Marine Accident Investigation Branch (MAIB) - Safety Digest 02/1999

Contents

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 Coastguard 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 marine 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 shipping and fishing industries, the pleasure craft community and the public of the general circumstances of marine accidents and to draw out the lessons to be learned. The sole purpose of the 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.

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Introduction

As the Chief Inspector of Marine Accidents I am charged with investigating as many accidents as I can to determine their causes with the specific aim of preventing them happening again. Part of this process involves promulgating the lessons learned and making whatever recommendations are considered appropriate.

It also involves trying to identify anything that appears to feature repeatedly as a cause. The most obvious is the human factor and my inspectors are focusing more and more attention on this aspect to try and understand why errors are made. This edition of the Safety Digest contains several accounts of incidents where this is done so we can draw attention to the human issues involved.

The challenge we face is describing such incidents without appearing to apportion blame. People are understandably very sensitive to implied criticism and we are careful to draw out the lessons in such a way that we depersonalise them as far as we are able without detracting from some of the very important lessons to be learned. Feedback on past editions suggests we have got the formula about right and most people understand why we often extend the lessons beyond those that naturally fall out from the incident described. Learning from the experiences of others is an essential feature of seafaring and the MAIB will continue in its efforts to present a cross section of incidents so that as many people as possible can benefit from the results of our investigations.

One benefit of reading a number of reports in quick succession is that your eye catches sight of a word or phrase that keeps on repeating itself. While reviewing some accident reports recently I was struck by the number of times the word assume featured. It soon became apparent that in many instances a contributory factor to whatever the eventual incident was involved someone assuming something was going to happen, or had been done. The officer of the watch of the stand on vessel assumed the give way vessel would do just that, or an engineer officer assumed his colleague had checked something. Very often it seems that the assumption is far from justified. Readers with long memories can relate this observation to past incidents such as the capsizing of the Herald of Free Enterprise when an assumption was made that the bow doors were shut.

As people absorb the lessons from this edition it might be instructive to count the number of times the word assume features. While this might have some academic appeal, the mariner should develop an element of caution when assumptions start to be made at sea. It doesnt matter if you are on the bridge, in the wheelhouse or cockpit, in the engine room, galley, storeroom or on deck but, the moment you assume something has been done and you are not absolutely sure, allow the mental alarm bells to start ringing. Many accidents in the past have started with similar assumptions being made. The sensible mariner will back his instinct and make a double check that all is well.

Your increased alertness may well prevent an accident.

John Lang
Chief Inspector of Marine Accidents
October 1999

Part 1 Merchant Vessels

As this edition of the Safety Digest was being prepared for publication, two large merchant ships, the Bahamas registered cruise ship Norwegian Dream and the Panamanian container vessel Ever Decent, collided in good visibility in the northern approaches to the Dover Strait.

The accident is being investigated by the two flag states involved and it would be entirely wrong to speculate on what the inquiries will reveal. There are, however, three certainties about the accident; it should never have happened in the first place, it did, and every mariner wants to know what went wrong. Had the owners, masters and the officers of the watches been asked a few hours before the event whether two well found vessels, equipped with the latest technology and manned by competent crews could collide, they would probably have thought it inconceivable that either of their vessels could be involved. And yet they were.

We will have to wait and find out what the investigators discover but shipowners throughout the world will, once again, be reviewing their procedures and asking themselves the same question. Could such a thing happen to one of my ships? The uncomfortable reality is that it could. No matter how good the regulations, preparations, the training, the technology, formal safety assessments and precautions, collisions still occur.

As with all collisions the same questions will be asked. Who was to blame, why were the Regulations for the Prevention of Collision at Sea seemingly ignored, are the regulations adequate, was human error involved, was there a technical failure, should there be more control for busy shipping lanes? It is not up to the marine accident investigator to apportion blame, but he will wish to find out what happened and why. If human error was involved, a key feature of the investigation will be to establish why.

In the meantime shipowners, masters and officers of the watch will be reflecting whether there is anything more they can do to minimise the risk of collision.

The Dover Strait and its approaches are, we are reminded on a daily basis, one of the busiest waterways in the world. The northern approaches are especially complex with major terminals to both east and west. Crossing, joining or leaving, the main north/south transit lanes demands immense concentration, technical competence and a thorough understanding of the regulations. It is not a dangerous area but it can be busy, especially if visibility is poor, and fishermen and yachts are present.

We do not yet know how many people were on the bridges of both Norwegian Dream and Ever Decent, but of all the waterways in the world where pilotage is not compulsory, the area that embraces the Dover Strait, the Thames estuary and the approaches to the ports of Belgium and the Netherlands is one of the busiest for an officer of the watch. Not only does he have to be sure of his position; shoals and sandbanks abound, but the volume of shipping can be high. Any decision to prevent collision must be made on reliable information, in good time and after a full assessment has been made. It is, very probably, one of those few occasions when safe navigation is better conducted by two people rather than one. The permutations are wide. It could be master and mate, pilot and mate or two certificated officers of the watch. At the time of writing nobody knows the causes of the Norwegian Dream/Ever Decent collision but can any ship owner or manager put hand on heart and say, with total conviction, that such an accident could never possibly happen in his ship? If the answer is 'no' then, peeling the outcome of the investigation, an appraisal has to be made about how best to minimise the risk of collision in these waters.

Case 1
Grounding of Large Container Vessel

Narrative

The 65,475 gt container vessel *NOL Cyprine* with an overall length of 274m and a draught of 11m was inbound for the port of Felixstowe. The vessel was well found and all systems were in good working order.

There was a north-westerly wind of 12 knots. It was daylight, the visibility was good and the spring tide was running at half-ebb in a north-easterly direction across the approach channel.

The pilot boarded the vessel four miles north-east of the Sunk light float. Once on board he discussed and agreed the inward passage plan with the master. However, neither the pilot nor the ports VTS informed the master that Nos 3 and 4 main channel buoys were off station by 50m to the north and south respectively to facilitate on-going dredging operations. This made the channel appear wider by 100m.

The pilot had been informed by VTS that two vessels were outward bound and he also knew that another large container vessel was in the process of sailing. In view of this the pilot decided to proceed slowly along the channel until the outbound container vessel had rounded Landguard Point.

Speed was reduced from half to slow ahead as *NOL Cyprine* approached the first of the two outward bound vessels that was on a reciprocal course and in the middle of the channel. Both vessels were approaching the point where the buoys had been repositioned. There was no communication between them and neither the pilot nor the VTS contacted the outward bound vessel to draw attention to the fact that by keeping to the centre of the channel, she was making *NOL Cyprine* stay well to starboard. Although the radar echo of *NOL Cyprine* was, by now, overlapping the northern edge of the channel, VTS did not advise the pilot that he was very close to the edge. *NOL Cyprine* was still proceeding very slowly and the pilot assumed he was safe.

After passing the outward bound vessel to port and No 3 buoy to starboard, *NOL Cyprine*s bow began swinging to starboard. Full port helm and bow thrust were applied and the main engine speed was increased but the swing to starboard continued. Moments later *NOL Cyprine* grounded on the north side of the channel.

Initial attempts to refloat her on a rapidly falling tide were unsuccessful but, with the assistance of four tugs she was successfully refloated on the next high tide. The vessel was undamaged and there was no pollution.

 Select the thumbnail to view the accompanying chart (134KB)

The Lessons

1. Always bear in mind the likely effects of the tidal stream when navigating in narrow channels or close to the shore, especially when it is a cross tide. Its effect is aggravated when proceeding at slow speed.

2. Mariners will need no reminding of the interaction effects between vessels passing each other in a narrow channel. The effect is exaggerated if one vessel is propelling at a speed slower than the other. The slower vessel may well find her handling characteristics are affected when she clears the pressure area that forms between them as they pass.

3. In the interests of safety, bridge teams must be made aware if any navigational buoy or mark is out of position or is not displaying the charted characteristic. In this case, neither the pilot nor the VTS advised the master that Nos 3 and 4 buoys were out of position. Without this information the bridge team was unable to provide adequate navigational support to either the master or pilot.

4. VTS operators should be aware of the greater risks faced by vessels when navigating in the vicinity of an area where navigation marks have been repositioned. Greater attention should be paid to their movements and if any vessel navigates in a manner to cause concern, a VTS operator can do no wrong by alerting the pilot or master to the matter. The pilot concerned may well have cause to be grateful, especially if he is on a deep draught vessel.

Footnote

This accident was investigated by the Harwich Haven Authority who concluded that errors of judgment were made by steering the vessel so close to the northern edge of the deep water channel without making sufficient allowance for the north setting tide.

Case 2
Crankcase Explosion caused by Fitting of Wrong Type of Damper Securing Bolt

Narrative

The 8,007 gt passenger ro-ro vessel *European Trader* was on passage in the Irish Sea, both main engines were operating at service speed with electrical power being supplied by shaft generators. At 0055 the port main engine crankcase oil mist alarm sounded, followed shortly afterwards by an explosion and a fire. With the port main engine damaged and stopped, and the starboard main engine shut down so the fire could be tackled, the vessel experienced a blackout until the emergency generator cut in.

The fire, which had burnt electric cabling and a plastic container next to the crankcase doors, was extinguished by the crew using portable extinguishers. The coastguard was informed and a Pan Pan message was relayed to all ships. The fire was declared out at 0126 and steps were taken to see what services could be made available. Full electrical power was restored at 0300, which together with full use of starboard main engine, enabled the vessel to resume passage to port under her own power.

A subsequent investigation into the cause of the explosion found that a nut securing the viscous damper at the forward end of the engine crankshaft had become loose and had rubbed against the inside of the crankcase housing. This caused a hot spot which had caused the oil film in the area to evaporate and create an oil mist. The hot spot eventually provided the ignition source for the explosion. Simultaneously with the explosion, the loose bolt nut had jammed causing the damper assembly to twist and the remaining three bolt heads to shear. The damper had come off and smashed the crankcase casing releasing a fireball into the engine room which then set fire to combustibles in the immediate area.

The primary cause of the incident was excessive clearance on the securing bolts these should have been fitted bolts. Ordinary bolts or those with excessive clearance, can lead to fretting and the eventual fracture of the castellated nut securing split pin.

The Lessons

1. At regular intervals and at all crankcase inspections, always check that all bolts are tight and that any nuts fitted or designed for securing devices have the device correctly fitted in place.

2. At every overhaul, carefully examine all bolts removed for signs of wear or fretting. Each bolt should be marked to ensure it is refitted in original position.

3. From section 9.5.1 of the *Code of Safe Working Practices*: *All personnel should be made fully aware of the precautions necessary to prevent fire in machinery spaces in particular the maintenance of clean conditions, the prevention of oil leakage and the removal of all combustible materials from vulnerable positions.*

Case 3
Lifeboat Accident While Undergoing Inspection causes Injury

Narrative

The Bahamian flag bulk carrier *Maersk Pomor* was alongside in Gladstone, Queensland, undergoing a Port State Control inspection. The crew were Russian nationals. As part of the inspection, the surveyor requested that the engine of the free-fall lifeboat be started and its ahead and astern movement tested.

The third engineer boarded the lifeboat, started the engine, operated it in the ahead and astern modes and stopped the engine once the test was complete. The surveyor then asked for the rudder to be operated to both port and starboard.

After unsuccessfully trying to turn a spoked wheel adjacent to the coxswains seat the engineer restarted the engine. He again tried to turn the spoked wheel. This time he succeeded but, instead of turning the rudder, he launched the lifeboat. He was thrown to the bottom boards.

The ships rescue boat was launched, the lifeboat retrieved and taken alongside the wharf where the third engineer was transferred to an ambulance. He had suffered a crush fracture to the spine and concussion.

The Lessons

1. This very simple error could have had much more serious consequences. Its fundamental cause was a ships officer having to operate equipment with which he was unfamiliar.

2. Few officers would be brave enough to admit to a Port State Control inspector that they did not know how to carry out sucha straightforward directive. This officer assumed the spoked wheel was the helm and turned it. He was wrong and suffered the consequences. If you ever find yourself in the embarrassing position of having to admitignorance to someone in authority, do so. It is infinitely better than injuring or killing yourself or someone else. The onboard training regime had failed to ensure the crew were fully conversant with the lifeboats free-fall controls.

3. The labelling and instructions for the lifeboat release gear, although clear, were in English. The crew spoke Russian.

4. If you are serving in a vessel where you might be required to know how to operate the free-fall controls, and your knowledge is wanting, it will pay dividends to find out now - and before you are invited to demonstrate your skills at the next Port State Control inspection.

5. If serving in a vessel where signs are written in a language that is totally incomprehensible to you, insist on having written in a suitable language. Generally speaking this is not a problem for English speakers, but it can be a nightmare for others. English speaking owners, managers of ships' officers should be aware of this when manning vessels with a crew whose narrative is not that in which signs are written.

Case 4
Fire in Engine Room of Container Ship

Narrative

On 24 August 1998, the 50,350 gt container ship *Repulse Bay* was on passage from Rotterdam to Port Said. At 1902 alarms sounded indicating low air pressure on the main engines exhaust valve springs and a fire in the engine room. At the same time the main engine slowed down automatically.

An investigation found several small fires on the main engines exhaust manifold and oil spraying on to it from a broken pipe on No 7 unit. The engineers stopped the main engine and lubricating oil pumps, and promptly tackled the fires with foam fire extinguishers. They were successful.

Bolts securing the exhaust valve actuator housing to the cylinder head were found to have fractured enabling it to move freely. This caused the attached oil pipe to fail and oil to impinge on a small unlagged area of the exhaust manifold around welded support brackets and ignite.

After replacing the exhaust valve, actuator securing bolts and the oil pipe, the remaining spilt oil was cleaned up. The main engine was then restarted and *Repulse Bay* resumed her passage.

The Lessons

Failure of any component on a diesel engine has the potential to cause significant damage.

Although regarded as static items, the securing bolts on this exhaust valve actuator were subjected to cyclic loads and were therefore working under conditions where fatigue could become a problem.

Metallurgical tests showed that these bolts had failed due to fatigue. Some of the precautions which can be taken to reduce this type of failure are:

1. An engine manufacturer may specify the material, method of manufacture and working life of critical bolts and studs. If so, it is important to use specified components and ensure they are renewed when specified working life is expired.

2. The pre-loading of bolts, studs etc has a significant effect on the level of stress induced in service. Too low a pre-load is as likely to promote fatigue failure as too high. If a manufacturer recommends a pre-loading specification, its guidance should be followed.

3. Wear of damage to threads, even if apparently minor, can generate stress concentrations that will, in turn, reduce a component's resistance to fatigue.

4. Where the manufacturer makes no recommendations, or none are available, there are some easily visible features which should disqualify bolts and studs being fitted to critical engine assemblies. These are: rough surface finish, corrosion, sharp internal corners, worn or damaged threads, sign of fretting from previous service and distortion such as bending. Some of these features are also applicable to mating threaded components such as nuts.

Case 5
Procedural Failure leads to Near Disaster

Narrative

This 1,871 gt twin screw passenger ro-ro vessel *Claymore* is fitted with two marine diesels, each driving through a gearbox to a controllable pitch propeller. She was securely moored at number two Linkspan in Heysham harbour and was loading traffic over the stern ramp.

At about 0330 during a break in the loading, the master and chief officer went down to the shore end of the linkspan leaving the second officer on the bridge. The chief engineer was working in the bow thrust space while the second engineer was preparing the main engines for departure. The master and chief officer suddenly noticed that the ship was beginning to move forward. They shouted to the bosun to lift the ramp clear of the linkspan. They were just in time; the mooring lines began to part. This was at about 0340. Realising that the main engines had been started with the pitch set at full ahead, the chief officer contacted the second officer on the bridge who reacted immediately by moving the pitch control lever to neutral taking propulsive power off the propellers.

The vessel had by now cleared the berth and was drifting slowly down the dock. Fortunately the weather was fine with only a light breeze. As the master and chief officer reboarded the vessel via the pilot boat, the second officer started the steering gear and dropped the anchor at about 0350. Once on board, the master and chief engineer tested the pitch controls, raised the anchor, and manoeuvred the vessel back into her berth. A subsequent examination found no damage to either vessel or linkspan.

The direct cause of the incident was starting the main engines with the controllable pitch propellers set in the ahead position. The company has a standard procedure for starting main engines which includes carrying out a full functional test of the pitch control mechanism. This is designed to identify any fault in the system before the main engines are started.

All interlocks on the control system were tested on this occasion and found to function correctly. The only way to start the main engines with the pitch at full ahead was for there to be no control air on the system. The second engineer states that control air was available but that immediately prior to starting the main engines, he had blown through the control air lines to drain off any moisture. This action may have temporarily lowered the pressure and volume of control air to pitch control allowing it to move to the full ahead position under the emergency control air failure fail safe condition.

The Lessons

1. Procedures laid down in a Ships Operational Manual are designed to ensure a safe method of operation and should be followed to the letter. Failure to do so can, as this case shows, lead to an emergency and possible injury and damage.

2. Before attempting to start the main engines, the bridge should be told and asked to confirm that all is clear aft. This action not only alerts the bridge as to what is happening in the engine room but it also allows them to monitor the controls on the bridge.

3. If, as in this case, there is a possibility that draining the air line immediately before starting the main engines can cause a temporary loss of pressure in the control air supply resulting in

movement of the pitch control, it is essential that the dangers are brought to the attention of all engineering staff.

Case 6
Failure of Pilot Ladder while Boarding

Narrative

The 9,088 gt ro-ro vessel *Merle* was on passage from Belfast to Heysham.

She operated between the two ports on a regular basis and the master held a Pilot Exemption Certificate. *Merle* was subject to frequent security checks by Royal Marines when entering or leaving port and this entailed the vessel being boarded while underway in the confines of Belfast Lough. It also involved having to rig the pilot ladder frequently. Because of this the security services eventually instructed the master to have a means of boarding available at all times.

To meet this requirement the master had the pilot ladder rigged just forward of the accommodation to a point on deck, and at the correct length to reach the water. It could be recovered by a block and tackle suspended on the superstructure. When not in use the ladder was suspended upside down between the deck attachment and the block.

The ladder was not at risk from any physical damage but was exposed to the weather at all times.

On the day in question the Royal Marines informed the master that the vessel would be boarded. The master instructed his crew to lower the pilot ladder and the three man boarding party came alongside *Merle* shortly afterwards in their 7m Rigid Inflatable Boat (RIB).

Once in position the first two marines started to climb while the third prepared to follow. When they were halfway up the ladder one of the manila side ropes parted, catapulting them both into the RIB below where they became entangled in the broken ladder.

Both marines were injured.

The reason why the manila side ropes parted was that they had been over-exposed to the weather and had weakened over a period of time.

The Lessons

1. Any cordage will weaken if continually exposed to the elements. When a pilot ladder, or indeed anything similar, is left in an exposed position for prolonged periods, it must be examined frequently and replaced at regular intervals. Rain, seawater, sunlight and general exposure will take its toll on any equipment left exposed to the elements. A cover will provide some protection.

2. It may prove helpful if a record is kept of such equipment and when the cordage is replaced.

Footnote

Regulations regarding transfer arrangements can be found in *Statutory Instrument* 1999 No 17 *The Merchant Shipping (Pilot Transfer Arrangements) Regulations* 1999.

Case 7
Cargo Vessel Runs Aground shortly after Leaving Port

Narrative

The 1,059 gt cargo vessel *Oakland* completed loading in the port of Buckie in the early evening. The chief officer secured the vessel for sea and she sailed a couple of hours later in the dark. The weather conditions were favourable, the wind was south-westerly force 34 and the visibility was good.

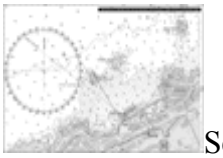
The master, an experienced shiphandler, piloted the vessel himself. After leaving the berth, he personally manoeuvred *Oakland* out of harbour. The chief officer joined the master on the bridge shortly before clearing the northern breakwater.

Once clear of the breakwater the course to steer to make for the open sea was 295° leaving the shoreline and some rocks to port and the West Muck rocks to starboard. From his previous experience and earlier advice from the pilot who had brought the vessel into port, the master knew that this course cleared the south rocks by about 350m and West Muck rocks by about 150m.

A light beacon which marked the West Muck rocks and lay some two and three quarter cables to the north-west of the northern breakwater was not lit. Neither the master, nor the mate was aware of this.

Once clear of the harbour the master became distracted by the working lights of a vessel at anchor about a mile distant and thought he was to port of his intended track. He altered course to starboard to regain it and, once he thought he was back on track, altered back to port. Moments later *Oakland* grounded on the West Muck rocks.

The following morning *Oakland* was refloated on the rising ride with the aid of a tug. Damage was minimal and the vessel proceeded to Invergordon for further inspection.

 Select the thumbnail to view the accompanying chart (300KB)

The Lessons

1. This grounding typifies the sequence of events that features in many marine accidents. An experienced master is confident of his ability to undertake what appears to be a straightforward act of pilotage, ignores the need to do any detailed planning, assumes his intended action is safe, allows himself to become distracted by something and then suffers the ultimate embarrassment of running aground. Ships in this situation tend to become the centre of attention for the media and the subject of a difficult interview with the owner. If pollution results, the consequences become even more painful. It is not a recommended course of action and can be avoided by planning.

2. There is nothing wrong with navigating by eye, providing the necessary preparation is done. A qualified pilot will spend many years accumulating experience as preparation. He will, furthermore, check tides, expected traffic movements and navigation warnings. The master of a vessel making an occasional visit is less likely to have had this background and has to adopt traditional pilotage and navigation techniques in addition to making the

standard last minute checks. Not only does he need to study the charts, sailing directions, tidal information and notices to mariners, but he must prepare a plan with dangers highlighted, clearing bearings calculated and minimum depths predicted. Buckie has a lit transit that provides a ready use reference for ships to stay clear of the West Muck rocks.

3. The straightforward analysis of this accident reveals that the master did not know precisely where he was once he had cleared the breakwater, assumed he needed to come a certain distance to starboard to regain an intended track and ran aground as a result. Had he looked astern at the leading lights he would have had an instant check on his position relative to the West Muck rocks.

4. As in all accidents this was a catalogue of ifs. Had the West Muck rocks beacon been lit the master would have been aware he was steering into danger. Yet he never knew the light was unlit and doesnt seem to have registered he had not seen it once he had cleared the breakwater. If the master had employed a helmsman he would have been able to devote his full attention to conducting safe pilotage and would probably have recognised he was too far to the north side of the channel.

5. A common factor in many small ship groundings is the finding that the vessel concerned is being steered by either the master or watchkeeper, not by a seaman. When navigating in shoal waters or narrow channels, a dedicated helmsman should be employed. Apart from being seamanlike it is called for in the STCW Code. With minimal manning there is a great temptation to avoid using ratings as helmsmen and many of them never gain the necessary experience. When the need arises they may not necessarily have the appropriate skills. Train your ratings as helmsmen and use them. Steering is one of the oldest skills of seamen and is just as important today as it ever was.

6. When conducting your own pilotage always check with the harbour authorities to ensure you know of any local notices to mariners.

Case 8
Cleaner Stops Ship!

Narrative

The *Island Commodore*, an 18 knot, twin engined ro-ro cargo vessel was on a reduced speed passage from Jersey to Portsmouth using one main engine. Electrical power was being supplied from a generator driven off the main engine gear box. The weather was good with a calm sea. At 1330, the watchkeeping motorman started to clean the top of an electrical cabinet. To gain access to it, he stood on top of a sounding pipe and leant over a fuel oil booster pump. In doing so he accidentally activated its emergency stop button.

The fuel booster pump stopped causing the main engine fuel pressure to fall. This, in turn, caused the main engine to slow and eventually stop. When the main engine started to slow down, the generator breaker on the main switchboard tripped resulting in a black out. Emergency power came on automatically but all the vessels main power systems shut down.

The watchkeeping engineer, who was in the stores at the time, returned immediately to the engine control room to restart the auxiliary plant and restore power. Once this was achieved, the main engine was restarted. The vessel continued her passage. Once everything had been restored to normal, the cause of the failure was investigated.

When it was discovered that the motorman had inadvertently activated the emergency stop button a protective cover was fitted to prevent it happening again. It allowed easy access but prevented accidental operation. Similar covers were fitted to the pumps in the sister vessel.

The Lesson

1. All emergency stops should be fitted with a brightly coloured protective cover. The design of the cover should make it easy to see, easy to operate, but its function is to prevent accidental operation.

Footnote

This incident highlights the need for an active Safety Committee and regular zone inspections. Experience already indicates that these can be very effective in preventing accidents. This unprotected stop switch was a perfect example of what should attract peoples attention so that the appropriate action can be taken. Safety committees should examine all new regulations, operating requirements and the implications of new equipment to see whether any affect the risk profile. Regular committee meetings and zone inspections should be a feature of the safety regime in any vessel.

Case 9
Crewman Falls into Dock while Attempting to Board

Narrative

The 60m offshore supply vessel *Northern Mariner* was moored alongside in Heysham Harbour one evening. The vessel was engaged in supplying offshore gas installations and was a regular visitor to the harbour.

Due to the extreme rise and fall of the tide, the gangway could be rigged in one of two positions and required frequent adjustment by the crew.

It was normal practice for the crew to lower the gangway onto the dockside at around midnight and leave it there until 0700. The master judged it impracticable for the night watchman to keep on adjusting it as the tide rose and fell. When the gangway was lowered, the ends of the two rope lashings used to secure it when rigged, were retained on board to allow easy recovery in the morning.

On this particular evening three crew members from a safety standby vessel, who were effectively passengers being transferred to their own vessel offshore, went ashore for a few drinks at the local pub. Before setting off, the master reminded them to be back on board before midnight for safety and security reasons.

Two of the three returned shortly after midnight and lowered the gangway onto the dockside. The third man had indicated an intention to visit a night club but was unable to say when he would be back.

At 0100 the third crewman returned to find the gangway was so positioned that it was resting halfway up the side of the hull. One of its securing ropes had got caught on board so that when the tide rose, it had lifted the inboard end with it.

Under the influence of alcohol, the lone seaman approached the gangway thinking it was rigged and climbed up it. On reaching the top, he toppled off and fell into the dock.

His shouts were heard and help came. He was sent to hospital where he remained until the following day. Fortunately, he only suffered from mild hypothermia and bruising to the neck and shoulder.

The Lessons

1. It is hard to imagine a crew anywhere that wont have tales to tell about people returning onboard after a good run ashore. Some will be hilarious, others more sobering and, occasionally, there will be the tragic recollection of someone being badly injured or, worse still, losing a life. This one had a relatively happy ending but it could have been very different and all because some basic precautions were not taken.

2. It is the owners and masters responsibility to provide a safe means of access to and from the vessel at all times when alongside. This includes the provision of adequate lighting. If this is impracticable access should be banned. If again, there are reasons why this cannot be implemented, suitable warnings must be clearly displayed.

3. Although there may have been reasons in this case for doing so, the practice of landing the gangway at night should be avoided. If a gangway has to be adjusted continually to match the rise and fall of the tide, somebody should be detailed off to tend the gangway at all times. There may be times when the vessel has to be evacuated or boarded in an emergency and the time taken to rig the gangway could be crucial.

4. Returning to any vessel under the influence of alcohol is dangerous. Alcohol impairs your judgement. Even with the best rigged access arrangements, accidents can happen. If going ashore for a drink, moderation is the key word.

Footnote

Guidance to the Regulations regarding a safe means of access required on board vessels can be found in Chapter 6 and 18 of the *Code of Safe Working Practices for Merchant Seamen*.

Case 10
Bulk Carrier runs Aground after Master Falls Asleep on Watch

Narrative

The 1,602 gt dry bulk carrier *Sea Humber* was on passage from Glasgow to Belfast in ballast.

The master and the mate were the only qualified watchkeepers on board. The bridge watches were split on a five hours on, five off basis. During the seven days prior to the incident, the master had worked for a total of 106 hours. This included watchkeeping, shifting ship, loading cargo, pilotage and being present on the bridge in heavy weather.

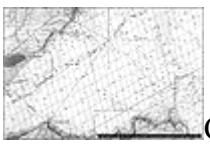
On the morning prior to arrival at Belfast the master came on watch at 0330 and relieved the mate. The weather was fine and clear with good visibility and a SSE wind of force 3. No lookout was posted; one was only used in poor visibility. The vessel was steering 213° on autopilot and the master intended altering course to 236° into Belfast Lough shortly after 0430.

After fixing the ships position at 0430, the master returned to his seat in the wheelhouse to watch the radar and promptly fell asleep. With nobody awake on the bridge the vessel maintained her course across Belfast Lough and ran aground at full speed on Grey Point on the southern shore at 0455. The master was thrown to the deck by the impact.

Sea Humber was detected as an unidentified contact on Belfast Port Radar as she approached the Lough and was called up on VHF radio. As she was still outside port limits there was no requirement to identify herself. When she neither replied nor altered course, it was assumed she was a fishing vessel. She then entered a radar shadow zone to the east of Grey Point and was lost to sight. Her grounding was not detected.

Following the impact the master stopped the engines and directed the crew to take soundings all round. The vessel was not taking water and was found to be aground for one third of her length. Attempts to refloat her using the engines and adjusting the ballast were made without success. At low water it was discovered that damage was confined to the forefoot and two holes in the forepeak ballast tank.

At the next high water she was refloated with the aid of a tug and escorted to a safe anchorage in Bangor Bay. She was subsequently allowed to sail to Liverpool where repairs were carried out.

 Click on the thumbnail to view the accompanying chart (237KB)

The Lessons

1. This master was suffering from the cumulative effects of fatigue. He is not the first to be subjected to such a punishing routine. There will be many masters and mates in the short sea trade who, with justification on reading this narrative, will be thinking There but for the Grace of God go I.

2 The lessons from this accident are just as pertinent to flag states, owners and managers as they are to masters and mates. The MAIB has consistently drawn attention to the problems faced by ships officers required to maintain a watch and watch about routine in the very tight

schedule of the short sea trade and there is little more that can be said. In our opinion, an effective watchkeeping routine cannot be maintained with only two officers for long. This accident serves to reinforce our point. A very tired man who sits down at night is very likely to go to sleep. Even if he manages to stay awake, perhaps forced to by the noise of a watch alarm, his effectiveness is much reduced.

3. So what lessons are there for the master or mate who finds himself in this situation? The commercial realities dictate that normally the certificated minimum number of people are employed. So what can he or, more to the point, the owner do to prevent these unnecessary accidents?

4. The caring owner should make it abundantly clear that he will support any master who makes a legitimate decision to anchor his ship, or delays sailing, while he and the mate necessarily catch up on sleep. There will be cries of outrage by people who will accuse the MAIB of not understanding the realities of the short sea trade, that ships must maintain schedules and that watch alarms are the answer. If such charges are made we will respond with all the emphasis at our disposal that our main concern lies with the safety of the ships, the people who sail in them and for the protection of the environment. The sooner these ships are adequately manned to reach required schedules the better, and in the meantime, we would prefer to see masters receiving support should they decide to stop when they become so tired that they cannot maintain an effective watch.

5. There is one other lesson. Lookouts. During the hours of darkness an additional person should be posted on the bridge to act as a lookout. Had one been closed up (in accordance with the STCW regulations) it is probable that this accident would not have occurred. But lookouts do not relieve fatigue, they are there to act as a pair of eyes to prevent ships colliding, or running aground.

Footnote

Regulation 11 of *The Merchant Shipping* (Safe Manning, Hours of Work and Watchkeeping) Regulations 1997 does state that it is the masters responsibility to ensure that the watchkeeping arrangements for the ship are at all times adequate for maintaining a safe navigational watch having regard to STCW 95.

Case 11
Failure of Battery Charging Arrangements causes Loss of Steering

Narrative

The small ro-ro passenger ferry, *Loch Alainn*, carrying 38 passengers, four vehicles and four crew, was manoeuvring to clear its berth at Cumbrae Slip. Wind was force 56, occasionally force 7 giving seas sufficiently rough to cause moderate pitching and rolling. The loading ramp was being raised when the wheelhouse alarms sounded and steering control was lost.

With control lost, the vessel briefly made contact with its berth before drifting off parallel to the shoreline. The passengers were mustered and donned lifejackets. Two anchors were let go to hold the vessel 200m from its berth and 60m from the shore.

The coastguard was alerted and two lifeboats were quickly on scene together with other craft.

Technical staff from ashore boarded the anchored vessel and quickly established that 24 volt power supplies serving the control systems had failed because battery charging arrangements were incorrectly set. Main and emergency battery banks had gradually discharged over a period of several hours until their output was insufficient to power the control system. Once battery charging arrangements were reset and the 24 volt supply restored, *Loch Alainn* was able to weigh anchor and resume her short passage to Largs without further incident.

The incident was promptly investigated by the owners who were unable to find any positive reason for the incorrect setting of the charging arrangements. They did, however, identify a possible problem with the security of the battery room, particularly during the vessels overnight shut down periods.

The Lessons

1. Security is now recognised as a potential problem and the door to the battery room is secured by padlock with the keys in the custody of the vessels engineer or, at night when the vessel is unmanned, with shoreside security staff.

2. Since the incident, the start up and shut down check lists have been amended to ensure that the 24 volt supplies are positively checked at the beginning and end of each day.

3. A visual and audible alarm in the wheelhouse, to give warning of low voltage on the 24 volt system, would give warning before voltage drops to a critical level. A feasibility study was carried out by the owners and the 24 volt system has now been fitted.

Case 12
Deflagration in Sewage Tank System

Narrative

The passenger vessel *Island Princess* was originally fitted with a holding tank sewage system. With extended port stays, its limited tank capacity proved to be insufficient and an Omnipure sewage treatment plant was added. It is designed to oxidise and disinfect raw sewage by means of an electrochemical reaction. It macerates raw sewage, mixes it with sea water and then passes it through two electrolytic processing cells. The resultant electrochemical reaction produces clean water suitable for discharge overboard together with hydrogen, chlorine and other gases. About 0.2 ft^3/min of hydrogen gas per cell is produced and discharged overboard using a sea water eductor.

Island Princess was on passage towards Sydney, Australia, when a loud bang was heard and a bump felt. An inspection of the machinery space revealed that the walls of two of the tanks forming part of the Omnipure sewage system were bowed outwards. The system, which had been in use for about $13^1/_2$ hours, was immediately shut down. Further inspection showed that a small number of toilet and deck scupper seals in the crew accommodation had been blown out and that a crack had developed in the sewage vent main riser pipe.

Further investigation found:

- the inlet filter on the sea water eductor was choked and was preventing the flow of sea water through the eductor;
- the vacuum breaker fitted between the treatment tank vent line and the hydrogen eductor suction manifold had been fitted the wrong way round;
- a small bore drain line had been fitted in the eductor manifold;
- a small hole was found in the water trap in the vent line between the treatment tanks.

The cause of the over-pressurisation was deflagration* resulting from ignition of a build-up of an explosive gas mixture within the last two treatment tanks of the Omnipure sewage plant. There was visual evidence of over-pressurisation but no tell-tale indications of where ignition took place. Since hydrogen mixed with air requires very low energy levels to ignite, all potential low energy sources were examined but without any positive result.

The high pressure alarm fitted to the system did sound but only as a result of the deflagration and the subsequent over-pressurisation. It was not triggered by the initial gas build-up.

The hydrogen gas build-up in the last two sewage treatment tanks was due to a choked sea water inlet filter to the gas discharge eductor and the incorrectly fitted vacuum breaker. Additionally, the small bore drain line allowed hydrogen gas to enter the second treatment tank while the hole in the water trap allowed air to be drawn via the vent line into the last two tanks.

Following the investigation:

- The vacuum breaker was refitted correctly;
- The small drain connection fitted on the eductor manifold was removed;

- The eductor, sea water pump and pipe system was renewed with a larger pump, pipes and inlet filter;
- The damaged tanks were repaired.

The Lessons

1. When new equipment is being installed, either by contractors or suppliers, always check at each stage of the installation, that items are correctly fitted.

2. Sewage treatment plants are not the most interesting part of a vessel but this incident illustrates the importance of monitoring all machinery systems. Gases released during sewage treatment can be explosive under certain conditions and toxic under others. Always make yourself familiar with the operating principals of the system and know what potential problems can occur.

Footnote

*Deflagration can be defined as:

> A very rapid oxidation (or combustion) with the evolution of heat and light as well as the generation of a very low intensity pressure wave of moving gases.

Note that this is a low-pressure wave and not a shock wave.

Case13
Collapse of Cargo Stack causes Death of Stevedore

Narrative

The Cyprus registered cargo vessel *Kim*, of 1,597 gt, arrived in Avonmouth at 0224 on 23 February 1998 with a cargo consisting of prebanded timber and granite blocks. She had a single hold and the cargo was stowed in parcels as it had arrived on the jetty at the loading port.

The discharge had, as normal, been preplanned by the Bristol Port Company based on the ships manifest and stowage plan. This culminated in the stow being inspected by a representative of Bristol Port Company to note any variance with the stowage plan, movement of the cargo during transit and any other factor. The inspection was undertaken when the hatch was opened soon after arrival and before any work started. The stow was found to be neat and tight.

The stow consisted of granite in various locations separated by stacks of timber. Some of the granite blocks were loose and others were on pallets. The timber stacks consisted of up to five bundles of timber each of rectangular cross-section, weighing approximately one tonne and measuring about 2m x 1m x 1m. Each bundle was secured with three clean steel bands. The timber within each bundle was banded in smaller parcels.

Discharge with one gang of stevedores began soon after arrival and continued until 1645 with no indication of any problem. Both timber and granite blocks were discharged during the day.

The discharge restarted the following morning at 0700 with two gangs, one working the forward end of the hold and the other the aft. A parcel of timber cargo situated under a strong back separated the work areas. The after team began discharging granite blocks using a Bobcat truck on the floor of the hold to pick up the blocks and tip them into skips ready for lifting ashore. Due to mechanical problems the Bobcat was replaced by a fork lift truck being used to discharge timber from the central area of the hold. Several bundles were unloaded leaving a dog-leg in the athwartships face and a five high stack of timber with a vertical face aligned fore and aft.

At 0815 the repaired Bobcat was returned to the hold and the after gang resumed discharging granite blocks. Apart from a break for breakfast they continued until 1015 when the top three bundles on the fore and aft face of timber suddenly collapsed. One of the stevedores was killed.

The precise cause of the accident has not been identified. It is suspected that while a load was being lifted from the hold, the stevedore had retreated under the strongback, to a position he regarded as safe. This placed him below the fore and aft face of the timber stow. Timber had not been worked in the area of the accident for at least two hours.

Something triggered the collapse of the top bundles in the stack of timber. It may have become unstable due to:

- the ship movement caused by the removal of loads during the cargo operation;
- the progressive increase in list and trim caused by ballasting, bunkering and cargo operations which were happening simultaneously;
- the movement of machinery in the vessels hold;

The stack may have collapsed due to failure of the banding of one or more bundles of timber.

The Lessons

1. Tall stacks of cargo may become unstable due to gradual changes in the ships condition. Initially they may be held stable by slight contact with adjacent cargo but even a small change in ships attitude can break the contact and leave the stack unstable.

2. Never stand under a vertical face of cargo, however safe it might appear.

Footnote

The accident was investigated by the HSE. This account has also drawn on a report compiled by Bristol Port Company.

Case 14
Loss of Steering Control on Safety Standby Vessel

Narrative

The *Viking Sentinel* is a 673 gt purpose built safety standby vessel operating in the North Sea with a crew of 12. The vessels main propulsion system consists of two azimuth propeller units, each powered by a high speed diesel engine. It is controlled from consoles on the bridge and, for emergency purposes, locally within the engine room.

The propulsion control systems relies on a 24 volt electrical supply. Normally this is supplied from the main switchboard, via a transformer and rectifier, but an emergency supply is available from a bank of batteries maintained on a trickle charge. The emergency control in the engine room is purely mechanical and does not rely on the 24 volt system.

The vessel left Montrose early in December, following a crew change, and headed for an offshore installation where she remained on station for a little over a week. Weather conditions became very poor, with seas 89m high.

The first reported symptom of a problem was the failure of the battery charging system. The following day the vessel reported a total steering failure. Efforts to restore steering were unsuccessful and a tow was arranged. Very poor weather resulted in the tow line breaking. As a safety precaution personnel were taken off two nearby platforms. The tow was reestablished and the vessel eventually reached a Norwegian port.

Investigation established that three separate breakers serving both the 24 volt supply and the battery charger had tripped. No certain reason could be found for these breakers being open, neither was it established why the crew did not close them. Closing these breakers restored the 24 volt supply and the battery charger output. It also allowed all steering and propulsion systems to operate normally.

The Lessons

1. Emergency steering arrangements are important. They should be accorded the same high priority as other emergency systems such as life saving and firefighting equipment.

2. Crews should be very familiar with the arrangements for emergency steering. When primary steering fails it is often essential that it is restored without delay. A team that has no idea how to check what part of the system has failed, is not well placed to react to a standard, albeit rare, shipboard breakdown. It becomes an emergency only when nobody knows what to do or the ship is in danger of grounding.

3. The crew should have ready access to instructions about what to do when things go wrong with the steering.

4. As with any safety system, crews should regularly practice using emergency steering arrangements.

5. Failure of a safety standby vessel has potentially serious implications for those working on offshore installations.

Case 15
A Collision and Near Miss in the North Sea. Dredgers Involved

Narrative I

The *Arco Arun*, was engaged in dredging operations on the Wash Bank at night and was correctly displaying the lights for a vessel restricted in her ability to manoeuvre.

During the evening, the watchkeeper detected another vessel 2 miles off her starboard quarter and closing. This was the 400 gt general cargo vessel *Ena* on passage from New Holland to Rotterdam. From plotting, it became apparent that the approaching vessel was on a steady bearing and taking no action to avoid a collision.

Arco Aruns officer of the watch sounded five short and rapid blasts several times on the ships whistle and increased the ships propeller pitch to maximum. This was followed by directing a searchlight towards the *Ena* to attract her attention.

In a last attempt to avoid a collision the watchkeeper put the helm hard to port in the hope that this action would result in *Ena* passing astern, but because *Arco Arun* was hampered by her dredging gear she was slow to respond to the manoeuvre.

Moments later *Enas* port bow glanced *Arco Aruns* starboard quarter and then continued raking along *Arco Aruns* starboard side until clear. After the incident a damage assessment was made and radio contact established between the vessels and the coastguard.

Fortunately damage to both vessels was limited. *Ena* continued on passage after standing by for a short period and *Arco Arun* made her way to the Tees for repairs. There was no pollution.

Narrative II

The *Arco Bourne* was engaged in dredging operations with her dredging gear deployed on her port side. She was correctly displaying the shapes for a vessel restricted in her ability to manoeuvre but was not displaying the prescribed signals to show the safe side for others to pass. Unless there was an obstruction on one side she was under no obligation to do so.

During the morning, another vessel, the *Bastiaan Broere*, a 3,693 gt chemical tanker, approached *Arco Bourne* from astern doing 12 knots and on a very similar heading.

The master of the *Bastiaan Broere*, saw the shapes displayed by *Arco Bourne*, noted they were positioned on her starboard side and assumed it was safe to pass on the port side.

Bastiaan Broere overtook *Arco Bourne* at a distance of approximately 1 to 2 cables.

Arco Bournes master contacted Yarmouth Coastguard and reported a near miss.

Radio contact was eventually made with the master of *Bastiaan Broere* who considered that he had passed *Arco Bourne* at a safe distance and on the correct side.

The Lessons

1. A vessel engaged in dredging is restricted in her ability to manoeuvre and relies on other vessels to recognise this and take appropriate measures to keep clear. The dredger will

display the appropriate shapes by day and the lights by night to indicate what she is doing. The approaching vessel has a responsibility to look at those shapes or lights to determine what they signify. This is one of those occasions when eyesight very definitely takes precedence over the radar set. It is also obvious that a sound knowledge of the Rules is essential. Once these vessels have been sighted ahead it is far too late to be rummaging through the book shelves to find out what the Rules say about the shapes or lights being displayed and what they mean.

2. The prescribed signals for a vessel restricted in her ability to manoeuvre do not in themselves indicate which side to pass, irrespective of where they are displayed. If such vessels *have* an obstruction on one side however, then additional shapes or lights *are* required.

> **To quote an extract from Rule 27 of the *Collision Regulations: A vessel restricted in her ability to manoeuvre, , shall exhibit (ii) three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond.***
>
> ***A vessel engaged in dredging or underwater operations, when restricted in her ability to manoeuvre, shall in addition, when an obstruction exists, exhibit;***
>
> ***(i) two all-round red lights or balls in a vertical line to indicate the side on which the obstruction exists;***
>
> ***(ii) two all-round green lights or diamonds in a vertical line to indicate the side on which another vessel may pass.***

3. All dredging areas in home waters are, as a minimum, charted on the largest scale Admiralty and INT charts. Particular caution should be exercised when navigating in these areas.

4. In the first narrative, *Ena* was probably not keeping a proper lookout. It isnt known why but once again the importance of having a dedicated lookout at night is clearly demonstrated. Failure to do so breaches the regulations, is irresponsible and can lead to death and injury.

5. In the second, daylight situation, the master seems to have misidentified the displayed shapes. He took a decision to keep clear at a range of between 1 and 2 cables. Others reading this narrative will have their own views about whether this was an adequate distance to pass a dredger in open water, but there was no reason why a greater distance should not have been adopted. One two cables is close, far too close. Unless there are good reasons for passing so close, a much wider berth should be given to a dredger. Apart from anything else, the wash is unlikely to be helpful.

Case 16
Lack of a Safe Access Results in Fatality

Narrative

The 29.90m long Belgian tug *Jerome Letzer* was moored at her normal berth in Victoria Dock, Dundee. During the day the contractors experienced difficulty boarding and leaving because of the vessel movement alongside. There was no easy means of access and those on board had become used to clambering on and off by stepping onto some rubber tyre fenders and heaving themselves over the bulwark.

At the end of the day in question all bar one of the crew went ashore leaving the chief engineer and two contractors on board to progress some maintenance.

The shore contractors completed their work in the early part of the evening and went ashore leaving the chief engineer on board. Sometime later he too went ashore leaving the vessel unattended and the generators shut down. *Jerome Letzer* was left in darkness.

The following morning, a shore contractor discovered the body of the chief engineer in the dock alongside the bow.

A torch lay on the dockside, it was switched on but the batteries had discharged.

The post mortem revealed the chief engineer had died from salt water poisoning and that he had consumed a significant amount of alcohol. Heavy bruising to the head indicated he had struck a solid object.

The Lessons

1. There were no witnesses to this accident, but it is probable the chief engineer lost his footing and fell between the vessel and the dockside when he tried to climb back on board via the tyre fenders. The vessel was unattended and in darkness. Due to the rise and fall, the berthing ropes had become slack thus allowing the vessel to move in and out from the jetty. As she was less than 30m long she was not required to carry a gangway, but was still required by law to have a safe means of access. Boarding was a hazardous pursuit. At night and in darkness it was more so. A proper means of access must always be provided and owners and masters have a responsibility to ensure this is done.

2. Alcohol consumption in moderate quantities impairs judgement. This becomes even more of a problem when moderate gives way to heavy drinking.

3. Always ensure that the means of access to the vessel is well illuminated, and a safety net is provided beneath it.

4. This accident reveals a very typical human factor seen in many marine accident investigations. Very often a procedure is established, often to solve a particular problem, but without adequate thought for the risks involved. The procedure then develops into a bad habit which nobody questions. By the time it becomes the accepted practice, real dangers exist but nobody queries them until the accident occurs. Good seamanship and common sense dictates that everyone is constantly on the lookout for the bad practice and doing something to correct it before it is too late.

Footnote

Guidance to the Regulations regarding a safe means of access required on board vessels can be found in Chapters 6 and 18 of the *Code of Safe Working Practices for Merchant Seamen*.

Part 2 Fishing Vessels

No two accidents are ever quite the same but certain trends begin to emerge, not only when scrutinising several reports in quick succession, but by keeping a weather eye open and monitoring what fishermen themselves are saying.

The narratives that feature in this edition embrace the full spectrum of what can go wrong in the industry and are repeated so that people can learn from them. For those who persevere and read them all or, better still, discuss them with friends will note the number of occasions when flooding incidents occur. The flooding reports that feature in this edition are representative of those examined by the Branch. Many others are also received and, taken overall, certain observations can be made about why so many fishing vessels appear to experience flooding.

On first inspection it seems the common denominator is the fishing vessels age. There is every indication to suggest that the older boats experience flooding more frequently than those built in recent years. Closer scrutiny, however, reveals that while age may have a part to play it is not so much how old it is but how well certain items of equipment onboard are looked after.

Take the automatic bilge alarm. The purpose for which it is designed, built and installed is to give notice to the watchkeeper that there is excess water in either the engine room or fish hold, and, occasionally, in other compartments. To function, it must be installed correctly, switched on and checked to see it is working correctly. It is surprising the number of times a flooding accident is reported and the MAIB discovers the bilge alarm has either been switched off, has been landed for repair, or is known to be defective and nothing has been done about it. Yet on other occasions it has been instrumental in alerting the skipper to flooding down below and ensuring there was sufficient time to contain it.

It is hoped that by drawing attention to preventable problems with bilge alarms, a skipper will pay particular attention to ensuring that on his boat, it is installed, functioning properly, and switched on.

The second observation to be made from flooding reports is the number of times there is a problem with either a valve or a length of pipeline on some part of the sea water services system. This system carries a substantial quantity of water through it and if it is breached for any reason, flooding will follow unless very rapidly contained. Finding out there is a problem in a full gale while on the fishing grounds is not everyones idea of fun. It could be extremely serious and peoples lives could be placed at risk let alone the eventual consequence to the vessel involved.

The moral is obvious. Treat all seawater services with the greatest possible care. Whenever the vessel is slipped or docked examine all parts of the system to ensure there is no corrosion, that the valves open and shut correctly and that they seat properly. Use a professional surveyor, replace defective or worn parts immediately and talk to colleagues to learn of their experiences. A length of pipework with multiple right angled bends in it is far more susceptible to failure than a straight length.

If there is one item of equipment that needs more tender loving care than most on board it is any part of the seawater services. Look after it and it won't let you down.

Case 17
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 910 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 they had been recovered they were dropped straight into a plastic portable net bin.

Before the first fleet of nets had been hauled, the skippers 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 Frenchman. The two deckhands were pre-occupied on deck; one was on the port side next to the bulwark and 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.

Heart of Oak of Helford

The Lessons

1. The first lesson in basic seamanship is to make sure 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 him on board without the victim 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. But how do you get him on board?

6. 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 round the working deck and the crew now wear single chamber self-inflating lifejackets at all times when working on deck.

Case 18
Explosion aboard Fishing Vessel causes Injury

Narrative

An explosion occurred in the 24m long stern trawler *Egalite* during repair work to insulation in the fish room. One of the crew suffered burns to his face and right hand.

The repair work involved applying expanding foam from an aerosol can. The crew had not appreciated that the gases from an aerosol can be inflammable and will slowly build up in a confined space. It then only needs a spark to ignite it and cause an explosion. This occurred when a cigarette lighter fell from someones pocket as the owner bent down to pick up a can. Without warning the gases ignited and the explosion occurred.

The Lessons

1. Ensure good ventilation of spaces where spray application maintenance work is being carried out.

2. In circumstances where danger of explosion might occur all potential sources of ignition should be removed. Any aerosol can which contains a flammable warning on the label (a black flame on a yellow/orange background) and is used in a confined space is a potential hazard.

3. A conscious appraisal should be made of what constitutes a possible source of ignition. Some are obvious such as smoking, an open flame or hot spots in a machinery space. Others are less so, matches, an electrical switch being made, or a cigarette lighter that falls out of someones pocket.

Case 19
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. Finding it clear he opened the sea inlet valve again in the expectation that the water pressure would remove the blockage. It didnt. He then pushed a compressed air line into the strainer and inlet pipe and opened the air valve. Air was admitted and 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 couldnt use the handwheel. He then tried a gripping wrench but this, too, didnt 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.

Case 20
Mistaken Identity

Narrative

Arctic Corsair, a trawler of 53.85m registered length, grounded in Isfjorden, Spitzbergen, on 16 September 1998.

The vessel left Longyearbyen at 0430 and proceeded to sea. The skipper, who was alone in the wheelhouse, cleared Adventfjorden and set a course of 260° on the autopilot towards a position off Erdmannodden on the north side of the fjord. He intended to alter course to port when 2.5 miles off it and head towards the open sea leaving Festningen Island on the south side of the fjord 2.5 miles to port.

While approaching his intended alteration point and using radar as his primary means of navigation, the skipper misinterpreted the echoes on his radar and thought the land ahead of him was Erdmannoden. He altered course when he assumed he was in the appropriate position, came round to port as planned and, soon afterwards, went aground. He then discovered that the land ahead that he had assumed was Erdmannoden was in fact the next, and much higher, headland some 2.5 miles to the west of it. He ran aground on well charted rocks.

No courses were drawn on the chart and no positions were plotted. The skipper navigated by radar alone with occasional reference to the chart. Two radars were operating; one on 3 miles and the other on 32 miles range. A watch alarm was not fitted.

The vessel had been in port since 1320 to clear a fouled propeller. Since 0600 the previous morning the skipper had only managed to sleep between 0140 and 0345. He was keen to resume fishing as soon as possible and decided to sail before dawn. The mate had been on duty throughout the night and the skipper decided to take the first watch to allow the mate to get some sleep. The vessel also carried a qualified second mate who had been asleep since 2100.

Although company standing instructions required a lookout to be posted, the skipper did not normally do so.

The grounding ruptured two fuel oil tanks and caused extensive damage to the hull but there was no evidence of pollution and flooding was restricted to double bottom tanks.

Following the accident, the master was tested for alcohol by the Norwegian authorities. It proved negative.

The management company has since issued a memorandum to each of its vessels highlighting the lessons to be learned from the accident. The company intends to provide its officers with specific training in leadership skills and to enhance their watchkeeping skills by seconding them to vessels other than trawlers.

 Click on the thumbnail to view the accompanying chart (195 KB)

The Lessons

1. The root cause of the accident was the lack of a proper passage plan. The distance from Longyearbyen to the open sea is about 35 miles. Isfjorden itself is deep and about 7 miles wide at its narrowest. One or two places on the southern shore, including Festningen, are marked by lights. Spitsbergen is not exactly on a main shipping lane and there is only one British Admiralty chart that covers the entire territory known as Svalbard. Nevertheless, study of this chart shows that it is possible to plan a passage to sea through Isfjorden keeping at least three miles clear of danger and without steering for any headland.

2. By any normal reckoning it was a very straightforward passage. Before sailing, courses should have been drawn on the chart, dangers highlighted, minimum soundings identified, the ranges of lights marked and parallel indexes calculated. The range scales of radars should have been selected with care.

3. The lack of any passage planning was aggravated by the skippers total reliance on radar as his prime means of navigation. Had he used any one other skill, the chances of his not going aground would have significantly increased and would probably have been avoided. Had he used all the tools necessary for responsible navigation his passage to sea would have been without incident. So what didnt he do? Not only did he fail to draw a course on the chart but he never plotted a fix. Without a fix, no DR was calculated. He relied totally on radar detecting land ahead. Without parallel indexes he never gave himself an opportunity to check his displacement to one side of the channel or the other. The fjord shoals towards either shore but there is no record of him having used the echo sounder. It would have warned him that he was on the wrong side of the 100 fathom line.

4. A second contributory cause was the choice of radar range scales; one was too high to be of practical use and the other too low to identify the land in sufficient time. An intermediate range scale would have enabled detection of the adjacent headlands and an opportunity for the skipper to recognise his error. Radar is only an aid to navigation, and misidentfying land echoes is one of the oldest mistakes in the book. All conscientious navigators cross-check the positions obtained with a secondary source. If this cannot be done, veer on the side of caution and assume the vessel is in the position nearest to danger. And take the appropriate action.

5. Although there is no evidence to suggest the skipper fell asleep, a tired man can never be as alert as the one who is properly rested. The risks involved in putting to sea when short of sleep and without any navigational planning were very high indeed. The possibility of a lone watchkeeper falling asleep where there is no watch alarm fitted can never be discounted. Without the provision of a dedicated lookout there is always the risk that whoever is on watch will be reluctant to spend too much time attending to basic navigation.

6. The second mate was rested and could have taken the watch. The skipper could have delayed sailing.

Case 21
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 seabed.

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 to be sprayed 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 a 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 closed fully. 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 in limiting the severity of a flooding incident.

2. The second incident shows the importance of maintaining a vessels bilges free of rubbish so it cannot be drawn into the bilge system.

3. Valves on a bilge system must be regularly checked for correct operation.

Case 22
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.

 Select the thumbnail to view the accompanying chart (227KB)

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 23
Deckhands Injured whilst 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 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 24
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 the 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:

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

b. the fracture of the casting itself.

The mechanical damage seen in the bore of the main casting was most 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 25
Fishing Vessel Flooded during Bilge Pumping

Narrative

When hauling the prawn trawl on board, the skipper sensed that his 6m long steel fishing vessel *Val G* 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 fish room prevented the spread of the flooding. The coastguard were 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 own bilge pumping system which had been recently renewed. The skipper had set the valves with the intention of pumping out from the fish room, 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 be 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.

Part 3 Leisure Craft

One of the most safety conscious sectors in the marine community are the leisure craft users. Whereas fishing newspapers rarely devote much space to safety matters except in the aftermath of a tragedy, the yachting and motorboat press devote page after page to safety. Much of it is pertinent, some of it is based on personal experience and all of it provides food for thought. Occasionally the yarns are very amusing. A touch of humour can be very effective in pushing a message home.

This is largely borne out by the relatively small number of serious accidents involving leisure craft. There are any number of small ones and there will be few yachtsmen who can put their hands on their hearts and say that his last time at sea was totally trouble free or that he didnt do something that in retrospect was pretty stupid but thankfully nobody was watching. Where the majority of leisure craft users are at a serious disadvantage over their professional colleagues, is in the accumulation of experience. The person who only goes sailing a few times each year can hardly hope to match the experience of someone who is at sea in all weathers year after year. Even the most experienced and well respected yachtsmen will be the first to admit they always learn something whenever they set sail. Every passage, race, potter or circumnavigation is a learning experience. The important thing is to learn from them.

The *Safety Digest* plays a small part in this process. It describes various accidents and deliberately reflects on certain features for people to think about and, hopefully, learn. It cannot possibly replace real life experience but it might prevent some of the more tragic accidents from repeating themselves.

If the leisure craft sector has a problem, it is with the near misses; the accidents that nearly happened but were somehow avoided at the last moment. In most circumstances the only visible consequence is probably a badly frightened helmsman, or a skipper pouring himself an extra large gin when he finally gets home. None of these near misses are particularly new but are exemplified by the helmsman who insists on crossing ahead of that large container ship bearing down on him in a narrow channel but knows full well he should have given way. Or the man working on deck at night trying to take in a reef but isnt clipped on or wearing a lifejacket. Or the man who thinks he can smell gas and switches on the cabin light so he can see better. Everyone of us has some experience he would rather forget about but it is vital we learn from them, and even better when the lessons stem from somebody elses misfortunes.

Safety briefings are an important feature of life afloat. Skippers are reminded that peoples lives may be placed in jeopardy if those embarked are not given a safety brief before getting under way. This will obviously have to be tailored to the experience and knowledge of those present, but at the very least everyone should know where the lifejackets are stowed and how to put them on. They should also be shown where to stow things so that personal gear doesnt get in the way or breaks loose the first time you go about. The greatest shortcoming in yachts that proudly feature accommodation for eight is that the readily available stowage space is about right for two. Other essentials in safety briefings is knowing where the fire extinguisher is, where the first aid kit is stowed and reminding people of that traditional marine adage, one hand for yourself and one for the boat.

Case 26
Yacht Knocked Down in Bay of Biscay. One Man Lost

Narrative

The Beneteau Oceanis 390 *Ocean Madam* was on the final leg of a delivery voyage from Malta to Plymouth, UK, when she was knocked down twice in a severe gale while sailing across the Bay of Biscay in a force 9 severe gale. She recovered from the first knockdown but remained inverted after the second. Her skipper and one of the two crew members survived but the second was swept away and never recovered.

Ocean Madam was skippered by an experienced yachtmaster but her two crew had little previous sailing experience.

Before leaving her last port of call, La Coruña, weather forecasts had been received indicating strong to gale force winds, up to force 8 from the south-west in the Bay of Biscay. Once *Ocean Madam* was at sea BBC Radio shipping forecasts were taken. Winds up to severe gale force 9 were forecast in the northern part of the Bay of Biscay.

On their second evening at sea and when about 110 miles south-west of Brittany, conditions developed as forecast. Steep seas with wave heights of 79m were encountered with a south-westerly force 9 blowing. Occasional waves were observed to be coming from the east which created a confused sea.

With one of the crew at the helm, and under shortened sail in the dark, the yacht was laid flat by a wave. She righted immediately but the event alarmed both skipper and crew. The skipper took over the helm and retained one of the crew on deck to help him. An hour later the yacht was knocked down again but this time she inverted and failed to recover. Once he realised she was not going to right itself, the skipper extricated himself from the submerged cockpit and found his way to the surface where he managed to cling to the transom-mounted boarding ladder.

After an indeterminate period the yacht righted herself and this enabled the skipper to climb back on board. On regaining the cockpit he discovered that the yacht had been dismasted and that he was alone. There was no sign of the crewman who had been on watch with him. When last seen he been wearing a lifejacket and safety harness and had been clipped on. There was no indication of harness failure so it is assumed he had unclipped himself when trapped under water.

The off-watch crewman came on deck after seeing water pouring into the cabin through the open hatch. The situation was aggravated by the washboards falling out.

The two survivors could hear shouts from the man overboard but were confronted with an inflated liferaft that was flailing around in the wind and required securing. This became their immediate priority. In the meantime the crewman activated the yachts EPIRB while the skipper donned his lifejacket.

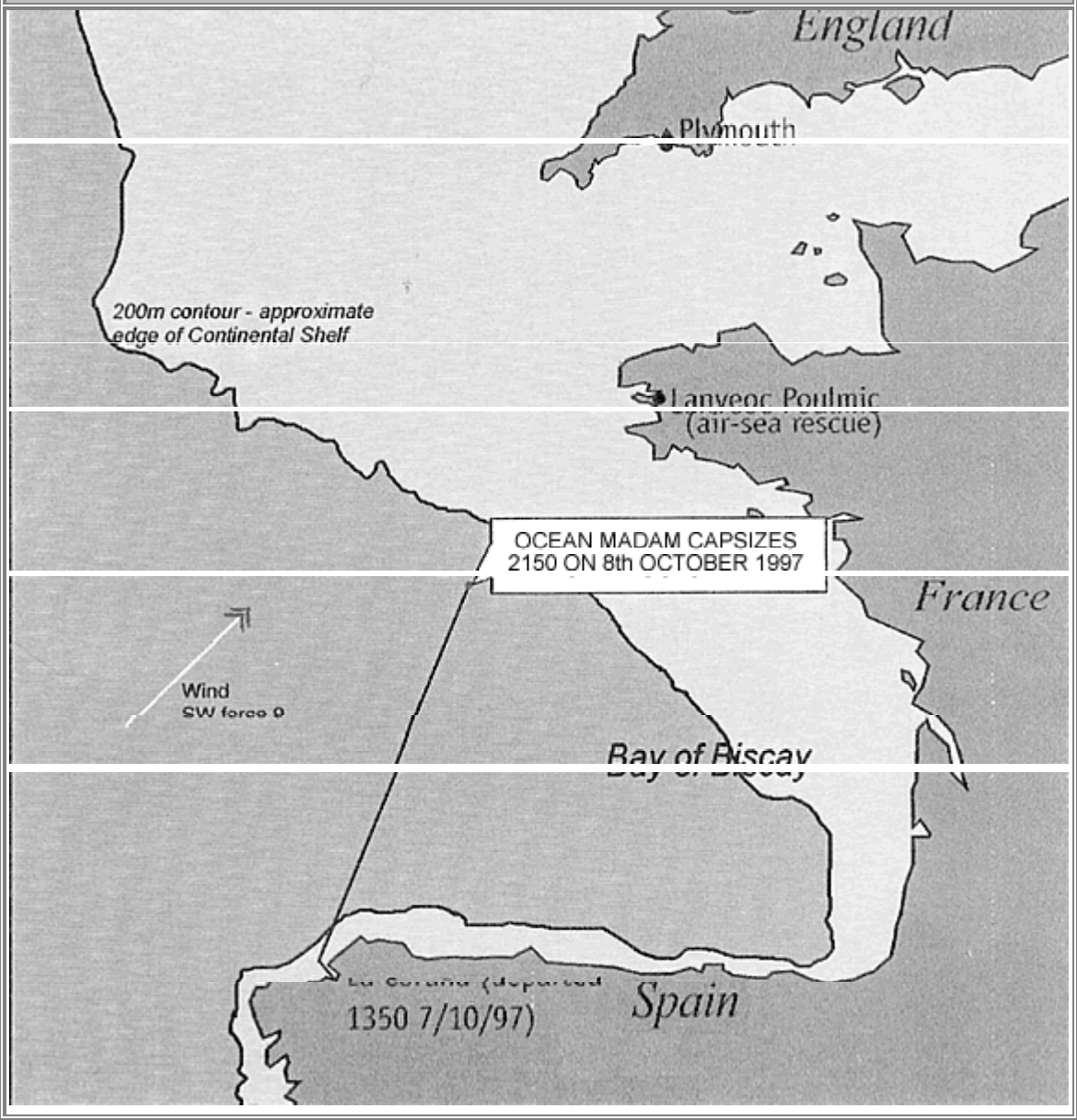
The only way to secure the liferaft in the extremely difficult conditions was for the two men to climb into it and make it fast. With both men in the liferaft another wave broke over them and the painter parted before it could be secured. Within seconds they were being swept away. Although any realistic chance of saving the missing man had now passed, they hoped it could still be achieved. Before anything further happened another wave broke over them and capsized the raft.

Attention then turned to survival. They had great difficulty trying to right the capsized liferaft and were finally forced to climb onto it with it upside down. It capsized again.

They managed to get back on board and spent the next few hours trying to keep warm. They also set off several flares to try and attract the attention of what they thought were passing ships. Meanwhile the EPIRB had successfully operated to alert the French SAR authorities. In the early hours of the morning a fixed wing aircraft found them and at 0530 they were rescued by a French air-sea rescue helicopter.

The missing crewman was never found.

Figure 1: Bay of Biscay showing location of incident



Lessons Learned

Introduction

Any death at sea prompts questions as to whether it could have been avoided. Such questions become more pointed when the events are associated with a leisure activity. Sailing involves many risks and a voyage in bad weather attracts more risks than most. The cause of this accident was bad weather but there were many underlying factors which contributed to the final outcome. As in all accidents there are several lessons to be learned both in the lead up to the capsize and in the hours that followed.

The Lessons

1. The ability to survive in heavy weather is dependent on three factors; a suitable boat, thorough preparation and an experienced and well worked up crew. Providing all three criteria can be met, there are no overwhelming reasons why sailors should not confront these conditions. But as soon as any one of these requirements is ignored, overlooked or underestimated, the risks escalate. If all three are disregarded then the attempt becomes dangerous and the consequences potentially tragic.

2. In deciding whether a boat is capable of standing up to bad weather, there is little to replace practical experience of the actual craft and a sensible appraisal of what it is capable of. This must be supported by an understanding and knowledge of equipment carried and the boats handling characteristics. Once the shelter of the land is left behind, a skipper is placing great trust in the boats design, her rigging, maintenance and watertight integrity. Any small boat is subjected to immense forces in heavy weather and if anything unexpected gives, disaster can follow.

3. *Ocean Madams* skipper knew the boat and had already sailed several hundred miles in varying weather conditions on this voyage without cause for concern. He did not, however, know enough about her stability to predict her performance in the heavy weather likely to be encountered in an autumn gale in the Bay of Biscay. Yachts are designed for particular conditions and should not be deliberately placed in situations for which they are unsuitable. There is a world of difference between a craft suitable for summer cruising and one designed to cross oceans in all weathers.

4. If the stability characteristics of a modern high displacement sailing yacht are unknown, err on the side of caution. Breaking waves in high sea states can be extremely dangerous to this type of craft.

5. The decision to sail is always the skippers. He should not be influenced by perceived peer group pressures but must make a realistic judgement based on sound knowledge. If there is no need to sail when bad weather is forecast, there is nothing to be lost by delaying the departure until conditions improve.

6. Weather forecasting continues to improve but skippers have, ultimately, to make their own judgement based on the best possible data. This includes an analysis of a series of weather reports, in depth study of the sailing directions and local information. Many yachtsmen think of weather in terms of wind strength and the Beaufort Scale. The very experienced sailor goes one further and thinks of it in terms of sea state. A force 9 severe gale in the Solent is one thing; it is something completely different in the shallow seas of the North Sea or the open wastes of the Southern Ocean. High seas can come from different directions; not just the one forecast. This unpredictability is one of the factors that makes them so dangerous. Significant wave height is one thing, the maximum height is another; it can be substantially higher.

7. The skippers greatest asset is a good crew. A well worked up team who get on well together is a pearl beyond price. Leading such a crew is a great challenge and very rewarding. It is as important a function as an in-depth knowledge of the sea and sailing and can be overlooked. Once mutual trust begins to break down, or inexperience creeps in and tiredness takes a hand, the problems escalate. Handling a yacht in rough weather makes huge demands on a crew, especially when their experience of such conditions is either very limited or non-existent. If too much is expected of them, they are unlikely to be sufficiently effective. The problems can also escalate if the crew is short handed or they succumb to sea sickness.

8. Handling a boat well in heavy weather can only come with experience. It is not something you acquire from books, but there is a mass of available literature with some extremely good advice that should not be overlooked. Skippers will devise their own systems and check lists to prepare for, and conduct, heavy weather sailing. Such checks will have two underlying themes; keeping sea water out of the boat and the crew in it. The fitting of washboards falls into one category, the wearing of lifejackets and safety harnesses is in the other.

9. EPIRBs should be registered correctly with the Maritime and Coastguard Agency, and a double check made to ensure it has been done if someone else is doing it for you.

10. The two survivors in this accident had a reason to climb into the liferaft. Under normal circumstances it is invariably more sensible to stay on board. Yacht hulls usually survive the worst the weather can do.

11. Among the most important items of kit carried on board any vessel, including yachts, are those relating to lifesaving. It is too easy to assume that because they are on board they will work when required. Every owner should have a system for ensuring that all lifesaving equipment is thoroughly checked and any requisite servicing is meticulously carried out by the dates due. They should check that flares are in date and kept dry, that jackstays are maintained in good working order, that lifejackets are in good condition and that the effects of UV light do not weaken the fabric of equipment carried on the upper deck. Danbuoys should not disintegrate when removed from their stowage.

12. When planning the contents of a grab or panic bag, give careful thought to the circumstances under which it might be opened. It wont be on the kitchen table at home or the skippers bunk in harbour. It is much more likely to occur in a tossing liferaft in rough weather in the middle of the night, when you are almost certainly feeling distraught, shaken and very distressed. You might even be injured or even very ill. The question to be answered is: what will I need and what am I likely to want first?

13. The skipper of *Ocean Madam* had attended a sea survival course. The MAIB is seeing evidence that attendance on this course is proving to be a life saver literally. It is very highly recommended.

14. Keep the registration details of EPIRBs up to date with HM Coastguard. This can be achieved via a simple fax.

Case 27
Four Die in Narrow Boat Accident

Narrative

The narrow boat *Drum Major* was transiting the Leeds and Liverpool canal during the afternoon of 19 August 1998 with eight people on board. Four were disabled with learning difficulties and were sitting in the lounge area of the accommodation. The rest were social service carers who operated and controlled the boat through the locks.

During their return cruise to the boatyard, *Drum Major* entered Steg Neck lock near Gargrave in preparation to descend in what should have been a perfectly normal, and familiar, operation. However on this occasion she was joined by another similar sized boat. She lay alongside the left hand side of the broad lock with the other boat lying next to her on the other side. In accordance with established practice, care was taken to ensure the rudder was clear of the top gate and the cill that lay beneath it.

Both paddles were opened to release water from the lock and the level started to go down. Shortly afterwards it was realised *Drum Majors* bow fender (commonly known as a turks head) had caught in the narrow gap between the balance beam and the top of the gate. As the water level continued to be lowered, frantic efforts were made to release the fender. They failed and she became suspended by the bow. She assumed an increasing bow up angle until the stern was sufficiently depressed to allow water to start pouring in over the stern and into the accommodation.

As soon as they became aware of what was happening, immediate steps were taken to stop the lock draining and to open the gate paddle at the top end of the lock to refill it. The water released by this action poured into the stern deck but within seconds the suspended bow slipped from the lock gate allowing *Drum Major* to fall heavily into the lock and create a wave that swept through the boat. The surge of water sank her. The four disabled people on board became trapped inside and were drowned before they could be rescued.

The Lessons

1. The procedures for taking a narrow boat through a lock are straightforward and anyone using inland waterway canals should be familiar with them once they have done it a few times. Of the many precautions they need to take when descending, boat handlers should be aware of the need to keep the boat clear of the top end gate and its cill. These precautions were taken on this occasion but less attention was paid to what was happening at the other end. Keep an eye on both ends when ascending or descending in a lock.

2. This accident draws particular attention to the need to check that the bow fender is clear of the adjacent gate and cannot be caught as the level is lowered. Before any paddle is opened to empty a lock, a positive check must be made that it is clear before, and immediately after, they are fully opened. If there is a problem, the paddles must be shut as fast as possible.

Drum Major in Steg Neck Lock

Drum Major fender caught on the lock gate

Appendix A

Investigations commenced in the period 01/05/99 30/09/99					
Date of Accident	**Name of Vessel**	**Type of Vessel**	**Flag**	**Size**	**Type of Accident**
03/05/99	Edinburgh Castle	Cruise	UK	32,753 gt	Accident to Personnel
14/05/99	Wahoo	Small Commercial Sailing	UK	9.2m	Accident to Personnel
18/05/99	Sea Centurion	Royal Fleet Auxiliary	UK	21,104 gt	Accident to Personnel
29/05/99	Unnamed Dory	Pleasure Craft	UK	4.34m	Foundering
06/06/99	Willem B	Tug	Netherlands	42 gt	Accident to Personnel
07/06/99	Purbeck II	Fishing Vessel	UK	11.03m	Accident to Personnel
13/06/99	Toisa Puffin Luc	Offshore Supply Fishing Vessel	Bahamas UK	282 gt 16.95m	Collision
25/06/99	P&O SL Calais	Ro-Ro Passenger	UK	26,433 gt	Dangerous Occurrence
30/06/99	Lord Trenchard	Sail Training	UK	25.03 gt	Explosion Vessel
03/07/99	Random Harvest	Small Commercial Motor	UK	9.86m	Flooding
16/07/99	Dea Fighter	Offshore Supply	UK	1,022 gt	Dangerous Occurrence
17/07/99	Purdy	Small Commercial Motor	UK	10m	Accident to Personnel
03/08/99	Sharona	Fishing Vessel	UK	18.75m	Foundering
06/08/99	Radiant Star III	Fishing Vessel	UK	24.38m	Foundering

07/08/99	Bluebell of Warsash Unknown	Pleasure Craft Unknown	UK	10.44m	Collision
15/08/99	Fraoch Ban	Fishing Vessel	UK	15.12m	Capsize
31/08/99	Donna M	Fishing Vessel	UK	8.80m	Capsize
01/09/99	Sonia	Gen Cargo	St Vincent & the Grenadines	4,659 gt	Flooding
02/09/99	Union Arbo Philomena	Gen Cargo Multi deck Fishing Vessel	Bahamas UK	1,522 gt 27.30m	Collision
10/09/99	Jasper III	Fishing Vessel	UK	24.20m	Foundering
16/09/99	Wilson Flyer	Pleasure Craft	UK	4.2m	Capsize

Appendix B
Inspectors Inquiries

An Inspectors Inquiry is the highest level of investigation carried out by the MAIB. Reports arising from such Inquiries are normally submitted to the Secretary of State for the Environment, Transport and the Regions within twelve months of the date of the incident.

Such reports are published, subject to the approval of the Secretary of State.

The following accidents are at present subject to Inspectors Inquiries and will be submitted to the Secretary of State:

Name of Vessel	**Brief Details**
Island Princess	**Passenger Cruise Ship; Economiser Accident**
Rema	**Coastal General Cargo Vessel; foundered in North Sea**
Multitank Ascania	**Fire on chemical tanker in Pentland Firth**

Appendix C
Reports issued in 1999

Sapphire Sinking of fishing vessel on 1 October 1997 with loss of four lives
Published 18 March 1999
ISBN 1 85112 107 2
£10

Gaul Report on the underwater survey of the stern trawler and supporting model experiments
Published 16 April 1999
ISBN 1 85112 171 4
£20

Sand Kite Collision of dredger with the Thames Flood Barrier on 27 October 1997
Published 24 April 1999
ISBN 1 85112 108 0
£20

MAIB Safety Digest 1/99
Published May 1999

Margaretha Maria Sinking of fishing vessel between 11 and 17 November 1997 with loss of 4 lives
Published 22 July 1999
ISBN 1 85112 109 9
£12

MAIB Annual Report 1998
Published 3 August 1999
ISBN 1 85112 184 6
£16

Green Lily Grounding of cargo vessel on 19 November 1997 with loss of one life
Published 11 August 1999
ISBN 1 85112 183 8
£12

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

A list of Stationery Office stockists and distributors outside the UK appears in Appendix D.

SAFETY DIGEST
Copies of this publication can be obtained, free of charge, on application to the Marine Accident Investigation Branch (Mrs J Blackbourn 023 8039 5500).

Appendix D
Stationery office stockists and distributors overseas

If there is no agent in your country and you have difficulty placing an order, please write to:
Stationery Office Books, PO Box 276, London, SW8 5DT, England

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Buenos Aires

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Kowloon

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Technical Books (Pty) Ltd
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Anreith Corner
Hans Strijdom Avenue
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(PO Box 2866
Cape Town 8000)

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4327/3 Ansari Road
Daryaganj
New Delhi
110002

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CH 1002, Lausanne

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Nicosia

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Kobmagergade 49
Copenhagen 1150

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Singapore 2262

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(Al-Jubeiha)
Amman

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Leiden

Germany

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Wiesbaden

Norway

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Gibraltar Bookshop
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