APPENDIX 28
SOLE-2

Site Survey Report

-Thales-

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Sole-2 Site Survey Report

Prepared for
OMV Australia Pty Ltd

Report No: 3349C1

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Prepared for

OMV

OMV AUSTRALIA PTY LTD

SOLE-2 SITE SURVEY REPORT

DOCUMENT TITLE	:	SOLE-2 SITE SURVEY REPORT
CLIENT	:	OMV AUSTRALIA PTY LTD
LOCATION	:	GIPPSLAND BASIN, BASS STRAIT
PERMIT	:	VIC\RL3
REPORT REF.	:	3349C1
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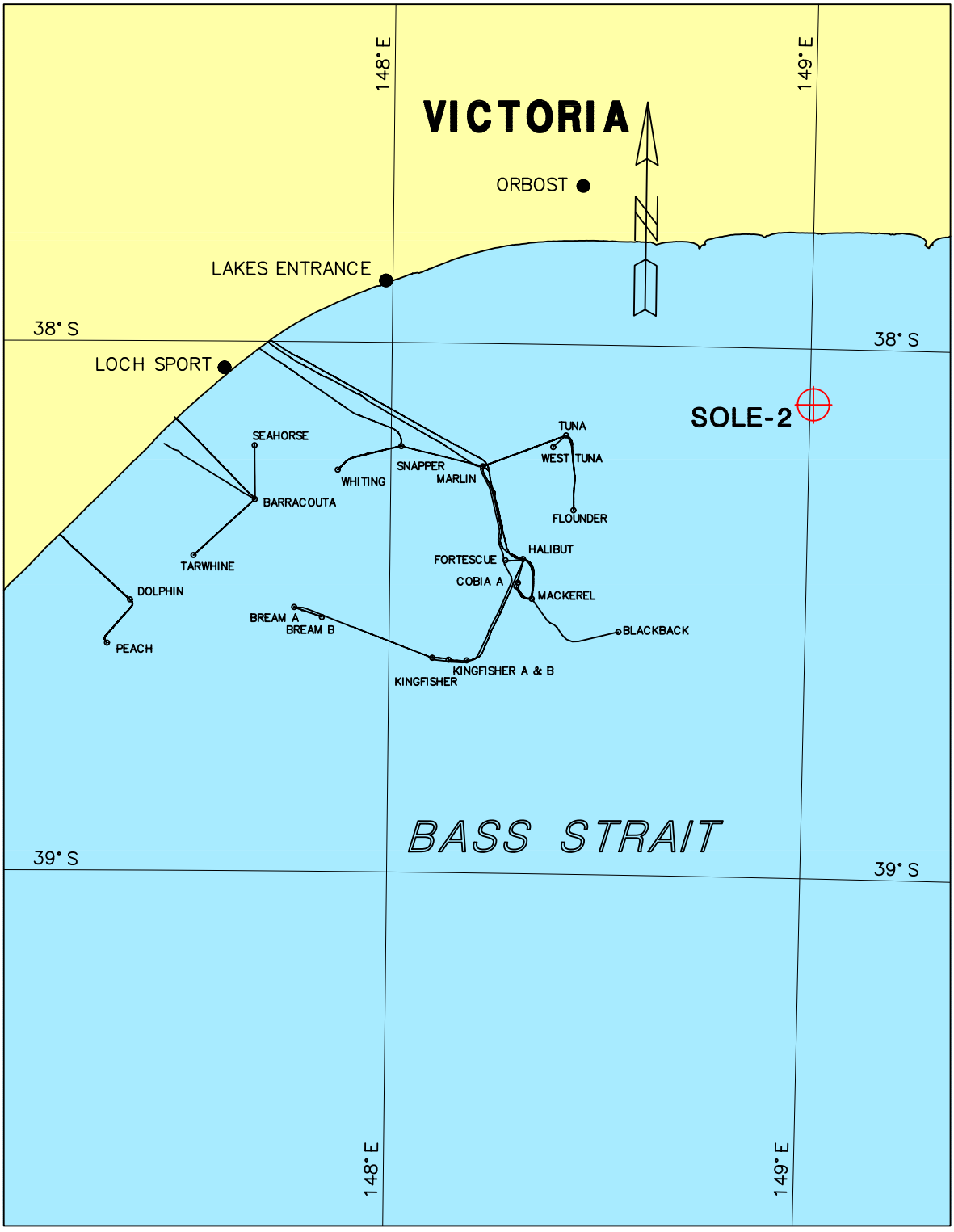


1. INTRODUCTION

Positioning, bathymetric and geophysical services were provided by Thales GeoSolutions (Australasia) Limited (Thales) for a survey of the proposed Sole-2 location for OMV Australia Pty Ltd (OMV) in the Gippsland Basin, Bass Strait, offshore Victoria. All survey requirements and operating procedures were undertaken in accordance with the agreement between Thales and OMV. The survey was undertaken to investigate the suitability of the area for the positioning of a semi-submersible drill rig.

The survey vessel, Bluefin, was used to conduct the survey. All necessary survey positioning, geophysical and geotechnical equipment were installed and calibrated prior to the commencement of the survey. A Trimble 4000 Series Global Positioning System (GPS) receiver was used in conjunction with Thales' SkyFix/SkyFix Spot Differential GPS and associated equipment to provide on-line positioning. An Atlas Deso 15 single beam echo sounder, dual frequency GeoAcoustics side scan sonar with CODA data logging, EG&G surface tow boomer sub-bottom profiling systems with CODA data logging and Geometrics G-880 magnetometer, were used for geophysical data acquisition. A 12m gravity corer was used to recover samples from the seabed.

The survey site consisted of a 3.0km (azimuth 000° to 180°) x 3.0km (azimuth 090° to 270°) rectangular area.

The following co-ordinates were supplied by OMV for the removed Sole-1 wellhead and proposed Sole-2 location:

Sole-1 location

Datum: AGD66

Latitude	:	38° 06' 59.50" South
Longitude	:	149° 02' 04.40" East

Projection: AMG Zone 55, CM 147° East

Easting	:	678 355.2m
Northing	:	5 779 286.1m

Proposed Sole-2 location

Datum: AGD66

Latitude	:	38° 06' 18.6" South
Longitude	:	149° 00' 29.0" East

Projection: AMG Zone 55, CM 147° East

Easting	:	676 058.0m
Northing	:	5 780 596.0m

The survey included 29 primary lines spaced at 100m and 3.0km long on an orientation of 090° to 270°. The cross lines comprised six 3km long lines on an orientation of 000° to 180° and spaced at 500m. One primary line, SP4 was extended by 325m to cover the Sole-1 abandoned wellhead site. The full suite of geophysical equipment comprising echo sounder, sidescan sonar and sub-bottom profiler (boomer) was operated simultaneously on all lines.

At the end of the survey, additional lines were run with the magnetometer over the Sole-1 abandoned wellhead site. The aim of the magnetometer survey was to confirm the location of this wellhead.

Seabed sampling was successfully undertaken at two locations across the survey area, the results of which have been used to ground truth the geophysical data.

The survey was carried out between 15 and 23 March 2002.

All times are quoted in Eastern Daylight Time (UTC + 11 hours).

2. SUMMARY OF SURVEY RESULTS

Bathymetry

All soundings have been reduced to the Lowest Astronomical Tide (LAT) based on the tidal predictions obtained from WNI for the survey area generated for the Proposed Location (38° 06' 18.6" South, 149° 00' 29.0" East, refer Drawing No. 3349C1-02). LAT is approximately 0.75m below Mean Sea Level (MSL) or the Australian Height Datum (AHD) (refer Appendix L).

The nearest observable water depth to the proposed Sole-2 location is 124.3m. The minimum water depth observed within the survey area is 122.8m found approximately 1180m northwest of the proposed Sole-2 location. The maximum water depth observed is 127.9m found approximately 3000m southeast of the proposed Sole-2 location.

Across the survey area, the seabed shoals very gently (seabed gradient << 1°) to the northwest. The seabed surrounding the proposed Sole-2 location is essentially flat and free of steep slopes and bathymetric anomalies.

Seabed features

A low reflectivity seabed interpreted as soft to firm silty clays with minor shell fragments occupies the Sole-2 site survey area. Two gravity core samples were recovered within this seabed type.

Shallow geology

The shallow stratigraphy in the survey area has been defined as follows:

Stratigraphy	Description
Unit A	Soft to firm silty CLAYS.
Unit B	Firm CLAYS.
Unit C	Firm to Stiff CLAYS.
Unit D	Consolidated Sediments.

The shallow geological stratigraphy at the proposed Sole-2 location is defined as follows:

Top of Unit	Depth Below Seabed (m)	Unit Thickness (m)	Predicted Lithology
A	0.0	6.5	Soft to firm silty CLAYS.
B	6.5	0.5	Firm CLAYS.
D	7.0	>2.0 to beyond the limit of useful seismic penetration	Consolidated Sediments.

Shallow Gas Risk Assessment

Using the method of shallow gas risk assessment outlined in section 3.6 of this report, the risk of shallow gas is defined as slight (gas unlikely) at the proposed Sole-2 location and within the limit of useful boomer penetration.

Seabed Sampling

Two gravity core samples of the seabed were collected within the site survey area, the results of which have been used to ground truth the geophysical data.

3. SURVEY RESULTS

3.1 BATHYMETRY

Analogue and digital soundings of the seafloor were obtained using an Atlas Deso 15 echo sounder with dual frequency 210kHz and 33kHz transducers. The data was corrected for heave using a TSS DMS 2-05 motion sensor. The transducers were mounted onto the starboard side of the vessel and a bar check was carried out prior to commencement of the survey. A draft setting of 1.54m was obtained for the 33kHz and the 210kHz transducers on 16 March 2002 and entered into the echo sounder (refer Appendix F).

All soundings have been reduced to the Lowest Astronomical Tide (LAT) based on the tidal predictions obtained from WNI for the survey area generated for the Proposed Location (38° 06' 18.6" South, 149° 00' 29.0" East refer Drawing No. 3349C1-02). LAT is approximately 0.75m below Mean Sea Level (MSL) or the Australian Height Datum (AHD) (refer Appendix L).

Bathymetric data quality was generally good considering the poor weather conditions. Maximum miss-ties observed were up to 0.6m.

The velocity of sound in seawater was determined prior to the commencement of the survey by the deployment of an Applied Microsystems Model SVPlus Velocity Profiler Probe. A mean velocity of sound of 1518m/s was determined and entered into the echo sounder on 22 March 2002 (refer Appendix I).

The bathymetric soundings are representative of the seafloor topography and are plotted on Drawing No. 3349C1-02 (scale 1:5000) and contoured at 1m intervals.

The nearest observable water depth to the proposed Sole-2 location is 124.3m. The minimum water depth observed within the survey area is 122.8m found approximately 1180m northwest of the proposed Sole-2 location. The maximum water depth observed is 127.9m found approximately 3000m southeast of the proposed Sole-2 location.

Across the survey area, the seabed shoals very gently (seabed gradient <<1°) to the northeast. The seabed surrounding the proposed Sole-2 location is essentially flat, free of steep slopes and bathymetric anomalies.

A dual frequency single beam echo sounder data example at the proposed Sole-2 location is shown as Figure 1.

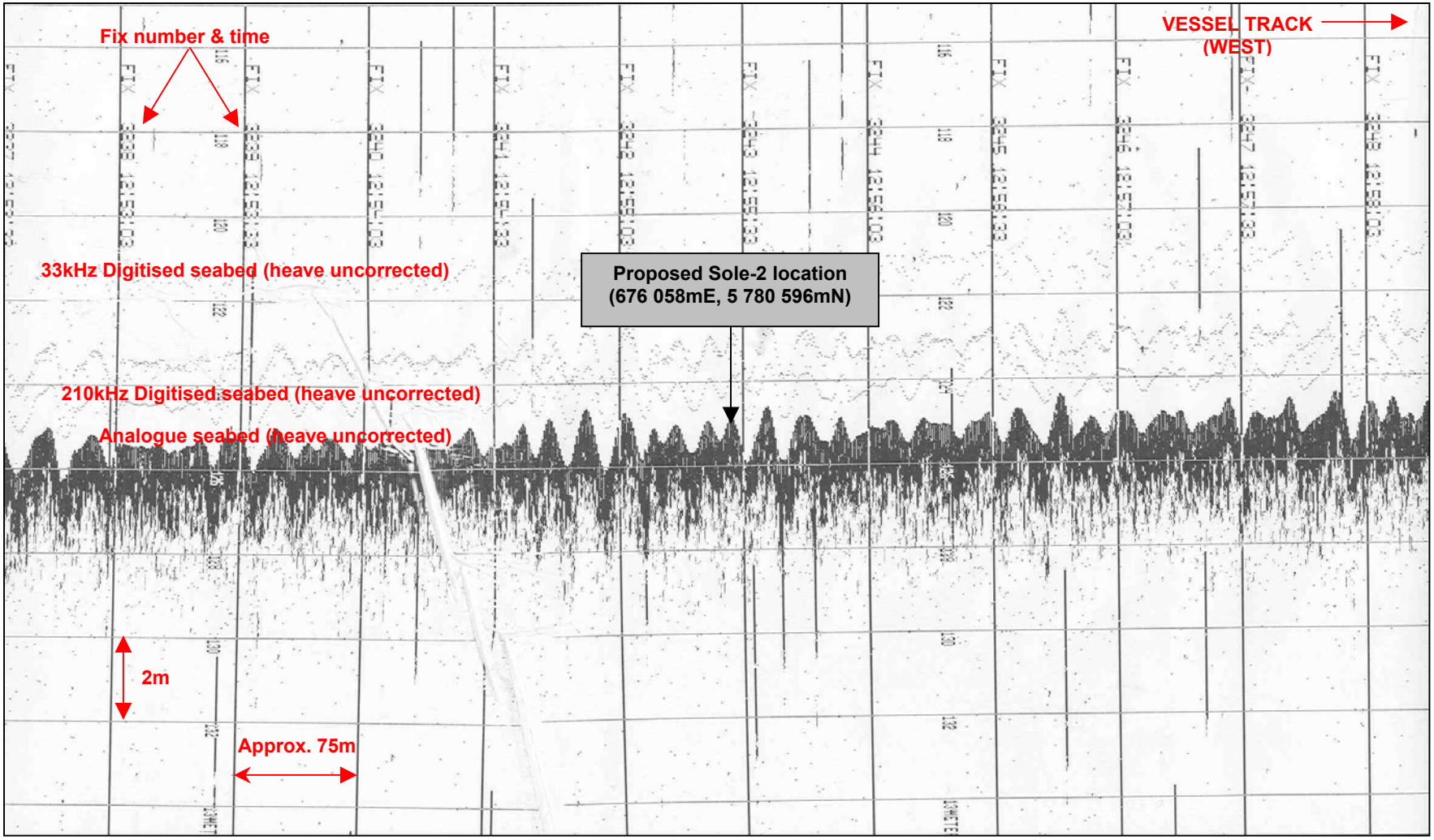


Figure 1 : 33kHz and 210kHz Atlas Deso 15 single beam echo sounder data example. Illustrating the seabed at the proposed Sole-2 location.
Line SP17. Heading 270°.

3.2 SEABED FEATURES

The textural characteristics and reflective strengths of the seafloor around the survey area were investigated by the deployment of a dual frequency GeoAcoustics side scan sonar system. The system consists of a GeoAcoustics side scan sonar transceiver and towfish operated at 100kHz, a CODA DA200 Digital Recorder and an Alden 9315 CTP printer. The data was digitally recorded using the CODA Acquisition System to allow further processing or replay. The side scan sonar was set at 125m slant range, with interval scaling lines at 10m, providing over 100% data overlap on a 100m primary line spacing.

Two gravity core samples (GC1 and GC2) were recovered from two locations within the 3km x 3km site survey area. These samples were used to ground truth the geophysical data. Correlation between seabed sample and sonar acoustic reflectivity across the survey area enables textural characteristics to be interpreted in terms of sediment lithology and plotted on the seabed features drawings (refer Drawing No. 3349C1-03).

Side scan sonar data quality was good. Insonification of the seabed was generally achieved to the limit of the selected slant range and adequate to produce the required coverage.

Seabed sediments within the survey area have been interpreted and classified into the following acoustic and lithological seabed categories:

Low reflectivity seabed interpreted as soft to firm silty CLAYS with some shell fragments

This seabed type occupies the Sole-2 site survey area and comprises soft to firm silty clays with minor shell fragments. The shell fragment content is thought to vary throughout this seabed type. This seabed type is characterised by semi-continuous low reflectivity seabed (refer Figure 2).

Two gravity core samples were recovered in this seabed type southeast and northeast of the proposed Sole-2 location. The samples comprised soft to firm silty clays with minor shell fragments (GC2).

Sole-1 Wellhead Location

The Sole-1 well (38° 06' 59.5" South, 149° 02' 04.4" North), drilled in 1973 is located approximately 2640m southeast of the proposed Sole-2 location. The Sole-1 wellhead was removed and the well location could be seen on the side scan sonar records of lines SP3 and SP4, starboard side between fixes 3116 and 3117, and 4613 and 4614 respectively. The Sole-1 wellhead is shown on line SP4 in a data example Figure 3.

Sonar Contact and Disturbed Seabed Location

A sonar contact (3.8m x <0.5) and an area of disturbed seabed was identified on the side scan sonar records (674 715mE, 5 780 915mN) of lines SP20 port side between fixes 3159 and 3160 (refer Figure 4) and outside the fix range on SP21, port side. The sonar contact is characterised by high reflectivity which is circular shaped and is interpreted as being debris. The disturbed seabed is located southeast of the debris.

The survey area is free of debris within a 500m radius of the proposed Sole-2 location.

Positional Considerations

The accuracy of derived dimensions is dependent on the quality of the side scan sonar data. Adverse operating conditions can produce effects such as tow fish heave and yaw which reduce interpretation accuracy.

The accuracy with which a sonar contact or seabed feature can be positioned is dependent on a number of factors. Survey considerations are of primary importance, as position accuracy ultimately depends on the accuracy with which both the vessel and tow fish can be positioned. Running adjacent survey lines in opposite directions reduces the effects of tow fish position inaccuracy, as miss-ties between lines can then be averaged to produce a best-fit position.

The position accuracy of features derived from an interpretation of side scan sonar data, is subject to additional considerations that are independent of the data quality issues discussed above. Such potential errors include those associated with scaling, plotting and subsequent digitising of features. Additionally, certain features require a subjective interpretation.

In the survey area, the accuracy of positioning is estimated at ±15.0m and the accuracy of height measured above and below ambient seabed is estimated at ±0.5m.

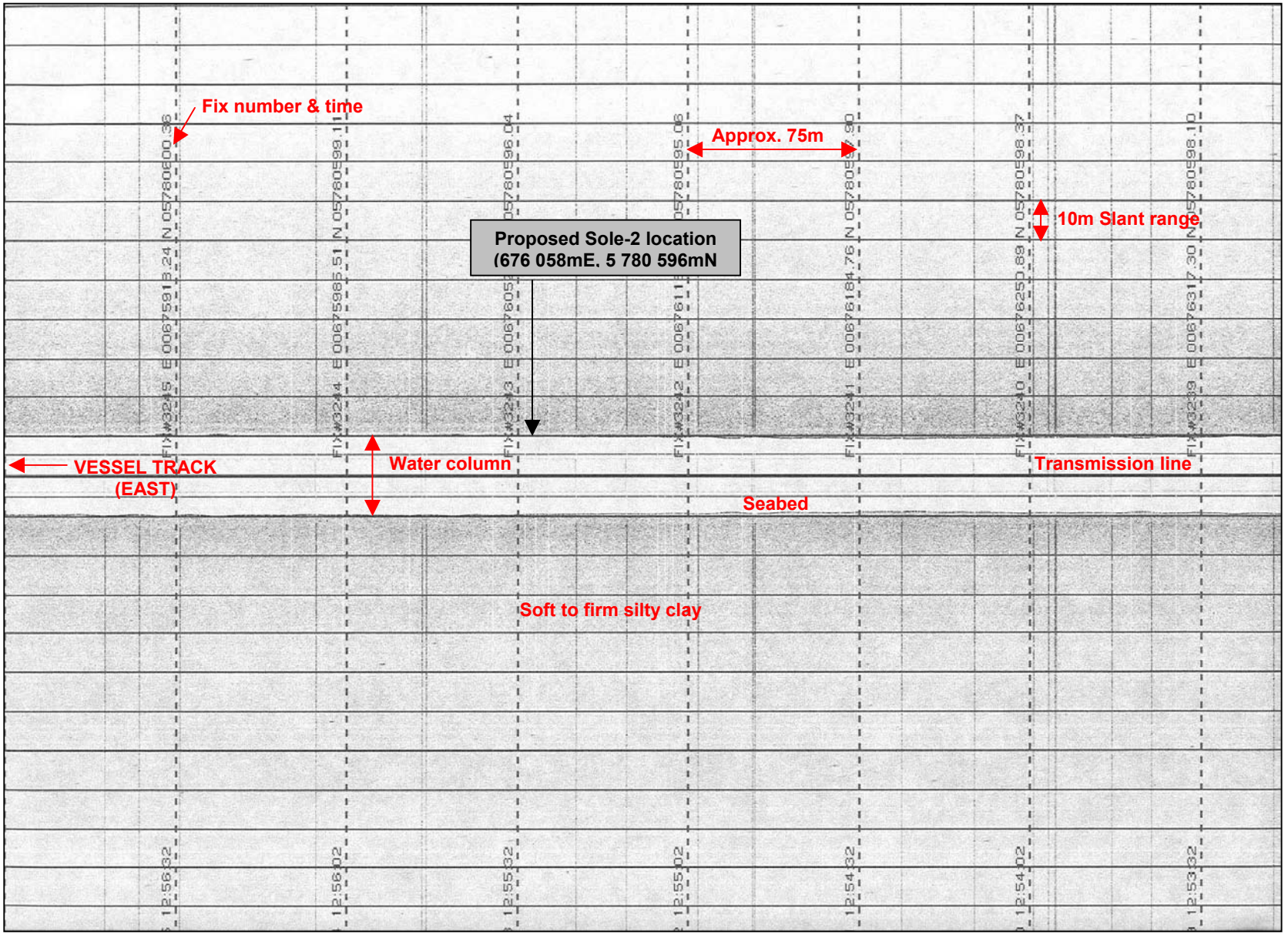


Figure 2 : 100kHz side scan sonar data example. Illustrating typical low reflectivity of the seabed in the survey area. Interpreted to comprise soft to firm silty CLAY with some shell fragments.
Line SP17. Heading 270°.

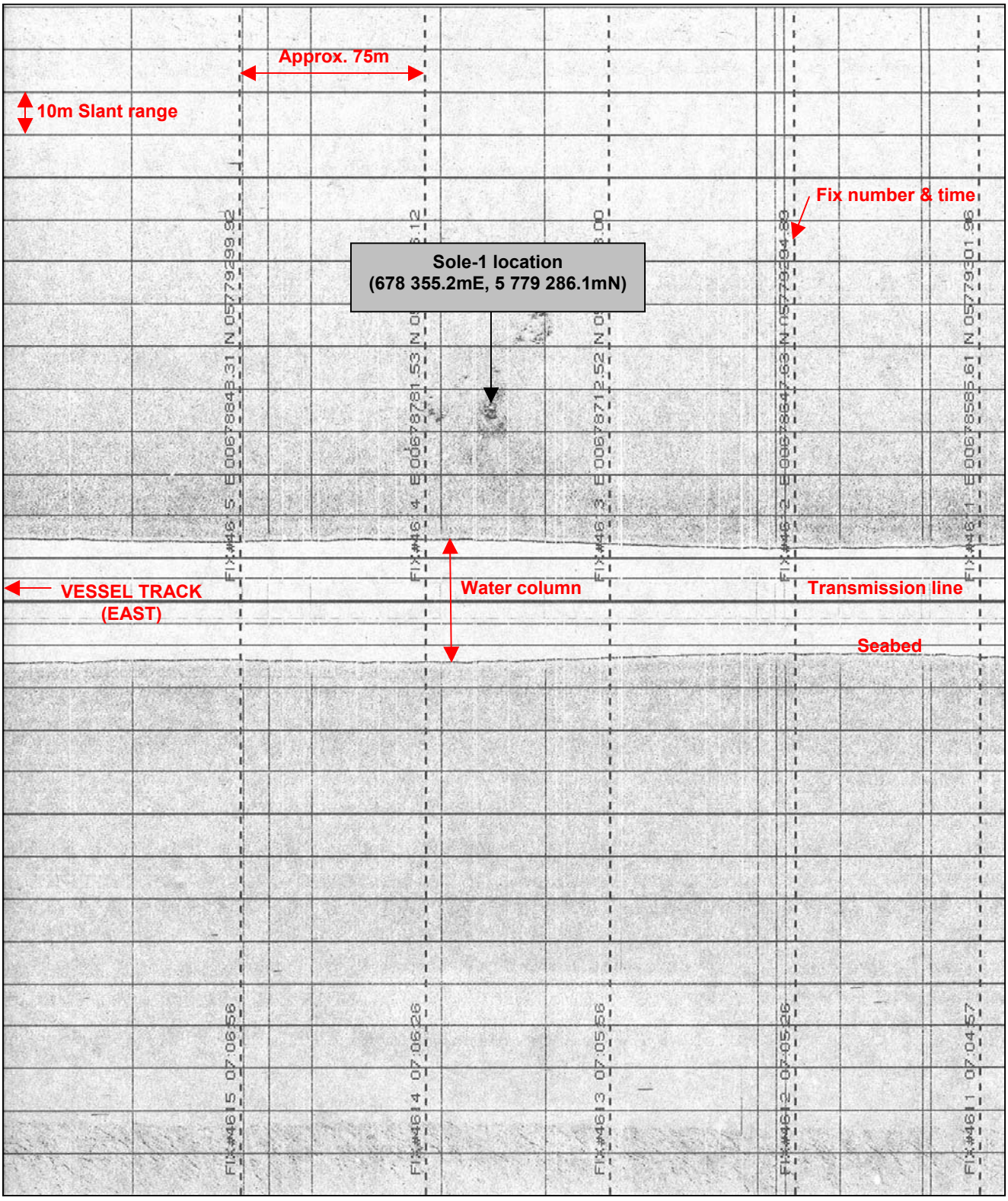


Figure 3 : 100kHz side scan sonar data example. Illustrating Sole-1 removed wellhead location. Line SP4. Heading 090°.

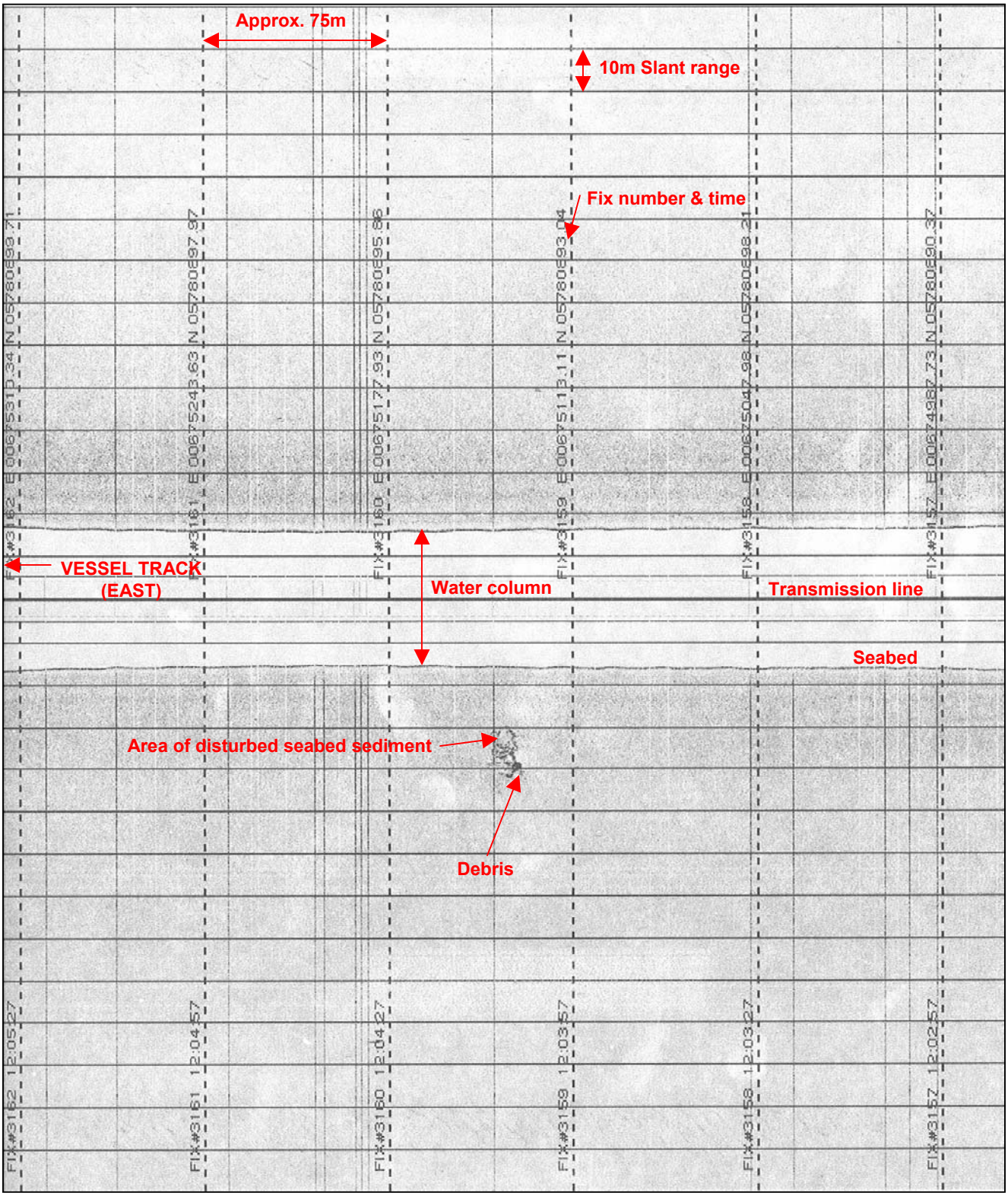


Figure 4 : 100kHz side scan sonar data example. Illustrating debris and disturbed seabed sediment identified.
Line SP20. Heading 090°.

3.3 WELLHEAD MAGNETOMETER SURVEY

Analogue and digital magnetometer data were obtained using a Geometrics G-880 Cesium Marine deep tow magnetometer. The G-880 deep tow fish was towed from the stern of the Bluefin with various lay back lengths. The aim of the magnetometer survey was to confirm the location of the Sole-1 wellhead.

One line was extended over the Sole-1 wellhead.

Confirmation of the wellhead location was reported separately to OMV.

3.4 SHALLOW GEOLOGY

The shallow geology of the survey area was interpreted from data acquired by the deployment of an EG&G 230 surface tow boomer. Analogue seismic data was recorded on a CODA DA200 Digital Recorder and an Alden 9315 CTP printer. The data was digitally recorded using the CODA Acquisition System to allow further processing or replay. The boomer data was recorded with a sweep of 135ms of which 85ms was displayed on a hard copy printout using an Alden 9315 CTP printer. The firing interval was 410ms and a power level of 300 Joules was supplied by an Applied Acoustics, high voltage energy source. The printed sub-bottom data was TVG amplified to compensate for signal loss.

Sub-bottom profiler data quality was generally good considering the poor weather conditions. The limit of penetration reached with the sub-bottom profiler (or limit of useful acoustic penetration) was generally 10m below seabed but reached a maximum of 25m below seabed. Boomer data could not be interpreted below this depth.

Sediment thickness was calculated using an assumed acoustic velocity of 1600m/s for the time to depth conversion. The stratigraphy in the survey area has been categorised as follows:

Stratigraphy	Description
Unit A	Soft to firm Silty CLAYS.
Unit B	Firm CLAYS.
Unit C	Firm to Stiff CLAYS.
Unit D	Consolidated Sediments.

The thickness of Unit A (seabed to reflector R1) was mapped across the survey area and plotted on an isopach drawing contoured at one metre interval (refer Drawing No. 3349C1-04). The shallow geology is represented on two cross-sections through the proposed Sole-2 location in Drawing 3349C1-05.

The shallow geology comprises four identifiable units across the survey area which have variable thickness' and bounding reflectors. Units A, B and C have similar acoustic properties and in places, appear to grade into each other. Unit A is generally flat lying with its thickness varying between 3.0m and 8.0m across the survey area. Both Units B and C are also planar however neither is consistently present across the entire survey area. Where Unit B occurs, Unit C is generally present beneath it. Units A, B and C onlap the upper surface of the lowest identified unit, Unit D. Reflector R3 is interpreted as representing an angular unconformity binds Unit D. The shape of Unit D may indicate a gently dipping dome structure.

Boomer data examples are presented as Figure 5 and Figure 6.

Unit A : Soft to Firm Silty CLAYS

The seabed and reflector R1 bind the uppermost unit, designated Unit A. Unit A is a flat lying unit present over the entire site survey area and varies in thickness from 3.0m to 8.0m. Reflector R1, the base of Unit A, has relatively low reflection amplitude and is laterally discontinuous across the survey area. In places, R1 is very poorly defined suggesting that the boundary between Unit A and Unit B is gradational.

The thickness of Unit A (seabed to reflector R1) was mapped across the survey area and presented as an isopach drawing contoured at one metre interval (refer Drawing No. 3349C1-04).

The thickness of Unit A at the proposed Sole-2 location is 6.5m.

Unit B : Firm CLAYS

Reflector R1 defines the top of Unit B and reflector R2 defines its base. Unit B has similar acoustic properties to Unit A suggesting that it is composed of firm, possibly silty, clays. These are expected to be more compacted than the overlying sediments of Unit A. Unit B partially underlies Unit A over the survey area. The thickness of Unit B varies between 0.5m and 5.5m.

The base of Unit B, reflector R2 is relatively continuous in the areas where it is intersected by the stronger R3 reflector. Where R2 is poorly defined it is thought that the boundary between Unit B and Unit C is gradational. No sample was recovered from Unit B.

The thickness of Unit B at the proposed Sole-2 location is 0.5m.

Unit C : Firm to Stiff CLAYS

Reflector R2 defines the top of Unit C and reflector R3 defines the base. No sample was recovered from Unit C. Unit C is interpreted as comprising firm to stiff clays with some layering present. Unit C underlies Unit B over the survey area and its thickness varies between 0m to 7.5m.

Reflector R3 is generally consistent across the survey area and the strength of the reflector suggests that is represents the upper bounding layer of a more consolidated unit.

The thickness of Unit C at the proposed Sole-2 location is 0m.

Unit D : Consolidated Sediments

The reflector R3 bounds the upper surface of Unit D. Unit D extends to below the limit of useful acoustic penetration that is generally 10m below the seabed with a maximum of 25m. No sample was recovered from Unit D. Unit D is interpreted as comprising consolidated sediments.

The minimum thickness of Unit D at the proposed Sole-2 location is 2m.

The shallow geological stratigraphy at the proposed Sole-2 location is defined as follows:

Top of Unit	Depth Below Seabed (m)	Unit Thickness (m)	Predicted Lithology
A	0.0	6.5	Soft to firm silty CLAYS.
B	6.5	0.5	Firm CLAYS.
D	7.0	> 2.0 to beyond the limit of useful seismic penetration	Consolidated sediments.

A boomer data example at the proposed Sole-2 location is presented as Figure 5.

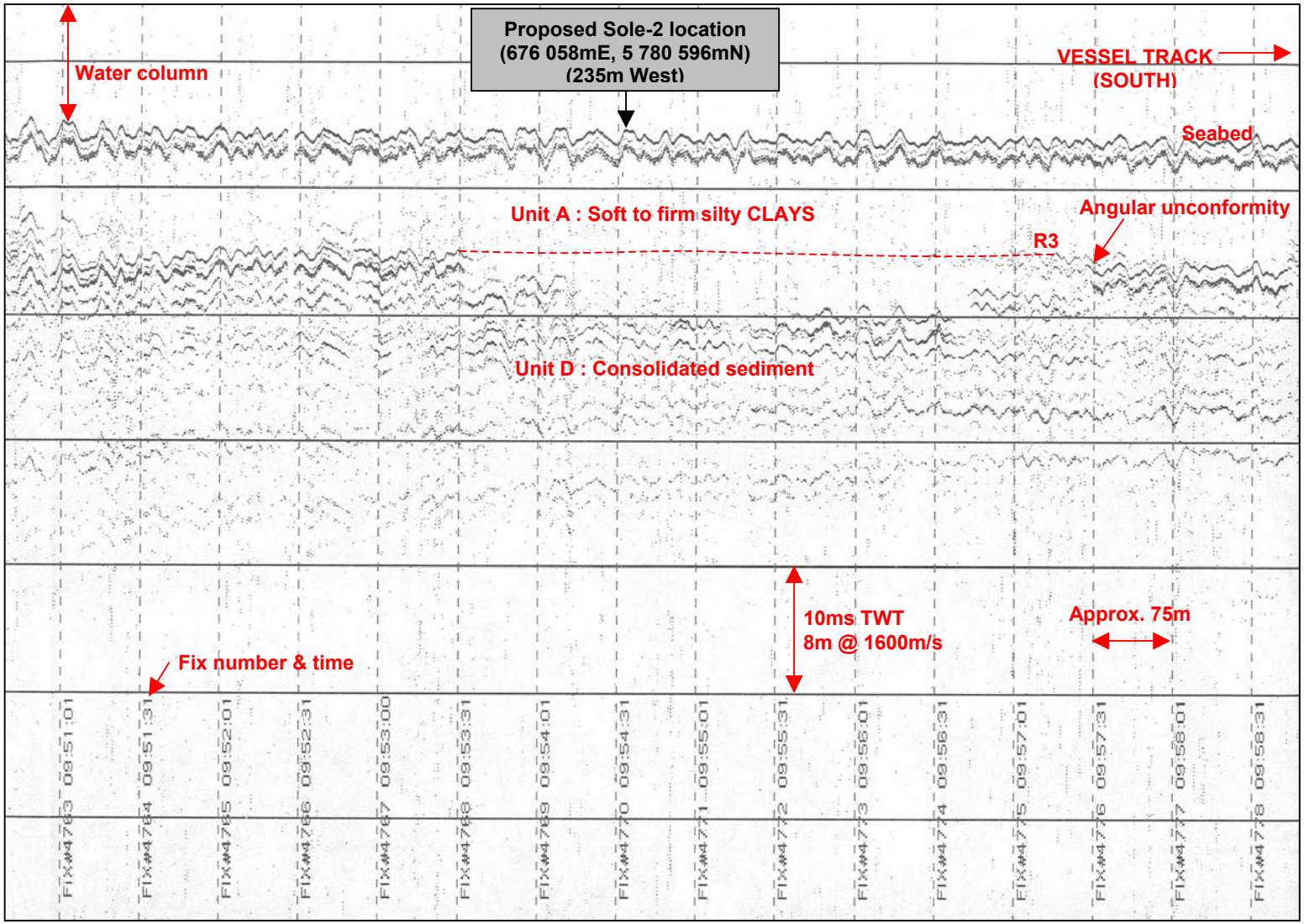


Figure 5 : Boomer sub-bottom data example. Illustrates the shallow geology at the proposed Sole-2 location. Line SX3. Heading 180°.

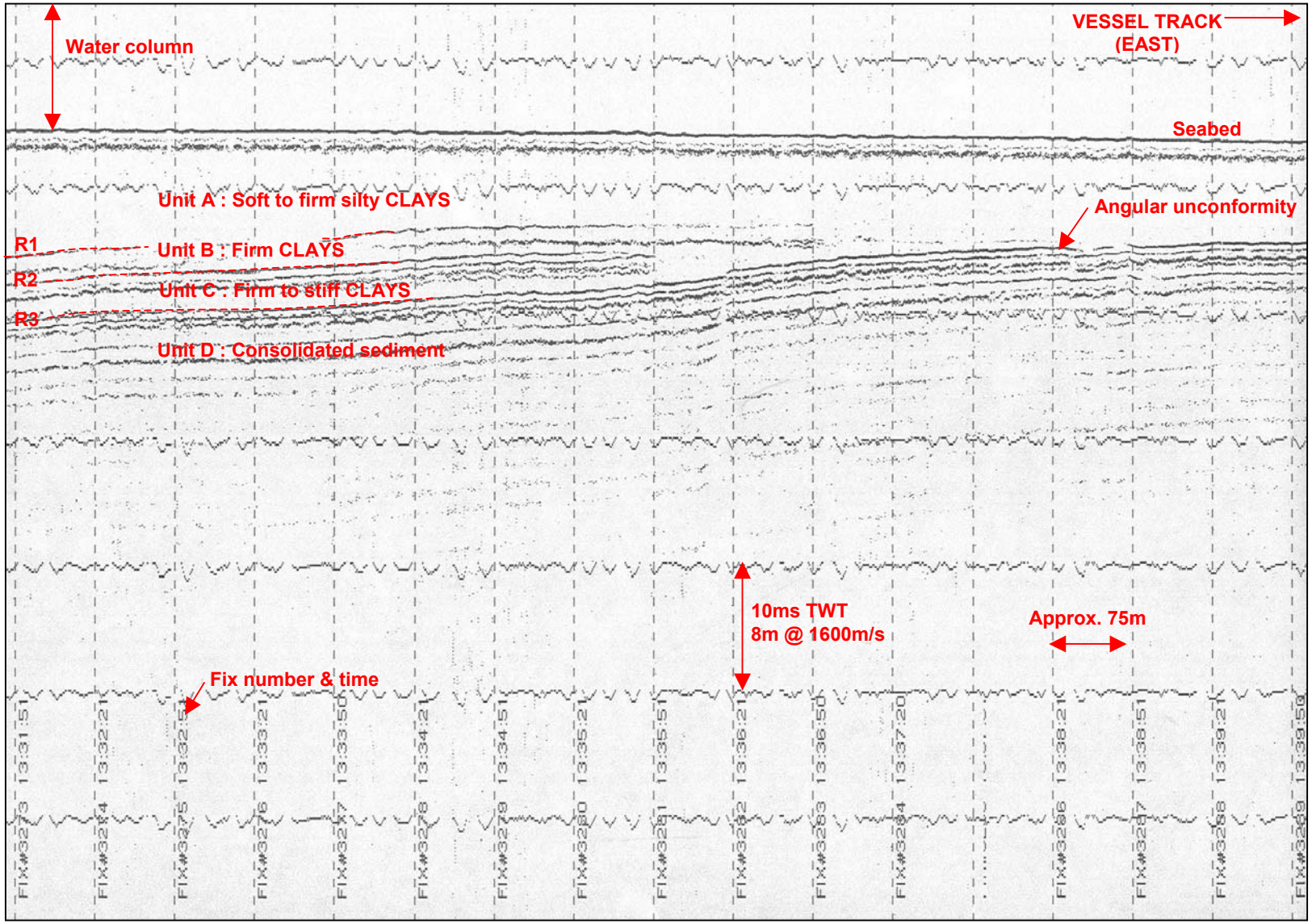


Figure 6 : Boomer sub-bottom data example. Illustrating the relationship between Unit D and the overlying units. Line SP14. Heading 090°.

3.5 SHALLOW GAS RISK ASSESSMENT

The limit of penetration reached with the subbottom profiler (or limit of useful acoustic penetration) was generally 10m below seabed with a maximum of 25m. Boomer data could not be interpreted below this depth.

No features suggesting the presence of shallow gas were observed on the bathymetry, side scan sonar and boomer records.

Using the method of shallow gas risk assessment outlined in section 3.6 of this report, the risk of shallow gas within the limit of useful acoustic penetration is defined as slight (gas unlikely) at the proposed Sole-2 location.

3.6 STANDARD METHOD OF SHALLOW GAS RISK ASSESSMENT

The shallow gas hazard assessment consisted of the following:

- Analysis of side scan sonar / echo sounder data attributes, which included the following:
  - Disturbed seabed and / or numerous pockmarks
  - Areas of high reflectivity seabed
  - Evidence of gas within the water column
- Lithological / structural evidence e.g. faults
- Analysis of seismic data attributes which included the following:
  - Anomalously high amplitude reflectors: high acoustic impedance contrast
  - Acoustic blanking: high signal attenuation
  - Velocity pull down of underlying reflectors: velocity reduction
  - Phase reversal: negative reflection coefficient
  - Edge effects: diffraction hyperbolae

The risk assessment criteria in this report is summarised in the following table and is dependant on the type and number of attributes observed and the magnitude or severity of these attributes.

Shallow Gas Risk Assessment Criteria

Level of Risk	Probability of Gas	Typical Seismic Characteristics
High	Gas most probable	High amplitude with 3 or 4 other well defined features (closure, phase reversal etc.)
Moderate	Gas likely	High amplitude with 2 other subsidiary gas like features
Low	Gas possible	Moderate amplitude with 1 or 2 other features or very high reflector amplitude alone
Slight	Gas unlikely	Usually 1 or more features, but unremarkable reflector amplitude

3.7 SEABED SAMPLING

Two gravity core samples were recovered within the site survey area. The recovered samples were photographed and logged upon recovery, sealed in plastic bags and returned to Thales Perth office for storage.

The sample descriptions are summarised in the table below and sample logs are presented in Appendix K.

Datum : AGD66 Projection : AMG Zone 55, CM 147° East

Sample Reference Number	Location		Brief Description
	Easting (m)	Northing (m)	
GC1	676 543.65	5 779 200.50	Grey/green soft-firm silty CLAY.
GC2	677 080.90	5 780 887.87	Grey/green soft-firm silty CLAY with minor shell fragments (<<1%).

4. CONCLUSIONS

The nearest observable water depth to the proposed Sole-2 location is 124.3m LAT. The seabed within a 500m radius of the proposed Sole-2 location appears clear of any topographical features, debris or other obstructions which may be considered hazardous to rig installation.

The shallow geological stratigraphy at the proposed Sole-2 location is defined as follows:

Top of Unit	Depth Below Seabed (m)	Unit Thickness (m)	Predicted Lithology
A	0	6.5	Soft to Firm Silty CLAYS.
B	7.0	0.5	Firm Clays.
D	7.5	> 2.0 to beyond the limit of useful seismic penetration	Consolidated Sediments.

Anchoring conditions across the survey area will be dictated by the geotechnical properties of Units A, B, C and D that have a combined thickness of 8.5m to 25m across most of the site survey area. The sediments of Units A, B and C are believed to comprise soft to stiff clays and the sediments of Unit D are believed to comprise more consolidated sediments. Although it is not possible to predict geotechnical properties of the soils from the boomer records, it is reasonable to assume that these sediments will become denser with increasing depth below seabed.

Using the method of shallow gas risk assessment outlined in section 3.6 of this report, the risk of shallow gas is defined as slight (gas unlikely) at the proposed Sole-2 location.

5. SAFETY

Objective

The prevention of accidents and injury is the primary objective on this and all Thales projects, and great importance is placed on ensuring and maintaining the health and safety of employees. Furthermore, Thales wishes to protect all persons with whom employees may have association during work activities. It is therefore the policy of Thales; to observe and comply with all statutory provisions and to take additional measures that it sees fit in the pursuance of safety. Thales maintains a safe working environment by employing the following measures:

a) Observe and comply with all statutory provisions.

b) Ensure that all work places are suitably equipped and free from recognised hazards that are liable to cause death, injury or illness.

c) Encourage employees to improve health and safety awareness in their own sphere of activity, to prevent injury to themselves and to other people and to report accidents and hazards to their superiors.

d) Hold all supervisory personnel responsible for developing and maintaining safety equipment where appropriate.

e) Provide employees with suitable safety equipment where appropriate.

f) Seek ways of improving health and safety in the work environment.

g) Encouraging the use of the 'Stand Back, 5 by 5' work safety ethic.

To facilitate the implementation of these measures Thales produces the following documents; Survey Safety Manual, Project Manual (includes Safety Management Plan), and Emergency Response Plan.

Project Induction and Safety Meeting

A general Project Induction and Safety Meeting was held at 0800 on 15 March 2002 onboard the Bluefin, prior to the start of mobilisation. A further safety meeting and fire & abandonment drill was held at 1730 on 16 March 2002. The subsequent safety meeting was held to go into further detail of the safety requirements expected from the Client, Thales and Australian Maritime College (AMC). The Client Representative, Thales and AMC personnel attended the Project Induction and Safety Meeting.

The Thales Party Chief discussed the Following topics:

1. Thales personnel introductions.
2. Project briefing of the survey campaign.
3. Introduction of Thales Operations Policies including Thales Health and Safety Policy, Environmental Policy, Drugs and Alcohol Policy, Injury Management Policy and Procedures, and Quality Policy.
4. The effective implementation of Thales Policies under the Thales Safety Management Systems (SMS).
5. Legislation and Regulations applicable to Thales Operations, particularly offshore operations.
6. Hazard Identification and Assessment (the introduction of Thales U-See, U-Act Safety System and the Stepback 5x5 process), Risk Assessment and Job Safety Analysis (JSA) with particular discussion directed toward equipment deployment / recovery and geotechnical coring operations.

7. Thales Emergency Response Plan and the process for accident / incident reporting and investigations.
8. Safety documentation supporting Thales SMS including Thales Manuals, Legislation and Acts, Safety Work Instructions, Safety Notes, Safety Forms, Codes of Practice and Guidance Notes.
9. The appropriate use of Personal Protective Equipment (PPE) including coveralls, safety footwear, safety helmets, safety glasses, hearing protection devices, safety gloves and the mandatory use of life vests during operations near the vessels stern.
10. Thales' Underwater Engineers to control all back deck operations involving equipment deployment / recovery and geotechnical coring.

The AMC Vessel Master discussed the Following topics:

1. AMC personnel introductions.
2. Vessel safety onboard the Bluefin.
3. Emergency procedures, muster points and alarms.
4. General reinforcement of Thales Safety Management System (SMS).

Vessel Inductions

AMC held vessel inductions onboard the Bluefin on 15 March 2002. All Thales personnel and the Client Representative were required to undertake the vessel induction.

Job Safety Analysis (JSA) Meetings

Job Safety Analysis meetings were undertaken prior to all facets of the survey. A JSA was held for the following operations; vessel mobilisation, equipment installation, vessel operations, deployment / recovery of equipment, velocity profile dip and coring operations. Particular emphasis was directed towards safety near the stern of the vessel, with all non-essential personnel required to remain clear of equipment deployment and geotechnical coring operations. The use of PPE was re-iterated. The process of communication between the back deck and bridge was outlined during each JSA to ensure personnel wee informed during each phase of the operation.

JSA worksheets are detailed in the Thales Safety Management Plan.

Incidents

There were no safety incidents reported for the project.

6. GEODETIC PARAMETERS

Co-ordinates shown in this report are referred to the Australian Geodetic Datum 1966 (AGD66). The Global Positioning System (GPS) is referenced to the World Geodetic System 1984 (WGS84).

6.1 DATUMS

Datum	:	**ITRF92 (Epoch 1994.0) WGS84 G730**
Spheroid	:	WGS84
Semi-major Axis (a)	:	6 378 137.000m
Semi-minor Axis (b)	:	6 356 752.314m
Eccentricity Squared (e^2)	:	0.006 694 380
Flattening ($^1/_f$)	:	298.257 223 563
Datum	:	**Australian Geodetic Datum AGD66**
Spheroid	:	Australian National Spheroid
Semi-major Axis (a)	:	6 378 160.000m
Semi-minor Axis (b)	:	6 356 774.719m
Eccentricity Squared (e^2)	:	0.006 694 542
Flattening ($^1/_f$)	:	298.25

6.2 PROJECTION

Projection Name	:	Australian Map Grid 1966 (AMG66)
Projection Type	:	Universal Transverse Mercator (UTM)
AMG Zone	:	55
Central Meridian (CM)	:	147° East
Scale factor on the CM	:	0.9996
False Easting	:	500 000m
False Northing	:	10 000 000m
Latitude of Origin	:	0° (Equator)
Unit of Measure	:	International Metre

6.3 DATUM TRANSFORMATION

The following 7-parameter datum transformation was used to convert WGS84 co-ordinates to AGD66 co-ordinates:

Dx	=	+ 123.314m
Dy	=	+ 47.223m
Dz	=	- 136.594m
Rx	=	+ 0.264"
Ry	=	+ 0.322"
Rz	=	+ 0.270"
Scale (K)	=	+ 1.384 p.p.m.

The sign convention applied by Thales in GNS2 software is that used by the US Department of Defence, where a positive sign about the z axis is an anti-clockwise movement of the x and y-axes (when viewed from the North Pole looking towards the centre of the Earth).

7. EQUIPMENT DESCRIPTIONS

7.1 GNS2

GNS2 (General Navigation System) is Thales' third generation of On-line Navigation Survey Control software. Thales' Software Support Group in C++ has written it for operation under Windows® 95 or Windows® 98 or Windows® NT. GNS2 adheres to the operation and dialogue conventions of the Microsoft Windows® environment. Attention has been paid to preserving a consistent operator interface, while at the same time modifying individual dialogue boxes to reflect specific logical circumstances. It has been designed for operation with a pointing device such as a mouse or a tracker ball but control can still be effected in case of the absence or failure of such a device.

The program has the ability to accommodate a large number and variety of mobiles, including surface vessels/ships, anchor-handling vessels, tugs, barges, ROVs, towfish, aircraft, vehicles and submersibles etc. The only limiting factors on the number of mobiles that can be tracked in GNS2 are the number of input/output serial communication ports available on the computer and the computer's memory.

For the input/output (I/O) of navigation and sensor data, GNS2 employs intelligent multi-channel serial communications boards to expand a computer's serial input/output facility. Currently GNS2 can support up to 26 communication (Comm) ports, which would consist of the computer's two internal Comm ports and three 8 channel serial communications boards fitted in the computer's internal expansion slots.

If Least Squares Computations (LSCs) are employed for positional calculations, whether two-dimensional (2D), three-dimensional (3D) or altitude aided, GNS2 uses standard iteration routines for the minimisation of residuals using 'variation of co-ordinate' algorithms. The number of I/O serial communication ports available on the computer and the computer's memory, limits the number of positioning systems/computations that GNS2 can handle.

All input observables are accepted on interrupt. Screen updates and other internal triggers are paced to once per second but time critical activities occur at discrete moments as required.

The GNS2 application workspace can extend beyond the display area, which is normally restricted to a single monitor connected to the computer. By using one or more multiple VGA cards, an enlarged display area can spread across multiple monitors.

Currently GNS2 can display 14 different types of view windows. Several copies of the same type of view window can be invoked at any one time. This may be required when several mobiles are being tracked and a Plan, Helmsman's or Bullseye display are required for each one or when the data on several Comm ports are to be viewed simultaneously. Each window can be individually sized to optimise use of the available display area.

GNS2 can be operated in 2 modes: GNS2 Master or GNS2 Remote. GNS2 Master has the full functionality of GNS2. GNS2 Remote is run on a separate computer and allows independent configuration of the graphics display and its associated numeric information. GNS2 Remote is operated on Anchor Handling Vessels or anywhere where positional information is required (e.g. Vessel Masters, ROV Pilots, Winch Control Stations). The link between GNS2 Master and GNS2 Remote can be via a telemetry link or hard-wired cable.

7.2 GLOBAL POSITIONING SYSTEM (GPS)

System Description

The NAVSTAR GPS (Navigational Satellite Timing and Ranging Global Positioning System) is a USA Military all-weather, space-based positioning system that transmits signals from a constellation of satellites orbiting the Earth. It is capable of providing suitably equipped users worldwide with accurate three-dimensional positions on, or near, the Earth's surface. The accuracy of these determined positions can vary from a few millimetres to several 10's of metres depending on the GPS receiver and on the method of data acquisition and processing. System design consists of three integrated parts: the Ground Control Segment, the Space Segment and the User Segment.

The operational space segment consists of 24 production satellites and 3 active spares; the term Space Vehicle (SV) is used as a synonym for satellite. The satellites are in high orbits, at approximately 20,200km, having an orbit period of 12 hours. They are arranged in 6 orbital planes, inclined at 55 degrees with near circular orbits. The configuration provides complete 4-satellite (3D) coverage world-wide.

GPS Observations

There are two important types of GPS observations (observables): Pseudo-range and Carrier Phase. Carrier phase is sometimes also referred to as carrier beat phase. Pseudo-range techniques are generally used for navigation. In high-precision baseline surveying the carrier phase is used. Although the (undifferenced) phase can be used directly, it has become common practice, at least in surveying applications, to process certain linear combinations of the original carrier phase observations (double differences and triple differences).

Pseudo-ranges

The pseudo-range is a measure of the distance between the satellite and the receiver at the epochs of transmission and reception of the signals. The transit time of the signals is measured by comparing (correlating) identical pseudo-random noise (PRN) codes generated by the satellite and by the receiver. A code-tracking loop within the receiver shifts the internal replica of the PRN code in time until maximum correlation occurs. The codes generated at the receiver are derived from the receiver's own clock, and the codes of the satellite transmissions are generated by the satellite system of clocks. It follows that unavoidable timing errors in both the satellite and the receiver clock will cause the measured quantity (pseudo-range) to differ from the geometric distance.

Where instantaneous positions are required, pseudo-range is the preferred observable. Given the satellite ephemeris (i.e. the position of the satellite at the epoch of transmission), there are seven unknowns: two clock errors, three receiver co-ordinates and the ionospheric and tropospheric delays. The effect of the satellite clock error is negligible for the typical navigation solution, particularly considering that the time errors are indistinguishable from the ionospheric and tropospheric delays. The satellite clocks are constantly monitored and synchronised with GPS time as maintained by the control centre. Actual offsets of the satellite clocks are approximated by polynomials in time and transmitted as part of the navigation message to the user for the correction of the measured pseudo-ranges. The ionospheric and tropospheric delays can be computed on the basis of ionospheric and tropospheric models, thus there are four unknowns left X, Y, Z and receiver clock error. These can be determined from four pseudo-ranges measured simultaneously to four GPS satellites.

Carrier Phase

The phase observable is the difference between the phase of the carrier signal of the satellite, measured at the receiver and the phase of the local oscillator within the receiver at the epoch of measurement. This can be regarded as a biased range measurement of the satellite-receiver distance with the integer number of carrier waves being unknown. The wavelength of the L1 carrier is about 19cm. Because of the fraction of the carrier phase is measured, the term "interferometry" is often used to describe carrier phase techniques.

7.3 SKYFIX/SKYFIX SPOT DIFFERENTIAL GPS (DGPS)

Differential GPS (DGPS)

GPS is primarily a USA Defence space-based positioning system capable of operating worldwide and in all weather conditions. The USA Military can degrade the accuracy of GPS with the use of Selective Availability (SA) to control the accuracy of Pseudo-range measurements. Essentially, the user is given a false Pseudo-range for each satellite so that the resulting measurement is in error by a controlled amount. On the 1 May 2000 SA was discontinued conditionally and coincided with the successful demonstration of the ability to selectively deny GPS signals on a regional basis. SA has been set to zero and can be reinstated during periods of heightened global tension.

GPS signals are affected by several sources of positional bias, the largest of which was SA. The remaining biases of the ionosphere, the troposphere, time, satellite ephemeris and inherent receiver noise also give rise to substantial bias of position.

Differential GPS is a means by which the civil user can improve the accuracy and quality of GPS to the 1-3m level. It requires a receiver be located at a precisely known point from which pseudo-range corrections for each satellite can be determined and monitored. These pseudo-range corrections are then communicated by means of a telecommunications link to users at unknown locations. In the relative mode, most of the important systematic errors common to the known station and at the unknown location cancel out to improve the accuracy of the computed position.

SkyFix/SkyFix Spot Differential

SkyFix

Thales GeoSolutions (Australasia) Limited introduced its SkyFix Differential GPS System in Australia in February 1991, using the Inmarsat Pacific and Indian Ocean marine communications satellites as the differential data broadcast link. Extensive performance trials and projects undertaken to date have shown SkyFix to meet the best industry expectations in terms of quality of service and accuracy.

Satellite communications systems, particularly at the Inmarsat L-band frequencies of 1.5 GHz are reliable and free of the interference associated with the crowded MF/HF bands. This high data integrity gives users confidence that the corrections will be continuously received without interference.

The SkyFix Australian network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Sydney, Cairns and Darwin.

SkyFix Spot

The SkyFix Spot Differential GPS System was launched in Australia in December 1994, using the OPTUS high powered focused communications satellite as the differential data broadcast link. Projects undertaken to date have shown SkyFix Spot to meet the industry expectations in terms of quality of service and accuracy.

The SkyFix Spot system has a link capacity of 1200 bits per second, similar to the SkyFix system but because it is only transmitting corrections from the Australian network an update rate of better than five seconds is achieved.

The OPTUS satellites uses the L-band frequencies of 1.5586 GHz and are very reliable and free of interference avoiding data loss associated with the crowded MF/HF bands.

The SkyFix Spot network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Sydney, Cairns, Darwin, Alice Springs and also Ujung Pandang and Jakarta in Indonesia and Wellington, New Zealand.

The differential corrections generated at each reference station are brought via landline links to the data hub and control centre in Singapore, where the system is monitored for performance and quality. From there, a composite message containing full RTCM 104 version 2 formatted data from all reference stations are sent via dual redundant links to Satellite Earth Stations at Sentosa Island, Singapore, O.T.C. Perth, Western Australia and OPTUS, Perth, Western Australia, for uplink and broadcast over the Inmarsat Pacific and Indian Ocean Region satellites and the OPTUS Satellite.

The SkyFix/SkyFix Spot system includes a 24 hour monitoring facility to ensure the validity of data received at the control centre from the Differential GPS reference stations, and that the same data are received over the SkyFix/SkyFix Spot satellite data link.

7.4 TRIMBLE SERIES 4000 GPS RECEIVER

The Trimble Series 4000 GPS receiver is designed for moderate precision static and dynamic positioning applications. The GPS receiver provides time and three-dimensional station co-ordinates at a once-per-second update rate.

The receiver receives the civilian coded signal (C/A) from the GPS NAVSTAR satellites. The receiver automatically acquires and simultaneously tracks GPS satellites and precisely measures code phase and computes position and velocity.

Latitude, longitude and height values are output on the World Geodetic System (WGS 84) Earth-centred, Earth-fixed co-ordinate system.

The receiver is designed to measure the following observables:

- Coarse/Acquisition (C/A) code Pseudo-ranges
- Rate of change of Pseudo-range
- Integrated Carrier

C/A code correlation techniques measure the propagation time of the signal from the satellite to the antenna. Latitude, longitude, height and time can be determined from measurements made from at least 4 satellites, by a process similar to triangulation.

To determine speed and heading, the receiver calculates the rate of change of Range (the range-rate) by measuring the Doppler shift of the carrier.

It is capable of receiving and processing differential corrections from other reference sources using the standard format of the Radio Technical Commission for Maritime Services, Special Committee 104 (RTCM SC-104), Version 1.0 or 2.0 protocols.

The Trimble Series 4000 GPS receiver has several options available, including internal data logging memory, event marker logging etc. and therefore may be used alone or as part of a more extensive navigation system.

7.5 MULTIFIX 3

7.5.1 System Overview

MultiFix 3 is Thales GeoSolutions third generation *multiple reference station* differential GPS (DGPS) real time position computation and quality control program. It is an integral part of the Thales SkyFix Premier service but can also be used with the standard SkyFix service. MultiFix 3 has more advanced features than its predecBSOCr, MultiFix 2, including being able to use dual frequency receivers and form real time 'Iono-Free DGPS position solutions'.

MultiFix 3 is one of a series of programs available under the group name Zero, which includes other tools and utilities with a similar user interface and layout structure, like static and dynamic position comparison programs, a correction monitor program, a terminal program and a replay utility.

MultiFix 3 takes in Almanac, Ephemeris and Raw Code and Carrier measurements from a single or dual frequency GPS receiver (or, for replay, from logged files). It takes in RTCM SC104 Version 2 differential correction messages from one or more RTCM correction delivery systems. It also takes in RTCM Type 15 or Thales Proprietary RTCM Type 55 Ionospheric range corrections generated at selected SkyFix Premier reference stations and broadcast via the Thales global network of high (SkyFix Spot-Optus) and low (SkyFix-Inmarsat) power satellite based L-Band beams.

Key features of the program are:

- No limit on the number of RTCM correction delivery systems (data links)
- No limit on the number of RTCM differential reference stations
- No limit on the number of computations (solutions)
- Each computation can employ corrections from any combination of reference stations available
- Computations are weighted least squares with statistical evaluation based upon the UKOOA recommendations
- No limit on the number of outputs
- No limit on the number of view windows
- View windows can be customised
- Extra NMEA outputs can be defined
- TCP/IP communication via sockets for GPS, RTCM and position data transfer between networked computers

MultiFix 3 has been designed in a modular fashion such that data is passed between modules as if over a computer network. The core module MultiFix 3 performs the computation of position. Additional modules are available and more will be made available in the future. While a single computer can be used, the various modules will equally be able to be run on different computers, provided there is a network interconnection.

MultiFix 3 uses the EGM96 geoid/spheroid separation model.

The RTCM corrections that are generated at reference stations are contaminated by a variety of error components, one of which is Ionospheric delay. The Ionospheric delay is currently more variable because of greater sun spot activity. MultiFix 2 and MultiFix 3's standard computation uses the Klobuchar Ionospheric delay model. This model is updated periodically but is not responsive to the current short-term variability. MultiFix 3 has an additional calculation option when working with dual frequency receivers and in receipt of Type 15 or 55 RTCM messages. With dual frequency receivers, estimates can be made of the Ionospheric delay by examining the differences between the measurements from the two frequencies. If the same procedure for estimation of Ionospheric delay is performed at the reference stations and on the mobile, both the RTCM corrections and the pseudo-ranges can have the Ionospheric delay removed, effectively providing an Iono-Free DGPS position solution.

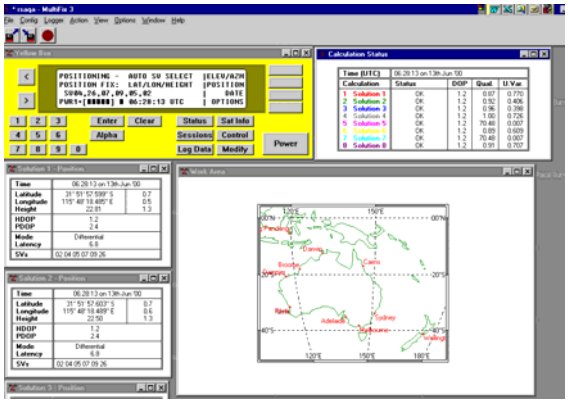
7.5.2 Hardware Requirements

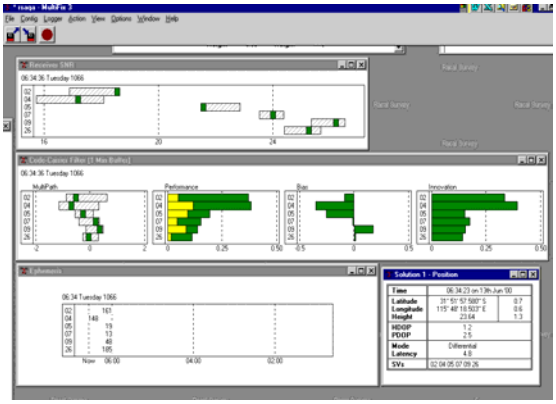
Optimum requirements for MultiFix 3 are:

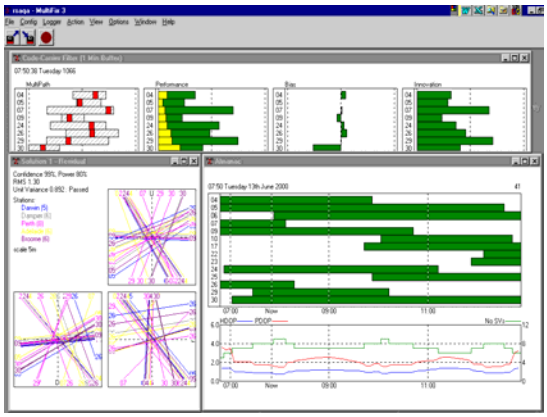
- 350 MHz Pentium II computer
- 32 Mb RAM
- Windows 95, 98 or NT operating system
- Graphics resolution of at least 800 x 600 pixels
- Intelligent multi-port serial I/O board

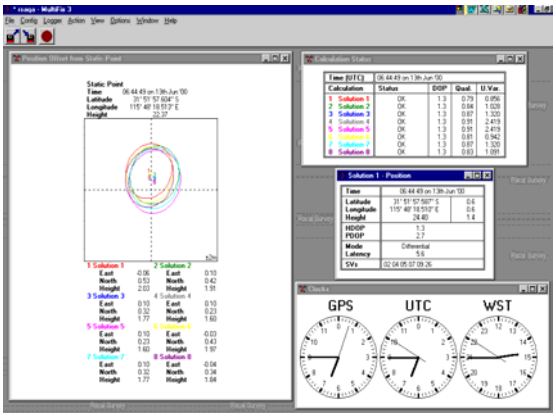
7.5.3 Positioning and Quality Control Displays

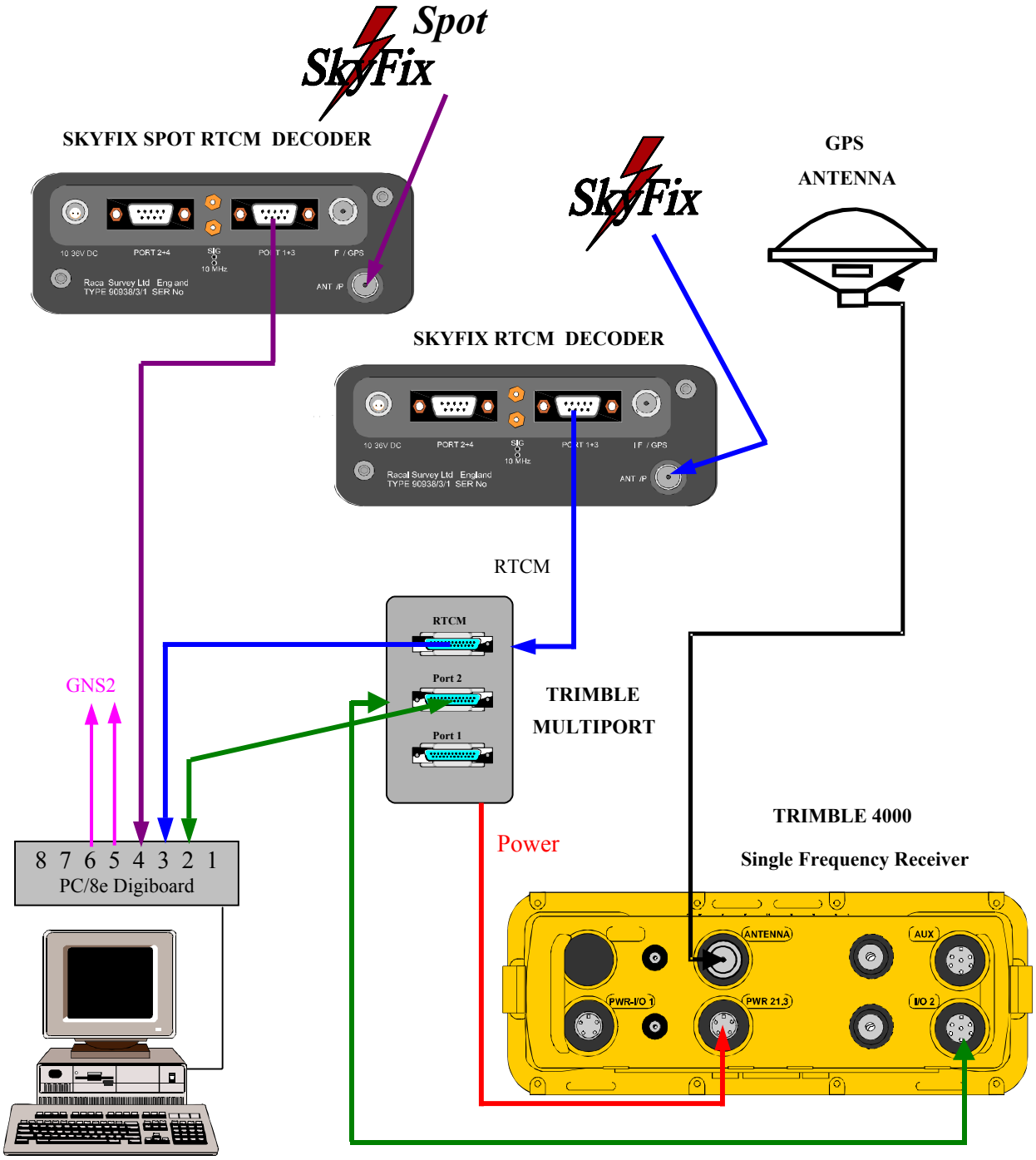
MultiFix 3 has a large number of features to accomodate the user requirements of highly accurate positions with quality control (QC) information and outputs in different formats. MultiFix 3 runs in a Windows environment, which allows the user to design a preferred screen layout by opening, sizing and placing the numerous displays that are available. Examples of the various displays can be found below.











Typical MultiFix 3 Interconnection With Trimble 4000 GPS Receiver

7.6 ATLAS DESO 15 ECHO SOUNDER

The Atlas Deso 15 echo sounder is a dual frequency system operating at 33kHz and 210kHz. Digital technology is employed so that the equipment comprises one unit incorporating an analogue/digital thermal recorder, transceiver electronics and digitiser. The transducers may be hull or over-the-side mounted.

To measure water depth the Atlas Deso 15 echo sounder uses ultrasonic sound waves. A short burst of ultrasound is transmitted vertically downwards into the water by a transducer, which converts electrical energy into mechanical energy. A proportion of the sound energy is reflected by the bottom or by other solid media such as fish, and returns as an echo to the transducer. The time which elapses between the transmission of the signal and the return of its echo is proportional to the depth. The accuracy of the depth measurement depends on such factors such as the print speed and index errors, although the primary influence on depth accuracy is the measurement (and concomitant accuracy) of the velocity of sound through the water column, which is set by the operator in the echo sounder. Bar checks are also carried out to calibrate the system for index errors. Print speed checks are carried out as part of the mobilisation procedures. The echo sounder controls the generation, timing and length of outgoing pulses that are transmitted from the transducer.

High frequency transmissions will tend to be reflected by the seafloor whilst lower frequency signals penetrate soft mud and sediment to produce shaded echoes of the various layers on the analogue recorder. The echo sounder contains two digitisers, one for each transmitted frequency. Returns from several transmissions are stored, weighted and summed so that faint returns from the seabed will be recognised from the background noise. Digital information is indicated in the display window of the echo sounder and is also available for external use. The digitiser can be set to track either or both of the two frequencies.

System specifications are as follows:

Operational Voltage:	18 - 32 V DC or 240 V AC
Power Consumption:	Approx. 100 VA
Transducer Frequencies:	33kHz 210kHz
Beam Widths:	33kHz - 16° 210kHz - 9°
Depth Capability:	0.5 - 650 metres
Power Output:	300W, 600W & 1,000W
Measuring Accuracy:	33kHz - better than 10cm 210kHz - better than 1cm
Water Sound Velocity:	1400 m/s to 1600 m/s in 1 m/s steps

7.7 TSS DMS 2-05 MOTION SENSOR

The TSS DMS 2-05 Motion Sensor is used to provide heave, pitch and roll data to the single beam echo sounder system. The TSS DMS 2-05 is a small portable system for measuring the vertical displacement and altitude of a vessel when no stationary reference is available.

Sensor Package

The standard sensor package contains the solid state sensing elements that resolve the magnitude and direction of forces acting upon the sensor so that it can supply motion measurements. High speed circuitry converts the signals from the sensing elements into actual measurements of attitude and motion. These are then communicated via RS232 or RS422 to a receiving PC, or terminal, or to the appropriate receiving equipment (echo sounder, datalogger etc.).

Installation of the DMS System is simple, and the compact design allows it to be mounted close to the point for which measurements are required.

Software

Software resident within the sensor electronics package allows a PC or terminal to control the DMS System so that its configuration can be optimised for any particular installation. The software can be utilised to check the analogue output values, and to measure the roll and pitch mount angles.

Auxiliary Input

The DMS System can accept signals from auxiliary equipment such as a Global Positioning System (GPS) or a gyrocompass. The sensor uses these ‘aiding’ inputs to maintain the accuracy and stability of measurements throughout vessel turns.

Principle of Operation

The DMS includes an array of solid-state sensing elements that measures the instantaneous linear accelerations and angular rates affecting the sensor at any time. These measurements allow the system to derive the attitude of the platform on which the sensor is mounted with respect to the true vertical.

Additionally, velocity and heading information supplied by external GPS and gyrocompass systems can be used by the DMS system to maintain the measurement accuracy of the sensor throughout vessel turns.

The digital output from the sensor is updated and supplied as a digital data string transmitted to external equipment using either RS232 or RS422.

To support the requirement of applications that require an analogue input (i.e. the Elac Multibeam System), the sensor provides scalable analogue outputs for roll, pitch and heave.

System specifications are as follows:

Heave

Range	:	± 10 meters
Resolution	:	1cm
Bandwidth	:	0.05 to >10 Hz
Accuracy	:	The greatest of 5cm or 5%
Measurement Datum	:	All measurements are with respect to the centre of the bottom surface of vertically mounted Sensor.
Acceleration Range (vertical)	:	2g

Noise (at cut-off frequency 0.05 Hz) : <1cm RMS

Roll, Pitch

Range	:	±30º
Resolution	:	Digital 0.01º
Bandwidth	:	0 to >10 Hz
Accuracy		
(Dynamic) DMS 2-05	:	±0.05º
(Static) DMS 2-05	:	±0.05º
Angular rate change	:	100º/second
Noise	:	<0.05º RMS
Cross axis coupling	:	<1%

Electrical

Power Requirement	:	12V to 36V DC 12W at 24V
Digital Interface	:	RS232C, RS422 user selectable
Digital Output Data Rate	:	Dependent upon output format and baud rate. The Sensor will supply data packets at the highest possible transfer rate. Using the default settings (format TSS1 at 9600 baud), the digital output rate will be 32 packets/second.

Environmental

Temperature Range		
(Operating)	:	0 to +40°C {32ºF to 104°F}
(Storage)	:	-20 to +70°C {-4ºF to 158°F}
Shock (Survival)	:	30g peak 40ms half-sine
Vibration (Operating)	:	Meet Lloyd's Register ENV2 (1996) specification for vibration Meet ABS Table 4/11.1 (1996) No. 12 IEC Publication 68-2-6 (1995) Test F.
Transverse Acceleration	:	500mg peak 0.1s sine
Enclosure Ingress Protection	:	3000m {9840ft} depth rated
Tilt	:	±30° any plane
Operating Transit/Storage	:	No limit
Yaw Immunity	:	10° per second with 30° roll and pitch

7.8 GEOACOUSTICS DUAL FREQUENCY SIDE SCAN SONAR SYSTEMS

The GeoAcoustics Dual Frequency Side Scan Sonar system provides mapping of the seabed and consists of a GeoAcoustics combined towfish (159D), a pair of dual frequency sonar transducers (196D) and a Sonar Transceiver (SS941).

The GeoAcoustics combined towfish contains side scan sonar transducers which transmit short pulses of high frequency acoustic energy in fan shaped beams at right angles to the fish's track. The beams are narrow in the horizontal plane and wide in the vertical plane. In the nose of the towfish are the transmitting and receiving circuitry and on receipt of a trigger pulse from the ship-borne recorder the transducers are energised. The receiving circuitry amplifies the returned echoes and sends them via the tow cable to the recorder for display.

The transceiver unit allows the operator a simple means of controlling various Side Scan operating parameters. The unit includes standard controls such as: Gain, Time Varying Gain (TVG), Automatic Gain Control (AGC), with duplicated controls for port and starboard transducers. The operating frequency can also be switched from 100kHz to 500kHz directly from the transceiver. The choices of frequencies means that long range scanning and short range high resolution investigations are possible. The output of the transceiver can be recorded digitally if interfaced to a digital recording system.

System specifications are as follows:

GeoAcoustics 196D Dual Frequency Transducers

Source level	223 ± 3 dB re 1µPa @ 1 m
Beamwidth	50° by 1°/40° by 0.5°
Sensitivity	190 dB re 1 V/µPa
Depression	Angle 10° ±1° down.

Transmitter

Frequency	100/500 kHz ±1%.
Power output	1.2 kW/1 kW pulse ±20%.
Pulse length	167 µsec/88 µsec ±1%
Pulse repetition rate	50 pulses per second maximum.

Protection Open and short circuit protected.

Efficiency Greater than 80%.

Receiver

Port channel	100/500kHz, heterodyned to 135kHz.
Starboard channel	100/500kHz, heterodyned to 65kHz.
Bandwidth	20kHz TVG Transmission loss curve compensated at both frequencies. Approximately + 40dB at 100m range.
Keyburst Frequency	455kHz ± 2%.
Pulse length	300µsec for 110 kHz operation. 600µsec for 410kHz operation.
Power	150V DC at 100mA.
Size	Diameter 10.2cm Length 34.5cm Weight 3.2kg in air, 0.45kg in water.

7.9 BOOMER SUB-BOTTOM PROFILING SYSTEM – CSP1000

A Boomer sub-bottom profiling system consisting of an Applied Acoustics CSP1000 power source, EG&G Model 230 Boomer seismic source, and an EG&G Model 265 Type hydrophone is used to determine the nature of the sub-seafloor geology. The boomer catamaran and the 10-element hydrophone are towed astern of the vessel.

The raw analogue signal is firstly filtered using a Krohn-Hite 3700 filter before it is digitally displayed and recorded.

The system is operated and fired by an Applied Acoustics CSP1000 Triggered Capacitor Bank and Power Source. The data can be processed and recorded by a digital recording system, which includes a band pass filter.

The Boomer Sub-bottom Profiling system comprises the following components:

Applied Acoustics CSP1000 Power Source

The Applied Acoustics CSP1000 Power Source provides a high-voltage direct current for charging the capacitor banks used in sub-bottom profiling systems. The Applied Acoustics CSP1000 Power Source will charge at 1100 Joules per second. This allows the operator to select sound-pulse repetition rates as fast as six pulses per second at an energy level of 1000 Joules:

System specifications are as follows:

Size:	19” rack mounted 7U high 550mm deep
Weight:	55 kg
Operating Temperature:	0-37°C at maximum output
Mains input:	207-206 VAC 45-65Hz @ 2.5kVA 3 pin connector
Voltage Output:	3550 or 3800 volts DC 4 pin interlocked connector
Output Energy:	100 to 1000J in 100J increments
Charging Rate:	1100J per second
Capacitance:	144μF. 1 x 10^8 shot life
Trigger:	+ive key opto isolated or closure set by front panel switch. BNC connector on front panel and remote.
Repetition Rate:	To 6pps
Earth:	M8 stainless steel stud on front panel

EG&G Model 230 Boomer Seismic Source

The EG&G Model 230 Boomer (or Uniboom) is an electromechanical source fixed to a surface towed catamaran. The boomer source consists of an induction coil against which an aluminium plate is applied by a system of springs. With each discharge, from the ship-borne capacitor banks, the eddy currents induced in the conductive plate cause it to move violently away from the coil. The initial movement of the plate triggers the acoustic pulse, the duration of the boomer signal is limited to about 0.2ms.

EG&G Model 265 Type Hydrophone

The EG&G Model 265 Type Hydrophone uses 10 elements connected in series and incorporates a current summing amplifier. The hydrophone elements and preamplifier are enclosed in a one-inch, oil filled tube designed to minimise turbulent noise from towing, this part of the hydrophone is called the active section. In addition to the active section, the hydrophone includes a tail for stabilisation, a tow cable that incorporates the conductors for transmitting the electric signals and a battery box attached to the shipboard end of the cable which supplies the DC voltage for operating the pre-amplifier.

System specifications are as follows:

Input Power:	9v DC Battery
Sensitivity:	-61 dB/volt/microbar
Bandwidth:	400Hz - 5kHz
Hydrophone Element:	
Sensitivity	-103 dB/volt/microbar (single element)
Gain (Preamplifier)	42 dB (including gain of 10 elements in series)
Output	2 kohms

7.10 GEOMETRICS G-880 MAGNETOMETER

The Geometrics G-880 magnetometer is a high resolution marine Cesium magnetometer system, which features very high sensitivity measurements of total field and gradient combined with rapid sampling. A Larmor counter provides direct connection to a host CPU for integrated side scan sonar applications. The G-880 is completely digital, unaffected by shipboard noise, easily deployed and simple to operate.

A key element in the high performance of the system is the conditioning and the counting of the Larmor signal. Using a proprietary design mounted into the electronics pressure vessel, sensitivity, measurement rates and data format are selected by operator commands. Counters from multiple sensors may be concatenated together to provide a sequential stream of RS232 data for transmittal through the tow cable. A basic software package for data logging and system control is provided with each model G-880.

Magnetic field variations are measured using the Geometrics G-880 magnetometer, towed from the stern of the vessel. Data are processed and recorded as ASCII files (containing numerical values for latitude, longitude, magnetic field, magnetometer altitude, time, and date) using Sandia Research Associates MagSea logging program software, on the magnetometer control notebook computer. Data are also displayed on a hardcopy using a printer.

Additional Plot software allows any portion of the data recorded on disk to be called up for display or printing; and CsAz for determining optimum sensor orientation.

Deviations from the ambient magnetic field (caused by metallic objects such as pipelines) produce anomaly spikes on the hardcopy printout that can be correlated with GPS navigation information to derive an anomaly location.

Magnetometer Electronics

Operating Principle: Self-oscillating split-beam Cesium Vapor (non-radioactive Cs133) with automatic hemisphere switching.

Operating Range: 17,000nT to 100,000nT

Heading Error: +/- 0.5nT

Sensitivity: 90% of all readings will fall within the following Peak-to-Peak envelopes:

1. 0.05nT at 0.1 second cycle rate
2. 0.03nT at 0.2 second cycle rate
3. 0.01nT at 1.0 second cycle rate

Operating Zones: For highest signal-to-noise ratio, the sensor long axis should be oriented at 45^{o}, +/- 30^{o} to the earth's field angle, but operation will continue through 45^{o}, +/- 35^{o}.

Gradient Tolerance: > 500nT / inch; >20,000nT / meter

Data Output: Three wire RS232, magnetics, up to 6 A/D channels for other sensors if present

Larmor Counter:

4. Integrated into sensor electronics in 'fish'
5. Ref Osc: Nominal 22MHz
6. Output data concatenated with other counters or data sources if present
7. A/D converters: 3 single and 3 differential, 12 bit resolution.
8. Control functions: Keyboard commands from surface

7.11 CODA DA200 DIGITAL RECORDING/PROCESSING SYSTEM

The CODA-DA200 Sonar Data Acquisition and Playback System is used to convert the analogue signal from the GeoAcoustics Transceivers to digital format, and to record the digital data on magneto-optical disk. The CODA is a Unix-based hardware and software system developed for recording and processing of analogue or digital signals from a dual channel side scan sonar.

In real time the data can be recorded to the hard disk, to removable disk drives, or to magneto-optical disk. Processing parameters such as slant range correction, TVG enhancement, image enhancement, zoom facilities, real-time cursor navigation position and on-screen management, scrolling speed adjustment, multi-resolution data display and single/dual channel waterfall display, can be applied while on-line or during playback. Only the raw data will be recorded to magneto-optical disk.

CODA-DA200

Physical
Flight-cased industrial 19” rackmount chassis - 21” x 22” x 13”
Monitor flight casing - 20.75” x 19.75” x 19.5”

Hardware
Dedicated acquisition board
Dual Independent input/output triggers
High-spec Pentium PC
High Resolution 17” monitor
Mouse or Trackball

Data Storage/Retrieval
Shock mounted high speed DDS DAT (4mm) SCSI tape (Exabyte tape, Optical Disk optional)
Shock mounted 1GB SCSI HDD

Data Format
CODA, SEG-Y, SDEF, Q-MIPS™ compatible

Hard Copy
Continuous real-time output to various thermal recorders:
Ultra Wideline 200, Ultra Wideline 195
Ultra 3710, EPC1086, Alden 9315
Screen dump to disk or printer in EPS or TIFF format
SCSI, GPIB, Parallel interface

DATA INTERFACES

Analogue Input
200 kHz throughput
Fully independent triggers
Input signal range ± 1.25 to ±10V
12-bit resolution, dynamic range 72dB (16-bit optional)
Up to 10,240 samples per channel

Triggering
2 fully independent triggers
Master Trigger Output
Trigger period 33ms to 65s
TTL (user-specifiable duty cycle)
Slave Trigger Input
Trigger period minimum 33ms
TTL (min. pulse width 40ns)
Negative/Positive Edge Triggered

Digital Input/Output
TCP/IP Ethernet link, or customer-specified (e.g. SCSI, GPIB), RS-232, DMA compatible parallel
External event input by TTL

Navigational Interface
RS-232 serial interface
Data rate up to 9600 baud, user-configurable
User-configurable RS-232 data format
Corrected navigation input from floppy disk

SOFTWARE

General On-line Processing
Simultaneous, real-time, dual sensor display windows
Real-time, on-line corrective processing including independent channel TVG
Automatic seabed detection and display
Full colour image enhancement

Side scan On-line Processing
Slant range correction
Across-track smoothing

Shallow Seismic On-line Processing
High, low, and band-pass filtering
Trace mixing and anti-mixing
User selectable sound velocity for measurements
Swell filtering

High-Resolution Display
Multi-channel window displays including horizontal and vertical waterfall display and 3D mesh plot (optional)
Multi-resolution, independent channel display
3-mode zoom
Freeze-frame with auto-release during acquisition
A-scan oscilloscope display
Geo-referenced screen and cursor
On-screen measurement and event marking
User configurable scale lines

High Speed Tape Operating System
Random data access with intuitive controls including GoTo, Stop, Play, Fast Forward, Rewind, Cue and review
Tape copying facility including data format and tape conversion
Continuous recording with dual type system
CODA, SEG-Y, SDEF, Q-MIPS™ compatible data formats

Acquisition
Navigation input and survey parameter QC
Software-configurable acquisition setup
Time-synchronised navigation input
User-programmable nav. string input

General
X windows/Motif user interface (version X11R6)
UNIX SVR4 operating system
Additional software modules available for pipeline inspection (PI100), site survey interpretation and reporting (GeoKit), survey overview (Trackplot and Trackplot Plus), on-line mosaicing (CODA Mosaic), swathe bathymetry acquisition and processing (CODA Swathe module)

7.12 S.G. BROWN 1000S GYROCOMPASS

The S.G. Brown 1000S Gyrocompass is a compact, simple-to-operate master heading reference instrument employing the effect of gravity and the earth's rotation to produce a True North reference. This reference may be read off the compass card or from a digital display and can be interfaced to the GNS2 navigation system.

The normal starting cycle of the instrument is fully automatic and is initiated when the system power supply is switched on. A fail safe control circuit is incorporated which ensures that the compass is not damaged after a power failure when power is restored; the compass will restart automatically and carry out its normal settling program.

7.13 APPLIED MICROSYSTEMS MODEL SVPLUS SOUND VELOCITY PROFILER

The SVPlus is a multi-parameter, self-contained, intelligent instrument designed for the measurement of sound velocity, temperature and pressure. The SVPlus features microprocessor based CMOS circuitry, two A/D converters (1 part in 40,000, 1 part in 16,000) and 128 Kbytes of battery backed-up random access memory (RAM) for data storage. The SVPlus has the options of logging data continuously, by depth increments, by time increments, by sound velocity increments, or logging individual scans.

Prior to deployment the SVPlus is connected to an IBM compatible computer via a 3-conductor cable, the instruments output is standard ASCII RS-232. When connected to a computer the SVPlus is programmed using Applied Microsystems Ltd's Total System Software. The SVPlus is configured for logging, choosing sample time units, sampling interval, depth logging increment, sound velocity increment and log file name. Logging begins when the SVPlus is immersed in water and when the instrument receives a valid sound velocity value it begins recording the data. Logging stops when the instrument cannot detect a sound velocity signal and it will assume it is out of the water.

Deployment of the SVPlus is either by hand or winch. As the instrument is lowered to and raised from the seabed, data is stored in memory.

When recovered the SVPlus is re-connected to a computer to view, edit and graph the data logged by the instrument. When a file (or cast) has been completely loaded an analysis of the data automatically begins. The purpose of this analysis is to compute the engineering values of the data and to determine the maximum and minimum values for graphing.

The SVPlus records the temperature, pressure and sound velocity at user specified logging increments. The sound velocity is measured by injecting an acoustic pulse into the water and measuring the time taken for that pulse to travel across a fixed distance.

The SVPlus's sensors must be calibrated occasionally. These should remain within published specifications for periods of 1 - 2 years, depending on the amount of use, and depth of deployment. Sensors are calibrated by recording the instruments raw data at known reference points. This data is applied to a curve fitting algorithm to produce calibration coefficients which are permanently stored in the instruments memory.

System specifications are as follows:

Pressure:	Type: Keller stainless steel pressure transducer Range: Assorted pressure ranges up to 5000 dBars Accuracy: 0.15% of Full scale Resolution: 0.005% of Full scale Response Time: 10 ms
Temperature:	Type: Pressure protected precision aged thermistor Range: -02°c to 32°C Accuracy: ±0.005°C Resolution: 0.001°C Response Time: 100 ms
Sound Velocity:	Type: 1 Megahertz piezoelectric transducer. INVAR stabilised path length (±5.5nm/°C) Range: 1400 - 1550 m/s Accuracy: <0.06 m/s (r.m.s) Resolution: 0.015 m/s
Sample Rate:	When recording internally without sending data, the scan rate is selectable

from 10 scans/second to one every 24 hours.

Memory: 128 Kb battery backed-up RAM, expandable to 40 Mbytes. The standard RAM can record 6400 scans of date, time, pressure, sound velocity and battery.

8. EQUIPMENT CALIBRATIONS AND CHECKS

8.1 GYROCOMPASS CALIBRATION

The S.G.Brown survey gyrocompass was calibrated at 1130 on 16 March 2002. Calibration of the survey gyrocompass was performed using total station observations, while the Bluefin was alongside the Australian Maritime College (AMC) Wharf, Beauty Point, Tasmania.

Survey Mark AMC5 on the AMC Wharf was occupied by total station. The observed reference object was Survey Mark AMC2 on the AMC Wharf. A series of horizontal angles and distances were measured to reflective prisms located along the centreline of the vessel, at the bow and stern. Simultaneous survey gyrocompass observations were recorded within the Thales GNS2 software. The gyrocompass Calculated minus Observed (C-O) was reset to zero before commencing logging data to file.

The vessels Calculated (C) heading was compared to the Observed (O) survey gyrocompass heading to determine the gyrocompass C-O. The gyrocompass C-O was entered into GNS2 and used throughout the site survey campaign. The results of the calibrations are tabulated below.

Control Point Co-ordinates

Datum: AGD66 Projection: AMG Zone 55, CM 147° East

Control Mark	Easting (m)	Northing (m)
AMC5	485 188.128	5 443 443.762
AMC2	485 232.088	5 443 475.890

Observations

Date: 16 March 2002 Instrument Station: AMC5
Backsight Station: AMC2

Time (hh:mm:ss)	Observation Point	Observed Bearing	Observed Distance (m)	Observed (O) True Heading
11:34:40	Bow	343° 21' 35"	70.910	338.80°
11:35:20	Stern	001° 12' 00"	61.880	339.20°
11:35:50	Bow	343° 30' 25"	70.840	339.00°
11:36:20	Stern	001° 03' 05"	61.935	339.00°
11:36:50	Bow	343° 20' 05"	70.830	338.80°
11:37:20	Stern	001° 03' 40"	61.930	338.50°
11:37:50	Bow	343° 23' 55"	70.730	338.20°
11:38:20	Stern	001° 10' 45"	61.890	337.80°
11:40:10	Bow	343° 19' 05"	70.720	338.80°
11:40:40	Stern	001° 10' 55"	61.980	338.20°
11:41:00	Bow	343° 20' 25"	70.750	337.70°
11:41:40	Stern	001° 16' 25"	61.835	338.70°
11:42:20	Bow	343° 17' 40"	70.935	339.00°
11:43:00	Stern	001° 06' 30"	61.970	339.30°
11:43:30	Bow	343° 23' 40"	70.910	339.00°
11:44:00	Stern	001° 06' 30"	62.000	338.30°
11:44:30	Bow	343° 22' 40"	70.685	338.20°
11:45:00	Stern	001° 12' 45"	61.815	339.00°

Time (hh:mm:ss)	Observation Point	Observed Bearing	Observed Distance (m)	Observed (O) True Heading
11:45:40	Bow	343° 19' 45"	70.500	338.80°
11:46:10	Stern	001° 21' 05"	62.020	338.70°

Results

Calculated (C) Vessel Heading (True)	Observed (O) Survey Gyrocompass (True)	C-O
339.66°	339.00°	+0.66°
339.73°	339.00°	+0.73°
339.42°	338.65°	+0.77°
339.32°	338.00°	+1.32°
338.94°	338.50°	+0.44°
339.34°	338.20°	+1.14°
339.44°	339.15°	+0.29°
339.48°	338.65°	+0.83°
339.25°	338.60°	+0.65°
339.54°	338.75°	+0.79°
	Mean	**+0.76°**

The mean gyrocompass C-O = +0.76° was entered into the GNS2 configuration parameters.

The printouts for the pre-survey gyrocompass calibration are located in Appendix D.

8.2 STATIC DIFFERENTIAL GPS CHECK

A static check of the SkyFix/SkyFix Spot Differential GPS was carried out at 1150 on 16 March 2002 while the Bluefin was alongside the AMC Wharf.

Survey Mark AMC5 on the AMC Wharf was occupied by total station. The observed reference object was Survey Mark AMC2. A series of horizontal angles and distances were measured to the vessel datum (echo sounder transducer pole) installed onboard the Bluefin. Simultaneous Differential GPS position fixes were recorded within Thales GNS2 software.

The calculated datum position was then compared to the observed datum position to provide verification of the Differential GPS positioning system. The results of the static Differential GPS check are tabulated below.

Control Point Co-ordinates

Datum: AGD66 Projection: AMG Zone 55, CM 147° East

Control Mark	Easting (m)	Northing (m)
AMC5	485 188.128	5 443 443.762
AMC2	485 232.088	5 443 475.890

Results

Date: 16 March 2002
Instrument Station: AMC5
Backsight Station: AMC2

Time (hh:mm:ss)	Calculated Co-ordinates		Observed DGPS Co-ordinates		Linear Misclose (m)
	Easting (m)	Northing (m)	Easting (m)	Northing (m)	
11:49:50	485 234.330	5 443 500.347	485 235.440	5 443 500.200	1.12
11:50:15	485 234.300	5 443 500.436	485 235.460	5 443 500.320	1.17
11:50:35	485 234.452	5 443 500.466	485 235.350	5 443 500.040	0.99
11:50:55	485 234.447	5 443 500.490	485 235.300	5 443 499.640	1.20
11:51:15	485 234.450	5 443 500.494	485 235.120	5 443 499.300	1.37
11:51:30	485 234.397	5 443 500.460	485 234.930	5 443 498.870	1.68
11:51:45	485 234.310	5 443 500.415	485 234.910	5 443 498.780	1.74
11:52:05	485 234.401	5 443 500.327	485 234.790	5 443 498.780	1.60
11:52:20	485 234.346	5 443 500.243	485 234.700	5 443 498.870	1.42
11:52:35	485 234.375	5 443 500.181	485 234.740	5 443 499.020	1.22
				Mean	**1.35**

Mean Linear Misclosure = 1.35m

Printouts of the static Differential GPS checks are located in Appendix E of this report.

8.3 VELOCITY OF SOUND IN SEAWATER PROFILES

A velocity of sound in seawater profile was carried out at the Sole-2 survey site on 22 March 2002, using a SV Plus Sound Velocity Probe. A mean velocity of sound of 1517.8m/s was determined and entered into the echo sounder.

The water column velocity profile is detailed in Appendix I of this report.

8.4 ECHO SOUNDER TRANSDUCER DRAFT MEASUREMENT AND MOTION SENSOR TEST

8.4.1 Echo Sounder Transducer Draft Measurements

The Atlas Deso 15 echo sounder transducer draft settings were established by undertaking a bar check. A bar check was performed after vessel mobilisation on 16 March 2002, while Bluefin was alongside the AMC Wharf. The draft was measured as 1.54m for the 33kHz and 210kHz transducers.

Copies of the bar check are included in Appendix F of this report.

8.4.2 Motion Sensor Test

A motion sensor test was carried out prior to departure from the AMC Wharf on 16 March 2002. This involved physically lifting the DMS2-05 Motion Sensor up and down whilst watching the echo sounder screen for the correct movement in the raw heave trace.

8.5 SIDE SCAN SONAR RUB TESTS & WET TESTS

Side scan sonar rub tests and wet tests were performed on the primary and back-up towfish alongside the AMC Wharf on 16 March 2002. The purpose of these tests was to ensure that the fish mounted transducers were operating within specification and connected to the correct recorder channels. The Client Representative accepted the results.

The results of these tests are presented as Appendix G of this report.

8.6 BOOMER WET TESTS

A boomer wet-test was performed while the Bluefin was alongside the AMC Wharf on 16 March 2002. The purpose of the test was to check the overall operation and performance of the seismic equipment. The Client Representative was present during the test and accepted the results.

The results of this test are presented as Appendix H of this report.

9. SUMMARY OF EVENTS

The Bluefin commenced mobilisation at the AMC Wharf on 15 March 2002 to conduct a series of site surveys for OMV, in Gippsland Basin in the Bass Strait.

A vessel induction, pre-mobilisation safety meeting including a JSA for the mobilisation was conducted for Thales and Bluefin personnel on arrival at the vessel. The induction and safety meeting commenced at 0800 on 15 March 2002.

Thales survey equipment was loaded onto the Bluefin at 0830 and all crane, welders and labour work were completed by 1545. The Gyrocompasses were powered up at 1300. At 1600 a power failure was encountered but power returned by 1630. At 2000 Thales personnel departed the vessel for the night.

At 0700 on 16 March 2002 mobilisation recommenced. Boomer wet test and side scan sonar rub tests and wet tests were completed by 1000. An echo sounder bar check, gyrocompass calibration and DPGS health check were completed by 1345. Another power failure was encountered from 1515 to 1530. By 1600 the magnetometer was operational. An emergency muster including a fire and abandonment drill was held at 1730.

At 1800 on 16 March 2002 the vessel departed the AMC wharf. The vessel arrived at the Patricia-2 site survey location at 1845 on 17 March 2002. From 1845 17 March 2002 until 0400 on 18 March 2002 the vessel went on weather standby. Equipment was tuned from 0400 until 1030.

Data acquisition on the Patricia-2 site survey was conducted from 1043 until 2119 on 18 March 2002. Data acquisition on the Baleen-3 site survey was conducted from 2148 on 18 March 2002 until 1233 on 19 March 2002. Magnetometer and seabed sampling were carried out to complete both site survey areas until 2053.

From 2200 on 19 March 2002 until 0828 on 20 March 2002 data acquisition was carried out on the Patricia-Baleen pipe route survey. At 0900 on 20 March 2002 the vessel commenced transit to the Baleen-3 site survey location but poor conditions forced the vessel to divert to shelter. At 1700 the vessel dropped anchor for weather down time in the lee of Gabo Island. The anchor was recovered at 2359 on 21 March 2002 and the vessel transited to the Sole-2 site, arriving at 0800 on 22 March 2002. All survey operations were completed on Sole-2 at 2000 on 23 March 2002.

At 2041 on 23 March 2002 data acquisition commenced on the scouting line from Sole-2 to meet with the Patricia-Baleen survey line. This was completed at 0330 on 24 March 2002 and transit commenced to Port Welshpool at 0400.

10. PERSONNEL AND EQUIPMENT

10.1 PERSONNEL

The following personnel were employed on this project:

For: Thales GeoSolutions (Australasia) Limited

Chris Shuttleworth	-	Team Leader/Senior Surveyor
Marc Dybala	-	Surveyor
Laurie Etheridge	-	Senior Underwater Engineer
Jeremy Antao	-	Underwater Engineer
Patrick Fournier	-	Offshore Geophysicist
Luis McArthur	-	Interpretation Geophysicist

For: OMV Australia Pty Limited

Rick Glanville	-	Client Representative

10.2 EQUIPMENT

NAVIGATION

2 x Trimble 4000 Series GPS Receivers
3 x SkyFix/LandStar Demodulators
2 x LandStar Whip Antennae
1 x Skyfix Minidome plus controller
2 x Compaq Pentium Desktop GNS2 Computers
1 x Compaq 486/66 MHz Desktop MultiFix3 Computer
2 x Epson LX300 Printers
2 x SG Brown 1000S Gyro Compass
2 x Helmsman's GNS2 Remote Display
1 x 3KVA Un-interruptible Power Supply

GEOPHYSICAL

ECHO SOUNDER
2 x Atlas Deso 15 Single Beam Echo Sounder
2 x Overboard Transducer (Dual Frequency)
1 x Model XR-666 230vac to 24vdc Power Converter
2 x SV-Plus Velocity Probe
1 x E/S Bar Check
1 x TSS DMS 2-05 Motion Sensor
1 x TSS 335 Motion Sensor

SIDE SCAN SONAR
2 x GeoAcoustics Transceiver Units
2 x Dual Frequency (100 and 500 kHz) Towfish Assemblies
2 x Side Scan Sonar Deck Cables
2 x CODA DA200 Acoustic Recorder
2 x Alden 9315 CTP printer
1 x Seamac Winch
1 x Electric/Hydraulic Winch

BOOMER SYSTEM
2 x EG&G Surface Tow Source
2 x CSP 1000 Cap/Disch Power supplies
1 EG&G Power Supply Model 232-A
1 EG&G Triggered Capacitor Bank Model 231
2 x EG&G Type Hydrophones
2 x TSS 307 TVG amplifiers
Auto transformer
2 x Krohne-Hite Filters

MAGNETOMETER
2 x Geometrics G-800 marine caesium magnetometers
2 x Magnetometer Deck Leads
2 x Geometrics MagSea Computer System

11. DISTRIBUTION

Copies of this report have been distributed as follows:

OMV Australia Pty Ltd : 4 copies
Attn: Mr Ron King

Thales GeoSolutions (Australasia) Limited : 1 copy

Gail Marshall-Neill
Geophysicist

John Graindorge
Senior Geophysicist

Anthony Kerr
Survey Manager

APPENDIX A

SAFETY REPORTS

VESSEL INDUCTION/PRE-MOBILISATION MEETING

MINUTES

Date : 15 March 2002 **Job No. :** 3349C1 Sole-2 Site Survey
Time : 0800 **Location :** AMC, Beauty Point

Present : TGA Personnel and Bluefin Marine Crew

The Party Chief opened the meeting & made the following points.

1) Everything to be proven & tested prior to departure.
2) A detailed discussion on where all the equipment to be positioned & what required welding & testing.
3) An explanation of the site, including size, water depth & procedures.
4) Talk of the safety requirements during mobilisation, including hot work certificates, PPE, cranage, etc.
5) Explanation of survey crew shift pattern & responsibilities.
6) Safety environment & hierarchy, need to keep hazard free as possible.

The First Officer.

1) No smoking within the vessel. Restrictions on smoking on deck.
2) Restriction on personnel in working areas on back deck.
3) Safety chains on stern when applicable.
4) No work boots in accommodation, keep clean environment.

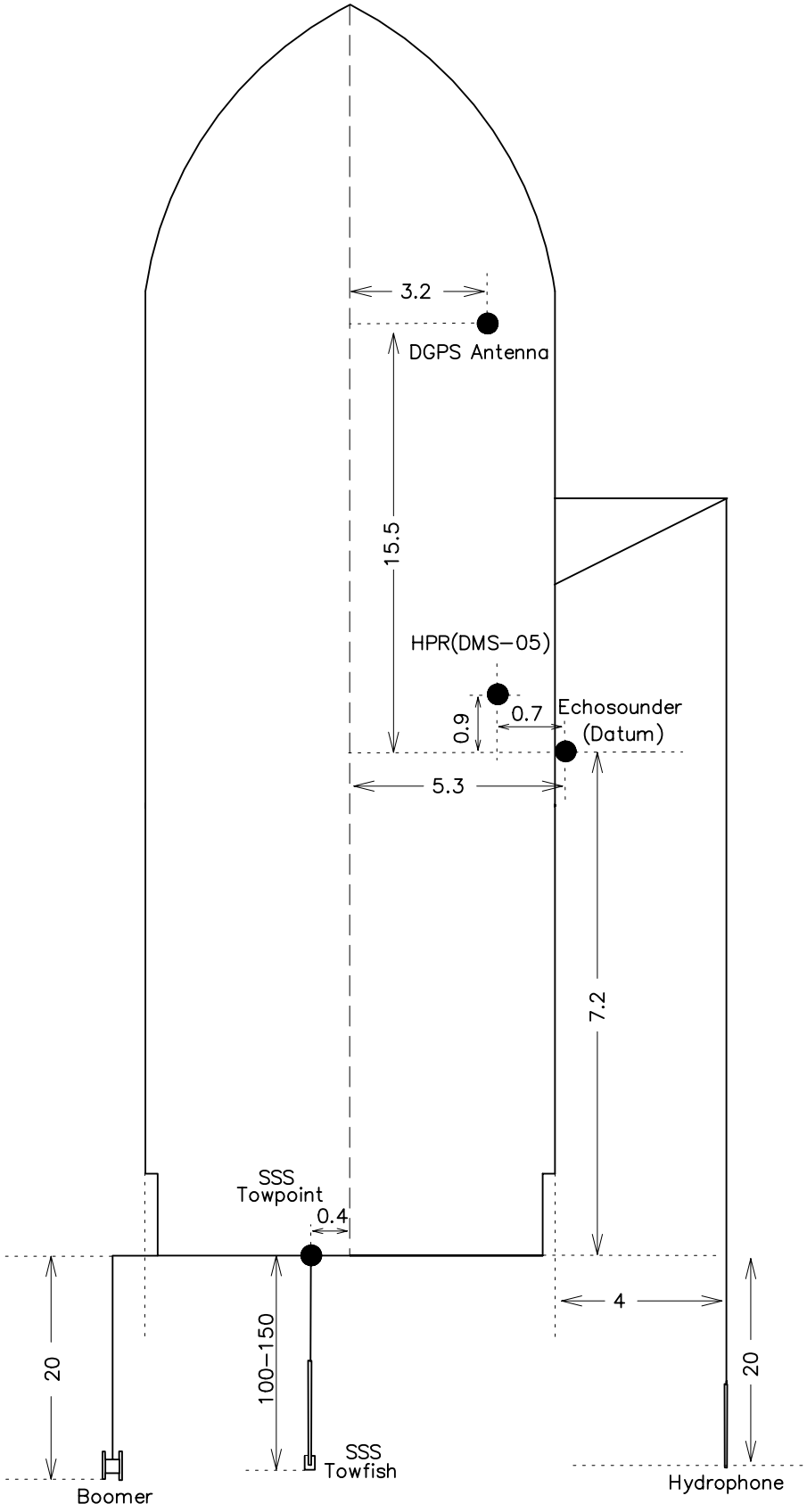
The Party Chief then thanked all attendees, the survey crew were then taken on the vessel induction tour by the First Officer.

APPENDIX B

OFFSET DIAGRAM - BLUEFIN

FTV BLUEFIN

(NOT TO SCALE)



UNITS IN METRES

APPENDIX C

GNS SYSTEM DATA PRINTOUT

GNS II CONFIGURATION FILE C:\3346C1_Site Surveys\Bass Strait.gns

JOB DETAILS
Job Number : 3346C1
Job Description : Site Surveys
Company : Thales GeoSolutions Group Ltd
Client : OMV
Time Zone : GMT +11:00

WORKING SPHEROID
AGD 1966
Semi-major : 6378160.000 m
e Squared : 0.006694541855

WORKING PROJECTION
AMG Zone 55
Lat of Origin : 00°00'00.000"N
Long of Origin : 147°00'00.000"E
False Easting : 500000.00
False Northing : 10000000.00
Scale Factor : 0.999600
Units : Metres

GPS TRANSFORMATION
From : WGS 84
Semi-major : 6378137.000 m
e Squared : 0.006694380067
To : AGD 1966
Dx : 123.314 m
Dy : 47.223 m
Dz : -136.594 m
Rot x : 0.2640 secs
Rot y : 0.3220 secs
Rot z : 0.2700 secs
Scale : 1.3840 ppm

MOBILES
Blue Fin (ship)
Shape Definition: Bluefin
Line:-
X: -10.30 m Y: -7.00 m
X: -10.30 m Y: 13.00 m
X: -5.30 m Y: 23.00 m
X: -0.30 m Y: 13.00 m
X: -0.30 m Y: -7.00 m
X: -10.30 m Y: -7.00 m

Tracking Point : Datum
Pitch and Roll Centre: HPR

Selected Sources:-
Primary Position : T1 Thales UKOOA (Using Antenna Offset : GPS)
Backup Position : T3 Thales UKOOA (Using Antenna Offset : GPS)
Primary Heading : S1 SGB 1000S
Primary Height : Datum Displacement

Verified by: (sign)_____ (print)_____

GNS II CONFIGURATION FILE C:\3346C1_Site Surveys\Bass Strait.gns

```
   Pitch and Roll    : T2 TSS DMS-05
   Heave Sensor      : T2 TSS DMS-05
   Soundings         : A1 Atlas Deso 15 Ch1
   Speed             : Position Filter
   Course Made Good  : Posn Filter CMG

  Equipment:-
   T1 Thales UKOOA
    Status:  ON   Interface: COM3
    Antenna Offset Selected: GPS
     X:   -2.10 m Y:   15.49 m Z:    0.00 m Rng:   15.63 m Brg:352.3°
    Apply Pitch Roll: Instantaneous  Stale Time: 5.0 s  Posn SD: 3.0 m  Ht S
    Update posn regardless of whether diff corrected
    Filter: Off  Time Constant:60.0 s  Sample Dwell: 0.5 s
    Gate: Off  Gate Width: 9.0 xSD  Minimum Gate: 0.0 m

   T3 Thales UKOOA
    Status:  ON   Interface: COM4
    Antenna Offset Selected: GPS
     X:   -2.10 m Y:   15.49 m Z:    0.00 m Rng:   15.63 m Brg:352.3°
    Apply Pitch Roll: Instantaneous  Stale Time: 5.0 s  Posn SD: 3.0 m  Ht S
    Update posn regardless of whether diff corrected
    Filter: Off  Time Constant:60.0 s  Sample Dwell: 0.5 s
    Gate: Off  Gate Width: 9.0 xSD  Minimum Gate: 0.0 m

   S1 SGB 1000S
    Status:  ON   Interface: COM5
    C-O:   0.8 degs  Stale Time: 5.0 s  SD: 0.1 degs
     Filter: Off  Gate: Off  Time Constant: 5.0 s  Sample Dwell: 0.5 s

   T2 TSS DMS-05
    Status:  ON   Interface: COM7
    Pitch C-O:   0.0 degs  Roll C-O:   0.0 degs  Stale Time: 0.2 s

   C1 CODA DA200
    Status:  ON   Interface: COM8
    Antenna Offset Selected: Datum
     X:    0.00 m Y:    0.00 m Z:    0.00 m Rng:    0.00 m Brg:  0.0°

   A1 Atlas Deso 15
    Status:  ON   Interface: COM6
    Tdr 1:Datum
     X:    0.00 m Y:    0.00 m Z:    0.00 m Rng:    0.00 m Brg:  0.0°
    Tdr 2:Datum
     X:    0.00 m Y:    0.00 m Z:    0.00 m Rng:    0.00 m Brg:  0.0°
    Stale Time: 5.0 s
    Corrections Applied:-
     Is Heave Compensated: Yes  Tdr Draught entered in E/S:  0.00 m
    Apply Corrections:-
     Heave Compensate: No   Correct for Draught: No   Correct for Pitch and
    Sounding Selection:-
     Mode: All  Gate: No  Gate Window: 25.00
    Annotation: Yes  Every: 1 fixes
```

Verified by: (sign)_____ (print)_____

GNS II CONFIGURATION FILE C:\3346C1_Site Surveys\Bass Strait.gns

Defined Offsets:-

Datum									
	X:	0.00 m	Y:	0.00 m	Z:	0.00 m	Rng:	0.00 m	Brg: 0.0°
GPS									
	X:	-2.10 m	Y:	15.49 m	Z:	0.00 m	Rng:	15.63 m	Brg:352.3°
Stern									
	X:	-5.30 m	Y:	-7.17 m	Z:	0.00 m	Rng:	8.92 m	Brg:216.5°
SSS									
	X:	-5.70 m	Y:	-7.17 m	Z:	0.00 m	Rng:	9.16 m	Brg:218.5°
HPR									
	X:	-0.70 m	Y:	0.93 m	Z:	0.00 m	Rng:	1.16 m	Brg:323.0°

Verified by: (sign)_____ (print)_____

APPENDIX D

GYROCOMPASS CALIBRATIONS PRINTOUTS

THALES

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Gyrocompass Calibration

Thales Job Number: 3346C1
Job Description: Bass Strait Site Surveys
Client: OMV
Party Chief: C.Shuttleworth
Surveyor: M.Dybala
Wharf: Beauty Point
Vessel: Blue Fin
Date: 16 March 2002

Control Point Co-ordinates

Datum: AGD66 Projection: AMG Zone 55 CM 147° East

Instrument Station:	AMC5	Easting (m):	485 188.128
		Northing (m):	5 443 443.762
		AHD Height (m):	0.000
Backsight Station:	AMC2	Easting (m):	485 232.088
		Northing (m):	5 443 475.890
		AHD Height (m):	0.000

Calculated Grid Bearing (DMS):	053	50	20	
Calculated Grid Convergence (DMS):	000	06	58	Negative-Grid North East of True North

Gyrocompass Observations

Backsight Observation (DMS): 000 00 00

Time (hh:mm:ss)	Observation Point	Observed Direction (DMS)			Observed Distance (m)	Observed (O) True Heading (D.D)
11:34:40	Bow	343	21	35	70.910	338.80
11:35:20	Stern	001	12	00	61.880	339.20
11:35:50	Bow	343	30	25	70.840	339.00
11:36:20	Stern	001	03	05	61.935	339.00
11:36:50	Bow	343	20	05	70.830	338.80
11:37:20	Stern	001	03	40	61.930	338.50
11:37:50	Bow	343	23	55	70.730	338.20
11:38:20	Stern	001	10	45	61.890	337.80
11:40:10	Bow	343	19	05	70.720	338.80
11:40:40	Stern	001	10	55	61.980	338.20
11:41:00	Bow	343	20	25	70.750	337.70
11:41:40	Stern	001	16	25	61.835	338.70
11:42:20	Bow	343	17	40	70.935	339.00
11:43:00	Stern	001	6	30	61.970	339.30
11:43:30	Bow	343	23	40	70.910	339.00
11:44:00	Stern	001	6	30	62.000	338.30
11:44:30	Bow	343	22	40	70.685	338.20
11:45:00	Stern	001	12	45	61.815	339.00
11:45:40	Bow	343	19	45	70.500	338.80
11:46:10	Stern	001	21	5	62.020	338.70

Signature

SURVEYOR/PARTY CHIEF

CLIENT SURVEY REPRESENTATIVE

THALES

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Gyrocompass Calibration

Thales Job Number: 3346C1
Job Description: Bass Strait Site Surveys
Client: OMV
Party Chief: C.Shuttleworth
Surveyor: M.Dybala
Wharf: Beauty Point
Vessel: Blue Fin
Date: 16 March 2002

Datum: AGD66 Projection: AMG Zone 55 CM 147° East

Time (hh:mm:ss)	Observation Point	Observed Direction (DMS)			Observed Distance (m)	Plane Bearing (DMS)			Plane Distance (m)	Calculated Co-ordinates		Calc (C) True Heading (D.D)	Obs (O) True Heading (D.D)	C-O (D.D)
										Easting (m)	Northing (m)			
11:34:40	Bow	343	21	35	70.910	037	11	55	70.882	485 230.982	5 443 500.222	339.66	339.00	0.66
11:35:20	Stern	001	12	00	61.880	055	02	20	61.855	485 238.821	5 443 479.206			
11:35:50	Bow	343	30	25	70.840	037	20	45	70.812	485 231.084	5 443 500.056	339.73	339.00	0.73
11:36:20	Stern	001	03	05	61.935	054	53	25	61.910	485 238.774	5 443 479.369			
11:36:50	Bow	343	20	05	70.830	037	10	25	70.802	485 230.909	5 443 500.177	339.42	338.65	0.77
11:37:20	Stern	001	03	40	61.930	054	54	00	61.905	485 238.776	5 443 479.358			
11:37:50	Bow	343	23	55	70.730	037	14	15	70.702	485 230.911	5 443 500.050	339.32	338.00	1.32
11:38:20	Stern	001	10	45	61.890	055	01	05	61.865	485 238.816	5 443 479.230			
11:40:10	Bow	343	19	05	70.720	037	09	25	70.692	485 230.826	5 443 500.102	338.94	338.50	0.44
11:40:40	Stern	001	10	55	61.980	055	01	15	61.955	485 238.892	5 443 479.280			
11:41:00	Bow	343	20	25	70.750	037	10	45	70.722	485 230.866	5 443 500.110	339.34	338.20	1.14
11:41:40	Stern	001	16	25	61.835	055	06	45	61.810	485 238.830	5 443 479.115			
11:42:20	Bow	343	17	40	70.935	037	08	00	70.907	485 230.932	5 443 500.291	339.44	339.15	0.29
11:43:00	Stern	001	06	30	61.970	054	56	50	61.945	485 238.838	5 443 479.339			
11:43:30	Bow	343	23	40	70.910	037	14	00	70.882	485 231.016	5 443 500.196	339.48	338.65	0.83
11:44:00	Stern	001	06	30	62.000	054	56	50	61.975	485 238.862	5 443 479.356			
11:44:30	Bow	343	22	40	70.685	037	13	00	70.657	485 230.863	5 443 500.030	339.25	338.60	0.65
11:45:00	Stern	001	12	45	61.815	055	03	05	61.790	485 238.775	5 443 479.158			
11:45:40	Bow	343	19	45	70.500	037	10	05	70.472	485 230.704	5 443 499.919	339.54	338.75	0.79
11:46:10	Stern	001	21	05	62.020	055	11	25	61.995	485 239.029	5 443 479.152			

Mean C-O 0.76

Signature

SURVEYOR/PARTY CHIEF

CLIENT SURVEY REPRESENTATIVE

APPENDIX E

STATIC DIFFERENTIAL GPS CHECK PRINTOUTS

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Static Differential GPS Check

Thales Job Number: 3346C1
Job Description: Bass Strait Site Surveys
Client: OMV
Party Chief: C.Shuttleworth
Surveyor: M.Dybala
Wharf: Beauty Point
Vessel: Blue Fin
Date: 16 March 2002

Control Point Co-ordinates

Datum: AGD66 Projection: AMG Zone 55 CM 147° East

Instrument Station:	AMC5	Easting (m):	485 188.128
		Northing (m):	5 443 443.762
		AHD Height (m):	0.000
Backsight Station:	AMC2	Easting (m):	485 232.088
		Northing (m):	5 443 475.890
		AHD Height (m):	0.000

Calculated Grid Bearing (DMS):	053	50	20	
Calculated Grid Convergence (DMS):	000	06	58	Negative-Grid North East of True North

Observations To: **Vessel Datum**

Backsight Observation (DMS): 000 00 00

Time (hh:mm:ss)	Observed Distance (m)	Observed Direction (DMS)			Positioning System DGPS Co-ordinates	
					Easting (m)	Northing (m)
11:49:50	73.080	345	23	35	485 235.440	5 443 500.200
11:50:15	73.130	345	19	50	485 235.460	5 443 500.320
11:50:35	73.250	345	24	30	485 235.350	5 443 500.040
11:50:55	73.265	345	23	35	485 235.300	5 443 499.640
11:51:15	73.270	345	23	35	485 235.120	5 443 499.300
11:51:30	73.210	345	22	40	485 234.930	5 443 498.870
11:51:45	73.120	345	20	50	485 234.910	5 443 498.780
11:52:05	73.110	345	26	45	485 234.790	5 443 498.780
11:52:20	73.010	345	27	15	485 234.700	5 443 498.870
11:52:35	72.980	345	30	10	485 234.740	5 443 499.020

Signature

SURVEYOR/PARTY CHIEF

CLIENT SURVEY REPRESENTATIVE

THALES

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Static Differential GPS Check

Thales Job Number: 3346C1
Job Description: Bass Strait Site Surveys
Client: OMV
Party Chief: C.Shuttleworth
Surveyor: M.Dybala
Wharf: Beauty Point
Vessel: Blue Fin
Date: 16 March 2002

Datum: AGD66 Projection: AMG Zone 55 CM 147° East

Observations To: **Vessel Datum**

Time (hh:mm:ss)	Observed Direction (DMS)			Observed Distance (m)	Plane Bearing (DMS)			Plane Distance (m)	Calculated Co-ordinates		Positioning System DGPS Co-ordinates		Linear Misclose (m)
									Easting (m)	Northing (m)	Easting (m)	Northing (m)	
11:49:50	345	23	35	73.080	039	13	55	73.051	485 234.330	5 443 500.347	485 235.440	5 443 500.200	1.12
11:50:15	345	19	50	73.130	039	10	10	73.101	485 234.300	5 443 500.436	485 235.460	5 443 500.320	1.17
11:50:35	345	24	30	73.250	039	14	50	73.221	485 234.452	5 443 500.466	485 235.350	5 443 500.040	0.99
11:50:55	345	23	35	73.265	039	13	55	73.236	485 234.447	5 443 500.490	485 235.300	5 443 499.640	1.20
11:51:15	345	23	35	73.270	039	13	55	73.241	485 234.450	5 443 500.494	485 235.120	5 443 499.300	1.37
11:51:30	345	22	40	73.210	039	13	00	73.181	485 234.397	5 443 500.460	485 234.930	5 443 498.870	1.68
11:51:45	345	20	50	73.120	039	11	10	73.091	485 234.310	5 443 500.415	485 234.910	5 443 498.780	1.74
11:52:05	345	26	45	73.110	039	17	05	73.081	485 234.401	5 443 500.327	485 234.790	5 443 498.780	1.60
11:52:20	345	27	15	73.010	039	17	35	72.981	485 234.346	5 443 500.243	485 234.700	5 443 498.870	1.42
11:52:35	345	30	10	72.980	039	20	30	72.951	485 234.375	5 443 500.181	485 234.740	5 443 499.020	1.22

Mean Linear Misclose (m) **1.35**

Surveyor _____

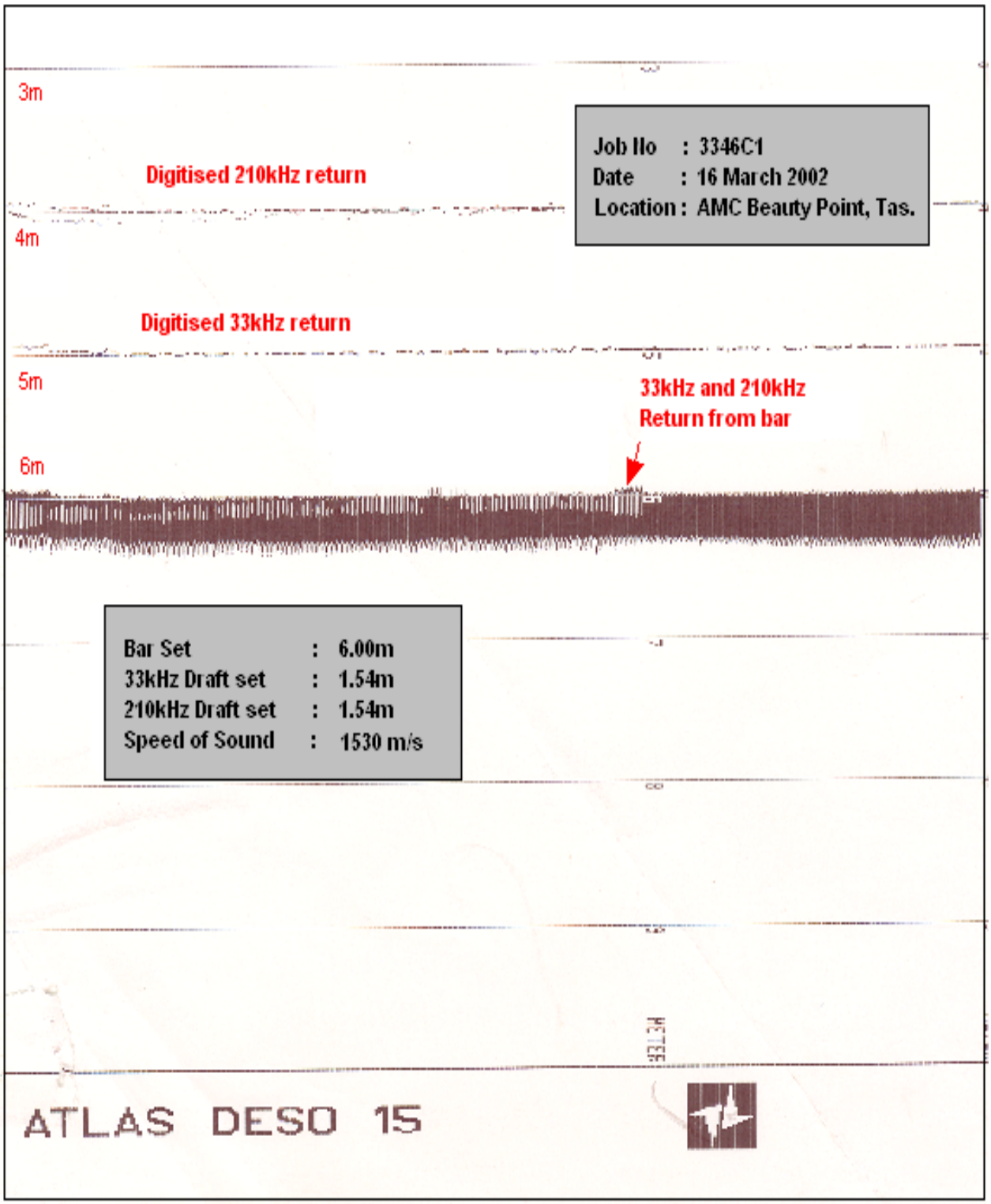
SURVEYOR/PARTY CHIEF

_____

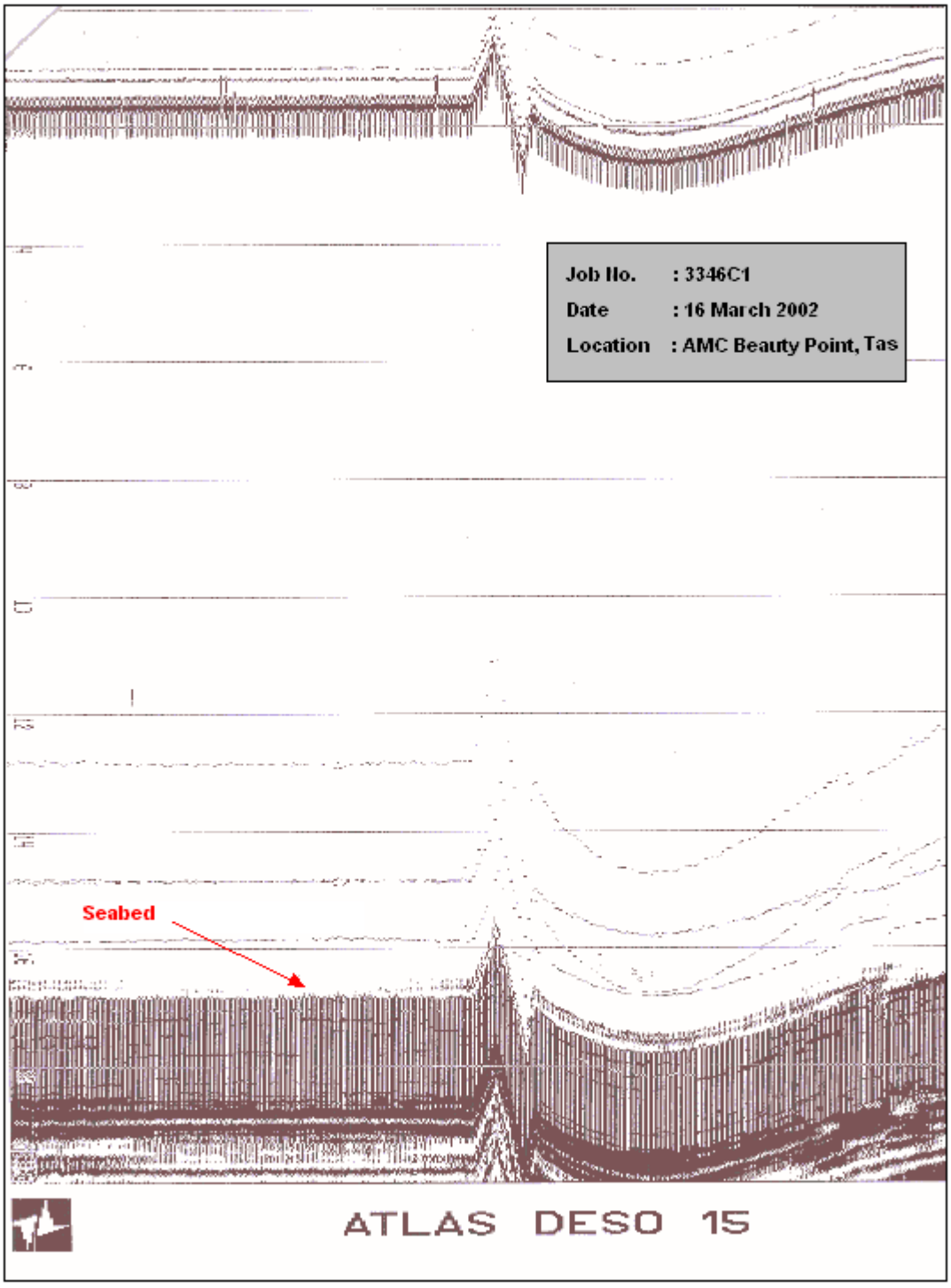
CLIENT SURVEY REPRESENTATIVE

APPENDIX F

BAR CHECK & MOTION SENSOR CHECK



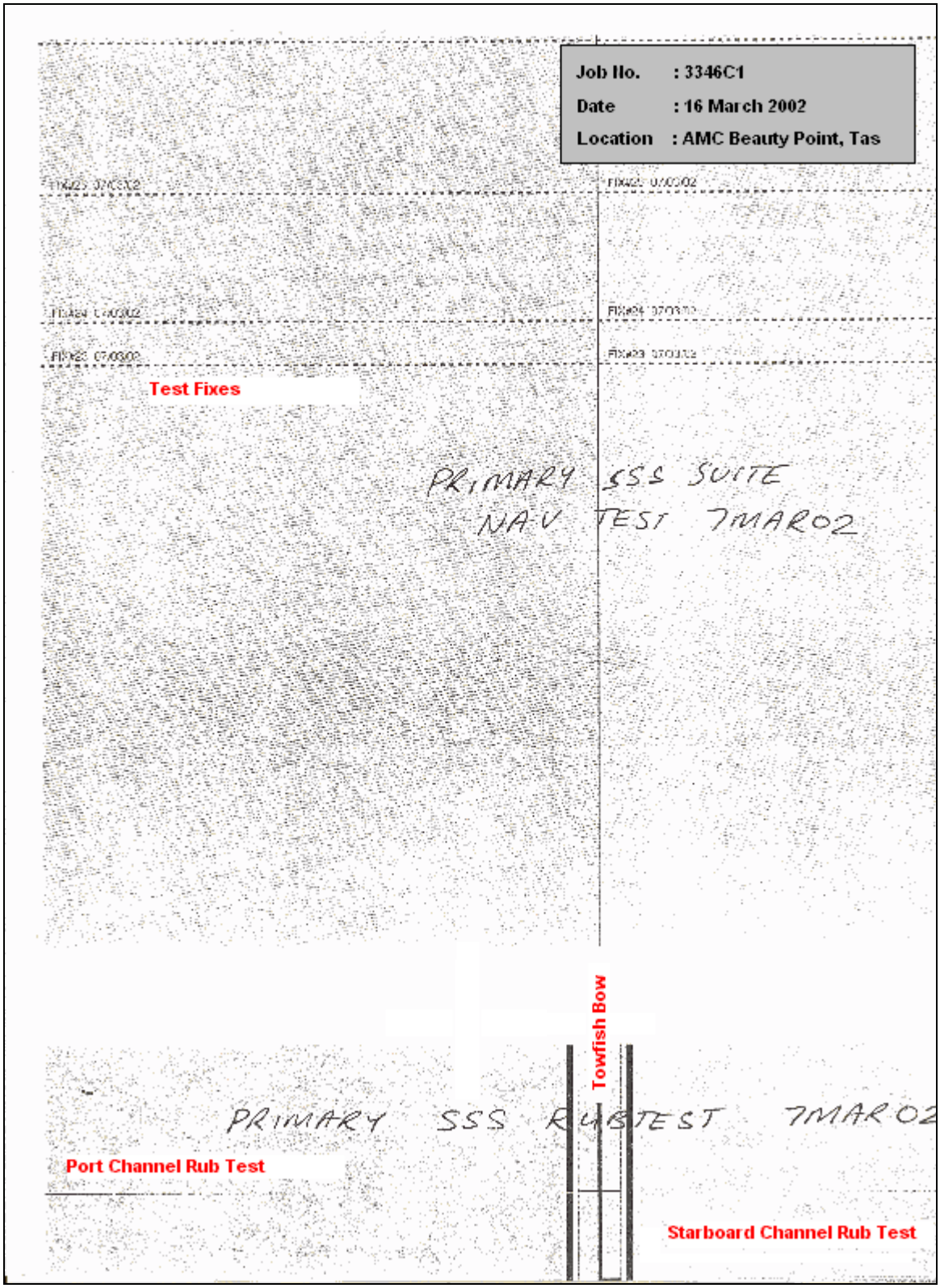
Primary Atlas Deso 15 Echo Sounder Bar Check



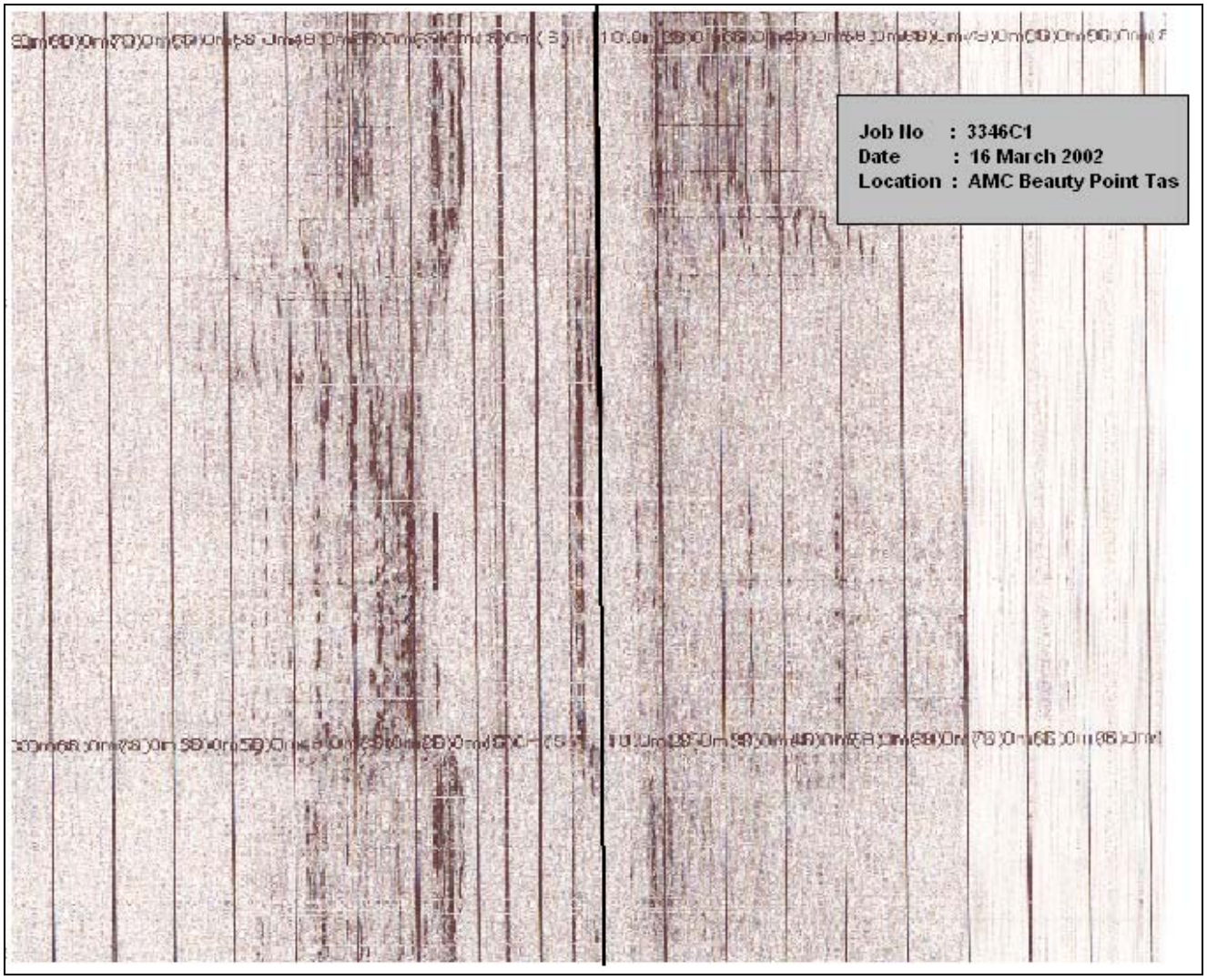
TSS DMS-05 Motion Sensor Test

APPENDIX G

SIDE SCAN SONAR WET TEST & RUB TEST



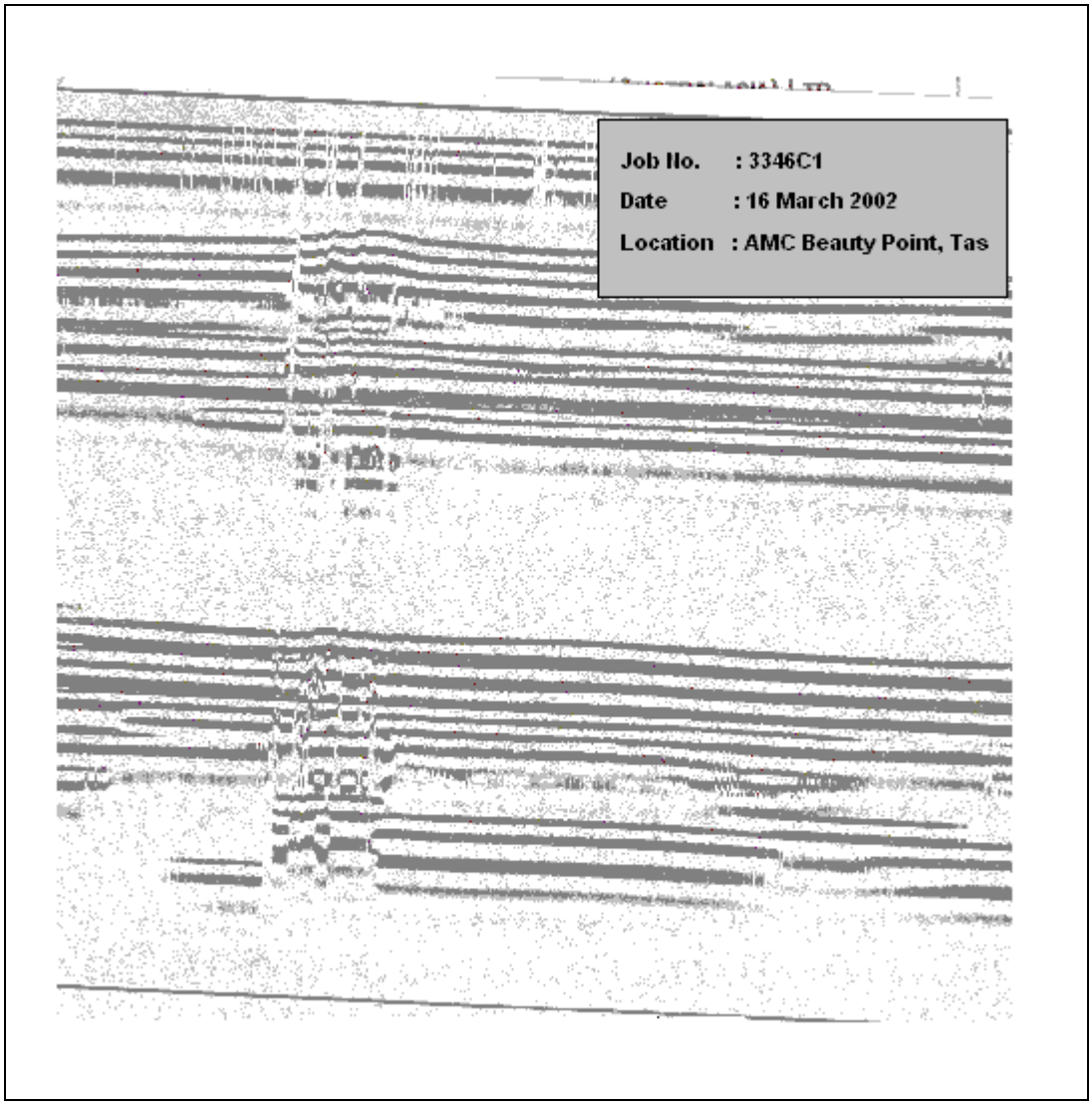
Primary Side Scan Sonar Towfish Nav Test and Rub Test



Primary Side Scan Sonar Towfish Wet Test

APPENDIX H

BOOMER WET TEST AND PULSE TEST



Primary Boomer Sub-Bottom Profiler System Wet Test

APPENDIX I

VELOCITY OF SOUND IN SEAWATER PROFILE

Sound Velocity Profile

Date : 22 March 2002

Location : Bass Strait Sole-2 Site Survey

Job No. : 3349C1

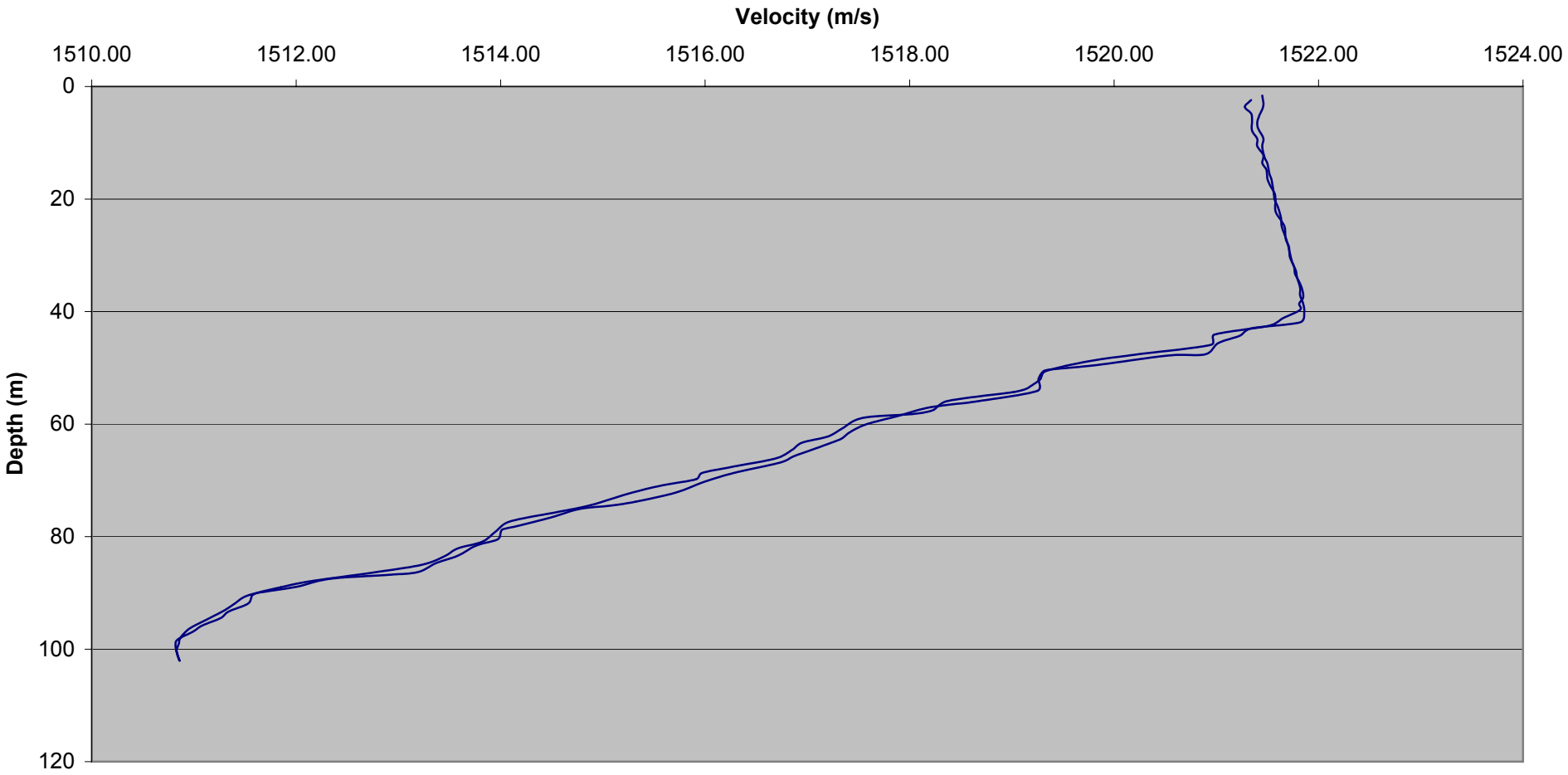
Model : Applied Microsystems SV Plus

Pressure	Temperature	Sndvel	Battery
1.6	19.625	1521.45	12.07
3.4	19.655	1521.46	12.06
5.2	19.636	1521.42	12.06
6.4	19.628	1521.40	12.06
7.5	19.623	1521.41	12.06
9.2	19.621	1521.46	12.06
10.7	19.618	1521.45	12.06
12.5	19.619	1521.47	12.06
13.7	19.619	1521.50	12.06
15.5	19.619	1521.52	12.06
16.6	19.619	1521.54	12.06
18.7	19.618	1521.56	12.06
20.1	19.619	1521.57	12.06
21.3	19.619	1521.60	12.06
23.1	19.619	1521.63	12.06
24.9	19.62	1521.64	12.06
26.9	19.62	1521.68	12.06
28.1	19.619	1521.70	12.06
29.6	19.619	1521.72	12.05
31.1	19.617	1521.74	12.05
32.8	19.616	1521.78	12.05
33.9	19.616	1521.79	12.06
35.8	19.616	1521.82	12.05
37.1	19.616	1521.82	12.06
38.6	19.607	1521.85	12.05
40.1	19.596	1521.86	12.06
41.9	19.581	1521.82	12.05
43	19.464	1521.34	12.05
44.3	19.395	1521.23	12.05
45.6	19.311	1521.02	12.05
47.6	19.272	1520.89	12.05
47.8	19.218	1520.53	12.05
49.5	19	1519.83	12.05
50.3	18.832	1519.38	12.05
50.6	18.727	1519.31	12.05
52	18.658	1519.26	12.05
54.1	18.636	1519.25	12.05
55.9	18.532	1518.68	12.05
56.6	18.419	1518.37	12.05
57.2	18.26	1518.15	12.05
58.6	18.195	1517.88	12.05
60	18.095	1517.58	12.05
61.4	17.996	1517.42	12.05
62.4	17.964	1517.35	12.05
62.8	17.946	1517.31	12.05
64.4	17.855	1517.07	12.05
65.7	17.78	1516.87	12.05
66.8	17.738	1516.74	12.05
68.6	17.61	1516.30	12.05

70.2	17.473	1516.00	12.05
72.2	17.376	1515.71	12.05
73.8	17.242	1515.32	12.05
74.5	17.194	1515.07	12.05
75.1	17.1	1514.77	12.05
76.6	16.985	1514.49	12.05
78.1	16.866	1514.17	12.05
78.7	16.814	1514.02	12.05
79.3	16.784	1514.00	12.05
80.5	16.759	1513.97	12.05
81.6	16.71	1513.76	12.05
83.4	16.642	1513.58	12.05
84.7	16.563	1513.37	12.05
86.3	16.494	1513.19	12.05
86.8	16.447	1512.90	12.05
87.5	16.275	1512.33	12.05
88.9	16.141	1512.01	12.05
89.7	16.079	1511.73	12.05
90.3	15.995	1511.58	12.05
91.9	15.927	1511.53	12.05
93.3	15.866	1511.34	12.05
94.5	15.84	1511.26	12.05
95.8	15.784	1511.08	12.05
96.9	15.74	1510.99	12.05
98.3	15.691	1510.84	12.05
99.4	15.667	1510.82	12.05
101	15.652	1510.84	12.05
102.1	15.646	1510.86	12.05
100.4	15.647	1510.83	12.04
99.1	15.656	1510.85	12.04
97.9	15.666	1510.87	12.04
96.3	15.693	1510.96	12.04
94.8	15.747	1511.12	12.04
93.2	15.804	1511.29	12.04
91.9	15.843	1511.40	12.04
90.5	15.906	1511.52	12.04
89	15.967	1511.85	12.04
87.9	16.051	1512.15	12.04
86.4	16.154	1512.75	12.04
85	16.395	1513.23	12.04
83.5	16.515	1513.45	12.04
82.1	16.573	1513.58	12.04
80.9	16.651	1513.82	12.04
79.1	16.716	1513.95	12.04
77.3	16.762	1514.09	12.04
75.6	16.898	1514.56	12.04
74.4	17.032	1514.88	12.04
72.3	17.143	1515.26	12.04
70.9	17.254	1515.58	12.04
69.8	17.362	1515.91	12.04
68.7	17.405	1515.97	12.04
67.6	17.471	1516.26	12.04
66.1	17.638	1516.69	12.04
64.6	17.71	1516.85	12.04
63.3	17.761	1516.95	12.04
62.2	17.824	1517.20	12.04

60.8	17.916	1517.34	12.04
58.9	17.984	1517.54	12.04
58.2	18.084	1518.04	12.04
57.5	18.204	1518.23	12.04
55.9	18.282	1518.37	12.04
54.3	18.432	1519.02	12.04
53.8	18.515	1519.13	12.04
53.2	18.557	1519.19	12.04
52	18.633	1519.28	12.04
50.6	18.649	1519.33	12.04
48.8	18.71	1519.76	12.04
47.6	18.89	1520.23	12.04
45.9	19.211	1520.95	12.04
44.1	19.25	1520.98	12.04
42.5	19.339	1521.52	12.04
41.2	19.478	1521.65	12.04
39.7	19.549	1521.82	12.04
38.6	19.572	1521.81	12.04
37.5	19.589	1521.85	12.04
36.1	19.603	1521.84	12.04
34.7	19.603	1521.81	12.04
33.3	19.606	1521.77	12.04
32	19.603	1521.76	12.04
30.3	19.603	1521.72	12.04
28.5	19.604	1521.71	12.04
27.1	19.606	1521.68	12.04
25.1	19.607	1521.67	12.04
24	19.607	1521.64	12.04
22.2	19.608	1521.58	12.04
20.2	19.609	1521.58	12.04
19	19.61	1521.57	12.04
17.7	19.611	1521.53	12.04
16.4	19.611	1521.50	12.04
14.8	19.611	1521.49	12.04
13.6	19.61	1521.45	12.04
12.2	19.61	1521.46	12.04
10.6	19.609	1521.40	12.04
9.3	19.61	1521.40	12.04
7.8	19.609	1521.35	12.04
6	19.609	1521.35	12.04
4.8	19.61	1521.34	12.04
3.6	19.612	1521.28	12.04
2.4	19.614	1521.34	12.04
	Average	**1517.80**	

Sound Velocity Profile
Date : 22 March 2002
Location : Bass Strait Sole-2 Site Survey
Job No. : 3349C1



APPENDIX J

SURVEY LINE LOGS

THALES

SIDE SCAN SONAR AND SUB BOTTOM PROFILE ANALOGUE LOG SHEET

Job No: 3349 C1 | Site SOLE - 2 | Operators: LE. SA. | Page of 1

Date	Line No	Fixes		Times		SSS		SBP		ES	Cable Position	Comments
		SOL	EOL	SOL	EOL	Disc	Roll	Disc	Roll	Roll	Cable @ SOL	
22-3-02	SP 29	2989	3043	0956	1023	1A	1	1A	1		390	SBP @ 20 HYDROPHONE 20
"	SP 26	3044	3100	1039	1107	1A	1	1A	1		370	
"	SP 23	3101	3151	1120	1145	1A	1	1A	1		390	
"	SP 20	3152	3210	1200	1229	1A	1	1A	1		370	
"	SP 17	3211	3268	1239	1308	1A	1	1A	1		390	
"	SP 14	3269	3324	1329	1357	1A	1	1A	1		376	
"	SP 11	3325	3378	1409	1435	1A	1	1A	1		369	
"	SP 8	3379	3430	1458	1521	1B	1	1B	1		387	
"	SP 5	3431	3482	1534	1604	1B	1	1B	1		360	
"	SP 2	3483	3551	1617	1646	1B	1	1B	1		356	
"	SP 1	3552	3607	1729	1757	1B	1	1B	1		353	
"	SP 3	3608	3668	1806	1836	1B	1	1B	1		275	Fix 3612 - EOL 3638
"	SP 6	3669	3724	1853	1920	1B	2	1B	2		330	
"	SP 9	3725	3781	1934	2002	1B	2	1B	2		330	
"	SP 12	3782	3838	2019	2047	2B	2	2B	2		329	
"	SP 15	3839	3829	2102	2129	2A	2	2A	2		352	
"	SP 18	3830	3945	2146	2211	2A	2	2A	2		391	
"	SP 21	3946	3997	2226	2252	2A	2	2A	2		390	
"	SP 24	3998	4055	2310	2338	2A	2	2A	2		370	
23-3-02	SP 27	4056	4111	2352	0019	2A	2	2A	2		364	
23-3-02	SP 28	4112	4168	0034	0102	2B	2	2B	2		380	

THALES

SIDE SCAN SONAR AND SUB BOTTOM PROFILE ANALOGUE LOG SHEET

Job No: 3349C1 | Site SOLE - 2 | Operators: | Page of 2

Date	Line No	Fixes		Times		SSS		SBP		ES	Cable Position	Comments
		SOL	EOL	SOL	EOL	Disc	Roll	Disc	Roll	Roll	Cable @ SOL	
23·3·02	SP25	4169	4222	0120	0146	2B	2	2B	2		350	4175/360
"	SP 22	4223	4275	0202	0228	2B	2	2B	2		390	4248/415
"	SP 19	4276	4330	0244	0311	2B	2	2B	2		370	
"	SP 16	4331	4383	0332	0358	2B	2	2B	2		415	
"	SP 13	4384	4440	0415	0443	2B	2	2B	2		380	
"	SP 10	4441	4495	0501	0528	3A	2	3A	2		415	
"	SP 7	4496	4552	0549	0617	3A	2	3A	2		370	
"	SP 4	4553	4615	0635	0706	3A	3	3A	2		380	4606/405 w/H @ 4614.
"	SX 6	4616	4663	0737	0801	3A	3	3A	2		400	
"	SX5	4664	4709	0812	0844	3A	3	3A	2		410	
"	SX4	4710	4756	0906	0929	3A	3	3A	2		390	
"	SX3	4757	4803	0948	1011	3B	3	3B	2		415	
"	SX2	4804	4857	1035	1059	3B	3	3B	2		390	
"	SX1	4852	4895	1118	1140	3B	3	3B	2		410	

SIDE SCAN SONAR CABLE OUT LOG			Page 1 of 1
Job No: 3349c1	Site Name: Sole-2	Operators:	

NB – ONLY FILL OUT LOG IF THERE ARE ANY ADDITIONAL CABLE CHANGES OTHER THAN THAT AT START OF LINE

Line Number	Fix Number	Cable Out
SP29	2989-3043	390
SP26	3044-3100	370
SP23	3101-3151	390
SP20	3152-3210	370
SP17	3211-3268	390
SP14	3269-3324	370
SP11	3325-3378	369
SP8	3379-3430	387
SP5	3431-3492	358
SP2	3493-3551	356
SP1	3552-3607	353
SP3	3608-3612	275
SP3	3613-3656	335
SP3	3656-3659	293
SP3	3660-3668	303
SP6	3669-3708	330
SP6	3709-3724	353
SP9	3725-3781	330
SP12	3782-3806	329
SP12	3807-3638	352

Line Number	Fix Number	Cable Out
SP15	3639-3892	352
SP18	3893-3945	391
SP21	3946-3997	390
SP24	3998-4055	370
SP27	4056-4111	364
SP28	4112-4168	380
SP25	4169-4175	350
SP25	4175-4222	360
SP22	4223-4248	390
SP22	4249-4275	415
SP19	4276-4330	370
SP16	4331-4383	415
SP13	4384-4440	380
SP10	4441-4495	415
SP7	4496-4552	380
SP4	4553-4606	380
SP4	4607-4615	405
SX6	4616-4663	400
SX5	4664-4709	410
SX4	4710-4756	390

Line Number	Fix Number	Cable Out
SX3	4757-4803	415
SX2	4804-4851	415
SX1	4852-4895	410

Line Number	Fix Number	Cable Out

THALES

NAVIGATION AND ECHO SOUNDER ANALOGUE LOG INFORMATION COVER SHEET				Page 1 of 1
Client	OMV			
Project	Site Surveys			
Job No	3346C1 – 3349C1, 3375C1	**Vessel**	FTV Bluefin	
Area	Bass Strait	**Sites**	Patricia-2, Baleen-3 and Sole-2	
Date(s)	18 – 23 March 2002	**Operators**	ECS/MD	

Equipment	Make/Model	Serial No (Bar Code)	Software Version
Positioning System	Multifix 3	ARR000867	1.28
Navigation System	GNS II	ARR000866	2.35
Echo Sounder	Atlas Deso 15	ARR000607	
Motion Sensor	TSS DMS-05		

Datum	E/S Pole
GPS Ant Offset from Datum	X=-2.10, Y=+15.49
Stern Offset from Datum	X=-5.30, Y=-7.17

Echo Sounder Settings					
From Fix	**To Fix**	**210Khz Draft**	**33Khz Draft**	**SOS**	**Comments**
1	2988	1.54 m	1.54 m	1516 m/s	Heave applied in GNS II, not in echo sounder.
2989	5940	1.54 m	1.54 m	1518 m/s	Heave applied in GNS II, not in echo sounder.

THALES

NAVIGATION AND ECHO SOUNDER ANALOGUE LOG SHEET		
Job No: 3349C1	Operators: ECS/MD	

Date	Line No	Fixes		Times		ES Roll	Heading	Comments
		SOL	EOL	SOL	EOL			
22/3/02	SP29	2989	3043	0956	1023	6	269	No heave in E/S; applied in GNS. Start of Sole-2 site survey.
	SP26	3044	3100	1039	1107	6	89	
	SP23	3101	3151	1120	1145	6	269	
	SP20	3152	3210	1200	1229	6	89	
	SP17	3211	3268	1239	1308	6	269	
	SP14	3269	3324	1329	1357	6	89	
	SP11	3325	3377	1409	1439	6	269	
	SP8	3378	3430	1454	1521	6	89	100m missed @ SOL
	SP5	3431	3492	1534	1605	6	269	250m of ES paper record missed at SOL
	SP2	3493	3552	1617	1647	6	89	Early SOL to cover Sole-1 wellhead
	SP1	3553	3607	1729	1757	6	89	Shooting head to wind only due boomer interference
	SP3	3608	3668	1806	1836	6	269	Return to 2 way shooting
	SP6	3669	3724	1853	1920	7	89	
	SP9	3725	3781	1934	2002	7	269	
	SP12	3782	3838	2019	2047	7	89	
	SP15	3830	3892	2102	2129	7	269	
	SP18	3893	3945	2145	2112	7	89	
	SP21	3946	3997	2226	2252	7	269	
	SP24	3998	4055	2310	2339	7	89	
	SP27	4056	4111	2352	0019	8	269	
23/3/02	SP28	4112	4168	0034	0103	8	89	

THALES

	SP25	4169	4222	0120	0146	8	269	
NAVIGATION AND ECHO SOUNDER ANALOGUE LOG SHEET								Page 2 of 3
Job No: 3349C1		Operators: ECS/MD						

Date	Line No	Fixes		Times		ES Roll	Heading	Comments
		SOL	EOL	SOL	EOL			
23/3/02	SP22	4223	4275	0202	0228	8	89	
	SP19	4276	4330	0244	0311	8	269	
	SP16	4331	4383	0332	0358	8	89	
	SP13	4384	4440	0415	0443	8	269	
	SP10	4441	4495	0501	0528	8	89	
	SP7	4496	4552	0549	0617	8	269	
	SP4	4553	4615	0635	0706	8	89	Long run-out to pass Sole-1 wellhead
	SX6	4616	4663	0737	0801	8	359	
	SX5	4664	4709	0821	0844	8	179	
	SX4	4710	4756	0906	0929	8	359	
	SX3	4757	4803	0948	1011	8	179	
	SX2	4804	4851	1035	1059	8	359	
	SX1	4852	4895	1118	1140	8	179	Sole-2 site survey complete.
	S1EW	4896	4907	1259	1305		89	Magnetometer on Sole-1 wellhead, 100m cable out.
	S1NS	4908	4919	1343	1348		179	
	S15	4920	4936	1402	1410		359	
	S12	4937	4949	1417	1423		179	
	S3	4950	4967	1428	1437		359	
	S14	4968	4981	1443	1450		179	
	S5	4982	5000	1458	1507		359	

THALES

	S2	5001	5015	1513	1521		179	
NAVIGATION AND ECHO SOUNDER ANALOGUE LOG SHEET								Page 3 of 3
Job No: 3349C1		Operators: ECS/MD						

Date	Line No	Fixes		Times		ES Roll	Heading	Comments
		SOL	EOL	SOL	EOL			
23/03/02	S13	5016	5033	1528	1536		359	
	S4	5034	5047	1544	1550		179	
	S!	5048	5065	1612	1620		359	150-200m of Cable out
	S1a	5066	5081	1630	1638		179	
	S1b	5082	5098	1650	1658		359	
	S1Ewa	5099	5115	1709	1717		269	
	S1Ewb	5116	5130	1730	1737		089	

APPENDIX K

FIELD SEABED SAMPLE DESCRIPTIONS

Gravity Core / Grab Sample Description

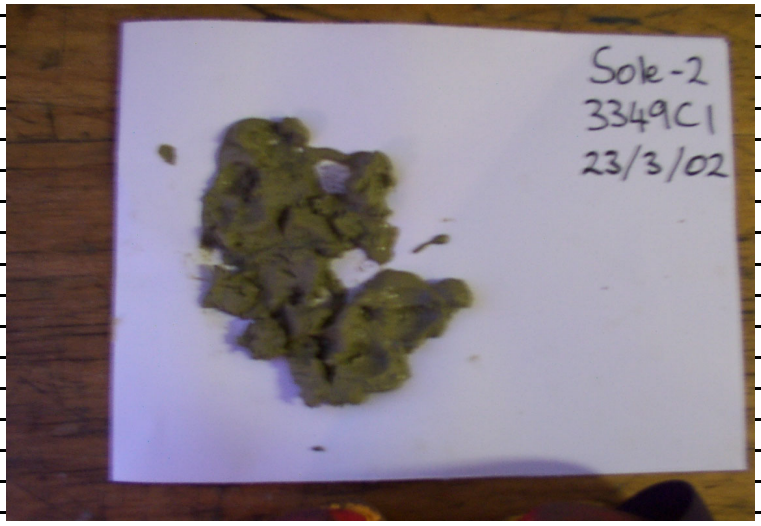
THALES

THALES GEOSOLUTIONS (AUSTRALASIA) LTD

CLIENT: OMV
PROJECT: Sole-2
JOB No.: 3349C1
VESSEL: Bluefin
LOGGED BY Pat Fournier
POSITION EAST: 676 543.65
POSITION NORTH: 5 779 200.50
RECOVERY (m): 0.86

SAMPLE No.: GC1
WATER DEPTH (mLAT): 125
DATE: 23-Mar-02
TIME: 19:10
TYPE OF CORER Gravity corer
BARREL LENGTH (m): 2.0m
CORER WEIGHT: 500kg
CUTTER CONDITION ON RECOVERY:

DEPTH (m)	LITHOLOGY	SAMPLE NUMBER	VISUAL DESCRIPTION	TORVANE (Kn/m^2)	PENETROMETER (Kn/m^2)
0		GC1	Grey/green soft-firm silty CLAY	20	
0.86				40	0.5



Sample has been described by visual identification. A pocket penetrometer and a Torvane have been used to define the unconfined compressive strength and shear strength respectively, of the soil. The undrained shear strength of the soil is taken as half the unconfined compressive strength.

Note: field identification for strength of cohesive soils (AS 1726 - 1993)

		Undrained shear strength kN/m^2	Undrained shear strength kgf/cm^2
Very soft	Exudes between fingers when squeezed in fist	< 12	< 0.12
Soft	Easily moulded in the fingers	12 to 25	0.12 to 0.25
Firm	Can be moulded in the fingers by strong pressure	25 to 50	0.25 to 0.50
Stiff	Cannot be moulded in the fingers, can be indented by thumb	50 to 100	0.50 to 1.00
Very stiff	Can be indented by thumb nailVery tough	100 to 200	1.00 to 2.00
Hard	Can be indented with difficulty by thumb nail	>200	>2.00

	CLAY		SILT		SAND		sandy GRAVEL
	silty CLAY		clayey SILT		clayey SAND		sandy silty GRAVEL
	sandy CLAY		sandy SILT		silty SAND		
	silty sandy CLAY				clayey silty SAND		ROCK

Gravity Core / Grab Sample Description

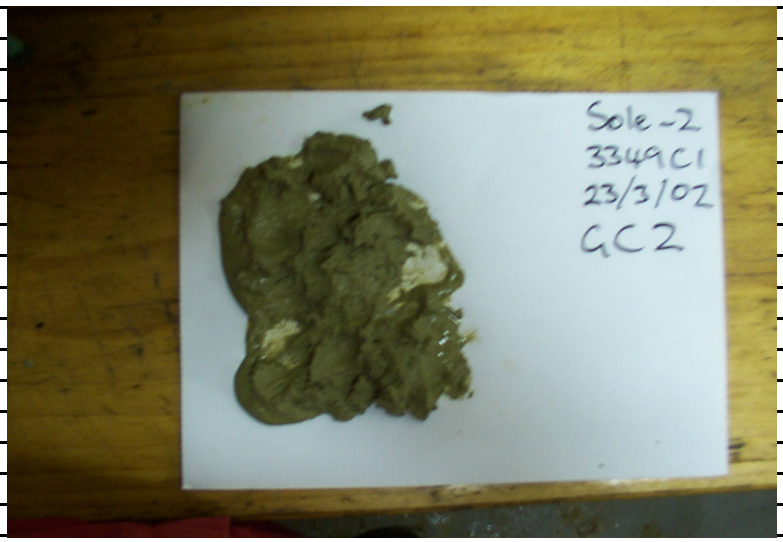
THALES

THALES GEOSOLUTIONS (AUSTRALASIA) LTD

CLIENT: OMV
PROJECT: Sole-2
JOB No.: 3349C1
VESSEL: Bluefin
LOGGED BY Pat Fournier
POSITION EAST: 677 080.90
POSITION NORTH: 5 780 887.87
RECOVERY (m): 0.86
CUTTER CONDITION ON RECOVERY:

SAMPLE No.: GC2
WATER DEPTH (mLAT): 125
DATE: 23-Mar-02
TIME: 19:34
TYPE OF CORER Gravity corer
BARREL LENGTH (m): 2.0m
CORER WEIGHT: 500kg

DEPTH (m)	LITHOLOGY	SAMPLE NUMBER	VISUAL DESCRIPTION	TORVANE (Kn/m^2)	PENETROMETER (Kn/m^2)
0		GC1	Grey/green soft-firm silty CLAY with minor shell fragments (<< 1%)	20	
0.84				40	0.5



Sample has been described by visual identification. A pocket penetrometer and a Torvane have been used to define the unconfined compressive strength and shear strength respectively, of the soil. The undrained shear strength of the soil is taken as half the unconfined compressive strength.

Note: field identification for strength of cohesive soils (AS 1726 - 1993)

		Undrained shear strength kN/m^2	Undrained shear strength kgf/cm^2
Very soft	Exudes between fingers when squeezed in fist	< 12	< 0.12
Soft	Easily moulded in the fingers	12 to 25	0.12 to 0.25
Firm	Can be moulded in the fingers by strong pressure	25 to 50	0.25 to 0.50
Stiff	Cannot be moulded in the fingers, can be indented by thumb	50 to 100	0.50 to 1.00
Very stiff	Can be indented by thumb nailVery tough	100 to 200	1.00 to 2.00
Hard	Can be indented with difficulty by thumb nail	>200	>2.00

	CLAY		SILT		SAND		sandy GRAVEL
	silty CLAY		clayey SILT		clayey SAND		sandy silty GRAVEL
	sandy CLAY		sandy SILT		silty SAND		
	silty sandy CLAY				clayey silty SAND		ROCK

APPENDIX L

TIDAL PREDICTIONS

TIDE HEIGHT PREDICTIONS
LOCATION : SOLE-2
LATITUDE : 38 6 24 S
LONGITUDE : 149 0 45 E
CLIENT : THALES
TIME ZONE : -1000 (EST)
DATUM : LAT (~0.75M < MSL/AHD)
PERIOD : 21/03/2002 - 24/03/2002
INTERVAL : 30 MINUTES

HHMM:SS	DD	MM	YYYY	TIDE HEIGHT (M)
0: 0	21	3	2002	1.16
30: 0	21	3	2002	1.21
100: 0	21	3	2002	1.24
130: 0	21	3	2002	1.24
200: 0	21	3	2002	1.23
230: 0	21	3	2002	1.19
300: 0	21	3	2002	1.13
330: 0	21	3	2002	1.05
400: 0	21	3	2002	0.96
430: 0	21	3	2002	0.86
500: 0	21	3	2002	0.76
530: 0	21	3	2002	0.66
600: 0	21	3	2002	0.56
630: 0	21	3	2002	0.48
700: 0	21	3	2002	0.41
730: 0	21	3	2002	0.36
800: 0	21	3	2002	0.33
830: 0	21	3	2002	0.32
900: 0	21	3	2002	0.33
930: 0	21	3	2002	0.36
1000: 0	21	3	2002	0.41
1030: 0	21	3	2002	0.46
1100: 0	21	3	2002	0.53
1130: 0	21	3	2002	0.60
1200: 0	21	3	2002	0.67
1230: 0	21	3	2002	0.74
1300: 0	21	3	2002	0.79
1330: 0	21	3	2002	0.84
1400: 0	21	3	2002	0.86
1430: 0	21	3	2002	0.88
1500: 0	21	3	2002	0.87
1530: 0	21	3	2002	0.86
1600: 0	21	3	2002	0.83
1630: 0	21	3	2002	0.78
1700: 0	21	3	2002	0.74
1730: 0	21	3	2002	0.69
1800: 0	21	3	2002	0.64
1830: 0	21	3	2002	0.60
1900: 0	21	3	2002	0.58
1930: 0	21	3	2002	0.56
2000: 0	21	3	2002	0.56
2030: 0	21	3	2002	0.58
2100: 0	21	3	2002	0.61
2130: 0	21	3	2002	0.66
2200: 0	21	3	2002	0.72
2230: 0	21	3	2002	0.79
2300: 0	21	3	2002	0.87
2330: 0	21	3	2002	0.96
0: 0	22	3	2002	1.04
30: 0	22	3	2002	1.11
100: 0	22	3	2002	1.17

 130: 0 22 3 2002   1.21
 200: 0 22 3 2002   1.24
 230: 0 22 3 2002   1.25
 300: 0 22 3 2002   1.23
 330: 0 22 3 2002   1.19
 400: 0 22 3 2002   1.13
 430: 0 22 3 2002   1.06
 500: 0 22 3 2002   0.97
 530: 0 22 3 2002   0.87
 600: 0 22 3 2002   0.76
 630: 0 22 3 2002   0.66
 700: 0 22 3 2002   0.56
 730: 0 22 3 2002   0.47
 800: 0 22 3 2002   0.40
 830: 0 22 3 2002   0.34
 900: 0 22 3 2002   0.30
 930: 0 22 3 2002   0.29
1000: 0 22 3 2002   0.29
1030: 0 22 3 2002   0.32
1100: 0 22 3 2002   0.36
1130: 0 22 3 2002   0.42
1200: 0 22 3 2002   0.49
1230: 0 22 3 2002   0.56
1300: 0 22 3 2002   0.63
1330: 0 22 3 2002   0.70
1400: 0 22 3 2002   0.76
1430: 0 22 3 2002   0.81
1500: 0 22 3 2002   0.85
1530: 0 22 3 2002   0.87
1600: 0 22 3 2002   0.88
1630: 0 22 3 2002   0.87
1700: 0 22 3 2002   0.84
1730: 0 22 3 2002   0.81
1800: 0 22 3 2002   0.77
1830: 0 22 3 2002   0.72
1900: 0 22 3 2002   0.68
1930: 0 22 3 2002   0.64
2000: 0 22 3 2002   0.61
2030: 0 22 3 2002   0.59
2100: 0 22 3 2002   0.58
2130: 0 22 3 2002   0.60
2200: 0 22 3 2002   0.63
2230: 0 22 3 2002   0.67
2300: 0 22 3 2002   0.73
2330: 0 22 3 2002   0.80
   0: 0 23 3 2002   0.88
  30: 0 23 3 2002   0.96
 100: 0 23 3 2002   1.04
 130: 0 23 3 2002   1.11
 200: 0 23 3 2002   1.18
 230: 0 23 3 2002   1.22
 300: 0 23 3 2002   1.25
 330: 0 23 3 2002   1.26
 400: 0 23 3 2002   1.24
 430: 0 23 3 2002   1.21
 500: 0 23 3 2002   1.15
 530: 0 23 3 2002   1.07
 600: 0 23 3 2002   0.97
 630: 0 23 3 2002   0.87
 700: 0 23 3 2002   0.76
 730: 0 23 3 2002   0.65

 800: 0 23 3 2002   0.54
 830: 0 23 3 2002   0.45
 900: 0 23 3 2002   0.37
 930: 0 23 3 2002   0.31
1000: 0 23 3 2002   0.27
1030: 0 23 3 2002   0.25
1100: 0 23 3 2002   0.25
1130: 0 23 3 2002   0.28
1200: 0 23 3 2002   0.32
1230: 0 23 3 2002   0.38
1300: 0 23 3 2002   0.46
1330: 0 23 3 2002   0.54
1400: 0 23 3 2002   0.62
1430: 0 23 3 2002   0.70
1500: 0 23 3 2002   0.77
1530: 0 23 3 2002   0.83
1600: 0 23 3 2002   0.87
1630: 0 23 3 2002   0.90
1700: 0 23 3 2002   0.91
1730: 0 23 3 2002   0.90
1800: 0 23 3 2002   0.88
1830: 0 23 3 2002   0.85
1900: 0 23 3 2002   0.80
1930: 0 23 3 2002   0.75
2000: 0 23 3 2002   0.70
2030: 0 23 3 2002   0.65
2100: 0 23 3 2002   0.62
2130: 0 23 3 2002   0.59
2200: 0 23 3 2002   0.58
2230: 0 23 3 2002   0.59
2300: 0 23 3 2002   0.61
2330: 0 23 3 2002   0.66
   0: 0 24 3 2002   0.72
  30: 0 24 3 2002   0.79
 100: 0 24 3 2002   0.87
 130: 0 24 3 2002   0.96
 200: 0 24 3 2002   1.04
 230: 0 24 3 2002   1.12
 300: 0 24 3 2002   1.19
 330: 0 24 3 2002   1.24
 400: 0 24 3 2002   1.27
 430: 0 24 3 2002   1.28
 500: 0 24 3 2002   1.26
 530: 0 24 3 2002   1.22
 600: 0 24 3 2002   1.16
 630: 0 24 3 2002   1.07
 700: 0 24 3 2002   0.97
 730: 0 24 3 2002   0.86
 800: 0 24 3 2002   0.74
 830: 0 24 3 2002   0.62
 900: 0 24 3 2002   0.51
 930: 0 24 3 2002   0.41
1000: 0 24 3 2002   0.32
1030: 0 24 3 2002   0.26
1100: 0 24 3 2002   0.22
1130: 0 24 3 2002   0.20
1200: 0 24 3 2002   0.21
1230: 0 24 3 2002   0.25
1300: 0 24 3 2002   0.30
1330: 0 24 3 2002   0.37
1400: 0 24 3 2002   0.46

```
1430: 0 24  3 2002     0.55
1500: 0 24  3 2002     0.65
1530: 0 24  3 2002     0.73
1600: 0 24  3 2002     0.81
1630: 0 24  3 2002     0.88
1700: 0 24  3 2002     0.93
1730: 0 24  3 2002     0.96
1800: 0 24  3 2002     0.96
1830: 0 24  3 2002     0.95
1900: 0 24  3 2002     0.92
1930: 0 24  3 2002     0.87
2000: 0 24  3 2002     0.82
2030: 0 24  3 2002     0.76
2100: 0 24  3 2002     0.70
2130: 0 24  3 2002     0.64
2200: 0 24  3 2002     0.59
2230: 0 24  3 2002     0.56
2300: 0 24  3 2002     0.55
2330: 0 24  3 2002     0.56
```

APPENDIX M

DAILY FIELD PROGRESS REPORT SHEETS

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:15 March 2002 Client: OMV Job No.: 3346C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Mob	
SkyFix Spot	Mob	
Gyro	Mob	
GNS 2	Mob	
MultiFix 3	Mob	
GRREP	Mob	

Equipment	Op	
Echo Sounder	Mob	
Sidescan	Mob	
Boomer	Mob	
Heave Comp	Mob	
Velocity Probe	Mob	
ENSIN/CODA	Mob	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+11
0800	Thales personnel at vessel. Project Briefing & vessel induction
0830	Truck, crane, welders & labour commence work.
1115	All equipment loaded to vessel
1300	Gyros powered up.
1545	Crane, welders & labour complete work
1600	Power failure.
1630	Power return
2000	Thales personnel depart vessel for night.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:16 March 2002 Client: OMV Job No.: 3346C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+11
0700	Thales personnel at vessel.
0800	Boomer in water
1000	SSS rub & wet test
1100	ES deployed. Deso 15 problem.
1200	DGPS Health check & gyro calibration complete.
1300	ES operational
1345	ES bar check complete.
1430	Spare magnetometer arrive.
1515	Power failure.
1530	Power back. Reboot equipment
1600	Magnetometer operational
1730	Fire & Abandonment drill
1800	Depart Beauty Point.
2400	Transit to Patricia

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:17 March 2002 Client: OMV Job No.: 3346C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	6	2m	NW
0600	6	2m	SW
1200	6	2m	SW
1800	3/4	2m	SW

DIARY OF OPERATIONS

TIME	Time Zone=UTC+11
0000	Transit to Patricia
1100	DMS2-05 reset itself to 1200 baud rate. Reset GNS2 & Deso 15 to same.
1845	Drop anchor at Patricia site. Wx standby. Wind dec., seas 2m+
2100	SVP check during wx dt. 1515.7 m/s
2400	Standby for wx on Patricia 2 site

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:18 March 2002 Client: OMV Job No.: 3346C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	3/4	2m	SW
0600	3/4	1m	NW
1200	3	<1m	NE
1800	3	<1m	NE

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Standby for wx on Patricia 2 site
0400	Deploy and tune E/S. No heave into E/S as causes loss of soundings. Heave applied in GNS.
0520	Recover anchor.
0530	Deploy SSS. Tuning SSS.
0639	Start SSS dynamic check Patricia 2.
0715	End of dynamic check.
0730	Deploy hydrophone. Tuning boomer.
1030	Commence run-in to line PP1.
1043	Commenced SSS, ES & Boomer on Patricia 2 site.
2119	Analogue acquisition completed at Patricia 2.
2148	Commence analogue acquisition at Baleen 3 site.
2400	Continue on Baleen 3 site.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:19 March 2002 Client: OMV Job No.: 3347C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	4	1-2m	SW
0600	3	1-2m	SW
1200	3	1-2m	SW
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Continue on Baleen 3 site.
1233	Analogue acquisition complete on Baleen 3. Recover SSS & Boomer, deploy magnetometer.
1315	Magnetometer deployed.
1353	Commence magnetometer checks on wellheads.
1800	Magnetometer recovered. Rig for coring.
1845	JSA/Toolbox for coring.
1902	Gravity core attempt on Patricia 2. Fail.
1920	Gravity core attempt on Patricia 2. Sample.
1940	Grab Sample 1 (Patricia site.)
2007	Grab Sample 2 (Patricia site.)
2036	Grab Sample 3 (Baleen site.)
2053	Grab Sample on Baleen 3 site. Derig corer, hd for pipe route ridge.
2200	SSS deployed. Commence ridge examination

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:20 March 2002 Client: OMV Job No.: 3347C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	3	1	NW
0600	3	1	NW
1200	5/6	2m+	SW
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Continue on ridge survey.
0014	Complete ridge survey. Deploy Boomer for route development
0115	Commenced pipe route development.
0617	Pipe route completed.
0654	Commence scout line to 15m contour.
0828	Scout line complete. Start recovering spread.
0900	Commence transit to Sole-2 site.
1100	Divert to shelter off Gabo Island. Wind SW'ly, force 6, seas 2m+. F'cast W/SW 30 – 40 kn.
1700	Drop anchor in lee of Gabo Island.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:21 March 2002 Client: OMV Job No.: 3349C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	At anchor in lee of Gabo Island.
1300	Deployed Sub-tow boomer for testing. Deployed ES pole to check HeCo.
1700	Recovered all equipment.
2400	Commence recover anchor.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:22 March 2002 Client: OMV Job No.: 3349C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000		na	
0600	4	2m	SW
1200	3	1m	E
1800	5	1-2m	E

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Enroute to Sole-2 site..
0800	Arrive Sole-2 site. Deploy E/S pole.
0815	Deploy SVP probe. SV = 1517.8m/s.
0840	Deploy boomer and SSS.
0900	Deploy hydrophone. Start tuning gear.
0930	Heading for SOL
0956	Commenced analogue acquisition on Sole 2 site.
1700	Shooting from west to east, into prevailing seas, due to excess noise on boomer data.
1800	Return to shooting both directions.
2400	Continue on Sole 2 site survey.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:23 March 2002 Client: OMV Job No.: 3349C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	5	1-2m	E
0600	4	1-2m	NE
1200	3	1m	NE
1800	4	1-2m	NE

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Continue analogue acquisition on Sole 2 site.
1140	Complete analogue on Sole 2 site. Recover gear, deploy magnetometer.
1240	Magnetometer deployed, hdg wellhd.
1800	Magnetometer recovered. Preparing corer.
1910	Core S1 on Sole 2 site
1934	Core S2 On Sole 2 site
2000	Corer de-rigged. Analogue gear deployed. Hdg for line.
2041	Commenced scout line from Sole to meet scout line running north from Patricia Baleen,

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date:24 March 2002 Client: OMV Job No.: 3349C1 Vessel: Blue Fin Location: Bass Strait

Equipment	Op	
SkyFix	Y	
SkyFix Spot	Y	
Gyro	Y	
GNS 2	Y	
MultiFix 3	Y	
GRREP	Y	

Equipment	Op	
Echo Sounder	Y	
Sidescan	Y	
Boomer	Y	
Heave Comp	Y	
Velocity Probe	Y	
ENSIN/CODA	Y	

Racal Personnel
EC Shuttleworth
M.Dybala
J Antao
L.Ethridge
P Fournier
Client Personnel
R Glanville

WX	Sea State	Swell	Wind Dir.
0000	5	1-2m	E
0600	4	1-2m	NE
1200	3	1m	NE
1800	4	1-2m	NE

DIARY OF OPERATIONS

TIME	Time Zone=UTC+ 11
0000	Continue analogue acquisition on scout line from Sole-2 to Patricia/Baleen pipe route.
0330	Finish scout line. Recover survey spread.
0400	Commence transit to Port Welshpool.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3346C1*	REPORT No.:	*1*	DATE:	*15 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
Beauty Point, Tasmania

BB. WEATHER:
Na

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	4	0	1	0	5	5
Man-Hours	96	0	24	0	120	120
No. On Today	4	0	1	4	9	9
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	60
Patricia 2	0
Baleen 3	0
Pipe route	0
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	0	0	0	0	0	0	0	0
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	Vessel Induction and Pre-MOB Safety Meeting	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*0800*	*Wait on equipment*	*MOB/DEMO*	*8*
0800	*2000*	*Mobilisation*	*MOB/DEMO*	*12*
2000	*2400*	*Standby*	*MOB/DEMO*	*4*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*0*	*0*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*0*
Downtime	*TD*	*0*	*0*
Working	*OP*	*0*	*0*
Mobilisation / Demobilisation	*MOB/DEMO*	*24*	*24*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*24*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
Na

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Mob progressing satisfactorily.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Continue Mobilisation and Equipment testing. Expect to depart 1800 hrs.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3346C1*	REPORT No.:	*2*	DATE:	*16 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
40° 58" S, 146° 46" E

BB. WEATHER:
NW 30 kn, 2m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	16
Man-Hours	120	0	24	120	262	382
No. On Today	1	0	0	1	2	11
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	0
Baleen 3	0
Pipe route	0
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	0	6	0	0	0	6	0	0
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	Fire & Abandon Boat Drill	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*0700*	*Standby*	*MOB/DEMO*	*7*
0700	*1800*	*Mobilisation*	*MOB/DEMO*	*11*
1800	*2400*	*Transit. Depart Beauty Point*	*TR*	*6*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*0*	*0*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*6*	*6*
Downtime	*TD*	*0*	*0*
Working	*OP*	*0*	*0*
Mobilisation / Demobilisation	*MOB/DEMO*	*18*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*48*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
NW 20-30 kn, back SW 20-30 kn, then moderating

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Mob completed.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Transit to Patricia. ETA 1400 hrs 17/03/02. Commence proof of wellheads. Acquisition.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3346C1*	REPORT No.:	*3*	DATE:	*17 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
At anchor on Patricia 2 site

BB. WEATHER:
SW 15 kn, 2m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	27
Man-Hours	120	0	24	120	262	644
No. On Today	0	0	0	0	0	11
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	0
Baleen 3	0
Pipe route	0
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	0	18.75	0	5.25	0	24.75	0	5.25
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*1845*	*Transit*	*TR*	*18.75*
1845	*2400*	*Standby at anchor, Patricia 2 site*	*STBY*	*5.25*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*5.25*	*5.25*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*18.75*	*24.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*0*	*0*
Mobilisation / Demobilisation	*MOB/DEMO*	*18*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*72*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
SW back NW inc 20-30 kn. Seas dec to 1m then inc again.

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Expect seas to remain low when wind is NW from off the land. Geko Beta 30m south of sites.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
SSS dynamic position on Patricia 1 wellhead. Commence acquisition Patricia 2.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3346C1 3347C1*	REPORT No.:	*4*	DATE:	*18 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
On Baleen 3 site

BB. WEATHER:
SW 15 kn, 1m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	38
Man-Hours	120	0	24	120	262	906
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	90
Baleen 3	10
Pipe route	0
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	18.5	O	0	5.5	18.5	24.75	0	10.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*0530*	*Standby at anchor on Patricia site.*	*STBY*	*5.5*
0530	*2130*	*Analogue acquisition on Patricia 2 site*	*OP*	*16*
2130	*2400*	*Analogue acquisition on Baleen 3 site*	*OP*	*2.5*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*5.5*	*10.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*24.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*18.5*	*18.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*96*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
W/SW 20-30 kn, seas 2-4m, dec 10-20 kn, seas 1-2m

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Patricia 2 site completed excepting coring. No heave on Deso 15 ES, but applied in GNS.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Continue Baleen 3 analogue acquisition, then magnetometer over wellheads, then coring.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3347C1*	REPORT No.:	*5*	DATE:	*19 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
On pipe route, 37 56 S 148 26 E

BB. WEATHER:
SW 15 kn, 1m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	49
Man-Hours	120	0	24	120	262	1168
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	100
Baleen 3	100
Pipe route	10
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	24	O	0	0	42.5	24.75	0	10.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*1230*	*Analogue acquisition on Baleen 3*	*OP*	*12.5*
1230	*1800*	*Magnetometer check on wellheads*		*5.5*
1800	*2130*	*Core & grab samples, Patricia & Baleen*		*3.5*
2130	*2400*	*Pipe route development*		*2.5*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*0*	*10.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*24.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*24*	*42.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*120*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
NW inc 25-35 kn, back W/SW inc 30-40 kn.

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Patricia 2 & Baleen 3 sites complete.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Complete pipe route development, transit & commence on Sole, weather permitting.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3348C1 3349C1*	REPORT No.:	*6*	DATE:	*20 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
At anchor, lee of Gabo Isl., 37 33, S. 149 55, E

BB. WEATHER:
SW 35 kn.

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	60
Man-Hours	120	0	24	120	262	1430
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	100
Baleen 3	100
Pipe route	100
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	9	2	0	13	51.5	26.75	0	23.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*0900*	*Pipe route development*	*OP*	*9*
0900	*1100*	*Transit to Sole*	*TR*	*2*
1100	*1700*	*Divert to Gabo Isl*	*STBY*	*6*
1700	*2400*	*At anchor in lee of Gabo Island*	*STBY*	*7*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*13*	*23.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*2*	*26.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*9*	*51.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*120*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
Continue SW 30 kn

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Pipe route development completed.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Commence on Sole, weather permitting.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3349C1*	REPORT No.:	*7*	DATE:	*21 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
At anchor, lee of Gabo Isl., 37 33, S. 149 55, E

BB. WEATHER:
In lee.

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	71
Man-Hours	120	0	24	120	262	1692
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	100
Baleen 3	100
Pipe route	100
Sole 2	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	0	0	0	24	51.5	26.75	0	47.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
1700	*2400*	*At anchor in lee of Gabo Island*	*STBY*	*24*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*24*	*47.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*26.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*0*	*51.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*144*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
SW 15-25 kn., dec 10-15kn, swell dec 3-4 to <2m

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Anchor recover at midnight. ETA on location 0700hrs 220302.

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Commence on Sole with analogue acquisition

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3349C1*	REPORT No.:	*8*	DATE:	*22 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
Sole 2 location

BB. WEATHER:
NE 20 kn, 1-2m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	82
Man-Hours	120	0	24	120	262	1954
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	100
Baleen 3	100
Pipe route	100
Sole 2	50
Scout pipe route	0
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	16	0	0	8	67.5	26.75	0	55.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*0800*	*En route Gabo Isl. To Sole 2 site*	*STBY*	*8*
0800	*1000*	*Deploy & tune equipment*	*OP*	*2*
1000	*2400*	*Analogue acquisition on Sole 2 site*	*OP*	*14*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*8*	*55.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*26.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*16*	*67.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*168*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
Cont. E/NE 10-15 kn

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
Scout line pipe route from Sole 2 location to meet line Patricia Ballen-15m contour added to programme

II. CLIENT REPRESENTATIVE'S COMMENTS:
Nil

JJ. PROGRAMME FOR NEXT 24 HOURS:
Continue on Sole with analogue acquisition, magnetometer search, coring & scout line, head Welshpool.

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)

THALES

DAILY PROJECT REPORT

ALL TIMES ARE WST

VESSEL:	*Blue Fin*	PROJECT No.:	*3349C1 3375C1*	REPORT No.:	*9*	DATE:	*23 March 2002*
To:	TGA Perth	Attn:	Operations - N. Mackay				Fax 08 9344 8783
To	OMV Australia Pty Ltd	Attn:	Ron King			Via:	TGA Perth
Copy:	TGGL Compass House	Attn:	Audrey Maysh			Via:	TGA Perth

AA. LOCATION AT 2359 hrs:
On scout line 38 03 S, 148 53 E

BB. WEATHER:
NE 20 kn, 1-2m seas

CC. OPERATIONAL DATA:

C2. PERSONNEL

	Racal	Sub-Cont	Client	Vessel	Today	Total Project To Date
No. of Persons	5	0	1	5	11	93
Man-Hours	120	0	24	120	262	2216
No. On Today	0	0	0	0	0	0
No. Off Today	0	0	0	0	0	0

C3. SURVEY PROGRESS

Area of Activity	Percent Complete (at end of today)
Mobilisation	100
Patricia 2	100
Baleen 3	100
Pipe route	100
Sole 2	100
Scout pipe route	50
Demobilisation	0

C4. RE RUNS TODAY

C5. SUMMARY OF CHARGEABLE TIME

	Today (hours)				Total (hours)			
	Working	Transit	Downtime	Weather	Working	Transit	Downtime	Weather
Patricia 2	24	0	0	0	91.5	26.75	0	55.75
Baleen 3								
Pipe route								
Sole 2								

DD. HSE REPORT:

	Today	To Date
TOTAL HAZARDS/INCIDENTS REPORTED:	0	0
TOTAL MINOR INJURIES:	0	0
TOTAL LTI:	0	0
DETAILS OF INCIDENTS AND DRILLS TODAY:	0	

EE. EVENT DIARY TODAY (all times WST)

From	To	Activity	Code	Hours
0000	*1200*	*Analogue acquisition on Sole 2 site*	*OP*	*12*
1200	*1800*	*Magnetometer search for Sole 1 wellhead*	*OP*	*6*
1800	*2000*	*Coring*	*OP*	*2*
2000	*2400*	*Scout line, Sole to line north of Patricia Baleen*	*OP*	*4*

FF. TIME SUMMARY:

Rate	Code	Hours	Acc. Hours
Standby and/or Weather	*STBY*	*0*	*55.75*
Disputed Time	*DT*	*0*	*0*
Transit	*TR*	*0*	*26.75*
Downtime	*TD*	*0*	*0*
Working	*OP*	*24*	*91.5*
Mobilisation / Demobilisation	*MOB/DEMO*	*0*	*42*
Breakdown (Vessel)	*VD/STBY*	*0*	*0*
Other Nil Revenue Time	*CT*	*0*	*0*
	TOTAL	*24*	*216*

GG. EXPECTED WEATHER FOR NEXT 24 HOURS:
Cont. E/NE 10-15 kn

HH. TECHNICAL & PARTY CHIEF'S COMMENTS:
ETA Port Welshpool now delayed to approx 1600 hrs 24/03/02

II. CLIENT REPRESENTATIVE'S COMMENTS:
Sole 1 magnetometer runs proved location of seabed disturbance as observed on sidescan to be wellhead position.

JJ. PROGRAMME FOR NEXT 24 HOURS:
Complete scout line, head Port Welshpool for data drop & discharge magnetometers

Signed for Thales GeoSolutions

Chris Shuttleworth
(Party Chief)

Signed for OMV Australia Pty Ltd

Rick Glanville
(Client Representative)