

Report on the investigation of  
the capsized and foundering of

**fv *PAMELA S*, IH 308**

in Carmarthen Bay

on 17 June 2006

with the loss of one life

Marine Accident Investigation Branch  
Carlton House  
Carlton Place  
Southampton  
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**Report No 32/2006  
December 2006**

**Extract from**  
**The United Kingdom Merchant Shipping**  
**(Accident Reporting and Investigation)**  
**Regulations 2005 – Regulation 5:**

*“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”*

**NOTE**

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## **GLOSSARY OF ABBREVIATIONS AND ACRONYMS**

|       |   |   |
|-------|---|---|
| Ah    | - | Ampere Hours (Battery rating)               |
| BST   | - | British Summer Time (UTC + 1 hour)          |
| EPIRB | - | Electronic Position Indicating Radio Beacon |
| FISG  | - | Fishing Industry's Safety Group             |
| LSA   | - | Life Saving Appliance                       |
| MCA   | - | Maritime and Coastguard Agency              |
| MSN   | - | Merchant Shipping Notice                    |
| RAF   | - | Royal Air Force                             |
| RNLI  | - | Royal National Lifeboat Institution         |
| SFIA  | - | Sea Fish Industry Authority                 |
| VHF   | - | Very High Frequency (radio)                 |
| Knots | - | Nautical Miles per hour (1 knot = 1.15mph)  |

## SYNOPSIS



### All times are BST

At around 1700 on 17 June 2006 on a fine, calm day the crew of the fishing vessel *Pamela S* were preparing to lay a line of whelk pots in Carmarthen Bay when the vessel suddenly, rapidly and without warning, capsized and sank.

Two people were on board at the time: one crewman on deck aft, and the skipper in the forward wheelhouse. The crewman shouted a warning to the skipper as water began to flood onto the deck aft as the vessel started to capsize to port.

Seawater began to flood through the wheelhouse door, threatening to trap the skipper inside, but the crewman made his way forward to the wheelhouse and pulled him clear. The vessel then capsized rapidly to port and, as the men clambered onto the upturned hull, she sank by the stern, sucking the men under the water as she went down.

The men surfaced together and initially congratulated themselves on having survived the sinking. They could see a large navigation buoy, DZ1, denoting the MOD firing range off Pendine beach, approximately 0.5 mile away, which they started to swim towards. However, the tidal flow carried them away from the buoy.

Although the sea was calm, the water temperature was 12.7°C and the men began to tire as they continued to swim. After some time, the crewman became exhausted and slipped below the water, but the skipper managed to pull him back to the surface and resuscitate him. Later, the crewman went under for a second time, and although the skipper was again able to bring him back to the surface, the skipper was unable to resuscitate him and, as darkness fell, he had to leave him. As he did so, he secured a plastic fender, which had floated free from the vessel, to the crewman's clothing and then started to swim towards a light he could see on the shore. Extraordinarily, almost 10 hours after the sinking, the skipper staggered ashore at Pendine beach in the early hours of 18 June. He was discovered by a member of the public, who fortuitously was a trained first-aider and who kept the skipper warm until medical assistance arrived.

Despite an extensive search for the crewman, his body was not found until 27 June when it was recovered from the water off Pendine beach.

The wreck was subsequently salvaged by the vessel's insurers and the MAIB was able to carry out a detailed examination of the vessel to determine its stability, freeboard, bilge pumping arrangements and degree of watertight integrity at the time of the accident.

The MAIB examination found that, regardless of loading condition, the vessel had a very low level of inherent stability with a very low freeboard throughout the length of its working deck. Electrical faults were discovered on the bilge pumping system, no bilge alarm was fitted and, at the time of the sinking, nine securing bolts from the base of the stern gantry were missing.

No evidence of the lifesaving equipment: liferaft, lifejackets or VHF radio previously issued to the skipper on a lease purchase agreement with the South and West Wales Fishing Communities association, through an EU funding scheme, was found on the vessel. If the men had been wearing lifejackets it is probable that they would have both survived.

The report concludes that urgent attention must continue to be given to protecting the lives of fishermen working on fishing vessels under 15 metres in length by:

- improving fishermen's knowledge and understanding of their vessel's stability, freeboard and watertight integrity condition;
- improving MCA fishing vessel inspections;
- introducing basic stability and freeboard requirements for these vessels;
- increasing the number of fishermen who voluntarily carry appropriate lifesaving appliances, such as liferafts and EPIRBs, even though they are not a mandatory carriage requirement.

Recommendations relating to the above points have been made in recent MAIB reports, which the MCA and SFIA are already addressing.

This report does not make further recommendations. However, it is vitally important that the groups involved in reviewing MAIB's previous recommendations relating to fishing vessels of less than 15 metres in length ensure that the necessary momentum is maintained in moving to adopt measures which will improve the safety of this important sector of the fishing industry in which 69 lives and 49 vessels have been lost since 1989 as a result of capsized and foundering accidents.

## SECTION 1 - FACTUAL INFORMATION

### 1.1 PARTICULARS OF *PAMELA S* AND ACCIDENT

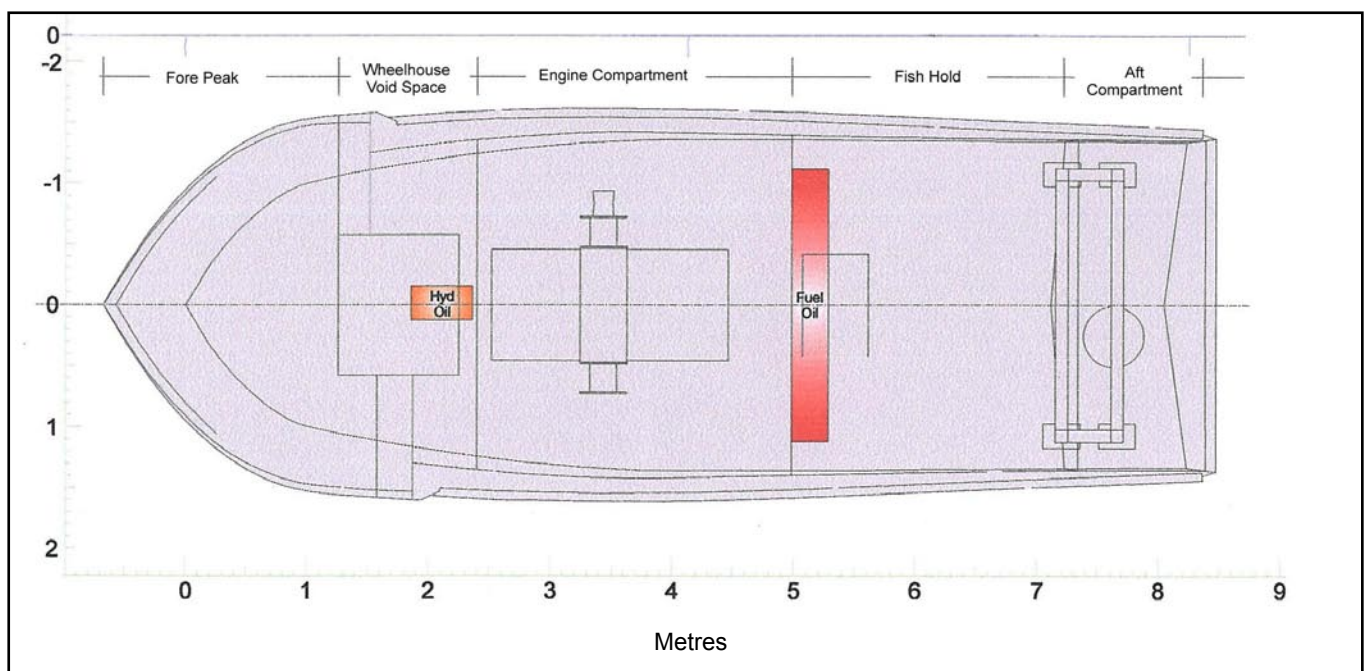
#### **Vessel details**

|                          |   |                                      |
|--------------------------|---|--------------------------------------|
| Registered owner         | : | Privately owned                      |
| Port of registry         | : | Ipswich                              |
| Registration Number      | : | IH 308                               |
| Flag                     | : | UK                                   |
| Type                     | : | Fishing Vessel                       |
| Built                    | : | 1992, Ipswich                        |
| Construction             | : | Steel                                |
| Length overall           | : | 9.16m (lengthened from 8.0m 2004)    |
| Gross tonnage            | : | 3.42 in 1992                         |
| Engine power and/or type | : | Gardner Diesel, 5LW, developing 63kW |
| Service speed            | : | Approximately 6 knots                |
| Other relevant info      | : | Single, fixed pitch, propeller       |

#### **Accident details**

|                      |   |  |
|----------------------|---|--|
| Time and date        | : | Approximately 1500 on 17 June 2006                       |
| Location of incident | : | 51° 41.85'N 004° 35.20'W<br>Monkstone Point 271° x 3.5nm |
| Persons on board     | : | Two  |
| Injuries/fatalities  | : | One fatality   |
| Damage               | : | Loss of vessel   |

Figure 1



Pamela S



## 1.2 BACKGROUND

*Pamela S* was built in 1992 and had been extensively modified since new before the present owner/skipper purchased the vessel in Grimsby on 17 May 2006 (**Figure 1**).

The foremast and stern gantry were taken down before the vessel was transported by road from Grimsby to Pembroke Dock, Milford Haven at the beginning of June 2006, where it was lifted into the water and then delivered to Lawrenny Quay.

At Lawrenny Quay, the skipper and a crewman re-erected the vessel's foremast and stern gantry.

An EPIRB was reportedly fitted onto a shelf on the port side of the vessel beside the wheelhouse, at this time. The skipper and crewman then made the vessel ready to haul the multiple lines of whelk pots which they had previously laid, from another boat, in the Carmarthen Bay area.

## 1.3 NARRATIVE

### All times are BST

The skipper and crewman, Mr Askey, took *Pamela S* to sea for the first time on 16 June 2006, the day before the accident, when they made passage from Lawrenny Quay, Milford Haven to their mooring at Lydstep Haven. This passage took approximately 6 hours, during which they experienced a SW'ly Force 4 wind with a moderate following sea. The vessel handled well and the passage was uneventful (**Figure 2**).

The skipper checked both the engine compartment and the fish hold during the passage and confirmed that both spaces were dry. He also disconnected and removed the engine-driven deck wash/bilge pump as this was making a high pitched noise. As the men intended to begin fishing the following day, they had loaded two drums of bait at Lawrenny Quay, weighing approximately 50 kilos each.

The men left the vessel, by tender, at 2200 and travelled by road back to their homes in Pembroke Dock for the night.

The two men boarded *Pamela S* at her mooring in Lydstep Haven at approximately 0900 on 17 June. They also loaded and installed a davit arm to facilitate use of the pot hauler which the men had fitted while the vessel was at Lawrenny Quay, Milford Haven.

The vessel left its mooring at 1030, with their tender on board. A fisherman on a vessel at an adjacent mooring saw *Pamela S* depart, and he observed that she was trimmed by the stern with a list to port, and that the waterline was approximately level with the bottom of the letters of the vessel's name on the stern (**Figure 3**).

*Pamela S* then proceeded to Saundersfoot, where she arrived and was secured to a mooring buoy at approximately 1200. Mr Askey went ashore in the tender to collect some tools and food, and on his return, the skipper took *Pamela S* out into Carmarthen Bay to commence fishing. The tender was left on the mooring at Saundersfoot as the skipper planned to return there later that day to land their catch.

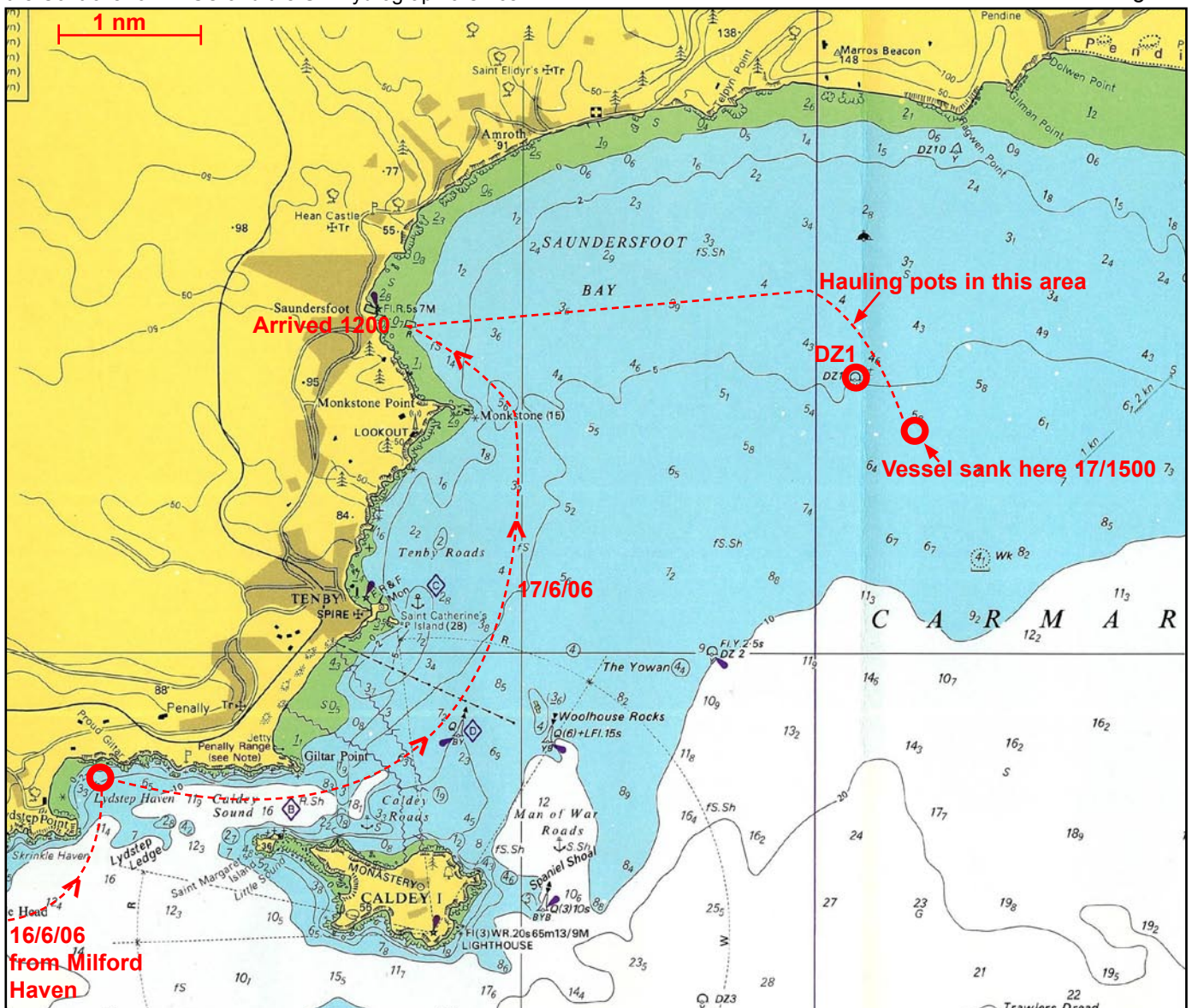
Once in the area of the DZ1 buoy (**Figure 2**) the men began to haul and re-lay lines of whelk pots.

At 1433, the skipper's wife called him on his mobile telephone to check on how *Pamela S* was performing on her first operational trip. The skipper informed her that all was well and confirmed that they intended to return, as planned, to Saundersfoot that evening, at high water, to land their catch and to pick up more bait for further fishing the following day.

The men had hauled and re-laid two lines of pots to the north of the DZ1 buoy when they proceeded to, and recovered a set of pots from a position approximately 0.5 mile south-east of the DZ1 buoy. At that time, they had filled four bags with whelks, which they stowed on the fish hatch cover (**Figure 4**).

Reproduced from Admiralty Chart 1076 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 2



*Pamela S* - showing approximate track on day of accident

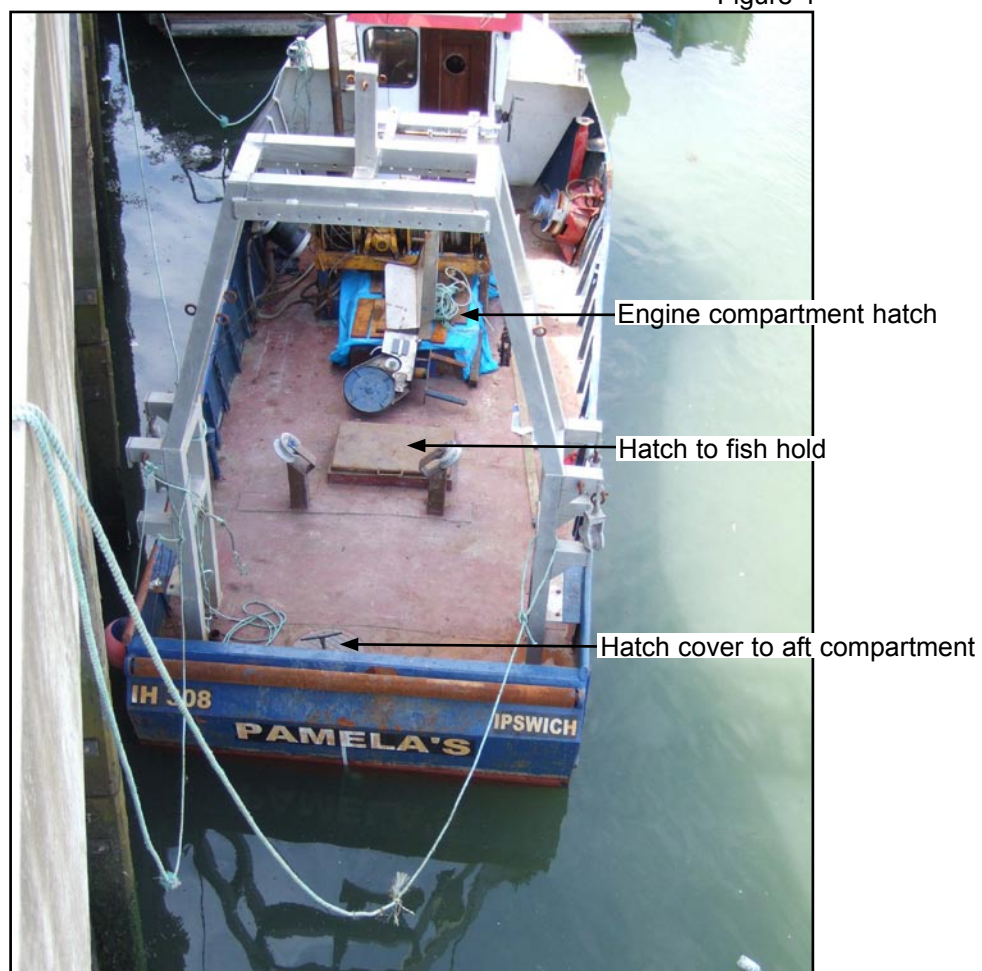


Figure 3



Probable waterline level as vessel left its moorings on 17 June 2006

Figure 4



*Pamela S* shown in light condition (with no gear) following inclining trial

At approximately 1700, with the set of pots on deck, Mr Askey, who was at the aft end of the vessel, noticed that *Pamela S* was taking on water at the stern and called out to alert the skipper, who was in the wheelhouse. The skipper then immediately put the bilge pumps to manual, having left them in the automatic position for the passage. He then made a very hurried and short “Mayday” call on the VHF radio. The vessel rapidly started to sink by the stern and then rolled to port at such a rate that the skipper was in danger of being trapped in the wheelhouse by the intruding water.

The skipper was pulled from the wheelhouse by Mr Askey and, as they scrambled clear, the vessel continued to roll to port and then capsized.

The men managed to climb onto the upturned hull just as *Pamela S* began to sink rapidly by the stern. They were then drawn under the water by the suction effect of the vessel going down before they resurfaced.

Once back on the surface, the men took stock of their situation and initially were jubilant to have survived the sinking. They briefly discussed what might have happened to cause the sinking, but could not explain it. They noted that there were a few boats in the area, at least 0.5 mile away, and made an attempt to attract attention by shouting out for help. When they realised they had not been seen or heard, they decided to swim towards the DZ1 buoy.

At the time they entered the water, both men were wearing T-shirts and trousers under bib and brace oilskin trousers. Both men were wearing sea boots.

When the vessel sank, the only item to float free was a plastic buoy, approximately 850mm diameter, with a short lanyard attached. The men grabbed this and continued to swim towards the DZ1 buoy, but the tide, which was flowing to the south-west at approximately 0.5 knot, initially took them away from the buoy and further out to sea.

The water temperature at this time was 12.7°C and the men quite quickly became cold and began to suffer from cramps. At one stage they hugged each other to keep warm. At one point, the skipper blacked out and was starting to go under the water when he was pulled back up by Mr Askey.

Later, Mr Askey went under the water; the skipper managed to pull him back to the surface and administered mouth to mouth resuscitation before Mr Askey responded and the men were able to continue swimming.

The skipper also assisted Mr Askey by removing the latter’s sea boots, which seemed to be dragging him down. The skipper left his own sea boots on.

The two men continued to swim together until approximately 2100 when Mr Askey slipped below the water again. On this occasion, despite the skipper once again pulling him to the surface and administering mouth to mouth resuscitation, Mr Askey failed to recover. The skipper then secured, as best he could, the plastic buoy to Mr Askey’s oilskins and set out to swim towards a light, which he saw on the shore.

At 0240 the following morning, 18 June, the skipper was discovered, exhausted and suffering from hypothermia, on the beach at Pendine. He had survived after being in the water for almost 10 hours. The person who discovered the skipper was a trained first-aider and was able to administer appropriate first-aid by wrapping the skipper in cardboard to preserve body heat while awaiting the arrival of the ambulance.

The skipper was taken to hospital suffering from hypothermia and dehydration, but was able to inform the coastguard sector manager of the details of the vessel's loss which allowed the search for the missing crewman to be centred on a more accurate datum.

## **1.4 DESCRIPTION OF VESSEL**

### **1.4.1 General**

*Pamela S* was built by its first owner, in Ipswich in 1992. The vessel was constructed from a lines plan produced by Boat Cadcam of Falmouth, Cornwall. The vessel was not built by a recognised boatyard nor, as far as can be ascertained, with any qualified supervision of the standard of construction or of its compliance in terms of steel thickness and weight with the original design plans.

The vessel was built of steel with a single deck above the waterline and a forward wheelhouse. The engine compartment was located immediately aft of the wheelhouse, aft of which was a compartment in which the rudder stock was located.

When first built, the vessel was 8.0 metres in length with a forward, stand-alone wheelhouse. However, the vessel was extensively modified by some of its six previous owners, before being purchased by the present skipper.

In 1996, the bulwark around the forward end was raised by approximately 200mm; in 2003, a whaleback was fitted around the forward end of the wheelhouse which was enclosed to increase the size of the cabin area forward of and below the wheelhouse. Also, at this time, a steel stern gantry was fitted to enable the vessel to be used for trawling.

In 2004, *Pamela S* was lengthened by approximately 1 metre when a section was added onto the stern. This section was fitted with a flush fit watertight hatch, relocated from the original compartment aft of the engine, which then became the fish hold when a hatchway of 870mm x 570mm covered by a hinged steel cover on a 100mm coaming was installed. The hatch cover did not have any securing system and relied on its weight to keep it closed.

On deck, aft of the wheelhouse, a hydraulic trawl winch was located over the engine compartment hatch, with a hydraulic net hauler to port, adjacent to the bulwark.

### **1.4.2 Machinery**

*Pamela S* was fitted with a 5 cylinder Gardner 5LW, diesel engine developing 63kW and capable of propelling the vessel at 6 knots.

A hydraulic pump, located in the space under the wheelhouse, supplied power to the trawl winch and the net and pot haulers.

The vessel's 12 volt electrical system was supplied by a set of 2 x 12 volt heavy duty 120Ah batteries which were located in the forward port side of the engine compartment. Two spare batteries were stored on the starboard side of the engine compartment. These batteries supplied the electrical system via 2 x 6-way fuse boxes located in the wheelhouse.

The MAIB commissioned an electrical condition report of the vessel to assess the effectiveness of the bilge pumping system prior to the accident (**Annex 1**).



### 1.4.3 Bilge pumping system

The vessel's electrical bilge system consisted of 3 *Rule* 12 volt, 2275 litres per hour (500 gallon per hour), electric bilge pumps which were controlled via three switch panels in the wheelhouse (**Figure 5**). The switches for the fish hold and aft compartment were 3-way rocker panel switches with manual off and automatic positions. A feature of these panels is that the switch is spring-loaded in the manual position such that it will return to the off position if released. The third switch controlled the engine compartment bilge pump, which had no automatic position as the pump required a float switch installation to be operated automatically. No float switch was fitted to this pump; therefore automatic operation was not possible.

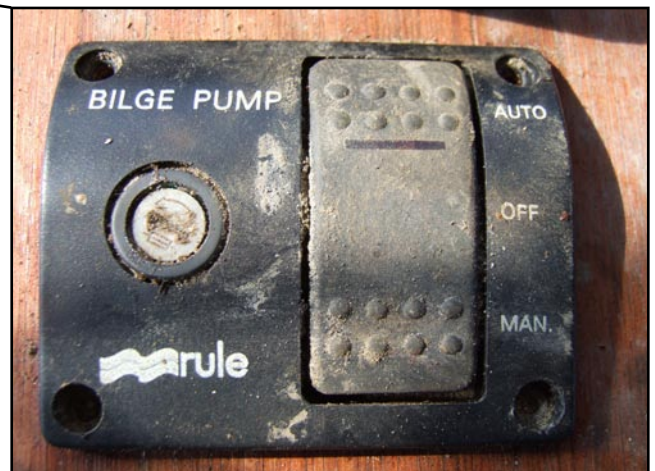
Figure 5



Bilge pump switches



Engine compartment bilge pump switch



Fish hold and aft compartment bilge switch type

The three bilge pumps discharged via individual 18mm diameter plastic reinforced hoses, which were connected to separate 12mm overboard discharges located in the forward starboard side of the engine compartment approximately 100mm above the waterline.

There was also provision for an engine-driven deck wash pump to be configured to suck from the engine bilge.

A manual “Whale Gusher” pump was installed on the port side forward, with suction to the engine compartment; the engine-driven wash deck pump could also be switched to pump out the engine compartment.

## **1.5 THE CREW**

There were two people on board *Pamela S* at the time of the accident: the skipper and his brother in law, Mr Askey. Both men were experienced fishermen who had previously owned their own boats and had recently agreed to join forces and work together on *Pamela S*.

The skipper was 38 years of age and started fishing when he left school at the age of 16. He worked at sea for 6 years, and then spent the next 15 years working for the local council’s road maintenance department. He left there in 2004 to return to fishing. In September 2004 he purchased a 7.3m fishing vessel, and operated this from Saundersfoot harbour until she sank while alongside in the harbour in April 2006. The boat was subsequently sold.

The crewman, Mr John Askey, was 31 years of age and was an experienced fisherman. Mr Askey owned a 7m fishing vessel, based at Saundersfoot, and had fished in the Carmarthen Bay for many years.

In October/November 2003 both men completed the mandatory training courses in Basic First-Aid; Basic Sea Survival; Basic Fire-Fighting and Prevention and the, then, voluntary Basic Health and Safety (including Accident Prevention and Risk Assessment) in accordance with the Fishing Vessels (Safety Training) Regulations 1989. Neither held certificates of competency, although this was not a statutory requirement for operating *Pamela S* as she was less than 16.5 metres in length (The Fishing Vessels (Certification of Deck Officers and Engineering Officers) Regulations 1984 refers).

## **1.6 WHELK FISHING**

The crew of *Pamela S* caught whelks by laying baited pots (**Figure 6**) connected in lines or strings of 30 pots or more, weighted at each end of the string by an anchor. Each end of the string was marked with a buoy to highlight the gear and aid recovery of the pots.

The pots were connected to the main string or back rope at 12 metre intervals by 12mm diameter polypropylene rope.

The pots were approximately 35cms in height with a diameter of 40cms. They had a netting eye or mouth with a draw cord across the top of the pot and were ballasted to ensure they sat upright on the seabed. Each pot weighed approximately 15 kilos.

Once baited, usually with peeler or shore crab, the draw cord in the net eye was drawn tight and the pot was then ready to be laid. When the string of pots was recovered, the whelks were removed from the pots and stored in bags in readiness for landing ashore. A full bag of whelks weighed approximately 40kgs.

Figure 6



Whelk pot - recovered from *Pamela S*

## 1.7 ENVIRONMENTAL CONDITIONS

The weather conditions in Carmarthen Bay on the day of the accident were:

|                  |                          |
|------------------|--------------------------|
| Wind:            | South west, force 2 to 3 |
| Sea State:       | Calm                     |
| Visibility:      | Good                     |
| Sea temperature: | 12.7°C                   |

Tides (Tenby), 17<sup>th</sup> June 2006  
50% spring rates.

|            |              |
|------------|--------------|
| Low Water  | 04:53, 1.58m |
| High Water | 11:02, 7.25m |
| Low Water  | 17:12, 1.92m |
| High Water | 23:28, 7.52m |



## 1.8 THE SEARCH

*Pamela S* had been due to return to Saundersfoot at approximately 2130 on 17 June 2006, this being the earliest time at which the crew would have been able to get alongside in the harbour to land their catch.

At 0030 the following day, the skipper's wife telephoned the coastguard to report that the vessel was overdue. The coastguard immediately activated a communications search by calling the vessel on VHF and also requested vessels in the area to report any sightings of *Pamela S*.

At 0041, with no response to their VHF calls, the coastguard alerted the local lifeboat and, at 0049, the Coastguard Rescue Team was activated.

The Tenby lifeboat launched at 0108 on 18 June, and began a search of the Lydstep area before proceeding towards Caldey Island and then into Carmarthen Bay. The Coastguard Rescue team was on task by 0123 and proceeded to check the Saundersfoot area. This was supplemented by further teams throughout the night, particularly once the skipper was discovered on the beach at Pendine at 0240, when an intensive search of the Pendine beach area was carried out.

At 0137 a second all weather lifeboat, which was in Tenby as a relief, joined the sea search and, at 0327, the inshore lifeboat was also launched to join in the search.

The search assets were further strengthened at 0332 when a rescue helicopter from RAF Chivenor joined the search for the missing crewman and commenced flying a pre-agreed search pattern.

At 0516, the Tenby lifeboat discovered an oil slick approximately 0.6 mile south-east of the DZ1 buoy, and observed 2 marker buoys in this position. As day dawned, the crew of the lifeboat were able to see the wreck of *Pamela S* below the water. It was found to be lying in 8 metres of water, with approximately 3 metres of water over it.

The search continued throughout 18 June, and the coastguard also utilised the services of the local police helicopter and a local inshore rescue group to supplement the resources they were already using from the RNLI and their own coastal rescue teams.

The search for Mr Askey was finally called off at 1835 that day. His body was subsequently recovered on 27 June 2006 from the sea, off Pendine beach, close to where the skipper had staggered ashore.

## 1.9 DIVE INSPECTION AND SALVAGE

MAIB inspectors arrived on site on 18 June and arranged for local divers to make a preliminary inspection of the wreck of *Pamela S* the following day. This inspection revealed that the vessel was lying on her port side with no apparent damage to the visible hull areas. There were a large number of whelk pots on and around the wreck. The divers failed to locate an EPIRB which the skipper advised had been fitted to the vessel. They found the engine throttle controls were set full astern and confirmed that the rudder and propeller were clear and free of obstruction. They recovered a yellow lifebuoy light, still in its packaging, from the wheelhouse.

The vessel's insurers agreed to salvage *Pamela S*, and she was raised at 1248 on 27 June 2006 (**Figure 7**) and was subsequently towed into Tenby harbour at 2025 that day. The salvage divers made a report of their observations during the operation (**Annex 2**), which identified the location of various items of equipment on and around the wreck before it was raised.

Figure 7



*Pamela S* - raised from seabed on 27 June 2006

## 1.10 MAIB INITIAL INSPECTION

MAIB inspectors were in attendance throughout the salvage operation, and undertook an inspection of the vessel at low water in the early hours of 28 June, as the vessel dried out alongside the harbour wall at Tenby (**Figure 8**).

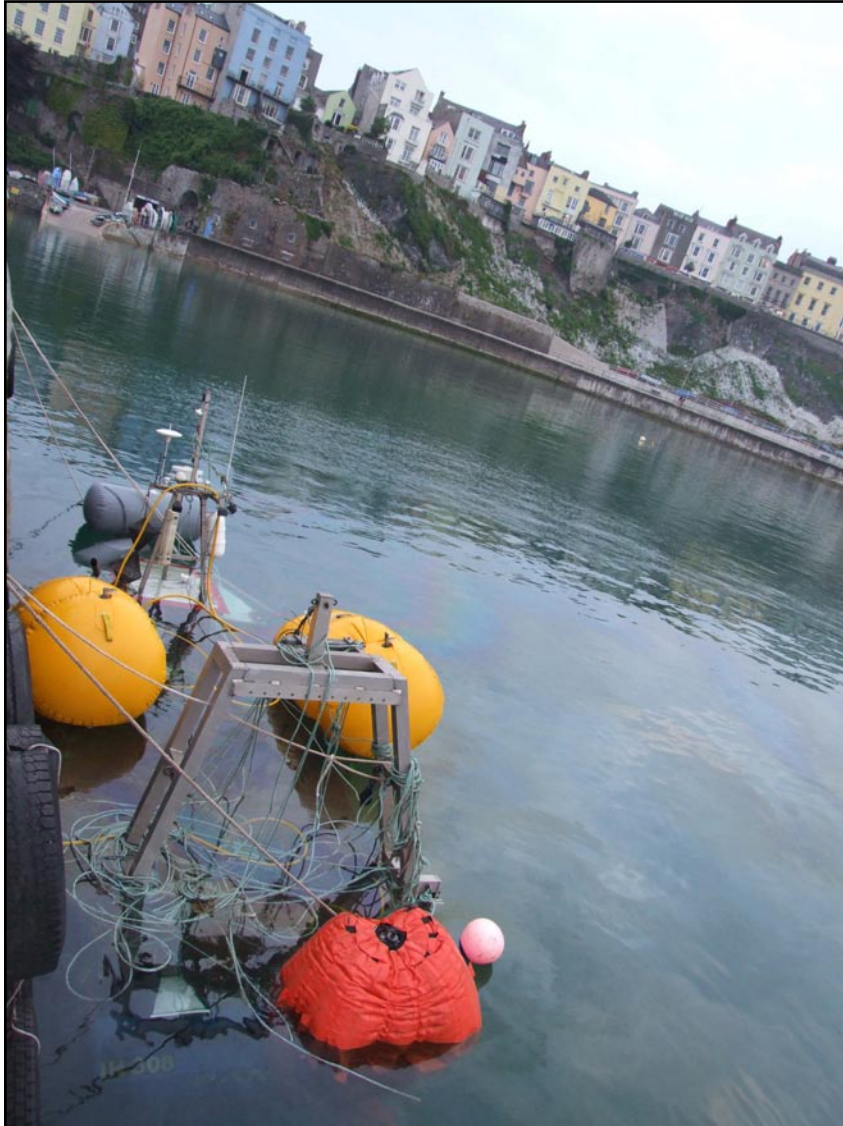
Also present at this inspection were the insurer's representative, MCA's sector manager and the Tenby harbourmaster, all of whom provided valuable assistance to the MAIB during the course of its investigation.

It was observed at the early stages of this initial inspection, as the tide ebbed and the vessel dried out, that water was spouting from several of the bolt holes at the base of the stern gantry.

A closer inspection revealed that 9 of the 16 bolts which should have been in place to secure the gantry to the deck of the vessel were missing.

MAIB inspectors, in conjunction with the MCA, confirmed at this inspection that the vessel's hull was intact and watertight, and once the vessel's compartments had been pumped out, arrangements were made to have her towed to Burry Port, Carmarthenshire, for lifting out of the water.

Figure 8



*Pamela S* alongside at Tenby

### 1.11 MAIB DETAILED INSPECTION

Once *Pamela S* had been successfully towed across Carmarthen Bay, from Tenby to Burry Port, in calm conditions and without taking any water, it was lifted out of the water and placed in secured storage.

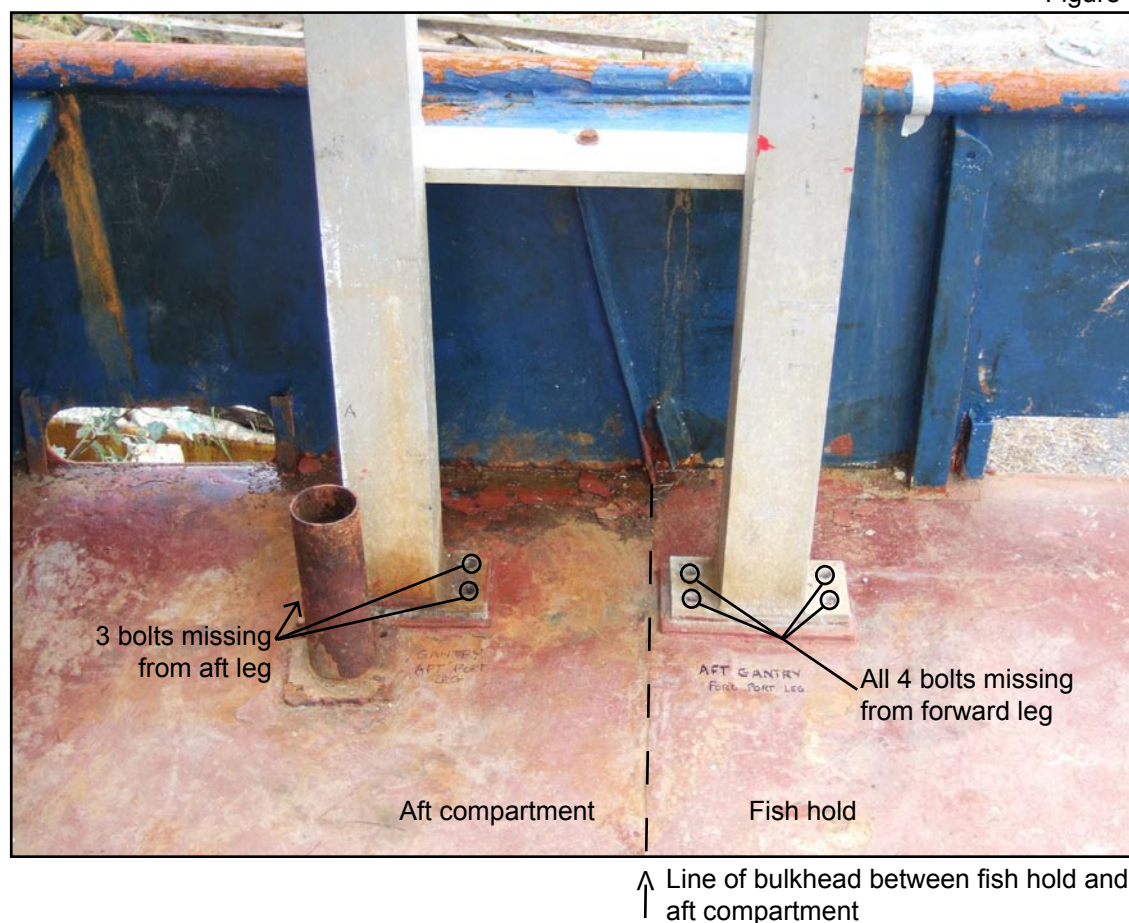
MAIB inspectors then undertook a detailed inspection of the vessel.

### 1.11.1 Stern gantry securing arrangements

Nine bolts were missing from the stern gantry securing points, seven from the port side and two from the starboard side. The gantry, made of aluminium alloy, had been installed in 2003 by the then owner to replace a steel gantry. The bolt holes were 18mm in diameter.

The gantry was secured to the vessel's deck with through deck bolts, and was positioned such that the forward legs were located over the fish hold and the aft legs were over the aft compartment (Figure 9).

Figure 9



*Pamela S* - stern gantry securing arrangements, port side

### 1.11.2 Lifesaving appliances

One lifejacket was found in the wheelhouse which appeared to be old and in poor condition. As the skipper had indicated that there were new, auto-inflation lifejackets on board the vessel, it was decided to send the lifejacket to an independent test house to verify its age and functionality.

A detailed inspection of the lifejacket was carried out by the Fleetwood Testing Laboratory, which ascertained that the lifejacket was dated September 2002 and was fitted with a manual inflation activator. During the test, the lifejacket was inflated and showed no sign of leakage. (Figure 10)

Two hand-held red flares, expiry date April 2004, were found in the wheelhouse.





Lifejacket found on board *Pamela S*

### 1.11.3 Bilge pumping system

The bilge pumping system was inspected and it was found that three of the vessel's spaces were served by *Rule 500 gph* electric pumps (**Figure 11**). Each pump was rated at 2275 litres per hour. The pumps were removed and tested and were found to have the following outputs:

|                    |                      |
|--------------------|----------------------|
| Engine compartment | 873 litres per hour  |
| Fish hold          | 1456 litres per hour |
| Aft compartment    | 969 litres per hour  |

The discharge from each pump was via 18mm diameter plastic hoses to 12mm hull openings above the waterline on the starboard side of the engine space. Non return valves were fitted to each line. These were tested and it was found that the valve on the line from the fish hold was not working. The remaining valves were found to be functioning correctly.

There were no watertight fittings where the electrical cables and bilge pump hoses passed through the bulkheads. Thus, water would have been able to flow between the compartments once it reached the appropriate level.

A hand pump was also fitted to pump from the engine compartment; this was found to be non operational at the time of the inspection.

Figure 11



Bilge pumps

## 1.12 STABILITY AND FREEBOARD INVESTIGATION

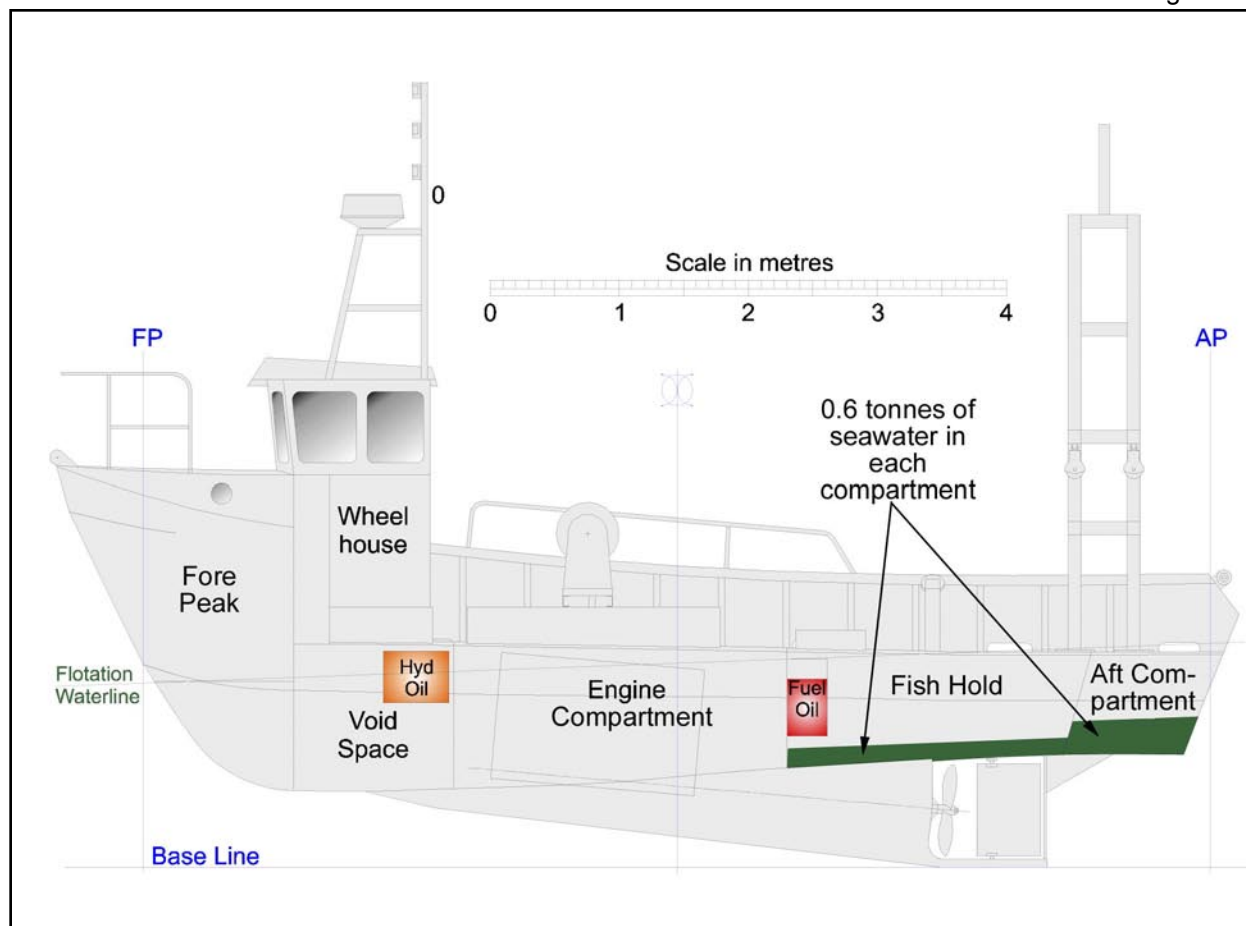
The MAIB commissioned an investigation to determine the stability condition and freeboard of *Pamela S* at the time of the accident. This work was carried out by Marine Data International; their report is attached (**Annex 3**).

To facilitate an objective assessment of the vessel's stability against accepted standards, the report makes reference to and comparison with the stability and freeboard requirements for fishing vessels with a registered length greater than 12 metres as laid down in the Fishing Vessel (Safety Provisions) Rules 1975.

The report concludes that, regardless of the loading condition, *Pamela S* had a very low level of inherent stability and a very low freeboard throughout the length of its working deck.

The report notes that nine bolts were missing from the base of the stern gantry, and calculates the effect which water in the spaces below these holes would have had on the vessel's freeboard and stability. If 0.6 tonne of seawater had entered each of the two aft compartments the vessel's deck would have been 26mm below the waterline (Figure 12).

Figure 12



Flotation waterline with 1.2 tonnes of seawater in aft compartments

The conclusions of this report are supported by evidence obtained during the investigation which indicated that *Pamela S* routinely operated with sea water washing over her deck in all weather conditions.

## 1.13 ELECTRICAL SYSTEM INSPECTION

In order to establish the condition of *Pamela S*'s electrical system, particularly with regard to the bilge pumping and alarm systems, MAIB commissioned a National Inspection Council Approved Contractor to undertake an examination of the vessel's electrical system.

### 1.13.1 Bilge system (electrical)

The contractor's report (**Annex 1**) found that each of the three compartments was fitted with a *Rule* 500 gph electric bilge pump. *Rule* is a specialist company supplying a range of marine equipment, and they recommend that the 500 gph pumps are used on leisure vessels, specifically Personal Water Craft (Jet Skis).



The pumps were controlled through three switches, located in the wheelhouse; the wiring on all three pumps was found with poor connections, and all three were found to be incorrectly wired.

The pump in the engine compartment was wired for manual operation only. To work automatically this pump would have had to be rewired and would have also required a float switch to be connected to operate with the pump.

The pump in the fish hold was found to be wired straight on to a manual switch with the automatic wiring connected through a separate feed. It is not certain that this pump would have operated on automatic setting.

The pump switch for the aft compartment was found to be incorrectly wired and would probably have operated in its manual setting only (**Figure 13**).

Figure 13



Wiring to bilge pump switch

### 1.13.2 Bilge alarm

No bilge alarms were found on the vessel

### 1.13.3 Batteries

There were 4 heavy duty batteries on the vessel, located in the forward end of the engine compartment. Two of the batteries were on the port side and two on the starboard. There was only one battery connected, this was located on the port side.



#### **1.13.4 Fuse box**

This was located in the wheelhouse and consisted of two, six-way units. The port unit was found disconnected and not working. The starboard unit was found connected, but poorly wired, with all the switches on the "Off" position.

#### **1.14 MCA INSPECTIONS**

The MCA had undertaken inspections of *Pamela S* in July 2001 and March 2003. The inspection in 2001 found that the vessel's flares and fire extinguishers required replacement, while the 2003 inspection found no deficiencies.

These inspections were carried out under guidance issued in MSN 1756 (F), as amended, which promulgates the Fishing Vessels Code of Practice for the Safety of Small Fishing Vessels. The "Code" provides a checklist of safety items required to be carried on vessels up to 15 metres in length.

Inspections are carried out by the MCA under the "Code" at intervals not exceeding 5 years, and the owner is required to undertake an annual self certification to confirm that the vessel remains Code compliant.

No MCA inspection was carried out on *Pamela S* after the vessel had been delivered to Pembroke Dock, as none of the local MCA surveyors or inspectors was aware of the vessel's purchase by a fisherman based in their area. No system exists at present for the details of a vessel's change of ownership to be advised to the MCA inspectors or sector managers in the vessel's new area of ownership/operation.

#### **1.15 PREVIOUS ACCIDENT *PAMELA S***

*Pamela S* suffered a previous accident in 1996 when she grounded on a bar in the River Deben and suffered flooding. The crew of two were rescued and the vessel was later salvaged and refitted.

#### **1.16 SIMILAR ACCIDENTS**

Since 1989, the MAIB has undertaken 52 investigations and 1 preliminary examination into accidents involving the capsize/listing or flooding/foundering of fishing vessels less than 12 metres in length.

There have been 63 fatalities, and 47 vessels have been lost as a result of these accidents.

In August 2005, the MAIB published a report (no 15/2005) on the combined findings of three investigations into the loss of three fishing vessels in which four fishermen lost their lives.

This report made various recommendations to FISG, SFIA and the MCA to, inter alia, agree, develop and implement measures to ensure that <15m fishing vessels are fit for purpose in relation to their area of operation, stability, mode of operation, outfit and equipment and periodic owner checks; also to develop a list of suitably qualified personnel to provide fishermen with expert advice when purchasing and/or making significant modifications to fishing vessels and to make non mandatory LSA more readily available to fishermen.

## SECTION 2 - ANALYSIS

### 2.1 AIM

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

### 2.2 THE CIRCUMSTANCES OF THE LOSS

#### General

The fact that *Pamela S* was salvaged, allowed a full and detailed investigation into the cause of her capsizing and foundering to be undertaken. In addition to a thorough physical examination, analysis of the vessel's watertight integrity, bilge pumping system, freeboard and stability was undertaken.

#### Flooding

The vessel was found with exposed bolt holes in the main deck. Nine bolts, 18mm in diameter, were found to be missing from the base of the stern gantry. Significantly, seven of the nine bolts were missing from the port side of the gantry securing arrangements (**Figure 9**). These holes would have allowed sea water on deck to downflood into the vessel's aft compartment and fish hold.

Calculations to estimate the quantity of sea water downflooding into the aft compartments were made using Bernoulli's equation (**Annex 4**). These showed that, with 25mm of water on deck, the rate of flow through each hole would have been approximately 0.5 cubic metre per hour. As *Pamela S* had nine missing bolts, water could potentially have entered the vessel at a rate in excess of 4 cubic metres (4 tonnes) per hour, which would have caused the very rapid downflooding.

#### Freeboard and List

Before flooding, the vessel's mean freeboard aft was about 170mm, which is very low. In addition, there was a list to port, which would have further reduced the freeboard on this side. To support this fact, even with its compartments pumped out after the salvage operation, the vessel was observed by MAIB inspectors to have a low freeboard aft, and a list to port when it was towed from Tenby to Burry Port on 28 June 2006 (section 1.11) (**Figure 14**).

It was also reported that *Pamela S* had a list to port and was down by the stern, with the waterline level with the bottom of the vessel's name on the transom when leaving its mooring at Lydstep Haven (**Figure 3**). Based on this evidence, the aft freeboard would have been only approximately 50mm, and it is therefore probable that some water had already entered both the aft compartment and the fish hold during the vessel's passage from Lawrenny Quay to Lydstep Haven on 16 June 2006.

#### Loss scenario

When *Pamela S* departed Lawrenny Quay, Milford Haven, on 16 June the aft two compartments would probably have been dry. However, with a list to port, and with a low freeboard, sea water would have washed onto the aft deck through the vessel's freeing ports when she was underway. This would have resulted in water ingress into the two compartments through the bolt holes (section 1.11).

On 17 June 2006, when the vessel was hauling and relaying lines of whelk pots, the catch of whelks would have caused her to sink lower in the water. Also, there would have been water on the aft deck which would have flowed into the aft compartments, resulting in a greater stern trim, producing an increased rate of flooding (section 1.12).

This water would have continued to fill the compartments as the bilge pumps were not operating in the automatic setting (section 1.13). The stern would have sunk deeper in the water until noticed by Mr Askey, who then alerted the skipper. The vessel's rate of sinking by the stern would have increased as water spread from the aft compartments through cable holes into the engine space, until she rolled to port and capsized, leaving her forefoot on the surface for a short period before sinking (section 1.11.3). With *Pamela S* inverted, the aluminium alloy engine hatch cover, which was not secured, fell off, allowing flooding of the engine space and increasing the speed of sinking.

As *Pamela S* sank so rapidly, there was insufficient time to transmit a successful "Mayday" call on VHF, and without an EPIRB alert to indicate that she had sunk, nobody was aware that the two crew members were in the water.

Figure 14



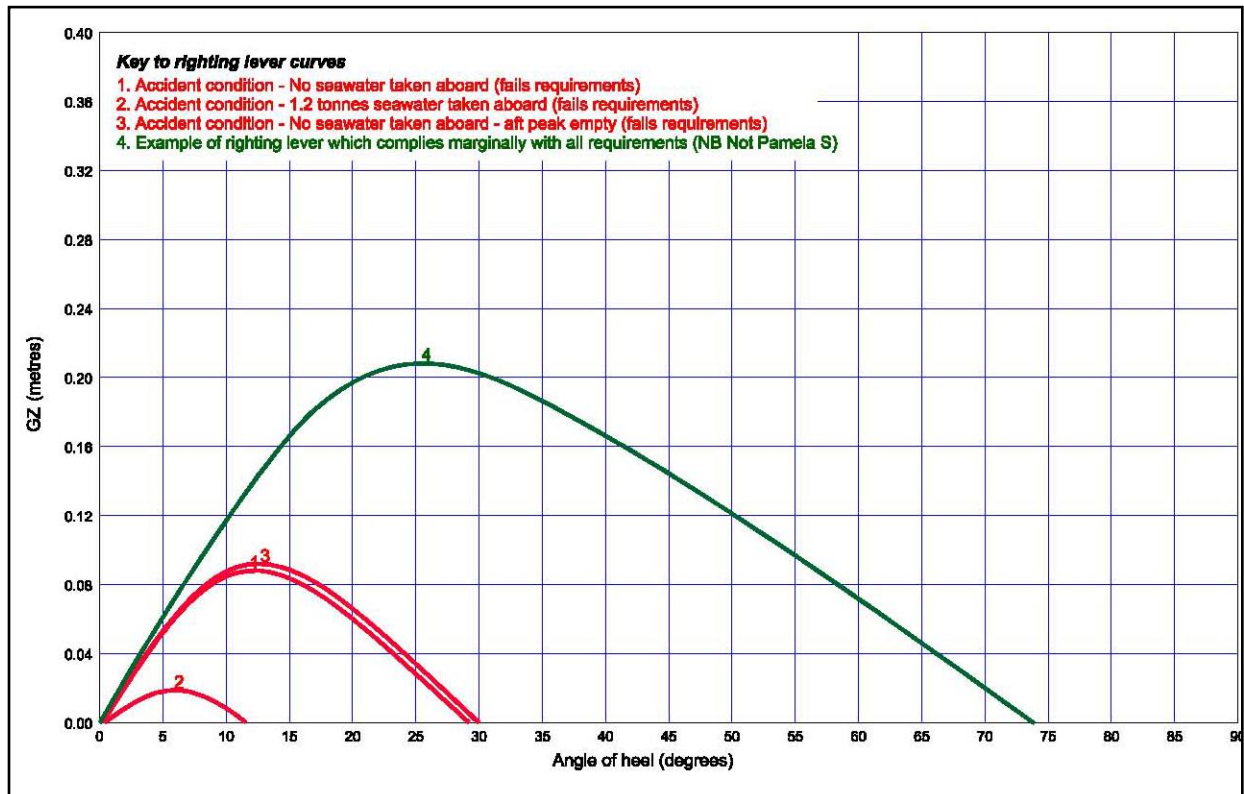
*Pamela S* being towed from Tenby to Burry Port with all compartments pumped dry

## 2.3 FREEBOARD AND STABILITY

*Pamela S*'s stability and freeboard in the accident condition are shown in the report (**Annex 3**). The vessel had been extensively altered from new, however there is no evidence to indicate that her stability was verified at any stage by the various owners who undertook these modifications.

The results of the stability and freeboard analysis undertaken on *Pamela S* indicate that she had a very low freeboard aft, and a very low level of inherent stability.

The vessel's righting lever in the intact condition before flooding and without a catch on deck (curve no 1) has about half the minimum righting lever required by a fishing vessel of 15m or more in length. The aft freeboard of 170mm was also insufficient.



*Pamela S* - Righting lever curves in accident conditions

With an assumption that there were 1.2 tonnes of sea water (curve no 2) in the two aft compartments just prior to the vessel sinking (section 1.12), the stability was further reduced, resulting in an extremely low righting lever of 20mm. This quantity of sea water produced a negative freeboard aft, and resulted in the vessel being unstable.

However, it must be acknowledged that this vessel had operated for 14 years without a major stability accident; probably because her initial stability (GM) was acceptable (in fact, at 35mm, it exceeded the requirements for larger fishing vessels), also the previous operators had kept the vessel watertight.

The reason for *Pamela S* having a very low freeboard was that her hull was built with heavier steel plate, and was fitted with a heavier engine than the original designer intended. This difference in weight between the designed, and as-built vessel, would

account for the reduction in freeboard. Having a low freeboard would mean her reserve of stability was low, and that she would lose stability very rapidly when heeled to an angle at which the deck edge went into the water. Freeboard is an extremely important factor in a vessel's stability. Any decrease in freeboard will also decrease the angle of heel at which the deck edge becomes immersed, and this has the effect of decreasing the vessel's stability at all greater angles of heel.

The importance of having sufficient freeboard is not always understood by vessel operators and owners, therefore this topic should be covered more fully in stability awareness training courses.

At present, there is no requirement for fishing vessels under 15m in length to comply with any kind of stability criteria. However, in response to previous MAIB recommendations, the MCA is progressing, through FISG, a proposal to introduce a simple form of stability criteria and assessment for vessels in this size range based purely on initial freeboard.

The MCA is about to begin validation of a study undertaken for the FISG which will enable the production of a simple stability notice for under 15m fishing vessels, providing an indication of the stability condition of a vessel at various loadings based on its freeboard.

This stability notice appears to provide a simple method of indicating the basic stability of a class of vessel which has seen the loss of 63 fishermen since 1989. However, the challenge for FISG will be the acceptance and adoption of the measure by the fishing industry at large.

The industry may be cautious about the introduction of additional statutory requirements, but it should accept that a solution must be found to address the significant loss of life in this sector over many years.

## **2.4 STABILITY AWARENESS TRAINING**

*Pamela S* sailed from Lydstep Haven on 17 June 2006 with 9 of 16 securing bolts missing from the stern gantry which, in turn, allowed water to enter the below deck spaces of the vessel (section 1.11). The fact that two experienced fishermen failed to appreciate the significance of the missing bolts on the vessel's stability and watertight integrity, highlights the urgent need to improve fishermen's knowledge of basic stability in fishing vessels under 15m in length.

The proposal to introduce simple stability indicators for under 15m fishing vessels will only be effective if owners and skippers are able to understand the significance of the results. Therefore, it is important that fishermen undertake appropriate stability awareness training in conjunction with the proposed measures.

SFIA has recently introduced a short stability awareness training course to improve fishermen's knowledge in this area. This is a positive initiative which has been taken in response to previous MAIB recommendations. However, its effectiveness will need to be closely monitored in order to ensure that sufficient numbers of fishermen are availing themselves of this important non-mandatory training.

## 2.5 BILGE ALARM, MCA INSPECTIONS

The vessel had been inspected by the MCA on two occasions (section 1.14), and no reference was made in either inspection to the absence of a bilge alarm.

*Pamela S* should have been fitted with a bilge alarm, in accordance with the Code of Practice for the Safety of Small Fishing Vessels. However, no alarm installation was seen when the MAIB inspection was carried out, nor was there any evidence to indicate that a bilge alarm had ever been fitted on this vessel.

The installation of an effective bilge alarm is an essential safety item, and at least one must be installed in registered fishing vessels, regardless of length. An early warning of water in the aft compartments could have prevented this accident.

The fact that it is highly probable that no bilge alarm was fitted at the time of the MCA inspections is of concern. Previous MAIB recommendations have addressed concerns regarding the training and guidance issued to MCA fishing vessel inspectors, and it is noted that the MCA is currently providing additional training to these inspectors to ensure that they are able to carry out their important work to the requisite standard.

It is good practice for compartments not fitted with bilge alarms to be checked by operators daily for ingress of water, in accordance with MGN 165 (F) "The risks of flooding". There is no evidence to suggest that this was undertaken on the day of the accident.

The fact that there is no system for notifying MCA inspectors when the ownership of a fishing vessel has transferred to a person in their area of operation is of concern (section 1.14). However, the MCA considers that such a system would be difficult to administer and would probably not provide accurate information in view of the nomadic nature of such vessels, dependent on seasonal fisheries and differing ownership arrangements.

## 2.6 BILGE PUMPING SYSTEM

The MAIB commissioned a survey of the bilge pumping arrangements on *Pamela S* (**Annex 1**). The bilge pumps fitted on the vessel were specified for leisure use, by the manufacturer "Rule" and were therefore unsuitable for installation on a vessel such as *Pamela S* (**Figure 11**).

The electrical wiring system for the bilge pumps was found to be in poor condition, with numerous connection blocks fitted into the wiring, and inadequate waterproofing.

The wheelhouse switches for the three bilge pumps had both manual and automatic settings (**Figure 5**). However, the survey revealed that the bilge pump in the engine compartment was not capable of automatic operation without a float switch, and the wiring for the other two pumps was such that it could not be guaranteed that the pumps would have operated in the automatic mode. The previous owner confirmed that he had not operated the pumps in the automatic mode, and he did not consider they were operational in this mode.

In addition to the electrical bilge pumps, an engine-driven deck wash and compartment bilge suction pump was fitted after the vessel was purchased (section 1.4). However, the skipper had disconnected and removed this pump as it was emitting a high pitched

noise. Inspection of the pump housing revealed that the alignment of the pump to the pulley on the engine shaft was out of true. Although there was the facility to adjust the pump to improve the alignment, there was no evidence to indicate that any attempt had been made to do so.

There was also a hand bilge pump, which was reported to be working before the accident, although it did not work at the time of the MAIB's inspection of the vessel (section 1.11).

## 2.7 LIFESAVING APPLIANCES

In accordance with the Code of Practice for the Safety of Small Fishing Vessels, a fishing vessel of less than 12m in length is required to carry not less than the following LSA:

- 1 lifejacket per person
- 2 lifebuoys (1 with 18m of buoyant line attached), or
- 1 lifebuoy (with line) plus 1 buoyant rescue quoit
- 3 parachute flares, 2 hand-held flares, 1 smoke signal.

The lifesaving appliances found on *Pamela S* after the accident were:

- a manually activated lifejacket
- two hand-held flares (expiry date April 2004)
- a lifebuoy light (still in its original packaging).

The lifejacket did not comply with the Code of Practice for the Safety of Small Fishing Vessels as it was not capable of auto-inflation and was not fitted with a light or with retro-reflective tape.

The previous owner confirmed that he had left the two flares on the vessel at the time of the sale. There was no evidence of any other LSA being on board the vessel at the time of the accident.

The skipper had previously been supplied with: a liferaft, 2 auto-inflation lifejackets, 2 immersion suits and a hand-held VHF set in a waterproof case. These were supplied through a lease purchase agreement with the South & West Wales Fishing Communities Ltd, under an EU funded fishing safety initiative, at a peppercorn rental.

This lease purchase agreement between fishermen and their local associations is commendable as it facilitates the provision of non mandatory LSA, which MAIB recommended in report no 15/2005 (section 1.16).

It is known that the liferaft was ashore at the time of the accident, and that the skipper had returned the two immersion suits because they were too cumbersome to wear while fishing. The location of the remainder of the LSA at the time of the accident cannot be reliably ascertained.

The importance of correctly maintained and positioned lifesaving appliances being on board in the event of an emergency cannot be over emphasised (**MGN 267(F) refers**).

The design of lifejackets has improved considerably in recent years, and it is now possible for fishermen to wear a British Standard approved lifejacket when working on deck, without undue inconvenience or discomfort (**MGN 155 refers**). If both men had been wearing lifejackets it is likely that both would have survived.

## **2.8 SEARCH AND RESCUE**

The skipper reports that he made a very short “Mayday” call as *Pamela S* began to take on water, but it would appear this call was so brief that it would not have been recognised as a genuine distress call.

The search for the crew of *Pamela S* started at 2349, shortly after the coastguard received notification of the vessel being overdue. That a coastguard rescue team was undertaking a general shore check within 20 minutes of the initial report, and the first lifeboat was launched and searching within 40 minutes of the report is commendable.

The fact that there was also, by chance, a relief lifeboat at Tenby, which enabled three lifeboats to be tasked to undertake a search of the harbours and sea area in the west of Carmarthen Bay demonstrates the dedication of the RNLI volunteers at the Tenby station. That these assets were later supplemented by helicopters and further coastguard search teams also indicates the efficiency of the operation and the willingness of professionals and volunteers alike to turn out in such numbers in the early hours of a Sunday morning.

Unfortunately, the lack of a reliable datum meant that the initial search area was very large. However, there is no doubt that the response of the coastguard, RNLI, RAF and police following the initial report was excellent, despite the tragic conclusion.

## **2.9 EPIRB**

The skipper reported that Mr Askey had fitted an EPIRB to the vessel. However, there is no record of this being registered with the coastguard, and no proof of purchase could be found for such a unit.

It is therefore considered unlikely that there was an EPIRB on the vessel when she sank. An operational ‘float-free’ EPIRB would have alerted the coastguard to the emergency as soon as the vessel sank, resulting in a rapid search and rescue response, with the likelihood that both men would have been rescued.

An EPIRB is not a mandatory carriage requirement for fishing vessels less than 15m in length. However, if an EPIRB had been correctly fitted when the vessel sank, it would have released and activated almost immediately. This would have alerted the emergency services and facilitated an early and focussed search to be undertaken, and in this case it could have saved a life.

The benefits in safety terms of having a properly installed EPIRB on board a vessel has been stressed in many recent MAIB investigations, particularly those involving small fishing vessels. It is important that owners and skippers fully appreciate the importance of fitting such equipment to their vessels.



## **2.10 SKIPPER'S SURVIVAL**

*Pamela S* probably capsized at 1700 on 17 June 2006.

The sea temperature on 17 June was 12.7°C and research (RINA 1996 et al) has shown that in sea water temperatures of between 10° and 15°C survival time is approximately 6 hours.

The fact that both men were able to swim together for several hours, thus expending energy, and that the skipper was able to successfully recover and resuscitate Mr Askey on the first occasion, was remarkable.

That the skipper then survived after spending almost 10 hours in the water, is also remarkable, especially as he was found on the beach still wearing his sea boots, which would normally be considered an impediment to flotation in such circumstances.

The skipper's survival story was featured by many national newspapers, and the articles are testament to his courage and extraordinary reserves of strength. His survival for such an extended period of time, well in excess of the survival time predicted by contemporary research, should be noted by HM Coastguard and other relevant emergency services when considering likely search time duration.

## SECTION 3 - CONCLUSIONS

### 3.1 SAFETY ISSUES

The following safety issues, (which are not listed in any order of priority,) have been identified:

#### Watertight Integrity

1. There were nine open bolt holes in the aft deck, which allowed downflooding to the fish hold and aft compartment. [2.2]
2. The crew's lack of stability and watertight integrity awareness. [2.4]
3. The flooded after compartments caused the vessel to trim by the stern, capsize and sink. [2.2]
4. The crew were unaware of water ingress into the aft compartments. [2.2]

#### Freeboard and stability

5. The vessel's stability and freeboard condition had not being verified prior to the accident. [2.3]
6. The vessel's freeboard on the port side aft was probably only 50mm when the vessel set out on the day of the accident [2.2], and with 1.2 tonnes of water in the aft compartments, the aft deck would have been awash. [2.3]
7. The vessel's stability was low in all loaded conditions. In the unloaded accident condition the maximum righting lever was about half the required minimum standard required on a 15m vessel. With 1.2 tonnes of sea water in the aft compartments, the righting lever was dangerously low with a maximum of only 0.02m. [2.3]

#### Life saving equipment

8. The absence of a mandatory carriage requirement for liferafts and EPIRBs on fishing vessels under 12m in length. [2.7, 2.9]
9. The liferaft, lifejackets, immersion suits and hand-held VHF provided to the owner under the EU funded Fishing Safety initiative were not onboard *Pamela S* at the time of the accident. Had the men been wearing lifejackets it is unlikely that a life would have been lost. [2.7]
10. No EPIRB distress signal was received from the vessel. Despite the skipper's understanding that one had been fitted, it is unlikely that there was an EPIRB on the vessel when she sank. [2.9] An operational EPIRB would have alerted the coastguard to the emergency soon after the vessel sank, this would have triggered a search and rescue response with the likelihood that both men would have been rescued.

11. Survival time in sea water of between 10°C and 15°C is normally a maximum of 6 hours. That the skipper survived after almost 12 hours in the water should be noted by the coastguard and other relevant emergency services when determining the likely duration of search operations. [2.10]

Bilge pumping and alarm arrangements

12. There was no bilge alarm fitted to the vessel. [2.5]
13. No inspection of the compartments appears to have been made on the day of the accident. [2.5]
14. The hand operated bilge pump was not operating when tested by MAIB. [2.6]
15. Unknown to the skipper, the bilge pumps were wired to operate on manual control only, and did not operate in the automatic setting. [2.6]

## **SECTION 4 - ACTIONS TAKEN**

The following actions are already in hand as a result of MAIB recommendations made in previous accident investigation reports

### **4.1 MCA INSPECTIONS**

The MCA is currently (commenced August 2006) undertaking a national programme of refresher training for its fishing vessel inspectors to ensure that vessels such as the *Pamela S* are inspected in accordance with the requirements of the Fishing Vessels Code of Practice for the Safety of Small Fishing Vessels. This should ensure that MCA inspections do not permit such vessels to operate without bilge alarms in the future.

### **4.2 STABILITY INFORMATION FOR SMALL FISHING VESSELS**

The FISG has commissioned a research project in order to produce simple, yet reliable stability condition information for the owners and skippers of fishing vessels of less than 15m in length.

The research project has recently (April 2006) produced proposals for the format of a stability notice which is currently being validated by the MCA.

### **4.3 STABILITY (AND SEAWORTHINESS) AWARENESS TRAINING**

SFIA is currently engaged in presenting a stability awareness course to fishermen around the UK. This course is focussed towards the operators of small fishing vessels and involves the use of models in a tank, which course participants can load with equipment to gain a better understanding of the effects various loadings will have on vessel stability.

### **4.4 CARRIAGE OF LIFESAVING APPLIANCES AND EPIRBs**

Lease purchase agreements are in place with many local associations for fishermen to obtain non mandatory Lifesaving Appliances.

## **SECTION 5 - RECOMMENDATIONS**

In view of the actions taken by the MCA and SFIA subsequent to recommendations made in previous MAIB reports, no additional recommendations have been made following this investigation. However, it is vitally important that the groups involved in reviewing MAIB's previous recommendations relating to fishing vessels of less than 15 metres in length ensure that the necessary momentum is maintained in moving to adopt measures which will improve the safety of this important sector of the fishing industry in which 69 lives and 49 vessels have been lost since 1989 as a result of capsized and foundering accidents.

**Marine Accident Investigation Branch  
December 2006**