Særskilt vedlegg nr. 1 til NOU 2008: 8

Bourbon Dolphins forlis den 12. april 2007

Sentrale underlagsdokumenter

Forord

Undersøkelseskommisjonen etter Bourbon Dolphins forlis har hatt fokus på forhold og informanter som kan være med på å forklare forliset.

Med utgangspunkt i fartøyets beskaffenhet, utrusting og bemanning har kommisjonen bedt om, selv innhentet og fått tilsendt omfattende skriftlig materiale fra rederi, verft, DNV, Sjøfartsdirektoratet og andre.

Kommisjonen har også sett nærmere på det arbeidsoppdrag Bourbon Dolphin utførte da forliset inntraff. Kommisjonen har således gjennomgått betydelige mengder dokumenter som gjelder planlegging og gjennomføring av ankerhandteringsoperasjonen. Dokumentene er skaffet til veie av oljeselskapet, boreriggselskapet og konsulentselskapet. Kommisjonen har også fått tilgang på dokumenter innhentet av norske og britiske sjøfarts- og politimyndigheter.

Sist, men ikke minst, har kommisjonen innhentet forklaringer fra 38 personer og nedtegnet dette i skriftlige referater.

I særskilt vedlegg nr. 1 har kommisjonen tatt inn de dokumenter som etter kommisjonens vurdering utgjør det sentrale vurderingsgrunnlag.

I tillegg er også en inntatt en vurdering av Bourbon Dolphins maskineri fra Ship & Offshore Surveyors A/S og en juridisk betenkning fra stipendiat Hanne Sofie Logstein.

De skriftlige referatene fra høringene er inntatt i sin helhet i særskilt vedlegg nr. 2 (Avhør).

Detaljert innholdsfortegnelse

Vedlegg 1

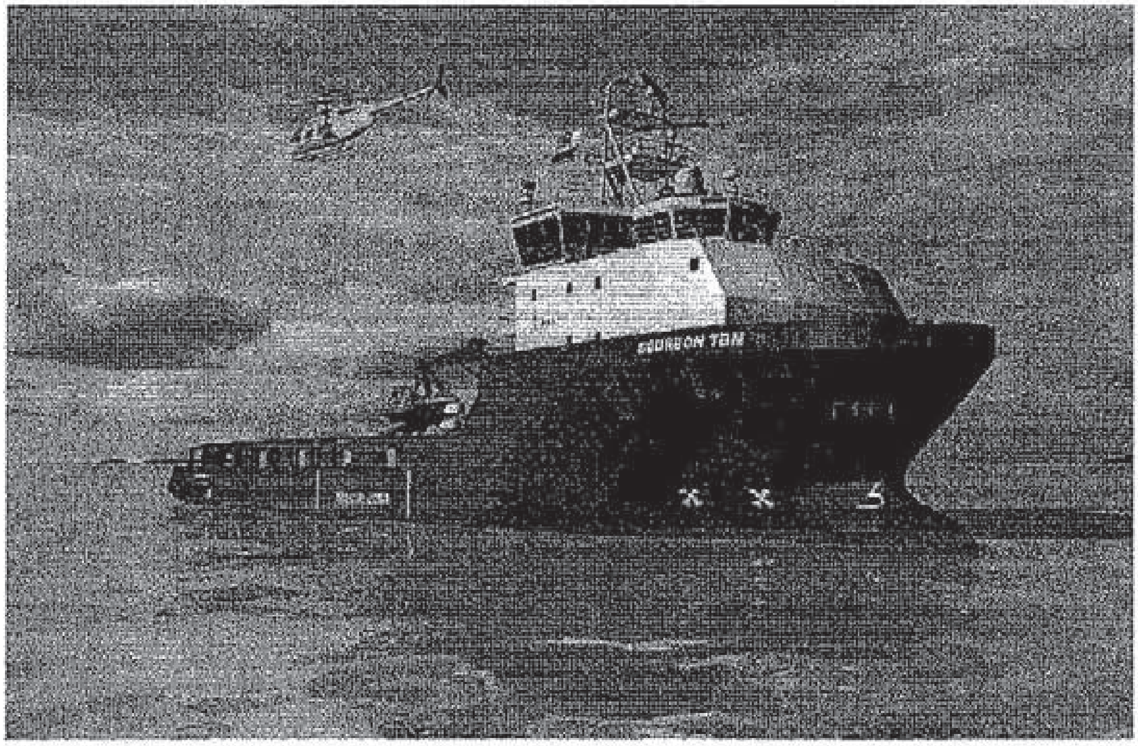
Fartøyet

ULSTEIN®

TURNING VISIONS INTO REALITY

ULSTEIN A102

Anchor Handeling Tug Supply Vessel



FOR MARINE OPERATIONS

ULSTEIN A102 *is a compact and reliable AHTS for anchor handling, tug and supply services designed to meet the future demands of the offshore industry.*

The vessel surpasses industry standards with regards to cargo capacities and performance, and fully complies with requirements for energy efficiency and conservation.

Main characteristics

Brake horsepower	16000	bhp	Length over all	75,2	m
Main winch	400	tonnes	Breadth	17,0	m
Bollard pull	180	tonnes	Draught, max	6,5	m
Speed	17	knots			

ULSTEIN DESIGN AS

N-6067 Ulsteinvik, Norway. Tel. +47 7000 8000. Telefax +47 7000 8559. www.ulsteindesign.com

1. SHIP GENERAL

General description

Together with the enclosed General Arrangement plan, U10180_101-100, this specification describes a Multifunctional Anchor Handling, Tug, Supply and Service Vessel, hereafter described as the Vessel.

The basic principle for the design of this Vessel is to meet operational demands with the best possible solutions. The Vessel shall be able to fulfil the general demands of the offshore industry as anchor handling, towing, transport general cargo on deck and dry- and liquid bulk cargos in tanks to and from offshore units. The Vessel to be built for world wide service, except for service in the arctic or antarctic climatic zones, US inland waters, and similar areas with special restrictions and requirements.

The hullform of the Vessel is designed to ensure good fuel economy during transit and operation. The Vessel to be propulsioned by four diesel engines engaged to two twin input single output main gearboxes. Further the Vessel to have two controllable pitch propulsion propellers, one side thruster and one swingup compass thruster forward and two side thruster aft. Two flap rudders to be arranged.

A passive controlled stabilising system is built in for minimising roll.

The Vessel to be arranged with accommodation for 35 crew and passengers.

Main particulars

	Approx.
Length over all:	75,2 m
Length between perpendiculars:	67,0 m
Breadth moulded:	17,0 m
Depth from Main deck to base line:	8,0 m
Max. draught to base line:	6,5 m
Design draught to base line:	5,0 m
Freeboard at max. draught:	1,5 m
Deadweight at max. draught:	2500 t
Gross tonnage:	2600 GRT

Performance

Trial speed at Sea state 0 - 1 to be approx. 17 knots.
Maximum continuous bollard pull approx. 180 t according to Class testing procedure.

Vessel systems are to be designed for service at ambient air temperatures between -20 C° to +35 C° and sea temperature up to +32 C°

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Capacities

	Approx.	Remarks
Fuel oil, cargo and domestic:	1000 m³	
Fresh water, cargo and domestic:	600 m³	
Ballast- / Drillwater:	1200 m³	
Liquid mud:	320 m³	(4 x 80 m³)
Brine, category III:	280 m³	(4 x 70 m³)
Dry bulk:	200 m³	(4 x 50 m³)
Lub. oil.:	20 m³	
Hydr. oil.:	20 m³	
Sewage:	20 m³	
Rig chain:	320 m³	(2x 160 m³)
Deck load (VCG 1 m above M-dk.):	1000 t	(5/10 t/m², #15)
Cargo deck area:	530 m²	

Class, Certificates and Regulations

The Vessel is designed to comply with rules, regulations and requirements laid down by the Flag State, IMO and the Classification Society (hereafter referred to as the Class) as applicable.

Flag: NOR

IMO: Conventions, Codes and Resolutions that are adopted by the Flag State
Resolution A.469(XII) – Guidelines for the design and construction of offshore supply vessels.
Resolution A.534(13) – Code of Safety for Special Purpose Ships.

Class: Det norske Veritas + 1A1, Tug, Supply Vessel SF, E0, Dyn Pos AUTR, DK(+), HL(+), CLEAN.

Drawings, Instruction Manuals etc.

In general all drawings to be delivered by the Yard unless else is particularly agreed upon.
Approval of drawings by the Flag state and Class to be obtained by the Yard.
Arrangement- and Class drawings to be submitted to the Owner for approval.

All numerical units refer to the metric, SI system of measurement.

Building methods

The Yard's normal standards and production methods shall be applied.

2. HULL AND STRUCTURE

Hull materials

All materials to be new and of marine quality according to Class regulations, and where required, with certificates. Materials are to be suitable for the service intended with this Vessel.

Blasting, shop priming, cleaning of materials

Steel building materials to be grit blasted, and primer of approved type to be applied. Paint work to be performed on clean surfaces, according to manufacturer recommendations for specified coating.

Steel construction in general

All dimensioning to be according to Class requirements and recommendations from noise and vibrations analysis.

Frame spacing to be 700 mm (600 mm in fore- and aft ship).

Ventilation duct and exhaust casing is designed with a minimum of obstructions to prevent noise.

3. CARGO/SERVICE HANDLING

Pneumatic plants for bulk cargo handling

4 off Tanks for dry bulk to be installed. Working pressure 87 psi / 6,0 bar.
Dry bulk tanks to be freestanding and of circular type with sloped bottom.
Inspection/sounding hatch of 5", to be located on top of each tank.
Access hatches to be located on side of tanks, swinging inwards.
Ladders to be mounted inside tanks.
2 off BHS compressors with seawater cooling.
Capacity approx. 30 m³/min each.
1 off Mucking ejector for tank cleaning.
2 off Water separators with automatic drain trap.

2 segregated loading/discharge systems to be installed with monitoring from cargo control system.
Loading / discharge pipes to be 4".
Ventilation line midship to be arranged with hose connection at deck.
Straub Grip couplings to be installed for easy removal of pipes in case of blocking in pipe.
Valves below main deck and compressors to be remote controlled.

Deck cranes for cargo

1 off Work / provisions crane; Approx. 5 tonnes at 15 m.
Dynamic factor 1,5.

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Loading / discharging pumps

Qty.	List of cargo pumps	Capacity approx.	Pump driven by:
1 off	FW cargo pump.	200 m³/h – 8 bar	Centrifugal type. Electric motor, two-speed.
2 off	Brine pump.	100 m³/h – 18 bar	Screw type. El. motor, variable speed.
2 off	Ballast/Drillwater pump.	200 m³/h – 8 bar	Centrifugal type. Electric motor, two-speed.
1 off	FO cargo pump.	150 m³/h – 8 bar	Centrifugal type. Electric motor, two-speed.
2 off	Mud pump.	100 m³/h – 18 bar	Screw type. El. motor, variable speed.
1 off	Mud agitator for each mud tank.		Electric motor.

Loading / discharging systems on deck

	Dim.	Connection: Hose type	Location Port side	Location Starboard	Remarks
BHS no.1	4"	WECO fig.50 or equal	Midship Aft.	Aft.	Adapter: 1 off 4" -> 5"
BHS no.2	4"	WECO fig.50 or equal	Aft.	Midship Aft.	Adapter: 1 off 4" –> 3 "
BHS ventilation line	4"	WECO fig.50 or equal	Midship.	Midship.	
Fresh water cargo	4"	WECO fig.50 or equal	Midship. Aft.	Midship.	
Brine	4"	WECO fig.50 or equal	Midship Aft	Midship.	
Ballast/Drillwater	5"	WECO fig.50 or equal	Midship.	Midship Aft	
Fuel oil cargo	4"	TODO CC4500 or equal	Midship.	Midship. Aft	
Liquid mud	4"	TODO CC4500 or equal	Midship.	Midship Aft	

Loading / discharging systems in pump room

General
Discharge pipes for cargo systems to be used as filling lines with bypass line at pumps.
NR valves to be installed at pressure side of all cargo pumps.
The cargo system to be manually operated.
Blind flanges between combined system to be of suitable type like 'SIP™ Blank off concept" or similar.

FW cargo system
Pipe system to be designed with transfer possibility and discharge to deck.

Brine system
Brine tanks to be designed for specific gravity 2,5 t/m^3.
High level alarm sensor inside brine tanks to be mounted 400 mm below main deck and connected to cargo control system.
Pipe system to be designed with transfer possibility and discharge to deck.

Ballast / Drillwater system
All ballast tanks to be divided into four groups.
Pipe system to be designed with transfer possibility between each group, ballast water overboard and drill water discharge to deck.

FO cargo system
Flowmeter for FO cargo in filling/discharge line and possibility for monitoring and printing from cargo control system to be included.
Pipe system to be designed with transfer between groups of tanks and loading/discharge to main deck.
FO cargo system to be connected to fuel oil transfer system.

Liquid mud system
Tanks for liquid mud with specific gravity 2,5 t/m^3 and flash point above 60°C.
High level alarm sensor inside mud tanks to be mounted 400 mm below main deck and connected to cargo control system.
Recirculation lines to be arranged.
2 discharge systems to be designed with one pump.
Blowing of pipes by compressed air.
Loading / discharge filter with bypass possibility.

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4. SHIP EQUIPMENT

Maneuvering machinery and equipment

1 off Tunnel thrusters forward, electrical driven.
Fixed speed, variable pitch type.
Propeller diameter approx.: 2200 mm
Motor rating approx.: 883 kW at 1200 rpm.
Motor to be fresh water cooled.

1 off Swingup compass thrusters forward, electrical driven.
Variable speed, variable pitch type.
Propeller diameter approx.: 1800 mm
Motor rating approx.: 883 kW at 1800 rpm.
Motor to be fresh water cooled.

2 off Tunnel thruster aft, electrical driven.
Fixed speed, variable pitch type.
Propeller diameter approx.: 1800 mm
Motor rating approx.: 590 kW at 1800 rpm.
Motor to be air cooled.

Roll Reduction System:
3 off Passive roll reduction tanks. Two are located below main deck in the aft ship and one amidship. They are designed to allow for maintaining minimum allowed GM during a range of the Vessel's load conditions.

Dynamic Positioning:
The Vessel to be fitted with a DYNPOS AUTR DP-system including:
2 off Wind sensor
2 off Motion Reference Unit
2 off DGPS
1 off Laser reference system

Navigation and communication equipment

Navigation and communication equipment to be according to regulations.
2 off Radars
1 off GPS
2 off Gyrocompasses (combined use with DP-system)
1 off PABX type telephone system with PA
1 off Complete GMDSS A3 radio installation
1 off Automatic Identification System (AIS)

Anchoring and mooring equipment

The deck machinery to be electrical driven, alternatively of hydraulic type, and to include:

2 off	Capstans aft, 10 tonnes
1 off	Windlass according to Class.
2 off	Bollards aft, Ø300 mm.
4 off	Bollards fore, Ø300 mm.
4 off	Bollards midship, Ø250 mm.

Towing equipment

Towing and anchor handling winch, 2 drum waterfall type with hydraulic drive units consisting of:

1 off	Towing/ Working drum, Ø1500/3200 x 5470	
	Capacity:	5000 m Ø77 mm wire.
	Braking force on 1. layer:	450 tonnes
	Duty on 1. layer:	400 tonnes.
	Hoisting speed on 1. layer:	18,7 m/min (30,4 m/min at 237 tonnes).
	Lowering speed:	30,4 m/min
	Dynamic breaking:	88 m/min (90 – 480 tonnes).
1 off	Anchor handling drum, Ø1500/3200 x 4570 + 900 [mm].	
	Capacity:	5000 m Ø77 mm wire.
	Socket compartment:	900 m Ø77 mm wire.
	Braking force on 1. layer:	450 tonnes
	Duty on 1. layer:	400 tonnes.
	Hoisting speed on 1. layer:	18,7 m/min (30,4 m/min at 237 tonnes).
	Lowering speed:	30,4 m/min
	Dynamic breaking:	88 m/min (90 – 480 tonnes).
2 off	Cable lifters, 5 snugs at Ø1209 [mm].	
	Duty high / low:	370 / 310 tonnes.
	Hoisting speed high / low:	14,5 / 23,0 m/min.
	Dynamic breaking:	67 m/min (85 – 445 tonnes).
1 off	Secondary drum, Ø1500/4500 x 4500 + 900 [mm].	
	Capacity:	4000 m Ø77 mm wire.
	Capacity:	1600 m Ø203 mm rope.
	Socket compartment:	900 m Ø77 mm wire.
	Braking force on 1. layer:	170 tonnes
	Duty on 1. layer:	138 tonnes.
	Hoisting speed on 1. layer:	28,0 m/min.
	Dynamic breaking:	170 tonnes at 70 m/min.

One remote operated spooling device for waterfall winch.
One manually operated spooling device for each drums.

Auxiliary equipment:

2 off	Hydraulic towing pin units.
2 off	Anchor handling tong.
1 off	Double stern roller, Ø3.500 mm x 5.000 mm (tot).
2 off	Tugger winches, HP or LP hydraulic type. Duty, 1. layer: 15 tonnes

5. EQUIPMENT FOR CREW AND PASSENGERS

Safety equipment

Vessel to be fitted with safety equipment according to SOLAS-regulations.
6 off Life rafts for 20 persons, 3 on each side.
1 off MOB-boat according to regulations in single point davit.

Accommodation and inventory

The Vessel to be equipped to accommodate a total number of 35 persons according to current regulations. 13 off single- and 10 off double cabins for crew, all with separate toilet / shower. In addition 4 off 4-berth cabins with separate toilet / shower and two separate sleeping quarters.

Free deck height min. 2100 mm (floor top to below ceiling paneling), 2300 mm in wheelhouse.

Main deck will accommodate gas store, paint-/chemical store, hydraulics rooms, garbage room, workshop, ECR, deck pantry, wardrobe with washstand, public toilets, laundry, and 2 off cabins.

A-deck will accommodate air conditioning room, provisions store with freezer and cooler, public toilets, mess, day rooms and 3 off cabins.

B-deck will accommodate emergency generator room, office, conference room, and 9 off cabins.

C-deck will accommodate CO_2 –room, instrument room and 7 off cabins.

Bridge deck will accommodate wheelhouse with equipment, toilet and a small kitchenette.

Deck covering in general to be vinyl, using leveling mass where needed. The decks in galley, wardrobe/change room and provision stores to be covered with casting and tiles.

Required thermal and fire insulation to be provided in order to obtain fire integrity according regulations. Insulation to be applied on all outer steel bulkheads and the Vessel sides towards accommodation and internal steel bulkheads adjacent to weather exposed areas. The accommodation shall be built up by means of an approved steel paneling system with insulation and plastic surface.

Insulation to be properly fitted below all weather exposed decks. An approved sealing system to be applied.

10 off windows in wheelhouse to be equipped with wipers and defrosted by heated air.

Freezing / refrigeration systems for provisions

Dry provision room to be connected to the air condition plant.
The refrigeration plant to consist of two fully automatic air-cooled compressors.
Each compressor to be dimensioned for an air temperature of 40 °C and be able to serve as backup for each other. R-404a as cooling medium.

Ventilation, AC and heating

Areas in general to be fitted with satisfactory ventilation, heating and cooling according to ISO standards for 'Design conditions and basis of calculation'.

Design conditions

Summer:	Outdoor air temperature	+38 C° (70% humidity)
	Indoor air temperature	+27 C° (50% humidity)
Winter:	Outdoor air temperature	–5 C°
	Indoor air temperature winter	+22 C°

Air conditioning plant for accommodation with hot water secondary system from boiler as heating medium. Single spiro duct system to be installed.

2 off Cooling compressor of piston type for air conditioning plant with condenser.
Each compressor approx. 50 % of total capacity.

Refrigeration compressor to be provided with automatic capacity control system.
Condenser of shell or tube type with FW cooling to be located in engine room.
Redundant system for evaporator coil in air condition unit.

1 off Cooling unit for engine control room.
Cooling.unit to be FW cooled and self-contained.

Sanitary systems

Sanitary supply systems
2 off FW hydrophore pumps.
1 off UV-steriliser.
2 off Hot water circulation pump. (One spare in store)

Sanitary discharge systems
1 off Vacuum sewage plant, consisting of 2 pumps.
1 off Sewage treatment plant with sewage transfer pump.
1 off Sewage tank as hull tank.
1 off Sewage discharge pump.

Sewage discharge pump to be arranged for discharge to deck PS and SB with IMO flange and overboard below ballast water line.
Grey water from washstands and scuppers to discharge to sewage tank or directly overboard.

6. MACHINERY MAIN COMPONENTS

Propulsion machinery

4 off Diesel engines, total engine power approx. 12.000 bkW (16.300 bhp).
FW LT and HT pumps to be mechanical driven and built on engines.

Propellers, transmissions

2 off Propulsion propellers with controllable pitch to be installed. Diameter approx. 4000 mm.
Each propeller to have 4 blades, Ni-Al-Bronze.
The shaft to be equipped with simple locking device to avoid wind-milling during repairs.

Main reduction gear

2 off Main gears, twin input / single output to be installed.
In-/ output to be approx. 750 / 160 rpm.
The reduction gears to be equipped with built in hydraulic clutch, thrust-bearing and PTO for shaft generator.

Central heating and boilers

1 off Hot water boiler, 250 000 kcal/h, oil fired with electrical heater, 4 x 10 kW.
Hot water for domestic use. Type of fuel to be gas oil.
Hot water boiler secondary system to be used for heating of air condition plant.

Diesel Generator sets

2 off Auxiliary generator sets, output of approx. 550 ekW.
Speed at 1800 rpm. Pumps built on engines.

1 off Emergency generator set, approx. 60 ekW at 1800 rpm.
The engine to be radiator-cooled.

Shaft generator

2 off Shaft generators, each approx. 1800 ekW, 1800 rpm.
Generators mounted at main gear PTO.

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7. SYSTEMS FOR MACHINERY MAIN COMPONENTS

Fuel oil system

Engines and boiler to use Fuel oil type marine gas oil according to ISO 8217, ISO-F-DMA.
A complete FO overflow system with dedicated overflow tank to be installed.

2 off FO service tanks as hull tank.
2 off FO settling tank as hull tank.
2 off FO separator, self-cleaning type with capacity according to engine make.
2 off FO transfer pump (15 m³/h - 2 Bar)
1 off FO service tank for Emergency generator set. Capacity according to Class requirement.

Lubricating oil system

4 off LO separators, self-cleaning type with capacity according to engine make.
1 off LO transfer pump (2,9 m³/h - 2 Bar)

Cooling system

2 off Sea inlets (1 off low suction and 1 off high suction) to be arranged in engine room.
Sea inlets to be connected with tank duct below tanktop.
1 off Sea inlet in aft ship.

SW cooling system with common SW back-up pump.
Independent FW cooling system for main engine and propeller plant at each side.
FW cooling system for miscellaneous equipment.

Compressed air system

2 off Starting air compressors according to Class requirement.
2 off Starting air bottles, each 500 liters
1 off Working air bottle, 1000 liters
1 off Control air drier, capacity 30 m³/h – 7 Bar.

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Exhaust system

Silencers with 35 dB (A) noise reduction.

Automation systems for machinery

3 off Workstations with steel consoles.
2 off pilot chairs on bridge fwd 2 off pilot chairs on bridge aft with electrical remote controls in the arm rests.
2 off office chairs in engine control room.
1 off Alarm/monitoring system according to Class.

8. SHIP COMMON SYSTEMS

Ballast system

See item 3.

Bilge system

2 off Bilge water pumps according to Class requirement
1 off Bilge water separator, 2,5 m^3/h – 15 ppm.
1 off Sludge pump (5 m^3/h - 3 Bar)

Gutter pipes, outside accommodation

Sufficient number of drain pipes to be laid from respective decks.

Fire fighting system

2 off Fire pumps according to Class requirement
1 off Emergency fire pump according to Class requirement
1 off Local protection system of water mist type in engine room according to SOLAS II-2/7.
1 off Fire alarm system
1 off CO_2-plant for engine room
1 off Sprinkler nozzle in Paint/Chemical store from hydrophore line.

Air and sounding system

A remote tank sounding system with electronic reading to be installed.
Air pipe size according to Class requirement.
Workmanship for air and sounding pipes according to Yard standard.

Common electric and electronic system

Alternating current system, 3 phase, 60 Hz according to DIN and/or IEC norms.
System voltages: 440 V AC, 22 0V AC and 24 V DC.

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Sjøfartsdirektoratet
Norwegian Maritime Directorate

Our date	Our reference and file no
23.08. 2006	06/2418
Your reference	Inquiries to / Direct phone
Per Gullik Strand	jtn +47 70114283/95196398

MOTTATT
25 AUG 2006

Ulstein Verft As

6065 Ulsteinvik

Mv Bourbon Dolphin - BN. 274, Ulstein Verft As. Inclining test.

We hereby confirm that the result of Inclining test is as given in this report.

According to the report, the light ships main data will be ;

Light ships weight = 3201,64 tonnes
VCG = 7,43 m ab.base line
LCG = 33,10 from AP (frame 0)
TCG = - 0,07 m (to PS)
GM = 0,29 m

These results are to be used in Final stability calculations.

This letter, together with an example of approved rapport and one example of approved Preliminary calculations; have to be delivered onboard before delivery of ship from yard.

Yours faithfully,

John Nerem
Acting Station Manager

UL274 - Inclining test report

Report on inclining test and light ship survey

Name of ship (Yard no. and yard):
"Bourbon Dolphin"

Signal letters:
LNUW

Carried out, place and date:
Ulstein Verft AS, 20.08.2006

Summary of lightship results:

Light ship weight:			3201,64	**tonnes**
Vertical centre of gravity, VCG:			7,43	**m above baseline**
Longitudinal centre of gravity, LCG:			33,10	**m from** #0
Transverse centre of gravity, TCG:			-0,07	**m from BL** (to PS)
Lightship Metacentric height, GM_T:			0,29	**m**
Lightship moulded draught amidships:	4,27	**m from BL**	**Trim:** 0,49	**m forward**
			Heel: -10,40	**degrees PS**

Person responsible (name and company): Per Gullik Strand, Ulstein Verft AS

....
signature

Stamp

NORWEGIAN MARITIME DIRECTORATE

Approved, date 28.08.06

Time used **hours**

Surveyor

Se brev av

23 AUG 2006

UL274 - Inclining test report

Report on inclining test
and
light ship survey

Name of ship (Yard no. and yard):
"Bourbon Dolphin"

Signal letters:
LNUW

Carried out, place and date:
Ulstein Verft AS, 20.08.2006

Summary of lightship results:

Light ship weight:				3201,64	**tonnes**	
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Lightship Metacentric height, $GM_{T:}$				0,29	**m**	
Lightship moulded draught amidships:	4,27	**m from BL**	**Trim:**	0,49	**m forward**	
			Heel:	-10,40	**degrees PS**	

Person responsible (name and company): Per Gullik Strand, Ulstein Verft AS

signature

Stamp

Approved, date

Time used **hours**

Surveyor

UL274 - Inclining test report

1. GENERAL INFORMATION

Owners (name and address): Bourbon Offshore Norway AS
Mjølstadneset
N-6090 Fosnavaag

If existing ship, state reason for new inclining test:

Report date: 15.05.2006

Last revision of the report, date:

Test commenced 13:00 **(hrs.)** **Finished** 17:00 **(hrs.)**

Weather conditions in general: Good

Sea state: None **Wind:** 0 **Current:** None

Specific gravity of seawater: 1,024 **t/m^3** **measured?** ☑ Yes ☐ No

Mooring arrangement: Slack mooring ropes

Attending surveyor: John Nerem

Classification society: Sjøfartsdirektoratet

2. SHIP PARTICULARS

Length over all:			75,46	**(m)**
Length between perpendiculars(LPP):			64,91	**(m)**
Breadth moulded amidships:			17,00	**(m)**
Depth moulded amidships (D):			8,00	**(m)**
Ship without shell plating: Is deck thickness included in D?	☐ Yes	☑ No	10,00	**(mm)**
Design trim (rake of keel) over LPP:			0,00	**(m)**
Height/thickness of bar keel/keel plate:			11,00	**(mm)**

3. OTHER INFORMATION

Sister ships if any
(Y no, name, signal letters):

Last hull extension or other modification
(year):

Permanent ballast during test: 0 **tonnes**

Permanent ballast taken on board *after* the test: 0 **tonnes**

UL274 - Inclining test report

4. DRAUGHT READINGS

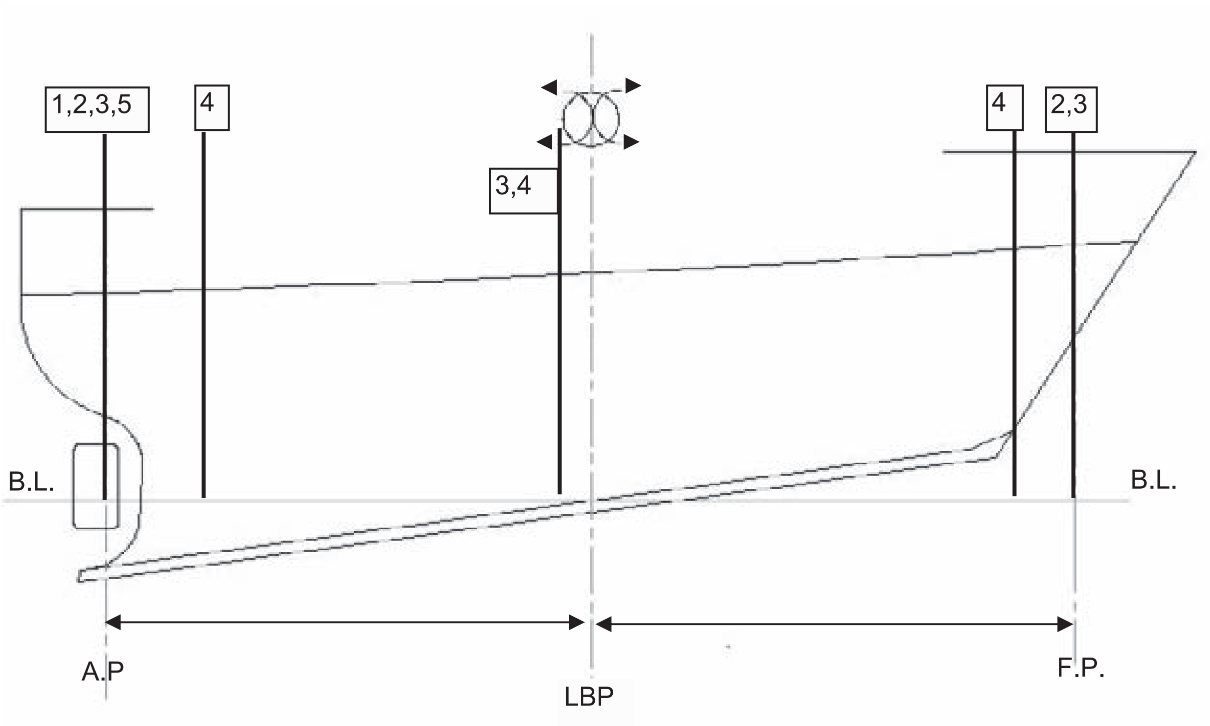

Fig.1

Please indicate the following information on the sketches:

1. Base line and longitudinal reference point used in the hydrostatic particulars
2. Location of draught marks for and aft (Fig.1)
3. Draught readings at marks
4. Freeboard readings at marks, starboard and port side (Fig.2 or fig. 3)
5. Longitudinal, transverse and vertical location of other reference points used, if any
6. Readings at other reference points, if any

NOTE:

If the ship has trim during the test, care must be taken to ensure that the readings are correct according to how "draught" is defined in the hydrostatic data used. (Perpendicular to the base line or perpendicular to the waterline.)

UL274 - Inclining test report

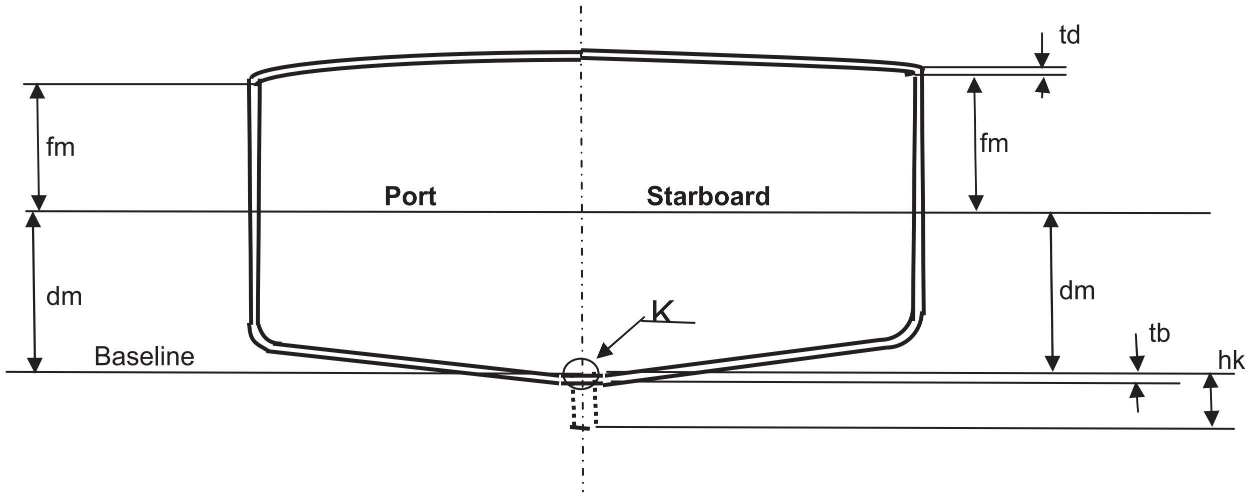

Fig. 2

Ship with shell plating

PORT:			**STARBOARD:**		
fm=	3,419	m	td=	0,012	m
dm=	4,579	m	fm=	3,549	m
			dm=	4,429	m
			tb=	0,011	m
			hk=	0,411	m

Longitudinal position of this section, if not at LBP/2: 27,65 **m** **from:** AP (#0)
Measurement of depth moulded at this section, if taken: SB: **m** **PS:** **m**

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5. HYDROSTATIC PARTICULARS FOR THE INCLINING TEST CONDITION

Measured values:	**Prior to incline**		**After incline**		
	sb	**ps**	**sb**	**ps**	
Draught incl. shell reading forward:			4,570	4,610	**m**
Correction for keel/keel plate:	-0,011	-0,011	-0,011	-0,011	**m**
Correction for longitudinal location: *separate calc.			0,000	0,000	**m**
Draught moulded:			4,559	4,599	**m**
Mean value moulded:			4,579		**m**
Moulded draught to rabbet at FP,$d_{F:}$			4,579		**m**
	sb	**ps**	**sb**	**ps**	
Draught incl. shell reading aft:			4,420	4,500	**m**
Correction for keel/keel plate:	-0,011	-0,011	-0,011	-0,011	**m**
Correction for longitudinal location:			0,000	0,000	**m**
Draught moulded:			4,409	4,489	**m**
Mean value moulded:			4,449		**m**
Moulded draught to rabbet at AP,$d_{P:}$			4,449		**m**
Depth moulded:					**m**
	sb	**ps**	**sb**	**ps**	
Draught incl. shell amidships:			4,440	4,590	**m**
Correction for keel/keelplate:	-0,011	-0,011	-0,011	-0,011	**m**
Correction for longitudinal location:			0,001	0,001	**m**
Draught moulded:			4,430	4,580	**m**
Mean value moulded:			4,505		**m**
Moulded draught midships:			4,505		**m**
Deck thickness, ships with shell plating:					**m**
Correction for longitudinal location:					**m**
Correction for sagging(+)/hogging(-) (enclose calculations):	**0,000**		-0,0090		**m**
Mean draught to baseline at LBP/2, d_m:			4,514		**m**
Trim t=(d_{AP}-d_{FP}) minus design trim (rake of keel):	**0,000**		0,130		**m**

Hydrostatic data as inclined from curves/tables for trim=		**m by stem/stern**
Extreme displacement during the test, Δ :	3328,4	**tonnes**
Volum displacement during the test, Δ/ρ:	3250,4	**m^3**
Transverse metacentre above baseline, KM_t :	7,713	**m**
KM_T for trimmed waterline:	7,713	**m**
Moment to change trim 1 cm, MCT 1 CM:	38,2	**tm/cm**
Longitudinal centre of buoyancy, LCB:	32,801	**m**
Vertical centre of buoyancy, VCB:	2,468	**m**
Transverse centre of buoyancy, TCB:	-0,046	**m**
Longitudinal metacentre ab. B.L.(KM_L),if MCT must be calculated:		**m**

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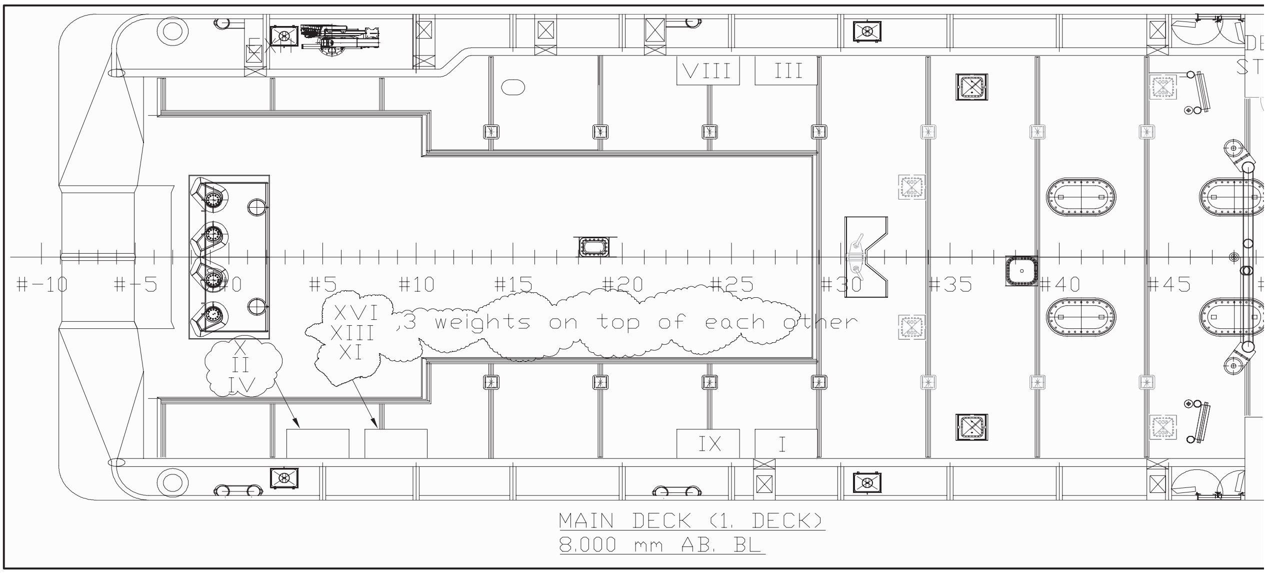
6. DESCRIPTION OF INCLINING WEIGHTS

Weight no.	Mass (tonnes)	Material	Verification		Arm m
			Date	Surveyor	
I	3,890	Steel block	07.12.1988	DnV	13,200
II	3,940	"	07.12.1988	"	13,215
III	3,890	"	07.12.1988	"	13,210
IV	4,050	"	07.12.1988	"	13,205
	4,010	"	07.12.1988	"	13,210
	3,870	"	07.12.1988	"	13,195
VII	3,880	"	07.12.1988	"	13,220
VIII	3,860	"	07.12.1988	"	13,200
IX	3,840	"	26.04.1990	"	13,210
X	4,190	"	26.04.1990	"	13,010
XI	4,190	"	26.04.1990	"	13,020
XII	3,880	"	26.04.1990	"	13,215
XIII	4,110	"	26.04.1990	"	13,020
XIV	3,610	"	26.04.1990	"	13,135
XV	3,785	"	26.04.1990	"	13,215
XVI	4,320	"	26.04.1990	"	12,985
XVII	2,940	"	26.11.2001	"	13,275
XVIII	3,600	"	26.11.2001	"	13,180
XIX	5,380	"	26.11.2001	"	12,455
XX	5,260	"	26.11.2001	"	12,455
XXI	1,310	"	26.11.2001	"	13,205
XXII	1,360	"	26.11.2001	"	13,205
XXIII	1,280	"	26.11.2001	"	13,205
XXIV	2,660	"	26.11.2001	"	13,205
Sum:	87,105				

Placement of weights prior to first movement



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7. PENDULUMS

Pend. no.	Length	Location
1	4146 (mm)	Anchor Winch Zone, Radovan
2	5065 (mm)	Bow Thruster Room, Johan

Note: If a pendulum is replaced by a U-tube or similar device the transverse distance between the measuring posts is indcated as "length" in above table. A sketch of the arrangement shall be enclosed with the report.

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8. TANK CONTENTS FOR DEDUCTION

tank no.	Tank name	Sounding	Volume m^3	Sp.grav. γ t/m^3	Mass t	VCG m	Vertical moment tm	LCG m	Longitudinal moment tm	TCG m	Transverse moment tm	Moment of inertia, i m^4
71	FO Settl. TK 1 PS		13,50	0,860	11,61	3,08	35,76	38,13	442,69	-7,94	-92,18	0,20
73	FO Service TK 2 PS		15,00	0,860	12,90	3,84	49,54	41,60	536,64	-7,88	-101,65	0,30
74	FO Service TK 2 SB		22,50	0,860	19,35	3,87	74,88	40,86	790,64	7,91	153,06	0,40
79	Emerg. Generator TK		0,25	0,860	0,21	14,18	2,99	43,75	9,22	-6,76	-1,42	0,00
12	FW Centre TK	Full	76,00	1,000	76,00	0,67	50,92	31,49	2393,24	0,00	0,00	0,00
	Liquids:				120,07	1,78	214,09	34,75	4172,43	-0,35	-42,20	0,90

Correction for free surface: $\frac{\sum i}{\nabla} =$ 0,0003 m

Note! If the amount of (sea)water ballast/fuel oil exceeds approximately 20% of Δ , the specific gravity shall be verified (all tanks).

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9. SUCCESSION OF WEIGHT MOVEMENTS

Movement no.	Direction, indicate with arrows			Weight no(s). Moved
	PS(-)	C.L.	SB(+)	
1		---------------	>	III
2		---------------	>	VIII
3	<	---------------		VIII
4	<	---------------		III
5	<	---------------		I
6	<	---------------		IX
7		---------------	>	IX
8		---------------	>	I
9				
10				

10. GENERAL REQUIREMENTS FOR CONDUCTION OF THE TEST:

The following items shall be checked and found in order by the person in charge of the test before this report is submitted to the surveyor for approval:

1. The deflections shall be measured at at least two (2) stations, of which at least one shall be a pendulum.

2. List before first movement shall be as small as possible. The results will not be acceptable without exact calculation of the righting moment(s) if the sum of list and inclination exceeds 5^{o} to one side.

3. The test will not be approved if, due to list, the ship has not been inclined beyond the upright position.

4. Maximum deflection to both sides shall be 2^{o}-4^{o}. For large ships (tankers, bulk carriers etc.) $1{,}5^{o}$ may be accepted. For unconventional designs and ships with especially large initial stability (GM_T) other values may be permitted subject to acceptance prior to the test.

5. Pendulum length and maximum heeling moment applied shall be so adjusted that maximum deflection read is not less than 150 mm.

6. For the test to be approved, at least eight (8) succesfull readings, including the starting point, shall be obtained and these readings shall lie on an approximately straight line for all measuring stations.

7. The difference between actual trim and the trim in the hydrostatic data used shall not exceed 0,01*LBP.

11. MEASURED METASENTRIC HEIGHT FOR THE SHIP AS INCLINED

Displacement during the test Δ = 3328,40 **(tonnes)** **Pendulum 1, Length L1=** 4146 **(mm)**

Pendulum 2, Length L2= 5065 **(mm)**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	
Mov. Nr.	Weight no (I - XX)	Mass (t)	Transv. Distance +/- (arm) (m)	Single moment =(2)*(3) ™	Accumulated moment =∑(5) (tm)	Single pendulum deflection +/- (mm)	Accum. Pendulum deflection =∑(7) (mm)	Accum. Tan φ =(8)/L_1	Single GM_T $\frac{(5) \times L_1}{\Delta \times (7)}$ (m)	Single pendulum deflection +/- (mm)	Accum. pendulum deflection =∑(10) (mm)	Accum. Tan φ =(11)/L_2	Single GM_T $\frac{(5) \times L_2}{\Delta \times (10)}$ (m)
1	III	3,890	13,210	51,387	51,387	Rado 134	134	0,032	0,478	Johan 160	160	0,032	0,489
2	VIII	3,860	13,200	50,952	102,339	119	253	0,061	0,533	152	312	0,062	0,510
3 Neg	VIII	3,860	-13,200	-50,952	51,387	-119	134	0,032	0,533	-150	162	0,032	0,517
4 Neg	III	3,890	-13,210	-51,387	0,000	-134	0	0,000	0,478	-163	-1	0,000	0,480
5 Neg	I	3,890	-13,200	-51,348	-51,348	-126	-126	-0,030	0,508	-154	-155	-0,031	0,507
6 Neg	IX	3,840	-13,210	-50,726	-102,074	-130	-256	-0,062	0,486	-155	-310	-0,061	0,498
7	IX	3,840	13,210	50,726	-51,348	121	-135	-0,033	0,522	143	-167	-0,033	0,540
8	I	3,890	13,200	51,348	0,000	126	-9	-0,002	0,508	155	-12	-0,002	0,504

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Use positive sign for (3), (6) and (9) when moving weights towards SB. Negative sign when moving towards PS. Accumulated Tan φ shall be plotted continuously during the test, as a function of accumulated moment.

Move no.	Tot.mom. (tm)	Tan.(Fi) Pend.1		Tan.(Fi) Pend.2
1	51,387	0,032		0,032
2	102,339	0,061		0,062
3	51,387	0,032		0,032
4	0,000	0,000		0,000
5	-51,348	-0,030		-0,031
6	-102,074	-0,062		-0,061
7	-51,348	-0,033		-0,033
8	0,000	-0,002		-0,002
	LR GM1=	**0,492**	**LR GM2=**	**0,496**

Inclining angle	
Pend. 1	Pend. 2
1,85	1,81
3,49	3,52
1,85	1,83
0,00	-0,01
-1,74	-1,75
-3,53	-3,50
-1,86	-1,89
-0,12	-0,14

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12. RESULTS FROM THE INCLINING TEST

KM_T for trimmed waterline			7,713 **m**
Measured GM_T, pendulum 1	0,492	**m**	
Measured GM_T, pendulum 2	0,496	**m**	
Average GM_T			0,494 **m**
Correction for free surface in tanks			0,000 **m**
Average GMT, with correction for free surface:			0,494 **m**

VERTICAL CENTRE OF GRAVITY

VCG (at test) = KMT - GMT= 7,219 **m**

LONGITUDINAL CENTRE OF GRAVITY

Trim, t: 0,130

LCG = LCB - (VCG - VCB) t / LPP = 32,791 **m**

(with trim by stern taken as negative)

TRANSVERSE CENTRE OF GRAVITY

Heeling, ø -0,506 degrees

TCG (at test) = TCB - (VCG - VCB) * tan ø = -0,033 **m**

CORRECTION OF DISPLACEMENT DUE TO SAGGING(+)/HOGGING(-)
(USING SIMPSON)

Displ. = 3328,40 t

CORR. = (LPP/2)/3 * ((1*0)+(4*Sagg\hogg*B)+(1*0))*Water grav. = -6,78 t

DISPLACEM. AT TEST = 3321,62 t

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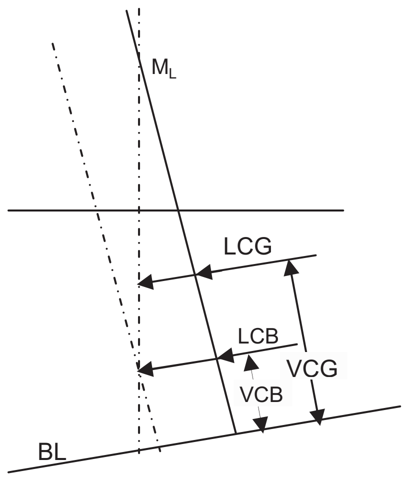
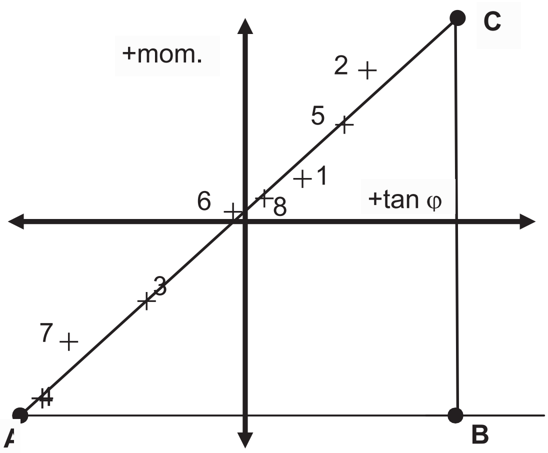
Calculation of LCG:



At LBP/2

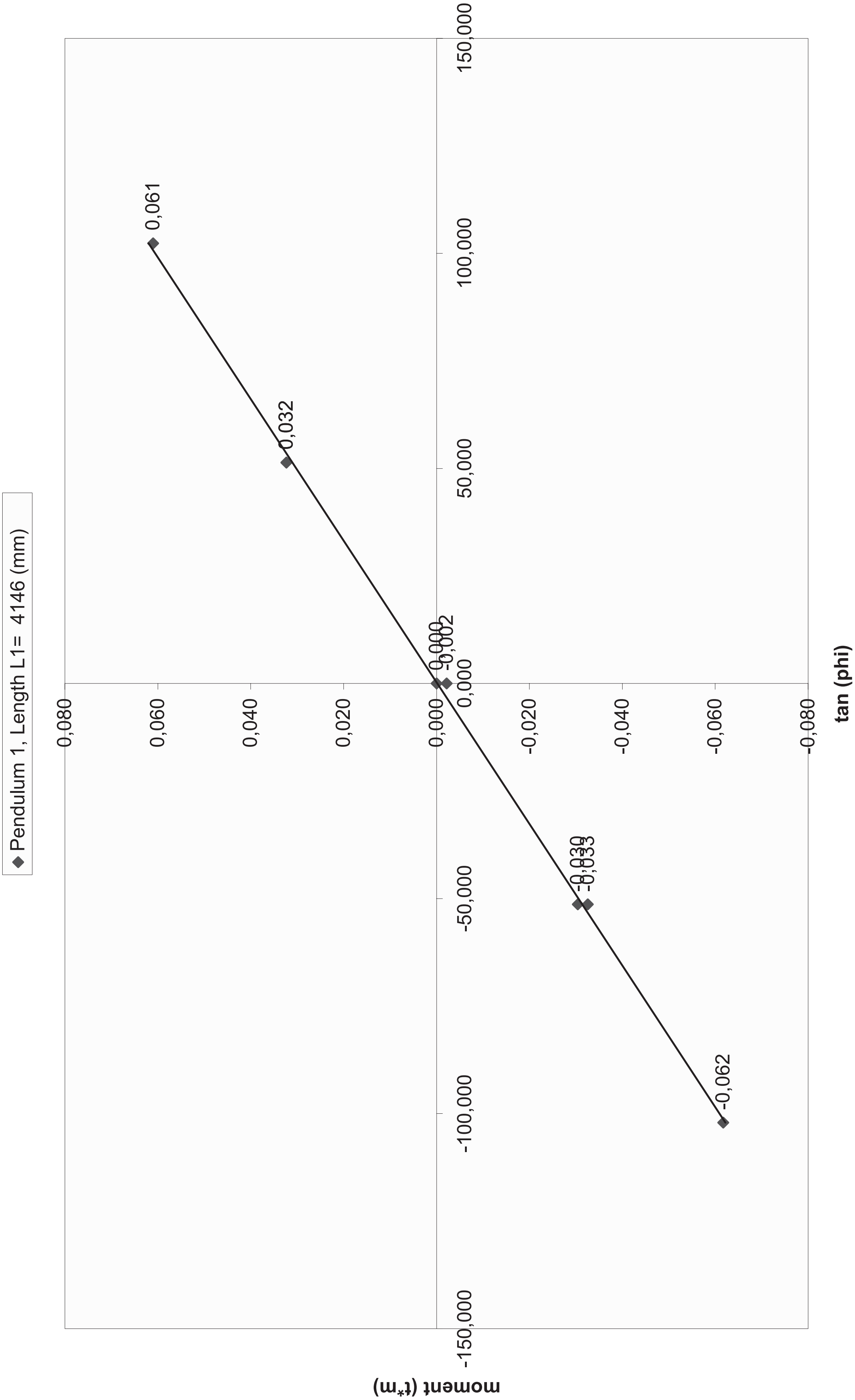
Graphical method which should be used for calculation of GM:

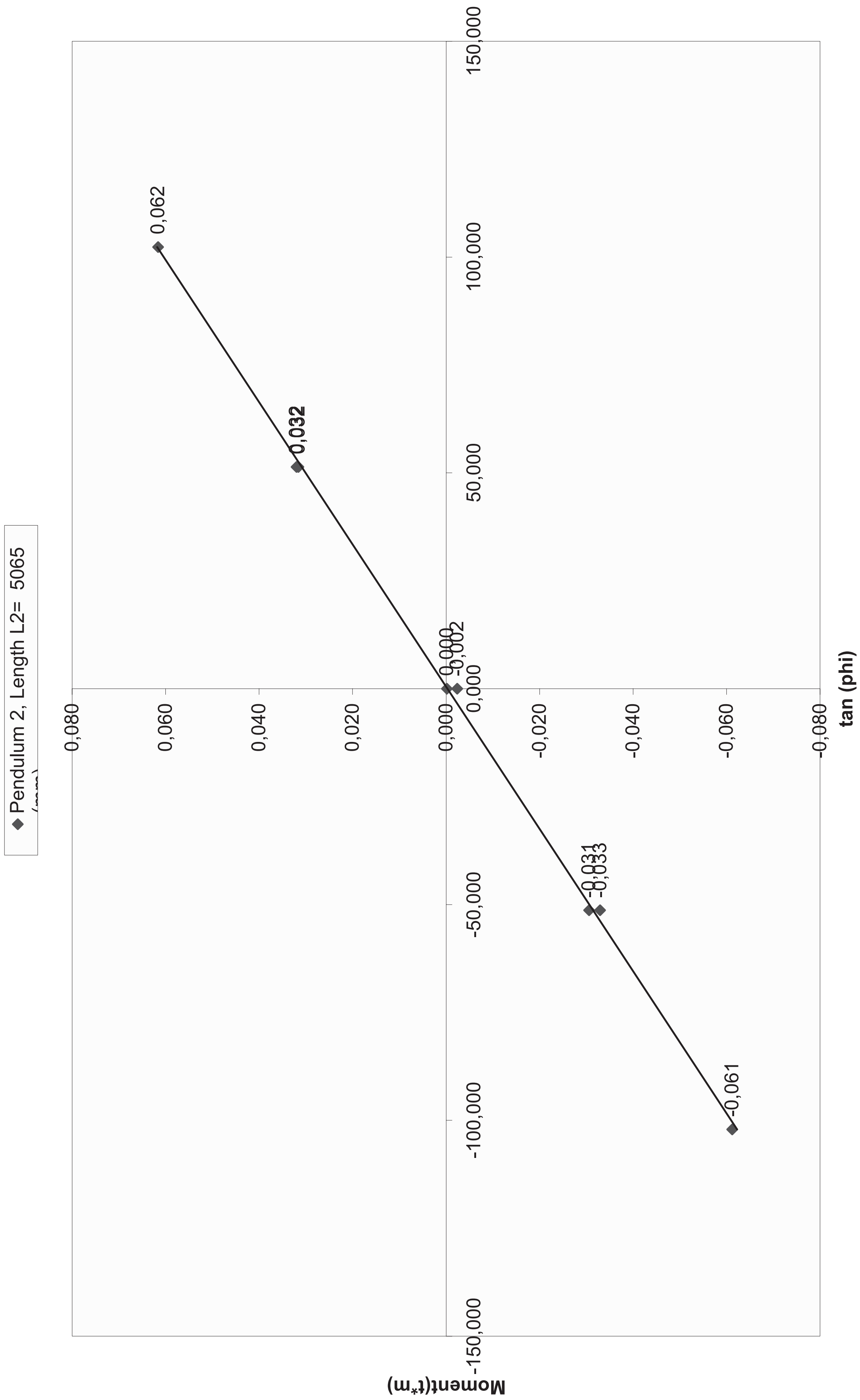


Draw a straight line through the "mean" of the plotted points.

Mark two arbitary points A and C as far apart as possible on the straight line

$$GM = \frac{\overline{BC} \quad (tm)}{\overline{AB} \times \Delta \quad (t)}$$


Pendulum 1, Length L1= 4146 (mm)
tan (phi)
moment (t*m)
0,080
0,060
0,040
0,020
0,000
-0,020
-0,040
-0,060
-0,080
150,000
100,000
50,000
0,000
-50,000
-100,000
-150,000
0,061
0,032
0,000
-0,002
-0,030
-0,033
-0,062


Pendulum 2, Length L2= 5065
tan (phi)
Moment(t*m)
0,080
0,060
0,040
0,020
0,000
-0,020
-0,040
-0,060
-0,080
-150,000
-100,000
-50,000
0,000
50,000
100,000
150,000
0,062
0,032
0,000
-0,002
-0,031
-0,033
-0,061

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13. CALCULATION OF LIGHT SHIP

Item	Weight (tonnes)	VCG (BL)	Vertical moment (tm)	LCG (AP)	Longitudinal moment (t m)	TCG (CL)	Transv mom. tm
Ship as inclined:	3321,62	7,219	23977,40	32,791	108920,86	-0,033	-108,47
Weights to be taken on board:							
Wheelhouse roof	0,35	23,000	8,05	48,300	16,91	0,000	0,00
Brigde deck	1,45	20,521	29,76	50,917	73,83	0,097	0,14
C-deck	0,95	14,909	14,16	54,143	51,44	0,163	0,16
B-deck	1,98	14,457	28,64	41,754	82,72	4,163	8,25
A-deck	4,93	10,001	49,31	35,173	173,40	0,456	2,25
Maindeck	29,72	8,939	265,65	36,999	1099,53	-0,646	-19,21
Tweendeck	2,47	5,630	13,88	49,349	121,65	0,507	1,25
Tanktop	3,07	1,439	4,42	37,383	114,84	0,000	0,00
SUB TOTAL: +	44,92	9,214	413,87	38,612	1734,31	-0,160	-7,16
Weights to be taken ashore:							
A-deck	0,00	0,000	0,00	0,000	0,00	0,000	0,00
Maindeck	43,25	8,588	371,42	10,592	458,10	3,795	164,11
Tweendeck	1,37	4,275	5,87	25,147	34,50	-0,036	-0,05
Tanktop	0,20	0,000	0,00	52,500	10,50	2,500	0,50
Tanks from table 8	120,07	1,783	214,09	34,750	4172,43	-0,351	-42,20
SUB TOTAL: -	164,89	3,586	591,37	28,355	4675,53	0,742	122,36
LIGHT SHIP =	**3201,64**	**7,434**	23799,89	**33,102**	105979,64	**-0,074**	-238,00

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APPENDIX 1

MASSES TO BE ADDED

Wheelhouse roof	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Shield for wh.windows	0,350	23,00	8,050	48,30	16,905	0,00	0,000
	0,000						
	0,000						
	0,000						
TOTAL	**0,350**	**23,00**	8,050	**48,30**	16,905	**0,00**	0,000

Brigde deck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Ship's Documents	0,200	20,50	4,100	51,00	10,200	1,00	0,200
Various Furniture	1,070	20,50	21,935	51,00	54,570	0,00	0,000
Pyro Equipm.	0,120	20,50	2,460	50,00	6,000	-0,50	-0,060
PC screens etc.	0,060	21,00	1,260	51,00	3,060	0,00	0,000
TOTAL	**1,450**	**20,52**	29,755	**50,92**	73,830	**0,10**	0,140

C-deck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various furniture	0,310	17,20	5,332	53,20	16,492	0,50	0,155
Safety Gear every cabin	0,440	13,80	6,072	54,60	24,024	0,00	0,000
TV / Stereo whole boat	0,200	13,80	2,760	54,60	10,920	0,00	0,000
TOTAL	**0,950**	**14,91**	14,164	**54,14**	51,436	**0,16**	0,155

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B-deck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various furniture	0,460	14,60	6,716	54,50	25,070	0,50	0,230
Oil for deck crane	1,201	15,00	18,015	35,00	42,035	6,50	7,807
Life Jackets	0,070	11,20	0,784	45,50	3,185	3,00	0,210
Various in stairs	0,250	12,50	3,125	49,70	12,425	0,00	0,000
TOTAL	**1,981**	**14,46**	28,640	**41,75**	82,715	**4,16**	8,247

A-deck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Paint Winch Area	0,850	9,00	7,650	37,10	31,535	0,00	0,000
Various furniture	0,380	11,70	4,446	54,60	20,748	0,00	0,000
Chain Guiders,SB&PS	3,200	9,80	31,360	28,85	92,320	0,00	0,000
Various equip. galley/mess	0,500	11,70	5,850	57,60	28,800	4,50	2,250
TOTAL	**4,930**	**10,00**	49,306	**35,17**	173,403	**0,46**	2,250

Maindeck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various furniture	0,615	8,80	5,412	56,40	34,686	0,00	0,000
	0,000	0,00		0,00		0,00	
Fire&Safety, all decks	0,600	14,50	8,700	47,60	28,560	0,00	0,000
Gas Bottles	0,300	9,00	2,700	41,30	12,390	5,80	1,740
Wood Deck Winch Area	4,750	8,00	38,000	32,20	152,950	0,00	0,000
AH Winch Oil	13,583	9,06	123,035	35,35	480,173	-0,80	-10,866
FW System no1+2 PS	5,200	9,00	46,800	40,60	211,120	-6,30	-32,760
FW System no2 SB	3,600	9,00	32,400	40,60	146,160	6,30	22,680
Various System Oil	0,120	8,00	0,960	26,60	3,192	0,00	0,000
Cover Plates ManHoles	0,800	8,00	6,400	30,00	24,000	0,00	0,000
Flooring Winch Area	0,150	8,30	1,245	42,00	6,300	0,00	0,000
TOTAL	**29,718**	**8,94**	265,652	**37,00**	1099,531	**-0,65**	-19,206

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Tweendeck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Tools, interior and spares	0,500	6,00	3,000	49,00	24,500	2,50	1,250
Various Furniture	1,715	5,60	9,604	51,10	87,637	0,00	0,000
Paint Hydr. Room	0,150	6,50	0,975	36,40	5,460	0,00	0,000
Cables, sensors and various	0,100	3,00	0,300	40,50	4,050	0,00	0,000
TOTAL	**2,465**	**5,63**	13,879	**49,35**	121,647	**0,51**	1,250

Tanktop	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various Covering	0,300	1,80	0,540	40,00	12,000	0,00	0,000
CP Prop Gear Oil	2,772	1,40	3,881	37,10	102,841	0,00	0,000
TOTAL	**3,072**	**1,44**	4,421	**37,38**	114,841	**0,00**	0,000

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APPENDIX 2

MASSES TO BE REMOVED

A-deck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various C- deck	0,000	0,00	0,000		0,000		0,000
TOTAL	**0,000**	**0,00**	0,000	**0,00**	0,000	**0,00**	0,000

Maindeck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
5 persons	0,375	8,00	3,000	14,70	5,513	1,00	0,375
Spare incl.weights	24,800	8,63	214,024	4,12	102,176	6,55	162,440
Inclining weights	15,500	8,13	126,015	16,61	257,455	-0,01	-0,155
Plywood	0,080	8,40	0,672	15,00	1,200	0,00	0,000
Power stations	0,330	9,00	2,970	22,40	7,392	2,30	0,759
Various	0,100	8,20	0,820	20,00	2,000	0,00	0,000
2 persons in Control Room	0,150	5,30	0,795	53,20	7,980	-1,50	-0,225
Scaffolding in Winch Area	1,714	12,50	21,425	38,50	65,989	0,00	0,000
Scaffolding at stern	0,200	8,50	1,700	42,00	8,400	4,60	0,920
TOTAL	**43,249**	**8,59**	371,421	**10,59**	458,105	**3,79**	164,114

Tweendeck	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various	0,100	5,50	0,550	45,50	4,550	0,00	0,000
Scaffolding in TK 37	0,081	3,00	0,243	50,40	4,082	-2,50	-0,203
Scaffolding in TK 38	0,081	3,00	0,243	50,40	4,082	2,50	0,203
Scaffolding in TK 3	0,122	3,00	0,366	57,00	6,954	1,50	0,183
Scaffolding in TK 2	0,155	3,00	0,465	57,00	8,835	-1,50	-0,233
Scaffolding in TK 30	0,833	4,80	3,998	7,20	5,998	0,00	0,000
TOTAL	**1,372**	**4,28**	5,865	**25,15**	34,501	**-0,04**	-0,050

Tanktop	Weight tonnes	VCG m	Mom t*m	LCG m	Mom t*m	TCG m	Mom t*m
Various	0,200	0,00	0,000	52,50	10,500	2,50	0,500
TOTAL	**0,200**	**0,00**	0,000	**52,50**	10,500	**2,50**	0,500

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14. PARTICULAR WEIGHTS INCLUDED IN THE LIGHT SHIP

The light ship as calculated shall exclude cargo, fuel, lubricating oil, water ballast or other fluid or pumpable ballast, potable water, feed water, sewage, provisions and other consumables as well as crew, passengers and their effects. However, the minimum amount of mooring equipment, spares etc. required by the Norwegian Maritime Directorate or the classification society as well as the minimum amount of water in boilers, system oil in piping etc. is to be included in the light ship.

The light ship data calculated in this report includes the following items related to special operations and shall not be included in the ship's loading conditions:

Included in lightship weight :	1 off mob-boat Liferafts Emergency batteries Mattresses in beds Hydr./Lub. oil in systems Cooling water in systems Gas bottles in stores (Ac./O^2. and CO^2) Two anchors and chain Engine spare parts Galley/ mess equipm. One palfinger crane on B-deck Wire on this crane
Not included in lightship weight :	Fuel oil in day and settling tank Hydr./Lub. oil in stores tanks Personal equipment carried onboard by crew Stores

Note: In this table items such as fishing gear, towing gear, fixed hotel appliaces, removable modules and solid movable ballast which may be taken ashore in case of change of operation shall be specified.

15. COMMENTS ON THE INCLINING TEST:

Final Stability Manual

Yard No. 274

M/V "BOURBON DOLPHIN"

ULSTEIN

3 INSTRUCTIONS FOR MASTER

3.1 STABILITY CRITERIA

It is important that the stability requirements for this vessel comply with the criteria listed below which are in accordance with IMO Res. A469(XII): GUIDELINES FOR THE DESIGN AND CONSTRUCTION OF OFFSHORE SUPPLY VESSELS.

INTACT STABILITY CRITERIA

The area under the curve of righting levers (GZ–CURVE) should not be less than 0.070 metre–radians up to an angle of 15 degrees when the maximum righting lever (GZ) occurs at 15 degrees, and 0.055 metreradians up to an angle of 30 degrees when the maximum righting lever (GZ) occurs at 30 degrees or above.
Where the maximum righting lever (GZ) occurs at an angle of heel between 15 degrees and 30 degrees, the area under the curve of righting levers (GZ–CURVE) up to the angle of maximum righting lever (Delta–max) should be determined by the use of the formula:

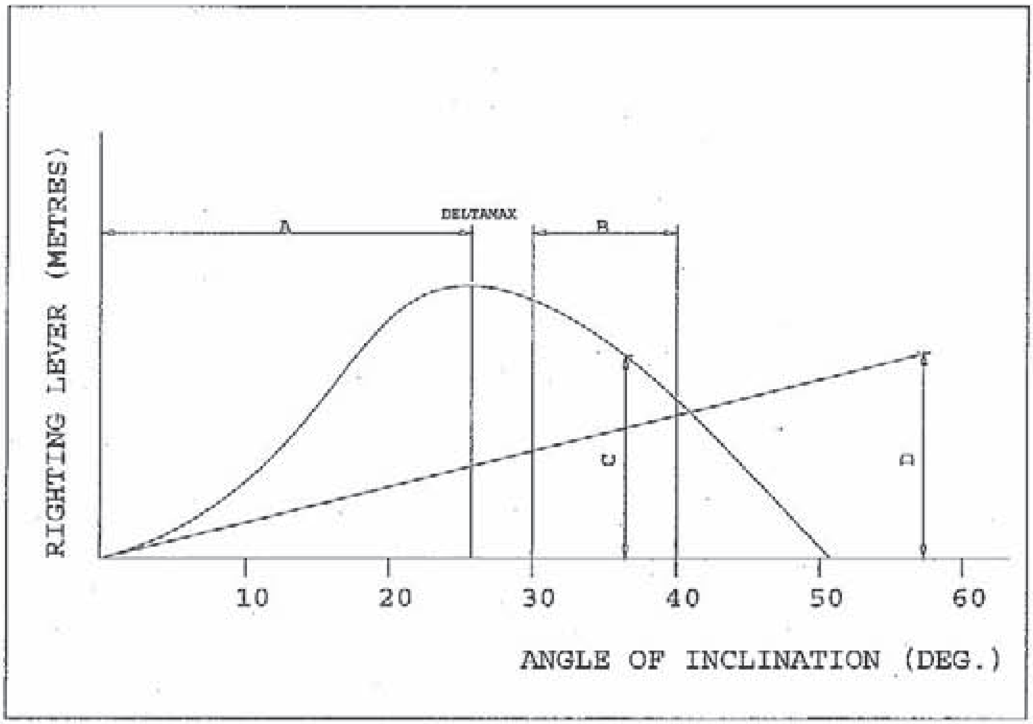
Area (metre–radians) = 0.055 + 0.001x(30 – Delta–max)

The area under the curve of righting levers between 30 and 40 degrees angle of heel, or between 30 degrees and Delta–f, if Delta–f is less than 40 degrees, should not be less than 0.030 metre–radians, where Delta–f is the angle of heel at which the lower edge of any openings in the hull, superstructure or deckhouses, which cannot be closed weatertight, is immersed.

The righting lever (GZ) should be at least 0.20 metres at an angle of heel equal to or greater than 30 degrees.

Maximum:
The maximum righting lever shall occur at an angle of heel of not less than 15 degrees.

The initial transverse metacentric height (GM) shall not be less than 0.15 metres.



SUBDIVISION AND DAMAGE STABILITY

Damage stability criteria

The final waterline, taking into account sinkage, heel and trim, should be below the lower edge of any opening through which progressive flooding may take place. Such openings should include air pipes and those which are capable of being closed by means of weathertight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors, and side scuttles of the non–opening type.

In the final stage of flooding, the angle of heel due to unsymmetrical flooding should not exceed 15 degrees. This angle may be increased up to 17 degrees if no deck immersion occurs.

The stability in the final stage of flooding should be investigated and may be regarded as sufficient if the righting lever curve has at least a range of 20 degrees beyond the position of equilibrium in association with a maximum residual righting lever of at least 100 mm within this range.

Unprotected openings should not become immersed at an angle of heel within the prescribed minimum range of residual stability unless the space in question has been included as a floodable space in calculations for damage stability.
Within this range, immersion of any of the openings referred to above and any other openings capable of being closed weathertight may be authorised.

Subdivision

Damage should be assumed to occur anywhere in the vessel's length between transverse watertight bulkheads.

The vertical extent of damage should be assumed from the underside of the cargo deck, or the continuation thereof, for the full depth of the vessel.

The transverse extent of damage should be assumed as 760 mm, measured inboard from the side of the vessel perpendicularly to the centreline at the level of the summer load waterline.

A transverse watertight bulkhead extending from the vessel's side to a distance inboard of 760 mm or more at the level of the summer load line joining longitudinal watertight bulkheads may be considered as a transverse watertight bulkhead for the purpose of damage calculations.

If pipes, ducts or tunnels are situated within the assumed extent of damage, arrangements should be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed to be floodable for each case of damage.

If a damage of a lesser extent than that specified above results in a more severe condition, such lesser extent should be assumed.

Where a transverse watertight bulkhead is located within the transverse extent of assumed damage and is stepped in way of a double bottom or side tank by more than 3.05 m, the double bottom or side tanks adjacent to the stepped portion of the transverse watertight bulkhead should be considered as flooded simultaneously.

3.2 GENERAL

Compliance with the stability criteria does not ensure immunity against capsizing, regardless of the circumstances, or absolve the Master from his responsibilities. Master should therefore exercise prudence and good seamanship, having regard to the season of year, weather forecasts and the navigational zone, and should take the appropriate action as to speed and course warranted by the prevailing circumstances.

Care should be taken to ensure that the cargo allocated to the ship is capable of being stowed, so that compliance with the criteria can be achieved. If necessary, the amount should be limited to the extent that ballast weight may be required.

Before a voyage commences, care should be taken to ensure that the cargo and sizeable pieces of equipment have been properly stowed or lashed, so as to minimise the possibility of both longitudinal and lateral shifting while at sea, under the effect of acceleration caused by rolling and pitching.

It is important to ensure that all ballast tanks in any condition, which are to be full, are in fact pressed full. Those tanks which are dry should be completely dry.

When a tank is to be ballasted at sea to counteract the loss of consumables, it should be noted that:

- The tank will have a complete free surface as ballasting commences.
- The free surface will adversely effect the stability of the vessel before any benefit can be assumed by the weight of the ballast water taken on board.

3.3 ICING

If the vessel is engaged in waters, where the possibility of top–side icing may occur, then the Master should take such action as deemed necessary either to remove this ice, or at least, keep it to a minimum, bearing in mind that this top–side icing will adversely affect the stability of the vessel.

3.4 DECK CARGO

When loading deck cargo, attention should be paid to the need for maintaining freeboard at the stern with regard to the safety of the crew working on deck, and also to the adverse effect of trim by stern has on the stability of the vessel. the vessel should not be operated at a trim exceeding the values of the min. GM curves. In addition it should be ensured that the stern trim limitation according to the rules is always enforced.

All doors, hatches and other openings onto exposed cargo deck should be kept closed and secured at sea (except for access) and it should be ensured that the disposition of the deck cargo does not impede the operation of these fittings.

When loading deck cargoes, care should be taken to avoid any obstruction of the freeing ports or areas necessary for the drainage of pipe stowage positions.

When pipe deck cargoes (or other cargoes liable to provide a temporary trap for water) are carried, adequate areas should be provided between adjacent stowage racks and also between the vessels structure and stowage racks to ensure free drainage of the pipe stowage positions. Such areas should be in excess of the freeing port area provided.

When pipes are carried on deck, a volume of entrapped water should be assumed. The centre of gravity of this entrapped water should be assumed to be at a height above the cargo deck equal to one half the height to the top of the (pipe) deck cargo. A suitable allowance should also be made where other deck cargoes which may trap water are carried.

The effect of the weight of this trapped water on the vertical centre of gravity and trim of vessel must be taken into account.

The weight of this water is included in the cargo dead–weight permitted by the position of the Load Line Mark.

The minimum GM limitations should not be exceeded and should include an allowance for the effect of entrapped water in deck cargoes in the total VCG for the relevant conditions.

When cargo is discharged at sea, great care must be taken to maintain the vessel in a stable condition during the discharging operation. Attention should be paid to the trimming of the vessel during unloading.

- Cargo should be unloaded from the top, i.e. deck cargo should be discharged (heaviest items first) before any underdeck cargo.
- It should be noted that when liquid cargo is to be discharged, as soon as pumping is commenced a full free surface will exist in those tanks being pumped and the effect this has on the stability of the vessel taken into account.
- The loading pattern of cargo should be such that the freeboard at stern is at least 0.34 metres.
- Tanks containing slack liquids should be kept to a minimum.
- Necessary ballasting should be carried out before taking on cargo at sea.

3.5 DOCKING

When docking the vessel, all water ballast and fresh water should be removed. Fuel oil should be kept to a minimum. This to avoid damages to hull in bottom of the vessel.

Regarding location of support, see drawing Docking Plan

3.6 PIPECARGOS ON DECK – EFFECT OF ENTRAPPED WATER

When pipes are carried on deck, a quantity of water has to be assumed to be trapped in and around the pipes, equal to a certain percentage of the net volume of the pipe deck cargo.

The net volume should be taken as the internal volume of the pipes plus the volume between the pipes. The percentage of the net volume used to obtain the quantity of trapped water is based on the freeboard amidships, as follows,

- 30 % if the summer freeboard amidships to the main deck is equal to or less than 0.015*L.
- 10 % if the summer freeboard amidships to the main deck is equal to or greater than 0.03*L.
- For intermediate values of the freeboard amidships, the percentage may be obtained by linear interpolation. For this vessel the value is 20.4 %.

Depth...........	8.00	meter
Draught..........	6.50	meter
Rule length......	67.46	meter
Freeboard at SWL	0.34	meter
Freeboard/L......	0.0222	meter

3.7 ANTI ROLLING DEVICE

This vessel is equipped with an Ulstein Passive Stabilisation System designed and tested by Marintek, and a copy of the results in booklet form has been supplied to the vessel.

The master should refer to this booklet for operation information.

In all loading conditions where the stabilising tanks are included, the tanks should be filled to their working level and the full free surface loss taken into account when assessing the vessels stability. The working level of the tanks varies with the displacement of the vessel and is found in the stabilising tank manual.

Filling and/or discharging of the tanks is through the fire/ballast pumps situated in engine room. To eliminate the free surface loss when stability is critical the time to fill or empty the tanks from working level should be as short as possible.

3.8 PRINCIPLES FOR STABILITY

The loading conditions in this booklet are representative for operating conditions, and it is for the Master to either compare his actual condition with a similar in the Stability Booklet or use a Simplified Stability Calculation to estimate the stability of an actual condition of the vessel.

When simplified stability calculations are performed, the master should be aware of the influence of free surface moments. Since the loading conditions in this booklet are calculated with actual free surface moments (at each heeling angle), small deviation from the simplified calculations can NOT be prevented.

Any loading conditon calculated by the master must comply with the limiting GM–curves.

NOTE: WHEN CARRYING HEAVY DECK LOADS, SPECIAL STABILITY CALCULATIONS HAS TO BE DONE TO ENSURE THAT THE CONDITION FULFILS THE STABILITY CRITERION.

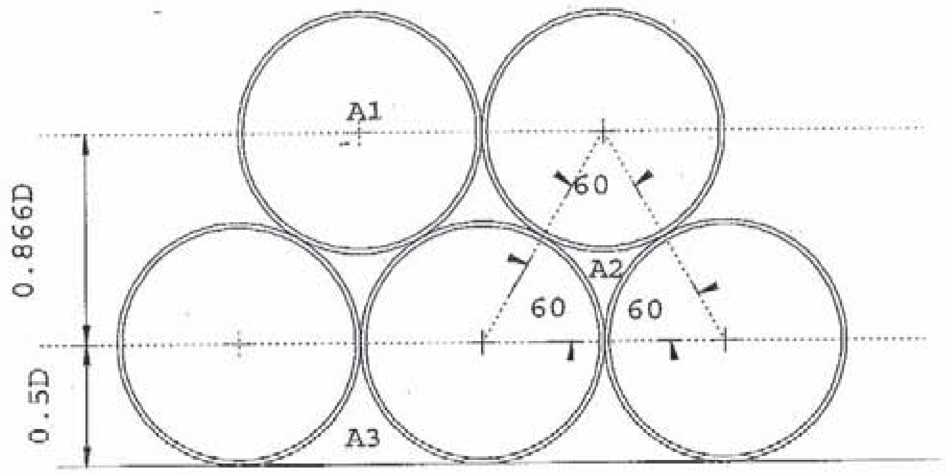
ENTRAPPED WATER IN PIPE DECK CARGO

OUTSIDE DIAMETER OF PIPES IN METRES.................. = D
INSIDE DIAMETER OF PIPES IN METRES................... = d

DERIVATION OF AREAS (SEE SKETCH)

INTERNAL SECTIONAL AREA OF ONE PIPE:

$A1 = \frac{\pi}{4} \times d^2 = \frac{3.1416}{4} \times d^2 = \ldots\ldots = \underline{0.7854 \times d^2}$ (M^2)



SECTIONAL AREA OF ONE SPACE BETWEEN PIPES:

$A2 = 0.5D \times (\sin 60^0 \times D) - 0.5 \times \frac{\pi}{4} \times D^2$

$= 0.5 \times 0.8660 \times D^2 - 0.5 \times 0.7854 \times D^2 = \ldots\ldots = \underline{0.0403 \times D^2}$ (M^2)

SECTIONAL AREA OF ONE SPACE BETWEEN PIPES AND DECK:

$A3 = 0.5D \times D - 0.5 \times \frac{\pi}{4} \times D^2$

$= 0.5\, D^2 - 0.5 \times 0.7854 \times D^2 = \ldots\ldots = \underline{0.1073 \times D^2}$ (M^2)

DERIVATION OF VOLUME

THE VOLUME OF ENTRAPPED WATER IS FOUND BY MULTIPLYING A1, A2 AND A3 RESPECTIVELY BY LENGTH OF PIPES IN METRES AND ACTUAL NUMBER OF PIPES OR SPACES. (SEE CONDITION SHEET GIVING DETAILS OF PIPE DECK CARGO.)

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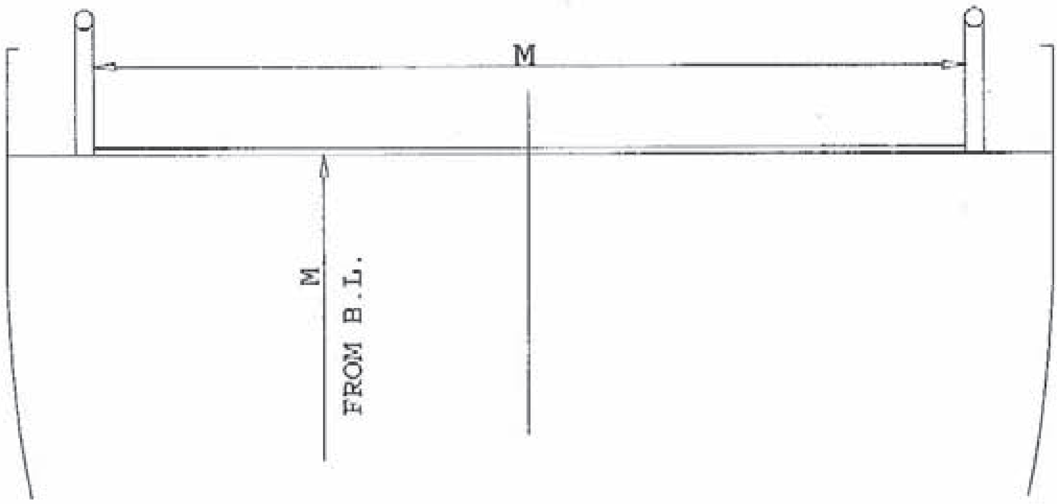
PIPE DECK CARGO FOR COND. NO.



PIPES:

OUTSIDE DIAMETER	: D =	INCH =	MM
WALL THICKNESS	:	INCH =	MM
INSIDE DIAMETER	: d =	INCH =	MM
LENGTH	: L =	FEET =	MM
WEIGHT ON PIPE	:		T

POSITION		PCS	WEIGHT (T)	LCG (M)	VCG (M)
BAY NO.1	LAYER NO.				
	"" ""				
	"" ""				
	TOTAL				
BAY NO.2	LAYER NO.				
	"" ""				
	"" ""				
	TOTAL				
GRAND TOTAL					

ENTRAPPED WATER:

INSIDE PIPES	$V1 = 0.7854 \times {}^2d \times L \times$	=	M^3
BETWEEN PIPES	$V2 = 0.0403 \times {}^2D \times L \times$	=	M^3
BETWEEN PIPES AND DECK	$V3 = 0.1073 \times {}^2D \times L \times$	=	M^3

TOTAL VOLUME .... V = M^3

"D" AND "d" TO BE TAKEN IN METRE

ASSUMED WEIGHT = $V \times \frac{\quad}{100} \times 1.025$ T

CENTRE OF GRAVITY AS FOR PIPES

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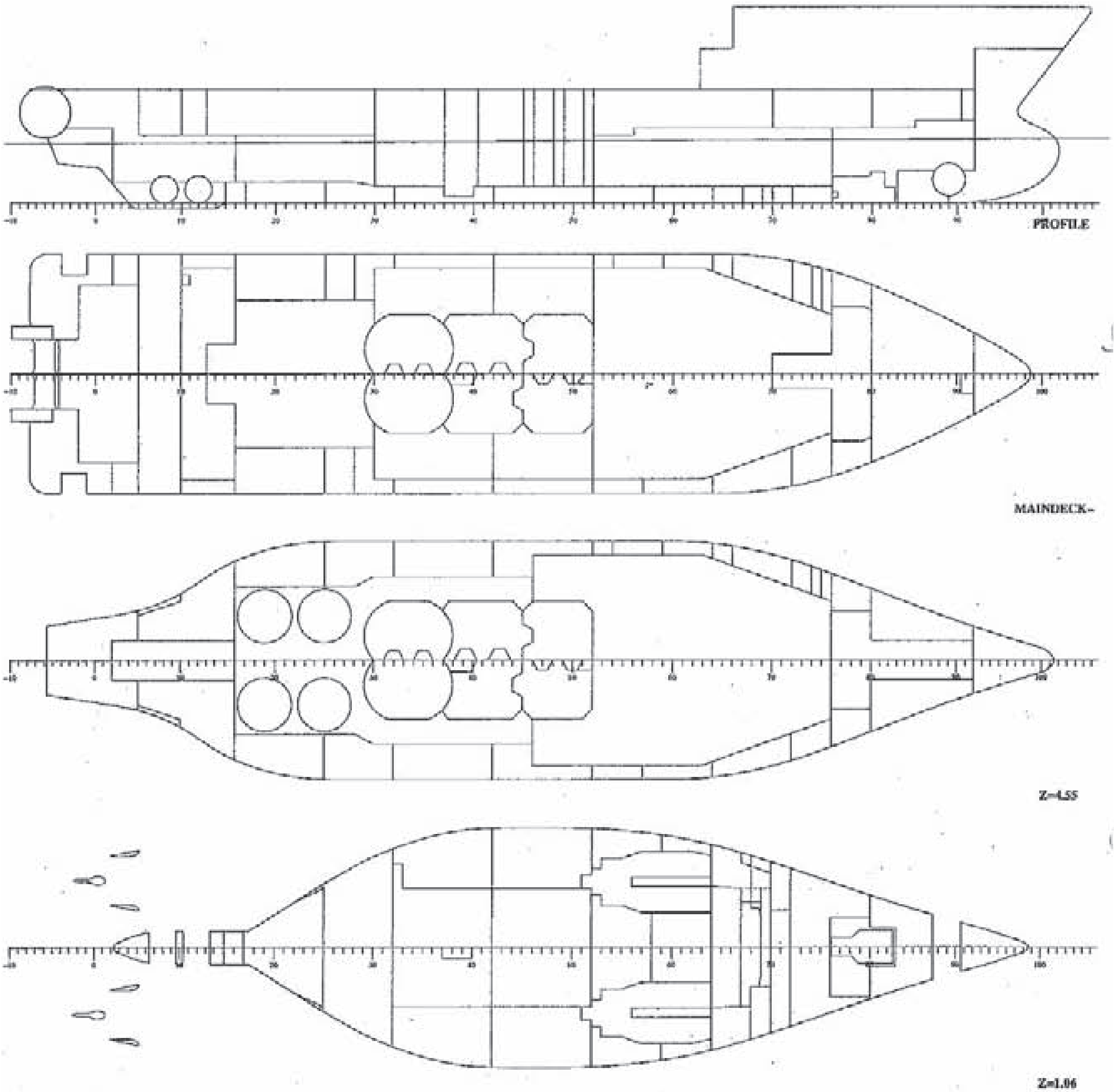
L1 LIGHTSHIP



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FLOATING POSITION – INTACT CONDITION

FLOATING POSITION

Mean draught (moulded)	4.38 m	KM above the moulded base	7.73 m
Draught at AP (moulded)	4.21 m	KG above the moulded base	7.43 m
Draught at FP (moulded)	4.55 m	GM0 (solid)	0.29 m
Trim (by head)	0.34 m	Free surface correction	0.00 m
Heeling to port side	-10.4 deg		
		GM (fluid)	0.29 m
Mean draught (heel -10.4)	4.27 m		
Trim (heel -10.4)	0.48 m		

LOAD SUMMARY TABLE

Lightweight	3201.6	33.10	-0.07	7.43
Deadweight	0.0	0.00	0.00	0.00
Total weight	3201.6	33.10	-0.07	7.43

STABILITY COMPONENTS – INTACT CONDITION

HEEL degree	DISP t	T m	TR m	GZ m	MS m	AREA rad*m
0.0	3201.6	4.377	0.343	0.074	0.074	0.000
-1.0	3201.6	4.375	0.348	0.069	0.074	-0.001
-3.0	3201.6	4.367	0.358	0.058	0.073	-0.003
-5.0	3201.6	4.353	0.368	0.045	0.071	-0.005
-10.0	3201.6	4.280	0.469	0.004	0.055	-0.008
-15.0	3201.6	4.145	0.704	-0.063	0.012	-0.005
-20.0	3201.6	3.981	0.938	-0.166	-0.066	0.005
-25.0	3201.6	3.747	1.230	-0.284	-0.161	0.024
-30.0	3201.6	3.492	1.522	-0.361	-0.215	0.053
-35.0	3201.6	3.170	1.672	-0.336	-0.169	0.084
-40.0	3201.6	2.841	1.823	-0.271	-0.083	0.110
-50.0	3201.6	2.003	1.596	-0.095	0.128	0.143
-60.0	3201.6	1.063	1.000	0.154	0.407	0.139

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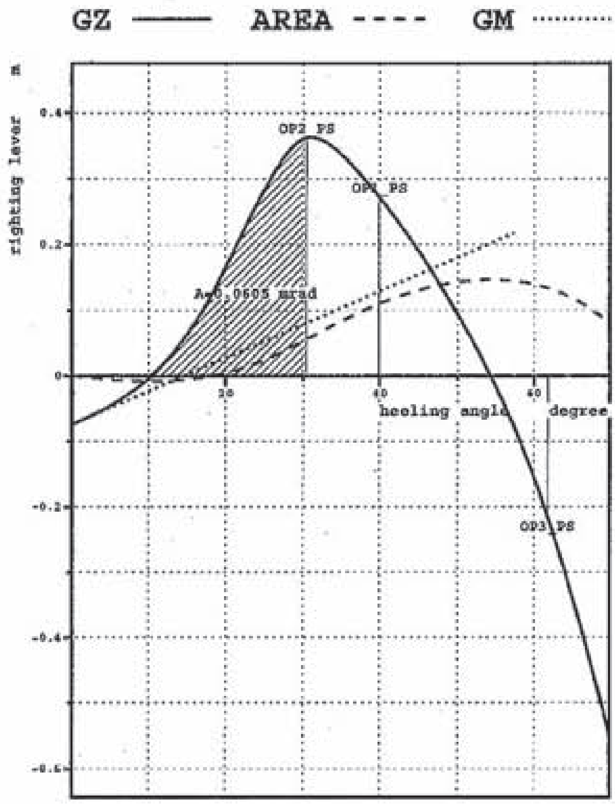
INTACT STABILITY CHECK PLOT



RELEVANT OPENINGS

NAME	TEXT	X m	Y m	Z m	IMMA degree	IMMR m
OP1_SB	AIR PIPE SB	0.300	7.560	8.860	-	6.048
OP1_PS	AIR PIPE PS	0.300	-7.560	8.860	39.9	3.321
OP2_SB	AIR PIPE SB	32.100	8.250	8.860	-	5.934
OP2_PS	AIR PIPE PS	32.100	-8.250	8.860	30.5	2.958
OP3_SB	CASING SB	43.180	6.280	13.910	-	10.463
OP3_PS	CASING PS	43.180	-6.280	13.910	-	8.197

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT	MINGM m
IMO469.1	Area depending on GZ-curve top	0.055	0.060	mrad	OK	0.244
IMO469.2	Area between 30 deg and 40 deg	0.030	0.058	mrad	OK	0.016
IMO469.3	Required maximum GZ-value	0.200	0.363	m	OK	-0.030
IMO469.4	Position of maximum GZ-value	15.000	30.921	deg	OK	-0.591
IMO469.5	Required initial GM-value	0.150	0.291	m	OK	0.150
TOTAL						0.244

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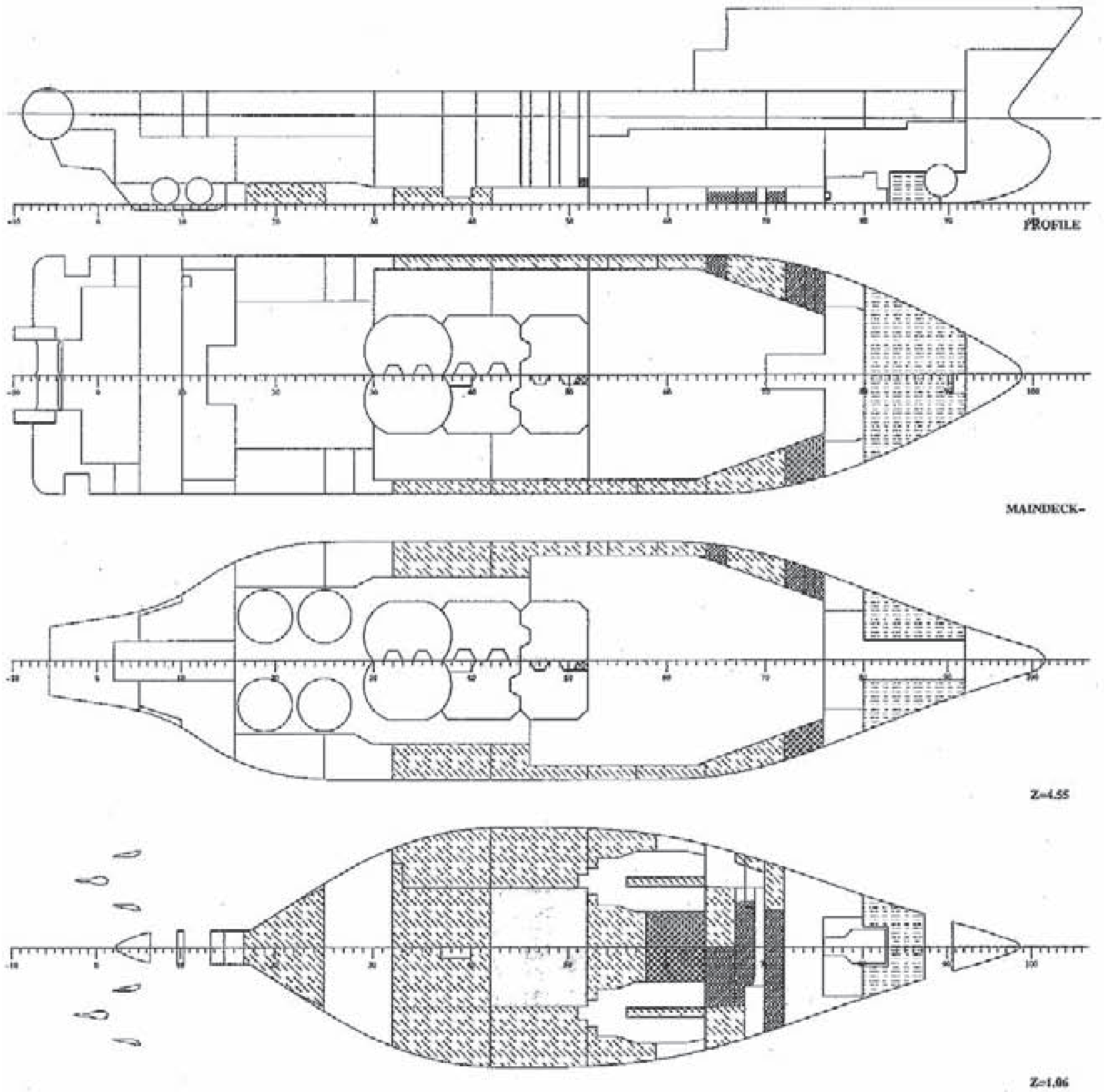
L16 ANCHORHANDLING (300t SWL) DEPARTURE



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FLOATING POSITION – INTACT CONDITION

FLOATING POSITION

Mean draught (moulded)	6.22	m	KM above the moulded base	8.15	m
Draught at AP (moulded)	6.40	m	KG above the moulded base	6.31	m
Draught at FP (moulded)	6.04	m	GM0 (solid)	1.84	m
Trim (by stern)	-0.36	m	Free surface correction	-0.17	m
Heeling to starboard side	1.0	deg			
			GM (fluid)	1.67	m
Mean draught (heel 1)	6.22	m			
Trim (heel 1)	-0.36	m			

LOAD SUMMARY TABLE

ITEM	MASS t	LCG m	TCG m	VCG m	FRSM tm
FUEL OIL	529.8	31.15	0.23	2.03	324.48
FRESH WATER	117.0	57.27	0.39	2.68	151.39
HYDRAULIC OIL	16.3	46.21	-3.20	2.42	60.47
LUB OIL	37.5	48.55	-3.15	2.83	50.15
MASS LOAD	511.7	8.90	0.57	7.89	0.00
MISCELLANIES	7.5	45.41	2.50	0.97	56.43
WATER BALLAST	647.0	30.09	0.12	4.01	195.01
DEADWEIGHT	1866.8	26.86	0.21	4.38	837.93
Lightweight	3201.6	33.10	-0.07	7.43	
Deadweight	1866.8	26.86	0.21	4.38	
Total weight	5068.4	30.80	0.03	6.31	

STABILITY COMPONENTS – INTACT CONDITION

HEEL degree	DISP t	T m	TR m	GZ m	MS m	AREA rad*m
0.0	5068.4	6.220	-0.364	-0.029	-0.029	0.000
1.0	5068.4	6.218	-0.360	0.000	-0.032	-0.000
3.0	5068.4	6.209	-0.351	0.058	-0.038	0.001
5.0	5068.4	6.192	-0.343	0.116	-0.044	0.004
10.0	5068.4	6.108	-0.270	0.253	-0.066	0.020
15.0	5068.4	6.009	-0.258	0.346	-0.130	0.047
20.0	5068.4	5.864	-0.246	0.363	-0.265	0.078
25.0	5068.4	5.754	-0.505	0.332	-0.444	0.109
30.0	5068.4	5.592	-0.763	0.300	-0.618	0.136
35.0	5068.4	5.434	-1.265	0.268	-0.786	0.161
40.0	5068.4	5.216	-1.767	0.236	-0.945	0.183
50.0	5068.4	4.694	-3.101	0.172	-1.235	0.219
60.0	5068.4	4.060	-4.359	-0.008	-1.599	0.236

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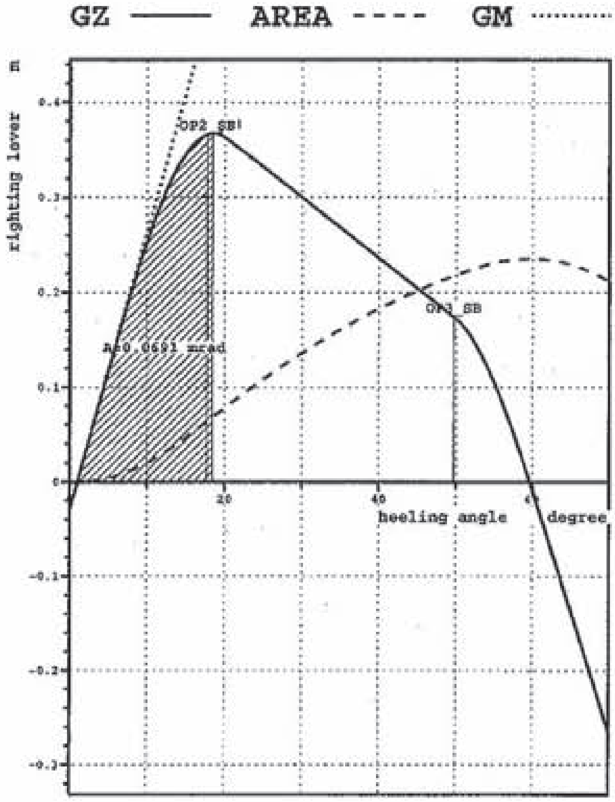
INTACT STABILITY CHECK PLOT



RELEVANT OPENINGS

NAME	TEXT	X m	Y m	Z m	IMMA degree	IMMR m
OP1_SB	AIR PIPE SB	0.300	7.560	8.860	18.4	2.330
OP1_PS	AIR PIPE PS	0.300	-7.560	8.860	-	2.594
OP2_SB	AIR PIPE SB	32.100	8.250	8.860	17.7	2.495
OP2_PS	AIR PIPE PS	32.100	-8.250	8.860	-	2.783
OP3_SB	CASING SB	43.180	6.280	13.910	49.7	7.640
OP3_PS	CASING PS	43.180	-6.280	13.910	-	7.859

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT	MINGM m
IMO469.1	Area depending on GZ-curve top	0.066	0.069	mrad	OK	1.642
IMO469.2	Area between 30 deg and 40 deg	0.030	0.047	mrad	OK	1.504
IMO469.3	Required maximum GZ-value	0.200	0.300	m	OK	1.471
IMO469.4	Position of maximum GZ-value	15.000	18.527	deg	OK	0.979
IMO469.5	Required initial GM-value	0.150	1.672	m	OK	0.150
TOTAL						1.642

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TANK LOADING TABLE

CCODE	DES	LOAD	MASS t	FILL %	XM m	YM m	ZM m	FRSM tm
04	DB. WING TK. PS	FO	31.5	72.0	47.14	-6.39	3.68	3.53
05	DB. WING TK. SB	FO	37.9	71.0	46.18	6.66	3.67	4.56
06	DB/WING TK. 1 PS	FO	15.2	57.0	38.62	-5.86	0.41	19.56
07	DB/WING TK. 1 SB	FO	22.9	59.0	38.13	6.35	0.76	0.25
08	DB/WING TK. PS	FO	63.7	75.0	31.14	-6.82	1.77	45.80
09	DB/WING TK. SB	FO	67.9	80.0	31.12	6.88	1.96	45.80
13	DB/WING TK. PS	FO	65.6	70.0	24.74	-6.71	2.02	8.22
14	DB/WING TK. SB	FO	76.0	80.0	24.65	6.74	2.30	8.22
17	CENTRE TK.2	FO	65.1	100.0	24.42	-0.11	0.67	0.00
34	CENTRE TK.	FO	29.2	100.0	13.78	0.00	0.87	0.00
71	FO SETTL TK 1 PS	FO	14.0	70.0	38.13	-7.95	3.51	0.25
73	FO SERV. TK.1 PS	FO	12.7	70.0	41.60	-7.88	3.84	0.27
74	FO SERV TK 2 SB	FO	18.2	70.0	40.85	7.90	3.75	0.37
75	FO DRAIN TK. PS	FO	6.2	70.0	44.45	-2.12	0.42	11.34
77		FO	3.0	10.0	37.10	0.00	0.05	176.33
79	Em. Gen. Tk	FO	0.5	70.0	43.75	-6.76	14.75	0.01
02	DB. WING TK. PS	FW	50.0	35.0	57.24	-2.20	2.34	77.81
03	DB. WING TK. SB	FW	67.0	47.1	57.30	2.32	2.93	73.58
66	HP HYDR. OIL STORE TK. PS	HO	8.1	70.0	44.13	-7.55	4.38	0.36
67	HO drop tank	HO	8.1	70.0	48.29	1.15	0.45	60.11
90	LO STORE TK PS	LO	11.8	70.0	49.70	-5.86	4.22	1.71
91	LO TK. main gear PS	LO	6.0	70.0	50.75	-5.49	4.23	0.91
92	LO aux. eng.	LO	6.1	70.0	51.45	-5.24	4.24	0.94
97		LO	7.0	70.0	46.16	0.17	0.42	34.26
99	LO DROP TK. SB	LO	6.7	70.0	44.45	2.12	0.42	12.32
	PROVISION	MAS	10.0	0.0	60.00	4.00	12.00	0.00
	DECK LOAD	MAS	50.0	0.0	10.00	0.00	9.00	0.00
	CREW	MAS	3.5	0.0	53.20	0.00	14.50	0.00
	STORES	MAS	10.0	0.0	35.70	0.00	9.00	0.00
	1500 M TOWING WIRE SB	MAS	37.0	0.0	43.40	6.70	10.61	0.00
	15% TUGGER WIRE PS	MAS	2.1	0.0	32.30	-6.10	12.10	0.00
	15% TUGGER WIRE SB	MAS	2.1	0.0	32.30	6.10	12.10	0.00
	800 M WORKING WIRE PS	MAS	19.8	0.0	43.40	-6.70	10.61	0.00
	1500 M SPARE WIRE BELOW MAIND.	MAS	37.0	0.0	9.20	-0.44	6.20	0.00
	1500 M ANCHOR HANDLING WIRE	MAS	37.0	0.0	38.85	0.00	12.14	0.00
	STERN ROLLER 300T SWL	MAS	300.0	0.0	-5.35	0.50	6.47	0.00
	125 m forerunner SECONDARY WI.	MAS	3.1	0.0	43.58	0.00	16.85	0.00
52	SEWAGE TK. SB	MIS	3.7	10.0	50.41	5.05	1.76	0.76
80	BILGE WATER TK. SB	MIS	1.7	10.0	41.30	2.15	0.05	27.83
81	BILGE WATER SETTL. TK.1	MIS	0.4	10.0	34.56	0.37	1.54	0.02
83	SLUDGE TK. PS	MIS	1.7	10.0	41.30	-2.15	0.05	27.83
01	FORE PEAK TK.	WB	16.5	10.0	62.72	-0.00	1.18	15.13
12	CENTRE TK.1	WB	77.9	100.0	31.49	-0.00	0.67	0.00
18	RIG CHAIN LOCKER 1 PS	WB	134.4	98.0	32.65	-1.88	4.59	37.22
19	RIG CHAIN LOCKER 1 SB	WB	126.8	98.0	32.42	2.15	4.60	24.73
20	RIG CHAIN LOCKER 2 PS	WB	133.1	98.0	27.62	-2.22	4.60	26.93
21	RIG CHAIN LOCKER 2 SB	WB	130.6	98.0	27.55	2.10	4.60	34.19
28	DB/WING TK. SB	WB	27.7	58.5	7.44	2.85	3.92	56.81
TOTAL			1866.8		25.86	0.21	4.38	837.93

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BOURBON DOLPHIN
ULSTEIN VERFT AS

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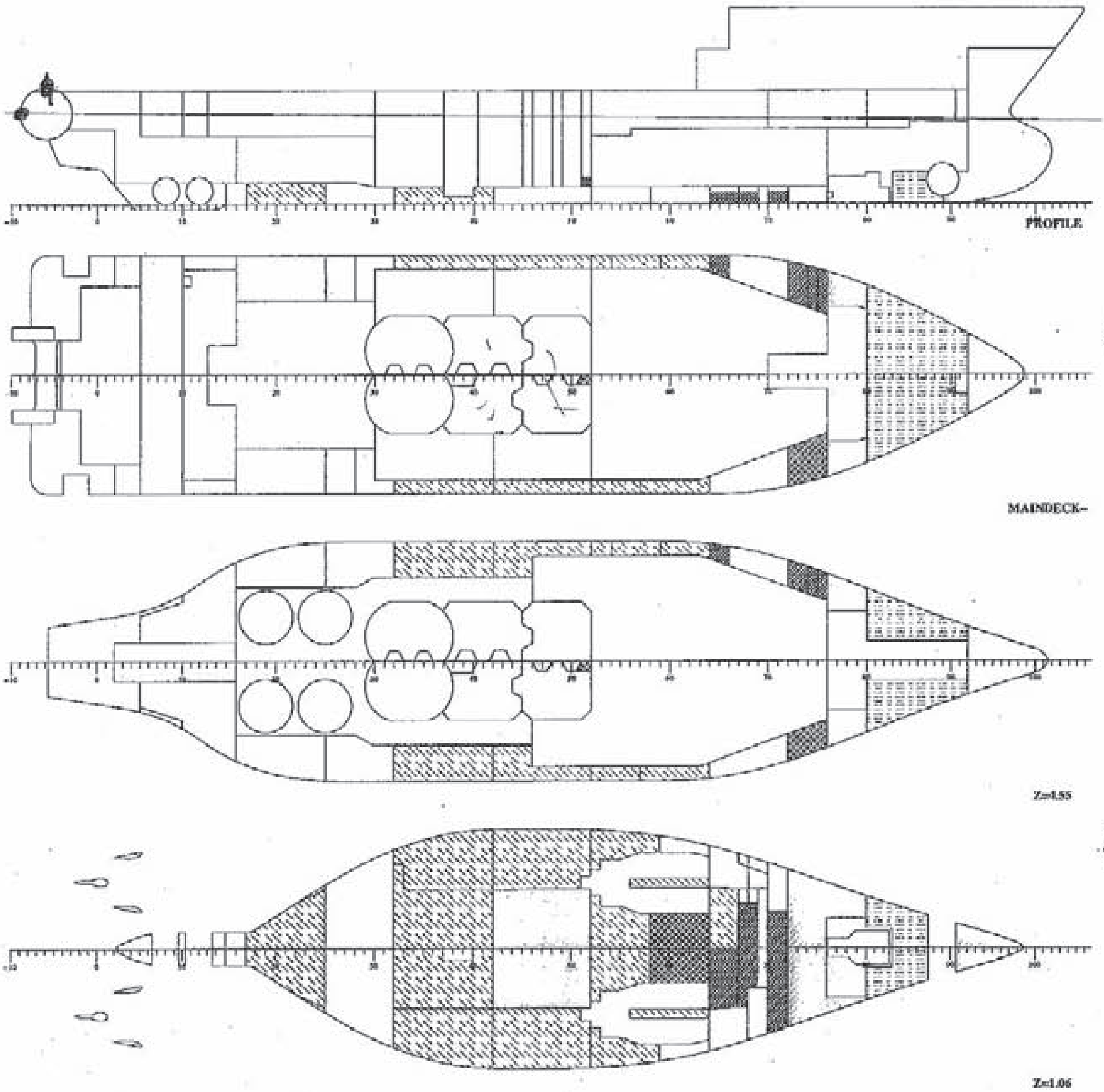
L17 ANCHORHANDLING (300t SWL) ARRIVAL



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BOURBON DOLPHIN
ULSTEIN VERFT AS

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FLOATING POSITION – INTACT CONDITION

FLOATING POSITION

Mean draught (moulded)	6.17	m	KM above the moulded base	8.16	m
Draught at AP (moulded)	6.43	m	KG above the moulded base	6.31	m
Draught at FP (moulded)	5.90	m	GM0 (solid)	1.86	m
Trim (by stern)	-0.53	m	Free surface correction	-0.15	m
Heeling to starboard side	1.0	deg			
			GM (fluid)	1.71	m
Mean draught (heel 1)	6.16	m			
Trim (heel 1)	-0.53	m			

LOAD SUMMARY TABLE

ITEM	MASS t	LCG m	TCG m	VCG m	FRSM tm
FUEL OIL	460.3	28.37	0.17	2.02	286.19
FRESH WATER	49.0	57.23	2.04	2.15	151.39
HYDRAULIC OIL	16.3	46.21	-3.20	2.42	60.47
LUB OIL	37.5	48.55	-3.15	2.83	50.15
MASS LOAD	493.7	7.48	0.51	7.79	0.00
MISCELLANIES	7.5	45.41	2.50	0.97	56.43
WATER BALLAST	760.4	33.82	0.14	3.77	150.54
DEADWEIGHT	1824.6	26.41	0.21	4.33	755.17
Lightweight	3201.6	33.10	-0.07	7.43	
Deadweight	1824.6	26.41	0.21	4.33	
Total weight	5026.3	30.67	0.03	6.31	

STABILITY COMPONENTS – INTACT CONDITION

HEEL degree	DISP t	T m	TR m	GZ m	MS m	AREA rad*m
0.0	5026.3	6.166	-0.527	-0.030	-0.030	0.000
1.0	5026.3	6.164	-0.523	-0.001	-0.033	-0.000
3.0	5026.3	6.155	-0.515	0.059	-0.039	0.001
5.0	5026.3	6.138	-0.507	0.118	-0.044	0.004
10.0	5026.3	6.055	-0.435	0.257	-0.066	0.020
15.0	5026.3	5.956	-0.426	0.352	-0.128	0.047
20.0	5026.3	5.811	-0.416	0.374	-0.262	0.080
25.0	5026.3	5.702	-0.668	0.344	-0.441	0.111
30.0	5026.3	5.542	-0.920	0.311	-0.617	0.140
35.0	5026.3	5.385	-1.408	0.278	-0.788	0.165
40.0	5026.3	5.169	-1.895	0.244	-0.950	0.188
50.0	5026.3	4.646	-3.209	0.175	-1.247	0.225
60.0	5026.3	4.008	-4.464	-0.012	-1.621	0.242

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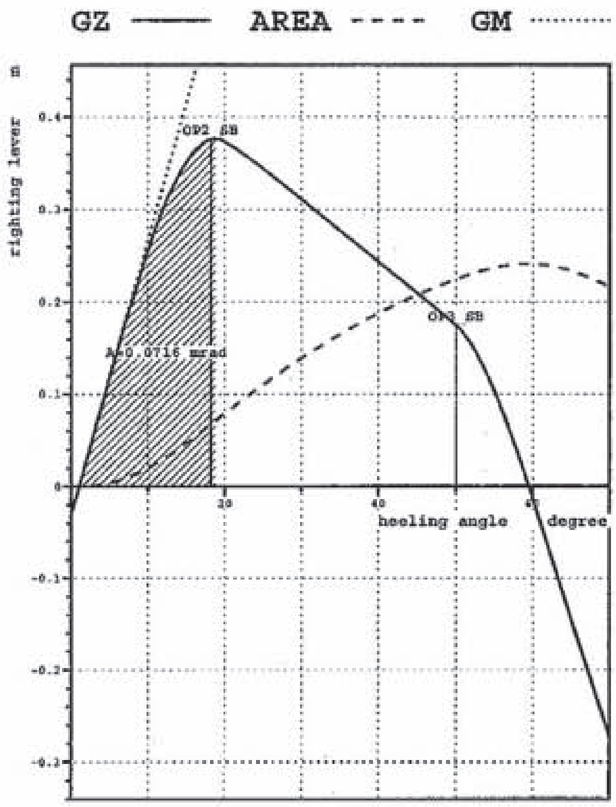
INTACT STABILITY CHECK PLOT



RELEVANT OPENINGS

NAME	TEXT	X m	Y m	Z m	IMMA degree	IMMR m
OP1_SB	AIR PIPE SB	0.300	7.560	8.860	18.2	2.301
OP1_PS	AIR PIPE PS	0.300	-7.560	8.860	-	2.570
OP2_SB	AIR PIPE SB	32.100	8.250	8.860	18.1	2.545
OP2_PS	AIR PIPE PS	32.100	-8.250	8.860	-	2.838
OP3_SB	CASING SB	43.180	6.280	13.910	50.1	7.719
OP3_PS	CASING PS	43.180	-6.280	13.910	-	7.942

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT	MINGM m
IMO469.1	Area depending on GZ-curve top	0.066	0.072	mrad	OK	1.643
IMO469.2	Area between 30 deg and 40 deg	0.030	0.048	mrad	OK	1.522
IMO469.3	Required maximum GZ-value	0.200	0.311	m	OK	1.484
IMO469.4	Position of maximum GZ-value	15.000	18.730	deg	OK	0.965
IMO469.5	Required initial GM-value	0.150	1.707	m	OK	0.150
TOTAL						1.643

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BOURBON DOLPHIN
ULSTEIN VERFT AS

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TANK LOADING TABLE

CCODE	DES	LOAD	MASS t	FILL %	XM m	YM m	ZM m	FRSM tm
06	DB/WING TK. 1 PS	FO	20.0	75.0	38.26	-6.13	0.60	27.00
07	DB/WING TK. 1 SB	FO	29.1	75.0	37.84	6.70	1.36	27.10
08	DB/WING TK. PS	FO	32.3	38.0	31.48	-6.25	0.71	37.61
09	DB/WING TK. SB	FO	45.0	53.0	31.32	6.54	1.04	4.94
13	DB/WING TK. PS	FO	91.8	98.0	24.67	-6.99	3.05	0.50
14	DB/WING TK. SB	FO	93.1	98.0	24.62	6.96	3.01	0.50
17	CENTRE TK.2	FO	65.1	100.0	24.42	-0.11	0.67	0.00
34	CENTRE TK.	FO	29.2	100.0	13.78	0.00	0.87	0.00
71	FO SETTL TK 1 PS	FO	14.0	70.0	38.13	-7.95	3.51	0.25
73	FO SERV. TK.1 PS	FO	12.7	70.0	41.60	-7.88	3.84	0.27
74	FO SERV TK 2 SB	FO	18.2	70.0	40.85	7.90	3.75	0.37
75	FO DRAIN TK. PS	FO	6.2	70.0	44.45	-2.12	0.42	11.34
77		FO	3.0	10.0	37.10	0.00	0.05	176.33
79	Em. Gen. Tk	FO	0.5	70.0	43.75	-6.76	14.75	0.01
02	DB. WING TK. PS	FW	2.0	1.4	57.45	-0.95	0.19	77.81
03	DB. WING TK. SB	FW	47.0	33.1	57.22	2.17	2.23	73.58
66	HP HYDR. OIL STORE TK. PS	HO	8.1	70.0	44.13	-7.55	4.38	0.36
67	HO drop tank	HO	8.1	70.0	48.29	1.15	0.45	60.11
90	LO STORE TK PS	LO	11.8	70.0	49.70	-5.86	4.22	1.71
91	LO TK. main gear PS	LO	6.0	70.0	50.75	-5.49	4.23	0.91
92	LO aux. eng.	LO	6.1	70.0	51.45	-5.24	4.24	0.94
97		LO	7.0	70.0	46.16	0.17	0.42	34.26
99	LO DROP TK. SB	LO	6.7	70.0	44.45	2.12	0.42	12.32
	PROVISION	MAS	1.0	0.0	60.00	4.00	12.00	0.00
	DECK LOAD	MAS	50.0	0.0	10.00	0.00	9.00	0.00
	STORES	MAS	1.0	0.0	35.70	0.00	9.00	0.00
	CREW	MAS	3.5	0.0	53.20	0.00	14.50	0.00
	1500 M TOWING WIRE SB	MAS	37.0	0.0	43.40	6.70	10.61	0.00
	15t TUGGER WIRE PS	MAS	2.1	0.0	32.30	-6.10	12.10	0.00
	15t TUGGER WIRE SB	MAS	2.1	0.0	32.30	6.10	12.10	0.00
	800 M WORKING WIRE PS	MAS	19.8	0.0	43.40	-6.70	10.61	0.00
	1500 M SPARE WIRE BELOW MAIND.	MAS	37.0	0.0	9.20	-0.44	6.20	0.00
	1500 M ANCHOR HANDLING WIRE	MAS	37.0	0.0	38.85	0.00	12.14	0.00
	STERN ROLLER 300T SWL	MAS	300.0	0.0	-5.35	0.50	6.47	0.00
	125 m forerunner SECONDARY WI.	MAS	3.1	0.0	43.58	0.00	16.85	0.00
52	SEWAGE TK. SB	MIS	3.7	10.0	50.41	5.05	1.76	0.76
80	BILGE WATER TK. SB	MIS	1.7	10.0	41.30	2.15	0.05	27.83
81	BILGE WATER SETTL. TK.1	MIS	0.4	10.0	34.56	0.37	1.54	0.02
83	SLUDGE TK. PS	MIS	1.7	10.0	41.30	-2.15	0.05	27.83
01	FORE PEAK TK.	WB	66.2	40.0	63.68	-0.00	2.77	15.85
12	CENTRE TK.1	WB	77.9	100.0	31.49	-0.00	0.67	0.00
18	RIG CHAIN LOCKER 1 PS	WB	134.4	98.0	32.65	-1.88	4.59	37.22
19	RIG CHAIN LOCKER 1 SB	WB	126.8	98.0	32.42	2.15	4.60	24.73
20	RIG CHAIN LOCKER 2 PS	WB	133.1	98.0	27.62	-2.22	4.60	26.93
21	RIG CHAIN LOCKER 2 SB	WB	130.6	98.0	27.55	2.10	4.60	34.19
28	DB/WING TK. SB	WB	32.8	69.3	7.46	3.12	4.06	7.81
37	DB/WING TK. SB	WB	30.3	55.0	51.75	-2.88	1.16	1.49
38	DB/WING TK. SB	WB	28.3	60.0	51.64	3.24	1.64	2.32
TOTAL			1824.6		26.41	0.21	4.33	755.17

Sjøfartsdirektoratet
Norwegian Maritime Directorate

Our date	Our reference and file no
02.10.2006	200615596-9/57/024332
Your reference	Inquiries to / Direct phone
Bygg 274-J2005/127-50	Tor Egil Skarbø / 22 39 18 43

The Norwegian Maritime Directorate is relocating: See www.sjofartsdir.no for important information.

Ulstein Verft AS
Postboks 158
6067 ULSTEINVIK

Sjøfartsdirektoratet
Stasjon Ålesund
03 OKT 2006
06/2857
Ark: 58/274-UlsV Sb: JN

TIL EFT
3 OKT 2006
J.N.

Dear Sirs,

MV "BOURBON DOLPHIN" - LNUW - IMO 9351983
FINAL INTACT AND DAMAGE STABILITY AS SUPPLY VESSEL

Reference is made to your letter dated 2006-08-30 enclosed with Final Stability Calculations addressed to the Norwegian Maritime Directorate in Ålesund.

Enclosed, please find 2 approved copies of:

- Loading conditions 2 – 5, 8 – 9 and 12 – 13
- Towing conditions 20 – 21
- Damage stability calculations
- GM limit curves (intact and damage)

Also enclosed are 2 copies of:

- Loading conditions 1, 6 – 7, 10 – 11 and 14 – 19
- Hull description and input data
- Hydrostatics and cross-curves
- Tank capacities

After having examined the above mentioned documents the Norwegian Maritime Directorate (NMD) may approve the final intact and damage stability for a maximum moulded draught of 6,500 metres, corresponding to the DNV assigned summer freeboard. The intact and damage stability is found to comply with NMD regulation FOR-1992-09-15-695: "Construction of Passenger Ships, Cargo Ships and Barges, § 43, and the stability requirements put forward in IMO Res.A.469(XII).

The approval is also based on:

- Inclining test report approved 2006-08-23
- Preliminary stability approved in letter of 2006-07-05

The Norwegian Directorate remarks:

1. Deck cargo and its centre of gravity above base line shall not exceed 500 tonnes and 9.00 meter respectively when the ship is loaded in accordance with conditions 4 and 5.

Sjøfartsdirektoratet
Norwegian Maritime Directorate

2. Unplugged pipe cargo on deck and its centre of gravity above base line shall not exceed 486,20 tonnes and 8,71 meter respectively when the ship is loaded in accordance with conditions 8 and 9.
3. Consumption of fuel oil and fresh water has to be compensated for by ballast water as shown in the stability calculations.
4. The limitations on the use of the roll reduction tank shall be observed and complied with. Please see chapter 13 in the booklet.
5. If the ship is to operate in waters where icing is likely to occur, an allowance for ice at least as stipulated in the above mentioned regulation § 15(4) is to be made, cf. FOR-1987-06-15-507: "Concerning Safety Measures, etc. on Passenger Ships, Cargo Ships and Lighters" § 14(2).
6. Bollard pull shall not exceed 180 tonnes when the vessel is engaged in towing operations (ref. loading conditions 20 and 21)

These limitations except no 5 and 6 may be disregarded if the shipmaster has calculated the actual conditions of loading before the voyage commences. The shipmaster shall be able to demonstrate that the actual metacentric height (GM) of the loaded vessel is within the limits of the approved GM_{min} curves, loading condition 10 and 11 are examples of this.

The approval is based on the assumption that the input is correct and that the openings in volumes calculated as buoyancy in the computations are equipped with water-/weathertight closing devices. These devices should, as far as the operation of the vessel allows, be kept closed at sea.

One copy of each of the submitted documents together with a copy of this letter shall be kept onboard the ship.

Please note that individual decisions made by the Norwegian Maritime Directorate may be appealed to the Ministry of Trade and Industry. Appeals must be lodged within three weeks with the Norwegian Maritime Directorate.

Yours faithfully,

Ole Morten Fureli

Ole Morten Fureli by authority
Senioringeniør

Tor Egil Skarbø
Tor Egil Skarbø
Overingeniør

Cert. No.: 26425

DNV
DET NORSKE VERITAS

CERTIFICATE OF BOLLARD PULL

Name: "BOURBON DOLPHIN" Type: AHTS Registry: NORWAY (NOR)

Signal letters: LNUW GRT: 2985 Length: 67,529

Owners: Bourbon Ships AS

Number of Engines, make & type: 4 off Rolls-Royce Marine Engines-Bergen, Type B32:40LP6

Number of propellers, make & type: 2 off Roll-Royce AB Kristinehamn Sweden, Type 102 XF5/4 E

Number of nozzles, make & type: 2 off Talleres y Montajes GANAIN S.L. Poligono Industrial Pasaje, Diameter 3940 mm

Number of rudders, make & type: 2 off Rolls-Royce Marine Poland Sp. z o.o Gniew, Type FB-S

Total BHP: 12000 kW Max. continuous RPM: 147

Test location: Osneset, Ulsteinvik, Norway

Test date: 2006-09-30

Det Norske Veritas, after having surveyed and examined the relevant data according to our recommendations for the testing of bollard pull, hereby declare that the above named vessel and its towing gear have been tested giving these results:

CONTINUOUS BOLLARD PULL:: 180 metric tons

BOLLARD PULL AT 100 % ~~OVERLOAD~~: 194 (Remark 1) metric tons

+Azimuth thr.

Place: Ulsteinvik, Norway Date: 2006-10-03

DET NORSKE VERITAS 1864 ULSTEINVIK

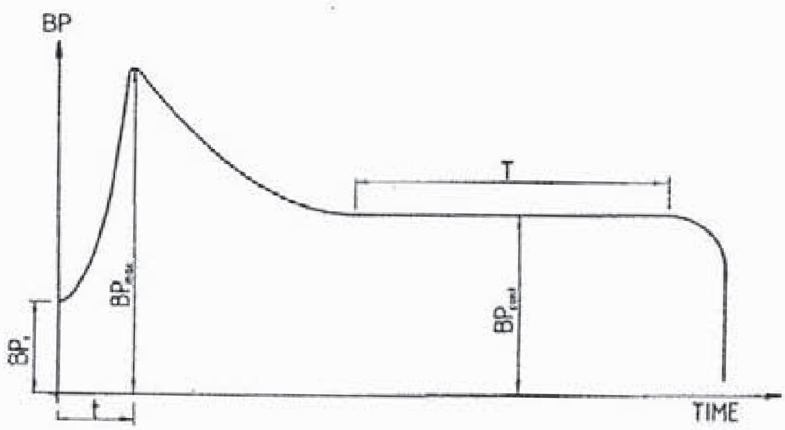
Robert Kanestrøm

Robert Kanestrøm
Surveyor

TEST DATA

Vessel heading:	250 degr						
Length of towing wire:	856 m						
Draught:		F	6,2 m	A	6,2 m	M	6,2 m
Max. allowed draught (Loadline):	6,489 m						

Ballast onboard:	1257 tonnes	Total capacity:	1810 tonnes
Fuel onboard:	92 tonnes	Total capacity:	1025 tonnes
Stores, Freshwater, Lub.oil:	170 tonnes		
Wind direction:	Variable	Force:	1 - 2 m/s
Current setting:	-	Speed:	-
Air temp.:	15 C	Sea water temp.:	14,6 C



CONTINUOUS BOLLARD PULL:

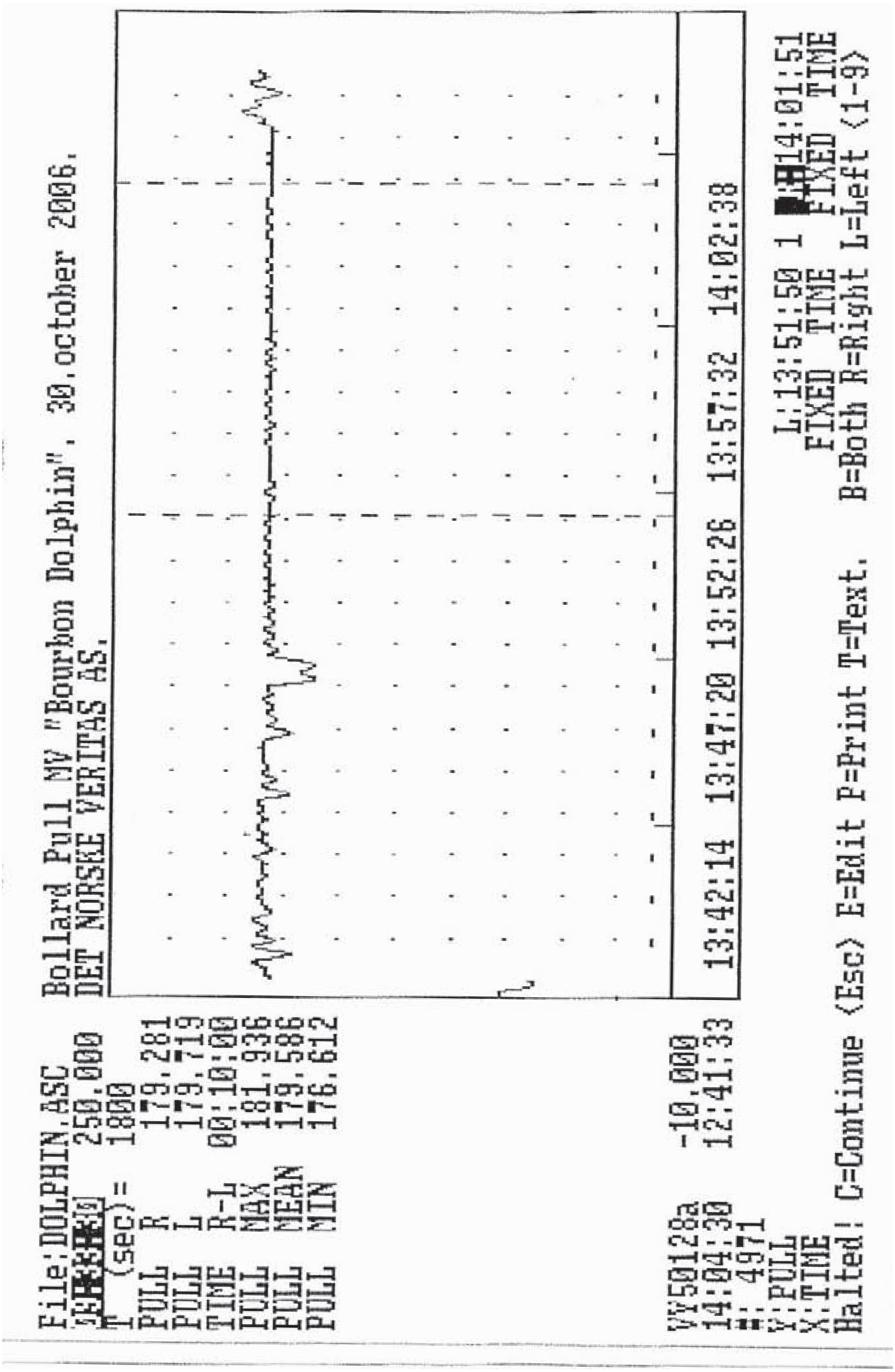
BP_{max} =		BP_{cont}	= 180 metric tons
BP_i =		T	= 10 min.
=			

BOLLARD PULL AT: 100 %

BP_{max} =		$BP_{overload}$	= 194 metric tons 1)
BP_i =		T	= 10 min.
t =			

REMARKS:

1) 194 metric tons bollard pull achieved with 100 % power on main propellers, and 100 % power on retractable azimuth thruster. The last-mentioned 20 degr. out of heading direction.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PULL R 179.281
PULL L 179.719
TIME R-L 00:10:00
PULL MAX 181.936
PULL MEAN 179.586
PULL MIN 176.612
Bollard Pull MV "Bourbon Dolphin", 30.october 2006.
DET NORSKE VERITAS AS.
13:42:14 13:47:20 13:52:26 13:57:32 14:02:38
VY50128a -10.000
14:04:30 12:41:33
#: 4971
Y:PULL
X:TIME
L:13:51:50 1 14:01:51
FIXED TIME FIXED TIME
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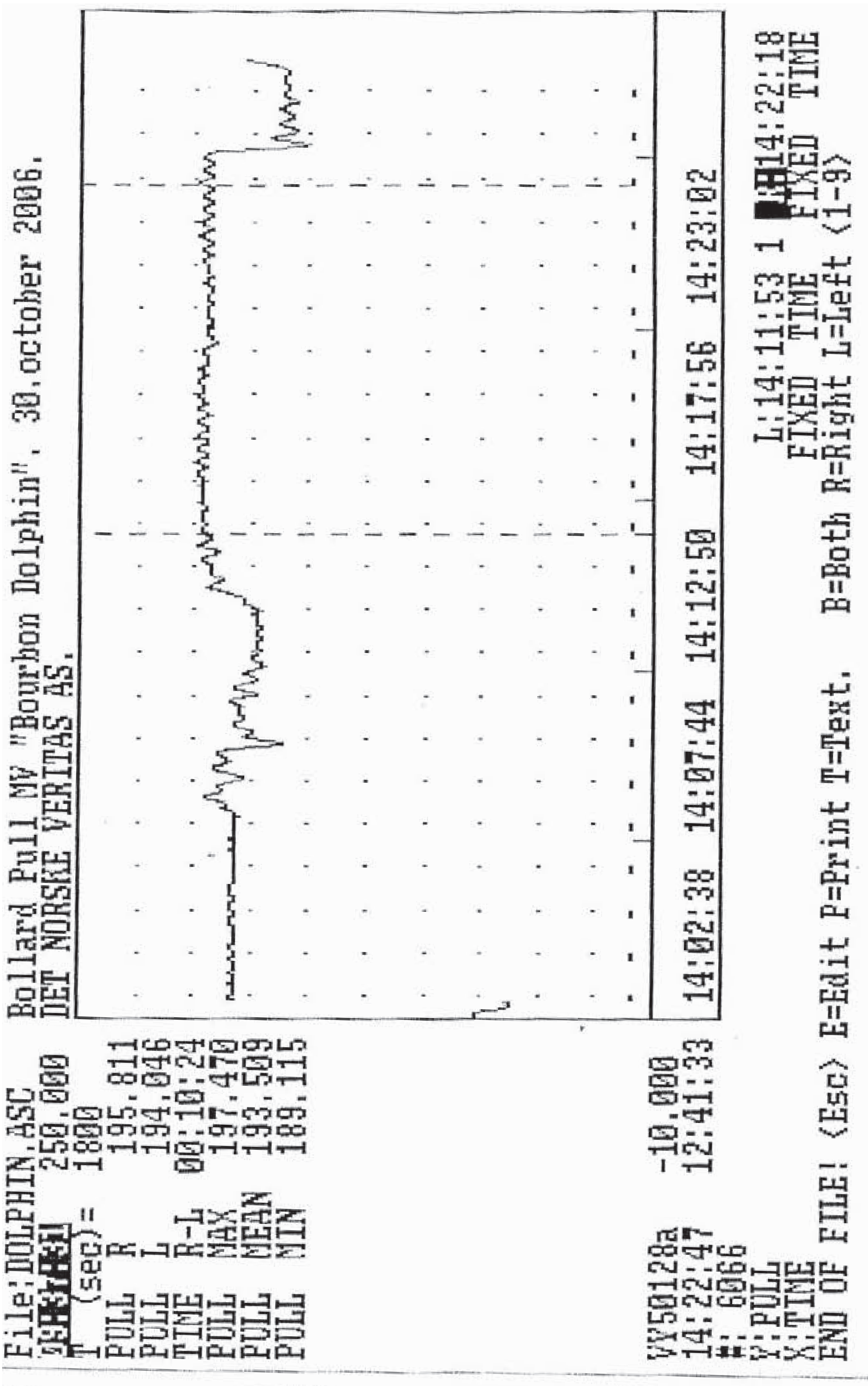

100% load on engines + WROS in 20 deg. angle STB.

SKIPSREGISTRENE
NIS NOR
http://www.nis-nor.no
Norwegian International Ship Register - Norsk Ordinært Skipsregister

CERTIFICATE
of
OWNERSHIP and ENCUMBRANCES
Hjemmel- og heftelsesattest

NAME OF VESSEL: Skip navn:	BOURBON DOLPHIN		
CALL SIGN: Kjenningssignal:	LNUW	IMO no.: IMO nr.:	IMO 9351983
GROSS TONNAGE: Brutto tonnasje:	2,985.000	NET TONNAGE: Netto tonnasje:	895.000
HOME PORT: Hjemsted:	FOSNAVÅG	FIRST REG. IN NOR: Reg. 1.gang i NOR:	03/10/2006 13:00 hrs

REGISTERED OWNER: (Reg. 03 October 2006 at 13:00 hrs.)
Registrert eier: BOURBON SHIPS AS
6090 FOSNAVÅG
POSTBOKS H
6099 FOSNAVÅG
NORWAY

The following encumbrances are registered upon the vessel:
Det er registrert følgende heftelser på skipet:

\- N O N E -

Issued by The NORWEGIAN ORDINARY SHIP REGISTER
Utstedt av NORSK ORDINÆRT SKIPSREGISTER

Bergen, 17 APRIL 2007 at 08:00 hrs

Anita Malmedal
ANITA I. MALMEDAL
Head of Administration and Notary/Administrasjonssjef

SKIPSREGISTRENE

Fee paid, NOK
Gebyr betalt, NOK 430.00

* Fixed units or floating units are registered as 'vessels'
* Fast eller flytende innretninger registreres som 'skip'

Page 1 of 1
Side 1 av 1

KR-0043

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Anchor Handling/Towing Winches
Emergency Release
Dated: 16th May 2007

This document contains information about the Emergency Release on anchor handling winches delivered by Rolls Royce Marine AS, Offshore Deck Machinery.
In an Emergency Release situation the assumption is made that there is a significant force on the wire rope/chain and this force will make the winch pay out. If the wire rope/chain is being restricted by any part of the ship's structure the force experienced by the winch will be reduced and consequently the release rate will be reduced.
Anchor handling/towing winches delivered after 1990 have the functionality described below. Anchor handling/towing winches delivered before 1990 utilise a different approach to Emergency Release functionality.

This information is being sent out in response to questions received from customers related to Emergency Release and the "Bourbon Dolphin" accident.

If further information is required, or clarification is needed , please contact our service department Mr. Kjell Arne Midtbust, direct number +47 70 20 85 17, mobile +47 91 78 98 78 and mail kjell_arne.midtbust@rolls-royce.com

Testing procedure will be sent on request.

Information is also given in our training courses.

Contents:

- **Authority/Class**
- **Emergency Release functionality (on our anchor handling/towing winches) in normal and blackout situation.**
- **Battery backup and Accumulators**

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Authorities/Class

Emergency Release is built according to customer's requirements, class requirements and national authority requirements.
As a minimum, the anchor handling/towing winches are designed according to Norwegian Maritime Directorate (NMD) and DNV Rules for Ships.

- Emergency Release approval is limited to functional testing during bollard pull test.
- If specifically requested by the customer, Emergency Release is tested according to an agreed test procedure during bollard pull testing of anchor handling /towing winches. In this case data from the test is documented and signed by class, yard, owner and supplier.

Emergency Release functionality

1. Emergency Release when drive unit coupling is engaged and band brake on.

Note: Static brake force is obtained by hydraulic servo pressure. Pressure loss will "release" band brake.
Emergency Release system is equipped with accumulators.

Emergency Release functionality during normal operation:
- Band brake will automatically go to "Off" position.
- Drive unit torque will automatically go to minimum.
- Drum/chain wheel will increase rotation (payout) due to tension in line.
- Emergency Release includes functionality to avoid uncontrolled payout. This will limit the payout speed to the maximum dynamic braking speed given in the technical specification.

Emergency Release functionality in black out situation:
- Band brake will automatically go to "Off" position.
- Drive unit torque will automatically go to minimum.
- Drum/chain wheel will increase rotation (payout) due to tension in line.
- Emergency Release includes functionality to avoid uncontrolled payout. This will limit the payout speed to the maximum dynamic braking speed given in the technical specification.

2. Emergency Release when drive unit coupling is engaged and band brake off.

Emergency Release functionality during normal operation:
- Drive unit torque will automatically go to minimum.
- Drum/chain wheel will increase rotation (payout) due to tension in line.

Rolls-Royce

- Emergency Release includes functionality to avoid uncontrolled payout. This will limit the payout speed to the maximum dynamic braking speed given in the technical specification.

Emergency Release functionality in black out situation:

- Drive unit torque will automatically go to minimum.
- Drum/chain wheel will increase rotation (payout) due to tension in line.
- Emergency Release includes functionality to avoid uncontrolled payout. This will limit the payout speed to the maximum dynamic braking speed given in the technical specification.

3. Emergency Release when drive unit coupling is disengaged and band brake on
Emergency Release functionality during normal operation:

- Band brake will automatically go to “Off” position.
- Drum/chain wheel will increase rotation (payout) due to tension in line.
- Emergency Release includes functionality to avoid uncontrolled payout.

Emergency Release functionality in black out situation:

- Band brake will automatically go to “Off” position.
- Drum/chain wheel will increase rotation (payout) due to tension in line.
- Emergency Release includes functionality to avoid uncontrolled payout.

Battery Backup and Accumulators
In a blackout situation the system is connected to the vessel’s battery backup to secure operation of Emergency Release.

Accumulators are installed to secure Emergency Release functionality.

Regards

Arne Tande
Vice President Offshore Deck Machinery

Rolls-Royce

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Anchor Handling/Towing Winches
Emergency Release, Testing
Dated: 16th May 2007

Procedure for Anchor Handling/Towing Winches delivered after 1990.
If further information is required, or clarification is needed, please contact our service department Mr. Kjell Arne Midtbust, direct number +47 70 20 85 17, mobile +47 91 78 98 78 and mail kjell_arne.midtbust@rolls-royce.com

Note: Static brake force is obtained by hydraulic servo pressure. Pressure loss will "release" band brake.

Battery Backup and Accumulators
In normal and blackout situation the Emergency Release system is connected to the vessel's battery backup to secure operation.
Accumulators are installed to secure Emergency Release functionality.

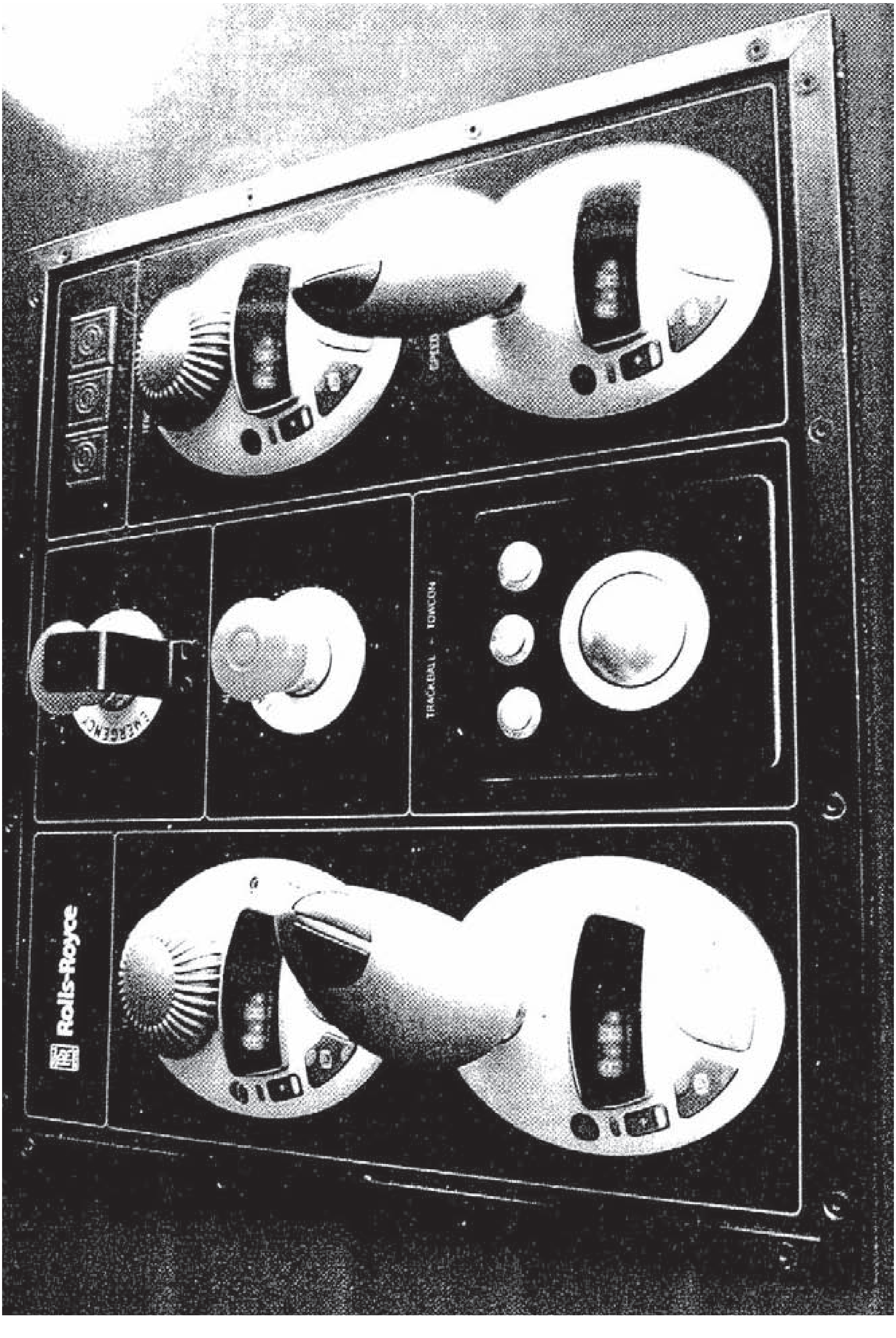
Test procedure
Before test is started make sure the Anchor handling/Towing Winch is not operating and no load is connected to any wire or drum. Make sure that any drum brake can be released without any risk of damage or hazard to equipment or crew.

1. Drum Brakes in position "ON"
2. Couplings in position "OUT"
3. Stop Servo Pump Unit for winches.
4. Visually confirm all brake cylinder piston position on the winch
5. Activate Emergency Release button
6. Verify the solenoid valves which engage accumulators on servo pump unit is activated
7. Verify the solenoid valves which bypass the proportional valves for tension control on servo pump unit is activated
8. Visually confirm that all brake cylinder piston positions on the winch have opened/released the brake.
9. Reset Emergency Release button
10. Visually confirm that all brake cylinder piston position on winch are back to normal position(4) "ON".

Note: For 6 and 7 see electrical diagrams and principal drawing servo pump unit.

Regards

Arne Tande
Vice President Offshore Deck Machinery


Rolls-Royce
TRACKBALL – TOWCON

FUNCTIONAL DESCRIPTION

FUNCTION :	EMERGENCY RELEASE

OPERATOR CONTROLS
Red emergency release switch, type Telemecanique, press down to activate, pull up to reset.
Switch is mounted with circular, yellow sign, engraved "Emergency Release" in red letters around switch.
Usually two or more operator locations. **Switch to be protected against unintended operation.**

ELECTRICAL POWER SUPPLY
All circuits and devices involved in this function are to be powered by 24V-DC Emergency Supply, either the vessels 24V battery supply, or 24V-DC generated by a 230V-AC / 24V-DC Power Supply connected to vessels 230V-AC uninterruptable supply. (230V-AC Emergency Supply)

FUNCTION
The function will limit holding forces on all drums/cable lifters connected to the system to a minimum. On drums with coupling out, the band brake is completely released until drum is rotating. When drum starts to rotate brakes are re-engaged with limited force.

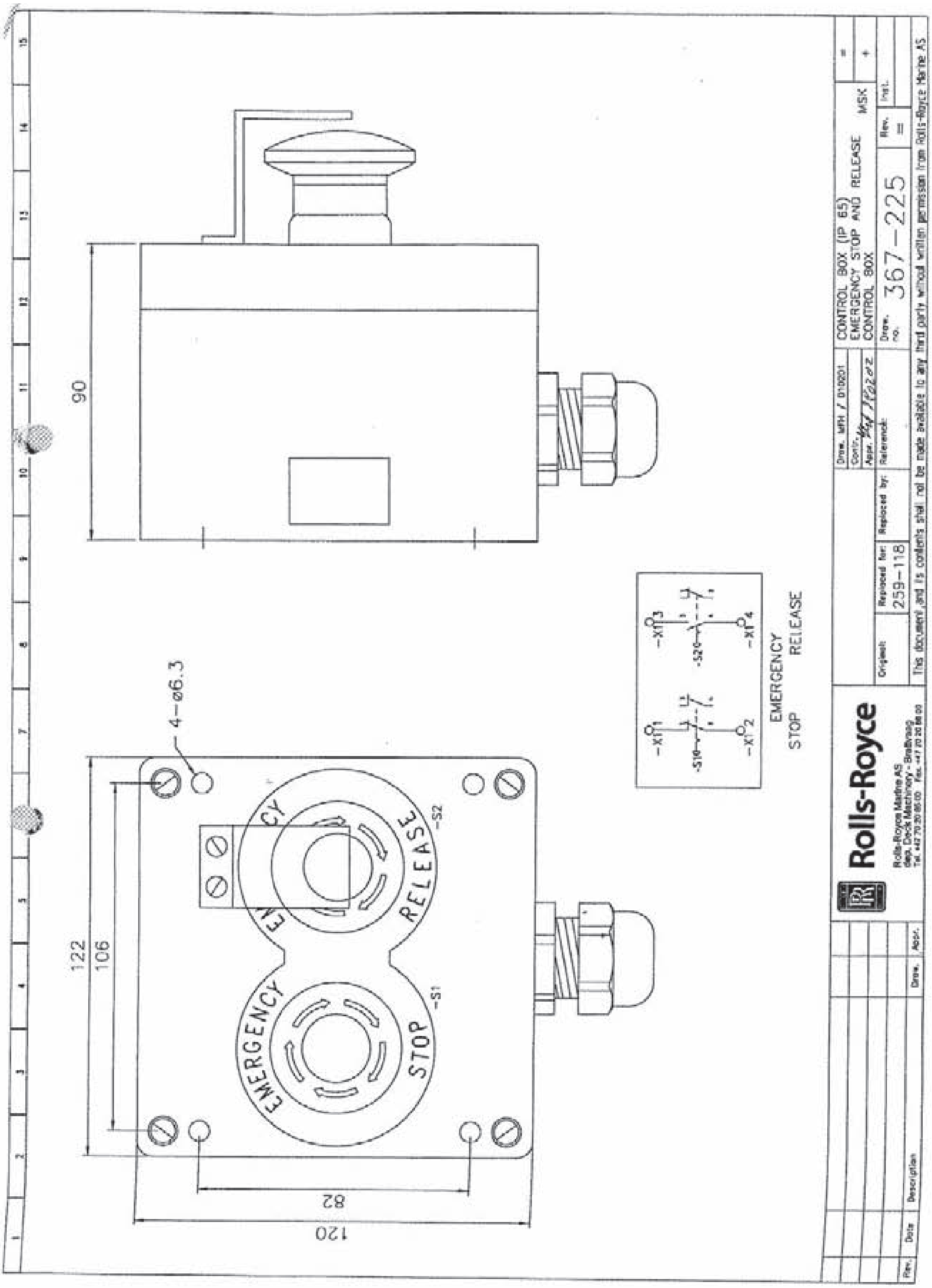
On drums with coupling in, the band brake is completely released. Residue force is maintained from resistance in the hydraulic motors (pressure is reduced to give reasonable brake force)
Speed control will adjust manoeuvre valves on winch to stop position in an emergency release situation. By resetting emergency release function, all affected operator controls will go back to normal mode.

Emergency Release includes functionality to avoid uncontrolled payout, which will limit the maximum payout speed.

If the system has more than one operator location, these will be coupled in parallel. The function will be the same regardless of where it was activated. It may occur that not all operator locations are active at the same time. This depends on if the system has "Command Shift" function.
Function is not to be interlocked to any other function, not even Emergency Stop !

FACTORY ACCEPTANCE TEST - EMERGENCY RELEASE :
Verify that switch is properly protected against unintended operation.
Connect suitable device for simulating Emergency Release Switch, and operate to Emergency Release.
Connect suitable device for simulating Drum Rotation for all drums included in system, or check for one and one drum at a time. Simulate drum rotation at a speed of minimum 1 RPM.
Check that system takes action to operate **brakes** as described in Functional Description above.
(Check both when drums are "connected" and "disconnected" – simulate couplings !)
Check that **speed control** takes action to stop motor rotation.
(If the control device for speed control is WRC 1021, the speed input order for this should be 2,5 V)
Check that system takes action to decrease **tension** on motor units to minimum.
(Normally secured by activating special solenoid valves – see Principal Sketch, Servo System)
Check that **Servo Accumulators** are released to secure pressure for hydraulic brakes and tension control
(Normally secured by activating special solenoid valves – see Principal Sketch, Servo System)
Check that system takes action as described above if Emergency Stop is activated.

Rolls-Royce	PREP. BY: OH	PAGE 1 OF 1st	REPLACES:	
	DATE :970924			
	FUNCTIONAL DESCRIPTION EMERGENCY RELEASE		813-048	REV F
Rolls-Royce Marine AS Dept. Deck Machinery - Brattvaag Tel. +47 70 20 85 00 Fax. +47 70 20 86 00	INS		REPL. BY :	


CONTROL BOX (IP 65)
EMERGENCY STOP AND RELEASE
CONTROL BOX
MSK
367-225
259-118
Rolls-Royce
EMERGENCY STOP
RELEASE
EMERGENCY
STOP
RELEASE
-S1
-S2
4-ø6.3
122
106
90
82
120
This document and its contents shall not be made available to any third party without written permission from Rolls-Royce Marine AS

Maxvalue logging

The system is also equipped with an internal logging system that keeps track of the maximum pressures, speeds and temperatures of the systems winches.

2.4.8.1 Emergency stop

If one or more of the emergency stop switches has been pressed the system responds by setting off both visual and audible alarm.

2.4.8.2 Emergency Release

If one or more of the emergency release switches has been pressed the system responds by setting off both visual and audible alarm.

2.4.8.3 Overspeed

There is three different overspeed limits. Prewarning which is the adjusted hi limit on the rpm dial. Hi and HiHi limits is factory preset depending on type of motor is used. The three different alarms produce individual texts in the alarm picture so they can easily be separated. The Hi and HiHi alarms may also on some systems activate rpm slowdown or system shutdown functions.

2.4.8.4 High oil temperature

There is three different temperature limits. Prewarning which is the adjusted hi limit on the temperature dial. Hi and HiHi limits is factory preset. The three different alarms produce individual texts in the alarm picture so they can easily be separated. The Hi and HiHi alarms may also on some systems activate rpm slowdown or system shutdown functions.

2.4.8.5 High oil pressure

If the oil pressure has exceeded the system pressure + 1bar, an alarm will be trigged. When trigged it gives both visual and audible warning.

2.4.8.6 High Tension

The high-tension alarm is activated if the tension exceeds the limit set in the tension bar.

2.4.8.7 Low pressure expansion system

Indicates that the pressure in the oil expansion tank has dropped below the set limit, and both a visual and audible alarm is set off.

2.4.8.8 Low level expansion system

Indicates that the oil level in the expansion tank has sunken below the set limit, and both an visual and audible alarm is set off.

2.4.8.9 Clogged Oil filter - Expansion system

Indicates that the filter-guard in the expansion system is activated, and both an visual and audible alarm is set off.

2.4.8.10 Clogged Oil filter - LP filter system

Indicates that the filter-guard in the Low Pressure fine filtration system is activated, and both an visual and audible alarm is set off.

3.14 SAFETY FUNCTIONS

3.14.1 Emergency Stop.

If something unexpected or dangerous should occur, demanding the winches to be stopped immediately, there is an Emergency Stop Switch on the Control Panel on bridge. There is also one or more of these switches placed on a small junction box on a convenient place on deck. Please make sure that the crew is informed about where they are placed before any winch operations are started.

Section of Control Panel.
Illustration only !

Pushing down one of these switches will **stop the Servo Unit and all Main Pumps,** make the **manoeuvre valves** on winches go **to Stop Position**, and **engage** all remote controlled **brakes**.

3.14.2 Emergency Release.

If something unexpected or dangerous should occur, demanding the winches to ***release the load***, there is an Emergency Release Switch on the Control Panel on bridge. There is also one switch placed on deck. Please make sure that the crew is informed about where they are placed before any winch operations are started. One should however be ware of the rather serious consequences using these switches may cause to ship, crew and equipment; and because of this the switches are also protected against being pushed down by accidents. **Pushing down** one of these switches will cause brakes being only **smoothly engaged,** with a rather weak force, just enough to **prevent uncontrolled rotation** on drum resulting wire injury.

Section of Control Panel.
Illustration only!

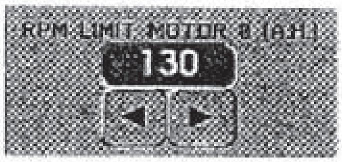
NOTICE!
Observe that pulling up again the activated switch will make the brake be engaged (if it was engaged before the Emergency Release was activated). If so is done while there is load in wire this may cause serious damages to winch equipment, towing wire, ship, and even expose crew members to great danger.

NOTE ! Em.release overrule Em.stop !

3.14.3 Over speed Protection.

If the Remote Control system detects rotation speed on a motor above allowed limit, the hydraulic pressure in the winch motors will automatically be increased to maximum to reduce motor RPM. At the same time the Speed Control will adjust manoeuvre valves on the topical motor units to Stop-Position. A Brake On order will be given simultaneously to reduce the RPM under the preset limit. If this happens one should increase the motor pressure a little next time when similar operations is to be carried out, to prevent damages on winch motors caused by too high revolution speed.

On screen change of overspeed limit: (System Addon)



Segment of Alarm picture in Towcon.

By reducing the RPM limit on the Towcon Monitoring System, over speed protection can easily be tested. Lowest possible limit is 15RPM.
The maximum value allowed in the display equals max. allowed rpm on motor.

3.14.3.1 Max tension when over speed

If the Remote Control system detects rotation speed on a motor above allowed limit, the power to the proportional valve, controlling the motor tension, is cut. This causes the motor to give max tension according to shock valves on motor.

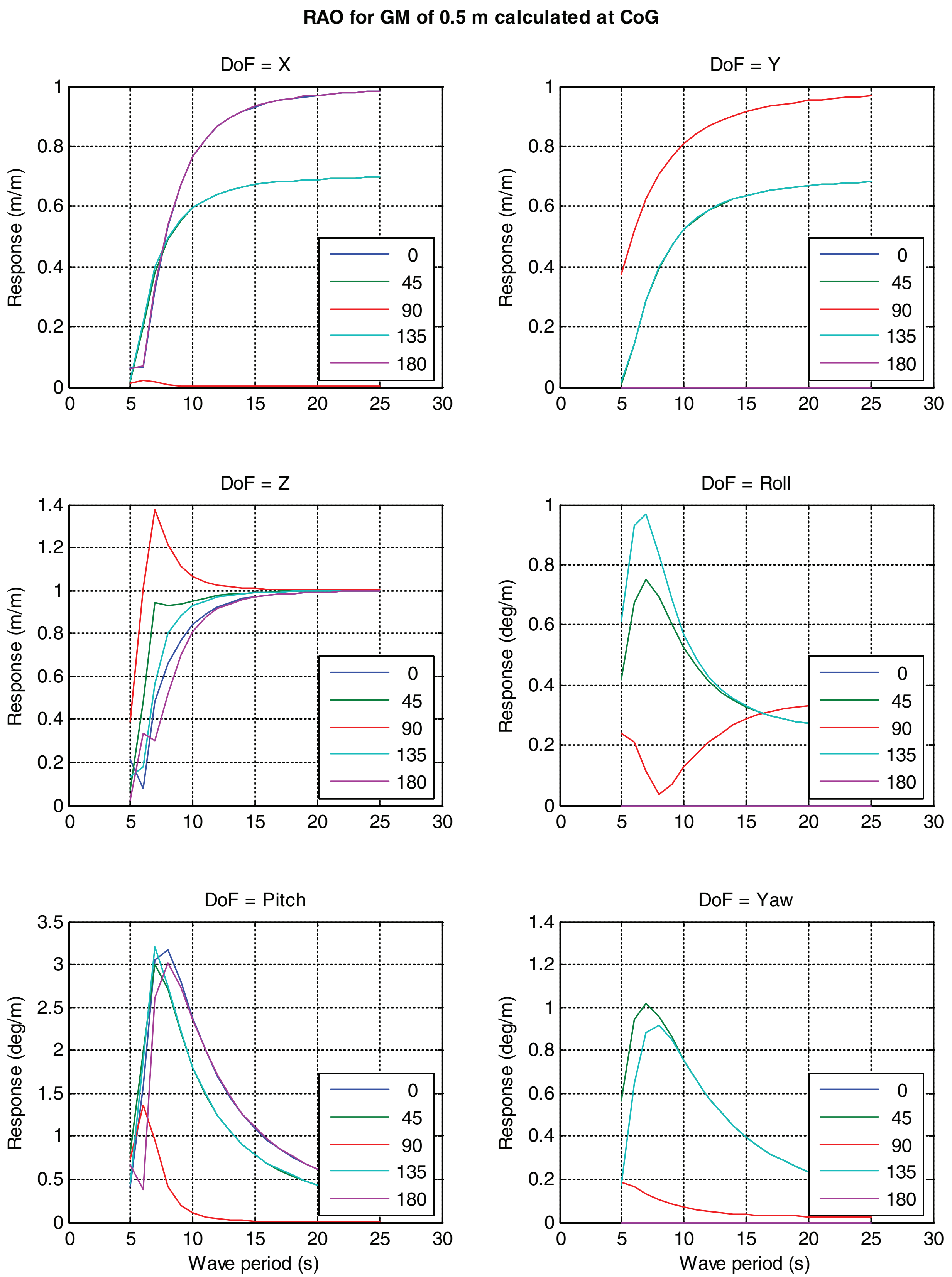
3.14.3.2 Bandbrakes engage when over speed

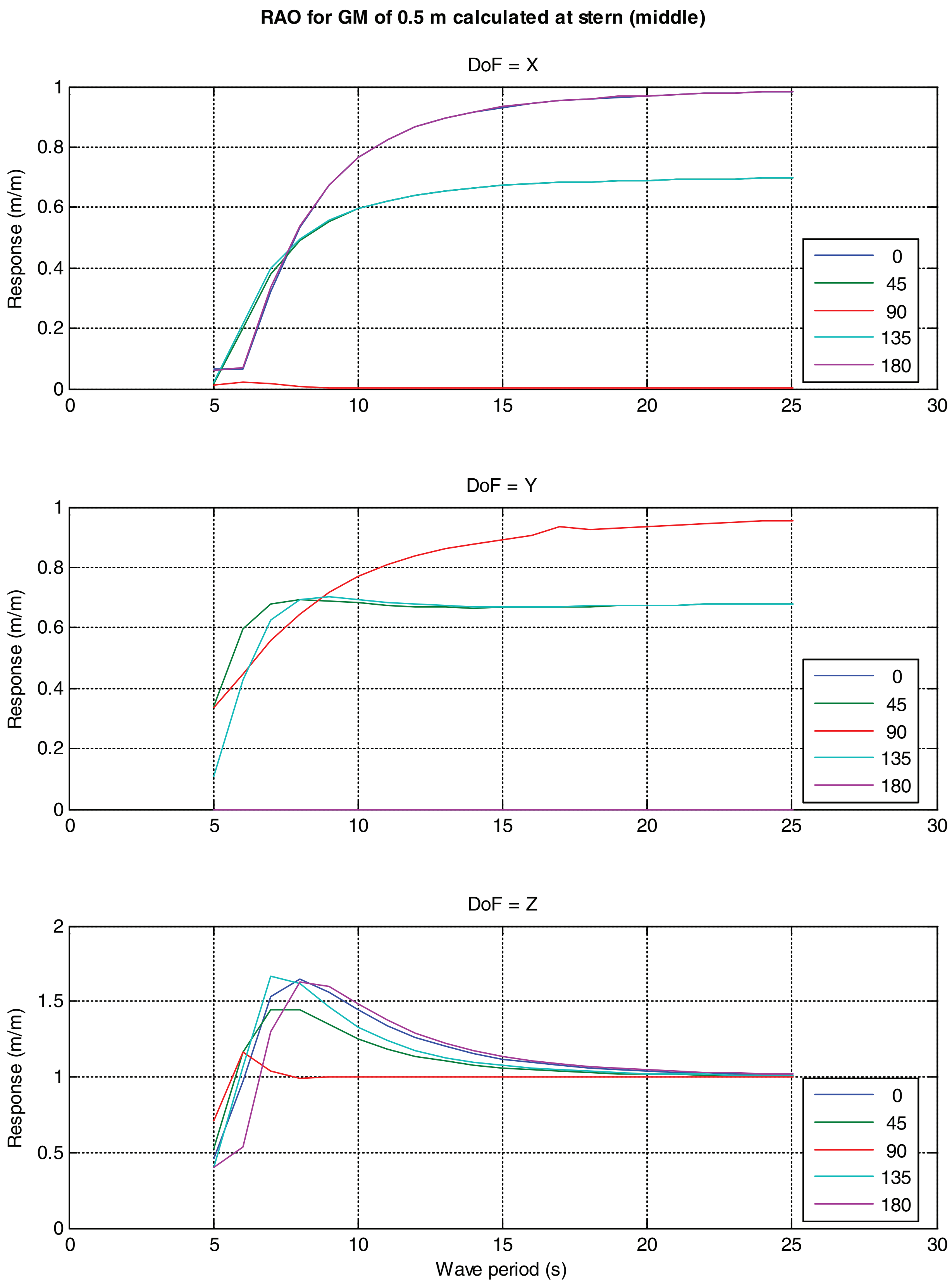
If the Remote Control system detects rotation speed on a motor above allowed limit, the bandbrake on drum connected to motor is engaged.

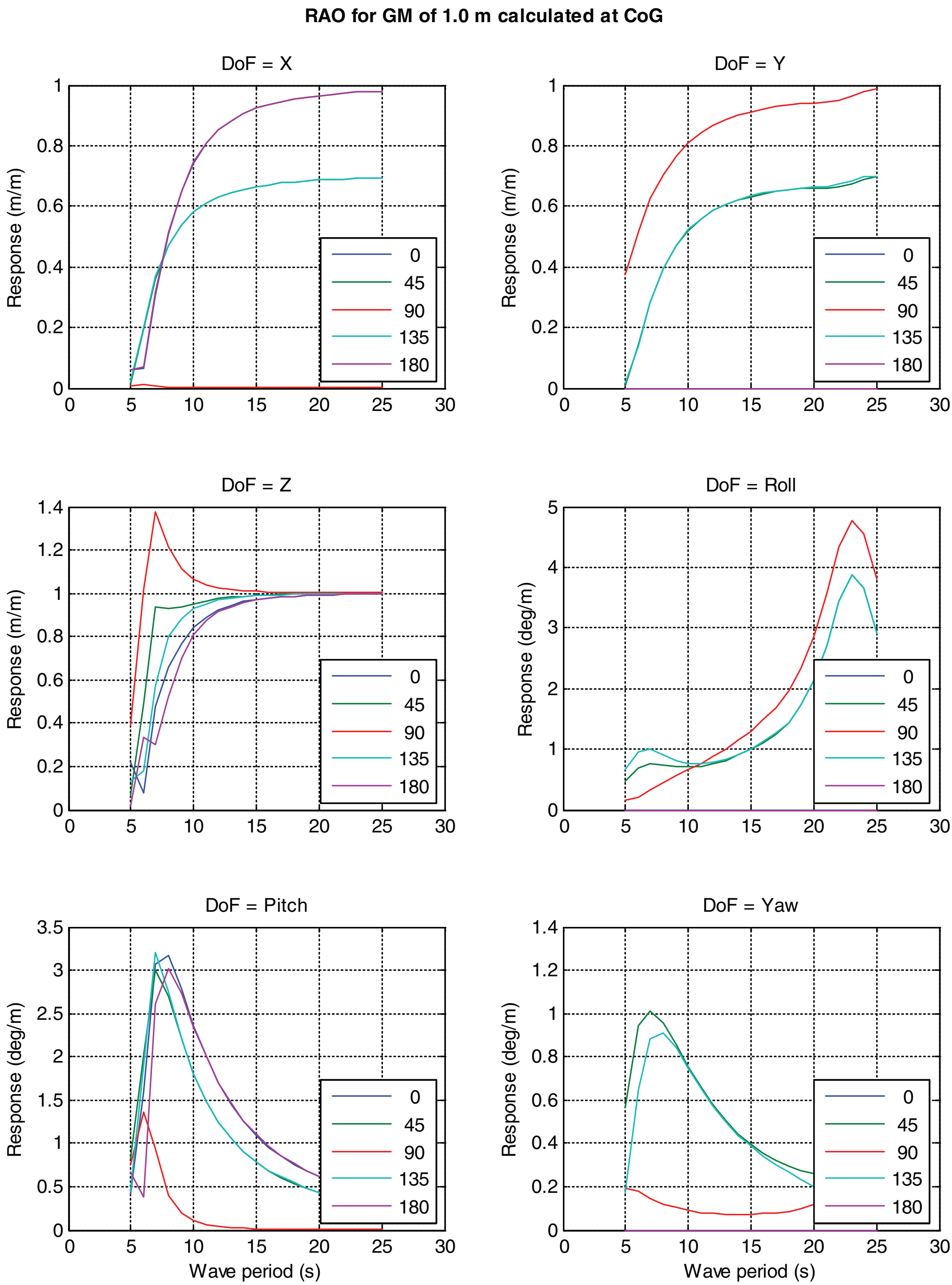
3.14.4 Active stop

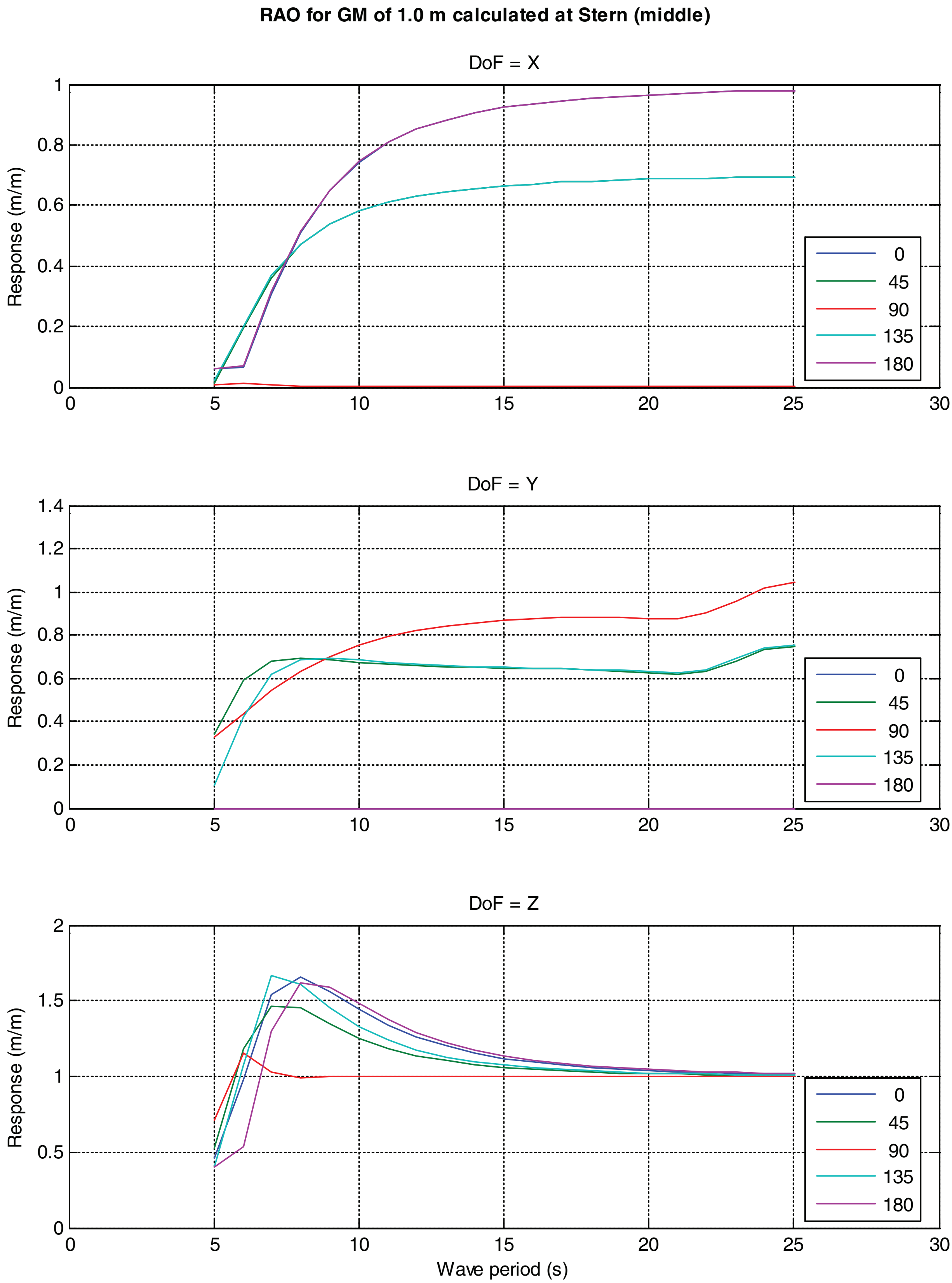
Active stop is the common name for forcing speed control order to zero (stop position), the speed order from the operator is then superseded
It is used to protect the winch installation in various situations, such as:

3.14.4.1 No oil to motors. Not allowed to operate speed control.
3.14.4.2 Trying to run drum against brake. (Only a certain pressure is allowed)
3.14.4.3 Over speed on motor.
3.14.4.4 Overload on winch.


RAO for GM of 0.5 m calculated at CoG
DoF = X
DoF = Y
DoF = Z
DoF = Roll
DoF = Pitch
DoF = Yaw
Response (m/m)
Response (deg/m)
Wave period (s)
0
45
90
135
180


RAO for GM of 0.5 m calculated at stern (middle)
DoF = X
Response (m/m)
0
45
90
135
180
DoF = Y
Response (m/m)
0
45
90
135
180
DoF = Z
Response (m/m)
0
45
90
135
180
Wave period (s)


RAO for GM of 1.0 m calculated at CoG
DoF = X
DoF = Y
DoF = Z
DoF = Roll
DoF = Pitch
DoF = Yaw
Response (m/m)
Response (deg/m)
Wave period (s)
0
45
90
135
180


RAO for GM of 1.0 m calculated at Stern (middle)
DoF = X
Response (m/m)
0
45
90
135
180
DoF = Y
Response (m/m)
0
45
90
135
180
DoF = Z
Response (m/m)
0
45
90
135
180
Wave period (s)

Undersøkelseskommisjonen etter forliset med Bourbon Dolphin

Pb 8027 Dep
0030 Oslo

Møtereferat

Dato: 07.12.2007
Arkiv:

Participants: Gisle Fiksdal
Dag Andreassen
Guro Høyaas Løken

Kaptein Hugo Hansen
Richard Palmer - Noble Denton
Kieran Dodworh – Safety at Sea
Andrew Squire – LOC

Copy to: All relevant parties

From: Guro H Løken

Meeting place: Theatergata 5, Oslo

Meeting date: 07.12.2007 kl 0900-1

Facilitator: Gisle Fiksdal

Minute taker: Guro H Løken

Minutes from: **Stability Meeting**

Please note that Frank Shepard - Trident and representatives from the Ulstein yard was not invited due to the purpose of the meeting.

1. **Welcome by Gisle Fiksdal**

2. **Purpose of Meeting**

The commission will carry out investigations in order to identify possible loading conditions at the time of the vessel capsize and when leaving port on April 10. The investigations will be based on hydrostatic analysis by use of the software systems Shipshape and ShipLoad by Lodic AS.

Outcome from meeting will be utilised as reference to the analysis that the commission will carry out and base its conclusion on with respect to stability of the vessel.

3. **Received Documents from the involved parties before the meeting**

- LOC
  - Preliminary Report dated 16 October 2007
  - Comments in reply to Noble letter dated 4 November December 2007
  - Errata and Addendum dated 5 December 2007

- Noble Denton
  - Review of LOC Preliminary calculations - L01 - 3 August 2007
  - Response to commission hearings - L02 - 21 September 2007
  - Response to LOC preliminary report - L03 - 14 November 2007

- Safety at Sea

- SaS060807-Mackinnons-KD-002 6 August 2007
- SaS-SA-071129- 29 November 2007
- SaBD01-RE-003-SE-RevC 21 November 2007

4. Brief Summary by Participants

- Analysis background
- Basis for analysis
- Methods applied
- Validation
- Uncertainties
- Application of witness statements

LOC

- LOC have prepared a response to comments from Safety at Sea
- LOC have created their model based on input from Captain Reiersen
- Model not updated based on updated geometry information
- Model geometry is slightly different form the Ulstein model based on limited drawings of the vessel, LOC confident that the minor difference in model will not affect the overall conclusions.
- Orcaflex used to assess the chain tensions
- Conclusion; not any one factor leading to the capsize

Safety at Sea

- Orcaflex analysis performed to assess chain loads
- Report not issued to the commission
- Static stability analysis performed - NAPA model - copied stab book from yard. SAS model is checked against the stability booklet. Calibration is very close.
- Fuel loads and mass loads - used liquid manifest from Bourbon - extrapolated fuel consumption - three different fuel distributions
- Have matched up loading conditions with witness statements
- Have looked at effect of chain on the static stability
- Have looked at pictures, drawings etc to assess chain angle in horizontal plane
- Have created a dynamic stability model to be able to reproduce the capsize- using only a static stability model will not draw the whole picture.
- Using a dynamic model developed for damage stabilty, calibrated for many vessel types in many research and consultancy projects.
- Conclusion; overturning moment from static chain load is sufficient to capsize the vessel.

Noble Denton

- Conditions based on witness statements and Bourbon/Transocean manifests
- Main assumptions
    - Trim and stab book
    - Evidence from Syversen and others
    - Data from Transocean regarding consumables
- Hand Calculations as per the stability book
- Started to built a independent model - input line plan - not sufficient info to produce a reliable model
- Use NAPA model, lines plan and GA arrangement as input - resulted in a semi independent GHS model - currently up to 1.5% deviations for all drafts

- Draft conclusion; trim and stability book hydrostatics from Olstein is OK.

5. Loading Condition

- Leaving Lerwick'
    - Liquid Loads
    - Mass loads onboard
    - Uncertainties
- Time of Capsize
    - Liquid Loads
    - Mass loads onboard
    - Tension Loads
    - Uncertainties

Fuel Consumption
Captain Hugo Hansen view on the following

- Application of fuel and fresh water tanks
- Sequence of use
- Ballasting routines
- Roll reduction tank routine

Fuel tanks;
T17, T13 & T14 - Filled up first - max 90%

T25 & T26 - probably slack at the same time, evenly filled, valve connecting the two tanks, valve should be closed at sea (known by chief). These tanks were used before T17, T13 & T14.

Last tank to be used T17.

Only one service tank in use, whether port or stb tank not known by capt Hansen.

Fresh water;
T2 and T3 - Consumption for ship, evenly used - large tanks, could pump from those tanks to T31.

Comment from Fiksdal; If delivering fresh water to the rig - T2 & T3 could have been used.

T31 - roll reduction tanks, T31 always used for fresh water, never used for salt water, not possible to run seawater due to blind, use dependent on the amount of fuel. If all tanks filled up > forward trim > T31 filled up. Also used for delivering fresh water to the rig. T31 not used for anti rolling during anchor handling, either filled up or empty. For cargo runs or PSV operation filled up 60%, i.e. used as roll reduction tank.
Comment; if BD delivered fresh water to the rig during last voyage, most likely taken from T31.

Evaporator does not exist on the vessel.

Ballast Water

T37 & T38 - water ballast wing tanks - Used as heeling tanks. Ship was a bit by the head leaving Lerwick (based on BD photo), tanks probably used. These two tanks set up with automatic system to change the list of the vessel - often used slack 50% - could easily be the case during anchor handling operation.

T32 & T33 - could have been in use leaving Lerwick - dependent on trim of loading condition.

If chain taken out from fwd chain locker T18 & T19, normally not filled up, all dependant of the amount of fuel, T37 and T38 used for trim. With 400t of fuel Hansen would have filled up the chain locker with ballast water. Would never fill up chain locker if locker filled with chain.

Comment from SAS; chain taken out from T18 (port) earlier that day, T19 (stbd) later on.

Hansen - T18 would have been filled up. When deploying chain from T18, T37 or T38 would probably been filled up to keep the list.

Comment; According to Syversens evident - water ballast shifted from T37 to T33.

Comment from Fiksdal; T38 might have been filled up since transfer from T37 to T33 carried out.

T20 & T21 - normally not used i.e empty.
Comment from Fiksdal; T20 & T21 could also be used for brine - need to be cleaned reason for not being used.

T27 & T28 - normally not used i.e empty -reason for not using them limited size. Volume approx 46m³ each.
Question from Fiksdal; did you have any dumping system from T30&31 to T27&28 since placed below - Hansen stating that it might be a system - but not affirmative - never used by Hansen

One stability tank built as a pump room (T? need to be checked) - rebuilt due to limited space.

T1 - FP tank - never used by Hansen.

T30 - roll reduction tank - never used by Hansen.

T1 - double bottom tank - never used by Hansen.

T31 - used as the roll reduction tank at 60% - whether 100% or empty - dependent on the fuel amount and type of operation.

<u>Mass Loads - Leaving Lerwick</u>

- Provisions and stores (minor weights) could very well be in accordance with the stability booklet
- Crew and effects (minor weights) could very well be in accordance with the stability booklet
- Chain - 2 of
- Anchor - 2 of

Capt Hansen

- BD work wire too short - original work wire 1500m 77mm stored on the secondary winch - left anchor handling winch free for the Chevron 84mm.
- Spare towing wire 76mm 1500m underneath the deck
- Comment to Chevron report (assumption given to Chevron experts) - ship work wire 3500m 77mm 86.1t - appear to be wrong
- Towline 2000m 76mm on tow drum - 90t - appear to be wrong

Assumed by LOC

- See below, did not investigate the leaving Lerwick condition

Assumed by Safety at Sea

- Total weight calculations higher
- Anchor winch wire (main) - 65.8t - 12.14m above base line
- Secondary winch wire - 86.1t - 16.85m above base line
- Spare wire (on spare drum) - 36.9t - 10.1m above base line
- Tugger wire - 2.1t - z 12.1m above base line y -6.1 from CL
- Tugger wire - 2.1t - z 12.1m above base line y 6.1 from CL
- Chain - 2* 113.4tons (2 * 900m 76mm)
- 2 * 18t Anchors

Assumed by Noble Denton

- Broadly agree with LOC (see below)
- Same tugger wire as SAS
- Chain - 2* 113.4tons (2 * 900m 76mm)
- 2 * 18t Bruce Anchors
- Trash collars 6.5t - main deck
- Misc jewellery 10t - main deck
- 2 off 75ft pennant - 2.7t total - main deck
- Work Wire stored on the anchor handling drum - 2000m of 84mm + peewee socket (email from Derek Hart Transocean.
-

Mass Loads - Time of capsize

- 1 anchor gone
- 2 chain gone
- All wire onboard

Comment from Hansen and the Commision

- Some chain on deck and 2-3 turn around the drum

Assumed by LOC

- Mix of Reiersens statement and stability booklet
- Towing wire - 37t - 64mm at 2.6m above main deck
- Work Wire - 19t - 64mm at 2.6m above main deck
- Spare towing wire - 37t - at 1.4m above tween deck
- AHV wire - 78t - at 1.2m above A-deck
- Secondary winch wire - 37t - at 2.6m above B-deck
- Tugger wires in accordance with stability booklet
- Chain - 1* 113.4tons (2 * 900m 76mm) in T21 instead of T19
- 1 * 18t Bruce Anchors

Tension Loads – time of capsize

- Maximum loads
- Attacking point
- Deviation angles
- Angle of attack
- Witness statements applied

Assumed by LOC

- Mean chain tension – 214t at time of capsize
- Mean vertical load 106t – Orcaflex static analysis
- Dynamic analysis performed – not included in the stability analysis
- COG for load
    - according to stability booklet
    - top of the roller – transverse against the outer pin
- Declination angles
    - Based on chain tension
- Chain angle between centreline and chain
    - 25 degrees based on Orcaflex analysis – angle increased when pin is lowered
    - Heading of the vessel dependent on how you apply the thrusters force
    - Applied as heeling lever from horizontal force and vertical applied as a weight in the loading condition
    - Heeling lever 5.08m
- Used the survey video – used witness statements to assume the approx time of the capsize
- Need to check position of BD at end of simulation

Assumed by Noble Denton

- Static vertical load 104t – catenary calcs static analysis
- No assumption to date on peak loads
- COG for load
    - according to stability booklet
    - transverse against the outer pin
- Declination angles
    - Based on chain tension
- Chain angle between centreline and chain
    - Approx 15 degrees based on balance between the thrusters forces
    - Heading of the vessel dependent on how you apply the thrusters force
    - Applied as heeling lever from horizontal force and vertical applied as a weight in the loading condition
    - Varied lever arm 5.5m to 8m to investigate effects
- No witness statements used for vessel heading
- Highly dependent on relative angle between vessel and mooring line

Assumed by Safety at Sea

- Mean vertical load 118t – Orcaflex static analysis
- Mean horizontal load 96t – Orcaflex static analysis
- No assumption on peak loads
- COG for load

  - Transverse position outer port pin and chain angle coming off the vessel
  - Top of the stern roller
  - Take into account the shape of the roller
  - Attachment point changed for different azimuth angles
- Chain angle between centreline and chain
  - Range of angles 0-60 degrees, at 48 chain will touch bulwark
  - Vertical component used as a offset weight
  - Horizontal moment - constant
  - Lever is taken as the center of the tunnel thrusters to whatever crest of stern roller
  - Horizontal moment and vertical moments are applied differently in dynamic analysis.
- Syversen witness statement 60 degrees + Transocean evidence - given to commission during meeting. Evidence shows 310 to 330 degrees according to SAS. Chain angle 38 - 58 degrees.

6. Impact from Thrusters and horizontal loads

- Effect on trim
- Effect on list

Assumed by LOC

- No trim effect taken into account in static analysis
- Have used the impact of the thrusters through the Orcaflex analysis
- Thrusters and drag of the hull provide the reaction on the chain

Assumed by Noble Denton

- No trim effect taken into account in static analysis
- Thrusters being accounted for in simplified manner by balance of forces

Assumed by Safety at Sea

- No trim effect taken into account in static analysis
- Thrusters and drag of the hull provide the reaction on the chain

7. Calculation Methods

- Free surface correction
- Water on deck vs. temporary buoyancy from side rails

Assumed by LOC

- GHS calculates "true free surface - the COG move"
- Hand calc by VCG raise method
- Need to check if GHS model have the buoyancy of side rails included
- Water on deck due to green water etc. not included
- Static time independent analysis for water on deck

Assumed by Noble Denton

- Method as in stability booklet, VCG raise
- Static time independent analysis for water on deck

Assumed by Safety at Sea

- NAPA calculates "true free surface - the COG move"
- Static time independent analysis for water on deck
- Dynamic analysis - temporary buoyancy from superstructure and work deck included (not siderails)
- Dynamic analysis - water on deck included

8. Dynamic behaviour of vessel before capsize

Fiksdal; Based on witness statements - list - back to 0 list - list - back to almost 0 list - capsize

Views by LOC

- Vessel is using a lot of power,
- imbalance due to lowering the pin,
- yaw effect would induce heel,
- you might then get a yaw to port and stern/sideways movement,
- moving backwards with a back heel,
- wave forces would have an influence,

Views by Noble Denton

- No analysis or discussions regarding the above subject
- Based on static analysis, if she did roll to 45 degrees she would probably only do it once based on the GZ curves derived by Noble Denton.

Views by Safety at Sea

- Moving the pin would induce a transient lurch to port - in the process of analysing
- Dynamic analysis have shown large inclination due to waves which it then recovers from
- Roll period high due to estimated low stability

9. Witness statements

- References to witness statements in the analysis

Views by LOC

- Should focus on witness statements commenting the last few minutes.
- Should be cautious using the recollected list angles from witnesses

Views by Noble Denton

- All relevant witness statements included in Noble Denton submitted reports
- Should be cautious using the recollected list angles from witnesses

Views by Safety at Sea

- No comments

10. Important factors for the hydrostatic calculations

- Etc….

Views by all participants

- Angle from CL of the chain tension
- Being able to create the most realistic loading condition
- Vertical position taken into account the angle
- Chain tension applied

11. Received Documents from the involved parties during the meeting

- Evidence from Transocean approved by Derek Hart - Confidential
- Draft presentation by Noble Denton - Confidential
- Photograph of BD in Lerwick probably 10 April 2007

KARMØY WINCH as

Rapport

Kunde: Granskingskommisjonen	Vårt Ordre nr. 284900
Sak: "Bourbon Dolphin"	**Rapport nr. 284900-1**
Kontaktperson: Dag Andersen	**Utstyr: Karm Fork & Towingpins**

Viser til deres e-mail av 15.jan, 2008 med spørsmål angående hvorfor samtlige Tauepinner og Karm Forker (haikjefter) er funnet i oppkjørt posisjon når båten ligger på havbunn med 30 graders slagside.

Vi skal her prøve på en enkel og kortfattet måte å beskrive hvorfor dette er slik.

Vedlagt er skisser merket 1 til 3, HD1-892, HD3-963 og hovedskjema HD1-904 for hydraulikk systemet.

Beskrivelse;
Vi deler fasene inn i 3 stk trinn. Som er beskrevet med skissene 1,2 og 3

Normal tilstand. Dvs. Før kantring. Skisse nr.1
Lasten av Tauepinner og Karm Fork blir tatt opp av bremseventiler.
Typisk for dette anlegget så veier Karm Forken ca.2200kg og Tauepinnen ca.1500kg
Lasten blir tatt opp av hydraulik sylinderne som holder et mottrykk P.g.a. bremseventilen. Se pos B1 og B2 på skissen

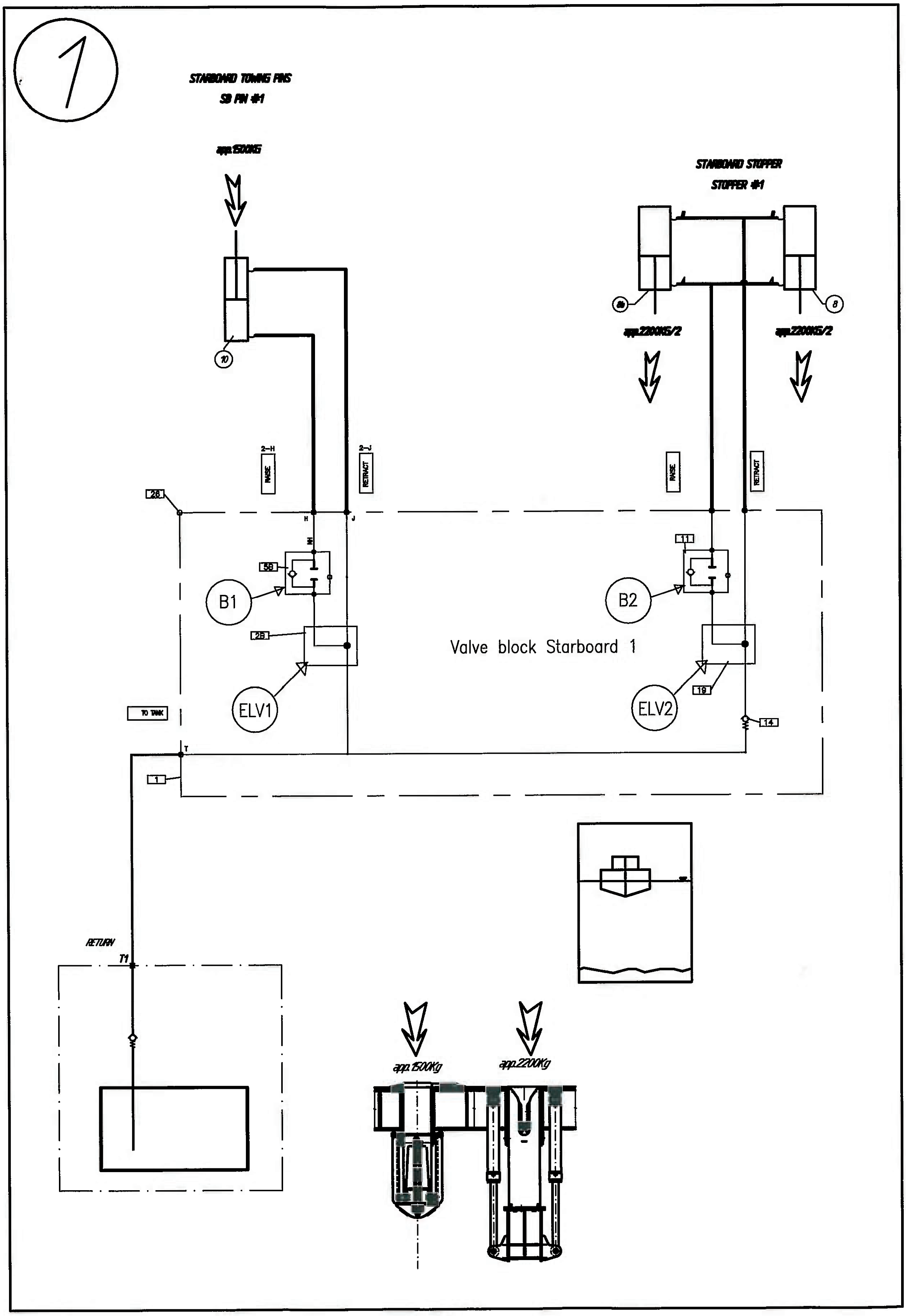
Båten har kantret. Skisse Nr.2
Her vil kraftretningen på hydraulik sylinderne skifte. D.v.s. at vi har ingen bremseventiler som opprettholder lasttrykket i sylindere.
Det betyr i dette tilfelle at både Karm Fork og Tauepinner vil sige ut.
Rent teknisk så vil Karm Fork sylinderne avgi olje. P.g.a areal differanse stangside kontra stempel side vil Tauepinne sylindere ta opp olje pga areal forholdet stang/stempelside.
Resterende olje vil gå til tank/Retur. Dette er mulig pga. at elektrisk velgeventil har bilde A+B til tank i midtstilling.
Videre har bremseventilen en enveis ventil innebygget.
Se pos. ELV1 på skisse nr.2

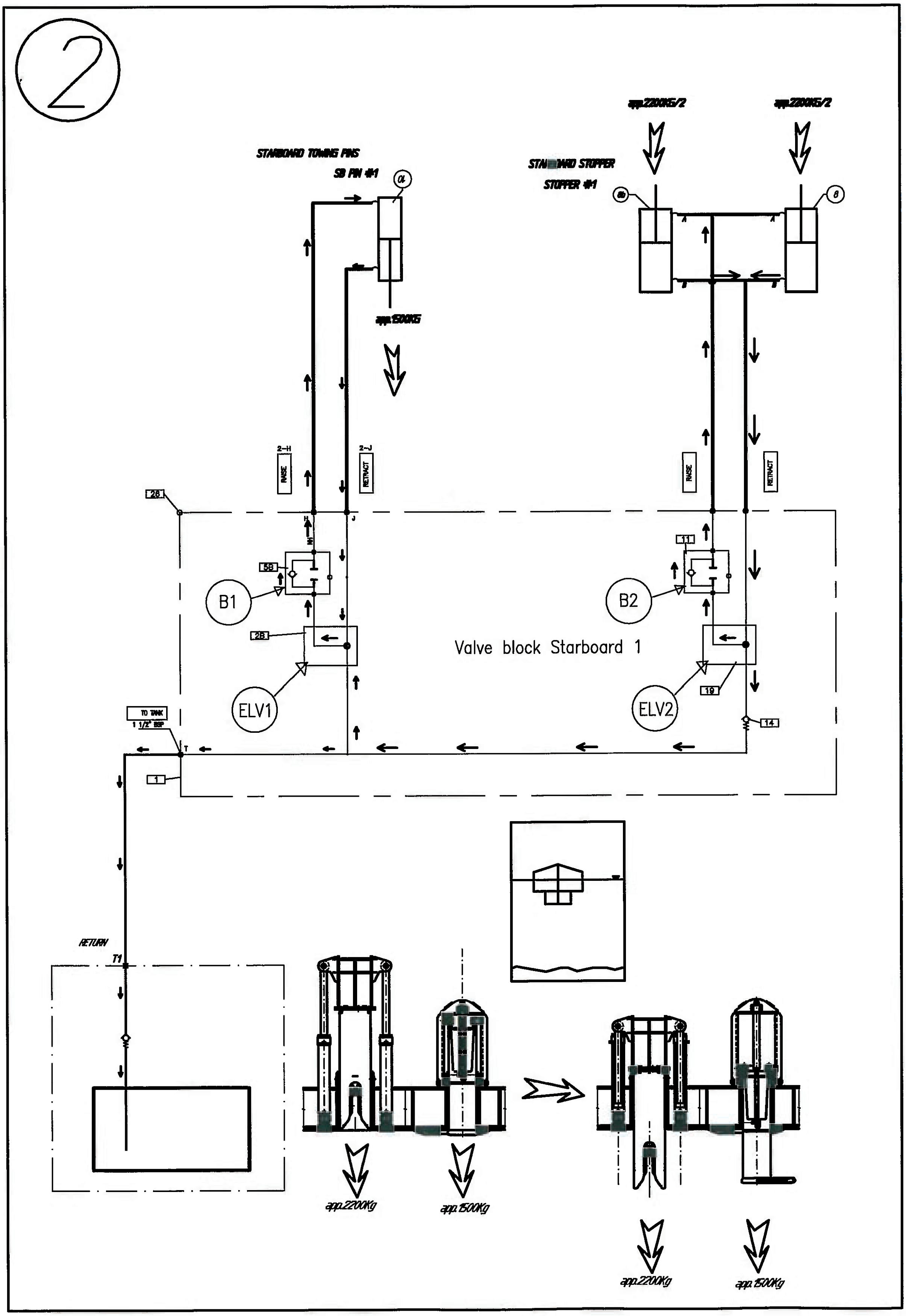
Båten har truffet bunn. Skisse Nr.3
Alle Karm Forkene og Tauepinner er oppe og holdes i den posisjon av bremseventilene, som også opprettholder last trykket av vekten på Stopperne og Tauepinner.

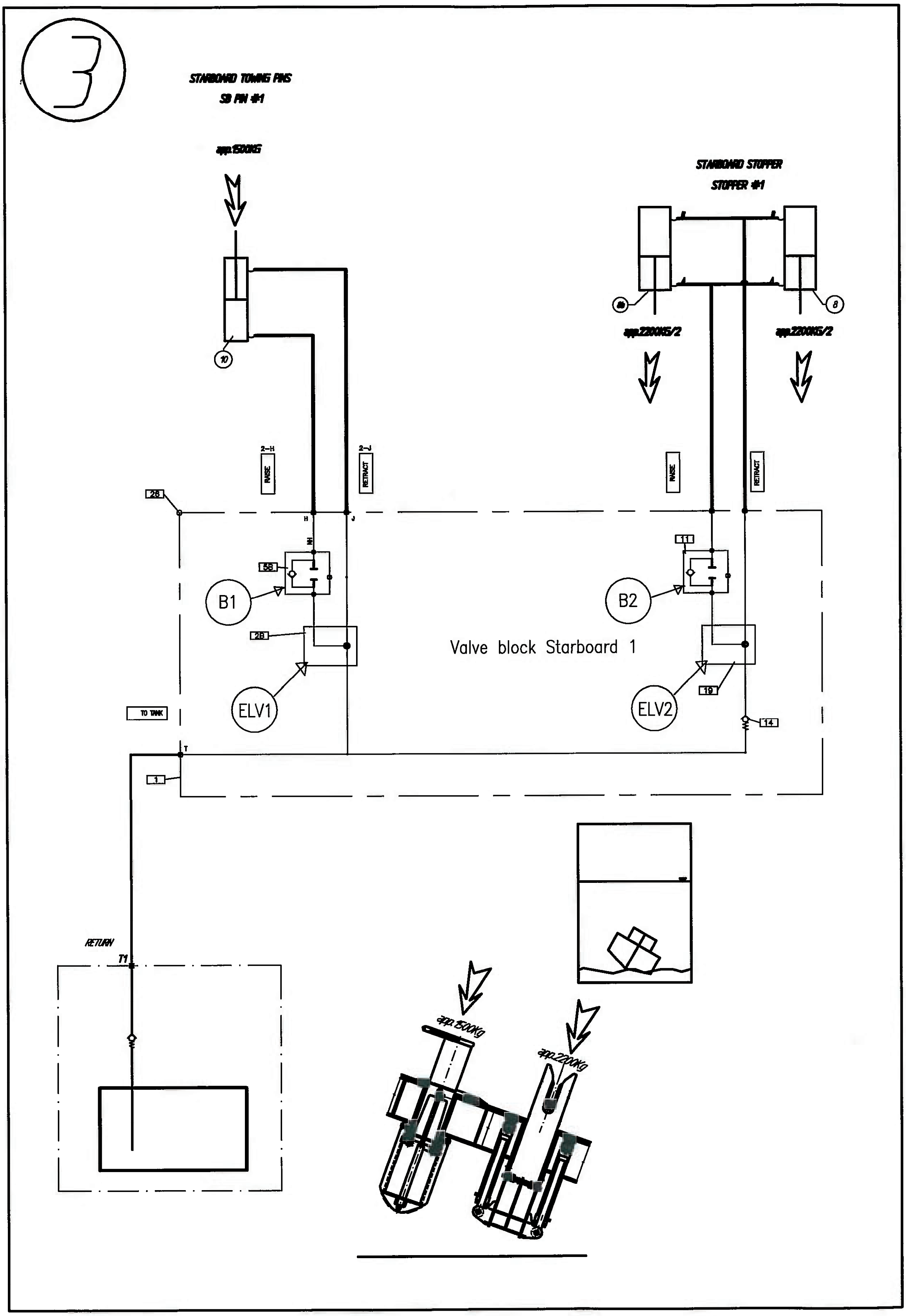
Hvis det skulle være behov for mer informasjon, så ta kontakt

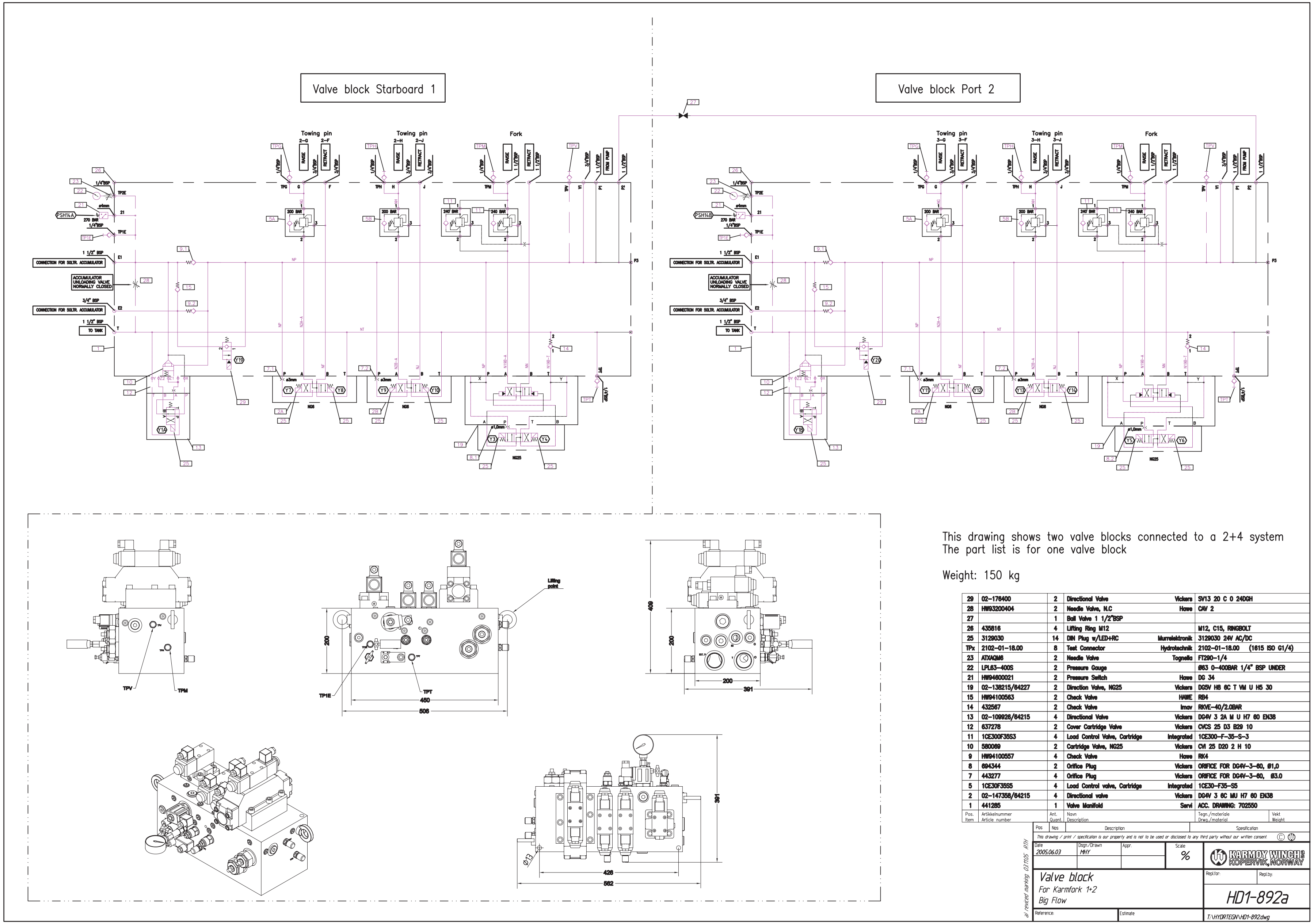
Med vennlig hilsen

Magne Hystad


1
STARBOARD TOWING PINS
SB PIN #1
app.1500KG
STARBOARD STOPPER
STOPPER #1
app.2200KG/2
app.2200KG/2
RAISE
RETRACT
RAISE
RETRACT
B1
B2
ELV1
ELV2
Valve block Starboard 1
TO TANK
RETURN
T1
app.1500Kg
app.2200Kg


2
STARBOARD TOWING PINS
SB PIN #1
STOPPER #1
B1
B2
ELV1
ELV2
Valve block Starboard 1
RETURN
app.2200Kg
app.1500Kg
app.2200Kg
app.1500Kg


3
STARBOARD TOWING PINS
SB PIN #1
STARBOARD STOPPER
STOPPER #1
RAISE
RETRACT
B1
B2
ELV1
ELV2
Valve block Starboard 1
TO TANK
RETURN
T1
app.1500Kg
app.2200Kg

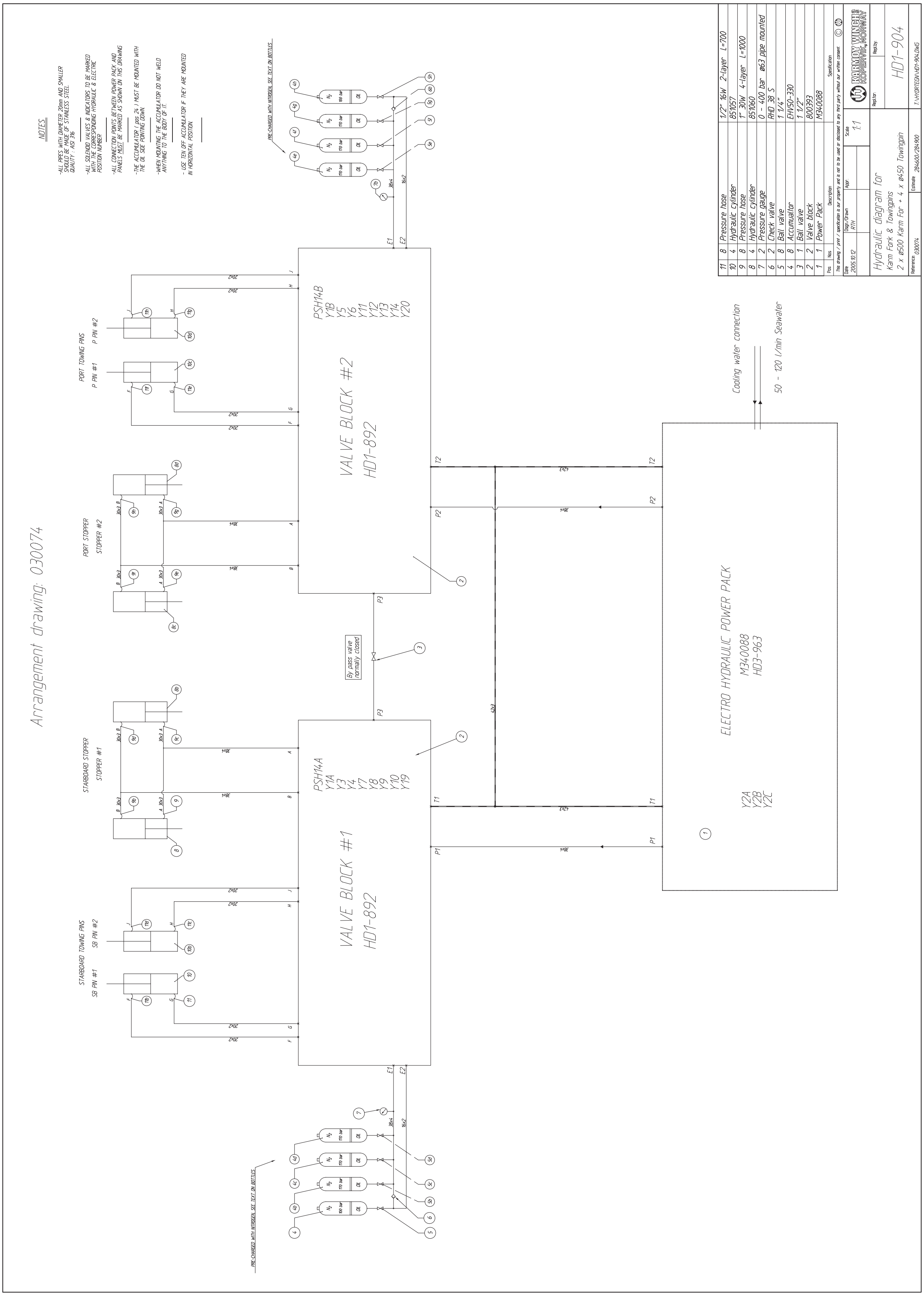


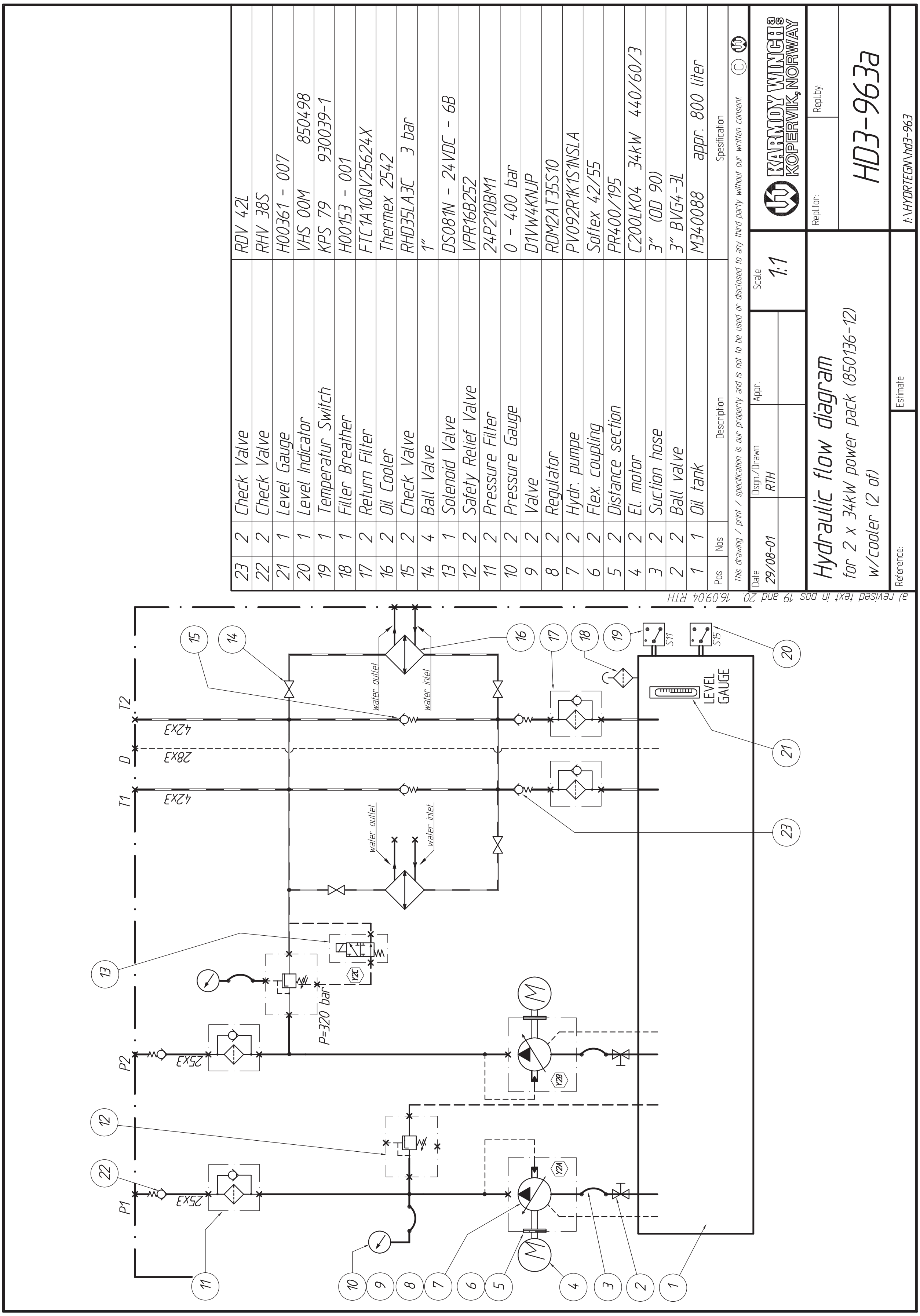
This drawing shows two valve blocks connected to a 2+4 system
The part list is for one valve block

Weight: 150 kg

Pos. Item	Artikkelnummer Article number	Ant. Quant.	Navn Description		Tegn./materiale Drwg./material	Vekt Weight
29	02-176400	2	Directional Valve	Vickers	SV13 20 C 0 24DGH	
28	HW93200404	2	Needle Valve, N.C	Hawe	CAV 2	
27		1	Ball Valve 1 1/2"BSP			
26	435816	4	Lifting Ring M12		M12, C15, RINGBOLT	
25	3129030	14	DIN Plug w/LED+RC	Murrelektronik	3129030 24V AC/DC	
TPx	2102-01-18.00	8	Test Connector	Hydrotechnik	2102-01-18.00 (1615 ISO G1/4)	
23	ATXAQM6	2	Needle Valve	Tognella	FT290-1/4	
22	LPL63-400S	2	Pressure Gauge		Ø63 0-400BAR 1/4" BSP UNDER	
21	HW94600021	2	Pressure Switch	Hawe	DG 34	
19	02-138215/64227	2	Direction Valve, NG25	Vickers	DG5V H8 6C T VM U H5 30	
15	HW94100563	2	Check Valve	HAWE	RB4	
14	432567	2	Check Valve	Imav	RKVE-40/2.0BAR	
13	02-109926/64215	4	Directional Valve	Vickers	DG4V 3 2A M U H7 60 EN38	
12	637278	2	Cover Cartridge Valve	Vickers	CVCS 25 D3 B29 10	
11	1CE300F35S3	4	Load Control Valve, Cartridge	Integrated	1CE300-F-35-S-3	
10	580069	2	Cartridge Valve, NG25	Vickers	CVI 25 D20 2 H 10	
9	HW94100557	4	Check Valve	Hawe	RK4	
8	694344	2	Orifice Plug	Vickers	ORIFICE FOR DG4V-3-60, Ø1,0	
7	443277	4	Orifice Plug	Vickers	ORIFICE FOR DG4V-3-60, Ø3.0	
5	1CE30F35S5	4	Load Control valve, Cartridge	Integrated	1CE30-F35-S5	
2	02-147358/64215	4	Directional valve	Vickers	DG4V 3 6C MU H7 60 EN38	
1	441285	1	Valve Manifold	Servi	ACC. DRAWING: 702550	

Date	Dsgn./Drawn	Appr.	Scale
2005.06.03	MHY		%


Arrangement drawing: 030074
VALVE BLOCK #2
HD1-892
VALVE BLOCK #1
HD1-892
ELECTRO HYDRAULIC POWER PACK
M340088
HD3-963
Cooling water connection
50 - 120 l/min Seawater
By pass valve normally closed
PORT TOWING PINS
STARBOARD TOWING PINS
PORT STOPPER
STARBOARD STOPPER
Hydraulic diagram for
HD1-904


Pos | Nos | Description | Specification
23 | 2 | Check Valve | RDV 42L
22 | 2 | Check Valve | RHV 38S
21 | 1 | Level Gauge | H00361 - 007
20 | 1 | Level Indicator | VHS 00M 850498
19 | 1 | Temperatur Switch | KPS 79 930039-1
18 | 1 | Filler Breather | H00153 - 001
17 | 2 | Return Filter | FTC1A10QV25624X
16 | 2 | Oil Cooler | Thermex 2542
15 | 2 | Check Valve | RHD35LA3C 3 bar
14 | 4 | Ball Valve | 1"
13 | 1 | Solenoid Valve | DS081N - 24VDC - 6B
12 | 2 | Safety Relief Valve | VPR16B252
11 | 2 | Pressure Filter | 24P210BM1
10 | 2 | Pressure Gauge | 0 - 400 bar
9 | 2 | Valve | D1VW4KNJP
8 | 2 | Regulator | RDM2AT35S10
7 | 2 | Hydr. pumpe | PV092R1K1S1NSLA
6 | 2 | Flex. coupling | Softex 42/55
5 | 2 | Distance section | PR400/195
4 | 2 | El. motor | C200LK04 34kW 440/60/3
3 | 2 | Suction hose | 3" (OD 90)
2 | 2 | Ball valve | 3" BVG4-3L
1 | 1 | Oil tank | M340088 appr. 800 liter
This drawing / print / specification is our property and is not to be used or disclosed to any third party without our written consent.
KARMOY WINCH as
KOPERVIK, NORWAY
Date 29/08-01
Dsgn./Drawn RTH
Appr.
Scale 1:1
Repl.for:
Repl.by:
Hydraulic flow diagram
for 2 x 34kW power pack (850136-12)
w/cooler (2 of)
Reference:
Estimate
HD3-963a
f:\HYDRTEGN\hd3-963
a) revised text in pos. 19 and 20. 16.09.04 RTH
T1
D
T2
P1
P2
42X3
28X3
25X3
water outlet
water inlet
LEVEL GAUGE
S11
S15
P=320 bar
Y2A
Y2B
Y2C

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 1
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L1.1

Avgang Lerwick, med rulledempningstank

FLOATING CONDITION DATA

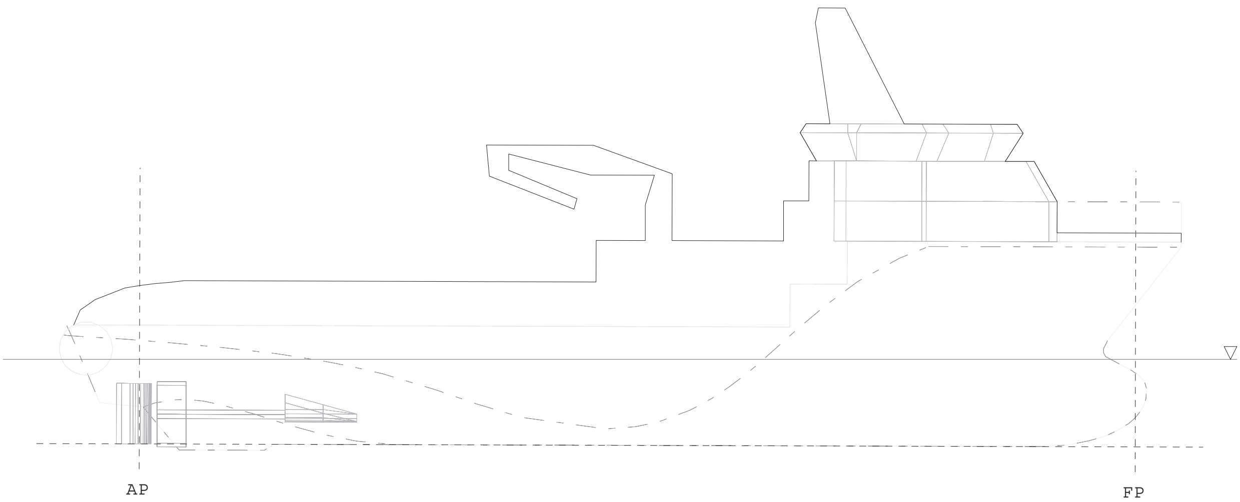
Mean Draught (moulded) :	5.797	m
Trim over Lpp (aft +) :	-0.203	m
List (starboard +) ... :	-0.534	°
Displacement .... :	4568.508	MT
LCB (rel. AP) .... :	31.863	m
VCB (rel. BL) .... :	3.202	m
LCF (rel. AP) .... :	27.423	m
Immersion .... :	10.290	MT/cm
Trim Moment .... :	52.251	MT*m/cm

WEIGHT SUMMARY

FO Avgang Lerwick	:	414.4 MT
FW Avgang Lerwick, rulledempni	:	151.0 MT
LO Avgang Lerwick	:	30.3 MT
WB Avgang Lerwick, rulledempni	:	242.9 MT
Andre Tanker Avgang Lerwick	:	35.3 MT
Wire på tromler	:	211.7 MT
Kjetting ombord Avgang Lerwick	:	226.8 MT
Last på dekk Avgang Lerwick	:	41.0 MT
Mannskap og proviant	:	13.5 MT
Total DEADWEIGHT	:	1366.9 MT

STABILITY DATA

KG (incl. FSC) .... :	7.101	m
Free Surface Correction:	0.446	m
KM (metacentre) ...... :	7.995	m
GM (incl. FSC) .... :	0.894	m

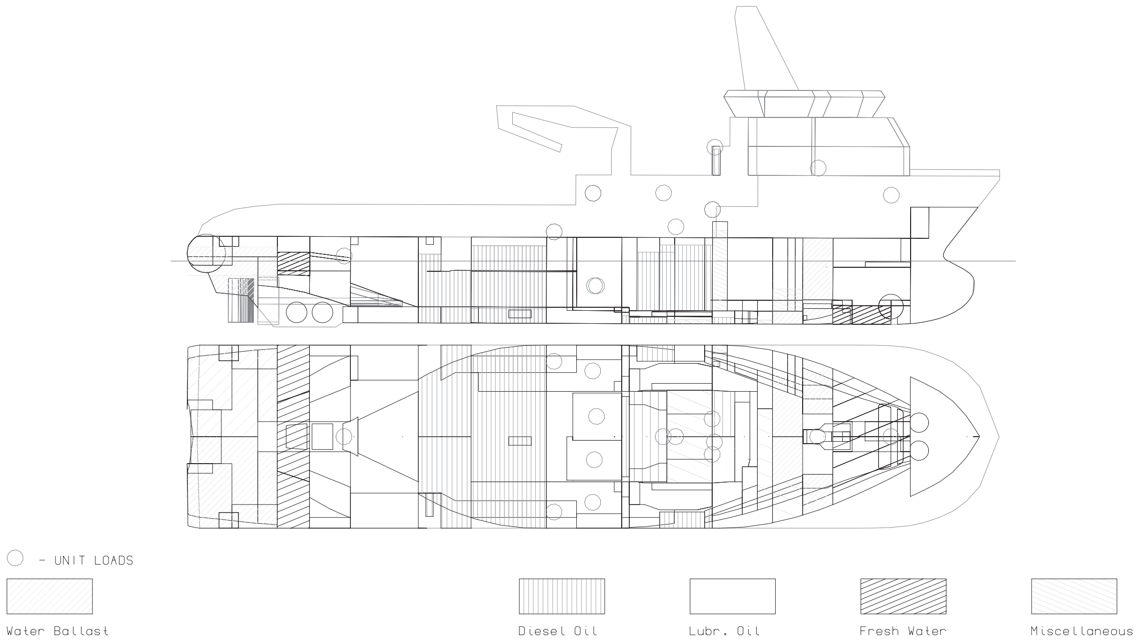


Water Density = 1.025 t/m3

Please note !
-Floating data are based on hydrostatic for upright vessel (zero heel). List is found by use of GM.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 2
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L1.1
Condition Id. text : Avgang Lerwick, med rulledempningstank



WEIGHT LOADS

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
1	FO Avgang Lerwick									
-	T13 FO DB/Wing Tank PS	84.306	90.0	0.8500	21.00	28.00	24.685	-6.906	2.708	0.50
-	T14 FO DB/Wing Tank SB	85.529	90.0	0.8500	21.00	28.00	24.634	6.875	2.673	0.50
-	T17 FO Centre Tank 2	58.600	90.0	0.8500	21.00	28.00	24.429	-0.096	0.602	317.73
-	T25 FO DB/Wing Tank PS	63.378	80.0	0.8500	16.10	21.00	18.575	-4.952	2.266	5.11
-	T26 FO DB/Wing Tank SB	62.902	80.0	0.8500	16.10	21.00	18.585	4.938	2.245	5.11
-	T71 FO Settl. Tank 1 PS	15.980	80.0	0.8500	36.40	39.90	38.133	-7.958	3.868	0.25
-	T74 FO Service Tank 2 SB	23.409	90.0	0.8500	38.50	43.40	40.877	7.919	4.436	0.37
-	T75 FO Drain Tank PS	4.420	50.0	0.8500	43.40	45.50	44.445	-2.120	0.300	11.32
-	T77 FO Overflow Tank	15.215	50.0	0.8500	35.00	39.20	37.133	0.000	0.262	167.52
-	T79 FO Em. Gen. Tank	0.688	90.0	0.8500	43.40	44.10	43.750	-6.760	15.014	0.01
		414.427					24.910	0.099	2.312	508.40
2	FW Avgang Lerwick, rulledempning									
-	T2 FW DB/Wing Tank PS	30.995	21.7	1.0000	54.60	61.80	57.121	-1.928	1.621	8.69
-	T3 FW DB/Wing Tank SB	30.993	21.8	1.0000	54.60	61.80	57.122	1.928	1.623	8.69
-	T31 WB Stab. Tank 2	88.980	60.0	1.0000	3.00	6.00	4.519	0.000	5.857	***
		150.969					26.118	0.000	4.118	17.38
3	LO Avgang Lerwick									
-	T90 LO Store Tank PS	12.612	75.0	0.9240	49.00	50.40	49.703	-5.872	4.383	1.84
-	T91 LO Tank Main Gear PS	6.445	75.0	0.9240	50.40	51.10	50.751	-5.516	4.397	1.00

.... to be continued on next page

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 3
Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
-	T92 LO Aux. Engine PS	6.514	75.0	0.9240	51.10	51.80	51.450	-5.268	4.402	1.03
-	T97 LO Drain Tank SB	2.518	25.0	0.9240	45.50	46.90	46.160	0.172	0.150	34.26
-	T99 LO Drop Tank SB	2.210	23.0	0.9240	43.40	45.50	44.445	2.119	0.138	12.30
		30.300					49.624	-4.581	3.728	50.42
4	WB Avgang Lerwick, rulledempning									
-	T32 WB Aft Peak Tank PS	48.707	45.0	1.0250	-5.40	3.00	-0.480	-2.913	4.934	59.94
-	T33 WB Aft Peak Tank SB	92.002	85.0	1.0250	-5.40	3.00	-1.115	4.350	5.738	71.92
-	T37 WB DB/Wing Tank PS	55.045	100.0	1.0250	49.00	54.60	52.345	-3.850	3.079	
-	T38 WB DB/Wing Tank SB	47.148	100.0	1.0250	49.00	54.60	52.208	4.031	3.388	
		242.902					21.477	0.974	4.518	131.86
5	Andre Tanker Avgang Lerwick									
-	T66 HP HO Store Tank PS	10.478	90.0	0.9240	43.40	44.80	44.131	-7.592	5.091	0.05
-	T67 HO Drop Tank	3.493	30.0	0.9240	47.60	49.00	48.292	0.864	0.208	45.22
-	T52 Sewage Tank SB	11.040	30.0	1.0000	49.00	51.80	50.410	5.343	2.742	1.84
-	T80 Bilge Water Tank SB	5.130	30.0	1.0000	39.20	43.40	41.300	2.150	0.141	27.83
-	T83 Sludge Tank PS	5.130	30.0	1.0000	39.20	43.40	41.300	-2.150	0.141	27.83
		35.271					45.685	-0.497	2.432	102.76
6	Wire på tromler									
-	Towing Wire SB	37.000					43.400	1.650	10.610	
-	Tugger Wire SB	2.100					32.300	6.100	12.100	
-	Tugger Wire PS	2.100					32.300	-6.100	12.100	
-	Working Wire PS	18.500					43.400	-1.650	10.610	
-	Spare Wire below Deck	37.000					9.200	0.000	6.200	
-	Anchor Winch Wire	78.000					38.850	0.000	12.140	
-	Secondary Winch Wire	37.000					43.600	0.500	16.400	
		211.700					35.561	0.232	11.444	
7	Kjetting ombord Avgang Lerwick									
-	Kjetting i Kasse 1 babord	113.400					32.650	-1.880	3.500	
-	Kjetting i kasse 1 styrb.	113.400					32.450	2.150	3.500	
		226.800					32.550	0.135	3.500	
8	Last på dekk Avgang Lerwick									
-	Anker styrbord	18.000					28.700	7.000	8.500	
-	Anker babord	18.000					28.700	-7.000	8.500	
-	Forskjellig på dekk	5.000					40.000	0.000	9.000	
		41.000					30.078	0.000	8.561	
9	Mannskap og proviant									
-	Mannskap	3.500					53.200	0.000	14.500	
-	Proviant	10.000					60.000	0.000	12.000	
		13.500					58.237	0.000	12.648	
	DEAD WEIGHT	1366.868					28.919	0.147	4.839	810.82
	LIGHT WEIGHT, Final	3201.600					33.100	-0.070	7.430	
	TOTAL WEIGHT	4568.468					31.849	-0.005	6.655	810.82

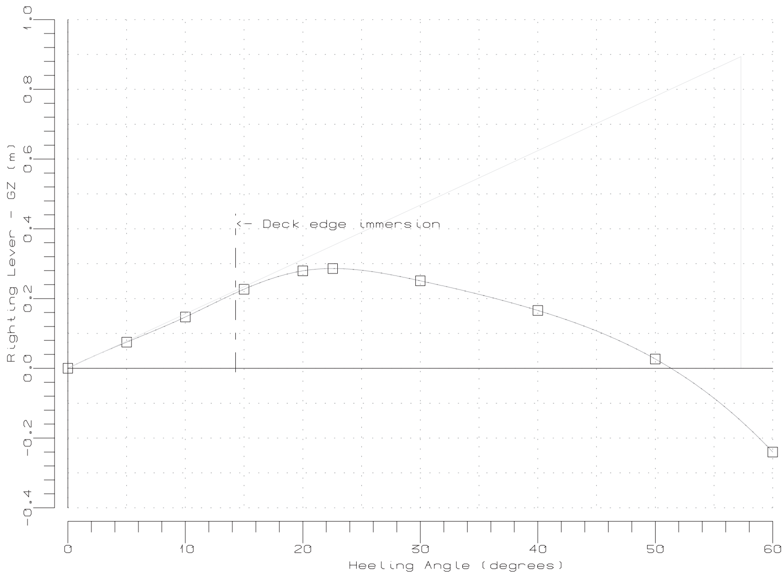
.... to be continued on next page

***) The center of the liquid in these tanks are allowed to shift with heel. The effect from this is incorporated in the calculated GZ-values. Subsequently the moment of inertia from these tanks are not used to calculate a constant Free Surface Moment applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 5
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L1.1
Condition Id. text : Avgang Lerwick, med rulledempningstank

INTACT STABILITY DATA (GZ-curve, Areas, Particulars & Criteria Control)



Angle (degr.)	GZ (m)	Area (m*rad)
0.000	0.000	0.0000
5.000	0.075	0.0034
10.000	0.147	0.0130
15.000	0.227	0.0294
20.000	0.280	0.0518
22.550	0.286	0.0644
30.000	0.251	0.0999
40.000	0.166	0.1367
50.000	0.027	0.1548
60.000	-0.240	0.1386

Deck immersion : 14.277 °
Maximum GZ at : 22.550 °
Area, 0 - 30 : 0.0999 m*rad
Area, 0 - 40 : 0.1367 m*rad
Area,30 - 40 : 0.0368 m*rad
Area, 0 - maxGZ: 0.0644 m*rad
GM : 0.894 m

Heel to port side
Applied VCG : 6.832 m
TCG : 0.003 m

Table of intact stability criteria

TYPE : Supply-vessel incl IMO Wind & Rolling

Code	Id. text		Actual value	Conclusion
GZMi1	Minimum GZ at angle greater than 30.0°	: 0.20 m	0.251	OK
GZAng	Minimum heel angle for GZmax, ð	: 15.00 °	22.550	OK
GMMin	Minimum GM	: 0.15 m	0.894	OK
GZAr2	Minimum GZarea (30.0-min<40.0,ß>)°	: 0.030 m·rad	0.037	OK
GZAr5	Minimum GZarea (0.0-ð)°, 15.0°<ð<30.0°	: 0.055+0.001·(30.0-ð) m·rad	0.064	OK
A.562	IMO A.749(18), Severe wind & rolling	Wind speed = 57.3 knots	----	OK

ß : flooding angle
ð : angle for maximum GZ
GZarea : area of righting lever

Stability conclusion .... : OK

Please note !

-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)

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/ PAGE 6
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L2.1

Lastekondisjon ved kantring, med rulledempningstk.

FLOATING CONDITION DATA

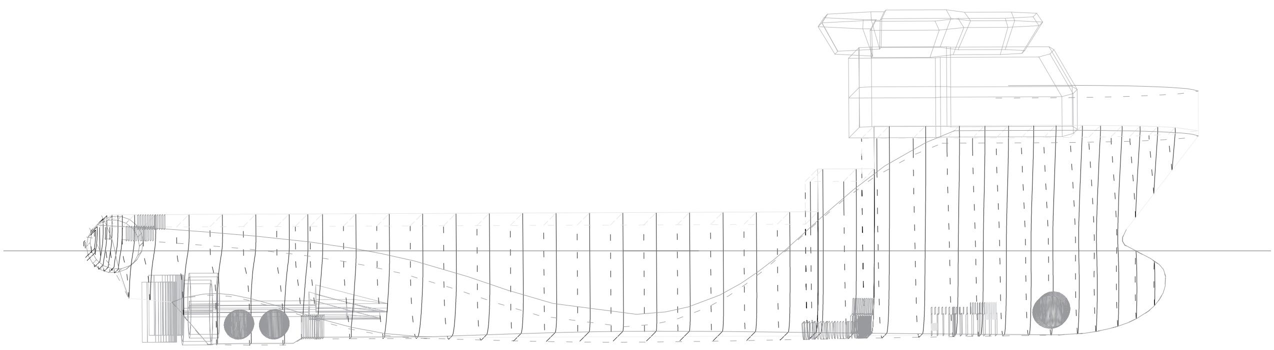
Mean Draught (moulded) :	5.808	m
Trim over Lpp (aft +) :	0.285	m
List (starboard +) ... :	-2.852	°
Displacement .... :	4640.071	MT
LCB (rel. AP) .... :	31.248	m
VCB (rel. BL) .... :	3.232	m
LCF (rel. AP) .... :	27.402	m
Immersion .... :	10.354	MT/cm
Trim Moment .... :	52.125	MT*m/cm

WEIGHT SUMMARY

Miscellaneous Mass Loads :	132.5	MT
FO ved kantring :	371.8	MT
FW ved kantring, rulledempning:	144.0	MT
LO ved kantring :	30.0	MT
WB ved kantring, rulledempning:	498.6	MT
Andre Tanker ved kantring :	39.0	MT
Wire på tromler :	211.7	MT
Kjetting ombord ved kantring :	7.0	MT
Last på dekk ved kantring :	23.0	MT
Mannskap og proviant :	13.5	MT
Total DEADWEIGHT :	1438.5	MT

STABILITY DATA

KG (incl. FSC) .... :	7.188	m
Free Surface Correction:	0.435	m
GM (GZ derived) ...... :	0.953	m



Water Density = 1.025 t/m3

Please note !
-Floating data are based on iterations incorporating calculation of exact list (heel giving zero righting lever).
-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the equilibrium calculation. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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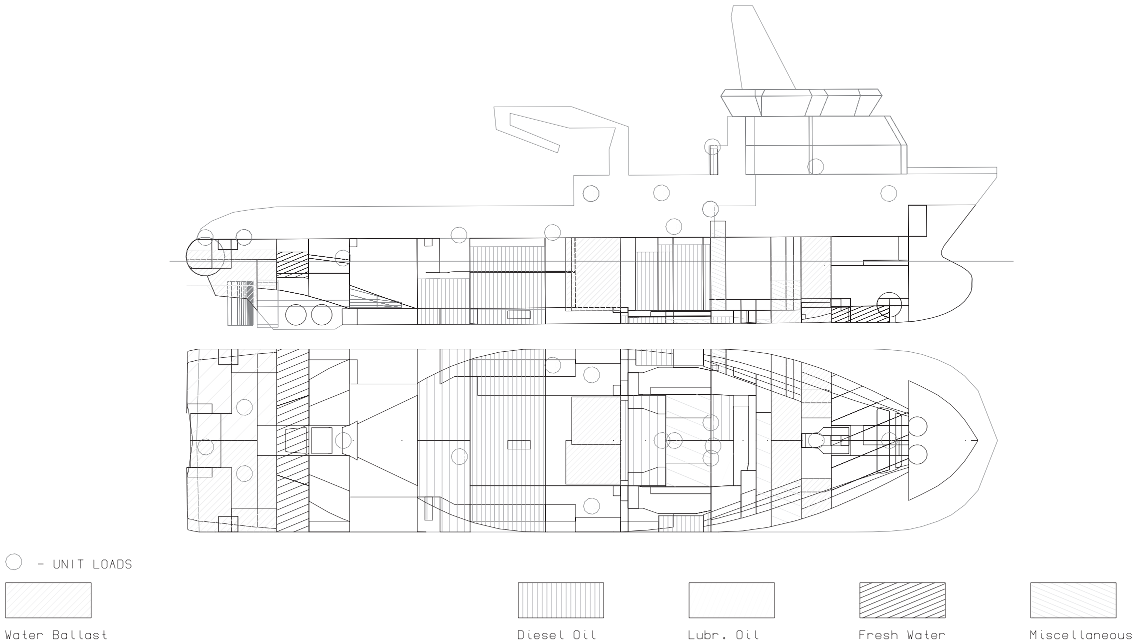
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L2.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.



WEIGHT LOADS

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
1	FO ved kantring									
-	T13 FO DB/Wing Tank PS	84.306	90.0	0.8500	21.00	28.00	24.685	-6.906	2.708	0.50
-	T14 FO DB/Wing Tank SB	85.529	90.0	0.8500	21.00	28.00	24.634	6.875	2.673	0.50
-	T17 FO Centre Tank 2	58.600	90.0	0.8500	21.00	28.00	24.429	-0.096	0.602	317.73
-	T25 FO DB/Wing Tank PS	41.988	53.0	0.8500	16.10	21.00	18.706	-3.926	1.326	7.04
-	T26 FO DB/Wing Tank SB	41.672	53.0	0.8500	16.10	21.00	18.707	3.905	1.313	6.95
-	T71 FO Settl. Tank 1 PS	15.980	80.0	0.8500	36.40	39.90	38.133	-7.958	3.868	0.25
-	T74 FO Service Tank 2 SB	23.409	90.0	0.8500	38.50	43.40	40.877	7.919	4.436	0.37
-	T75 FO Drain Tank PS	4.420	50.0	0.8500	43.40	45.50	44.445	-2.120	0.300	11.32
-	T77 FO Overflow Tank	15.215	50.0	0.8500	35.00	39.20	37.133	0.000	0.262	167.52
-	T79 FO Em. Gen. Tank	0.688	90.0	0.8500	43.40	44.10	43.750	-6.760	15.014	0.01
		371.807					25.664	0.114	2.108	512.17
2	FW ved kantring, rulledempning									
-	T2 FW DB/Wing Tank PS	27.500	19.2	1.0000	54.60	61.80	57.068	-1.851	1.479	7.96
-	T3 FW DB/Wing Tank SB	27.500	19.4	1.0000	54.60	61.80	57.069	1.852	1.481	7.96
-	T31 WB Stab. Tank 2	88.980	60.0	1.0000	3.00	6.00	4.518	-0.667	5.879	***
		143.980					24.592	-0.412	4.198	15.92
3	LO ved kantring									
-	T90 LO Store Tank PS	12.276	73.0	0.9240	49.00	50.40	49.703	-5.863	4.319	1.78
-	T91 LO Tank Main Gear PS	6.445	75.0	0.9240	50.40	51.10	50.751	-5.516	4.397	1.00

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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
-	T92 LO Aux. Engine PS	6.514	75.0	0.9240	51.10	51.80	51.450	-5.268	4.402	1.03
-	T97 LO Drain Tank SB	2.518	25.0	0.9240	45.50	46.90	46.160	0.172	0.150	34.26
-	T99 LO Drop Tank SB	2.210	23.0	0.9240	43.40	45.50	44.445	2.119	0.138	12.30
		29.963					49.623	-4.563	3.695	50.36
4	WB ved kantring, rulledempning									
-	T32 WB Aft Peak Tank PS	37.883	35.0	1.0250	-5.40	3.00	-0.354	-2.328	4.695	37.86
-	T33 WB Aft Peak Tank SB	92.002	85.0	1.0250	-5.40	3.00	-1.115	4.350	5.738	71.92
-	T37 WB DB/Wing Tank PS	55.045	100.0	1.0250	49.00	54.60	52.345	-3.850	3.079	
-	T38 WB DB/Wing Tank SB	47.148	100.0	1.0250	49.00	54.60	52.208	4.031	3.388	
-	T18 Rig Chain Locker 1 PS	137.141	100.0	1.0250	30.45	35.00	32.725	-1.832	4.659	
-	T19 Rig Chain Locker 1 SB	129.349	100.0	1.0250	29.90	35.00	32.427	2.166	4.670	
		498.568					27.898	0.640	4.569	109.78
5	Andre Tanker ved kantring									
-	T66 HP HO Store Tank PS	10.478	90.0	0.9240	43.40	44.80	44.131	-7.592	5.091	0.05
-	T67 HO Drop Tank	3.493	30.0	0.9240	47.60	49.00	48.292	0.864	0.208	45.22
-	T52 Sewage Tank SB	14.720	40.0	1.0000	49.00	51.80	50.409	5.425	3.157	2.39
-	T80 Bilge Water Tank SB	5.130	30.0	1.0000	39.20	43.40	41.300	2.150	0.141	27.83
-	T83 Sludge Tank PS	5.130	30.0	1.0000	39.20	43.40	41.300	-2.150	0.141	27.83
		38.951					46.131	0.086	2.619	103.31
6	Wire på tromler									
-	Towing Wire SB	37.000					43.400	1.650	10.610	
-	Tugger Wire SB	2.100					32.300	6.100	12.100	
-	Tugger Wire PS	2.100					32.300	-6.100	12.100	
-	Working Wire PS	18.500					43.400	-1.650	10.610	
-	Spare Wire below Deck	37.000					9.200	0.000	6.200	
-	Anchor Winch Wire	78.000					38.850	0.000	12.140	
-	Secondary Winch Wire	37.000					43.600	0.500	16.400	
		211.700					35.561	0.232	11.444	
7	Kjetting ombord ved kantring									
-	Kjetting på dekk	7.000					20.000	1.500	8.300	
8	Last på dekk ved kantring									
-	Anker babord	18.000					28.700	-7.000	8.500	
-	Forskjellig på dekk	5.000					40.000	0.000	9.000	
		23.000					31.157	-5.478	8.609	
9	Mannskap og proviant									
-	Mannskap	3.500					53.200	0.000	14.500	
-	Proviant	10.000					60.000	0.000	12.000	
		13.500					58.237	0.000	12.648	
10	Vertikal kraft kjetting	100.000					-3.600	0.600	8.170	
11	Horisontalt moment -	-32.500					0.000	3.080	8.170	
12	Horisontalt moment +	32.500					0.000	-3.080	8.170	
	DEAD WEIGHT	1438.471					27.173	-0.026	5.246	791.54

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SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
	LIGHT WEIGHT, Final	3201.600					33.100	-0.070	7.430	
	TOTAL WEIGHT	4640.071					31.262	-0.056	6.753	791.54

***) The center of the liquid in these tanks are allowed to shift with heel. The effect from this is incorporated in the calculated GZ-values. Subsequently the moment of inertia from these tanks are not used to calculate a constant Free Surface Moment applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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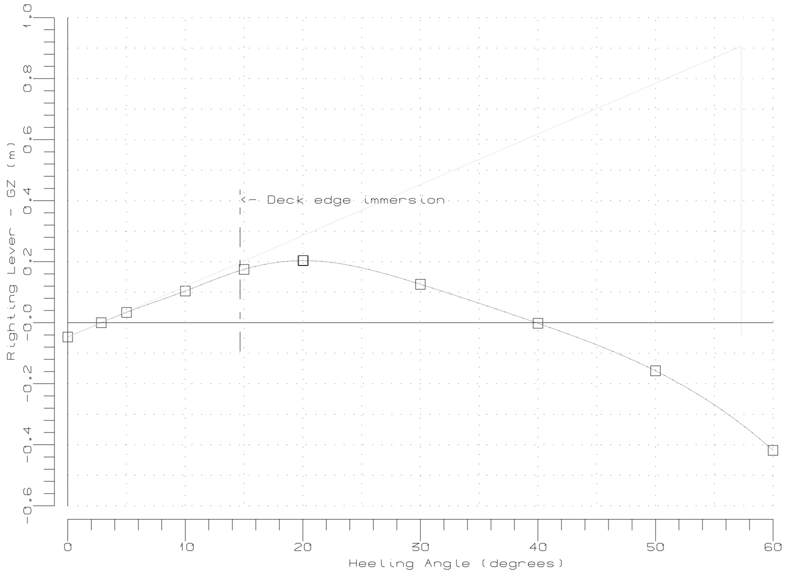
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L2.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.

INTACT STABILITY DATA (GZ-curve, Areas, Particulars & Criteria Control)



Angle (degr.)	GZ (m)	Area (m*rad)
0.000	-0.047	-0.0012
2.852	0.000	0.0000
5.000	0.034	0.0006
10.000	0.104	0.0067
15.000	0.175	0.0189
20.000	0.203	0.0359
20.050	0.203	0.0360
30.000	0.126	0.0664
40.000	-0.002	0.0774
50.000	-0.158	0.0643
60.000	-0.418	0.0162

Deck immersion : 14.658 °
Maximum GZ at : 20.050 °
Equilibrium at : 2.852 °
Area, 0 - 30 : 0.0675 m*rad
Area, 0 - 40 : 0.0786 m*rad
Area,30 - 40 : 0.0110 m*rad
Area, 0 - maxGZ: 0.0372 m*rad
GM : 0.953 m

Heel to port side
Applied VCG : 6.923 m
TCG : -0.044 m

Table of intact stability criteria

TYPE : Supply-vessel incl IMO Wind & Rolling

Code	Id. text		Actual value	Conclusion
GZMi1	Minimum GZ at angle greater than 30.0°	: 0.20 m	0.126	NOT OK
GZAng	Minimum heel angle for GZmax, ð	: 15.00 °	20.050	OK
GMMin	Minimum GM	: 0.15 m	0.953	OK
GZAr2	Minimum GZarea (30.0-min<40.0,ß>)°	: 0.030 m·rad	0.011	NOT OK
GZAr5	Minimum GZarea (0.0-ð)°, 15.0°<ð<30.0°	: 0.055+0.001·(30.0-ð) m·rad	0.035	NOT OK
A.562	IMO A.749(18), Severe wind & rolling	Wind speed = 57.3 knots	----	NOT OK

ß : flooding angle
ð : angle for maximum GZ
GZarea : area of righting lever

Stability conclusion .... : NOT OK

Please note !

The calculations of KGmax are based on upright vessel (TCG=0.0 m). If the actual calculations are based on TCG <> 0.0, the stability conclusion may not correspond with the presented stability margin. The conclusion will anyway be correct as it reflects the actual loading condition.

Please note !

-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the calculation of GZ-values. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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Project : Bourbon Dolphin File : Bo-Dolph

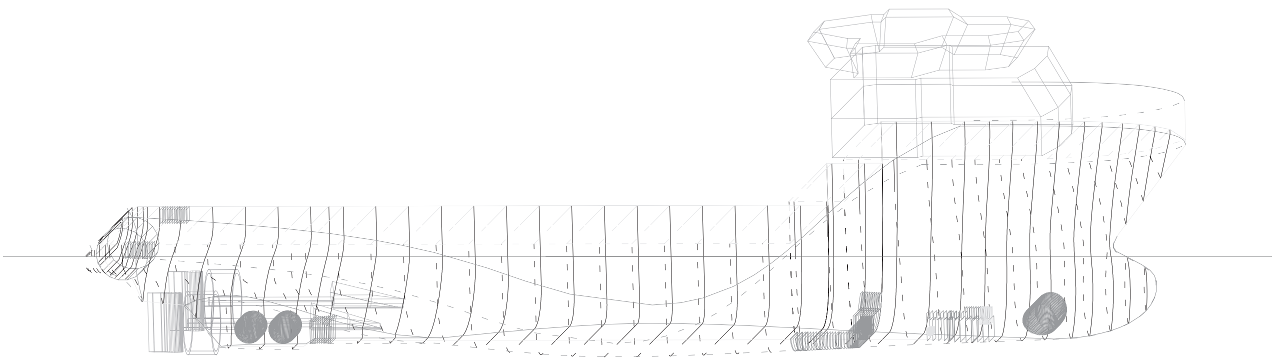
Loading Condition code : L3.1

Lastekondisjon ved kantring, med rulledempningstk.

FLOATING CONDITION DATA		
Mean Draught (moulded) :	5.729	m
Trim over Lpp (aft +) :	0.145	m
List (starboard +) ... :	-8.883	°
Displacement .... :	4640.071	MT
LCB (rel. AP) .... :	31.255	m
VCB (rel. BL) .... :	3.146	m
LCF (rel. AP) .... :	27.687	m
Immersion .... :	10.346	MT/cm
Trim Moment .... :	51.471	MT*m/cm

WEIGHT SUMMARY		
Miscellaneous Mass Loads :	149.5	MT
FO ved kantring :	371.8	MT
FW ved kantring, rulledempning:	144.0	MT
LO ved kantring :	30.0	MT
WB ved kantring, rulledempning:	498.6	MT
Andre Tanker ved kantring :	39.0	MT
Wire på tromler :	211.7	MT
Kjetting ombord ved kantring :	7.0	MT
Last på dekk ved kantring :	23.0	MT
Mannskap og proviant :	13.5	MT
Total DEADWEIGHT :	1438.5	MT

STABILITY DATA		
KG (incl. FSC) .... :	7.188	m
Free Surface Correction:	0.435	m
GM (GZ derived) ...... :	0.953	m



Water Density = 1.025 t/m3

Please note !
-Floating data are based on iterations incorporating calculation of exact list (heel giving zero righting lever).
-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the equilibrium calculation. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

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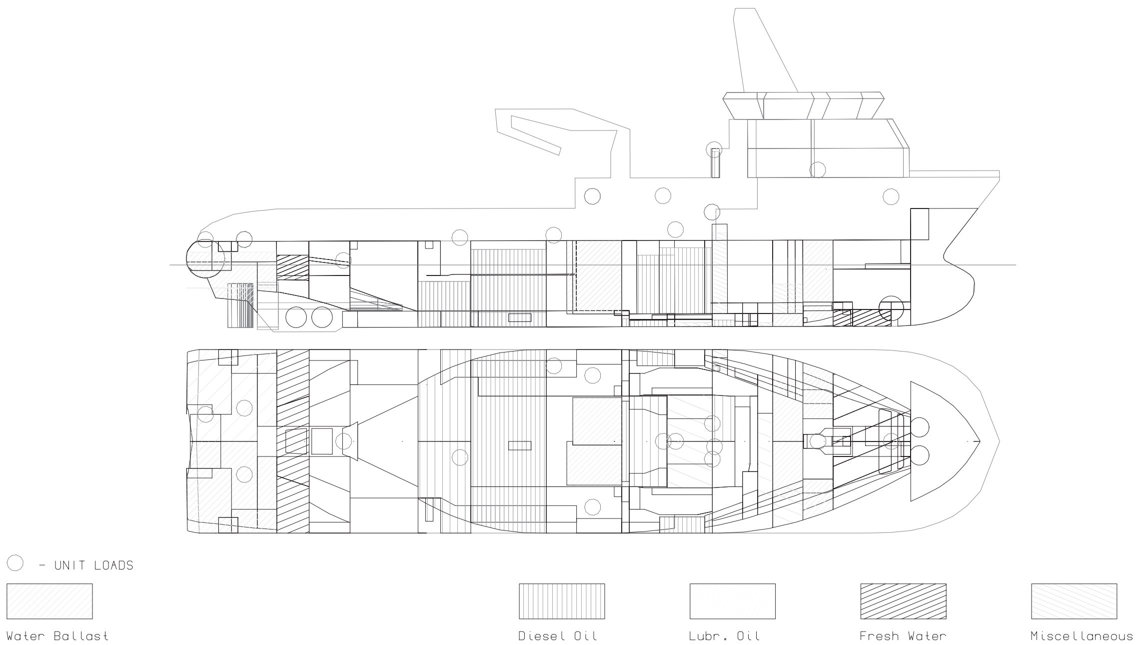
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.



WEIGHT LOADS

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
1	FO ved kantring									
-	T13 FO DB/Wing Tank PS	84.306	90.0	0.8500	21.00	28.00	24.685	-6.906	2.708	0.50
-	T14 FO DB/Wing Tank SB	85.529	90.0	0.8500	21.00	28.00	24.634	6.875	2.673	0.50
-	T17 FO Centre Tank 2	58.600	90.0	0.8500	21.00	28.00	24.429	-0.096	0.602	317.73
-	T25 FO DB/Wing Tank PS	41.988	53.0	0.8500	16.10	21.00	18.706	-3.926	1.326	7.04
-	T26 FO DB/Wing Tank SB	41.672	53.0	0.8500	16.10	21.00	18.707	3.905	1.313	6.95
-	T71 FO Settl. Tank 1 PS	15.980	80.0	0.8500	36.40	39.90	38.133	-7.958	3.868	0.25
-	T74 FO Service Tank 2 SB	23.409	90.0	0.8500	38.50	43.40	40.877	7.919	4.436	0.37
-	T75 FO Drain Tank PS	4.420	50.0	0.8500	43.40	45.50	44.445	-2.120	0.300	11.32
-	T77 FO Overflow Tank	15.215	50.0	0.8500	35.00	39.20	37.133	0.000	0.262	167.52
-	T79 FO Em. Gen. Tank	0.688	90.0	0.8500	43.40	44.10	43.750	-6.760	15.014	0.01
		371.807					25.664	0.114	2.108	512.17
2	FW ved kantring, rulledempning									
-	T2 FW DB/Wing Tank PS	27.500	19.2	1.0000	54.60	61.80	57.068	-1.851	1.479	7.96
-	T3 FW DB/Wing Tank SB	27.500	19.4	1.0000	54.60	61.80	57.069	1.852	1.481	7.96
-	T31 WB Stab. Tank 2	88.980	60.0	1.0000	3.00	6.00	4.517	-2.004	6.014	***
		143.980					24.592	-1.238	4.282	15.92
3	LO ved kantring									
-	T90 LO Store Tank PS	12.276	73.0	0.9240	49.00	50.40	49.703	-5.863	4.319	1.78
-	T91 LO Tank Main Gear PS	6.445	75.0	0.9240	50.40	51.10	50.751	-5.516	4.397	1.00

.... to be continued on next page

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
-	T92 LO Aux. Engine PS	6.514	75.0	0.9240	51.10	51.80	51.450	-5.268	4.402	1.03
-	T97 LO Drain Tank SB	2.518	25.0	0.9240	45.50	46.90	46.160	0.172	0.150	34.26
-	T99 LO Drop Tank SB	2.210	23.0	0.9240	43.40	45.50	44.445	2.119	0.138	12.30
		29.963					49.623	-4.563	3.695	50.36
4	WB ved kantring, rulledempning									
-	T32 WB Aft Peak Tank PS	37.883	35.0	1.0250	-5.40	3.00	-0.354	-2.328	4.695	37.86
-	T33 WB Aft Peak Tank SB	92.002	85.0	1.0250	-5.40	3.00	-1.115	4.350	5.738	71.92
-	T37 WB DB/Wing Tank PS	55.045	100.0	1.0250	49.00	54.60	52.345	-3.850	3.079	
-	T38 WB DB/Wing Tank SB	47.148	100.0	1.0250	49.00	54.60	52.208	4.031	3.388	
-	T18 Rig Chain Locker 1 PS	137.141	100.0	1.0250	30.45	35.00	32.725	-1.832	4.659	
-	T19 Rig Chain Locker 1 SB	129.349	100.0	1.0250	29.90	35.00	32.427	2.166	4.670	
		498.568					27.898	0.640	4.569	109.78
5	Andre Tanker ved kantring									
-	T66 HP HO Store Tank PS	10.478	90.0	0.9240	43.40	44.80	44.131	-7.592	5.091	0.05
-	T67 HO Drop Tank	3.493	30.0	0.9240	47.60	49.00	48.292	0.864	0.208	45.22
-	T52 Sewage Tank SB	14.720	40.0	1.0000	49.00	51.80	50.409	5.425	3.157	2.39
-	T80 Bilge Water Tank SB	5.130	30.0	1.0000	39.20	43.40	41.300	2.150	0.141	27.83
-	T83 Sludge Tank PS	5.130	30.0	1.0000	39.20	43.40	41.300	-2.150	0.141	27.83
		38.951					46.131	0.086	2.619	103.31
6	Wire på tromler									
-	Towing Wire SB	37.000					43.400	1.650	10.610	
-	Tugger Wire SB	2.100					32.300	6.100	12.100	
-	Tugger Wire PS	2.100					32.300	-6.100	12.100	
-	Working Wire PS	18.500					43.400	-1.650	10.610	
-	Spare Wire below Deck	37.000					9.200	0.000	6.200	
-	Anchor Winch Wire	78.000					38.850	0.000	12.140	
-	Secondary Winch Wire	37.000					43.600	0.500	16.400	
		211.700					35.561	0.232	11.444	
7	Kjetting ombord ved kantring									
-	Kjetting på dekk	7.000					20.000	1.500	8.300	
8	Last på dekk ved kantring									
-	Anker babord	18.000					28.700	-7.000	8.500	
-	Forskjellig på dekk	5.000					40.000	0.000	9.000	
		23.000					31.157	-5.478	8.609	
9	Mannskap og proviant									
-	Mannskap	3.500					53.200	0.000	14.500	
-	Proviant	10.000					60.000	0.000	12.000	
		13.500					58.237	0.000	12.648	
10	Vertikal kraft kjetting	100.000					-3.600	-2.500	8.170	
11	Horisontalt moment -	-49.500					0.000	3.080	8.170	
12	Horisontalt moment +	49.500					0.000	-3.080	8.170	
	DEAD WEIGHT	1438.471					27.173	-0.397	5.254	791.54

.... to be continued on next page

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
	LIGHT WEIGHT, Final	3201.600					33.100	-0.070	7.430	
	TOTAL WEIGHT	4640.071					31.262	-0.172	6.755	791.54

***) The center of the liquid in these tanks are allowed to shift with heel. The effect from this is incorporated in the calculated GZ-values. Subsequently the moment of inertia from these tanks are not used to calculate a constant Free Surface Moment applied to artificially raise the VCG of the loading condition.

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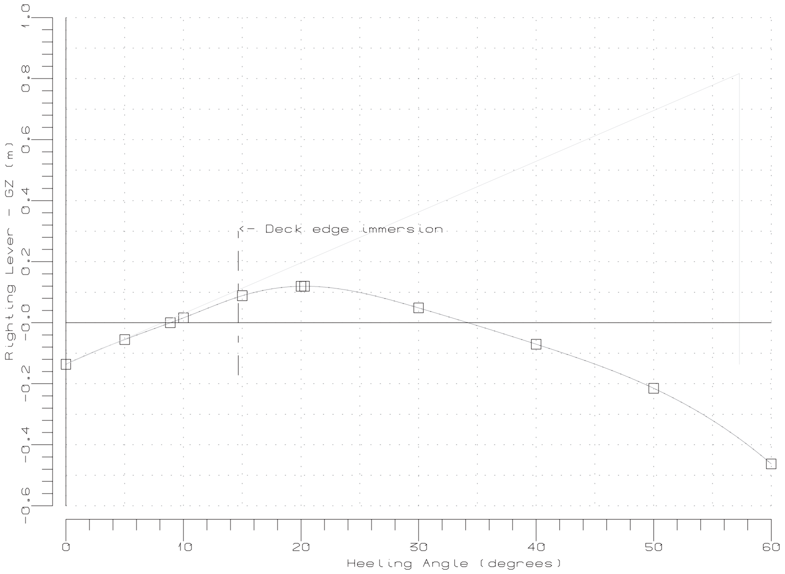
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.

INTACT STABILITY DATA (GZ-curve, Areas, Particulars & Criteria Control)



Angle (degr.)	GZ (m)	Area (m*rad)
0.000	-0.136	-0.0101
5.000	-0.055	-0.0019
8.883	0.000	0.0000
10.000	0.016	0.0002
15.000	0.088	0.0048
20.000	0.120	0.0143
20.300	0.120	0.0149
30.000	0.048	0.0307
40.000	-0.070	0.0289
50.000	-0.215	0.0049
60.000	-0.463	-0.0521

Deck immersion : 14.658 °
Maximum GZ at : 20.300 °
Equilibrium at : 8.883 °
Area, 0 - 30 : 0.0408 m*rad
Area, 0 - 40 : 0.0390 m*rad
Area,30 - 40 : -0.0017 m*rad
Area, 0 - maxGZ: 0.0250 m*rad
GM : 0.953 m

Heel to port side
Applied VCG : 6.923 m
TCG : -0.133 m

Table of intact stability criteria

TYPE : Supply-vessel incl IMO Wind & Rolling

Code	Id. text		Actual value	Concl-usion
GZMi1	Minimum GZ at angle greater than 30.0°	: 0.20 m	0.048	NOT OK
GZAng	Minimum heel angle for GZmax, ð	: 15.00 °	20.300	OK
GMMin	Minimum GM	: 0.15 m	0.953	OK
GZAr2	Minimum GZarea (30.0-min<40.0,ß>)°	: 0.030 m·rad	-0.002	NOT OK
GZAr5	Minimum GZarea (0.0-ð)°, 15.0°<ð<30.0°	: 0.055+0.001·(30.0-ð) m·rad	0.005	NOT OK
A.562	IMO A.749(18), Severe wind & rolling	Wind speed = 57.3 knots	----	NOT OK

ß : flooding angle
ð : angle for maximum GZ
GZarea : area of righting lever

Stability conclusion .... : NOT OK

Please note !

The calculations of KGmax are based on upright vessel (TCG=0.0 m). If the actual calculations are based on TCG <> 0.0, the stability conclusion may not correspond with the presented stability margin. The conclusion will anyway be correct as it reflects the actual loading condition.

Please note !

-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the calculation of GZ-values. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.1

Lastekondisjon ved kantring, med rulledempningstk.

FLOATING CONDITION DATA

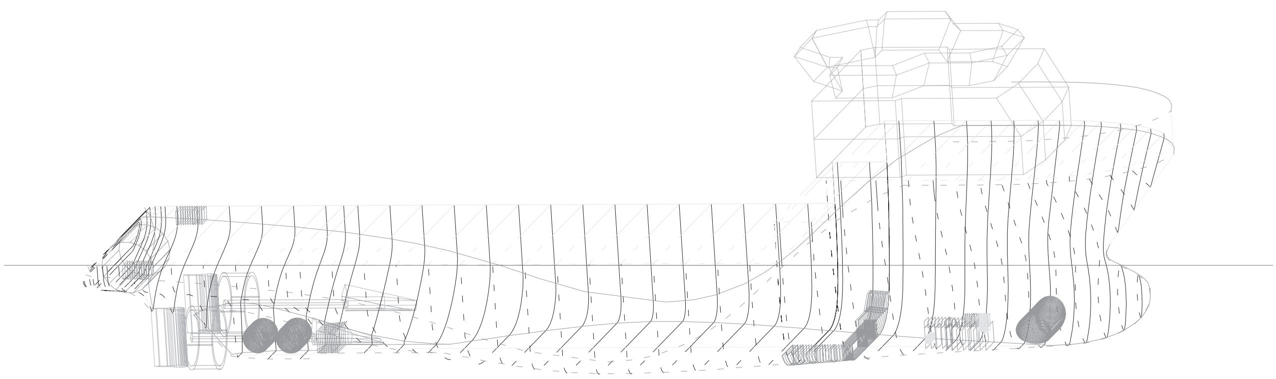
Mean Draught (moulded) :	5.620	m
Trim over Lpp (aft +) :	0.275	m
List (starboard +) ... :	-13.945	°
Displacement .... :	4681.873	MT
LCB (rel. AP) .... :	30.937	m
VCB (rel. BL) .... :	3.029	m
LCF (rel. AP) .... :	28.465	m
Immersion .... :	10.146	MT/cm
Trim Moment .... :	48.087	MT*m/cm

WEIGHT SUMMARY

Miscellaneous Mass Loads :	237.8	MT
FO ved kantring :	371.8	MT
FW ved kantring, rulledempning:	144.0	MT
LO ved kantring :	30.0	MT
WB ved kantring, rulledempning:	498.6	MT
Andre Tanker ved kantring :	39.0	MT
Wire på tromler :	211.7	MT
Kjetting ombord ved kantring :	7.0	MT
Last på dekk ved kantring :	23.0	MT
Mannskap og proviant :	13.5	MT
Total DEADWEIGHT :	1480.3	MT

STABILITY DATA

KG (incl. FSC) .... :	7.196	m
Free Surface Correction:	0.431	m
GM (GZ derived) ...... :	1.000	m



Water Density = 1.025 t/m3

Please note !
-Floating data are based on iterations incorporating calculation of exact list (heel giving zero righting lever).
-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the equilibrium calculation. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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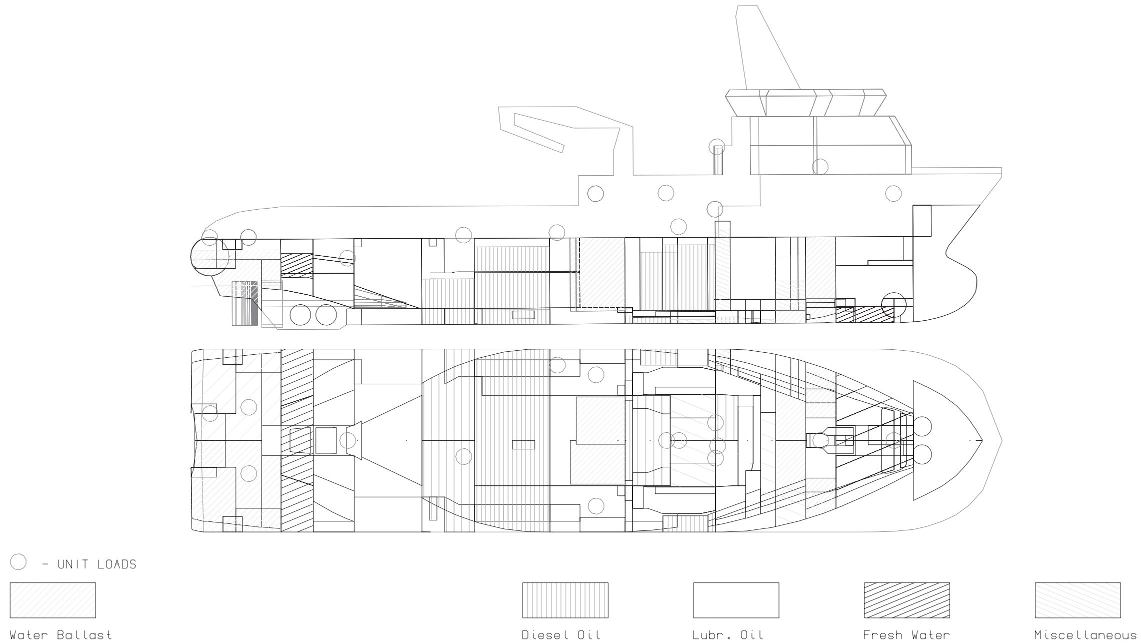
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.



WEIGHT LOADS

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
1	FO ved kantring									
-	T13 FO DB/Wing Tank PS	84.306	90.0	0.8500	21.00	28.00	24.685	-6.906	2.708	0.50
-	T14 FO DB/Wing Tank SB	85.529	90.0	0.8500	21.00	28.00	24.634	6.875	2.673	0.50
-	T17 FO Centre Tank 2	58.600	90.0	0.8500	21.00	28.00	24.429	-0.096	0.602	317.73
-	T25 FO DB/Wing Tank PS	41.988	53.0	0.8500	16.10	21.00	18.706	-3.926	1.326	7.04
-	T26 FO DB/Wing Tank SB	41.672	53.0	0.8500	16.10	21.00	18.707	3.905	1.313	6.95
-	T71 FO Settl. Tank 1 PS	15.980	80.0	0.8500	36.40	39.90	38.133	-7.958	3.868	0.25
-	T74 FO Service Tank 2 SB	23.409	90.0	0.8500	38.50	43.40	40.877	7.919	4.436	0.37
-	T75 FO Drain Tank PS	4.420	50.0	0.8500	43.40	45.50	44.445	-2.120	0.300	11.32
-	T77 FO Overflow Tank	15.215	50.0	0.8500	35.00	39.20	37.133	0.000	0.262	167.52
-	T79 FO Em. Gen. Tank	0.688	90.0	0.8500	43.40	44.10	43.750	-6.760	15.014	0.01
		371.807					25.664	0.114	2.108	512.17
2	FW ved kantring, rulledempning									
-	T2 FW DB/Wing Tank PS	27.500	19.2	1.0000	54.60	61.80	57.068	-1.851	1.479	7.96
-	T3 FW DB/Wing Tank SB	27.500	19.4	1.0000	54.60	61.80	57.069	1.852	1.481	7.96
-	T31 WB Stab. Tank 2	88.980	60.0	1.0000	3.00	6.00	4.514	-2.583	6.127	***
		143.980					24.590	-1.596	4.352	15.92
3	LO ved kantring									
-	T90 LO Store Tank PS	12.276	73.0	0.9240	49.00	50.40	49.703	-5.863	4.319	1.78
-	T91 LO Tank Main Gear PS	6.445	75.0	0.9240	50.40	51.10	50.751	-5.516	4.397	1.00

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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
-	T92 LO Aux. Engine PS	6.514	75.0	0.9240	51.10	51.80	51.450	-5.268	4.402	1.03
-	T97 LO Drain Tank SB	2.518	25.0	0.9240	45.50	46.90	46.160	0.172	0.150	34.26
-	T99 LO Drop Tank SB	2.210	23.0	0.9240	43.40	45.50	44.445	2.119	0.138	12.30
		29.963					49.623	-4.563	3.695	50.36
4	WB ved kantring, rulledempning									
-	T32 WB Aft Peak Tank PS	37.883	35.0	1.0250	-5.40	3.00	-0.354	-2.328	4.695	37.86
-	T33 WB Aft Peak Tank SB	92.002	85.0	1.0250	-5.40	3.00	-1.115	4.350	5.738	71.92
-	T37 WB DB/Wing Tank PS	55.045	100.0	1.0250	49.00	54.60	52.345	-3.850	3.079	
-	T38 WB DB/Wing Tank SB	47.148	100.0	1.0250	49.00	54.60	52.208	4.031	3.388	
-	T18 Rig Chain Locker 1 PS	137.141	100.0	1.0250	30.45	35.00	32.725	-1.832	4.659	
-	T19 Rig Chain Locker 1 SB	129.349	100.0	1.0250	29.90	35.00	32.427	2.166	4.670	
		498.568					27.898	0.640	4.569	109.78
5	Andre Tanker ved kantring									
-	T66 HP HO Store Tank PS	10.478	90.0	0.9240	43.40	44.80	44.131	-7.592	5.091	0.05
-	T67 HO Drop Tank	3.493	30.0	0.9240	47.60	49.00	48.292	0.864	0.208	45.22
-	T52 Sewage Tank SB	14.720	40.0	1.0000	49.00	51.80	50.409	5.425	3.157	2.39
-	T80 Bilge Water Tank SB	5.130	30.0	1.0000	39.20	43.40	41.300	2.150	0.141	27.83
-	T83 Sludge Tank PS	5.130	30.0	1.0000	39.20	43.40	41.300	-2.150	0.141	27.83
		38.951					46.131	0.086	2.619	103.31
6	Wire på tromler									
-	Towing Wire SB	37.000					43.400	1.650	10.610	
-	Tugger Wire SB	2.100					32.300	6.100	12.100	
-	Tugger Wire PS	2.100					32.300	-6.100	12.100	
-	Working Wire PS	18.500					43.400	-1.650	10.610	
-	Spare Wire below Deck	37.000					9.200	0.000	6.200	
-	Anchor Winch Wire	78.000					38.850	0.000	12.140	
-	Secondary Winch Wire	37.000					43.600	0.500	16.400	
		211.700					35.561	0.232	11.444	
7	Kjetting ombord ved kantring									
-	Kjetting på dekk	7.000					20.000	1.500	8.300	
8	Last på dekk ved kantring									
-	Anker babord	18.000					28.700	-7.000	8.500	
-	Forskjellig på dekk	5.000					40.000	0.000	9.000	
		23.000					31.157	-5.478	8.609	
9	Mannskap og proviant									
-	Mannskap	3.500					53.200	0.000	14.500	
-	Proviant	10.000					60.000	0.000	12.000	
		13.500					58.237	0.000	12.648	
10	Vertikal kraft kjetting	141.800					-3.600	-2.500	8.170	
11	Horisontalt moment -	-96.000					0.000	3.080	8.170	
12	Horisontalt moment +	96.000					0.000	-3.080	8.170	
	DEAD WEIGHT	1480.271					26.303	-0.685	5.343	791.54

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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
	LIGHT WEIGHT, Final	3201.600					33.100	-0.070	7.430	
	TOTAL WEIGHT	4681.871					30.951	-0.264	6.770	791.54

***) The center of the liquid in these tanks are allowed to shift with heel. The effect from this is incorporated in the calculated GZ-values. Subsequently the moment of inertia from these tanks are not used to calculate a constant Free Surface Moment applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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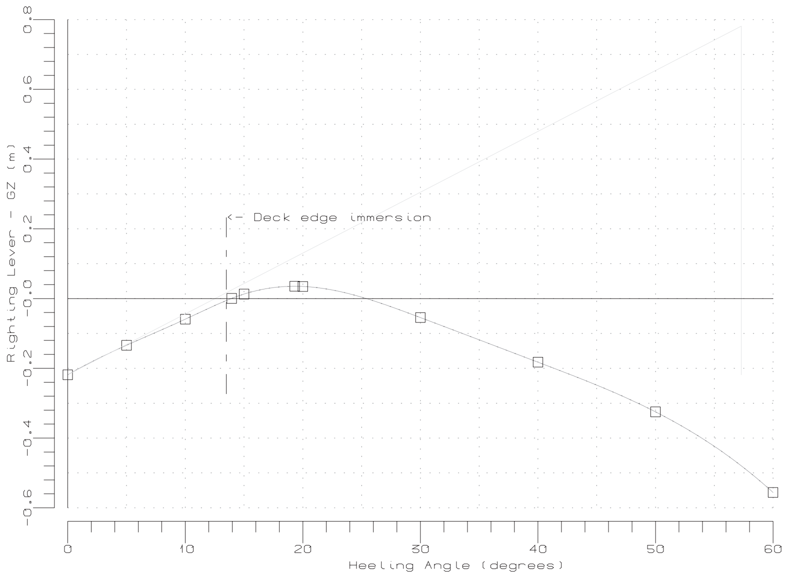
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.1
Condition Id. text : Lastekondisjon ved kantring, med rulledempningstk.

INTACT STABILITY DATA (GZ-curve, Areas, Particulars & Criteria Control)



Angle (degr.)	GZ (m)	Area (m*rad)
0.000	-0.219	-0.0256
5.000	-0.134	-0.0104
10.000	-0.059	-0.0020
13.945	0.000	0.0000
15.000	0.013	0.0001
19.300	0.035	0.0022
20.000	0.035	0.0026
30.000	-0.055	0.0025
40.000	-0.182	-0.0181
50.000	-0.325	-0.0618
60.000	-0.556	-0.1367

Deck immersion : 13.496 °
Maximum GZ at : 19.300 °
Equilibrium at : 13.945 °
Area, 0 - 30 : 0.0282 m*rad
Area, 0 - 40 : 0.0075 m*rad
Area,30 - 40 : -0.0207 m*rad
Area, 0 - maxGZ: 0.0279 m*rad
GM : 1.000 m

Heel to port side
Applied VCG : 6.934 m
TCG : -0.215 m

Table of intact stability criteria

TYPE : Supply-vessel incl IMO Wind & Rolling

Code	Id. text		Actual value	Conclusion
GZMi1	Minimum GZ at angle greater than 30.0°	: 0.20 m	-0.055	NOT OK
GZAng	Minimum heel angle for GZmax, ð	: 15.00 °	19.300	OK
GMMin	Minimum GM	: 0.15 m	1.000	OK
GZAr2	Minimum GZarea (30.0-min<40.0,ß>)°	: 0.030 m·rad	-0.021	NOT OK
GZAr5	Minimum GZarea (0.0-ð)°, 15.0°<ð<30.0°	: 0.055+0.001·(30.0-ð) m·rad	-0.023	NOT OK
A.562	IMO A.749(18), Severe wind & rolling	Wind speed = 57.3 knots	----	NOT OK

ß : flooding angle
ð : angle for maximum GZ
GZarea : area of righting lever

Stability conclusion .... : NOT OK

Please note !

The calculations of KGmax are based on upright vessel (TCG=0.0 m). If the actual calculations are based on TCG <> 0.0, the stability conclusion may not correspond with the presented stability margin. The conclusion will anyway be correct as it reflects the actual loading condition.

Please note !

-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)
-The center of the liquid in some or all tanks are allowed to shift with heel. The effect from this is incorporated in the calculation of GZ-values. Subsequently, the moment of inertia from these tanks are not contributing to the constant "Free Surface Moment" applied to artificially raise the VCG of the loading condition.

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.2

Lastekondisjon ved kantring, uten rulledempningstk

FLOATING CONDITION DATA

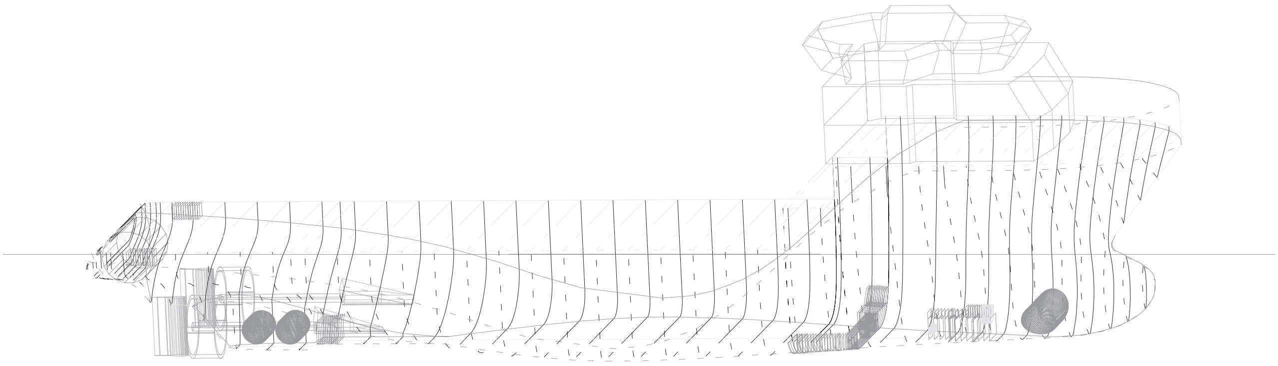
Mean Draught (moulded) :	5.658	m
Trim over Lpp (aft +) :	0.059	m
List (starboard +) ... :	-11.770	°
Displacement .... :	4637.154	MT
LCB (rel. AP) .... :	31.251	m
VCB (rel. BL) .... :	3.072	m
LCF (rel. AP) .... :	28.118	m
Immersion .... :	10.293	MT/cm
Trim Moment .... :	49.764	MT*m/cm

WEIGHT SUMMARY

Miscellaneous Mass Loads :	237.8	MT
FO ved kantring :	371.8	MT
FW ved kantring :	144.0	MT
LO ved kantring :	30.0	MT
WB ved kantring :	453.8	MT
Andre Tanker ved kantring :	39.0	MT
Wire på tromler :	211.7	MT
Kjetting ombord ved kantring :	7.0	MT
Last på dekk ved kantring :	23.0	MT
Mannskap og proviant :	13.5	MT
Total DEADWEIGHT :	1435.5	MT

STABILITY DATA

KG (incl. FSC) .... :	6.962	m
Free Surface Correction:	0.173	m
GM (GZ derived) ...... :	1.181	m
KGmax, intact, calc. . :	6.802	m



Water Density = 1.025 t/m3

Please note !
-Floating data are based on iterations incorporating calculation of exact list (heel giving zero righting lever).
-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
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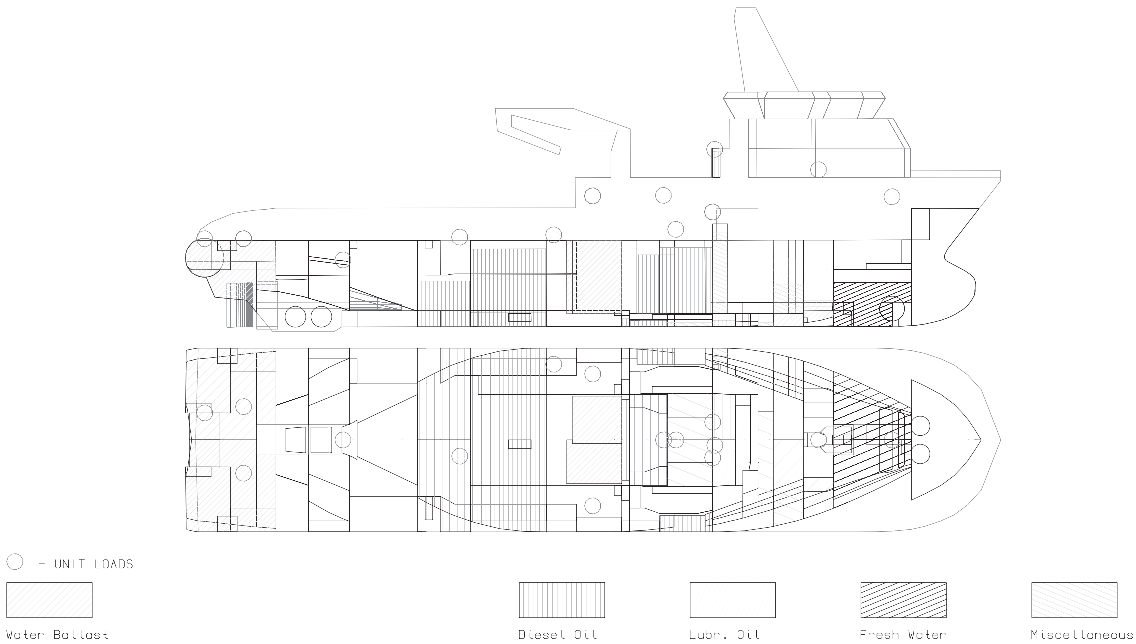
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.2
Condition Id. text : Lastekondisjon ved kantring, uten rulledempningstk



WEIGHT LOADS

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
1	FO ved kantring									
-	T13 FO DB/Wing Tank PS	84.306	90.0	0.8500	21.00	28.00	24.685	-6.906	2.708	0.50
-	T14 FO DB/Wing Tank SB	85.529	90.0	0.8500	21.00	28.00	24.634	6.875	2.673	0.50
-	T17 FO Centre Tank 2	58.600	90.0	0.8500	21.00	28.00	24.429	-0.096	0.602	317.73
-	T25 FO DB/Wing Tank PS	41.988	53.0	0.8500	16.10	21.00	18.706	-3.926	1.326	7.04
-	T26 FO DB/Wing Tank SB	41.672	53.0	0.8500	16.10	21.00	18.707	3.905	1.313	6.95
-	T71 FO Settl. Tank 1 PS	15.980	80.0	0.8500	36.40	39.90	38.133	-7.958	3.868	0.25
-	T74 FO Service Tank 2 SB	23.409	90.0	0.8500	38.50	43.40	40.877	7.919	4.436	0.37
-	T75 FO Drain Tank PS	4.420	50.0	0.8500	43.40	45.50	44.445	-2.120	0.300	11.32
-	T77 FO Overflow Tank	15.215	50.0	0.8500	35.00	39.20	37.133	0.000	0.262	167.52
-	T79 FO Em. Gen. Tank	0.688	90.0	0.8500	43.40	44.10	43.750	-6.760	15.014	0.01
		371.807					25.664	0.114	2.108	512.17
2	FW ved kantring									
-	T2 FW DB/Wing Tank PS	72.000	50.4	1.0000	54.60	61.80	57.330	-2.329	3.080	24.22
-	T3 FW DB/Wing Tank SB	72.000	50.7	1.0000	54.60	61.80	57.350	2.317	3.080	27.74
		144.000					57.340	-0.006	3.080	51.97
3	LO ved kantring									
-	T90 LO Store Tank PS	12.276	73.0	0.9240	49.00	50.40	49.703	-5.863	4.319	1.78
-	T91 LO Tank Main Gear PS	6.445	75.0	0.9240	50.40	51.10	50.751	-5.516	4.397	1.00
-	T92 LO Aux. Engine PS	6.514	75.0	0.9240	51.10	51.80	51.450	-5.268	4.402	1.03

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Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
-	T97 LO Drain Tank SB	2.518	25.0	0.9240	45.50	46.90	46.160	0.172	0.150	34.26
-	T99 LO Drop Tank SB	2.210	23.0	0.9240	43.40	45.50	44.445	2.119	0.138	12.30
		29.963					49.623	-4.563	3.695	50.36
4	WB ved kantring									
-	T32 WB Aft Peak Tank PS	64.942	60.0	1.0250	-5.40	3.00	-0.761	-3.613	5.247	72.28
-	T33 WB Aft Peak Tank SB	108.237	100.0	1.0250	-5.40	3.00	-1.216	4.626	6.034	
-	T38 WB DB/Wing Tank SB	14.144	30.0	1.0250	49.00	54.60	50.485	2.295	0.617	9.88
-	T18 Rig Chain Locker 1 PS	137.141	100.0	1.0250	30.45	35.00	32.725	-1.832	4.659	
-	T19 Rig Chain Locker 1 SB	129.349	100.0	1.0250	29.90	35.00	32.427	2.166	4.670	
		453.814					20.306	0.722	4.948	82.16
5	Andre Tanker ved kantring									
-	T66 HP HO Store Tank PS	10.478	90.0	0.9240	43.40	44.80	44.131	-7.592	5.091	0.05
-	T67 HO Drop Tank	3.493	30.0	0.9240	47.60	49.00	48.292	0.864	0.208	45.22
-	T52 Sewage Tank SB	14.720	40.0	1.0000	49.00	51.80	50.409	5.425	3.157	2.39
-	T80 Bilge Water Tank SB	5.130	30.0	1.0000	39.20	43.40	41.300	2.150	0.141	27.83
-	T83 Sludge Tank PS	5.130	30.0	1.0000	39.20	43.40	41.300	-2.150	0.141	27.83
		38.951					46.131	0.086	2.619	103.31
6	Wire på tromler									
-	Towing Wire SB	37.000					43.400	1.650	10.610	
-	Tugger Wire SB	2.100					32.300	6.100	12.100	
-	Tugger Wire PS	2.100					32.300	-6.100	12.100	
-	Working Wire PS	18.500					43.400	-1.650	10.610	
-	Spare Wire below Deck	37.000					9.200	0.000	6.200	
-	Anchor Winch Wire	78.000					38.850	0.000	12.140	
-	Secondary Winch Wire	37.000					43.600	0.500	16.400	
		211.700					35.561	0.232	11.444	
7	Kjetting ombord ved kantring									
-	Kjetting på dekk	7.000					20.000	1.500	8.300	
8	Last på dekk ved kantring									
-	Anker babord	18.000					28.700	-7.000	8.500	
-	Forskjellig på dekk	5.000					40.000	0.000	9.000	
		23.000					31.157	-5.478	8.609	
9	Mannskap og proviant									
-	Mannskap	3.500					53.200	0.000	14.500	
-	Proviant	10.000					60.000	0.000	12.000	
		13.500					58.237	0.000	12.648	
10	Vertikal kraft kjetting	141.800					-3.600	-2.500	8.170	
11	Horisontalt moment -	-96.000					0.000	3.080	8.170	
12	Horisontalt moment +	96.000					0.000	-3.080	8.170	
	DEAD WEIGHT	1435.536					27.139	-0.541	5.360	799.97

.... to be continued on next page

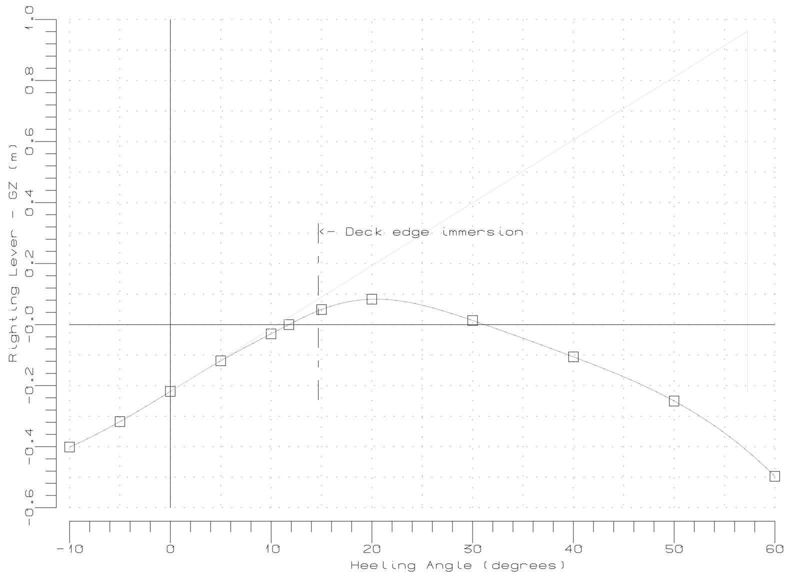
SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 24
Project : Bourbon Dolphin File : Bo-Dolph

Part no.	Id.text	Weight (MT)	Load (%)	Density (MT/m3)	Distribution Aft (m)	Distribution Fore (m)	LCG (m)	TCG (m)	VCG (m)	FSCT Moment (MT*m)
	LIGHT WEIGHT, Final	3201.600					33.100	-0.070	7.430	
	TOTAL WEIGHT	4637.136					31.255	-0.216	6.789	799.97

SHIPSHAPE - VERSION 5.23.0002, DATE : 2008-02-25
/ PAGE 25
Project : Bourbon Dolphin File : Bo-Dolph

Loading Condition code : L3.2
Condition Id. text : Lastekondisjon ved kantring, uten rulledempningstk

INTACT STABILITY DATA (GZ-curve, Areas, Particulars & Criteria Control)



Angle (degr.)	GZ (m)	Area (m*rad)
-10.000	-0.401	-0.0766
-5.000	-0.318	-0.0451
0.000	-0.219	-0.0216
5.000	-0.119	-0.0069
10.000	-0.030	-0.0005
11.770	0.000	0.0000
15.000	0.049	0.0015
20.000	0.083	0.0077
30.000	0.013	0.0179
40.000	-0.106	0.0100
50.000	-0.250	-0.0203
60.000	-0.497	-0.0833

Deck immersion : 14.687 °
Maximum GZ at : -10.000 °
Equilibrium at : 11.770 °
Area, 0 - 30 : 0.0395 m*rad
Area, 0 - 40 : 0.0316 m*rad
Area,30 - 40 : -0.0079 m*rad
Area, 0 - maxGZ: -0.0550 m*rad
GM : 1.181 m

Heel to port side
Applied VCG : 6.962 m
TCG : -0.216 m

Table of intact stability criteria

TYPE : Supply-vessel incl IMO Wind & Rolling

Code	Id. text		Actual value	Conclusion	KGmax (m)
GZMi1	Minimum GZ at angle greater than 30.0°	: 0.20 m	0.013	NOT OK	6.968
GZAng	Minimum heel angle for GZmax, ð	: 15.00 °	20.450	OK	7.638
GMMin	Minimum GM	: 0.15 m	1.181	OK	7.992
GZAr2	Minimum GZarea (30.0-min<40.0,ß>)°	: 0.030 m·rad	-0.008	NOT OK	6.895
GZAr5	Minimum GZarea (0.0-ð)°, 15.0°<ð<30.0°	: 0.055+0.001·(30.0-ð) m·rad	-0.013	NOT OK	6.917
A.562	IMO A.749(18), Severe wind & rolling	Wind speed = 57.3 knots	----	NOT OK	6.802

ß : flooding angle
ð : angle for maximum GZ
GZarea : area of righting lever

Stability conclusion .... : NOT OK

Resulting KGmax .... (m): 6.802
KG (incl. correction) .... (m): 6.962
Intact stability margin .... (m): -0.159

PLEASE NOTE !
The calculations of KGmax is based on upright vessel (TCG=TCB). If the actual calculations are based on TCG <> TCB, the stability conclusion may not correspond with the presented stability margin. The conclusion will anyway be correct as it reflects the actual loading condition.

Please note !

-GM is calculated based on metacentric height (KMT) for upright vessel (zero heel)

Vedlegg 2

Rederiet

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 0.0 General

Original Date:	01.10.2003
Revision nr:	4
Revision date:	23.03.2006
Prepared by	QHSE Dep.
Approved by	Managing Dir.

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Original Date:	01.10.2003
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DISTRIBUTION LIST

Distributed manuals are marked with manual number

Manual number	Distributed to:	Distribution date:
1.0 – 01	Bourbon Offshore Norway AS / HSE Manager	2003-10-01
1.0 - 02	Bourbon Borgstein	2003-10-01
~~1.0 – 03~~	~~Bourbon Captain~~	~~Deleted (vessel sold)~~
~~1.0 – 04~~	~~Bourbon Castle~~	~~Deleted (vessel sold)~~
~~1.0 – 05~~	~~Bourbon Champion~~	~~Deleted (vessel sold)~~
~~1.0 – 06~~	~~Bourbon Charisma~~	~~Deleted (vessel sold)~~
1.0 – 07	Bourbon Charmer	2003-10-01
1.0 – 08	Havila Chieftain	2003-10-01
1.0 – 09	Bourbon Crown	2003-10-01
1.0 – 10	Bourbon Eko	2003-10-01
1.0 - 11	Bourbon Hidra	2003-10-01
1.0 - 12	Bourbon Jade	2003-10-01
1.0 - 13	Bourbon Lista	2003-10-01
1.0 - 14	Bourbon Opale	2003-10-01
~~1.0 – 15~~	~~Bourbon Reel~~	~~Deleted (vessel sold)~~
~~1.0 – 16~~	~~Bourbon Scotia~~	~~Deleted (vessel sold)~~
1.0 - 17	Bourbon Skagerak	2003-10-01
1.0 - 18	Bourbon Surf	2003-10-01
1.0 - 19	Bourbon Tampen	2003-10-01
~~1.0 – 20~~	~~Bourbon Trader~~	~~Deleted (vessel sold)~~
1.0 - 21	Bourbon Emerald	2004-10-01
1.0 - 22	Bourbon Topaz	2004-11-10
1.0 - 23	Managing Director, Trond Myklebust	2004-11-10
1.0 - 24	Operation Director, Bjørn Idar Remøy	2004-11-10
1.0 - 25	Marketing Director, Eirik Eide	2004-11-10
1.0 - 26	Technical Department, Bjørn Borgsnes	2004-11-10
1.0 - 27	Purchasing Department, Bjørn Hageselle	2004-11-10
1.0 - 28	Crewing Department, Rune Paulsen	2004-11-10
1.0 - 29	Finance Department, Ottar Jan Mork	2004-11-10
1.0 - 30	Bourbon Peridot	27.10.2005
1.0 - 31	MV Rem Fortune	20.10.2005
1.0 - 32	Technical Superintendent Petter-Are Vik	23.03.2006
1.0 - 33	Technical Superintendent Terje Fjelle	23.03.2006
1.0 - 34	Technical Superintendent Kjetil Bostad	23.03.2006
1.0 - 35	Technical Superintendent Jon-Helge Voldsund	23.03.2006
1.0 - 36	Bourbon Orca	19.06.2006
1.0 - 37	Bourbon Dolphine	21.09.2006
1.0 - 38	Bourbon Mistral	20.10.2006
1.0 - 39	Bourbon Monsoon	30.01.2007

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SAFETY MANAGEMENT SYSTEM
Section 0.0 General

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Prepared by	QHSE Dep.
Approved by	Managing Dir.

REVISION LIST

On receipt of new documents or when receiving revision, the below matrix is to be updated.

Replaced documents to be destructed

Revision No.	Date	Description	Signature of person who has changed out documents
0	2003-10-01	Manual Issued	*Ståle Hånes*
1	2004-10-01	Manual Sec.0 – 12 *	*Ståle Hånes/Eli D.Oksavik*
2	2004-11-10	Manual Sec.0 - 12	*Ståle Hånes/Eli D.Oksavik*
3	2004-11-10	Manual section 3	*Ståle Hånes/Eli D.Oksavik*
3	01.07.2005	Section 2	Steven Rooney
3	25.10.2005	Section 0, 1, 4, 5, 6, 7, 8, 9, 10, 11 & 12	Steven Rooney
3	25.10.2005	SMS manual section 3	Steven Rooney
4	23.03.2006	Section 1,3,4, 7	Eli D.Oksavik
4	19.06.2006	Section 3	Eli D.Oksavik
4	21.09.2006	Section 3,4 & 12 is updated	Eli D.Oksavik
4	30.01.2007	Section 3	Eli D.Oksavik

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SAFETY MANAGEMENT SYSTEM

Section 0.0 General

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Prepared by	QHSE Dep.
Approved by	Managing Dir.

COMPANY APPROVAL DOCUMENT

This manual forms a part of the Safety Management System of Bourbon Offshore Norway AS, and is to be approved, marked, registered and updated according to procedures in the Company's SMS.

All enquiries relating to this manual should in the first instance be addressed to Bourbon Offshore Norway AS

Fosnavåg, 30th of January 2007

This Manual is approved by

Trond Myklebust

Managing Director

This Manual is issued by

Eli D.Oksavik

QHSE Manager

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 1.0
Introduction

Original Date:	01.10.2003
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Prepared by	QHSE
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 1.0
Introduction

Original Date:	01.10.2003
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

1.1 BOURBON OFFSHORE NORWAY AS`S WORKPLACE SAFETY CHARTER

Working safely is a core value for everyone - wherever you are, whatever the priority of the task.

When you are working for Bourbon Offshore Norway AS, the following expectations apply.

From Bourbon Offshore AS you can expect:

- A safe workplace.
- Trained and competent colleagues.
- A just and fair reporting culture.
- Prompt action to fix reported safety defects.
- Thorough investigation of incidents and injuries, plus feedback and corrective actions.
- Active support for your efforts to improve safety.
- Actions against unsafe or negligent behaviour by anyone.

Bourbon Offshore Norway AS expects you to:

- Understand and comply with site safety standards and procedures that effect you.
- Understand the hazards and precautions before starting each task.
- Use equipment which is in good order.
- Keep your work area safe and tidy.
- Dispose of waste correctly.
- Suggest improvements and actively support others who are trying to do the same.
- Stop the task if you 're worried about safety.
- Know what to do in an emergency.
- Report any unsafe conditions, equipment, incidents or injuries immediately.

Our common goal is a safe, accident-free workspace.

July 2005

Trond Myklebust

Managing Director

BOURBON

SAFETY MANAGEMENT SYSTEM

Section 1.0
Introduction

Original Date:	01.10.2003
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

1.2 INTRODUCTION TO THE SAFETY MANAGEMENT SYSTEM

The Company's Safety Management System (SMS) has been designed to comply with the requirements of the International Safety Management Code (ISM Code), ISO 9001 and ISO 14 001.

In order to comply with the ISM code, ISO 9001and ISO 14 001, our objectives are to ensure as follows:

- Safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.
- Compliance with mandatory rules and regulations.
- Observance of applicable codes, Guidelines and standards by IMO and other maritime industry organisations, Administrations and Classification Societies.
- Establishment of adequate safeguards against all identified risks.
- Continuous improvement of safety management skills of personnel ashore and on board ships. The preparation for handling emergencies, both safety and environmentally related, and safe practices in both ship operation and the working environment.

The functional elements of the Company's SMS system are:

- A Health, Safety and Environment Protection Policy.
- A Drug and Alcohol Policy.
- Procedures to identify, evaluate and minimise all risks that may lead to hazardous situations, errors and incidents.
- Instructions and procedures to ensure the safe operation of vessels and protection of the environment in compliance with relevant international and Flag State legislation.
- Defined levels of authority and lines of communication between shore management and each vessel and on board each vessel.
- Procedures for reporting accidents/near misses and non-conformances within the provisions of the ISM Code, ISO 9001 and ISO 14 001.
- Procedures to prepare for, and respond to all relevant emergency situations.
- Undertake Internal Audits and Technical Inspections.

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SAFETY MANAGEMENT SYSTEM
Section 1.0
Introduction

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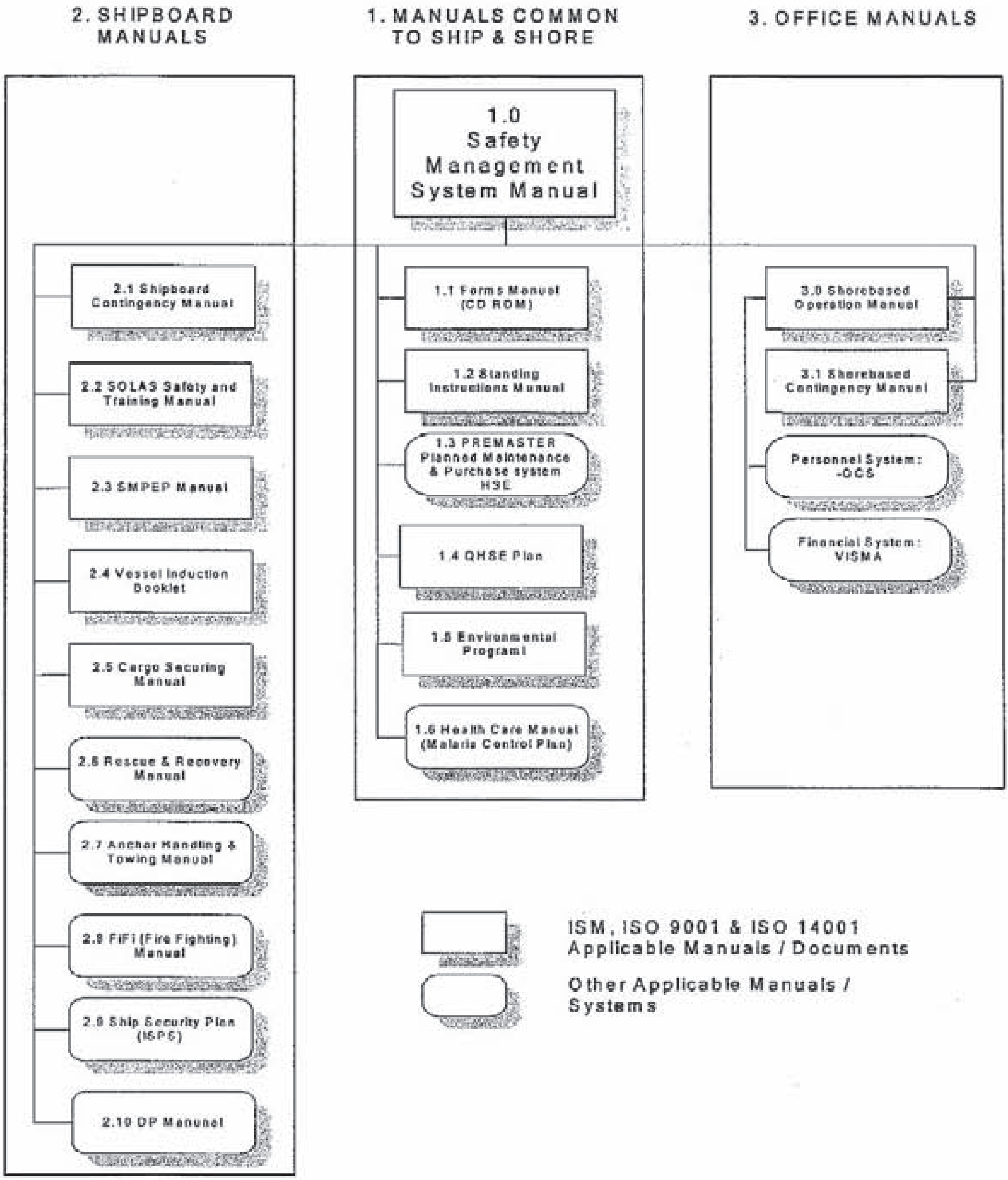
1.3 OVERVIEW OF THE MANUALS IN THE SAFETY MANAGEMENT SYSTEM



BOURBON

SAFETY MANAGEMENT SYSTEM
Section 2.0
Company Policies

Original Date:	2003-10-01
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM

Section 2.0
Company Policies

Original Date:	2003-10-01
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

2.1 COMPANY QUALITY POLICY

The Bourbon Offshore Norway AS owns and operates Offshore Support Vessels. The operation of the vessels is based on a combination of experience and good marine practice, utilising modern technology. By continuous search for optimum solutions, the Company aims to satisfy our customers by providing a cost effective operation, and safe and healthy working environment for its own and client employees.

By constant review of our operations, and ongoing comparison with its competitors and other similar operations, the Company will seek to identify and implement "Best Practice" in everything it does.

The Company Safety Management System is developed to cover the requirements in the ISM code, ISO 9001 and ISO 14 001. The Company Policies and the Safety Management System shall be adopted by all employees at all times within Bourbon Offshore Norway AS.

The Company's **Objectives** are:

- To manage the fleet in accordance with the best professional standards.
- To comply with all relevant national and international rules and regulations.
- To maximise safety of the vessel, onboard equipment, personnel, cargo and the environment.
- To have in place an effective organisational structure suitable for the Company's business activities.
- To meet customers expectations regarding contractual and operational conditions

The company aim is to continuously monitor and improve the operation of the vessels and the management systems.

Fosnavåg, 1 July 2005
Bourbon Offshore Norway AS

Trond Myklebust
Managing Director

BOURBON

SAFETY MANAGEMENT SYSTEM

Section 2.0
Company Policies

Original Date:	2003-10-01
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

2.2 HEALTH & SAFETY POLICY STATEMENT

Bourbon Offshore Norway AS is committed to provide Healthy and Safe Working and Living conditions for all Employees, Third Party personnel, Sub-Contractors and all those who may be affected by the company's activities.

Safety, Health and the Protection of the Environment are Management responsibilities ranking equally with all other Company responsibilities.

Management accepts its duty to ensure that all practical measures are taken to provide and maintain safe and healthy conditions on board its ships and premises.

Management also accepts its duty in respect of the design, construction and operation of all plant, machinery and equipment.

The Managing Director along with the Management of the Bourbon Offshore Norway AS will:

- Encourage the active involvement of all employees and sub-contractors in the company's effort to promote and improve standards of Health and Safety.
- Make the necessary resources available to enable Employees, Third Parties, and Sub-Contractors to achieve the Company's objectives.
- Encourage continuous improvement in safety awareness and safety management skills at all levels within the Company.
- Improve performance and safety by implementing routines and procedures designed to identify and prevent the consequences of unsafe acts and habits that may lead to incidents or near misses.
- Execute Safety Risk Analysis and Safety Risk Assessment in order to prevent unwanted occurrences and consequences.
- Implement an effective "Feedback System" to ensure that all Employees learn from unplanned events.
- Ensure that effective Personal Protection Equipment (PPE) is available to all Employees.
- Regular Safety drills and training to be carried out both on- and offshore.

It is the duty of all Employees, including Employees of Sub-Contractors to act responsibly in order to prevent injury to themselves or fellow workers. Action will be taken where this primary requirement is not observed.

Health & Safety is the direct responsibility of all employees within the Bourbon Offshore Norway AS, Third Parties and Sub Contractors irrespective of position or rank. All personnel have a responsibility to be conversant with and work within the principles and procedures of the Bourbon Offshore Norway AS, Shipboard Safety Management System.

Fosnavåg, 1 July 2005
Bourbon Offshore Norway AS

Trond Myklebust
Managing Director

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 3.0
Company responsibility & authority

Original	01.10.2003
Revision nr.:	8
Revision date:	30.01.2007
Prepared by	HSEQ
Approved by	Managing Dir.

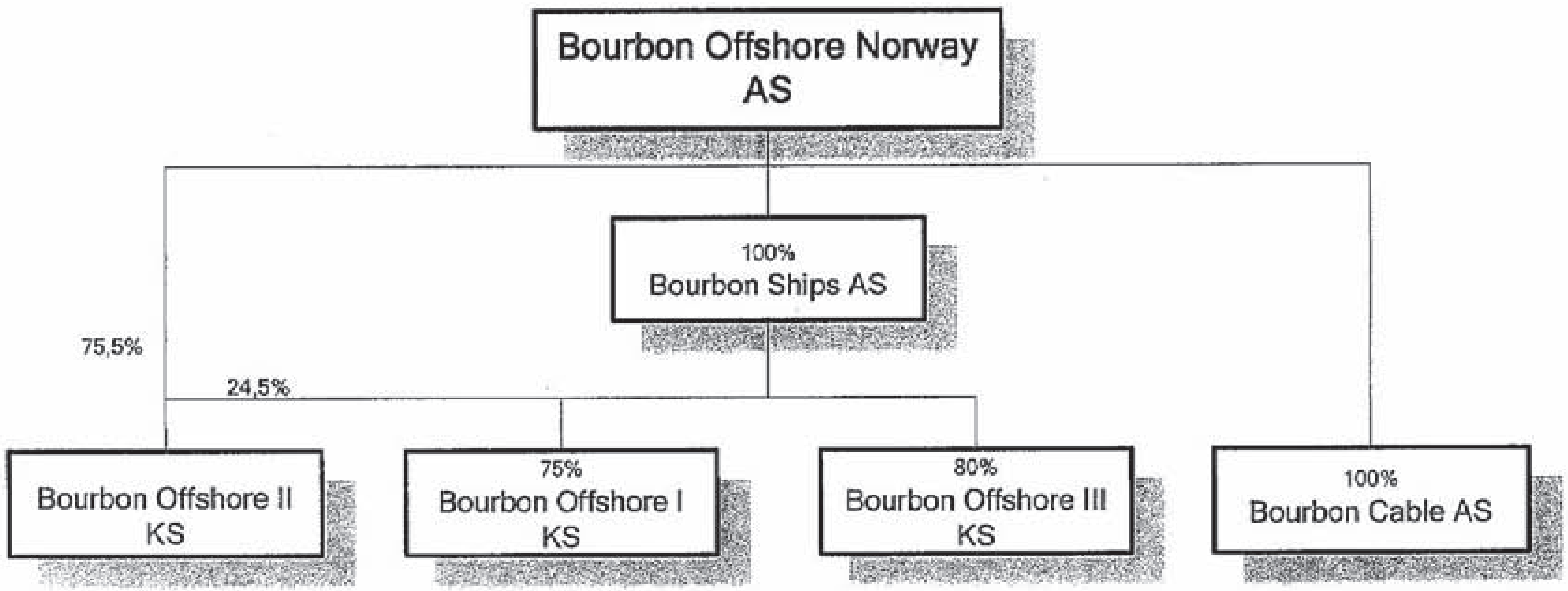
BOURBON

SAFETY MANAGEMENT SYSTEM
Section 3.0
Company responsibility & authority

Original	01.10.2003
Revision nr.:	8
Revision date:	30.01.2007
Prepared by	HSEQ
Approved by	Managing Dir.

3.1 COMPANY INTRODUCTION

Bourbon Offshore Norway AS was established on 15th October 2003. Bourbon Offshore Norway AS is formed by the below companies:



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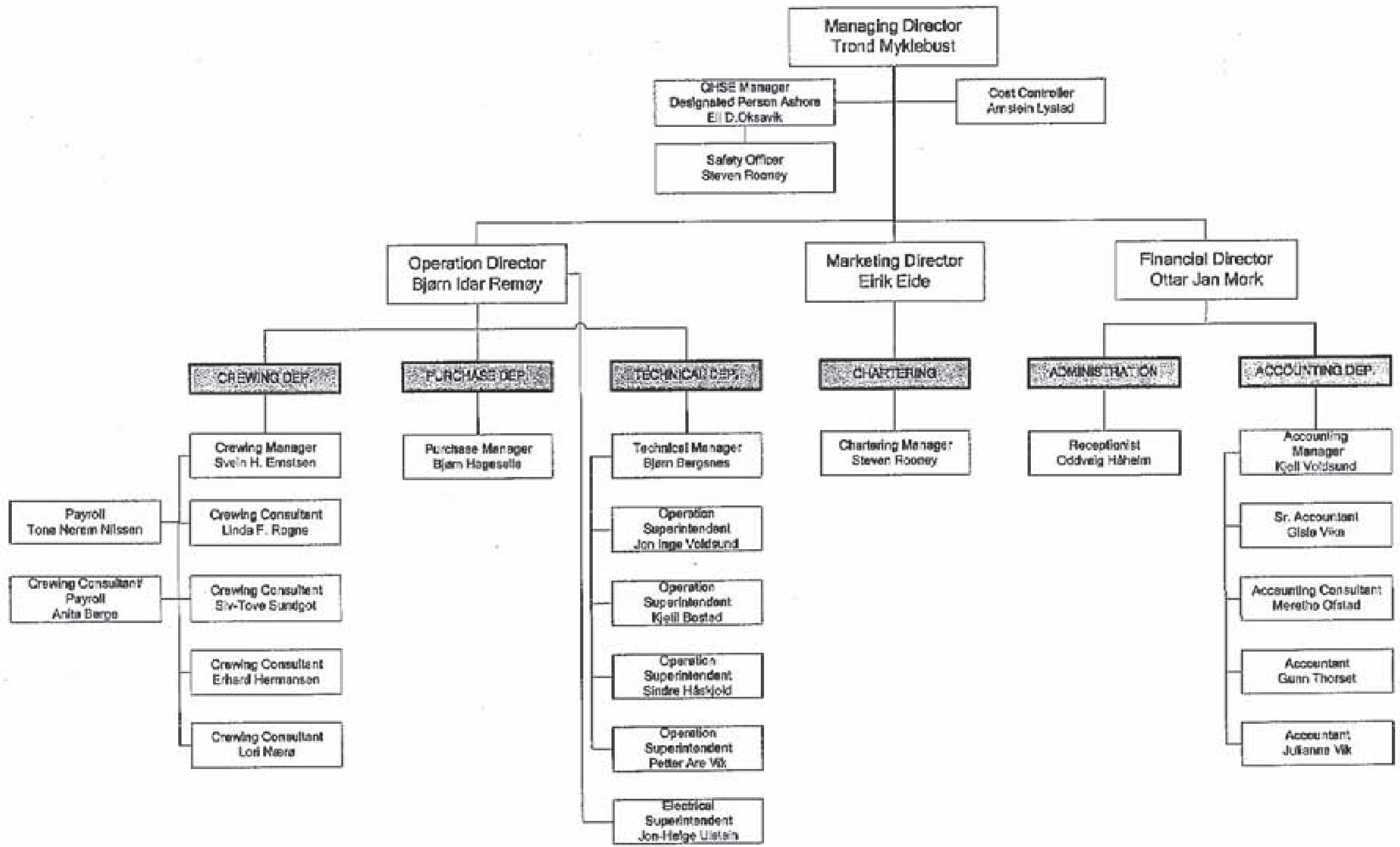
SAFETY MANAGEMENT SYSTEM
Section 3.0
Company responsibility & authority

Original	01.10.2003
Revision nr.:	8
Revision date:	30.01.2007
Prepared by	HSEQ
Approved by	Managing Dir.

3.2 ORGANISATION CHART FOR BOURBON OFFSHORE NORWAY



BOURBON

SAFETY MANAGEMENT SYSTEM
Section 5.0
Master's Responsibility and Authority

Original Date:	01.10.2003
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Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 5.0
Master's Responsibility and Authority

Original Date:	01.10.2003
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

5.1 MASTERS JOB DESCRIPTION

According to National and International law, the Master has the highest authority on board. He has the ultimate responsibility for the vessel, its cargo and crew. He is also responsible for carrying out all operations in accordance with Government Legislation, Charterer's and Owners instructions. The Master also has the overall responsibility for the vessels Watch-Keeping duties.

The Master has the **overriding authority** and responsibility for taking all necessary actions regarding safety, pollution prevention and the efficient operation of the vessel.

The Master is responsible for:

- Implementing the Company's safety and environmental policy.
- Motivating the crew to observe the policy by demonstrating knowledge and showing a positive attitude to the Safety Management System.
- Issuing orders and instructions in a clear and simple manner.
- Verifying that specific requirements are observed.
- Reviewing the Safety Management System and reporting its deficiencies to the shore based management.
- Undertake a Master's Review annually.

The Master is authorised to:

1. To sign the Lloyds Open Form in case the vessel is in an immediate emergency situation. If time allows it the Master should contact the office and the insurance company for support
2. To sign the Lloyds Open Form in case the vessel is in charge of a rescue situation with another vessel in emergency

In all matters, which are or may affect Safety or the Environment, the Master shall report directly to Operation Director. If the necessary action from shore Line Management is deficient, he may report directly to the Designated Person Ashore (DPA). All written communications in this respect should be copied to the DPA.

5.1.1 Duties And Responsibilities

The Master represents Bourbon Offshore Norway AS in all contacts with the Charterer and has the responsibility to protect Bourbon Offshore Norway AS interests. The Master is to establish a good relationship with Charterers personnel and strictly follow all orders given by the Charterer, subject to such orders complying with Flag-state regulations and Governmental Instructions.

The Master is to ensure:

- That the Company's Safety, Alcohol and Drug Abuse policies are strictly observed by all crew.
- Ensure that all work is undertaken in a safe and efficient manner at all times, with care to allow crewmembers sufficient time for maintenance and other essential tasks.
- Ensure that the Vessel has sufficient stability. Taking into account the ships Stability Booklet and/or Class Rules, and/or Flag state Legislation.

The Master also has the overall responsibility for the vessels Watch-Keeping duties.

The Master shall keep himself updated on:

- Laws and Regulations issued by competent Authorities and/or Governments by keeping a library list of all relevant IMO publications and check Flag States web-site monthly if new regulations apply.
- Recommendations from the Classifications Society.
- The Owners instructions and Safety Management System.
- Tariff conditions that have significance with regard to the performance of his duties as Master.

5.1.2 Reporting

The Master reports direct to the Operations/Chartering Department on all normal operational matters. He may also report direct to the Managing Director when considered necessary. When the vessel is on hire the Master is to communicate direct with the Charterer's representative as directed.

Reporting and filing:
The Master is responsible for all Reports and other Documentation requiring to be completed, and forwarded in time.

Ref: Section 7.10 in this manual.

Any delegation of the Masters responsibility to complete the various reports shall be included in the Master's standing orders. However, the Master is personally responsible for completing his part of the Company's **Non-Conformance Report** form.

5.1.3 Certificates / Exemptions:

The Master shall maintain the following:

- Ship's certificates and classification documents
- Recommendations and reports issued by the Flag state, the Classification Society or the corresponding Port State authority

The original certificate shall be filed onboard and a copy shall be filed at the Company Office.

During the tour of Duty the Master should mark off the certificates due during next period on a copy of the Certificate List and forward this to the Technical Superintendent for following up.

If the Master should receive an original certificate, directly from the Classification Society or the Authorities, he shall forward a copy to the Company office.

5.1.4 Personnel File:

The Master shall establish and maintain a personnel file, which shall include as a minimum:

- Name
- Date of Birth
- Passport No.
- Next of kin, contact numbers
- Copy of the relevant certificates
- Health certificate
- Copy of the employment agreement
- Report on seamen to the Maritime Employer / Employee register (RTV) (only Norwegian seamen and seamen onboard NOR-Registered vessels

The Master shall give notice to the Crewing Department if:

- the information received is different from earlier given information; or if

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SAFETY MANAGEMENT SYSTEM

Section 5.0
Master's Responsibility and Authority

Original Date:	01.10.2003
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Prepared by	QHSE
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- the certificates, health certificates or courses are new (The Master shall send a copy of the new certificate(s) to the Crewing Department; or if
- there are changes in the original crew or passenger list

This notice shall be forwarded as soon as practical, preferably before departure from port.

5.1.5 Safety Management System :

The Master shall familiarise himself with the Safety Management System, and be aware of all procedures and instructions.

An annual "Master's Review" shall be completed in accordance with the Company HSE plan.
Ref. Sect. 12.2.

The Master shall propose improvements to the Safety Management System in order to improve the quality and safety of the Bourbon Offshore Norway AS 's services.

The Master shall report Non-Conformances, determine the causes of same, and suggest corrective actions.

The Master shall verify that raising Non-Conformances also involves responsibility for Corrective Action, and shall prepare a written report of the result.

The Master shall verify that any revised pages for a manual are replaced and that the old pages are destroyed by signing and returning the covering letter.

5.1.6 Budgeting And Cost Control

The Master shall ensure that all efforts to improve the ships operational economy achieve the desired end result.

He shall operate the vessel within the Running Expenses Budget. The master has the overall responsibility for purchasing and budget`s onboard and should approve any purchasing.

5.1.7 Hand-over Note

The Master leaving the ship shall prepare a hand-over note for the joining Master at each crew-change.
Form M2 to be used.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 6.0
Resources and Personnel

Original Date:	01.10.2003
Revision nr.:	draft
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 6.0
Resources and Personnel

Original Date:	01.10.2003
Revision nr.:	draft
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

INTRODUCTION

Selection, monitoring and follow up on human resources onboard all Company vessels are the most important task of the Company's Personnel department and is subject to daily review along with other Operational matters during the daily Management Meeting.

Following are important factors to be considered when addressing manning:

- Type of vessel and trade
- Skills required over and above the Safe Manning level requirements
- SMS education / experience and awareness
- Records of qualifications, training and medical fitness
- Employer's responsibilities towards their employees also beyond the minimum requirements, i.e.: a good personnel policy.

6.1 VESSEL'S MASTER

It is a Company requirement that any appointed Master is medically fit, competent and fully qualified in accordance with international standards to S.T.C.W, or other pertinent regulations including the Company's own requirements for the Master position onboard.

New Masters in the Company will be briefed in the Company's Safety Management System before joining the Vessel.

The Company ensures that the Vessel is adequately manned and that support from the Office is available to make sure that the Vessel is safely operated.

6.2 MANNING

It is a Company requirement that each vessel is manned with qualified officers in accordance with S.T.C.W. regulations and national requirements.

When recruiting new crewmembers, the Crewing department shall ensure that they possess the required valid health certificate, training courses and maritime certificates. The Master shall monitor that training courses and certificates are up to date prior to sailing. The Master shall notify the Crewing department if any certificate expires before next sailing period. Each crewmember has to ensure that his own health certificate is valid before each sailing period.

Ref. Minimum requirement is stated in the OCS Manning System according to the size, type and trade the Vessel is engaged in.

Additional training will be provided according to Charterer's Certeparty.

To ensure that the period of rest hours are kept within the STCW-95 regulation, each crewmember has to register their hours of rest. If the rest hour regulation is overruled, the Master has to notify the Company that further recourses are provided.

6.3 FAMILIARISATION

New personnel and personnel transferred to new assignments onboard will be familiarised with the vessel's safety system and their job description.

Ref. Form S1 Induction Checklist

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 6.0
Resources and Personnel

Original Date:	01.10.2003
Revision nr.:	draft
Revision date:	25.10.2005
Prepared by	QHSE
Approved by	Managing Dir.

6.4 RELEVANT RULES AND REGULATION

The Vessels will be provided with subscriptions for Nautical Publications and Chart Corrections for the actual trading area.

Ref. Master's Library List

If the trading area requires additional publications exceeding the *Master's Library List*, the Master is responsible for requiring the additional publications for the voyage.

6.5 TRAINING

The Company continuously identifies training requirements that may be required for both shore and sea-going personnel in support of the Safety Management System (Internal Audits, analyses of Incident Reports and Crew Assessments), and will carry out regular refresher courses as deemed necessary. Identification of training need should cover requirements related to the ISM-code, ISO 14 001 and ISO 9001.

The Master has to undertake regular emergency drills and exercises to ensure that each crewmember has the needed skills for the emergency situations listed in sect. 8.

If any lacks of required skills are identified, additional training must be provided.

6.6 SAFETY MANAGEMENT SYSTEM – INDUCTION

Certain essential instructions associated with the Safety Management System have been defined on board each vessel. These are provided to joining crew before sailing. Induction should cover necessary items related to

- Safety
- Security
- Quality
- Environment

Ref. Form S1 Induction Checklist & Induction Booklet

6.7 COMMUNICATIONS – SHIPBOARD PERSONNEL

The Company have established procedures, which ensure that all shipboard personnel receive relevant information about the Safety Management System in either English or Norwegian, and that individuals are able to communicate effectively in the execution of their duties.

The formal working language in Bourbon Offshore Norway AS is English.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 7.0
Shipboard Operations

Original Date:	01.10.2003
Revision nr.:	5
Revision date:	12.12.2006
Prepared by	HSEQ
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 7.0
Shipboard Operations

Original Date:	01.10.2003
Revision nr.:	5
Revision date:	12.12.2006
Prepared by	HSEQ
Approved by	Managing Dir.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 7.0
Shipboard Operations

Original Date:	01.10.2003
Revision nr.:	5
Revision date:	12.12.2006
Prepared by	HSEQ
Approved by	Managing Dir.

7.1 INTRODUCTION

The Company has developed specific instructions, which cover operations associated with daily routines of the vessels and reflect the trade, cargo carried and specific vessel types operated within the Safety Management System.

Mandatory Log Books should be kept updated and properly signed-off according to the Flag State requirements.

Any adjustments in procedures required for own vessel must be undertaken by the Vessels own crew. If the procedure has any omissions, or is incorrect in the detail, this must be reported to the Company.

Company Form SMS 1 to be used.

7.2 FAMILIARISATION

When new personnel join the vessel, they must immediately familiarise themselves with the "Vessel Induction Booklet" which is in their cabin. In addition, a familiarisation introduction together with the Safety Officer shall be performed.

The Vessels Safety/Rescue equipment must be located and identified, and before the vessel leaves port, instruction in its use must be given to all new personnel onboard.

Company Form S1 to be used.

7.3 WORK PERMIT

The purpose of this Procedure is to ensure that all work which requires a Work Permit is planned and carried out in accordance with the Company's Safety Standards, and the Authority's requirements.

A Work Permit is an authorisation for work to be carried out in areas where the application of stringent safety precautions is necessary, in order to overcome a potentially hazardous situation.

A Work Permit is required for jobs that include:
- Working aloft / outboard.
- Hot Work.
- Working in enclosed spaces.
- Use of dangerous substances *(regarding to IMDG Code)*.
- Work on Machinery and Equipment (when need for maintenance will affect the operational capability of the vessel, i.e. the shut-down of a main engine or auxiliary engine) .

Company Form S2 to be used.

Appropriate Personal Protective Equipment (PPE) shall be worn at all times when working in or passing a hazardous areas.

7.3.1 Working aloft/outboard

- Safety hardness with lifeline or other arresting device shall be worn.
- If working in area in vicinity of radio aerials, radar scanners, whistle i.e., the devices shall be shut down and warning sign be posted.
- Do not work overboard while the vessel is underway.

7.3.2 Hot Work

- Area clear to dangerous material and gas-free.
- Ventilation adequate.
- Equipment in good order.
- Sufficient fire appliances available and in good order.
-

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 7.0
Shipboard Operations

Original Date:	01.10.2003
Revision nr.:	5
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Prepared by	HSEQ
Approved by	Managing Dir.

7.3.3 Working in enclosed spaces

Before entry into enclosed space or confined spaces:

- Space thoroughly ventilated.
- Atmosphere tested and found safe.
- Rescue and resuscitation equipment available at entrance.
- Responsible person in attendance at entrance.
- Communication arrangement made between person at entrance and those entering.
- Access and illumination adequate.
- All equipment to be used is of approved type.
- Breathing apparatus (BA) available at entrance (tested and found to be satisfactory).

7.3.4 Use of dangerous substances

- Product Data Sheet to be consulted before use.
- Health and Safety Data Sheet available.

7.3.5 Work on Machinery and Equipment

- Removed from service/isolated from sources of power or heat.
- All relevant personnel informed.
- Warning notices displayed.

7.3.6 Heavy Lift

- PTW and to be issued before any Heavy Lift (> 10 tons)
- Risk assessment or JSA to be conducted before the PTW is signed

7.3.6 Sub-Contractors

The Master must ensure that the following text is stated to the Sub-Contractors:

Bourbon Offshore Norway AS is proactive regarding all personnel working safely onboard Bourbon Offshore Norway AS ships. As the Service Company performing the above detailed work on the indicated ship, you are required to work according to the Bourbon Offshore Norway AS Safety Management System. To this end, as a minimum you must work to the following Company instructions, and any additional instructions given by the Master or his appointed Deputy.

- Before boarding the ship, apply the appropriate PPE including Hard Hat.
- On boarding the ship immediately report to the Master or his appointed Deputy.
- Discuss the work in hand, and as appropriate, the implementation of a Permit To Work (PTW).
- Ensure that all tanks or enclosed spaces where work may take place are gas free
- Ensure that all open man-holes/work areas are safely guarded
- On completing the work advise the Master or appointed Deputy and close out any PTW

Company Form S2 to be use

7.4 TOOL BOX TALK

As a part of the Bourbon Offshore Norway AS Risk Assessment Programme, a Toolbox Talk shall be performed before any work is carried out.

The purpose of a Toolbox Talk is to ensure that the job is understood including the need to work safely and protect the environment. The Toolbox Talk is a part of all non-routine jobs and also routine jobs if there are people who are unfamiliar with the work activity or are unfamiliar with the work location.

The leader of the work team is responsible for the talk, and following items shall be discussed:

- Discuss all elements of the specific job to be undertaken.

- Identify and organise the job steps.
- Identify potential hazards .
- Ensure that the tools are inspected before use, and that they are in good working order.
- Ensure sure that all members of the work group are familiarised with the tools.
- The working area(s) must be inspected, cleaned and cleared away.
- Discuss the risks and hazards that may occur during the work:
  - Lack of proper ventilation.
  - Likelihood of gas.
  - Use of PPE.
  - Illumination.
  - Sufficient first aid equipment available.
  - Fire fighting equipment available.

Make sure that sufficient warning signs are available.

7.5 RISK ASSESSMENT

Each job of work, on deck, in the engine room, galley etc, which is not covered by the shipboard procedures and where potential risk is involved, shall be analysed as to the way the job is performed, in order to quantify the risk, and to determine if the risk can be reduced or removed by doing the job a different way.

The results of the various assessments should be documented and filed for future reference by any outside authority, oil company etc, and also for the benefit of any future new crew onboard that ship.

When undertaking Risk Assessment, following items should be considered:

Consider risk
- What can go wrong?
- What is the consequence if anything goes wrong?

Analyse how to reduce risk
- Do the workforce hold the skills to undertake the job safely?
- Is additional training needed?
- Do the workforce hold the correct Personal Protective Equipment (PPE)?
- Are proper tools available?

Premaster or Company Form S7 to be used.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 9.0
QHSE Reporting
Reports and Analyses of Non Conformances

Original Date:	01.10.2003
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	HSEQ
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BOURBON

SAFETY MANAGEMENT SYSTEM
Section 9.0
QHSE Reporting
Reports and Analyses of Non Conformances

Original Date:	01.10.2003
Revision nr.:	3
Revision date:	25.10.2005
Prepared by	HSEQ
Approved by	Managing Dir.

9.1 INTRODUCTION

Bourbon Offshore Norway AS has established procedures to ensure that Non-Conformances are reported to the Company.

The primary objective is to improve safety and to prevent pollution, and this procedure ensures that appropriate corrective actions are carried out, verified, and analysed.

As a secondary objective, this procedure will enable the Company to register all types of Non-Conformances and to have them analysed for trends. Action will be taken to avoid recurrences.

Premaster HSE is the company reporting system for non-conformances and other QHSE issues.

9.2 DEFINITIONS

An unplanned occurrence, or item of equipment which does not meet the requirements or specification.

9.2.1 Accident

An undesired event that results in injury or fatality to personnel.

An unplanned event or situation that may involve damage to the vessel, its cargo, environment or third party.

9.2.2 Near Miss

An undesired situation that could have led to an accident if it had been allowed to develop further.

9.2.3 Hazard Indentification

A deviation from requirements specified in the Safety Management System, other required Legislation, or any other defects which may lead to hazardous occurrences.

9.2.4 Suggestion for improvement

Prosedures, checklist in the Safety Management System, or vessel's machinery or other systems, which have a potencial for improvement.

9.2.5 Quality Report BON

Quality non-conformace or incident related to BON organisation or operation.

9.2.6 Quality Report Customer

Quality non-conformace or incident related to operation interface with customer. Including *Waiting on Platform (WOP).*

9.2.7 Security Report ISPS

Report on security incident or undesired situation. See Ship Security Plan for details.

9.2.8 Safety Inspection Report

Reports from the safety inspection to be according to checklist S4.

9.2.10 Safety Meeting

Report on safety meeting to be documented in HSE Premaster .

BOURBON

SAFETY MANAGEMENT SYSTEM

Section 12.0
Company Verification, Review and Evaluation

Original Date:	2003-10-01
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BOURBON

SAFETY MANAGEMENT SYSTEM
Section 12.0
Company Verification, Review and Evaluation

Original Date:	2003-10-01
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Prepared by	QHSE
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12.1 INTERNAL AUDITS

The Company shall carry out Internal Audits both onshore and onboard all Company owned vessels, in order to verify that the Safety Management System (SMS) is fully implemented and is being utilised as intended. Internal Audits of elements of the system shall be performed annually by fully trained internal auditors, such that over a 5 year period the whole system has been audited.

The Vessels shall be audited annually by the Safety & Quality Assurance Manager or by a deputy appointed by him.

The audit shall include the requirements of the ISM code, the ISPS code, ISO 9001 and ISO 14 001, and in general cover the following areas:

- Safety
- Health
- Environment
- Quality
- Security

12.2 MASTERS REVIEW

The purpose of completing a "Master's Review" is to give Company Management sufficient information regarding how the Safety Management System (SMS) is implemented onboard. This information is vital for Management when completing the overall "Management Review Meeting" and considering necessary improvements to the SMS.

The Masters Review should be a **continuous process** throughout the year, focusing on the company targets for **health & safety, environment** and **quality**.

The Master's Review shall include (ref.M16 Index & Guidelines), but are not limited to:

1. Minutes of the previous meeting
2. Analysis of accidents, hazardous occurrences and non-conformities
3. Internal audit findings
4. Organisational and operational changes
5. Third party audit results
6. Effectiveness of training methods
7. Changes in national and international legislation
8. Identification of new plans, procedures, or instructions
9. Improvements in the vessels QHSE Performance
10. The efficiency of the Safety Management System

<u>Master's Review Meeting</u>

The Master and the Department Leaders onboard shall, as a minimum, annually review the Safety Management System and evaluate its efficiency and implementation. (ref. SM 6).

<u>Masters Review Report</u>:

A full report of the review findings shall be submitted to the Safety & Quality Assurance Manager at the end of each year, and no later than **31^{st} of January**.
Both Captains shall contribute to the review, and sign the review report. If more convenient, or for other reasons, separate reports may be prepared for each shift.

The masters review report should preferably be 2, or maximum 3 pages.

BOURBON

SAFETY MANAGEMENT SYSTEM
Section 12.0
Company Verification, Review and Evaluation

Original Date:	2003-10-01
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Approved by	Managing Dir.

Ref. Masters Review (Index) M16.

12.3 MANAGEMENT REVIEW

Subsequent to the Masters Review, Management shall, as a minimum, annually review the Safety Management System and evaluate its efficiency and implementation.

The Management Review shall cover the requirements of the ISM code, ISO 9001 and ISO 14 001, and in general review the following areas:

- Safety
- Health
- Environment
- Quality
- Security

At the review meeting a summary of the Masters Review from the individual vessels should be presented and reviewed by the management.

The planning, review agenda, participation and reporting are described in more detail in the company Shorebased Manual Section 2.7.

The evaluation shall be submitted to the vessels, and it is the Masters duty to review the report and take actions as necessary.

INDEX

BOURBON

ANCHOR HANDLING & TOWING MANUAL
Section 0.0 General

Original Date: 2003-10-01
Revision nr: 1
Revision date: 2006-06-20
Prepared by: QHSE Dep.
Approved by: Man. Dir.

REVISION LIST

On receipt of new documents or when receiving revision, the below matrix is to be updated.

Replaced documents to be destructed

Revision No.	Date	Description	Signature of person who has changed out documents
0	2003-10-01	Manual Issued	
1	2006-06-20	New logo	

COMPANY APPROVAL DOCUMENT

This manual forms a part of the Safety Management System of Bourbon Offshore Norway AS, and is to be approved, marked, registered and updated according to procedures in the Company's SMS.

All enquiries relating to this manual should in the first instance be addressed to Bourbon Offshore Norway AS.

Fosnavåg, 20 SEPTEMBER 2006

This Manual is approved by

Trond Myklebust

Managing Director

This Manual is issued by

Eli D.Oksavik

QHSE Assurance Manager

BOURBON

ANCHOR HANDLING & TOWING MANUAL
Section 0.0 General

Original Date:	2003-10-01
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Prepared by:	QHSE Dep.
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Manual number	Distributed to:	Distribution date:
2.7 – 01	Bourbon Offshore Norway AS	2003-10-01
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2.7 – 08	Bourbon Chieftain	2003-10-01
2.7 – 09	Bourbon Crown	2003-10-01
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2.7 - 11	Bourbon Orca	2006-06-20
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BOURBON

ANCHOR HANDLING & TOWING MANUAL

Section 1.0
INTRODUCTION

Original Date:	2003-10-01
Revision nr.:	1
Revision date:	2006-06-20
Prepared by	QHSE Dep.
Approved by	Man.Dir.

1.0 ANCHOR HANDLING AND TOWING OPERATIONS

1.1 INTRODUCTION

Nothing in this procedure shall deprive the Master his responsibility for the safety of the crew and the vessel, to follow international regulations considering preventing collision or responsibility of lifesaving in the execution of the anchor handling operation.

The Operator is given permission to have a representative on board.

Prior to Anchor Handling (AH) the Master must inform the crew and prepare the vessel for the operation. Actual charts and drawings from the rig are to be studied and discussed. All crew on deck to wear personal protective equipment as described.

The content of this section is based upon the experience gained through several years with anchor handling operations.

See also CD-ROM "Best Practice Anchor handling & Towing

1.2 SAFETY

Safety will always have 1st priority no matter what operation the vessel is participating in. The Master has the responsibility to ensure that all possible safety precautions are dealt with prior to (and during) anchor handling operations.

The rig may be using laser equipment for positioning of the anchors, the Master must therefore ensure that no binoculars are used unless permission is granted from the installation.

During any rig or barge handling these safety procedures has to be followed:

- Don't use anchor-handling winch to move anchors on deck. Tugger winches must be used.
- Use equipment that has been certified and marked.
- Before the winch operator start hoisting he must be sure that everybody is in a safe position.
- It must be remember that when connected up an apparently slack wire, it may without warning suddenly become tight due to the relative movements of the vessel and/ or tow
- In such cases severe accidents have occurred and it is essential that all crewmembers are in a protected position, preferably well forward and behind the crash barrier until the wire is secured into the sharks jaw.

1.3 INFORMATION (TOOL BOX TALKS)

Anchor Handling Operations are totally based upon teamwork. In order to prevent incidents, it is essential that all available information shall be exchanged between the different parties, internal among the crew, external to the rig and other involved third parties.

As any negligence or misunderstanding of the information given can be fateful, thus, the Master should assure himself that no receiver misunderstand the information submitted.

The Master should also bear in mind the importance of informing **all** on board.

1.4 PLANNING

It must be stressed that prior to an anchor handling operation, detailed planning of the job execution is of vital importance to avoid misunderstandings and accidents.

1.5 WATCHES

During an anchor handling operation, the Master organises the watches, and decides who to operate the AH winch.

The Master must meet the rules according the resting time.

BOURBON	ANCHOR HANDLING & TOWING MANUAL Section 2.0 ANCHOR HANDLING OPERATIONS	Original Date: 2003-10-01 Revision nr.: 1 Revision date: 2006-06-20 Prepared by QHSE Dep. Approved by Man.Dir.

2.0 ANCHORHANDLING OPERATION

2.1 CONCLUSIONS

The following is a summary of conclusions when working with a chasing system:

- The length of the chaser pennant should be at least 1,5 to 2 times the depth.
- The rig has to maintain a winch tension of 50% of its maximum before chasing can start.
- When towing the chaser along the line, the propeller pitch of the vessel must be carefully controlled in order to prevent breaking of the wire when the chaser reaches the anchor.
- The winchman on the rig must report any change in the tension to the vessel; this will indicate when the anchor has broken out.
- When the chaser has reached the anchor, the vessel must carefully increase the pitch of the propeller to 50% of its maximum in order to keep the pennant line taut.
- The distance from the rig and the variation of the tension of the rig's winch indicate whether or not the anchor has broken out.
- The vessel has to start hauling the pennant line until the anchor has broken out, maintaining 50% of the propeller thrust.
- After breaking out, the pitch should be maintained, and the pennant line hauled until at least 60 metres of the chain are hanging over the anchor (for weight reasons) or until the anchor is approximately 10 metres from the vessel. This will prevent the anchor from falling through the chaser.

2.2 PRELIMINARIES

In good time before the anchor handling operation starts, necessary equipment must be prepared. When within VHF-range, the rig must be contacted and asked for all necessary information related to the job. The information must contain:

- Anchor pattern.
- No. Of piggy-backs.
- Pennant systems.
- Buoys / permanent chaser system.
- Information on other participating vessels.

The Anchor pattern can with advantage be plotted on a plot diagram or a video plotter.

The information request from the rig may consist of:

- The name of the Captain.
- The vessel's BHP.
- Bollard pull.
- The tugwire's length and dimension.
- Fuel, lub, oil, water and bulk figures.
- POB

2.3 RETRIEVING ANCHORS / BUOYS

- The rig informs the vessel's Master on which anchors to retrieve.
- A (wire) lasso connected to a tugger winch is used to pick up the buoy.
- The pennant is locked in the anchor handling tong.
- Disconnect the buoy.
- Connect the anchor handling wire from the winch to the pennant.
- Remove all equipment and personnel from deck.
- Inform the rig, open the A.H. tong and break out the anchor.
- When the anchor has broken out, the rig starts to heave on the rig chain. (Some rigs may wait until the anchor is on deck)
- The operational leader on the rig decides whether or not the anchor should be taken in and secured on deck.

See racking the anchor after retrieving below

2.4 ANCHORING WITH PENNANTS AND BUOYS

Sufficient pennant wire, depending on the water depth must be prepared and spooled on the A.H. winch. When the crown pennant is received and secured in the A.H. tong, and connected with the pennant from the winch, the anchor is ready to be deployed from the rack.
The rig will lower the anchor to about 100 metres (300 ft) before the vessel hoist the anchor either on deck or just under the stern.

While towing out the anchor, the rig will advice about speed / pull.

When the anchor position is reached, the anchor must be lowered to the seabed while the vessel is holding a firm pull in the pennant.

When the last pennant is secured in the A.H. tong, the A.H. Wire must be disconnected and the buoy fastened.

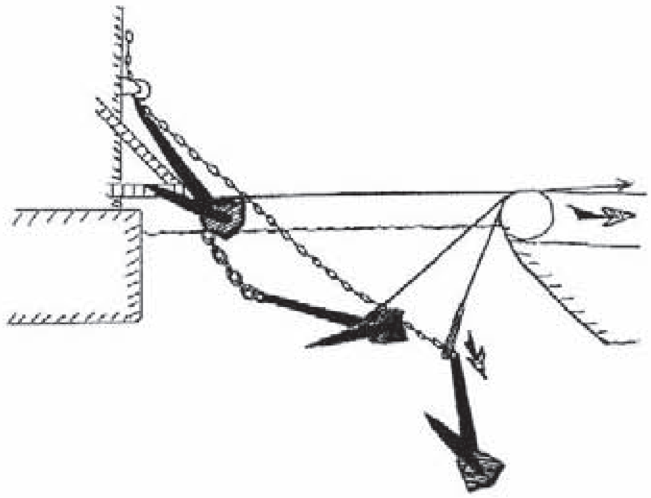
Remove all equipment and personnel from deck, inform the rig and let go the buoy.

2.5 ANCHORING WITH PERMANENT CHASER

Anchoring with permanent chasers on the rig chain is in some ways similar to anchoring with pennant wires and buoys. Some extra care must be taken to keep the chaser on the anchor at all times.

2.6 DEPLOYING THE ANCHOR FROM THE RACK

The vessel must be at sufficient distance to create as much of a horizontal pull on the chaser as possible. When lowering the anchor, the pennant wire must be sufficiently tensioned, if not the anchor will slip off the chaser (see figure).



2.7 TOWING OUT THE ANCHOR

When towing out the anchor in deep water, the anchor must be kept as close as possible to the vessel, and the chain must be extended as much as possible. This is done in order to prevent the chain from laying on the seabed building up a drag resistance. The winch operators on the rig will advice the vessel's speed and pull.

2.8 DEPLOYING THE ANCHOR

It is advisable to deploy an anchor under the most controlled conditions possible in order to land the anchor at the right anchor position. If for any reason, it is merely dropped, it will tend to land closer to the rig than intended, with a loss of chain length as result.

2.9 BOARDING THE CHASER

When the anchor is safely on the seabed, and the rig has achieved sufficient tension on the anchor winch/rig chain, the vessel can start towing the chaser back to the rig.
When the vessel is alongside the rig, secure the chaser pennant in the A.H. tong.

Connect the rig's crane hook to a wire strap through the eye of the pennant. When the rig crane is ready to take the chaser pennant on board, release the pennant from the A.H. tong.

2.10 CHASING THE ANCHOR

When retrieving anchors with permanent chasers, the chaser pennant is received from the rig, secured in the A.H. tong, and connected to the A.H. Wire. The length of the wire must be 1,5 to 2 times the depth while towing the chaser.
In the event that the angle of the chaser line is too steep, the chaser will not reach the anchor shank, and consequently, the breaking out forces will increase from the effects of the leverage.
The rig must maintain the tension of the anchor line, while the vessel tows the chaser towards the anchor. When the chaser has reached the anchor, the pull must be increased to about 50% of its maximum before breaking out the anchor.

2.11 BREAKING OUT FORCES

The breaking out forces of anchors are always related to the holding power applied. If an anchor has not penetrated too deeply - thus giving a low holding efficiency - it can easily be broken out. For this reason, some users apply oversized anchors. However, if an anchor has penetrated deeply and has been subjected to a high load, it will then be portionally more difficult to break out.

A second factor influencing the forces required for breaking out is the design of the anchor.

The Stevpris anchor is a deep penetrating anchor; such anchors offer high holding power. The V-shaped shank of the Stevpris anchor permits the soil to pass through the shank legs. The pennant eye or the chaser near the anchor shackle forms a lever to turn out the fluke. This combination means that the Stevpris anchor needs relatively low breaking out forces compared to other anchor designs.

The types of soil clearly influence breaking out forces, regardless of the anchor type.

- In sandy soil, the breaking out force is approximately 12 - 17% of the load held.
- In clay this percentage will be higher (60%)
- In soft soils it will be even higher
- In sticky soils it can exceed 100%

These approximations are applicable to any anchor type.

When breaking out deeply penetrated anchors, the following must be taken into consideration:

- Under the soaking test it has been clearly shown that dilatancy promotes the holding capacity of an anchor. The same phenomenon obstructs the breaking out of the anchors.
- Breaking out forces is caused by the volume of the soil on the fluke and the sucking or under-pressure below it. Pulling up the anchor increases the soil resistance due to the soil's dilettante behaviour. This resistance decreases with time, reducing the negative pressure and thus easing the break out.
- The length of the pennant line for retrieving must be 1,5 times the water depth. When hauling the pennant, the line should be kept under tension at 50% of the pulling force of the vessel.
- The movement of the vessel due to wind and waves is reduced by this anchor tension while the same movement slowly breaks out the anchor, allowing the above phenomenon to occur.
- If breaking out does not occur after a period of approx. 30 minutes, the forces on the winch must be increased slightly.

2.12 BOARDING THE CHASER AND ANCHOR

In general, the speed of the rig's winches is low. Therefore, the vessel will have sufficient time to steam astern and board the anchor in the correct way.
The vessel either moves astern or turns, depending upon the direction of the wind and sea.

2.13 RACKING THE ANCHOR AFTER RETRIEVING

When the rig is heaving the chain, the vessel should keep a distance of at least 150 to 200 metres from the rig, while keeping a tension of at least 30 to 40 tons.
The vessel, maintaining the aforementioned distance, pays out the pennant, while the rig simultaneously heaves the chain. The tension must be kept until the anchor is completely bolstered. At the moment the main (bow) shackle of the anchor touches the anchor rack, it is essential that the winch be briefly stopped, so the anchor can settle in the proper position for racking. Otherwise, the wings on the shank will rotate the anchor, turning its back towards the rack.

The anchor will fall off the chaser if:

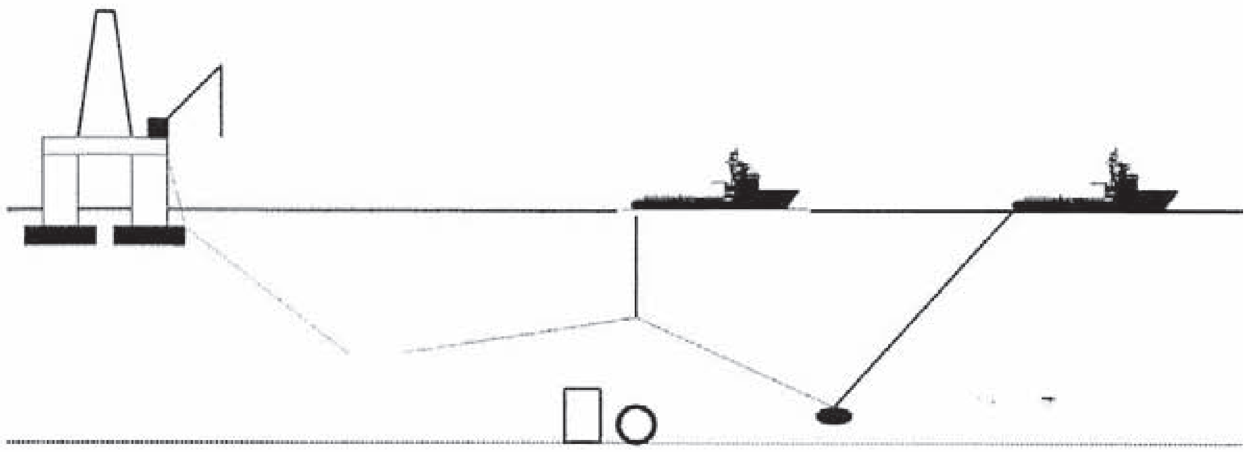
- the chain is not heaved quickly enough by the rig
- the pennant is not kept sufficiently tight
- the vessel is too close to the rig.

The chaser should remain in contact with the bow shackle at all times.

2.14 TANDEM OPERATIONS

In situations where the anchor chain is crossing an underwater construction (e.g. pipeline, cable, etc.) on the seabed, there is sometimes need for tandem operations. The tandem operation is performed in co-operation with two anchor handling vessels.

- The vessel picks up the anchor from the rig as described above.
- When vessel A has towed the anchor some distance from the rig, vessel B moves in close to the rig and connects the chaser hook on the rig chain between the rig and vessel A.
- Vessel B will position above the underwater construction with the chaser hook lowered to approximately ½ water depth. (The Charters/Operators "on-site"-procedure to be consulted).
- The rig chain will slide through the chaser hook as vessel A is towing towards the anchor position.
- When the anchor is safely deployed on the seabed, vessel B lowers the chaser hook closer to the bottom.
- When the rig has achieved sufficient tension on the anchor winch/rig chain, both vessels can start moving back to the rig.
- Vessel B releases the chaser hook
- Vessel A boards the chaser as described above



2.15 RETRIEVING BROKEN ANCHOR CHAIN WITH GRAPPLE

When the rig's anchor chain has broken the vessel must use a Grapple trying to retrieve the anchor. The rig will inform about the length of the chain left on the anchor, and the anchor position.

Prior upon commencing the anchor handling, a plot diagram can be used to plan the execution of the grapple operation.
The grapple operation starts close to the anticipated anchor position. If the result is negative, the next crossing line will be closer to the rig.

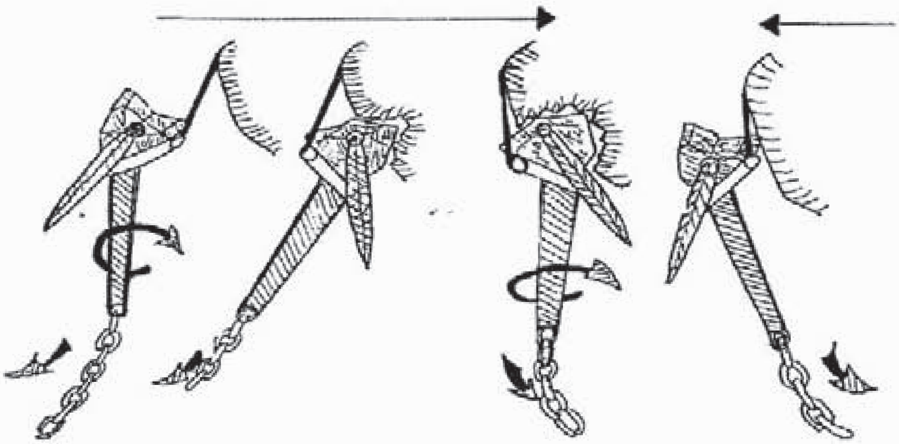
The grapple must be towed across (90°) the anticipated direction of the chain with an approximate wire length of 1,5 times the water depth in slow speed.
As soon as the grapple has hooked on the chain, start heaving on the winch.

Remove equipment and personnel from deck until the chain and anchor is safely on deck.

The Officer on Watch has the responsibility for the safety of personnel on deck during the operation.

2.16 ANCHOR WITH PERMANENT CHASER ON DECK

When the rig request the vessel to take an anchor with permanent chaser on deck, it is important that the correct method is used in order to prevent damage to the vessel's stern.
When the anchor is close to the stern, the vessel must move astern to position the anchor the correct way. If the vessel is towing forward the anchor will always come up the wrong way, with possible damage to the hull as result. The harder the vessel is towing forward, the harder the force against the hull and on the pennant.
If the vessel is moving astern, and the anchor chain is pointing forward, the anchor will always position it selves the correct way.



2.17 SPOOLING OF WIRES.

When Anchorhandling in deep water, the use of piggyback-anchors,"midline"-wires, and other operations can require spooling of workwires.

In the context of this procedure, the spooling of wires is the operation where wires are transferred from the rope-reel to the anchorhandling winch, or vice versa. It can also be when a coil of wire is connected to the work winch, dropped over board and then spooled onto the winch. Installation/replacement of wingwires and long workwires also requires spooling. Spooling of wires is necessary in order to achieve a proper lay of the wire on the drum, which avoids damage and unnecessary wearing of the wire.

Spooling of wires can be controlled either by tugger-winches, or spooling devices on the rope-reel or the anchorhandling winch. In both cases it is important to haul the wire through closed towingpins. If the wire slides off the gypsy/towing pins, the resulting bight of wire can be a serious hazard for the crew. A stretched wire may hold forces that can be released if the wire is allowed to behave in an uncontrolled manner.

Wire work carried out with remote controlled devices, is the safest and best way for both for the crew and the wire requiring to be spooled. For vessels not equipped with spooling devices, the operation must be carried out with the tuggerwinches. An open hook is connected to the tuggerwire, and the hook is hung onto the wire to be spooled. For spooling from side to side, both tuggerwinches are to be used. When hauling, the lay on the drum is controlled by the tuggerwinches pulling sideways in the appropriate direction.

When hauling, the guiding hook(s) will slide along the hauled wire, with quick jerky movements. Therefore, when hanging the hook(s) on/ off the wire to be spooled, the spooling operation must be completely stopped. No wires are to be hauled whilst working with the spooling guide hooks. In case there are any shackles/connections on the wire(s), stop spooling, shift the hook(s)and then resume spooling.

Communications between crew operating the winches is also of great importance. Supervise the operation from the bridge, and no one should be allowed to stand in a bight of wire or hazardous area.

BOURBON

ANCHOR HANDLING & TOWING MANUAL
Section 3.0
Towing

Original Date:	2003-10-01
Revision nr.:	1
Revision date:	2006-06-20
Prepared by	QHSE Dep.
Approved by	Man.Dir.

3.0 TOWING

3.1 INTRODUCTION

The Master is responsible for the safety of the operation. If more than one vessel is towing, one should be appointed as the leading tug.

A successful tow of a manned object (rig, barge, etc.) is depending upon good communication between the vessel and the responsible leader on the towed object.

3.2 PLANNING

Thorough planning of the towing operation is of vital importance. The normal towing operation is towing of drilling rigs from one location to another. In these cases the information given is often insufficient. The Master must therefore establish a good communication with the rig to get the needed information.

In cases of larger towing operations (platforms etc.), the company will prepare a project manual if needed.

3.3 OBJECTIVES

An unalterable objective is to maintain the towing connection under any conditions that may arise during the operation. The Master must take any precautions necessary to prevent the tug line to break.

3.4 PRELIMINARIES

Prior to towing operations, the Master must inform the crew and prepare the vessel for the operation.

- The towing operation to be studied and discussed.
- All towing equipment must be prepared for the operation.
- Hydraulic equipment to be tested.
- The towing wire and wire eye to be inspected.

3.5 SAILING ROUTE

To make the sailing route as short as possible, the Master must consider several factors:

- Time of the year.
- Current settings.
- Water depth.
- Wreaks.
- Submarine oil wells.
- Offshore installations.
- Prevailing and expected weather conditions.
- If the towed rig has it's own propulsion machinery.
- Used or recommended sailing route.
- The presence of actual and corrected charts and other relevant publications for navigation.

Even if sailing routes and plans are received from the rig, the Master has the responsibility to control and evaluate if the operation is within normal operational limits, and if the sailing route is navigational safe.

3.6 TOWING REQUIREMENTS

A recognised requirement to normal towage is that it shall be able to maintain a speed through the water of 5 kts in good weather, and that the tug shall be able to keep the towed object *stationary* in a sea state defined as 5 metres significant wave height and a wind speed of 20 m/s.

Another requirement is that each component in the towing gear shall have a breaking strength not less than 3 times the bollard pull. An exception to this concerns synthetic fibre hawsers.

Whenever a hawser is used as a part of the towing gear, DNV require that its breaking strength shall be twice that of the towing wire.

3.7 THE TOWING OPERATION

The below is meant to be guidance and includes a summary of actions during towing operations.

- The towing wire to be tread through the towing eye (if applicable)
- The towing gear from the rig to be fastened in the AH tong
- The wire and the towing gear to be connected with a 85 or 120 tons shackle
- The tension control to be set to the lowest level
- The winch to be operated in high speed mode
- After connection, tension up the wire
- Lower the towing pins, and open the AH tong

In good weather give out wire until the vessel is 700- 800 metres from the rig or vessel to be towed.
In rough weather a distance of up to 1200 metres is advisable

When the towing operation is ready to commence, the Master can either:

- Put on the winch brake, and stop all hydraulic pumps, or
- Operate the winch in low speed mode, adjust the tension control to 20 bar, loosen winch brake and stop the hydraulic pumps. Great care should be taken during operations with this alternative.

NOTE! The compressed air in the servo unit may leak, and it is advisable to start the servo pump for a minute once per hour.

In towing operations that lasts for a period of time, it is important frequently to give out or haul in on the wire in order to prevent abrasion at the stern roller.

3.8 ON COMPLETION OF TOWING

On completion of the towing operation all equipment that has been used must be inspected, maintained and stored at its regular place. Equipment belonging to the rig must be returned.

BOURBON

FORMS & CHECKLIST MANUAL

B 17 Two officers on bridge

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-03-23
Prepared by	QHSE Manager
Approved by	Managing Dir

Platform Supply Services

Officer on Watch	Officer no. 2
DPO No 1	DPO No. 2
Before entering 500 M ZONE	
• Use B3 checklist * • Steering from forward manoeuvring position towards the rig. • Alarm limits on DP to be set at acceptable limits due to weather and sea state. • Get approval for switching over to DP from OIM or authorized person	• Communicates with the rig control room. • Communicate with installation, Crane driver, • Give information of which rig and UHF channel to ECR, and establish contact with all parties involved.
At 100 M from installation	
• Stops the vessel in correct position alongside the rig. • Change over to DP in safe distance away from the installation, ref DP checklist. • Observes DP system stability and capability to hold position and heading.(ca 10 min).	• Going through location of cargo with deck crew and crane driver on installation. • Make plans for backload
In Position at the Rig	
• Communicate with crane driver and place the vessel in a optimal position for discharging and backload • DP system to be monitored at all times, check all 3 reference systems for stability. • Observes if position is within acceptable limits for DP operations. • Ref. Charterers Operation Procedures (Kapteinshåndbok)	• Pick up all incoming telephone calls. • Keep an eye on discharged cargo and backload coming onboard. • Starts/Stops pumps and valves for bulk system if such cargo is handled.

*B3 – 500 M Pre-entry Checklist

BOURBON

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-03-23
Prepared by	QHSE Manager
Approved by	Managing Dir

FORMS & CHECKLIST MANUAL

B 17 Two officers on bridge

Anchor Handling

Officer on Watch	Officer no. 2
DPO No 1	**DPO No. 2**
Before entering 500 meter zone	
• Ref. B3 and B10 checklist. • Steering from forward manoeuvring pos towards the rig. • Alarm limits on DP to be set at acceptable limits due to weather and sea state. • Get approval from the rig to enter the 500 m zone	• Start up and test all winches/equipment for anchor handling • Test communication with the deck crew • Inform the engine control room
Inside the 500 meter zone	
• Stops the vessel in correct position • Change over to aft manoeuvring position • Communicate with the crane/winch driver on the rig regarding anchor handling operation • If vessel is connected to rig or object during DP operation, vessels and objects distance/position to be monitored at all times	• Operating the winches/equipment according to OOW instructions • **IMPORTANT!** Decks crew to be informed before releasing the shark jaw or the towing pins.

*B3 – 500 M Pre-entry Checklist
B10- AHT Checklist

BOURBON

FORMS & CHECKLIST MANUAL

B 17 Two officers on bridge

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-03-23
Prepared by	QHSE Manager
Approved by	Managing Dir

Towing

Officer on Watch	Officer no. 2
DPO No 1	**DPO No. 2**
Before entering 500 M ZONE	
• Ref. B3 and B10 checklist. • Steering from forward manoeuvring pos towards the rig. • Alarm limits on DP to be set at acceptable limits due to weather and sea state. • Get approval from the rig to enter the 500 m zone	• Start up and test all winches/ equipment for anchor handling • Test communication with the deck crew • Inform the engine control room
Inside the 500 meter zone	
• Stops the vessel in correct position • Change over to aft manoeuvring position • Communicate with the crane/winch driver on the rig regarding anchor handling operation • If vessel is connected to rig or object during DP operation, vessels and objects distance/position to be monitored at all times	• Operating the winches/equipment according to OOW instructions. • **IMPORTANT!** Decks crew to be informed before releasing the shark jaw or the towing pins.
During Towing	
• Observe wire length, tension according to towing instruction. • Observe traffic along the towing route. • Inform the rig regarding any dangerous traffic • Broadcast safety message on VHF radio	• *No requirement for second officer, but company procedures for navigation watches and lookout to be followed.*

*B3 – 500 M Pre-entry Checklist
B10- AHT Checklist

BOURBON

FORMS & CHECKLIST MANUAL

B 17 Two officers on bridge

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-03-23
Prepared by	QHSE Manager
Approved by	Managing Dir

DP / Sub-sea Operation

Officer on Watch	Officer no. 2
DPO No 1	DPO No. 2
• Operate DP • Communication with ROV operator and Shift Supervisor	Take care of all other bridge communication like: • VHF • check list completion • communication with deck • communication with crane driver • communication with engine room • reply to phone calls Take care off all other bridge operation duties.

BOURBON

FORMS & CHECKLIST MANUAL

B10 Anchor Handling/Towing Operation

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-10-01
Prepared by	QHSE Manager
Approved by	Managing Dir.

This checklist to be completed before all Anchor Handling/Towing Operations.

Location:		Rig:		Date/Time:	

		Tick off when completed
1.	Toolbox talk performed for each job of work	☐
2.	Risk assessment performed for each job of work	☐
3.	All Deck Crew shall wear proper PPE (hardhat, boots, gloves & buoyancy suit/jacket)	☐
4.	All crewmembers involved comply with the STCW regulations regarding periods of rest	☐
5.	Communication with the rig established and tested?	☐
6.	Internal communications equipment working correctly	☐
7.	Anchor Handling Equipment (Winches, towing pins, shark jaws, wires, guide rollers, shackles etc.) available and working correctly	☐
8.	Main Engine tested both ahead and astern	☐
9.	Tunnel Thruster/ Azimuth Thruster tested and working satisfactorily	☐
10.	Steering Gear checked and working satisfactorily	☐
11.	Vessel Stability checked and found safe for work	☐
12.	Navigational Lights checked and found satisfactory	☐
13.	Sufficient deck lighting	☐
14.	On-site procedure received from the rig	☐
15.	Weather Reports available and considered favourable for the operation	☐

Other:

16.		☐
17.		☐

When all checks according to this checklist are completed, the following is to be noted in the Log book: ***Anchor Handling/ Towing Operations checklist completed.***

BOURBON

Safety Management System
B 24 Anchor Handling
Experience Log

Date: 01.12.06
Rev.: 1
Page: 1/3
App: Man.Dir.

ANCHOR HANDLING OPERATIONS

The purpose of this log is to document the individuals experience from anchor handling operations. It is the individual crew member responsibility to maintain his experience log in cooperation with the Chief Officer and the Master. The purpose of this document is also to meet experience log requirements.

Name	:
Date	:
Current position	:
Vessel	:

1 AH Winch Operation

The following operations have been performed under observation, and the performance has been to the vessel management satisfaction:

1.1 Receiving pennant

Date	Vessels name	Comments	Masters signature

1.2 Chasing Anchor, Braking out forces – Anchor off Bottom

Date	Vessels name	Comments	Masters signature

1.3 Breaking out Forces – Anchor over Stern Roller

Date	Vessels name	Comments	Masters signature

BOURBON

Safety Management System
B 24 Anchor Handling
Experience Log

Date: 01.12.06
Rev.: 1
Page: 2/3
App: Man.Dir.

1.4 Deploying Anchor from Deck

Date	Vessels name	Comments	Masters signature

1.5 Returned Pennant to the Rig/Installation

Date	Vessels name	Comments	Masters signature

2 Manoeuvring the Ship

The operation has been performed under observation, and the performance has been to the vessels management satisfaction:

2.1 Receiving pennant

Date	Vessels name	Comments	Masters signature

2.2 Chasing Anchor, Braking out forces – Anchor off Bottom

Date	Vessels name	Comments	Masters signature

2.3 Breaking out Forces – Anchor over Stern Roller

Date	Vessels name	Comments	Masters signature

2.4 Deploying Anchor from Deck

Date	Vessels name	Comments	Masters signature

2.5 Returned Pennant to the Rig/Installation

Date	Vessels name	Comments	Masters signature

BOURBON

FORMS & CHECKLISTS MANUAL

C2: MATES HANDOVER CHECKLIST

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-12-01
Prepared by	QHSE Manager
Approved by	Managing Dir.

Mate's name:		Date:	

No.	Following items to be discussed	Comments:
1	Rescue facilities / equipment	
2	Lifesaving equipment	
3	Fire-fighting appliances	
4	Lighting	
5	Deck machinery / equipment	
6	Ropes and wires	
7	Training, Exercises and safety matters	
8	Induction Training of new crewmembers	
9	Safety Inspections	
10	Status Nav. / Com. equipment	
11	Tank / Cargo status	
12	New equipment onboard	
13	Crew and passengers	
14	Last life boat exercise, fire drill and first aid exercise?	
15	Major changes during the shift	
16	PPE Stock	
17	Paint store, stock	
18	General Maintenance	
19	Medicine Chest, Hospital	
20	Others (specify):	

Checks Completed by:

Name	Signature:	Date:

Read and accepted by:

Name:	Signature:	Date:

- *This form to be completed and filed onboard for two years.*
- *The form may be substituted by other handover systems, but such systems to contain information on above items.*

BOURBON

FORMS & CHECKLISTS MANUAL

E4: CH. ENGINEER'S HANDOVER CHECKLIST

Original Date: 2003-10-01
Revision nr.: 2
Revision date: 2006-12-01
Prepared by QHSE Manager
Approved by Managing Dir.

Vessel name:		Date:	

No.	Following items to be discussed	Comments:
1	E5 Engineers Monthly Report	
2	Status Main Engines	
3	Status Auxiliary Engines	
4	Status Main Propellers / Gears	
5	Status compressors etc.	
6	Status Side thrusters / Azimuth thrusters	
7	Status Boiler / Heating system	
8	Status Pumps / Pipe systems	
9	Status Fi-Fi equipment	
10	Status Electrical system	
11	Status Rescue- / Lifeboats (engines)	
12	Status Deck Machinery /Hydraulic System	
13	Status tanks	
14	Special tasks started or planned	
15	Status of requisitions and orders	
16	Status maintenance - under work	
17	Status maintenance - finished	
18	Major changes during the shift	
19	Special events this shift	
20	Important circulars / letters	
21	Tank stock	
22	Classification status	
23		
24		

On-signing Chief Engineer

Off-signing Chief Engineer

To be filed within the Engine Department for 24 months

BOURBON

FORMS & CHECKLISTS MANUAL

M2 Master Handover Checklist

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	2006-10-01
Prepared by	QHSE Manager
Approved by	Managing Dir.

Vessel name:		Date:
No.	**Following items to be discussed**	**Comments:**
1	Place, Quay, Depth	
2	Special conditions (harbour)	
3	Special conditions (sailing)	
4	Planned sailing schedule	
5	Weather forecast	
6	Loading condition (if actual)	
7	Loading/Discharging operations	
8	Special events	
9	Major changes during the shift	
10	Important circulars / letters	
11	Tank status	
12	Status Engine	
13	Status Nav. / Com. equipment	
14	Status DP-equipment	
15	Status Fi-Fi equipment	
16	Status Safety equipment	
17	Status Oilrec. equipment	
18	Status Ship equipment	
19	Status Rescue- / lifeboats	
20	Certificates	
21	Crew and passengers	
22	Cash Balance	
23	Status of requisition and orders	
24	Safety Management System	
25	Field information	
26	Safety Alerts	
27	Company Standing Order	
28	New equipment on board	
29	Special tasks started or planned	
30	Recommendations from Class or Authorities?	
31	Last life boat exercise, fire drill and first aid exercise?	
32	Updating on Standing Instructions	
33	Safety Meeting / Safety Committee	
34	Status of Premaster HSE Reports	
35		
36		
37		
38		
39		
40		

Date:

_____________________________ On-signing Master

_____________________________ Off-signing Master

BOURBON

FORMS & CHECKLISTS MANUAL

S1: SAFETY INDUCTION CHECKLIST

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	18.09.2006
Prepared by	QHSE Manager
Approved by	Managing Dir.
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NAME	RANK
VESSEL'S NAME	DATE JOINED

All new crew members must complete an induction of the vessel as soon as possible after joining, but no later than two weeks after joining. A member from the relevant Head of Department will go through this form with the new crew member. The Heads of Departments should induct the new crew member in the areas indicated and the new crew member sign on this form upon completion together with the Master.

A new crew member is one who: 1. Has never sailed on the vessel
2. Has not sailed on the vessel in the past 12 months.

1.	Ship Safety Induction Booklet discussed and explained.	☐	
2.	Introduced to relevant parts of the Company's Safety Management System.	☐	
3.	Introduced to duties with respect to the security of the ship. *(ref. ship security plan)*	☐	
4.	Company Policy's HSE / Alcohol and Drug. *(random testing may be performed)*	☐	*
5.	Company's Designated Person *(Utpekt Person)* Who, How, When	☐	*
6.	Work Permit and risk assessment procedures.	☐	
7.	Reporting of accidents, near accidents and other hazardous observations.	☐	
8.	Use of the B- safe card.	☐	
9.	Crewmember's job description to be discussed and explained.	☐	*
10.	Watch arrangements, general requirements onboard vessel.	☐	*
11.	Muster and Fire Alarm (explain alarms, how to respond, where to meet, duties in the event of an emergency)	☐	*
12.	General layout of vessel, fire and safety plan, muster stations and alarms.	☐	*
13.	Indication and how to operate watertight doors, emergency generator main and emergency fire pump.	☐	*
14.	Indicate locations of safety and emergency equipment such as fire fighting equipment, survival suits, lifejackets, life-rafts , emergency flares, parachutes, SART's, EPIRB's etc.	☐	*
15.	Escape routes from inside accommodation, engine room spaces, etc.	☐	*
16.	Hospital and First Aid Facilities.	☐	*
17.	Lowering and use of Fast Rescue Craft (FRC) or man over board boat (MOB)	☐	*
18.	Use and control of hazardous substances (COSHH) (include also transport of dangerous goods IMDG)	☐	
19.	General operation of SMPEP equipment or oil recovery equipment of any.	☐	
20.	General house keeping, cleanliness and hygiene.	☐	
21.	Guided tour of the vessel.	☐	*
22.	Applicable Installation / Client requirements and procedures if any.	☐	
23.	Completed the relevant "vessel & equipment familiarisation" below.	☐	

**** Items identified to be completed before vessel sails and box ticked on completion***

Upon completion of the induction the new crew member must satisfy himself that he or she is fully aware of his / her responsibilities, Company policy, ships routine and the location and use of all Emergency Equipment.

With his / her signature the new crew member hereby declares that he / she has been given full "New Crew Members" Safety familiarisation of the vessel.

Induction given by (name): ___________________________

Signatures:

Date / New Crew Member **Date / Master**

BOURBON

FORMS & CHECKLISTS MANUAL

S1: SAFETY INDUCTION CHECKLIST

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	18.09.2006
Prepared by	QHSE Manager
Approved by	Managing Dir.
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VESSEL & EQUIPMENT FAMILIARISATION - BRIDGE

NAME: POSITION:

	BRIDGE DEPARTMENT	DATE
1.	Radar / Arpa	
2.	Radio / vessel communication	
3.	Navigation light & vessel lightening	
4.	Navigation equipment; GPS, gyro, compass	
5.	Autopilot	
6.	Bjørge Steinco or UMAS & all alarm systems	
7.	Transfer of manoeuvring positions	
8.	DP system	
9.	DP ref. systems; Hipap, GPS, Fanbeam	
10.	DP emergency procedures, DP > manual operation	
11.	Joystick Manoeuvring	
12.	Cargo handling systems	
13.	Bunkering procedures	
14.	Fire Alarm System	
15.	Fi- Fi I or II	
16.	Dangerous goods	
17.	Methanol loading /discharge	
18.	Special products loading/discharge	
19.	Mob- boat, technical and operation	
20.	Tank tender + Local Sounding	
21.	Stability Program	
22.	Loading Calculator	
23.	Mooring/Anchoring/Tugger/Capstans	
24.	Conning	
25.	IAS	
26.	Emergency Steering	
27.	Diesel Electric Propulsion	
28.	Thruster Configuration	
29.	Operator Procedures	

Master signature to verify completion:

BOURBON	FORMS & CHECKLISTS MANUAL S1: SAFETY INDUCTION CHECKLIST	Original Date: Revision nr.: Revision date: Prepared by Approved by Page	2003-10-01 2 18.09.2006 QHSE Manager Managing Dir. 3 / 5

VESSEL & EQUIPMENT FAMILIARISATION - ENGINE

NAME: POSITION:

	ENGINE DEPARTMENT	DATE
1.	Main engines	
2.	Emergency generator	
3.	Auxiliary machinery	
4.	UMAS and Alarm systems	
5.	Main propulsion systems including gear	
6.	Manual manoeuvring of the vessel	
7.	Fuel system	
8.	Cooling water system	
9.	Cargo handling system	
10.	Bilge system	
11.	Oily water seperator - Operation and rules	
12.	Sewage plant - Operation and rules	
13.	Fresh water generator	
14.	Internal communication	
15.	Fuel oil quick closing valves	
16.	Methanol loading discharge	
17.	Loading, discharge and procedures for petroleum products	
18.	Special and hazardous products - discharge and loading	
19.	Inert gas generator	
20.	Incinerator	
21.	Premaster planned maintenance system	
22.	Tools and spare parts	
23.	Fire alarm systems	
24.	SMPEP equipment and procedures	
25.	Muster list	
26.		
27.		
28.		
29.		

Master signature to verify completion:

BOURBON

FORMS & CHECKLISTS MANUAL

S1: SAFETY INDUCTION CHECKLIST

Original Date:	2003-10-01
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Prepared by	QHSE Manager
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VESSEL & EQUIPMENT FAMILIARISATION - DECK

NAME: POSITION:

	DECK DEPARTMENT	DATE
1.	Fire fighting equipment	
2.	Muster list	
3.	Emergency procedures	
4.	Mooring winches - tuggers - capstans - anchor winches etc.	
5.	Operating deck cranes	
6.	Rigging of gangway	
7.	Dangerous goods equipment	
8.	Methanol loading and discharge	
9.	Special and hazardous products - Discharge and loading	
10.	Cargo handling procedures	
11.	SMPEP equipment and procedures	
12.	Deck drain and scuppers	
13.	Maintenance of deck equipment	
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28.		

Master signature to verify completion:

BOURBON

FORMS & CHECKLISTS MANUAL

S1: SAFETY INDUCTION CHECKLIST

Original Date:	2003-10-01
Revision nr.:	2
Revision date:	18.09.2006
Prepared by	QHSE Manager
Approved by	Managing Dir.
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VESSEL & EQUIPMENT FAMILIARISATION - GALLEY

NAME: POSITION:

	GALLEY DEPARTMENT	DATE
1.	Fire fighting equipment - extinguishers and fire blankets	
2.	Muster list	
3.	Emergency procedures	
4.	Operator procedures	
5.	Use of galley equipment and machinery	
6.	Maintenance and cleaning of equipment and machinery - Isolation of equipment and machinery	
7.		
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Master signature to verify completion:

BOURBON

Health, Safety and Environment Report

General Information

Report:	**209-07-5001 - Internal ISM and ISPS audit**
Report Type:	Internal Audit ISM & ISPS
Site:	BOURBON DOLPHIN
Date:	09.03.2007
Time:	10:00
Location:	Aberdeen
Author:	Steven J. Rooney
Reported Date:	12.03.2007
Reponsible Action:	Captain

Description of Event/Observation

Health, Safety and Environment Report

Description:

The internal audit was carried while the vessel was OFF hire in Aberdeen, UK. The vessel was very clean and in excellent condition. There also seems to be a very good working environment on board. The auditor interviewed the Captain, Chief Officer, both 1st Officers, Chief Engineer, 1st Engineer, one AB and the Cook.

The purpose of the audit was to ensure that Bourbon Dolphin is operated in accordance with Bourbon Offshore's Safety Management System and the ships ISPS code.

Even though the ship seems to be very much following the Company SMS system there are a few points the auditor would like to comment on. See items below.

The Company internal audit checklist was used when performing the audit.

No Non Conformities were raised but some Observations were observed during the audit. This does not however mean that there are no NC's but they were not discovered.

NON CONFORMITIES

1. It was evident that handover were not always signed by both parties.

2. There have been no test of the ship security alert since the vessel was delivered.

3. There were also a lack of recording of security events in the security log.

OBSERVATIONS

1. The risk assessment system could be better used. It has mostly been in used before start up of anchor handling work.

2. There is very little recorded in the Prermaster HSE system also. All safety meeting minutes are also to be recorded in this system and at the time of the audit there were only a total of 5 HSE reports. Bourbon Dolphin can do better than this. This is for all departments.

3. Lifting and Slinging course. This is not a mandatory requirement by the authorities but for some charters. 2 men did not have this course.

4. The Cook did not know how to start the emergency fire pump.

5. There were no system for refilling of BA bottles.

All Non Conformities are to be closed within May 31st, 2007. Observation are recommendations only but it is expected to threat these as Non Conformities and close them within the same date.

Fosnavåg March 15, 2007

Steven Rooney
HSE Manager

BOURBON

Health, Safety and Environment Report

Notified Instances

Owner	Notified	Premaster HSE only
Charter	Not Notified	

BOURBON

Health, Safety and Environment Report

Control Actions

Control Action: NC 1 Handover
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:
Date Closed:
Recommendations: All senior positions required to complete a handover should sign the handover. The handover are to be signed by both "off" and "on" going officer.

Control Action: NC 3 Ship security log
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:
Date Closed:
Recommendations: The Company have just forwarded instructions about recoding of ship security events and this has been addressed with the Ship Security Offcier (Captain) on board.

The ship will in the future use the Premaster ISPS log for recording of all security related events as per the instructions.

Control Action: OBS 2 Non Conformity registration
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:
Date Closed:
Recommendations: The crew on board Bourbon Dolphin can inmprove in writing of Non Conformities. All crew should be encouraged to report near accidents and hazardous observations they witness to the bridge crew.

This will also be monitored by the Designated Person Ashore.

Control Action: OBS 4 Starting of emergency fire pump
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:
Date Closed:
Recommendations: All personnel on board should know how to start the emergency fire pump.

Control Action: NC 2 Ship Security Alert
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:
Date Closed:
Recommendations: The ship security alert system should be tested regularly and in accordance with the Ship Security Plan and ISPS code.

Control Action: OBS 1 Risk assessment
Responsible: Captain
Date Due: 31.05.2007
Date Implemented:

BOURBON

Health, Safety and Environment Report

Date Closed:

Recommendations: The risk assessment must be more used. At least should there be a risk assessment completed prior to any dangerous work being completed. But one will also like to see that a risk assessment is also completed for all routine work and made available to the crew. These should be reviewed at least once a year.

Control Action: OBS 3 Lifting and slinging course

Responsible: HSE Manager

Date Due: 13.06.2007

Date Implemented:

Date Closed: 15.03.2007

Recommendations: Some of the major clients to the Company requires all AB's to have lifting and slinging training.

Actions Taken: There were two Ab's without thhis course. Both have been booked on such training for next time home.

Steven Rooney

Control Action: OBS 5 Refilling of BA bottles

Responsible: Captain

Date Due: 31.05.2007

Date Implemented:

Date Closed:

Recommendations: A system should be etsablished to ensure that all BA bottles are comletely refilled on a yearly basis.

DNV

DET NORSKE VERITAS
SURVEY REPORT

Rev. [1]

Name of vessel	Name of owner	DNV id. no.	Job Id.
BOURBON DOLPHIN	Bourbon Ships AS	26425	3630820-1
		IMO no. 9351983	

SMC and ISSC Initial Audit.

This is to confirm that the following has been carried out:

Certificates

Certificate Name	Endorsed	Issued/ Extended	New expiry date
International Ship Security Certificate		FullTerm	2012-03-17
Safety Management Certificate		ShortTerm	2007-08-16

Surveys

Survey Code	Survey Name	Result
SMC.R	Safety management renewal	Complete (Initial)
ISSC.R	Ship security renewal	Complete (Initial)

Conditions and Memoranda – Given		Due Date
NC 1	NON-CONFORMITY ISM Code 6.3 "The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarisation with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given. Finding(s): **[Safety management, resources and personnel > Safety management, familiarisation and training]** Procedure not effectively implemented The familiarisation training of new personnel was not always effectively carried out. For example while the "general" familiarisation checklist was always completed, the deck and engine room specific SMS checklists were not being used. It is recommended that the all these training aids be put into effect for new personnel.	2007-06-16
NC 2	NON-CONFORMITY ISM Code 6.5 "The Company should establish and maintain procedures for identifying any training which may be required in support of the SMS and ensure that such training is provided for all personnel concerned."	2007-06-16

Station	Place of survey	Survey started	Survey completed	Stamp
Aberdeen - Offshore units in Operation	Aberdeen	2007-03-17	2007-03-17	DET NORSKE VERITAS 1864 ABERDEEN
Lead surveyor's name [redacted]	Lead surveyor's signature [redacted]			
Surveyor's name	Surveyor's signature			

DET NORSKE VERITAS AS, VERITASVEIEN 1, N-1322 HØVIK, NORWAY, TEL.INT.: +47 67 57 99 00, TELEFAX: +47 67 57 99 11
Form No.: 40.9 Issue: April 2005

Name of vessel	Name of owner	DNV id. no.	Job Id..
BOURBON DOLPHIN	Bourbon Ships AS	26425	3630820-1

Conditions and Memoranda – Given		Due Date
	Finding(s): **[Safety management, resources and personnel > Safety management, procedures for training]** Procedure not adequately defined. Not all crew training requirements appear to have been identified within the SMS. For example there were no levels of training or experience defined within the SMS for anchor handling operations before the crew are allowed to work on deck and operate the winches. It was further noted that an accident dated 06/12/2006 was attributed to lack of anchor handling training/experience. In addition this matter was raised in the Master's review dated Jan 2007 and the Safety Committee Meeting of 19/02/2007. It is recommended that the Company review the anchor handling training and experience procedures and practise and define them within the SMS.	
NC 3	NON-CONFORMITY ISM Code 7.0 "The Company should establish procedures for the preparation of plans and instructions, including checklists as appropriate, for key shipboard operations......" Finding(s): **[Safety management, development of plans for shipboard operations]** Procedure not adequately defined Not all the key shipboard operations appear to be identified within the SMS. For example there were no procedures for anchor handling operations. It is recommended that the ship specific key operations are reviewed.	2007-06-16
NC 4	NON-CONFORMITY ISM Code 9.2 "The Company should establish procedures for the implementation of corrective action". Finding(s): **[Safety management, reports and analysis of non-conformities, accidents and hazardous occurences > Safety management, investigation and analysis]** Procedure not effectively implemented The company is not always analysing suitable corrective action in response to reported hazardous occurrences. For example it was noted that a safety committee recommendation dated 19/02/2007 (control action 209-66004) regarding crew training had been closed out by the Company with no corrective action having been taken.	2007-06-16

Name of vessel	Name of owner	DNV id. no.	Job Id..
BOURBON DOLPHIN	Bourbon Ships AS	26425	3630820-1

Survey Observations and Findings

Corrective action plan for NCs raised at the audit shall be sent to DNV Aberdeen for acceptance within 2 weeks after the audit.

Audit Observations;

ISM Code.

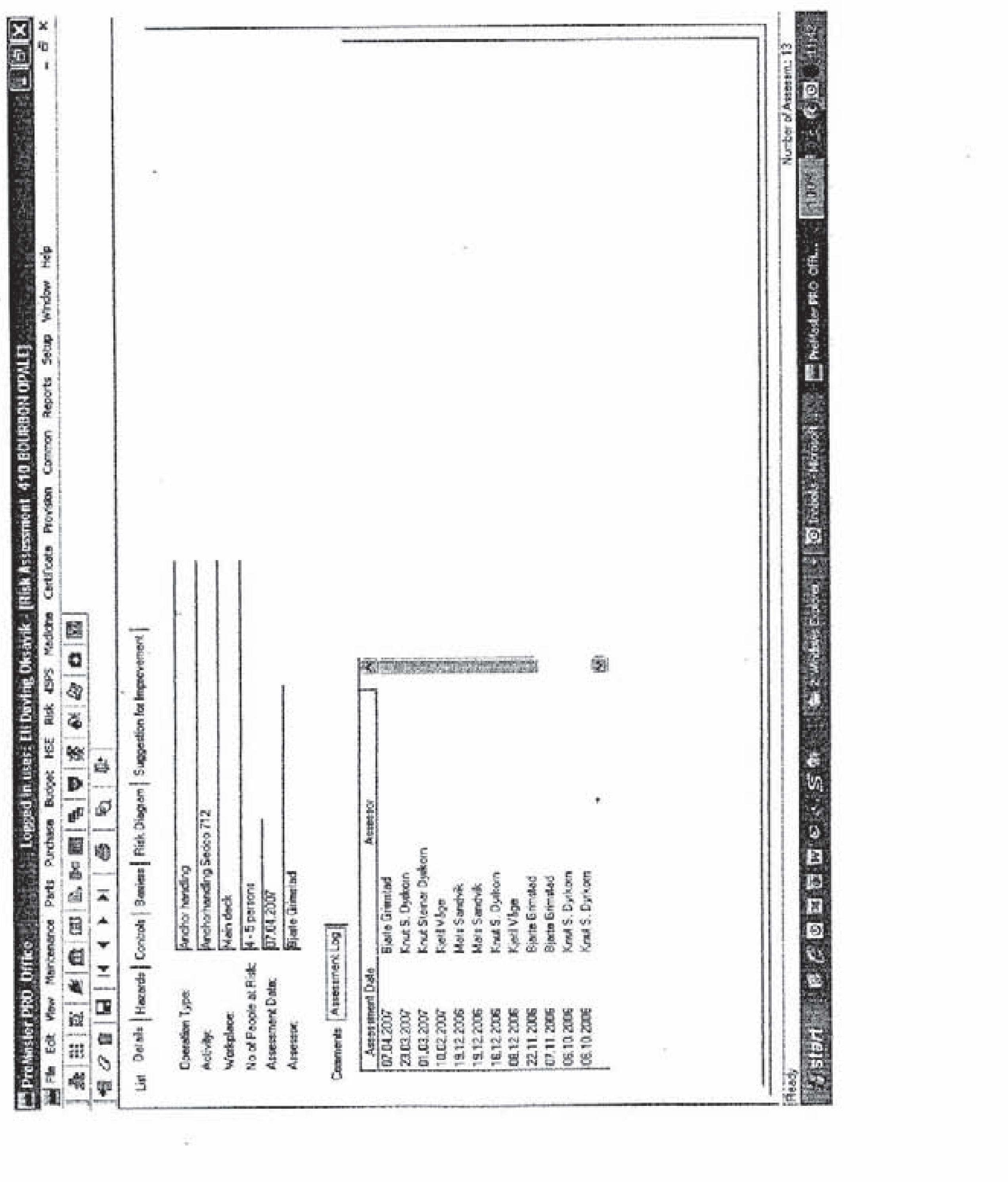
1. It was not clear from the planned maintenance system if all the calibration requirements of safety critical equipment had been entered into the system. For example it was not possible to generate a calibration list from the PMS.
ISM Code 10.4 refers.

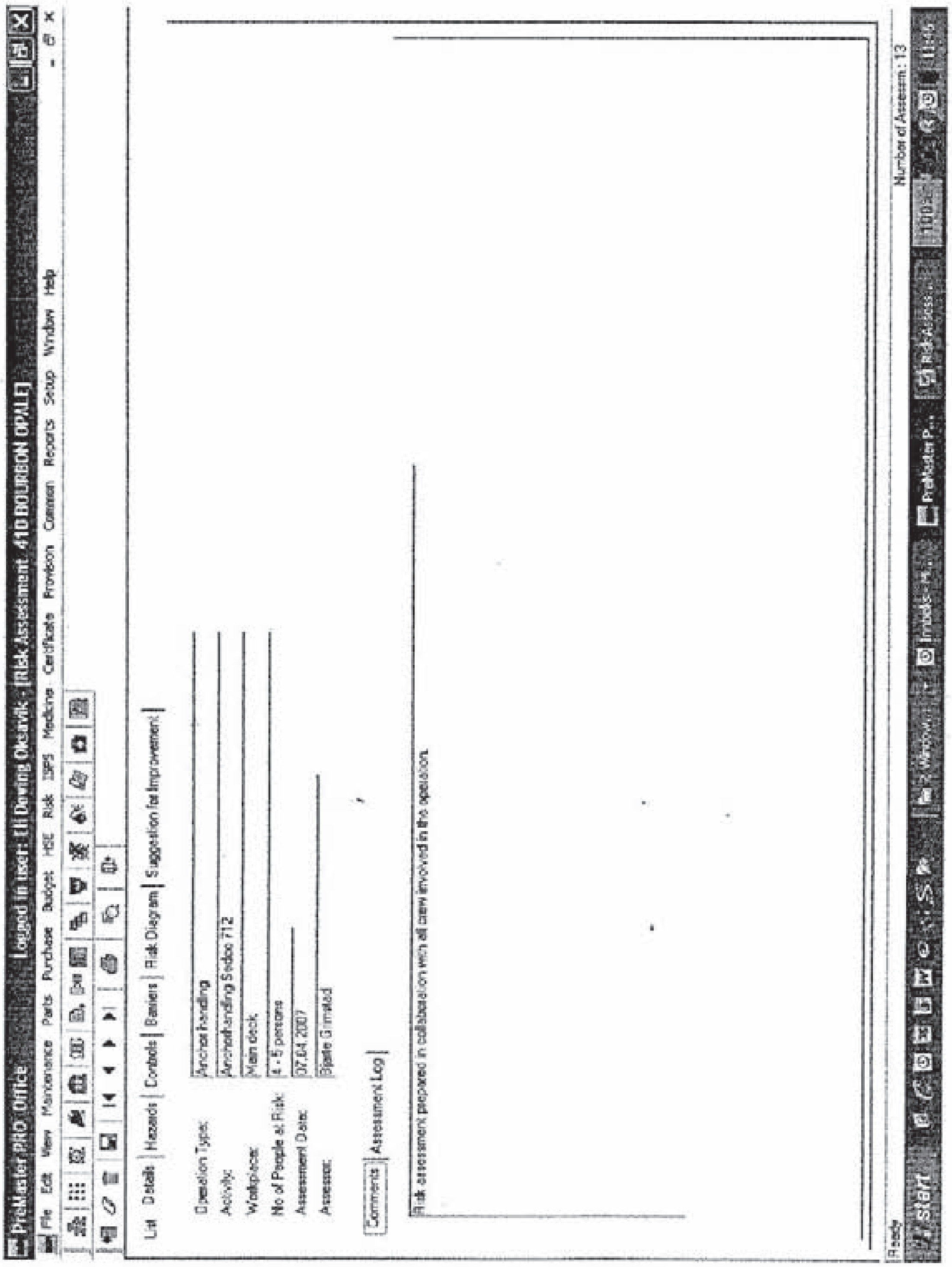
ISPS Code

2. Not all the access points to the restricted areas had the correct signage. For example the steering flat deck hatch, engine room and bridge wing doors did not have the recommended warning signs. It is recommended that the correct signage be put in place. Meanwhile temporary signage was put in place.
ISPS Code Part B 9.20 refers.

3. It was stated that a new method of locking the restricted area deck access hatches was being considered by the SSO. This would involve the use of a lockable hinged cover over the hatch wheel. DNV guidance it attached to the cover letter to assist the SSO/CSO in selecting the most suitable means of securing the restricted areas.
ISPS Code Part B 9.19 refers.

All participants in the audit found positive and helpful during the audit.




PreMaster PRO Office
Risk Assessment
410 BOURBON OPALE
List
Details
Hazards
Controls
Barriers
Risk Diagram
Suggestion for Improvement
Operation Type:
Anchor handling
Activity:
Workplace:
Main deck
No of People at Risk:
4 - 5 persons
Assessment Date:
07.04.2007
Assessor:
Comments
Assessment Log
Risk assessment prepared in collaboration with all crew involved in the operation.
Ready
Start

Risk Assessment Report

Anchor handling

Anchorhandling Sedco 712

Site:	BOURBON DOLPHIN
Assessment Date:	07.04.2007
Assessor:	Bjarte Grimstad
Number of People at Risk:	4 - 5 persons
Comments:	Risk assessment prepared in collaboration with all crew involved in the operation.
Barriers:	All operations mentioned in this Risk Assessment to be done according to Bourbon Anchor Handling & Towing manual which mainly is absed upon Statoil best practice, Safe Anchor handling and towing of mobile offshore units. Be extremely careful when working on or close up to stern roller. When lowering grapple over the roller in order to commence grappling operation crew must be very careful and use available cranes, capstans etc to avoid working close up to tools that may cause sudden movement to the wires attached. Lasso catching of buoy is also an operation that require extreme caution as the crew will have to work close up to the stern roller with wires close to their standing positions. (Applicable if piggyback anchor deployed with buoy) Connection and disconnection of shackles, kenterlinks, etc joining wires must be done in a safe matter. Disconnection to be done according to i.e. "Statoil best practice" as theese methods are implemented as guidelines in owners recommendations of operation of the ship. When delivering pennants back to the rigs crane, operation to be agreed upon before crew connect crane to PCP.

Hazard	Effect	Control	Reduces	Degree of Harm	Likelihood	Risk Factor
Adverse Weather	Damage equipment	Weather to be found acceptable for anchorhandling before commence of operation. If working in adverse weather, the possibility of personal injury is considerable larger.	Degree & Likelihoc	Harmful	Possible	Medium Risk
Drowning	Drowned	Use lifebelt / work west when working on aft part of deck. MOB boat ready to be launched.	Degree	Harmful	Possible	Medium Risk

Risk Assessment Report

Anchor handling

Anchorhandling Sedco 712

		When receiving or delivering PCP, connecting and disconnecting wires and all other work performed on aft part of deck lifebelt is to be worn.				
Equipment Failure	Struck	Crew not to enter deck before "clear deck" given from OOW. Crew must not stand in any danger position such as but not lilited to bight of wires, behind tensioned fork jaw or any position not considered safe.	Degree & Likelihoc	Extremely Harmful	Unlikely	Medium Risk
Excessive loads	Damage equipment	High attention to be given tension control display when crew is working on deck. Wires and chains to be secured in fork jaw and winch to be slack as long as crew is working on deck	Degree & Likelihoc	Extremely Harmful	Unlikely	Medium Risk
Fall / Slip on level	Injured	Proper PPE to be worn and deck to be kept clean and tidy at all times. Adequate shoes to be worn, good grip and stability is important. Deck must be kept clean and tidy at all times to prevent stumbling in equipment and slippery clay.	Degree & Likelihoc	Moderate	Likely	Medium Risk
Falling overboard	Drowned	Be extremely careful when working on or near stern roller, lifebelt to be worn at all times! MOB boat ready to be launched. Falling overboard from the stern is extremely harmful due to rotating propellers.	Degree & Likelihoc	Extremely Harmful	Unlikely	Medium Risk
Manual handling	Injured	Use adequate equipment and lifting methods when handling heavy equipment on deck Use all available equipment such as deck cranes, winches, capstans etc to ease work on deck and reduce amount of manual handling.	Degree & Likelihoc	Harmful	Possible	Medium Risk
Mechanical	Blinded	Use of proper PPE, especially safety goggles.	Degree	Harmful	Possible	Medium Risk

Risk Assessment Report

Anchor handling

Anchorhandling Sedco 712

		Crew must at all times use proper PPE, especially Safety goggles in operations which include mechanical work such as removing of split pins from shackles, opening of kenterlinks etc.				
Moving object	Harmed	Crew to be very careful when entering the deck and winch area in order to prevent injuries from moving objects such as anchors, grapples, j-hooks etc. due to vessels movements. When disconnecting and pull the anchor out to one of the side, crew must not stand in the dangerous zone of the wire that pull the anchor. When receiveing or put out buoys, crew must not stand in dangerous zone of wire that pull the buoy. Also take in consider that the buoys(especially circular buoys) easy roll on deck. All equipment that is not in use, is to be properly secured on deck.	Likelihood	Harmful	Possible	Medium Risk
Overturn/Collapse	Hit	Use of swivel between wires to prevent turn on wires If swivel is not fitted between wires to be disconnected, extreme caution to be kept while disconnecting. Use tugger winches to split kenterlinks, remove bolts from shacles etc. to avoid personnel close to wires that may spin out and cause extreme danger.	Degree & Likelihoc	Harmful	Possible	Medium Risk
Sudden movement	Crushed	No crew on deck as long as winch is operated or wire tensioned. Deck to be cleared before crew enters. The cause of a sudden movement of equipment and wires is extremely harmful and care must be taken. Winch operator to inform crew that deck is cleared before crew may enter winch area.	Degree & Likelihoc	Harmful	Possible	Medium Risk

Risk Assessment List

Site	Operation Type	Activity	Assessment Date	Assessor	Risk Factor
209	Deck operations	MOB-launching	07.11.2006	Bjarte Grimstad	Medium Risk
209	Deck operations	Work in the mast.	19.01.2007	Kjetil Våge	Medium Risk
209	Deck operations	Welding on deck	09.03.2007	Kristoffer Hjellestad	Medium Risk
209	Deck operations	Reset of "hoist stop" at the phalfinger c	08.04.2007	Bjarte Grimstad	Medium Risk
209	Deck operations	Working with FRC close to installation	16.01.2007	Kristoffer Hjellestad	Medium Risk
209	Cargo work	Loading of containers	24.03.2007	Knut S. Dyrkorn	Medium Risk
209	Special operations	Connecting and replacing of tow bridle	25.02.2007	Knut S. Dyrkorn	Medium Risk
209	Engine room operations	Cleaning of sea water suction filters	23.10.2006	Even M Tangen	Medium Risk
209	Engine room operations	Welding	15.03.2007	Even M Tangen	Medium Risk
2[illegible]	Engine room operations	Welding	04.04.2007	Frank Nygård	Medium Risk
[illegible]	DP operations	Stand by on DP alongside rig	09.03.2007	Kristoffer Hjellestad	Medium Risk
2	Anchor handling	Anchorhandling Sedco 712	07.04.2007	Bjarte Grimstad	Medium Risk
209	Tank cleaning	Cleaning of FW tank	19.03.2007	Knut S. Dyrkorn	Medium Risk

Vedlegg 3

Planlegging av riggflyttet

ChevronTexaco

AREA	ChevronTexaco Europe	CTE
TYPE	Health, Environment and Safety	SA
SYSTEM	Safety, Health and Environment	303
TITLE	Marine Operations Manual	002

Document Sponsor	DSG - Marine HE&S Specialist

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The content of this procedure was developed through a documented consultation and review process. Corrections, comments or recommended alterations to this Procedure should be communicated directly to the Document Sponsor.

Rev	Date	Description	Author	Reviewed	Approved
1	05/06/03	Issued for Implementation	RJTM	PM	HE
A	10/04/02	FINAL DRAFT	RJTM	PM	HE

ChevronTexaco

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05/06/03
Revision 1
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8	Subsea Offshore Rep. Copy 2	Seafield House
9	FPSO OIM	Offshore
10	WPP OIM	Offshore
11	ANP OIM	Offshore
12	FSU OIM	Offshore
13	Erskine OIM	Warehouse
14	Warehouse Team Leader	Warehouse
15	Northern Producer - OIM	Offshore
16	Master - M.V. Caledonia Master	Offshore
17	Master - Captain Relief Vessel	Offshore
18	Master - M.V. Havila Searcher	Offshore
19	Master - Alba Relief Vessel	Offshore
20	Master - Galley Main ERRV (Currently BUE SKYE)	Offshore
21	Master - Galley Relief Vessel	Offshore
22	Spare - c/o DSG -- Marine HE&S Specialist	Offshore
23	Spare - c/o DSG – Marine HE&S Specialist	Offshore
24	Team Marine	Onshore
25	MODU No: 1 - OIM	Offshore
26	MODU No: 2 - OIM	Offshore
27	Trident Offshore	Onshore
28	Trident Offshore - Marine Rep. 1	Onshore
29	Trident Offshore - Marine Rep. 2	Onshore

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Section:

ChevronTexaco

MOORING ANALYSIS REPORT

TRANSOCEAN RATHER

UKCS BLOCK 213/27 (FAROES SOUTH EAST)

DOC NO: TOL/MA/10472/rather#2

JULY 2005

DOCUMENT ISSUE RECORD					
Rev. No.	Date	Status	Author	Checked	Approved
00	21/07/05	Final	M.K	F.S.	

Prepared By:

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EXECUTIVE SUMMARY

The mooring analysis results contained in this report indicate that the Transocean Rather, fitted with a modified eight line chain/wire combination mooring system will fully comply with the code line tension safety factor and excursion requirements of DnV POSMOOR for: -

1. Environmental conditions equivalent to the 100/10 year return period storm in the survival condition whilst moored at the UKCS Block 213/27 (Faroes South East) location in a water depth of 1,189m (3,900 ft.).
2. Environmental conditions associated with the 1 year return period storm at operating draft with the drilling riser disconnected whilst moored at the UKCS Block 213/27 (Faroes South East) location.
3. 99% non-exceedence environmental conditions at operating draft with the drilling riser connected whilst moored at the UKCS Block 213/27 (Faroes South East) location.

The survival condition was examined in environmental parameters equivalent to the 100/10 year return period storm in order to investigate the integrity of the mooring system and to ensure it meets the requirements of DNV POSMOOR. The required factors of safety for mooring line tensions and anchor loads were met in all cases.

The performance of the mooring system in the 1 year return period storm was investigated in order to ensure that the rig could remain at operating draft at the proposed operating working tensions. However, it should be noted, that rig operating offsets could not be maintained within acceptable drilling limits in the 1 year return period storm, therefore, for these cases, the riser was considered to be disconnected. The DNV POSMOOR required factors of safety for mooring line tensions and anchor loads were achieved in all cases.

The Operating condition was examined to investigate the performance of the mooring system for drilling operations. The required factors of safety for mooring line tensions and anchor loads were achieved in estimated 99% non-exceedence environmental conditions for all cases applied to the head, quarter and beam of the rig. Analyses also demonstrated that the riser could be maintained within assumed allowable drilling limits during estimated 99% non-exceedence conditions for all applied directions when limited lee line manipulation was simulated.

The maximum allowable offsets considered for the operating condition with the riser connected were 2.0% of water depth (mean drilling), 4.0% of water depth (maximum drilling) and 10% of water depth for riser disconnect. A maximum riser angle of 9.0° (15.8% of water depth) was considered for transient analysis subsequent to a line failure.

The Transocean Rather has a minimum chain length of 891m x 84mm K4 chain on mooring line No.1. All other lines have in excess of 900m of chain fitted. For the purpose of the analysis, each line was considered to be fitted with 900m x 84mm K4 chain with a Minimum Break Load (MBL) of 735 tonnes. The rig is equipped with 96mm mooring wires, with useable lengths ranging from 1,700m to 1,800m and MBL values ranging from 685 tonnes to 738 tonnes. For the purpose of the analysis, 1,700m x 96mm mooring wires with an MBL of 685 tonnes were considered.

The rig mooring system requires to be enhanced to meet the requirements of DNV POSMOOR for all year operations at the Faroes South East location. Mooring system modifications have been developed based on the requirements of DNV POSMOOR.

For all-year operations at the Faroes South East location in a water depth of 1,189m,it is proposed that the Transocean Rather mooring system will be enhanced with chain extensions as detailed below:

- 915m x 76mm K4 chain (Line Nos. 1, 2, 7 & 8)
- 610m x 76mm K4 chain (Line Nos. 3 - 6)

It should be noted that the use of 76mm K4 chain in the mooring system is acceptable as the line tensions at this ground chain section are reduced to DNV POSMOOR required levels due seabed friction effects and reduced motion at the lower end of the catenary.

In order to assess the operability of the mooring system for a range of drilling locations and timing schedules, a sensitivity study has been performed to establish the mooring system upgrade requirements for the four seasonal quarters and for water depths ranging from 1,098m (3,600 ft.) to 1,189m (3,900 ft.). For all analyses, except winter storm cases, SWR inserts and chain extensions were considered. For winter storm conditions, only chain extensions are recommended as SWR insert preliminary analyses results demonstrated that the DNV POSMOOR dynamic line tension safety factors could not be met due to the additional stiffness added to the mooring system by the inclusion of the wires. For operations in a water depth of 1,189m in the months of December to February, the SWR insert length requirement would be 1,740m x 96mm SWR.

As no specific guidance is contained in DnV POSMOOR regarding anchor holding capacity, API RP 2SK has been referenced with regard to anchor performance. Anchor loads were maintained within allowable limits in all cases.

TABLE OF CONTENTS

4.0 VESSEL CHARACTERISTICS

4.1 Transocean Rather Data

4.1.1 The Transocean Rather is a four column stabilised, twin hull, semi-submersible, of the GVA 4500 series design. The vessel has the following principal dimensions:

LOA:	99.1m
Breadth:	87.5m
Survival Draft:	18.3m
Operating Draft:	25.0m

4.2 Mooring System Components

4.2.1 The Transocean Rather is currently equipped with 8 chain/wire combination anchor lines as detailed below:

Anchor: 18 tonne Bruce FFTS MkIV

Mooring chain:	Length	= 891m – 937m
	Diameter	= 84mm
	MBL	= 735 tonnes
	Wet mass	= 0.134 tonne/m
	Stiffness	= 63,269 tonnes

A mooring chain length of 900m has been considered in the analysis.

Mooring wire:	Length	= 1,700m – 1,800m (Useable)
	Diameter	= 96mm
	MBL	= 685 – 738 tonnes
	Wet mass	= 0.034 tonne/m
	Stiffness	= 45,377 tonnes

A mooring wire length of 1,700m has been considered in the analysis with a minimum break load of 685 tonnes.

4.2.2 The rig is currently equipped with 8 x 18 tonne Bruce FFTS MkIV anchors each with a theoretical holding capacity of approximately 560 tonnes when deployed in soft mud.

4.3 Environmental Forces

4.3.1 The environmental loadings on the vessel due to wind, waves and current were calculated using coefficients, QTFs and RAOs for the Transocean Rather as supplied by Transocean.

8.0 SENSITIVITY STUDY

8.1 Summary

In order to assess the operability of the mooring system for a range of locations and schedules, a sensitivity study has been performed to establish the mooring system upgrade requirements for the four seasonal quarters and for water depths ranging from 1,098m (3,600 ft.) to 1,189m (3,900 ft.).

8.2 Winter Season

For all analyses, except winter storm cases, SWR inserts and chain extensions were considered. For winter storm conditions only chain extensions are recommended as when considering SWR inserts, preliminary analyses demonstrated that the DNV POSMOOR dynamic line tension safety factors could not be met due to the additional stiffness added to the mooring system by the inclusion of the inserts.

8.3 Seasonal Quarters

For the purpose of this sensitivity study, the seasonal quarter were divided as detailed below:

Quarter 1: December – February
Quarter 2: March – May
Quarter 3: June – August
Quarter 4: September - November

8.4 Upgrade Requirements (Line Nos. 1, 2, 7 & 8)

The sensitivity results for line Nos. 1, 2, 7 & 8 are detailed in table 9 below:

Table 9

Water Depth (ft.)	Extension Type	Extension Length by Season (m)			
		Q1	Q2	Q3	Q4
3600 (1098m)	Chain	762	305	0	457
	SWR	1524	610	0	914
3700 1128(m)	Chain	813	330	0	483
	SWR	1595	661	0	965
3800 1158(m)	Chain	864	355	45	508
	SWR	1666	712	91	1016
3900 1189(m)	Chain	915	381	91	534
	SWR	1737	762	183	1067

Note: Although SWR inserts lengths for quarter 1 have been defined in table 9, SWR is not recommended as an upgrade method for the winter period as it adds considerable stiffness to the mooring system resulting in mooring line tensions which are in excess of DNV POSMOOR limits.

This table is shown graphically in appendix A.

8.5 Upgrade Requirements (Line Nos. 3 - 6)

The sensitivity results for line Nos. 3 - 6 are detailed in table 10 below:

Table 10

Water Depth (ft.)	Extension Type	Extension Length by Season (m)			
		Q1	Q2	Q3	Q4
3600 (1098m)	Chain	510	140	0	335
	SWR	1020	280	0	670
3700 1128(m)	Chain	543	163	0	360
	SWR	1067	326	0	720
3800 1158(m)	Chain	577	187	0	385
	SWR	1114	373	0	770
3900 1189(m)	Chain	610	210	0	410
	SWR	1160	420	0	820

Note: Although SWR inserts lengths for quarter 1 have been defined in table 10, SWR is not recommended as an upgrade method for the winter period as it adds considerable stiffness to the mooring system resulting in mooring line tensions which are in excess of DNV POSMOOR limits.

This table is shown graphically in appendix A.

8.6 Equipment Availability

It should be noted that the lengths of both chain and SWR detailed in tables 9 and 10 are currently available. However, considering the current high levels of offshore activity, the rental / purchase of any marine equipment should be considered at the earliest opportunity.

9.0 REFERENCES

1. "Position Mooring (POSMOOR)"
Part 6, Chapter 2
Rules for Classification of Mobile Offshore Units
Det Norske Veritas (DnV) January 1996

2 "Recommended Practise for Design and Analysis of Station Keeping Systems for Floating Structures" (API RP 2SK).
American Petroleum Institute
1st Edition June 1 1995.

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Task Risk Assessment Worksheet

Task description: Mooring operations – deployment and recovery of anchors.

Competent person(s) to carry out task: Barge Supervisor, Assistant Barge Supervisor, Ballast Control Operator, Able Seaman and other personnel deemed competent to operate anchor windlasses.

Competent person(s) to carry out risk assessment: Barge Supervisor, OIM, Assistant Barge Supervisor, Ballast Control Operator, RSTC

Task steps	**Hazard**	**Who or what**			**Risk**			**Controls / Safeguards**	**Residual Risk**		
		Per.	Env.	Prop.	**S x**	**P =**	**R**		**S**	**P**	**R**
Assess task	Misunderstanding risks and instructions, conflicting operations	X	X	X	A	2	L	THINK, START, **Rig Specific Procedures** Appropriate Supervision, Marine Procedures (UKR-OPS-001) Sections 1,2,3 and 4, Rig Move Procedures. Regular weather reporting.	A	2	L
Identify Personnel qualified to carry out task	Task carried out incorrectly/unsafely	X		X	A	2	L	OJT, Supervisor Assessment, Competency training. Approved list of windlass operators.	A	2	L
Inspect and assess all the equipment to be used.	Windlasses, PCP's, spare mooring equipment, crane wires/ pennants in poor condition leading to equipment failure, loss of mooring. Windlass gear in poor condition, chain twists, slips, trips and falls. Moving/Rotating Equipment. Incorrect indication on equipment.	X		X	A	2	L	THINK, START, PPE, PM routines. OJT and competency training. Only competent personnel to inspect equipment prior to use.	A	2	L

Carry out stability checks for transit draft move.	Calculations carried out incorrectly – loss of stability. Loss of rig and personnel.	X	X	X	F	1	M	Only competent trained personnel carry out stability calculations.	F	1	M
AHV alongside to receive/deliver PCP's	Loss of vessel station keeping – low impact collision. Damage to rig structure above and below the waterline. Compartment flooding.	X		X	E	3	M	Vessels to confirm all pre entry checks prior to entering 500m zone. Compartment leak detection. Communication checks with AHV. THINK, START, **Rig Specific Procedures**, Appropriate Supervision, Marine Procedures (UKR-OPS-001) Sections 1,2,3 and 4, Rig Move Procedures. As per Marine Procedures (Semi-Sub) UKR-OPS-001/K Section 4 Subsection 11 Supply Vessel Operations the same will apply to work with Anchor Handling Vessels – "The Barge Supervisor or competent person nominated by the OIM shall be on deck at all times", to supervise critical stages of the operation e.g. when an AHV is alongside and during all PCP handling to/from the rig and AHV.	E	3	M
								Only stage 3 trained crane operators to pass PCP's. Banksman/Slinger training. THINK, START, OJT, **Rig Specific Procedures,** Lifting Gear Inspection.			

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Pass/recover PCP's	Struck by, pinch points, lifting equipment failure. Loss of AHV station keeping and being unable to release the crane from the PCP during this interface whilst the crane is still attached to the PCP sling with the PCP secure and pinned in the AHV's Karm Fork. (Crane and AHV tethered together at this stage.) Loss of crane wire.	X		X	D	4	M	As per Marine Procedures (Semi-Sub) UKR-OPS-001/K Section 4 Subsection 11 Supply Vessel Operations the same will apply to work with Anchor Handling Vessels – "The Barge Supervisor or competent person nominated by the OIM shall be on deck at all times", to supervise critical stages of the operation e.g. when an AHV is alongside and during all PCP handling to/from the rig and AHV.PCP will not be recovered or passed without confirmation from the AHV master that he is happy with station keeping and is ready to proceed. Crane on single fall block. Crane fitted with "wire at minimum" brake and emergency release of wire on the hoist drum. To prevent overload. Operations to cease immediately when environmental conditions exceeds criteria agreed with AHV at start of operations. (Vessel should not require to use more than 45% power to maintain station alongside.)	D	4	M
								Clamping with bulldog grips to be done only with PCP stationary and adequately suspended by the crane. When PCP is being raised or lowered			

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If required raise PCP and clamp with bulldog grip	Struck by, pinch points	X		X	E	2	M	by the crane all personnel are to stand well clear. 2 bulldog grips, one above the other are to be used to clamp the PCP. Bulldog grips are to rest on the PCP sock and the gate to the sock is to be locked.	E	2	M
Windlass operation – recover/deploy anchors.	Windlass gear in poor condition, chain twists, slips, trips and falls. Moving/Rotating Equipment. Incorrect indication on equipment. Equipment failure, failure to monitor movement of rig in relation to sub-sea assets. Communication failure. Loss of mooring/rig position. DC motor failure - flying debris, struck by. Equipment failure, impairment to hull/column shell – loss of water tight integrity. Bolster damage. Loss of anchor – damage to sub-sea assets. Trapping adjacent PCP in to lower fairlead. DC motor failure - flying debris, struck by.	X	X	X	D	4	M	Only competent personnel to operate windlasses. Approved list of competent personnel posted in each winch cab. THINK, START, Appropriate Supervision, Marine Procedures (UKR-OPS-001) Sections 1,2,3 and 4, Rig Move Procedures. **Rig Specific Procedures – MAR-Mooring-005.**	D	4	M
Recover/deploy anchors/chain	Fouling of anchors, chains, PCPs with each other or with hull fittings and thrusters			X	D	2	M	PCPs to be positioned to ensure that loops of chain/pennant do not become fouled on anchor flukes, hull fittings or thrusters. Personnel to be aware of relative positions of chains, anchors, pennants and rig structure at all times.	D	2	M

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Risk before controls are in place | M | Residual risk after controls are in place | M

Task Risk Assessment Worksheet

Comments and Conclusions:

Task may be carried out in line with controls and safeguards as detailed in assessment.	

Risk Assessment team members:

Name	Position	Signature	Date
Jim Sutherland	Barge Supervisor	Jim Sutherland	20-10-05
Sam Robinson	Barge Supervisor	Sam Robinson	20-10-05

Reviewed by OIM:

Name	Comments	Signature	Date
N. Meldrum		N.Meldrum	27-10-05

Form No SMS 4.2.1/01 Rev 04, Dec 10th , 2002

Guidance to Vessel Masters

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Section Changes:

Revision	Section	Description of Change
1	All	Reformat to CUE as new document. and to reflect Routine Review, TEAM Logistics Implementation, Change of TEAM Administrator, and the incorporation of 2003/4 TEAM Safety Notices and Memorandums.

Abbreviations:

Abbreviation	Description

AMENDMENTS

Amendments to the manual shall be published as and when required. The amendments shall be made by replacement of the applicable pages. Each revised page shall be identified by an amendment number and date.

The Amendment Summary shall indicate all the amendments to the latest issue of the manual.

Amendments are numbered consecutively until a new issue of the manual incorporates all the changes.

The manual shall be formally reviewed at intervals of 12 months (during internal audits) to re-affirm its adequacy to current Company practices. Unauthorized amendments are prohibited.

DO NOT PHOTOCOPY

CONTENTS **Page**

1.0 Guidance for Masters

1.1 Team Logistics Safety Policy

TEAM Logistics (TEAM) exists to provide shared and optimised marine logistics, transport, warehousing, quayside and anchor handling services for its members and, where appropriate, external parties.

Using our combined resources, knowledge and experience, we aim to provide a safe, efficient and environmentally friendly service, by adopting industry best practices.

It is our policy to continually improve our services and ensure they meet our clients' needs and expectations, central to which is our understanding of the importance to listen to customer's requirements and service feedback.

Central to TEAM Logistics' operations, are six principle services:

- The Provision of Vessels (PSV & AHTS)
- Waste Management
- Ship-broking
- Onshore logistics (warehousing, transport and quayside operations)
- Fuel Supply
- Fleet control, contracting, co-ordination, benchmarking

The latter, (Fleet control) is retained in-house & managed by TEAM's own Marine Operations staff and all others are contracted services. Auditing of all these services is an integral part of TEAM's operation.

All these contracted and in-house services have to comply with appropriate UK, European and International legislation, and/or formal accredited management/safety systems. TEAM's Marine Operations services are undertaken in accordance with these Marine Procedures, which ensure compliance with the principles and requirements contained within the TEAM Members Vessel Co-ordination Agreement (VCA).

Improved efficiency and safety are facilitated by TEAM's Management, directing and reviewing TEAM's Marine Operations and contracted 3rd party services performance criteria, on a continuous basis, all with a view to achieving excellence in all areas of our operations.

All TEAM personnel have a direct influence on the quality of our service, therefore compliance with these procedures are mandatory. It is the responsibility of TEAM's Management to ensure that this policy is understood, implemented and maintained throughout the TEAM organisation.

Signed ………………………… Date…………………………….

Team Logistics Management

1.18 Cargo Metrics

Masters should be mindful of TEAM's preferred cargo metrics terminology as follows:

a) Metric Tonnes (MT) = Dry bulk, Potable Water, Drillwater, Fuel and Deck cargo.

b) Barrels (BBLS) = Brines, Bromides, Base Oil, Oil based mud in Barrels.

1.19 Anchor-handling and Towage Duties

Where anchor handling or other types of specialist operations are concerned TEAM or their representatives will issue work packs detailing the scope of work and the lines of communication that are to be in place for the management of all anchor handling and towage operations.

1.20 UKCS Oil Industry's Marine Safety Forum (MSF)

TEAM subscribes to the UKCS Oil Industry's Marine Safety Forum, together with UKCS vessel owners/operators.

From time to time MSF issues various safety notices, and in order to avoid duplication of effort, TEAM does not re-issue these notices to its contracted vessels.

The MSF website (www.marinesafetyforum.org) contains an up to date listing of the following information; including the following: -

- Best UKCS Practices Notices
- Safety Alerts
- Industry and UKOOA Guidelines

1.21 Bulk Tank Cleaning Operations

Vessel tank cleaning operations are an integral part of TEAM's workscopes and vessel Masters attention is drawn to the safety controls and advices contained in UKOOA's Guidelines –ref section 6.6 and Appendix 16 therein.

Masters should liaise with and undertake tank cleaning risk assessments in conjunction with TEAM's Tank Cleaning Contractor, in strict accordance with UKOOA's guidelines and/or any additional Industry guidelines that may be issued from time to time by the MSF, MCA or relevant port authorities.

As a general principle, TEAM does not permit bulk tank cleaning operations to be undertaken in conjunction with other cargo operations, and best endeavours are made to ensure vessels remain undisturbed at suitable berth during such operations.

Transocean	TRANSOCEAN RATHER OPERATIONS MANAGEMENT PLAN CLIENT: CHEVRON MAN NO: RAT-OMP-003	SECTION:	TOC
		SUBSECTION:	N/A
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		SUBSECTION:	N/A

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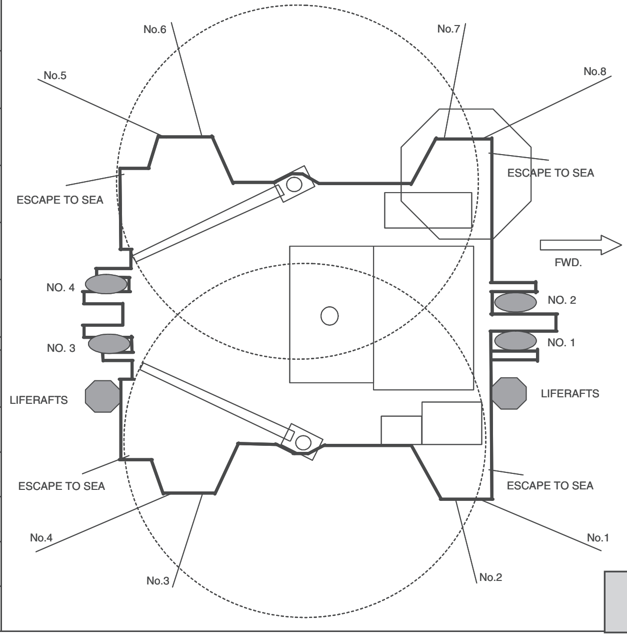
Transocean

TRANSOCEAN RATHER ROSEBANK 213/26-G PSV / AHV DATA CARD

Location	Rosebank Block 13/26
Latitude	61º 01’ 18” N
Longitude	03º 48’ 29” W
Rig Heading	272º (T)
Water Depth	1,103 metres 3,619 ft
Call Sign	3EGN6

Specific Marine Hazards
▶ 500 m safety zone
▶ Tidal information
▶ Overboard discharges
▶ Azimuthing thrusters (2)
▶ Thruster wash



Oct. 2006
Rev. 1

Anchor	Bearing	Total Distance	Ext. Chain	Anchor	Bearing	Total Distance	Ext. Chain
No.1	300º (T)	3,154 m	915 m	No.5	119º (T)	3,190 m	915 m
No.2	340º (T)	3,019 m	915 m	No.6	160º (T)	2,942 m	915 m
No.3	020º (T)	3,000 m	915 m	No.7	200º (T)	3,134 m	915 m
No.4	060º (T)	3,092 m	915 m	No.8	240º (T)	3,088 m	915 m

Communications	General	Emergency
VHF	Ch. 9	Ch. 16
Tel : Radio Room	01224 410536 01224 333486	00 870 763 579 958
Fax : Radio Room	01224 333487	

Helicopters	Bristow
Log Traffic Emergency NDB	129.125 MHz 122.800 MHz 121.500 MHz 579.5
Telephone	01224 756214
Tel (Out of hours) Fax	01224 756321 01224 756348

Cranes	Port SWL	Radius	Stbd SWL	Radius
Whip Line	15 Tonnes	10 m to 43 m	15 Tonnes	10 m to 43 m
Main Block	75 Tonnes 19 Tonnes	8.0 m to 10.7 m 39.6 m	75 Tonnes 19 Tonnes	8.0 m to 10.7 m 39.6 m

Rig Alarms	Fire & Emergency	Abandon Rig	Toxic Gas
Sound	Intermittent	Continuous Variable Tone	Continuous Steady Tone
Light	Flashing Yellow	Flashing Yellow	Flashing Red

Before Arrival
Before arrival the Master and Bridge Officers should read and understand the relevant sections of the Guidelines for the Safe Management of Offshore Supply & Anchor Handling Operations (NW European Area).

Pre-entry Check to be completed in conjunction with rig prior to entering 500 m safety zone	
PSV / AHV to confirm to the Installation	**Check**
That the Master & Bridge Officers are fully aware of the procedures for vessel entry. (Steering offset course, speed, manoeuvring, communication points, physical layout of the installation etc.)	
Whilst within the 500 m zone the bridge will be manned with a minimum of two competent personnel.	
Main Engines / Thrusters : Fully tested & confirmed to be functional and in satisfactory operating condition.	
Steering Gear : Function tested (main and emergency) and confirmed to be fully operational.	
Joystick : Function tested and confirmed to be fully operational.	
Communications : VHF sets and two-way comms. established with Control Room, Deck Foreman, Cranes and Vessel Deck Crew.	
Master and crew are sufficiently rested and deck crew have been briefed of the proposed operation.	
Assessment of prevailing conditions in 'set up' position a minimum of 50 metres from the proposed working location will be performed.	
Wearing of 'hi-vis' PPE by vessel deck crew whilst working alongside.	
The weather conditions are suitable for the proposed operations.	
The Declaration of Security with reference to the ISPS Code is at Level 1.	
Master to record completion of checks in Vessel Deck Log Book and formally request permission to enter.	
Installation to confirm to the Vessel	**Check**
Deck, Crane and Control Room communications have been tested satisfactorily.	
Correct communication channels are being utilised.	
Inform Master of name of ERRV and names of other vessels working at or close to the installation. Also inform Master of other attendant vessels radio working channels.	
Confirm to the attendant ERRV that PSV / AHV operations are to commence.	
Confirm the side of the installation to be worked and inform of any hazards on that or adjoining faces.	
Installation facilities are ready to receive the specified cargoes and time alongside will be kept to a minimum.	
Information on any specific installation operations which may affect vessel operations alongside, including any helicopter movements.	
All non-essential overboard discharges have been turned off and installation personnel have been made aware of the fact that a vessel is coming alongside.	
Control Room to record completion of checklist in installation Deck Log Book.	

Hoses & Connections - Port

Grade	Connection
Diesel Fuel	4" Avery Hardoll
Pot. Water	4" Weco
Drill Water	4" Weco
Cement	5" Weco
Barite	5" Weco
Bentonite	5" Weco
Base Fluid	4"Avery Hardoll
Drilling Fluid	4" Avery Hardoll
Brine	4" Avery Hardoll

Cargo Transfer Operations

- ▶ Agree product & quantity of bulk to be transferred
- ▶ Ensure agreed pump pressures / rates before discharge commences
- ▶ Confirm who will decide the routine halting of the operation
- ▶ Cargo transfer should commence slowly
- ▶ Rates should only be increased when integrity of hose proved
- ▶ Confirm regularly with Control Room amount of cargo transferred

Hoses & Connections - Stbd.

Grade	Connection
Diesel Fuel	4" Avery Hardoll
Pot. Water	4" Weco
Drill Water	4" Weco
Cement	5" Weco
Barite	5" Weco
Bentonite	5" Weco
Base Fluid	4"Avery Hardoll
Drilling Fluid	4" Avery Hardoll
Brine	4" Avery Hardoll

Vessel Co-ordination

The co-ordination of Marine Operations will be as per the Master's Instructions issued to the vessel by Team Marine prior to departure from port. Daily reporting requirements are detailed within these instructions.

When in field area report :
Name of vessel
Arrival at the installation
Departure from installation
Upon being sent to standby
Upon ceasing operations due to weather

Upon leaving the field report :
Name of vessel
Location and time of departure
ROB bulk products
Fuel and water requirements
ETA at port or next installation
Deck area utilisation (e.g. 80%)
Liquid tank status

TRIDENT OFFSHORE LIMITED

SECTION A - SEMI-SUBMERSIBLE RIGMOVE MARINE REPORT

Rig Name	**Transocean Rather**
Operator	**Chevron Tenaco**
Owner	**Transocean Drilling inc**
Rig Manager	**Adrian Brown**
Date	**25.10.06**

Commence Move	**10.10.06 @ 1345**	Complete Move	**25.10.06 @ 01**
Total Time	**14D 15H 10M**	Lost Time	**9D 03 35M**

1.0 Locations

Details	Old Location		New Location (Final)	
Block Number	**Supply Base #4,**		**213/26-G**	
Latitude	**Invergordon**			
Longitude				
Depth		L.A.T	**1106**	L.A.T.
Rig Heading		Deg. (T)		Deg. (T)
Soil Type			**Slightly gravelly muddy sands**	
Holding				

Re: New Location (Final)	Installation	Range	Bearing	Operator
Nearest Fixed Installation				
Nearest Mobile Installation				

2.0 Rigmove Personnel

Position	Name	Company
OIM	**Graham**	**Transocean**
Rig Master/Barge Engineer	**Sam Robertson/Jim Sutherland**	**Transocean**
Drilling Representative	**Jim Meire**	**Chevron**
Marine Representative	**Peter Warren**	**Trident Offshore**
Towmaster	**Tony Bucknole**	**Trident Offshore**
Insurance Surveyor		
Survey Representative		
Surveyor 1	**Iain Flett**	**Trident Offshore**
Surveyor 2	**Nyle Bassilious**	**Trident Offshore**
Surveyor 3	**Martin Trout**	**Trident Offshore**
Survey Engineer		

3.0 Offshore Pre-Rigmove Meeting

Place	Company Office	Date & Time	12.10.06 @ 0900

4.0 Summary Of Events

4.1 Milestone Times.

Event	From		To		Total
	Date	Time	Date	Time	Time
Rig on Hire	10.10.06	1345	25.10.06	0455	14D 15H 10M
Retrieve Back-Ups					
Deballasting					
Retrieve Main Anchors					
Under Tow	10.10.06	0600	11.10.05	1700	1D 13H 00M
Run Main Anchors	13.10.06	1500	25.10.06	0455	11D 10H 00M
Ballasting					
Re-Lay Main Anchors					
Running Back-Ups					
Re-Lay Back-Ups					
Test Tension Anchors	16.10.06	1600	25.10.06	0055	8D 08H 55M
Final Positioning	25.10.06	0050	2510.06	0140	0D 00H 50M

	Date	Time
Marine Rep Arrived On Board Unit	3.10/6.10	0800/1500
Marine Rep Departed Unit	25.10.06	1700

4.2 Remarks: Events.

5.0 Rigmove Vessels

5.1 Vessel Details.

Details	No. 1	No. 2	No. 3	No. 4
Vessel Name	**Highland Courage**	**Highland Valour**	**Normand Neptune**	**Maersk Leader**
BHP	**16,320**	**16,320**	**18,600**	**10,738**
Bollard Pull	**180**	**180**	**222**	**143**
Master	**D Brown**	**K Williams**	**T Thorgeen**	**P Bent**
On Location	**07.10.06 @ 1200**	**07.10.06 @ 1345**	**11.10.06 @ 0214**	**11.10.06 @ 2400**
Off Location		**25.10.06 @ 0630**	**18.10.06 @ 1640**	**17.10.06 @ 0945**
Towline	**1200M x 83mm**	**1200M x 83mm**	**1500M x 83mm**	**950 x 71mm**
Spare Towline	**1200M x 83mm**			**950M x 72mm**
Workwire	**406M x 83mm**	**2300M x 83mm**	**2300M x 83mm**	**850M x 76mm**
Spare Workwire		**500M x 82mm**	**2 – 150M x 83mm**	

5.2 Vessel Performance.

	No. 1	No. 2	No. 3	No. 4
Vessel Name	**Highland Courage**	**Highland Valour**	**Normand Neptune**	**Maersk Leader**
Co-operation	**Very Good**	**Very Good**	**Very Good**	**Very Good**
Handling	**Very Good**	**Very Good**	**Very Good**	**Very Good**
Crew Ability	**Very Good**	**Very Good**	**Very Good**	**Very Good**
Mechanical	**None Reported**	**None Reported**	**None Reported**	**Winch Problem**

5.3 Remarks: Vessels.

Maersk Leader had problem with winch 2H 32M

6.0 Mooring Equipment Tracking

6.1 Equipment Shipped To Location *Note:- Equipment as per manifest. To be confirmed following consultation with vessel Master.*

Vessel	Equipment	Deployed	Transferred	Returned	Remarks
Normand Neptune	**4 – 914M Chain extensions**	**4**			
	8 – 83mm Kenter links	**4**		**4**	
	3 – 76mm Kenter links			**3**	
	4 - # 7 Pear links	**4**			
	13 – 120T Shackles	**5**		**8**	
	1 – 250T J hook			**1**	
	1 – Spare Swivel assembly	**1**			
	2 – Stevpris Mk VI anchors	**2**			
	4 – 250T Chasing collars	**4**		**3**	
	4 – 250T Shackles	**4**			
	3 – 145' Pennants	**2**		**3**	
	4 – 75' Pennants	**4**		**4**	
	2 – 83mm CCL's			**2**	
	5 – 30 Link chains	**4**		**1**	
	1 – Socket repair kit			**1**	
Highland Valour	**4 – 914M Chain extensions**	**4**			
	8 – 83mm Kenter links	**4**		**4**	
	3 – 76mm Kenter links	**3**			
	4 - # 7 Pear links	**3**		**1**	
	13 – 120T Shackles	**4**		**6**	
	1 – 250T J hook			**1**	
	2 – Spare Swivel assembly			**2**	
	3 – Stevpris Mk VI anchors	**2**		**1**	
	4 – 250T Chasing collars	**4**			
	4 – 250T Shackles			**4**	
	2– 145' Pennants			**1**	
	6 – 75' Pennants			**4**	
	3 – 83mm CCL's	**2**		**1**	
	5 – 30 Link chains	**4**		**1**	
	4 – 250T Chain Grapnels		**2**	**2**	
	1 – Socket repair kit			**1**	
	150T/85T Shackles			**3/1**	**Don't know where these came from**

6.2 Equipment Shipped to location

Vessel	Equipment	Redeployed	Transferred	Returned	Remarks
Highland Courage	**2 – 250T gropnels** **1 – Length chain**			**2** **1**	

7.0 Damages

7.1 Reported Damage To Vessels During Rigmove.

Vessel	Damage	Remarks

7.2 Reported Damage To Mooring Equipment During Rigmove (Rental Equipment).

Equipment	Damage	Remarks
# 8 Chaser collar	**Roller parted from chaser collar**	

7.3 Reported Damage To Rig's Equipment During Rigmove.

Equipment	Damage	Remarks

Separate sheets should be attached as required.

8.0 <u>Towage</u>

8.1 Towing Vessels.

Details	No. 1	No. 2
Name	**Highland Courage**	
Tow Position	**Main Tow Bridle**	
Tow Connected Time	**08.10.06 @ 0100**	
Gear Used During Tow		

8.2 Tow Details.

Draft	**12.93M**	Deck Load	**2595 Tonnes**
Rig Propulsion Used	**No**	Average Thrust %	
Type/No. Thrusters	**2 x Azimuth**		
Total BHP	**2 x 300kw**		

8.3 Tow Summary.

	Date	Time	Location
Tow Commenced	**10.10.06**	**0600**	**59° 50.8'N 003° 20.8'W**
Tow Completed	**11.10.06**	**1700**	**213/26-G Rosebank**

Total Time	**1D 13H 00M**
Total Distance	**217.5**
General Average Speed	**5.88Kts**

8.4 Remarks: Towage.

9.0 Rig/Vessel Consumables

9.1 Vessel Consumables - Arrival On Location.

Name	Date	Time	D.O.	I.M.F	L.O.	P.W.
Highland Courage	**07.10.06**	**1200**	**720M³**		**23292 lts**	**197M³**
Highland Valour	**07.10.06**	**1345**	**782M³**		**30683 lts**	**285M³**
Normand Neptune	**11.10.06**	**0215**	**775.6M³**		**21550 lts**	**346M³**
Maersk Leader	**11.10.06**	**2400**	**497M³**		**20551 lts**	**205M³**
Highland Valour	**12.10.06**	**0900**	**497M³**		**20551 lts**	**205M³**

9.2 Rig/Vessel Consumables – (On-Hire) ~ *delete as appropriate.*

Name	Date	Time	D.O.	I.M.F.	L.O.	P.W
Transocean Rather	**10.10.06**	**1345**	**431M³**		**700 gals**	**265M³**
Highland Courager	**10.10.06**	**1345**	**658M³**		**22388 lts**	**192M³**
Viking Venturer	**10.10.06**	**1345**	**66.5M³**		**1148lts**	**61M³/**

9.3 Vessel Consumables – Departure From Location.

Name	Date	Time	D.O.	I.M.F.	L.O.	P.W.
Maersk Leader	**17.10.06**	**0945**	**429M³**		**19891 lts**	**160M³**
Normand Neptune	**18.10.06**	**1640**	**607.4M³**		**19930 lts**	**173M³**
Highland Valour	**25.10.06**	**0630**	**497M³**		**34800 lts**	**205M³**

9.4 Remarks: Consumables.

10.0 Lost Time Breakdown *Note:- All delays are to be noted.*

10.1 Anchor Recovery.

Anchor Recovery	Day	Hrs	Mins	Remarks
Waiting On Weather				
Rig Equipment Failure				
Vessel Equipment Failure				
Mooring Equipment Failure				
Survey Equipment Failure				
Other				
Total				

10.2 Towing.

Towing	Day	Hrs	Mins	Remarks
Waiting On Weather	**1**	**22**	**00**	**11th/1700 – 13th/1500**
Rig Equipment Fail				
Vessel Equipment Fail				
Survey Equipment Fail				
Total	**1**	**22**	**00**	

10.3 Anchor Deployment.

Anchor Deployment	Day	Hrs	Mins	Remarks
Waiting On Weather	**5**	**11**	**25**	
Rig Equipment Failure	**1**	**13**	**16**	**Winch failures**
Vessel Equipment Failure		**2**	**32**	**Maersk Leader winch problem**
Mooring Equipment Failure				
Survey Equipment Failure				
Re-Lay Main Anchors				
Run/Relay Back-ups Anchors				
Other waiting on helicopter		**2**	**22**	
Total				

10.4 Lost Time Summary.

Event	Day	Hrs	Mins	Remarks
Waiting On Weather	**6**	**23**	**25**	
Rig Equipment Fail	**1**	**13**	**16**	
Vessel Equipment Fail		**2**	**32**	
Mooring Equipment Fail				
Survey Equipment Fail				
Re-Lay Main Anchors				
Run/Re-Lay Back-up Anchors				
Other		**2**	**22**	
Total	**9**	**03**	**35**	

11.0 Anchor Recovery/Deployment - Special Requirements

Should rigmove procedures require special precautions during anchor deployment recovery sequences - e.g. minimum tensions to be maintained in order to provide adequate clearances - confirm requirements have been met.

11.1 Anchor Recovery.

Mooring No.	Clearance/Tension Required	Clearance/Tension Maintained	Remarks

11.2 Anchor Deployment.

Mooring No.	Clearance/Tension Required	Clearance/Tension Maintained	Remarks

11.3 Other Special Requirements.

Requirement	Remarks

11.4 Additional Remarks: Anchor Recovery/Deployment.

12.0 Test Tensions

Test tensions are to be witnessed.

	Date	Time
Commenced	**16.10.06**	

Mooring No.	Tension Applied	Duration	Remarks
1	**215 tonnes**	**15 minutes**	
5	**215 tonnes**	**15 minutes**	
4	**215 tonnes**	**15 minutes**	
8	**215 tonnes**	**15 minutes**	
3	**215 tonnes**	**15 minutes**	
7	**215 tonnes**	**15 minutes**	
2	**215 tonnes**	**15 minutes**	
6	**200 tonnes**	**15 minutes**	**Due to bearing/shaft problem, only tensioned to**
			200T

	Date	Time	Witnessed By
Completed	**25.10.06**	**0055**	**T Bucknole/P Warren**

13.0 Marker Buoys

13.1 Location Details.

To be recorded upon recovery/deployment.

	Designation	Recovered From	Date Time	Deployed To	Date Time
Buoy No.1		**E**		**E**	
		N		**N**	
Buoy No.2		**E**		**E**	
		N		**N**	

13.2 Remarks: Marker Buoys.

14.0 Weather Log

To be recorded at 4 hourly intervals when operational. Interval to be reduced as required during severe weather conditions.

Date	Time	Wind		Seas		Remarks	Retr/ Tow/Run
		Dir	Spd	Ht	Per		
08.10.06	**0400**	**212**	**8**	**1**	**4**		**Retr**
	0800	**200**	**11**	**1**	**4**		"
	1200	**188**	**15**	**1**	**4**		"
	1600	**190**	**15**	**1**	**4**		**Tow**
	2000	**190**	**8**	**1**	**4**		**At anchor**
	2400	**Lt**	**Airs**	**1**	**4**		"
09.10.06	**0400**	**Lt**	**Airs**	**1**	**4**		"
	0800	**240**	**25**	**2**	**5**		"
	1200	**230**	**25**	**3**	**5**		"
	1600	**230**	**25**	**3**	**5**		"
	2000	**230**	**20**	**2**	**5**		"
	2400	**210**	**10**	**2**	**5**		"
10.10.06	**0400**	**190**	**10**	**2**	**4**		"
	0800	**180**	**12**	**2**	**4**		**Tow**
	1200	**180**	**12**	**3**	**5**		"
	1600	**115**	**15**	**3**	**4**		"
	2000	**110**	**18**	**6**	**5**		"
	2400	**115**	**25**	**6**	**5**		"
11.0.06	**0400**	**135**	**30**	**6**	**5**		"
	0800	**120**	**30**	**8**	**5**		"
	1200	**120**	**30**	**13**	**6**		"
	1600	**125**	**30**	**13**	**6**	**Waiting on Weather from 1700**	"
	2000	**130**	**40**	**15**	**6**	**WOW**	"
	2400	**140**	**30**	**16**	**6**	**WOW**	"
12.10.06	**0400**	**135**	**30**	**16**	**6**	**WOW**	"
	0800	**135**	**25**	**16**	**6**	**WOW**	"
	1200	**160**	**22**	**13**	**6**	**WOW**	"
	1600	**171**	**31**	**8**	**6**	**WOW**	"
	2000	**180**	**23**	**10**	**6**	**WOW**	"
	2400	**160**	**25**	**12**	**6**	**WOW**	"
13.10.06	**0400**	**180**	**25**	**12**	**6**	**WOW**	"
	0800	**180**	**20**	**11**	**6**	**WOW**	"
	1200	**180**	**25**	**9**	**6**	**WOW**	"
	1600	**180**	**23**	**12**	**6**	**1500 End waiting on weather**	**Run**
	2000	**180**	**22**	**12**	**6**		"
	2400	**180**	**18**	**8**	**6**		"
14.10.06	**0400**	**180**	**16**	**8**	**6**		"
	0800	**208**	**17**	**8**	**6**		"
	1200	**208**	**16**	**8**	**6**		"
	1600	**208**	**17**	**8**	**6**		"
	2000	**208**	**16**	**8**	**6**		"
	2400	**208**	**18**	**8**	**6**		"
15.10.06	**0400**	**208**	**16**	**8**	**6**		"
	0800	**208**	**17**	**8**	**6**		"
	1200	**208**	**21**	**8**	**6**		"
	1600	**208**	**17**	**8**	**6**		"
	2000	**211**	**16**	**8**	**6**		"
	2400	**200**	**18**	**8**	**6**		**Run**
16.10.06	**0400**	**208**	**17**	**7**	**6**		"

	0800	**210**	**15**	**7**	**6**		**“**
	1200	**210**	**15**	**7**	**6**		**“**
	1600	**182**	**13**	**6**	**6**		**“**
	2000	**123**	**8**	**6**	**6**	**1730 Waiting on Weather**	**“**
	2400	**103**	**15**	**7**	**6**		**“**
17.10.06	**0400**	**105**	**18**	**10**	**6**		**“**
	0800	**264**	**19**	**10**	**7**		**“**
	1200	**053**	**19**	**12**	**7**		**“**
	1600	**060**	**28**	**13**	**8**		**“**
	2000	**056**	**30**	**13**	**8**		**“**
	2400	**027**	**27**	**18**	**8**		**“**
18.10.06	**0400**	**044**	**20**	**16**	**8**		**“**
	0800	**035**	**25**	**14**	**8**		**“**
	1200	**02**	**16**	**14**	**8**		**“**
	1600	**015**	**16**	**14**	**8**		**“**
	2000	**020**	**14**	**13**	**8**		**“**
	2400	**063**	**14**	**12**	**8**		**“**
19.10.06	**0400**	**061**	**13**	**13**	**8**		**“**
	0800	**061**	**19**	**13**	**8**		**“**
	1200	**066**	**23**	**13**	**9**		**“**
	1600	**066**	**26**	**14**	**9**		**“**
	2000	**060**	**30**	**16**	**9**	**1730 Waiting on weather**	**“**
	2400	**060**	**35**	**16**	**9**	**WOW**	**“**
20.10.06	**0400**	**060**	**40**	**17**	**10**	**“**	**“**
	0800	**060**	**35**	**17**	**10**	**“**	**“**
	1200	**060**	**35**	**17**	**10**	**“**	**“**
	1600	**060**	**47**	**15**	**10**	**“**	**“**
	2000	**060**	**40**	**16**	**10**	**“**	**“**
	2400	**055**	**40**	**14**	**11**	**“**	**“**
21.10.06	**0400**	**050**	**40**	**14**	**12**	**“**	**“**
	0800	**050**	**40**	**14**	**14**	**“**	**“**
	1200	**050**	**45**	**15**	**14**	**“**	**“**
	1600	**050**	**42**	**14**	**14**	**“**	**“**
	2000	**050**	**45**	**14**	**14**	**“**	**“**
	2400	**045**	**40**	**14**	**13**	**“**	**“**
22.10.06	**0400**	**040**	**45**	**16**	**13**	**“**	**“**
	0800	**050**	**50**	**20**	**14**	**“**	**“**
	1200	**050**	**40**	**20**	**14**	**“**	**“**
	1600	**050**	**45**	**20**	**14**	**“**	**“**
	2000	**050**	**50**	**20**	**14**	**“**	**“**
	2400	**045**	**40**	**20**	**14**	**“**	**“**
23.10.06	**0400**	**044**	**40**	**20**	**14**	**“**	**“**
	0800	**040**	**35**	**18**	**14**	**“**	**“**
	1200	**035**	**34**	**17**	**14**	**“**	**“**
	1600	**030**	**33**	**15**	**12**	**“**	**“**
	2000	**030**	**30**	**15**	**12**	**“**	**“**
	2400	**040**	**25**	**12**	**12**	**“**	**“**
24.10.06	**0400**	**020**	**35**	**12**	**12**	**“**	**“**
	0800	**020**	**35**	**12**	**12**	**“**	**“**
	1200	**020**	**20**	**12**	**12**	**“**	**“**
	1600	**010**	**16**	**10**	**12**		**Run**
	2000	**010**	**14**	**10**	**12**		**“**
	2400	**010**	**15**	**10**	**12**		**“**

15.0 Log Of Tow

Date	Time	Position	SPD	DMG	DTG	Remarks
10.10.06	**0600**	**57° 50.8’N 003° 20.8’W**			**217**	**Start of Passage**
	0800	**58°00.3’N 003° 05.2’W**	**6.6**	**11.1**	**206**	
	1200	**58° 21.1’N 002° 39.2’W**	**6.0**	**36.2**	**181**	
	1600	**58° 31.7’N 002° 30.5’W**	**5.8**	**59.4**	**158**	
	2000	**59° 08.2’N 001° 56.4’W**	**7.7**	**87.5**	**130**	
	2400	**59° 39.5’N 002° 06.6’W**	**5.5**	**113.2**	**103**	
	0400	**56° 49.2’N 002° 27.1’W**	**5.7**	**133.8**	**82.5**	
	0800	**60° 13.4’N 002° 53.6’W**	**7.2**	**161.5**	**54.8**	
	1200	**60° 37.5’N 003° 19.7’W**	**6.8**	**188.9**	**27.4**	
	1600	**60° 57.2’N 003° 45.5’W**	**6.2**	**213.4**	**4.1**	
	1700	**61° 01.0’N 003° 50.0’w**	**4.1**	**217.5**		**End of Passage**

16.0 Mooring Equipment Recovered (Departing Location)

No.	Wire/Chain Feet/Metres TOB	Deployed	Brg °(T)	Range	Water Depth	Main Anchor Type	Fluke Angle	Ground Pennants	Back-up Anchor	No./Sizes of Connecting Shackles	Riser Pennants	Buoy + Pigtail

Remarks:-

17.0 Mooring Equipment Deployed (New Location)

No.	Wire/Chain Metres TOB	Deployed	Brg °(T)	Range Metres	Water Depth Metres	Main Anchor Type	Fluke Angle	Ground Pennants	Back-up Anchor	No./Sizes of Connecting Shackles	Riser Pennants	Buoy + Pigtail
1	**937 1920**	**1851 1612**	**300**	**3018**	**1132**	**15T MkV Bruce**	**50**					
2	**903 1828**	**1817 1528**	**340**	**3014**	**1135**	**12T Mk VI Stevpris**	**50**					
3	**935 1828**	**1849 1472**	**020**	**3029**	**1124**	**12T Mk VI Stevpris**	**50**					
4	**926 1920**	**1840 1579**	**060**	**3027**	**1105**	**15T MkV Bruce**	**50**					
5	**937 1920**	**1851 1665**	**119**	**3103**	**1102**	**15T MkV Bruce**	**50**					
6	**935 1828**	**1849 1413**	**160**	**2930**	**1102**	**12T Mk VI Stevpris**	**50**					
7	**930 1920**	**1844 1617**	**200**	**3092**	**1103**	**12T Mk VI Stevpris**	**50**					
8	**937 1920**	**1851 1580**	**240**	**3130**	**1108**	**15T MkV Bruce**	**50**					

Remarks:-

18.0 Time Breakdown: Retrieval Of Back-Up Anchors

No.	Vessel	Date	Buoy On Deck	Anchor Off Bottom	Anchor On Deck	Buoy In Water	Remarks

Remarks:-

19.0 Time Breakdown: Retrieving Main Anchors

No.	Vessel	Date	By/PCP Passed	Anchor Up	Comm. Recovery	Anchor Racked	Pennant Passed	Total Time	Lost Time	Remarks

Remarks:-

20.0 Time Breakdown: Running Main Anchors

No.	Vessel	Date	Pennant Passed	Run Anchor	Anchor On Bottom	PCP Passed	Total Time	Lost Time	Remarks
5	**Normand Neptune**	**13.10.06**	**1506**	**1517**	**14.10.06 2320**	**15.10.06 0048**	**33H 42M**	**18H 04M**	**See Note. Down time, 14th/0226 to 2030**
1	**Highland Valour**	**13.10.06**	**1534**	**1540**	**15.10.06 0620**	**0813**	**40H 39M**		**Waiting on winch repairs #5 and running of same.**
4	**Normand Neptune**	**15.10.06**	**0707**	**1004**	**1721**	**1850**	**11H 43M**		
8	**Highland Valour**	**15.10.06**	**0847**	**1219**	**16.10.06 1343**	**1542**	**30H 55M**	**14H 55M**	**Winch brake failure. Down time 15th/2110 to 16th/1205**
7	**Normand Neptune**	**16.10.06**	**1935**	**2057**	**17.10.06 0617**	**0741**	**12H 06M**		
6	**Normand Neptune**	**17.10.06**	**0825**	**1455**	**18.10.06 1525**	**1637**	**32H 12M**	**17H 12M**	**17th/1508 to 18th/0820 Waiting on helicopter and weather**
2	**Highland Valour**	**18.10.06**	**0655**	**1720**	**19.10.06 0613**	**1245**	**29H 50M**	**7H 29M**	**Lost time – Winch problems and ballast valve repairs**
	Highland Valour	**24.10.06**	**1423**	**1608**	**2305**	**25.10.06 0100**	**10H 37M**		

Remarks:- Note; #5 13.10 @ 2300 to 14.10 @ 0145 run in to location plus down time is actual running time of 12H 53M
#1 Actual running time 15H 29M

21.0 Time Breakdown: Running Back-Up Anchors

No.	Vessel	Date	Start Time (Main Anchor Re-laid)	Anchor on Bottom	Buoy In Water	Total Time	Remarks

Remarks:-

22.0 Time Breakdown: Relaying Main/Back-Up Anchors

No.	Vessel	Main Anchors			Back-Up Anchors			Remarks
		From	To	Total	From	To	Total	

Remarks:-

23.0 Comments On Rigmove

Electronic chart system. In view of what happened to the Transocean Prospect in Rotterdam, it is surprising that this was not on board for departure from Invergordon

Communications. For any operation to be successful and be carried out safely, good communications are all important. It's a pity this is not the case when it comes to VHF communications on the Transocean Rather's bridge.
Although a new radio was fitted in Invergordon and the Radio op ran in a new Arial, coms with the boats was still far from satisfactory, and one had to rely on a held radio which was only good for no more than 50% of coms, for the rest the radio in the control room had to be used.
This needs to be sorted before the next rig move, along with a second radio as a standby set.

Winches It soon became apparent that the winches were unable to handle the weight of the additional chain when it came to deploying the anchors, resulting in the band break pads not lasting out for the running of anchor.
Because of this, it was decided to modify the original load sharing whereby the rig and the AHV shared the weight of the chain as the mooring was being run.
To reduce the load on the winch when paying out the wire, the AHV kept the anchor on its stern roller until 1000M of wire had been paid out (the load on its winch being 180T at this point), the AHV then began to pay out work wire in step with the pay out of the rig wire until the required amounts had been paid out.
Whilst this helped to reduce the wear on the pads, it was not the solution, so it was decided to use the 2nd AHV to assist in the loading sharing.
This was done (after the anchor had been put over the stern roller of the 1st AHV by the 2nd AHV grappling the chain 200M from the crossover and bringing the chain up to about 30M below its stern roller. The mooring was then run out in tandem to 1000M where both AHV's began paying out work wire, and once the 2nd AHV was off the chain, the other AHV continued to run the chain out to distance. Once we knew that the grapnel would come off the chain at 1000M, the amount of wire paid out the 2nd AHV came off the chain was increased to 1200M and finally Full scope, when the chain was lowered to bottom by the 2nd AHV, the weight cane off the grapnel wire at 970M had been paid out.
With the 2 AHV's load sharing, the load the winch was reduced to about 40T, thus resulting in a reduction of brake pad wear.

The bearing on # 5/6 winch are in poor condition, these were repaired in Invergordon. The bearings deteriorated during the deployment of # 6, s a result of this, the barge engineer only wanted to test tension this one to 200T.

The worm gear on # 2 winch had to have a collar welded on to it to ensure the clutch stayed engaged.

Personnel All personnel involved in this operation carried out their duties in a most professional manner. I would like to say a big thank you to the mechanics for all the hard work they put in to keep the winches working

24.0 Comments On Lost Time

Rig equipment lost time due to brake pad wear and lack of spares.

25.0 Suggestions/Recommendations

26.0 Author

	Name	Position
Report Completed By:		

27.0 Confirmation

This signed statement is to be removed from the handwritten report and appended to the final typed report which is supplied to client on completion of the rigmove.

I confirm that the preceding report is a true record of the rigmove of the

______________________ From: ____________________ To: ___________________
(Rig Name) (Location 1) (Location 2)

Signed ___________________________ Date _______________________________

Transocean	RIG SPECIFIC PROCEDURE		Tracking No. / For Office Use Only
RIG NAME:	**Transocean Rather**	**RSP NO:**	**MAR-Mooring-001-RAT**

RIG SPECIFIC PROCEDURE NAME: Retrieving Anchors

PERSONNEL INVOLVED: Barge Supervisor, Assistant Barge Supervisor, Able Seaman, Ballast Control Operator, Crane Operator and Crew, Vendor partners rig move personnel.

RESPONSIBLE PERSON: Barge Supervisor.

MINIMUM CONSIDERATION FOR THE RISK ASSESSMENT *Enter YES/NO*

Operational	Noise	COSHH	Manual Handling	Lighting	Environmental Impact
Yes	Yes	No	Yes	No	No

PRE TASK ACTIONS:

A Think Process is mandatory for all tasks and a Think Drill is required when there are changes or additions to the task

	YES/NO
Permit to Work	No
Electrical Isolation	No
Mechanical Isolation	No

Ref: Marine Procedures UKR-OPS-001. SEC 4 SUB SECTION 3. 4.

a. All relevant authorities to be informed that anchor handling operations are about to commence.
b. Complete Empac pre rig move checks and confirm that all systems are fully functional.
c. Ensure that all winch operators have completed OJT training package and confirmed competent to operate the equipment.
d. Inspect all portable lifting equipment/cranes prior to the start of anchor handling operations, ensure it is colour coded and fit for the purpose.
e. Hold a Pre-Operation meeting with the Marine crew, Crane Operators and Deck Crews on safe pendant handling procedures.
f. Discuss the anchor-handling plan with the AHV masters and pass written copies of the procedures to them if they have not been received prior to arrival at the location.
g. Hold a Pre-Rig Move meeting with all relevant personnel, document the minutes and file with the rig move report information.
h. Discuss specific procedures with the AHV masters e.g. techniques for recovering/handling Bruce 18.0 mt anchors and any limitations of the Installation and AHV equipment.
i. Raise PTW with installation in the field if required by combine operations documents.
j. As per Marine Procedures (Semi-Sub) UKR-OPS-001/K Section 4 Subsection 11 Supply Vessel Operations the same will apply to work with Anchor Handling Vessels – "The Barge Supervisor or competent person nominated by the OIM shall be on deck at all

Transocean	RIG SPECIFIC PROCEDURE	Tracking No. / For Office Use Only

RIG NAME:	Transocean Rather	RSP NO:	MAR-Mooring-001-RAT

times", to supervise critical stages of the operation e.g. when an AHV is alongside and during all PCP handling to/from the rig and AHV.

METHOD:

a. Communicate with the AHV's and request that they approach the Installation individually in order to pass the appropriate PCP. It is imperative that the AHV Master confirms with the Crane Operator that he is happy with his station keeping and is ready to receive the PCP.
b. The AHV will connect the PCP to its work wire
c. Information will be exchanged from the Pilot House on the bearing and distance of the anchor to be recovered and the AHV will be aligned towards the anchor.
d. The rig will maintain sufficient tension on the anchor chain to facilitate chasing out.
e. The AHV will proceed along the bearing of the chain towards the anchor (using telemetry information for positioning, if available) until the chasing collar attached to the PCP reaches the anchor and progress is halted.
f. On instruction from the Transocean Towmaster the AHV will lift the anchor from the sea bed until it is at the AHV's stern roller, maintaining tension on the PCP throughout in order to prevent the anchor and chain slipping through the chasing collar.
g. When confirmation is received from the AVH that the anchor is secure on his roller, recovery of the chain/wire can commence after all non-essential personnel are clear of the anchor winch.
h. Commence to haul In.
i. When the wire has been recovered to the transition point, ensure that the AHV reduces all power to minimum acceptable level. This is to ensure that there is not excessive pull on the devils claw during transition. The Devil's Claw SWL is 100 mt, ½ of the weight of the deployed chain is 80mt. When transion is complete inform AHV and continue to heave in chain.
j. When the chain has been recovered so that there is still 150 meters of chain to go, the AVH will be instructed to chase off anchor to allow any twists to rotate out. After 5 – 10 minutes start retrieving the anchor and when the shackle is sighted slow winch to a slower speed and pull anchor towards the rack. If the anchor is on its back retrieving it at a slow speed should allow the anchor to right itself. The Bruce anchor has a tendency to rotate on the bolsters of the Rather due to design of the anchor and the bolster. If the anchor does not turn correctly then power payout the anchor until the anchor shackle is under the water then retreive again and the anchor will turn right then. Must ensure that the AHV is not putting any pressure on the anchor with the PCP during this racking procedure or it will not rack correctly.
k. To rack the anchor use only the jog button, providing the anchor is presented in the right attitude to the rack.
l. The AHV will now secure the PCP in its jaws and disconnect the PCP from its work wire.
m. Recover the PCP back to the rig and secure. It is imperative that the AHV Master confirms with the Crane Operator that he is happy with his station keeping and is ready for the Crane Operator to recover PCP.
n. Confirm that the chain counter reads zero.

Transocean	RIG SPECIFIC PROCEDURE		Tracking No. / For Office Use Only
RIG NAME:	Transocean Rather	RSP NO:	MAR-Mooring-001-RAT

POST TASK ACTIONS:

a. Turn off cooling water supply.
b. Remove slings from the PCPs and return to the rigging loft.
c. Examine the PCP and slings for damage and replace if necessary.
d. Examine the anchor winches for defects, loose covers, hydraulic or water leaks
e. Record all defects in the Empac System.

Transocean	RIG SPECIFIC PROCEDURE	Tracking No. / For Office Use Only
RIG NAME:	Transocean Rather	RSP NO: MAR-Mooring-001-RAT

APPROVED BY BOTH THE RELEVANT HEADS OF DEPARTMENT

DRL=STP	TEC= Maint Supv	MAR=Barge Supv
Enter Position	*Enter Name*	*Enter Date*
MAR	R.Bernard	23/03/05
MAR	S.Robinson	23/03/05

READ AND AUTHORISED FOR USE BY THE OIM

Enter Name	*Enter Date*
P.O'Malley	01/12/05

READ AND REVIEWED BY COMPETENT PERSON

Enter Name	*Enter Date*

AMENDED RSP

Enter Position	*Enter Name*	*Enter Date*
Authorised by the OIM		

Transocean	RIG SPECIFIC PROCEDURE		Tracking No. / For Office Use Only
RIG NAME:	**Transocean Rather**	**RSP NO:**	**Mar – Mooring -002 - RAT**

RIG SPECIFIC PROCEDURE NAME: Running Anchors

PERSONNEL INVOLVED: Barge Supv, Asst Barge Supv, A.B, BCO, Crane Op and Deck Crew, Transocean Towmaster, and Client Representative

RESPONSIBLE PERSON: Barge Supv

MINIMUM CONSIDERATION FOR THE RISK ASSESSMENT *Enter YES/NO*					
Operational	Noise	COSHH	Manual Handling	Lighting	Environmental Impact
Yes	Yes	No	Yes	No	No

PRE TASK ACTIONS:

A Think Process is mandatory for all tasks and a Think Drill is required when there are changes or additions to the task

	YES/NO
Permit to Work	No
Electrical Isolation	No
Mechanical Isolation	No

Ref: Marine Procedures UKR-OPS-001. SEC 4 SUB SECTION 3. 4.

a. All relevant authorities to be informed that anchor handling operations are about to commence.

b. AHV's to be consulted on anchor running program

c. Pre-move meeting with all relevant personnel to be held.

d. Ensure cooling water is lined up and tank is filled up

e. Anchor winches and communication equipment to be function tested.

f. Complete Empac pre rig move checks and confirm that all systems are fully functional.

g. Ensure all chain length out counters are reading zero.

h. Ensure that all winch operators have completed OJT training package and confirmed competent to operate the equipment.

i. Inspect all portable lifting equipment/cranes prior to the start of anchor handling operations, ensure it is colour coded and fit for the purpose.

Transocean	RIG SPECIFIC PROCEDURE	Tracking No. / For Office Use Only

RIG NAME:	Transocean Rather	RSP NO:	Mar – Mooring -002 - RAT

j. Hold a Pre-Operation meeting with the Marine crew, Crane Operators and Deck Crews on safe pendant handling procedures.

k. As per Marine Procedures (Semi-Sub) UKR-OPS-001/K Section 4 Subsection 11 Supply Vessel Operations the same will apply to work with Anchor Handling Vessels – “The Barge Supervisor or competent person nominated by the OIM shall be on deck at all times”, to supervise critical stages of the operation e.g. when an AHV is alongside and during all PCP handling to/from the rig and AHV.

METHOD:

a. The rig approaches to about 1 mile from the drilling location along an extended line of either No 4 or 5 anchor, depending upon prevailing weather conditions (windward side for the drop anchor), transition to be made at this time.

b. Before arrival at the drop site, the selected drop anchor will be lowered +/- 30 meters above the seabed, ready to drop.

c. At the drop position, the anchor is lowered to the seabed and the chain/wire is paid out as the rig is maneuvered towards the location.

d. When a reasonable length of chain/wire (dependant on water depth) has been paid out, the brake should be applied and the tension allowed to increase to approx 70 tonnes to seat the anchor and stretch the chain. Once this tension is attained, the brake is released and the rig is allowed to progress towards its final position.

e. Once the rig reaches location, the brake is again applied to the drop anchor traction winch, allowing the rig to settle over the location. The opposite bow anchor will then normally be deployed.

f. To send an anchor to the AHV, ensure a 5 tonne x 15ft sling is choked through the eye of the permanent chaser pennant (PCP). To enable the crane to lift the PCP, pass another 5 tonne x 10ft sling through the eye of the PCP attaching both eyes to the crane hook. Once the crane has taken the weight of the PCP, the deck crew can release the PCP from the securing socket, allowing the crane to swing away from the rig. The AHV’s deck crew then grapples the choked sling, attaching it to a tugger before securing the PCP in the shark’s jaws. Upon completion of this operation, the crane will be released. It is imperative that the AHV Master confirms with the Crane Operator that he is happy with his station keeping and is ready to receive the PCP.

g. Once the PCP is secured to the AHV’s work wire, the rig can them lower approx 50 meters of chain, allowing the AHV to secure the anchor at its stern roller.

h. Upon instruction from the rig, the AHV can start running the anchor chain out along a specified direction to the transition point. The winch operator by liaising with the AHV, will control the payout speed. A careful watch is required on the digital counters to ensure that they are operating and counting out at the desired rate. At the transition point inform AHV of the transition point and to reduce power to minimum acceptable level to reduce all pull from the AHV especially while the transition is being made and the chain is in the

Transocean	RIG SPECIFIC PROCEDURE		Tracking No. / For Office Use Only
RIG NAME:	Transocean Rather	RSP NO:	Mar – Mooring -002 - RAT

Devil Claw. Devil Claw SWL is 100 mt, and the ½ weight of the deployed chain is 80 tonnes.

i. Make transition.

j. Transition complete inform AHV of progress and Power Payout MOJO below the Anchor bolster, then switch over to Dynamic Payout inform AHV that we are in Dynamic Payout mode and have the AHV increase the pulling power. Liase with the AHV to adjust pulling power as needed to help smooth out the running of the winch in Dynamic Payout.

k. The winch operator will regularly update the AHV regarding the amount of line out. Once the required amount of line is out, the winch operator will inform the AHV, and then apply the brake. The AHV can then stretch out the chain and when satisfactorily tensioned, lower to the seabed.

l. The winch operator will then tension the chain to +/- 100 tonnes, allowing the chaser to be stripped back.

m. It is imperative that the AHV Master confirms with the Crane Operator that he is happy with his station keeping and is ready for the Crane Operator to recover each PCP once back to the rig.

n. The remaining anchors will be deployed by this method.

o. The rig's thruster capacity will be utilized to keep the rig on location, if needed.

p. When all anchors have been deployed, cross tensioning will be carried out to an acceptable tension for that location and held for 15 minutes. Tensions will then be reduced to working tension.

q. The rig is then moved over location to within the operators required tolerances.

r. The rig is then ballasted down to drilling draft, 24.9 meters.

POST TASK ACTIONS:

a. Cooling water is turned off

b. Slings removed from PCPs, and return to the rigging loft

c. Examine the PCPs and slings for damage and replace if necessary.

d. Examine the anchor winches for defects, loose covers, hydraulic or water leaks

e. Record all defects in the Empac System

f. Tow report completed and sent to town.

Transocean	RIG SPECIFIC PROCEDURE	Tracking No. / For Office Use Only
RIG NAME: Transocean Rather	RSP NO:	Mar – Mooring -002 - RAT

APPROVED BY BOTH THE RELEVANT HEADS OF DEPARTMENT

DRL=STP	TEC= Maint Supv	MAR=Barge Supv
Enter Position	*Enter Name*	*Enter Date*
MAR	R.Bernard	23/03/05
MAR	S.Robinson	23/03/05

READ AND AUTHORISED FOR USE BY THE OIM

Enter Name	*Enter Date*
P.O'Malley	01/12/05

READ AND REVIEWED BY COMPETENT PERSON

Enter Name	*Enter Date*

AMENDED RSP

Enter Position	*Enter Name*	*Enter Date*
MAR		
Authorised by the OIM		

Chevron

RIG MOVE PROCEDURES

'TRANSOCEAN RATHER'

FROM: 213/26-1z 'ROSEBANK'

TO: 205/1-I 'ROSEBANK'

MARCH 2007

Transocean

DOCUMENT ISSUE RECORD					
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Aberdeen
United Kingdom
AB10 1UP
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Copy No: ________________ Date: ______________

RMTRAT#05

TRANSOCEAN

MARINE OPERATIONS

RIG MOVE PROCEDURES

TRANSOCEAN RATHER

PROCEDURE NO:RM/10095/TRAT#DW05/11217

Procedures Prepared by: S. Johnson – Operations Manager, T.O.L

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Procedures Approved by: A. Brown - Rig Manager, Transocean.

Procedures Approved by: R. Mathieson - Marine Manager, Transocean.

Procedures Approved by: R. Macklin – Marine & HSE Specialist, Chevron

TRANSOCEAN

MARINE OPERATIONS

RM/10095/TRAT#DW05/11217

RIG MOVE PROCEDURES

DISTRIBUTION

The following is a list of holders of Rig Move Procedures RM/10095/TRAT#DW05/11217:

COPY NO.	ISSUED TO	STATUS
1	TOL Document Control	Master
2	TOL Marine Representative	1 x Controlled copy
	TOL Marine Representative	3 x Uncontrolled copies (P)
	Transocean	3 x Uncontrolled copies (E&P)
	CHEVRON	2 x Uncontrolled copies (E&P)
	AHV 'A'	1 x Uncontrolled copy (P)
	AHV 'B'	1 x Uncontrolled copy (P)
	AHV 'C'	1 x Uncontrolled copy (P)
	AHV 'D'	1 x Uncontrolled copy (P)
	AHV 'E'	1 x Uncontrolled copy (P)

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1.0 INTRODUCTION.

A requirement exists to move the semi-submersible drilling unit 'TRANSOCEAN RATHER' from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location.

The proposed 205/1-I 'Rosebank' location is as follows:

Latitude: **60° 59' 32.776" N**
Longitude: **03° 49' 49.242" W**

The proposed rig heading at the 205/1-I 'Rosebank' location is 270°(T).

The distance from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location is some **2 nautical miles**.

The estimated period of time required for each stage of the rig move is as follows:-

Anchor Recovery at 213/26-1z 'Rosebank'	60 Hours
Passage Time @ 4.0 kts	04 Hours
Anchor Deployment and Ballasting at 205/1-I 'Rosebank'	60 Hours
Insurance Cross-Tensioning & Final Positioning	04 Hours
	Total Time 05 Days 08 Hours

The following assumptions are made:

- *The passage from 213/26-1z 'Rosebank' to 205/1-I 'Rosebank' will be conducted by one AHV towing on the rig's main tow bridle.*
- *Five AHVs will be available for mooring recovery & deployment operations. This includes the towing vessel.*
- *Four primary AHVs to be used during the operation should have a 2300m x 83mm work wire fitted on their work drum and the remaining AHV will have a 1200m wire.*
- *Work wires to be suitably tensioned prior to commencing operations.*
- *Work wires to be de-torqued on completion of anchor handling, this should be completed by using two vessels stern to stern.*
- *The water depth at the proposed 205/1-I 'Rosebank' location is 1103m and the deepest anchor will be in 1114m.*
- ***The roller collars on mooring Nos. 3 & 8 have lost the lower roller and have been removed from the mooring line. All 8 roller collars are deemed unusable.***

2.0 PERSONNEL RESPONSIBILITIES.

The following descriptions of responsibility refer to the KEY personnel who will be involved in the rig move of the 'TRANSOCEAN RATHER' from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location.

2.1 The Chevron Drill Site Manager.

The Chevron Drill Site Manager is the senior CHEVRON Representative onboard the 'TRANSOCEAN RATHER' and as such will be the sole point of contact through which all rig move notifications and exterior communications will pass.

Will liaise with the CHEVRON Marine Representative with regard to rig move status.

Will liaise between Contractor and Hirer in all matters other than specified in the following responsibilities.

Will be responsible for the acceptance of the rig's final position at the proposed 205/1-I 'Rosebank' location.

2.2 The 'TRANSOCEAN RATHER' OIM.

Will have total responsibility for all operations and the safety of the 'TRANSOCEAN RATHER' and all personnel at all times as per statutory requirements.

Will decide when it is safe and practicable to commence operations within the limitation of the unit's Operations Manual, having consulted with the Transocean Towmaster, CHEVRON Marine Representative and Chevron Drill Site Manager.

Will be responsible for the conduct and safety of the tow and will give instructions to the towing vessel with regard to tow wire deployment, passage planning, courses and speeds, after consultation with the Transocean Towmaster, CHEVRON Marine Representative and vessel Masters.

Will ensure the correct placement of competent TRANSOCEAN personnel to ensure the safe handling of anchors (recovery at 213/26-1z 'Rosebank' and deployment at 205/1-I 'Rosebank') and handling of vessel tow gear.

Will ensure the stability of the rig at all times, including making any required adjustments to trim or heel as necessary.

Will ensure that all relevant authorities are kept informed of the rig move status, as required by HSE Operations Notice No. 3 - Liaison with Other Bodies and HSE Operations Notice No. 6 - Reporting of Offshore Installation Movements.

2.3 The Transocean Towmaster.

Will liaise with and advise the 'TRANSOCEAN RATHER' OIM of the requirements for ensuring the integrity of any and all CHEVRON and third party assets.

Will liaise with and advise the 'TRANSOCEAN RATHER' OIM regarding the correct deployment of vessels associated with the rig move operation.

Will be responsible together with the 'TRANSOCEAN RATHER' OIM for ensuring that all marine operations are conducted in such a manner as to safeguard the integrity of all subsea equipment, rig and tow.

Will liaise with and advise the Chevron Marine Representative on all operations associated with the rig move.

Will ensure that any additional marine equipment provided for anchor deployment operations i.e., pennants, and shackles, buoys etc. is in good condition, certified where required and correctly recorded upon use **together with the purpose for which the equipment is utilised.**

Will ensure that all non-used items of mooring equipment are correctly manifested for return to shore on completion of the rig move operation.

May inspect all equipment upon return to shore as required.

Will maintain a detailed log throughout the rig move and complete a rig move report on completion of the operation, including rig and vessel consumables at the relevant milestone times.

2.4 CHEVRON Marine Representative.

Will liaise with and advise the 'TRANSOCEAN RATHER' OIM of the requirements for ensuring the integrity of any and all third party assets.

Will liaise with and advise the Chevron Drill Site Manager on all operations associated with the rig move.

Will provide all interested parties with such information and updates on rig activities as they may require.

Will ensure that all non-used items of mooring equipment are correctly manifested for return to Aberdeen on completion of the rig move.

Will ensure that any additional marine equipment provided for mooring the unit i.e., pennants, shackles and buoys etc. is certified, and correctly recorded upon deployment **together with the purpose for which the equipment is deployed.**

May inspect all equipment upon return to Aberdeen as required.

Will ensure that all relevant authorities are kept informed of the rigmove status, as required by HSE Operations Notice No. 3 - Liaison with Other Bodies and HSE Operations Notice No. 6 - Reporting of Offshore Installation Movements.

2.5 Rig Positioning Supervisor.

Will be responsible for providing constant data showing the position of the 'TRANSOCEAN RATHER' at all times during the rig move from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location.

Will ensure that all relevant field data, especially with respect to any pipelines, umbilicals and sub-sea equipment, is displayed on the navigation screen as appropriate.

Will perform system checks to prove navigation system confidence prior to commencement of the rig move and at intervals during the rig move operation. Any failures / shortfalls in navigational equipment must be immediately reported to the Chevron Drill Site Manager and CHEVRON Marine Representative.

Will maintain detailed logs of all movements of the unit from the commencement of mooring recovery at the 213/26-1z 'Rosebank' location until the unit is safely moored at the proposed 205/1-I 'Rosebank' location. These logs should be available to CHEVRON on completion of the operation.

2.6 Rig Move Vessel Masters.

Will be responsible for the safety of their vessels, and when towing, for the safety of the tow.

Will ensure that appropriate navigation warnings are issued at regular intervals.

Will review the rig move procedures and pass any comments or concerns to the CHEVRON Marine Representative / Transocean Towmaster.

Will be responsible for ensuring all anchor-handling operations are conducted in a safe manner with due regard to safe working practices and the practices of good seamanship.

Will ensure that all items of anchor handling equipment, particularly pennant wires, are handled in the proper manner so as to safeguard the integrity of the equipment.

Will ensure that the deployment and recovery of all marine equipment is recorded and any deficiencies or damage noted and advised to the CHEVRON Marine Representative.

2.8 Contact Numbers.

The following contact numbers are included for use by personnel connected with the rig move operations:

Chevron	**Tel (01224) 334000**	
Transocean	Tel (01224) 427700	Fax 427800
- Adrian Brown (Rig Manager)	Tel (01224) 427786 Mob: 07769 742045	
- Ron Mathieson	Tel: (01224) 427826 Mob: 07703500289	
Trident Offshore Ltd.	Tel (01224) 622111	Fax 622333
- Sean Johnson	Mobile 07771731082	
- Martin Kobiela	Mobile 07712 556783	
TRANSOCEAN RATHER		
- OIM	Tel (01224) 410533	
- Radio Room/Control Room	Tel (01224) 410535	
Nowcasting	Tel (01975) 563705	Fax Same
Weathernews	Tel (01224) 248080	Fax 248250
HM Coastguard (Aberdeen)	Tel (01224) 592334	Fax 575920
Scotia Helicopter Services	Tel (01224) 771353	Fax 770015
Bristows Helicopters	Tel (01224) 723151	Fax 770120
Bond Helicopters	Tel (01224) 779007	Fax 215220
Kingfisher Charts	Tel (01224) 223310	Fax 327837
Anatec UK Ltd	Tel (01224) 573434 Fax (07092) 367306	
Craig Group (I.M.S.)	Tel (01224) 701830	Fax 701831

3.0 LOCATION DETAILS.

3.2 The present location for the 'TRANSOCEAN RATHER' is:-

BLOCK:	**213/26-1z 'ROSEBANK'.**
WELL STATUS:	**P & A**
LATITUDE:	**61° 01' 17.977" NORTH**
LONGITUDE:	**03° 48' 29.541" WEST**
UTM (CM 3°W, ED50):	**N 6 765 629.95** **E 456 315.85**
RIG HEADING:	**272.1°(T)**
WATER DEPTH:	**1106 metres (≈ 3629 feet) LAT**

SITE SURVEY INFORMATION:

Obstructions:

- P & A well 213/27-1z lies 5589m x 053°(T) from the proposed location.

Bathymetry:

Water depths within the survey area vary from a minimum of 1100m in the south-eastern corner, to a maximum of 1140m in the north-western corner.

Seabed Features:

Shallow soils consist of slightly gravely muddy sands.

The holding is expected to moderate to good with the fluke angles set at the wide (mud angle) setting.

3.2 The proposed location of the 'TRANSOCEAN RATHER' is:

BLOCK:	**205/1-I 'ROSEBANK'.**
WELL STATUS:	**APPRAISAL**
LATITUDE:	**60° 59' 32.776" NORTH**
LONGITUDE:	**03° 49' 49.242" WEST**
UTM (CM 3°W, ED50):	**N 6 762 390.0** **E 455 078.0**
RIG HEADING:	**270°(T)**
WATER DEPTH:	**1106 metres (≈ 3629 feet) LAT**
TOLERANCE:	**10m RADIUS CENTRED ON THE PROPOSED LOCATION.**

SITE SURVEY INFORMATION:

Obstructions:

- Suspended well 213/26-1z lies 3468m x 020°(T) from the proposed location.

Bathymetry:

Water depths within the survey area vary from a minimum of 1100m in the south-eastern corner, to a maximum of 1130m in the north-western corner.

Seabed Features:

Shallow soils consist of slightly gravely muddy sands.

The holding is expected to moderate to good with the fluke angles set at the wide (mud angle) setting.

4.0 PREAMBLE.

4.1 General.

The purpose of this document is to ensure that the 'TRANSOCEAN RATHER' rig move operation from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location is conducted in a safe and efficient manner.

These approved procedures shall be followed as closely as circumstances permit, having due regard for the limitations of the unit and its assisting vessels. Should any deviation from these procedures be deemed necessary, the Chevron Drill Site Manager shall be advised immediately. Due consideration must be given to any and all effects of such a deviation. Such deviations shall be minuted, and the minutes attached to the rigmove log.

Prior to the commencement of rigmove operations, weather forecasts shall be obtained and a suitable weather window identified to allow each stage of the operation to be safely completed without interruption.

During all mooring operations, the chains/wires not being adjusted will have the double band brakes fully on, when there is no operator present.

Where possible, all rig move vessels will be issued with a copy of this rig move procedure prior to departure from port. The vessel Masters will be required to review the procedure and comment accordingly. Where a port visit is not possible, procedures will be issued to the vessels offshore.

In order to prevent a chain run out, all anchor winch pre-check and operating procedures will be followed and all clutches and gears will be mechanically secured. Only properly trained and competent personnel who are familiar with the systems will operate the anchor winches. The order of anchor handling operations may need to be revised should any winch failures occur and the procedures amended after discussion with all relevant parties. Circumstances may dictate that the rig does not deploy all moorings whilst awaiting repairs.

A pre-rig move meeting will be held onboard prior to the commencement of operations where all key personnel, as described in Section 2.0, shall be fully briefed to ensure a full understanding of these procedures. Minutes are to be kept of this meeting and a copy attached to the rigmove log.

4.2 Anchor Recovery.

Following anchor deployment it was found that chasing collar Nos. 3 & 8 had lost the lower roller and had come off the chain. The securing bolts had not been correctly torqued / locked and as a result of this fault none of the chasing collars will be used for anchor recovery and all anchors will be recovered using a 'J' hook.

The breast anchors will be recovered, in opposite pairs, until the rig chain has been lockered on the rig. This will then enable the collars to be passed to the AHVs for repair. Once repaired they will be re-instated on the moorings during anchor deployment.

The primary anchors will be recovered and deployed using a 'J' hook. The anchors will not be decked and will be suspended by the AHVs for the tow between locations.

When re-instating the collars the PCPs will be made up as follows, from the collar:

Primary anchors:

Bel 4214 wire chaser / 250 T bow shackle / 120 T Bow shackle / 30 links x 3" chain / 120 T bow shackle / 145 ft x 83mm wire

Secondary anchors:

Bel 4214 wire chaser / 250 T bow shackle / 120 T Bow shackle / 30 links x 3" chain / 120 T bow shackle / 75 ft x 83mm wire / 83mm CCL / 75 ft x 83mm wire

4.3 Decking the Chasing System.

As all anchors will be recovered utilising a 'J' hook the chasing system will need to be recovered to the deck of the AHV to enable inspection / repair of the collar. The chasing system will be decked in the following manner:

- With the AHV close to the rig and the rig chain recovered to the locker the rig will pass the PCP by crane to the AHV.
- The rig chain will be secured to a work wire with an 85 T shackle.
- With the PCP secured on deck it will be connected to a second work wire and this work wire recovered until the collar is decked.
- With the collar on deck the rig chain will be released from the sharks jaw and the weight taken by the work wire.
- With the sharks jaw housed and clear the collar will be pulled forward until the chain can be secured in the sharks jaw once more with the collar forward of the jaw.
- The collar can then be removed from the chain for inspection / repair and the PCP connected to the rig chain and passed back to the rig.

4.4 Mooring Deployment.

Whilst passing the PCP back to the rig, Masters are advised that towing pins must be fully retracted before releasing the pennant from the 'Shark's jaws/Karm Forks'.

All AHV workwires supplied for the mooring deployment operation must be regarded as critical items of equipment. All appropriate precautions must be taken to ensure the integrity of such equipment during the preparation and deployment phases of the operation.

Workwires will be carefully spooled onto work drums whilst under tension prior to the commencement of mooring deployment operations and prior to the deployment of each anchor.

Prior to each anchor deployment operation the PCP (and its components) will be thoroughly examined - particular attention shall be paid to the terminations.

In deploying anchors, the load sharing methodology detailed in these procedures will be utilised. Adequate chain tension (as detailed) must be maintained during anchor recovery and deployment to minimise chain/wire chafe on the bolsters.

Should anchors require to be recovered to the deck of an AHV during the rigmove, the operation will receive proper consideration and will be conducted with extreme care. The vertical load placed upon the anchor by the weight of chain connected to the anchor must be taken into account. Decking of the anchor over the stern roller is a critical operation and high stresses are placed on the anchor shank and the individual components of the PCP assembly. Any anchor, which is recovered to the deck of an AHV, will be thoroughly inspected for damage, together with PCP assembly components, and any defects rectified. In any event no anchor will be decked with more than 250 metres of chain deployed without the assistance of a 2nd AHV.

Anchor positioning is critical during deployment of all moorings and it is essential that full use is made of the facilities provided by both the rig and vessel navigation packages.

4.3 AHV Utilisation.

The AHVs will be designated as follows:

AHV 'A':	Main Anchor Handler
AHV 'B'	Main Anchor Handler
AHV 'C':	Assisting Anchor Handler
AHV 'D':	Assisting Anchor Handler
AHV 'E':	Tow and grapnel vessel

5.0 SUPPORT.

5.1 Vessels.

Four Anchor Handling Vessels will be available for mooring recovery at the 213/26-1z 'Rosebank' location and mooring deployment at the 205/1-I 'Rosebank' location. In addition there will be a tow / grappling vessel. All vessels will be capable of assisting with the grappling operations.

The tow from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location will be conducted by one AHV towing on the rig's main bridle and with an AHV supporting each of the primary anchors / rig chain section / extension chain section.

All Anchor Handling vessels (AHVs) shall have a minimum Bollard Pull of 180 tonnes. The towing vessel shall have a minimum bollard pull of 150 Tonnes.

All AHVs will be equipped with the following gear in full working order:

- Joystick/Poscon control.
- Main Tow wire plus a spare.
- Double anchor handling drum.
- Chain gypsy for 76mm chain
- Chain Gypsy suitable for 84mm chain (1 AHV).
- Hydraulic towing pins and Shark's Jaws/Karm Forks.
- 1 x 'J' Hook (previously checked for cracks and faults).
- 1 x Grapnel (previously checked for cracks and faults).
- Winch load indicators to be calibrated prior to the operation.

In addition the main AHVs will have the following:

- 1 x 2300m x 84mm work wire.
- **Capacity for 3 x 914m x 76mm chain extensions**
- Chain Gypsies suitable for 76mm chain.
- Capacity for 900m x 84mm chain

In addition the assisting AHVs will have the following:

- 1 x 2300m x 84mm work wire.
- **Capacity for 1 x 914m x 76mm chain extensions**

In addition the nominated grappling AHVs will have the following:

- 1 x 1200m x 76mm work wire.
- 1 x ballasted grapnel suitable for 76mm chain.

Spot hire vessels will be inspected prior to charter.

All vessels must be suitably manned in accordance with MSN 1767(M) and be capable of 24 hours operation.

5.2 Navigation Package.

A DGPS fully redundant (dual) navigation package will be provided for anchor recovery, tow and anchor deployment at 205/1-I 'Rosebank'.

The rig move package will be capable of monitoring the rig's position during all stages of the rig move operation, thus safeguarding the integrity of any pipelines, umbilicals and subsea equipment.

The installation and operation of the navigation package shall be the responsibility of the Rig Positioning Supervisor who will provide continuous position information to all interested parties as required.

Rig positioning equipment should be on board the rig at least 24 hours prior to commencement of anchor recovery operations at the 213/26-1z 'Rosebank' location to allow adequate time for installation, set up and system checks.

All five AHVs will be supplied with a DGPS navigation system, linked by telemetry to the rig navigation system.

The rig move package should therefore include the following:

1 x DGPS rig based fully redundant (dual) navigation system c/w DGPS receiver, computer, software and monitor.

1 x On line print facility.

1 x Calibrated GYRO compass.

1 x navigation system, linked by telemetry to the rig navigation system, fitted to each vessel

6.0 MOORING SYSTEM COMPONENTS.

6.1 Mooring Lines.

The rig's chain/wire mooring system has been utilised at the 213/26-1z 'Rosebank' location and will be utilised at the 205/1-I 'Rosebank' location with the mooring line make-up as follows (from the anchor end):-

- 18 tonne Bruce Mk. IV FFTS Anchor (Primary anchors)*
- or 12 T Stevpris Mk. VI. (Breast anchors)
- 914 metres (3000 feet) x 76mm chain.
- 900 metres (2950 feet) x 84mm chain.
- 1660 metres (5446 feet) of 96mm SWR.

* The 12 T Stevpris Mk. VI anchors will be replaced with 18 T Bruce Mk. IV FFTS anchors during the rigmove.

6.2 Workwires and Attachments.

All nominated deployment AHVs will be equipped with a suitable work-wire for anchor deployment at the 205/1-I 'Rosebank' location.

Workwires are terminated with 'Pee Wee' sockets.

Workwires will be carefully re-spooled onto the vessel's work drums following each use.

The Anchor Handling Vessels must be allowed sufficient time for re-spooling of the workwires after each deployment operation, as necessary.

A fully-enclosed swivel assembly will be utilised on the end of the work wire.

7.0 MOORING RECOVERY METHODOLOGY.

A 4-stage load sharing procedure has been developed for the recovery of each anchor.

The load share sequence offers the benefits of reducing the maximum bollard pull and winch load required for the recovery vessels and reduces bollard pull values for the procedure as a whole due to the controlled recovery of the rig's moorings. This reduces to a minimum the overall catenary weight that has to be manipulated by the AHV and the rig.

The procedure has been developed to:-

- Minimise the load on vessel winches & workwires and the rig's winches during the recovery sequence by sharing the load between rig and vessel winches.
- Ensure no contact between mooring wire and rig bolster during the recovery sequence.
- Identify loads at critical points during the recovery sequence.
- Ensure that the anchor recovery sequence can be undertaken in a controlled manner.

The distance of the AHV from the rig is the main controlling element for bollard pull required. As the distance between the rig and AHV decreases the rig mooring wire departure angle increases. The limiting wire departure angles for the 'Transocean Rather' moorings to ensure no contact between the mooring wire and the anchor bolster is 45° (measured below horizontal).

A single load share procedure has been developed, assuming a maximum wire departure angle of 45° (assumed to be the worst case). This restriction was used as the critical factor for rig/AHV distances, and therefore the bollard pull and winch tension values calculated.

Sections 7.2 -7.4 provide a brief description of the methodology to be utilised. It specifically refers to and provides a description of the load condition stages as tabulated (section 7.3). Tabulated results are obtained from finite element analysis of the complex, multi-element mooring system/workwire arrangement and stages have been selected in order that peak loads can be identified. ***Under operational circumstances, it is anticipated that mooring recovery may not be performed in stages as detailed but will be performed, where possible, continuously and without interruption.***

7.1 Discussion of Static Results.

The recovery operation commences with the AHV chasing out to anchor with a workwire of suitable length.

The anchor is then broken out from the seabed and the recovery sequence begins:

Stage 1 **The completion of this stage is optional.**

This stage is performed subsequent to anchor breakout if the rig is unable to recover mooring wire due to the chain being embedded in the seabed. Using bollard pull alone the AHV lifts the chain clear of the seabed. The rig and AHV winches will be in the braked conditions throughout this stage.

The rig mooring wire payout is 1,725m and the AHV has chased out to the anchor. To clear the catenary from the seabed, the AHV moves to a position 4,150m from the fairlead.

Maximum loads are experienced at this stage.

Stage 2 Subsequent to anchor breakout or the optional clearance of the chain from the seabed (stage 1), the AHV reduces power and lays the catenary back on the seabed. To maintain a fairlead angle of approximately 45°, the AHV range at this stage will be approximately 4,000m.

Subsequent to laying the chain down, the rig and AHV commence recovery of the mooring wire and workwire respectively. Recovery loads will be 144 tonnes at the rig and 180 tonnes at the AHV.

Stage 3 At this stage, the rig wire payout is reduced to 1,300m and the workwire payout is reduced to 800m and the mooring catenary lifts clear of the seabed. Loads will increase at this stage to 186 tonnes at the rig and 214 tonnes at the AHV. In order to maintain a fairlead angle of 45°, the range to the AHV will be 3,150m.

Maximum dynamic loads are experienced at this stage.

Stage 4 The rig and AHV continue to recover mooring wire and workwire. At this stage the AHV has a payout of 900m and the workwire payout is 400m. The loads are 165 tonnes at the fairlead and 200 tonnes at the AHV stern roller. In order to maintain a fairlead angle of 45°, the range to the AHV will be 2,525m

Stage 5 The AHV has now recover all of the workwire with only the PCP below the stern roller. Only 400m. of mooring wire remains outboard of the fairlead. Loads of 144 tonnes and 186 tonnes will be experienced at the rig and AHV at this stage. In order to maintain a fairlead angle of 45°, the range to the AHV will be 1,950m

Stage 6 The rig has now recovered all of the mooring wire, and only the chain remains outboard of the fairlead. The AHV range at this stage will be 1,650m.

7.2 Static Analysis Results (Anchor Depth 1,106m)

The bollard pull and winch loads required to recover the moorings from a range of 3,125m with a rig mooring wire payout of 1,725m, are detailed in table 1 below: -

Table 1: Load Share Recovery

Stage	Chain Payout (m)	SWR Payout (m)	Total Payout (m)	Workwire Payout * (m)	Distance AHV - Rig (m)	Layback (m)	Fairlead Tension (t)	Fairlead Angle	Anchor Above Seabed (m)	Bollard Pull (t)	AHV Tension (t)	Rig Winch Status	AHV Winch Status
1	1814	1725	3539	1217	4150	950	245.6	37°	330	195.9	262.1	Brake	Brake
												Brake	Brake
2	1814	1725	3539	1217	4000	863	143.5	45°	240	119.8	180.3	Brake	Brake
		↓		↓								Haul	Haul
3	1814	1300	3114	800	3150	513	185.7	45°	485	131.6	213.9	Haul	Haul
		↓		↓								Haul	Haul
4	1814	900	2714	400	2525	241	164.6	45°	782	117.1	200.4	Haul	Haul
		↓		↓								Haul	Haul
5	1814	400	2214	50	1950	-	144.0	45°	1063	101.8	185.9	Haul	Haul
		↓										Haul	Brake
6	1814	0	1814	50	1650	-	163.6	45°	1063	116.6	172.7	Haul	Brake

Notes: - * The workwire length detailed above includes an allowance for the PCP of 50 metres.

7.3 Dynamic Analysis Results

The dynamic loads resulting from environmental effects on the load share recovery operation have been investigated.

During anchor recovery operations, the limiting factor for anchor handling vessels is wave height and wave period.

The following maximum weather conditions have been considered to run the dynamic analysis: -

Table 4: Weather conditions

Wave Height	Wave Period	Current Speed	Wind Speed
4m	8.5 s	1.0 m/s	10 m/s

The weather has been applied against the direction of towing. A maximum heave amplitude of 2.0 m has been considered.

Dynamic analyses have been carried out for the case where the AHV experiences maximum static loads namely, stage 1 where a maximum static winch pull of 265 tonnes in combination with a bollard pull of 203 tonnes will be experienced.

The table below shows the peak dynamic loads induced on the vessel by the mooring lines at stage 1 of the recovery procedure of line No. 6.

Table 5: Peak Dynamic Loads

Stage No.	Fairlead Tension	Bollard Pull	Winch Load
1	299 t	244 t	318 t

The environmental loads on the AHV itself have been investigated in order to establish the reduction of effectiveness. A medium-large anchor handling vessel has been assumed for this purpose.

The results are shown in the following table:-

Table 6: Environmental loads on the AHV

Environmental Direction	Wind Load	Wave Drift Load	Current Load	Total Load
Head	7.5 T	2.7 T	0.7 T	10.9 T
Beam	19.5 T	12.7 T	16.2 T	48.8 T

7.4 Summary

The results obtained from this study indicate that a maximum static bollard pull of 196 tonnes and a maximum static winch load of 262 tonnes at stage 1 may be experienced during the recovery sequence of anchors in a water depth of 1,106m.

The total length of workwire required to recover the moorings in a water depth of 1,106m was found to be 1,167m + 50 m PCP, however, this length does not include the length of wire required to reach the winch from the stern roller and allow a suitable amount of wire on the winch drum. The overall workwire length will be dependent on selected AHV dimensions and winch geometry; however, it is likely that the total workwire length required for the operation will be in the region of 1,342m (WW+PCP+125m).

8.0 MOORING RECOVERY AT 213/26-1z 'ROSEBANK'.

8.1 General.

The semi-submersible drilling rig 'Transocean Rather' is moored at the location to an 8 anchor on a heading of 272.1°(T) in a water depth of 1104 metres (3322ft). A combined chain/wire mooring system has been utilised.

The as-laid anchor positions are as follows:-

ANCHOR	BRG °(T)	Rig Wire Payout (m)	Rig Chain (m)	76mm Chain (m)	RANGE (m)
1	300.0	1612	937	914	3154
2	340.0	1528	903	914	3019
3	020.0	1472	935	914	3000
4	059.9	1579	926	914	3092
5	128.6	1665	937	914	3190
6	160.2	1413	935	914	2942
7	199.9	1617	930	914	3133
8	239.7	1580	937	914	3088

Anchor recovery will be undertaken in a controlled manner. Loads on assisting AHVs and workwire strings must be carefully controlled and kept to a minimum consistent with performing the operation in hand. Close liaison is required between AHV Masters and key personnel on board the 'Transocean Rather' at all stages of the mooring recovery procedure.

Anchor recovery shall not commence until:

- Permission has been obtained from the CHEVRON Drill Site Manager and the rig OIM.
- Weather forecasts have been obtained and a suitable weather window has been identified of sufficient duration to allow for uninterrupted operations during each stage of the mooring recovery.
- Rig propulsion is available.

Note: anchor Nos. 2 & 6 will be recovered during the recovery of the BOP to allow work to commence on the No. 6 winch. The mooring will take place as per the following procedures with Nos. 2 & 6 recovered early and then the remaining anchors on completion of well operations.

8.2 Anchor Recovery.

Anchor recovery will be conducted in accordance with unit's Operations Manual, CHEVRON Procedures, and the following guidelines:-

The water depth and proposed work wire lengths are tabulated below:

Anchor	Water Depth (m)	x 1.15	x 1.25
1	1132	1302	1415
2	1133	1303	1416
3	1122	1290	1403
4	1104	1270	1380
5	1100	1265	1375
6	1101	1266	1376
7	1103	1268	1379
8	1108	1274	1385

(i) When drilling operations have been completed and the necessary permissions obtained, the recovery of main anchors may commence. In preparation the following will take place:

- All anchor chains will be tensioned to approximately 400 kips.
- Rig propulsion will be brought on line as appropriate.

(ii) Anchor recovery will commence with the recovery of the breast anchor Nos. 2 & 6. The breast anchors will be recovered in the following manner:

1. The AHV will rig and deploy the 'J' hook over the roller and pay out the workwire. Utilising the cat curves & mooring line tension to set the work wire length and the navigation system for position the mooring will be 'J' hooked on the rig chain section outboard of the wire / chain crossover.
2. With the 'J' hook on the chain the AHV will chase out to the anchor.
3. With the 'J' hook on the anchor the work wire length will be reported to the rig. Using a layback calculation the position of the AHV will be checked to confirm that the anchor has been reached. The anchor should not be broken out until it has been confirmed that the AHV is on the anchor.
4. The anchor will be broken out with care, a record is to be kept of winch tension. **The tension is not to exceed 150 Tonnes without the Towmasters permission.**

8.2 Anchor Recovery (Cont. 2/...).

5. With the anchor broken out the anchor will be recovered as per the mooring recovery methodology is section 7.0 until the anchor is at the roller. **The rig is to maintain a watch on the PCP to ensure it does not foul the wire or lower fairlead.**
6. With the anchor at the roller the rig will continue to recover the wire until the cross-over is at the cross-over deck.
7. With the wire recovery completed the AHV will increase power and stretch the mooring. The assisting AHV will then grapnel the 76mm chain approx. 300m astern of the AHV and recover work wire until approx. 95 Tonnes tension is obtained on the winch.
8. With the weight of the mooring supported by the grapnel the AHV will deck the anchor and secure the chain on deck.
9. With the anchor secured on deck the grapnel vessel will payout work wire and allow the grapnel to drop free.
10. The AHV will then disconnect the anchor and recover the 914m x 76mm chain extension to the locker until the rig chain can be secured on deck.
11. With the chain extension recovered the AHV reduce power and the rig will complete the cross-over to chain. **The AHV will be allowed to move astern towards the rig to reduce loads to a minimum during the wire / chain crossover on the rig.** With the cross-over completed the AHV will increase power as directed by the rig to lift the chain off the bolster as the rig lockers chain.
12. With the chain recovered the PCP will be connected to the chain end and passed back to the rig.

(iii) The breast anchors will be recovered in opposite pairs with the four AHVs. Anchor Nos. 2 & 6 will be recovered first to allow the repair on No. 6 winch to be completed prior to the recovery of the remaining anchors.

(iv) With the repair on winch No. 6 completed anchor Nos. 3 & 7 will be recovered as described above.

(iv) Following recovery of the breast anchors the primary anchors will be recovered. Anchor Nos. 1& 5 will be recovered until the cross-over is on the bolster and the anchor is under the roller. The rig will not complete the cross-over. With anchor Nos. 1 & 5 suspended anchor Nos. 4 & 8 will be recovered until the cross-over is on the bolster and the anchor is under the roller. The rig will not complete the cross-over.

8.2 Anchor Recovery (Cont. 3/…).

(v) The primary anchors will be recovered as described in 1 ~ 6 above. The anchors will be chased out in turn until it is confirmed that the 'J' hook is on the anchor. With the AHV on the anchor it will maintain power but will not break the anchor out until all four primary anchors are chased out. With all four anchors chased out they will be broken out simultaneously prior to anchor recovery progressing.

(vi) The primary anchors will be chased out in opposite pairs with the tow vessel assisting as necessary.

(vii) With all four anchors broken out the tow vessel will connect its tow line into the rig's main towing bridle and take up a position to assist holding the rig on location. With the tow established, the recovery of the primary anchors may commence.

(viii) Anchor Nos. 1 & 5 will be recovered as per the mooring recovery methodology in section 7.0 until the anchor is at the roller and the cross-over is on the bolster. With this achieved the AHVs will reduce power to the minimum required to hold station and assist with rig positioning.

(ix) With the tow established on anchor Nos. 1 & 5 anchor Nos. 4 & 8 will be recovered as per the mooring recovery methodology in section 7.0 until the anchor is at the roller and the cross-over is on the bolster.

(x) When the last anchor has been recovered, tight tow will commence to the new location. Tow length shall be adjusted according to prevailing weather conditions with appropriate notifications and navigation warnings issued.

The CHEVRON Marine Rep. will record details of any known or apparent damage to additional mooring equipment, rig equipment or AHV's.

At all stages of mooring recovery the AHV's must adjust position and maintain the required distance from the rig such that the required bollard pull/winch tensions are applied to the work wire/mooring catenary.

Close liaison will be required between AHV Masters and key personnel onboard the 'Transocean Rather' at all stages of the mooring recovery operation.

9.0 PASSAGE FROM 213/26-1z TO 205/1-I.

9.1 General.

The passage from 213/26-1z 'Rosebank' to the proposed 205/1-I 'Rosebank' location is a total distance of **2 nautical miles.**

The passage will be conducted by one AHV towing on the rig's main tow bridle and with 4 AHVs suspending mooring Nos. 1, 4, 5 & 8.

9.2 Precautions.

Both the rig, tow vessels & assisting AHVs will have emergency towing gear ready for immediate deployment at all times while under tow.

If for any reason, e.g. stress of weather, the tow is required to be hove to, every effort will be made to steer the tow into an area where there is sufficient depth of water, and clearance from surface and subsea obstructions for the tow to be safely hove to.

9.3 Notifications.

Navigation warnings shall be transmitted at regular intervals throughout the passage to warn other vessels of rig position and progress.

Notification shall be transmitted to CHEVRON, TRANSOCEAN, HM Coastguard and all Helicopter Operators at:

- 48 hours prior to commencement of unmooring at 213/26-1z 'Rosebank'.
- Commencement of unmooring at 213/26-1z 'Rosebank'.
- Every 12 hours on passage.
- Commencement of Anchor Deployment at 205/1-I 'Rosebank'.
- Completion of Anchor Deployment at 205/1-I 'Rosebank'.

The HSE, DTI, MCA, and other appropriate authorities shall also be notified of rig move progress as required by HSE Operations Notice No. 6 - Reporting of Offshore Installation Movements and HSE Operations Notice No. 3 - Liaison with Other Bodies (contained in Appendix 'B').

It is requested that Kingfisher charts be notified on rig's arrival at 205/1-I 'Rosebank'.

10.0 MOORING DEPLOYMENT METHODOLOGY.

10.1 Load Sharing: General.

A mooring deployment load sharing procedure has been developed for the deployment of all anchors.

The load share sequence offers the benefits of reducing the maximum bollard pull and winch load required for the deploying vessels and reduces bollard pull values for the procedure as a whole due to the controlled deployment of the rig mooring. This reduces to a minimum the overall catenary weight that has to be manipulated by the AHV and the rig.

The procedure has been developed to:-

- Minimise the load on vessel winches & work-wires and the rig's winches during the deployment sequence by sharing the load between rig and vessel winches.
- Ensure no contact between mooring wire and rig bolster during the deployment sequence.
- Identify loads at critical points during the deployment sequence, i.e., work-wire changeover points.
- Ensure that the anchor deployment sequence can be undertaken in a controlled manner.

The distance of the AHV from the rig is the main controlling element for bollard pull required - a shorter distance requires less bollard pull to maintain an adequate catenary. However, as the distance between the rig and AHV decreases the rig mooring wire departure angle increases. The limiting wire departure angles for the 'Transocean Rather' moorings to ensure no contact between the mooring wire and the anchor bolster was unknown at time of writing, however, for the purpose of the procedures a limiting fairlead angle of 45° has been assumed. This restriction was used as the critical factor for rig/AHV distances, and therefore the bollard pull and winch tension values calculated.
The load share procedure for deploying each anchor at the proposed location is defined below. This procedure should be considered in conjunction with the general anchor deployment procedures detailed in Section 11.0.

Unless specified, the operation should be continuous, with the various stages defining ranges, loads, bollard pull etc. for various wire payouts.

10.2 Discussion of Static Results.

With the chain extension fitted and the rig chain deployed the AHV will be at a range of 1,650m from the fairlead with the anchor on the roller ready to run. The assisting AHV will grapnel the chain some 200m from the lower fairlead. With all preparations completed the rig will commence paying out wire as the AHVs increase power to maintain bolster clearance.

Stage 1 With 1500m of mooring wire paid out from the rig, the vessel will have increased its range to 3150 m from the fairlead. At this stage the tension applied to the AHV winch is 156 tonnes, the assisting AHV will have 138 tonnes and the rig 100 tonnes. The rig will stop deploying wire at this point.

Stage 2 Both AHVs has now paid out 450m of workwire (including 50 m PCP) with the lead AHV 3,175m from the fairlead. At this stage the tension applied at the AHV winch is 146.8 tonnes, 123 tonnes at the assisting AHV and 100 tonnes at the rig.

Stage 3 Both AHVs has now paid out 650m of workwire (including 50 m PCP). At this stage the tension applied at the AHV winch is 149.7 tonnes, 115.4 tonnes at the assisting AHV and 107.4 tonnes at the rig.

Stage 4 At the end of stage 3 the lead AHV stops paying out work wire and the assisting AHV continues to payout work wire until the grapnel drops free from the mooring chain. At this stage the AHV will have a winch tension of 243.6 tonnes, a bollard pull of 160.2 tonnes and the rig will have a tension of 200.2 tonnes.

Stage 5 With the grapnel free the rig resumes paying out mooring wire as the AHV gradually increases its range to 3600m. At completion of this stage the tension applied to the AHV winch is 243.6 tonnes and a winch tension of 200.2 tonnes at the rig with 1725m of mooring wire deployed.

Stage 6 With the rig completed its wire payout the rig resumes paying out mooring wire as the AHV gradually increases its range to 3600m. At completion of this stage the tension applied to the AHV winch is 243.6 tonnes and a winch tension of 200.2 tonnes at the rig.

Stage 7 With the rig completed its wire payout the AHV resumes paying out work wire as the AHV gradually increases its range to 4075m. At completion of this stage the tension applied to the AHV winch is 82.4 tonnes and a winch tension of 99.2 tonnes at the rig.

10.3 Static Analysis Results.

The bollard pull and winch loads required to stretch the moorings to a range of 3,125m with a rig mooring wire payout of 1,725m are detailed in table 1 below: -

Table 1: Load Share Deployment

Stage	Chain Payout (m)	SWR Payout (m)	Fairlead Tension (t)	Fairlead Angle	Main AHV Workwire Payout * (m)	Main AHV Tension (t)	Assist AHV Workwire Payout * (m)	Assist AHV Tension (t)	Rig Winch Status
1	1814	1500	100.0	44.9	50	156.0	-	138.0	Brake
					↓		↓		Brake
2	1814	1500	99.8	45.2	450	146.8	450	123.0	Brake
					↓		↓		Brake
3	1814	1500	107.4	44.9	650	149.7	650	115.4	Brake
							↓		Brake
4	1814	1500	177.2	43.8°	650	216.7	1000	27.2	Payout
		↓							Payout
5	1814	1725	200.2	41.1°	650	243.6			Brake
					↓				Brake
6	1814	1725	193.2	51.2°	775	234.0			Brake
					↓				Brake
7**	1814	1725	99.2	51.2°	1425	82.4			Brake

Notes: -
* The workwire length detailed above includes an allowance for the PCP of 50 metres.
** An overrun of 17m has been considered.

10.4 Dynamic Analysis Results

The dynamic loads resulting from environmental effects on the load share deployment operation have been investigated.

During anchor deployment operations, the limiting factor for anchor handling vessels is wave height and wave period.

The following maximum weather conditions have been considered to run the dynamic analysis: -

Table 2: Weather conditions

Wave Height	Wave Period	Current Speed	Wind Speed
4m	8.5 s	1.0 m/s	10 m/s

The weather has been applied against the direction of towing. A maximum heave amplitude of 2.0 m has been considered.

Dynamic analyses have been carried out for the case where the AHV experiences maximum static loads namely, stage 5 where a maximum static winch pull of 243.6 tonnes in combination with a bollard pull of 160.2 tonnes will be experienced.

Table 3 shows the peak dynamic loads induced on the vessel by the mooring lines at stage 5 of the deployment procedure.

Table 3: Peak Dynamic Loads

Stage No.	Fairlead Tension	Bollard Pull	Winch Load
5	264 Tonnes	192 Tonnes	292 Tonnes

The environmental loads on the AHV itself have been investigated in order to establish the reduction of effectiveness. A medium-large anchor handling vessel has been assumed for this purpose.

The results are shown in the following table:-

Table 4: Environmental loads on the AHV

Environmental Direction	Wind Load	Wave Drift Load	Current Load	Total Load
Head	7.5 T	2.7 T	0.7 T	10.9 T
Beam	19.5 T	12.7 T	16.2 T	48.8 T

10.5 Summary.

Iterative analyses were performed as part of this study in order to identify a mooring deployment strategy that would minimise deployment loads experienced at AHVs and rig winches during the deployment of the 'Transocean Rather' moorings.

The results obtained from this study indicate that a maximum static bollard pull of 160.2 tonnes and a maximum static winch load of 243.6 tonnes at stage 5 may be experienced during deployment sequence of line No. 2.

The total length of workwire required to deploy the mooring was found to be 1,425m (including 50 m PCP), however, this length does not include the length of wire required to reach the winch from the stern roller and allow a suitable amount of wire on the winch drum. The overall workwire length will be dependent on selected AHV dimensions and winch geometry; however, it is likely that the total workwire length required for the operation will be in the region of 1,900m.

The maximum water depth considered in this procedure was 1103m. If anchors are to be deployed in water depths in excess of this then it is likely that additional workwire length will be required and deployment loads will be slightly increased.

11.0 MOORING DEPLOYMENT AT 205/1-I 'ROSEBANK'.

11.1 General.

The 'TRANSOCEAN RATHER' is to be moored at the proposed 205/1-I 'Rosebank' location to an 8-anchor spread, on a heading of **270°(T)**. The unit will be moored to 8 x 18 tonne Bruce Mk. IV FFTS anchors utilising a chain / wire system. A permanent chasing system will be in operation.

The proposed anchor positions are as follows:

NO.	BRG °(T)	Anchor Type	Fluke Angle	RANGE (m)	RANGE (ft)
1	300.0	18 T Bruce	50°	3125	10253
2	340.0	18 T Bruce	50°	3125	10253
3	020.0	18 T Bruce	50°	3110	10204
4	060.0	18 T Bruce	50°	3125	10253
5	120.0	18 T Bruce	50°	3125	10548
6	160.0	18 T Bruce	50°	2965	9728
7	200.0	18 T Bruce	50°	3125	10253
8	240.0	18 T Bruce	50°	3125	10253

Approach to location, for commencement of mooring deployment, shall not be made until:

- Permission to do so has been obtained from the 'TRANSOCEAN RATHER' OIM and the Chevron Drill Site Manager.
- Weather forecasts have been obtained and a weather window has been identified of sufficient duration to allow for the 4 primary anchors to be deployed.
- Rig Propulsion is available.

Anchor deployment will be undertaken in a controlled manner. Loads on assisting AHVs winches & workwires and rig equipment must be carefully controlled and kept to a minimum consistent with performing the operation in hand. Close liaison is required between AHV Masters and key personnel onboard the TRANSOCEAN RATHER at all stages of the mooring deployment procedure.

11.2 Mooring Deployment.

Anchor deployment will be conducted in accordance with unit's Operations Manual, TRANSOCEAN procedures, CHEVRON Procedures, and the following guidelines:

(i) The tow AHV will proceed directly to the location. The rig will be brought to stop at the location with the tow vessel and the assisting AHVs. During the deployment of all moorings the rig position will be maintained within 50m of the proposed location. With the rig on location the tow vessel will be released from the bridle to assist with anchor deployment as the grappling vessel.

(ii) With the rig within 50m of location anchor No. 4 will be deployed utilising a two boat method. The assisting AHV will grapnel the chain some 200m from the lower fairlead and recover work wire until 50m remains deployed. With the grapnel engaged the rig will commence deploying wire as the two AHVs increase power to maintain bolster clearance. With 1500m of wire deployed the anchor will be deployed as per the mooring deployment methodology outlined in Section 10.0. until the assisting AHV has the grapnel free. At this point the rig and AHV will stop deploying wire and the AHV will maintain station until the No. 8 anchor has reached the same point in the deployment sequence.

(iii) With anchor No. 4 deployment suspended anchor No. 8 will be deployed utilising a two boat method. The assisting AHV will grapnel the chain some 200m from the lower fairlead and recover work wire until 50m remains deployed. With the grapnel engaged the rig will commence deploying wire as the two AHVs increase power to maintain bolster clearance. With 1500m of wire deployed the anchor will be deployed as per the mooring deployment methodology outlined in Section 10.0. until the assisting AHV has the grapnel free.

(iv) Anchor Nos. 4 & 8 will now be deployed to their pre-determined positions, tensioned up and the 'J' hook chased back to the rig until it drops free of the chain. The AHV can then recover the work wire clear of the mooring.

(v) With anchor No. 4 deployed anchor Nos. 1 & 5 will be deployed, simultaneously, in the same manner as No. 4 & 8 with two boats per anchor.

(vi) With anchor Nos. 1 & 5 deployed the rig position will be stabilised over the location.

11.2 Mooring deployment (Cont. 2/...).

At all stages of mooring deployment the AHVs must adjust position and maintain the required distance from the rig such that the required bollard pull/winch tensions are applied to the workwire/mooring catenary so as to avoid bolster contact.

Workwires must be re-spooled under tension following each anchor deployment. In addition, all workwires must be inspected during recovery and any damage brought to the attention of the TRANSOCEAN Towmaster.

(vii) With the primary anchors deployed the breast anchors will be deployed in the following manner

- The chain end will be passed to AHV 'A' or 'B', the anchor decked and disconnected.
- With the rig chain end secured on AHV 'A' or 'B' the rig will deploy the 900m x 84mm chain. AHV 'A' or 'B' will maintain sufficient tension to ensure there is no bolster contact. Simultaneous to this AHV A or 'B' will bring the 76mm chain extension on deck and secure it to the 84mm rig chain.
- With the chain deployed AHV 'A' or 'B' will reduce power to the minimum required to maintain station. With AHV 'A' or 'B' on reduced power the rig will complete the cross over. On completion of the cross over the rig should deploy a minimum amount of wire and, if possible, keep the end of the 84mm chain section on the bolster.
- With the crossover completed AHV 'A' or 'B' will commence deploying the 914m x 76mm chain extension and will secure the end on deck. The anchor / PCP set will be reinstated on the chain end.
- With all preparations completed AHV 'A' or 'B' will increase power to approx 130 T winch tension and stretch the Catenary.
- With the Catenary stretched AHV 'C' or 'D' will grapnel for the chain approx 300m astern of AHV 'A' or 'B' at a depth of approx. 190m.
- With the grapnel engaged on the chain AHV 'C' or 'D' will recover work wire as AHV 'A' or 'B' reduces power. AHV 'C' or 'D' should recover wire until some 20m remains deployed with a winch tension of approx. 90 Tonnes.
- With the grappled chain Catenary secure AHV 'A' or 'B' will deploy the anchor over the roller. With the anchor in the water it will be recovered to the roller and the orientation checked. The orientation of the anchor will be reported to the rig. If the anchor is incorrectly orientated then AHV 'A' or 'B' will attempt to re-orientate in the water but, if necessary, will deck the anchor.

11.2 Mooring deployment (Cont. 3/...).

- With the anchor correctly orientated AHV 'A' or 'B' will increase power to stretch the Catenary as AHV 'C' or 'D' lowers the grapnel until it disengages from the chain.
- With AHV 'C' or 'D' disengaged they will proceed to the rig and grapnel the chain some 200m from the lower fairlead. With the grapnel engaged the AHVs will increase power until the mooring is clear of the bolster and the anchor can be deployed as per the mooring deployment methodology described in Section 10.0.

(viii) With the primary anchors deployed anchor Nos. 2, 3, 6 & 7 will be deployed in diagonally opposite pairs as described above, the anchors deployed to their pre-determined position, set on the bottom, tensioned up and the PCP chased back to the rig. The AHV will chase back in a controlled manner, recovering the workwire as the operation progresses. Note: anchor Nos. 2, 3, 6 & 7 will have the PCP re-instated prior to deployment. The chasing collars mobilised from port will be fitted and the existing collars removed and returned to shore.

(ix) With all the anchors set, the rig will be ballasted down to working draft (if required) and the anchors insurance cross-tensioned as described in Section 11.0. Following successful insurance cross tensioning the rig will be repositioned over the proposed location.

Final position acceptance shall be the responsibility of the Chevron Drill Site Manager.

11.3 Work Wire De-Tensioning.

On completion of all mooring operations including cross-tensioning all AHVs will de-tension all rental work wires.

The AHVs will go stern to stern and one AHV will pass the work wire end to the other. The two work wires will be connected together with a double swivel arrangement.

With the connection made the AHVs, in turn, will deploy their work wire overboard until the bottom layer is reached. The work wire will then be recovered under minimum tension.

Once both AHVs have completed this operation they will report this to the Transocean Towmaster.

12.0 CONTINGENCY PLANNING.

This section covers the following contingencies:

Difficulty reaching anchor during 'J' hooking.
Failure of the PCP close to the rig.
Failure of the PCP / workwire string during wire deployment.

This section is to provide guidance and should be supported by a specific risk assessment and, if necessary, a job specific procedure.

12.1 Difficulty reaching anchor during 'J' hooking.

If the primary AHV has difficulty reaching the anchor when chasing out with the 'J' hook then a second AHV should prepare a 'J' hook to assist with breaking the chain out.

The second AHV, utilising the cat curves and navigation system will engage the 'J' hook astern of the primary AHV and outboard of the wire chain cross-over. With the 'J' hook on the chain the AHV should increase power and lengthen work wire to 1.15 water depth at the anchor.

The secondary AHV will then chase out toward the primary AHV. The primary AHV will increase power at this stage and attempt to continue chasing out to the anchor. The two AHVs will co-ordinate their progress with the seconday AHV following the primary out toward the anchor as required.

No shortening of the work wire will be permitted at this stage without the permission of the Towmaster.

If difficulty reaching the anchor is still experienced then, after discussions with the Towmaster, shortening of the secondary AHV work wire can be tried.

At each stage of this operation the work wire lengths, winch tensions and power settings / bollard pull are to be carefully noted. Full use of the navigation system will be used to determine AHV direction and speed.

12.2 Failure of PCP Close to rig.

This covers a PCP failure with the anchor overboarded but after the grappling boat has disengaged the grapnel from the chain.

With a total of 1800m of chain deployed the anchor will land on the seabed with the chain Catenary lying under low tension back to the rig. Using a 'J' hook to chase out to the anchor will be the primary method considered for mooring recovery.

Prior to deploying a 'J' hook the following should be considered:

- Recover any wire that has been deployed to the bolster to both protect the wire and tension the mooring.
- Skid the rig away from the dropped anchor as far as practicable.

The 'J' hook should then be deployed close to the seabed before engaging on the chain.

With the 'J' hook on the anchor the AHV will break out the anchor and recover work wire. As there is no movement of mooring equipment at the rig bolster clearance is not required and loads should be kept to the minimum required to keep the 'J' hook on the anchor.

With the anchor under the roller the AHV will increase power and stretch the Catenary. The assisting AHV will then grapnel the chain approx. 300m astern of the AHV as per Section 10.2 (ii).

The AHV will then deck the anchor.

12.2 Failure of PCP during wire Deployment.

Once the AHV has recovered the work wire an assessment will be made with regard to what is on the seabed and what effect this will have on the loads that will be encountered by the recovery AHV. Using a 'J' hook to chase out to the anchor will be the primary method considered for mooring recovery.

Prior to deploying a 'J' hook the following should be considered:

- Recover wire to tension the mooring.
- Skid the rig away from the dropped anchor as far as practicable (if required).
- An assessment is to be made on the location of the crossover between the rig wire and the rig chain.

The AHV will deploy the 'J' hook and engage it on the rig chain outboard of the crossover. Full use will be made of the navigation system to ensure the AHV is outboard of the cross over.

With the 'J' hook on the chain the AHV will chase out to the anchor.

With the 'J' hook confirmed on the anchor the AHV will break out the anchor and recover 50m of work wire.

The AHV will then increase power gradually until the wire is observed to lift off the bolster.

The mooring will then be recovered by the reverse method of deployment using the mooring deployment methodology as a step guide for loads and payouts.

Close observation of the bolster will assist in keeping loads as low as possible.

With the wire on the bolster the assisting AHV will then grapnel the chain approx. 300m astern of the AHV as per Section 10.2 (ii).

The AHV will then deck the anchor.

13.0 INSURANCE CROSS-TENSIONING.

When mooring deployment is completed, the anchors should be insurance cross-tensioned to ensure adequate holding and the rig ballasted down to working draft.

Each pair of opposite anchors (usually commencing with the primary anchors) is tensioned to 500 kips (or winch stall). This tension is held for 15 minutes, then slackened down to approximately 360 kips.

Anchors will be insurance cross-tensioned in the following opposite pairs:

No. 2 and No. 6
No. 3 and No. 7
No. 1 and No. 5
No. 4 and No. 8

During insurance cross tensioning, winch house tensions will be checked against motor amps and pilot house readouts.

When all anchors have been successfully insurance cross-tensioned, the tensions will be adjusted for working at the 205/1-1 'Rosebank' Location.

14.0 ANCHOR SLIPPAGE.

In the event that anchor slippage occurs during insurance cross tensioning, the mooring will be chased out. The chain catenary will be lifted clear of the seabed by raising the anchor and applying tension until mooring tension is seen to increase at the rig. The anchor can then be re-run on a bearing 2-3 degrees removed from the original line of run. An adjustment in the wire mooring length deployed may be made, as appropriate, taking into account the bathymetry in the vicinity of the anchor. The anchor will then be insurance cross tensioned again.

If the anchor fails to hold tension following repositioning, the anchor should be recovered (using a reverse of the deployment methodology) and hauled to the stern of the AHV to check anchor orientation or for fouling.

If it is found necessary to deck the anchor then this should not be attempted with more than 250 metres of chain deployed (unless a second AHV is utilised to support the chain catenary with a Grapnel) in order to minimise the loads imposed upon the AHV, anchor and individual components of the PCP assembly.

Once checked and clear, the anchor will be deployed using the methodology detailed within this procedure (Sections 9.0 & 10.0), and insurance cross-tensioned again. Should further slippage occur, the option of changing the fluke angle setting should be considered.

Due to the logistical and operational difficulties associated with backing-up main anchors in these depths of water, back-up gear will not be provided.

15.0 ADDITIONAL MOORING EQUIPMENT.

15.1 Equipment.

The following equipment will be provided for mooring deployment at the 205/1-I 'Rosebank' location:

15.1.1 Recovery & Deployment AHVs:

From Craigs:

2 x 914m x 76mm K4 chain
4 x 83mm Kenter links
4 x 2300m x 83mm work wire c/w pee-wee sockets.
4 x 7000 kN swivel
16 x No. 7 pear links
8 x 3 links x K4 76mm chain
12 x 120 Tonne shackles (8 x contingency spares)
4 x Socket repair kit comprising 1 x 83mm pee wee socket, cleaning fluid, socketfast resin and accelerator.
4 x 250 T SWL 'J' hook c/w 120 T shackle
4 x 250 T SWL 'Roller-J' hook c/w 120 T shackle
4 x 76mm 250 T SWL chain grapnel c/w high capacity shackle ballasted with 85 T shackle and 10 ft x 3" chain
200 lead plugs & 100 split pins

From Transocean:

4 x 18 Tonne Bruce Mk. IV FFTS anchors (fluke angles set 50°)
4 x 250 T chasing collars (BEL 4214), complete units (for PCP Nos. 2, 3, 6 & 7)
6 x lower rollers for BEL 4214 collars c/w bolts, washers etc
6 x 120 T shackles (4 for PCP Nos. 3 & 8, 2 spare)
2 x 145 ft x 83mm pennants (1 for No. 8 PCP, 1 spare)
4 x 75 ft x 83mm pennants (2 for No. 3 PCP, 2 spare)
2 x 83mm CCLs (1 for No. 3 PCP, 1 spare)
2 x 30 links x 76mm chain (for PCP Nos. 3 & 8)

15.1.2 AHV 'E':

From Craigs:

1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

1 x 76mm 250 T SWL chain grapnel
1 x 7000 kN swivel
4 x No. 7 pear links
2 x 3 links x K4 76mm chain
2 x 120 Tonne shackles
40 split pins

The CHEVRON Marine Representative will ensure that all used equipment is correctly recorded upon deployment and all unused equipment is correctly manifested for return. **The CHEVRON Marine Representative will correctly record the I.D. numbers and positions of all equipment deployed, together with the purpose of deployment.**

The Masters of the AHVs should keep account of all mooring equipment used and advise the CHEVRON Marine Representative accordingly.

15.2 AHV Load Out.

AHV A – AHV 'A':

From Craigs:

1 x 914m x 76mm K4 chain (plus 5 x K4 kenters to join chains together)
2 x 84mm Kenter links
4 x No. 7 pear links
2 x 76mm Kenter links
2 x 120 Tonne shackles (spare)
1 x 2300m x 83mm work wire (pee wee socket each end)
1 x 250 T SWL roller 'J' hook c/w 120 T shackle
1 x 250 T SWL 'J' hook c/w 120 T shackle
1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

1 x swivel assembly made up as follows from the AHV work wire end:

No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 7000 kN swivel / No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 120 Tonne shackle

Socket repair kit comprising 1 x 83mm pee wee socket, cleaning fluid, socketfast resin and accelerator.

50 lead plugs & 50 split pins

From Transocean:

2 x 18 Tonne Bruce Mk. IV FFTS anchors (fluke angles set 50°)
2 x lower rollers for BEL 4214 collars c/w bolts, washers etc
2 x 250 T chasing collars (BEL 4214)
3 x 120 T shackles
1 x 145 ft x 83mm pennants
2 x 75 ft x 83mm pennants
1 x 83mm CCLs
2 x 30 links x 76mm chain.
Locking devices as required

15.2 AHV Load Out (Cont. 2/...).

AHV 'B':

From Craigs:

1 x 914m x 76mm K4 chain (plus 5 x K4 kenters to join chains together)
2 x 83mm Kenter links
4 x No. 7 pear links
2 x 76mm Kenter links
2 x 120 Tonne shackles (spare)
1 x 2300m x 83mm work wire (pee wee socket each end)
1 x 250 T SWL roller 'J' hook c/w 120 T shackle
1 x 250 T SWL 'J' hook c/w 120 T shackle
1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

1 x swivel assembly made up as follows from the AHV work wire end:

No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 7000 kN swivel / No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 120 Tonne shackle

Socket repair kit comprising 1 x 83mm pee wee socket, cleaning fluid and socketfast resin and accelerator.

50 lead plugs & 50 split pins

From Transocean:

2 x 18 Tonne Bruce Mk. IV FFTS anchors (fluke angles set 50°)
2 x lower rollers for BEL 4214 collars c/w bolts, washers etc
2 x 250 T chasing collars (BEL 4214)
3 x 120 T shackles
1 x 145 ft x 83mm pennants
2 x 75 ft x 83mm pennants
1 x 83mm CCLs
2 x 30 links x 76mm chain.
Locking devices as required

15.2 AHV Load Out (Cont. 3/...).

AHV 'C':

From Craigs:

4 x No. 7 pear links
2 x 120 Tonne shackles (spare)
1 x 2300m x 83mm work wire (pee wee socket each end)
1 x 250 T SWL roller 'J' hook c/w 120 T shackle
1 x 250 T SWL 'J' hook c/w 120 T shackle
1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

1 x swivel assembly made up as follows from the AHV work wire end:

No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 7000 kN swivel / No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 120 Tonne shackle

Socket repair kit comprising 1 x 83mm pee wee socket, cleaning fluid and socketfast resin and accelerator.

50 lead plugs & 50 split pins

From Transocean:

1 x lower roller for BEL 4214 collars c/w bolts, washers etc

15.2 AHV Load Out (Cont. 3/...).

AHV 'D':

From Craigs:

4 x No. 7 pear links
3 x 76mm Kenter links (1 spare)
2 x 120 Tonne shackles (spare)
1 x 2300m x 83mm work wire (pee wee socket each end)
1 x 250 T SWL roller 'J' hook c/w 120 T shackle
1 x 250 T SWL 'J' hook c/w 120 T shackle
1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

1 x swivel assembly made up as follows from the AHV work wire end:

No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 7000 kN swivel / No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 120 Tonne shackle

Socket repair kit comprising 1 x 83mm pee wee socket, cleaning fluid and socketfast resin and accelerator.

50 lead plugs & 50 split pins

From Transocean:

1 x lower roller for BEL 4214 collars c/w bolts, washers etc

AHV 'E':

1 x 76mm x 250 T SWL chain grapnel c/w 120 T shackle ballasted with 85 T shackle and 10 ft x 3" chain

20 split pins

Swivel assembly (made up):

No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 7000 kN swivel / No. 7 pear link / 3 links x K4 76mm chain / No. 7 pear link / 120 Tonne shackle

20 split pins

15.2 Transocean Equipment.

The following lists show the ID numbers and required position for each piece of Transocean supplied equipment:

Pennant Wires

75ft x 83mm	-	B7978/5 (TSF727)	for # 3 mooring	AHV 'B'
75ft x 83mm	-	B7978/6 (TSF728)	for # 3 mooring	AHV 'B'
75ft x 83mm	-	B7978/11	spare	AHV 'A'
75ft x 83mm	-	B7978/12	spare	AHV 'A'
145ft x 83mm	-	B7978/1	for # 8 mooring	AHV 'A'
145ft x 83mm	-	B8665/1	spare	AHV 'B'

Thrash Chains

BALK4R0760033002	for # 3 mooring	AHV 'B'
BALK4R0760033006	for # 8 mooring	AHV 'A'

Chasing Collars c/w 250te Bow Safety Shackle

BEL 4214 0008	for # 3 mooring	AHV 'B'
BEL 4214 0011	spare	AHV 'A'
BEL 4214 0017	spare	AHV 'A'
BEL 4214 0018	spare	AHV 'B'

Spare Rollers for BEL4214 Chasing Collar

Quantity 6 — spare (all on individual pallets)

(2 on A & B, 1 on C & D)

83mm Chain Connecting Link

R04 HN 674864 (Batch Number)	for # 3 mooring	AHV 'B'
R04 HN 674864 (Batch Number)	spare	AHV 'A'

15.2 Transocean Equipment (Cont. 2/...).

120 Tonne Shackles

BSA5534/8	for # 3 mooring	AHV 'B'
BSA5456/6	for # 3 mooring	AHV 'B'
BSA5624 (Batch Number)	for # 8 mooring	AHV 'A'
BSA5624 (Batch Number)	for # 8 mooring	AHV 'A'
BSA5624 (Batch Number)	spare	AHV 'A'
BSA5624 (Batch Number)	spare	AHV 'B'

Bruce FFTS 18 Te anchors

Anchor	for # 2 mooring	AHV 'A'
Anchor	for # 3 mooring	AHV 'B'
Anchor	for # 6 mooring	AHV 'A'
Anchor	for # 7 mooring	AHV 'B'

APPENDIX A

Reference Drawings and Diagrams

The following drawings are attached for reference purposes:

(i) Field Drawing.

(ii) 'As laid' anchor Pattern for the 'TRANSOCEAN RATHER' at 213/26-1z 'Rosebank'.

(iii) Catenary Curves for the 'TRANSOCEAN RATHER' at 213/26-1z 'Rosebank'.

(iv) Mooring Recovery Stage Drawings.

(v) Grappling load drawing.

(vi) Proposed Anchor Pattern for the 'TRANSOCEAN RATHER' at 205/1-1 'Rosebank'.

(vii) Catenary Curves for the 'TRANSOCEAN RATHER' at 205/1-1 'Rosebank'.

(viii) Mooring deployment stage drawings.

(ix) PCP make up drawings (2 x A4).

(x) Swivel arrangement drawing.

(xi) Bel 4214 Roller installation drawings.

Quality Assurance System

TRIDENT OFFSHORE LIMITED

MARINE SERVICES PROCEDURAL AMENDMENT NOTIFICATION

Client:	Chevron
Contract No:	11217
Job Title:	Transocean Rather: Rosebank 'G' to 'I'
Responsibility:	SJ
Document Name:	NA
Document No:	RM/10095/TRAT#DW05/11217
Amendment No:	01
Date Completed:	30th March 2007

The attached pages are issued as a supplementary revision to final procedures.

Issued on: 16th March 2007
as revision number: 02

Page No.	Rev. No.	Title	Date of Issue	Date QA18 Returned
20	03	7.0 Mooring Deployment Methodology	30/03/07	
21	03	7.1 Discussion of static results	30/03/07	
22	03	7.2 Static analysis results	30/03/07	
Appendix		Recovery Stage drawings 4, 5 & 6	30/03/07	

REMARKS:

7.0 MOORING RECOVERY METHODOLOGY.

A 6-stage load sharing procedure has been developed for the recovery of each anchor.

The load share sequence offers the benefits of reducing the maximum bollard pull and winch load required for the recovery vessels and reduces bollard pull values for the procedure as a whole due to the controlled recovery of the rig's moorings. This reduces to a minimum the overall catenary weight that has to be manipulated by the AHV and the rig.

The procedure has been developed to:-

- Minimise the load on vessel winches & workwires and the rig's winches during the recovery sequence by sharing the load between rig and vessel winches.
- Ensure no contact between mooring wire and rig bolster during the recovery sequence.
- Identify loads at critical points during the recovery sequence.
- Ensure that the anchor recovery sequence can be undertaken in a controlled manner.

The distance of the AHV from the rig is the main controlling element for bollard pull required. As the distance between the rig and the AHV decreases the rig mooring wire departure angle increases. The limiting wire departure angles for the 'Transocean Rather' moorings to ensure no contact between the mooring wire and the anchor bolster is 60° (measured below horizontal).

A single load share procedure has been developed, assuming a maximum wire departure angle of 60°. This restriction was used as the critical factor for rig/AHV distances, and therefore the bollard pull and winch tension values calculated.

Sections 7.2 -7.4 provide a brief description of the methodology to be utilised. It specifically refers to and provides a description of the load condition stages as tabulated (section 7.3). Tabulated results are obtained from finite element analysis of the complex, multi-element mooring system/workwire arrangement and stages have been selected in order that peak loads can be identified. ***Under operational circumstances, it is anticipated that mooring recovery may not be performed in stages as detailed but will be performed, where possible, continuously and without interruption.***

7.1 Discussion of Static Results.

The recovery operation commences with the AHV chasing out to anchor with a workwire of suitable length.

The anchor is then broken out from the seabed and the recovery sequence begins:

Stage 1 **The completion of this stage is optional.**

This stage is performed subsequent to anchor breakout if the rig is unable to recover mooring wire due to the chain being embedded in the seabed. Using bollard pull alone the AHV lifts the chain clear of the seabed. The rig and AHV winches will be in the braked conditions throughout this stage.

The rig mooring wire payout is 1,725m and the AHV has chased out to the anchor. To clear the catenary from the seabed, the AHV moves to a position 4,150m from the fairlead.

Maximum loads are experienced at this stage.

Stage 2 Subsequent to anchor breakout or the optional clearance of the chain from the seabed (stage 1), the AHV reduces power and lays the catenary back on the seabed. To maintain a fairlead angle of approximately 45º, the AHV range at this stage will be approximately 4,000m.

Subsequent to laying the chain down, the rig and AHV commence recovery of the mooring wire and workwire respectively. Recovery loads will be 144 tonnes at the rig and 180 tonnes at the AHV.

Stage 3 At this stage, the rig wire payout is reduced to 1,300m and the workwire payout is reduced to 800m and the mooring catenary lifts clear of the seabed. Loads will increase at this stage to 186 tonnes at the rig and 214 tonnes at the AHV. In order to maintain a fairlead angle of 45º, the range to the AHV will be 3,150m.

Maximum dynamic loads are experienced at this stage.

Stage 4 The rig and AHV continue to recover mooring wire and workwire. At this stage the rig has a payout of 1229m and the workwire payout is 50m. The loads are 105 tonnes at the fairlead and 202 tonnes at the AHV stern roller. In order to maintain a fairlead angle of 60º, the range to the AHV will be 2,050m

Stage 5 The AHV has now recovered all of the workwire with only the PCP below the stern roller. Only 650m of mooring wire remains outboard of the fairlead. Loads of 113 tonnes and 175 tonnes will be experienced at the rig and AHV at this stage. In order to maintain a fairlead angle of 60º, the range to the AHV will be 1,675m

Stage 6 The rig has now recovered all of the mooring wire, and only the chain remains outboard of the fairlead. The AHV range at this stage will be 1,425m.

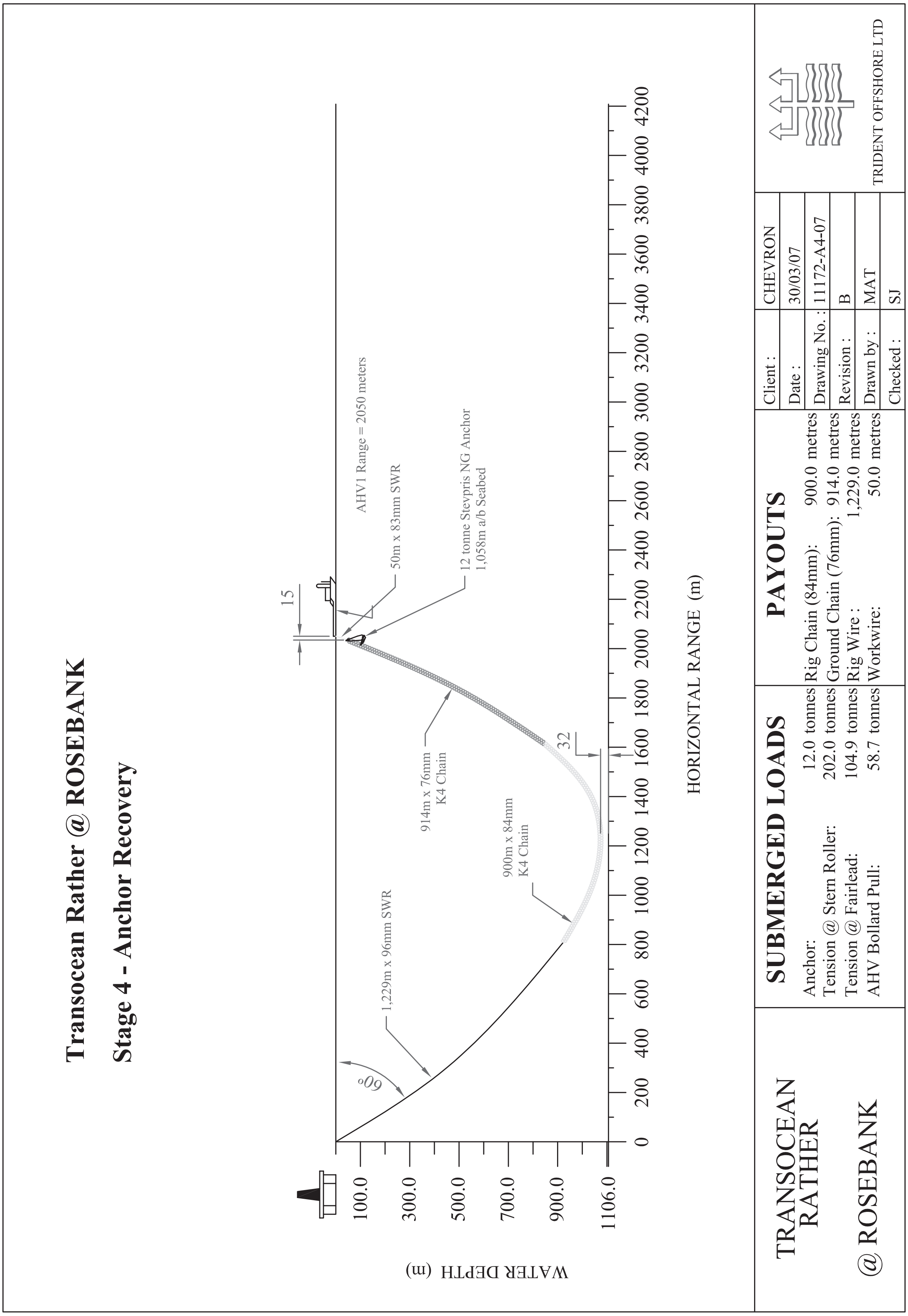
7.2 Static Analysis Results (Anchor Depth 1,106m)

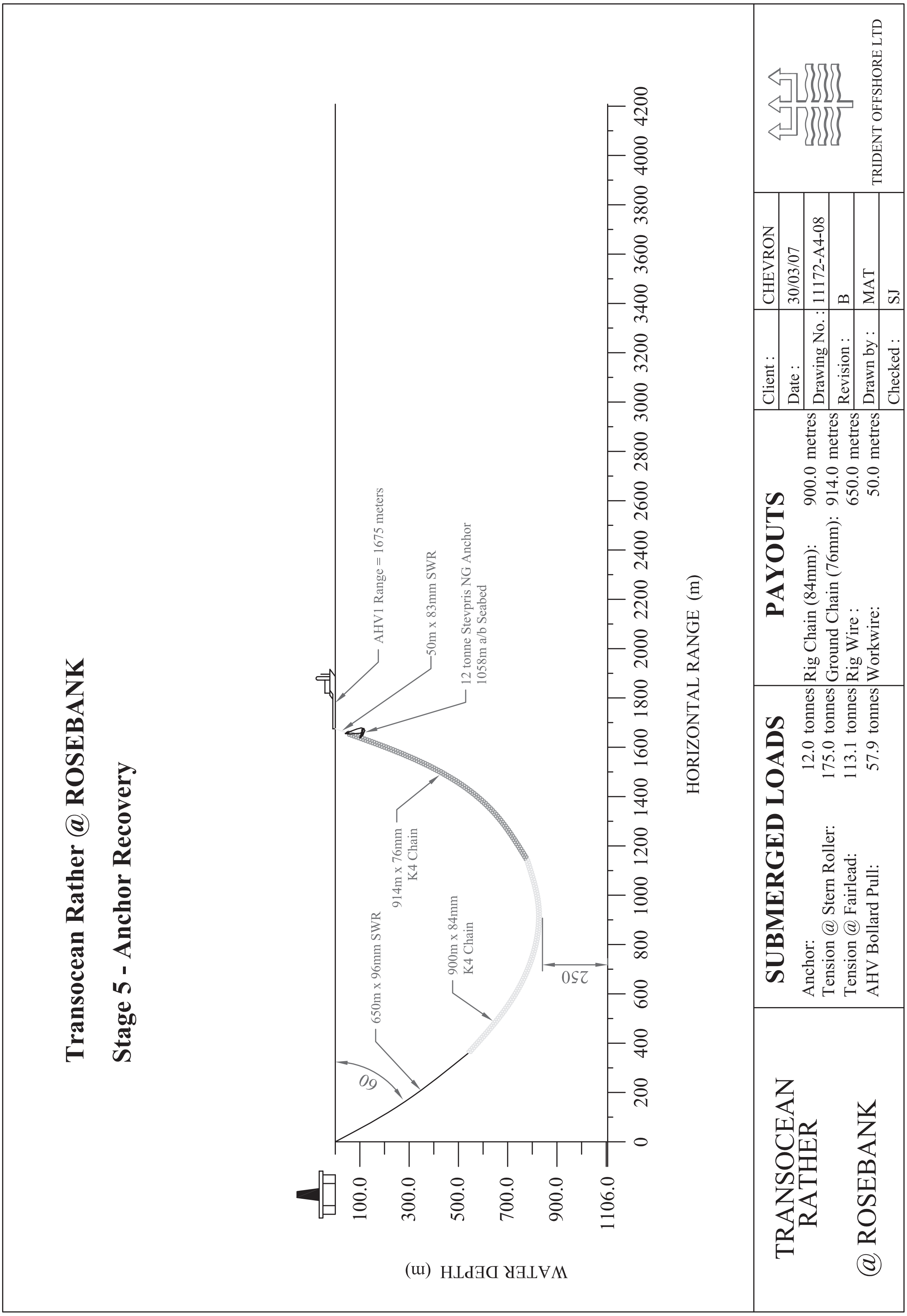
The bollard pull and winch loads required to recover the moorings from a range of 3,125m with a rig mooring wire payout of 1,725m, are detailed in table 1 below: -

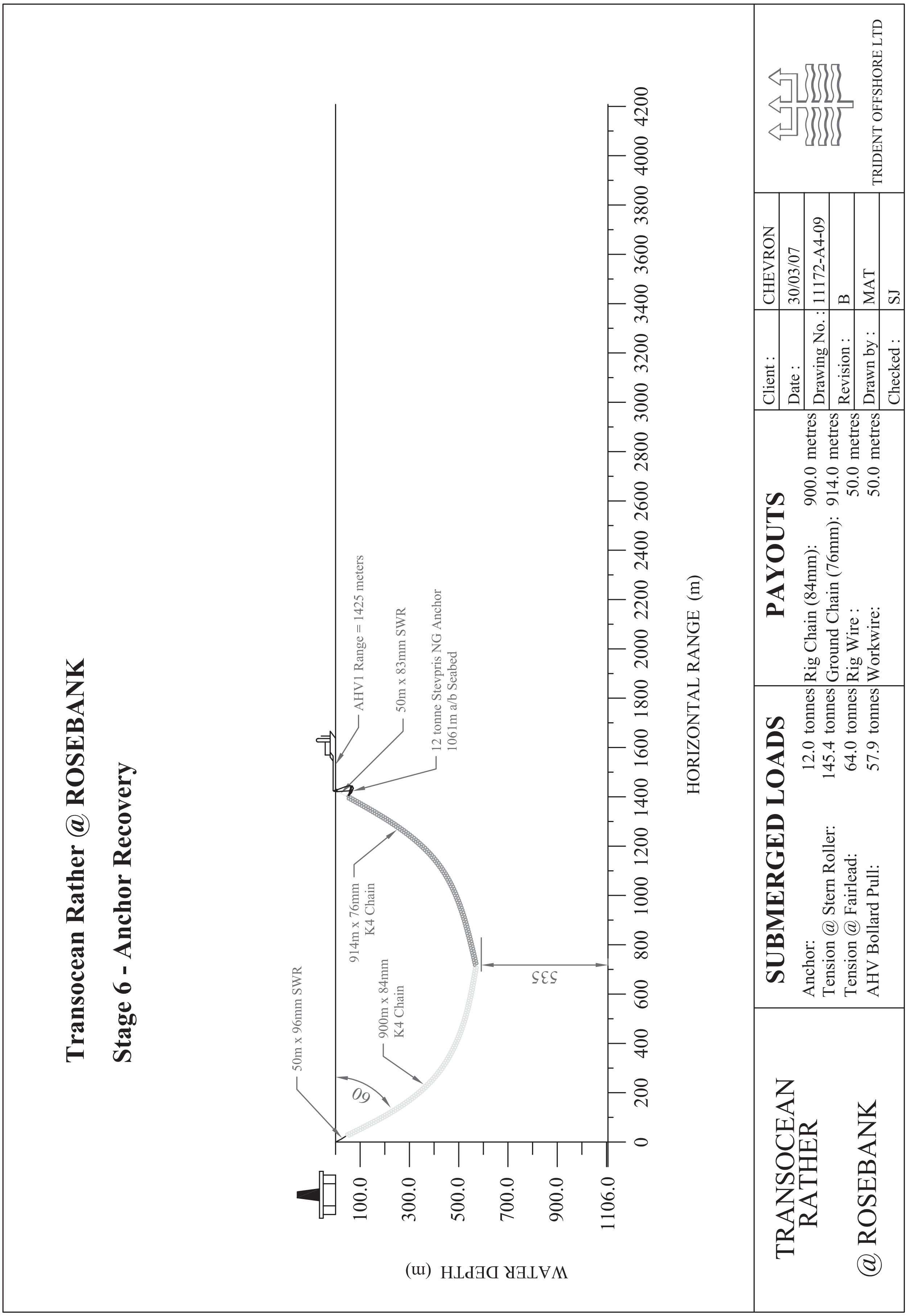
Table 1: Load Share Recovery

Stage	Chain Payout (m)	SWR Payout (m)	Total Payout (m)	Workwire Payout * (m)	Distance AHV - Rig (m)	Fairlead Tension (t)	Fairlead Angle	Anchor Above Seabed (m)	Bollard Pull (t)	AHV Tension (t)	Rig Winch Status	AHV Winch Status
1	1814	1725	3539	1217	4150	245.6	37º	330	195.9	262.1	Brake	Brake
											Brake	Brake
2	1814	1725	3539	1217	4000	143.5	45º	240	119.8	180.3	Brake	Brake
		↓		↓							**Haul**	**Haul**
3	1814	1300	3114	800	3150	185.7	45º	485	131.6	213.9	**Haul**	**Haul**
		↓		↓							**Haul**	**Haul**
4	1814	1229	3043	50	2050	104.9	60	1058	58.7	202.0	**Haul**	Brake
		↓									**Haul**	Brake
5	1814	650	2464	50	1675	113.1	60º	1058	57.9	175.0	**Haul**	Brake
		↓									**Haul**	Brake
6	1814	0	1814	50	1425	64.0	60º	1058	57.9	145.4	**Haul**	Brake

Notes: - * The workwire length detailed above includes an allowance for the PCP of 50 metres.


Transocean Rather @ ROSEBANK
Stage 4 - Anchor Recovery
AHV1 Range = 2050 meters
50m x 83mm SWR
12 tonne Steypris NG Anchor
1,058m a/b Seabed
15
32
914m x 76mm
K4 Chain
900m x 84mm
K4 Chain
1,229m x 96mm SWR
60°
WATER DEPTH (m)
100.0
300.0
500.0
700.0
900.0
1106.0
HORIZONTAL RANGE (m)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
TRANSOCEAN
RATHER
@ ROSEBANK
SUBMERGED LOADS
Anchor: 12.0 tonnes
Tension @ Stern Roller: 202.0 tonnes
Tension @ Fairlead: 104.9 tonnes
AHV Bollard Pull: 58.7 tonnes
PAYOUTS
Rig Chain (84mm): 900.0 metres
Ground Chain (76mm): 914.0 metres
Rig Wire : 1,229.0 metres
Workwire: 50.0 metres
Client : CHEVRON
Date : 30/03/07
Drawing No. : 11172-A4-07
Revision : B
Drawn by : MAT
Checked : SJ
TRIDENT OFFSHORE LTD


Transocean Rather @ ROSEBANK
Stage 5 - Anchor Recovery
WATER DEPTH (m)
100.0
300.0
500.0
700.0
900.0
1106.0
HORIZONTAL RANGE (m)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
60
650m x 96mm SWR
900m x 84mm
K4 Chain
250
914m x 76mm
K4 Chain
AHV1 Range = 1675 meters
50m x 83mm SWR
12 tonne Stevpris NG Anchor
1058m a/b Seabed
TRANSOCEAN
RATHER
@ ROSEBANK
SUBMERGED LOADS
Anchor: 12.0 tonnes
Tension @ Stern Roller: 175.0 tonnes
Tension @ Fairlead: 113.1 tonnes
AHV Bollard Pull: 57.9 tonnes
PAYOUTS
Rig Chain (84mm): 900.0 metres
Ground Chain (76mm): 914.0 metres
Rig Wire : 650.0 metres
Workwire: 50.0 metres
Client : CHEVRON
Date : 30/03/07
Drawing No. : 11172-A4-08
Revision : B
Drawn by : MAT
Checked : SJ
TRIDENT OFFSHORE LTD


Transocean Rather @ ROSEBANK
Stage 6 - Anchor Recovery
50m x 96mm SWR
60
900m x 84mm K4 Chain
914m x 76mm K4 Chain
535
AHV1 Range = 1425 meters
50m x 83mm SWR
12 tonne Stevpris NG Anchor 1061m a/b Seabed
WATER DEPTH (m)
100.0
300.0
500.0
700.0
900.0
1106.0
HORIZONTAL RANGE (m)
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600 3800 4000 4200
TRANSOCEAN RATHER
@ ROSEBANK
SUBMERGED LOADS
Anchor: 12.0 tonnes
Tension @ Stern Roller: 145.4 tonnes
Tension @ Fairlead: 64.0 tonnes
AHV Bollard Pull: 57.9 tonnes
PAYOUTS
Rig Chain (84mm): 900.0 metres
Ground Chain (76mm): 914.0 metres
Rig Wire : 50.0 metres
Workwire: 50.0 metres
Client : CHEVRON
Date : 30/03/07
Drawing No. : 11172-A4-09
Revision : B
Drawn by : MAT
Checked : SJ
TRIDENT OFFSHORE LTD

Macklin, Richard J

From: Rig_RAT, Marine [marine@rat.rig.deepwater.com]
Sent: 07 April 2007 21:00
To: Brown1, Adrian
Cc: Rig_RAT, OIM; Transocean Rather - Drill Rep; fs@trident-offshore.com; Macklin, Richard J
Subject: FW: Forward Plan - Saturday

Adrian,

Correction to previous update. Once the lead AHV has lifted the anchor close to the stern roller, the assisting vessel will release the J hook from the chain before the rig commences hauling in wire in order to remove any chance of the J hook slipping and contacting the mooring wire.

Regards,

Sam

From: Rig_RAT, Marine [mailto:marine@rat.rig.deepwater.com]
Sent: 07 April 2007 20:22
To: Brown1, Adrian
Cc: Rig_RAT, OIM; Transocean Rather - Drill Rep; 'fs@trident-offshore.com'; 'MackIRJ@chevron.com'
Subject: FW: Forward Plan - Saturday

Adrian,

In view of the difficulty the AHVs have experienced in getting on and off chain with the grapnel, the rig team is proposing to change the forward plan slightly. Once anchors 1 & 5 have been raised close to the lead AHV stern, instead of getting the assisting vessel to grapple the chain 300mtrs astern of the lead AHV, we propose that the assisting AHV release the J hook once the rig has all the mooring wire back to the transition. The assisting vessel will then grapple the rig chain close to the rig in preparation for running the anchor once transit to new location is complete.
We believe that this amounts to a considerable time saving and also in the event that, were the J hook to fail, the resulting shock load on a grapnel positioned close astern of the lead vessel would lead to failure of that grapnel.

Regards,

Sam/Jim

From: Rig_RAT, Marine [mailto:marine@rat.rig.deepwater.com]
Sent: 05 April 2007 16:24
To: 'MackIRJ@chevron.com'
Cc: Brown1, Adrian; Transocean Rather - Drill Rep; Rig_RAT, OIM; 'fs@trident-offshore.com'
Subject: Forward Plan - Thursday

Dick,

The following is the forward plan as discussed on this afternoon's phone call:

Transocean Rather
Rosebank move, April 2007.

Proposal:

Move the rig with
1 x AHV on the towing bridle

21/05/2007

2 x AHV on anchor #1
2 x AHV on anchor #5

Anchor 1 & 5 approx 150 metres below stern roller of lead boat
Assisting AHV approx 300 metres astern of lead AHV stern roller supporting the chain with #1 – a locking J hook. #5 a grapnel, to prevent hook sliding onto rig wire while recovering wire to transition.

#4 & #8 anchors and chain extensions removed. End of rig chain to the rig. Roller type Permanent Chaser Pendant can be fitted (on arrival new location).

Method.

#8

a) lead vessel hook chain and chase out as far as possible. Assisting vessel with J hook work the chain to allow lead boat to fish the anchor.
b) Lead vessel raise anchor to 150 metres below roller.
c) Assisting vessel to change J hook for Grapnel, hook in and assist lead boat to deck anchor
d) Lead AHV deck and remove anchor, locker chain extension, disconnect extension from rig chain.
e) assist AHV unhook from chain and move clear
f) rig makes transition to chain and lockers rig chain.
g) End of chain back from lead AHV

#4

a) Lead vessel raise anchor to 150 metres below roller
b) Assisting vessel change J hook for Grapnel, hook in and assist lead boat to deck anchor

Proceed as #8 d, e, f, g above.

#1 Unseat anchor using 2 vessel method Raise anchor to approx 150 metres below stern roller
#5 Unseat anchor as #1

Both 1 & 5 shorten rig wires until transition is above bolster.

Move the rig close to new location.
Towing vessel giving opposite pull
Run and place #5. Pay out wire using 2 boat method until rig at or near to location
Run and place #1 using 2 boat method.
2 AHV method of run out:-
#4 & #8 Pass rig chain to lead vessel. Payout rig chain and make transition to wire. Connect chain extension.
Pay out chain extension. Fit Roller type Permanent Chaser. Secure anchor.
Assisting vessel engage hook into the chain.
Run #4 then #8 out to position or near to – see load sharing procedures.
Assist vessel disengage hook and move clear.
Position rig if required.
Olympic Hercules and Bourbon Dolphin run breast anchors. Vidar Viking and Highland Valour assist to support the chains during run out.

Pros:

For the tow 2 anchors held in J hooks instead of 4, less risk of failure
J hooked anchors are supported for the tow – less risk of J hook failure
always 2 vessels available for breakout of anchors
arrival new location #1 and #5 ready for immediate deployment with support AHV already in position
Roller type Permanent Chaser gets fitted to #4 & #8 as well as breast anchors

21/05/2007

Cons:
If support AHV has a grapnel for supporting the chain and lead AHV J hook fails during the tow, problem to release the grapnel from the chain. (Use J hook?).
Decking of anchors required.
Requires more use of the rig's mooring equipment to wind in chain.

Suggestions:
Try to ensure the 2 assist vessel (which come off the laid anchor first) are ready to start on the next primary anchor – i.e. with chaser collar and all ancillary gear. That will speed the operation.
Try to ensure that of the two lead boats – one has on board collar etc for last primary anchor.
If that is achievable, best efficiency achieved for deploying the Primary anchors.

Option 2:

Valour J hooks no.8 chain assisted by the Bourbon Dolphin and raises the anchor to 150mtrs below the stern roller. Valour stays on anchor for tow.

Hercules assisted by Vidar Viking recovers no.4 anchor to 150mtrs below the stern roller. Hercules stays on no.4 for the tow.

Bourbon Dolphin assisted by the Vidar Viking breaks out no.1 and the rig recovers wire to the transition. Dolphin remains on anchor.

Vidar Viking assisted by the Sea Lynx recovers no.5 anchor and the rig recovers wire to the transition. Vidar Viking remains on the anchor.

Pros:

Potentially less time consuming.
Less use of rig mooring equipment.

Cons:

More potential for damage to J hooks.
Dropped moorings.

At this time Option 1 is the preferred option.

Regards
RW

21/05/2007

Fra: Macklin, Richard J
Sendt: 3. mai 2007 15:38
Til: Stevens, Chris (CHRS)
Emne: FW: Secondary anchors procedures
Vedlegg: John's Procedures.doc

As requested.

Regards

Dick Macklin
Marine HE&S Specialist
Chevron Upstream Europe
Tel: 01224-334096
Email: macklrj@chevron.com

From: Rig_RAT, Marine [mailto:marine@rat.rig.deepwater.com]
Sent: 10 April 2007 15:23
To: bgn.vidar.viking@rabt.se; bridge.dolphin@bonship.com; highland.valour@gtships.com; O-HERCULES@gtw.dualog.com
Cc: Brown1, Adrian; Rig_RAT, OIM; Macklin, Richard J; 'Sean Johnson'
Subject: Secondary anchors procedures

Gents,
Attached new procedures for running remaining anchors, please review & comment if any problems

Regards
John Sapsford
Towmaster
Trident Offshore

Transocean Rather

Procedures For Running Secondary Anchors

Tuesday 10th April 2007

Will all AHV Masters review the following procedures and inform the rig if there is anything they are unsure of or if they do not have the required equipment onboard.

When 3 AHV's return from Lerwick & when weather permits anchor handling operations the following operations will be carried out.

1. Transfer grapnel from Bourbon Dolphin or Highland Valour via rig to Vidar Viking. Transfer Roller Chasing Collar from rig to Olympic Hercules. (Stbd crane)

2. Bourbon Dolphin to No.3, receive pennant from rig. (Rig transfer crane pump from Stbd to Port crane.) Rig pay out 935m rig chain then change over to wire. Bourbon Dolphin connect lockered 76mm insert chain to rig chain and deploy 914m of chain and install new roller chaser collar on chain and connect Bruce anchor to chain. 250t Shackle on chaser collar to be secured with stainless steel locking pins. Thrash chain to be secured to 250t shackle with No.7 Pear link. New 75m pennant to be secured to thrash chain with kenter or No.7 Pear link and second new 75m pennant to be secured to first pennant with CCL, kenter or Pear link. **Vidar Viking** to grapple chain 300m from stern of Bourbon Dolphin and take weight of chain. Bourbon Dolphin to overboard anchor. Vidar Viking to disengage grapple and grapple chain 300m from fairlead. Run anchor.

3. When Port crane available, Highland Valour to No.7, receive pennant from rig. Rig pay out 930m rig chain then change over to wire. Highland Valour connect lockered 76mm insert chain to rig chain and deploy 914m of chain and install new roller chaser collar on chain and connect Bruce anchor to chain. 250t Shackle on chaser collar to be secured with stainless steel locking pins. Thrash chain to be secured to 250t shackle with No.7 Pear link. 75m pennant to be secured to thrash chain with kenter or No.7 Pear link and second 75m pennant to be secured to first pennant with CCL. Olympic Hercules to grapple chain 300m from stern of Highland Valour and take weight of chain. Highland Valour to overboard anchor. Olympic Hercules to disengage grapple and grapple chain 300m from fairlead. Run anchor.

4. When Olympic Hercules free of grapple on No.7, Rig pass down No.6 pennant to Olympic Hercules. Rig pay out 930m rig chain then change over to wire. Olympic Hercules connect lockered 76mm insert chain to rig chain and deploy 914m of chain and install roller chaser collar on chain and connect 12t Stevpris anchor to chain. 250t Shackle on chaser collar to be secured with stainless steel locking pins. Thrash chain to be secured to 250t shackle with No.7 Pear link. 75m pennant to be secured to thrash chain with kenter or No.7 Pear link and second 75m pennant to be secured to first pennant with CCL. Highland Valour to grapple chain 300m from stern of Olympic Hercules and take weight of chain. Olympic Hercules to overboard anchor. Highland Valour to disengage grapple and grapple chain 300m from fairlead. Run anchor.

5. When pennant returned from No.6, rig transfer crane pump from Port to Stbd. Bourbon Dolphin to No.2, receive pennant from rig and roller chaser collar complete with thrash chain. Rig pay out 902m rig chain then change over to wire. Bourbon Dolphin connect lockered 76mm insert chain to rig chain and deploy 914m of chain and install new roller chaser collar on chain and connect anchor to chain. 250t Shackle on chaser collar to be secured with stainless steel locking pins. Thrash chain to be secured to 250t shackle with No.7 Pear link. 75m pennant to be secured to thrash chain with kenter or No.7 Pear link and second new 75m pennant to be secured to first pennant with CCL, kenter or Pear link. **Vidar Viking** to grapple chain 300m from stern of Bourbon Dolphin and take weight of chain. Bourbon Dolphin to overboard anchor. Vidar Viking to disengage grapple and grapple chain 300m from fairlead. Run anchor.

Note:
1. All identification numbers of roller chasers, Pear links, kenters and CCLs should be recorded and passed to the rig.
2. On completion of operations all AHVs are requested to do a full inventory of remaining anchor handling equipment onboard before departing the rig.

John Sapsford
Towmaster
Trident Offshore

Quality Assurance System

TRIDENT OFFSHORE LIMITED

DOCUMENT TRANSMITTAL FORM

From: **Trident Offshore Limited** **34 Carden Place** **Aberdeen** **AB10 1UP**	**To: AHV 'C'** **Name: Master** **Date: 21.03.07**

Purpose of Transmittal: ☐ ACTION ☐ INFORMATION ☐ APPROVAL

Document No.	Document Title	Rev No.	Issued To	Status	No.
11217	Rigmove Procedures	02	Master	UCC	1
	Transocean Rather				
	From: 213/26-1Z Rosebank				
	To: 205/1-1 Rosebank				

Received by: BOURBON DOLPHIN

Signature: Frank Reiersen

Position: MASTER

Date: 26.03.07

The sender will retain a copy of this form.
The recipient should sign this form and return it to the sender (Fax No. 01224 622333)

CT543

Swan & Co.
(Marine Surveyors) Ltd
1st Floor Suite,
Horizons House,
81-83 Waterloo Quay,
Aberdeen, AB11 5DE
Telephone 01224 586633
Fax 01224 586688

INTERNATIONAL INSTITUTE OF MARINE SURVEYORS

SURVEY REPORT

Ref No: 1603/07
Date: 27th March 2007

ON HIRE SURVEY **BOURBON DOLPHIN**

Instructed by:	Stewarts Offshore Ltd
Vessel attended at:	Jamiesons Quay, Aberdeen
Charterer:	TEAM Marine
On-Hire time & date:	1800, 26th March 2007
Port of Departure:	Aberdeen
Scope of Work:	PSV Duties

The following particulars were recorded:

Fuel Oil:	**808.000 M3**	**(694.880 Tonnes)**
ULSD Fuel Oil:	**00.000 M3**	**(00.000 Tonnes)**
Fresh Water	**246 Tonnes**	
Drill Water	**0 Tonnes**	

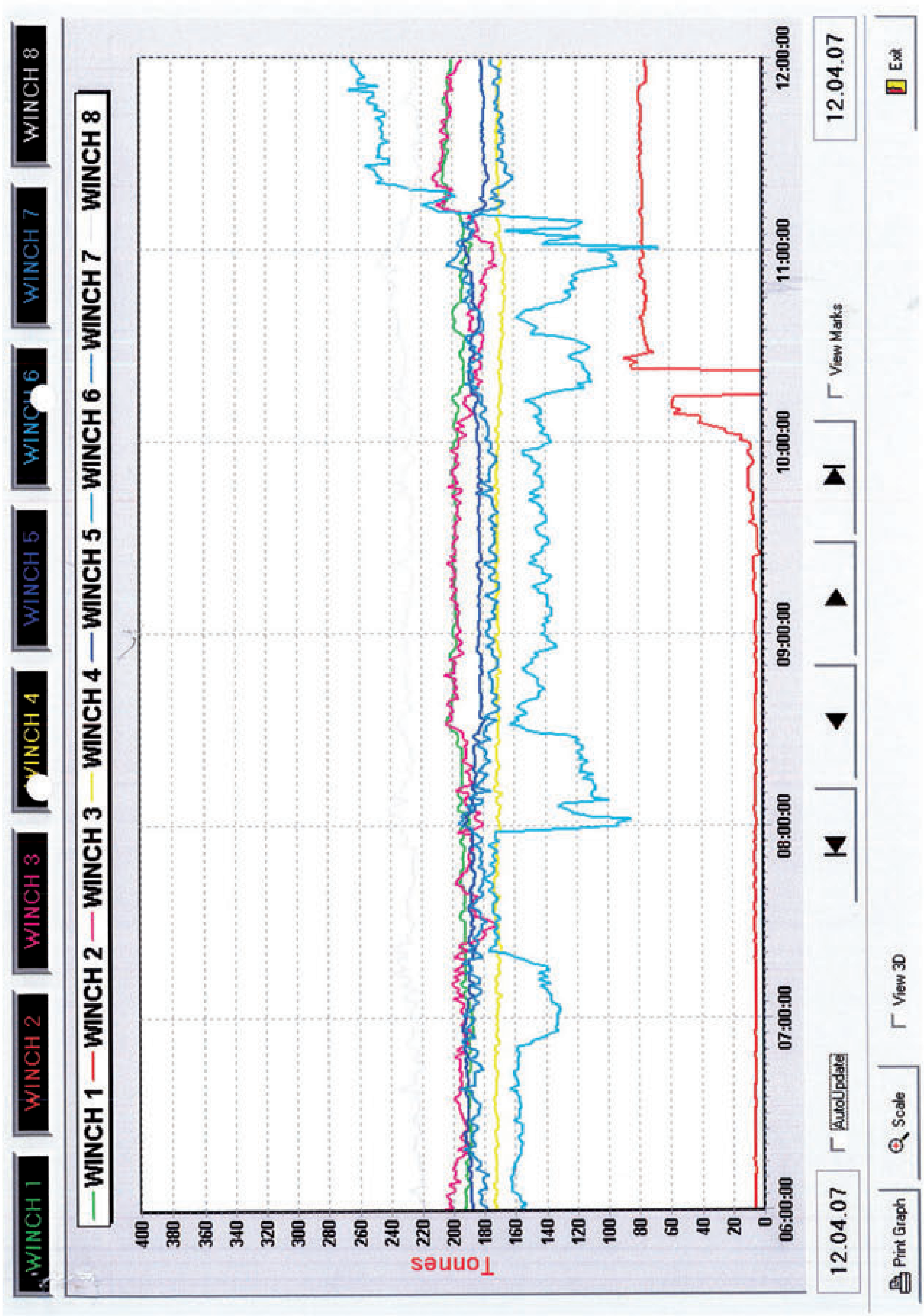
Note:
TEAM Marine Manual No. 37 issued to vessel master.
All bulk hose connections checked for compatibility with Rig Data Cards.

We noted all damage to the vessel for comparison with the subsequent Off-hire survey.

This survey was carried out and the report issued without prejudice.

Surveyor

1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WINCH 1 WINCH 2 WINCH 3 WINCH 4 WINCH 5 WINCH 6 WINCH 7 WINCH 8
Tonnes
400 380 360 340 320 300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0
06:00:00 07:00:00 08:00:00 09:00:00 10:00:00 11:00:00 12:00:00
12.04.07
AutoUpdate
View Marks
12.04.07
Print Graph
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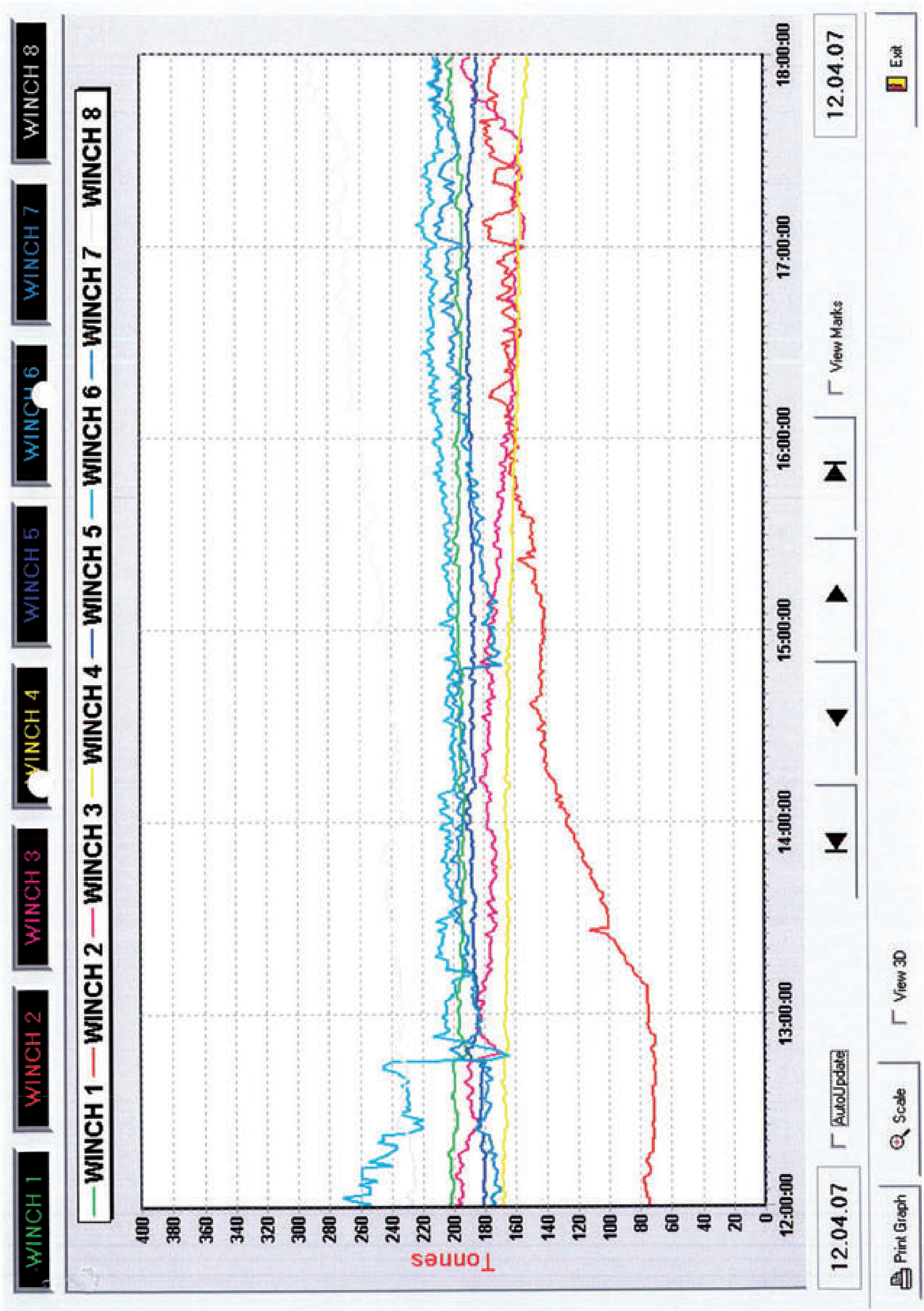
Exit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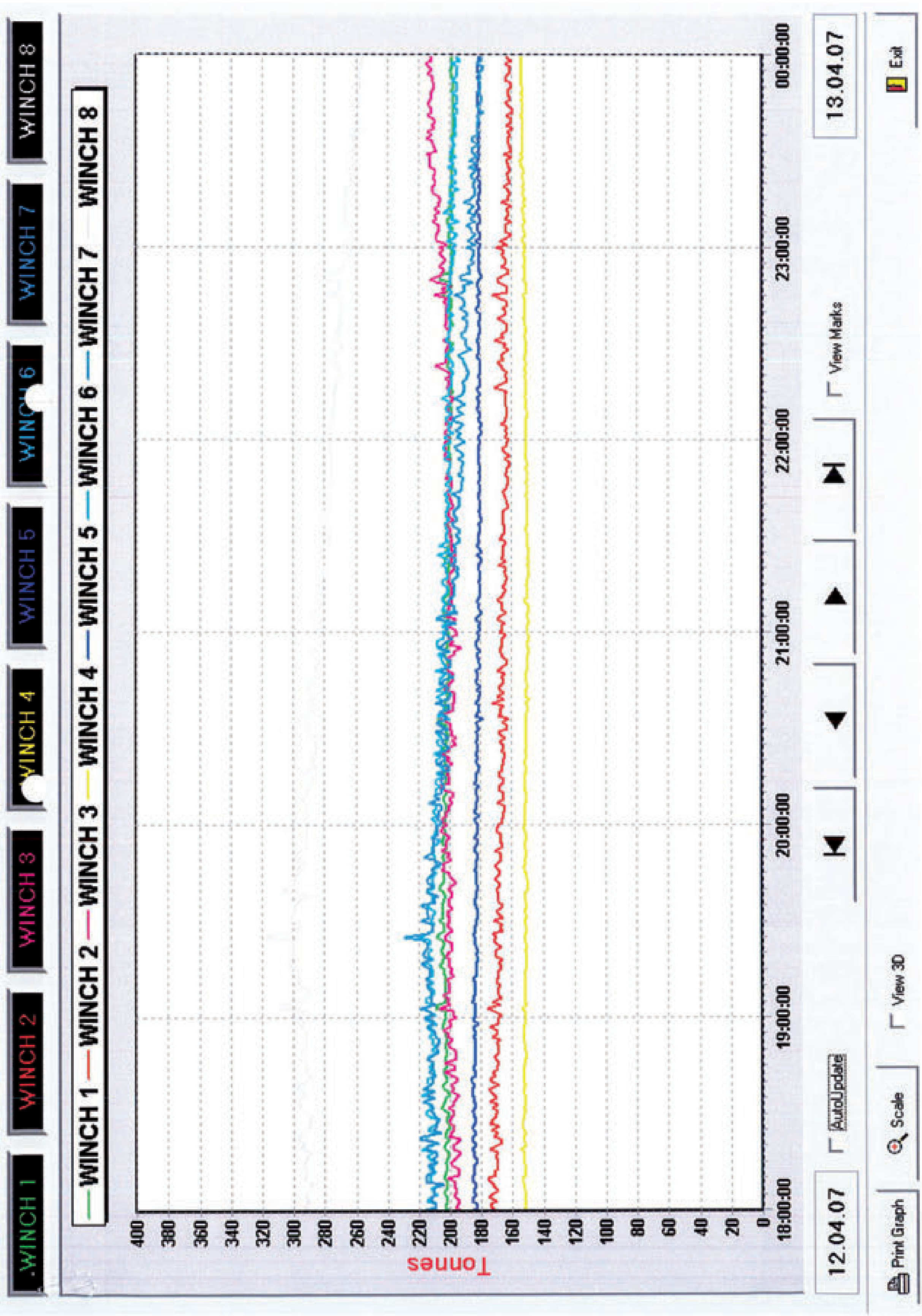
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AutoUpdate
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Print Graph
Scale
View 3D
Exit

26 SEPT 2007
227/2007

TRIDENT OFFSHORE LTD

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E: general@trident-offshore.com
W: www.tident-offshore.com

TECHNICAL MEMORANDUM

Subject:	Mooring Deployment – Dynamic Analysis		
To: Attn:	Rona Jamieson	Date:	21/09/07
cc:	Sean	Doc #:	070921-tm-mk
From:	Martin Kobiela	Phone:	01224 622111 07712 556783
Job No.	11472	Email:	mk@trident-offshore.com

Rona,

Further to our recent discussion regarding the mooring deployment study for the Transocean Rather rigmove to Rosebank, I have produced a description of the Dynamic Analysis process as outline below.

The dynamic deployment analysis results referenced in the procedures estimates the dynamic amplification which could potentially be applied to the suspended catenary during anchor handling operations. The environmental effects applied to the catenary are waves and current, both applied against the direction of towing in order to maximize the tension in the mooring catenary at the AHV end of the system.

The current forces are based on standard drag values for chain and SWR. The motion at the end of the mooring line catenary is based on the motion characteristics of a typical North Sea anchor handling vessel.

What this analysis does not consider is the effect the environmental forces will have on the operability of the vessel. This is due to a lack of data being available when the deployment analysis is carried out. In order to perform an analysis of the effect of environmental forces on the operability of the AHV, the following information would be required:

1) AHV dimensions
2) Current force coefficients
3) Wind force coefficients
4) Motion coefficients (RAOs & QTFs)
5) Engineer power & propeller types and arrangement
6) Thruster power & arrangements
7) Loading conditions
8) Operating environmental conditions
9) Vessel attitude to weather
10) Anchor handling equipment in use
11) Vessel stability

This data is never available in time for a rigmove operation as generally, AHVs are hired at short notice from the spot market. Even if all of the constant data (1 – 6) is made available, too many variables (7 – 11) remain outstanding for any meaningful results to be obtained.

The weather data selected in this portion of the procedures is a guide for anchor handling operations. It is not a design criteria and can't be compared to the specific, statistical extreme, data that is required for mooring design and analysis. Environmental design data is based on a certain return period in which a value will statistically be exceeded once over the duration of the specified period. The data considered in the procedures is based on values that are likely to be experienced during operations.

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The environment that is experienced during an operation can be reliably assessed on the day by those present and involved in the operations. It is only they who can decide if an operation can or cannot continue.

The current speed value of 1.0 m/s was considered in the procedures is less than the 1-year return period value of 1.3 m/s, however, it was considered that this was a reasonable operations value. Observation from the time of the Bourbon Dolphin capsize indicate that the current speed at the time was 0.75 m/s (1.5 knots). Current reading data available for the location covering the period from late October 2006 to early December 2006 shows that at no time did current speed exceed 1.6 knots (0.8 m/s).

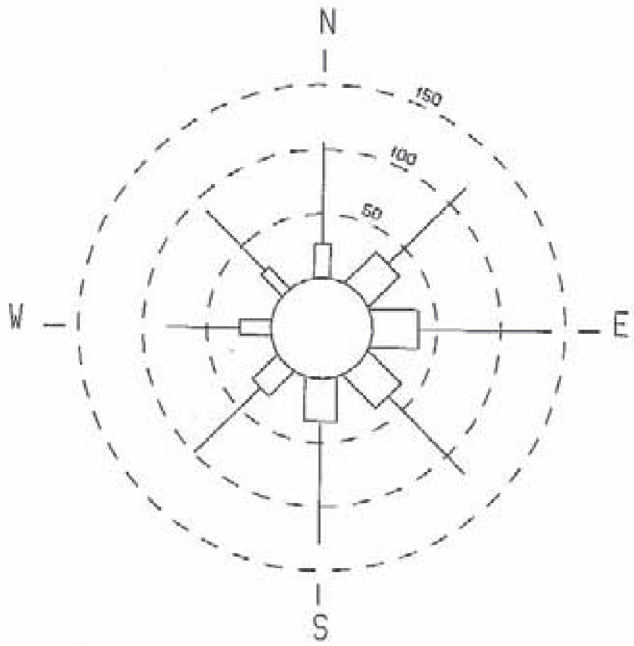
Even if a higher current speed was to be considered in the analysis, the effect on overall loading would be limited as the tension in the mooring line is dominated by the static effects of self weight and horizontal force required to stretch the catenary out to the proposed anchor position. An increase in current speed to the 1.68 m/s, 100-year return period value is likely to increase bollard pull by about 6 tonnes and line tension by approximately 10 tonnes.

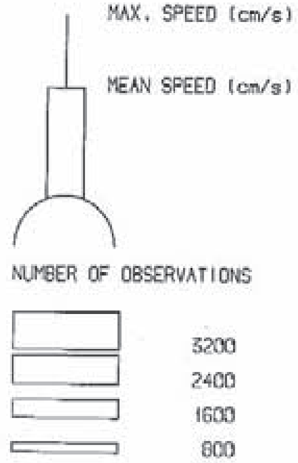
The final table in this section of the procedures includes estimates of loads that could be applied a typical North Sea anchor handling vessel. However, again this is only a guide as the unknown data(1 -11) above will also apply for these calculations.

I hope this clarifies this section of the procedures, however; if you have any further questions, please feel free to contact me.

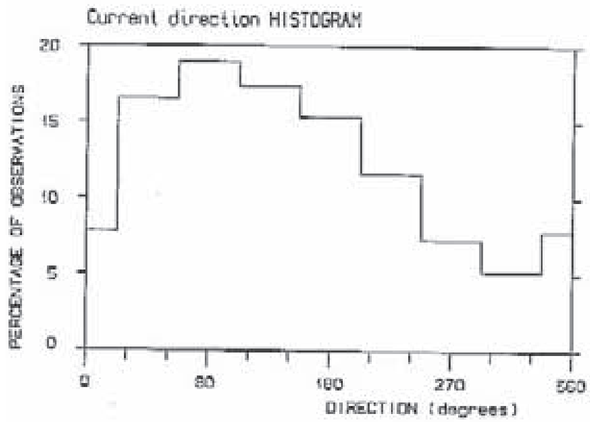
Regards

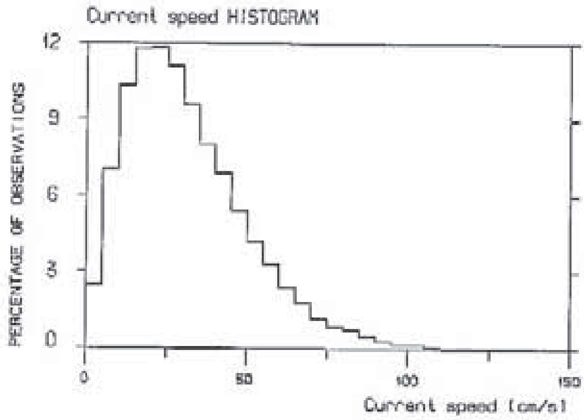
Martin Kobiela
Technical Manager
Trident Offshore ltd.





26 SEPT 2007





STATISTICS

NUMBER OF OBSERVATIONS: 17526
SAMPLING INTERVAL: 1 hour
INSTRUMENT TYPE: RD-ADCP 75 kHz
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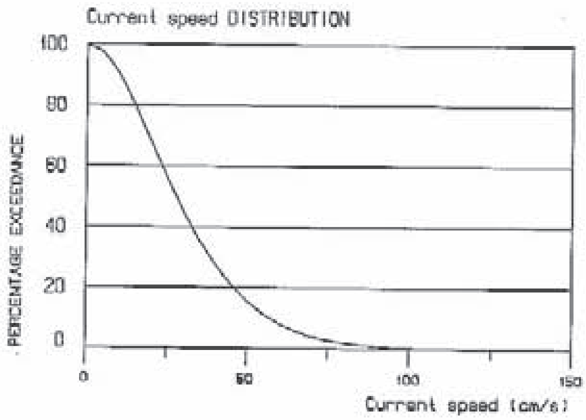
VECTOR MEAN MAGNITUDE: 11.3 cm/s DIRECTION: 116°
MEAN MAGNITUDE: 31.3 cm/s
MAXIMUM VECTOR COMPONENTS (cm/s) N: 104 E: 154 S: 125 V: 82
DIRECTIONAL STABILITY: 36 %



Summary statistics				INSTRUMENT RD-ADCP 75 kHz
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OCEANOR OCEANOGRAPHIC COMPANY OF NORWAY			PROJECT 1147	FIGURE

Date: 2001-04-06

Orkan/orkapp/v4.1.4

TRIDENT OFFSHORE LTD

INTERNAL MEMORANDUM

To:	Guro Loken	From:	Martin Kobiela
CC.	Rona Jamieson, Joe Price		
Ref:	071129-deployment study	Date:	3rd December 2007
Subject:	**Transocean Rather – Deployment Study Methodology**		

Guro,

Further to your request, please see below, the methodology utilized in the study performed for the deployment of the Transocean Rather moorings at the Rosebank location on behalf of Chevron.

Step	Description
1	Preliminary marine procedure and outline deployment methodology kick-off meeting is held between the responsible Trident Offshore Marine Superintendent and Engineer. At this step, critical stages in the mooring deployment are identified for analysis.
2	Mooring analysis and associated drawings are reviewed in order to define the range to which anchors are to be deployed.
3	Bathymetry at the location is reviewed in order to ascertain if more than one deployment study is required to cover the full range of depths at the mooring site. If a depth differential in the order of 100m across the anchor range is found, consideration is given to performing at least two deployment studies, one for the deepest and one for the shallowest anchor.
4	The mooring line assembly is reviewed for each line. If significant differences are found for the mooring spread, multiple deployment studies are performed. Differences to be considered include useable line lengths, line weights and anchor types.
5	The environmental data to be considered for dynamic analysis runs are defined. Unless location specific data dictates otherwise the environmental data will be: Hs = 3.5m – 4.0m Vc = 1.0m/s The environmental conditions are applied against the direction of towing. These are standard values we consider for deployment analyses, which are based on our experience of a general threshold for anchor handling operations, however, they are not defined as limits as environmental conditions have to be assessed on the day by those on location. Any location specific environmental anomalies are considered on a case by case basis.
6	A review of previous deployment studies are carried out for the drilling unit and a suitable file-set is selected as the basis for the new case. The input data in the software files (Flexcom) are checked by the responsible Engineer to ensure accuracy.

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Step	Description
7	Based on the outcome of the kick-off meeting, a new set of static analysis files are created for the operation under consideration. As part of the static analysis file set-up, an RAO file is referenced. The RAO reference position in relation to the approximate position of the vessel stern roller is defined.
8	Due to non-availability of vessel specific data, a standard Anchor Handling Vessel (ME 303 design) RAO file is considered in the analysis. The structure of this file is checked by the responsible Engineer. This check is carried out using Flexcom's built-in RAO checking module. This provides a graphical display of the RAO amplitude and phase angle for user defined wave periods and directions.
9	The static analysis files created at step 6 are run using Flexcom software.
10	The worst case result found from the static analysis is run dynamically considering the environmental conditions detailed in step 5.
11	The current force is modeled quasi-statically. This is run for a period which ensures that equilibrium is reached. If current profile data is available this is considered, if not, then a uniform current speed from surface to seabed is considered. Graphical outputs are checked by the responsible Engineer to ensure that equilibrium has been reached. If necessary, the analysis is revised with an increased time period to ensure equilibrium is reached.
12	Waves are modeled dynamically in the time domain. The analysis starts from the current case equilibrium position and is run for a period of at least 3,600 seconds. The wave model will be irregular and unless location specific data dictates otherwise, a JONSWAP spectrum will be considered.
13	Results obtained from the static and dynamic analyses files include: Tensions Bollard pull Vertical loads Vessel positions Anchor positions Line lengths Fairlead angles
14	The methodology utilized and results obtained from the deployment study are reviewed by a Trident Offshore Senior Engineer or Technical Manager. If necessary cases are redefined and rerun.
15	On satisfactory conclusion of the analyses review process, a results table, brief description and supporting drawings for each stage of the deployment operation are created by the responsible Engineer. Minimum recommended workwire length is defined. Estimated environmental loads applied to a standard anchor handling vessel hull are included for head and beam directions. In addition to the environmental conditions detailed in step 5, a wind speed of 10 m/s is considered.
16	The methodology, results and drawings are reviewed by a Trident Offshore Senior Engineer or Technical Manager and the responsible Marine Superintendent. Revisions are carried out as necessary.

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Step	Description
17	Subsequent to final review, the relevant results, drawings and description are passed to the responsible Marine Superintendent for inclusion in detailed Marine Procedures.
18	The marine department now review the results of the analyses and define a base specification for the anchor handling vessels to be recommended for the operation. This will include: Minimum number of vessels required Minimum bollard pull Minimum winch pull Winch drum dimensions and geometry

We hope this is what is required; however, if you have any questions or comments, please feel free to contact me.

Martin Kobiela
General Manager
Trident Offshore Ltd

an ACTEON company

MARINE OPERATIONS SAFETY BRIEF

Gentlemen and ladies too if you are out there, we are shortly to commence our marine operations.

We are not under any pressure to be the fastest rigmovers in the North Sea but we are under a great obligation to be the safest. That obligation extends not only to ourselves but to those persons we di conduct the various tasks, our families, our employers and the environment.
(Xmas time only)
At this time of year it is most important that we take even greater care than normal. An accident at time is devastating for your family waiting at home, a family loss is always a brutal experience, *bu years end it would be much worse* if you were not to be returning home from this trip or were injur

I urge you all to take particular care and especially ask the co-operation of the masters to ensure th the seamen are on deck they always wear the correct PPE, Hard hat, boots, gloves, exposure suits a most importantly a work vest or floatation device. That is so that if a man should fall or be knocke the water unconscious or with broken arm or leg and unable to protect himself he still has an excell chance of being safely recovered by the FRC from the standby vessel. Please ensure the seamen do understand that we particularly request them to take especial care when working close to the stern r

There has been an incident whereby a vessel opened the sharks jaw and released a chaser pendant b the rig crane when a towing guide pin was still raised. There was no warning from the vessel that t was about to be released. The crane stinger wire got caught around the pin and a serious incident w just avoided. Please make sure before you release anything back to the rig that:
a) all pins and Karm Forks are lowered
b) all of the crew are standing clear
c) that the carne driver has agreed to accept the load on the crane

We on the rig have limited visibility from the pilothouse where we conduct our operations. We ten mainly to be watching Visual Displays to keep the pipelines and well heads clear. We depend on y great extent for advising us. If you see that some thing is not going correctly please advise us at on

There is never any intention to put pressure on you to do anything that is not safe. If you feel at an that you are being put under pressure to do something that you believe is not safe, quite clearly we here have made a mistake. We have not communicated with you properly. You should stop the job once and advise us. The job will not resume until you are satisfied it is safe to continue.

Gentlemen, I trust all of the foregoing is clearly understood. Please confirm or ask your questions.
Standby vessel.

We depend on you to a tremendous extent to look after us while we are conducting the mooring an unmooring and also while we are under tow.

During anchor handling the seamen on the vessels are frequently working close to the stern rollers rig crew working at or close to the rig rails. There is always the danger of a man falling or being kn overboard. If you should hear radio traffic that makes you think a man has fallen overboard please wait for us to call you but use your own initiative righht away. If it is a false alarm that would be unfortunate but the time saved in an emergency could prove to be vital.

While under tow we ask you to maintain station about one mile astern of the rig so that in the even manoverboard situation, by the time we get the word to you, you will be in a prime position to effe rescue. I trust we can rely on your co-operation.

Vedlegg 4

Meteorologiske data og kart


Bergen
Stavanger
Europe
Aberdeen
Faroe Islands
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TRANSOCEAN RATHER

WEST OF SHETLAND MOORING & RISER ANALYSES

ENVIRONMENTAL DATA

REFERENCE : O:\CTOPI\CTE\DSG\WELLS\WEST OF SHETLANDS\19TH ROUND\213-27-G\WEO\RISER & MOORING ANALYSIS\ENVIRONMENTAL PARAMETERS REV1.DOC

Rev	Date	Remarks	Prepared	Reviewed	Approved
1	03/05/05	As issued	A. Murdoch	F.Close	F.Close

CONTENTS **Page**

1. ENVIRONMENTAL DATA

The environmental data to be used for all mooring and riser analyses has been compiled by Oceanor in the following reports:

- Oceanor, Faroes South-East Metocean Conditions, Project number 1147.
- Oceanor, Faroes South-East Metocean Conditions Summery report, Project number 1147. (See e-mail attachment)

The following combined 50 year "extreme criteria" have been extracted from the above reports and should be utilized in the mooring and riser analyses:

- Wind (1 hour mean, 10m height) : 30.6 m/sec (See Appendix 1)
- Significant Wave Height : 12.4 m (See Appendix 2)
- Surface Current (100m) : 1.62 m/sec, toward NE (See Appendix 3)
- 600m depth : 0.92 m/sec, toward NE (See Appendix 3)
- Bottom Current : 0.74 m/sec, toward NE (See Appendix 3)

The current profile at Rosebank is expected to be characterized by high near surface current speeds overlying slab currents below. These currents may be very severe through the upper 100m and reduce linearly to 600m depth, and are thereafter relatively uniform to sea bed.

Soil data for the area is presented as Appendix 4.

The maximum well location water depth during the 2006 drilling campaign will not exceed 1163m (+/- 10m).

The maximum anticipated mud weight for the campaign is 13 ppg. (This mud weight is considered as an extreme value and if it proves problematic for the riser analysis it may me possible to adjust this value).

2. APPENDICES

2.1 SUMMARY OF APPENDICES

Appendix 1: Extracted table 4.1 from Oceanor Report, Faroes South-East Metocean Conditions Summary report, Project number 1147.

Appendix 2: Extracted table 5.1 from Oceanor Report, Faroes South-East Metocean Conditions, Project number 1147.

Appendix 3: Extracted table 6.1 (Station NWSC) from Oceanor Report, Faroes South-East Metocean Conditions Summary report, Project number 1147.

Appendix 4: Soil data taken from Atkins report used during previous operations in Block 213/27.

2.2 APPENDIX 1

Table 4.1 *Omni-directional extreme values of hourly mean wind speed in m/s, WINCH grid point 1665.*

Month	Return period			
	1-year	10-years	50-years	100-years
January	30.1	34.4	36.8	37.7
February	26.8	30.0	32.0	32.8
March	25.7	28.8	30.6	31.4
April	22.9	25.8	27.6	28.3
May	22.3	25.9	28.2	29.1
June	19.7	22.7	24.5	25.2
July	17.8	19.9	21.2	21.7
August	20.6	23.7	25.6	26.4
September	25.8	29.8	32.3	33.3
October	27.4	31.4	33.8	34.8
November	26.9	30.7	33.1	34.0
December	27.2	30.7	32.9	33.7
All year	30.9	34.5	36.8	37.7

2.3 APPENDIX 2

Table 5.1 *Monthly and all year extreme value estimates for Hm0 with corresponding expected Tp, Location A.*

Month	Return period (years)							
	1		10		50		100	
	Hm0 (m)	Tp (s)	Hm0 (m)	Tp (s)	Hm0 (m)	Tp (s)	Hm0 (m)	Tp (s)
January	13.1	17.7	16.3	19.1	18.3	20.0	19.1	20.3
February	11.2	16.7	13.3	17.8	14.6	18.4	15.1	18.6
March	9.7	15.9	11.4	16.8	12.4	17.3	12.9	17.6
April	8.3	15.0	10.5	16.3	11.9	17.0	12.5	17.4
May	6.7	14.0	8.8	15.3	10.2	16.1	10.8	16.5
June	5.2	13.0	6.7	14.0	7.7	14.7	8.1	14.9
July	4.3	12.3	5.3	13.0	6.0	13.5	6.3	13.8
August	4.9	12.7	6.0	13.5	6.8	14.1	7.1	14.3
September	8.5	15.2	11.3	16.7	13.2	17.7	14.0	18.1
October	10.0	16.0	12.6	17.4	14.4	18.3	15.1	18.6
November	10.8	16.5	13.5	17.8	15.3	18.7	16.1	19.1
December	11.1	16.6	13.5	17.8	15.0	18.6	15.6	18.8
Year	13.7	17.9	16.5	19.2	18.3	20.0	19.1	20.3

2.4 APPENDIX 3

Table 6.1 *Extreme values of current speed in cm/s for return periods of 1, 10, 50, and 100 years. Duration of extremes: 1 hour.*

Station	Instru-ment	Depth (m)	Return period			
			1 year	10 years	50 years	100 years
NWSA	ADCP 150 kHz	70	117	136	150	155
		100	86	98	105	108
		150	71	78	83	85
		200	70	78	82	84
		250	67	74	78	80
		280	57	64	68	69
NWSB	ADCP 75 kHz	100	107	122	132	136
		200	92	104	112	115
		300	82	93	100	103
		400	73	81	87	90
		500	73	83	89	91
		650	70	78	83	86
NWSC	ADCP 75 kHz	100	130	150	162	168
		200	111	125	134	138
		300	99	111	119	122
		400	89	101	108	111
		500	77	88	95	98
		600	73	84	92	95
		694	71	82	89	91
		794	71	81	87	90
		894	71	82	89	92
		994	62	69	74	76
FGEB	ADCP 150 kHz	100	108	129	144	150
		200	95	110	119	123
		300	81	93	100	103
		400	71	81	88	91
		500	65	75	82	85
		650	68	79	86	89
FGEC	ADCP 150 kHz	150	110	127	137	142
		200	97	111	121	125
		300	72	82	89	92
		400	53	60	65	66
		500	49	55	59	60
		650	50	56	60	62

2.5 APPENDIX 4

Depth below mudline (m)	Geological Unit	Description	Assumed Soil	Position in Layer	Soil Properties: Submerged unit weight (kN/m^3)	Soil Properties: Shear Strength, S_u[4] (kPa)	Soil Properties: Initial strain[2] (ε_{50}) (-)
0 – 40	Unit 1	VERY SOFT to STIFF sandy CLAY with gravel and shell fragments	Soft Clay	Top	7.0	0	0.020
				Bottom	8.2	67	0.007
40 – 70	Unit 2	VERY STIFF to HARD CLAY and SILT with occasional gravel and MEDIUM DENSE to VERY DENSE SAND with silt and clay	Stiff/Hard Clay	Top	8.2	67	0.007
				Bottom	9.1	117	0.005
70 - 100	Unit 3	VERY STIFF to VERY HARD CLAY and DENSE to VERY DENSE SAND	Very Stiff/Hard Clay	Top	9.1	117	0.005
				Bottom	10.0	167	0.005

TABLE 3-5a : LOWER BOUND SOIL PROFILE

Notes:
1. Scour depth of 1.5 m assumed
2. From Sullivan *et al.* 1980
3. P-Y curves generated in accordance with API RP2A-WSD, J = 0.5 (soft clay, clause 6.8.2 and Matlock 1970)
4. Soil strength based on Tranche 6 data provided by ChevronTexaco for Blocks 212 and 213: Fugro-McClelland Limited, "Draft Engineering Geological Appraisal Report Tranche 6 Development UK Sector, North West Frontier Area" [5].
5. Soil p-y curves to be based on cemented hole diameter

Depth below mudline (m)	Geological Unit	Description	Assumed Soil	Position in Layer	Soil Properties: Submerged unit weight (kN/m^3)	Soil Properties: Shear Strength, S_u[4] (kPa)	Soil Properties: Initial strain[2] (ε_{50}) (-)
0 – 40	Unit 1	VERY SOFT to STIFF sandy CLAY with gravel and shell fragments	Soft Clay	Top	8.0	5	0.020
				Bottom	10.0	110	0.005
40 – 70	Unit 2	VERY STIFF to HARD CLAY and SILT with occasional gravel and MEDIUM DENSE to VERY DENSE SAND with silt and clay	Stiff/Hard Clay	Top	10.0	200	0.005
				Bottom	11.0	200	0.005
70 - 100	Unit 3	VERY STIFF to VERY HARD CLAY and DENSE to VERY DENSE SAND	Very Stiff/Hard Clay	Top	11.5	400	0.004
				Bottom	11.5	400	0.004

TABLE 3-5b : UPPER BOUND "ALL CLAY" SOIL PROFILE

Notes:
1. No soil scour assumed for upper bound soil
2. From Sullivan *et al.* 1980
3. P-Y curves generated in accordance with API RP2A-WSD, J = 0.5 (soft clay, clause 6.8.2 and Matlock 1970)
4. Soil strength based on data provided by ChevronTexaco: Fugro-McClelland Limited, "Draft Engineering Geological Appraisal Report Tranche 6 Development UK Sector, North West Frontier Area" [5].
5. Soil p-y curves to be based on cemented hole diameter

Depth below mudline (m)	Geological Unit	Description	Assumed Soil	Position in Layer	Soil Properties				
					Submerged unit weight (kN/m³)	Shear Strength, S_u[4] (kPa)	Initial strain[2] (ε_{50}) (-)	Internal Friction Angle (degrees)	Initial Modulus (kN/m³)
0 – 40	Unit 1	VERY SOFT to STIFF sandy CLAY with gravel and shell fragments	Soft Clay	Top	8.0	5	0.020	n/a	n/a
				Bottom	10.0	110	0.005	n/a	n/a
40 - 60	Unit 2	DENSE SAND	Sand	Top	10.0	n/a	n/a	35	21,900
				Bottom	10.0	n/a	n/a	35	21,900
60 – 70		VERY STIFF to HARD CLAY and SILT with occasional gravel and MEDIUM DENSE to VERY DENSE SAND with silt and clay	Stiff/Hard Clay	Top	11.0	200	0.005	n/a	n/a
				Bottom	11.0	200	0.005	n/a	n/a
70 - 100	Unit 3	VERY STIFF to VERY HARD CLAY and DENSE to VERY DENSE SAND	Very Stiff/Hard Clay	Top	11.5	400	0.004	n/a	n/a
				Bottom	11.5	400	0.004	n/a	n/a

TABLE 3-5c : UPPER BOUND "CLAY/SAND" SOIL PROFILE

Notes:
1. No soil scour assumed for upper bound soil
2. From Sullivan *et al.* 1980
3. P-Y curves generated in accordance with API RP2A-WSD, J = 0.5 (soft clay, clause 6.8.2 and Matlock 1970)
4. Soil strength based on data provided by ChevronTexaco: Fugro-McClelland Limited, "Draft Engineering Geological Appraisal Report Tranche 6 Development UK Sector, North West Frontier Area" [5].
5. Soil p-y curves to be based on cemented hole diameter

3. ATTACHMENTS

Attachment 1: Oceanor, Faroes South-East Metocean Conditions Summery report, Project number 1147.

Meteorologisk institutt
met.no

Vår ref.:
07/17/321.3-53

Deres ref.:
epost

Vår dato:
24.04.2007

Deres dato:
24.04.07

Saksbehandler:
Magnar Reistad

Wikborg Rein
att: Eirik Thomassen
Postboks 1513 Vika
0117 OSLO

VURDERING AV VÆRFORHOLD MELLOM SHETLAND OG FÆRØYENE 12. APRIL 2007.

I forbindelse med ulykken med Bourbon Dolphin 12. april 2007 har vi undersøkt vind- bølge- og strømforholdene rundt ulykkesstedet mellom Shetland og Færøyene. Vi har fått oppgitt posisjonen for ulykken til (60:59'20"N, 003:49'20"W). Posisjonen er merket med X på de vedlagte kartene.

Vind

Figur 1 viser beregnet vind kl 17 UTC fra den operasjonelle atmosfæremodellen ved Meteorologisk institutt. Beregningene viser at da blåste det litt under 14m/s fra sørvest. Fra kl 15 UTC til kl 20 UTC blåste det i følge modellberegningene ca 14m/s fra sørvest. Deretter minket vinden gradvis. Vi har ingen meteorologiske observasjoner i det aktuelle området rundt havaritidspunktet, men modellberegningene passer bra med noen observasjoner 100-200km vest og sørvest for havaristedet. Ut fra dette antar vi at det blåste omkring 14m/s fra sørvest i tidsrommet fra kl 15 UTC til kl 20 UTC. Det vil si at det stort sett blåste stiv kuling. Grensen mellom liten og stiv kuling går mellom 13.8m/s og 13.9m/s.

Bølger

Figur 2 er et kart med signifikant bølgehøyde og dominerende bølgeretning fra den operasjonelle bølgevarslingsmodellen ved Meteorologisk institutt. Kartet gjelder for kl 17 UTC. Ved havaristedet beregnet modellen signifikant bølgehøyde til å være ca 4 m kl 15UTC. Bølgehøyden økte gradvis til ca 4.5m kl 20 UTC. Det ligger en britisk bøye i posisjon 60:42'02"N, 004:30'00"W, det vil si et stykke sørvest for havaristedet. Vi hadde tilgang til bølgeobservasjoner fra denne bøyen på internett. Den målte signifikant bølgehøyde på 3.0m kl 15 UTC, 3.6m kl 17 UTC, 3.7m kl 19UTC og 4.2m kl 21 UTC. Dette var noe lavere enn det modellen beregnet i samme posisjonen. Det er derfor grunn til å tro at modellen overestimerte bølgehøyden på havaristedet noe i det aktuelle tidsrommet. Vi antar at kl 15 UTC var signifikant bølgehøyde på havaristedet mellom 3 og 3.5m, kl 17 UTC litt over 3.5m og kl 20UTC ca 4m. Ved en mer detaljert undersøkelse av modellresultatene ser vi at det er to bølgesystemer. Det er vindsjø fra sørvest (230-240 grader) med dominerende periode 8-9s, og det er dønning fra vest (ca 260 grader) med dominerende periode ca 12s.

Strøm
Generelt kan en si at strømmen i området er dominert av Den norske atlanterhavsstrømmen som har en forgreining som går mot nordaust i området mellom Shetland og Færøyane. Overflatestrømmen kan her nå opp i 1.5m/s (ca 3 knop). Posisjonen for maksimal strømstyrke kan variere en del, og det oppstår gjerne storstilte virvler i området. Den sterkeste strømmen mot nordaust går vanligvis langs sokkelkanten, litt aust for havaristedet.

Det er nylig publisert en rapport om de oseanografiske forholdene i Færøy-Shetland-kanalen, et stykke sørvest for ulykkesstedet (Fisheries Research Services Collaborative Report No 01/06. FLUXES OF ATLANTIC WATER (VOLUME, HEAT AND SALT) IN THE FAROE-SHETLAND CHANNEL CALCULATED FROM A DECADE OF ACOUSTIC DOPPLER CURRENT PROFILER DATA (1994-2005) S L Hughes, W R Turrell, B Hansen, S Østerhus, February 2006
http://www.uib.no/People/ngfso/Publications/Reports/2005 ADCP %20Report4.pdf)
Rapporten understøtter vårt estimat av maksimal strømstyrke nær overflata på omlag 1.5m/s. Videre går det fram av rapporten av strømmen er relativt stabil mot nord-nordaust i området (stabilitetsfaktor 66%).

Det vedlagte kartet (figur 3) viser et utsnitt fra den operasjonelle havmodellen til Meteorologisk institutt kl 18UTC. På kartet er mørkt blått 1.5m/s. Retningen til overflatestrømmen er gitt med piler. Koter for havdjup er gitt i grått. Modellen viser strøm mot vest, litt under 0.5m/s på havaristedet. Men detaljene i strømbildet fra havmodellen er usikre. Vi ser at litt lengre aust er det strøm mot nordaust på over 1m/s.

Vi har ikke gode nok data til å gi et pålitelig estimat av strømmen på havaristedet i det aktuelle tidsrommet.

./. 3 vedlegg

Med hilsen
Reidun Holmøy
for Karen H. Doublet e.f.
Regionleder,
Vervarslinga på Vestlandet

Magnar Reistad
Magnar Reistad
forsker

APPENDIX A

Depth (metres)	Maximum Speed (cms^{-1})	Mean Speed (cms^{-1})	St Dev Speed (cms^{-1})	Maximum Along Channel Speed (cms^{-1})	Minimum Along Channel Speed (cms^{-1})	Mean Along Channel Speed (cms^{-1})	Maximum Across Channel Speed (cms^{-1})	Minimum Across Channel Speed (cms^{-1})	Mean Across Channel Speed (cms^{-1})	Stability %	Number of Hourly Samples
12.5	92.13	21.52	13.01	76.01	-83.61	-2.56	55.78	-56.35	-2.88	18	68714
37.5	87.95	20.99	12.66	73.06	-80.11	-2.62	53.75	-54.35	-2.79	18	68714
62.5	83.79	20.47	12.31	70.18	-76.61	-2.67	51.75	-52.35	-2.70	19	68714
87.5	79.64	19.96	11.97	67.38	-73.11	-2.72	51.25	-50.35	-2.61	19	68714
112.5	75.94	19.49	11.65	64.70	-69.61	-2.77	51.58	-48.52	-2.52	19	68714
137.5	73.27	18.97	11.31	62.21	-66.11	-2.82	51.35	-46.54	-2.42	20	68714
162.5	70.07	18.45	10.99	59.97	-62.66	-2.86	49.13	-44.34	-2.31	20	68714
187.5	66.37	17.89	10.63	60.37	-58.95	-2.91	47.11	-43.23	-2.18	20	68714
212.5	62.16	17.26	10.26	59.80	-55.86	-2.91	45.52	-42.91	-2.05	21	68714
237.5	60.75	16.56	9.84	58.78	-53.24	-2.88	42.67	-41.70	-1.89	21	68714
262.5	59.64	15.84	9.38	57.78	-52.43	-2.89	38.17	-39.14	-1.79	21	68714
287.5	57.63	15.07	8.90	55.93	-51.88	-2.96	36.50	-36.35	-1.74	23	68714
312.5	55.38	14.26	8.36	53.74	-50.69	-3.03	35.85	-32.72	-1.73	24	68714
337.5	52.70	13.33	7.76	51.29	-48.53	-2.99	35.03	-30.58	-1.74	26	68714
362.5	49.72	12.31	7.12	48.49	-45.04	-2.83	33.11	-29.08	-1.75	27	68714
387.5	46.75	11.15	6.51	45.49	-39.02	-2.67	29.22	-27.95	-1.73	29	68714
412.5	43.08	9.98	5.95	41.89	-33.84	-2.59	24.68	-25.86	-1.67	31	68714
437.5	39.22	8.93	5.39	38.16	-31.14	-2.55	21.78	-24.12	-1.60	34	68714
462.5	33.82	8.05	4.88	32.64	-29.93	-2.63	20.35	-22.36	-1.56	38	68714
487.5	29.68	7.37	4.53	27.39	-29.68	-2.77	18.45	-21.04	-1.60	43	68714
512.5	30.15	6.90	4.34	22.04	-30.15	-2.92	16.90	-18.24	-1.68	49	68714
537.5	30.27	6.62	4.28	18.71	-30.25	-3.09	16.32	-17.94	-1.74	53	68714
562.5	30.58	6.48	4.29	18.57	-30.45	-3.23	15.79	-18.17	-1.78	57	68714
587.5	30.20	6.46	4.32	18.97	-29.97	-3.36	15.94	-18.29	-1.84	59	68714
612.5	30.12	6.51	4.37	18.70	-29.95	-3.50	16.35	-18.78	-1.91	61	68714
637.5	29.94	6.58	4.42	18.37	-29.79	-3.62	16.28	-19.21	-1.96	63	68714
662.5	30.06	6.68	4.46	18.10	-29.65	-3.70	15.77	-19.59	-2.05	63	68714
687.5	30.19	6.78	4.51	18.42	-29.56	-3.77	15.37	-19.90	-2.12	64	68714
712.5	30.28	6.87	4.55	18.97	-29.48	-3.82	15.07	-20.12	-2.18	64	68714
737.5	30.34	6.94	4.58	19.34	-29.44	-3.85	14.88	-20.28	-2.21	64	68714
762.5	30.37	6.97	4.60	19.52	-29.41	-3.87	14.78	-20.35	-2.23	64	68714
787.5	30.37	6.97	4.60	19.52	-29.41	-3.87	14.78	-20.35	-2.23	64	68714

Table A1.1 Statistics of Dataset III Site B. Data are hourly-mean values, interpolated onto a 25m depth grid, a low-pass (72hr) filter has been applied to remove the tidal signal. Data have been extrapolated in the vertical to fill gaps near surface and seabed. Along-channel = positive towards 0.30ºN. Across-channel = positive towards 128ºN. Note “maximum” and “minimum” speeds refer to “most positive” and “most negative” respectively.

Depth (metres)	Maximum Speed (cms^{-1})	Mean Speed (cms^{-1})	St Dev Speed (cms^{-1}	Maximum Along Channel Speed (cms^{-1})	Minimum Along Channel Speed (cms^{-1})	Mean Along Channel Speed (cms^{-1})	Maximum Across Channel Speed (cms^{-1})	Minimum Across Channel Speed (cms^{-1}s)	Mean Across Channel Speed (cms^{-1})	Stability %	Number of Hourly Samples
12.5	88.32	24.72	15.62	74.20	-71.81	3.35	75.77	-77.69	-6.56	30	70776
37.5	87.09	24.41	15.36	73.00	-70.53	3.21	74.22	-75.86	-6.45	30	70776
62.5	85.86	24.10	15.10	71.79	-69.25	3.07	72.70	-74.05	-6.35	29	70776
87.5	84.62	23.84	14.88	70.60	-67.97	2.94	71.18	-72.24	-6.26	29	70776
112.5	83.51	23.58	14.66	69.63	-67.17	2.79	69.83	-70.43	-6.15	29	70776
137.5	82.16	23.18	14.38	69.74	-65.42	2.62	68.13	-68.77	-6.03	28	70776
162.5	80.28	22.71	14.05	68.74	-62.45	2.43	66.03	-67.71	-5.92	28	70776
187.5	78.51	22.21	13.71	67.28	-61.35	2.26	62.89	-65.16	-5.81	28	70776
212.5	76.73	21.68	13.36	64.87	-60.09	2.11	62.10	-64.20	-5.67	28	70776
237.5	74.71	21.10	12.98	62.30	-58.49	1.90	60.50	-62.81	-5.50	28	70776
262.5	72.95	20.48	12.61	59.46	-56.48	1.60	57.68	-60.94	-5.38	27	70776
287.5	70.37	19.80	12.19	56.85	-54.14	1.21	55.76	-59.84	-5.28	27	70776
312.5	66.96	19.09	11.76	55.32	-53.75	0.73	54.75	-58.82	-5.21	28	70776
337.5	62.45	18.31	11.30	53.89	-52.89	0.25	52.83	-58.06	-5.16	28	70776
362.5	57.89	17.48	10.78	53.92	-51.45	-0.29	50.44	-57.87	-5.06	29	70776
387.5	58.22	16.58	10.26	54.22	-50.24	-0.88	47.58	-58.20	-4.85	30	70776
412.5	58.39	15.58	9.74	53.05	-48.48	-1.46	43.86	-58.37	-4.48	30	70776
437.5	57.74	14.51	9.21	48.36	-46.77	-2.05	40.48	-57.72	-4.03	31	70776
462.5	56.16	13.47	8.71	40.79	-46.04	-2.61	40.34	-56.14	-3.55	33	70776
487.5	52.62	12.57	8.25	36.88	-45.17	-3.20	39.58	-52.56	-3.06	35	70776
512.5	50.34	11.90	7.90	36.24	-46.99	-3.78	38.03	-46.81	-2.62	39	70776
537.5	52.43	11.43	7.72	34.93	-50.38	-4.31	36.50	-39.86	-2.25	43	70776
562.5	53.67	11.12	7.69	32.15	-52.77	-4.73	33.71	-35.71	-1.95	46	70776
587.5	55.54	10.92	7.72	29.96	-53.44	-5.09	30.95	-34.82	-1.71	49	70776
612.5	57.78	10.82	7.78	31.15	-53.92	-5.35	31.04	-34.26	-1.50	51	70776
637.5	54.38	10.61	7.69	31.20	-52.96	-5.33	31.06	-33.05	-1.45	52	70776
662.5	53.68	10.46	7.62	31.25	-52.00	-5.31	32.25	-32.56	-1.46	53	70776
687.5	52.99	10.32	7.60	31.31	-51.04	-5.28	33.53	-32.08	-1.45	53	70776
712.5	52.31	10.20	7.60	31.38	-50.08	-5.24	34.92	-31.59	-1.43	53	70776
737.5	51.64	10.09	7.61	31.45	-49.13	-5.19	36.41	-31.11	-1.41	53	70776
762.5	50.99	10.00	7.64	31.54	-48.17	-5.14	38.01	-30.77	-1.37	53	70776
787.5	50.99	9.98	7.59	31.54	-48.17	-5.08	38.01	-30.77	-1.50	53	78340
812.5	50.99	9.97	7.59	31.54	-48.17	-5.07	38.01	-30.77	-1.48	53	78340
837.5	50.99	9.96	7.59	31.54	-48.17	-5.07	38.01	-30.77	-1.46	53	78340
862.5	50.99	9.95	7.58	31.54	-48.17	-5.06	38.01	-30.77	-1.44	53	78340
887.5	50.99	9.95	7.58	31.54	-48.17	-5.06	38.01	-30.77	-1.42	53	78340
912.5	50.99	9.94	7.58	31.54	-48.17	-5.05	38.01	-30.77	-1.41	53	78340
937.5	50.99	9.95	7.58	31.54	-48.17	-5.04	38.01	-30.77	-1.39	53	78340
962.5	50.99	9.95	7.58	31.54	-48.17	-5.04	38.01	-30.77	-1.38	53	78340
987.5	50.99	9.95	7.57	31.54	-48.17	-5.04	38.01	-30.77	-1.38	53	78340
1012.5	50.99	9.95	7.57	31.54	-48.17	-5.04	38.01	-30.77	-1.38	53	78340
1037.5	50.99	9.95	7.57	31.54	-48.17	-5.04	38.01	-30.77	-1.38	53	78340

Table A1.2 Statistics of Dataset III at Site C. Data are hourly-mean values, interpolated onto a 25m depth grid, a low-pass (72hr) filter has been applied to remove the tidal signal. Data have been extrapolated in the vertical to fill gaps near surface and seabed. Along-channel = positive towards 0.30ºN. Across-channel = positive trends towards 128ºN. Note “maximum” and “minimum” speeds refer to “most positive” and “most negative” respectively.

FLUXES OF ATLANTIC WATER (VOLUME, HEAT AND SALT) IN THE FAROE-SHETLAND CHANNEL CALCULATED FROM A DECADE OF ACOUSTIC DOPPLER CURRENT PROFILER DATA (1994-2005)

Depth (metres)	Maximum Speed (cms^{-1})	Mean Speed (cms^{-1})	St Dev Speed (cms^{-1})	Maximum Along Channel Speed (cms^{-1})	Minimum Along Channel Speed (cms^{-1})	Mean Along Channel Speed (cms^{-1})	Maximum Across Channel Speed (cms^{-1})	Minimum Across Channel Speed (cms^{-1})	Mean Across Channel Speed (cms^{-1})	Stability %	Number of Hourly Samples
12.5	101.52	32.31	17.00	95.24	-60.12	19.43	53.71	-67.94	-8.88	66	64721
37.5	99.17	31.76	16.77	93.10	-58.32	18.97	51.71	-66.46	-8.88	66	64721
62.5	96.83	31.24	16.59	90.96	-56.58	18.52	49.71	-64.99	-8.89	66	64721
87.5	94.48	30.73	16.41	88.82	-54.84	18.05	47.71	-63.52	-8.89	65	64721
112.5	92.14	30.27	16.24	86.69	-54.15	17.55	45.71	-62.06	-8.90	65	64721
137.5	89.80	29.81	16.05	84.57	-53.78	17.06	43.71	-60.59	-8.88	65	64721
162.5	87.46	29.29	15.78	82.44	-53.46	16.51	41.71	-60.14	-8.83	64	64721
187.5	85.73	28.80	15.49	80.85	-53.83	15.96	39.71	-59.18	-8.79	63	64721
212.5	82.77	28.31	15.15	78.20	-52.97	15.41	37.71	-57.73	-8.75	63	64721
237.5	81.29	27.63	14.69	77.05	-51.05	14.90	36.56	-56.14	-8.47	62	64721
262.5	79.22	26.85	14.20	75.18	-49.41	14.32	35.86	-54.73	-8.14	61	64721
287.5	76.42	26.02	13.63	72.50	-47.49	13.69	35.38	-52.62	-7.81	61	64721
312.5	74.04	25.04	13.06	70.41	-45.28	12.94	34.56	-49.28	-7.45	60	64721
337.5	72.69	23.95	12.51	69.21	-43.30	12.09	35.15	-47.22	-7.11	59	64721
362.5	70.77	22.71	11.96	67.63	-41.25	11.12	34.17	-46.22	-6.78	57	64721
387.5	68.47	21.32	11.38	65.71	-38.78	9.93	33.89	-45.58	-6.35	55	64721
412.5	65.68	19.77	10.73	63.13	-35.61	8.46	32.49	-44.46	-5.78	52	64721
437.5	61.67	18.09	9.93	59.17	-36.29	6.67	31.60	-41.71	-5.06	46	64721
462.5	56.45	16.43	9.06	54.13	-37.77	4.69	30.82	-37.60	-4.22	38	64721
487.5	51.78	15.01	8.29	49.42	-38.56	2.68	29.48	-33.05	-3.35	29	64721
512.5	49.11	13.92	7.79	47.02	-40.22	0.68	28.33	-30.98	-2.52	19	64721
537.5	47.94	13.27	7.63	45.99	-44.11	-1.16	31.78	-29.34	-1.71	16	64721
562.5	49.23	13.02	7.87	45.23	-47.36	-2.78	33.97	-29.90	-0.98	23	64721
587.5	50.72	13.08	8.40	45.62	-49.11	-4.08	33.51	-31.52	-0.31	31	64721
612.5	52.38	13.44	8.85	46.10	-50.87	-5.05	29.96	-32.90	0.17	38	64721
637.5	54.71	13.99	9.22	46.59	-53.32	-5.64	24.32	-34.06	0.46	40	64721
662.5	57.19	14.51	9.53	47.03	-55.71	-5.82	19.89	-34.99	0.65	40	64721
687.5	52.33	14.88	9.71	47.39	-49.39	-5.57	22.40	-35.69	0.77	38	64721
712.5	53.83	14.98	9.72	47.64	-50.28	-4.95	24.17	-36.16	0.80	33	64721
737.5	53.15	14.79	9.59	47.77	-48.71	-4.27	25.08	-36.39	0.81	29	64721
762.5	52.27	14.33	9.41	47.77	-48.56	-3.89	25.08	-36.39	0.82	28	64721
787.5	29.44	8.47	5.59	18.76	-29.42	-2.50	10.84	-6.63	0.49	30	5489

Table A1.3 Statistics of Dataset III at Site D. Data are hourly-mean values, interpolated onto a 25m depth grid, a low-pass (72hr) filter has been applied to remove the tidal signal. Data have been extrapolated in the vertical to fill gaps near surface and seabed. Along-channel = positive towards 0.30ºN. Across-channel = positive towards 128ºN. Note “maximum” and “minimum” speeds refer to “most positive” and “most negative” respectively.

Depth (metres)	Maximum Speed (cms^{-1})	Mean Speed (cms^{-1})	St Dev Speed (cms^{-1})	Maximum Along Channel Speed (cms^{-1})	Minimum Along Channel Speed (cms^{-1})	Mean Along Channel Speed (cms^{-1})	Maximum Across Channel Speed (cms^{-1})	Minimum Across Channel Speed (cms^{-1})	Mean Across Channel Speed (cms^{-1})	Stability %	Number of Hourly Samples
12.5	114.83	31.32	18.91	111.63	-29.50	28.15	28.60	-53.91	-8.59	94	80474
37.5	112.71	30.63	18.51	109.93	-28.18	27.60	27.62	-51.66	-8.37	94	80474
62.5	110.61	29.97	18.16	108.25	-26.87	27.06	26.65	-49.41	-8.14	94	80474
87.5	110.36	29.22	17.75	108.32	-25.58	26.44	25.67	-47.15	-7.89	94	80474
112.5	106.54	28.34	17.29	104.92	-24.30	25.67	24.71	-46.82	-7.66	95	80474
137.5	100.60	27.71	16.98	99.36	-23.02	25.14	23.75	-45.37	-7.47	95	80474
162.5	92.44	27.10	16.72	91.75	-22.05	24.63	22.79	-43.89	-7.23	95	80474
187.5	86.33	26.65	16.49	86.09	-20.51	24.26	22.09	-42.64	-7.02	95	80474
212.5	83.39	26.19	16.28	83.13	-19.22	23.87	22.36	-40.50	-6.81	95	80474
237.5	81.32	25.67	15.91	81.03	-18.19	23.38	21.03	-39.22	-6.69	95	80474
262.5	81.29	24.98	15.54	80.98	-16.86	22.72	19.63	-38.88	-6.46	95	80474
287.5	79.71	24.12	15.21	79.35	-16.65	21.91	19.42	-38.10	-6.18	94	80474
312.5	75.37	23.07	14.83	75.07	-18.38	20.94	19.13	-36.89	-5.84	94	80474
337.5	68.84	21.97	14.37	68.64	-21.01	19.94	18.89	-34.92	-5.46	94	80474
362.5	68.06	20.84	13.78	66.51	-20.81	18.92	19.63	-32.98	-4.97	94	80474
387.5	65.05	19.54	12.93	63.69	-18.85	17.73	19.09	-31.97	-4.35	93	80474
412.5	62.05	18.11	11.99	61.45	-17.16	16.35	18.57	-30.72	-3.58	92	80474
437.5	61.61	16.98	11.33	61.05	-20.34	15.12	18.52	-29.48	-2.82	91	80474

Table A1.4 Statistics of Dataset at Site E. Data are hourly-mean values, interpolated onto a 25m depth grid, a low-pass (72hr) filter has been applied to remove the tidal signal. Data have been extrapolated in the vertical to fill gaps near surface and seabed. Along-channel = positive towards 0.30ºN. Across-channel = positive towards 128ºN. Note “maximum” and “minimum” speeds refer to “most positive” and “most negative” respectively.

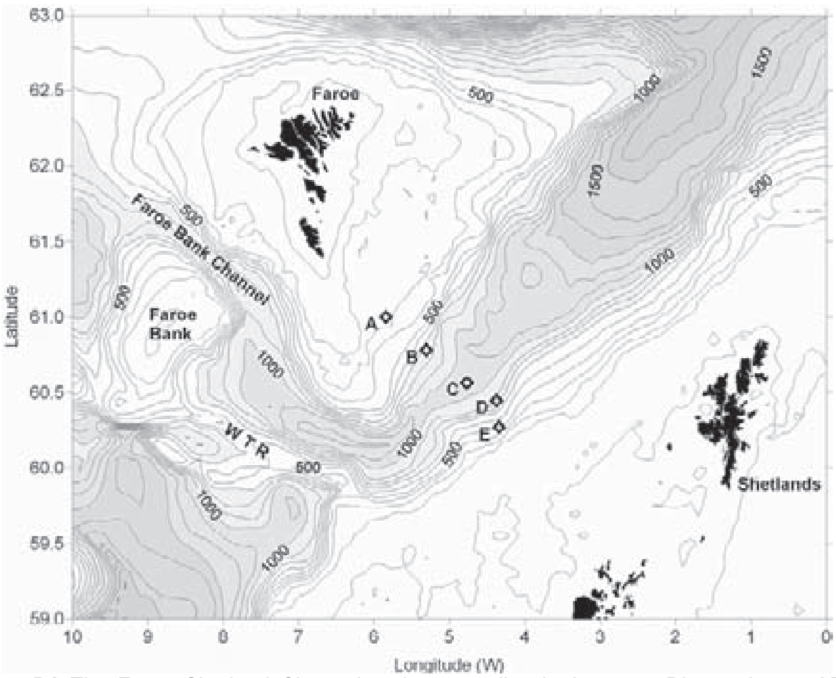

Figure D2 The Faroe Shetland Channel and surrounding bathymetry. Diamonds are ADCP mooring sites (A-E). Bathymetric contours are at 100m intervals.

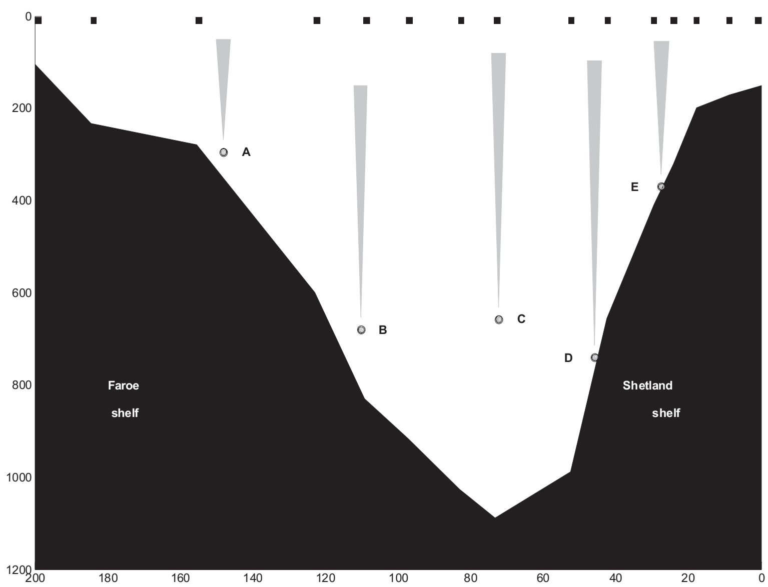

Figure D3. Cross-section of the Faroe-Shetland Channel. Horizontal axis is distance from the Shetland shelf (km). Vertical axis is depth (metres). The position of the standard CTD stations are indicated by square markers. The position of each mooring (A-E) is marked by a circle at the deployment depth of the ADCP. The grey shaded area indicates the maximum range over which each moored instrument made valid measurements

	Average Position		Number of Records	Avg. Depth (m)	Total Record Days	Shortest Record (days)	Longest Record (days)
	Latitude (N)	Longitude (W)					
A	61º 00.0’	5º 50.6’	4	295	1110	199	350
B	60º 47.1’	5º 18.1’	7	785	1944	120	352
C	60º 35.8’	4º 50.6’	7	1071	1970	120	352
D	60º 27.1’	4º 20.6’	21	752	2198	13	231
E	60º 20.0’	4º 10.0’	51	421	3359	14	343

Table D1 Summary of the ADCP datasets showing the average position and water depth at each mooring site, as well as statistics of records.

Current meter observations in the Faroe Shetland Channel

The five ADCP current meter moorings across the Faroe-Shetland Channel have been maintained by FRS and Faroese Fisheries Laboratory on a semi-permanent basis since October 1994 (see Figures D2 and D3 and Table D1). A detailed description of the analysis of these mooring is to be found in Hughes et al. (2004), and a discussion of the effect of mesoscale variability on the strength of the slope current can be found in the report for Deliverable 3.3.

Data analysis

One of the most direct way to investigate Question 1 would be to deploy vertical strings of thermistor chains above the ADCPs to calculate <θU> directly for subsequent comparison with the calculation <θ><U>. However, there are technical difficulties to deploying thermistor strings in the important slope region of the FSC (specifically in the vicinity of Station D) due to fishing activity. So an alternative approach is required, which in the present case is based on the temperature time series measured by sensors located on the housing of ADCPs. As Figures D3 and D4 demonstrate, most of the ADCPs are located in regions where horizontal and vertical temperature gradients are small - moorings B and C are placed below the deep pycnocline; and moorings A and E are in mixed shelf slope regions (mooring A is anyway on the wrong side of the FSC for this investigation). This leaves mooring D, which has been deployed in a range of depths varying from 625 m to 801 m (in general the depth has increased with time). At the greater depth the ADCP is deployed beneath the deep water pycnocline at a level where the temperature gradient is too small. However, for those deployments when the instrument has been above 650 m there is sufficient gradient for an analysis to be undertaken. Only data from these shallower deployments have been used in the analysis giving a total of 44 weekly averages of velocity and temperature, with the temperatures being taken from a depth of 637±2 m.

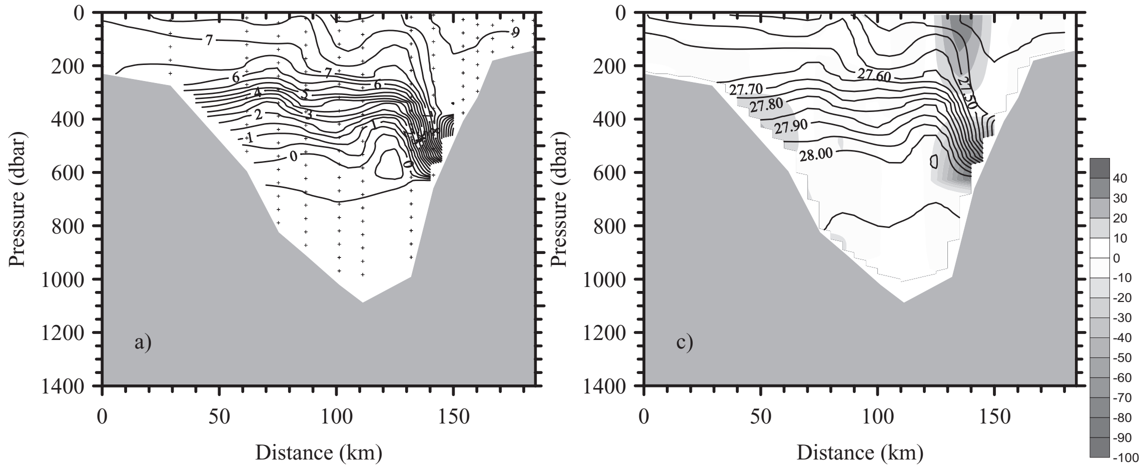

Figure D4. Typical temperature, density and geostrophic current sections along the line of the moorings. Distance is from the Faroe Shelf. Scale bar shows current speed in cms^{-1}. Maximum southward speed is $93cms^{-1}$ near the sea-bed; maximum northward speed is $38cms^{-1}$ at the surface (both near km 150).

	flux	mean of variable	$<U_{500}>$ / cm s^{-1}	flux difference	relevant equation
Q_D^A	13258				(3)
Q_D^B	16806	1.94 ºC	17.8	3548 (~24%)	(4)
Q_θ^A	73461				(7)
Q_θ^B	74295	8.44 ºC	17.8	834 (~1%)	(8)
Q_S^A	313720				(9)
Q_S^B	313788	35.26	17.8	68 (~0.02%)	(10)

Table D2. Fluxes of heat and salt in the surface waters of the FSC using fluctuating (A) and mean (B) estimates of temperature and salt.

Depth integrated flow against ADCP temperature

In the first experiment the surrogate for the heat flux, Q, is used with θ_D, the temperature at 637 m from the ADCP at Station D, and U_{500}, the velocity in the mean direction along the channel (69º T, see Deliverable 3.3) integrated over the top 500 m. Two quantities have been calculated:

$$Q_D^A = <\theta_D U_{500}> \quad (3)$$
$$Q_D^B = <\theta_D><U_{500}> \quad (4)$$

Using these parameters there is a significant difference between the two flux estimates with the 'practical' method (4) suggesting a heat flux that is over 25% greater than the 'true' method (see Table D2). This result suggests that there is a significant correlation between the depth mean current and the temperature at 637 m at Station D. The fact that $Q_D^B > Q_D^A$ means that the faster northward currents are associated with lower sea-bed temperatures. The implications of this result are considered in more detail below, and the question of whether it should be a matter of concern is discussed next.

Depth integrated flow against depth integrated temperature

The fact that the surface current is significantly correlated with the temperature at 637m at Station D, does not necessarily mean that the same applies to the temperatures of the upper 500m of the water column. In order to examine this further, CTD data taken from a regular

FLUXES OF ATLANTIC WATER (VOLUME, HEAT AND SALT) IN THE FAROE-SHETLAND CHANNEL CALCULATED FROM A DECADE OF ACOUSTIC DOPPLER CURRENT PROFILER DATA (1994-2005)

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Key Words: Volume Flux Heat Flux, Salt Flux, Atlantic Water, Faroe-Shetland Channel, Acoustic Doppler Current Profiler (ADCP), Current Meter, Climate Change, Long Term Monitoring

EXECUTIVE SUMMARY

- Current velocity data have been collected in the Faroe-Shetland Channel (FSC) since 1994, using RD Instruments broadband acoustic Doppler current profilers (ADCP), deployed at five standard mooring sites across the FSC. In this report, the data from October 1994 to June 2005 have been used along with hydrographic measurements from standard sections in the FSC, to investigate the transport of heat and salt by Atlantic Water flowing through the FSC.

- This report describes the secondary stage of a study of these current measurements. The original data analysis was described in FRS Report 01/05, “Long term measurements of currents in the Faroe-Shetland Channel (1994-2002)”. All of the preliminary data quality control, processing and analysis techniques described in that report were also used in the extended study described here.

- The individual ADCP records from each individual deployment were quality controlled and analysed, following procedure developed during the preliminary data investigation. Hourly mean vales were interpolated onto a regular 25m depth grid, filtered to remove tidal signals and gaps filled by vertical or horizontal interpolation. This concatenated dataset, referred to as Dataset III, is available on the CD-ROM accompanying this report. Dataset III represents the most complete and coherent collation of ADCP data obtained in the Faroe-Shetland Channel that is available (at this time in 2006) to the oceanographic and modelling community. The data set is a compilation of data obtained both by the research and offshore oil and gas sectors.

- The mean along-channel speeds averaged over the entire record (1994-2005) confirm the picture of a barotropic slope current at the Scottish shelf edge, with reverse flows below the slope current offshore, and reversed flow at the surface towards the Faroese side of the Channel. There is no strong evidence for a seasonal cycle in the upper layers. There appears to be some seasonal variability on current speed on the shelf edge between 400-600m, this is thought to be related to the seasonal variability in the depth of the pycnocline. The linear trends calculated from the data indicate a reduction in current speeds on the shelf. However the high degree of variability in the measurements means that trends are statistically insignificant using the current data set. This is most likely due to the meso-scale variability present in the FSC (Hughes et al, 2005), coupled with the insufficient mooring resolution to observe this variability correctly.

- September 1994 and May 2005. Although some stations may have been missed due to inclement weather. The average pattern of temperature and salinity in the FSC, clearly shows the core of warm and saline Atlantic Water flowing as a slope current along the edge of the continental shelf on the Shetland side of the FSC. The mean temperature and salinity decrease rapidly with depth forming a permanent thermocline and halocline at an average depth of between 350-500m. This feature is deeper on the Shetland shelf than the Faroese shelf, as density contours slope down steeply and lie perpendicular to the Scottish continental slope

- The hydrographic dataset was analysed to investigate seasonal patterns and long term trends in the water masses within the Faroe Shetland Channel. As expected, there is clear seasonality of both temperature and salinity in the upper layers. The seasonal cycle in temperature is consistent with that of solar heating, with maximum temperatures reached in August/September as expected. The seasonal cycle of salinity is out of phase with the temperature cycle and minimum salinities are observed during October. In the intermediate layers there is strong evidence for a seasonal cycle related to the depth of the permanent pycnocline, with maximum temperature and salinity occurring when the pycnocline is at its deepest level in January. Below 700m the seasonal cycle in both temperature and salinity is negligible.

- The CTD data was used to extract a timeseries of the properties (temperature and salinity) of NAW flowing through the Faroe Shetland Channel, and shows that both the temperature and salinity have increased over the period of the study. Temperature and salinity in the upper layers of the Faroe Shetland channel have increased over the period (1994-2005) at a rate of °C per decade. In the deeper waters below the pycnocline, both the temperature and salinity have remained fairly steady over the same period.

- The daily mean along-channel current flow was used to calculate volume heat and salt fluxes through the channel. Following on from the previous study it was thought that some of the original methodology could be improved. In this report, therefore, an improved methodology for filling time gaps was introduced and the flux model was developed further. Daily mean values of this filled dataset were calculated.

- In order to calculate fluxes across the channel, a model grid with 25m depth bins and 10km distance bins and daily timesteps was devised. Both ADCP and CTD data were interpolated onto this common model grid. The interpolated ADCP and CTD were used to calculate the volume, heat and salt fluxes through the channel. The resultant fluxes show a high degree of daily variability which is associated with the hotspot of mesoscale variability identified along the section. The results from the data indicate on overall reduction in the volume heat and salt flux, but although this may appear significant when compared to mean values, the daily variability is such the overall results do not have any statistical significance. Further monitoring is necessary at these locations to confirm these initial findings.

- The analysed datasets have been included on a CD-ROM for distribution between partners in the EU funded project MOEN (Meridianal Overturning with the Nordic Seas – EVK2-CT-2002-000141). The datasets are provided in ASCII format as well as MATLAB format. MATLAB code has also been provided to allow the datasets to be easily imported. This project is part of the Scottish Executive funded ROAME AE1190 “Oceanic Transport around Scotland” and relates to Task1: Transport Measurements.

FLUXES OF ATLANTIC WATER (VOLUME, HEAT AND SALT) IN THE FAROE-SHETLAND CHANNEL CALCULATED FROM A DECADE OF ACOUSTIC DOPPLER CURRENT PROFILER DATA (1994-2005)

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Site	File Stem	Source	Start Date	End Date	Water Depth	Inst. Depth	Bin Length	Latitude (N)		Longitude (W)	
B	NWSB0107	FFS	08-Jul-01	15-Jun-02	775	667	25	60	47.100	5	18.800
B	NWSB0209	FFS	08-Sep-02	17-Sep-03	772	664	25	60	47.094	5	19.258
B	NWSB0307	FFS	06-Jul-03	14-Jun-04	675	675	25	60	47.000	5	17.981
B	NWSB0407	FFS	03-Jul-04	22-May-05	678	678	25	60	47.000	5	18.262
C	NWSC0107	FFS	07-Jul-01	16-Jun-02	1073	659	25	60	34.150	4	46.772
C	NWSC0207	FFS	08-Jul-02	17-Jun-03	1066	652	25	60	34.200	4	46.700
C	NWSC0307	FFS	06-Jul-03	14-Jun-04	1060	646	25	60	33.390	4	46.167
C	NWSC0407	FFS	04-Jul-04	22-May-05	1068	649	25	60	33.958	4	45.775
D	NWSD0110	FRS	13-Oct-01	17-May-02	813	801	25	60	27.070	4	22.490
D	NWSD0205	FRS	24-May-02	25-Sep-02	804	799	25	60	26.990	4	22.560
D	NWSD0209	FRS	30-Sep-02	30-Apr-03	802	797	25	60	27.012	4	22.296
D	NWSD0305	FRS	03-May-03	22-Sep-03	800	795	25	60	26.930	4	22.130
D	NWSD0309	FRS	25-Sep-03	14-May-04	817	813	25	60	27.200	4	22.650
D	NWSD0405	FRS	09-Jun-04	NO DATA							
D	NWSD0410	FRS	13-Oct-04	14-May-05	805	800	25	60	27.020	4	22.540
E	NWSE0110	FRS	13-Oct-01	30-Dec-01	447	435	10	60	16.540	4	19.970
E	NWSE0205	FRS	24-May-02	25-Sep-02	449	444	10	60	16.500	4	20.000
E	NWSE0209	FRS	30-Sep-02	30-Apr-03	445	440	25	60	16.530	4	20.000
E	NWSE0305	FRS	03-May-03	22-Sep-03	452	447	25	60	16.870	4	19.510
E	NWSE0309	FRS	25-Sep-03	14-May-04	447	442	25	60	16.570	4	20.100
E	NWSE0405	FRS	09-Jun-04	10-Oct-04	459	454	10	60	16.920	4	20.310
E	NWSE0410	FRS	13-Oct-04	14-May-05	448	443	10	60	16.610	4	20.020

Table 2.1 Details of all individual NWOCE instrument deployments used in the final data analysis.
Sources: FFL – Faroese Fisheries Laboratory, Torshavn.
FRS - Fisheries Research Services, Aberdeen.

2 CURRENT VELOCITY (ADCP) DATA COLLECTION AND QUALITY CONTROL

Current velocity data analysed in this report were collected between 1994 – 2005, using RD Instruments (RDI) broadband acoustic Doppler current profilers (ADCP), deployed at five standard mooring sites (A to E) across the FSC (Figure 1.1). The initial deployments were undertaken as part of the Nordic-WOCE (NWOCE) project, with later deployments being part of the EU funded VEINS and MAIA projects. Two of the moorings, situated on the Shetland shelf of the Channel are serviced by the FRS Marine Laboratory. Since 2003, these ADCP moorings have been deployed as part of an FRS project to monitor Oceanic Transport around Scotland, funded by the Scottish Executive under the ROAME AE1190.

A preliminary investigation of the data was undertaken during 2003, results from data collected between September 1994 to June 2002 were presented in Fisheries Research Services Collaborative Report No 01/05 which also included an initial estimate of fluxes within the FSC. The data analysed for this final report includes all of the data presented in the preliminary report plus additional measurements made between June 2002 and June 2005.

The moorings at sites A and E were deployed in 300-450m of water, situated at the edge of the Faroese and Scottish continental shelves. Moorings at sites B and D were deployed in 700-800m of water on the continental slope at either side of the FSC. The mooring at site C was deployed in a water depth of around 1100m towards the centre of the FSC. The design of each mooring was determined by the water depth, instrument frequency and fishing activity at each mooring site. The Faroe-Shetland Channel is approximately 200km wide across the section occupied by the ADCP moorings. The two ADCPs on the Shetland shelf were deployed fairly close together, with only 18km horizontal separation. Further into the centre of the FSC, the moorings were further apart, with 26km between site D and site C and then 38km from site C to site B and again from site B to site A (Figure 1.2). Further information about the ADCP deployments and typical mooring designs for each site are described in FRS Report 01/05 (Hughes et al, 2005).

3 CURRENT VELOCITY (ADCP) DATA ANALYSIS AND INVESTIGATION

3.1 Preliminary ADCP Data Processing

Preliminary data quality control for ADCP data collected between June 2002 and June 2005 was undertaken as described in FRS Report 01/05 (Hughes et al, 2005). As discussed in the preliminary report there were some seasonal and daily patterns of data loss. Following the initial quality control and processing stages, velocity data from individual ADCP deployments at each site in the FSC were amalgamated to make five contiguous datasets, one for each mooring site, each 10 years long and of standard record (one hour) and depth (25m) interval using the following procedures:

Hourly Mean

Firstly, each dataset was averaged to produce hourly-mean values, creating a standard record interval for all records. As the individual records had different sampling intervals and averaging periods, care was taken to centre the records as closely as possible to the hour when averaging was necessary. (i.e. the 0900 record, if averaged represents the period 0830 to 0930)

Gridding

Each filtered, hourly record was then linearly interpolated onto a regular vertical grid with 25m spacing, such that the uppermost bin was centred at a depth of 12.5m. However, at this stage no vertical extrapolation was performed either above the uppermost valid bin for any hourly mean record, or below the lowest valid bin. At each site, all of the available records were then merged to create five individual data-sets, each one containing hourly mean northerly and easterly values of low-pass filtered current speed averaged over the 25m bins. Missing data were represented by a null data marker (NaN).

Filtering

Fluctuations at tidal frequencies were removed by filtering the data using a 72-hour low pass filter (Godin, 1968). Due to the non-stationary nature of the tides in the FSC this method was chosen to be the most satisfactory way of removing the tidal component (Hughes et al, 2005).

Along-Channel Direction

The data were then resolved into along- and across-channel components. For the purpose of this analysis, the along-channel axis was defined as 038° clockwise from true North. This direction is perpendicular to the standard hydrographic section; the Fair Isle–Munken (FIM) line. The FIM line was established at this position as it crossed the complex bathymetry of the region orthogonally.

Data Analysis - Gap filling

The datasets were extrapolated to the surface and seabed by extrapolating the vertical shear for each profile. One problem with this method is that it is likely to over estimate near-surface and near-bed maxima and to reduce this effect, a threshold was set. When vertical shear exceeded these thresholds, a different set of criteria were used to extrapolate the profiles, limiting the maximum values. In the surface layers, if shear exceeded the threshold, the threshold value was used to extrapolate the profiles. In the near-bed layers at B,C and D, if the shear exceeded the threshold level, profiles were extended by reducing shear as a % of the water depth to approximate a power law profile. The shear threshold was set at a value representing 0.1% of all the records, therefore only a small number of profiles were limited in this way. Surface shear thresholds were calculated separately at each site, typical values were 0.08-0.14 cm s^{-1} m^{-1} near the surface and 0.04–0.23 cm s^{-1} m^{-1} in the deeper layers.

Concatenating datasets.

The above analysis resulted in a basic merged dataset at each mooring site. The dataset for 2002-2005 was combined with the earlier dataset created for 1994-2000 to create a single long timeseries at each ADCP site. This data set will be referred to as Dataset III.

Figure 3.1 shows how the original data records have been combined to create a single amalgamated dataset. At site C, data from conventional current meters (Aanderaa RCM7's) were added into the merged dataset. For sites D and E, records from the NWAG and FRS instruments often overlapped in time, and so the data were merged by giving priority to the records having valid data over the greatest depth range. This generally resulted in FRS records being chosen in preference to NWAG records. Although the depth range of overlapping records may have been different, only one record was used to fill each sample period, thereby ensuring that the vertical integrity of the dataset was maintained.

From Table 3.1, it can be seen that only four deployments took place at mooring site A. An assessment of the preliminary results from A revealed that the fluxes at this site were negligible (FRS Report 01/04) and in 2001, the ADCP was redeployed in another position to the north of Faroe.

Between 8 and 9 continuous, full-year deployments populate the record at mooring sites B and C, augmented by 2 shorter deployments at site C by Aanderaa current measurements. During a single deployment at site C (August 1997 – June 1998) the ADCP was inadvertently deployed in the downward looking orientation. At both B and C, single deployments (B: August 1997 – June 1998, C: July 1999 – June 2000) had limited depth ranges, because of a malfunction of the instrument.

Deployments at sites D and E proved most problematic, particularly in the period prior to 2002. Despite 6 monthly servicing intervals, moorings were sometimes lost. This was due partly to intense fishing activity, and partly to extremely rapid and unexpected corrosion of stainless steel mooring components. The imposition of an oil development area proved both a problem and an advantage. Although the position of mooring site E had to be moved once the oil development area was created (Figure 1.1), the drilling rigs within the development area often had rig-mounted downward-looking ADCP's fitted, and these provided gap-filling data. At mooring site E, most of the final record is populated with such data. Since 2002, a single ADCP was deployed at mooring E. However, there have been some limits to its range.

Before 1999, there are limited periods when data was available at all four sites (B-E) simultaneously. This situation improved in the period since 1999 and in total there were 1785 days when data were available at all four sites B to E.

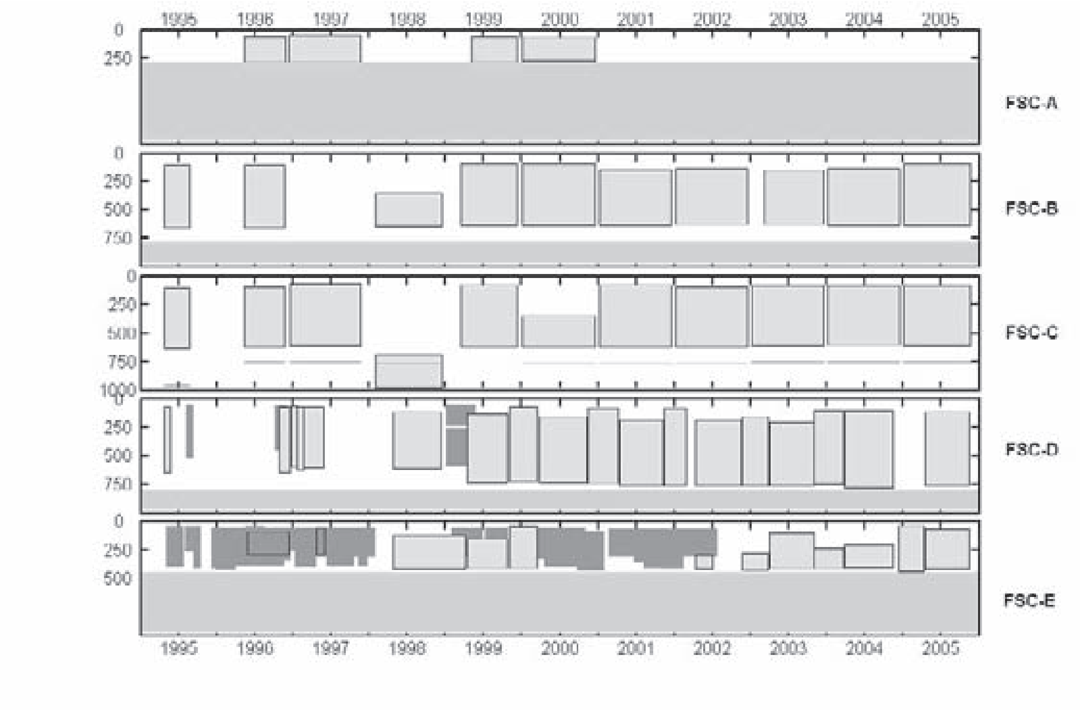

Figure 3.1 Record length and depth range (metres) of each available ADCP dataset for mooring sites A to E. Moored, upward-looking ADCP data is indicated by medium grey, outlined boxes. Single point recording current meter are shown as individual lines. Rig-mounted, downward looking ADCP data used at sites D and E are shown as dark grey shading, with not outlining. Continuous light grey shading indicates the depth of the seabed at each of the sites.

	Average Position				Number of Records	Avg. Depth (m)	Min. Depth (m)	Max. Depth (m)	Total Record Days	Shortest Record (days)	Longest Record (days)
	Lat. (North)		Long. (West)								
A	61	00.0	5	50.6	4	295	293	298	1018	199	350
B	60	47.1	5	18.1	10	785	775	790	2890	120	352
C	60	35.8	4	50.6	22	1071	1066	1076	3639	120	352
D	60	27.1	4	20.6	24	752	562	940	2961	28	232
E	60	20.0	4	10.0	59	421	313	506	4566	14	343

Table 3.1 Summary of original data records showing the average position and water depth at each mooring site, as well as statistics of records.

3.2 ADCP Data Analysis: Statistics, Seasonality and Trends

The basic characteristics of the along- and across-channel data at each mooring site were determined through simple statistical analysis of the hourly mean, filtered and interpolated dataset (Dataset III).

Basic Statistics

Basic descriptive statistics were derived from the merged hourly filtered dataset, after vertical interpolation. It should also be noted that the data coverage from each site is over different periods, so maximum values are not directly comparable as they will be caused by single events that may not have been observed at all sites. Figure 3.2 shows the basic statistics derived from the whole of the data gathering period, at each of the five mooring sites. Further statistics for sites B to E are also presented as Tables A1.1-A1.4.

The statistics of the updated dataset were compared with those calculated from the interim data, as published in FRS Report 01/04. Figure 3.2 shows profiles of the mean along-channel current speed from the updated dataset (1994-2005) compared to that calculated from the interim dataset (1994-2002). Although there are small differences in the values, they compare very well. This means that despite the high daily and annual variability, the timeseries are long enough to determine relatively stable mean values.

From these statistics it is clear that site E, at a depth of 421m on the Shetland side of the channel, obviously lay within the slope current, with average along channel speeds varying from a minimum of 20cms^{-1} at 300m depth, to 30cms^{-1} in the upper layers. Directional stabilities exceeded 90% at all depths. Cross-channel flow at E (defined by this analysis as perpendicular to 038° N) was off-shelf at all depths, with speeds of between 2cms^{-1} near the bed to 8cms^{-1} near to the surface.

At the deeper site D (752m), poleward average along-channel flow occurred down to 525m. Below this depth the average flow reversed. Mean speeds within the poleward flow in the upper layer were between 20-30cms^{-1}, with directional stabilities in the upper layer typically 65%. However, in the along-channel direction, mean speeds were 20cms^{-1}. The lower reverse flow reached maximum average speed of 15cms^{-1} at 670m, with a secondary maximum in stability of typically 40%.

Weak along-channel speeds and current stabilities were found at mooring site C (depth 1071m). On average, poleward flow occurred above 350m, with reverse flow below. In the upper layer, stabilities did not exceed 30%, and average along-channel current speeds were less than 3.5cms^{-1}. Cross-channel flows in the upper layer were greater than along-channel flows, with speeds typically 6.5cms-1. Although cross-channel flow was toward Faroe at all depths, the same vertical shear as observed at D and E was also observed at C.

The directional stability of the flow increased towards the bed at C, implying the lower layer flows were more consistent in direction than the upper layers. This was also observed at mooring site B (depth 785m), with unstable flow near the surface (stability 25%) and directional stability increasing to a maximum nearer the bed (60% at 630m). Average along-channel speeds were directed towards the Atlantic at all depths, and cross-channel flow was directed towards Faroe at all depths. Average speeds of both components were fairly constant throughout the water column, with along-channel speeds of typically 3cms1, and cross channel speeds of 2cms-1.

No additional data was collected at site A after 2001, and therefore updated statistics cannot be presented here. As described in the preliminary report, mean along channel speeds were less than 3cms^{-1} and cross channel speeds were less than 1.5cms^{-1}, and directed towards Faroe.

Trends

The long-term trend in the dataset at each mooring site was derived by fitting a straight line to the data. The results are summarised in Table 3.2 and presented fully in Appendix A, Tables A1.5-A1.8. Figure 3.3 shows example time series along with the fitted trend, at the 100m depth level for moorings B-E. Over the 10-year measurement period, the trends were generally small compared to the overall variability. The calculated long-term trend was negative in all layers at mooring site E and D (-1.4 and -0.5cms^{-1}/year) and also in the deeper layers at sites C and B (-0.4 and -0.1cms^{-1}/year).

The trend was positive in the upper layers at C and B (0.2 and 0.9cms^{-1}/year respectively). However, these calculated trends represent a very small proportion of the overall variability (2-5%) and therefore they cannot be said to have any statistical significance. The overall pattern of the trends compare well to those calculated from the preliminary dataset (FRS Report 01/04) but the calculated values differ. This is not too surprising, when considering the high variability in current speeds on daily, monthly and annual timescales.

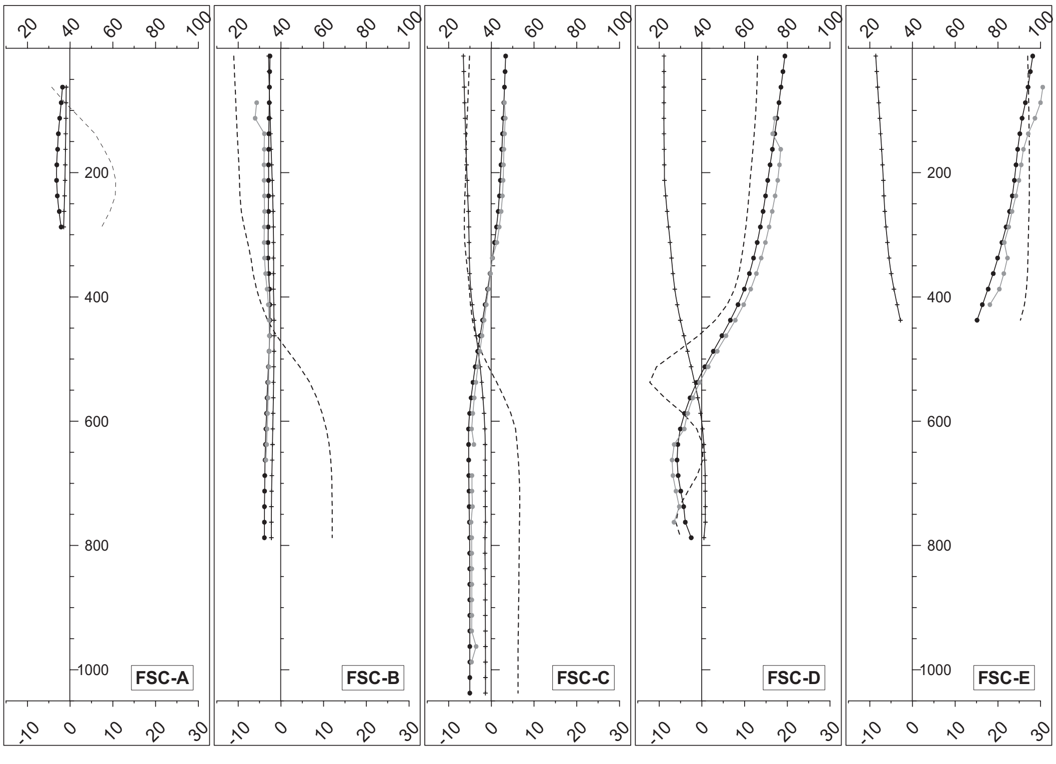

Figure 3.2 Filtered, along- and across-channel current statistics at ADCP sites A to E in the Faroe-Shetland Channel. Statistics calculated using hourly mean values, interpolated onto a 25m depth grid, and filtered using a low-pass (72hr) filter to remove tidal signal. Data have been extrapolated in the vertical to fill gaps near surface and seabed. Lower Axis: Circles show mean along-channel current speed, crosses show mean across-channel current speed (cms^{-1}). Upper Axis: Dotted line shows stability (%). Red line shows mean along-channel current speed as calculated from the interim dataset (September 1994 to June 2002)

ADCP Site	Depth Level	Mean Along-channel (cms^{-1})	Standard Deviations (cms^{-1})	Stability	Trend (cms^{-1}/year)	Amplitude Of Seasonal Cycle (cms^{-1})	Month Of Max
B	Near-Surface	-3	± 19	18%	+0.9	2	5
	Near-Bed	-4	± 6	64%	-0.1	-	-
C	Near-Surface	+3	± 19	30%	+0.2	2	6
	Lower Layer	-5	± 9	53%	-0.4	1	7
D	Near-Surface	+19	± 24	66%	-0.5	4	5
	Near-Bed	-4	± 16	29%	-0.4	5	9
E	Near-Surface	+28	± 19	94%	-1.4	2	3
	Near-Bed	+18	± 14	93%	-0.4	1	11

Table 3.2: Summary of near-surface (37.5 m) and near-bed (bottom -50 m, except at C where data is from lower layer) mean along-channel current speeds at moorings B-E. Also shown are standard deviations, stability, overall trend, amplitude at seasonal cycle and month of maximum.

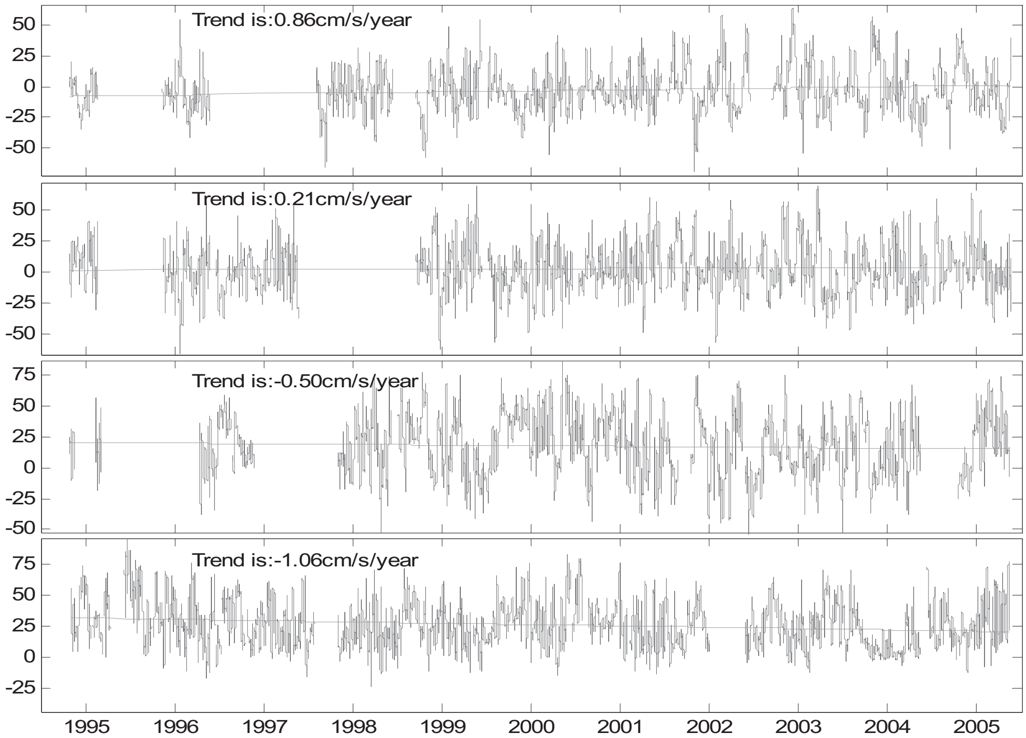

Figure 3.3 Along -channel current speed at the 100m level at ADCP sites B (upper) to E (lower) in the Faroe-Shetland Channel. The data (blue) are hourly mean values, interpolated onto a 25m depth grid, and filtered using a low-pass (72hr) filter to remove tidal signal. The red line shows the linear trend.

Despite the uncertainties, the results suggest that during the measurement period there was some reduction in average current speeds on the shelf. A corresponding increase in the centre of the channel is less pronounced. Flow towards the south west at mooring B (outflow from the Nordic Sea towards the Atlantic) also appeared to decrease during the observational period, although, again the trend is less than the variability.

Seasonality

A seasonal cycle was also derived, using a least squares analysis to fit a sinusoidal cycle with a period of 365 days. The results are presented in Tables A1.5-A1.8.

There is no strong evidence for a seasonal cycle in the upper layers. For sites B and C, the results of the seasonal cycle analysis are significantly different to those calculated from the interim dataset. In the upper layers at D and at site E, the seasonal coefficients are more consistent with those of the interim analysis. However, it is likely that any seasonal cycle is masked by the scale of the mesoscale variability and possibly biased by the seasonal pattern of data loss in the near surface layers (FRS Report 01/05).

There does appear to be a coherent pattern of seasonality in the lower layers at site D. These results are more significant than those at any other site and are consistent between the two sets of analysis. Below 600m, a seasonal cycle with an amplitude of 5cms^{-1} explains 5% of the variability in current speed. The seasonal cycle at this depth reaches a maximum in September. This is probably related to the seasonal variability of the depth of the permanent thermocline, with stronger currents occurring at these depths during periods when the interface is also deeper.

Summary

Dataset III represents the most complete and coherent collation of ADCP data obtained in the Faroe-Shetland Channel that is available (at this time in 2006) to the oceanographic and modelling community. It contains individual, hourly means of fitted along- and across-channel current speed, interpolated onto a fixed grid, both in time (centred hourly) and space (25m bins). The data set is a compilation of data obtained both by the research and offshore oil and gas sectors.

The mean along-channel speeds averaged over the entire record (1994-2005) confirm the picture of a barotropic slope current at the Scottish shelf edge, with reverse flows below the slope current offshore, and reversed flow at the surface towards the Faroese side of the Channel. The high degree of variability means that trends and seasonality are statistically insignificant using the current data set. This is most likely due to the meso-scale variability present in the FSC (Hughes et al, 2005), coupled with the insufficient mooring resolution to observe this variability correctly.

3.3 Secondary ADCP Data Processing: Cross Channel and Temporal Interpolation

As shown in Figure 3.1, the hourly mean filtered dataset at each site has gaps where data were unavailable due to instrument servicing or data loss. In order to calculate fluxes, it was desirable to produce a regular timeseries of daily mean values with gaps filled wherever possible. In the interim report, gaps in time were filled using a method for correlating data across the channel. On further investigation it was found that the interpolation method initially chosen may have introduced bias into some of the interpolated data and, therefore, an improved method was investigated. However, the improved method retained the basic concept of the original method, and data were interpolated in the across channel direction from the irregularly spaced measured sites (A-E) onto a 20 station, grid with a regular 10km interval, effectively creating pseudo-ADCP records between the original moorings.

Due to the nature of the dataset, and the high mesoscale variability in this region of the Faroe-Shetland Channel, any interpolation method may bias the resulting data and therefore the results. To try and avoid bias, and to assess the sensitivity of the flux calculations to different methods, two different interpolation models ('complex' and 'simple') were chosen, each with three permutations for filling temporal gaps, giving 6 sets of final results for comparison. In the simple model the data were interpolated along depth surfaces and in the complex model the data were interpolated along isopycnal surfaces.

Complex Interpolation Model (A)

In the complex model, data were interpolated in the cross-channel direction from 5 measured gridpoints onto a regular 10km spaced grid by interpolating along isopycnal surfaces. We know that Atlantic Water flows through the FSC as a slope current, driven by the joint effects of the bathymetry and the along channel density gradient (Huthnance, 1984). In the along channel direction therefore, the currents flow along isopycnal surfaces.

However, we also know that in the channel the poleward flowing slope current is separated from deeper waters by a strong pycnocline. In the complex model we assume that the pycnocline marks the boundary where changes in current occur, and that by interpolating in the across-channel direction along isopycnal surfaces we avoid merging current data across this pycnocline.

Simple Interpolation Model (B)

In the simple model, data were interpolated in the cross channel direction from measured gridpoints onto a regular 10km spaced grid by interpolating along equal depth surfaces.

Temporal Gap Filling

During the measurement period there are occasions when no data were available from one or more of the ADCP's. Current speeds at site A were low and not strongly correlated with the other ADCP's, therefore, although these data are included where they are available they are not used when determining thresholds for interpolation. At any one time, the confidence we have in the resulting interpolated data increases with the number of original datsets available to interpolate between. Three separate datsets were produced for each interpolation model, each setting a different threshold for the number of ADCP's included in the dataset. Dataset 1, allows interpolation if there are 2 or more ADCP's available and therefore produces the longest timeseries, although we have least confidence in these data. Dataset 3 only allows interpolation when all 4 ADCP's are present and therefore we have most confidence in these data but the timeseries is of limited length. Figure 3.4a-c illustrates graphically how the datasets are interpolated in each of these 3 methods. Table 3.3 shows the how the six different sets of results derive from the derived from 2 models and 3 permutations of temporal threshold.

Daily Mean Analysis

Daily mean values were calculated as the average of 24 discrete hourly mean values, between 00 to 23 hours. Daily means were calculated from the fully interpolated dataset to create the final daily mean dataset (Dataset V).

The summary datasets from this analysis have been included on a CD-ROM that accompanies this report. Table 3.4 describes the ADCP datasets included on that CD-ROM.

Forecast for the Transocean Rather Report 1

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Chevron — **Issued: 12-Apr-2007 03:46UTC**

Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time:

Synopsis

There were no significant changes.

High pressure will remain over the North Sea through Sunday which will force low pressure systems to move west and north of your location. A cold front may push through on Monday, followed by a decrease in conditions. Moderate to rough seas will persist.

Summary of Forecast Conditions

Max Sig Wave(Hs): 4.0m on 12-Apr at 12:00 UTC
Max 10m Wind: 28kts on 12-Apr at 12:00 UTC
48hr Fog Risk (= visibility < 0.5NM): Low
48hr Lightning Risk: Nil.
Sea Surface Temperature: 8° C
CONF = Swells from more than one direction
Wintry showers: sleet, snow and/or hail

Forecaster Jolene Hrinda

8 to 10 Day Synopsis

Low pressure moving near Iceland on Thursday should move near your location on Friday. Strong to near gale force winds are expected in the wake of this low for Saturday. 10m winds: N-NW moderate to fresh Thursday, incr'g NW-N strong Friday, and N-NE near gale force Saturday.

Confidence — Confidence is MODERATE to HIGH until Saturday due to persisting ridge of high pressure over the North Sea and British Isles then MODERATE due to uncertainty in track / intensity of low pressure forecast over Iceland.

Time (UTC)	Weather	Winds					Waves							Vis. (km)
		Dir	10m		50m		Wind Waves		Swells			Sig Hgt (m)	Max Hgt (m)	
			Speed (kts)	Gusts (kts)	Speed (kts)	Gusts (kts)	Dir	Hgt (m)	Dir	Hgt (m)	Per. (s)			
Thu, Apr 12, 2007														
6:00	Fair	SSW	22	28	26	32	SSW	1.7	W	3.0	9	3.4	5.9	5-10
9:00	Fair	SSW	24	30	28	35	SSW	2.0	W	3.0	9	3.6	6.2	5-10
12:00	Fair	SSW	28	35	33	41	SSW	2.6	W	3.0	9	4.0	7.1	5-10
15:00	Fair	SSW	28	35	33	41	SSW	2.6	W	3.0	9	4.0	7.1	5-10
18:00	Fair	SW	28	35	33	41	SW	2.6	WSW	3.0	9	4.0	7.1	5-10
21:00	Fair	SW	24	30	28	35	SW	2.0	WSW	3.2	9	3.8	6.5	5-10
Fri, Apr 13, 2007														
0:00	Light rain/drizzle	SW	22	28	26	32	SW	1.7	WSW	3.2	10	3.6	6.2	1-3
3:00	Light rain/drizzle	SSW	20	25	23	29	SSW	1.4	WSW	3.2	10	3.5	5.8	1-3
6:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	3.0	10	3.4	5.9	5-10
9:00	Fair	SSW	23	29	27	34	SSW	1.9	WSW	3.0	10	3.6	6.1	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	3.0	10	3.4	5.9	5-10
15:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	3.0	10	3.3	5.6	5-10
18:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	10	3.0	5.1	5-10
21:00	Fair	S	18	23	21	26	S	1.2	WSW	3.0	10	3.2	5.4	5-10
Sat, Apr 14, 2007														
0:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
3:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
6:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	2.8	11	3.1	5.3	5-10
12:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	2.8	11	3.1	5.3	5-10
18:00	Fair	SW	16	20	19	23	SW	1.0	WSW	2.8	11	3.0	4.9	5-10
Sun, Apr 15, 2007														
0:00	Fair	SSW	16	20	19	23	SSW	1.0	WSW	2.8	11	3.0	4.9	5-10
6:00	Fair	SSW	18	23	21	26	SSW	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	2.2	10	2.8	4.9	5-10
18:00	Sctd Showers	SW	20	25	23	29	SW	1.4	WSW	2.0	10	2.4	4.3	2-7
Mon, Apr 16, 2007														
0:00	Sctd Showers	WSW	14	18	16	20	WSW	0.9	WSW	2.0	10	2.2	3.7	2-7
6:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	WSW	1.8	10	2.2	3.7	2-7
12:00	Sctd Showers	WSW	20	25	23	29	WSW	1.4	WSW	1.8	10	2.3	4.0	2-7
18:00	Sctd Showers	W	22	28	26	32	W	1.7	WSW	2.0	10	2.6	4.7	2-7
Tue, Apr 17, 2007														
0:00	Sctd Showers	W	18	23	21	26	W	1.2	W	2.2	9	2.5	4.3	2-7
6:00	Sctd Showers	WNW	16	20	19	23	WNW	1.0	W	2.0	9	2.2	3.8	2-7
12:00	Sctd Showers	NNE	18	23	21	26	NNE	1.2	W	2.0	9	2.3	4.0	2-7
Wed, Apr 18, 2007														
0:00	Sctd Showers	NNE	14	18	16	20	NNE	0.9	CONF	2.2	9	2.4	4.0	2-7
12:00	Sctd Showers	NNE	14	18	16	20	NNR	0.9	CONF	2.2	9	2.4	4.0	2-7

Criteria Levels	None Set	Over Criteria Level	Within 20% of Level

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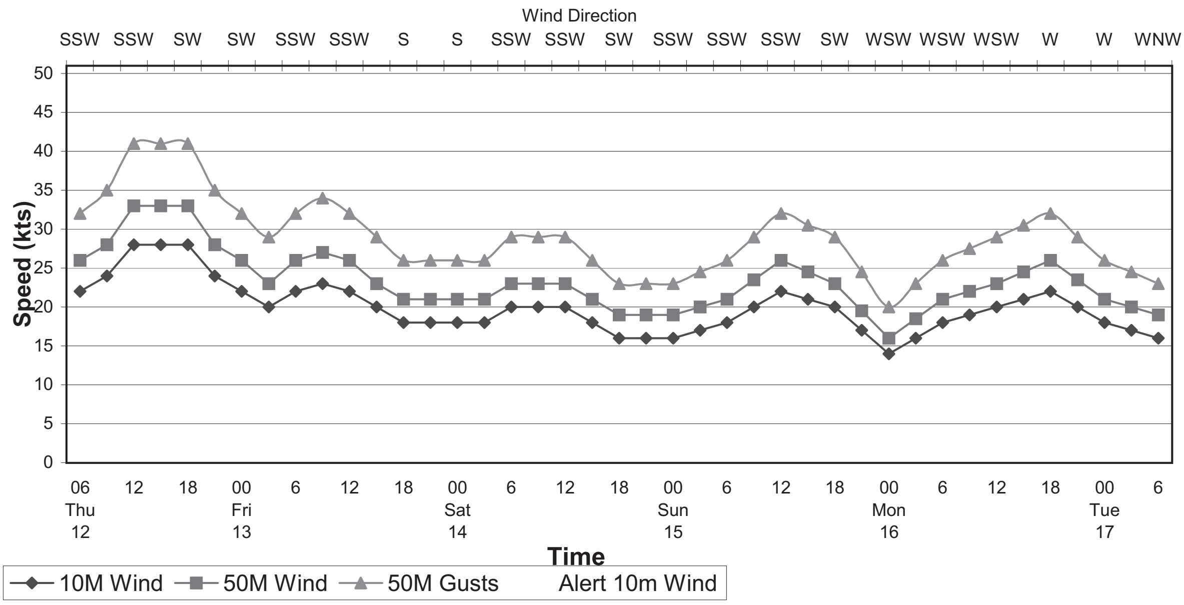
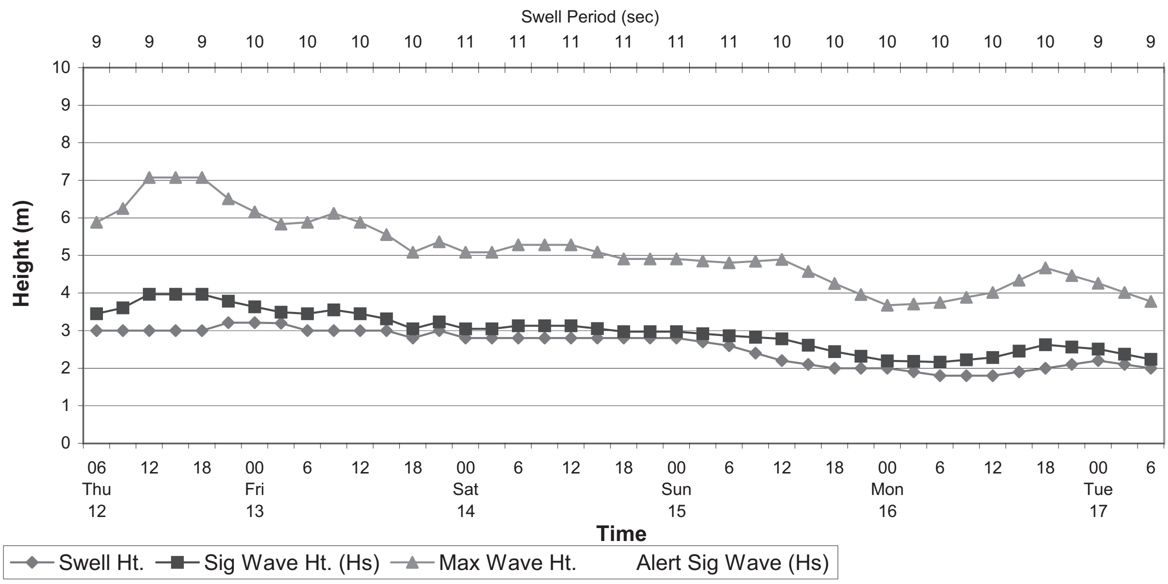
Chevron	**Issued: 12-Apr-2007 03:46UTC**
Forecast for the Transocean Rather Valid for Rosebank Field (61° 01'N 003° 48'W)	
Current Location: Lat: 61° 01' N Lon: 003° 48' W Time	

5-Day Wind Graph



5-Day Wave Graph



Forecast for the Transocean Rather Report 2

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E-Mail: wwt@wilkensweather.com

Chevron — **Issued: 12-Apr-2007 11:48UTC**

Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time:

Synopsis

Seas were increased on Tuesday and Wednesday.

High pressure will remain centred over the Baltic Sea today and tonight and a ridge of high pressure will continue to extend westwards into the North Sea and British Isles during the next few days and into the weekend / early next week. During this time low pressure will continue to be centred over Iceland with a trough extending southeastwards towards the Shetland Isles.

Summary of Forecast Conditions

Max Sig Wave(Hs): 4.0m on 12-Apr at 21:00 UTC
Max 10m Wind: 28kts on 12-Apr at 18:00 UTC
48hr Fog Risk (= visibility < 0.5NM): Low
48hr Lightning Risk: Nil.
Sea Surface Temperature: 8° C
CONF = Swells from more than one direction
Wintry showers: sleet, snow and/or hail

Forecaster Natalie Eaton

8 to 10 Day Synopsis

Low pressure will remain over Iceland on Thursday and high pressure will build east to the west of Scotland. Low pressure will deepen east into the Norwegian Sea on Friday with a ridge of high pressure returning across your location on Saturday. 10m winds: NNW fresh on Thursday, backing WNW strong to Near Gale force on Friday and W moderate to fresh on Saturday.

Confidence: Confidence is MODERATE to HIGH until Saturday due to persisting ridge of high pressure over the North Sea and British Isles then MODERATE due to uncertainty in track / intensity of low pressure forecast over Iceland.

Time (UTC)	Weather	Winds Dir	10m Speed (kts)	10m Gusts (kts)	50m Speed (kts)	50m Gusts (kts)	Wind Waves Dir	Wind Waves Hgt (m)	Swells Dir	Swells Hgt (m)	Swells Per. (s)	Sig Hgt (m)	Max Hgt (m)	Vis. (km)
Thu, Apr 12, 2007														
18:00	Fair	SSW	28	35	33	41	SSW	2.6	WSW	2.8	9	3.8	6.9	5-10
21:00	Fair	SW	26	33	31	38	SW	2.3	WSW	3.3	9	4.0	7.0	5-10
Fri, Apr 13, 2007														
0:00	Fair	SW	20	25	23	29	SW	1.4	WSW	3.6	10	3.9	6.4	5-10
3:00	Light rain/drizzle	SSW	16	20	19	23	SSW	1.0	WSW	3.4	10	3.5	5.8	1-3
6:00	Light rain/drizzle	SSW	16	20	19	23	SSW	1.0	WSW	3.0	11	3.2	5.2	1-3
9:00	Fair	S	18	23	21	26	S	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	S	16	20	19	23	S	1.2	WSW	2.6	11	2.9	4.8	5-10
15:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.6	11	2.9	4.8	5-10
18:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.8	11	3.0	5.1	5-10
21:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
Sat, Apr 14, 2007														
0:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
3:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
6:00	Fair	S	22	28	26	32	S	1.7	WSW	2.7	11	3.2	5.5	5-10
9:00	Fair	SW	22	28	26	32	SW	1.7	WSW	2.7	11	3.2	5.5	5-10
12:00	Fair	SW	20	25	23	29	SW	1.4	WSW	2.9	11	3.2	5.4	5-10
15:00	Fair	SW	16	20	19	23	SW	1.0	WSW	3.0	11	3.2	5.2	5-10
18:00	Fair	SW	12	15	14	17	SW	0.7	WSW	3.0	11	3.1	5.0	5-10
Sun, Apr 15, 2007														
0:00	Fair	S	12	15	14	17	S	0.7	WSW	2.8	11	2.9	4.7	5-10
6:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	2.2	10	2.8	4.9	5-10
18:00	Light rain/drizzle	SW	22	28	26	32	SW	1.7	WSW	2.2	10	2.8	4.9	1-3
Mon, Apr 16, 2007														
0:00	Light rain/drizzle	WSW	16	20	19	23	WSW	1.0	WSW	2.4	10	2.6	4.3	1-3
6:00	Fair	WSW	16	20	19	23	WSW	1.0	WSW	2.2	10	2.4	4.0	5-10
12:00	Fair	WSW	20	25	23	29	WSW	1.4	WSW	2.0	9	2.4	4.3	5-10
18:00	Fair	WSW	18	23	21	26	WSW	1.2	WSW	2.4	9	2.7	4.5	5-10
Tue, Apr 17, 2007														
0:00	Fair	WSW	20	25	23	29	WSW	1.4	W	2.4	9	2.8	4.8	5-10
6:00	Fair	W	18	23	21	26	W	1.2	W	2.4	9	2.7	4.5	5-10
12:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	W	2.4	9	2.7	4.5	2-7
18:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	W	2.4	9	2.7	4.5	2-7
Wed, Apr 18, 2007														
0:00	Sctd Showers	WSW	20	25	23	29	WSW	1.4	CONF	2.4	9	2.8	4.8	2-7
12:00	Fair	WNW	12	15	14	17	WNW	0.7	CONF	2.6	9	2.7	4.4	5-10

Criteria Levels	None Set	Over Criteria Level	Within 20% of Level

NowcastingWilkens
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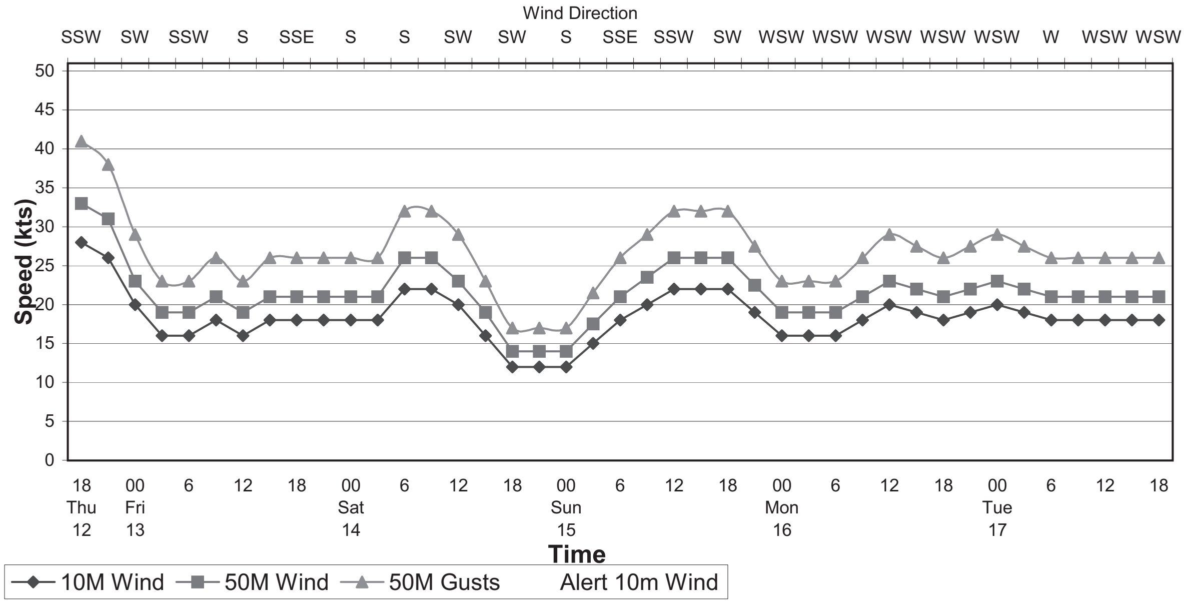
Chevron | **Issued: 12-Apr-2007 11:48UTC**

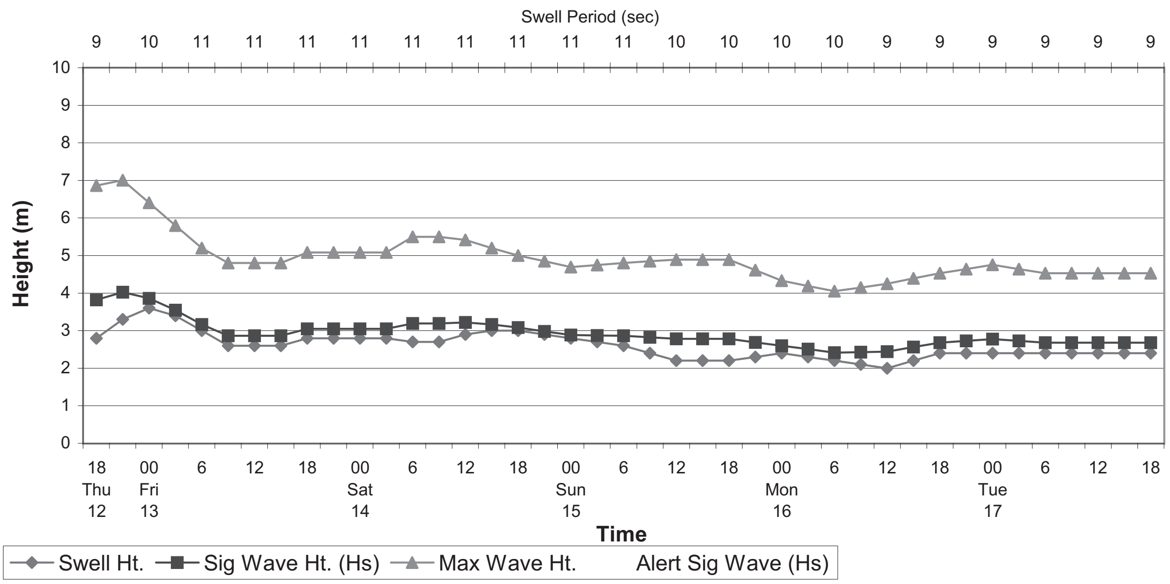
Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time

5-Day Wind Graph



5-Day Wave Graph



7 day Forecast for the Transocean Rather 12.04 Report 1

7-Day Forecast: Chevron - Transocean Rather

Issued At: Thu Apr 12 05:05 GMT

Forecaster: J.P. Lindeboom

Confidence: High

Warnings: Gusts up to 50 kts.

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E-mail: marine@wni.com

Forecast Summary

Risk of Lightning (first 24hrs): Nil

Risk of Fog (first 24hrs): Nil

Sea Surface Temperature: 9 °C

Max Wave Height: 6.4 m (At Fri Apr 13 00:00)

Max Mean Wind Speed at 50m: 38 kts (At Thu Apr 12 15:00)

Synoptic Discussion

High building over the North Sea and Denmark, moving towards the Baltic Sea and Poland on Friday. Low pressure areas moving northeast over Iceland, associated weak fronts passing the forecast area at times. Last low is expected to pass Iceland Sunday evening. Between this low and a developing high near South Greenland cold and unstable air will reach the area from Monday on.

Date	Wind				Wave								Weather	Vis. (m)	Temp (°C)	Cloud Base (ft)
	Dir	10m	50m		Sig Ht (m)	Max Ht (m)	Sea			Swell						
		mean (kts)	mean (kts)	gust (kts)			Dir	Ht (m)	Per (sec)	Dir	Ht (m)	Per (sec)				
Thu Apr 12 06:00	SW	23	34	43	3.4	5.8	SW	2.4	6	W	2.4	10	Cloudy	10000	9	6000
Thu Apr 12 09:00	SW	25	37	47	3.5	5.9	SW	2.5	6	W	2.4	10	Cloudy	10000	9	6000
Thu Apr 12 12:00	SW	25	38	48	3.5	6.0	SW	2.5	6	W	2.5	10	Cloudy	10000	9	6000
Thu Apr 12 15:00	SW	25	38	49	3.6	6.1	SW	2.5	6	W	2.6	11	Cloudy	10000	9	4800
Thu Apr 12 18:00	SW	25	37	47	3.7	6.3	SW	2.4	6	W	2.8	11	Cloudy	10000	9	4600
Thu Apr 12 21:00	SW	23	35	44	3.7	6.3	SW	2.2	6	W	3.0	11	Cloudy	10000	9	4100
Fri Apr 13 00:00	SW	20	30	38	3.7	6.4	SW	2.1	5	W	3.1	10	Fair	10000	9	3200
Fri Apr 13 03:00	SW	18	27	34	3.6	6.2	SW	1.9	5	W	3.1	10	Fair	10000	9	4000
Fri Apr 13 06:00	SW	16	25	31	3.4	5.8	SW	1.8	5	W	2.9	10	Cloudy	10000	9	6000
Fri Apr 13 09:00	S	16	24	30	3.2	5.4	S	1.7	5	SW	2.7	11	Fair	10000	9	6000
Fri Apr 13 12:00	S	16	24	30	2.9	5.0	S	1.7	5	W	2.4	11	Fair	10000	9	6000
Fri Apr 13 15:00	S	16	24	31	2.9	4.9	S	1.7	5	W	2.3	11	Cloudy	10000	9	6000
Fri Apr 13 18:00	S	16	25	32	2.9	4.9	S	1.7	5	W	2.3	11	Cloudy	10000	9	6000
Fri Apr 13 21:00	S	17	26	33	2.8	4.8	S	1.8	5	W	2.2	10	Rainshower	7800	9	5800
Sat Apr 14 00:00	S	18	27	34	2.8	4.8	S	1.8	5	W	2.2	10	Rainshower	7000	9	6000
Sat Apr 14 03:00	S	18	27	34	2.8	4.7	S	1.8	5	SW	2.1	10	Cloudy	10000	9	5600
Sat Apr 14 06:00	S	18	27	35	2.8	4.8	S	1.8	5	SW	2.2	10	Rainshower	6700	9	4100
Sat Apr 14 09:00	SW	18	27	34	2.8	4.7	SW	1.7	5	SW	2.2	11	Cloudy	4600	9	3300
Sat Apr 14 12:00	SW	17	25	32	2.8	4.8	SW	1.6	5	SW	2.3	11	Cloudy	3800	9	3100
Sat Apr 14 15:00	SW	15	23	30	2.8	4.8	SW	1.5	5	SW	2.4	11	Cloudy	3700	9	2800
Sat Apr 14 18:00	S	14	21	27	2.9	4.9	S	1.4	4	SW	2.5	10	Rainshower	4900	9	2900
Sat Apr 14 21:00	S	13	20	26	2.7	4.6	S	1.3	4	SW	2.4	10	Cloudy	5500	9	3200
Sun Apr 15 00:00	SE	13	20	25	2.7	4.6	SE	1.3	4	SW	2.4	10	Overcast	6300	9	3300
Sun Apr 15 03:00	SE	13	20	25	2.6	4.5	SE	1.3	4	SW	2.3	10	Overcast	4700	9	3100
Sun Apr 15 06:00	SE	14	21	27	2.6	4.3	SE	1.3	4	SW	2.2	10	Rain	4100	9	2900
Sun Apr 15 12:00	S	14	22	28	2.4	4.1	S	1.2	4	SW	2.1	10	Rainshower	3400	9	2200
Sun Apr 15 18:00	S	13	20	26	2.4	4.1	S	1.2	4	SW	2.1	10	Cloudy	5300	9	3800
Mon Apr 16 00:00	SW	13	19	24	2.3	4.0	SW	1.2	4	SW	2.0	9	Cloudy	8100	9	6000
Mon Apr 16 06:00	SW	15	22	28	2.4	4.1	SW	1.3	4	SW	2.0	9	Cloudy	9900	9	6000
Mon Apr 16 12:00	SW	18	27	34	2.4	4.2	SW	1.4	5	SW	2.0	9	Cloudy	9900	9	6000
Mon Apr 16 18:00	W	19	29	37	2.5	4.3	W	1.5	5	W	2.0	9	Overcast	10000	8	6000
Tue Apr 17 00:00	W	18	27	35	2.6	4.5	W	1.6	5	W	2.1	9	Overcast	9900	8	6000
Tue Apr 17 06:00	NW	17	25	32	2.6	4.5	NW	1.6	5	W	2.1	9	Rain	9700	7	4500
Tue Apr 17 12:00	NW	17	26	33	2.8	4.7	NW	1.7	5	NW	2.2	9	Rain	4300	7	2800
Tue Apr 17 18:00	N	19	29	37	2.8	4.8	N	1.8	5	NW	2.2	9	Rain	2600	7	2400
Wed Apr 18 00:00	S	20	30	39	2.8	4.8	S	1.8	5	NW	2.2	8	Overcast	2400	7	1700
Wed Apr 18 06:00	NE	20	30	38	2.8	4.7	NE	1.8	5	NW	2.1	8	Drizzle	3000	6	1600
Wed Apr 18 12:00	NE	20	30	38	2.5	4.3	NE	1.7	5	NW	1.9	8	Overcast	3300	6	1700
Wed Apr 18 18:00	E	19	28	36	2.5	4.3	E	1.8	5	NW	1.8	8	Rain	3600	6	1800
Thu Apr 19 00:00	E	18	27	34	2.5	4.2	E	1.9	5	NW	1.6	8	Cloudy	4100	6	2100
Thu Apr 19 06:00	SE	18	27	34	2.5	4.3	SE	2.0	5	NW	1.5	8	Cloudy	3200	6	6000

7 day Forecast for the Transocean Rather 12.04 Report 2

7-Day Forecast: Chevron - Transocean Rather

Issued At: Thu Apr 12 16:07 GMT

Forecaster: M. van der Putte

Confidence: High

Warnings: Low risk of fog.

weathernews
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Forecast Summary

Risk of Lightning (first 24hrs): Nil

Risk of Fog (first 24hrs): Low (10-40 percent)

Sea Surface Temperature: 9 °C

Max Wave Height: 6.1 m (At Fri Apr 13 00:00)

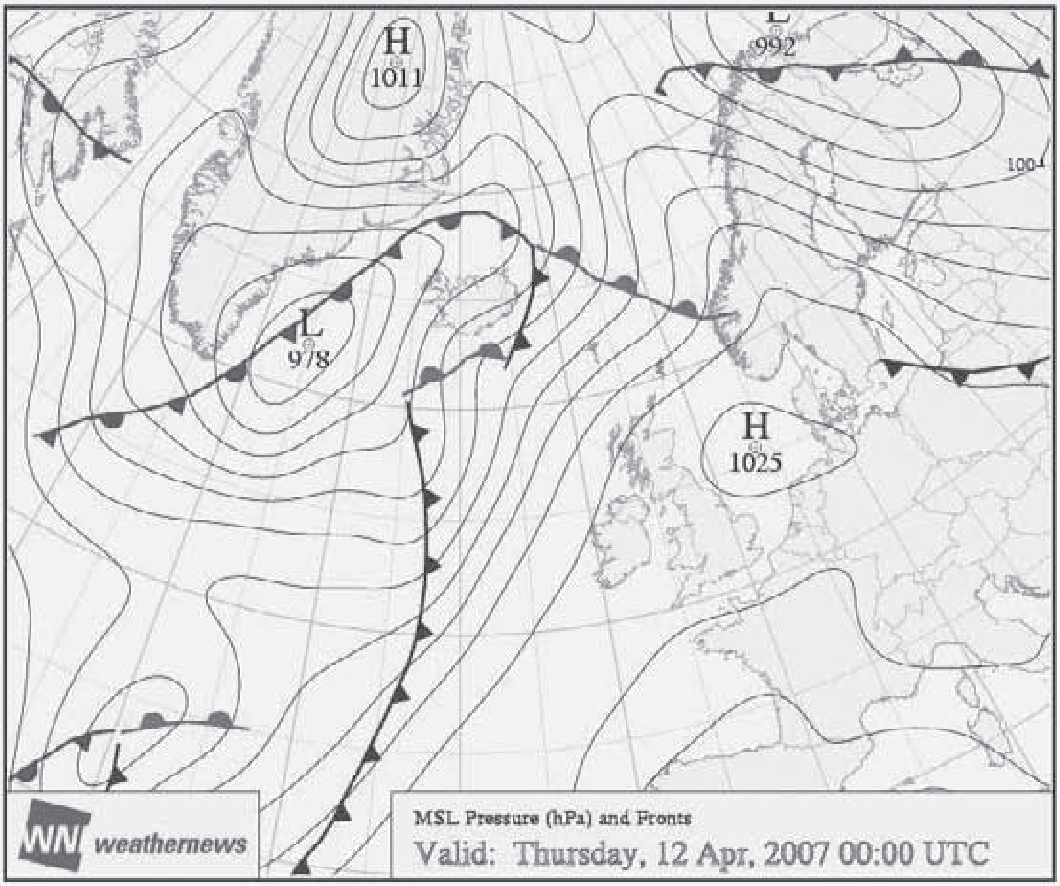
Max Mean Wind Speed at 50m: 37 kts (At Thu Apr 12 18:00)

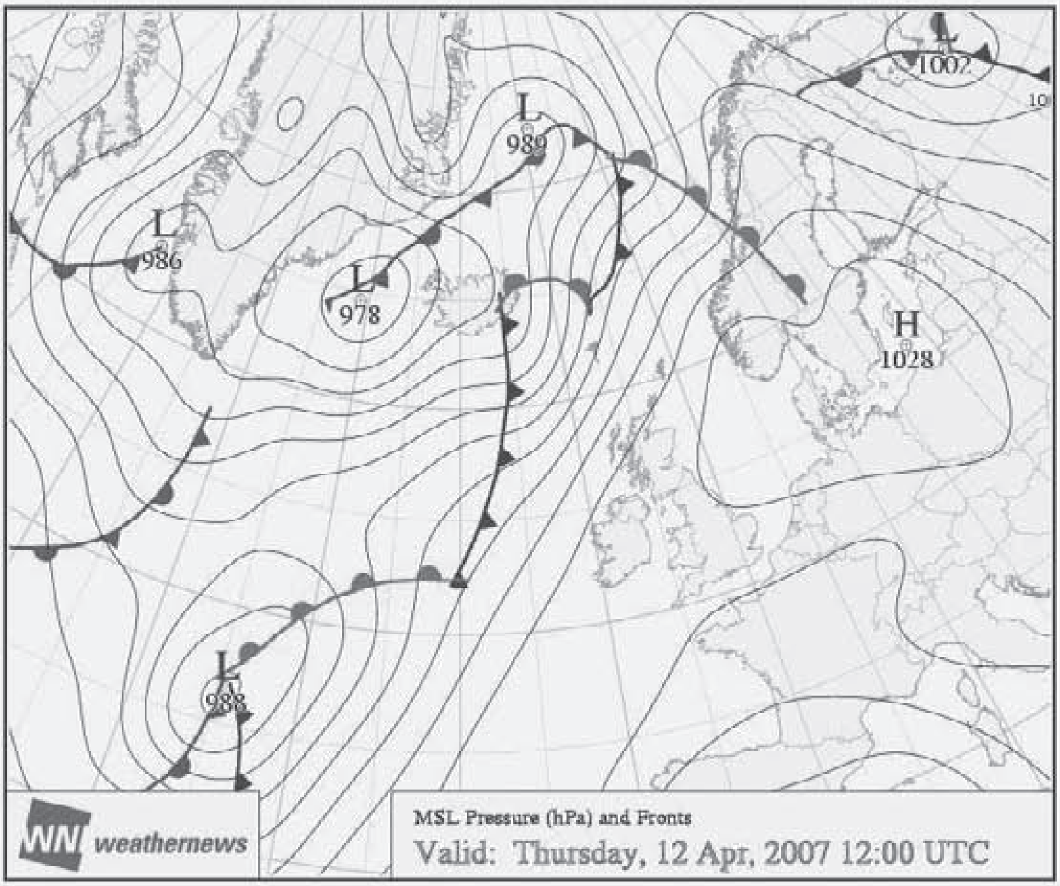
Synoptic Discussion

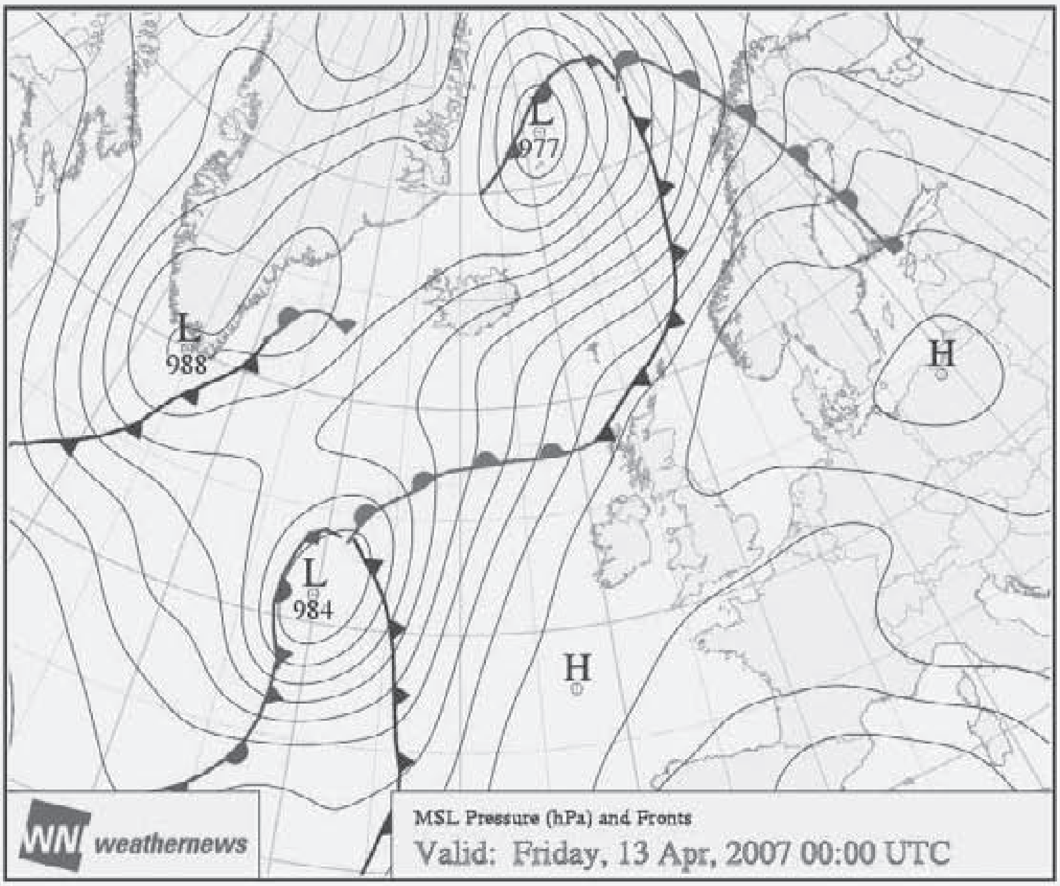
High building over the North Sea and Denmark, moving towards the Baltic Sea on Friday, staying stationary until Monday. Low pressure areas moving over Iceland, associated fronts passing the forecast area at times. South of these lows a ridge is developing and after passage of a cold front more unstable air will reach the area from Monday on. However, this front will stay just south of the location and influence the weather at times.

Date	Wind				Wave								Weather	Vis. (m)	Temp (°C)	Cloud Base (ft)
	Dir	10m	50m		Sig Ht (m)	Max Ht (m)	Sea			Swell						
		mean (kts)	mean (kts)	gust (kts)			Dir	Ht (m)	Per (sec)	Dir	Ht (m)	Per (sec)				
Thu Apr 12 18:00	SW	25	37	47	3.4	5.8	SW	2.7	6	W	2.1	10	Cloudy	7200	9	4700
Thu Apr 12 21:00	SW	23	34	44	3.5	6.0	SW	2.4	6	W	2.6	10	Overcast	6100	9	3300
Fri Apr 13 00:00	SW	20	30	38	3.6	6.1	SW	1.8	5	W	3.1	10	Drizzle	3600	9	1300
Fri Apr 13 03:00	SW	17	25	32	3.4	5.8	SW	1.2	5	W	3.2	10	Drizzle	3100	9	700
Fri Apr 13 06:00	SW	15	22	28	3.1	5.3	SW	0.9	4	W	3.0	10	Overcast	3500	8	1300
Fri Apr 13 09:00	S	15	23	30	2.9	5.0	S	0.9	5	W	2.8	10	Cloudy	4000	9	1900
Fri Apr 13 12:00	S	16	25	32	2.8	4.7	S	1.0	5	W	2.6	10	Mist	3600	9	600
Fri Apr 13 15:00	S	16	24	30	2.8	4.7	S	1.0	5	W	2.6	11	Mist	3000	9	700
Fri Apr 13 18:00	S	16	24	30	2.8	4.7	S	1.0	5	W	2.6	11	Mist	3100	8	800
Fri Apr 13 21:00	S	17	26	34	2.8	4.8	S	1.3	5	W	2.5	11	Mist	3100	8	1000
Sat Apr 14 00:00	S	19	28	36	2.8	4.8	S	1.5	5	W	2.4	10	Mist	3600	8	1200
Sat Apr 14 03:00	S	17	26	34	2.8	4.7	S	1.4	5	W	2.4	10	Mist	4000	8	1400
Sat Apr 14 06:00	S	16	24	31	2.6	4.4	S	1.2	5	W	2.3	10	Cloudy	4900	8	3200
Sat Apr 14 09:00	S	18	27	34	2.5	4.3	S	1.4	5	W	2.1	10	Cloudy	5000	9	3300
Sat Apr 14 12:00	SW	19	28	36	2.6	4.4	SW	1.5	5	SW	2.1	10	Cloudy	4400	10	3100
Sat Apr 14 15:00	SW	16	25	31	2.6	4.5	SW	1.1	5	SW	2.4	10	Cloudy	4700	10	2800
Sat Apr 14 18:00	SW	13	19	24	2.9	4.9	SW	0.6	4	SW	2.8	10	Cloudy	4700	9	2900
Sat Apr 14 21:00	SW	10	15	19	2.9	5.0	SW	0.3	3	SW	2.9	11	Cloudy	5400	9	3200
Sun Apr 15 00:00	S	10	15	19	2.8	4.8	S	0.2	3	SW	2.8	11	Cloudy	5200	9	3300
Sun Apr 15 03:00	S	12	19	24	2.7	4.6	S	0.4	4	SW	2.7	11	Cloudy	4900	9	2600
Sun Apr 15 06:00	S	15	23	29	2.6	4.5	S	0.8	4	SW	2.5	11	Mist	3900	9	1900
Sun Apr 15 09:00	S	17	26	33	2.7	4.6	S	1.2	5	SW	2.4	11	Mist	2200	9	600
Sun Apr 15 12:00	S	18	27	35	2.6	4.4	S	1.4	5	SW	2.2	11	Overcast	3000	9	900
Sun Apr 15 15:00	SW	18	28	35	2.6	4.4	SW	1.5	5	SW	2.1	10	Overcast	5100	9	1300
Sun Apr 15 18:00	SW	18	27	34	2.4	4.2	SW	1.4	5	SW	2.0	10	Drizzle	4600	9	1000
Mon Apr 16 00:00	S	14	22	28	2.3	4.0	S	0.8	4	SW	2.2	9	Cloudy	4800	8	1100
Mon Apr 16 06:00	SW	15	23	30	2.4	4.0	SW	0.9	5	SW	2.2	9	Overcast	9900	8	2000
Mon Apr 16 12:00	W	19	28	36	2.3	4.0	W	1.2	5	SW	2.0	9	Overcast	9900	8	6000
Mon Apr 16 18:00	W	18	27	34	2.3	3.9	W	1.4	5	SW	1.8	9	Cloudy	9900	7	6000
Tue Apr 17 00:00	W	18	27	35	2.3	3.9	W	1.5	5	W	1.7	9	Overcast	9900	6	2400
Tue Apr 17 06:00	W	17	26	34	2.4	4.0	W	1.4	5	W	1.9	9	Drizzle	8800	6	1500
Tue Apr 17 12:00	W	20	30	38	2.3	4.0	W	1.7	5	W	1.6	9	Drizzle	7900	6	1100
Tue Apr 17 18:00	W	21	31	39	2.6	4.4	W	2.0	6	W	1.6	9	Overcast	9400	6	1400
Wed Apr 18 00:00	W	20	30	38	2.5	4.3	W	1.9	5	W	1.7	9	Overcast	9900	6	1700
Wed Apr 18 06:00	W	19	29	37	2.4	4.1	W	1.7	5	W	1.7	9	Drizzle	7600	8	1000
Wed Apr 18 12:00	W	16	24	31	2.2	3.7	W	1.1	5	W	1.9	9	Rain	7100	7	900
Wed Apr 18 18:00	N	16	24	31	2.1	3.7	N	1.0	5	W	1.9	9	Rain	7600	7	900
Thu Apr 19 00:00	N	19	28	36	2.4	4.1	N	1.7	5	NW	1.7	10	Rain	8100	5	1100
Thu Apr 19 06:00	NW	19	29	37	2.3	4.0	NW	1.7	5	NW	1.6	10	Rain	8200	4	1000
Thu Apr 19 12:00	W	19	29	37	2.3	3.9	W	1.8	5	NW	1.4	10	Drizzle	9900	5	1400
Thu Apr 19 18:00	SW	20	30	38	2.2	3.8	SW	1.8	5	NW	1.3	9	Rainshower	9900	6	1400

12. april 2007 Chart Report 1



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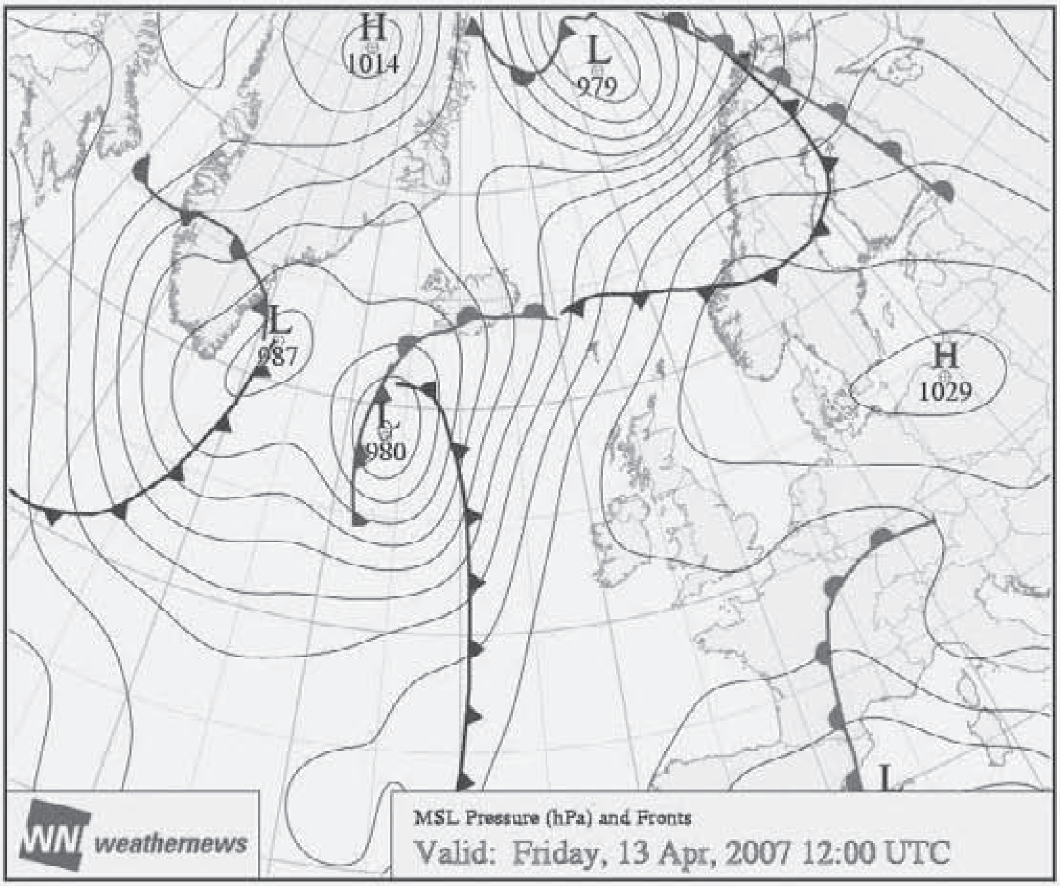
weathernews
MSL Pressure (hPa) and Fronts
Valid: Friday, 13 Apr, 2007 00:00 UTC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weathernews
MSL Pressure (hPa) and Fronts
Valid: Friday, 13 Apr, 2007 12:00 UTC

TR Daily Marine Report 11. - 13.04

DATE: 13.04.07

OPERATOR: CHEVRON — WELL: ROSEBANK 205/1-I — WATER DEPTH: 1103m

LAT: 60° 59' 33" N — LONG: 003° 49' 49" W — RIG HEADING: 270°

ANCHOR LINE LENGTH AT [illegible] URS: 1: 3364 — 2: — 3: 3378 — 4: 3339 — 5: 3435 — 6: 1840 — 7: 3437 — 8: 3387

TRANSOCEAN RATHER
DAILY MARINE REPORT

TIME	WIND		SIG WAVE			MAX WAVE			CURRENT		BARO	TEMP	PITCH		ROLL		HEAVE		OFFSET		RISER			ANCHOR LINE TENSIONS								REMARKS
	DIR	KTS	HT	PER	DIR	HT	PER	DIR	DIR	SPD	MBS	C	DEG	PER	DEG	PER	HT	PER	DIST	DIR	ANG	DIR	TEN	1	2	3	4	5	6	7	8	
0100																																
0200																																
0300																																
0400	224	18	2,9	11	224	4,6	16	258			1016,4	8,9	1,0	8	0,9	8	3,5	11						197	160	202	153	180	192	170	249	
0500																																
0600	210	23	2,7	10	210	4,3	16	252			1017,7	9,0	1,0	8	1,0	8	2,3	11						195	159	203	152	182	186	188	253	
0700																																
0800	200	24	2,5	10	200	4,0	16	252			1017,7	9,2	1,0	8	1,0	8	2,2	11						195	156	203	151	184	187	189	251	
0900																																
1000	201	26	2,4	10	200	3,8	16	251			1018,3	9,7	1,0	8	1,0	8	2,0	11						193	156	220	166	185	194	165	230	
1100																																
1200	190	24	2,5	10	190	3,9	16	252			1018,3	10,1	0,7	8	0,8	8	1,7	19						191	154	223	156	183	192	162	227	
1300																																
1400	190	23	2,1	10	190	3,3	15	250			1018,4	11,4	0,7	7	0,7	7	1,6	12						192	153	222	157	183	190	162	226	
1500																																
1600	180	21	2,1	10	180	3,4	16	240			1018,1	11,7	0,6	6	0,6	6	1,9	12						192	153	223	156	183	163	163	229	
1700																																
1800	170	23	1,9	10	170	3,1	16	260			1017,0	10,7	0,6	6	0,6	6	1,7	11						191	155	217	158	182	160	166	229	
1900																																
2000	170	26	2,3	10	170	3,7	15	263			1016,4	7,4	0,8	8	0,9	8	2,0	11						192	158	223	159	184	192	181	229	
2100																																
2200	171	28	2,5	10	170	3,9	15	256			1016,0	7,6	1,0	8	1,0	8	2,6	12						191	155	237	162	185	189	152	214	
2300																																
2400	179	24	2,4	10	175	3,9	14	256			1015,8	7,8	0,7	8	0,8	8	1,8	12						190	153	238	162	185	192	154	213	

DATE: 12.04.07

OPERATOR: CHEVRON WELL: ROSEBANK 205/1-I WATER DEPTH: 1103m

LAT: 60° 59' 33" N LONG: 003° 49' 49" W RIG HEADING: 270°

ANCHOR LINE LENGTH AT HOURS

1: 3364 2: 3: 3378 4: 3330

5: 3435 6: 1840 7: 3437 8: 3387

TRANSOCEAN RATHER
DAILY MARINE REPORT

TIME	WIND		SIG WAVE			MAX WAVE			CURRENT		BARO	TEMP	PITCH		ROLL		HEAVE		OFFSET		RISER			ANCHOR LINE TENSIONS								REMARKS
	DIR	KTS	HT	PER	DIR	HT	PER	DIR	DIR	SPD	MBS	C	DEG	PER	DEG	PER	HT	PER	DIST	DIR	ANG	DIR	TEN	1	2	3	4	5	6	7	8	
0100																																
0200																																
0300																																
0400	217	24	3,1	9	220	5,0	14	260			1011,8	9,0	1,1	8	1,1	8	3,0	12						166		200	171	188	110	174	217	
0500																																
0600																																
0700																																
0800	210	32	2,5	9	210	3,5	14	265			1012,2	9,2	1,1	8	1,1	8	3,2	11						191		182	167	186	100	162	231	
0900																																
1000																																
1100																																
1200	200	15	2,5	9	200	3,5	14	270			1012,7	9,7	1,1	8	1,1	8	3,1	11						201	75	200	168	178	162	166	220	
1300																																
1400																																
1500																																
1600	200	37	2,0	10	200	3,0	13	240			1011,0	10,4	0,8	7	0,8	7	2,3	12						194	142	167	160	186	199	175	244	
1700																																
1800																																
1900																																
2000	215	36	3,0	9	215	4,4	15	255			1013,6	8,7	1,1	8	1,1	8	3,0	12						199	160	196	148	179	197	195	277	
2100																																
2200																																
2300																																
2400	218	24	3,0	9	215	4,1	15	246			1014,0	8,7	1,1	8	1,1	8	3,0	12						197	160	198	150	180	195	175	260	

DATE: 11.04.07 | ANCHOR LINE LENGTH AT [illegible]URS

OPERATOR: CHEVRON | WELL: ROSEBANK 205/1-I | WATER DEPTH: 1103m | 1: 3364 | 2: | 3: | 4: 3339 | TRANSOCEAN RATHER

LAT: 60° 59' 33" N | LONG: 003° 49' 49" W | RIG HEADING: 270° | 5: 3435 | 6: | 7: | 8: 3387 | DAILY MARINE REPORT

TIME	WIND		WAVES			SWELL			CURRENT		BARO	TEMP	PITCH		ROLL		HEAVE		OFFSET		RISER			ANCHOR LINE TENSIONS								REMARKS
	DIR	KTS	HT	PER	DIR	HT	PER	DIR	DIR	SPD	MBS	C	DEG	PER	DEG	PER	HT	PER	DIST	DIR	ANG	DIR	TEN	1	2	3	4	5	6	7	8	
0100	290	21	4,0	11	290	6,0	16	290			1007,0	7,1	1,5	8	1,8	8	4,5	12						185			173	181			190	
0200	280	22	4,0	11	280	6,0	16	300			1007,5	6,8	1,7	8	1,7	8	4,9	12						183			174	183			192	
0300	280	21	4,0	10	280	6,6	16	305			1007,5	6,9	1,3	8	1,4	8	3,5	12						184			173	191			195	
0400	275	18	4,0	10	275	5,5	16	290			1007,9	7,1	1,2	8	1,3	8	3,5	13						183			172	192			196	
0500	270	16	3,5	11	270	5,5	16	290			1008,1	7,2	1,3	8	1,5	9	4,0	14						184			177	192			189	
0600	269	11	3,5	9	275	5,0	17	288			1009,0	7,6	1,4	8	2,8	8	3,2	12						183			174	193			187	
0700	259	9	3,0	9	275	4,5	17	294			1009,4	7,6	2,0	8	2,8	8	4,1	14						182			177	195			190	
0800	230	4	3,0	10	270	4,0	18	305			1009,9	7,5	1,7	8	3,7	8	4,8	13						182			175	193			183	
0900																																
1000																																
1100																																
1200	186	12	3,0	10	250	5,0	16	311			1009,9	8,1	1,8	8	3,0	10	4,1	12						177			170	198			201	
1300																																
1400																																
1500																																
1600	235	28	2,0	11	235	5,0	17	308			1009,2	6,5	1,2	8	1,2	5	3,0	13						182		95	171	190		123	199	
1700																																
1800																																
1900																																
2000	233	30	3,8	11	235	6,0	15	287			1010,2	9,2	1,2	8	1,2	8	3,0	10						183		223	168	194		198	214	
2100																																
2200																																
2300																																
2400	227	35	3,5	10	230	5,6	14	288			1011,2	9,2	1,1	8	1,1	8	2,9	12						180		181	168	194		198	214	

Newcasting
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Chevron — **Issued: 12-Apr-2007 11:48UTC**

Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time:

Synopsis

Seas were increased on Tuesday and Wednesday.

High pressure will remain centred over the Baltic Sea today and tonight and a ridge of high pressure will continue to extend westwards into the North Sea and British Isles during the next few days and into the weekend / early next week. During this time low pressure will continue to be centred over Iceland with a trough extending southeastwards towards the Shetland Isles.

Summary of Forecast Conditions

Max Sig Wave(Hs): 4.0m on 12-Apr at 21:00 UTC
Max 10m Wind: 28kts on 12-Apr at 18:00 UTC
48hr Fog Risk (= visibility < 0.5NM): Low
48hr Lightning Risk: Nil.
Sea Surface Temperature: 8° C
CONF = Swells from more than one direction
Wintry showers: sleet, snow and/or hail

Forecaster Natalie Eaton

8 to 10 Day Synopsis

Low pressure will remain over Iceland on Thursday and high pressure will build east to the west of Scotland. Low pressure will deepen east into the Norwegian Sea on Friday with a ridge of high pressure returning across your location on Saturday. 10m winds: NNW fresh on Thursday, backing WNW strong to Near Gale force on Friday and W moderate to fresh on Saturday.

Confidence

Confidence is MODERATE to HIGH until Saturday due to persisting ridge of high pressure over the North Sea and British Isles then MODERATE due to uncertainty in track / intensity of low pressure forecast over Iceland.

Time (UTC)	Weather	Winds Dir	Winds 10m Speed (kts)	Winds 10m Gusts (kts)	Winds 50m Speed (kts)	Winds 50m Gusts (kts)	Wind Waves Dir	Wind Waves Hgt (m)	Swells Dir	Swells Hgt (m)	Swells Per. (s)	Sig Hgt (m)	Max Hgt (m)	Vis. (km)
Thu, Apr 12, 2007														
18:00	Fair	SSW	28	35	33	41	SSW	2.6	WSW	2.8	9	3.8	6.9	5-10
21:00	Fair	SW	26	33	31	38	SW	2.3	WSW	3.3	9	4.0	7.0	5-10
Fri, Apr 13, 2007														
0:00	Fair	SW	20	25	23	29	SW	1.4	WSW	3.6	10	3.9	6.4	5-10
3:00	Light rain/drizzle	SSW	16	20	19	23	SSW	1.0	WSW	3.4	10	3.5	5.8	1-3
6:00	Light rain/drizzle	SSW	16	20	19	23	SSW	1.0	WSW	3.0	11	3.2	5.2	1-3
9:00	Fair	S	18	23	21	26	S	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	S	16	20	19	23	S	1.2	WSW	2.6	11	2.9	4.8	5-10
15:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.6	11	2.9	4.8	5-10
18:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.8	11	3.0	5.1	5-10
21:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
Sat, Apr 14, 2007														
0:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
3:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
6:00	Fair	S	22	28	26	32	S	1.7	WSW	2.7	11	3.2	5.5	5-10
[illegible]:00	Fair	SW	22	28	26	32	SW	1.7	WSW	2.7	11	3.2	5.5	5-10
[illegible]2:00	Fair	SW	20	25	23	29	SW	1.4	WSW	2.9	11	3.2	5.4	5-10
15:00	Fair	SW	16	20	19	23	SW	1.0	WSW	3.0	11	3.2	5.2	5-10
18:00	Fair	SW	12	15	14	17	SW	0.7	WSW	3.0	11	3.1	5.0	5-10
Sun, Apr 15, 2007														
0:00	Fair	S	12	15	14	17	S	0.7	WSW	2.8	11	2.9	4.7	5-10
6:00	Fair	SSE	18	23	21	26	SSE	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	2.2	10	2.8	4.9	5-10
18:00	Light rain/drizzle	SW	22	28	26	32	SW	1.7	WSW	2.2	10	2.8	4.9	1-3
Mon, Apr 16, 2007														
0:00	Light rain/drizzle	WSW	16	20	19	23	WSW	1.0	WSW	2.4	10	2.6	4.3	1-3
6:00	Fair	WSW	16	20	19	23	WSW	1.0	WSW	2.2	10	2.4	4.0	5-10
12:00	Fair	WSW	20	25	23	29	WSW	1.4	WSW	2.0	9	2.4	4.3	5-10
18:00	Fair	WSW	18	23	21	26	WSW	1.2	WSW	2.4	9	2.7	4.5	5-10
Tue, Apr 17, 2007														
0:00	Fair	WSW	20	25	23	29	WSW	1.4	W	2.4	9	2.8	4.8	5-10
6:00	Fair	W	18	23	21	26	W	1.2	W	2.4	9	2.7	4.5	5-10
12:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	W	2.4	9	2.7	4.5	2-7
18:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	W	2.4	9	2.7	4.5	2-7
Wed, Apr 18, 2007														
0:00	Sctd Showers	WSW	20	25	23	29	WSW	1.4	CONF	2.4	9	2.8	4.8	2-7
12:00	Fair	WNW	12	15	14	17	WNW	0.7	CONF	2.6	9	2.7	4.4	5-10

Criteria Levels None Set — Within 20% of Level

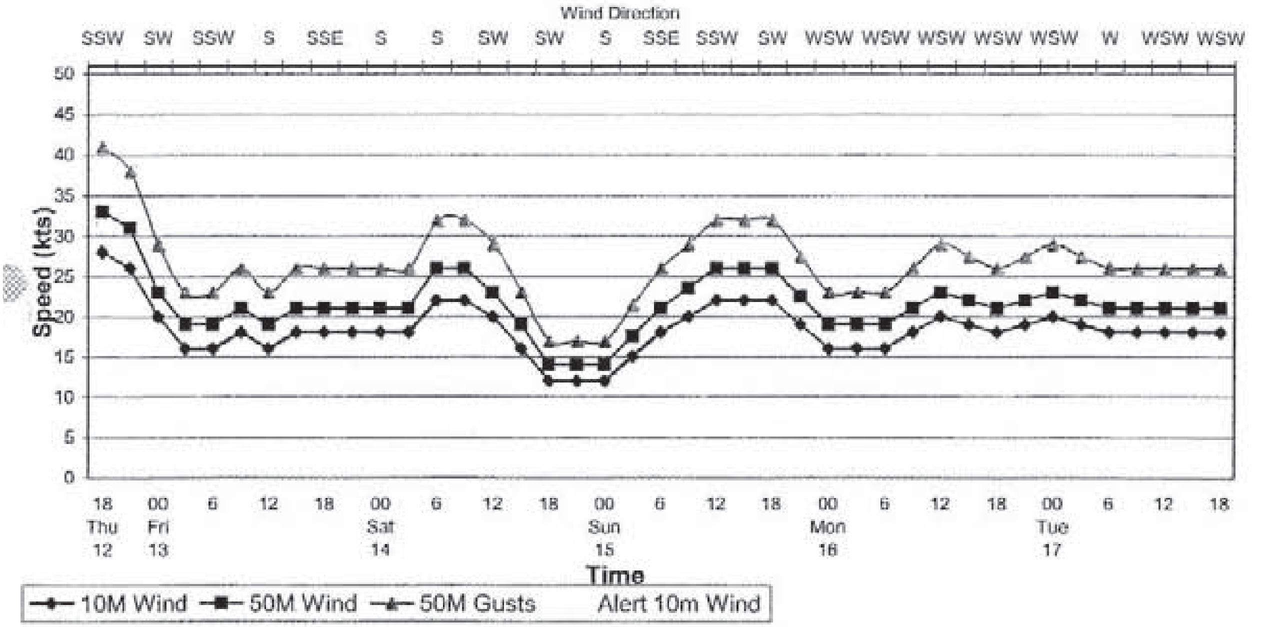
Newcasting
WWT
Tel: +44-12-24-845-632
E-Mail: wwt@wilkensweather.com

Chevron **Issued: 12-Apr-2007 11:48UTC**

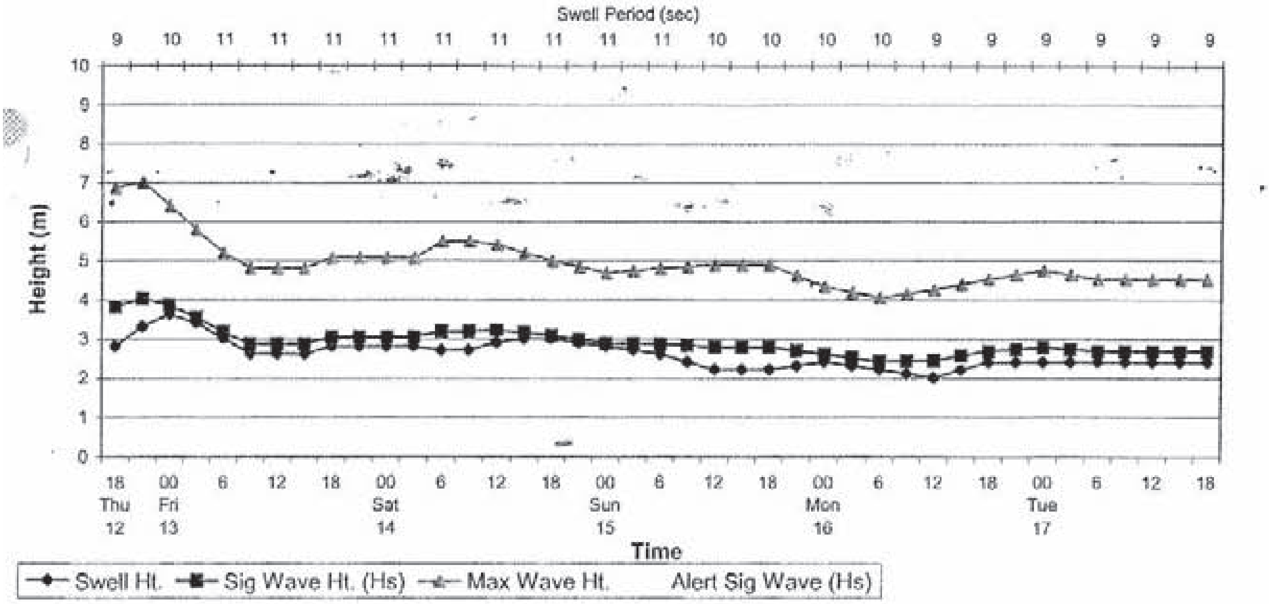
Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time

5-Day Wind Graph



5-Day Wave Graph



Nowcasting
WWT
Tel: +44-12-24-846-532
E-Mail: wwt@wilkensweather.com

Chevron | **Issued: 12-Apr-2007 03:46UTC**

Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

Current Location: Lat: 61° 01' N Lon: 003° 48' W Time:

Synopsis

There were no significant changes.

High pressure will remain over the North Sea through Sunday which will force low pressure systems to move west and north of your location. A cold front may push through on Monday, followed by a decrease in conditions. Moderate to rough seas will persist.

Summary of Forecast Conditions

Max Sig Wave(Hs): 4.0m on 12-Apr at 12:00 UTC
Max 10m Wind: 28kts on 12-Apr at 12:00 UTC
48hr Fog Risk (= visibility < 0.5NM): Low
48hr Lightning Risk: Nil.
Sea Surface Temperature: 8° C
CONF = Swells from more than one direction
Wintry showers: sleet, snow and/or hail

Forecaster Jolene Hrinda

8 to 10 Day Synopsis

Low pressure moving near Iceland on Thursday should move near your location on Friday. Strong to near gale force winds are expected in the wake of this low for Saturday. 10m winds: N-NW moderate to fresh Thursday, incr'g NW-N strong Friday, and N-NE near gale force Saturday.

Confidence Confidence is MODERATE to HIGH until Saturday due to persisting ridge of high pressure over the North Sea and British Isles then MODERATE due to uncertainty in track / intensity of low pressure forecast over Iceland.

Time (UTC)	Weather	Winds					Waves							Vis. (km)
		Dir	10m		50m		Wind Waves		Swells			Sig Hgt (m)	Max Hgt (m)	
			Speed (kts)	Gusts (kts)	Speed (kts)	Gusts (kts)	Dir	Hgt (m)	Dir	Hgt (m)	Per. (s)			
Thu, Apr 12, 2007														
6:00	Fair	SSW	22	28	26	32	SSW	1.7	W	3.0	9	3.4	5.9	5-10
9:00	Fair	SSW	24	30	28	35	SSW	2.0	W	3.0	9	3.6	6.2	5-10
12:00	Fair	SSW	28	35	33	41	SSW	2.6	W	3.0	9	4.0	7.1	5-10
15:00	Fair	SSW	28	35	33	41	SSW	2.6	W	3.0	9	4.0	7.1	5-10
18:00	Fair	SW	28	35	33	41	SW	2.6	WSW	3.0	9	4.0	7.1	5-10
21:00	Fair	SW	24	30	28	35	SW	2.0	WSW	3.2	9	3.8	6.5	5-10
Fri, Apr 13, 2007														
0:00	Light rain/drizzle	SW	22	28	26	32	SW	1.7	WSW	3.2	10	3.6	6.2	1-3
3:00	Light rain/drizzle	SSW	20	25	23	29	SSW	1.4	WSW	3.2	10	3.5	5.8	1-3
6:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	3.0	10	3.4	5.9	5-10
9:00	Fair	SSW	23	29	27	34	SSW	1.9	WSW	3.0	10	3.6	6.1	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	3.0	10	3.4	5.9	5-10
15:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	3.0	10	3.3	5.6	5-10
18:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	10	3.0	5.1	5-10
21:00	Fair	S	18	23	21	26	S	1.2	WSW	3.0	10	3.2	5.4	5-10
Apr 14, 2007														
0:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
3:00	Fair	S	18	23	21	26	S	1.2	WSW	2.8	11	3.0	5.1	5-10
6:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	2.8	11	3.1	5.3	5-10
12:00	Fair	SSW	20	25	23	29	SSW	1.4	WSW	2.8	11	3.1	5.3	5-10
18:00	Fair	SW	16	20	19	23	SW	1.0	WSW	2.8	11	3.0	4.9	5-10
Sun, Apr 15, 2007														
0:00	Fair	SSW	16	20	19	23	SSW	1.0	WSW	2.8	11	3.0	4.9	5-10
6:00	Fair	SSW	18	23	21	26	SSW	1.2	WSW	2.6	11	2.9	4.8	5-10
12:00	Fair	SSW	22	28	26	32	SSW	1.7	WSW	2.2	10	2.8	4.9	5-10
18:00	Sctd Showers	SW	20	25	23	29	SW	1.4	WSW	2.0	10	2.4	4.3	2-7
Mon, Apr 16, 2007														
0:00	Sctd Showers	WSW	14	18	16	20	WSW	0.9	WSW	2.[illegible]	10	2.2	3.7	2-7
6:00	Sctd Showers	WSW	18	23	21	26	WSW	1.2	WSW	1.8	10	2.2	3.7	2-7
12:00	Sctd Showers	WSW	20	25	23	29	WSW	1.4	WSW	1.8	10	2.3	4.0	2-7
18:00	Sctd Showers	W	22	28	26	32	W	1.7	WSW	2.0	10	2.6	4.7	2-7
Tue, Apr 17, 2007														
0:00	Sctd Showers	W	18	23	21	26	W	1.2	W	2.2	9	2.5	4.3	2-7
6:00	Sctd Showers	WNW	16	20	19	23	WNW	1.0	W	2.0	9	2.2	3.8	2-7
12:00	Sctd Showers	NNE	18	23	21	26	NNE	1.2	W	2.0	9	2.3	4.0	2-7
Wed, Apr 18, 2007														
0:00	Sctd Showers	NNE	14	18	16	20	NNE	0.9	CONF	2.2	9	2.4	4.0	2-7
12:00	Sctd Showers	NNE	14	18	16	20	NNR	0.9	CONF	2.2	9	2.4	4.0	2-7

Criteria Levels None Set [illegible] **Within 20% of Level**

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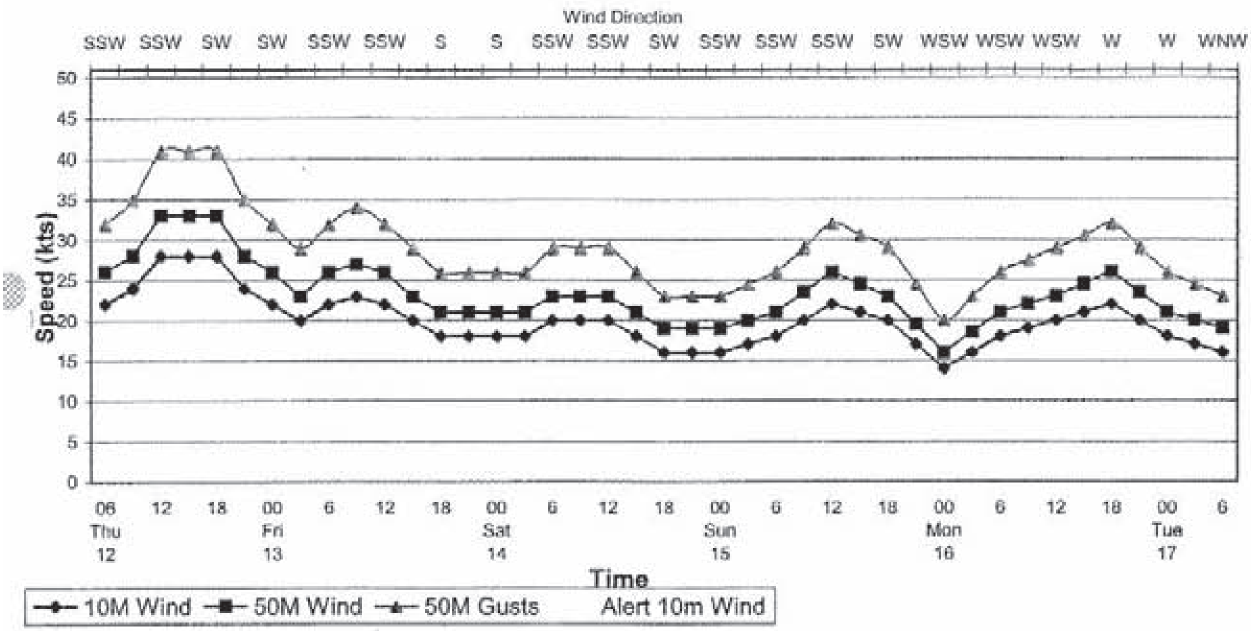
Chevron | **Issued: 12-Apr-2007 03:46UTC**

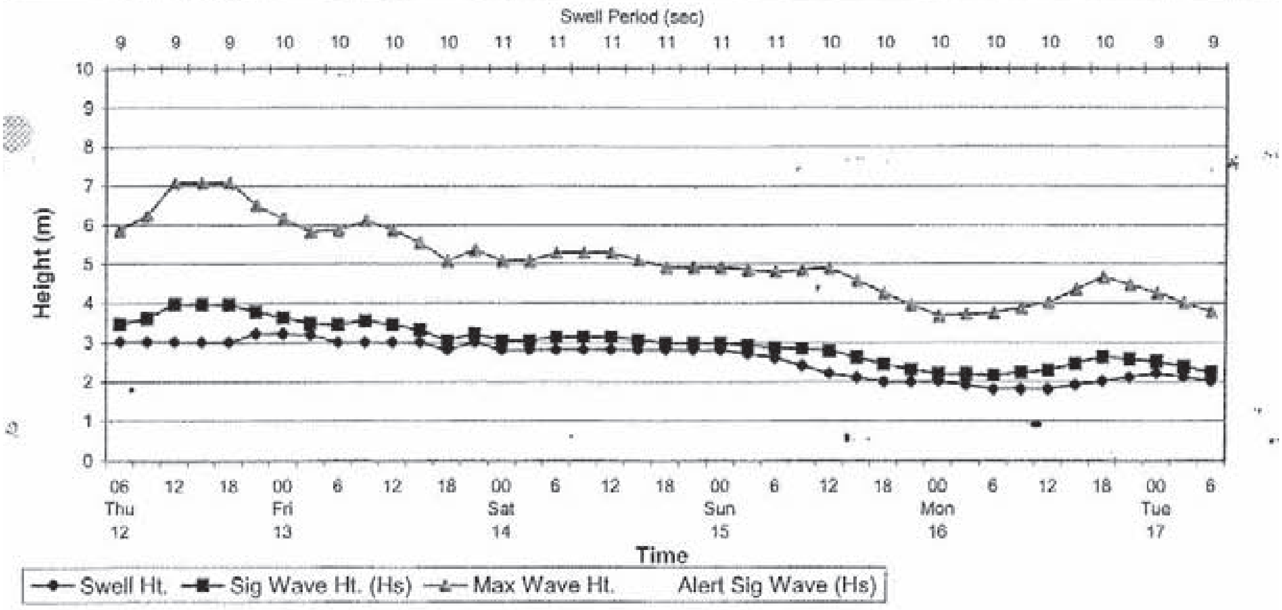
Forecast for the Transocean Rather
Valid for Rosebank Field (61° 01'N 003° 48'W)

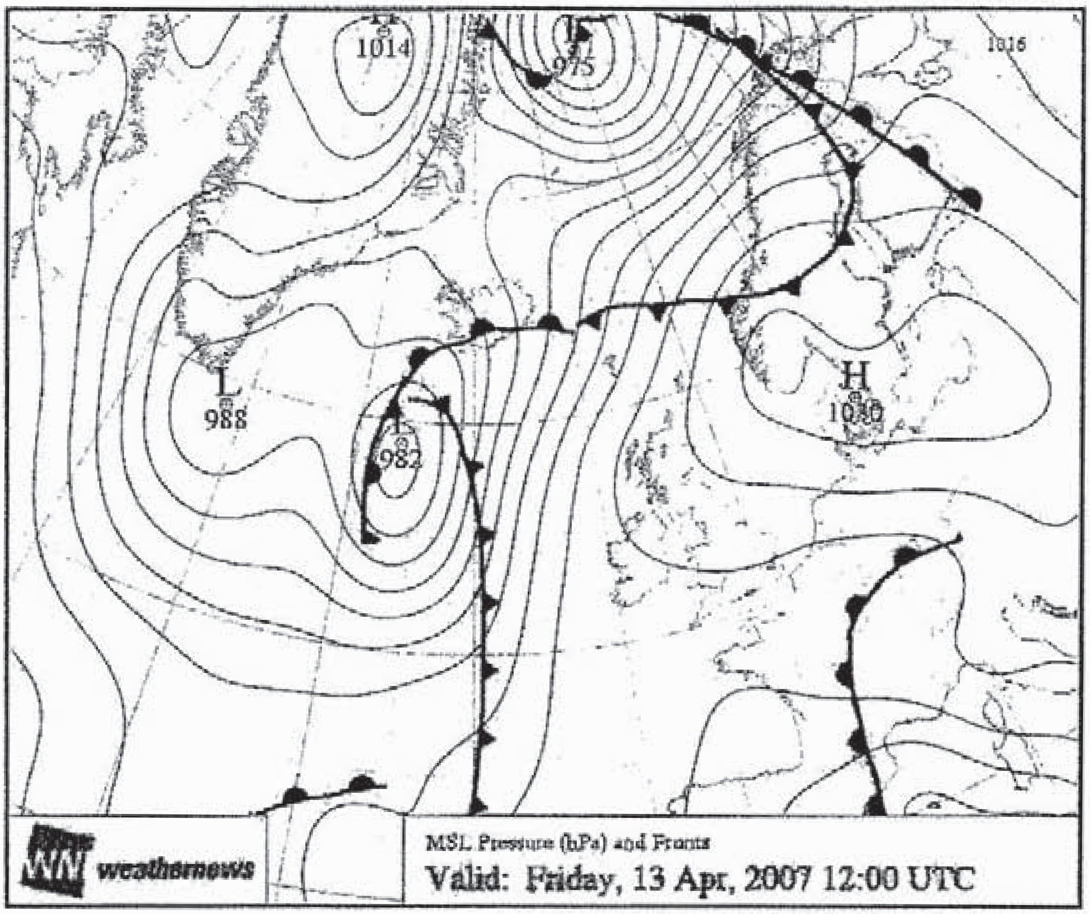
Current Location: Lat: 61° 01' N Lon: 003° 48' W Time

5-Day Wind Graph



5-Day Wave Graph

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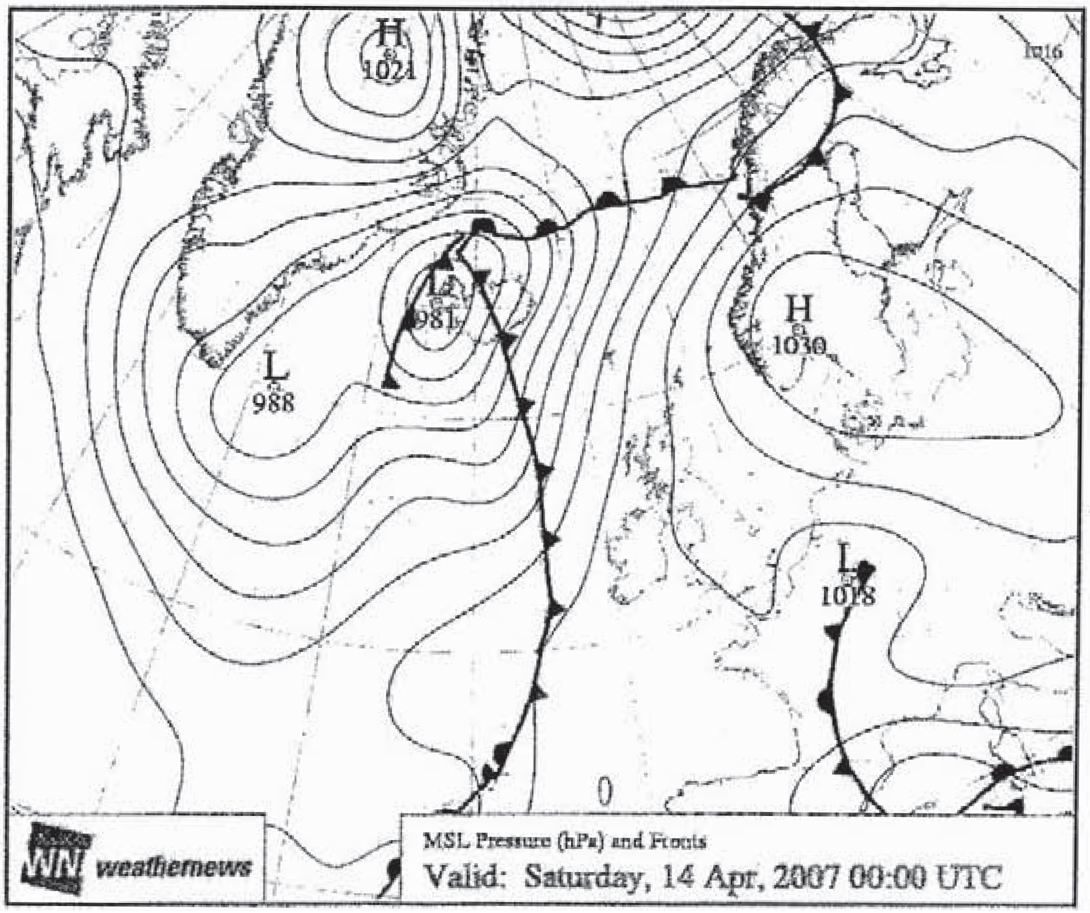
weathernews
MSL Pressure (hPa) and Fronts
Valid: Friday, 13 Apr, 2007 12:00 UTC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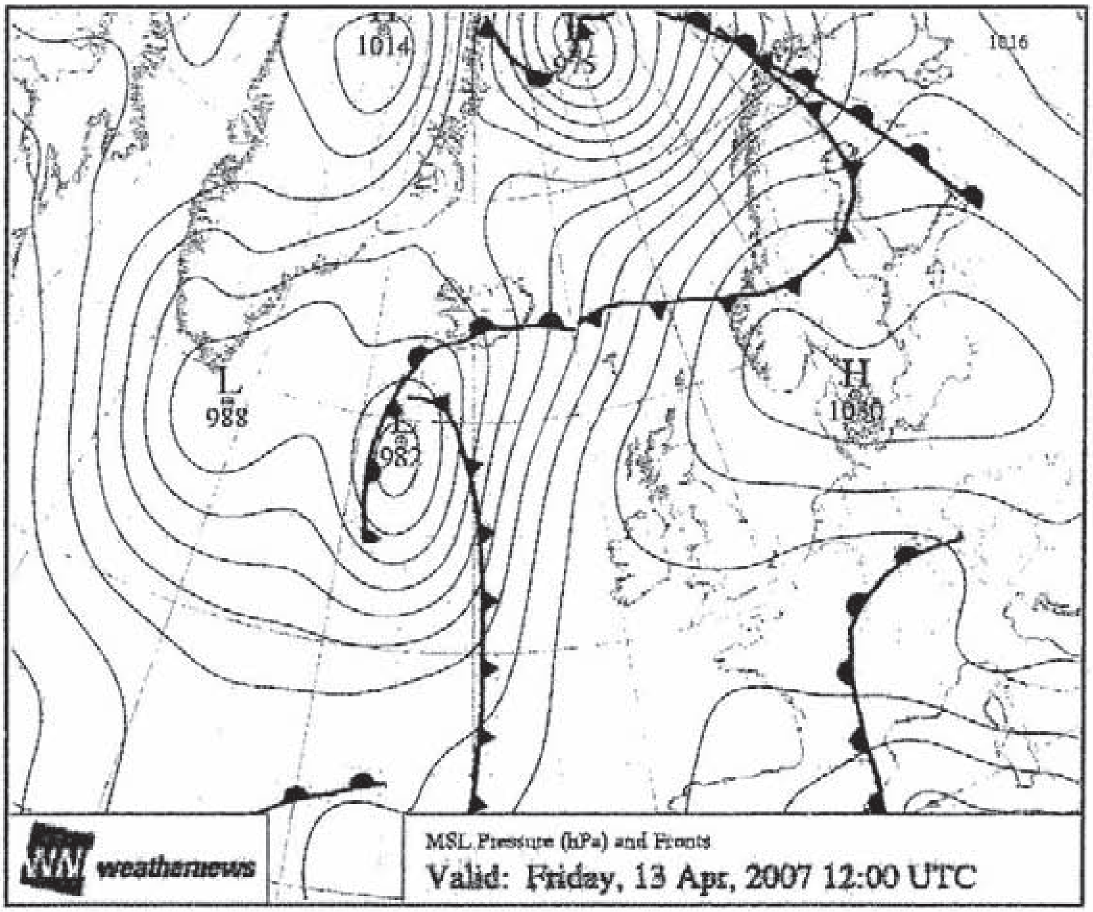
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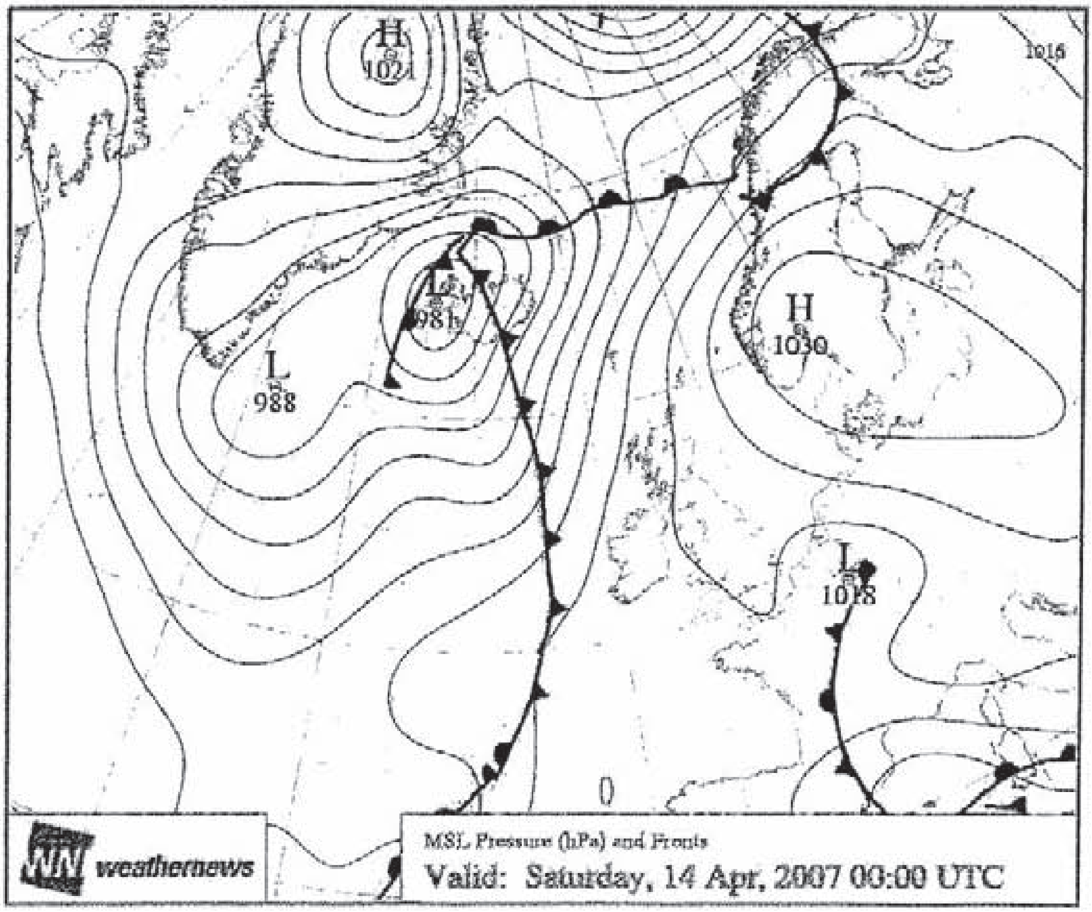
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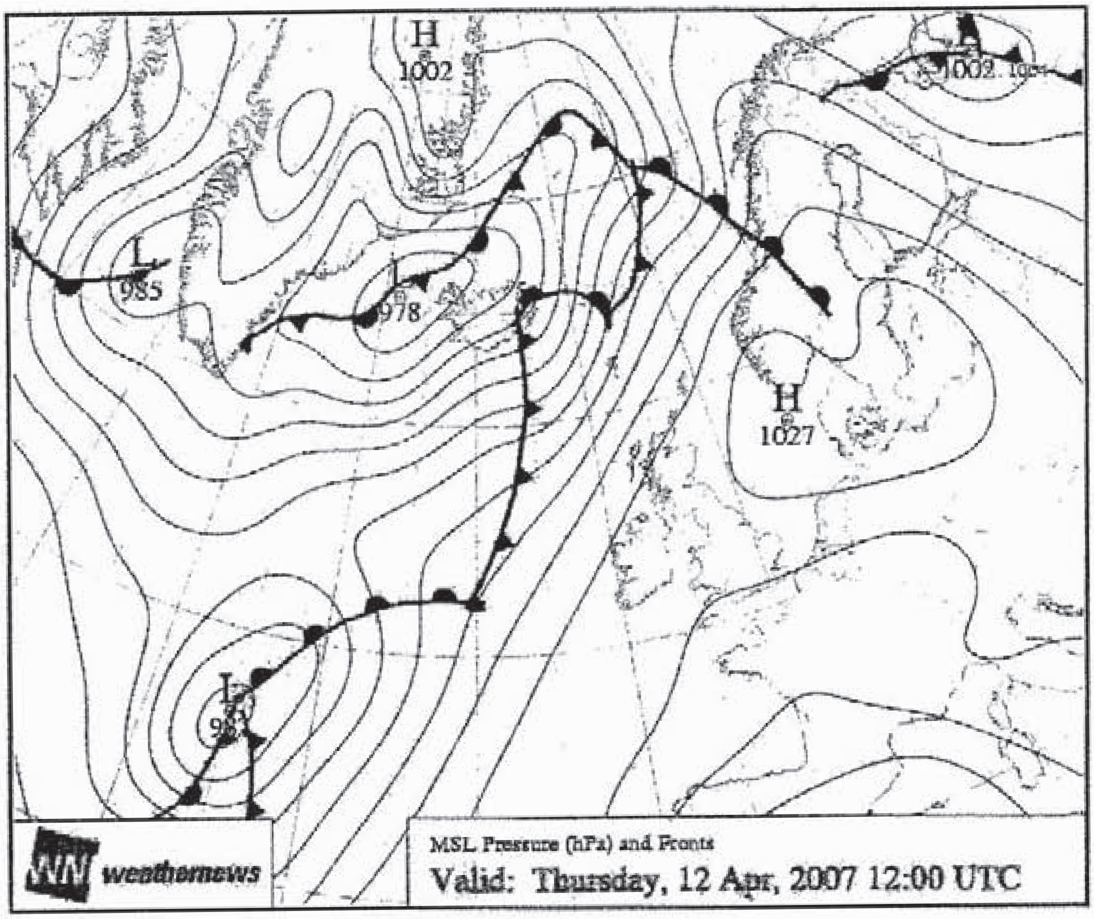
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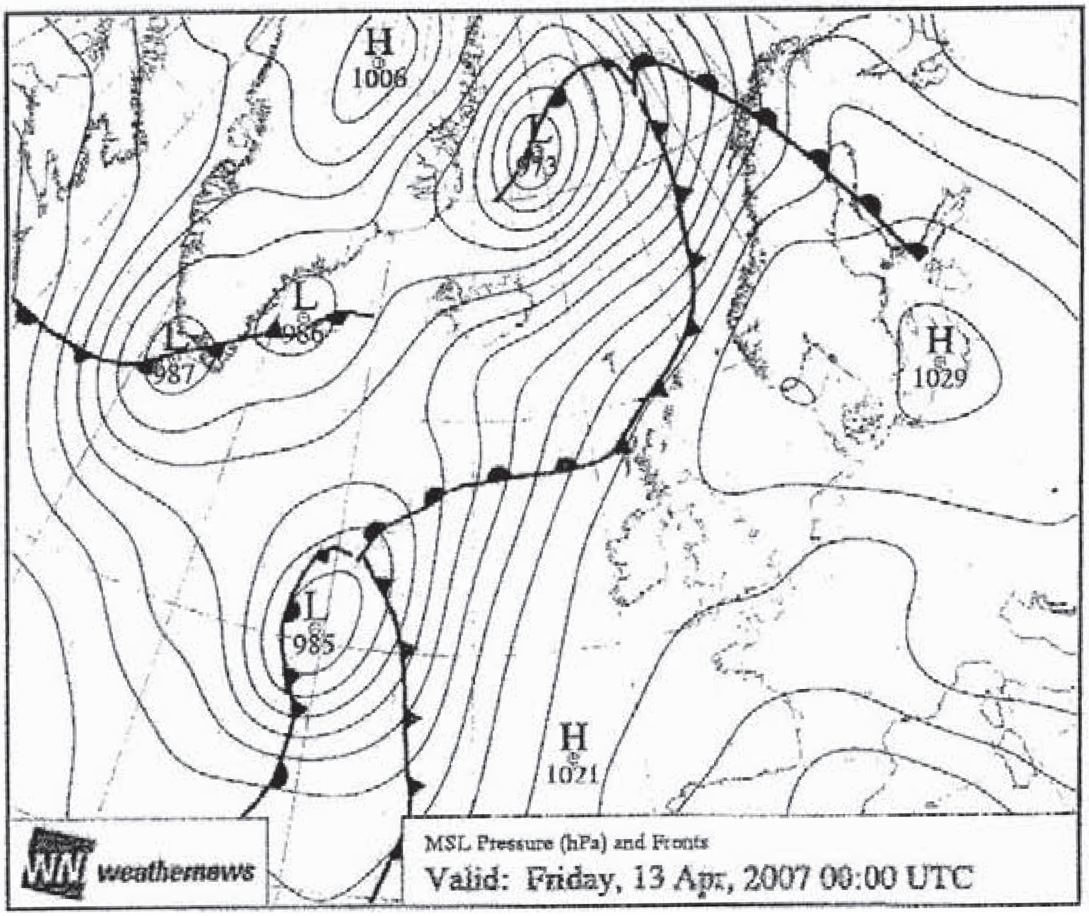
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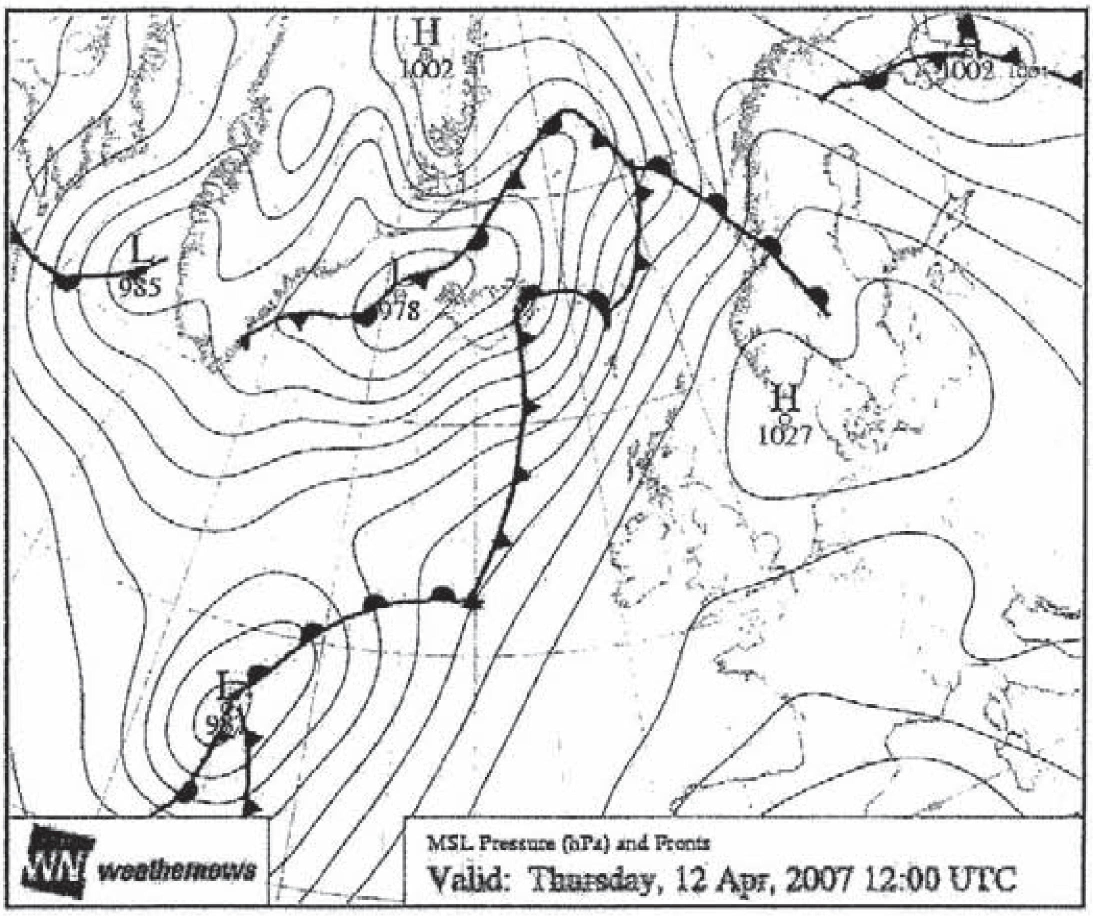
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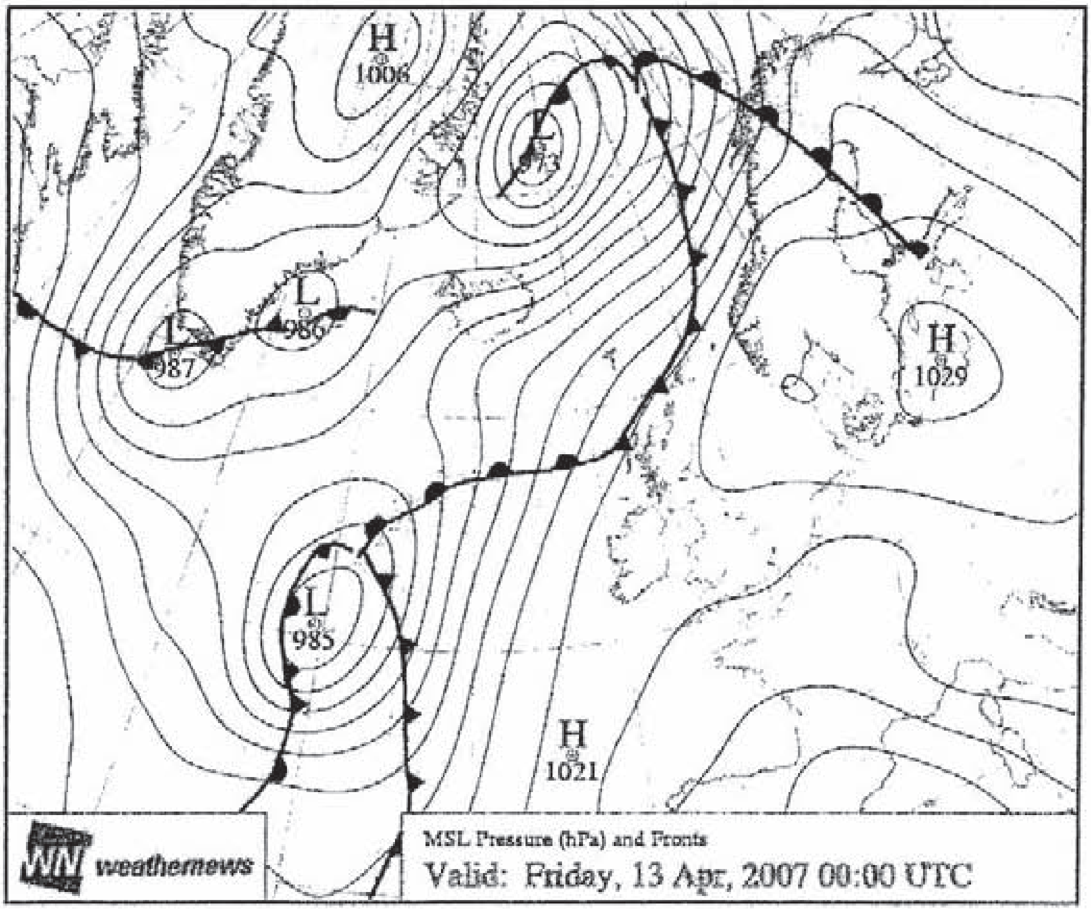
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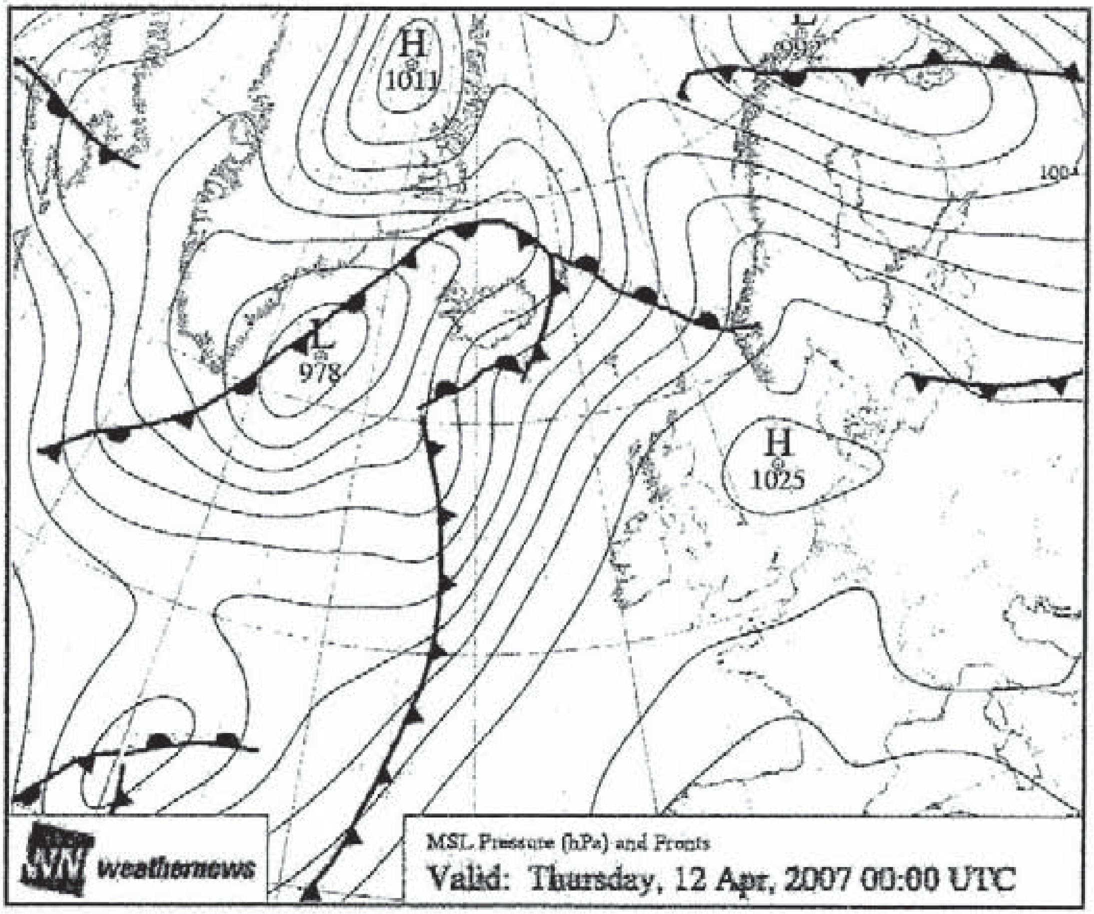
Valid: Friday, 13 Apr, 2007 00:00 UTC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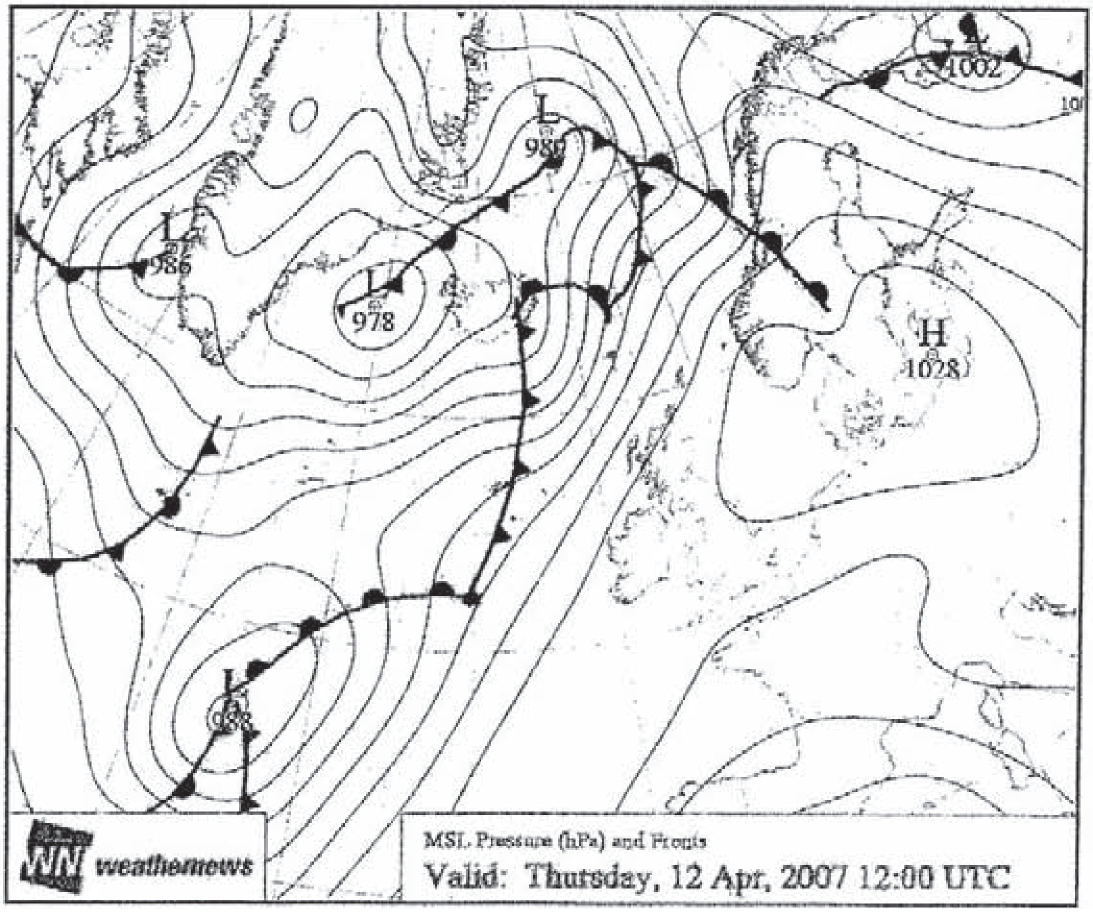
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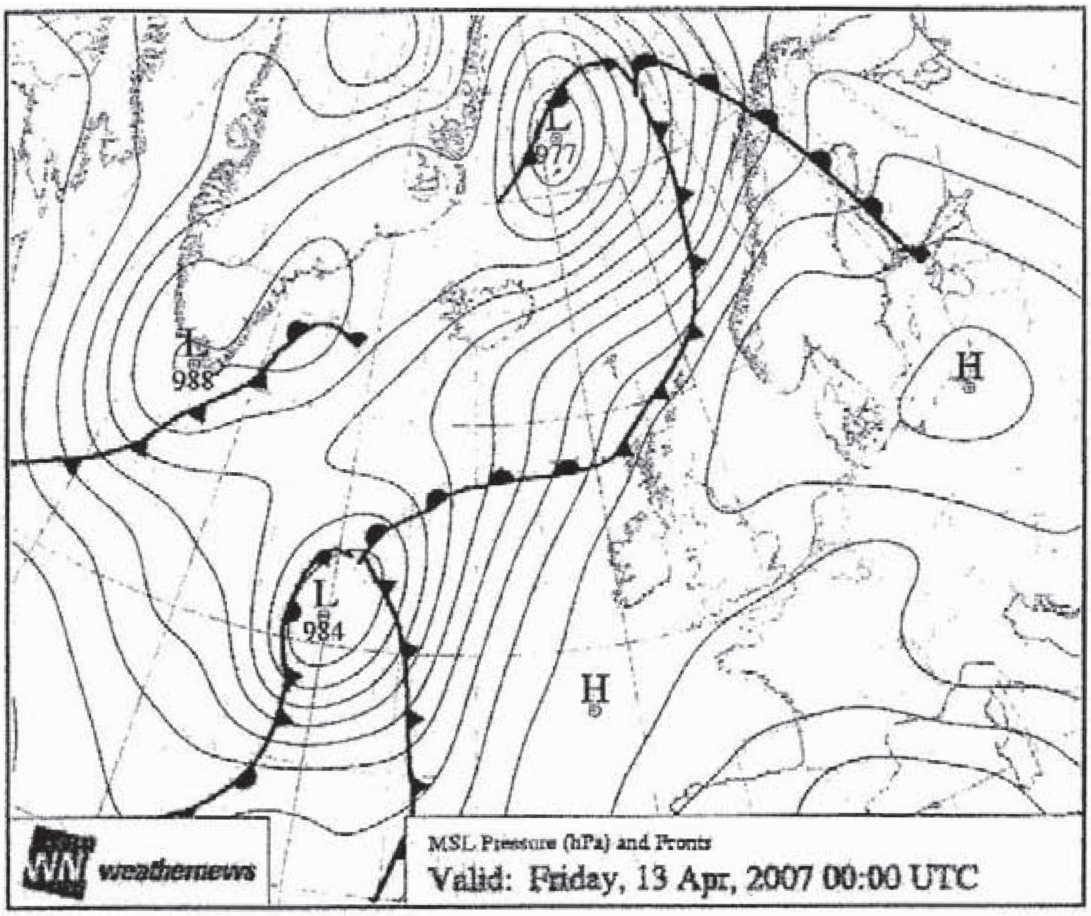
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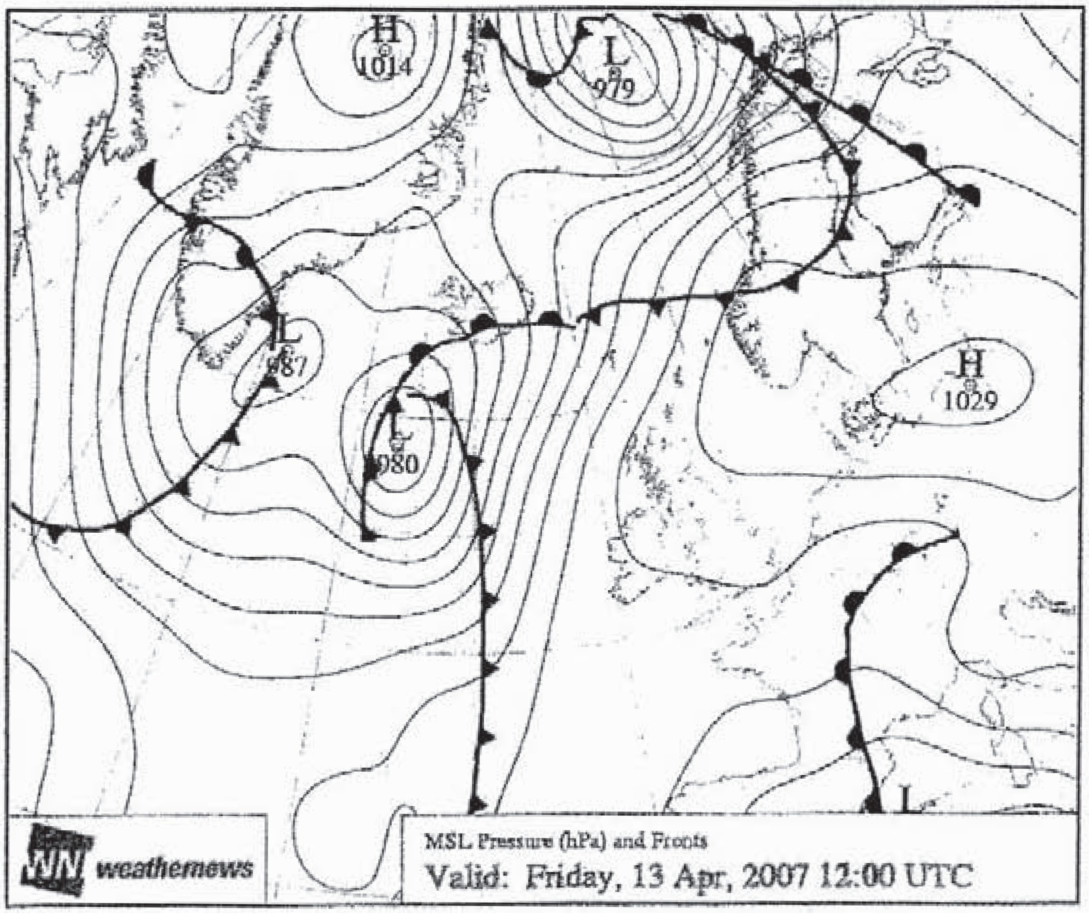
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weathernews
MSL Pressure (hPa) and Fronts
Valid: Friday, 13 Apr, 2007 12:00 UTC

7-Day Forecast Graph: Chevron - Transocean Rather

Issued At: Thu Apr 12 22:12 GMT
Forecaster: J.P. Lindeboom
Confidence: High
Warnings: Nil

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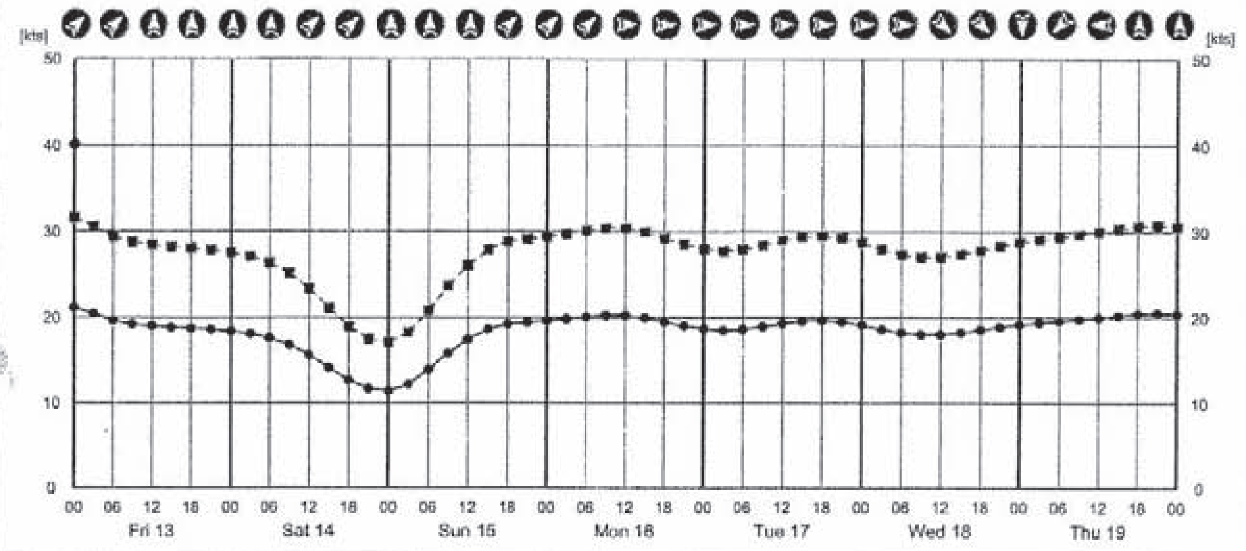
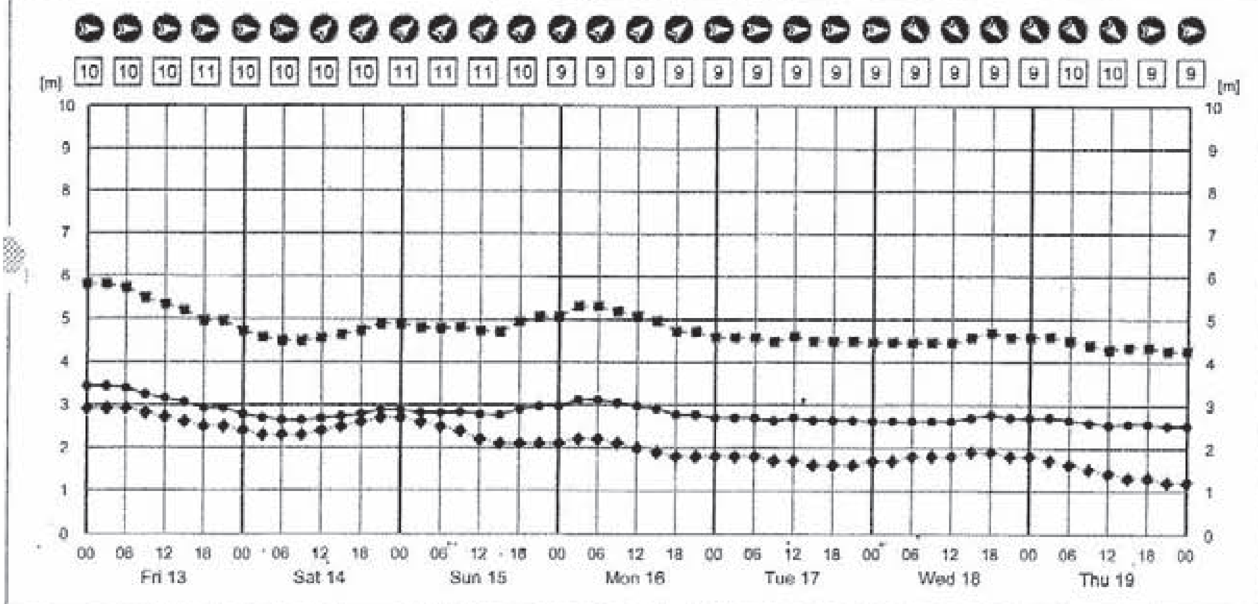
Wind Graphs



Wave Graphs



Wind Legend

10m Wind | 50m Wind | 50m Gust | Wind Direction

Wave Legend

Sig.Wave Ht. | Max Wave Ht. | Swell Height | Swell Direction | 12 Swell Period

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7-Day Forecast: Chevron - Transocean Rather

Issued At: Thu Apr 12 22:12 GMT
Forecaster: J.P. Lindeboom
Confidence: High
Warnings: Nil

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E-mail: marine@wni.com

Forecast Summary

Risk of Lightning (first 24hrs): Nil
Risk of Fog (first 24hrs): Nil
Sea Surface Temperature: 9 °C
Max Wave Height: 5.8 m (At Fri Apr 13 00:00)
Max Mean Wind Speed at 50m: 31 kts (At Fri Apr 13 00:00)

Synoptic Discussion

High over southern Scandinavia remains stationary until Monday. Low pressure areas moving over Iceland, associated fronts passing the forecast area at times. After the weekend high pressure will decline whilst moving east, new high building over British Isles, becoming stationary. Low pressure then found over N Scandinavia and Iceland, fronts affecting the weather over the area.

Date	Wind				Wave								Weather	Vis. (m)	Temp (°C)	Cloud Base (ft)
	Dir	10m	50m		Sig Ht (m)	Max Ht (m)	Sea			Swell						
		mean (kts)	mean (kts)	gust (kts)			Dir	Ht (m)	Per (sec)	Dir	Ht (m)	Per (sec)				
Fri Apr 13 00:00	SW	21	31	40	3.4	5.8	SW	1.8	6	W	2.9	10	Overcast	3600	9	1300
Fri Apr 13 03:00	SW	20	30	38	3.4	5.8	SW	1.8	5	W	2.9	10	Overcast	3100	9	700
Fri Apr 13 06:00	SW	19	29	37	3.4	5.7	SW	1.7	5	W	2.9	10	Overcast	3500	8	1300
Fri Apr 13 09:00	S	19	28	36	3.2	5.5	S	1.6	5	W	2.8	10	Cloudy	4000	9	1900
Fri Apr 13 12:00	S	18	28	36	3.1	5.3	S	1.6	5	W	2.7	10	Cloudy	3600	9	600
Fri Apr 13 15:00	S	18	28	35	3.1	5.2	S	1.6	5	W	2.6	10	Cloudy	3000	9	700
Fri Apr 13 18:00	S	18	28	35	2.9	5.0	S	1.5	5	W	2.5	11	Cloudy	3100	8	800
Fri Apr 13 21:00	S	18	27	35	2.9	5.0	S	1.5	5	W	2.5	10	Cloudy	3100	8	1000
Sat Apr 14 00:00	S	18	27	34	2.8	4.7	S	1.4	5	W	2.4	10	Cloudy	3600	8	1200
Sat Apr 14 03:00	S	18	27	34	2.7	4.6	S	1.4	5	W	2.3	10	Cloudy	4000	8	1400
Sat Apr 14 06:00	S	17	26	33	2.6	4.5	S	1.3	5	W	2.3	10	Cloudy	4900	8	3200
Sat Apr 14 09:00	S	16	25	31	2.6	4.5	S	1.3	5	W	2.3	10	Cloudy	5000	9	3300
Sat Apr 14 12:00	SW	15	23	29	2.7	4.6	SW	1.2	5	SW	2.4	10	Cloudy	4400	10	3100
Sat Apr 14 15:00	SW	14	21	26	2.7	4.6	SW	1.1	4	SW	2.5	10	Cloudy	4700	10	2800
Sat Apr 14 18:00	SW	12	18	24	2.8	4.7	SW	1.0	4	SW	2.6	10	Cloudy	4700	9	2900
Sat Apr 14 21:00	SW	11	17	22	2.9	4.9	SW	1.0	4	SW	2.7	11	Cloudy	5400	9	3200
Sun Apr 15 00:00	S	11	17	21	2.9	4.9	S	1.0	4	SW	2.7	11	Cloudy	5200	9	3300
Sun Apr 15 03:00	S	12	18	23	2.8	4.8	S	1.1	4	SW	2.6	11	Cloudy	4900	9	2600
Sun Apr 15 06:00	S	13	20	26	2.8	4.8	S	1.3	4	SW	2.5	11	Cloudy	3900	9	1800
Sun Apr 15 09:00	S	15	23	30	2.8	4.8	S	1.5	5	SW	2.4	11	Cloudy	2200	9	600
Sun Apr 15 12:00	S	17	26	33	2.8	4.7	S	1.7	5	SW	2.2	11	Overcast	3000	9	900
Sun Apr 15 15:00	SW	18	27	35	2.8	4.7	SW	1.8	5	SW	2.1	10	Overcast	5100	9	1300
Sun Apr 15 18:00	SW	19	28	36	2.9	4.9	SW	2.0	5	SW	2.1	10	Drizzle	4900	9	1000
Sun Apr 15 21:00	SW	19	29	36	3.0	5.0	SW	2.1	5	SW	2.1	10	Drizzle	3700	8	700
Mon Apr 16 00:00	SW	19	29	37	3.0	5.0	SW	2.1	5	SW	2.1	9	Cloudy	4800	8	1100
Mon Apr 16 06:00	SW	20	30	38	3.1	5.3	SW	2.2	5	SW	2.2	9	Overcast	9900	8	2000
Mon Apr 16 12:00	W	20	30	38	3.0	5.1	W	2.2	5	SW	2.0	9	Overcast	9900	8	6000
Mon Apr 16 18:00	W	19	29	37	2.8	4.7	W	2.1	5	SW	1.8	9	Cloudy	9900	7	8000
Tue Apr 17 00:00	W	18	28	35	2.7	4.6	W	2.0	5	W	1.8	9	Overcast	9900	6	2400
Tue Apr 17 06:00	W	18	27	35	2.7	4.6	W	2.0	5	W	1.8	9	Drizzle	6800	6	1500
Tue Apr 17 12:00	W	19	28	36	2.7	4.6	W	2.1	5	W	1.7	9	Drizzle	7600	6	1100
Tue Apr 17 18:00	W	19	29	37	2.6	4.5	W	2.1	5	W	1.6	9	Overcast	6800	6	1400
Wed Apr 18 00:00	W	19	28	36	2.6	4.5	W	2.0	5	W	1.7	9	Overcast	6700	6	1700
Wed Apr 18 06:00	W	18	27	34	2.6	4.4	W	1.9	5	NW	1.8	9	Drizzle	6600	8	1000
Wed Apr 18 12:00	NW	18	27	34	2.6	4.4	NW	1.9	5	NW	1.8	9	Rain	6600	7	900
Wed Apr 18 18:00	NW	18	27	35	2.8	4.7	NW	2.0	5	NW	1.9	9	Rain	6900	7	900
Thu Apr 19 00:00	N	19	28	36	2.7	4.6	N	2.0	5	NW	1.8	9	Rain	7200	5	1100
Thu Apr 19 06:00	NE	19	29	37	2.6	4.5	NE	2.1	5	NW	1.6	10	Rain	7500	4	1000
Thu Apr 19 12:00	E	19	29	37	2.5	4.3	E	2.1	5	NW	1.4	10	Drizzle	9900	5	1400
Thu Apr 19 18:00	S	20	30	38	2.6	4.3	S	2.2	5	W	1.3	9	Rainshower	9900	6	1400
Fri Apr 20 00:00	S	20	30	38	2.5	4.3	S	2.2	5	W	1.2	8	Fair	9900	5	2000

7-Day Forecast Graph: Chevron - Transocean Rather

Issued At: Thu Apr 12 16:07 GMT
Forecaster: M. van der Putte
Confidence: High
Warnings: Low risk of fog.

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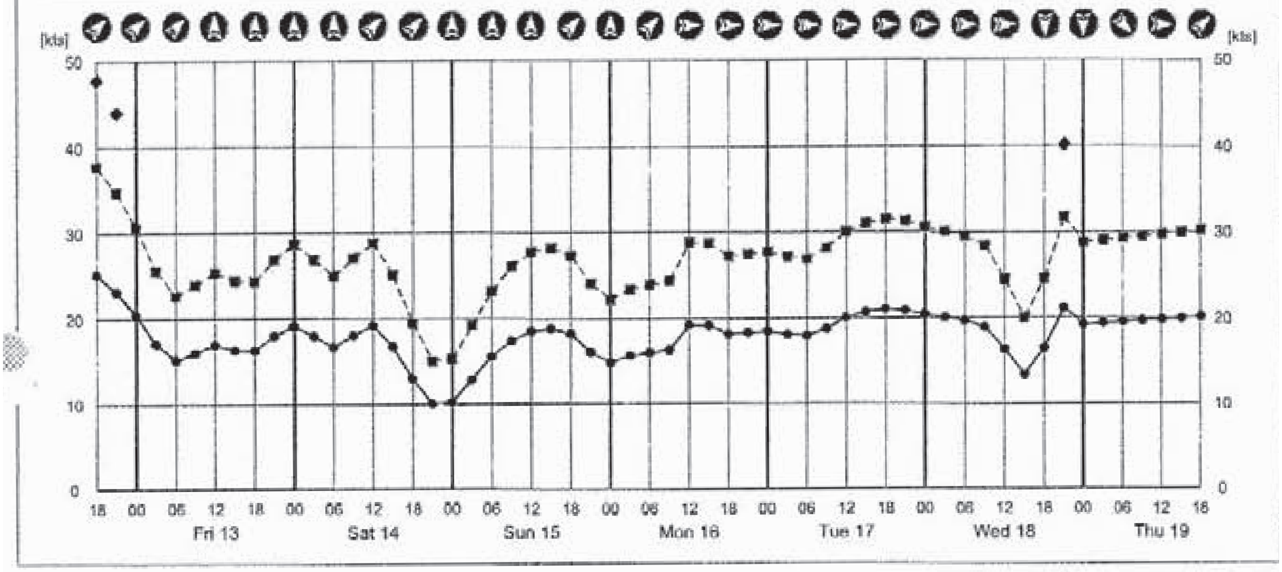
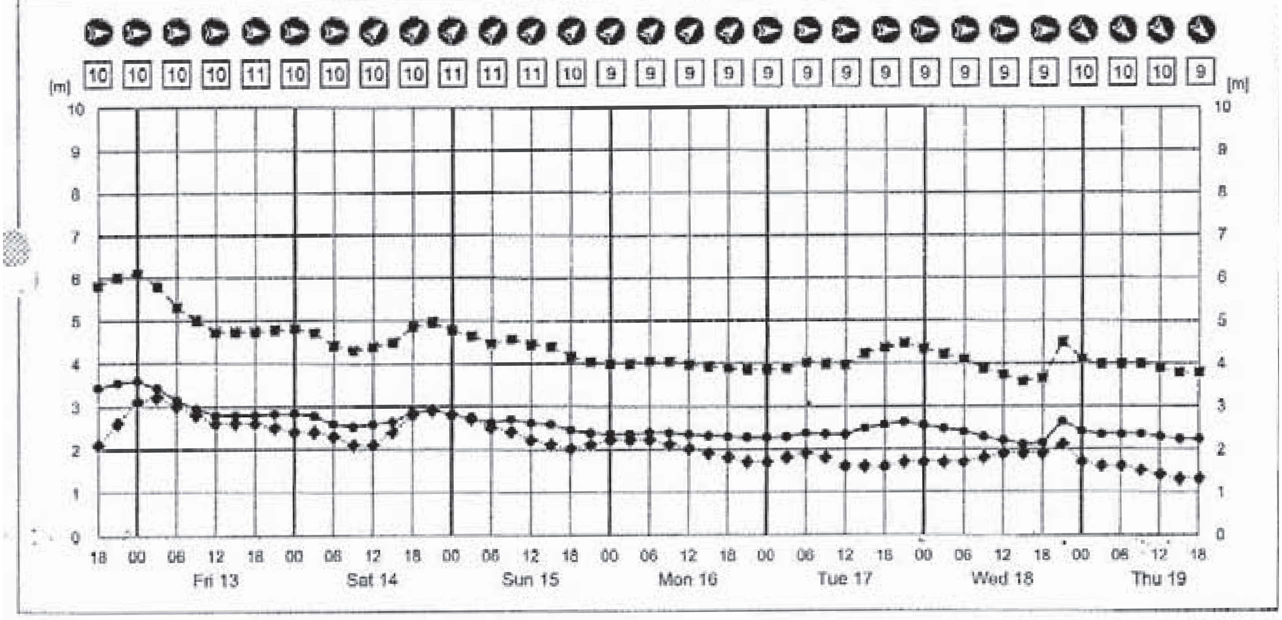
Fax: +31 (0) 35 6039009
E-mail: marine@wni.com

Wind Graphs



Wave Graphs



Wind Legend				Wave Legend				
10m Wind	50m Wind	50m Gust	Wind Direction	Sig.Wave Ht.	Max Wave Ht.	Swell Height	Swell Direction	Swell Period

7-Day Forecast: Chevron - Transocean Rather

Issued At: Thu Apr 12 16:07 GMT
Forecaster: M. van der Putte
Confidence: High
Warnings: Low risk of fog.

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Fax: +31 (0) 35 6039009
E-mail: marine@wni.com

Forecast Summary

Risk of Lightning (first 24hrs): Nil
Risk of Fog (first 24hrs): Low (10-40 percent)
Sea Surface Temperature: 9 °C
Max Wave Height: 6.1 m (At Fri Apr 13 00:00)
Max Mean Wind Speed at 50m: 37 kts (At Thu Apr 12 18:00)

Synoptic Discussion

High building over the North Sea and Denmark, moving towards the Baltic Sea on Friday, staying stationary until Monday. Low pressure areas moving over Iceland, associated fronts passing the forecast area at times. South of these lows a ridge is developing and after passage of a cold front more unstable air will reach the area from Monday on. However, this front will stay just south of the location and influence the weather at times.

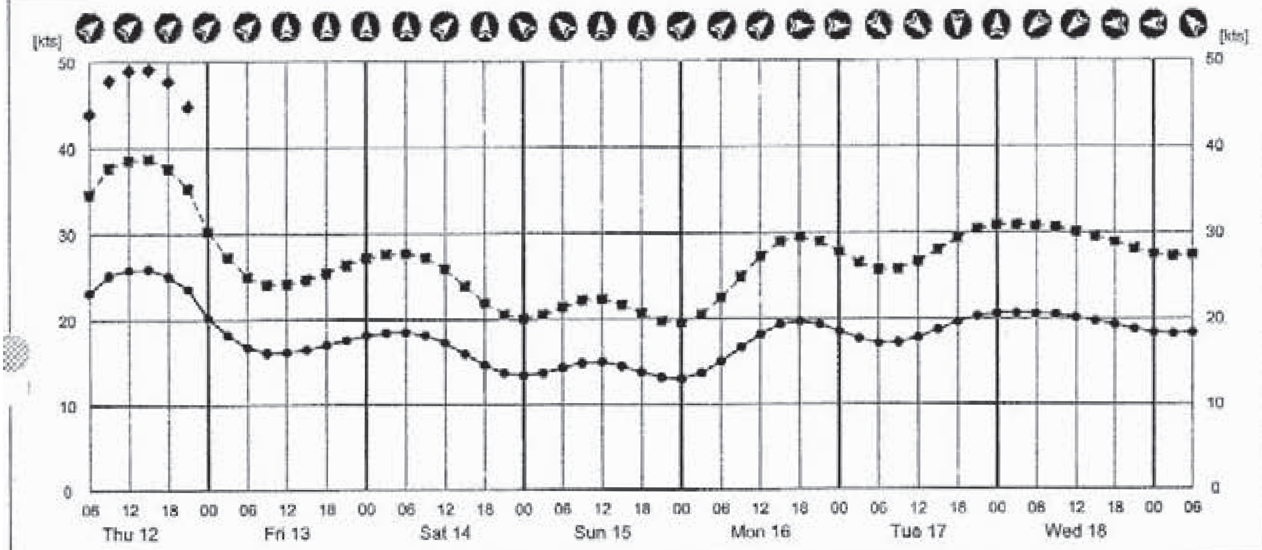
Date	Wind				Wave								Weather	Vis. (m)	Temp (°C)	Cloud Base (ft)
	Dir	10m	50m		Sig Ht (m)	Max Ht (m)	Sea			Swell						
		mean (kts)	mean (kts)	gust (kts)			Dir	Ht (m)	Per (sec)	Dir	Ht (m)	Per (sec)				
Thu Apr 12 18:00	SW	25	37	47	3.4	5.8	SW	2.7	6	W	2.1	10	Cloudy	7200	9	4700
Thu Apr 12 21:00	SW	23	34	44	3.5	6.0	SW	2.4	6	W	2.6	10	Overcast	6100	9	3300
Fri Apr 13 00:00	SW	20	30	38	3.6	6.1	SW	1.8	5	W	3.1	10	Drizzle	3600	9	1300
Fri Apr 13 03:00	SW	17	25	32	3.4	5.8	SW	1.2	5	W	3.2	10	Drizzle	3100	9	700
Fri Apr 13 06:00	SW	15	22	28	3.1	5.3	SW	0.9	4	W	3.0	10	Overcast	3500	8	1300
Fri Apr 13 09:00	S	15	23	30	2.9	5.0	S	0.9	5	W	2.8	10	Cloudy	4000	9	1900
Fri Apr 13 12:00	S	16	25	32	2.8	4.7	S	1.0	5	W	2.6	10	Mist	3600	9	600
Fri Apr 13 15:00	S	16	24	30	2.8	4.7	S	1.0	5	W	2.6	11	Mist	3000	9	700
Fri Apr 13 18:00	S	16	24	30	2.8	4.7	S	1.0	5	W	2.6	11	Mist	3100	8	800
Fri Apr 13 21:00	S	17	26	34	2.8	4.8	S	1.3	5	W	2.5	11	Mist	3100	8	1000
Sat Apr 14 00:00	S	19	28	36	2.8	4.8	S	1.5	5	W	2.4	10	Mist	3600	8	1200
Sat Apr 14 03:00	S	17	28	34	2.8	4.7	S	1.4	5	W	2.4	10	Mist	4000	8	1400
Sat Apr 14 06:00	S	16	24	31	2.6	4.4	S	1.2	6	W	2.3	10	Cloudy	4900	8	3200
Sat Apr 14 09:00	S	18	27	34	2.5	4.3	S	1.4	5	W	2.1	10	Cloudy	5000	9	3300
Sat Apr 14 12:00	SW	19	28	36	2.6	4.4	SW	1.5	5	SW	2.1	10	Cloudy	4400	10	3100
Sat Apr 14 15:00	SW	16	25	31	2.8	4.5	SW	1.1	5	SW	2.4	10	Cloudy	4700	10	2800
Sat Apr 14 18:00	SW	13	19	24	2.9	4.9	SW	0.6	4	SW	2.8	10	Cloudy	4700	9	2900
Sat Apr 14 21:00	SW	10	15	19	2.9	5.0	SW	0.3	3	SW	2.9	11	Cloudy	5400	8	3200
Sun Apr 15 00:00	S	10	15	19	2.8	4.8	S	0.2	3	SW	2.8	11	Cloudy	5200	9	3300
Sun Apr 15 03:00	S	12	19	24	2.7	4.6	S	0.4	4	SW	2.7	11	Cloudy	4900	9	2600
Sun Apr 15 06:00	S	15	23	29	2.6	4.5	S	0.8	4	SW	2.5	11	Mist	3900	9	1900
Sun Apr 15 09:00	S	17	26	33	2.7	4.6	S	1.2	5	SW	2.4	11	Mist	2200	9	600
Sun Apr 15 12:00	S	18	27	35	2.6	4.4	S	1.4	5	SW	2.2	11	Overcast	3000	9	900
Sun Apr 15 15:00	SW	18	28	35	2.6	4.4	SW	1.5	5	SW	2.1	10	Overcast	5100	8	1300
Sun Apr 15 18:00	SW	18	27	34	2.4	4.2	SW	1.4	5	SW	2.0	10	Drizzle	4600	9	1000
Mon Apr 16 00:00	S	14	22	28	2.3	4.0	S	0.8	4	SW	2.2	9	Cloudy	4600	8	1100
Mon Apr 16 06:00	SW	15	23	30	2.4	4.0	SW	0.9	5	SW	2.2	9	Overcast	9900	8	2000
Mon Apr 16 12:00	W	19	28	36	2.3	4.0	W	1.2	5	SW	2.0	9	Overcast	9900	8	6000
Mon Apr 16 18:00	W	18	27	34	2.3	3.9	W	1.4	5	SW	1.8	9	Cloudy	9900	7	6000
Tue Apr 17 00:00	W	18	27	35	2.3	3.9	W	1.5	5	W	1.7	9	Overcast	9900	6	2400
Tue Apr 17 06:00	W	17	26	34	2.4	4.0	W	1.4	5	W	1.9	9	Drizzle	8800	6	1500
Tue Apr 17 12:00	W	20	30	38	2.3	4.0	W	1.7	5	W	1.6	9	Drizzle	7900	6	1100
Tue Apr 17 18:00	W	21	31	39	2.6	4.4	W	2.0	6	W	1.6	9	Overcast	9400	6	1400
Wed Apr 18 00:00	W	20	30	38	2.5	4.3	W	1.9	5	W	1.7	9	Overcast	9900	6	1700
Wed Apr 18 06:00	W	19	29	37	2.4	4.1	W	1.7	5	W	1.7	9	Drizzle	7600	8	1000
Wed Apr 18 12:00	W	16	24	31	2.2	3.7	W	1.1	5	W	1.9	9	Rain	7100	7	900
Wed Apr 18 18:00	N	16	24	31	2.1	3.7	N	1.0	5	W	1.9	9	Rain	7600	7	900
Thu Apr 19 00:00	N	19	28	36	2.4	4.1	N	1.7	5	NW	1.7	10	Rain	8100	5	1100
Thu Apr 19 06:00	NW	19	29	37	2.3	4.0	NW	1.7	5	NW	1.6	10	Rain	8200	4	1000
Thu Apr 19 12:00	W	19	29	37	2.3	3.9	W	1.8	5	NW	1.4	10	Drizzle	9900	5	1400
Thu Apr 19 18:00	SW	20	30	38	2.2	3.8	SW	1.8	5	NW	1.3	9	Rainshower	9900	6	1400

7-Day Forecast Graph: Chevron - Transocean Rather

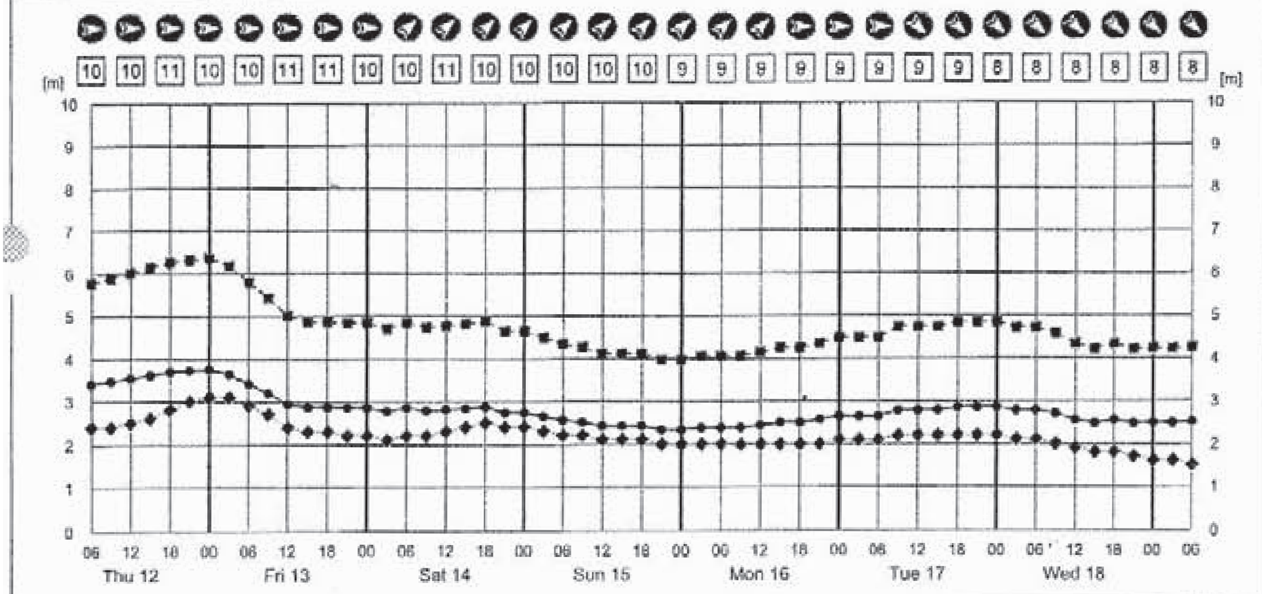
Issued At: Thu Apr 12 05:05 GMT
Forecaster: J.P. Lindeboom
Confidence: High
Warnings: Gusts up to 50 kts.

weathernews
Amsterdam Seaplanning
Tel: +31 (0) 35 6039001
Fax: +31 (0) 35 6039009
E-mail: marine@wni.com

Wind Graphs



Wave Graphs



Wind Legend

10m Wind — 50m Wind — 50m Gust — Wind Direction

Wave Legend

Sig.Wave Ht. — Max Wave Ht. — Swell Height — Swell Direction — 12 Swell Period

7-Day Forecast: Chevron - Transocean Rather

Issued At: Thu Apr 12 05:05 GMT
Forecaster: J.P. Lindeboom
Confidence: High
Warnings: Gusts up to 50 kts.

weathernews
Amsterdam Seaplanning
Tel: +31 (0) 35 6039001
Fax: +31 (0) 35 6039009
E-mail: marine@wni.com

Forecast Summary

Risk of Lightning (first 24hrs): Nil
Risk of Fog (first 24hrs): Nil
Sea Surface Temperature: 9 °C
Max Wave Height: 6.4 m (At Fri Apr 13 00:00)
Max Mean Wind Speed at 50m: 38 kts (At Thu Apr 12 15:00)

Synoptic Discussion

High building over the North Sea and Denmark, moving towards the Baltic Sea and Poland on Friday. Low pressure areas moving northeast over Iceland, associated weak fronts passing the forecast area at times. Last low is expected to pass Iceland Sunday evening. Between this low and a developing high near South Greenland cold and unstable air will reach the area from Monday on.

Date	Wind Dir	Wind 10m mean (kts)	Wind 50m mean (kts)	Wind 50m gust (kts)	Wave Sig Ht (m)	Wave Max Ht (m)	Sea Dir	Sea Ht (m)	Sea Per (sec)	Swell Dir	Swell Ht (m)	Swell Per (sec)	Weather	Vis. (m)	Temp (°C)	Cloud Base (ft)
Thu Apr 12 06:00	SW	23	34	43	3.4	5.8	SW	2.4	6	W	2.4	10	Cloudy	10000	9	6000
Thu Apr 12 09:00	SW	25	37	47	3.5	5.9	SW	2.5	6	W	2.4	10	Cloudy	10000	9	6000
Thu Apr 12 12:00	SW	26	38	48	3.5	6.0	SW	2.5	6	W	2.6	10	Cloudy	10000	9	6000
Thu Apr 12 15:00	SW	25	38	49	3.6	6.1	SW	2.5	6	W	2.8	11	Cloudy	10000	9	4800
Thu Apr 12 18:00	SW	25	37	47	3.7	6.3	SW	2.4	6	W	2.8	11	Cloudy	10000	9	4600
Thu Apr 12 21:00	SW	23	35	44	3.7	6.3	SW	2.2	6	W	3.0	11	Cloudy	10000	9	4100
Fri Apr 13 00:00	SW	20	30	38	3.7	6.4	SW	2.1	5	W	3.1	10	Fair	10000	9	3200
Fri Apr 13 03:00	SW	18	27	34	3.6	6.2	SW	1.9	5	W	3.1	10	Fair	10000	9	4000
Fri Apr 13 06:00	SW	16	25	31	3.4	5.8	SW	1.8	5	W	2.9	10	Cloudy	10000	9	6000
Fri Apr 13 09:00	S	16	24	30	3.2	5.4	S	1.7	5	SW	2.7	11	Fair	10000	9	6000
Fri Apr 13 12:00	S	16	24	30	2.9	5.0	S	1.7	5	W	2.4	11	Fair	10000	9	6000
Fri Apr 13 15:00	S	16	24	31	2.9	4.9	S	1.7	5	W	2.3	11	Cloudy	10000	9	6000
Fri Apr 13 18:00	S	16	25	32	2.9	4.9	S	1.7	5	W	2.3	11	Cloudy	10000	9	6000
Fri Apr 13 21:00	S	17	26	33	2.8	4.8	S	1.8	5	W	2.2	10	Rainshower	7800	9	5800
Sat Apr 14 00:00	S	18	27	34	2.8	4.8	S	1.8	5	W	2.2	10	Rainshower	7000	9	6000
Sat Apr 14 03:00	S	18	27	34	2.8	4.7	S	1.8	5	SW	2.1	10	Cloudy	10000	9	5600
Sat Apr 14 06:00	S	18	27	35	2.8	4.8	S	1.8	5	SW	2.2	10	Rainshower	6700	9	4100
Sat Apr 14 09:00	SW	18	27	34	2.8	4.7	SW	1.7	5	SW	2.2	11	Cloudy	4600	9	3300
Sat Apr 14 12:00	SW	17	25	32	2.8	4.8	SW	1.6	5	SW	2.3	11	Cloudy	3800	9	3100
Sat Apr 14 15:00	SW	15	23	30	2.8	4.8	SW	1.5	5	SW	2.4	11	Cloudy	3700	9	2800
Sat Apr 14 18:00	S	14	21	27	2.9	4.9	S	1.4	4	SW	2.5	10	Rainshower	4900	9	2900
Sat Apr 14 21:00	S	13	20	26	2.7	4.6	S	1.3	4	SW	2.4	10	Cloudy	5500	9	3200
Sun Apr 15 00:00	SE	13	20	25	2.7	4.6	SE	1.3	4	SW	2.4	10	Overcast	6300	9	3300
Sun Apr 15 03:00	SE	13	20	25	2.6	4.5	SE	1.3	4	SW	2.3	10	Overcast	4700	9	3100
Sun Apr 15 06:00	SE	14	21	27	2.6	4.3	SE	1.3	4	SW	2.2	10	Rain	4100	9	2900
Sun Apr 15 12:00	S	14	22	28	2.4	4.1	S	1.2	4	SW	2.1	10	Rainshower	3400	9	2200
Sun Apr 15 18:00	S	13	20	26	2.4	4.1	S	1.2	4	SW	2.1	10	Cloudy	5300	8	3800
Mon Apr 16 00:00	SW	13	19	24	2.3	4.0	SW	1.2	4	SW	2.0	9	Cloudy	8100	8	6000
Mon Apr 16 06:00	SW	15	22	28	2.4	4.1	SW	1.3	4	SW	2.0	9	Cloudy	9900	9	6000
Mon Apr 16 12:00	SW	18	27	34	2.4	4.2	SW	1.4	5	SW	2.0	9	Cloudy	9900	9	6000
Mon Apr 16 18:00	W	19	29	37	2.5	4.3	W	1.5	5	W	2.0	9	Overcast	10000	8	6000
Tue Apr 17 00:00	W	18	27	35	2.6	4.5	W	1.6	5	W	2.1	9	Overcast	9900	8	6000
Tue Apr 17 06:00	NW	17	25	32	2.6	4.5	NW	1.6	5	W	2.1	9	Rain	9700	7	4500
Tue Apr 17 12:00	NW	17	26	33	2.8	4.7	NW	1.7	5	NW	2.2	9	Rain	4300	7	2800
Tue Apr 17 18:00	N	19	29	37	2.8	4.8	N	1.8	5	NW	2.2	9	Rain	2600	7	2400
Wed Apr 18 00:00	S	20	30	39	2.8	4.8	S	1.8	5	NW	2.2	8	Overcast	2400	7	1700
Wed Apr 18 06:00	NE	20	30	38	2.8	4.7	NE	1.8	5	NW	2.1	8	Drizzle	3000	6	1600
Wed Apr 18 12:00	NE	20	30	38	2.5	4.3	NE	1.7	5	NW	1.9	8	Overcast	3300	6	1700
Wed Apr 18 18:00	E	19	28	38	2.5	4.3	E	1.8	5	NW	1.8	8	Rain	3600	6	1800
Thu Apr 19 00:00	E	18	27	34	2.5	4.2	E	1.9	5	NW	1.6	8	Cloudy	4100	6	2100
Thu Apr 19 06:00	SE	18	27	34	2.5	4.3	SE	2.0	5	NW	1.5	8	Cloudy	3200	6	6000

Bourbon Dolphin Capsize
Recorded Weather data 12th April

	0300	0400	0600	0800	0900	1200	1500	1600	1800
Transocean Rather									
Wind (Kts)		217 x 24		210 x 32		200 x 35		200 x 37	
Waves (m) Significant		220 x 3.1		210 x 2.5		200 x 2.5		200 x 2.0	
Swell (m)		260 x 5.0		265 x 3.5		270 x 3.5		240 x 3.0	
Viking Victory									
Wind (Kts)		220 x 30		200 x 30		200 x 35		190 x 35	
Waves (m) Significant		220 x 2.5		220 x 2.5		N/A		190 x 2.0	
Swell		230 x 2.5		230 x 2.5		N/A		190 x 3.0	
Highland Valour									
Wind (Kts)	225 x 28		225 x 31		200 x 31	225 x 35	200 x 35		200 x 35
Waves (m) Significant	Moderate		Moderate		Mod/Rough	Mod/Rough	Moderate		Moderate
Swell	Moderate		Moderate		Mod/Rough	Short?/Rough	Moderate		Moderate

Eli Døving Oksavik

Fra: Eli Døving Oksavik
Sendt: 9. mai 2007 14:26
Til: Trond Myklebust; Bjørn Hellum Bergsnes; Bjørn Remøy; Steven John Rooney
Kopi: Eirik Eide; 'ksd@ksdyrkorn.no'; 'Knut Erling Øyehaug'
Emne: VS: Strømdata

Hei igjen,

Fekk svar frå Marintek over telefon – dei viktigaste punkta er:

1. Vest fro Shetland er blant fagfolk kjent for å være det verste område i heile væra med hensyn til bølger og straum.
2. Arealet som ein kjetting på 1800 meter representerer gir større eksponering for straum enn sjølve båten, å kun ta hensyn til vekta på kjettingen vil være heilt feil under slike forhold
3. Straumforholda kan være andreleis på djupet enn på overflata, og vi kan teoretisk ha større straum hastigheit på djupet enn ved skipet.
4. Traidisjonelt har straummålinger basert seg på 15 min intervall, nyere måling viser at dette ikkj er tilstrekkelig. Straum endrer retning og hastighet vesentlig raskare enn 15 min.
5. BP gjorde store undersøkelser i dette område på 90 tallet, Marintek var litt involvert, men har ikkje desse dataene.
6. Anbefaler at BON kontakter meterologiske intitutt i Norge eller UK.

Eli

Fra: Eli Døving Oksavik
Sendt: 8. mai 2007 14:49
Til: 'Nedrelid Terje'
Emne: SV: Strømdata

Hei,
Og takk for denne informasjon!

I berekningane for rigg flyttet er 1,0 m/s brukt som max verdi – det er kanskje litt interesant.

Har du kjennskap til institusjoner eller institutt som eventuelt kan hjelpe oss med slik vær / strøm informasjon i UK?

Kan vi under spesielle forhold få sterkare strøm på djupet enn på/nær overflata?

Mvh

Eli D.Oksavik
Bourbon Offshore Norway AS

Fra: Nedrelid Terje [mailto:Terje.Nedrelid@marintek.sintef.no]
Sendt: 8. mai 2007 11:25
Til: Eli Døving Oksavik
Emne: RE: Strømdata

Hei,

Vi har ikke så mange referanser på strømforholdene i området fra den senere tid. Midt på 90-tallet gjorde vi imidlertid tester og vurderinger for området der Schihalion og Foinavon feltene ligger vest av Shetland.

Området ble den gang vurdert som spesielle pga høye bølger og sterke strømmer som påvirkes av en lang undervannsegg. Vi opererte med strømhastigheter omkring 1.2 - 1.3 m/s. Max hastigheter opp mot 1.8 m/s ble o så omtalt. Metocean data for disse områdene fikk vi fra oljeselskapene som utviklet feltene i området. Vi har a dri innhentet direkte informasjon fra oseanografiske institusjoner selv. Det er altså generelt høye strømmer i området vest av Shetland, men om dette er tilfellet på akkurat den posisjon dere oppgir, kan jeg ikke bekrefte pr i dag.

Mvh

Terje Nedrelid
Marintek

From: Eli Døving Oksavik [mailto:eli.oksavik@bourbon-online.com]
Sent: 7. mai 2007 16:44
To: Nedrelid Terje
Subject: Strømdata

Hei,

Viser til samtale i dag, og ber om å få tilsendt tilgjengelig informasjon om strømforhold relatert til Bourbon Dolphin forliset. Feltet heite Rosebank 205/1-l, posisjon oppgitt i rigg loggen er lat: 60-59-33 N og long: 003-49-49 W, havdjup er 1103 meter.

All relevant informasjon som vi mottar vil bli lagt fram for Granskningskomisjon. Bourbon gjennomfører ikkje egen intern granskning.

Legg ved Rettsboka frå Sjøforklaringa til informasjon.

Mvh

Eli D.Oksavik
HMS Sjef
Bourbon Offshore Norway AS

Eli Døving Oksavik

Fra: Mo Knut [Knut.Mo@marintek.sintef.no]
Sendt: 23. mai 2007 15:48
Til: Eli Døving Oksavik
Kopi: Nedrelid Terje
Emne: FW: Straumdata Shetland

Eli Døving Oksavik

Jeg beklager at vi ikke har fått svart deg før nå.
Svaret på spørsmålet ditt er at MARINTEK kan utarbeide enkle matriser som viser dragkraft i kjetting og wire under forskjellige strømforhold.
For egen del vil jeg si at jeg har for dårlig kjennskap til hvordan ankerhåndterings-operasjoner utføres i praksis. Denne informasjonen er vesentlig for at vi skal kunne utarbeide relevante tabeller.

Vennligst
Knut Mo
MARINTEK

tlf. 7359 5880

From: Nedrelid Terje
Sent: 16. mai 2007 09:41
To: Mo Knut
Subject: FW: Straumdata Shetland

From: Eli Døving Oksavik [mailto:eli.oksavik@bourbon-online.com]
Sent: 15. mai 2007 21:07
To: Nedrelid Terje
Subject: Straumdata Shetland

Hei igjen,

Vedlagt finn du omtalte rapport frå Universitetet i Bergen.

- Kan Marintek utarbeide enkle matriser som viser drag i kjetting eller wire (fks. per 100 m.) under ulike teoretiske strømforhold? Slike tabeller kan da integreres i vår AHT manual for referanse.

Vi ber om at denne henvendelsen blir behandla konfidensielt!

Relevant informasjon som vi mottek frå Marintek vil bli lagt fram for granskningskomisjon.

Mvh

Eli D.Oksavik
Bourbon Offshore Norway AS

01.06.2007

Aerospace and Marine International

Hindcast of Weather and Currents for the Rosebank Field on 12th April S07023

Instructed by:- Mackinnons Solicitors

Issued:- October 2007

rospace & Marine UK Ltd
ail: amieu@weather3000.com
b: www.amiwx.com

Table of Contents

1 General

Aerospace and Marine UK Ltd were instructed to prepare a hindcast covering all the weather elements and wave parameters for the 12^{th} April 2007 for the location of the loss of the M.V. Bourbon Dolphin on UK Block 205/1 at 60^0 59' 32''N, 003° 49' 49''W (Rosebank Location) whilst she was anchor handling in connection with the move of the rig Transocean Rather. In addition we were asked for all obtainable data on sea surface currents throughout the 12^{th} April and also depth currents for the time of the incident.

2 Executive Summary

We have a high degree of confidence in the data detailed below for the Hindcast weather elements. We have a lesser confidence in the surface currents but it is difficult to quantify the level of this uncertainty. We have little confidence in the data we have obtained for sub-surface currents and doubt that reliable data can be reproduced with any degree of accuracy and recommend that data is not used for further engineering analysis of loadings on the Bourbon Dolphin, 12^{th} April.

Estimated environmental forces 1700 BST 12^{th} April 2007

Wind: -	210 degrees 26-28 knots
Sea: -	3.0-3.5m at 7-8 seconds.
Weather: -	Partly cloudy becoming cloudy.
Visibility: -	15-20 km.
Surface Current: -	30.0cm/sec (approx 0.6 knots), setting 066 degrees
Depth Current: -	N/A

3 Data Sources

The following data sources were available to us in constructing this hindcast:-

1) Archived 3 hourly fields of winds derived from the U.S. National Centre for Environmental Prediction GFS model at a resolution of 1 x 1 degree. These represent the starting fields used by this global forecast model. They give values of hourly averaged winds at the standard height of 10m above the surface every 3 hours.

2) Archived 3 hourly fields of wave heights and the principal spectral parameters (but not the full spectrum) derived from the Wave Watch 3 third generation wave model run at AMI on the above winds at a resolution of ¼ x ¼ degree.

3) Surface synoptic charts were drawn up at 3 hourly intervals. These show the distribution of surface air pressure which allow winds to be derived. These were based on land and ship observations and also data buoys. (Appendix 1) The sea height readings from buoy 64046 at 60.6N 4.9W was particularly useful as it was close to the location and almost immediately upwind of it throughout the 12th April.

4) Ascents from Lerwick in the Shetland Isles and Torshavn in the Faroes at 1200Z. (Appendix 2) These are the results of balloon flights which carry instrument packages and measure pressure, temperature and humidity as well as giving a measure of upper wind through being tracked by radar.

5) Quikscat wide swathe scatterometer passes. These measure 10m height winds from satellite passes as processed by NOAA/NESDIS, from near real-time data collected by NASA/Jet Propulsion Laboratory's SeaWinds Scatterometer aboard the QuikSCAT satellite. These are derived from interpretation of radar back scatter from the sea surface. Two excellent passes showing the whole area were available for around 0540Z and 1930Z. The winds data is shown in knots in standard meteorological form as "arrows and feather" but is also colour coded with the colours being explained on the images. (Appendix 3)

6) Geostationary images from the Meteosat 8 satellite at 3 hourly intervals derived from the National Climatic Data Centre in the U.S. These show images of the cloud distribution taken at infra-red wavelengths to give coverage both by day and night. (Appendix 4)

7) Daily fine mesh surface currents derived from the U.S. Navy Coastal Ocean Model and available at 1/8 x 1/8 degree resolution. These are the initial states of this forecast ocean model. The data is given as arrows showing the direction the current flows towards and is colour coded to show current speed in knots. The key to the colour coding is displayed at the top of each image. (Appendix 5)

8) Extract from the FOAM Ocean model run by the UK Met. Office for the Royal Navy. This is another ocean model and this data is again derived from its initial states. These are day-average values in depth run at a 12km resolution. The data is quoted in the text but the chart for the 12th April is shown in appendix 6. Note this charts is a

day long average for the 12th April and the currents quoted are at 5m depth and not the surface. They have also had tidal components taken away.

9) Data from the HYCOM - Hybrid Coordinate Ocean Model - run at Florida State University. This also yielded in-depth currents.

10) Surface Sea Temperature values extracted from the NOAA Comprehensive Large Array-data Stewardship System (CLASS) of satellite originated products. These consist of accumulated data from radiometers on various satellites.

4 Weather Hindcast Results

4.1 General

Below are listed our assessments of the three-hourly conditions at the Rosebank Field on the 12th April 2007. The following should be noted:-

1) Winds are given in degrees true and knots for the standard level of 10m above the surface.

2) Seas are given as significant wave heights. The highest wave that may be experienced in a seaway is of the order of twice the significant wave height. Periods are mean zero upcross figures (Tz)

3) A brief review of the visibility and weather is also given.

4.2 Synoptic Situation

Charts showing the progression of the weather on the 12th April 2007 are shown in appendix 1. The situation at Rosebank Field was essentially dominated by a major high pressure system centred over southern Scandinavia and the eastern North Sea. An Atlantic cold front came east over Iceland early in the day. But as it progressed further east towards the Faroes it was weakening and confined to the lowest layers of the atmosphere as the high pressure area to the south east maintained its identity. This is clearly shown on the midday ascents in appendix 2 for Lerwick in Shetland and Torshavn in the Faroes. Even at Torshavn, a major inversion around 6000FT with a great depth of dry subsided air above can be seen. The cold front passed through Torshavn around 1600Z but never reached the Rosebank location. A surge in pressure behind it as the high reasserted itself weakened it even further, eased the winds at the Rosebank location and caused the remains of the front to return north as a warm front late in the day.

The winds over the location were from the south west all day and the air had its origin over western Scotland. Dew points coming north over the sea were not as high as might be expected in such an airflow and were in the range 7-8C at first tending to drop very slightly later in the day to around 6-7C. Sea temperatures in the area were rather mixed but were around 9C to the south of the location although rather colder water at 7-8C was not far away to the north and north west. There was therefore not the usual cooling of the air by the sea till it reached its dew point and mist or fog formed which is common in southerly winds especially in spring.

Additional guidance was afforded by the Quikscat passes on that day. These are shown in appendix 3.

4.3 Hindcasts at Rosebank Field

Note all times are in G.M.T. which would have been one hour behind local time as they were in B.S.T. at the time.

12th April 2007 0300Z

Wind:- 220 degrees 25-27 knots

Sea:- 3.0-3.5m at 7-8 seconds.

Weather:- Cloudy or partly cloudy.

Visibility:- 8-12 km.

12th April 2007 0600Z

Wind:- 210 degrees 24-26 knots

Sea:- around 3.0m at 7-8 seconds.

Weather:- Mainly cloudy.

Visibility:- 8-12 km.

12th April 2007 0900Z

Wind:- 210 degrees 25-28 knots

Sea:- around 3.0m at 7-8 seconds.

Weather:- Partly cloudy.

Visibility:- 10-15 km.

12th April 2007 1200Z

Wind:- 200 degrees 23-25 knots

Sea:- around 3.0m at 7-8 seconds.

Weather:- Partly cloudy or clear.

Visibility:- 15-20 km.

12th April 2007 1500Z (N.B. This would have been very similar to the weather at the time of the incident which happened around 1600Z)

Wind:- 210 degrees 26-28 knots

Sea:- 3.0-3.5m at 7-8 seconds.

Weather:- Partly cloudy becoming cloudy.

Visibility:- 15-20 km.

12th April 2007 1800Z

Wind:- 210 degrees 27-29 knots

Sea:- around 3.5m at 7-8 seconds.

Weather:- Cloudy – risk of some light rain.

Visibility:- 15-20 km but 5-10km in any rain.

12th April 2007 2100Z

Wind:- 210 degrees 29-33 knots

Sea:- around 4.0m at 7-8 seconds.

Weather:- Cloudy – patchy light rain.

Visibility:- 10-15 km but 4-8km in rain.

12th April 2007 0000Z

Wind:- 220 degrees 17-19 knots

Sea:- around 3.5m at 7-8 seconds.

Weather:- Partly cloudy.

Visibility:- 10-15 km.

5 Surface Currents

5.1 General

Ocean surface currents are generated by a range of various causes but it is convenient to model them as tidal currents and current resulting from all other sources. This is because the tidal currents are predictable and dependent only on the relative position of the Earth, Moon and Sun. Other ocean currents have multiple causes and are driven by the weather and complex thermohaline flows within the ocean itself. These are termed residual currents, being what is left when the tidal signal is removed, and they can only be forecast by modelling over short periods. The initial fields of data from such modelling were used to obtain the surface residual flows. The model used was the US Navy NCOM model which deliberately does not include tidal effects. The surface currents given from this model are for 5m below the surface to avoid the complications of the exact structure of wind-driven components in the shallowest layers (see para. 5 below). This is available once per day at a resolution of 1/8 x 1/8 degree. The point used was 61.0N 3.75W. The two outputs used are shown in appendix 5 at 0000Z on the 12th April and the 13th April. The values at these two times were linearly interpolated between to approximate to hourly residual currents.

The full discussion of the performance of ocean models is outlined in the following paragraphs, but it should be noted here that we have used the NCOM output for the surface currents as it approaches most closely what we would expect the surface current to be from more traditional current assessments. But we do not attach the same level of confidence to this surface current data as we do to the meteorological data. We are however confident with the surface tidal currents but this is of limited use as they are only a minor component of the total current. Full details of the status and reliability of the current data may be found in section 5 below.

The tidal currents were expected to be weak at this location but were added in for completeness. These were taken by running the Oregon State model of the tides. This consists of global digitised values of all the major angles and factors derived from harmonic analysis of the tides. These are M2, S2, N2, K2, K1, O1, P1 and Q1. The model has these digitised at ¼ x ¼ degree resolution in most coastal waters and interpolates the values when an intermediate site is requested.

5.2 Surface Current Data

The currents due to tides, residual effects and their resultant total surface (5m depth) current at hourly intervals for the 12th April 2007 are shown below.

	Currents in cm/sec			*Directions to (Geographical)*		
Time	*Total*	*Tidal*	*Residual*	*Total*	*Tidal*	*Residual*
0300Z	**35.9**	**7.8**	**29.2**	**076**	**051**	**086**
0400Z	**35.6**	**8.0**	**28.7**	**078**	**052**	**085**
0500Z	**35.6**	**8.1**	**28.2**	**078**	**056**	**084**
0600Z	**32.6**	**5.3**	**27.7**	**079**	**058**	**083**
0700Z	**28.4**	**1.4**	**27.1**	**080**	**069**	**081**
0800Z	**24.1**	**3.0**	**26.6**	**084**	**228**	**080**
0900Z	**20.3**	**6.7**	**26.1**	**087**	**233**	**079**
1000Z	**17.7**	**8.9**	**25.5**	**089**	**235**	**078**
1100Z	**16.8**	**8.9**	**24.9**	**086**	**236**	**076**
1200Z	**17.7**	**7.1**	**24.4**	**082**	**238**	**075**
1300Z	**20.6**	**3.4**	**23.9**	**076**	**241**	**074**
1400Z	**24.1**	**0.9**	**23.4**	**071**	**036**	**072**
1500Z	**27.4**	**4.8**	**22.8**	**068**	**054**	**071**
1600Z	**29.7**	**7.6**	**22.3**	**066**	**056**	**070**
1700Z	**30.0**	**8.4**	**21.8**	**066**	**057**	**069**
1800Z	**28.0**	**6.9**	**21.2**	**066**	**059**	**068**
1900Z	**24.5**	**3.7**	**20.7**	**067**	**065**	**066**
2000Z	**19.6**	**0.9**	**20.2**	**067**	**192**	**065**
2100Z	**14.8**	**4.9**	**19.6**	**067**	**230**	**063**
2200Z	**11.1**	**8.3**	**19.1**	**068**	**233**	**062**
2300Z	**9.3**	**9.5**	**18.6**	**067**	**235**	**061**
2400Z	**9.8**	**8.2**	**18.0**	**063**	**237**	**060**

6 Depth Currents

6.1 General

We investigated the prospects of obtaining currents at depth from a number of sources. All of these were model sources because, as far as we are aware, there was no source of actual current meter data from the Rosebank location or anywhere in its vicinity. Our requests of the US Navy for the corresponding depth currents from the same model which provide our surface currents was unsuccessful as they apparently do not keep other than surface currents on their public access data server. The reason for this is not given.

We next approached the UK Met. Office for access to data from their FOAM Ocean Model. This was available but only as daily averaged figures. The data was given along with the caution that it realistically represented the kind of eddy structure displayed by ocean currents but would not necessarily reflect the day to day positions of these eddies and hence the current at a given location and time. This in our opinion falls a long way short of what is required in the present case where we are looking for a highly accurate version of the currents in depth for one specific location.

We also have data from the HYCOM team at Florida State University. The HYCOM (Hybrid Coordinate Ocean Model) is reputed to be the best Ocean Model currently available. It was developed by a multi-institutional effort funded by the National Ocean Partnership Program (NOPP), as part of the U. S. Global Ocean Data Assimilation Experiment (GODAE), to develop and evaluate a data-assimilative hybrid isopycnal-sigma-pressure (generalized) coordinate ocean model (See http://hycom.rsmas.miami.edu/)

6.2 FOAM Currents

Currents from the FOAM model were requested from the Met. Office. The following was all that was apparently available and is given only as a day-long average for the 12th April 2007. The model grid position was 61.0N and 3.75W

12th April 2007 – Day average - FOAM.

Depth	***Current Strength (knots -cm/sec)***	***Current Direction (degrees)***	***Temperature (Deg C)***	***Salinity (ppt)***
5m	***0.20-10.3***	***160***	***8.0***	***35.28***
30m	***0.19-9.7***	***179***	***8.0***	***35.28***
50m	***0.18-9.3***	***183***	***8.0***	***35.28***
100m	***0.17-8.7***	***183***	***8.0***	***35.28***
200m	***0.18-9.3***	***188***	***8.0***	***35.28***
400m	***0.24-12.4***	***210***	***5.9***	***35.20***

The area wide chart of the day-averaged surface currents for the 12th April was also provided and are shown in appendix 6.

6.3 The HYCOM Currents

We obtained the complete current profile as calculated by the team at Miami State University by the HYCOM model. This, like the NCOM data, is run once per day and we obtained the output for 12th and 13th at 0000Z. The grid position was 60.88N and 3.8W. These are listed below.

12th April 2007 – 0000Z-HYCOM

Depth	Current Strength (cm/sec)	Current Direction (degrees)	Temperature (Deg C)	Salinity (ppt)
Surface	39.5	137	8.7	35.26
10m	39.4	148	8.7	35.26
20m	38.7	152	8.7	35.26
30m	38.0	154	8.7	35.26
50m	36.7	157	8.7	35.26
75m	35.1	158	8.7	35.26
100m	34.1	158	8.7	35.26
150m	33.1	158	8.7	35.26
200m	32.7	157	8.7	35.26
250m	32.5	157	8.7	35.26
300m	32.4	156	8.7	35.26
400m	30.1	157	8.5	35.24
500m	28.2	158	7.9	35.19
600m	24.0	160	6.9	35.12
700m	9.6	183	3.6	35.00
800m	8.4	224	1.7	34.96
900m	10.8	246	0.7	34.94

13th April 2007 – 0000Z-HYCOM

Depth	Current Strength (cm/sec)	Current Direction (degrees)	Temperature (Deg C)	Salinity (ppt)
Surface	35.6	159	8.8	35.26
10m	38.0	168	8.8	35.26
20m	38.3	173	8.8	35.26
30m	37.7	176	8.8	35.26
50m	35.5	179	8.8	35.26
75m	32.3	176	8.8	35.26
100m	34.4	169	8.8	35.26
150m	35.9	165	8.8	35.26
200m	37.2	164	8.8	35.26
250m	37.3	164	8.8	35.26
300m	37.4	164	8.8	35.26
400m	36.3	165	8.5	35.24
500m	33.3	165	7.9	35.19
600m	27.5	169	6.9	35.12
700m	12.9	206	3.6	35.00
800m	11.9	240	1.8	34.96
900m	14.1	246	0.8	34.94

6.4 NCOM Surface Currents

For the sake of completeness and to facilitate comparisons, the NCOM surface currents are repeated below.

12th April 2007 – 0000Z-NCOM			***13th April 2007 – 0000Z-NCOM***		
Depth	***Current Strength (cm/sec)***	***Current Direction (degrees)***	***Depth***	***Current Strength (cm/sec)***	***Current Direction (degrees)***
5m	***30.1***	***089***	***5m***	***18.0***	***060***

6.5 Residual Current Assessment

The large and significant difference between these models may be summarised as follows:-

Surface or Near Surface Currents

	12th 0000Z	***13th 0000Z***
FOAM	***10.3 cm/sec to 160 degrees***	***10.3 cm/sec to 160 degrees***
HYCOM	***39.5 cm/sec to 137 degrees***	***35.6 cm/sec to 159 degrees***
NCOM	***30.1 cm/sec to 091 degrees***	***18.0 cm/sec to 060 degrees***

Depth Currents – to 400m

	12th 0000Z	***13th 0000Z***
FOAM	***~9-12 cm/sec to SSE/SSW***	***~9-12 cm/sec to SSE/SSW***
HYCOM	***~30-40 cm/sec to SSE***	***~32-38 cm/sec to SSE***

The differences shown in the above tables are an order of magnitude larger than we should have a right to expect. These ocean models are long established and much discussed but are obviously incapable of giving accurate actual current data at a given location in hindcast mode regardless of any forecast use. They seem to be able to reproduce the typical structures of the ocean without these simulated structures necessarily bearing very much relationship to the actual distribution of currents in the ocean. Indeed this was the essence of the warning that came with the data from the Met. Office.

If we compare the situation to the level of output we might expect from meteorological models in hindcast (or even forecast mode) the differences are enormous. If we obtained the equivalent of the currents and temperatures in depth for a given time and place then this would be the winds and temperatures at height above the location. If we obtained such data from a range of leading atmospheric models we could expect to see only the smallest differences in the actual data, at least an order of magnitude below what we see above, and indeed it would typically be several days into the forecast process before such levels of difference emerged between the models.

To decide on what surface value to use we resorted to an approximate pre-modelling assessment of one of the currents present at the surface to get even an approximate idea of which might be correct.

It is noteworthy that FOAM and also the US Navy NCOM models do not give a surface current. The shallowest layer given is for 5m depth. This we assume is to avoid the complications of determining the exact structure of the wind driven current component in the top metre or so of the ocean. The wind driven component of currents decays away rapidly with depth and the smoother the surface the more rapidly it decays. To determine this level of decay with depth is obviously more difficult if there are any kind of even moderately dimensioned waves present and the actual position of the surface is changing. This 5m level was stated by the Met. Office to be a "good average" for the top 10m of the water column. This is a statement which we question because we consider it too generalised to be reasonable as will be explained below in more detail.

It can be seen that the contrast between the NCOM model surface(5m) currents and the FOAM surface(5m) currents is that they are completely different in strength and direction. FOAM gives 0.2 knots towards 160 degrees for the 5m level which is day-averaged for the 12th April, whereas NCOM gave 0.30 m/s (12th 0000Z) falling 0.18 m/s (13th 0000Z) - approx 0.6 to 0.4 knot - towards the E or ENE .

Surface currents are frequently dominated by wind driven currents which decay away to be almost negligible by the time approximately a 10m depth is reached. To broadly investigate the effects of this wind driven current we calculated the typical wind driven surface current as outlined in the DoE Publication Metocean Parameters – Parameters other than Waves (OTH 89 299)* This recommends around 3% of wind speed directed towards 10-30 degrees to the right of the wind and provides a model for calculating the decay with depth of the surface wind driven component. Using the winds present at the time of the incident of around 26 knots (13.4m/s) this gives a surface (skin) wind driven component of around 0.41m/s.

The same DoE volume mentioned above, recommends a logarithmic model to assign current strengths to the very top layer of the ocean where this surface wind driven component is known to decay rapidly with depth. This has the form:-

$$u_{s(z)} = u_w - (u^*/k).\ln((h-z)/z_{os}))$$

where,
u_s = current speed at h-z metres below the surface or z above the seabed.
h = total water depth
z = height above the seabed
u_w = surface wind drift taken as 3% of 10m surface wind speed.
K = von Karman's constant = 0.4
u^* = the friction velocity
z_{os} = the surface roughness length

This requires as input not only the surface wind speed but also a measure of ocean surface roughness. It is conceded in the DoE Guidance that the choice of this measure is difficult and recommends using a range of figures to judge the possible uncertainty of outcome. We used a range of 0.1 to 0.01 as representative of a sea surface having significant waves of 3.5 metres and fairly frequent maximum waves around 5.0 metres.

The results of this calculation for 5m below the surface give a wind driven component of 22 cm/sec for a z_{os} of 0.1 and 12 cm/sec for a z_{os} of 0.01. Now the total residual component for the surface(5m) current at 1600Z is 22.3 cm/sec to 070 degrees. This is very close correspondence and suggests that the currents at this level are wind drift dominated with the other residual components only becoming noticeable in marked eddies or similar where their direction is contrary to the wind and their speed is enough to make them dominant. This is the pattern which the NCOM charts reveal; surface (5m) currents mostly broadly with the winds but with other components showing through in places where they are of comparable strength.

The FOAM day averaged current for the surface (5m) 0.2 knot – around 10 cm/sec directed towards 160 degrees. This allows very little or no wind driven component to be present at the 5m depth or supposes that the other residual components apart from the wind driven one were directed towards the WSW and of comparable strength on a day average basis. This latter assumption would have to apply fairly uniformly to large areas of ocean where very light currents are shown as may be appreciated from the FOAM current chart of the area shown in appendix 6. This seems to be a rather improbable assumption and the first one seems much the more likely; that the FOAM model has allowed the wind driven current to decay away too quickly with depth. This may be due to an assumption of too low a surface roughness. However with the waves running at the time of 3.5m significant wave height and 5.0-6.0 possible maximum waves, the 5m level must be considered to be almost at the surface in wave troughs and the larger surface roughness we have assumed would seem to be much more likely. It may be that the FOAM wave model does not have a variable surface roughness input from the wave model to allow for the varying effect of surface waves on the vertical structure of currents close to the surface. For these reasons we chose no to use FOAM for the surface (5m).

The HYCOM surface currents seem too much removed from the wind direction and show very little shear in the currents between the surface and 10m values which is precisely where we would expect to see a marked fall off in the surface wind driven component.

For all of the above reasons we prefer the NCOM surface currents but still do not have full confidence in their figures.

For currents in depth we cannot even make an informed if uncertain decision between the two sources. In effect we feel that there is little that modelling can do to pinpoint the depth currents at the time and location of the incident. We can possibly accept the stronger figure of the HYCOM data and say that they were around 30-40 cm/sec from SSE-SE down to around 600-700m and lower than that, 10-15 cm/sec towards the S or SW. Should another model be found, it is not certain that this would not give yet another set of results. We can only offer the above rough guidance with very low levels of confidence.

We have contacted the HYCOM team at Florida State University and the Met. Office on the above points but as yet have had no response.

6.5 Tidal Currents in Depth

Having considered what the residual currents at depth were likely to be, the next step was to investigate the likely structure of the tidal current in depth. In shelf waters this should be much the same as surface values with a fall off close to the sea bed due to friction. However the situation is not so simple in deep water, especially where the water column is characterised by large temperature differences. This is very much the case at Rosebank, especially in the bottommost layers. In such waters vertical phase differences of the tide have been noted. It is very difficult if not impossible to determine these without complex modelling for which would need to know the exact temperature structure of the water column but, as we have seen, it is very difficult to be sure these. However we note that at 1600Z the tides were close to their maximum value in that cycle. We can conclude that around 7.0 cm/sec towards around 060 should be added to the residual currents at depth. This is not at all a significant amount and also, in view of its being around the maximum current of that tide, any phase differences in the tides at depth would reduce it further. We have not therefore added in the current with depth for these reasons but would note that this omission is not going to make a significant difference as the depth figures are highly uncertain.

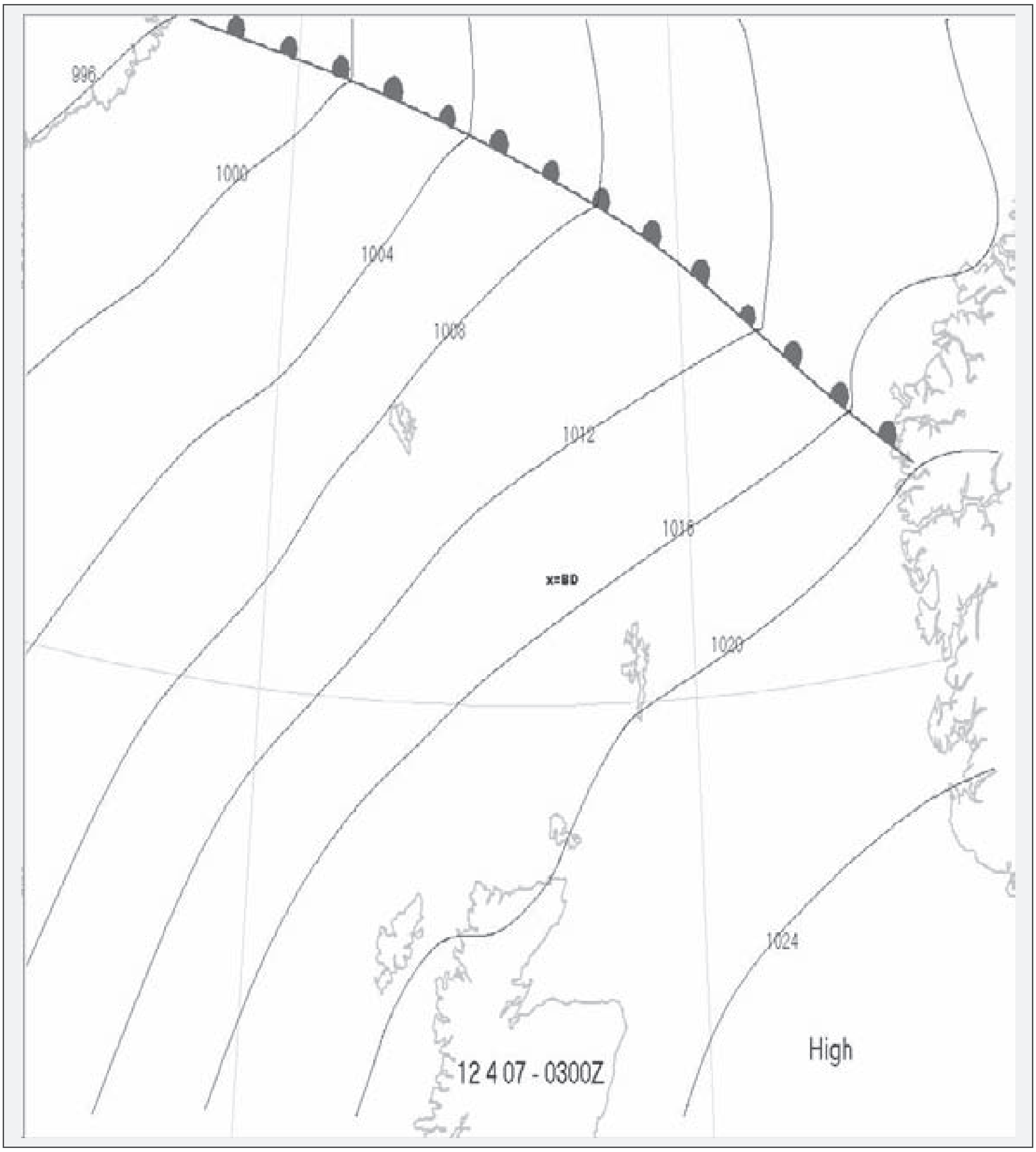
6.6 Current Summary

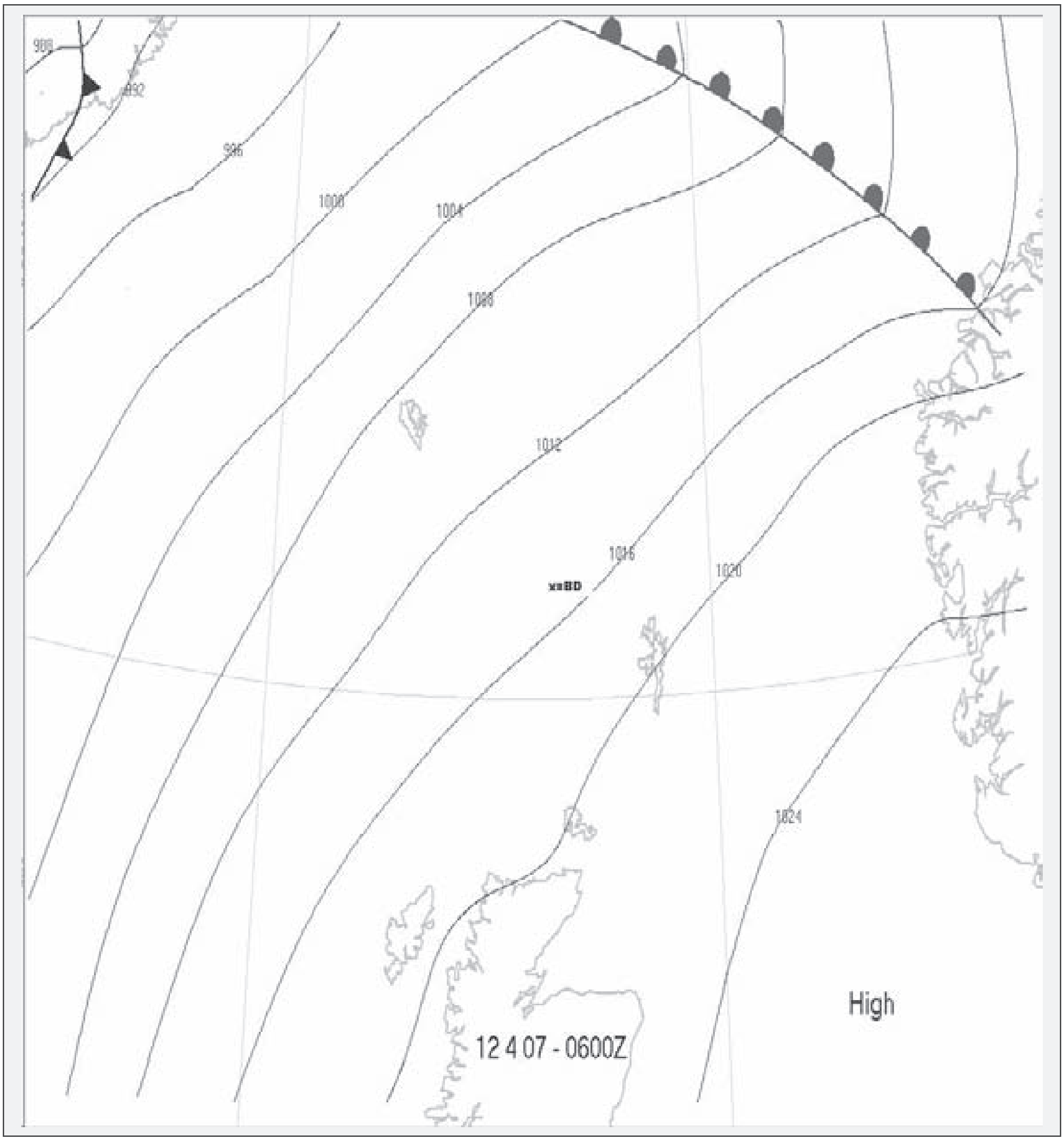
Surface:- We can be confident in the tidal current and have used the HCOM residuals to form the hourly surface currents. We do not however have full confidence in these surface residuals.

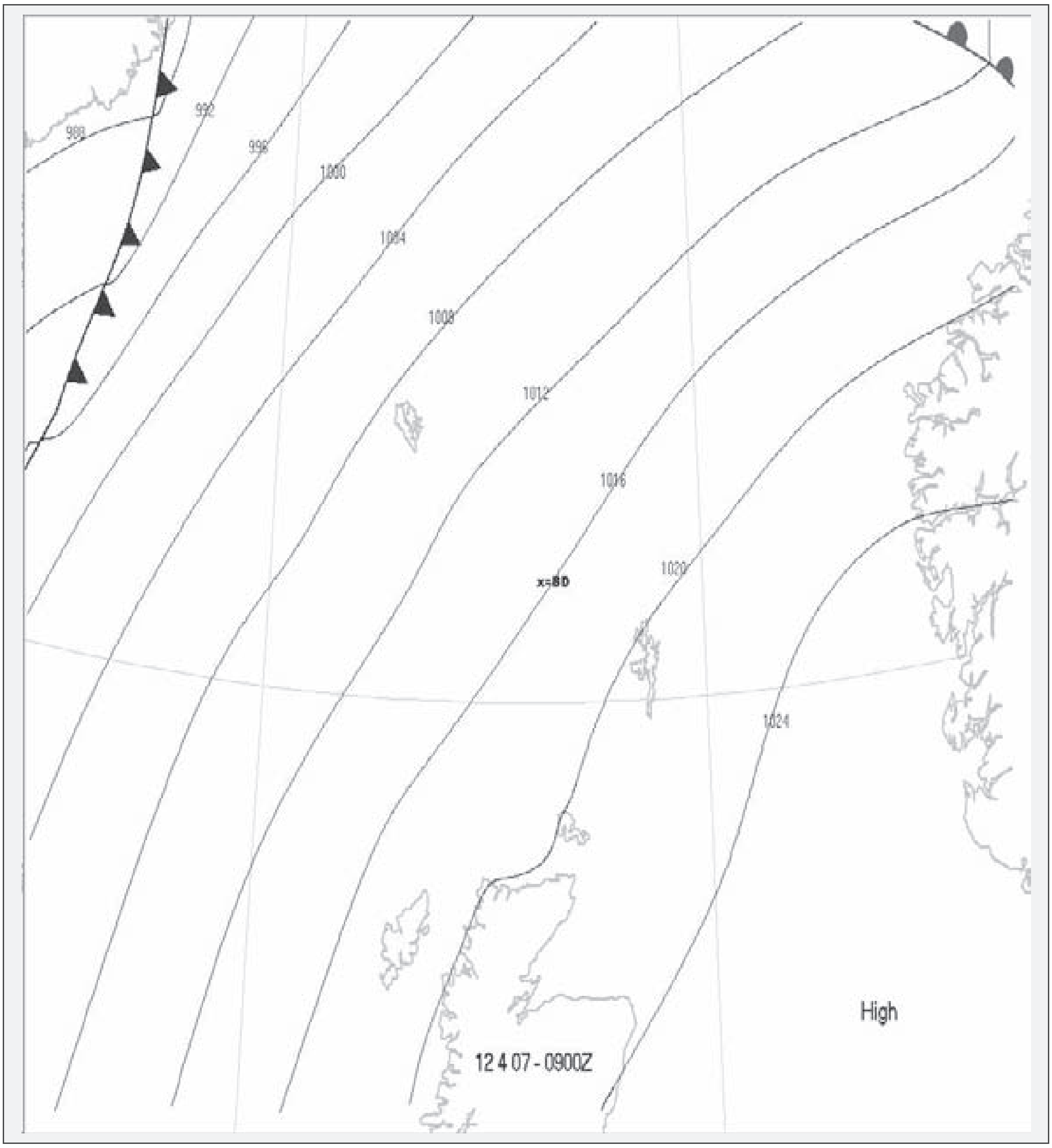
Depth:- The differences in the two data sets are too great to make other than the broadest of assessment of the depth currents which we fear will be greatly less accurate than the engineering analysis of vessel loading will require.

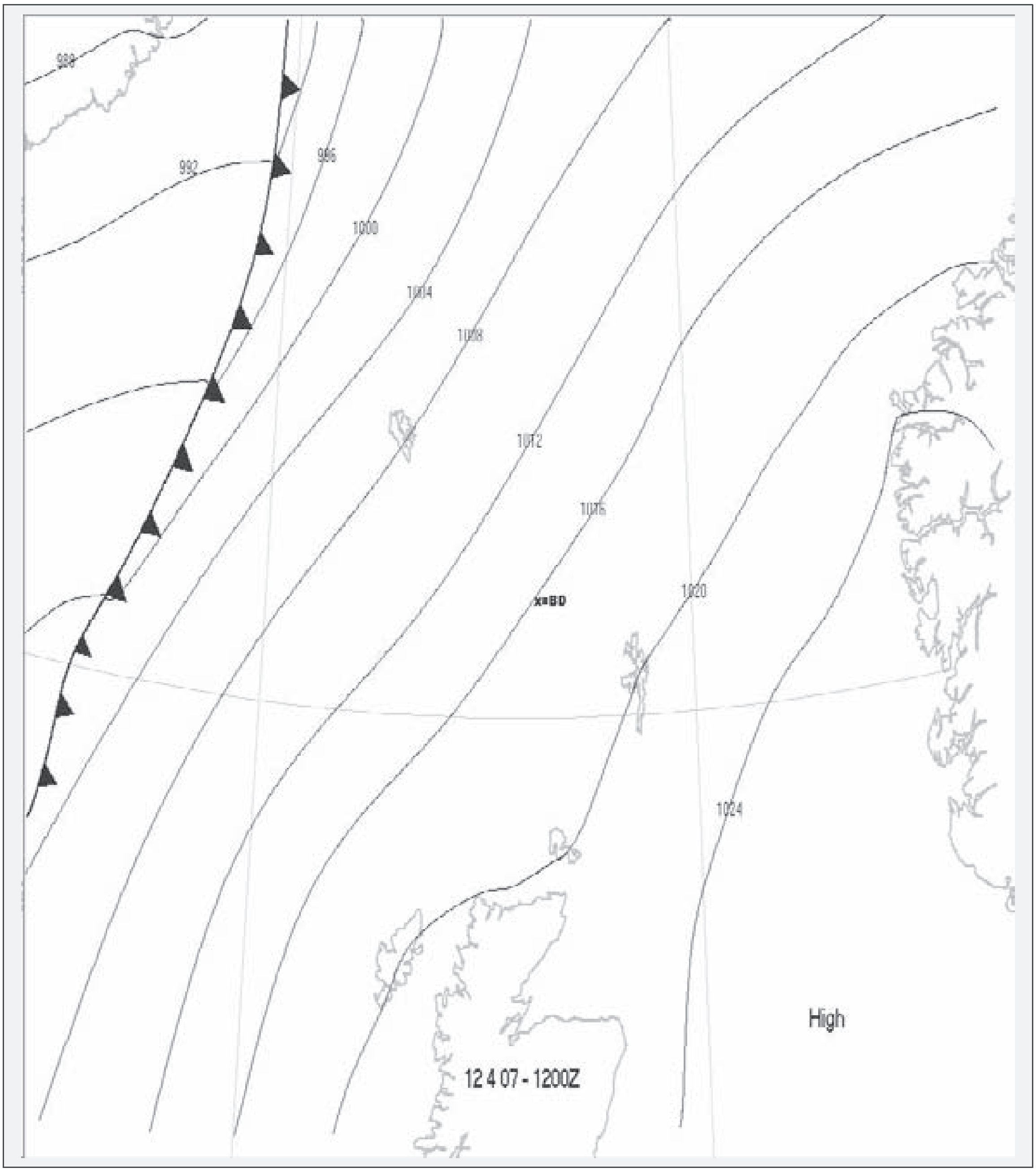
*Supporting volume to Offshore Installations: Guidance on Design, Construction and Certification – Environmental Considerations.

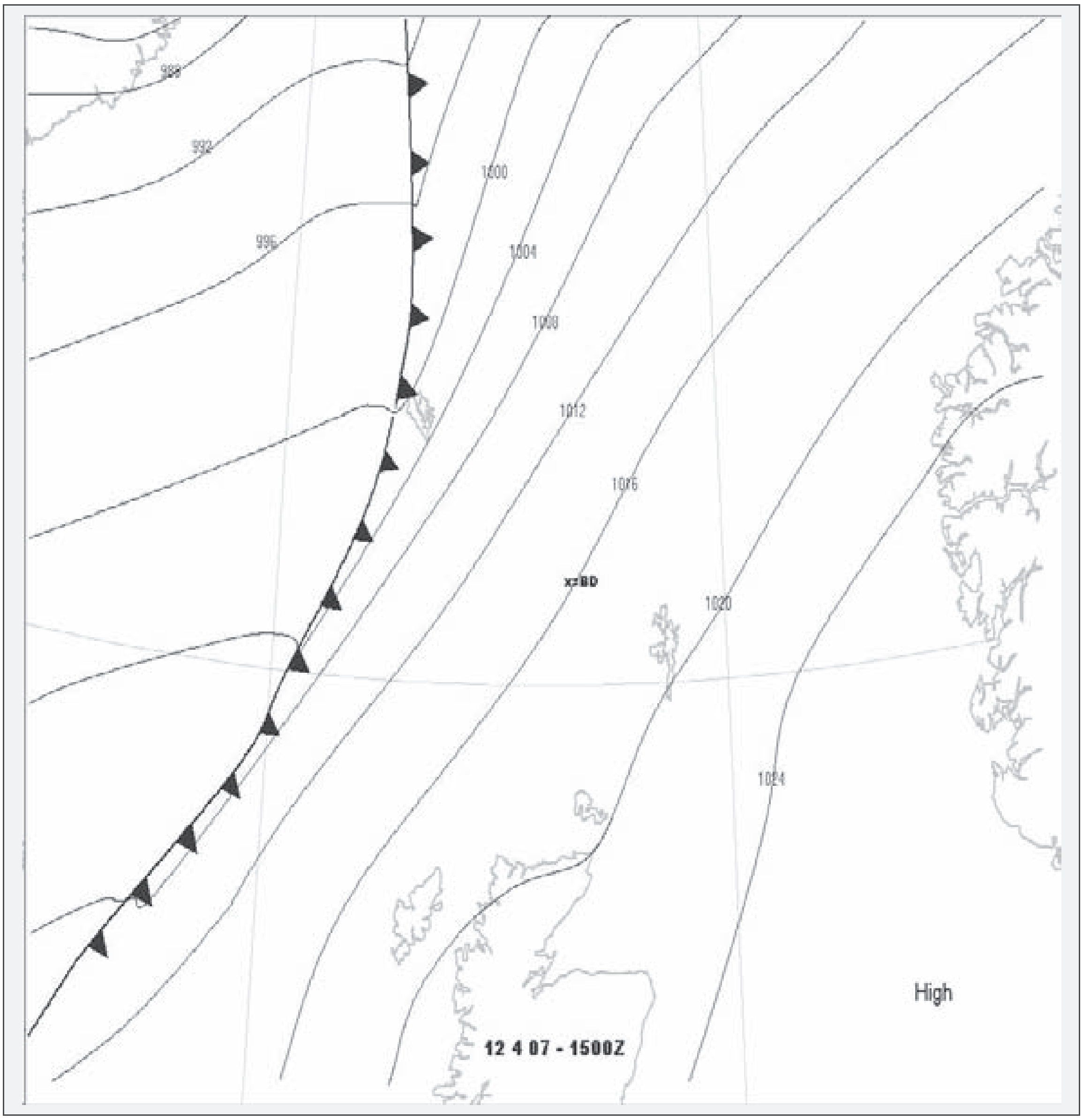
Appendix 1 – Synoptic Charts for 12th April 2007

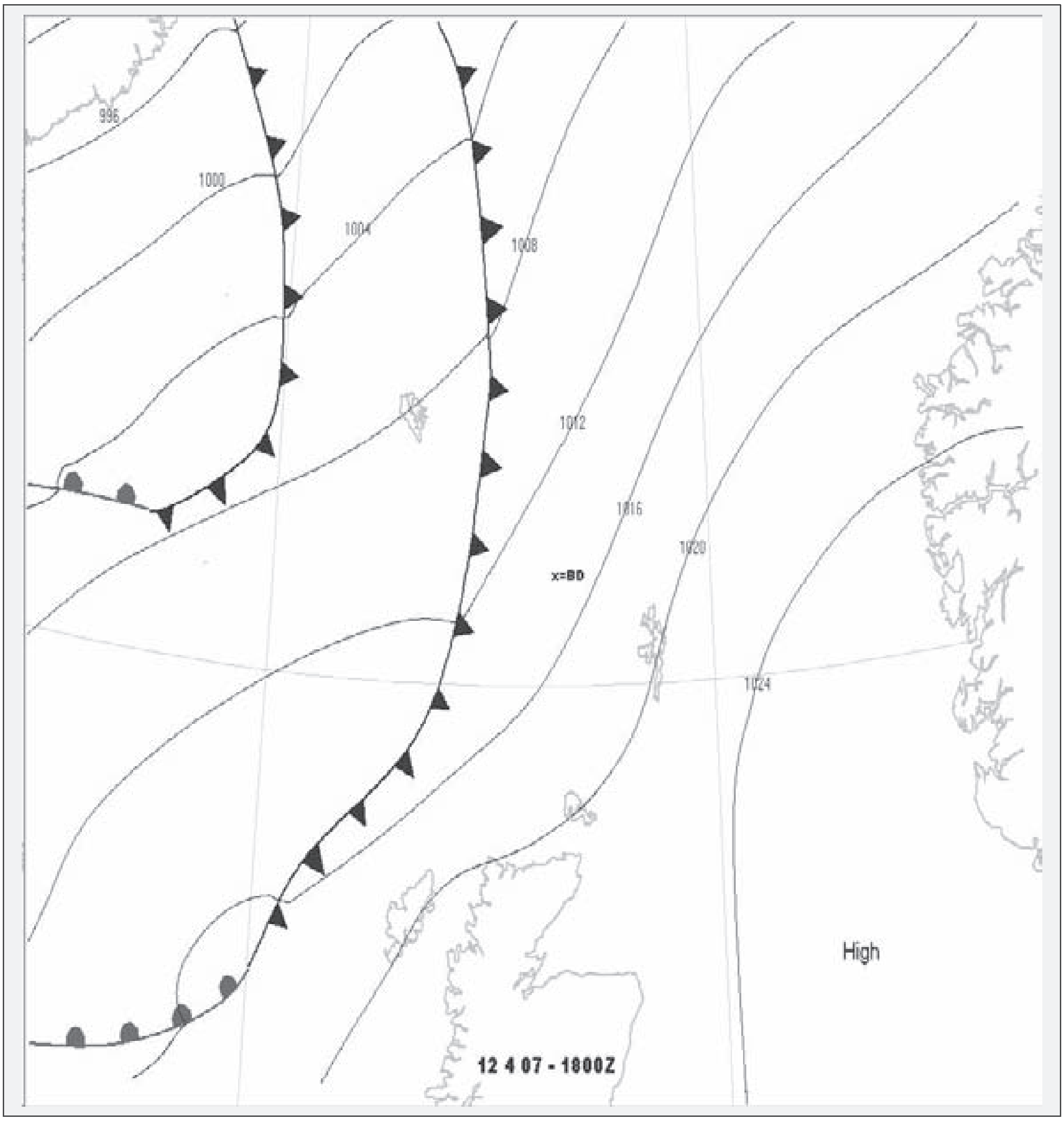


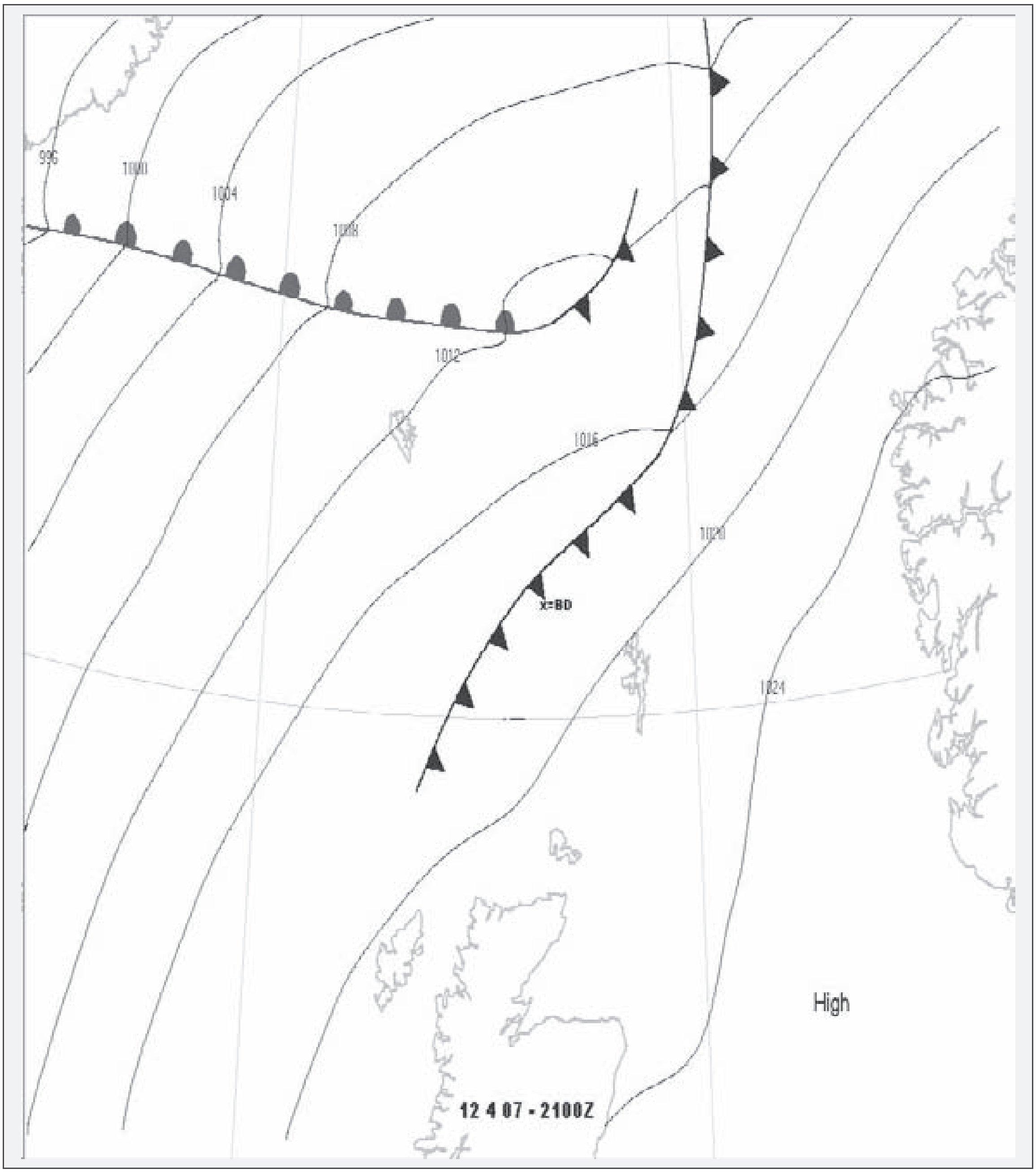

996
1000
1004
1008
1012
1016
1020
1024
High
12 4 07 - 0600Z

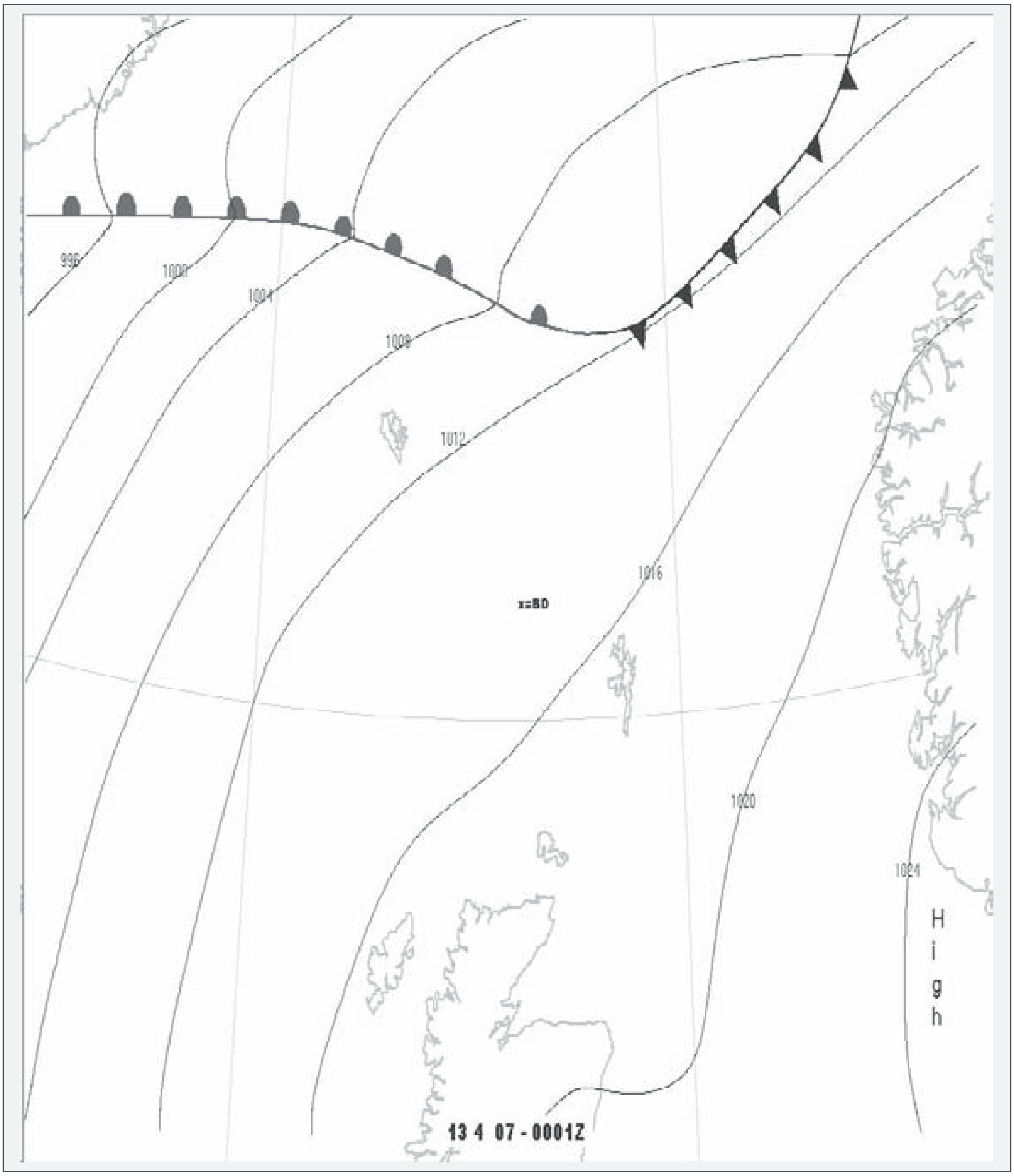

988
992
996
1000
1004
1008
1012
1016
x=BD
1020
1024
High
12 4 07 - 0900Z


988
992
996
1000
1004
1008
1012
1016
x=BD
1020
1024
High
12 4 07 - 1200Z

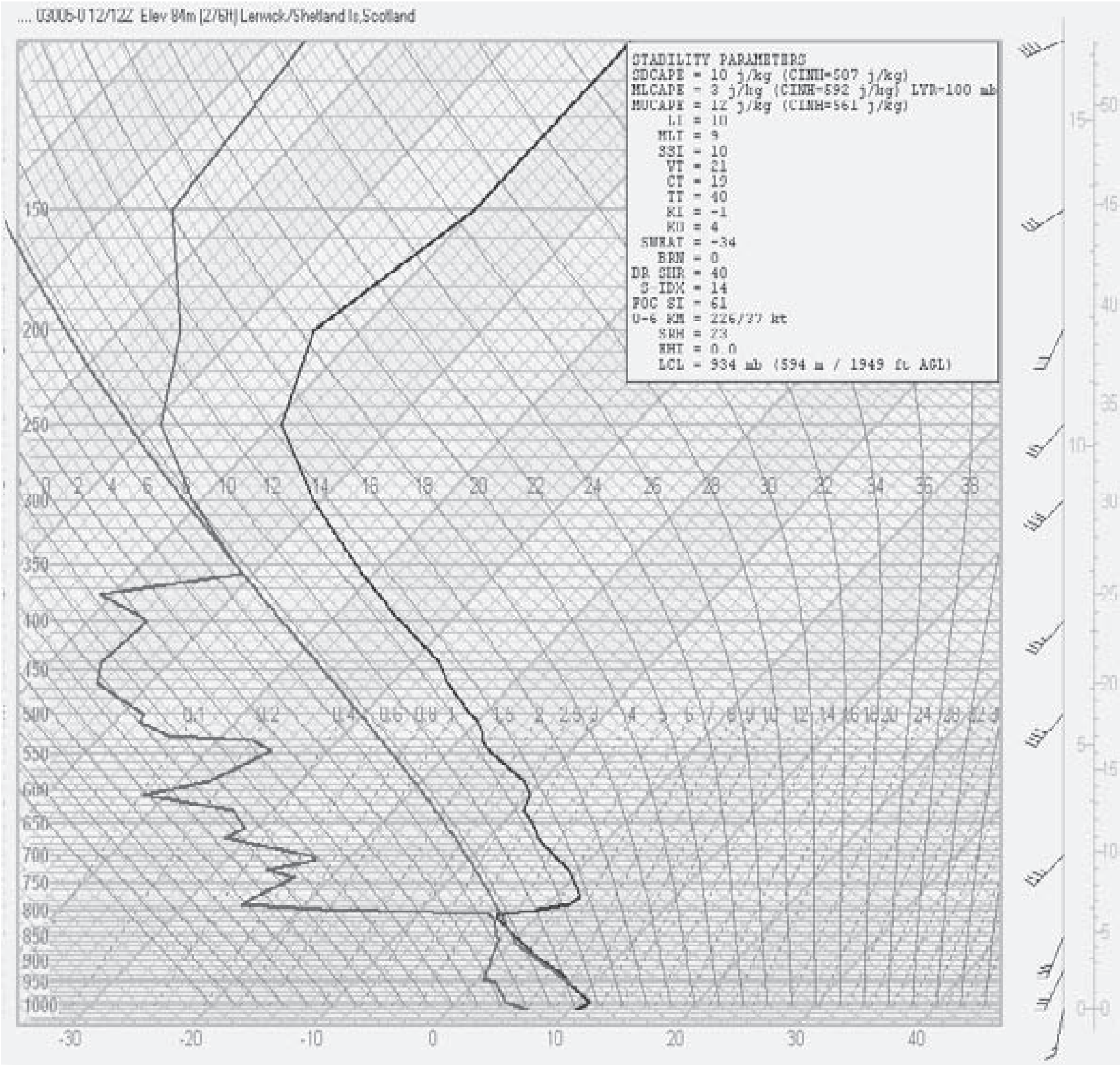

988
992
996
1000
1004
1008
1012
1016
x=BD
1020
1024
High
12 4 07 - 1500Z

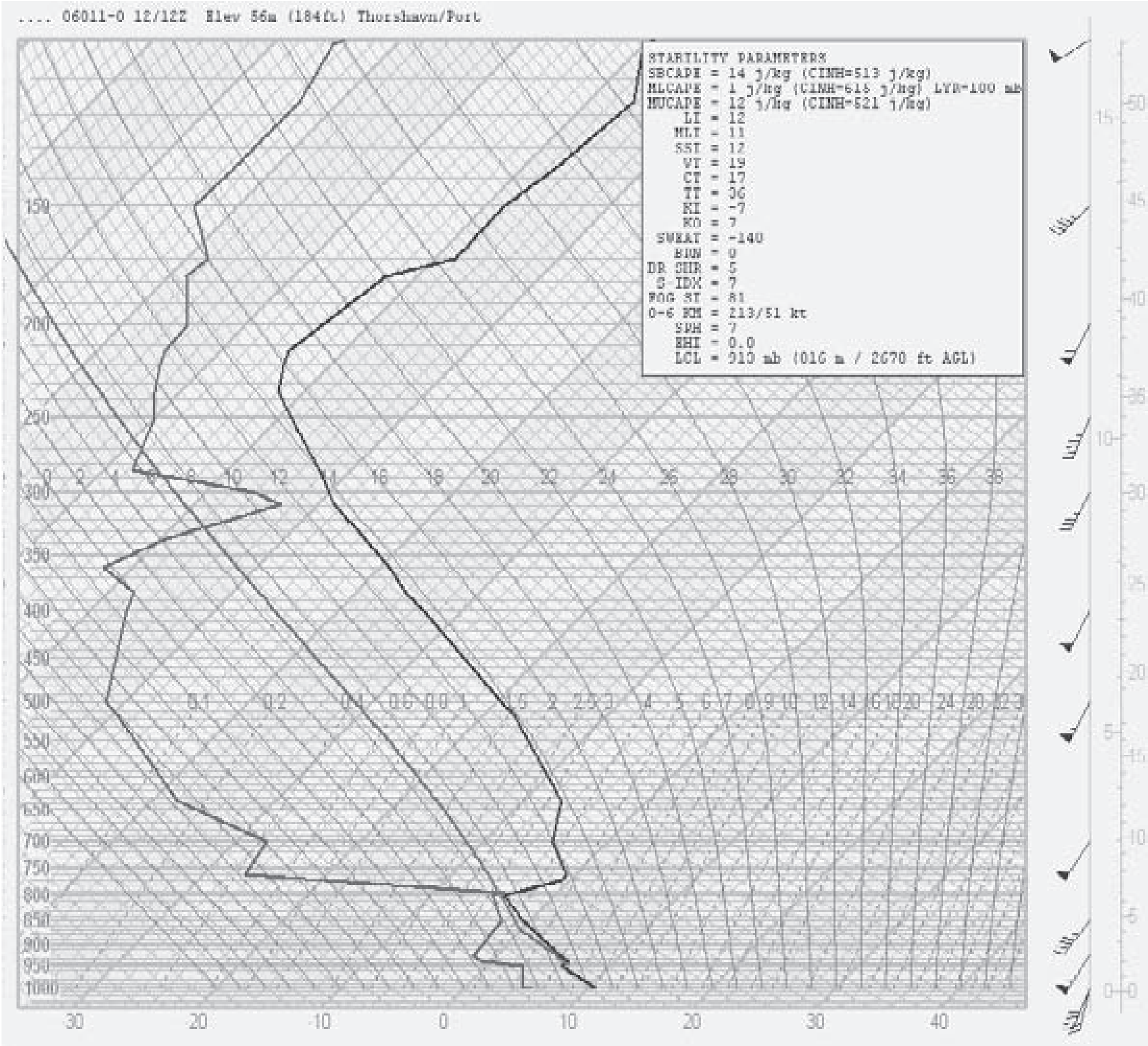

996
1000
1004
1008
1012
1016
1020
1024
x=BD
High
12 4 07 - 1800Z


996
1000
1004
1008
1012
1016
1020
1024
x=BD
High
12 4 07 - 2100Z

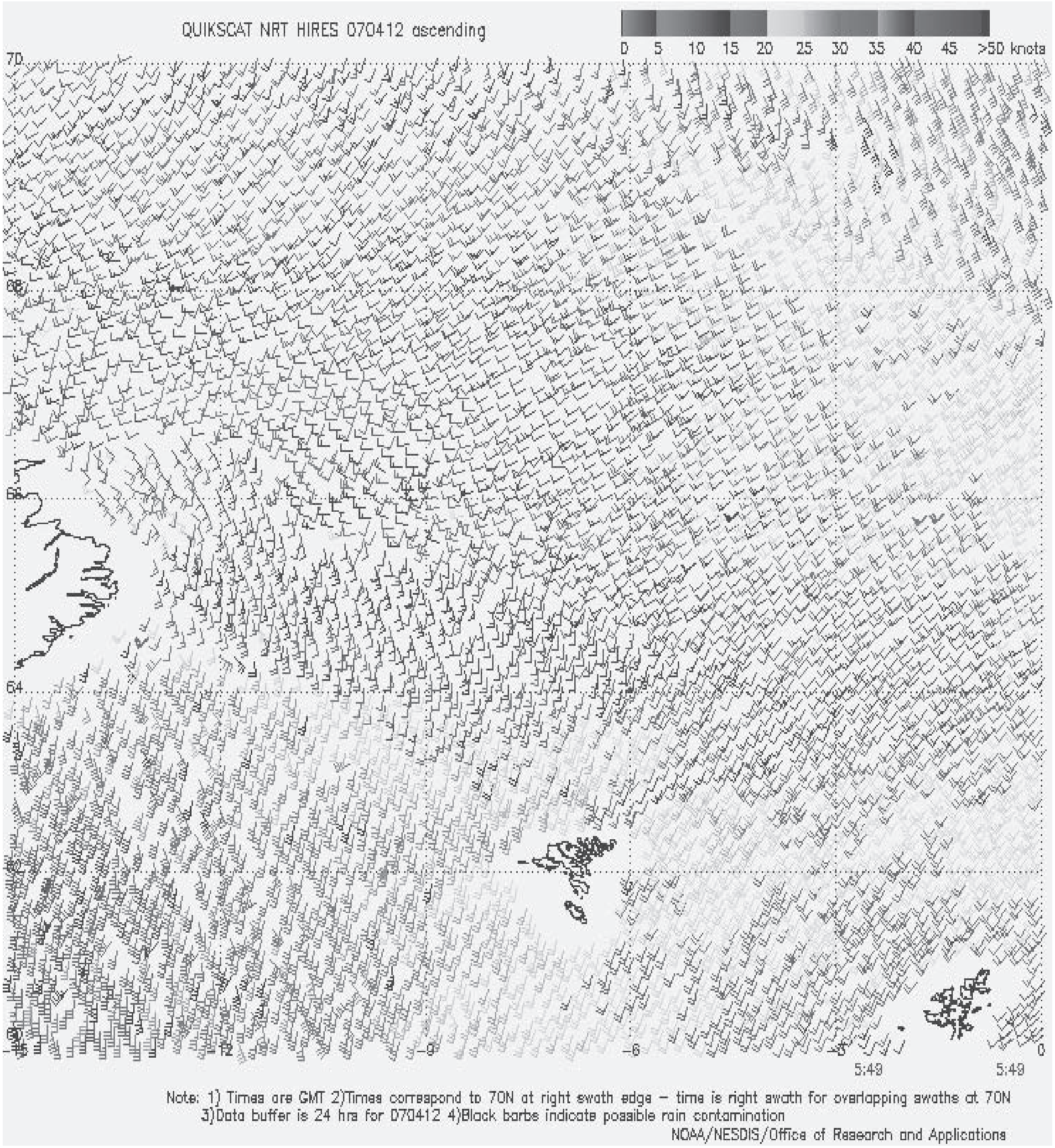

996
1000
1004
1008
1012
1016
1020
1024
x=BD
High
13 4 07 - 0001Z

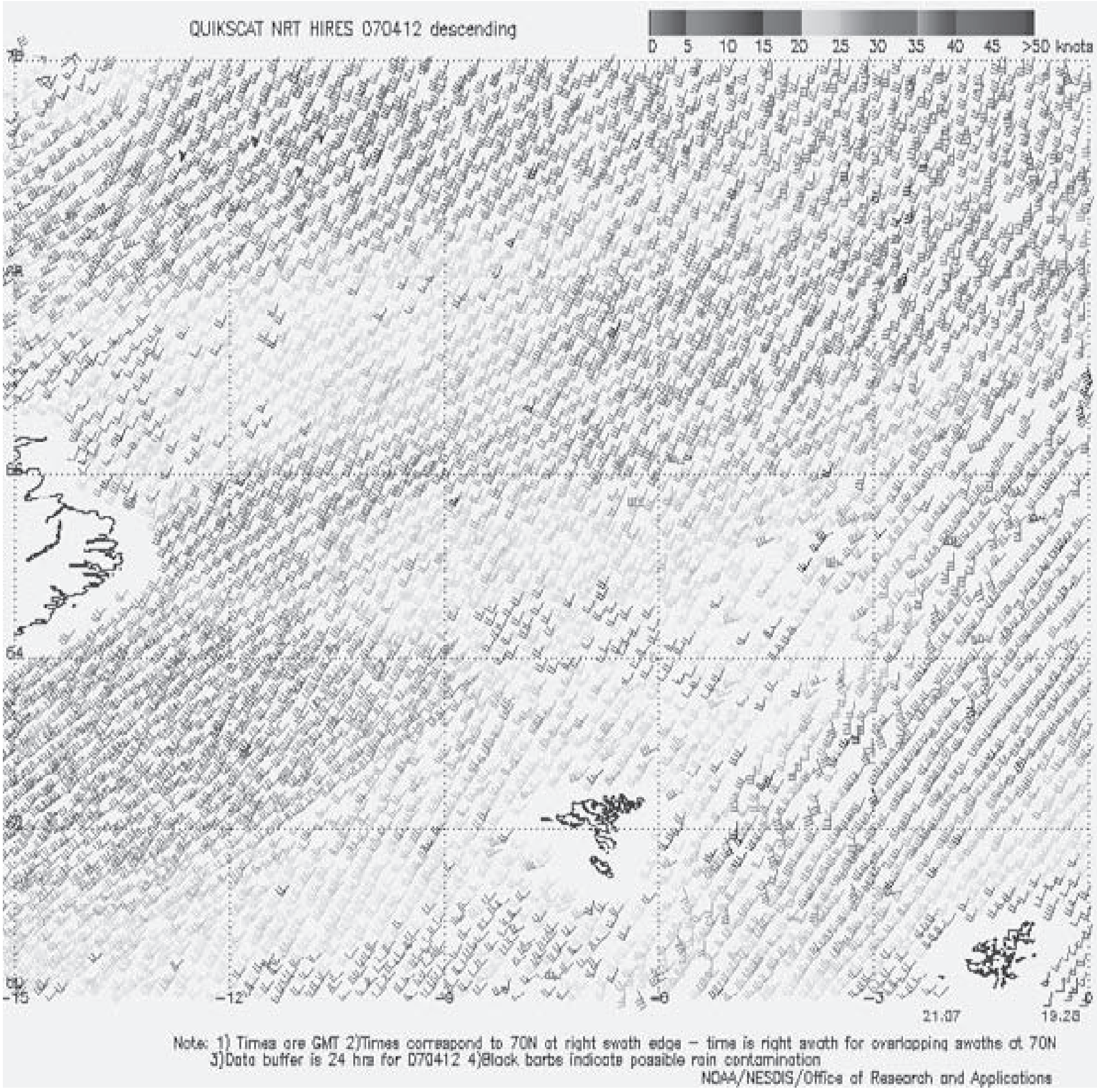
Appendix 2 – Midday Ascents from Torshavn and Lerwick 12 4 2007



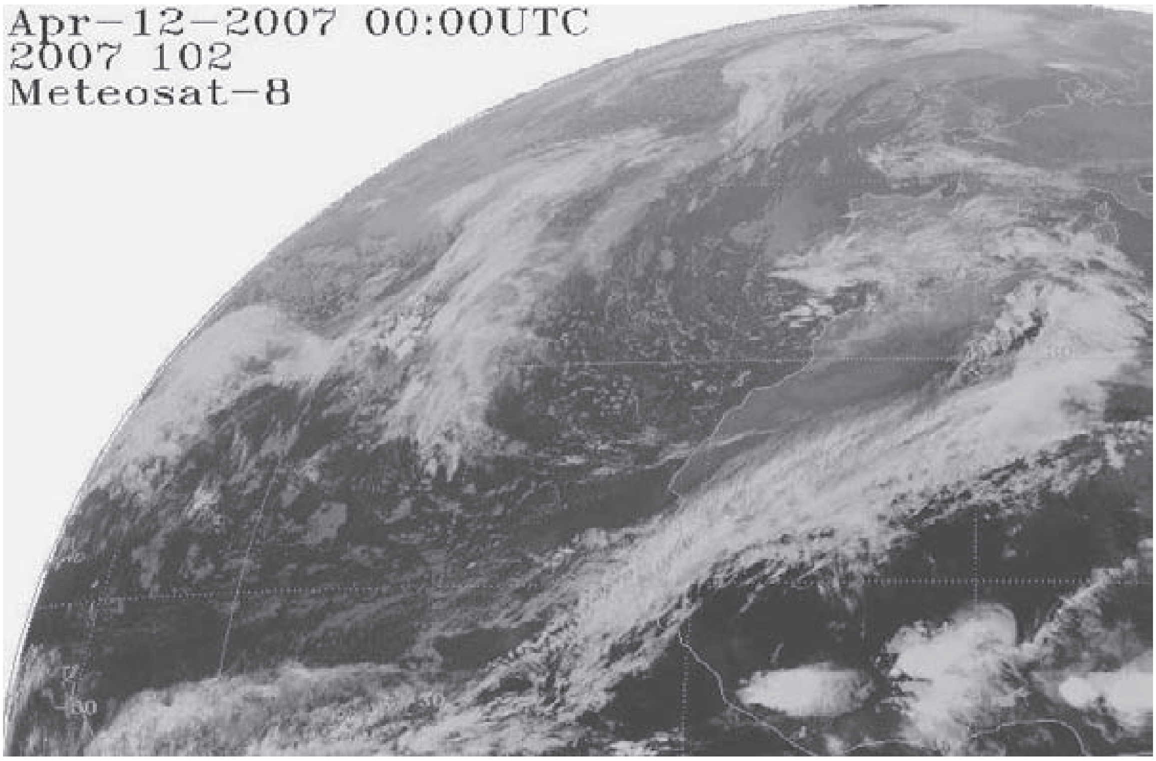

.... 06011-0 12/12Z Elev 56m (184ft) Thorshavn/Port
STABILITY PARAMETERS
SBCAPE = 14 j/kg (CINH=513 j/kg)
MLCAPE = 1 j/kg (CINH=616 j/kg) LYR=100 mb
MUCAPE = 12 j/kg (CINH=521 j/kg)
LI = 12
MLI = 11
SSI = 12
VT = 19
CT = 17
TT = 36
KI = -7
KO = 7
SWEAT = -140
BRN = 0
DR SHR = 5
S-IDX = 7
FOG ST = 81
0-6 KM = 213/51 kt
SRH = 7
EHI = 0.0
LCL = 910 mb (816 m / 2670 ft AGL)
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
30
20
10
0
10
20
30
40

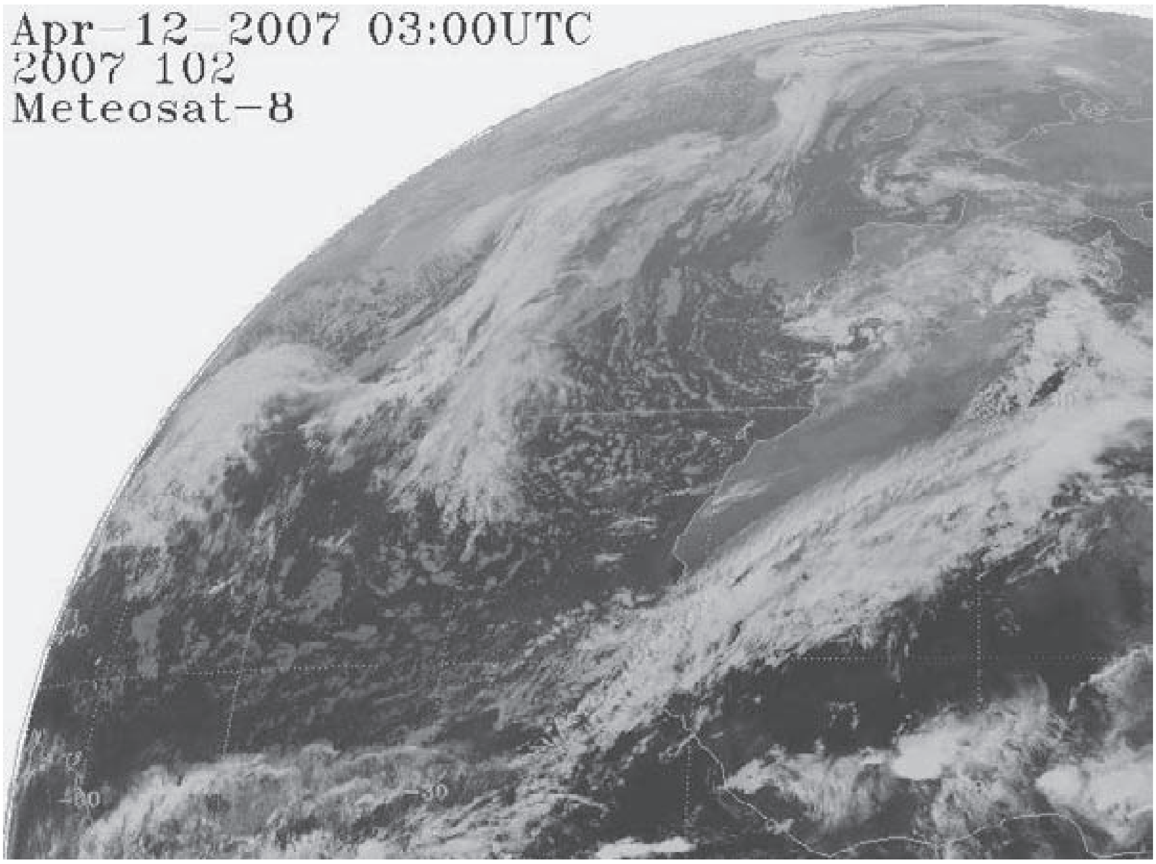
Appendix 3 – Quikscat Data, 12 4 07. around 0540Z and 2100Z

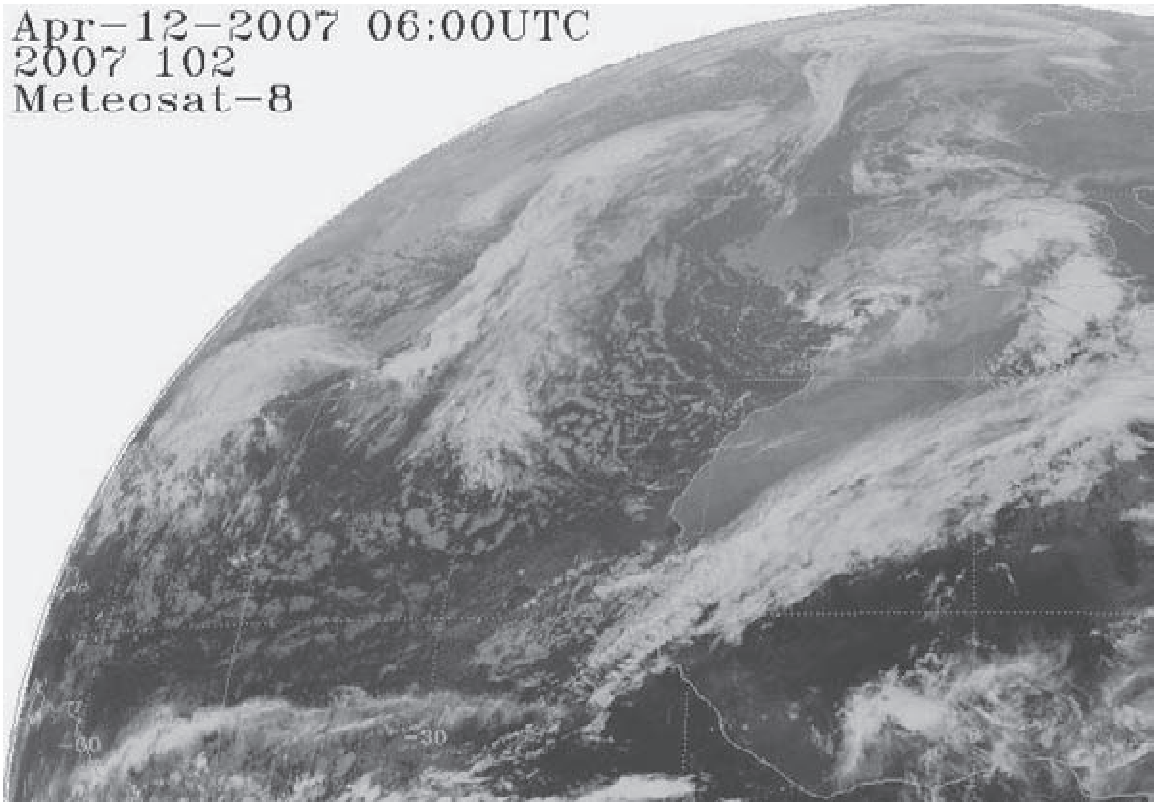


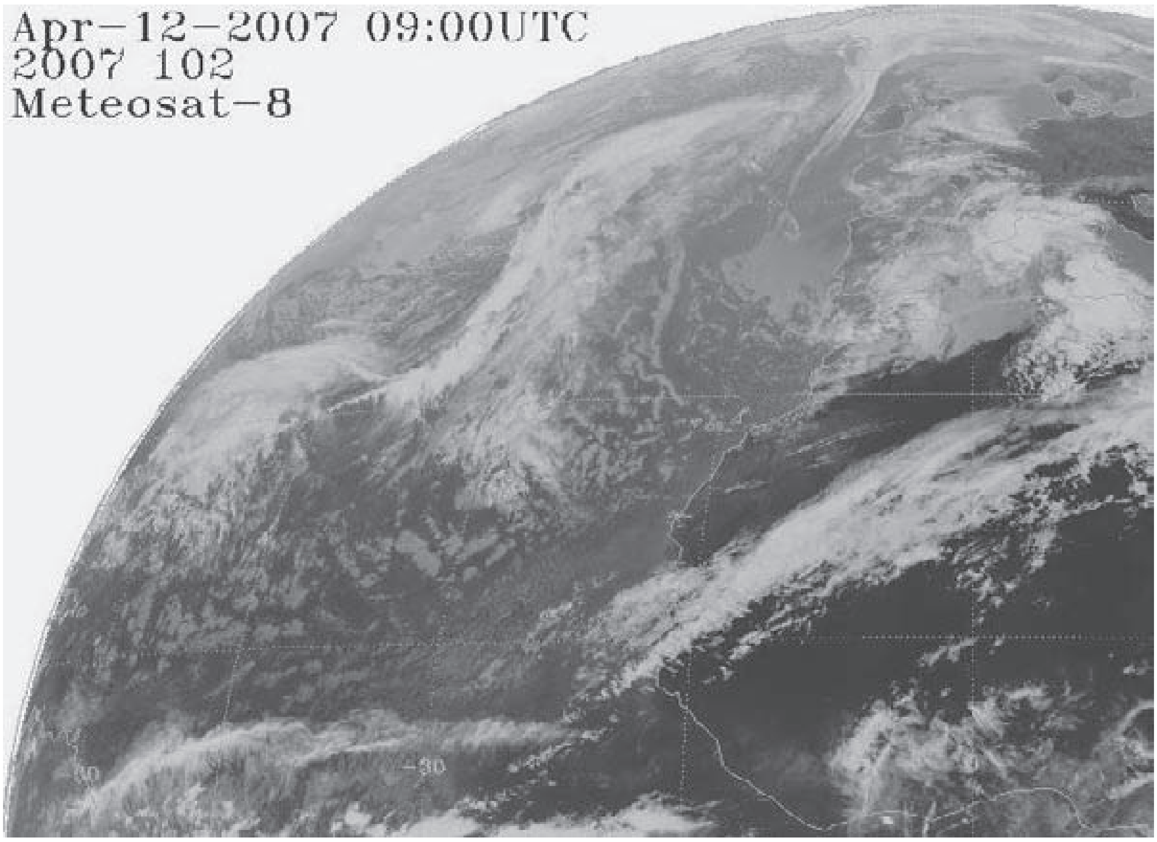

QUIKSCAT NRT HIRES 070412 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
70
68
66
64
62
60
-15
-12
-9
-6
-3
0
21:07
19:28
Note: 1) Times are GMT 2)Times correspond to 70N at right swath edge – time is right swath for overlapping swaths at 70N
3)Data buffer is 24 hrs for 070412 4)Black barbs indicate possible rain contamination
NOAA/NESDIS/Office of Research and Applications

Satellite Imagery – I.R. 12th April 2007

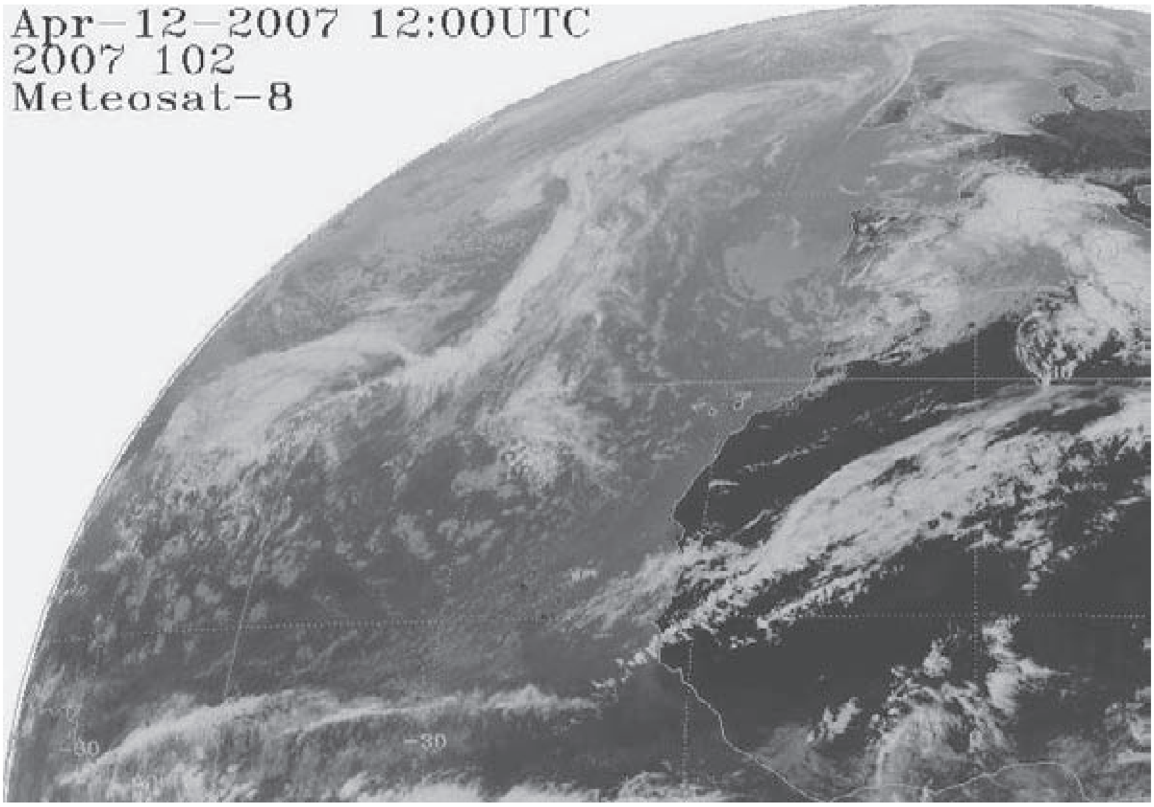








Aerospace & Marine UK Ltd
Email: amieu@weather3000.com
Web: www.amiwx.com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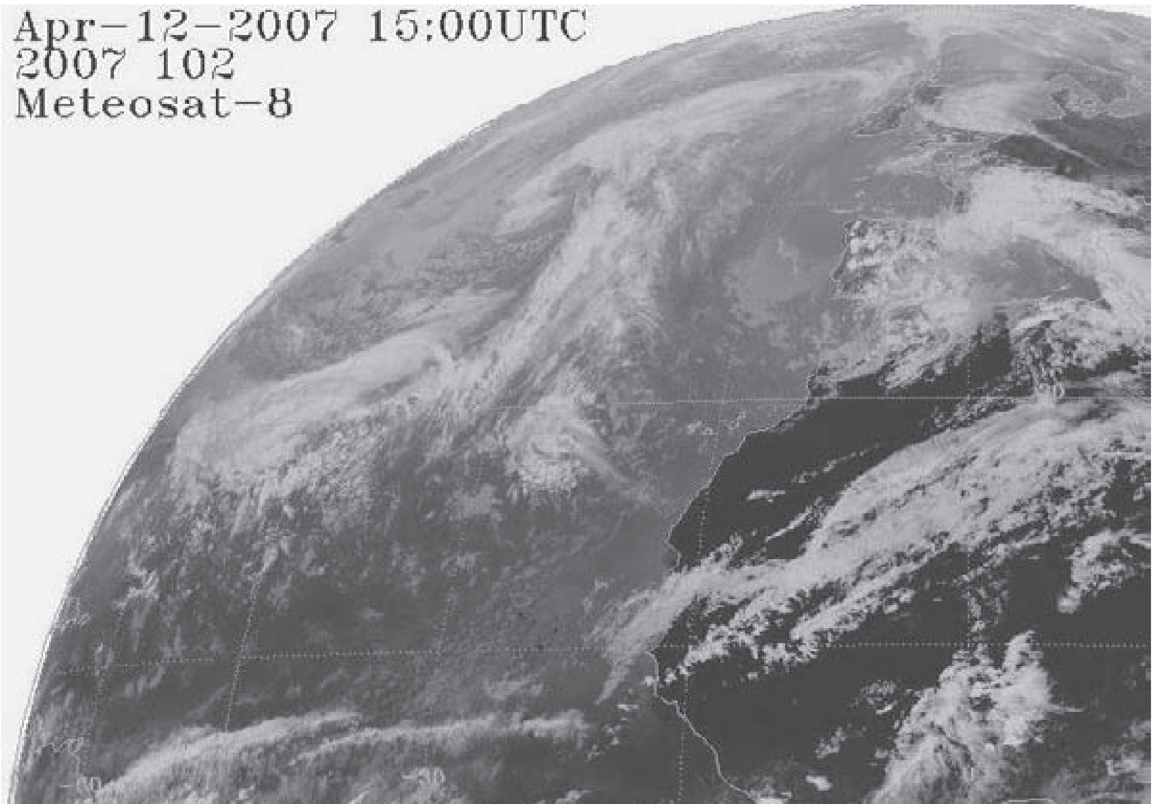
2007 102
Meteosat-8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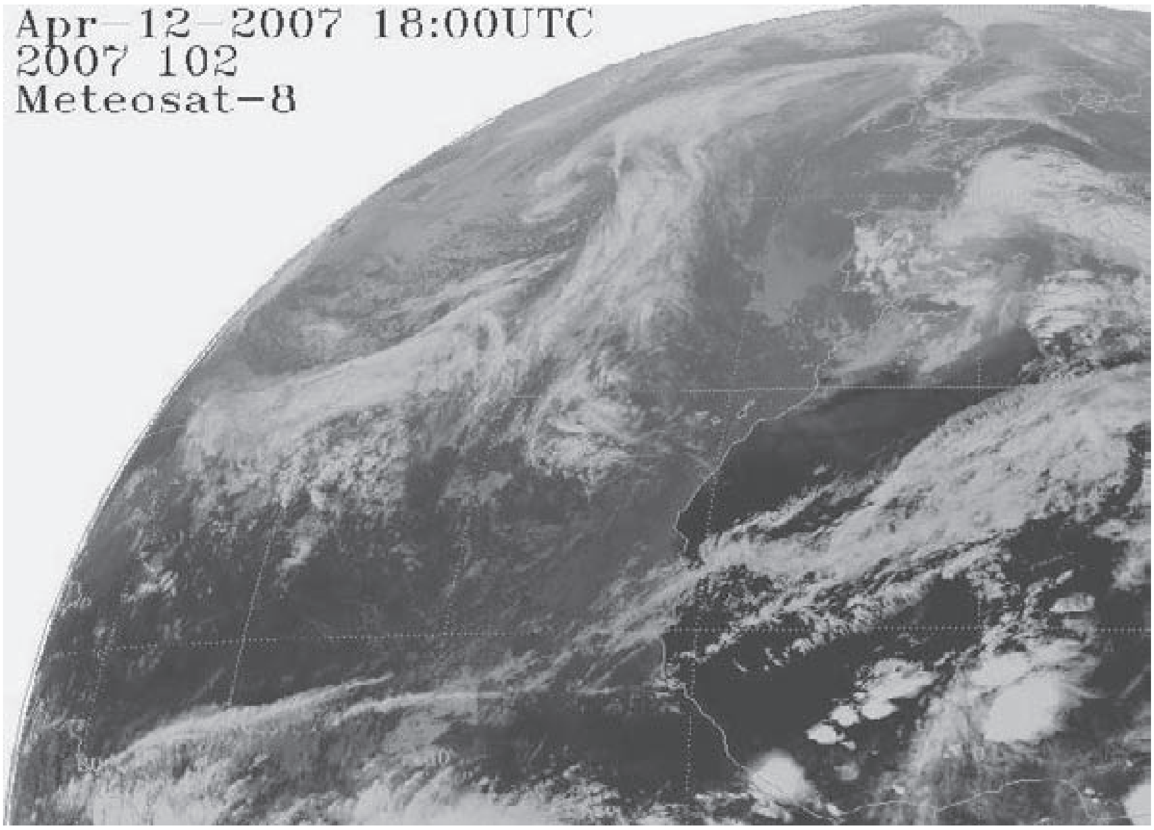
2007 102
Meteosat-8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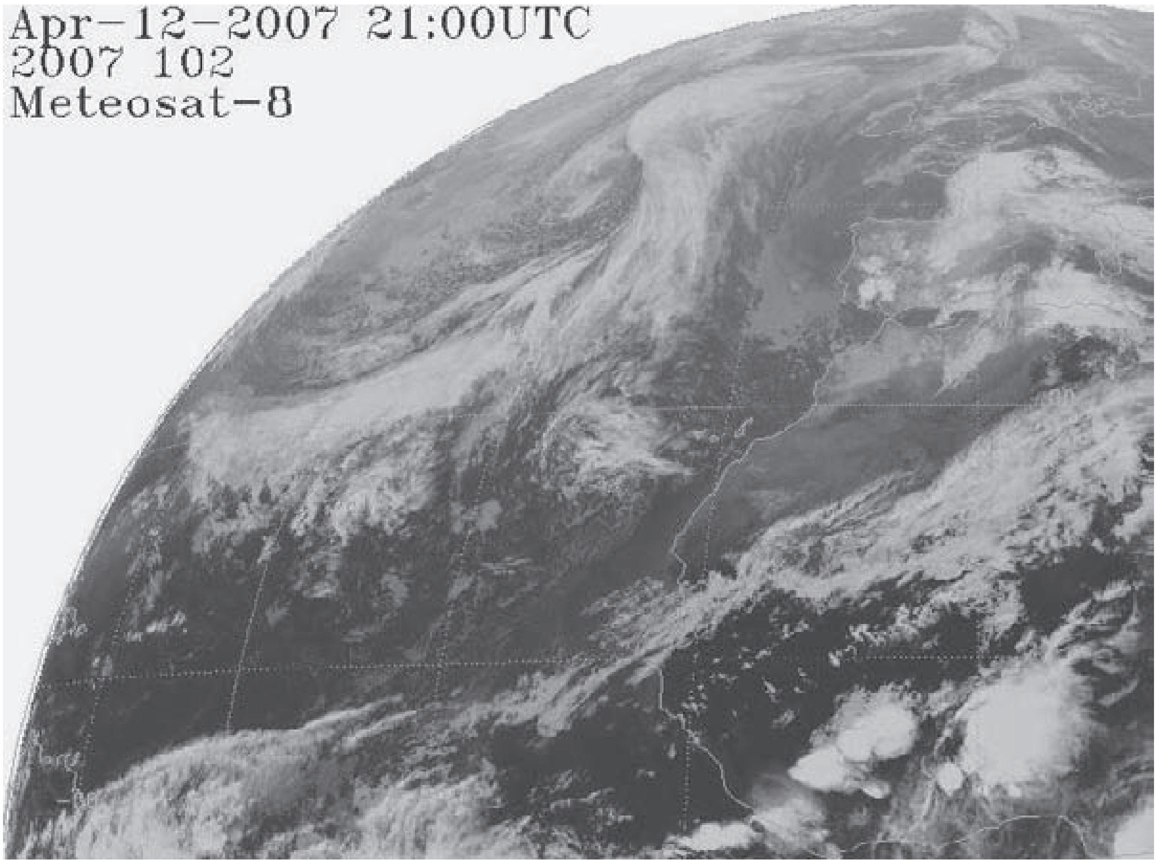
2007 102
Meteosat-8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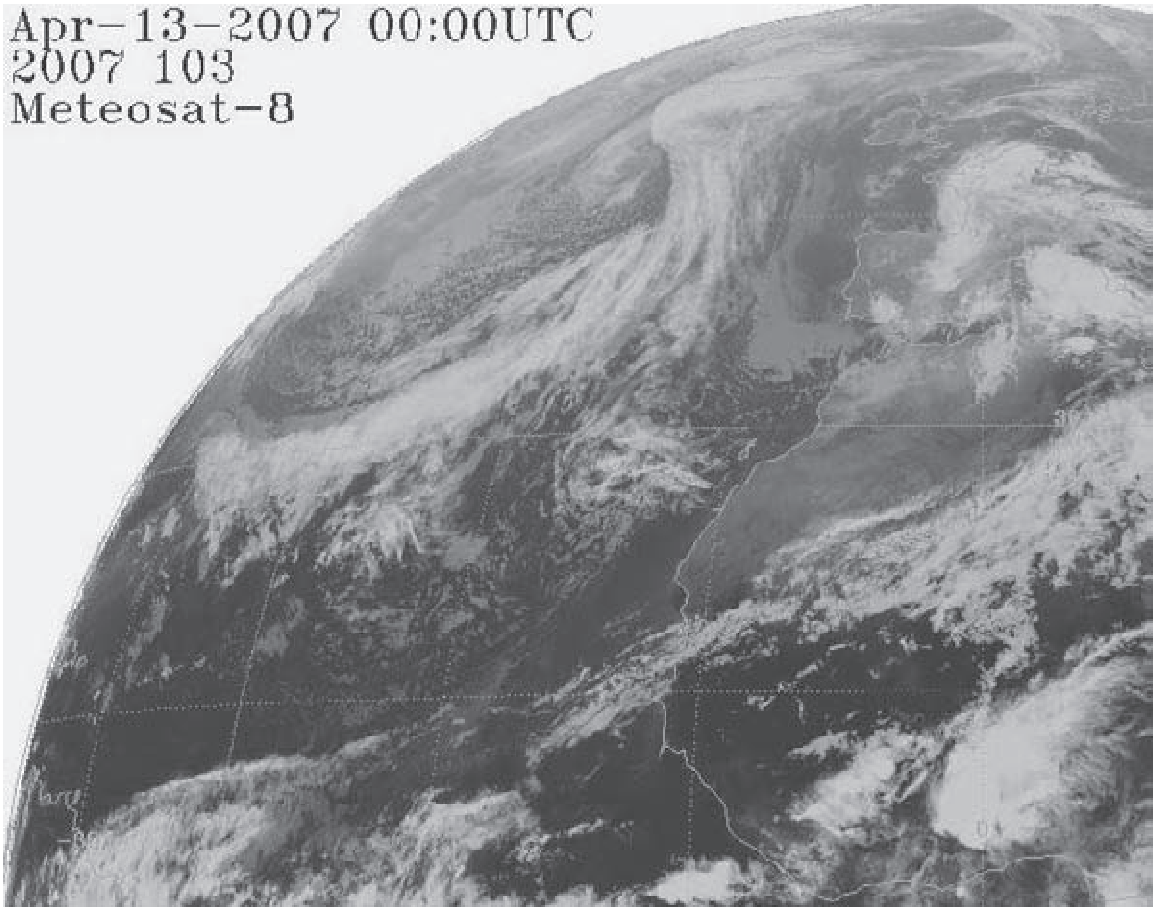
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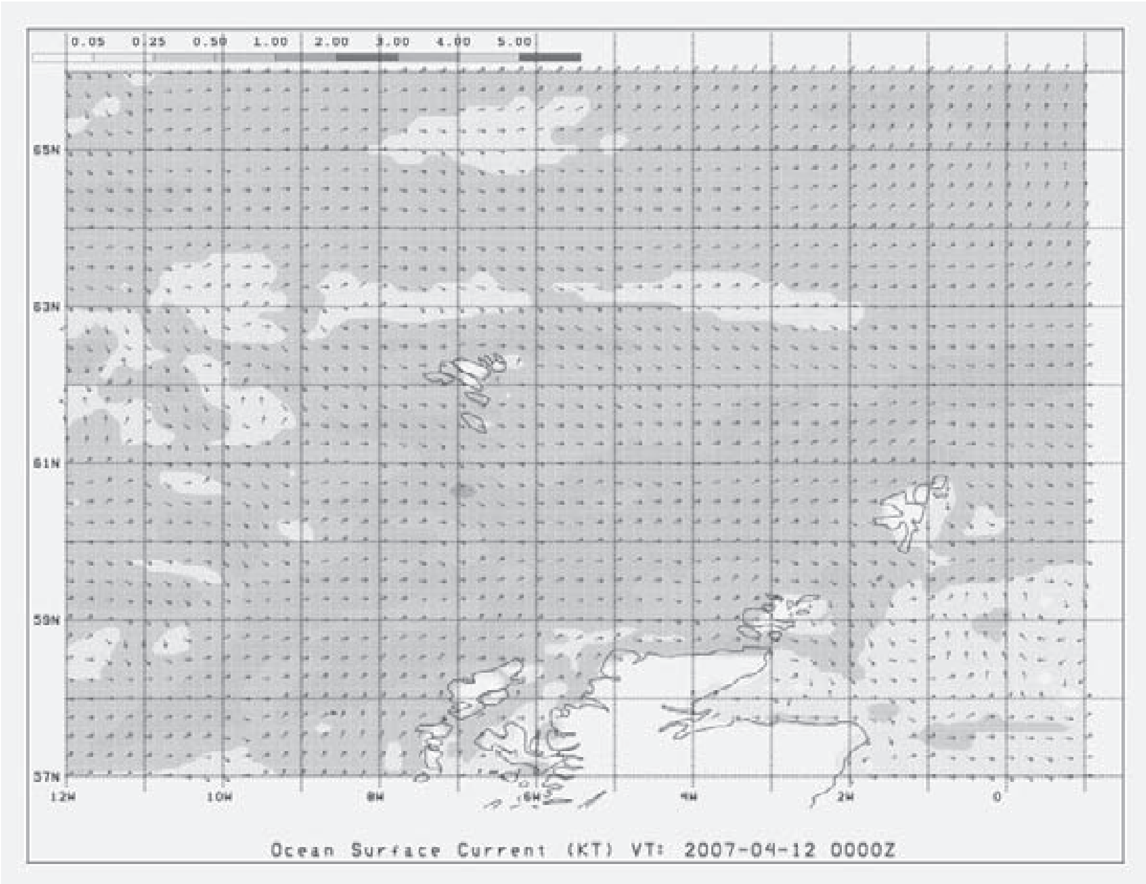
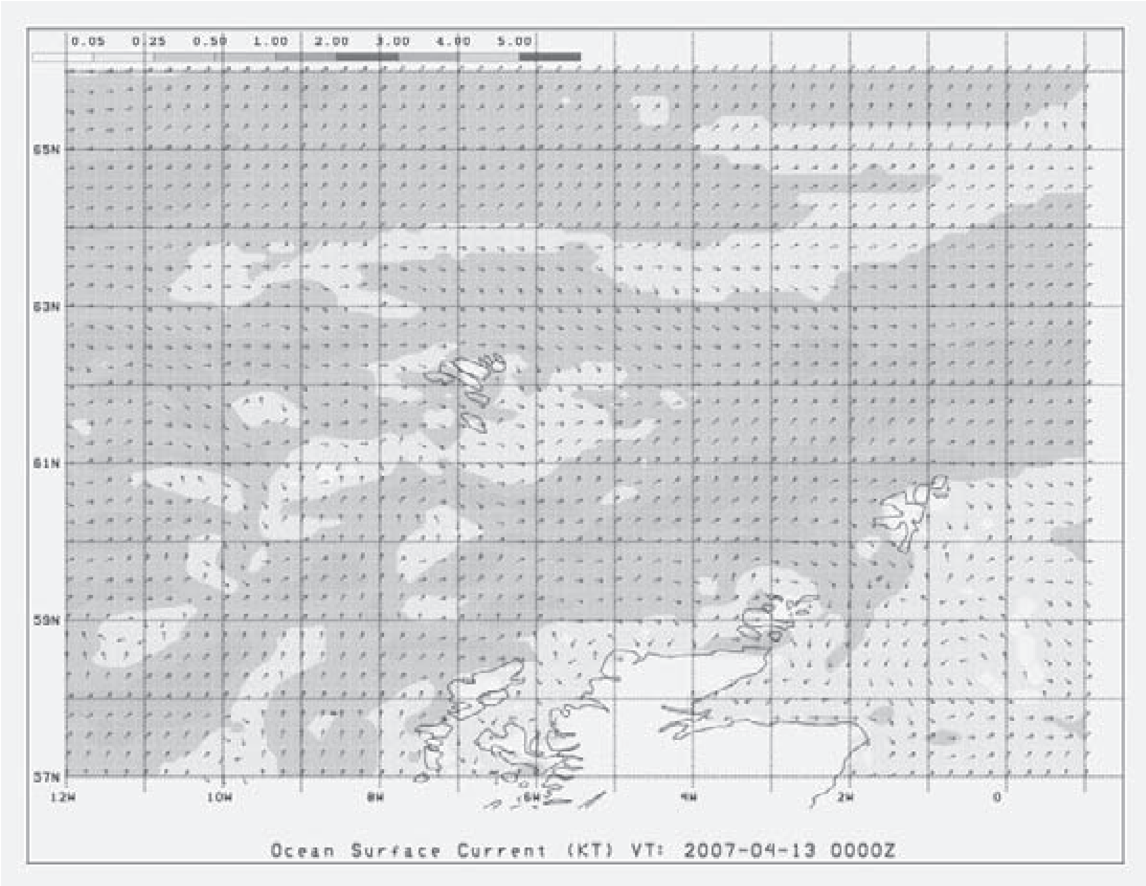
Meteosat-8

Appendix 5 – NCOM Surface Currents

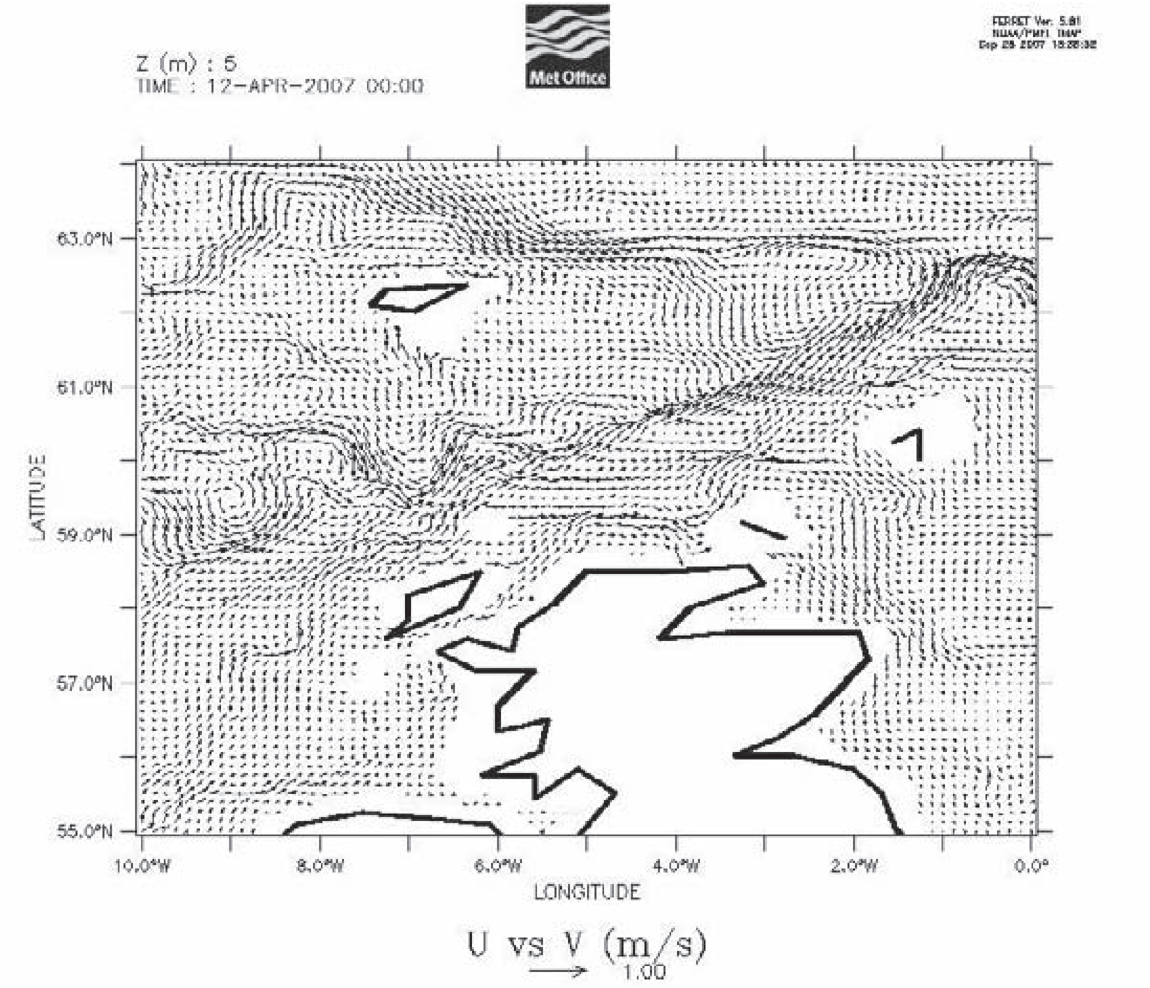
0000Z – 12th and 13th April 2007




0.05
0.25
0.50
1.00
2.00
3.00
4.00
5.00
65N
63N
61N
59N
57N
12W
10W
8W
6W
4W
2W
0
Ocean Surface Current (KT) VT: 2007-04-13 0000Z

Appendix 6 – FOAM Surface Currents

Day Average – 12th April 2007



Vedlegg 5

Logger

DRAFT until approved by Trident Offshore Ltd Marine Manager for promulgation

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG/BARGE NAME:	DATE:	PAGE:
Transocean Rather	March 2007	1 OF 17

TIME	OPERATIONS
	26th March 2007
0930	Train to Aberdeen
0945-1000	Briefing by mobile phone
1030	Taxi to Bristows
1130	Check in
1315	Take off
1445	Landed Transocean Rather
1515-1645	Safety induction
1700-1730	Meeting with barge engineer
1830-2130	Studying procedures
	27th March
0630	Pre tour meeting
0715	Telephone call to Chevron, Capt D. Macklin
0745-0800	Discussions with Barge Engineer
0820-0830	Update to Trident Offshore Ltd
0830-0900	Chevron morning call
	Studying Trident Offshore Ltd Procedure
1852	Olympic Hercules on location. FO 708 M3 LO 33119 ltrs PW 190 M3
1915	Olympic Hercules called to the std side to transfer the navigation package and 1 x ballasted grapnel
2000	Premove meeting
2030	Bourbon Dolphin on location FO 782 M3 LO 35385 ltr PW 2443 M3. Spooling work wire with the Olympic Hercules.
2345	Bourbon Dolphin completed spooling work wire. Approaching to receive Ballasted Grapnel
	28th March
0010	Bourbon Dolphin has received the Ballasted Grapnel
0024	Olympic Hercules close alongside for positioning "Gross Error Check" positioning accurate, Olympic Hercules prep to engage the chain.
0033	#6 Permanent Chaser Pendant to the Bourbon Dolphin
0040	#6 anchor winch raising tension
0050	#6 Permanent Chaser Pendant shortened and returned to the rig. Bourbon Dolphin rigging grapnel hook
0055	Olympic Hercules instructed – do not start to engage the J hook until pilot house has been informed. That to ensure hook is kept away from the wire section of the catenary.
0100	Start Unmooring. Olympic Hercules at 1400 metres from the #6 fairleader. #6 winch at 195 tonnes tension. Total out 3225 metres = 3225 – (914+935) 1376 metres of wire out. Horizontal distance to wire/chain transition less than 1400 metres. Olympic Hercules will J hook between 1400 and 1600 metres from #6 fairleader. Olympic Hercules lowering the J hook
0140	Olympic Hercules starting the first run with the J hook
0200	First run not successful – preparing for 2nd run
0210	Second run started
0245	Third run started
0415	J hook in the chain 1400 metres from #6 F/L with 200 tonnes tension on the rig mooring – chasing out tensioning the anchor again back to 200 tonnes
0457	Olympic Hercules J Hook has come off the chain
0530	Olympic Hercules J hook engaged in the chain – chasing out to the anchor
0625	Olympic Hercules chased to the anchor – pulling to ensure the J hook is at the anchor. Layback 430

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RIGMOVE LOG SHEET

RIG/BARGE NAME:	DATE:	PAGE:
Transocean Rather	March 2007	2 OF 17

	metres.
0705	#6 permission given to break out the anchor
0708	Update to Chevron Marine
0810	#6 roller chaser – lower roller is missing – called Bourbon Dolphin to receive the chaser then rig the J hook
0820	Anchor still fast in the bottom. Instructed Olympic Hercules to start rocking the anchor by fluctuating the pull between 100 and 150 tonnes.
0905	**Handed a copy of email from rig manager. AHV pull on the anchors is not to exceed 150 tonnes**
0920	#6 Olympic Hercules adjusts wire length to 1160 metres, continue pulling at 150 tonnes
0950	Bourbon Dolphin J hook rigged
1020	Bourbon Dolphin has 1100 metres of wire deployed, starting J hook run
1032	#6 Bourbon Dolphin hooked into the chain 1400 metres from #6 F/L – chasing towards Olympic Hercules
1115	#6 Bourbon Dolphin 300 metres from the anchor, stopped moving ahead and raising the anchor chain to 1000 metres of wire deployed
1128	#6 Bourbon Dolphin has 1000 metres deployed, 140 tonnes, 300 metres from the anchor, Olympic Hercules has 1130 metres deployed, 150 tonnes
1130	??? #6 anchor broken loose ???
1136	**#6 anchor broken out**
1145	**Olympic Hercules reports tension has dropped from 150 tonnes to 95 tonnes. Shock from #6 mooring felt on the rig.**
1157	#6 - to achieve stage 3:- Olympic Hercules stopped at 800 metres of wire deployed 190 tonnes load
1204	Stage 3. #6 winch hauling in. Olympic Hercules hauling to 400 metres
1224	#6, Olympic Hercules stopped at 400 metres of wire out, load 170 tonnes. Rig continues hauling in
1237	Bourbon Dolphin has the J hook on deck, preparing the Grapnel hook
1240	Stage 4. Olympic Hercules hauling in to 50 metres of wire deployed, rig hauling in to 400 metres of wire deployed
1258	#6, Olympic Hercules stopped at 50 metres of wire deployed below stern roller, load 165 tonnes. Rig continues hauling in wire, tension 165 tonnes.
1300	Bourbon Dolphin has the grapnel deployed at the stern roller ready for use
1345	#6 at crossover position. Rig stopped hauling in.
1404	Bourbon Dolphin hooking #6 chain
1416	Bourbon Dolphin has hooked the chain
1425	Bourbon Dolphin has 80 – 100 tonnes tension. Olympic Hercules starts to deck the anchor
1443	#6 anchor on deck of Olympic Hercules
1457	Olympic Hercules reports #6 anchor no damages
1507	**Olympic Hercules reports damage to roller J hook**
1529	Bourbon Dolphin released grapnel from chain
1630	Rig extension lockered by Olympic Hercules
1640	Started transition cross over
1710	Transition cross over stopped to allow Helideck crew to attend helicopter
1811	Helicopter away. Marine Rep. John Sapsford onboard.
1820	#6 Resumed at transition
1850	Transition completed – Olympic Hercules lockering chain
1945	#6 rig chain - extension chain connection on the deck of the Olympic Hercules. Preparing to separate the chains
1958	#6 chains separated
2004	#6 rig hauling in rig chain
2030	#6 stopped hauling in. Twists in the anchor chain
2045	#6, chain hanging vertical, hauling in chain again
2110	#6, stopped hauling in rig chain to change out a Kenter Link

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RIGMOVE LOG SHEET

RIG/BARGE NAME: Transocean Rather
DATE: March 2007
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2205	Kenter link cut out of the system
2228	#6 Kenter Link replaced. Rig paying out chain to the Olympic Hercules
2233	Rig chain end on the deck of the Olympic Hercules ready for the Permanent Chaser Pendant to be inserted for recovery and securing to the rig
2255	#6 chain end passed back to the rig
2320	#2 chain tensioned ready for J hooking the chain
	29th March
0015	Olympic Hercules ready for hooking #2 chain
0035	2nd pass not successful
0100	3rd pass not successful
0107	Olympic Hercules hooked into #2 chain
0112	Olympic Hercules chasing out
0120	#2 mooring raising tension for the chase out
0200	Olympic Hercules at the anchor, 1303 metres of wire deployed
0205	Olympic Hercules position confirmed by layback calculation
0210	Olympic Hercules breaking out the anchor
0258	#2 mooring tension down
0300	#2 anchor off bottom at 145 tonnes tension
0317	Recovering #2 mooring.
0332	Olympic Hercules has 700 metres of work wire out. Stopped hauling in
0338	**Rig stopped hauling in. Winch problem**
0340	Bourbon Dolphin recovered J hook and preparing grapnel hook
0430	**#2 winch problem is caused by clutch malfunction**
0945	**#2 winch back in service – Olympic Hercules increasing to staged tension**
0955	**#2 winch problem again**
1540	#2 winch hauling in
1542	Stop
1555	**#2 winch hauling in**
1557	**#2 winch** hauling in. Stopped. Tension too high at 250 Te. Instructed Olympic Hercules to reduce tension.
1605	**#2 winch** hauling in again at 200 – 210 tonnes tension
1615	**#2 winch** stopped. Problem again. Repairs on-going
1810	Telecon with Chevron Marine – Capt. Dick Macklin reference problems with #2 winch. The decision is that the Bourbon Dolphin will be employed with the grapnel to engage into the chain and reduce to the load of in-haul on the rig winch
1830	Called Trident Offshore Ltd – Capt. Sean Johnson. Tendered advice that Chevron and Transocean will require a calculation and determination of the distance from the rig where the grapnel of Bourbon Dolphin is to be positioned. That to ensure the hook does not engage into the rig mooring wire.
2000	Conference call with Chevron, Transocean & Trident. Briefing by Chief Mechanic on winch repairs to No.2 winch, estimated completion of repairs & trials, midday tomorrow (Friday). Estimate of completion of No.6 repair, midday Monday. All agreed to release Bourbon Dolphin to Scalloway to make crew change immediately. First option for continued recovery of No.2 with minimum tension at winch after repair, anchor to be hauled to below Olympic Hercules roller prior to recovery of rig wire. Second option to stretch out chain & grapple chain with Bourbon Dolphin. Catenary curves required.
2055	**Bourbon Dolphin departed for Scalloway ETA 1200/30th. FO 746m3,LO 35185ltr. Pot 237m3**
2105	Telecon with Captain Sean Johnson Trident Offshore to discuss requirements for catenary curves.
	30th March
	#2 winch repairs on-going
0800	Morning call in Chevron office

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG/BARGE NAME:	DATE:	PAGE:
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0900	#2 winch trials
0920	Update to Trident Offshore Ltd. New drawings expected by email soon
0945	#2 winch requires further work
1120	Deballasting to Survival draft
1130	Bourbon Dolphin back on location
1140	**Started recovering #2 anchor tension 165 tonnes**
1210	#2 winch stopped
1215	#2 winch hauling in again, anchor at Olympic Hercules stern roller 155 tonnes tension
1235	#2 at Stage 4 (2714 total out) rig tension 135 tonnes. Olympic Hercules anchor at stern roller tension 155 tonnes
1240	**At survival draft**
1235	Stage 5, Rig tension 160 Te Olympic Hercules 120 Te
1430	#2 at Stage 6 – transition – line out 1765, Bourbon Dolphin approaching to engage the grapnel hook
1435	#2, Olympic Hercules pulling 180 te for Bourbon Dolphin to engage the grapple
1450	#2, Bourbon Dolphin first pass hooked into the chain
1518	Bourbon Dolphin has 90 tonnes tension on the grapple line. Olympic Hercules started to deck the anchor
1522	#2 anchor on the deck of the Olympic Hercules
1600	Conference call to Chevron
1620	Olympic Hercules lockering the chain extension – Bourbon Dolphin disengaging grapnel from the chain
1634	Bourbon Dolphin clear of the chain
1645	Bourbon Dolphin preparing for J hooking #3 chain
1720	#3 Bourbon Dolphin starting the first run for J hooking the chain
1725	#2, Olympic Hercules has the rig chain/extension chain connection on deck
1755	#2 through transition
1800	#3, Bourbon Dolphin hooked in to the chain –range 1400 metres from the fairleader, rig tension 195 tonnes
1825	#2, changing out a K/L from the rig chain
1836	#3, Bourbon Dolphin chased out to the anchor
1900	#3, Bourbon Dolphin has been pulling on the anchor and now instructed to break out the anchor and haul it to the stern roller
1913	Bourbon Dolphin reports tension dropped to 30t, vessel moving ahead, tension on rig dropped to 145t.
1918	Commence changing first Kenter on No.2
1919	Bourbon Dolphin recovering work wire
1954	Bourbon Dolphin recovered 'J' Hook – broken
2010	Telecon with Dick Macklin
2035	Cease heaving No.2 chain, No.2 pennant passed to Olympic Hercules
2045	Telecon with Sean Johnson Trident Offshore
2132	No.2 Pennant passed back, chain end on bolster.
2136	No.2 Pennant Racked
2140	Bourbon Dolphin enters 500m zone
2147	Bourbon Dolphin departs with 'J' Hook from Olympic Hercules
2215	Bourbon Dolphin has 'J' hook rigged
2220	Unable to get No.3 winch in gear
2230	Heaving in No.3 chain
2240	Bourbon Dolphin attempting 'J hook No.3 chain, spooling gear on No.3 not working, tension 180t.
2300	1st Run unsuccessful
2320	**Spooling gear on No.3 storage winch failed. Anchor chasing operations continuing.**
2323	Bourbon Dolphin reports 'J' hook on chain

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RIG/BARGE NAME:	DATE:	PAGE:
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2330	Bourbon Dolphin chasing out
	31st March 2007
0010	Bourbon Dolphin at anchor
0013	Survey confirmed Bourbon Dolphin at anchor
0015	Bourbon Dolphin attempting to lift anchor
0040	Reduce work wire by 20m
0115	No.3 anchor off bottom, 165t tension
0125	Bourbon Dolphin heaved work wire in to 900m, waiting for spooling gear trouble shooting. Delay starts.
1045	**#3 spooler reported back in operation. Instructed Bourbon Dolphin to haul the anchor to close below the stern roller**
1050	#3 hauling in again
1118	#3, anchor under the stern roller of Bourbon Dolphin. Rig 3030 metres deployed, (1181 m wire) tension 165 – 170 tonnes
1140	#3, rig wire 931 metres tension 170 T, Bourbon Dolphin anchor at stern roller, tension 170 T
1200	Stage 5 rig wire 630 tension 180 T, Bourbon Dolphin tension 170 T anchor at stern roller
1207	Bourbon Dolphin instructed to increase tension to 190 T
1240	#3 rig wire 350 m, tension 165 T
1300	#3 at transition. Bourbon Dolphin increasing power to stretch the chain, Olympic Hercules approaching to hook the chain
1320	#3, Olympic Hercules hooked into the chain
1325	#3, Olympic Hercules has 90 tonnes tension, Bourbon Dolphin started decking the anchor
1337	#3 anchor on the deck of the Bourbon Dolphin
1512	#3, Bourbon Dolphin lockering the chain extension. Olympic Hercules disengaging the grapnel hook from the chain
1525	#3, Olympic Hercules off the chain
1634	#3, Bourbon Dolphin has lockered all of the 76 mm chain extension, disconnected it from the 84 mm rig chain. Rig putting chain through the transition..
1720	#3 chain through transition
1725	#3 recovering the chain
1828	#3 Pendant wire passed down to Bourbon Dolphin
1855	#3, end of chain back to the rig
1915	'J' Hook over roller Bourbon Dolphin
1920	Increasing tension on #7 wire
1935	1st 'J' Hook run
1955	Run unsuccessful
2045	'J' Hook on chain 3rd attempt.
2100	Bourbon Dolphin chasing out
2120	Bourbon Dolphin unable to chase further, rig attempting to heave chain
2140	Bourbon Dolphin resume chasing
2200	Bourbon Dolphin at anchor
2212	Tension reduced on #7 to 180t.
2215	Bourbon Dolphin attempting to lift anchor
2315	Bourbon Dolphin unable to lift anchor. Olympic Hercules instructed to rig vessels 250t 'J' hook.
2355	Olympic Hercules rigged 'J' Hook over roller.
	1st April 2007
0020	Olympic Hercules attempting 'J' Hook #7 chain
0046	Olympic Hercules on chain

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RIG/BARGE NAME:	DATE:	PAGE:
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0120	Olympic Hercules 300m from Bourbon Dolphin , commence lifting chain
0121	Bourbon Dolphin moving ahead with reduced tension, anchor off bottom.
0135	Bourbon Dolphin 800m Wire deployed, Olympic Hercules attempting to clear 'J'Hook
0140	Olympic Hercules off chain.
0150	Commence heaving wire to rig
0215	#7 Anchor 50m below Bourbon Dolphin roller
0230	Bourbon Dolphin on 40% Power, 150t Tension, 1000m rig wire deployed
0400	Chain/Wire connection at Transition deck, cease heaving, Olympic Hercules coming in to grapple chain
0420	Olympic Hercules on chain
0432	#7 anchor on deck & secure Bourbon Dolphin
0443	Olympic Hercules off chain, to stand by.
0530	Bourbon Dolphin reports rental swivel not working, also small damage caused to Stevpris anchor by 'J' hook
0645	Bourbon Dolphin disconnected anchor & commence lockering chain.
0800	#7 extension chain lockered and rig chain ready for in-haul
0820	#7 chain at transition
0830	Morning call with Chevron. Inter alia, informed Chevron that the Bourbon Dolphin swivel is possibly malfunctioning.
0845	#7 through transition
0905	#7 hauling in chain
0915	#7, replacing K/L in the rig chain
0930	Telephone call with Chevron Marine. Bourbon Dolphin swivel has malfunctioned.
1020	K/L replaced
1024	#7 replacing next K/L
1055	#7, K/L replaced. Resumed hauling in chain
1110	#7 stopped hauling in chain to pass the Roller Chaser Collar to the Bourbon Dolphin
1120	#7 Roller Chaser Permanent Chaser Pendant passed to the Bourbon Dolphin
1215	**Olympic Hercules master reports that following a thorough inspection of equipment on the vessels deck the following has been noted:** **a) Stevpris anchor ex #6 the main shackle and joining link are stretched out of true** **b) Rental swivel is damaged - pulled and opened cannot be used again** **c) Vessels own J hook is cracked on one side (NB this the first time it has been used)**
1235	#7 chain end back to the rig
1300	**No more progress can be made due to #6 winch repairs and waiting arrival of boats with Swivels.** Bourbon Dolphin inspection of equipment, Swivel U/S, J hook (ex Olympic Hercules) and work wire OK. Rig now waiting to resume operations. Olympic Hercules has U/S equipment a) Swivel b) Roller J hook c) Ordinary J hook (ships equipment) Bourbon Dolphin has U/S equipment a) Swivel
1355	Telephone call with Chevron. Discussed that the rig cannot progress because of no swivel fit for purpose is available on site.
1915	Telecon with Dick Macklin, Highland Valour due to sail at 2230, ETA at rig 2100/2nd at economical speed, recommended vessel proceed at Full speed. Vidar Viking proceeding to Scrabster to load work wire, ETA Scrabster 0300/2nd, expected at rig approx 1800/2nd.

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Transocean Rather	March 2007	7 OF 17

	2nd April 2007
0001	Waiting #6 winch repair and arrival of AHVs from Aberdeen with swivels
0700	Studying weather forecast poor Wednesday late. Not good end of week.
0800	Morning call to Chevron
1300	Bourbon Dolphin advises they cannot dis-assemble the pear link to the swivel. Instructed to cut it clear
1620	Bourbon Dolphin advises Highland Valour eta is 2 hours 40 minutes
1730	Highland Valour called, eta 1830
1800	Call to Chevron marine reference the weather increasing from 0600 Wednesday
1815	Highland Valour on location. FO 674 m3 LO 33000 ltr PW 445 m3
1845	4 x swivels off the Highland Valour to the rig
1900	1 x swivel to the Olympic Hercules
1905	1 x swivel to Bourbon Dolphin
1910	Sea Lynx on location FO 547 m3, LO 10004ltr, PW 424m3
1940	Vidar Viking on location FO 559m3, LO 20523ltr, PW 61m3.
2000	Pre-Move meeting in conference room
2030	#6 Winch repaired & tested OK
2050	**Bourbon Dolphin to 'J' Hook #8. Rig – unmooring back in progress.**
2055	Vidar Viking alongside to pass up 2 x 'J' Hooks
2100	Awaiting crane, positioning slip joint.
2130	Bourbon Dolphin attempting to 'J' hook #8
2150	Bourbon Dolphin on #8 chain
2207	2 x 'J' Hooks up from Vidar Viking, Vidar Viking to Highland Valour to tension work wires.
2220	1 x 'J' Hook to Olympic Hercules
2230	Bourbon Dolphin at #8 anchor
2238	Position confirmed, Bourbon Dolphin attempting to retrieve anchor.
2245	Olympic Hercules to 'J' Hook #4.
2315	Bourbon Dolphin reports #8 anchor off bottom.
2323	Bourbon Dolphin 900m wire deployed, 110t tension, standing by.
2324	Olympic Hercules on #4 chain
	3rd April 2007
0005	Olympic Hercules unable to chase out any further, shortening work wire.
0012	Heaving wire to rig.
0017	Heaved in 30m, Olympic Hercules resumes chasing
0045	Olympic Hercules stopped again, lifting chain again
0105	Olympic Hercules unable to chase further, chasing back to have another go.
0120	Olympic Hercules chasing out.
0145	Olympic Hercules at #4 anchor
0150	Highland Valour reports work wire tensioned, Vidar Viking to do.
0200	**Commence de-ballasting to transit draft.**
0215	#4 Anchor off bottom
0230	Olympic Hercules has 900m work wire deployed, 110t tension, standing by.
0230	Vidar Viking 1700m work wire to heave in under tension.
0350	Highland Valour reports ready to anchor handle, Vidar Viking work wire tensioned. Sea Lynx to Vidar Viking to tension work wire, Highland Valour to rig up 'J' hook for No.1
0450	Highland Valour attempting to 'J' Hook #1
0500	**Deballasting complete, draft 9.6m**
0505	Highland Valour on # 1 chain
0517	Highland Valour chasing out #1

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RIG/BARGE NAME:	DATE:	PAGE:
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0630	Complete tensioning Sea Lynx work wire, Vidar Viking preparing 'J' Hook.
0640	Highland Valour at anchor
0700	Sea Lynx approaching to secure for towing. #4 & 8 raising the anchors to the stern rollers prior to shortening in
0722	Vidar Viking making first run
0726	**Towing bridle passed to the Sea Lynx**
0732	Vidar Viking hooked into the #5 chain, chasing out --- #8 Bourbon Dolphin has the anchor at the stern roller
0750	#4 & 8 hauling in rig wire. #4 157 tonnes, #8 160 tonnes rig tension. Highland Valour still breaking out the #1 anchor, Vidar Viking chasing #5
0800	Morning call
0818	**#8 Bourbon Dolphin J hook broken, anchor dropped to the sea bed.**
0820	Vidar Viking lost tension – off the chain? (No still on chain)
0822	#4 stopped hauling in – Olympic Hercules lowering anchor to the sea bed for #8 to tension against - #8 stopped wire on the bolster - #4 winch possible problem
0830	#5 Vidar Viking possibly at the anchor, pulling 140 – 150 tonnes for half hour to confirm the anchor is chased out
0835	#8 Total out 2855 metres. Rig wire out 1004 metres, rig tension 170 Te. Bourbon Dolphin instructed to J hook 900 metres from the rig with 1000 metres of work wire deployed from the stern
0910	**#1 Highland Valour reports the J hook has been recovered it is broken**
0935	#8 Bourbon Dolphin making first pass to hook the chain
0950	#8 Bourbon Dolphin first pass not successful, preparing for 2nd run
1018	#8 Bourbon Dolphin has hooked into the chain, chasing to the anchor
1020	#5 Layback Calculation: Wire out 1350 m Water depth 1102 metres. Layback + 780 metres – verified correct
1030	#1, Highland Valour ready for J hooking again
1048	#1 Highland Valour hooked in and chasing out
1100	#8 breaking out - #4 easing pulling power to assist #8 break out
1103	#8 off bottom?
1105	#8 Bourbon Dolphin anchor at 900 metres of working wire and hauling to the stern roller. At 160 tonnes tension, traction winch is slipping due to the lubricant on the rig wire (ex Nautilus). #4 Olympic Hercules hauling anchor to the stern roller
1118	#8 hauling in again, returned to equivalent position. #4 winch hauling in again
1120	#1 Highland Valour has 1120 metres of work wire deployed, 50 T tension, vibrations from the mooring as J hook is pulled out to position
1140	#1 Highland Valour at the anchor – checked layback – OK
1214	#8 Anchor at the stern roller
1215	#1 Highland Valour layback confirmed OK
1250	#8 winch requested Bourbon Dolphin to reduce power.
1252	Bourbon Dolphin at 180 tonnes pull
1257	#8 winch instructed Bourbon Dolphin to reduce power – **anchor has slipped through the J hook – amount not known.**
1300	#8, Stopped hauling in. All stopped. #8 problem. #4 spooler not working – rig crew working to rectify
1406	Bourbon Dolphin – anchor has dropped through the J Hook some more. Decision – Bourbon Dolphin to disengage J hook and move clear
1420	1945 metres out total 330tons tension at the rig, 250 metres and 10 t tension at the Bourbon Dolphin
1545-1615	Conference call to the shore
1630	#5,Instructed Vidar Viking to come off the anchor #8, Instructed Bourbon Dolphin to chase out to the anchor #4 still working on the spooling device

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1730	#5 Vidar Viking off the chain and standing by
1827	#8 Bourbon Dolphin making very slow progress ahead. Occasional few vibrations felt as the J Hook moves over the chain
1835	#8, Bourbon Dolphin stopped moving ahead, increased power to 80 tonnes
1838	#8, Bourbon Dolphin moving ahead again
1844	#8, Bourbon Dolphin stopped again, increase power to 90 tonnes
1850	#8, Bourbon Dolphin increased to 100 tonnes tension
1900	Vidar Viking preparing to J hook with the 150 T J hook (rental)
1920	Vidar Viking attempting to 'J' hook #8 chain
1950	Vidar Viking on chain
2000	Vidar Viking appears to be on Bourbon Dolphin work wire
2002	Vidar Viking off wire
2052	Vidar Viking on chain 60t tension, reduced tension on rig.
2110	Vidar Viking off chain & standing by
2130	Bourbon Dolphin chasing again
2155	Bourbon Dolphin stopped at anchor? Vidar Viking preparing to 'J' hook chain
2205	Resume heaving #4 wire, winch repaired.
2235	Cease heaving #4, chain at bolster.
2255	Vidar Viking failed to 'J' hook chain
2320	Vidar Viking attempting to 'J' hook chain
2350	Vidar Viking on chain.
	4th April 2007
0010	Bourbon Dolphin reports chasing on chain
0015	Bourbon Dolphin stopped again.
0020	Vidar Viking paying out wire & chasing towards Bourbon Dolphin
0030	Bourbon Dolphin moving ahead at 2.5 knots. Anchor off bottom?
0055	Vidar Viking reports come off chain
0100	Bourbon Dolphin work wire at 800m. Tension 150t, Rig tension 290t. Heaving work wire.
0120	Tension at rig dropped to 190t
0155	'J' hook at stern roller Bourbon Dolphin, anchor not visible, chain running through hook towards rig
0205	Bourbon Dolphin reports chain stopped, checking for anchor in 'J' hook
0205	Vidar Viking alongside pass up Nav Package for repair.
0215	**Bourbon Dolphin reports heaving up anchor, tension to zero, anchor lost.**
0220	**Bourbon Dolphin reports 'J' hook broken & swivel damaged.**
0302	Vidar Viking alongside to pass up Nav Pack & 'J' Hook
0340	Vidar Viking complete transfer
0341	Bourbon Dolphin to Stbd side for 'J' Hook & swivel.
0405	Bourbon Dolphin complete transfer
0445	Vidar Viking alongside to pass up 150t 'J' hook
0500	Vidar Viking departs for Scrabster ETA 1500
0510	Bourbon Dolphin attempting to 'J' hook #8 chain
0545	Bourbon Dolphin missed chain
0715	WOW. Wind 270° @ 30 kts (10 metres level) seas 3.0 metres significant. Bourbon Dolphin instructed to move clear of #8 and stand by
0720	#4 Olympic Hercules requests permission to ease the tension due to deteriorating weather, shipping water at the stern. Permission given but cautioned about potential for anchor to fall through the chaser.
0800-0845	Morning conference call
0850	#4 Olympic Hercules – master advises there is movement at the vessel stern, potential for J hook damage - instructed to lay down #4 anchor and then pay out working wire

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1015	#4 anchor on the bottom, 1240 metres of wire deployed – Olympic Hercules paid out working wire head to weather, attempting to keep the hook into the anchor
1200	WOW
1600	WOW
2000	WOW
2400	WOW
	5th April 2007
0245	Telecon from Rig Manager re 'J' hook arriving in Scrabster.
0300	Contacted Vidar Viking by telephone to check number of 'J' hooks onboard, only 2 not 3 as per Chevron Night Rep telecom with agent in Scrabster & manifest. With Chevron Night Rep. instruct Vidar Viking to return to Scrabster for 'J' hook. ETA 0700. Informed transport agent Blue Water Int. Scrabster agent informed by Chevron.
0400	WOW Wind 285 x 29 knots, Seas 3.5/4.0m.
0650	Update to Chevron, D. Macklin
0700	Called Bourbon Dolphin to standby port side to observe movements in the seaway
0800	WOW Wind 040° 10 knots, sea 3-3.5 meters
0830	**ENDED WOW. Called Highland Valour to come off of #1 and prepare for J hooking #8**
0835	Called Trident Offshore with update
0840	#1 Highland Valour off the chain, hauling up J hook and work wire to check all over
0915	Telephone call with Trident Offshore senior management
1000	Moving into position at #8 to J hook the chain
1015	**Highland Valour Grapnel to the rig – Highland Valour to J hook #8**
1035	Bourbon Dolphin received Grapnel (ex Highland Valour) from the rig
1100	#8 Highland Valour making the first pass
1120	#8, Highland Valour first pass not successful
1150	#8 2nd pass not successful with 850 metres deployed
1220	#8 Highland Valour hooked in to the chain chasing out
1230	#8 hook off the chain – Highland Valour making a 2nd pass
1300	#8, 2nd pass not successful, Highland Valour making third pass
1330	Conference call with Chevron. Instructed to prepare a procedure and contingency plan
1600	Procedure and contingency plan completed.
1615	#8 Highland Valour not successful hooking the chain
1630	Tensioned up on #5 anchor but with no visible success in raising tension at #8 Vidar Viking eta 1730 with additional eq't from Scrabster. Instructed vessel to rig Grapnel hook
1725	Vidar Viking back on location, FO 445 m3 LO XXXXX PW XXX. Discharging a/h equipment
1800	Vidar Viking completed discharge – proceeding to grapple for #8 anchor. Highland Valour instructed to stop J hooking, move clear and standby **Rig received 1 x ordinary 1 x locking J hooks, 4 x swivels, 1 x navpak**
1820	Vidar Viking navigation display – Intermittent problem. Instructed Bourbon Dolphin to rig the grapnel hook
1840	Bourbon Dolphin – grapnel not connected. Open end of wire, ready for any contingency
1915	Vidar Viking stopped grappling whilst rig discussed position of grapple.
2000	Vidar Viking instructed to try grappling chain 800m from fairlead
2048	Vidar Viking grapelled chain.
2050	Highland Valour making ready to 'J' Hook chain
2110	Vidar Viking at 800m wire, 90t tension.
2117	Vidar Viking at 700m wire, 100t tension, stop heaving & tension chain against rig.
2145	Highland Valour attempting to 'J' Hook chain.
2215	First pass failed

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2230	Second pass failed
2305	Third pass failed
2315	Vidar Viking heaved in wire to 600m, tension 100t
2345	Highland Valour Fourth pass failed, checked hook & OK
	6th April 2007
0030	5th pass failed, Vidar Viking heaved in wire to 500m, 110t tension
0140	6th Pass failed
0245	7th Pass failed
0320	Highland Valour on chain
0330	Highland Valour heaving up wire, 600m, 60t tension
0335	Vidar Viking attempting to unseat grapnel
0345	Highland Valour reports chain running through 'J'hook
0415	Vidar Viking attempting to unseat grapnel
0505	Highland Valour chasing towards Vidar Viking
0530	Highland Valour stopped & heaving wire to 700m.
0550	Vidar Viking unable to get off chain
0637	Olympic Hercules reports come off #4
0700	#8 grapnel at the stern of the Vidar Viking
0705	#8 grapnel and chain on deck – there is a knot in the chain - ?76mm?
0738	#4 Olympic Hercules has J hooked into the chain, chasing out to the anchor
0800	Morning conference call.
0826	#8 Jammed transition device (previously jammed on the bolster) freed – **started ballasting the rig**
0840	**#8 Vidar Viking, chain knot burned out. 76 mm K/L inserted No. 671. 120T shackle into the grapnel changed out – metal missing, worn out.**
0844	#8 Vidar Viking fishing the anchor to the stern roller
0855	#4 Olympic Hercules reports the hook has come off of the chain
0905	#8 anchor at the stern roller, decking operations started
0924	#8 Bourbon Dolphin approaching to engage grapnel into the chain astern of the Vidar Viking
0940	#4, Olympic Hercules reports J hook inspected and OK swivel useable but showing signs of wear
1010	**Completed ballasting – draft 17.0 metres**
1055	#8 Bourbon Dolphin 250 metres of wire out
1112	#4 Olympic Hercules 2nd pass, not successful, trying to J hook again
1124	#8 anchor decked and secured on Vidar Viking
1134	#8 Highland Valour J hook disengaged from chain. Standby to assist at #4 anchor
1151	Highland Valour passed 1 x 145 ft wire to the rig
1155	#4 Olympic Hercules not successful J hooking the chain. Trying again
1200	#8 Vidar Viking lockering the chain extension –**Grapnel one tine is badly bent.**
1240	#4 Olympic Hercules not successful, rigging grapnel
1242	#8 Vidar Viking has rig chain extension chain connection on deck
1250	#8 Bourbon Dolphin grapnel out of the chain
1252	Olympic Hercules has Grapnel rigged
1300	#8 windlass – chain going through transition. **Vidar Viking reports #8 anchor inspected and no damages seen.**
1320	#8 transition completed. Rig hauling in rig chain
1355	#8 chain recovered, **Rig port crane down.**
1400	#4 first pass not successful, preparing for 2nd pass
1445	#4, Olympic Hercules 2nd grapnel pass not successful, preparing for 3rd pass

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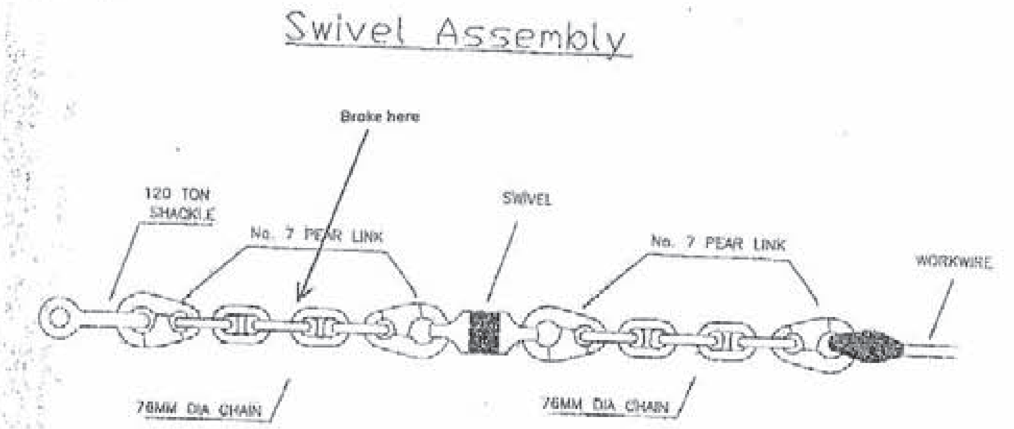
1519	#4 Olympic Hercules 3rd pass not successful, preparing for 4th pass
1535	#4, 4th pass not successful, preparing for the 5th pass
1600	Rig crane back in operation. Vidar Viking returning the chain
1624	#8 Permanent Chaser Pendant passed back to the rig #4, Olympic Hercules has grapnel hooked into the chain
1710	#4, chain on deck of Olympic Hercules being secured for measurement. **Grapnel damaged.** Removing the grapnel and inserting the J hook for fishing the anchor to the stern roller. Bourbon Dolphin closing to Olympic Hercules ready to assist anchor decking with grapnel
1735	Sea Lynx instructed to 240° (T) at 30% power to counter tensions at #4
1745	#4 Olympic Hercules has rigged the J hook started fishing the anchor
1750	Sea Lynx power down to 25% Olympic Hercules reports the chain (chain adapter) between the swivel and the Grapnel has parted (76 mm chain) No injuries environmental issues or damages to vessel. Chain still secured in Karm Fork. Master reports the chain bight on deck was being slacked out when the chain adapter broke. Previous loads 120 – 140 tonnes (reported periodically to duty towmaster). Load at time of break approximate 110 tonnes.



1840	#4 Olympic Hercules still re-rigging on deck. Requested Vidar Viking, Highland Valour and Bourbon Dolphin to inspect the swivel assembly thoroughly for any visible defects
1842	Sea Lynx instructed to increase power to 30% on heading 240° (T)
1844	#4 Bourbon Dolphin has Grapnel hooked into the chain
1845	Vidar Viking reports swivel assembly no visible defects
1940	**Olympic Hercules reports end of 76mm chain recovered to deck without anchor or anchor shackle. There is a shackle pin which is apparently not damaged but no nut.** Olympic Hercules sorting out deck ready to locker chain.
2015	Highland Valour & Vidar Viking rigging 'J' hooks to chase out #1 & #5.
2040	Vidar Viking lowering 'J' hook
2135	Vidar Viking on #5 chain preparing to chase out to anchor.
2200	Olympic Hercules commence lockering chain
2215	Vidar Viking at #5 anchor, 1290m wire deployed, max tension 130t. Lay back calculation gives 70m short.
2245	76/84mm connection on deck Olympic Hercules
2255	Heaving #4 chain/wire connection to transition deck
2255	Highland Valour on #1 chain
2320	Commencing transition at #4

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2345	Commence heaving #4 chain, transition complete
2355	Highland Valour chasing back, definitely on chain.
	7th April 2007
0001	Cease heaving #4 to pick up tension on #1
0005	25m heaved in on #1, tension 190t
0006	Highland Valour wire at water depth, 300m clear of chain/wire connector
0010	Highland Valour 'J' hook come off chain
0030	Highland Valour attempting to 'J' hook chain
0045	#4 Pennant passed to Olympic Hercules, cease heaving chain at 80m.
0045	Highland Valour on #1 chain
0055	Highland Valour chasing on chain
0125	Highland Valour stopped
0135	Resume heaving #4 chain end onto bolster
0135	Large vibration felt on rig, Highland Valour observed to be moving rapidly ahead. Highland Valour Power 50%, tension before 80/90t.
0143	~4 Pennant passed back to rig
0220	Highland Valour retrieved work wire found 'J' hook broken.
0300	Highland Valour alongside for 'J' hook
0342	Highland Valour on #1 chain
0400	Highland Valour chasing on chain
0425	Highland Valour on anchor, layback calculation shows 100m short.
0425	Bourbon Dolphin preparing to 'J' hook chain to assist Highland Valour.
0530	Bourbon Dolphin on #1 chain. Rig Thruster on line.
0540	Bourbon Dolphin 'J' hook fell off #1 chain
0625	Bourbon Dolphin on #1 chain
0630	Olympic Hercules to chase out towards Vidar Viking on #5
0722	#1 Bourbon Dolphin in position, 300 metres from Highland Valour. Highland Valour at 100 tonnes tension 1250 metres of wire to prove at the anchor. Bourbon Dolphin with 900 metres of wire out raising the chain catenary to assist Highland Valour
0735	Olympic Hercules hooked into #5 chain
0756	Started breakout of #1 anchor Vidar Viking was able to chase straight out to #5 anchor – Olympic Hercules has hung up before getting to 300 metres from Vidar Viking – how can that happen?
0800	Highland Valour at 1250 metres and 150 tonnes fluctuating in the swell, Bourbon Dolphin at 750 metres at 35 tonnes. Rig started deballasting
0808	Bourbon Dolphin at700 metres – 35 tonnes tension – instructed to verify still on the chain
0815	Bourbon Dolphin confirms the hook is off the chain – how can that happen without the vessel becoming aware? Is it the J hooks?
0820	#1 windlass hauling in to tension up for Bourbon Dolphin hooking the chain
0830	#5 Olympic Hercules in position to assist breakout of the anchor
0836	#5 Olympic Hercules has come off the chain, preparing to J hook again. How can the hook come off and the vessel does not know until towmaster instructs the vessel to haul up and prove the hook is still on the chain?
0850	#1 Bourbon Dolphin back on the chain, chasing out
0915	#5 Olympic Hercules back on the chain, chasing out
0920	#1 Is Bourbon Dolphin still on the chain? 2500 metres from the fairleader
0924	Bourbon Dolphin IS off the chain again
0930	Olympic Hercules holding position 700 metres from #5 anchor

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1000	#1 Bourbon Dolphin hooked in again
1020	Rig completed de-ballasting
1036	Bourbon Dolphin 1100 metres from #1 anchor. Cannot chase closer to the anchor. Instructed to raise the hook to 1000 metres length
1042	#1 Bourbon Dolphin 950 m out – 110 T
1045	#1 Bourbon Dolphin slack down try to chase again towards Highland Valour
1115	Bourbon Dolphin 800 m from #1 anchor cannot chase any more, wire 1050 metre 110 T, Highland Valour instructed to breakout
1120	Bourbon Dolphin instructed to 950 metres of wire out
1122	Bourbon Dolphin at 900 m wire 127 T Highland Valour 1130 metres 150 – 160 T
1127	Bourbon Dolphin 850 metres 140 T Highland Valour 1109 metres wire 150-160T
1128	Highland Valour possible some chain passed through the hook. All stop. Highland Valour pay out 100 metres stop trying to breakout the anchor. Bourbon Dolphin pay out wire and try to chase towards Highland Valour again. Rig to haul again on #1 mooring
1156	Olympic Hercules informs that the reason they cannot chase along the chain towards the Vidar Viking is that the locking J hook was fitted overnight. Instructed Olympic Hercules to take off the Locking J hook and fit the ordinary J hook
1205	Bourbon Dolphin at 800 metres of wire 130 tonnes tension, raise 50 metres
1209	Bourbon Dolphin at 750 metres of wire 150 tonnes
1220	Highland Valour at 1150 metres 120 -150 tonnes, Bourbon Dolphin at 750 metres 150T
1222	**Port leg of towing bridle parted (Sea Lynx at 60% power heading 280 °) Sea Lynx instructed to reduce to minimum power and shorten to 300 metres then stand by. Highland Valour and Bourbon Dolphin instructed to reduce to minimum power and lengthen wires**
1224	Sea Lynx instructed to come astern and close the rig forward port bow. Highland Valour instructed to 1250 metres of wire and 100 tonnes, Bourbon Dolphin instructed to attempt to chase closer to the Highland Valour
1245	Sea Lynx recovering the towing bridle
1308	Sea Lynx not able to recover all of the towing bridle to the deck
1402	Olympic Hercules hooked in with a plan J hook, chasing out
1427	#5 Olympic Hercules j hook has come off the chain, preparing to chase again
1453	Sea Lynx released towing bridle back to the rig, Fore-runner pendant remains on the Sea Lynx deck having been cut off.
1724	Secondary towing bridle passed to the Sea Lynx. Securing the forerunner pendant
1728	Sea Lynx connected to the secondary towing bridle, slacking out
1732	**Rig back to equivalent position, started raising #1 anchor**
1800	Continue breakout of #1 anchor
1830	Continue breakout of#1 anchor
1900	Continue breakout of #1 anchor
1920	#1 Highland Valour lowering chain & chasing further out.
1930	#5 Olympic Hercules instructed to chase back & attempt to chase out again
2000	Permission received from Dick Macklin via Chevron Drilling Rep to increase tension on anchor to maximum 200t when attempting to unseat anchor.
2010	Olympic Hercules off #5 chain
2045	Olympic Hercules on #5 chain again
2100	#1 Bourbon Dolphin continuing to attempt to chase out towards Highland Valour with little success.
2145	#1 Bourbon Dolphin chasing along chain
2155	#1 Bourbon Dolphin 300m from Highland Valour, picking up chain.
2200	#1 Highland Valour chasing to anchor again, 170t tension
2205	#1 Bourbon Dolphin at 900m chain, 160t tension
2210	Highland Valour moving ahead, tension decreased to 155t at rig, tension at Bourbon Dolphin fell to 30t, off chain? #1 Anchor off Bottom

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2215	Commence heaving #1 rig wire
2235	Bourbon Dolphin reports 'J' hook on roller in good condition, rigging grapnel
2315	#5 Olympic Hercules 300m from #5 anchor, shortening wire
2335	#5 Olympic Hercules at 920m wire, tension 160t. Vidar Viking shortening wire.
2340	#1 Highland Valour has anchor 50m below stern roller
	8th April 2007
0005	Vidar Viking heaving wire to unseat #5 anchor
0010	#1 Chain on bolster, cease heaving wire.
0020	~~#5 anchor off bottom~~
0025	Vidar Viking reports #5 anchor not off bottom
0110	Bourbon Dolphin grappeled #1 chain 300m from fairlead.
0200	Olympic Hercules & Vidar Viking continue to attempt unseat #5 anchor
0205	Olympic Hercules 'J' hook fell off chain
0255	Olympic Hercules instructed to rig up grapple
0325	Olympic Hercules grapple rigged, lowering wire
0350	Olympic Hercules attempting to grapple #5 chain 300m from anchor
0415	Olympic Hercules grappeled #5 chain
0440	Olympic Hercules lifting #5 chain & pulling against anchor.
0500	Vidar Viking attempting to chase to anchor
0600	Vidar Viking continues attempt to lift #5 anchor
0700	Vidar Viking reports #5 anchor off bottom
0718	#5 hauling in wire
0720	Vessels at various settings
0734	Re-set vessels powers lengths and headings
0736	Vidar Viking has 150 metres of wire out, **TOW TO NEW LOCATION STARTED**
0810	Instructed Olympic Hercules to disengage the grapnel from #5 chain and prepare to hook 2 – 300 metres from the rig after the transition connector is at the bolster
0823	Olympic Hercules grapnel disengaged from the chain
0900	#5 at transition, Olympic Hercules approaching to hook the grapnel into the chain 200 metres from the rig
0957	#5, Olympic Hercules grapnel hook in the chain 250+/- metres from the rig. Rig 733 metres from intended location – making final adjustments before running #5
1042	In pos'n started to run #5
1046	Olympic Hercules & Vidar Viking lower to 450 metres
1050	Olympic Hercules & Vidar Viking lower to 650 metres
1055	#5 run out to position
1100	Olympic Hercules instructed to un hook off the wire
1118	Olympic Hercules off the wire
1138	#5 anchor on the bottom
1144	Sea Lynx + 584 metres minimum power 260°
1153	Bourbon Dolphin at 50 meters of wire hook below roller
1155	#1 running out to position
1158	Sea Lynx at 45% power
1208	#5 Vidar Viking is off the anchor
1215	#1 run out the full distance, Bourbon Dolphin disengaging the hook.
1250	#1, Bourbon Dolphin hook is off the chain
1338	#1 anchor on the bottom, Highland Valour has out 1435 metres layback 895
1356	#1 anchor tensioned up to 190 tonnes. Highland Valour striping off the chain. Olympic Hercules and

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	Vidar Viking advise sea conditions too rough for working lockered chain and securing anchors
1400	**WOW**
1442	Highland Valour hook off #1 chain
1450	Started ballasting the rig to Survival Draft
1640	Weather easing. Requested Olympic Hercules to approach the rig and observe if it is possible to resume working
1640	Rig at survival draft – 17.0 metres
1742	**Ended WOW (3h 42m) Olympic Hercules alongside to work #4 anchor.**
1750	#4Pennant passed to Olympic Hercules.
1820	#4 rig chain paid out. Transition in progress, Vidar Viking alongside for #8 collar.
1900	Transition complete. Vidar Viking away. Pump being transferred from Stbd crane to Port crane
1920	Olympic Hercules commence paying out insert chain from locker.
2025	Insert chain paid out & Olympic Hercules attaching anchor & collar.
2045	Bourbon Dolphin moving in to grapple #4 chain 300m astern of Olympic Hercules
2100	Bourbon Dolphin on #4 chain
2135	#4 anchor & chasing collar connected by Olympic Hercules (locking pins in place on 250t shackle)
2140	#4 anchor over roller Olympic Hercules confirmed right way round.
2150	Bourbon Dolphin grapple off #4 chain
2200	Still waiting for Port crane.
2238	Bourbon Dolphin grapple on #4 chain 250m from rig. Commence downtime
2400	Port crane repaired, Vidar Viking called in for #8 pennant. Cease downtime
	9th April 2007
0100	#8 Pennant passed to Vidar Viking
0105	Running #8 anchor chain
0130	Complete running #8 chain, commence transition.
0230	Transition complete at #8, paying out connector over bolster.
0235	#8 connector over bolster.
0257	Running #4 anchor
0317	Cease running #4, Bourbon Dolphin & Olympic Hercules paying out wire.
0330	Cease paying out wire at 450m, Bourbon Dolphin attempting to free grapple.
0425	Bourbon Dolphin no success in removing the hook from the chain – Olympic Hercules instructed to raise the hook 200 metres
0438	Olympic Hercules hook raised to 300 metres below the stern
0505	Bourbon Dolphin still having problems to disengage the hook. Olympic Hercules raise the hook 100 metres more
0548	Bourbon Dolphin still on the chain
0615	#4 Bourbon Dolphin cannot get the hook out of the chain. Instructed to haul the chain to the deck, secure the chain in the jaws, remove the grapnel, insert the J hook and lower to the sea bed
0705	#4 is the Bourbon Dolphin work wire wrapped around the chain
0722	#4, grapnel on the deck of the Bourbon Dolphin. Grapnel is fouled in the chain.
0800	Morning call to Chevron
0830	#4 Bourbon Dolphin grapnel removed and J hook inserted
0835	#4 Bourbon Dolphin lowering the J hook
0850	#4 = Bourbon Dolphin 650 metres paid out range 1900 metres
0856	#4 Bourbon Dolphin off the chain ??? range 1900 metres
0900	#4 Bourbon Dolphin confirmed off the chain – Olympic Hercules lowering chaser to 650 metres
0905	**Bourbon Dolphin reports the grapnel has one tine broken off. This grapnel came offshore as Highland Valour equipment.**
0920	Call to Chevron marine dept.
0940	Bourbon Dolphin work wire has 250 metres of work wire damaged. Called Chevron for permission to

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	crop and re-socket. Permission given.
0945	Bourbon Dolphin instructed to either crop and resocket or, turn the wire end for end if there is a Pee-Wee socket on the inboard end Highland Valour received from the rig 1 x Grapnel, one tine bent, ex Vidar Viking ex #8anchor recovery to the deck
1014	#4 anchor on the bottom
1030	#4 Olympic Hercules chased off the anchor
1035	Olympic Hercules chaser stuck (in the mud?) - Vidar Viking increasing power to 65%
1048	Olympic Hercules chased clear – standing by (waiting for crane) Vidar Viking paying #8 chain extension out of the locker, Highland Valour approaching to engage grapnel hook
1116	#8 Vidar Viking has connected the chain extension to the rig chain paying out extension chain.
1150	Bourbon Dolphin has changed the work wire end for end but requires to tension re-spool with another vessel, O. Hercules is on #4 line on D.P.
1158	Vidar Viking requests HV to grapple into the extension chain because of high loads due to weight of chain causing jumping over the gypsy.
1320	No 8 INSERT CHAIN PAID OUT BY VIDAR VIKING, CONNECTING ANCHOR
1325	No 8 ANCHOR CONNECTED.
1435	No 8 ANCHOR OVER STERN ROLLER VIDAR VIKING
1515	HIGHLAND VALOUR ON No 8 CHAIN.
1520	HELICOPTER ON DECK.
1533	HELICOPTER DEPARTS.
1534	RUNNING No 8 ANCHOR.
1540	CEASE PAYING OUT - WINCH PROBLEM.
1615	RUNNING No 8.
1637	CEASE PAYING OUT No. 8.
1640	COMMENCE PAYING OUT WORK WIRE TO 450m ON AHV's
1655	CEASE PAYING OUT ON VIDAR VIKING AT 500m, CONTINUE PAYING OUT ON HIGHLAND VALOUR
1710	HIGHLAND VALOUR PAID OUT WORK WIRE TO WATER DEPTH, TENSION 20T
1713	HIGHLAND VALOUR OFF CHAIN.
1750	~~AR~~ No 8 ANCHOR ON BOTTOM.
1810	BOURBON DOLPHIN REPORTS WORK WIRE TENSIONED
1815	No 8 TENSIONED TO 200T, VIDAR VIKING TO CHASE BACK.
1830	VIDAR VIKING OFF ANCHOR & CHASING BACK.
1930	No 8 [illegible] CHASED BACK TO RIG, HIGHLAND VALOUR & VIDAR VIKING [illegible] REPORT WEATHER TOO ROUGH.
1933	
2025	DISCONNECT SEA LYNX FROM TOW
2200	BOURBON DOLPHIN, VIDAR VIKING AND HIGHLAND VALOUR DEPART TO LERWICK TO RE-ARRANGE ANCHOR HANDLING GEAR - ETA FOR ALL VESSELS 0900 HRS ON THE 10TH APRIL. THIS AFTER DISCUSSING WITH DICK MACKLIN & CHECKING WEATHER FORECAST FOR NEXT 24 HRS.
2310	No 4 PENNANT PASSED BACK. 10th APRIL 2007

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RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER **DATE:** APRIL 2007 **PAGE:** 18 OF

	TIME	OPERATIONS
H	0630	ATTENDED PRE-TOUR MEETING
	0800	ATTENDED CHEVRON CONFERENCE CALL
	1400	PROCEDURES DRAWN UP FOR RUNNING SECONDARY
		ANCHORS AND EMAILED TO AHV'S, CHEVRON, TRANSOCEAN
		AND TRIDENT.
		11TH APRIL 2007
	0245	HIGHLAND VALOUR BACK ON LOCATION
	0540	SEA LYNX DEPARTS LOCATION BOUND FOR ABERDEEN
		ETA 0300 12TH. FO 404 M^3 LO 9634 LTR DW 390 M^3
	0600	TRANSFER OF ANCHOR HANDLING GEAR FROM RIG TO O HERCULES
J	0647	OLYMPIC HERCULES MOVES CLEAR.
J	0700	BOURBON DOLPHIN ON LOCATION
H	0745	VIDAR VIKING ON LOCATION
	0800	BOURBON DOLPHIN ALONGSIDE → 2 OLD COLLARS AND
		DAMAGED GRAPNEL TO RIG.
	0820	VIDAR VIKING ALONGSIDE STBD SIDE – PASS DUMMY GRAPNEL
	0840	NO 3 PENNANT PASSED TO BOURBON DOLPHIN.
J	0905	VIDAR VIKING REPORTS GRAPPLE OVER STERN ROLLER,
		SHACKLE HOLDING BALLAST CHAIN BENT SO
		REPLACED WITH 120T SHACKLE
H	0930	COMMENCE RUNNING OUT 935m CHAIN ON NO 3.
	0942	NO 3 AT TRANSITION POINT – BOURBON DOLPHIN ADVISED TO
		STOP – NO TENSION ON NO 3.
	1000	TRANSITION TO WIRE COMPLETE AND WIRE AT BOLSTER
		COMMENCE CONNECTING INSERT CHAIN.
	1049	COMMENCE PAYING OUT INSERT CHAIN (BOURBON DOLPHIN)
J	1118	NO 7 PENNANT PASSED TO HIGHLAND VALOUR
H	1133	COMMENCE PAYOUT OF NO 7 RIG CHAIN (930M)
J	1144	TOO MUCH WEIGHT ON BOURBON DOLPHIN GYPSY WHILST
		PAYING OUT CHAIN FROM LOCKER, REQUEST VIDAR
		VIKING GRAPPLE CHAIN TO TAKE WEIGHT
	1158	CEASE PAY OUT NO 7 CHAIN AT TRANSITION POINT.
	1205	VIDAR VIKING COMMENCE 1ST GRAPPLE RUN
	1213	H. VALOUR – INSERT CHAIN CONNECTED.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER
DATE: APRIL 2007
PAGE: 19 OF

TIME	OPERATIONS
1220	VIDAR VIKING ON No3 CHAIN – PICKING UP TO 80 M W/WIRE
1222	B. DOLPHIN RESUMES PAY OUT OF INSERT CHAIN.
1235	H. VALOUR COMMENCE PAYING OUT INSERT CHAIN – No7
	TRANSITION COMPLETE.
1320	TOO MUCH WEIGHT ON No7 CHAIN – OLYMPIC HERCULES TO
	"J" HOOK CHAIN TO EASE TENSION
1408	OLYMPIC HERCULES ON CHAIN.
1440	HIGHLAND VALOUR COMPLETE PAYING OUT INSERT CHAIN
1625	HIGHLAND VALOUR ANCHOR OVER ROLLER
1645	BOURBON DOLPHIN ANCHOR OVER ROLLER – CHECKING
	ORIENTATION OF ANCHOR
1654	B. DOLPHIN CONFIRMS ANCHOR'S CORRECT WAY ROUND – LOWERED
	TO 50M. V. VIKING REQUESTED TO COME OFF CHAIN AND
	GRAPPLE 200M FROM RIG
1708	VIDAR VIKING OFF No3 CHAIN MOVING TO GRAPPLE 200M FROM RIG
1749	V. VIKING ON No3 CHAIN PICKING UP TO 50 M
1800	RUNNING No3
1815	No3 WINCH ALL STOPPED. V. VIKING + B. DOLPHIN LOWER TO 450 M
1840	VIDAR VIKING ATTEMPTING TO CLEAR GRAPNEL
1900	VIDAR VIKING UNABLE TO FREE GRAPNEL
1905	HEAVE IN 150m ON WORK WIRE BOURBON DOLPHIN
1950	HEAVE IN 100m ON WORK WIRE BOURBON DOLPHIN.
2013	VIDAR VIKING GRAPNEL OFF CHAIN
2055	No 3 ANCHOR ON BOTTOM
2140	BOURBON DOLPHIN CHASING BACK ON CHAIN
2200	OLYMPIC HERCULES OFF No 7 CHAIN
2215	BOURBON DOLPHIN STANDING BY 1200m FROM RIG
2245	OLYMPIC HERCULES FAILED TO GRAPPEL No 7.
2315	THIRD ATTEMPT TO GRAPPEL CHAIN FAILED.
2340	FOURTH ATTEMPT FAILED
2358	OLYMPIC HERCULES GRAPPLED No 7 CHAIN 200m
	FROM FAIRLEAD.
	THURSDAY 12TH APRIL 2007.
0015	RUNNING No 7

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
T/O RATHER	12-4-07	20 OF

TIME	OPERATIONS
0020	STOPPED ON NO 7 - WINCH PROBLEMS (BEDDING OVERRIDING)
0028	RESUME PAYING OUT NO 7 WIRE
0037	ALL STOPPED ON WINCH #7
0040	O. HERCULES PAYING OUT TO 450M. H. VALOUR PAY OUT TO 300M
0052	H. VALOUR - LOWERED 300M.
0100	NO8 PENNANT RACKED
0125	O. HERCULES ATTEMPTING TO GET OFF NO 7 CHAIN
0156	O. HERCULES OFF NO 7 CHAIN MAKING WAY TO NO 6
	HIGHLAND VALOUR PAYING OUT W/W TO 1400M
0242	NO6 PENNANT PASSED TO HERCULES
0253	COMMENCE PAYING OUT NO6 CHAIN
0257	HIGHLAND VALOUR PAID OUT 1400M - LOWERING ANCHOR TO BTM
0300	NO 7 ANCHOR ON THE BOTTOM
0307	ALL STOPPED ON NO6 WINCH - AT TRANSITION
0333	PICKING UP TENSION ON NO 7
0337	HIGHLAND VALOUR COMMENCE STRIPPING BACK
0403	NO 6 TRANSITION COMPLETE PAY OUT CONNECTION THROUGH F/LEAD
	OLYMPIC HERCULES COMMENCE CONNECTION OF INSERT AND PAY OUT
0456	HERCULES CONNECTED INSERT COMMENCE PAYING OUT.
0519	NO 7 PENNANT PASSED TO RIG
0530	NO 7 PENNANT SECURE IN CUP
0532	COMMENCE CHANGE OVER OF PUMP FROM PORT TO STBD CRANE
0535	HIGHLAND VALOUR - REQ 1½ HRS TO REPAIR LEAK IN FUEL LINE
0600	OLYMPIC HERCULES PAID OUT ALL INSERT WIRE - COMMENCE
	CONNECTING COLLAR + ANCHOR ETC VIDA VIKING REQUESTED
	TO GRAPPLE AND SUPPORT NO 6 CHAIN
0650	VIDAR VIKING 'ON' NO 6 CHAIN - 100M W/WIRE.
0652	ANCHOR CONNECTED (NO 6)
0656	HIGHLAND VALOUR - REPAIRS COMPLETE.
0657	OLYMPIC HERCULES ~~HIGHLAND VALOUR~~ ANCHOR OVER THE ROLLER - CONFIRMED
	CORRECT ORIENTATION W/WIRE LOWERED TO 50M.
0704	STBD CRANE OPERATIONAL BOURBON DOLPHIN CHASING
	BACK NO 3 PENNANT
0715	VIDA VIKING OFF NO 6 CHAIN - COMING IN TO 200M

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	12 APRIL 2007	21 OF

TIME	OPERATIONS
0730	INFORMED BY BOURBON DOLPHIN HE HAS INSUFFICIENT
	PEARLINKS AND KENTERLINKS – HIGHLAND VALOUR REQUESTED
	TO COME IN TO PASS K/LINKS
0745	VIDAR VIKING ON No 6 CHAIN AT 200 M FROM RIG – INSTRUCTED
	TO HEAVE UP TO 50M
0813	No 3 PENNANT PASSED BACK FROM B. DOLPHIN
0815	HIGHLAND VALOUR PASSES UP KENTERS + PEAR LINKS
0830	BOURBON DOLPHIN ALONGSIDE STBD.
0920	No 2 PENNANT TO BOURBON DOLPHIN.
0947	PAYING OUT No 2 CHAIN.
1000	No 2 AT TRANSITION.
1015	TRANSITION COMPLETE.
1040	RUNNING No. 6 (STEVPRIS)
1058	COMPLETE RUNNING No 6
1120	VIDAR VIKING OFF CHAIN.
1130	VIDAR VIKING INSTRUCTED TO DE-TENSION
	WORK WIRE + SEND INVENTORY OF REMAINING
	ANCHOR HANDLING EQUIPMENT
1215	BOURBON DOLPHIN CONNECTING INSERT CHAIN
	TO RIG CHAIN.
1222	No 6 ANCHOR ON BOTTOM.
1250	OLYMPIC HERCULES OFF ANCHOR + CHASING ON
	CHAIN.
1253	BOURBON DOLPHIN PAYING OUT INSERT CHAIN
1325	VIDAR VIKING COMPLETE DE-TENSIONING WORK
	WIRE, DEPARTED FOR ABERDEEN, ETA 1100/13TH
	F.O. 276m³ L.O. 18477 LTR, POT 69m³
1400	No 6 PENNANT PASSED BACK.
1430	~~VIDAR~~ HIGHLAND VALOUR TO GRAPPLE No 2 CHAIN.
1440	OLYMPIC HERCULES MOVES CLEAR TO DE-TENSION
	WORK WIRE.
1445	BOURBON DOLPHIN COMPLETE PAYING OUT CHAIN.
1610	HIGHLAND VALOUR GRAPPLED No 2 CHAIN
1620	BOTH AHV'S UNABLE TO HOLD STATION UNABLE TO MOVE WEST

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	12TH APRIL 2007	22 OF

TIME	OPERATIONS
1635	HIGHLAND VALOUR REPORTS GRAPPLE IS OFF No 2 CHAIN
1640	BOTH VESSELS INSTRUCTED TO MOVE WEST - AWAY FROM No 3
1710	BOURBON DOLPHIN CAPSIZED - ALL V/LS REQUESTED
	TO ASSIST. - S/BY VESSEL REQUESTED TO ATTEND
1713	P.A. ANNOUNCEMENT BY RIG OF EMERGENCY SITUATION
	COMMAND TEAM TO CONTROL ROOM.
1716	RIG EMERGENCY ALARM - ALL PERSONNEL TO MUSTER STATION
	BOURBON DOLPHIN 'UPSIDE DOWN' - RANGE UNKNOWN
1718	VALOUR SPOTTED 5 'CASUALTIES' PREPARING TO LAUNCH
	SURVIVAL CRAFT.
1719	OH - PREPARING TO LAUNCH SURVIVAL CRAFT.
1720	UNABLE TO CONTACT VIKING VICTORY CH 9
1722	HIGHLAND VALOUR RESCUE CRAFT ON ROUTE TO SCENE
1724	V-VICTORY CONTACTED ON CH 16.
1726	V. VICTORY RECOVERED x 1 CASUALTY. H. VALOUR 2 CASUALTIES
	IN SIGHT - VALOUR RECOVERS 3 CASUALTIES. REQUEST
	FOR POB FROM CASUALTY - MADE VIA HIGHLAND VALOUR
	3 SURVIVORS IN LIFERAFT
1731	POB OF B DOLPHIN REPORTED AS 15
31	HERCULES - FRC IN THE WATER
34	UNCONFIRMED REPORT FROM VALOUR - 8 SURVIVORS
48	UPTURNED HULL OF BOURBON DOLPHIN STILL VISIBLE
50	3 CASUALTIES ON HIGHLAND VALOUR REPORTED IN GOOD
	HEALTH.
1804	B DOLPHIN - STILL VISIBLE UPTURNED - 'TETHERED' ON
	No 2 CHAIN - INLINE WITH WIND/CURRENT.
1810	VALOUR - SENDING FRC AND MOVING FROM DOWNWIND
	OF SCENE UP TO SCENE TO CHECK FOR CASUALTIES
17	ETA HELICOPTER (COAST GUARD) 12 MINS
22	HELICOPTER ON SCENE.
34	HELICOPTER ANNOUNCED INBOUND WITH ONE CASUALTY (PA).
36	HELICOPTER ON DECK
42	THIRD HELICOPTER ON SCENE - HELICOPTER TO DEPART HELIDECK
44	HELICOPTER LC ON DECK - x1 CASUALTY

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER
DATE: 12 APRIL 2007
PAGE: 23 OF

TIME	OPERATIONS
1847	HELICOPTER L.C. OFF DECK
*	WEATHER AT 1730 HRS WIND 38 KTS DIRECTION 205°
	SEAS SIG 2.6M PERIOD 10S 205°
	MAX 4.2M PERIOD 13S 240°
1920	CONFIRMED WITH HIGHLAND VALOUR - BOATS IN CONTACT WITH
	CG - CO-ORDINATES SEARCH
1949	RESCUE HELICOPTER ON DECK FOR RE-FUEL
2004	RESCUE HELICOPTER DEPARTS
2011	CG HELICOPTER ON DECK - REFUEL
2111	HIGHLAND VALOUR REPORTS HULL OF B. DOLPHIN IS SITTING
	LOWER IN THE WATER.
2125	VIDAR VIKING ETA 2215.
2125	AT REQUEST OF OIM, HIGHLAND VALOUR REQUESTED
	TO ORGANISE SEARCH PATTERN WITH OTHER V/C'S.
2230	UPDATE FROM HIGHLAND VALOUR - UPTURNED HULL OF
	BOURBON DOLPHIN STILL VISIBLE - BUT LESS FREEBOARD
	THAN WHEN INITIALLY TURNED OVER
2257	1st DOWN MAN HELICOPTER ON DECK.
2300	ASSISTED ROYAL NAVY DIVERS IDENTIFY LAYOUT OF
2359	BOURBON DOLPHIN VIA PLANS AND TELEPHONE LINK
	WITH OWNERS
	FRIDAY 13TH APRIL 2007
0108	HIGHLAND VALOUR - REPORTS UPTURNED HULL
	FREEBOARD STILL THE SAME.
0508	LAST DOWN MAN
1000	CONFERENCE CALL WITH ALL PARTIES TO DISCUSS FORWARD
	PLAN - BOURBON DOLPHIN CONDITION REMAINS STABLE
1300-1500	DIVERS DOING PRELIMINARY INVESTIGATION OF BOURBON
	DOLPHIN
1505	ALL DIVING OPS SUSPENDED - CURRENT TOO STRONG.
1600	CONFERENCE CALL WITH D. MACALIN (CHEVRON) REGARDING
	BOAT DISTRIBUTION
1930	CONFERENCE CALL WITH TOWN TO AGREE FORWARD PLAN
2130	HERCULES ALONGSIDE TO RETRIEVE SWIVEL AND PENNANT

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER

DATE: 13TH APRIL 2007

PAGE: 24 OF

TIME	OPERATIONS
2330	VIDA VIKING ALONGSIDE FOR PENNANT
	SATURDAY 14TH APRIL 2007
0600-0700	REVIEW OF 'DOLPHIN CAPSIZE PLAN'.
0830	CONFERENCE CALL WITH ALL INVOLVED PARTIES TO
0945	DISCUSS / REVIEW FORWARD PLAN
1008	OLYMPIC HERCULES INSIDE 500M - SETTING UP TO MONITOR
	CURRENT / WEATHER CONDITIONS PRIOR TO START OF OPERATION
1020	ANGLIAN SOVEREIGN MAKING WAY TO PORT SIDE TO
	TRANSFER 5 PERSONNEL
1027	HERCULES SET UP ON DP TO MONITOR WEATHER CONDITIONS
1039	GRAMPIAN FRONTIER RELEASED FROM LOCATION
1046	X 3 PERSONNEL ON BOARD FROM A. SOVEREIGN
1050	VIDA VIKING MOVING ~~[illegible]~~ IN TO ASSUME 'SPOTTING' DUTIES
	ON HULL OF BOURBON DOLPHIN.
1052	PERSONNEL TRANSFER COMPLETE.
1100	SUB SEA VIKING POSITIONING 700M NORTH OF RIG TO
	FACILITATE ~~[illegible]~~ ROV OPERATIONS
1138	SUBSEA VIKING IN POSITION TO LAUNCH R.O.V.
	(SAFETY DISCUSSION TAKES PLACE BETWEEN O.H AND
	SUBSEA VIKING)
1240	OLYMPIC HERCULES REQUESTED TO MOVE 100M EAST
	PRIOR TO DEPLOYING GRAPPLE TO ENSURE NO 2 LINE IS
	'CAUGHT' IN CORRECT POSITION
1246	O.H. REQUESTED TO MOVE 150M SOUTH TO BE 'INSIDE'
	OF NO2 CROSS OVER
1254	O.H. LOWERING GRAPPLE TO 750M
1256	S/S VIKING ROV ALREADY LAUNCHED GOING TO 500M DEPTH
1310	O.H MOVING 100M EAST WITH GRAPNEL AT 750M
1317	O.H. COMMENCES FIRST GRAPPLE RUN 010° X 200M
1330	O.H REPORTS ~~[illegible]~~ GRAPNEL WIRE CHANGED ANGLE - PICKING
	UP ON GRAPNEL WIRE TO TRY AND GET TENSION
1345	O.H. REQUESTS S/S VIKING TO CHECK OVER WITH R.O.V
1358	R.O.V FINDS NOTHING.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	13-04-07	25 OF

TIME	OPERATIONS
1407	R.O.V CHECKING FIGURES – MAY BE ABLE TO 'CON'
	O.H. GRAPNEL ONTO CHAIN.
1515	SUBSEA VIKING COMPLETED SURVEY OF CHAIN &
	MOVED 100m CLEAR OF No 3 MOORING WIRE, OLYMPIC
	HERCULES REQUESTED TO MOVE 100m AHEAD.
1523	OH REQUESTED TO MOVE AHEAD ANOTHER 50m BY SS. VIKING
1530	SS. VIKING REQUESTS OH TO LOWER GRAPNEL TO 750M – CHIPPED 'GF' ON DECK.
	'GF' ON DECK.
1543	SS VIKING REPORTS HERCULES 70m SOUTH OF No 2 CHAIN REQUESTS
	HERCULES TO MOVE 25m x 325°
44	HELICOPTER 'CF' DEPARTS
47	325° x 25m (SS VIK REQ HERCULES)
49	SS VIKING ROV CHECKING POSITIONS AGAIN
51	SS VIKING 2 OH. 15m x 310°
54	10m x 315°.
58	5m x 315°
1600	10M x 315 – SS VIKING REPORTS GRAPNEL WITHIN 10M
	OF No 2 CHAIN.
1603	S.S.V REPORTS GRAPNEL ~~[illegible]~~ 50M BELOW No 2 CHAIN – LYING
	ON CHAIN – VERY STEEP CATENARY
1610	HERCULES – START TO RECOVER GRAPNEL
14	ALL STOPPED WAITING FOR SECOND R.O.V. TO MONITOR RECOVER
1620	O.H. RAISING GRAPNEL SLOWLY
1641	GRAPNEL SLIPPING ON CHAIN
1653	GRAPNEL FELL OFF FOLLOWING PARTIAL ENGAGEMENT
1657	VIDAR VIKING REPORTS – BOURBON DOLPHIN MOVED
	APPROX 70M TO ~~WEST~~ EAST.
1712	VIDAR VIKING REPORTS B.D DRIFTED TOTAL 100M EAST
1730	R. Watson & A. Bain on watch. O. Hercules attempting
	to engage grapnel into #2 chain. Being advised by
	ROV operators on Subsea 7. – (Sub Sea Viking) (Ch)
1757	Stopped grapnel operations to receive 1K man survivor
	from Viking Victory on port side

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN CAPTOR
DATE: 14 APRIL 2007
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TIME	OPERATIONS
1815	VIKING VICTORY COMPLETED TRANSFER & CLEAR OF RIG
1820	ANGLIAN SOVEREIGN ALONGSIDE PORT SIDE TO RECOVER NON-SURVIVORS FROM RIG
1907	A. Sovereign cleared port side bound for Scalloway.
1909	Instructed O. Hercules to resume the operations to hook the #2 chain.
1920	#2 grapnel on the chain by #3 time. O. Hercules hauling up. tension on #3 mooring reducing.
1923	#3 mooring - tension back up to 250-255 tons grapnel reported off of #2 chain.
1927	O. Hercules getting ready to resume grapnelling operations.
2012	#2 – O. Hercules grapnel in the chain #7 @ 143, #8 @ 205 #3 @ 237
2014	O. Hercules stopped hauling up until R.O.V. catches up and reports if the hook is properly engaged.
2018	Good engagement in #1 time
2030	O. Hercules hauling in from 659 to 600 metres.
2033	At 600 metres – rumbling & vibrations no changes to tension loads hauling to 500 metres
2037	At 500 metres 75 tonnes load., Viking Viking reports no changes, ROV swimming across for a report.
2100	ROV reports a "good capture" in the hook, moving clear.
2105	O. Hercules hauling up to 400 metres
2109	O. Hercules at 400 metres all stopped. #2 @ 104 #3 @ 197 #7 129 #8 @ 187. load 90T.
2111	O. Hercules hauling up to 300 metres
2115	At 300 m #2 @ 96 #3 @ 197 #7 @ 130 #8 186 load on hook 100 tonnes
2118	Instructions to O. Hercules stop hauling up the hook and hold.
2127	Instruction changed – continue and set the chain.
2129	At 200 m #2 @ 91 #3 205 #7 132 # 186 hook 105 tonnes.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG/BARGE NAME:	DATE:	PAGE:
Transocean Rather	April 2007.	27 OF

TIME	OPERATIONS
2134	~~#2~~ #2 = 82 #3 203 #7 130 #8 = 187 load 115T.
2136	O. Hercules hauling to the stern roller.
2140	Hook at stern of O. Hercules #2 = 74 #3 205
	#7 131 #8 = 183 hook load 130 Tonnes
2142	V. Viking reports no changes to B. Dolphin hull trim.
	S.S. Viking to the pos'n to watch the hull. V. Viking
	to the stern of the O. Hercules.
2150	V. Viking reports the hull of B. Dolphin remains the same.
	Some swells break over and submerges the forward
	(azimuth) thruster which then reappears. Trim appears
	to be unchanged.
2205	S.S. Viking has the BD hull in sight. V. Viking proceeding
	to the stern of O. Hercules.
2212.	O. Hercules instructed to deck the grapple hook and
	secure the chain in the Karm Fork.
2222	#2 chain secured in both Karm Forks.
2223	O. Hercules reports one tine of the grapnel is bent.
2226	O. HERCULES REPORTS DECKED CHAIN IS 76 MM
2229	O. HERCULES REPORTS CHAIN CUT & REMAINING GRAPNEL
2255	O. Hercules passing rig chain to V. Viking #2 = 72
	#3 = 213 #7 129 #8 = 186 tonnes
2313	O. HERCULES REPORTS RIG CHAIN PASSED TO VIDAR VIKING
	V. Viking has the rig chain - back to the rig. O. Hercules
	is released to the B. Dolphin.
2328	O. Hercules has moved clear, V. Viking has the 84 mm
	connector on deck. There is 60 metres of 76 mm chain
	EXTENSION ON VIDAR VIKING. COMM DISCONNECTING 76 MM CHAIN
2359	VIDAR VIKING REPORTS No 2 PCP CONNECTED TO 84 MM
	RIG CHAIN AND 200 MTRS WORK WIRE DEPLOYED.
	VIDAR VIKING ON DP HOLDING POSITION
15 APR 07	
0033	O. HERCULES REPORTS DRIFT 000 × 0.6 SINCE PASSING
	RIG CHAIN TO VIDAR VIKING
0100	O. Hercules 1640 metres north of the rig. std side.
0110	O. Hercules reports no problems at this time. Rate of drift
	0.3 ~ 0.4 knots north
0200	Since 0100 hrs. O. Hercules has drifted 0.3 NM - course
	343°. H. Patriot reports "no special changes" to B. Dolphin
	hull since they took up position (0100 hrs)
0228	SUBSEA VIKING ENTERS 500 MTR ZONE ON SURVEY OF
	No 3 MOORING WIRE
0300	O HERCULES REPORTS DRIFT 321° × 0.4
0310	SUBSEA VIKING EXITS 500 M ZONE
0324	SUBSEA VIKING REPORTS COMPLETED No 3 MOORING SURVEY
	PHOTOS AND REPORT TO BE E-MAILED
0350	SUBSEA VIKING OFF LOCATION TOWARDS SCHIEHALLION

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG/BARGE NAME: Transocean Rather

DATE: 15 April 2007

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TIME	OPERATIONS
0400	O. HERCULES REPORTS DRAFT 3.44' x 0:6. BOURBON DOLPHIN
	& OLYMPIC HERCULES CLEAR OF ANCHOR PATTERN
0500	O HERCULES REPORTS DRAFT 3.46' x 0:6. NOW ON DP
0830	INFORMED VIDAR VIKING OF IMINENT RECOVERY OF
	NO. 2 CHAIN AFTER DEBALLASTING.
0915	TELECON FROM OLYMPIC HERCULES. POSIBILITY THAT
	BOURBON DOLPHIN IS LOWER BY HEAD, SUGGESTING TOW V/L
	TO 200m WATER DEPTH, SMIT SALVAGE MASTER INFORMED.
1010	V. VIKING REQUESTED TO GIVE MINIMUM POWER TO ALLOW CRAN TO
	CARRY OUT TRANSITION.
1040	NO2 TRANSITION COMPLETE, COMMENCE HEAVING NO. 2
	CHAIN TO RIG.
1118	CEASE HEAVING NO 2 CHAIN, END ON BOLSTER
1119	NO2 PCP PASSED BACK FROM VIDAR VIKING
1125	NO2 PCP RACKED
1135	OLYMPIC HERCULES REPORTS BOURBON DOLPHIN IS LOWER BY THE
	HEAD
1210	INFORMED OLYMPIC HERCULES OF ONGOING DISCUSSIONS IN
	TOWN REGARDING TOWAGE OF BOURBON DOLPHIN.
1220	VIDAR VIKING DEPARTED FOR LERWICK, ETA 0100/16.
	F.O. 220m³, L.O. 18417 LTR, POT. 63m³
1355	OLYMPIC HERCULES REPORTS BOURBON DOLPHIN
	GETTING HEAVIER IN WATER.
1420	COMMENCE TEST TENSION 4 & 8.
1430	4 & 8 AT 700 AMPS (220T)

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	06/04/07	12 OF

*RE ON NO.4 PREVIOUSLY CALCULATED

TIME	OPERATIONS
19:38	HERCULES REPORTS ANCHOR 4 LOST. DISCUSSED - LOST WHEN LOWERED
	ON 04/04/07 AT 10:15AM,
N=6766822	
E=458535	
20:02	VALOUR SENT INSTRUCTION TO RECOVER NO. 1, RX OK, JHOOK AT 1400
	VIDAR SENT INSTRUCTION TO RECOVER NO. 5, RX OK, JHOOK AT 1400
20:10	DOLPHIN COMES OFF OF CHAIN NO. 4
20:48	VIDAR BEGINS TO J-HOOK FOR NO. 5 CHAIN @ 1400M FROM RIG
21:00	VALOUR BEGINS TO J-HOOK FOR NO. 1 CHAIN @ 1400M FROM RIG.
21:32	VIDAR ON CHAIN NO. 5, BEGINS CHASING OUT.
21:55	HERCULES BEGINS LOCKERING CHAIN NO. 4
22:07	VIDAR AT ANCHOR NO. 5, WW = 1290 BRG = 301.8° LR: 673.87m
	Wd = 1100m N = 6763689.6 E = 459620.4m
	ACTUAL POSITION = N = 6764078m E = 459010m
22:39	CROSSOVER ON DECK OF HERCULES AND SECURED.
22:51	BEGIN HAULING IN ON NO. 4 WINCH
22:52	VALOUR CONFIRMS HE HAS J-HOOKED NO. 1 CHAIN, VALOUR
	BEGINS TO CHASE OUT.
23:18	BEGIN TRANSITION ON NO. 4 WINCH
23:37	TRANSITION COMPLETE ON WINCH NO. 4 CHAIN
23:44	BEGIN HAULING IN CHAIN ON WINCH NO. 4 - 800M TO GO.
23:57	STOP HEAVING IN ON 4, HEAVE IN ON NO. 1 EXTRA 20T AS
	VALOUR IS STUCK CHASING ON NO. 1
	SATURDAY 7TH APRIL 2007
00:10	VALOUR CONFIRMS HE HAS COME OFF OF CHAIN NO. 1, RETURNING
	TO 1400m OUT MARK TO TRY AGAIN
00:20	400M TO GO ON WINCH NO. 4
00:23	VALOUR ATTEMPTS TO J-HOOK NO. 1 CHAIN AGAIN

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	07/04/07	13 OF

TIME	OPERATIONS
00:31	WINCH NO.4, 200m OF CHAIN TO GO
00:39	ALL STOP ON WINCH NO.4, 80m OF CHAIN OUT
00:40	VALOUR J-HOOKED NO.1 CHAIN AT 1400m, BEGINS CHASING OUT
01:25	VALOUR STOPPED AT SAME POINT E = 454042.3 N = 6766970
01:35	SHUDDER FELT ON RIG, VALOUR SPRUNG FORWARD TO 4KTS.
01:40	PCP NO.4 PASSED BACK TO RIG
02:20	HIGHLAND VALOUR CONFIRMS J-HOOK DAMAGED, ASKED TO COME IN
	TO RIG TO GET NEW J-HOOK, INCREASE WINCH TENSION AND LIFT CHAIN
	AT OBSTRUCTION POINT. J-HOOK POINT N = 6766488.9m E: 454366.9m
02:40	J-HOOK PASSED TO VALOUR FROM RIG.
03:35	VALOUR BEGINS TO J-HOOK FOR NO.1 CHAIN
03:39	VALOUR J-HOOKS CHAIN, BEGINS TO CHASE OUT
04:17	VALOUR AT ANCHOR NO.1 :- WD = 1132m WW = 1270m
	BRG = 121.9° LB = 575.74m +50 = 625.74m
	N = 6767532.3m ACTUAL POSITION :- N = 6767195m
	E = 453178.4m E = 453705m
04:32	SENT DOLPHIN INSTRUCTION TO RECOVER ANCHOR NO.1 RX OK.
05:10	DOLPHIN ATTEMPTS TO J-HOOK NO.1 CHAIN, FIRST RUN
05:26	DOLPHIN J-HOOKS NO.1 CHAIN, BEGINS CHASING OUT TO 300m FROM VALOUR
05:36	SLIPPED OFF CHAIN
05:49	DOLPHIN ATTEMPTS TO J-HOOK NO.1 CHAIN AGAIN
06:21	DOLPHIN CATCHES NO.1 CHAIN, BEGINS TO CHASE OUT.
0732	Hercules On No5 chain.
0800	Starts De-Ballasting Rig.
0812	Dolphin Loses connection to No1 Anchor chain.
0836	Hercules Loses No5 chain.
0855	Dolphin Back On No1 chain.
0913	Hercules Back On No5 chain.
0916	Dolphin Loses No1 chain Again.
1000	Dolphin Back On The chain For No1.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	07/04/07	14 OF

TIME	OPERATIONS
1034	Valour starts To Break out Anchor 1,
1134	Finish Paying Out On No1 Winch.
1225	Tow-Bridle Parts from Rig To Sea Lynx.
1726	Sea Lynx Back On Tow - Bridle. (Sec)
1730	DOLPHIN STRUGGLING TO REACH VALOUR WITH J-HOOK - 700M
	FROM VALOUR
20:43	HERCULES J-HOOKS NO.5 CHAIN, BEGINS CHASING OUT
20:58	HERCULES LOSES NO.5 CHAIN, RETURNS TO 1400M TO J-HOOK.
21:45	DOLPHIN CHASING OUT TO NO.1
21:55	DOLPHIN 300M FROM VALOUR, BEGINS PICKING UP CHAIN
22:10	VALOUR MOVING AHEAD, TENSION DOWN TO 155T AT RIG,
	DOLPHINS TENSION DOWN TO 30T - OFF CHAIN
22:15	BEGIN HEAVING IN ON NO.1 CHAIN
23:18	HERCULES AT ANCHOR NO.5, BEGINS LIFTING WIRE
23:26	VALOUR 140T TENSION, ANCHOR 50M FROM ROLLER., VALOUR 1722m FROM RIG.
23:20	VIDAR BEGINS LIFTING WIRE.
23:57	100M TO GO ON WINCH NO.1 TO VALOUR
	SUNDAY 8TH APRIL 2007
00:05	FINISHED HEAVING IN ON NO.1 WINCH, CHAIN ON BOLSTER
00:16	VIDAR CONFIRMS ANCHOR OFF THE BOTTOM.
00:22	VIDAR ON CHAIN?, TRYING TO HEAVE IN. - TOOK IN 1040M
00:25	VIDAR LOWERING WIRE TO CHASE OUT TO ANCHOR NO.5
00:45	DOLPHIN BEGINS RUN TO GRAPPLE NO.1 CHAIN, 300M FROM RIG
01:06	DOLPHIN CATCHES NO.1 CHAIN WITH GRAPPEL HOOK.
02:00	HERCULES COMES OFF CHAIN NO.5 WITH J-HOOK
04:12	HERCULES ~~[illegible]~~ GRAPPLES NO.5 CHAIN, HEADS TOWARD RIG.
05:57	VIDAR STUCK AT SAME PLACE, APPROX 400m TO STERN PAST ANCHOR
	WW = 1150M

07:00 ANCHOR NO.5 OFF BOTTOM.

07:18 No.5 - HAULING IN WIRE.

07:36 VIDAR HAS 150M OF WIRE OUT.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER **DATE:** 02/04/07 **PAGE:** 15 **OF**

TIME	OPERATIONS
0736	Start Tow To New Location.
0813	Ins To Deploy Anchor No5 Bx oh By Vidar.
0954	Hercules On No5 Anchor chain.
1037	On New Location.
1040	Paying out on No5 winch.
1055	Finished Paying out on No5 Winch.
1117	Hercules Off No5 chain.
1138	Ins To Deploy Anchor 1 Bx oh By Vidar.
1139	Anchor No5 On Bottom – AP = 6,760,367N
	458,477E
	WD = 1360m WD = 1102 m Bearing 299°
	Layback = 796+50m
	Actual Position = 6,760,785N
	457,742E
1157	Paying Out On No1 Winch.
1206	Vidar off Anchor No5.
1210	All stop on No1 Winch.
1249	Dolphin off No1 chain.
1336	Anchor No1 On Bottom AP = 6,764,550N
	1435m 451,560E
	WD = ~~1112~~ WD = 1112m Bearing = 122°
	Layback = 907+50m
	Actual Position = 6,764,032N
	452,364E
1400	Waiting On Weather To Improve.
1747	Ins To Deploy Anchor No4 Bx oh By Hercules.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER **DATE:** 08/04/07 **PAGE:** 16 OF

TIME	OPERATIONS
1755	Paying Out On No4 Winch. 1900 - PCP NO.4 To HERCULES
1916	HERCULES BEGINS RUNNING EXTENSION CHAIN FROM LOCKER - NO.4
20:24	ANCHOR CONNECTED ON DECK, BEGIN TO CONNECT CHASING COLLAR - HERCULES
21:32	HERCULES ALL CONNECTED ON 4, DOLPHIN ON GRAPNEL 800m FROM RIG
22:18	DOLPHIN GRAPNELS FOR NO.4 CHAIN 280m FROM RIG,
22:38	DOLPHIN CATCHES NO.4 CHAIN
1900 - 0026	PORT CRANES PUMP FAULTY, HALTED OPERATIONS FOR REPAIRS - FROM 22:38
0026	PORT CRANE REPAIRED, VIDAR TO COME IN FOR PCP NO.8
00:56	PCP NO.8 PASSED TO VIDAR VIKING
01:02	WINCH NO.8 PAYING OUT CHAIN
01:30	COMPLETE RUNNING NO.8 CHAIN, COMMENCE TRANSITION
02:30	TRANSITION COMPLETE AT NO.8, PAYING OUT CONNECTOR OVER BOLSTER
02:35	NO.8 OVER BOLSTER
02:54	BEGIN PAYING OUT ON NO.4 WINCH, HERCULES + DOLPHIN CHASING OUT
03:~~30~~	FINISHED PAYING OUT ON WINCH NO.4, DOLPHIN + HERCULES PAYING OUT WIRE.
03:30	CEASE PAYING OUT WIRE AT 450m, DOLPHIN ATTEMPTING TO FREE GRAPNEL
06:56	GRAPNEL HOOK JUST BELOW STERN ROLLER OF DOLPHIN.
0954	Dolphin Off No.4 chain.
1011	Anchor No4 On Bottom AP = 6,764,271N
	458,412E
	WD = 1102m WW = 1300m
	Length = 689.6m Bearing 60° (340°brg)
	+50 = 739.6
	Actual Position = ~~[illegible]~~ ~~[illegible]~~
	~~[illegible]~~ N = 6763909 E = 457767.44
1113	Vidar Connected To No8 chain
1315	Vidar Connecting Up To Anchor No8.
1344	Ins To Deploy Anchor No8 Rx chain By Vidar as Guide
	Line To Assist Vidar In Deploying Anchor.
14.32	Anchor over stern Roller off Vidar Viking.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME: TRANSOCEAN RATHER
DATE: 09/04/07
PAGE: 17 OF

TIME	OPERATIONS
15:15	HIGHLAND VALOUR ON No.8 CHAIN
15:20	HELICOPTER ON DECK.
15:29	HELICOPTER LEAVES RATHER.
15:40	BEGIN CHASING OUT ON No.8, WINCH No.8 PAYING OUT CHAIN.
16:33	FINISHED PAYING OUT ON No.8 WINCH
17:15	VALOUR CONFIRMS HE IS OFF THE GRAPPEL, No. 8
17:49	INSTRUCTION SENT TO VALOUR TO DEPLOY No.7, RX OK.
17:50	ANCHOR No. 8 ON THE BOTTOM - VIDAR BRG° = 60.1° Wd = 1107m
	WW = 1400m LB = 857+50 = 907 N = 6760367.6
	E = 451496
	ACTUAL POSITION :- E = 452288 m
	N = 6760809 Em
18:28	VIDAR OFF ANCHOR AND CHASING BACK TO THE RIG.
19:31	No.8 PCP PASSED BY TO RIG. BY VIDAR.
19:32	WAITING ON WEATHER.
2200	Dolphin, Vidar, Valour Leave location for Lerwick
2205	All Nav off line Till Vessels Arrive. Back
	TUESDAY 10TH APRIL 2007
	WAITING ON WEATHER.
	WEDNESDAY 11TH APRIL 2007
02:45	HIGHLAND VALOUR ARRIVES BACK ON LOCATION
05:40	SEA LYNX LEAVES LOCATION.
07:02	DOLPHIN ARRIVES BACK ON LOCATION
0703	VALOUR BACK ONLINE, RX/TX DATA O.K.
07:35	DOLPHIN BACK ONLINE

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	11/04/07	18 OF

TIME	OPERATIONS
07:45	VIDAR VIKING ON LOCATION - ONLINE RX/TX OK
07:58	INSTRUCTION SENT TO VIDAR AND DOLPHIN TO DEPLOY NO.3, RX OK.
09:30	DOLPHIN ALL CONNECTED UP - WINCH NO.3 BEGINS PAYING OUT.
09:42	WINCH NO.3 PAID OUT 900m OF CHAIN, ALL STOP FOR TRANSITION
10:00	TRANSITION COMPLETE, 1 ON WINCH NO.3
10:08	INSTRUCTION SENT FOR VALOUR TO DEPLOY NO.7, RX OK.
10:50	DOLPHIN BEGINS CHASING OUT TOWARDS NO.3
11:15	NO.7 PCP PASSED TO HIGHLAND VALOUR
11:18	BEGIN PAYING OUT CHAIN ON NO.7 WINCH TO VALOUR
12:18	VIDAR VIKING GRAPPLES NO.3 CHAIN - ~50m 260T
12:21	DOLPHIN BEGINS & PAYING OUT CHAIN
13:18	HERCULES SENT INSTRUCTION TO DEPLOY NO.7, RX OK
1708	Vidar Viking off chain No3.
1758	Paying out on No3 Winch.
1813	All stop on No3 Winch All Wire. Payed out.
2053	Anchor No3 on Bottom AP = 6,766,154 N
	456,536 E
	1450m
	WD = ... WD = 1164m
	Layback = 450 Bearing = 201°
	940m = 990m
	Actual Position = (~~[illegible]~~ ~~[illegible]~~) TMC
	(6765231.5 456168) (6,765,231.5 N 456,168 E) - (DOLPHIN LATE WITH CALLBACK)
2136	Dolphin off Anchor No3.
2157	Hercules off No7 chain.
2215	OLYMPIC HERCULES ATTEMPTING TO GRAPPEL NO.7 CHAIN, 200-300m FROM RIG.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	11/04/07	19 OF

TIME	OPERATIONS
23:56	HERCULES GRAPPLES NO.7 CHAIN, 285M FROM RIG
	THURSDAY 12TH APRIL 2007
00:10	BEGIN PAYING OUT WIRE ON WINCH NO.7 - HERCULES/VALOUR CHASING OUT.
00:36	FINISHED PAYING OUT ON WINCH NO.7
01:54	HERCULES OFF OF GRAPPLE ON NO.7 CHAIN
01:57	INSTRUCTION SENT FOR HERCULES TO DEPLOY NO.6 ANCHOR, RX OK.
02:40	NO.6 PCP PASSED TO HERCULES
02:51	BEGIN PAYING OUT CHAIN ON NO.6 WINCH, HERCULES HEADING OUT.
03 00	ANCHOR NO.7 ON THE BOTTOM WW = 1401m Wd = 1102m
	LB = 865.1m @ 218.7°
	+50 = 915.1m
	N = 6758693.4
	E = 453687.6 ACTUAL POSITION N = 6759556 1m
	E = 453992 m
0305	WINCH NO.6 STOPPED, PAID OUT 900m OF CHAIN
03 31	HAULING IN ON WINCH NO.7 (160T)
03 35	ALL STOP WINCH 7 @ 195T.
04 01	TRANSITION COMPLETE ON WINCH NO.6
04 54	HERCULES ALL CONNECTED, BEGINS PAYING OUT ON NO.6
05 17	NO.7 PCP PASSED BACK TO THE RIG.
05 32	FINISHED WITH PORT CRANE - SWAP PUMP TO STARBOARD CRANE FOR NO.3
05 33	VALOUR HAS AN ENGINE PROBLEM - LEAK, ESTIMATE REPAIR 7AM.
06:00	SPUD BOAT - ISLAND PATRIOT ON LOCATION
06:00	HERCULES FINISHED PAYING OUT CHAIN ALL STOP.
06:01	VIDAR SENT INSTRUCTION TO 'DEPLOY' (ASSIST GRAPEL) NO.6, RX OK.
0655	Anchor over stern roller of Hercules (No6)
0744	Vicker Viking On No6 chain.

TRIDENT OFFSHORE LIMITED

RIGMOVE LOG SHEET

RIG / BARGE NAME:	DATE:	PAGE:
TRANSOCEAN RATHER	12/04/07	20 OF

TIME	OPERATIONS
0812	PCP No2 Passed Back To The Rig From Dolphin.
0817	Ins To Deploy Anchor No2 Bt Ch By Dolphin.
0916	No2 PCP Passed To Dolphin.
1055	All Wire Paid out On No6 Winch.
1119	Vidar off the chain for No 6 Anchor.
1230	Anchor No6 On Bottom AP = 6,758,844N
	456,360E
	WL = 1350m WD = 1102m
	Layback = 780±50m Bearing = 338°
	Actual Position = 6,759,617N
	456,058E
1325	Vidar Viking leaves location ETA Aberdeen is
	11:00AM Tomorrow 13/04/07.
1400	No.6 PCP PASSED BACK TO THE RIG - HERCULES
1708	BOURBON DOLPHIN CAPSIZED. - SCREENSHOTS TAKEN
	AND LOG POSITION FILES PUT INTO FOLDER.
1708	RESCUE OPERATION ONGOING
	(RIG+VESSEL)
NOTE *	DOLPHIN HAD NO.2 PCP, PAID OUT ALL CHAIN, RIG WIRE
	ON WINCH, VALOUR GRAPPLED CHAIN BEHIND DOLPHIN,
	BOTH VESSELS DRIFTING TOWARD NO.3 CHAIN - 100M
	WEST OF LINE, VALOUR LOST GRAPPEL, DOLPHIN TRIED
	HEADING BACK TOWARD NO.2 LINE - STRUGGLING AGAINST
	WIND AND CURRENT AND COULDN'T TURN TO 270° AS
	CHAIN ON DECK, DOLPHIN BEGAN TACKING (ZIGZAG) AND
	WAS MAKING SLOW PROGRESS TO THE WEST, TIPPED A FEW
	TIMES TO ALMOST 45°, VALOUR ISSUED WARNING TO
	RELEASE CHAIN, MOMENTS LATER DOLPHIN CAPSIZED.

HAD ONE [redacted] ANCHOR ON DECK. (ANTICLOCKWISE)

Rig: Rather

Emergency Log Date: 15/04/2007 Time: 10:06 AM

INSTRUCTIONS TO OPERATOR: OPEN HEADER AND INSERT RIG NAME MAKE 110%. GO TO FULL SCREEN SORTING ONLY WORKS WITHIN DAY - START NEW FORM AFTER MIDNIGHT

INSTRUCTIONS TO TEAM MEMBERS: ON RECEIPT ON NEW PRINTOUT DISCARD ALL PREVIOUS.

TIME	LOG DETAILS	MESSAGE FROM
17.20hr	Call from A Brown AHV capsized @ Rather – Coastguard informed	Team Leader
17.30hr	Bourbon Dolphin capsize side #2 anchor POB 15, Olympic Hercules, Highland Valour Viking Victory – SV Island Patriot – cargo vessel 2 chopper from Sumburgh LC 40 min, Bond 2 – Recovering people – life rafts in water – 7 possible recovered	ERM Co-ord
17.35hr	Phil Finch calling Arnaud – Michel calling Guy Cantwell	Team Leader
17.38hr	Coastguard updated. T/O Rep to Coastguard – Are T/O releasing press holding statement	Liaison Co-ord
17.42hr	Grampian Police informed Gordon Nicol – Direct line 01224 306401 Liaison Officer being sent over	HSE
1750	CG @ 18.26 2 Aircraft 3 people from vessel to H. Valour Viking Victory Rec 2 (1 fatality) 3 in liferaft. Vessel still to Rig by # 2 drifting stbd side & Stern Ready to cut him loose. Team OK	Emerg Co-ord
1750	Ed Moro Informed. On way	Team Leader
1751	Tel 0151 9229235. Incident details passed to HSE. Jim Murphy. Passing details to Duty Offshore Division HSE	Liaison Co-ord
1754	14 POB	Emr Co-ord
1757	Call Pat – OIM. Boat is one at anchor.	Emr Co-ord
1800	Operator Olrn, 16 POB, Bourbon Offshore Norway – Steven Rune called.	Team Leader
1804	DTI Informed. Passed details of incident. Eric Leslie – Duty Officer	Liaison Co-ord
1805	5 on vic vict (1 fatality). 3 on high valour. Bourbon upside down. Still to rig. Tension 160kips. Cutting gear ready. Mustered. 99 POB. POB 14 – confirm.	Emerg Co-ord
1818	Steven Rune – 15 POB 0 4 page fax to be sent to TO.	Team Leader
1819	HSE – called to clarify. Hugh Smallman – Bootle Duty OSD. Direct	Liaison Co-ord
1821	Radio Contact with Aircraft. Due 1828. Helideck & Crew Ready. Search pattern downwind of vessel.	Emerg Co-ord
1824	Abermed Informed. On call Doctor Dr Peacock located Great Yarmouth. Aberdeen Duty doctor Aberdeen being informed.	Liaison Co-ord
1827	G Ferries @ Chevron	Team Leader
1838	Rather Control – Stuart Greene. 1 chopper inbound bond 12. 1 casualty from water. Going to Rig with man. POB come from those in water.	Emerg Co-ord
1838	Faye Touch. Grampian Police – liaison officer. Looking for Crew List. 1 officer to SAR Team in flight. 1 Officer to Coastguard Aberdeen. Faye Touch to deploy to Transocean	Liaon Co-ord
1839	Coastguard – No Statement. A Blake @ Coastguard. POB 15.	Team Leader
1846	G Ferries called re relative response, informed him chevron deal with their 3rd party. A Blake - 8 on 2 vessels (1 fatality). 3 seriously injured. Bond rec on deck – 1. C/Guard – 1 x casualty – 1.	Team Leader
1848	Stuart Greene, 1st Chopper Bond ½. 1 Casualty on rig. 2nd Chopper Rescue L.C 1 casualty on Rig. Bond ½ Back to sweep.	Emerg Co-ord

Rig: Rather
Emergency Log Date: 15/04/2007 Time: 10:06 AM

1854	Grampian Police. Graeme Milne on route to Transocean. Requested Fax copy of vessel POB to 01224 643366. Confirmed with Neil Clyne to send.	Liaison Co-ord
1856	2 Casualties came off chopper – no sign of life. Now on rig. Over ¾ pattern. Extension chain out/anchor on deck.	Emerg Co-ord
1903	Rescue 51 – Nimrod Aircraft. Search & Rescue take primacy.	Emerg Co-ord
1903	Terry Thompson HSE. Focal point for incident. 0781 3160 791. Call for any actions by HSE if assistance required.	Liaison Co-ord
1910	Coastguard say rather stay in command. Subsea Viking contacted by Shetland coastguard. (ROV Vessel). What dive support can we get? Recovered 2 on Rig – FATALITIES. Recovered 10. 5 of Viking Victory. 3 on Highland Val.	Emerg Co-ord
1910	Stuart Greene. Fax out POB. TO Rather. Bourbon Dolphin. Linda Will Sending.	Emerg Co-ord.
1923	Bourbon have contacted 14 of the 15 next of kin and set up emergency response centre at their office.	Tech Advisor.
1925	Heli fuel – enough checking 6000 ltrs. Muster – Keep people at muster, all informed. Comms shutdowns, only keep emerg. Weather – Emerg response form, tensions # 3 – 195k.	Emerg Co-ord
1928	Mob navy dive team – Glasgow. Rescue 5 has fuel for 21/2 hours. 2 Fatalities, No I.D. Jim, holding on # 2, remain on station chain across # 3. Distance 1200 mtr. 1800 mtrs chain # 2 out. Wire connection is through fairleader # 8 tension 290t.	Emerg Co-ord
1930	G Ferries – Confirms Chevron dealing with relative response.	Team Leader
1932	Faslane – Royal Navy divers 4 of them. Lossiemouth then to DSV	Tech Adv
1934	Alison Carroll – Offered assistance – Abermed. Have talked to Margaret – Medic on Rig.	
1948	Bourbon will handle next of kin. Chevron will handle reception of survivors.	Tech Adv.
1953	**Press Statement # 1 sent.**	Media
1957	Fax in details. # 3 Now 198t then 182t. #4 Now 150t, then 170t. Bearing 059 deg. 120mtrs from rig. 1800 mtr (275 deg) chain out 775 mtrs of stbd. Names came sat phone from boats. Thrusters on to relieve tension on # 7 and # 8, 200 and 290 t.	
2012	Subsea Viking (DSV) 2248 ETA.	Tech Adv.
2016	Coastguard request tech drawings for Bourbon Viking. Bourbon contact details in Norway passed to coastguard.	Tech Adv
2017	**Press Statement # 2 sent**	Media
2019	Chopper Lima Charlie refuelled. Helifuel to helideck. No more casualties reported. Ice flower – freighter port side. Viking Victor may transfer to rather people, chopper is on Viking victory. Correct direction – Stbd Aft, all Rather ok.	Emerg Co-ord
2025	Press Statement received from Maritime and Coastguard Agency.	Team Leader
2031	Stuart advised 2 fatalities on board.	Emerg Co-ord
2036	**Press Statement # 3 sent.**	Media
2056	Pat – OIM - Options: Crew all ok just now. Down Man? Or not? Coastguard is calling off tonight. Take casualties of valour to Tingwall. 4 off Viking Victor are heading to Tingwall. Putting last fuel onto Helideck 2700 ltrs.	Emerg Co-ord
2130	Claire Platform OIM, 13 PAX Available. Max 120-POB, present @ 113. 3000L Fuel for Chopper.	Emerg Co-ord
2145	OIM called asking re conference call – informed 2 dead – are in hospital facility in backroom.	Emerg Co-ord
2230	Initiating down manning	Team Leader
2253	Call to coastguard to confirm time of LC & Bond 2 Landing in Tingwall	Team Leader

Rig: Rather
Emergency Log Date: 15/04/2007 Time: 10:06 AM

	with casualties. Bond 2 2138 LL 2205	
2255	Open up comms on rig for Rather personnel	Team Leader
2305	Adrian – Steve Quin (Coastguard) Evac situation – option of commercial choppers. Re investigation option of commercial chopper. Coastguard Helicopter pilots are running out of flying time.	Emerg Co-ord
2305	Helicopter confirmed ABZ – Sumburgh @ 0645 with 8 police & 2 Transocean. Paterson/Gray.	
2310	Requested CVX to investigate option of securing commercial choppers to help the coast guard with the down manning.	Emerg Co-ord
2315	Spoke to Dave (Radio Op) Navy Divers on the Rather in progress of transferring to the Subsea Viking (DSV)	Emerg Co-ord
2322	Rather OIM called. Rescue 137, discussing with diver, transfer Grampian frontier (foinhaven standby vessel de compression chamber on board. After transfer, start down manning, leaving midnight. (Estimated). Info – 11 PBLJ beds avail 13 – Claire – beds avail.	Emerg Co-ord
2330	Norman – OIM PBLJ 11 beds available now, has been contacted by coastguard.	
2340	G Ferries confirms that Steve Dover (Chevron) to organise helicopter.	Team Leader
2345	Families starting to call Transocean office reception. Phil Finch will take calls from families.	Liaison Co-ord
0000	Call to coastguard – Steve Quinn, Steve asked to confirm requirement for commercial flight assistance. Steve Quinn confirmed that dependant on mobilisation time; commercial flight assistance would be required. Kevin Murdoch to reply to Steve Quinn with mobilisation times.	Liaison Co-ord
0000	72 PAX (18x4 loads) to be offloaded. 27 to stay on board. Will remain on board. 1st flight rescue 137 – 8pax. 2nd flight LC – 20 Pax	Emerg Co-ord
0015	Steve Quinn coastguard advised of commercial flight assistance. 1 chopper lift 0045 from ABZ ETA Shetland 0300. Steve to relay info to Shetland and reply as to whether to mobilise or not.	Liaison Co-ord
0020	Steve Quinn confirmed Shetland need commercial assistance. Ian – Chevron – informed of requirement	Liaison Co-ord
0022	L.C CG chopper now out of service. Bond 2 – on board – Sumburgh, 19pax. Rescue 137 – working dive vessel. MU, coastguard chopper – from S61 Stornaway, PAX 8 (max) unknown ETA.	Emerg Co-ord
0030	Steve Quinn @ coastguard informed that commercial flight Bristows Tiger, 18 seats is about to lift.	Liaison Co-ord
0045	POB LIST - Down manning form for first helicopter for Bond 2.	
0045	Steve Quinn @ coastguard asked to confirm reception arrangements for down man pax. Steve confirmed that 40 pax small be down manned to Scheihallion and the remainder to Shetland. Steve shall call back with Shetland arrangements.	Liaison Co-ord
0051	Martina @ coastguard confirmed airport has been opened up/ 80 beds in place and catering. For remaining downman pax.	Liaison Co-ord
0052	Info Bristows Tiger in final throws of arranging flight path taking fuel on the way. Requested phone number – Grampian Frontier 00871 600367672	Emerg Co-ord
0100	Bristows / 40m. 0105 take off Abz (via Sumburgh for fuel) ETA 0330 @ Rig, Pax 18 places available.	Emerg Co-ord
0105	Boat Status (30mins) – Static No reports of any change.	Emerg Co-ord
0112	Info from CVX – BA flight 0630 Depart. 0530 Check in, Bond chopper on standby on the BP miller platform awaiting instruction direct from coastguard.	Emerg Co-ord
0118	2625Ltrs Helifuel on board. Informed rig that Bristow flight 40m taking fuel on route to the rig.	Emerg Co-ord
0120	Flight 0630 will be BA 8780	

Rig: Rather
Emergency Log Date: 15/04/2007 Time: 10:06 AM

0120	POB LIST - Down manning form for 2nd helicopter for resc 137	
0124	Call from Sumburgh to the rig. Rig personnel settled in Airport.	Emerg Co-ord
0136	POB LIST - Down manning form for 3rd helicopter for rescue MU 15 pax	
0138	Boat status unchanged. Pick up aviation life jackets – requested extra. Aviation life jacket to assist with down manning. Boat condition: Level Heel. 2m @ stern freeboard. 3m @ bow freeboard.	Emerg Co-ord
0138	Martina @ coastguard called to query Bourbon crew list. There is a discrepancy with the captain on the crew list supplied to Transocean by Bourbon and to Coastguard by Bourbon. Martina is calling Bourbon direct to clarify.	Liaison Co-ord
0154	Martina @ coastguard has confirmed Transocean copy of Bourbon crew list is correct	Liaison Officer
0157	Diver situation Grampian Frontier – SSV – ROV Survey to assess site prior to diving. 1 diver moved from GF to SSV. An ROV survey will be conducted to assess risks, prior to starting any diving operations. Divers spoken to owners. % received info on Drawings	Emerg Co-ord
0201	POB LIST - Down manning form for 2nd helicopter for Rescue 137 – destination changed to Scheihallion	
0207	Boat Hull OK, 2 divers looking @ the hull, they will then go on to the SS Viking to review the ROV survey of the underside of the vessel.	Emerg Co-ord
0203	Flight 2, Confirmed at 0136. S61 Sea King, S61 Rescue NW – Shuttle rat-Sch. Bond – shuttle Rat – Sum. Bristow – Sch – Sum – Flight Schedule	Emerg Co-ord
0212	POB for remaining on board will be sent in once all flights are done with.	Emerg Co-ord
0214	Anticipated remaining POB of 27 persons received from Rather.	
0214	Downman plan fax received from Rather Radio Op	
0220	From Bjorn Bergesmes, Technical Manager – Bourbon offshore. Advised him present status of v/c. Requested plans to release v/c from rig mooring – advised waiting on diving operations and daylight. No firm plans at this time. He advised that insurers are arranging salvage. Gave him Transocean ERR phone no.	Marine Supv
0224	Nigal Flows -- Airport Manager called & wanted to know what message to pass on to crews.	Emerg Co-ord
0233	Boat Situation – OK no change. 1 more chopper on approach at present.	
0246	Bond 12 left with 19 pax. 37 pax on board. List will be changed for persons remaining on board. New list will be sent after last chopper.	Emerg Co-ord
0248	POB LIST - Down manning form for 4th helicopter for bond 2 received. 19 persons on board.	
0250	Onshore team and coast guard, consider best place for parking helicopters in case of urgent need.	Emerg Co-ord
0258	Steve Quinn confirmed that: MU – return to Stornaway. Rescue 137 -- Return to Lossiemouth. Bond 2 – Remain in Sumburgh. LC – Still u/s but expected to be back in service shortly. Bristows Tiger – Chevron to confirm status.	Liaison Co-ord
0307	Update to downman plan fax received from Radio Op	Liaison Co-ord
0307	Info passed to rig: AS ABOVE. Boat Ok no change. Note: Choppers in Sumburgh are best placed for quick response.	Emerg Co-ord
0313	Ian Watt Chevron confirms that 40M Bristows Tiger must return to ABZ on completion of duties.	Liaison Co-ord
0324	Martina from coastguard confirmed scramble and flight times, bond 2. 60 + 69 mins. Rescue 137, 45 + 104 mins. MU 45+110mins. LC (US at this time) but normal 45+69mins.	Liaison Co-ord
0330	Revised "Anticipated" final POB received from Radio Op.	Liaison Co-ord

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0354	Martina @ coastguard asked to keep Transocean informed of status of u/s helicopter LC. Martina also confirms 19 seats.	Liaison Co-ord
0356	OIM confirmed that anchor chains 3+4 are ready to be paid out. Subsea Viking currently conducting boat survey. Rig have request ROV to conduct a survey of # 3 chain once available. Weather 18knts crown / 2.9m seats (S19).	Emerg Co-ord
0430	Heli – Due at Rather at 04:50	Emerg Co-ord
0505	Rig confirmed departure of 40M Heli with last 10 Pax. 27 Remaining onboard. Reduced visibility at rig.	Emerg Co-ord
0520	POB Down manning fax for 40M received = 10 pax. Remaining 27 POB also confirmed by fax and verified.	Liaison Co-ord
0530	Remaining crew briefed on current status by OIM. Crew split to cover 24hrs. Stuart Green TP & Dave Simpson night Barge on tour.	Emerg Co-ord
0532	Martina @ coastguard confirms that Heli LC is now back operational	Liaison Co-ord
0600	SS Viking confirmed that the ROV shows the work wire extends 225M below the hull of vessel joining to a swivel & chain. ROV ops suspended due to current strength 1.5kts at 050 deg. No change to upturned vessel position.	Emerg Co-ord
0615	Talked to Steven Rune at Bourbon 0047 70086030 (Emergency No.) All next of kin informed. Charter flight being arranged to Lerwick. Offered to all NOK. Bourbon Mgt team going to Lerwick. Request call back in 30 min to discuss salvage.	Team Leader
0625	SS Viking – No dive operations due to strength of current. No change to position of vessel.	Emerg Co-ord
0630	Martina at Coast Guard confirmed 72 arrivals from Transocean rather to Sumburgh.	Liaison Co-ord
0639	Liaison Co-ordinator informed Coast Guard of Rather and Bourbon Dolphin conditions. Transocean Rather down manned from 99 to 27 persons, no damage sustained. Bourbon Dolphin has remained stationary throughout the night due to high currents.	Liaison Co-ord
0655	Bourbon contact Bjorn Remoy, office No: 700 86 002 (+47 Norway) Mobile 977 90 695 – Operations Director	Team Leader
0718	Call with Bjorn Remoy at Bourbon For salvage issue, Bourbon are working with SMIT to co-ordinate. Should be mobilising salvage vessel, but still to be confirmed. Charter flight scheduled to depart AALESUND, Vigra Airport at 10:30. 2 Bourbon Reps, 1 Police Officer, 2 Priests, 8-10 Next of Kin. Gathering an investigation team.	Team Leader
0735	1. Request rig to forward chain recovery plan to attending AHV's & Subsea DSV. 2. Confirm rig draft 24.6M – just below drilling draft. 3. Request rig to contact SS DSV & for contact to call Transocean Technical advisor.	Emerg Co-ord
0745	Eric Leslie – DTI called. Contacted SOSREP – MCA – DTI. SOSREP requested to deploy DTI to gather info. Hugh Shaw on route to Transocean Arr: 12.00 approx. Role: Assistance… SOSREP Robin Middleton	Liaison Co-ord
0755	Ian Frame – RSTC called from Sumburgh. All persons are OK. Getting Breakfast. Ian Paterson arrived with flight from Aberdeen.	Team Leader
0757	Discuss way forward plan with DSV Subsea Viking with Eric Dickson onboard. E-mail sketch to Subsea Viking shiftsuper1@subsea7.com	Tech Advisor

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	From DSV current is slackening presently, however divers pessimistic on getting to work.	
0805	Day shift crew – Rest period until 1200 / 1300 Night shift crew – On shift until 1200 / 1300. Trident reps split shift. John Sapsford – day shift. Harvey Wilks – night.	Emerg Co-ord
0815	Call from Ian Paterson / Bruce Craig (McKinnon's) Mob: 07801 787862 Will speak to personnel in Sumburgh to try and keep spirits up as some may be traumatised. May require some counselling assistance an Aberdeen	Team Leader
0830	Planned conference call with the following parties at 9am Olympic Hercules AHV. Highland Valour AHV. Subsea Viking SS7 And the Coast Guard. Conference number 08702 407821 Code: 00311472.	Emerg Co-ord
0845	Bourbon Rep: Bjorn Remoy was offered chance to take part in conference call, but declined. He is still trying to contact the Underwriters. Stated to him that we need discussion concerning salvage before we consider parting chain, unless the rather is under threat.	Team Leader
0855	HSE - Rog Thomson deploy to Transocean. Will liaise with Grampian Police.	Liaison Co-ord
0900	Chevron advise crew change chopper scheduled for 12 noon is still available for personnel going to the rig.	Tech Advisor
0910	SORHEIM – Norwegian Maritime Directorate emergency dept. Tel: 0047 5274 5259. Require position of vessel and situation update.	Team Leader
0916	Call to Abermed – Dr Ewan Thomson. Yes – Trauma counselling is available. Immediate counsellors as required. Long term – Telephone contact for counselling service.	Liaison Co-ord
0918	Norman Parks PBLJ OIM called: Current is .17kts at 54 deg. (52Mtr depth) Prediction Low, peak @ midday.	Emerg Co-ord
0935	Request rig to prepare notice of Fatality/Sudden Death – Figure F Section 4 – 6.3 of SMS manual.	Emerg Co-ord
0945	Spoke to Leanne Thomson concerning legal position with the rigs attachment to the Bourbon Dolphin and agreed that we go ahead with Grapple of Chain (when technical solution agreed). Once chain is secured we will consult again, but we are concerned with the integrity of the rig and the existing moorings if the Bourbon Dolphin should sink or move closer to the rig.	Team Leader
1003	Rig Update- No change Regarding Bourbon Dolphin	Emerg Co-ord
1025	Bjorn Remoy called Lloyds open signed with SMITS. Charter delayed to 1500 arrival.	Team Leader
1030	Details from 0900 Conference call with: Chevron Seafield House. Transocean Emergency Room. Highland Valour. Olympic Hercules. DSV Subsea 7. Lerwick Coast Guard. Aberdeen Coast Guard. Vidar Viking MCA Salvage officer. Smit Salvage. :: Discuss options to disconnect B.Dolphin from rig chain and move to safer position outside rig anchor pattern. Subsea 7 to complete survey of B.Dolphin (1 hr) then assess how much of No:2 chain is available for Hercules to grapple safely. Will report in Mid Afternoon.:	Logistics Co-ord
1018	Rather reported that Coast Guard helicopter Lima Charlie is on deck for Fuel. Heading for Sumburgh or Scrabster for Heli crew change and await instructions Question from Margaret the Medic: What is plan to lift bodies.	Emerg Co-ord

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1005	Spoke to ken Robertson @ Chevron and flight capacity is 50 persons. Aircraft can do 3 flights. 1st flight ETA Sumburgh 12:30 etd possible 13:00. Forecast is dubious for 2nd flight.	Emerg Co-ord
1032	Bill McKinley – ½ hr Status on Bourbon Dolphin – No Change Do we have to continue this..? How about 1 hr or..? Change to 1 hr OK.	Emerg Co-ord
1030	Notification of fatality fax from Transocean Rather by OIM. Pat O Malley. 12th April @ 18:37 Unidentified A. 12th April @ 18:44 Unidentified B.	Emerg Co-ord
1040	SMIT sending salvage team to Lerwick. Contact Mr Peak 0031 1045 49911	Team Leader
1050	Coast Guard – Call to Michael Coull If bodies are seen, consult with Navy divers. If feasible they will look at entering the vessel. Moving the vessel, we should consult with Police and Procurator Fiscal. Higher lever with MCA Richard Crowther – senior MCA contact	Team Leader
1056	Pat on Transocean Rather received call from Chevron Logistics on crew change flight: Fuel only 1590 ltrs left. 1 crane working. Part on Chopper. Discussed with Pat option of explosives to cut chain @ does Subsea Viking have that option? Told that catenary graphs were sent by email to OIM & Marine and they should pass to boats.	Emerg Co-ord
1104	Call to SMIT 0031 10454 9911 RENIER. colleague of Mr Peak. Asked for ETA of any salvage tug – cannot confirm, but mobilisation is being planned	Team Leader
1107	Call Pat – About Margaret. She is OK. Discussed with Margaret about moving bodies to fridge. Rig to revert. Bourbon Dolphin – No Change. Subsea Viking – Tom Taylor vessel is tethered amidships to bow by tow winch wire. No explosives. Saw wont cut.	Emerg Co-ord
1131	Contacted Bob Brechin @ Subsea 7 in Aberdeen to establish if ROV on the Subsea Viking would have capability to cut the anchor chain/wire No. 2 between Rather and Bourbon Dolphin. (contingency plan) Bob Brechin mobile: 07801 019474	Tech Advisor
1133	CVX response consultant will be sent to meet the returning crews which were down manned. Mike Forbes will assist at the Thistle Hotel. CVX – ABZ – Sum Flight delayed. ETD: ETA: back in ABZ is 14:10 (delay expected) Flight EZE1061	Team Leader
1143	Norman Parks on PBLJ – Surface Current @261 deg @ 0:07mts	Emerg Co-ord
1154	(Contract Manager) Rhina Peek (SMIT) spoke to D,Hart & E Moro. Contact: 0031 10454 9911 Request to be involved in any decisions including conference call. Charter scheduled 4pm 13th April Dive Team. Naval Architect and Salvage experts (6 more later) ETA Shetlands 18:50 Email salvage@smit.com Team will then be sent to rig and onwards to the boats. One Smit rep will also be coming to the Transocean office.	Team Leader
1148	Pat on Rather – Margaret comfortable – Heating down. Coast Guard asked for Heli fuel. Tell any aircraft heading for rig to avoid asking for helifuel as they need remainder for emergency only. Surface search – Downwind 15/16 miles, 14.2 miles submerged FRC 067 deg. Heading out to 80 miles highland Valour co-ordinating surface search. ISL: Pat. OLY here. Vid Flights Situation…?	Emerg Co-ord
1150	Smit update: Contract manager @ Smit Mr Peak plane charter to Lerwick mobilising salvage team. Helicopter leave at 1900 with 6	Team Leader

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	people. Jason Bennet of Smit on way to office. SOSREP Robbie Middleton on way to office. Potential legal issues, but safety of rig personnel priority.	
1155	Pat – GRS Info to a minimum. Incident report needed. Told not now by me. You (OIM) has enough to do. G.Donald	Emerg Co-ord
1204	Billy on Rather: Hull of Bourbon Dolphin – No Change. Little more oil on surface.	Emerg Co-ord
1205	Info: Smit approach CVX to take over a CVX AHV for their use.	Team Leader
1218	Called MCA – Michael Coull SOSREP. Robin Middleton will call to talk about decision to release.	Team Leader
1216	Called rig and spoke to Billy McKinley then Pat. No flights to rig except one at 1900 from Sumburgh with Smit salvage. 7 people. Need to plan if rig wants anyone else off. Rig to decide. Rig – Can we get 20 kilo pump on flight..? John Sapsford a bit shook up, Harvey Wilkes. Speak to Trident.	Emerg Co-ord
1210	Notification of fatality/sudden death offshore fax from Viking Victory. 12th April at 17:40hrs BST. Name of deceased Bujarte Grimstad. Medic person: Geoffrey Buckley.	Emerg Co-ord
1231	Pat called: Keep Stuart. Keep command team as they are so good. Comms settled down – Agency did great, Dave Duncan off duty. RO Bill Kelly offered services. Great but not required.	Emerg Co-ord
1230	ETD Fixed wing charter to Sumburgh 1230. Second flight from ABZ 1515. Send fax of names c/w Vantage numbers to Chevron 334085 Check in Eastern Airlines at ABZ airport.	Team Leader
1220	Spoke to Billy then Pat. Possible to put Towmasters on flight. Take Stuart Greene off..? Rig thinking about it... Revert soon.	Emerg Co-ord
1230	Dr Thomson – Abermed 788800 enquiring about when council support will be required on return to Aberdeen for crews. Advised to be at the Thistle Hotel (airport) by 14:00 hrs 1 each Psychologist to be made available from Abermed.	Liaison Co-ord
1248	Billy – AMA Advanced Medical Assistant. Ian Taylor – Safety coach AMA Geoffrey Buckley – Cook AMA Confirmation of positions of the two personnel who confirmed that there were "No signs of Life" of fatality on the Viking Victory.	Emerg Co-ord
1250	Call from Ian Paterson & Bruce Craig. Bruce will fly back today, ready to fly out to be part of the investigation team whenever required. Ian will come back on second charter to ABZ.	Team Leader
1302	Confirmation: Airport Thistle – Reception – Stay. 18 Twin Rooms. 6 Interview rooms. 1 holding room. Snacks, water, coffee, etc, ETA first flight 14:30	Team Leader
1303	Billy Buckley Bourbon Dolphin – No change in situation	Emerg Co-ord
1300	People Meeting flight at airport Thistle hotel. Emma West at Chevron tel: 315573. Ian Paterson. Adrian Brown. Ali Walker. Becky Harris. Michelle Rennie. Michael Sisson. Tom Clark. Tracy hart. Jim Glennie. Anne Williamson. John Deas. Susanne Laing. Gordon Charlton – Abermed Psychologist.	Liaison Co-ord
1304	Bob Brechin – Subsea Viking Ref advises Subsea Viking DSV have on wire cutter capable of cutting 75mm wire onboard vessel. Bob will advise on availability of cutter suitable for 83mm wire asap. System will have to be shipped as will be too heavy for air freight.	Tech Advisor
1307	Billy McKinley – Video inspection of hull completed and tape passed to Grampian Frontier. Based on evidence of the tape divers are preparing to dive to bridge area from out with. ROV setting up 2000mtr N/E of rig to survey No: 3 chains.	Emerg Co-ord

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1320	Andrew Horgan ABZ Coast Guard requesting number to contact Adrian for conference call with SOSREP and Bourbon Offshore. Info 427850	Liaison Co-ord
1130	Information from Bourbon Norway (spoke to Erik) estimate of fuel oil onboard when Bourbon Dolphin capsized. Fuel Oil: 449 Mt3 Lube Oil: 32,711 Ltrs	Team Leader
1330	Chevron (Diane) informed that Dick Lennox will be arriving at the Thistle in a van with clothing etc; He is to be allowed entry. Note: 13:30 press release No: 6 approved by Transocean. Waiting on Chevron for approval.	Liaison Co-ord
1346	Bob Brechin – Subsea Viking rep has located wire cutter for 115 mm wire. Checking with DSV if compatible with their system. He will advise. Unit: weight 150Kg approx. 90 x 50 x 40 CM.	Tech Advisor
1403	Billy McKinley – Bourbon Dolphin – No Change. Diver observing out with finished one other going into water. Vidar Viking – Debris found 20 miles. Extended search to 25 miles.	Emerg Co-ord
1427	Richard – MCA has pictures of vessel from other vessel. Can we send out……… G.Donald…NO.	Emerg Co-ord
1435	Coast Guard update- ROV survey on Dolphin complete. Video footage given to and being reviewed by Navy divers. Divers in the water conducting external survey only – no entry to vessel. ROV currently inspecting anchor chain + leg No 3 crossover for movement or wear.	Liaison Co-ord
1416	Wire cutter mobilisation. Bob Brechin Subsea Viking rep advises that cutter is compatible with DSV ROV. Preparing unit for despatch. Need to phone back & confirm form of delivery – ship/ helicopter..? Chevron forwarded details to Logistics – waiting reply.	Tech Advisor
1416	Eastern Airways flight into Aberdeen ETA 15:45 (50 people)	Team Leader
1346	Conference call with SOSREP Robin Middleton – SOSREP Bert Clynet – Smit Salvage master Paul Glerum independent salvage consultant. Hugh Shaw DTI will be here approx 15:30. Held long conversation to explain the situation. Estimate 4-5 pm to have all data from ROV which will send pictures of vessel and anchoring stretch to: vm.portland@mcga.gov.uk Rescue co-ordination centre Gary sending at 14:40.	Team Leader
1500	Discussed Towmasters with Pat OIM on Rather. Pat said Towmasters stressed and could do with change out. That will be tried. Made room on helideck for helifuel pods to take 2 pods from Island Patriot for rig and allow to settle.	Emerg Co-ord
1504	Norman on the PBLJ: Current @ 52mtr is 0.06kts Direction is now 029 deg. Prediction = Peak @ 23:00hrs but still Less than 1/2kt @ surface.	Emerg Co-ord
1523	Bruce Craig – Scatsta. About to leave. Plane to leave in 30 min. Available the whole weekend to travel to rig for interview. Will instruct the crew on police interview.	Team Leader
1540	Ian @ Chevron concerns about boats: 2 BP boats Subsea Viking & Grampian Frontier. BP says Salvage Ops. Smit Salvage: Highland Valour – Smit take over the charter from Chevron we need to clarify when salvage starts. Delivery details of package.	Team Leader
1500	Smit salvage – Choppers will be hard to come by. Should Smit mobilise by boat…? 5 hrs. On BD (estimate) Fuel Oil 449 M3 • Lube Oil 32,711 Ltrs	Team Leader
1542	Pat on Transocean rather: 95% sure nobody in Wheelhouse of Bourbon (divers on Grampian	Emerg Co-ord

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	Frontier)	
1549	Coast Guard called duty officer gave update: Coast Guard from S&R to recovery informed that he is keeping vessels for surface search	Emerg Co-ord
16:00	Coast Guard asked for assistance to get salvage team out to rig. Potential payload 6 pax, 150 kg cutting gear, 90x50x40cm. Looking into helicopter from Scatsta or use Anglia Sovereign (Counter pollution tug) which is in Scalloway.	Liaison co-ord
16:09	Bourbon dolphin – NO CHANGE	Emerg Co-ord
16:12	From Pat – OIM. Boats to stay. Call from SS Viking asking when they are to go. It may be possible to release the Highland Valour 9-10 Hrs in Lerwick/12 Hrs in Scatsta.	Emerg Co-ord
16:30	From Ian Chisnall @ Chevron. Plane Arrived 1605 – 50 pax (TO Personnel etc) ETA Second plane 17:10 – 25 pax (Shell Flight). Bruce Craig (McKinnon's) & Ian Paterson believed to be on one of the above flights.	Team Leader
16:35	Confirmation from coastguard – Anglian Sovereign on stand-by at Scalloway. Estimated sailing time to rig – 5 Hrs @ 16 knots. Cargo 6 x Salvage pax, 1 poss. 2 towmasters, 150kg cutting tool. Awaiting confirmation of requirement.	Liaison co-ord
16:41	Pat wants confirmation on all boat situations. Explained to him that Anglian sovereign coming with Smit, cutting tool, 1 or 2 Towmasters. 5 hours from sailing.	Emerg Co-ord
16:54	From Pat: Neil Cummings of Shetland Coastguard wants to keep navy divers onboard.	Emerg Co-ord
17:00	Plan to OIM: Valour – to town for refuel & Crew change / Vidar – Needs fuel – When? / Hercules – 4 days fuel left / Establish if Vidar is up for the job / Anglian Sovereign coming tonight with Smit + Towmaster + Tools.	Emerg Co-ord
17:13	Bourbon dolphin – NO CHANGE	Emerg Co-ord
17:46	Billy McKinley – Bourbon dolphin update – Highland Valour reports it is a little bit lower by the head.	Emerg Co-ord
17.55	Communicated to Rhiner at SMIT that he should inform the 6 salvagers to make their way to Scalloway on arrival at the Shetlands. Once in Scalloway, tie in with Anglian Sovereign. Asked SMIT to confirm when the salvagers have been informed.	Liaison Co-ord
18.03	From Stuart. No update from R.O.V yet. Still trying for info on #3 chain	Emerg Co-ord
18.12	Pat says S.S Viking says #3 safe crossing point. Chain crosses wire @ depth 620m. Distance from rig 500m. Catenary from cross point to rig is up all the way. As it crosses wire, wire is dipped. Chain is dipping. Going to follow catenary down to Dolphin. What at x/o point checked wire for distance of 40m, seen scuffing? After that all ok. Digital stills coming.	Emerg Co-ord
18.35	Talk to Pat – 1. Wait for ROV survey #3 chain 2. Highland Valour released – water etc. crew change. How much fuel – 200 cubes 3. Frontier – release ASAP divers to Anglian Sovereign 4. Hercules will cut chain after grapple. Hand rig end back to Vidar Viking for pass to rig. Hercules will float away with casualty. 5. 15 mins conference call (1900 hrs) 6. Hercules call in to call	Emerg Co-ord
16.15	Confirmed with Shetland Coast Guard that we will utilise the Anglian Sovereign to transport the Smit Salvagers x 6. 2 x towmasters and cutting gear to the rig.	Liaison Co-ord

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	Coast Guard informed me that the plan was for the Anglian Sovereign to then take the divers from the Grampian Frontier and remain on station to release the Grampian Frontier. Existing towmasters will remain on the rig until resources are available to get them off.	
17.00	Plan to OIM – Valour? → To town for refuelling & Crew change Vidar → Need fuel → When Hercules →4 days fuel left Establish if Vidar is up for the job Anglian Sovereign coming tonight with Smit & tow master & tools	Team Leader
17.22	Vidar. Viking – 250 cu/m 3 Days Olympic Hercules – 280 cu/m 5 days High Valour – 440 cu/m 8 days Rig - 200 T 10 days Vidar. Viking – yes up for job. *Highland Valour to be in for 8am Lerwick SMIT +31 653 840 905 Rheiner Bodies? Still in sick bay	Emerg Co-ord
19.02	Update on Bourbon – NO CHANGE	Team Leader
19.11	Norman – PBLJ Update – Current .53kts @ 52m water depth Direction 0.74°	Emerg Co-ord
19.18	Adrian Brown – 40+ in hotel (Airport) Meeting 0930 hrs Saturday. Need someone to attend	Emerg Co-ord
19.29	Margaret the Medic, Prefer going off? Yes from me. People upset, need to watch. Will police come if all ok? Medic will leave bodies in sick bay for all good reasons, and for people.	Emerg Co-ord
20.02	Team of 5 from SMIT Salvage on the Anglian Sovereign. Asst. Salvage Master, Dive Master & 3 Divers. Salvage Master due to arrive tomorrow	Liaison Co-ord
20.06	Bourbon Dolphin – Update – NO CHANGE	Emerg Co-ord
20.26	From Keith Miller – Flight EZE 1062 – now in transit 50/50 chance to land at Sumburgh. ETA Approx 2045 hrs. On board is: ROV Cutting Gear, Ross Watson, W.P.C.	Team Leader
20.35	Stuart – Viking Victory wanting the dead bodies off the boat. V.V. on location 2nd April 2007	Emerg Co-ord
20.43	Coastguard updated on the status of SMIT salvage experts	Liaison Co-ord
20.45	Eastern Flight 1062 landed at Sumburgh @ 2041 hrs	Liaison Co-ord
20.53	HSE in contact to ensure they get to the rig along with police	Liaison Co-ord
21.07	Stuart Greene – No change to situation. Everyone fine. Medic ok. Salvage team (5) eta 6 hrs	Emerg Co-ord
21.16	Chevron – Ok to shut down ER team? Discussion with DHA/KWI & STH – Chevron in place here so ok to go to 0600 hrs	Team Leader
21.49	Keith Miller – will close Chevron ERT @ 2200. Will re-open @ 0600 & Graham Ferries will attend.	Emerg Co-ord.
21.58	Keith Miller – Few calls from BP, when will Viking Victory & Subsea Viking be released? Colin Ladd (01467 642649 07881 854056) will call in the morning.	Emerg Co-ord.
22.02	Stuart Greene – No change to situation.	Emerg Co-ord.
22.12	Gary: Northwest Transport (Shetlands) 07879 695222 – he has the Viking Cutting Gear.	Logistics
23.03	Stuart Greene – No change to situation regarding height of hull, but a little more to the west. No danger of contact.	Emerg Co-ord.
23.45	Stuart Greene – Casualty visibly moving to west x 50 metres	Emerg Co-ord.

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0002	Stuart Greene - Casualty stabilised – no more movement to west	Emerg Co-ord.
0102	Stuart Greene – No change from last report. From STH, please pass risk assessment worksheet to AHV's + SS Viking	Emerg Co-ord.
0158	From Brian Ross PBLJ – WX 21kts x 188° Current @ 0.1kt x 073°	Emerg Co-ord.
0206	Stuart Greene – Boat 10 metres to east, hull in water still the same. Confirm v/l's on location, Viking Victory, Olympic Hercules, Vidar Viking, Grampian Frontier, Island Patriot, Subsea Viking	Emerg Co-ord.
03:02	Stuart Greene – Boat drifted back a further 10m to East (20m total). Anglian Sov (w/Smit Salvage) 13miles away – ETA 04:00	Emerg Co-ord (A Leslie)
04:03	Stuart Greene – Bourbon Dolphin returned to original position. Anglian Sovereign has been in contact with Rather and will confirm with Rather on arrival.	Emerg Co-ord
05:02	Stuart Greene – No change in (B/D) position. Anglian Sovereign on location.	Emerg Co-ord
05:45	Call with Mike Hollinshead (Chevron Drill Rep) Draft Procedures for chain recovery under review. So far had failed to forward to Anglian Sovereign (Fax problem at their end). Concern expressed re continued presence of bodies on board (no facilities to store and morale issue). Disappointment expressed that there was no commitment by police to remove. John Sapsford (Lead Towmaster) considered to be taking personal responsibility for incident (BD acting under his instruction at time of capsize). Currently offshore in excess of 2 weeks. Considered advisable to swap out both Towmasters. Several other personnel were also due to crew change yesterday.	Client Rep
05:55	Brian Ross – PBLJ – current : 0.75kts to 072deg wind speed 29kts 196deg, seas: 2.8m sig, 3.5 max	Emerg Co-ord
06:05	Stuart Greene – No change in (B/D) position. Anglian Sovereign going in for close look. Current weather@ Rather 24 knots 185°, 2.2m Sig, 3.5m Max Visibility : 6 miles : Horizontal : Vertical : 3000 ft Will confirm need to retain Grampian Frontier at next call.	Emerg Co-ord
0630	Updated Aberdeen Coastguard on situation. 0830 Conference Call: Numbers given to Coastguard and vessel status given	Team Leader
0640	Called Police concerning removal of bodies from Rather and Viking Victory. Inspector Scott Bruce. Unaware of arrangements, but is aware that there is an "Authority Dispute". Does the incident come under Norwegian control or British Police control? Plan to have a decision at 08:00am when key players are available.	Team Leader
07.00	Called Brian Morison (Chevron ERR) to get one possibly 2 flights set up to T/Rather One flight to return bodies One flight for limited crew change (6 pax TBC) Can the body on the Viking Victory be transferred to the Rather	Senior Client
07.02	No change in position of Bourbon dolphin	Emerg Co-ord
07.10	1. 2 x Smit Salvage personnel to transfer to Rather from Anglian Sovereign once their initial inspection is complete. 2. Coastguard had previously requested that Naval divers are retained at the location and that they can be accommodated on the Anglian Sovereign. 3. Due to sea conditions, currently unable to transfer dive equipment and personnel from Grampian Frontier + Anglian Sovereign with rig crane.	Emerg Co-ord
07.32	Brian Morison – Initial approach to Bristows for ad hoc flights not	Senior Client Rep

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	feasible (backlog of flights due to fog over last 2 days) Transocean need to provide details of all personnel to be moved. Brian also mentioned that transfer of bodies is usually undertaken by Coastguard flights rather than commercial carriers.	
07.38	Mike Hollinghead called to seek confirmation of the desire to transfer the body on the Viking Victory to the Rather for onward passage in to Aberdeen. Mike was advised of planned call @ 0800hrs with police to discuss movement of bodies	Senior Client Rep
08.01	Billy McKinley B/D – drifted eastwards v slightly Everything else as before	Emerg Co-ord
08.05	Contacted Inspector Bremner at Grampian Police to inform them that the Highland Valour will be in Lerwick ETA 0800 if the Police require to interview personnel	Team Leader
08.05	Tom Brock called CHC Helicopters, Bristows and Bond. All companies confirmed that there are no aircraft available and Chevron already called	Logistics Co-ord
08.15	Paul Bremner – police – called Incident commander and senior investigator are in office, the issue with the bodies is a priority for them Officers are at Highland Valour, interviewing personnel	Team Leader
0825	Rig confirm that they have 6500 litres of helifuel available, following the lifts taken from the Island Patriot yesterday	Emerg Co-ord
09.00	Norman – PBLJ Current @ 52 m, is 0.68 kts @ 078 deg Predicted minimum 13.00hrs Weather 40 kts, 33 kts average sea 2.8m significant	Emerg Co-ord
09.09	Billy McKinley – Rather No change with Bourbon Dolphin	Emerg Co-ord
09.13	From Graham Ferries Possibility of fixed wing to Sumburgh/Scatsta. Heli flight from Sumburgh/Scatsta for crew change purposes.	Liaison Co-ord
09.40	Ken Gillans – Chevtex Confirmed that legal jurisdiction over incident and removal of bodies is being discussed by police – DCI Gordon Gibson is contact name	Emerg Team Leader
09.52	Arlene – needs to know if those who want to go home can go home from hotel. Arlene 07768 803123 Called Arlene back – will confirm after speaking to Derek and Adrian Brown	Emerg Co-ord
	UK personnel OK'd to go home International personnel to standby in the hotel	Comment from Adrian Brown
09.54	Colin Ladd – need call back from Adrian Blake re Subsea Viking – 07881 854056 *Updated Colin on situation 1010hrs – Adrian Blake	
10.01	Billy McKinley – update on Bourbon Dolphin – no change	Emerg Co-ord
10.12	UK HSE : have made an informal request that the survey computer be untouched once the operation of disconnecting the BD from the rig is completed UK HSE will be on wanting to be present during the police interview ROG (HSE) – Mobile – 07866 625198	Info – Adrian Brown
10.15	Coastguard requesting a contact number at Transocean for enquiries Guy Cantwell number given – 713 232 7647	Team Leader
10.20	Ian Birnie – police 2 inspectors in Shetland Operating as if Grampian Police have primacy	Team Leader

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	The undertaking from the Police is that the bodies will be removed today	
10:31	Divers – Smit team coming onboard now – 5 pax Bourbon dolphin – Monitored by SS Viking & Vidar Viking – split role. Lt Commander Andy Ward to Pat about Navy Dive Team. Can these be released? Can go on Grampian Frontier? Coastguard is aware, this will happen.	Emerg Co-ord
10:45	Concerning release of SS Viking going back to BP: Informed Colin Ladd that SS Viking should be free of emergency duties when chain to B. Dolphin has been cut. B. Dolphin is in safe situation with rig & ROV has done a final inspection of anchor wire # 3. Approx 15 Hrs to complete. Release subject to chevrons agreement. Requested email confirmation. Discussed with Alan Leiper and Doug Mowatt of chevron. Agreed that SS Viking could be released on completion of above. Coastguard also informed. laddc@bp.com	Team Leader
11:03	Billy McKinley: B. Dolphin - No real change. SS Viking has DP - B. Dolphin drifting 50 mtrs west to East back and forth. Hull monitored by Vidar Viking 5 Pax onboard (Smit) POB now 32 Grampian Frontier released 10:40 to Scalloway	Liaison Co-ord
11:20	Neville @ Shetland coast Guard called: Dropped the SMIT salvers on Rather from Anglian Sovereign Can we release the Anglian Sovereign? need to check with rig and SMIT Rig doesn't want to release yet. Hugh Shaw will contact Shetland Coastguard. Wants Hugh Shaw number to confirm release of Anglian Sovereign is OK	Team Leader
11.23	Billy McKinley was to ask Pat if he needed increase in exclusion zone. Not Needed. Question to Billy Ask Pat if Harry to release Anglian Sovereign will revert.	Emergency co-ordinator
11.27	OIM wants to keep Anglian Sovereign. Has spoken to coastguard.	Emergency co-ordinator
11.40	Graham Ferries called has heard from Shetland police that authority has been handed to Norwegian authorities. They want to send chopper to rig with 1 Norwegian police officer and 1 British police photographer. May need body taken from Viking Victory to rig. To be clarified	Emergency co-ordinator
11.43	Confirmed by Ian Birnie at Grampian police.	Emergency co-ordinator
12.01	Pat received updated procedure. Jim (Barge Eng) checking with boats, review and comment SS Viking – review position and ROV Vidar Viking – happy with plan Olympic Hercules – in position Waiting on word to go Briefed Schmidt on plan and access to phone.	Emergency co-ordinator
12.14	Worksheet received from Transocean Rather Vidar Viking	

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12.34	Discussed and agreed with OIM Rather Meeting with Doug Halkett and others. NOTE: Rig will respond to BD sinking by A) Paying out wire and watching tension B) On rise of tension and / or if thought necessary operate emergency release on the line being loaded. Subject to A) & b) above the rig has permission to execute the plan Rev 0 dated 14/04/07	Emergency Team Leader
12.23	Call to Pat – why want to keep Anglian Sovereign? Answer – would like as much support as possible comfort factor mainly Support as all boats on other duties. Coastguard changed their tune. Pat turned down chopper support as Anglian Sovereign - SOSREP has used his powers 12.37 to release the Anglian Sovereign.	Emergency co-ordinator
12.53	Call to Pat – taken by Billy McKinley SOS Rep has given approval for Anglian Sovereign to stay on location till 15.00hors.	Emergency co-ordinator
13.07	Bill McKinley Status of Bourbon Dolphin couple of metres west says Vidar Viking	Emergency co-ordinator
13.18	Norman – PBLJ Current @52 mts 0.06 kts Direction 288° Prediction – Max current @ 17.00 0.9 kts Winds 30 kts 2.7 mts Significant seas	Emergency co-ordinator
13.21	Pat – Hercules – Run along line Co. man hears about flight leaving he was contacted by Seafield. Tiger from Scatsta. Wait till 14.00 hrs for police. 39 min flight time. Advice to OIM – monitor chopper times to make any decisions.	Emergency co-ordinator
13.21	Fax received from Grampian Police	
13.40	Informed Grampian Police 2 x Rather personnel Stuart Greene (Toolpusher) Martin McKeague (Crane Op) Arriving in Aberdeen airport on Eastern Airways Flight time ETX 19.15 hrs Comments from CID Detective Superintendent Alan Smith. Via Susan Lumsden Grampian Police. There is now no requirement for Grampian Police to interview returning crew as it is a Norwegian investigation.	Liaison Co-ordinator
13.46	Discussed with Andy Imray Grampian police (Lerwick) transport of 2 Grampian policemen + 1 Norwegian police. They are on standby at present in Scatsta to fly with 2 Tow Masters to Rather. Will confirm transport of 3 fatalities later.	Emergency Team Leader
14.09	Billy McKinley Bourbon Dolphin hull status – no change Note: Agreed to stop 1 hour notice of hull by emergency team.	Emergency co-ordinator
15.00	Contacted Bjorn Remoy (Bourbon Norway) and he is going to chase up a helicopter from Norway as it is becoming a serious issue.	Emergency team leader
15.39	Police has requested that the bodies + police go to Shetlands Information from Andy Imray (Lerwick) to Chevron office.	Emergency team leader
15.46	Helicopter on deck – ready to lift. Still tying to grapple the chain. ROV guiding him in ROV stepping the grapple into the chain. Catenary has changed between No 3 and casualty vessel steeper that it was yesterday. HLO team will return to galley after chopper.	Emergency co-ordinator

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	POB 3 police officers – 1 Norwegian, 2 British POB will be sent when helicopter lifts OIM will be having discussions with the police soon	
15.53	Request from Norwegian police via Andy Imray Lerwick Norsk has a chopper available but Bourbon said that another option is being perused	Emergency Team Leader
16.17	Bjorn Remoy (Bourbon) has option of Norsk "Helicopter for Sunday", meantime is "Chasing other options". (Including fixed wing from Shetland to Norway)	Emergency Team Leader
16.31	OIM – still grappling chain contact with Chain but not engaged yet. Police understood that all three bodies were onboard the rig Frog configured for stretchers. Pump on the rig?	Emergency co-ordinator
16.46	Norman PBLJ OIM Current 52 m – 0.41 kts 60° Windspeed 25 kts Sea state 3.3 m	Emergency co-ordinator
16.54	OIM called Pat + Mike Still try to grapple + Trying to Talk to police about their requirements / bodies then getting them off the rig. The police are with the medic and bodies PLAN: Viking Victory – body picked up and landing on helideck until Anglican Sovereign.	Emergency co-ordinator
17.00	Fixed wing flight E2E1065 – 1647 Departed for Scatsca - 2 Transocean need to be met.	Emergency team leader
17.03	Billy McKinley Hull now 70m to the west of original position Positioning grapple further attempt. Pump off the chopper for the crane. Wind 24 kts @ 233° Size waves 2.4 m Max 3.9m Visibility 4 km horizontal - 1000 ft vertical	Emergency co-ordinator
17.10	Imray (Lerwick Police) Informed that the 3 bodies will be transported to Shetland on the Anglian Sovereign – sailing time 7 hours The 2 Grampian police and 1 Norwegian policeman will accompany the bodies on the Anglian Sovereign	Liaison co-ordinator
17.20	Informed Billy McKinley that the plan is to put the bodies onto the Anglican Sovereign. The police should accompany the bodies to Scalloway. Police will be waiting for the bodies Rig speaks to Viking Victory Police onto the boat.	Emergency co-ordinator
17.23	Discussed with Pat (OIM) Victory has been spoken to, and has no problems with frog transfer of the body. The rig required to plan how they will move the bodies and transfer them to the Anglican Sovereign. Plane will be waiting for the bodies in the Shetlands The Anglican Sovereign will sail to Scalloway. Pat has to talk to the police about going onto the boat. The police should call their superior officer in the Shetlands.	Emergency co-ordinator

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18.05	Viking alongside at present, transferring casualty	Emergency co-ordinator
1827	Anglian Sov, to Scalloway with 3 casualties and 3 police. ETA 0100 hrs, undertaker is organised and will take care of remains and transport to airport. As soon as the Anglian is out of the 500meter zone the rig control of the 3 casualties will seize.	Emerg cord.
1857	Chevron control room is starting again 0730 Sunday morning.	Emerg Cord
1908	OIM informed transfer complete, Anglian Sov outside 500m, ETA 0230 15th April at Scalloway.	Emerg Cord
1937	Billy McKinley, Grapple slipped, 2nd attempt unsuccessful. considering taking ballast off grapple. They got up to 30tons before the chain slipped.	Emerg Cord
2023	Billy McKinley – grappling the chain 3rd attempt looks like a good grip 30 ton, putting people on winches. Release of tension on No 3 as the chain comes off no3 wire.	Emerg cord
2034	Called HSE to update on situation. No problem with running no 2. Rig move PC must be left undisturbed. Attempt to get to the rig on Monday.	HSE Liaison
2041	Pat – Heaved up to 500m – ROV going to check 75ton on work line. No 3 – 60T. No 2 – 25T, No 7 – 10T, No 8 – 10T.	Emerg Cord
2052	Norman Park – PBLJ. Current 52m, 0.9kts, 076deg peaked will drop about midnight. Wind 15kts, sig 3.0m. Vis - poor fog horn on.	Emerg cord
2108	Hugh Shaw called and advised us that the independent consultant to SOS Rep will phone in a few minutes. Meantime DO NOT CUT	Emerg Team Leader
2116	Called Pat. Told the rig not to cut the chain on instruction from the SOSREP. They will continue to pull the chain to the stern roller. Pat is going to discuss the situation.	Emerg cord
2122	Pat – OIM halted operations, OIM want to make public that he and master of the Hercules are not happy to hold the operation with the chain. They would prefer to complete the operation.	Emerg Cord
2126	Pat – OIM. After call to Ron Mathieson and Paul Trantor and Smit. We will continue with the plan to cut the chain. Agreed and signed off by Kee's Witte and Paul Tranter	Emerg Cord
2140	Hugh Shaw – Mobile no 07801023484, Hugh Shaw ok with cut. Paul Glarr. Additional line was not attached and Hugh was not aware it was not attached. He is ok with cut – coastguard confirmed choppers available if we need to downman.	Emerg Leader
2218	Pat – Grapple below roller – v/Viking obs process to deck chain. NO change to aspect of BD. Tension – 130T roller	Emerg Cord
2224	Pat – Chain on board OH and secured in both shark jaws. Will call when cut.	Emerg Cord
2317	Pat – Separated from the BD. Rigside chain on v/v. OH now free from rig mooring system. Cut made in 76mm chain. v/v on DP overnight. How much – 76m chain on v/v, reply will find out now. Request ss Viking to pass ROV over number 3 at cross over point. Highland valour went to Peterhead for crew change. Team downmanning emergency response. Chevron/Smitt responsible for Bourbon Dolphin.	Emerg Cord
2343	HSE informed of Highland Valour ETA Peterhead 0845.	HSE Liaison
2346	Wx 18knts x 170deg, 28 – 4.5m. Time of cut – 2315. Drift of casualty WNW. Olympic Hercules – Chain – bourbon.	Emerg Cord

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Rig Move 23

			TRANSOCEAN RATHER
CODE	SCHEDULE		0=OPERATION NOT PERTAINING TO ANCHOR HANDLING
			00=PROBLEM WITH ANCHOR BOAT
			01=PROBLEM WITH ANCHOR WINCH NUMBER 1
			1/8=OPERATION OF PARTICULAR ANCHOR
	MOVE #	23	
	CLIENT		CHEVRON
	MOVE TO:	LAT:	60° 59' 32.778" N
		LONG:	003° 49' 49.242" W
			Rosebank Block:205/1-I Water Depth:1103 metres (3619 feet)
	CLIENT		CHEVRON
	MOVE FM:	LAT:	61° 01' 17.947" N
		LONG:	003° 48' 30.464" W
			Rosebank Block:213/26-1z Water Depth:1103 metres (3619 feet)
CODE	DATE	TIME	EVENT
0	27/03/2007	18:52	Olympic Hercules on location.
0		19:12	Olympic Hercules enters 500m zone for Stb side to offload container containing Nav Package.
0		20:30	Bourbon Dolphin on location.
0		20:52	Bourbon Dolphin commences respooling her workwire with the Olympic Hercules.
0		23:48	Bourbon Dolphin completes respooling work wire.
0	28/03/2007	00:07	Bourbon Dolphin comes into Stb side to collect Grapnel.
6		00:13	Bourbon Dolphin collected Grapnel and making her way round to # 6
0		00:25	Olympic Hercules on stb side for calibration of nav package.
6		00:27	Olympic Hercules asked to deploy J hook in readiness to assist with # 6
6		00:30	# 6 PCP secured to Bourbon Dolphin
6		00:31	# 6 Winch hauls in to pick up tension
6		00:33	Bourbon Dolphin connected up to # 6
6		00:37	Bourbon Dolphin recovers first pennant and prepares to split kenter link connection to 2nd pennant.
6		00:38	# 6 Winch commences hauling in.
6		00:44	# 6 Winch completes hauling in at 190mt tension - hauled in 60m.
6		00:47	# 6 PCP passed back to rig.
0		00:48	Bourbon Dolphin put to standby.
6		00:52	# 6 PCP secured to rig
6		01:13	Olympic Hercules reaches position for J hook run and starts lowering J hook
6		01:49	Olympic Hercules commences J hook ops
6		03:18	Olympic Hercules lowers J hook to 20 m off sea bed and tries again
6		03:32	Olympic Hercules instructed to try 50m closer to the rig - But under no circumstances to come closer than 1400m from
			the fairlead and to keep the hook as near to the bottom as possible
6		04:16	Olympic Hercules J hooks chain. # 6 Winch commences hauling in to maintain tension.
6		04:20	Olympic Hercules starts to chase out to anchor
6		04:21	# 6 Winch all stop at 200mt tension
6		04:55	Olympic Hercules reports they have come off the chain
6		05:22	Olympic Hercules starts J hook run
6		05:29	Olympic Hercules J hook engaged on chain - Commences chasing out to anchor.
6		06:40	Olympic Hercules on anchor
6		07:05	Olympic Hercules applies 130 mt to Anchor and proceeds to attempt to break out
6		07:18	Olympic Hercules reports 151 mt of tension on his winch. Still not broken out.
6		07:27	Pilot house instructs Hercules to pull in his work wire 10 metres
6		07:50	Olympic Hercules reports he has 1136m of work wire out and is still pulling 150mt
6		08:00	Pilot house instructs Hercules to pull in his work wire another 10 metres
6		08:23	Bourbon Dolphin prepares to come into port side at #6 to pass chaser down onto his deck
6		08:45	Bourbon Dolphin enter's 500 m zone to Port aft leg to receive broken chaser collar

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6	08:55	Olympic Hercules increases power to 160 mt
6	09:00	PCP passed down onto Dolphin. Dolphin now prepares his J hook.
6	09:17	Pilot house instructs Hercules to pay out 20 metres to 1158m and to keep the tension on @ 150mt
6	09:55	Bourbon Dolphin deploys his J hook.
6	10:25	Dolphin now crossing over position of chain now.
6	10:33	Dolphin reckons he is J hooked onto # 6, he is reading 50 mt tension. Now proceeding to run down the chain.
6	10:40	Dolphin reports he has 996 metres of work wire deployed
6	11:10	Dolphin reports he has 1288 metres of work wire deployed with 30mt, chasing out.
6	11:15	Dolphin maintains his current position and proceeds to retrieve work wire to 1000 metres
6	11:25	Dolphin reports at 1000m workwire and 160mt
6	11:29	Hercules commences hauling in on his workwire. Thinks anchor may have jumped loose. Tension 150 mt
6	11:35	Rig slacks off # 2 anchor from 200 mt to 185 mt
6	11:36	Anchor # 6 off the bottom
6	11:38	Hercules starts to retrieve his wire to 800m. Dolphin try's to get off his J Hook
6	11:50	Dolphin has zero tension now on his workwire and starts to recover
6	11:53	Hercules confirms he has 180 mt tension on his workwire.
6	11:57	Hercules all stopped @ 800 metres of workwire and 190 mt
6	12:05	Rig commences heaving in wire on # 6
6	12:06	Hercules retrieving wire to 400 metres
6	12:10	Hercules wire @ 700 metre's. Tension @ 200mt
6	12:40	Bourbon Dolphin reports J Hook on deck and now preparing Grapnel
6	12:41	Commence stage 4. Hercules hauling in to 50 metres, rig hauling to 400 metres
6	12:43	# 6 at 2700 metres and continues heaving
6	12:58	Hercules Stopped at 50 metres
6	13:00	Dolphin reports his Grapnel is ready.
6	13:47	# 6 winch at transition point.
6	13:53	Dolphin deploys his Grapnel for # 6 chain
6	14:25	Dolphin has 80mt of tension on his grapnel with 50 metre's of wire out and stationary, holding position.
6	14:33	Hercules has 85mt with 55 metres out. Starting to recover anchor to his deck
6	14:42	Hercules decks anchor # 6
6	14:56	Hercules Reports everything okay with anchor # 6
6	15:03	Hercules reports his J Hook with roller is damaged. Anchor is secure.
6	15:12	Dolphin prepares to disengage the Grapnel from the chain
6	15:33	Bourbon Dolphin confirms his grapnel is now off the chain
6	15:35	Hercules starts to recover chain extension.
6	16:30	Hercules informs pilot house that chain extension is recovered and rig gets prepared to retrieve the chain.
6	16:45	Deck crew @ transition deck changing over from wire to chain.
6	17:10	# 6 Transition operation suspended due to Helicopter operations.
6	18:20	Commence transition again on # 6
6	18:56	# 6 Transition complete.
6	19:00	Hercules now informs us chain extension is not yet lockered, and is instructed to locker chain.
0	19:36	Bourbon Dolphin comes into stb side to pass up pennent wire.
6	19:41	Olympic Hercules has chain extension lockered - Commence splitting rig chain connection.
0	19:48	Pennent from Bourbon Dolphin passed up to rig.
0	19:49	Bourbon Dolphin put to standby.
6	19:56	# 6 chain now split and secured to Hercules work wire
6	20:02	# 6 Commences hauling in
6	20:25	# 6 All stop due to twists in chain.
6	20:44	# 6 Recommences hauling in
6	21:07	# 6 All stop at 25m from bitter end to change kenter link.
6	21:14	# 6 chain in devils claw
6	22:15	Completed replacing kenter link @ 25 metre's from anchor end (Ser no : HN 696349/29)
6	22:25	# 6 commences paying out chain to hercules.
6	22:30	Completed paying out 75 m chain to Hercules inorder for PCP to be connected to chain end.
6	22:33	PCP passed to Hercules.
6	22:45	PCP connected to # 6 chain
6	22:52	# 6 PCP passed to crane
6	22:55	# 6 PCP secured to rig.

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2		23:12	# 2 Starts hauling in to pick up tension.
2		23:20	# 2 All stop chain tensioned ready for J hook ops
	29/03/2007		
2		00:15	Olympic Hercules starting J hooking for # 2 chain
2		00:35	2nd run unsuccessful
2		01:00	3rd run unsuccessful
2		01:07	J hook on chain on 4th run.
2		01:15	Hercules commences chasing out on chain.
2		01:21	# 2 hauls in to keep up tension
2		01:22	# 2 all stop - 180mt tension
2		01:28	Bourbon Dolphin instructed to get ready to J hook # 2.
2		01:56	Hercules at the anchor. 1303m w/wire deployed and 120mt tension
2		02:05	# 2 Slacks off tension
2		02:06	# 2 Winch at 180mt tension. Hercules instucted to lift anchor
2		02:08	# 2 slacks off tension to maintain 180mt tension
2		02:55	# 2 Anchor tension drops off to 145mt - Anchor believed to be off bottom.
2		02:56	Hercules confirms anchor off bottom and starts recovering w/wire to 800m
2		03:00	Bourbon Dolphin instructed to rig up grapnel.
2		03:14	# 2 Winch commences hauling in
2		03:28	Hercules stops recovering w/wire at 700m - 150mt tension
2		03:35	# 2 winch jumped out of gear causing wire on drum to slack off. All stop hauling in while slack wire on drum rectified.
2		04:27	Problem with selecter shaft # 2 Winch. Shaft needing replacing.
2		09:45	Winch # 2 function tested and commence hauling in on rig wire again. Length out = 3148 metres
2		09:45	Hercules takes his tension up to 215 mt then commence hauling into 400m of workwire2
2		09:55	All stop on # 2 winch. Hercules stops hauling and eases off on the power.
2		10:00	Winch operator notifies pilot house that repairs will take 1 to 2 hrs. (Repairs took 5.5 hrs)
2		15:40	Hauling in on # 2 winch again, testing. Hercules takes his tension up to 215 mt to relieve tension
2		15:43	All stop on # 2 winch. Hercules stops hauling and eases off on the power.
2		15:53	Recommencing hauling in on # 2 winch
2		15:54	# 2 winch shut down, stopped hauling due to high tension
2		16:00	Re commence hauling in on # 2 again very slowly
2		16:01	Hercules instructed to take his wire up to 550 metre's
2		16:06	Hercules instructed to take his wire up to 400 metre's
2		16:06	Hercules instruted to stop, seems to a problem with # 2 again.
2		16:17	# 2 winch shutdown again due to mechanical failure
2		16:30	Paying out 20 / 30 metre's to relieve tension for maintenance
		20:55	Bourbon Dolphin released for crew change in Scalloway. ETA 03:00 30/03/07
			R.O.B's
			L.O. 35185 lt F.O. 746 m³ P.W. 237 m³
	30/03/2007		
0		02:25	Olympic hercules instructed to reduce power to help rig position over wellhead.
2		09:10	Commence function testing of winch # 2
2		09:20	All stop function testing. More weld required on the shaft to number 2 winch.
0		11:20	Commence de ballast to survival draft
0		11:30	Bourbon Dolphin back on location F.O. 719 m³ L.O. 35185 Litres F.W. 234 m³
2		11:38	Commence hauling in on # 2 winch
2		12:06	# 2 stopped for winch check
2		12:11	Hercules reports # 2 anchor at the roller
2		12:15	Pulling in slowly again on # 2
0		12:40	De Ballast complete @ survival 18.4m
0		13:15	Commende de ballast to 17.4 metres to visually aid winch operators at fairleads.
2		13:45	Still pulling in on # 2, approx 300 metres to end of wire.
2		13:45	Bourbon Dolphin prepares his grapnel ready to hook onto # 2 chain to load share.
2		13:46	All stop # 2 winch
2		13:48	Commence hauling again on # 2 winch
0		14:00	Stopped de ballast @ 17 metres
2		14:30	Winch # 2 @ transition point. All stop
2		14:30	Olympic Hercules instructed by towmaster to come up to 180mt

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2		14:32	Bourbon Dolphin paying out to 350 metres with grapnel to hopefully hook the stretched chain
2		14:55	Bourbon Dolphin reports he has J hooked # 2 chain
2		15:20	Dolphin has now 90mt tension on his grapnel. Hercules proceeds to deck anchor # 2
2		15:23	# 2 Anchor decked on Hercules
2		16:20	Dolphin lowers grapnel and Hercules starts to locker the chain extension for # 2.
2		16:35	Dolphin's grapnel is now released from the chain
3		16:45	Bourbon Dolphin prepares and rigs his J Hook for number 3 chain
2		16:51	Hercules has 410 metres of chain lockered so far
3		17:10	Picking up tension on # 3 to help Bourbon Dolphin to J Hook
3		17:22	Bourbon Dolphin lowers his J hook for number 3 chain.
2		17:25	Hercules has chain extension lockered and has the chain in his jaws
2		17:28	Picking up on # 2 chain to land in the devil's claw.
2		17:30	Lowering # 2 chain in the hook to disconnect wire at transition
2		17:55	Transition Complete. Commenced hauling in on # 2 chain
3		18:00	Bourbon Dolphin is J hooked onto # 3 chain and now chasing out to anchor.
2		18:25	All stop hauling on # 2 chain, changing Kenter link
3		18:35	Dolphin 165 mt tension and speed 0. Thinks he's at the anchor. Instructed to keep tension on for now.
3		19:00	Dolphin instructed to start trying to break out #3 anchor and recover to stern roller
3		19:13	Dolphin reports tension dropped to 30mt
2		19:14	# 2 chain in devils claw. Commence changing out Kenter link.
3		19:19	Dolphin commences recovering w/wire
2		19:45	New kenter link connected 300m from end of # 2 chain. Ser. No. ES629049/7
3		19:49	Borbon Dolphin reports J hook recovered to deck and J hook has snapped.
2		19:50	# 2 commences hauling in
2		20:01	# 2 All stop at next kenter to change link
2		20:26	2nd Kenter link changed out # 2 chain recommces hauling in. New link ser.no.ES629049/4 fitted 123m from end of chain.
2		20:31	# 2 All stop - 50 m chain out.
2		20:34	# 2 PCP passed to boat.
2		21:00	# 2 Pays out 10m to Hercules
2		21:23	Hercules completed connecting PCP to # 2 chain.
2		21:25	# 2 hauls in.
2		21:26	# 2 All stop.
2		21:27	# 2 PCP passed to crane.
2		21:31	# 2 PCP secured to rig
2		21:33	J Hook picked up from Hercules
2		21:40	Bourbon Dolphin enters 500m zone to pass back damaged J Hook and collect good one.
0		21:47	Transfer to Bourbon Dolphin complete.
0		21:58	Pot water hose passed to Plympic Hercules.
0		22:06	Hercules starts P.W. pump.
3		22:09	Dolphins connected J hook and commences paying out w/wire
3		22:10	# 3 winch commences picking up tension to 195mt.
3		22:31	# 3 All stop
3		22:40	Dolphin attempting to J hook chain
3		23:00	Dolphin starts 2nd J hook run.
0		23:06	Hercules stops PW pump. Rig received 90mt
3		23:20	Spooling gear on # 3 Storage winch failed.
3		23:23	Dolphin reports J hook on # 3 chain.
3		23:30	Dolphin starts chasing out to anchor
3	31/03/2007	00:04	Dolphin rep[orts to be on the anchor. 1154m w/wire deployed.
3		00:10	Dolphin instructed to try lift anchor - Max 150mt tension
0		00:14	P.W. hose recovered from Hercules.
3		00:35	Dolphin Instructed to heave in 20m of w/wire
3		00:52	Dolphin instructed to increase tension by 10mt
3		00:59	# 3 hauls in 2 m
3		01:06	Dolphin reports anchor believed to be off bottom
3		01:10	Dolphin confirms anchor off bottom and is instructed to haul in w/wire to 900m
3		01:20	Dolphin's w/wire at 900m. Standing by waiting on storage winch trouble shooting.
3		10:44	Spooler on # 3 traction storage winch fixed and ready to go. Dolphin instructed to haul anchor up to his aft roller.

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3		10:53	Hauling in on # 3 winch. Dolphin has 720 metres of work wire out. Dolphin recovering some work wire back.
3		11:06	Dolphin has 400 metres out and still spooling in
3		11:17	Dolphin has the # 3 anchor at his stern roller
3		11:40	Dolphin has 170 mt tension at his winch
3		12:05	Dolphin instructed to increase power to 180 mt
3		12:08	Dolphin instructed to increase power to 190 mt
3		12:17	Dolphin has180 mt tension, speed 1.7 kts and asked to decrease tension to 170 mt
3		12:25	Hercules starts to lower his grapnel in preparation for hooking into # 3 chain
3		13:00	Winch # 3 all stop and secure at transition point. Dolphin instructed to increase power to 200 mt
3		13:20	Olympic Hercules hooked onto chain.
3		13:25	Olympic Hercules has 90 mt of tension. Bourbon Dolphin has started to deck anchor
3		13:37	Dolphin has anchor secured on deck.
3		15:10	Dolphin is now lockering chain extension. Hercules instructed to let go of chain with his grapnel
3		15:25	Olympic Hercules off the chain
3		16:34	Bourbon Dolphin has lockered all the chain extension. Deck crew now beginning to disconnect the chain from the wire
3		17:20	Transition Complete. Callibrating anchor monitor in BCR
3		17:28	Hauling in on # 3 chain.
3		17:48	All stop on # 3 winch due to twists on the chain
3		17:55	Re commence hauling in again on # 3 chain. 300 metres to go
3		18:00	All stop hauling on # 3 chain. Taking twists out of chain.
3		18:28	# 3 Pennent passed to Dolphin.
3		18:55	# 3 PCP passed to crane
3		18:57	# 3 PCP secured to rig
7		19:15	Dolphin has J hook over roller.
7		19:20	Picking up tension on # 7 to 190mt
7		19:35	Dolphin commences 1st J hook run
7		19:50	Dolphin commences 2nd J hook run
7		20:19	Dolphin commences 3rd run.
7		20:36	Dolphin commences 4th run
7		20:41	Dolphins J hook engages chain. Commences chasing out to anchor.
7		21:16	Dolphin believed to have picked up bite in chain.
7		21:27	# 7 heaves in to try and pull bite from chain.
7		21:36	# 7 all stop at 190 mt
7		21:40	# 7 heaves in to maintain tension.
7		21:58	# 4 paying out to ease tension on # 7
7		22:08	# 4 All stop.
7		22:19	Dolphin has 190mt tension on w/wire. Pilot house instructs Dolphin to sit on anchor for 1 hour to see if tension eases
			anchor out.
7		23:15	Dolphin unable to lift anchor. Hercules asked to prepare to J hook chain inorder to assist lifting anchor.
7		23:55	Hercules starts lowering J hook
7	01/04/2007	00:18	Hercules has 1100m w/wire out. Commences to J hook chain
7		00:44	Hercules J hook on chain. Commences chasing out
7		01:19	Bourbon Dolphin has anchor off bottom. Recovering w/wire to 800m to confirm
7		01:30	Dolphin w/wire at 800m.
7		01:31	Hercules instructed to disengage J hook from chain
7		01:38	hercules off chain.
7		01:40	Dolphin instructed to haul in w/wire till anchor 50m off stern roller
7		01:46	# 7 commences hauling in
7		02:11	Dolphin has anchor 50m below stern roller at 150mt tension
7		02:13	Dolphin asked to increase power by 10%
7		02:28	# 7 Winch 1100m to go
7		03:05	# 7 Winch 600m to go
7		03:36	# 7 Winch 100m to go.
7		03:59	# 7 at transition point
7		04:00	Dolphin asked to increase power by 10%. Olympic Hercules asked to come in and grapple chain.
7		04:06	# 7 Anchor at stern roller of Dolphin
7		04:09	Hercules attempts to grapple chain
7		04:17	Hercules grapple on chain

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7		04:21	Hercules has picked up wieght on chain. Dolphin instructed to ease back on power and deck anchor.
7		04:29	Dolphin reports # 7 anchor secured on deck. Instructed to disconnect anchor and locker chain extension.
7		04:30	Hecules instructed to disengage grapple from chain.
7		04:41	Hercules disengaged from # 7 chain. Instructed to go to standby.
7		05:30	Dolphin reports damage to # 7 stevpris anchor and unusable swivel.
7		07:50	Dolphin has # 7 chain extension lockered. Deck crew working at transition.
7		08:21	Chain in the devils claw
7		08:45	Transition complete
7		08:47	Hauling in on # 7 chain
7		08:50	All stop hauling at # 7. Dolphin not ready.
7		09:05	# 7 recovering chain again
7		09:12	Stopped to change out kenter link. (Had to gas axe off) Ser no: ES-629049/23
7		10:10	Re commence hauling in on # 7 again
7		10:20	Stopped at next kenter link to change. (Had to gas axe off) Ser no: ES - 629049/14
7		10:55	Kenter changed. Re commence hauling in on # 7 chain
7		11:10	All stop # 7 to pass PCP to Bourbon Dolphin
7		11:20	No 7 PCP/ Roller chaser passed down to the Dolphin
7		12:20	Hauling in on # 7 chain again to the end
7		12:25	All Stop hauling in on # 7. Chain end back to rig
0		12:26	Olympic Hercules reports his own 250t J Hook has crack on it on one side. Also the swivel for the J hook is damaged.
			Also reported that Stevpris # 6 anchor master shackle and adapter link is stretched and not to be used again
7		12:35	# 7 PCP passed back to the rig
7		12:38	# 7 PCP secured on rig. Dolphin advised to check his equipment on deck
0		13:00	Bourbon Dolphin exits 500m to st/by and advises his Swivel is damaged.
			Waiting on other three anchor boats to arrive to proceed with operations.
6	02/04/2007	15:40	Testing operation of # 6 winch
0		18:15	Highland Valour on location F.O. 674 m³ L.O. 33000 Litres F.W. 445 m³
0		18:35	Highland Valour enters 500m zone to starboard side
0		18:49	X-fers from Valour to rig complete. Valour pulls off.
0		18:50	Olympic Hercules enters 500m zone.
0		18:53	Bourbon Dolphin enters 500m zone.
0		18:58	X-fer of swivel to Olympic Hercules complete. Hercules pulls off.
0		19:01	X-fer of swivel to Bourbon Dolphin complete. Dolphin pulls off.
0		19:03	Hercules exits 500m zone
0		19:05	Highland Valour approaches stb side for cargo ops.
0		19:07	Dolphin exits 500m zone
0		19:10	Sea Lynx on location
0		19:27	Sea Lynx reports she has no Nav. Package onboard.
0		19:30	Highland Valour pulls round to port side for cargo ops.
0		19:40	Vidar Viking on location.
0		19:59	Vidar Viking enters 500m zone
0		20:08	Highland Valour cargo ops complete.
8		21:18	Bourbon Dolphin begins J hook operations on # 8
8		21:47	Dolphins J hook engages # 8 chain
0		21:55	Vidar Viking along stb side to x-fer J hooks etc.
0		22:04	Vidar Viking completes x-fer and pulls away
0		22:05	Olympic Hercules enters 500m zone to pick up J hook.
0		22:13	X-fer to Hercules complete.
8		22:30	Dolphin at anchor also # 6 anchor winch has leaking brake caliper repaired and ready to go.
8		22:38	Dolphin instructed to attempt to lift anchor.
4		22:43	Hercules instucted to prepare J hook for # 4
8		23:14	Dolphin reports # 8 off sea bed
8		23:20	Dolphin confirms anchor off sea bed with 900m w/wire at 110mt tension
4		23:22	Hercules J hook engaged on # 4 chain
4	03/04/2007	00:08	# 4 Hauls in to pick up tension
4		00:12	# 4 All stop at 190mt tension.
4		00:13	Hercules chases out on # 4
4		00:40	Hercules stopped moving forward with 140mt tension with 1150m of chain out.

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4	01:04	Hercules still unable to chase out to anchor. Stripping back to try again.
4	01:12	# 4 Hauls in to pick up tension.
4	01:16	# 4 All stop at 190 mt tension.
4	01:17	Hercules commences chasing out to # 4 anchor again.
4	01:21	# 4 Hauls in 10m.
4	01:43	Hercules reports to be on anchor # 4 with 1164m w/wire deployed
4	01:46	# 4 detensions to 160mt
4	01:47	Hercules instructed to attempt to lift anchor
0	01:50	Highland Valour w/wire to tension.
0	02:03	Commence Deballasting rig
4	02:14	Hercules reports anchor off bottom.
4	02:28	Hercules has w/wire at 900m and 100mt tension
0	02:30	Vidar Viking has 1700m of w/wire to heave in under tension.
0	03:50	Highland Valour reports ready to anchor handle and is instructed to rig up and J hook # 1.
0		Vidar Viking completed tensioning w/wire. Sea Lynx to tension w/wire with Vidar Viking
0	05:00	Deballasting rig complete at 9.6m draft
1	05:05	Highland Valour on # 1 chain.
1	05:17	Highland Valour chasing out
1	06:30	Highland Valour at # 1 anchor
1	06:31	# 1 Winch detensions.
1	06:32	# 1 Instructed to stop. Checking to see if Valour is at anchor.
1	06:35	# 1 Winch instructed to detension.
1	06:36	Highland Valour increases power.
1	06:38	Highland Valour attempts to lift/ unseat anchor.
0	07:00	Sea Lynx instructed to come round to the fore end of the rig to attach to tow bridle
5	07:15	Vidar Viking has deployed his J hook and making a pass at # 5 anchor chain.
5	07:31	Vidar Viking reports he thinks he is J hooked to # 5 chain and starts to chase out to number 5
8	07:32	Bourbon Dolphin reports anchor # 8 just sitting under the stern roller
0	07:37	Sea Lynx connected to bridle and paying out 300 metres of work wire with minimum tension on work wire
4	07:40	Hercules hauling in anchor # 4. 300 metres to go to stern roller
4	07:50	Commence recovering # 4 wire
8	07:50	Commence recovering # 8 wire
1	07:52	Highland Valour has 150/160 mt tension and 1150 metres of W, wire out and still trying to unseat # 1 anchor
1	08:15	Tension has dropped off from Valour from 165 down to 30mt. May have unseated anchor
8	08:17	Dolphin has broken his J, hook with 150mt tension. # 8 winch continues hauling. Dolphin changes J Hook.
5	08:20	Vidar Viking also lost tension
4	08:22	Stop hauling in on # 4 anchor, hercules instructed to lower anchor onto bottom.
8	08:22	All stop on # 8 winch due to wire rubbing on bolster
4	08:30	Hercules applying more power due to # 4 anchor wire rubbing the bolster. Spooling broken on # 4 storage winch
5	08:33	Vidar Viking reckons he is chased out to Anchor # 5. 130mt tension. Instructed to stay there meantime.
4	08:35	Wire # 4 wire off the bolster now
8	08:36	# 8 wire reported to be off the bolster. All stop on # 8 winch. B.E. Reported vibration at winch
1	08:45	Highland Valour retrieves his work wire. J. Hook definitely off the chain
8	09:10	Bourbon Dolphin has just started to deploy his wire and roller J hook
1	09:10	Highland Valour recovered his work wire and reported his 250mt J hook is also broken
1	09:25	Highland Valour instructed to come alongside and pass up the spare 150mt J Hook and receives 250mt J Hook from the rig
4	09:30	# 4 Storage winch spooler repaired and ready to go.
8	09:30	Dolphin reports wire deployed and standing by. Pilot house instructs to just hold position.
4	09:34	Hercules has deployed 1050 metres of work wire and increase tension on # 4
8	09:36	Dolphin instructed to make a pass at # 8 chain.
0	09:45	Highland Valour Alongside Rig on stbd side, passing J Hooks
1	09:50	Highland Valour pulls off and rigs up the 250 mt J Hook
1	10:10	Valour runs out his workwire in preparation to J hook # 1 again
8	10:18	Bourbon Dolphin hooks onto chain and now chasing out to anchor # 8 again
1	10:33	Valour proceeds to make a pass for # 1 chain
1	10:47	Highland valour has J hooked # 1 chain again and proceeds to chase out to anchor
8	11:00	Dolphin now recovering his work wire and # 8 anchor to his stern roller
8	11:05	# 8 traction winch commence hauling in again.

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8	11:07	# 8 all stop due to wire slipping on the traction winch due to lubrication on wire. Waiting until Dolphin can ease the tension
1	11:20	H. Valour has 1120m of wire out and 50 t tension. Lot of vibration on rig as he chases out to # 1 anchor
8	11:35	Commence hauling in on # 8 winch. Dolphin has 180 metres of wire out still hauling in also.
4	11:35	Commence hauling in on # 4 winch
1	11:40	Highland Valour reckons he is now at anchor # 1. Keeping on the tension to make sure.
4	12:10	All stop on # 4 winch. Waiting on Hercules to take up tension. 170 mt tension. Wire on the bolster
8	12:12	Dolphin reports anchor at stern roller. 165 t tension
4	12:15	Hauling in on # 4 anchor wire again. Wire off the bolster. Hercules has 180t tension
8	12:20	Approx 550m of wire still to pull in on # 8
4	12:20	Approx 850m of wire still to pull in on # 4
8	12:40	All stop at # 8. Wire slipping again
8	12:50	# 8 Hauling in again and asked Dolphin to reduce power to ease tension a bit to 185 mt
8	13:00	# 8 winch all stopped as anchor chain is slipping through Dolphins J Hook. Dolphin maintains power at 195mt
4	13:23	All stop on # 4 due to slack wire rope alarm
8	14:05	Dolphin reports the vessel moved aft, looks like chaser collar is slipping through the chain. Tension 180 mt
8	14:10	Dolphin instructed to come clear of the chain with his J Hook, now slacking out his work wire.
8	14:12	Dolphin instruted to stop paying out. Has paid out 270 m of wire. Reduce tension to a minimum and stand by. Tension 10t
0	15:35	Conference Call with town to discuss way forward as high tension of 380mt on # 8 rig winch.
5	16:30	Vidar Viking instructed to come off the anchor and chase back to the rig
8	16:35	Dolphin instructed to move ahead and paying out his work wire as he goes. Plenty clearance at # 8 bolster.
8	16:37	Tension on # 8 anchor dropping. 315t at present.
5	17:06	Vidar Viking off the Anchor and chasing back to rig
8	17:20	Dolphin has 610 m of wire out and 20mt
8	17:30	Dolphin has 720 metres and 20mt
5	17:31	Vidar Viking's J hook is off the chain and notified to standby with work wire deployed.
8	17:53	Dolphin has 900 metre's of wire out and 30 mt tension and still moving ahead and paying out work wire
8	18:05	Vidar Viking instructed to come around and stand off the port fwd bow.
8	18:12	Dolphin has 1000 metres out and tension of 30 mt
0	18:14	V. Viking instructed to proceed to the rig's starboard side and pick up 150 mt J-Hook. Now hauling in his work wire.
8	18:27	Dolphin has 60 mt now and has stopped, increasing power to 70 mt with 1200 wire deployed and paying out another 50 metr
8	18:36	Dolphin increases tension to 80 mt. Still stopped in the water
0	18:40	Vidar Viking along side port
0	18:45	Vidar Viking pulls off port side.
8	18:48	Vidar Viking connects up J hook to assist on # 8
8	18:50	Bourbon Dolphin increases tension to 100mt.
8	19:00	Bourbon Dolphin to increase tension to 110mt.
8	19:01	Vidar Viking pays out 500m of w/wire
8	19:08	Vidar Viking instructed to pay out to 600m and to start J hooking # 8 500m from rig.
8	19:20	Vidar Viking starts J hookin chain
8	19:50	Vidar Viking on # 8 chain
8	19:52	Vidar Viking stops 300m from Bourbon Dolphin with 20m w/wire out at 42mt tension.
8	19:54	Bourbon Dolphin believes Vidar Vikings J hook is on his w/wire not the chain.
8	19:59	Vidar Viking pays out to 600m wire to come of Bourbon Dolphins w/wire
8	20:02	Vidar Viking off Dolphins w/wire
8	20:52	Vidar Viking on # 8 chain showing 60mt tension. Rig see's reduction on anchor tension.
8	21:00	Vidar Viking believed to be on Bourbon Dolphins w/wire again. Instructed to disengage J hook.
8	21:13	Vidar Viking confirms J hook disengaged.
8	21:15	Bourbon Dolphin instructed to reduce power and try lift chain off sea bed to 100mt tension. Then lower back to sea bed and t
		to chase out to anchor.
8	21:19	Bourbon Dolphin starts moving forward.
8	21:26	Bourbon Dolphin still moving ahead. 1200m w/wire deployed 100mt tension.
8	21:55	Bourbon Dolphin at anchor?
4	22:05	# 4 Winch repaired. Resume heaving in.
4	22:32	# 4 All stop. Chain at the bolster.
8	22:55	Vidar Viking failed to J hook # 8 chain.
8	23:20	Vidar Viking attempting to J hook # 8
8	23:46	Vidar Viking reports to be on chain. 600m w/wire out at 50mt tension

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8	04/04/2007	00:10	Bourbon Dolphin chasing out on chain again.
8		00:15	Bourbon Dolphin stopped again.
8		00:20	Vidar Viking paying out wire and chasing out to Bourbon Dolphin.
8		00:30	Bourbon Dolphin moving ahead again at 2.5 kts. Believed to be on anchor.
8		00:55	Vidar Viking reports come off chain.
8		01:00	Bourbon Dolphin heaving in. W/wire at 800m. Tension 150mt. Rig tension 290mt.
8		01:15	Rig tension dropped to 190mt.
0		01:52	Vidar Viking makes her way into stb side for x-fer of faulty nav pack.
0		01:57	Faulty nav pack passed to rig.
8		01:55	J hook at stern roller of Bourbon Dolphin. Anchor not visible. Chain running through hook towards rig.
8		02:05	Bourbon Dolphin reports chain stopped. Checking for anchor in J hook.
8		02:15	Bourbon Dolphin reports heaving up and tension dropped to zero. Anchor lost.
8		02:16	Bourbon Dolphin reports J hook destroyed and swivel damaged.
0		03:02	Vidar Viking coming in to collect repaired nav. Pack and pass up a 250t and J hook.
0		03:40	X-fer to/from Vidar Viking complete.
0		03:41	Bourbon Dolphin enters 500m zone to collect 250t J hook and swivel.
0		04:00	X-fer to Bourbon Dolphin complete
0		04:05	Bourbon Dolphin exits 500m zone.
0		04:33	Vidar Viking enters 500m zone to come in to pass up 150t J hook.
8		04:44	Bourbon Dolphin has new J hook rigged up. Instructed to J hook for # 8 between 400 and 500m from rig
0		04:51	X-fer from Vidar Viking to rig complete.
0		04:55	Vidar Viking instructed to head to Scrabster at best possible speed to collect 2 J hooks. ETA 15:00
8		05:40	Bourbon Dolphin fails to J hook # 8.
8		05:41	Bourbon Dolphin again attempts to J hook # 8
8		06:47	Bourbon Dolphin reckons he has missed # 8 chain. Going to recover his work wire.
		07:15	WOW
8		07:47	J Hook on stern roller of Bourbon Dolphin.
4		08:55	Olympic Hercules begins to lower his work wire due to Westerly seas of 3.6 Sig to 4.5 Max seas and put anchor 4 on bottom
8		08:56	Number 8 anchor wire reported to be rubbing the bolster
8		08:58	Hauling in on # 8 wire to try and get the anchor chain on the bolster.
8		09:10	All stop hauling on # 8. Wire safe. Mojo at bolster
4		10:16	Olympic Hercules has anchor on the bottom and vessels head to the wind
	05/04/2007		
1		08:27	Highland Valour asked to disengage J hook from # 1 and standby to J hook # 8 with Bourbon Dolphin giving backup.
1		08:30	No Longer WOW
1		08:40	Highland Valour chasing back on # 1 chain
1		09:00	Highland Valour off # 1 chain
		10:00	Highland Valour recovers J hook to deck.
		10:20	Highland valours comes along side to pass up Grapnel.
		10:28	X-fer from Highland Valour complete
		10:30	Bourbon Dolphin comes in to collect Grapnel.
		10:35	X-fer to Bourbon Dolphin complete
8		10:52	Highland Valour commences J hook run on # 8 chain
8		11:18	Highland Valour starts 2nd run with J Hook.
8		11:51	Highland Valour fails to J hook with 850m w/wire deployed.
8		11:52	Highland Valour to deploy 1100m w/wire and start 3rd J hook run
8		12:20	Highland Valour reports J hook on # 8 chain
8		12:27	Highland Valour reports chain not in hook and starting 4th run.
8		13:03	Highland Valour trys 5 th run nearer to bolster.
		13:06	Sea Lynx asked to reduce power on tow bridle to minimum
		13:10	Sea Lynx asked to change heading to 315º
8		13:45	Highland Valour again fails to J hook # 8 chain
8		13:46	Highland Valours bringing J hook up to check all ok then to carry on attempting to J hook chain.
1		16:15	# 1 Winch paying out.
1		16:18	# 1 Winch all stop.
5		16:21	# 5 Heaving in to attempt to raise tension on # 8
5		16:29	# 5 All stop. No difference to # 8 tension
		17:25	Vidar Viking on location.

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		17:31	Vidar Viking enters 500m zone to stb side to x-fer up J Hooks and associated jewellery
		17:56	X-fers from Vidar Viking complete
		18:00	Vidar Viking has grapnel on stern roller
8		18:05	Highland Valour instructed to cease J hook operations and move clear from # 8 line
8		18:06	Vidar Viking instructed to move to a position 1400m from rig on # 8 line to prepare to grapple chain
		18:10	Sea Lynx asked to change heading to 270° and stay on minimum power.
8		18:22	Bourbon Dolphin asked to prepare grapnel as a precaution due to problems with Vidar Vikings nav pack.
8		18:24	Vidar Vikings nav pack now appears to be updating. Vidar Viking proceeding to agreed position.
8		20:45	Vidar Viking says they think they have grappled chain & will heave in
8		22:25	All stop Vidar Viking on # 8 - tension at 168mt
8		22:26	Olympic Hercules attempting to J-hook # 8
	06/04/2007		
8		03:53	Vidar Viking instructed to get off the grapple since Olympic Hercules is relatively sure they J-hooked # 8 chain
4		06:37	Olympic Hercules reports to have come off # 4.
8		07:00	Vidar Viking has grapnel at stern roller.
8		07:05	Vidar Viking has grapnel on deck attached to 76mm chain.
8		07:08	Vidar Viking reports knot in 76mm chain.
8		07:18	Vidar Viking has # 8 chain ondeck and secured in shark jaws.
8		07:35	Vidar Viking confirms chain is 76mm.
4		07:36	Olympic Hercules reports to be on # 4 chain
		07:53	Bourbon Dolphin asked to rig Grapnel and come round to port fwd of rig.
		08:13	Bourbon Dolphin ready with grapnel. Instructed to standby.
4		08:17	Olympic Hercules chasing out on # 4
8		08:18	# 8 heaving in to free mojo from bolster.
8		08:26	# 8 mojo free from bolster.
		08:27	Commence ballasting rig to 17m draft
8		08:40	Vidar Viking has cut knot from # 8 chain. Kenter link fitted. Ser. No. 671. 120t shackle on grapple changed due to wear.
8		08:44	Vidar Viking fishing # 8 anchor to haul onto stern roller.
4		08:55	Olympic hercules reports J hooks come off # 4 chain.
8		09:05	# 8 Anchor at Vidar Viking stern roller.
8		09:24	Bourbon Dolphin approaching to grapple # 8 chain astern of Vidar Viking
4		09:40	Olympic Hercules inspects Jhook and swivel. J hook ok swivel useable but showing signs of wear.
		10:10	Rig at 17m draft
4		11:12	Olympic Hercules fails to J hook # 4. Instructed to continue trying.
8		11:24	# 8 Anchor decked and secured to Vidar Viking
8		11:34	Highland Valours J hook disengaged from # 8 chain. Instructed to standby to assist Olympic Hercules
		11:49	PCP x-ferred to rig from Highland Valour.
4		11:54	Olympic hercules again fails to J hook chain # 4 trying again.
8		12:03	Vidar Viking has # 8 anchor diconnected and starts to recover chain.
8		12:04	Bourbon Dolphin instructed to disengage J hook from chain
8		12:16	Bourbon Dolphin Off chain. Instructed to standby.
8		12:27	Vidar Viking reports # 8 anchor OK. 350m of chain extension still to recover.
4		12:39	Olympic Hercules fails to J hook # 4 chain and recovers J hook to deck and starts to rig up grapnel.
8		12:42	Vidar Viking at joining link between chain ext. and rig chain.
4		12:52	Olympic Hercules has grapnel rigged.
4		12:54	Olympic Hercules instructed to grapnel 950m from rig
8		12:58	# 8 Heaving in to transition point
8		13:02	# 8 Chain in devils claw.
8		13:03	Vidar Viking has w/wire connected to rig chain.
4		13:04	Olympic Hercules instructed to grapnel 1100m from rig
8		13:18	# 8 Transition complete. # 8 Winch heaving in to recover rig chain.
8		13:55	# 8 All stop - 115m chain out. Waiting on Port crane to pass pennant down.
4		14:45	Olympic Hercules fails to grapple Chain. Tries again
4		15:18	Olympic Hercules commences 4th grapnel run
		15:51	Port crane back in operation.
8		15:52	Vidar Viking comes along port side to collect pennant
		16:09	X-fers from Vidar Viking complete
8		16:16	# 8 Winch heaving in remaining chain.

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8		16:20	# 8 All stop
8		16:22	# 8 PCP passed to rig
4		16:24	Olympic Hercules grapnel on # 4 chain. Instructed to heave in w/wire
8		16:27	# 8 PCP secured to rig
		16:50	Vidar Viking has damage to grapnel. Instructed to remove grapnel and rig up J hhok.
4		16:51	Olympic Hercules has 100m w/wire left to recover at 110mt tension
4		17:09	Olympic Hercules has # 4 chain on deck.
4		17:14	Olympic Hercules confirms chain on deck is 78mm
		17:35	Sea Lynx instructed to change heading to 240° and increase power to 30%.
4		17:44	Olympic Hercules has connected up J hook and starts to fish for anchor.
		17:50	sea Lynx reduces power to 25%
4		17:51	Olympic Hercules reports chain adapter between swivel assembly and grapnel has parted (76mm chain) No injuries or other
			damage. Chain still secure.
4		19:40	Olympic Hercules reports they have lost # 4 anchor & will start to locker chain
1		20:00	Highland Valour instructed to J-Hook # 1 chain
5		20:00	Vidar Viking instructed to J-Hook # 5 chain
5		21:35	Vidar Viking J-Hooks # 5 chain and will chase to # 5 anchor
4		21:55	Olympic Hercules starts to locker chain
5		22:10	Vidar Viking at # 5 anchor and instructed to Stand By
4		22:53	Start hauling in on # 4 wire
4		23:20	All stop hauling in on # 4 wire - at transition point
4		23:45	Transition complete - hauling in on # 4 chain
4		23:55	Temporarily stop heaving in on # 4 chain
	07/04/2007		
1		00:01	Heaving in on # 1 wire to add tension for Highland Valour to J-Hook # 1
1		00:06	All stop heaving in on # 1 wire
4		00:08	Resume heaving in on # 4 chain
4		00:40	All stop heaving in on # 4 chain with 80m out
1		00:41	Highland Valour reports that they have J-Hooked # 1 chain & will chase to # 1 anchor
4		00:43	# 4 PCP passed to Olympic Hercules
1		01:30	Highland Valour reports that they think they "broke something" & will retrieve work wire to investigate
4		01:35	Heave in on # 4 chain
4		01:40	All stop heaving in on # 4 chain with app. 25m out
4		01:43	# 4 PCP back on rig
1		02:15	Highland Valour reports she has a Failed J-Hook
		02:37	Rig passes another J-Hook to Highland Valour on stbd. side
1		03:05	Highland Valour connects new J-Hook and passes it over her roller and will try to J-Hook # 1 chain
1		03:40	Highland Valour thinks they have J-Hooked # 1 chain & will chase out to # 1 anchor
1		04:20	Bourbon Dolphin instructed to go to # 1 and J-Hook # 1 chain
5		06:30	Olympic Hercules instructed to go to # 5 and J-Hook # 5 chain
1		07:22	Bourbon Dolphin in position 300m from Highland Valour. Highland Valour has 1250m w/wire out and 100mt tension.
			Bourbon Dolphin has 900m of w/wire out and is raising chain to assist Highland Valour.
		07:24	Sea Lynx instructed to increase power to 35%.
5		07:35	Olympic hercules reports J hook engaged on # 5 chain.
		08:00	Highland Valour has 1250m w/wire deployed with 150t tension. Bourbon Dolphin has 750m of w/wire deployed with 35t tensi
		08:00	Commence deballasting rig to transit.
1		08:08	Bourbon Dolphin asked to verify still on # 1 chain.
1		08:15	Bourbon Dolphin reports hook is off # 1 chain
1		08:20	# 1 winch hauling in to pick up tension.
5		08:30	Olympic Hercules in position to assist breakout of # 5 anchor.
5		08:36	Olympic Hercules reports hook has come off chain. Preparing to J hook again.
1		08:50	Bourbon Dolphins J hook back on # 1 chain. Commence chasing out to anchor.
5		09:15	Olympic Hercules J hook back on # 5 chain. Commence chasing out to anchor.
1		09:24	Bourbon Dolphin reports J hook has come off # 1 chain again.
5		09:30	Olympic Hercules holding position 700m from # 5 anchor.
1		10:00	Bourbon Dolphin back on # 1 chain chasing out to anchor again.
		10:20	Completed deballasting rig. 10.2 m draft.
1		10:36	Bourbon Dolphin 1100m from # 1 anchor unable to chase out further. Instructed to heave in w/wire to 1000m.

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1	11:13	Highland Valour instructed to start breaking out # 1 anchor.
1	11:15	Bourbon Dolphin 800m from #1 anchor.
1	11:17	Bourbon Dolphin instructed to haul in wire 950m
1	11:20	Bourbon Dolphin instructed to heave in w/wire to 900m
1	11:26	Highland Valour at 1100m of wire with 130t tension. Instructed to pay out 100m. Bourbon Dolphin instructed to slack out wire
		and try to chase out closer to anchor.
1	11:30	Highland valour instructed to stop paying out at 1150m wire and to wait to see if Bourbon Dolphin can get closer.
5	11:39	# 5 commences hauling in to pick up tension.
5	11:41	# 5 All stop. No difference to # 8 tension
5	11:56	Olympic Hercules informs pilot house the reason they are unable to chase out is they have the locking J hook fitted.
		They are instructed to remove locking hook and fit normal J hook.
	12:04	Sea Lynx instructed to increase power to 60%
1	12:05	Bourbon dolphin at 800m w/wire with 130t tension. Instructed to raise w/wire 50m
1	12:09	Bourbon Dolphin at 750m w/wire with 150t tension
		Highland Valour at 1104m w/wire with150t tension.
	12:20	Port leg of tow bridle snapped. Sea lynx asked to reduce power to minimum.
	12:22	Sea lynx asked to come astern to the rig port bow.
1	12:25	Bourbon Dolphin instructed to try and chase closer to Highland Valour.
	12:34	Sea Lynx instructed to come back to rig recovering wire and prepare to pass tow bridle back to rig.
	12:50	Sea Lynx instructed to deck fish plate.
	12:56	Sea Lynx asked to remove lead pennant from fish plate.
	13:02	Sea Lynx informs rig they cannot disconnect lead pennant
	13:06	Sea Lynx asked if it is possible to cut the shackle out.
1	13:07	Bouborn Dolphin stops making way with 1150m w/wire deployed and 150t tension
1	13:12	Bourbon Dolphin recovers 50m of tow wire.
1	13:13	Highland Valour instructed to try break out anchor.
1	13:16	Highland Valour instructed to cease trying to break out anchor and have no more than 100t tension till tow bridle sorted out.
		Bourbon Dolphin instructed to try again to chase out closer to highland Valour.
1	13:17	Bourbon Dolphin instructed to pick up another 50m on w/wire.
1	13:24	Bourbon Dolphin instructed to pick up another 50m on w/wire.
	13:24	Sea Lynx instructed to cut pear link and then pass fish plate back to rig.
1	13:29	Bourbon Dolphin reports chasing out on chain
1	13:34	Bourbon Dolphin reports come to a halt on the chain at 65% power and 160t tension. Instructed to slowely pay out wire and s
		if they can resume making way.
1	13:51	Bourbon Dolphin has payed out w/wire to 1130m and has 150t tension still trying to make way
5	13:59	Olympic Hercules J hooks # 5 chain and commences chasing out.
1	14:00	Bourbon Dolphin increase's power by 5 % to try and chase out.
1	14:10	Bourbon Dolphin stops again. Heaves in to try to move forward.
5	14:25	Olympic Hercules reports 988m of w/wire out and 0 tension believed to of come off chain.
		Instructed to J hook again
1	14:34	Bourbon Dolphin reports tension of 160-170t and has come to a stop.
	14:36	Sea Lynx has cut pear link and ready to pass back fish plate
	14:46	Rig ready to receive fish plate.Sea Lynx instructed to come closer to rig before releasing fish plate.
	14:51	Sea Lynx releases fish plate and passes bridle back to rig.
1	15:12	Bourbon Dolphin cannot make way. Instructed to come back 300m and lift hook.
1	15:34	Bourbon Dolphin has 120t tension with 900m w/wire out. Commences chasing out on # 1
5	15:44	Olympic Hercules J hook on # 5 chain. Commences chasing out.
	16:01	Rig ready to pass tow bridle to Sea Lynx.
1	16:07	Bourbon Dolphin comes to a stop.
	16:08	Sea Lynx requests heaving line to be connected to fish plate and thrown to her deck as swell is causing problems.
	16:13	Sea Lynx agrees to try to come into the rig again as connecting heaving line presents many difficulties.
	16:29	Too much swell for Sea Lynx to come between pontoons to have tow bridle passed down. Rig attaching heaving line to throw
		to Sea Lynx
	17:02	Sea Lynx instructs rig to lower fish plate
	17:17	Fish plate passed and secured to Sea Lynx.
	17:26	Sea Lynx has tow bridle secured. Instructed to start paying out.
1	17:31	Highland Valour instructed to start heaving in and prepare to break anchor free.
1	17:33	Bourbon Dolphin to heave in to 1000m

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1		17:42	Bourbon Dolphins w/wire at 1000m - 130t tension
			Highland Valour at 1175m still hauling in
1		17:46	Bourbon Dolphin instructed to heave in 20m
		17:47	Sea Lynx has 450m paid out.
1		17:52	Bourbon Dolphin tension at 150-160t
1		18:05	# 1 Winch pays out 50m.
1		18:10	Bourbon Dolphin heaved in to 900m and has 160t tension
1		18:32	Bourbon Dolphin instructed to heave in 10m
1		22:10	Heaving in slowly on # 1 wire - Highland Valour suspects # 1 anchor off bottom
1		23:00	Bourbon Dolphin reports their grapple is ready on stern roller
1		23:40	Highland Valour reports # 1 anchor 50m below roller
	08/04/2007		
1		00:06	All stop heaving in on # 1 wire - chain at bolster
1		00:21	Bourbon Dolphin starts to grapple for # 1 chain
1		01:10	Bourbon Dolphin grappled # 1 chain
5		00:23	Vidar Viking attempting to J-Hook # 5 chain
5		02:40	Olympic Hercules instructed to rig up grapple for # 5 chain
5		03:25	Olympic Hercules grapple rigged, lowering wire to grapple # 5 chain
5		04:15	Olympic Hercules grappled # 5 chain
5		04:40	Olympic Hercules lifting # 5 chain and pulling against anchor
5		05:00	Vidar Viking attempting to chase to # 5 anchor
5		06:00	Vidar Viking continues attempt to unseat # 5 anchor
5		06:40	Vidar Viking moves forward. Possibly been on a bight of chain. Chases out further.
5		06:51	Vidar Viking comes to a halt and commences trying to unseat anchor
5		07:01	Vidar Viking reports anchor off bottom. 1000m w/wire out at 120t tension. Instructed to continue heaving to confirm.
5		07:16	# 5 Commences hauling in slowly
5		07:25	Olympic Hercules instucted to heave in to 300m w/wire.
		07:26	Sea Lynx instructed to change heading to 240°
		07:27	Highland Valour instucted to change heading to 240°
		07:29	Bourbon Dolphin instructed to change heading to 240°
		07:35	Sea Lynx instructed to change heading to 230°
		07:36	Commence Tight Tow to Rosebank Block 205/1 - I. Towing Vessel Sea Lynx
			Olympic Hercules and Vidar Viking on # 5 Anchor Chain. Highland Valour and Bourbon Dolphin on # 1 Anchor chain
			T.Rather R.O.B. F.O. 686mt L.O. 10101lts P.W. 143mt
			Sea Lynx R.O.B. F.O. 451m³ L.O. 9681lts P.W. 403m³
			Olympic Hercules R.O.B. F.O. 412m³ L.O. 33109lts P.W. 41m³
			Highland Valour R.O.B. F.O. 549m³ L.O. 32398lts P.W. 431m³
			Bourbon Dolphin R.O.B. F.O. 539m³ L.O. 33731lts P.W. 208m³
			Vidar Viking R.O.B. F.O. 381m³ L.O. 18523lts P.W. 38m³
			Weather. Wind 38kts @ 254° Sea state 3 - 4.5m. 8 sec. @ 318° Barometer 1000.4mbs Pitch 1.9° Roll 2.2° Heave 3.3m
		08:00	Lat 61° 00' 29' N Long 003° 48' 08' W Course 220° Speed 0.5 kts Distance Travelled 1.0 NM
			Distance to go 2.5 NM E.T.A.
			Weather: Wind: 30kts @ 140° Sig. Wave: 3.0m Barometer: 1006.4mbs
5		08:12	Olympic Hercules instructed to disengage grapnel from # 5 chain.
5		08:23	Olympic Hercules grapnel off # 5 chain
5		08:29	Vidar Viking reports tension on w/wire 200t due to vessel motion. Instructed to adjust heading to minimise vessel motion.
5		08:31	Vidar Viking reports new heading 130°
		08:53	Sea Lynx instructed to change heading to 250°
		08:58	Sea Lynx instructed to increase speed to 40%
5		08:59	All stop # 5 at transition point
5		09:00	Olympic Hercules instructed to grapnel # 5 chain 200m from rig
1		09:01	Highland Valour and Olympic Hercules instructed to change heading to 270°
		09:07	Sea Lynx instructed to decrease power to 35%
5		09:57	Olympic Hercules grapples # 5 chain 250m from rig
		10:00	Lat 60° 59' 27' N Long 003° 49' 08' W Course 280° Speed 1.5 kts Distance Travelled 3.5 NM
			Distance to go 0.5 NM E.T.A.
			Weather: Wind: 39kts @ 255° Sig. Wave: 4.0m Barometer: 999.3mbs
5		10:22	Olympic Hercules instructed to heave in w/wire to 200m

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	10:42	Rig on location at Rosebank Block 205/1 - I.
		T.Rather R.O.B. F.O. 686mt L.O.10101lts P.W. 143mt
		Sea Lynx R.O.B. F.O. 447m^3 L.O. 9881lts P.W. 403m^3
		Olympic Hercules R.O.B. F.O. 408m^3 L.O. 33109lts P.W. 41m^3
		Highland Valour R.O.B. F.O. 545m^3 L.O. 32398lts P.W. 431m^3
		Bourbon Dolphin R.O.B. F.O. 536m^3 L.O. 33731lts P.W. 208m^3
		Vidar Viking R.O.B. F.O. 377m^3 L.O. 18523lts P.W. 38m^3
5	10:42	# 5 Winch commences paying out wire.
5	10:55	# 5 Winch all stop. Wire payed out.
5	11:00	Olympic Hercules instructed to disengage grapnel from # 5 chain.
	11:17	Sea Lynx and Bourbon Dolphin instructed to increase power 5%
5	11:17	Olympic Hercules grapnel disengaged from # 5. Instructed to recover w/wire and standby.
	11:24	Sea Lynx instucted to change heading to 270º
5	11:29	Vidar Viking deployed 1000m w/wire
5	11:30	Vidar Viking instructed to put anchor on bottom
	11:31	Sea Lynx instructed to change heading to 260º
	11:35	Olympic Hercules reports grapnel at stern roller and standing by.
5	11:36	Vidar Viking reports anchor on bottom with 1360m w/wire deployed
5	11:40	Vidar Viking instructed to come off anchor.
	11:43	Sea Lynx instructed to reduce to minimum power.
1	11:46	# 1 Winch advises to much tension to run anchor
5	11:47	# 5 Winch heaving in.
	11:49	Sea lynx instructed to increase power 5 %
5	11:50	# 5 Winch all stop.
1	11:54	# 1 Winch commences paying out.
1	12:03	Highland Valour and Bourbon Dolphin instructed to lower w/wire to 450m
5	12:07	Vidar Viking off anchor
1	12:11	# 1 Winch all stop. Wire payed out.
1	12:13	Bourbon Dolphin instructed to disengage grapnal from # 1 chain
1	12:20	Highland Valour at 450m w/wire.
1	12:50	Bourbon Dolphin instructed to disengage grapnel from # 1 chain.
1	13:14	Highland Valour instructed to put anchor on bottom.
1	13:37	Highland Valour reports anchor on bottom with 1430m w/wire deployed.
1	13:43	# 1 Winch hauling in.
1	13:43	Highland Valour instructed to come off anchor.
	13:48	Sea Lynx asked to reduce power to 40%
1	13:53	# 1 Winch all stop
	13:54	Sea Lynx asked to reduce power to 30%
	14:00	W.O.W.
1	14:42	Highland valour off anchor and chain recovering w/wire
	14:50	Commence ballasting rig to 17m draft
	17:06	Olympic Hercules comes into see if conditions suitable for work.
	17:35	Olympic Hercules along stb side for x-fer to rig
	17:42	End of W.O.W.
4	17:50	# 4 PCP passed to Olympic Hercules
4	17:55	# 4 PCP secured to Olympic Hercules.
4	17:57	# 4 Winch commences paying out.
4	18:02	# 4 Winch all stop.
4	18:04	# 4 Winch recommences paying out.
4	18:15	# 4 Winch all stop at transition point.
4	19:00	Transition complete # 4
4	19:20	Olympic Hercules commence paying out insert chain from locker
4	20:45	Bourbon Dolphin to grapple # 4 chain
4	21:00	Bourbon Dolphin onto # 4 chain
4	21:40	Olympic Hercules reports # 4 anchor off roller & will lower down 50m
4	21:41	Bourbon Dolphin instructed to get off # 4 chain and re-grapple # 4 chain app. 200m from rig
4	21:50	Bourbon Dolphin off # 4 chain
	22:00	Still waiting for Port Crane

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Rig Move 23

4	22:38	Bourbon Dolphin grapple on # 4 chain 250m from rig and Standing By
09/04/2007		
8	01:00	# 8 PCP passed to Vidar Viking
8	01:05	Paying out # 8 chain
8	01:30	All stop paying out # 8 chain - at transition point
8	02:30	Transition complete - paying out # 8 wire
8	02:35	All stop paying out # 8 wire with connector over bolster - Vidar Viking instructed to just add a little tension for now
4	02:55	Paying out on # 4 wire
4	03:10	All stop paying out # 4 wire - Bourbon Dolphin instructed to get her grapple off of # 4 chain
4	06:15	Bourbon Dolphin instructed to heave in grapple onto her deck, then J-Hook chain & take grapple off and lower chain to seabe
4	07:05	Bourbon Dolphin reports w/wire wrapped around # 4 chain.
4	07:17	Bourbon Dolphin has # 4 chain between pins but unable to secure in jaws due to high tension.
4	07:22	Bourbon Dolphin has grapnel on deck. Grapnel fouled in # 4 chain
4	08:00	Bourbon Dolphin has # 4 chain secured in jaws and is trying to disengage grapnel.
4	08:29	Bourbon Dolphin reports grapnel diengaged from # 4 chain and J hook engaged ready to lower. Instructed to standby as towmaster is in a meeting
4	08:32	Bourbon Dolphin instucted to lower chain from deck till J hook disengaged.
4	08:35	Bourbon Dolphin reports J hook and chain over stern roller. Vidar Viking instructed to increase power 5 %.
4	08:54	Bourbon Dolphin reports J hook off chain.
	08:55	Highland Valour asked to make her way in port side to receive a grapnel from the rig.
4	08:57	Bourbon Dolphin confirms J hook off # 4 chain. Instructed to recover w/wire and check for damage. Bourbon Dolphin reports damage to grapnel - 1 tine snapped off.
4	08:59	Olympic Hercules instructed to increase power to 65% and stretch out # 4 anchor in preperation to putting on bottom
	09:08	Sea Lynx instucted to increase power to 30%
	09:13	Highland Valour enters 500m zone.
	09:19	Sea Lynx instructed to come down to minimum power.
	09:20	X-for to Highland Valour complete.
	09:38	Bourbon Dolphin reports damage to w/wire.
	09:39	Highland Valour has grapnel rigged up and ready.
4	10:09	Olympic Hercules instructed to put anchor on bottom
4	10:12	Olympic Hercules reports anchor on bottom.
4	10:13	Olympic Hercules instructed to come off # 4 chain.
4	10:21	# 4 Heaving in.
4	10:27	Olympic Hercules off # 4 anchor chasing back.
4	10:30	Olympic Hercules chaser stuck in mud.
4	10:32	# 4 Winch all stop.
4	10:40	Olympic Hercules continues chasing back.
4	10:48	Olympic Hercules chased clear. Standing by waiting for stbd. crane to become operational.
8	10:49	Vidar Viking commences paying out chain ext. from locker. Highland valour approaching to engage grapnel into # 8 chain
8	11:12	Vidar Viking has connected chain extension to rig chain # 8 and commenced paying out
	11:50	Bourbon Dolphin has turned the work wire end to end due to damage 250m from end.Requires to respool under tension with Olympic hercules.
8	11:55	Pilot house instructed Highland Valour to grapnel # 8 to ease tension on chain as it's jumping over the gypsy on Vidar Viking.
8	12:47	Highland Valour on # 8 chain. Instructed to haul upto 250m.
8	13:15	Vidar Viking has completed paying out chain ext. Connecting # 8 anchor.
8	14:04	Vidar Viking has # 8 anchor connected to chain ext. Instructed to put anchor over stem roller
8	14:35	# 8 Anchor over stern roller of Vidar Viking.
8	14:57	Highland Valour disengaged grapnel from # 8 chain preparing to grpnel chain closer to rig
8	15:15	Highland Valours grapnel engaged in # 8 chain liftin chain to ease tension.
8	15:18	# 8 Winch ready to pay out. Waiting for crew change helicopter to lift off deck.
8	15:31	# 8 Winch paying out.
8	15:34	Vidar Viking and Highland Valour asked to ease back on power
8	15:35	# 8 All stop
8	16:06	Vidar Viking reduce power to 30%
8	16:08	Sea Lynx increase power to 30%
8	16:10	# 8 Winch paying out.
8	16:33	# 8 Allstop.
8	16:34	Highland Valour instructed to start paying out w/wire.

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8		16:34	Vidar Viking instructed to start paying out out w/wire to 450m
8		16:51	Vidar Viking all stopped with 130t tension
8		16:59	Highland Valour instructed to carry on paying out and disengage grapnel from chain
8		17:07	Highland valour reports grapnel off # 8 chain
8		17:14	Highland Valour confirms grapnel off # 8 chain
8		17:16	Vidar Viking instructed to continue paying out to 50m above bottom
8		17:44	Vidar Viking has 1400m w/wire deployed ready to put anchor on bottom.
8		17:45	Vidar Viking instructed to put anchor on bottom
		17:48	Highland Valour has grapnel on deck.
8		17:50	Vidar Viking reports anchor on bottom.
8		18:00	# 8 heaving in
8		18:07	# 8 All stop.
8		18:08	Vidar Viking instructed to chase back off anchor.
		18:09	Bourbon Dolphin reports w/wire fully tensioned with Olympic Hercules.
		18:11	Sea Lynx instructed to ease back to minimum power.
8		18:28	Vidar Viking off # 8 anchor chasing back.
		18:29	Sea Lynx instructed to wind in tow wire in preperation to come off tow bridle.
		18:45	Too rough to disconnect tow wire properly
		19:30	Commence W.O.W.
8		19:34	# 8 PCP back on rig
		20:20	Rig trying again to release Sea Lynx from tow bridle
		20:25	Sea Lynx disconnected from tow bridle & vessel Standing By
		20:43	Tow Bridle secured on rig
		20:55	Start ballasting rig down to normal Survival Draft - 18.4m
		21:15	Complete ballasting rig down to normal Survival Draft - 18.4m All Secure
		22:00	Bourbon Dolphin, Highland Valour & Vidar Viking instructed to sail to Lerwick to swap equipment and then all to return to rig
			ETA to Lerwick for all 3 vessels : 09:00 hrs. 10/04/2007
4		22:30	Stbd. crane finally operational - will pick up # 4 PCP off of Olympic Hercules now
4		23:13	# 4 PCP off Olympic Hercules & secured on rig
	10/04/2007		
		00:01	Continue W.O.W.
	11/04/2007		
		00:01	Continue W.O.W.
		05:00	Sea Lynx says it is calm enough to work & is instructed to come to our stbd. side to give us 1 grapnel,4 pear links & 1 swivel
		05:28	Sea Lynx a/s stbd.
		05:40	Sea Lynx released to ABZ ETA: 03:00 12/04/07 Lube Oil:9634 lt Fuel Oil: 404m³ Potable Water: 390m³
		06:11	Commence deballsting rig to 17.0m draft.
		06:39	Olympic Hercules coming into stb side to receive chaser collar from rig.
		06:47	X-fer to Olympic Hercules complete.
		06:58	Rig at 17.0m draft.
		07:02	Bourbon Dolphin on location.
		07:40	Bourbon Dolphin coming in to stb side to pass grapnel and 2 x old chaser collars to rig.
		07:45	Vidar Viking on location.
		08:00	Vidar Viking coming in to collect grapnel.
		08:15	Bourbon Dolphin asked to move away to let Vidar Viking come into stb. Side.
		08:24	X-fer to Vidar Viking complete.
		08:30	End of W.O.W.
3		08:30	# 3 PCP passed to Bourbon Dolphin
3		08:38	# 3 PCP secured to Bourbon Dolphin
		09:02	Vidar Viking reports grapnel attached to w/wire and over stern roller. Instructed to standby.
3		09:29	Bourbon Dolphin has w/wire connected to # 3 chain ready to run. # 3 Winch instructs Bourbon Dolphin to pick up tension to
			allow pay out.
3		09:31	# 3 Winch paying out.
3		09:42	# 3 Winch all stop at transition point.
3		09:44	# 3 Chain in devils claw. Bourbon Dolphin instructed to connect rig chain to chain ext.
3		10:00	Transition complete # 3 mojo at bolster.
7		10:08	Highland Valour asked to make her way in for # 7.
3		10:48	Bourbon Dolphin has chain connected and ready to pay out. Instructed to commence paying out

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7		10:52	Highland Valour comes in to collect # 7 PCP
7		11:15	# 7 PCP secured on Highland Valour.
7		11:23	Highland Valour has chain on deck - connecting to w/wire.
7		11:30	Highland Valour has chain connected to w/wire.
7		11:32	Highland Valour picks up tension to allaow winch to pay out.
7		11:40	# 7 Winch paying out.
3		11:44	Bourbon Dolphin asks for Vidar Viking to grapnel chain as to much tension causing chain to jump over gypsy.
7		11:54	# 7 All stop at transition point.
7		11:58	# 7 Chain in devils claw. Highland valour commences connecting rig chain to chain ext.
7		12:12	Highland Valour has rig chain connected to chain ext.
3		12:18	Vidar Viking has grapnel engaged on # 3 chain. Instructed to pick up weight.
3		12:21	Vidar Viking has 50m w/wire out at 60mt tension. Bourbon Dolphin recommences paying out chain.
7		12:31	# 7 Transition complete. Mojo at bolster.
7		12:32	Highland Valour instructed to start paying out chain
7		13:23	Olympic Hercules instructed to J-Hook # 7 chain
7		14:08	Olympic Hercules on # 7 chain
7		14:40	Highland Valour complete paying out insert chain for # 7
7		15:40	Highland Valour reports they have # 7 anchor connected to insert chain
7		16:25	Highland Valour has # 7 anchor over roller
3		16:45	Bourbon Dolphin has # 3 anchor over roller - but too far down so will pick up to check orientation
3		16:55	Bourbon Dolphin reports # 3 anchor orientation is correct
3		16:56	Vidar Viking instructed to get grapple off # 3 chain and re-grapple chain closer to rig
3		17:00	Vidar Viking reports that they are off # 3 chain
3		17:50	Vidar Viking reports that they have re-grappled # 3 chain app. 200m from fairleader & is instructed to lift it 50m off bottom
3		18:00	Start paying out # 3 wire
3		18:15	All stop paying out # 3 wire
3		18:22	Vidar Viking instructed to lower grapnel to ocean floor and get off # 3 chain
3		20:13	Vidar Viking grapnel clear of #3 chain.
3		20:26	Bourbon Dolphin slacking off anchor to 1400mtrs
3		20:36	Anchor at 1400 mtrs, proceed to lay anchor on sea bed
3		20:52	Anchor on bottom
3		20:56	Haul in 25m on #3-200mt tension,start to chase back to rig
7		22:00	Olympic Hercules off #7 chain
7		22:45	Olympic Hercules failed to grapple #7
7		23:55	Olympic Hercules Grapples #7 chain 200m from fairlead
7	12/04/2007	00:12	Start to run out #7 mooring
7		00:35	All stop running on #7
7		01:53	Olympic Hercules free of chain with grapple
7		01:54	Highland Valour begins paying out wire to 1400m
6		02:40	#6 PCP passed to Olympic Hercules
6		02:54	Start paying out chain on #6
7		02:55	Highland Valour pays out 1400m of wire, preparing to lay anchor
7		03:00	#7 Anchor on bottom, work wire length 1401m
6		03:07	Stop paying out on chain, preparing for transition.
7		03:30	Begin to pick up tension on #7
7		03:35	Stop picking up tension-190mt
7		03:37	Highland Valour chasing back to rig
6		04:00	Transition complete.Pay out mojo through fairlead
6		04:20	Olympic Hercules prepares to add chain extension
6		04:54	Olympic Hercules now connected to wire.
7		05:15	#7 PCP back on rig, Highland Valour pulling off to perform essential maintenance on fuel pumps.
6		06:28	Vidar Viking begins to grapple for #6 chain with 600m of wire.
7		06:56	Highland Valour reports fuel pump problem fixed
6		07:45	Vidar Viking grapples # 6 chain
3		08:14	# 3 PCP retrieved off Bourbon Dolphin
		08:17	Highland Valour passes us kenters & pear links
1		08:40	Bourbon Dolphin a/s stbd. and will receive loose/dangling # 1 PCP and store on her deck
2		09:17	# 2 PCP passed to Bourbon Dolphin

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2		09:19	Start paying out # 2 chain so Bourbon Dolphin can connect her work wire
2		09:30	All stop paying out # 2 chain so Bourbon Dolphin can connect her work wire
2		09:46	Start paying out # 2 chain
2		09:57	All stop paying out # 2 chain - at transition point
2		10:00	# 2 chain in hook
2		10:14	Transition complete - paying out # 2 wire to get mojo over bolster
2		10:17	All stop paying out # 2 wire - mojo over bolster
6		10:40	Start paying out # 6 wire
6		10:57	All stop paying out # 6 wire
6		11:20	Vidar Viking reports that their grapple is off of # 6 chain
6		11:21	Olympic Hercules instructed to start lowering # 6 anchor
2		12:15	Bourbon Dolphin connecting insert chain to rig # 2 chain
6		12:32	# 6 anchor on bottom
6		12:35	Heaving in on # 6 wire
6		12:39	Olympic Hercules instructed to strip back to rig
6		12:42	All stop heaving in on # 6 wire
2		12:53	Bourbon Dolphin starting to lower # 2 chain
		13:25	Vidar Viking released to ABZ ETA: 1100 13/04/07 Lube Oil: 18477 lt Fuel Oil: 276m³ Pot Water: 69m³
6		14:00	# 6 PCP retrieved off Olympic Hercules & onto rig
2		14:30	Highland Valour instructed to grapple # 2 chain to help out Bourbon Dolphin
2		16:18	Highland Valour reports they think they have grappled # 2 chain
2		16:20	Both AHV's unable to hold station
2		16:35	Highland Valour reports their grapple is off # 2 chain
2		16:40	Both vessels instructed to move West - away from # 3 leg
2		17:10	AHV Bourbon Dolphin capsizes while working # 2 anchor - See INCIDENT REPORT. (All anchor work suspended)
		17:30	WEATHER: Winds:38 kts @205° Seas: sig 2.6m/10sec/205° max 4.2m/13sec/240°
			Pitch: 1.0 @8sec Roll: 1.1 @8sec Heave: 2.4m @10sec
	13/04/2007		
		00:01	All anchor work suspended
		20:00	Highland Valour released to Lerwick ETA: 0700 14/04/07 Lube Oil: 31519 lt Fuel Oil: 447m³ Pot Water: 414m³
	14/04/2007		
		00:01	All anchor work suspended
2		10:10	Olympic Hercules enters our 500m zone on stbd. side & will prepare to grapple for # 2 chain
2		11:00	SubSea Viking reports that they will move app.700 meters directly north of the rig in preparation of helping Olympic Hercules
2		11:38	SubSea Viking reports that they are positioned app. 700m directly north of the rig and is standing by to assist
2		12:35	Olympic Hercules instructed to move 100m east of her current location before deploying grapple
2		12:40	Olympic Hercules instructed to deploy grapple
2		12:44	Olympic Hercules instructed to move app. 100m to the south before reaching grapple deployment depth
2		13:05	Olympic Hercules reports that their grapple is 750m out and will now start to grapple
2		13:10	SubSea Viking reports that their ROV has been deployed and is 500m down
2		14:05	SubSea Viking reports that their ROV has spotted the Olympic Hercules' grapple
2		16:38	SubSea Viking reports that grapple is 10m below # 2 chain and instructs Olympic Hercules to slowly heave in
2		16:53	Olympic Hercules appeared to have grappled # 2 chain but then it slipped out
2		17:56	Olympic Hercules & SubSea Viking instructed to cease grappling operations while casualty boat transfers are being made.
2		19:05	Casualty boat transfers complete, Olympic Hercules & SubSea Viking instructed to resume grappling operations
2		19:25	Olympic Hercules appeared to have grappled # 2 chain
2		19:26	Olympic Hercules appeared to have grappled # 2 chain, but then it slipped out
2		20:08	Olympic Hercules appeared to have grappled # 2 chain
2		20:15	Sub Sea Viking advises that chain is in grapple and secure.Olympic hercules has 659m of wire out.
2		20:26	Olymic Hercules instructed to recover wire to 600m.
2		20:30	Olympic Hercules stops @ 600m, carrying 50mt tension.Pilot House instructs to recover wire to 500m
2		20:34	Olympic hercules stops @ 500m, carrying 75mt tension.ROV instructed to verify chain engaged in grapple.
2		21:00	Subsea Viking ROV advises chain well grappled.
2		21:04	Olymic Hercules instructed to recover wire to 400m.
2		21:09	Olympic hercules stops @ 400m, carrying 90mt tension.
2		21:10	Olymic Hercules instructed to recover wire to 300m.
2		21:15	Olympic hercules stops @ 300m, carrying 100mt tension.
2		21:15	Olymic Hercules instructed to recover wire to 200m.

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2		21:18	Olympic Hercules instructed to stop hauling-234m of work wire out.
2		21:26	Olympic Hercules instructed to continue hauling in.
2		21:29	Olympic hercules stops at 200m with 105mt tension.
2		21:30	Olymic Hercules instructed to recover wire to 100m.
2		21:34	Olympic hercules stops at 100m with 115mt tension.
2		21:35	Olymic Hercules instructed to recover wire to stern roller.Subsea Viking recovers ROV and exits 500m.
2		21:40	Olymic Hercules reports grapple at stern roller.130mt tension.
2		22:10	Olympic Hercules instructed to deck grapple.
2		22:20	Chain secured in sharks jaws(both sides secure)
2		22:30	Chain is cut and grapple removed.Vidar Viking making way into position to receive rig end of cut chain.
2		22:55	Olympic Hercules paying out chain to Vidar Viking.
2		23:14	Olympic Hercules now connected to Bourboun Dolphin and Vidar Viking connected to rig.Olympic Hercules instructed to recover all 76mm chain(insert chain)Rig now seperated from Bourbon Dolphin and Olympic Hercules.
2		23:26	Vidar Viking recovers all 76mm chain(60 meters)Instructed to remove all the 76mm chain and connect to 84mm, connect wir and wait until morning to continue after crews rest period
2		23:59	Wire chain connection made with 120mt shackle
	15/04/2007		
		07:30	Begin de-ballasting rig to Survival Draft
2		09:42	Start hauling in # 2 wire to transition point
2		09:46	All stop hauling in # 2 wire - at transition point
		09:50	Complete de-ballasting rig to Survival Draft - 18.0m All Secure
2		10:15	# 2 chain in the hook - start transition
2		10:40	Transition complete - start hauling in # 2 chain
2		11:17	All stop hauling in # 2 chain
2		11:19	# 2 PCP passed to rig from Vidar Viking
		11:25	Begin ballasting rig back down to Drilling Draft
		13:00	Complete ballasting rig back down to Drilling Draft - 24.9m All Secure
		13:30	Vidar Viking released to Lerwick ETA 01:00 16/04/07 Lube Oil: 18417 lt Fuel Oil: 220m³ Pot Water: 63m³
4+8		14:45	Cross-tensioned #4 + #8 - Held 220mt for 15 minutes Good Test
3+7		14:50	Cross-tensioned #3 + #7 - Held 220mt for 15 minutes Good Test
1+5		15:35	Cross-tensioned #1 + #5 - Held 220mt for 15 minutes Good Test
	16/04/2007		
		04:00	Olympic Hercules departs for Lerwick, ETA: 16.04.07 @ 1400 ROB: F.O.232 m³ Lub Oil.31763L Pot Water: 11m³
		05:00	Highland Valour arrives on location for observation purposes of debris from Bourbon Dolphin. F.O 602m³ Lube Oil 31511 ltr Pot Water 310m³
		20:08	Highland Valour released to Aberdeen ETA: 18:00 17/04/2007 F.O. 519m³ Lube Oil 31501 lts Pot water 308m³

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Chronological List of Events at Site

Time	Event
12.04.07	
05:40	Island Patriot arrives on location
13:25	Vidor Viking released to Aberdeen
17:15	**Bourbon Dolphin capsized while running anchor #2**
17:16	Instructed standby vessel Viking Viktory to assist
17:16	All Emergency Sevrvices informed. Transocean / Coastguard
17:17	OIM rang general alarm - personnal to muster at muster stations
17:18	Bourbon Dolphin: Tension #2 Anchor: 170 tons - Boat still attached
17:19	Check Tension on anchor #2 every 5 min.
17:19	Capsized vessel 1800m away from rig (estimated)
17:20	3 men on fire team #1
17:21	Information to get helicopter from Sumburgh (S 61 and Bond chopper)
17:21	5 men in Emergency Control Room
17:22	Fire team #1 standing by on starboard side
17:23	Transocean Emergency team in Aberdeen mobilized
17:23	Booster Pump ON
17:24	#2 Anchor chain holding at 170 tons (still attached to rig and boat))
17:26	1 man picked up by FRC from Viking Viktory
17:26	3 men in liferaft
17:30	2 aircrafts: Bond 12 and Rescue Lima Charlie w/ winchman and medic team - 40 min to E.T.A. (18:10 hrs)
17:31	Fire team #2 on standby in ECR
17:31	Full POB on TO Rather accounted for
17:32	OIM announcment to crews
17:32	15 POB onboard Bourbon Dolphin
17:33	Coastguard informed of POB on Bourbon Dolphin
17:35	8 survivors picked up (unconfirmed at this time)
17:37	Medic setting up triage in sick bay
17:37	Fire team #2 handrail watch
17:38	Fire team #1 instructed to go to helideck
17:38	#2 anchor winch tension now 174 tons
17:39	Medic informed of possible casualties by frog transfer
17:43	2 personnel recovered on Viking Viktory (1 is a fatality)
17:43	Frog positioned on APV deck
17:45	Fire team #2 moving burning gear to starboard side
17:47	Aircraft ETA 18:26 (revised)
17:48	3 survivors in liferaft, 3 on Highland Valour (confirmed)
17:50	Highland Valour: 3 survivors on board (in good health)
17:50	14 people now reported to be the full POB on Bourbon Dolphin
17:52	Bourbon Dolphin now drifting towards starboard aft of the rig
17:52	Fire team #2 getting ready to burn anchor cable if or when required
17:53	Call made to update Transocean office
17:55	Viking Viktory has retrieved 3 survivors from liferaft
17:57	Now 5 survivors onboard Viking Viktory
18:01	Fire team #2 report to helideck
18:02	Fire team #1 on standby
18:06	Anchor #2 winch tension holding at 170 tons
18:07	4 people taken from galley (muster point) for helideck duties
18:08	Shetland to broadcast for diving support vessel to attend area
18:09	OIM completes further call from Transocean office
18:12	Welder has radio contact if required
18:15	2 way comms established with rescue aircraft (ETA in 12 min)
18:16	HLO has comms with rescue aircraft also
18:21	Aircraft Bond 12 ETA: 2 min to location; aircraft Rescue Lima Charlie ETA: 8 min to location
18:22	OIM liase with coastguard by telephone (for update on situation)
18:22	Helicopter Bond 12 on location
18:23	Capsized vessel still attached to rig
18:26	2 rescue aircrafts now on location (Bond 12 & Lima Charlie) doing sector search. TO Rather helideck confirmed available
18:29	Call from coastguard to OIM enquireing about rig stability
18:30	Anchor #2 winch tension holding steady at 180 tons
18:34	Rescue aircraft Bond 12 to land on TO Rather with casualty (retrieved from the water) - sick bay informed
18:37	Bond 12 on deck
18:38	Now 5 persons still missing from B. Dolphin
18:39	Medic to helideck to receive casualty
18:40	It has been established that the Bourbon Dolphin POB was 15 personnel and not 14 as originally stated
18:40	Rescue Lima Charlie recovers 1 casualty from water
18:40	5 persons now confirmed to be still missing
18:41	More stretcher assigned to helideck
18:43	Bond 12 departs rig; Rescue Lima Charlie inbound with 1 casualty now on deck
18:44	2 casualties now onboard - total POB now 101
18:45	Transocean Aberdeen informed of 2 casualties now onboard
18:46	Rescue Lima Charlie departs TO Rather deck

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18:48	Coastguard informed of 2 casualties now onboard
18:55	OIM call to T/O Aberdeen for update of situation
18:56	Confirmed that the 2 casualties brought onboard are fatalities
19:00	Rescue 51 (Nimrod aircraft) now on scene
19:01	T/O Aberdeen has been contacted by OIM to request advise that Rescue 51 Nimrod aircraft takes over command on scene
19:07	T/O Rather to maintain on scene command
19:10	Sub Sea Viking dive support vessel en route - ETA in 3 hrs (22:10 hrs)
19:11	Anchor #2 winch holding 160 tons
19:12	Commenced ballasting down to 18.5m to achieve greater stability
19:14	T/O Aberdeen requested to fax POB of Bourbon Dolphin (received at 19:26 hrs)
19:15	Viking Victory rescue craft now back onboard the Victory
19:20	Rescue 51 (Nimrod) will stay on scene for another 2.5 hrs (until 21:50 hrs)
19:26	T/O Aberdeen contacted by OIM for update purposes
19:27	Capsized vessel is now 1200m bearing NE of rig (as reported to T/O Aberdeen)
19:33	Completed ballasting down to 18.5m (all secure)
19:40	Continue to ballast down to drilling draft
19:48	Rescue helicopter Bond 12 inbound to T/O Rather for refuel (on deck at 19:49 hrs)
19:52	Coastguard informed of names of recovered personnel from capsized vessel
19:57	Anchor winch tensions (all) reported to T/O Aberdeen by Barge Master
20:04	Bond 12 rescue helicopter leaves deck after refuelling
20:07	Announcement made for all on duty personnel to stay clear of all anchor winch houses
20:12	Rescue helicopter Lima Charlie on deck for refuel
20:16	Vessel "Ice Flower" offers assistance and put to standby should she be required
20:17	T/O Aberdeen contacted by OIM for update
20:34	4 casualties taken from Viking Viktory and taken to Tingwall by rescue helicopter; 1 fatality remains on the Viking Viktory
20:41	Coastguard contacted by OIM for update of situation
20:42	Vessel "Ice Flower" released on advice of coastguard
20:54	T/O Aberdeen contacted by OIM for update of situation
20:56	Rescue aircraft Lima Charlie released from rescue duties by coastguard. He will now be sent to pick up the 3 casualties from the Highland Valour and head to Tingwall
21:00	Vessels in attendence at the scene: Viking Viktory, Highland Valour, Island Patriot, Olympic Hercules
21:01	Rescue helicopter Lima Charlie leaves T/O Rather deck. Bound for Tingwall
21:05	Sub Sea Viking ETA in 1 hour (22:05 hrs)
21:07	OIM contacts coastguard to relay/receive information on situation
21:08	All STBD watertight dampers closed
21:08	Helicopter Bond 12 back to Sumburgh for fuel and pick up clearance divers and return to rig as relayed by coastguard
21:10	Highland Valour reports that Bourbon Dolphin hull is now sitting lower in the water
21:13	Time out called by OIM
21:18	Radio operator to contact Clair Platform to find out how many non essential personnel she may be able to take if T/O Rather reaches an abandonment situation
21:23	Vidar Viking ETA at 22:15 hrs
21:25	Claire Platform helideck has been cleared
21:25	Grampian Frontier standby vessel has sailed from Foinaven Field - ETA 22:30 hrs
21:27	Sub Sea Viking ETA now 21:55 hrs
21:30	T/O Aberdeen contacted
21:30	Claire Platform OIM advises he can take only 13 personnel. 3700 liters of fuel onboard Claire should it be required
21:37	Rescue 52 aircraft (Nimrod) dispatched. ETA to be confirmed (22:00 hrs)
21:52	Call from T/O Aberdeen to liase with OIM
22:00	All vessels continue to sweep the area with Highland Valour being central coordinator
22:05	Rescue 52 aircraft (Nimrod) now on scene
22:12	Rescue 137 RAF helicopter with divers ETA 23:00 hrs
22:25	Grampian Frontier ETA in 1 hour (23:25 hrs)
22:27	Prepare draft copy for downmanning
22:32	Highland Valour reports that Bourbon Dolphin hull continues to sink deeper into the water
22:33	Shetland coastguard calls for update for info for divers
22:36	RAF 137 rescue helicopter ETA 23:00 hrs
22:40	RAF 137 going to Schiehallion to refuel
22:45	Bond 12 helicopter (18 seats) ETA to be confirmed
22:45	Coastguard Helicopter leaving from Stornoway - ETA to be confirmed
22:47	Rescue 137 RAF helicopter with 3 divers ETA 22:55 hrs
22:48	OIM announcement to crews for possible downmanning
22:55	T/O Aberdeen contact OIM for update (Adrian Brown - Rig Manager)
22:56	Sub Sea Viking contacts OIM for update
22:56	Rescue 137 lands on T/O Rather deck
22:56	Coastguard call to confirm Bond flight can take 20 personnel - ETA to be confirmed
23:02	First 18 passengers ready to go (in Heli lounge)
23:04	Grampian Frontier en route to rig - ETA 23:35 hrs (decompression chamber available)
23:07	Grampian Frontier ETA now 23:22 hrs
23:11	Rescue 137 reports he can only receive 7 or 8 passengers
23:22	Bond 12 helicopter ETA 00:10 hrs (20 passengers)
23:25	Viking Victory calls for update
23:28	Grampian Frontier on location; divers to be transferred to this vessel
23:28	T/O Aberdeen calls OIM for update (Adrian Brown)
23:38	Grampian Frontier requested to go 1/2 mile off port quarter corner standby
23:45	Bond 12 rescue helicopter ETA 00:05 hrs

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13.04.07	
00:05	Rescue 137 leaves T/O Rather deck (no passangers)
00:06	Shetland coastguard call for update from OIM. Also to confirm that Mike Uniform 61 can take 7 or 8 personnal; also if Rescue 137 can take 6 or 7 passengers - is going to Schihallion: Bond 12 going to Sumburgh - 19 pax to carry
00:12	Viking Victory is now on location with T/O Rather
00:13	Bond 12 rescue helicopter on T/O Rather deck
00:21	Bond 12 leaves T/O Rather deck with 19 personnel on board
00:21	T/O Aberdeen calls for update from OIM (Adrian Brown)
00:26	T/O Aberdeen calls for further update (Adrian Brown)
00:27	Bond 12 ETA Sumburgh: 01:10 hrs
00:37	Rescue 137 back on T/O Rather deck to collect divers and take them to the Grampian Frontier
00:38	Coastguard call to confirm that all personnel have survival suits and life jackets
00:41	Call to coastguard to confirm ETA of next flight. S61 at 01:10 hrs - projected pax of 10 but may take more. Destination will be Schihallion or Sumburgh - to be confirmed.
00:44	OIM calls Subsea Viking vessel for update and information. Speaks to Tom Taylor.
00:46	Coastguard calls for update - speaks with OIM.
00:46	Rescue 137 leaves T/O Rather deck to transfer divers, will return to rig to pick up 9 passengers for onward flight to Sumburgh
00:50	T/O Aberdeen calls for number for the Gramian Frontier (Adrian Brown)
00:53	Bristow chopper en route from Aberdeen - can accommodate 18 pax. ETA 03:00 hrs; Bristow (40M call sign) ETA 03:30 hrs)
00:56	Mike Uniform flight ETA 01:14 hrs - can take 10 personnel
01:04	Rescue 137 on deck (refuelling)
01:05	T/O Aberdeen calls, report to town every half hour.
01:15	Rescue 137 leaves T/O Rather deck with 9 p-assengers on board for Sumburgh via Claire Platform; 305 liters of fuel taken - 2625 liters remain
01:25	Mike Uniform now on T/O Rather deck for the transfer of 10 passengers - may be able to take more
01:35	Mike Uniform will lift with 10 check weights & potentially take 5 more
01:40	Mike Uniform lifted with 15 pax on board (ROB = 56), bound for Sumburgh.
01:41	Diver from Grampian Frontier to Sub Sea Viking; ROV to witness dive. T/O Aberdeen has been informed.
01:43	Mike Uniform diverted to Schihallion
01:48	Rescue 53 (Nimrod) en route - ETA 02:20 hrs
01:54	Call to T/O Aberdeen; Transfer of diver to ROV support vessel.
02:00	2 divers now to check hull of capsized vessel
02:05	Call to T/O Aberdeen on latest update on condition of capsized vessel (no change)
02:10	Call to T/O Aberdeen by OIM
02:16	Next aircraft Bond 12, ETA 02:30 hrs - 19 pax
02:27	40 Mike flight due at 03:50 hrs
02:31	Highland Valour reports no change in Bourbon Dolphin hull
02:31	FRC heading back to Grampian Frontier, 2 divers on Sub Sea Viking
02:34	Bond 12 on deck
02:43	Bond 12 off deck with 19 pax
02:43	Subsea Viking approaching to within 200m of Bourbon Dolphin hull to assess situation
02:45	Mike Uniform bounds for Stornoway and will not be returning; 40 Mike will now join the evacuation operation
02:50	Call to T/O Aberdeen by OIM for accomodation for personnel
03:03	T/O Aberdeen calls for update (Adrian Brown)
03:04	No change on present situation as far as upturned vessel concerned
03:09	40 Mike in Sumburgh refuelling for onward flight to T/O Rather - is due 40 min. after take off from Sumburgh; Bond 12 with left rig at 02:43 was sent to Sumburgh
03:24	T/O Aberdeen calls for update and info (Adrian Brown). Andy Leslie is now point of contact in T/O Aberdeen office.
03:35	Subsea Viking launching ROV to further assess situation -
03:40	40 Mike en route to Claire platform to refuel; Lima Charlie 45 min scramble time 69 min flight; Bond 12 60 min scramble time 69 min flight: Rescue 137 45 min scramble time 104 min flight (9 pax); Mike Uniform 45 min scramble time 110 min flight
03:50	Subsea Viking requested to check chain catenary after completion of upturned vessel survey
03:53	T/O Aberdeen (Andy Leslie) ask if rig is able to slack off 3 and 4 moorings if necessary, confirmed as yes, weather info passed to Andy Leslie.
04:02	No change in upturned vessel
04:05	Visibility 8 miles horizontal, approximately 200 ft vertical (reported by Viking Victory)
04:25	40 Mike ETA 04:55 hrs to pick up remaining non essential personnel
04:32	No change in upturned vessel
04:36	40 Mike ETA 04:47 hrs
04:45	Highland Valour informs Olympic Hercules to extend search to another 3 miles
04:51	40 Mike makes 1st approach - no good, making 2nd approach
04:59	40 Mike on deck, 2nd pass
05:05	40 Mike off deck to Sumburgh with 10 pax; 27 POB left on T/O Rather
05:11	No change reported in situation of capsized vessel
05:12	T/O Aberdeen called with an update from the rig
05:36	No change reported in situation of capsized vessel
05:37	Lima Charlie repaired
05:48	Subsea Viking reports at 225m below Bourbon Dolphin seeing a wire with a swivel attached to a chain, current conditions unsuitable to continue diving; operations standing by, waiting for current to subside; estimated 1.5 knots to 050 degrees.
06:00	Highland Valour reports no change in Bourbon Dolphin situation
06:06	Viking Victory positioned 500m to the North of the T/O Rather
06:20	Rather mooring tensions: #1: 195 tons; #2: 160 tons; #3: 200 tons; #4: 150 tons; #5: 180 tons; #6: 200 tons; #7: 180 tons; #8: 250 tons; Wind: 20 knots from 220 deg.; Seas: 2.5m sign. 3.9m max. to 070 deg.
06:26	Subsea Viking reports that they will look at further diving operations in one hour if the current strength subsides; Shetland coastguard informed of the situation
06:40	Highland Valour reports no change in Bourbon Dolphin situation

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06:48	Subsea Viking asked to inform Navy divers to contact their commanding officer
06:53	Text received from T/O Aberdeen; re-proposed plan to recover #2 mooring - for discussion
07:15	Highland Valour reports no change in Bourbon Dolphin situation
07:20	Rather mooring tensions: #1: 195 tons; #2: 160 tons; #3: 200 tons; #4: 150 tons; #5: 180 tons; #6: 200 tons; #7: 180 tons; #8: 255 tons; Wind: 24 knots from 220 deg.; Seas: 2.5m sign, 3.9m max. to 070 deg.
07:38	Subsea Viking asked to contact T/O technical department on # Aberdeen 427 853
08:05	Highland Valour reports no change in Bourbon Dolphin situation
08:12	Vidar Viking reports object in the water, possibly an upturned FRC (61 05 27 N; 003 21 96 W); Trying to recover object
08:25	Grampian Frontier instructed to take stills of Bourbon Dolphin in relation to the T/O Rather; pics asked for by Andy Leslie (T/O)
08:30	Grampian Frontier reports oil in water rounf Bourbon Dolphin
08:40	Lima Charlie 17 miles to run to location. 4 souls on board
08:57	Grampian Frontier confirms pictures being sent by e-mail
09:07	Highland Valour reports no change in Bourbon Dolphin situation
09:12	Vidar Viking reports recovery of object - transmission broken
09:13	Highland Valour possess message from Vidar Viking - object is Bourbon Dolphin FRC
09:18	Subsea Viking launches ROV to survey Bourbon Dolphin
09:20	Rather mooring tensions: #1: 193 tons; #2: 158 tons; #3: 207 tons; #4: 153 tons; #5: 183 tons; #6: 197 tons; #7: 174 tons; #8: 244 tons; Wind: 25 knots from 193 deg.; Seas: 2.3m sign, 3.7m max. to 070 deg.
09:35	Highland Valour reports no change in Bourbon Dolphin situation
09:42	Lima Charlie due in 10 min for refuel, helideck crew being woken
10:00	Highland Valour reports no change in Bourbon Dolphin situation
10:08	Lima Charlie on deck for refuel
10:15	Fatality forms (2x) faxed to town (Form F)
10:18	Subsea Viking requests anchor pattern coordinates and headings
10:20	Grampian Frontier launches FRC - transfer divers
10:20	Rather mooring tensions: #1: 193 tons; #2: 155 tons; #3: 214 tons; #4: 154 tons; #5: 183 tons; #6: 193 tons; #7: 169 tons; #8: 238 tons; Wind: 25 knots from 205 deg.; Seas: 2.4m sign, 3.9m max.
10:24	Lima Charlie off deck routing to Sumburgh
10:30	Highland Valour reports no change in Bourbon Dolphin situation
10:42	Viking Victory requested to fax form declaring casualty
10:50	Highland Valour confirms he is still coordinating search
10:55	OIM phones town to request handlind of issues for crew change flight
11:05	Highland Valour reports no change in Bourbon Dolphin situation
11:20	Rather mooring tensions: #1: 192 tons; #2: 155 tons; #3: 221 tons; #4: 155 tons; #5: 183 tons; #6: 192 tons; #7: 183 tons; #8: 233 tons; Wind: 28 knots from 198 deg.; Seas: 2.3m sign, 3.6m max.
11:37	Highland Valour confirms details of search pattern, involves Island Patriot, Olympic Hercules, Vidar Viking
11:40	OIM calls coastguard to update on search
11:45	Aberden coastguard requests helifuel figure - 1590 liters reported
11:55	Subsea Viking reports video tape of survey ready for transfer to Grampian Frontier
11:58	Subsea Viking reports survey of Bourbon Dolphin complete, no casualties located
11:59	Shetland coastguard requires dive team leader to make contact by phone
12:03	Highland Valour reports Bourbon Dolphin hull in same attitude with more oil evident
12:20	Rather mooring tensions: #1: 192 tons; #2: 154 tons; #3: 223 tons; #4: 157 tons; #5: 183 tons; #6: 190 tons; #7: 160 tons; #8: 227 tons; Wind: 24 knots from 198 deg.; Seas: 2.4m sign, 3.8m max.
12:23	Advised of flight with provisional take off at 19:00 hrs from Sumburgh with Smit personnel
12:45	Subsea Viking set up 2000m NE to survey #3 mooring line
13:02	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
13:02	Advised by dive sup. That Grampian Frontier will set up for divers to go in and check out bridge
13:20	Rather mooring tensions: #1: 191 tons; #2: 154 tons; #3: 223 tons; #4: 157 tons; #5: 183 tons; #6: 191 tons; #7: 182 tons; #8: 225 tons; Wind: 26 knots from 195 deg.; Seas: 2.0m sign, 3.2m max.
13:41	First diver enters water - advised by Grampian Frontier
13:54	Contacted Island Patriot to assess availability of helifuel tanks to be picked from deck - two available
13:58	Island Patriot instructed to continue with search duties
14:00	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
14:01	Debris found by Vidal Viking 20 miles from rig; extended search area to 25 miles
14:02	First diver out of water
14:05	Second diver in water, one diver in water
14:14	Second diver out of water, no diver in water
14:18	Third diver in water, one diver in water
14:20	Rather mooring tensions: #1: 191 tons; #2: 152 tons; #3: 225 tons; #4: 158 tons; #5: 184 tons; #6: 191 tons; #7: 162 tons; #8: 226 tons; Wind: 26 knots from 192 deg.; Seas: 2.0m sign, 3.3m max.
14:20	Third diver out of water, no diver in water - diver in water
14:30	Empty helifuel tanks removed from helideck station
14:30	Diver out of water - diver in water
14:50	Diver out of water, FRC back to Grampian Frontier
14:55	Daughter craft and diver recovered to Grampian Frontier
15:00	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
15:10	From Grampian Frontier - no further diving possible due to current
15:20	Rather mooring tensions: #1: 192 tons; #2: 152 tons; #3: 227 tons; #4: 156 tons; #5: 184 tons; #6: 190 tons; #7: 162 tons; #8: 228 tons; Wind: 21 knots from 198 deg.; Seas: 2.2m sign, 3.5m max.
15:22	OIM gives situation report to Chevron Emergency team (Ian Chisnal)
15:28	From dive team - no sign of casualties on bridge of Bourbon Dolphin, diving stopped due to swell
15:37	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
15:41	Grampian Frontier has been informed by coastguard to remain on station for +/- 24 hrs
15:43	OIM gives situation report to coastguard regarding diving operation and search

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15:45	Highland Valour reports she, the Olympic Hercules and the Vidar Viking all due crew change
15:45	Coastguard changes from search and rescue to recovery phase
16:00	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
16:20	Rather mooring tensions: #1: 192 tons; #2: 154 tons; #3: 225 tons; #4: 157 tons; #5: 183 tons; #6: 191 tons; #7: 165 tons; #8: 228 tons; Wind: 22 knots from 175 deg.; Seas: 1.8m sign, 2.8m max.
16:30	Subsea Viking given permission to enter 500m zone
16:32	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
17:01	Update from Subsea Viking - survey of #3 anchor line, 500m to go - completed in 2 hrs
17:20	Rather mooring tensions: #1: 192 tons; #2: 155 tons; #3: 219 tons; #4: 156 tons; #5: 182 tons; #6: 188 tons; #7: 163 tons; #8: 227 tons: Wind: 20 knots from 167 deg.; Seas: 2.0m sign, 3.2m max.
17:32	Highland Valour reports Bourbon Dolphin has gone down a little by the head
18:05	Subsea Viking reports cross over located between #2 chain and #3 wire at a depth of 620m, 500m from the rig. Chain leading directly to #2 fairlead. The wire is loaded with chain. Viking now following chain down towards Dolphin.
18:20	Rather mooring tensions: #1: 192 tons; #2: 158 tons; #3: 218 tons; #4: 155 tons; #5: 182 tons; #6: 190 tons; #7: 165 tons; #8: 228 tons; Wind: 22 knots from 170 deg.; Seas: 1.9m sign, 3.1m max.
18:58	Highland Valour reports no change in Bourbon Dolphin, hull in same attitude
19:20	Rather mooring tensions: #1: 192 tons; #2: 155 tons; #3: 217 tons; #4: 157 tons, #5: 182 tons; #6: 191 tons; #7: 166 tons; #8: 231 tons; Wind: 22 knots from 167 deg.; Seas: 2.2m sign, 3.5m max.
19:42	Vidar Viking takes over watch duties at Bourbon Dolphins hull from Highland Valour
20:05	Highland Valoul released to Lerwick
20:17	Subsea Viking takes over monitoring duties of Bourbon Dolphin from Vidar Viking
20:20	Rather mooring tensions: #1: 191 tons; #2: 157 tons; #3: 219 tons; #4: 158 tons; #5: 184 tons; #6: 193 tons; #7: 162 tons; #8: 231 tons; Wind: 26 knots from 168 deg.; Seas:.2.1m sign, 3.4m max.
20:42	Anglian Sovereign leaves Scalloway with 5 Smit, ETA 04:00 hrs
20:56	Grampian Frontier to standby, rest period, RN dive team on board
21:04	Subsea Viking reports no change to the Bourbon Dolphin
21:20	Rather mooring tensions: #1: 191 tons; #2: 155 tons; #3: 228 tons; #4: 159 tons; #5: 184 tons; #6: 192 tons; #7: 157 tons, #8: 222 tons; Wind: 26 knots from 174 deg.; Seas: 2.5m sign, 3.8m max.
21:21	Olympic Hercules enters 500m zone for equipment transfer
21:34	Olympic Hercules departs 500m zone for standby
21:40	Vidar Viking enters 500m zone for equipment transfer
21:55	Vidar Viking departs 500m zone for retensioning of work wires with Olympic Hercules
22:00	Subsea Viking reports Bourbon Dolphin hull above water is still the same, hull has moved a few yards to the West
22:05	Rather mooring tensions: #1: 190 tons; #2: 155 tons; #3: 235 tons; #4: 160 tons; #5: 185 tons; #6: 190 tons; #7: 155 tons; #8: 220 tons; Wind: 24 knots from 174 deg.; Seas: 2.3m sign, 3.7m max.
22:15	Island Patriot enters 500m zone with deck cargo (2 lifts) to port side
23:00	Subsea Viking reports Bourbon Dolphin hull in same attitude. Hull has now pivoted to the NNW
23:28	Subsea Viking reports Bourbon Dolphin is moving slowly to the West
23:29	Rather mooring tensions: #1: 190 tons; #2: 155 tons; #3: 240 tons: #4: 165 tons; #5: 185 tons; #6: 190 tons; #7: 150 tons; #8: 210 tons; Wind: 28 knots from 174 deg.; Seas: 2.4m sign, 3.8m max.
23:59	Subsea Viking reports same situation regarding Bourbon Dolphin attitude, hull now stationary
14.04.07	
00:20	Vidar Viking and Olympic Hercules finish tensioning work wires, O. Hercules attaching grapnel to workwire, both boats to standby.
01:00	Subsea Viking reports no change in status with Bourbon Dolphins hull
01:00	Rather mooring tensions: #1: 190 tons; #2: 155 tons; #3: 240 tons; #4: 165 tons; #5: 185 tons; #6: 190 tons: #7: 150 tons; #8: 210 tons
01:18	Movement on mooring #3 noticed in Ballast Control Room, slight increase in tension (23 tons)
01:31	E-mail with attachment received from T/O Aberdeen regarding the Bourbon Dolphin hull, e-mail forwarded to Olympic Hercules, Vidar Viking and Subsea Viking
02:00	Subsea Viking reports Bourbon Dolphins hull seems to have drifted another 30-40m to the West, Subsea Viking reports slack tide at this moment
03:00	Subsea Viking reports Bourbon Dolphins hull to have drifted a few meters back to the East, otherwise no change
04:00	Subsea Viking reports Bourbon Dolphins hull has drifted 50m back to the East, otherwise no change
04:01	Rather mooring tensions: #1: 190 tons; #2: 153 tons: #3: 237 tons; #4: 162 tons; #5: 185 tons; #6: 190 tons; #7: 153 tons; #8: 212 tons; Wind: 20 knots from 180 deg.; Seas: 2.2m sign, 3.5m max.
04:15	Anglian Sovereign on location, standing by
04:55	Subsea Viking reports no change in Bourbon Dolphin status
05:40	Rather mooring tensions: #1: 190 tons; #2: 150 tons; #3: 235 tons; #4: 160 tons; #5: 185 tons; #6: 190 tons; #7: 155 tons; #8: 215 tons; Wind: 23 knots from 183 deg.; Seas: 2.3m sign, 3.6m max.
07:00	Rather mooring tensions: #1: 190 tons: #2: 150 tons; #3: 230 tons; #4: 160 tons; #5: 185 tons; #6: 190 tons; #7: 155 tons; #8: 220 tons; Wind: 24 knots from 185 deg.; Seas: 2.2m sign, 3.6m max.
07:00	Subsea Viking reports no change in Bourbon Dolphin status
07:57	Subsea Viking reports Bourbon Dolphins hull has drifted 100-150m to the East, otherwise no change
08:00	Rather mooring tensions: #1: 190 tons; #2: 151 tons; #3: 227 tons, #4: 160 tons; #5: 185 tons; #6: 192 tons; #7: 157 tons, #8: 219 tons; Wind: 30 knots from 192 deg.; Seas: 2.3m sign, 3.8m max.
08:03	Transfer of relevant DVD's / pictures of Bourbon Dolphin from Subsea Viking to Anglian Sovereign via Grampian Frontier FRC
08:25	Update of helifuel onboard figures given to T/O shorebased emergency team and Shetland coastguard (6500 liters useable)
09:00	Subsea Viking reports no change in Bourbon Dolphin status
09:00	Rather mooring tensions: #1: 189 tons; #2: 153 tons; #3: 228 tons; #4: 160 tons: #5: 184 tons; #6: 191 tons; #7: 157 tons; #8: 230 tons; Wind: 32 knots from 196 deg.; Seas: 2.3m sign, 3.7m max.
10:00	Subsea Viking reports no change in Bourbon Dolphin status
10:00	Rather mooring tensions: #1: 189 tons; #2: 150 tons; #3: 232 tons; #4: 159 tons; #5: 185 tons: #6: 192 tons; #7: 156 tons; #8: 218 tons; Wind: 32 knots from 202 deg.; Seas: 2.4m sign, 3.8m max.

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10:50	Transfer 5 pax (Smit Salvage) from Anglian Sovereign to rig on port side by frog - POB: 32
10:57	Vidar Viking takes over watch duties of Bourbon Dolphin hull from Subsea Viking, status unchanged
11:00	Rather mooring tensions: #1: 190 tons; #2: 151 tons; #3: 235 tons; #4: 159 tons; #5: 183 tons; #6: 190 tons; #7: 154 tons; #8: 218 tons; Wind: 30 knots from 208 deg.; Seas: 2.3m sign, 3.7m max.
12:00	Vidar Viking reports no change in Bourbon Dolphin status
12:01	Rather mooring tensions: #1: 190 tons; #2: 153 tons; #3: 242 tons; #4: 162 tons; #5: 184 tons; #6: 189 tons; #7: 152 tons; #8 212 tons; Wind: 27 knots from 207 deg.; Seas: 2.5m sign, 4.0m max.
12:35	Anglian Sovereign released by rig to return to coastguard operations
12:40	Olympic Hercules instructed to deploy grapnel
13:00	Vidar Viking reports Bourbon Dolphin hull has drifted a few meters West, otherwise no change
13:02	Rather mooring tensions: #1: 190 tons; #2: 152 tons; #3: 249 tons; #4: 163 tons; #5: 185 tons; #6: 188 tons; #7: 149 tons; #8: 209 tons: Wind: 24 knots from 221 deg.: Seas: 2.3m sign. 3.7m max.
14:00	Rather mooring tensions: #1: 190 tons; #2: 151 tons; #3: 252 tons; #4: 164 tons; #5: 184 tons; #6: 186 tons; #7: 146 tons; #8: 208 tons; Wind: 25 knots from 223 deg.; Seas: 2.4m sign, 3.9m max.
14:06	Vidar Viking reports no change in Bourbon Dolphin status
14:10	Attempts to grapple #2 chain continue with Olympic Hercules assisted by Subsea Viking (ROV support)
14:28	Helicopter lifting Scatsta due at rig 15:10 hrs - call sign 70 X, police officers and crew change on board
14:49	Subsea Viking reports #2 chain catenary is different from yesterday much steeper than before east of #3 wire.
15:00	Rather mooring tensions: #1: 190 tons; #2: 153 tons; #3: 251 tons; #4: 164 tons; #5: 184 tons; #6: 185 tons; #7: 147 tons; #8. 209 tons; Wind: 23 knots from 222 deg.; Seas: 2.5m sign, 4.0m max.
15:07	Helicopter 70 X to make arial circuits of rig to take photos - required by police
15:27	70 X - GF on deck with 8 pax (5 crew change plud 3 police officers)
15:35	Viking Victory advises receipt of an EPIB signal.
15:40	EPIB located - off going passenger. Reset.
15:44	Subsea Viking confirms position of O. Hercules grapnel on connect line of #3 chain as viewed by ROV - commence guiding O. Hercules towards chain
15:45	Helicopter 70 X lifts with 2 pax (POB 38)
16:00	Rather mooring tensions: #1: 190 tons; #2: 153 tons; #3: 252 tons; #4: 163 tons; #5: 184 tons; #6: 186 tons; #7: 148 tons; #8: 211 tons; Wind: 22 knots from 222 deg.; Seas: 2.2m sign., 3.6m max.
16:08	Crew mustered - off duty personnel in galley 16 pax, 4 hospital, 3 in ECR, 1 in Radio Room, 1 Company Man, 11 in Control Room, 3 preparing FROG. Total 38. for preparation of recovery of #2 anchor chain.
16:55	Subsea Viking reports grapnel drops off chain. Assessing situation and orientation.
16:57	Vidar Viking reports Bourbon Dolphin hull has moved 70m to East
17:00	Rather mooring tensions: #1: 191 tons; #2: 145 tons; #3: 254 tons; #4: 162 tons; #5: 184 tons; #6: 188 tons; #7: 150 tons; #8: 212 tons; Wind: 24 knots from 233 deg.; Seas: 2.4m sign., 3.9m max.
17:12	Vidar Viking reports Bourbon Dolphin hull has moved another 30m to East - 100m in total
17:32	Viking Victory informed of intension to recover casualty via frog and onpass to Anglian Sovereign. A. Sovereign informed that she will take three casualties and three police away
17:55	Grappling operations suspended while casualties transfer takes place
17:58	Viking Victory called to portside for transfer of one casualty to rig
18:00	Rather mooring tensions: #1: 191 tons; #2: 152 tons: #3: 252 tons: #4: 161 tons: #5: 183 tons; #6: 186 tons; #7: 150 tons; #8: 210 tons; Wind: 18 knots from 234 deg.; Seas: 2.4m sign., 3.9m max.
18:06	Frog landed on Viking Victory deck and unhooked
18:13	Casualty recovered from Viking Victory to rig. Viking Victory to remain at close standby whilst transfers to Anglian Sovereign take place
18:23	Anglian Sovereign alongside port
18:27	First transfer complete - one casualty and one police officer
18:36	Second transfer complete - one casualty and one police officer
18:44	Shetland coastguard - situation report by OIM
18:50	Third transfer complete - one casualty and one police officer (POB 35)
18:55	Viking Victory to normal standby - personnel transfer complete
19:00	Rather mooring tensions: #1: 192 tons; #2: 148 tons; #3: 251 tons; #4: 161 tons; #5: 183 tons; #6: 185 tons; #7: 154 tons; #8: 215 tons; Wind: 15 knots from 224 deg.; Seas: 2.5m sign., 4.0m max.
19:07	Anglian Sovereign off location to Scalloway - ETA 02:00 hrs
19:08	Resume grappling operation with Olympic Hercules guided by Subsea Viking. T/O and coastguard informed
19:25	Grapple #2 chain and attempt to haul in - not successful - grapple slipped
20:00	Rather mooring tensions: #1: 191 tons; #2: 141 tons; #3: 260 tons; #4: 162 tons; #5: 184 tons; #6: 187 tons; #7: 150 tons; #8: 211 tons; Wind: 14 knots from 214 deg.; Seas: 2.7m sign., 4.2m max.
20:12	Olympic Hercules attemps to grapple, weight coming off #3 line. ROV to check chain is correctly orientated in hook
20:15	Vidar Viking informs Bourbon Dolphins hull has moved 10m to West
20:18	Subsea Viking confirms good grapple of #2 chain, ROV retreating. Baerge Engineer to winch #2
20:27	ROV in safe area, Barge engineer at winch #2, all stations ready, commence hauling on Olympic Hercules winch wire to 600m on workwire
20:29	Weight continues to come off #3 line - now 230 tons
20:32	Olympic Hercules winch stop at 600m, no movement of Bourbon Dolphin hull, Olympic Hercules to haul in to 500m on workline
20:37	All stop at 500m, #3 tension: 200 tons, #2 tension: 111 tons, all parties report OK to continue, ROV to check hook
21:00	Rather mooring tensions: #1: 192 tons; #2: 112 tons; #3: 202 tons; #4: 170 tons; #5: 184 tons; #6: 173 tons; #7: 131 tons; #8: 190 tons; Wind: 13 knots from 218 deg.; Seas: 2.7m sign., 4.3m max.
21:01	Subsea Viking confirms good grapple, taking video footage
21:04	Subsea Viking ROV clear, recommence haul on Olympic Hercules workwire to 400m
21:09	All stop at 400m plus 90 tons weight, anchor tensions: #2: 103 tons, #3 195 tons; Vidar Viking reports no significant movement of Bourbon Dolphin hull
21:11	Recommence haul in to 300m on Olympic Hercules workwire
21:14	All stop at 300m plus 100 tons, no movement of Bourbon Dolphin hull
21:15	Recommence haul in to 200m

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21:17	All stop hauling - following call from Transocean shorebase; wire length 234m
21:26	Resume operations, Olympic Hercules continues hauling in to 200m
21:29	All stop hauling at 200m and 105 tons, Bourbon Dolphin stable, tensions: #2: 91 tons, #3: 203 tons
21:31	Recommence hauling in to 100m
21:34	All stop at 100m and 115 tons, Vidar Viking reports no change to Bourbon Dolphin hull
21:35	Recommence hauling in to stern roller of Olympic Hercules
21:37	Subsea Viking confirms recovery of both ROV's and is moving outside 500m zone. Subsea Viking prepares to release Vidar Viking of watch duties on Bourbon Dolphin hull
21:40	All stop at stern roller, 130 tons, Vidar Viking reports Bourbon Dolphin hull stable - no change: Anchor tensions: #2: 76 tons; #3: 203 tons
21:41	Vidar Viking requires to take up position at stern of Olympic Hercules, Subsea Viking to take over watch of Bourbon Dlophin hull
21:55	Vidar Viking reports Bourbon Dolphin hull still stable - no change
21:58	Subsea Viking takes over watch of Bourbon Dolphin hull from Vidar Viking
22:12	Commence operation to deck #2 anchor chain and secure on Olympic Hercules deck
22:20	#2 anchor chain secured at both ends on Olympic Hercules deck sharks jaws.
22:25	Confirmed as 76mm chain, commence cutting; Vidar Viking ready to receive rig end from Olympic Hercules
22:28	Chain is cut; removing grapple, confirmed by Olympic Hercules
22:55	Pay out wire on #2 chain; commence operations to transfer rig end to Vidar Viking
22:57	Subsea Viking reports no change in status of Bourbon Dolphins hull
23:07	Subsea Viking reports Bourbon Dolphins hull is moving slowly WNW
23:13	#2 chain transferred to Vidar Viking (rig end); Vidar Viking commence recovering 76mm chain; Olympic Hercules connected to Bourbon Dolphin by chain; length to be established; no connection between the two anchor handling vessels
23:25	Vidar Viking reports 60m of 76mm chain recovered
23:27	Vidar Viking instructed to disconnect 76mm chain from 84mm rig chain, deploy work wire and wait
23:57	Crew stood down from muster
15.04.07	
00:18	Island Patriot instructed to put search light onto the Bourbon Dolphin and report any changes to the Olympic Hercules
02:25	Subsea Viking enters 500m zone - ROV survey of #3 mooring wire
04:00	Bourbon Dolphin drifts out of anchor pattern

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Vedlegg 6

Berging

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"BOURBON DOLPHIN"

SUMMARY REPORT OF SMIT SALVAGE B.V

This short summarising report relates to the loss of the anchor-handling tug "BOURBON DOLPHIN" off the Shetlands which occurred in April 2007. This report derives from the witness statements of the Smit personnel involved in the attempted salvage operation carried out under Lloyd's Open Form agreed between Smit and Bourbon Offshore on 13th April 2007.

The Commission has indicated, with regard to Smit's involvement, that the below key issues are of particular interest. These areas are dealt with in the witness statements, and are summarised as follows:

1. **The question of the cutting of the anchor chain connecting "BOURBON DOLPHIN" to "TRANSOCEAN RATHER"**

The no. 2 anchor chain was grappled and brought on to the working deck of "OLYMPIC HERCULES". The chain was then separated and "OLYMPIC HERCULES" then effectively had "BOURBON DOLPHIN" under tow. As a consequence, the weight of the catinery (as between "BOURBON DOLPHIN" and "OLYMPIC HERCULES" compared to between "BOURBON DOLPHIN" and the rig) was reduced. In this regard the chronology is as follows:

13 April 2007:

At 18.00 Smit Rotterdam had a conversation with the UK Government's Secretary of State's representative, Robin Middleton ("SOSREP") who was together with Smit Salvage Master

Bert Kleijwegt at the "MSC NAPOLI" incident room in Portland, Dorset. SOSREP sought Smit's view on the question of separating the chain and Bert Kleijwegt clearly stated that in his view the chain should not be separated. As a general proposition Smit advised that nothing should be done to alter the condition of the casualty until such time as the Salvage Master, salvage team and salvage equipment was on site and Smit had an opportunity to make an assessment of the situation.

At around 19.00 Smit were advised that SOSREP, following discussions with Transocean and Chevron, had given his approval for the anchor chain to be separated. It would appear that this decision was taken in the light of an argument put by Chevron/Transocean that due to unpredictable current direction, it was possible that the drift pattern of "BOURBON DOLPHIN" might alter such that she might drift back towards the rig putting the rig and her crew at risk.

14 April 2007:

The salvage team (minus the Salvage Master who was travelling separately and held up by fog) arrived on site at 04.15. At first light the salvage team were provided with a bundle of documentation sent across from the dive support vessel, "SUBSEA VIKING". Included in this information was a Transocean worksheet setting out in detail the planned operation to bring the anchor chain on to the working deck of "OLYMPIC HERCULES", separate the anchor cable and allow the "BOURBON DOLPHIN" to drift away from the drill site.

At 11.00 the salvage team boarded the rig and, despite their advice that the chain should not be cut for the reasons already set out by Smit (above), it was made clear by the Offshore Installation Manager that the plan was to separate to anchor cable later that day.

At 23.00 the anchor chain was separated and "BOURBON DOLPHIN" was taken into the custody of "OLYMPIC HERCULES" (under Chevron charter). Smit had no involvement in this operation.

SMIT

2. The charter of "OLYMPIC HERCULES":

During the afternoon of 15 April, there were on-going discussions between Transocean/Chevron and Smit on the subject of Smit taking over the charter of "OLYMPIC HERCULES" which was connected by the anchor chain to "BOURBON DOLPHIN".

Initially, Smit were not prepared to take over charter of "OLYMPIC HERCULES" in circumstances where:

(i) The Salvage Master had not arrived on site, so had not been able to assess the condition of the "BOURBON DOLPHIN",

(ii) The fact that "OLYMPIC HERCULES" had taken over custody of the "BOURBON DOLPHIN" was against the express advice of Smit. Therefore, not only did Smit not have control of that decision and that situation, it was a situation had arisen against their express advice. Accordingly, Smit did not feel that they were in a position to take over the charter of the "OLYMPIC HERCULES".

(iii) The position with regard to the towing connection was not clear. It is important to consider the nature of the connection between the "BOURBON DOLPHIN" and the "OLYMPIC HERCULES". This was not an ocean towing connection. The nature of the connection was a length of the "BOURBON DOLPHIN"'s towing cable running from the upper reel at the forward end of the working deck made fast to a length of the no. 2 anchor chain of "TRANSOCEAN RATHER" which had been grappled, cut and made fast on the "OLYMPIC HERCULES". The Smit salvage plan was to assess the condition of the casualty and to make arrangements for a satisfactory towing connection on the exposed section of the casualty's hull, perhaps in way of the rudder posts aft. As detailed in the Smit witness statements, this was against a background whereby Smit had identified that "HIGHLAND VALOUR" was the most suitable tug for the task of taking over the anchor chain and towing the casualty.

In summary, and as detailed in the witness statements, Smit did not consider themselves in a position to take over the charter of "OLYMPIC HERCULES" in circumstances where steps

SMIT

had already been taken on the decision of other parties, against the express advice of Smit, and the Salvage Master was not on site in order to make an assessment of the situation.

Smit's position was borne out by the fact that they did take over the charter of "OLYMPIC HERCULES" when the Salvage Master arrived on site.

3. **Inspection of "BOURBON DOLPHIN" after capsize:**

As detailed in the witness statements, due to the prevailing conditions on site at the time, there was no opportunity for the Smit personnel to make an inspection of the casualty, either the exposed section of the hull or by diving.

4. **Involvement of DNV**

From the very beginning of Smit's involvement in the matter one of their naval architects was in touch with DNV, the Classification Society of "BOURBON DOLPHIN" to produce a damage stability model for the vessel.

SIGNED : ....
Print name A. Dutilh
On behalf of SMIT Salvage BV
Date :...September 19...2007

"BOURBON DOLPHIN"

STATEMENT OF THE SALVAGE MASTER
TAKEN AT ROTTERDAM
ON 19 APRIL 2007

JAN VAN DER LAAN

WILL STATE :

1. This statement relates to the loss of the anchor handling tug "BOURBON DOLPHIN" off the Shetlands which occurred in April 2007, Smit were contracted as salvors under Lloyds Open Form and I was the Salvage Master.

Friday, 13 April 2007

2. My first involvement in this case was when I was contacted by Nan Halfweeg during the morning. He told me that there had been a casualty off the Shetlands and that I should contact Smit.

3. At around 09.00 I got in contact with Smit head office at Rotterdam. Smit wanted me to act as Salvage Master and accordingly I drove straight to the office arriving at around 11.30.

4. A planning meeting was already underway at Smit's office. I learned that the "BOURBON DOLPHIN" had capsized the previous afternoon and that prior to the salvage team mobilising, the first requirement was to draw up an initial salvage plan to be provided to the UK Secretary of State's representative (SOSREP) for approval.

5. We had a good line of communication to the SOSREP because he was, at that time, in the "MSC NAPOLI" incident room together with the Smit Salvage Master, Bert Kleijwegt. I learned that there had been search and rescue operations since the time of the capsize and via SOSREP obtained a fairly detailed account of the circumstances of the casualty and her present condition.

6. The salvage plan was formulated during the afternoon. One of Smit's naval architects, Alex Gorter, was in touch with DNV (the Classification Society of "BOURBON DOLPHIN") in order to arrange damage stability modelling. In parallel, Reinder Peek of the Smit Commercial Department was in touch with tug brokers in order to assess the available assets in the vicinity of the casualty which might best be contracted into the salvage plan.

7. It was quickly determined that we would need two tugs. The first would be tasked with transporting the salvage spread, including diving gear, which was being prepared for dispatch from the Smit warehouse. For this purpose the tug "ZEUS" at Den Helder was contracted during the afternoon. This tug would then serve as a dive support vessel.

8. The second tug would be tasked with towing the casualty to a sheltered site at the Shetlands. At the time of the casualty, the "BOURBON DOLPHIN" had been one of a number of anchor-handling tugs engaged in positioning the semi-submersible rig, "TRANSOCEAN RATHER". Accordingly, there were a number of candidate vessels already on site. These were the "HIGHLAND VALOUR", the "OLYMPIC HERCULES" and the "VIKING VICTORY". Full details of these tugs were obtained via tug brokers, and the tugs were assessed for suitability. It was decided that the "HIGHLAND VALOUR" was most suitable for the task due mainly to the fact that she had the most suitable chain-handling gear on her working deck, in particular a gypsy for handling 76mm chain.

9. "HIGHLAND VALOUR" was not immediately available. We were advised that she needed a crew change and in addition she needed to refuel. Accordingly, it was anticipated that "HIGHLAND VALOUR" would be available within 16 – 20 hours.

10. The diving equipment and salvage spread was mobilised, leaving the Smit warehouse at 17.00 for Den Helder where it was transferred onto the "ZEUS" which departed for the casualty site at 19.25. The salvage team departed at the same time for the jet centre where a private jet had been chartered. The salvage team comprised:

Eric de Graaf	-	Salvage Supervisor
Dennis van Harten	-	Assistant Salvage Master
Cees Jongbloed	-	Salvage Diver
Martyn Oudshoorn	-	Salvage Diver
Rob Janssen	-	Salvage Diver

11. The salvage team were bound for Lerwick and their onward transfer to the casualty site would, weather permitting, be by helicopter,

12. In the early evening I returned to my home in Achel in order to collect my own equipment.

Saturday, 14 April 2007

13. At 05.00 I left home and drove to Schipol where I took the 09.35 flight to Edinburgh arriving at 10.00. On arrival at Edinburgh I learned that there were delays in the flights to Lerwick due to fog at the Shetlands. I finally left Edinburgh at 17.30 and arrived at Lerwick at 19.00. At this time the rest of the salvage team had already arrived on the rig having been transferred on board the "ANGLIAN SOVEREIGN" which had been tasked by SOSREP. Attempts were made to arrange a helicopter transfer for myself during the evening, but due to the fog this was not possible. During the early evening I met with Captain Gavin Grey, a local pilot who had been sourced by Smit to act as Tow Master/Pilot to bring the casualty into Colla Firth in the Yell Sound which had been identified as the best site for redelivery.

Sunday, 15 April 2007

14. At 08.00 I had a call from Ian Bell at Bristow helicopters. He advised that the earliest flight might be 10.30 that morning, but the situation was still under review due to fog. I was in regular contact with Smit Rotterdam and was advised during the morning that at around 23.00 the previous evening the chain connecting the casualty to the rig had been separated on board "OLYMPIC HERCULES", which was now fast to the casualty.

15. I was aware that Smit had expressly cautioned the SOSREP as well as Chevron direct against taking any steps to change the situation at the casualty until such time as I had arrived on site together with the salvage spread and salvage team, and had had the opportunity to assess the casualty's condition.

16. It seemed clear that Chevron's prime concern was protecting the rig and moving the "BOURBON DOLPHIN" away from the rig and drill site.

17. It seemed that Chevron had persuaded SOSREP by arguing that the rig and her personnel might otherwise be at risk and that the anchor chain should be separated and handed over to the "OLYMPIC HERCULES".

18. During the morning I received another call from Bristow helicopters who advised that there was no prospect of any helicopter flights during the day. Accordingly we switched to the contingency plan whereby "ZEUS", en route from Den Helder to the casualty site would divert to Scalloway in order to pick me up. Her ETA at Scalloway was around 13.00 hours.

19. However, the situation quickly changed and in discussion with Smit Rotterdam I was advised that the "ANGLIAN SOVEREIGN" had again been made available for personnel transfer from Scalloway to the casualty site. I transferred to Scalloway together with Captain Gavin Grey and departed on board "ANGLIAN SOVEREIGN" at 11.10.

20. In this way it was not necessary for "ZEUS" to deviate into Scalloway. "ZEUS" had already deviated the previous evening as she passed Aberdeen in order to pick up the SCR, Stefan Schultz.

21. My ETA at the casualty site was 19.00 hours. The wind was from the south-west about force 5, and there was a moderate sea with a swell of 2 to 3 metres. "ANGLIAN SOVEREIGN" arrived on site at 18.30 and I asked her Master to move close to the casualty. It was still light at this time. "BOURBON DOLPHIN" was approximately 4 nautical miles north-east (down wind) of the rig and she was close by to the "OLYMPIC HERCULES", about 4 cables distant. "VIKING VICTORY" was approximately 1 cable off the "BOURBON DOLPHIN".

22. "ANGLIAN SOVEREIGN" came within 100 metres of the "BOURBON DOLPHIN". I could immediately see that her floating condition had changed. During the planning meeting on the afternoon of the 13th, I had seen photographs showing that "BOURBON DOLPHIN" had a freeboard of 2 - 2½ metres, and that she was pretty much even keel. However, as at 18.30 on the 15th, while the stern still had a freeboard of around 1 -2 metres the bow was visibly lower than before.

23. As a reference, the aquamaster thruster forward, which had previously been plainly visible, was now totally submerged. "BOURBON DOLPHIN" was wallowing quite heavily in the swell which was around 4 metres from the south-west.

24. With regard to the connection between the "BOURBON DOLPHIN" and the "OLYMPIC HERCULES", I understood, following discussions with the Master of the "OLYMPIC HERCULES", that the 76 mm chain had been grappled and lifted on deck. This had been made fast on the working deck of "OLYMPIC HERCULES" by taking turns around a vertical securing pin in order that quick release was possible if necessary.

25. I should say that during the trip from Scalloway to the casualty site, I had been in contact on the satellite phone with Eric de Graaf and Dennis van Harte who were on board the "TRANSOCEAN RATHER". I was told that the Master of the "OCEAN HERCULES" had reported to the "TRANSOCEAN RATHER" that the condition of the "BOURBON DOLPHIN" was steadily deteriorating during the afternoon.

26. Due to the fact that the "BOURBON DOLPHIN" had drifted some 4 miles from the rig, it was not possible for the salvage team on the rig to make any observations themselves.

27. At 18.45 the "ZEUS" arrived on site and preparations were made to transfer the SCR together with a representative of Bourbon Offshore from the "ZEUS" to the rig. This was to prove difficult due to the heavy swell. The plan was that at the same time we would transfer the Smit divers from the rig on to the "ZEUS".

28. At around 18.45, at which time "ANGLIAN SOVEREIGN" was still around 1 cable of the "BOURBON DOLPHIN", I saw a large quantity of air escape from around the "BOURBON DOLPHIN". It was also clear that there was a sheen of oil in the water around the casualty.

29. Shortly after this time the forward end of the "BOURBON DOLPHIN" was seen to sink deeper in the water. I discussed this with the Master of the "OLYMPIC HERCULES" who was also closely watching the casualty and could see that the casualty's condition was deteriorating.

30. At 19.40 I received a call from Smit Rotterdam to confirm that "OCEAN HERCULES" was now on hire to Smit.

31. By this time it was fully dark, although casualty was illuminated by floodlights from the "ANGLIAN SOVEREIGN".

32. In the circumstances of a heavy swell around 3 – 4 metres and the majority of the exposed hull of "BOURBON DOLPHIN" being awash, there was no realistic prospect of making a towing connection. There was no prospect of divers operating due to the heavy sea and significant current.

33. Over the next hour I saw that "BOURBON DOLPHIN" was gradually sinking by the head. At 21.15 she came upright and sank by the head.

34. At this time I called the Master of the "OCEAN HERCULES" by VHF and told him to release the chain. "OCEAN HERCULES" disconnected the chain immediately.

35. I contacted Smit Rotterdam and updated them. "ZEUS" was immediately dismissed and departed for Den Helder. "ANGLIAN SOVEREIGN" was ordered to remain on site by the Coast Guard, and she did so until midnight searching the casualty site for debris.

Monday, 16 April 2007

36. "ANGLIAN SOVEREIGN" returned to Scalloway at 07.30 on the 16th. Arrangements were made for my return journey and I arrived home at 22.00 on 16th.

37. I ~~speak and~~ read English fluently. I confirm that I have read this statement and it is true to the best of my knowledge and belief.

SIGNED : ....

JAN VAN DER LAAN

DATED: ....30/08/07.....

"BOURBON DOLPHIN"

STATEMENT OF THE CONTRACT MANAGER
TAKEN AT ROTTERDAM
ON 20 APRIL 2007

JASON BENNET

WILL STATE :

1. This statement relates to the loss of the anchor handling tug "BOURBON DOLPHIN" off the Shetlands which occurred in April 2007, Smit were contracted as salvors under Lloyds Open Form and I was the London based Contract Manager for this job.

Friday, 13 April 2007

2. I was in the Smit London office during the morning when I was contacted by Smit Rotterdam. The case was outlined to me and I was tasked to travel initially to the Shetlands. As I was making travel plans these were revised so that I would go to the emergency room of TransOcean at Aberdeen.

3. I was given full details of the salvage plan and salvage team. I took a scheduled flight and arrived in Aberdeen at 20.00 hours where I proceeded straight to TransOcean's offices. I met with various representatives of the authorities as well as TransOcean and Chevron and was brought up to date.

4. I learned that SOSREP had approved TransOcean's plan to separate the anchor cable connecting "BOURBON DOLPHIN" to "TRANSOCEAN RATHER". The deputy to SOSREP, Hugh Shaw, had arrived in Aberdeen that evening and established the Salvage Control Unit. I updated Mr. Shaw as to the salvage plan and the details of the salvage team's mobilisation.

Saturday, 14 April 2007

2. I returned to the Salvage Control Unit first thing in the morning and I was invited to join in a conference call between TransOcean, Chevron and several other interested parties at 08.30.

3. The position was that the condition of "BOURBON DOLPHIN" had deteriorated overnight. Those reporting from the scene, including the skippers of the anchor handling tugs on site, reported that the freeboard of "BOURBON DOLPHIN" had diminished and she was apparently settling down by the head.

4. There was a heavy swell on site of around 3 metres and the exposed section of the casualty's hull was awash. During the conference call the options were discussed and it was confirmed that, with the authority of SOSREP, TransOcean's plan to use "OLYMPIC HERCULES" to separate the anchor cable would be carried out during the day.

5. TransOcean and Chevron were clearly concerned about the safety of the rig and her crew. It was discussed during the conference call that any change in the catinary of the anchor change may be detrimental to the buoyancy and stability of the "BOURBON DOLPHIN". I took the opportunity to confirm Smit's position that the situation should be left unaltered until the Salvage Master and salvage equipment was on site.

6. The first Salvage Control Unit meeting was convened at 10.20 hours. The position was that "OCEAN HERCULES" was low on fuel, she had reserves for about 4 days. Details of the planned chain cutting operation was discussed. The plan was that "OCEAN HERCULES" would manoeuvre so as to keep the weight on the catinary neutral. "OCEAN HERCULES" would not tow "BOURBON DOLPHIN", rather she would hold her position relative to "BOURBON DOLPHIN" and allow "BOURBON DOLPHIN" to continue to drift north-east away from "TRANSOCEAN RATHER".

7. There were further discussions about the risk assessment of bringing the

casualty into Yell Sound with regard to local fisheries, etc. In addition, there were concerns about seabed pipelines to the north west of Shetland. A key part of the plan to tow "BOURBON DOLPHIN" into Yell Sound was the ability of the towing tug to handle the 76 mm anchor chain and shorten the chain as the casualty was brought into shallower waters.

8. After the meeting I was involved in making arrangements to get the SCR on to the "ZUES", transferring by pilot boat at Aberdeen. In further discussions with Smit Rotterdam I was updated with the latest technical assessment being done with Bourbon Offshore Norway with regard to the likely changing stability situation of the casualty and the likelihood that watertight doors had been open at the time she capsized.

9. At 16.00 the second Salvage Control Unit meeting took place. I was advised that at 12.25 "OLYMPIC HERCULES" had begun grappling for the rig's no. 2 anchor chain and grappling would continue until the chain had been retrieved.

10. There were discussions at this meeting about the options for the crew change on "HIGHLAND VALOUR". Scrabster was put forward as a possibility but this proved to be unsuitable and Peterhead was agreed upon as the best available option.

11. During the evening there were further discussions at the Salvage Control Unit where I expressed Smit's preference for, if possible, fitting a towing connection to the hull of "BOURBON DOLPHIN" before the anchor cable was separated. However, the Transocean work plan did not allow for the fixing of a towing connection and Chevron confirmed that in their assessment it could not be done due to the prevailing weather conditions and difficulty with access to the exposed section of the hull.

Sunday, 15 April 2007

12. I received an update first thing in the morning that the ETA of "ZUES" at the casualty site was 18.00. The ETA of the "HIGHLAND VALOUR" at the casualty site was 03.00 on the 16th.

13. At 11.15, the third Salvage Control Unit meeting took place. All parties were updated on the current position. The anchor cable had been separated on board "OLYMPIC HERCULES" at around 23.00 the previous evening and "BOURBON DOLPHIN" was now some 3 nautical miles north-east of the rig.

14. At 12.00 we received an update from the Master of "OLYMPIC HERCULES" that the condition of "BOURBON DOLPHIN" was deteriorating. She was sitting lower in the water and it was apparent that she was gradually sinking. During the afternoon the Salvage Control Unit moved from the TransOcean Emergency Room to the MCA base at Aberdeen. Part of the reason for this was that, from TransOcean's perspective, the situation had a much lower degree of urgency now that the "TRANSOCEAN RATHER" was not under threat of damage from the "BOURBON DOLPHIN".

15. During the afternoon there was increasing pressure from the Chevron representatives that Smit take over the charter of the "OLYMPIC HERCULES". There was discussion about beginning a tow towards the Shetlands using the "OLYMPIC HERCULES". However, Chevron, having discussed this with the Master on "OLYMPIC HERCULES", said that they were not prepared to proceed. The condition of "BOURBON DOLPHIN" was obviously deteriorating and she was not fit in Chevron's view for an ocean tow. I confirmed to Chevron that Smit fully intended to take over charter of the "OLYMPIC HERCULES" as soon as Jan van der Laan arrived on site. His ETA was around 18.00 this afternoon. I confirmed to Chevron that the Smit Contracts Department had already set up through tug brokers to take over the charter of "OLYMPIC HERCULES".

16. At 16.00 hours the fourth meeting of the Salvage Control Unit took place. Swell conditions on site had deteriorated and were now 3 - 4 metres. The condition of "BOURBON DOLPHIN" was continuing to deteriorate. The Chevron representatives put to Mr. Shaw (deputy to SOSREP) that in circumstances where Smit would not immediately take over the charter of "OLYMPIC HERCULES", Chevron wanted "OLYMPIC HERCULES" to release the anchor chain. I explained why this was plainly a bad idea. Firstly,

it would change the stability condition of "BOURBON DOLPHIN" as there would be about 1,000 metres of wire and chain hanging vertically below her. Further, with regard to the safety of "TRANSOCEAN RATHER", if the direction of the current altered then with no tug secured to her, there would be no way to prevent "BOURBON DOLPHIN" drifting back towards the rig and the drill site. On hearing the various points, Mr. Shaw advised Chevron that "OLYMPIC HERCULES" should not disconnect the chain at this stage.

17. At 18.15 Jan van der Laan arrived on site on board "ANGLIAN SOVEREIGN" and provided the Salvage Control Unit with an update. Very shortly afterwards, Smit, via Samuel Stewart, took "OLYMPIC HERCULES" on hire. It was now dark on site but the "ANGLIAN SOVEREIGN" was very close by "BOURBON DOLPHIN" and by her floodlights the Salvage Master could see that "BOURBON DOLPHIN" was continuing to settle lower in the water. The conditions on site with swell of 3 – 4 metres was such that it was simply not possible for divers to operate.

18. Shortly after 21.00 we received the news that "BOURBON DOLPHIN" had sunk.

Monday, 16 April 2007

19. At 10.00 there was the fifth and final Salvage Control Unit meeting dealing with demobilisation of craft and personnel.

20. I left Aberdeen at 13.30, arriving back in London later in the afternoon.

21. I have read this statement and confirm that it is true to the best of my knowledge and belief.

SIGNED : ....

JASON BENNET

DATED: 26/8/07.

HFWLDN\4235950-1

Initials: ....

"BOURBON DOLPHIN"

STATEMENT OF SALVAGE SUPERVISOR
TAKEN AT ROTTERDAM
ON 19 APRIL 2007

ERIC DE GRAAF

WILL STATE :

1. This statement relates to the loss of the anchor handling tug "BOURBON DOLPHIN" off the Shetlands which occurred in April 2007, Smit were contracted as salvors under Lloyds Open Form and I was the Salvage Supervisor.

Friday, 13 April 2007

2. I was off duty on this day and my first involvement in the case was when I was contacted by the office late in the morning.

3. I came into the office at around 13.30 where a planning meeting was underway. The Salvage Master, Jan van der Laan, was in the office. Once I had been made aware of the main points of the salvage plan I went to the Smit warehouse where the salvage team was gathering, and during the afternoon took charge of loading up the salvage spread into containers.

4. The spread was ready and loaded onto a truck by 16.00 and we made arrangements to transfer to the jet centre where a charter jet was waiting.

5. We departed Rotterdam at 17.00 and arrived at Lerwick at 18.00. Smit's agent in Shetland, Ross Bennett of OBC Aberdeen, met us at the airport and arranged for our transfer to Scalloway where we arrived at 19.00. We were advised that helicopter transfer to the casualty site was not an option due to fog.

6. We immediately boarded "ANGLIAN SOVEREIGN" alongside and departed Scallaway at 19.35.

Saturday, 14 April 2007

7. At 04.20 we arrived at the casualty site. The wind was force 5 from south west. There was a moderate sea and swell of around 3 metres. I made VHF contact with the "TRANSOCEAN RATHER" and it was agreed that we would standby until first light for boarding.

8. Shortly after first light the fast rescue craft from "SUBSEA VIKING" came across to "ANGLIAN SOVEREIGN" and I was provided with an information pack giving details of the ROV survey, the nature of the chain and wire connection between the rig and the "BOURBON DOLPHIN", and a copy of the Transocean worksheet detailing step by step the planned operation to separate the chain in order to allow "BOURBON DOLPHIN" to be towed away from the rig and drill site.

9. The information provided included DVDs showing the ROV survey and I viewed these on my laptop computer. The depth meter on the ROV had been used to measure the length of towing cable from the "BOURBON DOLPHIN" connected to the rig's No. 2 anchor chain which it had been handling at the time of the capsize.

10. I asked the Master of "ANGLIAN SOVEREIGN" to go closer to the casualty. At a range of about 200 metres I could see that "BOURBON DOLPHIN" was almost on an even keel, perhaps slightly down by the head, with a freeboard of 1 – 2 metres. The propellers were clear aft and the aquamaster was clear forward. At no time during the whole job did we see any divers on site, operating around the casualty. We understood from the Master of the "ANGLIAN SOVEREIGN" that as part of the search and rescue operation the previous day navy divers had been on site.

11. As our diving gear and salvage spread was not on site at this stage, we were occupied only with familiarising ourselves with the situation and the casualty's condition.

12. At 10.30 the "ANGLIAN SOVEREIGN" received a call from the Coast Guard ordering her back on station. Accordingly, arrangements were made to

transfer the salvage team to the rig and this was done between 11.00 and 11.30 using the rig's personnel transfer basket. This was not straightforward as the swell was around 3 metres.

13. Immediately on board, we met with the Off Shore Installation Manager (OIM) in order to be brought up to date.

14. We obtained details of the circumstances of the capsize. Prior to arriving on site it had been thought that "BOURBON DOLPHIN" may have been in the process of locating/retrieving the No. 2 anchor. In fact the No. 2 anchor had already been retrieved, and the capsize occurred during the next phase of the operation, namely transferring the No. 2 anchor chain back into position. It is possible, therefore, that the No. 2 anchor was on board "BOURBON DOLPHIN" at the time of the capsize.

15. The plan which had been signed off between Transocean and Chevron was that the chain would be grappled at the 76 mm section and brought onto the working deck of the "OLYMPIC HERCULES" before being broken. This would enable the "OLYMPIC HERCULES" to tow the "BOURBON DOLPHIN" away from the rig and the drill site.

16. We explained to the OIM that the "HIGHLAND VALOUR" was expected back on site early the following morning. It was obvious that Transocean/Chevron were concerned at the proximity of "BOURBON DOLPHIN" to the rig and the drill site. The concern was that if she sank she might foul the drill site or foul/damage the rig's other moorings. The OIM advised us that another factor was that in the prevailing weather conditions, which were forecast to deteriorate, there was no realistic prospect of transferring personnel on to the hull of the "BOURBON DOLPHIN" in order to establish a proper towing connection.

17. I explained the salvage plan to the OIM and stressed that Smit's advice was that the situation surrounding the casualty should not be altered until the Salvage Master had arrived on site and Smit had the opportunity to make a proper assessment of the casualty's condition.

18. In the circumstances I updated Smit Rotterdam to the effect that Transocean were intent on proceeding as per their plan and separating the chain.

19. It therefore became apparent that it would be necessary for the salvage plan to evolve into two phases. Phase 1 would be the separation of the chain and the removal of the casualty from the drill site while fast to "OCEAN HERCULES". Phase 2 would be assessing the condition of the casualty, if possible improving her buoyancy and arranging for a towing connection so that "HIGHLAND VALOUR" could tow the casualty to Yell Sound.

20. We were advised by the OIM that throughout the duration of the chain separation it would be necessary for the Smit personnel to remain in the green zone on "TRANSOCEAN RATHER". This was a muster station/safety zone well inside the rig accommodation block.

21. The team was transferred to the green zone at around 16.15 and not allowed to leave until after 23.00, at which time we were advised the chain had been separated. We were advised that the cut had been made on the working deck of "OCEAN HERCULES" such that the catinery now comprised 845 m of 76 mm chain and 225 m of 75mm towing wire (of "BOURBON DOLPHIN"). Therefore, the catinery was 1,079 metres of wire and chain.

Sunday, 15 April 2007

22. As well as being in regular contact with Smit in Rotterdam, I was also in contact with Jason Bennett who was at the Transocean emergency room in Aberdeen.

23. I was advised that the ETA of "HIGHLAND VALOUR" had gone back to 10.00 on 16th. This was because she had had to transfer to Peterhead in order to carry out her crew change. Fog had prevented the new crew from transferring to the Shetlands.

24. At 08.30 the OIM received a message from the Master of "OLYMPIC HERCULES" that the floating condition of the "BOURBON DOLPHIN" was

visibly deteriorating. Air could be seen to be escaping from around the casualty. She was losing freeboard bodily and in particular forward.

25. The Master of "OCEAN HERCULES" proposed that he begin to slowly tow the casualty towards the Shetlands.

26. It was difficult for us to assess that proposal, or agree to it, as we had no control and did not have access to the casualty. It was apparent to me that Chevron wanted Smit to take over charter of the "OLYMPIC HERCULES" at this stage and I understood that Smit's commercial department were in contact with Chevron, Transocean and Bourbon to discuss the next steps.

27. At around 14.00 there was further contact from the Master of the "OCEAN HERCULES" who advised that without doubt the floating condition of "BOURBON DOLPHIN" was deteriorating. There were further calls frequently from the Master of the "OCEAN HERCULES" over the next 3 – 4 hours updating us on the reducing freeboard and deteriorating condition of the casualty.

28. At 18.15, Jan van der Laan arrived on board the "ANGLIAN SOVEREIGN" which went close to "BOURBON DOLPHIN" in order to carry out a visual inspection.

29. At 18.45, the " ZEUS" arrived on site.

30. The swell was around 3 metres and we were advised by the OIM that the conditions were too rough to allow a transfer of the Smit divers from the rig on to the "ZEUS".

31. It became dark shortly afterwards and it seemed that we would need to wait until first light the following day in order to assess the situation.

32. There was a further meeting on board the rig at around 19.15. The Chevron representatives wanted to know what were the next steps. Chevron wanted Smit to take over the hire of the "OLYMPIC HERCULES" and to begin towing towards the Shetlands. I explained that this was in hand.

33. At 21.00 I had a call from Jan van der Laan who advised that "BOURBON DOLPHIN" was sinking. We could overhear VHF conversation between Jan van der Laan and the Master of the "OCEAN HERCULES". "BOURBON DOLPHIN" sank at around 21.15 and immediately "OLYMPIC HERCULES" released the chain.

Monday, 16 April 2007

34. We departed the rig at 20.00 and transferred by helicopter to Aberdeen, arriving at 22.00.

Tuesday, 17 April 2007

36. We took a scheduled flight back to Schipol, arriving 14.00.

SIGNED : ....
ERIC DE GRAAF

DATED: 31-08-2007

"BOURBON DOLPHIN"

STATEMENT OF THE CONTRACT MANAGER
TAKEN AT ROTTERDAM
ON 20 APRIL 2007

REINDER PEEK

WILL STATE :

1. This statement relates to the loss of the anchor handling tug "BOURBON DOLPHIN" off the Shetlands which occurred in April 2007, Smit were contracted as salvors under Lloyds Open Form and I was the Contract Manager for this job.

Thursday, 12 April 2007

2. I was on duty this day and was at home at around 19.00 hours when I was contacted by Shaun Frestle of Samuel Stewart who advised that an anchor handling tug had capsized north-west of the Shetlands. At this time the details were unknown.

3. I immediately contacted Carl Beare of Klyne Tugs. Carl was aware of the casualty. "ANGLIAN SOVEREIGN" had not been tasked. It seemed that "BOURBON DOLPHIN" was expected to sink.

4. I also contacted Geert Koffeman, our Commercial Manager. We established that the "BOURBON DOLPHIN" was owned/operated by Bourbon Offshore, Norway. The Norwegian Hull Club were contacted. The priority at this stage was search and rescue, and it was anticipated that "BOURBON DOLPHIN" would shortly sink.

Friday, 13 April 2007

5. At first light the "BOURBON DOLPHIN" was still afloat. The Norwegian Hull Club were not the lead underwriters, but they were involved. We got in touch with Rolv Dale of Gjensidig, who were the lead underwriter. We

advised that we were putting together a salvage team and had called in Jan van der Laan as Salvage Master.

6. At 09.50, Carl Beare called and advised that SOSREP had granted permission, subject to seeing a salvage plan, to tow "BOURBON DOLPHIN" to Calla Firth in the Yell Sound. SOSREP had also asked that environmental and pollution aspects be taken into consideration, in particular due to the salmon farms around the west coast of the Shetlands.

7. At 10.15 Bert Kleijwegt, our Senior Salvage Consultant, called and provided me with contact details of Transocean Marine (owners of "TRANSOCEAN RATHER"), and Chevron (charterers of the "BOURBON DOLPHIN").

8. At 10.30 I took a call from Ove Ericsson of the Danish Salvage and Towage Company (DBB). They were aware of the case and were calling to put forward their sheerlegs, "SAMSON". We discussed the availability of "SAMSON", and she would be available at Keil on 8 May. The rate quoted for the "SAMSON" was €20,000 per day.

9. Late in the morning, Bert Kleijwegt called to give details of the wire and chain combination which connected the "BOURBON DOLPHIN" to the "TRANSOCEAN RATHER".

10. I understood that overnight, as part of the search and rescue operation involving the UK Coast Guard, there had been navy divers on site. I also understood that there had been an ROV survey of the casualty.

11. It was also apparent from various discussions that Transocean/Chevron had concerns about potential change in current and weather, and the possibility that "BOURBON DOLPHIN" might drift towards the rig.

12. At 11.00, LOF was signed with Bourbon Offshore, Norway, who had been copied into correspondence to date between Smit and the underwriters. Immediately upon receipt of the email enclosing the signed LOF, I sent a return email invoking SCOPIC.

13. At 12.00 I took a call from Georg Eide of Eide Marine in Norway offering his services. He advised that if the casualty could be towed to Norway she could be righted whilst alongside by pull barges/winches.

14. Shortly after midday, Derek Hart of Transocean Marine (Aberdeen) called. There was a conference call including representatives of Transocean and Chevron. We were advised that the priority of Transocean Chevron was as follows:

    (i) To attempt to locate the five missing crew of "BOURBON DOLPHIN". We were advised that due to the prevailing weather conditions and the current, the navy divers had not been able to operate.

    (ii) Transocean/Chevron considered that while the condition of the casualty appeared stable, there were concerns that "BOURBON DOLPHIN" might change drift direction and strike the rig.

15. At 12.50 I took a call from Adrian Brown of Transocean. He advised that a further ROV survey was currently underway. He advised that, based on the information to hand, Transocean/Chevron had drawn up a plan to disconnect the No. 2 anchor chain from the "BOURBON DOLPHIN". This plan would be provided to the SOSREP for prior approval.

16. At 14.10 I took a call from Stefan Schultz who had been appointed as SCR. He was flying up to Aberdeen and would then make arrangements for onward travel to the casualty site.

17. During the afternoon there was a salvage team planning meeting and a preliminary salvage plan was drawn up. I was aware that the salvage team were in contact with SOSREP via Bert Kleijwegt who was with him at the "MSC NAPOLI" incident room.

18. As Contract Manager, I was focussed on the assets on site and establishing which craft might usefully be brought into the salvage effort. I was in contact with Samuel Stewart Aberdeen and Samuel Stewart London in order to establish the technical details of the other anchor handling tugs on site. I was

advised by the salvage team that we would want to take over one of the on-site anchor handling tugs. The role of this tug would ultimately be to tow the casualty to the Yell Sound. The plan was to arrange for helicopter transfer of the salvage team from Shetland to the casualty site. I gave the anchor handling tug specs to Jan van der Laan who examined them and advised that the "HIGHLAND VALOUR" was best equipped due to her chain handling equipment.

19. Accordingly I notified Stewarts that we wanted to contract the "HIGHLAND VALOUR". Stewarts advised that the "HIGHLAND VALOUR" required a crew change as the crew were traumatised, having witnessed the capsize of "BOURBON DOLPHIN" the previous day. A replacement crew was on its way and was expected at Lerwick during the 13th. It was anticipated therefore that a crew change and refuelling would take place late on 13th. Accordingly the plan was that "HIGHLAND VALOUR" would come on hire, come into Lerwick for her crew change, and at the same time pick up the Smit salvage team.

20. The casualty was approximately 75 miles off shore and accordingly it was forecast that it should be possible to have the "HIGHLAND VALOUR" back on site shortly after first light on the 14th.

21. During Friday afternoon, "HIGHLAND VALOUR" was fixed at £100,000 per day. In addition, Samuel Stewart assisted me in fixing the tug "ZEUS" (at £28,000 per day). "ZEUS" was at Den Helder and was to be used to transfer the salvage spread and diving equipment to site.

22. At 16.10 I took a call from Bert Kleijwegt who advised that Transocean had made the decision based on the ROV data and general assessment of the situation that the anchor chains nos. 2 and 3 were fouled and that the no. 2 chain would be retrieved and cut.

23. At 16.45 I was contacted by Bjorn Remoy of Bourbon Offshore Norway and I brought him up to date. I asked him for a bunker plan for "BOURBON DOLPHIN" and he provided this by email.

24. Late on Friday afternoon I assisted Jan van der Laan in finalising the salvage plan which was submitted for the approval of SOSREP.

25. At 18.00 I took a call from Bert Kleijwegt. He was with SOSREP. SOSREP had been asked by Transocean for permission to cut the no. 2 anchor chain. We advised SOSREP via Bert Kleijwegt that the chain should not be cut. Our advice was that nothing should be done to alter the condition of the casualty until the Salvage Master and dive equipment were on site and the team had had the opportunity to assess the casualty's condition.

26. Later during the evening I was at home and took a further call from Bert Kleijwegt who advised that SOSREP had granted permission for the cable to be cut. I was also advised at this time that on-going fog at the Shetlands might hamper onward travel for the salvage team and others.

27. At 19.30 I sent an email message informing all parties of the current situation. While I was writing that email I received a call confirming that the salvage team had arrived at the Shetlands. I heard that the salvage team would not now transfer to "HIGHLAND VALOUR" but instead they would board the "ANGLIAN SOVEREIGN" at Scalloway. "HIGHLAND VALOUR" had been held up as fog had caused a delay to the planned crew change.

Saturday, 14 April 2007

28. I took a call from Carl Beare at 09.30 and he provided an update. "ANGLIAN SOVEREIGN" was on site with the salvage team. I contacted "ANGLIAN SOVEREIGN" by satellite phone and received an update from the team at 10.15.

29. At this time Jan van der Laan was still in Edinburgh. His flight to Lerwick was delayed due to fog.

30. Via Samuel Stewart I had found out that the "HIGHLAND VALOUR"'s replacement crew were similarly stuck at Aberdeen. Further, I learned from the SCR that he was stuck at Aberdeen due to fog. Accordingly, I arranged for "ZEUS" to divert to Aberdeen in order to pick up the SCR and Jan van der

Laan. I also looked into the question of picking up the "HIGHLAND VALOUR"'s replacement crew, however there was insufficient space on "ZEUS".

31. Jan van der Laan finally got to Lerwick at 19.00. However, the SCR could not get out of Aberdeen and accordingly I confirmed to "ZEUS" that she should divert to Aberdeen.

32. I arranged via Jason Bennett in Aberdeen to arrange via our agent to get the Aberdeen pilot boat to take the SCR off-shore to rendezvous with "ZEUS". This took place at 23.00.

33. I had further discussions with Samuel Stewart on how to get the replacement crew to "HIGHLAND VALOUR". In the circumstances the best that could be done was to bring the "HIGHLAND VALOUR" to Peterhead in order to pick up the crew.

34. I gave consideration to abandoning the "HIGHLAND VALOUR" and instead taking "OLYMPIC HERCULES" on hire. However, I was advised by Samuel Stewart that the "OLYMPIC HERCULES" was low on fuel and also required a crew change.

35. I knew at this stage that the separation of the anchor chain was planned to take place using "OLYMPIC HERCULES" and accordingly my plan at this stage was to leave "OLYMPIC HERCULES" in Chevron control pending a change-out for the "HIGHLAND VALOUR" once she could get back to the casualty site.

36. I was advised at 23.15 that the anchor cable had been cut on board "OLYMPIC HERCULES" and that "BOURBON DOLPHIN" was being moved away from the drill site and the "TRANSOCEAN RATHER".

Sunday, 15 April 2007

37. The "HIGHLAND VALOUR" had ETA Peterhead at 09.00. On this basis her ETA at the casualty site would be 03.00 on 16th.

38. At 09.15 I had a call from Samuel Stewart in order to discuss the taking on hire of the "OLYMPIC HERCULES" in place of the "HIGHLAND VALOUR". At this stage the intention was to stick with the "HIGHLAND VALOUR".

39. At 09.30 Doug Mowat of Chevron called. Chevron wanted Smit to take over hire of the "OLYMPIC HERCULES" immediately. In parallel to this I was considering how best to get Jan van der Laan on site. I was in touch with Bristow Helicopters and it was thought that they might have a helicopter flight at 10.30 this morning. All of this was doubtful. In the circumstances I decided to ask "ZEUS" to make preparations to deviate to Scalloway if necessary to pick up Jan van der Laan.

40. At 11.00 I took a call from Jason Bennett who was with the Deputy SOSREP at the Transocean emergency room in Aberdeen. I was advised that "ANGLIAN SOVEREIGN" had now been tasked to take Jan van der Laan and Gavin Grey from Scalloway to the casualty. Accordingly, I updated "ZEUS" and directed her to proceed directly to the casualty where her ETA was 18.30.

41. At 13.30 I received a call from the managing director of Bourbon Offshore Norway, Trond Myklebust. He was in the Shetlands together with the survivor and next of kin and he requested that he be updated on all further updates. There were further discussions around 14.00 with representatives of Chevron that Smit immediately take over the charter of "OLYMPIC HERCULES".

42. It was known at this time that the condition of "BOURBON DOLPHIN" was deteriorating. She had less freeboard, particularly at the forward end, and air could be seen to be escaping from around her hull. Chevron were aware that "HIGHLAND VALOUR" was delayed due to fog and that her ETA on site was not until early hours the following morning.

43. I advised Chevron that they had already taken practical steps which we had cautioned against in order to have "OLYMPIC HERCULES" effectively take custody of the casualty. I explained that in the circumstances Chevron had to take some responsibility for that and in circumstances where the Salvage Master was not on site and the salvage team had not been able to assess the condition of the casualty, it was not reasonable to expect Smit to take over the charter of the "OLYMPIC HERCULES".

44. The Chevron representatives threatened at this stage to disconnect the chain from "OLYMPIC HERCULES" unless Smit would take over the charter. I explained that this did not alter Smit's position and could only severely caution against disconnecting the line to the "BOURBON DOLPHIN". I pointed out that if "OLYMPIC HERCULES" was in any danger, disconnection could be carried out at any time. However, if it was not necessary to disconnect then from Smit's point of view we could see no reason why this should be done. Chevron said they would take the matter to the SOSREP.

45. I explained that Smit's intention was to take over the contract for the "OLYMPIC HERCULES" once the Salvage Master was on site and his ETA was around 18.00 hours (i.e. in about 3 hours time). Chevron also said they would contact Bourbon Offshore Norway direct.

46. Accordingly, at 15.30, Rolv Dale of lead underwriters called. Chevron had indeed been in contact with Bourbon Offshore and Rolv Dale wanted to discuss the situation. I set out Smit's position and he understood it.

47. I called Samuel Stewart in Aberdeen and asked that they make preparations to have the contract in place to take "OLYMPIC HERCULES" on-hire as soon as the Salvage Master was on site.

48. At 16.30 I contacted Doug Mowat of Chevron to confirm that Smit would be taking over the charter of "OLYMPIC HERCULES" very shortly, within the next two hours.

49. At 18.45 Jan van der Laan called to advise that he was on site and had seen that the condition of "BOURBON DOLPHIN" had deteriorated.

50. At 19.35 I contacted Samuel Stewart in order to fix "OLYMPIC HERCULES".

51. I also called Chevron in order to confirm that we had taken over the charter, and they were relieved.

52. Having received an update from Jan van der Laan I circulated a message to owners and underwriters reporting that the "BOURBON DOLPHIN" appeared to be deteriorating. I also contacted the Managing Director of Bourbon to advise that "BOURBON DOLPHIN" appeared to be sinking. This was a very emotional and traumatic time as the Managing Director was together with the relatives of the crew members and various next of kin.

53. At 22.30 (21.30 local time on site) I had a call advising that "BOURBON DOLPHIN" had sunk.

54. I immediately circulated an email updating all parties.

55. "HIGHLAND VALOUR" was immediately taken off contract, as was the "OLYMPIC HERCULES". "ZEUS" was directed back to Den Helder via Aberdeen to drop off the SCR.

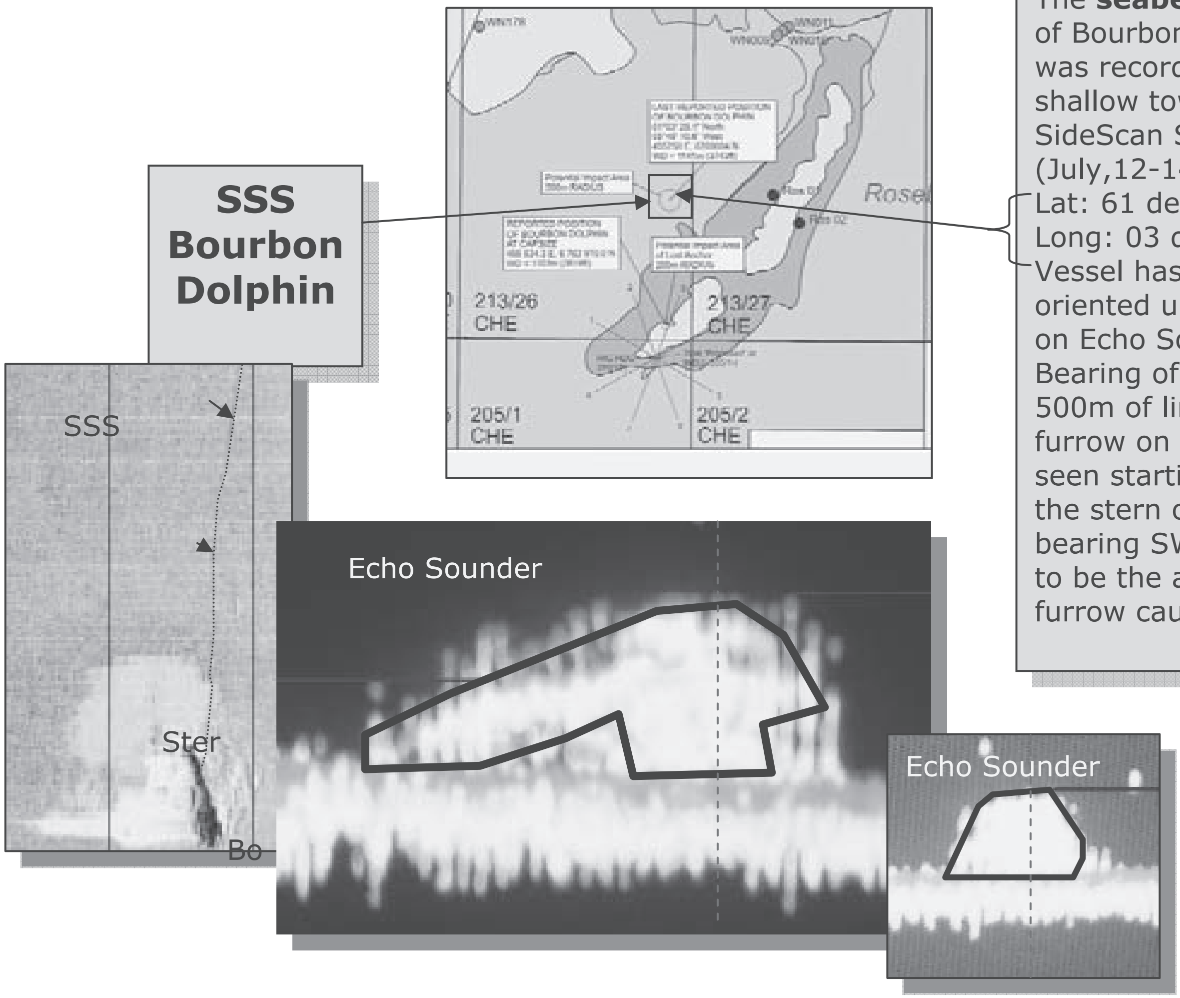
56. I speak and read English fluently. I confirm that I have read this statement and it is true to the best of my knowledge and belief.

SIGNED : ....

REINDER PEEK

DATED: 18th September 2007

Bourbon Dolphin SideScan Sonar Survey, July 2007
Summary slide



The **seabed location**
of Bourbon Dolphin
was recorded by
shallow towed
SideScan Sonar
(July,12-14, 2007):
Lat: 61 deg 3' 37.368''
Long: 03 deg 48' 53.280''
Vessel has been interpreted to be
oriented upside down
on Echo Sounder.
Bearing of vessel is NW.
500m of linear feature or
furrow on seabed can be
seen starting from
the stern of the ship,
bearing SW. This is believed
to be the anchor chain and/or
furrow caused by the anchor chain

Vedlegg 7

Juridisk betenkning fra Hanne Sofie Logstein

En gjennomgang av det britiske regelverket i tilknytning til ankerhåndteringsoperasjonen der Boubon Dolphin forliste

Hanne Sofie Logstein, stipendiat
Nordisk Institutt for sjørett, Avdeling for petroleums- og energirett
Universitetet i Oslo
Oslo 14. desember 2007

INNHOLDSFORTEGNELSE

1 Bourbon Dolphin -forliset

1.1 Mandat og formål

Kommisjonen ønsker en gjennomgang av de britiske reglene som gjaldt for fartøyet, operatør og riggen/lisensinnehaver under ankerhåndteringsoperasjonen der Bourbon Dolphin deltok som ett av flere fartøy ved flyttingen av riggen Transocean Rather 12. april 2007, en operasjon som resulterte i at Bourbon Dolphin gikk rundt og senere sank.

Vurderingen skal omfatte en omtale av hvilke regler som kommer til anvendelse. Videre skal det redegjøres for i hvilken grad aktørene var bundet av disse reglene. Betenkningen er saklig begrenset til det britiske regelverket og tidsmessig begrenset til å omhandle de regler som kom til anvendelse før og under ankerhåndteringsoperasjonen. Herunder ønskes det en vurdering av i hvilken grad retningslinjer og lignende kan ansees bindende for aktørene.

Regelverk i forhold til fartøyet, samt konstruksjon og herunder stabilitet, skal ikke behandles og heller ikke beredskap og gjennomføring av redningsoperasjon etter at Bourbon Dolphin forliste.

Til sist er det et ønske om en kort redegjørelse for hva som evt. kan gjøres for å unngå tilsvarende hendelser i fremtiden.

Betenkningen skal ligge innenfor de rammene som undersøkelseskommisjonen for Bourbon Dolphin –forliset har fått gjennom sitt mandat.

Professor dr. juris Knut Kaasen har gjennomgått betenkningen.

Kommisjonen har rett til å legge betenkningen ved den endelige rapporten og for øvrig vise til den i sin egen rapport. Forfatteren har rett til selv å publisere hele eller deler av betenkningen.

1.2 Materiale og bakgrunnsopplysninger

Til grunn for utredningen har det vært ett møte med hele kommisjonen 8. august 2007,

Videre har jeg vært til stede under kommisjonens høring 7. august 2007. Kommisjonen formidlet kontakt med Mr. Rognvald Thomson i Health and Safety Executive i Storbritannia, som tilsvarer Petroleumstilsynet i Norge og det har vært telefonisk kontakt 9. oktober, 19. oktober og 4. desember, samt et møte i Aberdeen 22. november og på Gardermoen flyplass 6. desember 2007.

Følgende materiale er blitt oversendt fra kommisjonen:

- Undersøkelseskommisjonens mandat
- ISM Code and Revised Guidelines on Implementation of the ISM Code by Administrations 2002 Edition

- OLF/NRs retningslinjer for sikker ankerhåndtering og sleping (Nr 061-A)
- Retningslinjer for sikker styring av offshore service- og ankerhåndteringsoperasjoner eller som de benevnes på engelsk; Guidelines for the safe management of offshore supply and anchor handling operations (NW European Area -NWEA).
- The Health and Safety at Work ect Act 1974
- The Health and Safety at Work Act 1974 (Application outside Great Britain) Order 2001
- The Management of Health and Safety at Work Regulations 1999
  - Approved code of practice and guidance L21
- The Offshore Installations (safety case) Regulations 2005
  - A Guide to the Offshore Installations (safety case) Regulations 2005 L30
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995
  - Approved code of practice and guidance L65
- The Offshore Installations and Pipelines works (management and administration) Regulations 1995
  - A Guide to the Offshore Installations and Pipelines works (management and administration) Regulations 1995 L70

I tillegg er følgende kilder/regelverk vurdert eller benyttet:

- The offshore safety act 1992
- Lov 9. juni 1903 nr. 7 om Statskontrol med Skibes Sjødyktighed m.v.
- Knut Kaasen: *Sikkerhetsregulering i petroleumsvirksomheten*, Sjørettsforndet, Oslo 1984, og særlig § 7 «Utkast til petroleumslov» og § 50 «Oversikt over Britisk sikkerhetsregulering og -kontroll».
- Terence Daintith, Geoffrey Willoughby & Adrian Hill: *United Kingdom Oil and Gas Law*
- Michael Ford and Jonathan Clarke: *Redgrave's Health and Safety*, 5th edition, published by LexisNexis/Butterworths ISBN 978-1-4057-1890-5
- John Ridley & John Channing: *Safety at work*, 6th edition, published by Elsevier ISBN 978-0-7506-5493-7

Det er en rekke opplysninger som ligger med link fra the Health and Safety Commission sin nettportal som er benyttet, og herunder *The health and safety system in Great Britain* og *Five steps to risk assessment.* Siden regelverket er svært omfattende har det i en viss utstrekning vært nødvendig å bygge på opplysninger fra HSE i arbeidet med å finne relevant regelverk og rettsavgjørelser. Vurderingene av materialet er imidlertid gjort på selvstendig grunnlag.

Noen foreløpige konklusjoner fra arbeidet ble presentert for undersøkelseskommisjonens leder og sekretær fredag 26. oktober.

Informasjon om de faktiske forholdene rundt havariet er innhentet fra undersøkelseskommisjonen.

1.3 Innledende kommentar og begrepsavklaring

Det presiseres at betenkningen her er generelle juridiske betraktninger slik at det ikke kan trekkes slutninger om det faktiske hendelsesforløpet ut fra betenkningen. De faktiske forhold begrenser imidlertid hva som tas opp til drøftelse her, slik at spørsmål som ikke er til hjelp for å avklare de juridiske sidene ved Bourbon Dolphin -havariet ikke vil bli behandlet.

I betenkningen benyttes begrepet «regelverk» som en fellesbetegnelse på lover, forskrifter og retningslinjer, uavhengig av om de regnes som juridisk bindende. Der det er viktig å skille mellom de ulike typene regelverk, fremkommer det hva slags regelverk det er snakk om.

Det vil bli benyttet forkortelser for to offentlige britiske organ; The Health and Safety Commission (HSC) som er et ikke-departementalt organ som er underlagt Department of Work and Pensions og som arbeider med helse- og sikkerhetslovgivningen.

Under The Health and Safety Commission (HSC) ligger The Healt and Safety Executive (HSE), som kan sammenlignes med vårt eget petroleumstilsyn (Ptil), men HSE forvalter alt helse- og sikkerhetsregelverk i Storbritannia og ikke bare det som omhandler petroleumsvirksomheten.

Bestemmelser om HSC og HSE er å finne i The Health and Safety at Work etc. Act 1974 § 10 flg.

1.4 Kort om fakta rundt ulykken - som ramme for betenkningen

Bourbon Dolphin var et norsk-registrert ankerhåndteringsfartøy som var engasjert av Team Marine på vegne av Chevron. Fartøyet gikk rundt og sank 12. april 2007 i britisk økonomisk sone i forbindelse med flytting av riggen Transocean Rather (registrert i Panama). Bourbon Dolphin var i ferd med å sette ut det åttende og siste ankeret til riggen da båten gikk rundt. Operasjonen involverte flere andre fartøy og da Bourbon Dolphin forliste, ble den assistert av den britisk registrerte båten Highland Valour.

Chevron var operatør på feltet og den hovedansvarlig for riggflyttingen, men hadde gitt konsulentselskapet Trident i oppdrag å utarbeide Rig-move-plan med beskrivelse av hvordan og når flyttingen skulle foregå. Om bord på riggen var det to ”tow-masters” som var selvstendig næringsdrivende og som var engasjert av Team Marine på vegne av

Chevron. ”Tow-masters” hadde det operative ansvaret for riggflyttet og var kontaktpunkt mellom de involverte fartøyene.

2 Regelverket – noen særtrekk

2.1 Oversikt og avgrensninger

Bourbon Dolphin var et norsk-registrert fartøy og flaggstatsprinsippet medfører at Norsk regelverk kommer til anvendelse for selve fartøyet. Norge har således jurisdiksjon over Bourbon Dolphin, men ikke over andre under operasjonen, som operatøren eller riggen. Selve fartøyet er ikke omfattet av britisk jurisdiksjon. Fartøyet opererte i Britisk økonomisk sone. Det er derfor det britiske regelverket som kommer til anvendelse på operasjonen og de øvrige impliserte.

Ulykken skjedde videre i skotsk sektor, men dette har kun betydning i forhold til det prosessuelle ved en eventuell rettsforfølgelse og ingen betydning for det materielle innholdet i regelverket. Dette vil således ikke bli omtalt videre.

Spørsmålene som belyses videre, er hvilke regelverk som på det tidspunkt kom til anvendelse på ankerhåndteringsoperasjonen, hvem som er forpliktet etter regelverket og i hvilken grad reglene er bindende for disse. Det vil bli gjort noen sammenligninger med det norske regelverket der dette faller naturlig.

Det regelverket som behandles, er reglene som kommer til anvendelse på aktiviteter forut for og under selve operasjonen. Redningsoperasjonen og regleverket for dette vil således ikke bli berørt.

2.2 Regleverket rundt operasjonen som helhet – det britiske regelverket

2.2.1 Reguleringsmetodikk

Regelverket som komme til anvendelse er omfattende og består foruten lov og forskrifter, også av flere andre rettskilder. Som i Norge er det et skille mellom sjøfartslovgivningen, petroleumslovgivningen og lovgivningen på land. Grensegangen for offshorevirksomheten på britisk side er en annen enn den vi kjenner fra norsk rett, ved at flyttbare innretninger regnes til petroleumsvirksomheten og landregelverket kommer til anvendelse på disse. I begge land er det landbaserte regelverket gitt anvendelse på petroleumsvirksomhet og i tillegg er det gitt en rekke regler for offshorevirksomheten spesielt.

Reguleringsmetodikken ligner på mange måter den vi finner innenfor sikkerhetsreguleringen i petroleumsvirksomheten i Norge, der lov og forskrifter er utformet som funksjonskrav (på engelsk omtalt som ”goalsetting regime”). Dette innebærer at reglene presenterer mål og prinsipper der det fremgår hva styresmaktene ønsker å oppnå med regelverket. Reglene er dermed i stor grad vagt utformet, hvilket vanskeliggjør arbeidet med å finne ut hva som må til for å oppfylle regelverkets krav ut fra lov og forskrifter alene.

Det britiske regelverket er utfylt på flere måter. For det første finnes det flere typer regelsett ut over lov og forskrifter. Herunder blant annet en form for «semi-bindende» regler utarbeidet av myndighetene som utdyper kravene i forskriftene og som aktørene kan velge om de vil følge (*approved code of practise* og *guidance*). I tillegg finnes det en rekke ulike standarder som kan utgjøre ”relevant good practice”. For det andre er aktørene pålagt selv å utfylle regelverket bl.a. med risikovurderinger. Det er ingen tradisjon å benytte forarbeider som rettskilde slik det er i Norden.

Tendensen er at regelverket blir mer konkret jo lengre unna man beveger seg fra de bindende reglene i lover og forskrifter. Dette gir opphav til et spørsmål om hvilken rettskildemessig betydning anbefalt praksis, retningslinjer, standarder og eventuelle egne risikovurderinger har, herunder om de har relevans og hvilken vekt de i så fall kan tillegges.

Det britiske regelverket kan etter dette deles inn i fem ulike kategorier i tre grupper.

De to første kategoriene er *lov* og *forskrifter* som er bindende regler, men som altså er vagt og generelt utformet. Dette har slik sett likhetstrekk med det norske sikkerhetsregelverket.

De to neste kategoriene består av de semi-bindende reglene som er utarbeidet av HSE og som i formen kan minne om spesialmerknadene i en odelstingsproposisjon. Den første er *godkjent praksis* (*approved code of practice*, forkortet ACOP) og den andre er *retningslinjer (guidance). Approved Code of Practice* og *guidance* kan revideres av HSE ved behov.

Den femte og siste kategorien er *standarder* og tilsvarende anbefalinger som er utarbeidet av andre instanser enn myndighetene som for eksempel nasjonale eller internasjonale organisasjoner.

2.2.2 Nærmere om godkjent praksis (Approved Code Of Practice - ACOP) og retningslinjer (Guidance)

The Health and Safety at Work etc. Act 1974 §§ 16 og 17 inneholder bestemmelser om godkjenning av *approved code of practice* samt bruk av slike i sammenheng med straffeforfølgelse. Det fremgår her hvordan *approved code of practice* kan bli gitt, endret og opphevet. Bestemmelsen lyder i sin helhet:

> “17 Use of approved codes of practice in criminal proceedings
>
> (1) A failure on the part of any person to observe any provision of an approved code of practice shall not of itself render him liable to any civil or criminal proceedings; but where in any criminal proceedings a party is alleged to have committed an offence

by reason of a contravention of any requirement or prohibition imposed by or under any such provision as is mentioned in section 16(1) being a provision for which there was an approved code of practice at the time of the alleged contravention, the following subsection shall have effect with respect to that code in relation to those proceedings.

(2) Any provision of the code of practice which appears to the court to be relevant to the requirement or prohibition alleged to have been contravened shall be admissible in evidence in the proceedings; and if it is proved that there was at any material time a failure to observe any provision of the code which appears to the court to be relevant to any matter which it is necessary for the prosecution to prove in order to establish a contravention of that requirement or prohibition, that matter shall be taken as proved unless the court is satisfied that the requirement or prohibition was in respect of that matter complied with otherwise than by way of observance of that provision of the code.

(3) In any criminal proceedings--

(a) a document purporting to be a notice issued by the Commission under section 16 shall be taken to be such a notice unless the contrary is proved; and

(b) a code of practice which appears to the court to be the subject of such a notice shall be taken to be the subject of that notice unless the contrary is proved."

Om *approved code of practice* brytes, skal det ikke i seg selv medføre et sivilrettslig eller strafferettslig ansvar. Men om domstolen finner en relevant *approved code of practice* overtrådt, kan dette føre til at en bestemmelse er overtrådt med mindre retten finner at bestemmelsens krav er oppfylt på annen måte enn ved å følge *approved code of practice* jf. § 17.

Til sammenligning har petroleumsloven § 10-1 første ledd en henvisning til at «[p]etroleumsvirksomhet … skal foregå … i samsvar med gjeldende regelverk for slik petroleumsvirksomhet.» Tidligere var formuleringen at petroleumsvirksomheten skulle foregå i samsvar med «gjeldende regelverk og anerkjente normer for slik petroleumsvirksomhet» Det fremgår av forarbeidene at endringen ikke var ment å ha innvirkning på innholdet, og bestemmelsen viser således også til krav og spesifikasjoner som fremkommer i veiledningene.

I forordet til forskriftene er det vist til at statusen til *approved code of practice* og *guidance* er omtalt i begynnelsen av forskriften der også *approved code of practice* og *guidance* fremgår, og i en ramme fremst i forskriften er det sagt noe om hvilken betydning approved code of practice og retningslinjene er ment å ha. Verken forordet eller rammen er en del av den formelle forskriftsteksten.

I rammen fremst i forskriftene fremgår det at *approved code of practice* gir praktisk veiledning i hvordan regelverkets krav kan oppfylles. Disse bestemmelsene er som nevnt ikke juridisk bindende og aktørene er ikke pålagt å følge reglene. De er likevel tillagt en spesiell rettskildemessig betydning.

«This Code has been approved by the Health and Safety Commission, with the consent of the Secretary of State. It gives practical advice on how to comply with the law. If you follow the

> advice you will be doing enough to comply with the law in respect of those specific matters on which the Code gives advice. You may use alternative methods to those set out in the Code in order to comply with the law.
>
> However, the Code has special legal status. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provision of the Code, you will need to show that you have complied with the law in some other way or a court will find you at fault.»

Det følger av dette at dersom *approved code of practice* (ACOP) følges, er det tilstrekkelig til at kravene oppfylles når det gjelder de spesifikke forholdene *approved code of practice* gir anbefaling i forhold til. Det er frivillig å følge *approved code of practice*, og aktørene kan benytte alternative måter å oppfylle regelverkets krav. Det vises til at *approved code of practice* har en spesiell rettslig status ved at om noen som er tiltalt for brudd på regelverket og det viser seg at vedkommende ikke har fulgt *approved code of practice*, vil han eller hun bli dømt dersom vedkommende ikke klarer å vise at regelverkets krav er oppfylt. Bevisbyrden for om loven er overholdt vil i slike tilfeller ligge hos aktøren. Bruken av *approved code of practice* gir dermed en fleksibilitet hva gjelder teknologisk utvikling m.v. men også gjennom at den er enklere å endre.

Når det gjelder *guidance*, har disse en annen rettskildemessig status enn *approved code of practice*.

> «This document also includes other, more general guidance not having this special status. This guidance is issued by the Health and Safety Commission. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.»

Tilsvarende som for *approved code of practice* er aktørene ikke pålagt å følge *guidance* og kan velge andre fremgangsmåter for å oppfylle forskriftens krav. Om aktørene velger å følge *guidance*, vil det normalt være tilstrekkelig for å oppfylle lovens krav. På den annen side fører ikke avvik fra *guidance* i seg selv til noe krav om at aktøren må dokumentere at den valgte fremgangsmåten tilfredsstiller lov- og forskriftskrav, slik tilfellet er ved avvik fra *appoved code of practice*.

Til sammenligning kan det nevnes at det norske regelverket viser til ikke-bindende kommentarer utarbeidet av myndighetene. Forskrift 31. august 2001 nr 1016 om helse, miljø og sikkerhet i petroleumsvirksomheten (rammeforskriften) § 18 2. ledd lyder:

> «Når den ansvarlige bruker en norm som anbefales i kommentaren til en forskrifts-bestemmelse som en måte å oppfylle forskriftens krav på, innen helse-, arbeidsmiljø- og sikkerhetsområdet, kan den ansvarlige normalt legge til grunn at forskriftens krav er oppfylt.»

De britiske *guidance* er dermed tillagt samme rettskildemessige betydning som kommentarene til forskriftsbestemmelsene i Norge, dog med den forskjellen at det i det norske regelverket vises til normene i en forskrift.

Bakgrunnen for valget av denne reguleringsmetoden er at aktørene skal ha en viss valgfrihet siden ansvaret for sikkerheten ligger hos disse og ikke myndighetene. Gjennom å la lov og forskrift bestå av mål og prinsipper, mens de mer detaljerte reglene er å finne i *approved code of practice* og *guidance*, har man ment å gi regelverket en fleksibilitet som bl.a. tillater teknisk utvikling innenfor rammen av de bindende reglene. Innenfor regelverkets rammer er aktørene pålagt å redusere risikoen så langt det er rimelig praktisk «reasonably practicable», se for eksempel The Health and Safety at Work etc. Act 1974 § 2.

Aktørene kan imidlertid velge å følge anbefalingene i *guidance* og *approved code of practice*. De vil da være tilnærmet sikre på at kravene i lov og forskrift er oppfylt og at de ikke vil bli stilt til ansvar om en ulykke inntreffer. Det ligger således ingen sterk *oppfordring* i regelverksmetodikken til aktivt å finne nye og bedre løsninger for å bedre sikkerheten, selv om dette er angitt som en grunn til å benytte *guidance* og *approved code of practice.* På den annen side innebærer det forhold at disse retningslinjene ikke er bindende at aktørene har *adgang* til å utvikle bedre løsninger.

2.2.3 Pliktsubjektene

Hvem som er pliktsubjekter etter regelverket varierer etter om reguleringen er rettet mot arbeidslivet generelt eller om det er regler for offshorevirksomheten spesielt. I de generelle arbeidsmiljøreglene er pliktsubjektene i hovedsak hhv arbeidsgiver og selvstendige næringsdrivende.

Reguleringen som retter seg mot offshorevirksomheten spesielt har andre benevnelser på pliktsubjektene. For eksempel legger The offshore Installation (Safety Case) regulation 2005 plikter til ”the duty holder” som kan være henholdsvis operatør på en ”production installation” og eier på en ”non-production installation, jf. definisjonene i § 2.

3 Geografisk og funksjonelt virkeområde

3.1 Noen innledende betraktninger

Den sentrale loven innenfor britisk sikkerhetsregulering er The Health and Safety at Work etc. Act 1974. Den tilsvarer på mange måter den norske arbeidsmiljøloven, og bærer følgelig preg av å skulle regulere mange forskjellige arbeidssituasjoner, fra jernbanetransport til gruvearbeid. Det foreligger ikke noen *approved code of practice* eller *guidance* til loven, men det er gitt en rekke forskrifter med hjemmel i loven som jeg kommer tilbake til.

The Health and Safety at Work etc. Act 1974 kommer i utgangspunktet ikke til anvendelse utenfor Britisk territorium og da heller ikke på offshoreinstallasjoner eller fartøy, men det gitt en egen forskrift som omhandler lovens virkeområde i territorialfarvannet og andre angitte områder.

Forskriften er gitt med hjemmel i The Health and Safety at Work etc. Act 1974 § 84 (3) og heter «The Health and Safety at Work ect. Act 1974 (Application outside Great Britain) Order 2001 No. 2127». Heretter vil forskriften bli omtalt med forkortelsen AOGBO. Heller ikke til forskriften er det gitt ut noen *approved code of practice* eller *guidance.*

Forskriftens § 4 (1) omhandler virkeområdet og lyder:

> Offshore installations
>
> 4.—(1) The prescribed provisions of the 1974 Act shall apply within the territorial sea or a designated area to and in relation to—
>
> (a) any offshore installation and any activity on it;
>
> (b) any activity in connection with an offshore installation, or any activity which is immediately preparatory thereto, whether carried on from the installation itself, in or from a vessel or in any other manner, other than—
>
> (i) transporting, towing or navigating the installation; and
>
> (ii) any activity in or from a vessel being used as a stand-by vessel;
>
> (c) a diving project involving—
>
> (i) the survey and preparation of the sea bed for an offshore installation;
>
> (ii) the survey and restoration of the sea bed consequent on the removal of an offshore installation.

Denne bestemmelsen fastlegger i hvilken utstrekning The Health and Safety at Work etc. Act 1974 kommer til anvendelse både med tanke på geografisk område og på hvilke type installasjoner og fartøyer under utførelsen av hvilke typer arbeid.

Når det gjelder geografisk område, gir den loven anvendelse i territorialfarvannet og tilknyttede områder. Tilknyttede områder omfatter også den britiske kontinentalsokkelen og herunder det området der ankerhåndteringsoperasjonen pågikk jf. The Continental shelf Act 1964 § 1 (7), (se Terence Daintith, Geoffrey Willoughby & Adrian Hill: *United Kingdom Oil and Gas Law* side 3007, Consolidation of designation of Areas Orders).

Når det gjelder hvilke installasjoner og fartøy som er omfattet etter AOGBO, så fremgår det for det første at alle offshoreinstallasjoner er omfattet. Det er dermed på det rene at riggen var omfattet mens Bourbon Dolphin ikke var det, uten at det er nødvendig å gå nærmere inn på definisjonen av "offshore installation". Videre er all aktivitet i tilknytning til offshore installasjoner omfattet og herunder forberedelser til offshorevirksomhet der også fartøy inngår jf. § 4 bokstav b). I § 4 bokstav (b), (i), er det imidlertid gjort unntak for transport, tauing og navigering av installasjoner.

Det første spørsmålet som melder seg, er om det uttrykkelige unntaket for tauing i punkt (i) også omfatter den operasjonen som Bourbon Dolphin deltok i (3.2 nedenfor), og neste spørsmål er om selve operasjonen med å flytte en rigg kommer inn under «aktiviteter i tilknytning til offshore installasjoner» (3.3).

3.2 Unntaket for "towing" jf. § 4 (1) (b) (i)

3.2.1 Funksjonell avgrensning

Unntaket for tauing skyldes skillet mellom det maritime regelverket og offshoreregelverket. Det må trekkes et skille mellom petroleumsvirksomhet som omfattes av offshoreregelverket (her The Health and Safety at Work ect. Act) og maritim virksomhet (her: tauing) som ikke gjør det. Distinksjonen gjøres ikke på grunnlag av for eksempel fartøyets konstruksjon, hvilket formål det er bygget for eller lignende, men på grunnlag av hvilke aktiviteter fartøyet er involvert i.

Mobile plattformer (som ikke drives av eget maskineri) forflyttes ved at de taues når de transporteres ut på feltet for første gang, når de skal skifte lokasjon fra ett felt til et annet, når de tas til land for vedlikehold og modifisering og når de går ut av drift og tas til land for opphugging.

Når en plattform taues over lengre avstander, vil det være lite aktivitet som kan knyttes til petroleumsvirksomhet. Operasjonen vil dermed bære mer preg av å være en maritim operasjon mer enn en operasjon i forbindelse med petroleumsvirksomhet. Når plattformen er i drift og skal forflyttes over kortere avstander for å komme til et nytt felt, er situasjonen en annen. Over svært korte avstander kan dette gjøres kun ved å lette ett og ett av de ankrene som holder plattformen i posisjon. Ved forflytninger mellom felt vil aktiviteten i mindre grad være preget av å være en maritim operasjon, og mer å betrakte som et ledd i petroleumsvirksomheten. I tilfellet med Bourbon Dolphin ble alle ankrene til Transocean Rather tatt opp og plattformen flyttet til en ny lokasjon to nautiske mil unna.

Det er som nevnt ikke funnet noen ytterligere veiledning i tilknytning til verken i loven, forskriften (AOGBO) eller rettsavgjørelser om det funksjonelle virkeområdet. Derimot sier forskriften "The Offshore Installations and Pipelines works (management and administration) Regulations 1995" § 4 noe om skjæringspunktet for når noe er en maritim operasjon og når det er petroleumsvirksomhet.

Denne forskriften har ingen materiell relevans for Bourbon Dolphin siden den kun omfatter forhold om bord på offshoreinnstallasjoner uten å berøre spørsmål knyttet til for eksempel forankerhåndteringsfartøy. Og forskriftens bestemmelser om eget virkeområde gjelder selvsagt bare nettopp dette, altså ikke virkeområdet for AOGBO. Men kriteriene forskriften anvender i denne avgrensningen kan være av interesse, særlig siden den tilhørende *guidance* spesifikt viser til bestemmelsen om AOGBOs virkeområde, se 3.3.2 nedenfor.

3.2.2 The Offshore Installations and Pipelines works (management and administration) Regulations 1995 : Plassering og virkeområde

Forskriften er hjemlet i the Health and Safety at Work ect. Act 1974. Den inneholder mer detaljerte krav til ledelse av offshoreinstallasjoner og den definerer eier og operatør som pliktsubjekter, til forskjell fra The Health and Safety at Work etc. Act 1974 og The Management of Health and Safety at Work Regulations 1999, som begge legger pliktene på arbeidsgiver.

De to nevnte regelsettene virker imidlertid parallelt med The Offshore Installations and Pipelines works (management and administration) Regulations 1995 på offshorevirksomheten.

Forskriftens § 4 definerer virkeområde og fastsetter når en installasjon regnes for å være i gjennomfart. Bestemmelsen lyder:

> "Regulation 4: Application
> (1) These Regulations shall apply -
> (a) in Great Britain; and
> (b) to and in relation to offshore installations, wells, pipelines and activities outside Great Britain to which sections 1 to 59 and 80 to 82 of the Health and Safety at Work etc. Act 1974 apply by virtue of articles 4(1) and (2)(b), 5 and 6 of the 1995 Order.
> (2) Regulations 6 to 21 shall not apply in relation to an offshore installation which is in transit to or from a location; and an offshore installation is not in transit to or from a location while it is being manoeuvred at the location.
> (3) Save where otherwise expressly provided, nothing in regulations 6 to 13 or 15 to 18 shall impose a duty in relation to an offshore installation while there are no persons aboard."

I annet ledd er det vist til at enkelte av reglene ikke skal anvendes i forhold til en offshoreinstallasjon som er i gjennomfart til eller fra en lokasjon. Det interessante i denne sammenheng, er at en installasjon ikke regnes for å være i gjennomfart når den blir manøvrert på stedet. Begrepene som her benyttes er altså ikke de samme som i AOGBO, der unntaket kommer til anvendelse ved "transporting, towing or navigating" installasjonen.

Det er gitt en *guidance* til forskriftsbestemmelsen som sier noe om hensynene bak skillet mellom en installasjon som er i gjennomfart og en som manøvreres. Her kommer det frem at distinksjonen mellom installasjoner som er i gjennomfart og de som manøvreres er gjort for å unnta installasjoner fra regelverket når de primære risiki er av maritim art. Manøvrering av en installasjon under forberedelser for å forlate stedet eller etter ankomst kommer dermed inn under forskriften. Som eksempel nevnes det når en halvt nedsenkbar installasjon kommer til en ny posisjon, så vil den bli ansett for ikke lengre å være i transit fra første anker er satt ut og det selv om installasjonen ikke er kommet i riktig posisjon.

> "Application to offshore installations in transit
> 36
> Although the definition of offshore installation in regulation 3 covers installations while in transit to or from their working stations, regulation 4 provides that installations in transit will not be subject to regulations 6 to 21. The term 'in transit' relates to all times when the installation is not at or in the immediate vicinity of its first, a previous or its new working station. It is intended to exclude installations from the Regulations when the primary risks are marine. Manoeuvring in preparation for leaving a station or after arrival to position the installation is not part of transit, ie the Regulations do apply to such manoeuvring. For example, a semi-submersible installation approaching a new location might be considered as manoeuvring from deployment of the first anchor, which may be some distance from its final location."

Disse *guidance* er gitt for å presisere anvendelsesområdet til Offshore Installations and Pipelines works (management and administration) Regulations 1995 og berører for så vidt ikke AOGBOs anvendelsesområde. Avgrensningen mellom regelverket for henholdsvis petroleumsvirksomhet og maritime operasjoner har likevel en viss overføringsverdi, særlig siden disse guidance også viser til AOGBO, se 3.3.2 nedenfor.

Ved forflytningen av Transocean Rather var alle ankrene tatt opp før riggen ble flyttet to nautiske mil (som tilsvarer ca. 3 km). Riggen var kommet frem til stedet der borevirksomheten skulle starte, og da ulykken skjedde var alle ankrene så nær som ett plassert ut. Dette trekker i retning av at operasjonen er å betrakte som en aktivitet i tilknytning til en offshoreinstallasjon, og ikke som en primær maritim aktivitet.

En slik grensedragning mellom petroleumsregelverket og maritimt regelverk svarer til den grensedragningen vi har i norsk rett. I Ot.prp. nr. 43 (1995-96) side 30 annen spalte er det i tilknytning til spesialmerknadene til § 1-6 "Definisjoner" skrevet:

> «Når det gjelder forflytning av innretninger kommer loven i likhet med gjeldende lov ikke til anvendelse. Med forflytning tenkes først og fremst på en flyttbar innretnings bevegelser til og fra det felt den skal betjene, enten forflytningen skjer for egen maskin eller ved slep. Slike forflytninger reguleres av sjøfartslovgivningen.»

I Ot. prp. Nr. 72 (1982-83) side 37 1. spalte er det presisert at «[d]ersom det dreier seg om mindre bevegelser mellom to borelokaliteter på samme felt vil […] selve forflytningen få en sterkere tilknytning til petroleumsvirksomheten".

Ordet forflytning eller tauing må etter dette tolkes innskrenkende, både i britisk og norsk rett.

Konklusjonen er at operasjonen med å sette ut det siste ankeret ikke omfattes av unntaket for "towing" i AOGBO § 4 (1) bokstav (b) (i).

3.3 Omfattes forflytningen av «any activity in connection with an offshore installation»

3.3.1 Innledende vurderinger

Når det gjelder spørsmålet om hvorvidt manøvrering av en installasjon omfattes av aktivitet i tilknytning til offshorevirksomhet, jf. AOGBO § 4 (1) bokstav b, er det for det første nærliggende å vise til konklusjonen i drøftelsen overfor. For det andre kan det anføres at om riggforflytningen ikke omfattes av det utrykkelige unntaket for transport, tauing og navigering av installasjonen, må det følge av en antitetisk tolkning av bestemmelsen som helhet at forflytningen også ansees som aktivitet i forbindelse med en offshoreinstallasjon.

Det er imidlertid en *guidance* til forskriften The Offshore Installations and Pipelines works (management and administration) Regulations 1995 som omtaler hva som kan forstås med aktiviteter i tilknytning til offshore installasjoner.

3.3.2 The Offshore Installations and Pipelines works (management and administration) Regulations 1995 § 4 -guidance

The Offshore Installations and Pipelines works (management and administration) Regulations 1995 § 4 har overskriften «Application» og fastsetter når regelverkerket kommer til anvendelse. Det er gitt en *guidance* til bestemmelsen der AOGBO § 4 (1) er gjengitt og kommentert i punkt 42.

Punkt 42 lyder:

> Activities in connection with an installation are specified in article 4 of AOGBO. They are:
> (a) any offshore installation and any activity on it;
> (b) any activity in connection with an offshore installation, or any activity which is immediately preparatory thereto, whether carried on from the installation itself, in or from a vessel or in any other manner, other than—
> (i) transporting, towing or navigating the installation; and
> (ii) any activity in or from a vessel being used as a stand-by vessel;
> (c) a diving project involving—
> (i) the survey and preparation of the sea bed for an offshore installation;
> (ii) the survey and restoration of the sea bed consequent on the removal of an offshore installation.
> This includes any of the following activities carried out in connection with an installation: provision of accommodation (but see paragraph 15), well servicing, inspection, testing, loading, unloading, fuelling, provisioning, construction, reconstruction, alteration, repair, maintenance, cleaning, demolition, dismantling, and diving operations, and any activity which is immediately preparatory to any of the above activities. It does not include purely marine activities such as anchor handling or navigation, nor does it include activities which take place on or from a stand-by

vessel. Regulation 15(2) also applies to servicing wells which are not connected to an installation.

I punkt 42 er det presisert hva som omfattes, og hva som ikke omfattes av aktiviteter i tilknytning til en offshoreinstallasjon. Ett av de forholdene som i følge *guidance* ikke omfattes, er rene marine aktiviteter slik som ankerhåndtering. G*uidance* trekker således i retning av at ankerhåndtering, og herunder operasjonen Bourbon Dolpin var involvert i, ikke kan regnes som en aktivitet i tilknytning til en offshoreinstallasjon.

3.3.3 Vurdering av hva som omfattes av «tilknyttede aktiviteter»

Det som i henhold til AOGBO § 4 faktisk omfattes av aktiviteter i tilknytning til en offshoreinstallasjon, er operasjoner som kan sies å ha en form for støttefunksjoner ved petroleumsvirksomhet, men også slikt som nedbygging. Videre omfattes alle aktiviteter som kan sies å være en umiddelbar forberedelse til slike aktiviteter. Spørsmålet blir om operasjonen inklusive ankerhåndteringsbåtenes virksomhet kan sies å utgjøre en umiddelbar forberedelse til petroleumsvirksomhet.

Både forskriften AOGBO § 4 (1) og retningslinjen til The Offshore Installations and Pipelines works (management and administration) Regulations 1995 § 3 viser til en virksomhetsvurdering som grunnlag for regelverkets anvendelsesområde. Det er altså av avgjørende betydning etter begge regelsett om virksomheten har tilstekkelig tilknytning til en offshoreinnstallasjon. Jeg mener spørsmålet om tilstrekkelig tilknytning må avgjøres etter en konkret vurdering av hvilket regelverk riggforflytningen mest naturlig hører inn under, tilsvarende vurderingen av unntaket for ”towing” i AOGBO § 4 (1) bokstav (b) (i).

Tilfellet med Transocean Rather var at riggen holdt på med boringer ett sted, for å bli fraktet et par nautiske mil til en ny lokasjon og fortsette boringen der. Boring ligger i kjernen av hva som kan kalles petroleumsvirksomhet.

Målet for operasjonen var å forflytte riggen. Ankerhåndteringsfartøyene inngikk som nødvendige hjelpemidler for å gjennomføre forflytningen. Fremgangsmåten gikk ut på at ankerhåndteringsfartøyene tok opp ankrene, riggen ble tauet i posisjon og ankrene plassert ut igjen. Ankerhåndteringen ble administrert av to «tow-masters» som var lokalisert på riggen. «Tow-masters» organiserte hele operasjonen og fartøyene fikk sine ordre fra disse. De enkelte fartøyene utgjorde dermed elementer i en større operasjon for å muliggjøre forflytningen: operasjonen var planlagt ved at det var bestemt hvilke fartøy som skulle stå for de ulike oppgavene. Når flere fartøyer og en rigg befinner seg i et så begrenset område, er det også nødvendig ut fra sikkerhetsmessige aspekt at noen har den overordnede styringen med hvordan de ulike aktørene til enhver tid forholder seg for å unngå farlige situasjoner.

Riggen var kommet på plass og det var under utplassering av det siste ankeret at Bourbon Dolphin kantret.

Jeg mener operasjonen i denne sammenheng må sees i et helhetsperspektiv. Å betegne ankerhåndteringen i dette tilfellet som en ren maritim operasjon, bryter med systematikken i regelverket. Det virker således mest naturlig å se operasjonen som et hele og derfor som en del av petroleumsvirksomheten, mer enn som en maritim operasjon der hvert enkelt fartøy sin opptreden vurderes isolert etter maritime regler.

Mot dette taler altså at det foreligger en guidance til en annen forskrift enn AOGBO (nemlig The Offshore Installations and Pipelines works (management and administration) Regulations 1995) som fastslår at denne andre forskriften ikke gjelder "purely marine activities such as anchor handling". Dette kan imidlertid etter min mening nokså klart ikke være tilstrekkelig til å endre den konklusjonen som synes å følge av en tolkning av AOGBOs egen bestemmelse om virkeområde.

Operasjonen faller dermed etter min mening inn under benevnelsen "activity in connection with av offshore installation" jf. AOGBO § 4 bokstav (b) og unntaket for "towing" i bokstav (b) (i) er ikke aktuelt. Konklusjonen er at The Health and Safety at Work etc. Act 1974 kommer til anvendelse på ankerhåndteringsoperasjonen. I en mulig straffesak vil dette spørsmålet kunne komme på spissen siden legalitetsprinsippet krever et klart hjemmelgrunnlag

Dersom konklusjonen skulle være at The Health and Safety at Work etc. Act 1974 ikke kommer til anvendelse for operasjonen, vil den etter hva som er opplyst fra HSE heller ikke omfattes av noe annet sikkerhetsregelverk. Jeg har gjennom mine undersøkelser heller ikke kunnet påvise noe slikt alternativt regelverk.

4 Generelle krav for å sikre helse, sikkerhet og velferd

4.1 The Health and Safety at Work etc. Act 1974

The Health and Safety at Work etc. Act 1974 del 1 gir innledningsvis anvisning på en rekke generelle plikter, og herunder en hva gjelder en arbeidsgiver eller selvstendig næringdriver sitt ansvar for både arbeidstaker og andre sin sikkerhet.

§ 2 omhandler en arbeidsgivers generelle plikter i forbindelse med sine ansattes helse, sikkerhet og velferd:

"General duties

2 General duties of employers to their employees

(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.
(2) Without prejudice to the generality of an employer's duty under the preceding subsection, the matters to which that duty extends include in particular--
  (a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;

(b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;
(d) so far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks;
(e) the provision and maintenance of a working environment for his employees that is, so far as is reasonably practicable, safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

(3) Except in such cases as may be prescribed, it shall be the duty of every employer to prepare and as often as may be appropriate revise a written statement of his general policy with respect to the health and safety at work of his employees and the organisation and arrangements for the time being in force for carrying out that policy, and to bring the statement and any revision of it to the notice of all his employees.
(4) Regulations made by the Secretary of State may provide for the appointment in prescribed cases by recognised trade unions (within the meaning of the regulations) of safety representatives from amongst the employees, and those representatives shall represent the employees in consultations with the employers under subsection (6) below and shall have such other functions as may be prescribed.
(5) . . .
(6) It shall be the duty of every employer to consult any such representatives with a view to the making and maintenance of arrangements which will enable him and his employees to co-operate effectively in promoting and developing measures to ensure the health and safety at work of the employees, and in checking the effectiveness of such measures.
(7) In such cases as may be prescribed it shall be the duty of every employer, if requested to do so by the safety representatives mentioned in [subPage 4 section (4)] above, to establish, in accordance with regulations made by the Secretary of State, a safety committee having the function of keeping under review the measures taken to ensure the health and safety at work of his employees and such other functions as may be prescribed."

Arbeidsgiver plikter etter dette, så langt det «rimelig og praktisk» lar seg gjøre, å sikre helse, sikkerhet og velferden for arbeidstagerne i arbeidstiden. Det er listet opp en rekke forhold som den generelle bestemmelsen særlig omfatter, herunder å ha systemer, lokaliteter, informasjon og opplæring m.v. som skal sikre helse og sikkerhet.

§ 3 omhandler arbeidsgiveres og selvstendig næringsdrivendes ansvar overfor andre enn egne ansatte:

"3 General duties of employers and self-employed to persons other than their employees

(1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.

(2) It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.

(3) In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety."

Her er det et krav om at arbeidsgiver og selvstendige næringsdrivende skal utføre sine oppgaver på en slik måte at det sikrer, så langt det rimelig og praktisk lar seg gjøre, at tredjemenn ikke er utsatt for noen risiko i forhold til helse og sikkerhet.

Bestemmelsene i §§ 2 og 3 kan sammenlignes med lov 17. juni 2005 nr. 62 om arbeidsmiljø, arbeidstid og stillingsvern mv. (arbeidsmiljøloven) sitt krav i § 1 om "full trygghet mot fysiske og psykiske skadevirkninger" ved at det oppstilles en resulatforpliktelse. Arbeidsmiljøloven etablerer i hovedsak kun et ansvar for egne arbeidstakere med et unntak for andre som utfører arbeid i tilknytning til aktiviteten eller innretningen jf. arbeidsmiljøloven § 3. Det er dermed ikke gitt noe generelt ansvar for sikkerheten til andre slik som i The Health and Safety at Work etc. Act § 3.

I følge § 2 er arbeidsgiver bl.a. forpliktet «…to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees» mens kravet etter § 3 bl.a. er «to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety». Begrepet "reasonably practicable" er sentralt for å tolke kravet med å sikre henholdsvis arbeidstakernes helse, sikkerhet og velferd i § 2 og at andre enn ansatte ikke utsettes for risiki i tilknytning til helse og sikkerhet jf. § 3. Begrepet lar seg vanskelig oversette direkte til godt norsk (rimelig praktikabelt).

4.2 "Reasonably practicable"

Begrepet var et tema i saken Edwards v National Coal Board [1949] og det ble fastslått at risikoen må bli balansert opp mot innsatsen som må til, enten det er penger, tid eller uleilighet for øvrig, for å forebygge hendelsen eller redusere omfanget av den. Gjennom slike vurderinger kan en arbeidsgiver avgjøre hvilke tiltak det er rimelig å sette i verk. Saken etablerte således et krav til risikovurderinger i form av kost-/nytte-vurderinger.

«Reasonably practicable» regnes for å være snevrere enn det som faktisk er fysisk mulig. Begrepet viser til at det må foretas en beregning av størrelsen på risikoen på den ene siden og innsatsen som trengs for å forebygge risikoen, enten det er penger, tid eller innsats for øvrig, på den annen. Hvis det er et misforhold mellom disse størrelsene, ligger bevisbyrden hos den ansvarlige for at det ikke var «reasonably practicable» at tiltakene ikke ble satt i verk.

Skulle det vise seg at en arbeidsgiver ikke visste eller ikke hadde noen grunn til å være oppmerksom på en risiko, kan det være at det ikke var «reasonably practicable» å sette inn tiltak mot den.

For mer om dette, se Redgrave`s Healt and Safety, side 30

At et fartøy havarerer, er en ulykke av slike dimensjoner at det ikke er rom for å vurdere om det er «reasonably practicable» å gjøre det som var nødvendig for å unngå kantringen. Spørsmålet om det var grunn til å kjenne til en slik risiko, vil jeg komme tilbake til under pkt 6.3.

4.3 Omfatter forpliktelsene etter The Health and Safety at Work etc. Act 1974 §§ 2 og 3 også sikkerheten til mannskapet på Bourbon Dolphin?

Spørsmålet er hvem som etter bestemmelsene i The Health and Safety at Work etc. Act 1974 vil kunne ha et ansvar for sikkerheten for mannskapet på Bourbon Dolphin. Flaggstatsprinsippet gjelder for fartøyet slik at det norske regelverket kommer til anvendelse på forholdet mellom rederiet og mannskapet på båten. Spørsmålet er om hvem som omfattes av det ansvar som er tillagt arbeidsgiver m.fl. gjennom The Health and Safety at Work etc. Act 1974 §§ 2 og 3. Operatøren på Transocean Rather var Chevron som hadde leid inn selskapet Trident for å forestå selve rigg -forflytningen. Trident leide igjen inn "tow-master". Disse var da ikke formelt ansatt i Trident, men selvstendige oppdragstakere.

Når det gjelder bestemmelsens anvendelse på andre enn egne ansatte, har det vært et par saker oppe for britiske domstoler der spørsmålet har vært hvilken krets av personer det er som nyter vern etter The Health and Safety at Work etc. Act 1974 § 3.

I avgjørelsen R v Board of Trustees of Science Museum i 1993 var det et spørsmål om i hvor stor grad utslipp av legionella faktisk hadde måttet utgjøre en risiko for befolkningen i den forstand at de måtte ha inhalert smitten. Argumentet var at en potensiell fare for legionellasmitte ikke utgjorde noen fare for publikum all den tid faren ikke materialiserte seg. Court of appeal avviste dette og uttalte at ordet risiko forutsetter en forestilling om potensiell fare og det er ingenting i språket eller i sammenhengen som indikerte en slik innskrenkende fortolkning. Befolkningen generelt er således beskyttet av forbudet mot å utsette noen for risiko også om risikoen ikke fører til noen konsekvenser når det gjelder helse og sikkerhet.

Når det gjelder risiko i forhold til andre enn egne ansatte, er det en annen avgjørelse som også omhandler dette. I saken R v Associated Octel Company Ltd fra 1996, var et entreprenørfira leid inn av Associated Octel Company Ltd og en arbeidstaker i firmaet pådro seg alvorlige brannskader under arbeidet. Entreprenørfirmaet ble dømt med hjemmel i § 2, mens Associated Octel Company Ltd ble dømt for brudd på § 3 1. ledd. Associated Octel Company Ltd anket med den begrunnelsen at de hadde leid inn et selvstendig, kompetent firma som utførte oppgaven og som måtte bære ansvaret for sikkerheten til sin arbeidstaker. Verken the Court of Appeal eller the House of Lords gav medhold i anken. Det ble uttalt at det er likegyldig hvorvidt en oppdragsgiver engasjerer arbeidstakere eller et uavhengig entreprenørfirma for å utføre arbeidet og uansett om aktiviteten kontrolleres av oppdragsgiver. Så lenge arbeidet er en del av virksomheten, noe som er et spørsmål om fakta, har man et ansvar etter § 3 (1). Stedet hvor oppdraget utføres, vil derimot normalt være en avgjørende faktor.

Konklusjonen etter dette er at en arbeidsgiver har et vidtrekkende ansvar for at også andre enn egne ansatte ikke blir utsatt for risiko når det gjelder deres helse og sikkerhet.

Spørsmålet er om ansvaret kan trekkes så langt som til å omfatte andre profesjonelle aktører som i dette tilfellet bestod av mannskapet på et ankerhåndteringsfartøy leid inn som selvstendig oppdragstaker for å bistå med å flytte riggen. Når det gjelder hvem som omfattes av ansvaret, var det i saken R v Board of Trustees of Science Museum befolkningen generelt som var beskyttet. I saken R v Associated Octel Company Ltd fra 1996, var ansatte i et entreprenørfira som var leid inn av Associated Octel Company Ltd beskyttet. Det er i utgangspunktet ingen begrensninger i ansvaret for andre i disse avgjørelsene som tilsier at mannskapet på et innleid fartøy ikke er omfattet.

Saken R v Associated Octel Company Ltd fra 1996 viser at et selskap holdes til ansvar selv om det er leid inn et selvstendig firma så lenge arbeidet utføres i tilknytning til oppdragsgivers område. Spørsmålet er om et ankerhåndteringsfartøy ved utplassering av anker kan sies å utføre arbeid i tilknytning til arbeidsgivers område. Det kan her trekkes frem at forflytningen av riggen var en operasjon der flere ankerhåndteringsfartøy bistod med gjennomføringen. Operasjonen var planlagt med alle partene i fellesskap på land god tid i forveien og arbeidet foregikk i området rundt riggen. Forflytningen ble ledet av et innleid selskap for anledningen, Trident, som selv hyret inn ”tow-masters”. ”Tow-master” oppholdt seg på riggen under operasjonen og arbeidet på skift. Under operasjonen hadde de kontakt med og gav beskjeder til fartøyene om hvordan de skulle forholde seg. Ønsket fra Bourbon Dolphin om at Highland Valour skulle forsøke å «grapple» kjettingen da Bourbon Dolphin fikk problemer med å manøvrere i posisjon, gikk via ”tow-master”. At operasjonen foregikk på et begrenset område i den hensikt å forflytte riggen gjennom en samordnet operasjon, medfører at oppdraget må ansees å være utført innenfor oppdragsgivers område, både geografisk og faktisk.

Neste spørsmål er da hvem som hadde plikt til å treffe tiltak for å unngå en slik risiko som materaliserte seg ved ulykken. Ansettelsesforholdene er her mer komplisert enn de refererte rettsavgjørelsene, med en operatør som har engasjert et firma som igjen har engasjert selvstendige oppdragstakere, mens skaden rammet ansatte hos en annen selvstendig oppdragstaker som var engasjert av Team Marine på vegne av Chevron. Når det i R v Associated Octel Company Ltd uttales at det er likegyldig hvorvidt det er egne ansatte eller et annet firma som utfører arbeidet og hvorvidt aktiviteten kontrolleres av oppdragsgiver, mener jeg dette kan betraktes som en prinsippiell uttalelse om at det ikke er anledning for en oppdragsgiver å bli fri fra ansvaret etter § 3 gjennom å engasjere et annet firma til å utføre arbeidet. I alle fall gjelder dette når det er nærhet både geografisk og saklig mellom operasjonene.

Dette tilsier at en operatør som en overordnet oppdragsgiver og ansvarlig for en ankerhåndteringsoperasjon har et ansvar for sikkerheten også til mannskapet på et innleid ankerhåndteringsfartøy som han ikke står i et direkte kontraktrettslig forhold til.jf. The Health and Safety at Work ect. Act 1974 § 3.

Plikten til å ivareta ansattes og andres sikkerhet henger nært sammen med plikten til å foreta vurderinger av risiko knyttet til virksomheten, se pkt. 5 nedenfor.

5 Krav om risikovurderinger

5.1 Regelverk som krever at det utføres risikovurderinger

Flere ulike regelverk stiller krav om risikovurderinger. The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 kom som en følge av Piper Alpha -ulykken i 1988 og retter seg mot brann og eksplosjoner på offshoreinstallasjoner. The Offshore Installations (safety case) Regulations 2005 har som formål å forebygge større ulykker og krever bl.a. godkjennelse fra HSE før det gis tillatelse for oppstart på installasjonen. Disse regelverkene kommer dermed ikke direkte til anvendelse her, og vil ikke bli nærmere omtalt. The Management of Health and Safety at Work Regulations 1999 har bestemmelser om risikovurderinger generelt.

5.2 The Management of Health and Safety at Work Regulations 1999

Forskriften er gitt med hjemmel i The Health and Safety at Work ect. Act 1974 og implementerer et EU-direktiv (89/391/ECC). Som The Health and Safety at Work ect. Act 1974, gjelder forskriften generelt og ikke petroleumsvirksomhet spesielt.

Forskriften inneholder en del bestemmelser med krav om risikovurderinger, helse- og sikkerhetsordninger, helseovervåkning samt koordinering og samarbeid om helse og sikkerhetsformål mellom ulike arbeidsgivere og selvstendig næringsdrivende. Det er gitt ut både *Approved Code of Practice* og *guidance* til forskriften.

Forskriften kommer til anvendelse på offshore-installasjoner og aktivitet i tilknytning til slike med tilsvarende avgrensning som the Healt and Safety at Work ect. Act 1974 jf. AOGBO, se forskriftens § 23.

En sentral bestemmelsen i denne sammenheng er § 3 som krever at det blir foretatt risikovurderinger.

Bestemmelsen lyder:

"Risk assessment

3. - (1) Every employer shall make a suitable and sufficient assessment of -

(a) the risks to the health and safety of his employees to which they are exposed whilst they are at work; and

(b) the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking,

for the purpose of identifying the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions and by Part II of the Fire Precautions (Workplace) Regulations 1997.

(2) Every self-employed person shall make a suitable and sufficient assessment of -

(a) the risks to his own health and safety to which he is exposed whilst he is at work; and

(b) the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking,

for the purpose of identifying the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions.

(3) Any assessment such as is referred to in paragraph (1) or (2) shall be reviewed by the employer or self-employed person who made it if -

(a) there is reason to suspect that it is no longer valid; or

(b) there has been a significant change in the matters to which it relates; and where as a result of any such review changes to an assessment are required, the employer or self-employed person concerned shall make them.

(4) An employer shall not employ a young person unless he has, in relation to risks to the health and safety of young persons, made or reviewed an assessment in accordance with paragraphs (1) and (5).

(5) In making or reviewing the assessment, an employer who employs or is to employ a young person shall take particular account of -

(a) the inexperience, lack of awareness of risks and immaturity of young persons;

(b) the fitting-out and layout of the workplace and the workstation;

(c) the nature, degree and duration of exposure to physical, biological and chemical agents;

(d) the form, range, and use of work equipment and the way in which it is handled;

(e) the organisation of processes and activities;

(f) the extent of the health and safety training provided or to be provided to young persons; and

(g) risks from agents, processes and work listed in the Annex to Council Directive 94/33/EC[8] on the protection of young people at work.

(6) Where the employer employs five or more employees, he shall record -

(a) the significant findings of the assessment; and

(b) any group of his employees identified by it as being especially at risk."

Det er henholdsvis arbeidsgiver og selvstendig næringsdrivende som er pliktsubjektene etter første og annet ledd i bestemmelsen. Plikten for arbeidsgiver består ikke kun i å utføre en risikovurdering for å avdekke hvilke farer egne ansattes helse og sikkerhet kan være utsatt for, men også den helse- og sikkerhetsmessige risiko personer som ikke er ansatt kan bli utsatt for gjennom virksomhetens opptreden. Som etter bestemmelsene i the Healt and Safety at Work ect. Act 1974 §§ 2 og 3, er det en vid krets av personer som er gitt beskyttelse etter bestemmelsen. Den er ikke begrenset hvem som omfattes av "andre", slik at arbeidstakere ansatt i et annet firma må antas omfattet.

I tredje ledd kreves det at risikovurderingen blir revidert når det har vært en viktig endring i de forholdene som lå til grunn for den opprinnelige vurderingen. I henhold til sjette ledd, skal en arbeidsgiver med fem eller flere ansatte registrere funnene som gjøres ved risikovurderingen.

Myndighetene har publisert en relativt omfattende *Approved Code of Practice* (ACOP) til The Management of Health and Safety at Work Regulations 1999 § 3. Denne omtaler generelle prinsipper og formålet med risikovurderinger i tillegg til at den presiserer og utdyper kravene i paragrafen. I ACOP er risiko omtalt som sannsynligheten for at en potensiell skade skal inntreffe: omfanget av risikoen vil avhenge av sannsynligheten for at skaden inntreffer, alvorlighetsgraden av skaden (eller den negative helsepåvirkningen) og antallet mennesker som kan bli berørt. Risikovurderingen skal bl.a. identifisere hvordan risiko kan oppstå og innvirke for å kunne ta beslutninger om hvordan risikoen skal håndteres slik at avgjørelsene tas på en informert, rasjonell og strukturert måte og slik at tiltak som settes i verk, er forholdsmessige. Risikovurderingene skal omfatte alle som kan bli affisert.

Videre skal det være en forholdsmessighet i risikovurderingene: ubetydelig risiko kan vanligvis ignoreres. Det er ikke gjort andre unntak fra kravet om risikovurderinger. Det presiseres at det ikke er faste regler for hvordan en risikovurdering skal gjennomføres siden dette vil avhenge av arbeidets eller virksomhetens natur og type fare eller risiko. I henhold til ACOP er det videre et krav om at det risikovurderingene avdekker, skal nedtegnes. Når det er nødvendig, for eksempel fordi man finner at risikoen utvikler seg, skal risikovurderingene revideres. Om det er arbeidstakere som utfører arbeid for ulike arbeidsgivere på samme arbeidssted, skal arbeidsgiverne samarbeide om å oppfylle regelverkets krav, jf. forskriftens § 11.

Kravet til risikovurderinger etter The Management of Health and Safety at Work Regulations 1999 med tilhørende *Approved Code of Practice* er dermed meget omfattende både med tanke på når det skal utarbeides risikovurderinger og hvem risikovurderingene skal omfatte.

Kravene i forskriften er naturlig nok generelt utformet med tanke på de ulike formene for risiko som kan forefinnes på ulike arbeidsplasser. Kravet om å identifisere farene på en arbeidsplass og iverksette tiltak i forhold til disse, kan konkretiseres gjennom å benytte standarder som er utarbeidet innen spesifikke områder. Dette kan være en måte å presisere hva som kreves når det gjelder krav til sikkerheten og herunder risikovurderinger.

6 Standarder

6.1 Standarders rettslige status

Standarder kan inneholde forslag til hvordan en arbeidsoperasjon kan gjennomføres, hvem som bør ha ansvaret for hvilke oppgaver, tekniske spesifikasjoner m.v. De kan være utarbeidet av myndighetene eller ulike private organisasjoner. Det sentrale spørsmålet her er hvilken rettskildemessig status de kan tillegges.

Et ytterpunkt er å ikke anse standardene relevant, d.v.s. se helt bort fra de ved vurderingen av om kravene i lov og forskrifter er oppfylt. Et annet ytterpunkt er ikke bare å tillegge standardene relevans, men også la de bli en vektig rettskildefaktor i den samme vurderingen. Det er imidlertid en absolutt grense ved at legalitetsprinsippet krever hjemmelsgrunnlag i autorative kilder for å kunne ilegge straff. Standardenes rettslige betydning vil sannsynligvis ligge et sted mellom disse ytterpunktene, der relevante faktorer vil være hvilke andre rettskildefaktorer som foreligger, hvor godt kjent standarden er, hvem som har utarbeidet den og hvor gode løsninger den gir anvisning på.

I følge opplysninger fra HSE og informasjon på deres nettportal kan standarder ansees som "relevant good practice", men det er så langt jeg har kunnet avdekke, ikke avklart i autorative rettskilder som lov, forskrift eller domstolene hvilken rettskildemessig betydning disse kan ha. Det er derfor ikke grunnlag for å anse standardene som bindende. Aktørene kan således fritt velge om de vil benytte de løsningene standardene gir anvisning på eller ikke. Standardene må imidlertid antas å ha en relevans uansett om de følges eller ikke, all den tid de gir en anvisning på hvordan et vagt utformet krav i det bindende regelverket kan møtes.

6.2 Standarder som kan komme til anvendelse

6.2.1 Presentasjon av noen aktuelle standarder

Det er flere ulike standarder som kan komme til anvendelse under en riggforflytning.

"OLF/NR 061A Retningslinjer for Sikker ankerhåndtering og sleping" skal ifølge formålsbestemmelsen i punkt 1.1. legge til rette for sikker ankerhåndtering og slepeoperasjoner. Retningslinjene har bl.a. detaljerte bestemmelser om de enkelte aktørenes ansvar, krav til fartøy, innretning og utstyr og krav til sikker jobbanalyse, men er begrenset til å gjelde slike operasjoner på norsk sokkel og vil ikke bli videre omtalt her.

The International Safety Management Code (ISM-koden) er utarbeidet av International Maritime Organization (IMO) som ble opprettet for å øke sikkerheten til sjøs og for å forebygge forurensning. Koden kommer til anvendelse på alle skip jf. kodens punkt 1.3. Koden krever at skip har et sikkerhetsstyringssystem. Sikkerhetsstyringssystemets mål er bl.a. at det etableres sikkerhet mot all identifisert risiko jf. punkt 1.2.2 2. ledd. Det er således et krav å identifisere risiko og sette inn tiltak i forhold til den risiko som blir avdekket, med andre ord et krav om risikoanalyse. Det utstedes et sertifikat som bevis på at skipet oppfyller kravene i koden. Det skal fremgå av sertifikatene hvilket selskap som er driftsansvarlig og dette kan havnestaten kontrollere, noe som synliggjør ansvarsforholdene for skipet.

Siden ISM -koden uansett kun kom til anvendelse på fartøyene, blir den ikke videre behandlet her.

6.2.2 Guidelines for the safe management of offshore supply and anchor handling operations NWEA

En relevant standard som omhandler ankerhåndteringsoperasjoner og som gjelder der riggforflytningen fant sted, er ”Guidelines for the safe management of offshore supply and anchor handling operations NWEA” (North West European Area) eller ”Retningslinjer for sikker styring av offshore service- og ankerhåndteringsoperasjoner (nordvesteuropeisk område)” som den heter på norsk.

Det norske rederiforbund, Oljeindustriens landsforening (OLF) og United Kingdom Offshore Operators Association er blant signaturorganisasjonene til denne ”guideline”. Retningslinjene har som formål å bedre sikkerheten ved forsynings- og ankerhåndteringsoperasjoner i det nordvestlige Europa. Dette gjøres gjennom å integrere beste praksis og prosedyrer fra operatørselskaper, redere og andre. Retningslinjene kommer i tillegg til eventuelle nasjonale krav. De erstatter ikke nasjonale krav, men om de følges, ”gir man sterk indikasjon til nasjonale administrasjoner om at helse- og sikkerhetslovgivningen følges og at de riktige forholdsreglene treffes”, jf. punkt 1.5.2. Avvik fra retningslinjene må inkluderes i risikovurderingen eller sikker jobb-analyse og godtas av de involverte parter.

Disse retningslinjene inneholder på enkelte områder de mest spesifikke kravene til hvordan en ankerhåndteringsoperasjon skal gjennomføres, og jeg gir først en generell oversikt over hvilke bestemmelser som kan være av interesse for riggforflytningen.

Retningslinjens mål er i henhold til punkt 1.1 å ”[s]ikre og forbedre sikkerheten ved forsynings- og ankerhåndteringsoperasjoner i det nordvestlige Europa (NWEA).” Videre er det et mål å ”[g]i veiledning om eliminering eller reduksjon av farer og risikoer under forsynings- og ankerhåndteringsoperasjoner”. Virkeområdet er ikke begrenset til enkelte lands kontinentalsokkel eller skip, men omfatter ”alle som er involvert i samhandling mellom offshoreinnretninger, baser og offshore servicefartøy knyttet til offshoreoperasjoner i Nordvest-Europa”, jf. punkt 1.4 2. ledd.

Punkt 2 omhandler rollefordeling og etter punkt 2.1 er ”samtlige medarbeidere […] ansvarlige, både for egen sikkerhet og sikkerheten til dem som de samhandler med”. Kapteinen er ”til enhver tid ansvarlig for sikkerheten til mannskapet, fartøyet og lasten…” og ”må stanse operasjoner som utgjør en trussel mot fartøyets sikkerhet…”, jf. punkt 2.2.1. Det er både i denne bestemmelsen og andre steder i regelverket påpekt at kapteinens faglige skjønn med tanke på fartøyet og mannskapets sikkerhet ikke skal påvirkes.

Rederen er på sin side ansvarlig for at fartøyet er ”riktig bemannet og utstyrt for oppdraget” og at det er ”forberedt en operasjonsplan som dekker operasjoner og tjenester fartøyet kan forventes å delta i”. Videre skal rederen ”[u]tarbeide operasjonsbetingelser for fartøyet” med ”beskrivelse av betingelsene for sikker operasjon av fartøyet under alle forhold, og begrensningene fartøyet måtte ha” og sørge for at et eksemplar av retningslinjene ”oppbevares om bord” og at ”alle involverte mannskaper er kjent med innholdet”.

Punkt 6 inneholder spesifikke regler for ankerhåndtering og sleping. Innledningsvis er det en advarsel om at ankerhåndteringsoperasjoner og sleping kan være farlig og at innretningspersonalet må kjenne til fartøyets driftsmessige og begrensninger, jf. punkt 6.1.

Operatørselskapet har ansvaret for å sørge for ”adekvat planlegging og risikovurdering for hele ankerhåndterings- og slepeoperasjonen”, jf. punkt 6.1.2 2. ledd. Eier skal bl.a. utarbeide riggflyttingsprosedyrer. Plattformsjefen kan delegere riggflyttingsoppgaver til slepeansvarlig, jf. punkt 6.1.4, 1.ledd. Kapteinens hovedanliggende er fartøyets og mannskapets sikkerhet og han kan ”om nødvendig” stanse operasjoner som kan sette disse i fare, jf. punkt 6.1.5 1. ledd.

Det er krav om at operatørselskapet arrangerer et riggflyttingsmøte før operasjonen starter der hensikten bl.a. er å utarbeide risikovurdering for fartøy, jf. punkt 6.2 2. ledd og der også krav til fartøy skal gjennomgås. Det er imidlertid krav om at både innretning og fartøy utfører risikovurderinger før operasjonen starer, jf. punkt 6.4 1. ledd. Om en operasjon er endret, må personalet gå gjennom farer og risikoen ved den endrede operasjonen, noe som krever en pause.

Det er et eget kapittel i retningslinjen om risikohåndtering, og alle parter skal ha adekvat opplæring til å foreta risikovurderinger. Reder og operatørselskaper har et ansvar for at adekvate risikovurderinger er på plass, jf. punkt 7.2 3. ledd. Plattformsjef og kaptein har ansvaret for å sikre at risikovurdering utføres på henholdsvis innretningen og fartøyet. For at dette skal la seg gjøre, er det i punkt 9 et krav om opplæring, kompetanse og bemanning. En kaptein uten tidligere erfaring med ankerhåndtering skal ha gjennomført minst fem riggflyttinger med en erfaren kaptein før vedkommende har kommandoen i et ankerhåndteringsoppdrag. Det er rederen som skal dokumentere at kapteinen har oppfyller disse kravene, jf. punkt 9.2.4 2. ledd. For offisrerer uten tidligere erfaring, er det kun en anbefaling i punkt 9.2.4 3. ledd om at slike offiserer bør gjennomføre minst fem riggflyttinger eller en passende kombinasjon av riggflyttinger og simulatortrening.

6.3 Standardens betydning for riggforflytningen

"Guidelines for the safe management of offshore supply and anchor handling operations NWEA" krever at alle tar ansvar for både egen og andres sikkerhet, og at operatørselskapet sørger for at det utføres risikovurderinger. Disse kravene følger også av bl.a. The Health and Safety at Work etc. Act og The Management of Health and Safety at Work Regulations 1999. The Management of Health and Safety at Work Regulations 1999 med tilhørende *approved code of practice* er relativt detaljert, men det sies at det ikke er noen faste regler for hvordan en risikovurdering skal gjennomføres all den tid dette vil avhenge av typen arbeid eller virksomhet og hvilken type risiko og farer dette fører med seg. En standard som omhandler den operasjonen som gjennomføres vil således kunne ha en betydelig innflydelse på hva som konkret kreves av risikovurderinger etter forskriften, kanskje særlig fordi standarden direkte eller indirekte kan si noe om hva som kan utgjøre en risiko ved en ankerhåndteringsoperasjon. I den grad standarden definerer hva som kan utgjøre en sikkerhetsmessig risiko, kan gjøre det vanskelig for en aktør å hevde at slik risiko ikke er kjent, jf. begrepet "reasonably practicable".

7 Oppsummering og konklusjoner

Hvert land kan gi bindende regler innefor sitt territorium samt i en viss grad på kontinentalsokkelen. Videre kan det enkelte land gi regler for skip registrert i landet i henhold til flaggstatsprinsippet. Hva reglene materielt sett går ut på, må fastsettes etter en alminnelig anvendelse av juridisk metode

Regelverksmetodikken i UK går grovt sett ut på at det er gitt generelle, formelle regler der målet er formulert, mens aktørene har en viss valgfrihet når det gjelder hvordan målene skal oppnås. For noen regelverk er det utarbeidet *guidance* eller *approved code of practise*. Disse er ikke juridisk bindende og det er frivillig for aktørene om de vil benytte de anbefalte løsningene i den forstand at det kan velges andre løsninger så lenge de valgte løsningene oppfyller de formelle kravene i lov eller forskrift. Det er vanskelig å fastslå hvorvidt en valgt løsning oppfyller kravene i svært vage normer og dette må skje gjennom en konkret vurdering. Som siste ledd i kjeden er det utarbeidet standarder eller anbefalinger som kan bli betraktet som "relevant good practice". Ettersom de gjerne er mer konkret i sitt innhold, kan de presisere ellers vage normer. De er dermed å anse som anbefalinger om hvordan man kan gå frem for å oppfylle forskriftens krav der denne ikke er tilstrekkelig konkret. Dersom de skal tillegges rettskildemessig vekt ut over dette, må det bero på at en tolkning av bindende rettskilder som lov og forskrift vil kunne føre til samme resultat, eller at det følger av autorative tolkninger av slike, i praksis rettsavgjørelser.

The Health and Safety at Work etc. Act 1974 er gitt anvendelse på Britisk kontinentalsokkel, og etter en tolkning av forskriften AOGBO mener jeg at loven kommer til anvendelse også på operasjonen med å forflytte riggen. Lovens §§ 2 og 3 gir arbeidsgiver og selvstendige næringsdrivende er vidtrekkende plikter, både når det gjelder sikkerheten til egne ansatte og andre. Domstolene har definert kretsen loven gir beskyttelse, til å omfatte også ansatte i andre firma engasjert i virksomheten. Jeg mener dommen kan sies å ha oppstillet et prinsipp der aktører som ikke har et direkte kontraktsrettslig forhold til en annen profesjonell aktør, likevel har et ansvar for at deres handlinger ikke truer sikkerheten til den andre aktørens ansatte, forutsatt at det er tilstrekkelig saklig og geografisk forbindelse mellom aktørenes virksomhet.

The Management of Health and Safety at Work Regulations 1999 krever at arbeidsgiver og selvstendige næringsdrivende foretar risikovurderinger både når det gjelder risiko i forhold til egne ansatte og andre jf. § 3. Videre er det et krav etter § 3, 3. ledd at det foretas nye risikovurderinger dersom særskilte forhold tilsier det. Slike forhold kan være uventede hendelser, eller endringer i operasjonen. Når arbeidstakere ansatt av ulike arbeidsgivere arbeider sammen, skal arbeidsgiverne samarbeide om å oppfylle forskriftens krav, jf. § 11.

Standarder, og mest nærliggende "Guidelines for the safe management of offshore supply and anchor handling operations NWEA", vil kunne utfylle de vage kravene i lov og forskrift gjennom at det er konkretisert hva som kan utgjøre en risiko ved ankerhåndteringsoperasjoner og hvordan slike kan forebygges.

8 Virkemidler for å unngå at en tilsvarende hendelse skal kunne inntreffe igjen.

8.1 Fokus på sikkerhet ut fra uønskede hendelser

Det er flere hensyn å ivareta når det skal utarbeides regelverk og sikkerhetsreguleringen står i en særstilling. Forebygging av ulykker er ikke et arbeid som kan fullføres og avsluttes, men må kontinuerlig prioriteres i alle ledd og under alle operasjoner.

Normalt vil det være stort fokus på sikkerheten i kjølvannet av en ulykke og de forhold som forårsaket den siste ulykken får særlig oppmerksomhet. Dette kan medføre store svingninger mht. hvor stor oppmerksomhet forebyggende tiltak får og hvordan oppmerksomheten fordeler seg. For det første kan oppmerksomheten på ett felt svekke oppmerksomheten på andre risikofylte operasjoner. I verste fall kan tiltak begrunnet i en ulykke svekke tiltakene på andre felt fordi man blir for ensidig oppmerksom på den aktuelle svikten uten å være våken for at de tiltak denne tilsier kan ha korresponderende uheldige virkninger på andre felt. For det andre vil sikkerheten totalt sett kunne få mindre og mindre oppmerksomhet jo lengre tid som går etter en ulykke ved at andre gjøremål krever oppmerksomhet, det kommer inn nytt personell som ikke har erfart de farene virksomheten fører med seg, m.v.

8.2 Regelverkets virkeområde og ansvarlige etter regelverket

Det er viktig å presisere hvilket virkeområde regelverket har slik at det ikke oppstår uklarheter om hvilke regler som gjelder for hvilke operasjoner og innenfor hvilke geografiske områder.

Der flere regelverk møtes, bør forholdet mellom reglene, de ansvarlige (både myndigheter og virksomhetsaktører) m.v. avklares. Hensikten er både å hindre utilsiktede overlappende regelverk (der de også kan bli selvmotsigende) og å hindre lovtomme rom, d.v.s. handlinger som ikke dekkes av reglene eller som ingen har et overordnet ansvar for.

Det bør vektlegges å ha klare bestemmelser om hvem som er ansvarlige i henhold til reglene til enhver tid. I større virksomheter der oppgaver gjerne blir delegert til entreprenører og underentreprenører, vil en åpning for å delegere ansvaret for at regelverket blir fulgt, kunne føre til ansvarspulverisering eller uklarhet om hvor ansvaret faktisk ligger. Det er et spørsmål om det i det hele tatt bør være mulig å delegere fra seg ansvar siden dette vil kunne føre til uklare ansvarforhold. Den som delegerer fra seg ansvar vil gjerne være i en posisjon der han eller hun har en innvirkning på sikkerheten for eksempel gjennom å kunne velge hvem som blir tildelt oppdraget eller hvilke økonomiske rammer oppdraget får. Det bør sikres at dette ikke frister til at løsninger konstrueres med det formål å begrense ansvaret for uønskede hendelser. Men engasjerte entreprenører og underentreprenører må også kunne holdes ansvarlig for sine handlinger. Løsningen er derfor ofte at flere kan stilles til ansvar. Det er da ikke unnskyldelig at en overordnet instans ikke visste om at enkelte forhold hos en entreprenør var uforsvarlige, hvilket vil gi et incitament til at det velges entreprenører som er seriøse, og at de gis arbeidsforhold som gir rom for å ta sikkerhetsmessige hensyn. På den annen side vil ansvaret kunne pulveriseres hvis absolutt alle involverte gjøres til pliktsubjekter. En slik reguleringsteknikk bør derfor kombineres med at ett subjekt utpekes til å ha overordnede koordinerende plikter i forhold til de øvrige – slik man ser utslag av på norsk sokkel (der rettighetshaver/operatør er gitt denne rollen i viktige sammenhenger).

8.3 Regelverkets materielle innhold

For å unngå store variasjoner i hvilken oppmerksomhet forebyggende arbeid får, bør regelverket pålegge aktørene til å ha et vedvarende fokus på sikkerhet og dermed motvirke at bransjen blir for avslappet ift. å forebygge ulykker. Et for konkret og detaljert regelverk vil gi en forutsigbarhet i forhold til hvilke krav som stilles og forenkle tilsynet med om regelverket blir fulgt. På den annen side vil det føre til en stagnering av utviklingen ved at ny teknologi og nye løsninger ikke tas i bruk og fordi aktørene, som er de nærmeste til å kunne velge trygge løsninger, ikke får tilstrekkelig oppfordring til det. Ansvaret for sikkerheten ved et slikt detaljert regelverk blir videre liggende hos regelgiver, som ofte ikke har førstehånd kjennskap til hva som faktisk kan utgjøre en trussel mot sikkerheten. Regelverket bør derfor legge opp til at det legges inn en fleksibilitet som gir et incitament – men også en plikt – til å velge det som fremstår som den beste løsningen i et sikkerhetsmessig perspektiv. Dette kan gjøres gjennom å kreve at aktørene selv må utarbeide interne risokovurdeinger, arbeidsprosedyrer m.v. og at de selv må etablere systemer for å sikre at dette følges internt i virksomheten (og av underliggende virksomheter). En regulering etter disse linjene stiller i neste omgang krav til utformingen av systemet for myndighetenes kontroll med at regelverket etterleves.

En grense for hvor vagt regelverket kan utformes følger av kravet om et hjemmelsgrunnlag med en viss substans for å kunne straffeforfølge overtredelser av regelverket.

8.4 Internasjonalt samarbeid

Innenfor petroleumsvirksomhet og spesielt den maritime del av den, bør internasjonalt samarbeid vektlegges for å sikre så ensartede avgrensninger, materielle krav og lik ansvarsfordeling som mulig. Dette vil også være kostnadseffektivt ved at tilsyn kan skje fra ulike land, selskaper kan utarbeide planverk i henhold til ett lands krav, materiell kan benyttes på flere lands kontinentalsokkel uten ombygging m.v. Dette vil kunne frigjøre ressurser som kan settes inn i forebyggende tiltak. Videre vil erfaringsutveksling og samarbeid over landegrensene kunne gi bedre løsninger for sikkerheten totalt sett.

Translation from Norwegian

A REVIEW OF THE BRITISH REGULATIONS IN RELATION TO THE ANCHOR-HANDLING OPERATION IN WHICH THE "BOURBON DOLPHIN" WAS LOST

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Oslo 14 December 2007

True Translation Certified - Government Authorized Translator

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1 THE LOSS OF THE "BOURBON DOLPHIN"

1.1 Terms of reference and object

The Commission desires a review of the British rules that govern the vessel, operator and the rig/licensee during the anchor-handling operation in which the "Bourbon Dolphin" participated as one of several vessels in the moving of the rig "Transocean Rather" on 12 April 2007, an operation that resulted in the "Bourbon Dolphin" rolling over and subsequently sinking.

The evaluation is to cover a discussion of what regulations are applicable. In addition, it is to be explained to what degree the players were bound by these rules. The legal opinion is restricted in theme to the British regulatory system and in time to the rules that were applicable before and during the anchor-handling operation. Under this head the Commission desires an assessment of to what degree the guidelines and similar can be deemed to be binding upon the players.
Regulatory systems in relation to the vessel, its design and thereby stability, will not be discussed, nor will emergency response and the implementation of the rescue operation after the "Bourbon Dolphin" was lost.

Finally, the Commission desires a brief account of what, if anything, can be done in order to avoid similar occurrences in the future.

The legal opinion shall be within the framework given to the Commission of Inquiry into the loss of the "Bourbon Dolphin" through its terms of reference. Professor *dr. juris* Knut Kaasen has reviewed the legal opinion.

The Commission has the right to append the legal opinion to the final report and otherwise refer to it in its own report. The author has the right to publish the legal opinion herself, wholly or in part.

1.2 Materials and background information

As a basis for the report, I held a single meeting with the entire Commission on 8 August 2007.

I was further present during the Commission's hearing of 7 August 2007. The Commission put me in touch with Mr. Rognvald Thomson of the Health and Safety Executive in The United Kingdom, which corresponds to the Petroleum Safety Authority (*Petroleumstilsynet*) in Norway, and there was telephonic contact on 9 October, 19 October and 4 December, plus a meeting in Aberdeen 22 November and another at Gardermoen airport (Oslo) on 6 December 2007.

The following material has been sent by the Commission:

- The Commission of Inquiry's terms of reference
- ISM Code and Revised Guidelines on Implementation of the ISM Code by Administrations 2002 Edition
- (Norwegian) OLF/NR's guidelines for safe anchor-handling and towing (No. 061-A)
- Guidelines for safe management of offshore supply and anchor handling operations (NW European Area, NWEA).
- The Health and Safety at Work etc. Act 1974
- The Health and Safety at Work Act 1974 (Application outside Great Britain) Order 2001
- The Management of Health and Safety at Work Regulations 1999
    - Approved code of practice and guidance L21
- The Offshore Installations (safety case) Regulations 2005
    - A Guide to the Offshore Installations (safety case) Regulations 2005 L30
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995
    - Approved code of practice and guidance L65
- The Offshore Installations and Pipelines Works (management and administration) Regulations 1995
    - A Guide to the Offshore Installations and Pipelines Works (management and administration) Regulations 1995 L70

In addition the following courses/regulatory systems have been evaluated or employed:

- The Offshore Safety Act 1992
- (Norwegian) Act No. 7 of 9 June 1903 on State Control of the Seaworthiness of Ships etc.
- Knut Kaasen: *Sikkerhetsregulering i petroleumsvirksomheter* (Safety Regulation of the Petroleum Activity), Sjørettsfondet, Oslo 1984, and particularly Section 7 "Draft Petroleum Act» and Section 50, "Overview of British Safety Regulations and Control".
- Terence Daintith, Geoffrey Willoughby & Adrian Hill: *United Kingdom Oil and Gas Law*
- Michael Ford and Jonathan Clarke: *Redgrave's Health and Safety*, 5th edition, published by LexisNexis/Butterworths, ISBN 978-1-4057-1890-5
- John Ridley & John Channing: *Safety at work*, 6th edition, published by Elsevier, ISBN 978-0-7506-5493-7

There is a quantity of information available on links from the Health and Safety Commission's web portal that has been used, including *The Health and Safety System in Great Britain* and *Five Steps to Risk Assessment.* Since the regulatory system is extremely extensive, to a certain extent it has been necessary to build on information from the HSE in the work of finding relevant regulations and legal decisions. The evaluations of the material have, however, been made on an independent basis.

Some provisional conclusions from the work were presented to the Commission of Inquiry's chairman and secretary on Friday 26 October. Information about the factual aspects of the capsizing has been obtained from the Commission of Inquiry.

1.3 Introductory comments and clarification of terms

It should be noted that this legal opinion consists of general legal observations, so that conclusions about the actual course of events cannot be derived from the legal opinion. The facts of the case are, however, limited to what is raised for discussion here, so that questions that are not relevant to clarifying the legal aspects of the "Bourbon Dolphin" capsizing will not be considered.

In the legal opinion the term “regulatory system” is used as an umbrella term for acts, statutory regulations and guidelines, regardless of whether they are regarded as legally binding or not. Where it is important to distinguish between the various types of regulatory systems, it will be stated what kind of regulatory system we are talking about.

Abbreviations will be used for two public British agencies; The Health and Safety Commission (HSC), which is a non-departmental body that answers to the Department of Work and Pensions and that works on health and safety legislation. Under the Health and Safety Commission (HSC) comes the Health and Safety Executive (HSE), which can be compared with our own Petroleum Safety Authority (*Ptil*), although the HSE administers the entire health and safety regulatory system in the United Kingdom and not only that governing the petroleum activity.
Provisions about the HSC and HSE may be found in the Health and Safety at Work etc. Act 1974 Sections 10ff.

1.4 Briefly on the facts surrounding the accident – as a framework for the legal opinion

The “Bourbon Dolphin” was a Norwegian-registered anchor-handling vessel hired by Team Marine on behalf of Chevron. The vessel capsized and sank on 12 April 2007 in the British exclusive economic zone in connection with the move of the rig “Transocean Rather” (registered in Panama). The “Bourbon Dolphin” was engaged in deploying the eighth and last anchor of the rig when the boat rolled over. The operation involved several other vessels and when the “Bourbon Dolphin” capsized, she was assisted by the UK-registered boat “Highland Valour”.

Chevron was operator on the field and had the prime responsibility for the rig move, but had commissioned the consultancy firm Trident to prepare the rig move plan with a description of how and when the move should be done. On board the rig were two towmasters, who are self-employed and hired by Team Marine on behalf of Chevron. The towmasters had the operational responsibility for the rig move and were the liaisons between the involved vessels.

2 THE REGULATIONS – SOME SPECIAL CHARACTERISTICS

2.1 Overview and delimitation

The “Bourbon Dolphin” was a Norwegian-registered vessel and the flag-state principle means that the Norwegian regulatory system is applicable to the vessel herself. Norway thus has jurisdiction over the “Bourbon Dolphin”, but not over others during the operation, such as the operator or the rig. The vessel herself is not embraced by British jurisdiction. The vessel was operating in the British economic zone. This is why the British regulatory system is applicable to the operation and the other implicated parties.

Moreover, the accident happened in the Scottish sector, but this is only relevant in relation to the procedural aspect of a possible criminal prosecution and has no significance to the substantive content of the regulatory system. This will not, therefore, be discussed further.

The questions to be further illuminated are: which regulatory systems at that time were applicable to the anchor-handling operation, who is bound under the regulatory system and to what degree the rules are binding on them. Some comparisons will be made with the Norwegian regulatory system where this is natural.

The regulatory system to be considered is the rules that are applicable to activities prior to and during the actual operation. The rescue operation and the regulatory system governing this will not, therefore, be touched upon.

2.2 The regulations governing the operation as a whole – the British regulatory system

2.2.1 The methodology of the regulations

The regulatory system that is applicable is extensive and consists, apart from acts and statutory regulations, of several other sources of law as well. As in Norway there is a distinction between the maritime legislation, the petroleum legislation and the legislation on shore. The demarcation of the offshore activity on the British side is different from what we know from Norwegian law, in that mobile installations are included under the petroleum activity and the land-based regulatory system is applicable to these. In both countries the land-based regulatory system has been given application to the petroleum activity and in addition a number of rules are issued for the offshore activity specifically.

The regulatory methodology is in many ways similar to what we find in safety regulation of the petroleum activity in Norway, where acts and statutory regulations are designed as functional requirements (in the UK called a "goalsetting regime"). This means that the rules present goals and principles in which it is stated what the authorities wish to achieve by means of the regulatory system. The rules are thereby to a great degree vaguely formulated, which hampers the work of finding out what must be done in order to fulfil the regulatory system's requirements on the basis of acts and statutory regulations alone.

The British regulatory system is complemented in several ways. In the first place there are several types of regulations over and above acts and statutory regulations. These include a form of "semi-binding" rule drawn up by the authorities that amplifies the requirements of the statutory regulations and which the players can follow if they choose (*approved code of practice* and *guidance*). In addition there are a number of different standards that can constitute "relevant good practice". In the second place, the players are mandated themselves to complement the regulatory system inter alia by risk assessments. There is no tradition of using the *travaux préparatoires* as a source of law as in the Nordic countries.

The trend is towards the regulatory system becoming more concrete the further we move from the binding rules in acts and statutory regulations. This gives rise to a question of what is the significance in terms of sources of law of recommended practice, guidelines, standards and any own risk assessments, including whether they have relevance and if so what weight they can be assigned.

The British regulatory system can consequently be divided into five different categories, in three groups.

The first two categories are *acts of Parliament* and *statutory regulations,* which are binding rules, but which are consequently vague and generally worded. In this way they display similarities with the Norwegian safety regulatory system.

The next two categories consist of the semi-binding rules formulated by HSE and which in form are reminiscent of the special remarks in a Proposition to the Odelsting, a Norwegian Bill. The first is *approved code of practice*, abbreviated ACOP) and the other are *guidance*. The *Approved Code of Practice* and the *guidance* can be revised by HSE as required.

The fifth and last category is *standards* and corresponding recommendations drawn up bodies other than the authorities as for example national or international organisations.

2.2.2 More on the Approved Code Of Practice (ACOP) and the Guidance

The Health and Safety at Work etc. Act 1974 Sections 16 and 17 contain provisions on approval of the *approved code of practice* and use thereof in the context of criminal prosecution. This states how the *approved code of practice* can be promulgated, amended and rescinded. The provision in its entirety reads:

> "17 Use of approved codes of practice in criminal proceedings
>
> (1) A failure on the part of any person to observe any provision of an approved code of practice shall not of itself render him liable to any civil or criminal proceedings; but where in any criminal proceedings a party is alleged to have committed an offence by reason of a contravention of any requirement or prohibition imposed by or under any such provision as is mentioned in section 16(1) being a provision for which there was an approved code of practice at the time of the alleged contravention, the following subsection shall have effect with respect to that code in relation to those proceedings.
>
> (2) Any provision of the code of practice which appears to the court to be relevant to the requirement or prohibition alleged to have been contravened shall be admissible in evidence in the proceedings; and if it is proved that there was at any material time a failure to observe any provision of the code which appears to the court to be relevant to any matter which it is necessary for the prosecution to prove in order to establish a contravention of that requirement or prohibition, that matter shall be taken as proved unless the court is satisfied that the requirement or prohibition was in respect of that matter complied with otherwise than by way of observance of that provision of the code.
>
> (3) In any criminal proceedings--
>
> (a) a document purporting to be a notice issued by the Commission under section 16 shall be taken to be such a notice unless the contrary is proved; and

> (b) a code of practice which appears to the court to be the subject of such a notice shall be taken to be the subject of that notice unless the contrary is proved."

If the *approved code of practice* is violated, this shall not in itself mean any liability in civil or criminal law. But if the court finds that a relevant *approved code of practice* has been contravened, this may mean that a provision has been contravened, unless the court finds that the requirement of the provision has been fulfilled otherwise than by following the *approved code of practice*, confer Section 17.

For purposes of comparison, the (Norwegian) Petroleum Act Section 10-1 first paragraph contains a reference to the effect that "the petroleum activity … shall proceed … in conformity with the applicable regulatory system for such petroleum activity." Previously the formulation was that the petroleum activity had to proceed in conformity with "the applicable regulatory system and recognised norms for such petroleum activity." It is apparent from the *travaux préparatoires* that the change was not meant to have any effect on the content, and the provision thus refers also to requirements and specifications that appear in the guidelines.

The preamble to the statutory regulations refers to the fact that the status of the *approved code of practice* and the *guidance* is described at the beginning of the statutory regulation, where the *approved code of practice* and the *guidance* also appear, and in a box at the beginning of the statutory regulation something is said about what significance the approved code of practice and the guidance is meant to have. Neither the preamble nor the box is a part of the formal text of the statutory regulation.

The box at the beginning of the statutory regulations states that the *approved code of practice* provides practical guidance in how the requirements of the regulatory system can be met. These provisions are, as mentioned, not legally binding, and the players are not mandated to follow the rules. They are, however, assigned a particular regulatory significance:

> "This Code has been approved by the Health and Safety Commission, with the consent of the Secretary of State. It gives practical advice on how to comply with the law. If you follow the advice you will be doing enough to comply with the law in respect of those specific matters on which the Code gives advice. You may use alternative methods to those set out in the Code in order to comply with the law.

> However, the Code has special legal status. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provision of the Code, you will need to show that you have complied with the law in some other way or a court will find you at fault."

It follows from this that if the *approved code of practice* (ACOP) is followed, it is sufficient that the requirements are fulfilled as regards the specific conditions in relation to which the *approved code of practice* makes recommendations. It is voluntary to follow the *approved code of practice*, and the players can use alternative methods of meeting the requirements of the regulatory system. It is stated that the *approved code of practice* has a special legal status, in that, if someone is prosecuted for contravention of the regulatory system and it is found that the person has not followed the *approved code of practice*, he or she can be convicted if unable to show that the requirement of the regulatory system has been fulfilled. The burden of proof for whether the law has been complied with will in such cases lie with the prosecution. The use of the *approved code of practice* thereby provides a flexibility as regards technological development and so forth but also because it is easier to amend.

As regards the *guidance*, this has a status as a source of law different from that of the *approved code of practice*.

> "This document also includes other, more general guidance not having this special status. This guidance is issued by the Health and Safety Commission. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice."

In the same way as for the *approved code of practice*, the players are not obliged to follow the *guidance* and may choose other procedures in order to fulfil the requirements of the statutory regulations. If the players choose to follow the *guidance*, this will normally be sufficient to fulfil the requirements of the legislation. On the other hand, deviation from the *guidance* does not lead it itself to any demand that the prosecution document that the chosen procedure fulfils the requirements of legislation and statutory regulations, as the case was for deviation from the *approved code of practice*.

By way of comparison it may be mentioned that the Norwegian regulatory system refers to non-binding commentaries prepared by the authorities. The Regulations No. 1016 of 31 August 2001 pertaining to Health, Safety and the Working Environment (framework regulation), Section 18 second paragraph, states:

> "*When the party responsible makes use of a standard recommended in the guidelines to a provision of the regulations, as a means of complying with the requirements of the regulations in the area of health, working environment and safety, the party responsible may as a rule take it that the regulation requirements have been met*."

The British *guidance* is thereby assigned the same significance as a source of law as the commentaries to the regulatory provisions in Norway, but with the difference that the Norwegian regulatory system refers to the norms in statutory regulations. The reason for the choice of this regulatory method is that the players should have a certain freedom of choice, since the responsibility for safety is vested in them and not in the authorities. Having legislation and statutory regulations consisting of goals and principles, while the more detailed rules are to be found in the *approved code of practice* and *guidance*, was intended to give the regulatory system a flexibility that inter alia permits technical development within the framework of the binding rules. Within the framework of the regulatory system, the players are mandated to reduce the risk as far as is "reasonably practicable", see for example the Health and Safety at Work etc. Act 1974 Section 2.

The players may, however, elect to follow the recommendations in the *guidance* and the *approved code of practice*. They will then be virtually certain that the requirements of legislation and statutory regulation are fulfilled and that they will not be held accountable should an accident occur. There is thus no strong *encouragement* in the methodology of the regulatory system to actively find new and better solutions in order to improve safety, even if this is stated as a reason for using the *guidance* and the *approved code of practice.* On the other hand, the fact that this guidance is not binding on the players means that they are *allowed* to develop better solutions.

2.2.3 The subjects of the obligations

Who is the subject of the obligations under the regulatory system varies according to whether the regulation is directed at working life in general or whether the rules govern the offshore activity in particular. In the general rules on working environment, the subjects of the obligations are primarily the employer and the self-employed.

The regulations governing the offshore activity in particular have different terms for the subjects of the obligations. For example The Offshore Installation (Safety Case) regulation 2005 assigns duties to "the duty holder", who may be either the operator of a "production installation" or the owner of a "non-production installation", confer the definitions in Section 2.

3 GEOGRAPHICAL AND FUNCTIONAL AREA OF APPLICATION

3.1 Some introductory remarks

The key piece of legislation in British safety regulation is the Health and Safety at Work etc. Act 1974. In many ways it answers to the Norwegian Working Environment Act, and is consequently supposed to regulate many different work situations, from railway transport to mining. There exists no *approved code of practice* or *guidance* for the Act, but a number of statutory regulations have been issued pursuant to the Act, to which I will return.

In principle the Health and Safety at Work etc. Act 1974 is not applicable outside British territory, and thereby not on offshore installations or vessels, but separate regulations have been promulgated that deal with the Act's field of application in territorial waters and other designated areas.

The statutory regulations are promulgated pursuant to the Health and Safety at Work etc. Act 1974 Section 84 (3) and are called "The Health and Safety at Work etc. Act 1974 (Application outside Great Britain) Order 2001 No. 2127". Hereinafter these statutory regulations will be abbreviated as AOGBO. No *approved code of practice* or *guidance* has been issued for these statutory regulations either.

The statutory regulations' Section 4 (1) describes the scope and is worded as follows:

> Offshore installations
>
> 4.—(1) The prescribed provisions of the 1974 Act shall apply within the territorial sea or a designated area to and in relation to—
>
> (a) any offshore installation and any activity on it;
>
> (b) any activity in connection with an offshore installation, or any activity which is immediately preparatory thereto, whether carried on from the installation itself, in or from a vessel or in any other manner, other than—
>
> (i) transporting, towing or navigating the installation; and
>
> (ii) any activity in or from a vessel being used as a stand-by vessel;
>
> (c) a diving project involving—
>
> (i) the survey and preparation of the sea bed for an offshore installation;
>
> (ii) the survey and restoration of the sea bed consequent on the removal of an offshore installation.

This provision lays down to what extent the Health and Safety at Work etc. Act 1974 is applicable, with a view to both geographical area and to what kind of installations and vessels during the performance of what kind of work.

As regards geographical area, the Act has application to the territorial sea and associated areas. The latter also include the British Continental Shelf, which covers the area in which the anchor-handling operation was being carried out, confer the Continental Shelf Act 1964 Section 1 (7), (see Terence Daintith, Geoffrey Willoughby & Adrian Hill: *United Kingdom Oil and Gas Law,* page 3007, Consolidation of Designation of Area Orders).

As regards which installations and vessels are covered by AOGBO, it appears that in the first place all offshore installations are embraced. It is thereby clear that the rig was covered whereas the "Bourbon Dolphin" was not, without our having to discuss in detail the definition of "offshore installation". Moreover, all activity in relation to offshore installations is covered, including preparations for offshore activity in which vessels are also involved, confer Section 4 b). In Section 4 (b), (i), however, exceptions are made for transport, towing and navigation of installations.

The first question that occurs is whether the express exception for towing in subsection (i) also embraces the operation in which the "Bourbon Dolphin" was participating (3.2 below), and the next question is whether the actual operation of moving a rig comes under the head of "activities in connection with offshore installations" (3.3).

3.2 The exception for "towing", confer Section 4 (1) (b) (i)

3.2.1 Functional delimitation

The exception for towing is due to the division between the maritime regulatory system and the offshore regulatory system. A distinction must be drawn between petroleum activity that is covered by the offshore regulatory system (here the Health and Safety at Work etc. Act) and maritime activity (here: towing) that is not. The distinction is not made on the basis of for example the vessel's design, for what purpose she was built or similar grounds, but on the basis of in what activities the vessel is involved.

Mobile platforms (which do not have their own propulsion) are moved by towing when they are taken out on the field for the first time, when they are to shift location from one field to another, when they are taken ashore for maintenance and modification and when they are obsolete and are taken to shore for breaking up.

When a platform is towed over a long distance, there will be few operations that can be related to the petroleum activity. The operation will thereby have more of the character of a maritime operation than an operation in connection with the petroleum activity. When the platform is in operation and is to be moved over short distances so as to be on a new field, the situation is different. Over very short distances this can be done by recovering one anchor at a time of those holding the platform in position. In movements between fields the activity will have less of the character of a maritime operation, and is more to be regarded as a part of the petroleum activity. In the case of the "Bourbon Dolphin", all the anchors of the "Transocean Rather" were recovered and the platform moved to a new location two nautical miles away.

As mentioned above, no further guidelines were discovered, in connection with either the legislation, the statutory regulation (AOGBO) or court decisions concerning the functional scope. On the other hand, the statutory regulation "The Offshore Installations and Pipelines Works (management and administration)

Regulations 1995" Section 4 has something to say about when something is a maritime operation and when it is a petroleum activity.

These statutory regulations have no substantive relevance to the "Bourbon Dolphin" since they only deal with conditions on board offshore installations without affecting questioned related to for example anchor handling vessels. And the statutory regulations provisions about their own area of application naturally apply precisely to this, that is, not the scope of AOGBO. The criteria that the statutory regulations apply in this delimitation may, however, be of interest, since the appurtenant *guidance* specifically refers to the provisions about the scope of AOGBO, see 3.3.2 below.

3.2.2 The Offshore Installations and Pipelines Works (management and administration) Regulations 1995 : Placement and scope

The statutory regulations are promulgated on the authority of the Health and Safety at Work etc. Act 1974. They include more detailed requirements on the management of offshore installations and define the owner and operator as duty-holders, in contradistinction to the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999, which both impose the duties on the employer.

The two above-mentioned sets of regulations, however, function in parallel with the Offshore Installations and Pipelines Works (management and administration) Regulations 1995 on the offshore activity.

The statutory regulations' Section 4 defines the scope and lay down when an installation may be deemed to be in transit. The provision is worded as follows:

> "Regulation 4: Application
> (1) These Regulations shall apply -
> (a) in Great Britain; and
> (b) to and in relation to offshore installations, wells, pipelines and activities outside Great Britain to which sections 1 to 59 and 80 to 82 of the Health and Safety at Work etc. Act 1974 apply by virtue of articles 4(1) and (2)(b), 5 and 6 of the 1995 Order.

> (2) Regulations 6 to 21 shall not apply in relation to an offshore installation which is in transit to or from a location; and an offshore installation is not in transit to or from a location while it is being manoeuvred at the location.
> (3) Save where otherwise expressly provided, nothing in regulations 6 to 13 or 15 to 18 shall impose a duty in relation to an offshore installation while there are no persons aboard."

The second paragraph notes that some of the rules shall not be applied in relation to an offshore installation that is in transit to or from location. The interesting thing in this context is that an installation is not deemed to be in transit when it is being manoeuvred at the location. The terms used here are not, therefore, the same as in AOGBO, where the exception is applicable to "transporting, towing or navigating" the installation.

A *guidance* to the provision of the statutory regulation has been issued, which says something about the reasons for the distinction between an installation that is in transit and one that is being manoeuvred. Here it emerges that the distinction between installations that are in transit and those that are being manoeuvred is made in order to exempt installations from the regulatory system when the primary risks are of a maritime nature. Manoeuvring of an installation during the preparation for leaving the location or after arrival thereby falls under the statutory regulations. As an example is mentioned the case of a semi-submersible installation coming to a new position, when it will be deemed no longer to be in transit from when the first anchor is deployed, and that even if the installation has not come to the correct position.

> "Application to offshore installations in transit
> 36
> Although the definition of offshore installation in regulation 3 covers installations while in transit to or from their working stations, regulation 4 provides that installations in transit will not be subject to regulations 6 to 21. The term 'in transit' relates to all times when the installation is not at or in the immediate vicinity of its first, a previous or its new working station. It is intended to exclude installations from the Regulations when the primary risks are marine. Manoeuvring in preparation for leaving a station or after arrival to position the installation is not part of transit, ie the Regulations do apply to such manoeuvring. For example, a semi-submersible installation approaching a new

> location might be considered as manoeuvring from deployment of the first anchor, which may be some distance from its final location."

This *guidance* is issued in order to clarify the application area of the Offshore Installations and Pipelines Works (management and administration) Regulations 1995 and as such does not affect the scope of AOGBO. The demarcation between the regulatory systems for the petroleum activity contra maritime operations nevertheless has a certain transfer value, particularly since this guidance also refers to AOGBO, see 3.3.2 below.

In the move of the "Transocean Rather" all the anchors had been recovered before the rig was moved two nautical miles (about 3 km). The rig had arrived at the location where the drilling was to start, and when the accident occurred all the anchors but one had been deployed. This suggests that the operation was to be deemed an activity in connection with an offshore installation, and not as a primary maritime activity.

Such a demarcation between the petroleum regulatory system and the maritime regulatory system corresponds to the demarcation we have in Norwegian law. In Proposition to the Odelsting No. 43 (1995-96) page 30, second column, in connection with the special comments to Section 1-6, "Definitions" is written the following:

> "As regards the moving of installations, the Act is, like the current Act, not applicable. By moving is envisaged primarily the movements of a mobile installation to and from the field it is to service, whether the move is under its own propulsion or on tow. Such moves are governed by the maritime legislation."

Proposition to the Odelsting No. 72 (1982-83) page 37 first column makes it clear that "if it is a matter of minor movements between two drilling locations on the same field, […] the actual move will acquire a stronger affiliation with the petroleum activity".

The words move or towing must consequently be given a restrictive interpretation in both British and Norwegian law.

The conclusion is that the operation of deploying the last anchor is not covered by the exception for "towing" in AOGBO Section 4 (1) (b) (i).

3.3 Is the rig move covered by "any activity in connection with an offshore installation"?

3.3.1 Introductory considerations

As regards the question of whether the manoeuvring of an installation is covered by activity in connection with offshore activity, confer AOGBO Section 4 (1) (b), the obvious course is first to refer to the conclusion of the above discussion. Secondly, it may be argued that if the rig move is not embraced by the explicit exception for transport, towing and navigation of the installation, it must follow from an antithetical interpretation of the provision as a whole at the move is also deemed to be activity in connection with an offshore installation.

There is, however, a *guidance* to statutory regulations, namely the Offshore Installations and Pipelines Works (management and administration) Regulations 1995, that discusses what can be understood by "activities in connection with offshore installations".

3.3.2 The Offshore Installations and Pipelines Works (management and administration) Regulations 1995 Section 4 - Guidance

The Offshore Installations and Pipelines Works (management and administration) Regulations 1995 Section 4 is entitled "Application" and lays down when the regulatory system is applicable. A *guidance* to the provision has been issued, in which AOGBO Section 4 (1) is reproduced and commented upon in point 42. Point 42 is worded as follows:

> Activities in connection with an installation are specified in article 4 of AOGBO. They are:
>
> (a) any offshore installation and any activity on it;
>
> (b) any activity in connection with an offshore installation, or any activity which is immediately preparatory thereto, whether carried on from the installation itself, in or from a vessel or in any other manner, other than—
>
> (i) transporting, towing or navigating the installation; and
>
> (ii) any activity in or from a vessel being used as a stand-by vessel;
>
> (c) a diving project involving—

(i) the survey and preparation of the sea bed for an offshore installation;

(ii) the survey and restoration of the sea bed consequent on the removal of an offshore installation.

This includes any of the following activities carried out in connection with an installation: provision of accommodation (but see paragraph 15), well servicing, inspection, testing, loading, unloading, fuelling, provisioning, construction, reconstruction, alteration, repair, maintenance, cleaning, demolition, dismantling, and diving operations, and any activity which is immediately preparatory to any of the above activities. It does not include purely marine activities such as anchor handling or navigation, nor does it include activities which take place on or from a stand-by vessel. Regulation 15(2) also applies to servicing wells which are not connected to an installation.

Point 42 makes clear what is being covered, and what is not covered in the way of activities in connection with an offshore installation. One of the factors that, according to the *guidance,* is not covered is pure marine activity such as anchor-handling. The *Guidance* thus pulls in the direction of anchor-handling, and including the operation in which the "Bourbon Dolphin" was involved, not being countable as an activity in connection with an offshore installation.

3.3.3 Evaluation of what is covered by "connected activities"

What, pursuant to AOGBO Section 4, is actually embraced by activities in connection with an offshore installation are operations that may be said to have a form of support functions in the petroleum activity, but also those such as shutdown. In addition, all activities that may be said to be an immediate preparation for such activities. The question then becomes whether the operation, including the activity of the anchor-handling boats, can be said to constitute an immediate preparation for the petroleum activity.

Both statutory regulation AOGBO Section 4 (1) and the guideline to The Offshore Installations and Pipelines Works (management and administration) Regulations 1995 Section 3 refer to a consideration of the activity as a basis for the regulatory system's area of application. It is, therefore, of crucial importance under both sets of regulations that the activity has sufficient connection with an offshore installation. I consider that the question of sufficient connection must be decided by means of a concrete evaluation of under which regulatory system the rig move most naturally belongs, corresponding to the evaluation of the exception for “towing” in AOGBO Section 4 (1) (b) (i).

The case of the “Transocean Rather” was that the rig was engaged in drilling at one location, and was then carried a couple of nautical miles to a new location and continued the drilling there. Drilling is at the heart of what can be called the petroleum activity.

The object of the operation was to move the rig. The anchor handling vessels were included as necessary aids to implementation of the move. The procedure involved the anchor handling vessels recovering the anchors, the rig was towed into position and the anchors deployed again. The anchor-handling was administered by two towmasters who were located on the rig. The towmasters organised the entire operation and the vessels received their orders from them. The individual vessels thereby formed elements of a larger operation to facilitate the move: the way the operation was planned, it was decided which vessel would be responsible for the individual tasks. When several vessels and a rig are in such a limited area, it is also necessary for safety reasons that somebody has the paramount control of how the players comport themselves at all times so as to prevent hazardous situations.
The rig had arrived at its location and it was during the deployment of the last anchor that the “Bourbon Dolphin” capsized.

I consider that the operation in this context must be seen in a holistic perspective. To call the anchor-handling in this case a pure maritime operation would violate the systematic basis of the regulatory system. It thus seems most natural to view the operation as a whole and therefore as a part of the petroleum activity, rather than as a maritime operation in which every single vessel’s behaviour is considered in isolation under maritime rules.

Against this, therefore, militates the fact that there exists a guidance to a set of regulations other than AOGBO (namely The Offshore Installations and Pipelines Works (management and administration) Regulations 1995), which lays down that this other set of statutory regulations do not apply to “purely marine activities such as anchor handling”. In my opinion, however, it is quite clear that this cannot be sufficient to alter the conclusion, which would appear to follow from interpretation of AOGBO’s own provision regarding its scope.

In my opinion, therefore, the operation falls under the designation "activity in connection with an offshore installation", confer AOGBO Section 4 (b) and the exception for "towing" in (b) (i) is not relevant. The conclusion is that the Health and Safety at Work etc. Act 1974 is applicable to the anchor-handling operation. In any criminal case, this question could be highly relevant, since the legality principle demands a clear authority.

Were the conclusion to be that the Health and Safety at Work etc. Act 1974 is not applicable to the operation, then, according to what has been stated by the HSE, it will not be covered by any other regulatory system. Nor have I been able to find any alternative regulatory system through my investigations.

4 General requirements for addressing health, safety and welfare

4.1 The Health and Safety at Work etc. Act 1974

The Health and Safety at Work etc. Act 1974 Part 1 is introduced by a number of general duties, including one that rests upon an employer or self-employed person, making him responsible for the safety of both the employee and others.
Section 2 discusses an employer's general duties in connection with his employees' health, safety and welfare:

"General duties

2 General duties of employers to their employees

(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.

(2) Without prejudice to the generality of an employer's duty under the preceding subsection, the matters to which that duty extends include in particular--

(a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;

(b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;

(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;

(d) so far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks;

(e) the provision and maintenance of a working environment for his employees that is, so far as is reasonably practicable, safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

(3) Except in such cases as may be prescribed, it shall be the duty of every employer to prepare and as often as may be appropriate revise a written statement of his general policy with respect to the health and safety at work of his employees and the organisation and arrangements for the time being in force for carrying out that policy, and to bring the statement and any revision of it to the notice of all his employees.

(4) Regulations made by the Secretary of State may provide for the appointment in prescribed cases by recognised trade unions (within the meaning of the regulations) of safety representatives from amongst the employees, and those representatives shall represent the employees in consultations with the employers under subsection (6) below and shall have such other functions as may be prescribed.

(5) . . .

(6) It shall be the duty of every employer to consult any such representatives with a view to the making and maintenance of arrangements which will enable him and his employees to co-operate effectively in promoting and developing measures to ensure the health and safety at work of the employees, and in checking the effectiveness of such measures.

(7) In such cases as may be prescribed it shall be the duty of every employer, if requested to do so by the safety representatives mentioned in [subPage 4 section (4)] above, to establish, in accordance with regulations made by the Secretary of State, a safety committee having the function of keeping under review the measures taken to ensure the health and safety at work of his employees and such other functions as may be prescribed."

Under this the employer is obliged, as far as is "reasonably practical", to ensure the health, safety and welfare of the employees in working hours. A number of factors have been listed that the general provision particularly covers, including having systems, localities, information and training etc. designed to secure health and safety.

Section 3 discusses the responsibility of employers and self-employed vis-à-vis others than their own employees:

> ”3 General duties of employers and self-employed to persons other than their employees
>
> (1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.
>
> (2) It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.
>
> (3) In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety.”

Here is a requirement that the employer and self-employed shall perform their tasks in such a way that they ensure, as far as it is reasonably practical, that third parties are not exposed to any risk in relation to health and safety.

The provisions of Sections 2 and 3 can be compared with Section 1 of the Act No. 62 of 17 June 2005 pertaining to Working Environment, Working Hours and Worker Protection etc. (the Working Environment Act) on “full safety from harmful physical and mental influences” in that a results obligation is established. The Working Environment Act establishes in principle only a responsibility for own employees with an exception for others performing work in connection with the activity or installation, confer the Working Environment Act Section 3. No general responsibility for the safety of others is thus laid down, unlike in the case of the Health and Safety at Work etc. Act Section 3.

According to Section 2 the employer is inter alia obliged “…to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees” whereas the requirement under Section 3 is inter alia is “to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety”. The term "reasonably practicable" is the key to the interpretation of the requirement both to safeguard the employees' health, safety and welfare in Section 2 and to ensure that people other than employees are not exposed to risks in connection with health and safety, confer Section 3. The term is difficult to translate directly into good Norwegian.

4.2 "Reasonably practicable"

The term was a theme of the case Edwards v National Coal Board [1949] and it was there found that the risk had to be balanced against the effort required, whether in money, time or inconvenience, to prevent the incident or reduce its extent. Through such evaluations an employer may decide what measures it is reasonable to take. The case thus created a requirement for risk assessments in the form of cost/benefit calculations.

"Reasonably practicable" is considered to be narrower than what is actually physically possible. The term refers to the fact that a calculation of the size of the risk on the one hand and the effort necessary to prevent the risk on the other, whether this be money, time or other inputs. If there is a disproportion between these quantities, the burden of proof rests on the person responsible for it not being "reasonably practicable" for the measures to be taken.

Should it transpire that an employer did not know about or had no reason to be aware of a risk, it may be that it was not "reasonably practicable" to take measures against it.

For more on this, see Redgrave's *Health and Safety*, page 30.

The loss of a vessel is an accident of such dimensions that there is no room for considering whether it is "reasonably practicable" to do what is necessary to avoid such a capsize. The question whether there were grounds to be aware of such a risk is one to which I shall return, see 6.3 below.

4.3 Do the obligations under The Health and Safety at Work etc. Act 1974 Sections 2 and 3 also cover the safety of the crew of the "Bourbon Dolphin"?

The question is who, under the provisions of the Health and Safety at Work etc. Act 1974, can be held responsible for the safety of the crew of the "Bourbon Dolphin". The flag-state principle applies to the vessel, so that the Norwegian regulatory system is applicable to the relationship between the owner and the crew of the ship. The question is who is covered by the liability assigned to the employer et al. through the Health and Safety at Work etc. Act 1974, Sections 2 and 3. The operator on the "Transocean Rather" was Chevron, who had hired the company Trident to organise the actual rig move. Trident in turn hired the towmasters; these were not formally employees of Trident, but independent contractors.

As regards the provision's application to others than own employees, a couple of cases have come before British courts in which the question was which circle of individuals enjoyed protection under the Health and Safety at Work etc. Act 1974 Section 3.

In the decision R v Board of Trustees of Science Museum in 1993, it was a question of to what degree release of legionella would actually have to constitute a risk to the population in the sense that they would have had to have inhaled the infection. The argument was that a potential hazard of legionella infection did not constitute any danger to the public as long as the danger did not materialise. The Court of Appeal rejected this and stated that the word "risk" presupposed a perception of a potential hazard and that there was nothing in the language or in the context that indicated such a restrictive interpretation. The general population is thus protected by the prohibition against exposing anyone to the risk, even if the risk does not lead to any consequences as regards health and safety.

As regards risk in relation to others than own employees, there is another decision that also deals with this. In the case R v Associated Octel Company Ltd in 1996, a contracting firm had been hired by Associated Octel Company Ltd and an employee of the firm suffered serious burns during his work. The Court convicted the contractor on the grounds of Section 2, whereas Associated Octel Company Ltd was convicted of contravention of Section 3 first paragraph. Associated Octel Company Ltd appealed on the grounds that they had hired an independent, competent firm that performed the assignment and had to bear the liability for the safety of its employee. Neither the Court of Appeal nor the House of Lords allowed the appeal. It was stated that it was a matter of indifference whether a principal engages employees or an independent contractor firm to do the work, and regardless of whether the activity was controlled by the principal. As long as the work is a part of the activity, which is a question of fact, there exists a liability under Section 3 (1). The place where the assignment is performed, on the other hand, will normally be a decisive factor.

The conclusion of this is that employer has an extensive responsibility for the protection also of other than his own employees from risks to their health and safety. The question is whether the responsibility can be taken so far as to embrace other professional players, who in this case consisted of the crew of an anchor-handling vessel hired as an independent contractor in order to help with moving the rig. As regards who was covered by the liability, in the case R v Board of Trustees of Science Museum it was the general population that was protected. In the case R v Associated Octel Company Ltd in 1996, it was the employees of a contracting firm hired by Associated Octel Company Ltd who were protected. In principle there are no limitations to the liability for others in these decisions that would suggest that the crew of a hired vessel are not covered.

The case R v Associated Octel Company Ltd in 1996 shows that a company is held liable even if an independent firma has been hired, provided that the work is performed in connection with the principal's area. The question is whether an anchor handling vessel engaged in deploying anchors can be said to be performing work in connection with the employer's area. It can be mentioned here that the move of the rig was an operation in which several anchor handling vessels assisted with the implementation. The operation was planned by all parties jointly on shore well in advance and the work was done in the area around the rig. The move was led by a company hired for the occasion, namely Trident, which itself hired the towmasters. The towmasters stayed on the rig during the operation and the work, on shifts. During the operation they were in contact with, and gave orders to, the vessels regarding what they were to do. The request from the "Bourbon Dolphin" that the "Highland Valour" should attempt to grapple the chain when the "Bourbon Dolphin" encountered problems manoeuvring in position, was relayed via the towmaster. That the operation took place in a restricted area with a view to moving the rig through a coordinated operation means that the assignment must be deemed to have been performed within the principal's area, both geographically and actually.

The next question is who had a duty to take measures in order to avoid such a risk as materialised in the form of the accident. The employment relationships are here more complicated than in the court decisions referred to, with an operator who had hired a firm that in turn had hired independent contractors, while the loss affected the employees of another independent contractor that had been hired by Team Marine on behalf of Chevron. When the decision R v Associated Octel Company Ltd states that it is a matter of indifference whether it is own employees or another firm that performs the work and whether the activity is controlled by the principal, I am of the opinion that this can be regarded as a statement of principle to the effect that a principal is not permitted to escape liability under Section 3 through hiring another firm to do the work. At any rate this applies when there is proximity both geographically and professionally between the operations.

This means that an operator who is a paramount principal and liable for an anchor-handling operation has a liability for safety also of the crew of a hired anchor handling vessel with which he does not have a direct relationship in contract law, confer the Health and Safety at Work etc. Act 1974 Section 3.

The duty to address the employees' and others' safety is closely associated with assessments of risk related to the activity, see point 5 below.

5 THE REQUIREMENT FOR RISK ASSESSMENTS

5.1 Regulatory systems that demand the performance of risk assessments

Several different regulatory systems make requirements for risk assessments. The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 came as a consequence of the Piper Alpha accident in 1988 and are directed at fire and explosions on offshore installations. The object of the Offshore Installations (safety case) Regulations 2005 is to prevent major accidents and demands inter alia approval from the HSE before permission is given for start-up of the installation. These regulatory systems are thereby not directly applicable here, and will not be discussed further. The Management of Health and Safety at Work Regulations 1999 has provisions for risk assessments in general.

5.2 The Management of Health and Safety at Work Regulations 1999

The statutory regulation is promulgated on the authority of the Health and Safety at Work etc. Act 1974 and implements a EU Directive (89/391/ECC). Like the Health and Safety at Work etc. Act 1974, the statutory regulation applies generally and not to the petroleum activity in particular.

The statutory regulation contains a number of provisions with requirements for risk assessments, health and safety arrangements, health monitoring and coordination and collaboration for health and safety purposes between different employers and independent self-employed. Both an *Approved Code of Practice* and a *guidance* to the statutory regulation have been issued.

The statutory regulation is applicable to offshore installations and activity in connection therewith, with demarcation as in the Health and Safety at Work etc. Act 1974, confer AOGBO, see the statutory regulations Section 23.

A key provision in this context is Section 3, which demands that risk assessments be made.
The provision is worded as follows:

"Risk assessment

3. - (1) Every employer shall make a suitable and sufficient assessment of -

(a) the risks to the health and safety of his employees to which they are exposed whilst they are at work; and

(b) the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking,

for the purpose of identifying the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions and by Part II of the Fire Precautions (Workplace) Regulations 1997.

(2) Every self-employed person shall make a suitable and sufficient assessment

of -

(a) the risks to his own health and safety to which he is exposed whilst he is at work; and

(b) the risks to the health and safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking,

for the purpose of identifying the measures he needs to take to comply with the requirements and prohibitions imposed upon him by or under the relevant statutory provisions.

(3) Any assessment such as is referred to in paragraph (1) or (2) shall be reviewed by the employer or self-employed person who made it if -

(a) there is reason to suspect that it is no longer valid; or

(b) there has been a significant change in the matters to which it relates; and where as a result of any such review changes to an assessment are required, the employer or self-employed person concerned shall make them.

(4) An employer shall not employ a young person unless he has, in relation to risks to the health and safety of young persons, made or reviewed an assessment in accordance with paragraphs (1) and (5).

(5) In making or reviewing the assessment, an employer who employs or is to employ a young person shall take particular account of -

(a) the inexperience, lack of awareness of risks and immaturity of young persons;

(b) the fitting-out and layout of the workplace and the workstation;

(c) the nature, degree and duration of exposure to physical, biological and chemical agents;

(d) the form, range, and use of work equipment and the way in which it is handled;

(e) the organisation of processes and activities;

(f) the extent of the health and safety training provided or to be provided to young persons; and

(g) risks from agents, processes and work listed in the Annex to Council Directive 94/33/EC[8] on the protection of young people at work.

(6) Where the employer employs five or more employees, he shall record -

(a) the significant findings of the assessment; and

(b) any group of his employees identified by it as being especially at risk."

It is the employer and the independent self-employed respectively who are duty-holders under the first and second paragraphs of the provision. The duty incumbent on the employer does not consist in formulating a risk assessment solely in order to uncover to what hazards the health and safety of his own employees may be exposed, but also the health and safety-related risks to whom persons who are not employed may be exposed through the behaviour of the undertaking. As under the provisions of the Health and Safety at Work etc. Act 1974 Sections 2 and 3, there is a wide circle of individuals who enjoy protection under the provision. There is no restriction on whom is covered by the term "others", so that employees of another firm must be regarded as covered.

The third paragraph demands that the risk evaluation be revised whenever there has been an important change in the factors that underpinned the original the evaluation. Pursuant to the sixth paragraph, an employer with five or more employees must register the findings made through the risk evaluation.

The authorities have published a relatively comprehensive *Approved Code of Practice* (ACOP) to the Management of Health and Safety at Work Regulations 1999 Section 3. This discusses general principles and the purpose of the risk assessments in addition to clarifying and amplifying the requirements of the section. In the ACOP, risk is defined as the probability that a potential damage or injury will occur; the extent of the risk will depend on the probability of the damage or injury occurring, the gravity of the damage of injury (or its negative health impact) and the number of people who may be affected. The risk evaluation shall inter alia identify how the risk may arise and influence decisions on how the risk is to be handled, so that decisions are taken in an informed, rational and structured way, and so that the measures taken are proportional. The risk evaluations shall include everyone who may be affected.

Moreover, there shall be proportionality in the risk evaluations: insignificant risk can normally be ignored. No other exceptions from the requirement for risk assessments are made. It should be noted that there are no set rules for how a risk assessment shall be implemented, since this will depend on the nature of the work or the activity, and the type of hazard or risk. Pursuant to the ACOP, moreover, it is also a requirement that whatever the risk assessment uncovers be written down. When necessary, for example because it is found that the risk is increasing, the risk evaluations shall be revised. If there are employees doing work for different employers at the same workplace, the employers shall collaborate on fulfilling the requirements of the regulatory systems, confer the statutory regulations' Section 11. The requirement for risk assessments under the Management of Health and Safety at Work Regulations 1999 with appurtenant *Approved Code of Practice* is thereby a very comprehensive one with a view to when risk assessments shall be prepared and whom the risk evaluations shall cover.

The requirements of the statutory regulation are naturally enough in general formulated with a view to the various forms of risk that may be found at different workplaces. The requirement to identify the hazards at a workplace and take measures in relation to these can be specified through use of standards that have been prepared in specific areas. This may be a way of clarifying what is required in the way of requirements for safety and including risk assessments.

6 STANDARDS

6.1 The legal status of the standards

Standards may contain proposals for how a work operation may be completed, who should have the responsibility for what assignments, technical specifications etc. They may be prepared by the authorities or by various private organisations. The key question here is what status as a source of law they may be assigned.

An extreme position is not to consider the standards relevant, that is to say, entirely ignore them when evaluating whether the requirements of legislation and statutory regulations have been met. Another extreme position is not merely to assign the standards relevance but also let them constitute an important source of law in that same evaluation. There is, however, an absolute limit in that the legality principle demands an empowering basis in authoritative sources in order for punitive sanctions to be imposed. The standards' legal significance will probably lie somewhere between these extremes, at a point where relevant factors will be what other sources of law are present, how well-known the standard is, who has performed the work and how good the solutions are that it indicates.

According to information from the HSE and information on their web portal, standards can be deemed to constitute "relevant good practice", but as far as I have been able to uncover, it has not been clarified in authoritative sources of law such as legislation, statutory regulation or the courts what significance these may have as sources of law. There is therefore no basis for regarding the standards as binding.

The players may thus make a free choice as to whether or not they wish to use the solutions suggested by the standards. The standards must, however, be considered to have a relevance whether or not they are followed or not, so long as they constitute a pointer to how a vaguely formulated requirement in the binding regulatory system can be met.

6.2 Standards that may be applicable

6.2.1 Presentation of some relevant standards

There are several different standards that may be applicable during a rig move. According to the object provision in their subsection 1.2, the "OLF/NR 061A Guidelines for Safe Anchor-handling and Towing" facilitate safe anchor-handling and towing operations. The guidelines include detailed provisions about the individual players' responsibility, requirements as to the vessel and her equipment, and requirements for safe job analysis, but are limited in their application to such operations on the Norwegian Shelf and will not be discussed further here.

The International Safety Management Code (The ISM Code) has been drawn up by the International Maritime Organization (IMO), which was established in order to enhance maritime safety and to reduce pollution. The code is applicable to all ships, confer Section 1.3 of the Code. The Code demands that ships have a safety management system. The objects of the safety management system include the establishment of safety in the face of all identified risk, confer Section 1.2.2 second paragraph. It is thus a requirement that risk be identified and measures be taken to deal with the risk that is uncovered, in other words a requirement for risk analysis. A certificate is issued as proof that the ship meets the requirements of the code. It shall be apparent from the certificates which company is responsible for operations, and the flag state can check this, which makes the responsibility for the ship clear. Since the ISM code is in any case applicable only to the vessels, it will not be further discussed here.

6.2.2 Guidelines for the safe management of offshore supply and anchor handling operations NWEA

A relevant standard that deals with anchor-handling operations and that applies to where the rig move took place, is “Guidelines for the safe management of offshore supply and anchor handling operations NWEA” (North West European Area)”. The Norwegian Association of Shipowners, the Norwegian Oil Industry Association (OLF) and the United Kingdom Offshore Operators Association are among the signatory organisations for this “guideline”. The object of the guidelines is to enhance safety in the supply and anchor-handling operations in North West Europe. This is done via best practice and procedures from operator companies, shipowners and others. The guidelines are additional to any national requirements. They do not replace national requirements, but if they are followed, “they provide a strong indication to national administrations that the health and safety legislation is being followed and that the correct precautions are being taken”, confer Section 1.5.2. Deviation from the guidelines must be included in the risk evaluation or safe job analysis and be approved by the parties involved.

These guidelines contain in certain areas the most specific requirements as to how an anchor-handling operation should be performed, and I will first provide a general overview of what provisions may be of interest for the rig move.

Pursuant to Section 1.1 the object of the guidelines is to “safeguard and improve the safety of supply and anchor-handling operations in the North-West European Area (NWEA).” It is also an objective to “give guidance on elimination or reduction of hazards and risks during supply and anchor-handling operations”. The scope is not limited to individual countries’ continental shelves or ships, but covers “everyone who is involved in interaction between offshore installations, bases and offshore service vessels connected to offshore operations in North West Europe”, confer Section 1.4 second paragraph.

Section 2 deals with the division of labour and under Section 2.1 “all employees are […] responsible for both their own safety and the safety of those with whom they are interacting”. The master is “at all times responsible for the safety of the crew, the vessel and the cargo…” and “must halt operations that constitute a threat to the vessel’s safety…”, confer Section 2.2.1. In both this provision and elsewhere in the regulatory system it is pointed out that the master’s professional judgement concerning the safety pf the vessel and crew shall not be influenced.

For his part, the shipowner is responsible for the vessel being "correctly manned and equipped for the assignment" and for "an operational plan being prepared that covers the operations and services in which the vessel can be expected to participate". In addition the shipowner shall "prepare operational conditions for the vessel" with a "description of the conditions for safe operation of the vessel under all conditions, and the restrictions the vessel may be under" and ensure that a copy of the guidelines "is stored on board" and that "all involved crew are aware of the content".

Section 6 contains specific rules for anchor-handling and towing. By way of introduction there is a warning that anchor-handling operations and towing can be hazardous and that installation personnel must be aware of the vessels' operational limitations, confer Section 6.1.

The operator company has the responsibility to ensure "adequate" planning and risk assessment for the entire anchor-handling and towing operation", confer Section 6.1.2 second paragraph. The owner shall inter alia draw up rig move procedures. The Oil Installation Manager can delegate rig move assignments to the Towmaster, confer Section 6.1.4, first paragraph. The master's main concern is the safety of the vessel and crew and he can "if necessary" halt operations that can endanger them, confer Section 6.1.5 first paragraph.

It is a requirement that the operator company arranges a rig move meeting before the operation begins, at which the intention is inter alia to prepare a risk assessment for the vessel, confer Section 6.2 2. paragraph and at which the requirements made of the vessels are also to be reviewed. It is, however, a requirement that both the installation and the vessel perform risk assessments before the operation begins, confer Section 6.4 first paragraph. If an operation is changed, the personnel must review the risks of the altered operation, which demands a break.

There is a separate chapter in the guideline on risk management, and all parties shall have adequate training in undertaking risk assessments. The owner and operator companies have a responsibility for adequate risk assessments being put in place, confer Section 7.2 third paragraph. The Oil Installation Manager and the master have the responsibility for ensuring that the risk assessment is performed on both the installation and the vessel. For this to happen, Section 9 makes a requirement for training, qualifications and manning. A master without previous experience of anchor-handling shall have undertaken at least five rig moves with an experienced master before he may have command of an anchor-handling assignment. It is the owner who must document that the master has met these requirements, Section 9.2.4 second paragraph. For officers without previous experience, there is only a recommendation in Section 9.2.4 third paragraph that such officers should undergo at least five rig moves or a suitable combination of rig moves and simulator training.

6.3 Significance of the standard for the rig move

The "Guidelines for the safe management of offshore supply and anchor handling operations NWEA" require that everyone takes responsibility for both their own and others' safety, and that the operator company ensures that risk assessments are carried out. These requirements also follow from inter alia the Health and Safety at Work etc. Act and the Management of Health and Safety at Work Regulations 1999. The Management of Health and Safety at Work Regulations 1999 with the appurtenant approved code of practice is relatively detailed, but it says that there are no rigid rules for how a risk assessment should be done, given that this will depend on the type of work or activity and what kind of risk and hazard it involves. A standard dealing with the operation that is to be undertaken will thus have a significant influence on what in specific terms is required of a risk assessment under the statutory regulations, perhaps particularly because the standard, directly or indirectly, may say something about what may constitute a risk in an anchor-handling operation. To the degree the standard defines what may constitute a safety risk, this may make it difficult for a player to claim that such risks are not known, confer the term "reasonably practicable".

7. Summary and conclusions

Every country may issue binding rules within its territory and to a certain extent on the Continental Shelf. In addition, the individual country may issue rules for ships registered in the country pursuant to the flag-state principle. What the rules involve in material terms must be determined by general application of jurisprudential methods.

The methodology of the regulatory system in the UK involves, roughly speaking, the issuance of general, formal rules that formulat the objective while the players have a certain freedom of choice in how to achieve them. For some regulatory systems a *guidance* or *approved code of practice* has been drawn up. These are not legally binding and it is up to the players themselves whether they will use the recommended solutions, as long as the selected solutions meet the formal requirements in legislation or statutory regulations. It is difficult to determine how far a selected solution meets the requirements of very vague norms, and this must be done through a specific assessment. As the last link in the chain, work standards or recommendations have been prepared, that can be regarded as "relevant good practice". Since these are generally more specific, they can clarify otherwise vague norms. They are thereby to be regarded as recommendations about how to proceed in order to meet the requirements of statutory regulations wherever the latter are insufficiently concrete. If they are to be given significance as a source of law over and above that, this must depend on an interpretation of binding sources of law, such as legislation and statutory regulation, leading to the same result, or on it following from authoritative interpretations thereof, which in practice means court rulings.

The Health and Safety at Work etc. Act 1974 has been extended to the UK Continental Shelf, and my interpretation of the statutory regulation AOGBO leads me to believe that the Act applies also to the operation of moving the rig. Sections 2 and 3 of the Act assigns employer and self-employed extensive duties, both as regards the safety of their employees and others. The courts have defined the circle of individuals to whom the Act extends protection to cover also employees of other firms engaged in the activity. I consider that the judgment can be said to have erected a principle in which players who do not have a direct contractual relationship with another professional player nevertheless have a responsibility for their actions not threatening the safety of this other player's employees, provided that there is sufficient professional and geographical connection between the players' activities.

The Management of Health and Safety at Work Regulations 1999 demands that employers and the self-employed undertake risk assessments both as regards risk in relation to their own employees and others, confer Section 3. It is also a requirement under Section 3, third paragraph that new risk assessments be made if special circumstances so dictate. Such circumstances may be undesirable incidents or changes in the operation. When employees in the service of different employers are working together, the employers shall cooperate to meet the requirements of the statutory regulations, confer Section 11.

Standards, and most obviously the "Guidelines for the safe management of offshore supply and anchor handling operations NWEA", will be able to amplify the vague requirements of legislation and statutory regulation by means of concretising what constitutes a risk in anchor-handling operations and how it may be prevented.

8 Instrumentalities for avoiding a similar incident in future

8.1 Focus on safety from undesirable incidents

There are several things to take into account when designing a regulatory system, and the safety regulation is in a special position. The prevention of accidents is not work that can be completed and terminated, but something that must continually be prioritised at all stages and during all operations.

Normally there will be a sharp focus on safety in the wake of an accident, and the factors that caused the accident will receive special attention. This can cause sharp fluctuations in how much attention is paid to preventive measures and how that attention is distributed. In the first place, attention in one field can weaken attention to other risky operations. In the worst case, measures justified in terms of an accident can weaken the measures in other fields, because people become over-attentive to the failure in question without being alert to the fact that the measures dictated by this can have corresponding unfortunate effects on other fields. In the second place, overall safety may receive less and less attention the more time elapses after an accident, in that other tasks demand attention, new personnel arrive who have not experienced the hazards involved in the enterprise and so on and so forth.

8.2 The regulatory system's scope and who is responsible under the regulatory system

It is important to clarify the scope of the regulatory system so that there is no lack of clarity regarding what rules are applicable to what operations and within what geographical areas.

Where regulatory systems meet, the relationship between the rules, those responsible (both the authorities and industry players) etc. should clarified. The aim is both to prevent unintended overlap between regulatory systems (which may also involve contradiction) and to prevent statutory vacuums, that is, actions for which no one has a paramount responsibility.

We should emphasise having clear provisions about who is responsible under the rules at any given time. In major enterprises in which tasks are often delegated to contractors and subcontractors, an opening for delegation of the responsibility for the regulatory system being followed can lead to an atomisation of responsibility or a lack of clarity about where the responsibility actually lies. This is a question of whether it ought to possible to delegate responsibility at all, since this can lead to unclear lines of responsibility. The person who delegates responsibility generally wants to be in a position in which he or she has an influence on safety, for example through being able to choose who is allocated the assignment or what financial frameworks the assignment will be granted. We should ensure that this does tempt people to design solutions for the purpose of restricting responsibility for undesirable incidents. On the other hand, it should also be possible to hold hired contractors and contractors responsible for their actions. The solution is therefore to hold several parties responsible. It cannot, therefore, be accepted as an excuse that a superior body did not know that certain factors on the part of a subcontractor were unacceptable; such an approach would create an incentive to choose subcontractors who are serious, and to organise working conditions that allow for safety considerations to be taken into account. On the other hand, there is a danger of responsibility being atomised if absolutely everyone involved is made duty-holders. Such a regulation technique should therefore be combined with a single subject being designated to have overarching coordinating obligations in relation to the others – which is what we see on the Norwegian Shelf (where the licensee or operator is given this role in important contexts).

8.3 The substantive content of the regulatory system

In order to avoid big variations in the degree of attention paid to preventive work, the regulatory system should mandate the players to have a permanent focus on safety and thereby to counteract the industry becoming too relaxed about preventing accidents. A too-specific and detailed regulatory system will create predictability in relation to what requirements are made and simplify the supervision of the following of the regulatory system. On the other hand, it would led to a stagnation in development, in that new technology and new solutions are not adopted and because the players, who are naturally the parties most capable of selecting safe solutions, are not sufficiently encouraged to do so. In such a detailed regulatory system, the responsibility for safety remains with the Regulator, who often lacks first-hand knowledge of what can actually constitute a safety hazard. The regulatory system should therefore allow for the building-in of a flexibility that provides an incentive – but also a duty – to choose what appears the best solution from a safety point of view. This can be done through demanding that the players themselves prepare internal risk assessments, working procedures etc. and that they themselves establish systems to ensure that these are followed internally within the enterprise (and by underlying enterprises). Regulation along these lines may in the next instance lead to demands that the system be designed to as to facilitate the authorities' supervision of compliance with the regulatory system.

A limit to how vaguely the regulatory system can be formulated follows from the requirement for legislative authority of a certain substance so as to allow criminal prosecution of contraventions of the regulatory system.

8.4 International cooperation

Within the petroleum activity and particularly the maritime portion thereof, international cooperation should be emphasised in order to secure as uniform delimitations, as substantive requirements and as equal division of responsibility as possible. This will also be cost-efficient, in that the supervision can be done from various countries, companies can prepare their planning system pursuant to a single country's requirements, materiel can be used on several countries' continental shelves without rebuilding and so on. This will liberate resources that can be invested in preventive measures. In addition, exchange of experience and collaboration across national boundaries can yield better overall safety solutions.

Vedlegg 8

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SHIP & OFFSHORE SURVEYORS A/S

RAPPORT

TEKNISK VURDERING.

FORLIS AHTS "BOURBON DOLPHIN"

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RAPPORT			Antall Sider **20 + 7 vedlegg**
Dato **15.desember 2007**		Antall eksemplarer **5**	Revisjon **1**
Oppdragsgiver			Rapporttype
Undersøkelseskommisjonen etter forliset med ankerhåndterings fartøyet "Bourbon Dolphin".			**Tekniskrapport**

Sammendrag

Rapporten omhandler en delvis beskrivelse av den tekniske utrustningen som vedrører kraft forsyning om bord, inklusive trøstere og fremdriftsmaskineriet basert på informasjoner gitt av skipets klasseselskap på en CD til Kommisjonen, og informasjoner i fra Ulstein Verft AS.
Så langt det lar seg gjøre har vi foretatt vurderinger av skipets maskinutrustning og kapasiteter samt en vurdering av de problemer som oppsto med maskinutrustningen om bord kort tid før forliset. Disse vurderingene bygger på vitneutsagn tatt opp av av Grampian Police på Shetland den 13.april 2007, vitneutsagn presentert i Rettsboken for Sunnmøre tingrett i anledning sjøforklaringen avholdt den 25.april 2007 samt tilgjengelig informasjon gitt av undersøkelseskommisjonen i form av møtereferat etter møte med skipets klasseselskap Det Norske Veritas i Oslo den 6.juni 2007 og dokumenter fra andre høringer.
Videre deltok undertegnede under høringen i Oslo den 7.august og 24. september 2007.

Rapporttittel

RAPPORT
TEKNISK VURDERING
ATHS BOURBON DOLPHIN'S FORLIS
12. APRIL 2007.

Utført av

Theodor S. Maurstad

Anmerkning

Det er benyttet kildemateriale fra følgende selskap og instanser:

- Grampian Police, Shetland, vitneutsagn fra overlevende mannskaper
- Sunnmøre tingrett, Sjøforklaring, kopi av Rettsboken
- Møtereferat etter Kommisjonens møte hos skipets klasseselskap Det Norske Veritas (DNV)
- CD-rom med opplysninger gitt av DNV vedrørende deres arbeider og korrespondanse i forbindelse med byggetilsyn og oppfølging under bygging av "Bourbon Dolphin".
- Informasjon fra Ulstein Verft.

På grunn av personvernet er tillatelse gitt av Statsadvokaten til å gjennomgå relevante politidokumenter.

INNHOLDSFORTEGNELSE.

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1. <u>INNLEDNING.</u>

Mandatet for vårt engasjement i saken er som maskinteknisk sakkyndig basert på forslag til mandat med brev av 13.juni 2007 til kommisjonen.

Basis for oppdraget er med bakgrunn i:

"Undersøkelseskommisjonen nedsatt av Justisdepartementet for å undersøke ulykken med ankerhåndterings fartøyet Bourbon Dolphin har besluttet å vurdere maskinanlegget med tilhørende utstyr om bord i lys av de vitneforklaringer som foreligger omkring driftstekniske avvik som oppsto like før forliset."

Mandat:

- *Gjennomgang av sjøforklaringen for Sunnmøre tingrett datert 25.april 2007 og vitneforklaringer etter forliset.*
- *Gjennomgang av dokumenter vedrørende skipets fremdriftsmaskineri, trøstere, hjelpemotorer, strømforsyning inklusive generatorer og nødlysarrangementet samt overvåknings- og alarmanlegget inklusive anlegg for lagring av data.*
- *Om påkrevd, kontakte fabrikant av relevant utstyr og maskineri for å gjøre seg kjent med maskineriet om bord og dets funksjon.*
- *Vurdering av maskinanlegget med bakgrunn i de opplysninger som foreligger omkring hendelsen.*
- *Utarbeide rapport i ( ) eksemplarer.*
- *Delta på møter sammen med kommisjonen.*
- *Faktura for arbeidet og utførte tjenester med underbilag skal tilstiles ( ) som formell oppdragsgiver og skal inkludere merverdiavgift. Faktura i ( ) eksemplarer, en (1) original og ( ) kopier skal merkes:*
  Undersøkelseskommisjonen etter forliset med Bourbon Dolphin.

<u>Konfidensialitet.</u>
Informasjoner og detaljer omkring de funn som blir gjort i forbindelse med granskningen og de dokumenter som blir gjort tilgjengelige fra kommisjonens side skal behandles konfidensielt.

Vi gjør oppmerksom på personvernet om data om personer som fremkommer i vitneforklaringene og andre dokumenter som blir gjort tilgjengelig.

2. KONKLUSJON.

Basert på vitneforklaringer og de dokumenter som foreligger i saken og informasjon vi har mottatt finner vi det overveiende sannsynlig at de maskintekniske avvikene som er observert kort tid før skipet kantret kun er av sekundær karakter og kan ikke ha vært den utløsende faktor til at skipet kantret.

Man har kjørt hovedmotorene og trøsterne under maksimal belastning og muligens i overbelastet tilstand over lengre tid under den situasjon som rådet. Dette vil naturlig nok kunne resultere i relative høye drifts parametere.
Etter at styrbord indre taupinne ble senket slo slepewire kraftig til babord og skipet fikk kraftig slagside.
Deretter ble det rapportert fra maskinrommet at styrbord hovedmaskineri hadde stoppet. Vitnet 1.styrmann Geir Syversen på broen hadde observert at styrbord propellaksel sto stille. Skipet kantret kort tid deretter.

Det er ikke mulig med sikkerhet å fastslå hva som utløste en stopp av styrbordfremdriftsmaskineri, men stor krenging av skipet kan ha utløst lavt oljetrykk på styrbord reduksjonsgir. Giret er felles for begge hovedmotorene på styrbord side og lavt smøreoljetrykk på giret skal stoppe begge hovedmotorene.

"Bourbon Dolphin" har etter alt å dømme blitt operert i en driftsmodus (AUTR-Max) som er ansett som normalt under de forholdene som rådet. Det er imidlertid å bemerke at i denne driftmodus ligger det en stor begrensning i trekkraft (bollard pull) ved tung bruk av trøstere og ror samt hovedvinsj.

3. GENERELL BESKRIVELSE AV SKIPET.

3.1 Skipet

Skipet er et kombinert forsyning-, slepe og ankerhåndteringsfartøy, såkalt AHTS (**A**nchor **H**andling **T**ug **S**upply Vessel) av Ulstein Design AX 102 type 630 og er bygget ved Ulstein Verft AS i henhold til klassifikasjonselskapet Det Norske Veritas (DNV) sine regler gjeldende i januar 2005. Skipet skal tilfredstille klassenotasjon DYNPOS-AUTR.
Skipet ble satt i drift oktober 2006.

Skipet har følgende klassenotasjon hos DNV: +1A1 Tug Supply Vessel Fire Fighter I SF COMF-V(3) EO DYNPOS AUTR NAUT-OSV CLEAN DK(+) HL(2.5).

DNV ID: D26425. IMO No.: 9351983

Skipet har følgende hoveddimensjoner:

Lengde over alt:	75,2 meter
Lengde mellom perpendikulærene :	68,8 meter
Bredde, form:	17,0 meter
Dybde til hoveddekk:	8,0 meter
Maksimum dypgående:	6,5 meter
Design dypgående:	5,5 meter

Kapasitet:

Dødvekt ved maksimum dypgående på 6,5 meter:	2.130 tonn
Gross tonn:	2.985 tonn

Prestasjon:

Maksimum fart ved design dypgående på 5,5 meter:	17,7 knop
Bollard pull (100% MCR):	180 tonn

3.2 Operatør plassering på broen.

På broen er det to hovedstasjoner for manøvrering av skipet; en i forkant og en i akterkant sammen med vinsjoperatøren. I akterkant av broen er det to stoler med nødvendige instrumenter og paneler innen rekkevidde for å kunne operere skipet under ankerhåndtering. Sett akterover så sitter navigatøren i stolen på babord side. Vinsjoperatøren sitter i en stol på styrbord side.

3.3 Dynamisk Posisjonering System (DPS)
Skipet er utrustet med et dynamisk posisjonerings (DP) system IMO klasse 2 av type SDP-22 levert av Kongsberg Maritime. Som posisjon referanse er benyttet et DPS 700 laser referanse system. Utstyret er klargjort for en hydro-akustisk enhet.

Fra en selektor bryter kan det etter ønske i fra operatør velges mellom DP, manuell og /eller joystick. Denne bryteren er en del av "Trøster Klar" signalet og går til alle trøstere og styremaskineri. "Trøstere" i denne sammenheng inkluderer også fremdriftsmaskineriet.

DP-systemet består av en dobbel sikret kontroll enhet (DPC-21) og to operatør stasjoner (SDP OS 1/2). Kontroll enhetene består av to kontroll datamaskiner og I/O enheter som interface til posisjon-referanse systemene, sensorer, propellene og trøsterne. Hver operatør stasjon inneholder en høyprestasjon datamaskin. En høy oppløselig farge flat skjerm for hver stasjon, beregnet for marint bruk, viser et grafisk bilde for presentasjon av data.

3.4 Trøstere
Arrangementet av trøstere er dobbelt sikret i en teknisk utforming til to systemer. Et babord (B/B) og et styrbord (S/B) system. DP eller Joystick systemet kontrollerer følgende:

1. Trøster 1, tunnel trøster, forre (B/B system)
2. Trøster 2, sving-opp kompass trøster, forre (S/B system)
3. Trøster 3, aktre tunnel trøster 1, (B/B system)
4. Trøster 4, aktre tunnel trøster 2, (S/B system)
5. Trøster 4, propulsjon B/B, (B/B system)
6. Trøster 4, propulsjon S/B, (S/B system)
7. Ror B/B, (B/B system)
8. Ror S/B, (S/B system)

3.5 Posisjon kontrol systemet (Positioniong Control System – PCS)
DP-systemet er basert på fire hovedkomponenter, nemlig;

1. DP-kontroller
2. Operatør stasjonene
3. Interface feil system
4. Batteripakkene for kraftforsyning (UPS – Uninterruptible Power Supply).

3.6 Posisjon referanse systemet og sensorer.
Komponenter og utstyr i dette systemet består av en rekke antenner, gyrosystemer, DPS moduler med software, peileapparater og GPS med mer.

Vi har bevist utelatt å nevne alle enkelt komponentene da selve posisjon referanse systemet har lite relevans for saken.

For en mer utfyllende beskrivelse refereres det til vedlagt kopi av "Single line diagram of the DP system" side 36 i Failure Mode and Effect Analysis (FMEA) Doc.id. 274_101-780-01 revisjon A ,datert 11.10.2006 , og utarbeidet av Ulstein Verft AS. Vedlegg nr. 1.

3.7 <u>Side trøstere.</u>
Skipet har to (2) tunnel trøstere akter, en (1) tunnel trøster forut og en (1) sving-opp kompass trøster plassert forenom midtskipet. Samtlige trøstere er levert av Rolls-Royce Marine / og produsert hos Ulstein Propulsion. Samtlige har vribar propell og er elektrisk drevne.

1. Tunnel trøster nr.1 forre, type TT2200 DPN CP, inngangs effekt 883 kw ved 1.180 omdr./min.

2. Kompass trøster nr.2 forre, frekvens kontrollert, type TCNS 73/50-180, inngangs effekt 883 kw ved 1.800 omdr./min.

3. Tunnel trøster nr.3, forre akter, type TT1850 DPN CP, inngangs effekt 590 kw ved 289 omdr./min.

4. Tunnel trøster nr.4, akterste, type TT1850 DPN CP, inngangs effekt 590 kw ved 289 omdr./min.

4. <u>BESKRIVELSE AV FREMDRIFTSMASKINERIET.</u>

4.1 <u>Diselmotorer, gir og propeller.</u>
Skipet har 4 hovedmotorer av fabrikat Rolls-Royce Marine type B32:40L6P , 4-takt marine diesel motorer med 6 sylindere i rekke. Motorene har en sylinder diameter på 320mm og en slaglengde på 400mm og utvikler hver seg 3.000 kw ved 750 omdr./min. Motorene er turboladet.
Motorene forbrenner marine diesel olje og er montert fleksibelt.

Motorene er montert parvis til et reduksjons gir, "tween-in single out" av fabrikat Scana Volda type EACGTS 1250/SA550/2XPF470 med kraftuttak (PTO). Giret er tilkoblet en propell med vribare propellblad av fabrikat Rolls-Royce type 102 XF5/4 i propelldyse.

Motorene er benevnt som 1,2,3,4 talt fra babord ytre; PO, PI, SI & SO. (Port Outboard, Port Inboard, Starboard Inboard & Starboard Outboard).

Hovedmotor nr. 1og 2 & 3 og 4 danner henholdsvis babord og styrbord fremdriftsanlegg.

5. KRAFT, AUTOMASJON OG KONTROLL SYSTEM.

Skipet har følgende hovedsystemer:

5.1 Hovedmotor kontroll system
5.2 Kraftforsyning administrator system (PMS)
5.3 Integrert alarm system (IAS)
5.4 Trøster & fremdrift kontroll system
5.5 Uavhengig styrespake system (Joystick på broen).

Hovedmotorene kan opereres lokalt eller fjernstyrt med overvåkning i fra broen og i fra maskinkontroll rommet og lokalt på den enkelte motor.

Hovedmotorene skal stoppe automatisk ved følgende tilstander:

- Lavt smøreolje trykk på giret.
- Høy kjølevannstemperatur.
- Feil /Lavt smøre olje trykk.
- Alvorlige alarmer, kritisk turtall
- Utrusing
- Høy oljetåke konsentrasjon i veivrommet.

6. STRØMFORSYNING.

6.1 Akselgenerator
Det er to (2) akselgenerator av fabrikat Marelli Motori S.p.A type MJR 630 LA6 og som hver utvikler 2.400 kw ved 1.200 omdr./min, 60 Hz, 440 volt flytende spenning og 3.037 ampèr er tilkoblet reduksjons girenes kraftuttak (PTO).

Akselgeneratorene kan enten bli kontrollert lokalt eller fjernstyrt via kraftforsynings administrator systemet (PMS).

6.2 Generator, diesel drevet.
To (2) diesel drevne hjelpemotorer av fabrikat Mitsubishi Heavy Industries type S12A2-MPTA og som utvikler 761 kw ved 1.800 omdr./min driver hver seg en generator av fabrikat AEM- Anhaltische El.werk type SE 400 M4, og leverer 875 kw ved 1.800 omdr./min, 60Hz, 440 volt 1.123 ampèr.

6.3 Nødgenerator.
En diesel drevet nødgenerator leverer 120 kw, 440 volt spenning om bord.

6.4 Kraft forsynings nett.
Spenning til større forbrukere er 440 volt, 60 Hz. Til mindre forbrukere, lys og varme er 220 volt, 60 Hz.

6.5 UPS 230 VAC system
Det er installert to (2) uavhengige UPS'er hver på 8 kVA. Hver UPS får elektrisk kraft fra 450 volt fordelingstavlen gjennom en 440 / 230 volt transformator.
UPS 1 → UPS 1.1 (plassert på broen) og 2.1 (plassert i maskinrommet).
UPS 2 → UPS 1.2 (plassert på broen) og 2.2 (plassert i maskinrommet).

6.6 450 volt tavle.

6.6.1 Hovedleverandørene av elektrisk kraft er:

• Akselgenerator nr. 1 :	3.000 kVA /	2.400 kW (PS)
• Akselgenerator nr. 2 :	3.000 kVA /	2.400 kW (SB)
• Dieselgenerator nr. 1 :	875 kVA /	700 kW (PS)
• Dieselgenerator nr. 2 :	875 kVA /	700 kW (SB)
		6.200 kW

6.6.2 Hovedforbrukere av elektrisk kraft er:

• Forre sidetrøster nr.	1 :	883 kW
• Kompass trøster	:	883 kW
• Aktre side trøster nr.	1 :	590 kW
• Aktre sidetrøster nr.	2 :	590 kW
		2.946 kW

I tillegg kommer elektrisk kraft til hovedvinsjene.

For ytterligere detaljer se vedlagt Main One Line Diagram Electric System No. 274_871-735-01 utarbeidet av Ulstein Verft AS datert 04.01.2005, vedlegg nr. 2.

7. Elektrisk kraft forbruk.

Elektrisk kraftforbruk om bord er oppgitt å være følgende i de forskjellige driftsmessige faser:

1.	Under normal sjøreise:	300 kw
2.	Under en nød operasjon under sjøreise (all unødvendig belastning slått av):	300 kw
3.	Under normal operasjon som skipet er bestemt for:	3.800 kw

7.1. Kraftforsynings administrator systemet (Power Management System - PMS).

PMS er av typen MSE 2000 og er levert av Megacon AS. Den viktigste oppgaven PMS systemet har for skip med mekanisk fremdrifts maskineri er for valg av strømforsynings paneler, og start av stand-by generatorer.

Det er en rekke funksjoner innbygget i PMS systemet, og som ivaretar kontroll av kraftforsyningen om bord og sikkerhets funksjoner. Noen kan nevnes:

- Kort-tid parallel drift mellom dieselgeneratorer og aksel generatorer.
- Start av stand-by generator etter black-out om bord.
- Kraft reservering for prioriterte forbrukere (trøstere).
- Kontroll av kraft behov.
- Kontroll av elektrisk kraft for tyngre forbrukere.

Fem forskjellige driftsmodeller er tilgjengelig i PMS systemet:

- Hjelpe modus (Aux.mode)
- Akselgenerator 1 (SG1)
- Akselgenerator 2 (SG2)
- AUTR Min. (AUTR klasse DNV)
- AUTR Max. (AUTR klasse DNV)

For ytterligere detaljer se vedlagt Ulstein Design's Propulsion Modes Variation, tegning nr. 274_793-738-01, datert 03.10.2005, vedlegg nr. 3.

8. INTEGRERT AUTOMASJON SYSTEM (IAS).

IAS konseptet er levert av Kongsberg Maritime og er et uavhengig system. DP systemet er ikke forbundet til IAS.

Det er to (2) operatør stasjoner med monitorer plassert på broen:

- SVC OS 31 (plassert i bro konsoll akter babord - BCA PS) og som suppleres med strøm fra UPS 1.
- SVC OS 32 (plassert i bro konsoll akter styrbord – BCA SB) og som suppleres med strøm fra UPS 2.

Det er videre (to (2) operatør stasjoner med monitor plassert i maskin kontroll rommet:

- SVC OS 33 (plassert i maskin kontroll rommet) og som suppleres med strøm fra UPS 1.
- SVC OS 34 (plassert i maskin kontroll rommet) og som suppleres med strøm fra UPS 2.

Som en del av IAS er inkludert et alarm & monitorsystem av typen SVC-400. Dette overvåker prosess parametere og aktiverer lydsignal og visuell alarm utstyr i tilfelle der hvor alarmterskel overskrides.

Standard form av SVC-400 alarm systemet består av følgende:

- 4 justerbare alarm grenser (høy/lav og høy-høy/lav-lav) for analog følere.
- Justerbar alarm tidsforsinkelse.
- Lav filter passering
- Alarm undertrykkelse (ved prosess tilstand)
- Signal ut av område alarms (kortslutning / åpen krets / føler feil)
- Kritiske alarmer visualisert med alarm farger (3 nivåer).
- Vakt kall gruppe bestemmelse.
- Prosess område bestemmelse.

Operatøren kan forandre alarm formen og midlertidig omgå alarm rapportering for hver føler (pass ord beskyttet).

9. UAVHENGIG STYRESTIKKE SYSTEM (Joystick system).

Det er et DYNPOS system med overflødighet i teknisk utforming og med et uavhengig styrestikke back-up system. Det er en styrestikke ved hver av de to operatør stolene i akterkant av broen. Det er også et operatør panel som kan bli plugget i brovinge terminalene (PS/SB) og konsoll i forkant av broen.

Det er en bryter montert i aktre bro konsoll hvor operatøren kan velge mellom:

- Styrestikke (Joystick).
- Manuell
- DP (Dynamisk Posisjonering).

Denne bryteren er en del av trøster-klar signalet, og går til alle trøsterne og begge styremaskinene.
Elektronikk kabinettet for DP systemet har en (1) hoved- og en (1) back-up 24 VDC kraft tilførsel.

- Hovedkontroll kraft leveres fra DC10 (24VDC PS system).
- Back-up kontroll kraft leveres fra DC20 (24VDC SB system).

10. PROPULSJON / TRØSTER KONTROLL SYSTEM.

Skipet er utrustet med et HELICON-X fjernkontroll system levert av Rolls-Royce. Det er et separat kontroll system for hver propulsjon maskin og alle trøsterne.

HELICON-X fjernkontroll systemet er et mikroprosessor basert system. Følgende hoved funksjoner er inkludert:

- Kombinator kontrol for hovedpropellene, som gir en nøyaktig og pålitelig kontroll av propellblad stigningen og motorturtall.

- Retningskontroll for kompasstrøster, som gir en nøyaktig og pålitelig kontroll av trøster retningen.

- Oppfølging av back-up kontroll for kontrollhendler.

Trøster kontroll for hvert propulsjon system er lokalisert i forre brokontroll konsoll, manøver stol i akterkant på broen og i maskinkontroll rommet.

Trøster kontroll for sidetrøstere og kompass trøster er lokalisert i forre brokontroll konsoll og manøverstol akter på broen.

Hovedkontrollene drives av en elektrisk spenning på 230 volt. Back-up kontroller drives av 24volt likestrøm.

Trøsterne er dobbelt sikret og har et 2-delt strømforsyningsnett som følger:

- Propulsjon babord (Port – PS) : L1 (230 VAC PS-system)
- Propulsjon babord (Port – PS) : DC20 (24 VDC SB-system) Back-up.

- Propulsjon styrbord (SB) : L2 (230 VAC SB-system).
- Propulsjon styrbord (SB) : DC10 (24VDC PS-system) Back-up.

- Kompasstrøster : L2 (230 VAC SB-system).
- Kompasstrøster : DC20 (24VDC SB-system) Back-up.

- Sidetrøster, forre 1 : L1 (230 VAC PS-system).
- Sidetrøster, forre 1 : DC10 (24VDC PS-system) Back-up.

- Sidetrøster, aktre 1 : L1 (230 VAC SB-system).
- Sidetrøster, aktre 1 : DC10 (24VDC PS-system) Back-up.

- Sidetrøster, aktre 2 : L2 (230 VAC SB-system).
- Sidetrøster, aktre 2 : DC20 (24VDC SB-system) Back-up.

<u>Kompasstrøster (Azimuth-thruster).</u>

Trøsteren har stillbare propellblad og er elektrisk drevet med 440 volt supplert fra styrbord hovedtavle i maskinrommet. Servo- og smøreolje pumpe for trøsteren er supplert med elektrisk kraft direkte i fra styrbord hovedtavle i maskinrommet.

Den elektriske drivmotoren er en vann-kjølt asynkronmotor, 3 fase, 440 volt – 60Hz, og som utvikler 883 kw ved 1.800 omdreininger/min. Det er 2 stk. PT100 temperatur følerelementer for hver fase i motoren. Et sett går direkte til alarmsystemet. Det andre settet går til drivenheten som automatisk vil redusere belastningen om temperaturen i vindingene i elektromotoren blir for høy.
En frekvens konverter er montert for å regulere motorens hastighet. Kompass trøster kan kjøres med strøm i fra dieselgeneratorene.

11. <u>ROR & STYREMASKINER</u>

Skipet er utrustet med to (2) ror. Styremaskinene er hydraulisk operert og levert av Rolls-Royce Tenfjord. Hver side er utstyrt med to (2) frekvenskontrollerte elektromotorer som driver hydraulikpumpene.

Begge rorene kan bli tilkoblet DP (dynamisk posisjoneringssystemet). Hver styremaskin er uavhengig av hverandre og det er ingen forbindelse mellom de to systemene.

Elektrisk kraft til elektromotorene leveres i fra som følger:

- PS ror pumpe 1 (1) : Nødtavle
- PS ror pumpe 2 (2) : Hovedtavle i maskinrommet, babord (PS)
- SB ror pumpe 1 (3) : Nødtavle
- SB ror pumpe 2 (4) : Hovedtavle i maskinrommet, styrbord (SB)

12. KOMMUNIKASJON / NØDLYS.

12.1 Alarm og varsling system.
Skipet har et Public Address and General Alarmsystem av fabrikat Scandec Systemer AS type som drives fra 230VAC og via 24VDC batterier som back-up.

12.2 Nødlys om bord.
Nødlys leveres fra dieseldrevet nødgenerator som skal starte opp automatisk ved total black-out om bord.

13.0 VURDERING.

Kantringen av skipet skyldes etter vår vurdering ikke maskintekniske problemer.

Skipet er i sin form å anses som et flere bruk skip og er optimalisert med tanke på økonomisk drift. Skipet er et dieselmekaniske ankerhåndteringsfartøy og det dreier seg om hvordan man tenker utnyttelsen av den installerte dieselmotorkraften i forskjellige driftskondisjoner.
Det er derfor viktig å forstå formålet og begrensningene i de forskjellige driftskondisjonene.

Når det gjelder bollard pull, eller slepekraft, er skipet utrustet med to (2) ulike driftsmoder som er designet for å tjene forskjellige formål. Egenskapene og begrensningene i disse to ulike driftsmoder er beskrevet nedenfor.
Vi vil også vise til vedlegg 2 , Main On Line Diagram Electrical System som vi har mottatt i fra Ulstein Verft AS.

Da det dynamiske posisjon (DP) systemet ikke er en av de 2 driftsmoder som er relevant for saken ser vi ikke noen grunn til å utdype dette systemet nærmere utover at DP systemet er ment benyttet når skipet skal ligge i en bestemt posisjon ved hjelp av alle trøsterne og hovedpropellene. Denne driftsmodus er helt forskjellig i fra ankerhåndtering.

Skipets propellere er etter alt å dømme designet for god funksjon i både transittkondisjon og trekkraftkondisjon, og dette betyr at propelldesign alltid vil være et kompromiss mellom disse kondisjonene. For å kunne oppnå 100% motoreffekt i en transittkondisjon, designes propellen med en design stigning som gir 100% effektuttak fra hovedmotoren ved 100% stigning ved en gitt design-dypgang.

I en typisk trekkraft- bollard pull kondisjon vil forholdene endres. Denne kondisjonen introduserer større propellbelastning, og hovedmotorene er her ikke lenger i stand til å opprettholde 100% effektuttak på hovedmotorene ved 100% propellstigning med mindre man reduserer enten propellturtallet eller propellstigningen. Siden maskinerisystemet om bord i "Bourbon Dolphin" baserer seg på konstant turtall, må man i dette tilfelle redusere propellens stigning for dermed å kunne oppnå 100% effektuttak på hovedmotorene.

Maksimum bollard pull.
Skipet er utrustet med et fremdriftsmaskineri som totalt utvikler ca.11.600 kW ved 750 omdr./min. og har et bollard pull sertifikat pålydende 180 tonn oppnådd under gunstige forhold ved denne ytelsen, og uten at noen av trøsterne skal være i bruk og at rorene skulle beveges minst mulig.
Testen som er utført er en standard test i henhold til DNV's regelverk.

Testen som er utført er en ren slepekondisjon der hovedvinsjen er minimalt elektrisk belastet da bremsen på vinsjen er satt på. Skipets akselgenerator er ikke i bruk, slik at all kraften fra

hovedmaskinene går rett til hovedpropellene. De to dieselgeneratorene (hjelpemotorene) forsyner da hele skipets elektriske nett i tillegg til at de forsyner den nedsenkbare kompass trøsteren. Denne kompass trøsteren spiller her en viktig rolle som ekstra skyvkraft når den rettes bakover, samt at den benyttes for å holde skipet i ønsket retning.
Man ønsker ikke å benytte skipets ror i denne kondisjonen, da rorflatene vil bidra til å redusere skipets maksimale bollard pull/ slepekraft.

Den elektriske hovedtavlen i maskinrommet er inndelt i 4 separate felt og som kan samlmenkobles ved at alle skillebrytere mellom feltene lukkes. Når alle skillebrytere er lukket forsyner "Auxiliary Gen. Set No.1" og "Auxiliary Gen.set No.2" (dieselgenerator nr. 1 & 2) sammen , hele skipets elektriske nett. Det vil si alle forbrukerne som er tilkoblet "Heavy Consumer Bus bar 1", "Main bus bar 2" og "Heavy Consumer bus bar 2".

Dieselgeneratorene forsyner kompass trøster samt all generell elektrisk strøm til skipets forbruk.
Ved denne løsningen anvender man all tilgjengelig kraft fra hovedmaskinene til bruk på hovedpropellene.

Med andre ord: Har man stille pent vær og ikke bruker rorene unødig, og ikke bruker trøsterne, kan man oppnå en trekkraft / bollard pull på ca. 180 tonn. Ved å benytte seg av kompasstrøsteren i tillegg kan man oppnå maksimalt 194 tonn gitt de samme forholdene.

<u>Ankerhåndtering.</u>
Vitnet maskinist Reite indikerte under høringen i Oslo den 7.august 2007 at man kun hadde en trekkraft på ca. 60 % til rådighet når alle trøsterne var inne på full belastning. Det vil si at den kraft man hadde til disposisjon til trekkraft / fremdrift vil være i størrelses orden 6.960 kW.
Vitnet 1.styrmann Geir Syversen har i sine forklaringer tilkjennegitt at man kjørte med "full trøsterkapasitet" i forsøk på å holde skipet på kurs og at vinsjene ble benyttet.

Vitnet maskinist Reite sa underhøringen at man under ankerhåndtering alltid kjørte hovedmaskineriet i AUTR-Max modus.

I denne mode åpnes skillebryterne og deler hovedtavlen inn i fire (4) separate tavle felt, nemlig:

- Akselgenerator på babord side forsyner "Heavy consumer bus bar 1"
- "Auxiliary generatorset No.1" forsyner "Main bus bar 1"
- "Auxiliary generatorset No.2" forsyner "Main bus bar 2"
- Akselgenerator på styrbord side forsyner "Heavy consumer bus bar 2"

Dette betyr at dieselgeneratorene forsyner skipets generelle forbrukere, som innredning, radio og navigasjon, kjøling og smøring etc. Skipets generelle forbruk er da kjørt på to tavle felt

("Main bus bar 1 & 2) og som er helt separert fra de store forbrukerne som trøstere og elektromotorer for hovedvinsjer.

I "AUTR-Max modus forsynes sidetrøsterne, kompasstrøster og hovedvinsjen med strøm i fra akselgeneratorene. Skipets generelle kraftbehov til forbruk blir levert av dieselgeneratorene.
I denne moden vil tung bruk av trøsterne og hovedvinsjen redusere tilgjengelig kraft til hovedpropellene.

De store forbrukerne som trøstere og elektromotorer for hovedvinsjene er likt fordelt mellom styrbord og babord akselgenerator.
I en slik kondisjon med tung manøvrering og tung trøsterbruk, har skipets generelle forbrukere etter alt å dømme rikelig med krafttilgang fra dieselgeneratorene. Samtidig vil trøsterne og hovedvinsjen ta elektrisk kraft fra akselgeneratorene. Det vil si at kraften som blir produsert av skipets hovedmotorer, blir fordelt mellom hovedpropellere, trøstere og hovedvinsj.

I en kondisjon, der alle trøsterne går med full belastning og hovedvinsjen går med full belastning forbrukes nesten alt av akselgeneratorens ytelse.

I en slik situasjon gjelder følgende regnestykke:

Babord og styrbord side:

Dieselmotorer (4X3.000 kw)		12.000 kw (nominell)
Trøstere + hovedvinsj babord og styrbord	-	4.600 kw
Resteffekt til hovedfremdrift babord og styrbord	=	7.400 kw

I denne kondisjonen gjenstår altså 62% av maksimal ytelse til propellanlegget for å produsere skyvekraft.

Maksimal teoretisk tilgjengelig skyvekraft fra hovedpropellene vil i denne kondisjonen dermed bli 125 tonn, forutsatt at man ikke benytter ror for å korrigere eller endre skipets retning, i henhold til opplysninger gitt av Ulstein.

Ser man på kalibreringsdata for last-seller om bord i "Bourbon Dolphin" og på land tatt under "Bollard Pull" testen (i dokumenter vi har mottatt i fra DNV) så tilsvarer 60% belastning noe i underkant av 140 tonn trekkraft. Grunnen til avvik mellom 125 tonn og 140 tonn trekkraft kan muligens skyldes forskjell i turtall på hovedmotorene /propellen under de forskjellige prøvene.

Det sier seg selv at denne reduksjon i trekkraft (ned til 125 tonn) er uheldig når man skal benytte skipet som ankerhåndteringsfartøy. Som ankerhåndteringsfartøy bør man ha til disposisjon den trekkraft som er pålydende i Bollard Pull sertifikatet.

Fra presentasjonene til Chevron m.fl. som er fremlagt for kommisjonen og vitnet Towing Master Ross Watson's forklaring for kommisjonen er det nevnt at maksimale bollard pull var forventet å være 160 – 162 tonn. Dette er statiske krefter. Hele ankerhåndteringen er imidlertid dynamisk som følge av bl.a. vær- og sjøforholdene.

Et ankerhåndteringsfartøy som skal gå fra A til B må nødvendigvis ha krefter til fremdrift for å kunne trekke med seg kjettingen ut. Det er de samme kreftene som skal disponeres til både trekkraft / bollard pull og fremdrift, nemlig de krefter man maksimalt (11.600 kw) kan få ut av hovedmotorene og overført til hovedpropellene for å oppnå en trekkraft på 180 tonn.
Slik maskinsystemet er bygget opp vil denne trekkraften vanskelig kunne la seg realisere under ugunstige forhold når det er behov for sidetrøstere og kompasstrøster til styring av skipet eller for å holde det på kurs under slep med kraftig bruk av rorene.

At "Bourbon Dolphin" i den første fasen av slepet den 12. april 2007 ikke hadde problemer med å legge ut ankerkjetting / wire kan sannsynligvis skyldes en kort lengde på slepet. Etter hvert som slepet ble lengre og tyngre samt at værforholdene ble dårligere vil økt kraftbehov melde seg til trekk av kjettingen samtidig som man må korrigere for avdrift / kurs ved hjelp av trøstere og ror.

Den avdrift som er rapportert indikerer at "Bourbon Dolphin" har hadde store problemer med å holde kursen under de rådende forholdene.

Kompass trøsteren vil kunne bidra noe til trekkraft / fremdrift, men er hovedsakelig benyttet i forsøk på å holde skipet på kurs som en del av styringen av fartøyet.

Generatorer må sikres mot overbelastning. Dette gjøres ved at propellblad stigningen på trøsterne reduseres via kraftadministrasjons systemet (PMS). En reduksjon av stigning på propell bladene vil resultere i redusert skyve kraft fra den / eller de trøstere det gjelder.

Blir akselgeneratorene overbelastet vil en begrenset black-out om bord kunne skje. All den tid det er to separate elektriske systemer vil kun det system som er tilknyttet den aktuelle generatoren falle ut.

<u>Nesten ulykken</u>
Det er fra vitner og gjennom forklaringer av samme nevnt at "Bourbon Dolphin" det den 12. april 2007 ved ca. 16.26 tiden (Chevron m.fl. felles presentasjon) (kl. 15.10 i.h.t. Syversen) skal ha kommet svært nær "Highland Valour". Den faktiske avstanden mellom fartøyene var ifølge vitner 1 meter.

Fra vitnet 1.styrman Syversen er det forklart at hendelsen resulterte i at overstyrmann Bjarte Grimstad på "Bourbon Dolphin" ga full gass forover. Siden motorene går på fast turtall så må det ha vært propellstigningen som har blitt økt.
En slik manøver vil kunne resultere i at hovedmotorene får fullt pådrag av brennstoff.
Turboladeren består av en turbin del og en kompressor del og turbinen drives av avgassene som via kompressoren gir luft til motorene. En kort stund vil turbolader ikke ha tilstrekkelig turtall og følgelig redusert luft tilgang til motoren til at god forbrenning oppnås. Dette vil visuelt sett kunne registreres som noe mørkere avgass fra skipets skorstener enn vanlig.

<u>Maskin problem.</u>
Vitnet Syversen har videre forklart at ca. kl. 15.45 så ringte 1.maskinisten i fra maskinrommet og ba om at trøster kapasiteten ble redusert. Dette var nødvendig på grunn av overoppheting.

Overstyrmann som kjørte alle trøsterne på full belastning for å holde skipet opp mot vind og strøm, medelte at det ikke var mulig å redusere trøsterkapasiteten. Dette fordi at skipet hadde driftet forlangt vekk fra ankerposisjonen. Et eventuelt bortfall av sidetrøster ville ha gitt mer kraft til trekk / fremdrift, men redusert styreevne om det er behov for trøsterne.

Det er fra vitnet Kim Henrik Moldskred Brandal (i avhør av Grampian Police, side 5) nevnt at det var problemer med høy temperatur på kompasstrøsteren forut som følge av høye belastning på trøsteren (man hadde kjørt trøsteren på 900 - 1000 kw over lengre tid mot det normale 880 kw). Det er ikke eksakt kjent hvor den høye temperaturen er registrert. Vitnet 1.maskinist Morten Reite trodde at det kunne ha vært et lager. Baug trøster rommet er kjølt av et separate kjøleaggregat med kompressor og vifte og selve elektromotoren er ferskvannkjølt i fra sentral kjøleanlegget om bord i.h.t. vitnet.

Det er teknisk mulig å overstyre driftsparametere og forandre settpunkt og styringer av overvåkningssystemene om bord. Dette kan gjøres fra maskinkontroll rommet og en del av denne prosessen er passord styrt.
Det er imidlertid ikke uvanlig å justere / tilpasse sett punkt og tidsforsinkelser i en viss grad av rimelighet når situasjonen krever det, og så lenge man visuelt følger med på hva som skjer. Dette er mulig å overvåke i fra maskinkontroll rommet.
Vi har imidlertid ikke grunnlag for å kunne hevde at man har overstyrt alarmgrenser etc., men vil kun påpeke at det er fullt ut mulig for å komme ut av en beklemt situasjon.

Den black-out som fant sted kort tid før skipet kantret skyldes sannsynligvis at giret på styrbord side har mistet smøreolje trykket som følge av den store krengingen skipet fikk. Dette skal utløse auto-stopp av begge hovedmotorene. Når begge hovedmotorene stopper vil også propellen sammen med akselgeneratoren slutte å roter og det utstyr som omfatters av strøm tilførsel fra styrbord akselgenerator vil falle ut. Skulle kun en av hovedmotorene ha stoppet ville propellen fortsatt ha rotert. Vitnet 1.styrman Geir Syversen har forklart at før skipet kantret registrerte han at styrbord propellaksel sto stille.

Basert på de dokumenter og vitne utsagn som foreligger er det mye som tyder på at en av de bakenforliggende årsakene til problemene man fikk underveis om bord i "Bourbon Dolphin" må sees på i lys av den maskintekniske løsningen med påhengt akselgenerator som drives av fremdriftsmaskineriet. Denne type driftsløsning er ikke uvanlig i næringen for å optimalisere driften med tanke på økonomi. Det må likevel stilles spørsmål om denne type løsning er egnet for et ankerhåndterings fartøy, da værforholdene raskt setter store begrensninger på fartøyet.

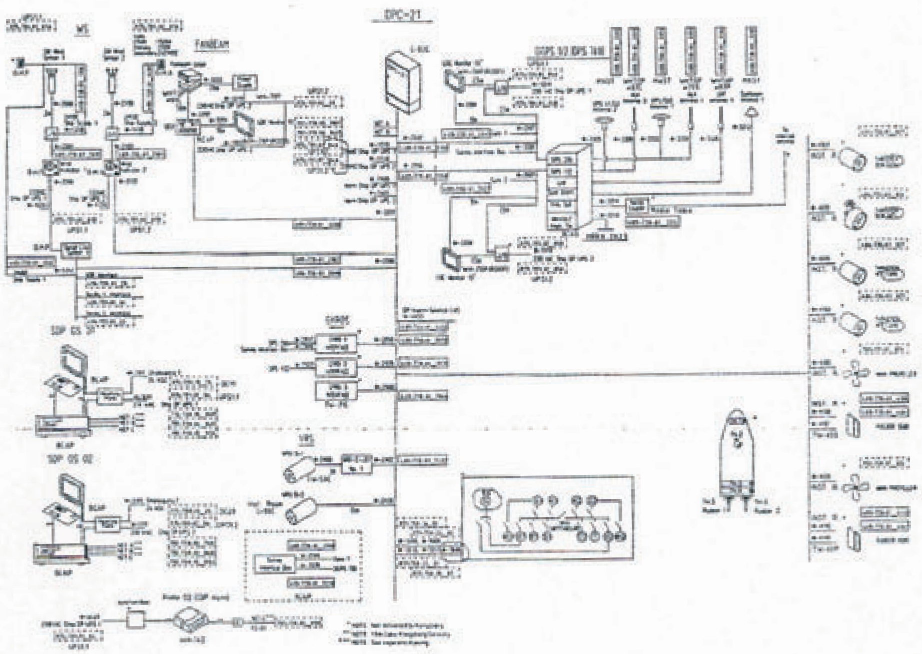
Den maskintekniske løsningen alene kan etter vår oppfatning ikke ha forårsaket at skipet kantret.

Vedlegg nr. 1.

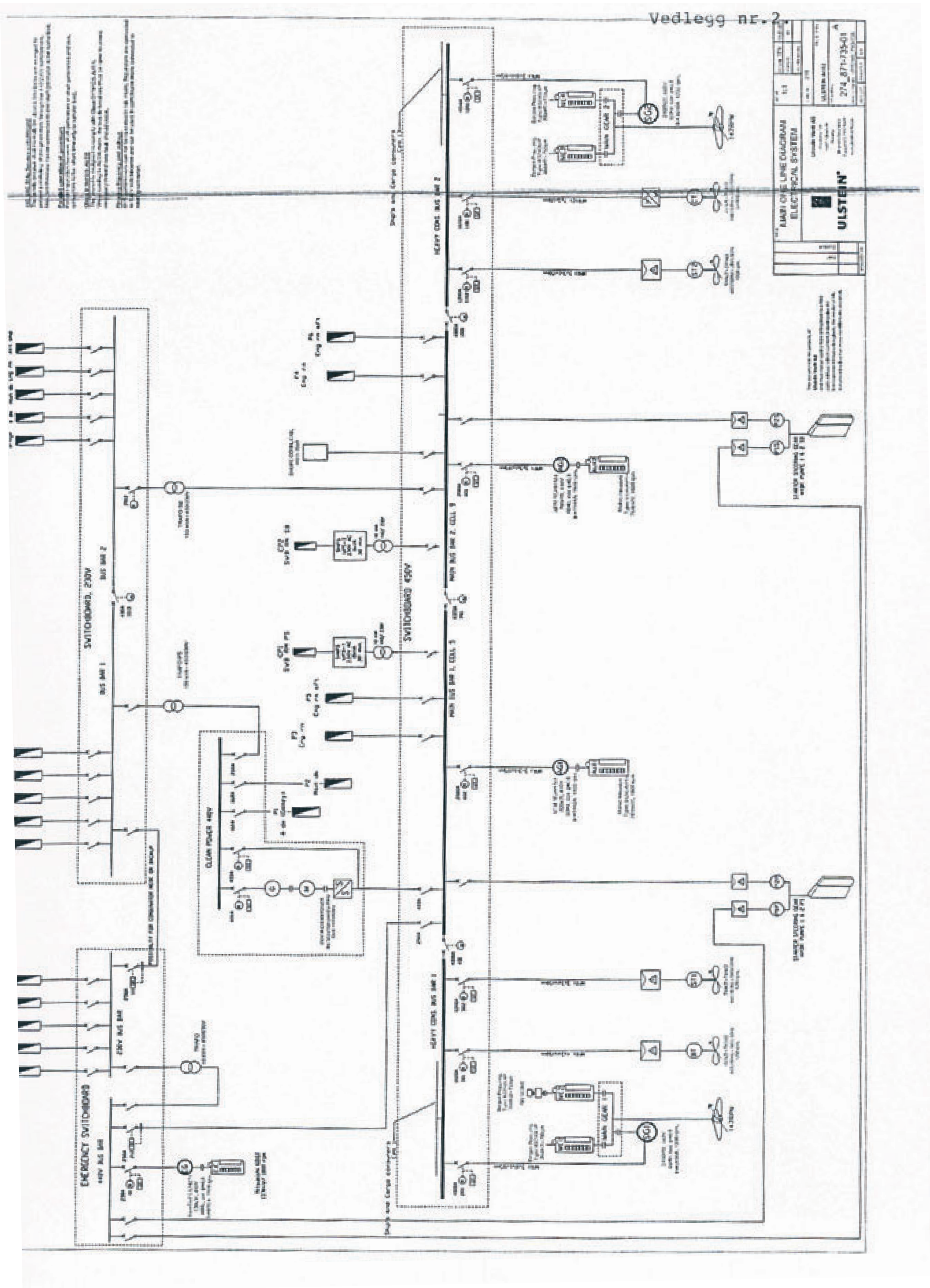
12.2.6 UPS Power supply

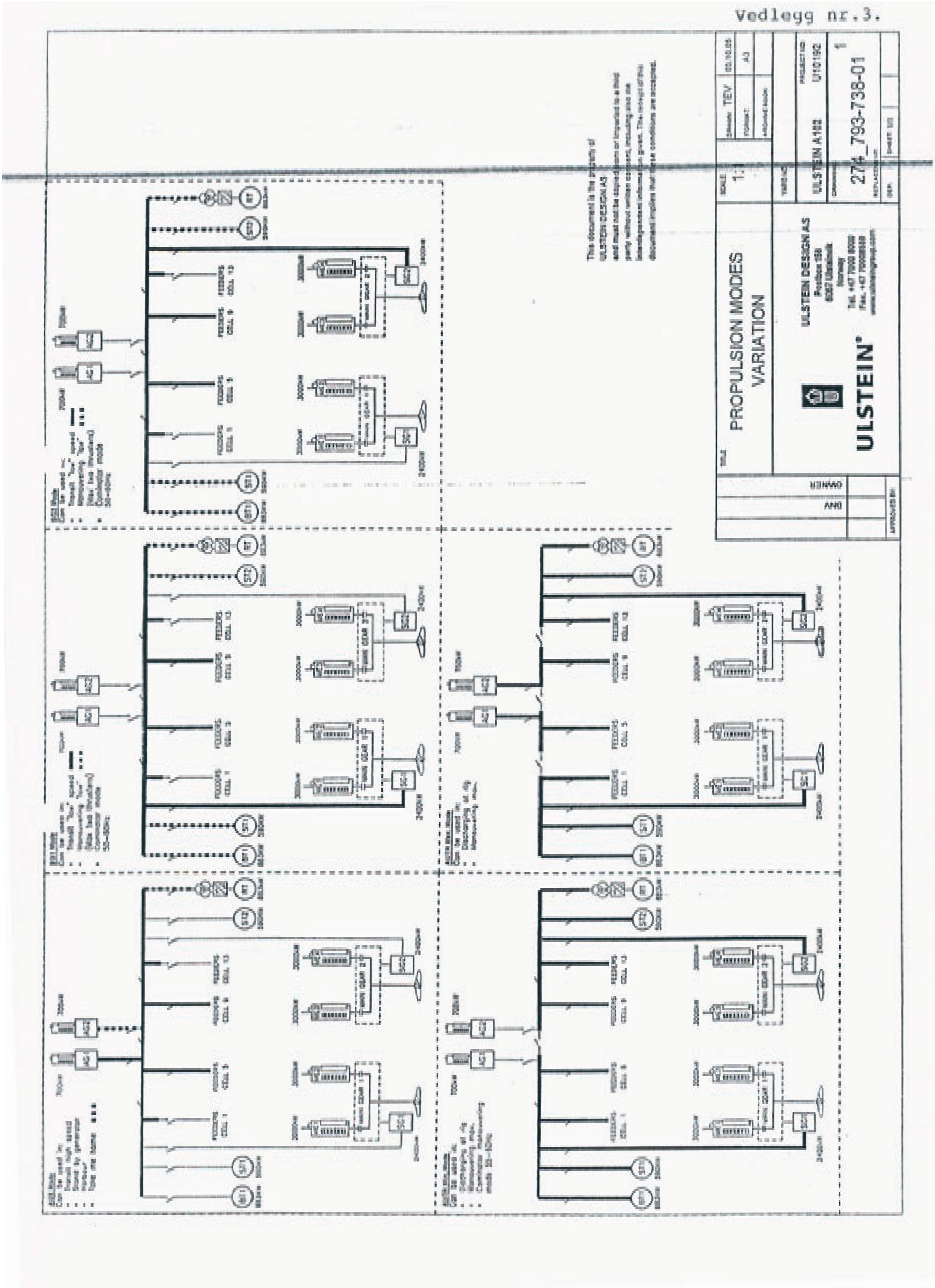
Powered from Ship's 230VAC UPS-1.1 PS:	Powered from Ship's 230VAC UPS-1.2 SB:
• Redundant controller unit (DPC-422)	• Redundant controller unit (DPC-422)
• DGPS monitor no. 1	• DGPS monitor no. 2
• SDP operator station no. 1	• SDP operator station no. 2
• Wind indicator/ sensor no. 1	• Wind indicator/ sensor no. 2
• Alarm printer	• FANBEAM laser with display
	• Hipap 450

<u>Single line diagram of the DP system.</u>



12.2.7 In the analyses made for the ship, it will consider the DP-plant for a "no-failure-source" in the sense of the vendors own FMEA also will have to be taken into count for a final conclusion. This means that power circuits from the ships electrical power supply will not be analysed in particular, it will be handed over to vendors <u>(Kongsberg Simrad) own FMEA for yard no. 274.</u>


Vedlegg nr.2.


Vedlegg nr.3.
PROPULSION MODES
VARIATION
ULSTEIN DESIGN AS
ULSTEIN
ULSTEIN A102
U10192
274_793-738-01
TEV

Vedlegg nr.4.

KVALITETSSIKRING / QUALITY ASSURANCE

NIVÅ 3	KS-avd./QA-dep.:	Godkj./Appr.:	Rev. / Rev. : 2
	Kapittel/Chapter: PRODUCTION		Dato/Date : 08.09.06
QA form No.55	Speed test at sea trials		Side / Page : 1 av/of 1

In-process inspection and testing		Test No. 3.9		Section 154
Quay tests				
Sea trials	X			Item
Prepared by Rear Riise	Approved by Owner	Yard no. 274	Class DnV	Authority

Draft
Fore: 5,6 m Aft: 5,2 m Mean: 5,4 m

Date: 19/9-06 Time: 0	Place: Vartdalsfjorden
Wind: 5 Sea state/waves: Less than 1 m	
Deplacement:	
All tests to be executed with aux. engines running - without shaft generator. Fuel type:	

	50 %		85%		100%	
Run	1A	1B	2A	2B	3A	3B
Time	11.05	11.18	11.53	12.05	12.17	12.33
Ship's course	228	53	228	53	228	53
Propeller pitch (%)	75	75	93	93	100	100
Engine load (%)	100	100	85	85	100	100
Propeller r.p.m.	150	150	150	150	150	150
Pump setting M.E. No. 1	46	46	38.5	38	45	45
Pump setting M.E. No. 2	N/A	N/A	38	38,5	45	45
Pump setting M.E. No. 3	N/A	N/A	38	38	45	45
Pump setting M.E. No. 4	45,5	45	38,5	38,5	45	45
Engine load (kw) sb	2498	2490	5000	5000	5938	5900
Engine load (kw) ps	2490	2442	5000	5000	5938	5900
R.p.m. M.E. sb 1 - 2	780	780	780	780	780	780
R.p.m. M.E. ps 3 – 4	780	780	780	780	780	780
Measured time, watch Class	4.09	4.05	3.37	3.33	3.23	3.23
Measured time, watch Owners	4.07	4.05	3.37	3.33	3.23	3.23
Measured time, watch UVE	4.07	4.05	3.37	3.33	3.23	3.23
Measured average time	4.07	4.05	3.37	3.33	3.23	3.23
Speed	14.57	14.69	16.39	16.90	17.73	17.73
	14.63		16.75		17.73	
Fuel consump. l/h	1339	1335	2232	2230	2673	2670

	Date	Yard	Owner	Class	Authority	Supplier
Attended by		X	X	X		
Tested						
Approved	19/9-06	[illegible]	[illegible]	[illegible]		

o:\qaforms\qa55.doc

ULSTEIN VERFT AS

Vedlegg nr.5.

KVALITETSSIKRING / QUALITY ASSURANCE

KS-avd./QA-dep.: Godkj./Appr. Rev. / Rev. :
Kapittel/Chapter: Dato/Date :
Side / Page :

TEST REPORT

Yard No. 274 – M/V "Bourbon Dolphin"

TEST NO. NAME
3.10 **MÅLING AV SLEPEKRAFT / BOLLARD PULL PRØVER**

H: STATISK OG DYNAMISK SLEPEKRAFT MED 4 MOTORER + VROS VED FULL YTELSE. FULLT TURTALL.

Prosedyre for proving: Stigning okes slik at slepekraft på ca. 100 tonn blir oppnådd. Skipets kurs stabiliseres inntil wire viser rett akterover. Etter signal fra proveleder økes stigningen til full ytelse på alle 4 fremdriftsmotorene i løpet av ca. 30 sekunder. Denne ytelsen holdes i ca. 10 min. Sidepropellere benyttes ikke under prøven. Ror benyttes så lite som mulig.

Hovedpumper for slepevinsj slås av under proven (bremser påsettes).

Avstand til land: 659 m (Slepewire)
200 m (Forløper) TOTALT: 859 m
Brennstoff:

Prøve nr.	Propeller-stigning Gjennom-snitt BB	SB	Pumpefylling HM 1	HM 2	HM 3	HM 4	VROS	Samlet ytelse h.motorer (kW) + VROS	Kon-tinuerlig slepekraft (Tonn)	Maksimum Slepekraft (Tonn)
H1			47	47	46	45	-	11600	180	
H2	89%	89%	47	47	47	47	880	12480	194	

H1 = 100% på motorene
H2 = 100% på motorene + VROS (7gr vridning)

Dato:

DnV Rederi Ulstein Verft AS

Page

ULSTEIN VERFT AS

Vedlegg nr. 6

KVALITETSSIKRING / QUALITY ASSURANCE

KS avd./QA-dep.: | Godkj./Appr.: | Rev. / Rev. :
Kapittel/Chapter: | Dato/Date :
Side / Page :

TEST REPORT

Yard No. 274 – M/V "Bourbon Dolphin"

TEST NO.	NAME
3.10	MÅLING AV SLEPEKRAFT / BOLLARD PULL PRØVER

Proven ledes fra skipet.

G: STATISK SLEPEKRAFT VED FORSKJELLIGE MOTORYTELSER (4 motorer)

Propellerstigningen okes i trinn fra 30% stigning til full ytelse ved 750 RPM med 4 motorer. Hver prove varer i ca. 5 minutter. VROS er innkoblet på hjelpemotorene, ingen thrustere på akselgenratorene.

Folgende avlesninger utfores og noteres for hver test:

- Pumpefylling for alle motorer.
- Propellerstigning for begge propellere.

Under proven kontrolleres strekkmåleinstrumentet på bro mot lastcelle.
Ved storre belastninger var det tilfredsstillende overensstemmelse mellom broinstrument og lastcelle.

Prove nr.	Stigning hoved-propellere	Pumpefylling (gjennomsnitt)				Samlet ytelse hovedmotorer (kw)	Slepekraft avlest (Tonn)	Propeller-Turtall
		HM 1	HM 2	HM 3	HM 4			
G 1	20%	18	17	15	15	2320		148
G 2	40%	23	24	23	24	4640		148
G 3	50%							
G 4	60%	33	33	32	31	6960		148
G 5	70%							
G 6	80%					9280	170	148
G 7	100%	47	47	46	45	11600	180	148

Page

ULSTEIN VERFT AS

Vedlegg nr.7.

Test No. 1 – Calibration of tension reading instrument against loadcell ashore (3 motor cells connected)

	20%	40%	60%	80%	100%	100% H/VROS							
Test No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10.**	**11**	**12**	**13**
Tension measured on load cell ashore	49	98	133	165	183	193							
Tension measured on instrument at bridge (static load sensor)	55	105	139	167	184	193							
Tension measured on instrument at bridge (dynamic load sensor-pressure transducers)			95 STOP 136 HIV	105 STOP 162 HIV									
Verify that wirelength reading is correct.	ok	ok	ok	ok	ok	ok							

NOTE ! Disengage coupling during towing with brake on.

e:\sk13\testproc.doc