Report on the investigation of an

accommodation fire on

mv *Rosebank*

7 miles east of Alnmouth, off the Northumberland coast

14 December 2001

Marine Accident Investigation Branch
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Extract from

The Merchant Shipping

(Accident Reporting and Investigation)

Regulations 1999

The fundamental purpose of investigating an accident under 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.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able seaman
CO_2	-	Carbon dioxide
gt	-	Gross tons
MCA	-	Maritime and Coastguard Agency
SCBA	-	Self-Contained Breathing Apparatus
STCW	-	Standards of Training, Certification and Watchkeeping for Seafarers
UMS	-	Unmanned Machinery Space
UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency (Radio)
Halon	-	Vapour-forming liquid fire extinguisher
“Mayday”	-	Internationally recognised signal of distress
NPK Fertiliser	-	Trade name for particular type of fertiliser
Pilotage	-	Period when vessel is under the guidance of a pilot
Pitch Control	-	Control centre for varying pitch of variable pitch propeller
Spontaneous combustion	-	Ignition without any external assistance

SYNOPSIS

On Saturday 15 December 2001, at 0151 UTC, Humber Coastguard notified the Marine Accident Investigation Branch (MAIB) that the general cargo vessel *Rosebank* was on fire and had been abandoned by her crew about 7 miles east of Alnmouth, off the Northumberland coast. A rescue helicopter airlifted all the crew off the vessel, and took them ashore. The situation was monitored by an RN vessel alongside, and a salvage vessel. The MAIB investigation started 2 days later when the vessel was towed into the River Tyne and brought alongside.

Rosebank, a UK-registered 1213gt general cargo vessel, operated with a crew of five and traded between ports in the UK, Ireland, and the Continent. The crew consisted of the master, mate, chief engineer, AB, and cook/AB. *Rosebank* had been purchased by new owners in October, was fully certificated and in class, with an experienced master and chief engineer on board.

Rosebank sailed from Berth 13, King George Quay, Dundee at 1315 on 14 December after completing loading at 1200. Her cargo consisted of bagged and palletised bags of NPK fertiliser and calcium nitrate for a two-port discharge in the Channel Islands of Guernsey and Jersey. After passing the fairway buoy at 1500, the mate took over the watch while the master went below. On entering the galley, the master was told that a power socket was not working and, after confirming this, he went below to the engine room to find the chief engineer. He found him working on boiler maintenance in the workshop. Both then attempted to trace the fault, but found nothing. The master returned to his cabin.

At 1800 the master took over the watch. At 2050, the master and chief engineer carried out a routine inspection of the accommodation and provision room areas. Nothing unusual was seen or smelt. At 2200 the master smelt smoke on the bridge and called the crew. While the remainder of the crew assembled on the poop deck, the chief engineer checked the engine room. While he went forward to start the fire pump, the cook/AB collected the SCBA set, put it on, and went to check the provision room via the engine room. He reported there was a fire in that area and then proceeded to fight it using the engine room 45kg CO_2 extinguisher. The chief officer and the chief engineer began boundary-cooling the deck above, while the other AB assisted the cook/AB.

The fire was knocked down, but it re-ignited as soon as the CO_2 ran out. The paint store above the provision room also caught fire, but the chief officer managed to extinguish it using a fire hose. The re-ignited fire spread into the accommodation and the crew were unable to contain it. The master had informed the coastguard of the fire and they had issued a “Mayday” on his behalf. With the fire out of control, the master was forced to say that they would have to abandon the vessel. By then, a helicopter was in attendance, and all five were airlifted off to hospital, suffering from smoke inhalation.

It is recommended that the MCA reviews the requirement which allows the continued use of smoke helmet/smoke masks in place of SCBA sets.

Figure 1

Rosebank

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *ROSEBANK* AND ACCIDENT

Vessel details

Registered owner	:	Boddingtons Shipping Ltd, Braintree, Essex
Manager(s)	:	Boddingtons Shipping Ltd
Commercial Manager	:	G T Gillie & Blair Ltd
Port of registry	:	Liverpool
Flag	:	United Kingdom
Type	:	General cargo vessel
Built	:	1982 – Hoogezand, Holland
Classification society		Bureau Veritas
Construction	:	Steel
Length overall	:	69.4 metres
Gross tonnage	:	1,213
Engine power and/ or type	:	B&W Alpha 8V 23L - 749 kW
Service speed	:	11.2 knots
Other relevant info	:	Single screw, CP propeller

Accident details

Time and date	:	2200 - 14 December 2001
Location of incident	:	55°30’N, 001°23’W 7 miles east of Alnmouth, off the Northumberland Coast
Persons on board	:	5
Injuries/fatalities	:	Crew suffering smoke inhalation
Damage	:	Accommodation block, including bridge, burnt out

1.2 BACKGROUND

1.2.1 Boddingtons Shipping Limited, a new British shipping company first registered in the UK in 2001, is a one-ship company with its head office in Braintree, Essex. The commercial managers are G T Gillie & Blair, a Newcastle shipping agency. The Firth Shipping Company Ltd owned a small number of shares in the ship. This was Boddington's first venture into the shipping market and, after examining a number of vessels, it eventually decided to buy *Rosethorn*, a small general dry cargo vessel, offered for sale by the James Fisher company. After completing the purchase on 15 October 2001, the vessel was renamed *Rosebank*, with Boddingtons Shipping formally taking over from Fishers on 18 October 2001 in Ellesmere Port, Cheshire.

The original crew of five consisted of a British master with four Polish nationals. It was intended that, apart from the master, the vessel would sail with the original crew but, at 1630 on Thursday afternoon 18 October, the Polish Crewing Agency, Hamiltons, told the new owners that the Polish crew did not want to sail. After some discussion, the chief engineer agreed to remain on board to assist in the handover, but wished to leave at the end of his contract (end October 2001).

1.2.2 The new crew flew in from Gdansk, Poland on the Monday evening, 22 October, and joined *Rosebank* the next morning. *Rosebank's* first voyage was to load stone at Llanddulas, Wales, for discharge at Newhaven, Sussex, followed by a ballast voyage to Erith, Kent, to load a cargo of rape seed oil for part discharge at Cork and Arklow. As the Polish chief engineer was due to leave in Cork, Mr Russell, a chief engineer with whom the master had sailed before, joined *Rosebank* in Newhaven to familiarise himself with the vessel before taking over in Cork. After arriving at the Cork anchorage, the Polish chief engineer left the vessel. On completion of the part discharge, *Rosebank* sailed along the coast to the next load port in Arklow.

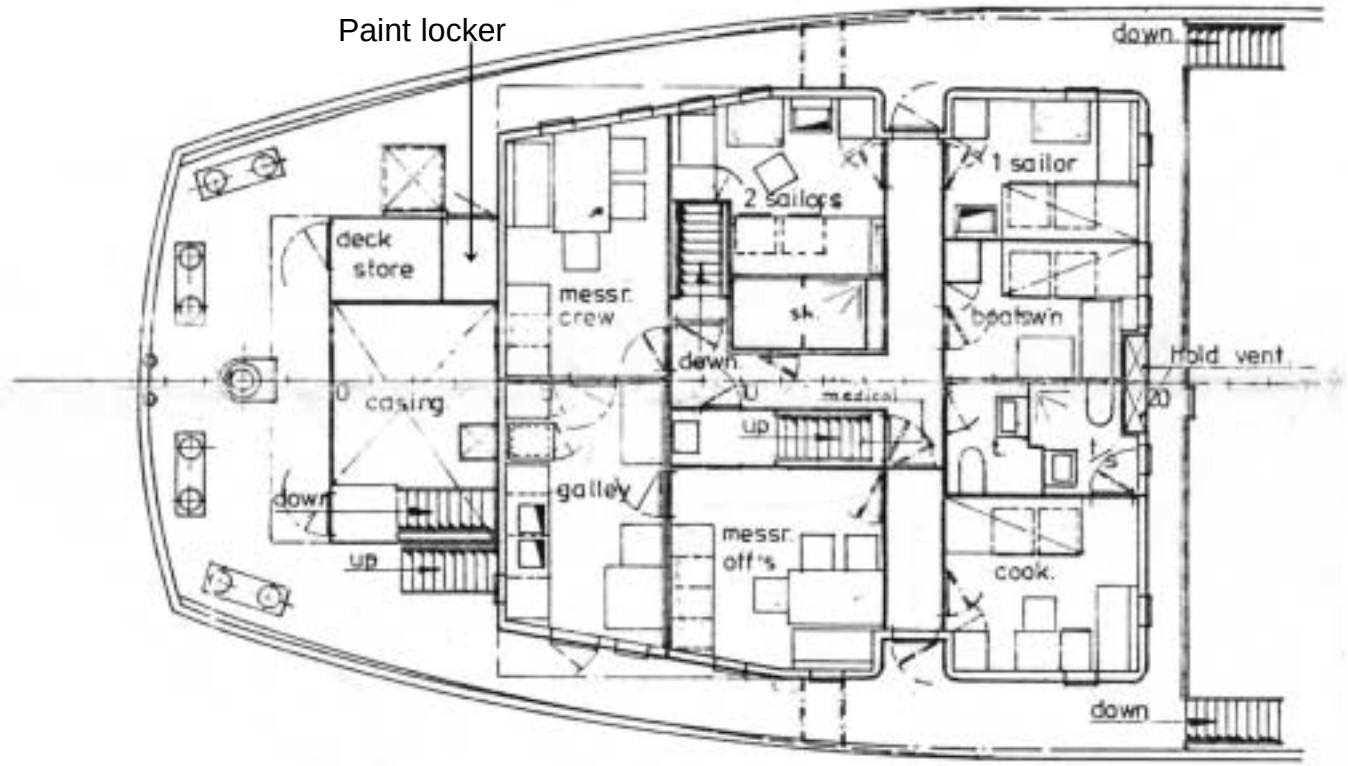
While in Arklow, the new chief engineer, Mr Russell, was advised that his wife was seriously ill, so he had to leave the vessel. Mr Clarke, a retired chief engineer, agreed to join the vessel until a permanent chief engineer could be found. Mr Clark stayed with the vessel for the next month until 5 December when Mr Rutherford joined *Rosebank* in Dundee. The following day, *Rosebank* left on a round voyage to Kirkwall, Orkney Isles, returning to Dundee on 10 December. No problems were experienced during this voyage. While alongside in Dundee loading for the voyage to Jersey and Guernsey, the vessel's boiler started to smoke very badly because of smouldering carbon deposits in the exhaust trunking. The volume of smoke generated was sufficient to cause the dockside crane driver to stop work until it cleared. The chief engineer, therefore, shut down the boiler for maintenance. In the process of overhauling both the burner and the exhaust system, he found that the flexible exhaust trunking was badly corroded.

Figure 2

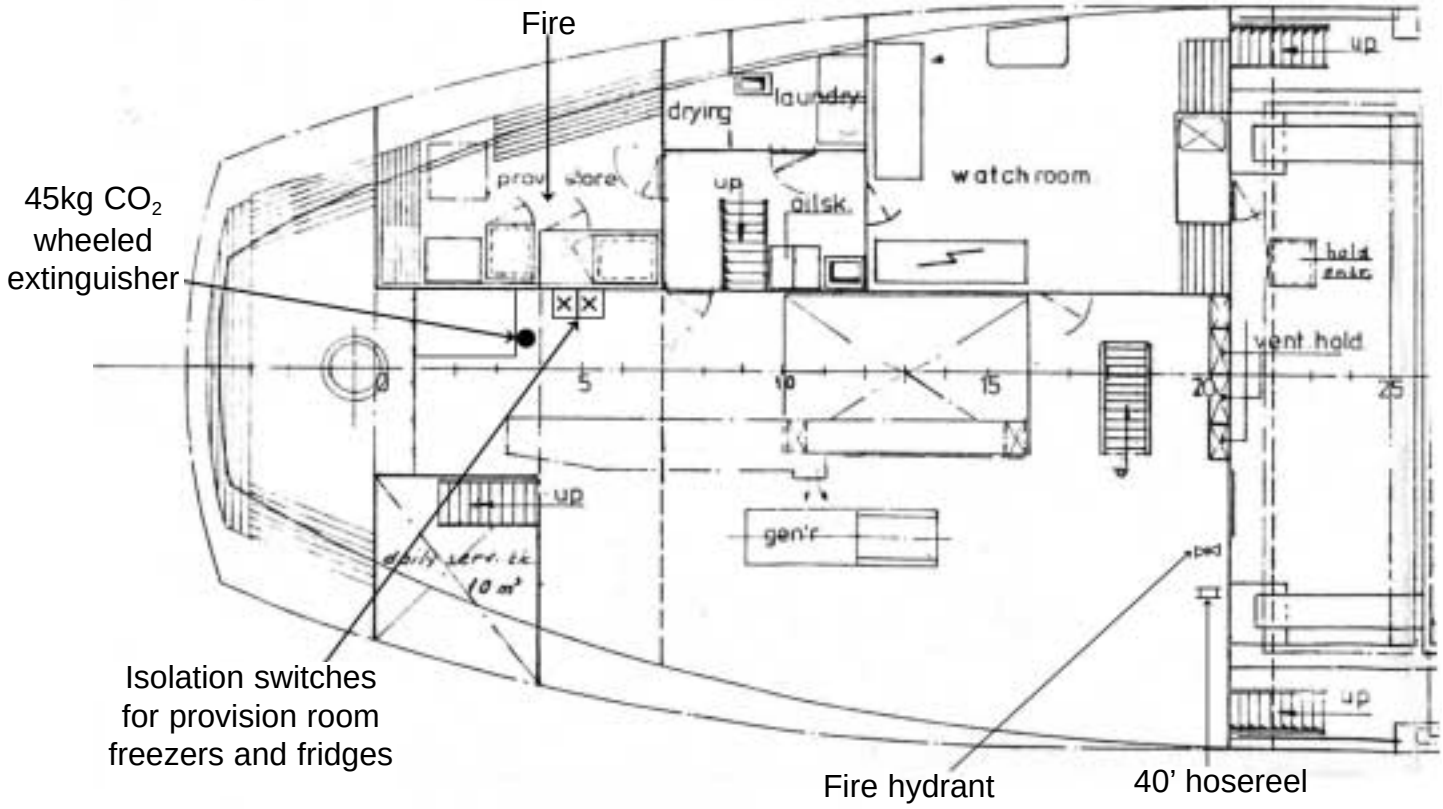
Rosebank

Figure 3

POOPDECK



MAINDECK



1.3 NARRATIVE (See Figure 3)

1.3.1 *Rosebank* sailed from Berth 13, King George Quay, Dundee, at 1315 on 14 December 2001, after completing loading at 1200. Her cargo consisted of bagged and palletised bags of NPK fertiliser (BC14-14 and BC16-16: main crop potato fertiliser) and calcium nitrate for a two-port discharge in the Channel Islands of Guernsey and Jersey (St Peter Port, about 370 tons, and St Helier, 956 tons).

The master and mate usually worked 6 hour watches starting at noon, with the master taking the watch for the first few hours after leaving port. This allowed him to cover the pilotage etc and enabled the mate to rest before taking over.

On this occasion, the pilot left at the inner pilotage at 1400, so the master continued pilotage until after passing the fairway buoy at 1500. At about 1510 the mate took over the watch. The master then left the bridge and went below, intending to return to the bridge at 1800 to take over the evening watch. The ABs did not stand a watch as such, they were on standby and came on to the bridge in bad weather conditions or when a lookout was required. The chief engineer did not stand a formal watch, but usually carried out maintenance work during the day and checked on the engine room periodically during the evening and night. During pilotage, he was usually in or around the engine room.

After handing over the watch, the master left the bridge and went down to the galley to make a cup of tea. AB Snios, who was in the galley at the time, mentioned that neither the domestic fridge nor the microwave were working. The master went into the cross-alleyway to check the fuses – which were a glass bottle type – pulled them out and put them back in again. The cook said that those were working as all the lights went off, and then came back on again, the fridge however remained off. The power socket for the toaster and kettle worked, but the power socket supplying the fridge and the microwave did not.

The master had not been conscious of any previous trouble with that power socket during the two months he had been on the vessel, and nobody else had reported any problem. After finding the fuses intact, the master went down the internal stairs to the lobby below, from which were the entrances to the provisions stores, laundry, the upper level of the engine room, and the engine workshop.

1.3.2 In the workshop the master found the chief engineer working on the overhaul and repair of the boiler. He told him there was a fault with the power socket supplying the fridge and microwave in the galley. He had checked the fuses for the galley but all these seemed to be working. The chief engineer said that he was aware of the fault and had also checked the circuit fuses for both the power and galley extractor fans. Once he had completed the work on the boiler, he intended to take another look at the defective socket in the galley. At the master’s insistence, the chief engineer stopped working on the boiler equipment,

and connected up an extension lead from a socket in the workshop and ran it up into the galley. Both the fridge and the microwave were connected up to the extension and both worked. This confirmed that the fault lay either in the socket itself or the cabling. The master and chief engineer then traced the cable from the non-working socket down from the galley into the deck below. However, they were unable to identify exactly where the cable led, other than that it was in the vicinity of the provisions room. With the cable tracing inconclusive, the master went back into the accommodation, while the chief engineer returned to the workshop and resumed his boiler maintenance work.

The provisions room was aft on the port side, the aft bulkhead formed part of the steering gear flat, the outer bulkhead the ship's hull, while the inner bulkhead formed part of the upper engine room. Entering via the provision room door, on the left hand side of the engine room bulkhead, was a dry store cupboard containing coffee, tins of meat etc, a box freezer and two upright freezers. On the aft bulkhead was a shelf with cleaning materials, milk, orange juice etc, and the access ladder to the booby hatch above. On the port side coming forward was a half bag of potatoes, more shelving containing toilet rolls, fruit in a box, a small upright freezer, and a small upright refrigerator. The wooden door into the provisions room opened inwards and was kept open; tied back to the dry store cupboard by a piece of rope. Next to the provisions room on the port side was the laundry – this space was divided into two areas by an athwartship bulkhead containing a doorway opening, but no door. The aft part was tiled and unused. The forward part had two washing machines, a clean one and a dirty one. A tumble drier was fitted on top of the clean washing machine.

1.3.3 At 1755 the master returned to the bridge and relieved the chief officer for the 1800 to 2400 watch. At about 2050, before altering course off the Farne Islands, the master decided to do the rounds of the accommodation and provision/laundry areas; the normal procedure for the night-time watches. He was accompanied by the chief engineer, who was in the mess room. With everything found to be in good order, the master returned to the bridge, while the chief engineer went to check the engine room. At about 2200, after having recorded *Rosebank*'s position on the chart, the master became conscious of a smell of burning on the bridge and opened the inner wheelhouse door to the master's accommodation. Immediately, he was engulfed in dense smoke, and shouted down to the chief engineer to shut down the boiler.

The chief engineer, who was in his cabin reading, with the door hooked in the open position and just the curtain drawn across the doorway, straightaway went to his cabin door and pulled the curtain back. He found that he was looking at a build-up of thick white acrid smoke at the deckhead. It was not at that time moving in any particular direction or moving with any speed, but appeared to be just slowly building up in density and volume. He tried to go below using the internal stairway, but found that the smoke in the stairway was too acrid, so he had to turn back. He then went up to the bridge and down to the poop deck

using the external ladders. Once there, he opened the upper engine room from the aft door on the poop deck, saw that the space was clear of smoke, and went in. He shut down the boiler, looked in the engine workshop, found it clear of smoke so left and went back up to the bridge. On looking aft down the port side from the bridge, he could see smoke coming up from the poop deck aft. Realising that the crew would need assistance, he went back down to the poop deck.

1.3.4 The chief officer, who was asleep in his cabin, heard the master calling him. He left his bed, put his shoes on and went up to the bridge. The master had in the meantime rung the general alarm and reduced the propeller pitch to slow ahead. When the chief officer reached the bridge, the master told him there was a fire below, but that he was not sure where. He was instructed to get the fire party to collect the breathing apparatus from the bridge and to check the provision and laundry areas for the seat of the fire. Because there was smoke in the accommodation, the chief officer went down to the poop deck using the external ladders.

The cook/AB, who was asleep in his cabin, woke up when he smelt smoke. He opened his cabin door and found thick smoke in the alleyway from the deckhead down to about mid-door height. He dressed immediately, and crawled under the smoke along the cross-alleyway to call the other AB. Both men then went out on to the poop deck where they met the chief officer. With the crew assembled at their emergency station on the poop deck, the chief officer sent the cook/AB to the bridge for the SCBA set, and asked the chief engineer to go forward and start the emergency fire pump. While waiting for the SCBA set and for pressure on the fire main, the chief officer noticed that paint was blistering on the port quarter of the hull, and that smoke was belching out of the deck vent from the provision store below.

The cook/AB returned from the bridge already wearing the SCBA set and ready to search below for the seat of the fire. With the other AB operating the safety line, he entered the upper level of the engine room from the aft access door on the poop deck. Although he found smoke in the engine room, there was no evidence of any fire, so he moved across to the entrance to the provision room lobby on the port side, adjacent to the boiler. When he cracked open the door, he encountered thick acrid smoke and saw through the open provision room door that the place was on fire. He attempted to fight the fire using the hose from the 45kg CO_2 trolley extinguisher by the boiler, through the partly opened engine room door into the lobby, and the open doorway of the provision store. With the hose becoming very cold, and being very conscious of what looked like electrical arcing occurring within the fire area, he turned off the CO_2, shut the engine room door and retreated to the poop deck.

1.3.5 Just at that moment, the master arrived on the poop deck to find out what was happening and was told by the cook/AB that there was a fire in the provisions room. Seeing the chief officer rigging fire hoses in preparation for boundary cooling, the master returned to the bridge. The cook/AB explained his concerns regarding cold hands and the possibility of electrocution to the chief officer and chief engineer and was given a pair of lined rubber gloves to use while handling the hose. With these on, he re-entered the upper engine room and, once again, fought the fire through the provision lobby door. Having apparently managed to put it out, the cook/AB returned to the poop deck. The chief officer was by then using water from the fire main to boundary cool the deck and hull above and around the provision room, but the port quarter remained very hot. The master paid a brief visit to the area at this time and, before returning to the bridge, was told by the AB that the provision room fire was out.

Smoke and flames were then seen coming from the provision room deck vent, which indicated that the fire had re-ignited. The cook/AB re-entered the upper engine room and tried to fight the fire, as before, but had to abandon the attempt when the CO_2 supply ran out. He then tried a portable dry powder extinguisher, but as this was ineffective he returned to the poop deck. No attempt was made to use the fire hose on the upper engine room level.

While the second fire-fighting attempt was being made, the paint locker, on the poop deck above the provision room, containing 30 to 35 litres of paint, caught fire. The chief officer put this out using a fire hose. During this episode, the rescue boat stowed on the boat deck directly over the paint locker also caught fire.

1.3.6 While the chief officer, assisted by the chief engineer, was using the fire hose on the paint locker and the rescue boat, the AB told the chief officer that the fire had spread upwards into the accommodation. The chief engineer went to confirm the extent of the spread and found that the central alleyway leading aft to the crew mess, galley and stairway down to the provision lobby was heavily smoke-logged with loud burning noises occurring behind the provision lobby stairway door. He found it easier to escape from the rapid build-up of smoke by going through the doorway into the crew mess, then exiting via the galley and officers' mess into the cross-alleyway and out on to the poop deck starboard side forward.

Having extinguished the paint locker fire, the chief officer turned his attention to the accommodation, but soon found that movement was difficult because of heavy smoke and restricted access.

The master had recorded *Rosebank*'s position at 2200, 2210, and 2220 but did not call the coastguard on VHF Channel 16 until 2232. He gave the vessel's position as 55° 30' N, 001° 23' W, and told them that a fire had broken out in the provision store, but that he felt it was under control. This was after the master had visited the poop deck, and had been told by the cook/AB that the fire was out. Shortly after this, the master called the coastguard again and told them that the fire had spread to the paint locker, and fire-fighting was continuing.

1.3.7 On the basis of this latest report, the coastguard decided to initiate a “Mayday” relay broadcast on the vessel’s behalf, and diverted a rescue helicopter from another nearby incident to *Rosebank*. Shortly after this, at 2238, a container vessel in the area acknowledged the distress call and advised that she could be on scene in about 30 minutes. At 2241, the coastguard advised *Rosebank*’s master that the vessel should be kept clear of the coast. Accordingly, the master altered course from 153°T to 090°. After this alteration, the master set the pitch control to stop, to ensure there was no wind to aggravate the fire. The smoke was now quite thick, and with the rescue helicopter on scene and hovering, the down-draught was causing the bridge to become smoke-logged.

The master had been maintaining contact with the coastguard and the helicopter using the ship’s VHF set on channel 16 but, with the bridge becoming smoke-logged, he had to move out on to the bridge wing. He attempted to maintain contact with the helicopter using a hand lamp; but this was not very effective. At about 2325, when the chief officer told the master that the accommodation fire was out of control, the need for voice communication between the vessel and the helicopter became urgent. The chief officer therefore used the SCBA set to enter the smoke-logged bridge and retrieve a hand-held VHF set. With the fire spreading rapidly through the accommodation, and out of control, the master decided that it was necessary to abandon the vessel.

At this time, both the main engine and the generators were still running in the engine room, with the fire pump operating forward. No fuel trips had been operated or fire flaps closed.

1.3.8 At 2333, with contact regained with the helicopter and coastguard, *Rosebank*’s master told them they would have to abandon the vessel, and suggested that the pick-up could be on the large open and clear deck. The helicopter pilot, however, said that because of the presence of heavy smoke, they should go to the forecastle. The chief engineer and the two ABs then prepared to go forward, using the starboard side of the poop deck. One of the ABs used a fire hose to extinguish the flames which, by that time, had spread over the upper decks. This allowed the master and chief officer to descend from the bridge using the starboard side external ladders. The chief engineer moved the two ABs forward, but not before the cook/AB entered his cabin on the poop deck starboard side forward, to throw a few clothes etc into a holdall.

With all the crew forward, the winchman landed on board and all were successfully lifted off, the master and the winchman being last off at about 2338. As the helicopter turned to proceed to the hospital, a large ball of flames erupted from the accommodation and engulfed the bridge. At 0010 the next day, rescue helicopter 131 landed in the grounds of Wansbeck Hospital. All crew members, including the helicopter crew, were treated for smoke inhalation. After a medical examination and a period of time, all crew members were discharged from the hospital, fit, and well.

1.3.9 At 0036, *HMS Anglesey* arrived on scene with fire-fighting equipment, and attempted to contain the situation **(Figures 4 and 5)**. All other vessels were therefore released and the incident was downgraded to a “Pan-Pan” situation. A 4-mile exclusion zone was established around the burning vessel and negotiations took place between the owners, insurers and pollution control officers as to what should be done about her.

At 0839, the fire-fighting tug *Phoenix Cross* arrived and started fire-fighting. At 1316, the tug *Rowan Garth* arrived with a salvage team which boarded *Rosebank.* At this point, *HMS Anglesey* was released to return to her duties. At 1404, a line had been secured on *Rosebank* by the tug *Phoenix Cross* and a tow started for the River Tyne. By 2117 that day, the casualty was safely moored in the River Tyne.

1.4 CREW PARTICULARS

At the time of the incident, *Rosebank* was sailing with a crew of five, as per the manning scale, and the previous owner. The vessel operated with a master, mate, chief engineer, AB, and a cook/AB. The master and mate kept six-hour watches with the chief engineer on day work. The two ABs were also on day work, as well as being on call to the bridge as and when they were needed.

John McMath, aged 58, the master, had been at sea for 42 years and master for over 24. He possessed a master, foreign going certificate (under STCW 95, regulation II/2 - master unlimited area less than 3000gt) and had sailed on *Rosebank* in that capacity since the vessel was taken over by Boddingtons Shipping in October 2001.

Aditya Bhattacharya, aged 27, the mate, had passed his Class 3 examination in Bombay and had joined the vessel on 12 December 2001 in Dundee. He had just completed two years sea time on tankers and OBOs, and had enrolled at the South Tyneside college on a Class 2 certificate course. During academic holidays he worked in the coastal trade as a deck officer.

Lawrence Noel Rutherford, aged 50, the chief engineer, possessed a Class 1 certificate motor (under STCW 95, regulation III/2 - chief engineer, motor ships only), and had joined the vessel on 5 December 2001 in Dundee. His experience was primarily on deep sea vessels, latterly with short contracts on coastal vessels.

Snios Zdziseaw & Rybacki Yerzy were both aged 45, an AB and cook/AB respectively, and were Polish nationals contracted to sail with the vessel for a six-month period. They had been recruited through the Polish crewing agency, Hamiltons, and had joined *Rosebank* on 16 October 2001.

Figure 4

Figure 5

1.5 FIRE-FIGHTING AND DETECTION EQUIPMENT

1.5.1 *Rosebank* was fitted with a fire detection system covering the engine room. This consisted of 12 detector heads divided into two groups, one covering the lower engine room, the other the upper level and workshop. The alarm panel for the system was sited on the bridge. No fire detection system was fitted in the accommodation, galley, or provision room areas.

The vessel carried nine 2-gallon foam extinguishers:

- two at floor plate level;
- one at main deck level in the engine room;
- one in the provision/laundry room lobby;
- two on the poop deck, (one in the galley and one in the cross-alleyway of the accommodation);
- one in the central alleyway on the boat deck accommodation; and
- two in the forecastle head by the emergency generator and fore pump.

A 45kg wheeled CO_2 extinguisher was fitted aft by the boiler on the upper engine level.

Two dry powder extinguishers were fitted, one on the bridge and the second by the main switchboard in the engine workshop.

The engine room was covered by a 39kg Halon 1301 system with four discharge nozzles covering both the lower and upper engine room levels. The control board for the Halon release was in the engine room workshop.

1.5.2 The emergency fire pump was belt-driven off the emergency diesel generator sited in the forecastle head. Although this diesel generator was designated as the harbour and/or emergency unit, it was the same size and type as the main generator in the engine room. This emergency diesel generator could be started from the bridge, but the emergency fire pump had to be engaged by hand locally.

Six fire hoses were carried, four 18m (60ft) on deck and two 12m (40ft) in the engine room. Of those on deck, one was in the forecastle head, one on the poop deck, starboard forward at the entrance to the accommodation, one on the boat deck, starboard aft, and one on the starboard side of the bridge deck. The engine room hoses were both sited on the forward bulkhead, starboard side, one at floor plate level, the other at the upper engine room level.

One self-contained breathing apparatus (SCBA) set was stored on the bridge with a smoke helmet stored in the forecastle head. Spare fire-fighting gear was stowed in one of the redundant crew cabins on the main deck.

Four emergency wire-operated fuel stops were fitted, one on the forecastle deck for the fuel supply to the emergency generator, and three on the poop deck aft for the main engine and other fuel tanks in the engine room.

1.6 EXTENT OF DAMAGE (Figures 6-9)

Fire damage was restricted to the entire accommodation block including the bridge, and on the port side of the main deck aft - the provision room/ laundry and lobby area and, to a lesser extent, the engine workshop.

The accommodation block from the poop deck to the bridge was burnt out; only the main structure was left standing. The provision room was burnt out with severe deckhead damage in the laundry and lobby area. The washing and drying machines had suffered heat damage, but had not been burnt out. The engine workshop suffered fire and smoke damage at deckhead level, with evidence of heat transmission downwards, which damaged the upper part of the main switchboard.

The lower levels of the engine room, including the main engine, were undamaged, with only some smoke damage at the upper level. The port side engine room bulkhead suffered heat damage and distortion in the area of the provision room.

Progress of the fire was largely internal although, during the period when both the paint locker and the provision room fires were ongoing, the rescue boat, a six-person inflatable with an outboard engine, stored on the boat deck directly above the paint locker, caught fire and was destroyed. This resulted in a flame pattern on the port side of the funnel.

The port quarter of the vessel suffered severe fire damage on the bulwark, but only in the area of the provision store on the hull itself.

No damage has been reported to the cargo of fertiliser.

1.7 RESCUE SERVICES

Apart from *HMS Anglesey* and rescue helicopter R131, the following vessels attended as a result of the “Mayday” call:

Seahouses’ lifeboat was called at 2252, was on scene at 2338, and was released at 0109.

The 2035gt general cargo vessel *Heereweg* responded to the “Mayday” and was on scene at 2333. Due to the presence of the lifeboat, the vessel was released at 2353.

Figure 6

Port side of superstructure

Figure 7

Fire damage

Figure 8

General view of fire damage of deck

Figure 9

Port quarter showing “hot spot” on hull

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 CAUSE OF THE FIRE

2.2.1 Although it was possible to establish that the fire broke out in the provision room, neither the exact seat of the fire, nor the time at which the outbreak occurred, could be identified. The master and chief engineer carried out an inspection of the provision room and laundry area at about 2045 on the evening of 14 December 2001, and state that they neither saw nor smelt any flame or smoke at that time. Everything was as normal. This was 1¾ hours before smoke appeared on the bridge.

A very distinctive and localised burn mark on the port quarter of the hull plating, in way of the provision room, suggests a particular point of intense heat. From the master's evidence, this roughly corresponds to an area in the provision room where toilet rolls were stacked on shelving, together with vegetables. Although all consumables, no readily available source of ignition such as electrical cables, light bulbs etc was in this area of the space. It is likely, therefore, that this was a secondary fire and not the initial cause.

2.2.2 The master and chief engineer's earlier investigation of the power socket failure in the galley is not considered to be a contributing factor in the subsequent fire. Removing the fuses from the box outside the galley confirmed that the power and lighting circuits were on the same fuse, but the master and chief engineer's subsequent investigation did not extend beyond checking where the cable run led. They did not check whether the actual socket was faulty, if the cable was "dead", or if the circuit came direct from the main switchboard in the workshop below. As a separate fuse box, at upper engine room level by the boiler, supplied the provision room freezers and the fridges, it is unlikely that the two electrical circuits were linked except through the main switchboard.

The chief engineer stated that when he joined *Rosebank* in Dundee, he carried out a rough inspection of the main machinery and equipment to establish her general condition, and what maintenance priorities were needed. The various fridges and freezers fitted in the provision store did not feature very highly in the list of maintenance priorities, as all appeared to be working and no problems had been reported. He was aware that a number of 13amp sockets were in use, and that they were apparently fed from a fuse box mounted on the port side

engine room bulkhead by the boiler. This bulkhead separated the provision room from the engine room. Only two fuses were in the fuse box, one marked “Freezer”, and the other “Fridges”. The age and origin of the freezers etc are not known, but they were in place when *Rosebank* was purchased in October 2001.

2.2.3 The laundry, which contained both washing machines and driers, was not in use at the time. The cook/AB, who was using a CO_2 extinguisher hose through the engine room door to the provision room lobby, suggested that at that time there was a fire in both the provision room and the laundry. Fire damage observed after the event suggests that any fire seen was at deckhead level, and had spread from the provision room.

2.2.4 Given the contents of the provision store, spontaneous combustion is unlikely. It is probable, therefore, that the source of ignition was either an electrical fault in the electric motors of one of the fridges or freezers, or within the adjacent sockets and cabling. The strongest possibility is that a fault developed in a motor compartment of a fridge/freezer, causing a local fire within the unit. This in turn spread and developed using accumulated dirt, dust, and oil within the motor space as fuel. The subsequent ignition of the plastic covering of that unit, followed by adjacent units, would lead to a major fire developing in the space, and the generation of thick white acrid smoke.

With an open doorway into the lobby area, the heat and smoke would escape into that area before passing up into the accommodation and alleyways above. The intense heat generated in the provision room at deckhead level would be transmitted through the steel deckhead, as well as through any deck penetrations into the crew mess room above, to start secondary fires. With the crew engaged in fighting the fire at the lower main deck level, these outbreaks within an enclosed and uninhabited space would likely remain unnoticed until they developed into a major outbreak. Once established within the accommodation, the fire would rapidly spread using cable ducts, deck, and bulkhead penetrations, initially and eventually by the collapse of interior cabin bulkheads. Furniture and other personal items in the cabins would provide readily combustible materials to feed the fire.

Figure 10

Remains of fire damaged upright freezer

Figure 11

Engine workshop showing damaged deckhead
Note: lack of fire damage to items on workbench

Figure 12

View of port quarter

2.3 CREW'S ACTIONS

2.3.1 The master's initial response on smelling burning, and discovering smoke on the bridge, was prompt and direct; he called the crew and sounded the general alarm. At about the same time as the master became conscious of the smoke, the cook/AB had become aware of the smoke on the poop deck, and was in the process of calling the other AB and evacuating the accommodation. Both men then went aft on the poop deck to their emergency station where the chief officer joined them.

The subsequent actions of the crew in fighting the fire followed the standard practice of working in teams of two, although with only one SCBA set available, there was no back-up. The smoke helmet system, although meeting the regulations, was not a practical alternative, as it would have required a minimum of three people to use it and even then would have been difficult to use effectively. A second SCBA set, instead of the smoke helmet, would have enabled a proper fire-fighting team to work below decks. The use of the 45kg CO_2 trolley extinguisher knocked the fire down, but with the failure to shut the deck vent above the space, as well as an open door, its effect was obviously likely to be limited.

The wooden provision room door had been tied in the open position and, although by the time the fire-fighting action started, the door had swung closed, it was kicked open to gain access. After that, the movement of debris, and the effects of the fire on the door, resulted in the door being unable to be closed.

Using the fire hose, fitted on the forward engine room bulkhead at that level, might well have provided a better solution. Fuses for the electrical equipment in the provision space were readily accessible by the boiler, and could have been removed to electrically isolate the machinery. This method of fire-fighting would also have provided a cooling effect; something which the CO_2 could not provide.

2.3.2 The use of the hoses to provide boundary cooling on deck followed good practice, but these cooling techniques require all boundaries to be monitored. In this case, with limited crew numbers and with them all committed to other tasks, nobody thought, or was available to monitor the internal boundary, ie the accommodation above the fire. The provision room had external hull on two sides, a ballast tank underneath, and the engine room bulkhead forming a fourth boundary. The two remaining boundaries were the forward bulkhead and doorway into the lobby (from which the fire was being fought), and the deckhead. This was partly external (the poop deck) and partly internal (the crew mess room). Boundary cooling was applied to the external part of the deck, but not to the remaining part which formed the deck of the crew mess room inside the accommodation.

Another problem which occurred during the fire, was the difficulty in maintaining communication between the master on the bridge and the chief officer on the poop deck. Although three VHF hand-sets were available, none was used during the emergency, initially because of the need for a quick response and, later, as it was felt that the chief officer would be too busy to respond. As a result, the only way the master could monitor the fire's progress, and his crew's attempts to fight it, was to run up and down between the bridge and the poop deck. This was further complicated by the fact that of the two Polish ABs, the one who was using the SCBA set and, therefore, below decks for some time, was the one with the greater understanding of English and able to explain the situation. This meant that there was a delay in obtaining up-to-date information on the fire below decks.

2.3.3 With the accommodation ventilation system not in use, no ventilation trips were operated. During the emergency, the crew forgot about the deck vent from the provision room to the main deck and, unfortunately, did not close it. As CO_2 was the medium being used in the store, this oversight led to a loss of the gas, and contributed to the fire re-igniting after the initial successful attempt to put it out. Fire flaps for the engine room and accommodation were not closed because, during the early stages of the fire, these areas were not under threat. Subsequently, when the fire spread, lack of personnel and other more immediate fire-fighting demands prevented any vent closures. By the time the crew were aware that the fire had spread to the accommodation, the closure of the fire flaps was largely academic.

The fuel trips for the main engine and the generators were also not operated because, with the fire not threatening either the engine room or the forecastle head, the master and chief engineer considered that the provision of lighting and manoeuvrability was a positive contribution to the safety of the vessel and crew.

2.3.4 The last fire and boat drill had been carried out in mid-November; soon after the new chief engineer joined in Ireland. Between then and when *Rosebank* arrived in Dundee in early December, a rescue boat drill, together with a fire and boat drill, was carried out. When the chief officer joined on 12 December, the master told him to familiarise himself with the lifesaving and fire-fighting equipment on board as they would be having an abandon ship and fire drill on Saturday 14 December, the day after departure from Dundee.

2.4 FIRE DETECTION SYSTEMS

Although at the time *Rosebank* was designed and built (1982), there was no requirement under SOLAS 1974 to fit a fire detection system in the engine room, there was such a requirement if she was to operate under UMS conditions. That, therefore, was presumably why the system was fitted in the engine room.

Under later legislation, SOLAS 1974 plus the 1978 Protocol and the 1981 & 1983 amendments, a fixed fire detection and alarm system covering all corridors, stairways and escape routes within the accommodation, is required. Under those Regulations, the fire and build-up of smoke which occurred in *Rosebank*'s passageways and corridors would have been detected much earlier, and might well have been dealt with successfully at that time.

On these older vessels the lack of any fire detection system in the accommodation places a duty on the master to consider not only what type and level of risk is likely to exist within the space but, also, how that risk is to be minimised. The current policy of operating these vessels with lower manning scales than originally envisaged (a crew of five rather than the original nine), creates additional problems, both in terms of coping with emergency situations and in providing adequate and frequent fire safety cover. With a small crew, the use of frequent fire patrols and inspections on vessels having a number of empty, and rarely visited cabins and spaces is not a viable option. Although, on this vessel, the master and chief engineer carried out an inspection of the areas in use during the late evening without finding anything amiss, the fire must have occurred within, at most, 1¾ hours of that safety inspection.

This fire illustrates the advantages of having a fire detection system fitted in the accommodation, particularly in vessels with low manning levels and redundant accommodation. Such a system is active and is testing the atmosphere 24 hours a day, week in, and week out, offering a high degree of safety and reliability as well as peace of mind to the master and crew.

2.5 MANNING LEVELS

2.5.1 During the course of the investigation, the master mentioned that although *Rosebank* complied with her current safe manning certificate as to the number of crew, he intended increasing the number of seamen when the existing crew contracts expired. His preference would be for a cook and two ABs; not one AB and a cook/AB. He made the very valid point that in the nature of coastal shipping work, cargo discharge often finishes at 1700 and before the vessel can sail, it is necessary to clean and wash the holds. Under the existing manning, the cook/AB is in the hold with the rest of the crew and meals tended to be forgotten until quite late. As a result, the master found that often he was having his meal on the bridge while the vessel was under pilotage. This situation is detrimental to the general health of the crew, as well as the safety of the vessel.

2.5.2 This situation also raises the question as to how effective are the requirements which result in the issue of a minimum safe manning certificate. Although the initial approach comes from owners or management, reflecting their perception of what constitutes a safe crewing level, there seems to be no place where the effect of low manning on safety issues is considered.

Although the manning scale will be sufficient to comply with the mandatory requirements for the vessel when at sea and manoeuvring in port, no account seems to have been taken of the requirements in an emergency such as a shipboard fire. In *Rosebank*'s case, five was clearly not enough to both fight the fire and monitor its progress. Further difficulties and delays can arise with multi-national crews, who sometimes have trouble communicating with each other.

2.5.3 In November 1993, IMO Resolution A.741(18) was adopted and came into force as SOLAS Chapter IX, "Management for the Safe Operation of Ships" (the ISM Code). The requirements of this Code may well address the concerns identified above under the functional requirements for a Safety Management System (SMS), in particular, Section 1.4.5 *"procedures to prepare and respond to emergency situations:"*.

Rosebank had only recently been purchased by a company new to shipping and, although she complied with all current mandatory operational requirements, the owner and management team (the master) would have had to comply with the requirements by 1 July 2002. The master had had discussions with the MCA regarding the requirements, and he had started to produce the various documents necessary for compliance. What had not been considered, and does not appear to be an identified concern, were the implications of small crews on the functional requirements for a Safety Management System (SMS). The simultaneous demands of an emergency situation, and normal ship operation with small crews, can result in failure on both counts. The authority which is involved in the issue and validity of a Document of Compliance (DOC) should consider the implication of these dual and simultaneous demands on small crews, and the vessel's ability to respond adequately to emergency situations.

2.6 LANGUAGE

2.6.1 The master also made the point that although the Polish seaman's grasp of English was sufficient for normal operational tasks, once the fire situation arose, only one of the crew (the cook/AB) had sufficient command of the English language under stress to readily converse with the master. This obviously had an effect on the master's appreciation of both the extent of the fire and what fire-fighting efforts were being made. It did not, in this case, affect the final outcome, but under different circumstances the result could have dire results.

The master, who was also the manager for the owning company, is required under STCW 95 and its associated Code (STCW Code) to:

"ensure that all seafarers are able to communicate in the common working language determined for the ship."

The Polish crewing agency, Hamiltons, supplied the two qualified ABs. The cook/AB was new to them, but had a greater command of English than the AB who was known to the agency, and who had sailed with the UK shipping company, Everards, for two contracts.

2.6.2 This raises the question as to whether the current level at which a foreign national is required to understand and converse in English on board a UK-registered ship, is adequate to cover emergency situations on small vessels. This is not to doubt the qualifications of the foreign seaman as a seaman but rather to express concern about the ability of the master to effectively control the situation when faced with an emergency situation. Poor or inadequate information because of language difficulties can result in wrong and potentially life-threatening decisions.

The "Marlins Test" is usually used to establish a benchmark on the level of English comprehension reached, with the higher levels being required for officers. Ratings can also be asked to undertake the test when serving on tankers, gas ships etc. With the ISM Code becoming a requirement on cargo vessels of 500gt on 1 July 2002, the use of the "Marlins Test" for all ratings should be considered, particularly when serving on vessels with small crews. The acceptable pass marks for officers are given in Annex 4 of MGN 179 (M).

2.7 FIRE-FIGHTING WITH SMALL CREWS

A further discussion point which arises from this accident is whether it would have been better for the chief engineer to have worn the SCBA set and to have fought the fire from the upper level of the engine room. The problem was that he had to go forward to start the fire pump, while fire-fighting efforts needed to be started immediately. This conundrum illustrates the difficulty of directing emergency situations with small crews. The alternative would be to have the chief officer using the SCBA set initially to assess where the fire was, while one of the ABs rigged the fire hoses. When the chief engineer returned aft, he could have taken the SCBA set and led the fire-fighting from the engine room. Not only would he have been aware of how to electrically isolate the provision room but, also, he could have assessed which fire-fighting medium was best to extinguish the fire.

2.8 ELECTRICAL CIRCUITRY

The electrical wiring system both in the galley and the provision room also calls for comment. It has been suggested that the lighting and power circuits were on a common ring main in the galley and were fed from the same fuses in the alleyway. Such an arrangement does not comply with the IEE regulations for ships, nor the recommended practice for their implementation. Such a fuse failure results not only in the loss of use of the item of equipment, but also the loss of lighting in the immediate area. The sudden loss of lighting, in itself, can create further problems and exacerbate what might already be a major safety issue.

SECTION 3 - CONCLUSIONS

3.1 CAUSE OF FIRE AND CONTRIBUTING FACTORS

1. Although the site of the fire has been identified as the provisions room, the exact seat and cause of the fire has not been identified.

2. The most probable cause was an electrical failure within the motor compartments of one of the domestic fridges or freezers operating within the space. The subsequent ignition of residual dust, dirt or other debris within the motor cabinet led to a significant fire within that and other adjacent units.

3.2 OTHER FINDINGS

1. During the master and chief engineer's inspection of the provision room and laundry at 2045 on the evening of 14 December, neither officer saw or smelt any flame or smoke. (2.2.1)

2. The electrical failure in the galley which the master and chief engineer investigated, is not considered a contributory factor in the subsequent fire. (2.2.2)

3. A post-incident examination of the fire scene suggests that the fire started in the provisions room, and then spread into the laundry area. (2.2.3)

4. Given the contents of the provision room, spontaneous combustion is unlikely. (2.2.4)

5. The spread of the fire into the accommodation was caused by the fire-fighting team failing to follow boundary cooling techniques and monitor all sides of the seat of the fire. (2.2.4 & 2.3.2)

6. The use of the 45kg CO_2 was effective in "knocking down" the fire, but because of an open deck vent and an inability to seal the space, the fire re-ignited. The use of a fire hose would have been more effective, and might have prevented the fire from spreading. (2.3.1)

7. Communication between the bridge and the fire party was inhibited because of a failure to use the three available hand-held VHF sets. (2.3.2)

8. The provision of a second SCBA set would have enabled the chief officer/chief engineer to assess the extent of the fire, and to advise on the use of fire hoses rather than CO_2. (2.3.1)

9. The carriage of a smoke helmet on ships with small crews satisfies the regulations, but is not a practical alternative. It requires a minimum of three people to use it, and even then is difficult to use effectively. (2.3.1)

10. The two Polish crew's command of English was sufficient for normal operational tasks, but was limited once the emergency situation arose. This did not help the master in understanding the fire situation. (2.6.1)

11. Neither the chief officer, nor the chief engineer, took control of the fire-fighting below decks and, given their experience and knowledge, an on the spot assessment might well have resulted in extinguishing the fire by using a different medium. (2.4.2)

SECTION 4 - RECOMMENDATIONS

The Maritime and Coastguard Agency is recommended to:

1. Review the Merchant Shipping (Fire Protection)(Amendment) Regulations 1999, which continues to accept a smoke helmet/smoke mask as an alternative to an SCBA set.

Note: The same recommendation was made after the investigation into the fire which occurred on board *Toisa Gryphon* on 2 February 1999.

Marine Accident Investigation Branch
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