



Tap Oil Limited

ACQUISITION REPORT

PGS Geophysical

Tap (Shelfal) Pty Ltd

M/V Pacific Explorer

Labatt 3D Seismic Survey
Block T/47P Offshore Tasmania,
Central Bass Strait, Australia

2007099

29th November 2007
to
01st January 2008



version 1

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AUTHORISATION

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Singapore
30th January 2008

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CONTENTS

1	INTRODUCTION	5
1.1	SUMMARY	5
1.2	KEY PARAMETERS	6
1.3	SYSTEMS	6
1.4	PRODUCTION	6
1.5	SURVEY TIMING	7
2	SEQUENCE OF EVENTS	8
2.1	DAILY LOG	8
2.2	DAILY PRODUCTION AND SEA STATE	11
2.3	POST PLOTTED VESSEL POSITIONS	12
3	KEY PERSONNEL	13
4	HSE	14
4.1	STATISTICS	14
4.2	INCIDENTS	14
5	SURVEY OPERATIONS REVIEW	15
5.1	SURVEY AREA INFORMATION	15
6	SEISMIC ENERGY SOURCE	16
6.1	SOURCE DETAILS	16
6.2	OFFSET DIAGRAM	17
6.3	GUN ARRAY LAYOUT	18
7	SEISMIC ACQUISITION SYSTEM	20
7.1	SYSTEM DETAILS	20
7.2	SYSTEM TIMING	21
7.3	STREAMERS	22
7.4	STREAMER LAYOUT	23
8	NAVIGATION AND POSITIONING	25
8.1	GEODETIC REFERENCE	25
8.2	SURFACE POSITIONING	27
8.3	UNDERWATER POSITIONING	30
8.4	NAVIGATION AND BINNING SYSTEMS	32
8.5	NAVIGATION SYSTEM PERFORMANCE	33
8.6	DELIVERED P1/90 AND P2/94	37
9	NAVIGATION PROCESSING	38
9.1	INTRODUCTION	38
9.2	NRT	38
9.3	SPRINT	39
9.4	DATA QUALITY CONTROL PROCEDURES	41
9.5	NRT vs SPRINT P190 POSITION COMPARISONS	42
10	SEISMIC DATA QUALITY	44
10.1	SHIP & RIG NOISE	44
10.2	SWELL NOISE	44
10.3	STRUM / TUG NOISE	44
10.4	SOURCE SEPARATION ERRORS	44
10.5	TELEMETRY AND PARITY ERRORS	44

10.6	STREAMER DEPTH ERRORS	44
10.7	BAD CHANNELS AND RECORDING SYSTEM PROBLEMS	44
10.8	SKEW CORRECTION FOR NTRS RECORDING.....	45
10.9	AIR LEAKS AND AUTO-FIRES	45
10.10	RMS AND NOISE ANALYSIS	46
10.11	FIRST BREAK / P190 OFFSET CHECK	46
10.12	SEISMIC DATA ATTRIBUTES	50
10.13	BRUTE STACK DATA	52
11	QC PROCESSING	53
11.1	ONLINE QC	53
11.2	OFFLINE QC	53
11.3	COMPUTER SYSTEMS	55
12	APPENDIX	56
12.1	DATA SHIPMENTS	56
12.2	SOURCE MODELLING	57
12.3	SEG-D HEADER	62
12.4	P1/90 HEADER	72
12.5	P6/98 FULL FOLD COVERAGE PERIMETER	74
12.6	COVERAGE PLOT.....	75
12.7	CETACEAN LOG.....	76

1 Introduction

1.1 Summary

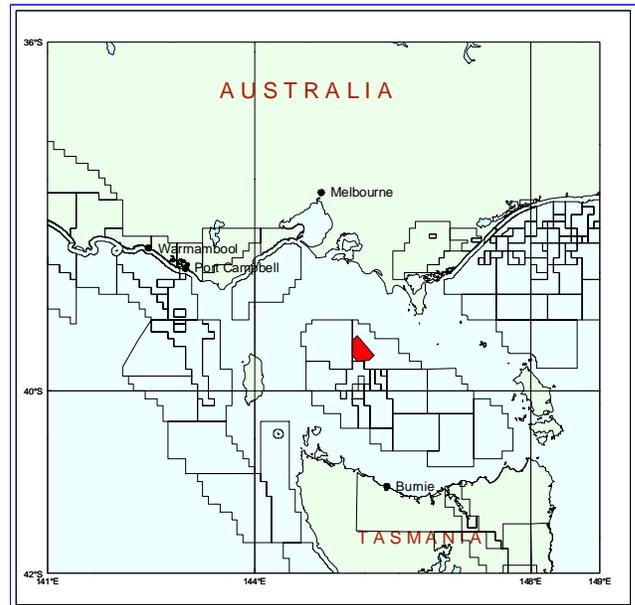
PGS was contracted by Tap (Shelfal) Pty Ltd, Australia to acquire the Labatt 3D survey using the M/V PACIFIC EXPLORER.

The seismic survey area was situated in block T47/P, approximately 50 nm south of the mainland between the mainland and Tasmania in the Bass Strait.

The vessel mobilised at sea.

The first line was acquired on 1st December 2007. During the first days we were interrupted by a fault on streamer 4, causing problems to read the compass-bird data.

Other than this, the survey was only interrupted by a succession of low pressure weather systems, causing wind and sea conditions unsuitable for data acquisition.



Some cetaceans were spotted, and although the activity was very low, we had on one occasion, 10th December 2007, a humpback whale come close, requiring us to stop the guns.

Acquisition was also halted during a SW'ly storm on 22nd December when tailbuoy #1 parted cleanly from the tail of streamer #1. The chaseboat was in port at the time but mobilised as soon as it returned to start the search for the tailbuoy. Some of the compass birds were knocked off their collars around the spread but did not cause enough of a data quality issue to warrant cessation of acquisition. Instead, two days later when the weather calmed down, the small boats were deployed to fix everything.

The final line was acquired on 1st January 2008.

1.5 Survey timing

	hours	% of total		hours	% of total
Production	463.48	56.80%	Prime Production	198.28	24.30%
			Line Change	196.90	24.13%
			Infill	39.98	4.90%
			Run Out (Prime)	23.43	2.87%
			Run Out (Infill)	4.88	0.60%
Standby	241.53	29.60%	Weather	146.85	18.00%
			Helicopter at Sea	52.42	6.42%
			Local Transit / Prospect Change	23.00	2.82%
			Extended LC d/t Survey Shape	12.53	1.54%
			Cetaceans	3.65	0.45%
			Line Change Standby	2.63	0.32%
			Bunkering At Sea	0.45	0.06%
Mob / Demob	34.77	4.26%	Extended Mob, Instrumentation	20.00	2.45%
			General Demob	8.28	1.01%
			Source Deployment	6.48	0.79%
Downtime	76.22	9.34%	Leakage, x-feed, Telemetry	48.32	5.92%
			Software problems inc. Crash	6.63	0.81%
			Bolt Airgun Autofire	6.30	0.77%
			Active, Passive Modules	4.93	0.60%
			Main Compressor	3.78	0.46%
			Recording/QC Software	2.53	0.31%
			Bolt Airgun Misfire	2.17	0.27%
			Compass-Bird	0.90	0.11%
			Recording/QC Hardware	0.30	0.04%
			Mechanical inc Gun-floats	0.27	0.03%
Physical Problems	0.08	0.01%			
Total	816.00				

2 Sequence of events

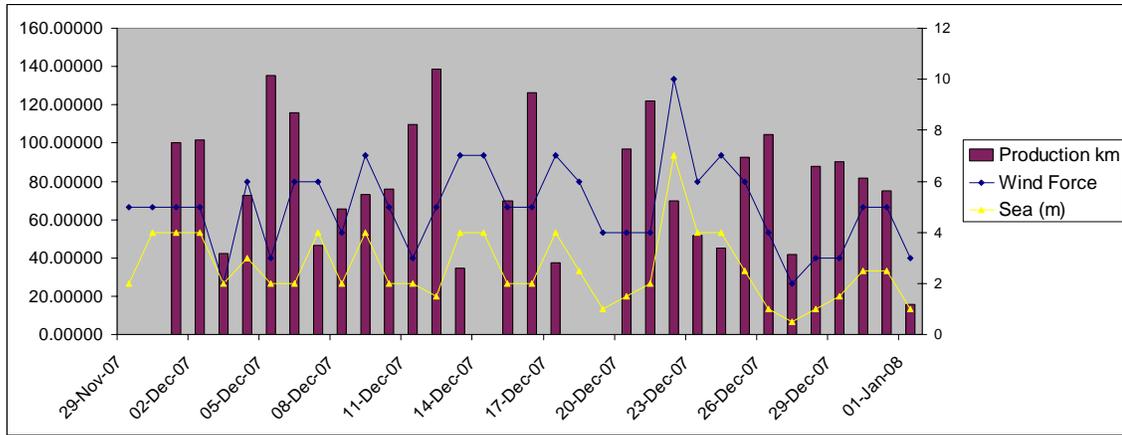
2.1 Daily log

Date	Total Km	Prime FF	Prime RO	Infill FF	Infill RO	wind f'ce	sea state	comments
29/11/2007	0.000000	0.000000	0.000000	0.000000	0.000000	5	Moderate	Travel to next prospect, meanwhile working on the streamer fronts.
30/11/2007	0.000000	0.000000	0.000000	0.000000	0.000000	5	Moderate	Changing front stretches on streamer 1, 2, 3. Working on leakage/parity problem on streamer 3. Deploying gun arrays
01/12/2007	100.106250	91.106250	9.000000	0.000000	0.000000	5	Moderate	Wind was down for 3-4 hours in the morning, and the workboat went out to change some pingers/birds.
02/12/2007	101.493750	92.493750	9.000000	0.000000	0.000000	5	Moderate	
03/12/2007	42.206250	39.206250	3.000000	0.000000	0.000000	2	Smooth (wavelets)	17:05 hrs due to bird line problems on streamer 4.
04/12/2007	72.412500	66.412500	6.000000	0.000000	0.000000	6	Rough	6.5 hrs weather standby. 4.87 due to, reshoot for streamer 4 bird line problems.
05/12/2007	135.412500	123.412500	12.000000	0.000000	0.000000	6	Moderate	Production all day. Workboat out to change 1 section and 1 module. Wind started increasing again in the evening.
06/12/2007	115.912500	106.912500	9.000000	0.000000	0.000000	6	Moderate	5.73 hrs standby due to weather.
07/12/2007	46.518750	43.518750	3.000000	0.000000	0.000000	6	Rough	marginal shooting conditions and weather standby. Tailbuoy 3 and 4 tangled in a turn.
08/12/2007	65.737500	0.000000	0.000000	59.737500	6.000000	4	Moderate	Winds were force 6 and calmed down in the early mornings
09/12/2007	73.256250	67.256250	6.000000	0.000000	0.000000	7	Rough	16:00 winds increasing to 35 kts.
10/12/2007	75.993750	69.993750	6.000000	0.000000	0.000000	5	Moderate	10.75 hrs weather standby. 71 minutes gun shutdown for humpback whale, distance 1100-1500 m.
11/12/2007	109.481250	97.481250	12.000000	0.000000	0.000000	3	Moderate	.15 hrs due to slow down to change 2 modules. 3.72 hrs standby, .067 reshoot for weather + 3.65 hours for cetaceans.

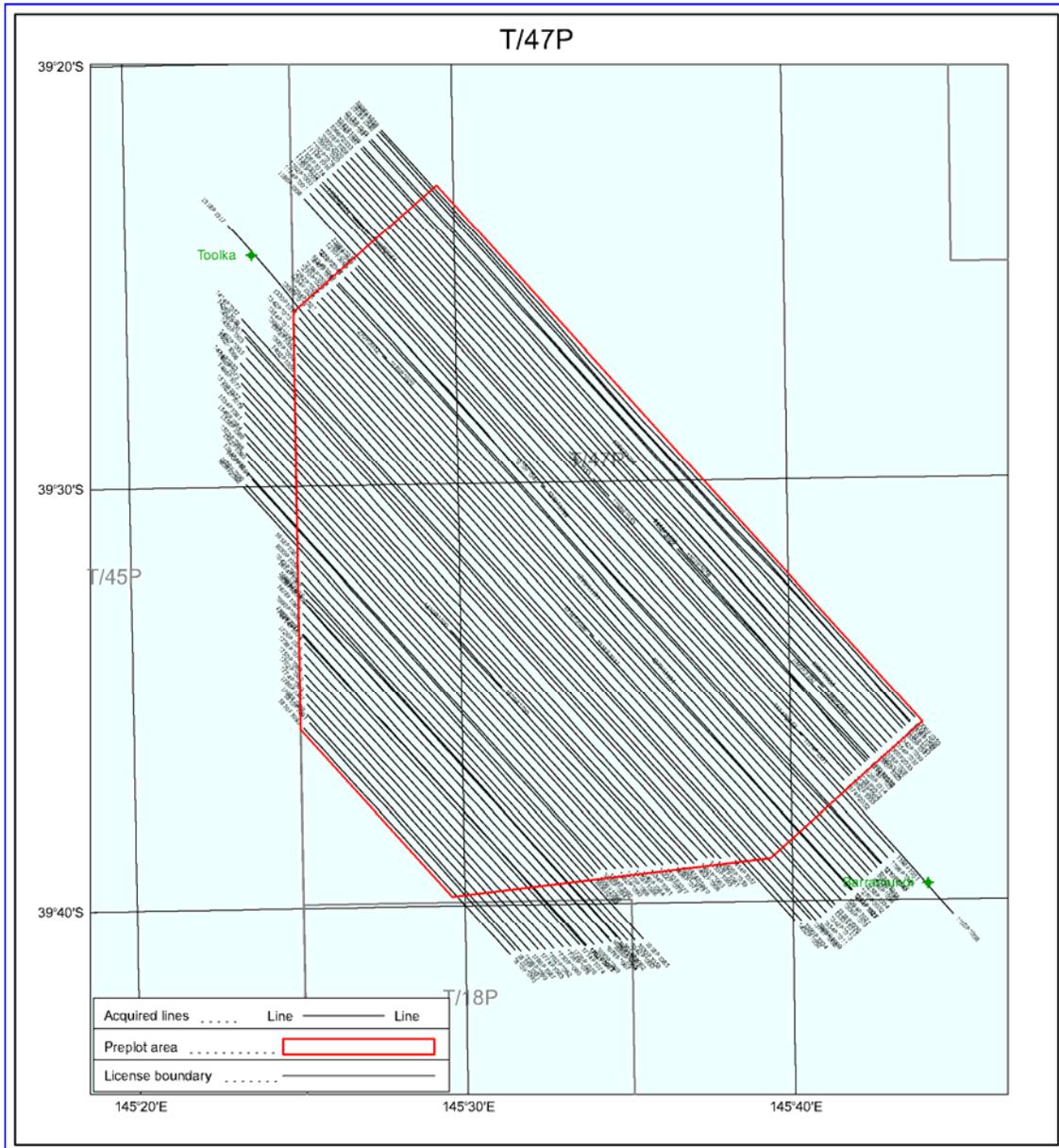
12/12/2007	138.787500	126.787500	12.000000	0.000000	0.000000	5	Moderate	Shooting all day. Wind increasing during the evening.
13/12/2007	34.687500	31.687500	3.000000	0.000000	0.000000	7	Rough	Down for bad weather from 07:50.
14/12/2007	0.000000	0.000000	0.000000	0.000000	0.000000	7	Rough	Down for weather all day
15/12/2007	69.637500	31.706250	3.000000	31.931250	3.000000	6	Moderate	Winds have switched since mid-night from NE to SW
16/12/2007	126.056250	63.393750	6.000000	50.662500	6.000000	5	Moderate	
17/12/2007	37.425000	2.718750	0.000000	31.706250	3.000000	7	Rough	8.18 hrs weather standby, 7.27 due to instr./reshoots. Winds calmed down during the night, then turned and increased again. Transferred stores in the morning. Incident report 11637/07, damaged provisions, burst lithium batteries.
18/12/2007	0.000000	0.000000	0.000000	0.000000	0.000000	6	Moderate	Moved closer to Melbourne for the crew changes. 4 helicopters for the maritime crew. Started to recover guns when the seas came down enough to work safe. Guns onboard at 15:00, turned heading into the wind and seas, and started to pick up the front of streamer 2 to try getting rid of crossfeed from the pinger lines. Cables back out at midnight.
19/12/2007	0.000000	0.000000	0.000000	0.000000	0.000000	4	Slight	Off prospect due to CREW CHANGE. Bunkered from chase boat.
20/12/2007	96.656250	87.656250	9.000000	0.000000	0.000000	4	Moderate	In production, Sequence 056, 057, 058, 059
21/12/2007	122.250000	107.812500	14.437500	0.000000	0.000000	4	Moderate	In production, Sequence 060, 061, 062, 063. Weather building in the evening to F8 on the beam
22/12/2007	69.656250	60.093750	9.562500	0.000000	0.000000	10	High	In production, Sequence 063, 064, 065, 066. Down for weather. Lost TB1.
23/12/2007	51.900000	2.868750	0.000000	43.031250	6.000000	6	Rough	Down for weather in the morning. In production, Sequence 067, 068, 069 (streamers at 8 or 9m all day).
24/12/2007	45.037500	39.037500	6.000000	0.000000	0.000000	7	Rough	Production & weather. Sequence 069, 070, 071(NTBP - weather) then down for weather over midnight.

25/12/2007	92.512500	80.512500	12.000000	0.000000	0.000000	6	Moderate	Weather then production. Sequence 072, 073, 074, 075.
26/12/2007	104.231250	89.231250	15.000000	0.000000	0.000000	4	Slight	In production, Sequence 076,077 (EDIT due to NTRS lock up),078, 079, 080.
27/12/2007	41.793750	35.793750	6.000000	0.000000	0.000000	2	Smooth (wavelets)	In production, Sequence 081, 082. Downtime for two issues. Streamer 3 optical boot and streamer 2 mini-lead in boot.
28/12/2007	88.068750	76.068750	12.000000	0.000000	0.000000	3	Slight	New TB1 installed. Downtime from yesterday's telemetry problems. Back in production, Sequence 083, 084, 85, 086
29/12/2007	90.356250	75.356250	15.000000	0.000000	0.000000	3	Slight	In production, Sequence 087, 88, 089, 090, 091.
30/12/2007	81.525000	40.256250	6.000000	29.268750	6.000000	5	Moderate	In production, Sequence 092, 093, 094, 095, 096
31/12/2007	74.812500	0.000000	0.000000	65.812500	9.000000	5	Moderate	Downtime for reshoots caused by autofires on Sequence 047 & NTRS lock up on Sequence 077 plus associated line changes. Production, Sequence 096, 097, 098, 099 (reshoot from Sequence 047), 100 (reshoot from Sequence 077).
01/01/2008	15.900000	0.000000	0.000000	15.900000	0.000000	3	Slight	Down time for more reshoots due to various reasons last swing. In production, Sequence 101, 102, 103. END OF JOB.

2.2 Daily production and sea state



2.3 Post plotted vessel positions



3 Key personnel

	28th November 2007	01st January 2008
Party Chief	Per Kåre Hovland	Andrew Sinnott
Chief observer	Mike Coble	Errol Wright
Chief navigator	Richard Murchie	Ian Kemp
Chief mechanic	Larry Granzin	Kenny Brock
Chief geophysicist	Rune Strømme	Colin Hughes
Client representative onboard	Alex White Ray Doughty	Russell Stanley Diane Osborne
Client contacts onshore	Denise Long	

4 HSE

4.1 Statistics

Exposure hours	Marine crew	13872
	Seismic crew	16272
	Third party crew	7512
	Chaseboat crew	4896
	Total	42552
Small Boat Launches		25
Small Boat Exposure (man hours)		138.52
Incident Reports		5
Toolbox Meetings		34
Drills		7
Helicopter Ops		15
Helicopter Exposure (man hours)		55.9
MMO Sightings		18
MMO where action reqd.		1

4.2 Incidents

Report no.	Date	Classification	Comments
11115/07/MA	05-Dec-07	FAC	Personnel : FAC IR twisted ankle
11235/07/MA	07-Dec-07	NM	Near Miss : Potential for cut / puncture accident during cleaning of mast camera
11637/07/MA	17-Dec-07	NM	Near Miss : Potential for injury by chemical burn/lung damage by inhaling of fumes
11895/07/MA	28-Dec-07	FAC	Personnel : Cut injury to finger in WB
1/08/MA	01-Jan-08	Occupational Illness	Personnel : Back pain unrelated to work

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.

A yacht race was held on 27th December, from Melbourne to Hobart. The client, party chief and race organisers were in close communication to bring awareness of our operations to the competitors. A successful race it was, albeit in light winds to start with. There were a few stray yachts on the return leg, which seemed to have forgotten about us, but they were all kept clear by hailing them on VHF ch.16 or by sending out the FRC to catch their attention.

Sea Conditions, Tides and Currents

The sea conditions were generally rough due to the weather. Tides and currents were very weak in this area and not much infill was generated due to feather mis-matches.

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

146.85 hours of time was lost to weather which equates to 18% 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 acoustic 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

3.65 hours of time was lost in order to fully implement the marine mammal sighting procedures. Despite this, minimal cetacean activity was observed (18 sightings) of which most were of dolphins. See the log in appendix 12.6

Naval Activity Including Civil Unrest

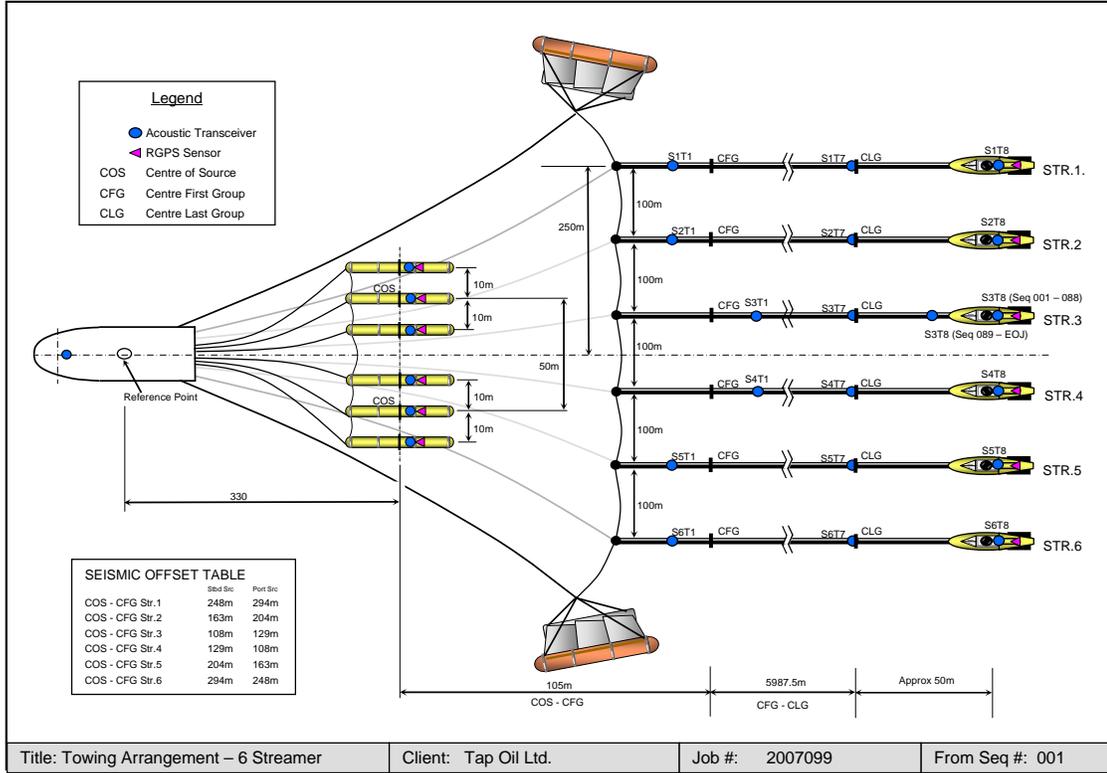
Nothing observed.

6 Seismic energy source

6.1 Source details

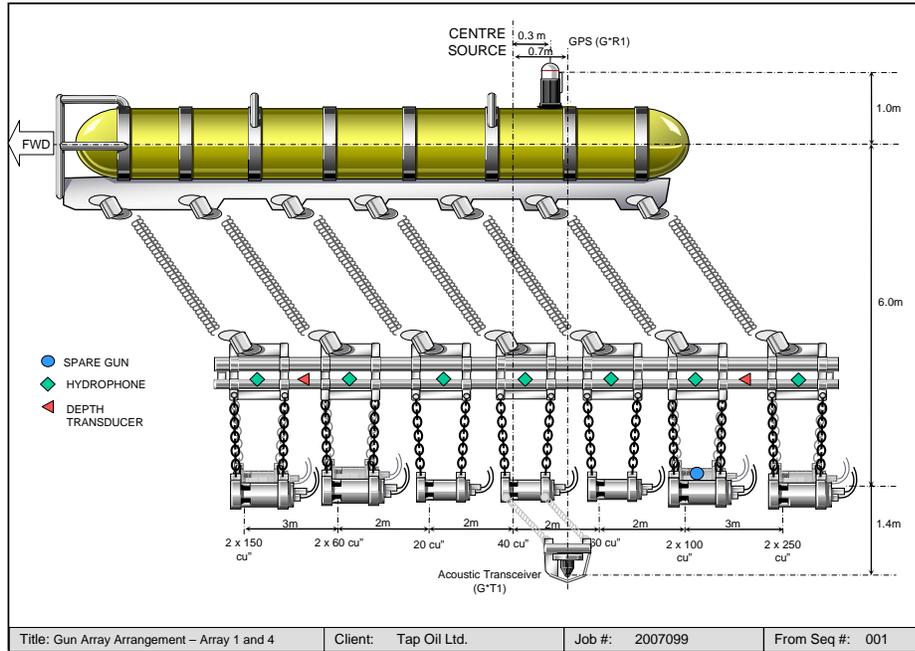
Source type	:	Bolt 1900 LLXT air guns
Air pressure	:	2000 psi
Volume	:	3090 in ³
Number of sources	:	2
Number of sub-arrays	:	6 (2x3)
Source separation	:	50 m
Sub-array separation	:	10 m
Source length	:	14 m
Gun synchronisation	:	± 1.0 ms
Drop-out specification	:	5 %
Shot interval	:	18.75 m
Depth	:	6 +/-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

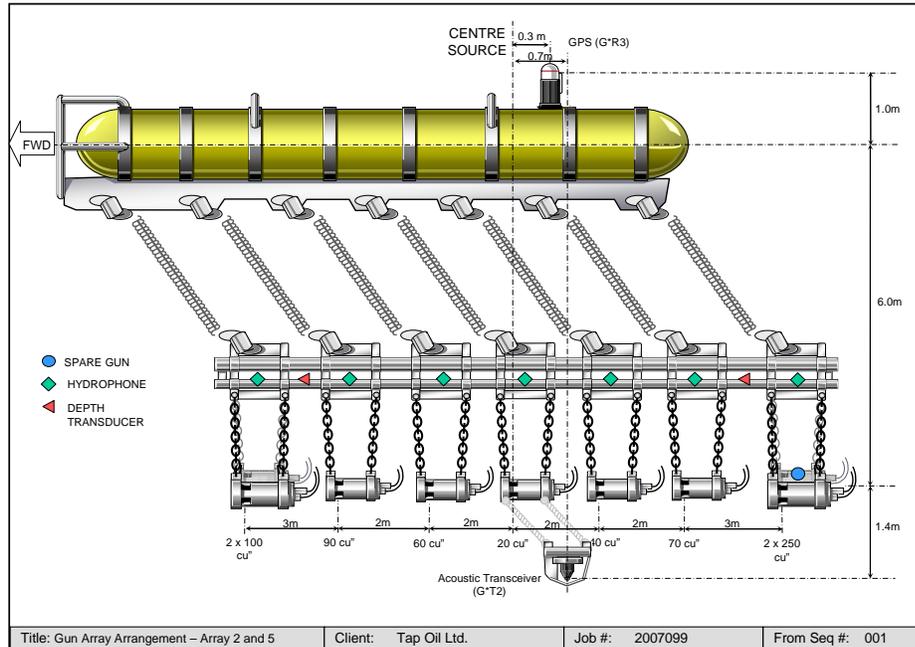


6.3 Gun array layout

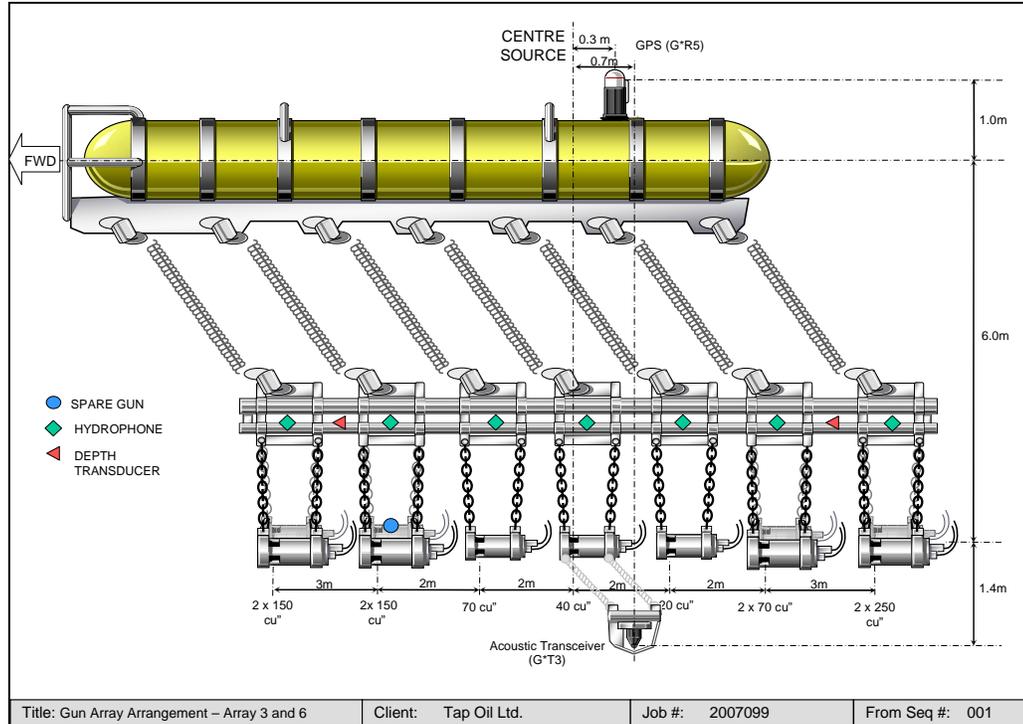
Array #1 & 4



Array #2 & 5



Array #3 & 6

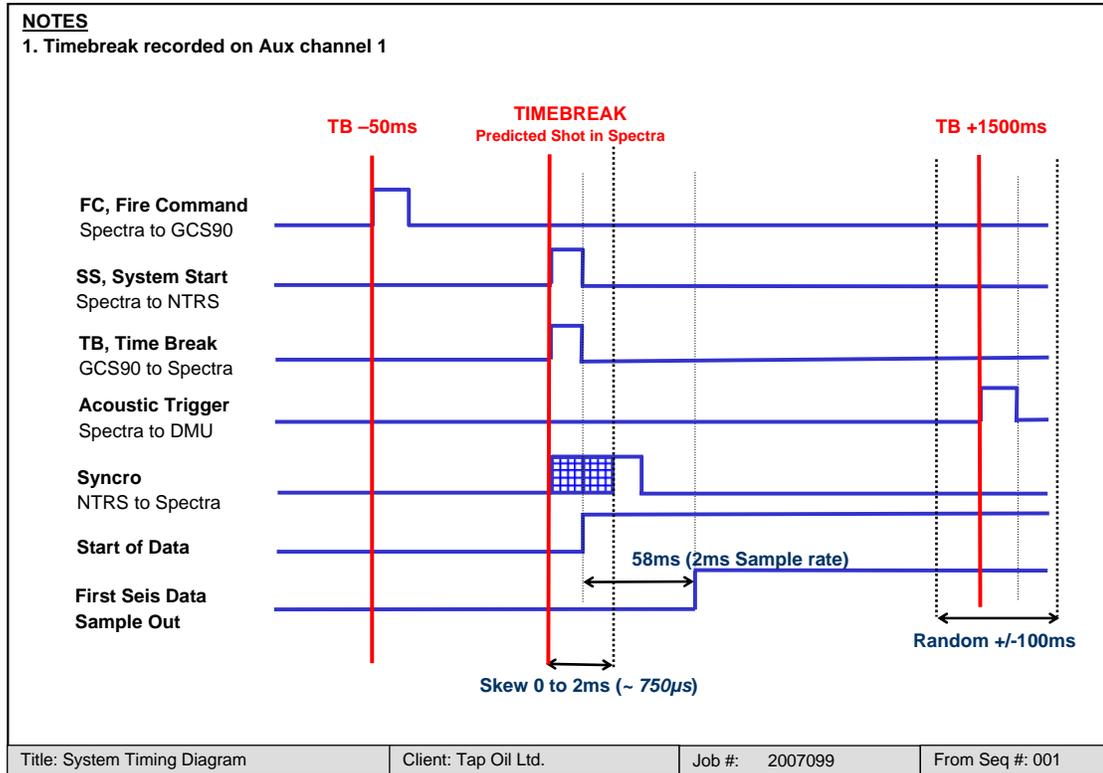


7 Seismic acquisition system

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	:	4.60 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



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 (1 extra bird for each outer streamer 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

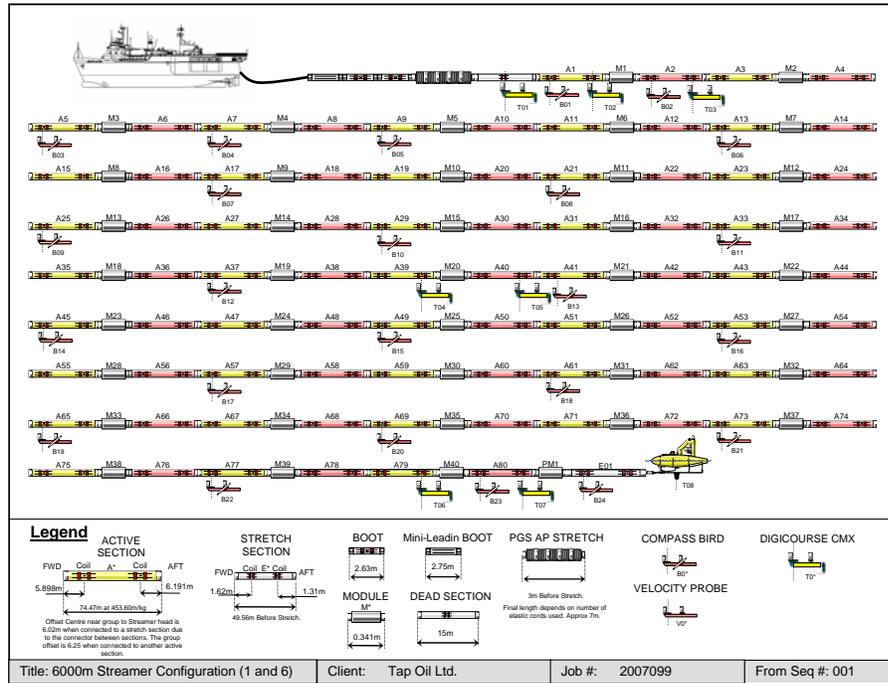
STREAMER	TRACE
Streamer 1	1 to 480
Streamer 2	481 to 960
Streamer 3	961 to 1440
Streamer 4	1441 to 1920
Streamer 5	1921 to 2400
Streamer 6	2101 to 2880
Auxiliaries	1 to 48

7.3.3 Component dimensions

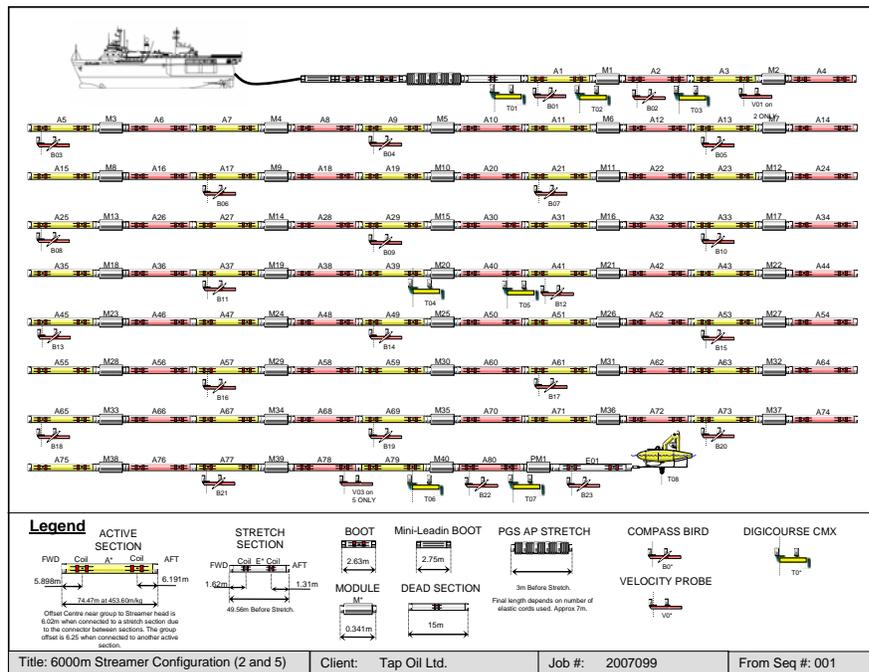
	NUMBER per STREAMER	NOMINAL LENGTH (m)
Lead-in	1	700
Mini Lead-in Boot	1	3.5
Head Conventional Boot	1	2.7
Head AP Stretch Section	1	5
Head Dead section	1	15
Hydroscience Module	41	0.350
Live Sections	80	75
Tail Stretch Sections	1	50
Power Adapter Tail Swivel	1	0.340

7.4 Streamer layout

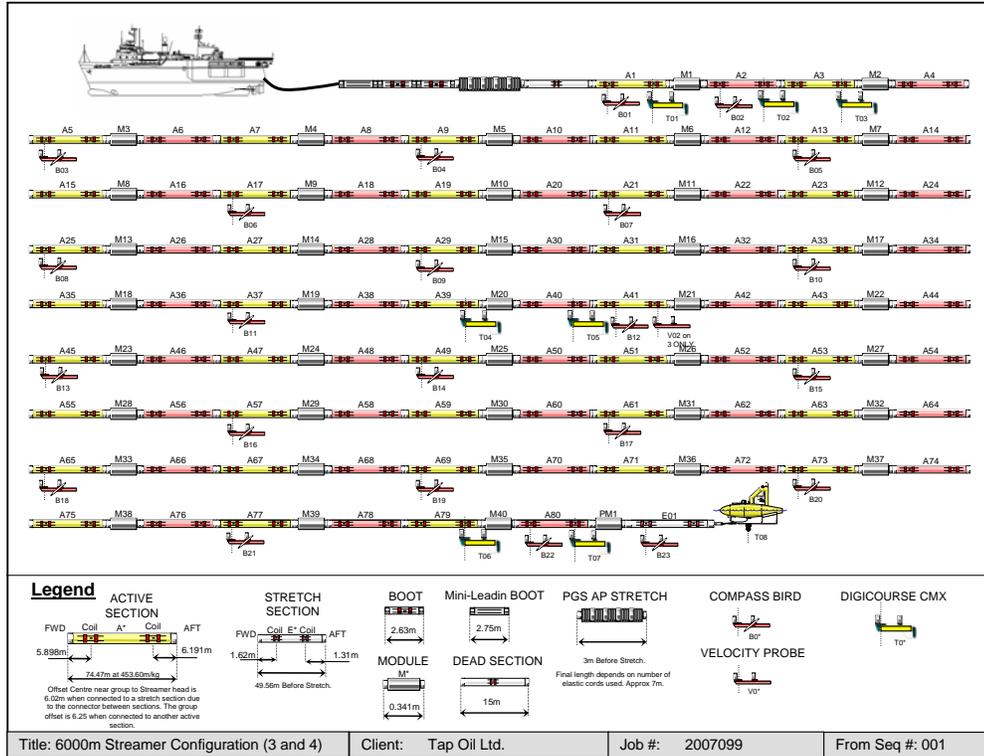
Streamer #1 & 6



Streamer #2 & 5



Streamer #3 & 4



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 (based on AUSLIG 2000)
GPS Datum	:	WGS84
Ellipsoid	:	WGS84
Semi Major Axis	:	6378137 m
1/Flattening	:	298.257223563
Geoid height	:	-0.35m (max value -0.03m, min value -0.84m)

8.1.2 Datum Shift WGS84 to GDA94

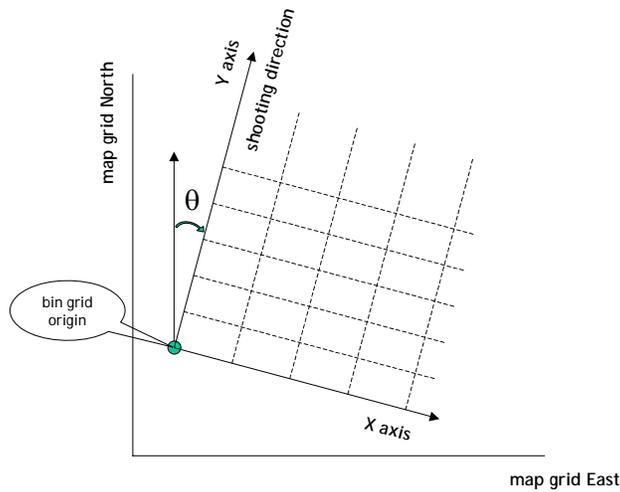
X-Translation	:	0.0 m
Y-Translation	:	0.0 m
Z-Translation	:	0.0 m
X-Axis Rotation *	:	0.0 "
Y-Axis Rotation *	:	0.0 "
Z-Axis Rotation *	:	0.0 "
Scale Correction	:	0.0 *10 ⁻⁶

* Bursa-Wolf sign convention

8.1.3 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	:	0°
False Northing	:	10,000,000 m
False Easting	:	500,000 m

8.1.4 Binning grid



Origin Easting (m) : 364,984.71
 Origin Northing (m) : 5,646,141.68
 Rotation (deg) : 137.92

	X	Y
Origin bin number	981	568
Bin number increment	1	0.33
Area size (m)	21375	50325
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)	90	20	18
For near-mid offset segment (1600 m to 3100 m)	85	20	17
For far-mid offset segment (3100 m to 4600 m)	70	20	14
For Far offset segment (4600 m to 6100 m)	50	20	10

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 A/S
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 380 km distant Bathurst 930 km distant Cobar 1080 km distant Brisbane 1460 km distant
Software	:	SPM 2000, version 4.26
Sub-Contractor	:	Fugro A/S
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.

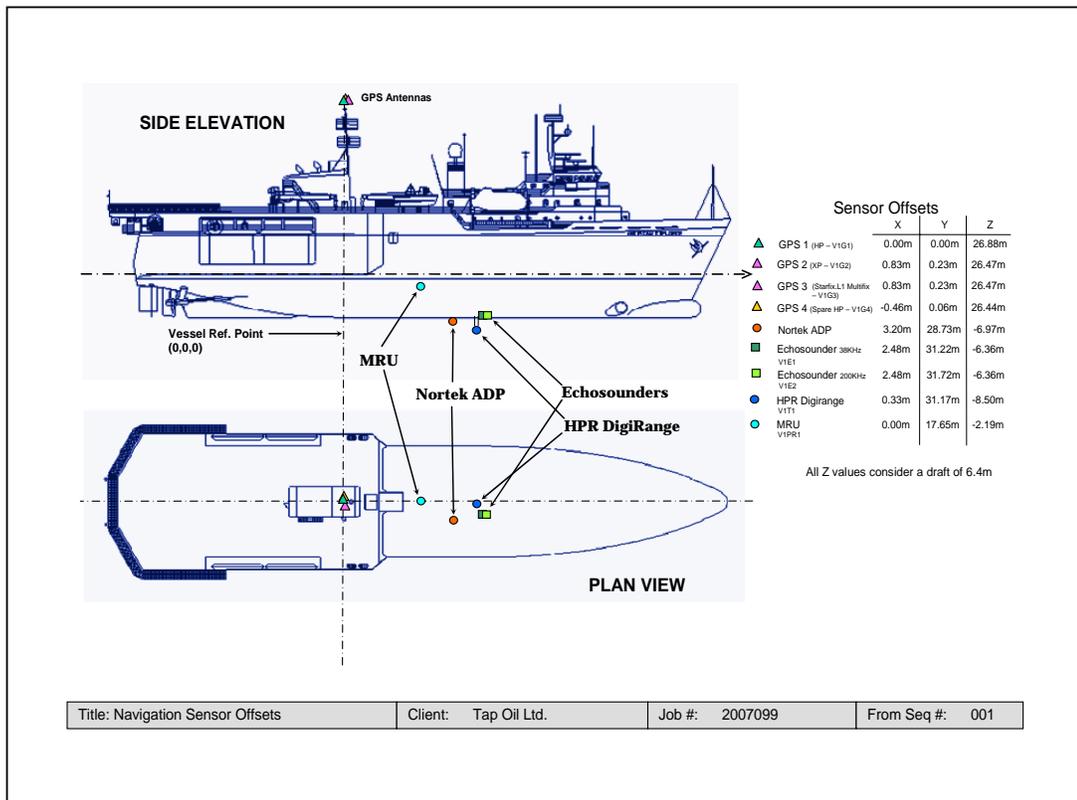
8.2.4 Heading reference

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

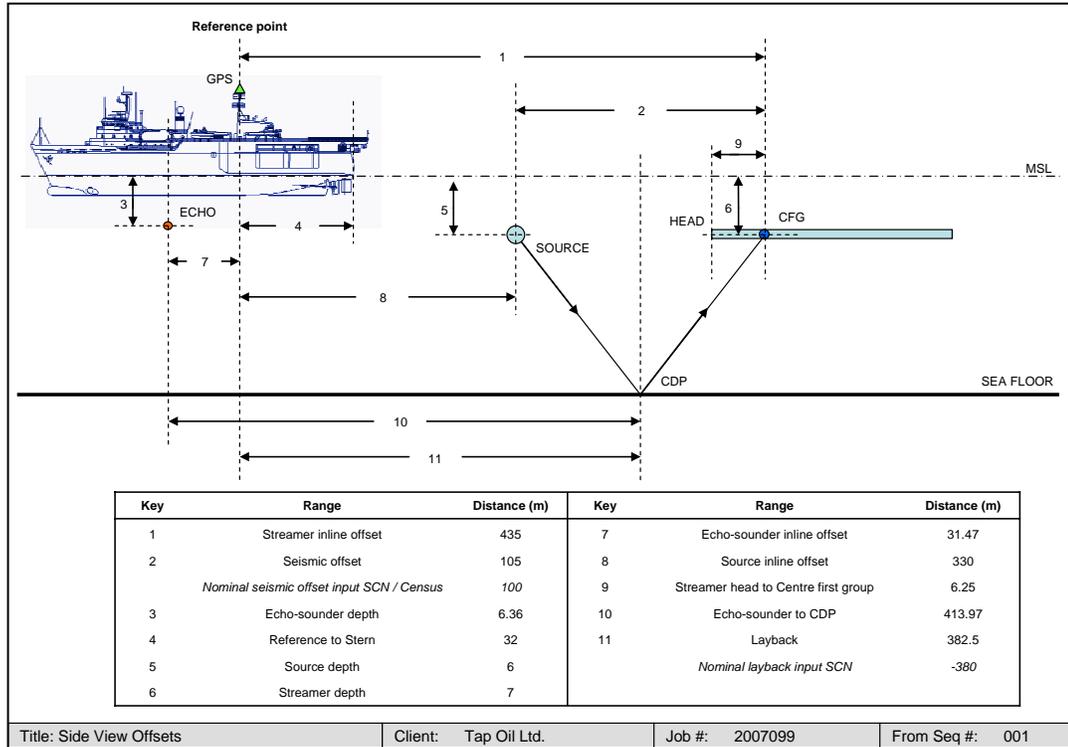
The Seapath 200 is an integrated GPS/Inertial attitude and positioning system. It is comprised of dual GPS antennae determining heading and position using carrier phase measurement. Inertial data from the Motion Reference Unit provides acceleration and angular information about three axes. Static speed 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

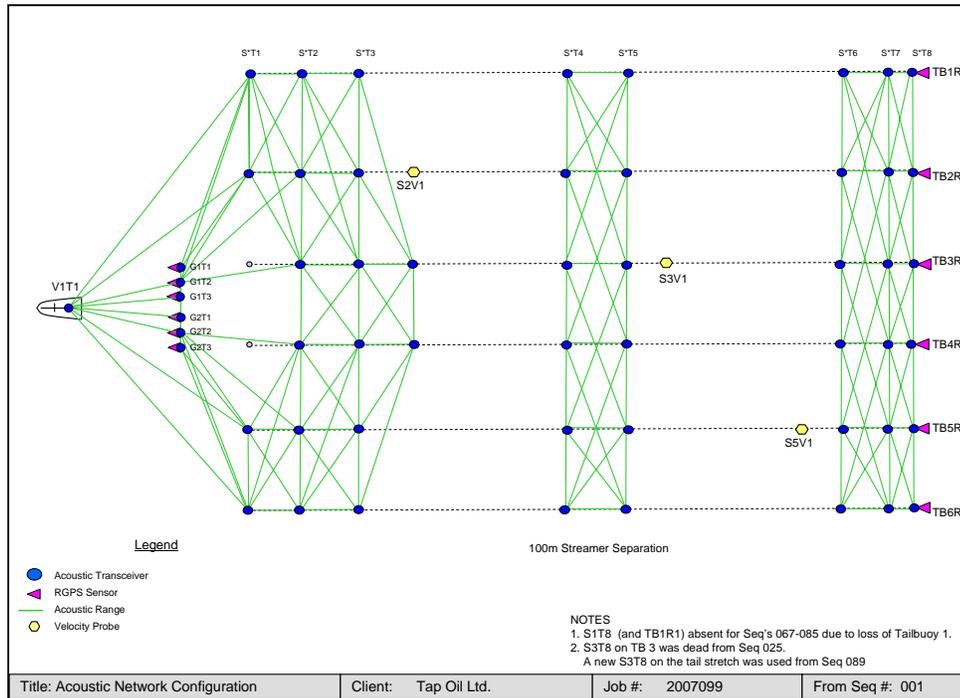


8.3 Underwater positioning

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 : 12.52°

This value was derived using the IGRF 2005 model for 30th November 2007 at position - 39°32'13.1" S, 145°31'46.6" E.

8.3.4 Echosounder

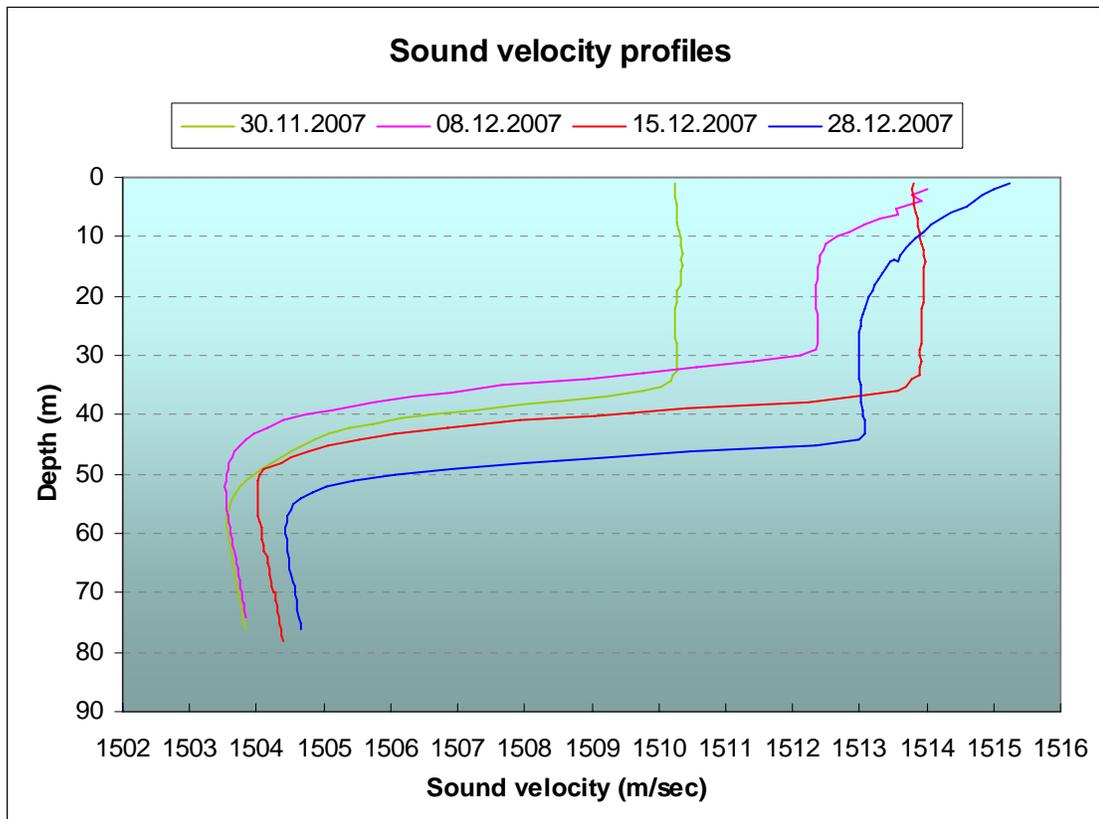
Type and model : Simrad EA500
Transceiver frequencies : 38 kHz, 200 kHz
Heave compensated : Yes

8.3.5 Sound velocity

CTD probe : Model 600 CTD (1000 μ bar)
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 four profiles were collected during the course of the survey.



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.

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.XP and part of Fugro's investigation concentrates on why some systems exhibit reset problems while others do not.

8.5.2 Acoustic ranges

The acoustic data for this survey was of good quality through out 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. As is normal, the only poor performance were the available ranges between streamers 3 & 4 in the front net, the area directly affected by the prop wash and gun bubble with its associated aerated water.

At one stage a proposal to extend from 3 subnets to a full acoustic network was considered. The thinking behind this was to give greater weight in the complete network solution to the acoustic data and be less reliant on the noisier compass data during the periods of marginal weather. This may have allowed more lines to be shot with the streamers set at 7m. Whether this would have limited the effect of noisy compasses is difficult to assess. The sequences with the noisiest compass data also exhibited noisier acoustic data on the outer ranges of the front network and within the tail network. A full network of acoustics requires considerably more "tuning" by the operator during poor weather to maintain good data quality. In-sea maintenance requirements are also increased and this is incompatible with limited weather windows in which to launch the workboat. The time period over which the full network could be deployed was also under question and ultimately production continued with no alterations made.

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, although a very small amount of radio interference was observed on both operating frequencies. The units had all been recently used on the previous survey and continued to operate within the expected standards of accuracy. Tailbuoy 1 was lost during a spell of bad weather and there were no observations available at that node from sequence 067 until the replacement tailbuoy was deployed prior to sequence 086.

8.5.5 Echo Sounder

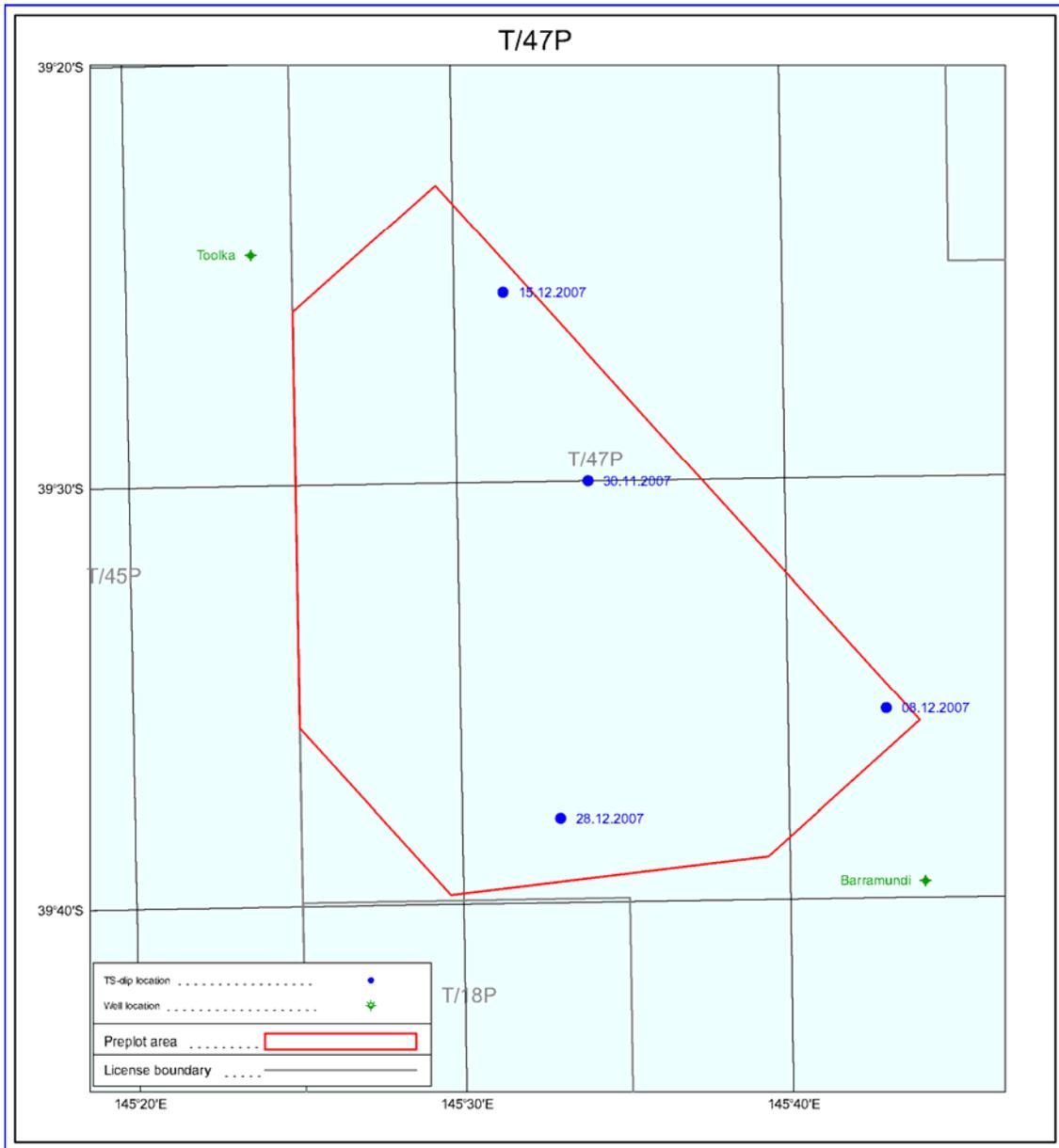
The echo sounder data output in the final P1/90 depth records was derived from the 200 KHz transducer, which performed well throughout the survey. The raw data was not draft corrected but compensation for vessel heave, using data interfaced from the MRU, was applied. A fixed water velocity of 1500m/s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

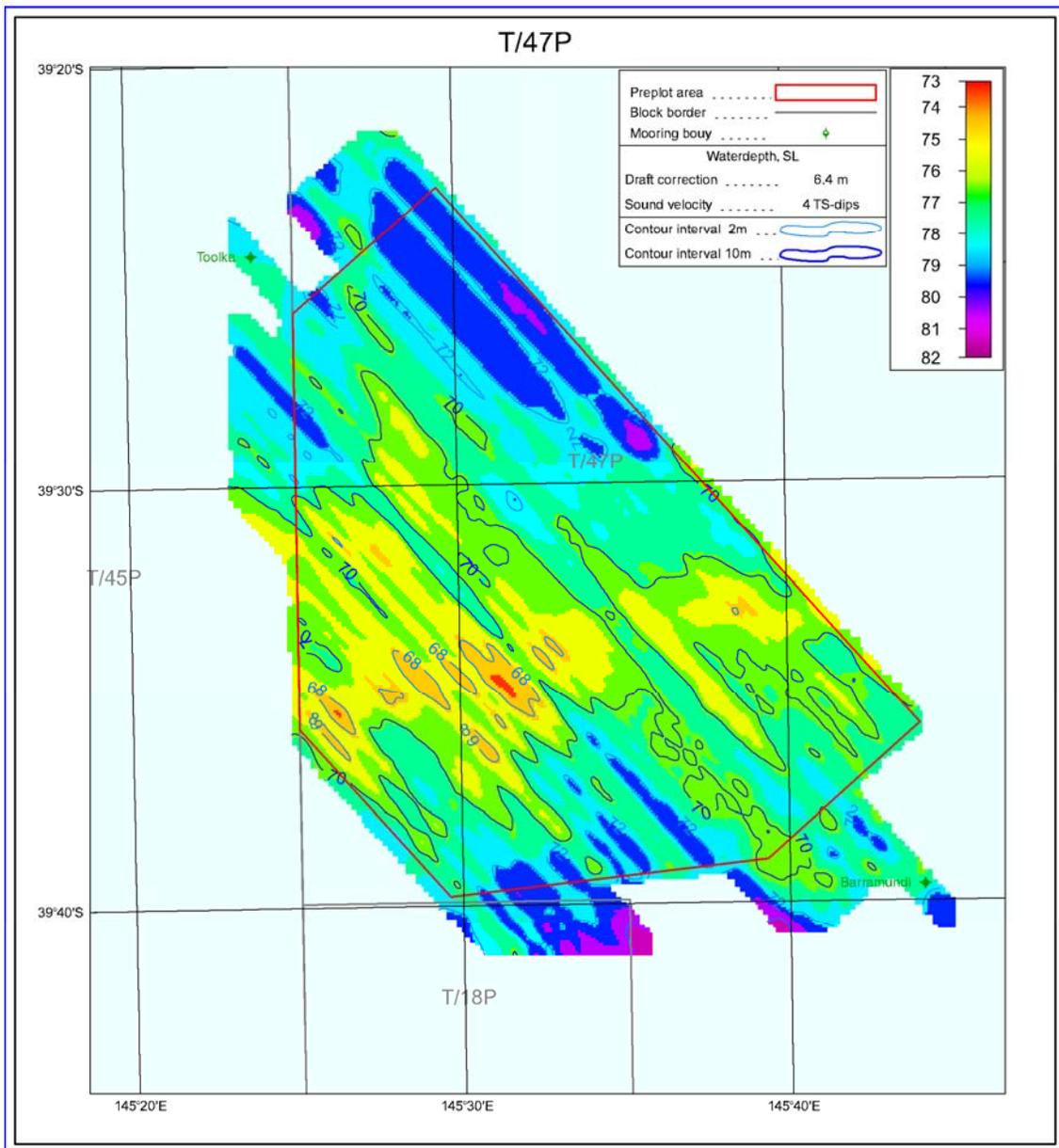
A special water depth tape was created, with depths corrected for draft and sound velocity

Draft correction applied: 6.4m

4 sound velocity profiles were taken in the area during the survey period. These were used to correct depths for sound velocity variations.

Profile no	date	position.
1	30.11.2007	39°30'S 145°34'E
2	08.12.2007	39°35.5'S 145°43'E
3	15.12.2007	39°25.5'S 145°31.5'E
4	28.12.2007	39°38'S 145°33'E





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 was de-spiked to remove gross outliers, but no filters were applied.

8.6 Delivered P1/90 and P2/94

Raw navigation data were 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 Tap Oil Ltd., Bentley 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, CMP positions, and all receiver groups. One set of P1/90 tapes was included with the seismic data delivered to Tap Oil Ltd., Bentley 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

All 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 all 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 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. 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.
- PGS internal software was used to plot the rotated and un-rotated streamer shapes. The un-rotated plots provided a plan view of the post-processing results. The rotated plots displayed the streamer shapes for every shot at a 90 degree rotation. This allowed the shot to shot consistency to be checked.

The final P1/90 files were also checked using a variety of software tools; Sprint QC tool, p1Plot and p1List, the two latter tools being 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 p1plot 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	1174P1001	-0.40	-6.10	-6.10	-6.20
002	1378P1002	0.3	-5.8	-5.8	7.1
003	1162P1003	-0.4	-6.7	-6.7	-6.9
005	1150P1005	0.4	2.4	1.8	6.2
008	1186P1008	-0.2	2.2	-1.9	-10.4
009	1366R1009	-0.2	1.6	1.6	4.0
011	1354P1011	0.4	2.3	2.3	10.0
017	1318P1017	0.3	2.2	2.2	10.9
018	1102P1018	-0.4	-1.9	1.7	-12.0
020	1090P1020	-0.3	1.8	1.8	-5.4
032	1270P3032	0.9	2.3	-2.0	-8.9
033	1066P2033	-0.6	2.5	2.5	-7.6
041	1030P1041	0.3	6.0	6.0	4.5
048	1006P1048	-0.4	2.4	2.4	9.7
050	1006F1050	-0.4	3.0	2.7	9.7
051	1198F1051	0.6	3.4	3.0	9.9
056	1402P1056	0.4	1.7	2.5	8.0
095	1666F1095	1.3	3.2	-4.1	-11.3

10 Seismic data quality

10.1 Ship & rig noise

Low level Ship noise from the Spirit of Tasmania Ferry was seen on a few lines. The brute stack was not affected.

10.2 Swell noise

No lines were scratched during this survey due to swell noise. Sequences 11 and 12 had marginal levels of swell but it was felt that the target area was not adversely affected. Sequences 16, 17, 18, 25, 43, and 66 benefitted from an application of 'SINK' swell noise reduction but the levels were below the marginal lines.

10.3 Strum / Tug noise

Front end strum/tug noise (FEN) was seen on all cables but was stronger on streamers 1 and 4. The FEN was very sensitive to vessel speed so online adjustments were made to control the levels.

10.4 Source Separation Errors

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

10.5 Telemetry and Parity Errors

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

10.6 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 streamers were dropped during the line for sequence 012 due to navigation compass problems caused by a deteriorating sea state. The maximum depth the streamers were dropped to was 9m.

10.7 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

Intermittent cross-feed could be seen on streamer 2 throughout much of the survey. The majority of this was weak but on some lines it was stronger. The cause of the problem was fixed after line sequence 082.

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).

10.8 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.

10.9 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.

Summary of causes of scratched and incomplete line sequences

Cause	Scratched	Incomplete or Edit
Air leak		
Source separation errors		
Compressor failure		
Auto-fire, misfire		26,47
SI / timesharing		
Ship noise		
Weather		
Depth control errors		
Observing software / hardware		1,21,32,77
Navigation software / hardware		
Strum noise		
Telemetry/parities/module failure	6,7,	053 054 063
Coverage		
Navigation Compass Problems	(6,7),10,23,24,30,31,44,55,71	17,18
Fishing activity & fishing gear		
Other		33,(whale within 2km of source)

10.10 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 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.

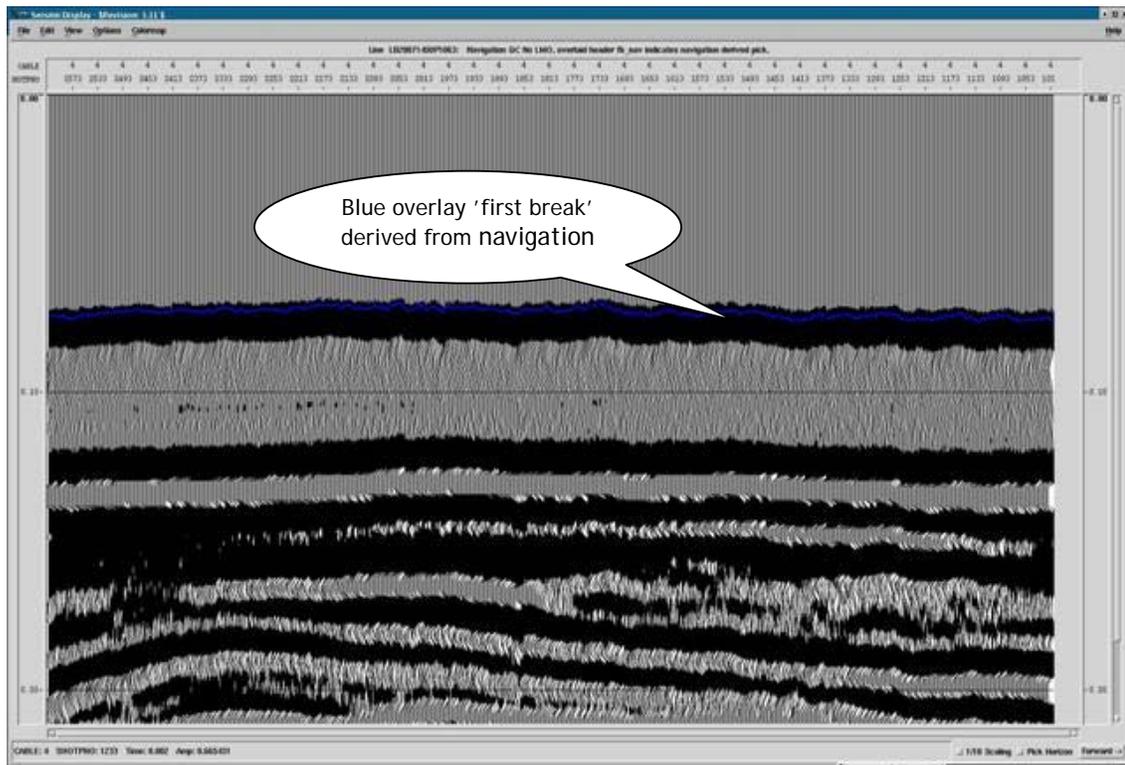
5: End-of-record windows

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.

10.11 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 1450P1063 Streamer 4 Starboard Source

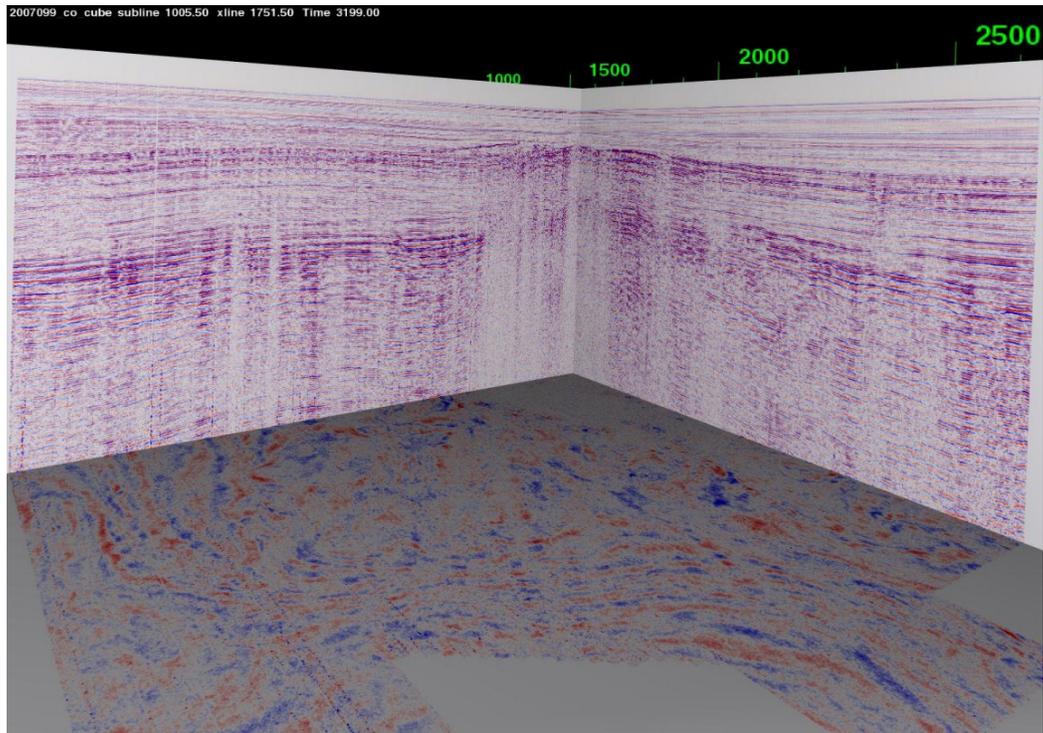


Common offset cube

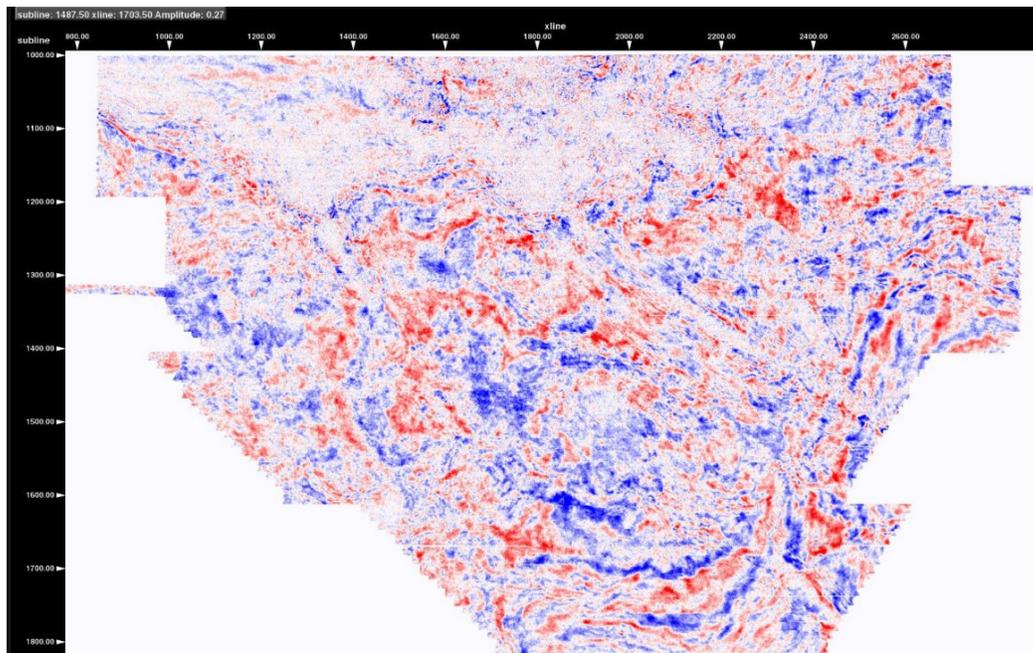
The common offset cube was created using PGS' proprietary 'HoloSeis' 3D visualisation program. The main purpose of the cube analysis was to assist with QC of the navigation data after having been merged with seismic. The appearance of miss-ties or busts between lines in the cube could indicate problems with the navigation data.

The client supplied a tidal static correction file which was applied to the data before loading to the cube. This eliminated miss-ties that were caused by tidal effects.

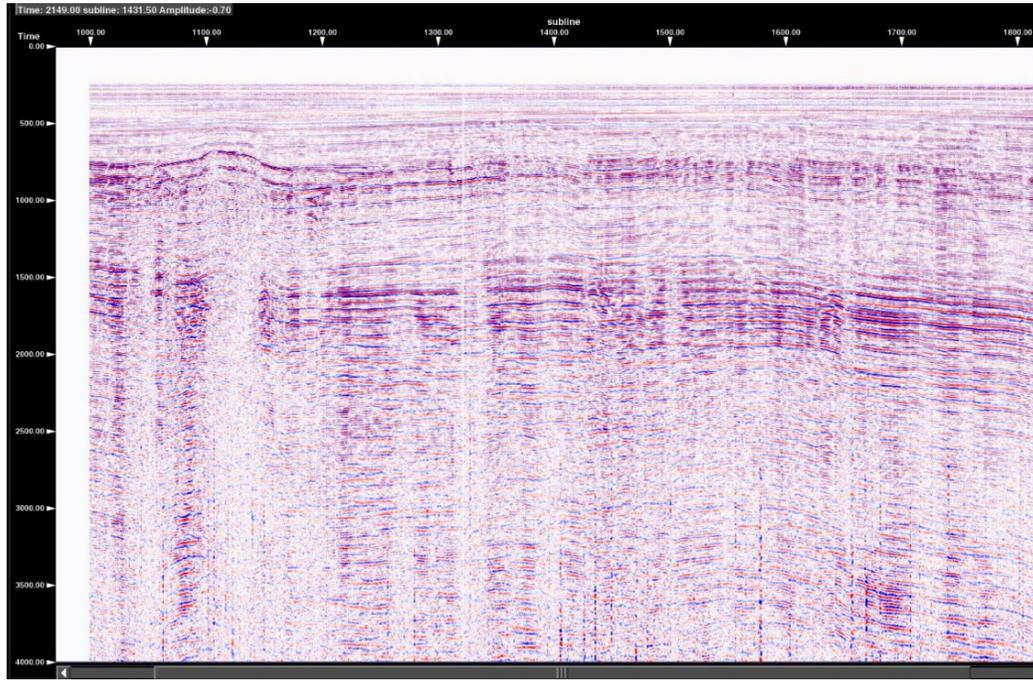
Holoseis plane view



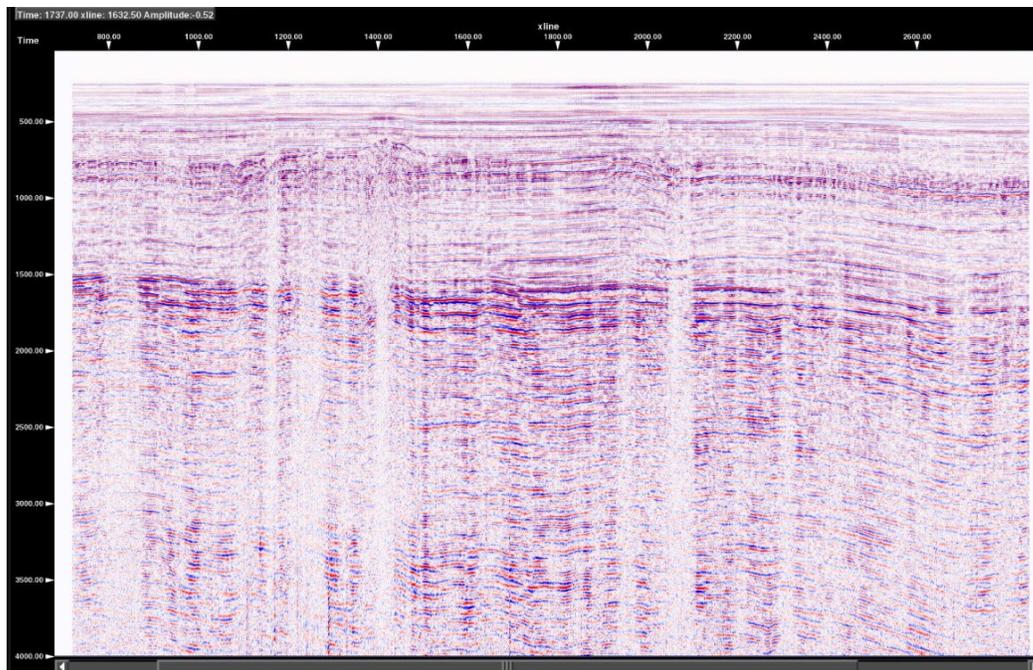
Time-slice at 2001ms



Cross-line at SP 2098



Inline 1318

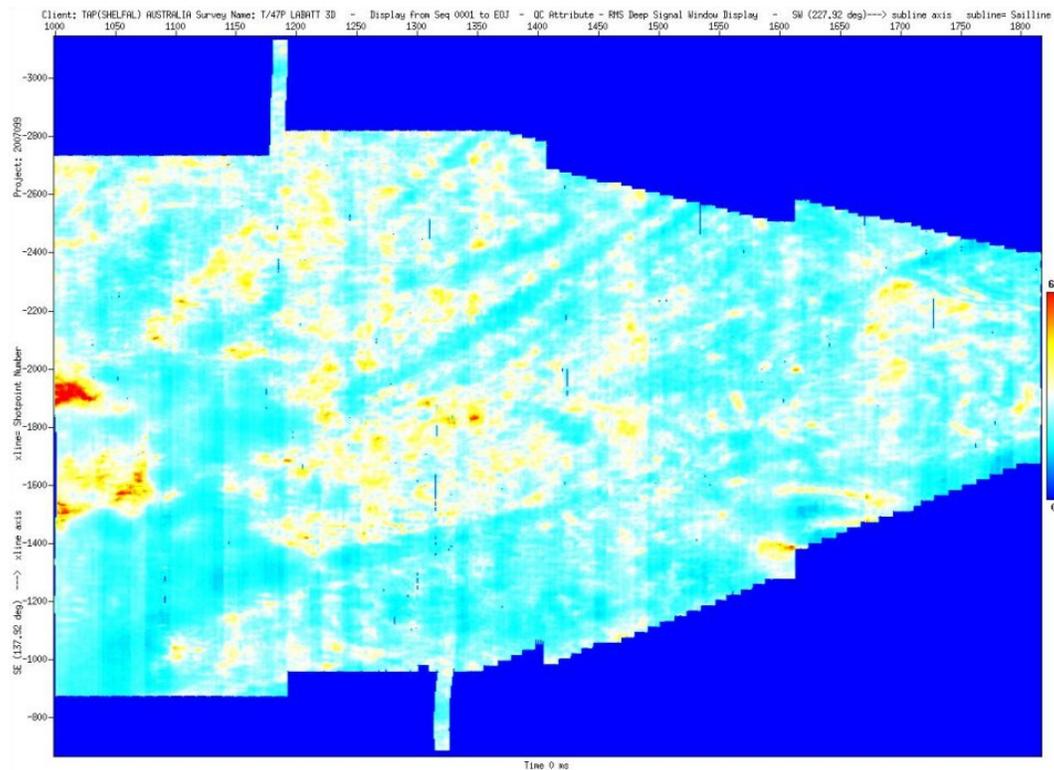


10.12 Seismic data attributes

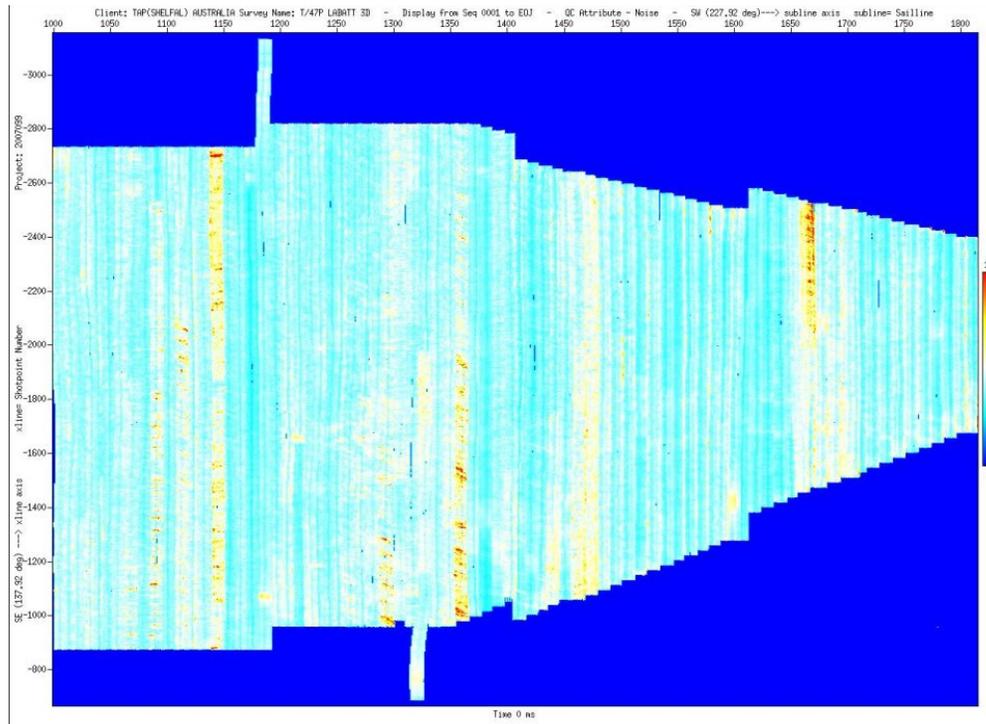
A number of attributes were calculated and binned both using holoseis and viper BinXYZ attribute handling to allow for investigation of streamer to streamer comparison and line to line comparison and matching over the whole survey.

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

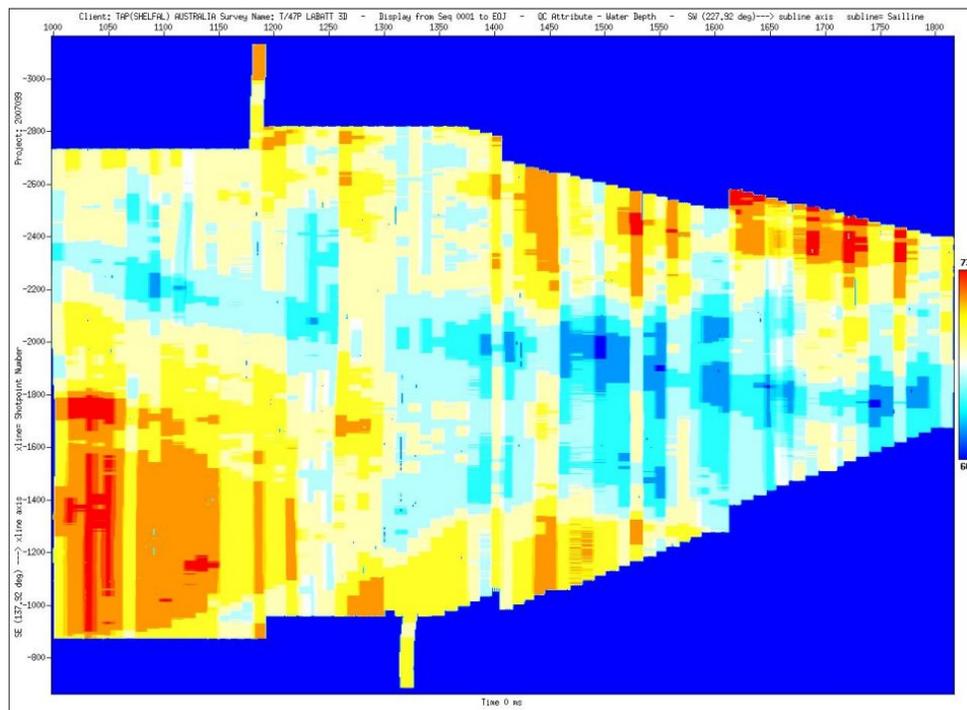
RMS signal window



RMS noise window



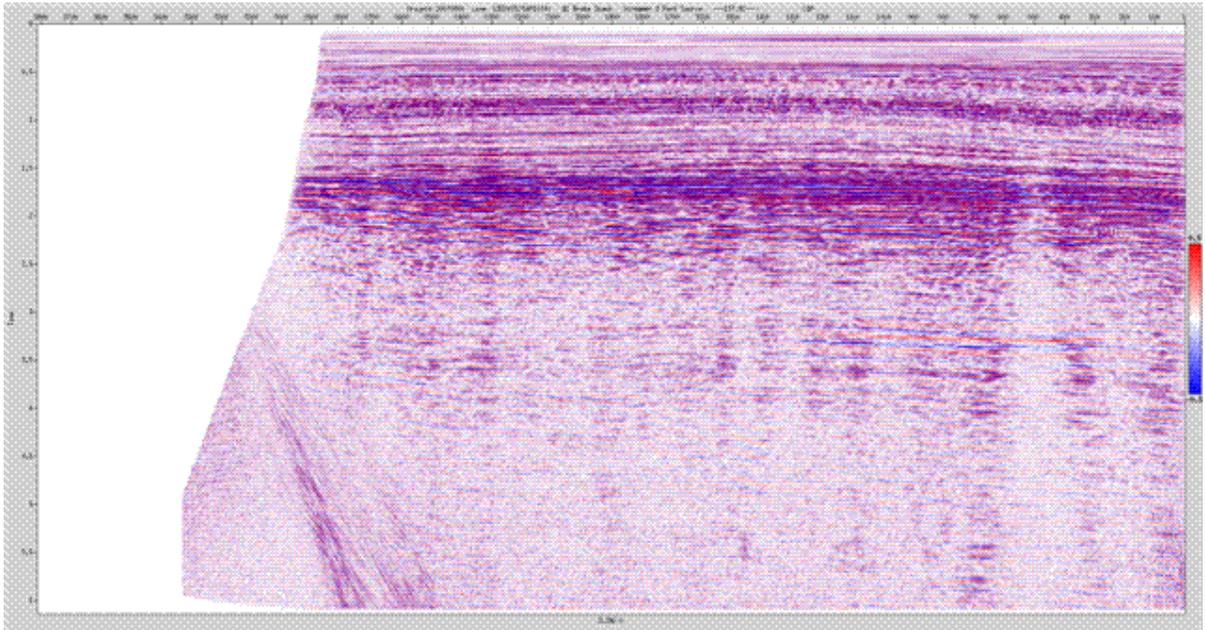
Water depth [m]



10.13 Brute Stack Data

An example brute stack display is shown below.

Screen Display Stack 1714P1074 Streamer 2



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 (using average velocity)
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	+8.5 ms gun and cable static to mean sea level
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 single fold common offset (CO) cube to check for anomalies and miss-ties between sail lines on cross-line sections and time slices.

The client supplied a tidal static correction file which was applied to the cube.

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 4000 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

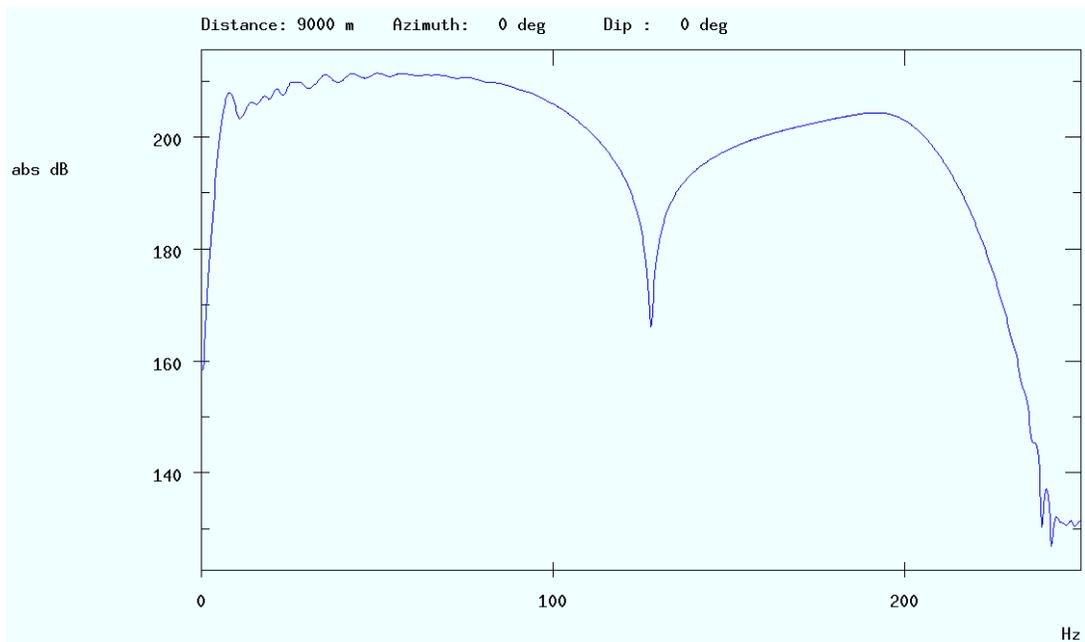
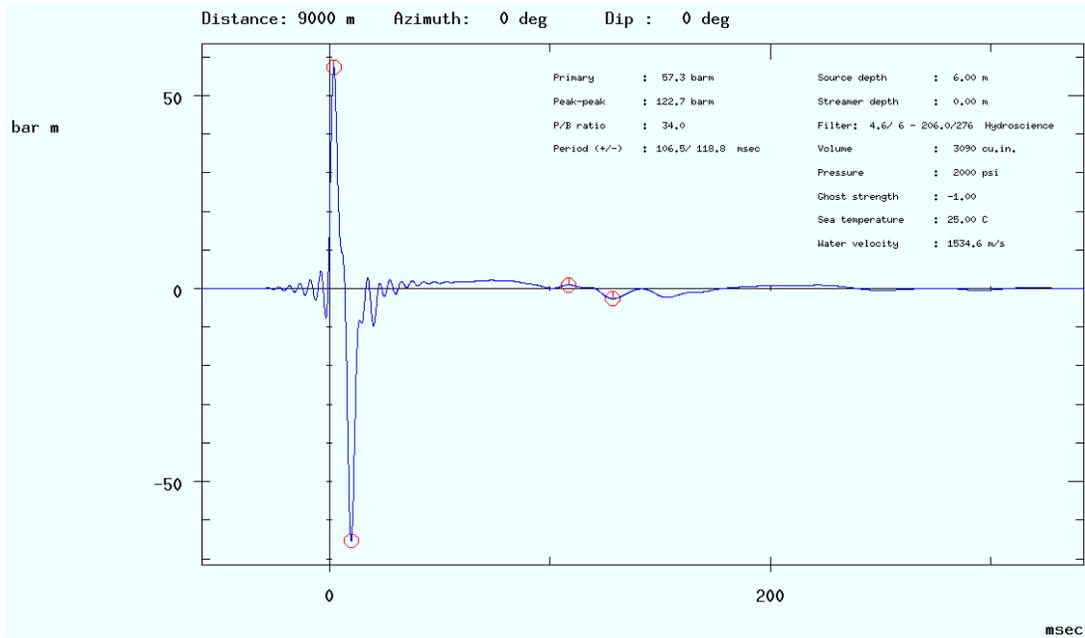
This system runs Viper V4.0.2-3, a data QC and pre-processing suite of software tools on the CentOS v4 Red Hat operating system.

12 Appendix

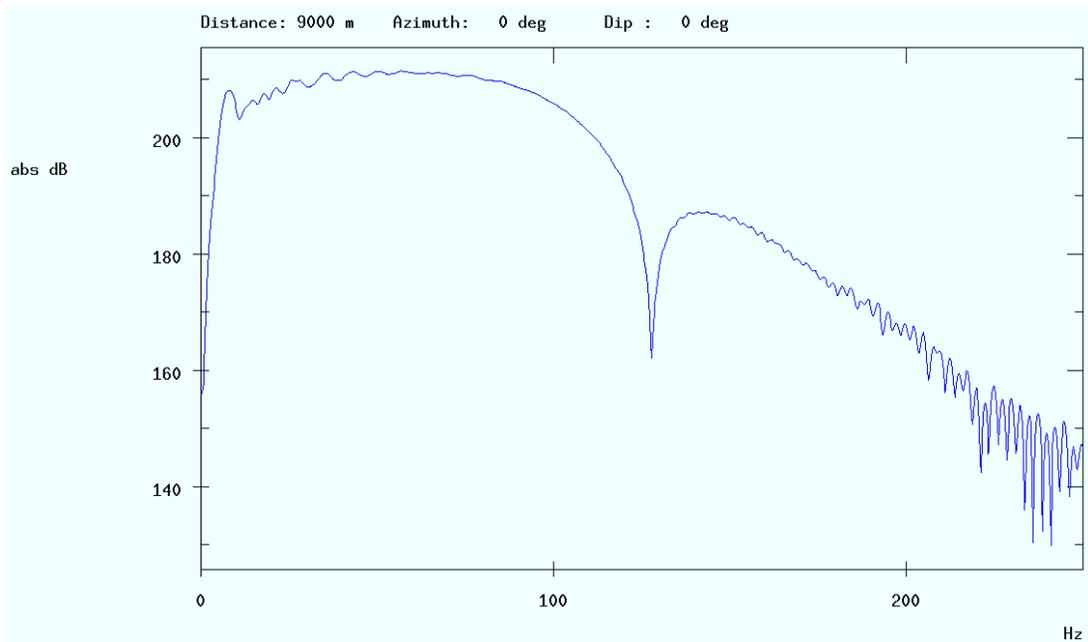
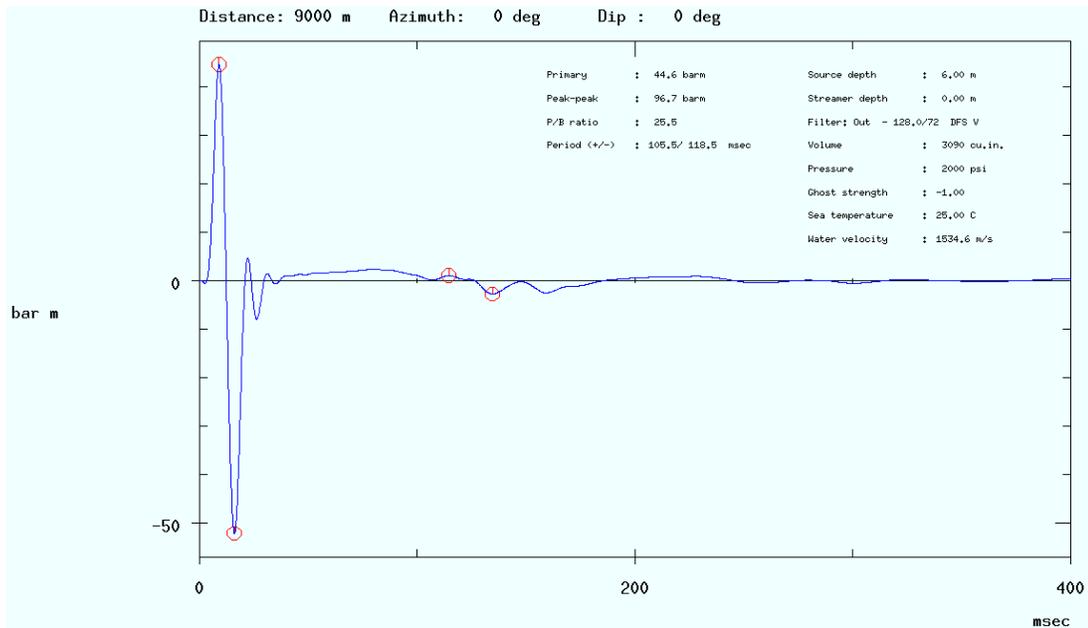
12.1 Data shipments

Date	Proforma	Content	Boxes	Wt	Shipping address	Comment
03 Dec 07	PAC13003567A	DATA SHIPMENT - PROJECT #:2007099. *Recorder 1 data sequences 1 to 5 and DVD of linelogs for same sequences.	1	3 kg	Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	
18 Dec 07	PAC13003570A	DATA SHIPMENT - PROJECT #:2007099. Recorder 1 data sequences 6 to 55 and DVD of linelogs for same sequences + P1/90 & P2/94 tapes for sequences 1 to 55	3	17 kg	Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	
Not yet sent	PAC13003608A	DATA SHIPMENT - PROJECT #:2007099. Recorder Set 1 data and DVD of linelogs Sequences 56-103. Also P1/90 & P2/94 Data for sequences 031-103. DVD of line logs.	3	18 kg	Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	Intended to be shipped 10 th January
Not yet sent	PAC13003609A	DATA SHIPMENT - PROJECT #:2007099. Recorder Set 2 data and DVD of linelogs Sequences 1-103. Also P1/90 & P2/94 Data for same sequences. DVD of line logs.	3	18 kg	Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	Intended to be shipped 23 rd January
10.Jan.08	NP 02/2008	P190 vespos tape P190 echo sounder Depth corr draft & sound Vespos plot Waterdepth plot CD p1files/plots/p698	1		Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	Shipped from Oslo DHL no:9650090155
17.jan 08	NP /2008	P190 echo sounder Depth corr . Replacement tape CD p1files/plots replacement			Tap Oil Ltd. c/o The Australian Data Management Center 14 Brodie Hall Drive Technology Park Bentley Western Australia Attn : Bronwen Cox	

12.2 Source modelling

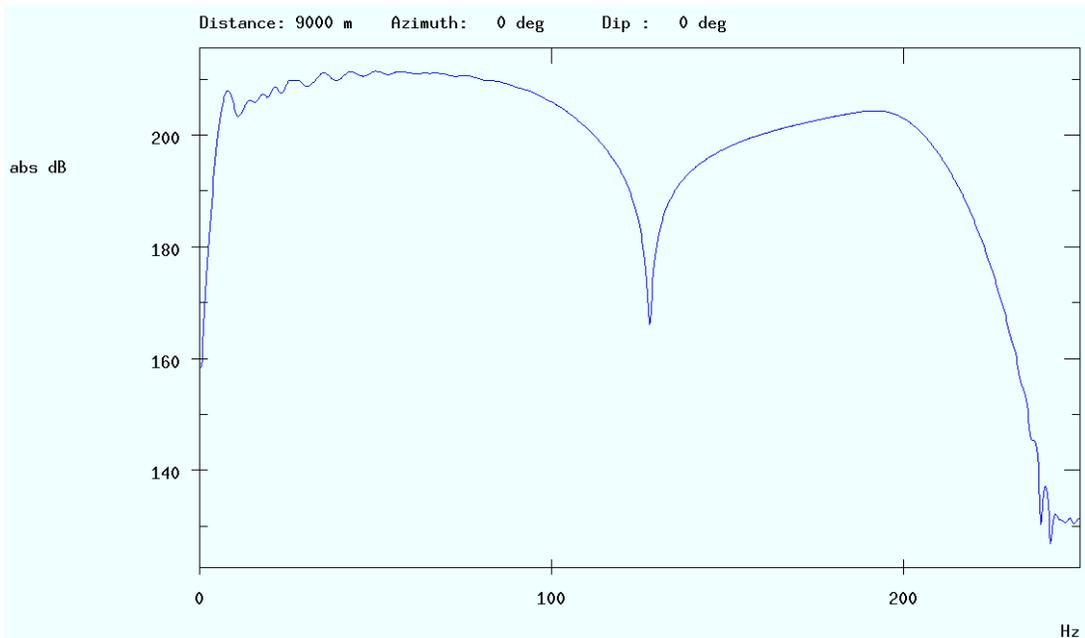
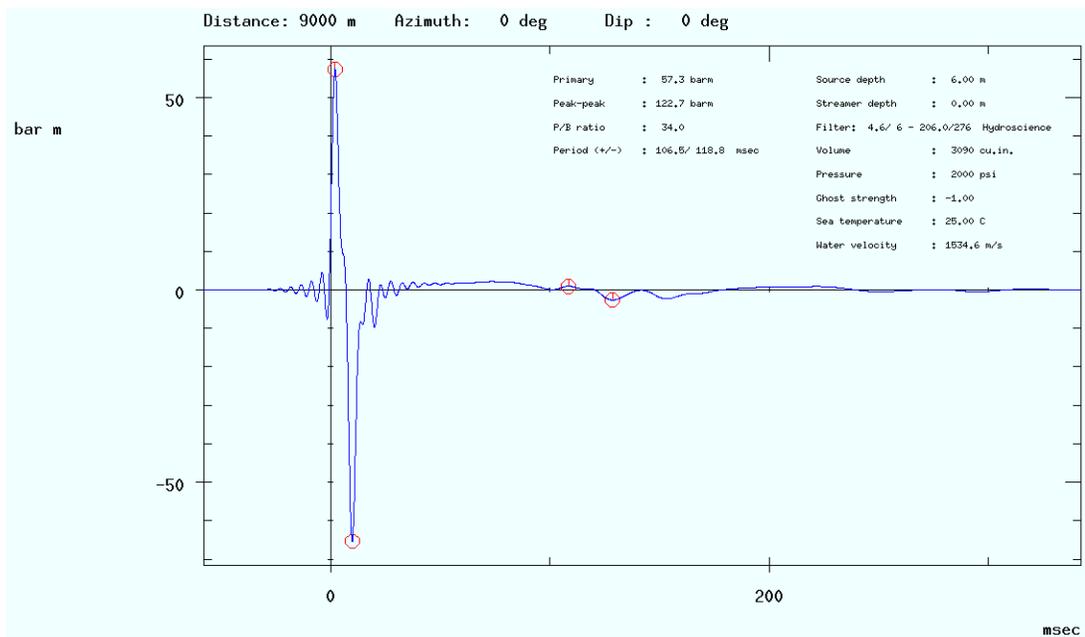


Modeled far-field signature and amplitude spectrum with Hydroscience recording filter (without receiver ghost).



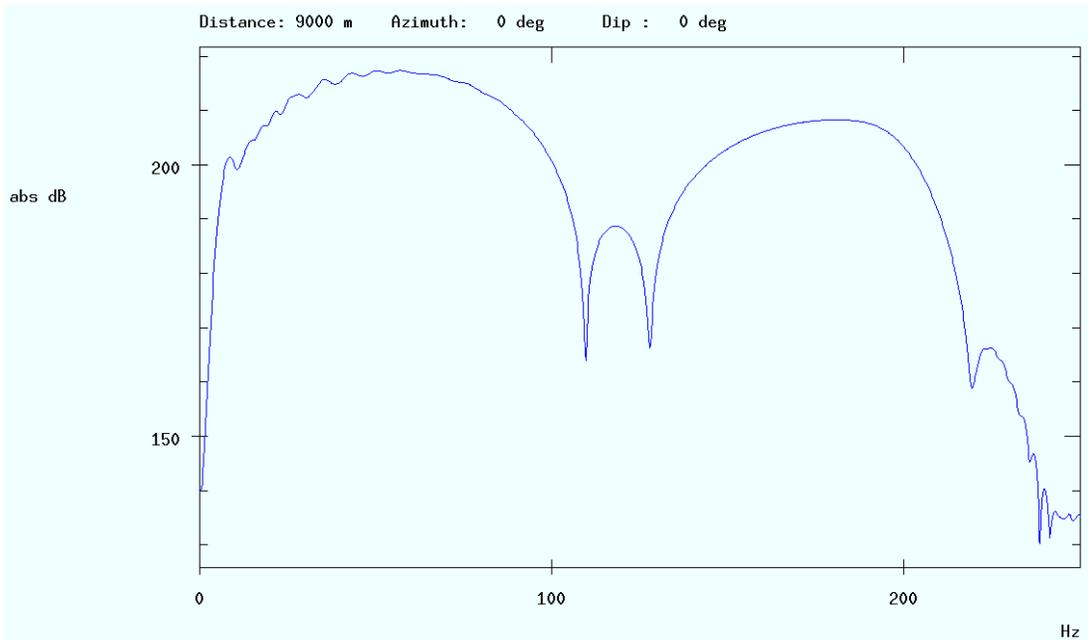
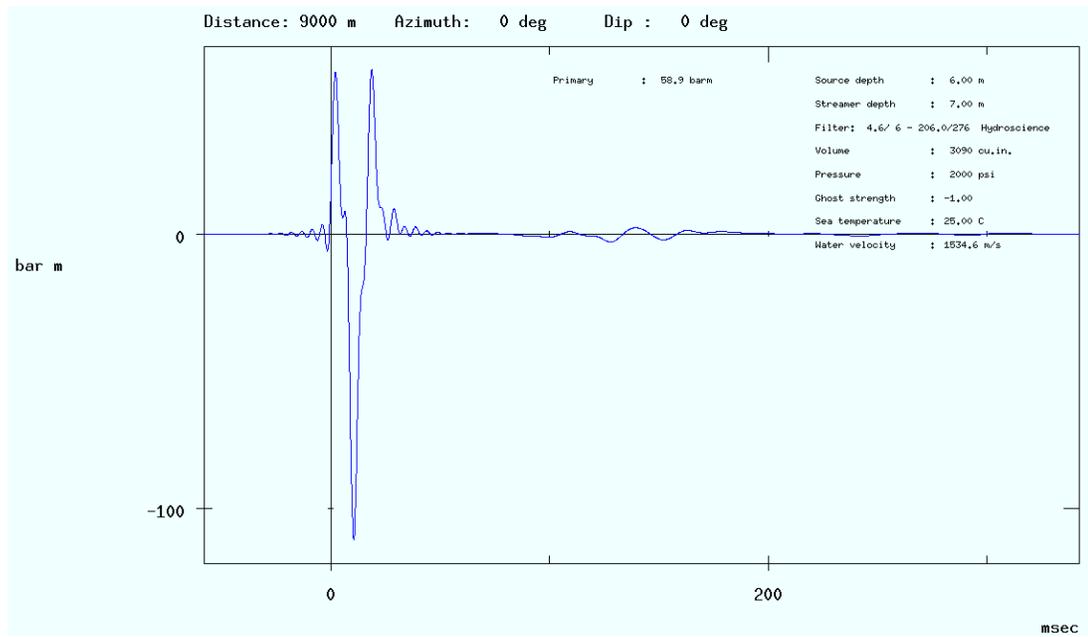
Modeled far-field signature and amplitude spectrum with DFS-V recording filter (without receiver ghost).

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).

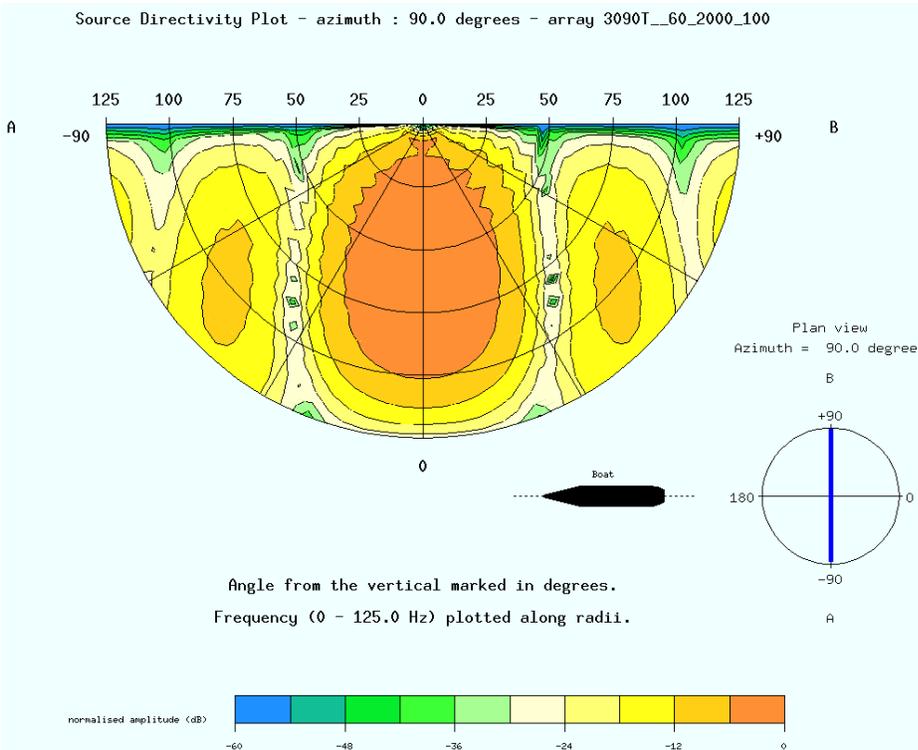
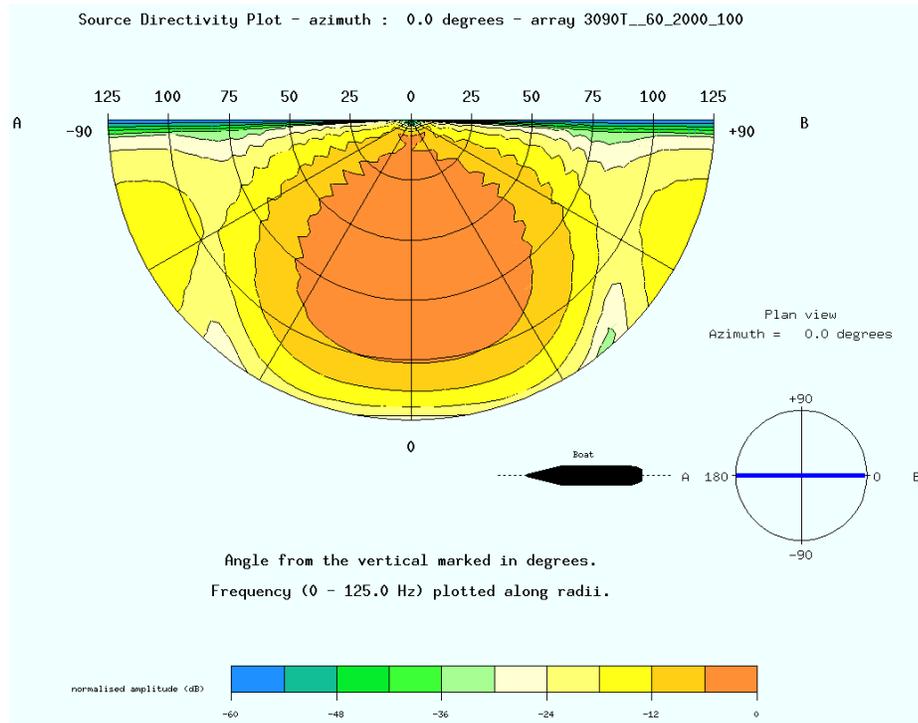


Figure 1: Directivity plot for constant azimuth of 0° and 90°.

12.3 SEG-D header

GENERAL HEADER #1		Starting byte 0
Bytes	Description	Value
01-02	File Number	14
03-04	SEGD Format	8036
	Bits Per Sample	24
05-10	General Constants	
11	Year	2007
12	Additional Header Blocks	2
12-13	Day	362
14	Hour	17
15	Minute	48
16	Second	34
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)	170496
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)                      2495
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        362
03      Shot Time: Hour        17
04      Shot Time: Minute      48
05      Shot Time: Second      34
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           1267

```

```

-----
CLIENT NAME              Starting Byte 448
Bytes   Description        Value
-----
01-32   Client Name          TAP(SHELFAL) AUSTRALIA

```

```

-----
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          T/47P LABATT 3D

```

```

-----
PROJECT CODE            Starting Byte 544
Bytes   Description        Value
-----
01-16   Project Code         2007099
17-18   Line Type            Off Line
19-24   Swath Number         0000.0
25-32   Sequence Number      88

```

```

-----
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 174834.30570520071228
34-36 Time Reference UTC
37-42 Shot Number 002495
43-58 Current Line Name LB20071570P1088
59-69 Master Latitude -39.652183
70-80 Master Longitude 145.580057
81-86 Water Depth (meters) 72.6
87-97 Source Latitude -39.654275
98-108 Source Longitude 145.582839
109-113 Master Gyro (degrees) 322.8
114-118 Master CMG (degrees) 318.8
119-122 Master Speed (knots) 4.4

```

```

-----
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 0P1088
17-20 Shot Number 2495
21-22 Active Array Mask 38
23 Trigger Mode External
24-25 Current Sequence Number 01
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	013
47-52	Volume Fired	003090
53-66	Spare	
67-70	Manifold Pressure	2013
71-74	Deep Tow	0000
75-78	Sub-Array String Pressure	1986
79-82	Sub-Array String Pressure	2040
83-86	Sub-Array String Pressure	1961
87-90	Sub-Array String Pressure	2009
91-94	Sub-Array String Pressure	2018
95-98	Sub-Array String Pressure	2032

12.4 P1/90 header

H0100	AREA	T/47P LABATT 3D					
H0101	GENERAL SURVEY DETAILS	3D, SINGLE VESSEL, DUAL SOURCE, SIX STREAMERS					
H0102	VESSEL DETAILS	PACIFIC EXPLORER					
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	30 NOV 2007 - CONTINUING					
H0201	DATE OF ISSUE OF TAPE	-- ----					
H0202	TAPE VERSION IDENTIFIER	LB2007P011--					
H0203	LINE PREFIX	LB2007					
H0300	CLIENT	TAP(SHELFAL) 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	2.48	31.72		
H1000	CLOCK TIME	GMT					
H1100	RECEIVER GROUPS PER SHOT	2880					
H1400	GEODETTIC 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	GEODETTIC 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 2007099
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

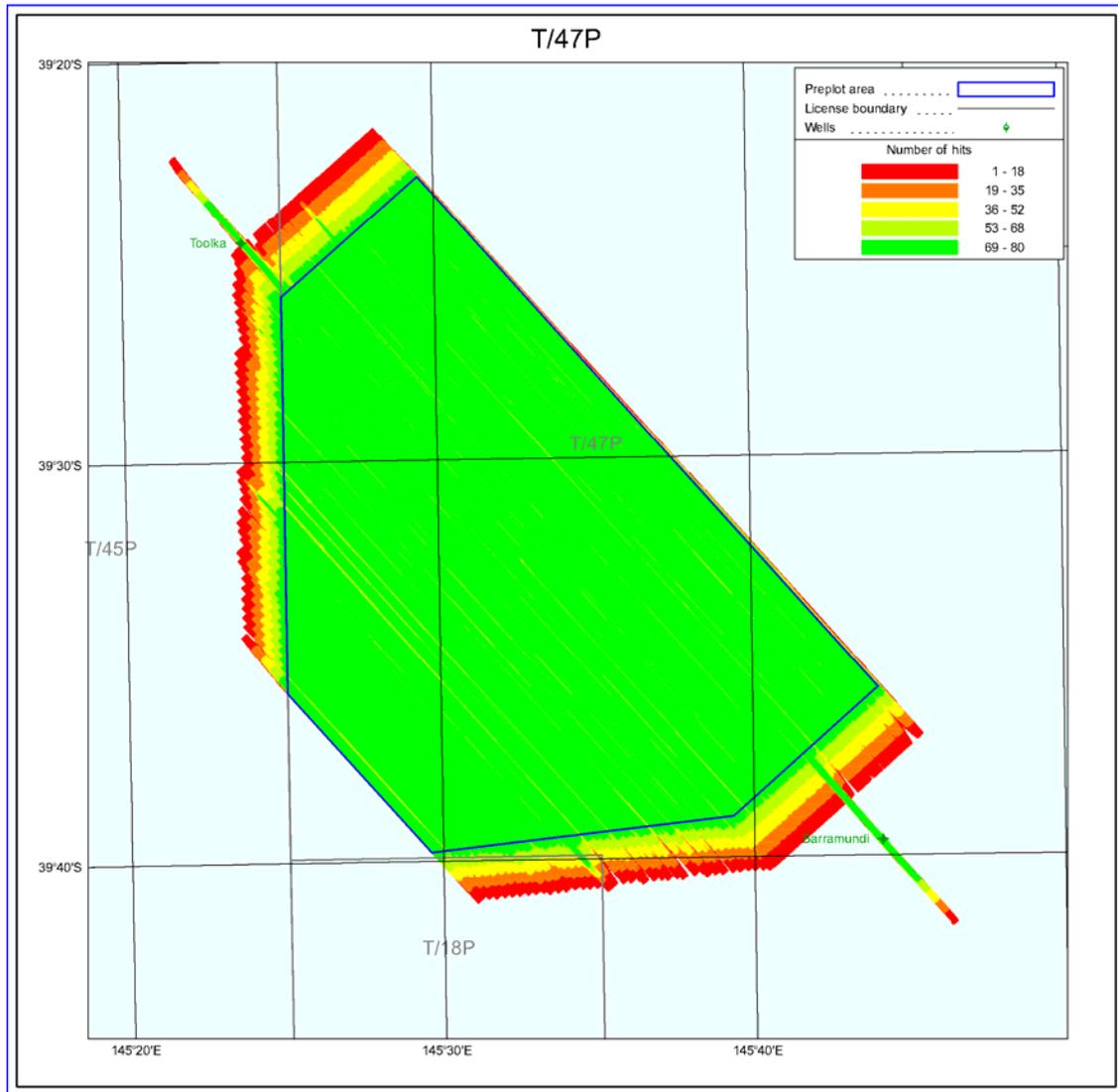
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12.5 P6/98 Full fold coverage perimeter

H0100	3D SURVEY NAME	T/47P LABATT, AUSTRALIA 3D			
H0200	BIN GRID DESCRIPTOR	ACQUISITION			
H0300	GEODETTIC 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 (I _o ,J _o)	1001.0000	1001.0000		
H0900	BIN GRID ORIGIN (E,N)	370047.34E	5639770.08N		
H1000	SCALE FACTOR AT (I,J)	1.0000000000	0.0000	0.0000	
H1100	NOM BIN WIDTH ON I AXIS	25.0000			
H1150	NOM BIN WIDTH ON J AXIS	18.7500			
H1200	GRID BEAR J AXIS (DMS)	1375512.000			
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	1221.0000	372811.78	5636708.46
H1401	COORDS (LAT,LON) FST NODE	392435.159S	1453121.529E		
H1410	COORDS (I,J,E,N) SEC NODE	1001.0000	1880.0000	381092.54	5627537.53
H1420	COORDS (I,J,E,N) GEN PNT	1346.0000	1880.0000	374690.98	5621757.34
H2300	DATA EXTENT BIN GRID	2691.0000	1001.0000	1816.0000	1001.0000
H2400	DATA EXTENT MAP GRID	5639728.33	5608566.79	391283.28	363831.33
H2501	DATA EXTENT GEOG (N/S)	392255.769S	393946.607S		
H2502	DATA EXTENT GEOG (E/W)	1454401.712E	1452504.264E		
H2700	NUMBER OF PERIMETERS	1			
H3101	FULL FOLD COV # OF NODES	5			
H3201	FULL FOLD COV (I,J,E,N)	1001.0000	2691.0000	391283.28	5616251.31
H3201	FULL FOLD COV (I,J,E,N)	1359.0000	2691.0000	384640.50	5610253.31
H3201	FULL FOLD COV (I,J,E,N)	1816.0000	2262.0000	370770.09	5608566.79
H3201	FULL FOLD COV (I,J,E,N)	1816.0000	1736.0000	364160.56	5615886.84
H3201	FULL FOLD COV (I,J,E,N)	1336.0000	1001.0000	363831.33	5634157.43
H3201	FULL FOLD COV (I,J,E,N)	1001.0000	1004.0000	370085.04	5639728.33
H8002	EPSG PROJECTED CS NAME	GDA94 /UTM 55S			
H8003	EPSG PROJECTED CS CODE	28355			
H8006	EPSG DATABASE VERSION	6.13			

12.6 Coverage plot

12.6.1 All noflex



12.7 Cetacean log

	species	inside x-zone?	action	duration	comments	sighting by	position
01/01/2008 @09:13	dolphin / porpoise	false / 0m	none	0	Line change	mmo	-39.59166 145.03975
01/01/2008 @09:05	dolphin / porpoise	false / 0m	none	0	Line change	mmo	-39.59166 145.03975
31/12/2007 @13:16	dolphin / porpoise	false / 0m	none	0	In production - seq.098	mmo	-39.52944 145.4626
30/12/2007 @08:19	dolphin / porpoise	false / 0m	none	0	In production - seq.093	mmo	-39.6279 145.51803
29/12/2007 @11:00	dolphin / porpoise	false / 0m	none	0	In production - seq.089	mmo	-39.69312 145.5352
28/12/2007 @17:39	larger whale	false / 3000m	none	0	Unidentified large cetacean outside of exclusion zone during a line change	mmo	-39.65355 145.58162
27/12/2007 @09:28	dolphin / porpoise	false / 0m	none	0	In production - seq.081	mmo	-39.27845 145.08294
26/12/2007 @18:26	dolphin / porpoise	false / 0m	none	0	In production - seq.079	mmo	-39.47684 145.39467
26/12/2007 @08:33	dolphin / porpoise	false / 0m	none	0	In production - seq.077	mmo	-39.46326 145.34323
26/12/2007 @06:19	dolphin / porpoise	false / 0m	none	0	In production - seq.077	mmo	-39.57173 145.5066
25/12/2007 @06:18	dolphin / porpoise	false / 0m	none	0	Line change	mmo	-39.7468 145.65233
23/12/2007 @09:45	dolphin / porpoise	false / 0m	none	0	Bowriding dolphins while down for weather	mmo	-39.46266 145.40368
22/12/2007 @08:57	dolphin / porpoise	false / 0m	none	0	In production, seq.065	mmo	-39.61784 145.95929
17/12/2007 @16:45	dolphin / porpoise	false / 0m	none	0	Bow riding	mmo	-38.9529 145.40858
11/12/2007 @10:50	dolphin / porpoise	false / 0m	none	0	Bow riding dolphins	mmo	-39.61807 145.6612
10/12/2007 @17:11	larger whale	true / 3000m	shutdown	71	Humpback whale. First sighting by Officer on duty at 2300 m. Followed it to 700 m. Had to go on low power, and then soft start.	maritime	-39.62401 145.73659
08/12/2007 @08:40	dolphin / porpoise	false / 0m	none	0	Observed from the workboat	seismic	-39.50998 145.60101
03/12/2007 @08:24	larger whale	true / 3000m	none	0	Streamer work	mmo	-39.42565 145.46807