

**Report of an Investigation into  
the Grounding of  
the Dry Bulk Carrier  
*Pentland***

**7 December 1998**

**Extract from**  
**The Merchant Shipping**  
**(Accident Reporting and Investigation)**  
**Regulations 1994**

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

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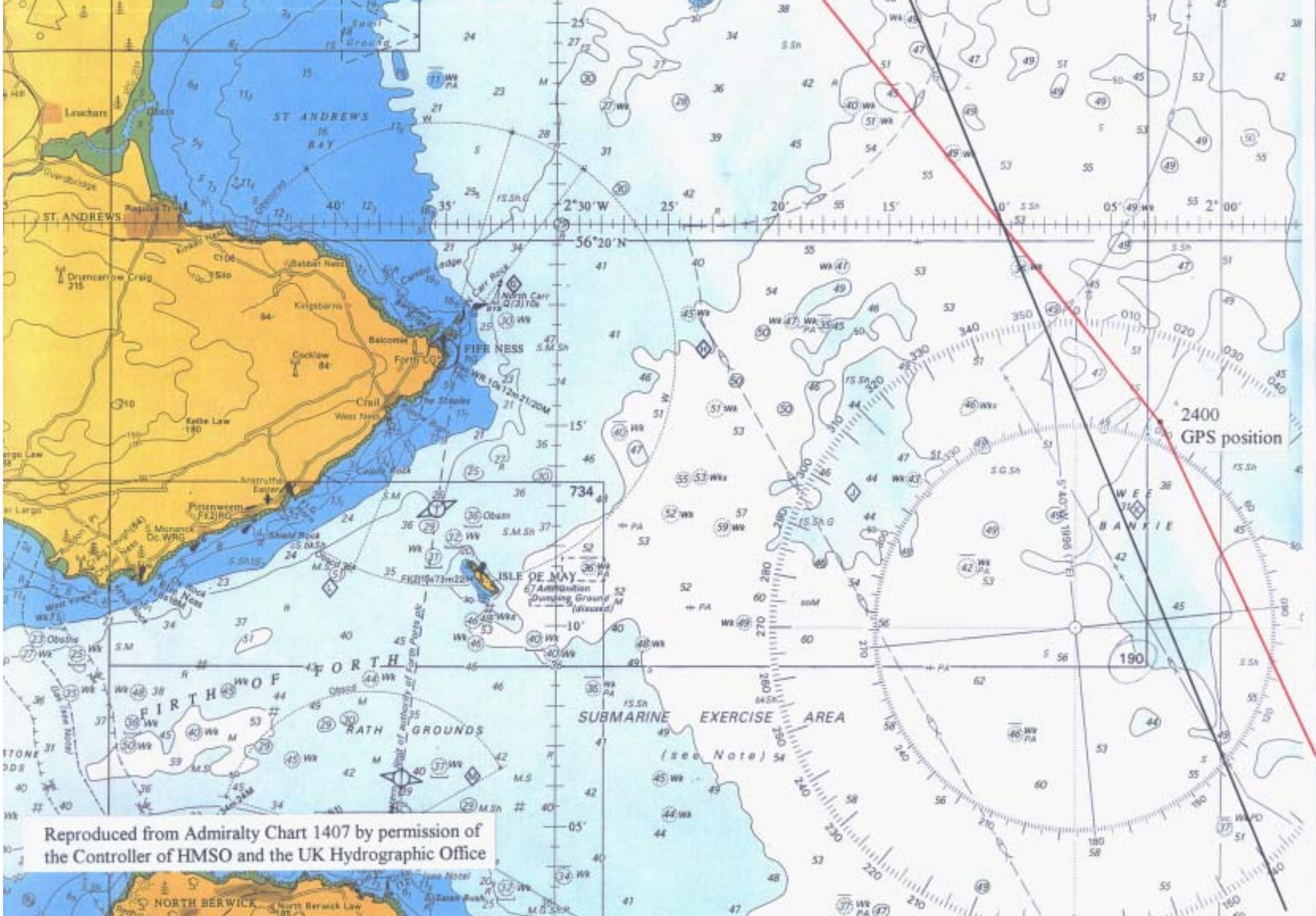
**Figures 1 & 2**      *Pentland*

## **GLOSSARY OF ABBREVIATIONS**

<b>AB</b>	Able Seaman
<b>BP</b>	Between Perpendiculars
<b>GPS</b>	Global Positioning System
<b>gt</b>	gross tonnage
<b>IMO</b>	International Maritime Organization
<b>kW</b>	kilowatt
<b>m</b>	metre
<b>MCA</b>	Maritime and Coastguard Agency
<b>MF</b>	Medium Frequency
<b>MRCC</b>	Maritime Rescue Co-ordination Centre
<b><i>STCW 95</i></b>	International Convention on Standards of Training, Certification and Watchkeeping incorporating the 1995 Amendments
<b>UK</b>	United Kingdom
<b>UTC</b>	Universal Co-ordinated Time
<b>VHF</b>	Very High Frequency







Reproduced from Admiralty Chart 1407 by permission of the Controller of HMSO and the UK Hydrographic Office

## SYNOPSIS

The accident was notified to the Marine Accident Investigation Branch (MAIB) on 7 December 1998 and an investigation commenced the same day.

The 909 gt Barbados registered dry bulk carrier *Pentland* ran aground 1.5 miles north of Arbroath while on passage from Amsterdam to Inverness.

The vessel was refloated on the following tide. Damage was sustained to the forepeak hull plating. There was no pollution.

The cause of the grounding was the track made good by the vessel in the prevailing circumstances and conditions.

Contributory causes were the master falling asleep on watch and his consequent failure to make a course alteration at the due time, the master suffering from the effects of cumulative fatigue, the absence of an additional person on watch during the hours of darkness, contrary to UK regulations, and the absence of a bridge watch alarm.

MCA is recommended to reaffirm its position on the requirement to post a lookout in addition to the officer of the watch during the hours of darkness, to continue to promote the concept of an international standard and carriage requirement for watch alarms and to seek international agreement on the specific number of qualified watchkeeping officers to be carried when determining minimum safe levels of manning.

Recommendations have also been made to the manager of the vessel to consider employing an additional watchkeeping officer on those vessels where the master and mate are currently the only qualified watchkeeping officers on board, ensure that a lookout is posted in addition to the officer of the watch, during the hours of darkness, and to consider fitting a watch alarm.

## SECTION 1 FACTUAL ACCOUNT

### 1.1 Details of Vessel and Incident

Name	:	<i>Pentland</i>
Type	:	Dry Bulk Carrier
Port of Registry	:	Bridgetown Barbados
Official Number	:	7827273
Built	:	1980 Cochranes Ship Builders Selby
Construction	:	Steel
Owner	:	Onesimus Dorey Guernsey Channel Islands
Manager	:	Torbulk Ltd Grimsby North East Lincolnshire
Gross Tonnage	:	909
Length Overall	:	59.98 metres
Length BP	:	56.00 metres
Breadth	:	11.28 metres
Depth	:	4.60 metres
Propulsion	:	Mirlees Blackstone 750 kW Single Screw Shaft
Crew	:	Six
Position of Accident	:	56° 34' N      002° 32' W
Date and Time (UTC)	:	7 December 1998      0357
Damage	:	Forepeak Hull Plating (Holed)
Injuries	:	None



Figures 1 & 2      *Pentland*



## 1.2 DESCRIPTION OF VESSEL

*Pentland* was designed as a dry bulk carrier and was currently engaged on the UK/near continental trade, carrying general bulk cargoes. The vessel had a single hold, with folding steel hatch covers.

She was equipped with standard navigational equipment which included: GPS, radar, gyro compass with autopilot, MF radio, VHF radio and echo sounder.

The helm position was situated centrally at the forward end of the bridge with the navigational equipment and main engine controls strategically placed in an operating console either side.

There was a chart table at the aft end of the bridge and a two-man seat/locker on the port side.

No watch alarm was fitted.

## 1.3 BACKGROUND TO THE VOYAGE (All times are UTC)

On 30 November 1998 *Pentland* arrived in the Belgian port of Fosdyke. At 0300 she was secured alongside and at 0700 commenced discharging her cargo. After a break overnight, discharging was completed at 1410.

*Pentland*, in ballast, sailed from Fosdyke at 1630 bound for the port of Amsterdam.

At 1940, on 2 December, the vessel arrived in the port of Amsterdam. The following day, she was shifted to a loading berth and started loading a cargo of coal.

Loading was completed at 1115 on 4 December.

## 1.4 THE CREW

*Pentland* carried a crew of six; the master, mate, chief engineer, two ABs and an AB/cook, in accordance with her safe manning certificate issued by the Barbados authorities.

The master, a Polish national, held an unrestricted Polish master's certificate of competency. An application for an equivalent Barbados certificate was being processed at the time of the accident. He was an experienced seafarer having served on fishing vessels from 1969 and on merchant vessels from 1985.

He joined *Pentland* in October 1998 in the employment of Torbulk Ltd, the manager of the vessel. He was employed on a four months on/two months off contract.

The mate, a Russian national, was the holder of a Russian master's certificate and a Barbados chief mate's certificate.

He was an experienced seafarer having served for over ten years on general cargo vessels. He also joined *Pentland* in October 1998 and was employed on a six-month contract.

The remainder of the crew were non-UK nationals employed on contracts ranging from six to nine months.

## **1.5 WATCHKEEPING**

When at sea, the navigation watch was shared between the master and the mate, alternating six hours on, followed by six hours off. The master was normally on watch from 0600 until 1200, and 1800 until 2400.

When in port, the mate supervised the loading and discharging of the cargo and the master was normally stationed on the bridge to take care of paperwork and visits by harbour officials, and to answer any telephone calls.

In port the ABs worked on deck around cargo operations. At sea, they normally worked on deck from 0800 until 1700. An AB was only posted as a lookout on the bridge during bad weather.

It was not normal practice to have an AB posted on the bridge as a lookout during the hours of darkness.

## **1.6 ENVIRONMENTAL CONDITIONS**

The weather at the time of the accident was a north-north-westerly wind of force 2/3 with a slight to moderate swell. The visibility was good. The predicted times of HW and LW at Leith on 7 December were 0452 and 1049 respectively.

## **1.7 EVENTS LEADING TO THE GROUNDING (All courses are true)**

*Pentland* sailed from Amsterdam at 1330 on 4 December 1999 bound for the port of Inverness with a cargo of 1165 tonne of coal. The master remained on watch until the vessel had cleared port.

A passage plan to Inverness was constructed. On leaving Amsterdam courses were set towards the Dowsing buoy off the UK coast. The weather during the passage across the North Sea was a north-north-westerly wind of force 7/8 with a 5m swell. The vessel made good a speed of approximately 5 knots,

pitching and rolling heavily in the prevailing weather conditions. None of the crew managed to get much sleep during this period.

At 1600 on 5 December *Pentland* reached the Dowsing buoy. Courses were then set to take the vessel northwards towards Rattray Head, maintaining a distance of 5 miles from the UK coastline. There was very little improvement in the weather conditions.

At 2400 that evening the master was relieved on the bridge by the mate. Before returning to the bridge at 0600 the following morning, he managed to sleep for approximately five hours.

The master took the navigation watch until 1200, when again he was relieved by the mate. There was still no significant change in the weather conditions.

The mate called the master at 1900, having decided to allow him an additional hour's rest. During the period the master was off-duty he slept for only three hours. This was due mainly to tasks which had to be completed during off-watch periods, and the pitching and rolling of the vessel in the heavy weather.

When the master took over the watch the course steered was 344° on autopilot. At 2000 a GPS position of 55° 41.0' N 001° 31.7' W was recorded in the deck log book. The master then altered course to 337° to maintain the laid-down course line. This course line would have taken the vessel to a position 5 miles east of Bell Rock, where, in accordance with the passage plan, an alteration of course to 012° would then have had to have been made to maintain a distance of 5 miles from the coastline. At 2400 a GPS position of 56° 15.0' N 002° 03.2' W was recorded in the deck log book.

The weather had begun to moderate sometime earlier in the evening and by 2100 the north-north-westerly wind had decreased to force 2/3 with a slight to moderate swell and good visibility. The GPS indicated the speed of the vessel had increased to an average of 8 knots.

The master did not call the mate at 2400, but remained on watch, subsequently sitting down on the seat/locker located on the port side of the bridge and falling asleep. He interpreted detecting both visually and by radar Bell Rock at a distance of 7 miles on the port beam at 0200 on 7 December.

Without the required course alteration the vessel continued on her current heading past Bell Rock.

At approximately 0340 the master woke. The first thing he noticed was the coastline in close proximity ahead and to port of the vessel. He immediately put the main engine controls from ahead to full astern. However the manoeuvre was insufficient to prevent *Pentland* from running aground at Carlingheugh Bay, north of The Diel's Heid.

After grounding, the master immediately instructed the crew to sound all internal compartments for water ingress, and to sound round the vessel externally. At 0357 the master contacted Forth Coastguard on VHF channel 16 and reported the vessel aground and taking water. There was no pollution.

It was found that the forepeak compartment had flooded with 30 tonne of water to a depth of approximately 2m. The remainder of the vessel was sound. *Pentland* had grounded on her starboard side forward. External soundings showed that the port side and the after part of the vessel was in a depth of 6-7m. The draught of the vessel was 3.1m.

After establishing the position of the vessel, co-ordination of the incident was passed to Aberdeen MRCC. Due to a falling tide and, with it, the imminent danger of the vessel sustaining further damage, Arbroath and Montrose lifeboats were launched and tasked to the scene.

At 0431 Arbroath lifeboat arrived on scene and an attempt was made to pull *Pentland* clear. This attempt failed. When the Montrose lifeboat arrived on scene, a further attempt using both lifeboats and the vessel's astern propulsion was made, but this too failed.

At 0525 *Pentland* began listing to port. By 0605 the list had increased to approximately 25°. A decision was then made by the master to abandon the vessel. All the crew were transferred to the Arbroath lifeboat and taken ashore to the lifeboat station.

At 0752 with *Pentland* hard aground but in no immediate danger, the master and the crew proceeded back to the vessel on the Arbroath lifeboat, with a portable salvage pump and materials to construct a temporary repair.

After being transferred back on board the vessel, the crew reduced the water level in the forepeak and effected a temporary repair to the damage.

At 1253, now on a rising tide, with the aid of the Arbroath lifeboat *Pentland* was refloated successfully, and made her way under her own power to Montrose for further examination of the damage. An escort tug was provided during the passage and *Pentland* was secured alongside at 1610.

## 1.8 STCW 95

International standards for watchkeeping are laid down in *STCW 95* which came into force on 1 February 1997.

The provisions of *STCW 95* include a mandatory code pertaining to manning and operational matters. The code addresses watchkeeping at sea and sets out certain principles to be observed in keeping a navigational watch. Relevant parts of the text read as follows:



*...All persons who are assigned duty as officer in charge of a watch... shall be provided a minimum of 10 hours rest in any 24 hour period...*

*... The hours of rest may be divided into no more than two periods, one of which shall be at least 6 hours in length.*

*...The minimum period of 10 hours may be reduced to not less than 6 consecutive hours provided that any such reduction shall not exceed beyond two days...*

*... The officer in charge of the navigational watch may be the sole lookout in daylight provided that on each occasion... (this is followed by conditions which should be taken into account such as weather, visibility and traffic density).*

*Merchant Shipping Notice 1682(M)* makes it clear that in order to comply with *The Merchant Shipping (Safe Manning, Hours of Work and Watchkeeping) Regulations 1997* the principles applying to the keeping a safe navigational watch under *STCW 95* must be followed. The Regulations apply to seagoing UK registered merchant ships and to other ships when they are in UK national waters.

*STCW 95* permits the officer of the watch to be the sole watchkeeper by day but not by night, although the wording of the text makes this only implicit.

*Merchant Shipping Notice 1682(M)* also provides guidance on appropriate manning levels. For vessels of the size and type of *Pentland* it recommends that at least three officers should be carried, unless the master keeps watch, or where the length of voyage is short enough to ensure adequate rest periods for watchkeepers.

## 1.9 TORBULK LTD

Torbulk Ltd is the manager of six foreign-flagged general bulk carriers ranging from 900 to 2000 gt.

The vessels normally trade within the near continental and extended European trading areas.

A memorandum, issued by Torbulk Ltd on 7 February 1997 to all masters, contained amendments to the company's standing instructions. These amendments embraced the provisions of *STCW 95*.

On 24 October 1997, *Sea Humber*, managed by Torbulk Ltd, ran aground in Belfast Lough. The resultant MAIB investigation concluded that the primary cause of the grounding was that the master fell asleep on watch. Contributory causes were the master's cumulative fatigue caused by working an excessive

number of hours prior to the grounding. Further contributory factors were the lack of a second person on watch and the absence of a bridge watch alarm.

On 6 February 1998, *Oakland*, also managed by Torbulk Ltd, ran aground while leaving Buckie harbour. A contributory factor to the grounding was the inability of the master to pilot the vessel successfully without the assistance of a dedicated helmsman, contrary to the provisions of *STCW 95*.

In September 1998, Torbulk Ltd, being aware of a growing opinion that, to fully comply with STCW legislation, current minimum safe manning scales are, in many cases, inadequate, employed an additional officer on one of its vessels as an exercise to alleviate the workload on other officers and crew.

This exercise was to be evaluated over a period of six months. The result of this exercise was not made available to the MAIB.

## 1.10 UK PAPER TO IMO

On 24 April 1998, the UK government, in light of a number of accidents investigated by the MAIB where the primary cause was the officer of the watch falling asleep, submitted a paper to the IMO Sub-Committee on Safety of Navigation highlighting these accidents and concluding:

1. *These accidents would not have occurred had an effective watch alarm been correctly set for the prevailing circumstances. The incidents demonstrate the need for shipowners to consider fitting effective watch alarms irrespective of the watch structure on board their vessels.*
2. *Whilst vessels are required to be manned so that the officer of the watch is properly rested, it is clear that an element of fatigue was present in the incidents investigated by the MAIB. It is also a requirement that a lookout is provided on the bridge at night. In these cases there is no doubt that the absence of a lookout contributed to the watchkeepers falling asleep. The UK does not condone non-compliance with IMO requirements.*
3. *Although most of these incidents occurred at night when sole watchkeeping is not permitted, there is clear evidence that fatigue can be a problem for sole watchkeepers during daylight hours. The UK believes that watch alarms significantly enhance navigational safety. Encouragingly, an increasing number of ships are being fitted with such watch alarm systems providing them with a valuable safeguard against watchkeepers falling asleep. The effectiveness of this important safety feature would be improved through the development of a performance standard.*

The sub-committee was invited to note the information provided and to consider inviting the committee to add the development of a performance standard for watch alarm systems to the sub-committee's work programme.

## **SECTION 2 ANALYSIS**

### **2.1 INTERPRETATION OF AVAILABLE EVIDENCE**

#### **2.1.1**

- a) The last two recorded GPS positions in the deck log book showed that *Pentland* had made good a course of 333° and covered a distance of 38 miles at an average speed of 9.5 knots during the period from 2000 until 2400. The increase in speed was probably due to the predicted tide flowing predominately in a north-westerly direction during this period.
- b) At 2400, in the given GPS position the predicted tide commenced flowing in a direction of 176° at a rate of 0.4 knots. By 0200 the direction was 191° at a rate of 1.0 knot, and by 0300 the rate had increased to 1.2 knots.

- 2.1.2 At 0200, having made no alteration to the course or speed of the vessel and allowing for the tidal current, *Pentland* would probably have been making good a course of about 323° at an approximate speed of 7 knots. It is therefore unlikely the master detected Bell Rock on the port beam at a distance of 7 miles. *Pentland* would have probably passed abeam of Bell Rock at 0150 at a distance of about 3 miles, eventually running aground in the position given.

### **2.2 ALTERNATIVE EVENTS LEADING TO THE GROUNDING**

- 2.2.1 The master recorded the GPS position in the deck log book at 2400. It was probably his intention to call the mate at 0100 having then been on watch for the allotted six-hour period. The mate, a qualified officer, was capable of making the required course change. There was no need for the master to remain on the bridge after his period of duty.
- 2.2.2 Sometime shortly after 2400, 6 December, the master sat down on the seat/locker on the port side of the bridge and fell asleep. Without the required course alteration coupled with the effect of the tidal current, the vessel continued on her passage past Bell Rock towards The Diel's Heid. At 0340 the master awoke and then used the main engines in an unsuccessful attempt to avoid a grounding.

### **2.3 WORK AND REST PERIODS**

- 2.3.1 From 0600 on 4 December 1998 until the vessel ran aground, a period of 70 hours, the master was on watch for a total of 42 hours and off watch for 28 hours. Had the mate relieved him on the bridge at 0100, he would have just managed to achieve an average period of 10 hours off watch in every 24 hours. These could be deemed to be periods of rest and therefore would be in accordance with *STCW 95*. However, although off watch for 28 hours the

master only managed to sleep for approximately 10-12 hours during the total period of 70 hours.

- 2.3.2 During the watch leading up to the grounding the weather subsided causing the master to inadvertently relax, no longer having to brace himself against the movement of the ship. This, coupled with the effects of cumulative fatigue caused by long hours of duty, interrupted sleep, and the lack of sleep during the passage from Amsterdam, was a major cause of his inability to remain awake.

## 2.4 MANNING

- 2.4.1 Like many small bulk carriers *Pentland* ran to a tight schedule. Again, like many vessels of her type, manning was no more than the minimum required and the watchkeeping was shared between the master and the mate. For officers working an equivalent number of hours on and off watch, the theory that the off-watch hours can be entirely spent resting is impossible to achieve due to the schedule of the vessel and other tasks which must be completed while off watch, both at sea and in port. Heavy weather, fog, and pilotage duties are a few instances where the master must either take over the conduct of the vessel himself, or at least be present on the bridge. While off watch, apart from meal times and undertaking domestic chores, the master has to deal with various items of paperwork, inspections and drills etc. All these activities must be carried out during off-watch periods.

- 2.4.2 Although the master recognised that it was virtually impossible to achieve adequate rest he made no formal complaint to the manager of the vessel.

- 2.4.3 The number of officers carried on board *Pentland* was in accordance with her safe manning certificate and with the guidance provided in *Merchant Shipping Notice 1682(M)*. However there is no international agreement on the specific number of qualified officers to be carried when determining safe manning levels.

- 2.4.4 The employment of an additional watchkeeping officer would have overcome the problem of existing officers and, in particular, the master being unable to achieve adequate rest.

## 2.5 ONE MAN BRIDGE OPERATION AT NIGHT (OMBON)

- 2.5.1 During the hours of darkness no additional lookout was posted on the bridge, contrary to *The Merchant Shipping (Safe Manning, Hours of Work and Watchkeeping) Regulations 1997*.

- 2.5.2 Lone watchkeeping at night was a regular practice on board *Pentland* and was also in contravention of standing instructions issued by the manager of the vessel.



- 2.5.3 A second man present on the bridge acting as a lookout could have ensured that the master remained awake and, in any event, could have realised that something was amiss in time to prevent the grounding.
- 2.5.4 The fitting of a fully operational bridge watch alarm also could have ensured that the master remained awake.

## SECTION 3 CONCLUSIONS

### 3.1 CAUSE

The cause of the *Pentland* grounding was the track made good by the vessel in the prevailing circumstances and conditions.

### 3.2 CONTRIBUTORY CAUSES

1. The master falling asleep on watch. **(2.2)**
2. The master's failure to make a course alteration at the due time. **(2.2)**
3. The master suffering from the effects of cumulative fatigue caused by long hours of duty, interrupted sleep, and the lack of sleep. **(2.3)**
4. The master's lack of sleep caused by the heavy weather conditions experienced, and off-duty tasks which had to be completed during passage. **(2.3)**
5. The absence of an additional person on watch during the hours of darkness. **(2.5)**
6. The absence of a bridge watch alarm. **(2.5)**
7. The master inadvertently relaxing due to the weather subsiding. **(2.3)**

### 3.3 OTHER FINDINGS

1. The available evidence indicates that the master fell asleep sometime shortly after 2400, 6 December, and did not detect Bell Rock at 0200, 7 December, at a distance of 7 miles on the port beam. **(2.1) (2.2)**
2. The employment of an additional watchkeeping officer would have overcome the problem of existing officers being unable to achieve adequate rest. **(2.4)**
3. The master and mate were in contravention of UK regulations, and standing instructions issued by the manager of the vessel, by keeping bridge watches on their own during the hours of darkness. **(2.5)**

## **SECTION 4 RECOMMENDATIONS**

### **4.1 MARITIME AND COASTGUARD AGENCY is recommended to:**

1. Reaffirm its position on the requirement to post a lookout in addition to the officer of the watch during the hours of darkness.
2. Continue to promote the concept of an international standard and carriage requirement for watch alarms.
3. Seek international agreement on the specific number of qualified watchkeeping officers to be carried when determining minimum safe manning levels.

### **4.2 TORBULK LTD is recommended to:**

1. Consider employing an additional watchkeeping officer on those vessels where the master and mate are currently the only qualified watchkeeping officers on board.
2. Ensure that a lookout is posted in addition to the officer of the watch during the hours of darkness.
3. Consider fitting a watch alarm.

**Marine Accident Investigation Branch  
July 1999**