

Report on the investigation of
the near miss between
Bro Axel/Noordhinder
and the subsequent grounding of
Bro Axel
at
Milford Haven
5 December 2002

Marine Accident Investigation Branch
First Floor
Carlton House
Carlton Place
Southampton
United Kingdom
SO15 2DZ

Report No 22/2003
September 2003

Extract from
The Merchant Shipping
(Accident Reporting and Investigation)
Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the cause 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

Page

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

SYNOPSIS 1

SECTION 1 - FACTUAL INFORMATION 2

| | | |
|--------|---|----|
| 1.1 | Particulars of <i>Bro Axel/Noordhinder</i> and accident | 2 |
| 1.2 | Description of vessels | 5 |
| 1.2.1 | <i>Bro Axel</i> | 5 |
| 1.2.2 | <i>Noordhinder</i> | 5 |
| 1.3 | Background | 6 |
| 1.3.1 | Vessels | 6 |
| 1.3.2 | Milford Haven and approaches | 6 |
| 1.3.3 | VTS | 8 |
| 1.4 | The crews | 8 |
| 1.4.1 | <i>Bro Axel</i> | 8 |
| 1.4.2 | <i>Noordhinder</i> | 9 |
| 1.5 | Manning and certification | 9 |
| 1.6 | Environmental conditions | 9 |
| 1.7 | Narrative of events (all times are UTC + 1 hour) all courses are true | 10 |
| 1.8 | Milford Haven Port Authority (risk assessment) | 12 |
| 1.9 | Safe navigation | 14 |
| 1.9.1 | Pilots | 14 |
| 1.9.2 | Pilot Exemption Certificate holders | 15 |
| 1.9.3 | Escort tugs | 16 |
| 1.10 | Vessel Traffic Service (VTS) | 16 |
| 1.10.1 | The role of VTS | 16 |
| 1.10.2 | Milford Haven Port Control | 17 |
| 1.10.3 | VTS operator training | 17 |
| 1.11 | Safe navigation (fishing vessels) | 18 |
| 1.11.1 | Previous incidents (fishing vessels – Milford Haven) | 18 |
| 1.11.2 | Fishing vessel agents | 19 |
| 1.11.3 | Certificates of Competency | 19 |
| 1.11.4 | Navigational standards | 19 |
| 1.11.5 | Marine guidance | 20 |
| 1.11.6 | Safety Management System | 20 |
| 1.12 | Electronic recording | 21 |
| 1.12.1 | VTS | 21 |
| 1.12.2 | Vessels | 21 |
| 1.13 | Simulation | 21 |

SECTION 2 - ANALYSIS 23

| | | |
|-------|------------------------------|----|
| 2.1 | Aim | 23 |
| 2.2 | General | 23 |
| 2.3 | The incident | 24 |
| 2.3.1 | Action by <i>Noordhinder</i> | 24 |
| 2.3.2 | Action by <i>Bro Axel</i> | 25 |

| | | |
|-------|---------------------------------------|----|
| 2.4 | Port Control | 25 |
| 2.5 | Other methods (vessel de-confliction) | 26 |
| 2.6 | Emergency response | 27 |
| 2.6.1 | <i>Noordhinder</i> | 27 |
| 2.6.2 | <i>Bro Axel</i> | 27 |
| 2.6.3 | Pilots and PEC holders (training) | 28 |
| 2.7 | Fishing vessels (safety management) | 28 |
| 2.8 | Pilotage | 29 |

SECTION 3 - CONCLUSIONS **30**

| | | |
|-----|---------------|----|
| 3.1 | Safety issues | 30 |
|-----|---------------|----|

SECTION 4- ACTION TAKEN **32**

SECTION 5- RECOMMENDATIONS **33**

ANNEX 1 REGULATIONS FOR PREVENTING COLLISIONS AT SEA

Rule 2
Rule 5
Rule 9
Rule 16
Rule 17
Rule 34

ANNEX 2 PILOT TRAINING PROCEDURES – MILFORD HAVEN

ANNEX 3 REQUIREMENTS – PEC HOLDERS – MILFORD HAVEN

ANNEX 4 PORT CONTROL POLICY – MILFORD HAVEN

ANNEX 5 PREVIOUS INCIDENTS INVOLVING FISHING VESSELS – MILFORD HAVEN

ANNEX 6 MGN 84(F)

ANNEX 7 SIMULATIONS

ANNEX 8 OPERATIONAL MEMORANDUM NO 03 OF 2003

| | |
|--------------|--------------------------------------|
| Figure 1 | <i>Bro Axel</i> |
| Figure 2 | <i>Noordhinder</i> |
| Figure 3 | <i>Bro Axel</i> – bridge |
| Figure 4 | <i>Noordhinder</i> – wheelhouse |
| Figure 5 | Milford Haven |
| Figure 6/7/8 | Milford Haven port control recording |

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

| | | |
|--------|---|---|
| (D)GPS | - | (Differential) Global Positioning System |
| AB | - | Able Seaman |
| ARPA | - | Automatic Radar Plotting Aid |
| CPA | - | Closest Point of Approach |
| dwt | - | deadweight |
| ECDIS | - | Electronic Chart Display Information System |
| ETA | - | Estimated Time of Arrival |
| IMO | - | International Maritime Organization |
| ISM | - | International Safety Management (Code) |
| kW | - | Kilowatt |
| m | - | metre |
| MCA | - | Maritime and Coastguard Agency |
| MF | - | Medium Frequency |
| MGN | - | Marine Guidance Note |
| MHPA | - | Milford Haven Port Authority |
| PEC | - | Pilot Exemption Certificate |
| STCW | - | Standards of Training, Certification and Watchkeeping for Seafarers |
| UTC | - | Universal Co-ordinated Time |
| VHF | - | Very High Frequency |
| VLCC | - | Very Large Crude Carriers |
| VTs | - | Vessel Traffic Service |

SYNOPSIS



The Swedish products tanker *Bro Axel*, and the Belgian registered fishing vessel *Noordhinder*, were involved in a near miss incident in the confines of Milford Haven on 5 December 2002. Subsequently, the avoiding action taken by the tanker resulted in her running aground.

The Marine Accident Investigation Branch (MAIB) was notified of the incident that day, and an investigation began immediately.

Bro Axel had left her berth at the Petroplus terminal and was outward bound for the port of Dublin. *Noordhinder* was inward bound after the completion of a fishing trip.

On executing the turn into the east channel, *Noordhinder*'s skipper applied only 15° of helm which took her to the north side of the channel, the incorrect side for entering. At the same time, *Bro Axel*, which was also on the north side of the channel, the correct side for departing, was approaching the vicinity of the turn.

It was always the intention of *Noordhinder*'s skipper to return to the south side of the channel when the turn was complete. However, *Bro Axel*'s master was under the assumption that she would remain on the north side. When *Noordhinder* began to alter course to starboard to return to the correct side of the channel, this put her on a potential collision with *Bro Axel*.

Realising this to be the case, *Bro Axel*'s master altered course to port to avoid a collision. When *Noordhinder*'s skipper detected the alteration of course, he came full astern on the main engine. The result of both vessels' manoeuvres was that *Noordhinder* passed down *Bro Axel*'s starboard side at a distance of approximately 10 metres.

When *Noordhinder* was approximately amidships to *Bro Axel*, *Bro Axel*'s master ordered full astern on the main engines. However, his action was insufficient to prevent her from running aground.

There were no injuries, no damage to either vessel, and no pollution. However, the potential for a much more serious accident was evident.

This incident has raised various safety issues relating to the operation of MHPA port control, the use of escort vessels, emergency response training for the holders of Pilot Exemption Certificates (PECs), safety management of fishing vessels and, with regard to fishing vessels and merchant vessels, a discrepancy in the Pilotage Act.

As a result of these issues, appropriate recommendations have been made to Milford Haven Port Authority, the operators of each vessel, Ports Division of the Department for Transport and the UK Chamber of Shipping.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *BRO AXEL/NOORDHINDER* AND ACCIDENT

| | | |
|------------------------|---|--|
| Name | | <i>Bro Axel</i> (Figure 1) |
| Registered owner | : | Brostrom Tankers |
| Manager(s) | : | Brostrom Ship Management, Sweden |
| Port of registry | : | Goteborg |
| Flag | : | Sweden |
| Type | : | Tanker |
| Built | : | 1998 P.T. Dok & Perkaplin, Jakarta |
| Classification society | : | Norske Veritas |
| Construction | : | Steel |
| Length overall | : | 144.15m |
| Gross tonnage | : | 11,324 |
| Engine power and type | : | 4800kW MAN |
| Service speed | : | 13.5 knots |
| Other relevant info | : | Controllable pitch propeller. Bow thruster |

| | | |
|-----------------------|---|--|
| Name | | <i>Noordhinder</i> (Figure 2) |
| Registered owner | : | Rederij De Noordhinder B.V.B.A |
| Manager(s) | : | Rederij De Noordhinder B.V.B.A Belgium |
| Port of registry | : | Zeebrugge |
| Flag | : | Belgium |
| Type | : | Fishing vessel (beam trawler) |
| Built | : | 1985 N.V. Scheepswerven Zeebrugge |
| Fishing number | : | Z 91 |
| Construction | : | Steel |
| Length overall | : | 34.9m |
| Gross tonnage | : | 274 |
| Engine power and type | : | 883kW ABC |
| Service speed | : | 12 knots |
| Other relevant info | : | Single screw |

Accident details

| | | |
|----------------------|---|--------------------------|
| Time and date | : | 0343, on 5 December 2002 |
| Location of incident | : | Milford Haven |
| Injuries/fatalities | : | None |
| Damage | : | None |

Photograph courtesy of FotoFlite

Figure 1



Bro Axel

Figure 2



Noordhinder



Figures 3a and b - *Bro Axel* 's bridge



1.2 DESCRIPTION OF VESSELS

1.2.1 *Bro Axel*

Bro Axel, built of steel by P.T. Dok & Perkaplin of Jakarta in 1998, was a 144m, 11,324gt products tanker. Her design incorporated one deck above the waterline with access to several cargo tanks. Her deadweight was 16839 tonnes (**Figure 1**). The engine room was aft of the cargo tanks.

Her superstructure, which included the accommodation and bridge, were also situated aft. The bridge ran the full width of the vessel. The helm position, main engine controls and navigational equipment were situated centrally in an operating console at the forward end of the bridge. Main engine and bow thruster controls were also situated on both sides of the bridge.

A chart table was located behind the centre console, towards the rear of the bridge on the port side. On the starboard side was a designated area for communication equipment (**Figures 3a and b**). Seating was available on the bridge.

Bro Axel was fitted with the following navigational equipment: two ARPA radars, DGPS and GPS navigators, Loran C navigator, magnetic and gyro compasses, auto pilot, echo sounder, ECDIS, and MF and VHF radios.

1.2.2 *Noordhinder*

Noordhinder, built of steel by N.V. Scheepswerven, Zeebrugge in 1985, was a typical Belgian/Netherlands beam trawler. Her design incorporated one deck above the waterline with the wheelhouse and accommodation situated aft and a whaleback forward (**Figure 2**). Below deck, the engine room was situated aft, and forward of this was the fishroom.

In the wheelhouse, the helm position, controlled by a small electronic tiller, was situated forward in the centre, directly behind the bulkhead which housed the wheelhouse windows. However, the navigational equipment which included an ARPA radar, DGPS and GPS navigators, ECDIS magnetic and gyro compasses, auto pilot, echo sounder, sonar, MF and VHF radios were situated in an operating console in the centre of the wheelhouse (**Figure 4**). Seating was available in the wheelhouse.



Noordhinder's wheelhouse

1.3 BACKGROUND

1.3.1 Vessels

Bro Axel, owned and managed by Brostrom Tankers, Sweden, was one of several sister vessels. She was engaged on a regular time charter, carrying oil products between the southern ports of Ireland and the south-western ports of the UK, which included Milford Haven.

Noordhinder was one of three fishing vessels owned and managed by a family of Belgian fishermen. The other two were *Westhinder* and *Easthinder*.

Although Belgian registered, and crewed by Belgian nationals, all three vessels worked on a regular basis from the port of Milford Haven and had been doing so for several years. Normally, after each trip, the catch would be landed, then transhipped by road to markets in Belgium or The Netherlands.

1.3.2 Milford Haven and approaches

The port of Milford Haven (**Figure 5**) includes the whole of the Haven, and its area extends from the inner limits on the upper reaches of the River Cleddau, to the outer seaward limits some 6 miles south-east and south-west of St Anne's Head. It is a major oil terminal, and is one of the few ports in the UK accessible to fully laden VLCCs with draughts up to 20m. Aggregates and general cargo are handled at Pembroke Dock, where there is a ro-ro ferry terminal for services to Ireland.



Milford Haven

Pilotage is compulsory within the port limits for all vessels over 50 metres in length except certain specified vessels and conditions. The Authority reviewed its Pilotage Directions, which are limited by the Pilotage Act 1987 to ships of 20 metres or more in length or fishing vessels of 47.5 metres or more in length, in 2001. The review concluded that very few ships of 20 to 50 metres used the port, none of them tankers, and only two fishing vessels between 47.4 and 50 metres had utilised the port in the previous five years. The 50 metre limit, therefore, remained appropriate in the Authority's view.

The pilots are provided by MHPA, which is a Competent Harbour Authority under the provisions of the Pilotage Act 1987.

Milford Docks has been, for many years, an important centre for the fishing industry. Today, the port is used mainly by Belgian, French and Spanish fishing fleets. Although the majority of catches from these vessels are transported by road for sale in their respective countries, Milford Haven fish auction, in 2002, had a turnover in excess of £1million. This represented 6,099 tonnes of fish sold.

There are two entrance channels to the Haven which converge to a single dredged channel leading to the port areas. The west channel is the deep-water channel. The east channel has a limiting depth of 9.8m.

On entering the Haven by the east channel, it is necessary to execute a starboard turn of approximately 60° to 70° in the vicinity of the Thorn Rock Buoy to keep to the correct side of the channel, which then runs in an east/west direction. At that point (Thorn Rock Buoy) the width of the channel is 1.75 cables. From there, the width of the channel (in an east/west direction) varies between 1.5 and 2 cables. However, to its north, ample sea room is available for shallower draught vessels. MHPA designated this area as a boom deployment area for beam trawlers.

1.3.3 VTS

The Haven is served by a port control facility, which is located above the main harbour authority building on the outskirts of the town of Milford Haven.

This facility is manned 24 hours a day, 7 days a week, by a marine officer. He/she is always the holder of a class 1 certificate of competency, and a marine operator who has had first-hand nautical experience of Milford Haven. At the time of the incident, MHPA was in the process of updating its port control equipment and operations room. While this process was taking place, port control operations were being conducted from a temporary location, albeit in the same building.

Milford Haven port control provides radar coverage for monitoring vessels' movements within the confines of the Haven and its approaches. In addition to radar coverage, a selected number of VHF channels are monitored for the purpose of directing and monitoring traffic.

1.4 THE CREWS

1.4.1 *Bro Axel*

Bro Axel had a compliment of 16 crew. This included the master, chief officer, second and third officer, chief engineer, second, third and fourth engineers, a fitter, a cook, three ABs and two officer cadets. They were all Swedish nationals.

The master was the holder of a Swedish unrestricted master's certificate of competency, and had served as master on tankers for 15 years. He had worked for Brostrom Ship Management for 17 years, which included 4 years as *Bro Axel*'s master. He had also been involved in vessel manoeuvrability trials when the vessel was first delivered.

The second officer, who was on watch with the master at the time of the incident, was the holder of a Swedish second officer's certificate of competency. He had been employed with Brostrom Ship Management since 1998 on board tankers, having served on *Bro Axel* for her three previous voyages.

The crew normally worked a rota system of 6 weeks on and 6 weeks off.

1.4.2 *Noordhinder*

Noordhinder had a compliment of six crew members, which included the skipper, mate, three deckhands and one deck boy. They were all Belgian nationals.

The skipper was the holder of a Belgian unrestricted (fishing vessel) certificate of competency. He had been fishing for 17 years, of which several had been spent as skipper, and had been a regular user of the Haven in both his capacity as master and mate over the last 10 years.

The mate, who was on watch with the skipper at the time of the incident, was also the holder of a Belgian unrestricted (fishing vessel) certificate of competency.

In addition to the master and mate, one other member of the crew held a Belgian skipper's certificate of competency and two others held engineering certificates of competency.

The crew normally worked two 12-day voyages before returning home for approximately 5 days.

1.5 MANNING AND CERTIFICATION

The certification issued in respect of both *Bro Axel* and *Noordhinder* were valid. *Bro Axel* was manned in accordance with her safe manning certificate. The master had a valid Milford Haven pilot exemption certificate (PEC) which exempted *Bro Axel* from the requirement to use a Milford Haven pilot.

Bro Axel had been issued with an International Safety Management (ISM) certificate.

1.6 ENVIRONMENTAL CONDITIONS

At the time of the incident, the weather conditions were a north-westerly wind force 7, with a moderate north-westerly swell. However, in the shelter of the Haven, the wind was north-west 4, with slight sea conditions and good visibility.

The tide was flooding in an easterly direction at a rate of approximately 1.2 knots, and the times of high and low water were 0030 and 0630 respectively.

1.7 NARRATIVE OF EVENTS (ALL TIMES ARE UTC + 1 HOUR) ALL COURSES ARE TRUE

At 0045, on 5 December 2002, *Bro Axel*'s master was called to the bridge in preparation for departing. He had been off watch and asleep in his cabin for most of the time from 1800 that evening. At 0300, after loading had been completed, *Bro Axel* left her berth at the Petroplus terminal, bound for the port of Dublin. Also departing her berth at Pembroke Dock, some time earlier, was *Isle of Inishmore*, the Irish ro-ro ferry bound for Rosslare.

The master, chief officer and a berthing/unberthing pilot were on *Bro Axel*'s bridge. Shortly after leaving the berth, the chief officer was relieved by the second officer. The master was steering the vessel. After leaving Petroplus 1 berth, at 0320, the pilot disembarked. A course of 270° and half ahead on the main engines was set to give a speed of 9 knots. Following some distance behind, on a similar course, was *Isle of Inishmore*.

At an approximate position, 1 mile south of the east channel, the skipper of *Noordhinder* reported to Milford Haven port control that his vessel was inbound for Milford Docks and, at the same time, requested permission to use the eastern channel for entry. He also had been off watch, asleep in his cabin, for 5 hours before being called 5 miles from the channel.

The marine operator was on watch by himself in the port control station. The marine officer had left some 5 to 10 minutes earlier to make a cup of tea and use the toilet.

On board *Bro Axel*, just after the vessel had passed Milford Docks, the second officer relieved the master on the helm. It was normal practice for the officer of the watch to steer the vessel until clear of the channel. The master, who had the con, was navigating by radar and ECDIS. At 0327, he reported his position to port control. At the same time he was informed, by the marine operator, that a fishing vessel was inward bound via the east channel.

At 0337, *Noordhinder* entered the east channel. Her speed was 8 knots. The skipper and mate were on watch. The skipper had the helm and was positioned close to the centre window of the wheelhouse, navigating by eye from buoy to buoy. The mate was on the starboard side of the wheelhouse acting as lookout.

Shortly afterwards, the skipper again reported his position to port control at the Thorn Rock Buoy. He was informed that a tanker, *Bro Axel*, and the ro-ro ferry *Isle of Inishmore*, were outward bound. The skipper acknowledged this, and then informed port control that he would navigate to the south side of the channel, also passing the tanker to the south. The ECDIS and both radars, which were set to the 1.5 and 3-mile range, were operational. No plotting was being carried out.

The master of *Bro Axel* heard the conversation between *Noordhinder* and port control but, mistakenly, thought he heard *Noordhinder's* skipper inform port control that he would pass the tanker to the north.

Not long after, *Noordhinder's* skipper began to execute the turn into the east/west channel by applying 15° degrees of starboard helm, his normal practice at this stage of entry to Milford Haven. This manoeuvre resulted, as it normally did, in *Noordhinder* initially tracking to the north side of the channel.

In the vicinity of the Esso buoy, the master of *Bro Axel* first detected *Noordhinder* at a distance of approximately 1 mile, 2 points (22 ½°) on the port bow, showing a green sidelight. The echo of *Noordhinder* was identifiable on the radar, but no plotting was carried out.

Noordhinder continued her track until she crossed the bow of *Bro Axel*, still showing a green light, until temporarily settling on an easterly course. By then, both red and green sidelights were visible to *Bro Axel's* bridge.

Back on board *Noordhinder*, the skipper realised that his track had taken him to the north of the channel and, at the same time, became aware of the closeness of *Bro Axel*. To avoid a potential collision, his immediate reaction was to begin altering course to starboard towards the correct side of the channel.

Bro Axel's master first became aware of a potential problem when he detected alternating red and green sidelights. He immediately called port control to ascertain *Noordhinder's* intentions. He then called *Noordhinder* and asked: "Fishing vessel what are you doing?"

However, before a reply was received, *Noordhinder* began to show a steady red sidelight on *Bro Axel's* starboard bow. The distance between both vessels was now decreasing rapidly, and to prevent a collision the master ordered 15° of helm to port.

At approximately the same time, realising that *Bro Axel* had begun altering course to port, *Noordhinder's* skipper came full astern on the main engine.

Both vessels' manoeuvres resulted in *Noordhinder* passing down *Bro Axel's* starboard side, at a distance of approximately 10 metres. The time was 0343.

When *Noordhinder* was approximately amidships to *Bro Axel*, *Bro Axel's* master ordered full astern on the main engines. port control, overhearing the calls on the VHF radio, called *Bro Axel* to find out if there was a problem. *Bro Axel's* master replied there was, but did not report a close quarters situation.

Approximately 2 minutes later, *Bro Axel* ran aground to the north of Thorn Point. The area of grounding was mainly sand.

After the close quarters situation, *Noorhinder's* skipper became disorientated, and the course steered by the fishing vessel became erratic, as *Isle of Inishmore* passed in the channel. The result was *Noorhinder* casting a glancing blow on the Esso buoy as she made her way to Milford Docks.

After running aground, *Bro Axel's* master instructed the crew to sound round the vessel and to examine for internal hull plating damage. They found neither water ingress nor plating damage.

Astern engines were then used and *Bro Axel* floated free easily. Port control then instructed her to anchor north of the main channel.

At 0420, *Bro Axel* anchored in a position half a mile on a bearing of 162° from Great Castle Head. *Noorhinder* was all fast in Milford Dock at 0428.

1.8 MILFORD HAVEN PORT AUTHORITY (RISK ASSESSMENT)

In March 1997, MHPA, in conjunction with BOMEL Engineering Consultants, carried out a comprehensive formal safety assessment for marine operations at Milford Haven.

The high risk areas identified fell into the following categories:

- *Collision*
- *Grounding*
- *Berthing Contact*
- *Fire and Explosion*

As a result of the assessment, risk control options were identified under the following headings:

- *Port Control*
- *Navigation Service*
- *Port Guidelines*
- *Safety Management system (SMS)*
- *Small Vessels*
- *Harbour entrance*
- *Tug resources*
- *Emergency Response Plan*
- *Berthing Controls*

In relation to *Port Control*, a number of recommendations were made which included, but were not limited to: an enhanced role of the navigation service, traffic control; the integration of pilot and navigation service functions; enhanced communications; separation of small craft from tankers while undergoing berthing operations and the issue of a port guide for visiting vessels.

In relation to *Navigation Service*, the following recommendations were made: additional training for pilots and PEC holders; and the establishment of a navigational sub-committee which would deal with all navigational issues and standards affecting the Haven.

In relation to *Port Guidelines*, a recommendation was made to develop and adopt port manoeuvring guidelines, and, as part of the safety management system, to be implemented via procedural control. The guidelines covered criteria for the handling of ships, the use of tugs, limitations on the transit of vessels, communications and navigational aids.

In relation to *Small Vessels*, recommendations were made regarding general compliance. These included significantly raising the profile of regulations applying to pleasure craft and fishing vessels, such as regulations pertaining to exclusion zones, use and misuse of VHF radio, and impeding the navigation and manoeuvring of large vessels.

In view of MHPA's interest in maintaining a viable fishing industry at the port, it was to consider a policy of providing undeclared free pilotage for fishing vessels with communication difficulties. Alternatively, it was to consider employing a patrol boat to accompany groups of fishing vessels into Milford Dock, and to consider confining fishing vessels to the east channel.

With regard to the more specific risk fishing vessels posed to larger vessels, predominantly tankers, navigating within the Haven, the following relevant hazards were identified:

1. *Fishing vessel uncontrolled entry and exit to Milford Docks*
2. *No or little control exercised over fishing vessels. Fishing vessels tend not to obey or follow advice given by signal station, which makes port control and informing other vessels of what is happening in the Haven more problematic*

In both cases BOMEL identified control measures which included:

- *Generating an information booklet about the port.*
- *Improving restriction of vessel movements when bigger vessels are coming in or exiting the port.*
- *Port control system needs to be enhanced to become heart of port operations.*
- *Passage plan from ship to port control received in ample time and ensure vessels demonstrate passage plan has been completed.*

- *Back up port control system by management formally at a high level to provide operators with confidence.*
- *Language courses for port personnel dealing with foreign trawlers should be implemented.*
- *Education of how to communicate and navigate is needed via a port guide for all users.*

With regard to general risks, relevant to this incident, the following were identified:

1. *Ships leaving Haven are blind to traffic coming up channels until past land (Thorn Island). Good signal station information and port control system is required to control traffic.*
2. *Vessels having to alter course suddenly to avoid vessels on potential collision course.*
3. *Communication undertaken by locals using voice recognition. PEC holders and other vessels may need to take avoiding action due to non-dissemination of information.*

Again, suggested control measures identified in addition to those already mentioned, included, but were not limited to, the following:

- *Movement control through improved port control system, continuous knowledge of vessel location and assessment of risk by ships' positions relative to each other.*
- *Port control must become the centre of communications and port activity.*
- *Control of routes in and out of harbour should be enhanced by port control.*
- *Integration of pilots into navigation service.*
- *PECs should be ship specific and holders need to demonstrate understanding through examination.*

1.9 SAFE NAVIGATION

1.9.1 Pilots

The port of Milford Haven has 14 pilots. They are normally recruited primarily as marine officers employed in the port authority's port control, before they move into pilotage.

Pilots will begin as trainees, with the option of eventually becoming a Class 1 pilot after following a laid down progression procedure (**Annex 2**).

As trainee pilots, they are restricted to vessels of up to 20,000gt and, as part of their training towards the next level, are required to undergo simulator training, ship handling theory, and bridge team management training.

From trainee, to authorisation as a pilot, a person must have 12 months' experience. The person must also have undertaken a number of pilotage movements "trips", with some time spent under the supervision of a Class 1 pilot. In addition, further simulator training, which includes emergency procedures, must be undertaken.

Thereafter, there are four more steps to be taken until Class 1 status can be achieved. Each progression level requires a minimum of 12 months experience, a certain minimum number of trips, and further simulator training, including emergency procedures. This emergency procedure training does not take the form of specific exercises, apart from those involving escort tugs. Then various scenarios will be introduced during training for the recovery of the escorted vessel.

1.9.2 Pilot Exemption Certificate holders

MHPA grants PECs to masters or first officers who meet tripping requirements for particular zones and size of vessels (**Annex 3**). Currently there are 87 holders of PECs.

Irrespective of the "tripping" requirements, candidates applying for the first time are required to undertake a minimum of six trips to and from any berth within the Haven. At least 50% must be undertaken during the hours of darkness.

The number of trips depends on the zone and the length of the vessel. In general, the greater the length, the more trips that are required. Trips range from one inbound and one outbound for smaller vessels, and up to 20 trips inbound and outbound for larger vessels. A Milford Haven pilot must supervise each trip.

Once the prerequisite number of trips has been completed, MHPA examines the candidates':

- Competence in navigating safely in the Haven.
- Knowledge of local bylaws and regulations, tidal and geographical conditions, buoys and navigational marks.
- Practical familiarity with the use of local tugs when berthing or unberthing.
- Knowledge of communication procedures in the Haven.
- Working knowledge of English.
- Acuteness of vision and colour perception.

PECs are granted for a period not exceeding one year, and are conditionally renewed on application.

However, simulator training is not required for a PEC to be issued.

1.9.3 Escort tugs

MHPA escorts all loaded, or partially loaded vessels over 50,000 tonnes dwt, and all vessels over 25,000 tonnes dwt carrying heavy fuel, atmospheric residue or vacuum gas oil cargoes.

Passive escorting for all vessels over 50,000 tonnes dwt was introduced on 10 April 2002, with active escorting being introduced on 1 August 2002. Active escorting for those categorised vessels over 25,000 tonnes dwt was introduced on 1 January 2003.

1.10 VESSEL TRAFFIC SERVICE (VTS)

1.10.1 The role of VTS

The IMO's resolution A.578 (14) defines VTS as:

Any service implemented by a competent authority designed to improve safety and efficiency of vessel traffic and the protection of the environment. The service shall have the capability to interact with marine traffic and to respond to traffic situations developing in the VTS area.

The following are extracts from the IMO resolution A.857 (20) guidelines for VTS:

- 9.1.1 *An information service is a service to ensure that essential information becomes available in time for on-board navigational decisions.*
- 9.1.2 *A navigational assistance service is a service to assist on-board navigational decision making and to monitor its effects.*
- 9.1.3 *A traffic organisation service is a service to prevent the development of dangerous maritime traffic situations and to provide for safe and efficient movement of vessel traffic within the VTS area.*

The purpose of VTS is to improve the safety and efficiency of navigation and the safety of life at sea. It also improves the protection of the marine environment and/or the adjacent shore area, worksites and offshore installations from possible adverse effects of maritime traffic.

- 2.1.2.1 *The type and level of service or services rendered could differ between both types of VTS; in a port or harbour VTS a navigational assistance service and/or a traffic organisation service is usually provided for. While in coastal VTS usually only an information service is rendered.*
- 2.2.4.1 *When the VTS is authorised to issue instructions to vessels, these instructions should be result-orientated only, leaving the details of the execution, such as course to be steered or engine manoeuvres to be*

executed, to the master or pilot on board the vessel. Care should be taken that VTS operations do not encroach upon the master's responsibility for the safe navigation or disturb the traditional relationship between master and pilot.

As suggested in 2.1.2.1 above, there are two types of VTS: port/harbour and coastal. Both can be found throughout the world. The former is a service provided for ships entering and leaving the confines of a port and/or transiting within harbour limits. The latter is concerned with traffic passing through an area outside harbour limits.

A difference between a coastal VTS and a port/harbour VTS is in the amount of control of shipping a port/harbour VTS can have. For example, the former can direct a ship to leave an anchorage at a certain time, to slow her speed, or to enter a certain channel.

1.10.2 Milford Haven Port Control

The policy of Milford Haven port control (**Annex 4**) is as follows:

1. *The port control is to maintain a control of shipping movements by providing pertinent, accurate and timely advice to vessels entering or leaving the harbour.*
2. *The port control will consult and plan the sequence of vessel movements for both entry and exit from the Haven and advise masters and pilots of their place in any queue.*
3. *Policy will be to maintain the sequence of movements where practicable by instructing masters and pilots not to proceed until permission has been granted.*
4. *Once a movement has commenced, port control will support that movement through to completion.*
5. *Decisions made and advice given by marine officers pursuant to this policy carry the formal authority and support of the harbourmaster and general manager.*

1.10.3 VTS operator training

In accordance with the advice contained in MGN 239, entitled Vessel Traffic Services (VTS) and Port Information, Responsibilities of the UK Competent Authority, Statutory Harbour Authorities and VTS Authorities, UK VTS operators should be trained to the V 103 standard.

This standard requires operators to be competent in the following areas: language, traffic management, equipment, nautical knowledge, communication co-ordination, VHF radio, personal attributes and emergency situations.

1.11 SAFE NAVIGATION (FISHING VESSELS)

1.11.1 Previous incidents (fishing vessels – Milford Haven)

There has been an ongoing problem with fishing vessels navigating within the confines of Milford Haven. About 36 incidents have taken place in the last few years involving larger vessels (predominantly tankers) and fishing vessels (**Annex 5**). Ten of these incidents occurred in 1996. Since 1996 regular meetings between fishing vessel agents and MPHA have taken place which address these types of incidents.

The issue centres on regular near misses, especially when fishing vessels are navigating in the dark. To this extent, there are several documented incidents of such vessels leaving Milford Docks and attempting to pass to the north and into the Total Fina Elf Jetty. Other incidents involve close quarter situations and groundings.

MHPA and the MCA consider the problem to be one of competency and lack of concentration at crucial moments of navigation, particularly during hours of darkness, and have tried various methods to address the problem. Together with the Milford Docks Company, fishing vessel agents, MCA, and some fishing vessel skippers, significant efforts were made to improve matters through the provision of additional navigational aids and documentation designed to assist fishing vessels. Regular meetings were held with all stakeholders, and various initiatives were taken. One such initiative was to issue each visiting fishing vessel with procedures written in their own language, for entering and leaving the Haven. However, near misses continued to happen on a regular basis.

In response, on 1 October 2002, MHPA wrote to all fishing vessel agents expressing its concern at the continued near misses involving fishing vessels. It was brought to their attention, that in the port authority's opinion, the navigational aids provided were adequate, and communications were satisfactory. The agents had two distinct views about direct communication with fishing vessels sailing with crews whose knowledge of English was limited. Some felt port control spoke too much, and others not enough.

With regard to the communication medium of simplified guides and safety bulletins, the port authority noted that, again, opinion was divided. Some believed the port authority had gone too far, others felt it was sufficient.

With effect from 7 October 2002, as a way forward, MHPA informed all fishing vessel agents that it would prosecute if bylaw offences were committed, and would impose pilotage for a specified number of occasions at full tariff charge. However, to assist skippers who were new to the port, a pilot or a cutter vessel would be made freely available to assist in the navigation in and out of port the first time.

1.11.2 Fishing vessel agents

Milford Haven fishing vessel agents expressed the view that, on the whole, the problem is less serious than has been suggested. However, a number recognised that most of the incidents referred to were caused by errors made by a minority of fishing vessel skippers.

As a solution, they would like to see port control being more involved when vessels are navigating in and out of the Haven.

1.11.3 Certificates of Competency

Most fishing vessels using the port of Milford Haven employ certificated skippers, mates and engineers. Officers on these vessels hold a certificate of competency issued by the respective flag state, predominantly Spanish, French and Belgian.

Since the introduction of STCW 95, standards of training certification and watchkeeping have been harmonised throughout the maritime industry. In this respect, there is no evidence to suggest that those holding other EU states' certificates of competency are any less proficient than those holding certificates issued by the UK.

1.11.4 Navigational standards

Fishermen's representatives have informed the MAIB that fishing skippers are recruited primarily on their ability to catch fish; not necessarily on their ability to navigate. This does not necessarily mean that all fishing skippers are poor navigators.

However, MAIB investigations have found that the standard of navigation, especially watchkeeping on many fishing vessels, is poor. This is due, in main, to fishing skippers and crews generally paying insufficient attention. Other factors include the lack of passage planning, poor lookout arrangements and unfamiliarity with the Collision Regulations.

1.11.5 Marine guidance

In respect to navigation on board UK fishing vessels, the MCA has issued the following guidance:

Marine Guidance Note *MGN 84 (F)* entitled: *Keeping a Safe Navigational Watch on Fishing Vessels* (**Annex 6**). Relevant parts of the Note read as follows:

1. *Why Should I Keep a Watch on Fishing Vessels?*
 - 1.1 *Investigations into collisions and groundings involving fishing vessels have continued to show that poor watchkeeping is a major cause. In many cases one or more of the following were important factors;*
 - (a) *an unqualified or inexperienced man in charge of the watch;*
 - (b) *only one man on watch;*
 - (c) *a poor lookout being kept;*
 - (d) *divided command; and*
 - (e) *fatigue*
4. *Navigation*
 - 4.2 *It is important that watchkeepers maintain a close watch on their own vessel and always know the position, speed and course steered.*
7. *Lookout*
 - 7.1 *It is absolutely essential that a proper lookout is kept at all times. Casualties to fishing vessels, resulting in loss of life, continue to occur because of the lack of a lookout. In addition to assessing the situation and risk of collision, stranding or other navigation dangers, the duties of the lookout should include the detection of other vessels.*

1.11.6 Safety Management System

In July 2002, all seagoing merchant vessels over 500 gross tons became subject to International Safety Management (ISM) requirements, and in doing so, were required to have in place a safety management system.

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) sets an international standard for the safe management and operation of ships. It also requires companies to document and implement clear procedures, standards and instructions for safety management ashore and afloat. This includes the safe navigation of vessels.

Fishing vessels, however, are not subject to the same regulations. In the UK, under the *Merchant Shipping and Fishing Vessels (Health and safety at Work) Regulations 1997*, which came into effect on 31 March 1998, risk assessment was introduced as a means to safety management.

Employers are required to make a suitable and sufficient assessment of the risks to health and safety of workers arising in the normal course of their activities or duties. The requirement to assess risk relates only to those which arise directly from the work activity being undertaken and which have the potential to harm the person(s) actually undertaking that work.

However, advice provided by the MCA states that the requirement to assess risk does not extend to any consequential peril to the ship resulting from the particular work activity, nor to any external hazards which may imperil the ship, either of which may cause harm to those on board or to others. The MCA is currently reviewing this anomaly.

1.12 ELECTRONIC RECORDING

1.12.1 VTS

The MAIB was able to obtain the radar recording from MHPA port control. Some of this recording has been reproduced in the form of still photographs (**Figures 6,7,8**).

1.12.2 Vessels

In addition to the recording obtained from port control, the MAIB was able to download the historic information from the Transas ECDIS system on board *Noordhinder*. The information from *Bro Axel's* ECDIS was not available.

The information contained from both Milford Haven's port control and *Noordhinder's* ECDIS enabled the MAIB to carry out a more thorough investigation than might have been possible without this information.

1.13 SIMULATION

Two simulations of the incident were carried out by the MAIB in March and April 2003. The first was at Marchwood, on Warsash Maritime Centre's Nor Control multi-purpose simulator. The second was on its Sindel modelling simulator.

The models used for both simulations were based on vessels having characteristics similar to those of *Bro Axel*.

The purpose of the simulation was to determine whether *Bro Axel's* master took the most appropriate emergency course of action in this incident. Also, whether an alternative course of action could have prevented the vessel from running aground, and the best course of action to take, given a similar situation in the future. The results of the simulations are detailed in (**Annex 7**).



Figures 6, 7 & 8 - Milford Haven VTS recordings

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 GENERAL

This incident has highlighted the many near misses involving fishing vessels and larger vessels, mainly tankers, in the confines of Milford Haven. Despite the control measures introduced by the port authority to reduce or eliminate these incidents, near misses continue to happen.

Since the meeting between MHPA and the fishing vessel agents, the frequency of incidents has reduced. Nevertheless, the incidents continue to happen.

In this case, fortunately, there were no injuries, no damage to either vessel and no pollution. However, the potential for a much more serious accident was evident. In light of this, this report will culminate in various recommendations to prevent a recurrence.

Reporting of near misses or hazardous incidents, as they are called in the Merchant Shipping (Accident Reporting and Investigation) Regulations 1999, is not mandatory and consequently is limited. Therefore, in this respect, the number of similar hazardous incidents involving both fishing vessels, and larger vessels, which have occurred in other UK ports, is uncertain.

Data held by the MAIB suggests that the problem in other ports is not so prevalent. But this view may be affected by under-reporting. However, compared with other port authorities, the MHPA makes a conscientious attempt to report all incidents, however minor.

In relation to this incident the recommended risk control measures have all been evaluated/reviewed by the Authority's Marine Committee and implemented when practicable. Since the incident further risk control measures have been introduced.

2.3 THE INCIDENT

2.3.1 Action by *Noordhinder*

When *Noordhinder*'s skipper started turning the vessel into the east/west channel, even though he had been informed by port control that there were two outward bound vessels, he was totally unaware of their proximity. He was standing in the forward part of the wheelhouse, navigating from buoy to buoy, by eye only. The mate, who was also on watch, was acting as lookout. However, they failed to detect the closeness of *Bro Axel* to their own position. They were thus in contravention of Rule 5 of the collision regulations because a proper lookout was not kept (**see Annex 1**).

Although backscatter from the various refineries' lights was a possible factor in their not realising how close the tanker was, neither of them was making any use of the available navigational equipment. *Noordhinder* was fitted with ARPA radar but no radar plotting was being carried out. Had they done so, it is likely that they would have detected *Bro Axel* at a much earlier stage. The incident could then have been avoided.

When the fishing vessel turned into the main channel, the skipper applied 15° of starboard helm, which took *Noordhinder* to the north side of the channel. This manoeuvre was in contravention of Rule 9 of the Collision Regulations (**see Annex 1**).

Such an action was normal practice. On other occasions, when making this turn it was not uncommon to leave the channel altogether, to the north, before eventually returning to the south, the correct side. No passage planning had been conducted and no reference to any charts, paper or electronic, was made.

On this occasion, had the passage been planned correctly, the turn into the channel could have been executed carefully. This would have allowed *Noordhinder* to remain on the correct side of the channel. The confusion presented to *Bro Axel*'s master would then have been alleviated.

When the turn into the channel was completed, it was always the intention of *Noordhinder*'s skipper to return to the starboard side of the channel. However, *Bro Axel*'s master was unaware of this. Sounding one short blast in accordance with Rule 34 of the Collision Regulations, in ample time and in advance of his starboard manoeuvre, could have alleviated any confusion the master of *Bro Axel* might have had. The sound signal could have prompted *Bro Axel*'s master to find out by VHF radio what *Noordhinder*'s intentions were at a much earlier stage. A close quarters situation could then have been avoided.

When *Bro Axel* began altering course to port, *Noordhinder*'s skipper, by then fully aware of the presence and close proximity of *Bro Axel*, was alarmed. He fully expected her master to maintain course and speed, or alter course to starboard. When this did not happen, he came full astern on both engines to prevent a collision.

2.3.2 Action by *Bro Axel*

Bro Axel's master was aware that a fishing vessel, *Noordhinder*, was inward bound via the east channel. He had been informed of this by port control when he reported his position at 0327. However, later, when *Noordhinder* reported in for the second time, crucially, *Bro Axel's* master mistakenly thought he heard *Noordhinder's* skipper inform port control that he would pass to the north of the tanker.

When *Noordhinder* made her turn, which took her to the north and out of the channel, *Bro Axel's* master was unconcerned as this reinforced his belief that *Noordhinder* would keep to the north.

Only when *Noordhinder* began to show at first alternating green and red sidelights, followed by a steady red sidelight, did he become concerned. At that point he made the VHF radio call. However, five short blasts on the ship's whistle in accordance with Rule 34 of the Collisions Regulations would have been more appropriate, as this would have alerted *Noordhinder's* skipper to a potential misunderstanding.

When he eventually realised that both vessels were on a collision course he ordered 15° of port helm.

Noordhinder's skipper confirmed with port control that he would proceed on the south side of the channel. *Bro Axel's* master misheard this message, and thought he was passing on the channel's north side.

2.4 PORT CONTROL

Apart from acknowledging the mandatory reporting-in VHF radio calls, Milford Haven port control had no other involvement in the incident.

It is probable that had port control intervened at some stage, the incident could have been avoided.

The vessels were being monitored by the marine operator who was on watch during the course of the incident, along with the marine officer who was absent at the time. Notwithstanding the need for necessary breaks, his absence played a major part in the events that unfolded.

Initially, given the limited width of the channel, it would have been prudent of the marine officer to have instructed *Noordhinder* to proceed north to the anchorages and hold until *Bro Axel* was past and clear. This would have allowed *Bro Axel* a free and unhindered passage. The time delay to *Noordhinder* would have been insignificant.

A further intervention could have been made when *Noordhinder* reported that she would navigate to the south side of the channel. It would have been a simple matter, given the developing events, to ask *Bro Axel's* master if he had copied and fully understood *Noordhinder's* intentions, especially considering that both the skipper and master were conversing in a language other than their own. In many VTS areas, this is normal practice, and is also in accordance with Milford Haven's port control policy in particular, which is to provide accurate and timely advice.

When *Noordhinder* was turning into the channel and was seen to track to the north, an intervention by port control, instructing *Noordhinder* to return immediately to the correct side of the channel, could also have been made.

A further intervention was possible when the distance between both vessels began to decrease, and the possibility of a collision became likely. Any one of these interventions by port control would have averted the incident. So why then did the marine officer not intervene?

The IMO resolution on the role of VTS is careful not to advise VTS operators to give specific navigational advice to masters and officers. This reflects the concern highlighted by previous MAIB accident investigations; that in many VTS operations, operators are reluctant to issue navigational instructions, for fear of litigation should an incident occur.

Considering all the above issues, there is a case for MHPA having a more detailed port control policy with greater emphasis on directing traffic in clear procedural ways. In addition to this, further operator training in the form of the prescribed V103 standard is advised.

2.5 OTHER METHODS (VESSEL DE-CONFLICTION)

MHPA has a number of optional methods of vessel de-confliction available.

These include more frequent use of escort tugs, extending exclusion zones in relation to tanker movements and allocating holding areas for use by smaller vessels when tanker movements are undertaken.

However, each method encroaches on other users of the port, and the resources of the port itself.

In respect to more frequent use of escort tugs, this inevitably means increasing port resources as far as manpower and, possibly, escort vessels are concerned.

With regard to exclusion zones and holding areas for use by smaller vessels, predominantly fishing vessels, this would have an effect on the vessels' commercial operation, given the restrictions of entry and exit to Milford Docks, which is governed by the tide.

These measures, together with the current system of navigation permits, starting with either escorting or piloting a fishing vessel for its first entry/exit to the port, should contribute to safer vessel operation within the confines of Milford Haven. In addition to this, to complement feedback with regard to bylaw infringements, port control could monitor fishing vessels and maintain an intervention log.

Further, MHPA, together with stakeholders, should consider conducting a risk assessment for the cut-off point for vessels requiring escort tugs. They should examine specific circumstances where the risk of grounding is significantly influenced.

2.6 EMERGENCY RESPONSE

2.6.1 *Noordhinder*

The action taken by *Noordhinder*'s skipper, in coming full astern on the main engine, prevented a collision. However, he became totally disorientated. As a result, his vessel collided with the Esso Buoy. This erratic movement thereafter left the master of the outgoing ferry, *Isle of Inishmore*, uncertain of his intentions.

2.6.2 *Bro Axel*

After ordering 15° of port helm to prevent a collision, *Bro Axel*'s master elected to come full astern on the main engine when *Noordhinder* was approximately amidships. This was the point at which the master felt safe to carry out further emergency manoeuvres. However, his actions did not prevent *Bro Axel* from running aground. Nevertheless, it has to be said that the grounding was slight in comparison to running aground with ahead propulsion.

By good fortune, the area of grounding was predominantly sand. Had it been rocky, as it was either side of the area where she grounded, it is more than likely that *Bro Axel* would have sustained damage to her hull, and possibly caused pollution as a consequence.

According to the modelling and simulations carried out by Warsash Maritime Centre and Marchwood, other emergency manoeuvring options were available. These showed that had *Bro Axel*'s master come hard-to-starboard when *Noordhinder* was amidships, as opposed to coming astern, *Bro Axel* would not have grounded. She would have left the main channel slightly to the south of the Chapel Buoy. By coming hard-to-starboard at the same point, and using full ahead propulsion, she would have remained in the channel.

However, faced with the same situation as *Bro Axel*'s master at the time of the incident, most masters and watchkeepers would probably have made the same manoeuvre.

Although the master was on board for *Bro Axel's* manoeuvrability trials when she was first delivered, he had received no training in emergency response ship handling. Such lack of training is probably faced by many masters and officers.

Given such training, *Bro Axel's* master might have been better aware of his vessel's capabilities in an emergency situation, thus decreasing the chance of running aground. In this respect, Brostrum Ship Management, and shipping companies in general, should consider introducing simulator training in emergency response procedures for watchkeepers and masters.

2.6.3 Pilots and PEC holders (training)

During the course of their training, Milford Haven pilots undergo several stages of simulator training. The emergency response training includes specific exercises, these are not recorded for individual pilots.

Moreover, PEC holders are not required to have this training, even though, as this incident has shown, both pilots and PEC holders could be faced with the same emergency situation.

Some form of simulator training in emergency response procedures, for PEC holders in all UK ports, could have a positive effect on safer pilotage. In this context, UK ports should consider specifying the degree of emergency response procedure training PEC holders should receive.

The safe management of port operations could be enhanced if guidelines for the issuing of PECs were contained in the Port Marine Safety Code.

2.7 FISHING VESSELS (SAFETY MANAGEMENT)

Many organisations concerned with fishing vessel safety recognise the benefits to be gained by introducing a safety management system similar to the ISM Code currently in force on board merchant vessels.

Given adherence to clear documented standards and procedures that a safety management system should have, it is possible that *Noordhinder's* navigational watch would have taken into consideration the need to make full use of the navigational equipment, and plan the passage.

However, in the UK, fishing vessel safety management is limited to the assessment of risks in the workplace, and there is no requirement to have documented procedures or standards. This is a commonsense approach to a simple means of achieving a safety management system. *Noordhinder* is Belgian registered, so the UK administration has no power to require her skipper or owner to undertake risk assessments.

Nevertheless, the owner and skipper of *Noordhinder* should consider introducing some form of safety management system on board their vessels.

2.8 PILOTAGE

In accordance with the Pilotage Act, UK competent harbour authorities may, if they so desire, impose pilotage on vessels 20m in length or more, apart from fishing vessels where the length is increased to 47.5m or more.

However, in practice, pilotage is rarely imposed on vessels of less than 50m in length, unless there are special circumstances in relation to the port.

About 95% of fishing vessels are less than 47.5m in length, so are excepted from pilotage.

As this report has highlighted, in relation to the many near misses in Milford Haven involving fishing vessels, and possibly also in other ports, had the harbour authority the power to impose pilotage, these could have been avoided had the vessels in question had the aid of a pilot.

In most cases it is unlikely that harbour authorities would impose impromptu pilotage on fishing vessels except in extreme cases where it was deemed absolutely necessary in the interests of safety. However, the facility would be there if needed.

In line with this, a uniform length in respect to all vessels would seem a sensible approach to reducing the possibility of near miss incidents such as those in Milford Haven.

However, on the basis that 95% of fishing vessels are excepted from pilotage, based on length, the MAIB does not believe that, on the basis of this accident, a change in the Act to accommodate large fishing vessels is necessary.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES

Relating to the Near Miss

1. The failure by *Noordhinder*'s skipper and mate to detect the close proximity of *Bro Axel* in Milford Haven's east/west channel. [2.3.1]
2. The execution of the turn into the east/west channel by *Noordhinder*'s skipper. [2.3.1]
3. The position in the channel of *Noordhinder* after the execution of the turn. [2.3.1]
4. The lack of any passage plan by *Noordhinder*. [2.3.1]
5. The master of *Bro Axel* mistakenly hearing, on the VHF radio, that *Noordhinder* would pass to the north of the tanker. [2.3.2]
6. The lack of any intervention by Milford Haven port control. [2.4]
7. The absence of the marine officer from the port control room. [2.4]

Relating to the Grounding

8. *Bro Axel*'s master altering course to port. [2.3.1]
9. *Bro Axel*'s master deciding to come astern on the main engines as opposed to hard-to-starboard on the helm. [2.6.2]
10. The master's unfamiliarity with emergency response manoeuvres in relation to his vessel. [2.6.2]
11. The lack of any simulator training in relation to emergency response procedures for Milford Haven PEC holders. [2.6.3]

Other safety issues

12. MHPA's risk assessment document has identified the majority of safety issues. [2.2]
13. Near misses involving fishing vessels and tankers have continued, despite the control measures introduced by MHPA. [2.2.]
14. The current system of navigation permits, in relation to fishing vessels, should contribute to safer vessel operation in the port of Milford Haven. [2.5]

15. A risk assessment involving stakeholders for the cut-off point for vessels requiring escort tugs, specifically looking at circumstances where risk is significantly influenced, should also contribute to safer vessel operation. [2.5]
16. Training in emergency response procedures for PEC holders in all UK ports would be a positive safety measure. [2.6]
17. Some form of safety management system on board *Noordhinder* and otherfamily owned vessels would be beneficial. [2.7]
18. Harmonising the Pilotage Act with a uniform length of 20m and over, for all vessels, subjected to pilotage, if deemed necessary in the interests of safety, would be a sensible approach. [2.8]

SECTION 4 - ACTION TAKEN

1. Since the incident, Milford Haven Port Authority has introduced a system of navigation permits applicable to all fishing vessels (**Annex 8**).

This system requires all fishing vessels to obtain such a permit by undergoing a briefing with an ex-fisherman, now employed by Milford Haven Port Authority, followed by entry or exit with a pilot on board, or escort, who will carry out an assessment of the skippers navigational capabilities.

If the skipper meets the criteria, a permit is issued with a unique number. Once that particular skipper has his unique number he will be allowed to enter or depart without the aid of a pilot or escort vessel at night.

2. A Chief Inspector of Marine Accidents' letter has been sent to Milford Haven Port Authority recommending it to:
 1. Introduce a more detailed port control policy with more emphasis on the direction of traffic in clear procedural ways.
 - operator training in the form of the IMO prescribed V103 standard.
 - intervention log and feedback system.
 2. Introduce a risk assessment with stakeholders for the cut-off point for vessels requiring escort tugs, specifically looking at circumstances where risk is significantly influenced.
 3. Introduce simulator training in emergency response procedures for its PEC holders and formalise specific emergency exercises for pilots.
 4. A Chief Inspector's letter has also been sent to the owner and skipper of *Noordhinder* recommending them to:
 - Introduce some form of safety management system on board *Noordhinder* and other vessels they may own and operate.
 5. A chief inspector's letter has also been sent to the managers of *Bro Axel* recommending them to:
 - Introduce simulator training in emergency response procedures for its masters and officers.

SECTION 5 - RECOMMENDATIONS

In addition to the recommendations in the Chief Inspector's letter, **The Chamber of Shipping** is recommended to:

1. Consider advocating simulator training in emergency response procedures, which encompasses ship manoeuvrability for masters and officers.

Ports Division of the Department for Transport is recommended to:

2. Draw attention to all Competent Harbour Authorities which issue Pilot Exemption Certificates to:
 - Consider the value of introducing simulator training in emergency response procedures, specifying the degree of training required for PEC holders and pilots.
 - Consider making the successful completion of simulator training in emergency response procedures for PEC holders and pilots, a requirement under section 8 of the Pilotage Act 1987.
3. Consider issuing guidelines, in relation to the Port Marine Safety Code, for the training in emergency response procedures for PEC holders and pilots.

Marine Accident Investigation Branch
September 2003

REGULATIONS FOR PREVENTING COLLISIONS AT SEA

Rule 2

The International Regulations for Preventing Collisions at Sea, Rule 2, Responsibility, states:

- (a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.*
- (b) In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessel involved, which may make a departure from these Rules to avoid immediate danger.*

Rule 5

Rule 5, Look-out states:

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

Rule 9

Rule 9 Narrow Channels states:

- a) A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit or fairway which lies on her starboard side and is safe and practicable.*
- b) A vessel of less than 20 metres in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.*
- c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.*
- d) A vessel shall not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway. The latter vessel may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel.*

e) (i) *In a narrow channel or fairway when overtaking can take place only if the vessel to be overtaken has to take action to permit safe passing, the vessel intending to overtake shall indicate her intention by sounding the appropriate signal prescribed in Rule 34(d). The vessel to be overtaken, shall if in agreement, sound the appropriate signal prescribed in Rule 34(c)(iii) and take steps to permit safe passing. If in doubt she may sound the signals prescribed in Rule 34(d).*

(ii) *A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(d)*

A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(e)

Any vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel.

Rule 16

Rule 16, *Action by Give-way Vessel* states:

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

Rule 17

Rule 17, *Action by Stand-on vessel* states:

a) (i) *Where one of two vessels is to keep out of the way the other shall keep her course and speed.*

(ii) *The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.*

b) *When from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.*

c) *A power-driven vessel which takes action in a crossing situation in accordance with sub-paragraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.*

d) *This Rule does not relieve the give-way vessel of her obligation to keep out of the way.*

Rule 34

Rule 34, *Manoeuvring and Warning Signals*, in part, states:

- (a) *When vessels are in sight of one another, a power-driven vessel underway, when manoeuvring as authorised or required by these Rules, shall indicate that manoeuvre by the following signals on her whistle:*
- *one short blast to mean “ I am altering my course to starboard” ;*
 - *two short blasts to mean “I am altering my course to port”*
 - *Three short blasts to mean “ I am operating astern propulsion”*
- c) *When vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes.*
- d) *A vessel nearing a bend or an area of a channel or fairway where other vessels may be obscured by an intervening obstruction shall sound one prolonged blast. Such signal shall be answered with a prolonged blast by any approaching vessel that may be within hearing around the bend or behind the intervening obstruction.*

PILOT TRAINING PROCEDURES – MILFORD HAVEN

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 28 of 80 |
|---------------|---|-----------------------------|

MILFORD HAVEN PORT AUTHORITY

PROGRESSION PROCEDURES FROM TRAINEE PILOT TO CLASS 1 PILOT

DEFINITION OF PILOT CLASSES

Class 6 Restricted to ships up to 20,000 GT. and 30,000 DWT*

Class 5 Restricted to ships up to 35,000 GT.

Class 4 Restricted to ships up to 50,000 GT.

Class 3 Restricted to ships up to 65,000 GT.

Class 2 Restricted to ships up to 80,000 GT.

Class 1 Unrestricted (Over 80,000 GT.)

- **NB.** A Class 6 Pilot may not have sole charge of any ship over 20,000 GT. or over 30,000 DWT.

(1) TRAINEE PILOT

(a) Induction Training

- (i) Safety procedure including boarding and landing.
- (ii) Tanker Safety Course (if applicable).
- (iii) Helicopter Familiarisation.

(b) Theory (See syllabus – Appendix 5 MOP 003)

(c) Practical

A minimum of 150 trips, of which 75 must be during the hours of darkness, to and from all berths and anchorages.

In addition :-

- (i) A minimum of 6 tug trips (including escort towage if implemented).

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 29 of 80 |
|---------------|---|-----------------------------|

- (ii) Five days in the Port Control from 0700 to 1900 hours.
- (iii) One day at each Oil Terminal, Pembroke Port, Ferry Terminal and Carr Jetty.
- (iv) Two Line Boat operations.
- (v) Two Lock Operations with the Milford Docks Company.
- (vi) Four Ferry Trips.

(d) **Courses**

- (i) Manned model course (including ship handling theory)
- (ii) Simulator
- (iii) Bridge Team Management/Bridge Resource Management

(e) **Assessment Interviews (Monthly)**

- (i) Assess Progress (Annexe 2 & 3)
- (ii) Examine Tripping Book (Annexe4)
- (iii) Identify Future Requirements
- (iv) Feedback on progress from Training Pilot

(f) **Examination by :**

- (i) Harbourmaster
- (ii) Examining Pilot
- (iii) Independent person with relevant marine experience

NOTE: Examination to be oral together with tripping book and formal assessment forms. (Annex 5)

(g) **Authorisation by CHA to 20,000 gt./30,000 dwt. (Class 6)**

NOTE: That trainee must not have the conduct of vessels when the charge pilot is only authorised to Class 6.

2. **UPGRADE AUTHORISATION 20,000 – 35,000 GT. (CLASS 6 – CLASS 5)**

- (a) Twelve months experience following authorisation.
- (b) A minimum of six assessment trips, having the conduct of, but under the supervision of a Class 1 pilot, on vessels between 20,000 and 50,000 gt.) Four must be inwards. Assessment trips may be made with any

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 30 of 80 |
|---------------|---|-----------------------------|

Class 1 Pilot, however, tripping with only one Pilot will not be accepted. At least one of the trips must be with the Training Pilot. Further, a minimum score of 36 points should be obtained from the Job Difficulty Table (see Annexe 1).

- (c) Simulation review – to include emergency procedures.
- (d) Assessment by :
 - (i) Harbourmaster
 - (ii) Class 1 Pilot
 - (iii) Training Pilot
- (e) Authorisation by CHA Board to 35,000 gt. (Class 5)

3. UPGRADE FROM 35,000 – 50,000 GT. (CLASS 5 – CLASS 4)

- (a) Twelve months experience from date of authorisation, and had the charge of at least ten vessels of 20,000 – 35,000 g.t..
- (b) A minimum of six assessment trips, having the conduct of, but under the supervision of a Class 1 pilot, on vessels between 35,000 – 65,000 gt. Four must be inwards. Assessment trips may be made with any Class 1 Pilot, however, tripping with only one Pilot will not be accepted. At least one of the trips must be with the Training Pilot. Further, a minimum score of 36 points should be obtained from the Job Difficulty Table (see Annexe 1).
- (c) Simulation review – to include emergency procedures.
- (d) Assessment by :-
 - (i) Harbourmaster
 - (ii) Class 1 Pilot
 - (iii) Training Pilot
- (e) Authorisation by CHA Board up to 50,000 gt. (Class 4)

4. UPGRADE FROM 50,000 – 65,000 GT. (CLASS 4 – CLASS 3)

- (a) Twelve months experience from date of authorisation and had charge of a minimum of ten vessels of 35,000 – 50,000 gt.
- (b) A minimum of twelve assessment trips, having the conduct of, but under the supervision of a Class 1 pilot, on vessels between 50,000 and 80,000 gt. Eight must be inwards. Assessment trips may be made with any Class 1 Pilot, however, tripping with only one Pilot will not be accepted. At least one of the trips must be with the Training Pilot. Further, a minimum score of 64 points should be obtained from the Job Difficulty Table (see Annexe 1).

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 31 of 80 |
|---------------|---|-----------------------------|

(c) Simulation review – to include emergency procedures.

(d) Assessment by :

- (i) Harbourmaster
- (ii) Class 1 Pilot
- (iii) Training Pilot

(e) Authorisation by CHA to 65,000 gt. (Class 3)

5. UPGRADE FROM 65,000 – 80,000 GT. (CLASS 3 – CLASS 2)

(a) Twelve months experience from date of authorisation, and had charge of a minimum of ten vessels of 50,000 – 65,000 gt.

(b) A minimum of six assessment trips, having the conduct of, but under the supervision of a more experienced pilot, on vessels over 65,000 gt. Four must be inwards. Assessment trips may be made with any Class 1 Pilot, however, tripping with only one Pilot will not be accepted. At least one of the trips must be with the Training Pilot. Further, a minimum score of 36 points should be obtained from the Job Difficulty Table (see Annexe 1).

(c) Simulation review – to include emergency procedures.

(d) Assessment by :

- (i) Harbourmaster
- (ii) Class 1 Pilot
- (iii) Training Pilot

(e) Authorisation by CHA Board up to 80,000 gt. (Class 2)

6. UPGRADE TO ANY VESSEL OVER 80,000 GT. (CLASS 2 – CLASS 1)

(a) Twelve months experience from date of authorisation, and had charge of a minimum of ten vessels of 65,000 – 80,000 gt.

(b) A minimum of six assessment trips, having the conduct of, but under the supervision of a Class 1 pilot, on vessels over 80,000 gt. Four trips must in inwards. Assessment trips may be made with any Class 1 Pilot, however, tripping with only one Pilot will not be accepted. At least one of the trips must be with the Training Pilot. Further, a minimum score of 32 points should be obtained from the Job Difficulty Table (see Annexe1).

(c) Simulation review – to include emergency procedures.

REQUIREMENTS – PEC HOLDERS – MILFORD HAVEN

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 48 of 80 |
|---------------|---|-----------------------------|

PILOTAGE EXEMPTION CERTIFICATE REQUIREMENTS

MILFORD HAVEN PORT AUTHORITY

PILOTAGE EXEMPTION CERTIFICATE REQUIREMENTS

MHPA EX.1

1.0 APPLICATIONS/QUALIFICATIONS

Pilotage exemption certificates (PEC's) for the Port of Milford Haven will be granted by the Milford Haven Port Authority (hereinafter referred to as "the Authority") to persons who are bona fide masters or first mates of ships and who have satisfactorily completed the following:-

- (a) Tripping requirements for the Zone and size of vessel (see below)

NOTE:

Irrespective of the tripping requirements stated below, candidates applying for an exemption certificate for the first time will be required to undertake a minimum of 6 trips in and 6 trips out to and from any berth within the Haven. At least 50% must be undertaken during the hours of darkness.

- (b) Attended the Port Control
- (c) Application form MHPA Ex.2
- (d) Oral examination arranged by the Authority.

2.0 VESSELS

The list of vessels for which the exemption certificate holder may apply will be limited by the Authority at their discretion to those of a similar size **and similar handling characteristics**

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 49 of 80 |
|---------------|---|-----------------------------|

such as sister ships, **or other vessels on which the holder has had adequate Pilotage experience.**

3.0 ZONES

- Zone 1 - From seaward as far as the western extremity of the Herbrandston Jetty.
- Zone 2 - From the western end of Herbrandston to Wear Spit excluding all berths, Milford Docks and Pennar Gut.
- Zone 2H - Herbrandston.
- Zone 2E - Elf 1, 2.
- Zone 2T - Texaco 1, 2, 3, 6, 7, 8.
- Zone 2PP - Petroplus 1, 2, 3.
- Zone 3E - Elf 3.
- Zone 3T4 - Texaco 4.
- Zone 3T5 - Texaco 5.
- Zone 4 - Milford Dock and the approach channel thereto.
- Zone 5 - From the Wear Spit to the Cleddau Bridge excluding all berths and buoys.
- Zone 5P - Port of Pembroke.
- Zone 5F - Ferry Terminal.
- Zone 5C - Carr Jetty.
- Zone 5M - Mainport Jetty.
- Zone 6 - Pennar Gut.
- Zone 7 - Cosheston Pill.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 50 of 80 |
|---------------|---|-----------------------------|

4.0 TRIPPING REQUIREMENTS

The following are the minimum requirements for completion within the 12 months immediately preceding the application:-

4.1 ZONE 1 - FROM SEAWARD AS FAR AS THE WESTERN EXTREMITY OF THE HERBRANDSTON JETTY

- a. *A ship of 50m, but not exceeding 130m, in length overall :*

One trip inwards and one trip outwards via both the East and West channels with a Milford Haven authorised Pilot. At least one inward trip and one outward trip to be during the hours of darkness.

- b. *A ship of 130m, but not exceeding 190m, in length overall :*

3 trips inwards and 3 trips outwards via both the East and West Channels with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 2 inward trips and 2 outward trips to be during the hours of darkness

- c. *A ship of over 190m, in length overall :*

20 trips inwards and 20 trips outwards via the West channel with a Milford Haven authorised Pilot. 50% of the trips to be during the hours of darkness.

4.2 ZONE 2 - FROM THE WESTERN END OF HERBRANDSTON TO WEAR SPIT EXCLUDING ALL BERTHS, MILFORD DOCKS AND PENNAR GUT

- a. *A ship of 50m, but not exceeding 130m, in length overall :*

3 trips inwards and 3 trips outwards between the western end of Herbrandston to Wear Spit excluding all berths, Milford Docks and Pennar Gut with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

- b. *A ship of 130m, but not exceeding 150m, in length overall :*

6 trips inwards and 6 trips outwards between the western end of Herbrandston and Wear Spit excluding all berths, Milford Docks and Pennar Gut with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure M0P 003 PILOTAGE | Revision D Page 51 of 80 |
|---------------|---|-----------------------------|

c. A ship of 150m. but not exceeding 190m. in length overall :

10 trips inwards and 10 trips outwards between the western end of Herbrandston and Wear Spit excluding all berths, Milford Docks and Pennar Gut with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

d. A ship of over 190m. in length overall :

20 trips inwards and 20 trips outwards between the western end of Herbrandston and Wear Spit excluding all berths, Milford Docks and Pennar Gut with a Milford Haven authorised Pilot, or at least 20 trips with a Milford Haven authorised Pilot and 20 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.2.1 ZONE 2H - Herbrandston

a. A ship of 50m. but not exceeding 130m. in length overall :

3 trips inwards and 3 trips outwards to/from Herbrandston with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder.

b. A ship of 130m. but not exceeding 150m. in length overall :

6 trips inwards and 6 trips outwards to/from Herbrandston with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder.

c. A ship of 150m. but not exceeding 190m. in length overall :

10 trips inwards and 10 trips outwards to/from Herbrandston with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder.

d. A ship over 190m in length overall :

20 trips inwards and 20 trips outwards to/from Herbrandston with a Milford Haven authorised Pilot, or at least 20 trips with a Milford Haven authorised Pilot and 20 trips with an exemption certificate holder.

NOTE: No vessels accepted at Herbrandston during the hours of darkness.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 52 of 80 |
|---------------|---|-----------------------------|

4.2.2 ZONE 2E - Elf 1, 2

- a. A ship of 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards to/from Elf 1 or 2 berths with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

NOTE: Provided that a candidate already holds an exemption for Zone 3E then only 1 inward trip and 1 outward trip is required.

- b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards to/from Elf 1 or 2 berths with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of trips to be during the hours of darkness.

- c. A ship of 150m, but not exceeding 190m, in length overall :

10 trips inwards and 10 trips outwards to/from Elf 1 or 2 berths with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

- d. A ship over 190m, in length overall :

20 trips inwards and 20 trips outwards to/from Elf 1 or 2 berths with a Milford Haven authorised Pilot, or at least 20 trips with a Milford Haven authorised Pilot and 20 trips with an exemption certificate holder. 50% of the trips to be during the hours of darkness.

4.2.3 ZONE 2T : Texaco, 1, 2, 3, 6, 7, 8

- a. A ship of 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards to/from any of the outside Texaco berths with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

NOTE: Provided that a candidate already holds an exemption for Zone 3T4 OR 3T5 then only 1 inward trip and 1 outward trip is required

- b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards to/from any of the outside Texaco berths with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

- c. A ship of 150m, but not exceeding 190m, in length overall :

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 53 of 80 |
|---------------|---|-----------------------------|

10 trips inwards and 10 trips outwards to/from any of the outside Texaco berths with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

d. A ship over 190m. in length overall :

20 trips inwards and 20 trips outwards to/from any of the outside Texaco berths with a Milford Haven authorised Pilot, or at least 20 trips with a Milford Haven authorised Pilot and 20 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.2.4 ZONE 2PP : Petroplus 1, 2, & 3

a. A ship of 50m. but not exceeding 130m. in length overall :

3 trips inwards and 3 trips outwards to/from Petroplus 1, 2, or 3 berths with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 trip inwards and 1 trip outwards to be during the hours of darkness.

b. A ship of 130m. but not exceeding 150m. in length overall :

6 trips inwards and 6 trips outwards to/from Petroplus 1, 2 or 3 berths with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

c. A ship of 150m. but not exceeding 190m. in length overall :

10 trips inwards and 10 trips outwards to/from Petroplus 1, 2 or 3 berths with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

d. A ship over 190m. length overall :

20 trips inwards and 20 trips outwards to/from Petroplus 1, 2, or 3 berths with a Milford Haven authorised Pilot, or at least 20 trips with a Milford Haven authorised Pilot and 20 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.3 ZONE 3E - ELF 3

a. A ship of 50m. but not exceeding 100m. in length overall :

3 trips inwards and 3 trips outwards to/from Elf No. 3 berth with a Milford Haven authorised Pilot. At least 1 inward trip and 1 trip outwards to be during the hours of darkness.

b. A ship of 100m. but not exceeding 130m. in length overall :

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 54 of 80 |
|---------------|---|-----------------------------|

6 trips inwards and 6 trips outwards to/from Elf No. 3 berth with a Milford Haven authorised Pilot. At least 50% of the trips to be during the hours of darkness.

4.3.1 ZONE 3T4 - Texaco 4

A ship of 50m, but not exceeding 100m, in length overall :

3 trips inwards and 3 trips outwards to/from Texaco No.4 berth with a Milford Haven authorised Pilot. At least 1 trip inwards and 1 trip outwards to be during the hours of darkness.

4.3.2 ZONE 3T5 - Texaco 5

A ship of 50m, but not exceeding 100m, in length overall :

3 trips inwards and 3 trips outwards to/from Texaco No. 5 berth with a Milford Haven authorised Pilot. At least 1 trip inwards and 1 trip outwards to be during the hours of darkness.

4.4 ZONE 4 - MILFORD DOCK AND THE APPROACH CHANNEL THERETO.

a. A ship of 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards to/from Milford Dock and the approach channel thereto with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards to/from Milford Dock and the approach channel thereto with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.5 ZONE 5 : FROM THE WEAR SPIT TO THE CLEDDAU BRIDGE EXCLUDING ALL BERTHS AND BUOYS

a. A ship of 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards between the Wear Spit and the Cleddau Bridge with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward and 1 outward trip to be during the hours of darkness.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 55 of 80 |
|---------------|---|-----------------------------|

b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards between the Wear Spit and the Cleddau Bridge with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be in the hours of darkness.

c. A ship of 150m, but not exceeding 190m, in length overall :

10 trips inwards and 10 trips outwards between the Wear Spit and the Cleddau Bridge with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. 50% of the trips to be during the hours of darkness.

4.5.1 ZONE 5P : Port Of Pembroke

a. A ship of 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards to/from the Port of Pembroke with a Milford Haven authorised Pilot or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards to/from the Port of Pembroke with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

c. A ship of 150m, but not exceeding 190m, in length overall :

10 trips inwards and 10 trips outwards to/from the Port of Pembroke with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.5.2 ZONE 5F - Ferry Terminal

a. A ship 50m, but not exceeding 130m, in length overall :

3 trips inwards and 3 trips outwards to/from the Ferry Terminal with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 trip inwards and 1 trip outwards to be during the hours of darkness.

b. A ship of 130m, but not exceeding 150m, in length overall :

6 trips inwards and 6 trips outwards to/from the Ferry Terminal with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 56 of 80 |
|---------------|---|-----------------------------|

c. A ship of up to 150m. but not exceeding 190m. in length overall :

10 trips inwards and 10 trips outwards to/from the Ferry Terminal with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.5.3 ZONE 5C.- Carr Jetty

a. A ship of 50m. but not exceeding 130m. in length overall :

3 trips inwards and 3 trips outwards to/from Carr Jetty with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

b. A ship of 130m. but not exceeding 150m. in length overall :

After making 6 trips inwards and 6 trips outwards to/from Carr Jetty with a Milford Haven authorised Pilot, or at least 6 trips with a Milford Haven authorised Pilot and 6 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

c. A ship of 150m. but not exceeding 190m. in length overall :

After making 10 trips inwards and 10 trips outwards to/from Carr Jetty with a Milford Haven authorised Pilot, or at least 10 trips with a Milford Haven authorised Pilot and 10 trips with an exemption certificate holder. At least 50% of the trips to be during the hours of darkness.

4.5.4 ZONE 5M - Mainport Jetty.

a. A ship of 50m. but not exceeding 130m. in length overall :

3 trips inwards and 3 trips outwards to/from Mainport Jetty with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder. At least 1 inward trip and 1 outward trip to be during the hours of darkness.

4.6 ZONE 6 PENNAR GUT

a. A ship of 50m. but not exceeding 100m. in length overall :

3 trips inwards and 3 trips outwards via Pennar Gut with a Milford Haven authorised Pilot, or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder.

NOTE: No ships accepted during hours of darkness in Zone 6.

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 57 of 80 |
|---------------|---|-----------------------------|

4.7 ZONE 7 - COSHESTON PILL

a. *A ship of 50m. but not exceeding 100m. in length overall :*

3 trips inwards and 3 trips outwards via Cosheston Pill with a Milford Haven authorised Pilot or at least 3 trips with a Milford Haven authorised Pilot and 3 trips with an exemption certificate holder.

NOTE: No ships accepted during the hours of darkness in Zone 7.

5.0 RENEWALS

Pilotage certificates will be granted for a period not exceeding 1 year and will be renewed upon written application by the holder supported by the owner of the ship or ships to which it relates if the Authority are satisfied:

- there has been no significant incident involving the certificate holder. (Where candidates fail to meet the above then a renewal may be granted subject to a further examination.)
- the applicant has, during the previous year, Piloted the ship or ships to which the certificate relates on at least the same number of occasions as that required for the initial exemption.

NB The Authority reserve the right to examine any applicant for renewal at their discretion.

6.0 EXAMINATIONS

Examinations will be conducted by persons appointed by the Authority experienced in navigation, navigational procedures and berthing and unberthing manoeuvres. The matters on which candidates will be required to satisfy the examiners will include:

- their competence to navigate safely in the Haven, or that part of it to which the certificate is to relate and to manoeuvre safely onto and from the relevant berths located in the area to which the certificate is to relate
- their knowledge of local bylaws and regulations, tidal and geographical conditions and buoys and other navigation marks
- their practical familiarity with the use of local tugs for assisting the ship or ships to which the certificate is to relate when berthing and unberthing
- their knowledge of communication procedures in operation in the Haven

| | | |
|---------------|---|-----------------------------|
| MHPA Group | Marine Operating Procedure MOP 003 PILOTAGE | Revision D Page 58 of 80 |
|---------------|---|-----------------------------|

- their working knowledge of spoken English
- their acuteness of vision and colour perception.

7.0 FEES

Issue of a Pilotage Exemption Certificate by examination for a single zone: £158

Issue of a Pilotage Exemption Certificate by examination for two or more zones: £221

NOTE: This fee will cover subsequent examinations up to 12 months from the date of the initial examination.

Renewal of a certificate: £32

Endorsement of a certificate so as to add a ship or ships of substantially similar draught, tonnage and handling characteristics, or a change of ownership or additional area or areas of the Haven without examination: £23

Revision date: 30th November, 1999

PORT CONTROL POLICY – MILFORD HAVEN

MILFORD HAVEN PORT AUTHORITY

PORT CONTROL POLICY

1. The Port Control is to maintain a control of shipping movements by providing pertinent, accurate and timely advice to vessels entering or leaving the Haven.
2. The Port Control will consult and plan the sequence of vessel movements for both entry and exit from the Haven and advise Masters and Pilots of their place in any queue.
3. Policy will be to maintain the sequence of movements where practicable by instructing Masters and Pilots not to proceed until permission has been granted.
4. Once a movement has commenced Port Control will support that movement through to completion.
5. Decisions made and advice given by Marine Officers pursuant to this Policy carry the formal authority and support of the Harbourmaster and General Manager.

Note:

1. The Master of a vessel is always in command.
2. When on board, a Pilot/Exemption Certificate Holder has the conduct of the vessel and is responsible to the Master for its safe navigation.
3. The Master, or Officer of the watch, has the conduct of the vessel when no Pilot is on board.

He Arnold

Harbourmaster

Stamps

General Manager

Adams

Chairman, Marine Committee

PREVIOUS INCIDENTS INVOLVING FISHING VESSELS – MILFORD HAVEN

MILFORD HAVEN PORT AUTHORITY

TRAWLER INCIDENTS FROM 1 JANUARY 1996

| PIR No | Date | Vessel(s) | Reason |
|--------|-------------------|--|--|
| 01/96 | 05 January 1996 | Ama Antxine / Lady Stephanie | Close Quarters |
| 15/96 | 30 March 1996 | Ellen / Perseverance | Close Quarters |
| 20/96 | 05 April 1996 | Atlantic C | Grounding |
| 21/96 | 14 April 1996 | Nohic / Isle of Innishmore | Close Quarters |
| 35/96 | 14 July 1996 | Atlantic C / United Traveller | Dangerous Manoeuvre |
| 36/96 | 20 July 1996 | Westhinder / Alandia Fox | Close Quarters |
| 40/96 | 09 September 1996 | Atlantic A | Passing too close to oil terminals and passing between vessel berthing and berth |
| 42/96 | 14 October 1996 | Bisson | Collision |
| 47/96 | 14 December 1996 | Lofeten / Stena Concertina | Close Quarters |
| 48/96 | 22 November 1996 | Glenelb | Grounding |
| 05/97 | 15 March 1997 | Juno / Alandia Prince / Isle of Innishturk | Close Quarters |
| 6/97 | 17 March 1997 | Atlantic B / Stena Concertina | Close Quarters |
| 18/97 | 14 July 1997 | Lundy Gannett | Grounding |
| 19/97 | 02 August 1997 | Arosa | Collision with buoy |
| 26/97 | 01 October 1997 | La Farouche | Grounding |
| 26/98 | 02 April 1998 | Layla | Grounding |
| 33/98 | 25 April 1998 | Avontuur | Grounding |
| 50/98 | 06 August 1998 | Sue Ellen | Grounding |
| 06/99 | 23 March 1999 | Nohic / Samson | Collision |
| 19/99 | 08 October 1999 | Westwind | Damage to buoy |
| 24/99 | 08 December 1999 | Gaztelutarrak | Grounding |
| 25/99 | 13 December 1999 | Zorrozaurre | Damage to buoy |
| 31/99 | 29 December 1999 | My Friend / Whitsea | Collision |
| 01/00 | 01 January 2000 | Ondarruman | Fatality (drowning) |
| 14/00 | 02 September 2000 | Mountain Peak | Grounding |

| PIR No | Date | Vessel(s) | Reason |
|---------------|-------------------|--------------------|---------------------------|
| 16/00 | 08 September 2000 | Ixxote | Garbage disposal |
| 18/00 | 04 October 2000 | Shipmate | Injured crewman |
| 03/01 | 09 February 2001 | Jean Claude Coulon | Keeled over in dry dock |
| 04/01 | 15 February 2001 | Royal Manor | Fell over on mooring |
| 05/01 | 15 February 2001 | Vertrouwen | Damage to buoy |
| 14/01 | 01 June 2001 | Arca / Supertaff | Collision |
| 19/01 | 23 July 2001 | St Gregory | Grounding |
| 04/02 | 30 January 2002 | De Marco | Grounding |
| 05/02 | 08 March 2002 | Op Van Vanzegan | Grounding |
| 07/02 | 02 April 2002 | Jeanne | Damage to leisure mooring |
| 09/02 | 11 April 2002 | Sarvy | Hung up in Milford Docks |

MGN 84(F)



Maritime and Coastguard Agency

MGN 84 (F)

KEEPING A SAFE NAVIGATIONAL WATCH ON FISHING VESSELS

Notice to Owners, Operators, Skippers and Crews of Fishing Vessels

This Notice supersedes Merchant Shipping Notices: M1020, M1190, M1463, M1649, M1656

Summary

This notice explains why fishing vessels need to maintain a proper navigational watch at all times, and defines the correct use of navigational equipment.

Key points:

- Watches must be properly manned by competent people who are fit for duty.
- A proper lookout must be kept at all times.
- Check the vessel's position by all available means. Do not rely only on a single piece of equipment.
- Other traffic must always be monitored.
- Do not use navigational aids for purposes for which they are not intended.

1. Why Should I keep a Watch on Fishing Vessels?

1.1 Investigations into collisions and groundings involving fishing vessels have continued to show that poor watchkeeping is a major cause. In many cases one or more of the following were important factors:

- (a) an unqualified or inexperienced man in charge of the watch;
- (b) only one man on watch (regardless of whether a watch alarm was fitted);
- (c) a poor lookout being kept;
- (d) divided command; and,
- (e) fatigue.

The guidelines laid down by the International Maritime Organisation must be closely followed at all times. **A competent alert Watchkeeper, keeping a proper all round lookout at all times is absolutely essential.**

1.2 Failure to maintain a safe navigational watch will be and has been viewed very seriously by the Agency and the Courts.

2. What are the Arrangements of a Safe Navigational Watch?

2.1 The watch should always take into account the prevailing circumstances and conditions. Even where there is no statutory requirement for certificated officers, it is still essential that watchkeepers are always experienced, capable, and have been instructed in their

duties. This is especially vital if you are making a landfall, navigating close to the coast, in restricted visibility, severe weather conditions or in dense traffic.

2.2 When deciding the composition of the watch the following factors should be considered:

- (a) the wheelhouse must not be left unattended at any time;
- (b) the weather conditions, visibility and time of day. Although the size of the crew and the wheelhouse may not permit a continuous two person watch, two people should always be on watch during the hours of darkness and in poor weather conditions;
- (c) the proximity of navigational hazards which may make it necessary for additional navigational duties to be undertaken;
- (d) the use and operational condition of navigational aids such as radar, automatic pilot, and position-fixing equipment.
- (e) any unusual demands on the navigational watch that may arise as a result of special operational circumstances.

3. Fitness for Duty

Both the skipper and the watchkeepers should take full account of the quality and quantity of rest taken when determining fitness for duty. Particular dangers exist when the watchkeeper is alone. It is all too easy to fall asleep, especially while sitting down in an enclosed wheelhouse. Watchkeepers should ensure they remain alert by moving around frequently, and ensuring good ventilation.

4. Navigation

- 4.1 The intended voyage should be planned in advance taking into account any relevant information. Courses should be checked before departure.
- 4.2 It is important that watchkeepers maintain a close watch on their own vessel and always know the position, speed and course steered. Many groundings occur when the position is not being monitored and the watchkeeper thinks that the vessel is in safe water.

4.3 The watchkeeper should know the location and operation of all safety and navigational equipment on board and their limitations.

4.4 The person in charge of a navigational watch should not undertake any other duties that would interfere with the safe navigation of the vessel.

4.5 Unfortunately it is not possible to rely on every give-way vessel to keep clear. It is therefore vital to monitor the movement of ALL traffic. Remember that a vessel engaged in fishing does not always have the right of way. In restricted visibility, even with gear extended, a fishing vessel has no special privileges.

4.6 Domestic radios, cassette players and television sets should never be used in the wheelhouse to the neglect of navigational duties. The proper place for such items, specifically television sets, is in the accommodation.

5. Navigational Equipment

5.1 Watchkeepers should make effective use of all available equipment and not hesitate to use the **helm, engines and sound signalling apparatus**. Use the **radar**, as an aid. There is no substitute for keeping a good visual lookout.

5.2 It is strongly recommended that any **automatic pilot** fitted should incorporate a **watch alarm**. It is good practice to extend the installation of a watch alarm to vessels not fitted with automatic pilot. It is advised that a watch alarm is fitted on board ALL vessels where there may be one person on navigational watch. The watch alarm will not only alert the watchkeeper but also other members of the crew.

5.3 Over-reliance on **video plotters** has been a factor in several recent collisions and groundings. Using an electronic system does not remove the need for proper passage planning and navigation, using appropriately scaled paper charts. Assessments or assumptions based on video plotters alone are dangerous and unreliable. A video plotter used for fishing purposes is not adequate for safe navigation.

5.4 If you use a video plotter, bear in mind the limitations of this type of equipment and always cross-check the accuracy of your position, course and speed. Equipment of this type may aid navigation, but it cannot replace the fundamental need to maintain a visual lookout.

5.5 Information, charts, routes and waypoints can be stored for future use. However, stored data should always be checked and used with caution, especially if transferred between vessels. Ensure it is applicable to the vessel's specific condition and voyage, and always keep this data up to date.

5.6 **Electronic magnetic compasses** may be unsuitable for use within a steel wheelhouse. Groundings have been caused by the improper functioning of this equipment linked to an auto-pilot. When a heading reference is required for navigational equipment such as an auto-pilot or radar, it is recommended that a **transmitting magnetic compass** (rather than an electronic magnetic compass) be fitted.

6. Navigational Duties and Responsibilities

6.1 The person in charge of the watch should:

- (a) keep watch in the wheelhouse, which should never be left unmanned;
- (b) continue to be responsible for the navigation of the vessel, despite the presence of the skipper, until it is mutually agreed the skipper has taken over;
- (c) notify the skipper when in any doubt as to what action to take in the interest of safety;
- (d) not hand over to someone who is obviously not capable of taking over the watch. The skipper should be advised accordingly.
- (e) on taking over a watch establish the vessel's estimated or actual position and confirm the intended track course and speed. Any dangers to navigation expected during the watch should be noted;

- (f) maintain a proper log of all movements and activities during the watch that relate to the navigation of the vessel.

7. Look-out

7.1 It is absolutely essential that a proper look-out is kept at all times. Casualties to fishing vessels, resulting in loss of life, continue to occur because of the lack of a look-out. In addition to assessing the situation and risk of collision, stranding and other navigation dangers, the duties of the look-out should include the detection of other vessels or aircraft in distress, shipwrecked persons, wrecks and debris.

7.2 The look-out must give full attention to keeping a proper look-out and no other duties should be undertaken which could interfere with that task. The duties of the look-out and helmsman are separate and the helmsman is not considered to be the look-out while steering except where an unobstructed all-round view is provided and there is no impairment of night vision or other impediment. The watchkeeper may only be the sole look-out during daylight hours provided that it is safe to do so and assistance is immediately available.

8. Weather Conditions

8.1 The watchkeeper should take early action to notify the skipper when adverse changes in the weather could affect the safety of the vessel, including the possibility of icing occurring.

9. Navigation with Pilot Embarked

9.1 The presence of a pilot on board does not relieve the skipper or watchkeepers from their duties and obligations. The skipper and pilot should exchange information regarding navigational procedures, local conditions and, the vessel's characteristics. The skipper should co-operate closely with the pilot. An accurate check of the vessel's position and movement should be maintained.

MSAS(C)
The Maritime and Coastguard Agency
Spring Place
Commercial Road
SOUTHAMPTON
SO15 1EG

Tel: 01703 329346
Fax: 01703 329161

October 1998

MS 88/001/386

© Crown Copyright 1998



*An executive agency of the Department of the
Environment, Transport and the Regions*

SIMULATIONS

MARCHWOOD SIMULATION

Bro Axel – Nordhinder Incident in Milford Haven 5th December 2002

1) The UK's MAIB are investigating the near miss between Bro Axel and fishing vessel Nordhinder, followed by the subsequent grounding, of Bro Axel on the morning of December 5th, 2002 whilst departing from Milford Haven.

The MAIB approached Warsash Maritime Centre in order to assess, through simulation, the likelihood of avoiding the grounding by taking action different from that taken by Bro Axel in the heat of the moment, having just missed the fishing vessel Nordhinder.

The incident was reconstructed on both ship bridge simulators of Warsash Maritime Centre. This report is concerned with the reconstruction on the Full Mission Ship's Bridge Simulator located at Marchwood Southampton.

2) The Simulator

The equipment is a Norcontrol NMS 90 mark III utilising the Norview 2000 visual system. There is a projected view from the bridge of 210° with viewing around a full 360° available using a scanning monitor on the bridge.

3) The Database Area

The reconstruction was undertaken in the "Haven" database that has been used for several years by WMC for, amongst other tasks, the training of Milford Haven pilots and also the reconstruction of the "Sea Empress" casualty. It is kept up to date from weekly Notices to Mariners and information from the Harbour Master.

4) The Environment

The relevant tidal times and heights were obtained from the Port Authority which, once entered into the simulator system, would produce the expected tidal directions and rates at the time of the incident together with tidal heights above datum.

The current was expected to be flooding along the line of the channel where the incident took place, at about 1.5 knots.

The wind was reported as being NW'ly, force 3. Accordingly a wind direction of 310° at a speed of 5m/s, gusting $\pm 10\%$, was used for the simulation.

Time was based on the Nordhinder track plot, since there is no agreed time between Bro Axel, Nordhinder and Milford Haven VTS.

5) The Mathematical Model

The Model used in this reconstruction was the nearest in configuration to the Bro Axel that was available in WMC's portfolio. No mathematical model of Bro Axel suitable for running on the NMS 90 system is known to exist. A model of "Ellen Knutsen" is in the Norcontrol library; this model is similar in size but does not necessarily have the same manoeuvring characteristics as the Bro Axel. This model would have to be purchased and then evaluated and may not produce results different from those obtained with the model used.

MARCHWOOD SIMULATION

Comparison Table: Bro Axel & DMI “Cargo” model

| Criteria | Bro Axel | “Cargo” / DMI, ship 1226 |
|--|----------------------|--------------------------|
| Length Overall (m) | 144.2 | 159.6 |
| Length between Perpendiculars (m) (L_{pp}) | 133.8 | 150 |
| Beam (m) | 23 | 24.9 |
| Draught (m) (T) | 8.7 | 9.10 |
| Propeller | CP, Left hand | F P, Right hand |
| Rudder type | Becker | Single spade |
| Rudder Max angle (°) | 60 | 35 |
| Rudder Area (m), (% of L_{pp} x T) | $\pm 20.4, \pm 1.75$ | 23.6, 1.73 |
| Engine type | Diesel | Diesel |
| Engine Power (MW) | 5.61 | 7.36 |
| | | |

Although the Bro Axel has a 60° Becker Rudder, only 15° rudder was in fact used in the incident. Where a hard over rudder order has been used to assess possible alternative action, then a maximum of 35° has been used. Bro Axel may well have been able to use more rudders in the event.

6) The Reconstruction

Basic details were provided by the MAIB. These included a copy of the Transas track plotter taken from the Nordhinder showing her position every 10 seconds up the East Channel to past the “Esso” buoy. This was used to reconstruct the track of the Nordhinder as faithfully as possible. It was also used to gain an estimation of track and speed being made good.

| Bro Axel - Nord Hinder near miss & grounding (basis NH Electronic Chart Plot) | | | | | | | | | | |
|--|---------|----------|------------|------------|------------|-------------|-------------|----------|-----------|--|
| 5th December 2002 | | | | | | | | | | |
| Sim | NH | Bro Axel | VTS | | NH bearing | NH distance | NH distance | approx | approx | |
| Run | Time | Time | Time | Buoy | from buoy | from buoy | from buoy | NH speed | NH track | Remarks |
| | (03:34) | (03:40) | (03:37:00) | | (degrees) | (cables) | (metres) | (kts) | (degrees) | |
| | | | | | | | | | | (VTS: NH entering East Channel) BA off Humberston Jetty |
| 00 | 3:37 | 3:46:00 | | Thorn | 204 | 2.8 | 518.6 | 12.0 | 353 | |
| 01 | 3:38 | 3:47:00 | | Thorn | 252 | 1.4 | 259.3 | 12.0 | 353 | |
| 02 | 3:39 | 3:48:00 | | Thorn | 323 | 1.65 | 305.6 | 11.4 | 45 | |
| 03 | 3:40 | 3:49:00 | | Thorn | 22 | 2.1 | 388.9 | 11.4 | 79 | |
| 04 | 3:41 | 3:50:00 | | Thorn | 47 | 3.6 | 666.7 | 11.4 | 68 | |
| 05 | 3:42 | 3:51:00 | | Thorn | 57 | 5.5 | 1018.6 | 11.4 | 271 | |
| 06 | 3:43 | 3:52:00 | | South Hook | 265 | 4.0 | 740.8 | 11.7 | 105 | BA 15° port helm |
| 07 | 3:44 | 3:53:00 | 03:47 | South Hook | 271 | 2.1 | 388.9 | 7.2 | 23 | NH ECS plotsheet time/BA log: near miss |
| 08 | 3:45 | 3:54:00 | | South Hook | 305 | 1.75 | 324.1 | 10.5 | 55 | VTS: BA Engines Running Astern |
| 09 | 3:46 | 3:55:00 | | South Hook | 9 | 0.85 | 157.4 | 10.5 | 123 | BA aground |
| 10 | 3:47 | 3:56:00 | | South Hook | 88 | 1.6 | 296.3 | 10.5 | 125 | BA log: suspected grounding |
| 11 | 3:48 | 3:57:00 | | South Hook | 109 | 3.05 | 564.0 | 9.6 | 123 | |
| 12 | 3:49 | 3:58:00 | | Esso | 246 | 1.2 | 222.2 | 7.8 | 67 | |
| 13 | 3:50 | 3:59:00 | | Esso | 146 | 0.25 | 46.3 | 7.2 | 40 | |
| 14 | 3:51 | 4:00:00 | | Esso | 66 | 1.0 | 185.2 | 7.2 | 84 | BA log: 04:00- moving astern |
| 15 | 3:52 | 4:01:00 | | Esso | 85 | 2.25 | 416.7 | 9.0 | 109 | |
| 16 | 3:53 | 4:02:00 | | Esso | 95 | 3.65 | 676.0 | 9.0 | 106 | |

Nordhinder track Information calculated from Transas track plot

MARCHWOOD SIMULATION

This track is considered fairly accurate, for example it is known that the Nordhinder hit the “Esso” buoy and this clearly shows on the plot.

The evidence for the track of the Bro Axel was more anecdotal. Screen shots of the VTS recording of her track show that she was on the northern edge of the channel. The master is reported as saying the speed was about 9 knots, and this has been taken to be the ground or GPS speed. With a 1.5 knot current against her it was assumed that the Bro Axel was making a water speed of about 10.5 knots.

For the purposes of this reconstruction, initial action by the Bro Axel, a “Port 15°” rudder order, was taken when Nordhinder was on Bro Axel’s starboard side and was showing both sidelights whilst swinging from port to starboard. This event appears to take place at 03:42:13 in the simulator. The distance between the two vessels appears to be about 5 cables at this moment.

The second action “Full Astern” was taken when the Nordhinder was clearing the starboard side of the Bro Axel. It was reported as missing by “30 metres”.

7) The Simulator Runs

Several runs were taken once the reconstruction had been fine-tuned.

Run 1 - Reconstruction of events as described

@ 03:42:13 order rudder Port 15°

@ 03:43:33 order full astern, (rudder remains at Port 15°)

Run 2 - Ordering 35° starboard rudder in lieu of the Full stern order, engine RPM remaining same

@ 03:42:13 order rudder Port 15°

@ 03:43:33 order rudder Starboard 35, (engine rpm not changed)

Run 3 - Ordering 35° starboard rudder in lieu of the full astern order, and increasing engine RPM, once the rudder past the amidships position, to increase rudder effectiveness

@ 03:42:13 order rudder Port 15°

@ 03:43:33 order rudder Starboard 35°, (increase engine rpm)

MARCHWOOD SIMULATION

8) Conclusions

It is likely that had the Master of the Bro Axel ordered Stb'd 35°, (or better with the Becker rudder) instead of full astern, then he would have likely kept in the channel or perhaps passed just south of the "Chapel" buoy, where there was sufficient water to stay afloat at the state of the tide.

Had the Master given this starboard rudder order and increased his Ahead RPM then he would likely have passed safely to the north of the "Chapel" buoy and been able to resume his planned departure track without further incident.

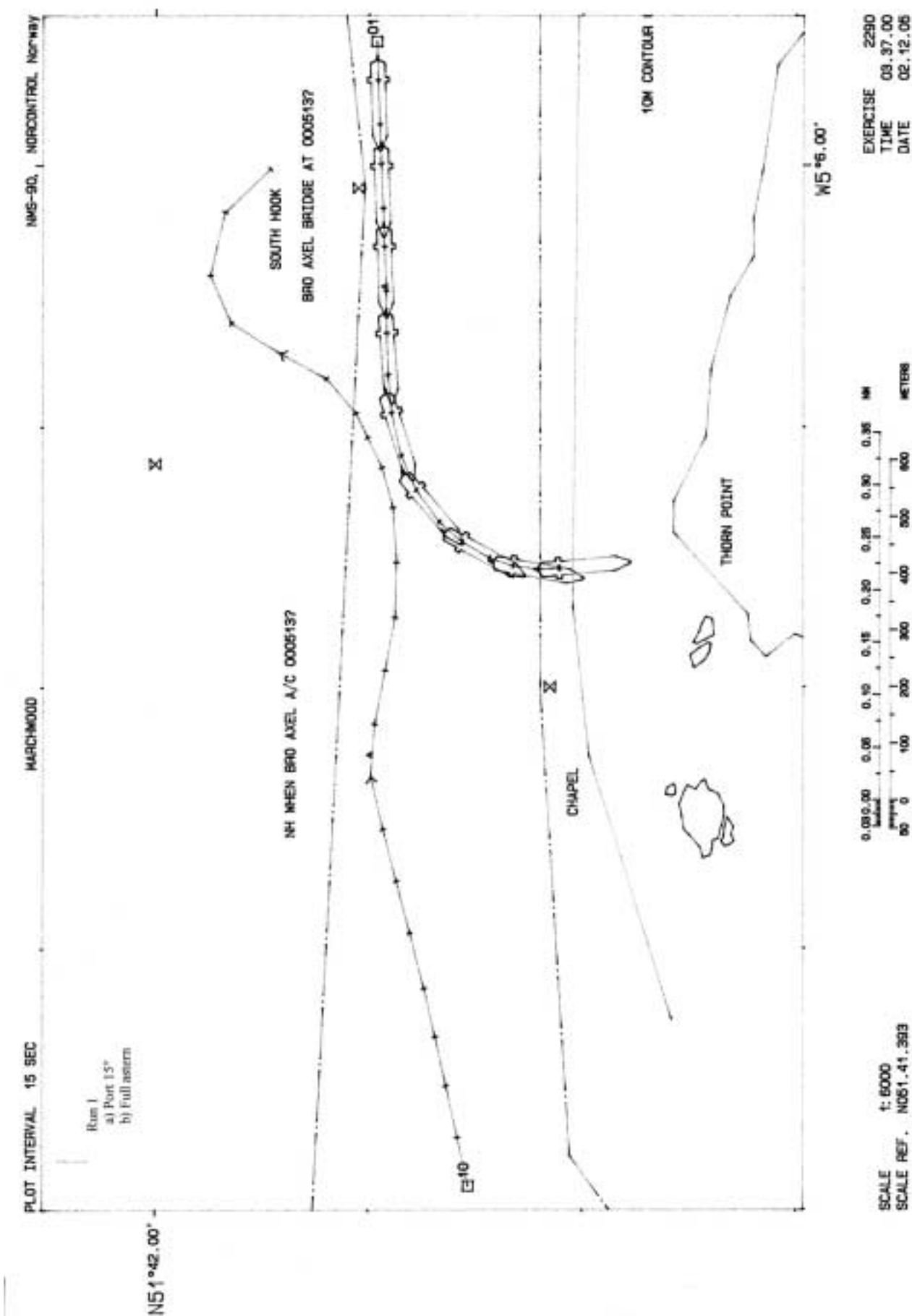
It should be noted that the concept of "hard to stb'd" and "Full Ahead" may not be instinctive, nor without hesitation in a critical situation unless the conning officer has had proper ship handling and/or emergency procedure training.

29th April 2003

A handwritten signature in black ink, appearing to read 'G. Lang', written over the printed name and title.

George Lang
BSc DMS FNI AFRIN FCIT FILT
Senior Lecturer
Warsash Maritime Centre
Southampton Institute

MARCHWOOD SIMULATION

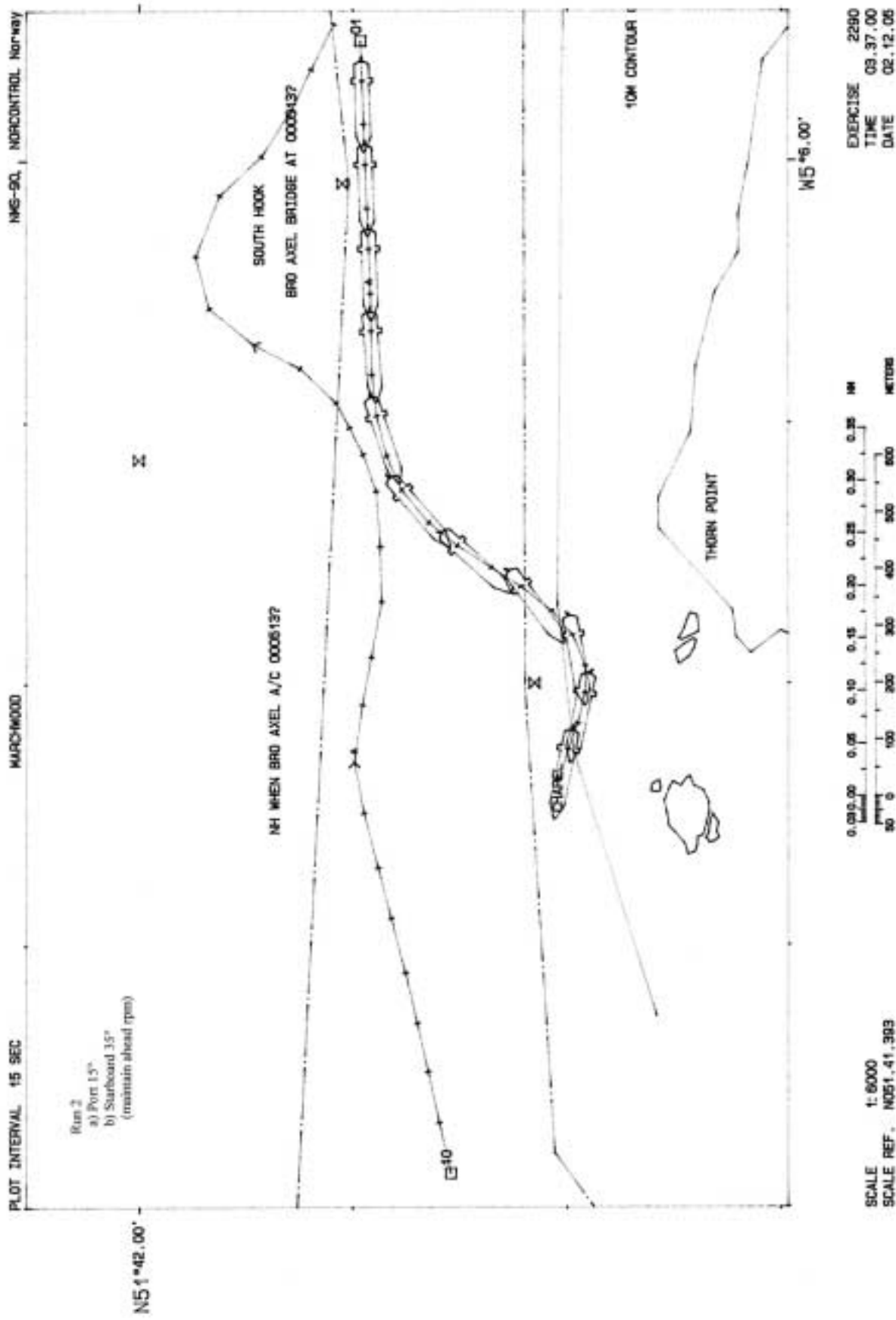


MARCHWOOD SIMULATION

| Exercise 2250 in HAVEN | | | | | | | | | | | Page 1 |
|------------------------|--------------------|------------------------|--------------------------|----------------|--------------|--------------------|---------------------|----------------|-----------------|-------------------|--------|
| 05 Station | Speed Long (Knots) | 02.12.05 Heading (Deg) | 03.37.00 Speed B (Knots) | Course B (Deg) | Rudder (Deg) | Turnrate (Deg/Min) | RPM s ord (Rev/Min) | Depth b.l. (M) | Curr. dir (Deg) | Curr. spd (Knots) | |
| 1 00.00.05 | 10.3 | 268.1 | 8.7 | 267.8 | 0.6p | 0.3s | 77 | 15.9 | 89.3 | 1.6 | |
| 1 00.00.20 | 10.3 | 268.0 | 8.7 | 267.7 | 0.5s | 0.3s | 77 | 16.1 | 89.3 | 1.6 | |
| 1 00.00.35 | 10.3 | 268.0 | 8.8 | 267.7 | 0.1p | 0.7p | 77 | 15.4 | 89.3 | 1.6 | |
| 1 00.00.50 | 10.3 | 269.1 | 8.8 | 267.7 | 0.6p | 0.3s | 77 | 12.1 | 89.3 | 1.6 | |
| 1 00.01.05 | 10.4 | 268.0 | 8.8 | 267.7 | 0.0s | 0.8s | 77 | 14.4 | 89.3 | 1.6 | |
| 1 00.01.20 | 10.4 | 268.1 | 8.8 | 267.7 | 0.3p | 1.8p | 77 | 14.5 | 89.3 | 1.6 | |
| 1 00.01.35 | 10.4 | 268.1 | 8.8 | 267.8 | 0.7p | 0.3s | 77 | 17.2 | 89.3 | 1.6 | |
| 1 00.01.50 | 10.4 | 268.1 | 8.8 | 267.7 | 0.0s | 1.1s | 77 | 20.0 | 89.3 | 1.6 | |
| 1 00.02.05 | 10.4 | 268.0 | 8.8 | 267.8 | 0.1p | 1.2p | 77 | 13.1 | 89.3 | 1.6 | |
| 1 00.02.20 | 10.4 | 268.1 | 8.8 | 267.8 | 0.3p | 0.8p | 77 | 13.2 | 89.3 | 1.6 | |
| 1 00.02.34 | 10.4 | 268.0 | 8.8 | 267.7 | 0.3s | 1.2s | 79 | 12.2 | 89.3 | 1.6 | |
| 1 00.02.50 | 10.4 | 268.0 | 8.9 | 267.7 | 0.0s | 0.2p | 79 | 11.9 | 89.3 | 1.6 | |
| 1 00.03.04 | 10.5 | 268.1 | 8.9 | 267.8 | 0.8p | 0.5p | 79 | 12.0 | 89.3 | 1.6 | |
| 1 00.03.19 | 10.5 | 268.1 | 8.9 | 267.7 | 0.1p | 1.2s | 79 | 12.4 | 89.3 | 1.6 | |
| 1 00.03.34 | 10.5 | 268.0 | 8.9 | 267.7 | 0.2p | 0.6p | 77 | 12.0 | 89.3 | 1.6 | |
| 1 00.03.49 | 10.5 | 268.1 | 8.9 | 267.8 | 0.8p | 0.7p | 77 | 10.8 | 89.3 | 1.6 | |
| 1 00.04.05 | 10.5 | 268.1 | 8.9 | 267.7 | 0.1p | 1.2s | 77 | 10.4 | 89.3 | 1.6 | |
| 1 00.04.19 | 10.5 | 268.0 | 8.9 | 267.8 | 0.2p | 0.4p | 77 | 11.5 | 89.3 | 1.6 | |
| 1 00.04.35 | 10.5 | 268.1 | 8.9 | 267.8 | 0.7p | 1.2p | 77 | 11.8 | 89.3 | 1.6 | |
| 1 00.04.50 | 10.4 | 268.1 | 8.9 | 267.8 | 0.1p | 1.2s | 77 | 11.2 | 89.3 | 1.6 | |
| 1 00.05.05 | 10.4 | 268.0 | 8.9 | 267.7 | 0.1s | 0.8s | 77 | 14.0 | 89.3 | 1.6 | |
| 1 00.05.20 | 10.4 | 268.0 | 8.9 | 267.8 | 3.2p | 2.1p | 77 | 12.2 | 89.3 | 1.6 | |
| 1 00.05.35 | 10.4 | 266.4 | 8.8 | 267.4 | 15.7p | 12.2p | 77 | 11.9 | 89.3 | 1.6 | |
| 1 00.05.50 | 10.3 | 262.1 | 8.8 | 264.3 | 15.7p | 23.0p | 77 | 13.1 | 89.3 | 1.6 | |
| 1 00.06.05 | 10.2 | 255.3 | 8.7 | 258.4 | 15.7p | 32.8p | 77 | 12.8 | 89.3 | 1.6 | |
| 1 00.06.19 | 9.9 | 246.2 | 8.5 | 249.9 | 15.7p | 37.9p | 77 | 13.0 | 89.3 | 1.6 | |
| 1 00.06.35 | 9.7 | 235.8 | 8.4 | 239.2 | 15.7p | 43.7p | 77 | 12.0 | 89.3 | 1.6 | |
| 1 00.06.50 | 8.9 | 224.7 | 7.8 | 227.1 | 15.7p | 44.1p | -95 | 13.8 | 89.3 | 1.6 | |
| 1 00.07.05 | 7.8 | 214.6 | 6.9 | 215.3 | 15.7p | 38.7p | -95 | 10.9 | 89.3 | 1.6 | |
| 1 00.07.20 | 6.9 | 205.1 | 6.2 | 203.9 | 15.7p | 34.7p | -95 | 8.1 | 89.3 | 1.6 | |
| 1 00.07.35 | 6.2 | 196.5 | 5.7 | 192.9 | 15.7p | 34.5p | -95 | 6.0 | 89.3 | 1.6 | |
| 1 00.07.50 | 5.5 | 189.0 | 5.3 | 183.0 | 15.7p | 30.8p | -95 | 3.1 | 89.3 | 1.6 | |
| 1 00.08.05 | 4.8 | 181.0 | 4.9 | 172.3 | 15.7p | 26.8p | -95 | 1.6 | 89.3 | 1.6 | |
| 1 00.08.20 | 4.3 | 174.9 | 4.5 | 164.1 | 15.7p | 25.6p | -95 | 1.6 | 89.3 | 1.6 | |
| 1 00.08.35 | 0.0 | 174.3 | 0.0 | 0.0 | 15.7p | 0.0s | -95 | 0.0 | 89.3 | 1.6 | |
| 1 00.08.50 | 0.0 | 174.3 | 0.0 | 0.0 | 15.7p | 0.0s | -95 | 0.0 | 89.3 | 1.6 | |

Run 1
a) Port 15°
b) Full Astern

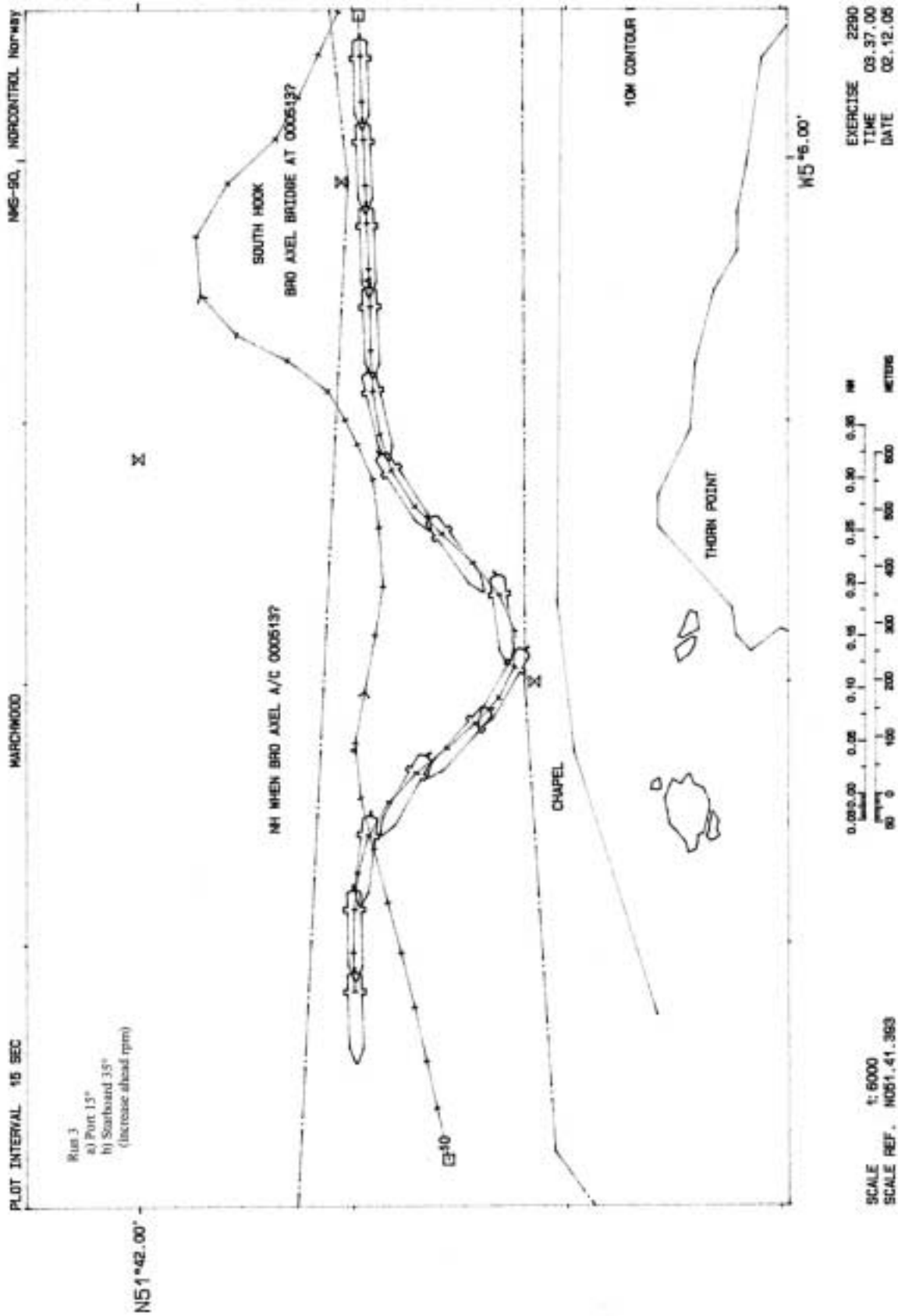
MARCHWOOD SIMULATION



MARCHWOOD SIMULATION

| TIME | | VELOCITY | | COURSE | | TURN | | DEPTH | | CURRENT | | Page |
|------|----------|----------|---------|---------|--------|--------|-----------|-----------|-------|---------|---------|------|
| 05 | Start | Speed | Heading | Speed | Course | Rudder | Turnrate | RPM | Depth | Dir | Speed | 1 |
| | (Knots) | (Knots) | (Deg) | (Knots) | (Deg) | (Deg) | (Deg/Min) | (Rev/Min) | (M) | (Deg) | (Knots) | |
| 1 | 00.00.00 | 10.3 | 268.0 | 8.7 | 267.8 | 0.5p | 1.2p | 76 | 15.9 | 89.3 | 1.6 | |
| 1 | 00.00.15 | 10.3 | 268.0 | 8.7 | 267.7 | 0.1a | 1.0p | 76 | 16.2 | 89.3 | 1.6 | |
| 1 | 00.00.30 | 10.3 | 268.0 | 8.7 | 267.7 | 0.2a | 0.3p | 76 | 15.3 | 89.3 | 1.6 | |
| 1 | 00.00.45 | 10.3 | 268.0 | 8.7 | 267.7 | 0.2a | 0.8a | 76 | 15.3 | 89.3 | 1.6 | |
| 1 | 00.00.55 | 10.3 | 268.0 | 8.7 | 267.7 | 0.1a | 1.0a | 76 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.01.05 | 10.3 | 268.1 | 8.7 | 267.7 | 0.2p | 1.3a | 76 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.01.15 | 10.3 | 268.1 | 8.7 | 267.8 | 0.7p | 0.4a | 76 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.01.25 | 10.3 | 268.1 | 8.7 | 267.8 | 0.9p | 0.1a | 76 | 14.7 | 89.3 | 1.6 | |
| 1 | 00.01.35 | 10.3 | 268.1 | 8.8 | 267.8 | 0.8p | 1.0p | 76 | 14.7 | 89.3 | 1.6 | |
| 1 | 00.01.46 | 10.3 | 268.1 | 8.8 | 267.8 | 0.4p | 1.1p | 76 | 16.7 | 89.3 | 1.6 | |
| 1 | 00.01.55 | 10.3 | 268.1 | 8.8 | 267.8 | 0.2p | 0.9p | 76 | 20.2 | 89.3 | 1.6 | |
| 1 | 00.02.05 | 10.3 | 268.1 | 8.8 | 267.7 | 0.2a | 0.2a | 76 | 20.1 | 89.3 | 1.6 | |
| 1 | 00.02.15 | 10.3 | 268.1 | 8.8 | 267.7 | 0.2a | 1.0a | 76 | 15.9 | 89.3 | 1.6 | |
| 1 | 00.02.25 | 10.3 | 268.1 | 8.8 | 267.7 | 0.2a | 1.0a | 76 | 16.0 | 89.3 | 1.6 | |
| 1 | 00.02.35 | 10.3 | 268.1 | 8.8 | 267.8 | 0.0p | 0.7a | 76 | 12.8 | 89.3 | 1.6 | |
| 1 | 00.02.46 | 10.3 | 268.0 | 8.8 | 267.7 | 0.4p | 0.4a | 76 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.02.55 | 10.3 | 268.0 | 8.8 | 267.7 | 0.7p | 0.6p | 76 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.03.05 | 10.3 | 268.0 | 8.8 | 267.7 | 0.3p | 1.1p | 76 | 12.0 | 89.3 | 1.6 | |
| 1 | 00.03.15 | 10.3 | 268.0 | 8.8 | 267.7 | 0.1p | 0.3p | 76 | 11.9 | 89.3 | 1.6 | |
| 1 | 00.03.25 | 10.4 | 268.1 | 8.8 | 267.7 | 0.1p | 0.2p | 78 | 11.2 | 89.3 | 1.6 | |
| 1 | 00.03.35 | 10.4 | 268.1 | 8.8 | 267.7 | 0.0a | 0.9a | 78 | 12.1 | 89.3 | 1.6 | |
| 1 | 00.03.45 | 10.4 | 268.1 | 8.8 | 267.7 | 0.2p | 1.2a | 78 | 12.2 | 89.3 | 1.6 | |
| 1 | 00.03.55 | 10.4 | 268.1 | 8.8 | 267.8 | 0.3p | 1.0a | 78 | 10.8 | 89.3 | 1.6 | |
| 1 | 00.04.05 | 10.4 | 268.1 | 8.8 | 267.8 | 0.6p | 0.2p | 78 | 10.9 | 89.3 | 1.6 | |
| 1 | 00.04.15 | 10.4 | 268.1 | 8.8 | 267.8 | 0.7p | 0.5p | 78 | 10.6 | 89.3 | 1.6 | |
| 1 | 00.04.25 | 10.4 | 268.1 | 8.8 | 267.8 | 0.6p | 1.2p | 78 | 10.9 | 89.3 | 1.6 | |
| 1 | 00.04.35 | 10.4 | 268.0 | 8.8 | 267.7 | 0.4p | 1.2p | 78 | 10.8 | 89.3 | 1.6 | |
| 1 | 00.04.46 | 10.4 | 268.0 | 8.8 | 267.7 | 0.0p | 0.2p | 78 | 10.9 | 89.3 | 1.6 | |
| 1 | 00.04.55 | 10.4 | 268.1 | 8.8 | 267.7 | 0.1a | 0.2a | 78 | 10.8 | 89.3 | 1.6 | |
| 1 | 00.05.06 | 10.4 | 268.1 | 8.8 | 267.7 | 0.1a | 1.2a | 78 | 12.4 | 89.3 | 1.6 | |
| 1 | 00.05.15 | 10.4 | 268.1 | 8.8 | 267.7 | 0.1p | 1.2a | 78 | 12.3 | 89.3 | 1.6 | |
| 1 | 00.05.25 | 10.4 | 268.1 | 8.9 | 267.8 | 0.7p | 0.4a | 78 | 12.6 | 89.3 | 1.6 | |
| 1 | 00.05.35 | 10.4 | 268.0 | 8.9 | 267.8 | 7.7p | 2.3p | 78 | 11.3 | 89.3 | 1.6 | |
| 1 | 00.05.45 | 10.4 | 266.9 | 8.8 | 267.6 | 15.4p | 11.4p | 78 | 11.3 | 89.3 | 1.6 | |
| 1 | 00.05.55 | 10.4 | 264.7 | 8.8 | 266.2 | 15.4p | 18.8p | 78 | 12.8 | 89.3 | 1.6 | |
| 1 | 00.06.06 | 10.3 | 260.9 | 8.8 | 263.2 | 15.4p | 25.3p | 78 | 12.8 | 89.3 | 1.6 | |
| 1 | 00.06.15 | 10.2 | 256.6 | 8.7 | 259.3 | 15.4p | 30.2p | 78 | 13.1 | 89.3 | 1.6 | |
| 1 | 00.06.25 | 10.1 | 250.8 | 8.6 | 254.2 | 15.4p | 34.0p | 78 | 12.2 | 89.3 | 1.6 | |
| 1 | 00.06.35 | 9.9 | 244.8 | 8.5 | 248.3 | 15.4p | 38.1p | 78 | 12.3 | 89.3 | 1.6 | |
| 1 | 00.06.46 | 9.7 | 237.9 | 8.4 | 241.3 | 15.4p | 42.6p | 78 | 12.8 | 89.3 | 1.6 | |
| 1 | 00.06.55 | 9.6 | 230.9 | 8.4 | 233.4 | 6.5a | 40.0p | 78 | 12.9 | 89.3 | 1.6 | |
| 1 | 00.07.05 | 9.4 | 225.1 | 8.3 | 225.1 | 33.1a | 25.9p | 78 | 12.7 | 89.3 | 1.6 | |
| 1 | 00.07.15 | 9.2 | 222.3 | 8.1 | 219.9 | 35.0a | 10.9p | 78 | 12.7 | 89.3 | 1.6 | |
| 1 | 00.07.25 | 9.1 | 221.7 | 8.1 | 216.9 | 35.0a | 0.5a | 78 | 10.6 | 89.3 | 1.6 | |
| 1 | 00.07.35 | 9.0 | 222.9 | 8.0 | 215.6 | 35.0a | 13.0a | 78 | 7.8 | 89.3 | 1.6 | |
| 1 | 00.07.45 | 8.9 | 225.4 | 7.9 | 216.1 | 35.0a | 22.5a | 78 | 7.7 | 89.3 | 1.6 | |
| 1 | 00.07.56 | 8.8 | 230.7 | 7.7 | 219.3 | 35.0a | 35.8a | 78 | 5.3 | 89.3 | 1.6 | |
| 1 | 00.08.05 | 8.6 | 236.8 | 7.5 | 224.3 | 35.0a | 45.8a | 78 | 5.6 | 89.3 | 1.6 | |
| 1 | 00.08.15 | 8.4 | 244.2 | 7.2 | 231.2 | 35.0a | 49.7a | 78 | 3.1 | 89.3 | 1.6 | |
| 1 | 00.08.25 | 8.1 | 253.3 | 6.8 | 241.1 | 35.0a | 52.3a | 78 | 2.3 | 89.3 | 1.6 | |
| 1 | 00.08.36 | 7.9 | 262.1 | 6.4 | 251.8 | 32.5a | 57.2a | 78 | 2.3 | 89.3 | 1.6 | |
| 1 | 00.08.45 | 7.8 | 270.4 | 6.2 | 264.1 | 8.5a | 46.9a | 78 | 2.6 | 89.3 | 1.6 | |
| 1 | 00.08.55 | 7.7 | 277.8 | 6.2 | 275.7 | 18.8p | 32.0a | 78 | 2.6 | 89.3 | 1.6 | |
| 1 | 00.09.04 | 7.7 | 281.7 | 6.2 | 282.3 | 35.0p | 17.4a | 78 | 3.1 | 89.3 | 1.6 | |
| 1 | 00.09.15 | 7.7 | 283.5 | 6.2 | 285.9 | 35.0p | 6.1a | 78 | 3.1 | 89.3 | 1.6 | |
| 1 | 00.09.25 | 7.8 | 283.4 | 6.2 | 287.3 | 35.0p | 5.3p | 78 | 9.0 | 89.3 | 1.6 | |
| 1 | 00.09.34 | 7.9 | 281.8 | 6.2 | 286.1 | 11.0p | 12.2p | 78 | 6.4 | 89.3 | 1.6 | |
| 1 | 00.09.45 | 8.0 | 279.6 | 6.4 | 284.2 | 10.0p | 13.2p | 78 | 6.4 | 89.3 | 1.6 | |
| 1 | 00.09.55 | 8.0 | 276.8 | 6.4 | 280.9 | 4.8a | 14.8p | 78 | 7.1 | 89.3 | 1.6 | |

MARCHWOOD SIMULATION



MARCHWOOD SIMULATION

| Exercise 2295 in HAVEN | | 02.12.05 | 03.37.00 | | | | | | | | | Page 1 |
|------------------------|----------|--------------------|---------------|-----------------|----------------|--------------|--------------------|---------------------|-----------------|-----------------|-------------------|--------|
| 02 | Station | Speed Long (knots) | Heading (Deg) | Speed S (knots) | Course S (Deg) | Rudder (Deg) | Turnrate (Deg/Min) | RPM a and (Rev/Min) | Depth h.f. (ft) | Corr. dir (Deg) | Corr. spd (knots) | |
| 1 | 00.00.00 | 10.4 | 288.1 | 8.8 | 287.8 | 0.7p | 0.4p | 77 | 10.1 | 89.3 | 1.0 | |
| 1 | 00.00.10 | 10.4 | 288.0 | 8.8 | 287.8 | 0.7p | 0.7p | 77 | 10.1 | 89.3 | 1.0 | |
| 1 | 00.00.20 | 10.4 | 288.0 | 8.8 | 287.7 | 0.7p | 1.1p | 77 | 10.7 | 89.3 | 1.0 | |
| 1 | 00.00.30 | 10.4 | 288.0 | 8.8 | 287.7 | 0.0p | 0.4p | 77 | 10.2 | 89.3 | 1.0 | |
| 1 | 00.00.40 | 10.4 | 288.0 | 8.9 | 287.7 | 0.1x | 0.1x | 77 | 12.2 | 89.3 | 1.0 | |
| 1 | 00.00.50 | 10.4 | 288.8 | 8.9 | 287.7 | 0.1x | 0.9x | 77 | 12.0 | 89.3 | 1.0 | |
| 1 | 00.01.00 | 10.4 | 288.1 | 8.9 | 287.7 | 0.2p | 1.4x | 77 | 12.1 | 89.3 | 1.0 | |
| 1 | 00.01.10 | 10.4 | 288.1 | 8.9 | 287.8 | 0.2p | 0.4x | 77 | 14.2 | 89.3 | 1.0 | |
| 1 | 00.01.20 | 10.4 | 288.1 | 8.9 | 287.8 | 0.8p | 0.2x | 77 | 14.8 | 89.3 | 1.0 | |
| 1 | 00.01.30 | 10.4 | 288.1 | 8.9 | 287.8 | 0.7p | 0.9p | 77 | 16.7 | 89.3 | 1.0 | |
| 1 | 00.01.40 | 10.4 | 288.1 | 8.9 | 287.8 | 0.7p | 1.2p | 77 | 20.2 | 89.3 | 1.0 | |
| 1 | 00.01.50 | 10.4 | 288.1 | 8.9 | 287.8 | 0.7p | 1.1p | 77 | 20.2 | 89.3 | 1.0 | |
| 1 | 00.02.00 | 10.4 | 288.0 | 8.9 | 287.7 | 0.7x | 0.2p | 77 | 18.8 | 89.3 | 1.0 | |
| 1 | 00.02.10 | 10.3 | 288.0 | 8.9 | 287.7 | 0.9x | 0.1x | 77 | 15.9 | 89.3 | 1.0 | |
| 1 | 00.02.20 | 10.3 | 288.0 | 8.9 | 287.7 | 0.4x | 1.1x | 77 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.02.30 | 10.3 | 288.1 | 8.9 | 287.7 | 0.1p | 1.0x | 77 | 11.9 | 89.3 | 1.0 | |
| 1 | 00.02.40 | 10.3 | 288.1 | 8.9 | 287.7 | 0.4p | 0.7x | 77 | 12.0 | 89.3 | 1.0 | |
| 1 | 00.02.50 | 10.3 | 288.1 | 8.9 | 287.8 | 0.8x | 0.4p | 77 | 12.0 | 89.3 | 1.0 | |
| 1 | 00.03.00 | 10.3 | 288.1 | 8.9 | 287.8 | 0.4p | 1.2p | 77 | 12.0 | 89.3 | 1.0 | |
| 1 | 00.03.10 | 10.3 | 288.0 | 8.9 | 287.8 | 0.5p | 1.1p | 77 | 11.3 | 89.3 | 1.0 | |
| 1 | 00.03.20 | 10.3 | 288.0 | 8.9 | 287.7 | 0.1p | 0.4p | 77 | 12.2 | 89.3 | 1.0 | |
| 1 | 00.03.30 | 10.3 | 288.1 | 8.9 | 287.7 | 0.0x | 0.8x | 77 | 12.2 | 89.3 | 1.0 | |
| 1 | 00.03.40 | 10.3 | 288.1 | 8.9 | 287.7 | 0.1x | 0.9x | 77 | 10.7 | 89.3 | 1.0 | |
| 1 | 00.03.50 | 10.3 | 288.1 | 8.9 | 287.7 | 0.2p | 1.1x | 77 | 10.7 | 89.3 | 1.0 | |
| 1 | 00.04.00 | 10.3 | 288.1 | 8.9 | 287.8 | 0.4p | 0.2x | 77 | 10.5 | 89.3 | 1.0 | |
| 1 | 00.04.10 | 10.4 | 288.1 | 8.9 | 287.8 | 0.8x | 0.1p | 77 | 11.1 | 89.3 | 1.0 | |
| 1 | 00.04.20 | 10.4 | 288.1 | 8.9 | 287.8 | 1.7p | 1.1p | 77 | 11.1 | 89.3 | 1.0 | |
| 1 | 00.04.30 | 10.4 | 288.0 | 8.9 | 287.8 | 0.3p | 1.1p | 77 | 11.0 | 89.3 | 1.0 | |
| 1 | 00.04.40 | 10.4 | 288.0 | 8.9 | 287.8 | 0.3p | 0.8p | 77 | 12.4 | 89.3 | 1.0 | |
| 1 | 00.04.50 | 10.4 | 288.0 | 8.9 | 287.7 | 8.1x | 0.4x | 77 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.05.00 | 10.4 | 288.0 | 8.9 | 287.7 | 8.1x | 0.7x | 77 | 12.4 | 89.3 | 1.0 | |
| 1 | 00.05.10 | 10.4 | 288.1 | 8.9 | 287.7 | 6.2p | 1.2x | 77 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.05.20 | 10.4 | 287.9 | 8.8 | 288.8 | 13.1p | 4.1p | 77 | 11.4 | 89.3 | 1.0 | |
| 1 | 00.05.30 | 10.4 | 288.0 | 8.8 | 287.4 | 13.1x | 12.1p | 77 | 12.9 | 89.3 | 1.0 | |
| 1 | 00.05.40 | 10.3 | 287.7 | 8.8 | 283.1 | 13.1p | 20.7p | 77 | 12.9 | 89.3 | 1.0 | |
| 1 | 00.05.50 | 10.3 | 280.2 | 8.7 | 282.6 | 15.1p | 26.7p | 77 | 13.2 | 89.3 | 1.0 | |
| 1 | 00.06.00 | 10.2 | 280.1 | 8.6 | 280.1 | 15.1p | 31.8p | 77 | 15.2 | 89.3 | 1.0 | |
| 1 | 00.06.10 | 10.4 | 289.7 | 8.6 | 280.1 | 15.1p | 35.7p | 77 | 12.1 | 89.3 | 1.0 | |
| 1 | 00.06.20 | 9.9 | 283.6 | 8.5 | 287.0 | 15.1p | 39.2p | 77 | 12.1 | 89.3 | 1.0 | |
| 1 | 00.06.30 | 9.7 | 237.1 | 8.4 | 239.8 | 8.5x | 35.0p | 77 | 12.7 | 89.3 | 1.0 | |
| 1 | 00.06.40 | 9.7 | 232.3 | 8.4 | 232.0 | 25.0x | 14.2p | 100 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.06.50 | 9.8 | 231.3 | 8.5 | 228.2 | 33.0x | 5.3x | 110 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.07.00 | 9.8 | 233.8 | 8.6 | 237.5 | 25.0x | 22.9x | 110 | 11.9 | 89.3 | 1.0 | |
| 1 | 00.07.10 | 9.9 | 239.2 | 8.6 | 229.9 | 33.0x | 48.5x | 110 | 13.8 | 89.3 | 1.0 | |
| 1 | 00.07.20 | 9.8 | 248.1 | 8.8 | 236.2 | 25.0x | 33.8x | 110 | 9.9 | 89.3 | 1.0 | |
| 1 | 00.07.30 | 9.3 | 238.3 | 8.2 | 240.1 | 25.0x | 66.3x | 110 | 9.7 | 89.3 | 1.0 | |
| 1 | 00.07.40 | 9.2 | 249.4 | 7.8 | 256.6 | 25.0x | 73.8x | 110 | 7.2 | 89.3 | 1.0 | |
| 1 | 00.07.50 | 8.8 | 282.8 | 7.4 | 271.6 | 21.7x | 75.5x | 110 | 7.2 | 89.3 | 1.0 | |
| 1 | 00.08.00 | 8.7 | 294.9 | 7.2 | 286.2 | 2.2p | 83.8x | 110 | 7.3 | 89.3 | 1.0 | |
| 1 | 00.08.10 | 8.6 | 292.7 | 7.2 | 299.2 | 26.9p | 82.9x | 110 | 5.8 | 89.3 | 1.0 | |
| 1 | 00.08.20 | 8.6 | 309.4 | 7.4 | 308.9 | 25.8p | 23.0x | 110 | 8.7 | 89.3 | 1.0 | |
| 1 | 00.08.30 | 8.7 | 311.1 | 7.5 | 314.1 | 25.8p | 9.3x | 110 | 11.4 | 89.3 | 1.0 | |
| 1 | 00.08.40 | 8.8 | 311.2 | 7.7 | 316.9 | 25.8p | 3.7p | 110 | 12.7 | 89.3 | 1.0 | |
| 1 | 00.08.50 | 8.9 | 309.7 | 7.8 | 317.5 | 25.8p | 17.3p | 110 | 12.1 | 89.3 | 1.0 | |
| 1 | 00.09.00 | 9.1 | 305.8 | 7.9 | 315.6 | 26.9p | 29.3p | 110 | 12.7 | 89.3 | 1.0 | |
| 1 | 00.09.10 | 9.2 | 300.2 | 8.0 | 311.5 | 26.9p | 37.1p | 110 | 12.3 | 89.3 | 1.0 | |
| 1 | 00.09.20 | 9.3 | 292.9 | 8.1 | 300.0 | 14.8p | 63.3p | 110 | 12.2 | 89.3 | 1.0 | |
| 1 | 00.09.30 | 9.4 | 280.7 | 8.1 | 297.7 | 7.2p | 47.5p | 110 | 12.4 | 89.3 | 1.0 | |
| 1 | 00.09.40 | 9.5 | 276.9 | 8.1 | 289.8 | 1.1p | 39.4p | 110 | 13.9 | 89.3 | 1.0 | |
| 1 | 00.09.50 | 9.6 | 271.2 | 8.1 | 282.1 | 19.2x | 28.4p | 110 | 13.4 | 89.3 | 1.0 | |
| 1 | 00.10.00 | 9.6 | 270.2 | 8.1 | 270.9 | 24.2x | 8.4p | 110 | 13.4 | 89.3 | 1.0 | |
| 1 | 00.10.10 | 9.8 | 264.2 | 8.2 | 270.4 | 2.8x | 8.8p | 110 | 12.7 | 89.3 | 1.0 | |

| Exercise 2296 in HAVEN | | 02.12.05 | 03.37.00 | | | | | | | | | Page 2 |
|------------------------|----------|--------------------|---------------|-----------------|----------------|--------------|--------------------|---------------------|-----------------|-----------------|-------------------|--------|
| 02 | Station | Speed Long (knots) | Heading (Deg) | Speed S (knots) | Course S (Deg) | Rudder (Deg) | Turnrate (Deg/Min) | RPM a and (Rev/Min) | Depth h.f. (ft) | Corr. dir (Deg) | Corr. spd (knots) | |
| 1 | 00.10.20 | 10.1 | 268.1 | 8.3 | 271.2 | 10.8x | 5.8p | 110 | 13.2 | 89.3 | 1.0 | |
| 1 | 00.10.30 | 10.3 | 267.8 | 8.7 | 267.4 | 16.8x | 6.3x | 110 | 13.2 | 89.3 | 1.0 | |
| 1 | 00.10.40 | 10.5 | 268.1 | 9.0 | 268.6 | 4.9x | 4.7x | 110 | 13.2 | 89.3 | 1.0 | |
| 1 | 00.10.50 | 10.8 | 268.7 | 9.2 | 268.8 | 0.5x | 2.5x | 110 | 13.2 | 89.3 | 1.0 | |

Run 3

a) Port 15°

b) Starboard 35°

(increase ahead rpm)

Warsash Maritime Centre

mv BRO AXEL

Simulated comparison of manoeuvres

The effect from position of close quarters encounter with fv Noordhinder:

- a) **Main engine full astern**
 - b) **Hard a-starboard and main engine full ahead**
-
- a) Vessel ran aground outside the channel at heading 198° at approx 2kts.
Ran a distance of 262 m with engine running full astern until grounding at 2 kts
 - b) Vessel remained in the deep water, but at the southerly limit of the channel.
Ran a distance of 170 m before regaining a track in deep water.

Contents:

- 1 Plot of full astern manoeuvre, 3 sheets
- 2 Data log full astern, 3 sheets
- 3 Plot of hard a'starboard manoeuvre 3 sheets
- 4 Data log hard a'starboard 3 sheets
- 5 Mathematical model details 4 sheets

(Note: Data logging tables show a +1kt error in long speed.)

P G Starkey

WARSASH SIMULATION

Main Ship Data

Type of Ship: Cargo Vessel

Condition: Loaded

Ship No.:

| | | |
|---------------------------------|----------------|--------------|
| Displacement | m ³ | 26893 |
| Length between perpendiculars | m | 150 |
| Length overall | m | 159.57 |
| Breadth moulded | m | 24.9 |
| Draught fore/aft | m | 9.10 / 9.10 |
| Wetted surface | m ² | 5552 |
| Wind area, side | m ² | 1532 |
| Wind area, front | m ² | 632 |
| Block coefficient | | .791 |
| Trim by the stern, % | | 0 |
| LCB, % of LBP forw. of LBP/2 | | 1.61 |
| Radius of inertia, % of LBP | | 24 |
| Type of Engine | | Diesel |
| Number of propellers | | 1 |
| Type of propellers | | Fixed Pitch |
| Direction of rotation | | Right Handed |
| Propeller diameter | m | 6.08 |
| Pitch ratio at 0.7R | | .755 |
| Area ratio | | .465 |
| Shaft Horse Power (ahead) | MW | 7.36 |
| Shaft Horse Power (astern) | MW | 7.36 |
| Number of rudders | | 1 |
| Type of Rudders | | Spade |
| Position | | in CL |
| Area of rudder | m ² | 23.6 |
| 100 x total rudder area/LBP x T | | 1.73 |
| Turning velocity of rudder | °/sec. | 2.50 |
| Max. rudder angle | ° | 35 |
| Number of bow thrusters | | 1 |
| Nominal bow-thruster force | kN | 137 |
| Number of stern thrusters | | 0 |
| Nominal stern thruster force | kN | 0 |

WARSASH SIMULATION

Ship Type: Cargo Condition Loaded

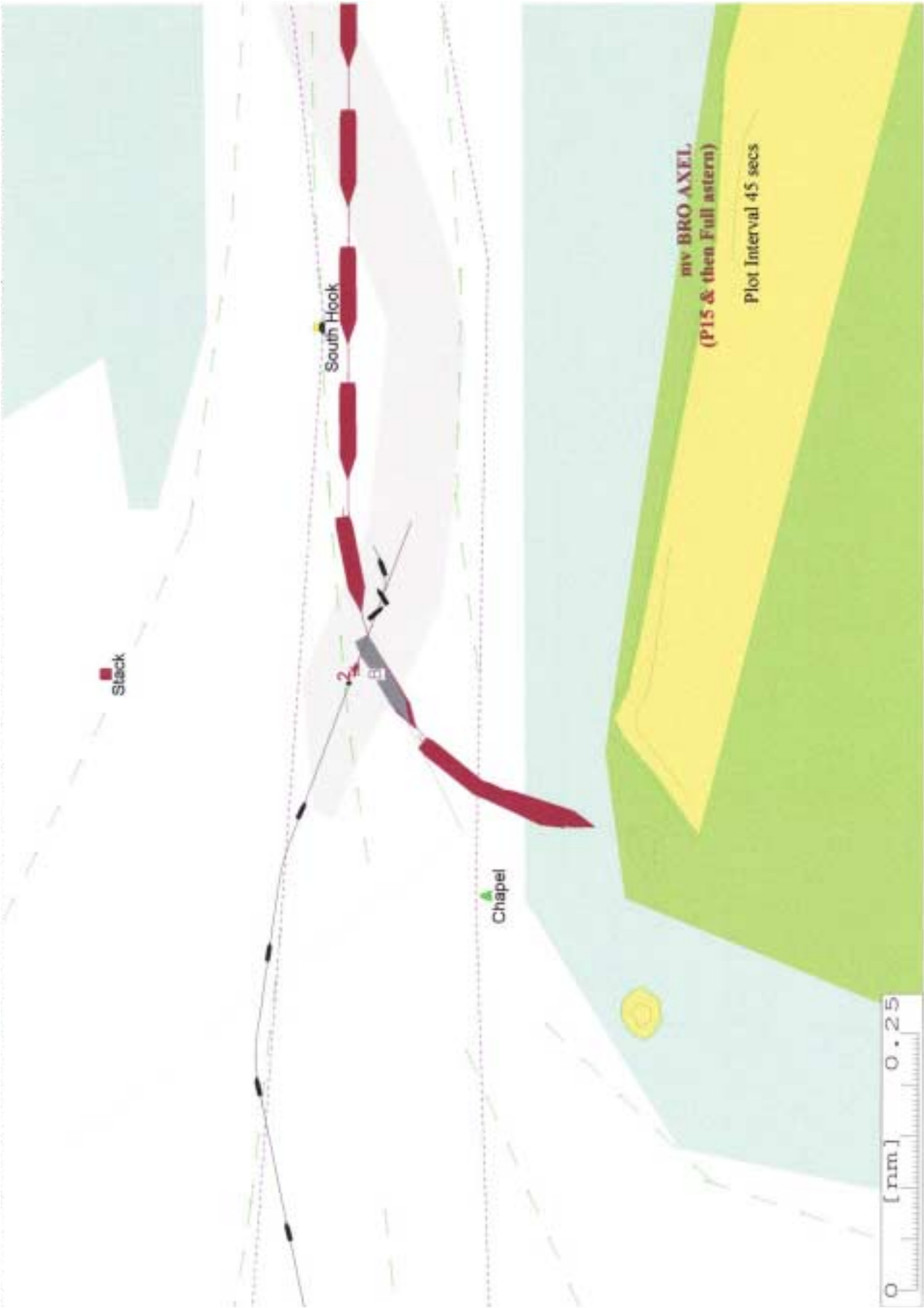
MANOEUVERING TABLE

| Telegraph | Throttle | R.P.M | Speed in Deep Water knots | Speed in Shallow Water knots |
|-----------------|----------|-------|---------------------------------|------------------------------------|
| Full Sea Speed | 100 | 100 | 15.7 | 13.6 |
| Full Ahead | 80 | 82 | 12.8 | 11.3 |
| Half Ahead | 50 | 55 | 8.5 | 7.4 |
| Slow Ahead | 25 | 36 | 5.6 | 4.6 |
| Dead Slow Ahead | 14 | 24 | 3.2 | 3.0 |

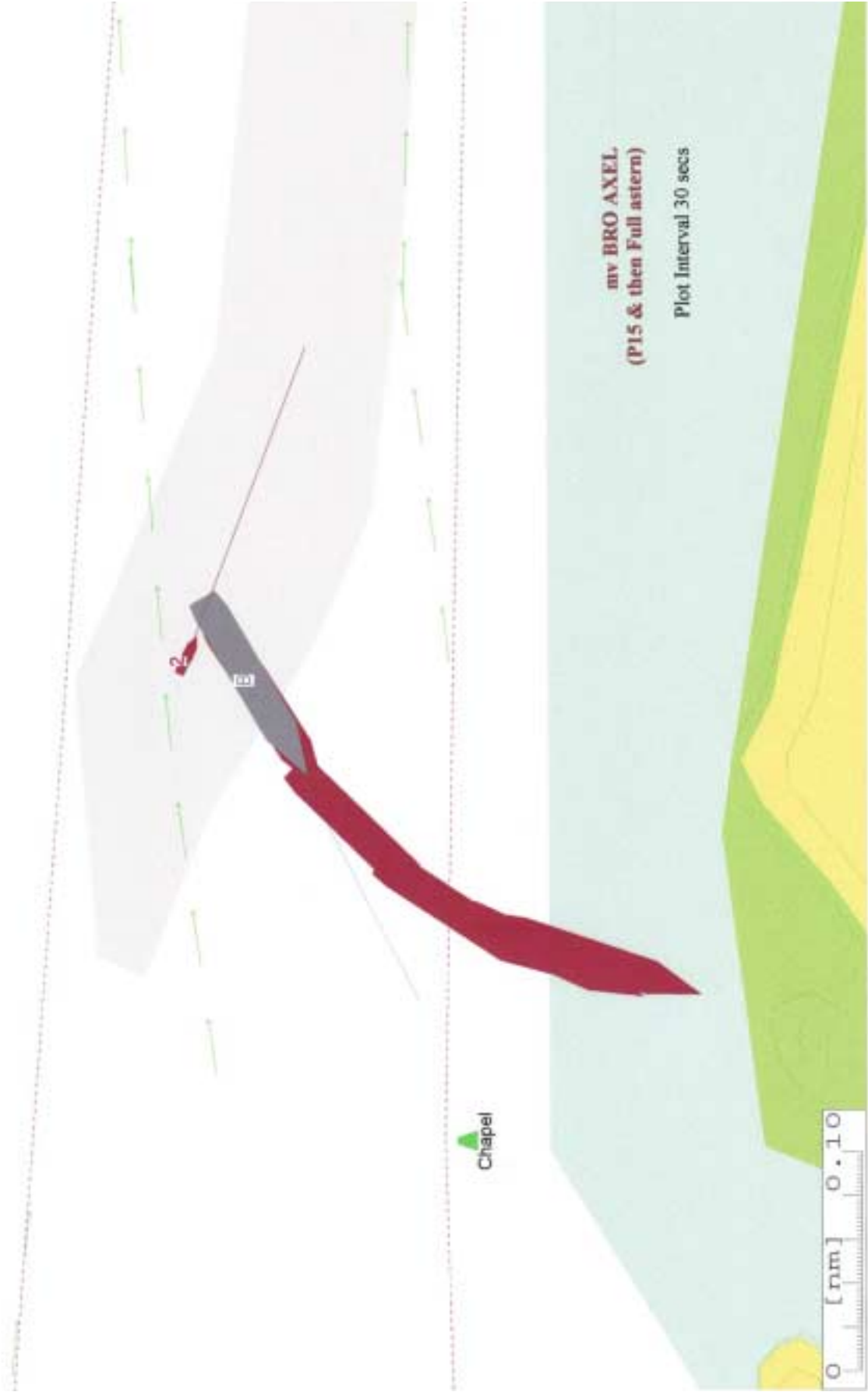
Deep Water: 1000 m

Shallow Water: 10.9 m (20% of Draught)

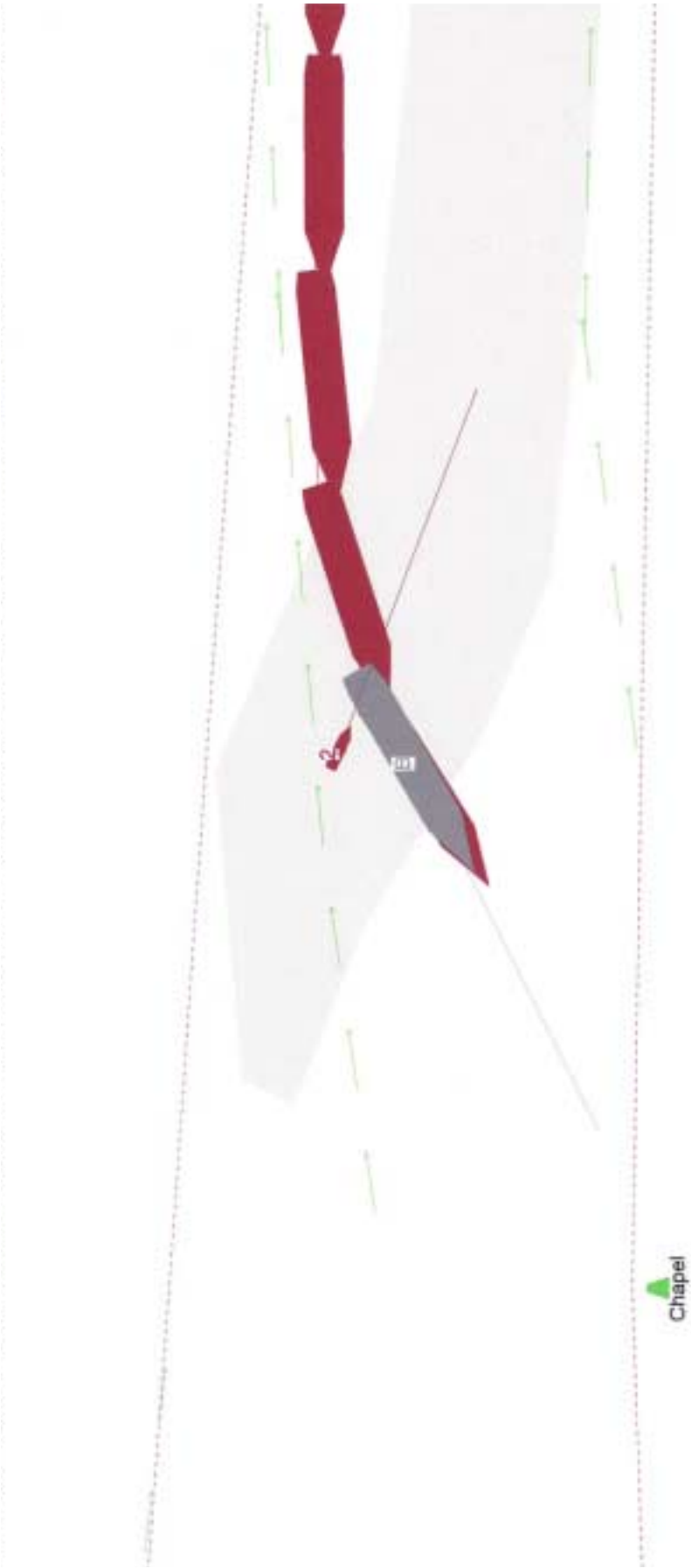
WARSASH SIMULATION



WARSASH SIMULATION



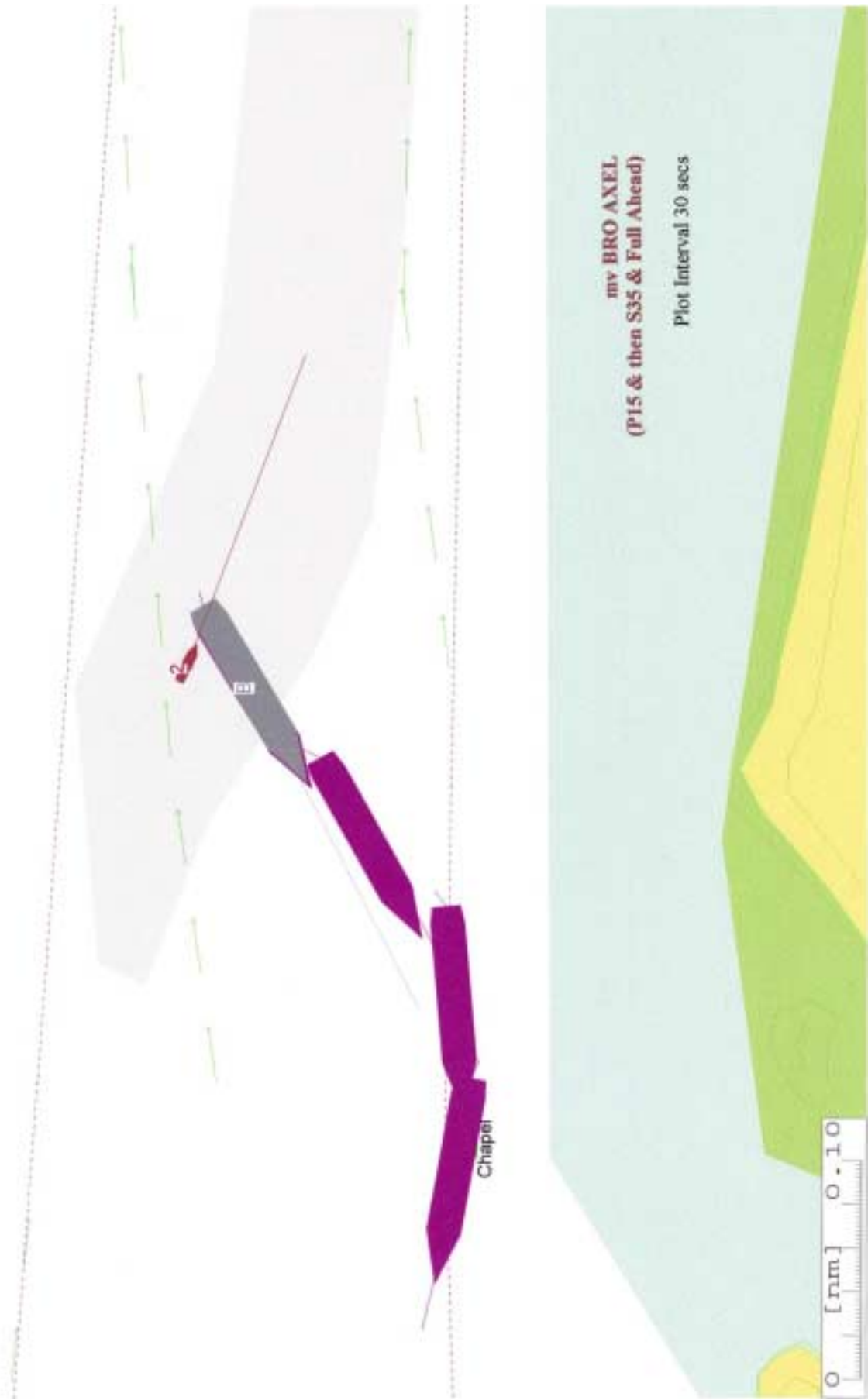
WARSASH SIMULATION



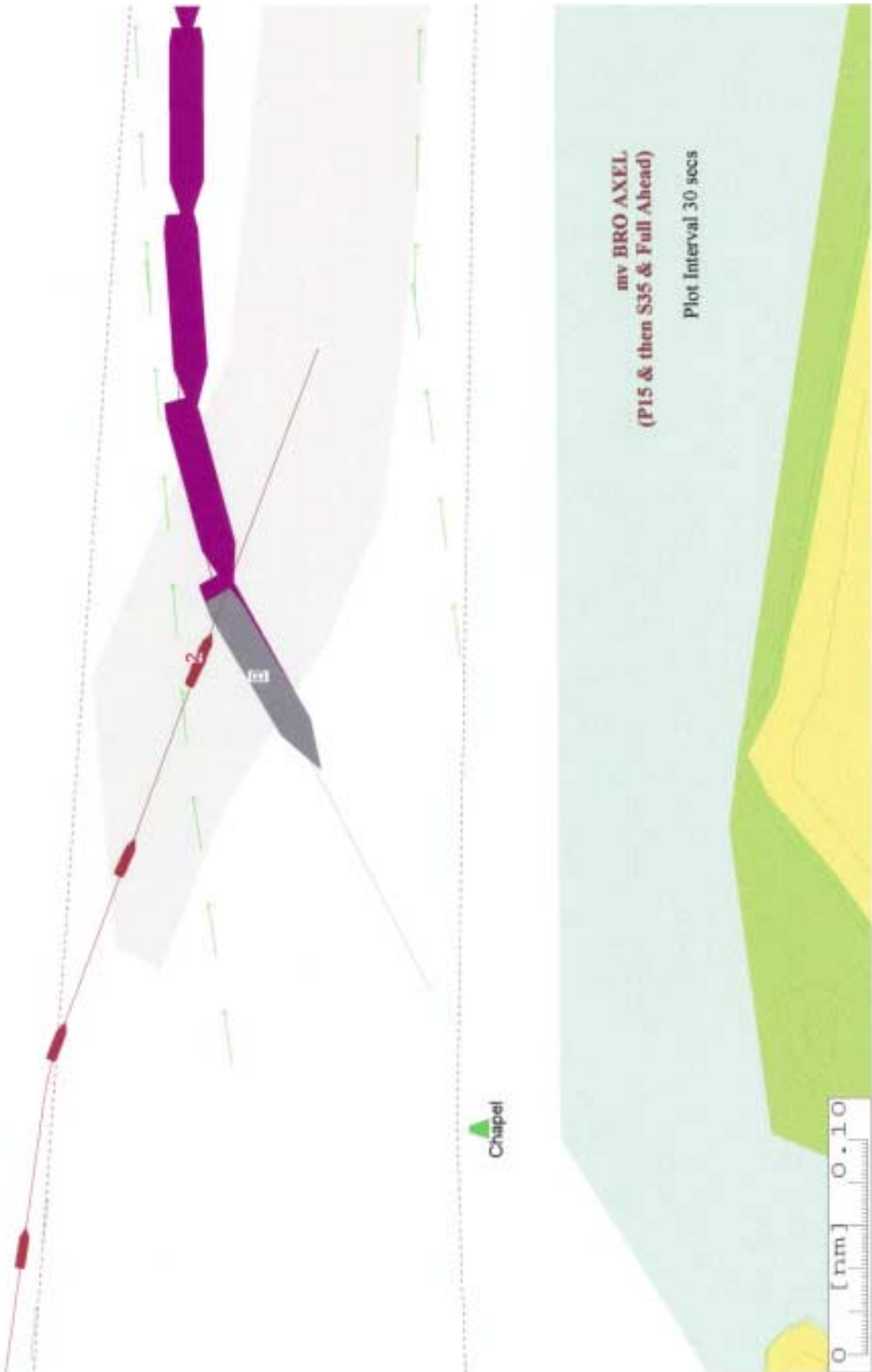
WARSASH SIMULATION



WARSASH SIMULATION



WARSASH SIMULATION



OPERATIONAL MEMORANDUM NO 03 OF 2003



MILFORD HAVEN PORT AUTHORITY

OPERATIONAL MEMORANDUM NO. 03 of 2003

TO: PORT CONTROL, PILOTS, LAUNCHES
COPIES: HM, AHM(P), AHM(C),
FROM: DEPUTY HARBOURMASTER
FILE NO: 335: 345/25
DATE: 31st January, 2003

Fishing Vessel Permit System

Fishing vessel skippers are to receive "Navigation Permits" issued by MHPA in order to attempt to satisfy us they are able to safely navigate in and out of the Haven.

Once a particular skipper has his unique number he will be allowed to enter or depart Milford Docks at night without the aid of pilot or lead boat.

The procedure for issuing a permit is as follows:-

- Vessel agent or MDC to call Port Control to advise of skipper's name prior to arrival. This to include Permit number if held; in which case he does not need a briefing or assessment trip.
- Port Control to call Gavin Phillips to carry out briefing. NB during daytime only - this service is not available 24 hours. Agents may liaise directly with Gavin.
- Gavin Phillips to give briefing aboard and advise Port Control if successful/unsuccessful. Paperwork returned to MHPA Admin.
- Port Control should organise a Pilot (if available as present - see Op. Memo 02 of 2003) to carry out night time assessment trip.
- Pilot to assess Skipper on departure - disembark once past Herbrandston. Verbal report to Port Control if successful or not.
- Port Control to place duplicate chit for Karen Smith with result of assessment trip.
- HM or DHM will authorise permit and this will be issued.


Bill Hirst

| Marine Officer | Signatures | Marine Operators | Signature |
|----------------|------------|------------------|-----------|
| A | | A | |
| B | | B | |
| C | | C | |
| D | | D | |
| E | | E | |
| DAYWORK | | | |