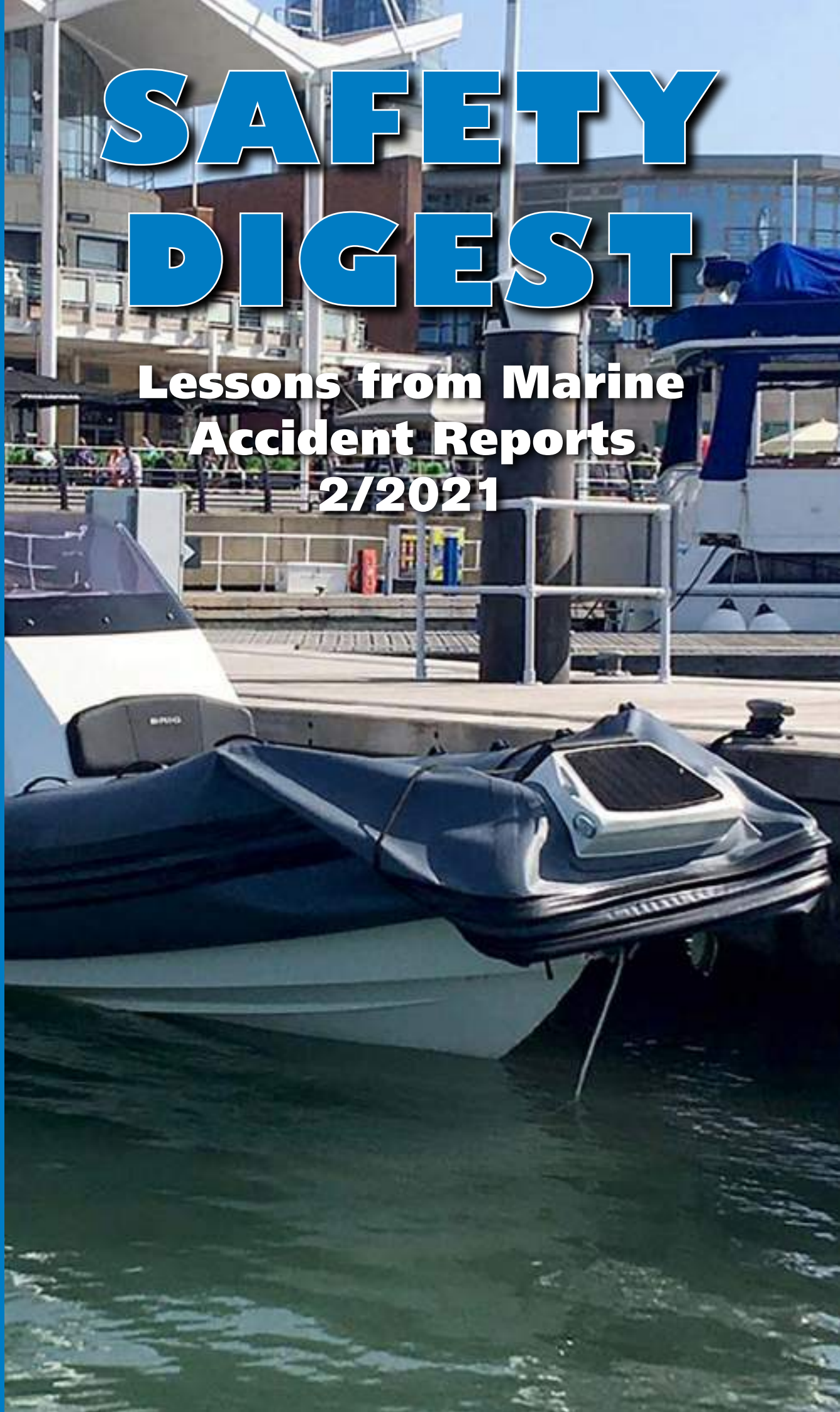
MARINE ACCIDENT INVESTIGATION BRANCH

MAIB

SAFETY DIGEST

Lessons from Marine Accident Reports 2/2021



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No 2/2021

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

Extract from The Merchant Shipping (Accident Reporting and Investigation) Regulations 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."

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 which has been determined up to the time of issue.

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

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

The editor, Clare Hughes, welcomes any comments or suggestions regarding this issue.

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INDEX

Glossary of Terms and Abbreviations

3/E	third engineer
4/E	fourth engineer
AIS	automatic identification system
ALB	all-weather lifeboat
CCTV	closed-circuit television
C/E	chief engineer
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea (1972)
COSWP	Code of Safe Working Practices for Merchant Seafarers
CPR	cardiopulmonary resuscitation
ECDIS	Electronic Chart Display and Information Systems
kts	knots
m	metre
"Mayday"	the international distress signal
NAABSA	Not Always Afloat But Safely Aground
OOW	officer of the watch
"Pan-Pan"	the international urgency signal
PFD	personal flotation device
RIB	rigid inflatable boat
RNLI	Royal National Lifeboat Institution
ro-ro	roll-on, roll-off
RSW	refrigerated salt water
SMS	safety management system
TSS	traffic separation scheme
VHF	very high frequency
VTS	Vessel Traffic Service

Introduction

Welcome to the MAIB's second Safety Digest of 2021. I would like to start by thanking Matthew Easton, John Clark and Iain Elliott for writing the introductions to the Merchant, Fishing and Recreational Craft sections of this digest. As always, their perspectives on maritime safety make compelling reading. There are many aspects to safe operations and, purely by coincidence, our three introduction writers have focused on different parts of the safety effort.

John Clark's accident in 2013 was the trigger for him to focus on assessing risks and taking steps to reduce them. I will not steal his thunder by repeating his words here, but, if you read nothing else in this edition, do please read John's introduction to the Fishing section. John's 'safety conversion' occurred as a result of an accident, but the whole point of the Safety Digest is to provide readers with the opportunity to learn from others' misfortunes.

I am a great fan of safety acronyms – they are not everyone's cup of tea, but they work for me. I will certainly be adding Matthew Easton's PLAN/PLAY to my toolkit. Sometimes a simple acronym is all that is needed to prompt a review before commencing a task; on other occasions a checklist is required; and, if the task is new or unusual, a dynamic risk assessment and, possibly, a permit to work might be needed before commencing it. Whatever level of preparation is required they have one thing in common, which is a pause to take stock before starting work.

The third element of safety in this edition is Iain Elliott's simple message, 'get trained'. His introduction precedes the Recreational Craft section of the digest, but astute readers will notice that many of the articles contain stories of how good training and preparation helped prevent a drama becoming a crisis.

In this introduction I would like to add one safety message of my own, which is the importance of a 'banksman' or other form of safety supervisor when the machine operator does not have direct sight of the work area. There have been very many accidents in recent months, some reported in this digest, that have occurred because there was no intermediary to tell the crane or winch operator that the work area was clear before operations commenced, or to call "Stop!" if someone entered a dangerous zone. It is all too easy to dispense with the banksman and 'manage' without, but the results can be catastrophic. When there is a manpower shortage it is tempting to manage without a supervisor, controller or banksman, but, because their vigilance is what keeps people safe, they are probably the most important members of the team.

Andrew Moll
Chief Inspector of Marine Accidents

October 2021

Part 1 – Merchant Vessels

The sea is an unforgiving environment and as such there will always be incidents and accidents. Despite the passage of time, there are no new accidents just repetition of old ones. Continuing fatalities in an enclosed space is a tragic example.

Many reports are written after an incident, accident, or near miss (learning opportunity, learning event: whatever term is used in your company) but these are of little value if companies don't have a robust system of disseminating a copy of a report to all their personnel to discuss the lessons to be learnt. In lieu of the facts, the sequence of the event will be altered, forgotten, or added to, thus denying the learning opportunity for all the actual facts of the case. Learning from incidents is adding to what Captain 'Sully' Sullenberger calls his 'bank of experience' and depositing knowledge into our long-term memory will aid us when encountering similar circumstances in the future.

Because of the repeating of accidents there is a common theme that runs through many of them; in terms of this digest, planning and communication failures constitute the majority of the reports. Indeed, through my experience as a senior Liverpool pilot and facilitator of pilot resource management training, these are ever present themes and topics for discussion.

One of the biggest hurdles to planning is time; how much time do we have before carrying out the task? It is often more than we think we have. Arriving into or departing a port is frequently a busy period for seafarers, leading to a limit on crew's time and, as proven in some of this edition's case studies, resulting in an accident.

For experienced seafarers, or indeed any experienced professionals, planning of a task is undertaken very quickly. If this is broken down into sections, we get the following:

Plan – time must be allowed for the planning phase, when all relevant information is gathered and assessed.

Limits – when developing plans, limits must be agreed at this early stage. For pilots, these could be wind, tidal height, under keel clearance or the number of tugs.

Awareness – the building of your situational awareness starts at the planning stage and is constantly updated. It is a movie, a dynamic, constantly changing situation.

No – if, during this phase, conditions are not favourable, then the operation must be cancelled or postponed. This is the concept of the stop work procedures many companies have implemented. However, if all aspects are within parameters it is a 'yes' and then we **PLAY** (Plan, Limits, Awareness and Yes).

Although many accidents occur during routine everyday operations, many companies have taken to having a briefing or toolbox talk prior to commencing the task; everyone involved then knows what is expected of them and, as such, it is hoped incidences are reduced.

Having observed shipboard operations for many years and read numerous accident reports, including the ones contained within this digest, another common theme that emerges is too many lone operations that end in an accident. 'Safety First' is a commonly used phrase among shipping companies; is it time to review the 'safe' or 'minimum' manning certificates issued to every ship? With even more scrutiny on seafarers' hours of work records this intensifies the pressure on crew to complete tasks in a timely manner.

With repetition of accidents comes a repetition in the language used in reports. 'Loss of situational awareness' and 'challenge' are two much used terms.

In many incidences the person in the middle (often an OOW, master or pilot) did indeed lose their situational awareness or, as described by a Principal Inspector of the MAIB at a pilot's conference, their situational awareness differed from reality. As a reader of a report that includes the phrase 'loss of situational awareness' it doesn't help in our understanding of the hows and whys of the loss. In order for us, the reader, to 'learn' from the incident it is essential that the human element, the human factor, is explored and explained in greater detail and not just under a stock phrase.

'The OOW should have challenged the master' or 'the master should have challenged the pilot' are again often used phrases in reports. Initially, what is wrong with simply 'questioning' someone? In my article (Seaways March 2019) I expand on this topic, suffice to say that the message marker used by VTS is 'question' not 'challenge'! A question will resolve most situations but if not then we can indeed issue a challenge. This is true for all walks of life not just at sea.

A question or challenge to the master or pilot is because there is doubt as to someone's intentions or there has been deviation from the plan. This brings us back to how essential planning and briefings are prior to any work being carried out.

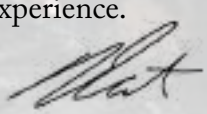
The person on the receiving end of the question often takes it personally; this is nothing more than a perceived slight to their ego and they react accordingly. Remember it is the plan, or a deviation from the plan in question, not the individual.

When the pilot boards, this briefing is generally referred to as the master pilot exchange but is that term fit for purpose? If taken literally, then there are only two people who 'attend'. A 'bridge team briefing' or 'pilotage briefing' would seem more appropriate, the whole team have a shared mental model. This often does bring us back to the number of crew on board and hence how many are available to attend the briefing, as many will be resting.

With regards to communications, we have always been taught never to assume. Accidents while mooring, again including two in this digest, could have been avoided with positive reporting, not an assumption that the ship was ready to leave the berth.

Being open and honest after an incident will depend very much on the culture within an organisation. The culture comes from the very top of a company so, for the benefit of all within the company and the wider industry, it needs to be one where there are thorough investigations and lessons learnt promulgated for all.

This digest, I'm sure, will continue to inform all mariners on board ship whatever their role – adding to their own bank of experience.



CAPTAIN MATTHEW EASTON CMMAR AFNI
LIVERPOOL PILOT

Matthew is a senior, Class 1, Liverpool Pilot, a recipient of the Merchant Navy Medal for Meritorious Service and a Chartered Master Mariner. In addition to piloting duties he has, for 12 years, developed and delivered bridge resource management courses for pilots and has presented on this subject at pilot conferences. Courses have been held in the UK, Europe and the Middle East. A member of the International Standards of Pilotage Organisation (ISPO) Board (ISPO is a safety and quality management system by pilots for pilots). A Younger Brethren of Trinity House and chair of their Northern Regional Grants Committee. A Liveryman of the Honourable Company of Master Mariners. Chairman of the Merchant Navy Honours Consultative Committee (formerly the Merchant Navy Medal Committee), liaising with the Department for Transport in all aspects of the Merchant Navy Medal for Meritorious Service.

Hot stuff

Narrative

A large ro-ro passenger ferry was on passage when, in the early hours of the morning, the engine room fire detection system activated. The fourth engineer (4/E) was in the engine control room and observed that the fire detection system was indicating a fire in the zone containing the shaft alternator and thermal oil pumps. However, the CCTV view of the area was obscured due to smoke building up in the engine room.

The 4/E raised the alarm with the bridge and the chief engineer (C/E) then stopped the running thermal oil pumps and requested a speed reduction from the bridge. At the same time, the third engineer (3/E) grabbed a portable fire extinguisher, rapidly proceeded to the scene and extinguished the fire that had broken out on one of the thermal oil pumps (see figure). Leaking oil from the pump then reignited and, again, the 3/E extinguished the fire with a portable extinguisher.

The C/E then took charge of the situation: further crew arrived on scene armed with portable extinguishers, and full fire-fighting teams were prepared in the event of the situation escalating. Once the situation was under control, a standby thermal oil pump was started, and additional generators were brought online to protect the vessel's power supply. The engine room ventilation was then configured for smoke clearance.

The cause of the fire was later found to be a failed pump bearing that had overheated, damaging the adjacent mechanical seal. The failure of the seal resulted in oil spraying out and igniting on the bearing's hot surfaces.

Figure: The scene of the fire, showing the fire damage around the coupling and leaked oil

The Lessons

1. Drills, training, exercises and toolbox talks all pay a big dividend when real emergencies occur. This was a well-organised ship's team that had conducted regular training and fire drills. As a result, the on-watch team took rapid and effective action to bring the situation under control, preventing escalation. Follow-up actions were also effective in restoring the availability of full propulsion capability for the bridge. In summary, the alarm was raised in a timely manner and effective actions were taken.

2. Smoke inhalation can be an immediate source of injury from a fire, so it was fortunate that the seat of the fire could be attacked at the same level, affording some protection for the 3/E from the smoke. It is wise to give consideration to using breathing apparatus to give protection from the smoke if the seat of the fire is not easily accessible.

3. The 3/E had to gain access to the fire using an emergency escape ladder, as the engine room's main access ladder had been removed to facilitate ongoing repairs unrelated to the fire. Potential consequences of even temporary blocking of main access routes should be carefully considered. The engine room is a high-risk compartment, especially when operating at sea. It was fortunate that the scene of the fire could be accessed by using the emergency escape. If access to the scene had been hampered, the potential delay could have allowed the fire to escalate requiring more drastic measures to be taken to control the fire.

Effective damage assessments

Narrative

During an outbound river passage under pilotage, a general cargo vessel grounded and suffered damage to its hull plating (see figure). Despite both the bridge team and pilot feeling the contact, no report of the grounding was made to the local Vessel Traffic Service (VTS) and the vessel proceeded to sea as usual after disembarking the pilot. Hull damage was not confirmed until the day after the incident and the full extent not realised until the vessel had completed its sea passage and entered a dry dock.

The master was on the bridge at the time of the grounding, but the pilot had control of the vessel and was steering using the tiller. It was dark and the vessel was proceeding at full ahead into a strong flood tide, making around 6 knots. During a turn to port, the pilot misjudged the effect the flood tide would have on the vessel and, even with full port helm applied, the vessel was set across the river and the bow made contact with the bank in an area of known underwater obstructions.

The vessel took a sheer towards the opposite bank of the river, which the pilot corrected with the tiller and, shortly afterwards, the master ordered an inspection of the vessel for damage and a position was recorded in the deck logbook. No further mention of the incident was made between the pilot and master and the vessel continued its passage to sea without the local VTS being informed.

Even though the initial damage assessment did not identify a breach of the hull, the next day an area of deformation in a cargo hold led to the discovery of a significant breach. The vessel was sent to a repair yard immediately on its next arrival and dry docked.

The Lessons

1. **The pilot took control of the navigation of a vessel in difficult tidal conditions. However, it is unclear how much knowledge of the vessel's manoeuvring characteristics he had. It is crucial that master and pilot take the time necessary to communicate the essential information needed for the pilot to take the con if this is decided more appropriate than the master maintaining the con. All vessels have manoeuvring posters on the bridge, which should be referenced in the creation of the pilot card.**
2. **Even if there has only been a suspicion of a vessel grounding, it is imperative that the local VTS is informed and a comprehensive check of the vessel made before proceeding to sea. Neither were done in this case, which not only contravened the local regulations and obligations of both the pilot and the vessel's master but also placed the safety of all the crew and vessel in jeopardy.**

Figure: Damage to the general cargo vessel's hull plating

Be careful with lines under tension

Narrative

The crew of a small river tug were preparing to depart their berth with a barge in tow. Two deckhands from the tug's crew of four went onto the barge to make fast the tow lines and release its mooring lines from the wharf. The tug's master and engineer began passing twin tow lines across, which the deckhands secured to the bow of the barge (Figure 1). One of the deckhands returned to the tug and assisted the engineer in securing the tow ropes to the tug's H post[1] (Figure 2), while the master returned to the bridge and started easing the tug away from the wharf and taking up the weight on the tow ropes.

While still securing one of the tow lines, the engineer's rubber glove became caught in the line and, as weight came onto the rope, drew the engineer's hand into a tightening bight, trapping him. The deckhand quickly raised the alarm, calling for the master to come astern to take the weight off the line. The master quickly engaged astern propulsion and overran one of the tows, which was drawn into the port propeller, fouling it (Figure 3).

With the engines stopped, the deckhand cut the tow rope to release the engineer's hand, and first aid was administered. The engineer's hand was clearly badly injured, so a "Pan-Pan" call was made, and the tug and barge were secured to a mooring buoy to await help. An RNLI vessel attended and took the engineer ashore to an ambulance, which then took him to hospital. Two of the engineer's fingers were badly damaged, with open wounds and lacerations. Although he made a good recovery, he was off work for several weeks. The tug was towed back to base and allowed to dry out alongside to enable the rope to be cleared from the port propeller.

[1] Also known as a towing staple

The Lessons

1. **The tow was attached with the tug stationary, and the master thought it was safe to start coming ahead. The ropes had a degree of stretch and the lines needed re-tightening to ensure they were secure on the H post after initial loading; this can be a dangerous evolution and needs to be carefully controlled to ensure there is no danger to crew. Information flow is key here – had the master known what was being done, he could have eased off power long enough for the engineer to adjust the ropes without significant loading. Ropes should only be adjusted when it is safe to do so and this means they should not be under tension.**

2. **Although a toolbox talk was conducted before this operation, careful briefing is always necessary to ensure all are aware of the intentions. Even seemingly routine tasks can be dangerous and it is important that all involved are aware.**

3. **PPE, such as gloves, must always be suitable for the job. Here, the engineer was wearing loose-fitting gloves, which made holding the rope harder and getting caught in it easier.**

Figure 1: Tug towing the barge

Figure 2: H post, showing cut line

Figure 3: Fouled propeller

A reflecting distraction

Narrative

A small harbour ferry was getting underway; the weather conditions were bright and sunny, but there was a strong wind tending to push the ferry astern. The ferry was propelled by two omni-directional 'rudder-propeller' thrusters, one at each end of the vessel.

Once the lines had been let go, the master set the thruster controllers, intending to propel ahead, with some lateral thrust to move off from the pontoon. As the ferry lifted off from the pontoon it unexpectedly began moving astern.

The master and a deckhand who was on the bridge checked the thrusters' digital display, but it was impossible to read because of bright sunlight reflecting off the glass panel display. The deckhand shielded the sunlight with his hand and saw that the aft thruster had been set to astern.

Acting quickly, the deckhand told the master and the thruster was stopped; however, this action came too late to prevent the ferry's stern making heavy contact with a navigation mark at the end of a nearby submerged slipway. The navigation mark was demolished (Figure 1); however, there was only cosmetic damage to the ferry's paintwork.

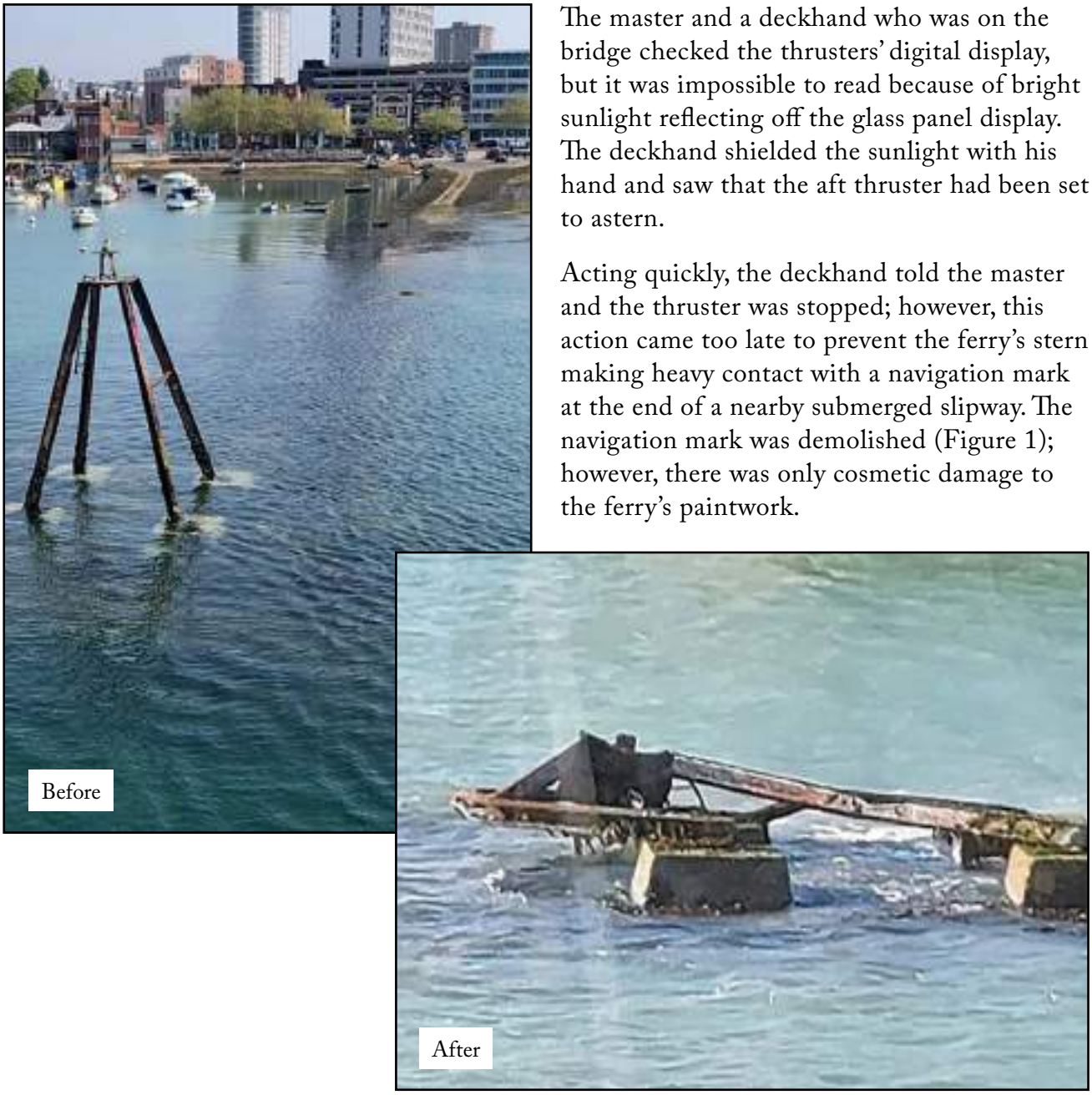


Figure 1: The navigation mark before and after the incident

The Lessons

1. Always check the effect of control system inputs. The ferry operated across a harbour, berthing and unberthing from the same two pontoons many, many times a day, and the master was extremely experienced at handling the vessel. Nevertheless, it's important to check the response to control system inputs, also taking into account the prevailing conditions. The reflecting sunlight was a distraction for the bridge team and vital seconds were lost trying to figure out what was wrong. Simple visual checks on the intended movement and immediate correction of unexpected movement, is necessary in the close confines of a harbour. After the incident, no fault could be found with the control system and the error could not be replicated, so it is probable that the master inadvertently selected astern and not ahead on the aft thruster.

2. The bridge control panels were of a modern design with flat panel digital displays (Figure 2) and the ferry had excellent all-round visibility with full height bridge windows. However, this made the control panels vulnerable to light reflection, potentially making them difficult to read. This issue had been discussed by crews and the company, although no change to the design had been incorporated.

Figure 2: The bridge control panel, showing flat glass-style displays and tall bridge windows

Just slipping into hospital

Narrative

A small cargo vessel had completed discharging and the crew needed to access the hold for cleaning. The normal route into the hold was blocked, so a crew member rigged a ladder over the main cargo hatch coaming and the chief officer went to fetch some rope to secure it. While the chief officer was away, the crew member decided to climb into the hold. However, as the crew member's weight transferred onto the ladder, its feet slipped, and the crewman and the ladder tumbled to the deck below.

When the chief officer returned a few minutes later with the rope, he saw the injured crew member in agony and raised the alarm. The injured crew member was extracted from the hold by paramedics and taken to the local hospital where he was treated for fracture injuries to both ankles.

Figure 1 is a post-accident reconstruction of the ladder arrangements, noting that the securing rope shown was not present when the accident happened.

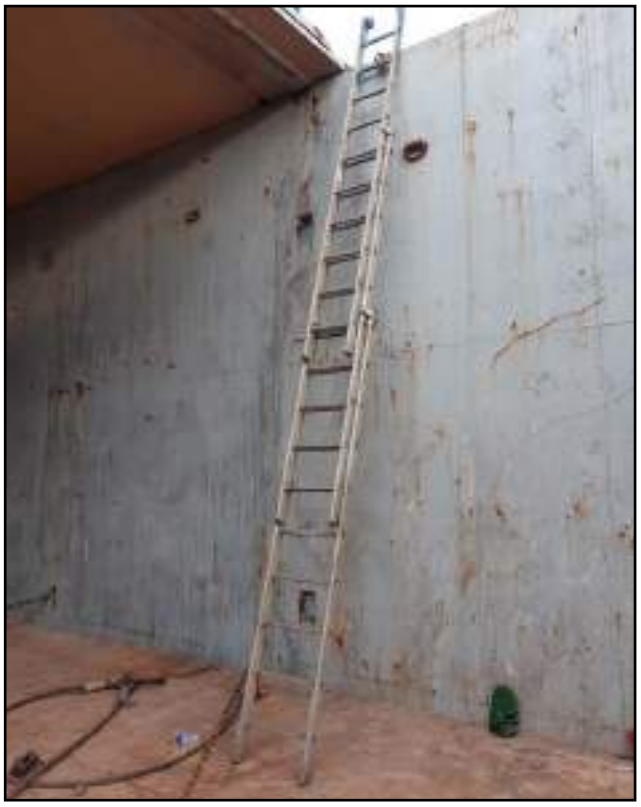


Figure 1: Post-accident images of the ladder arrangements (securing rope not present when the fall occurred)

The Lesson

1. **The use of a portable ladder must be safely supervised and controlled. Advice in the Maritime and Coastguard Agency's *Code of Safe Working Practices for Merchant Seafarers* (COSWP) stated that a portable ladder should only be used as a last resort *where no safer means of access is reasonably practicable*. In this instance, either the approved means of access into the hold should have been unblocked, or guidance for rigging a portable ladder followed. COSWP's guidance goes on to advise that, where a portable ladder is to be used, it must be properly secured, pitched at 75° from the horizontal with a clearance of at least 150mm behind the rungs and extended at least 1m (3 rungs) above the landing place (Figure 2).**

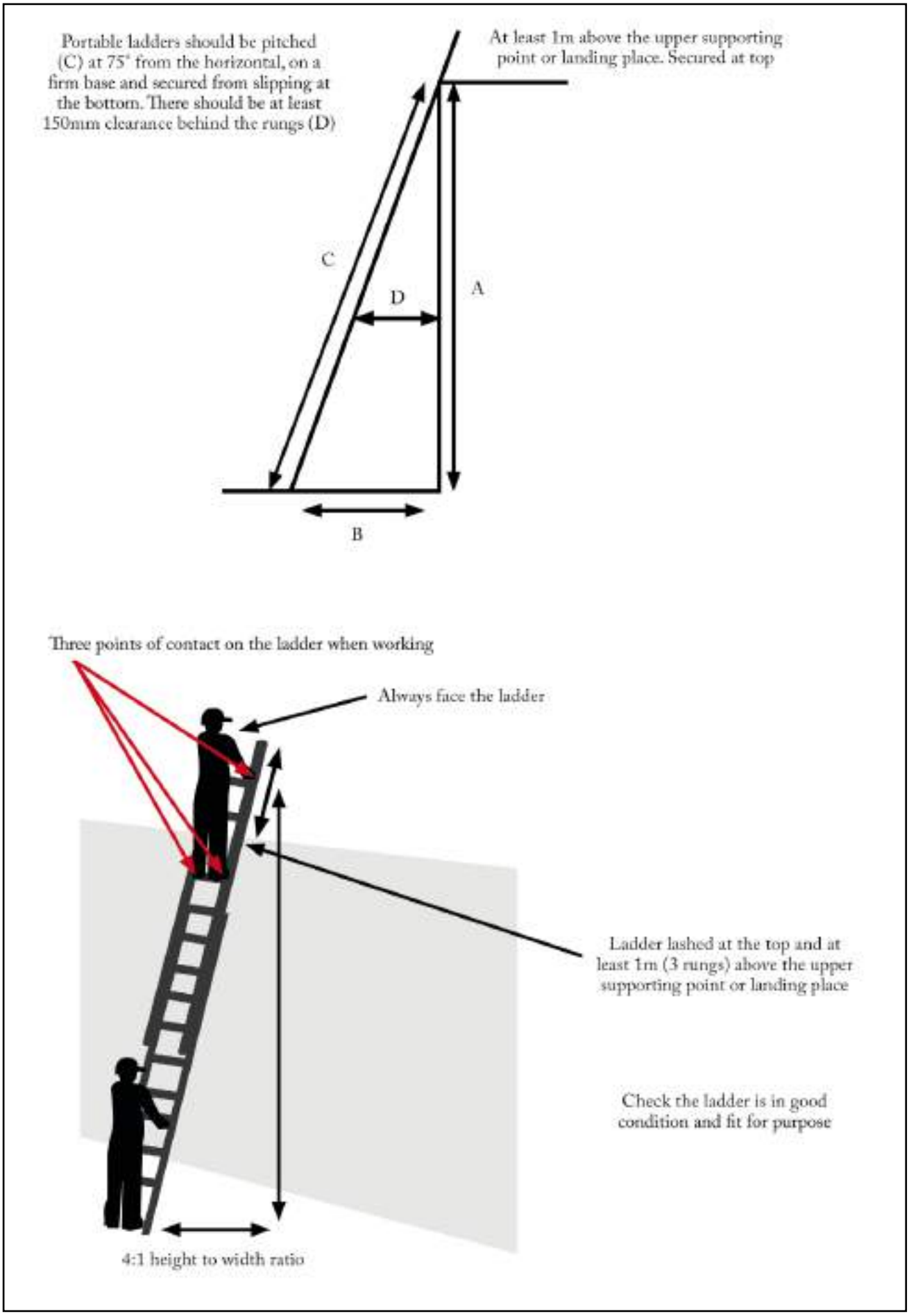


Figure 2: The correct way to rig and secure a portable ladder

The charge of the ferry brigade

Narrative

A coaster left port just after dawn and headed out along the channel towards the fairway buoy. Nearing the end of the channel, the coaster's master used VHF radio to inform the port's VTS of his intention to pass the fairway buoy then turn north to make an approach to a pier, positioned just outside the harbour's area of responsibility (Figure 1).

Twenty minutes later, two ferries (A and B) were inbound towards the fairway from the east at 22 knots and 17 knots respectively. Both ferries' OOWs reported their intentions to VTS, who acknowledged their reports and replied, stating that there was "*no reported traffic*". At about the same time, Ferry B's OOW interrogated the coaster's AIS data and spotted that its destination was the pier to the north. This alerted Ferry B's bridge team to the possibility that the coaster might turn to port.

Having passed the fairway buoy, the coaster's master made a visual assessment of the situation and believed that he could safely turn to port, following the stern of Ferry A and passing ahead of Ferry B. The master of the coaster then started to turn to port (Figure 2). As this happened, Ferry B's bridge team noted the rapidly reducing range and emerging risk of collision; the ferry's master took the con from the OOW and commenced a turn to starboard away from the coaster. Ferry B's OOW signalled a series of short flashes towards the coaster's bridge using an Aldis lamp.

The coaster's master started to appreciate the danger and called Ferry B by VHF radio asking the ferry to turn to port and pass astern of the coaster. Ferry B's OOW responded, stating that action was already being taken to avoid collision in accordance with COLREGs. The coaster eventually completed a 360° turn to port and passed under Ferry B's stern, before resuming its passage to the pier.

Lessons

1. **Fundamental to collision avoidance is an accurate appreciation of the situation and assessment of the risk of collision. On this occasion, the coaster's master had not made a satisfactory appreciation of the situation, in particular the high speed of Ferry B, and the danger associated with attempting to pass ahead. The coaster's master was not plotting Ferry B on radar and made the assessment solely on visual information. Assessing the situation also means understanding the consequences of intended actions – what will happen if I do this? No such consideration was made by the coaster's master, and the turn to port ahead of Ferry B was unsafe.**
2. **Conversely, Ferry B's bridge team had made an accurate assessment of the situation and had appreciated the potential for the coaster's turn to port. Collision avoidance decisions must be made on the actual rather than an anticipated situation; however, constantly reviewing the picture and doing the 'What if?' questions, particularly in pilotage waters, is good practice and, on this occasion, resulted in early and effective action to avoid collision as the situation deteriorated.**

3. Sound signals should always be made when there is uncertainty as to the actions of another vessel and a risk of collision is apparent. Ferry B could have immediately alerted the coaster with five short blasts as soon as it was apparent that things were going wrong.

4. The purpose of a VTS is to contribute to safety of life at sea and efficiency of navigation. Although the incident occurred outside the harbour authority's VTS area, it would have been perfectly reasonable for the VTS to alert both ferries to the coaster's intentions.

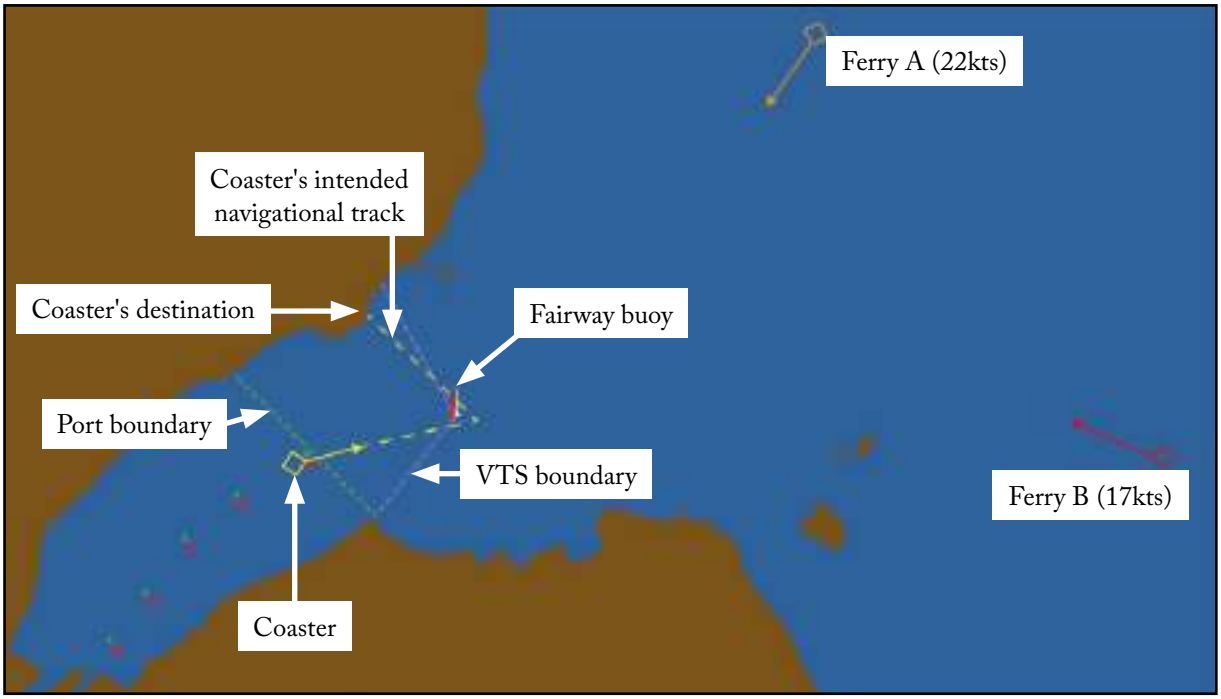


Figure 1: The coaster's master reports his intentions to VTS

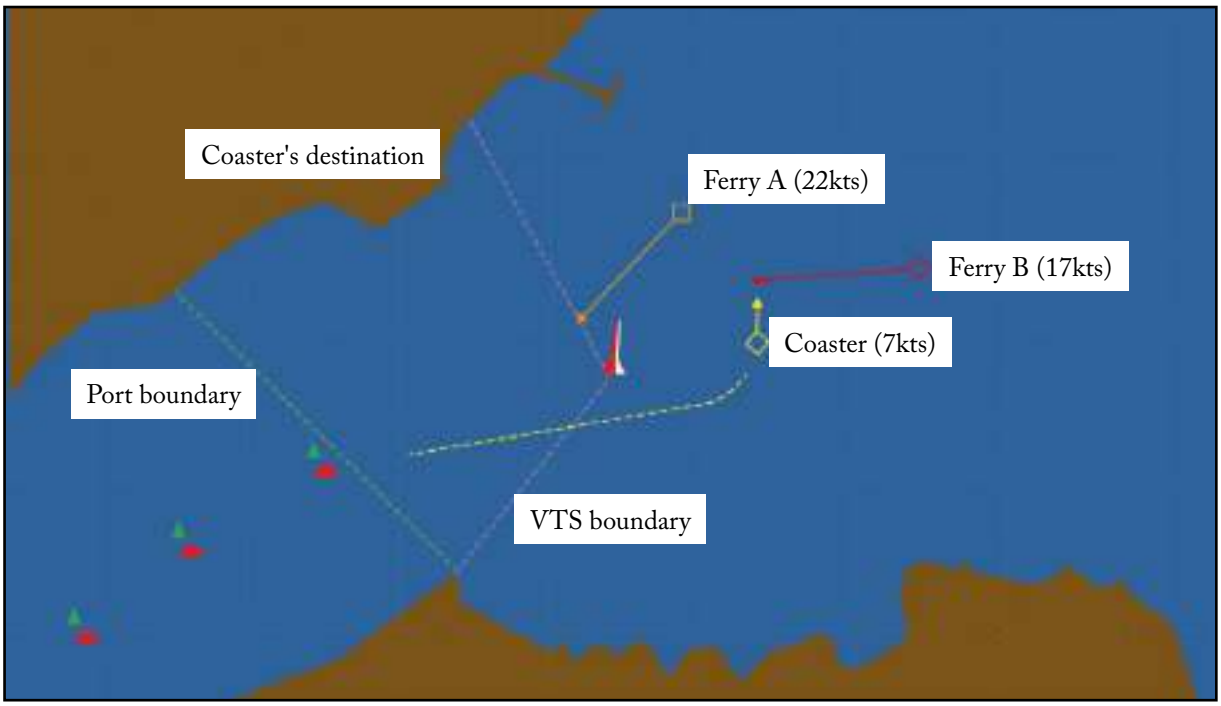


Figure 2: The coaster's master commences a turn to port, following the stern of Ferry A and attempting to pass ahead of Ferry B

Love me tender

Narrative

Two sister cruise liners were anchored near each other and some engine spare parts needed to be transferred from one vessel to the other. The parts were transported using a passenger tender, loading and discharging using the ships' pontoons. The weather was fine and clear with a gentle breeze; the sea was smooth, but a strong tidal stream was flowing.

The tender, with five crew, approached the pontoon to deliver the parts. Two crew members from the receiving cruise ship were standing by on the pontoon, ready to assist (see figure). The tender was made fast to the cleats on the pontoon with two mooring ropes, one forward and one aft.

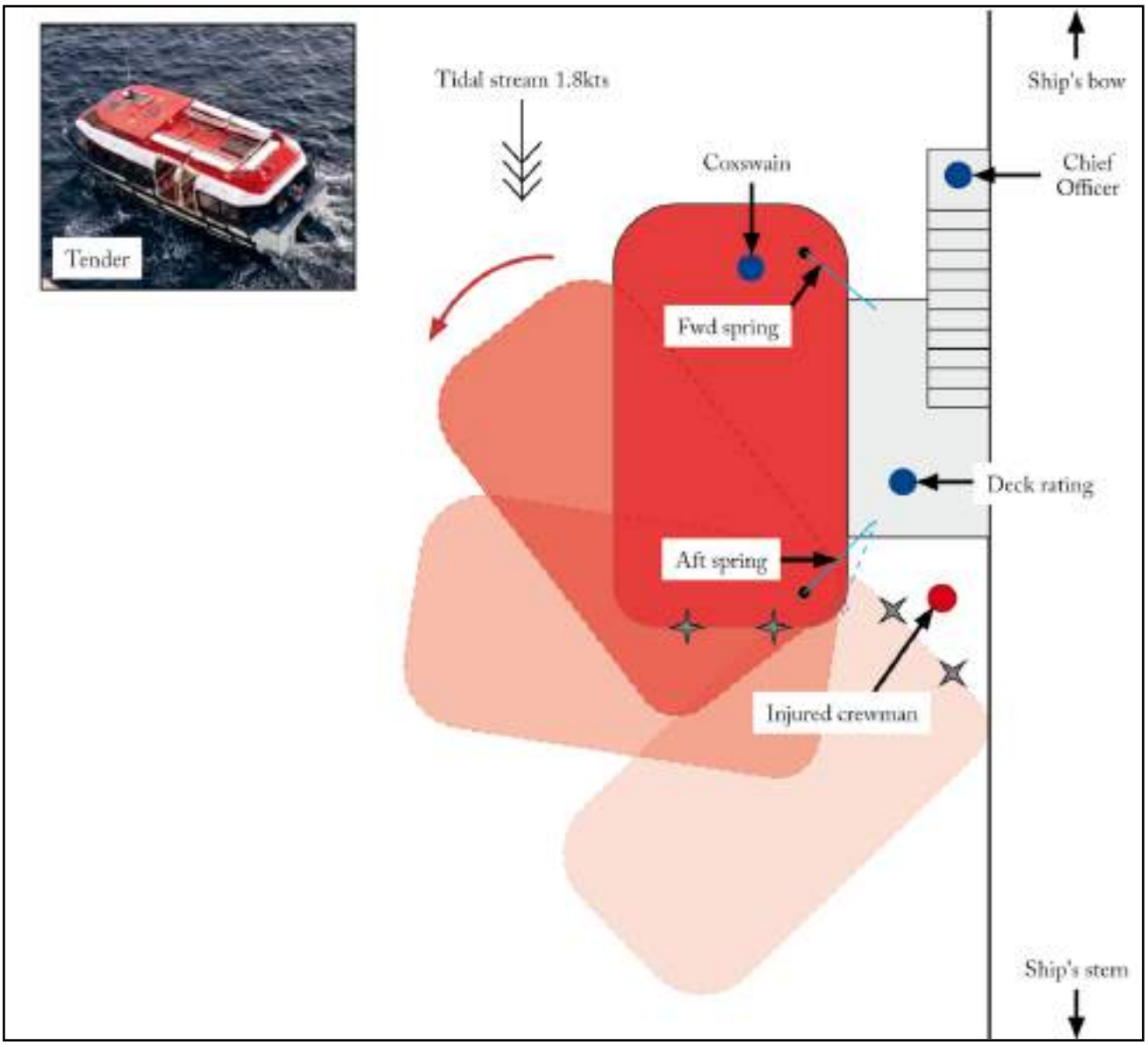


Figure: Tender's movement and contact with the ship's hull

As the parts were being transferred, the tender's forward mooring rope slipped off the cleat. The bow started to swing off the pontoon, with the stern held on by the aft line. As the bow swung away, the coxswain tried to control the situation using the engines, but he was unsuccessful against the strong tidal stream. He then instructed a crewman on the aft deck of the tender to let go of the aft mooring line, hoping to drive away from the pontoon. The attempt to let go the aft line was unsuccessful and the tender's port quarter made heavy contact with the ship's hull (see figure). The impact caused the crewman on the aft deck to lose his balance and fall overboard.

Although the crewman's lifejacket inflated as he fell into the water, the strong tide dragged his legs into the tender's propellers and he suffered lacerations and a broken leg. Despite plenty of crew to assist, it took several attempts to recover the crewman back on board. He was then transferred to the ship's medical centre for first aid and later transferred to hospital by a coastguard helicopter.

The Lessons

1. **Tender operations are hazardous and require careful planning and a comprehensive brief so everyone knows the plan and their role. Planning for a transfer of this nature should, as a minimum, cover the operation, environmental conditions, role of each crewman and emergency procedures. In this case, the tidal stream was a significant factor and, when the bow line slipped off the cleat, a very hazardous situation emerged. Given the tidal stream, the plan could have included using a small amount of ahead propulsion when alongside to ease the tension on the lines.**
2. **Crew must be familiar with tender emergency procedures, including what actions to take when someone falls overboard and how to recover them from the water. Stopping the tender's engines may have avoided injuries to the crewman's legs. Tender propellers are fitted with guards, but these are primarily intended to protect the propellers. Drills and training ensure tender crews know how to recover someone from the water when it happens for real.**

Check the passage plan...

Narrative

A 21-metre workboat was re-tasked overnight, moving from its base to conduct an urgent fish farm task some 9 hours' sailing distance away. The vessel had been delivered new earlier that year, and its crew, the skipper and a deckhand, who had both worked on the boat since its arrival into the company, were looking forward to the job.

Weather was calm and visibility was good. Sunrise was at 0753, with low water predicted at 0906. The skipper selected a pre-planned route, already stored in the vessel's electronic chart plotter, but did not check the route in detail, nor did he consult the paper charts held on board. The close proximity (45m) of a shallow isolated rock formation to the route around an island was not noticed.

Once the crew had loaded its cargo, they got underway, at a speed of about 9kts, and picked up the planned track. Now some 2 hours into his working day, the skipper handed the watch to the deckhand and went below to use the toilet and then make himself some breakfast in the galley, situated below the wheelhouse.

About 10 minutes after the skipper left the wheelhouse, at 0828, there was a loud crashing noise, and the vessel came to a complete stop. The vessel was firmly aground on the isolated rock formation. The shocked deckhand stopped the engines, and the skipper started to check the internal compartments for signs of damage or water ingress, finding nothing obvious. There were no immediate alarms, no water ingress, no sign of pollution and the propellers and rudders remained operational. The skipper tried to get the vessel off the rocks using the engines but was unsuccessful.

The skipper contacted his line manager and the crew of a smaller workboat that was operating in the vicinity. The workboat arrived a short while later and passed a tow rope. After several attempts, using engines and the smaller workboat, as the tide rose, the vessel was eased off the rocks. There were still no signs of water ingress, and the crew took the vessel to a local berth for a dive inspection. This found extensive scrape damage (Figure 1), but no signs of hull puncture. The skipper's line manager instructed him to continue with the vessel's tasking, including the long open water passage. This proceeded without further incident, although some unusual vibration was evident during astern manoeuvres.

On its return to base, it was decided to slip the vessel. Once dry, this revealed a badly damaged area of hull requiring replacement together with some framing that required repair. There was also some minor damage to the port rudder linkage.

Figure 1: Dive survey photos, showing hull scrape damage

The Lessons

1. On this occasion passage planning was cursory and relied on routes already stored in the chart plotter. The version of software in the plotter did not have the ability to check a planned route for dangers and no capability to warn the watchkeeper of hazards on the vessel's planned route. Safe navigation relied on the operator zooming in to check for dangers and annotating the plan accordingly, which did not happen for this passage.

   Under some circumstances, electronic chart plotters meeting certain requirements are permitted for navigation on some fishing vessels and workboats. In this case, the system fitted, while loaded with up-to-date charts, did not have all the required capabilities and should have been used as an aid to navigation, with paper charts being the primary source of charting information.

   This case highlights the importance of planning every passage in detail and identifying and highlighting dangerous areas. Here, the plotter held other routes, which gave the rocks much greater clearance, and were probably more appropriate, and this would have been apparent during a more detailed passage planning exercise.

2. Safe navigation requires full understanding of equipment limitations and close attention to the position of the vessel. The electronic chart plotter displayed the rock clearly, but at smaller scales; this may have been obscured by the waypoint mark or the vessel's own symbol (Figures 2, 3 and 4). A key technique in using electronic charts is to make frequent changes of range scale to get an overview of hazards ahead as well as checking for dangers closer to the vessel. This is particularly important in confined coastal waters and when using systems that do not alarm on dangers.

Figure 2: Chart plotter view with rock symbol covered by vessel shape

Figure 3: Planned route (blue), actual track (red) and rock ("+"). "PA" denotes position approximate

Figure 4: Zoomed out chart plotter view showing how the waypoint symbol (square) can obscure chart detail

3. The skipper reported the grounding to his manager and called for help from another workboat operating in the vicinity but did not inform the coastguard. As there was no immediate threat to life, and the vessel was not taking on water, this may not seem to be a major issue. However, it is good practice to inform the coastguard as soon as possible after a marine accident or incident, even if immediate assistance is not required. An early call allows the coastguard to assess the situation, consider what assets might be needed and enables a faster response should the situation worsen. In this case, a "Pan-Pan" call would have been appropriate, with updates provided to the coastguard as the incident progressed.

4. It was a good idea to arrange an immediate dive on the boat; however, while this did not reveal any major issues, the divers were not necessarily competent in assessing the seaworthiness of the vessel.

   In this case, the vessel's task was deemed urgent and the skipper and his manager, after cursory investigation and a brief dive survey, decided to allow the vessel to continue into relatively open water. If the damage had been worse, and undiscovered cracks had worsened in higher sea states, the outcome could have been catastrophic.

   After any major incident or accident where the extent of damage is not fully known, it is essential to inform the certifying authority as soon as possible, and their advice on formal surveys and repair action must be followed. As well as affecting insurance validity, failure to do this may place the vessel and crew in danger.

Wet feet and red faces

Narrative

On early morning rounds while a ferry was alongside, a motorman noticed that there was significant flooding in the engine room bilges, with the water level reaching approximately 0.5m above the tank top. This came as a surprise as the bilge alarm had not activated.

The motorman raised the alarm and soon afterwards the master ordered the emergency bilge pump to be started. A pollution watch was maintained at all times and the coastguard was informed.

As the water level began to drop, the source of the flooding was identified as a test valve on the fire-fighting sprinkler system, which had been left open. This valve was closed, and pumping continued until the vessel bilge was dry. No pollution was seen at any stage.

On investigation it was established that, the previous day, the duty engineer had been carrying out routine maintenance on the sprinkler system but had become distracted and forgotten to close the test valve. The test valve discharged under the closed deck plating into a bin sat in the bilge (Figure 1), which would then be pumped out once testing was complete.

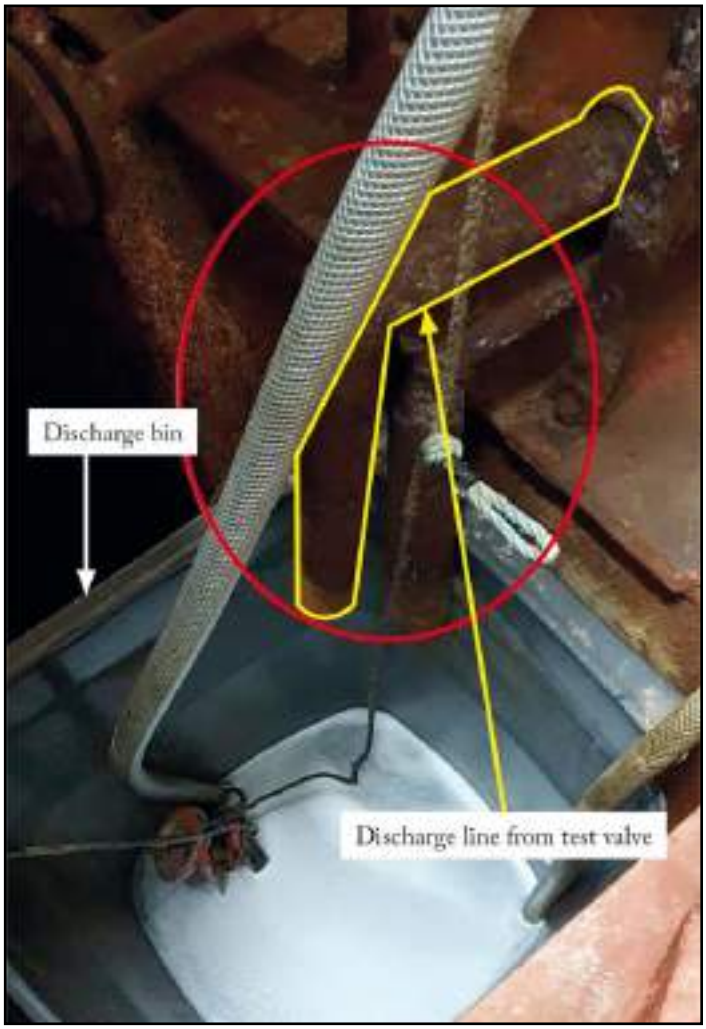


Figure 1: The discharge line from the test valve into the bin

On further inspection, the bilge alarms in the space were found to be clogged with oily deposits (Figure 2). As a result, seawater had been allowed to flow unchecked and unnoticed into the vessel for approximately 18 hours.

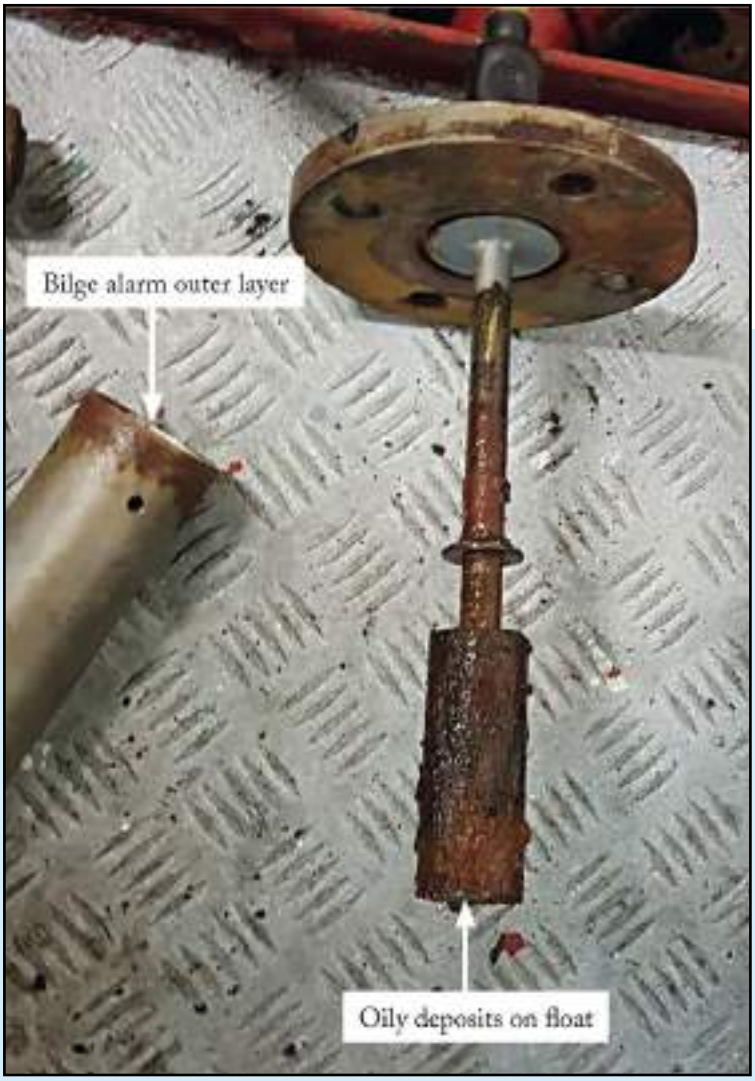


Figure 2: The disassembled bilge alarm, showing the build up of oily deposits on the float

The Lessons

1. **Just because a work around has always been in place, does not always mean it is right. The other vessels in the fleet had the corresponding test valve connected to an overboard discharge, therefore removing the hazard of unintentional flooding. Ship's crew and company superintendents need to be aware of the dangers of becoming blind to some hazards and continue to ask the question, "*Is this as safe as it reasonably can be?*".**

2. **The bilge alarms were tested every 4 months, the last test being 3 months prior to this incident. On that occasion and at times previously, notes had been left in the planned maintenance system that oily deposits had been found and cleaned off before the alarm could be successfully tested. The task was signed off as successful and the unsafe condition was not raised with the chief engineer and so no solution was sought. Planned maintenance systems will only work effectively if defects are proactively reported to the appropriate level of vessel or shore management, so that persistent problems can be resolved.**

3. **The deck plating in the flooded compartment comprised of solid plates so that, on rounds, the motorman would have to physically remove plates to properly check the bilges. Gratings in the floor plates in strategic locations would have enabled easier, more reliable bilge inspections. Can you inspect your bilges quickly and easily?**

Chafe, spray and ignite

Narrative

A tug was on operational service and engaged in the task of assisting a vessel by pushing it alongside when the engine room fire alarm sounded. The tug's crew mustered at the emergency station and the chief engineer went to investigate.

When the chief engineer arrived at the engine room, he saw flames and smoke coming from the top of the starboard engine. The chief engineer immediately shut down the starboard engine and attacked the fire with portable fire extinguishers. Other members of the crew assisted with the emergency by preparing to shut down the engine room and calling for assistance. The fire was extinguished by the crew and the tug proceeded alongside safely, using its port engine.

A post-accident investigation found that the fire was caused by fuel igniting when it sprayed onto the engine's exhaust after a flexible hose had failed. The failed fuel hose had been chafing on the engine, resulting in its eventual failure. Moreover, the investigation found that the hose was suitable for use with fuel systems; however, due to some previous maintenance, the hose's run had been moved from its original position, resulting in it making contact with the engine's manifold block (see figure).

Figure: Fire damage to the flexible fuel hose

The Lessons

1. **The use of flexible hoses for fuel lines is entirely acceptable and they can provide a good technical solution for connecting systems in difficult situations. The post-accident report found that this hose was suitable for the task. However, to prevent contact damage, flexible hoses need to be supported by clips and kept separated from other lines and hot machinery. If flexible hoses are disturbed due to maintenance, it is important that they are restored to their original position and all clips and supports replaced. Flexible hoses should also be inspected periodically to ensure that they remain in the correct position and are not degrading.**

2. **The tug's crew dealt with the fire quickly and effectively. Regular drills had been conducted on board and this meant that the crew was well prepared for the emergency. Finding time for drills can be difficult and time-consuming, but will pay a big dividend when the real emergency occurs.**

Tipping point

Narrative

The crew of a roll-on roll-off cargo ferry decided to take advantage of fine weather, and an extended stay in port, to paint the ship's side. Because of the ferry's size, it was necessary to use the ship's forklift truck and a purpose-built man basket to lift a crewman to the upper part of the ship's side. A working at height permit, which referenced a generic risk assessment, was issued in accordance with the ship's safety management system (SMS).

One crewman (the driver) drove the forklift truck and a second crewman (the painter) was lifted in the man basket along with the paint and brushes.

The painting started with the forklift truck positioned perpendicular to the ship's side. Once one section had been painted, the man basket was lowered and the forklift truck manoeuvred so that the next area could be reached. When relocating the forklift truck, it was necessary to cross two quayside crane rail tracks, which tended to shake the truck and the basket. To avoid this, the driver decided to reposition the forklift truck so that it was parallel and close to the ship's side, just outside the rail tracks. They then continued working. However, with the man basket lifted up 6m to reach the upper part of the hull, the force of the painter in the basket pressing the paint roller against the ship's side, caused the basket and forklift truck to rock. The driver noticed that the wheels of the forklift truck had started to slip into the quayside rail channel, causing the truck to become unstable. The forklift truck wheels then slid into the rail channel and the forklift truck started to topple. The driver shouted a warning to the painter to hold on as the forklift truck fell over onto its side (see figure). The painter was thrown to the ground and he sustained bruises, a cut to his head, and was covered in paint.

The painter was taken to hospital and received treatment for his injuries; he was discharged after a few days.

The shipping company that owned the ferry carried out an internal investigation and found:

- The crew were wearing the correct personal protective equipment and the painter also wore a safety harness, which was attached to a strong point in the man basket.
- The man basket was of unknown origin and had no certification.
- The forklift truck was maintained by the ship's staff and had no current certification.
- The permit to work was completed onboard the vessel without visiting the worksite to assess the contents of the risk assessment.

While they investigated the accident, the shipping company issued an internal safety notice prohibiting the use of forklift trucks and man baskets on quaysides.

The Lessons

1. Workplace risk assessments are a valuable aid to safety and to accident prevention. Generic risk assessments provide pointers to crew members, but these should always be supplemented by site-specific risk assessments and toolbox talks before commencing work.

2. Should an agreed work process need to be changed for whatever reason, the value of standing back for a moment to review the risks before resuming the work cannot be understated. The 'Take 5' job safety analysis method is used by many companies to encourage this concept. Had the crew taken a few minutes to reappraise the risks of positioning the forklift truck, they may have identified the proximity of the forklift wheels to the crane rail track and the unbalancing effect on the truck of the painter pushing against the ship's hull as risk considerations.

3. Although the man basket was well constructed and the forklift truck maintained, with neither being certified at the time of the accident there was a lack of assurance provided by the ship's management to their workforce. In accordance with workplace regulations and the company's SMS, ship's crew should check that equipment is properly certified and inspect it before use.

Figure: Toppled forklift truck

Fender bender

Narrative

Having waited for the weather to ease, a pilot boarded an inbound coaster and discussed the arrival plan with the master; there was still a fresh onshore wind and no tugs were available. The vessel's bow thruster was defective, so the master and the pilot agreed that the port anchor would be dropped off the berth to control the bow, with the engine and rudder being used to control the stern (Figure 1).

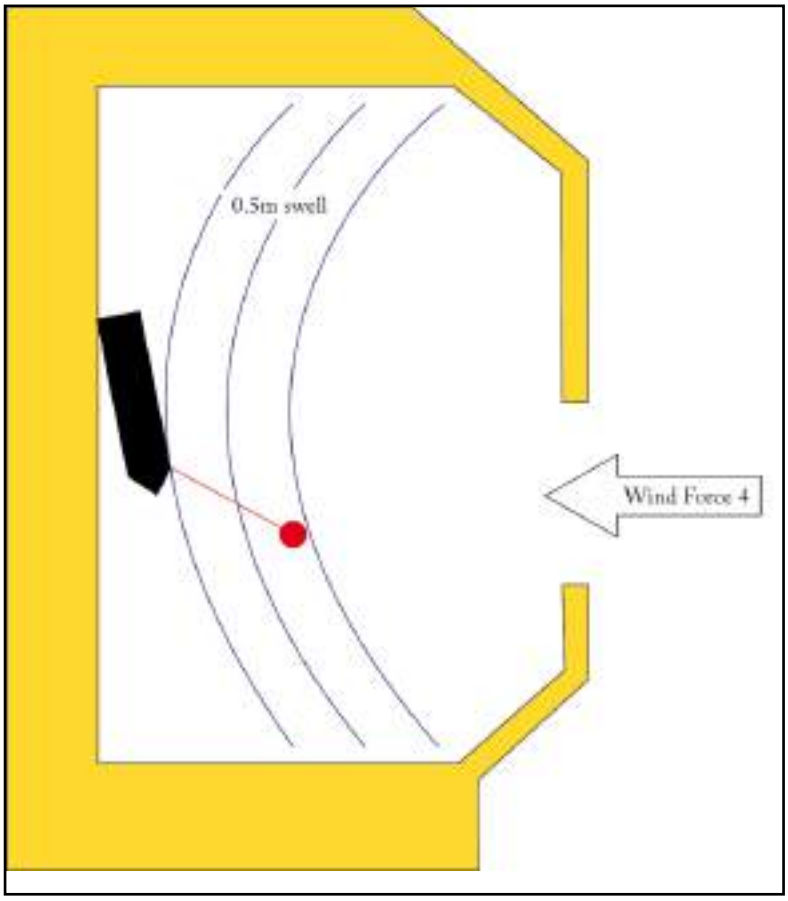


Figure 1: The berthing manoeuvre

Once the coaster had entered the harbour the port anchor was dropped as planned. As the anchor cable began to pay out, the engine and rudder were used to control the stern; however, the vessel was rolling gently in the swell.

During the final stages of the manoeuvre, when the vessel was close to the berth, mooring lines were passed and made fast ashore. Shortly afterwards, a gust of wind pushed its stern towards the quay. To counter the effect of the wind, the pilot instinctively applied power and rudder to kick the stern clear. However, this sudden manoeuvre took the mooring deck crew by surprise and, as the after lines became taut, the coaster's stern was quickly pulled towards the jetty.

As the coaster's starboard quarter struck the jetty, the combination of the impact and the swell caused the ship to roll onto its concrete edge. As it did so, the upper part of the coaster's hull was pushed against a steel fender bracket, which punctured an engine room fuel tank, causing fuel to spill into the harbour (Figure 2).

The fuel spill was contained and dispersed by the harbour authority, and the vessel was repaired before proceeding back to sea.

The Lessons

1. **This was a challenging manoeuvre that, in the fresh, blustery weather conditions was always going to be difficult to control. While the use of anchors and engines to berth vessels is fine, on this occasion the effects of wind, swell and the lack of tugs or the bow thruster probably made the plan unworkable. Although there had already been a delay for weather, waiting a little longer for tugs or calmer weather was an option to reduce the risks of this plan.**

2. Berthing plans like this rely on effective communications between the bridge and mooring teams. In this case, the urgent requirement to come ahead, before the crew could slacken the stern line, was a causal factor. Better communication between the bridge and mooring stations would have ensured that everyone knew when to pass lines ashore, take in or pay out slack, and finally secure the vessel safely alongside.

3. It is good practice to keep local operating guidance under review. In this case, the harbourmaster amended the guidance to masters and pilots on berthing vessels in marginal weather conditions.

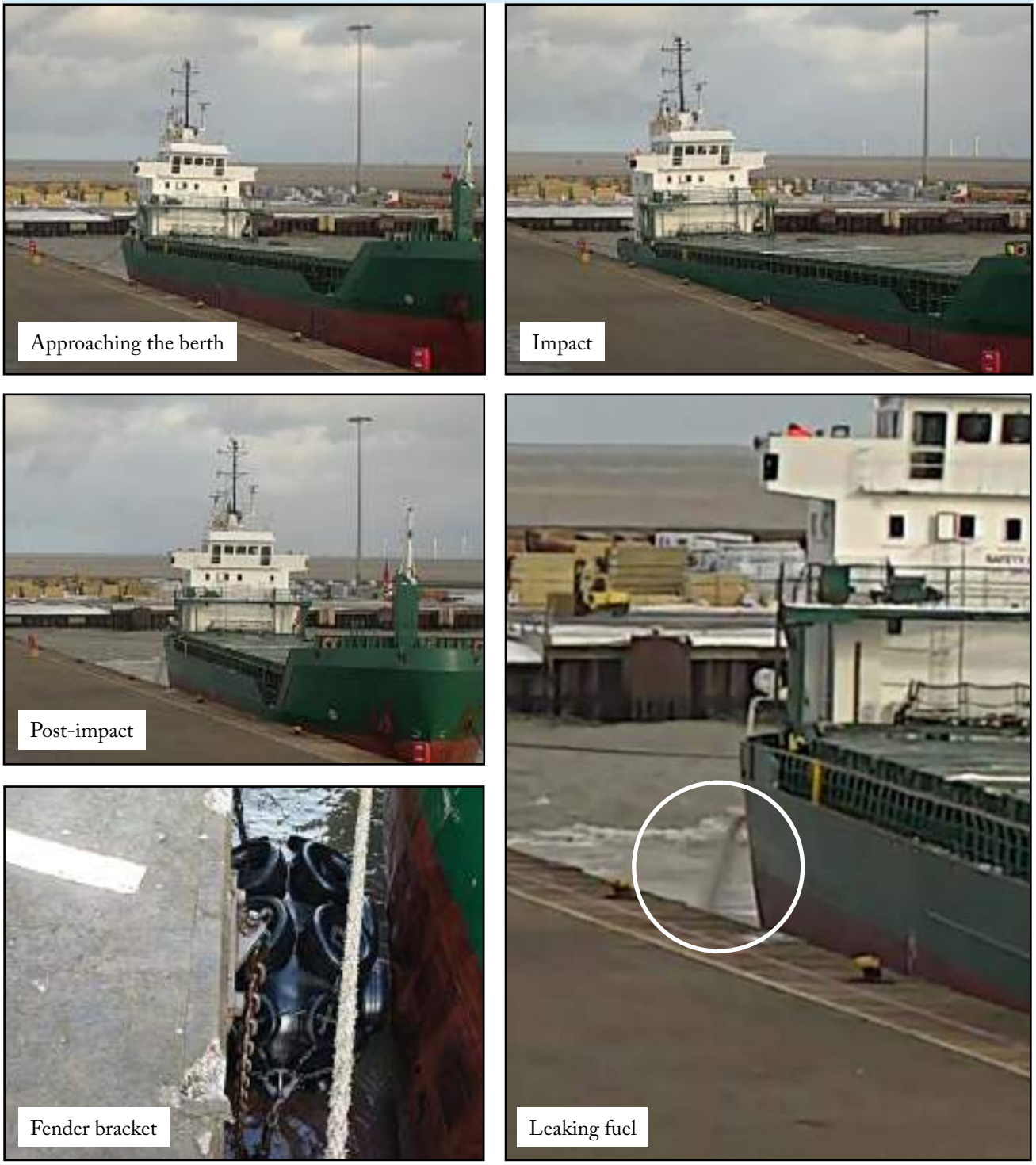


Figure 2: CCTV of accident sequence with fender bracket and leaking fuel

A reach too far

Narrative

It was a cool autumn evening, and a tug's crew were preparing to depart its berth for a routine task. The tug was berthed outboard of an unmanned sister vessel, secured with an ahead spring, breast line, and a tensioning line configured by shackling the outboard tug's harbour tow line to a tail permanently rigged on the inboard tug. Once connected, the line was tensioned by heaving on the winch, which locked the tugs together (Figure 1). This arrangement, used for many years, meant that personnel were not required to cross between vessels during mooring.

The tugs are well protected by solid bulwarks all round, and the company had not had previous berthing man overboard incidents, so it was company policy that personal flotation devices (PFDs) were optional within the harbour.

The deck crew, who were not wearing PFDs, had brought the gangway inboard and were releasing the tow line. One of the two deckhands eased the winch tension, and the mate disconnected the shackle joining the tow line to the tail. Next, the mate pulled the rope tail back through the fairlead, leaning over the bulwark, and then tried to 'flick' the rope over the bulwark of the adjacent tug, with the aim being that it was easy to grab with a boat hook on the tug's return.

On the first attempt, the rope slipped off the bulwark, so the mate tried again. This time, the rope lay as intended but the mate still needed to flick the remaining tail end of the rope over the bulwark, so he stood on his toes and leant further over the bulwark. The weight of the rope and his own body weight over-balanced

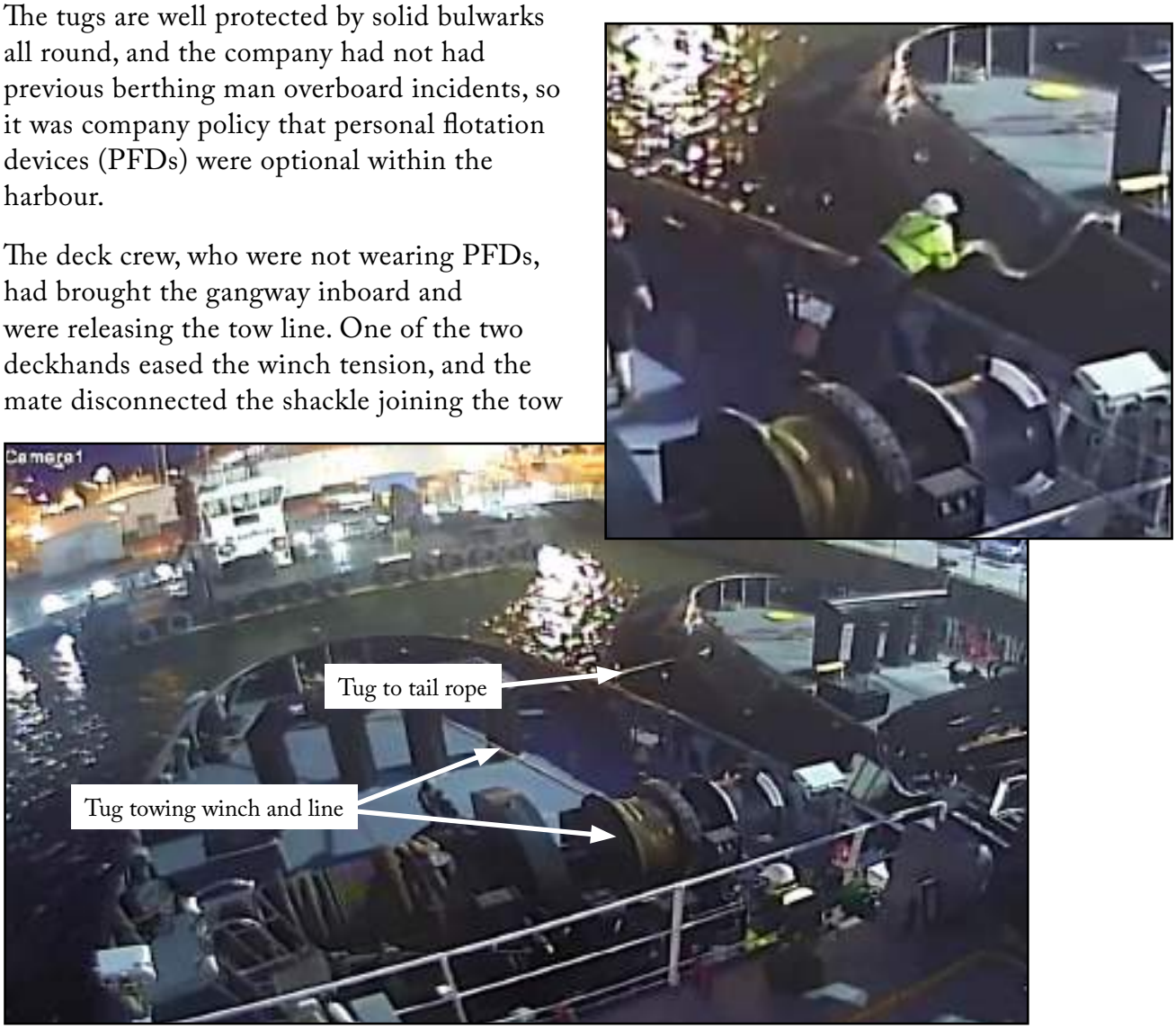


Figure 1: CCTV video still, showing the tugs moored together (inset: mate 'flicking' tail end of the rope over the bulwark)

him and, despite the two deckhands trying to grab him, the mate, now over-extended, toppled over the bulwark, completing a 360° roll into the water (Figure 2). As he fell, his head hit the tug's rubbing strake and he banged his right knee.

The deckhands reacted immediately, shouting "man overboard" to the bridge, although the master did not hear it. A deckhand passed the mate a line to hold onto while the other fetched the tug's embarkation ladder, which they quickly rigged. The mate climbed the ladder and was out of the water after about 2 minutes. The deckhands took the mate into the tug's accommodation for assessment and first aid, including a shower to warm him up.

Figure 2: CCTV video still, showing mate falling over the side of the tug

The Lessons

1. By standing on his toes and leaning on the bulwark, the mate was unstable, and it was easy for him to over-balance. By moving further forward, the distance between the bulwarks would have reduced (Figure 1), making the 'flick' much easier.

2. The procedure for self-mooring without the need for any crew to step ashore or onto another vessel until the tug was securely berthed was well-practiced but even simple, routine operations must be conducted carefully. Minimising the distance the tugs are apart by moving a little further forward or the use of a boat hook would significantly reduce the need for crew to stretch and risk going overboard.

3. Luckily, the mate was conscious in the water and able to keep himself afloat. However, he did strike his head on the way down and, had this rendered him unconscious, with no immediate method of rescue available for an unconscious casualty, he may well have floated face down, with a major risk of drowning. The water was cold, and cold shock could also have affected the mate's attempts to keep himself afloat. Wearing a PFD would have given the mate a much better chance of survival if he had been unconscious, particularly as he would have floated face upwards.

4. The mate indicated he was okay, so the master decided to proceed with the vessel's routine tasking. Once the tug was on task, the mate reported pain in his right knee and bruises were developing on his face. The master was concerned so, when the tug returned to port, he took the mate to hospital. Fortunately, in this case, the mate's injuries were minor, and he made a full recovery.

5. After any unintentional immersion accident, drowning, caused by residual water in the lungs, can develop, and is potentially life threatening. Any casualty should be closely observed and, if in any doubt, medical help or advice should be sought as soon as possible.

Tend those lines

Narrative

An 80-metre general cargo vessel loaded with roadstone entered port at high water springs and secured alongside its berth. Although not formally declared as a 'Not Always Afloat But Safely Aground' (NAABSA) berth, vessels normally sat on the bottom on this berth and were briefed by the pilot on the need to tend the lines as the ship settled. After berthing, the pilot left and unloading commenced.

Several of the crew went ashore to buy provisions, leaving four crew members on board. Later that afternoon, as the tide ebbed, the stern settled into the mud, and the vessel took a slight list to port (Figure 1). A short while later, the forward mooring lines parted one by one, and the bow started coming away from the jetty. Finally, the stern breast line parted and the bow crossed over to the other bank and came to rest with the vessel blocking the river (Figures 2 and 3).

Figure 1: Vessel alongside as tide drops

The master immediately alerted the crew to check for damage and called the port office. A pilot and the crew who had gone ashore then boarded from the pilot boat, and the vessel was carefully monitored until all were confident that it was fully aground and that there was no water ingress.

The vessel floated on the next rising tide and, with the assistance of a small tug, was manoeuvred back alongside and resecured with replacement lines. Operation of the engine and rudder were checked, and the vessel moved to an alternate berth under its own power. The hull was inspected at low water and no signs of damage were found; this was confirmed, after the vessel had unloaded and had sailed to the next port, with a class survey.

The Lessons

1. **Deliberately going aground at a berth can seem an alien concept to many mariners but, in ports with a significant tidal range and limited depth of water, it is common practice. To achieve this safely, a vessel must be designed to sit on the seabed and the berth must be as flat as possible. While there were no obstructions, the berth sloped gently up at the bow and was not formally declared as NAABSA. It is unlikely that a river berth will remain totally flat for long and, as a vessel settles, it will probably move away from the berth and mooring lines will have to be adjusted. In this case, the stern settled first but lines were not adjusted enough. The range of tide was nearly 6 metres and, due to spring tides, the ebb flow rate acting on the bow added to the forces on the berthing lines. Fortunately, the vessel was not damaged and the lines parted before the shoreside bollards were overloaded.**

2. The pilot had briefed the master on the need to tend lines as the vessel settled, and they had discussed the probability that the vessel would take a slight heel as the tide dropped. Mooring lines should be closely monitored on all berths; this is vitally important where there is a large range of tide, particularly on berths that dry out, as even on the flattest berths there is a chance a vessel will take the ground in one area before another, causing unequal loading on lines.
3. NAABSA berths, or non-declared berths where vessels regularly sit on the bottom, must be frequently checked to ensure they remain safe for use. This requires proactive engagement by berth owners, vessel agents and port authorities to ensure operations can be conducted safely. This is particularly important where berths are used less frequently, giving opportunities for sediment to build up and create slopes in the berth.

Figure 2: Vessel across the river, aground at bow and stern

Figure 3: Tug amidships, stabilising vessel against the ebb tide

Under pressure…

Narrative

A crewman from a workboat (Figure 1) was preparing to transfer fuel to another vessel. The fuel hose had been passed to the receiving vessel and connected to its loading manifold. The receiving vessel's system was then opened up ready to receive fuel.

The crewman checked that the receiving vessel was ready then went below to the engine room, opened an isolating valve, and started the fuel transfer pump. Returning back on deck, the crewman realised that no fuel was being transferred because the hose had not been connected to the discharge manifold on the workboat's deck (Figure 2).

After stopping the fuel transfer pump, the crewman attempted to release the blanking cap on the discharge manifold in order to connect the fuel hose. As the two securing clips were released, the blanking cap flew off with an explosive force, striking the crewman on the leg. The crewman suffered lacerations, a fractured limb, and was off work for 6 weeks. Although the accident involved a pressurised fuel system, there was no pollution.

Figure 1: The workboat

The Lessons

1. Safety procedures, enshrined in safety management systems, exist so that potentially hazardous operations are conducted safely. The workboat had a safety procedure for transferring fuel that stated (and was highlighted) in the preamble: "*Do not pressurise system until you have ensured all connections have been made secure.*" and the second step of the checklist asked: "*Are bunkering hoses correctly connected and drip trays in position at flanges?*" These procedures were for best practice and, if followed, could have ensured everything was connected up safely before starting the transfer pump.

2. It is equally important to ensure that any residual pressure in a system has dissipated before opening up, and the workboat's safety procedure also required this. Figure 3 is a reconstruction of the moment when the blanking plate was removed and the residual pressure in the system was released, causing the injury. Best practice on these occasions would be to check everything was safe and depressurised, have a toolbox talk so everyone knows the plan, and follow the procedures.

3. Lone working can introduce additional hazards when operating systems or undertaking potentially hazardous routines. In this case, a second crew member could have helped by supervising or double-checking the system or safety procedures.

Figure 2: The workboat's fuel discharge manifold

Figure 3: Reconstruction of the removal of the blanking plate when the system was pressurised

A lucky escape

Narrative

In the early hours of the morning a ro-ro ferry was making its approach to a traffic separation scheme (TSS) and a pilot station. The officer of the watch (OOW) released the lookout from the bridge so that he could wake the master and then prepare the pilot ladder. The OOW prepared the bridge for arrival by turning on the bridge wing equipment and continued to monitor the electronic chart display information systems (ECDIS) with radar and automatic identification system (AIS) overlaid on the screen.

Meanwhile, two nautical miles ahead of the ferry, a fishing vessel was towing a grapple to try and find a lost string of crab pots. The fishing vessel skipper was concentrating on his vessel's position on the plotter and did not see the ferry approaching from astern.

As the ferry's lookout made his way down the starboard side of the vessel to the pilot ladder he heard a scraping along the ship's side.

Simultaneously, the OOW saw a bright light being directed into the starboard bridge wing and ran over to see the fishing vessel amidships after it had sustained a glancing blow from the ferry.

The ferry's master was informed immediately and arrived on the bridge shortly afterwards. He called the fishing vessel on VHF radio channel 16 but received no reply and so informed the local vessel traffic service of the situation and carried on to the pilot station.

On board the fishing vessel, the collision with the ferry had come as a surprise such was the focus on finding the lost pots. After the collision, the skipper called all the crew on deck in their lifejackets and carried out a full damage assessment. After discovering that the only damage was a bent handrail, they returned to port.

The Lessons

1. **It was the OOW's intention to not release the lookout until the master had arrived on the bridge, but he had allowed the lookout to go slightly early to smoke a cigarette. This left the OOW in a vulnerable position, with no lookout, approaching a TSS with converging traffic. With no lookout being maintained on the fishing vessel either, it is unsurprising that there was collision, the consequence of which could have been much worse.**

2. **The OOW was overreliant on AIS as a medium to detect other vessels and did not keep an adequate visual lookout himself. Unfortunately, the AIS on the fishing vessel was not functioning correctly and was not transmitting. Many small craft will not have AIS so it is vital to keep a lookout by all available means, including visually and by radar.**

3. **The use of a radar image overlay on an ECDIS screen can be a useful tool in allowing the OOW to verify their position in real time and detect other vessels, but the amount of information present on the screen can clutter the navigator's view if not managed carefully. In this instance the ship's heading marker was obscuring the small radar return of the fishing vessel (see figure).**

4. Rule 10(f) of COLREGs states that:

   "A vessel navigating in areas near the terminations of TSSs shall do so with particular caution."

   When searching for fishing gear in the vicinity of a TSS, skippers must recognise the increased risk of collision and sufficient crew must be present in the wheelhouse to keep an effective look out. As demonstrated in this accident, the search for fishing gear can be a significant distraction from navigation.

5. Even though contact by mobile phone was eventually made between the fishing vessel and ferry, the initial attempts to contact each other via VHF radio were unsuccessful. After the glancing blow, the ferry's OOW and master made no assessment of the damage sustained on the fishing vessel and no attempt to slow down or return to the fishing vessel. Had the damage been catastrophic, the immediate deployment of search and rescue assets from the ferry could have been critical in the safe recovery of the fishing vessel's crew.

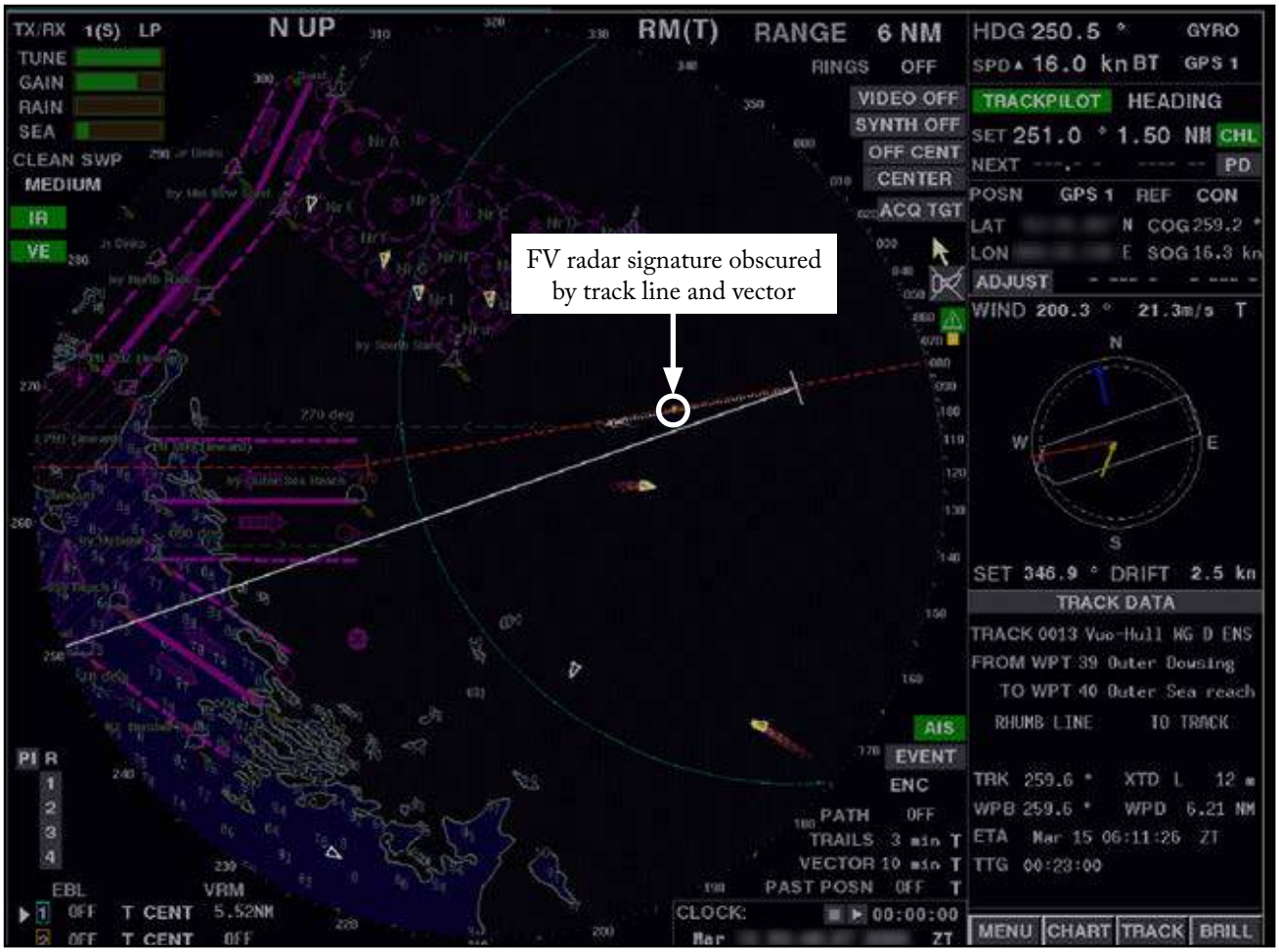


Figure: The fishing vessel's radar signature is visible, although obscured by the track line and vector

Part 2 – Fishing Vessels

On 13 June 2013, I suffered an accident on my own fishing vessel, one that I strongly remember eight years on, and it's safe to say I'm very lucky to still be here.

Prior to this, we, as a crew, never did any safety drills or wore any sort of personal flotation device (PFD), and assessing risks was unheard of. But after my accident, I made a promise to myself that things were going to change. And so, from 2014 to 2018, I began reading up on and learning how to assess risks and started to put measures in place to reduce them – after a while it got easy.

We installed a host of safer working methods and included these in the planning for a brand-new vessel that started construction in 2018. The focus for the new build being to make a safe working platform for my crew. Our first idea was a method to overcome crew falling from or being washed over the top of the shelter deck. We identified the hazard areas and made the rails one foot higher than regulations state and then installed a continuous safety rail system fitted to the handrails, which crewmen clip themselves on to and is attached to a harness worn under their PFD. Another proposal was to ensure safe port and starboard walking areas, so I came up with the idea of running all the trawl wires under the wheelhouse floor, making both sides of the vessel free of trawl wire and eliminating trip hazards.

I must say that, over the years, a lot of emphasis has been put into saving a crewman who has fallen overboard and getting him back on board the boat, but less has been put into ensuring a crewman cannot fall overboard in the first place.

A good skipper knows that the most hazardous part of fishing is hauling and shooting the fishing gear and that, on hauling, when the trawl doors reach the gallows, a crewman has to stand on the rail, reach up, grab the lazy wire and attach it to the net drums, which is a dangerous practice. On *Reliance III*, we made the aft bulwarks 2.6 feet higher than on the previous *Reliance* and with the installed safety rail system, the crew could clip themselves on by their safety line and harness so that, if a crewman does fall overboard, he remains attached to the vessel and other crewmen can quickly get him back on board. Again, this simple example of identifying a risk and putting measures in place to reduce it demonstrates basic safety management.

It amazes me that winch design has not progressed since the 1980s, with not one guard fitted to winches, such as the main trawl winch and Gilson winch. For *Reliance III*, I teamed up with Thistle Marine and designed a customised trawl winch fitted with safety guards on all sides and hydraulic brakes that stop a turning winch in seconds and include emergency kill switches. For the Gilson winch on the shelter deck, we fitted a guard over it and placed the winch in an area where, if a crewman were to fall or trip, he could not be dragged into it.

Additionally, we placed a total of 32 cameras on board *Reliance III* to record what is going on and enable the skipper to watch crewmen doing their job and monitor what is happening in areas classed as 'needing to be watched over'. If I see a

crewman doing something unsafe, I rewind the footage back, show it to him, and explain the risk and how to work safely; a further illustration of basic safety management.

I feel that, within the fishing industry, we need to do a lot more to improve safety; it may be a case of taking a step back and looking at why crewmen are falling overboard or getting injured by winches that have no guards. We need to encourage good risk assessment by identifying the hazard, then put methods or procedures in place to bring the risk down to an acceptable level. Only then will the fishing industry become a safer place to work.

JOHN CLARK
SKIPPER OF *RELIANCE III*

From the age of 12, all John wanted to do was become a fisherman and progress to be a skipper of his own boat.

He left school at 16, enrolled in the Seafish YTS fishing scheme, got a berth on a local trawler and got stuck in. At 21, he was offered a quarter share of a fishing boat called Reliance BF80 so sold his prized Audi sports car to raise enough money for that, worked away at the fishing and, six years later, having bought out all the shareholders, he was skipper.

John fished on *Reliance BF80* for 18 years before, in 2009, ordering a brand-new fishing vessel, *Reliance II* BF800. In 2018, he commissioned and helped design and incorporate a host of safety features on a new build fishing vessel, *Reliance III* BF800, which was launched on 3 September 2020. Both Reliance II and Reliance III were built and launched at Parkol Marine Engineering, Whitby.

That's over 30 years of being a fisherman and John has no plans to hang up his oilskins and PFD.

On John's vessel the crew have a motto, which is '*Prevention is better than cure: be aware of what's around you and work as a team*'. John really enjoys his job and his goal is to see huge safety improvements made in the fishing industry.

Paperwork can wait

Narrative

A 17m wooden-hulled scallop dredger had completed a long winter's day of fishing and, as darkness fell, two of the crew of three were sorting and stowing the final haul of the day. The skipper was in the wheelhouse and, to allow the crew to rest for the night before fishing the following day, the vessel's steering was being controlled by the autopilot as it proceeded to an anchorage.

The anchorage was in a relatively open inlet (Figure 1) and, with the tide close to high water, the approach was about 400 yards wide, but there were no navigational marks to assist in the dark. During the passage into the anchorage, the skipper was catching up on records for the day, and was completing his electronic log, intermittently monitoring the familiar passage on the chart plotter.

To the south of the planned approach was a shallow reef, exposed at low water, but now covered. While engrossed in his paperwork, the skipper did not notice that the vessel was being set to the south. At around 2120, just before high water, the vessel grounded on the reef at about 5kts.

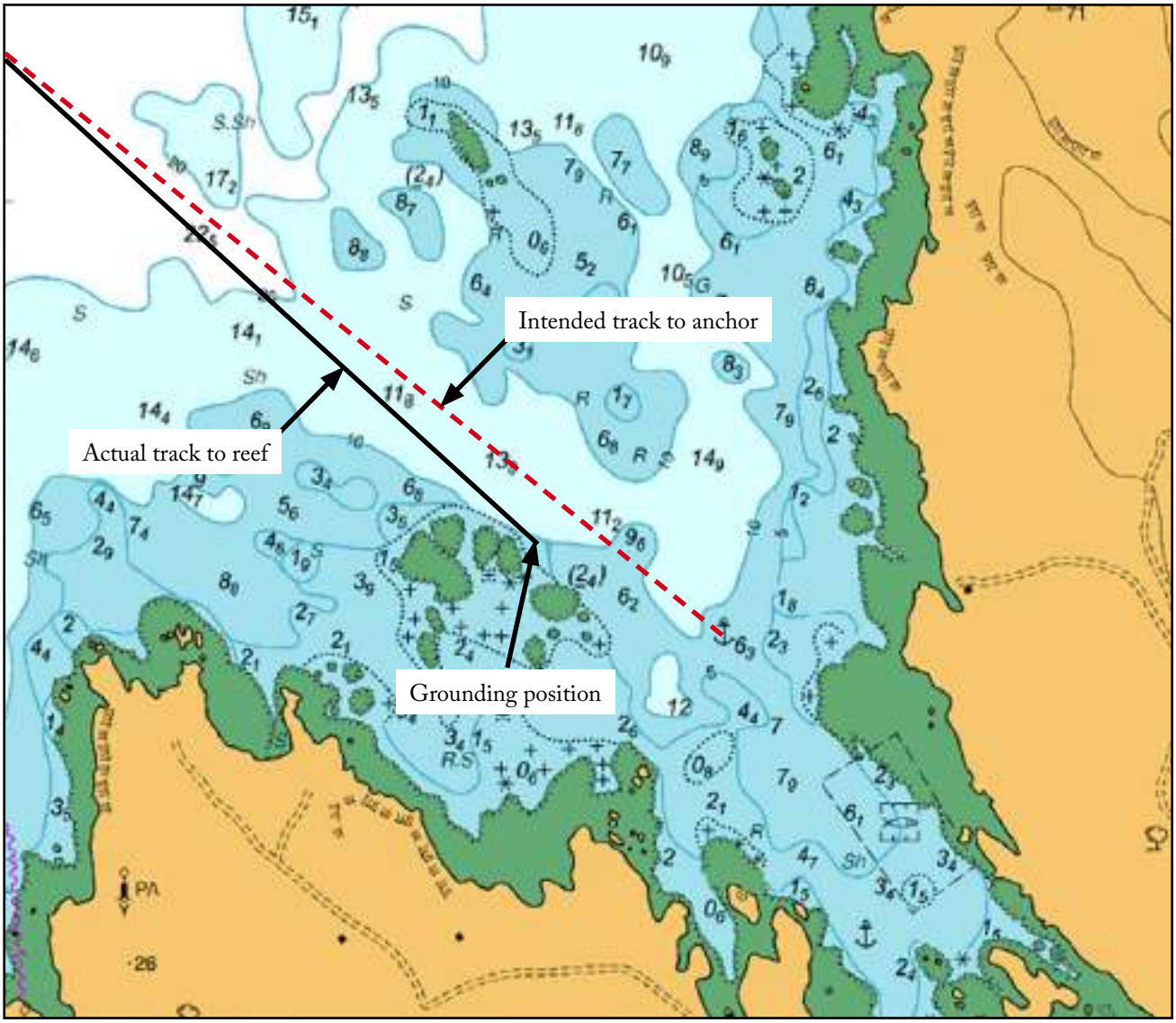


Figure 1: Fishing vessel intended track compared to actual track

The crew quickly checked the hull for signs of water ingress, while the skipper tried to work the vessel off the reef by going astern. He was unsuccessful and called the coastguard. An all-weather lifeboat (ALB) was dispatched and arrived about an hour later. There was no time to waste and, with the tide just beginning to drop, the ALB passed a tow rope. After a few minutes of gentle pulling, the fishing vessel came clear. No major water ingress was discovered, so the ALB returned to base and the fishing vessel followed, mooring overnight off a small coastal town. The next day, the vessel proceeded to a nearby boatyard, where it was slipped. This revealed damage to the keel and one hull plank (Figure 2). The vessel was out of service for several weeks for repairs.

Figure 2: Damage to keel and hull planking

The Lessons

1. **A momentary loss of concentration is all that is required to turn routine into an emergency. The skipper had been into the bay many times and knew it well. However, with no visual cues in the dark, he was reliant on the chart plotter for navigation. He allowed himself to be distracted by an admin task and did not notice the vessel was being set off track. Luckily, the vessel was robust, and there was no immediate ingress of water, but the consequences could have been much worse.**

2. **Navigation in confined waters always requires full attention, even when the passage is familiar. Admin tasks can usually wait – safe navigation comes first.**

3. **The skipper's call to the coastguard was immediate and resulted in the ALB attending promptly. Had the situation suddenly deteriorated, help was already on its way. Even if things appear under control after an accident, it is always a good idea to alert the coastguard as soon as possible.**

Learning the ropes

Narrative

A recently purchased 20m stern trawler was out fishing; the four crew were experienced fishermen, but more familiar with smaller boats. One purpose of the trip was to familiarise themselves with their new larger boat and its gear. This process had involved experimenting with the use of a preventer wire, rigged between the two outer sweeps, intended to control the spread of the trawls (Figure 1).

On the evening of the second day at sea, the crew were hauling the gear in calm conditions. The skipper was in the wheelhouse, with one of the crew controlling the winches on the trawl deck and the other two crewmen on the deck above, standing near the gallows, waiting to attach lines to the trawl doors. As the trawl doors came clear of the water, the two crew on the upper deck moved aft, ducking under the banana bar, to reach the doors. Unfortunately, as the gear continued to be hauled in, the two crew members were pinned to the gallows by the preventer wire (Figure 2).

The skipper heard shouts and told the winch operator to pay out the trawl wires, freeing the two crewmen; however, both had suffered torso crush injuries. First aid was administered on board, and both injured crewmen were evacuated to hospital by coastguard helicopter where they were treated for their injuries. They were discharged home a few days later.

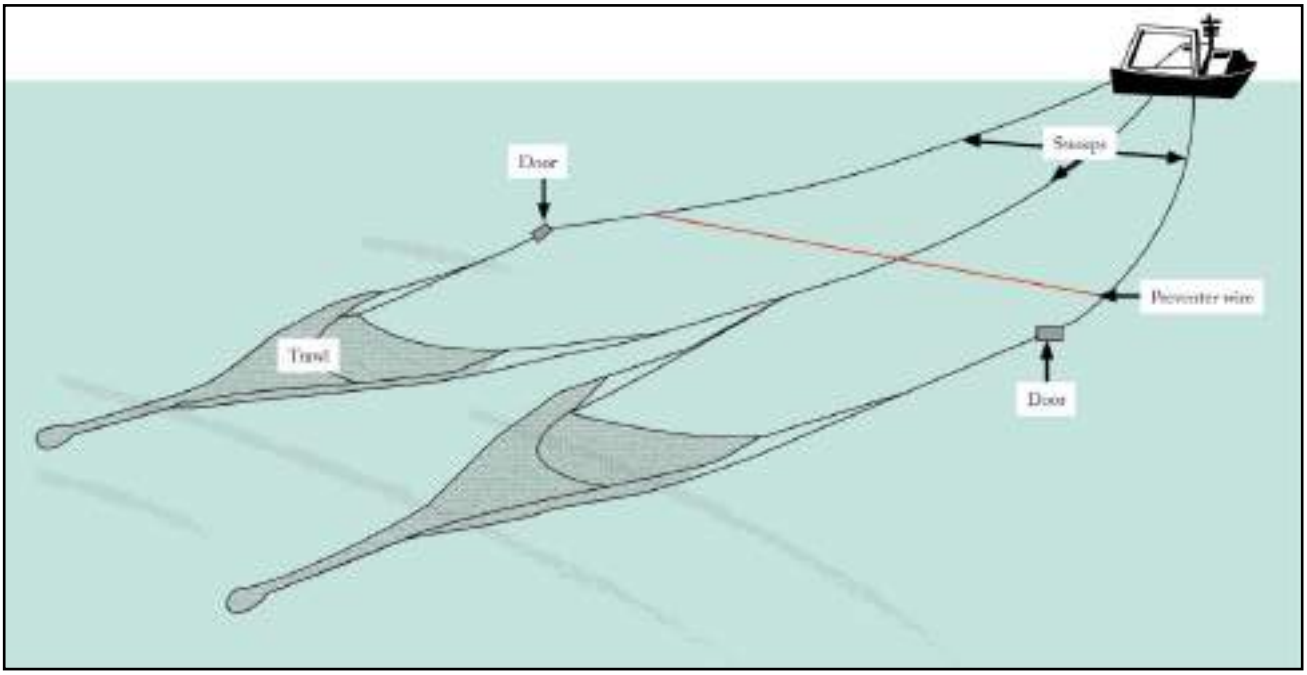


Figure 1: Net configuration

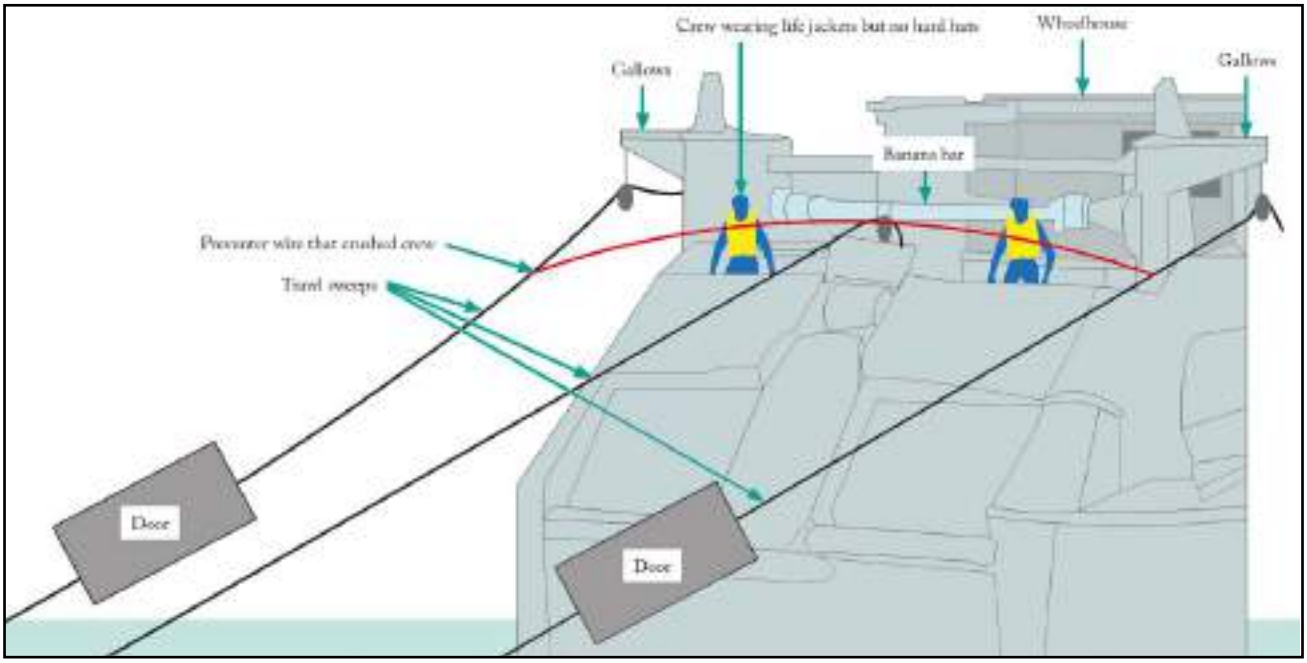


Figure 2: Preventer wire crushes two crew

The Lessons

1. Fishing is a hazardous business and it is critical that all members of the crew understand the risks associated with operating their boat. In this case, the crew were all inexperienced with this boat and not all activities had been properly risk assessed, with associated safe systems of work. It turned out that the crew did not need to go aft of the gallows to reach the trawl doors during hauling.

2. It was fortunate that the skipper heard the trapped mens' shouts in time to alert the winch operator. If a winch or crane operator does not have a clear, unimpeded view of the work area, a supervisor or banksman is essential.

3. After the accident, the skipper undertook to develop, with the crew, a full set of risk assessments and method statements to cover all routine activity on board the boat and to record it in the fishing boat's safety folder. Risk assessments should always be done, taking into account the work being performed. Often a small change to a work method (such as not stepping up, or outside guardrails) can do much to eliminate risk.

Even the experienced can be caught out

Narrative

A skipper checked the weather forecast and decided to head out to his creels before bad weather was due to arrive. The skipper, with his son as crew, left harbour in their small open-decked boat to lift, empty, rebait and reshoot their creels, and bring two strings ashore. The last set of creels to be recovered was closest to the shore. When the vessel reached the buoy for the last string, waves were breaking over it, so the skipper decided to leave that string and return home with only one recovered string of creels.

The skipper paused momentarily, before crossing the river bar to assess the waves. He waited while three waves passed before committing to the passage over the bar, as was his usual practice. Waves over the bar were a common occurrence and, in the previous year, the skipper had replaced the outboard with a more powerful engine to help keep up with the waves; although in some conditions, waves would still overtake the vessel while passing over the bar.

As the vessel was transiting over the bar an unexpected large wave caught the vessel from astern, causing it to broach to starboard and heel to port, beam on to the waves. A second wave hit the vessel, rolling it further to port and causing it to capsize and invert (see figure). Both crew were caught under the hull, but after 10-15 seconds the crewman was able to free himself. He tried to spot his father but there was no sign of him. After an exhausting swim in the heavy surf, the crewman was helped ashore by some members of the public.

Another local fisherman, who was on his vessel in harbour, was alerted to the capsize and headed for the harbour entrance to provide assistance. He spotted the unresponsive skipper in the water and manoeuvred his vessel to retrieve him; however, by the time he reached him, he was floating face down. The fisherman managed to pull the skipper onto his vessel but realised he was not breathing. He immediately started cardiopulmonary resuscitation (CPR), raised a "Mayday" alarm and managed to head back to the harbour. He continued to give CPR while his boat was tied up by others. An ambulance and search and rescue helicopter were on scene quickly and the skipper was moved to hospital where he was declared deceased. The skipper's cause of death was determined as drowning, although he had also suffered a head injury.

Figure: Vessel capsized and inverted

The Lessons

1. The skipper was one of the most experienced fisherman in his small harbour, having lived all his life overlooking it. Despite this, he was still caught out by the size of the waves that day. His usually effective strategy did not work, probably due to the difficulty in assessing wave height and pattern from out at sea. It is important that sailors, regardless of their experience, take time to assess the wave conditions on a bar prior to committing to a transit over it and have an alternative port of refuge if conditions are too dangerous. New Zealand is a country with many hazardous bars, and its coastguard provides useful information about how to successfully conduct an assessment: https://www.coastguard.nz/boating-safely/bar-crossing-safety/

2. The outcome of this accident may have been very different if both crew had been wearing personal flotation devices (PFD) and the surviving crewman was very fortunate to swim to shore in the surf. The wearing of PFDs is now mandatory for all fishermen while on an open deck. This requirement stems from the significant number of fishermen who have drowned and the benefits of wearing a PFD far outweigh any secondary issues, such as entrapment. Given his head injury, the skipper in this case may well have been knocked unconscious; an inflatable lifejacket keeps a person afloat with their face clear of the water, allowing them to breathe even when unconscious, and is essential to survival. An inflatable lifejacket also enables a casualty to survive cold water incapacitation, during which swim failure is likely to occur.

Running on fumes and dirt

Narrative

An old 24m fishing vessel was purchased by a new owner who had, over a two-year period, in between fishing trips, carried out renovation work to improve its condition. Prior to the incident, the vessel had been prepared for, and subsequently set out on, a regular planned three to five-day fishing trip. With a relatively short trip duration, the fuel tanks had not been topped up.

After poor catches over the first few days the skipper and crew decided to remain out at sea for longer, hoping that their luck would change. After nine days, encountering mostly benign weather conditions, the skipper headed for home as his fuel was running low. The following day, en route to their home port, the main engine stopped abruptly. Unable to restart it, they were forced to radio for assistance and an RNLI all-weather lifeboat was dispatched to tow the fishing vessel back to port.

Investigation of the engine failure identified debris in the fuel filter, and an inspection of the fuel tanks found that sediment had become concentrated in the bottom of the tank as the fuel was depleted during the longer than planned voyage. The fuel system had been included as part of the overhaul programme but the fuel tanks and pipework had not been inspected since the vessel was purchased.

The Lessons

1. **Although the new owner had sensibly decided to invest in the boat's long-term viability through a comprehensive overhaul programme, the fuel system had not been a priority. With the fuel system in an unknown condition, it was fortunate for the crew that the weather conditions had remained good and the vessel was not close to shore, as a dead ship in bad weather close to rocks can escalate into a life-threatening situation very quickly.**
2. **Accidents are usually a combination of factors; in this case, dirt in the fuel tanks, running part-full fuel tanks, and a longer than usual fishing trip. Given the poor fishing at the start of the trip, it is understandable to want to remain out fishing until a better catch was achieved. However, it is worth spending time considering what implications a change of plan may have on the safety of the vessel and crew.**

Caught on the rocks

Narrative

A potting fishing boat was in familiar waters and close inshore; it was a breezy day with a gentle swell and good visibility. The crew were working pots on deck when propulsion was unexpectedly lost. The effect of the swell then started moving the boat closer inshore until contact was made with the rocks.

The skipper raised the alarm using VHF radio and the local lifeboat was very soon on the scene; the crew also prepared for abandonment. Unfortunately, the lifeboat could not get alongside the fishing boat due to the swell and very shallow water.

As the tide fell, the sea receded from the rocks and the fishing boat was left high and dry (see figure), so the crew walked ashore to safety. The boat's hull was damaged by the grounding and it could not be repaired.

Figure: Grounded fishing boat

The Lessons

1. Potting fishing operations are routinely conducted very close inshore, which means that there can be very little time to respond to incidents, especially on a lee shore. In these situations, every hazard should be considered with the options available to stay safe considered. In such close proximity to shore, the anchor should ideally be ready for letting go immediately, as a contingency to loss of power.

2. After the accident, it was established that propulsion was lost because the propeller had almost certainly been fouled by the back rope from the string of pots that the boat was working. In this situation, every effort must be made to manoeuvre the boat to avoid the risk of running over your own gear.

3. The skipper raised the alarm immediately and a lifeboat was on the scene very soon after; the crew also prepared for abandonment. However, as events unfolded, it was safest to stay on board until the tide went out. Nevertheless, this highlights the importance of conducting drills and being prepared for emergencies.

An invisible and deadly hazard

Narrative

A large pelagic fishing trawler was in its home port undergoing maintenance, which included deep cleaning of the refrigerated salt water (RSW) tanks. RSW tanks were used to store fish, keeping them fresh in chilled water provided by large refrigeration plants. In this vessel, the refrigerant in use was Freon, which has since been phased out for environmental protection reasons.

The crew were all busy with cleaning and maintenance tasks and one of the engineers had entered an RSW tank through its access hatch (Figure 1). Sometime later, another crewman, who was looking for the engineer, saw him collapsed and unconscious in the bottom of the tank. The crewman raised the alarm by shouting loudly, and other members of the crew ran to assist. Three other crew entered the tank as part of the rescue effort, but they all suffered breathing difficulties and one also collapsed. The unconscious engineer was eventually rescued out of the tank by crew wearing breathing apparatus; however, he could not be resuscitated.

A technical analysis of the refrigeration system after the accident discovered that Freon gas had leaked into the RSW tank through corroded tubes in a heat exchanger. The heavy Freon gas had displaced the air, which meant that the atmosphere in the tank could not support life.

Figure 1: RSW tank access hatch

Figure 2: The view down through the access hatch into a pelagic fishing vessel's RSW tank

The Lessons

1. Freon was the hazard on this occasion, but there are many hazards associated with enclosed spaces, including exposure to: heat, flooding, flammable gasses, toxic gasses, or oxygen deprivation. The RSW tank in this accident met the internationally agreed definition of an enclosed space because it had limited openings, inadequate ventilation and was not intended for worker occupation. Safety precautions must be taken, including atmosphere testing, ventilation, emergency communications and an escape plan, to ensure crew safety when entering any enclosed spaces.

2. There are always additional hazards associated with lone working – in this case, the engineer collapsing in the RSW tank initially went unnoticed. Care should always be taken to ensure that risks associated with lone working are understood and additional mitigation measures, such as radio communication with other crew, are in place.

3. The view into an enclosed space (Figure 2) should cause concern and crew should ask themselves, "*Is this safe and are appropriate precautions in place?*"

Part 3 – Recreational Vessels

Recreational boating is without doubt very popular and great fun – I would encourage anyone to get on the water, but it must be done safely.

Aside from my career as a chief engineer in the merchant navy and, more recently an MAIB inspector, my love of the water started at a young age. One of my earliest experiences of being afloat was kayaking on a lake during a cub scout camping trip and, from that moment on, I took every opportunity to get out on the water. A few years later, while an engineering cadet at South Tyneside College, I bought an old speed boat and, after extensive tinkering, enjoyed many trips with friends out of my home port of Hartlepool.

I went on to own several craft, including a number of rigid inflatable boats (RIBs). As the RIBs I owned grew in size, my whole family began to embrace my hobby and we shared countless days touring the Solent. The dangers were never too far away though and I can appreciate how fast-changing sea conditions quickly change a fun experience into a challenging situation for the skipper.

Having spent lots of family time on the water, I decided to venture into the commercial world and offer my RIB for charter. After completing the process of coding the vessel and ensuring I was qualified to operate safely, I launched my business and met many great charter guests over the next few seasons. Working among lots of other local charter companies, the responsibility of a skipper on a small vessel at sea with paying guests on board cannot be underestimated; the temptation to turn a RIB charter into a high-speed thrill ride is very real, and one that must be dealt with professionally – we all want our guests to have a great time, but never at the expense of safety.

As highlighted in Cases 23 and 24 of this digest, a pleasant outing can take a turn for the worse in an instant and the skipper has a duty of care to maintain a good lookout and prioritise passenger safety.

The interim report[1] for the MAIB's ongoing *Seadogz* investigation into a fatal commercial RIB collision in Southampton Water raised the following urgent safety considerations:

- the skipper was operating single-handedly, at high speed, and did not see the navigation buoy, which was directly ahead, for 10 seconds before impact
- during the trip, the passengers became accustomed to passing close by large navigation buoys at speed and were, therefore, unconcerned at the craft's approach to the buoy and did not attempt to alert the skipper
- high-speed figure-of-eight turns increased the risk of hooking or spinning out

This interim report recommended that all UK operators of small commercial high-speed craft review their risk assessments and take appropriate measures to ensure their compliance with the Passenger Safety on Small Commercial High Speed Craft & Experience Rides Voluntary Code of Practice.

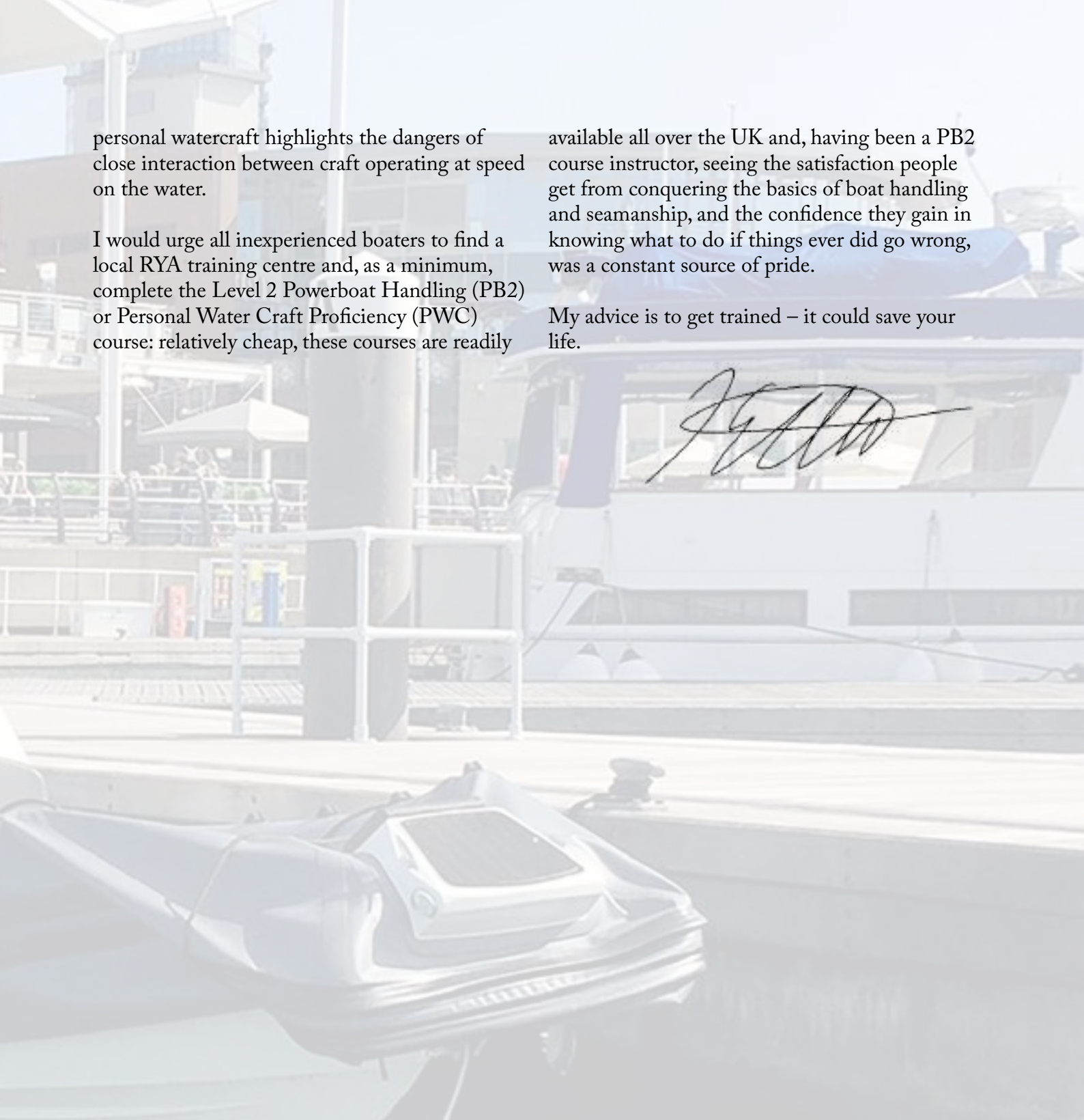
With overseas travel restricted due to COVID-19, the MAIB has seen a marked increase in recreational accidents. However, while it is very easy to buy a boat or personal watercraft from an online auction site and put it to sea, the MAIB's investigation into a fatal collision between the RIB *Rib Tickler* and a

[1] https://www.gov.uk/maib-reports/collision-between-the-high-speed-passenger-craft-seadogz-and-a-navigation-buoy-with-loss-of-1-life

personal watercraft highlights the dangers of close interaction between craft operating at speed on the water.

I would urge all inexperienced boaters to find a local RYA training centre and, as a minimum, complete the Level 2 Powerboat Handling (PB2) or Personal Water Craft Proficiency (PWC) course: relatively cheap, these courses are readily available all over the UK and, having been a PB2 course instructor, seeing the satisfaction people get from conquering the basics of boat handling and seamanship, and the confidence they gain in knowing what to do if things ever did go wrong, was a constant source of pride.

My advice is to get trained – it could save your life.



IAIN ELLIOTT
MAIB INSPECTOR OF MARINE ACCIDENTS

Iain started his engineering career with P&O/Princess Cruises, serving on the largest cruise ships in the world at the time and progressing through the ranks from engine room watchkeeper to senior management. After getting married and becoming a father, and having spent several years cruising around the world, Iain left the cruise industry and moved into the offshore oil and gas sector, serving as second engineer and chief engineer on platform supply vessels. Again, Iain spent a few years travelling the world, this time to various oil fields, spanning both the east and west coasts of Africa, Brazil and Singapore. Iain eventually moved closer to home and served as chief engineer on various vessels in the towage sector, including seagoing escort tugs and large harbour towage vessels. Iain is a qualified power boat instructor and ran a RIB charter business for a number of years. In 2019, Iain joined the MAIB as an engineering inspector of marine accidents.

Night navigation is not easy...

Narrative

One autumn evening, after a day out afloat in an 8m RIB, a party of six adults were travelling back to the owners' home marina. It was a beautiful night with light winds and a calm sea, there was no moon, and it was fully dark as they made passage past a large coastal town. The owners held RYA qualifications, and another experienced boater was at the helm, accompanied by one of the owners. The remainder of the party were sat at the rear of the RIB.

The first part of the passage had gone well, and the helmsman and owner were navigating using the installed chart plotter and looking out ahead. The RIB was making about 12kts through the water when it struck what appeared to be an unlit object and came to a sudden stop. Three of the occupants suffered minor injuries and all were shaken. The helmsman was thrown against the steering wheel, which buckled (Figure 1) and made the steering inoperable. His head struck the screen, cutting his forehead and damaging the Perspex. The RIB had suffered damage to the bow section, and both inflatable tubes had been punctured (Figure 2); however, in the calm seas, it did not take on water.

The owners anchored the RIB and called the coastguard, who requested a local lifeboat attend. A local workboat offered to assist, and, with the lifeboat standing by, the workboat took the RIB in tow to a marina in the coastal town. None of the party required medical treatment and, once the RIB was secure, they organised transport home.

Figure 1: Buckled steering wheel

The RIB was badly damaged, and when taken out of the water it was clear that it had struck a green object (Figure 3), probably a starboard hand marker buoy. Investigations by the local port authority indicated a possible candidate, but all lights were fully operational when checked the next day.

Figure 2: The RIB, showing damaged tubes

The Lessons

1. Navigation at night in small boats is always more difficult than in daylight and requires careful planning and great care. The owner and helmsman were keeping a good lookout and using a plotter, but they still hit a relatively large, charted and, almost certainly, lit object, causing some injuries and major damage to the RIB. A large amount of street and building lighting was visible along the coast, which can make picking out even bright navigation mark lights difficult. This can be even harder in a small boat with a relatively low driving position. Knowing where you are and being aware of the hazards ahead is essential. Locating and checking off each hazard as you approach is important and, if in any doubt, slowing down until you find the hazard is good practice.

2. The owners and their guests were all wearing lifejackets and the owners assessed the situation quickly, anchored the RIB, and called the coastguard for help. Injuries were minor, and the rescue effort only required a short tow to safety. Had the outcome been worse, the party were well prepared, took quick action and help would have arrived quickly. Have you thought through emergency actions in advance and do you know how to call for help?

Figure 3: Damage to bow section, showing green paint

We booked for fishing, not swimming

Narrative

A group of six recreational sea anglers booked a fishing trip after seeing an advert on social media. On the day of the trip the anglers met up with the skipper at a local marina before heading out to sea on board the sturdy sea angling vessel (see figure).

The forenoon had proved fruitless with only a few fish caught, so the skipper agreed to relocate the boat in search of a better catch in the afternoon. As the skipper slowed the boat down at the new fishing grounds, he heard the bilge alarm sounding, and the boat started to adopt a steep stern trim.

The skipper realised that the boat was sinking so made a "Mayday" call using the VHF radio, which was acknowledged by the coastguard. He then grabbed the liferaft from the wheelhouse and told the passengers to go to the bow area to stay dry; he also handed out lifejackets to everyone. Despite the skipper pulling the liferaft's painter it failed to inflate so, as the boat sank, everyone slipped into the sea.

The "Mayday" call had also been heard by another fishing boat that was a long way off; the skipper of which had the presence of mind to phone a friend, who he knew had a leisure powerboat that would be capable of assisting quickly. The powerboat owner dashed to the harbour, got underway and was first on the scene, about 20 minutes after the accident.

When the powerboat arrived, the owner was able to assist everyone out of the water; they were all very cold and several had started to really struggle. The coastguard helicopter was next to arrive and, after ambulance paramedics had checked everyone ashore, it was used to fly three of the sea anglers to hospital, all of whom were exhibiting hypothermic symptoms. Fortunately, they were discharged from hospital later the same day.

Figure: The fishing vessel before the accident, showing the liferaft on the foredeck – on the day of the accident, the liferaft was stowed inside

The Lessons

1. Unexpected immersion in cold sea water has immediate and profound effects on the human body. This starts with the initial cold shock, then cold incapacitation leading to hypothermia and death. When help arrived, it was evident that all seven people in the water were in immediate danger, showing signs of incapacitation with some of them on the verge of giving up. Nobody in the water was able to climb the ladder into the powerboat unaided.

2. Call for help as soon as the situation starts to deteriorate. In such circumstances, it is critical that the alarm is raised as soon as possible. It was extremely fortunate that the skipper had the foresight to call "Mayday" as soon as the situation worsened, and that this call was heard and acted upon. In this case, the decision of another fishing boat skipper to alert his friend was also extremely helpful.

3. Although the cause of this flood was never determined, there is no doubt that it was rapid, quickly overwhelming the boat, which sank soon after the bilge alarm sounded. In a vessel of this nature, the significant flooding risks are from the hull structure or hull valves, in particular engine cooling inlets and 'wet' exhausts. It is vital for the safe operation of small boats that hull fittings are regularly inspected and well maintained. Measures to counter flooding, including bilge pumps and wooden bungs, should also be working and available.

4. It is important that everyone on board is familiar with the boat's safety equipment. Some of the sea anglers did not know how to don their lifejackets properly because the skipper had not conducted a safety brief prior to departure.

5. The liferaft that failed to inflate was not recovered, so the reason it did not work will remain a mystery. Nevertheless, this accident serves as a reminder to keep <u>all</u> safety equipment regularly serviced and in good working order.

6. The voyage on the day of the accident was commercial in nature as the sea anglers had paid the skipper for their day out. However, the boat had recently changed hands and, as a result, its commercial certification had lapsed. Had the new owner made arrangements for a survey, this would have included an assessment by a surveyor that the vessel was structurally sound and that the hull fittings were in good condition. It is reasonable to assess that such an inspection could have identified the weaknesses on board that resulted in the flooding.

Tanker, what tanker?

Narrative

A single-handed yacht skipper put to sea in his small classic yacht for a familiar coastal passage. It was dark and conditions were calm and clear; he had departed in the early hours of the morning to benefit from favourable tidal streams. With little wind, the skipper decided to motor-sail.

After leaving the harbour, the skipper was aware that he was passing through a designated pilot boarding area, so ducked below to the chart table to check the situation on his automatic information system (AIS) display. The yacht's AIS display had been recently installed and could not be seen from the cockpit. Before going below, the skipper had seen lights on the horizon, but was not concerned as he assessed this was from offshore installations in the distance.

At the same time, a 38000 gross tonne chemical tanker was proceeding outbound at slow speed in the designated area, to disembark its pilot. When the pilot cutter was alongside the tanker, the coxswain saw the yacht's navigation lights close by. As soon as the pilot was safely on board the cutter, the coxswain manoeuvred clear of the tanker and approached the yacht. The cutter's horn was sounded and its searchlight was used to illuminate the yacht to alert the skipper to the risk of collision. The cutter's crew could also see that there was no-one in the yacht's cockpit. Soon after, the skipper emerged from the cabin and saw that a collision was imminent. He immediately put the yacht's engine astern but it was too late and the yacht collided heavily with the side of the tanker (Figure 1). The skipper was not injured and the cutter escorted the damaged yacht safely back to harbour (Figure 2).

Figure 1: A still image from the pilot cutter's external CCTV camera, showing the yacht with the skipper at the bow assessing the damage just after collision

Figure 2: Damage to the classic yacht's bow

The Lessons

1. Vessels are, at all times, obliged by the 'rules of the road' to keep a good lookout by all means available, but primarily by sight and hearing. For single-handed sailors, this can be very difficult to sustain. In this instance, by going below, the skipper denied himself the opportunity to detect and avoid this large, close tanker by visual observation that, in these conditions, would have been the best method.

2. The purpose of a designated pilot boarding area is to warn mariners of the likelihood of underway boat transfers that restrict the manoeuvrability of vessels embarking and disembarking pilots. The skipper was familiar with the area and had seen lights before going below. At night, it can be very easy to misinterpret the distance or meaning of lights, and the presence of background lights can add to the difficulty of determining the situation.

3. Both the tanker and the pilot cutter were transmitting AIS data, but the yacht skipper had not seen any tracks on his display. It has not been possible to determine why the skipper's AIS display was not showing the other vessels; however, it was newly installed. In these circumstances, it is important to build confidence that new equipment is functioning correctly, ideally by comparing the received AIS data with other means of detection.

APPENDIX A

INVESTIGATIONS STARTED IN THE PERIOD 01/03/2021 TO 31/08/2021

Date of Occurrence	Name of Vessel (PLN/IMO number)	Type of Vessel	Flag	Size	Type of Occurrence
05/03/21	*RRS Sir David Attenborough* (9798222)	Research ship	Falkland Islands	15609 gt	Lifeboat deployment failure
03/04/21	*Annie E* (9827190)	Workboat	UK	90 gt	Accident to person
02/05/21	*Saint Peter* (LH22)	Creel boat	UK	7.90 m	Accident to person (1 fatality)
18/06/21	*Angelena* (BM271)	Stern trawler	UK	13.99 m	Capsize | Foundering | Loss of ship
24/06/21	*Reul-A-Chuain* (OB915)	Fishing vessel	UK	47 gt	Accident to person (1 fatality)
06/07/21	*Bella*	Survey vessel	UK	5.62 m	Flooding | Foundering
20/07/21	*Clipper Pennant* (9372688)	Ro-ro cargo vessel	Cyprus	14759 gt	Accident to person (1 fatality)
25/07/21	*BBC Marmara* (9454228)	General cargo vessel	Portugal	5344 gt	Grounding
29/07/21	*Pioneer* (NN200)	Fishing vessel	UK	7.94 m	Accident to person (1 fatality)
26/08/21	*Mona Manx* (9801706)	Bulk carrier	Isle of Man*	35606 gt	Accident to person (1 fatality)
28/08/21	*Harriet J* (AH180)	Potter	UK	7.19 m	Accident to person (1 fatality)
30/08/21	*Teal Bay* (9343637)	Bulk carrier	Isle of Man*	20236 gt	Accident to person (1 fatality)

* Under investigation on behalf of the Isle of Man Ship Registry in accordance with the MOU between the MAIB and Cat 1 Red Ensign Group

Appendix A correct up to 31 August 2021, go to www.gov.uk/maib for the very latest MAIB news

Reports issued in 2021

Minx / Vision
Collision between a motor yacht and an anchored motor yacht at Île Sainte-Marguerite, near Cannes, France on 25 May 2019, with loss of 1 life.
Report 1/2021 Published 28 January

Finlandia Seaways
Catastrophic main engine failure resulting in an engine room fire and injury to the third engineer on board a cargo vessel, 11 miles east of Lowestoft, England on 16 April 2018.
Report 2/2021 Published 25 February

Ocean Quest
Flooding and foundering of a fishing trawler 70 miles north-east of Fraserburgh on 18 August 2019.
Report 3/2021 Published 9 April

Diversion
Carbon monoxide poisoning on board a motor cruiser at the Museum Gardens quay on the River Ouse, York, England on 4 December 2019, with loss of 2 lives.
Report 4/2021 Published 15 April

Olivia Jean
Crush incident on board a scallop dredger north-east of Aberdeen, Scotland on 28 June 2019, with loss of 1 life.
Report 5/2021 Published 12 May

Seadogz
Collision between a high speed passenger craft and a navigation buoy on Southampton Water, England on 22 August 2020, with loss of 1 life.
Interim Report Published 20 May

Beinn Na Caillich
Crush incident involving a fish farm worker during transfer from a workboat to a feed barge in Ardintoul, Glenshiel, Scotland on 18 February 2020, with loss of 1 life.
Report 6/2021 Published 26 May

Kaami
Grounding of a general cargo vessel on Sgeir Graidach, the Little Minch, Scotland on 23 March 2020.
Report 7/2021 Published 3 June

Arrow
Grounding of a ro-ro freight ferry in the approach channel of Aberdeen Harbour, Scotland on 25 June 2020.
Report 8/2021 Published 2 July

Stolt Groenland
Cargo tank explosion and fire on board a chemical tanker in Ulsan, Republic of Korea on 28 September 2019.
Report 9/2021 Published 20 July

Globetrotter
Foundering of a wooden hulled motorboat off the coast of Fleetwood, England on 31 May 2020, with loss of 1 life.
Report 10/2021 Published 6 August

Appendix B correct up to 31 August 2021, go to www.gov.uk/maib for the very latest MAIB news

Safety Bulletins issued during the period 01/03/2021 to 31/08/2021

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY BULLETIN

SB1/2021 MARCH 2021

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."

Press Enquiries:
01932 440015

Out of hours:
020 7944 4292

Public Enquiries:
0300 330 3000

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.

All bulletins can be found on our website:
https://www.gov.uk/maib

For all enquiries:
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Multiple cruise ship anchor failures during autumn/winter 2020-21


Image courtesy of The Financial Times

Note: This photograph is included to simply illustrate the size and number of cruise ships anchoring off the UK south coast during the recent autumn and winter period.

MAIB SAFETY BULLETIN 1/2021

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* provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The MAIB has become concerned at the number of recently reported marine incidents involving cruise ship anchor systems failures and would like to bring this issue to the attention of the cruise industry and to highlight the lessons that can be learned to prevent future incidents.

Captain Andrew Moll
Chief Inspector of Marine Accidents

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 not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.gov.uk/maib
Press Enquiries: 01932 440015 Out of hours: 020 7944 4292
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APPENDIX C

BACKGROUND

In early 2020 the COVID-19 pandemic forced the international cruise industry into an unprecedented operational pause, resulting in many cruise ships anchoring off the UK south coast for long periods of time. The MAIB has been made aware of several marine incidents since October 2020 where cruise ship anchors or anchor cables have failed, often while trying to ride out named winter storms. One cruise ship lost both its anchors within a week.

The strength of anchoring equipment is defined by ship Classification Rules and it is intended for temporary mooring of a ship within a harbour or sheltered area. In good holding ground, the anchoring equipment should be able to hold the ship to a maximum wind strength of 48 knots in flat water, but this reduces to a maximum of 21 knots wind strength in seas with a significant wave height of 2m. The International Association of Classification Societies (IACS) advises that the anchoring equipment is not designed to hold a ship off fully exposed coasts in rough weather or to stop a ship that is moving or drifting. In these conditions the loads on the anchoring equipment increase to such a degree that its components may be damaged or fail due to the high energy forces generated, particularly with ships with high windage.

INITIAL FINDINGS

Many cruise ships have been anchoring for extended periods of time and in conditions far worse than they would usually anchor, in areas with significant tidal streams and currents. Such operations are accelerating the wear rate of the anchoring equipment and in adverse conditions are exceeding the design limits of the anchoring systems. Failures have occurred in joining links, anchor chain common links, D-links and across the anchor crown causing the flukes to be lost.

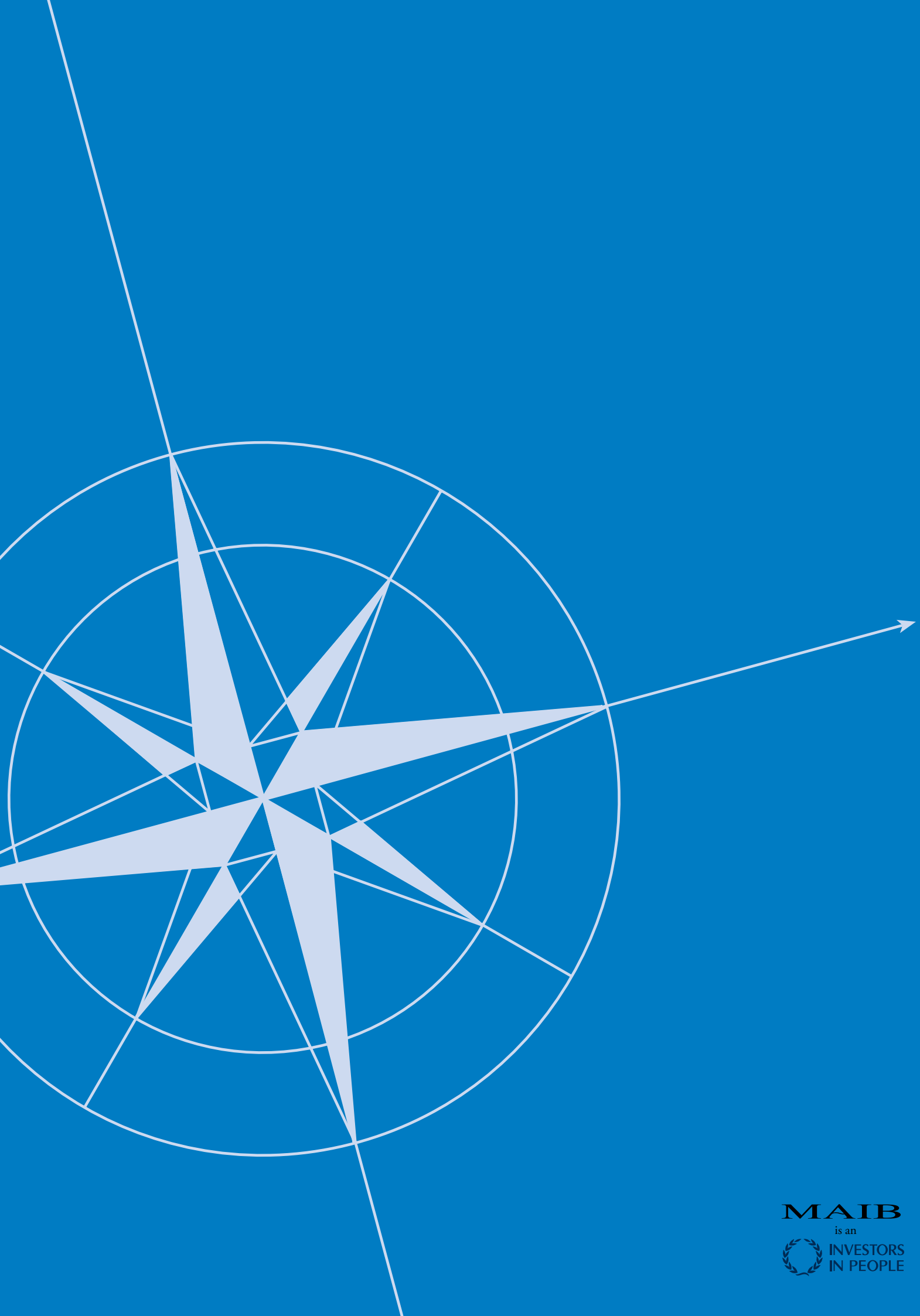
Of the failures reported so far, the most frequent has been failure of the joining links connecting two shackles of cable, often when a significant amount of cable was out, in some cases as much as 11 shackles on deck. Although the additional weight of the cable can prevent the vessel dragging anchor, in adverse conditions it will also increase the forces acting on the cable and anchor.

When combined with the significant yawing caused in high winds, and cable lying unused in a chain locker since the last time it was end for ended, it is unsurprising that several anchor equipment failures have occurred. The issue is further exacerbated when the scope of cable remains constant, causing a single point of loading and wear, for example, where the cable is in contact with the hawse pipe. The indications are that anchor equipment has been failing due to operational issues rather that fabrication defects.

SAFETY LESSONS

- Operational limits for anchoring must be sufficiently cautious to ensure weighing anchor is not left too late, risking overloading anchor equipment. If strong winds are forecast, proactive action should be taken to seek a more sheltered anchorage in good time or proceed to sea and ride out the weather. Do not wait until the anchor drags or until most of the anchor cable has been paid out before weighing anchor.
- Steps should be taken to minimize the wear on the anchoring equipment as far as possible. When the opportunity presents itself, the anchor in use should be rotated and the scope of cable varied on a regular basis to minimize single point loading. An appropriately experienced crew member should also carry out regular checks on the windlass brake condition and areas where the cable is in contact with the ship.
- While at anchor for significant periods, ensure all watchkeepers are confident in the actions to be take in the event of dragging or losing an anchor and there is a contingency plan ready for implementation in the event of having to proceed to sea or re-anchor. Also, watchkeepers and senior officers must be aware of the reporting requirements to the coastal state in the event of losing an anchor so that mitigation measures can be put in place if required.
- As the restrictions on the cruise industry ease, it must be remembered that this period of prolonged anchoring may have decreased the life span of the anchoring equipment. A full assessment of the future suitability of the anchoring equipment should be undertaken at the earliest opportunity or the next dry-docking period.

Issued March 2021



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