Report on the investigation of

the collision between

Pride of Portsmouth

and

HMS St Albans

Portsmouth Harbour

27 October 2002

Marine Accident Investigation Branch
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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 1999 is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

NOTE

This report is not written with liability in mind and is not intended to be used in court for the purpose of litigation. It endeavours to identify and analyse the relevant safety issues pertaining to the specific accident, and to make recommendations aimed at preventing similar accidents in the future.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ARPA	-	Automatic Radar Plotting Aid
CCTV	-	Closed circuit television
CHA	-	Competent Harbour Authority
ETA	-	Estimated time of arrival
gt	-	Gross tons
kW	-	kiloWatts (unit of power)
m	-	metres (unit of length)
OSB	-	Outer Spit Buoy
PEC	-	Pilotage Exemption Certificate
QHM	-	Queen’s Harbour Master
RAI	-	Rudder Angle Indicator
SHA	-	Statutory Harbour Authority
UTC	-	Universal Co-ordinated Time
VDR	-	Voyage Data Recorder
VER	-	Voyage Event Recorder
VHF	-	Very High Frequency (Radio)

SYNOPSIS

Severe weather had affected the south coast of England for two days when, early in the morning of 27 October 2002, the ro-ro passenger ferry *Pride of Portsmouth* entered Portsmouth Harbour after a routine crossing from Le Havre. The vessel had experienced very strong gusts of wind at the eastern entrance to the Solent but the wind was generally 35 to 40 knots from the west-south-west. Two gusts of 70 knots had also been experienced within the harbour, but the master was unaware of this.

Pride of Portsmouth had experienced difficulty in maintaining her heading in the harbour entrance channel. The master had used full bow thrust and hard-to-starboard helm in the strong beam wind and full ebb tide. Soon after clearing the harbour entrance, one of the vessel's two bow thrusters tripped out and could not be brought back into operation immediately.

The vessel continued through the harbour, making a speed of about 8 knots over the ground. Two harbour tugs stood by *Pride of Portsmouth* as she began the turn into Fountain Lake. The master was conning the vessel from the central console, and the chief officer was monitoring progress from the starboard side of the bridge. A helmsman was steering.

As *Pride of Portsmouth* was passing close to warships on her starboard side, an inappropriate helm order was given which was not noticed by the other members of the bridge team. The subsequent undesired turn to starboard was accelerated by the effect of the strong wind coming to bear on the starboard quarter and the possible effects of the bow getting into a lee created by a very large warship. *Pride of Portsmouth* turned into the side of a moored warship, *HMS St Albans*, before corrective action became effective.

HMS St Albans, a new Type 23 frigate, was substantially damaged in the collision, although *Pride of Portsmouth* suffered only minor damage.

Recommendations arising from the investigation are aimed at improving the bridge resource management on ro-ro passenger ferries, and particularly the communication on large vessels' bridges. Recommendations are also addressed to QHM Portsmouth on the berthing of warships and the passing of information to vessels.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *PRIDE OF PORTSMOUTH* AND ACCIDENT

Vessel details

Registered owner	:	Shelf Shipping Limited
Operator	:	P&O European Ferries (Portsmouth) Limited
Port of registry	:	Portsmouth
Flag	:	UK
Type	:	Passenger ro-ro ferry
Built	:	1989, Bremerhaven (previous name *Olau Britannia*)
Construction	:	Steel
Length overall	:	161m
Gross tonnage	:	33,336gt
Passenger Capacity	:	Up to 1600 passengers and 546 cars
Engine power and/or type	:	19,600kW
Service speed	:	21.3 knots
Other relevant info	:	Twin bow thrusters each of 21.6 tonnes bollard pull, twin propellers

Accident details

Description	:	Ferry made contact with berthed warship, *HMS St Albans*
Time and date	:	0535 UTC, 27 October 2002
Location of incident	:	Fountain Lake Jetty 1 Berth, Portsmouth Harbour 50° 48.62N 001° 06.14W
Persons on board ferry	:	971
Injuries/fatalities	:	None
Weather Conditions	:	Wind WSW'ly strong gale force gusting to 50 knots +
Damage	:	Superficial damage to starboard bow

Photograph courtesy of P&O European Ferries Photograph 1

Pride of Portsmouth

1.2 PARTICULARS OF *HMS ST ALBANS* AND ACCIDENT

Vessel details

Type	:	Type 23 Duke Class Frigate
Built	:	2000, Glasgow
Length overall	:	133m
Beam	:	16.1m
Gross tonnage	:	3,500

Accident details

Damage	:	Severe damage to port side superstructure and, on the starboard side, substantial impact damage with the quay fendering.

1.3 BACKGROUND

Pride of Portsmouth **(see photograph 1)** and her sister vessel *Pride of Le Havre* are operated by P&O European Ferries (Portsmouth) Ltd and run a scheduled ro-ro passenger/car and freight vehicle service between Portsmouth and Le Havre. P&O European Ferries (Portsmouth) Ltd also operates scheduled passenger ferry services between Portsmouth and Cherbourg, and Portsmouth and Bilbao. Other ferry services also use the port of Portsmouth, which has about 10,000 ferry movements each year. The commercial continental ferry port is sited at the north-easterly part of Portsmouth Harbour in an area known as Fountain Lake.

A major Royal Naval base is sited mainly at the eastern side of the harbour. Warships are berthed, sometimes two and three abreast, along the length of the harbour adjacent to the fairway used by the commercial traffic. The commercial ferry port lies within the Dockyard port of Portsmouth, created under the Dockyard Port Regulation Act 1865 for the protection of Naval Vessels.

Shipping movements within the harbour are monitored and controlled by the Queen's Harbour Master (QHM), who is the Statutory Harbour Authority (SHA). A control station is situated at Semaphore Tower, within the naval base, which is manned 24 hours a day. Traffic is monitored by the use of the VHF radio, radar and CCTV. All vessels intending to enter or leave the harbour must report at various points to QHM on VHF Ch 11 and, thereafter, maintain a listening watch on this channel.

The traffic is controlled with rules made under the Dockyard Port Order 1978 and short notice changes are issued by General Direction or Local Notice to Mariners as appropriate.

Commercial shipping within the port is also controlled by the Competent Harbour Authority (CHA) which is represented by a commercial harbour master. The CHA has responsibility for the commercial berths, it licenses and supplies commercial pilots, and issues pilotage exemption certificates (PEC) where appropriate; it does not monitor traffic in the harbour.

QHM can, and does on occasions, close the harbour to all traffic. An example of a circumstance when this might occur is during major vessel movements within the harbour. The harbour is rarely closed because of severe wind conditions. QHM's staff give reports on the current wind and weather conditions within the harbour to commercial vessels during their approach. The final decision as to whether it is safe to enter is left to the vessel's master who, it is thought, is best placed to understand the capabilities of his vessel in the prevailing conditions. Controls are in place to ensure that large vessels like *Pride of Portsmouth* have the services of a tug when wind speeds are in excess of 30 knots.

Heavy weather conditions had been prevalent in the English Channel for two to three days before the accident. The weather had been forecast to deteriorate further during the night of 26/27 October.

1.4 VOYAGE DATA RECORDER

Pride of Portsmouth was fitted with a Broadgate VER 1000A Voyage Data Recorder (VDR), the data from which has been used extensively in the following narrative and analysis of events.

1.5 NARRATIVE

All times are UTC unless indicated otherwise

Pride of Portsmouth left Le Havre at 2340 (UTC +1) on 26 October 2002, at which time command of the vessel was handed to the relief master. He retained command of the vessel as master until after the vessel had berthed at Portsmouth. Due to the westerly force 8 winds the master decided to use what is known as the "bad weather route". Accordingly, he directed the second officer to proceed to the west and, from there, to make a northerly course to the Nab Tower which marks the eastern approach to the Solent. Having established that the second officer was content, the master went to bed soon after 0000 (UTC +1).

At 0200 the ship's clocks were turned back 1 hour on to UTC.

At 0410 (about 30 minutes before Nab Tower) **(see chart extract 1)**, the second officer called QHM and reported the vessel's draught, ETA and the master's PEC number. QHM informed the vessel that the wind in the harbour was 28 knots gusting 38 to 40 and that two tugs were available if required.

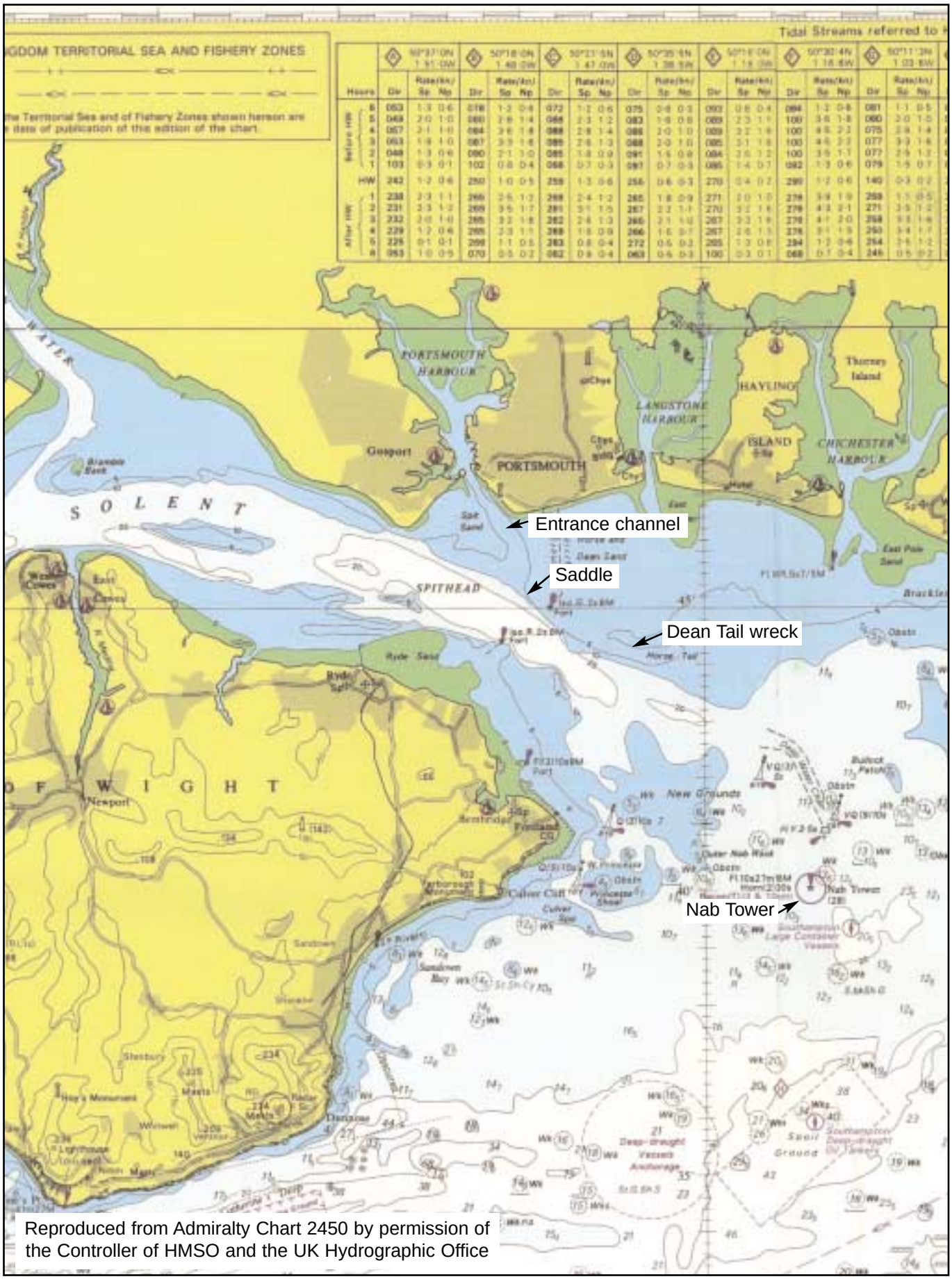
The master got up at 0415 and went to the bridge. The crossing had been quite comfortable.

Pride of Portsmouth passed Nab Tower at 0440.

The master spoke to QHM at 0500 and was informed that the wind in the harbour was 30 to 40 knots gusting 45 and, occasionally, 50 knots. He, in turn, informed QHM that he had just experienced gusts of 60 to 70 knots. The master formally requested the provision of two tugs on arrival.

QHM called *Pride of Portsmouth* at 0507 and informed the vessel that two gusts of 70 knots had been experienced in the harbour. The second officer received this call but did not ensure that the information had been heard by the master.

At 0509, as *Pride of Portsmouth* was approaching the Saddle **(see chart extract 2)**, QHM was called to ask for permission to enter the harbour approach channel. Permission was granted and the vessel was told that the wind in the harbour was still 35 to 40 knots, occasionally gusting 50 from the west-south-west.



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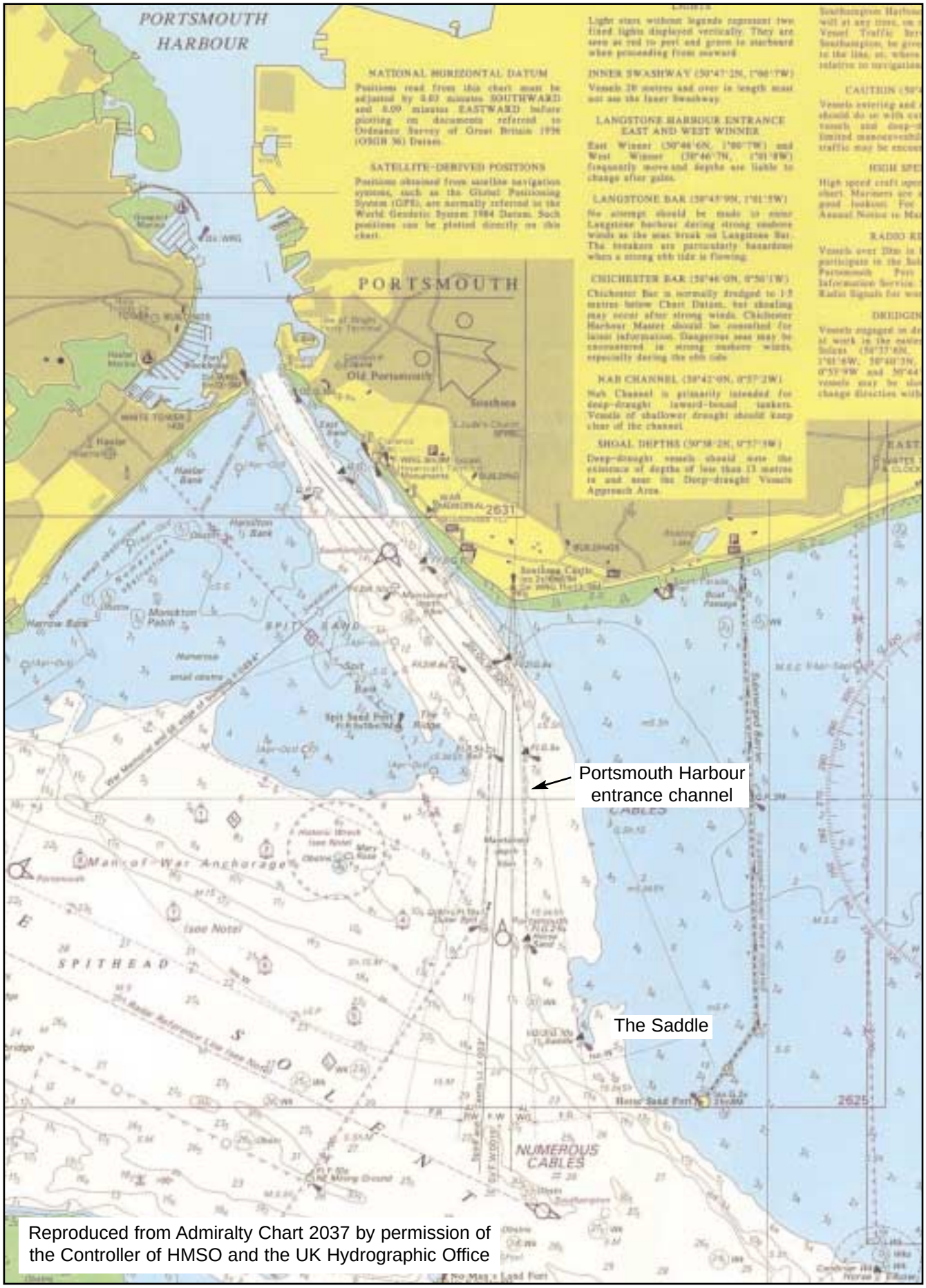

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Between 0510 and 0515, discussions took place between the master and the chief officer concerning the best way to utilise the tugs. The master had, initially, held the view that he would make both tugs fast, however, during these discussions, he changed his opinion and decided not to make them fast but to have them standing by to push as required. The chief officer called the tugs at 0517 and informed them that one should stand-by on the port quarter as they approached North Corner, and the other should meet them at Fountain Lake and stand-by on the starboard shoulder **(see harbour plan)**.

The vessel experienced some difficulty in keeping position in the approach channel. The master, chief officer, second officer and a helmsman were on the bridge. The master had the con and the vessel's speed was reduced from about 12.5 knots over the ground to about 9 knots. At times the master had to use hard to starboard rudder as well as both bow thrusters to maintain the required heading in the very strong cross-wind and maximum ebb tide.

The vessel was entering Portsmouth Harbour at 0524 when one of the bow thrusters tripped out. The engineer on watch was asked to reset it, but he replied that an electrician was needed and that it might be some time before it could be brought back on line.

At about 0525, the chief officer and the master reconsidered whether the forward tug should be made fast. The master reaffirmed his decision not to do so. One tug was already standing by off the port quarter at that time.

Soon afterwards, the second officer left the bridge and went to his forward station in preparation for arrival. The chief officer remained on the bridge to handle communications, to monitor the master's actions and to assist as required. The master was conning the vessel from the central conning position using verbal helm orders and altering the engine and bow thrust controls himself as necessary.

The vessel began to turn to starboard to round North Corner at about 0530, making about 8.5 knots over the ground **(see harbour plan).** The chief officer took up a position forward of the manoeuvring console at the starboard wing of the bridge at about that time. He reported that the vessel was "*looking good*" and about 120' (37 metres) clear [of North Corner] just before 0532.

The master, who remained at the central console, continued the vessel's gradual swing to starboard as they approached Fountain Lake Corner. The assault ship *HMS Ocean* was berthed alongside North West Wall with her bows to the north-east. The frigate *HMS St Albans* was berthed at Fountain Lake Jetty 1 with her bows to the east **(see harbour plan)**. The second tug took up station off *Pride of Portsmouth*'s starboard bow at this time.

Reproduced from Admiralty Chart 2631 by permission of the Controller of HMSO and the UK Hydrographic Office

Harbour plan

At 0534, when *Pride of Portsmouth*'s bow was about due west of Fountain Lake Corner, the master ordered hard to starboard to increase the rate of turn. The vessel was making about 8 knots over the ground against an ebb tide of less than half a knot and the wind was almost directly astern. The helm was returned to amidships 10 seconds later. The single bow thruster was operational at this time probably thrusting the bow to port. A further 10 seconds later, the chief officer reported that they were "*moving quite close to the stern of the frigate*".

At 0534:30, when the vessel's heading was 083° and turning to starboard at a rate of about 44° a minute, the master ordered starboard 20° on the helm. The wind by then was on the vessel's starboard quarter. Almost immediately, the chief officer advised "*bring the bow round*" and then "*get the bow to the left*, *get it left"*. The master tried going ahead on the starboard propeller, and astern on the port one, to twist the vessel. The single bow thruster was still on and thrusting full to port.

At 0535, the rate of turn to starboard had increased to over 70° per minute, and the vessel had slowed slightly to 5.8 knots over the ground, when the master replied "*I can't do anything*". By then he had set both engine/propeller combinator controls full astern as a collision was inevitable and imminent.

Pride of Portsmouth made contact with *HMS St Albans* at 0535:15 at which time her heading and speed were 130° and 4.4 knots respectively. *HMS St Albans* heeled to starboard on impact, causing the floating fenders to trip. This, in turn, allowed the vessel to come up hard alongside the jetty. *Pride of Portsmouth*'s starboard bow slid up the port side of the frigate before the combination of the force of impact, and the effect of the astern movement of the engines, caused her to move clear and out into Fountain Lake.

The tugs were quickly brought in to stabilise the situation, with one pushing on the port quarter and the other on the starboard bow. At 0546, as the vessel was being manoeuvred alongside her ro-ro berth, the second bow thruster was brought back on line.

Pride of Portsmouth was all fast at her berth by 0550. *Pride of Portsmouth* sustained only minor damage, but substantial damage had been caused to *HMS St Albans*' upper works. No injuries or pollution had occurred.

1.6 ENVIRONMENTAL CONDITIONS

The vessel had been operating in rough seas and winds up to force 9 for two days before the accident. She had just had a comfortable crossing from Le Havre in south-westerly force 8 winds. At 0500, on 27 October 2002, QHM reported winds within the harbour of about 30 to 40 knots with gusts of up to 50 knots. Very strong gusts were experienced across the vessel as she approached the Dean Tail wreck position. Two gusts of 70 knots were experienced within the harbour at about 0507. At 0509, when permission to enter the harbour was granted, the wind in the harbour was reported to be west-south-westerly and still 35 to 40 knots with gusts up to 50 knots.

QHM's staff gained wind information either from an anemometer sited on the top of Semaphore Tower, or from a remote anemometer sited on No 98 pile at the northern edge of the turning basin off North Corner. This latter gauge was considered to give a better indication of the wind strength and direction in the vicinity of the commercial ferry berths, but it had not been operational for 2 days before the accident. This fact was known to those in charge on the bridge of *Pride of Portsmouth*. The anemometer on Semaphore Tower had remote indicators within the port control room which could be seen by the operators from their control positions, but the information was not automatically recorded. While there was an instantaneous display of wind speed and direction it was not recorded on *Pride of Portsmouth*'s VDR. Neither *HMS St Albans*, nor any of the other vessels berthed near her, had a continuous record of wind information that morning. For this reason, the exact wind speed and direction at the time of the accident are not known. The wind speed noted in the logbook of the Commercial Port Harbour Control Office shows the wind at 0525 as W'ly 30 - 40 knots gusting to 45 - 50 knots and at 0545, W'ly 40 - 50 knots gusting 60 knots.

High water Portsmouth had been at 0221. At the time of the accident there was an ebb tidal stream in the vicinity of the vessel of less than ½ knot.

At the time of the accident, it was dark and the visibility was good.

1.7 *PRIDE OF PORTSMOUTH* - DESCRIPTION

Pride of Portsmouth was a modern passenger ro-ro ferry with her bridge sited at the forward end of a high slab-sided superstructure. The superstructure ran for nearly the whole length of the vessel, and offered a large rectangular area of windage, the top being over 20m above water level.

To counteract the effects caused by the large windage area, she was fitted with two bow thrusters each developing 21.6 tonnes bollard pull. She also had twin variable pitch propellers and twin rudders. For extra manoeuvrability the rudders were able to be operated either synchronously or individually.

When moving ahead, *Pride of Portsmouth* turned around a pivot point estimated to have been between 0.25 and 0.33 length from forward.

Her totally enclosed bridge stretched the whole 29m width of the vessel and was sited at the forward end of the superstructure housing. The bridge front was about 30m from the bow. The height of eye on the bridge was 26m. Manoeuvring consoles were sited at each bridge wing and centrally, at a conning position within an area protruding forward from the main bridge front. The helmsman's position was central and some metres back from the forward windows.

The bridge was well equipped with modern navigational aids including DGPS, twin-axis Doppler log and two Racal Decca ARPA radars.

1.8 THE BRIDGE TEAM

The master was aged 39. He had served on various types of ships before obtaining a Master's Certificate of Competency in 1991 and joining P&O Ferries in 1993. He had first obtained a PEC for Portsmouth in 1995. He was first promoted to relief master in 1997. He had served as master on *Pride of Le Havre* and on *Pride of Hampshire* before joining *Pride of Portsmouth* a month before the accident. Since joining the vessel he had completed one single-week tour of duty and, at the time of the accident, was halfway through a two-week tour. The master had undertaken Bridge Resource Management training.

At the time of the accident the master had the con. He was generally navigating the vessel by eye and using the radar to judge the vessel's position within the fairway. He was conducting a well-known and practised plan. For the passage through the harbour, he was controlling the engines and thrusters himself, using control levers sited on the central manoeuvring console. He used readouts from the twin axis Doppler log and a digital gyro compass repeater to assess the leeway to be allowed on each leg of the harbour passage, and was steering the vessel with verbal helm orders which were repeated back to him by the helmsman.

In common with the routines adopted by the other masters of *Pride of Portsmouth* he always moved to one of the bridge wing control stations for the final berthing manoeuvres.

The chief officer was aged 34. He had served on P&O Ferries since 1996 and had obtained a Class 1 (Master's) Certificate of Competency in 1997. He had served as master and relief master on *Pride of Bilbao* and as master on the high-speed ferry *Portsmouth Express* before joining *Pride of Portsmouth*, first as supernumerary for one week for familiarisation training and then, 4 days before the accident, as chief officer. He held a PEC for Portsmouth in respect of both *Pride of Bilbao* and *Portsmouth Express* but, at the time of the accident, was waiting for final approval of his PEC in respect of *Pride of Portsmouth*.

His role within the bridge team was to handle communications with tugs, QHM and mooring stations, to monitor the actions of the master and to assist the master as directed. He had moved around the bridge as necessary earlier in the passage but, as the vessel approached North Corner and Fountain Lake Corner, he took up a position standing forward of the manoeuvring console on the starboard bridge wing. From there, he had a good view forward and aft down the vessel's starboard side. He could not see the panoramic rudder angle indicators (RAI) which are sited above the central conning station but could, by turning and stepping backwards, see the RAI on the starboard manoeuvring console. He could see the positions of the engine combinator controls and the bow thrust indicator on the starboard console by turning around. In this position

he was about 14m from the master and the helmsman, and the master was not in his direct line of sight. He could shout advice to the master and could, if he listened carefully, hear the helm orders given by the master and repeated by the helmsman.

The man at the helm at the time of the accident had taken over the duty from a colleague at 0510. From the steering position he could not judge *Pride of Portsmouth*'s position relative to other vessels or structures. On the morning of the accident, helm orders were given in the form of the required rudder angles as opposed to compass headings. The orders were given loudly and clearly, but were not shouted. On hearing an order, in accordance with good practice, the helmsman routinely repeated the order to the master as he began to carry it out. It is also good practice for the helmsman to confirm when the required helm has been applied, but this was not what happened on *Pride of Portsmouth* on that occasion.

1.9 THE MANOEUVRING CONTROL STATIONS

The central manoeuvring console **(see photograph 2)** was sited against the forward bulkhead, in an area protruding forward from the main bridge. The engine and thruster control panel was sited on the centre line **(see photograph 3)** with an ARPA radar sited adjacent on either side. Rudder controls **(see photograph 4)** were sited to port of one of the radars about 2m from the engine and thruster controls. Bridge chairs were situated behind each of the radars; it is understood that they were rarely used.

Photograph 2

The central manoeuvering console

Photograph 3

The engine and thruster panel

Photograph 4

The steering panel

The central manoeuvring console was used routinely during harbour passages. The master, or other PEC holder with the con, generally stood on the centre line immediately behind the engine and thruster control panel. From that position the officer had a good view forward horizontally and down to the bow. The peripheral vision was limited but, because of the area protruding forward from the main bridge front, it was possible to see around to about 90° on either side horizontally and, say, 40° on either side at the level of the forward mooring deck.

From that central position, the officer with the con could easily see either of the radars, the twin-axis Doppler log and a gyro repeater. The main VHF radio was also within easy reach. The closest RAIs were sited on the deckhead directly above where the officer generally stood and, so, to see these, it was necessary to take a step back and to look up. It was not possible to reach the rudder controls from the central position without moving. The engine and thruster controls were within easy reach. During harbour passages it was customary to use a helmsman to steer from the main steering console which was sited on the centre line a few metres aft of the central manoeuvring console.

When approaching the berth, the officer with the con moved to one of the bridge wing control stations **(see photograph 5)** where he took control of the engines, thrusters and rudders to bring the vessel alongside. All the necessary controls and gauges could be reached or be seen from one standing position. Windows were arranged so that from a position behind the console the officer had a good view fore and aft, down the side of the vessel.

Photograph 5

A bridge wing control console

1.10 DETAILED TRACK OF THE VESSEL

See **Diagram 1** showing information gained from the VDR.

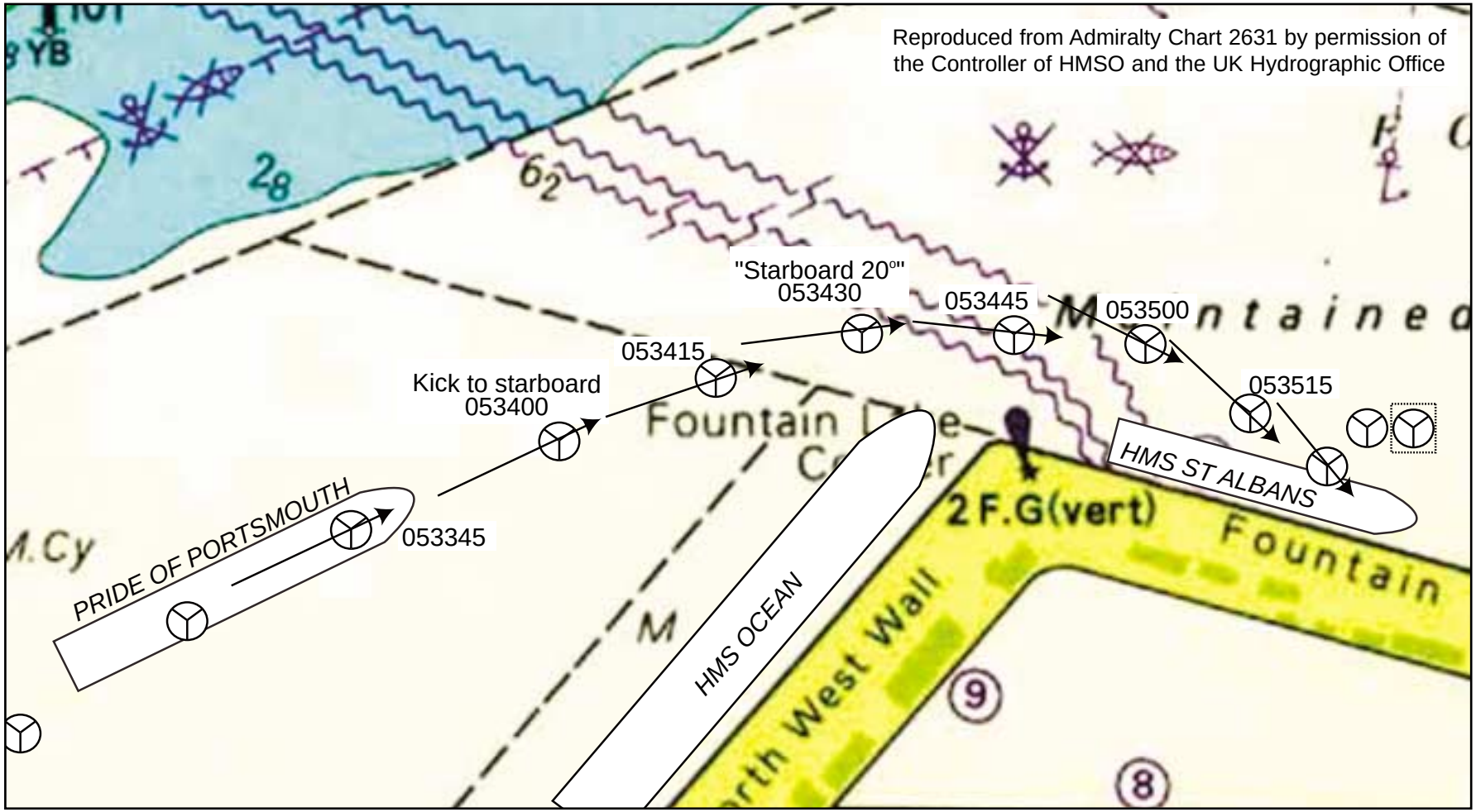
1.11 THE INTERACTION BETWEEN FERRIES AND WARSHIPS

- The manoeuvring room for ferries off the commercial ferry berths in Portsmouth Harbour is only just sufficient. This can, at times, be reduced substantially by warships berthing two and, sometimes, three abreast on North West Wall and Fountain Lake Jetty.

- The berthing of the largest vessels on North West Wall in extreme south-westerly winds can cause a lee in Fountain Lake which can affect the ferries' ability to manoeuvre safely.

- Most warships are armed while alongside the naval berths in Portsmouth, although loading and discharge of armaments takes place elsewhere.

- Inbound ferries pass the vessels berthed at North West Wall and Fountain Lake 1 at a very close distance so as to be correctly positioned to approach their berth. This can, inadvertently, cause the warships to range and occasionally part their moorings.



Detailed track from VDR data showing *Pride of Portsmouth*'s heading

Diagram 1

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 THE DECISION TO ENTER HARBOUR

As stated in 1.3 above, the decision whether to enter harbour in strong wind conditions is generally left to the discretion of the vessel's master. The master, being made aware of the wind and weather conditions in the harbour by QHM's staff, is best placed to make this decision. The master also has knowledge of the handling characteristics of his vessel, and the likely effect of the wind on his planned manoeuvres.

Pride of Portsmouth had the power and manoeuvrability to cope with severe wind conditions while making headway. The most critical time came when manoeuvring off, and then alongside, the berth. *Pride of Portsmouth* berthed bow-on to the linkspan in Portsmouth and did not, therefore, need to swing off the berth on arrival. Northerly winds provided most problems when berthing at the commercial ferry port, as vessels needed to be manoeuvred bodily sideways against the wind. A wind direction of west-south-west, as prevailed on the day of the accident, was almost directly along the line of the berth and was not considered to pose too much of a problem.

Two tugs were available for use by the vessel should she have needed assistance.

Pride of Portsmouth experienced strong gusts of wind in the vicinity of Dean Tail wreck. The master had experienced very strong gusts of wind in this area before, and he considered they were caused through a local effect when the south-westerly wind bends around the south of the Isle of Wight. In general, the wind within the harbour is less than that experienced outside. Reports by QHM's staff were quite consistent, and indicated that the wind in the harbour was 35 to 40 knots with gusts of up to 50 knots. The master was unaware of the report indicating two isolated gusts of 70 knots.

The master needed to decide whether to commit the vessel to entering the harbour before reaching the Outer Spit Buoy (OSB). Once in the entrance channel the vessel was committed.

The forecast wind, as the master understood it, although severe, did not pose too much of a problem for berthing. The vessel had berthed successfully in similar conditions many times previously. At the time the decision needed to be made, the vessel had all propulsion, steering motors and thrusters available.

Under these circumstances the master's decision was correct. However, had he been aware that 70 knot gusts of wind had been experienced only minutes before his vessel reached OSB, he might have considered it prudent to wait outside and monitor developments.

There had been two opportunities for him to become aware of these extreme gusts. Firstly the information could, and should, have been passed to him when the second officer took the VHF call from QHM at 0507. Secondly, QHM could, and should, have included this up-to-date information in its communication to the vessel at 0509. At this crucial time, when *Pride of Portsmouth* was asking for permission to enter the approach channel, the vessel was told only of gusts of 50 knots.

Despite having both bow thrusters, *Pride of Portsmouth* struggled to maintain the required track in the approach channel. When one of the bow thrusters was lost after passing through the harbour entrance, there was reason to consider a change of plan. It would have been possible to continue up the harbour and to swing in the turning basin off North Corner with the help of tugs and then, either to wait until the thruster was back on line, or to proceed back out of the harbour. Bearing in mind the direction of the wind in relation to the berth, and the fact that he had two tugs standing by to assist, it is not surprising that this option, which posed its own additional risks, was not taken up.

2.3 THE DECISION NOT TO CONNECT THE TUGS

It was unusual for *Pride of Portsmouth* to use tugs. However, the recent strong winds had caused the vessel to use tugs on the Friday before the accident. On that occasion one of the tug's lines had been incorrectly connected and the tug had become disconnected during the manoeuvre to berth the vessel. On the day of the accident, all options were considered in detail by the two senior officers on *Pride of Portsmouth*'s bridge. Noting that there were things for and against all the options, it was finally decided to use the flexibility provided by having the tugs free to move quickly to push where required. Without a tug connected, *Pride of Portsmouth* was able to maintain a greater speed through the harbour and, thus, increase her ability to maintain her track in the strong cross-wind.

When the bow thruster was lost, the matter was considered again, briefly, but the master decided to stay with his original decision.

The above decisions are considered to have been reasonable under the circumstances. However, with the benefit of hindsight, having a tug or tugs connected before Fountain Lake Corner, and approaching the berth at slower speed, may have allowed more positive control of the vessel and more time to correct mistakes if, and when, they occurred.

As stated above, it was unusual for *Pride of Portsmouth*, or any of the ferries, to use tugs. For this reason, masters and other PEC holders are generally unfamiliar with working with tugs and using them to best advantage. This fact did influence the master's decision not to make them fast that time.

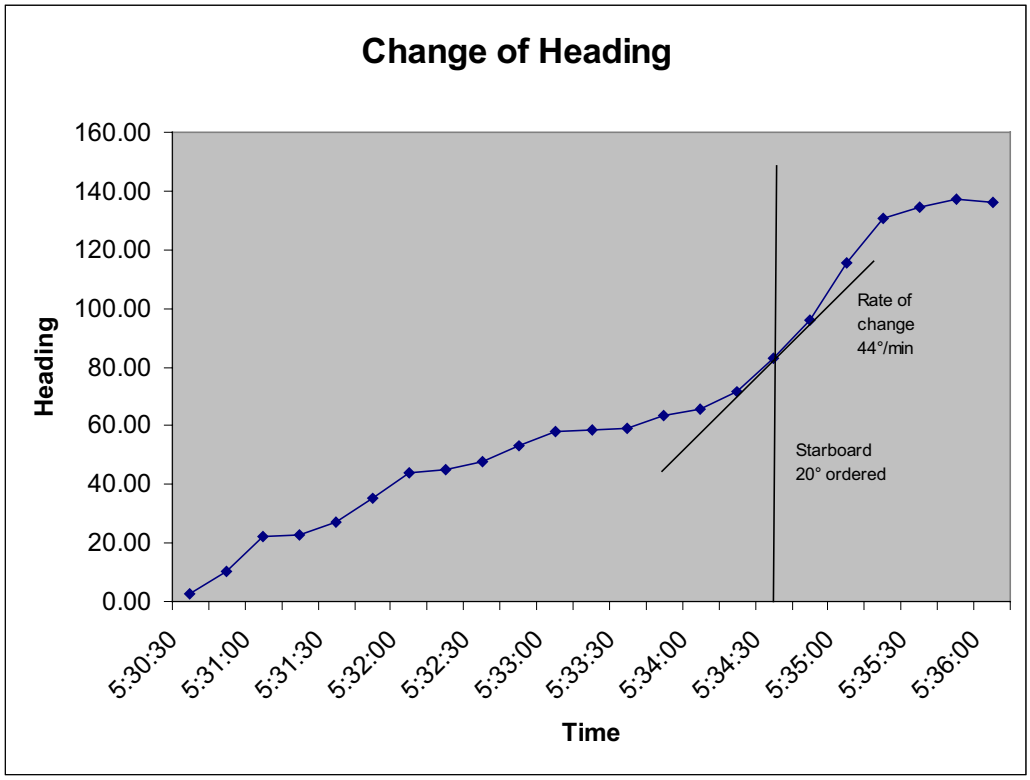
2.4 THE IMMEDIATE CIRCUMSTANCES OF THE COLLISION

It is likely that the strong winds played a part in bringing about the collision. As the vessel began the swing to round Fountain Lake Corner, the wind moved from directly astern to come to bear on the starboard quarter. This caused an increase in the rate of turn to starboard. This effect could have been exacerbated when the bow came into the substantial lee created by *HMS Ocean* **(see photograph 6)**. The lack of one bow thruster also reduced control authority. Whether or not these environmental factors were significant, recordings of the activity on the bridge suggest that human factors contributed to the accident. Most significantly, the master's last helm command before the collision was "*Starboard 20*", ie the vessel was steered into the collision further increasing the rate of turn induced by the environmental factors. At the time "*Starboard 20*" was ordered, the vessel's heading was about 087°, and the required heading for the approach to the ro-ro berth was about 105° plus some allowance for leeway. The master did not have a clear view of either *HMS Ocean* or *HMS St Albans* from the central conning position and it is possible, therefore, that in the demanding and rapidly changing situation "*Starboard 20*" was the intended order. However, the master had just acknowledged a warning from the chief officer that the vessel was "moving quite close to the stern of the frigate" and the vessel already had an accelerating swing to starboard and was turning at 44° a minute **(see Figure 1)** at the time the order was given. Despite the fact that on a bridge sited far forward like the one on *Pride of Portsmouth*, it is sometimes difficult to appreciate the amount that the stern is swinging, the master should have been aware, as an indicator was within his view. However, it is considered that the master lost situational awareness at about this time and the "*Starboard 20*" order was inappropriate. Under the circumstances, a large port helm order was appropriate to begin to arrest the accelerating swing to starboard. In any event, the master was unaware of the rudder position in the time between giving the order and the collision.

Photograph 6

HMS Ocean and *HMS St Albans* from the ferry berth soon after the accident

Figure 1



2.5 BRIDGE RESOURCE MANAGEMENT AND ERGONOMIC DESIGN

2.5.1 General comments

The bridge team at the time of the accident only consisted of the master, the chief officer and the helmsman. For this reason it was essential that everyone was used to best advantage.

A fundamental prerequisite of good bridge management is that a mistake by any one person must not be allowed to go unnoticed and unchecked. The way that the bridge team was deployed, and the ergonomics of the instrumentation on *Pride of Portsmouth*, meant that monitoring of the master's actions (by the chief officer and the helmsman) and those of the helmsman (by the chief officer and the master) was difficult and not effective.

To monitor the actions of the helmsman, it is necessary both to hear the master's orders and the helmsman's response, and to have sight of an RAI to ensure the correct action has been taken. The master did not have easy sight of an RAI from his conning position, and the chief officer could neither hear the orders easily nor easily see an RAI. Despite the fact that there was no misunderstanding between the master and the helmsman, this is considered to be a latent problem in the bridge management on *Pride of Portsmouth* because the inappropriate order was not noticed.

2.5.2 The role of the chief officer

One of the principal roles of the chief officer was to monitor the master's actions. To do this he needed to:

- be aware of the passage plan
- be aware of the position, course and speed of the vessel
- monitor the engine, thrusters and rudder movements, and
- hear the helm orders.

While the ship rounded North Corner and Fountain Lake Corner, the chief officer needed to be stationed on the starboard bridge wing. This enabled him to advise the master on the vessel's proximity to berthed vessels, as the visibility down the sides of the ves sel was poor or non-existent from the central conning position. He was aware of the passage plan, having had lengthy conversations with the master during the approach to the port. From his position on the starboard bridge wing, and his local knowledge, he was aware of the position, course and speed of the vessel. However, he had taken up a position standing forward of the manoeuvring console and, from there, sight of the engine and thruster controls was awkward, and sight of the RAI could only be achieved by changing

position. He was about 14m from the master and helmsman. The master and helmsman were communicating with each other clearly, but probably not with the intention that the chief officer must hear. The bridge audio channels on the VDR indicate that the helm orders were not obviously heard on the bridge wing.

Crucially, when the master ordered "*Starboard 20*" at 0534:33, the chief officer did not pick up the fact that this was at odds with his appreciation of the situation. Indeed, his simultaneous advice shouted to the master to "*bring the bow around*" was intended to arrest and reverse the change of heading. It is likely that the chief officer did not hear the "*Starboard 20*" order or the helmsman's response, and he was not in a position to notice the anomaly on an RAI easily.

2.5.3 The role of the helmsman

The helmsman, as part of the bridge team may, in certain circumstances, ask for clarification of an order which seems awry but, on this occasion, he could see nothing of the developments unfolding outside, and was not to know that the order was inappropriate. Had the helmsman been steering from the console at the front of the bridge, he would have been in a better position to judge the appropriateness of the master's commands. But this has drawbacks in other respects.

The master did not notice his order was inappropriate, despite the helmsman repeating his order and, within a few seconds, the chief officer advising that the bow needed to be brought to the "*left*". It is possible that had the chief officer used the term *port* instead of *left* it might have triggered either the master or the helmsman to notice the inappropriate helm position.

The bridge audio recording from the VDR reveals that the helmsman routinely acknowledged the master's helm orders by repeating them back to him. However, in what is accepted as good practice, there is usually a third phase in this control loop consisting of the final confirmation that the helm order had been applied. It was missing on *Pride of Portsmouth* on this occasion. This is considered to be understandable, given the dynamic character of the approach and the relatively rapid sequence of commands used. However, in this case, the lack of a final "Starboard 20 wheel on" statement from the helmsman denied both the master and the chief officer a vital piece of information during the most critical period.

2.5.4 The role of the master

The master had chosen to give verbal helm orders during his approach to, and during passage through, the harbour. This was a variation on the usual practice. It was general practice for the master to utilise the helmsman, but to give course orders or a combination of course and helm orders. Giving course orders relieves the master of the need to make the fine adjustments necessary to

maintain the heading, whereas giving helm orders tends to load the master with the responsibility to steer the vessel. On this occasion the master chose to give helm orders in the approach channel and through the harbour because of the difficulties posed by the strong wind conditions. This had the effect of increasing the loading on his role in these difficult circumstances.

It was the master's usual practice to take personal control of the helm only when he moved to one of the wing consoles on final approach to the berth. The master and PEC holders, generally, were very experienced in manoeuvring the vessel using the various controls from one of the wing consoles. However, the layout of the central control console was different, and did not allow one person to operate helm, engine and thruster controls from a single position.

The turn around Fountain Lake Corner in the weather conditions which prevailed on 27 October warranted careful manoeuvring using a fine balance between rudder, engine and thruster movements. This was even truer in the final stressful moments immediately before the collision. During these moments, the master found himself in an unusual position where, on passage as opposed to berthing, he really needed direct control of all manoeuvring functions. Direct control at this time would have allowed him to act intuitively using his skill and experience, especially if the controls were in familiar positions. As it was, in these moments, control was split (verbal and direct) and the master became overloaded and gave an inappropriate verbal order. It is possible that, had he had direct control, he would have put the helm the other way. A major change to the central control console design on *Pride of Portsmouth* at this stage in the vessel's life is not considered justifiable on the basis of this one accident. However, the limitations of the system as highlighted by this accident should be borne in mind when considering future bridge routines in close pilotage situations.

2.5.5 Bridge resource management conclusions

With the benefit of hindsight, the accident could have been avoided if the master had had direct control of the vessel from the starboard bridge wing console. Before the event, the master considered that the major danger in the turn around Fountain Lake Corner in the wind conditions lay in being swept across to port and down on to the moored warship *HMS Bristol*. It is understandable, therefore, that he chose to maintain a conning position in the centre of the bridge. However, both possible dangers, that is, the very close proximity to the unsighted warships at Fountain Lake Corner, and being swept across to port, could have been catered for by temporarily changing control positions and strategic positioning of the chief officer.

An improvement in the facilities for communication between the three key members of the bridge team is considered desirable. Bearing in mind the size of the bridge, it is considered that a technical solution might be advantageous. The three key members of the team should, ideally, be able to communicate directly

with each other. The chief officer, in particular, needs to pass quite detailed information to the master and all communications should be closed loop, in that there should always be confirmation that a message has been received and understood.

Additionally, both the master and the chief officer need a direct view of an RAI from their respective conning and monitoring positions. In the case of the chief officer on the bridge wing, this could be achieved by standing behind the existing control console, assuming an adequate view over the side can be obtained from that position. The master could not see the panoramic RAI situated directly above his conning position without moving away from the control console. This is an undesirable condition. The provision of an additional RAI in direct sight of someone operating the engine and thrusters controls from the central position would improve the safety and efficiency of bridge operations on *Pride of Portsmouth*.

2.6 CONSIDERATIONS AFFECTING THE CHOICE OF BERTH FOR WARSHIPS

The QHM generally took into account the risks associated with interaction and ranging of warships berthed at North West Wall and Fountain Lake 1 when deciding on the berthing plan in the port. Fountain Lake Jetty 1 berth was often left unoccupied for this reason. However, on this occasion *HMS St Albans* was berthed at Fountain Lake Jetty 1 when the port was relatively empty and berths were available elsewhere.

The problem of large ships berthed at North West Wall producing a lee which might affect the manoeuvring of large ferries, was recognised, but was not considered in berth selection.

The risks arising from a collision between a ferry and an armed warship are recognised but, once again, not generally taken into account in berth selection.

Additionally, more consideration could be given to the fact that the berthing of large warships, and the double and triple banking of other warships, restricts the room for ferries to manoeuvre safely in the harbour.

SECTION 3 - CONCLUSIONS

The following safety issues have been identified from the foregoing analysis. They are not given in any order of priority.

1. The master's decision to continue with the planned passage into Portsmouth Harbour was based on incomplete information about the prevailing wind conditions. In particular, he was unaware that two exceptional gusts of 70 knots had been experienced just before he committed his vessel to the entrance channel. This information should have been passed to him by the second officer, who received it himself over the VHF radio at 0507. Additionally, the weather information passed to the master by QHM at 0509, when *Pride of Portsmouth* asked permission to enter the approach channel, only stated occasional gusts of 50 knots. [2.2]

2. The master's decision not to make the tugs fast was made for good reason, on the basis of a professional consideration of the facts, and after discussion with another qualified and experienced PEC holder. However, it is possible that the discussion might have benefited from greater knowledge of the tugs' operational capability and more experience in using them. [2.3]

3. The rate of turn when rounding Fountain Lake Corner suddenly increased when the vessel's stern passed through the wind direction. The situation was probably exacerbated when the vessel's bow went into the lee created by *HMS Ocean*. [2.4]

4. The "*Starboard 20*" helm order, when the vessel was already turning to starboard at 44° a minute, effectively turned the vessel into the collision. It is concluded that this was inappropriate and probably arose because the master was overloaded. [2.4, 2.5.4]

5. The bridge resource management and ergonomics on *Pride of Portsmouth* were found lacking in that:

    - The master's actions were not sufficiently closely monitored by the chief officer [2.5.2]

    - The helm orders were not sufficiently closely monitored by the chief officer [2.5.3]

    - Communications between the master and the helmsman were not easily heard by the chief officer over a distance of 14 metres with high ambient noise levels [2.5.2]

    - The helmsman was not routinely confirming what helm had been applied by saying for example "*Starboard 20 wheel on*" [2.5.3]

- Communications between the master and the chief officer during the critical time were made by shouting over a distance of 14 metres. This did not allow for an easy and natural flow of information. [2.5.2]

- There was no rudder angle indicator visible from the central conning position. [2.5.1, 2.5.4]

- The chief officer chose to stand forward of the wing manoeuvring console from where he could not easily see a rudder angle indicator or engine and thruster controls. [2.5.1, 2.5.2]

- The master had been heavily loaded with responsibilities since passing the OSB. In the crucial seconds before the collision the master became overloaded partly through giving verbal helm orders as well as having direct control of engine and thruster movements. [2.5.4]

6. QHM's department could improve safety in the port by using berth selection to ensure the maximum possible safe manoeuvring room for large commercial traffic. [2.6]

SECTION 4 - ACTIONS TAKEN SINCE THE ACCIDENT

P&O European Ferries have taken the following actions:

- Senior masters in the fleet have reviewed the safety issues arising from this accident, but no changes to the Bridge Resource Management Course content are thought necessary.

- Bridge resource management training has now been undertaken by the five officers of the rank of chief officer and above who had not previously done the course.

- A second officer now remains on the bridge when requested to do so by the master, in addition to the master, the chief officer and the helmsman, until the vessel is secured at her berth. The duties of the bridge team members are then redefined accordingly.

The commercial harbourmaster has taken the following action with respect to PEC holders:

- An increasing emphasis is now placed on tug operations as part of the examination for all new large ferry PEC applicants.

- All large ferry PEC holders now include tug operations in the subjects addressed at their annual meeting with QHM's staff. Ferry masters taking short passages on tugs, and tug masters taking short passages on the ferries, is being encouraged.

The QHM, Portsmouth has taken the following action:

- The wind limits, and the requirements for large vessels to use tugs, have been reviewed. A new notice to mariners has been issued, which lays down that large vessels must have two tugs available for use in winds of over 45 knots.

- An upper wind limit of 55 knots has been imposed on large ferry operations.

- The largest vessels will no longer be berthed on North West Wall unless no other suitable berth is available.

SECTION 5 - RECOMMENDATIONS

P&O Ferries Ltd, other ro-ro passenger ferry companies operating to and from UK ports, and organisations supplying Bridge Resource Management training are recommended to:

1. Heed the lessons to be learned from this accident and to instigate appropriate measures as necessary. In particular, to ensure:

    - Communications between bridge team members are *closed loop* in that each message is confirmed as having been received and understood;

    - Key bridge personnel delegate tasks to avoid becoming overloaded.

    - Systems are in place so that a mistake or inappropriate command by one team member does not go uncorrected.

2. Consider the viability of a technical communication system to enhance the free flow of information between team members on large bridges.

The Queen's Harbour Master, Portsmouth is recommended to:

3. Ensure that the dangers associated with manoeuvring large ferries in poor weather conditions, in close proximity to armed warships, are taken into account in future risk assessments and when considering berthing plans. In particular:

    - To the extent that operational constraints permit, the maximum manoeuvring room is available for ferries especially in the locations where they swing off or make their final approach to the berth.

    - That port control officers routinely inform large vessels that are approaching the port, of any relevant warship berth information that might affect that vessel's manoeuvring.

4. Ensure that port control officers give the most accurate and up-to-date weather information to vessels approaching the harbour.

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