

Marine Accident Investigation Branch (MAIB) - Safety Digest - Fishing 2000

Contents

Marine Accident Investigation Branch	6
Glossary of Terms and Abbreviations.....	7
Fishing 2000 Safety Digest Introduction	8
Part 1 Bilge Alarms and Pumping	9
Case 1 Two Recent Flooding Cases -Vessels Saved by the Bilge Alarm	10
Narrative I.....	10
Narrative II.....	10
The Lessons	10
Case 2 Fishing Vessel Flooded during Bilge Pumping.....	11
Narrative	11
The Lessons	11
Case 3 Defective Bilge Alarm delays Discovery of Flooding	12
Narrative	12
The Lessons	12
Part 2 Flooding and Foundering.....	13
Case 4 Corroded Pipework causes Flooding of a Fishing Vessel.....	14
Narrative	14
The Lessons	14
Footnote	14
Case 5 Rapid Capsize following Flooding	15
Narrative	15
The Lessons	15
Case 6 Three Recent Flooding Cases -Mechanical Failures.....	16
Narrative I.....	16
Narrative II.....	16
Narrative III	16
The Lessons	16
Footnote	16
Case 7 Loss of Older Wooden Fishing Vessel.....	17

Narrative	17
The Lessons	17
Case 8 Valve Jams Open and Vessel Sinks	18
Narrative	18
The Lessons	18
Part 3 Personal Injuries	19
Case 9 Deckhands Injured While Shooting Pots	20
Narrative I	20
Narrative II	20
The Lessons	20
Footnote	20
Case 10 Crew Member Crushed to Death on Beam Trawler	21
Narrative	21
The Lessons	21
Case 11 Cook Falls on Conveyor Belt -Fractures Ankle and Leg	22
Narrative	22
The Lessons	22
Case 12 Fishermen Struck by Seas on Deck	23
Narrative	23
The Lessons	23
Case 13 Deckhand Injured by Parting Rope	24
Narrative	24
The Lessons	24
Footnote	24
Part 4 Man Overboard	25
Case 14 Crewman Lost Overboard -Fatal Accident	26
Narrative	26
The Lessons	26
Footnote	27
Case 15 Lone Fisherman Lost Overboard	28
Narrative I	28
Narrative II	28
The Lessons	28

Case 16 Crew Member Dragged Overboard and Loses his Life	29
Narrative	29
The Lessons	29
Part 5 Keeping a Good Lookout	31
WATCHKEEPING.....	31
NAVIGATION	31
Case 17 Fishing Vessel Grounds due to Fatigue of Watchkeeper.....	32
Narrative	32
The Lessons	32
Case 18 Fishing Vessel Runs Aground after Wheelhouse is Left Unattended	34
Narrative	34
The Lessons	34
Case 19 Collision between Two Fishing Vessels	35
Narrative	35
The Lessons	35
Case 20 Lack of Lookout Leads to Collision in Fog.....	37
Narrative	37
The Lessons	37
Footnote	38
Part 6 Machinery Maintenance	39
Case 21 Fishing Vessel Runs Aground after Main Engine Failure	40
Narrative	40
The Lessons	40
Footnote	40
Case 22 Dirty Fuel Disables a Fishing Vessel	42
Narrative	42
The Lessons	42
Case 23 Steering Failure	43
Narrative	43
The Lessons	44
Footnote	44
Case 24 Lifesaving Appliance Shortages Cost Lives Again.....	45
Narrative	45

The Lessons	45
Case 25 An Experienced Fisherman Drowns	46
Narrative	46
The Lessons	46
Case 26 Stern Trawler Capsizes during Trawling Operation.....	48
Narrative	48
The Lessons	48
Case 27 Loss of Life Close Inshore	49
Narrative	49
The Lessons	49
Case 28 The Loss of a Fishing Vessel and the Stowage of Liferafts	50
Narrative	50
The Lessons	50
Stowage and Float Free Arrangements for Inflatable Liferafts.....	51
Summary	51
Appendix - Diagrams of commonly fitted HRU's	52
Case 29 Discharged EPIRB and VHF Batteries cause Problems	56
Narrative	56
The Lessons	56
Part 8 Conversions	57
Case 30 Capsize of Open Fishing Boat in Adverse Weather	58
Narrative	58
The Lessons	58
Case 31 Poor Design of Working Arrangements Led to Death of Skipper	59
Narrative	59
The Lessons	59
Footnote	60
Case 32 Loss of a Small Clam Dredger	61
Narrative	61
The Lessons	61
Footnotes.....	62
Part 9 Stability.....	63
Case 33 Fishing Vessel Capsizes in Harbour	64

Narrative	64
The Lessons	65
Case 34 Two Cockle Dredgers Capsize	66
Case 1	66
Narrative	66
Case 2	66
Narrative	66
The Lessons	66
Case 35 Rapid Capsize and Sinking of a Fishing Vessel with Loss of Life	67
Narrative	67
The Lessons	67
Part 10 Weathertight Doors and Hatches	68
Case 36 Net becomes Fast on Seabed causing Vessel to Ship Seas and Sink	69
Narrative	69
The Lesson	69
Case 37 Another Vessel Sinks after Shipping Heavy Seas	70
Narrative	70
The Lessons	71
Case 38 Loss of Stern Trawler due to Snagging and Downflooding	72
Narrative	72
The Lessons	72
Case 39 Weathertight Closures Left Open and Vessel Sinks, Leading to Loss of Four Crewmen	73
Narrative	73
The Lessons	74
A Safety Postscript	75
MAIB safety digest/report request form	76
MAIB published reports (unpriced)	76
MAIB published reports (unpriced)	76

Marine Accident Investigation Branch

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department of The Environment, Transport and the Regions and is completely separate from the Maritime and Coast guard Agency (MCA). The Chief Inspector of Marine Accidents is responsible to the Secretary of State for the Environment, Transport and the Regions. The offices of the Branch are located at Carlton House, Carlton Place, Southampton, SO15 2DZ.

This *Safety Digest* draws the attention of the fishing community to some of the lessons arising from investigations into recent accidents. It contains facts which have been determined up to the time of issue.

This information is published to inform the fishing industry, and the public of the general circumstances of fishing vessel accidents and to draw out the lessons to be learned. The sole purpose of this *Safety Digest* is to prevent similar accidents happening again. The content must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available. The articles do not assign fault or blame nor do they determine liability. The lessons often extend beyond the events of the incidents themselves to ensure the maximum value can be achieved.

Extracts can be published without specific permission providing the source is duly acknowledged.

The publications home page contains information on how and where you can obtain publications produced by the Department for Transport.

The telephone number for general use is 023 8039 5500.

The Branch fax number is 023 8023 2459. The e-mail address is maib@dft.gsi.gov.uk

Summaries (pre 1997), and Safety Digests are available on the [MAIB site](#).

Glossary of Terms and Abbreviations

CPR Cardio pulmonary resuscitation
EPIRB Emergency position indicating radio beacon
GPS Global positioning system
grp glass reinforced plastic
HRU Hydrostatic release unit
kg kilogram
LSA Lifesaving appliance
m metre
MAIB Marine Accident Investigation Branch
MCA Maritime and Coastguard Agency
MGN Marine Guidance Note
Mhz megahertz
MRCC Marine Rescue Co-ordination Centre
MRSC Maritime Rescue Sub-Centre
Pan Pan The international urgency signal (spoken)
RAF Royal Air force
RNLI Royal National Lifeboat Institution
SAR Search and rescue
VDU Video display unit
VHF Very high frequency

Fishing 2000 *Safety Digest*

Introduction

Any accident at sea is unwelcome. At best there might be light damage or a minor injury. At worst a vessel is lost and people are killed. But no matter what the outcome, there will be implications for those most closely involved. These are likely to be additional costs, loss of earnings, pain, grief and suffering by an unknown number of people. In the worst cases, entire communities may be affected. Families may have to suffer hardship for years, and the memories will linger for a very long time. One question will dominate peoples thinking, why?

Although many of the lessons arising from past fishing vessel accidents are now incorporated in better designed vessels and the equipment carried, the sea is as unforgiving as it ever was. If a mistake is made, or the vessel is not as sound as it might be, or basic safety precautions are not taken, the sea will find the weakness and strike with devastating effect. It is all too easy to be fatalistic about such matters and accept them as the inevitable consequence of a traditional, and tough way of life, but the families who are left to mourn see things very differently. It is they who have to suffer the after math, and who push hard to make sure that whatever went wrong will never happen again.

They are not alone. The Marine Accident Investigation Branch (MAIB) is committed to the same objective. Its inspectors investigate a number of the fishing vessel accidents reported each year. In 1999 the Branch received 372 reports of fishing vessel accidents. The prime purpose of carrying out an investigation is not to apportion blame, or make ridiculous recommendations for fishermen to spend small fortunes in improving safety, but to find out exactly what happened so that the necessary steps can be taken to stop it happening again. We do this in two ways. Firstly, based on whatever we find, we make recommendations to whoever is best placed to implement measures to prevent a recurrence. Secondly we publish the lessons to be learned through the *Safety Digest*, issued three times each year.

This special edition of the *Safety Digest*, produced especially for Fishing 2000, is an amalgam of MAIB lessons learned during the past five years. Most have already featured in past editions, but are repeated here as it has become very evident that few fishermen have seen a copy or are even aware of its existence. There is an application form at the end of this booklet if you would like to be placed on our mailing list to receive the *Safety Digest*. It is FREE of charge. The same application form can be used to receive any of our unpriced fishing vessel reports. These too are FREE of charge and are available on request.

We are also using the opportunity to comment on some of the more common safety problems we see on a regular basis. One of the primary aims of pulling together these observations is to encourage discussion about matters to do with safety, and to instil a safety culture in the industry. Our overriding objective is to reduce the number of accidents at sea.

John Lang
Chief Inspector of Marine Accidents
March 2000

Part 1

Bilge Alarms and Pumping

We often find when investigating flooding incidents, that a major short coming in too many vessels is the state of, or lack of, bilge alarms in the engine room. We hear, over and over again, that the crew are seemingly unaware that the engine room is flooding until it is too late. Had the alarm sounded when flooding was first detected, adequate action could have been taken to save vessel and lives. We often find the alarm had been landed for repair and not been replaced, or was known to be defective and due to be looked at next time in harbour, or even assumed to be correct, but never tested. We even hear of some that have been muted because the noise was irritating. In each case the epitaph is the same. If only.....

Bilge alarms matter. Test them daily, and make sure they work. In some cases the bilge alarm works as designed, but the flooded area cannot be pumped because the strum box or valve is clogged with debris such as and fish parts. Check and clear strums and valves frequently - your life could depend on it.

Case 1

Two Recent Flooding Cases -Vessels Saved by the Bilge Alarm

Narrative I

This 19m long wooden fishing vessel Helenus touched bottom. A short time later the bilge alarm in the fish hold went off prompting the crew to inspect the hold. It was flooding. The rate of water ingress was greater than the bilge pumps could handle, so the coastguard were contacted for assistance and the vessel headed for the nearest port. Watertight bulkheads either side of the fish hold restricted the extent of flooding and the vessel made port safely. She was met by a fire brigade tender and pumped dry.

The cause of the flooding was damaged planking from the earlier contact with the sea bed.

Narrative II

In a severe gale, the bilge alarm went off on the 30m long steel beam trawler Noordpool. It was found that the engine room was flooding from the fractured casing of the main engine driven cooling pump. An auxiliary driven bilge pump was started. Since the vessel was close to a lee shore it was imperative that the main engine was kept running, but to limit the rate of flooding, it was slowed down.

When the flooding reached the main engine flywheel, water began spraying around the compartment. The engine was shut down, and the valve to the sea water inlet closed to stop the flooding. This provided the engineers with an opportunity to investigate why the bilge pumping was so ineffective.

By now the vessel had begun to drift onto the lee shore. The coastguard was alerted, and an RNLI lifeboat and rescue helicopter were launched to assist.

The engineers discovered that the bilge pump was sucking in air from the fish hold, which was known to be dry. Although the bilge line valve to the fish hold had been isolated so that the engine room bilges could be pumped, debris inside the valve body prevented it from being fully closed. Once it had been cleaned, the bilge pumping system was returned to full working order. This, together with a salvage pump from the lifeboat, managed to lower the water level in the engine room so that the main engine could be restarted. *Noordpool* was escorted safely to the nearest port by the lifeboat.

The Lessons

1. Both cases illustrate the benefits of bilge alarms, functioning bilge pump systems, and watertight bulkheads to limit the severity of a flooding incident.
2. The second incident shows the importance of maintaining a vessel's bilges free of rubbish so it cannot be drawn in to the bilge system.
3. Valves on a bilge system must be regularly checked for correct operation.

Case 2

Fishing Vessel Flooded during Bilge Pumping

Narrative

When hauling the prawn trawl on board his 6mlong steel fishing vessel *Val G*, the skipper sensed she was down by the head. He was working in rough seas some 8 miles south of Ayr. The crew lifted the deck hatch to check the condition of the fish room and discovered it was flooded to a depth of about 1.6m. Watertight bulkheads either side of the fishroom prevented the spread of the flooding. The coastguard was alerted, and the Girvan and Troon RNLi lifeboats were launched to assist, as was a rescue helicopter. The vessel was towed into Troon and pumped dry.

The source of the flooding was the vessels bilge pumping system which had been recently renewed. The skipper had set the valves with the intention of pumping out from the fishroom, but in fact they had been inadvertently set to pump sea water in. A bilge alarm was fitted to the fish room and was in good working order. Unfortunately it had been switched off.

The Lessons

1. Do not switch off bilge alarms when going to sea. A basic pre-sea check is to ensure they are switched on and functioning correctly. A non-operational bilge alarm, or one that is not switched on, could mean the difference between a successful fishing trip and a disaster. At worst it could result in the loss of a boat and a means of earning money.
2. In small vessels, it is essential that all crew members should know how to operate the bilge pumping system.
3. This accident has once more demonstrated the value of watertight bulkheads in preventing the spread of flooding.

Case 3

Defective Bilge Alarm delays Discovery of Flooding

Narrative

Due to poor weather, the 20.8m long wooden prawn dredger *Valiant*, was berthed unattended alongside a quay at Mallaig for two weeks during February. The vessel was hard up against the quay with up to ten other vessels moored alongside her.

Following an improvement in the weather, she sailed at 0500, with a crew of four on board. Three were newcomers on board, and only the skipper had any knowledge of its main and auxiliary machinery.

At about 0900 the fishing gear was shot and towing commenced. This continued until 1200, when the skipper found flooding in the engine room during a routine inspection. After starting the main bilge pump, the skipper returned up top to supervise the hauling of the gear. Having completed hauling, he returned to the engine room at 1230 to find the water level slightly higher.

Another fishing vessel was contacted by VHF radio and replied that she was about an hours steaming away, but would assist. By now, flooding was found to have spread to the cabin and fish hold. As a precaution, one liferaft was unlashed from its cradle by the crew but not launched or inflated.

In spite of using the bilge pump driven by the auxiliary engine in addition to the main pump, the water level in the engine room continued to rise.

Valiant was taken in tow by the second fishing vessel once she had arrived on scene and two crewmen were also transferred. The coastguard was contacted, and in response to this call, an RNLI lifeboat was requested to launch and provide a portable pump.

Towing *Valiant* proved very difficult, and the water level in her engine room continued to rise. The skipper and remaining crewman on board, decided to evacuate to the second vessel to await the arrival of the lifeboat.

However, 15 minutes later, and before the lifeboat arrived, the vessel rolled to port, capsized, moved quickly astern and sank. The unlashed liferaft floated free, but the second liferaft and EPIRB did not.

The Lessons

1. The cause of the flooding was not identified by the crew. However, the squeezing of the vessels hull between the quay and a number of other vessels during the poor weather in port, could have been a factor, and is a practice which should be avoided.
2. The discovery of the flooding was delayed because the high level bilge alarm failed. This contributed to the difficulty of finding the cause of flooding, and emphasises the value of these alarms. Defective bilge alarms are useless. They should be regularly checked and, if found defective, repaired at the earliest opportunity and before next proceeding to sea.
3. The failure of the second liferaft and the EPIRB to float free, when the vessel sank, is also a feature which cannot be fully explained and is a matter of concern. All owners and skippers should ensure that these important items of LSA have every chance of floating free and operating as intended. In particular, they should be free from obstructions and serviced as required. HRUs should be properly serviced or replaced when necessary and must be properly installed.
4. The vessel sailed with a crew which, apart from the skipper, had limited knowledge of the vessel and its systems. This imposed a significant workload on the skipper during the emergency. There is value in ensuring a low turnover of crew so that most people on board have a detailed knowledge of the vessel, not just for routine fishing operations but also when things go wrong.

Part 2

Flooding and Foundering

One of the most frequently reported types of accident in recent years has been the flooding and foundering of fishing vessels. Several have involved the tragic loss of life. More often, the combined effects of good communications, and the dedication of the search and rescue organisations (including fellow fishermen), have meant that many crews have been saved. The MAIB pays tribute to all those involved in such rescues.

By looking at a number of such incidents, and highlighting common features, it is possible to build up a picture of the most likely causes and to identify some important lessons. Once this has been done, we do our utmost to ensure others are aware of the circumstances so that they can prevent the same thing happening again.

The two spaces most vulnerable to flooding are the engine room and the fish hold. Of the known causes, hull failures account for about half, with sea water pipe failures coming a close second.

The MAIB tries to analyse the relevance of the age of a vessel to flooding and foundering. Vessels less than about 20 years old require less maintenance to ensure the integrity of hulls, pipes and valves. The older vessels are more susceptible to flooding, because the same level of maintenance is no longer adequate to prevent the type of defects that can cause flooding. By about 40 years of age, vessels are either scrapped or extensively refurbished, to bring them more in-line with boats less than 20 years old. Owners and skippers of the older fishing vessels need to pay greater attention to sound maintenance to ensure that age, and wear and tear, do not become the reasons why so many fishing vessels founder.

If owners and skippers decide to re-engine a vessel, and especially if they seek to increase the power, they should pay particular attention to the increase in flow rates on existing pipework. Any latent weakness may be exposed at the most awkward and inconvenient moment. A burst pipe on a dark night when running for shelter in a rough sea, is not the time to wonder whether that old length of pipe should have been surveyed when the new engine was installed.

The ultimate consequence of flooding is a vessel that sinks. MAIB received 28 reports of vessels lost in 1999. There is no reason why a well maintained vessel should sink if the flooding can be contained to a single compartment. Too often we find that the bulkheads between compartments are not watertight. Water flooding into one compartment seeps into the next. Bulkheads in wooden vessels are not required to be watertight, but in steel built boats they are. Watertight integrity will be far more effective if all bulkheads are properly maintained.

Case 4

Corroded Pipework causes Flooding of a Fishing Vessel

Narrative

The 23m steel trawler *Ocean Hunter* was heading for fishing grounds in good weather.

When she was about 25 miles east-south-east of Peterhead the driver (engineer) found water spraying from a bad leak in the elbow of a section of pipe to the starboard bilge pump. He shut the valves to that section of piping to stop the leak and told the skipper. The skipper decided to return to port to have the pipe repaired.

Soon afterwards the engine room bilge alarm went off. A return visit to the engine room revealed that the main seawater inlet pipe had fractured at a flange. The flooding was isolated by closing the appropriate valves, but because this led to the loss of seawater cooling, the main engine had to be shut down.

Apart from water spraying on to the nearby starboard generator and putting it out of action, there was no other damage. The engine room was quickly pumped dry using the port, auxiliary engine driven, bilge pump. With no main engine, *Ocean Hunter* was towed back to port by another fishing vessel without further incident.

The Lessons

1. The well located and effective bilge alarm gave early warning of the flooding and prevented serious damage to the main engine and gearbox.
2. The driver had many years of experience, including 3 years on *Ocean Hunter*, so was able to identify the problem and take the appropriate corrective action very quickly. Good ship knowledge paid dividends.
3. The pipes failed because they had been severely weakened by corrosion. On one length of pipe there was already a temporary repair which indicated that corrosion was becoming a problem, and that a closer and more extensive inspection was required.

Footnote

The flooding of engine rooms in fishing vessels is nothing new. There is increasing evidence to indicate that corroded pipework is very often the cause. If there is any doubt at all about the integrity of such pipework, or the isolating valves, have them properly surveyed. If corroded, damaged or defective, get them professionally repaired or, better still, replaced.

Case 5

Rapid Capsize following Flooding

Narrative

The 23m wooden pair trawler *Starlight* left Fraserburgh, in company with its partner vessel, with a crew of six on board. About 50 miles into the passage the vessels high level bilge alarm emitted a brief bleep. The alarms buzzer and light did not remain on and the unit did not require resetting. The watchkeeper waited about five minutes for another crewman to come to the wheelhouse before investigating why the alarm had sounded.

Inspection of the engine room showed water lapping over the floor plates and being thrown around by the engines drive belts. No cause for the flooding could be seen. The other crew members were alerted and each, sensibly, donned a survival suit. The partner vessel was informed of the situation and she broadcast a "Pan" call.

Use of the vessels own bilge pumps, which appeared to be functioning properly, failed to lower or control the flooding.

An SAR helicopter arrived on scene about 45 minutes after the flooding was discovered and lowered a portable pump. Use of this pump, supplemented by the vessels own pump, failed to control the flooding. At this stage three of *Starlights* crew were airlifted off.

Inspection of the fish hold showed some flooding of this space. A Royal Navy (RN) vessel arrived on scene and dispatched an inflatable craft with crew and self-inflating air bags. One air bag was passed into the engine room and inflated. At this instant the stern began to sink rapidly giving the four men on board very little time to scramble into the sea. They were all recovered from the water by the RN inflatable craft. Although the vessel sank, there was no loss of life.

The Lessons

1. The crew could not find the cause of the flooding, because the level of water in the engine room was too high at the time of discovery, with the most likely sites of ingress covered from view. Earlier detection, by a properly functioning high level bilge alarm, may have allowed more of the bilge area to be inspected at an early stage, the ingress located and a repair effected.
2. Although not a statutory requirement on this fishing vessel, the carriage and use of survival suits proved to be of tremendous value, particularly for those crew who had to spend some time in the sea.
3. Once major spaces of a vessel are flooded, such as engine room and/or fish hold, the dangers of rapid foundering or capsizing increase.

Case 6

Three Recent Flooding Cases -Mechanical Failures

Narrative I

The 8.4m long fishing vessel *Samaki* was on sea trials following a major re-fit. At some point, the two crew noticed smoke coming from the engine space. On investigating the source they discovered the engine space was flooding. The electrical submersible bilge pump in the bilges, rated at 2000 gallons per hour, could not cope with the flooding. The coastguard were alerted and an RNLI lifeboat came to their assistance. Using salvage pumps *Samaki* was kept afloat and was able to return to harbour.

The flooding was caused by the failure of the shaft seal that had been replaced during the refit. A bilge alarm was fitted in the lower bilges but it failed to operate.

Narrative II

Craignair, a 9.64m long creel boat, flooded through the open end of the wet exhaust system. The skipper, on board alone, was first alerted to something being wrong when he noticed exhaust fumes and smoke starting to accumulate in the wheelhouse. His investigation revealed that the exhaust hose had come off the transom fitting. Fortunately he was approaching harbour when the incident occurred and was able to beach the vessel to pump her out and rectify the failure.

The exhaust hose came off the transom fitting because the hose clips had rusted through. Although a bilge alarm was fitted, and in working order, the skipper had become aware of the flooding before the alarm activated.

Narrative III

The engine revs on the 24m long wooden fishing vessel *Vertrauen* began to fall. An investigation revealed flooding in the engine room to above the floor plates. Bilge pumps, and a portable pump kept on board, were started; and further pumps were requested from the coastguard. Another fishing vessel stood by. A rescue helicopter delivered two salvage pumps and these, together with the pumps already on board, enabled the water ingress to be controlled. She was towed to port by the other fishing vessel.

The source of the flooding was the disconnection of the hose supplying cooling water to the stern gland. A bilge alarm was fitted but failed to operate.

The Lessons

1. In each of these incidents, flooding was caused by a mechanical failure. The first incident resulted from the incorrect installation of the seal, while the other two stemmed from a lack of maintenance.
2. In two cases the failure of the bilge alarms allowed the flooding to pass undetected until it affected the running of the main engine. An early warning of flooding can reduce damage and save both time and money. It pays to keep a bilge alarm in good working order.
3. The complete loss of the vessel in Case III was possibly averted because the bulkhead forward of the engine room was watertight and prevented unrestricted flooding throughout the vessel.

Footnote

Excellent guidance on the prevention of, early detection of, and coping with flooding is contained in the Marine Guidance Note 49(F), a copy of which can be obtained from your local marine office or MCA surveyor.

Case 7

Loss of Older Wooden Fishing Vessel

Narrative

An 18m, 34 year old, oak-on-oak wooden fishing vessel was one of the top earning fishing boats in the area in which she fished. To maintain this status, her skipper/owner and four crew operated her even in extreme weather.

One day, the vessel was pitching heavily in a heavy swell and rough seas, when she came down particularly hard on her starboard side. Soon after, the forward cabin started to flood rapidly. Help was called for and using the vessels own bilge pump, together with pumps which the coastguard and another fishing vessel had supplied, the crew were able to maintain the water level in the forward cabin. After 11 hours of pumping, however, the water level had not gone down, but the forward wooden bulkhead started to leak water into the adjacent fish hold.

Realising the gravity of the situation, the skipper and his crew took to the liferaft, and were rescued by another fishing vessel. Four hours later the fishing vessel sank.

The Lessons

1. The cause of the flooding is thought to have been structural failure which occurred when the vessel rolled heavily in very rough seas. It has been impossible to identify the exact structural failure, but it was probably a sprung plank or loss of caulking, or both. This cabin had flooded six months previously, but afterwards the vessel was slipped and caulking repairs to her hull carried out.
2. The importance of maintaining wooden bulkheads as watertight as possible is graphically illustrated here. There is little doubt that the vessel remained afloat for a long time because of the integrity of the forward bulkhead. This gave the crew plenty of time to try to save the vessel and prepare for abandonment. Skippers should ensure that any penetrations to bulkheads, especially after modifications to pipework and electric cabling, are properly sealed. This applies to both wooden and steel bulkheads.
3. The MAIB has always recommended that a portable diesel-driven salvage pump of suitable output, fitted with an adequate length of suction hose, should be carried and stowed in a readily accessible position on all fishing vessels.

Case 8

Valve Jams Open and Vessel Sinks

Narrative

Fairline, PD235, was a 23.9m pair trawler, constructed of steel and operated by a crew of six.

The vessel had been fishing for several days in waters east of Shetland with her partner vessel, when the main engine high temperature alarm sounded. The skipper reduced engine speed to idling and the engineer went below to investigate. He closed the sea water inlet valve and checked the strainer by removing the cover. He found it clear and opened the sea inlet valve again; expecting the water pressure to remove the blockage. It didn't. He then pushed a compressed air line into the strainer and inlet pipe, and opened the air valve. Air was admitted and it successfully cleared the blockage. Sea water began to flow through the strainer and into the engine room.

To stem the flow of water so he could refit the strainers cover, the engineer began to close the sea inlet valve but, after two turns, it stuck. He applied extra leverage, but this broke the valves spindle which meant he couldn't use the handwheel. He then tried a gripping wrench but this, too, didn't work. Sea water continued to pour into the engine room through the 75mm diameter sea water inlet. He then attempted to refit the strainers cover, but water pressure made this difficult and it dropped into the bilges and could not be recovered.

While all this activity was going on in the engine room, the partner vessel was asked to contact the coastguard and request assistance. By now all *Fairlines* bilge pumps were being used in an attempt to control the level of flooding.

A coastguard helicopter arrived on scene with additional pumps but gave first priority to evacuating the crew. Four were taken off, leaving the skipper and engineer on board to cope with the problem. Before the pumps could be transferred, a problem developed on the aircraft, forcing it to leave. The skipper and engineer were quickly evacuated and the helicopter headed for an offshore platform to carry out repairs.

Although *Fairlines* partner vessel attempted a tow, *Fairline* sank about an hour later.

The Lessons

1. Because the vessel was lost, it has not been possible to find out why the sea inlet valve failed to close. This incident clearly demonstrates, however, how important it is that a sea inlet valve works properly and can be shut when problems arise with other parts of a sea water system. Careful examination of these valves when a vessel is slipped is vital.
2. The possible consequences of opening an underwater fitting without any form of backup to contain flooding should be carefully thought through.
3. Rescue helicopters are often able to provide pumps in situations like this, but their first priority is saving life. This was done and six people were successfully rescued.

Part 3

Personal Injuries

Fishing is the most dangerous occupation and worldwide, contrives to kill some 24,000 fisherfolk every year, while disabling thousands more. (Michael Grey, Lloyds List, 19 January 2000).

The MAIB believes that personal injuries to fishermen are under reported. Last year more than 70 injuries, which did not result in death, were reported to the MAIB, whereas many more were reported to the insurance companies and P & I clubs.

A number of injuries occur simply because fishermen become overconfident or careless. A slippery deck, a sudden movement of the vessel, or ropes in use can all spell danger, and a momentary lapse of concentration can be the difference between a fit and healthy life and one in a wheelchair or worse.

In other instances, the wrong or inappropriate gear is worn. You should wear slip-resistant boots with protective toecaps. Strong gloves or gauntlets and a hard hat should be worn when they are needed. Ear defenders should be worn in noisy environments such as engine rooms.

If a hatch is not in use, its cover should be kept closed at all times - you don't want to fall down it. Before entering an enclosed space, make sure it has been well ventilated. Exhaust fumes, rotting fish, and rusting steel can all deplete the oxygen content in an enclosed space.

Keep a good look out for "accidents waiting to happen", such as a swinging door, a frayed wire or a sliding bridge window. When you see them, do something about them. That way you will make life aboard your vessel safer for both you and your fellow fishermen.

Case 9

Deckhands Injured While Shooting Pots

Narrative I

The 13m crabber *Bosloe* was re-shooting a fleet of pots when a bight from the back rope caught the leg of a deckhand as he was lifting the pots over the side.

The deckhand was dragged against the vessels bulwark as the bight of rope tightened. The skipper immediately came full astern on the engine. While one crew member held onto the deckhand to prevent him going over the side, the fourth member of the crew cut the back rope with a knife kept handy for emergency purposes.

Although the deckhand was prevented from going over the side by the quick thinking of the skipper and crew, he sustained heavy rope burns to the lower leg.

The skipper made arrangements for an ambulance to meet the vessel on her immediate return to Plymouth.

After two operations on the deckhands lower leg, he was expected to make a full recovery.

Narrative II

The 13m creel boat *Dunan Star* was also in the process of shooting pots from the starboard side when the back rope, stowed in the fish hold, whipped out so that a bight caught one of the deckhands around his ribs and neck.

Normally a cover was kept over the fish hold to prevent this happening, but it was not being used on this occasion.

The deckhand was dragged against the vessels side as the bight tightened. The skipper put the main engine full astern while another crewman cut the back rope in time to prevent the deckhand going over the side.

The deckhand sustained heavy bruising and rope burns.

The Lessons

Shooting pots is hazardous.

1. When shooting, pots always stand clear of them and any associated ropes. Pay particular attention to keeping your feet out of the bights of back rope.
2. The operation is safer when the pots are stowed in rotation, with the back rope stowed separately and carefully so that it runs freely and without any snags.
3. A readily available sharp knife played an important part in both incidents.

Footnote

The "Fisherman and Safety" booklet, free of charge and available from the Maritime and Coastguard Agency is a guide to the safe working practices for fishermen.

Case 10

Crew Member Crushed to Death on Beam Trawler

Narrative

The *St Mark*, a beam trawler of 33m in length, left Lowestoft on 26 June for fishing grounds to the north of the Butt of Lewis. She began fishing on her arrival two days later.

When the nets were hauled in the evening of 1 July, nets and chain mats were found damaged. The beams were turned fore and aft and secured over the side using chains at each end of each beam. The nets and mats were lifted inboard to enable repairs to be made. The weather conditions were poor; a north easterly wind of force 6 to 7 was causing moderate to rough seas.

The repairs took an hour. The port side beam was prepared for shooting without incident, but when the starboard side beam was lowered for the securing chains to be released, it came to rest on top of the bulwark. Although unplanned, the situation was not unusual. One of the crew went forward to release the forward chain but, before he was able to do so, the vessel rolled heavily causing the forward end of the beam to fall off the bulwark rail and swing inboard. The 3 tonne beam crushed him against a central housing.

A coastguard rescue helicopter with a doctor on board was tasked to assist, but although the casualty was winched off, he was pronounced dead about two and a half hours after the accident.

The Lessons

1. The skipper and crew were very experienced fishermen. Most routine work on board was carried out automatically without direction or intervention by the skipper who controlled the winches and oversaw the operation from the wheelhouse. Each member of the crew acted independently and was responsible for his own safety. In normal circumstances operations were carried out without incident. On this occasion something out of the ordinary occurred; the beam landed on the rail instead of hanging safely outboard. The normal procedure should have changed to allow for the new risks.
2. The crew member should have waited until the skipper could lift the beam again and lower it into the correct, and safe, position. However, acting on his own initiative, presumably to save time, he put himself at great risk in his move to unhook the beam.
3. The skipper had oversight of the working deck. He saw the incident develop but was either unable to stop the operation once started, or accepted the risks involved.
4. Every operation which involves teamwork, should be under the control of a single person. As an operation moves from stage to stage that person should signal his permission, or otherwise, for it to continue. A recognised signal should exist to enable the person in control to stop the operation at any time. Nobody should be allowed to endanger himself unnecessarily.

Case 11

Cook Falls on Conveyor Belt -Fractures Ankle and Leg

Narrative

The crew of the 22.55m seine netter, *Renown*, were stowing fish in the hold. In the fish processing area on the deck above, the cook wanted to clear remaining fish from the holding bins. To achieve this he decided to stand on the stationary conveyor belt situated just below them. The boat rolled, he lost his footing and fell onto the conveyor belts control handle which activated the hydraulic operating system. The belt started to move and he found himself being drawn forwards until his legs became trapped. Because his back was keeping the handle in the "on" position, and he was out of sight and hearing of the rest of the crew, the belt stopped only when it reached the power cut-off pressure of 175.8 kg/cm². He was badly injured and fractured his right ankle and leg.

The fish handling system had been fitted the week before the accident occurred. The control handle was fitted to the side of the conveyor belt so it could be operated by the crew when gutting fish. Since the accident a number of safety measures have been introduced.

1. The control handle has been moved and a protective guard fitted.
2. To ensure the holding bins can be readily emptied, their inner shapes have been altered and a series of pipes have been fitted to supply running water.
3. A monitoring camera has been fitted in the wheelhouse so that the skipper can see what is happening and can, if necessary, shut off the power remotely.

The Lessons

1. It was dangerous and totally unnecessary to stand on the conveyor belt to clear fish from the holding bins. A deck wash hose would have been just as effective.
2. While the measures taken to prevent such an accident happening again are sound, they were only put in place after one of the crew was badly injured.
3. It is all too easy to remind fishermen that a full risk assessment of the fish processing area should have been carried out after installing new equipment. The MAIB know there are still many who are unconvinced of the need for such assessments, arguing they haven't the time to do it, or that they are unable to foresee a potential accident such as this. The whole purpose of risk assessment is to prevent accidents. Had the precautions listed above been implemented as the result of such an assessment, one man would not have been so unnecessarily injured.

Case 12

Fishermen Struck by Seas on Deck

Narrative

The 34.96m stern trawler *Norina* was hauling downwind in force 7 to 8 weather conditions. During the operation, she shipped a large wave over the stern which struck, and knocked down, two members of the crew working on deck. One struck a bollard and the second a hatch coaming.

The crew were concentrating on the hauling operation. The skipper tried to warn them of the oncoming sea but was not heard against the noise of wind and sea.

The Lessons

1. Fishermen will need no reminding that the sea is a dangerous place, and breaking waves an occupational hazard. Skippers develop a sixth sense in knowing which waves are likely to be dangerous; they also know their impact will be affected by how the vessel is lying. They will also be aware that less protection is provided when the seas approach from astern. In such conditions there is a need to keep a particularly vigilant lookout for oncoming seas when crew are working on deck.
2. Those on deck will be pre-occupied with hauling or shooting. Keeping a sharp lookout will never be easy, but the skipper has a responsibility to ensure it is always maintained and that the crew are warned of the imminent approach of heavy, oncoming, following or quartering seas during fishing operations. Only the skipper can decide whether he undertakes the task of maintaining that lookout himself, or whenever necessary he delegates. The requirement is straightforward, the lookout must be kept, and there must be a means of alerting the crew.
3. It is very easy for those not in this situation to say what should, or should not be done. The important thing is that each crew should work out how it can best be handled in their vessel. Ignoring it could lead to injury and, possibly, death.

Case 13

Deckhand Injured by Parting Rope

Narrative

The crew of a 24m steel fishing vessel involved in pair trawling was in the process of hauling across the net from her partner vessel. The rope being used led from the starboard gallows, through well greased blocks along the shelter deck, and then down to the winch on the main deck.

A moderate swell was running, the remnant of the previous day's gale. It was early morning and still dark.

Two deckhands were standing on the shelter deck, just forward of the wheelhouse, waiting to clear away the rope after the net had been connected to the warps. The skipper was operating the vessel from the controls located on the starboard side of the wheelhouse. In this position he had a good view of both the deck operations and the partner vessel. Looking aft, the skipper noticed that the rope to the winch had been inadvertently led through the loop of the preventer chain, instead of directly over the sheave of the block. Before he could do anything about it the rope parted, struck one of the deckhands across the head and knocked him unconscious.

The injured deckhand was covered with blankets to keep him warm, and was not moved from where he had fallen. He was evacuated by helicopter and retained in hospital for about 10 days. His injuries included a fractured collar bone and vertebra, but he was expected to make a full recovery.

The Lessons

1. Although the condition of the rope was acceptable, it parted because the loop of chain through which it had passed, had gripped it tightly when it came under load. Even the strongest rope or wire is liable to part if rove incorrectly.
2. To prevent a similar occurrence the preventer chain should be substantially shortened to keep it well away from the sheave of the block.
3. The winchman, on the main deck, could see nothing of the operations on the shelter deck. The skipper's instructions were passed to him over an intercom which, in this vessel, was an unsatisfactory arrangement. When things go wrong, as in this instance, immediate action is necessary. Not only must it be possible for effective warnings to be passed instantly, but an alternative means of stopping the winch in an emergency must be provided. Skippers and owners are recommended to review the procedures in force in their own vessels and, should they find shortcomings, should take whatever measures are necessary to ensure both criteria can be met. Crews, and their families, can rightly expect such safety measures to be implemented. Emergency winch stops should not only be provided and fitted in immediately accessible positions, but must also be regularly tested to ensure they are reliable and available when needed.
4. The deckhand who was injured should have stood well clear of the rope until the winch had stopped hauling.

Footnote

Merchant Shipping Notice No M.1561 "Dangers from Winches, Machinery and Fishing Gear" adequately covers the safety issues raised by this accident.

Part 4

Man Overboard

Drowning is a terrifying way to die. You suddenly and unexpectedly find yourself in the water fighting to keep your head above the surface. You are staggered to find how difficult it is as your heavy working clothes seem to do everything possible to drag you under. Within a few moments you are exhausted. Very, very few people have any conception of what it is like to be caught in such a situation. It is the most frightening, awful, mind shattering experience imaginable. Of all the thoughts that go through your mind as you struggle for air, one dominates: the desperate need for something to lift you to the surface and safety. It is called a lifejacket.

Among the most heart-wrenching reports we receive are those telling of fishermen going overboard (for any number of reasons) who do not survive because they are swept away or are drowned before they can be rescued. One can only imagine with horror what their last thoughts might have been. We know from those who have survived to tell the tale that, without exception, they have all recognised the value of having some form of buoyancy aid to keep them afloat.

The wearing of lifejackets is a sensitive subject to fishermen. The mythical MAIB book on "Reasons Why Lifejackets Should Not Be Worn" extends to several volumes. Extracts taken at random include: "they are too uncomfortable, they are too bulky, they get in the way, it would spoil the macho image, I wouldn't be seen dead in one, there are none suitable, we are not required to, my father never wore one, they are no good, my friends would laugh at me, you must be joking, wearing one is dangerous, they get oily and dirty, they are too hot, my life is my own concern, and they are too expensive". The only people who concede it is a good idea are those who have nearly drowned, and the next-of-kin of those who have.

There are some grave misconceptions about lifejackets. Few people acknowledge or are even aware that there are two types: the generally bulky versions normally stowed somewhere on board for use in an emergency, and the more slimline working lifejacket worn by fishermen on deck. The latter can be seen at Fishing 2000. Many are genuinely user-friendly and can be worn comfortably while working. But there is a problem: the cost. Few fishermen would willingly go to the expense of buying one even if they were convinced by the arguments to wear them. So it is business as usual and they go back to sea confident of their ability to survive. But statistically, people go overboard every year; and it might be you next time.

The chances of it happening increase markedly if you fish on your own. As others before have discovered, you will struggle for air and will, for the first time realise that the cost of a lifejacket was a very, very small price to have paid to be able to breathe again.

Drowning is not the only cause of death when in the water. Cold is just as much a killer. Extensive research has shown that when a body is suddenly immersed in very cold water, even the strongest swimmer or the fittest individual will begin to feel the effects within seconds. Blood pressure and heartbeat will increase rapidly, there is a tendency to hyper-ventilate and the co-ordination of limbs is lost. Although a few have been known to survive several hours when immersed in cold sea water, the chances of survival improve significantly if the victim remains as still as possible to preserve heat. He is far better placed to do this if he can hang onto something, or his head is being kept clear of the water without any effort on his part - by a lifejacket, and ideally one with a crotch strap fitted.

And even if the victim is successfully recovered, the devastating effect of cold will linger on as the deep body temperature continues to fall. This can lead to post-rescue death, and research has shown that lifting a victim horizontally will do much to reduce this happening. Notwithstanding this sound advice, it is far better to get the man back on board as quickly as possible.

If nothing else, this Fishing 2000 edition of the *Safety Digest* might prompt good skippers to insist that their crews change the habits of a lifetime, and wear lifejackets on deck when at sea.

Case 14

Crewman Lost Overboard -Fatal Accident

Narrative

The 12m tangle netter *Heart of Oak of Helford* left her base on the River Helford in the early morning. She was bound for the fishing grounds 9 -10 miles south of Lizard Point to haul her nets which had been shot three days previously.

Some two hours later she arrived and began hauling the first fleet of nets. The skipper and his two crew members worked on deck hauling the nets. Once these had been recovered they were dropped straight into a plastic portable net bin.

Before the first fleet of nets had been hauled, the skipper's attention was drawn to the presence of a French fishing trawler towing towards the remaining fleet of nets. To ward her off, and prevent any damage to the remaining nets, the skipper instructed the crew to disconnect the nets so he could pursue the French trawler.

As soon as he was able, the skipper turned towards the French trawler. The two deckhands were pre-occupied on deck; one was on the port side next to the bulwark; on his knees sorting and gutting fish. Neither man was wearing a lifejacket or buoyancy aid.

While making way in the heavy swell, the vessel started to roll heavily and the partially full net bin slid from where it was stowed, starboard of amidships, to where the deckhand was working. He raised himself up to try and fend it off but was caught by the bin and lost his balance. He fell overboard.

The skipper brought the vessel around in an emergency turn to get as close as possible to the man overboard. When the vessel reached him, a lifebuoy with a line attached was thrown towards him while the remaining two crew members shouted at him to grab hold of it. He did not respond. The operation was repeated three times without success then the victim fell face downwards in the water and appeared unconscious. Shortly after, he disappeared beneath the sea surface. His body was not recovered.

The Lessons

1. The first lesson in basic seamanship is to make sure that all loose gear is stowed securely when at sea. This should be done before sailing but, if for any reason it cannot, steps to do so must be taken before facing any situation where rolling can be anticipated or the vessels movements are likely to be unpredictable. Securing for even the shortest time underway is common sense.
2. Lifejackets were available to the crew but, as so often happens in the industry, were not worn because they were considered too bulky to work in. Few, very few, fishermen would ever consider wearing a lifejacket, but there are many varieties in production today that are comfortable to wear, are practical and save lives. If you drown, you will be leaving behind your mates, family and a community to mourn. Why make them suffer?
3. A man overboard is one of the most frightening and alarming events to happen at sea. The first and most obvious lesson is dont let it happen in the first place. The second is to ensure the man can remain afloat with his face above water until he can be rescued, the third is to keep him in sight at all times, and the fourth is to recover him with the minimum delay. The MAIB investigates many instances where people appear lifeless within two or three minutes of going over the side. Although there have been one or two cases where people have remained alive for much longer, the average time for survival is measured in minutes and can be significantly less than the theoretical tables would indicate.
4. The problem a skipper has to face is deciding how to recover the man from the water, especially when he is face down and possibly unconscious. Throwing a lifebuoy to, and shouting at, a victim has

limited prospects of success. He will almost certainly be in a state of shock, probably hyperventilating, losing body temperature fast and will, almost certainly, be exhausted within seconds. He will not be in a position to do much to help himself. The surviving crew must therefore go to his assistance.

5. The essentials for man overboard recovery are: speed of action, a means of hauling the victim on board without him having to do anything, an anticipation that he will be twice as heavy and awkward as expected, and the provision of first-aid and help as quickly as possible. If all of these actions can be met, there is a chance the victim will survive. If not, the outcome could be similar to what happened in this incident.

6. But how do you get him on board? The only person who can decide the best way is the skipper. He will know his boat and his crew. The thoughtful one will consider the matter and make the necessary preparations. Assuming the vessel can be manoeuvred near the man, the overriding priority is to get a line or, better still, a strop under his arms. Achieving this will not be easy and could provide the basis for a useful discussion in the main cabin. Options vary from putting another man in the water (is there a wetsuit onboard?) to climbing down a ladder. It is then necessary to hoist the man so he can be pulled over the bulwarks or through an opening in them without injuring him further. It follows that the point of purchase must be higher than the highest point he has to be lifted to. If for any reason the man can help himself, it is a bonus. It should never be taken for granted it will happen on the day. Dedicated retrieval equipment should also be available.

Footnote

Since this unfortunate accident, the owners of the vessel have fitted aluminium rails around the working deck and the crew now wear single chamber self-inflating lifejackets at all times when working on deck.

Case 15

Lone Fisherman Lost Overboard

Narrative I

A 6.80m potter was discovered by another fishing vessel 4 miles south-east of Eastbourne with no one on board.

The weather at the time was calm with a slight sea and good visibility.

The vessel was found with the main engine and autopilot engaged, a fleet of pots outboard and one pot wedged in the rail. But there was no sign of the sole occupant.

A detailed search and rescue operation was carried out by the emergency services, but the body of the casualty was not found.

The victim had over 12 years fishing experience but was not thought to be wearing either a buoyancy aid or safety line.

Narrative II

The skipper/owner of a 7m Poole canoe (a flat bottomed boat, similar to a punt, used for eel and general fishing, mostly within the confines of a harbour) had just set sail from the dockside at Poole when he fell overboard.

Although he was in the water for only a few minutes before being picked up by another fishing vessel, he was pronounced dead by the time he was landed.

He was not wearing a lifejacket or buoyancy aid.

The Lessons

These incidents highlight the dangers involved in single-handed fishing vessels.

1. It is ill-advised to put to sea single-handed. If you have an accident there will be no one immediately available to offer assistance. If you fall over the side there will be no one available to inform the rescue services, and your chances of survival will be slim.
2. If you do put to sea single-handed, always wear a safety line whenever possible, especially when working fishing gear. This will prevent you from falling overboard.
3. Always wear a lifejacket or buoyancy aid, no matter how awkward or cumbersome it may seem. If you do go over the side, it will help save your life.
4. Always let somebody know your movements. Keep in regular contact with other fishing vessels while at sea. This way the alarm can be raised if your expected movements or call is overdue.

Case 16

Crew Member Dragged Overboard and Loses his Life

Narrative

The seine net fishing vessel *Ajax* was shooting her gear for the last haul of the evening. The skipper was in the wheelhouse, two crewmen were tending the rope reels forward, and two others were positioned aft preparing to shoot the net which was stowed, as usual, in the forward of two net bins.

The weather conditions were favourable, with a slight sea and good visibility.

When the starboard side ropes were fully shot, the skipper eased back on the main engine rpm so the sweeps could be clipped to the ropes by a crewman positioned aft. Once done the skipper increased engine revs so the sweeps and net would run free from the net bin and over the stern of the vessel.

The sweeps were running free, until a shackle which was being used to attach an extension to the headline sweep, snagged on the upper lip of the net bin. One of the crewmen jumped into the net bin to clear it, but the snagged shackle cleared itself and a bight of the remaining sweeps, which were now running free, caught round his leg. The weight of the shot ropes, and the forward motion of the vessel, dragged him overboard. He was not wearing any form of lifejacket.

The alarm was raised immediately. The skipper came hard astern on the main engines to enable the net to be unshackled so he could manoeuvre freely. Three lifebuoys with lines attached were thrown to the casualty, who managed to pass his arm through one of them but, as the crew started to heave it in, his arm slipped and he began drifting away.

One of the crewmen then jumped into the water and swam towards the casualty. He managed to get hold of him and pull him back alongside the vessel, but although only a very few minutes had elapsed since he went over the side, the victim was showing no sign of consciousness. The crewman who had gone to his rescue was, by now, also very weak and having difficulty in keeping the casualty's head above water.

The skipper then went into the water with a safety line attached, and managed to get a lifting strop first around the casualty, and later around the crewman. With the aid of the gilson all three were lifted aboard.

Although the victim showed no sign of life, cardio pulmonary resuscitation (CPR) was carried out immediately and the emergency services alerted. A rescue helicopter was scrambled with a medic on board.

When it arrived the casualty was examined and then airlifted off. Although CPR was maintained throughout the flight ashore, the casualty was pronounced dead on arrival.

The Lessons

1. This unfortunate accident could quite easily have been avoided. Fishing gear often becomes snagged on some part of the vessel while shooting, and many fishermen have inadvertently put themselves in danger by trying to free the snag. But this incident highlights well known lessons. Always keep clear of any fishing gear while it is being shot. If the gear snags, inform the skipper so he can take the weight off the gear. The snag can then be cleared without danger. A torn net or broken rope can always be repaired later.

2. Even the most experienced and agile fisherman will occasionally do something he would privately admit was pretty silly. One of the best safeguards is for a colleague to warn him, probably in no uncertain terms, that what he is about to do, or is doing already, is unsafe. Everyone in the close-knit community of a fishing vessel should be constantly alert for the hidden danger that might affect a colleague.

3. No matter how awkward or cumbersome they may seem, always wear a working type lifejacket or buoyancy aid when on deck. If you go over the side, it may well save your life. The lifejacket will give you a realistic chance of being recovered alive.

4. Tossing a lifebuoy to someone in the water is a sensible first step; it provides an essential means by which a man overboard can keep himself afloat. But exercise extreme caution when trying to pull someone along by it. Hanging on to a moving lifebuoy is infinitely harder than it looks. If the victim cannot help himself, some means of getting a strop around the body must be sought. Ideally this strop will be the same means by which he is lifted back on board.

5. Recovering a man overboard is very much harder than anyone ever visualises. He will most likely be very cold, extremely tired, weighed down by water-logged clothing and almost certainly unable to help himself. Body temperature falls fast and even the fittest person becomes exhausted within a short period of time, so speed of any recovery is essential. Although there are some well documented cases of people surviving immersion in the water for several hours, the MAIBs experience is that survival time is generally measured in minutes rather than hours.

6. Every skipper should think about how he would recover a man overboard from his boat. The conscientious skipper will carry out manoverboard drills on a regular basis and have an effective system for retrieving casualties from the water.

7. The action of the two crew members who went into the water to help the man overboard was commendable. But it almost resulted in another casualty. Jumping into the sea is a very risky business, especially if not prepared for it. It should be undertaken only when absolutely essential, and then only with the aid of a safety line and a lifejacket. If a wet suit is available, a rescuer would find his task much easier if he wore it.

Part 5

Keeping a Good Lookout

WATCHKEEPING

Anybody entrusted with keeping watch in a fishing vessel is responsible for the safety of the vessel and all on board. There are many, too many, instances when an accident has occurred because the watch has either been inadequate or non-existent.

We are aware of situations when everyone joins in to stow fish before setting off to land the catch and a lookout is temporarily abandoned. The wheelhouse is left unattended, and the vessel sets off with the autopilot doing all the work. The problem is that somebody else in another vessel might be doing exactly the same thing. The consequences are predictable.

Another more common problem is associated with keeping awake while homebound after a tiring trip. We have seen several instances of people falling asleep while on watch because they were so exhausted. This is a very real problem and difficult to overcome unless a conscious decision is taken to ensure that those keeping a watch in such circumstances are given an opportunity to rest before taking over. Even a short catnap is better than nothing at all.

But the problems are not confined to the passage home. We have evidence of some fishermen believing that the mere presence of fishing lights and deck working lights is enough to provide blanket protection when fishing. The Rules state quite categorically that a fishing vessel engaged in fishing has right of way. "I can," so the reasoning goes, "relax; the other man will keep out of my way." This assumes two things: first that the other man has seen you, and secondly, that he takes the correct action to avoid collision. We do not live in a perfect world, and we have compelling evidence that in too many instances the man onboard the other vessel isn't keeping a proper lookout himself, and sometimes leaves avoiding action until far too late.

Unless the fisherman takes sufficient action to avoid a collision, he too could be the next casualty in a collision statistic. To take such action as will best avert a collision he, too, must be keeping a good lookout.

The favourite story still circulating within the Branch, is of an outbound fishing vessel running into the side of an anchored oil tanker one Saturday afternoon. The reason? The watchkeeper was watching the cup final on the wheelhouse TV.

NAVIGATION

In this age of the Global Positioning System (GPS), the navigation plotter and the electronic chart, it is all too easy to forget, or ignore, the traditional methods for safe navigation. Fishermen are not alone in having absolute confidence in their instruments, but there have been many instances where this confidence is misplaced.

Electronic aids can be misleading. They can fail, or suffer from a temporary power failure and lock back in with a built-in misalignment. A waypoint can be entered in error. The course selected without reference to a chart, might dictate that the vessel steams straight into a charted reef. Even the most basic checks such as taking a fix using alternative means, will prevent a grounding.

Case 17

Fishing Vessel Grounds due to Fatigue of Watchkeeper

Narrative

Jenmar, a 20.46m long wooden seine net fishing vessel was returning to Mallaig at the end of a ten day fishing trip when, at 0325 on 19 May 1997, she grounded on the Island of Muck. She was refloated with the assistance of another fishing vessel and was subsequently able to complete the passage to Mallaig. There was no pollution and there were no injuries as a result of the accident, but *Jenmar* suffered damage to her keel and forefoot.

The vessel grounded because the sole watchkeeper had fallen asleep and had consequently failed to navigate the vessel safely between the Point of Ardnamurchan and the Island of Muck. It is likely that he had been asleep for about 30 minutes before the grounding. Secondary causal factors include fatigue after several long and physically demanding days of work, and the inadequacy of the wheelhouse watch alarm.

On average the longest period of undisturbed sleep by any of the crew, had been about five hours in any 24 hour period. Typically a deckhand was able to achieve this two nights in every five. On the other nights he benefited from only three or four hours sleep in total, sometimes divided into two periods.

The young man entrusted with the safe navigation knew he was tired and short of sleep. He could have called one of his older and more experienced colleagues but was very reluctant to do so. They, too, were tired and in need of sleep.

Having taken over the watch he settled to the normal routine sitting in the comfortable chair immediately abaft the wheel. He found it extremely difficult to stay awake. It was in the middle of the night, he had been deprived of sleep and he faced the tediousness and loneliness of watchkeeping. There was the steady vibration from the engine turning at 1,600 rpm, a constant background noise and the natural movement of a vessel at sea. The inevitable happened and he fell asleep. He woke with a start when the vessel ran aground. So did everyone else on board.

The skipper had fitted a watch alarm which was activated whenever the autopilot was switched on. After seven years of trouble-free and effective operation he had placed faith in its ability to operate correctly and wake anyone who had failed to cancel it, perhaps because they had inadvertently fallen asleep. On this occasion the sleep of the 18 year old watchkeeper was so deep that he failed to hear the watch alarm when it sounded in the wheelhouse. Nobody else heard it either.

The Lessons

1. The simple explanation for this accident, is that a young watchkeeper fell asleep in the middle of the night and failed to make a course alteration. But the underlying causes go much deeper. He was very tired indeed. Sleep deprivation among fishermen is all too common. It usually catches up with them when they are returning to port to land their catch. The last night at sea is often the first time they can enjoy any degree of uninterrupted sleep after a very busy few days. But someone has to do the watchkeeping, and the danger of falling asleep on that last night is very real. Skippers should be very conscious of the potential problem and give careful thought to ensure their watchkeepers are adequately rested before taking over.
2. A very tired man sleeps very heavily indeed. A watch alarm is not guaranteed to wake him.
3. The provision of a watch alarm must not persuade skippers to ignore the requirement to ensure that a watchkeeper is adequately rested prior to commencing duty.
4. A watch alarm should be audible to everyone on board so as to be effective in situations where a sole watchkeeper fails to respond.

5. No matter what the social consequences, a watchkeeper realising he is likely to fall asleep must alert another member of the crew to the situation. The one certainty about feeling sleepy is that you are aware of it. If you find yourself struggling to stay awake, stand up. And if you are still struggling, tell someone.

Case 18

Fishing Vessel Runs Aground after Wheelhouse is Left Unattended

Narrative

The 19m trawler *Valhalla* was inbound for the port of Lerwick to land her catch.

After the final tow, the skipper engaged the main engine at half speed and set the autopilot to take the vessel south, off the west coast of Whalsay.

As the last haul of fish was large, the skipper and the crew were eager to process and stow the catch before arriving in Lerwick. With this in mind the skipper decided to give a hand on deck. Before leaving the wheelhouse, he carried out a check both visually and by radar to ensure he was clear of traffic.

The skipper was on the deck for approximately one hour. During this time he returned to the wheelhouse a number of times to check the vessels progress, but failed to note the strong tidal currents in that area. Ten minutes after his last visit to the wheelhouse, *Valhalla* ran aground on the Outer Holm of Skaw.

Later, with the aid of another fishing vessel, she was refloated successfully with minimal damage. She proceeded to Lerwick for repairs.

The Lessons

1. The temptation to leave the wheelhouse unattended for just a few minutes to lend a hand stowing fish is very great. It has been done many times in the past and, generally speaking, those responsible have got away with it. It is manifestly dangerous and breaks every rule in the book. The lesson is clear: dont do it. In this instance the consequences were not particularly serious, but next time it could be a collision with loss of life, or a grounding that results in a total constructive loss. Either of these consequences can be avoided by heeding the lessons of this incident.
2. When navigating in shoal waters, and especially in a narrow channel, a vessel should be in manual steering with a dedicated helmsman.
3. No matter how well you know a particular passage or area, a passage plan should always be drawn up. Currents and tidal streams can usually be predicted and allowed for when selecting a course to steer. Thereafter good seamanship demands that a constant check be kept on the vessels progress. This cannot be done if the watchkeeper is stowing fish on deck.

Case 19 Collision between Two Fishing Vessels

Narrative

In this incident two fishing vessels collided in good visibility in the North Sea.

The 23m pair trawler *Constant Faith* sailed from Peterhead at 1200 bound for the fishing grounds at Lingbank and, once clear of the harbour, set a course of 080°. Her navigation equipment included two relative motion radars.

Two watchkeepers were on duty at 2330 when they visually detected another vessel about 30° on the port bow. The watchkeepers concluded she could not be on a steady course or bearing because they could see alternating sidelights. No attempt to plot the other vessel was made; she could be seen visually and they considered that no risk of collision existed. No compass bearing was taken. There were several well lit oil platforms in the vicinity.

The watch changed at midnight with the mate and another crew member taking over. The handover included a brief on the other vessel which was now at a range of 2 miles but still 30° on the port bow. The offgoing watch left the wheelhouse.

Turning his attention to the oncoming vessel, the mate looked at her masthead lights and assumed she would pass clear to port. On this basis he judged that a risk of collision did not exist.

Shortly afterwards, the engine room bilge alarm sounded, prompting the mate to leave the wheelhouse to investigate. Before leaving, he informed the junior watchkeeper that the navigational situation was clear.

Having been told that all was well, the junior watchkeeper turned his attention to taking a scheduled shipping forecast and went to the rear of the wheelhouse to tune the radio. Then he turned round and was extremely surprised to see a green light very close on the port bow. He then heard a blast from a ship's horn.

Before he could take any avoiding action, the two vessels had collided.

It was later established that the other vessel was the Danish purse seine net vessel *Stromnes*, looking for herring but not actually fishing. She was correctly exhibiting the lights for a power driven vessel underway. The watchkeepers in *Stromnes* did not detect *Constant Faith* until the last minute.

Both vessels were damaged. *Constant Faith* sustained heavy damage to the port bow and stem, and flooding of the forepeak and fish room spaces. *Stromnes* was only slightly damaged, and after offering assistance to *Constant Faith* she stood by until pumps arrived from the rescue services. She then continued with her passage.

Constant Faith managed to control the flooding with the aid of the pumps and was escorted by the rescue services to Fraserburgh where repairs were carried out.

The Lessons

1. This incident is all about keeping a proper lookout. The watchkeepers in *Constant Faith* saw the other vessel, but did not realise a risk of collision existed. Those on board *Stromnes* didn't see the other vessel until collision was inevitable.
2. The mate on *Constant Faith* was unwise to assume that the Danish vessel would pass clear by appraising her masthead lights alone. The fact that *Stromnes* was showing alternating sidelights and was not on a steady course should have given cause for concern. The vessel should have been monitored at all times which would have allowed ample time to take appropriate action had it become necessary.

3. Being the only qualified person on watch, the mate was very unwise to leave the wheelhouse with another vessel so close. This step was compounded by his verbal assurance to the unqualified watchkeeper that the navigational situation was clear when it manifestly was not. Had anyone left the wheelhouse at that particular moment it should have been the junior watchkeeper.
4. The precise circumstances of what happened with *Stromnes* has not been established but quite obviously her two watchkeeper failed to see *Constant Faith*. It is known they were searching for herring. We do not know what they were concentrating on but the fishfinding VDUs were below the level of the wheelhouse windows.
5. When operating in the vicinity of oil platforms at night, any lookout has to be especially vigilant. Identifying other vessel lights against a backdrop of platform lights is not easy and radar displays can be cluttered. Nothing should distract watchkeepers from maintaining a good lookout.

Case 20

Lack of Lookout Leads to Collision in Fog

Narrative

A 14.5m gill netter was approaching her intended fishing grounds in the North Sea. The time was shortly before 0200, the weather was calm with fog; the vessel was steaming on a course of 275° at a speed of about 7 knots and showing the lights of a power-driven vessel under way. She was not equipped with a radar reflector.

The skipper, who was alone on watch, was aware from monitoring his VHF radio that beam trawlers were operating in the area. He observed a radar echo cross ahead from starboard to port at a range of 2 miles. He also observed a further five or six radar echoes to the north at ranges of between 4 and 5 miles. He interpreted the echoes to the north to be beam trawlers towing in a westerly direction and the crossing echo ahead to be a beam trawler towing in a south-easterly direction.

The skipper then put the propeller out of gear. Once the vessel had lost way, he switched on two all-round red lights in a vertical line and switched off the steaming lights. He also switched on additional decklights and a floodlight in way of the hauler before going below to call his crew to prepare for fishing. Before leaving the wheelhouse, he saw that the range of the radar echo of the beam trawler on the port bow was more than 3 miles and assessed that she was now towing in a south-westerly direction.

After leaving the wheelhouse, the skipper went to the forward cabin, lit the gas range and boiled a kettle of water, which took between 5 and 10 minutes. He then called the crew, made a cup of coffee for himself and returned to the wheelhouse. A few seconds after his arrival in the wheelhouse, a 37m beam trawler, which had been trawling on a heading of 250° at a speed of 6 knots, collided with the gill netter.

It is hard to determine which of the two skippers was the more surprised. Although the gill netter was stopped in the water, was showing not under command lights and had several working lights switched on, the trawler ran into her. The beam trawlers skipper had seen the radar echoes of two other vessels in the vicinity but not that of the gill netter. The fact that he collided with the other vessel also suggests he was not looking out of the wheelhouse windows.

After the collision, communications between the two vessels were established on VHF Channel 16. An internal inspection of the gill netter revealed a small leakage in the forward cabin which was contained effectively using the available manual bilge pump.

The Lessons

1. The collision occurred due to the fact that no avoiding action was taken by either the gill netter or the beam trawler. The watchkeepers in both vessels were unaware of the presence of the other and neither had any appreciation that risk of collision existed. In other words, no proper lookout was being kept by either vessel.
2. Although the skipper of the gill netter had assessed there were no vessels in the immediate vicinity and that it would be safe for him to leave the wheelhouse unattended temporarily, his assumption was based on the radar information presented at that time. He further assumed that any approaching vessel would keep out of the way of a vessel displaying not under command lights. He appears to have ignored the prevailing poor visibility while his lack of a radar reflector was a factor he had clearly overlooked.
3. The prolonged absence of the gill netter's skipper from his wheelhouse was potentially disastrous. Not only did it result in his failing to keep a good lookout (a proper lookout must be kept from every vessel under way, even when stopped and making no way) but his decision to display the lights of a

vessel not under command because he had gone below to boil the kettle and call his relief was a gross abuse of Collision Regulation privilege. Marine Guidance Note MGN 25 (M+F) draws attention to the increasing use of not under command signals by vessels which are not restricted in manoeuvring through some exceptional circumstance. It also draws attention to the requirement for such vessels to adhere to their collision avoidance responsibilities.

4. The skipper of the trawler failed to maintain an effective visual lookout and probably failed to maintain a proper radar watch. Although the smaller fishing vessel was well-illuminated, the range of visibility was poor and it is probable that the skipper of the trawler was relying upon his radar to detect other vessels.

5. The provision of a radar reflector might have enabled the gill netter to be detected by the skipper of the trawler in sufficient time for effective avoiding action to be taken. (Merchant Shipping Notice No M.1638 recommends that all fishing vessels should be fitted with an approved radar reflector in order to enhance their detection.)

6. No sound signals were made by the gill netter nor did her skipper hear any sound signals from the trawler. Sound signals must be made by every vessel when visibility is restricted.

Footnote

MAIB Inspectors often ask skippers of fishing vessels whether they ever read M Notices (or MGN Marine Guidance Notes as they are now known). In many instances skippers are refreshingly honest and admit they do not. On the basis of an admittedly limited survey it seems as if the MGN notice system is not an effective means of conveying important safety related information to the fishing community. The MAIB has raised the matter with the Maritime and Coastguard Agency (MCA) and recommended it reviews its methods of promulgating advice and guidance.

The MAIB does, however, remind skippers that such notices have been produced to help skippers operate their vessels safely. Ignoring them is a dereliction of responsibility.

Part 6

Machinery Maintenance

A properly run fishing vessel will be well maintained. Machinery will be inspected at regular intervals, and time expired components will be replaced promptly. Engines, winches and steering gears will be tested before use. Only the correct lubricants and fuels will be used.

The three cases in this section illustrate the types of accident caused by dirty oil filters, dirty fuel, and a material defect in the steering gear. All of these accidents could have been avoided if more care had been taken.

Regular maintenance is an essential part of a safe and well-managed fishing vessel. Not only should equipment manufacturers instructions and advice be followed, but a careful, systematic and regular inspection of all control and alarm systems should be carried out.

You would not take your car on a long journey without making sure it was in a reliable condition, so why take risks with your fishing vessel? There is no AA or RAC to call on when you are 100 miles off the coast!

Case 21

Fishing Vessel Runs Aground after Main Engine Failure

Narrative

The 24.5m fishing vessel *Aalskere* was returning to Kirkwall from the fishing grounds west of the Orkney Isles.

A course was set via the Westray Firth, round Kili Holm then south past Egilsay, Gairsay, and through the channel to Kirkwall. The vessels route through the Westray Firth was plotted on the video plotter.

The skipper took the first watch. The mate/engineer made the normal checks in the engine room on the oil/fuel pressures and levels and joined the skipper on watch in the wheelhouse. The remainder of the crew turned in for some sleep prior to reaching Kirkwall.

After rounding Kili Holm in a position approximately 0.5 mile south-east of Mae Ness Point on Egilsay, the main engine began to falter and, after a short period, stopped. The mate/engineer went down below to investigate.

After informing the skipper that a problem with the fuel system was suspected he by-passed the water trap filter, changed over duplex filters on the in-line fuel supply and tried to restart the main engine. He was unsuccessful. He then proceeded to replace the three main engine filters.

The skipper instructed the remainder of the crew to shackle up the trawl doors, and lower them to provide a form of anchor to offset the tidal stream which was setting the vessel onto Mae Ness point.

Before the planned actions were completed, *Aalskere* ran aground. Some 15 minutes had elapsed since the engine stopped.

There was no interior damage or flooding. Once the filters had been changed and the fuel system bled, the main engine was successfully restarted. Using astern power she was refloated with the aid of the Kirkwall lifeboat.

The filters had not been changed for seven weeks prior to the accident.

The Lessons

1. Skippers navigating in confined waters rely on three things, accurate navigation, a good lookout and reliable engines. Remove any one of these ingredients and there is potential for the vessel to go aground. The damage in this instance was only minimal. Next time it could be much worse, so what went wrong?
2. The main engine failed due to fuel starvation caused by dirty fuel oil filters. Always ensure that you have an adequate maintenance procedure in place which includes the regular changing of all main engine filters. It should also embrace the regular drainage of water and sludge from the main fuel oil storage tanks.
3. When navigating in narrow channels or close to the shore, good seamanship dictates the engine room be manned and the anchor ready for letting go.

Footnote

The MAIB is aware that in many fishing vessels the anchor is rarely, if ever, used. It is often found to be very well secured and obviously untouched over lengthy periods. Skippers should reflect that in extremis it is the one item of equipment that may prevent a vessel from drifting ashore. Before any anchor is used skippers should know the length of cable attached and be sure the inboard end is properly connected in the chain locker.

Case 22

Dirty Fuel Disables a Fishing Vessel

Narrative

An under 10m fishing vessel bunkered from a 45 gallon drum on the quayside, before sailing for the fishing grounds. Shortly after leaving, the main engine stopped. On investigating the cause, the skipper found the water trap and fuel filters were full of water. As the sea conditions were reasonably calm, the water was drained and attempts made to re-start the engine.

When the engine failed to start, a further investigation found the lift pump used to transfer fuel from the tanks to the engine had become choked with dirt. The skipper managed to partially clear the pump but, with the weather deteriorating, felt it prudent to advise the coastguard of the problem.

While the coastguard organised a tow by the local lifeboat, the skipper managed to keep the engine running sufficiently long to reach the lee of the land. The lifeboat arrived shortly afterwards and towed the fishing boat some 2 to 3 miles into port.

The Lessons

1. When taking fuel from drums stored on the quayside, care must be taken to check that water and dirt has not entered the drum during storage. As water will sink to the bottom of the drum during storage, test the outflow for water content prior to filling the vessels fuel tanks.
2. When filling the fuel tanks, make sure a fine filter is in the filling line to ensure that any dirt in the drum is prevented from entering the vessels fuel system.
3. Do ensure that the fuel system, including the fuel tanks, are cleaned on a regular basis. Dirt in the fuel system acts as a grinding paste and can cause an increased rate of wear in the engine.
4. Do advise the coastguard if you suffer any kind of engine failure, even if you are able to clear the problem, given time. Early warning of a possible problem can be a life saver!

Case 23 Steering Failure

Narrative

While going about his normal business, the skipper of the small fishing vessel *Gillian S*, suddenly found he had no steering after the casting around the tiller arm had fractured. He had to be towed in by lifeboat.

This 7.62m fishing vessel was approaching turbulent sea conditions off Portland Bill when the skipper decided to change from autopilot to hand steering. Shortly after he changed over, he became aware that control of the steering had been lost. He immediately notified the coastguard, who arranged for the local lifeboat to tow him in. While waiting for the lifeboat, the skipper checked the steering gear and found that the cast aluminium alloy tiller arm secured to the top of the rudder post had developed a vertical fracture around the tiller keyway, and that a large section of the casting had broken away. This allowed the key, locking the tiller arm to the rudder post, to come free, leading to complete loss of rudder control.

After arrival in port, the aluminium alloy tiller arm casting was inspected and the following found:

- Mechanical damage running up the inside face of the casting for a distance of about 25mm and about 10mm wide (the approximate width of the key) with a tapering depth from zero at the base to 0.5mm at the top. This damage ran parallel to the keyway.
- A 10mm crack on the remaining body of the casting running along the bottom of the keyway and extending backwards through the main casting into the tiller arm itself.
- A narrow wedge shaped piece, approximately 48mm long and 15mm wide, had broken away. Discoloured edges where it met the side of the keyway suggested the cracks had developed from the base of the casting upwards, along the bottom corners of the keyway and into the body of the casting.
- A large triangular section of the casting had broken away. The top of the keyway side forming part of the triangular section had mechanical damage with heavy lip, surface cracking and indentations.
- Both the main body of the casting and the triangular section had significant sections of internal porosity adjacent to the working surface of the tiller arm/rudder post interface. In short there was a lot wrong.

There appear to be two parts to the story of this casting failure:

1. the development of a crack in the tiller arm,
and

2. the fracture of the casting itself.

The mechanical damage seen in the bore of the main casting was probably due to casting fragments breaking away from the keyway area and becoming wedged between the rudder stock and the casting.

The origin of the crack in the tiller arm was most probably due to poor fitting of the tiller arm locating key in the keyway. This looseness of the key allowed the key edges to "roll" into the bore of the tiller arm, setting up a wedge between the tiller bore and the rudder post. Once established, normal operational movements of the tiller and rudder would cause rapid local wear and increased stress levels.

The bore face of the tiller arm, although showing no visible evidence of casting porosity, had a number of "in hole" defects very close to the working face. It is likely that with high stress levels

developing at this working face, material breakdown occurred with small particles breaking off and forming wedges between the rudder post and the bore face of the tiller arm.

A combination of a loose key and local weakness in the bore face due to porosity, resulted in the failure of the casting due to increasing movement between rudder post and tiller arm. This increasing movement, and the rising stress levels brought about by this movement, eventually led to a torsional failure of the tiller arm casting.

The Lessons

1. The fitting of keys in keyways requires care and the use of good fitting practice. Keys should be a good fit in both the drive and driven keyways. They should be the correct length and thickness for the keyways, with the ends rounded and all surfaces smooth. The keyways should be undercut at the corners, and all stress raisers removed.
2. Keys and keyways are often seen as "a small part of the whole" but they are a vital part, and failure here often results in total failure of the machine and the loss of control.

Footnote

This narrative has a distinctive engineering flavour to it and has been included to remind fishermen that like their big ship brethren, material defects can often occur at the most inconvenient moments. Most fishermen take a keen interest in the repair and maintenance of their craft. This incident should heighten their awareness of the problems caused by the poor fitting of a tiller arm locating key.

Case 24

Lifesaving Appliance Shortages Cost Lives Again

Narrative

This accident involved the 6.5m wooden open boat *Pentland Spray*, engaged in creel fishing around the Scottish Islands. She was built with a small wheelhouse forward and was equipped with a power hauler and inboard engine, but had no radio or bilge pump for her final voyage. Lifejackets and flares were carried, but not a liferaft. The vessel was considered to be in sound condition but had a persistent leak from the stern gland.

On an October morning her owner, and another man acting as crew, collected bait before heading to sea to recover some creels. They had expected to complete their days work by early afternoon. The vessel was sighted at sea later the same morning by another fishing vessel and an observer ashore. She was apparently returning to her berth but was not seen again.

Weather conditions at the time were no worse than force 3 or 4 and the sea conditions were moderate to present apparent difficulty. It appeared to observers, however, that she had very little freeboard.

When she was clearly overdue, the local lifeboat station was alerted. The subsequent SAR operation found nothing more than debris, identified as coming from *Pentland Spray*. Both men lost their lives.

The Lessons

Tragic accidents such as this occur from time to time. Establishing what happened in such circumstances is not easy and, in all probability, the precise reasons for her loss will never be determined. Nonetheless some lessons can be learned for others to heed.

1. A combination of the weight of creels on board and effects of water ingress via the leaking stern gland, could have reduced the vessels freeboard, making it susceptible to seas breaking over the side. Being an open vessel, any water taken over the bulwark would have to be pumped clear. With no bilge pump on board this would have been difficult. It has been concluded that had the leakage from the stern gland been stopped, free water might not have accumulated in the bilge and the boat might not have foundered.
2. Had there been an inflatable liferaft on board both men may have survived.
3. Had a radio been carried both men might have been able to call for help.

Case 25

An Experienced Fisherman Drowns

Narrative

Shortly after 0830 on 6 April 1998, a 5.5m dory left Criccieth harbour, north Wales, with one man on board intending to set pots to the west of the Dwyfor estuary. Weather conditions were good with light winds and low waves. The water temperature was about 8.5°C.

At about 0955 the Marine Rescue Sub-Centre (MRSC) at Holyhead received a report that an upturned boat had been sighted west of Criccieth. The RNLI inshore lifeboat was launched to investigate. The crew found the vessel upside down about 500m off the shore and with one green wader and a pair of waterproof over-trousers lying on top of the inverted hull. There was no sign of the occupant and a rescue helicopter from RAF Valley, and the Pwllheli RNLI lifeboat, joined the search for him.

He was found about a quarter of a mile north-west of his capsized craft, unconscious and face down in the water. He was recovered by the helicopter and taken to Ysbyty Gwynedd, Bangor. All attempts to revive him failed.

The initial cause of the accident is unknown, but the evidence suggests he fell overboard when preparing the pots for shooting. He was not wearing a lifejacket. He was, however, able to cling to the hull and may even have been in a position to climb back on board. In the process the craft either inverted or filled with water through the submerged drain holes until she lost stability and then capsized. At some stage he might have been able to climb onto the upturned hull where he removed his waders and overtrousers. Whether he removed them while on the hull or in the water is not known, but it is thought he took them off before attempting to swim for the shore.

The skipper was a well respected, competent and cautious fisherman with many years experience who knew the waters well. He held a boatmasters licence. He was one of 24 UK fishermen to lose his life in 1998.

The Lessons

1. Of all the types of fishing to take place in UK waters, single-handed operations are among the most risky. And every fisherman who earns a living this way knows it. There is little room for serious error and when anything goes wrong, the consequences can be severe.
2. Very sadly other fishermen are destined to drown in circumstances not dissimilar to this vessels skipper. Not one of them will have any foreknowledge of what could befall them. The one certainty is that they will be mourned by people who will ask "could it have been avoided?" Few will readily admit it, but the answer is yes.
3. Beware of low bulwarks and guardrails. On this vessel the bulwarks were about 500mm high and topped by guardrails to a safe height of 1m. But down the starboard side where the pots were shot away, the top of the bulwark remained at about 500mm or just below knee height. This is just the right height to trip someone overboard if caught off-balance. An awareness of this potential danger must encourage other precautions to be taken.
4. In such circumstances fishermen will realise that despite their experience, skill, qualifications, natural instincts and familiarity with their boat, they might go overboard. It is then far too late to start thinking about what might have been done to save them from their predicament. There is nobody to help them back on board. There is nobody, other than themselves to raise the alarm. They are very much on their own, very cold and probably very tired. As anyone knows who goes swimming from a boat, it is almost impossible to climb back on board unless you are extremely strong or there is some form of ladder. Every skipper should think through how he would climb back in the event of him being in the water.

5. Perhaps he will think about raising the alarm. But how? Is this the moment he would give anything for a personal locator beacon which he could activate? Or would mini flares suffice? Without either, the option is closed to him.

6. And then there is the cold. Sea water has a very rapid chilling effect. Theoretical survival times tend to overlook the shock effect, the break down in insulation and waves breaking over a face. Actual survival times are, with a few conspicuous exceptions, much less than the text books say. And yet, the wearing of thermal protective clothing can do much to maintain body heat and keep the victim alive.

7. And finally lifejackets. It will never be known exactly when this vessels skipper died, but the one option he never had was something to keep his face above water. Although the dory carried a lifejacket, it was in a locker and out of reach. Had the skipper been wearing a personal lifejacket at all times when he was at sea, he would not have had to worry about donning it in the event of an unexpected emergency. He would have had it on when he was thrown into the water, and he might have been alive today. The only thing we do know is that by not having it, he didnt even have that chance.

Case 26

Stern Trawler Capsizes during Trawling Operation

Narrative

A 10m steel fishing vessel was towing a stern trawl across well known fishing grounds. There were three crew on board; one was on watch and two, including the skipper, were in the forward cabin. The weather was good with easterly winds of force 4 to 5 and a 1m swell.

The vessel was heading into the wind, but there was a 3 knot stern current. Suddenly the vessel heeled over and veered to starboard. The skipper and a deckhand were thrown out of their bunks. The skipper rushed to the wheelhouse, only to find that the starboard windows were already under water, and water was entering the wheelhouse around the edges of the closed starboard door. The skipper managed to radio a brief "Mayday", and ordered the crew to abandon ship.

Because escape was impossible on the starboard, the crew had to leave via the port accommodation door. On their way through the accommodation they picked up their liferaft which was stowed inside. Arriving on the after deck they found that water was up to the door sill. The liferaft was launched but no-one thought to make the painter fast to a strong point, and by the time the skipper came to board it, it had drifted away from the sinking vessel. He had to swim some distance in the cold water before he could clamber on board the raft. The skippers "Mayday" had been heard and the raft was located from the air. Two hours later they were rescued by the local lifeboat.

It is probable that the starboard trawl door snagged on the bottom and the vessel capsized because she veered across the snagged trawl warp while still moving quickly ahead. This is known as "girting" and its dangers are well known to tug operators.

The Lessons

1. The chance of "girting" can be reduced if the towing point is as far aft as possible, ideally at the stern. The risk of capsizing from "girting" can also be reduced if the tow point is as low as possible.
2. The benefits of having a secondary means of escape are clearly illustrated in this accident.
3. Lifejackets were stowed in the accommodation, and in the rush to get out, none of them were collected. The crew lessened their chances of survival by not wearing lifejackets. It is sensible to have additional lifejackets stowed in the wheelhouse and other positions on board.
4. Stowing the liferaft inside the accommodation was not sensible. If she had heeled over to port the crew would not have been able to launch the liferaft, and they would probably have drowned. Remember, they were not wearing lifejackets. A liferaft is required to float free and automatically inflate if a vessel sinks. MGN 104 (M+F) (copy attached following Case 28) gives useful advice regarding stowing liferafts and rigging hydrostatic releases.
5. To launch the liferaft, without having first made the painter fast, was something that should never have happened, especially as all three of the crew had attended a basic sea survival course.
6. After the accident, it was found that the liferaft had not been serviced for at least two years, and because of this the ties to the canopy hood were pulled off and a flare could not be activated. All fishermen should ensure that liferafts are properly serviced; lives depend on it.

Case 27

Loss of Life Close Inshore

Narrative

Antrim Fisheries IV, an open top fishing boat had been launched down the slipway at Portrush, Northern Ireland, in choppy conditions and was approximately 25m offshore when a series of large waves struck on the beam and rolled her over. All three crew were thrown into the sea. Two regained their footings on a sandbank almost immediately and started to wade ashore. The third, who was somewhat older, surfaced by the upturned boat, but could only manage to cling onto it. One of the others turned back to assist him, while the third continued to wade ashore.

When only metres from the shore, this third man was swept off his feet in a fierce undertow, and dragged into deeper water. He surfaced briefly but was carried out to sea and drowned.

The other two managed to hang onto the boat, until with the aid of a piece of wood and a lifebuoy, they managed to get ashore.

The boat was recovered the same day with slight bottom and frame damage, but with the lower half of the rudder post broken. Despite an extensive search by a police diving unit, the body of the other young man was not recovered until some time later.

The Lessons

1. No matter how close inshore fishing boats work, or the number of times launching has been carried out, accidents can and do happen. In this case, the victim was wearing the proper wet weather gear but NOT a lifejacket.
2. The effect of tide changes and rough weather often results in unusually strong local currents and confused sea states. These currents are not always visible and are frequently flow close to the bottom. Large waves at the surface and strong currents on the bottom make for a very dangerous combination, particularly close to any rock formation.
3. Working close to the shore can introduce a false sense of security. Being able to swim is an advantage, but even the strongest swimmer will find it extremely difficult, and very tiring when fully dressed and in choppy seas. The arguments for not wearing lifejackets in the fishing industry are well known but are quite meaningless when trying to explain to the next-of-kin that a life could have been saved had one been worn. Wearing a lifejacket greatly increases the chances of survival.

Case 28

The Loss of a Fishing Vessel and the Stowage of Liferrafts

Narrative

A 16m fishing vessel had a crew of five. Her EPIRB and inflatable liferaft had been fitted with new HRUs, and the inflatable raft had been recently surveyed, repacked and reinstalled on board.

Several hours after leaving her home port, she was on passage to the skippers chosen fishing grounds when it was noticed that the engine room was flooding. The crew tried to stop the flooding by various means, but were unsuccessful. Eventually, the skipper called the coastguard for help.

A rescue helicopter and an RNLI lifeboat were quickly on scene, and the crew were taken off by lifeboat, but the skipper stayed on board until just before the vessel sank. He, too, was taken off by the liferaft. Although the vessel sank in deep water, her inflatable liferaft did not float free.

The Lessons

This successful rescue might have had a tragic ending had the rescue units not been on scene so quickly.

1. It is likely that the liferaft did not float free because it was incorrectly installed. This is not uncommon, and a recent survey has found that only 2 out of the 23 liferaft containers inspected on board fishing vessels were properly installed. Some of the most common errors are shown in the following photographs.



MGN 104 (M+F) gives some very clear diagrams on how painters and canister retaining bands should be connected to HRUs.

2. The skipper and, indeed, his crew should have checked the installation of the liferaft and the HRUs on both the liferaft and the EPIRB before sailing. It doesn't take much time and could save lives.

MGN 104 (M+F)

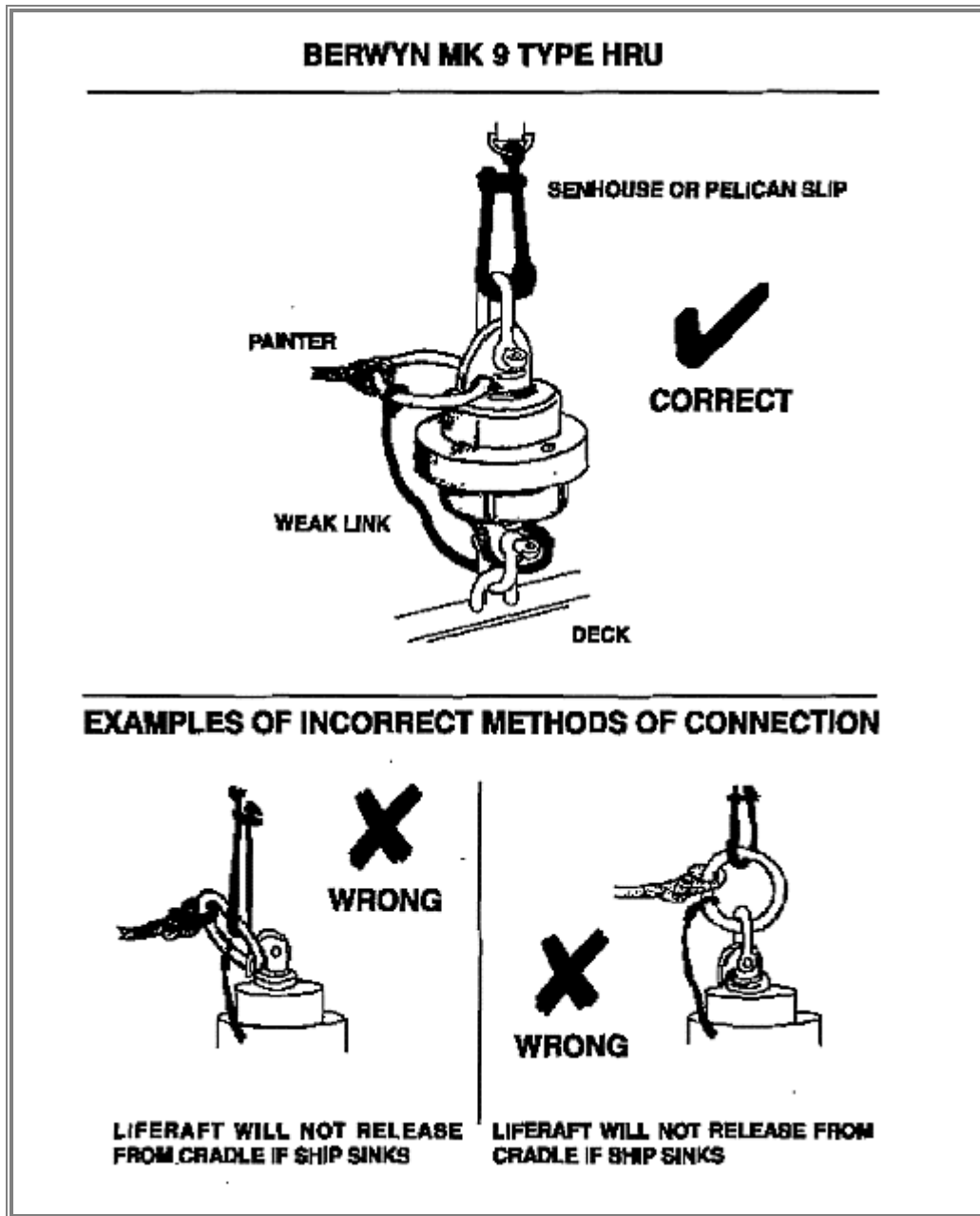
Stowage and Float Free Arrangements for Inflatable Liferrafts

Notice to Owners, Masters, Skippers and Crews of Merchant Ships and Fishing Vessels. This Note supersedes Merchant Shipping Notice No. M.1400

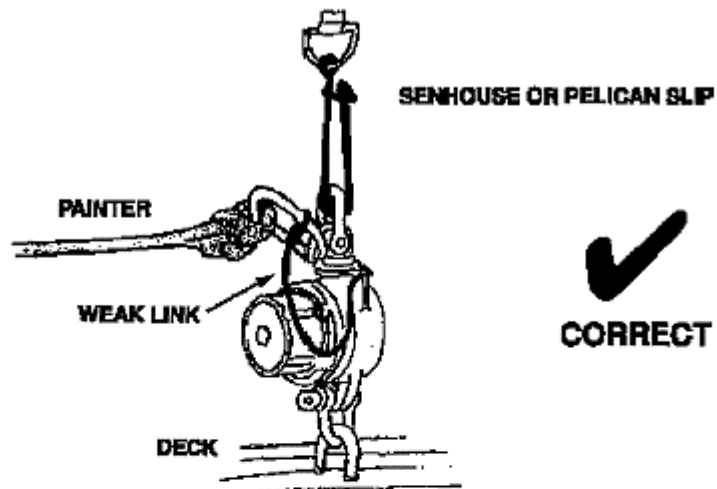
Summary

The purpose of this Note is to provide general advice and guidance on the securing, stowage and launching of liferafts, and the fitting of Hydrostatic Release Units - HRUs.

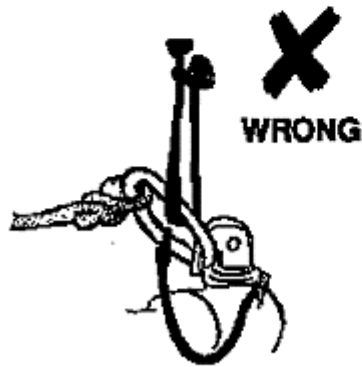
Appendix - Diagrams of commonly fitted HRU's



BERWYN MK 7 TYPE HRU



EXAMPLES OF INCORRECT METHODS OF CONNECTION

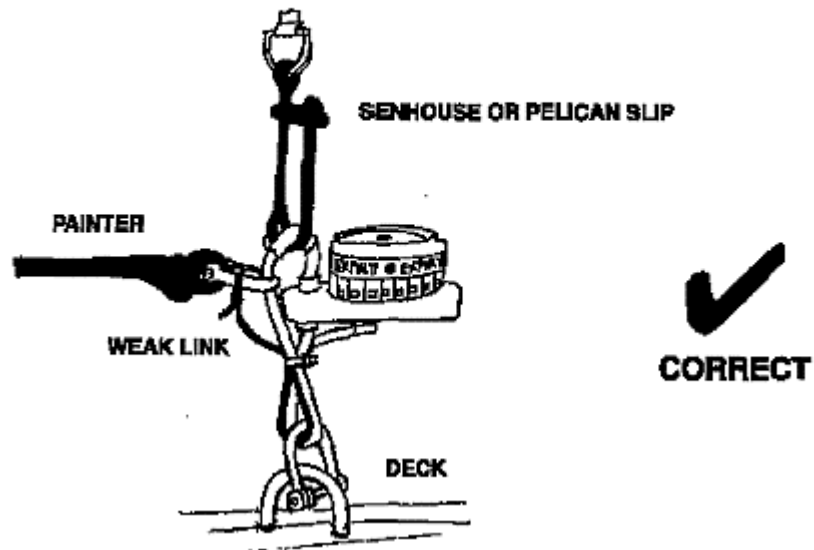


LIFERAFT WILL NOT RELEASE FROM CRADLE IF THE SHIP SINKS

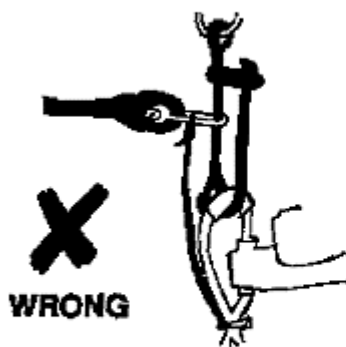


LIFERAFT WILL NOT RELEASE FROM CRADLE IF THE SHIP SINKS

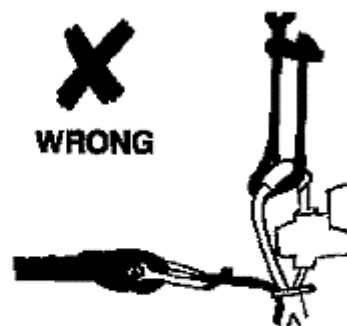
HAMMAR DISPOSABLE TYPE HRU



EXAMPLES OF INCORRECT METHODS OF CONNECTION

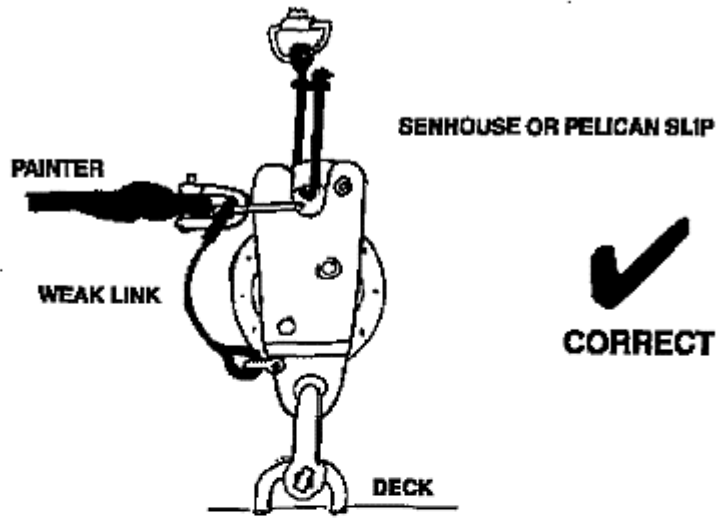


LIFERAFT WILL NOT RELEASE FROM CRADLE IF SHIP SINKS

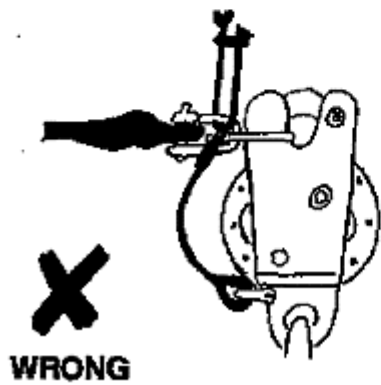


WILL WORK CORRECTLY ON AUTOMATIC RELEASE BUT THE LIFERAFT WILL ONLY BE SECURED BY THE WEAK LINK IF THROWN OVERBOARD - WEAK LINK MAY BREAK AND LIFERAFT WILL BE LOST

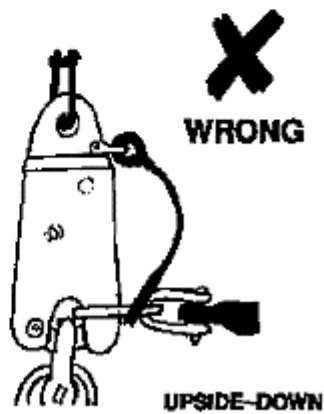
THANNER TYPE HRU



EXAMPLES OF INCORRECT METHODS OF CONNECTION



LIFERAFT WILL NOT RELEASE FROM CRADLE IF SHIP SINKS



MAY FOUL WHEN AUTOMATICALLY RELEASED

Case 29

Discharged EPIRB and VHF Batteries cause Problems

Narrative

The 20m wooden fishing vessel *Alliance*, with a crew of four, had been working only sporadically over several days during February due to poor weather conditions. Before the incident the vessel was in Amlwch, Anglesey, taking shelter from the bad weather.

Conditions eventually improved, and the vessel left port at 0530 for passage to her home port to land her fish. At 1000 the high level bilge alarm sounded. An inspection of the engine room confirmed the presence of a significant quantity of floodwater.

Over the next few hours both powered and hand bilge pumps were used with various degrees of success to control the ingress.

By early afternoon the skipper recognised he needed assistance. Efforts to broadcast a "Mayday" were unsuccessful due to lack of battery power for both main and portable VHF sets. Judging it as the only remaining method of summoning assistance, the skipper activated the EPIRB and placed it in the sea alongside the vessel at 1500. At about this time the engine driven bilge pump ceased to function and the main engine stopped; the drive belt to the alternator had slipped off earlier.

The first signals from the EPIRB were detected at 1529 but confined to 121.5Mhz; a reliable position for the EPIRB was not obtained until 1708. SAR operations were initiated and an MRCC accepted responsibility for co-ordinating operations at 1745.

The skipper and crew of *Alliance* transferred to an RNLi lifeboat at 2010 and the vessel finally sank at 0423 the following morning. There was no loss of life.

The Lessons

1. The start of SAR operations was delayed because the EPIRB failed to transmit on 406Mhz. This was due to its battery having insufficient power to operate on this frequency, which requires a higher output than does 121.5Mhz. In turn, the lack of battery power was due to the EPIRB being two years overdue for service and battery replacement. EPIRBs must be serviced at recommended intervals to ensure their correct functioning.
2. The vessels electrical system was effectively disabled very early in the incident. It is vital that all components of electrical systems, generators and batteries are maintained in good condition so that electrical power is available both for normal and emergency conditions.
3. *Alliance* carried a portable VHF set, as part of her LSA, together with a suitable battery charger. The VHF's battery was allowed to discharge, rendering this important item useless at the time it was needed most. It is clearly vital for VHF sets to be maintained ready for immediate use; otherwise they have no value.

Part 8

Conversions

The MAIB has found that a significant percentage of accidents occur shortly after an extensive refit, especially when extra top weight has been added, or the vessel has been converted from one type of fishing to another. Fishermen, more than any other seafarers, develop an instinctive feel for their vessel, and this is acknowledged as being a major contribution to safety. When this intimate knowledge of a vessel is undeveloped, perhaps because the skipper is trying a new technique, is working with an inexperienced crew, or has yet to develop a feel for how his craft handles at sea, the risk of an accident is significantly higher. An awareness of this phenomenon will do much to reduce the risks.

The owner or skipper is also very strongly advised to seek professional advice whenever he is considering adding topweight to his vessel. Ill-considered modifications can seriously affect stability.

Case 30

Capsize of Open Fishing Boat in Adverse Weather

Narrative

A 6m long grp open potting vessel, originally built to a standard design, was modified during construction and again by subsequent owners. The boat was seven years old, and had just been bought by her new owner. The vessel did not carry any lifejackets, buoyancy aids, lifebuoys, liferafts, EPIRB, distress flares or VHF radio.

One morning, with two people on board, she sailed to fishing grounds which were close inshore but exposed to the prevailing weather conditions. The crew had intended to move three fleets of pots to a more sheltered position.

The wind freshened during the day and the vessel was reported as overdue to the coastguard. An extensive land, air and sea search was mounted. Later the vessels upturned hull was found, but the two people on board have never been found. The hull was examined and was intact and in good condition both internally and externally. Two fleets of pots were seen close to the fishing grounds.

The Lessons

1. This is a case where a vessel was modified and deviated from a standard and tested design, such that the stability, reserve of buoyancy, and freeboard were less than safe. It is probable that two fleets of pots had been loaded on deck, reducing stability, and this, combined with the weather conditions was sufficient to capsize her.
2. There is little doubt that lives would have been saved if:
 - lifejackets or buoyancy aids had been worn;
 - an inflatable liferaft had been carried; and
 - some means to alert the emergency services had been carried.

Case 31

Poor Design of Working Arrangements Led to Death of Skipper

Narrative

The skipper and three crew were hauling a fleet of pots for only the second time since their 16m long vessel *Flamborough Light* had been converted from a stern trawler. While doing so, the main line came off the lead block, and jumped off the line hauler. The skipper, who was operating the hauler, was caught by the wrist and pulled over the side and into the water. The weight on the line dragged him under. He was never seen alive again.

Before the event, *Flamborough Light* had been drifting before a force 5 wind. At the time of the accident she had turned, causing the line to lead aft and under the vessel.

A thorough search of the sea surface involving a rescue helicopter, three RNLI lifeboats and the fishing vessel itself failed to locate the missing man. The skipper's body was subsequently recovered from the sea still attached to the fleet of pots.

The MAIB investigation concluded the accident occurred as a result of several shortcomings in the vessel's conversion from a stern trawler to a potter. Some of the working arrangements had been badly designed and the following features were found to have had a significant role in causing the accident:

- the line hauler had been sited too far from the lead block;
- the open lead block had been crudely converted from a wide-throated trawl block;
- there were no local engine and rudder controls sited near the hauler;
- nobody was assigned the duty of conning the vessel during the hauling operation, the engine was out of gear and the vessel had been left to drift;
- two of the crew were inexperienced fishermen which made it necessary for the skipper to take charge of the after deck instead of conning the vessel.

The Lessons

This accident was caused by a combination of circumstances that resulted in a fisherman losing his life. Accidents often occur in fishing vessels that have just been converted and before the new skipper has become used to its handling characteristics, equipment, stability and, quite possibly, his crew.

1. The origins to this accident occurred in the conversion process when all the implications of the modified design were not thought through. Furthermore the lead block was adapted to fulfil a function for which it was not designed and it failed to conform to an adequate level of safe operation.

When converting or re-equipping a fishing vessel, owners and skippers should take every care to ensure:

- the basic design of the boat is suitable for the intended purpose;
- any newly purchased or converted equipment is fully fit for the intended purpose;
- the advice of specialist professional designers or experienced specialist fishermen is sought on the layout of the working arrangements and on the vessel's future operation.

2. Until the converted vessel has been fully tested in its new mode of operating and any wrinkles ironed out, skippers should exercise even greater care handling her and have special regard for the safety of all onboard.

Footnote

The MAIB has noticed a tendency for accidents to occur in vessels which have just been converted from one type of fishing to another. A variation on this theme is when a new skipper and crew embark in a vessel with which they are unfamiliar. The evidence is still tenuous but lack of familiarity with a boat is a contributory factor to unsafe practices at sea. Perhaps more than in any other form of seafaring, a skipper with long experience of a single boat will develop a sixth sense for when something is not right. This is acquired over time and is rarely present when sailing in an unfamiliar vessel or one that has recently been converted.

Case 32

Loss of a Small Clam Dredger

Narrative

The small clam dredger *Equinox* was fishing about 2 miles west of the port of Ayr one evening. The weather was good with light airs and a slight sea. She was normally operated with a crew of two but, on this occasion, five were embarked. The fishing gear was shot and hauled twice without incident. On the third occasion the port gear snagged on the bottom.

The propeller was disengaged and power was supplied to the winch to pull in the warps. This moved the vessel over the dredges. The starboard dredge was hauled in but the port dredge remained tight on the bottom. Both sets of gear were towed from outriggers just above the bulwarks but were lifted inboard using a gantry. When the starboard gear reached the surface it was connected to the lifting tackle. When it was lifted, the tackle broke and the starboard gear ran away under its own weight. One of the crew then climbed up the gantry to try and repair it.

When the starboard gear reached the seabed its weight was released from the starboard outrigger. The warp to the port gear remained tight with the gear still snagged on the bottom. Given this force, the craft rolled to port, but because one of the crew had climbed the gantry the stability was much reduced. Furthermore, the additional weight of three extra people had reduced the freeboard to an estimated 3 inches. As she started to heel, water began to pour in through the deck scuppers and found its way to non-watertight openings on deck. With the low freeboard, flooding starting to take place and given the inherent poor stability, the heel continued. She capsized.

She sank shortly afterwards and all five crew ended up in the water without any lifesaving equipment. There had been no time to don the two lifejackets which were kept on board. One of the crew managed to swim ashore. The others lost their lives.

The Lessons

1. Many will draw their own conclusions about the lessons to be learned from this tragic accident, but one of the underlying causes can be traced to a change of ownership and the decision to change the method of fishing. This vessel had fished successfully for many years under previous owners when she had been rigged for single beam dredging. She then changed hands and the new owner altered the method of fishing to twin beam dredging and made a number of modifications; additional weight was added. The modifications increased her fishing capacity but reduced her stability and reserve of buoyancy. The original freeboard was about 305mm (1 foot) but following the modifications, had come down to about 76mm (3 inches). She was no longer safe and several people who saw the modifications thought she was unseaworthy.
2. An increase in fishing capacity is not worth it if the result is an unsafe vessel. Modifying a fishing vessel, changing its type of fishing or adding top weight through additional equipment is potentially dangerous, especially if weights have to be lifted from high points or the freeboard is reduced. Fishing vessels under 12m in length are not required to meet any statutory criteria for stability which places an even greater responsibility on owners and skippers to ensure their vessels are safe. It is irresponsible to take a vessel to sea that is obviously unseaworthy. Owners of fishing vessels should seek professional guidance before undertaking modifications. Merchant Shipping Notice No 989 gives further advice.
3. Increasing the number of people on board in these circumstances does nothing to improve matters.
4. No vessel, regardless of size, should ever go to sea without sufficient life saving equipment for all on board.

5. Once again, four men lost their lives leaving families and friends to mourn. Had they been wearing lifejackets while working on deck, their chances of survival would have been greatly increased.

6. The astute reader will also be wondering about the tackle that broke. Gear does break from time to time, but skippers learn to recognise when it is time to change damaged, worn or rusty equipment on board. There is no evidence to suggest what, if anything, was wrong with the equipment in this vessel but the point will not be lost on those who rely on sound gear to pursue an already hazardous occupation.

Footnotes

The MAIB has noted the relatively high percentage of accidents that occur to fishing vessels that have just changed hands and where modifications have taken place. In practically every instance a desire to increase the fishing capacity with the consequent addition of topweight and the reduction of stability has been an underlying cause of the accident that soon followed.

Many fishermen still do not realise that there are many lifejackets available on the market that can be comfortably worn while working on deck. The MAIB is beginning to receive a number of reports from skippers and owners who insist that their crews now wear them. The common denominator in nearly all these reports is that the policy change has been made following the loss of a member of crew through drowning. The point the MAIB wishes to put across is that we are convinced that most families wish crews would adopt this policy before somebody else loses his life.

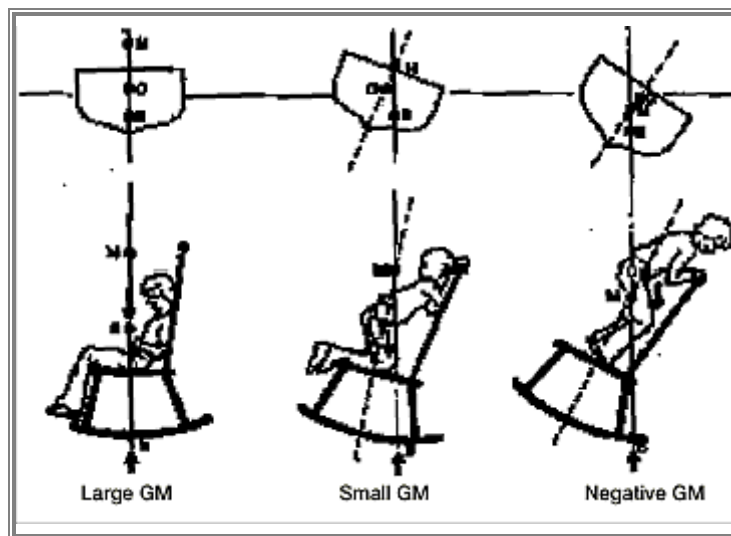
Part 9 Stability

Most foundering of fishing vessels can be attributed to a lack of sufficient stability. Sometimes the skipper has not been taught the elements of stability, sometimes he has not bothered to read the stability book, and in some cases it seems as if he considers it to be unimportant. Sometimes a skipper or owner knows that his vessel has a low level of stability, but is unwilling to do something about it, simply because there is a cost involved. Try telling that to the widows, children and girlfriends when a fishing vessel has been lost.

Stability is important. An unstable vessel is dangerous and liable to capsize. A number of things can turn a once stable vessel into one that is unstable: floodings, causing a free-surface effect, loading of excess weights on deck and lifting weights by derrick. Remember, the centre of gravity of a load moves to the lifting point once it is suspended. Two of the cases in this section concern capsizes due to lifting weights, one at sea, the other in port.

Skippers are advised to ensure that the stability of their vessels or boats is checked by a properly qualified person if it has not already been done. Those with stability books on board are urged to read them and familiarise themselves with its contents, to ensure that they are aware of their vessels limitations.

Maintaining the watertight integrity of a vessel is critical for safe operation and is the direct responsibility of the skipper. A vessel which can quickly flood from stem to stern is a potential death trap. Fishing vessels must have watertight bulkheads.



Case 33 Fishing Vessel Capsizes in Harbour

Narrative

A newly built steel beam trawler, 11.98m long had had her stability calculated after she was launched, but before significant items of top weight were added. In port one day, the crew were changing the cod ends on her trawl gear. The vessel was lying starboard side to a dock wall, with the trawl gear on that side suspended from the top of the almost vertical derrick. (See photographs).



The skipper began hauling the port beam gear, using the port derrick, which was slightly lower than the starboard derrick. As the chain mat cleared the port bulwark rail the vessel heeled suddenly to port and capsized. All three of the crew managed to scramble to safety. None were seriously injured. The vessel was later recovered and her stability assessed and found to be significantly less than the minimum standard recommended by the MCA for less than 12m fishing vessels.

The Lessons

1. The fundamental cause of the accident was the vessels dangerously low level of transverse stability which had been reduced still further by lengthening and strengthening the derricks. This added even more weight above the centre of gravity.
2. It is essential, particularly on small fishing vessels, that alterations are not made to the structure or fishing gear without checking to see if the standard of stability is reduced.
3. Although there are no specific regulations covering the stability of less than 12m fishing vessels, owners and skippers should be left in no doubt that legally they still have an obligation to ensure that the vessels they own or sail on are seaworthy.

Case 34 Two Cockle Dredgers Capsize

Case 1

Narrative

A 9.91m steel cockle dredger was manned by two very experienced crew. The vessel had two bags of cockles unsecured on deck, weighing a total of around 1.5 tonne, although she frequently carried 4 tonne. The vessels helm was left unattended, so both the crew could recover the dredge. During this operation, the vessel drifted beam on to the waves and started rolling heavily. During one particularly heavy roll, the two bags of cockles shifted to the low side, and the vessel capsized.

Fortunately the water was less than 2.5m deep and the vessel lay on her starboard side on the seabed. Both of the crew on board managed to clamber to safety on the port side. They were rescued half an hour later. The vessel did not carry a liferaft.

Case 2

Narrative

An 11.92m cockle dredger had six to seven tonne of bagged cockles on deck, and although she too had an experienced crew of two, neither the bags nor the riddle were secured.

On her way back to harbour in the dark, the vessel encountered a series of large waves and heeled to port. A bag of cockles slid across the deck and the riddle fell outboard causing the vessel to capsize. In this case a liferaft was carried and the crew inflated and boarded it. Within minutes the vessel had turned completely upside down, and she was lost to sight. The crew remained in the liferaft for seven hours before being rescued by a fisheries research vessel.

The Lessons

1. Because of rising concerns about the stability of small cockle vessels, the MAIB arranged for the first vessel to be measured and inclined. Full co-operation was received from her owners and insurers. A computer analysis by a naval architect, concluded that the vessel was unsuited for cockle dredging, because her stability and freeboard were below the MCAs recommended minimum values.
2. In the second case, the vessel was salvaged but not inclined. Nevertheless, an examination of the vessel found that her range of stability to the first downflooding point was also insufficient to meet MCAs recommended minimum values.
3. It is a potentially dangerous practice to store and carry a bagged cockle catch on the weather deck and should never be done unless:
 - the bags are secured to prevent any possibility of shifting;
 - gear on and above deck is also secured properly;
 - the freeboard and stability of the vessel in the loaded condition have been assessed by a suitably qualified person, and found to be more than adequate.

Case 35

Rapid Capsize and Sinking of a Fishing Vessel with Loss of Life

Narrative

A two year old 8.10m steel hulled stern trawler had been trawling for about three and a half hours. There were only two people on board. The weather was fine with good visibility, a slight swell and a light breeze.

During a tow, the skipper noticed that the vessel was slowing down and thought that this was caused by the net filling with sand and debris. They began to haul in the net. The winch was struggling, but eventually the cod end was hauled up as far as possible. The two hauling lines through the top of the post (3.4m above the deck) were tied off and the deckhand went aft to try to pull the cod end over the stern.

While he was struggling with the cod end, he heard the skipper shout, and, looking forward, he saw the vessel was heavily heeled to port. The bulwark rail was under water and the water level was about quarter of the way across the hatchcover. The deckhand rushed forward to let go the hauling lines to release the cod end to allow the vessel to recover. He managed to let go one hauling line, and the skipper joined him to help with the other, but the vessel suddenly rolled over and both men were thrown into the water.

The skipper of another fishing vessel saw the capsize and recovered both men, but the skipper was unconscious. Despite continuous resuscitation attempts, he died later.

The Lessons

1. This capsize, loss of vessel and the death of the skipper, occurred because the weight of the cod end, when lifted clear of the water and suspended from the top of the post on the stern gantry, raised the effective centre of gravity to such an extent that the vessels transverse stability was reduced to zero.
2. Skippers should be aware that when a full net is raised out of the water, the effective centre of gravity of the load transfers to the derrick or post head. This in turn raises the vessels centre of gravity, sometimes to such an extent that neutral or negative stability results. Under those circumstances, a very small upsetting moment, such as a roll in a slight swell, can be enough to capsize the vessel
3. Skippers and fishermen should never lift a cod end heavy with sand clear of the water. Instead they should tow it at speed astern of the vessel for some time to wash out the sand and thereby reduce its weight, before attempting to lift it out of the water.
4. The accident could have been avoided if the vessels stability characteristics had been assessed by a suitably qualified person, and the owner and skipper advised on the operational limits.
5. Had the skipper worn a lifejacket it is likely he would have survived. He was a non-swimmer.

Part 10

Weathertight Doors and Hatches

The unsinkable fishing vessel would have no doorways, hatches or other openings in its watertight hull and deck. No such vessel exists. A working fishing vessel requires the crew to move around it and for the fish to be stowed. Doors and hatches, and the means to secure them properly, are features of any type of vessel, including fishing vessels. Each has a part to play in ensuring the watertight, or weathertight, integrity of the vessel concerned. Properly used, they make a major contribution to safety. When forgotten, or worse still, ignored completely, many of the design safety features of a vessels construction are removed. The risk of something going seriously wrong rises dramatically. Too often such incidents arise because people onboard have either forgotten, or never realised, that any open door, or improperly secured hatch, may be the difference between a vessel sinking and floating.

Too often doors and hatches are left latched opened or not properly secured closed.

Doors and hatches have two functions; to provide access and to keep the weather and elements out. Leave them open, the elements come in and in this context the word element is usually taken to be cold air, rain or spray. To the fisherman there is another meaning: green seas sweeping the decks, or because the vessel has heeled to an unnatural angle, such that doors and hatches that are normally well above the waterline are suddenly very close to it. Increase the heel only slightly and the water starts to pour in.

Most people working afloat will think nothing about leaving a door to the accommodation spaces open. An open door presents no obstacle to those using it, and the added fresh air is welcome. But after a while, the open door becomes the accepted practice and it gets lashed open. Following accident investigations, the MAIB has seen instances of doors, and even engine room escape hatches, being so effectively secured open that it was obviously impossible to shut them.

Very often an open door is not in view of the watchkeeper. When something goes wrong and the boat begins to heel, the last thing he is thinking about is that water may have started to come in through an open door. The vessel progressively floods. Stability is lost and a capsize follows. The vessel then sinks and lives may be lost.

The moral of the story is, keep all hatches and doors shut while at sea. Resist the temptation to leave them open because they will be used again in a few minutes. The sea has a habit of exposing weaknesses when peoples attention is elsewhere. It takes a few seconds to shut a door. About the same time it takes the sea to find one that has been left open.

Case 36

Net becomes Fast on Seabed causing Vessel to Ship Seas and Sink

Narrative

Audacious II was trawling with twin rig fine ground nets off Rockall when the skipper was alerted by the tension recording gauges on the auto trawl system. They indicated that the port side net had become fast on the seabed. The weather was easterly force 5 to 6 with a 3m swell.

The skipper tried to clear the obstruction by keeping the engine controls in the ahead position, but when this proved unsuccessful, he told the engineer to go below to the main deck and close the transom doors. The skipper started to heave in both trawl warps which had the effect of moving the vessel astern into the weather.

Because of the strain on the port warp, the vessel took a port list, and seas were shipped over the stern breaching the transom door openings. This, in turn, caused flooding of the after deck where the net drums were fitted, and increased the port list until the freeing ports were under water.

The skipper told the crew to transfer the power block and landing derrick to the starboard side to try to reduce the list, but this only transferred the weight of the entrapped water from the port side to the starboard side. Because the weathertight doors to the after main deck and engine room had been left open, water downflooded to the engine room and fish room spaces.

All but 100m of the port warp was then heaved back on to the winch. Realising that the port net was still fast to the seabed, the port warp was cut, using an electric grinder.

The engine room bilge alarms sounded, there was an electrical blackout and the main engines revolutions decreased. Gradually the starboard list decreased until the vessel was upright. An inspection by the crew revealed that the engine room was flooded to a depth of 2.50m and that the after deck and the passageway leading forward to the processing area were flooded. The extent of flooding in the other compartments was unknown.

On receiving this information the skipper shut down the main engine, and contacted the fishing vessels in the vicinity. *Audacious II* was eventually taken in tow by one of the fishing vessels, but gradually settled by the stern and, 33 hours after becoming fastened, sank. The crew took to the liferaft and were rescued by one of the accompanying fishing boats.

The Lesson

Had all the weathertight doors on board been secured closed, there would have been no downflooding and the vessel would not have sunk.

Case 37 Another Vessel Sinks after Shipping Heavy Seas

Narrative

The 28.32m long *Pescalanza* was fishing in an area about 80 miles south of Ireland, with an estimated 12 tonne of fish on board. The weather was frequent heavy showers with a north-north-west to north-west force 8 to 9 wind. There was a heavy swell running and the sea was described as very rough.

Pescalanza's trawl gear was side-winder rigged, but on her port side instead of the more traditional starboard side. Prior to hauling her fishing gear, both warps were released from the towing block aft so that the vessel could come round to place the prevailing weather on to the port side.

With the weather on the port beam, *Pescalanza's* crew began heaving on the trawl warps with the main winch until the trawl boards were close up to the fore and aft gallows. While this was going on, the vessel was rolling heavily in the very rough sea conditions.

As the crew were about to secure the trawl boards to the gallows, with the trawl and sweeps still outboard, *Pescalanza* shipped a heavy sea and heeled over to port. The main deck flooded. Before she could recover, the vessel was struck by another heavy sea. She rose up on the sea and, because of the entrapped water on the main deck and the weight of the trawl gear, the list increased until she was on her beam ends. Sea water then began flooding into the after part of the vessel which caused her stern to become partially submerged. Just as the fishing skipper was calling on VHF channel 13 for help from nearby fishing vessels, a third large wave struck *Pescalanza*, and she began to sink.

The skipper and the fishing skipper managed to get out of the wheelhouse and on to the starboard bridge wing. From there they could see that the crew members were clinging on to the exposed part of the vessel. At that stage the port liferaft was under the water and could not be reached. They managed to release the starboard liferaft, but it inflated upside down. The fishing skipper then saw a fishing vessel approaching them and threw a lifebuoy with smoke float attached into the sea.

Pescalanza continued to sink, and when the water had reached chest level the liferaft painter was cut and the liferaft started moving away from *Pescalanza*. Realising that their only hope of rescue was to reach the liferaft, the skippers and the rest of the crew swam towards it. After three of them had reached the raft they tried to right it, but it was impossible in the wind and sea. Eventually six of them made it, and hung on to the upturned liferaft. One person was swept away by a wave but managed to grab the lifebuoy which had been thrown into the water earlier; the others were able to climb on to the liferaft. There they huddled together, desperately hanging on and trying to keep warm, until they were rescued by *Agorreta*, another fishing vessel. The person holding on to the lifebuoy was also rescued by *Agorreta*.

Under normal circumstances an accumulation of water on deck will run off through the vessel's freeing ports on the main deck. Weathertight doors and hatches will, if properly secured, ensure that water does not get inside.

There is insufficient evidence available to the MAIB to identify precisely how water entered *Pescalanza*, but it is obvious she shipped a substantial quantity very quickly. As there is no report of structural damage from eye-witnesses, it is reasonable to suppose water entered through the weathertight door protecting the shelter from the main deck area which had been left open while recovering the trawl gear.

This would allow water to flow into the shelter. Not only did *Pescalanza* list heavily to port, but she also took up a stern trim and this is indicative of the doors to the mess room and the engine room also having been left open, allowing sea water to enter and downflood.

The third large wave to hit *Pescalanza* exacerbated the situation, and she was unable to recover.

The volume between the main deck and the shelter deck aft of the bridge front was included in the zone used in calculating stability. Allowing water into this space would have an adverse effect on the vessels stability, and this is clearly noted in *Pescalanza's* approved stability booklet. One of the working instructions contained in that booklet deals with watertight integrity, and states "The levels of stability ... are entirely dependent upon water being excluded from the hull below the trawl deck. Open doorways, hatchways etc breach this watertight integrity, leaving the vessel vulnerable when suddenly heeled, or when taking the sea on board."

The Lessons

1. Skippers should read the stability book and note any working instructions carefully.
2. Weathertight doors should be marked or painted in some way to indicate to the crew that they are to be kept closed, except when used for access.
3. Where the buoyancy effects of shelters have been considered when assessing stability, fishing vessels may not comply with stability requirements if certain weathertight doors are left open at sea.

Case 38

Loss of Stern Trawler due to Snagging and Downflooding

Narrative

A 27m stern trawler, a well-found vessel with adequate stability reserves provided by her weathertight shelter and aft casing, was towing in good weather. It was night time, the skipper was in the wheelhouse and the other crew members were under the forward shelter processing the previous haul.

Shortly before midnight, the vessel gear became fastened on an underwater obstruction. She heeled suddenly to starboard, quickly reaching an angle of 45°. The crew under the shelter, realising the vessel was in difficulties, launched a liferaft which was stowed on the shelter. The angle of heel continued to increase rapidly. The crew managed to get on board the liferaft and were joined a short time later by the skipper. At that time the list was 75°.

Using a portable VHF radio the crew managed to contact a sister vessel. The vessel sank while they were waiting to be rescued.

The Lessons

1. A weathertight structure is only weathertight if all external doors are kept securely closed. In this case, the aftermost starboard door in the aft casing was not closed after the previous shooting operation. This doorway became a major down flooding point even before the 45° heel had been reached.
2. Warnings setting out the importance of maintaining the integrity of the hull and superstructure had been included in the stability book. Unless this integrity is maintained at all times, the vessels stability will not match that in the stability book.
3. This case is an example of how, even in good weather, simply not shutting a weathertight door can result in the loss of a vessel. In other cases, people have been killed.
4. Skippers should read the stability book thoroughly; fishermen should close weathertight doors immediately after using them.

Remember, if a weathertight door is not required to be open, it must be kept shut.

Case 39

Weathertight Closures Left Open and Vessel Sinks, Leading to Loss of Four Crewmen

Narrative

Sapphire and Elegance, two wooden fishing vessels of similar construction and general arrangement, operated as partner vessels in pair trawling operations. Late one morning they left port for fishing grounds east-north-east of Peterhead and, two days later, with the catch stowed on board in boxes, they headed for Fraserburgh at 1000 on a course of 298°. *Sapphire* was in the lead with *Elegance* about two miles astern, both travelling at about 8 knots. They were within visual and radar contact of each other.

The wind was westerly, about force 4 to 5. *Sapphire* was taking heavy spray over her wheelhouse, but because *Elegance* was taking seas over the bows, her skipper reduced speed.

At 1030, *Sapphires* skipper handed over the watch to one of the crew, and, having checked the engine room, went to his bunk

At about 1330 the watchkeeper on *Elegance* noted that *Sapphire* was gradually pulling ahead of *Elegance*. The wind had increased to north-west force 7 to 8. The last contact between the two vessels was at about 1400 with *Sapphire* about 4 miles ahead of *Elegance*. *Elegance's* watchkeeper could see *Sapphire*, visually and on radar, and radio contact was made.

Sapphires skipper was woken at about 1530 by the vessel listing heavily to starboard. Thinking they were turning sharply to port, he got out of his bunk to find out why. On his way to the wheelhouse the list increased to about 60°, and, realising something was desperately wrong, he called for all the crew to "get up".

On reaching the wheelhouse the skipper found the watchkeeper sitting in the starboard chair holding the armrest with his left hand and leaning on to the instrument console with his right. The skipper thought of sending a "Mayday" but changed his mind before he had selected the correct channel and tried instead to activate the distress alerting function of the telex. The skipper asked the watchkeeper whether *Elegance* had been told of the situation; she had not. A call was then made for everybody to evacuate the accommodation. The starboard windows of the wheelhouse were, by then, immersed in the sea.

The skipper tried to call *Elegance* on MF radio, but before he could read the vessels position from the GPS display, the power supply failed. The wheelhouse filled rapidly with water and the skipper was swept towards the open port aft window which was open but underwater. He managed to escape through this window. *Sapphire* sank shortly afterwards, but the two liferafts released and inflated as designed, and the skipper swam to one and got on board. He set off some flares and smoke floats, one of which was seen by *Elegance's* watchkeeper and skipper who contacted the coastguard. The skipper was rescued by helicopter, but none of *Sapphires* other four crew members managed to escape from the sinking vessel.

The MAIB investigation found that *Sapphire* had been operating with the following weathertight closures open: the engine rooms emergency escape hatch; the forward and aft doors on the starboard passage; and the door from the starboard passage to the engine room. Also the weathertight main fish hatch was not securely closed.

Careful analysis of all the facts led to MAIBs conclusion that the fundamental cause of the sinking of *Sapphire* was the progressive downflooding of major spaces through weathertight door ways and hatches which were open or inadequately secured while at sea. A major contributory factory was the crews lack of understanding of the function and importance of the weathertight hatch covers and doors.

The Lessons

1. It is important to keep weathertight doors and hatches securely closed when at sea, except when being used for access or egress.
2. The doors and hatches which are required to be closed at sea should be identified in some way so all crew can recognise them immediately. The doors or hatches could be painted or marked in a particular way, or warning notices could be fixed to them.
3. The vessels high level bilge alarm was not working. Had it been, the flooding might have been detected at an earlier stage, before becoming serious.

A Safety Postscript

If, having read one, more, or even all the articles in this special Fishing 2000 edition of the MAIBs *Safety Digest*, you start to think more about safety at sea, then we have achieved much. If you begin to talk about the accidents among yourselves, and even debate the pros and cons of the lessons, we will have achieved even more.

Should your discussions prompt you to wonder what the main enemies of safety are, we would be interested to know what you think. Some might say it is an attitude problem. There are those who think that fishing is an inherently dangerous occupation and that nothing can be done to improve safety other than throwing money at it. We would disagree and argue that much can, and should be done, by individuals at little or no cost to themselves. Time and time again we find when investigating an accident, that a supposedly safety conscious fisherman has deliberately taken shortcuts to overcome a particular problem and is knowingly doing something unsafe with, sometimes, all too tragic consequences.

Or perhaps you might focus on ignorance. It comes in two guises, inexperience or lack of training and sometimes both. We might, for instance, find that the fisherman who knows his vessel inside out, who has an instinctive feel for the business and practice of fishing, and can read the wind and sea with effortless ease, knows little about survival techniques, practical stability or how to use the sophisticated nav plotter he has recently installed. Conversely there are those who have been to college yet have no real feel, say, where to put their hands and feet in a seaway. It is something that cannot be taught, but the accumulation of experience on top of sound training does much to prevent accidents.

But perhaps the greatest enemy of safety is fatigue. There isnt a seaman anywhere who hasnt experienced it and fishermen know the effects more than most. We all live with the problems of too little, or interrupted, sleep. There is the constant need for shooting, hauling, sorting, gutting and stowing the catch. We sleep whenever we can and perhaps for no more than a few minutes at a time. Add to this snatched meals, perhaps a poor diet, a heaving deck, night working and constant damp, and we have a cocktail of ingredients that all lead to fatigue. It doesnt matter what we call it, but fatigue dulls our senses and greatly increases the chances of us making a mistake. Mistakes lead to accidents. And accidents cost money, injure people and, sometimes, lead to the loss of life.

So what should we do about it? This postscript does no more than invite fishermen to develop an awareness of the dangers. Fatigue is a major contributory cause of accidents at sea. Once we are aware of the dangers, we can start to do something about it. Future *Safety Digests* will develop this theme and give examples of the lessons to be learned from accidents where fatigue has been a major factor. If you would like to learn more about these lessons, ask us to put your name on our mailing list and you will receive a copy FREE of charge. Please see the request form at the end of this booklet.

The same request form can be used if you would like to receive any of our unpriced report publications.

MAIB safety digest/report request form

Name:

Address:

.....

.....

.....

Please place me on your mailing list to receive the MAIB Safety Digest

Number of copies of Safety Digest you wish to receive.....

MAIB published reports (unpriced)

I wish to receive copies of the following unpriced reports from the list opposite:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Please detach and return this form to: The Publications Manager, Marine Accident Investigation Branch, First Floor, Carlton House, Carlton Place, SOUTHAMPTON SO15 2DZ

MAIB published reports (unpriced)

fv BEVERLEY ANN II/CYPRESS PASS - collision on 9 March 1999

BLUE HOOKER - loss of a fishing vessel with two lives off Blackchurch Rock, North Devon on 12 November 1998

CATRINA - capsized of the UK registered fishing vessel south of Newhaven on 13 October 1998

Document title

CONSTANCY - sinking of fishing vessel on 30 July 1998 with the loss of one life

DE KAPER - fire on board trawler off Hanstholm, Denmark on 12 February 1999

DINGHY - (Unnamed) which capsized in The Sound of Iona with the loss of four lives on 13 December 1998

DORY (Unnamed) which sank on Loch Awe with the loss of three lives on 29 May 1999

mv ELM/mfv SUZANNE - near miss incident on 11 February 1999

GEESKE - death of one person while fishing off Beachy Head on 9 December 1998

PURBECK II - injury to crew member on board on 7 June 1999

PESCALANZA - sinking of the fishing vessel with the loss of six lives on 2 November 1998

SALLY JANE - capsize alongside in Shoreham Harbour on 27 July 1998

