY DETAILS

4.1 GENERAL

Recording of these two trial lines was conducted in the period from 2nd to 4th May, 2008, with sweep tests on May 1. Line OEA-08-01 was 4.15Km in length, while line OEA-08-02 was 7.47Km.

4.2 LOCATION/ACCESS

The location of the third trial survey was approximately 75km south of Roma in western Queensland along the Roma Southern Road. The lines were located on the eastern side of the road in a paddock. Figure 6 shows the location of the Emu Apple seismic lines.

<Figure 6.>

4.3 TERRAIN/WEATHER

The terrain was generally flat of gently undulating and was predominantly used for livestock breeding.

4.4 LOGISTICS

All equipment was mobilised from Brisbane and incidentals were procured in Roma

4.5 ACCOMMODATION

Accommodation and messing for the field crew was provided at the Kings Hotel/Motel in Roma. The travel time from the accommodation to the jobsite was approximately 1hr.

4.6 COMMUNICATIONS

Field communications for all phases of the fieldwork were by VHF radio (both vehicle mounted and hand held) using Velseis' discrete frequencies.

NEXT-G mobile phone coverage was available over much of the site.

Communications between the field crew and Brisbane office were available by telephone, and by Internet (from the accommodation, and by wireless network from the dogbox).

4.7 PERMITTING/SURVEYING/LINE PREPARATION/REHABILITATION

Permitting and landholder relations were carried out by Mathew Dorling of Origin Energy.

Surveying services were provided by Klau Geomatics of Bawley Point, NSW. Geophone stations were marked with pin flags. Two lines totalling 11.62km were marked at 10m intervals. A copy of the final survey coordinates is included in the DVD-ROM enclosed.

The recording crew removed survey markers after completion of recording

4.8 RECORDING OPERATIONS

4.8.1 GENERAL

Recording operations began on the 2nd of May 2008, starting on the north-western end of line 1 (Peg 100). Recording production was finished on this day with spread being moved to line 2 in the afternoon.

Various force levels, pad-to-pad source array lengths, sweep ranges and sweep lengths, including a 50 second sweep, were trialed at shot point 225.5 on line 1 in order to obtain optimum parameters for the survey. Parameters selected for the survey are listed below

4.8.2 RECORDING PARAMETERS

Geophones were laid out along the entire of line 1 from peg 100 to peg 515, and remained static while the Envirovibe source moved through the spread. Line 1 was rolled off with 200 channels behind the shot-point.

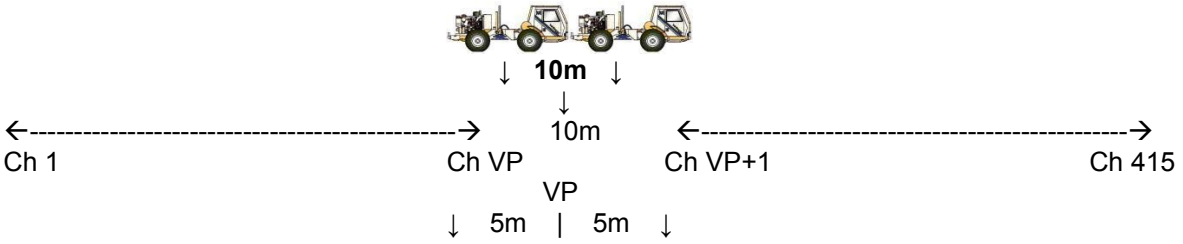
Line 2 was recorded from north to south, on the 2nd and 3rd of May 2008. A conventional 160-0-160 split spread was used with a 250 channel roll-on and a 160 channel roll-off. The 250 channel roll-on was used because the spread was already in place on the ground.

Recording parameters were developed with due regard to both geological targets and survey costs. A nominal CDP coverage of 160 fold was proposed, to ensure that data quality was maintained despite possible changes in geological conditions and target depth. A maximum fold of 207 was achieved on line 1 due to the static spread.

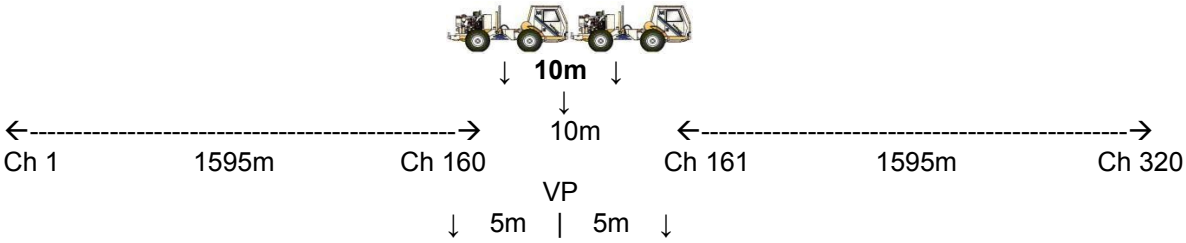
For both lines, the spread was symmetrical about the shot point. For line 1, 415 channels were recorded for each shot. For line 2, 320 live channels were recorded, i.e. 160-0-160 split spread.

4.8.3 SPREAD GEOMETRY

Line 1:



Line 2:



4.8.4 INSTRUMENT PARAMETERS

Number of recording channels – line 1	415
Number of recording channels – line 2	320
Auxiliary channel 1	Time break
Auxiliary channel 2	True reference
Auxiliary channel 3	Wire-line reference
Auxiliary channel 4	Auto-correlation
Sample rate	1.0 ms
Record length	3.0 sec.
Pre amplifier gain	24dB
Filters: High Cut (anti alias)	0.8 Nyquist

Low cut	Nil
Recording media/format	3490-E Data cartridge, (SEG-D)
Archive format	3490-E Data cartridge, (SEG-D)

4.8.5 SOURCE PARAMETERS

Vibrator	'Envirovibe'
Number of units	2, in line
VP interval	10.0m
Array length	10.0m (pad-to-pad)
Number of sweeps	1
Sweep frequency	10-90Hz
Sweep length	8.0 seconds
CDP fold (nominal) – line 1	up to 207
CDP fold (nominal) – line 2	160

4.8.6 RECEIVER PARAMETERS

Geophone group interval	10.0m
Geophone stringing array	6 elements in series,
Array layout	Equispaced in line, over 5m
Array centre	on station
Element	Sensor SM-4UB, 14Hz

4.8.7 RECORDING SYSTEM DESCRIPTION

Recording system type	Sercel 408CMXL
Recording	24 bit
Sample rate	0.5, 1.0, 2.0 or 4.0 milliseconds
Output media	3490-E data cartridge (SEG-D)
Format	SEG-D demultiplexed; 4 bytes per sample
High Cut Record Filters	anti-alias - 0.8 Nyquist
Low Cut Record Filters	Out
Noise editing	diversity stack and other options

(Note: A detailed specification PDF for the Sercel 408 recording system will be provided if required)

4.9 QUALITY CONTROL, HEALTH, SAFETY AND ENVIRONMENT (QHSE)

4.9.1 SITE SAFETY MANAGEMENT PLAN/SAFETY INDUCTION

Velseis Pty Ltd has developed a comprehensive safety management system which has been mapped against the requirements of the Workplace Health and Safety Act (1995) and the Petroleum Act (1923) and the Petroleum Amendment Act (1996).

A site-specific safety management plan was developed by John Harris (OH&S Officer) from Origin Energy and Jason Parker (Safety Coordinator) from Velseis, with input from Simon McMonagle (Vibroseis Engineer).

Site specific inductions were conducted by Origin Energy on April 30th prior to the commencement of field operations.

Morning toolbox meetings, convened by Steve Hearn, were held at the accommodation each day, prior to driving to the work site. These meetings ran for a typical period of 15-20 minutes, and provided a forum for personnel to discuss operational and safety aspects.

Velseis' Fit for Work procedures were also administered at this time, including random breath testing. Copies of inductions, toolbox meeting records and details of topics discussed, have been archived at Velseis' Brisbane office.

4.9.2 SAFETY STATISTICS

Up to 21 personnel were on the field crew each operational day (including 3 Origin Energy staff). No lost time or restricted work injuries were recorded.

APPENDIX A: PERSONNEL

1. MILES SURVEY

RECORDING CREW

POSITION	NAME	COMPANY
Observer	Gerard Wells	Velseis Pty Ltd
Line Supervisor	Fraser Davey	Velseis Pty Ltd
Line Supervisor	Des Cronin	Velseis Pty Ltd
Vibe Driver 1/Mechanic	Simon McMonagle	Velseis Pty Ltd
Vibe Driver 2	Ritchie Mackay	Velseis Pty Ltd
Field Assistant	Emma Burton	Velseis Pty Ltd
Field Assistant	Rob Estritch	Velseis Pty Ltd
Field Assistant	Balaz Petras	Velseis Pty Ltd
Field Assistant	Wade Briese	Velseis Pty Ltd
Field Assistant	Keegan Williams	Velseis Pty Ltd
Field Assistant	Geoff Moriaty	Velseis Pty Ltd
Field Assistant	Rochelle Johns	Velseis Pty Ltd
Field Assistant	Emily Fisher	Velseis Pty Ltd
Field Assistant	Mike Denniston	Velseis Pty Ltd
Client	Neil Millar	Origin Energy
Client	John Harris	Origin Energy
Client (Visitor)	Randall Taylor	Origin Energy
Client (Visitor)	Mathew Dorling	Origin Energy
Chief Geophysicist	Steve Hearn	Velseis Pty Ltd
Operations Manager	Mike Reveleigh	Velseis Pty Ltd
Engineer	Clement Muthukrishna	Velseis Pty Ltd

SUB CONTRACTORS

POSITION	NAME	COMPANY
Surveyor	Charles Johnson	Conics Positioning

2. BOGANDILLA AND EMU APPLE SURVEYS

RECORDING CREW

POSITION	NAME	COMPANY
Observer	Gerard Wells	Velseis Pty Ltd
Line Supervisor	Ben Robinson	Velseis Pty Ltd
Line Supervisor	Alan Meulenbroek	Velseis Pty Ltd
Vibe Driver 1	Ritchie Mackay	Velseis Pty Ltd
Vibe Driver 2	Anthony Smith	Velseis Pty Ltd
Vibe Mechanic	Simon McMonagle	Velseis Pty Ltd
Field Assistant	Anthony Cadell	Velseis Pty Ltd
Field Assistant	Christopher Dickfos	Velseis Pty Ltd
Field Assistant	Tim Robinson	Velseis Pty Ltd
Field Assistant	Mark Hanson	Velseis Pty Ltd
Field Assistant	Emily Fisher	Velseis Pty Ltd
Field Assistant	Kelsie Loveday	Velseis Pty Ltd
Field Assistant	Arthur Weston	Velseis Pty Ltd
Field Assistant	Frank Schifcofske	Velseis Pty Ltd
Field Assistant	Rebecca Statham	Velseis Pty Ltd
Field Assistant	Wade Briese	Velseis Pty Ltd
Client	Mathew Dorling	Origin Energy
Client	Neil Millar	Origin Energy
Client	Cameron Hamilton	Origin Energy
QHSE Coordinator	Jason Parker	Velseis Pty Ltd
Chief Geophysicist	Steve Hearn	Velseis Pty Ltd

SUB-CONTRACTORS

POSITION	NAME	COMPANY
Surveyor	Rob Klau	Klau Geomatics Pty Ltd
Line Prep/Rehab Supervision	Dudley Horn	Aztex (for Emu Apple only)

APPENDIX B: EQUIPENT AND VEHICLES

1. MILES SURVEY

Recording System	Sercel 408UL telemetric seismic data acquisition system

Line Equipment

Geophones	700 arrays, 6 units per array; Sensor SM-4UB, 14Hz, 395Ω
Telemetry	700 single FDUs (Field Digitiser Units) with minimum 36m links
Power Units	12 LAULs (Line Acquisition Units) c/w batteries and cables
Interconnect	2 LAUXs (Crossing Line Acquisition Units) c/w batteries and cables
Miscellaneous	radios and all peripheral equipment

Line vehicles

Recording vehicle	1	Mitsubishi Canter 4x4 3 tonne truck with air conditioned cab
Spread movement	2	Toyota Land Cruiser 4x4 tray-backs
Spread checking	2	Toyota Land Cruiser 4x4 tray-backs
Service/personnel t'port	3	Toyota Hi-Lux 4x4 dual cabs

Other vehicles

Envirovibe support	1	Toyota Landcruiser 4 x 4
Crew Supervisor	1	Toyota Land Cruiser 4 x 4 tray-back or similar
Equipment transport	1	Acco 6 tonne flat bed truck

Energy Source	2 Industrial Vehicles International Inc. Envirovibe Vibroseis buggies (new) with approx. 7.5 tonnes peak force and 8.0 tonnes hold down; 10Hz to 300Hz sweep capability. Electronics (encoders and decoders) are SSI Force-Two; Pelton compatible, with all current sweep options. One encoder and three decoders will be installed in the recording truck and vibrator units with one complete spare encoder and decoder on site.

Highway transport for Envirovibe buggies, as required.

2. BOGANDILLA AND EMU APPLE SURVEYS

Recording System	Sercel 408CMXL telemetric seismic data acquisition system
Line Equipment	
Geophones	700 arrays, 6 units per array; Sensor SM-4UB, 14Hz
Telemetry	700 single FDUs (Field Digitiser Units) with minimum 36m links
Power Units	12 LAULs (Line Acquisition Units) c/w batteries and cables
Interconnect	2 LAUXs (Crossing Line Acquisition Units) c/w batteries and cables
Miscellaneous	radios and all peripheral equipment
Line vehicles	
Recording vehicle	1 Mitsubishi Canter 4x4, 3 tonne truck with air conditioned cab
Spread movement	2 Toyota Landcruiser 4x4 tray-backs
Spread checking	2 Toyota Landcruiser 4x4 tray-backs
Service/personnel t'port	2 Toyota Hi-Lux 4x4 dual cabs
	1 Holden Rodeo 4x4 dual cab
Other vehicles	
Envirovibe support	1 Toyota Landcruiser 4x4
Equipment transport	1 Acco 6 tonne flat bed truck
Energy Source	2 Industrial Vehicles International Inc. Envirovibe Vibroseis buggies (new) with approx. 7.5 tonnes peak force and 8.0 tonnes hold down; 10Hz to 300Hz sweep capability. Electronics (encoders and decoders) are SSI Force-Two; Pelton compatible, with all current sweep options. One encoder and three decoders will be installed in the recording truck and Vibrator units with one complete spare encoder and decoder on site.

Highway transport for Envirovibe buggies, as required.

APPENDIX C: PHOTOGRAPHS

Figure 7. Envirovibe working on side of Fairymeadow Road south of Miles

Figure 8. Rear view of Envirovibe working on Fairymeadow Road.

Figure 9. Two Envirovibes creating a source array with pad-to-pad distance 6.25m.

Figure 10. Front view of Envirovibe on side of Fairymeadow Road.

Envirovibe testline 11-12-07

0.0km Looking West from Waypoint END

1.4km Looking West from Waypoint 117

Figure 11. View of proposed trial seismic line along Fairymeadow Road, south of Miles. Photos taken on 11th December 2007. Courtesy: Origin Energy.

Figure 12. Transport of Envirovibes to Emu Apple prospect.

ENCLOSURES

ENCLOSED DVD-ROM

COPIES OF: Survey reports
Survey Coordinates
Daily Observer's Logs
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