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## 1. Survey Information and Objectives

The M/V Pacific Titan mobilised for SANTOS LIMITED in Portland, Australia on the 08<sup>th</sup> of November 2004 to perform a range of marine seismic 2D surveys – among them; this survey in the VIC/P 55 license called GISN05.

The pre-plotted survey consisted of 18 lines totally **305.250 full fold kilometres**.  
The actually acquired numbers were: **305.700 f.f. km + 54.000 run-out km = 680.275 sail km**.

The Pacific Titan acquired the survey with a 6000 m digital Streamer and a 3040 cu/in Source towed at 5 m depth. The array was spread over 3 sub-arrays. All 3 sub-arrays had GPS positioning in addition to a “Head buoy” towed in front of the Streamer to determine the cross line offsets between Source and Streamer.

See the enclosed CWO for further details about the Survey parameters.

The Multiwave job number was: 6211.

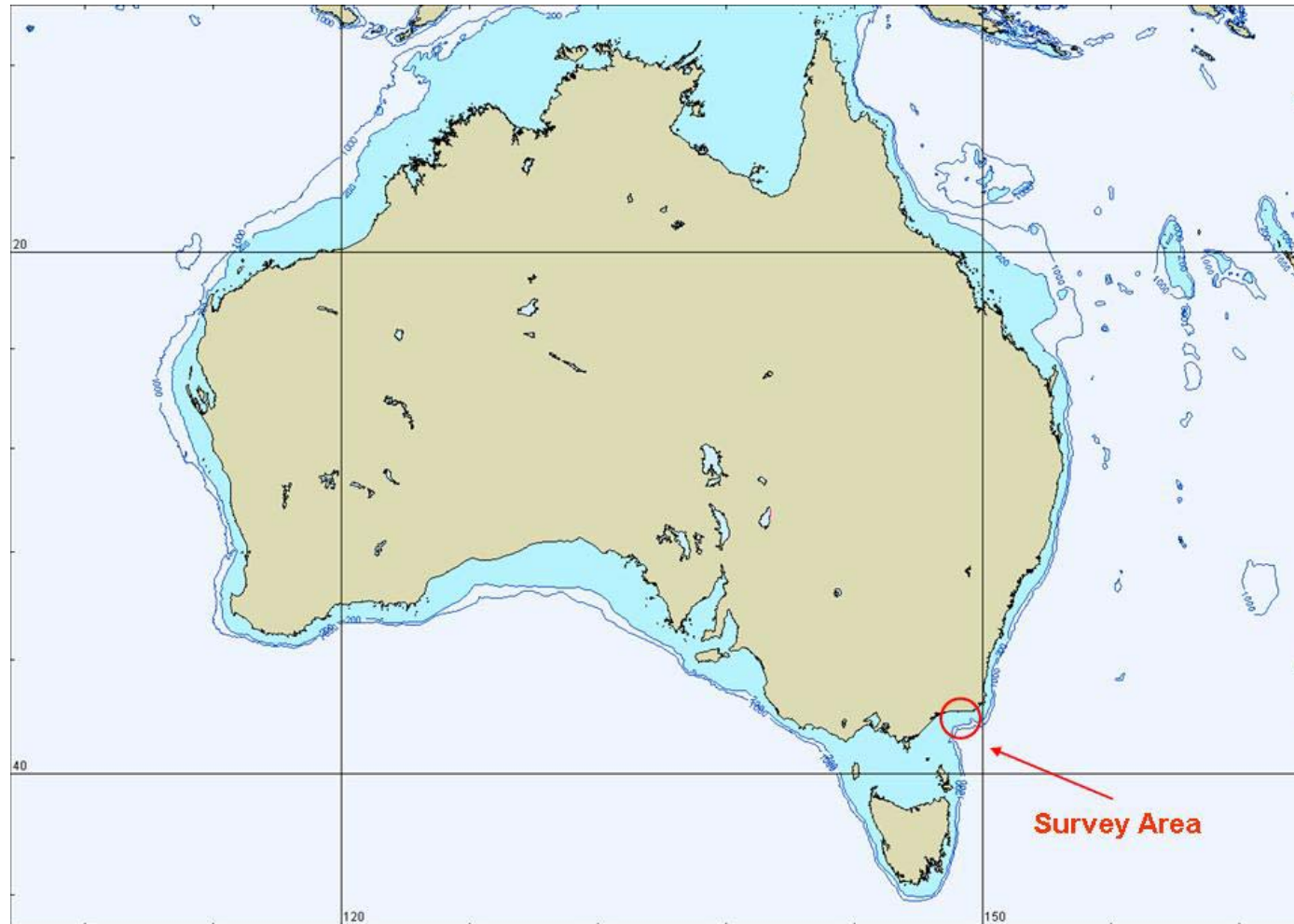
A Safety audit was carried out on the 15<sup>th</sup> October 2004 with only minor findings. Also an onboard cross department inspection was carried out on the 2<sup>nd</sup> and 3<sup>rd</sup> of December where 7 different areas were inspected. Also here there were only minor findings.

The Pacific Titan had a lengthy stay in Hobart, Tasmania (from 21<sup>st</sup> till late 31<sup>st</sup> of January) due to maritime maintenance of the vessel as the seawater intake for cooling of the main engines as well as the sewage system onboard had failed. When arriving in the prospect weather and sea conditions hampered deployment; hence production started on the 4<sup>th</sup> of February and was completed the 8<sup>th</sup> of February 2005. All lines were labelled GISN05-XX-YY-ZZZ where XX is the unique line nr, YY is the attempt nr for the line and ZZZ is the sequence number, unique for each line or part of line. Shot point numbering were kept the same. The lines started with shot point numbering always incrementing from 1001 regardless of direction the line were shot. A Soft Start procedure was used prior to all start of lines. The time of each soft start is logged in the navigation as well as the observer's logs.

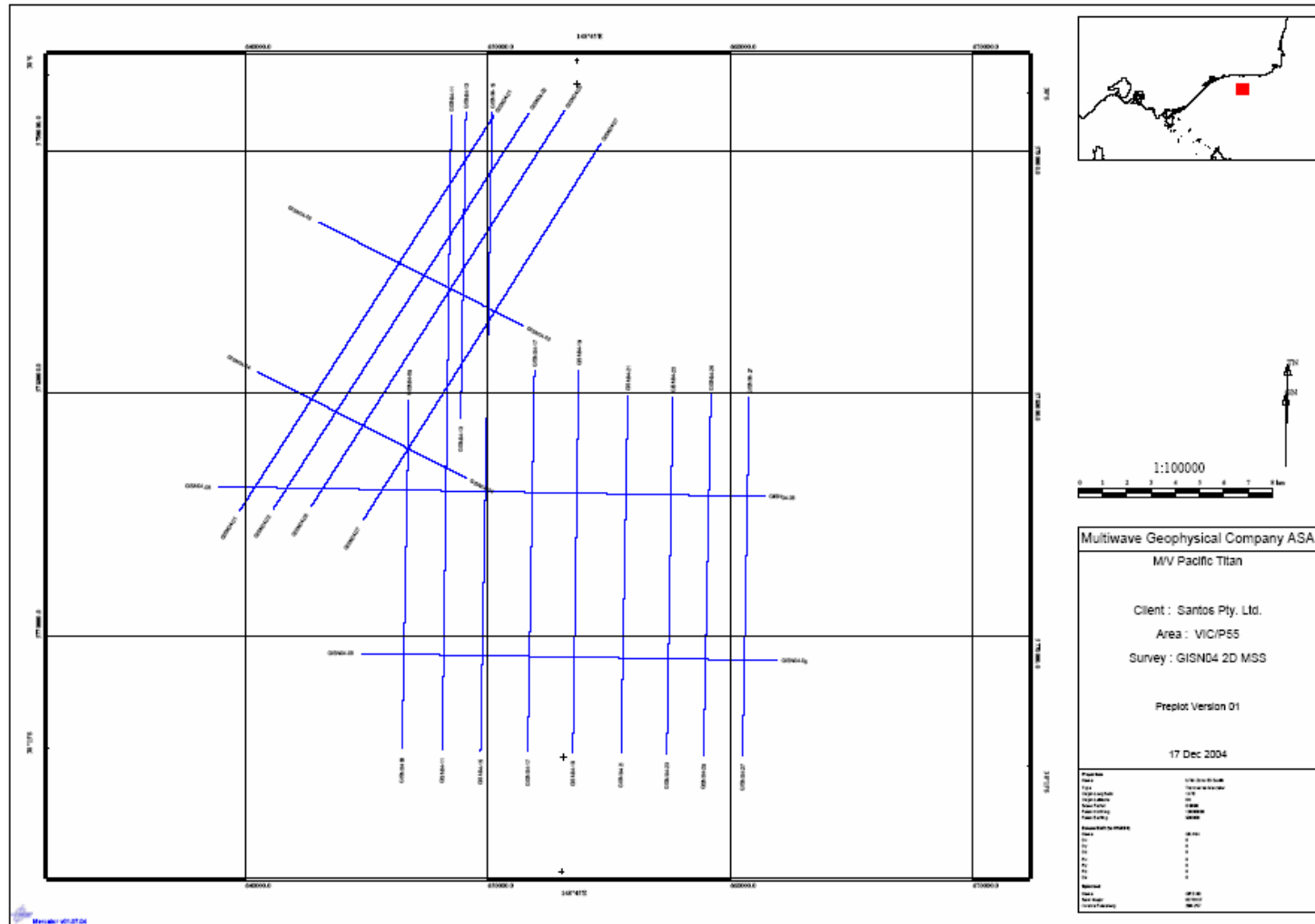
Recording length was 8 sec and the nominal streamer depth was 7 m. However due to the rough weather and sea noise the streamer was set at 8 metre for some lines. This is documented in the observer logs whenever this took place.

Neither a guard vessel nor any MMO were used during this survey.

## 2. Area Map



### 3. Preplot GISN05 - VIC/P 55



## **4. Minutes of Meeting - Start-up Meeting**

Who: Santos and Multiwave.

Where: Onboard the M/V Pacific Titan in Portland Australia.

When: 08<sup>th</sup> of November 2004.

Present:

John Hughes (host), Drew Douglas (client rep), Rebecca Pirzl (MMO), seismic crew and captain.

The meeting concentrated on environmental issues.

The first topic covered was the whale activity expected in the survey area. It was presented pictures of blue whales and sperm whales taken in the vicinity of the survey area. It was highlighted that shooting will stop if any whales are observed within 3000 m of the guns.

Next topic covered the lobster fishing which will commence on the 15<sup>th</sup> of November. The fishing goes on by traps lowered down to the seabed through a rope. On the surface is normally an orange buoy. The rock lobster fishing will seldom go beyond the 100m. water depth line. However also crab traps will be present, but far less of them.

As a consequence of this, the easternmost lines will have priority as they will exceed into the lobster fishing area.

The meeting continued with an overview over the different environmental rules and regulations which take effect in the area. Act No. 10190/1985 – Occupational Health and Safety Act, Code Of Environmental Practice from 1996 and Occupational Health and Safety (Incident Notification) Regulations of 1997 (S.R. No. 25/1997)

## 5. Contract Work Order

CONTRACT	
Client:	SANTOS LIMITED
Vessel(s):	Pacific Titan
Job number:	6211
Area:	Southern Margin, Australia
Type of survey:	2D
Area, or total kms:	App 305 Km Full-Fold sail km
Line heading:	Various
Number of lines:	18
Line length:	Variable
Acquisition method:	Single streamer/single source
Estimated duration:	5 Days
STREAMER	
Type of streamer	Seal
Number of streamers	1
Streamer length	6000 m
No. of channels	480
Group interval	12.5 m
Streamer depth	7m ideal
Water Depth	Greater than 20m
RECORDING	
Instrument type	Sercel - Seal
Record length	8 sec
Sample rate	2 msec
Recording filter: Hi-cut	206Hz @ 276 dB/Octave
Recording filter: Lo-cut	3.0 Hz, 6dB/Oct
Filter type	Linear Phase
Pre-Amplifier Gain	0 db
Tape format	Seg D Rev.1
Recording media	3590 Tape
Tape Copy	Yes
SOURCE	
Source type	Bolt long-life Airguns
Source controller	GunLink 2000
Number of sources	1
Source separation	n/a
Volume per source	3040 cu.in.
Source depth	5 m
Source pressure	2000 psi / 138 Bar
Source length	14.7 m
Number of sub-arrays per source	3
Sub-array separation	10
Flip/Flop	n/a
Shot point interval per shot	25m
Near fields to be recorded?	yes
Source firing specifications	+/- 1.0 ms
Signed:	

## **6. Vessel Description**

### **6.1. Vessel Specifications – Pacific Titan**

M/V Pacific Titan is capable of doing both 2D and 3D seismic data acquisition work. For 2D work the vessel can tow 12 000 meters streamers. For 3D seismic work the vessel can do dual source/dual streamer (2X8000m) or dual source/three streamer (3X4000m) operation providing high quality 2D and 3D seismic data for the industry. Features include a SEAL-24 system configurable for multiple streamers. Options include real-time seismic processing, acoustic source positioning, acoustic streamer positioning and onboard navigation. The following are general specifications for the vessel and seismic equipment on board.



## Section 1: General Information

### Vessel Information

Description: 6,400 BHP Seismic Survey Vessel  
Classification: A1 (E) Seismic Research  
AMS ACCU  
Built: Japan, 1982,  
Conversion later in Seattle  
Flag: Singapore  
Call Sign: 9V5935  
IMO No. : 8208385

### Dimensions

Length, overall: 64.5 m  
Length BP: 55.2 m  
Breadth, molded: 18.5 m  
Depth, molded: 6.0 m  
Summer Draft: 5.18 m  
GRT: 3211.0  
NRT: 963.0

### Machinery

Main engines: 4 x 1,600 BHP, 6Z-ST Total 6,400  
BHP Propellers in Kort Nozzles  
Bow Thruster: 420 BHP Yanmar 6LAAL-DTN 5  
tones thrust, CP propeller  
Rudders: Trailing Flap  
Generator: 3 x 280 kW Yanmar 6LAAL-DTN  
Speed: 4 x engines,  
Max: 12.0 kts/14 tons/day  
Service: 10 kts/10 tons/day  
2 x engines: 9.0 kts/9 tons/day

### Electronics

Radar: Kelvin Hughes Nucleus 6000A  
ARPA  
Secondary Radar: JRC JMA 3210 Daylight  
GPS: Furuno GP 30  
Echo Sounder: Simrad ED-162  
Communications: G.M.D.S.S. Skanti  
SSB,VHF,Inmarsat C 456304540 /  
456304550  
Weather Fax: Furuno 207  
Vsat: Instrumentroom +47 51 40 76 11  
Party Chief +47 51 40 76 12  
Chiefs office +47 51 40 76 13  
Fax +47 51 40 76 14  
High Speed data link: NERA Inmarsat system:  
Tel (873) 356 304 510

### Miscellaneous:

Fire monitoring and detection to all work areas  
USCG approved sewage treatment plant.  
Incinerator, macerator and compactor.  
Six man inflatable Man-overboard boat on quick release  
davit  
LSA equipment for 45 persons excluding survival suits.  
Foam deluge system covering streamer winches, streamer  
storage reels and helicopter deck.  
P.A. System  
Stainless steel gun deck.  
Helicopter deck rated for Bell 212 or equivalent with lights.



**6.2. Seismic Particulars****Streamer and Sensors Details**

Item	description	type	amount	remark
Streamer	24 bit, digital distributed electronic	SEAL Sercel	Up to 12 km active	50 mm diameter
Depth Control	Digicourse	5011	40	Located every 300 m along the streamer
Buoyancy		Isopar M		
Retrievers		Concorde	12	1 every 900 meters
Streamer skin	Polyurethane	3.3mm		
Hydrophones	NH-95-250			
Section Length	150 m			
Section diameter	50 mm			
Lead-in	350 m			
Group Length	12.5 m			
No of hydrophones per group	16			256 nF Group capacitance 17.4 V/Bar sensitivity
Max number of channels	2000			12.5 m @ 2ms
Telemetry data link	Dual twisted quartet	AWG 22		
Aux. Data link	4 twisted pair	AWG 22		
Power lines	Dual	AWG 14		
Connectors	28 points	AWG 16		

**Recording System Details**

Item	description	type	amount	remark
Acquisition	SEAL Vs 4.0	Sercel	1	Max 10 000 channels
Format	SED D Vs1	De-multiplexed		
Recording	3590 cartridge	IBM computer	3	
Computer	Sun	Blade 1000	2	
Bird Controller		Digicourse		
Graphic user interface	Unix	X11 Ultra 5		
Terminal	Sun	21"	2	
Sampling				1/4, 1/2, 1, 2, 4 ms
Aux channels			36	Max 255
Plotter	24"	Veritas	1	On-line
Printer	A4			Label
Printer	A4			Logs, tests etc.
Network	UNIX			Ethernet

## Section 1: General Information

### Seismic QC Details

item	description	type	amount	remark
Online Qc	SEAPRO QC Vs 4.0	Sercel	1	Online seismic QC, fully integrated with recording system.
Offline Qc	ProMAX	Landmark	1	Brute stacks, etc
Plotter	24"	Veritas	1	
Computer	Sun	Blade 2000		
Terminals	Sun	21"	2	
Graphic user interface	Unix	X11 Ultra 5		
Remote	X terminal			Sat.link
Network	UNIX			Ethernet
Product options		High resolution seismic record display. Pre-filtering of seismic data. Attribute calculation First break picking. Signal to noise ratio. Seismic trace energy. Noise level. Seismic trace frequency analysis. Single trace displays. Attribute db generation		

### Navigation Details

item	description	type	amount	remark
<u>Navigation online</u>	Concept	Spectra		
<u>Navigation offline</u>	FGPS	SeisPos		
Work Stations	PC workstations	Shuttle	2	
Network	Ethernet	100 Mbit		TCP/IP
PC workstation	Shuttle			
Printer	HP			Network to 12"
Compasses	Digicourse	5011		Every 300 meter along the streamer
Streamer positioning	RGPS	Various	1	Geotrack, Tracks
Source Positioning	RGPS	Various	3	Geotrack, Tracks
Acoustics	N/A			
Acoustics	N/A			
Data logging	UKOOA	P2/94 P1/90		3590, CD-Rom, Online hard disk
Echo Sounder	Simrad	EA600		12 KHz & 200 KHz
Gyro	Simrad HS 50			GPS Gyro
Autopilot	Robertson	AP9 Mk III		
Steering	Robtrak	STS500		
Helmsman Steering display	Spectra	Shuttle		

## Section 1: General Information

### Source and Mechanical Department Details

item	description	type	amount	remark
Guns	Long Life	Bolt		6 gun positions per sub-array 8 guns per sub-array
Hanging Plates	Multiwave design	Multiwave		
Chambers	40 – 300 cu.in.			
Cluster	2-gun cluster	Bolt	12	2 clusters on per sub-array
Near field hydrophones	2540	I/O		3 per sub-array
Depth/pressure Sensors	2527B	I/O		3 per sub-array
Source	Varying configuration	Multiwave / Bolt	Single /dual	Typical: 90-110bar output
Compressors	Frick	TDSB 355	3	Capacity 3 x 2000 cu.ft/min
	Aerial	JGA4	3	
	Caterpillar	Prime mover	3	1 for ea. set of Frick/Aerial
Source controller	Gunlink 3000	Seamap		32 guns, expandable
Solenoid Power Supply	Gunlink 3000	Seamap		25 ms fire pulse width
Deflector	Multiwave	6 foils	2	
Gun Winches		Dual/single	2 * 3	Slip-ring, Air
Streamer winches		Single	4	Each 9000 m (50 mm)
Spooling Device	Marine Project Development	Linear	4	Spooling on each streamer winch individually
Tow Points	ODIM	Flexible	3	
Winch Control	ODIM		2	Hydraulic remote