Report on the investigation of the loss of

Constant Faith

about 100 miles north-north-east of Peterhead

on 30 June 2001

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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

EPIRB	-	Emergency position indicating radio beacon
HRU	-	Hydrostatic release unit
MCA	-	Maritime and Coastguard Agency
MF	-	Medium frequency
MGN	-	Marine guidance note
mm	-	millimetres
SFIA	-	Sea Fish Industry Authority
UTC	-	Universal co-ordinated time
VHF	-	Very high frequency

SYNOPSIS

Constant Faith capsized and foundered at 0546 on 30 June 2001, about 100 miles north-north-east of Peterhead. An MAIB investigation began 3 days later.

On 29 June 2001, *Constant Faith* left Peterhead in company with her partner vessel *Conquest,* to engage in pair trawling. During the evening, as the vessels were steaming north-north-east, the mate noticed that the main engine temperature was rising. He identified the reason for this as being a blocked sea water inlet to the engine cooling system, so he closed the seacock and removed the cover plate from the adjacent strum box. He looked inside the strum box and saw a black plastic bag jammed in the valve. He opened the valve, removed the bag and water immediately gushed out.

The mate then attempted to close the seacock, but the linkage came off. Despite strenuous efforts, he was unable to close the seacock.

Water continued to rush out. *Constant Faith*'s bilge pumps were used to pump out the floodwater, but they were unable to keep pace with the ingress of water into the engine room.

A coastguard helicopter carrying two salvage pumps flew out to the vessel, but she was in a dangerous condition, and her crew felt it unwise to remain on board. They therefore evacuated to *Conquest. Constant Faith* sank 3 hours later.

The MAIB recommends that *Constant Faith*'s owners carry an on-board portable pump on any vessel they operate in the future. This should help prevent the loss of a vessel facing similar difficulties.

Constant Faith

Figure 1

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *CONSTANT FAITH* AND ACCIDENT

Vessel details

Skipper and part owner	:	John Simpson Wellside, Stoneygate Croft, Hatton, AB4 0RE
Mate and part owner	:	Edward Smith 7 Towerhill, Peterhead, AB42 2GP
Port and number	:	PD 344
Flag	:	British
Type	:	Fishing vessel (pair trawler)
Built	:	Buckie in 1985
Classification society	:	None
Construction	:	Wood
Length registered	:	21.9m
Gross tonnage	:	157
Engine type and power	:	Caterpillar 3508 (492kW)

Accident details

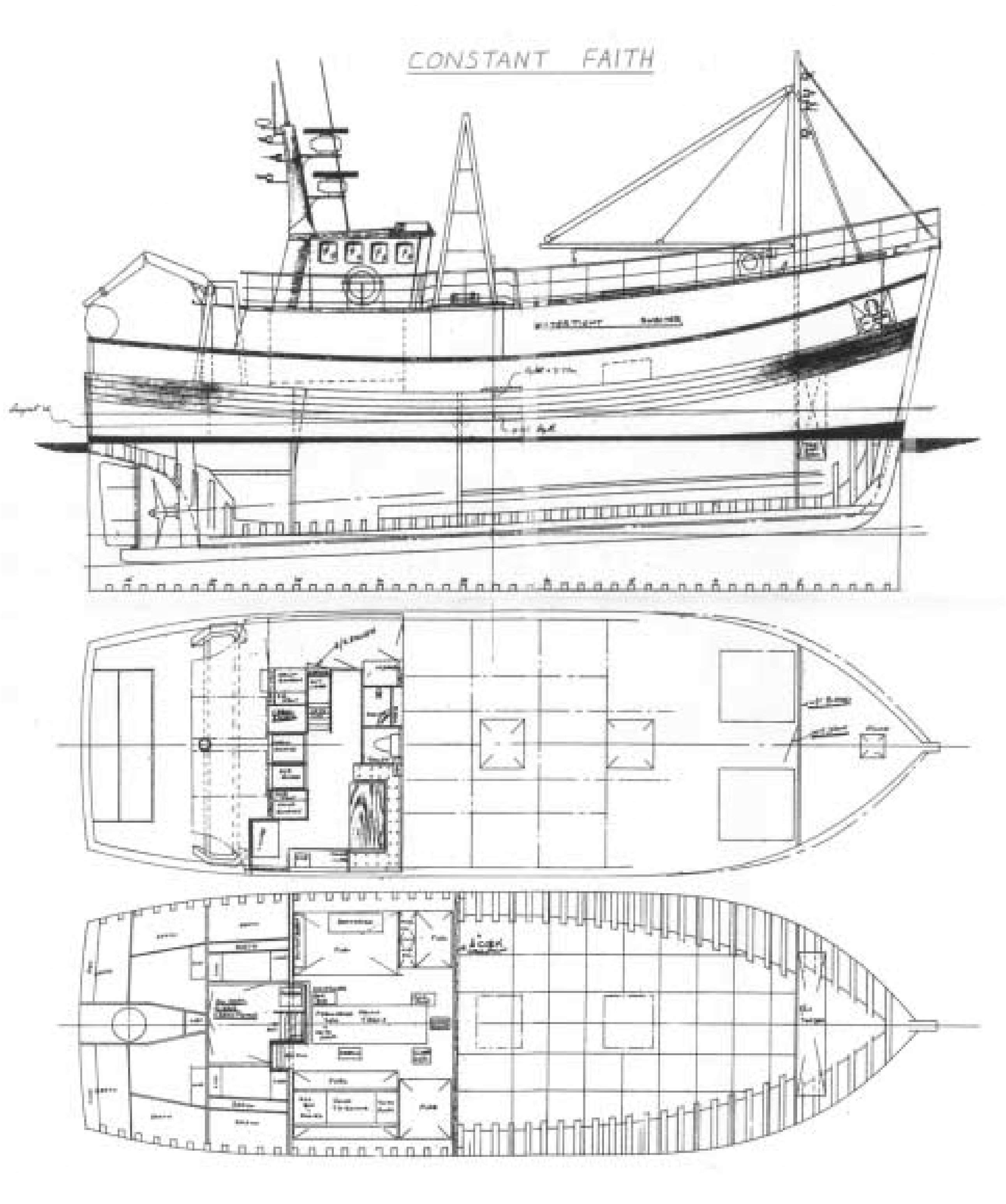
Time and date	:	0546 UTC 30 June 2001
Location of incident	:	59° 04.6' N 000° 41.5' W About 100 miles north-north-east of Peterhead
Persons on board	:	Six
Injuries/fatalities	:	None
Damage	:	Vessel lost

General views of *Constant Faith* are shown in **(Figures 1, 2 and 3)**. A general arrangement is shown in **(Figure 4)**. The vessel was constructed of wood **(Figure 5)**.

Figure 2

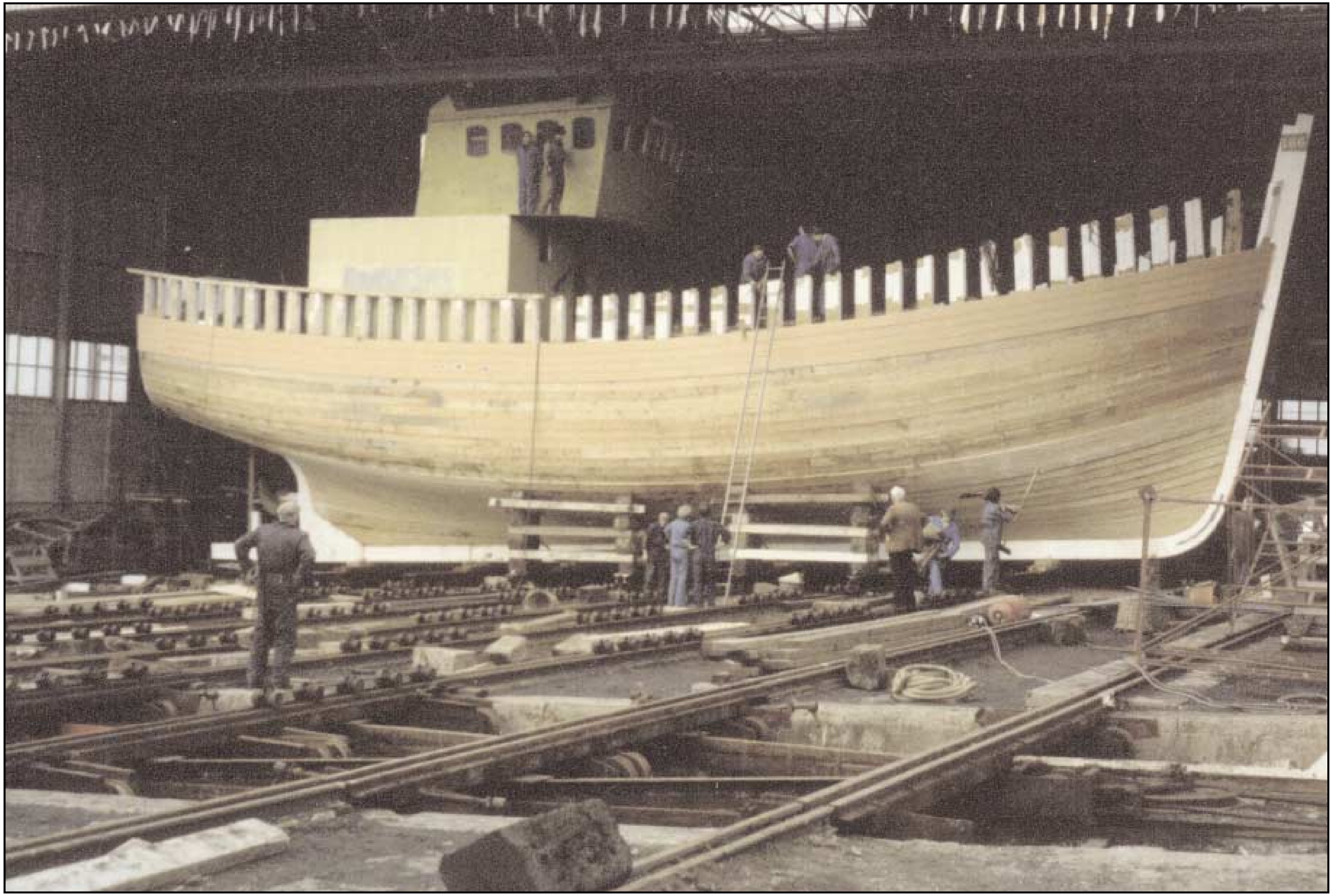
Figure 3

Constant Faith



General arrangement

Figure 5



Constant Faith showing wooden construction

1.2 NARRATIVE

All times are UTC.

At about 1300, on Friday 29 June 2001, *Constant Faith* left Peterhead in company with her partner vessel *Conquest* to engage in pair trawling. The vessels steamed north-north-east towards the fishing grounds about 160 miles from Peterhead.

The skipper was on watch until 1700, during which time everything appeared to be normal. Deckhand 4 was on watch after the skipper, and he called the mate at 2000 to take over.

It was a hot night, and the skipper was uncomfortable in his cabin, so he went up to the wheelhouse. He noticed that *Constant Faith* was falling behind *Conquest*, which was about 2 miles ahead. He therefore increased the engine revolutions to catch up with the other vessel.

At about 2100, the mate noticed the engine temperature was rising, and the outflow of engine cooling water seemed to be reduced. This happened quite often and was usually caused by a blocked sea water inlet. The mate had intended to call the next watch at about 2300, but instead he decided not to retire to his cabin because at that time the engine temperature had risen even further. At about 2345, the engine high temperature alarm sounded.

The mate went down to the engine room to unblock the seacock, and deckhand 3 joined the skipper on the bridge. They started the auxiliary engine to provide electrical power, stopped the main engine, and took the vessel out of gear. *Conquest* was told that *Constant Faith* had been stopped.

Normally, it took no more than 10 minutes to unblock a sea inlet, so after this length of time the skipper went down in the engine room to see why it was taking so long on this occasion.

Cooling water was fed through two seacocks. Both needed to be clear to provide sufficient cooling water for the main engine and gearbox under normal steaming conditions. However, the vessel could steam for quite a while with only one seacock open before there was a danger of overheating.

The mate closed the aft valve, but was unable to close the forward one completely. This indicated to him that something was jammed inside. He took the cover plate off the forward seacock. The top part of the valve was the strum box. He took the strainer out of the strum box, and saw a black plastic bag - probably a bin liner - jammed in the valve. He opened the valve and pulled out the bag. As soon as it was released water started to pour through. The mate attempted to close the seacock, but the linkage came off. The skipper handed the cover plate to the mate, but when this was placed on the strum box the water pressure knocked it out of the mate's hand and it fell into the bilges from where it could not be recovered. The skipper then tried to put his foot over the opening in the strum box, but this did not stop the inflow significantly. Using an adjustable spanner, the mate tried to close the seacock by turning the square end of the valve spindle. Access to the spindle was very difficult, especially with floodwater pouring in, and he had to lie on the floor plates, and work on the seacock below him. Floodwater soaked his overalls. He thought that it would be easier to try to use a spanner rather than attempt to refit the linkage.

He tried for some time to close the seacock with the spanner, but the rising floodwater forced him to give up. In an attempt to reduce the floodwater, the bilge pump on the auxiliary engine was clutched in, and the hand pump in the engine room was operated.

The skipper then went to the wheelhouse and asked *Conquest* to steam to them, to provide assistance. He also asked deckhand 3 to call the other deckhands who were in their cabins. The skipper then returned to the engine room, by which time the water was above the strum box. The bilge pump on the auxiliary engine seemed to be holding the water level in the engine room. However, the hand pump was not very effective, so the mate wasted little time using it.

The skipper returned to the wheelhouse, and spoke to one of *Conquest*'s crew, saying he thought that the flooding was contained. However, the crewman on *Conquest* said that *Constant Faith* was going down by the head. The skipper concluded from this that flooding was taking place forward; this surprised him because he thought the forward engine room bulkhead was watertight, since the fish hold had been designed to carry small sand eels.

1.3 ABANDONING

The skipper alerted Aberdeen Coastguard on MF radio frequency 2182kHz at 0109 on 30 June 2001. Shetland Coastguard co-ordinated the search and rescue, as they were closer to *Constant Faith* than Aberdeen. Shetland Coastguard told the skipper that a helicopter would be dispatched from Sumburgh with two pumps. It took off at 0149 to fly the 60 miles to *Constant Faith*.

While awaiting the helicopter, the skipper told the deckhands to don their lifejackets. *Conquest* then came alongside and the four deckhands were transferred; Shetland Coastguard was kept informed. The helicopter arrived over *Constant Faith* at 0218. The VHF radio was used to speak to the helicopter crew. The winchman came down, and then one of the coastguard pumps was passed down. The pump was carried forward into the shelter with the intention of pumping out the fish room, because the vessel was thought to be down by the head, and the floodwater in the engine room was being evacuated by the bilge pump on the auxiliary engine. They entered the shelter, which was over the fish room, to rig the portable pump on the shelter deck with the end of its suction hose passed down to fish room, and the discharge hose poked out of a freeing port on the aft deck.

Before the coastguard pump was started, the mate emerged from the engine room saying the floodwater was now entering quite fast. The winchman advised the skipper and the mate to don their lifejackets, which they did. The skipper was worried about working in the shelter by the fish hold hatch, because the only easy access to the shelter was at the aft end, several metres away. *Constant Faith* was, by that time, low in the water, and the skipper considered that she was becoming unstable. Had she capsized while they were in the shelter, the three of them would have been trapped underwater. When a vessel capsizes it is often sudden and unexpected.

The winchman remembers that when he first arrived on *Constant Faith* the open aft deck was dry, but by the time the pump had been rigged, water was coming in through the freeing ports and washing around this deck as the vessel was rolling. On the basis of these concerns they decided to abandon ship. The winchman offered to take the crew up to the helicopter, but the skipper and mate chose to abandon to *Conquest*. It was 0244.

The winchman was hoisted back to the helicopter with the pump (the second portable pump had remained in the helicopter throughout the incident). The coastguard pumps had a maximum capacity of 818 litres per minute. Some video footage was taken from the helicopter, and it left the scene.

Constant Faith remained afloat for about another 3 hours, during which time the skipper felt inclined to go back on board to try and save the vessel. He resisted. *Constant Faith* sank lower in the water on more or less an even keel, but towards the end she developed a list to port, which ended in a capsize to port. She floated upside down for a while before the stern sank. The bow stayed on the surface briefly, before disappearing at 0546.

Towards the end of the 3-hour period, the radar antennas ceased rotating, and exhaust gases stopped coming out of the funnel. This indicated that the auxiliary engine was no longer running. The auxiliary engine was driving a bilge pump; once pumping had stopped, the vessel was soon lost.

The EPIRB was released by HRU, and Falmouth Coastguard picked up its transmissions. *Conquest*'s crew recovered the EPIRB, and it was turned off. The HRU also released the liferaft, which the crew of *Conquest* also recovered, before departing the scene to return to Peterhead at 0615.

1.4 WEATHER

The wind was from the south, force 4. Visibility was moderate to good.

1.5 CREW

The skipper, 55 year old John Simpson, had been fishing for 40 years. He had worked mainly at seine netting and pair trawling fishing; always out of Peterhead. He started as a deckhand, but progressed to mate and then skipper. He had operated *Constant Faith* since about 1990; before that he had worked on *another* vessel called *Constant Faith*. He obtained a Skipper Full Certificate of Competency on 24 March 1977.

The mate/engineer, 51 year old Edward Smith, had been fishing since he left school. He had worked in many types of fishing, including pair trawling and seine netting. He, too, had always worked out of Peterhead. He began as a deckhand, but progressed to mate and engineer. At the time of the accident he was mate and engineer, but on some previous trips he had been skipper. He obtained a Mates' Full and Special Certificate of Competency in November 1977. He held no formal qualifications as an engineer, but had many years of experience. *Constant Faith* was not required to have a certificated engineer on board.

Gordon Forman, aged 40, is referred to as deckhand 1 in this report. He had been fishing for 17 or 18 years. He had engaged in several different types of fishing, mainly on vessels based in Peterhead.

Alexander Manson, aged 44, is referred to as deckhand 2 in this report. This was only his second recent fishing trip, and it was his first on *Constant Faith*. Before this, his only fishing experience was during a 4-month period in 1996.

Deckhand 3 was aged 28. He does not want his name mentioned in this report. He had been fishing for about 10 years and was in the process of qualifying as a mate. He had always fished out of Peterhead and had been employed in many types of fishing.

George Stewart, aged 34, is referred to as deckhand 4 in this report. He had been a fisherman for about 18 years, serving mainly on trawlers based in Peterhead or Fraserburgh. He had recently served as mate on other fishing vessels.

The Sea Fish Industry Authority (SFIA) has no record of any of the crew having taken basic safety training, apart from deckhand 4 who had attended the Basic Fire-Fighting and Prevention course. The skipper and mate are exempt from the requirement to have basic safety training, as both were born before 1954. Furthermore, the content of these courses would have been covered by the training they received for their certificates.

1.6 SEACOCK

Drawings of the seacock, through which the flooding occurred, are shown in **Figures 6, 7 and 8**. They are based on sketches made by the mate, and were necessary because no other record of the valve existed. A section through the port side of the engine room looking forward at the valve is shown in **Figure 6**. A drawing of the seacock looking inboard can be seen in **Figure 7**. **Figure 8** shows three different views looking down on the valve.

The seacock was a cone cock valve, which is sometimes referred to as a plug valve. The cone had an aperture, which allowed seawater to pass through when in line with the flow. When the cone was turned through 90° the flow was shut off. The cone was attached to a spindle with a square end. A lever fitted on the square end was used to turn the cone. On top of the seacock was a strum box, containing a strainer, which was a wire mesh open topped cylinder. This fitted snugly inside the strum box body. The strainer filtered seawater being fed to the main engine and the gearbox, and was held in place by the cover plate. When the cover plate was removed, the strainer could be extracted for cleaning. The pipe connected to the strum box, which carried the cooling water to the main engine and gearbox, had an internal diameter of 50mm. There was a grille over the sea inlet, consisting of a series of bars, flush with the outside surface of the hull. Although the grille would have prevented some types of debris from entering the seacock, it was not designed to stop a plastic bag from passing through.

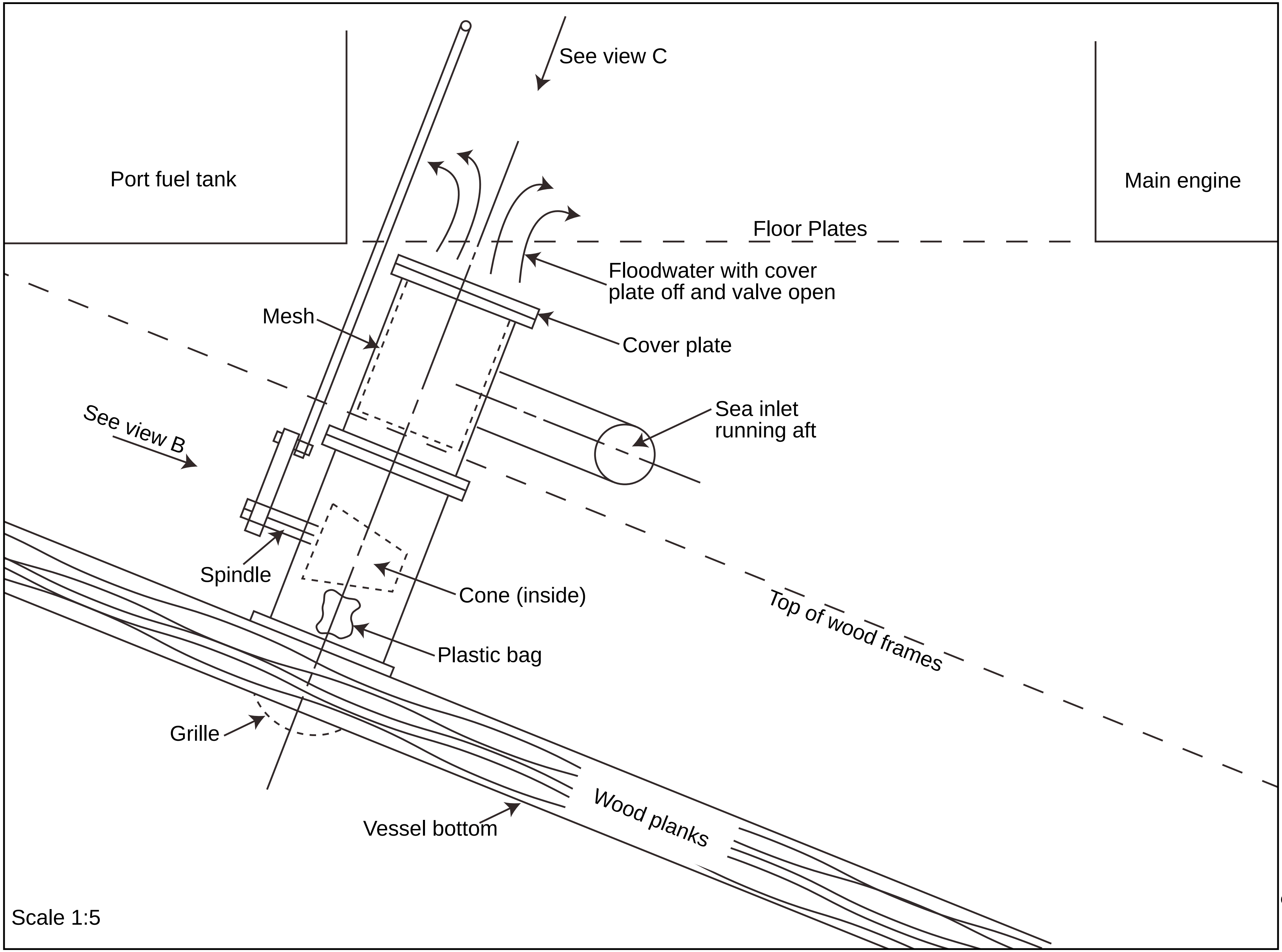
Originally the seacock was closed by lifting a floor plate, reaching down into the bilges, and operating the lever. At the request of an MCA surveyor, a linkage was fitted to enable the valve to be closed from above the floor plates. Richard Irvin Engineering and Fabrication fitted the linkage in February 1998. The linkage made use of the original lever; a length of flat bar was bolted to the lever, and at the top of the flat bar a short length of round bar was welded on. The skipper recalls the MCA surveyor checking the operation of the linkage after it was fitted, but the surveyor does not remember. (MCA surveyors see many valves on many fishing vessels).

The mate recalls that the original lever was secured to the spindle with a grub screw. He does not know if this grub screw was refitted when the linkage was installed **(Figure 7)**. Although the linkage enabled the seacock to be closed without lifting a floor plate, the mate was not entirely happy with the new arrangement. He preferred the old method, as he felt this provided a more positive way of operating the valve.

The mate had used the linkage many times before the accident. The strainer was often cleaned; the linkage was used to close the seacock before the strum box was opened up to provide access to the strainer.

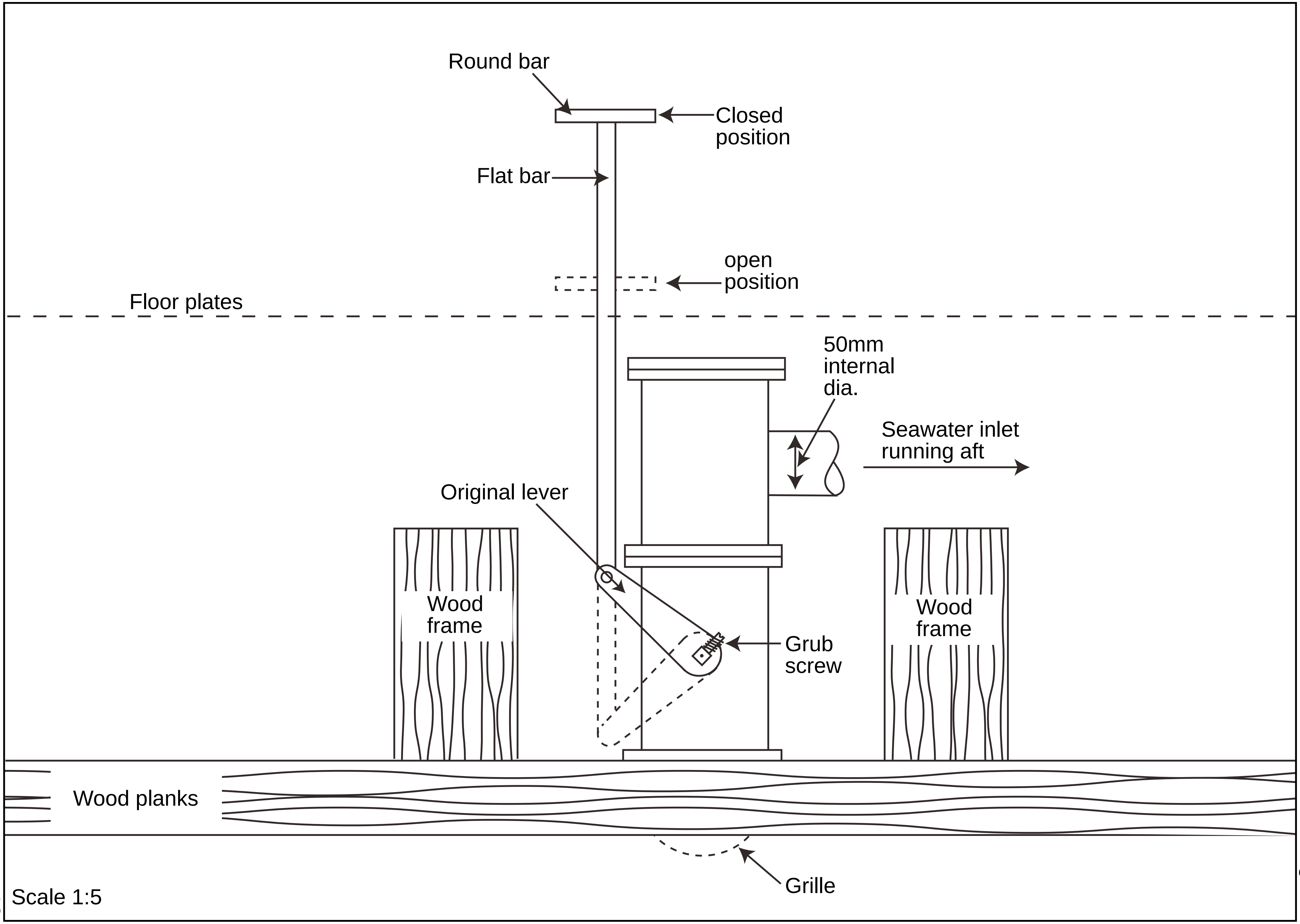
The member of staff who fitted the linkage is no longer employed by Richard Irvin Engineering and Fabrication. He remembers that the grub screw in the original lever was in place when the linkage was completed. He referred to the grub screw as a set pin; the material list for the job refers to a set pin.

The skipper and mate believe that the plastic bag, which blocked the seacock before the flooding took place, was sucked in when *Constant Faith* was in Peterhead harbour.



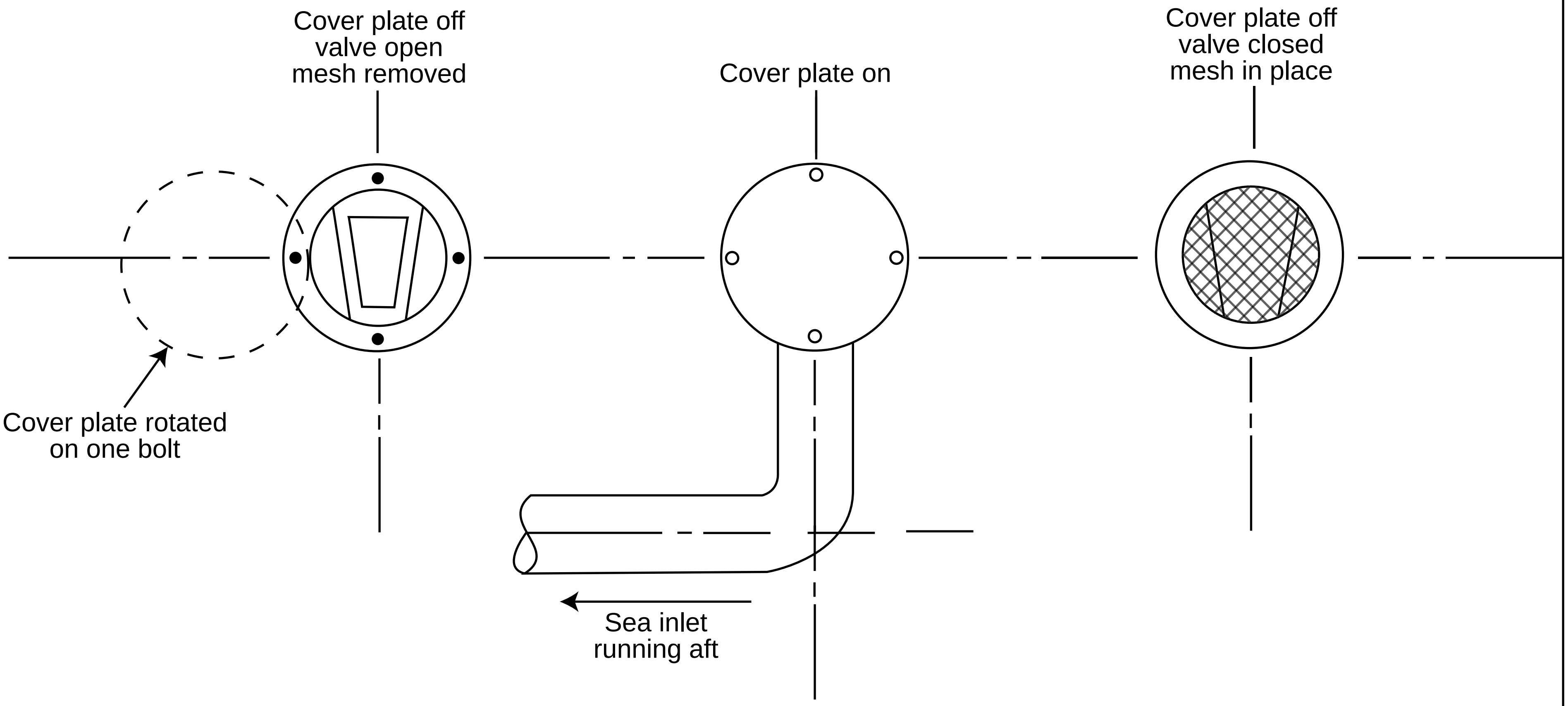
Looking forward - View A

Figure 6



Looking inboard - View B

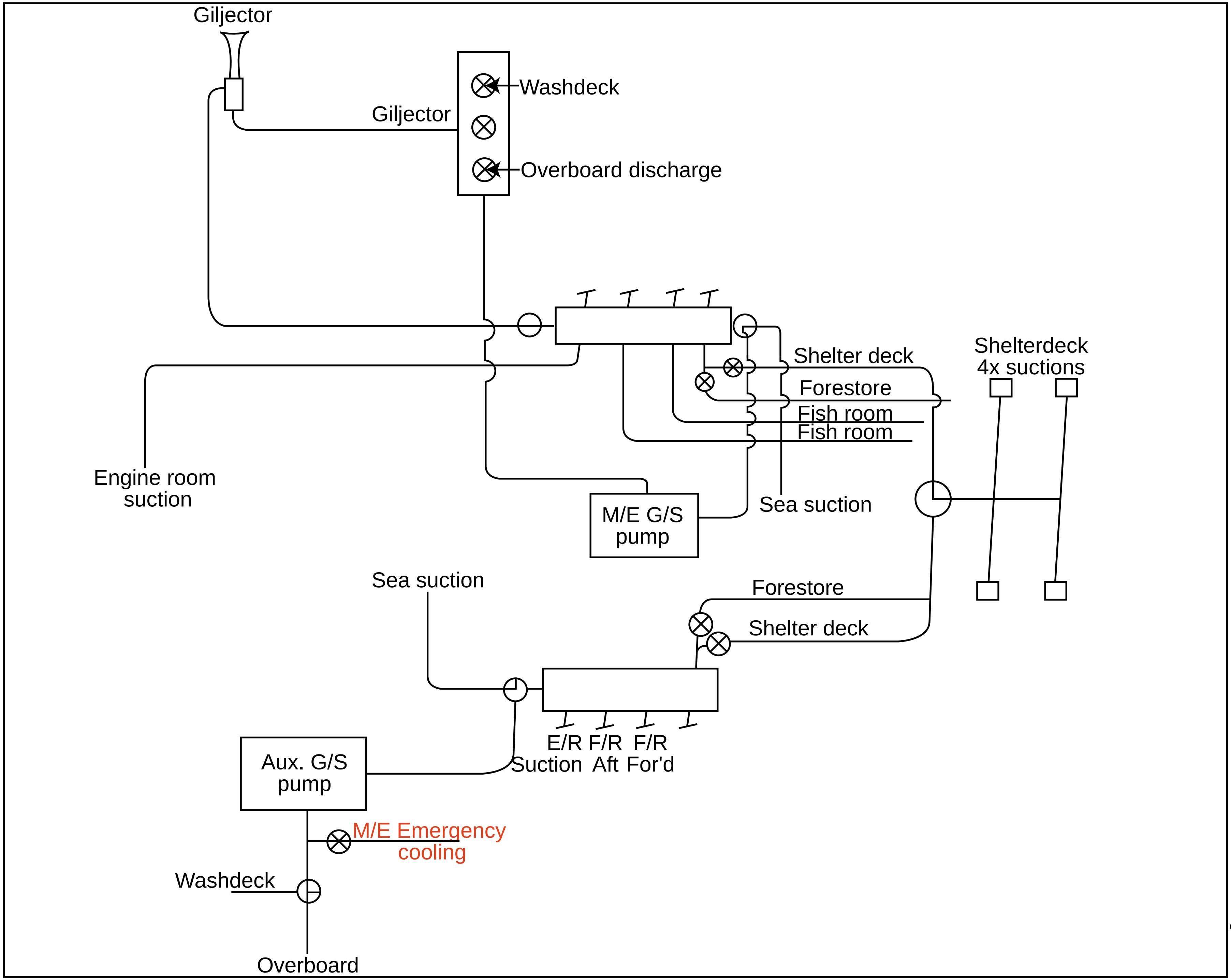
Figure 7



Scale 1:5

Looking down - View C

Figure 8



Bilge system

Figure 9

1.7 MAIN ENGINE COOLING

The main engine contained fresh water, which absorbed the heat of the engine when it was running. The heat in the fresh water was extracted by seawater through the pipe walls of a heat exchanger. Cooling water for the main engine entered the vessel via two seacocks. It was then pumped to the heat exchanger, and once it had been cycled through this unit it was discharged overboard. The seawater from the two seacocks also cooled the gearbox directly through a cooling stack. Once the seacock had been opened up, the skipper and the mate then had it in their minds that they could not start the main engine, because they thought there was no cooling water for it.

A pipe from the bilge system **(Figure 9)** could feed sea water directly into the main engine water jacket. (Seawater salt deposits can damage an engine if this method of cooling is used long term. It is, however, acceptable in an emergency as an alternative source of engine cooling.) The mate had never used this method of main engine cooling on *Constant Faith*. He knew of the supply pipe, but was unsure how the cooling water would discharge from the main engine once it had circulated around the jacket.

1.8 BILGE PUMPS AND BILGE ALARMS

The bilge pump driven by the main engine had a rated capacity of 350 litres per minute. The bilge pump driven by the auxiliary engine had the same rated capacity.

The engine room bilge alarm activated as the floodwater rose. The alarm panel, which contained the fish room bilge alarm, was situated in the wheelhouse. It was deactivated to stop the alarm sounding continuously. Had the alarm panel not been cancelled, the alarm would have sounded continuously as the floodwater rose.

1.9 FREEING PORTS

The shelter was fitted with a freeing port on each side. Each freeing port was fitted with a flap, which acted as a non-return valve, allowing water to flow out, but not back in. Such a valve is normally referred to as a tonnage valve. The use of tonnage valves enables the shelter to act as buoyancy to counteract forces which tend to roll the vessel. Shelters fitted with plain freeing ports cannot be considered buoyant.

The aft open deck was fitted with freeing ports on each side. They were simple openings at the bottom of the bulwark.

1.10 VIDEO

The coastguard helicopter was fitted with a video camera. Still frames taken from the video are shown in **Figures 10 to 15**. They are in chronological order. All the video footage was taken after the winchman returned to the helicopter at

0238. *Constant Faith,* with her skipper and mate still on board, is shown in **Figures 10 and 11**. The tonnage valve and freeing port on the starboard side are above the waterline. **Figures 12 to 14** show *Conquest* manoeuvring in and taking off the skipper and mate. *Conquest* is shown manoeuvring away in **Figure 15**. All the figures show that the sea was fairly calm.

The helicopter arrived on scene at 0218, and the skipper and mate abandoned at 0244. Therefore, the helicopter was on scene for about half an hour.

Figure 10

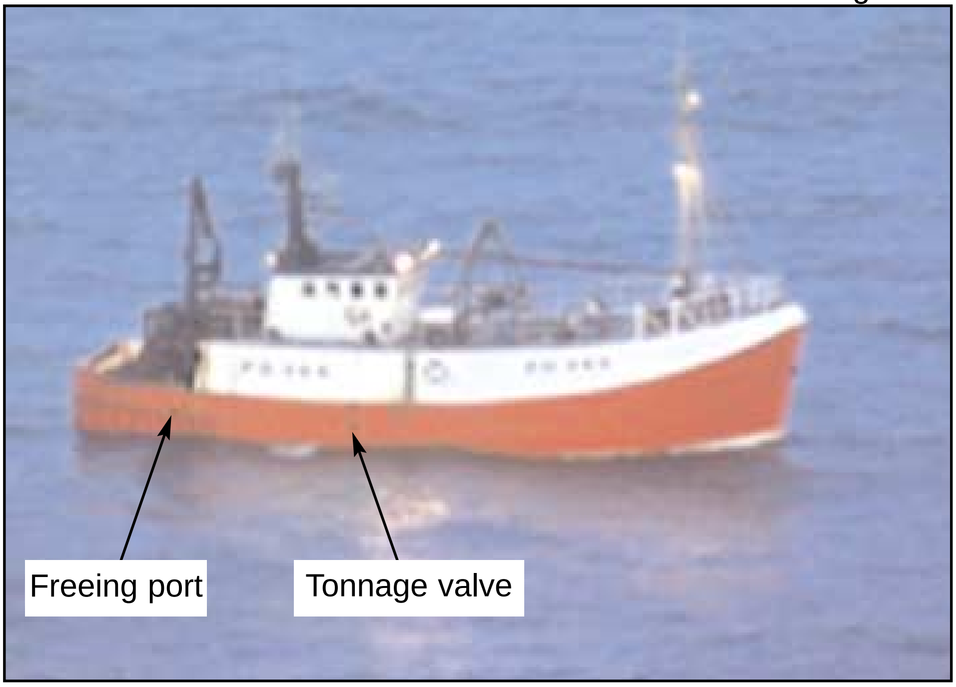


Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

1.11 FISHING VESSEL CERTIFICATE

The fishing vessel certificate for *Constant Faith* was current. The MCA issued it on 7 May 1998, and it was due to expire on 10 January 2002. As a wooden vessel, *Constant Faith* was not required to have any watertight bulkheads. All the sea inlets were overhauled and inspected in 1998 before the new certificate was issued.

1.12 HARBOUR

Peterhead is one of the busiest fishing ports in the country. A consequence of this is that a large amount of rubbish accumulates there. Furthermore, there is no river-mouth in Peterhead to wash debris out to sea.

Peterhead harbour has a port waste management plan, which has been approved by the MCA.

The Peterhead harbourmaster employs two staff to collect rubbish around the harbour, and a workboat is used to collect floating debris. Skips are provided for fishing vessel crews to deposit their rubbish in. If crews do not want to carry it to the nearest skip, they can leave it on the dockside next to their vessel, and the harbourmaster's staff will deal with it. The harbourmaster and his staff encourage fishermen to dispose of their rubbish responsibly. If, for instance, a vessel is seen entering the harbour with rubbish on the deck, the skipper will be told by radio to put it in a skip.

The harbourmaster does not think that there are any shops or businesses which are responsible for rubbish collecting in the harbour. When the harbour is dredged, shopping trolleys and other debris are found, which probably originates from the general public, fishermen or other mariners.

Skips are provided in the fish market for the disposal of fish papers and other debris. Notices are displayed in the market to remind users of this. At sea, fish are stowed in fish boxes. Plastic or paper sheets (known as fish papers), are laid on top of the full boxes and then ice is shovelled on top to keep the catch fresh. When the fish boxes are taken to market, the ice is disposed of by pulling away the fish papers, to reveal the fish to potential buyers. The fish papers sometimes blow about in the market and then end up in the water. A plastic fish paper floating in Peterhead harbour is shown in **(Figure 16)**. Such an item could easily be sucked into a sea water inlet of the vessel shown in the picture. Plastic fish papers are a similar hazard to the plastic bags; it was a plastic bag which was sucked into *Constant Faith*'s seacock.

Figure 16

Plastic fish paper

SECTION 2 - ANALYSIS

2.1 SEACOCK

It is unwise to open up a seacock when afloat. The ideal way to deal with a blocked sea inlet, is to berth the vessel in a tidal harbour, wait for the tide to go out, open up the seacock and clear the blockage, then close up the seacock before the tide comes back in. Using this method, when the seacock is opened water does not pour through, and if there is a problem in getting it closed up, there is time to deal with the situation.

Constant Faith could have steamed back to harbour on reduced power, to carry out the unblocking procedure described above. The aft seacock would have provided sufficient cooling for a voyage at reduced speed. However, using this solution would have meant losing a day or two's fishing. Additionally, *Conquest* would not have been able to pair trawl while *Constant Faith* was absent. This might have been why the inlet was unblocked at sea. Nine out of ten fishing vessel skippers would probably have followed the same course of action if faced with the same problem.

When the seacock was opened up, it would have been better to have left one loosened bolt in place, and then swivel the plate to one side around that bolt **(Figure 8)**. When the plate needed to be refitted to stop the floodwater, it might have been possible to achieve this if one bolt was already in position. The plate could have been twisted back over the opening; the other bolts could then have been inserted and tightened up. However, the mate recalls that in this particular situation there was not enough room to swivel the plate to one side.

The US Coast Guard trains repair teams so that ships can be kept operational after limited damage. There is a method for dealing with water coming from open pipes. A large softwood wedge is driven in; initially this may cause the water to spurt even more. Smaller softwood wedges are then driven in between the main wedge and the pipe until the flow is choked off. The tops of the wedges are trimmed with a saw, and then a wood shore is put between the tops of the wedges and the nearest part of the ship's structure.[1] The US Coast Guard encourages fishing vessel skippers to carry softwood wedges and shores for this purpose.

2.2 HARBOUR

The skipper and mate believe that the plastic bag, which blocked the seacock before the flooding took place, was sucked-in in Peterhead harbour. As a result of further enquiries MAIB believes that the harbourmaster and his staff are making their best efforts to minimise rubbish in Peterhead harbour. Fishermen and other mariners using the harbour are strongly encouraged to do what they can to help keep the harbour free of rubbish.

[1] Fishermen reading this report may like to take note of the technique.

2.3 LINKAGE

Fitting a linkage, to enable the seacock to be closed without lifting a floor plate, was a good idea in principle. The grub screw which tightened the lever on to the spindle, was crucial to this arrangement. The absence of this screw in the tightened position was one of the main causes of this accident. A linkage which provides an easier way of opening and closing a seacock is not much good if it falls off when it is needed in an emergency.

The ex-staff member of Richard Irvin Engineering and Fabrication believes that the grub screw was tightened on the valve spindle when the linkage was installed; more than two years before the accident. It is assumed that this screw had loosened, or fallen out, owing to vibration before the flooding which led to *Constant Faith*'s loss.

2.4 MAIN ENGINE COOLING

Once the seacock had been opened up, the skipper and the mate had it in their minds that they could not start the main engine, because they thought there was no cooling water for it. However, there were two ways in which cooling could have been provided:

2.4.1 Floodwater

Once the flooding had developed, if the main engine had been started it could have drawn its cooling water from the floodwater inside the vessel. This would have helped to pump out the vessel, because the cooling water was discharged overboard once it had been cycled through the heat exchanger. Starting the main engine would also have meant that the bilge pump, driven by this source, could also then have been used. However, this course of action did require some lateral thinking; it is not surprising that it did not occur to them, bearing in mind the stress of the situation. Fishermen reading this report may like to bear this lesson in mind, in case they too encounter a similar situation.

2.4.2 Supply from the bilge system

There was a pipe from the bilge system which could feed sea water to the main engine **(Figure 9)**. There should have been a way of allowing this water to discharge once it had circulated around the main engine jacket, although the mate was unsure if this was possible. If this source of cooling could have been used, it would have meant that the main engine could have been started, and the bilge pump driven by this engine could then have been brought into play. If the mate had had time to consider this, he would have realised that it was acceptable to use this method of engine cooling, because they were faced with an emergency. The damage the salt would have done to the engine would have been a minor consideration, since the vessel was in danger of being lost. Additionally, this means of engine cooling could have been used to get the vessel back to harbour, if it had been decided to unblock the seacock there.

Constant Faith would probably have been saved had the main engine been started.

2.5 BILGE PUMPS

The MAIB has calculated that for a 50mm opening with a pressure head of water of 3.38m – the approximate depth of the top of the seacock below the waterline – the flooding rate through the open seacock would have been about 700 litres per minute.

The bilge pump on the auxiliary engine had a rated capacity of 350 litres per minute; as this pump was running the flooding rate would have been halved. If the main engine-driven pump could have been brought into play, its rated capacity of 350 litres a minute means that the pumps should have just kept pace with the inflow. As the flooding progressed, *Constant Faith* settled lower in the water. This would have increased the pressure head at the open strum box, and consequently the inflow would have become greater. In the MAIB's experience, bilge pumps on fishing vessels do not usually work at their rated capacity because of losses through valves etc. Conversely, the flow would have been throttled if the seacock was not fully open.

MGN 165 (F) published by the MCA **(Annex 1)**, and available free of charge, gives guidance on bilge pumping and other issues related to flooding. One of the points made in this document is that fishing vessels should carry a portable salvage pump, although this is not a requirement. Many owners have provided this piece of equipment, and very positive feedback has been received from their crews. A portable bilge pump can also be used as a fire pump. A portable pump would have been a great help in trying to save *Constant Faith.* A recommendation has therefore been made to the owners to consider carrying such a pump on any vessel which they operate in the future.

2.6 COASTGUARD PUMPS

The coastguard pumps carried by the helicopter each had a maximum capacity of 818 litres per minute; this rate lessens as the suction head increases. *Constant Faith* took about 3 hours to sink after she was abandoned. It is evident that the coastguard bilge pumps were of substantially greater capacity than the inflow rate. With the benefit of hindsight, there was enough time to get the coastguard pumps working, and if this had been achieved, the vessel probably would have been saved.

Once the crew had abandoned to *Conquest,* and the helicopter had departed, the skipper was probably right to resist the inclination to return to the vessel, because without the coastguard pumps he did not have the means to save *Constant Faith* when the flooding was at an advanced stage.

2.7 SAFE OPERATION

In pair trawling, if one vessel has an accident, there is always another vessel at hand to render assistance. A similar case occurred in August 1999 when *Constant Faith* was pair trawling with *Radiant Star*. *Constant Faith* rescued the crew of *Radiant Star* shortly before the vessel sank due to flooding.

2.8 TRAINING

The Fishing Vessels (Safety Training) Regulations 1989, require all serving fishermen born after 1 March 1954 to undertake safety training, and that all new entrants to the fishing industry undertake safety training before going to sea for the first time. Persons born before 1 March 1954 are exempt.

The safety training consists of instruction in sea survival, fire-fighting and first-aid.

Although none of the deckhands had undertaken the full mandatory basic safety training, there is no evidence to show that this was a factor in the accident. The requirement for every member of the crew to have a basic understanding of safety can mean the difference between life and death. The risk of an accident will be greatly reduced if everyone on board has received basic training in safety matters. There is already ample evidence elsewhere to show that some of those who have received basic safety training have owed their lives to knowing what to do in an emergency.

SECTION 3 - CONCLUSIONS

3.1 CAUSE

Immediate cause

1. *Constant Faith* flooded through an opened-up seacock.

Contributing factors

- The seacock was opened up because it was blocked by a black plastic bag.
- The linkage which operated the seacock fell off, because the grub screw in the lever was either loose or missing.

3.2 FINDINGS

1. The aft seacock would have supplied sufficient cooling water for the main engine, to enable the vessel to get back to port where the seacock could have been unblocked. [2.1]
2. The skipper and mate believe that the plastic bag, which blocked the seacock prior to the flooding, was sucked-in in Peterhead harbour. [1.6]
3. The harbourmaster is doing what he can to minimise rubbish in Peterhead harbour. [2.2]
4. After unblocking the seacock, the mate tried to close the valve, but the linkage separated from the valve. [1.2]
5. It is believed that the screw, which tightened the linkage on to the valve spindle, loosened or fell out due to vibration before the accident. [2.3]
6. Once the seacock had been opened up, and the flooding had developed, the main engine could have drawn its cooling water from the floodwater in the engine room. [2.4.1]
7. Once the seacock had been opened up, cooling water for the main engine could possibly have been supplied from the bilge system. [2.4.2]
8. The emergency supply from the bilge system could also possibly have been used to provide cooling water for the main engine, to enable the vessel to get back to port, where the seacock could have been unblocked. [2.4.2]
9. The main engine could have been started; if it had been, it is likely that the flooding would have been contained. [2.4,2.5]

10. If a portable salvage pump had been carried on *Constant Faith*, it probably would have saved the vessel. [2.5]

11. With the benefit of hindsight, there was enough time to get the coastguard pumps working, and if this had been achieved the vessel would probably have been saved. [2.6]

12. If an accident occurs during pair trawling, assistance from the other vessel is close at hand. [2.7]

13. None of the deckhands had undertaken the full mandatory basic safety training. [2.8]

SECTION 4 - RECOMMENDATION

John Simpson and Edward Smith, as fishing vessel owners, are recommended to:

1. Consider carrying a portable salvage pump on any vessel that they operate in the future. [3.2.10]

Marine Accident Investigation Branch
June 2002

ANNEX 1

MGN 165 (F)

MARINE GUIDANCE NOTE

MGN 165 (F)

Fishing Vessels: The Risk of Flooding

Notice to Owners, Builders, Employers, Skippers and Crews of Fishing Vessels.

This Notice replaces Marine Guidance Note No. MGN 49 (F).

Summary

This notice:

1. provides guidance on bilge systems, during construction and operation, to help reduce the number of vessels and lives lost as a result of flooding; and
2. recommends owners and skippers to consider using additional or alternative equipment, such as salvage pumps, propeller shaft-mounted pumps and secondary bilge alarms, to reduce the risk of catastrophic flooding.

1. INTRODUCTION

MAIB investigations into fishing vessel losses continue to show flooding as the primary cause. In 1999, 18 (out of a total of 33) vessels were lost for this reason.

Flooding is preventable, but if not prevented, in most cases can be controlled. If discovered early, leaking pipes can be isolated and the flooding controlled by pumping out the affected space. Flooding can be rapid and late discovery leaves no time to treat the cause. An efficient bilge alarm can be critical in providing early warning of flooding.

No alarm or pumping system, however efficient, is fully reliable on its own. Good practice requires regular checks and function tests of bilge alarms and pumps, together with regular checks of hull and pipework to prevent potential leaks or failures developing.

2. ARE THE PUMPS ON YOUR VESSEL ADEQUATE?

Statutory requirements provide for a minimum capacity for pumping bilges. There is no guarantee that the statutory minimum is adequate for dealing with serious hull or pipework failure. Alternative supplementary means of pumping bilges are available, such as salvage pumps and propeller-shaft mounted pumps. Use of such equipment is highly recommended.

3. CONSIDER CARRYING MORE EQUIPMENT THAN THE REGULATIONS REQUIRE

A range of bilge pumps and alarms are available. To help reduce the consequences of flooding, in addition to statutory requirements, consider one or more of the following options :-

- Install an efficient bilge alarm in the fish hold and any other compartment below the waterline.

- Fit secondary bilge alarms, positioned at a higher level to the main bilge alarm. This will reinforce the main alarm.

- Fit secondary bilge alarms, fed from a separate supply, that incorporate an alarm visible from outside the vessel (e.g. an orange "strobe" light).

- When available, fit electronic bilge level monitoring systems in addition to conventional "float switch" alarms.

- Fit "circuit healthy" indicators on bilge alarm circuits to ensure that the alarm system is working correctly (similar idea to navigation light failure alarms).

- Fit a propeller-shaft mounted pump; this type of pump runs continuously on the main propeller shaft and automatically attempts to pump out the engine room space in the event of flooding.

- Install "submersible" pumps, which continue to operate whilst submerged in water.

- Where practical, fit remotely operated clutches to engage engine driven bilge pumps.

- Carry a portable salvage pump. Extremely positive feedback has been received from Skippers who have sailed with this type of pump, which may "double-up" as a fire-fighting pump in a "dead ship" situation. However, a recent investigation attributed the death of one crew member to such a salvage pump. Unfortunately, he received fatal carbon monoxide poisoning whilst operating the pump inside the engine room.

<u>Such pumps should be:-</u>

i) Used in a well-ventilated space, preferably on deck, where the exhaust fumes will be released to outside the vessel.

ii) Permanently rigged, or readily available, with direct attachment to permanent suction lines (to prevent the need for hoses to be fed through open hatches/doors).

iii) Given due consideration concerning the storage of fuel, particularly petrol driven versions (i.e. adequate ventilation provided, fit for purpose storage canisters and away from sources of ignition).

4. PREVENTATIVE MEASURES – DURING CONSTRUCTION AND REFITS

Bulkheads/Openings

- Ensure that the main bulkheads are as watertight as practicable, to prevent (or at least delay) a flood from spreading to other compartments.

- DO NOT make additional penetrations through main bulkheads unless absolutely necessary.

- Clearly label ("TO BE KEPT CLOSED AT SEA") all doors which contribute to the watertight integrity of the vessel.

Sea Valves/Pipework

- Try to keep the number of sea inlet valves to a minimum.

- Valves and fittings should be manufactured from a suitable* material.

- Avoid unnecessary bends in sea water pipework.

- Position sea valves where they can be easily and quickly closed. Fit extended spindles if necessary, to ensure that sea intake valves can be closed without having to remove floor plates.

- Fit clear labels to identify sea valves.

- DO NOT fit flexible sections of piping in seawater lines unless designed and fitted to withstand vibration. Such sections should be made from reinforced neoprene rubber and secured with stainless steel clips (at least two at each end). The date of manufacture should be clearly marked to identify renewal dates in accordance with the manufacturers' instructions (typically every 5 years).

* "Suitable" means a ductile and corrosion resistant material e.g. bronze, gunmetal, stainless steel, alpha-brasses (containing 70% copper or more and effectively inhibited from de-zincification).

Bilge Alarms

- Position floats or level sensors to bilge alarm systems in accessible positions but where they cannot be damaged and low enough to provide early warning of flooding.

Bilge Valves/Strainers

- Fit bilge valves so they can easily be reached in an emergency.
- Fit clear labels to identify bilge valves.
- Fit and position all bilge strainers (mud boxes) in the engine room, so they can be cleaned easily.
- Fit grids over the fish hold slush well or some other form of coarse strainer.
- Fit a bilge isolating valve in the engine room for the fish hold, to allow cleaning of the strainer even if the hold is flooded.

Bilge Lines

- Avoid unnecessary bends in bilge lines, keeping them straight and direct.

Refits

- Inspect the outer hull closely each time the vessel is slipped, paying close attention to any signs of wastage, damage, caulking and fastenings.
- Inspect sea water pipework closely each time vessel is slipped, paying close attention to bends, "sumps" (e.g. the bottom of sea strainer boxes) and those pipes which are not easily accessible.
- If in doubt about the condition of the sea water pipework, have an ultrasonic inspection carried out and renew those pipes found to be wasted by more than 25-30% of the original wall thickness.

5. REDUCING THE RISK – DURING OPERATION

- Always investigate immediately the cause of high bilge alarms.
- Ensure all watertight and weathertight doors are closed when not in use.
- Regularly (at least weekly) test the bilge pumps and bilge system.
- Test bilge alarms daily.
- Regularly (at least monthly) open and close all bilge and sea water valves, to ensure they don't "seize".
- Keep sea water valves closed when not in use.
- Permanently repair any leaking sea water pipe as soon as possible. Do not rely on temporary repairs and find out if the other sea water pipes are in a similar condition and require renewal.
- Ensure crew members are familiar with sea water side valves and bilge systems. As a reminder, keep a plan at the engine room entrance, identifying the position of sea inlet valves.
- Regularly (several times a day) check compartments not fitted with bilge alarms.
- Regularly (at least weekly) clean bilge. strainers
- Keep the engine room and fish hold free of rubbish, which could choke the bilge system.
- Check sea valves (including overboard non-return valves) whenever the vessel is slipped.

6. EFFECTIVE USE OF THE BILGE PUMPING SYSTEM

- Close the sea suction after any priming of bilge pumps.
- Stop the bilge pump when pumping bilges is finished.
- Close all bilge valves when not in use.

7. WHAT TO DO IN AN EMERGENCY

- Immediately try to find the cause of the flooding and shut the right sea valve. If in doubt, close all sea valves until the flooding stops.
- Start pumping the bilge as soon as possible.
- Do not concentrate on other matters, such as recovering the fishing gear. Deal with the flooding first.

8. PREVENTION AT ANCHOR OR IN HARBOUR

- Close all sea suction valves.

- Avoid "squeezing" wooden vessels in harbour, whenever practicable. This can damage the caulking and lead to a sprung plank.

9. FURTHER NOTES

1. Statutory requirements for fishing vessels of 12 metres in length and over are detailed in the Fishing Vessels (Safety Provisions) Rules 1975 as amended [currently under review]. New vessels 24 metres in length and over now need to comply with EC Directive 97/70/EC, in accordance with the Torremolinos Protocol.

2. This notice is considered relevant to all types of fishing vessels, regardless of size.

Enquiries relating to the content of this MGN should be addressed to:-

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Tel: 023 8032 9297
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