MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 1/2006

Department for Transport

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Department for Transport
Eland House
Bressenden Place
London SW1E 5DU
Telephone 020 7944 3000
Web site: www.dft.gov.uk

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MAIB
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MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department for Transport, the Chief Inspector of Marine Accidents being responsible directly to the Secretary of State for Transport. 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 and incidents. 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.

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

The Editor, Jan Hawes, welcomes any comments or suggestions regarding this issue.

The Safety Digest and other MAIB publications can be obtained by applying to the MAIB.

If you wish to report an accident or incident please call our 24 hour reporting line 023 8023 2527

The telephone number for general use is 023 8039 5500.

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

Summaries (pre 1997), and Safety Digests are available on the Internet: www.maib.gov.uk

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

The role of the MAIB is to contribute to safety at sea by determining the causes and circumstances of marine accidents, and working with others to reduce the likelihood of such causes and circumstances recurring in the future.

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

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

INDEX

Glossary of Terms and Abbreviations

AB	–	Able Seaman
BA	–	Breathing Apparatus
CO_2	–	Carbon Dioxide
COLREGS	–	International Regulations for the Prevention of Collisions at Sea
ETA	–	Estimated Time of Arrival
GPS	–	Global Positioning System
GRT	–	Gross Registered Tonnes
HP	–	Horsepower
IMO	–	International Maritime Organization
"Mayday"	–	The international distress signal (spoken)
MCA	–	Maritime and Coastguard Agency
MGN	–	Marine Guidance Note
OBO	–	Oil Bulk Ore
OOW	–	Officer of the Watch
RIB	–	Rigid Inflatable Boat
RNLI	–	Royal National Lifeboat Institution
RYA	–	Royal Yachting Association
SWL	–	Safe Working Load
VHF	–	Very High Frequency
VTS	–	Vessel Traffic Services

Introduction

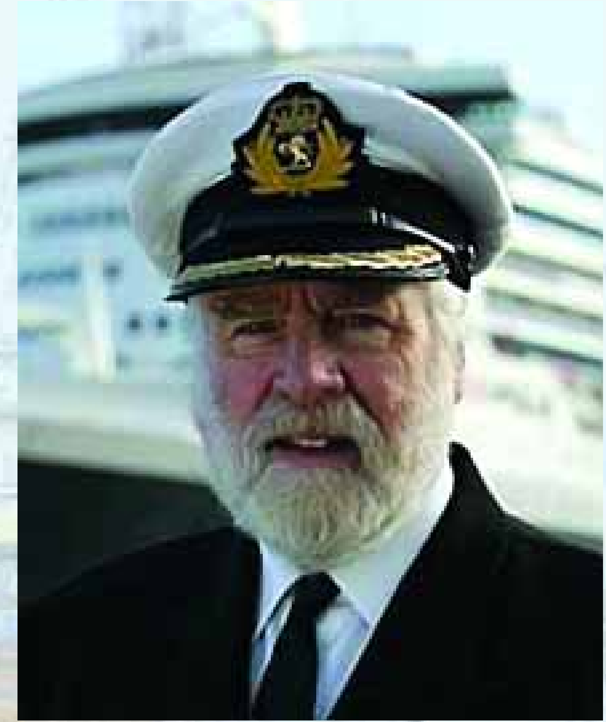
The diverse and growing readership of the Safety Digest is indicative of the wide range of accidents and incidents we report. This edition has a particularly broad span of cases. Sadly, we have fewer than normal good news tales, and many more with tragic consequences, particularly in leisure craft. I deal with this more fully in my introduction to the leisure craft section.

I will not try to précis the lessons from the accidents in this edition or offer a homily on the wisdom of risk assessment or the danger of complacency. I will leave it to each case to make its own impact.

Nearly every accident is a tragedy – whether it be through death, injury, loss of career or some other effect. It is difficult for MAIB inspectors to deal with these tragedies on a daily basis, and to know that the accidents could all have been avoided . . .

Stephen Meyer
Chief Inspector of Marine Accidents
April 2006

Part 1 – Merchant Vessels



I feel pleased to have been given the opportunity to write an introduction to this edition of the "Safety Digest" as this, in effect, serves as my personal endorsement of the valuable contribution to the seafaring community carried out by the MAIB.

In my career at sea, spanning just over 47 years, I have seen the use of the word *safety* increase year by year, and now there is hardly a nautical publication that does not include the word. In particular, there is the Code of Safe Working Practices for Merchant Seamen.

The Code of Safe Working Practices for Merchant Seamen clearly states our responsibilities towards safety. Of particular note is that the Code makes the Master responsible to ensure that safety is enforced. The importance of the Master's responsibility is highlighted by the fact that non compliance is a punishable offence. There are very few professions that make their senior staff accountable to such a severe degree. Accordingly, it is of paramount importance that officers embrace the culture of safety very early in their career, and have a clear understanding of the associated legal accountabilities of the Master. At the same time, the Master is not allowed to forget that he works for an owner that expects the ship to be profitable, so he is then tasked with balancing matters of safety against the requirements of making a successful commercial voyage.

This takes us into the realms of risk management. Probably the best piece of 'risk' advice I ever received was given to me shortly after I obtained my Second Mates Certificate in 1961. My first trip as a Third Mate was on a very small ship called the *Palaccio* of the MacAndrew Line. Once or twice a week, we used to round Cape St Vincente. As we approached the Cape, the Captain would come on the bridge and take charge of the ship. He would alter the course so that we passed less than half a mile from the coast, so one could easily see people in the monastery that was built on the edge of the high cliff. It was quite a fascinating manoeuvre, and it was one that I visually enjoyed.

However, there was some risk because periodically we would meet another ship doing the same thing from the opposite direction, and often we would not see it until we had rounded the Cape. After enjoying this experience for several months, an older, more experienced Captain took over command, and immediately introduced an order saying that all coastal navigation courses had to be plotted 3 miles off the land in the daytime, and 5 miles off at night. Needless to say, this rule made a 4 hour spell on watch far less interesting. After a few weeks, curiosity and frustration got the better of me, and I plucked up courage to question the Captain about his rule. To question the Master in those days was unheard of, so I was emotionally prepared to receive some harsh words in reply. Instead, the Captain quietly said "son, you do not get any extra pay for taking unnecessary risks", and he turned away. To this day, I have never forgotten those words.

On our Atlantic crossings, one of the most frequently asked questions by passengers is about the *Titanic.* Some Captains I know feel that it is taboo to discuss the subject, but I have always felt to the contrary. The sinking of the *Titanic* was a tragedy, but out of that tragedy came some good. For instance, the International Ice Patrol was introduced, and new and improved safety regulations were put in place. However, we should not rely on accidents to improve safety, but instead should be pro-active and do everything we can to avoid them. Notwithstanding, accidents continue to occur, so it is important that we take advantage of the MAIB cases discussed in this, and previous editions, of the "Safety Digest" to remind ourselves and our seafaring colleagues of the dire consequences of putting safety on the back burner.

Commodore Warwick

Commodore Warwick commenced his sea-going career at the age of 15 as a cadet at the pre-sea training ship HMS Conway in North Wales. After obtaining his Second Mate's Certificate in 1961, he spent the next several years sailing with various companies to gain experience on different types of ships. In 1970, he joined the Cunard Line, where he served in many ships before taking his first command, Cunard Princess.

Commodore Warwick first took command of the Queen Elizabeth 2 in July 1990, and in June 1996 was appointed to the position of Marine Superintendent of the Cunard Line fleet. On 4 July 2002, at the keel laying of Queen Mary 2, he was appointed Master Designate, taking command of the new ship when she was handed over to Cunard on 22 December 2003.

In 2004, Commodore Warwick received the Shipmaster of the Year award from the Nautical Institute and Lloyds List, and was presented with the Silver Riband Award by the Ocean Liner Council of the South Street Seaport Museum for his lifetime achievement in the maritime industry. In 2005 he was made an Officer of the British Empire in the Queen's Birthday Honours, received an honorary Doctor of Laws degree from the University of Liverpool, and was awarded the Merchant Navy Medal. He is an Honorary Fellow of the Institute of Transport Administration, a member of the Admiralty Circle of the Maritime Museum of the Atlantic, a Younger Brother of Trinity House, a member of the court of the Honourable Company of Master Mariners, a founder member and Fellow of the Nautical Institute, Governor of the Marine Society, he is Patron of the Cunard Steamship Society, President of the Queen Mary Association and Vice President of the Bristol Ship Society. The Commodore holds the rank of Honorary Captain in the British Royal Naval Reserve.

CASE 1

Insist On Cargo Trimming – It Can Save Lives

Photographs courtesy of Smit

Narrative

Tragedy ensued after a recently-built, 161m state-of the-art bulk carrier carrying 23,243 tonnes of gravel and stone, hit rocks which ripped a hole in her side. Within seconds, the vessel heeled over and capsized. Many of her 30 crew members were trapped inside, and a valiant rescue attempt, involving cutting a hole through the vessel's hull, was hampered by freezing temperatures, darkness and the vessel's slippery hull. Eighteen seafarers lost their lives.

A court case, aimed at establishing the cause of the accident, reviewed the reliability of sea charts mapping the seabed where the vessel is believed to have run aground. However, the reason why this modern, state-of-the-art vessel capsized so quickly remained unclear.
A technical working group was therefore commissioned to assess the vessel's stability and to help prevent a recurrence of the accident.

The working group discovered that, when the cargo was loaded into the vessel's single hold, the cargo was not trimmed (there was not a flat cargo surface) in accordance with current regulations. Without trimming, the sides of the piles of cargo took up an angle of repose of between 32° and 38°.

The working group identified the very serious effects resulting from the consequent shift of cargo, and produced the following lessons to help prevent a similar accident in the future.

The Lessons

1. Had the cargo been trimmed during loading, the vessel could have sustained angles of heel of over 30° during her voyage, before the cargo would have begun to shift. This would possibly have given the crew more time to abandon ship safely.

2. It was calculated that, after the grounding, the ingress of seawater into the vessel through the hole in her side, would have eventually led to her capsizing. However, the time taken to capsize was considerably reduced due to the shift of cargo as the vessel heeled over.

3. Many types of cargo will shift: in another accident, untrimmed bulk cement, loaded into a large open hold, resulted in the loss of a vessel, together with all her crew. The vessel had not grounded, nor had she collided with another vessel, but she was operating in heavy seas. It is therefore essential that bulk cargoes are loaded and trimmed in accordance with the requirements of the IMO BC Code[1].

1 IMO 260 C (c) Code of Safe Practice for Solid Bulk Cargoes

CASE 2

Grounding – on a Soft Bottom

Introduction

A vessel was making an approach to a pilot station for the purpose of embarking a pilot to proceed upriver and berth. While embarking the pilot, the vessel ran aground. Luckily, the seabed was soft mud and no environmental or physical damage resulted.

Narrative

The vessel, a 23,000 tonne double hull chemical/oil tanker, was carrying 16,300 tonnes of lower sulphur fuel oil. The vessel arrived at the estuary early and proceeded to anchor in a designated deep-water anchorage. The master was informed by his agent that the pilot was booked for 1315 the following day; the master made arrangements accordingly. The time of 1315 allowed a 30 minute delay factor, after which berthing would have to be postponed.

Although the master was familiar with the estuary, it had been nearly 10 months since his last visit. Previously, the vessel had always entered close to high water; this time entry took place 1 hour before low water. The key resultant difference was that, on previous occasions the tidal stream had been setting to the south-west, whereas on this occasion it was setting north-easterly.

The distance from the anchorage to the pilot embarkation point was just over 10 miles. With the anchor aweigh at 1235, and a maximum speed of 14 knots, allowing time for acceleration and deceleration the vessel was never going to achieve the programmed ETA for the pilot of 1315. The prevailing force 6 westerly wind, and the north-east tidal stream, were both unfavourable. Pressing on at full speed, the vessel's progress was being monitored by the local vessel traffic services (VTS). There were no other vessels in the vicinity. The entry course had been planned as 262 and the initial request from VTS was for the pilot ladder to be rigged on the starboard side. The prevailing wind was virtually right ahead, and the designated pilot embarkation point provided sufficient sea room to port and starboard for a vessel to alter course and provide an adequate lee. In this case, however, the combination of ship speed and tidal stream meant that the vessel overshot the designated boarding point, and entered the channel close to a shoal area.

With the vessel now 20 minutes behind schedule, the pilot boat became aware of the high speed on approach, and called the vessel to slow down and swing to starboard to provide a lee for boarding. Communication between the pilot launch coxswain and the vessel became confused, and this led to further delays. Throughout this process, the vessel was being set to the north of her planned track and no allowance had been made to counteract the tidal stream.

With the OOW now on deck to meet the pilot, the master was unable to effectively monitor the vessel's position, and when asked by the pilot to turn to starboard he did so without fully appreciating the very close proximity of the shoal patch. As soon as the pilot had boarded, the master swung the vessel back to port, but by the time the helm had been put over, and the vessel started to swing back, it was already too late – the vessel had grounded.

Lying on a soft mud and shingle bottom, the consequences were not detrimental to the environment, and by using the vessel's engines alone, she was successfully refloated 2 hours later, without sustaining damage.

The Lessons

1. **Poor planning considerations caused the delay in weighing anchor, which in turn required a high speed approach to the pilot boarding area. Always allow sufficient time to properly execute the passage plan. All too often, attention to detail becomes blurred against the perceived need to regain lost time.**

2. **The bridge team did not appreciate the strength, direction and effect of the tidal stream. Before starting to weigh anchor, it would have been prudent to conduct a short briefing between the key members of the bridge team. This would have ensured that everyone was familiar with all aspects of the passage plan. It would also have given the master an opportunity to study the standard of chart preparations, and revise the plan if he was not content.**

3. **The vessel's approach to the pilot embarkation area was being monitored by VTS. On this occasion, there was opportunity for VTS to be more proactive in their monitoring and, if necessary, advise the master of his close proximity to navigational dangers. Notwithstanding the earlier difficulties in communications, the request by the pilot vessel, for a swing to starboard to provide a lee, was inappropriate given the dangers close by. This was an excellent opportunity for both VTS and pilot to co-ordinate their individual responsibilities, each advising the other, and collectively both advising the vessel on the prevailing circumstances and dangers to navigation.**

CASE 3

Timber Deck Cargo Shift Leads to Dangerous List in Heavy Weather

Narrative

A general cargo vessel carrying 210m^3 of packaged timber cargo on deck encountered a very large wave on her starboard beam. The wave caused some of the webbing lashings and package banding to part and the cargo to shift. The vessel was passing close to the coast in strong south-westerly gale conditions, and it was winter. Although the conditions were not good, just prior to the accident the vessel had been making a steady 7.5 knots with only moderate pitching and rolling. The general poor weather conditions during the voyage from the loading port had already required the vessel to seek shelter on two occasions. The master had also taken the precaution of staying within the lee of an island, and hugging the coastline where possible.

During the early morning, and while still dark, the vessel left the protection of the island and set course in open sea conditions. Four hours later, the master, who was on watch, noticed a very large wave on the starboard side. The wave hit the vessel just forward of the bridge. The vessel heeled to port, to an angle estimated at more than 50°, before returning to

about 35°. A brief blackout occurred when the shaft generator stopped for several seconds and the emergency generator started, but the main engine continued to run. The subsequent investigation discovered that the vessel's track had taken her just downwind of a shallow patch, and it is thought that this is where the exceptionally large wave was generated.

The master rang emergency stations before attempting to slowly bring the vessel around to head north and put the weather on the port side. It was estimated that about 40 or 50 of the original 300 packs on deck had been lost, and about half of the lashings had failed. The remaining timber packages had moved to port, but were prevented from falling overboard by structure, at the ship's side, which was designed for the carriage of containers, and which caused the loose timber to jam between it and the hatch. Crew members were assigned to cut the remaining lashings in an attempt to jettison the rest of the packages and reduce the list. However, this was mostly unsuccessful.

The master attempted to wash away the loose timber overhanging the port side, but the list increased to over 40°. As a result of this, the coastguard issued a distress message on behalf of the vessel, and an RNLI lifeboat and two helicopters were tasked to the scene.

The vessel managed to make her way to a safe anchorage, where the deck cargo could be removed and complete packages eventually re-stowed. Fortunately, no injuries to the crew or serious structural damage to the vessel occurred.

CASE 3

The Lessons

1. The passage planning for the final leg of the voyage did not consider the possible effect of the shallower water downwind of which the vessel was to travel. The combination of strong south-westerly conditions, producing beam seas and shallower water, almost certainly caused the large wave encountered by the vessel. Given the prevailing weather and sea conditions, this was predictable.

2. Webbing or synthetic lashings have become more prevalent for securing deck cargoes in recent years, but are not mentioned in the IMO Code of Practice. They are quick and easy to use, they do not rot and are easy to store. They are, however, vulnerable to abrasion and are not suitable for really heavy-duty work. Regular and close inspection of the webbing material should be carried out, and worn lashings replaced. Consideration should also be given to using additional, alternative types of lashing to supplement the webbing lashings during winter or if heavy weather is predicted.

3. Due to the low value of the timber cargo, plastic wrappings or tarpaulins were not used on this vessel. The use of protective coverings would have assisted in reducing the amount of water absorption in the timber and consequent reduction in stability. It might also have reduced the possibility of packages being broken or distorted as a result of wave impact or heavy rolling.

4. The hatch covers were of smooth painted steel. This is not an effective non-slip coating, and when wet it has a particularly low coefficient of friction. One of the easiest methods to help prevent movement of a deck cargo, is to ensure that hatch tops are painted with a high friction coating. This reduces the effective loading on the lashing arrangement and reduces the possibility of lashing failure.

Let's Not Get Carried Away

Narrative

At 2230, a 20000grt bulk carrier anchored 3nm to the south-west of a pilot embarkation point in anticipation of entering port the following afternoon. The master left night orders for the main engines to be at standby, and to start weighing anchor at 1315. During the night, the second officer prepared the passage plan to the pilot embarkation point, which, from the anchorage position, was a single track of 030°.

At 1245, the master arrived on the bridge and saw that an 8000grt tanker, carrying petroleum products, had anchored 8 cables to the north-east, and was lying on the planned track to the pilot embarkation point. Accordingly, the master decided to leave the anchorage on a northerly course and pass to the west of the tanker. He was aware that the predicted tidal stream was easterly at 3 knots, but considered that his intended course would result in his ship passing clear. A course to steer to make

good a track of 000° was not calculated, and the master did not observe the actual rate of tidal stream, which was shown on the ship's electromagnetic speed log.

As the ship weighed anchor, she was heading directly into the tidal stream, and the engine was put to dead slow ahead to take the weight off the anchor cable. An AB helmsman, and the second officer, who was on the engine controls, accompanied the master on the bridge. The anchor was away at 1325, and 10° of starboard helm was used to alter course to the north.

The ship steadied on 000° at 1330, and by that time her speed was 5 knots. The master was aware of the close proximity of the tanker, but did not monitor her bearing, either visually using an azimuth gyro repeater, or by radar. At 1335, the master realised that the ship was being set down onto the tanker, and increased speed to slow ahead. At this point, the second officer plotted a fix on the paper chart. At 1336, speed was increased further to half ahead. Seconds later, the engine was put to full ahead, and the helm put hard to port to avoid the tanker. Once the bulk carrier's bow had passed the bow of the tanker, the helm was reversed to try and swing the stern clear. This action was unsuccessful, and at 1337 the starboard quarter of the bulk carrier struck the tanker's bow.

Both vessels were holed, but fortunately there was no pollution and nobody was injured.

The Lessons

1. Providing there is sufficient sea room, it is safer, and in the spirit of good seamanship, to pass astern of a ship at anchor. Passing close ahead of a ship at anchor is potentially perilous, but if it is unavoidable, the effects of the tidal stream, wind and a ship's manoeuvrability need to be taken into account.

2. Tidal stream is an extremely influential factor in navigation, and cannot be ignored. The slower a ship's speed, the greater its effect will be. When planning a passage, no matter how short, if the effects of tidal stream are not taken into account by the calculation of courses to steer in order to make good intended ground tracks, the value and usefulness of the passage plan is diminished. The time or effort taken to calculate and apply a tidal stream vector during the planning of a passage, can save a lot of anxiety during its execution.

3. When navigating in close proximity to navigational dangers, including other ships, it is important that bridge teams are effectively managed, to ensure that tasks are prioritised according to the nearest and most immediate dangers. It is equally important that full use is made of the equipment available, in order to obtain as much warning as possible of potentially dangerous situations or conditions.

Bring Back the *Budgie*

Narrative

A 22000grt general cargo vessel had recently arrived in port. Shortly after her arrival, she landed ashore all her BA sets and oxygen test meters for service and calibration – retaining none on board for use in an emergency. The ship's chief engineer and electrician worked late into the night on the emergency switchboard. The chief engineer left the electrician to complete the repairs, and went to his cabin to shower. While in the shower, the chief engineer heard the fire alarm sound, and received a report over the VHF of heavy smoke in the engine room.

The second engineer made his way to the engine control room, which he found in order. The engine room, however, quickly filled with dense smoke. The second engineer was instructed to leave the control room and, with heavy smoke now issuing from the engine room, the master and chief engineer considered it unsafe to enter. Further, they had no BA sets on board to assist in any attempt to do so.

The master decided it would be necessary to operate the engine room CO_2 system to extinguish the fire. The crew were mustered and accounted for. The engine room ventilation was stopped and all machinery space vents closed. All emergency stops were operated, however the main generator continued to run. The CO_2 flooding system was released into the engine room.

Shortly after the release of the CO_2, the shore fire brigade boarded the vessel, having been alerted by the master through the port authority. The chief engineer entered the engine room at the upper level, without BA, to guide the fire brigade. He had considered it unnecessary to use any form of respiratory aid, or check the oxygen level in the engine room prior to entry – in contravention of company procedures for entry into enclosed spaces which may contain a dangerous atmosphere.

While the engine room remained full of smoke, there was no sign of heating up of the bulkheads or any of the surrounding areas.

The fire brigade entered the engine room, with heat sensing equipment, and determined that the fire was extinguished. They left the vessel 3½ hours after the initial alarm. About 5 hours after the fire brigade had left, having given no guidance as to the time span for safe entry, the chief engineer went into the upper levels of the engine room to see if it was clear for entry. Again, he wore no BA, nor did he check oxygen levels prior to entry.

Following full ventilation, all engine room spaces were checked for satisfactory oxygen content, after a replacement meter had been obtained from ashore, and after having been confirmed as being free of CO_2. Main power was restored 15 hours after the initial alarm.

Subsequent investigation revealed that there was no trace of fire, and that the source of smoke was, in fact, a short circuit on the electric heater for the lubricating oil purifier, probably resulting from loose electrical connections. This is thought to have resulted in overheating and over pressurisation of the oil heater, leading to vaporisation of the lubricating oil through the heater relief valve. The high temperature alarm of the purifier system had not operated as the wiring had fused together, possibly as a result of the short circuit.

Examination of the vessel's CO_2 smothering system, after discharge, revealed that 7 out of a total of 91 bottles had not discharged, and the operating devices remained in the closed position. The CO_2 system had been serviced by an approved service agent 12 months previously, and the next annual service had, in fact, been arranged at the port of incident. Nevertheless, 7 bottles failed to operate. Examination revealed that the bottles in question were of an older style than the remainder of the system, and that the operating devices of some of them were severely corroded. All bottles were removed ashore, following the incident, for service and re-certification.

Investigation of the "running on" of the generator revealed that the fuel supply quick closing valve had not operated, leaving the fuel supply open. The quick closing valves were operated by an air cylinder from outside the engine room. Air supply to the quick closing valves came from a small tank which had a capacity to operate all valves together. When tested individually, all valves operated. However, when operated together, minor air leakage on the valve in question prevented it from operating.

The Lessons

1. **The importance of correct maintenance and calibration of essential safety equipment, such as breathing apparatus and oxygen measuring equipment, cannot be overstressed. However, before landing for service or repair, it should be positively ascertained that sufficient equipment is retained on board, or requested from ashore, to deal with any likely emergency which may arise while the equipment is away from the vessel undergoing service.**

2. **A vessel's safety management system should include procedures for entry into hazardous spaces. Crews should be drilled, at regular intervals, to enhance their awareness of such procedures, which should include entry into spaces which may have a depleted oxygen content (eg following the discharge of CO_2 "smothering" into machinery, or associated spaces).**

3. **CO_2 fire smothering systems are essential for the ultimate safety of a vessel. Despite the annual service and certification of such systems, planned maintenance schedules should include the routine examination of all associated equipment at regular intervals. In the event of any doubt as to the systems' operational condition, advice should be sought from the maker's service agent, without delay, to ensure that the system remains in good operating condition between service intervals.**

4. **During an emergency situation, crews must be confident that remote fuel isolation and remote stops will operate effectively; it may not be possible to enter a space to operate these locally. Routine testing of such essential equipment should replicate, as near as possible, the likely scenarios which may arise. In this case, routine testing of the fuel quick closing valves, *individually*, revealed no cause for concern. However, when operated in unison, minor air leakages resulted in insufficient air pressure to operate all the valves.**

5. **To ensure security, switchboard and terminal box electrical connections should be examined periodically under a planned maintenance routine. Such checks may be enhanced by the use of thermal imaging cameras.**

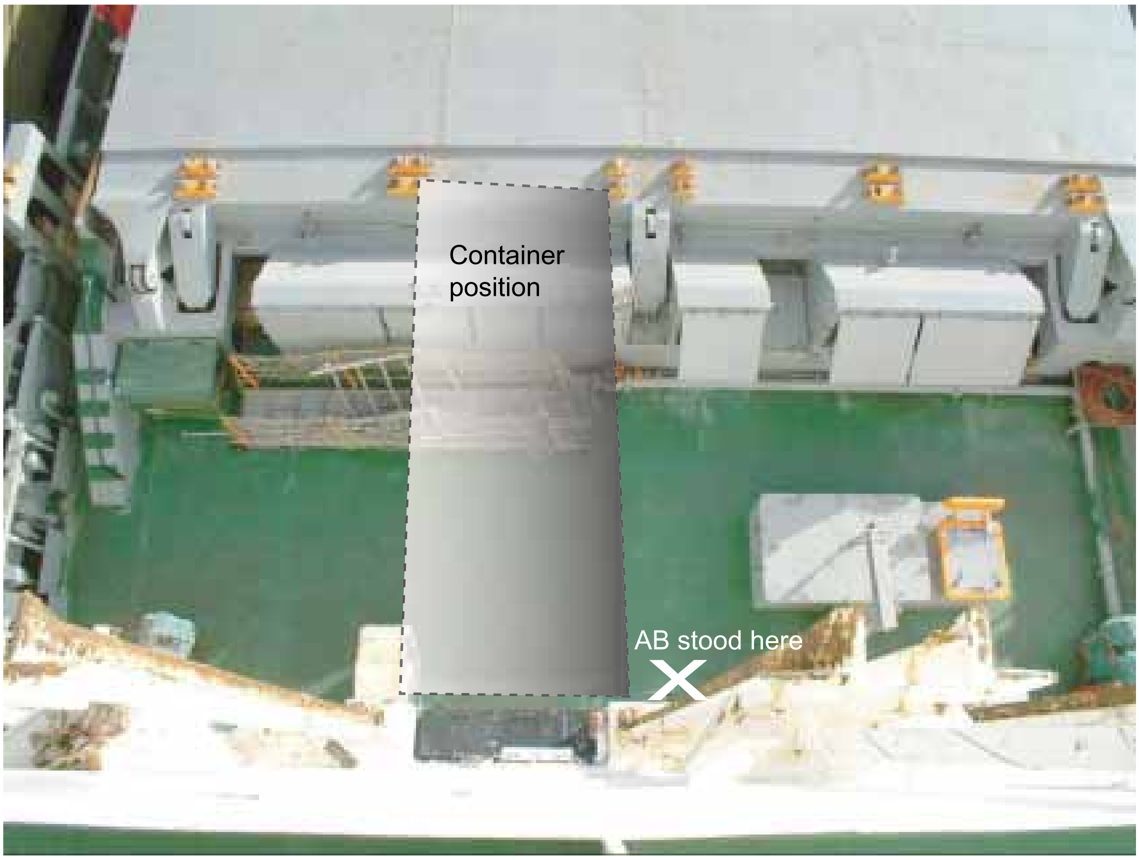
Wrong Place – Wrong Time

Narrative

A feeder container vessel was discharging cargo at one of her regular UK ports, using the shore cranes. On deck, an unsupervised AB was using a long pole to unlock the twist locks, and the discharge of the deck load was nearing completion. The last stack of containers to be discharged comprised 6 metre units loaded 2 high, spanning the well between the aft end of the hatch and the forward edge of the accommodation. Cell guides were fixed to the front of the accommodation, and strengthened pads supported the after corners of the containers. On the centreline, a ladder was also fixed to the front of the accommodation to provide access to the top of the containers, and serve as an escape route from the accommodation.

The vessel was moored starboard side to, and the discharge of this final stack started from the port side. It was not possible to fit twist locks on the aft corners of these containers because they rested in the cell guides on the accommodation front. Once the upper container had been discharged, the twist locks had to be removed from the lower container before the crane could lift it. The AB was standing by to do this and was standing at the bottom of the ladder at the front of the accommodation. He was preparing to use the ladder to gain access to the top of the lower container to remove the twist locks.

The final inboard containers on the port side were being discharged when one of the twist locks at the forward end failed to release. The combined weight of the two containers was not enough to set off the crane overload alarm; the crane continued to lift. This partially lifted the lower container by its forward end, and pitched the after end into the well. The top after edge of the container struck the AB, crushing him between the container and the ladder. The paramedics were called, but the AB was pronounced dead at the scene.



The Lessons

1. This is a hazardous operation, particularly in the feeder trade, where lean manning does not allow constant supervision. It is essential that people are routinely briefed on safety issues.

2. The company safety posters state that, when removing twist locks, crew should stand at least one container away from the one being worked. This tragic accident clearly demonstrates why.

3. There were no written instructions available for cargo work. Instruction relied on briefing and on-the-job training. The AB had been working on this ship for 6 years, and his work pattern was well established. It is possible that his perception of the risk had reduced, and that this unsafe shortcut had become his normal routine.

Lifting Equipment – Exceeding the Safe Working Load = Danger

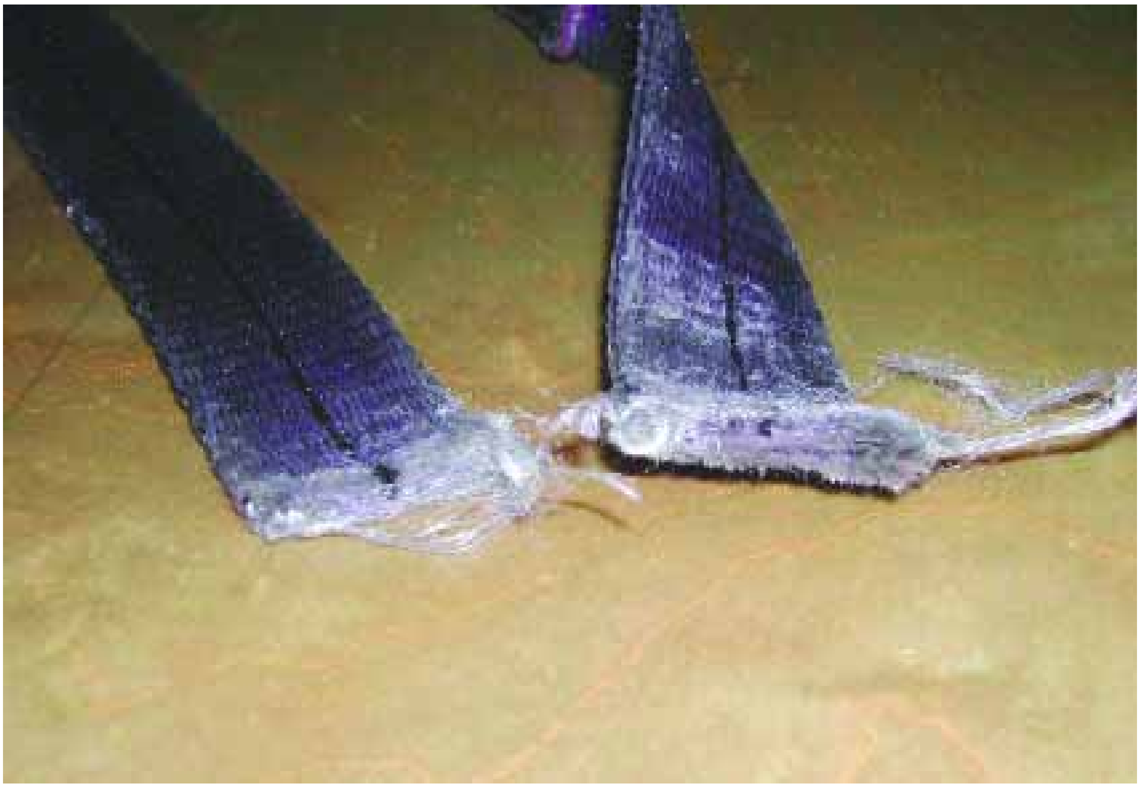


Figure 1: Parted fabric strop

Narrative

Engineering ratings of a foreign flagged ferry were preparing to move an air conditioning compressor from the auxiliary engine room to the engineer's workshop, for maintenance purposes. The weather was moderate and there was a 1m swell running.

The compressor/bedplate fastenings were removed and preparations made to lift the 1.1 tonne compressor from the bedplate. A single fabric strop was passed through 2 eyebolts on the compressor, and connected to a chain block with a Safe Working Load (SWL) of 2 tonnes. The strop had a recorded SWL of 1 tonne force. The strop was tested in December 2003, well inside the statutory 5 year testing requirement.

As the compressor was being lifted, the fabric strop parted (Figure 1), and the compressor fell against the compressor oil filter, fracturing the inlet and outlet pipes (Figure 2). The compressor then fell to the floor plates and bounced onto a nearby rating. The rating suffered an open fracture of the leg, and had to be evacuated by helicopter to a nearby UK hospital.

Those involved in slinging the compressor did not seek advice from a competent person. Had they done so, it would have been clear that the SWL of the single strop was less than the weight of the compressor, and that it was incapable of taking the load. In addition, the strop was being chaffed by sharp edges on the compressor, making failure of the strop almost inevitable.

The rating involved in this case, suffered only a fracture. The accident would have been far more serious if he had been under the compressor at the point of failure.

Figure 2: Damage to the inlet and outlet pipes

The Lessons

With luck on his side, the engineering rating escaped serious injury. The failure of the strop could so easily have resulted in a fatality. Safe Working Loads are recorded on all items of lifting equipment, and it is clear that these must be greater than the loads being lifted.

Statutory Instrument 1988 No 1639 states that "no person shall operate any lifting plant unless he is trained and competent to do so and has been authorised by a responsible ship's officer".

The Code of Safe Working Practices for Merchant Seamen – Chapter 21 also provides advice regarding lifting plant. This advice includes:

1. Lifting equipment should always be in date for survey or test before it is used.

2. The line of lift should be directly under the lifting equipment, whenever possible, in order to reduce stresses.

3. No attempt should be made to lift loads in excess of the certified lifting plant Safe Working Load.

4. A competent person should supervise the lift.

Face The Danger

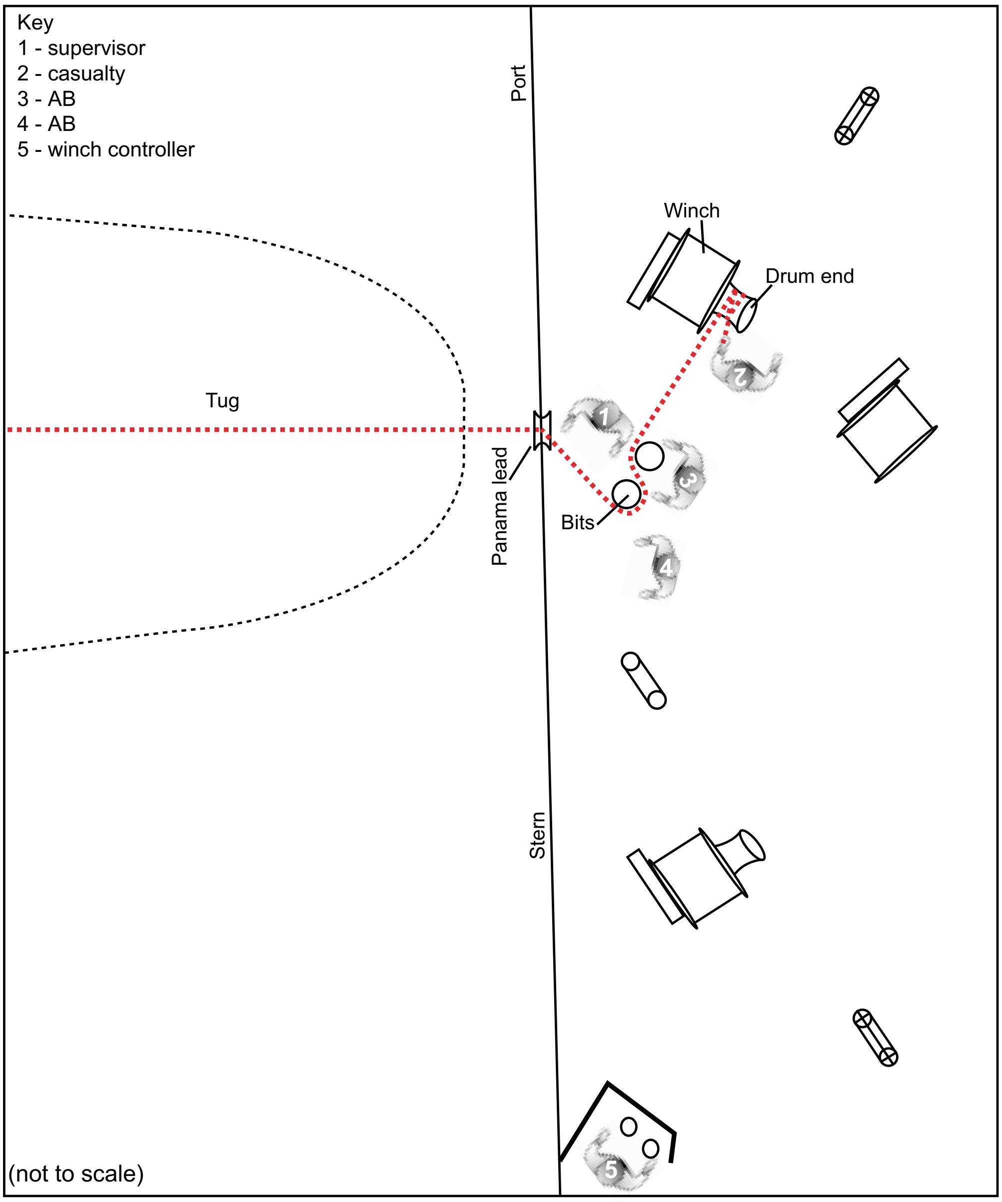
A deckhand suffered multiple fractures to his arm during a routine un-mooring operation while connecting a tug's towing wire.

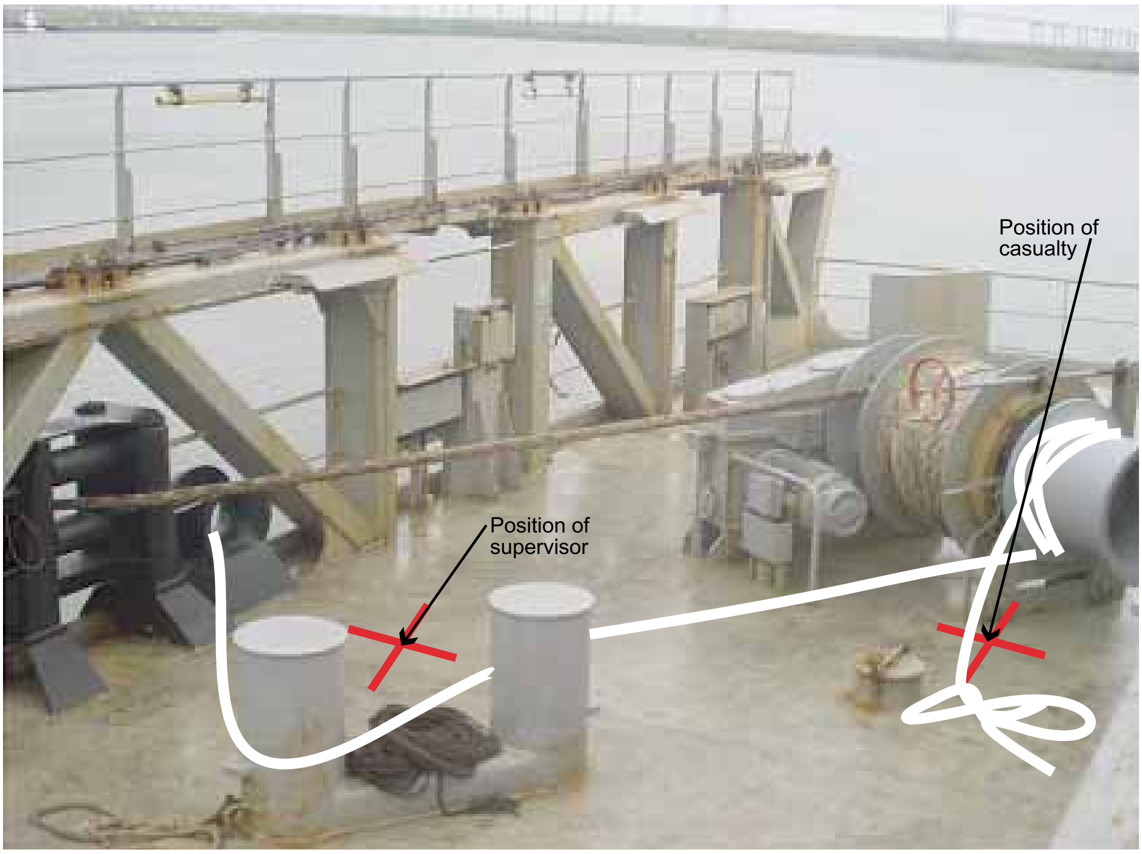
Narrative

The tug's tow rope messenger was led through a Panama lead, around the bits at a 100° angle and on to the winch end whipping drum. The drum end seaman was standing with his back to the working part of the rope and the supervisor, as he hauled on the rope.

Unfortunately the tug was not paying out slack at a controlled speed and, feeling the strain of the jerking motion, the drum end seaman attempted to apply more turns to the whipping drum. During this process, the messenger rope snapped back, and the whiplash of the working part connected with, and broke, the drum end seaman's arm.

The supervisor, who was standing in the precarious position of the bight of the rope, escaped injury. Had the rope come clear of the bits, the outcome for him could have been extremely serious.





Messenger rope arrangement

The Lessons

1. Stand facing the danger: always put the winch between the operative and the potential danger zone. This, in itself, creates a safety barrier, allows full visual contact with the mooring team and surroundings, allows controlled surging on the drum end and keeps the operative clear of the working part.

2. Be aware of the dangers of sharp nips – these cause excess strain on machinery, fittings and ropes – and use fair leads wherever possible.

3. During our first day at sea, most of us were made aware of the dangers of standing in bights of rope; a brief lapse of attention to this ordinary practice can so easily cause grief.

4. Watch out for shipmates and their work practices. Ships operate on efficient team-working, part of which involves looking out for our shipmates and recognising potential dangers to them. It is so much easier to stop bad habits than to patch up broken bodies.

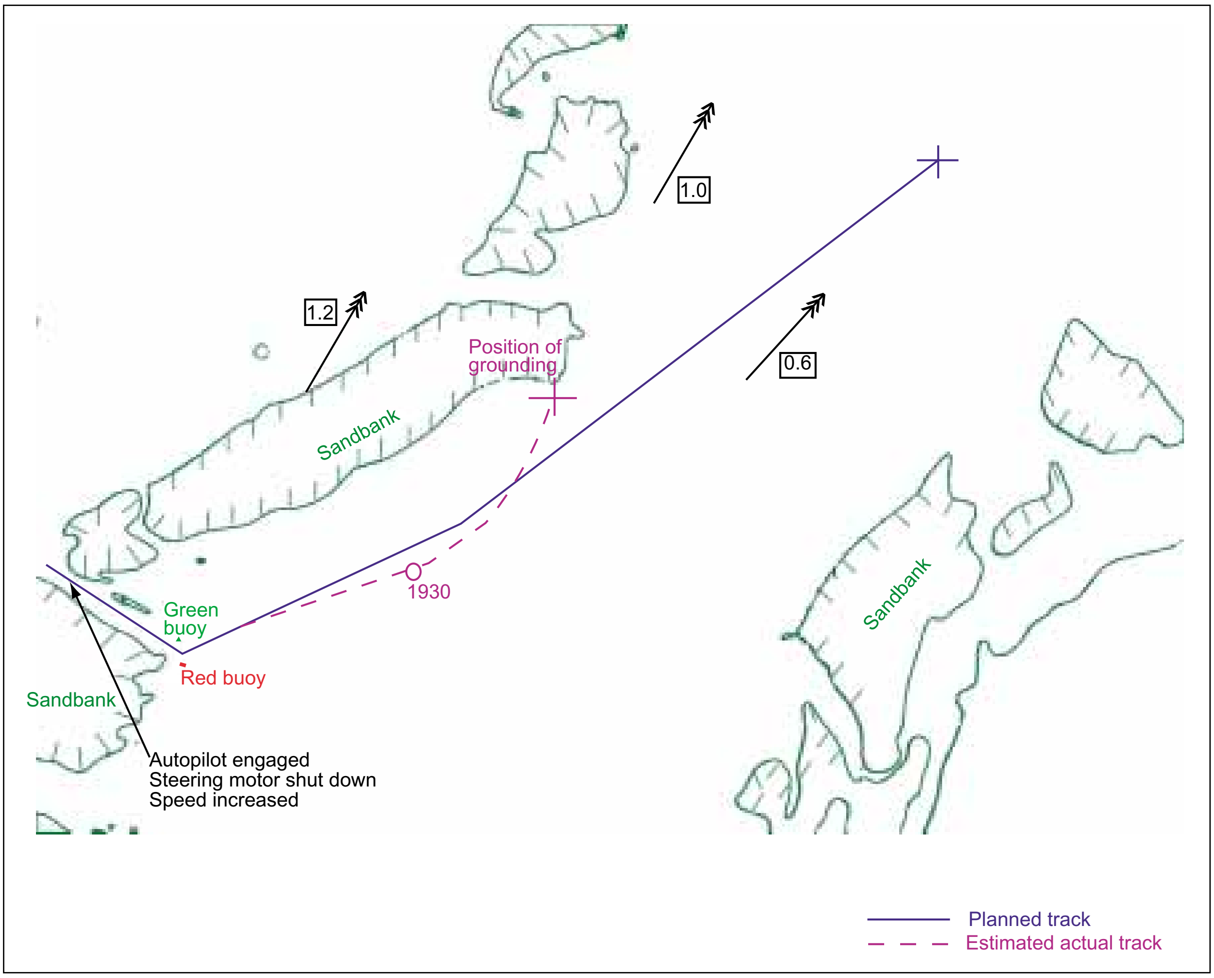
A Turn for the Worse

Narrative

A 2500grt dry cargo ship sailed from port at 1710 carrying a cargo of grain. A harbour pilot accompanied the master on the bridge until disembarking around 1845. It was dark, and visibility was moderate, but occasionally decreased to poor in snow showers. At about 1900, when the ship was still transiting a narrow buoyed channel (Figure), the master changed to auto from manual steering, shut down one of the two steering motors that were running, and increased speed from 6 knots to 10.5 knots. At about this time, the master was joined on the bridge by an AB to act as a lookout.

When the ship exited the buoyed channel at 1915, the master adjusted the course on the autopilot from 112° to 065°, to close a waypoint marked on the paper chart. This waypoint was part of a passage plan used when leaving an adjacent port. A passage plan for the departure for the port had been compiled and drawn on the charts in use up to the end of the buoyed channel, but not thereafter. The master then switched one of the two radar displays fitted to standby before leaving the bridge to go to the deck below.

The master was absent from the bridge for about 2 minutes. On his return, he plotted a fix on the chart at 1930 using a radar range and bearing of a nearby fairway buoy. Course was adjusted to 053°. Several minutes later, another fairway buoy fitted with a Racon was detected at a range of 6nm fine on his starboard bow. As the master intended to leave this buoy to port, the course set on the autopilot was adjusted to 057° to put the buoy fine on the port bow. On this course, the ship was still within 7 cables of adjacent hidden dangers, which had not been highlighted on the paper chart.



Shortly after, the master noticed that the ship's heading was drifting to port. He saw that the heading by gyro was now 040°. A large alteration to starboard was applied using the autopilot, but the ship kept turning. Breaking waves were then seen directly ahead. The master put the engine to stop, started the second steering motor, changed to hand steering, and applied maximum starboard helm. He then put the engine to full astern, but the vessel was felt to ground moments later on a gyro heading of 330°. The ship suffered substantial damage to her rudder.

It is not certain if the autopilot failed. It was fitted with an off course alarm, but this did not activate. Subsequent investigation revealed several defects with the equipment, but none were related to the activation of the off course alarm.

The Lessons

1. An OOW is responsible for the safety of his ship. If he is not on the bridge, from where he can monitor navigation and communications, and react to, and control on board emergencies, he cannot fulfil this vital duty. Leaving the bridge, albeit briefly, is not only a violation of regulation, but it also endangers a ship and her crew. On the occasions when an OOW finds it absolutely necessary to leave the bridge, it is in everyone's interest that he arranges a relief before doing so.

2. When in restricted waters with a pilot embarked, it is normal practice to have sufficient machinery and equipment, such as steering motors and radars, operating to provide optimum manoeuvrability and redundancy in the event of a breakdown. When in restricted waters without a pilot, the need for manoeuvrability and redundancy remains unaltered. It is the proximity to dangers and environmental conditions which should determine a ship's equipment readiness, not the presence of a pilot.

3. A passage plan is a navigational risk assessment and, as such, is crucial to the safety of a ship during a voyage. If it is incomplete, or more than one plan is in use, a lack of appreciation of the navigational dangers, and uncertainty, will inevitably result. Comprehensive and considered planning takes time, but it pays dividends.

4. Navigational buoys provide a good indication of a ship's position, and their use in this respect requires little effort. However, sole dependency on them is fraught with danger. The benefit of cross-checking positions using alternative methods has long been recognised, and with the availability of GPS this is simple to achieve. GPS also frequently has the benefit of cross-track error indication and alarm which, if used effectively, can provide early warning of a ship deviating from the intended track.

5. The use of autopilots is widespread, and is indeed essential on ships with limited crew. But they are fallible, and do occasionally malfunction. In open water, such a malfunction is likely to be detected and dealt with without any adverse consequences. However, when in close proximity to navigational dangers, or other shipping, the time available to react is far more limited and the potential outcome is therefore more serious. Manual steering is the safer option in many situations.

Fatigue Nearly Leads to Disaster

Figure 1

Narrative

A 58-metre coastal cargo vessel (Figure 1) was steaming south in the early hours of a February morning. The mate was on watch as the ship approached the area off the mouth of the river Humber and there was no lookout on the bridge. It was dark, but the first signs of daylight were starting to appear. Visibility was good and the wind was from the north-west force 7.

The mate had been working excessive hours, sharing a 6 hours on/6 hours off bridge watch with the master. The master had been on board the vessel for about a week, working as a relief for the regular master who was on leave. He undertook only bridge watches, leaving all the cargo work to the mate. The senior seaman had served on the vessel for about 18 months and had taken no leave of absence during that time. The junior seaman had only been at sea a few days. A cook was also on board.

The mate was not fully supported by the master. The senior seaman was probably not at his best after such a long period of duty, and the junior seaman was of limited value as he was very inexperienced. The mate tried to keep the ship running in these difficult circumstances, but as a result he was very tired on the morning of the incident.

The mate looked out for vessels ahead when about an hour's steaming from the Humber deep water anchorage. Using his radar and a visual lookout, he ascertained four ships to be there; all were at anchor. His intended track passed through the anchorage between the vessels.

About 30 minutes before the incident, a large oil bulk ore (OBO) vessel (Figure 2) raised her anchor and began to move in preparation for picking up a pilot. The vessel's movement was disguised by two other vessels, which had their deck lights on.

About 15 minutes before the incident, the mate left the bridge unattended, and went below to call the master for his watch. He returned to the bridge a couple of minutes later, but it took another minute for his night vision to return. When the mate looked out again, he thought that the situation ahead might be changing. As the two vessels closed, the mate should have given way, but he couldn't understand what was happening ahead. He could not clearly discern the OBO's steaming lights against the backdrop of the bright deck lights of the other two vessels behind. His radar would have given him a better understanding of the situation, but he didn't pay sufficient attention to it.

Figure 2

The OBO started to take avoiding action when the other vessel did not appear to be giving way. However, the mate on the small coastal vessel slowed down to give himself more time to try to perceive what was ahead. He could still not understand what was happening, even when the vessels were only metres apart. A collision was very narrowly avoided.

The Lessons

1. The mate's inability to adequately interpret the situation is consistent with fatigue. Fatigue is an insidious problem, and it can make the sufferer indecisive. It is very important that crew members are able to recognise the symptoms of fatigue, and that they take positive action to address it. Don't be afraid to say that you are tired!

2. This vessel met the requirements of the regulations, even so, a crew of five is considered to be barely sufficient. With a bare minimum crew it is very important that all of them are fully qualified and that they have frequent periods of leave. In addition, all crew members need to do their fair share of the work; this was patently not the case here.

3. Shipping companies should have contingencies for dealing with fatigue, such as the option to spend time at a layover berth until the crew is properly rested. Such a facility should be used when necessary.

4. The regulations require a lookout to be posted during the hours of darkness. In this case a lookout would have also been required in daylight, due to the proximity of navigational hazards. A bridge should ***never*** be left unattended, let alone when approaching an anchorage. Had one been present, the lookout could have called the master. The lookout would also have been able to assist with the navigational watch, and should have been able to alert the mate to the fact that he was becoming seriously debilitated by fatigue.

5. This vessel was using a well-established passage plan. Such passage plans should be reviewed periodically to see if they are still safe. The area off the river Humber has got very much busier in recent years. This passage plan should have been changed to pass outside the Humber deep water anchorage.

When Safety Maintenance = Hazardous Incident

Narrative

A chief engineer was conducting routine monthly checks on the engine room fixed CO_2 fire-fighting system. Although the maintenance instructions were a little unclear, he felt he knew enough about the system to do the job. He first checked the control box alarms, and then closed two system isolating valves, although it is not known which ones he operated.

Assuming the system to be safe, the chief engineer opened the pilot CO_2 bottle pressure gauge isolating valve, to confirm the bottle pressure was satisfactory. As he did this, he was surprised to hear gas escaping in the adjacent CO_2 bottle storage room. He went to the compartment and saw gas escaping from one of the gas bottle neck seals (Figure 1). He also noticed, from a gauge, that the system had become pressurised.

Believing he might have made a mistake in the procedure, he returned to the control box compartment. There, he found the CO_2 pilot bottle isolating valve – which controlled the gas supply to the main bottle activators – partially open. It appears that the chief engineer's coat sleeve might have inadvertently become caught on the isolating valve, causing the system to activate.

Figure 1

CO_2 storage bottle neck seal

The Lessons

CO_2 extinguishes fires by reducing the oxygen content in the protected compartment. It is extremely dangerous to be in a compartment into which gas is being discharged; several fatalities have occurred where this has happened. Fortunately, in this case, the main system isolating valve was closed, and this prevented gas discharging into the engine room. Had it been open, and had someone been in the space, the outcome could have been very different.

1. Maintenance instructions and valve identification should be clear and unambiguous in order to provide a safe system of work.
2. Those involved in maintenance and operation should be familiar with the systems and equipment, and should always refer to authorised documentation to ensure they are clear on procedures.
3. In the case of a CO_2 gas discharge, planned or otherwise, the compartment must be thoroughly ventilated, and the atmosphere oxygen concentration proven before personnel are allowed to enter without the support of breathing apparatus.

From What Height Can a Lifeboat be Safely Released?

Figure 1

Narrative

A large multi-role vessel was alongside a lay-by berth toward the end of an annual refit. As part of the refit work, the eight, davit-launched, fully enclosed lifeboats had been overhauled ashore (Figure 1) and refitted on board. The work on the lifeboats included overhauling the on load release gear, including load testing in a test rig.

An experienced Flag Administration surveyor had requested that the vessel lifeboat crew carry out two lifeboat operations, including releasing the on load gear with the lifeboat suspended just above the water to simulate failure of the hydrostatic release mechanism.

On the day of the incident, the surveyor was involved in a fatal accident investigation on board another vessel, and had to delay the planned lifeboat operations.

When the surveyor eventually arrived, the lifeboat crew mustered and carried out a safety briefing. During this time, the surveyor was distracted by mobile telephone calls about the fatal accident investigation. As a result, he was unaware that the crew had not carried out a practical drill to demonstrate the use of the on load release gear, and he did not tell them that he was to act only as an observer, and would play no part in the command and control of the operation.

The five lifeboat crew, the second officer and the surveyor embarked the lifeboat and harnessed themselves in. The water was calm. The engine was started, and lowering began immediately. After two brake tests were successfully carried out, the surveyor was asked if the height above the water was suitable for operating the on load gear. Although unwilling to take charge of the exercise, the surveyor looked out of the side

Figure 2

hatch briefly and told the crew to lower it further. This was done, and the surveyor's advice was requested again. The surveyor remained unwilling to be directly involved in the conduct of the drill.

Several times, the crew attempted to operate the on load release gear before the operation of the interlock lever and main release handle was co-ordinated and the lifeboat was released from its falls (Figure 2).

The lifeboat plummeted about 1.2m on to the calm water, injuring several crew members.

The lifeboat suffered several fractures to its internal structure.

The Lessons

1. How many readers would consider raising an objection to releasing a lifeboat from its falls when it is only 1.2m (4 feet) above calm water? It doesn't sound very high, does it, yet expert advice indicates that the impact forces from such a drop could be as much as 20g (gravity). Forces of this magnitude are capable of causing spinal injuries even to someone sitting in the correct, upright position. If it is felt necessary to test the operation of the on load gear, the guidelines provided by the IMO should be followed:

   Position the lifeboat partially into the water such that the mass of the boat is substantially supported by the falls, and the hydrostatic interlock system, where fitted, is not triggered;

   Additionally, it is also advisable to keep the number of crew members on board the lifeboat to a minimum during the test.

2. What is evident about this accident is that no-one was in overall control of the lifeboat. Communications had been poor. The surveyor was attending purely as an observer, but because the crew had not carried out the operation before, they expected him to provide guidance. The lifeboat crew did not clearly understand the surveyor's role, and the surveyor, by accepting the initial request for guidance on the height of the lifeboat release, reinforced the misconception. Whether or not a Flag State surveyor is present at a lifeboat drill, it is the ship's staff, or the shipyard's staff, who remain in charge of, and responsible for, the operation.

3. Communications broke down on a number of levels and played a part in this accident:

   - The surveyor failed to find out if the crew had carried out the operation before, or whether they had an adequate, risk assessed procedure for it;

   - The vessel's officers failed to inform the surveyor that the crew had no experience and no procedure for the operation;

   - The surveyor allowed himself to become distracted during the safety briefing, and missed an opportunity to clarify his role and make himself aware of the crew's planned procedure;

   - Although some of the crew were a little anxious before the lifeboat was released, no one raised their concerns or stopped the operation.

   Everyone involved in operations like this should be encouraged to voice any safety concerns that they may have.

4. Lifeboats and their launching systems are dangerous items of equipment, and must be maintained and operated by suitably qualified and experienced crew members.

5. In 2001, concerned about the high number of lifeboat accidents that had occurred, the MAIB published a safety study entitled, 'Review of Lifeboat and Launching Systems' Accidents'. The study can be found at www.maib.gov.uk/publications.

Part 2 – Fishing Vessels

Lessons can be learned from every accident, and most of us can relate to at least some of the problems that have occurred in the following pages. In spite of all the improvements in vessel safety, fishing still remains the most dangerous industry of all, and within that industry, my own sector, potting, is probably the most dangerous.

Most of the dangers, though, can be alleviated with common sense and good risk assessment. How often have we heard of boats capsizing because they have been modified, so that more pots can be carried, but without the necessary stability checks being done? Change the centre of gravity and the boat may well become unstable. How often have we read (or had the frightening experience ourselves) of a crew member going over the side with a rope around his leg? Good working practices can help to avoid this; and how often have boats been pulled under because the gear has been snagged and the winchman has kept on hauling?

Most of these sorts of accidents can be avoided with good risk assessment and good training.

Yet there are accidents occurring in spite of everyone's best efforts to reduce them. As fishermen, we see more and more regulations (not just fishing regulations) being heaped upon an already struggling industry. All these different regulations and controls have forced skippers to cut back on both maintenance and crew, and often to put to sea in conditions in which they would not normally do so. There can be no doubt that some of these extra pressures have contributed to some of the accidents. The Authorities need to be very careful about making fishing more and more costly and less and less profitable.

A typical result of increased regulations has been the move of more fishermen to single handed working – particularly the smaller inshore potter. The increased safety risks have not been fully appreciated, and are not being addressed in the safety courses we all have to do. How, for example, do you get back on board if you have the misfortune to go overboard? Should a personal safety device be carried and a Confidential Positioning Reporting System be installed? Is there a suitable hard wearing lifejacket (buckle and toggle free) available for constant wear? What extra safety equipment for watchkeeping, water ingress etc is required? Is there such a thing as a "dead man's cut out"? etc.

There is so much that we as skippers/owners (no matter what the size of boat) can do without having yet more regulations forced upon us. Let us have education, not regulation and use the MCA Pre-Sailing Checklist every time we put to sea, along with a check of all likely water ingress points like sea cocks and stern glands.

No matter how careful we are, though, accidents do happen, but it is up to all of us to do our very best to lessen the possibilities and to be in a position to counter them should we be unfortunate enough to be involved.

We are never too old or too experienced to learn, and the following reports offer us all a salutary lesson in sea safety. Don't become another statistic!

Chris.

After 11 years in the Army, reaching the rank of captain in the Brigade of Gurkhas, Chris returned to his home village of Torcross in South Devon where he was brought up among the crab fishing communities of Start Bay. He achieved his boyhood ambition in 1978 when he bought his first commercial crabber, and still runs a small 32ft inshore crabber and operates a 15ft bass beach boat. He has been the Hon Sec of the South Devon and Channel Shellfishermen since 1989, is Chairman of Devon Sea Fisheries Committee, Chairman of the Crustacea Committee of SAGB and a board member of the Sea Fish Industry Authority.

CASE 13

Poor Stability and Hull Defects Lead to Fatal Accident

Figure 1: Salvage

Narrative

An under 10m fishing vessel left her home port early in the morning to fish the prawn grounds off the north-east coast. The weather was pleasant with a light westerly breeze and a slight swell. The vessel had been fishing successfully and the skipper and his brother, as the only crew, looked forward to another good day's catch.

During the morning, the weather worsened. A westerly force 6-7 developed and the sea became very confused. Unworried, the brothers hauled in their catch and began steaming back to port. Just before midday, the skipper spoke to his wife by mobile telephone to tell her he was making his way home. Soon afterwards, the trawler was sighted, for the last time, by another local fishing vessel.

Late afternoon, the families of the two men, and local fishermen, became concerned that there was no sign of the vessel. The coastguard was informed and an air and sea search conducted, assisted by 15 local fishing vessels. Unfortunately there was no sign of the trawler, or of her crew.

Subsequent events included a search for the wreck. The wreck was located, and an underwater survey was carried out, during which the liferaft was found on the seabed and damage to the radar dome noted. The trawler was salvaged (Figure 1) to enable a more detailed structural survey, metallurgical examination of the hull plating and stability tests to be conducted. Neither of the brothers' bodies was found on board.

Figure 2: A frame supporting frame to deck split

The investigation found the vessel to be in a poor structural condition. There were splits and holes to her upper deck, hull shell plating and steering gear compartment forward watertight bulkhead (Figures 2, 3 and 4). In addition, the rudder stock gland was leaking, the engine room high level bilge alarm float switch had been disconnected, and one of her bilge pumps was not operational. It was also found that the vessel's inherent stability was marginal, making her unsuitable for offshore fishing; this was a major factor in her loss.

Understandably, the skipper/owner purchased the vessel believing it to be suitable to cope with the rigours of offshore fishing. Proud of his vessel, he sought to improve her by adding a winch and deck shelter. Unfortunately, in doing so, this additional top weight decreased the vessel's stability.

All the evidence indicates that the trawler began to take water in her steering compartment and her engine room, further reducing her limited stability. The flooding went undetected until the latter stages, when it is believed an attempt was made to pump out the bilges. During the process, the vessel was swamped by seas, downflooding occurred through the open steering gear compartment hatch and she sank rapidly by the stern. There was no time to transmit a "Mayday".

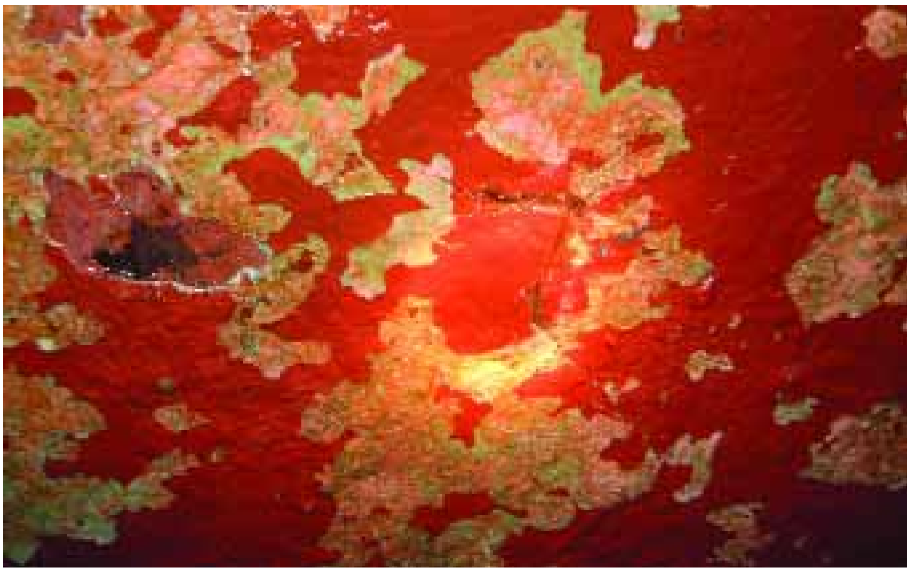


Figure 3: Vee split in hull

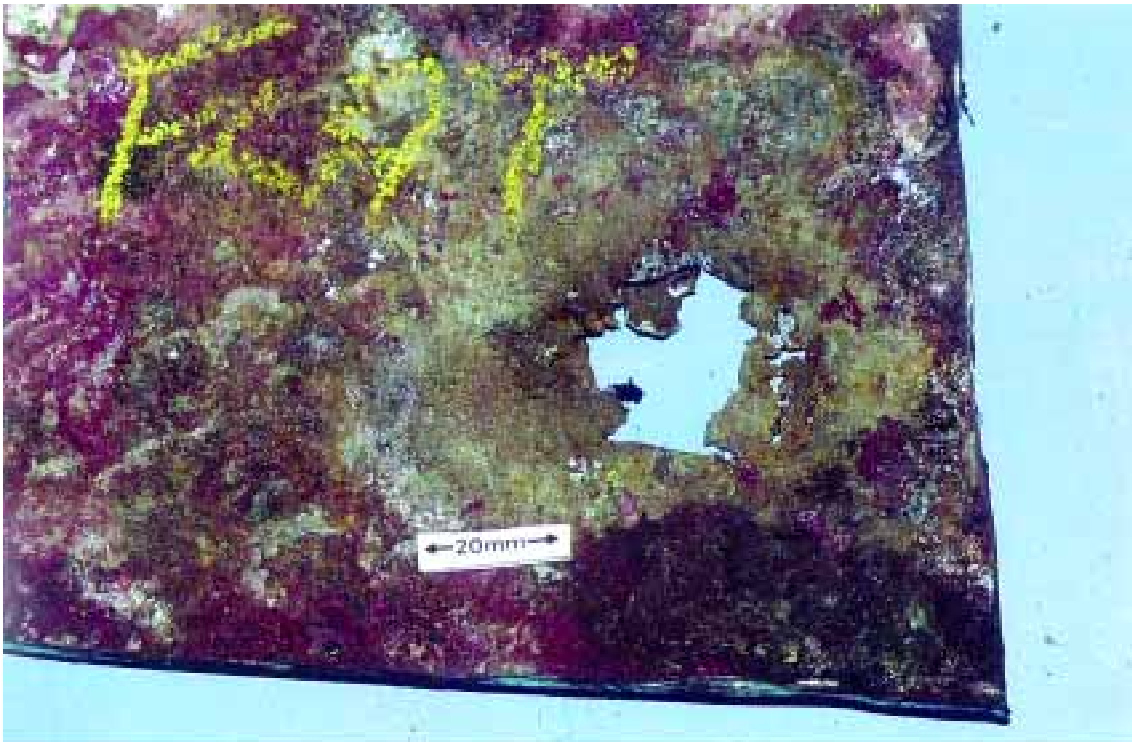


Figure 4: Steering compartment forward bulkhead hole

The Lessons

1. The purchase of a fishing vessel is a major undertaking, and sometimes a clean and shiny appearance can cloud good judgment. Skippers/owners are urged to seek expert advice when considering purchasing a vessel, to ensure that it is fit for the purpose intended. This advice also extends to changes to structure, to ensure that stability, and therefore safety, is not compromised.

2. Structural maintenance is an essential element in ensuring a vessel's watertight integrity. Although expensive, it is of comparatively little cost for a potentially great return: preventing the possible loss of a vessel. Hull repairs should be given the highest priority if downflooding and internal flooding is to be prevented.

3. Bilge level automatic alarms, operational bilge pumps and effective discharge non-return valves are part of the skipper's armoury to deal with flooding. It is essential that they are kept in good working order. Unfortunately, far too many vessels are lost because high-level bilge warning alarms and pumping systems are defective.

4. This vessel carried a liferaft, despite not being required by regulations to do so. Sadly, in this case, it failed to fully deploy, probably because it became trapped under the radar dome, causing the casing to flood and thus it lost positive buoyancy. Skippers are strongly advised to check stowage positions of liferafts to ensure that they are free from overhead obstructions such as radar domes, fishing gear and mast stays. Further comprehensive advice is provided in MGN 267(F).

The One That Got Away!

Narrative

The skipper and crewman of a fairly new, under 10 metre trawler completed hauling their afternoon tow and were making ready to shoot away again. The weather conditions were good with a slight swell running.

The skipper went into the wheelhouse to manoeuvre the boat for shooting, and spotted water washing about down below in the accommodation area. Dashing below, he found water overflowing from the toilet and welling up from drainage holes in the toilet floor. He opened the engine room door and found water almost covering the engine. The skipper immediately notified his crewman of the situation and sent out a distress call. On re-entering the engine room, the skipper attempted to shut off the sea inlets but, unfortunately, by that time they were too deeply submerged.

The men donned their lifejackets and made preparations to abandon the vessel. Another trawler fishing nearby came immediately to their rescue and, after attaching a towline, took both men on board. Both were unharmed. The rescuing vessel set off towards the beach, which was fairly close, with the sinking vessel under tow. She was successfully beached in shallow water just as she finally foundered.

At low tide, the skipper rowed out in a dinghy and went aboard the boat with a salvage pump. As much water as possible was removed from her engine room, and a search was carried out for the cause of ingress. Sea water could be seen welling up through the hull at one point and, upon investigation, the skipper pulled on a sea inlet pipe to find that the sanitary supply line was adrift from the hull at a point below the shut off valve. The skipper probed in the water with a broom handle and could see that at times he was reducing the surge. He shaped the end of the handle into a plug and, after locating the ingress point, drove the broom handle into the sheared inlet hole, thus preventing further ingress. The vessel was then pumped dry, and at high tide she was refloated and towed to port for inspection and repair.

Sheared fitting after accident

CASE 14

The vessel sustained no damage to her hull when she beached, but she did suffer serious water damage to machinery and electrics. Subsequent inspection showed various contributory factors to the flooding: the sheared sea inlet was threaded into a pad on the boat's side; the inlet fitting was unduly long and set at a convenient height for standing on; the vessel did not have non-return valves in her overboard discharges; no bilge alarm was fitted; holes were bored in the watertight toilet deck into the engine room to assist drainage when cleaning.

Similar sea water inlet before accident

The Lessons

1. The vessel had no bilge alarm fitted. Decked vessels should be fitted with effective bilge alarms to give earliest possible warning of water ingress. Owners may also wish to consider the benefits of an extension klaxon and/or a strobe light to give warning when the wheelhouse is unattended.

2. Frequently, overboard discharge lines are fitted with non-return valves to reduce the risk of backflooding. Had this been the case in this instance, the speed of flooding would have been greatly reduced.

3. The skipper's action in plugging the water entry point with a simple broom handle shows the effectiveness and benefit of carrying a selection of different size plugs to drive into holes or sheared pipework. Had he received early warning, by a bilge alarm, the hole might have been plugged even earlier and prevented the distress situation.

4. Fittings are greatly weakened by threading; sea inlets of the stub pipe and flange type have been found to be superior. They are best positioned where they are not convenient to be stood on, and the supporting of associated pipework reduces leverage and vibration.

5. Many vessels have foundered due to water being able to flow between compartments. During this incident, watertight integrity was compromised by someone boring drain holes in the floor, again speeding up the flooding process as water flowed back up through these holes.

A Fire Detection System Can Help Save Your Vessel

Narrative

In darkness, while on passage from one port to another, the deck lights of a potting fishing vessel suddenly lit up. Taken by surprise, the skipper/owner turned the wheelhouse switch to the off position, but the lights remained on. He then tried, unsuccessfully, to switch on the galley lights.

Because the fuse boxes were in the forward auxiliary generator hold, the skipper went out on deck and opened the access hatch to the space. He was met by thick black acrid smoke. He quickly closed the hatch and returned to the wheelhouse, where he alerted the coastguard that he had a fire on board.

The skipper switched on the cabin lights and called the two deckhands, who were sleeping. But the lights would not illuminate. He then returned to the forward hatch and, on opening it, saw flames in the hold.

He went back to the wheelhouse and tried to call the coastguard again, but found that the VHF radio would not transmit or receive. He looked in the compartment under the wheelhouse deck where the emergency batteries were fitted, and saw smoke emanating from it. He then tried to use the hand-held VHF set, but the battery was flat.

One of the deckhands went to the forward hatch and touched it with the back of his hand. It was hot. He took the continuously running deck wash hose and cooled the hatch with seawater. Once it was sufficiently cool, he was able to open the hatch and direct the water into the hold. But this had little effect, so he closed the hatch and sealed it to restrict the supply of oxygen to the fire.

In the meantime, following the initial call from the fishing vessel, the coastguard had alerted other vessels in the vicinity of the casualty. The nearest, which was 4 miles away, was a large

ferry, which then diverted from her passage towards the reported position of the casualty.

Using searchlights, the ferry found the fishing vessel, created a lee for the casualty and illuminated the scene. Soon after arriving on scene, the ferry's staff could see flames on the fishing vessel's deck. The RNLI lifeboat soon arrived on scene, took the three crew members off the fishing vessel and returned to her station.

The fishing vessel remained afloat and on fire until later that afternoon, at which time the fuel tanks exploded and the vessel foundered.

The Lessons

1. The fishing vessel was not fitted with a fire detection system in either her forward auxiliary generator hold or her engine room. Had one been fitted, this would have alerted the crew at a much earlier stage and would have given them a chance to fight the fire before it had time to take hold.

2. The electrical fault, which was probably the cause of the fire, also affected the charging of the emergency batteries and, in turn, the power to the radio sets. Therefore, it is essential to ensure that backup hand-held VHF sets are fully charged at all times.

3. The crew member who attempted to extinguish the fire used correct fire-fighting techniques, such as touching hot spots with the back of his hand and sealing a space which is on fire to starve it of oxygen. He clearly demonstrated the value of having attended a fire-fighting course.

CASE 16

Didn't Feel a Thing

Damage to fishing vessel

Narrative

On completion of a 2-week refit, a fishing vessel sailed for the fishing grounds. During the departure, the skipper realised that the buoys and navigational tracks had been removed from the chart plotter, which had recently been upgraded. These were re-installed as the passage progressed. The navigational watch was then handed over to a deckhand, and the skipper went to the engine room to conduct several routine checks before going to bed.

Forty five minutes later, during the early hours of the morning, the fishing vessel collided with the port quarter of an 86,000grt ore carrier, which was anchored in a designated area.

The skipper was woken by the boat manoeuvring. He went to the wheelhouse from where he saw the ore carrier directly astern. The deckhand on watch admitted that he had 'nodded off' but stated that there had been no collision. As the deckhand was obviously tired, the skipper woke another deckhand to take the watch. The skipper then returned to bed. The vessel was fitted with a watch alarm, but this had been disabled during the refit.

The ore carrier reported the collision to the local port authority, which relayed the information to the coastguard. The coastguard then contacted the fishing vessel via VHF radio to check that she was OK. The deckhand on watch confirmed this to be the case. The previous watchkeeper had admitted to him that he had 'bumped the boat', but did not amplify further.

When the crew mustered for work about 3 hours after the collision, the skipper was informed of the call made by the coastguard. He immediately turned on the deck working lights and saw that a davit arm was damaged. As this meant the vessel was unable to fish, the skipper decided to return to harbour. Fortunately, the damage to neither vessel was serious (Figures).

Shell plating damage on ore carrier

The Lessons

1. After extended periods alongside, it is prudent to make sure that all systems are working correctly before sailing. This is sometimes easier said than done, particularly during the latter stages of a refit or maintenance period, when there is a rush to complete work outstanding, and masters and skippers are frequently under pressure to sail as soon as possible. However, the time and effort invested in testing equipment alongside can save serious embarrassment at sea.

2. Numerous accidents at sea result from lone bridge and wheelhouse watchkeepers falling asleep, particularly during the early hours of the morning. Fatigue is a persistent problem, which can only be properly overcome by ensuring watchkeepers are well rested, and that their body clocks have adapted to working unusual hours. Where this is not possible, by ensuring that watchkeepers are not left alone, and that watch alarms are fitted and used, at least they can be prevented from falling asleep for extended periods during which dangerous situations can develop.

3. A ship can only operate safely if the relationships among her crew are open and honest. Every person is likely to make an error or lapse at some stage. When a mistake is made, or something is seen which is not as it should be, it is extremely important that it is reported as soon as possible. If it is not, valuable time is lost in investigating resultant problems, and the taking of remedial action. Honesty is the best policy.

4. The occasions on which a master or skipper is required to be called, varies considerably between companies and the individuals concerned. There are no hard and fast rules. However, when a master or skipper does not formalise the occasions he wishes to be called, through written orders, a heavy reliance is placed on the judgment of a watchkeeper. In this respect, many masters and skippers have been disappointed, embarrassed, and probably furious.

Part 3 – Leisure Craft

Aficionados of the Safety Digest will recognize that there are dramatically more cases in this leisure craft section than ever before. This is not by chance.

Most of you will know that accidents/incidents in leisure craft (***not*** including commercially operated leisure craft) do not need to be reported to the MAIB. All other accidents in UK waters, and to UK registered vessels worldwide, must be reported. The result of this is that most MAIB investigations are of accidents/incidents involving merchant ships or fishing vessels. However, by July 2005, there were five full investigations of leisure craft accidents underway in the MAIB, more than half of those started in the year. This made us take a look at what was happening in the leisure world.

For the 2 months 8 August – 10 October, we compiled a register of leisure craft accidents and incidents in UK waters, using the criteria against which merchant ships and fishing vessels report to the MAIB. With little effort, we identified an astonishing 1162 leisure craft accidents/incidents in UK waters. By the end of 2005, we were aware of 23 deaths in leisure craft accidents in the UK.

We all know that statistics can be misleading, particularly when we are dealing with relatively small numbers, but better statistics would help to identify trends, and so make our pastime safer. Please report accidents to the MAIB: it only takes a few minutes, and your report is in total confidence.

Alcohol has played a major part in four of the deaths we investigated in 2005. Sadly, the MAIB has heard from people who have bought a boat because they could not use their car to pub crawl; after accidents we have taken evidence from people who have stated that they would not have dreamt of driving a car in the state they were in, and we have heard arguments from apparently intelligent people that "it can't be that dangerous or the government would have done something about it". Any sane person knows that boating of any form is hazardous, and that you need your wits about you. Alcohol lessens inhibitions, clouds judgment, impairs your senses, slows your thought processes and reactions, and reduces your physical ability to survive in the water. In two accident investigation reports, published in February and March 2006, the MAIB has recommended that early legislation be introduced to establish limits on the amount of alcohol which may be consumed by operators of leisure craft.

Please take time to read all the cases in this section, and think how you can ensure that such things could not happen to you.

CASE 17

Double Tragedy

Figure 1: Owner's lifejacket

Narrative

When on a short coastal passage, a 4m sailing dinghy capsized 7 cables from the nearest point of land. On board were its owner, an adult crewman and two children. All were dressed in shorts and 'T' shirts. The owner was wearing a lifejacket, and the remainder of the crew wore buoyancy aids. Following capsize, two attempts were made to right the dinghy, which had fully inverted. Despite the wind being between force 5 and 6, and waves at a height of about 1.5m, the boat was rotated to an upright position on both occasions, but quickly capsized and inverted again.

Following the attempts to right the dinghy, it was noticed that the dinghy's owner had not been able to inflate his lifejacket. Consequently, the adult crewman located and pulled the toggle fitted to his lifejacket (Figure), which then inflated. However, the lifejacket did not appear to be fitted correctly, and the owner struggled to keep his mouth clear of the water. He died from a combination of hypothermia and drowning about 10 minutes after the initial capsize.

The remaining crew held onto the upturned hull, until they were seen by a passing charter fishing vessel, and recovered on board. They had spent at least 1½ hours in the water. Both children were taken to hospital by helicopter, but the youngest child was pronounced dead on arrival; he died from hypothermia. The dinghy was towed to the shore and beached in its inverted condition. The flares carried inside the dinghy's cabin were found to be out of date.

The dinghy was purchased at a boat show 4 months before the accident. Its crew was very inexperienced, and was not aware of the predicted wind or sea conditions. Affixed to the boat was a builder's plate which indicated that its maximum occupancy was three persons, and that the dinghy conformed to the stability and buoyancy requirements of the Recreational Craft Directive for a boat of Design Category C (Inshore Waters). However, tests conducted after the accident (see figures) showed that the dinghy did not meet these requirements. Although a generic manual relating to maintenance was provided with the boat, information specific to the operation of the dinghy was not.

Test report photograph – dinghy being capsized

Test report photograph – cockpit fully swamped

The Lessons

1. Although the conditions might appear to be benign when taking to the water, it is wise to bear in mind that they can change very quickly. Many boat owners have been caught out in this respect. Before putting to sea, where adverse conditions threaten the safety of many small boats, the checking of the local inshore weather forecasts, via the radio, internet, local newspapers, or coast radio stations, is a simple and cost free precaution to take.

2. When putting on a lifejacket, take a few seconds to ensure it is worn correctly. If it is not, the jacket will tend to ride up when inflated, and will be more of a hindrance than assistance. This will decrease, rather than increase, an individual's chances of survival.

3. Even in the summer, when the temperature of the sea around the UK is about 16°C, its debilitating effects should not be under-estimated. This is still 20°C below body temperature, and well below the temperature of most swimming pools. When in boats such as sailing dinghies, where the danger of capsize is ever present, and when in remote areas where assistance is not readily at hand, the effects of cold water immersion must not be ignored when deciding what clothes to wear.

4. Flares need to be accessible and in date if they are to be of use when needed.

5. Experience cannot be taught, however many of the dangers associated with sailing and power-boating, along with the tips of the trade, can be learned through various levels of RYA training courses. The completion of such courses provides a sound foundation from which to start, and to increase proficiency in these activities.

6. The maximum loading of a boat should be shown on the builder's plate affixed to its hull, and in the owner's manual provided by its manufacturer. The risk of capsize and swamping is increased when this is exceeded.

7. When buying a boat, it is important that the purchaser is fully aware of its limitations. For new under 24m recreational craft, purchased within the EU, this information should be available on: the affixed builder's plate; the owner's manual provided by the manufacturer specific to the boat model; and the manufacturer's declaration of conformity with the Recreational Craft Directive. It is worth taking the time to check this information, and where such information is incomplete, or contains anomalies that cannot be reconciled by the vendor, further investigation is probably warranted before completing the purchase.

A Tragic End to the First Trip of the Season

Figure 1

Narrative

The owner of a high powered, rigid inflatable boat (RIB) was well known to have been a keen and competent yachtsman. He always made a point of wearing his lifejacket, and ensured that his yacht was properly equipped to cope with emergencies. In sum, he was considered to be very safety conscious.

About 2 years before the accident, he had moved into the faster paced RIB craft arena. He enjoyed the excitement of driving his boat, and decided to replace it with a larger, more powerful, 6.4 metre RIB with a 150 horsepower engine, providing a top speed of about 50 knots (Figure 1). It was very doubtful if the boat was subjected to regular maintenance or a professional survey prior to purchase, but the outward appearance was of a smart, well presented craft.

The owner was pleased with the RIB's performance, but as the weather deteriorated during the latter part of the year, he decided to lay up the boat for the winter. As the weather improved, during the early part of the New Year, he took the opportunity to take the RIB on its first run of the season. As a treat, he also decided to take his two teenage daughters on the trip. Although clear and bright, it was a chilly day, the wind was force 4, the air and water temperatures were at 5°C and 3°C respectively, so the group wore warm clothing.

Once at the slipway, the owner realised that he had left the three lifejackets at home, but not wishing to disappoint the girls he decided to go ahead with the trip. Also contrary to his normal practice, he had no VHF radio or flares on board, with which to raise the alarm if anything untoward happened.

During the early part of the trip, the elder daughter took the wheel. She found steering the RIB rather difficult, and soon after, her father took over. He was sitting on the most forward seat, with his younger daughter on the seat behind and with her sister standing beside her. After a period of weaving the RIB about, the owner steadied on a course and set the throttle at full ahead. The RIB then unexpectedly lurched to port, throwing the father and his younger daughter into the cold water.

Because the engine kill cord had not been connected, the RIB continued at high speed until the elder daughter was able to scramble to the steering console and reduce the engine power. Despite the haphazard steering, she managed to drive the RIB back towards her father and sister. Without a VHF radio or flares, she could not raise the alarm, but on the way, she raised an arm to try to alert a passing cruiser to her predicament. Unfortunately, they mistook this to be a greeting and continued on their way.

Once close to her family, the elder daughter jumped into the water in an attempt to rescue her sister. The cold water was too much to bear and, despite her very brave rescue attempts, she had to climb back into the RIB. Tragically, without the support of lifejackets, her father and sister disappeared from view.

The elder daughter then drove the RIB towards two fishermen in a boat, told them of the situation and they raised the alarm by mobile telephone.

Despite long and rigorous searches, the father and his younger daughter were not seen again.

Figure 2: Steering system

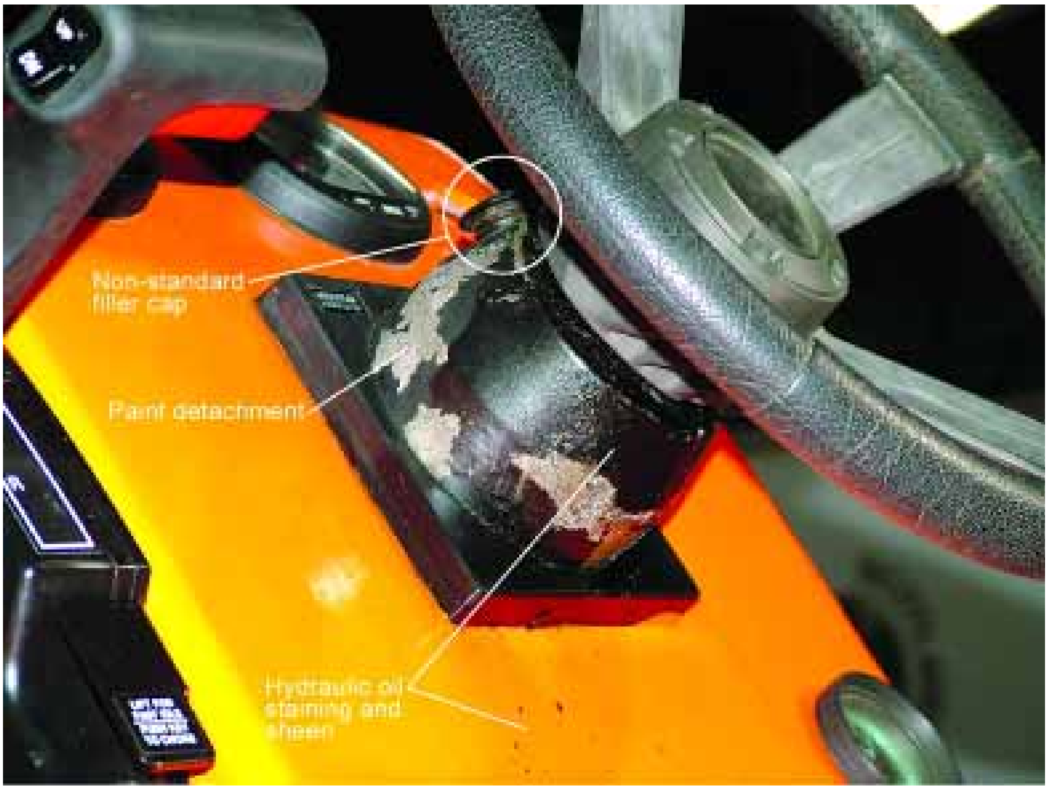


Figure 3

The Lessons

All the evidence points towards a mechanical failure of the RIB's steering system (Figure 2) causing it to lurch uncontrollably. It was found that the system had non-standard components fitted, and that the hydraulic oil level was low, due to oil leakage from the helm/shaft pump boss (Figure 3). This allowed air and moisture to enter the system, causing intermittent steering control, and water ingress causing corrosion to internal components.

It is tragic that a number of contributory factors to this accident have also been causal in other fatal leisure craft accidents. Most are obvious, and include:

1. Good preparation cannot be over emphasised – the use of lifejackets, carriage of flares and a VHF radio will greatly improve your chances of survival – you owe it to yourself and your passengers to carry them on board.
2. Do take the opportunity to regularly maintain your equipment in accordance with the manufacturer's instructions.
3. Always investigate fluid leaks and do not delay rectification – your life may depend upon it. Pools of fluid are obvious signs of leakage, but also look for staining and paint detachment on components as possible indicators of problems. It is important to do this during, and following, lay up because systems can develop leaks as seals can become dry and brittle through under use.
4. Always connect your engine kill cord – remember your boat may be the only lifeboat available – you do not want to see it disappear from view.
5. Make sure that those on board are aware of the internationally recognised method of signalling distress: raising and lowering of the arms outstretched at each side of the body.

Alcohol Ends a Weekend Pleasure Trip

Narrative

Four married couples set out from a marina for a weekend trip on board an 8 metre long, fast motor boat. Their destination was a popular small harbour, where they intended to stay overnight in a hotel.

The couples were in high spirits, and they had brought with them alcohol and food for the trip. During the passage, one of the men water skied behind the motor boat, and they stopped at a landing stage and had lunch in a waterside hotel. Later in the afternoon, they anchored the boat in a bay, and two of the wives went swimming. Alcohol was consumed throughout the passage and at the hotel.

The owner of the boat had taken the helm for most of the day, but, as they approached their destination, one of the other husbands took over. They entered the harbour, and the boat was made fast to one of the pontoons. The couples went ashore and enjoyed an evening of singing, dancing, eating and consuming more alcohol.

At 12.30am, three of the couples took the boat out again, to visit a prominent tourist feature about 2 miles away. They reached the feature and then began their return to the harbour. The owner was sitting in the port cockpit chair, with the other man sitting in the starboard chair and in control of the steering and the engine throttle control. One of the wives was standing between them. It became cold during the return passage, so the other two wives and one of the husbands moved forward and stood behind the chairs to take shelter behind the windscreen. The boat

A view looking forward from the stern of the cockpit area

Damage to starboard forefoot and bow forward

turned into the outer harbour, which funnelled down to a narrow entrance to the inner harbour. As the boat approached the entrance, it made a sharp turn to starboard and crashed into an unlit low cliff.

A yachtsman had seen the navigational lights of the motor boat travelling at speed and approaching the harbour. The boat disappeared from view and he heard a loud crash.

Realising something had happened to the boat, the yachtsman called the emergency services immediately. He and his crew headed for the stricken motor boat. When they reached it, they found it lying heavily in the water, with only one man and one woman still conscious. They took them on board the yacht and, concerned that the motor boat was in danger of sinking, the yacht towed the motor boat to a slipway on the other side of the harbour where medics and ambulances were waiting.

Three of the boat's occupants were killed during the accident; the other three sustained serious injuries.

The survivors cannot remember the events at or around the time of the accident, so it is not known why the motor boat turned suddenly to starboard.

Post accident investigations found:

- The three fatalities resulted from severe chest injuries, which were caused by being thrown against the forward part of the cockpit at the time of the impact with the low cliff.
- The severe damage to the motor boat, and the spread of debris field on the low cliff, showed that it must have been travelling at high speed when it approached the narrow entrance.

- The toxicology tests at the post mortem examinations showed that those who lost their lives had levels of alcohol in their bloodstreams which were more than twice the legal limit for driving a car.
- There were no other vessels moving either in the outer harbour, or the inner harbour, and the navigational light at the entrance to the inner harbour was clear and un-obscured.
- There were no mechanical faults with the boat.
- The weather was fine and calm, and the visibility was good.
- The owner and the helmsman had many years of experience on motor boats and yachts, and held RYA Powerboat Level 2 certificates.

The Lessons

1. **Don't drink and drive – on land *and water*.**
2. **Travelling in restricted waters, in darkness and at high speed, requires good vision, good judgment and quick reaction times. Alcohol causes reduced vigilance, lower inhibitions, poor night vision, affected perception and deterioration of judgment: all of which played a large part in this accident.**
3. **Even experienced and qualified people, travelling on well founded vessels, can make fundamental mistakes when adversely affected by alcohol.**
4. **It is wise to gradually reduce a boat's speed when approaching a narrow entrance, where manoeuvrability is restricted. This gives those in control more time to assess the situation and the hazards to navigation.**

Ouch! One Very Badly Cracked RIB

Figure 1: Broad on, port perspective

Narrative

It was another very pleasant, balmy summer's day in a popular seaside resort; just the sort of day to take the family out for a short, exhilarating, boat trip. Indeed, what better way to round off a holiday than to do this onboard a high speed, 12 passenger, 9 metre, Rigid Inflatable Boat (RIB) (Figure 1).

Full of expectations and a little trepidation, 12 passengers, 6 of whom were children, were given a rudimentary safety briefing by the fiancée of the RIB's skipper. She had no marine experience. The briefing only covered the use of the lifejackets, and emphasised that the "red" manual inflation toggle should not be pulled while in the RIB. Unfortunately, the passengers were not told when the toggle should be pulled. With the passengers now safely on board, the skipper and his fiancée took up their positions at the steering console.

The skipper rounded off the safety briefing by instructing his passengers to raise a hand should they become concerned at any time during the trip.

The skipper connected his engine kill cord to the steering console, started the engines and left the harbour entrance, while the passengers settled down for their big treat. They were not disappointed. With the wave height at about 0.5 metre, the skipper conducted a number of exhilarating, high speed manoeuvres before reversing his course to pass the nearby headland and into more open seas.

By now, the wave height had increased to about 1 metre. The passengers, now a little more nervous, were being bumped about their seats as they passed a nearby, small, single handed fishing vessel at about 25 knots, but none raised a hand to indicate concern. After

Figure 2: Front bench

Figure 3: Hull lifted to expose split

manoeuvring off a nearby beach, the skipper set his course to return to the harbour. Soon after, the RIB drove into the back of a wave in the following sea.

The skipper felt the RIB's handling characteristics change. The deck heaved slightly, there was a loud crack and the forward part of the hull momentarily adopted an angle of about 45 degrees from the horizontal. The front bench seat was torn from its deck mountings, plunging two of the children into the water (Figure 2). One female passenger also trapped her legs between the split sections of the marine ply deck before being pulled back by her husband. In the meantime, the skipper ran forward, the engines stopped as the kill cord was activated, and he dropped both his anchors and launched the lifeboat, although he was unsure how to do this. The RIB, although still afloat, had its bow section fully open to the sea, with port and starboard splits to the hull extending to over half the RIB's length (Figure 3).

Luckily, the two children in the water were quickly recovered by their father, who had dived into the sea to rescue them. The skipper of the fishing vessel saw the RIB in difficulties and immediately hauled in his lines and made his way towards the RIB. Lifeguards from the nearby beach also sped to the scene on a jet ski as the emergency services were activated.

The passengers were transferred to the fishing vessel, a jet ski, and the inshore lifeboat, and were landed at the harbour shortly afterwards. Surprisingly, none suffered serious injury.

The subsequent investigation found that the RIB was supposedly built to the European Craft Directive's standards, but there was no documentation to support this claim. In particular, there was no specification for the hull structure or its construction to justify its designation to cope with 4 metre seas, the structure lacked longitudinal stiffness and was of extremely light construction (Figure 4). As

Figure 4: Construction

this vessel was used for commercial purposes, it was subjected to detailed examination under the auspices of the MCA. However, in common with many other RIBs, there was no access to the under deck areas, so it was very difficult to assess the true condition of the hull.

It was also found that the operating company had conducted no risk assessments of their operation, and neither was it aware of the need to do so. The skipper lacked some of the mandatory qualifications and endorsements, and the local harbourmaster was unaware of the qualifications required for the RIB's operation, despite having endorsed the venture. Although the RIB had been examined for commercial use, the required certification had not been issued. While this had no impact on the accident, the vessel was, nevertheless, ineligible to carry fee paying passengers.

The Lessons

The owner of the RIB operating company identified a niche in the leisure market for high speed boat rides. He purchased the RIB, and operated it in good faith, believing that it had been built to the European Recreational Craft Directive (RCD) standards (which came into force in 1996 for recreational craft between 2.5 and 24 metres). As such, the craft should therefore have been able to withstand the loads expected for its intended operation. This assumption was further reinforced because the RIB had been examined for commercial use.

Fee paying passengers should expect to be carried in a safe manner, in a seaworthy vessel capable of coping with the predicted in service loads. Equally, they should expect that the operation has been assessed as being safe, part of which includes the skipper being fully trained and qualified for his role in order that he can competently deal with emergency situations.

In this case, the crew and passengers were very lucky to escape serious injury.

This accident has highlighted the following lessons appropriate to operators of small, high speed leisure craft, especially for those in commercial use:

1. If you are considering buying a boat that has been built since 1996, ensure that it carries a CE identifying plate confirming it has been built to the RCD standards.

2. Purchasing a new build vessel is a major financial undertaking – check with the builder that he holds a comprehensive Technical File supporting his build process. This should contain the necessary calculations proving the hull strength is suitable for the intended operation.

3. If considering buying a re-sale boat, you will wish to check the condition of the hull structure. This is often difficult with a GRP RIB as under deck access is frequently impossible. If this is the case, the builder may well have a set of photographs taken during build. These, coupled with the information in the Technical File, will aid you and your surveyor to determine the suitability of the vessel's construction for your needs. It is also wise to check the vessel's history for any major hull repairs.

4. Are you aware of the qualifications and endorsements required to skipper a commercial craft, and of the need for risk assessments? These are laid out in the MCA's Marine Guidance Note 280(M) colloquially known as the "Harmonised Code".

CASE 21

A Lovely Day Ends in Tragedy

Narrative

On a pleasant summer's day, the helmsman of a 6.55m cabin cruiser spent the day with various friends, cruising between near-by harbours, visiting the local public houses as they went. A local harbourmaster had particular reason to note the vessel that day, as it had twice sped out of his harbour, generating excessive wash.

Just after sunset, the cabin cruiser, with its helmsman and three passengers, completed the short 10-15 minute crossing to a small harbour for a drink. Thirty five minutes later, and being aware it was getting dark, the helmsman decided to head back to the main harbour. The vessel's navigation lights consisted solely of a combined side light (the pole mounted all-round white light being broken), however it was doubtful that the helmsman turned this on.

Earlier in the evening, a 4.4m dory, with three people on board, had travelled from the small harbour to the main harbour for an evening out. After several drinks, again as it was getting dark, the helmsman decided to head home. The dory had no navigation lights.

The dory and the cabin cruiser, both unlit, sped towards each other at a combined speed of over 45 knots. At the last moment, the helmsman of the dory saw the bow wave of the cabin cruiser. But it was too late to avoid a collision. The helmsman of the cabin cruiser saw nothing ahead, and only felt his vessel jump up as it hit and flew over the dory, and then stop as it landed back in the water.

No-one in the cabin cruiser was injured, and they were now able to see the vessel they had hit, also stopped in the water. They could see a person in the water, but could not render assistance as the stern drive of their own vessel was badly damaged. However, using a mobile phone they raised the alarm. Neither vessel had a VHF radio, flares or other lifesaving equipment.

On board the dory, one occupant was knocked unconscious and another was thrown into the water. Fortunately, he remained conscious and managed to swim back to the boat. Tragically, the helmsman was killed in the collision.

The lifeboat arrived quickly and evacuated the injured. After the accident, it was found that both helmsmen were over twice the alcohol limit permitted for driving a car on UK roads.

The Lessons

1. Using a leisure craft while under the influence of alcohol is dangerous and puts your and others' lives unnecessarily at risk. Alcohol will lead to:

   - deterioration of night vision
   - deterioration of peripheral vision
   - increased reaction times
   - greater risk taking as judgment becomes impaired.

   To be safe, employ the same practices as you would on the road, and ensure an experienced helmsman stays sober.

2. Navigation lights form a vital role on the water after sunset. They make you visible at night, give information on your vessel's aspect, provide an indication as to what sort of craft you are and the danger you may present. Having no navigation lights is inherently unsafe and will lead to a far greater risk of having a collision in the dark. The COLREGS[2] detail what navigation lights you must carry.

3. Adjust your speed to suit the conditions, especially at night. Travelling at a slower speed will provide more time to react and lessen the damage resulting from any impact. Be aware that your night vision will not be good just after leaving a lit area, and remember other craft may be hidden by background light from the shore.

4. Associated with speed is wash generation. Once a modern powerboat is fully planing, its wash may be insignificant. However, as a boat is climbing on to the plane, the wash generated can be considerable and can represent a real hazard to swimmers and small craft. Ensure you keep your wash to a minimum, and show some consideration to other water users in confined and busy areas of water.

5. The requirements to travel at a safe speed and to show navigation lights are both detailed in the COLREGS. A good awareness and understanding of these essential 'rules of the road' is vital when travelling on the sea, and you ignore them at your peril. There are plenty of publications available which explain the COLREGS quite simply, and the RYA teaches the basics on its numerous training courses.

2 The International Rules for the Prevention of Collisions at Sea

CASE 22

Fire: Put It Out and Keep It Out

Narrative

The owner and his wife were half way through a four week holiday, cruising the Western Isles of Scotland when fire gutted their 12.5m steel hulled yacht, forcing them to abandon ship. Fortunately no-one was hurt, but the yacht was burnt out.

The yacht was on a daytime passage between two ports. On sailing, the weather had been clear, but around midday the wind had dropped and visibility reduced to less than 1 mile, so they were motor-sailing. About 1½ hours later, the crew noticed smoke coming up the companionway, and the skipper went to investigate. On lifting the companionway steps, the skipper saw flames on the starboard side of the engine in the vicinity of the wiring loom. He fetched a fire extinguisher from the forepeak and with 3-4 blasts put the fire out. The engine had remained running throughout.

There was a lot of smoke below, so the skipper went on deck for some fresh air before inspecting the damage. While on deck, he noticed that the instruments were no longer working, so assumed the fire had damaged the cables. He decided not to dampen down the fire area or stop the engine as he might have trouble re-starting it, and there was insufficient wind to sail out of any trouble. However, he was unable to commence repairs due to residual smoke in the engine space, so he left the hatches open to try and clear it.

Fifteen minutes later, the skipper had gone below and forward to collect tools to begin repairs when he heard a shout from his crew, alerting him to black smoke emitting from the engine space and the wet locker area. As he left the cabin, he saw flames coming from the vicinity of the wet locker, and within minutes of his arriving in the cockpit, flames were rising through the companionway. At that point, the skipper decided to abandon ship and he and his wife, both wearing lifejackets, inflated and boarded their dinghy safely. Without a portable VHF in the liferaft, the skipper alerted the coastguard using his mobile phone.

The skipper and his wife were rescued by a nearby motorboat, and the local RNLI lifeboat fought the fire before taking the yacht in tow. Unfortunately, the extent of damage below was so great that it was not possible to determine the exact cause of the original fire, nor whether the second fire was a re-ignition of the first, or another fire caused by heat transfer into the wet locker.

The Lessons

1. Never assume a fire is out. To burn, a fire needs 3 ingredients: combustible material, oxygen and a source of ignition. Depriving the fire of any of these will put it out, temporarily. Fire-fighting must always be followed by action to permanently deprive the fire scene of at least one of the 3 key ingredients.

2. If you do suffer a fire on board, always check adjacent compartments and spaces for hot spots and secondary fires. If possible, dampen down hot spots, but at least monitor the area until any residual heat has dissipated.

3. Review your fire-fighting appliances. Have you enough? Are they the right type? Are they in date? Are they positioned sensibly? Do you and your crew know how to use them?

4. Finally, review and, if possible practice your abandon ship drill. Check you know the contents of the liferaft and, if necessary, use a grab bag to hold supplementary kit such as a handheld VHF and GPS.

Perilous Propellers

Narrative

A 12 metre long, twin screw charter boat was hired by a team of divers for 2 days of diving. This vessel had been used by one of the team on a previous occasion, with good results. It was known to some of the others by reputation and was operated under the Maritime and Coastguard Agency's Code of Practice; it was a Coded boat.

The boat's skipper met with the team the evening before the first dives and discussed buddy arrangements and dive sites.

The following morning all met at the boat, which then headed for the area of the first dive. This was just off an area of rocks where seals were common. Once at the site, the boat's skipper gave the dive team a briefing. This included details of the underwater terrain, an area of possible strong tidal streams, the use of delayed surface marker buoys and procedures to be followed after surfacing. Water depth was between 20 and 24 metres.

Four pairs of divers entered the water. Surface conditions were reasonable, with only a slight swell and breeze. After about 30 minutes, they began to surface close to the rocks. The swell had increased noticeably, as had the wind, which was tending to blow the boat towards the rocks; a lee shore. As instructed in the briefing, they swam towards the boat, and the first pair of divers boarded without incident.

One of the second pair to surface had difficulty getting on the boarding ladder. On the first attempt, he slipped off, largely because of the boat's movement in the swell. He again swam towards the boat for a second attempt. However, the skipper was concerned that his boat was being pushed too close to the rocks. Thinking the diver was still on the ladder, having not seen him slip off, he put his engines in reverse gear to move away from the rocks.

The diver quickly found himself beneath the boat, with his regulator knocked out. He tried to lose buoyancy, to get clear of the boat, but before he could do so his legs became caught in one of the propellers. He lost one leg and seriously injured the other.

Another, much faster boat in the area recovered the injured man and his buddy, and landed them ashore. During this short trip, the coastguard was alerted by VHF radio and arranged for both an ambulance and an air ambulance to attend.

The Lessons

1. The Maritime and Coastguard Agency's Code does not cover the safety of recreational diving operations; it is concerned primarily with the safety of the boat and those on board. A boat's compliance with the Code does not automatically indicate its suitability for diving.

2. Many Coded boats still operate with just a skipper; he may have no second crewman. A skipper working alone may not always be able to take steps to ensure his boat's safety, and at the same time monitor divers at the surface or coming to the surface. If possible, any of the dive party already on the boat should act as a second pair of eyes for the skipper, monitoring divers at or near the surface and making the skipper aware of their position.

Rafted Canoe Exercise Ends in That Sinking Feeling

Figure 1: Rafted canoe arrangement

Narrative

A group of 8 middle managers were taking part in a corporate team-building course, part of which involved a harbour crossing of about 1.6 miles using two rafted canoes provided by an outdoor activities centre. The canoes were accompanied by a small 4-man capacity safety boat. None of the group had any waterborne experience. The course was managed by a separate, third party specialist company, but the outdoor centre provided the training facilities and some specialist instructors. In this case, it included the safety instructor for the harbour crossing exercise. The instructor had previously been involved in the crossing, but he had never led this exercise before. Safety had always received high priority, and the centre had a comprehensive safety policy. However, they had not conducted a specific risk assessment covering the rafted canoeing exercise.

The evening before the exercise, a team briefing was held, during which an alternative exercise to the crossing was briefly discussed. However, the young instructor interpreted that the managing company wanted the crossing to be completed despite the forecasted south-westerly wind force 4-5, increasing to force 5-6.

The next day got off to a bad start. A wheel fell off the trailer carrying the safety boat, and while towing the two canoes to the start point, one of them capsized. This caused further frustrating delays to the already tight programme. To make matters worse, the weather had deteriorated and there was the additional pressure from the course manager to recover the programme. To make up lost up time, extra instructors were sent to help the course members build the rafted arrangement using spars and ropes, and one extra instructor embarked in the safety boat with the safety instructor (Figures 1 and 2).

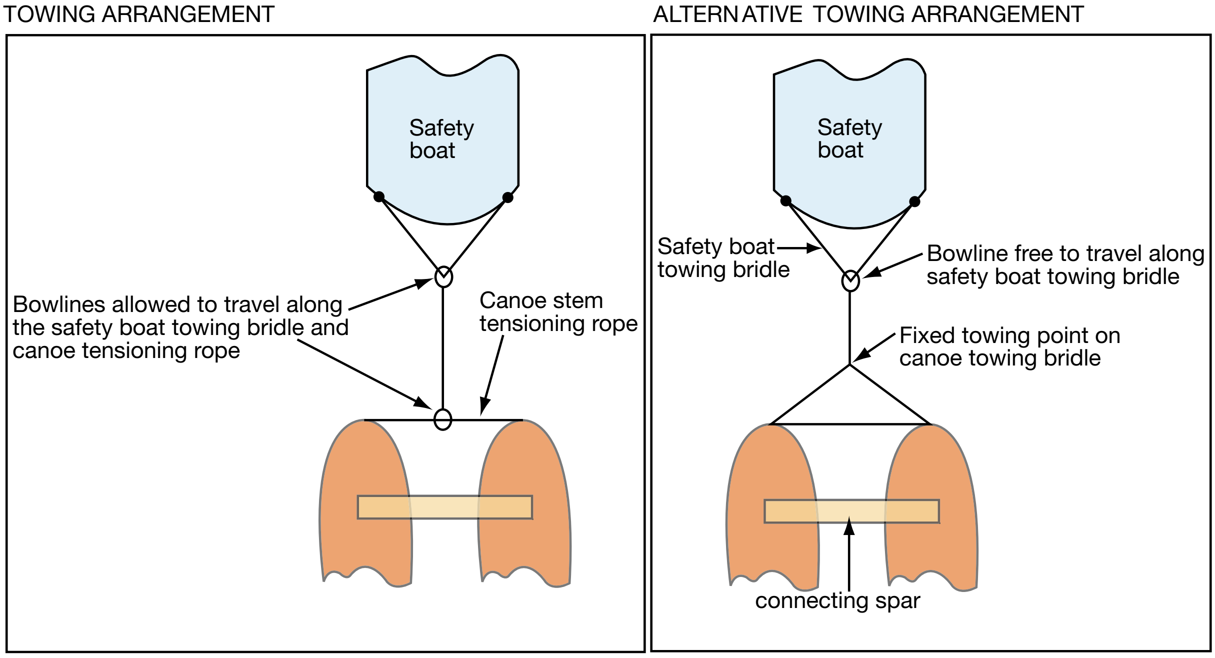


Figure 2

Despite the worsening conditions and heavy chop to the surface of the sea, the instructor did not consider cancelling the exercise although this had been done on previous occasions. Lifejackets were issued, and paddling and steering instruction was given as the group started off across the open water.

Following a review of earlier canoeing risk assessments, the centre had decided that the exercise should be conducted within 250 metres of the shore, instead of the previous limitation of 400 metres. However, the instructors were not made aware of this and the group continued with the open water crossing About 30 minutes later, the group became very tired, and made little headway, having lost the lee of the land. It was decided to take them in tow, although no thought had been given to the best towing method. The canoes yawed badly and became quickly swamped (Figure 2).

Unperturbed, the instructors attempted to release the spars and empty the canoes, the course members clung on, or floated nearby. When the crews attempted to climb back into the canoes, the canoes were swamped again,

Figure 3: Safety boat

plunging everyone back into the cold water. Using his mobile telephone, the instructor advised the outdoor centre of the situation but, despite the worsening situation, the emergency services were not alerted and the canoes and course members drifted towards a deep channel.

The safety boat carried no flares, nor was a VHF radio carried to raise the alarm. Fortunately, soon after, an oilrig supply vessel appeared nearby and the instructors managed to catch the crew's attention. The vessel informed the coastguard of the situation.

In an effort to warm up the course members, the instructors decided to put the entire group into the 4-man capacity safety boat (Figure 3). As the last person was pulled on board, the safety boat became swamped and all 10 people were, once again, plunged back into the cold water. The boat capsized.

Luckily the supply vessel arrived quickly and recovered those in the water. They were then transferred to a lifeboat and subsequently to hospital for check-ups; all were later released and the canoes and safety boat recovered.

The Lessons

The course members were extremely fortunate that the oilrig supply vessel was in the vicinity to make a speedy recovery, especially as the group were drifting quickly towards deep water, and the cold was rapidly sapping their strength. The appropriate control measures were not in place to minimise the risks, because the risk of rafted canoes becoming swamped had never been properly assessed. Had they been, it is probable that an alternative exercise would have been conducted.

This accident has highlighted the following lessons appropriate to the outdoor activity industry:

1. **Risk assessments need to be thorough, and must consider every element of the activity. Hybrid activities, such as the rafted canoe exercise, warrant their own risk assessment.**

2. **Although rafted canoes provide a stable platform, they are less able to "ride" with the sea conditions than a single canoe, and are therefore more susceptible to swamping.**

3. **Changes to risk assessments should be promulgated to staff as soon as possible.**

4. **It is always prudent to validate risk assessments by scenario-based training. By doing so, other risks and appropriate rescue actions are often identified. In this case, the best method of towing would probably have been identified.**

5. **Outdoor centres should ensure that they are fully involved in exercise programming and planning when "third party" managers are conducting training.**

6. **Instructors should be fully conversant with any limitations (wind force, sea state, visibility) imposed on an exercise, and should never be reluctant to cancel exercises if there is a risk to personal safety. The importance of having an agreed alternative plan should be fully realised.**

7. **It is essential for instructors to recognize when a "normal" recovery situation turns into an emergency situation.**

8. **Emergency services should be alerted early when people are getting into serious difficulty.**

Grounding in Perfect Weather

Narrative

A 48m luxury yacht grounded in good weather on a well charted reef. The vessel was badly holed and sank to a semi-submerged position. Two days later, the vessel slipped off the reef and disappeared below the surface.

The yacht had been cruising for 2 days with its passengers on board and had anchored in a bay overnight. The chief officer, who had joined the vessel 4 months previously, was up early as usual, assisting the crew and weighing anchor. He then went to the bridge to take over the watch from the master, and was informed by him of their day's destination. The weather was excellent, with good visibility and only a light breeze, and the plan was to make for a bay some 2-3 hours steaming down the coast.

The chief officer was responsible for navigation, and he drew a planned track on the small scale chart. He also made use of some waypoints of key headlands that he had previously programmed into the GPS. The course chosen was close to the shoreline to ensure a good view for the passengers, and they cruised at 10 knots. During this time, the master was never far away, but there were no positive handovers of watch between the master and the chief officer. On nearing their destination, the switch was made to a larger scale chart. Only 2 fixes were made on this chart, about 30 minutes apart, each time using a single radar range and bearing from a headland, backed up with a GPS check.

About the time of the second fix, the master studied the shore and decided to head to another bay slightly further down the coast. Between their position and the intended bay was a charted, but unmarked, reef, a small part of which was visible above the sea surface. Both officers were aware of the hazard, and the master asked the chief officer whether they were clear of the reef. The chief officer replied that they were and, after glancing at the radar, the master was happy to continue. The master watched as the depth on the echo sounder decreased, as he expected, believing that his vessel would cross a plateau to starboard of the shallowest part of the reef. The vessel then shuddered to a halt. The officers rushed to the port bridge wing and were able to see over the side the rock they had grounded on.

The master went into the engine room and saw flood water rising in the bilges. He returned to the bridge and alerted the coastguard. The chief engineer stopped the main engines and started the bilge pumps, but they did not stem the inflow of water. The chief officer then mustered the passengers and crew, the vessel's own two craft were lowered to the water, and the passengers were evacuated very calmly. Four of the crew stayed on board and rigged an emergency pump, but it had little effect and shortly before the weather deck immersed, the remaining crew abandoned ship.

The Lessons

Sadly, the lessons learnt from this accident are not new and are common to many accidents investigated by the MAIB.

1. Passage planning is not an optional extra. It is vital, if you are to avoid grounding on clearly charted obstructions, as is the case in this accident. There may have to be a great deal of flexibility in where a vessel goes, but this is no excuse for not conducting proper passage planning beforehand.

2. Ensure you use all the tools available to monitor your position. When working close inshore:

   - fix regularly
   - do not rely on a single bearing and range for position fixing
   - use clearing bearings
   - use parallel indexes on your radar.

   All of the above are aids to keeping your vessel safe.

3. Make sure the officer responsible for navigation is provided with sufficient time to complete a passage plan. Once on passage, it is too late, and 'local knowledge' is not always reliable.

4. Ensure your vessel's management has an external review. Relying solely on the master to effectively manage and command a vessel may mean unsafe and sloppy practices creep in unnoticed and unchecked.

Preliminary examinations started in the period 01/11/05 – 29/02/06

A preliminary examination identifies the causes and circumstances of an accident to see if it meets the criteria required to warrant an investigation, which will culminate in a publicly available report.

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (grt)	Type of Accident
07/11/05	*Sammi Superstars*	Bulk carrier	Korea	28327	Mach. failure
15/11/05	*George Lyras* *Cormill* *Corglen* *Corheath* *Corhaven* *Kenmouth*	Bulk carrier Barge Barge Barge Barge Barge	Greece UK UK UK UK UK	22322 Unknown Unknown Unknown Unknown Unknown	Collision
17/11/05	*Arctic Ocean* *Marie Af Hovrik*	Dry cargo container Fishing vessel	UK Sweden	6326 146	Collision
22/11/05	*Golden Bells II* *Plato*	Fishing vessel General cargo	UK Barbados	24.94 1990	Collision
23/11/05	*Varmland*	Dry cargo container	UK	6434	Acc to person (fatal)
29/11/05	*Solent Fisher*	Product tanker	Bahamas	3368	Hazardous incident
10/12/05	*Lisa Leanne*	Scallop dredger	UK	9.76	Fire/explosion (fatal)
18/12/05	*Sovereign*	Fishing vessel	UK	164	Grounding
	Dublin Viking	Ro-ro passenger	UK	21856	Grounding
19/12/05	*St Georgij*	Bulk carrier	Panama	14971	Fire/explosion
20/12/05	*Black Friars*	Oil tanker	UK	992	Grounding
08/01/06	*Jolbos*	Bulk carrier	Cyprus	18813	Acc to person (fatal)
07/01/06	*Mounts Bay*	Naval support RFA	UK	Unknown	Mach. failure
21/01/06	*Rubino* *Linda Kosan*	Oil/chemical tanker LPG carrier	Italy Isle of Man	5045 2223	Haz. Incident
27/01/06	*P&O Nedlloyd Genoa*	Dry cargo container	UK	31333	Heavy weather damage
30/01/06	*Pamela S*	Fishing vessel	UK	24.50	Acc to person (fatal)
21/02/06	*Pride of Calais*	Ro-ro passenger	UK	26433	Machinery failure
27/02/06	*Stena Leader*	Ro-ro passenger	Bermuda	12879	Contact

Investigations started in the period 01/11/05 – 29/02/06

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (grt)	Type of Accident
04/11/05	*Harvester* *Strilmoy*	Pair trawler Offshore supply	UK Norway	154 3380	Collision
05/12/05	*Dieppe*	Ro-ro passenger	France	17672	Grounding
	Arctic Ocean *Maritime Lady*	Dry cargo cont. General cargo	UK Gibraltar	6326 1857	Collision
09/12/05	*CP Valour*	Dry cargo cont.	Bermuda	15145	Grounding
13/12/05	*Noordster*	Beam trawler	Belgium	84	Capsize (fatal x 3)
05/01/06	*Berit*	General cargo	UK	9981	Grounding
18/01/06	*Emerald Star*	Beam trawler	Belgium	296	Contact
19/01/06	*Green Hill*	Fishing vessel	UK	74	Flooding/foundering (fatal x 2)
13/02/06	*Kathrin*	General cargo	Switzerland	2999	Grounding

APPENDIX B

Reports issued in 2005

Albatros – accident on board the commercial sailing vessel, Thames Estuary on 22 August 2004, resulting in one fatality
Published 8 April 2005

Amenity/Tor Dania – collision between vessels, south of Grimsby Middle, River Humber, UK on 23 January 2006
Published 7 November 2005

Attilio Ievoli – grounding of the Italian registered chemical tanker on Lymington Banks in the west Solent, south coast of England on 3 June 2004
Published 7 February 2005

Balmoral – grounding of passenger vessel, Gower Peninsula on 18 October 2004
Published 29 July 2005

Brenda Prior/Beatrice – collision, Lambeth Pier, River Thames on 17 December 2004
Published 11 August 2005

Brenscombe – Brenscombe Outdoor Centre canoe swamping accident in Poole Harbour, Dorset on 6 April 2005
Published 2 December 2005

British Enterprise – grounding in Ahirkapi Anchorage Area, Istanbul, Turkey on 11 December 2004
Published 30 December 2005

Cepheus J* and *Ileksa – collision in the Kattegat on 22 November 2004
Published 20 July 2005

Coral Acropora – escape of vinyl chloride monomer**,** Runcorn, Manchester Ship Canal on 10 August 2004
Published 8 March 2005

Daggri – contact made by the UK registered ro-ro ferry with the breakwater at Ulsta, Shetland Islands on 30 July 2004
Published 5 April 2005

(trilogy)

- ***Emerald Dawn*** – capsize and foundering, with the loss of one life on 10 November 2004
  Published 5 August 2005

- ***Jann Denise II*** – foundering 5 miles SSE of the River Tyne on 17 November 2004 with the loss of two crew
  Published 5 August 2005

- ***Kathryn Jane*** – foundering 4.6nm west of Skye on, or about, 28 July 2004 with the loss of the skipper and one possible crew member
  Published 5 August 2005

Hyundai Dominion/Sky Hope – collision in the East China Sea on 21 June 2004
Published 30 August 2005

Isle of Mull – contact between two vessels, and the subsequent contact with Oban Railway Pier, Oban Bay on 29 December 2004
Published 22 July 2005

Jackie Moon – grounding, Dunoon Breakwater, Firth of Clyde, Scotland on 1 September 2004
Published 23 March 2005

Loch Lomond RIB – two people being thrown from a high-speed rigid inflatable boat in Milarrochy Bay, Loch Lomond, with the loss of their lives on 13 March 2005
Published 21 December 2005

Nordstrand – fatal accident at Agencia Maritima Portillo, Seville, Spain on 20 September 2004
Published 15 April 2005

Orade – collision of general cargo vessel with the Apex Beacon, River Ouse on 1 March 2005
Published 14 December 2005

RFA Fort Victoria – investigation of the lifeboat release gear test, which caused injuries to two people at Falmouth ship repair yard on 10 September 2004
Published 18 May 2005

Sardinia Vera – grounding of the passenger ro-ro ferry, off Newhaven on 11 January 2005
Published 21 September 2005

Scot Explorer* and *Dorthe Dalsoe – collision, Route 'T' in the Kattegat, Scandinavia on 2 November 2004
Published 10 June 2005

Star Clipper – failure of a mooring bollard from the Class V passenger vessel, resulting in a fatal accident at St Katharine's Pier, River Thames, London on 2 May 2005
Published 18 February 2005

Stolt Aspiration/Thorngarth – collision between vessels, River Mersey, Liverpool on 13 April 2005
Published 28 November 2005

Stolt Tern – grounding, Holyhead, Wales on 1 December 2004
Published 9 September 2005

Swan – capsize of the passenger launch on the River Avon, Bath on 14 October 2004
Published 15 July 2005

Waverley – grounding of the passenger vessel, south of Sanda Island, west coast of Scotland on 20 June 2004
Published 1 February 2005

Recommendations Annual Report 2004
Published July 2005

Annual Report 2004 Published May 2005

Safety Digest 1/2005 Published April 2005

Safety Digest 2/2005 Published August 2005

Safety Digest 3/2005 Published December 2005

A full list of all publications available from the MAIB can be found on our website at **www.maib.gov.uk**

APPENDIX C

Reports issued in 2006

Abersoch RIB – a serious injury sustained when falling overboard on 7 August 2005
Published 3 February 2006

Auriga – loss of fishing vessel off Portavogie, Northern Ireland on 30 June 2005
Published 3 February 2006

Big Yellow – hull failure of RIB, Porthmeor Beach, St Ives Bay, Cornwall on 26 August 2005
Published March 2006

Blue Sinata – foundering in Weymouth Bay on 8 September 2005, with the loss of one life
Published 2 March 2006

Border Heather – explosion and fire in Grangemouth, Firth of Forth, Scotland on 31 October 2004
Published 16 February 2006

Bounty – capsize and loss 4 miles off Berry Head, South Devon on 23 May 2005
Published 2 February 2006

Carrie Kate/Kets – collision near Castle Point, St Mawes, Cornwall resulting in one fatality on 16 July 2005
Published 24 February 2006

Lykes Voyager/Washington Senator – collision in Taiwan Strait on 8 April 2005
Published 10 February 2006

Mollyanna – capsize of sailing dinghy, off Puffin Island, North Wales, resulting in two fatalities on 2 July 2005
Published March 2006

Portland Powerboats – collision during a junior racing event at Portland Harbour, 1 serious injury, on 19 June 2005
Published March 2006

Savannah Express – engine failure and subsequent contact with a linkspan at Southampton Docks on 19 July 2005
Published 7 March 2006

Sea Snake – grounding at high speed of leisure powerboat near the entrance to Tarbert harbour, Loch Fyne on 10 July 2005, with the loss of three lives
Published March 2006

Solway Harvester – capsize and sinking of fishing vessel 11 miles east of the Isle of Man on 11 January 2000 with the loss of 7 lives
Published 20 January 2006