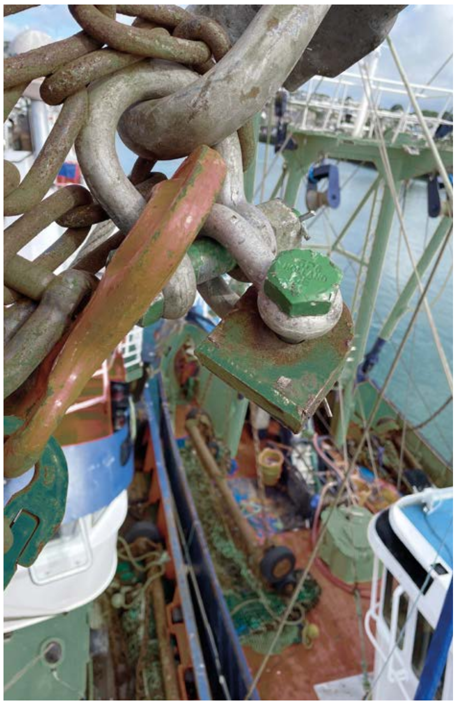
MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports

2/2022



Featuring introductions by Julian Hughes | Jim Portus MBE | Rachel Andrews

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 an 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 that has been determined up to the time of issue.

This information is published to inform the merchant and fishing industries, the recreational 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, Clare Hughes, welcomes any comments or suggestions regarding this issue.

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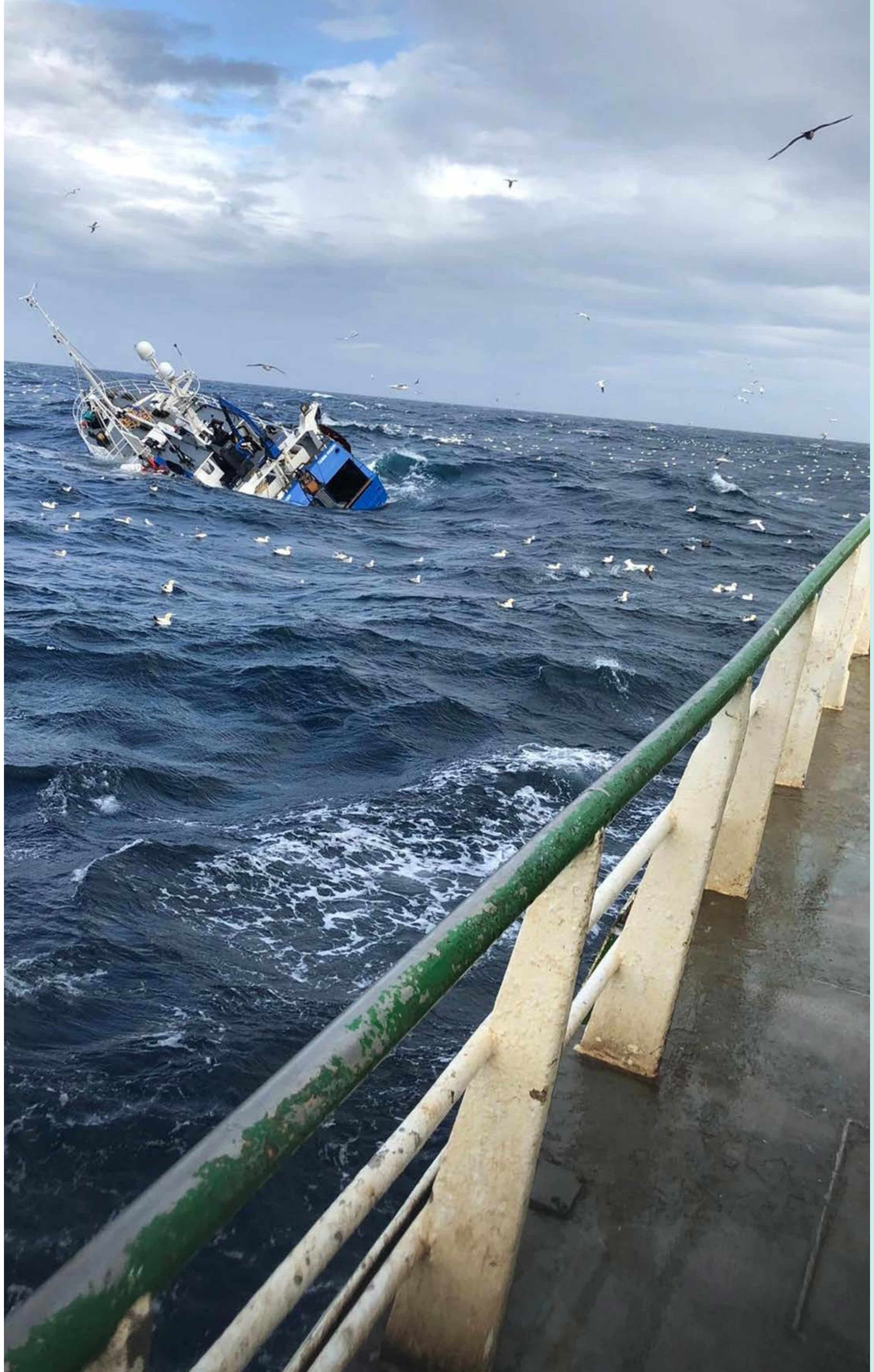

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GLOSSARY OF TERMS AND ABBREVIATIONS

2/E	second engineer
2/O	second officer
AIS	automatic identification system
ALB	all-weather lifeboat
C/E	chief engineer
C/O	chief officer
CCTV	closed-circuit television
CO_2	carbon dioxide
DfT	Department for Transport
ECR	engine control room
EPIRB	Emergency Position Indicating Radio Beacon
GPS	global positioning system
kts	knots
m	metre
“Mayday”	the international distress signal
MCA	Maritime and Coastguard Agency
MOB	man overboard
OOW	officer of the watch
“Pan-Pan”	the international urgency signal
PEC	Pilotage Exemption Certificate
PFD	personal flotation device
PLB	personal locator beacon
PPE	personal protective equipment
RIB	rigid inflatable boat
RNLI	Royal National Lifeboat Institution
RoPax	roll-on/roll-off passenger ferry
ro-ro	roll-on/roll-off
SAR	search and rescue
SWL	safe working load
VHF	very high frequency
VTS	vessel traffic services

CHIEF INSPECTOR’S INTRODUCTION

Welcome to MAIB’s second Safety Digest of 2022. I will start in the usual manner by thanking Julian Hughes, Jim Portus and Rachel Andrews for their respective introductions to the merchant, fishing and recreational sections of this edition. Each is an expert in their own field, and their industry insights to safety help bring contemporary context to the cautionary takes in the following pages. I hope you will find time to read the whole edition – there is something here for every mariner – but please do read the section introductions. And, when you have finished, please pass the digest on so others can benefit too.

We tend to think of the news as something fairly transient. Our media quickly moves on to the next sensational story and, to use an old saying from the days when chip shops wrapped food in newspaper to keep it warm, “*Today’s headlines are tomorrow’s chip wrappers*”. But the real world is not like that. Accidents have consequences, and Julian Hughes’s description of how passing through a powered watertight door affected him is a fantastic example of how an accident can resonate and impact on people’s behaviour long after the event itself.

The real trick, however, is to try and prevent accidents before they happen and people are injured, and this needs what in the trade we call *precautionary thought*. Something akin to this occurred last year in the lead up to my daughter’s wedding when her fiancé’s biggest concern was running out of tonic at the reception. A year on, as a family we are still drinking our way through out-of-date bottles of the stuff. Perhaps we should have purchased the extra on sale-or-return, but for the event itself the risk had been identified and effective action was taken to mitigate it; the bar did not run out of tonic!

Running out of tonic might not be a suitable example for a serious ‘lessons learned’ publication, but it helps emphasise the point Rachel Andrews makes in her introduction to the recreational section, *Before leaving…we need a plan*. If I can add to that, a plan needs to consider not just what we intend to do, but also what we will do if something goes wrong. The plan also needs reviewing and adjusting to changes, such as recovering a trawl and heading home early if the weather forecast changes for the worse.

In their early stages, accident investigations can be highly pressured and intense as we try to capture perishable evidence before it is lost. But every investigation needs a plan, and time has to be set aside and the effort made for review as the plan unfolds. Another old saying, but it works for me, “*Time spent planning is never wasted*”.

Be safe.

Andrew Moll OBE
Chief Inspector of Marine Accidents

MERCHANT VESSELS

Throughout my career and within our organisation, the Safety Digest and MAIB reports have informed safety moments, briefings, drills and campaigns so it is a privilege to be asked to write this introduction and hopefully give something back, having also featured in at least one report myself.

For those of us that have been around long enough, the sustained frequency and number of repeated incidents, themes and recommendations continues to be a major concern, and in most cases are a bit too close to home; this was certainly true for me as I was reading these articles.

In the 34 years I have been in the industry, the equipment and functions it performs remains fundamentally the same; however, while the designs and controls have changed and rules have been enhanced to support safety of seafarers, normally post-incident, the biggest change for me has been the way we interact with equipment, and how it in turn interacts with us. Be it old technology or new, it is usually the way we interact with it that leads to the incident.

Sitting on a waste bin in the engine workshop mid-Atlantic, head in my hands, I was exhausted and frustrated that, despite our best efforts and after working all day with the team to keep the plant going, we were going to be late into the turnaround port. I felt a fitter's hand on my shoulder followed by the wise words, "*It's lots of pieces of metal, boss, it doesn't have feelings, it's not trying to upset you, sometimes it gets tired too*". This sticks with me because the same applies for the injuries, or worse, suffered by seafarers and others on board. The object that caused the injury is not trying to damage or injure us, it is generally doing what we have asked it to.

Article 2 shows the remains of a boilersuit after entrapment by a powered door. As a cadet on watch I frequently operated and passed through the watertight door that caused this injury. Some years later, I passed through the same door as a manager of the vessel. To this day I think, *What if?* every time I pass through one. Watertight doors perform an essential function, and so their safe operation should be commonplace and not result in injury.

In 1997, after 6 years working on high-pressure steam vessels, I moved to a 2-year-old motor ship. The exhaust gas boiler ruptured on the Island Princess (MAIB report 37/2000)[1] shortly after, involving people I knew and had worked with of whom some were injured and two killed. Having been responsible for a steam system operating above 50 bars, I was horrified that a significantly lower pressure saturated steam system could cause such devastation. One comment stays with me from our on board discussions at the time: "*What people forget is there's more water in these boilers and economiser than on the high-pressure plant and it's all trying to get out and expand 1700 times, that's a lot of energy*". While safety around these systems has notably improved in the form of design changes, risk assessments, procedures and recommendations, this area remains a significant risk and there are still far too many occurrences.

Unlike computers we all make poor decisions or forget things

The motor ship was my baptism of fire into the world of integrated machinery and bridge automated control systems, a step change from the fully manual environment I was used to. I quickly realised it was not an option to tap the monitor if I disliked the reading and learnt that putting things on remote, manual or local was not a good idea because the system would control what it could to counteract my intervention; engines started, pumps changed over and shafts sometimes stopped. I have since been fortunate to attend factory acceptance tests and numerous delivery sea trials, where the full power of today's automation systems sometimes has to be seen to be believed but offers a huge amount of confidence to those witnessing it. Thus, my advice is to leave it in automatic and then fix it, not create a work around.

We completed a major upgrade to the automation system and, confident we had done all the testing we could, flooded the dock. The vessel floated without incident and we started the two port engines, which started and ran up to speed. The clutches were next and the two starboard clutches alarmed. After a quick discussion the decision was made to stop, manually engage the clutches and move to a lay berth; no one on board had done this before but we had an emergency response procedure in place for this. Working through the procedure and checklist we were able to give the master confidence to let go and safely move to the lay berth for maintenance.

Unlike computers we all make poor decisions or forget things, be it in on the bridge, in technical spaces or anywhere else on board. Procedures, checklists and testing exist to enable us to keep our vessels, crew and cargoes safe by performing every task correctly.

The marine industry and technology have moved on so far and continue to do so: data and communication allow us to be informed, understand and train by simulation; trending statistics enable us to derive focus areas for safety and many such items across statutory bodies and company fleets and immediately share them worldwide. With all these tools at our disposal we are safer but nowhere near where we should be. Maybe we forget or become complacent about the on board risks that we pass by without a thought while performing our tasks. How do I know this? Well, the PPE I have to wear should remind me: high visibility clothing when walking down the quayside; safety shoes in work areas; coveralls and ear protection in machinery spaces; and goggles and gloves to complete tasks. The purpose is to reduce the risk of harm that is inherent in the vessel's operation and tasks we have to perform.

Writing this has made me stop, reflect and remember, focusing purely on safety. I hope that reading this Safety Digest encourages you to do the same.

JULIAN HUGHES CEng CMarEng FIMarEST | V.Ships Leisure Technical Director

Julian is a Chartered Marine Engineer, Fellow of IMarEST and a qualified chief engineer unlimited motor or steam ships. He joined V.Ships Leisure 5 years ago as a Saga Cruises newbuild project manager and has since moved into the role of Head of Ship Management for Saga Cruises, which he has combined with that of V.Ships Leisure Technical Director over the past year.

Julian ran his own marine consultancy business for 4 years, which included acting as an expert witness for legal cases and technical assessor for the United Kingdom Accreditation Service while also delivering project management and specialist services to the maritime industry.

Julian started his maritime career in 1988, as an engineering cadet. He qualified in 1991 and spent the next 18 years at sea on passenger vessels, progressing to chief engineer through the various ships, roles and ranks. In 2007, Julian was seconded ashore as a superintendent and was promoted to senior fleet manager and then technical operations director for Carnival UK, where he was also a Merchant Navy Training Board technical committee representative, before leaving to set up his consultancy business.

1 https://www.gov.uk/maib-reports/rupture-of-exhaust-gas-boiler-on-passenger-cruise-ship-island-princess-while-undergoing-sea-trials-in-the-bay-of-naples-Italy-with-3-people-injured-and-loss-of-2-lives

Practice makes perfect

passenger ferry | machinery

A laden roll-on/roll-off (ro-ro) ferry was nearing the end of its sea passage and preparing to enter harbour. In the engine control room (ECR), the engineering team were preparing the main propulsion plant for entering harbour. The plant consisted of two propeller shafts that were each driven by a main engine via a clutch and gearbox. Each individual power train had a shaft alternator that supplied power to either the main switchboard or a dedicated bow thruster motor. Two additional diesel generators supplied auxiliary power to the main switchboard when the shaft alternators were connected to the bow thruster motors. A power management system automatically maintained the electrical integrity of all supplies.

An engineer in the ECR attempted a remote start of one of the diesel generators but it failed to start. The engineer then went to the machinery space and started the engine in local control. The second diesel generator was also started. At the same time, the senior engineer went to investigate a stabiliser room bilge alarm that had activated.

At the main switchboard in the ECR, the engineer set the power management system to manual to connect the running generators to the switchboard and manually disconnect the shaft alternator (Figure 1). During this operation, the first diesel generator engine tripped on low lubricating oil pressure and the vessel lost electrical power. The main engines continued to run for a few minutes before they stopped due to a lack of fuel pressure.

On the bridge, the officer of the watch (OOW) turned the ferry away from danger and an anchor was prepared for letting go. The vessel's emergency generator automatically started supplying critical systems such as steering and communications when the power failed.

Figure 1: Main switchboard

The senior engineer returned to the ECR and saw that the second generator was running but not supplying the main switchboard as both the engine and power management system were under manual control. He switched the generator and power management system to automatic control, immediately restoring power. On restarting the main engines, the vessel resumed passage without further incident.

Figure 2: Lubricating oil purifier

Figure 3: Diesel generator

The Lessons

1. **Equipment →** Let the system do the work. The vessel had a fully operational power management system for maintaining electrical power. When the system was set to manual to connect the incoming diesel alternators to the main switchboard, the power management system was thereafter unable to automatically restore power. This extended the period when the vessel was not under command. The design intent for the power management system was to quickly and efficiently detect and isolate power generation issues when operating in automatic mode.

2. **Check →** Be inquisitive. After a local engine start, it is good practice to check that the engine is running correctly and that pressures, temperatures and fluid levels are correct (Figure 2). The first generator stopped when the oil level in the sump fell, causing a loss of lubrication oil pressure and subsequent power failure; an oil level check may have indicated that there was a problem. The failure to start was associated with the low oil level in the sump; it is good practice to check running machinery before standby to ensure that potential critical failures are identified.

3. **Maintain →** Conduct rounds. The low oil level in the generator was caused by a fault with the lubricating oil purifier cleaning the engine's oil. The purifier had started to dump the oil to a waste tank (Figure 3). Regular and comprehensive machinery rounds may have picked this up before the situation became critical.

4. **Qualified →** Check the system. The vessel's monitoring and alarm system had recently been upgraded but, due to incorrect wiring, a generator's low oil pressure alarm was indicated as the stabiliser room bilge alarm. Critical system warnings and alarms must be tested and verified as operating correctly on completion of monitoring and alarm system modification work.

Pinkie is no longer perky

cargo vessel | accident to person

A crew member on a large cargo vessel had to pass through an A60 fire-rated hydraulically operated sliding door to access an adjoining machinery space. The door was fitted with a lever handle (Figure 1) on either side that, when operated, initiated the door opening sequence.

The crew member used their right hand to operate the lever handle and the door began to open to the right. As it reached the halfway position, the open warning alarm sounded as expected. The crew member walked through the doorway and placed their left hand on the lever handle on the other side, pushing it down once more to continue the operation. The door opened fully, while the crew member kept their hand on the handle. As the door retracted fully, the crew member's left hand became trapped between the handle and the doorframe, resulting in the little finger suffering amputation of the fingertip and nail above the first knuckle (Figure 2). It could not be reattached.

The door was subsequently inspected for technical, hydraulic and electrical defects and found to be in good working order.

Figure 1: Door operating handle

Figure 2: Amputated little finger

Figure 3: Remains of boilersuit after entrapment by powered door

The Lessons

1. **Qualified →** Automatic or powered doors are potentially very dangerous. Hydraulic and electric power-operated systems are unforgiving in their closing force and should be treated respectfully. Crew must be provided with suitable training on both the safe use of these doors and the dangers of their unsafe operation.

2. **Procedure →** If a powered door is transited frequently, it is easy to forget the dangers and take shortcuts such as walking through the door before it has fully opened. Previous accidents have sadly resulted in more serious injuries than those suffered in this case (Figure 3), and sometimes death.

3. **Aware →** Entrapment is a hazard often associated with moving machinery and wariness is the watchword. There should have been no need for the crew member's hand to remain on the door's operating lever and this action indicates insufficient knowledge of the system; however, if the operator was attempting to take a shortcut, then a greater understanding of the system would have been required to understand the dangers of doing so. Lack of understanding of how a system will work when shortcuts are taken, and the potential consequences, are a good enough reason not to do it.

Out of sight, out of mind

cargo vessel | grounding

A local pilot boarded a cargo vessel in preparation to navigate it into port and, after a brief handover with the master, took the helm. The pilot needed to time the entrance into the approach channel so that there was sufficient water under keel on the rising tide and depth of water on the berth. Each side of the channel was bordered by stone training walls, which concentrated the tidal water flow out of the river to help keep the channel clear. Because of the large tidal range the training walls were visible at low tide but submerged during favourable navigation tides, and were marked along their length by beacons (see figure).

The ship entered the channel mid-afternoon, 15 minutes after the pilot boarded. He navigated the vessel at slow speed down the starboard side of the channel, waiting for the tide to rise. The wind and the flood tide pushed the vessel across the channel further to the starboard side and over the top of the training wall. About 10 minutes later the ship grounded on the eastern training wall, causing substantial damage to the hull bottom and significant flooding of the engine room and ballast tanks. The ship was refloated and eventually made its way to a safe haven and onwards to a shipyard for repairs.

Although the master and chief officer (C/O) were in the wheelhouse, they had not actively participated in the vessel's navigation. Neither the electronic chart systems nor the radars were fully used by the pilot or ship's crew to monitor the vessel's position during pilotage. The ship's crew had used charts and sailing directions to prepare a passage plan, but did not include details about the arrival pilotage area, the approach channel and river, or any potential hazards. Furthermore, on boarding the vessel, the pilot did not provide a detailed pilotage plan to the master and verbally communicated scant information.

Figure: Channel and training wall vessel grounding position (low tide)

The Lessons

1. **Plan →** Preparation of a detailed port entry plan would have highlighted the local hazards and optimal tidal conditions. Without visibility of the prepared pilotage plans during the master and pilot exchange, the master and his team were unable to effectively monitor the execution of the pilotage into port. Effective planning, communication and passage monitoring can reduce the likelihood and occurrence of accidents in coastal and pilotage waters.

2. **Communicate →** Pilots provide the master and his team with up-to-date local information. It is important that the bridge team engages the pilot via effective master and pilot exchange and that the vessel's navigation is not left to the pilot to execute.

3. **Equipment →** Electronic navigation aids should be set up correctly and used to enhance safe navigation, especially in higher risk operational scenarios such as coastal passages and arrival into port.

A scalding injury

cruise ship | accident to person

During rounds, a cruise ship's third engineer discovered a leak on the drain valve for one of the vessel's four economisers. There was an open-ended pipe running from the valve to a tundish drain in the deck (see figure). The chief engineer (C/E) was briefed and a decision was taken to conduct a repair. The economiser's circulating pump was stopped and the inlet and outlet valves were shut; the plan was to leave the system to cool down overnight before the repair.

However, after the isolations were in place, the second engineer (2/E) decided to check the system by opening the drain valve. Leaning over the valve, the 2/E cracked it open and pressurised hot water and steam burst out of the drain pipe. The force of the discharge caused the hot water to deflect upwards off the tundish, severely scalding the 2/E's face. After initial medical treatment on board, he was evacuated to a nearby hospital for specialist burns care.

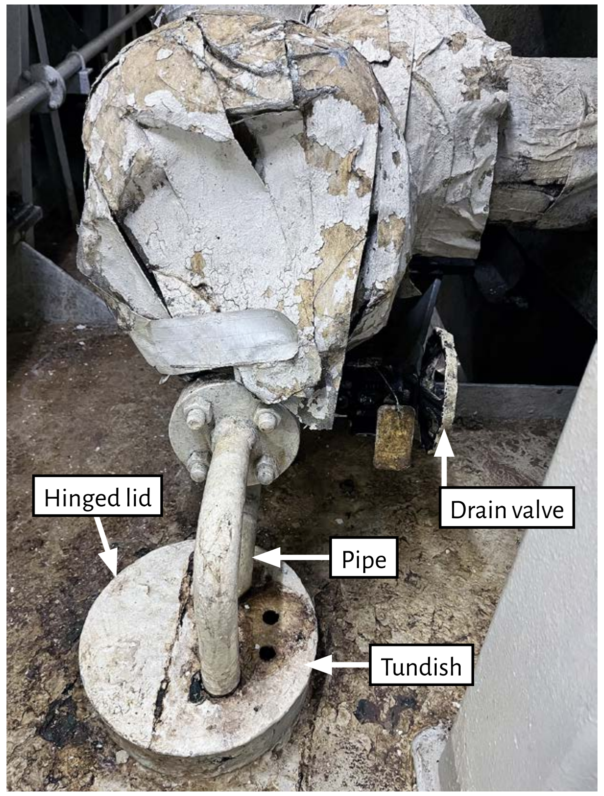


Figure: Economiser drain valve and tundish

The Lessons

1. **Hazard →** The opening of drain lines on pressurised systems must be undertaken with extreme caution. The 2/E intended to check that the drain line and valve was unobstructed before the economiser was drained the following day when the system had cooled. It is reasonable practice to use residual system pressure to check a drain line, but it must be done in a controlled manner. The economiser working pressure was 8 bar. It is good practice to allow the working pressure to lower and the system to cool sufficiently before opening the drain valve.

2. **Risk →** The 2/E leant forward over the pipework that ran to the tundish to open the drain valve. As a result, his upper body was directly in line with the deflected water and steam. When venting or releasing stored pressure, it is vital to ensure that your body is not in the path of any predictable discharge.

3. **Equipment →** Caution must be exercised when opening valves that are infrequently used. A valve that has become seized in the shut position may require excess force to manoeuvre it and lead to the valve suddenly and unexpectedly opening, causing an uncontrolled fluid flow. The use of a correctly sized wheel key can provide appropriate torque and increase the application of controlled force to the valve wheel.

A case of the bends

workboat | machinery

A ship's workboat davits were being recommissioned after many years of lay up. The ship manager had arranged for a manufacturer's representative to attend and oversee the davit testing process. The ship's C/O and the representative agreed on a weight test with a water bag suspended from the davit. The bags were to be filled to the davits' 12t safe working load (SWL), which was 6t per bag.

Two cadets, supervised by the C/O, filled the bags using hoses from a nearby hydrant and monitored the weight with load cells on each davit head. The water bag on the aft davit had been filled to 5.8t when the davit failed catastrophically (Figures 1 and 2). Fortunately, there were no injuries and the davit was later removed from the ship for examination.

The metallurgical examination could not conclusively determine the reason for the failure. It found that part of the davit had suffered almost 15% wastage due to rust near its failure point. One of the sheaves at the davit head was also seized. The examination concluded that wastage and the seized sheave may have contributed to the failure and noted that the davit structure and associated gear had not been maintained for many years.

Figure 1: Failed davit

Figure 2: Buckled section of davit

The Lessons

1. **Risk →** The crew demonstrated good working practices and were standing clear of the accident site. The davit failed at less than its SWL and for indeterminate reasons. Equipment can fail without warning despite checks and precautions, which is worth considering in risk assessments.

2. **Margin of safety →** Not standing under or near a suspended load, or its lifting gear, is good seamanship.

3. **Maintain →** Equipment that has not been maintained for a long time may require rigorous inspection by a metallurgical engineer before being recommissioned. The equipment might need nondestructive testing as part of this process.

Pitch imperfect

tanker | contact

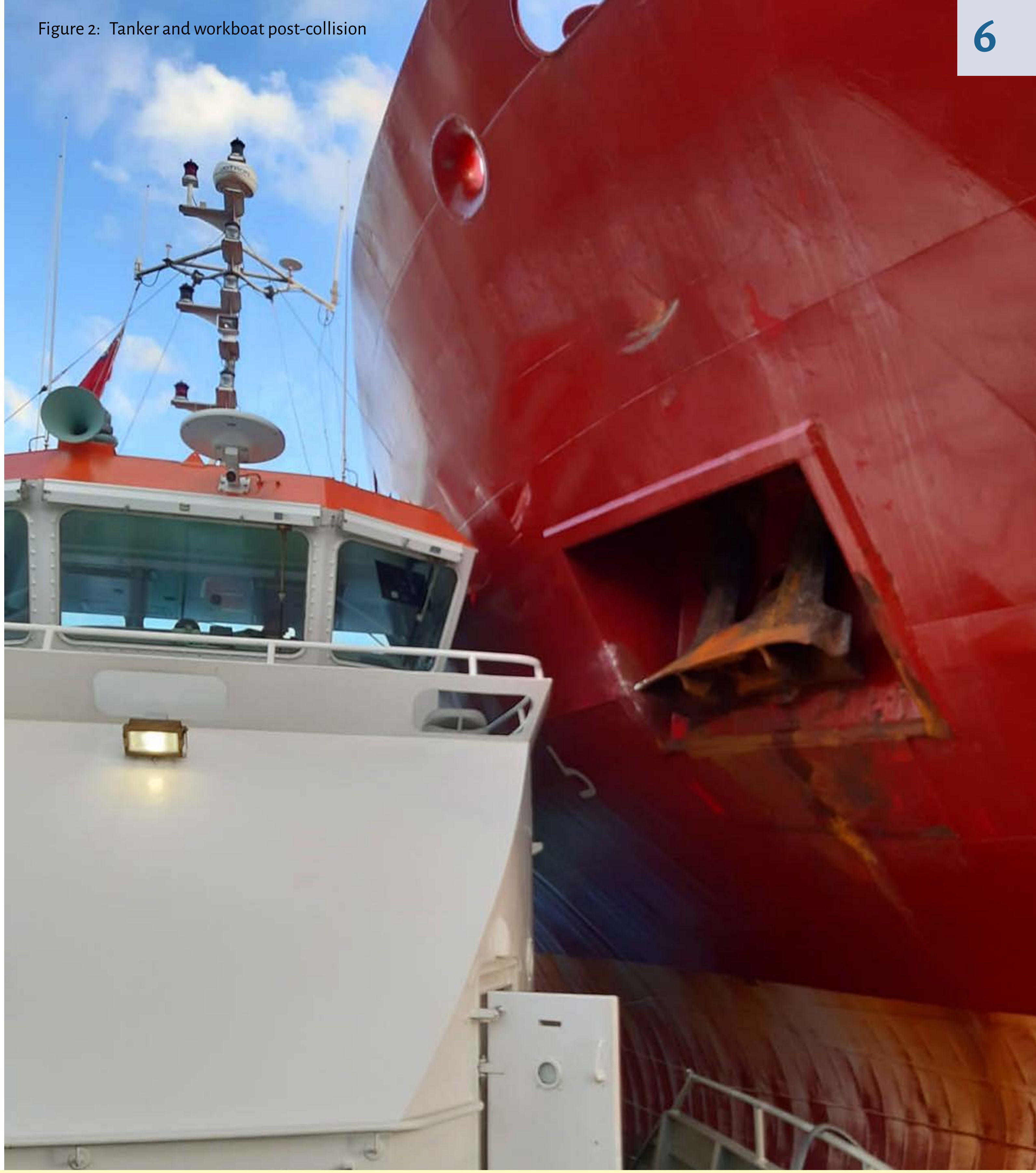
The pre-departure checks for a berthed tanker required the OOW to transfer propulsion control from the ECR to the bridge. At the first attempt the bridge engine controls appeared to be demanding ahead pitch, with the levers set to zero, resulting in an unsuccessful transfer of control.

The C/E went to the bridge to investigate and, having confirmed that all the bridge engine control levers were set to zero, a second attempt at transfer of control was made. Soon after, the OOW noticed that the vessel had started moving ahead (Figure 1) and immediately pressed the main engine emergency stop button.

The forward movement was sufficient to break mooring lines and for the vessel's bow to make contact with an adjacent berthed workboat and ground (Figure 2). The workboat sustained minor damage and the tanker was refloated at high water with the assistance of tugs.

Figure 1: Tanker unexpectedly moving ahead on berth

Figure 2: Tanker and workboat post-collision



The Lessons

1. **Procedure →** Standard operating procedures exist for a reason. A post-accident investigation determined that a defective circuit board in the propulsion control system had caused the demanded ahead pitch. However, the procedure for transferring control had been incorrectly followed and the first failed attempt had been a warning that something was wrong. This failure should have been thoroughly investigated before any further attempt was made to transfer control. The company has since updated its procedure to ensure that the bridge has control of propeller pitch before the engine is clutched in.

2. **Qualified →** The deck and engineering officers were unfamiliar with the main engine emergency and back-up controls. These essential skills are now included in the mandatory induction training that all officers must complete before their first watch.

7

Leave it be

river ferry | fire

A high-speed river ferry was on passage back to the company's pontoons after a period of maintenance. There were no passengers on board, just the master and two crew. During the passage, the fire alarm sounded for the starboard engine compartment; the master monitored the closed-circuit television (CCTV) and after a few moments saw smoke and then flames (Figure 1).

The master and crew followed the emergency procedure for an engine fire: the engine was shutdown, the compartment was sealed off, and the fixed carbon dioxide (CO_2) fire extinguishing system was initiated. The master assessed that the situation was under control and informed the port authority of his intention to continue to the intended berth, with a request for the local fire brigade to meet the ferry on arrival. The master continued on passage with one engine in use and the crew monitored the bulkhead and deckhead temperatures around the compartment; water hoses were prepared for boundary cooling although this was not judged necessary.

Once the ferry was berthed, the local fire and rescue service boarded the vessel to take charge of the situation. Without liaising with the crew, one of the fire officers opened the access hatch to the starboard engine, causing rapid reignition of the fire with significant flames and smoke emanating from the compartment (Figure 2). This forced the fire and rescue team to retreat to gather their firefighting equipment and the fire was eventually extinguished by completely flooding the compartment with water. The reignition of the fire caused severe damage (Figure 3) to the engine and the starboard engine compartment, requiring extensive repairs.

Figure 1: Engine fire seen on the CCTV

Figure 2: Flames emanating from the engine compartment hatch after reignition

Figure 3: Fire damage in the engine compartment

The Lessons

1. **Action →** The master and crew took the appropriate actions in this situation. The closing down of the engine compartment and timely use of the fixed firefighting system stopped the fire from spreading further and reduced the flames. Hotspot monitoring of the compartment by the crew ensured that they were prepared to react to any change to the situation. The engine compartment needed to remain sealed until the deckheads achieved an ambient external temperature. The master also made the appropriate calls to the local authorities, ensuring that assistance would be on hand when the ferry arrived alongside.

2. **Communication →** The local fire brigade inadvertently reignited the fire by opening the access hatch. This was inappropriate as the situation was under control and the correct action would have been to leave the compartment sealed until the deckhead temperature had fallen to ambient level. The master remains responsible for the vessel and communication is vital to build a clear picture of the situation. The fire officer's actions were well meaning; however, the outcome was avoidable damage to the vessel.

8

A bumpy shortcut

cargo vessel | grounding

A small general cargo vessel was on passage overnight. Its primary means of navigation was paper charts and there was no electronic plotter on board. To avoid forecasted strong winds and remain in sheltered waters, the master decided to switch to an alternative route that passed between an island and the mainland, rather than round the outside.

The alternative route was familiar to the crew, with tracks from several previous passages already drawn on the chart. It involved passing between the island and a rocky outcrop, and the master decided to be on the bridge for this narrow section and assist the OOW by plotting radar parallel indexes. The vessel was making about 8 knots (kts) through ncthe water and about 12kts over the ground with a strong tidal stream pushing it along.

About half a mile before the narrows, a fix had been plotted that showed the vessel to starboard of the planned track; this concurred with the master's assessment by radar parallel index. A course of 260° was then set on the autohelm, intending to regain the planned 283° track (Figure 1).

About a quarter of a mile before the narrows, a heavy rain squall enveloped the vessel, reducing visibility and causing significant clutter on the master's radar display. The bridge team lost visual and radar references and did not recognise that the vessel was not regaining track. Soon afterwards, the vessel's starboard quarter made contact with the outcrop's steep rocky shore, but the vessel did not stop.

Aware that the vessel had probably grounded but also that there were further dangers to navigate, the master decided to press on with the voyage. Once clear of danger, the speed was reduced and a full check of the internal compartments and systems was completed in accordance with the emergency checklists; no damage or water ingress was found. On arrival into harbour the following day, a dive survey was organised and revealed shell plating damage.

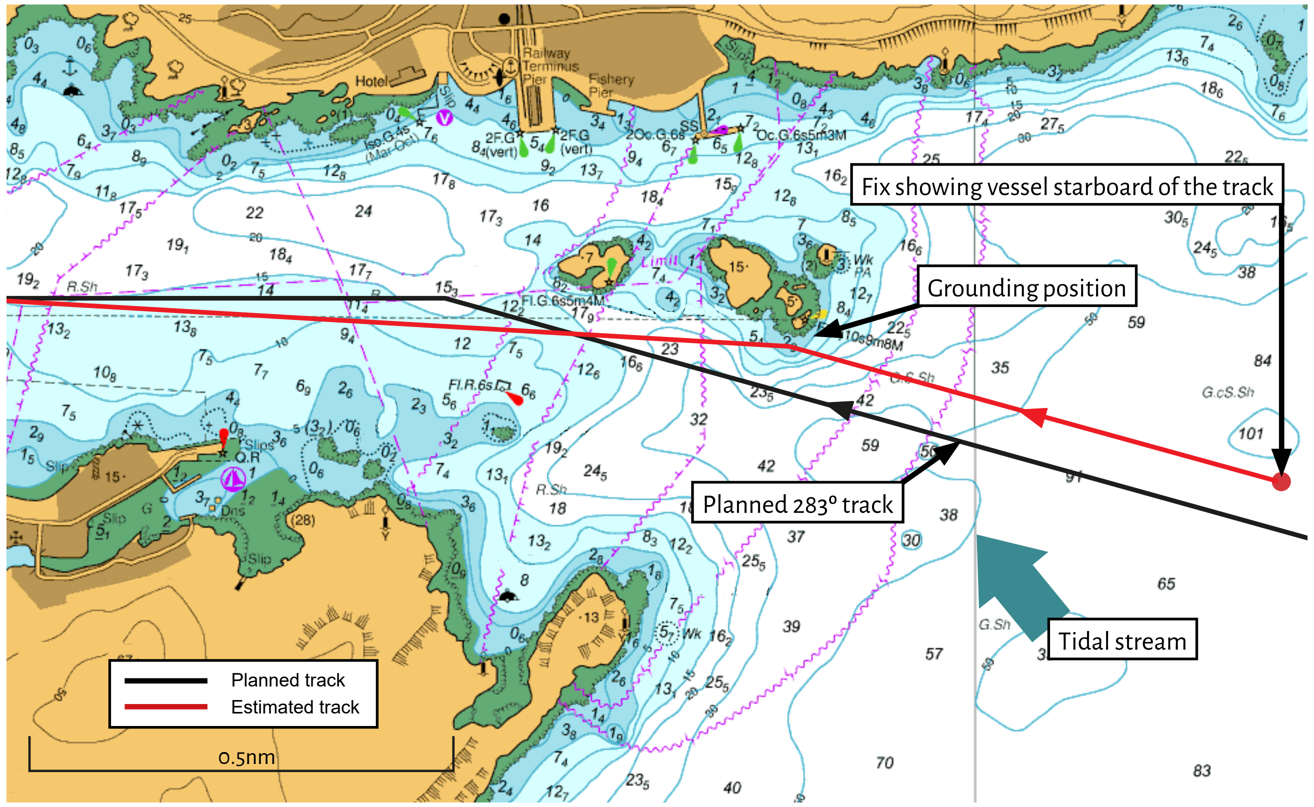


Figure 1: Chart showing planned track and estimated track

Figure 2: Damage to shell plating

The Lessons

1. **Plan →** Although the route was familiar to the crew, the decision to use it was taken late and this meant that a full appraisal of the alternative passage had not been completed. The effects of the tidal stream and courses to steer had not been precalculated; neither was consideration given to planning a 'no-go' point on the approach to the narrows. As the situation deteriorated, the bridge team did not have a plan to deal with the reduced visibility. Irrespective of familiarity with a route, a full appraisal of the passage is necessary to identify all potential hazards and make plans to avoid them.

2. **Monitor →** The vessel was not fitted with electronic charting so was reliant on paper charts, visual bearings, global positioning service (GPS) fixes and radar for coastal navigation. These navigation methods require accurate, careful manual plotting, constant monitoring of parallel indexes, fixes and early action to regain track. Given the vessel was already off track to starboard when the fix was plotted, it was important to quickly identify the effects of wind and current and take bold action to regain, then maintain, track. This accident demonstrated that, although the vessel's heading was altered intending to regain track, the action taken was insufficient and the bridge team ran out of time to accurately assess the situation and take further action to stay safe.

3. **Communicate →** The coastguard was not informed of the incident and the company was only notified the following day after the vessel was alongside. Although the master was confident the vessel and crew were not in danger, it would have been prudent to inform search and rescue authorities and the company. The coastguard can monitor your progress, warn of dangers ahead and be ready to react to a deteriorating situation. Likewise, keeping the vessel's management informed allows them to take early action to help safeguard the crew and prepare for damage assessments.

Towing trouble

dredger and unmanned barge | flooding

A harbour dredger was on a coastal passage, relocating to start its next contract. The passage was to take several days and the dredger was towing an unmanned barge laden with an excavator, in an alongside configuration. There were four crew onboard but, with only one bridge watchkeeper, the plan was to stop each night for crew rest.

During the passage, the dredger encountered a long swell that made the alongside towing configuration untenable and so the crew switched to an astern tow; however, the towline soon failed and the barge drifted free. After the towline failed a second time, the crew decided to head for shelter.

In the approaches to the refuge port, the towline failed again and fouled both propeller shafts (see figure), disabling the dredger as the crew were attempting to recover the situation. Without propulsion, the dredger was anchored; however, the crew were u nable to prevent a series of heavy collisions with the barge, which was then out of control. The collisions caused significant damage and flooding to the dredger.

The situation was eventually brought under control after the intervention of a lifeboat, an emergency towing vessel, and a powerful workboat that towed the dredger to safety for repairs.

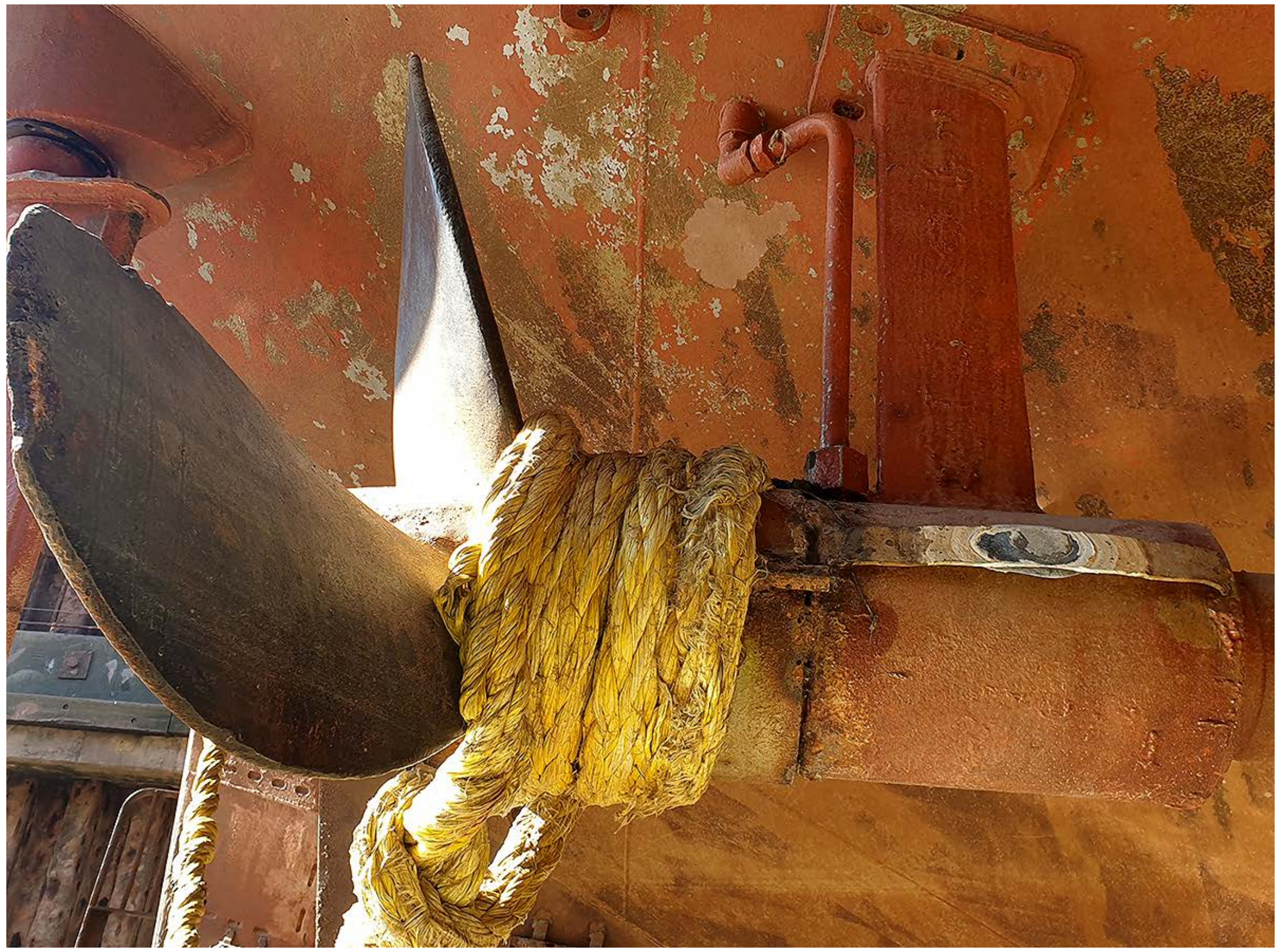


Figure: The fouled tow rope around the dredger's starboard shaft after dry docking

The Lessons

1. **Plan →** Seagoing towing is a hazardous task that requires detailed planning and execution by capable crew. Although the dredger's crew had experience of in-harbour towing and working with barges, they had little open sea towing experience. Post-accident analysis established that the crew's tow plan had not identified all the potential hazards with the passage and that the astern towing arrangements were vulnerable to failure. The key issues were that the towline length was too short and, without an elastic pennant or 'stretcher', it would be subject to potential overload due to 'snatching'. There was also no chafe protection. The International Maritime Organization or trade association guidance should be reviewed when preparing towing plans. Additionally, schemes such as the Maritime and Coastguard Agency (MCA) recognised voluntary towage endorsement scheme can help to ensure sufficient crew competence when towing.

2. **Teamwork →** The absence of a second watchkeeper was a significant limitation on a lengthy coastal passage and meant that a suitable port or anchorage had to be found every night; this was difficult to arrange with uncertainties such as weather and the slow overall speed because of the tow. Historically, the dredger's owner had employed a second watchkeeper for relocation passages or where there was a long sea passage to the spoil ground during dredging operations, but not on this occasion.

It's an accommodation ladder, not a diving board

bulk carrier | accident to person

A shore worker boarded a berthed bulk carrier via the accommodation ladder to obtain a signature on some paperwork. Because of the falling tide, the accommodation ladder was then stowed (Figure 1), its safety net was removed and the crew started to rig an access brow. The shore worker returned to the deck with the signed paperwork and was advised by the crew to wait a few minutes for the brow to be safely prepared for his disembarkation. He was also informed that the accommodation ladder was no longer in use for access.

However, the shore worker ignored the crew's direction and walked along the stowed accommodation ladder, intending to jump ashore from its lower platform (Figure 2). At the lower platform, the shore worker slipped, lost his balance and fell over 8m into the sea between ship and shore, suffering significant injuries.

Figure 1: The accommodation ladder secured alongside

The alarm was raised and emergency services were quick to arrive on scene. Meanwhile, the C/O climbed down the jetty ladder (Figure 2) and pulled the shore worker out of the water and safely into a recess just above sea level. From there, the shore worker was evacuated to hospital on a stretcher for treatment of his injuries.

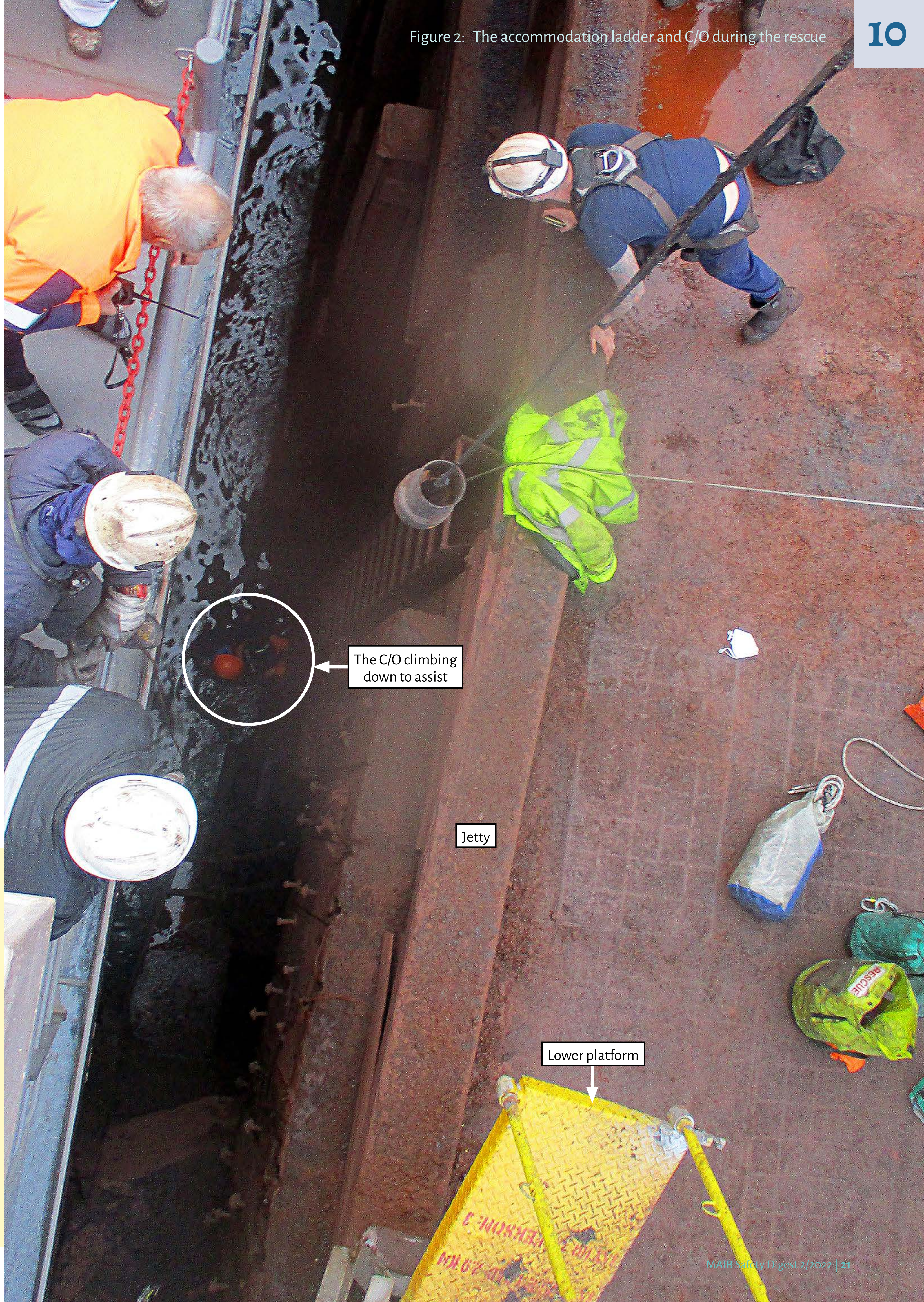
The Lessons

1. **Procedure** → The shore worker was largely responsible for his own injuries. Crew instructions to visitors are not optional advice. The crew member on gangway duty acted properly by instructing the shore worker to wait to use the brow; however, this was ignored. This accident demonstrates the importance of safe means of access and the importance of managing and, where necessary, directing visitors on board to be safe.

2. **Risk** → More haste seldom leads to more speed. Rushing to depart led to a nasty fall into the sea and injuries that required hospital treatment. Although waiting for the brow to be rigged might have seemed tiresome, the short delay to the shore worker's departure paled in comparison to the pain and inconvenience he suffered from the fall.

3. **Equipment** → Safe means of access is crucial. When rigged, and with a safety net in place, the accommodation ladder represented a safe means of access; however, the tidal state meant it was no longer able to be used. The crew acted to remedy this and rig alternative means of access, but the shore worker was impatient to leave and, tempted by what he perceived to be an easy jump to the jetty, he contravened the crew's instructions and took an unsafe route off the vessel.

Figure 2: The accommodation ladder and C/O during the rescue



11

Diddly-squat

cargo ferry | grounding

A ro-ro cargo ferry was inbound to harbour and following its regular passage plan at a speed of 16kts; it was low water and the master had confirmed all the details with harbour control, including the 7m draught. During the passage, the master and bridge team felt a heavy vibration and observed that the vessel's wake had increased in size. Suspecting that the ferry was experiencing squat in the shallow water, the master reduced speed and the unusual effects disappeared.

The master then increased speed and resumed the passage, monitoring the echo sounder throughout. Soon after the vibration, the bridge team observed that the log had stopped working. Once alongside, a diver inspection of the hull revealed that the log transducer was damaged and that paint had been scraped from the shell plating. An investigation concluded that the ferry had briefly grounded on a charted 7m shoal near the entrance to the navigational channel (Figure 1).

For illustrative purposes only: not to scale

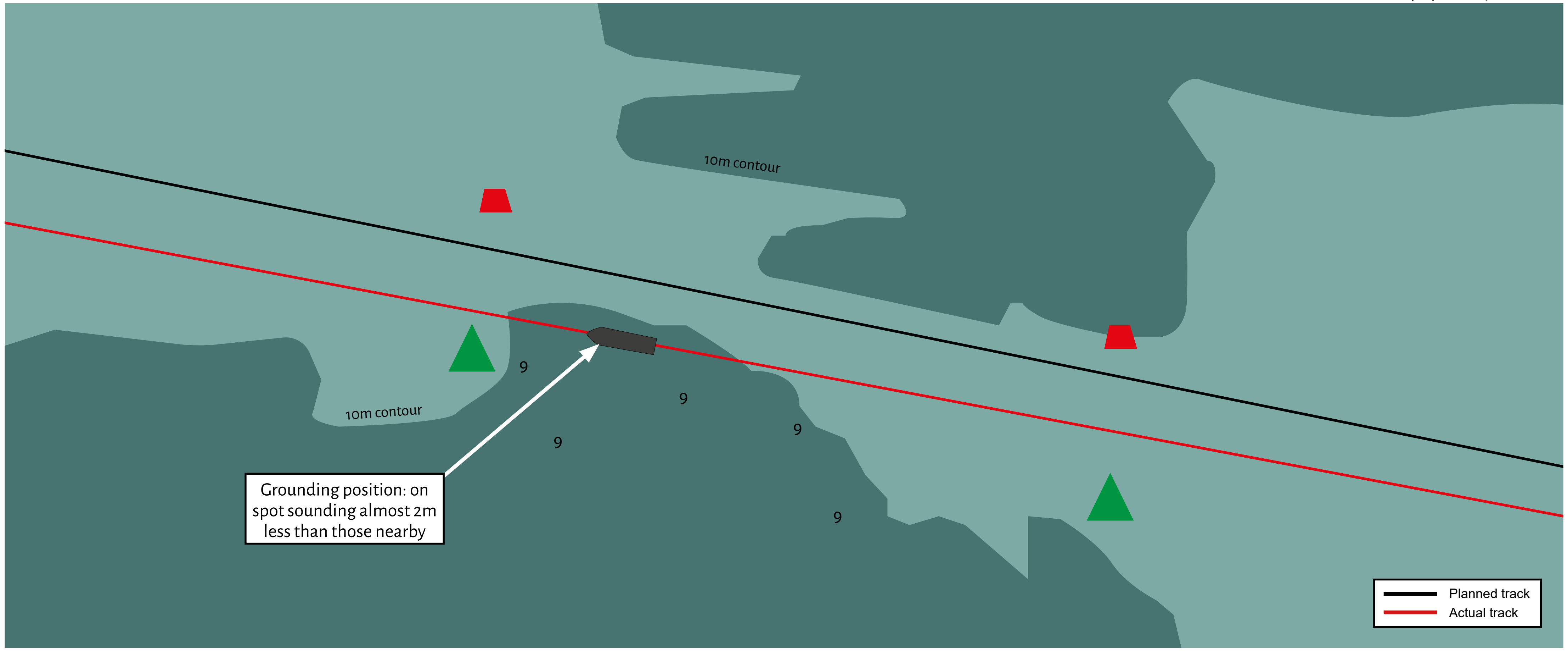


Figure 1: Chart showing position of ferry grounding

For illustrative purposes only: not to scale

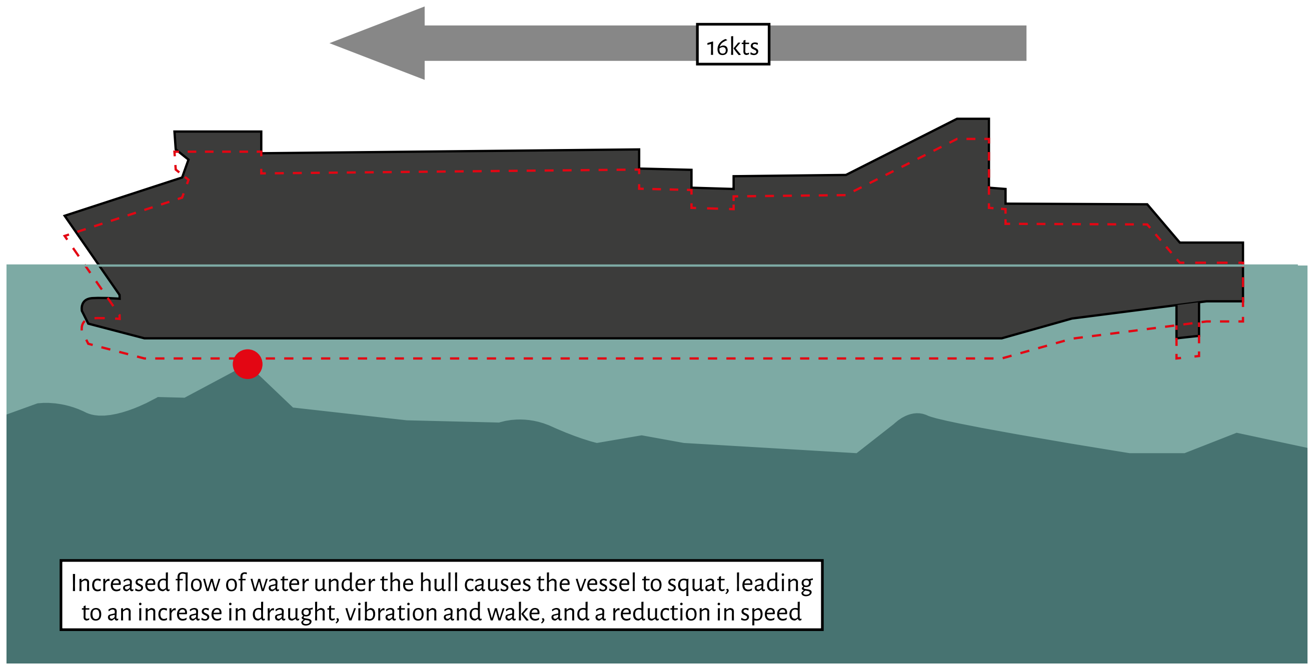


Figure 2: The effects of squat

The Lessons

1. **Plan →** Safe navigation relies on a berth-to-berth passage plan irrespective of the repetitive nature of the operations. The ferry grounded because the planned under keel clearance calculation made insufficient allowance for the effect of squat. The vessel's wheelhouse poster showed that, for depths of less than 10m, a squat of up to 1m could be experienced. Had the passage plan allowed for this and accounted for the speed and height of tide, the grounding risk could have been appreciated and the planned track amended or intended speed reduced.

2. **Action →** As soon as the vessel began to experience the telltale signs of squat – vibration, a speed reduction and increased wake (Figure 2) – the master took the correct action. Slowing the vessel, and thereby reducing its draught, minimised the risk of further hull damage.

3. **Observe →** The fact that there had been no alarms on the bridge dissuaded the crew from investigating the incident further. However, if they had taken the opportunity to review and assess the ferry's passage it is likely that they would have seen that the vessel had grounded. The crew could then have reported the accident in a timely manner, confirmed the scope of any damage and taken action to prevent a recurrence.

Not so cool

passenger ferry | fire

A roll-on/roll-off passenger ferry (RoPax) was embarking passengers and loading cargo trailers in a port in Northern Europe. Stevedores towed a refrigerated cargo trailer onto the main vehicle deck and the crew plugged the trailer into the ferry's power supply to enable the refrigeration unit to run throughout the voyage. The crew lashed the trailer in place and continued loading cargo.

A few minutes later, a crew member spotted flames and smoke coming from the refrigerated unit on the trailer (see figure). He immediately raised the alarm, then disconnected the power supply and tackled the fire with a dry powder fire extinguisher. The fire was quickly extinguished, with no injuries to crew or damage to the ferry, and the trailer was towed from the vessel onto the quay.

Subsequent investigation found that the trailer's refrigeration unit had developed an electrical fault that caused the fire. The shipping company issued a circular to their freight suppliers, advising them to conduct refrigerated trailer annual service and electrical safety checks.

Figure: The refrigerated unit on the trailer

The Lessons

1. **Action →** Rapid response to a small fire prevented it from escalating and minimised the risk of personal injury and damage to the vessel. Ship operators are reminded of the value of training and drills to ensure that their crew are prepared to deal with emergency events.

2. **Check →** Refrigerated trailers are commonly transported on board ro-ro and RoPax ferries. If a unit appears damaged or poorly maintained, the crew should have support from the shipping company to refuse carriage until safety checks have been completed and the unit is declared safe.

3. **Maintain →** Shippers are reminded of the importance of maintaining their refrigeration units in good condition to reduce the risk of damage and fires.

In off the post

cargo ferry | contact

A ro-ro cargo vessel picked up a local pilot on a blustery day before embarking on a river passage that included the transit of a lock. The pilot boarded early, and a master/pilot exchange was completed before they continued the river passage with tide and wind astern. Unknown to the pilot and master, there were delays at the lock ahead as the vessel in front of them had requested a tug due to the weather conditions. The pilot had not adjusted speed to account for his early boarding and, by the time they arrived at the lock, they had to turn to hold their position against the tide and wind.

Once the lock was clear, the pilot attempted an approach from his holding position but the vessel would not turn away from the wind and so he aborted his first attempt before completing a round turn and making another approach, this time with more speed. The vessel continued to struggle against the wind and made contact with the outer lock wall (see figure) at a speed of 2kts, resulting in superficial damage to the vessel and infrastructure.

Figure: The vessel making contact with the lock wall

The Lessons

1. **Procedure →** The port had comprehensive guidelines for the use of a tug at the lock. This was the first time the vessel had called at this port and, in view of the vessel's manoeuvring characteristics and wind strength on the day, a tug should have been ordered, but was not. There were opportunities for the pilot to request a tug, namely when his first approach to the lock had to be aborted, but this did not happen despite the tug's immediate availability. The safeguards that the port had in place were bypassed, leading to the vessel operating outside its capabilities, the consequences of which could have been far more costly. Guidelines are there for a reason, and it pays to be cautious.

2. **Communication →** The pilot boarded earlier than he was booked for good reason but did not then adjust the vessel's speed during the river transit. When combined with the delay at the locks, this meant that the vessel had to turn head to wind and tide and hold position in a less than ideal place. At no point had vessel traffic services (VTS) confirmed arrival times at the lock or passed information about the delay to the pilot, and communications from other parties about tugs and weather conditions were made via mobile phones. Without a shared mental model built from open communication between VTS, the pilots and the lock operators, a hazardous situation was allowed to develop that could have been avoided with proactive management.

3. **Teamwork →** The master/pilot exchange took place when the pilot boarded but salient information was either missed or not implemented during the approaches to the lock. The vessel's pilot card stated that minimum steerage was achieved at 5 to 6kts through the water but, when considering the following tide, this was not achieved on either approach. The master/pilot exchange is all too often disregarded but is crucial to the integration of the pilot into the bridge team and their ability to safely plan and carry out manoeuvres.

14

Lining up for trouble

cargo ferry | grounding

It was late afternoon, conditions were calm, visibility was good, and a laden ro-ro cargo vessel was getting underway. The vessel that normally operated the trade route was undergoing scheduled maintenance and this temporary replacement vessel had an aft bridge superstructure. The route's usual vessel was slightly smaller, more manoeuvrable and had a forward bridge superstructure.

The master, C/O and second officer (2/O) were on the bridge for departure, along with another member of the company's staff who held a Pilotage Exemption Certificate (PEC) for the harbour. A trainee pilot was also on board. The PEC holder regularly conducted pilotage on the usual vessel and was also familiar with the temporary vessel, having been on board during the usual vessel's previous maintenance period.

The master manoeuvred off the berth then passed control to the 2/O, who was handling the vessel under the PEC holder's direction. As the pilotage progressed, the PEC holder was explaining his plan to the trainee pilot.

The departure passage required a significant port turn in a constrained channel. The PEC holder used the alignment of familiar landmarks on the shore, sometimes referred to as natural transits, to determine the 'wheel over' point. When the PEC holder's visual references aligned, the order was given for "*Port 25 degrees*"; this was almost immediately increased to "*Maximum port wheel*" as the PEC holder appreciated that the vessel was not turning safely in the channel.

Figure 1: Damage to propeller blades and abrasion of rudder antifouling

The vessel's stern swung to starboard during the turn and a significant vibration was experienced before the vessel came to a halt with the stern and starboard propeller aground. The starboard engine was stopped, and the master then used the port engine and the bow thruster to manoeuvre off the bank and back into the channel. The vessel was put into dry dock, where damage to the starboard propeller blades was discovered (Figure 1) and repaired before the vessel returned to service.

For illustrative purposes only: not to scale

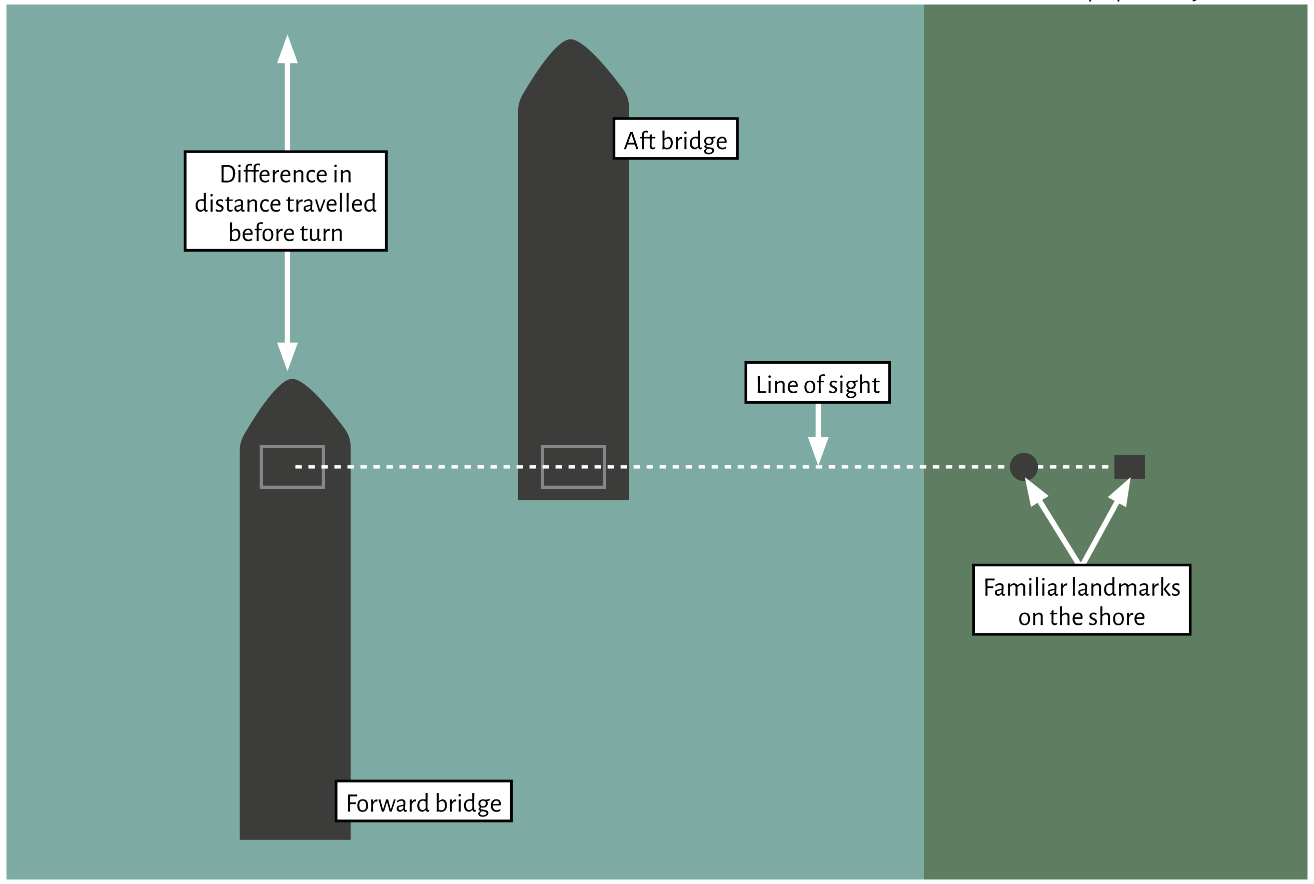


Figure 2: The difference between applying the same visual reference to a vessel with a forward and aft bridge superstructure

The Lessons

1. **Plan →** Local natural transits can be a very helpful guide to determine the position of a vessel during pilotage, and where helm orders should be given. However, all factors need to be taken into consideration when planning the pilotage, specifically the vessel's speed and turning data as well as local environmental effects such as wind and tidal stream. In this instance, the PEC holder was applying the visual references that had been developed for the usual ferry but were simply not applicable to the temporary ferry with its aft bridge arrangement (Figure 2). This resulted in a late application of port wheel and then insufficient sea room to correct the error by tightening the turn, culminating in the grounding.

2. **Teamwork →** The personnel in a bridge team are just that – a team. When the vessel grounded, there were four deck officers and a trainee pilot on the bridge, all with various levels of experience and qualifications. The master had detailed knowledge of the vessel's handling characteristics and the PEC holder and trainee pilot both knew the harbour well. Effective bridge teamwork requires that pilotage conduct is monitored and each other's actions are checked, which was not evident in this case where the actions of the PEC holder went unchecked; no one challenged the plan or the late helm order for the port turn.

3. **Aware →** Training is important but it must not detract from the safe conduct of the pilotage. The PEC holder was distracted by the presence of the trainee pilot and his focus was therefore divided between performing pilotage and narrating his actions.

FISHING VESSELS

The sea has been an enduring influence in my life. I grew up in Bideford, North Devon, and watched as the fishing boat crews mended their nets and track-laying cranes tended coastal cargo ships. On regatta days, I looked on, fascinated, as the Appledore RNLI all-weather lifeboat teamed up for exercises with RAF Chivenor's bright yellow search and rescue helicopters to practice rescuing fishermen. I became a Merchant Navy navigation cadet straight from school and left sea 14 years later as a ship's captain.

By then, apparently, I knew what a fishing boat was so the recruiters at the Civil Service decided I would make a good Ministry of Agriculture, Fisheries and Food fisheries inspector. I joined their intensive training course and, before long, was an *expert*. As a warranted British sea-fishery officer, I was qualified to identify infringements against dozens of Common Fisheries Policy regulations. I was also authorised to prosecute fishing skippers and owners for offences that could, and sometimes did, land them in jail. The fishermen were almost invariably guilty by their own hand, having found it impossible to conduct a successful fishing trip without breaking one law or another. I have since learned that managing the fishing industry is not rocket science; it is much more complicated!

To a man, fishermen are the most optimistic of characters. They face the elements with carefree bravado, knowing that day follows night, calm follows a storm, and a full cod end of fish will surely follow a poor haul. Their wit and wisdom endeared me to their calling. They surprised me with their ready acceptance of new technology in the wheelhouse, equipped with the latest radars, echo sounders and mobile phones, but rather intriguingly they continued to use Decca coordinates and charts for their established tows long after this navigational aid, developed in 1944 for D-Day, had been switched off and replaced by GPS.

They exasperated me with their loathing of paperwork and bureaucracy, which had been second nature to me on a well-run ship. I had learned over the years that systems for doing all sorts of tasks ensured risks of accidents and incidents were minimised. The new Common Fisheries Policy of the European Economic Community, with its logbooks, licences, and many restrictions, was universally hated. Admittedly, many fishermen left school without qualifications, often following previous generations to sea; if granddad and father managed to make a living from fishing, then so could any of today's fishermen! Their regard for personal safety confounded me.

The current death rate remains far too high

Community is important to fishing families and all agreed that they enjoyed time with family and friends during breaks between voyages. But lifejackets were for Board of Trade sports or drills and only came out of the storage bins during safety certification inspections! They worked hard, played hard, and life was for living; however, almost to a man, they would rather suffer a quick death at sea than stay afloat waiting for rescue that might not arrive. This was a measure of how low were considered the chances of survival for a man overboard in a cold, cruel sea.

These were my impressions of the fishing industry in the late 1980s. Very sadly, I attended far too many funerals of work colleagues and friends over the next 30-plus years, many killed in tragic accidents at sea or in port and remarkably few from old age. I also visited too many fishermen in hospital, often with life-changing injuries.

Thanks to the provision of lifesaving and firefighting appliances, safety innovations and compulsory training courses, death and accident rates in the fishing industry have diminished drastically since the 1968 Hull triple trawler tragedy. However, at around one for every thousand engaged on boats, the current death rate remains far too high and the fishing industry continues to be the most dangerous of peacetime occupations.

Several wonderful initiatives have been introduced in efforts to reduce fatality and injury statistics and improve attitudes to personal safety at sea, mainly under the banner of the Fishing Industry Safety Group (FISG) whose members include Seafish, the National Federation of Fishermen's Organisations, the RNLI and the MCA. Designers and manufacturers have produced better, more comfortable PFDs and PLBs are now so lightweight and portable they are routinely fitted to them. Many organisations have funded and delivered thousands of self-inflating PFDs and PLBs to fishermen. The fishing vessel safety solutions implemented in the 50 years since the Hull triple trawler tragedy have become increasingly more effective. There is no excuse.

But, as you will read in this Safety Digest, accidents on fishing boats are still far too many and lessons have clearly not been learned from the incidents and recommendations recorded in earlier editions. FISG created the Home and Dry campaign to improve commercial fishing safety at sea and its website (https://www.homeanddry.uk/) is a hub of essential information and free resources. Trusting to luck is simply not good enough; fishermen owe it to their families to reduce the risks wherever and whenever possible and return safely, home and dry.

For the fishing industry's safety record to improve further, and I fervently hope it does, more focus is needed by stakeholders around how to provide fishermen with effective education and guidance on basic stability, watchkeeping, navigation, gear that is held aloft and compartments where the atmosphere may not sustain life.

I urge you, please, to read this Safety Digest and try to eliminate luck from your fishing operations.

JIM PORTUS MBE | Retired CEO of the South Western Fish Producer Organisation Ltd

The sea and Red Ensign merchant and fishing vessel fleet have been enduring influences throughout Jim's adulthood. He served for 14 years as a navigator on merchant and passenger ships before deciding to contemplate shore-based life.

For the past 32 years, Jim has steered the mutual society known as the South Western Fish Producer Organisation Ltd (SWFPO) through the turbulence of the Common Fisheries Policy into what should have been the calm seas of the UK as an independent coastal state. Jim's job description required him to represent the members of SWFPO, all of whom were fishing vessel owners. He was their voice in complex fish quota negotiations with both the UK Government and the Fisheries Commission of the EU.

Jim describes the fishermen with whom he worked as, without exception, *Most generous and kind to me, accepting me as one of their own, an "honorary fisherman"*. In 2020, Jim was proud to be awarded an MBE in the Queen's Birthday Honours for services to the fishing industry, crowning an extraordinarily varied and rewarding working life.

Safety equipment saves lives

trawler | man overboard

On a bright, fresh autumn morning, a small trawler left harbour for a day's fishing with a skipper and crewman on board. Once past the breakwater, the skipper handed over the watch to the crewman and went below to rest. The crewman was wearing light clothing and a personal flotation device (PFD) and carried a personal locator beacon (PLB) (see figure).

During the passage to the fishing grounds, with the vessel under autohelm steering, the crewman left the wheelhouse to prepare the fishing gear on deck. As he was leaning over the transom to rig the trawl wires, the crewman lost his balance and fell into the sea; his PFD inflated and he shouted to get the skipper's attention but this was not heard. The crewman then activated his PLB to raise the alarm ashore. The fishing vessel continued its passage with the sleeping skipper unaware that the crewman was overboard.

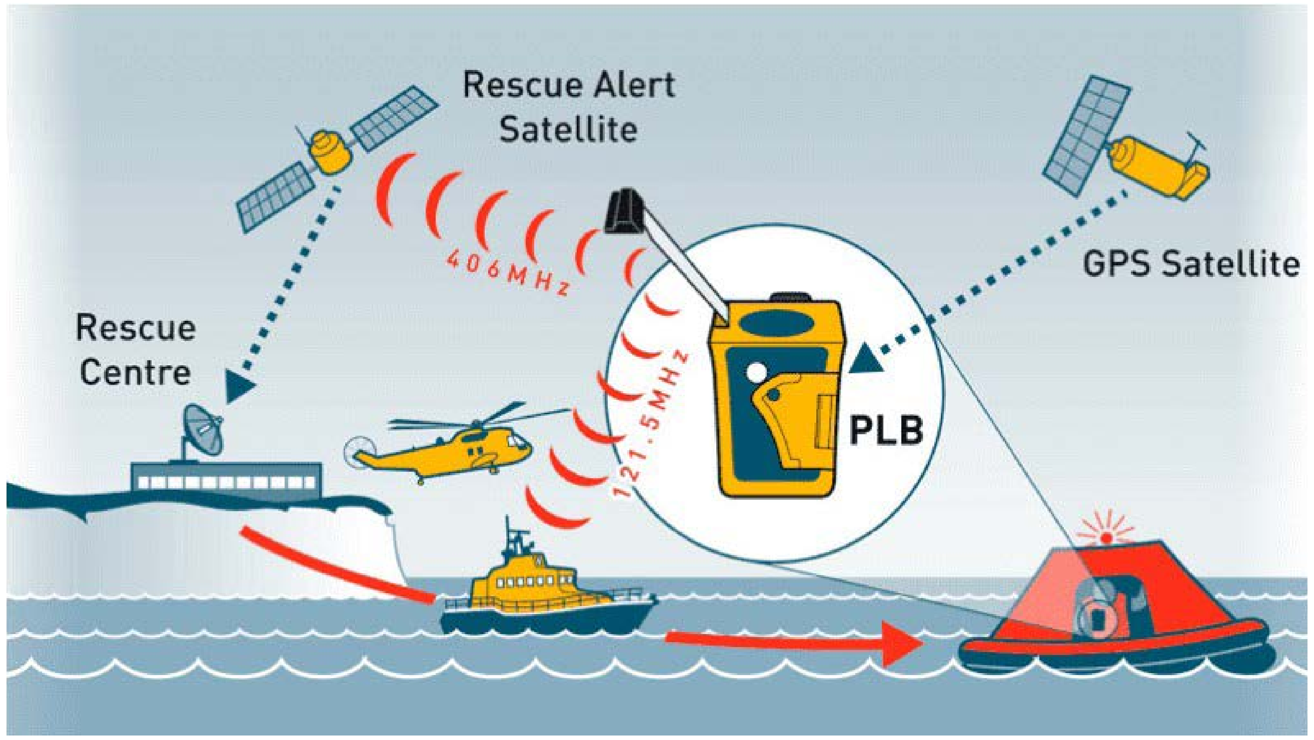
The coastguard received the PLB's signal and immediately initiated the launch of two local lifeboats and a search and rescue (SAR) helicopter. Other vessels in the area were also alerted. The trawler's skipper awoke during the SAR operation and informed the coastguard that his crewman was missing. At about the same time, the crewman was located and rescued by a lifeboat; he was transferred by helicopter to hospital, where he was found to be unharmed by his experience.

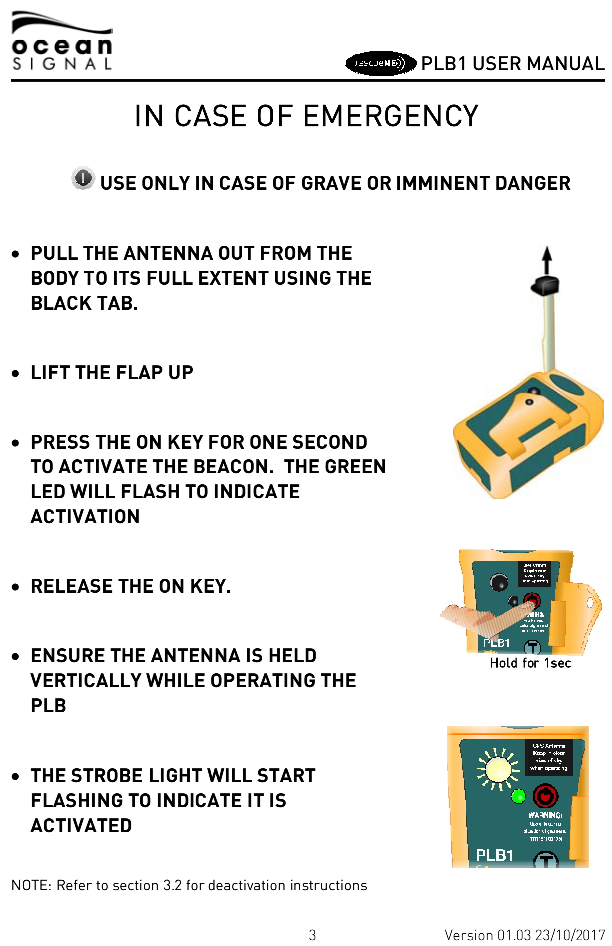
Figure: PFD and PLB used by the crew member

The Lessons

1. **Equipment** → PFDs save lives. The crewman was in the water for about 80 minutes before being rescued, which is a significant period of time to survive in seawater without lifesaving equipment. The PFD was absolutely crucial in keeping the crewman afloat, with his head out of the water; because there was no need for him to tread water to continue breathing, he could save his energy while awaiting rescue.

2. **Communicate** → PLBs also save lives. Because the crewman carried and activated a PLB, the coastguard was alerted to the emergency almost immediately and able to send rescue assets quickly. It is impossible to know the delay that would have been incurred had the alarm not been raised until the skipper realised he was alone; however, it is likely to have been significant. Importantly, a PLB transmits the distressed individual's position to the coastguard, which is vital for both a swift and effective search and the survival of the person in the water. A PLB is smaller than a mobile phone and a relatively inexpensive item of safety equipment that, in this case, undoubtedly contributed to the successful outcome of this rescue.





ocean SIGNAL — PLB1 USER MANUAL

IN CASE OF EMERGENCY

USE ONLY IN CASE OF GRAVE OR IMMINENT DANGER

- PULL THE ANTENNA OUT FROM THE BODY TO ITS FULL EXTENT USING THE BLACK TAB.
- LIFT THE FLAP UP
- PRESS THE ON KEY FOR ONE SECOND TO ACTIVATE THE BEACON. THE GREEN LED WILL FLASH TO INDICATE ACTIVATION
- RELEASE THE ON KEY.
- ENSURE THE ANTENNA IS HELD VERTICALLY WHILE OPERATING THE PLB
- THE STROBE LIGHT WILL START FLASHING TO INDICATE IT IS ACTIVATED

Hold for 1sec

NOTE: Refer to section 3.2 for deactivation instructions

3 Version 01.03 23/10/2017

Blinded by the lights

scallop dredger | grounding

A large scallop dredger departed its home port shortly after dawn; it was a fine and sunny day with a gentle breeze. As the vessel was underway without its full crew or sufficient supplies to sustain the planned week of fishing, the skipper intended to pick up an additional crew member, some fishing gear and supplies from a harbour further down the coast that he had not visited before.

The scallop dredger arrived at the harbour later that day to collect the crew and supplies. As darkness started to set in, the skipper decided to proceed into the buoyed channel and navigated into it by eye, without a plan. He was not referring to his navigational aids or charts and was also unaware of the effects of wind and tidal stream, both of which were pushing the vessel to port and out of the channel.

The skipper became confused by the multitude of shore lights and struggled to ascertain his position in the channel. The leading lights had not been identified and the vessel drifted out of the channel, running aground in mud and sand (Figure). Under its own power, and with the aid of the local lifeboat, the scallop dredger was hauled off the bank undamaged.

For illustrative purposes only: not to scale

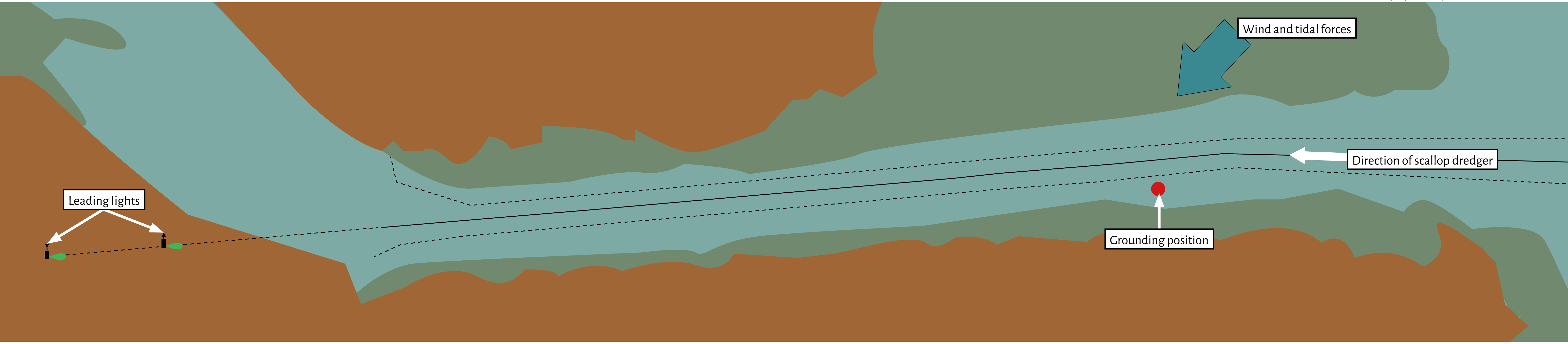


Figure: Chart of the port, showing the channel

The Lessons

1. **Plan** → Avoid ad hoc pilotage; every arrival and departure must be appropriately appraised and planned. Such preparation should include: a chart assessment, identification of danger areas, safe navigable water and suitable navigational aids, evaluation of the environmental conditions, suitability of daylight versus darkness channel navigation, and the experience of those in the wheelhouse.

2. **Monitor** → Leading lights are vital navigational aids to ensure the correct approach to a harbour. When entering at night, early detection of leading lights and their distinction from other lights, such as buoys and the shore, provide a reliable and easily identifiable track for safe passage. Continuous monitoring will ensure any resultant drift is readily apparent and allow for suitable heading adjustments to be made.

3. **Teamwork** → Entering a port for the first time can be overwhelming for any seafarer, regardless of their experience. Skippers should be unafraid to ask another crew member to lend support in the wheelhouse. When things go wrong, a helping hand can provide a valuable safety net.

4. **Risk** → Local environmental conditions must be considered before any port approach. The sea can often appear benign, particularly in protected waterways, but such conditions should not allow mariners to be lulled into a false sense of security. Anticipating the vessel's expected drift is a quick and simple assessment that counteracts any potentially hazardous outcomes.

Beam drop

beam trawler | machinery

A beam trawler was taking fresh water on board from a quayside connection when the skipper decided to even out the vessel's list by topping up the outboard (port) derrick, from which its fishing gear was suspended. The plan was to finish taking on water and then lower the beam and attached trawl gear onto the deck, ready for the next trip. As the harbour was quite busy, another beam trawler had been berthed outboard of the vessel.

All seemed to be progressing well until there was a sudden loud bang. Peering out from the wheelhouse, the skipper saw that his port side derrick, beam and fishing gear had fallen onto the wheelhouse roof of the other vessel (Figure 1). Fortunately, the uncontrolled descent of the derrick and fishing gear had been checked by the outboard vessel's backstay, which meant that this vessel sustained very little physical damage. With noone on the upper deck of the outboard vessel and all of the inboard vessel's crew in the wheelhouse or predesignated safe zones, there were also no injuries.

The company investigation identified that the derrick had been inadvertently over-topped, resulting in too much force being applied to the topping wire. On examination of the fallen gear, it became clear that the force had caused the welds on the port derrick lifting lug to fail (Figures 2 and 3). The lug had been supporting the weight of the derrick and the suspended gear so, when the weld gave way, the block, derrick, beam and fishing gear had come crashing down.

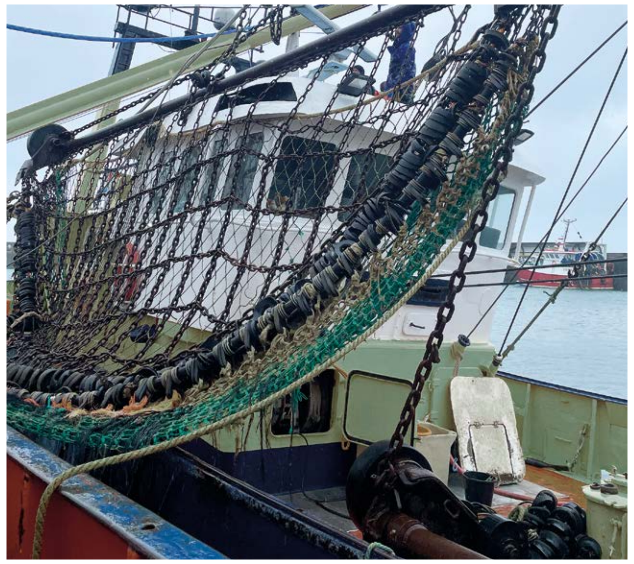


Figure 1: The fallen fishing gear on the outboard fishing vessel

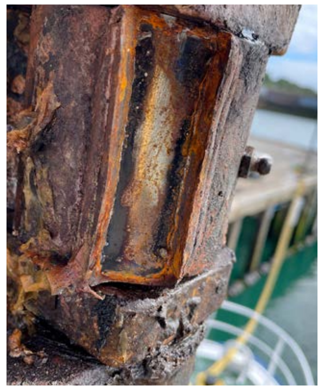


Figure 2: The failed weld on the gooseneck joint

Figure 3: The lifting lug

The Lessons

1. **Plan →** Every lifting operation, no matter how routine, can be hazardous. By having, and sticking to, a lifting plan, it can be relatively simple to make sure that no-one gets hurt when things go wrong. By making safety a routine matter, injuries can be avoided. This includes thinking about the possible impact, literally in this case, on adjacent vessels and warning them of your intended operations. The crew's use of predesignated safe zones during the lifting operation was positive and helped prevent potential serious injuries.

2. **Check →** Most fishing vessels rely on lifting points. Regular inspection, at least annually, of these lifting points by a competent person in accordance with the requirements of the Lifting Operations and Lifting Equipment Regulations 2006 (LOLER)[1] and Marine Guidance Note 619 (F)[2] can save lives. Lifting points are subject to intense loads and their failure can have significant consequences.

3. **Revise →** In this case, it would have been easy to just weld the lug back on and think nothing more of the accident. By more thoroughly examining what happened, the owner has produced a new lug arrangement that includes a preventer, fitted strain gauges and refined the lifting plan. Clear markings on the topping lift wire also indicate the safe working range. There is a lot to learn from every accident and near miss – taking the time and effort to do so pays dividends.

1 https://www.legislation.gov.uk/uksi/2006/2184/contents
2 https://www.gov.uk/government/publications/mgn-619-loler-and-puwer-regulations-2006

18

Deliver-oops

fishing vessel | foundering

The owner of a recently purchased second-hand under 10m fishing vessel employed a local yacht delivery company to bring it to its new home port. A window between winter storms was identified and the delivery skipper and mate arrived at the departure port to receive a handover of the vessel from the previous owner. Having sailed just after lunch, the pair conducted a range of vessel checks, including the bilges in the fish hold and the engine room. Everything appeared satisfactory, and they made good speed despite the lumpy following seas. Just over an hour into the trip, the skipper and mate heard a short beeping sound; this only lasted a couple of seconds, and they were unable to locate the source due to the background engine noise. The sound recurred about 20 minutes later and, because they were unfamiliar with the boat, it took them some time to identify it as the engine room bilge alarm.

A substantial amount of water was noted on checking the bilges. The skipper and mate switched the bilge pump on at the helm position and carried on with the passage. However, on checking the bilge levels some 15 minutes later, it was clear that these had increased. The skipper donned an immersion suit and grubbed around in the engine room to see if there was a problem with the bilge pump. On finding it not working, unsuccessful attempts were made to fix the bilge pump. The skipper tried the hand-operated bilge pump, which was also ineffective.

Realising that the situation was out of control, the skipper and mate set a course for the nearest harbour. Now heading directly into sea and wind, the vessel started to ship water over the bows. Concern was mounting and so, prompted by the coastguard, a "Pan-Pan" call was issued. Within seconds, the vessel capsized to starboard and all radio communications were lost. The local RNLI station's lifeboats were conducting some training in the area and, with the help of another vessel, soon located the (Figure 1). The skipper and mate were cold and in shock but were rescued unharmed from the liferaft. Their vessel had found a new home on the seabed some 35m below the surface (Figure 2); the source of the flooding remains unknown.

Figure 1: RNLI rescue of the crew from their liferaft

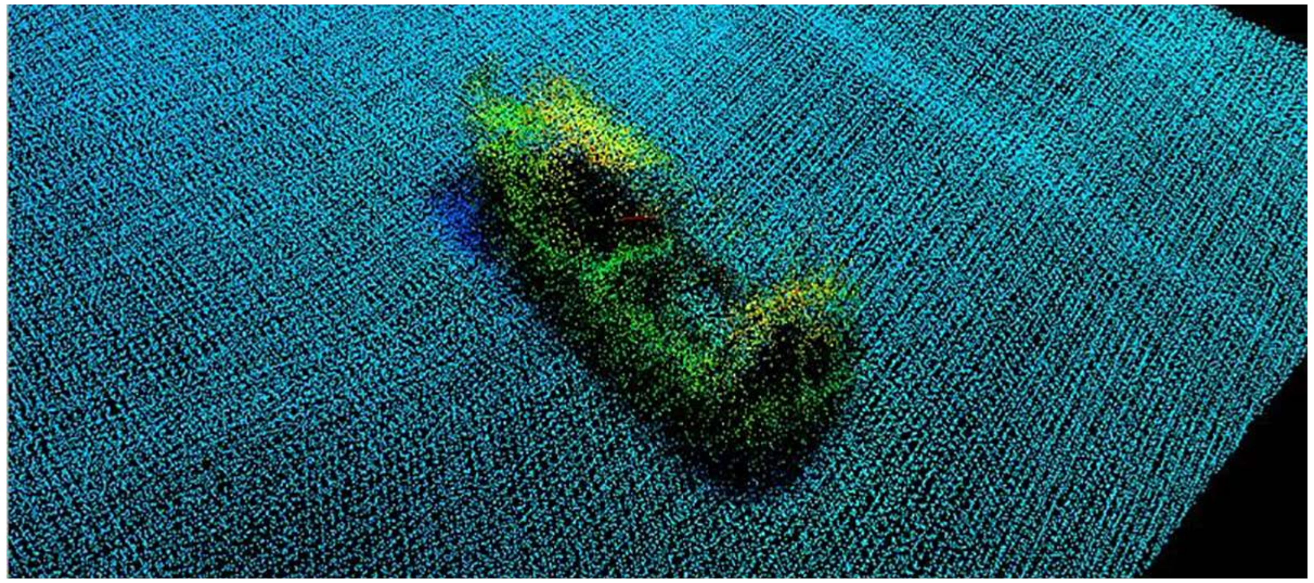


Figure 2: The fishing vessel upright on the seabed

The Lessons

1. **Prepare →** Voyages involving unfamiliar vessels are particularly sensitive to how much system knowledge the delivery crew have and can be fraught with hazards. This case highlights a lack of understanding of bilge pumping systems, which meant that available options such as using the deck wash pump were left unexplored. Detailed handovers and pre-departure checks covering the location and operation of all safety critical systems are essential before any delivery voyage begins. Once underway, fault-finding and rectification can become a difficult proposition.

2. **Procedure →** Emergency procedures and fallback modes always benefit from discussion, particularly before embarking on a delivery voyage. It is important to be prepared for the worst and ensure that everyone has a working lifejacket, that there is an Emergency Position Indicating Radio Beacon (EPIRB) and that it is correctly registered. MCA surveyors should also be consulted to ensure that any required exemption certification is in place.

3. **Action →** The benefits of making an early "Pan-Pan" call cannot be overstated. Although it can be tempting to spend time trying to resolve a problem, flooding situations can quickly deteriorate and result in sudden capsize. Lifeboats and the coastguard have access to salvage pumps and so the more notice they are given the better. In this instance, it was fortuitous that the lifeboat was already afloat and on a training exercise – this meant that the rescue was expeditious and that the impact of the cold was minimised.

19

Shooting yourself in the foot

fish carrier | accident to person

While alongside in harbour, the crew of a fish carrier vessel started a thorough clean of their fish tanks. The job required the operator to get inside the tanks with a pressure washer lance. It was a fiddly job as there was not much space inside the relatively small tanks. With the water pressure set to 260 bar, the lance operator went about cleaning the tank. During this work, the jet of water from the pressure washer lance penetrated the operator's boot just behind the protective steel toecap (Figure 1).

The cleaning operation stopped immediately and first aid was administered. The crew member was then taken to hospital, where they received emergency treatment. The wound was deep but, luckily, between their toes (Figure 2); any further to the left or right and the crew member could have lost a toe.

The company investigation highlighted that the pressure washer lance nozzle was damaged (Figure 3), which resulted in it emitting a very focused jet. It was also identified that other footwear was available on the market that could have provided better protection. Further, the company suspended such cleaning work until a safer method could be established.

Figure 1: The protective boot

Figure 2: The operator's injured foot

Figure 3: The damaged pressure washer lance nozzle

The Lessons

1. **Check** → Washing down using high pressure water jets can be hazardous. A thorough check of both the tools and personal protective equipment (PPE) is important to ensure the safety of those involved in the task. Damaged kit can be dangerous and expose users to unassessed risks. Wearing the right PPE can make all the difference. Do not shoot yourself in the foot by using damaged or inappropriate equipment.

2. **Risk** → The tank being cleaned was particularly small with a curved bottom, which meant there was very limited scope for the pressure washer lance operator to keep their feet out of the 'line of fire'. Risk assessments need to fully consider the practicalities of conducting tasks in confined spaces and ensure that exposure to hazards can be avoided where possible. In this instance, an ideal solution would have been the identification of an alternative method for cleaning the tanks that eliminated the need for crew members to enter them at all.

3. **Revise** → A thorough analysis of accidents and near misses can lead to beneficial changes such as improved crew safety. In this event, the company's proactive response resulted in the identification of more appropriate PPE and a change of practice and procedures for operations across its fleet.

20

Boats roll

open boat | man overboard

A single-handed gill net fisherman was shooting nets from the stern of his 7m open boat (Figure 1). It was a warm day with a gentle breeze and short, choppy sea. The engine was in gear and the boat was moving slowly ahead; the fisherman was not wearing a PFD but was carrying a mobile phone in his pocket.

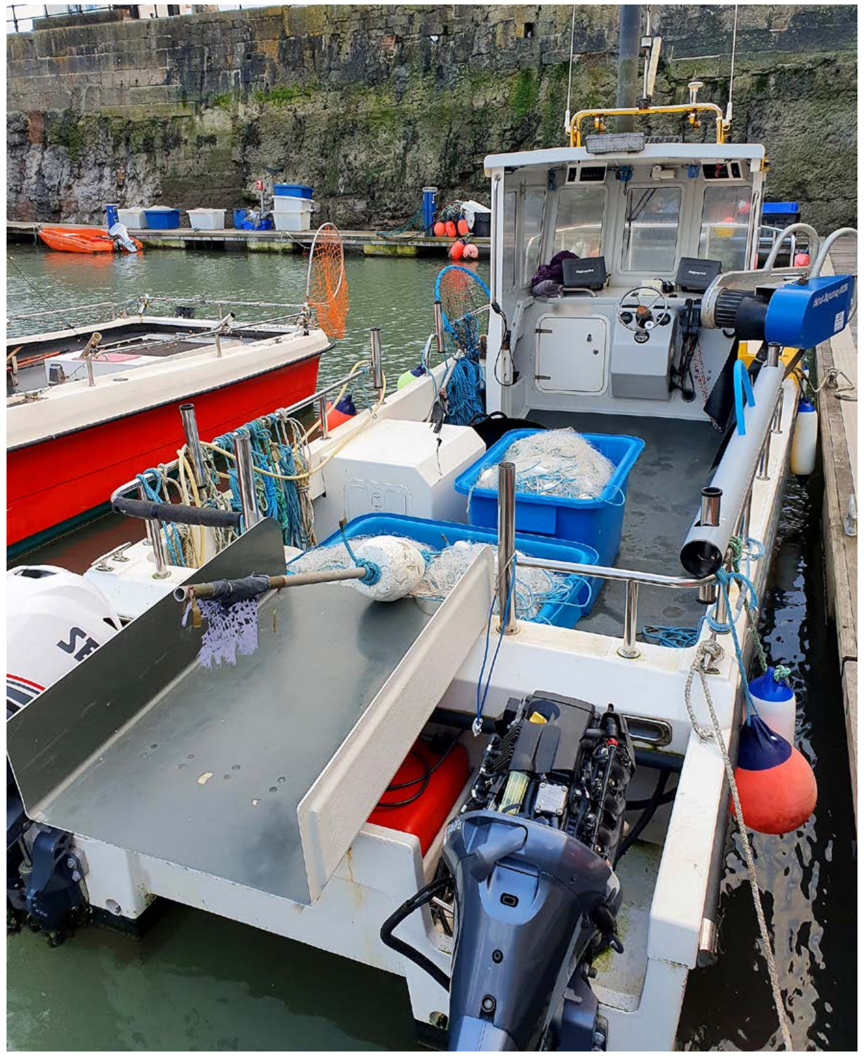


Figure 1: Fishing boat open deck

The boat rolled and the fisherman lost his balance on deck, became snagged in the nets and went overboard into the sea. The boat continued to motor away and eventually ran aground on a nearby beach.

The fisherman was immediately very cold in the water but managed to untangle himself and retrieve the phone from his pocket. He struggled to dial the number but managed to call the coastguard who dispatched a rescue helicopter and RNLI inshore lifeboat. The fisherman was also able to swim the short distance to the gill net marker buoy, which he clung to until rescued (Figure 2). Fortunately, despite feeling extremely cold after his seawater immersion, the fisherman did not require further medical treatment after a check-up.

Figure 2: RNLI approaching the fisherman in the water

The Lessons

1. **Communicate →** PLBs save lives. Single-handed fishing can be extremely hazardous, especially when shooting or hauling gear. Without a second crewman to control the boat or help with rescue, the most critical safety issue is having a reliable means of raising the alarm. The coastguard needs to know the nature of the distress and, critically, your location. In this case, the fisherman was able to use his phone but there is a risk that a phone will have no signal, insufficient battery, or disconnect from the network on contact with the water.

2. **Equipment →** PFDs also save lives and are mandatory when working on deck unless there are other robust means of preventing crew going overboard. Small light PFDs are designed to be unobtrusive and will keep you afloat until help arrives. In this case, it was extremely fortunate that the fisherman was able to swim to the buoyant marker buoy, which helped keep him afloat until the helicopter and lifeboat arrived. Without the marker buoy or a PFD, trying to stay afloat for a sustained period would have become increasingly difficult.

RECREATIONAL VESSELS

I am delighted to have been asked to write the recreational vessels introduction for this edition of the Safety Digest. It is an extremely valuable publication, which provides us with a timely reminder of how quickly things can go wrong when we least expect it.

I noticed a few common themes that weave through these incidents, all of which started as an enjoyable experience on the water.

As in two of the cases, training can have a profound effect on the actions we take if an incident happens. Aside from courses on how to steer and navigate a craft, learning about first aid, sea survival and how to use a VHF radio could make the difference between a challenging day and a life-or-death situation.

The knowledge gained on a training course and through subsequent experience gives us the confidence to respond to problems as they occur. It encourages us to remain as calm as possible to buy us the brain space to assess our options and decide what needs to be done to either effect our own rescue or to raise the alarm. Taking the time afterwards to process the incident can also improve safety on board.

By thinking about what happened leading up to and during the incident, and how we reacted, we may be able to identify anything that could be improved to prevent recurrence.

I always ask myself, What will happen next?

Before leaving the slipway or marina, we need a plan for what we are going to do and where we are heading. It may be that we have entered a route into the chart plotter or perhaps we have a hand-drawn sketch outlining the route. Decisions on the day's activities will be influenced by the wind and tidal conditions we anticipate will affect us. It would be prudent to brief the crew on the plan for the day and to ensure that someone other than the skipper understands the route.

A great day afloat for me means everyone coming back safely having had a good time

Referring to the plan and ensuring we have noted any areas of concern or hazards along the way enables us to avoid the pitfalls of overreliance on local knowledge. In two of the recounted incidents the skipper may have felt so familiar with their operating area that they took risks with speed or route, which they would not have taken in less familiar surroundings.

Whenever I am decision-making afloat I always ask myself, *What will happen next?* It encourages me to consider the conditions as they are now at my specific location. This helps me to check against my plan and either confirm my predictions were right or make a new decision based on the most accurate information taken from what I am experiencing at the time. It is a process I find useful when anchoring for a bit of swimming.

The water around the UK is almost always cold enough to get into trouble in swimwear if we do not ease ourselves in gradually. Once in the water, it is good practice to spend a few minutes holding on to either the side of the boat or a line trailing from it to get our breathing under control before we put our body under more stress by expecting to be able to swim. Immediately submerging our head by jumping in exacerbates the threat of cold water shock and the risk of sudden cold incapacitation.

Given the speed at which our body cools in the water, we should not expect to be able to stay in for long as we can tire quickly and then swimming normally becomes difficult. Swimming within our depth and in a spot with no current is much more enjoyable than realising there is more current than we first thought and struggling to swim back once we have had enough.

A great day afloat for me means everyone coming back safely having had a good time. Undertaking training, carrying a means to raise the alarm, having a plan, travelling at safe speed, anticipating risk, and leaving alcohol for afterwards will all help to keep ourselves and other water users safe.

RACHEL ANDREWS | Chief Instructor, Power, the Royal Yachting Association

Rachel Andrews has worked in the watersports industry as an instructor and professional skipper for over 20 years, during which time she has operated a range of boats from small tiller-steered dories to larger offshore RIBs and motor cruisers. Her passion is introducing people to watersports as well as encouraging skills development.

A qualified teacher, Rachel has delivered training to a varied spectrum of boaters, from those buying their first boat to coastguard agencies seeking further training for their boat crews. She trains instructor trainers within the RYA Power training schemes. Rachel currently works as the RYA Chief Instructor, Power, overseeing the training schemes for powerboating, personal watercraft and inland waterways, a post she has held since early 2011.

Rachel is a keen outdoor swimmer who enjoys all aspects of being in the water, from dipping and floating to training for a marathon swim each year. She encourages other swimmers to wear a brightly-coloured swim cap and use a high visibility tow float and to swim parallel to the coastline.

21

Things did not go swimmingly

commercial rigid inflatable boat | risk assessment

A family party of six had booked a two-hour excursion in a rigid inflatable boat (RIB) and, as it was a warm, sunny day, they had been informed that they would have the opportunity to swim if they wished.

After an enjoyable boat ride of around 45 minutes in breezy, choppy conditions, the skipper suggested moving closer inshore to a place he considered suitable for swimming. After anchoring, the skipper cajoled three of the party, who were initially reluctant, into the water.

As soon as they jumped in, the swimmers started to drift away from the boat (Figure 1) and had to swim hard to hold position. The skipper shouted to them to stay close but, despite swimming hard, they were gradually set away from the boat. After 3 minutes, the skipper tied two fenders to a length of rope and threw it over the side. Two of the swimmers managed to grab hold of this, but the third swimmer, now tiring, could not reach the line even at full length. With assistance, one of the two swimmers holding the fender managed to get back on board the RIB while the other left the fender to try to help her friend.

Having recovered the first swimmer onto the RIB, the skipper started the engine, raised the anchor and proceeded to the two others, who were by now extremely tired. Both had been swept around a sandy spit into more exposed, choppier waters and were out of sight.

One of the swimmers was quickly recovered, but the second had become very tired and had little remaining strength. Wearing a lifejacket, another of the RIB's occupants therefore went into the water and helped the last swimmer out of the water before themself being recovered back on board.

The three swimmers were very cold and tired and the boat proceeded back to base. One of the swimmers became distraught during the return trip and the skipper offered to call an ambulance, which was declined by the group. However, the family did accept the offer of hot showers to warm up on their return. Fortunately, they suffered no lasting physical effects, but all were traumatised by the experience.

Figure: Swimmers drifting away from the anchored boat

The Lessons

1. **Risk →** Swimming from a boat can be enjoyable but, even in fine conditions, needs careful planning. For a commercial operation this must include a detailed risk assessment and appropriate risk control procedures. In this case, the operator did not have detailed procedures in place for such an activity and, in light of this incident, has instructed its skippers not to permit swimming from their boats.

   For safe swimming from an anchored boat, the chosen location should not be susceptible to significant tidal stream or wind drift; water body movement should be minimal and well within the capability of the swimmers. A buoy should be streamed to provide a safety point for swimmers to aim for if they are struggling and swimmers should be instructed to stay well within range of the boat. Consideration should be given to providing swimmers, particularly weaker ones, with appropriate buoyancy aids to use while in the water.

   Safety procedures should be briefed to all swimmers and the skipper should be instantly ready to take action if any of the swimmers get into difficulty. The risk assessment should also consider the provision of an adequate means of recovering swimmers, who may be cold and tired, such as a boarding ladder.

2. **Cold water shock →** The sea can still be cold on a warm day, causing a large temperature differential that comes as a shock, even to experienced swimmers. Cold water shock can affect breathing and adjusting to the water can take several seconds, during which swimmers may get into difficulty. It is better to lower yourself gradually into the water to acclimatise, which may be less fun than diving in but it can reduce the risks.

3. **Action →** Fortunately, the swimmers were all safely recovered. However, had they been in the water longer, the consequences could have been much worse. The skipper took no action to raise the alarm, and this would have delayed the arrival of assistance, should it have been required. It is better to alert the coastguard early as this will ensure an appropriate response. All three swimmers ingested seawater and were probably mildly hypothermic. At the very least, insisting on a professional examination by a paramedic to confirm their health would have been advisable.

Beware the bight

yacht | accident to person

Two experienced sailors were enjoying a day's sailing on their 30ft pleasure yacht. The yacht's owner had just finished using the electric windlass to haul the anchor. He leaned on the top of the windlass (see figure) to steady himself as he stood up, but accidently trod on its deck-mounted operating switch. As the windlass started to turn, his finger was drawn into the gap between the windlass wheel (the gypsy) and the chain; the finger was badly damaged and bled freely.

The owner raised the alarm over the very high frequency (VHF) radio and started to motor the yacht back to its home marina. Despite suffering considerable pain, he managed to both remain conscious and navigate his boat. The RNLI all-weather lifeboat (ALB) was launched and quickly made its way to the yacht. The injured owner was transferred to the ALB and taken ashore to a waiting ambulance. Once he was admitted to hospital, doctors decided that his finger was too badly damaged and amputated it. The owner's sailing companion stayed on board the yacht and returned it to the marina without further incident.

Figure: Sailing yacht windlass

A few days later, the owner installed warning signs to the top of the windlass and fitted an isolation switch in the yacht's cockpit so that power to the windlass could be turned off remotely after anchoring.

The Lessons

1. **Aware** → Never underestimate the dangers of anchoring and line handling; even relatively small equipment can present real dangers.
2. **Qualified** → Although the yachtsman experienced a nasty accident, his training and experience enabled him to arrange rescue and be quickly brought to safety. Most of us will never experience accidents at sea but, if it does happen, it is training, equipment and practice that will prevent more serious consequences.
3. **Revise** → The addition of warning signs and modifications to the windlass power supply will help prevent further accidents.

Survival of the safest

sea angling | flooding

It seemed like a great day for some rod and line fishing, so a married couple caught the early morning tide and left the harbour on board their boat. There was slight drizzle, but the sea was calm. The couple had owned the 50-year-old 11 metre wooden boat for about four months and this was their first trip out to sea. The boat carried safety equipment including a liferaft, EPIRB, distress flares and a portable VHF radio set. The couple had both completed basic sea survival training

After about half an hour of steaming, they realised that the boat was taking on water and within a short time the bow was starting to go under the water. The electric bilge pump was initially able to cope, but the water ingress was heavy and soon both the engine room and the bilge pump were under water (Figure 1).

The skipper steered the boat towards shallow waters but, when they had reached about 0.5 nautical miles from land, it began to sink quickly and the couple deployed their liferaft. The skipper's partner was wearing a lifejacket and the skipper a flotation suit. The couple boarded the liferaft, taking the handheld VHF with them, just as the boat disappeared below the sea. The skipper transmitted a "Mayday" call using the VHF, but received no response, possibly due to their location below cliffs. They then used their mobile phone to make a 999 call to the coastguard and spoke to the watch officer, who requested that the nearest lifeboat launch to assist the stricken sailors. The couple wrapped themselves in the liferaft's thermal protective aids to keep warm and waited for help to arrive, maintaining contact with the coastguard.

When the couple spotted the lifeboat in the distance, they set off flares to attract the attention of its crew and indicate their position. About 90 minutes after abandoning their boat the couple were recovered onto the lifeboat and subsequently transferred by ambulance to hospital, where they were treated and later discharged.

The Lessons

1. **Equipment** → Most privately-owned boats do not benefit from safety inspections and surveys by the authorities. It is therefore extremely important that you look after your own safety and carry properly serviced lifesaving appliances that are in good working order. In this case, the couple were well prepared with a liferaft and means of calling for help. However, there are many examples of unprepared leisure boaters proceeding to sea with a very different outcome.
2. **Aware** → Being aware of the hazards you face at sea and the measures to mitigate the risks can save your life. Sea survival courses can teach you valuable lessons that may one day help save your own life, or that of others, as well as making life easier for those coming to your aid.
3. **Maintain** → Old wooden boats need lots of care and attention. Planking deterioration or failed fastenings can suddenly compromise the hull's watertight integrity, leading to catastrophic flooding. Regular and thorough out of water assessment of the planking condition, fastening and caulking is essential to verify the boat's condition and the effectiveness of equipment such as the bilge pumps, particularly if the boat is moored on a drying berth, the first time you put to sea in your 'new' boat or after a long lay up.

24

A bit of a blinder

commercial rigid inflatable boat | collision

In calm, clear, sunny conditions, a commercially operated RIB with a skipper and seven passengers on board was conducting a high-speed adventure ride close to the shore in an estuary, with moored boats nearby.

During the trip, one of the passengers near the bow stood up, pointed ahead, and tried to get the skipper's attention. Unable to see from the driving position at the rear of the RIB, but appreciating that there may be trouble ahead, the skipper put the outboard engines into neutral. However, this action came too late to prevent a collision with a small, unmanned tender tied to a nearby mooring (Figure 1). The tender was badly damaged (Figure 2) but there were no injuries to anyone on board the RIB.

Figure 1: CCTV image just prior to the collision

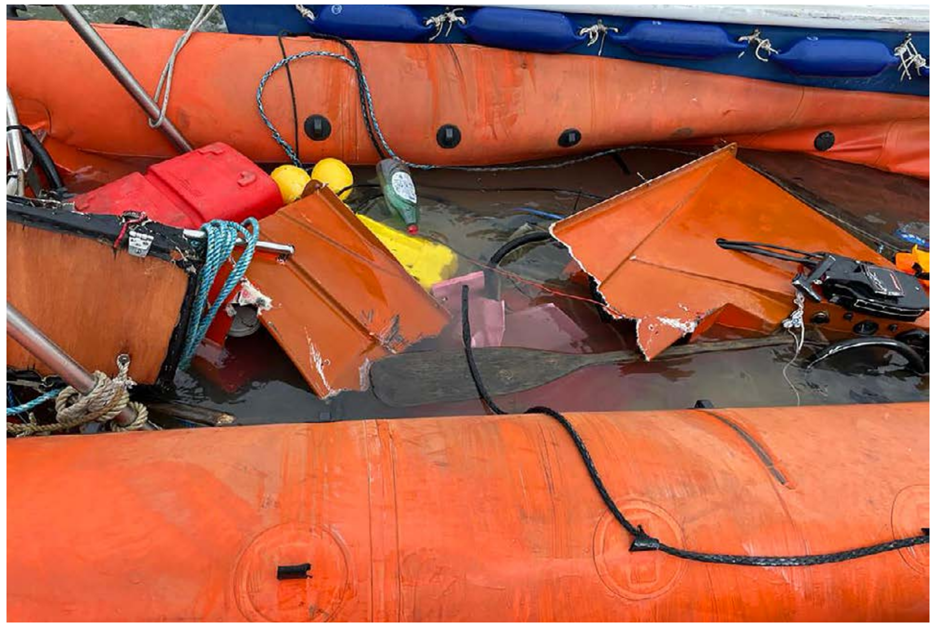


Figure 2: Damage to the unmanned moored tender

For illustrative purposes only: not to scale

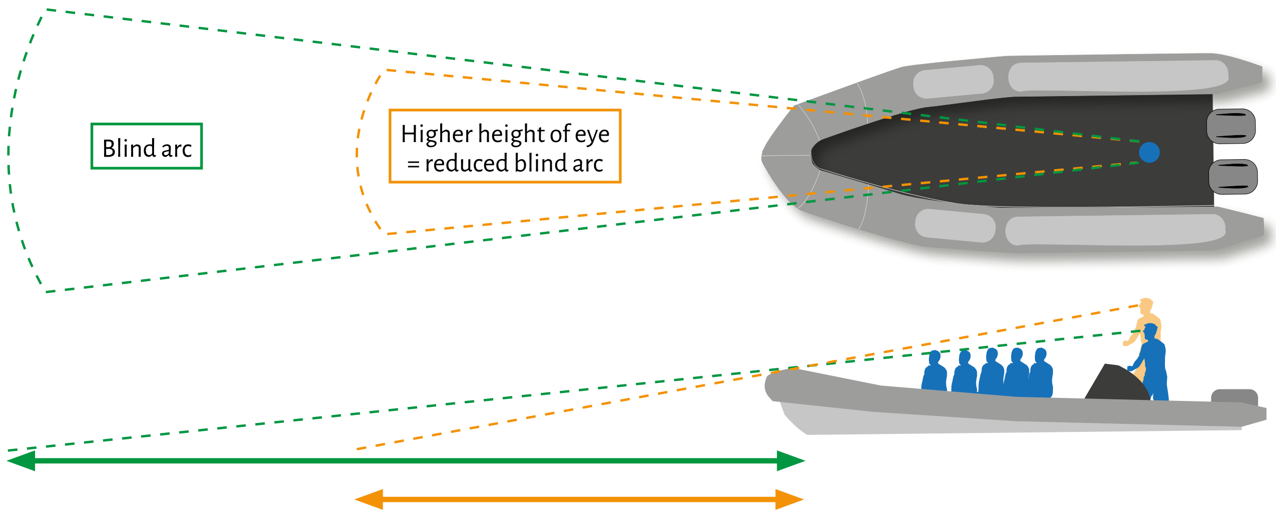


Figure 3: The effect on blind arc by raising the driver's height of eye

The Lessons

1. **Margin of safety →** Every vessel must proceed at a safe speed so that proper and effective action can be taken to avoid collision. This collision was a close call and it was extremely fortunate that nobody was in the tender. In a busy estuary with moored boats, dinghies, canoes, or even swimmers, a safe speed will almost certainly mean a non-planing slow speed whereby immediate action can avoid an accident.

2. **Observe →** Integral to operating at a safe speed is keeping an effective lookout. RIBs, particularly those with the driving pedestal aft, may have a blind arc immediately ahead whose size will depend on several factors, including the boat's bow up attitude and the skipper's height of eye. Figure 3 illustrates the potential impact of raising and lowering the driver's height of eye, which RIB skippers should understand and manage. The company modified the RIB after this accident, raising the deck at the driver's position to improve visibility immediately ahead.

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Cocktail capsize

rigid inflatable boat | capsize

It was a bright, sunny day and six friends were enjoying an outing on a RIB in a large, sheltered estuary in light winds. The group were dressed in swimwear but no one was wearing a PFD. The RIB's driver was familiar with the estuary, having undertaken rescue duties at a local sailing club.

The group began their trip by heading to a waterside restaurant for lunch and cocktails; the convivial atmosphere continued into the afternoon with more alcoholic drinks being consumed from a cool box on board. After an unsuccessful attempt at finding seals, the group decided to head out of the estuary to the open sea to use an inflatable ringo towed behind the RIB.

A strong ebb tide was running and there were shallows outside the estuary's entrance that were notorious for creating dangerous, rough seas. The RIB's driver headed out towards the choppy surf. After jumping over a few waves, the driver decided to try and get out of the surf and turned sharply to starboard. As the RIB turned it was hit by a wave and capsized, flinging the group into the water. The engine stopped because the driver was correctly attached to the boat's kill cord.

The skipper of a nearby yacht witnessed the capsize and called "Mayday" on VHF channel 16. The yacht stood by until rescue craft arrived but could not make an approach because of the shallow water and hazardous seas around the RIB. All members of the RIB group were recovered by a local rescue craft and taken ashore by the lifeboat for medical observation (see figure). Fortunately, although shocked, none of them were injured. The upturned RIB was towed back into the harbour and recovered.

Figure: The capsized RIB and rescue vessels on scene

The Lessons

1. **Risk →** Do not mix alcohol with powerboating. Alcohol dulls reaction times and can lead to impaired judgment. In this case, the RIB driver had consumed at least four units of alcohol during the afternoon. Although he did not feel impaired as a result, the alcohol may have contributed to the decision to head into the surf conditions and the subsequent loss of control and capsize. This case ended with all participants safe and well and with the vessel recovered; however, the MAIB has investigated many cases where the outcome has been less fortunate. The lure of a refreshing drink on a sunny afternoon can be compelling, but alcohol and boating do not mix well and the non-alcoholic option is a safer choice.

2. **Plan →** Local knowledge is of little value without planning. The group had no fixed plan for their afternoon and the trip outside the estuary into the hazardous surf was undertaken on a whim. The RIB driver was unaware of the state of the tide and depth of the water and was therefore unprepared for the dangerous conditions, despite which he headed straight for the surf. These actions demonstrated a lack of risk appreciation.

3. **Procedure →** Wearing a kill cord can save your life and those of your passengers. Many accidents, including those resulting in serious injury and death, have been caused by kill cords not being worn. Thankfully, the RIB's driver was wearing the kill cord correctly and the engine stopped when he was thrown from the helm during the capsize.

4. **Equipment →** PFDs are crucial safety equipment. This group were fortunate that the capsize was witnessed and rescuers arrived quickly. Even at the height of summer, the sea temperature around the UK coastline is cool enough that tiredness and cold can rapidly set in. Without a means of keeping your head above the water, the survival time between entering it and being rescued becomes critical.

INVESTIGATIONS

started during the period 1 March 2022 to 31 August 2022

Date	Occurrence
6 March 2022	Capsize and foundering of ***Njord***, a UK registered stern trawler, in the North Sea, resulting in 1 fatality.
1 June 2022	Foundering of ***Piedras***, a UK registered fishing vessel off Mizen Head, Ireland.
8 June 2022	Capsize of an unnamed motor vessel on Roadford Lake, Devon, England, resulting in 2 fatalities.
24 June 2022	Collision between the fishing trawler ***Kirkella*** and the moored tug ***Shovette*** in Hull, resulting in the sinking of the tug.
27 June 2022	Triple fatality on board the Isle of Man registered bulk carrier ***Berge Mawson*** at Bunyu anchorage, Indonesia.
5 July 2022	Grounding of the UK registered ro-ro passenger ferry ***Alfred*** on the island of Swona, Scotland.
16 August 2022	Serious injury to a deck officer on board the UK registered tug supply vessel ***Kommander Orca*** while alongside in Portland, England.

Correct up to 31 August 2022. Go to www.gov.uk/maib for the very latest MAIB news

REPORTS

issued in 2022

2022

Galwad-Y-Mor
Subsea explosion resulting in crew injuries and damage to a fishing vessel off Cromer, Norfolk, England on 15 December 2020.
1/2022 Published 20 January 2022

Diamond D
Flooding, capsize and foundering of a prawn trawler 20 nautical miles north-east of Tynemouth, England on 16 August 2020.
2/2022 Published 9 February 2022

***Rib Tickler*/personal watercraft**
Collision between a RIB and a personal watercraft on the Menai Strait, Wales on 8 August 2020, with 1 loss of life.
3/2022 Published 17 February 2022

Wight Sky
Two catastrophic failures, one resulting in a fire, on board a ro-ro passenger ferry in the entrance to Lymington River, and at Lymington Pier, England on 26 August 2018.
4/2022 Published 28 April 2022

Diamond Emblem 1
Person overboard from a motor cruiser on the River Bure, Great Yarmouth, England on 19 August 2020, with loss of 1 life.
5/2022 Published 5 May 2022

Saint Peter
Person overboard from a single-handed creel fishing vessel near Dunbar, Scotland on 2 May 2021, with 1 loss of life.
6/2022 Published 16 June 2022

Joanna C
Capsize and sinking of a scallop dredger south of Newhaven, England on 21 November 2020, with loss of 2 lives.
7/2022 Published 22 June 2022

Nicola Faith
Capsize and sinking of a whelk potter in Colwyn Bay, Wales on 27 January 2021, with loss of 3 lives.
8/2022 Published 23 June 2022

Teal Bay
Mooring deck accident on a general cargo vessel at the Kavkaz South anchorage, Russia on 30 August 2021, with loss of 1 life.
9/2022 Published 14 July 2022

Preliminary Assessments

Maud / Gardenia Seaways
Close quarters near miss between cruise vessel and a ro-ro ferry near the North Shipwash Buoy, England on 4 November 2021.
PA1/2022 Published 25 February 2022

Chem Alya
Grounding of a chemical tanker in the Needles Channel, England on 25 October 2021.
PA2/2022 Published 18 March 2022

Francisca
Loss of 34 containers overboard from a cargo vessel near Duncansby Head, Scotland on 31 October 2020.
PA3/2022 Published 13 April 2022

Thorco Angela
Fumigant poisoning on a general cargo vessel in Liverpool, England on 11 October 2021.
PA4/2022 Published 18 May 2022

Correct up to 31 August 2022. Go to www.gov.uk/maib for the very latest MAIB news

SAFETY BULLETINS

issued during the period 1 March 2022 to 31 August 2022

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY BULLETIN

SB1/2022

MARCH 2022

Extracts from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 Regulation 5:
"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

Regulation 16(1):
"The Chief Inspector may at any time make recommendations as to how future accidents may be prevented."

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NOTE
This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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Blockage of fixed CO_2 fire extinguishing system

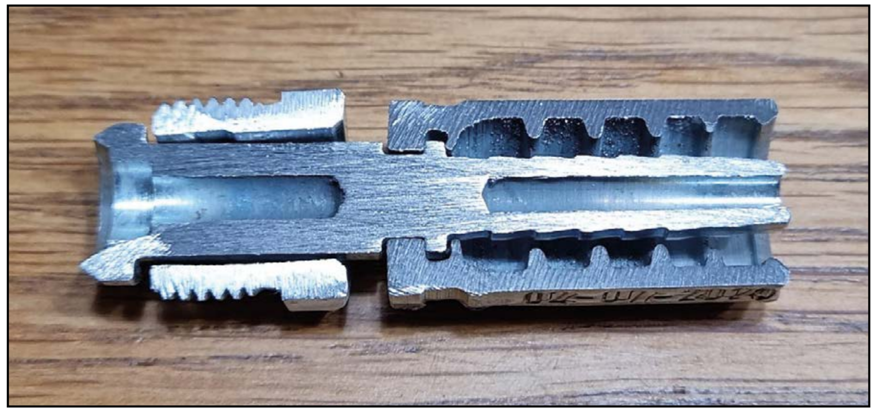
pilot hoses identified following a fire

on board the roll-on/roll-off cargo ship

Finnmaster

in Hull, England

on 19 September 2021



Section through blocked CO_2 pilot hose coupling showing incomplete bore through the stem

MAIB SAFETY BULLETIN 1/2022

This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 provides for the Chief Inspector of Marine Accidents to make recommendations or to issue safety lessons at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch is carrying out an investigation into the fire on board the roll-on/roll-off cargo ship *Finnmaster* in Hull, England, on 19 September 2021.

The MAIB will publish a full report on completion of the investigation.

Captain Andrew Moll
Chief Inspector of Marine Accidents

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BACKGROUND

On 19 September 2021, a fire broke out in the auxiliary engine room on board the Finland registered roll-on/roll-off cargo ship *Finnmaster* while departing Hull, England. The crew contained the fire and discharged the machinery space's carbon dioxide (CO_2) fire extinguishing system. Only half of the assigned CO_2 cylinders discharged, and the crew had to re-enter the space wearing breathing apparatus to fully extinguish the fire.

Finnmaster was operated by Finnlines Oyj (Finnlines) and was equipped with a fixed high-pressure CO_2 fire extinguishing system that provided protection for the ship's machinery spaces, encompassing the main engine room and the auxiliary engine room, and the two cargo holds. The system was designed to be activated remotely via a network of pilot lines and gas activated cylinder valves **(Figure 1)**.

INITIAL FINDINGS

The initial MAIB investigation identified that one of the auxiliary engine room's CO_2 system pilot hoses was completely blocked. Subsequent examination and testing of *Finnmaster*'s fixed fire extinguishing systems identified two other hoses on the cargo hold pilot line system that were blocked. Radiographic images taken of the blocked hoses **(Figures 2** and **3)** showed that the pilot hose couplings had not been fully bored through during the manufacturing process. The testing process also identified several coupling leaks in the pilot lines.

In March 2021, the pilot hoses had been replaced during a routine service conducted on board *Finnmaster* by the marine fire service section of Viking Life-Saving Equipment Oy Finland (Viking). The tests carried out by Viking during the service did not identify any faults with the system. Following the accident, Viking tested the high-pressure CO_2 fire extinguishing systems on board the remainder of the Finnlines fleet and identified two similar pilot hoses that were blocked on one of the operator's ships.

All the affected hose assemblies had been supplied to Viking by Geeve Hydraulics B.V. (Geeve), based in the Netherlands. The hose assemblies had been produced under the terms of the classification society type approval held by Geeve. Although the type approval required each completed hose assembly to be pressure tested, there was no specific test that gas could pass freely through the hose assemblies.

The hose used in the assemblies was provided in accordance with the type approval held by Geeve. However, Geeve had purchased the couplings from HSR Hydraulics B.V. in the Netherlands, who had sourced the couplings from a different manufacturer.

SAFETY ISSUES

Safety issues identified during the initial stages of the investigation included:

- The quality assurance processes of the pilot hose assembly supplier did not identify that the hose couplings had not been fully bored through.
- Viking's onboard installation testing processes did not identify both that some of the hose assemblies were blocked and that there were leaks in the CO_2 system pilot lines.

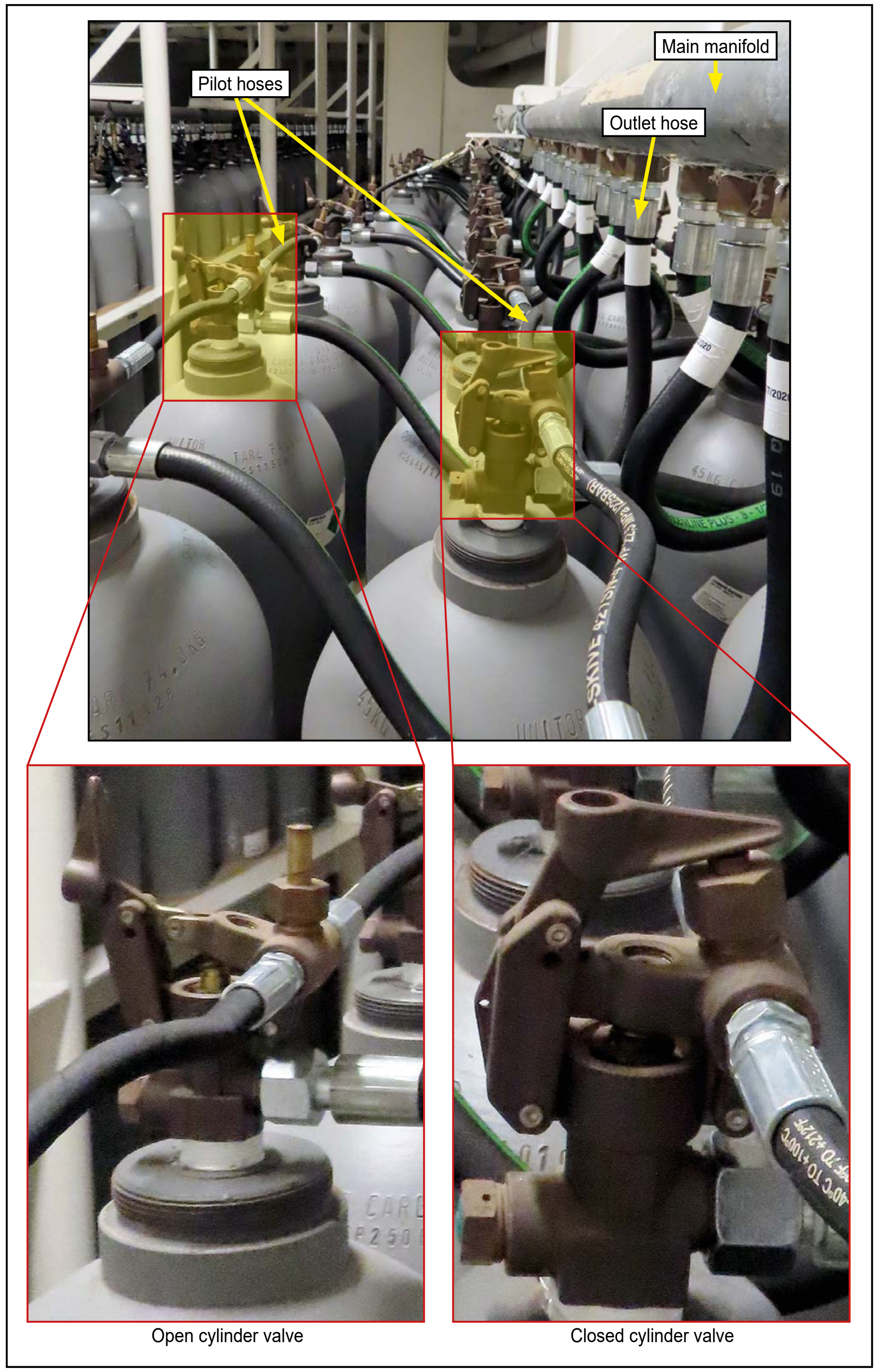


Figure 1: Part of the *Finnmaster* CO_2 fire extinguishing system post-accident

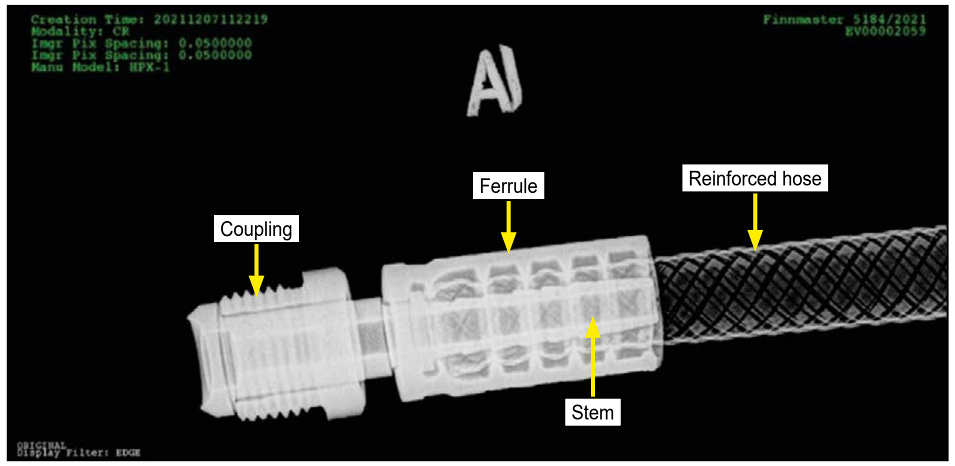


Figure 2: CO_2 pilot hose coupling, showing clear passage through the stem

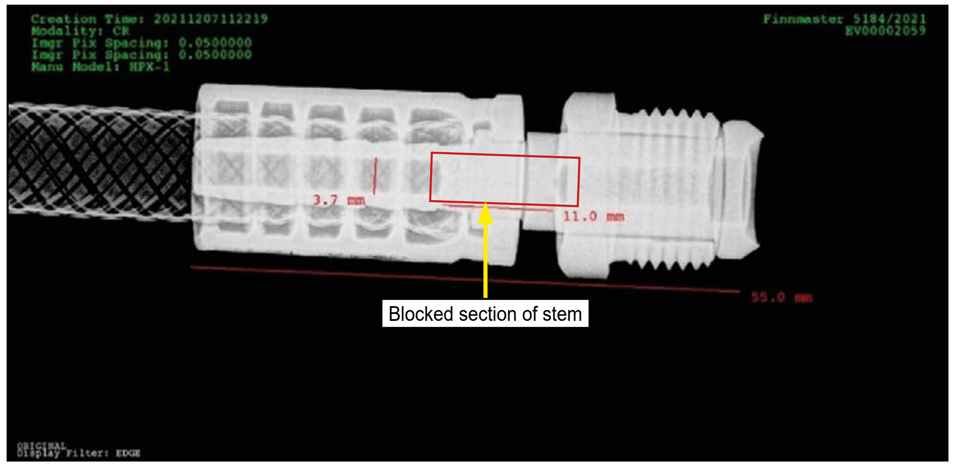


Figure 3: CO_2 pilot hose coupling, showing incomplete bore through the stem

ACTION TAKEN BY THE MAIB

The **MAIB** has:

Contacted the companies identified as having been supplied with the affected hose assemblies to make them aware that these assemblies may be blocked and to recommend that they take immediate remedial action in accordance with recommendation S2022/107M, as detailed below.

ACTIONS TAKEN BY OTHER ORGANISATIONS

Geeve Hydraulics B.V. has:

- Discontinued the supply of the affected hose assemblies.
- Amended its testing procedure to incorporate a pneumatic flow test of the complete hose assemblies to verify that they are not blocked.

Finnlines Oyj has:

Issued instructions to its fleet to ensure that crews on board its vessels are fully acquainted with the procedures for the manual activation of CO_2 fire extinguishing systems in the event of the pilot actuation system failing.

Viking Life-Saving Equipment Oy Finland has:

Amended its procedures for the servicing of high-pressure CO_2 systems to incorporate a positive test for blockages of the pilot system pipework. It has also issued a health and safety awareness notice highlighting the issues identified.

RECOMMENDATIONS

Geeve Hydraulics B.V. is recommended to:

S2022/105 Provide a copy of this safety bulletin to all customers supplied with hose assemblies fitted with couplings supplied by HSR Hydraulics B.V. that do not meet the required type approval, and draw attention to the safety issues raised and the need for immediate action to identify and rectify any defects found in safety critical systems.

S2022/106 Amend its purchasing and quality control procedures to ensure that hose assembly components are procured in accordance with the relevant type approval requirements.

All companies identified as having been supplied with the affected hose assemblies by Geeve Hydraulics B.V., with couplings sourced from HSR Hydraulics B.V., are recommended to:

S2022/107M Take immediate remedial action to identify and rectify any blocked pilot hose assemblies and pilot system leaks on potentially affected CO_2 fire extinguishing systems.

REQUEST FOR INFORMATION

To assist this investigation, it is requested that service providers, owners and operators pass details of any blocked pilot system hose assemblies that they find to the MAIB.

Email maib@dft.gov.uk with the title 'CO_2 Pilot System Hose Assembly Issues' and include the name of the vessel, the date and place of installation of the affected hose assemblies, and details of the defects identified.

This information is for internal use only and will be treated in strict confidence.

Issued March 2022

Safety recommendations shall in no case create a presumption of blame or liability

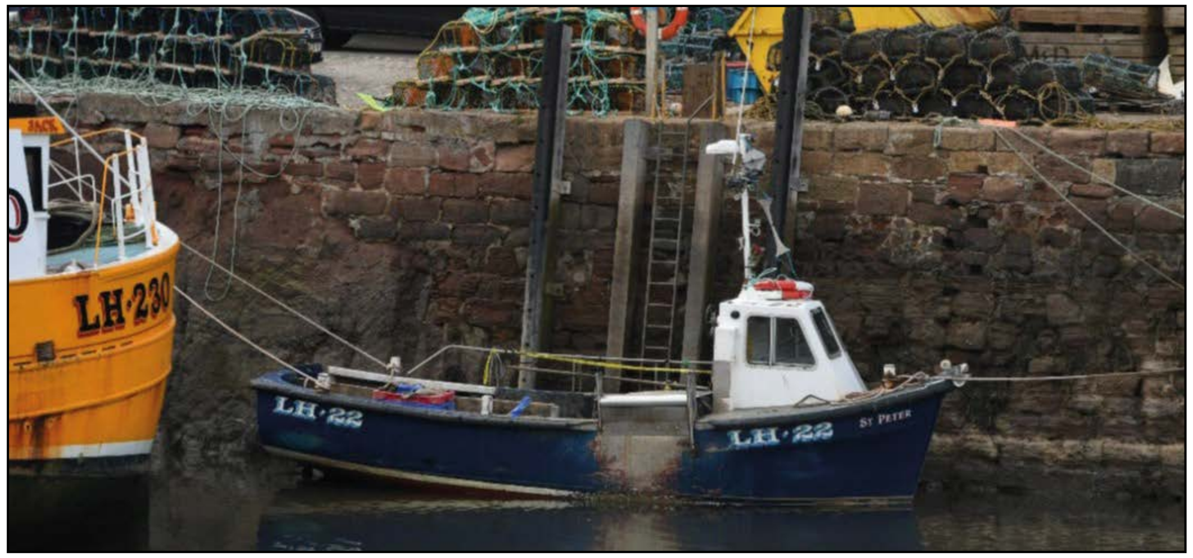
SAFETY FLYERS

issued during the period 1 March 2022 to 31 August 2022

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY FLYER TO THE FISHING INDUSTRY

Fatal man overboard from the single-handed creel fishing vessel, *Saint Peter* (LH22), 1.2 nautical miles, east of Torness Point, Scotland, on 2 May 2021



Saint Peter

Narrative

On 2 May 2021, the owner/skipper (the skipper) of the single-handed creel fishing vessel *Saint Peter* died from the effects of cold water immersion while working creels 1.2 nautical miles east of Torness Point, Scotland. There were no eyewitnesses to the accident, but evidence indicated that the skipper became caught in a bight of back rope while shooting a string of creels and was pulled overboard.

The skipper was wearing an automatic inflation personal flotation device (PFD), which kept his airways clear, but once in the water he had no means to reboard his vessel or send a distress signal. A concerned relative and a friend of the skipper searched for *Saint Peter* from another fishing vessel; they found *Saint Peter* stopped and unmanned with a string of creels streaming from its shooting door. They contacted the coastguard and a search and rescue operation was initiated. A coastguard helicopter located and recovered *Saint Peter*'s unresponsive skipper later that afternoon.

The MAIB investigation found that:

- The skipper was probably attempting to untangle a knotted section of creels and back rope when he became caught in a bight and was pulled overboard.
- There was an ever-present risk of entanglement while shooting as there was no physical barrier to separate the skipper from the fishing gear.
- It would have been difficult for the skipper to reboard *Saint Peter* as no means of self-recovery, such as a boarding ladder, had been rigged.
- The carrying of a personal locator beacon (PLB) or an automatic identification system (AIS) man overboard (MOB) alerting beacon might have enabled the skipper to send a distress signal from the water.
- The skipper's PFD automatically inflated and kept him afloat for about 9 hours with his face clear of the water.

Safety lessons

1. Single-handed fishing is deemed to be a high-risk occupation, and fishermen are advised to follow industry guidelines to minimise the chance of being pulled or falling overboard; a barrier between the fisherman and the fishing gear during every phase of the fishing process and/or the wearing of a safety line is recommended.
2. It is important to consider what methods of reboarding the vessel from the water are available. Emergency measures, such as rigging a man overboard ladder or having an overside tyre arrangement in place, can improve the chances of survival.
3. Fishermen should wear a PFD at all times as this will help to maintain buoyancy after a fall overboard. It is vital that a distress message is sent if it is not possible to reboard quickly. Wearing a PLB or AIS MOB that can send a distress signal will improve the chances of survival and rescue.
4. Adherence to well-prepared risk assessments and realistic safety procedures offers single-handed skippers protection from the hazards they encounter at sea.

This flyer and the MAIB's investigation report are posted on our website: www.gov.uk/maib

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Publication date: June 2022

Extract from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 – Regulation 5:

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MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY FLYER TO THE FISHING INDUSTRY

Capsize and sinking of the scallop dredger, *Joanna C* (BM 265), with the loss of two lives, on 21 November 2020

Narrative

Image courtesy of Fishing News

Joanna C

Early in the morning on 21 November 2020, in darkness and windy conditions, the crew of the scallop dredger, *Joanna C*, was recovering the dredges, full of catch, back on board. As the gear emerged out of the water, the skipper realised that the starboard dredge bar was snagged on a potting line. At the same time, *Joanna C* started to heel to starboard and then rapidly capsized.

The mate, who was on deck, was thrown into the sea, but the skipper and deckhand were initially trapped inside the floating, upturned hull. After about 40 minutes, the skipper managed to escape as *Joanna C* sank, but the deckhand remained trapped inside. Once at the surface, the skipper found the mate, who was very cold and tangled in a rope.

Only the skipper survived this accident. The deckhand was unable to escape from the upturned boat and his body was recovered from the wreck by divers the following day; the mate's body washed up ashore sometime later.

Safety lessons

1. Modifications will alter a vessel's stability characteristics. *Joanna C* capsized because it had insufficient reserve of stability to counter the effect of the heel created by the starboard dredge becoming snagged. Post-accident analysis identified that multiple modifications over many years had eroded *Joanna C*'s stability condition from one of being very satisfactory, to that of failing the required criteria by a wide margin. When considering any modifications to a fishing vessel, it is vital that the potential effect on stability is considered.

2. Professional advice from a naval architect and informing the Maritime and Coastguard Agency (MCA) of your modification plans are key processes to ensure that fishing boats are operating safely with a sufficient margin of static stability to counter the dynamic effects of wind, waves or, as on this occasion, heeling as a result of snagging. It is potentially unsafe to continue fishing operations if there is any uncertainty over a vessel's stability characteristic, such as awaiting the results of a post-modification inclining experiment.

3. Automatic lifesaving appliances need to be arranged so that they float free and aid survivors. After *Joanna C* sank, the float free liferaft was released from its cradle by the Hydrostatic Release Unit (HRU) but did not subsequently inflate **(see figure)**. This meant that it did not come to the surface to provide refuge for the skipper and mate, adversely affecting their chances of survival.

4. The liferaft did not inflate because it was a model intended for use in the leisure industry and was not manufactured to meet any design standard. This meant that there was no guarantee that the liferaft would have sufficient buoyancy to overcome the pull required on the painter to initiate the inflation mechanism.

5. At the time of this accident, the carriage of a liferaft that did not meet any industry standard was acceptable under the small fishing vessel regulations. However, the safety lesson from this accident is that it is vital to check that, where 'float free' arrangements are in place, the buoyancy of the liferaft will be sufficient to overcome the inflation mechanism, when released from the cradle.

Figure: *Joanna C*'s uninflated liferaft floating mid-water, seen during a dive survey of the wreck

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Publication date: June 2022

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY FLYER TO THE FISHING INDUSTRY

Foundering of the whelk potter *Nicola Faith* (BS58), resulting in the loss of all three crew, in Colwyn Bay, North Wales, on 27 January 2021

Nicola Faith

Narrative

On the 27 January 2021, the 9.81m whelk potter *Nicola Faith* was fishing about 2-3 miles offshore and relocating whelk pots. Loaded with a day's catch and four strings of pots (approximately 240 in total) to be relocated, the vessel capsized and foundered with the loss of all three of its crew.

The vessel was not equipped with an Emergency Position Indicating Radio Beacon (EPIRB) nor were the crew wearing personal locator beacons (PLBs). The absence of this mandatory safety equipment meant the alarm was not raised for some 16 hours after the foundering, and the subsequent search and rescue operation found no trace of *Nicola Faith* or its crew.

The MAIB investigation found that the boat had undergone extensive modifications in the 2 years before the accident, none of which had been approved by the Maritime and Coastguard Agency (MCA). The modifications had eroded its stability safety margin and this meant that, when combined with an estimated 2090kg of catch plus a weighed 2521kg of fishing gear on board at the time of the accident, the vessel had a very small amount of positive stability. The working deck was cluttered and partially covered by a canopy made from steel tubes and plywood sheets. The vessel capsized quickly; this is likely to have trapped the crew on board and they were probably taken down with the vessel when it sank.

Safety lessons

1. When *Nicola Faith* was built it had adequate stability for its designed purpose. The unauthorised modifications carried out to the vessel severely compromised its stability. Thought must be given to how planned modifications will affect a vessel's stability and may involve the services of a naval architect to accurately calculate what effect the additions or changes to the vessel will have on the stability safety margin. Additionally, permission must be sought from the MCA before any significant modifications are undertaken.

2. Skippers should have a good understanding of their vessel's underlying stability and how this can change during fishing operations. Simple roll tests, heel tests, or a Wolfson assessment will provide skippers with the basic information. Loading a vessel heavily with catch, and then adding retrieved fishing gear, can quickly render a vessel unstable.

3. EPIRBs and/or PLBs are mandatory safety equipment for very good reason. Their purpose, to transmit the location of an incident and thereby focus any search and rescue effort, undoubtedly saves lives. A personal flotation device (PFD) can keep a casualty afloat sufficiently long enough for the rescue services, or their own vessel, to find them.

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