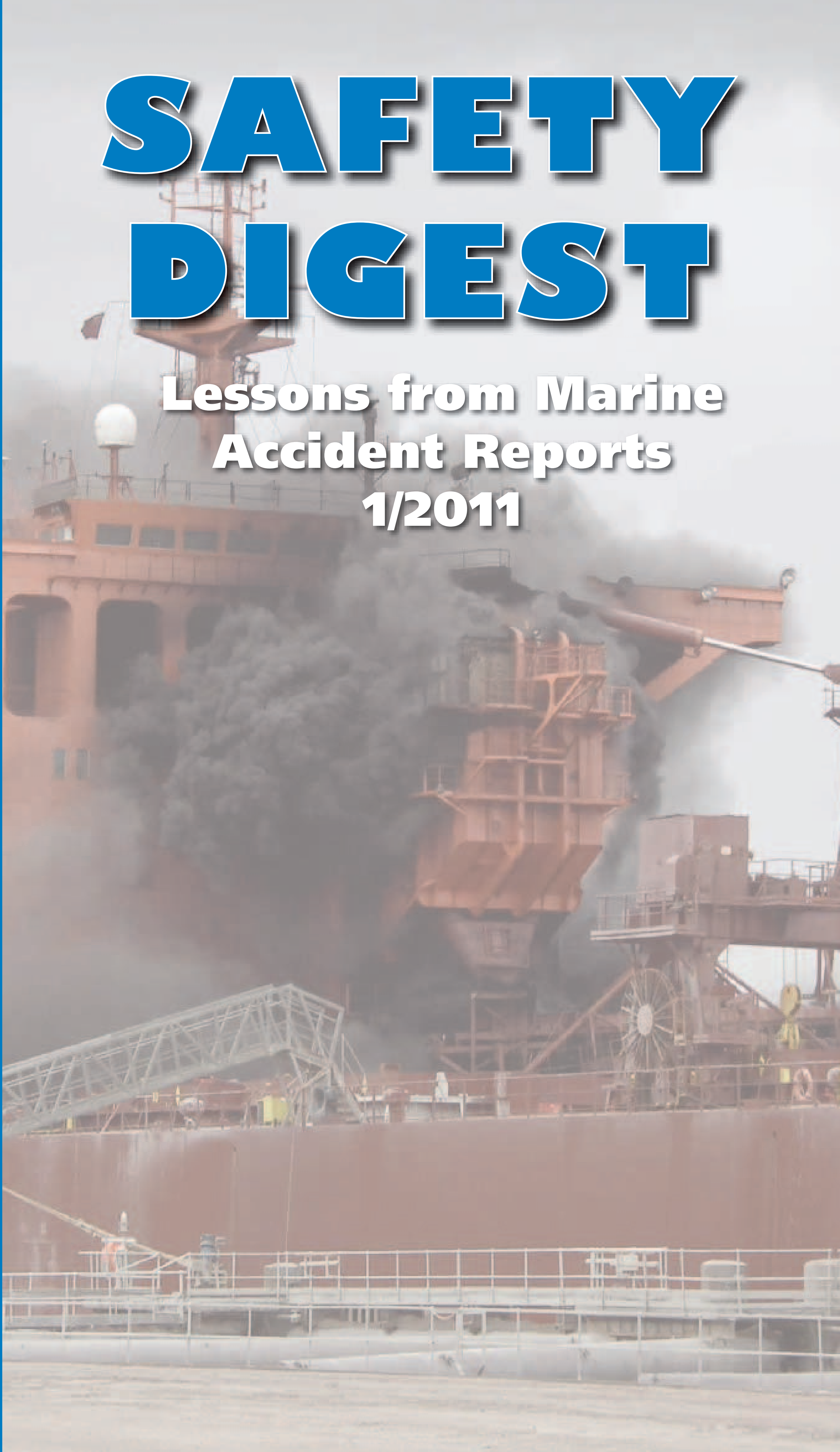
MARINE ACCIDENT INVESTIGATION BRANCH

MAIB

SAFETY DIGEST

Lessons from Marine Accident Reports 1/2011



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Lessons from Marine Accidents

No 1/2011

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is an
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MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) examines and investigates all types of marine accidents to or on board UK vessels worldwide, and other vessels in UK territorial waters.

Located in offices in Southampton, the MAIB is a separate, independent branch within the Department for Transport (DfT). The head of the MAIB, the Chief Inspector of Marine Accidents, reports directly to the Secretary of State for Transport.

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 information which has been determined up to the time of issue.

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

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

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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."

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Glossary of Terms and Abbreviations

AB	Able seaman
ARPA	Automatic Radar Plotting Aid
ASD	Azimuth Stern Drive
C	Celsius
cm	centimetre
CO_2	Carbon Dioxide
COLREGS	International Regulations for the Prevention of Collisions at Sea 1972 (as amended)
CPA	Closest Point of Approach
DSC	Digital Selective Calling
ECDIS	Electronic Chart Display and Information System
ECR	Engine Control Room
ERRV	Emergency Response and Rescue Vessel
FRS	Fire and Rescue Service
kN	kilonewton
m	metre
"Mayday"	The international distress signal (spoken)
MCA	Maritime and Coastguard Agency
MCR	Machinery Control Room
MGN	Marine Guidance Note
MIRG	Marine Incident Response Group
OOW	Officer of the Watch
"Pan Pan"	The international urgency signal (spoken)
PTW	Permit to Work
RNLI	Royal National Lifeboat Institution
Ro-Ro	Roll on, Roll off
RYA	Royal Yachting Association
SMS	Safety Management System
STS	ship-to-ship (transfer)
TSS	Traffic Separation Scheme
VHF	Very High Frequency
VTS	Vessel Traffic Services

Introduction

I've recently returned from the annual meeting of the Marine Accident Investigators' International Forum (MAIIF). 29 organisations were represented and it's perhaps not surprising that our wide ranging discussions covered a number of the issues captured in this edition of the Safety Digest. This included: poor application / knowledge of the COLREGS (Cases 2, 19); over reliance on ECDIS combined with a widespread lack of understanding about the limitations of this aid to navigation (Case 7); inadequate passage planning (Cases 23, 24); and the perennial reluctance of fishermen to wear lifejackets when working on deck (Cases 17, 18, 20).

The Forum's discussions about the use of lifejackets when working on the decks of fishing vessels struck a particular chord with me as the MAIB is currently investigating 3 separate accidents involving fishermen who tragically have lost their lives after falling, or being taken over the side. Arguably, the lives of all 3 could have been saved if they had been wearing a lifejacket. My heart goes out to the families of those concerned and I make no apology for repeating a plea to skippers of fishing boats and other small craft that has been made in this Digest before – please make sure that everyone working on the deck of your boat wears a lifejacket. If you do this, then wearing them will become as routine as using a seatbelt in cars has become, and lives will be saved.

There has been a small change to the format of the Safety Digest. At Appendix D you will find details of any Safety Bulletins the MAIB has produced since the last edition.

In closing, I would like to take the opportunity to thank Don Cockrill, John Goodlad and Sarah Treseder for the time they have given to produce the introductions to the three industry sections of this report. MAIB is extremely lucky to be able to record the thoughts and experience of people such as Don, John and Sarah for the benefit of its Safety Digest readership.

Until next time, keep safe.

Steve Clinch
Chief Inspector of Marine Accidents
April 2011

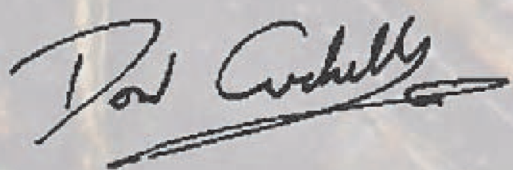
Part 1 - Merchant Vessels

This section of Safety Digest once again provides a unique and invaluable source of information for mariners of all disciplines to learn and benefit from the unfortunate experiences of others.

It is worth reflecting on why it is, that despite comprehensive regulation, numerous operational codes of practice and ever evolving training, qualification and certification schemes, so many accidents (or rather, failures of risk management) still occur in commercial shipping. Sometimes it can be a result of equipment failure through poor design, system fatigue or old age. However, in reading through the following reports it is clear that as ever, there are many cases where the accident is attributable to some sort of "operational error" arising from the fallibilities we all suffer - the "human factor" elements. Such failings, illustrated in the reports, include a common human desire, particularly strong in seafarers, to get the job done as a first priority. This is often with complete disregard to personal risk, perhaps due (especially in the current economic climate) to minimal profit margins and so any delay is financially damaging. Alternatively, perhaps the programmed maintenance regime is dispensed with to save expenditure on parts and labour. Managerial pressures, often (though not always) unintended are frequently inferred by those tasked with achieving a goal as requiring corner cutting to achieve the quickest and most economical solution. Examples are insufficient or incorrect use of tools and equipment, excessive speed, insufficient personnel delegated. Such inferred pressures are not limited to those on board, shore managers are equally susceptible. Sometimes, we take routine tasks for granted. Most of us have experienced finishing a task only to realise that we have no recollection of actually doing it. The problem is of course that because we may not have full concentration on the task in hand, we overlook the simplest of unexpected and undesirable occurrences and may make mistakes which can lead to a serious accident. Fatigue too can play a major part in this, not only by causing lack of concentration but simply a sort of numbing of the mind to the matter in hand and increasing vulnerability to distractions. In even the apparently simplest of tasks, there is a need for variety and frequent breaks to ensure continuity of concentration.

Being aware of our own fallibility adds a significant enhancement to any training regime or the compliance with an operational code of practice. There are numerous published works on the subject, but one I can recommend that is easy to read, amusing and very relevant is the memorably titled *The Invisible Gorilla*.

In reading the reports that follow, consider if you would have intentionally and knowingly taken the same risks and/or made the same "mistakes", probably not; neither in nearly all the cases most probably did the people involved. Remember that even in keeping a lookout, you may not see the obvious. Safe sailing!



Captain Don Cockrill FNI

My seafaring adventures started in 1973 with Canadian Pacific (CP Ships) where I progressed from cadet to master specialising in petro-chemicals. I joined the Port of London Authority as a pilot in 1991 following a short period in the NW European Chemical tanker coastal trade with Stolt Nielsen. In recent years I have been significantly involved in the various aspects of pilot training and its associated professional skill standards with particular emphasis on simulation as well as conventional processes. I have been involved in one way or another with the work of the United Kingdom Maritime Pilots' Association almost continually over the last 20 years and took over the Chairmanship in late 2010.

Close Encounters of the 'Aframax' Kind

Narrative

Two Aframax size oil tankers were underway at a speed of 2.5 knots having just completed a ship-to-ship (STS) transfer of diesel oil 10 miles from shore. As the last lines were slipped, the quarters of the two vessels closed. To check this movement, the overseeing superintendent on board the designated manoeuvring vessel ordered dead slow ahead and for 10° of port helm to be applied. However, the vessel's slow speed, direct drive engine did not start. Observing this, her OOW immediately informed the master and telephoned the chief engineer in the MCR. The superintendent was told about a minute later, by which time he had ordered slow ahead and had increased the amount of port helm. The superintendent immediately broadcast on VHF radio that the vessel had lost its engine, but he did not use ship names and the bridge team on the other vessel did not hear his call. No emergency signal was sounded on the ship's whistle.

As the manoeuvring vessel's bow swung very slowly to port towards the other vessel, the superintendent ordered 'slow astern'. This time, the engine started and the superintendent immediately ordered full astern followed by a series of engine and helm orders given in rapid succession. Seconds later, the manoeuvring vessel's port anchor struck the starboard lifeboat on the other vessel (see figure). The manoeuvring vessel's engine failed to start because a dirty air start pilot valve had not allowed starting air to pass into the cylinder.

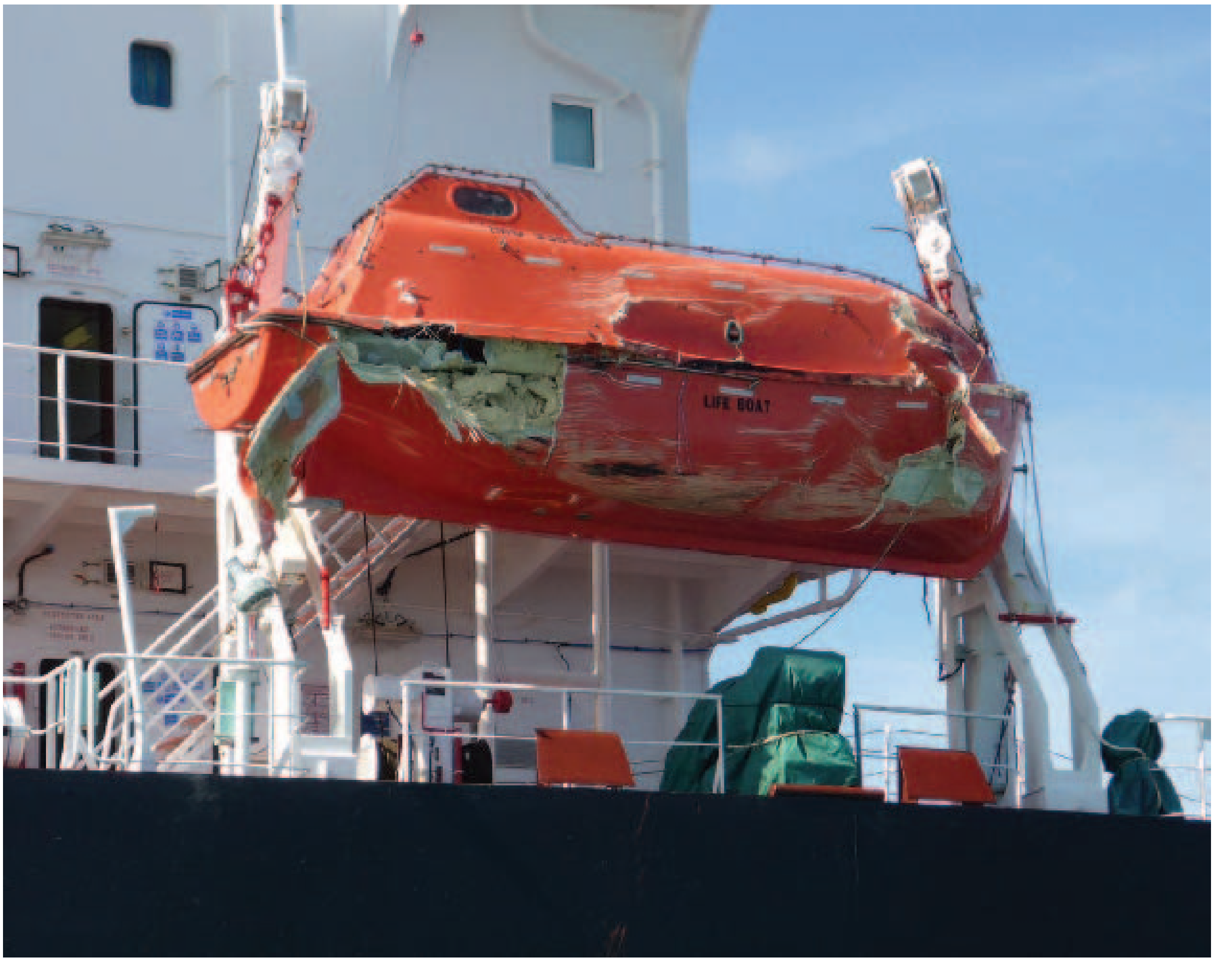


Figure 1: Damage caused to the lifeboat

The Lessons

1. When manoeuvring in close proximity to another vessel or navigational hazard the possibility of something going wrong must be carefully considered. In such situations, bridge and MCR teams need to be trained and ready to respond quickly and effectively to engine and steering failures.

2. Good internal and external communications are vital when operating close to another vessel. Dedicated communications operators, the correct use of radio procedures and a common language are all essential to ensure this is achieved.

3. This was the superintendent's eighth consecutive STS operation, and the cumulative effect of long working hours over a 3-week period possibly adversely affected his alertness. Proper monitoring of rest hours helps to prevent the onset of fatigue, but masters should also keep an eye out for the signs of fatigue among their crew and any person key to ship safety, such as STS superintendents and harbour pilots.

CASE 2

Different Interpretations

Narrative

A passenger ferry, on a southerly heading in daylight and good visibility, was crossing a TSS. The OOW was accompanied on the bridge by a cadet and a lookout. A cargo ship was transiting the westbound traffic lane of the TSS. The OOW had acquired her radar echo by ARPA, which predicted that the passenger ferry would cross ahead of the cargo ship at a range of 1 mile.

The lookout reported two yachts ahead: one fine to starboard and one fine to port; both were on westerly courses. The OOW acquired the radar echo of the yacht to port by ARPA, which predicted a CPA of 0.3 mile to starboard. He decided to maintain course and speed with the intention of crossing ahead of the cargo ship and then altering course to port to increase the CPA with the yacht.

After the ferry had crossed ahead of the cargo ship, the yacht altered course to starboard. The cadet reported this to the OOW, who then altered the ferry's course to starboard to increase the yacht's passing distance to port.

The Lessons

1. The ferry company's instructions required its masters in normal circumstances to accept a CPA of no less than 1 mile when passing ahead of another vessel. If the OOW intended a closer CPA, he/she was required to seek approval from the master. In this case, the OOW was content to accept a bow crossing distance of 1 mile with the cargo ship and a considerably reduced CPA with the yacht, without feeling the need to refer to the master.

   The OOW had become over-confident in his ability, to the extent that he was prepared to stretch the parameters within which the master had permitted him to operate autonomously. A lack of sufficient oversight and enforcement by the master had contributed to this complacency.
   Implementing company instructions, motivating the crew in following them, and verifying their compliance are fundamental elements of a master's responsibility.

2. Assuming a risk of collision existed with the yacht, the ferry's OOW correctly interpreted that his was the give-way vessel in accordance with Rule 18(a)(iv) of the COLREGs. His plan to alter course to port to pass around the yacht's stern would have been appropriate had it been executed at an early stage. However, his decision to cross ahead of the cargo ship before doing so meant that he was unable to take early avoiding action as required by Rule 16.

   The resulting circumstances were something which the OOW was able to control; had he opted not to cross ahead of the cargo ship, he would have demonstrated good seamanship, as required by Rule 8(a), in avoiding a close quarters situation with the yacht.

3. In interpreting a risk of collision with the ferry, the yachtsman initially maintained course and speed in accordance with Rule 17(a)(i). Unaware of the ferry's intentions, he then took avoiding action himself, in accordance with Rule 17(a)(ii) when it became apparent that the ferry was not taking appropriate action.

   Unlike a crossing situation involving two power-driven vessels, the ferry was at liberty to alter course to port in complying with the COLREGs. This severely restricted the options open to the yachtsman to take last-minute avoiding action. Whatever action he took would have put the yacht at risk if the ferry's OOW had subsequently decided to alter course to port.

4. The circumstances required the ferry's OOW to think "outside the box" and to view the developing situation from the yachtsman's perspective. Consequently, he should have aborted his plan to cross ahead of the cargo ship. Such action would have been in accordance with Rule 2(a), which requires an OOW to take any precaution which may be required by the ordinary practice of seamen or by the special circumstances of the case.

   Likewise, yachtsmen who find themselves in a similar situation may need to take earlier action than would normally be required to avoid becoming a "sitting duck".

Snagged & Dragged

Narrative

Towards the end of his watch at sea, a motorman was tasked by the chief engineer to mop up some hydraulic fluid in the steering gear flat which had been leaking onto the deck from the steering gear rams. The motorman entered the steering gear flat; neither the chief engineer nor the motorman informed the bridge.

A short while later, the chief engineer went to the steering gear flat to check on the motorman's progress. When he arrived there, he found the motorman pinned between the steering gear connecting rod and a raised walkway frame (Figure 1). The coastguard was alerted and the motorman was airlifted to the nearest hospital, where he received medical treatment for crush injuries to his vertebrae and pelvic region.

As he had leant through the gap in the rails (Figure 2), the motorman's high visibility jacket had become snagged on a connecting rod coupling. At the same time, a hard-over rudder movement was executed which resulted in him being dragged in between the connecting rod and the raised walkway frame, where he became trapped.

Figure 1: A demonstration of where the motorman was pinned

Figure 2

The Lessons

1. On this vessel, the railings around the steering gear were not sufficient to protect anyone from inadvertently being dragged into a dangerous position. Areas around moving machinery should be securely guarded to prevent such accidents.

2. Personnel should never enter or remain alone in any unmanned machinery space unless they have advised the bridge of their intentions.

3. Warning notices directing the crew's attention to the likelihood of machinery suddenly starting up and moving were not displayed at the entrance of the space.

4. The Code of Safe Working Practices for Merchant Seamen advocates the use of a permit-to-work (PTW) for appropriate tasks. While a PTW does not in itself make a job safe, it provides a process by which safe working practices can be considered and implemented. In this case, a PTW might have prevented this accident by prohibiting access to the steering gear flat while the vessel was manoeuvring.

Generators Don't Just Make Electricity

Narrative

A crewman died in a store room on a small merchant vessel after being overcome by carbon monoxide in the exhaust fumes from a portable generator.

The vessel was alongside overnight waiting to sail when tidal conditions allowed. The skipper went to bed early, but the crewman continued to work in the engine room. Later in the evening, the skipper heard the engine room door shut and thought that the crewman had finished work and had turned in. In the morning, the skipper became concerned that the crewman was not up and ready to sail, so he went to look for him.

The skipper found the crewman in the vessel's forward store; he had collapsed next to a portable petrol-powered generator. Ambulance crews could not revive the crewman and he was later found to have very high levels of carbon monoxide in his blood stream.

The generator was not part of the vessel's equipment and had been brought on board by the crewman for his own purposes. There was still petrol in the generator's fuel tank and the controls were set to allow it to run.

Ventilation openings to the forward store were still closed in the seagoing position, and although the hatch was partially open, carbon monoxide in the exhaust fumes built up quickly and overcame the crewman when he attempted to run the generator.

Figure 1: The portable generator involved in the incident

The Lessons

1. Carbon monoxide is a silent killer. It has no smell or taste and works by stopping oxygen from being carried in the blood stream. Even very small amounts can be fatal.

2. The exhaust from small petrol-driven engines and faulty heaters is the most common cause of accidents involving carbon monoxide. Petrol-powered bilge pumps and generators should only be used in well ventilated areas – and beware of the exhaust drifting away and collecting in the bottom of holds, or being sucked up by ventilation fans.

3. If you suspect an area has been contaminated with carbon monoxide, ventilate it thoroughly, preferably using a fan, before you put your life at risk by going in.

4. Simple carbon monoxide alarms are cheap to buy and easy to install. They may be the only warning you get.

CASE 5

STS Run-In, No Margin for Error

Narrative

Case 1

Before cargo ship-to-ship (STS) transfer operations at sea could begin, two tankers had to make fast to one another while underway and making way; known as a "run-in". The larger 243m long tanker was the constant heading ship, making a speed of about 4.2 knots, and the smaller 172m long tanker was the manoeuvring ship, which had four large Yokohama fenders made fast along her port side. The manoeuvring ship approached the constant heading ship's starboard side from astern, and then paralleled her course and matched her speed at a distance of about 1 cable abeam.

The STS superintendent was on the manoeuvring ship and had the con, while standing at the outboard end of the port bridge wing. The master was close by him relaying orders by voice and by a hand-held radio to the third officer and helmsman inside the wheelhouse. The third officer was relaying the ship's speed and acknowledging the helm orders by hand-held radio to and from the master, and was also operating the telegraph as instructed. The helmsman had been at the wheel for 1½ hours and had been steering course orders rather than specific helm orders.

Due to a delay caused by re-rigging the fenders earlier that afternoon, the run-in was now to occur in darkness, as agreed by the masters of both tankers. The sea state was slight, with a light wind on the starboard bow, and it was a moonlit night. The exterior bridge wing helm indicator illumination was very poor and could not be seen from the superintendent's position.

When the manifolds of the two ships were in line, the superintendent began giving specific helm orders to bring the tankers closer to one another so that mooring lines could be passed between them. Initially, he gave a "port 10" rudder order, which was acknowledged on the radio by the third officer and by direct voice from the helmsman. When the interior bridge rudder indicator showed that the rudder had reached 10 degrees to port, the helmsman shouted "port 10 now". As the bow began to swing to port and towards the other ship, the superintendent ordered "midships" and then "starboard 10" to counter the swing. The helmsman shouted "starboard 10 now". However, the port swing did not stop.

The superintendent then ordered the helm to "starboard 20" and then to "hard to starboard", and an increase in speed, but the rate of turn to port increased. Realising that something was wrong, the master repeated the orders to the third officer and helmsman. The bridge wing indicator was checked at this time and found to be reading "port 20". The helmsman then applied starboard helm and the rate of turn to port decreased, stopped and then the ship began to swing to starboard. However, after having made an alteration of course of nearly 30 degrees to port, the port side of the fo'csle inevitably collided with the other ship, causing structural damage. Fortunately, there were no resulting injuries or pollution.

Case 2

In a similar accident, the constant heading ship and the manoeuvring ship had reached a stage at which they matched courses and speed and were about 10m abeam of each other. The superintendent and master were on the port bridge wing of the manoeuvring ship, with the OOW and helmsman inside the wheelhouse.

The superintendent asked for "stop engine", which was carried out. The master, who was relaying the superintendent's orders to those within the wheelhouse, then talked by hand-held radio with the chief officer, who was on the fo'csle. The superintendent asked the master for "dead slow ahead" but the latter relayed the order as "dead slow astern", which was executed by the officer in the wheelhouse. Shortly afterwards, the helmsman reported that he was unable to steer and the officer reported that the engine was now running astern. The ship's port quarter was closing the other vessel's starboard quarter, so the superintendent asked for ever increasing ahead movements together with port helm orders.

Despite the superintendent's actions the two ships collided, causing structural damage in way of both vessels' boat decks.

Figure 1: Bridge steering console

Figure 2: Poor illumination of bridge wing instrumentation

The Lessons

1. In the first case, the helmsman had been concentrating for $1^1/_2$ hours on steering ordered courses, and it was increasingly important to keep these as accurate and steady as possible as the ships approached each other. When the superintendent's instructions changed from courses to steer to specific helm orders, the helmsman was relatively able to relax as he had only to move the wheel to the desired graduation on the wheel's boss (see photograph). This led to a lapse in concentration and resulted in him mistakenly applying opposite helm. It is necessary to change the helmsman at frequent intervals so that concentration is maintained.

2. In the critical stages of bringing two ships together, it is essential that orders are relayed and executed correctly, and that any error is immediately identified and countered. The ambient noise and the distance between the originator of the orders and those carrying them out can be such that they are not easily heard. Each situation requires careful consideration to ensure sufficient personnel are available to verify that orders are relayed, received and acted upon correctly.

3. Bridge wing instrumentation provides an important tool for checking that helm or engine orders have been correctly executed. The instrumentation needs to be regularly maintained and checked to ensure its functionality, particularly before critical operations such as those described above. A poorly illuminated indicator is of little value at night (see photograph).

Lack of Communication, and Distraction Lead to Benzene Spill

Narrative

A cargo of benzene had been discharged. Before the cargo hose was disconnected from the manifold, the cargo line was pressurised with air and then blown ashore to clear it of any residue. The manifold valve was then shut.

The cargo hose was disconnected and blanked by shore personnel, after which it was raised and temporarily hung in position above the ship's manifold. Two ABs, who were keeping watch on the main deck, considered it to be unsafe to blank the manifold while working under the cargo hose, and deferred doing so.

The normal procedure after the cargo line had been blown with air was to open a drop valve to release the pressure in the cargo line to a cargo tank. This operation was to be carried out by the duty officer stationed in the cargo control room. On this occasion, the duty officer was in the process of handing over his watch to another officer and was also communicating with the ship's agent. He became distracted and inadvertently opened the manifold valve instead of the drop valve, and some cargo residue sprayed onto the manifold platform and also onto the jetty. The ABs on deck told the duty officer by radio to close the manifold valve, which he did immediately, but he was unaware of the spill until a terminal representative went on board to make enquiries about the incident.

Fortunately, there were no resulting injuries.

The Lessons

1. **The duty officer had not checked that the ABs had blanked the manifold after the cargo hose had been disconnected, which, although not a checklist item, was a company operating procedure. Additionally, the ABs had not informed him that they considered it unsafe to work under the suspended hose and had, therefore, delayed blanking the manifold. Consequently, there was no verification that the blank had been put in place before the duty officer attempted to release the pressure in the cargo line.**

2. **A system of cross-checking/positive confirmation should always be employed when taking action or altering the status of critical machinery or equipment that may impact on personal or ship safety. Associated checklists should be used to ensure cross-checks/positive confirmation is undertaken when required.**

3. **Opening the cargo valve to release the pressure in the line was a simple and routine - yet critical - action, and therefore required the duty officer's full attention. The officer should have deferred his watch handover and asked his relief to deal with the agent until the pressure in the cargo line had been released. His familiarity with the task had caused him to become overconfident, allowing him to become distracted and therefore prone to error.**

4. **The reporting instructions in the case of a cargo spill were described in the discharging plan and reiterated to the crew during the pre-discharging meeting. The ABs claimed they had told the duty officer about the spill, but both the duty officer and the relieving officer did not hear the report. Again, positive confirmation, in accordance with best practice, would have ensured emergency procedures were initiated immediately.**

CASE 7

ECDIS Assisted Grounding?

Narrative

During the early hours of the morning a very large container ship grounded at full speed on a clearly marked sandbank in a busy traffic separation scheme. The vessel was equipped with an integrated bridge system, including full ECDIS capability, and the OOW was relying heavily on this despite having not been trained in its use.

As the vessel approached the bank the OOW altered course to give more room for a ship his vessel was overtaking. Unfortunately, this alteration put the bank right ahead, but the contour and colour settings selected on the ECDIS made this difficult to differentiate on the system's display.

Later, two flashing lights were seen, one on each bow, which the OOW thought to be fishing boats. He decided he could pass safely between them about 0.5 mile off. He therefore continued to steer between the lights instead of bringing his vessel back onto track. The officer was still unaware of the bank when the vessel came to a sudden stop and several alarms sounded. Luckily, there were no injuries and only minor damage was sustained. The vessel was refloated on the next high tide.

Even when the ECDIS recording was replayed after the grounding, it was not easy to see the bank. The settings selected, coloured all areas within the 30-meter contour in dark blue, including the bank and the buoy symbols. The echo sounder and ECDIS depth alarms had been set to minimum; once the buoys marking the bank were incorrectly identified as fishing boats, there was little left to warn the OOW he was heading into the shallows.

The Lessons

1. ECDIS is an effective <u>aid</u> to navigation when used correctly. However, it has many user-defined selections which can be set inappropriately by an untrained user. Officers who are appointed to ECDIS equipped vessels, whether to be used as the primary means of navigation or not, should have attended an approved, generic, ECDIS course followed by familiarisation with the equipment on board.

2. To avoid miss-application of settings and warning alarms the company (in its SMS), or the master (in his standing orders), should define the settings to be used rather than leave it to the personal preference of each OOW.

3. When aids to navigation fail, or are used incorrectly, judicious use of the "Mark 1 eyeball" should still avert an accident. However, in this case the OOW trusted what the ECDIS showed him rather than what he could see for himself. All aids to navigation should be treated as just that – aids – and the information presented checked by other independent means to verify its accuracy.

Last Out Turns the Lights Off!

Narrative

A dry bulk coaster had, since build, usually transported steel rolls, wire, tubes and paper rolls throughout Western Europe. Following the economic downturn the trading pattern had changed towards the carriage of dry bulk cargoes.

In line with this change the vessel was scheduled to load 1900 tonnes of animal feed wheat pellets.

The hold was cleared by the surveyor and the wheat pellet cargo was loaded. In doing so the pellets migrated up inside the after ventilation trunking and covered the starboard halogen light. Crucially, the hold lights were left on throughout loading and after the hold hatches were closed.

Figure 1: Cargo hold light

Figure 2: Ventilation terminal

The chief officer switched on the cargo hold lights (Figure 1), which had been fitted inside the lower end of the hold's port forward (which was forward of the moveable hold bulkhead) and starboard aft ventilation trunkings by the previous owners. These gave sufficient light to assist the cargo surveyor with his hold inspections.

No checks had been carried out on the hold lighting system to ensure the lights were turned off, and there were no indicators in the wheelhouse to alert the OOW that the lights were still burning.

The initial part of the passage to the discharge port went without mishap. The chief officer took the afternoon watch in the wheelhouse, while an AB carried out maintenance duties at the after end of the cargo hold hatch coaming. A short time later the AB saw smoke coming from the hold's starboard after ventilation terminal (Figure 2).

The terminal's cover was immediately closed, and the master was alerted. The crew remained calm and carried out a search for hot spots around the hold, and of the adjacent compartments. None were found. The crew had exercised for a cargo hold fire, and immediately laid out the fire hoses for boundary cooling as the master contacted the coastguard. One of the ABs checked the hold lighting switch and found it still switched on (Figure 3), so he switched it off.

Because the situation was far from clear, a 4-man Marine Incident Response Group (MIRG) team from the nearest Fire and Rescue Service (FRS) was transferred to the vessel by helicopter. Once again no hot spots were found, and the coaster was allowed into a nearby port.

The vessel was met by the local FRS. As the cargo hatches were opened, a small amount of smoke was seen. About 80 tonnes of the cargo was removed to the quayside. In doing so a smouldering "plug" of pellets fell from the hold's starboard aft ventilation trunking, and this was doused by the FRS team. There was no other evidence of a fire or smouldering.

The smouldering was caused by the wheat pellets covering the hot halogen lamp, which had been left on because of inattention to the basic post-loading checks to confirm the vessel was safe to proceed to sea.

On investigation it was also found that the hold lighting arrangement was not approved by the classification society, and that the electrical supply cable bulkhead glands did not conform to the rules, which compromised the ability of the bulkhead to prevent the spread of fire.

Figure 3: Hold lighting switch

The Lessons

1. The rationale for fitting the hold lights was to aid hold inspections and to check break cargo securing arrangements. When carrying break cargo (such as steel rolls), there was no risk of any cargo covering the lights. However, the fluid nature of the wheat pellets meant that it was easy for them to migrate into the ventilation trunking, and cover the hot halogen lights. Had a more flammable cargo been carried, the outcome could easily have been far worse.

2. When considering additions or modifications to equipment, do seek professional advice, especially from classification societies, to ensure that the proposal is safe and within the rules.

3. Ensure that there is a system of checking that heat sources in cargo holds have been isolated. In this case no one was specifically responsible for the checks.

4. The 30 and 60-minute fire resistant bulkhead specifications are for your safety. It is very unwise to compromise this by fitting unapproved electrical glands or other bulkhead penetrations.

5. The crew remained calm throughout the incident. They prepared for boundary cooling as previously exercised, highlighting the importance of regular fire drills.

CASE 9

Davit Control Adjustments - Proceed With Caution

Narrative

A man overboard rescue boat had been successfully launched and trialled in accordance with the ship's monthly routine. The boat returned to the falls, was hooked on and hoisted clear of the water. The hoist proceeded as normal, and once at the embarkation deck the boat was hauled inboard on its extendable hydraulic davit arm. However, the boat was too low to settle onto its chocks, so the bosun raised it up a further 2cm. Immediately after he did this a number of the fall wire strands parted and the boat dropped onto the chocks (Figure 1). Fortunately none of the crew in the boat was injured.

The cause of the failure was initially believed to have been a faulty limit switch which had been recently adjusted by a member of the crew.

The limit switch itself was activated by a circular block which was lifted when in contact with the davit hook (Figure 2). On lowering, the block was constrained by two chains which held it at about 0.5m below the limit switch. The design of this particular davit arrangement meant that there was still inertia in the winch drum that allowed it to continue to rotate for a very short time after the control lever was set to the stop position. The correct adjustment of the limit switch allowed for this, and was designed to prevent over tensioning and stretching of the wire, which would inevitably lead to its failure. However, the person who adjusted the limit switch did not seem to have been aware of this although it was stated in the operation and maintenance manual.

Figure 1: Man overboard rescue boat

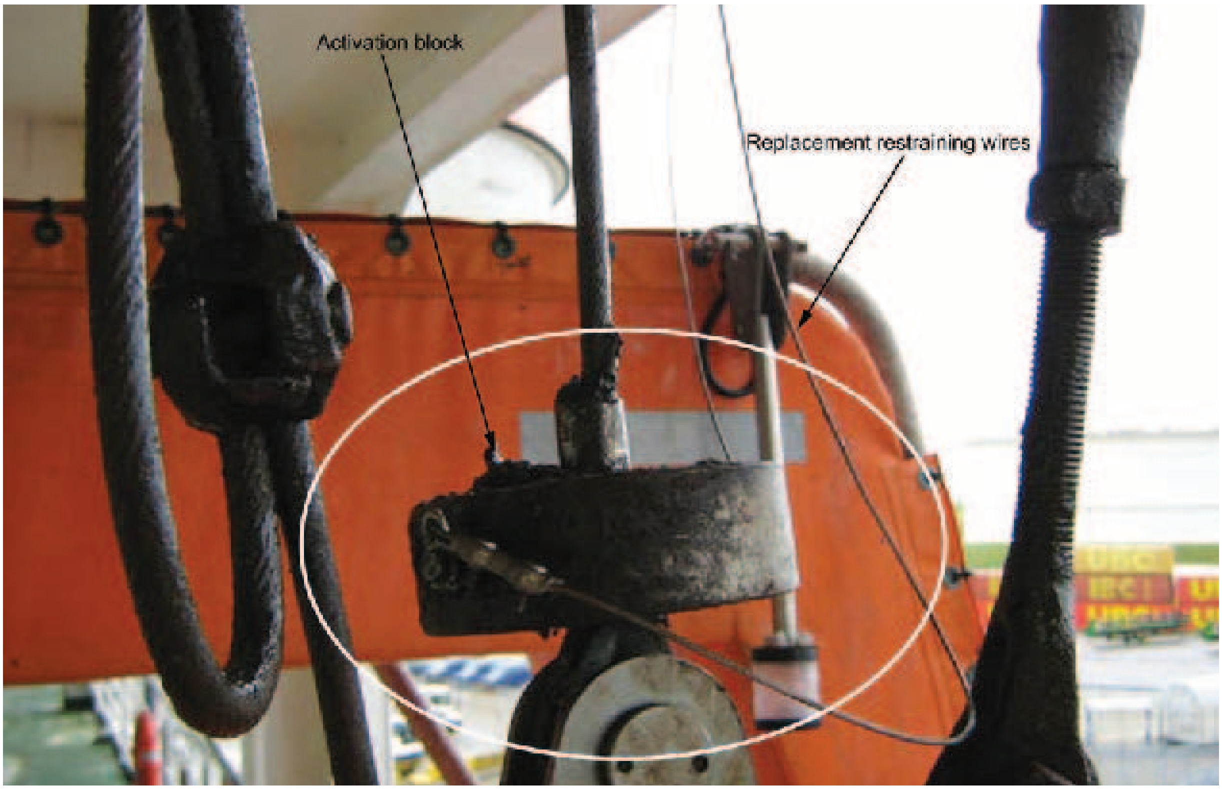


Figure 2: Limit switch activation block and replacement constraining wires

Unfortunately there have been a number of accidents, some fatal, resulting from a misunderstanding of the functionality of elements of rescue boat and lifeboat hoisting and lowering equipment. In this case maladjustment of the limit switch caused the fall wire to fail. However, the design of the circular block constraining chains had also occasionally caused the wire to snag before the limit switch operated. To prevent this happening, the manufacturer replaced the chains with stiff wires (Figure 2).

The Lessons

1. Ensure only qualified personnel operate and carry out adjustments to boat lowering and hoisting equipment – your life may depend upon the operator/maintainer's knowledge.

2. Always refer to the manufacturer's manual when carrying out adjustments – DO NOT GUESS.

3. When critical adjustments are made, always carry out a functional test, preferably using a dummy load to prove the adjustment.

4. Where design issues, which may affect the safe operation of the equipment, have been identified ensure that these are reported to your line manager, shore technical staff and the original equipment manufacturer for possible design modifications and issue of safety notices where appropriate.

CASE 10

Early Release Led to Early Demolition

Figure 1: The vessel involved in the accident *Photograph courtesy of Fotoflite

Narrative

A 235m container ship (Figure 1), fitted with a single, right-handed fixed pitch propeller was unmooring from a riverside container terminal. A pilot was embarked and two tugs were assisting: a 53 tonne bollard pull Voith Schneider tug was made fast on the centre lead forward and a 66 tonne bollard pull ASD tug was secured on the centre lead aft. The aft tug was slower to secure than usual as her secondary towing gear was being used due to her primary gear being defective.

The visibility was about 1 mile as the moorings were singled up, but had reduced to less than 2 cables when the ship sailed. The pilot's intention was for the tugs to keep the vessel parallel to the berth as they pulled her about 40m into the river. However, during the manoeuvre the container ship's bow was pulled off further than her stern, which resulted in the vessel heading away from the line of the berth at an angle of about 15°.

The aft tug was then released in anticipation that it would take longer than usual to recover her gear. The container ship then came to dead slow ahead with the forward tug still secured to assist the vessel to negotiate a nearby bend in the river. Almost immediately, the vessel entered dense fog. As a precaution, the forward tug was released before the container ship gathered excessive headway.

With both tugs slipped the vessel approached the turn in the river, but it failed to respond to full port rudder and increased engine revolutions. The pilot stopped the engine and then went astern and applied full thrust to port with the bow thrust. The forward tug was also requested to push on the starboard bow. However, this did not prevent the vessel from making contact with a disused jetty. The damage to the vessel was minor and she was able to continue on passage. The damage to the jetty, which was scheduled for demolition, was significant (Figure 2).

Figure 2: Damage caused to the jetty

The Lessons

1. The state of the visibility is key in many operations, and where there are signs that it might reduce considerably, it is frequently better to abort a manoeuvre early rather than risk being caught out half way through.

2. Although mooring and unmooring operations are usually achieved using the mark one eyeball, this is not possible once visibility has reduced and visual references are lost. In such circumstances electronic aids, such as compass repeaters and radar are available to enable a vessel's heading to be accurately monitored.

3. When making way, tugs are most effective when secured, and need to be attached in good time when approaching a berth. Similarly, when leaving a berth, tugs should remain attached for as long as they are needed. The safety of tugs and the vessel being assisted must be taken into account at all times, but this is usually best ensured by proceeding at a sensible speed, rather than by premature release.

CASE 11

'Improvement' Causes Unforeseen Consequences

Narrative

After discharging her cargo, a small product tanker departed from an oil terminal in a busy port. Within a few minutes of clearing the terminal, as the vessel was increasing speed, an alarm sounded indicating the main engine cooling fresh water temperature was too high.

The chief engineer called the master, and was asking him to slow down when the 'high cooling water temperature' safety cut-out shut down the main engine. The pilot immediately called for tugs, which arrived shortly afterwards, and the vessel was taken to a safe anchorage where the crew discovered that the sea water inlet filter of the fresh water cooler was blocked. After cleaning the filter, the vessel was able to resume her passage. Investigations revealed she had a history of sea water cooling system failures.

The vessel's main sea water system supplied all sea water pumps, including two high capacity ballast pumps, drawing from two low sea suction and one high sea suction intakes. The crew always kept both low suction intakes open because when both ballast pumps were used together, one intake could not cope with the demand. As the vessel was engaged in a busy short sea trade, the crew did not isolate either of the sea suction intakes as a matter of routine once ballasting operations were complete. The high sea suction was never used.

The fresh water cooling system on board was a combined low and high temperature cooling system, with two thermostat-controlled three-way valves controlling the differential temperatures. However, the system relied on a single fresh water cooler. Having experienced cooler blockages in the past, the ship's staff had fitted a back-flushing system at the sea water outlet side of the cooler. A subsequent 'improvement' was the installation of a filter box with a plate strainer at the sea water inlet to the fresh water cooler. It was this strainer which was found blocked when the incident happened.

The new filter was not a duplex type, nor was it fitted with a by-pass valve. There was no high temperature alarm at the fresh water cooler outlet, and the low sea water pressure alarm switch fitted at the inlet to the cooler was defective. When the chief engineer received the high temperature alarm at the fresh water inlet to the main engine, it was already too late.

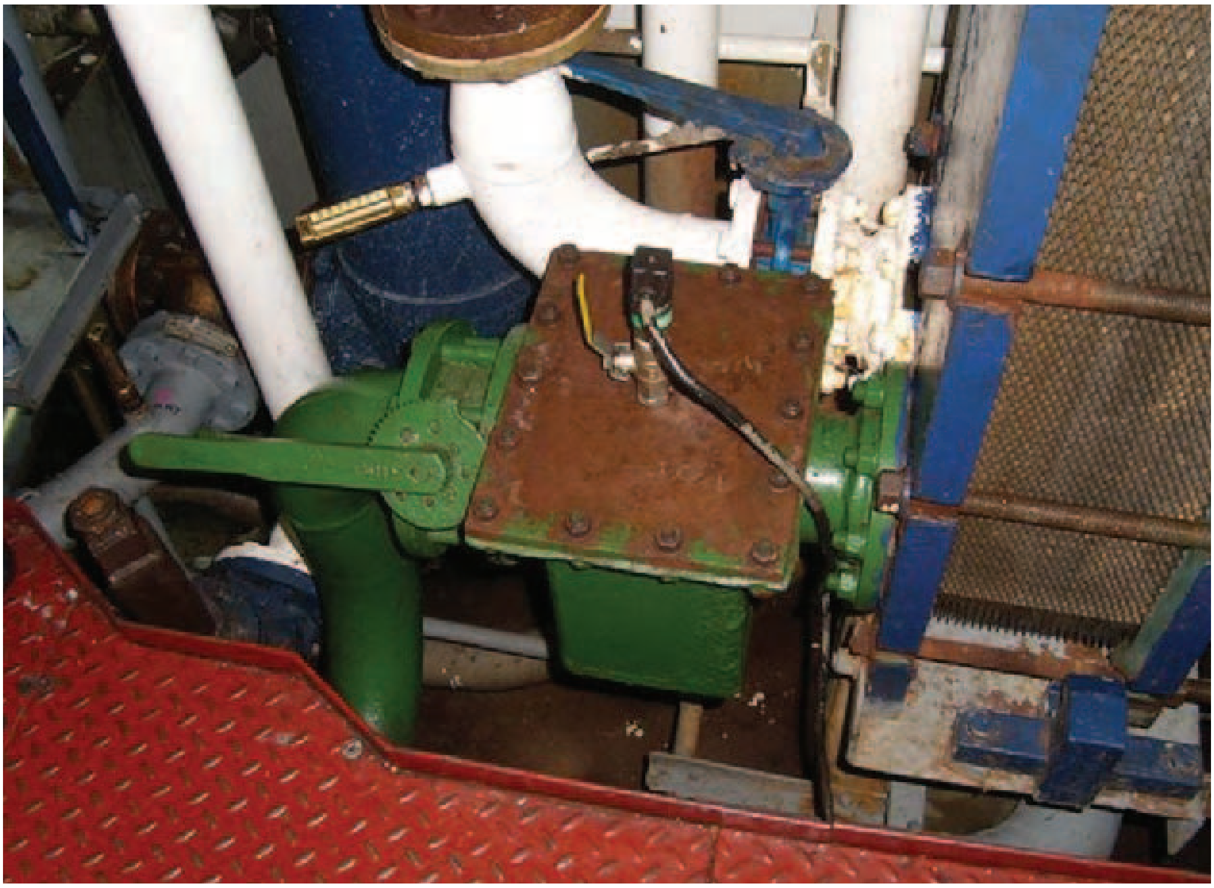


Figure 1: Freshwater cooling system

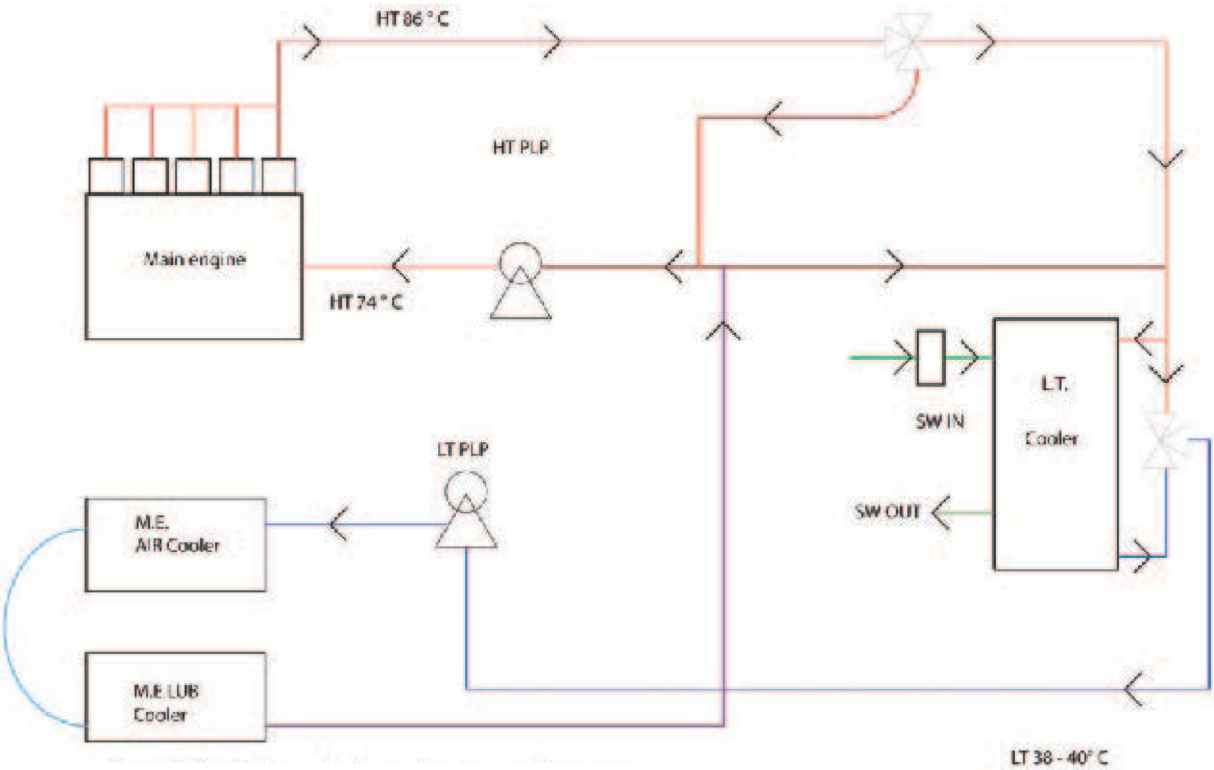


Figure 2: Circuit diagram for the main engine cooling system

The Lessons

1. The sea water filter installed at the inlet to the fresh water cooler functioned as intended by preventing weeds from fouling the cooler. However, there was no means of by-passing the filter if it became blocked. As the entire fresh water system relied on a single cooler, the loss of sea water to this cooler resulted in the ship losing its main engine. When implementing an improvement, it is imperative that all possible knock on effects are considered.

2. The vessel lost her main propulsion engine in restricted and busy waters. Had she grounded in the narrow channel or collided with another vessel, the consequences would have been disastrous. A means of by-passing the filter in an emergency could have kept the cooler functional while the crew cleaned the filter. Similarly, had there been a high temperature alarm at the cooler outlet, it would have alerted the crew to the developing situation several minutes earlier, giving them time to take preventative actions.

3. Although in this incident the main sea water filters were not blocked, there had been a number of previous incidents caused when both of the vessel's main sea suction filters became blocked in shallow waters. Good practice dictates that high sea suction intakes should be used in shallow waters to reduce the risk of the vessel ingesting mud and weed, and an intake should always be kept isolated and ready for use in an emergency. These requirements should be incorporated into the design of vessels' cooling systems. However, if these basic requirements cannot be met, consideration should be given to modifying the system instead of compromising safety.

Last Act of Defiance

Narrative

A decommissioned and unmanned coaster had just been beached and secured with the vessel's mooring ropes by shore workers on a slipway in an estuarial port (Figure 1). Two hours later, on a falling tide, the vessel's stern, which projected into the river and had remained afloat, lowered, causing the vessel to trim aft. As weight came on the aft spring line, it surged and slipped off the mooring bitts on board. This resulted in the other two mooring lines progressively parting and the vessel sliding astern and entering the main channel in dense fog.

The vessel's radar echo was acquired and tracked by the VTS officer, who made several attempts to establish communications with the unknown contact which was heading downstream. Initially, a pilot launch was tasked to identify it, and when it struck a buoy and came within 2.5nm of an oil terminal, two tugs, which were on station, were also tasked to investigate. The oil terminal and the dock master were informed of the situation and possible threat to the installation, and cargo operations were stopped. In the dense fog, one of the tugs managed to identify the vessel and transfer a crew member across onto her deck. Although one tug was able to make fast a tow line to the vessel's stern, the strong ebb tide and restricted visibility hindered the efforts of the tugs, which could not prevent the vessel from making contact with the oil terminal structure.

The terminal remained shut for 18 hours due to the damage to the support structure of the oil pipelines on the jetty roadway.

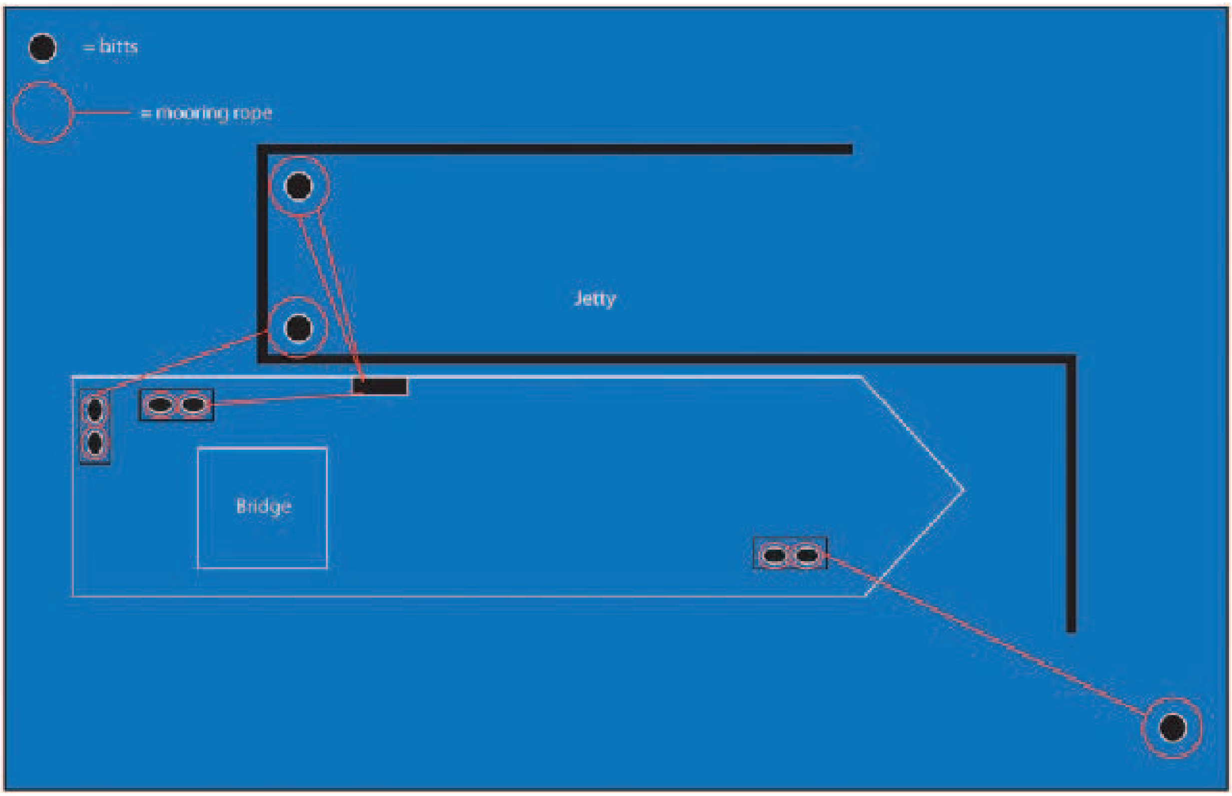


Figure 1: Mooring arrangements

The Lessons

1. The mooring ropes used to tie up the vessel were in very good condition, but the vessel had not been secured effectively. Pre-planning of such operations should be undertaken, especially in cases where the vessel will remain unmanned and/or has to use an unusual or non-standard mooring arrangement.

2. The aft spring line slipped as weight came on it because the rope had not been secured correctly. Synthetic fibre ropes should be made fast using two round turns around the leading post of the bitts before finishing it off with at least three 'figure of eight' turns.

3. Careful thought should be given to the lead of the lines so as to avoid creating sharp angles. In this case, the eye of the breast line was secured to a cleat forming part of the fairlead (Figure 2). A sharp edge on the fairlead effectively cut through the rope as the vessel oscillated alongside before breaking free.

Figure 2: Fairlead with cleats

Fire Below – The Need for Effective Engineering Oversight

Narrative

It was another day of tug escort duties. Once again the usual 5-man crew of a tug had been allocated to a different vessel because of manning cutbacks and rostering arrangements. They had become quite used to this procedure, which meant they only spent about 60% of their time on board their own allocated tug.

Pre-sailing checks were completed and there was nothing to raise the concerns of either the tug master or chief engineer. About 20 minutes after the escort duties started, the fire alarm sounded and the detection panel indicated a fire in the engine room. The chief engineer looked into the engine room through the engine control room (ECR) windows (Figure 1) and saw diesel fuel being sprayed onto the deckhead and cascading down onto the hot exhaust in the vicinity of number 4 cylinder head of the port main engine. He immediately advised the tug master to break off escort duties. As he did so, the fuel spray ignited. The chief engineer attempted to fight the fire using an extinguisher, but was quickly driven back into the ECR. He then stopped the engine at the same time as the tug master advised the pilot and harbour authorities of the situation.

Figure 1: The view from ECR

Having called for muster stations, the tug master went to the ECR. On seeing the fire he advised the chief engineer to prepare to flood the engine room with CO_2. He returned to the bridge to assess the navigational situation, and decided to stop the starboard main engine and drop the anchor. Meanwhile, the ABs shut the engine room ventilation flaps as the chief engineer operated the emergency quick shut-off fuel valves. He heard four out of the five valves slam shut, but the fifth one, which supplied the running generator, failed to shut and so the generator continued to run, with the high risk of feeding the fire with diesel fuel.

The chief engineer then operated the CO_2 system to the engine room. However, he thought he heard gas going into an adjacent machinery space. He opted to open that space to the gas system, unaware that the full set of bottles was required to extinguish an engine room fire.

Conscious of the need to carry out boundary cooling, the tug master instructed the ABs to start the emergency fire pump, which was located in the after hold. As they opened the hatch they were confronted with CO_2, which had somehow leaked into the compartment. Consequently they re-secured the hatch. Now unable to set up boundary cooling, the crew could only monitor the deck temperatures until they were evacuated from the vessel a short time later.

Fortunately, other company tugs were quickly on the scene, and set up boundary cooling. About 3 hours later the water was turned off. As there was no evidence of the decks warming up, or other evidence of fire, the tug master and chief engineer went back on board and "cracked" open the engine room vents before returning to the rescue vessel. In the meantime the local FRS had carried out a thermal image camera assessment of the vessel from a launch, and confirmed there were no unidentified hot spots.

As the engine room vents had already been opened, the FRS agreed to carry out an assessment of the atmosphere in the engine room to ensure it was free of CO_2. This was to allow the hydraulic pumps to be started to enable the anchor to be lifted and the vessel to be brought alongside and checked out by the FRS.

The investigation found the port engine's number 4 cylinder fuel injector leak-off pipe had suffered extensive chafing (Figure 2) because of its inadequate bracketing arrangements. The pipe failed and sprayed diesel fuel onto the hot engine, where it ignited.

Disappointingly, most of the other leak-off pipes on the port and starboard engines, and others in the same vessel class, had also suffered from severe chafing. While some of the pipes had been braze-repaired, there was no evidence of the defect being reported to the company ashore, so no proper engineering solution was developed to prevent the fire risk.

The investigation also found that the failure of the fuel quick shut-off valve was known to the regular chief engineer who knew how to set it to ensure it would operate. However, this had not been reported, or passed on to the other engineers who also manned the vessel.

The CO_2 flooded the hold when a pressure sensor pipe was pulled through a union (Figure 3) while the system was being pressurised. This was caused by missing support bracketing.

Figure 2: Failed CO_2 sensing pipe

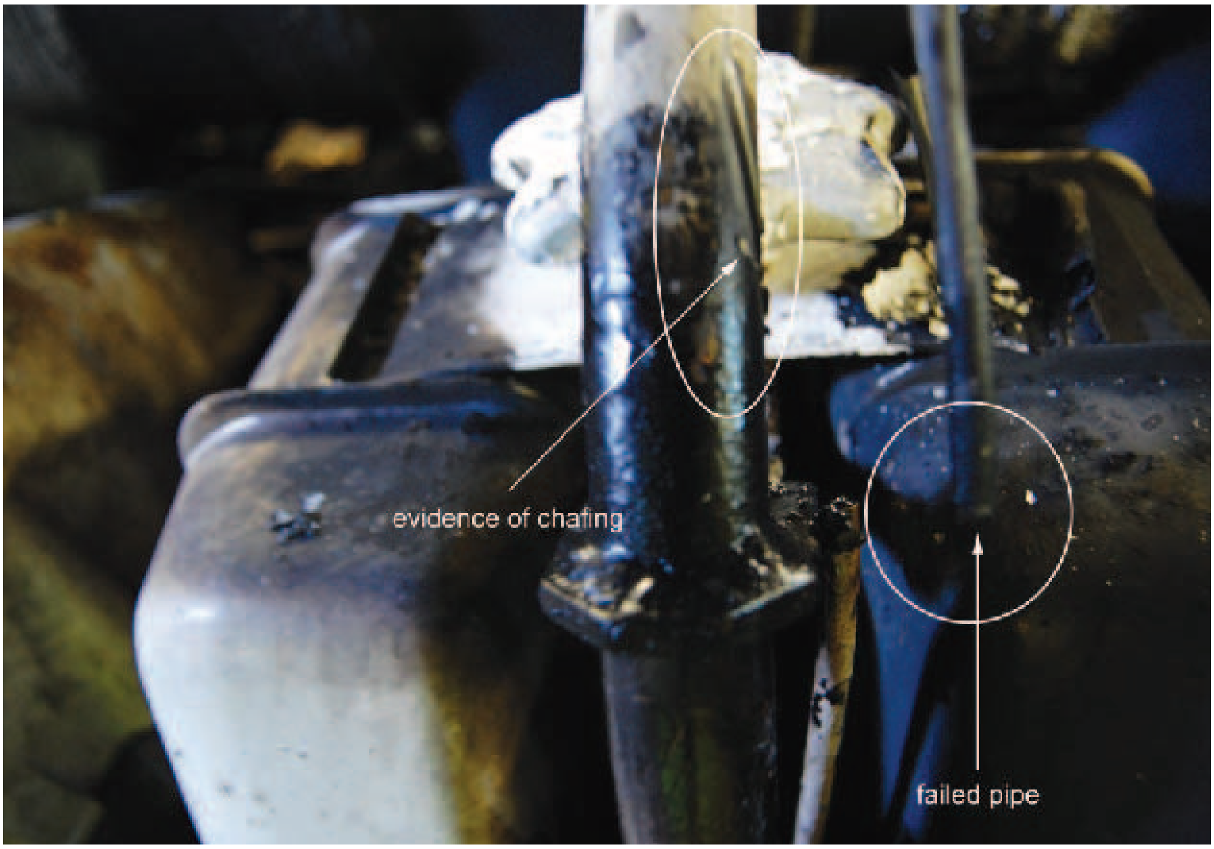


Figure 3: Failed leak-off pipe

While tug escort duties could be managed by transferring manpower between the various vessels, something had to give as a result of this lack of vessel "ownership":

- There was no proper maintenance plan.
- Defects were not properly reported or addressed.
- The long-term gapping of a technical manager and a technical superintendent meant the only remaining superintendent was severely stretched and did not have the time to regularly visit all vessels. Had he done so, the defects might have been identified and corrective action taken.
- The frequent crew changes also meant that individual crew members had not carried out emergency drills on all the vessels they were expected to operate. This clearly compromised their ability to deal effectively with emergency situations because of variations in vessel equipment and procedures, and their unfamiliarity with them.

The Lessons

1. **Effective management oversight, ashore and afloat, is a vital element in ensuring proper engineering standards are observed and complacency is prevented.**

2. **Managers should ensure effective "closed loop" engineering defect reporting processes are established to provide warning of dangers which may affect other vessels in the company and to ensure that defects are addressed promptly.**

3. **Chafing fuel and oil pipes present a very real fire hazard. Do take the trouble to make regular checks of this – often hidden – danger, and ensure that systems are properly bracketed/supported. Machinery which suffers from vibration, such as reciprocating engines, is particularly vulnerable. In this case the CO_2 pipework also failed because it was unsupported.**

4. **Be aware of the dangers of using crews across a number of vessels. Financial expediency may drive managers down this route, but with it come the dangers of declining engineering standards and poor emergency preparedness.**

5. **Crews should have a good understanding of their vessel's fixed fire extinguishing system. In this case, the engine room required the total outfit of gas bottles to provide the concentration of CO_2 required to smother a fire. As another compartment was opened the concentration was reduced, but the crew were unaware of the implications of this action and the consequent risk of fire re-ignition.**

Poor Cargo Configuration Results in Hull Failure and Pollution

Narrative

A 55 year old dumb barge suffered a catastrophic failure of her hull while lying alongside in a dock. Although the barge was loaded with approximately 1850m^3 of gas oil, the swift and effective actions of the terminal and port staff limited the release of oil into the water to only 50m^3, which was contained close to the barge. No one was injured, but the vessel was a constructive total loss.

The accident occurred suddenly and without warning when only the vessel's midships tanks were full, creating a maximum bending moment in the sagged condition. The hull failed along the line of a welded deck seam close to the tank hatch coamings (Figure 1), causing buckling of the main deck and ship sides (Figure 2).

The barge had lain idle for 2 years before entering service as a floating oil storage vessel. In accordance with local regulation, the barge had undergone annual 'fit for purpose' surveys confirming her suitability for her intended use. The surveys were basic, and did not identify the need to provide a stability information book, including bending moment information, and the vessel had not been dry docked for survey.

Cargo loading operations were controlled by the company's terminal staff, and discharge operations by the crew of vessels accepting the cargo. A lack of barge 'ownership' meant that operations had become disjointed. There were no written procedures for loading or discharge to ensure safe operation and that the vessel remained in a seaworthy condition.

Figure 1: Hull failure

Figure 2: Buckling of the ship's sides

The Lessons

1. Fortunately, oil pollution response plans and drills are not frequently required to be used in anger, but when an incident does occur their value is immense and can significantly reduce the environmental impact of a spill.

2. A barge is a ship - and must be treated as such, whether it is being used as a floating service station or as a houseboat. Even if a vessel is permanently moored alongside, routine precautions when loading and discharging tanks are still required.

3. 'Fit for purpose' is an all encompassing term that is frequently used without reference to the scope of factors that need to be considered when making this judgment. In this case, given the nature of the barge's intended use, in hindsight her survey would have been more comprehensive had it also verified the availability of stability information and procedures to be followed for the loading and discharging of cargo.

Know Your Systems Back to Black

Narrative

A ferry was sailing through the night when the duty engineer noticed an alarm indicating low compressed air pressure. He went to investigate and found that both main air compressors were running, but the air receivers were empty. The discharge pipe from one of the compressors had sheared, and because of the way the system was designed he could not isolate the leak.

The duty engineer tried to make a repair, but had to stop after 30 minutes to respond to a high water temperature alarm on the main engines. The duty engineer called for help and the chief engineer and first engineer came down immediately.

Unfortunately, by this time the air had gone from the control system and both main engines stopped. The shaft generators came off load as the shafts stopped, and there was no air left to start the main generators. The emergency generator started, but did not run for long because its ventilation openings were left shut, causing it to overheat.

Fortunately the ferry was in open sea and in no immediate danger. Nevertheless, the owners called a tug to stand by while repairs were carried out.

During the time the engineers took to repair the air system, the fuel for the main engines had gone cold. Consequently, the passengers spent nearly 2 hours in the dark before the engineers got the main generators started.

The ferry finally got underway again 5 hours after the duty engineer first noticed the low pressure alarm.

The Lessons

1. **Ask for help promptly. When machinery breaks down, the first priority must be to prevent the situation from getting worse. This can be very hard to do if you are on your own, particularly if you then get involved in repairs.**

2. **It is essential to understand how the machinery systems depend on one another and then think ahead to prevent damage and make recovery easier. In this case, loss of starting air also led to loss of the main engine control system, a high temperature alarm and the engines shutting down. This might have been avoided if the link had been appreciated early on.**

3. **More advanced systems may cost extra, but a few additional valves to isolate systems or bypass leaks can be worth considerably more during an emergency.**

4. **Take time to check that emergency generators and fire pumps are going to run properly. You never know when you might need them.**

When I'm Cleaning Windows

Narrative

A dredger was on her routine passage to the dredging grounds. There was a chop to the sea and the wind was about force 5 as the third engineer went to the engine control room to take the 0400-1200 engine room watch on his own. He was a little annoyed at the smears on the control room windows which gave visibility into the engine room (Figure 1).

The machinery was running well and there was still some time to go before the start of the dredging operations, so he decided to clean the windows. At about 0810 he completed cleaning the inside of them. He checked the machinery parameters in the control room and then went into the engine room to clean the outside of the windows. Access was difficult, but instead of using a long-handled cleaner or a safety harness to protect himself, he opted to stand with his right foot on the step of a ladder accessing the lower floor plates and with his left foot on a 4cm flat steel extension bar welded to the front of the control room bulkhead. His right hand grasped a small bore pipe also fitted to the control room bulkhead (Figure 2).

Figure 1: Door to the control room

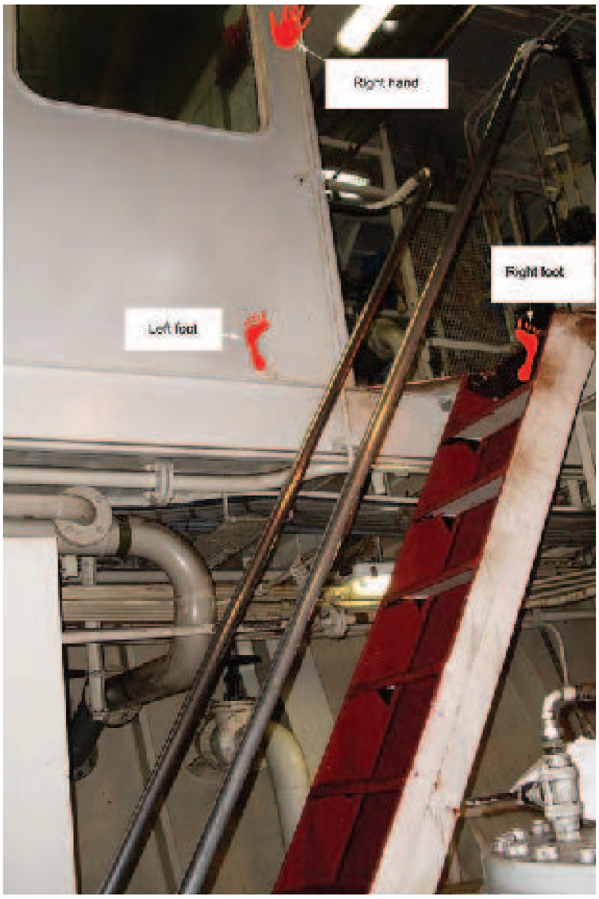


Figure 2: Position of the third engineer

As he steadied himself, his left foot slipped off the flat steel bar. He lost his balance and let go of the pipe.

The engineer slipped over the ladder handrails and fell 3 metres onto the lower floor plates, landing heavily onto his left side. He lost consciousness for about 1-2 minutes, after which he managed to struggle back to the control room from where he contacted the bridge and informed the OOW about the accident. The chief mate and bosun were alerted, and found the engineer sitting in a chair in the control room. He had suffered cuts to his head, which were cleaned and dressed. He was relieved of his watch and was later landed ashore. The engineer was repatriated to his home country where it was discovered that he had also suffered a hairline crack of his left hip bone. He was advised to take 2 weeks off work.

The Lessons

1. Working at height merits careful consideration of the risks. Without support it may not be possible to give full attention to the job and at the same time guard against falling. Whenever possible, use extendable equipment; where this is not possible wear a safety harness or a fall arrestor.

2. Where there are no strong points to connect the harness or arrestor, consider if the task is really necessary. If it is, can a ladder be used or can the job be deferred until alongside when scaffolding or staging can be set up?

3. If it is necessary to work at heights, consider the effect of the sea conditions and passing traffic. What may appear to be a stable platform can suddenly change into an unstable one under the effect of wave motion.

4. The third engineer was fortunate in that he only lost consciousness for a short period and was able to raise the alarm himself. It is good practice to have a second person in attendance when working at height in case difficulties are encountered. That second person can then also administer first-aid if necessary.

   Further advice on working at height is available in the MCA's publication – Code of Safe Working Practices for Merchant Seaman, Chapter 15. The publication can be accessed from the MCA's website at: www.mcga.gov.uk.

Part 2 - Fishing Vessels

Health and safety is a given in the work place and all industries obviously strive to achieve this. It is however usually much more challenging to achieve this objective with an industry that is based on the sea as opposed to the land. Whether on board a fishing boat or a fish farm vessel there is always the ever present danger of unpredictable weather, a constantly moving deck and machinery handling gear under considerable strain.

Over the past couple of decades there have been several factors which have improved safety at sea for fishermen and fish farmers.

In the first place there have been very considerable improvements to vessels. Probably the greatest improvement has been in the white fish fleet where most boats are now fitted with full length deck shelters. Within the fish farming industry, the greatest improvement has been the move away from converted fishing boats to purpose built vessels which are much better laid out and suited for their job. The much improved safety equipment which is now mandatory aboard both fishing and fish farm vessels has also greatly improved safety at sea.

Not that long ago life jackets were rarely used by fishermen and fish farmers. This has changed dramatically in recent years and reflects the growing safety culture amongst seafarers.

This growing awareness of the importance of safety at sea is in no small part due to the impressive range of training courses now available for fishermen and fish farmers. It is now hard to believe that, prior to the mid 1980's, there was no training for most young fishermen. They simply left school and went to sea where the quality of the on the job training was at best variable. Since that time virtually all young fishermen, and more recently fish farmers, have been able to undertake high quality vocational training where safety at sea, fire fighting and first aid are all given high priority. This has undoubtedly helped foster and develop the growing safety culture.

But despite all these improvements accidents still happen. The publication of the Safety Digest by the MAIB provides a sobering review of just how dangerous the sea continues to be. But more than that, the Safety Digest, in its case by case summary, describes what happened and the lessons to be learned in an easily understood way. It is therefore a valuable and valued contribution to the ongoing challenge of improving safety at sea for all seafarers.

John Goodlad

John Goodlad was born and brought up in the Shetland fishing village of Hamnavoe.

He has held a number of senior positions within the fishing industry including CEO of the Shetland Fishermens Association, Vice President of the Scottish Fishermens Federation and President of the European Association of Fish Producers Organisations. John is also a past Chairman of the Board of Trustees of the North Atlantic Fisheries College in Shetland which provides an impressive range of courses for the fishing and fish farming industries.

More recently John was Managing Director of his own fish farm, which reared organic salmon, before selling this business in 2007. He is currently Chairman of both the Scottish Pelagic Sustainability Group and the pelagic fish processing company, Shetland Catch. He also sits on the committees of a number of international fisheries organisations including the Marine Stewardship Council and the Association of Sustainable Fisheries.

CASE 17

Balancing Act

Narrative

A deckhand on board a scallop dredger fell overboard as he was emptying a dredge bag. He had been standing on the port dredge beam, which was suspended and almost level with the gunwale when the dredge bag lifting becket parted.

The deckhand was a seasoned fisherman but was new to scallop dredging and had worked on board for only 5 weeks. He had signed the Seafish Fishing Vessel Safety Folder to confirm that he had received a safety induction from the skipper, which included maintaining a secure hold of a suspension chain while attending to the dredge bags. However, he had not attended a safety awareness course and the risk assessment form neither identified any significant risk nor recorded any control measures against falling overboard.

The deckhand was not wearing a personal flotation device or a safety harness when he stepped onto the elevated dredge beam, and it was not the practice for deckhands to do so. On this occasion, he let go of the suspension chain (Figure 1) to facilitate the emptying of one of the dredge bags. As he grasped the dredge bag with both hands, the lifting becket parted, causing him to fall forward and, with no protection from the bulwark, to continue to fall overboard.

Despite the quick reactions of the skipper and crew, the deckhand sank below the sea surface before he could be rescued. Although an extensive search and rescue operation followed, his body was not recovered.

A demonstration of where the crewman was standing immediately prior to the accident

The Lessons

1. The lifting becket parted at a point of attachment to the dredge bag which was prone to wear. A robust inspection and maintenance regime for the working gear might have identified the wear and have prevented the failure. Ensure you have a regime that does so.

2. Risk assessments for the bag lifting/dredge discharge activity had been incorrectly calculated by the skipper - despite him having previously attended a safety awareness course - and indicated a lack of understanding of the concept. Guidance on risk assessment is provided in the MCA's Marine Guidance Note (MGN) 20 (M+F), the Seafish Fishing Vessel Safety Folder and the Fishermen's Safety Guide. Risk assessment is an important tool to help identify and reduce risks to safety in a dangerous working environment. Make sure you understand the process and then apply it.

3. The fitting of a 'tipping bar', commonly used on scallop dredgers, would have enabled all the dredge bags to be inverted at the same time and have avoided the need for deckhands to step onto the dredge beam or to lean over the gunwale. The best way to control a risk is to remove the hazard altogether.

4. The wearing of a lifejacket would have significantly improved the deckhand's chances of survival. The provision of a lifejacket or other personal flotation device is mandatory where there is a reasonably foreseeable risk of a crew member falling overboard. Develop a habit of always wearing one when working on deck.

5. Although the crew responded rapidly to the man overboard, they were ill-prepared to mount a successful recovery. Equipment required to assist the recovery of a person from the water was not available on board and no emergency drills had been conducted which would otherwise have ensured that correct procedures were followed.

CASE 18

Shooting Pots Ends Tragically

Narrative

At the end of a day at sea spent fishing and relocating sets of gear before the onset of bad weather, the owner of a potter was throwing the last set of pots overboard before heading for home.

The potter was fitted with a stern shooting door that enabled a single set of pots to be shot over the stern with the crew safe in the wheelhouse. When more than one set was carried, such as when moving gear, the stern door was closed and the more traditional, and riskier, method of lifting the pots overboard was employed.

As one of the last pots was being lifted overboard, the crewman in the wheelhouse heard the owner shout; he turned round and saw the owner standing at the stern, with the backrope caught around his leg. The owner did not have a knife to hand and the crewman threw the engine control full astern. Unfortunately, the weight on the backline was too great and the owner was pulled overboard.

The crewman reacted quickly. He led the remaining backline up to the hauler and pulled the owner back to the surface. The owner was unconscious. With some difficulty, the crew pulled him back on board but, sadly, despite valiant efforts to revive him and a swift airlift to a nearby hospital, he died.

Figure 1: Stern view of potter

Figure 2: Forward view of potter

The Lessons

1. The most common cause of death on creel boats is falling or being dragged overboard. Most of these accidents happen while shooting pots. The greatest risk to crew working on creel fishing boats is becoming caught in the back rope. Separating crewmen from the back rope, by methods such as using a stern shooting door, reduces the chance of them becoming entangled. Where this is not possible, other ways of keeping people clear of the back rope should be carefully considered. The fitting of rope pounds or dividers can create an effective barrier, with little lost deck space. Seafish[1] provides practical guidance on possible ways to reduce the dangers while potting.

[1]www.seafish.org/resources/publications

2. The owner did not carry a knife and there were none available for him to use to cut the back rope. Carrying a knife, or having one immediately available, could mean the difference between life and death.

3. None of the crew wore lifejackets or personal flotation devices. In most cases, lifejackets would assist rather than hinder the wearer to keep afloat, even if the wearer is trapped in a backline.

4. The owner and crew had never considered how to recover a trapped, unconscious crewman back on board. In the event, they found it was much more difficult than they had imagined. Think carefully how you might recover someone from the water on your boat and practise this drill regularly.

It's Foggy – No Stand-On Vessels Allowed

Narrative

A gill netter was steaming between wrecks on an easterly heading at about 7 knots. A large beam trawler was returning to port on a south-easterly heading at about 10.5 knots. It was foggy and the visibility was severely restricted. Both vessels had operational radar and the skippers were alone on watch.

The gill netter's skipper saw an echo on his radar to the north and broad on his port bow. He put the cursor over the echo and, after a short while, judged that the other vessel would pass astern. He was of the opinion that, with respect to the COLREGS, his was the stand-on vessel and the other vessel, being a crossing vessel, had the obligation of keeping out of the way. A short time later, the skipper saw the trawler out of the port side wheelhouse window at close range and just abaft the beam. He reacted by applying full starboard helm.

Although the trawler had both of her radars in operation (one on 6-miles range and the other on 12-miles range), her skipper was focused on other radar echoes in the vicinity and did not detect the gill netter until she appeared out of the fog on his starboard bow. By that time, the vessel was so close that the skipper decided to apply full astern propulsion rather than attempt to alter course.

The action taken by both skippers was insufficient to prevent the vessels colliding. The gill netter sustained significant damage and had to be escorted back to her home port.

This beam trawler sank affer a collision in dense fog - all of the trawler's crew were lost

The Lessons

1. The COLREGS require all vessels to maintain a proper lookout by sight and hearing, as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision. Wheelhouse manning, equipment and procedures all contribute to complying with this requirement and are all the more important in conditions of restricted visibility. Neither vessel maintained a proper lookout: the gill netter's skipper failed to accurately monitor the trawler's approach and the trawler's skipper failed to detect the gill netter until it was too late to take effective avoiding action.

2. The gill netter's skipper held a common misconception that the same rules apply in restricted visibility as for when vessels are in sight of one another. Consequently, having determined by radar that this was a crossing situation, he maintained course and speed. Rule 19 of the COLREGS applies to vessels not in sight of one another when navigating in or near an area of restricted visibility. It requires every vessel to determine if a close-quarters situation is developing and, if so, to take avoiding action in ample time.
   The Rule does not distinguish between types of vessels so all vessels are obliged to take avoiding action.

Never Give Up

Narrative

A crewman was dragged overboard when his foot became entangled in a creel dhan rope during routine self-shooting operations. After being dragged overboard, the weight of attached fishing gear pulled him down to the seabed. The skipper succeeded in recovering the casualty to the boat's side by hauling back the rope which had initially dragged him overboard.

During the recovery process a crewman from another fishing vessel transferred across and helped pull the casualty back on board. Following the casualty's recovery to his vessel's deck he was given first-aid by way of chest compressions and mouth to mouth resuscitation. However, these were stopped after a few minutes as they appeared to be having no effect on the seemingly lifeless casualty.

Half an hour later, an RNLI lifeboat arrived and lifeboat men transferred to the fishing vessel and recommenced artificial resuscitation to the casualty, despite being unable to detect outward signs of life.

The casualty was transferred to hospital, but died as a result of his underwater exposure.

Figure 1: The position of where the crewman was standing before he was dragged overboard

Figure 2: Onboard working area

The Lessons

1. The accident happened during a normal creel shooting operation which, despite having been carried out routinely for several years, had not been properly evaluated to make the operation as safe as possible. The shooting operation required the casualty to work in close proximity to unguarded ropes strewn on deck. A simple dividing barrier separating crew from ropes could have prevented this entanglement and should be considered on all static gear vessels.

2. Had the casualty been able to free his leg from the rope, a flotation device might have assisted him to the surface and therefore increased his chances of survival.

3. Never give up on apparently lifeless casualties unless advised to do so by medical experts. Seemingly deceased hypothermic and drowned casualties have been known to be resuscitated, despite them showing no visible signs of life for a prolonged period.

CASE 21

I Thought You Said the Fore Peak Was Empty

Narrative

A 30m scallop dredger was at sea in moderate weather. The crew felt that the vessel was behaving as though the fore peak tank was ballasted, whereas they believed it to be empty. They started the ballast pump and began pumping out water. After some time, water was still being pumped out and the crew decided to investigate further.

They removed the tank lid from the fore peak and were alarmed to find the sea washing in and out through a hole in the starboard side. Leaning over the side of the boat, they could see a section of shell plating at the waterline, opening and closing the hole as it moved about in the seaway.

The skipper revised his fishing plans and headed straight for the nearest major port. They arrived safely and took a drying out berth. At low tide, the full extent of the damage was revealed, with a hole of about 1.8m x 0.8m in the shell plating on the starboard side.

Detailed examination of the fore peak found that of the four frames, two had wasted and come away from the shell plating completely, and another was attached by only half its length. The shell plating had been unsupported and flexed as the boat moved through the sea. The plating was in good condition, but a crack had developed which had then spread, allowing the sea to leak in. The crack had then got bigger, until the force of the sea tore the plating open like a tin can. Fortunately, the collision bulkhead, at the aft end of the fore peak tank, was in good condition and saved the vessel from flooding uncontrollably.

Shell plating damage

*Photograph courtesy of MCA

The Lessons

1. The crew have since recognised the need to check ballast tanks and void spaces periodically for signs of damage or general deterioration. If you know what it should look like, it is much easier to spot potential problems. Get into the habit of thoroughly checking one compartment each month.

2. When you are checking compartments, look carefully at coatings, and remove them if necessary to look at the material underneath. In this case the coating looked fine, and it was only when crew looked more closely at the frames that their true condition was discovered.

3. Before you enter a ballast tank or void space, make sure it is properly ventilated. Corrosion uses up the oxygen in the air, and there are cases where people have gone into a tank, collapsed and died[2]. Sometimes crew mates try to rescue them and, sadly, they too have lost their lives in the attempt. In this case, the compartment had been well (if unintentionally) ventilated, but in normal circumstances it is good practice to use ventilation fans to blow fresh air into the compartment for 24 hours and use analysing equipment to check that the atmosphere is safe to breathe before entering.

4. It is always a good idea to tell the Coastguard if your vessel has been damaged, even if you do not need help or are in immediate danger. This helps them to be more prepared and to take action if the situation does get worse.

5. Finally, the collision bulkhead saved the boat from being lost. Collision bulkheads have more uses than their name suggests, and should be kept in good condition.

[2] MAIB report into the death of three crewmen in an enclosed space on the ERRV Viking Islay. Report No 12/2008 July 2008

CASE 22

Rock and Roll

Vessel on slipway after recovery

Narrative

The skipper and crewman of a 10 metre fishing vessel were on the aft deck, preparing bait and listening to music via a loudspeaker as the vessel headed towards the first string of pots due to be hauled that day. The vessel's wheelhouse was thus unmanned when the men noticed that she was listing and starting to bodily sink. Before the men had time to send a distress call or get to their lifejackets, the vessel rolled over and sank.

Fortunately for the men, who were left in the water clinging to pot marker buoys which had floated free as the vessel sank, the sinking had been seen by a nearby fishing vessel, which proceeded to the scene and recovered them from the water. They were taken back to port; wet, but otherwise unharmed.

The vessel was later salvaged and the cause of the sinking was found to have been water entering the engine space via a sea water suction hose, which had become detached from the sea cock. This was a valve with a 2 inch diameter, through which water would have flowed into the engine space at approximately 350 litres per minute. This meant that, on average, 1 tonne of water would have entered the vessel for each music track the men had listened to!

The vessel had two bilge pumps, one of which was fitted with an integral bilge alarm. The alarm sounder was located on the instrument panel in the wheelhouse, but this was not heard by either of the men outside, above the loud sound of the music.

The vessel sank very rapidly and the skipper, who was not a strong swimmer, realised that in different circumstances he and his colleague might not have been rescued. He subsequently attended a swimming course at a local swimming pool and now fully understands the importance of wearing a lifejacket when working on deck.

The Lessons

1. **This case illustrates the importance of someone remaining in the wheelhouse when on passage. This is obviously essential to meet the requirements for keeping a proper lookout, but it is equally important to be able to monitor alarms, including the bilge alarm, to enable corrective action to be taken in sufficient time to prevent the loss of the vessel.**

2. **The men found themselves in the water - without lifejackets and without having the time to transmit a "Mayday". Once again, the importance of wearing lifejackets when working on deck is clearly demonstrated.**

3. **Music playing via a loudspeaker meant that the crew were unable to monitor audible alarms or their VHF radio while they were on deck. This was not a safe way of operating the vessel, and it is notable that, later, when installing a new engine and rewiring the boat, the owner ensured that the *bilge alarm* and not the *music channel* was connected to the deck loudspeaker.**

Part 3 - Small Craft

One memorable Pirelli tyre advert featuring an Olympic sprinter in red stilettos carried the strap line "*power is nothing without control*".... The feeling of power we get from piloting an exhilarating and well equipped boat is only as good as our ability to exercise good judgement in controlling it.

The human brain is the single most important piece of safety equipment on any vessel. Despite advances in artificial intelligence, the brain's ability to respond to complex and fast changing circumstances is unsurpassed. Our first priority should always be to safeguard this primary piece of safety equipment: to keep it warm, hydrated and fed, to stimulate it with planning and information, to stretch it with training and experience; to use it to tell us where our limitations lie.

However, neither the most carefully laid plans nor the most extensive experience are definitive protection against accidents. It can happen, it does happen, and it can happen to you. The MAIB is best known for investigations after the fact – but it aims to prevent rather than cure and sharing the lessons learnt from such diverse accidents provides an invaluable wake up call. Reading the Safety Digest is far too close to home for me to ever be a pleasurable task, but every time I pick it up it helps remind me of the risk of complacency.

Complacency appears to be the root cause in so many incidents. Over-confidence, failure to appreciate the complex and often compounding factors in the lead up to an accident, retracing a route navigated many times before in different conditions: all fall under the umbrella of complacency and it is something almost all industries struggle with. How many of us can say we listen to every word of the aircraft safety briefing? Or complete a full "mirror signal manoeuvre" process at every junction?

The cases in this edition of MAIB Safety Digest underline the very fine dividing line between enjoyable and emergency. How many seconds separate a quick response – which may save lives – from a dangerous knee-jerk reaction? When does a careful and thorough safety briefing turn into information overload? How do we promote independence and challenge, without overburdening beginners with too much responsibility? The unfortunate reality is that learning from our mistakes is an indispensable part of how we all gain experience.

Happily, in all these cases tragedy was averted. No lives were lost, or serious injuries sustained. But help may not always be so close at hand. The importance of self-reliance and knowing what you can do to fix things in an emergency is difficult to over-emphasise.

Sarah Treseder

Sarah became Chief Executive of the RYA in February 2010, after a 20 year career in industry. She started sailing as a small child and has cruised and raced for pleasure whenever time has allowed.

The RYA's role is to promote and protect enjoyable, safe and successful boating and covers power and sail, offshore and inland, racing and cruising, for individuals of all ages and abilities. Each combination presents unique safety challenges. Although the RYA Training Scheme is arguably the best in the world, with over 22,000 RYA qualified instructors working in 44 countries, the Association's core ethos remains one of individual responsibility and all training is voluntary.

CASE 23

A "Plan" That Went Wrong

Narrative

A sail training vessel departed port on a late summer evening. No passage plan was prepared, and as the weather conditions were benign the skipper opted to execute the 3 hour passage to the next port under power, rather than sail.

On clearing the breakwater, the skipper ordered the helmsman to head in a northerly direction. About 10 minutes later, he estimated the vessel to be sufficiently clear of off lying dangers, and ordered the helmsman to alter course to port and head towards a visual reference point. No further position monitoring was undertaken, and soon after that the vessel ran aground on a charted rock. Fortunately none of the three crew or three passengers was injured when they were thrown forward as the vessel ground to a halt.

The skipper's initial reaction was to put the engine astern in an unsuccessful attempt to get the vessel off the rock. He then broadcast a "Pan Pan" message on VHF radio that was acknowledged by the coastguard. A rescue operation involving a helicopter, an inshore lifeboat and an all weather lifeboat ensured that the crew and passengers were landed safely ashore.

The Lessons

1. Although both the skipper and mate held the required qualifications to operate the vessel, they were complacent in not following navigational best practices. Complacency is a natural human response to repeated exposure to situations in which no adverse consequences are experienced. This inevitably results in people losing awareness of potential hazards, and it induces an attitude of over-confidence in one's own ability. In turn, this leads to shortcuts being taken and procedures being disregarded.

2. Regulations require all vessels proceeding to sea to plan their passage accordingly. While small vessels do not require a passage plan to be written down, there is still a need for prior planning. In this case, identifying navigational dangers that may be encountered during the passage would have required checking an up-to-date chart and marking off the intended track.

3. Navigational best practices require the vessel's position, speed and course to be checked at frequent intervals so as to ensure that she follows the planned track. Position monitoring should preferably be carried out by more than one method whenever circumstances allow.

4. Many yachtsmen instinctively put the engine astern on grounding, but this is usually when the vessel has grounded on soft mud and in familiar waters, with no resulting damage. In this case, the grounding came as a complete surprise. The skipper should have first established the condition of the vessel, the crew and passengers before attempting to refloat her. Had the vessel refloated with a breached hull, the outcome might have been significantly worse.

No Margin for Error Leads to Catastrophic Grounding

Narrative

A Bavaria 36 was being sailed by five crew on a bareboat charter between various ports. All five were gaining sea-time, miles and experience as part of a 'fast-track' course for the RYA Yachtmaster qualification.

They left a river estuary under power late in the evening at the beginning of a passage of about 80 miles that would take them to a port on the North African coast. It was dark and the breeze was blowing slightly onshore at around 12 knots. The crew had been taking it in turns to act as skipper and navigator, and the one with responsibility for this passage had identified a fairway buoy and a westerly cardinal mark as crucial turning points on the way out of the estuary.

On rounding the westerly cardinal, the acting skipper ordered a course of 160°T, the genoa was unfurled, and the engine put into neutral. The yacht was brought onto the desired heading and was making about $4\frac{1}{2}$ knots when she grounded violently, and after a few bounces took on a substantial angle of heel. The crew tried to extricate themselves straightaway using the engine, but with no success. There was a swell of about 1.5m running and the yacht continued to be pounded onto the rocks. The engine overheated and was shut down.

A 'Mayday' call was put out, and while the crew were waiting to be rescued the yacht began to take on water as the hull sustained serious damage. When the lifeboat arrived on scene they were unable to get close enough to effect a rescue, so a helicopter had to be mobilised.

All five crew were safely winched off but the yacht was a total loss.

The Lessons

1. **Seemingly correct 'mark rounding' does not guarantee safety. The westerly cardinal was warning of the danger of a well-charted area of exposed rocks, however the mark was rounded, leaving it just 20-30m on the beam. Coming immediately onto their course of 160°, the combination of excessive leeway as the yacht was gathering way, and the onshore swell, quickly placed them in danger. A safer option would have been to leave far more sea room before altering course, and carefully monitoring their position as they sailed around a dangerous obstruction.**

2. **The decision to try to motor off immediately after such a heavy grounding was questionable. The natural instinct to try to undo what you've just done needs to be tempered by an awareness that serious damage might have already been caused. These rocks were surrounded by deep water leaving a vessel that may be flooding in a yet more hazardous situation.**

Don't Forget When You Have Pulled the Plug

Narrative

A boat hire company operating on a stretch of water with access to the sea had recently taken ownership of six new, shallow draught moulded boats capable of carrying 8 passengers (the hire company limited the number to six persons). The boats were designed with a continuous void space between the two hull skins and

A family group of six persons won a charity raffle prize for the day hire of one of the boats. The boat they were to use was out of the water and on a trailer, and the engineers were busy checking the engine when the hire group arrived full of expectations of an enjoyable day on the water, including a spell of fishing.

Figure 1: Deck layout post-incident

Figure 2: Rear engine view with drain plug missing

they were very well equipped with lifesaving equipment, VHF radios and bilge pumps. The owner was particularly happy with the boats' stability which, together with the bow ramp access, made them suitable for hirers with disabilities (Figure 1).

The engineers had previously removed the hull drain plug (Figure 2) which emptied accumulated water from between the two hull skins. They had completed these tasks many times before and it was considered unnecessary to have a checklist to ensure that all tasks were completed and that the boat was safe for use.

As the hire group assembled around the boat, the engineers were diverted from their checks to provide the routine 40-minute safety briefing. This included information on steering, use of the liferaft, flares, hand-operated and electrical bilge pumps and control switch positions, hand-held radio, and console-mounted VHF radio, which was equipped with an emergency Digital Selective Calling (DSC) button. The group were advised of the need to hold down the DSC button for at least 5 seconds, after which the transmission would be acknowledged by a "beep". The briefing checklist was completed and signed by the hire company representative and the lead member of the hire group.

The group were individually fitted with 150kN lifejackets and felt safe and ready for a good day out as the boat was launched and they set off towards a recommended fishing spot. Importantly, no one realised that the engineers had forgotten to fit the hull drain plug, the consequences of which were soon to become evident.

Although the boat's handling didn't feel quite right, none of those on board were boat-experienced, and they did not realise that the odd motion of the boat was due to the accumulation of free surface water between the two hull skins.

The group fished for a short while and then moved to a new location to continue fishing. The engine was shut down and the boat drifted while the group, who were evenly distributed around the boat, continued to fish. A short time later, the engine well started to fill with water from the stern. The senior group member operated the bilge pump switch to what he believed to be the "on" position.

Some of the group stood up, and as they made their way towards the stern the boat started to roll about lazily, and the group became concerned that it was in danger of sinking. The senior member momentarily pressed the VHF radio DSC button, but did not hold it down and did not hear the acknowledgment "beep". He then set about firing off a red flare. Immediately afterwards, the bow lifted out of the water and all six occupants were thrown into the water as the boat suddenly capsized. The red flare was seen by other boats, and fortunately the group were rescued in rapid succession and landed at the hire company jetty. Happily there were no injuries. The capsized boat was later towed to the jetty, where it was found that the hull drain plug was missing.

The boat capsized because water had entered the hull void space through the open drain plug connection, causing free surface effect. As the freeboard reduced, water entered the engine well. The senior group member thought that the bilge pump was not working. He recalled from the safety briefing that there were various bilge pump control switch positions, and he moved the switch from the "auto" position to the "off" position. This allowed even more water to accumulate. As the group members stood up, the centre of gravity rose and the boat's instability increased, eventually causing it to capsize.

While the safety briefing was thorough, the group forgot that the DSC button should have been depressed for 5 seconds, so the emergency call was not transmitted. It was fortunate that other boats were nearby to effect the rapid rescue.

Crucially, no engineering checklist took place. The engineering items had been checked many times and were well known to the engineers. However, on this occasion, the engineer was distracted while giving the safety briefing, and forgot to replace the hull drain plug. Had he worked to a checklist, it is most unlikely that the drain plug would have been forgotten.

The Lessons

1. Avoid over burdening staff with multi-tasking if it impacts on their ability to complete safety-related activities.

2. Use checklists to ensure that all pre-hire checks are completed (eg drain plug in place and fully tightened), and that the boat is safe for use.

3. Ensure that checklists are periodically reviewed to ensure their currency.

4. When delivering safety briefings, emphasise the functionality of the VHF radio DSC button, the need to keep it depressed for at least 5 seconds, and the audio sound to be expected from the set to confirm the message has been transmitted.

Preliminary examinations[3] and field deployments commenced in the period 01/10/10 to 28/02/11

From 01/01/11, preliminary examinations were discontinued. Thereafter most field deployment will result in the production of an MAIB report.

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size (gt)	Type of Accident
03/10/2010	*Fitnes*	Bulk/oil carrier	Antigua	20234	Accident to person (1 fatality)
09/10/2010	*Flying Cloud*	Fishing vessel	UK	3.68	Accident to person (1 fatality)
[4]11/11/2010	*Stena Britannica*	Ro ro vehicle/ passenger	UK	64039	Collision (2 fatalities)
	Fairplay-22	Tug	Antigua & Barbuda	496	
25/11/2010	*Maxime*	General cargo	Netherlands, Antilles & Aruba	1554	Machinery failure
11/12/2010	*Antonis*	Bulk carrier	Greece	25935	Contact
13/12/2010	*Joanna*	General cargo	St. Vincent	1525	Accident to person (1 fatality)
03/01/2011	*Karen*	Fishing vessel	UK	50	Grounding
31/01/2011	*Jack Abry II*	Fishing vessel	France	840	Grounding
11/02/2011	*Boxford*	Container	Marshall Islands	25324	Collision
	Admiral Blake	Fishing vessel	UK	136	
15/02/2011	*K-Wave*	Container	UK	7170	Grounding
26/02/2011	*SBS Typhoon*	Offshore supply vessel	UK	2465	Contact
	Vos Scout	Standby safety vessel	Bahamas	516	
	Ocean Searcher	Offshore supply vessel	Bahamas	1472	

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

[4] This investigation, by agreement, is being led by The Dutch Safety Board http://www.onderzoeksraad.nl/en/index.php

APPENDIX A

Investigations started in the period 01/10/10 to 28/02/11					
Date of Accident	**Name of Vessel**	**Type of Vessel**	**Flag**	**Size (gt)**	**Type of Accident**
03/10/2010	*Discovery*	Fishing vessel	UK	5.65	Accident to person (1 fatality)
27/10/2010	*Cardiff Bay Yacht Club* RIB	Pleasure craft	UK	Unknown	Accident to person
06/01/2011	*Blue Angel*	Fishing vessel passenger ferry	UK	5.46	Accident to person
12/01/2011	*Sapphire II* *Silver Chord*	Fishing vessel Fishing vessel	UK UK	29.71 78	Collision
20/01/2011	*Breadwinner*	Fishing vessel	UK	15.29	Grounding (1 fatality)
07/02/2011	*Tombarra*	Vehicle carrier	UK	61321	Hazardous incident (1 fatality)

Reports issued in 2010

Aquila – capsize of the fishing vessel, with the loss of three lives, Bo Faskadale Reef, Ardnamurchan on 20 July 2009
Published 15 April

Ben-My-Chree – unintended movement of the ro-ro passenger vessel during loading operations at Heysham on 26 March 2010
Published 21 December

Bro Arthur – fatality of a shore worker in No 2 cargo tank on board the oil/chemical tanker at the Cargill Terminal, Hamburg, Germany on 19 February 2010
Published 19 August

Dover powerboats – collision between two offshore circuit racing powerboats - *Sleepwalker (A2)* and *Harwich 2011 (A89)* - in Dover Harbour on 8 August 2009, resulting in one fatality
Published 7 July

Etoile des Ondes/Alam Pintar – collision between fishing vessel and bulk carrier 15 miles north of the Cherbourg Peninsula on 20 December 2009, resulting in one fatality and the loss of the fishing vessel
Published 16 September

Ever Elite – uncontrolled descent of an accommodation ladder from the container ship in San Francisco Bay on 10 September 2009, resulting in one fatality
Published 14 July

Ijsselstroom – loss of the tug in the port of Peterhead on 14 June 2009
Published 9 April

Isle of Arran – contact with the linkspan at Kennacraig, West Loch Tarbert, Kintyre on 6 February 2010
Published 14 October

Kerloch – grounding and subsequent foundering at Crow Rock, off Linney Head, Wales on 20 February 2010
Published 6 October

Korenbloem – fatality resulting from a man overboard from the fishing vessel, Dover Strait, on 6 November 2009 (part of Trilogy)
Published 19 May

Llanddwyn Island – fatality on board the workboat, Roscoff, France on 1 March 2010
Published 18 November

Maersk Kendal – grounding on Monggok Sebarok reef in the Singapore Strait on 16 September 2009
Published 16 March

Olivia Jean – injury to a fisherman on board the fishing vessel, 17nm south-south-east of Beachy Head in the English Channel on 10 October 2009
Published 26 August

Optik – fatality resulting from loss overboard of a crew member from the fishing vessel 8 miles south east of Arbroath on 18 November 2009 (part of Trilogy)
Published 19 May

Osprey III – fatality resulting from a man overboard from the fishing vessel in the Moray Firth on 11 November 2009 (part of Trilogy)
Published 19 May

Saetta and Conger – collision between *Saetta* and *Conger* on completion of a ship to ship transfer 9.5 miles south east of Southwold, UK on 10 August 2009
Published 25 March

Wellservicer - fatal accident on the diving support vessel 3 miles south east of Aberdeen, Scotland on 1 April 2009
Published 20 January

APPENDIX C

Reports issued in 2011

Delta 8.5m RIB **–** injury to a passenger on board a Delta 8.5m RIB on the River Thames, London on 6 May 2010.
Published 27 January 2011

Homeland/Scottish Viking **–** collision between the fishing vessel *Homeland* and the ro-ro passenger vessel *Scottish Viking* 4.2 miles off St Abb's Head on 5 August 2010 resulting in one fatality.
Published 17 March 2011

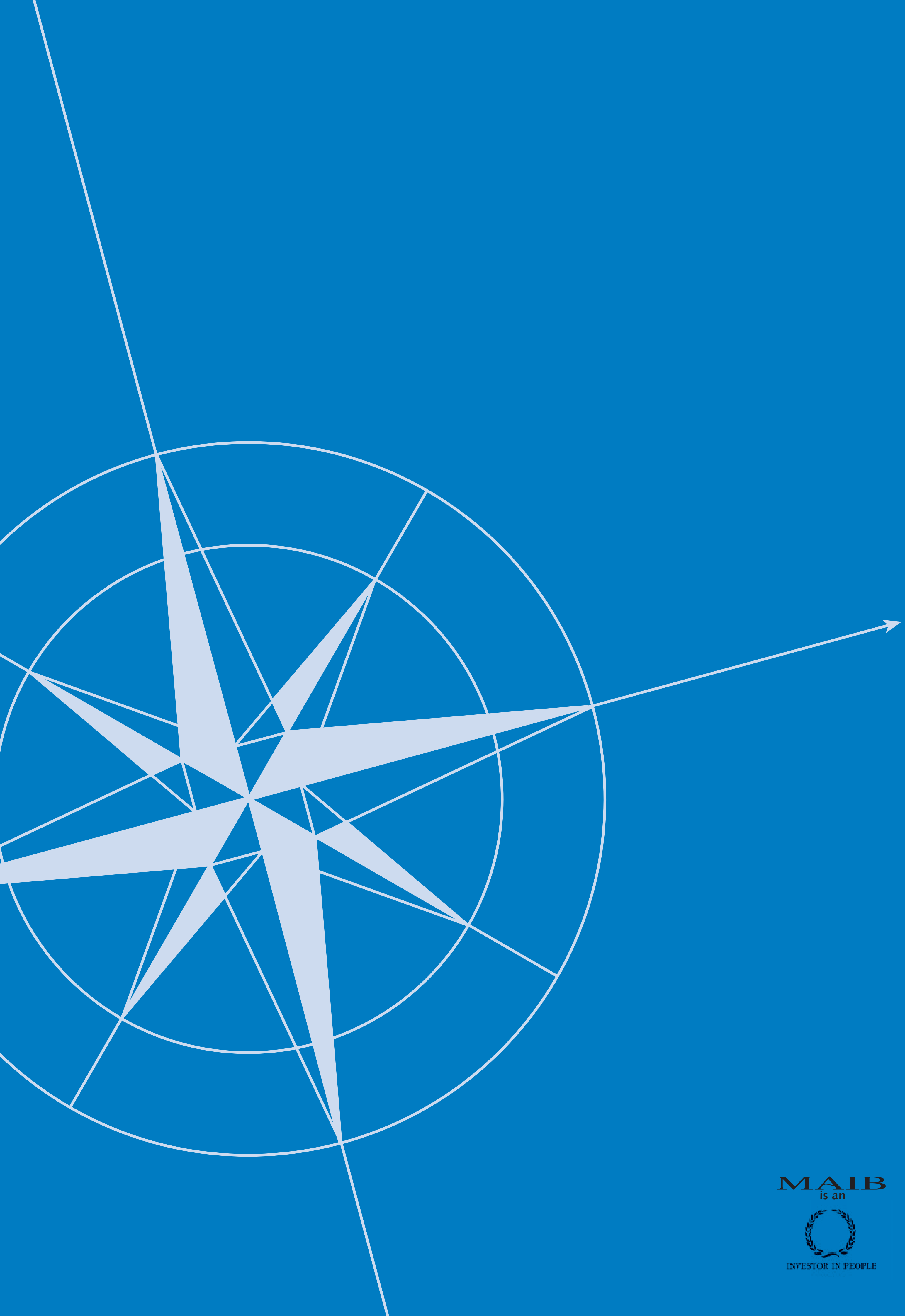
Oscar Wilde **–** machinery space fire on board *Oscar Wilde* in Falmouth Bay on 2 February 2010
Published 10 March 2011

Royalist **–** sea cadet's fatal accident on board the sail training ship *TS Royalist* in Stokes Bay in the Solent on 2nd May 2010
Published 3 March 2011

APPENDIX D

Safety Bulletins issued during the period 01/10/10 to 28/02/11

RMS Queen Mary 2 - catastrophic failure of a capacitor, and an explosion, in an 11kV harmonic filter on board the passenger cruise vessel RMS *Queen Mary 2*
Issued 3 December 2010



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