ACQUISITION REPORT

PGS Geophysical

Origin Energy

M/V Pacific Explorer

Silvereye 3D Seismic Survey
Block T/44P Offshore Tasmania,
Central Bass Strait, Australia

2007098

02nd to 29th January 2008

version 1

PGS Geophysical – Marine Acquisition, Singapore

AUTHORISATION

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Singapore,
22nd February 2008

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REVISED VERSIONS

NUMBER	CHANGES	AUTHOR	DATE

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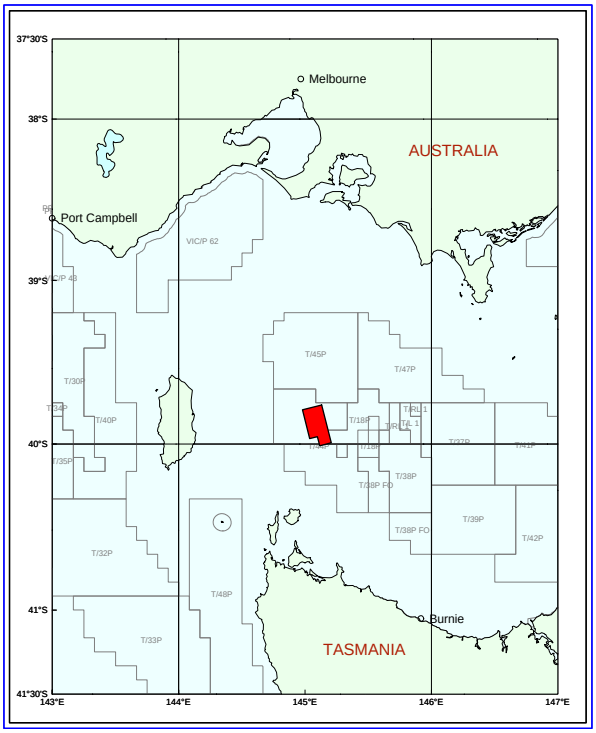
1 Introduction

1.1 Summary



PGS was contracted by Origin Energy, Australia to acquire the Silvereye 3D survey using the M/V PACIFIC EXPLORER.

The seismic survey area was situated in block T44/P approximately halfway between the mainland and Tasmania in the Bass Strait.

The vessel mobilised at sea. An induction and start up meeting was held onshore before the crew travelled out to the vessel.

The first line was acquired on the 2nd January 2008. Progress was steady, hampered mainly by a succession of high & low pressure weather systems. These resulted in wind and sea conditions being unsuitable for the acquisition of seismic data. The towed depth of the hydrophone arrays had to be varied to compensate for the noise induced by the wave motion on the streamers.

Due to the weather shut down over the weekend of 19th & 20th January 2008, time ran out to enable completion of the survey prior to a crew change planned for 23rd January. The vessel had to recover all seismic equipment in order to attend to a major resupply in the port of Burnie, Tasmania.

The vessel sailed again on 24th January and production resumed the same day. Weather during this period was marginal and the completion was again delayed when conditions only permitted acquisition on a heading of 345°. The survey was completed on 29th January with Sequence 79 being the last.

1.2 Key parameters

Source	:	2 x 3090 in^3
Source depth	:	6 m
Streamers	:	6 x 6000 m
Streamer spacing	:	100 m
Streamer depth	:	7 m *
Near trace offset	:	120 m

* Streamer depth varied between 7, 8 & 9 m depending on the weather conditions.

1.3 Systems

Source type	:	Bolt LLXT 1900 guns
Streamer type	:	PGS RDH-S
Recording system	:	NTRS
Navigation	:	SkyFix.XP DGPS
	:	StarFix.HP DGPS
Float positioning	:	Fugro RGPS
Acoustic ranging	:	ION Digicourse

1.4 Production

Traverse km		**CMP km**		**Square km**	
prime	1,072.425	prime	12,869.10	prime	321.72742
prime run out	135.000	prime run out	1,620.00	prime run out	40.500
infill	517.89375	infill	6,214.725	infill	155.36814
infill run out	57.000	infill run out	684.000	infill run out	17.100
Total	**1,782.31875**	**Total**	**21,387.825**	**Total**	**534.69556**
Infill percentage	52.74%				

1.5 Survey timing

	Hours	% of total		Hours	% of total
Production	397.05	66.6%	Prime Production	131.38	22%
			Line Change	160.47	26.9%
			Infill	68.30	11.5%
			Line change infill	13.08	2.3%
			Run Out (Prime)	16.35	2.7%
			Run Out (Infill)	7.47	1.2%
Standby	160.63	26.9%	Weather	107.75	18.1%
			Helicopter at Sea	1.10	0.2%
			Local Transit / Prospect Change	34.57	5.8%
			Extended LC d/t Survey Shape	0.25	0.04%
			Portcall bunkering	11.68	2%
			Line Change Standby	3.72	0.6%
			Bunkering At Sea	1.57	0.3%
Mob / demob	10.89	1.9%	Extended Mob, Instrumentation	10.47	1.8%
			General Demob	0.42	0.1%
Downtime	27.48	4.6%	Streamer separation	8.25	1.4%
			Software problems inc. Crash	3.55	0.6%
			Bolt Airgun Autofire	3.22	0.5%
			Source deployment/recovery problems	0.30	0.05%
			Hiflex hose	8.10	1.4%
			Survey planning	0.17	0.03%
			Mass storage recording devices	1.02	0.17%
			Mechanical inc Gun-floats	1.60	0.3%
			Bridle steering	1.27	0.2%
TOTAL	**596.05**				

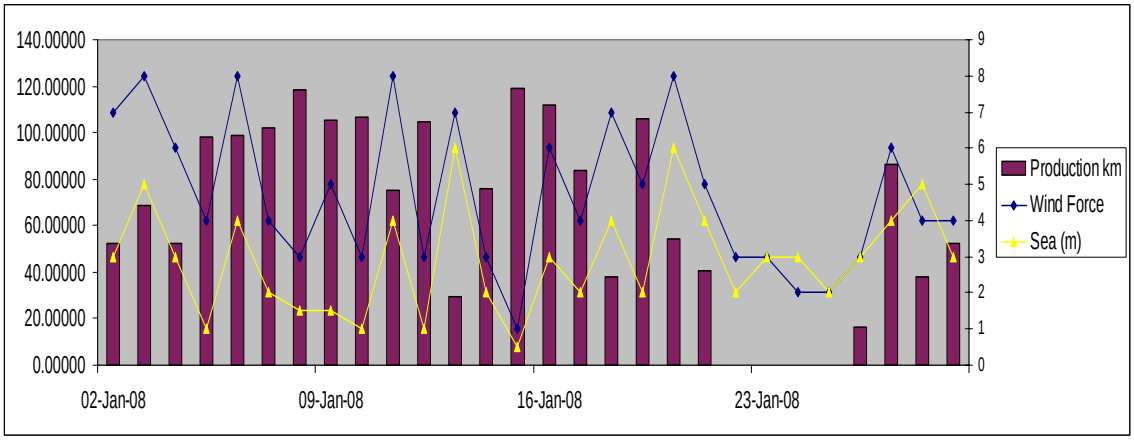
2 Sequence of events

2.1 Daily log

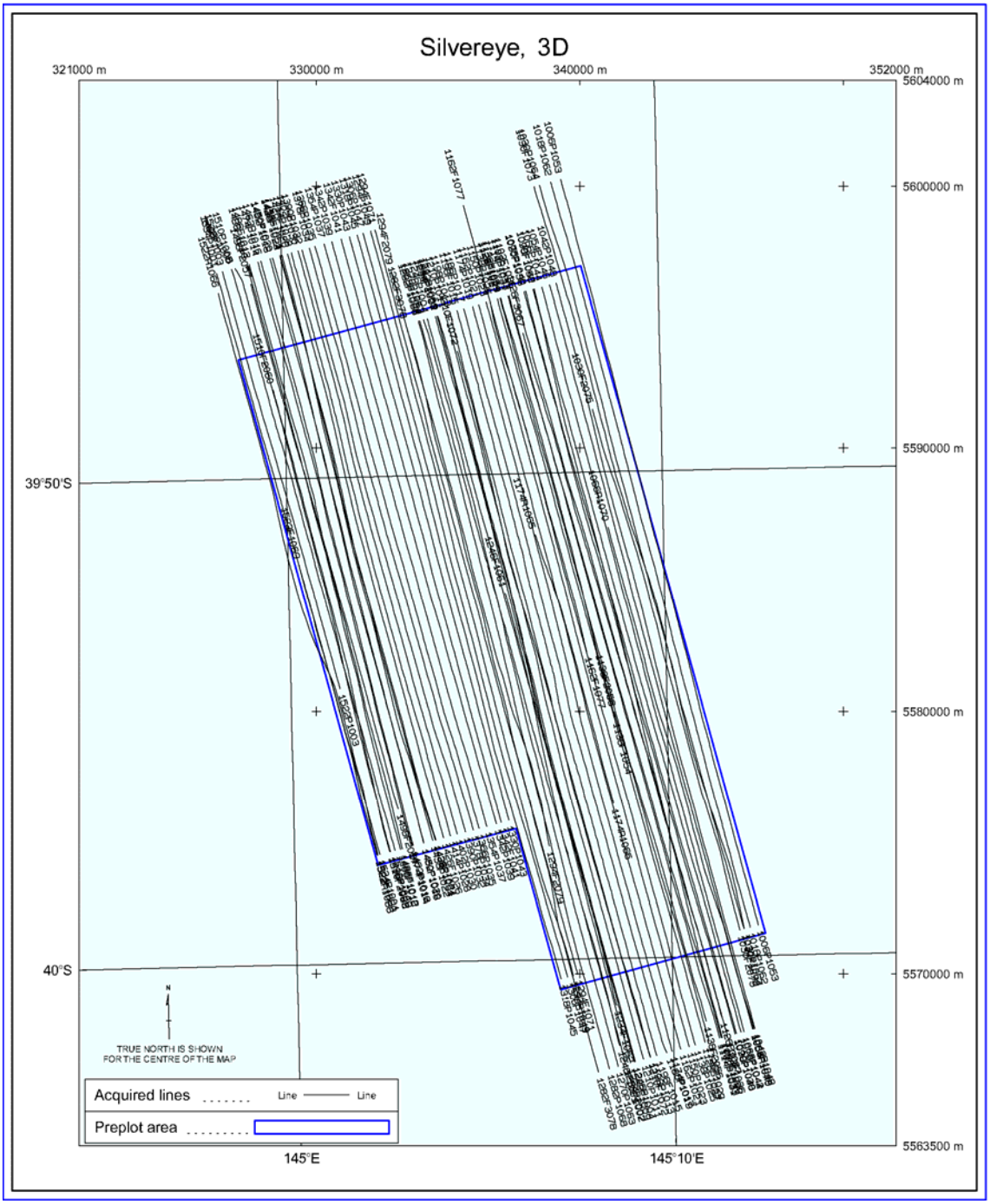
DATE	Total Km	Prime FF	Prime Runout	Infill FF	Infill Runout	Wind F'ce	Swell (m)	Location & Comments
02-Jan-08	52.36875	46.36875	6.00000			7	3	NEW JOB. Changed stretch on str#1.In production, seq.001,002
03-Jan-08	68.86875	59.86875	9.00000			8	5	Production seq.003(EDIT@SOL-gAS), 004,005,006(NTBP-weather). Standing by for weather.
04-Jan-08	52.36875	46.36875	6.00000			6	3	Standing by for weather, then production seq.007,008.
05-Jan-08	98.02500	72.76875	9.00000	16.25625		4	1	In production, seq.009,010,011,012
06-Jan-08	98.83125	56.70000	6.00000	30.13125	6.00000	8	4	In production, seq.012,013,014,015,016
07-Jan-08	101.79375	69.78750	9.00000	20.00625	3.00000	4	2	In production, seq.016,017,018,019(EDIT-NTRS),020
08-Jan-08	118.23750	105.45000	12.78750			3	1.5	In production, seq.020,021(EDIT-NTRS),022,023,024
09-Jan-08	105.07500	72.76875	9.30000	20.00625	3.00000	5	1.5	In production, seq.024,025,026,027,028.
10-Jan-08	106.68750	66.39375	10.91250	26.38125	3.00000	3	1	In production, seq.028,029,030,031,032.
11-Jan-08	75.43125	66.43125	9.00000			8	4	In production, seq.033 & 034 then down for weather until evening resuming with seq.035.
12-Jan-08	104.81250	66.43125	9.00000	26.38125	3.00000	3	1	In production, seq.036,037,038,039.
13-Jan-08	29.38125	26.38125	3.00000			7	6	In production, seq.040 then down for weather.
14-Jan-08	75.61875	20.21250	3.00000	46.40625	6.00000	3	2	Standing by for weather then production, seq.041,042,043,044.
15-Jan-08	118.95000	106.95000	12.00000			1	0.5	In production, seq.044,045,046,047,048.
16-Jan-08	111.76875	51.15000	6.00000	48.61875	6.00000	6	3	In production, seq.048,049,050,051,052.
17-Jan-08	83.96250	26.38125	3.00000	51.58125	3.00000	4	2	Down time due to gun autofir problem on Seq. 54 and air leak on Seq. 55. Seq. 54 partial line, Seq. 55 NTBP.
18-Jan-08	37.81875			35.56875	2.25000	7	4	In production, seq.057,058(NTBP-weather),059(NTBP-weather),060
19-Jan-08	105.91875	79.14375	9.00000	15.52500	2.25000	5	2	In production, seq.061,062,063,064.
20-Jan-08	54.03750	6.48750		43.05000	4.50000	8	6	In production seq. 065, 066, 067. Shut down for weather in afternoon.

21-Jan-08	40.85625	26.38125	3.00000	11.47500		5	4	Standing by for weather then production, seq.068, 069.
22-Jan-08						3	2	Recovered gear for port call at Woodside request.
23-Jan-08						3	3	In port Burnie, Tasmania. All charges to inter survey account.
24-Jan-08						2	3	Transitting from port and redeploying equipment.
25-Jan-08						2	2	Redeploying equipment - charged to Woodside.
26-Jan-08	16.65000			13.65000	3.00000	3	3	In production, seq.70. Downtime due to airleaks and streamer separations.
27-Jan-08	86.64375			77.64375	9.00000	6	4	In production seq. 71, 72. Downtime due to spreader rope tangle.
28-Jan-08	38.21250			35.21250	3.00000	4	5	In production, seq. 75, 77. Standby for weather, NTBP 72 and 74.
29-Jan-08	52.08750			47.75625	4.33125	4	3	In production seq. 78, 79. Job Complete.

2.2 Daily production and sea state



2.3 Post plotted vessel positions



3 Key personnel

	02rd January 2008 to 23rd January 2008	23rd January 2008 to 29th January 2008
Party Chief	Andy Sinnott	Mike Moran
Chief observer	Errol Wright	Mike Coble
Chief navigator	Ian Kemp	Nikolai Gritsenko
Chief mechanic	Kenny Brock	Larry Granzin
Chief geophysicist	Colin Hughes	Rune Stømme
Client representative onboard	Russell Stanley	Alex White
	Diane Osborne	Ray Doughty
Client contacts onshore	Neil Millar	

4 HSE

4.1 Statistics

Exposure hours	Marine crew	11616
	Seismic crew	12288
	Third party crew	4848
	Chaseboat crew	4032
	Total	32874

Small Boat Launches	19
Small Boat Exposure (man hours)	87.98
Incident Reports	3
Toolbox Meetings	24
Drills	6
Helicopter Ops	4
Helicopter Exposure (man hours)	13.00
MMO Sightings	3
MMO where action reqd.	0

4.2 Incidents

Report no.	Date	Action by	Classification	Comments
107/08/MA	05/01/08	TMS	Occupational Illness	Personnel : Lower back pain caused during manual handling
423/08/MA	16/01/08	TMS	First Aid Case	Personnel : Slip & fall causing pain to wrist and coccyx
653/08/MA	22/01/08	PGS	First Aid Case	Personnel: Knife cut while scraping barnacles.

5 Survey operations review

5.1 Survey area information

Oilfield installations

There were no oilfield installations or activity in the area.

Oilfield activity

See above.

Shipping Activity

There was very little traffic through the prospect. The MV Spirit of Tasmania I & II (ferries) passed well outside of the prospect area.

Sea Conditions, Tides And Currents

The sea conditions were generally rough due to the weather. Tides and currents were variable and strong at times. This caused quite a few feather mis-matches which required infilling.

In Sea Dangers

No specific in-sea dangers were identified other than the ambient temperature (~17°C) which required small boat crew to don survival suits before taking part in any in-sea operations.

Time sharing

There were no other seismic surveys going on at this time.

Fishing Activity

No fishing activity was identified during the survey.

Weather

107.75 hours of time was lost to weather which equates to 18.1% of the time on the survey. Considering that the survey was acquired in peak summer time, this is higher than anticipated. By setting the streamers deeper than the specification called for, the weather downtime was reduced beyond what it otherwise would have been. The navigational compass data was the most affected by the swell as it generally presented beam on to the vessel i.e. perpendicular to the survey lines. It is suggested that consideration be given to the use of a full-streamer acoustic network for future such surveys with this weather pattern expected.

Cetaceans

No time was lost due to marine mammal sighting procedures. Minimal cetacean activity was observed (3 sightings both of which were of dolphins). See the log in appendix 12.6

Naval Activity Including Civil Unrest

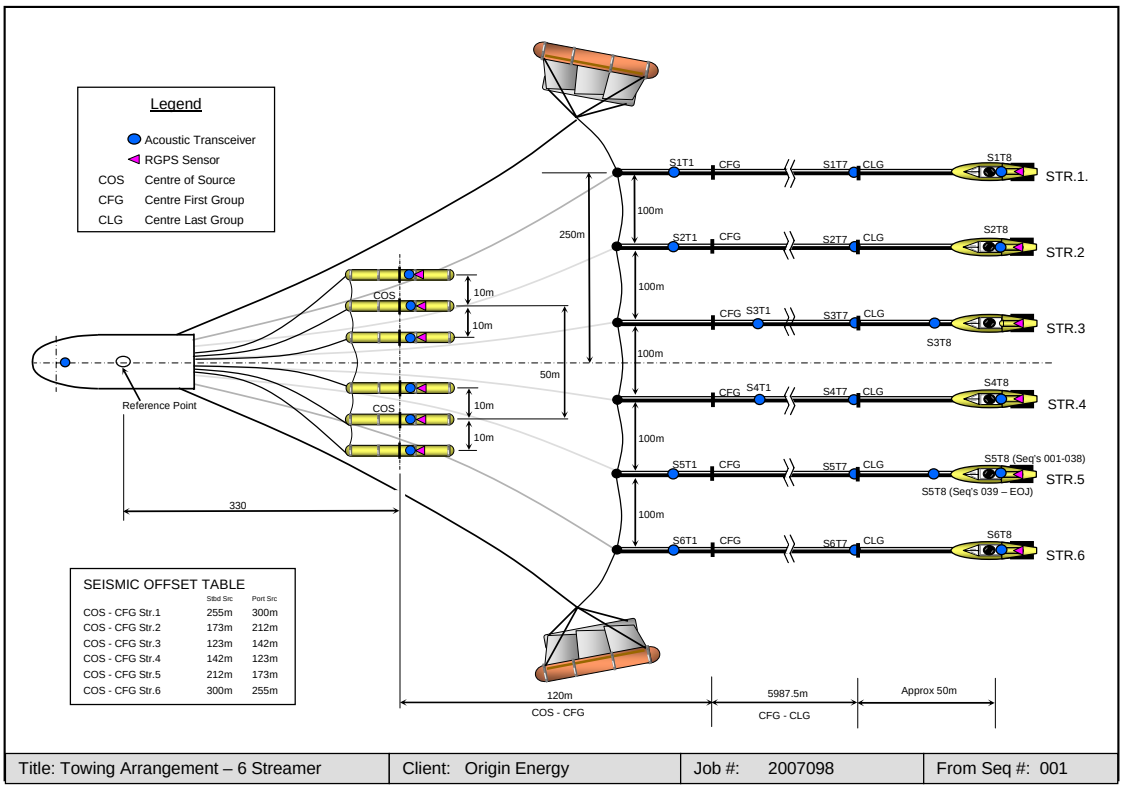
Nothing observed.

6 Seismic energy source

6.1 Source details

Source type	:	Bolt 1900 LLXT air guns
Air pressure	:	2000 psi
Volume	:	3090 in^3
Number of sources	:	2
Number of sub-arrays	:	6 (2x3)
Source separation	:	50 m
Sub-array separation	:	10 m
Source length	:	14 m
Gun synchronisation	:	± 1.0 ms
Drop-out specification	:	5 %
Shot interval	:	18.75 m
Depth	:	6 +/-1 m
Depth control	:	Fixed depth ropes
Depth monitoring	:	AGG depth transducers, GCS-90
Spacing control	:	Spread-ropes on sliding collars
Near field signatures	:	7 phones per subarray
Compressors	:	4 x Chirco
Source controller	:	GCS-90
Modelled source signature	:	See Appendix section 12.2

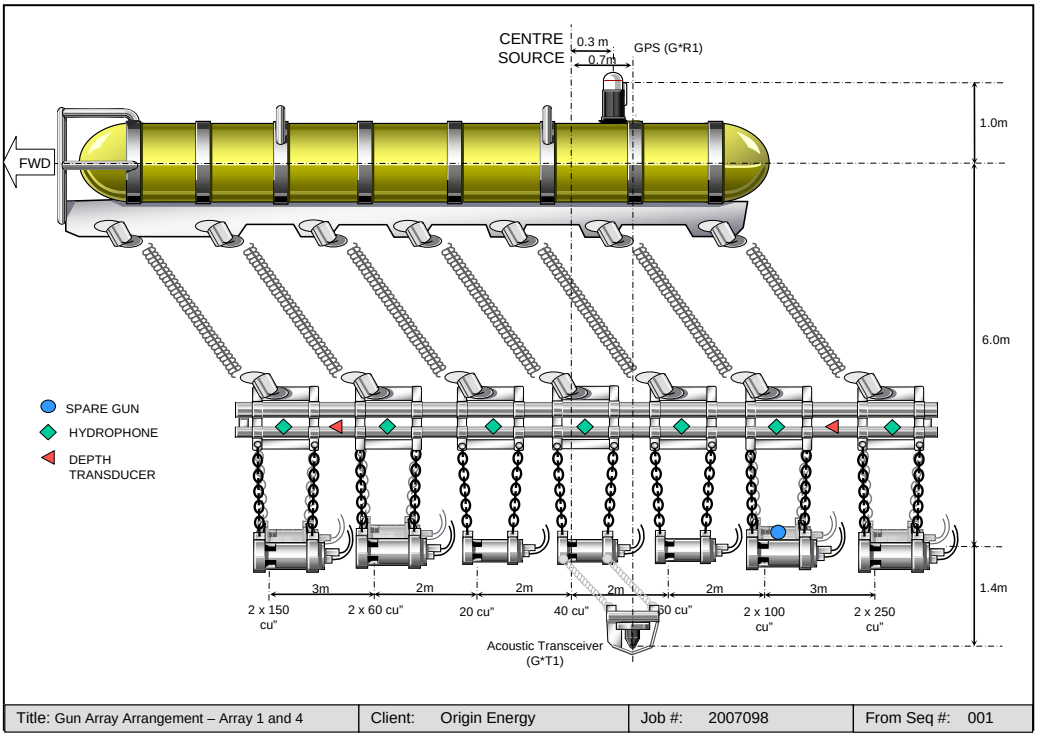
6.2 Offset diagram



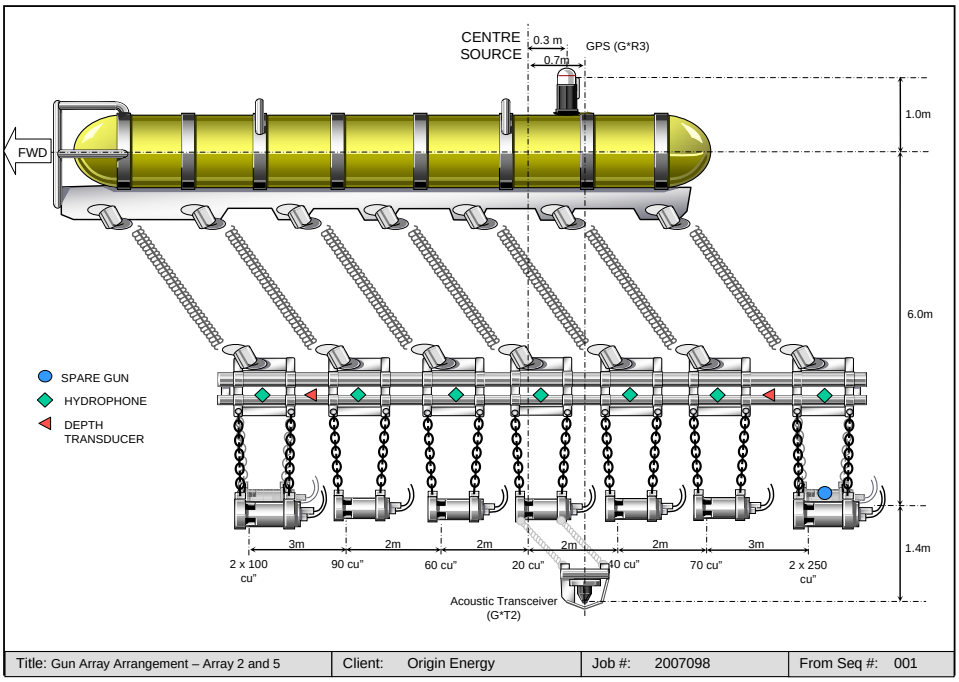
Title: Towing Arrangement – 6 Streamer	Client: Origin Energy	Job #: 2007098	From Seq #: 001

6.3 Gun array layout

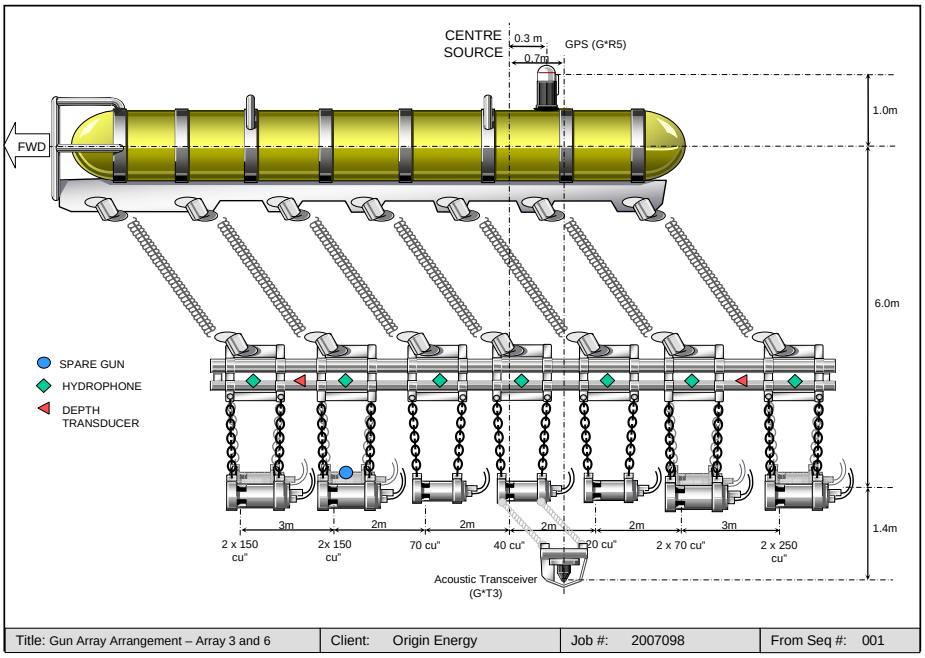
6.3.1 Gun Array 1 and 4



6.3.2 Gun Array 2 and 5



6.3.3 Gun Array 3 and 6



7 Seismic acquisition system

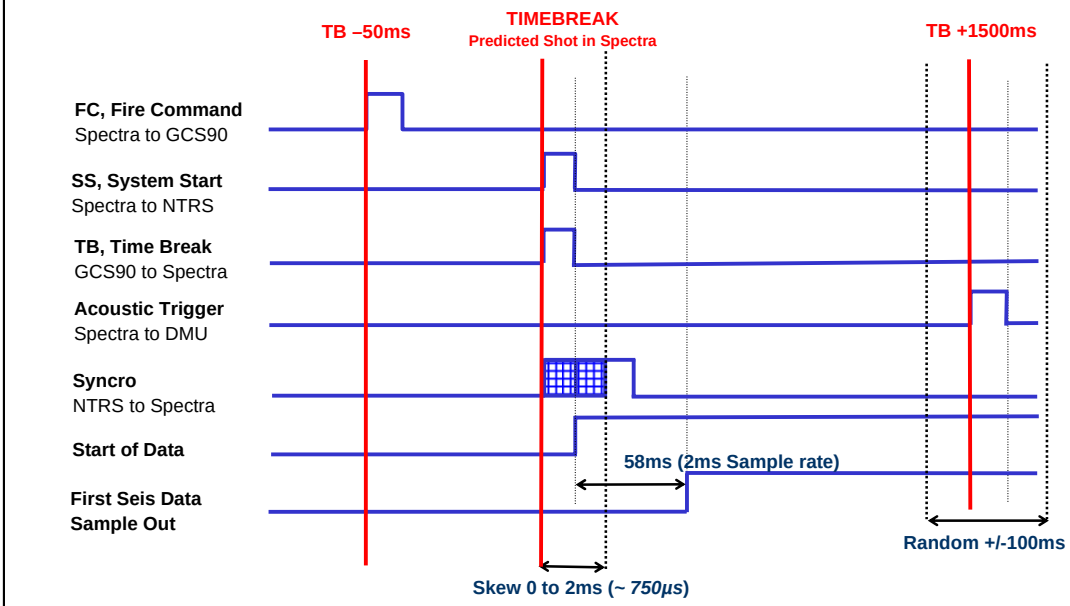
7.1 System details

Recording System	:	NTRS / gAS
Software Version	:	Version A.70a build 10581
Amplitude resolution	:	24 bit
Data Channels	:	6 x 480 = 2880
Auxiliary Channels	:	48 channels recorded to tape
Tape Transports	:	4 x IBM 3592 cartridge drives
Tape Format	:	8036 SEG D,
Recording Media	:	IBM 3592
Record Length	:	6144 ms
Deep water delay	:	0 ms
Sample Rate	:	2 ms
High Cut Filter	:	206 Hz /215.2dB/octave
Low Cut Filter	:	4.6 Hz /6dB/octave
Gain Setting	:	12 dB
Polarity Convention	:	SEG, positive pressure gives negative number
SEG-D header description	:	see Appendix section 12.3

7.2 System timing

NOTES

1. Timebreak recorded on Aux channel 1



Title: System Timing Diagram	Client: Origin Energy	Job #: 2007098	From Seq #: 001

7.3 Streamers

7.3.1 Streamer details

Type of streamer	:	Teledyne RDH-S
Number of streamers	:	6
Streamer sensitivity	:	20 V/bar
Streamer length	:	6000m
Number of groups	:	6 per section
Group interval	:	12.5 m
Group length	:	12.5 m
Hydrophone type	:	T-2
Streamer depth control	:	Digibird 5011
Streamer depth	:	7m *
Number of compass-birds	:	23/streamer (extra bird for outer streamers to compensate for door wash)

* Due to swell conditions some lines were shot with streamers at 8m depth and some at 9m depth.

7.3.2 Trace Numbering

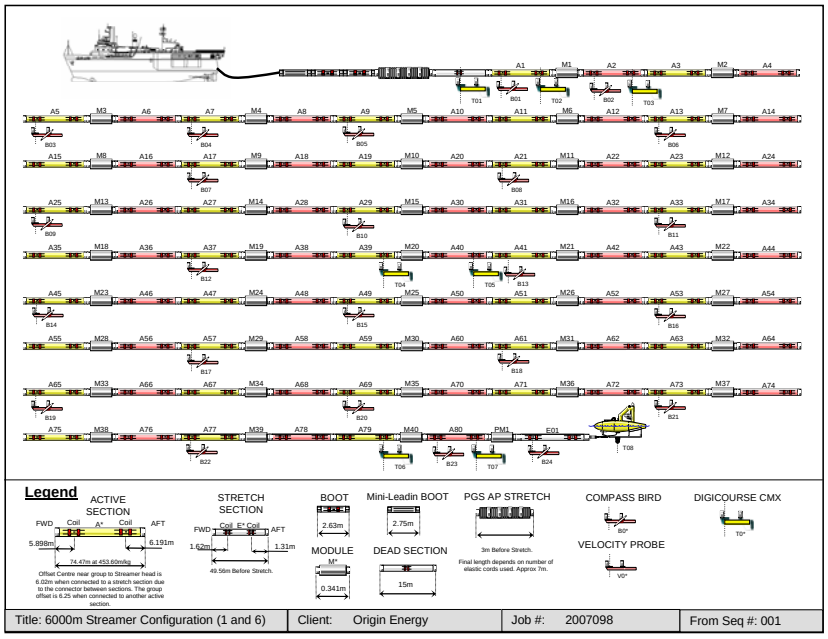
STREAMER	TRACE
Streamer 1	1 to 480
Streamer 2	481 to 960
Streamer 3	961 to 1440
Streamer 4	1441 to 1920
Streamer 5	1921 to 2400
Streamer 6	2101 to 2880
Auxiliaries	1 to 48

7.3.3 Component dimensions

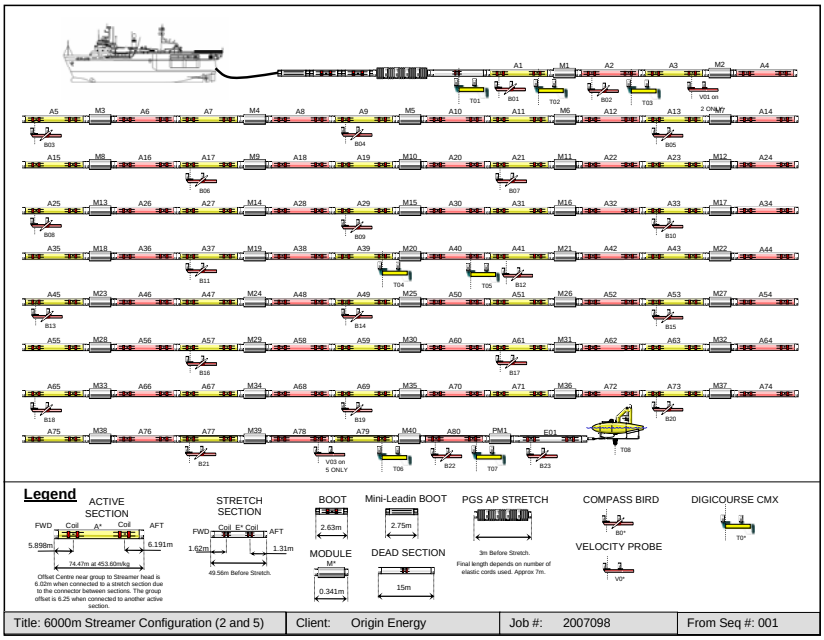
	NUMBER per STREAMER	NOMINAL LENGTH (m)
Lead-in	1	700
Mini Lead-in Boot	1	3.5
Head Conventional Boot	1	2.7
Head AP Stretch Section	1	5
Head Dead section	1	15
Hydroscience Module	41	0.350
Live Sections	80	75
Tail Stretch Sections	1	50
Power Adapter Tail Swivel	1	0.340

7.4 Streamer layout

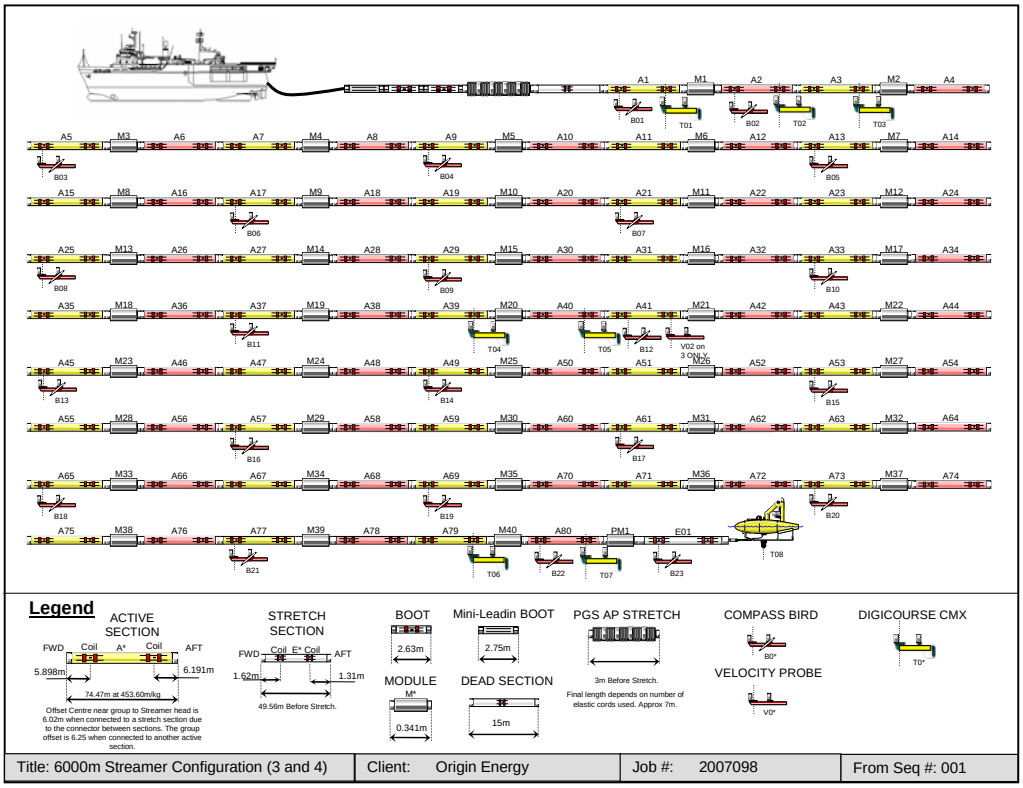
Streamers 1 and 6



Streamers 2 and 5



Streamers 3 and 6



8 Navigation and Positioning

8.1 Geodetic reference

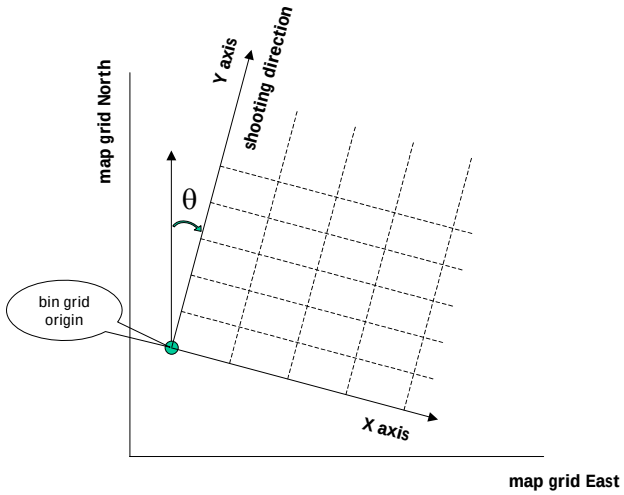
8.1.1 Survey Datum

Survey Datum	:	GDA94
Ellipsoid	:	GRS1980
Semi Major Axis	:	6378137 m
1/Flattening	:	298.257222101
GPS Datum	:	WGS84
Ellipsoid	:	WGS84
Semi Major Axis	:	6378137 m
1/Flattening	:	298.257223563
Geoid height	:	-1.46m
(Calculated for position: 39° 52' 35.55" S 145° 05' 25.50" E)		

8.1.2 Map projection

Projection	:	Universal Transverse Mercator
Projection System	:	UTM
Zone	:	55 (South)
Central Meridian	:	147° East
Scale Factor on Central Meridian	:	0.9996
Latitude of Origin	:	0º
False Northing	:	10,000,000 m
False Easting	:	500,000 m

8.1.3 Binning grid



Origin Easting (m)	:	339,519.02
Origin Northing (m)	:	5,600,698.75
Rotation (deg)	:	164.56

UNFLEXED BINNING	**X**	**Y**
Origin bin number	981	801
Bin number increment	1	0.33
Area size (m)	14475	33862.5
Bin interval (m)	25	6.25
Bin size minimum (m) at 100 m offset	25	6.25
Bin size maximum (m) at 6100 m offset	25	6.25

The following is taken from the Project Manual to indicate the original Flex Binning Parameters stipulated.

"Near trace bin width	:	1.5 times standard bin width of 25m (35.5m, 50% cell flex)
Near/Mid trace bin width	:	1.75 times standard bin width of 25m (43,75m, 75% cell flex)
Far/Mid trace bin width	:	2 times standard bin width of 25m (50m, 100% cell flex)
Far trace bin width	:	3 times standard bin width of 25m (75m, 200% cell flex)

Binning criteria may be adjusted depending on the survey conditions"

Due to the limitations of the Census Binning program used onboard it was not possible to provide an "Alls" coverage display to combine all of the separate flexed stages listed above.

Instead, it was agreed, with the onboard clients and Origin Energy that linearly tapered flex displays based on the following parameters would be acceptable.

FIRST SET OF FLEXED BINNING PARAMETERS AS AGREED WITH CLIENT AT START OF SURVEY	X	Y
Origin bin number	981	801
Bin number increment	1	0.33
Area size (m)	14475	33862.5
Bin interval (m)	25	6.25
Bin size minimum (m) at 100 m offset	37.5	6.25
Bin size maximum (m) at 6100 m offset	62.5	6.25

SECOND SET OF FLEXED BINNING PARAMETERS REQUESTED BY CLIENT MID-SURVEY	X	Y
Origin bin number	981	801
Bin number increment	1	0.33
Area size (m)	14475	33862.5
Bin interval (m)	25	6.25
Bin size minimum (m) at 100 m offset	37.5	6.25
Bin size maximum (m) at 6100 m offset	75	6.25

Offset divisions and coverage requirements for acquisition were:

	% Nominal Fold	Nominal Fold	Required Fold
For near offset segment (100 m to 1600 m)	80	20	16
For near-mid offset segment (1600 m to 3100 m)	75	20	15
For far-mid offset segment (3100 m to 4600 m)	70	20	14
For Far offset segment (4600 m to 6100 m)	65	20	13

P6/98 Full fold coverage perimeter listing : see Appendix section 12.5

8.2 Surface positioning

8.2.1 System I

Type	:	SkyFix.XP, SDGPS Orbit and Clock Corrected
System Corrections via	:	Inmarsat (POR) and AP-SAT High Power Spot
Software	:	Multifix 4, version 2.01
Sub-Contractor	:	Fugro Survey AS
GPS Receiver	:	SPM 2000 TopCon

The SkyFix.XP service uses a technique called Satellite Differential GPS (SDGPS); a worldwide network of reference stations is used to calculate, in real time, the orbital information (ephemeris) of each GPS satellite with more precision than that transmitted by the satellite. Corrections to the broadcast ephemeris are then uploaded to the user via the existing SkyFix/StarFix satellite communication infrastructure.

8.2.2 System II

Type	:	StarFix.HP, DGPS	
Differential Corrections via	:	Inmarsat (POR) and AP-SAT High Power Spot	
Reference Stations in use	:	Melbourne	230 km distant
		Bathurst	820 km distant
		Cobar	930 km distant
		Ceduna	1340 km distant
Software	:	SPM 2000, version 4.26	
Sub-Contractor	:	Fugro Survey AS	
GPS Receiver	:	SPM 2000 TopCon	

The StarFix.HP service provides centimetre-level accuracy by measuring the carrier-phase differences on both GPS signal frequencies (L1 and L2) to more accurately model the state of the ionosphere, minimising errors associated with the transmission path between the satellite and the receiver. As with standard Differential GPS networks, corrections are derived by a network of reference stations located within the geographical area of operations and transmitted to the user via geostationary satellite links to provide coverage over wide areas.

8.2.3 Float positioning

Relative GPS	:	Seatex models 320 & 220
GPS receiver	:	Ashtech G 12-L
UHF communication	:	Wood & Douglas, frequency 450-470 MHz
Software version	:	StarFix Suite RGPS v3.02.04

The relative GPS system works through using the pseudo-range phase differencing technique to provide the true range and bearing from the master antenna on the vessel to the GPS receivers on the in-sea equipment.

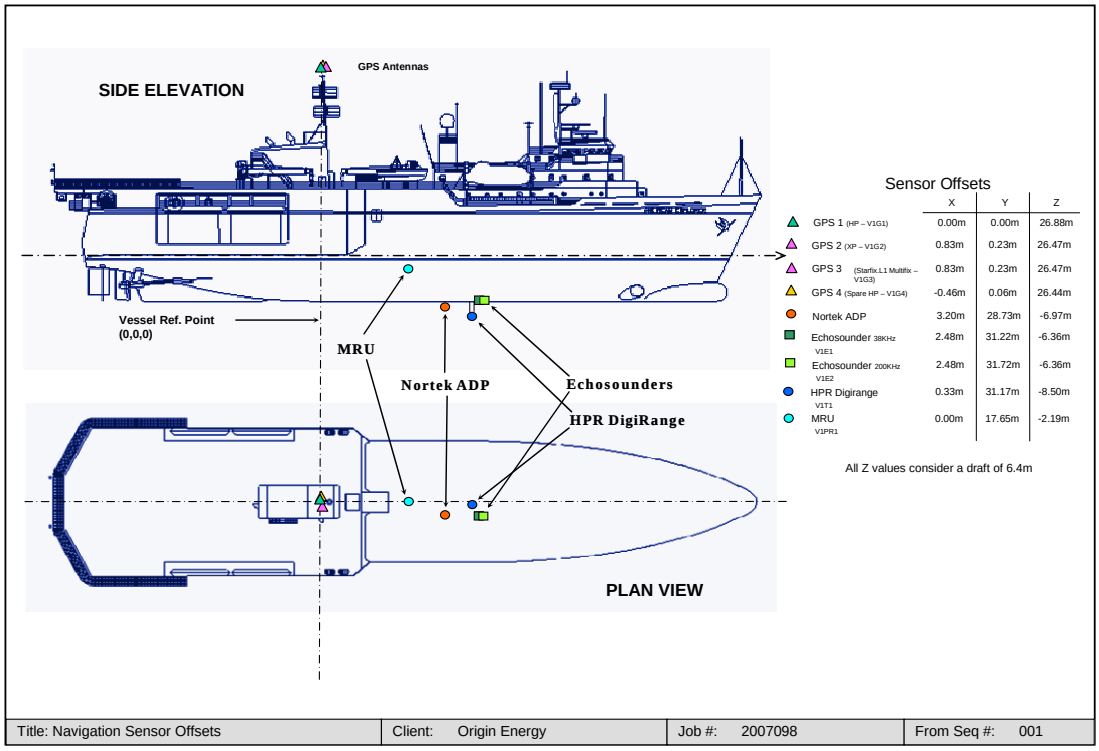
Heading reference

GPS Heading / Attitude system	:	Seapath 200
Gyro	:	SG Brown 1000S Gyro Compass

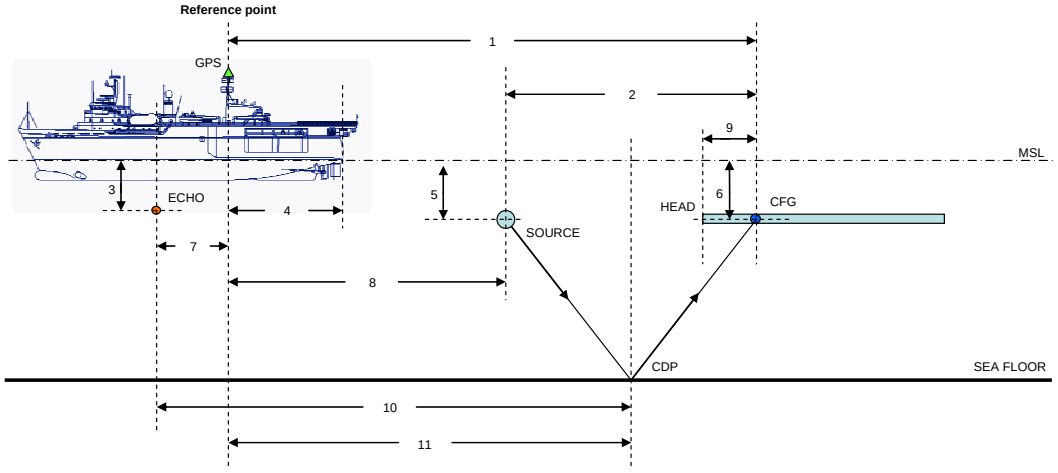
The Seapath 200 is an integrated GPS/Inertial attitude and positioning system. It is comprised of dual GPS antennae determining heading and position using carrier phase measurement. Inertial data from the Motion Reference Unit provides acceleration and angular information about three axes. Static speed and latitude corrections were applied to the gyrocompass via the internal controls and not automatically from the navigation system.

The Seapath 200 was used as main heading reference throughout the survey.

8.2.5 Navigation Sensor Offsets



8.2.6 Navigation Offsets



Key	Range	Distance (m)	Key	Range	Distance (m)
1	Streamer inline offset	450	7	Echo-sounder inline offset	31.47
2	Seismic offset	120	8	Source inline offset	330
	Nominal seismic offset input SCN / Census	*120*	9	Streamer head to Centre first group	6.25
3	Echo-sounder depth	6.36	10	Echo-sounder to CDP	421.47
4	Reference to Stern	32	11	Layback	390
5	Source depth	6		*Nominal layback input SCN*	*-390*
6	Streamer depth	7			

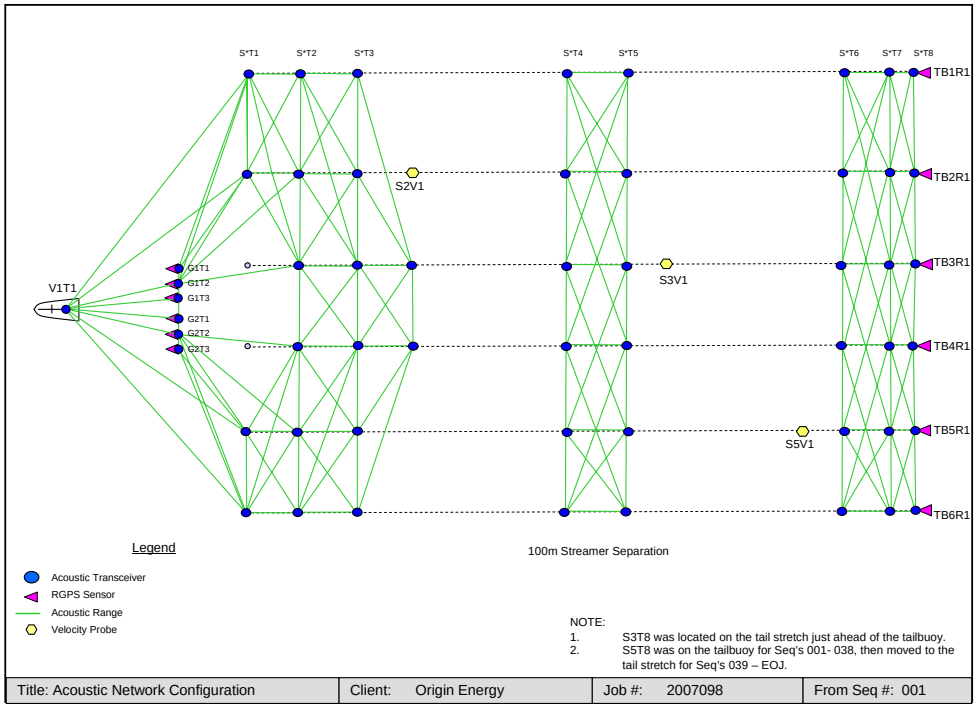
Title: Side View Offsets	Client: Origin Energy	Job #: 2007098	From Seq #: 001

8.3 Underwater positioning

8.3.1 Acoustic ranging system

System name	:	DigiRANGE
Software version	:	System 3, version 6.01
Operating frequency	:	50 – 100 kHz in 5 discrete frequencies

8.3.2 Acoustic network



8.3.3 Magnetic compasses

Bird Compasses	:	DigiCOURSE 5011 Compass/Bird
Software version	:	System 3, version 6.01
Compass Filtering	:	2s Sample rate, 14s filtering time
Magnetic variation	:	12.43°

This value was derived using the IGRF10 2005 model for 1st January 2008 at position – 39° 52' 35.55" S, 145° 5' 25.5" E.

8.3.4 Echosounder

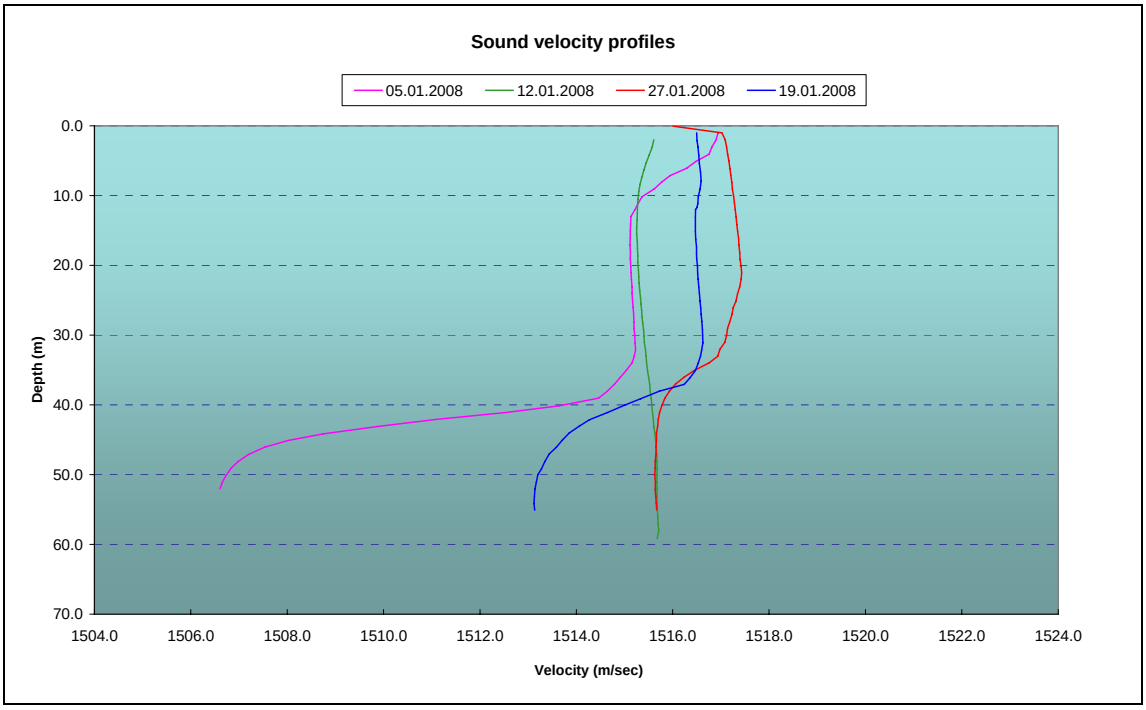
Type and model	:	Simrad EA500
Transceiver frequencies	:	38 kHz, 200 kHz
Heave compensated	:	Yes

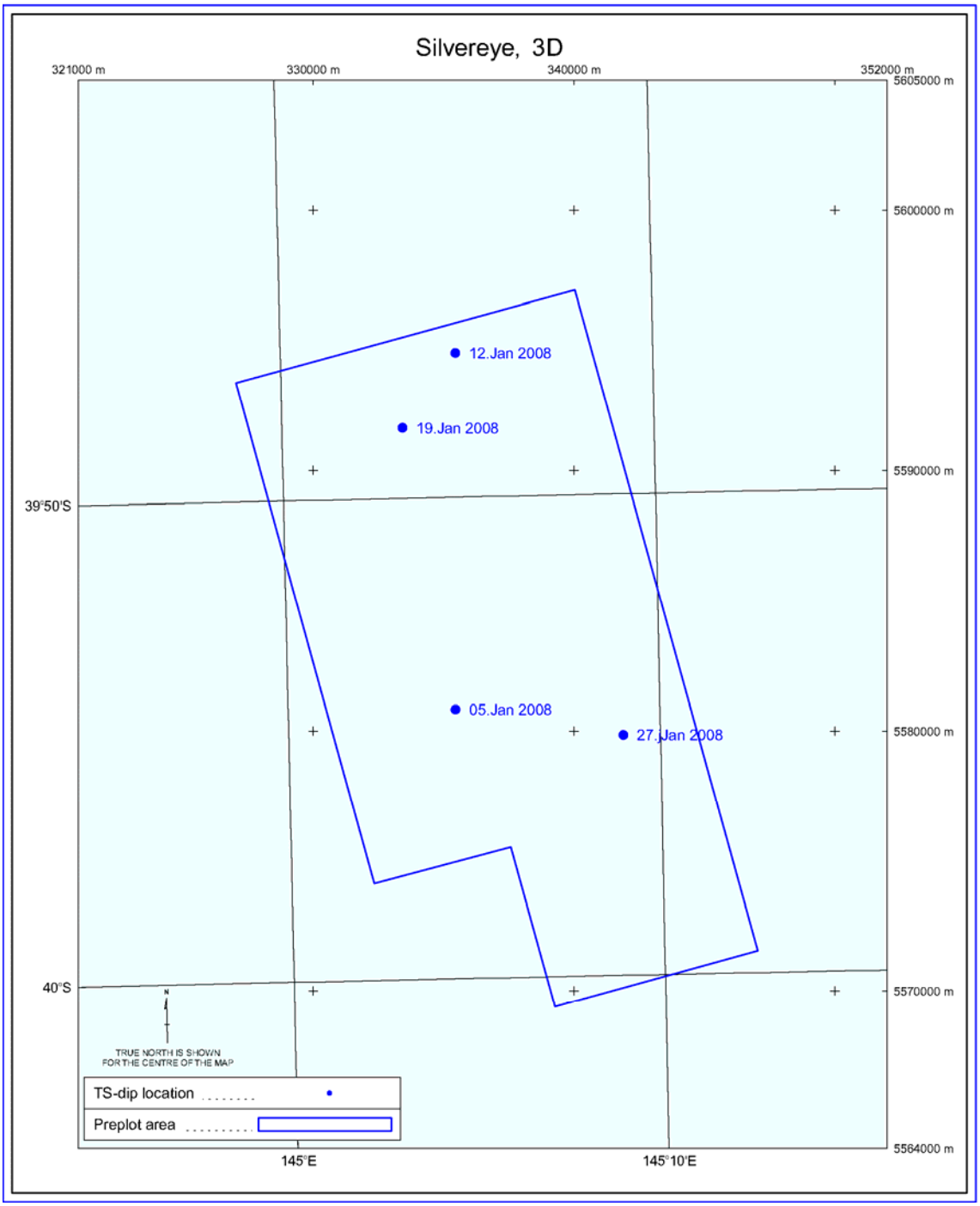
8.3.5 Sound velocity

CTD probe	:	Model 600 CTD (1000μbar)
Serial	:	13829
Calibration Date	:	15th March 2007
Supplier	:	Valeport
Real time sensors	:	DigiCOURSE model 7000 (Velocimeter)
Software version	:	System 3, version 6.01

The following chart shows the results produced with data from the Valeport probe. A total of 4 profiles were collected during the course of the survey.

PROFILE NO	DATE	LOCATION	
1	05.Jan 2008	39° 54.4' S	145° 4.5' E
2	12.Jan 2008	39° 47' S	145° 4.7' E
3	19.Jan 2008	39° 48.54' S	145° 3.24' E
4	27.Jan 2008	39° 55' S	145° 9' E




Silvereye, 3D
321000 m
330000 m
340000 m
352000 m
5605000 m
5600000 m
5590000 m
5580000 m
5570000 m
5564000 m
39°50'S
40°S
145°E
145°10'E
12.Jan 2008
19.Jan 2008
05.Jan 2008
27.Jan 2008
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP
TS-dip location
Preplot area

8.4 Navigation and binning systems

8.4.1 Integrated navigation system

Type	:	SPECTRA
Operating System	:	Linux Redhat 9
Supplier	:	Concept Systems Ltd.
Software version	:	10.09.01
Real Time Interface	:	PowerRTNU version 4.4.2
Machine type	:	2 x IBM X325 Servers 2 x IBM Intellistation
Tape storage	:	IBM 3590 / DAT
Disk Storage per Server	:	240GB
Disk Storage per Workstation	:	35GB
Disk storage device	:	RAID

8.4.2 Binning system

Type	:	Census
Supplier	:	Input / Output Systems
Software Version	:	4.4.1
Machine type	:	IBM RS6000 model 44P
Operating System	:	IBM AIX 4.3.3
Tape storage	:	IBM 3590
Hard Disk storage	:	75GB online, 75GB offline

8.5 Navigation System Performance

8.5.1 Vessel position

Two DGPS systems were operational for vessel positioning, SkyFix.XP and StarFix.HP. During the project, comparisons between the systems and the computed vessel position (Easting and Northing axis) indicated both systems performed well, with the mean difference less than 0.5 metre and the maximum difference less than 1.0 metre.

8.5.1.1 SkyFix.XP

The SkyFix.XP system performed well for the survey except for a few short periods without a converged solution. The periods without a solution were caused by firmware resets of the SPM2000 GPS receiver. The cause of the resets is part of an ongoing investigation by Fugro. Once the GPS position data string to the MultiFix software producing the XP solution fails it will cause the systems filtering algorithm to be reset. There is then a period when the solution will be rejected until the position re-converges. There was one occasion when solution output could not be decoded by Spectra for 13 minutes; the most likely cause was a corrupted data string.

8.5.1.2 StarFix.HP

The StarFix.HP system performed very well throughout the survey period, with no problems. This system utilises an identical SPM2000 to the SkyFix.

8.5.2 Acoustic ranges

The acoustic data for this survey was of good quality throughout the survey providing a strong network solution for each of the sub-nets. One additional transceiver was added to the front end of each streamer, from the original proposal of two per cable, to provide added redundancy in case of any unit failures in the front net. The poorest performance was seen in the ranges between streamers 3 & 4 in the front net, the area directly affected by the prop wash and gun bubble, caused by its associated aerated water. This is traditionally a problem area and very difficult to improve upon.

8.5.3 Compass Data

Twenty-four compasses were deployed on the two outer streamers and twenty-three on each of the inner streamers. The compass data was generally good. Compass data for all sequences was analysed for biases, stuck values and excessive noise with unacceptable compasses being rejected from the post-processing solution and physically replaced on the streamers when appropriate.

During the marginal weather conditions that were experienced for periods throughout the survey the compass data did become unacceptably noisy with the streamers set at the contractual depth of 7m. At the request of the client a number of lines were shot with the streamers at a depth 8m or 9m, depending on the severity of the conditions, to ensure cleaner compass data. An assessment was made on the approach to each of these lines, based on Spectra's real-time unit variance and the expected weather conditions, as to the most suitable depth to use for the entirety of the line.

8.5.4 Remote Positioning

Positioning of the remote targets, 6 source arrays and 6 tail buoys, was very reliable. The units had all been recently used on the previous survey and continued to operate within the expected standards of accuracy.

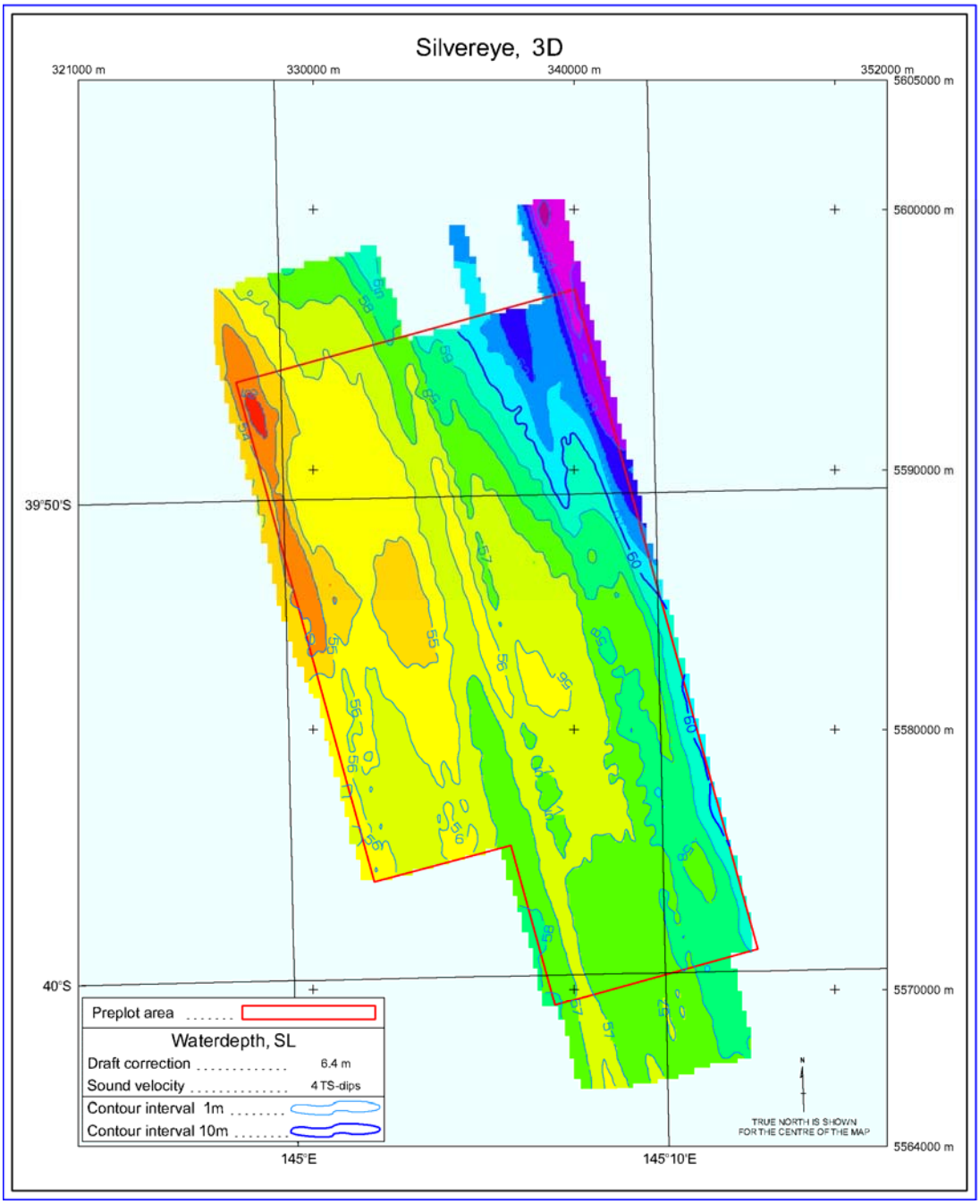
8.5.5 Echo Sounder

The echo sounder data output in the final P1/90 depth records was derived from the 200 kHz transducer, which performed well throughout the survey. The raw data were not draft corrected but compensation for vessel heave, using data interfaced from the MRU, was applied. A fixed water velocity of 1500m/s was used internally by the echo sounder. Final bathymetry data were produced after survey completion in the PGS Oslo office.

After the survey was finished a special water depth tape was created.
Water depth was corrected for draft and sound velocity.

Draft corrections applied: 6.4m

The Ts-dips collected in the area during the survey period. were used to correct for sound velocity variations.


Silvereye, 3D
321000 m
330000 m
340000 m
352000 m
5605000 m
5600000 m
5590000 m
5580000 m
5570000 m
5564000 m
39°50'S
40°S
145°E
145°10'E
Preplot area
Waterdepth, SL
Draft correction 6.4 m
Sound velocity 4 TS-dips
Contour interval 1m
Contour interval 10m
TRUE NORTH IS SHOWN FOR THE CENTRE OF THE MAP

8.5.6 Heading Sensors

The Seapath system was used as the primary vessel-heading indicator for all sequences while the conventional SG Brown gyrocompass served as back-up and a redundancy check. Seapath performed without interruption and was used as the heading indicator for all sequences. The heading data were de-spiked to remove gross outliers, but no filters were applied.

8.6 Delivered P1/90 and P2/94

Raw navigation data was recorded in UKOOA P2/94 format during acquisition and verified for accuracy before a deliverable P2/94 dataset was produced. These datasets were recorded to 3590 tape cartridge. One set of P2/94 tapes client tapes was included with the seismic data delivered to the Origin Energy, Brisbane and a second set was shipped to the PGS office in Lysaker for archiving. The format for these tapes is:

Data Format:	ASCII
Record Length:	80 bytes (no LF)
Tape Format:	dd, block size = 8000

Processed navigation data were delivered in UKOOA P1/90 format, recorded on 3590 tape cartridge. Each dataset included position records for vessel, sources, tail buoys, echo sounder, and all receiver groups. One set of P1/90 tapes was included with the seismic data delivered to the Origin Energy, Brisbane and a second set was shipped to the PGS office in Lysaker for archiving. The format for these tapes is:

Data Format:	ASCII
Record Length:	80 bytes (no LF)
Tape Format:	dd, block size = 8000

9 Navigation processing

9.1 Introduction

The final P190 was generated using either the NRT or SPRINT post processing systems. NRT is the SPECTRA near real time navigation processing module. The NRT system delivers a delayed position solution (P190) and associated quality assessment a few minutes after completion of the survey line. The delayed solution minimises the impact of latencies in certain observation streams and provides access to a portion of future data. This ensures that the NRT will provide a valid positioning solution significantly more often than is possible in the real-time solution. If manual processing were required, either due to NRT reported problems, abnormal QC statistical results, or observed situations on-line, the data was reprocessed using SPRINT.

9.2 NRT

The NRT is a separate licensed Spectra module. It gets the required information, data and from the Spectra data-server and a NRT specific parameter file. The NRT data flow:

1. **NCN Calculated Positions**
   NRT uses the real time positions calculated by Spectra as the basis for gating outlying observations.
2. **Raw Sensor Data**
   Raw DGPS, RGPS, Acoustic, Compass, Velocimeter, Gyro, Echo sounder, Depth sensor data acquired by Spectra.
3. **Outlier Rejection**
   Based on the Spectra NCN calculated positions and observations, outliers in the raw sensor data (spikes and biases) are rejected. Note that this does not apply to compass observations, as these generally have low redundancy.
4. **30 Shot Filter Buffer**
   Raw observations (after outliers have been removed) are filtered to remove noise. Future data (60 shots) is used to improve the quality of filtering. Secondary spike rejection – based on time series – is applied to remove remaining spikes. This is particularly useful for compass observations.
5. **Compass Drift Detection**
   Temporary biases (drifts) in compasses are removed based on deviations from the smoothness of the streamers.
6. **Least Squares Adjustment**
   All filtered observations are used to update the positions in the network in a least squares adjustment. The weights of these observations are proportional to the quality of the data.
7. **Qualifier**
   An extensive set of checks is applied to the data and the solution. Which quality flag is assigned to the data is determined on the basis of the results of these checks.
8. **P1/90**
   The final positions are exported to a P1/90 file.
9. **QC End of Line Report**
   A QC report is created, containing the outcome from the main qualifier checks. A statistical report similar to the standard Sprint end of line report is also produced.

9.3 SPRINT

The SPRINT processing was comprised of the following steps:

- Data import
- Data pre-processing
- Network adjustments
- Data export
- Final quality control

Each of these steps is covered in more detail below.

9.3.1 Data import

Raw data were recorded to tape and disk in P2/94 format. After the end of the line these data were checked, and if necessary, corrections were made to the header to produce a final archived version. These data were then imported into Sprint, and a QC report generated. Included in this report were:

- P2/94 format errors or inconsistencies
- differences in configuration between successive files
- changes in gun sequence
- time between shots not within specified limit
- jump in shot numbers
- number of headers

9.3.2 Pre-processing

Imported data were pre-processed to ensure consistent results in the adjustment phase.

During pre-processing, observations were grouped by sensor type. Predefined spike rejection gates and noise suppression filters were applied to the raw data. Configuration files were used to save all gating and filter values. After analysis, the final values were applied in a batch mode.

Where circumstances dictated, the values were changed interactively before the data were batched.

After pre-processing of all the observations, a quality report was generated containing the following information:

Nobs	:	Number of raw observations.
Nrej	:	Number of data observations missing after processing.
Bad block	:	Maximum block of missing raw data (in seconds).
Nominal	:	Nominal values computed from the logged offsets, or user assigned.
Mean	:	Mean value of the observation.
Max. Delta	:	The maximum shot to shot increment.
Units	:	In which unit data is recorded.

9.3.3 Network adjustments

The network adjustment stage consisted of a least squares adjustment of the processed observations for each shot point. The software allows the observations to be treated as either a complete net, or a series of sub nets (e.g.: vessel antenna, front net, tail net, etc.). Sub nets were used for analysis of problem lines. A complete net was used for final adjustment after the individual sub nets were solved.

The streamer-shaping algorithm in use was an arc of curve fit through the pre-processed compasses. The streamer shape is adjusted through network computed node positions.

At the end of the net adjustment, a quality report was generated. Items included were:

- Network configuration
- Statistics on node co-variances
- All observations scale/correction/SD in use
- Statistics on node shot point intervals
- Statistics on observation residuals
- Statistics on network variance factor and degrees of freedom
- The error ellipse (semi-major axis/skew) of all defined nodes
- Streamer rotation

9.3.4 Data analysis

Data analysis were performed for imported lines and allowed all data from the Ingres database to be displayed. There were two main uses for this facility. The first was to produce a standard set of QC plots for each line, and the second was to act as an investigation tool for problems seen at any stage of processing.

Configuration files were defined to create a standard set of QC plots for every Sprint processed line.

The following plots were included:

Inline miss-closure

Streamer rotations

Streamer separation

Distance vessel-sources, vessel-streamer heads

Shot point interval (distance and time) of vessel ref. position

Gyro and course made good of vessel ref.

Position comparisons (Field position vs. Post-processed position)

Network variance factor and degrees of freedom

Problem lines were more thoroughly investigated and required different plots for analysis.

9.3.5 Data export, P1/90 output

During the export process the receiver positions were computed and a P1/90-file was generated. The in-line miss-closure error was accounted for by applying a linear distribution of the error to computed receiver positions. A header was added to the data during export.

The data were written to 3590 tape cartridges.

9.4 Data quality control procedures

The first line was sent to the office for quality purposes; both the P1 and P2 headers were checked. The line was processed and the solution was compared with the P190 file from the vessel's NRT and SPRINT systems. This procedure was repeated after each crew change to make sure there were no errors introduced. In addition, lines were sent to the office when the QC parameters exceeded the thresholds given in the PGS standard procedures, or the Client's specifications.

The final P2/94 tapes were checked using PGS internal software **p2list**. This program checked and returned the following information:

- Which files were on a tape and if each file had a complete header.
- Number of end-of-file markers and if the last record had an EOF mark.
- The filename, the sequence, the media label identifier (H0003), the number of shots, the number of shot inconsistencies (missing or double shots) and the number of records.
- A checksum, which were used to verify that data on tape were identical to data on disk.
- For every file the first and last E1000 record was printed.
- If there were shot inconsistencies, the E1000 records surrounding the inconsistency were printed.

Final quality control performed on the data included a number of streamer comparisons, both inline and streamer-to-streamer.

- Vessel, source and receiver positions were checked for internal consistency.
- The applied streamer rotations and the inline miss-closures were checked.
- Latitude/longitude and grid coordinates were checked against the datum/projection defined in the header.

The final P1/90 files were also checked using Sprint QC tool and p1check/p1List, PGS internal software. These software tools provided checks on the following:

Sprint QC:
- Contents of the first and last vessel record.
- Source id of the first and last source record.
- Number of even and odd shot points with different source id.
- Number of header records found.
- Number of vessel, source, tail buoy and receiver records expected and how many were found.
- Number of new line characters found.

p1check:
- Tape name and date of issue.
- Datum/projection information from the header.
- For every line in the file: start/end shot and start/end co-ordinates.
- Standard comment record (H2600) concerning lines and shots in the file.
- Linefeeds in the file.
- All records 80 bytes long.
- Number of end-of-file markers and if the last record had an EOF mark.
- Grid co-ordinates correspond to the latitude and longitude with the given datum and projection.
- A checksum, which were used to verify that data on tape were identical to data on disk.

p1list:

- Which files were on a tape and if each file had a complete header.
- Number of end-of-file markers and if the last record had an EOF mark.
- The filename, the tape version identifier (H0202) and the number of records.
- A checksum, which were used to verify that data on tape were identical to data on disk.
- For every line in the file the line name, FSP, LSP and the position of SOL and EOL was given.

Results of the P2list, P1list and were saved and copies are archived in the Oslo office.

All tape labels were created using PGS internal software **mklab**. All information on the labels was extracted from the files on the tapes.

9.5 NRT vs Sprint P190 Position Comparisons.

Periodically during the survey NRT P190 positions were checked by comparison with P190 data produced by post processing with Sprint. This was nominally every 10th line. Lines which were reprocessed for problems are not included in the comparison since they naturally contain differences related to the reason for reprocessing.

Maximum position difference (m)					
Sequence	**Line name**	**Vessel**	**Sources**	**Tailbuoys**	**Receivers**
001	1534P1001	-1.7	-2.3	3.7	-17.4
011	1210P1011	0.9	1.9	2.2	-8.2
019	1174P1019	0.5	-2.1	2.5	15.7
030	1402P1030	-0.9	-2.1	3.6	6.4
040	1078P1040	-0.7	2.6	3.4	-7.2
050	1090F1050	0.6	4.2	-2.9	14.0
060	1510F2060	-0.8	-3.2	3.9	-14.4
070	1066R1070	0.4	2.6	3.2	7.1

10 Seismic data quality

10.1 Ship & rig noise

Very little ship noise was seen and it was always at a low level. The brute stack was not affected.

10.2 Swell noise

No lines scratched due to swell noise levels on the data. Sequences 6, 58, 59 74 and 76 was indirectly scratched due to swell because of poor compass data.

10.3 Strum / Tug noise

Front end strum/tug noise (FEN) was seen on all cables but was particularly strong at times on streamers 1, 2, 4 and 6. The FEN was very sensitive to vessel speed so online adjustments were made to control the levels but the speed could not be reduced too much as this would affect streamer separations. The FEN was worse when the streamer depths were increased during times of marginal weather. The length of the streamer front dilt depth ropes being fixed at 7m contributed a lot to this increased tug noise level. After the streamers were recovered after sequence 69 and redeployed, now with dilt depth ropes at 8m, noise level was reduced significantly for the rest of the survey, Sequence 70-79, see 1.4 below.

10.4 Barnacles

There was a constant barnacle growth during the time of the survey. This could be seen as an ongoing increase in general ambient noise level and also an increased front end strum noise level, refer 1.3 above. Bringing the gear onboard after sequence 069 killed most of the barnacles which mostly disappeared after redeployment. This could be seen as reduced streamer noise level overall, but significantly apparent on the streamer fronts noise levels/strum.

10.5 Source Separation Errors

Source separations were monitored online and actions taken to correct when needed. Not a significant contributor to problems on this survey.

10.6 Telemetry and Parity Errors

A few lines had parity errors and telemetry problems. Edits were made when required for the affected streamers.

10.7 Streamer Depth Errors

These were generally logged in the Observer logs as QC warnings.

On client request, the target streamer depth would be adjusted deeper to improve streamer control and continue recording. Any changes from the nominal 7m depth were made before the SOL to keep a consistent depth whilst shooting. The maximum depth the streamers were dropped to was 9m.

Sequence overview of streamer recording depth:

7m	8m	9m
011 - 013	001	002
019	003 - 005	007
023	008 - 010	015
026 - 034	014	051 – 053
038 - 039	016 - 018	059 – 069
042	020 - 022	074
046 - 050	024 - 025	077 – 078
070-072	035 - 037	
	040 - 041	
	043 - 045	
	053 - 058	
	073	
	075, 076	
	079	

10.8 Bad channels and Recording System Problems

After each sequence, all the recorded traces were checked for excessive RMS noise levels, weak or dead traces and for electrical spikes. This was done both automatically and interactively on-screen. The number of bad channels, edited was always in spec.

Spikes
Automated spike detection was running on all the traces, across the entire record length, on the gAS recording system as well as online on the Viper system. The number of spikes was usually small, and the number of bad traces was always well within spec. The spikes can be identified by analysing the observers' logs. They should be removed during processing either automatically using a de-spike algorithm or manually by referencing the observers' logs. The big spikes were flagged as edits.

Cross-feed
No significant cross-feed was detected during the survey.

Header corruption
Header data transferred from the navigation system to the seismic recording system was sometimes corrupted affecting values stored in the extended header. These events were flagged in the observers' log as "nav header short" which can cause zero values in some of the navigation header fields such as shot point number or source identifier. These errors can be fixed in processing by manipulating the headers to restore the correct values so that these shots can still be used. Using the time stamp in the general header is an option. This time is GPS corrected and relatively accurate (Approx +/- 1s window).

10.9 Skew Correction for NTRS Recording

The NTRS acquisition system used on this survey is a continuous recording system, enabling recording with nearly zero dead time between records. However, as a result of this, time zero does not necessarily fall on a sample time. This automated system sub-sample correction is known as the skew and is defined as the interval between time zero and the next following sample.

Any skew correction factor errors were identified by time-break analysis and the relevant shots were flagged as edits. Most commonly the skew errors were flagged automatically by the recording system.

10.10 Air leaks and Auto-fires

Any auto-fires flagged by gas were checked by QC and removed from the log if proven to be false.
The majority of air leaks were spotted immediately online and appropriate action taken. As seen below we had only one instance of autofire and one airleak.

Summary of causes of scratched and incomplete line sequences:

Cause	Scratched	Incomplete or Edit
Air leak	55	
Source separation errors		
Compressor failure		
Auto-fire, misfire		54
SI / timesharing		
Ship noise		
Weather		
Depth control errors		
Observing software / hardware		21 resync hole
Navigation software / hardware		
Strum noise		

Cause	Scratched	Incomplete or Edit
Telemetry/parities/module failure		3
Coverage		
Navigation Compass Problems		
Fishing activity & fishing gear		
Noisy compasses	6, 58, 59, 74 and 76	

10.11 RMS and noise analysis

RMS Windows		
RMS Window 1 (Water Column):	60 - 300 ms	relative to start of record
RMS Window 2 (RMS minimum):	500ms	sliding window
RMS Window 3 (Signal 1):	600 – 1100 ms	relative to start of record
RMS Window 4 (Signal 2):	1200 - 1700 ms	relative to start of record
RMS Window 5 (End of Record):	5500-6000 ms	relative to start of record

The gAS system produced online RMS values taken from 5 windows calculated on 1ms sample interval data. No instrument delay static was applied prior to analysis but a 5-8-90-120 Hz common online QC data band-pass filter was applied to all windows to remove noise occurring outside the bandwidth of the data. These RMS values were passed to the Viper system in real-time when needed to facilitate both online and offline RMS analysis. These values were also used to create areal rms and attribute displays using the PGS 'holoSeis' visualisation software package and Viper BinXYZ areal attribute handling.

1: Water Column noise window
The water column noise window (window 1) displayed the ambient background noise levels, and was also useful for assessing external sources of noise, such as ship noise. Noisy channels are generally much more obvious in this window too. The front traces, and in particular those on the centre streamers nearest the guns, recorded high amplitudes due to first break energy entering the window, and were of little use for QC purposes. To analyse these channels, the end of record RMS window was used.

2: Minimum RMS
RMS was computed for 250ms about each sample of each trace, i.e. in a sliding 500ms window down each trace. The minimum RMS value for each trace is then stored in a header which can subsequently be plotted. This method ensures that the signal contribution to the RMS value is minimised.

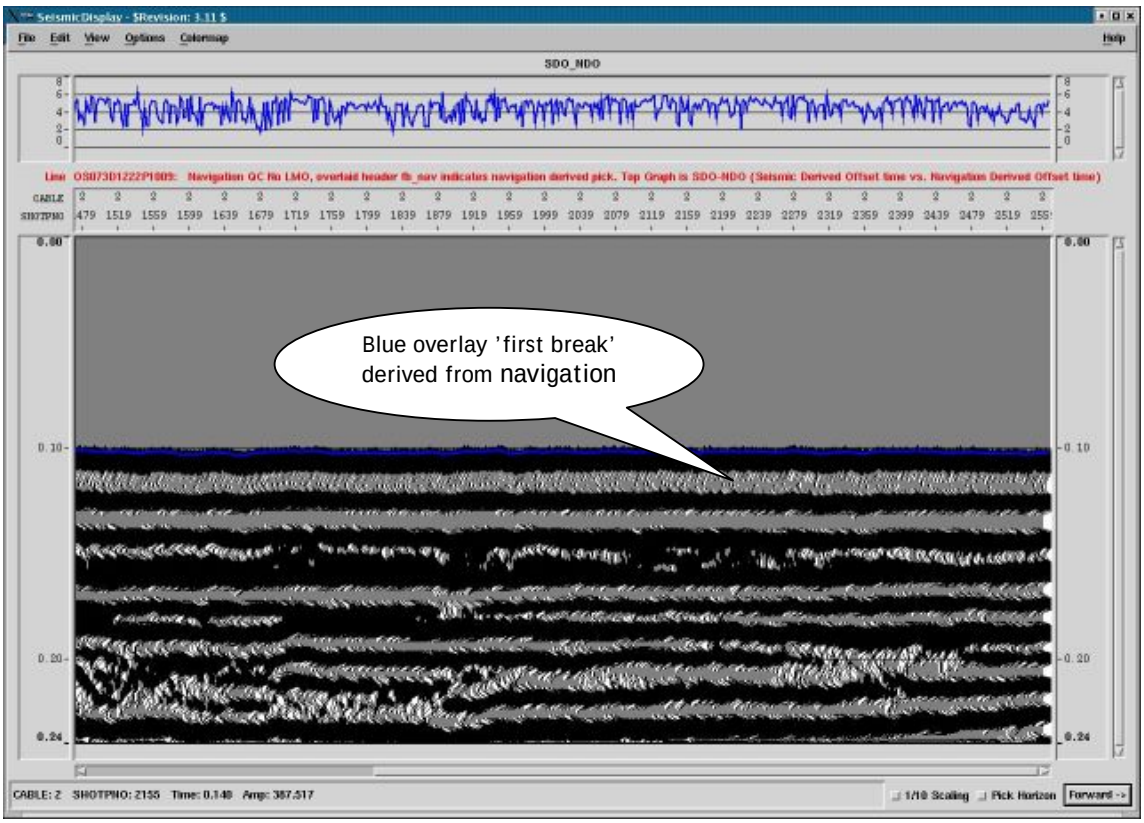
3, 4: Signal Windows
The RMS signal was calculated by the gAS QC system in both windows 3 and 4, as detailed in the table above. Reviewing the amplitudes of individual channels in these RMS windows could highlight weak or dead hydrophones, as the resulting contrast in the recorded amplitudes are greatest here.

5: End-of-record windows
This RMS end of record window (window 5) was used for monitoring ambient noise levels in addition to the water column window. This window was particularly useful for examining the ambient RMS levels on the near traces that were affected by first break energy in RMS window 1. The amount of shot-generated energy recorded in this window was much higher here than in window 1, and so external noise sources, for example ship noise, would not necessarily be as easily seen in the end-of-record window.

First break / P190 offset check

The nearest traces were merged with the P1/90 navigation data, and the navigation-derived first break was overlaid on the seismic data and checked on screen. In general, there was a good match between the P1/90 and the seismic data. The common offset cube was additionally used to verify navigation quality.

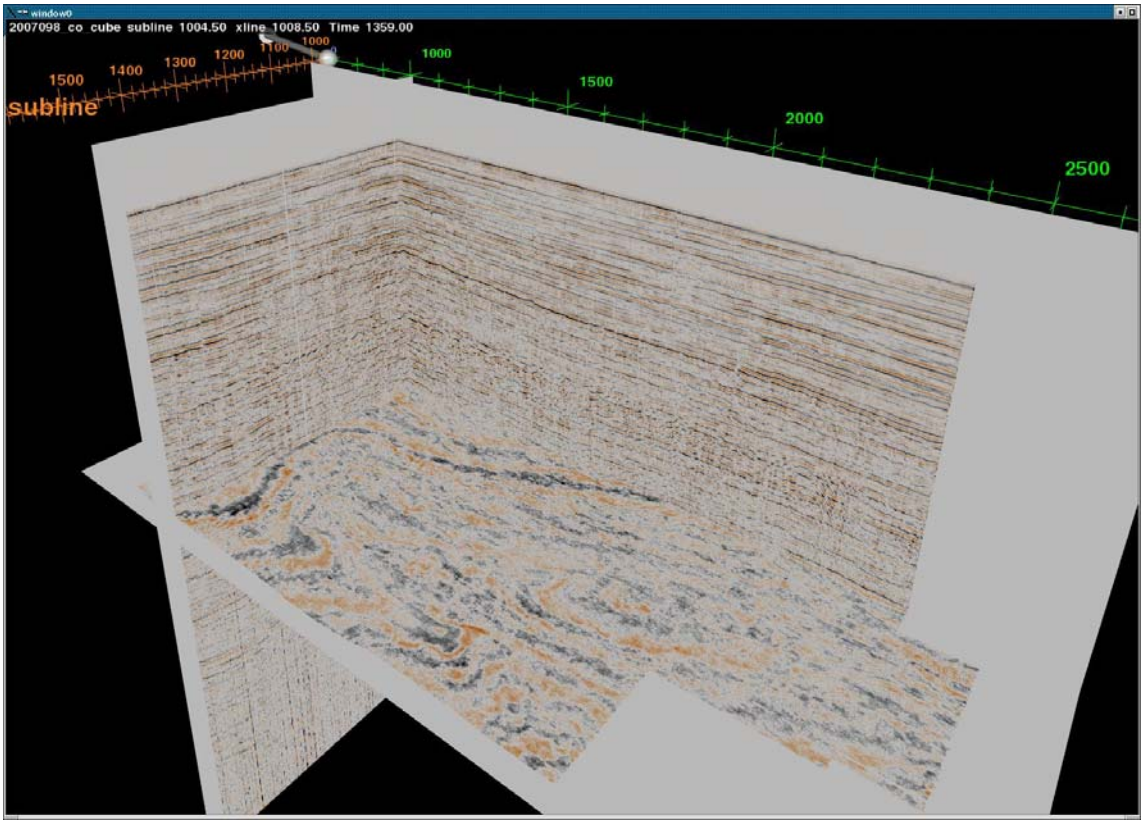
Sailine 1222P1009 Streamer 2 Starboard Source



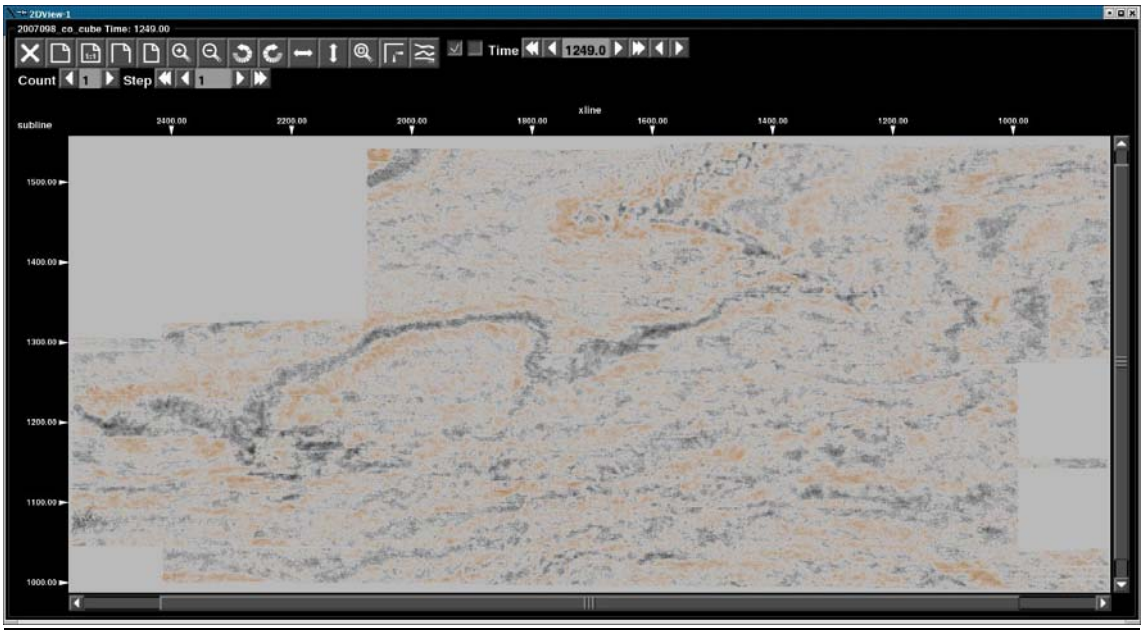
Common offset cube

The common offset cube was created using PGS' proprietary 'HoloSeis' 3D visualisation program. The main purpose of the cube analysis was to assist with QC of the navigation data after having been merged with seismic. The appearance of miss-ties or busts between lines in the cube could indicate problems with the navigation data. The various streamer recording depths and tidal introduced minor shallow miss-ties that after investigation related to difference in recording depth and tidal.

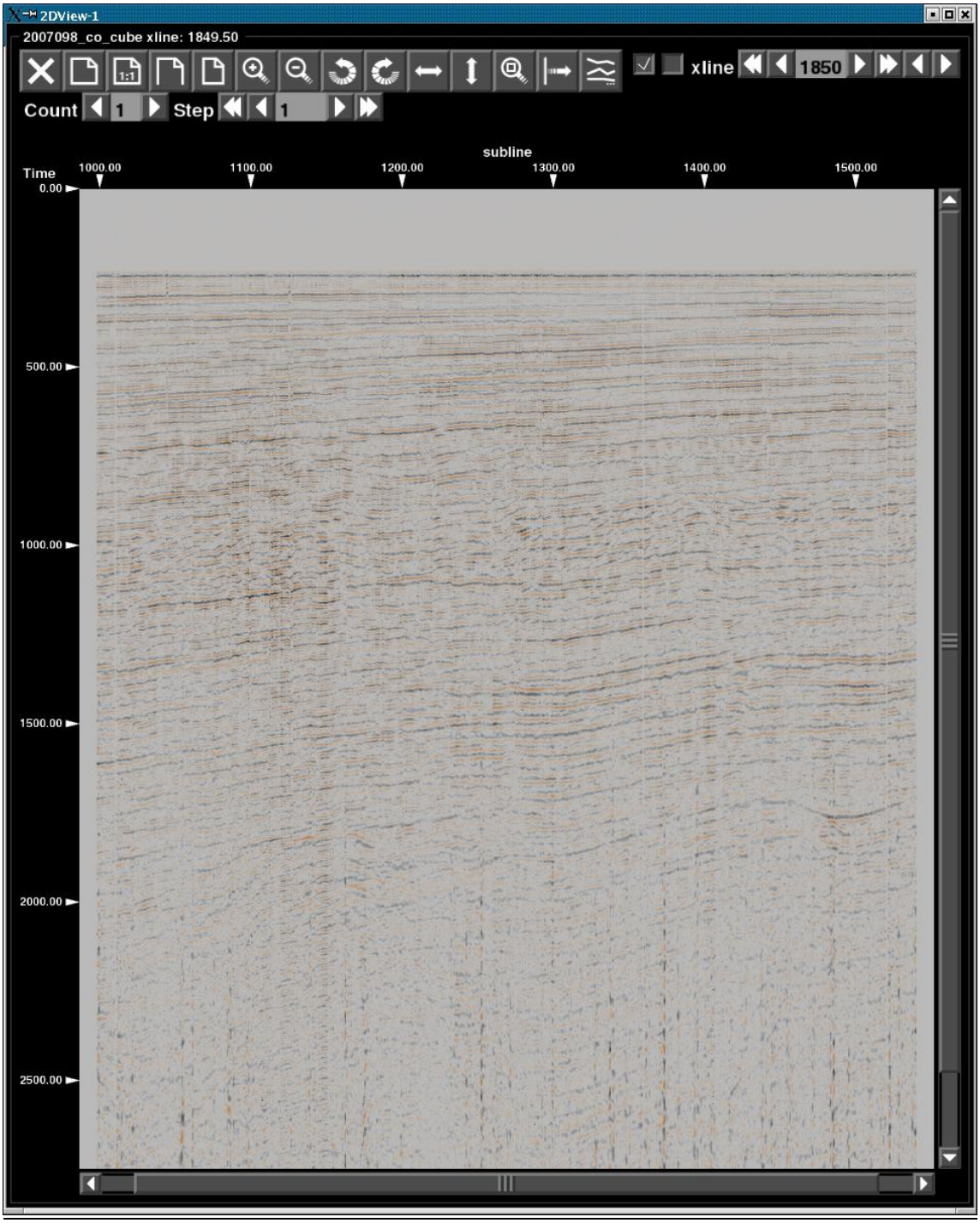
Holoseis 3D plane view



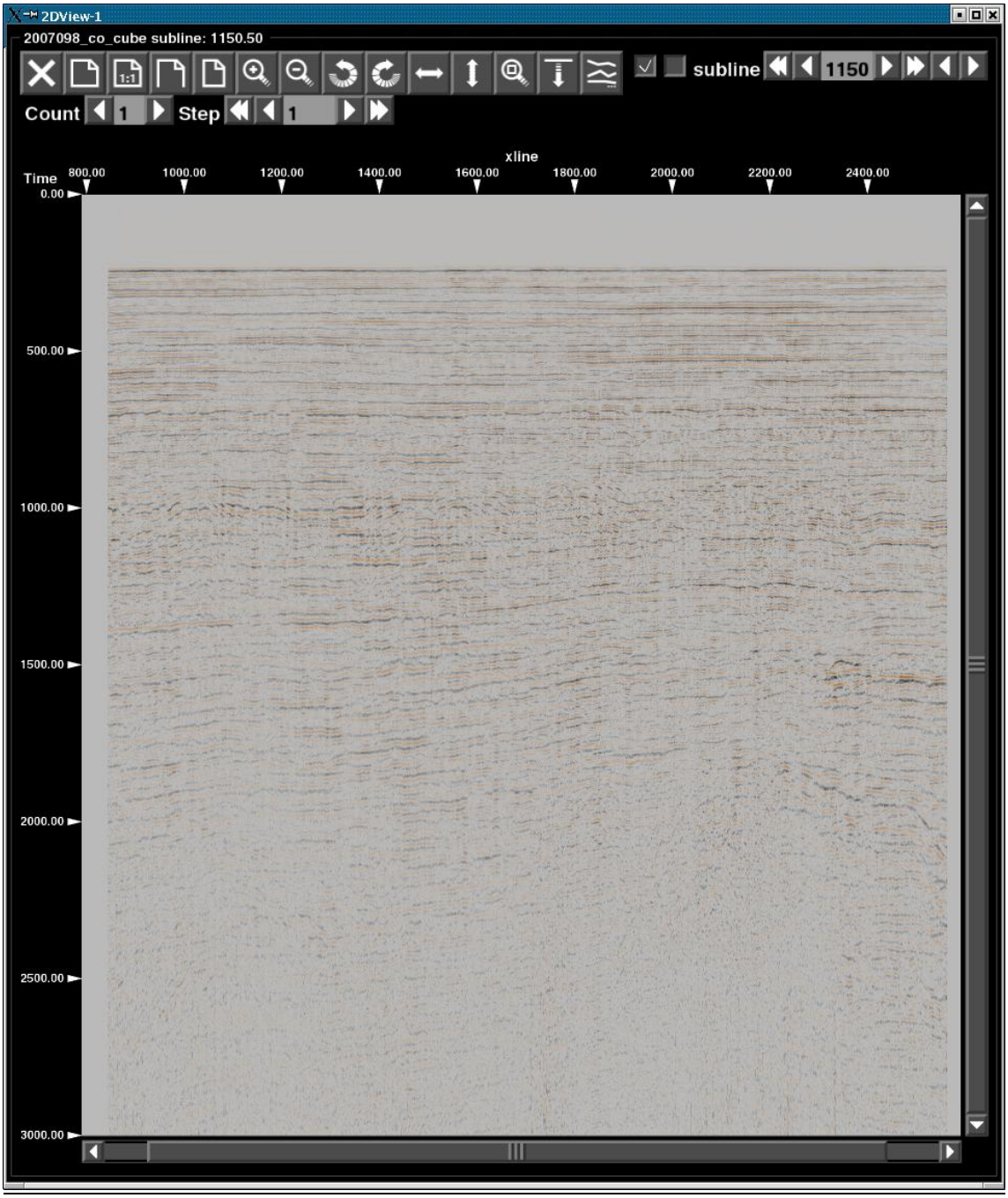
Time-slice at 1249ms



Cross-line at SP 1850



Inline 1318

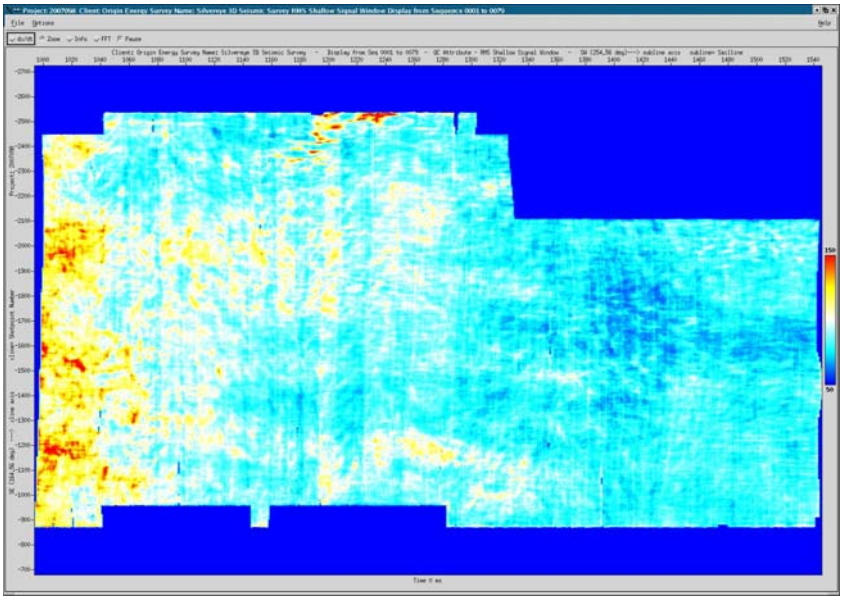

2DView-1
2007098_co_cube subline: 1150.50
subline
1150
Count
1
Step
1
xline
Time
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
2000.00
2200.00
2400.00
0.00
500.00
1000.00
1500.00
2000.00
2500.00
3000.00

10.12 Seismic data attributes

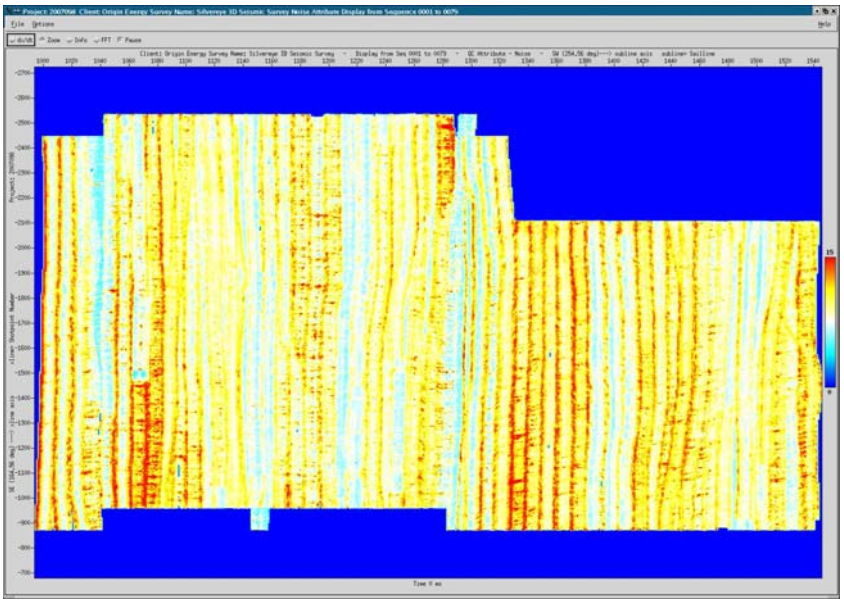
A number of attributes were calculated and binned both using holoseis and viper BinXYZ attribute handling to allow for investigation of streamer to streamer comparison and line to line comparison and matching over the whole survey.

RMS attributes were frequently investigated to quantify marginal lines with other lines previously accepted.

RMS signal window



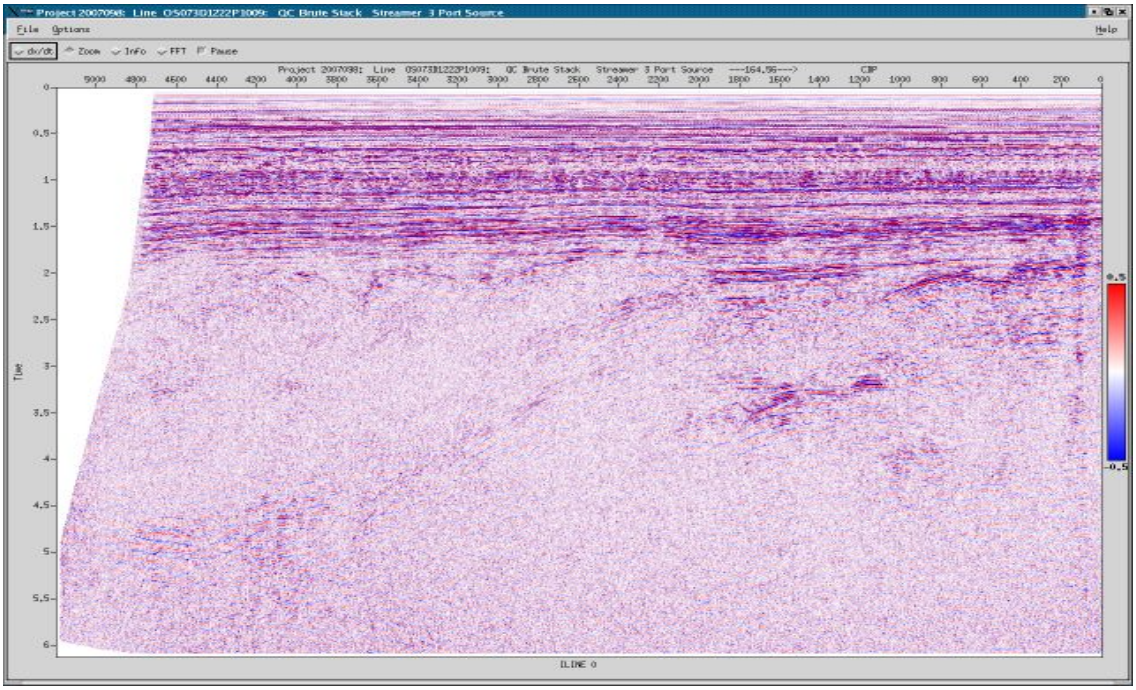
RMS noise window



10.13 Brute Stack Data

An example brute stack display is shown below.

Screen Display Stack 1222P1009 Streamer 3



11 QC Processing

The gAS acquisition system was used to monitor and record data in real time. The VIPER processing system was then utilised for the subsequent offline QC processing. Problems that occurred during production were investigated using all means available.

11.1 Online QC

Real-time RMS calculations were performed by the online gAS QC system for all channels of each shot, in five different time windows, as defined and explained in the section "RMS and noise analysis".

The PGS gAS acquisition system was used to provide real-time online QC displays that included:

- 2 x shot gathers, rotating through all streamers for every shot plus a further shot display fixed on one streamer.
- 'End of Record' and 'Water Column' RMS displays indicating the RMS levels of each channel for each shot point, for all 6 streamers. This enabled ambient noise estimates to be made, and external noise, such as ship noise, to be quantified.
- Cable depth variations display.
- Shot-to-shot difference display, for random noise analysis.
- Single near trace display, at full record length.
- Line graph display of gun volume, gun pressure and gun depth.
- Full-length auxiliary trace display from every gun hydrophone for the current shot.
- Stacked auxiliary trace display at full record length for each active shot, used for auto-fire detection.
- 2 x layered hydrophone display (one port array, and one starboard array) of the first 150ms of each auxiliary trace, for monitoring any variation in the gun signature along the line.
- Time break single trace display.

11.2 Offline QC

At the end of each line, as a minimum, the following displays were produced:

- Screen displays of one shot/km rotating through streamers
- RMS noise screen displays for bad channels and other noise analysis
- RMS signal screen displays for traces that might be weak
- Graphical RMS noise display of average channel RMS
- Stacked auxiliary near field phone data on screen for auto-fire analysis
- Layered hydrophone display of top 300ms of auxiliary hydrophone data to monitor variations in gun signature which might indicate an air leak or sub-array separation problem as well as a comparison with recent other line sequences to check for a possible signature change between lines
- Recorded time break screen display
- 'Smash Stack' shot-domain stacked data screen display to highlight any electrical cross-feed in particular.
- 2D Brute Stack paper plot.
- First break display with overlaid navigation offset on screen for comparison.

Further investigations were carried out as needed.

11.2.1 2D QC brute stack

A brute stack was produced for each line sequence in order to assess how noise interference (e.g. ship noise, swell noise, strum noise etc.) was likely to affect the final processed data. Each brute stack had deconvolution applied.

Brute Stack Processing Sequence

Transcription	From SEGD to Viper internal format
Static Correction	Skew correction (< 1ms) for continuous recording system
Geometry Assignment	Nominal 2D geometry (from preplot)
Select	One Source/Streamer combination for stack
Edit (zero)	Bad channels, Bad shots
Static Correction	–58 ms filter delay
High-pass filter	3-6 Hz
SINK (only tested on seq 59)	Swell or SI noise attenuation processing (if required)
Amplitude Recovery	T^2 gain
Mute	First break mute
Deconvolution	Minimum phase Predictive Deconvolution (Length 240ms/Gap 24ms)
NMO Correction	Using picked 2Km velocities
Mute	Post-NMO mute
Stack	Stack CDP gathers
Static Correction	+8.6@7m +9.2@8m and +9.9@9m [ms] gun and cable static
Display	Paper plot (with adjacent trace averaging before plotting)

11.2.2 Navigation / seismic merge QC

A near trace dataset was merged with the final P1/90 files for all streamers. The navigation-derived first break was overlaid on the seismic near trace for each streamer and checked on screen. The measured sound velocity was used to determine the calculated arrival time from the P1/90 offset.

11.2.3 Common offset cube

A second P1/90 QC step was to build a 3-fold common offset (CO) cube to check for anomalies and miss-ties between sail lines on cross-line sections and time-slices.

For each source/streamer combination, one trace was selected by offset (~ 350m) and merged with P1/90 positional data then loaded to the common offset cube. The data was pre-processed and truncated to 3000 ms prior to loading. Once loaded to the cube, inline, cross-line and time-slice displays were viewed to check for potential navigation merge errors.

The cube was viewed using PGS' HoloSeis software package in full 3D. This software makes it possible to view all inline, cross-line and time slices, and permits interactive rotation, translation and stretch of the 3D common offset cube to enable a more detailed analysis of the data.

11.3 Computer systems

The Viper system hardware on the Pacific Explorer is set up as follows…

- 2 x IBM x3650 nodes (2 x dual core processors/node, each node having 4 gb of RAM and 3 x 75gb disk drives) [mamba, python]. There is also 6.5 tb of external RAID disk attached to the mamba node.
- 3 x IBM x335 nodes (dual 2.8 GHz Intel Xeon processors/node, each node having 1.5 Gb of RAM and 2 x 146 GB SCSI disk drives) [Cpu01, Cpu02, Cpu03]
- 2 x Dell Precision 470 node (dual 3.0 Ghz Intel Xeon, with 3.84Gb of RAM and 2 x 360 Gb disks) [Hol01, Hol02]

Viper Node Configuration	
MAMBA:	Data-capture node, with real-time link to gAS recording system Control workstation Data-Processing node
PYTHON:	Data-Processing node and spare mamba replacement
CPU01:	Data-Processing node 3 IBM 3592 tape drive attached 2 IBM 3590 tape drive attached
CPU02:	Data-Processing node 1 IBM 3592 tape drive attached 2 IBM 3590 tape drive attached
CPU03:	Data-Processing node
HOL01:	Data-Processing node HoloSeis 3D viewing node
HOL02:	Data-Processing node HoloSeis 3D viewing node

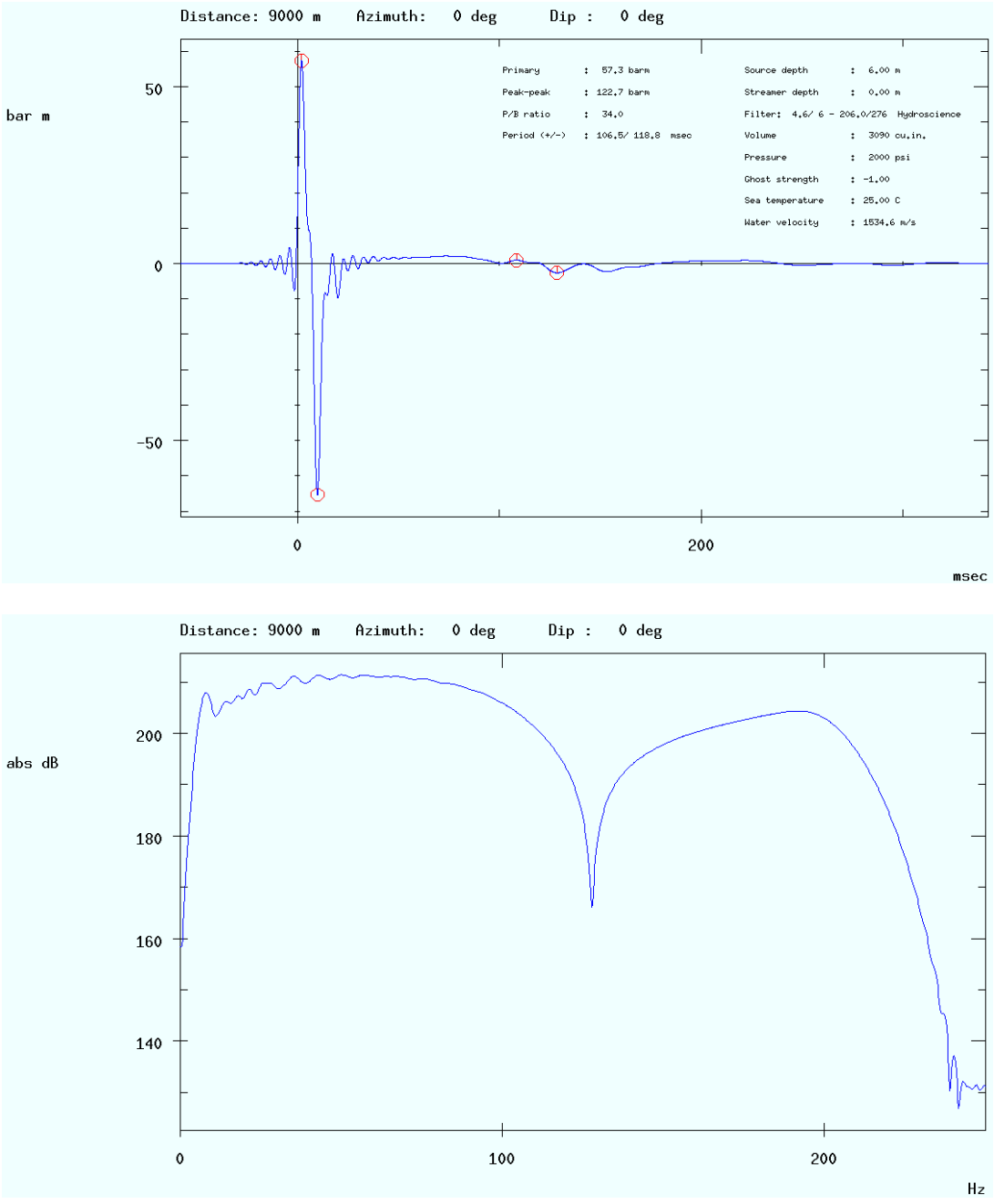
This system runs Viper V4.0.2-3, a data QC and pre-processing suite of software tools on the CentOS v4 Red Hat operating system.

12 Appendix

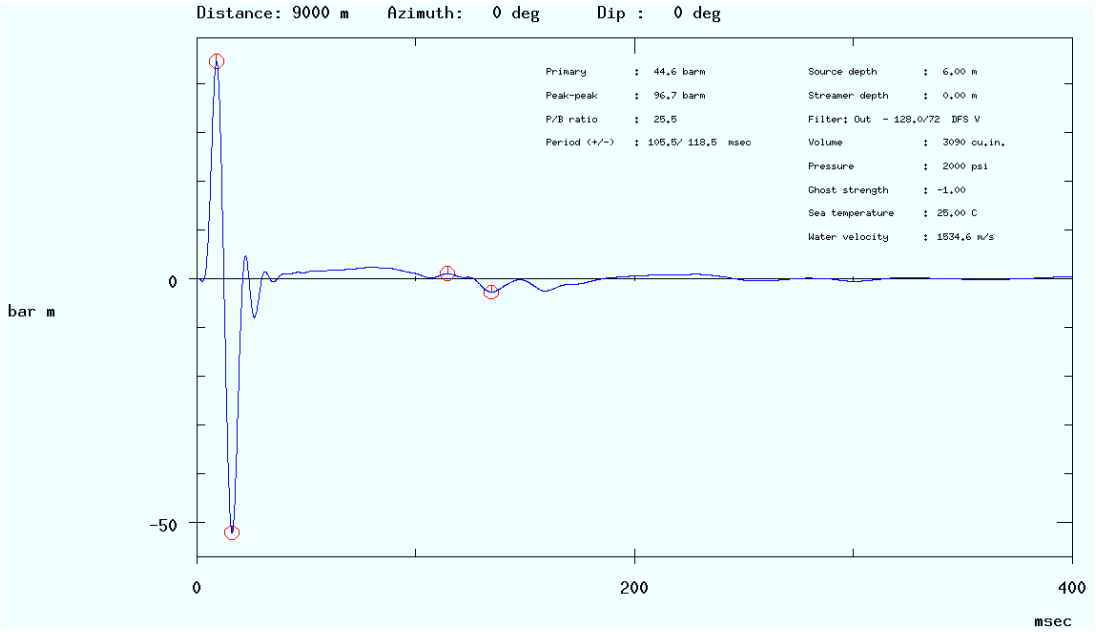
12.1 Data shipments

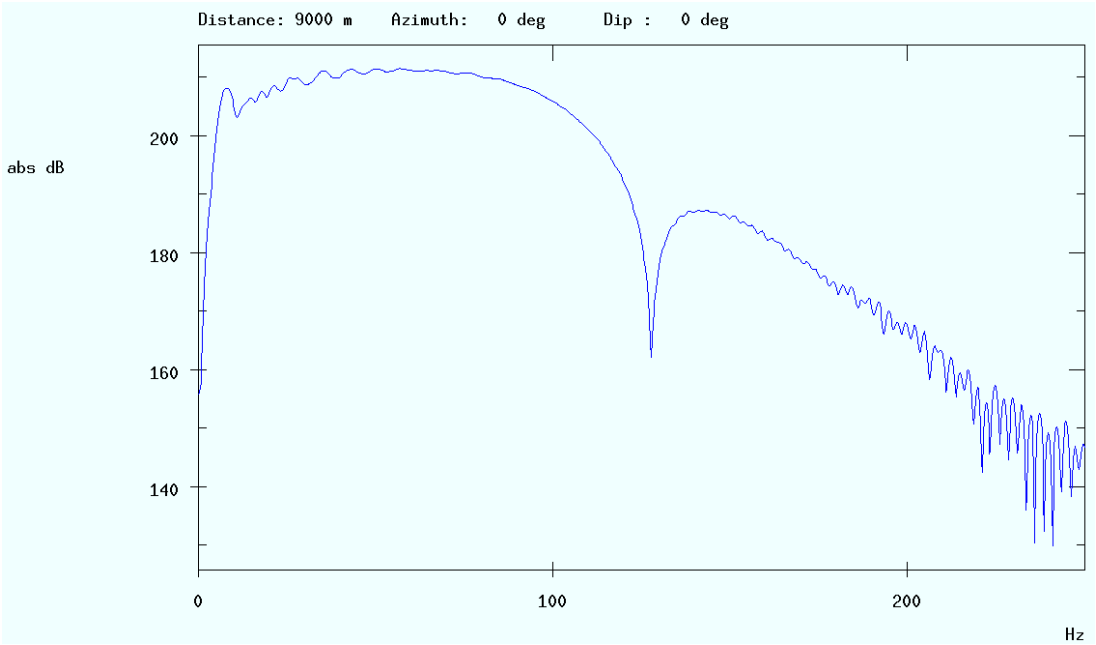
Date	Proforma	Content	Boxes	Wt	Shipping address	Comment
31.Jan.08	PAC13003618A	DATA SHIPMENT - PROJECT #:2007099. Recorder 1 data sequences 1 to 79 and DVD of linelogs for same sequences + P1/90 & P2/94 tapes for sequences 1 to 79	5	35 kg	CGGVeritas Australia 38 Ord Street West Perth 6005 Australia Attn:Tony Weatherall	Via Support Vessel Western Light to Port Fairey. Agent: N.T. Shipping PTY LTD. PO Box 443 0828 BERRIMAH NT Australia Attn: Robbie Robertson Tel. (+61)889472570 Fax.(+61)889472640
14.Feb 08	NP 10/2008	P190 vespos P190 echo sounder with depth corr draft/sound. Vespos plot Contour plot Coverage plots, Noflex			Origin Energy GPO Box 148, Brisbane Qld 4001 Australia Att Neil Millar	

12.2 Source modelling



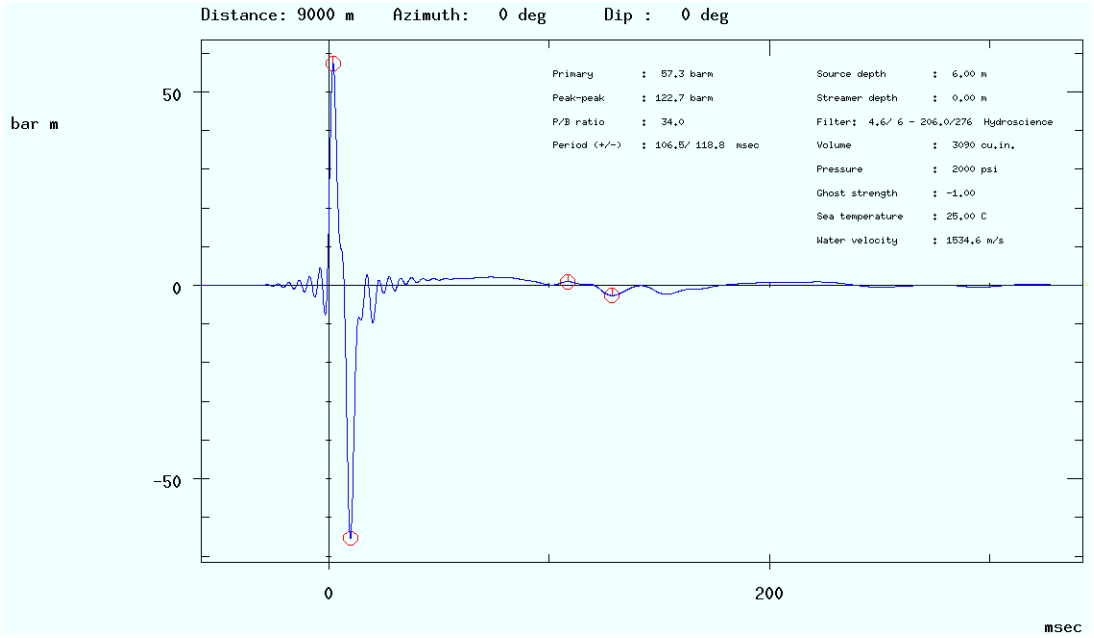
Modeled far-field signature and amplitude spectrum with Hydroscience recording filter (without receiver ghost).

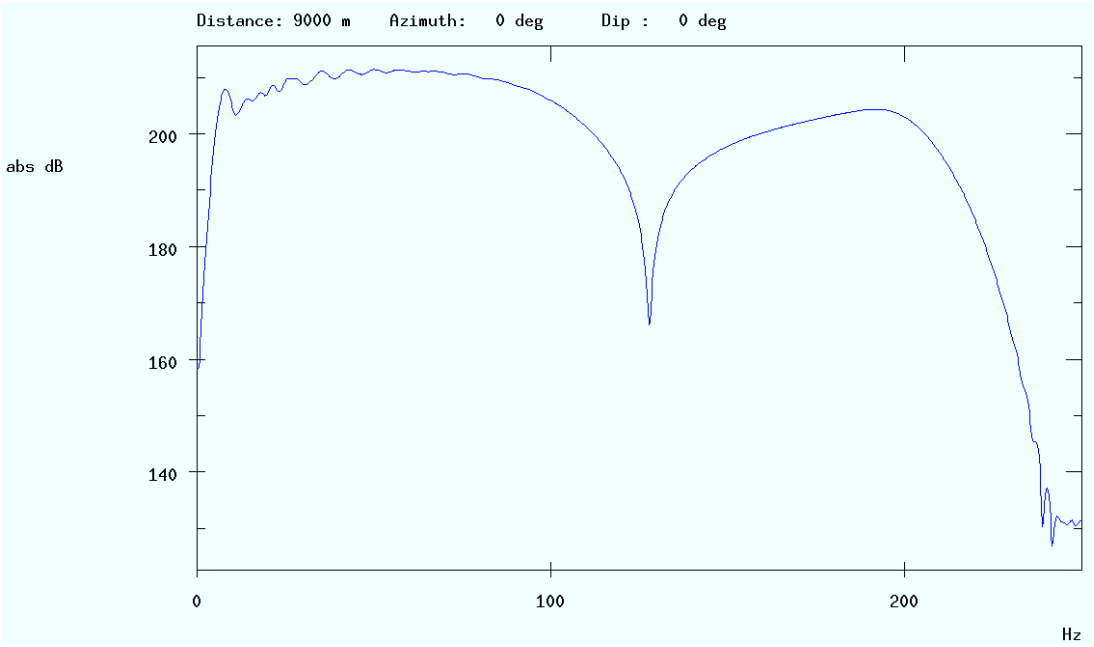




Modeled far-field signature and amplitude spectrum with DFS-V recording filter (without receiver ghost).

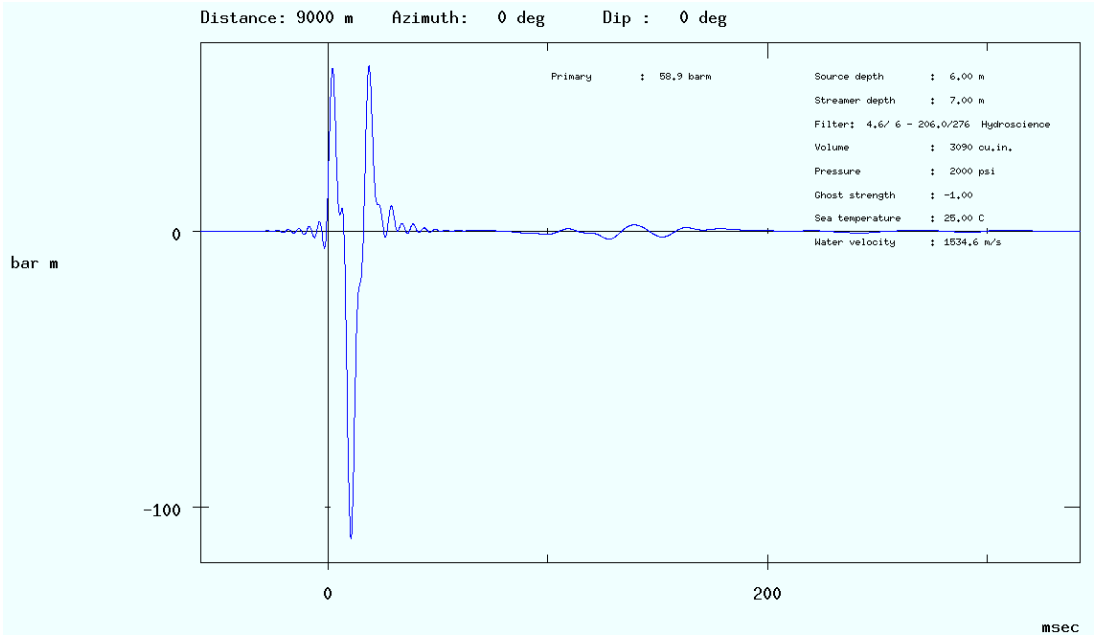
Full system response with source ghost only

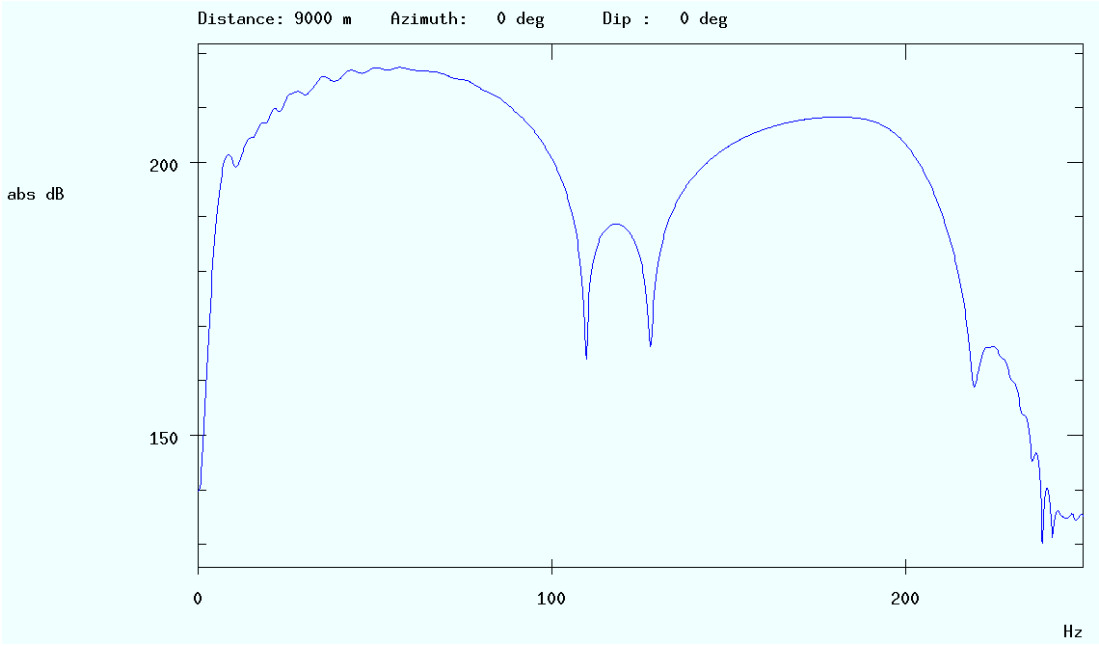




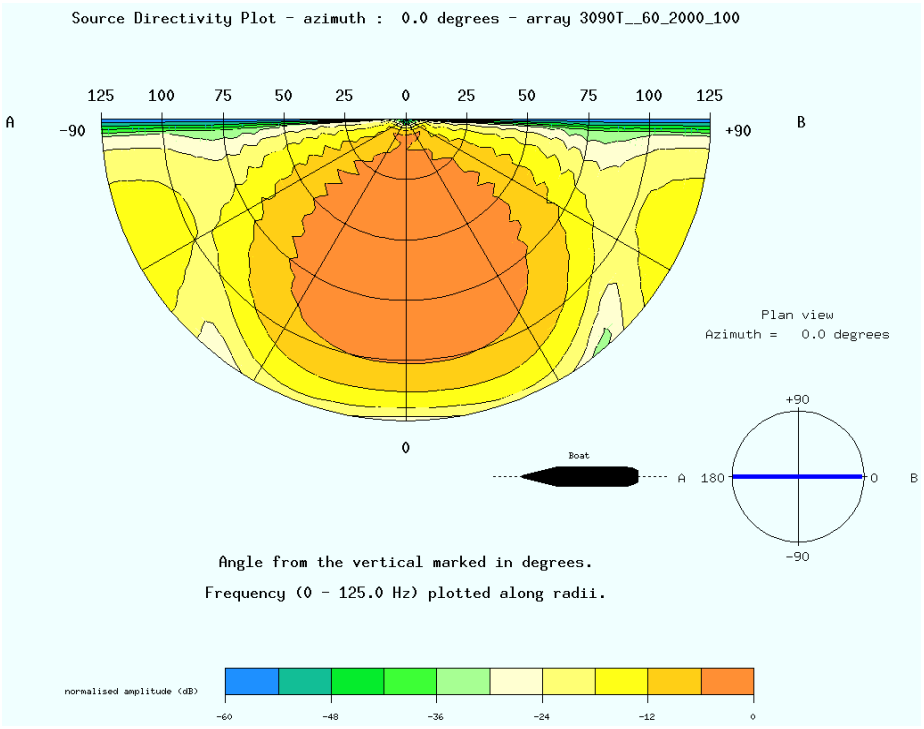
Modeled far-field signature and amplitude spectrum with full system response filter effect applied (without receiver ghost).

Full system response with source and receiver ghost





Modeled far-field signature and amplitude spectrum with recording and hydrophone filter effect applied (with receiver ghost).



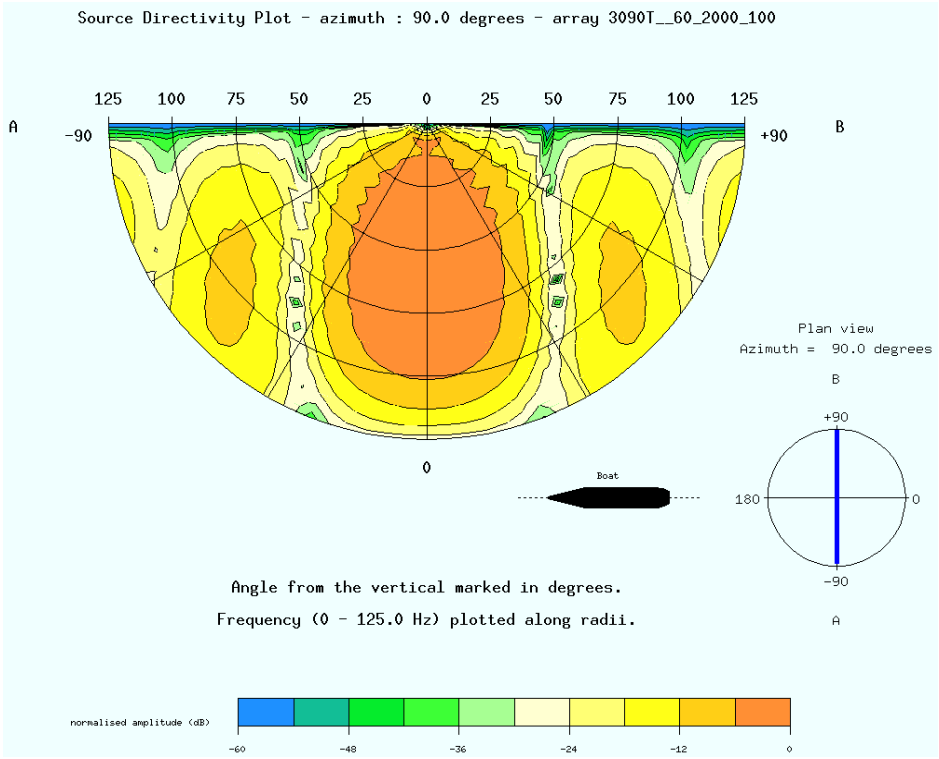


Figure 1: Directivity plot for constant azimuth of 0° and 90°.

12.3 SEG-D header

GENERAL HEADER #1		Starting byte 0
Bytes	Description	Value
01-02	File Number	40
03-04	SEGD Format	8036
	Bits Per Sample	24
05-10	General Constants	
11	Year	2008
12	Additional Header Blocks	2
12-13	Day	15
14	Hour	0
15	Minute	47
16	Second	57
17	Manufacturer's Code	41
18-19	Manufacturer's Serial Number	15
20-22	Not Used	
23	Base Scan Interval (ms)	2.0
24	Polarity	
25	Scan/Block Exponent	
26	Record Type	Normal Record
27	Record Length (ms)	6144
28	Scan-types / Record	1
29	Channel Sets/Scan Type	7
30	Skew Blocks	0
31	Extended-Header Blocks	0xFF
32	External-Header Blocks	0xFF

GENERAL HEADER #2		Starting byte 32
Bytes	Description	Value
01-03	Expanded File Number	0
04-05	Extended Channel Sets	0
06-07	Extended Header Blocks	890
08-09	External Header Blocks	119
10	Reserved	
11-12	SEG-D Revision Number	Rev. 0.0
13-14	General Trailer	
15-17	Extended Record Length	200
18-19	General Header Block Number	2
20-31	Reserved	
32	Extended Record Length	6

GENERAL HEADER #3 Starting Byte 64

Bytes	Description	Value
01-03	Reserved	
04-06	Source Line Number (int)	0
07-09	Source Line Number (fract)	0
10-12	Source Point Number (int)	1030
13-15	Source Point Number (fract)	0
14	Source Point Index	Not Used
15	Phase Control	Not Used
16	Type Vibrator	Not Used
17-18	Phase Angle	Not Used
19	General Header Block Number	3
20	Source Set Number	0
21-32	Reserved	

CHANNEL SET HEADER #1 Starting Byte 96

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	1
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #2 Starting Byte 128

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	2
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #3 Starting Byte 160

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	3
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #4 Starting Byte 192

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	4
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #5 Starting Byte 224

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	5
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #6 Starting Byte 256

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	6
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	480
11	Channel Set Type	Seismic Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

CHANNEL SET HEADER #7 Starting Byte 288

Bytes	Description	Value
01	Scan Type Number	1
02	Channel Set Number	7
03-04	Channel Set Start Time (ms)	0
05-06	Channel Set End Time (ms)	6144
07-08	Pre-Amp Gain (dB)	0
09-10	Number of Channels	48
11	Channel Set Type	AUX Data
12	Scans per Base Scan	1
13-14	Alias Filter Frequency	206
15-16	Alias Filter Slope	214
17-18	Low Cut Filter	5
19-20	Low Cut Filter Slope	6
21-22	First Notch Filter	0
23-24	Second Notch Filter	0
25-26	Third Notch Filter	0
27-28	Extended Channel Set Number	0
29	Extended Header Flag	0
30	Vertical Stack	0
31	Cable Number	0
32	Array Forming	0

HOST RECORDING SYSTEM STATUS BLOCK #1 Starting Byte 320

Bytes	Description	Value
01	External Header Status	OK
02	Tape Unit for Writing	0
02	Buffer Used	1
03-04	Number of Channels (Cable 1)	480
05-06	Number of Channels (Cable 2)	480
07-08	Number of Channels (Cable 3)	480
09-10	Number of Channels (Cable 4)	480
11-12	Number of Channels (Cable 5)	480
13-14	Number of Channels (Cable 6)	480
15-16	Number of Channels (Cable 7)	0
17-18	Number of Channels (Cable 8)	0
19-20	Reserved	
21	Transient Removal	No
22	Filter Samples Removed	0
23	Additional Host Blocks	0
23	Module Type	24-bit
24	Number of Physical Cables	7
24	Not Used	
25	Number of Receiver Lines	0
26	System Type	Non-Receiver Line
27	Record Status	Production Record
28	Header Revision	1
29	Software Revision	1
30-31	Blocks after SEG-D Area	198
32	Number of Cables	7

LINE ID BLOCK #1 Starting Byte 352

Bytes	Description	Value
01-08	Cable 1 Line ID	cable01
09-08	Cable 2 Line ID	cable02
17-24	Cable 3 Line ID	cable03
25-32	Cable 4 Line ID	cable04

LINE ID BLOCK #2 Starting Byte 384

Bytes	Description	Value
01-08	Cable 5 Line ID	cable05
09-08	Cable 6 Line ID	cable06
17-24	Cable 7 Line ID	cable07
25-32	Cable 8 Line ID	cable08

REEL NUMBER HEADER Starting Byte 416

Bytes	Description	Value
01-02	Shot Time: Day	15
03	Shot Time: Hour	0
04	Shot Time: Minute	47
05	Shot Time: Second	57
06-08	Shot Time: Microseconds	0
09	Acquisition Hardware	Seatrak System
10-12	Not Used	
13	External Header 1	Nav & GCS90 Combined
14	External Header 2	Digicourse Header
15	External Header 3	Not Defined
16	External Header 4	Not Defined
17-32	Reel Number	5329

CLIENT NAME Starting Byte 448

Bytes	Description	Value
01-32	Client Name	Origin Energy

CONTRACTOR NAME Starting Byte 480

Bytes	Description	Value
01-32	Contractor Name	PGS GEOPHYSICAL - MARINE ACQUIS

SURVEY NAME Starting Byte 512

Bytes	Description	Value
01-32	Survey Name	Silvereye 3D Seismic Survey

PROJECT CODE Starting Byte 544

Bytes	Description	Value
01-16	Project Code	2007098
17-18	Line Type	Off Line
19-24	Swath Number	0000.0
25-32	Sequence Number	46

CABLE #1 STATUS BLOCK 1 Starting Byte 576

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #2 STATUS BLOCK 1 Starting Byte 608

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #3 STATUS BLOCK 1 Starting Byte 640

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #4 STATUS BLOCK 1 Starting Byte 672

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #5 STATUS BLOCK 1 Starting Byte 704

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #6 STATUS BLOCK 1 Starting Byte 736

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

CABLE #7 STATUS BLOCK 1 Starting Byte 768

Bytes	Description	Value
01-03	Transmitted Scan Count	0
04-06	Received Scan Count	0
07-09	Transmitted Extraction Count	0
10-12	Received Extraction Count	0
13	Scan/Extraction Count Status	No Error
14	Time Break Status	No Error
15	Logical Cable	0
16-17	Not Used	
18	First Channel Set	0
19	Last Channel Set	0
20-23	Not Used	
24	Physical Cable Number	0
25-32	Not Used	

NAVIGATION HEADER #1 Starting Byte 28800

Bytes	Description	Value
01-02	Master Block ID	$1
03-06	Length of Message	1666
07-10	Program Revision	0002
11-12	Shot Switch	On-Line
13-26	Shot Time	004757.45768720080115
34-36	Time Reference	UTC
37-42	Shot Number	001030
43-58	Current Line Name	OS073D1054P1046
59-69	Master Latitude	-39.773494
70-80	Master Longitude	145.120081
81-86	Water Depth (meters)	54.7
87-97	Source Latitude	-39.770584
98-108	Source Longitude	145.119185
109-113	Master Gyro (degrees)	163.7
114-118	Master CMG (degrees)	165.9
119-122	Master Speed (knots)	4.6

GCS90 GUN-CONTROLLER HEADER #1 Starting Byte 28922

Bytes	Description	Value
01-06	ID String	*GCS90
07-10	Length of Block	1550
11-16	Line Number	4P1046
17-20	Shot Number	1030
21-22	Active Array Mask	07
23	Trigger Mode	External
24-25	Current Sequence Number	02
26-28	Number of Sub-Arrays	006
29-31	Number of Guns in Array	066
32-34	Number of Active Guns	028
35-37	Number of Delta-Errors	000
38-40	Number of Auto-Fires	000
41-43	Number of Mis-Fires	000

44-46	Delta Spread	008
47-52	Volume Fired	003090
53-66	Spare	
67-70	Manifold Pressure	2011
71-74	Deep Tow	0000
75-78	Sub-Array String Pressure	2026
79-82	Sub-Array String Pressure	2034
83-86	Sub-Array String Pressure	2014
87-90	Sub-Array String Pressure	1975
91-94	Sub-Array String Pressure	1996
95-98	Sub-Array String Pressure	1997

12.4 P1/90 header

```
H0100 AREA                      T/44P SILVEREYE 3D
H0101 GENERAL SURVEY DETAILS    3D, SINGLE VESSEL, DUAL SOURCE, SIX STREAMERS
H0102 VESSEL DETAILS            PACIFIC EXPLORER           1
H0103 SOURCE DETAILS            STBD SOURCE                1   1
H0103 SOURCE DETAILS            PORT SOURCE                1   2
H0104 STREAMER DETAILS          STREAMER 1 480CH           1       1   1
H0104 STREAMER DETAILS          STREAMER 2 480CH           1       2   2
H0104 STREAMER DETAILS          STREAMER 3 480CH           1       3   3
H0104 STREAMER DETAILS          STREAMER 4 480CH           1       4   4
H0104 STREAMER DETAILS          STREAMER 5 480CH           1       5   5
H0104 STREAMER DETAILS          STREAMER 6 480CH           1       6   6
H0105 OTHER DETAILS             N/A
H0200 DATE OF SURVEY            01 JAN 2008 - CONTINUING
H0201 DATE OF ISSUE OF TAPE     -- ---- ----
H0202 TAPE VERSION IDENTIFIER   ------------
H0203 LINE PREFIX               OS073D
H0300 CLIENT                    ORIGIN ENERGY AUSTRALIA
H0400 GEOPHYSICAL CONTRACTOR    PGS GEOPHYSICAL - MARINE ACQUISITION
H0500 POSITIONING CONTRACTOR    FUGRO SURVEY AS
H0600 POSITIONING PROCESSING    PGS GEOPHYSICAL - MARINE ACQUISITION
H0700 POSITIONING SYSTEM        NAV SYSTEM 1: STARFIX.HP  SPM_4.26
H0700 POSITIONING SYSTEM        NAV SYSTEM 2: SKYFIX.XP   MULTIFIX 4 V2.01 XP
H0700 POSITIONING SYSTEM        INTEGRATED NAV.SYSTEM:  SPECTRA VERSION  10.9.01
H0800 COORDINATE LOCATION       CENTER OF SOURCE
H0900 OFFSET SYS TO NAV REF PT     1   2    0.00    0.00
H0901 OFFSET SYSTEM TO SOURCE 1    1   2   25.00 -330.00
H0902 OFFSET SYSTEM TO SOURCE 2    1   2  -25.00 -330.00
H0903 OFFSET SYSTEM TO E/S    2    1   2    2.48   31.72
H1000 CLOCK TIME                GMT
H1100 RECEIVER GROUPS PER SHOT  2880
H1400 GEODETIC DATUM AS SURVEY  GDA94       GRS1980      6378137.000 298.2572221
H1401 DATUM SHIFT GDA94 TO WGS84   0.0   0.0   0.0 0.000 0.000 0.000 0.0000000
H1500 GEODETIC DATUM POSTPROC   GDA94       GRS1980      6378137.000 298.2572221
H1501 DATUM SHIFT GDA94 TO WGS84   0.0   0.0   0.0 0.000 0.000 0.000 0.0000000
H1600 SURVEY TO POSTPROC DATUM     0.0   0.0   0.0 0.000 0.000 0.000 0.0000000
H1700 VERTICAL DATUM            ES                      ECHO SOUNDER POSITION
H1800 PROJECTION                002 U.T.M. SOUTHERN HEMISPHERE
H1900 ZONE                      55 S
H2000 GRID UNITS                1 INTERNATIONAL METERS    1.000000000000
H2001 HEIGHT UNITS              1 INTERNATIONAL METERS    1.000000000000
H2200 CENTRAL MERIDIAN          147 0 0.000E
H2600*****************************************************************
H2600 THE Z OFFSET OF THE ECHO SOUNDER TRANSDUCER IS -6.36 METERS FROM THE
H2600 VESSEL REFERENCE POINT AT SEA LEVEL. TRANSDUCER DEPTH CORRECTIONS WERE
H2600 NOT APPLIED TO WATER DEPTHS.
H2600
H2600 THE SOUND VELOCITY SET IN THE ECHO SOUNDER WAS 1500 METERS/SECOND.
H2600 THE WATER DEPTH DATA HAS BEEN DESPIKED.
H2600 THE ECHO SOUNDER DEPTH DATA HAS BEEN CORRECTED FOR HEAVE PRIOR TO BEING
H2600 PASSED TO THE INTEGRATED NAVIGATION SYSTEM.
H2600*****************************************************************
H2600             FORMAT OF SHOT RECORDS
H2600      COLUMN           DESCRIPTION
H2600           1           'V', 'E', 'Z', 'S', 'T'
H2600                       V= VESSEL REFERENCE POINT
H2600                       E= ECHO SOUNDER
```

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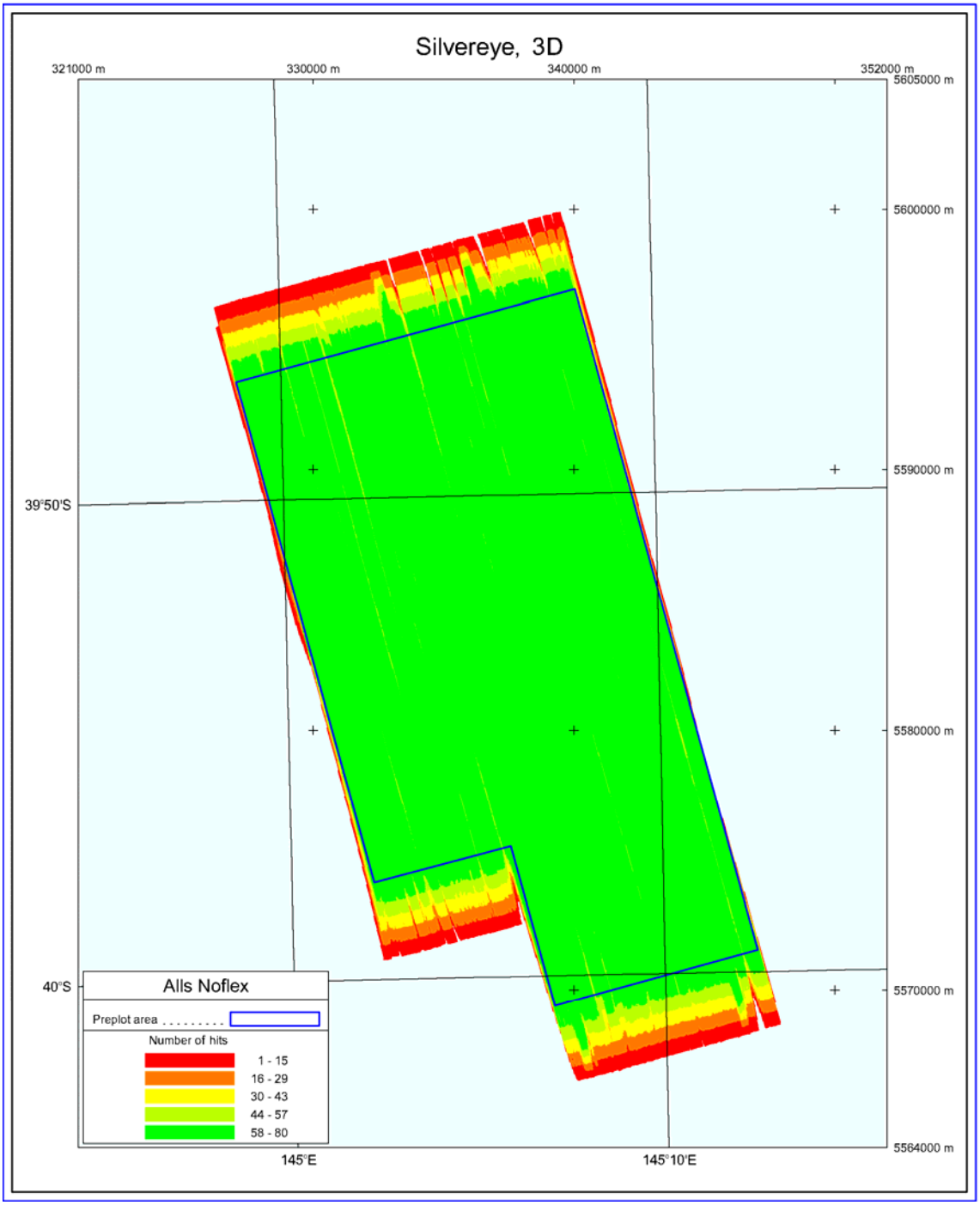
H2600                      Z= INDIVIDUAL SOURCE POSITION
H2600                      S= CENTER OF SOURCE
H2600                      T= TAILBUOY POSITION
H2600        2-13          LINE NAME
H2600          17          VESSEL IDENTIFIER
H2600          18          SOURCE IDENTIFIER
H2600          19          TAILBUOY/OTHER IDENTIFIER
H2600       20-25          SHOT POINT NUMBER
H2600       26-35          LATITUDE (DDMMSS.SS)
H2600       36-46          LONGITUDE (DDDMMSS.SS)
H2600       47-55          MAP GRID EASTING IN METERS
H2600       56-64          MAP GRID NORTHING IN METERS
H2600       65-70          WATER DEPTH
H2600       71-73          JULIAN DAY OF YEAR
H2600       74-79          TIME (HHMMSS)
H2600
H2600*************************************************************************
H2600             FORMAT OF RECEIVER RECORD
H2600      COLUMN
H2600           1          'R'
H2600         2-5          RECEIVER NUMBER
H2600        6-14          MAP GRID EASTING IN METERS
H2600       15-23          MAP GRID NORTHING IN METERS
H2600       24-27          RECEIVER DEPTH REFERENCED TO SEA LEVEL
H2600       28-31          RECEIVER NUMBER
H2600       32-40          MAP GRID EASTING IN METERS
H2600       41-49          MAP GRID NORTHING IN METERS
H2600       50-53          RECEIVER DEPTH REFERENCED TO SEA LEVEL
H2600       54-57          RECEIVER NUMBER
H2600       58-66          MAP GRID EASTING IN METERS
H2600       67-75          MAP GRID NORTHING IN METERS
H2600       76-79          RECEIVER DEPTH REFERENCED TO SEA LEVEL
H2600          80          STREAMER CODE
H2600
H2600*************************************************************************
H2600 STREAMER AND TAILBUOY NUMBERING INCREMENTS FROM STARBOARD TO PORT
H2600
H2600 STREAMER  1: RECEIVERS NUMBERED  480 (FAR) TO    1 (NEAR)
H2600 STREAMER  2: RECEIVERS NUMBERED  960 (FAR) TO  481 (NEAR)
H2600 STREAMER  3: RECEIVERS NUMBERED 1440 (FAR) TO  961 (NEAR)
H2600 STREAMER  4: RECEIVERS NUMBERED 1920 (FAR) TO 1441 (NEAR)
H2600 STREAMER  5: RECEIVERS NUMBERED 2400 (FAR) TO 1921 (NEAR)
H2600 STREAMER  6: RECEIVERS NUMBERED 2880 (FAR) TO 2401 (NEAR)
H2600
H2600 STREAMER ROTATIONS HAVE BEEN APPLIED ON A SHOT BY SHOT BASIS.
H2600
H2600 INLINE MISCLOSURES ARE DERIVED ON A SHOT BY SHOT BASIS.
H2600 THESE INLINE MISCLOSURE VALUES ARE DISTRIBUTED LINEARLY OVER THE ACTIVE
H2600 STREAMER LENGTH. THE CORRECTED STREAMER LENGTH IS USED TO COMPUTE THE
H2600 FINAL RECEIVER POSITIONS.
H2600
H2600*************************************************************************
H2600 NAVQC
H2600*************************************************************************
H2600 PGS JOB NUMBER 2007098
H2600
H2600 LINES CONTAINED IN THIS FILE:
H2600
H2600 LINE: --------              SEQUENCE:  ---   FSP:   ----   LSP:   ----
H2600
H2600 FOR SEISMIC DATA EDIT, PLEASE SEE THE OBSERVERS LOG
H2600
```

12.5 P6/98 Full fold coverage perimeter

```
H0100 3D SURVEY NAME            Silvereye 3D, block T744P
H0200 BIN GRID DESCRIPTOR       ACQUISITION
H0300 GEODETIC DATUM NAME       GDA94
H0400 ELLIPSOID-AXIS-INV FLAT   GRS1980      6378137.000 298.2572221
H0500 PROJECTION METHOD          002  U.T.M. SOUTH
H0510 PROJECTION ZONE NAME      ZONE 55
H0530 LON OF CM (DMS E/W)        1470000.000E
H0600 DESCR OF LINEAR UNITS     1 INTERNATIONAL METERS     1.000000000000
H0700 DESCR OF ANGULAR UNITS    1  DEGREES
H0800 BIN GRID ORIGIN (Io,Jo)     1001.0000   1001.0000
H0900 BIN GRID ORIGIN (E,N)        340024.21E   5596944.63N
H1000 SCALE FACTOR AT (I,J)     1.0000000000      1.0000      1.0000
H1100 NOM BIN WIDTH ON I AXIS    25.0000
H1150 NOM BIN WIDTH ON J AXIS    18.7500
H1200 GRID BEAR J AXIS (DMS)     1643336.000
H1300 BIN NODE INCREMENT I AXIS     1.000
H1350 BIN NODE INCREMENT J AXIS     1.000
H1400 COORDS (I,J,E,N) FST NODE   1001.0000   1163.0000    340832.88  5594016.75
H1401 COORDS (LAT,LON) FST NODE   394720.135S  1450827.986E
H1410 COORDS (I,J,E,N) SEC NODE   1001.0000   1647.0000    343248.91  5585269.27
H1420 COORDS (I,J,E,N) GEN PNT    1253.0000   1647.0000    337176.28  5583592.03
H2300 DATA EXTENT BIN GRID        2407.0000   1001.0000   1540.0000   1001.0000
H2400 DATA EXTENT MAP GRID        5596944.63  5569383.76   347042.68   327035.53
H2501 DATA EXTENT GEOG (N/S)      394544.670S   400037.632S
H2502 DATA EXTENT GEOG (E/W)     1451229.993E  1445847.591E
H2700 NUMBER OF PERIMETERS       1
H3101 FULL FOLD COV # OF NODES     5
H3201 FULL FOLD COV (I,J,E,N)     1001.0000   1001.0000    340024.21  5596944.63
H3201 FULL FOLD COV (I,J,E,N)     1001.0000   2407.0000    347042.68  5571533.56
H3201 FULL FOLD COV (I,J,E,N)     1324.0000   2407.0000    339259.10  5569383.76
H3201 FULL FOLD COV (I,J,E,N)     1324.0000   2067.0000    337561.89  5575528.68
H3201 FULL FOLD COV (I,J,E,N)     1540.0000   2066.0000    332351.79  5574109.12
H3201 FULL FOLD COV (I,J,E,N)     1540.0000   1001.0000    327035.53  5593357.19
H8002 EPSG PROJECTED CS NAME    GDA94  /UTM 147 S
H8003 EPSG PROJECTED CS CODE    17355
H8006 EPSG DATABASE VERSION      6.13
```

12.6 Coverage plot, All Noflex



12.7 Cetacean log

	species	inside x-zone?	action	duration	comments	sighting by	position
04/01/08 @20:07	common dolphin		none		Soft start – seq 008	mmo	39 59.17 145 03.08
08/01/08 @10:01	common dolphin		none		Soft start – seq 022	mmo	40 00.21 145 04.54
28/01/08 @16:12	common dolphin		none		In production – seq 076	mmo	39 58.44 145 05.45