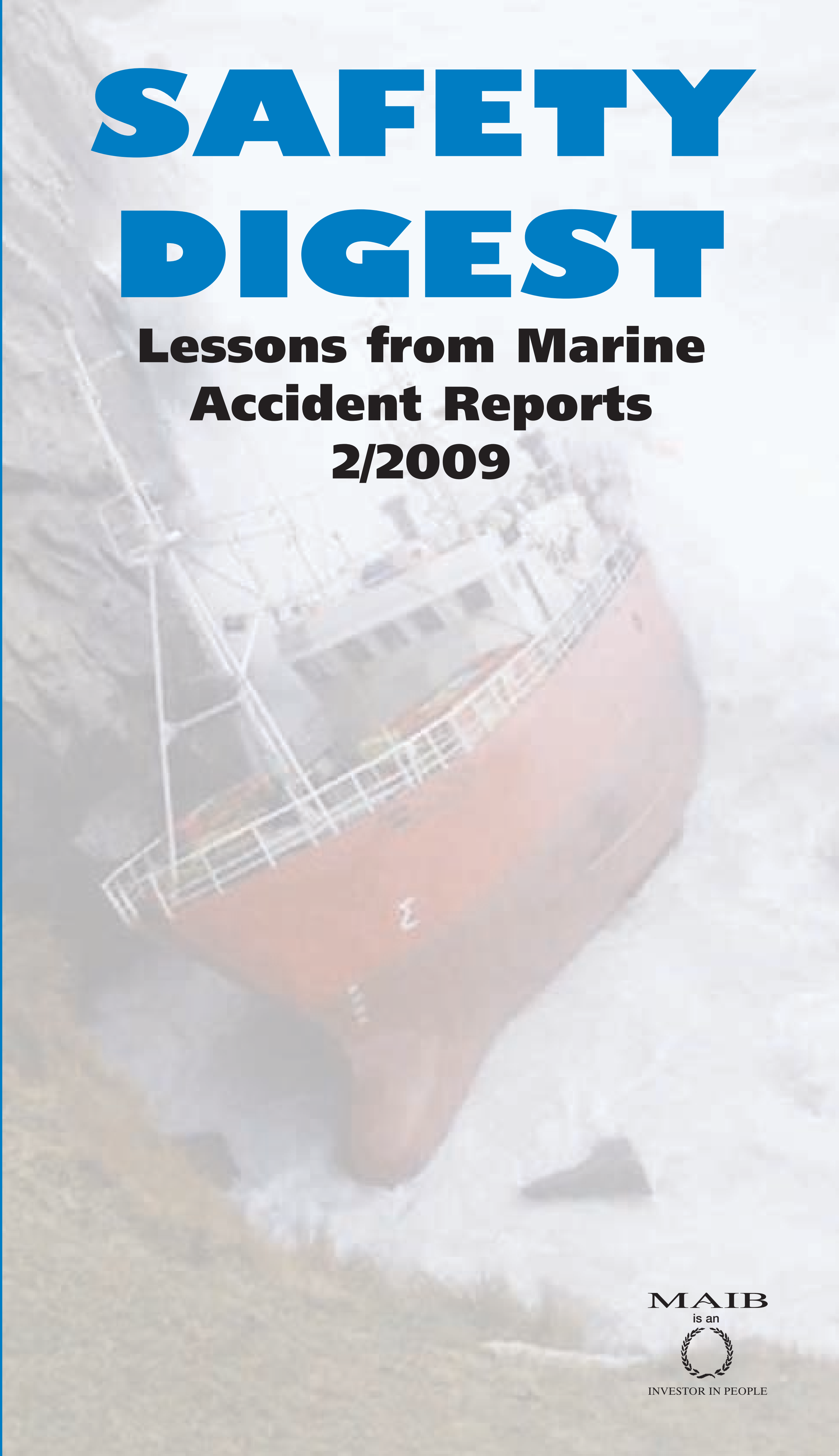
SAFETY DIGEST

Lessons from Marine Accident Reports 2/2009

MARINE ACCIDENT INVESTIGATION BRANCH

MAIB



MAIB is an INVESTOR IN PEOPLE

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No 2/2009

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MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department for Transport, the Chief Inspector of Marine Accidents being responsible directly to the Secretary of State for Transport. The offices of the Branch are located at Mountbatten House, Grosvenor Square, Southampton, SO15 2JU.

This Safety Digest draws the attention of the marine community to some of the lessons arising from investigations into recent accidents and incidents. It contains information which has been determined up to the time of issue.

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

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

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MARINE ACCIDENT INVESTIGATION BRANCH

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

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

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

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Glossary of Terms and Abbreviations

AB	–	Able seaman	Hz	–	hertz
ARPA	–	Automatic Radar Plotting Aid	LPG	–	Liquefied Petroleum Gas
AVR	–	Automatic Voltage Regulator	LSA	–	Life Saving Appliance
C	–	Celsius	m	–	metre
Cable	–	0.1 nautical mile	"Mayday"	–	The international distress signal (spoken)
CCTV	–	closed circuit television	MCA	–	Maritime and Coastguard Agency
CO_2	–	carbon dioxide	MGN	–	Marine Guidance Note
CPA	–	Closest Point of Approach	MRCC	–	Maritime Rescue Co-ordination Centre
CPP	–	Controllable Pitch Propellers	MSDS	–	Material Safety Data Sheet
DSC	-	Digital Selective Calling	MSN	–	Merchant Shipping Notice
ECR	-	Engine Control Room	OOW	-	Officer of the Watch
EEBD	-	Emergency Escape Breathing Device	OSV	–	Offshore Supply Vessel
EPIRB	-	Emergency Position Indicating Radio Beacon	PPE	–	Personal Protective Equipment
ETO	-	Electro Technical Officer	RIB	–	Rigid Inflatable Boat
FRC	-	Fast Rescue Craft	RNLI	–	Royal National Lifeboat Institution
GPS	-	Global Positioning System	Ro-Ro	–	Roll on, Roll off
GRP	-	Glass Reinforced Plastic	RYA	–	Royal Yachting Association
GT	–	Gross tonnes	SDS	–	Safety Data Sheet
HP	–	Horsepower	VHF	–	Very High Frequency
HRU	–	Hydrostatic Release Unit	VTS	–	Vessel Traffic Services

Introduction

This edition of the Safety Digest contains a number of important safety lessons. None of them is new, but they all need re-emphasising; please ensure you think about the lessons, and take the appropriate precautions, to safeguard your own life and those of your crew:

- Case 4 – which is of note to fishermen as well as merchant seafarers – is a classic over reliance on technology. Technology provides a wonderful aid to seafarers, but does not replace the application of professional knowledge and good seamanship. In this case, the visual aspect of the other vessel, and its relative vector on radar, should have alerted the OOW and the master to the fact that the ARPA was dangerously in error. Do not blindly take information from electronic aids at face value!
- Case 6 is another example of a seafarer tragically being killed by a watertight door. MAIB has just published its report into a similar fatality on board *Eurovoyager* (www.maib.gov.uk/publications/investigation_reports/2009/Eurovoyager.cfm). Companies and masters must ensure that watertight doors are always operated in 'local', except in an emergency, and all seafarers *must* adhere to the correct procedures for passing through such doors.
- Cases 17 and 20 are stark reminders of the dangers posed by bights. Everyone must take extra care when working ropes and wires, and ideally a supervisor should be free to watch out for everyone's safety.
- Cases 17, 18, 21 and 23 clearly demonstrate that lifejackets are no use if they are not worn. Even having them "readily to hand" is rarely enough, as accidents often happen without warning. I would ask everyone to read the heartfelt first-hand account (see page 52) of a skipper who, earlier this year, watched one of his crew die for want of a lifejacket. Modern lifejackets can be worn without encumbrance – please make sure that everyone on deck in a fishing vessel or other small craft routinely wears one. Within a short time, they will become as routine as wearing seatbelts in cars.
- Cases 18 and 21 show how important liferafts are, and the importance of fitting them, even if they are not a legal requirement. In both cases, it is likely that the crew would have died if it hadn't been for their liferafts.
- Finally, Case 25 is a good news tale. In a leisure angling boat, which had no legal requirement for any safety equipment, a man's life was saved by wearing a lifejacket and because the boat carried a VHF radio and flares.

Stephen Meyer
Chief Inspector of Marine Accidents
August 2009

A note to our readers: please be aware that our address has changed to:

MAIB,
Mountbatten House,
Grosvenor Square,
Southampton SO15 2JU

Our telephone/fax numbers remain unchanged

Part 1 – Merchant Vessels

The MAIB strives to share with us all the hard learned lessons of others to help make our daily work onboard that bit safer; we all need to go home in at least as good a condition as when we joined the ship. Reading the articles in this edition of the 'Digest' again illustrates the challenge we all face in delivering consistently safe operations onboard our ships. There is no magic bullet that will cure all our ills; it is simply a matter of persistent commitment to safe working practices by all of us whether ashore or at sea, day and night.

The one thing that strikes me about all the articles is that there are no new risks in there. There is nothing that we haven't seen before, but that is not to belittle the people involved – "there, but for the grace of God, go I". So what is it that lies behind these incidents? Could I venture the word 'complacency'? It feels pretty uncomfortable doesn't it? So, what does that word mean to me in our industry, let's explore that a bit…

Knowledge and Experience are two very different things. Knowledge is academic and learnt in the classroom, Experience is gained on the job, doing the job. Experience provides us with real life 'feedback', we get actual sensations and feelings not available in the classroom. The time we had our first near miss on the bridge as junior navigators will be crystal clear to us even today – mine certainly is! Experiences like that work for the better in the future, we have become sensitised to particular situations and we are more alert to them in the future; we become more cautious or vigilant. But, what about an operation that we have conducted dozens, maybe hundreds, of times and have experienced no problems during it, for example – going alongside a familiar berth, doing another boat drill, another mooring operation etc. But can experience serve to desensitise as well? – I think so. I can see in this 'Digest' examples of where experienced professionals have been caught out by years of 'feedback' which is saying to them subconsciously "routine operation, no past incidents, low risk". This can then lead to reduced vigilance or even to other tasks being inappropriately prioritised.

'Complacency'. It's an ugly word isn't it? Definitely uncomfortable. It is a word however that describes the trap of falling into a desensitised routine operation where you may make some assumptions about the outcome without really thinking it through. You don't think you need to think it through, you've done it lots of times before, you know how it will work out, or the other guy has always done what he was supposed to, and it's been OK before hasn't it?

So how do we break out of that cycle? Well, I am sure you will get a list as long as your arm from the all embracing 'safety culture' through to its separate components, but the one thing that we can all do is revisit some of these routine tasks and try to work out where they could go wrong – a 'risk assessment'. That risk assessment might identify inadequacies in vessel design, in equipment, in operating procedure or in the competencies required for an activity. Once identified, we are in a position to start doing something about it, BUT, only if it is a robust, 'from the heart', risk assessment. If we take any other approach to it and get a tick in the box, we will have only served to steepen the slippery slope of complacency.

So, if I am going to hang my hat on risk assessment as a good place to start, what would my one piece of advice be? It would be Think, Think, Think. When you do a risk assessment is it a piece of paperwork that is put together to 'allow' an operation to go ahead, one that you are going to do anyway because 'you have to', is it used to justify the plan you had or the way you already do it?

At this point it is vital that the ship's staff are properly encouraged and supported by their shore based colleagues. Was the risk assessment carried out by people who understand the risks and have the necessary experience (it's the double edged sword; does experience = near miss scare, or, experience = nothing ever goes wrong)? Do you really push hard to consider all the things that could go wrong if you had a really bad day? Have you done it to keep yourself and your colleagues free from harm?

The MAIB is part of our industry, their role is non-judgemental, they don't seek to apportion blame or prosecute; their one objective is to make the world of the seafarer safer. If, like me, you are a regular reader of the 'Digest' and dive straight into the articles, I need not encourage you further. If however, you are new and have got to me early on, then I encourage you to keep going and really reap the benefits of this publication produced for the benefit of all, by our colleagues.

And, finally, I would ask you all to look after each other. We are all fallible, fragile human beings, not machines. We can have bad days when our experience takes us down the road of complacency and we need a good buddy to pull us back. Think, Think, Think, what are the real risks, how I could get hurt, how could this go 'pear-shaped', what can I do to look after my shipmates?

Next time you fill in a confined space entry permit, tick the boxes in the arrival/departure checklist, or carry out a risk assessment, think about who you are doing that for – it should be you and your family.

Oh! Before I go, that near miss you still have etched in your memory. Have you shared it with others and used it to explain why a particular behaviour or practice is so important to you now. Share your "good" experience, not the bad.

Stay safe.

Captain Robert W. Fleming MNI

Started as a Navigating Cadet with BP Tanker Company in 1971 serving in crude and product tankers worldwide. A period with BP Exploration & Production saw service on a semi-submersible in the North Sea and then a two year shipyard period with a new build dynamically positioned offshore production vessel.

In 1989 Bob came ashore into the BP Shipping office and has progressed through various roles including marine manager, safety manager, vetting manager, DPA & CSO.

He is also a non-executive director of MENAS (Middle East Navigation Aids Service), a member of the Honourable Company of Master Mariners, a Younger Brother of Trinity House and a member of the Nautical Institute.

No Room For Mistakes

Narrative

An offshore supply vessel (OSV1) and a sister vessel (OSV2) moored stern to stern alongside the south side of a tidal basin (Figure 1), were instructed to exchange berths by the port control. Each vessel was equipped with azimuth stern thrusters and a bow thruster, but the bow thruster fitted to OSV1, which was the easterly of the two vessels, was defective. As OSV2 was available to assist if required, the master of OSV1 decided not to request the attendance of a harbour tug.

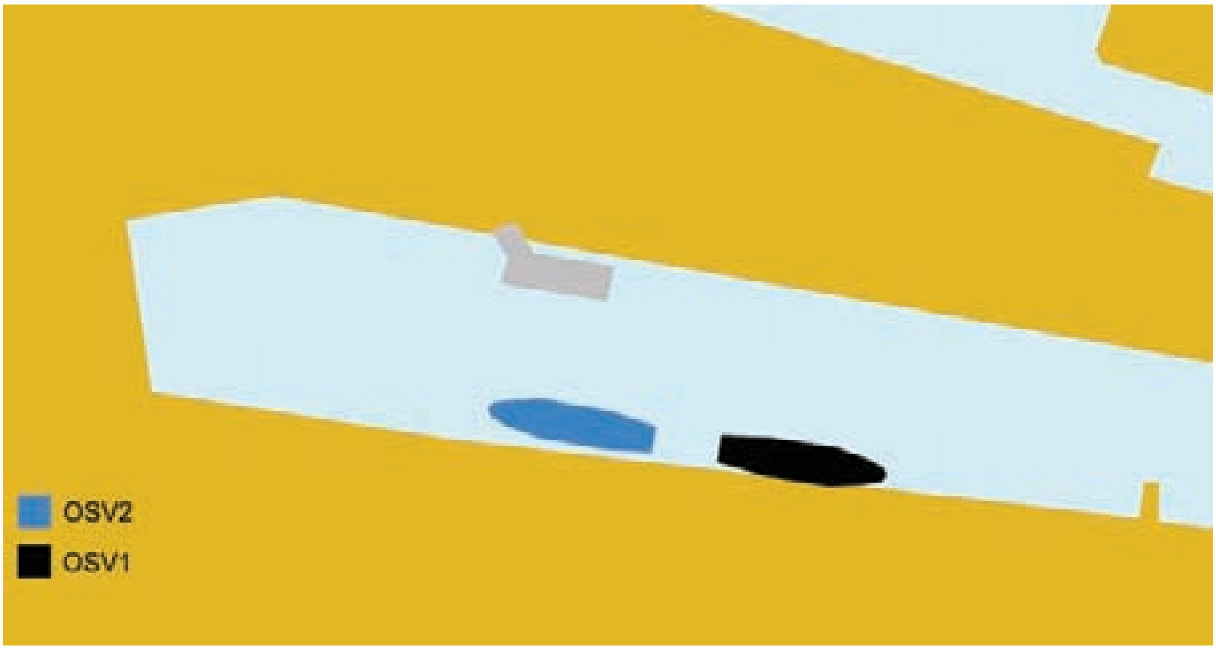


Figure 1

OSV2 slipped, manoeuvred into the centre of the basin, and then proceeded astern. During this manoeuvre, OSV1 also let go all ropes, and as soon as OSV2 was on the port beam, went astern (Figure 2). At this point the master of OSV1 was controlling the vessel's propulsion from the aft-facing control station. He was accompanied on the bridge by the chief officer, who was keeping a lookout astern. The bow of OSV1 was soon influenced by the 10-15 knot south-easterly wind and was blown towards the centre of the basin. To check this movement, the master moved to the forward control station and adjusted the stern azimuth units.

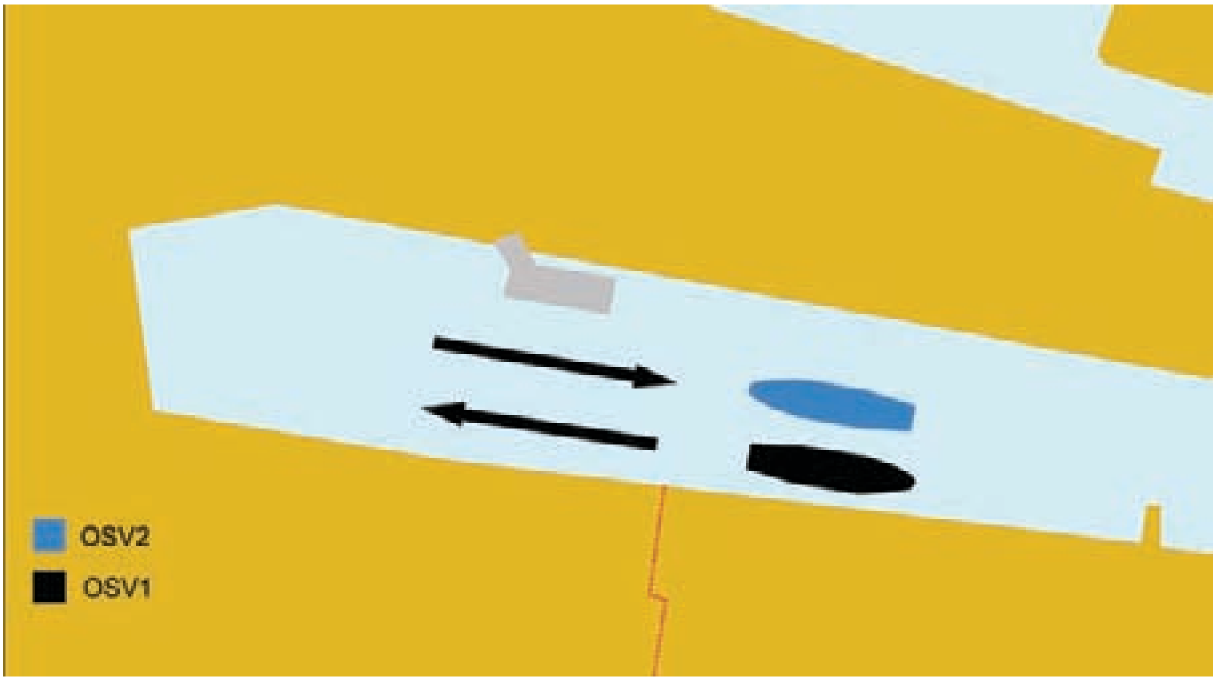


Figure 2

The bow moved back towards the quay, but the vessel's stern then started to swing rapidly towards a number of small pleasure craft moored alongside a ro-ro link span on the north side of the basin (Figure 3). Alerted by the chief officer, the master again moved to the aft control station and adjusted the azimuth units to arrest this movement. However, the vessel did not respond as expected, and OSV2 was too distant to assist. As a result, the port quarter of OSV1 made contact with the small pleasure craft and the link span. Three pleasure craft sank (Figure 4) and three others were damaged. The link span was put out of action for several weeks.

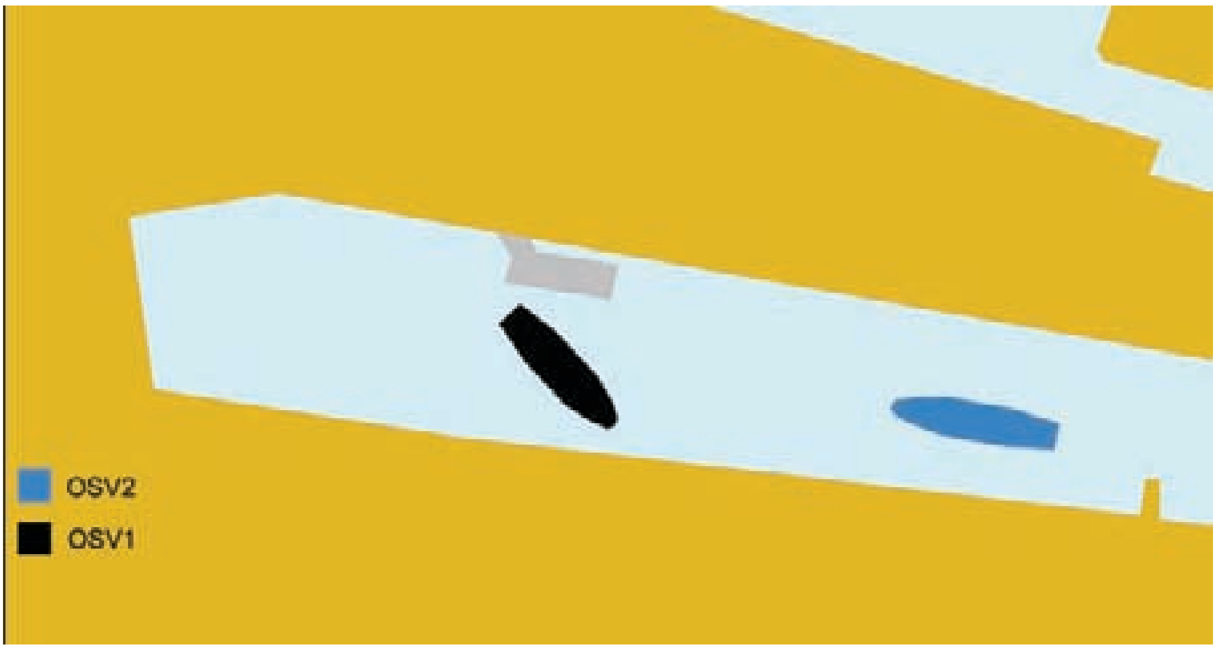


Figure 3

Figure 4

The Lessons

1. Moving berths is a routine task for many masters. However, although a berth shift might require a vessel to move only a few yards, the dangers are no different than when arriving and departing. Planning and briefing are therefore essential, no matter how straightforward a move might appear, and factors such as a vessel's manoeuvrability, the proximity of other vessels and dangers, the environmental conditions, and the external support available must always be borne in mind.

2. A reliance on vessels, other than harbour tugs, to assist when manoeuvring in port can be misplaced. Tugs are invariably built for purpose, and their crews are usually familiar with a port and are practised in the assistance they provide; other vessels seldom have similar attributes.

3. Moving between control stations when manoeuvring always has an element of risk. This risk is undoubtedly increased when moving between forward and aft facing control stations, when perspective, ergonomics and stress all play a part. In such situations, mistakes are easily made, so it is important that when this happens, they are quickly spotted. Effective bridge resource and team management are vital in this respect.

Chemical Cocktail Calamity

Narrative

It was another wonderful day in the Caribbean. The passengers on board a cruise ship were enjoying the sun and being able to cool off in the pool. Unbeknown to the passengers, the ship's technical team was having intermittent problems in stabilising the pool water chemical levels. A chlorine solution and hydrochloric acid were used in the treatment of the swimming pool and jacuzzi waters. On the day before the incident, there had been a chlorine spill in the pool machinery room (Figure 1) and there remained a fairly strong residual smell. The technical team was unaware of the spill and mistakenly believed there had been cross-contamination between the chlorine and hydrochloric acid systems, which gave rise to the pungent smell.

Figure 1: Pool machinery room

CASE 2

It was decided to empty the chlorine and acid drums. About 20 litres of chlorine and 50 litres of the hydrochloric acid were pumped from the drums supplying the pool dosing pumps (Figure 2), and disposed of down the pool machinery room scupper drains into the grey water holding tank. This resulted in gas being liberated into the pool machinery room, which was inhaled by a wiper who was assisting the technical team. Although he was reported as wearing personal protective equipment (PPE), it is unclear whether he was wearing the appropriate respiratory protection. Water was then added to the scupper in an attempt to dilute the acid and reduce the vapours. By this time, fumes were escaping to the public deck area from the nearby grey water tank vent which was located close to the swimming pool. The smell was fairly strong and, as a precaution, the area around the swimming pool was cordoned off to protect the passengers. However, by the time this was done, two passengers had inhaled the fumes. They, together with the affected wiper, were treated in the ship's hospital, but were released soon afterwards, with no ill effects.

Figure 2: Pool dosing pumps

The Lessons

Luckily the effect on the passengers and crew, of the liberated fumes, was minimal. Things could so easily have been far more serious. The company's related risk assessment clearly stated that full PPE should be used when dealing with the chemicals. Had effective respiratory protection been worn, the wiper would not have inhaled the harmful fumes and put himself at risk.

The hydrochloric acid Material Safety Data Sheet (MSDS) identifies that the solution is highly corrosive. It can cause burns, eye damage and can be fatal if swallowed, and this reinforces the need for wearing PPE. It is also significant that, while the acid itself is not flammable, it reacts with most metals to form an explosive/flammable hydrogen gas.

The company's standing orders specified that chemicals were to be kept separate, and when disposal was necessary should have been treated as hazardous waste and properly disposed of at an appropriate shore-side facility.

The following lessons can be drawn from this incident:

1. Does your ship's safety system identify how to properly dispose of chemicals? It should.

2. Risk assessments should direct staff to thoroughly read and understand the hazards associated with the chemical, as specified in the relevant MSDS/Safety Data Sheet (SDS).

3. Control measures should be identified to minimise the risks associated with handling, using and disposing of chemicals – refer to the MSDS/SDS for guidance.

4. Is your PPE suitable for use in dealing with chemicals? Is it regularly checked for integrity and are spares readily available to replace out of date items? Lives may depend upon it.

5. Crew should know how to deal with a chemical spill in a safe manner, and where to gain specialist advice should it be necessary. It is also sensible to include dealing with a chemical spillage as part of the ship's emergency drill programme.

6. Hydrochloric acid is highly reactive when in contact with alkaline materials and, as a result, will liberate hazardous gases. In this case the contents of the grey water tank were largely alkaline, and contributed to the release of the gases. Hazardous chemicals should be disposed of in a safe manner, and in most cases this will be at a shore-side facility.

CASE 3

Mussel Bound!

Narrative

A product tanker was making her way into port when the local port control instructed the master to wait in the pilot boarding area because of the traffic density and a shortage of available pilots.

Both engines were running with the propellers set at zero pitch. To reduce the ship's roll, the master used the bow thruster to keep the bow into the sea and at this time all systems were operating normally. Little did the crew know that down in the bow thruster compartment things were beginning to warm up.

About 30 minutes later, the bridge fire alarm panel sounded, indicating a fire in the bow thruster compartment. An AB was sent to investigate, and as he cautiously eased open the door he was immediately confronted by thick, acrid black smoke. He shut the door and reported his findings to the bridge. The master sounded the general alarm and the well practised fire-fighting organisation swung into action. The crew were mustered and accounted for, electrical isolations were made and the bow thruster compartment ventilation flaps were shut.

The chief officer took charge of the deck and approved a two-man team to attack the fire with an extinguisher. They were able to enter the compartment and discharge their CO_2 extinguisher, but they were beaten back by the smoke. In the meantime, boundary cooling had been set up and additional firefighters wearing fire suits and breathing apparatus arrived at the scene. They made a controlled entry of the compartment, extinguished a small fire and doused the smouldering cables in the bow thruster electrical resistor cabinet (Figure 1).

On investigation, it was found that the resistor cable insulation had burnt, indicating that the bow thruster had drawn excess current, and this caused an increase in the cable temperature (Figure 2). All the indications pointed to a seized bow thruster as being the cause. However, once the motor brake had been released, the bow thruster shaft was free to turn, proving that the gearbox and bearing arrangements were not seized.

Figure 1: Bow thruster electrical resistor cabinet

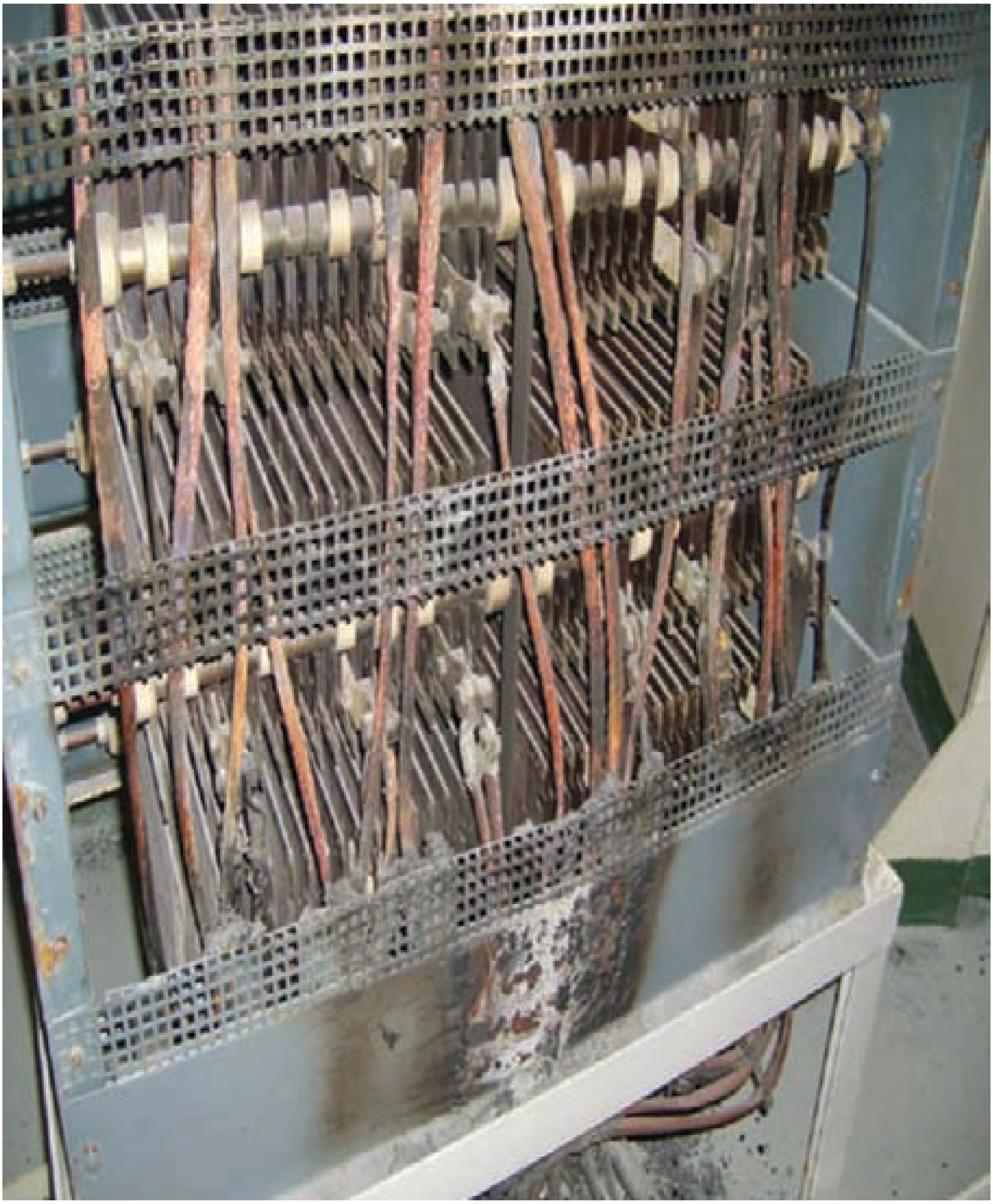


Figure 2: Damaged cables

The vessel was dry docked a week after the accident as part of the Continuous Class Survey schedule. Subsequent investigations found that there was extreme mussel and barnacle fouling of the inlet grids (Figure 3), propeller hub, and up to one third of the propeller blade length (extending from the hub connection) (Figure 4). The fouling led to strong turbulence and pressure build up within the bow thruster tunnel, and this in turn caused the high electrical currents leading to the overheating situation.

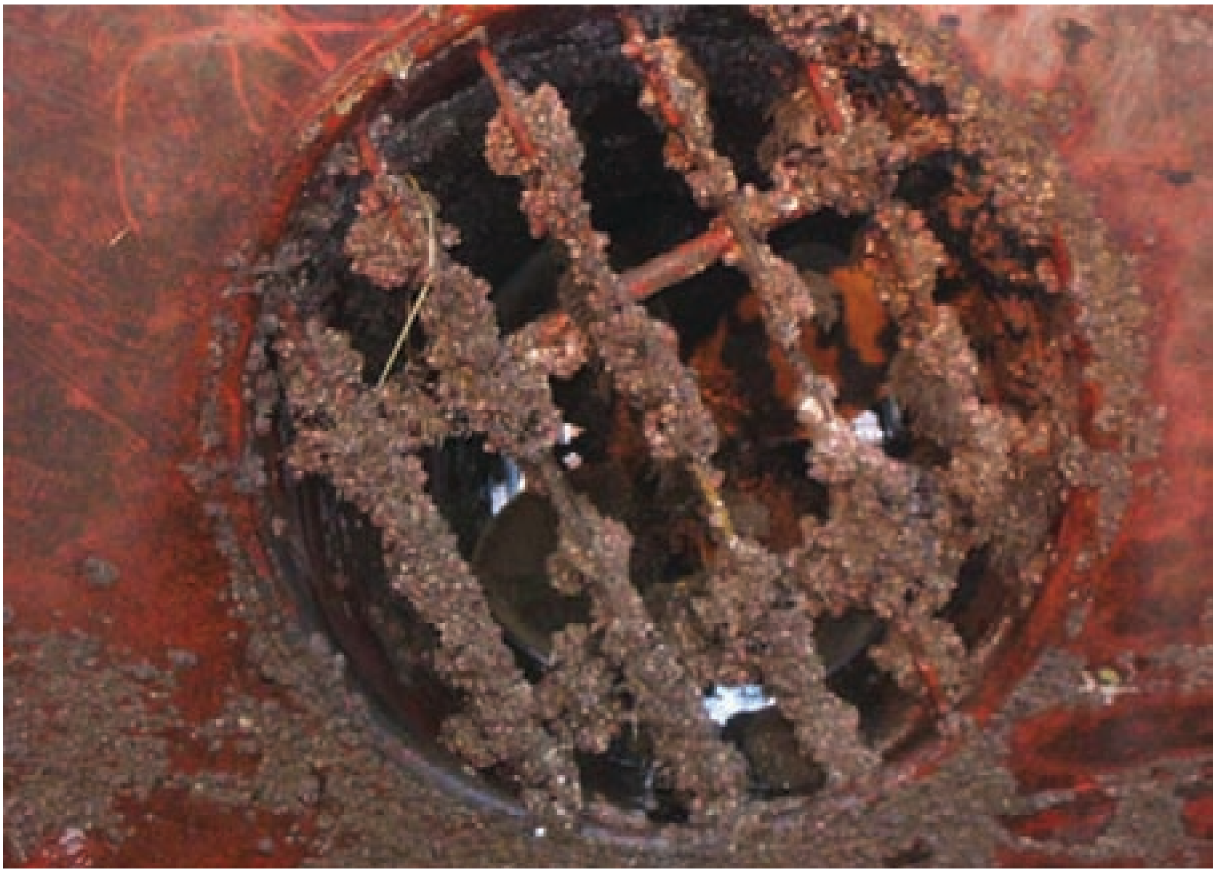


Figure 3: Mussel and barnacle fouling of an inlet grid

Figure 4: Fouling of the propeller blade

The Lessons

The crew dealt with the incident in a competent manner. A continuous aggressive attack was made on the fire, firstly using the first-aid attack team, closely followed by the fully protected fire-fighting team. The electrical systems were isolated to protect the firefighters, and ventilation was reduced to help remove the oxygen supply. The crew's prompt action certainly reduced the high risk of the fire spreading and clearly illustrates the benefits of realistic drills being carried out.

On the engineering front, the following lessons can be drawn from this accident:

1. Engineers should be aware of the risks relating to the build up of mussel, barnacle and other marine growth; some of the consequences are not always obvious – as this accident clearly illustrates.

2. The rate of marine growth will be more prominent if a vessel is laid up for some time. In this case it is beneficial to check that not only are bow thruster tunnels clear, but also rudders, propellers and pump sea suction grids. Basic checks at an early stage will pay dividends later in reduced maintenance and equipment availability.

3. In cases where the risk of marine growth is high, it is worth considering logging the currents drawn by bow thruster motors at each power setting. If there is unexplained deviation from the datum, this could be caused by marine growth fouling, and the bow thruster arrangements would warrant inspection and cleaning by divers.

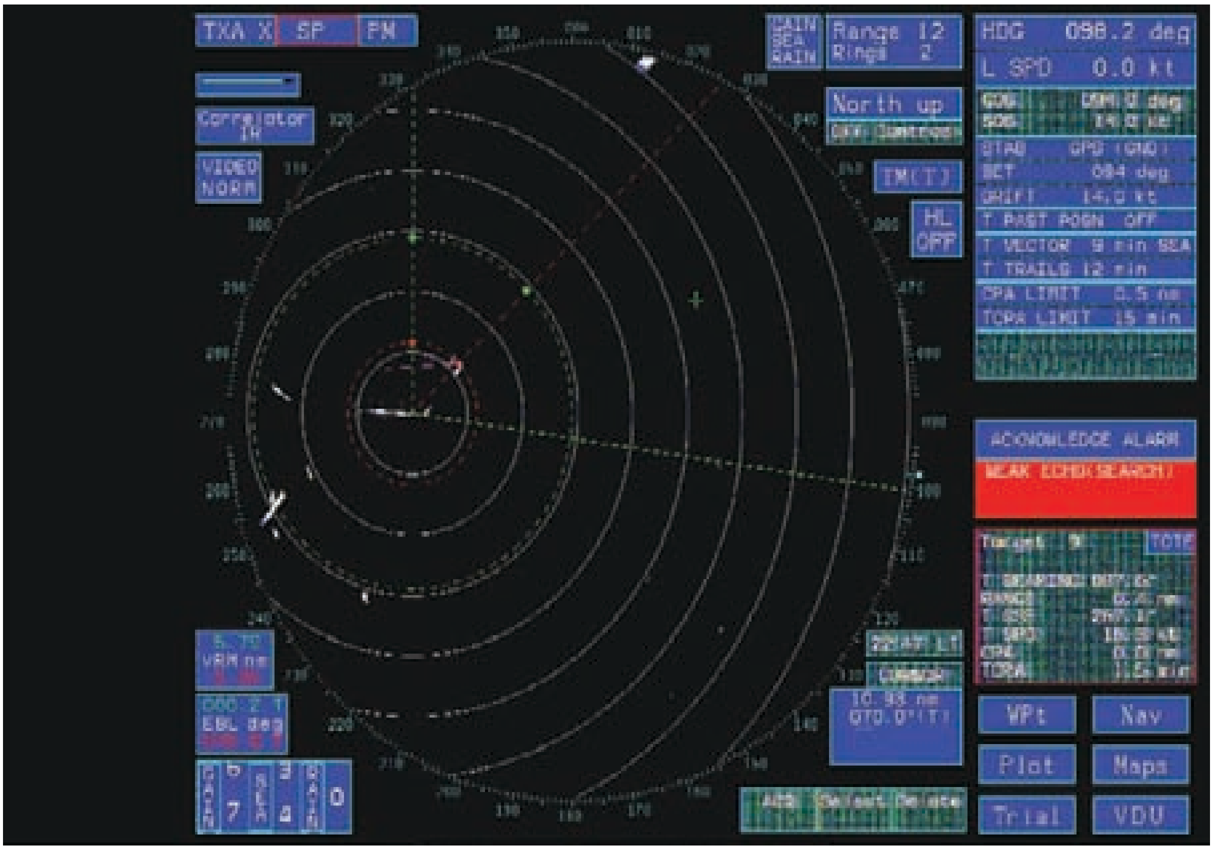
Wrong Input – Wrong Outcome

Narrative

A ferry was on a regular night time crossing with the master, officer of the watch (OOW) and a lookout on the bridge. The weather was fine and visibility was very good. Ahead of the ship were a number of fishing vessels, which were acquired for tracking with the ARPA radar. The radar was north-up, off-centred and sea stabilised, and set to display true target vectors and true trails. The ferry was steering 098°(T) and her GPS ground track was correctly displayed on the radar screen. However, the log speed input read zero knots, which meant that the vectors displayed relative rather than true target information.

A new small target was noted on the radar a little over 4 miles ahead of the ship and about 10° to port of the heading line. It was showing the lights for a vessel trawling, and a green sidelight. The true trail from the radar indicated that the fishing vessel was on a southerly heading, which agreed with the visual identification of the target. However, the ARPA target data indicated that the fishing vessel was making a course of 267°(T) and speed of 16.3 knots, from which it was interpreted that the fishing vessel would pass clear down the port side. Although this would have meant that the vessel could not have been fishing and should have been showing a red sidelight, the master and OOW chose to rely on these data and to maintain course and speed.

Over the next 15 minutes, the true bearing of the target changed by 1°, by which time it had closed to 0.5 mile. The master intervened, and altered course by 10° to starboard, which he later increased to 17°. The fishing vessel skipper also took action by putting the helm hard-to-starboard. This resulted in the two vessels passing at an estimated range of 20 metres.



Radar image of close-quarters situation

The Lessons

1. The radar was set up to be sea stabilised, but the log input was reading zero knots. Therefore the target's true data was not correct. Collision avoidance was being assessed by reference to the target's and own ship's true vectors, in that if the ends of the two vectors touched, then a risk of collision existed. The fact that own ship was not displaying a true vector, due to the zero speed input, seems to have been missed, and a risk of collision was not initially identified. The relative vector and the CPA information under these conditions will indicate the correct situation. The CPA indicated was 0.0, and this was displayed as part of the ARPA target data, but was ignored. The relative vector would have pointed directly at the display origin. Had either of these been referred to, or used, a better assessment of the risk of collision by ARPA could have been made.

2. The true bearing of the approaching fishing vessel did not appreciably change as the two vessels approached each other. A more traditional method of assessing risk of collision by monitoring the compass bearing, rather than relying on ARPA data from an incorrectly set up radar, would have confirmed the visual assessment of the situation, would have highlighted the danger at a much earlier stage, and should have prompted earlier avoiding action. Don't rely exclusively on ARPA; if the inputs are wrong, the output is wrong.

3. The skipper of the fishing vessel had a wealth of experience fishing these grounds. He had come to accept that the ferries normally passed close. Therefore, being the stand-on vessel and expecting the ferry to eventually alter course, he delayed his action until it was almost too late. The Colregs tell us that action to avoid collision must be substantial and made in good time. There is no doubt that the action taken by the skipper was substantial, but it could have been taken sooner. Guard against complacency – expect the unexpected.

Get it Right First Time

Narrative

A general cargo vessel loaded with timber, which was stowed in the holds and on top of the hatches, was on a pilotage passage upriver to her discharge berth. The pilot had shown the master the river pilotage plan and told him the target time for arriving at the berth. In return, the master had shown the pilot the ship's pilot card, noting that the ship had a becker rudder.

About 2 miles from the berth, a swing bridge spanned the river. To enable vessels to transit with maximum draught, ships had to pass through the bridge with the flood tide. The bridge was situated at the upstream end of a long bend so there was only about a cable in which the pilot could line up the ship with the narrow channel through the bridge.

The passage upriver was uneventful, with the pilot steering at the centre console. The weather was calm, with good visibility, it was dark and the tide was on neaps. As the vessel was negotiating the long bend before the bridge, the pilot, at the master's suggestion, moved the starboard console to obtain a better view down the side of the ship. When the ship's bow was half-way through the bridge transit, the master, standing at the centre console, sensed that the ship was being set to starboard and onto the buttress. He asked the pilot what he intended to do; the pilot applied hard to starboard helm and full ahead on the engine. However, the ship's starboard quarter made a glancing contact with the buttress's steelwork, causing damage to the ship's side plating.

View from starboard quarter

The Lessons

1. By choosing to steer the vessel himself, the pilot lost the opportunity of maintaining an appropriate overview. Additionally, instead of maintaining an overview of the situation from a central position, the pilot moved to the starboard console, causing him to lose perspective. The master, on the other hand, was in an ideal position to oversee the manoeuvre, and it was he who detected that the ship was being unduly set to starboard.

2. Although the master warned the pilot of the set towards the buttress, it was too late. Had a more detailed discussion of the pilot's intentions taken place during the master/pilot exchange, the master would have been able to challenge the pilot's decisions or actions at an early stage and, if in doubt, to implement effective corrective action.

3. This pilot operated in a relief capacity only, and had carried out about 50% of the full-time pilot's acts of pilotage. Harbour authorities should ensure that rota systems take into account the need for pilots to be regularly practised in particularly difficult parts of the pilotage passage.

A Very Sad Open and Shut Case

Narrative

A ro-ro cargo ferry was on river passage with a pilot embarked. At 0215, the chief and third engineers, who were in the engine control room (ECR), noticed an electrical earth on the vessel's calorifier sited in the bow thruster compartment. The ship's Electro Technical Officer (ETO) was woken to rectify the fault and arrived in the ECR at 0240. He then made his way to the bow thruster compartment. About 10 minutes later, the chief engineer noticed the earth fault alarm had cleared.

Shortly afterwards, the third engineer left the ECR to conduct routine rounds of the engine room. There, he found the ETO unconscious and pinned upright between a powered watertight door and its frame (Figure 1). The watertight door was set to operate in the 'remote closing' or 'automatic' mode and could not be opened because the movement of its operating lever was impeded by the ETO's upper torso. The third engineer raised the alarm and the ETO was eventually freed after the hydraulic pressure on the watertight door was released. The ETO's tools were found on both sides of the door.

The crew's attempts to revive the ETO were unsuccessful and he was pronounced dead by paramedics who met the vessel as soon as she came alongside.

Simulated position of casualty stuck in powered watertight door

The Lessons

1. Powered watertight doors can – and do – maim and kill. However, because the correct procedure for passing through such doors is time-consuming, and more often than not is seen to be unnecessarily tedious, the taking of short-cuts can become routine. While such short-cuts are generally taken without mishap, it must be remembered that until improvements in the design of powered watertight doors are implemented, the danger will always be present.

2. The chances of passing safely through a powered watertight door are greatly reduced if a door is not fully opened or if it is closing. The dangers also increase when something is being carried by hand, such as tools, as this restricts a person's ability to operate the door control mechanisms.

3. Although powered watertight doors are potentially dangerous in any mode of operation, they are marginally safer when operated in 'local'. This is the mode of operation required by regulation unless there is an emergency, or if the doors are being tested.

Not All Fires in Furnaces Are Desirable

Narrative

As a ferry arrived in port, the captain noticed flames briefly emitting from the ship's uptakes. The chief engineer was informed and he quickly conducted a check of his machinery, finding nothing untoward.

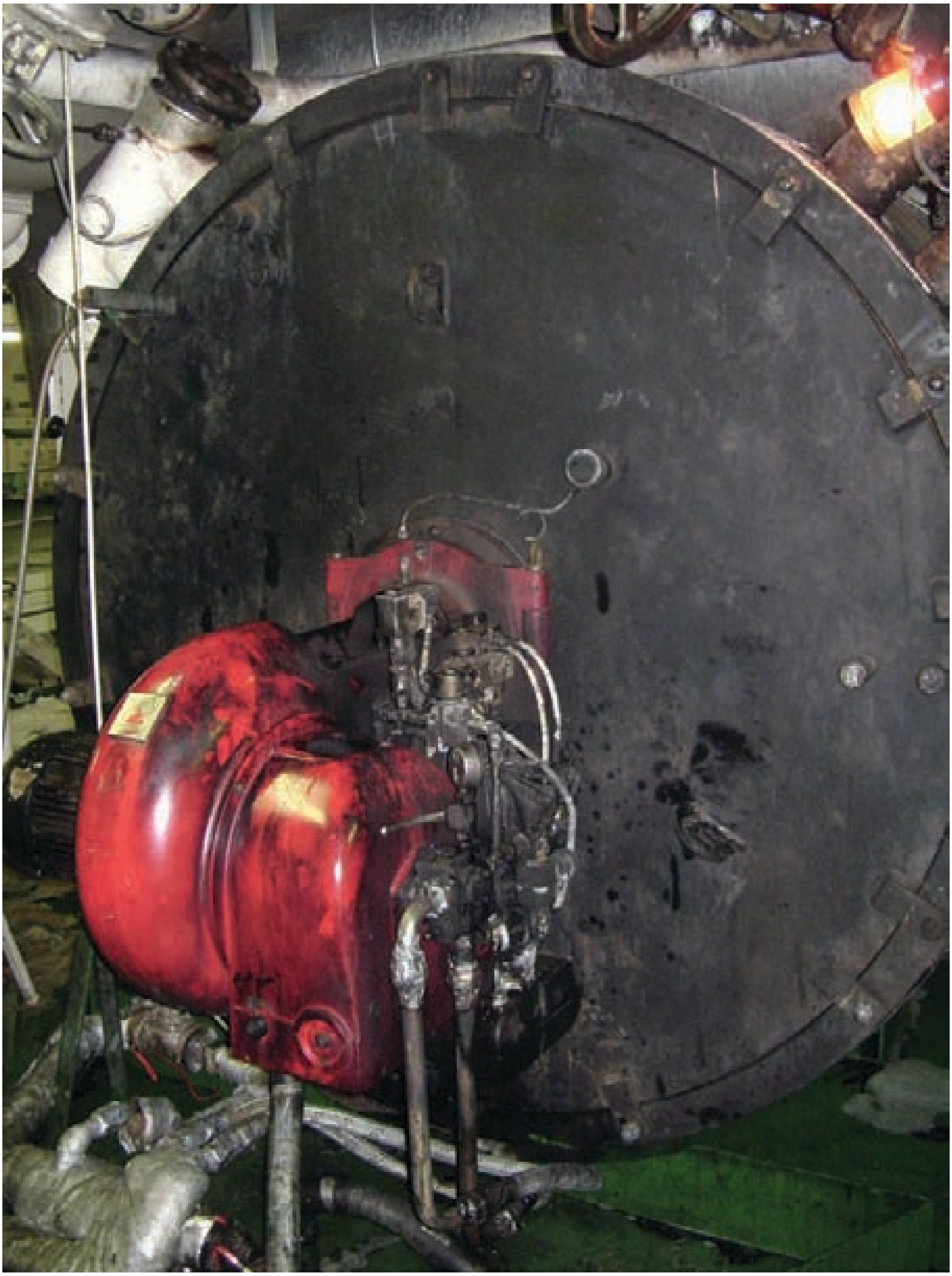
Once the ferry was safely alongside, the chief engineer went aloft to check the uptakes, and found traces of white smoke and a smell of burning oil. He immediately suspected thermal oil was leaking into the thermal oil heater's furnace from the heater coils. Back in the engine room, he asked for the thermal oil expansion tank level to be checked and, once the burner had been stopped, he swung back the burner unit to examine inside the furnace. Further white vapour was apparent, and the oil level in the expansion tank was also reported to have reduced.

Having had his fears confirmed, the chief engineer ordered the thermal oil heater to be isolated. He then focused on switching the ship's machinery fuel supply from heavy fuel oil to diesel, in preparation for the next sailing A short while later, engineering staff raised the alarm as a fire had broken out in the vicinity of the thermal oil heater. Flames had flashed out of the burner air intake, igniting lagging and other near by materials in the engine room.

The chief engineer was quickly on scene and extinguished the external fire using two portable fire extinguishers. However, the fire inside the heater furnace continued and flames could be seen licking out of the burner intake. A fire-fighting team in breathing apparatus arrived and attempts were made to insert foam into the thermal oil heater furnace via the burner air intake. The chief engineer briefly tried to seal off the burner air intake, but with no success, so his attention returned to trying to fill the furnace with foam.

The local fire brigade was called when the alarm was raised, and arrived quickly. However, they were unable to board immediately as the ferry's stern ramp had been raised ready for departure. Only one hotspot was located by ship's crew in way of the deck above the thermal oil heater, and boundary cooling was carried out. The ship's passengers and crew were mustered and kept informed of the progress; the master had decided to keep them on board because the fire was effectively contained, and was well away from the muster stations.

After consultation with the fire brigade, foam continued to be applied into the furnace. Eventually an inspection plate on top of the burner was able to be removed and the foam applied directly into the furnace. The fire was declared extinguished 90 minutes after it had started.



Burner after the fire

Thermal oil heater furnace

The Lessons

1. The ship's staff response to the fire was excellent, testament to the drills they conducted regularly, which enabled them to work together effectively. Although probably not vital to tackling this particular fire, the fire brigade was delayed in boarding the vessel as it had been forgotten that the stern ramp had been raised.

   Holding discussions and conducting drills with local emergency services in regular ports of call will ensure better response and co-ordination in an emergency, so helping prevent a situation from escalating.

2. The thermal oil heating system was generally regarded as being very reliable and requiring low maintenance. Unfortunately, although the planned maintenance schedule required the inside of the furnace to be cleaned annually, this had been omitted from the last refit. Because the heater burnt heavy fuel oil, over time a build up of carbon in the furnace was inevitable, and this likely provided the local hot spot that started the fire.

   Make sure the manufacturer's maintenance regime is followed for your boiler/heater to ensure that it runs safely and efficiently.

3. Fighting the fire inside the heater furnace was difficult because there was no means of breaking the 'fire triangle' to extinguish the fire. Specifically:

   - Oxygen – there was no means of closing off the air supply to the furnace.
   - Heat/ignition – there was no means of removing the heat from the system or applying an extinguishing medium directly into the furnace.
   - Fuel – there was no means of draining the thermal oil from the heater coils.

   In this case, fitting a fire damper to the burner air intake and including an injection point into the furnace for foam or CO_2 would not have been difficult modifications.

   Ensure you have fully considered, and have an effective means of tackling, unintentional furnace fires. Do not simply rely on the fire being contained within the furnace.

4. The chief engineer had not taken into account the full implications of swinging open the burner on this thermal oil heater, as the inrush of air could have caused re-ignition and possible flash over.

   Observation ports into the furnace should be kept clean to enable visual examination to take place in a safe manner.

Nothing Happened and Nobody Noticed

Narrative

During an inaugural port visit, a large passenger cruise ship made heavy contact with the quay when berthing. The berthing operation required the vessel to be turned through 180º before mooring port side to. At the start of the turn, the captain controlled the azimuth propulsion units and bow thrusters from the bridge's centre console, but later moved to the port wing console accompanied by the harbour pilot and the staff captain. The second mate stayed at the centre console to monitor the main control panel, alarms and communications.

Once on the port bridge wing, the captain adjusted the azimuth propulsion to arrest the vessel's movement astern. However, the control of the vessel's azipods had not transferred to the port console and the master's actions had no effect. This was not realised by the bridge team; the vessel continued to move astern until contact was made with the quay. Shortly afterwards, the reason for the lack of control was identified. Control of the azimuth propulsion was then transferred to the port console and the vessel was manoeuvred alongside without further difficulty.

The vessel sustained damage to her stern plating above the waterline (Figure 1) and remained alongside 12 hours longer than planned, to effect repairs; the wharf was also damaged (Figure 2).

Figure 1: Damage to stern

The Lessons

1. When entering or leaving a port, the transfer of the control of engines, steering and bow thruster between consoles is a routine operation on board many vessels. As it is usually undertaken in areas where there is frequently little room to manoeuvre, it is essential that all transfers are seamless and effective. This is usually the case where procedures have been promulgated, and practised on every occasion. However, where procedures are not developed because a ship is new, or if they are not followed, it is inevitable that the control of a vessel will be lost at the most inconvenient of times.

2. There is seldom little room for error when manoeuvring in confined spaces. However, there is always scope for human error or mechanical problems, and these must be spotted quickly if an accident is to be avoided. No person is infallible and no equipment is foolproof, so no matter how good at ship handling a master might be, unless he is well supported by his bridge team in monitoring his actions and equipment response, the chances of an error or machinery failure not being detected in time to prevent an accident will be increased considerably.

Beware Loose Electrical Connections

Narrative

A ro-ro cargo ship had just left its discharge port. There was nothing unusual about the departure: the engines were running smoothly, the weather was fine and the visibility good as the ship's staff settled into the routines for the short passage. Things were about to change.

About 40 minutes after leaving the berth the ship experienced a series of short power failures which interrupted the steering gear electrical supplies. As the master alerted the local VTS to the problem, the chief engineer reported that sparks and smoke were coming from behind one of the main switchboard panels located in the ECR. He donned an Emergency Escape Breathing Device (EEBD) and escaped into fresh air.

On receiving the report, the master sounded the fire alarm, reduced speed and prepared to anchor. All the crew and drivers were accounted for as the engine room was quickly closed down in preparation for making a re-entry. Soon afterwards, boundary cooling was set up and the chief mate and second engineer donned breathing apparatus and re-entered the ECR. They discharged a CO_2 extinguisher into the smoking panel, and the smoke quickly cleared. The panel was made safe by isolating it from the main busbars as the master anchored the vessel so that the cause of the failure could be investigated.

Investigations found that a loose connection enabled a cable to make intermittent contact with the steel panel casing. This caused an electrical short, resulting in sparking and leading to high temperatures which caused damage to the cable insulation and fittings (see figure). Also worrying was an annotation on the inside of the panel door indicating that a change in the circuitry had been made, but with no reason being given for it.

Damage to cable insulation and fittings

The Lessons

The speedy actions by the crew were commendable. They had been frequently drilled in dealing with an engine room fire and made a confident, safe, controlled re-entry of the ECR, extinguishing the fire before it had a chance to spread to adjacent switchgear.

Electrical systems are generally reliable as long as they are maintained correctly and are not subjected to unauthorised modifications. These can easily lead to circuit overloading, with subsequent overheating and the risk of fire.

1. The security of switchboard/breaker connections should be the subject of regular checks. Loose connections increase the current drawn, which, in turn, leads to overheating and the risk of fire.

2. Loose connections and other sources of electrical overheating can easily be identified by thermal imaging techniques. Although this procedure is generally undertaken by specialists, the cost benefits of using it routinely can be great if a fire is prevented.

3. Do keep switchgear free from the build up of dust, which can be easily ignited through even a slight increase in electrical enclosure (eg breaker panel) temperature.

4. It is advisable to regularly check earth fault indications before they cause overheating problems. Where earth leakage has been identified, isolate end user equipment to determine the source of the earth, and rectify the defect as soon as possible. “Wet” areas such as the galley or pantry are frequently the source of earth leakages.

5. *REMEMBER* – internal cleaning and maintenance of a switchboard must only be carried out while it is in the “dead” condition, after a full risk assessment has been carried out, and only following the issue of a Permit to Work.

More detailed safety guidance on the precautions associated with the maintenance of electrical equipment can be found in Chapter 22 of the Code of Safe Working Practices for Merchant Seamen, which is available on the MCA’s website at www.mcga.gov.uk.

Turn Too Late

Narrative

A small coaster was to sail between two docks on a UK river. A pilot was engaged and sailing timed for just before high water at the first dock. The passage would therefore be with the ebb flow, and this would require the ship to be turned to stem the stream before "crabbing" across to enter the locks for the second dock. The master and pilot discussed the plan and the ship sailed without incident from the first dock.

The passage downstream continued without incident, with the pilot and master on the bridge; the pilot was steering from the port chair and the master was sitting in the starboard chair. About 30 minutes before the pilot expected to turn and stem the tide, he was informed by VHF radio from the VTS station that an inbound ferry was making for the river berth off the second dock, and that it was due to arrive at the same time as the coaster.

The pilot contacted the ferry master by radio and suggested they pass "green-to-green", and that the coaster follow the ferry in. The ferry master agreed to this plan, and commenced manoeuvring his ship to pass the coaster and approach the berth. The coaster's pilot gave instructions to reduce speed, and altered her course to move to the port side of the channel and allow the ferry to pass. His intention was to alter course to starboard through about 180° to stem the stream once the ferry was abeam to starboard. The pilot informed the master of the change in plan, but not of his specific intentions for the turn.

Once the ferry was abeam to starboard, the pilot put the helm hard-to-starboard and asked for full ahead on the main engine. As the

Figure 1: Damage to tanker

Figure 2: Damage to the coaster's port quarter

coaster began to turn, the ebb tide set her towards a tanker berthed at a river oil terminal downstream of the lock entrance.

The coaster's port quarter made contact with the bulbous bow of the tanker (Figure 1), holing her fore peak ballast tank. The coaster sustained damage to her port quarter (Figure 2), but remained watertight. The ebb tide pinned the ship against the tanker's bow until she had built up sufficient speed to move clear. She then proceeded into the second dock without further incident.

The Lessons

1. The pilot's decision to allow the ferry to berth first, went against port procedures, including a requirement for "red-to-red" passing and for the ship heading into the tidal stream to give way. These procedures had been put in place based on extensive experience, to ensure that operations on the river proceeded safely. By disregarding them the pilot, and the master of the ferry, removed the safety net they provided. Procedures are there for a purpose – follow them!

2. When the pilot amended his plan for approaching the second dock, he decided that his manoeuvre would be dependent on the position of the ferry, and not on the coaster's position in the river. Thus, when the pilot started the turn, the ferry was abeam, as planned, but the coaster was further downstream than he had intended and closer to the moored tanker. No method was used to accurately determine the distance between the tanker and the ship, or how far off she needed to be to effect a safe turn.

3. Other manoeuvring options were available, such as turning to port, stemming the tide upstream of the second dock, or passing the oil terminal and carrying out the turn there. These alternatives were not considered, and the amended plan was executed without having assessed its viability under the changing conditions.

4. The pilot was steering the ship, and this was distracting him from his overriding responsibilities of navigating the ship and monitoring her position. Had a helmsman been employed, the pilot would have been able to more effectively perform these duties.

5. Although the master was informed of the change of plan to allow the ferry to approach first, he did not question the pilot about the subsequent manoeuvre to stem the tide. Had he done so, he would have been better placed to challenge the pilot's intentions at an early stage.

Fatal Consequences of a Caught "Chafer"

Narrative

A tug was being used to undertake a lengthy sea tow of a cargo vessel, which had experienced steering gear failure while on passage. Despite good weather conditions, the tow was progressing frustratingly slowly; the cargo vessel's rudder could not be controlled, which was contributing to heavy shearing.

Given the expected duration of the tow, the tug was using a tow wire protector or "chafer" (Figure 1) to prevent the wire chafing on the tug's bulwark rail. The "chafer" was a standard "towing shoe" design, with two sections of polyurethane designed to fit over the tow wire and be clamped in position. The arrangement in use, however, differed in that the "towing shoes" were not fixed to the wire, but were restrained from sliding along the wire and off the bulwark rail by a shackle at either end, connected by chain, with a rope tied off at the winch. This gave the advantage of allowing the tow wire length to be altered without the need for manual intervention on deck.

In the early hours of the morning, the "chafer" had slipped outboard as the cargo vessel continued to shear, so the tug's bosun went out alone onto the working deck to re-position it back onto the bulwark rail. Although he was able to pull the "chafer" back on board, it came too far inboard of the rail. The tug was therefore again manoeuvred to position the tow wire on the starboard quarter so that the quarter could then be dipped to allow the "chafer" to be pushed back into position. However, as the tow wire and "chafer" moved

Figure 1: Chafer arrangement raised above bulwark rail

Figure 2: Damage to Norman Pin socket

towards the starboard quarter during this manoeuvre, the aft shackle on the "chafer" arrangement became caught on a bracket fitted to one of the "Norman Pin" sockets at the stern bulwark rail (Figure 2).

As the wire continued to try to move to starboard (Figure 3), the bracket began to bend, freeing the shackle. This resulted in the tow wire and "chafer" jumping a metre to starboard and fatally striking the bosun's head.

Figure 3: View of tow wire in approximate position after shackle jumped

The Lessons

1. Sadly, it will never be known why the bosun, who was a highly experienced professional seaman, came to be standing in the danger area and exposed to the risk of being hit by the towing gear. However, what is certain is that this was a needless accident, and one which raises several key issues:

   - The value of effectively highlighting danger zones on vessels' working decks, which help to reinforce the areas where it is safe to stand.

   - The increased risk of lone working – another crew member on deck would perhaps have been able to give some warning of the impending danger, or to let the bosun know that he had strayed into the danger area.

   - The importance of minimising spare gear on deck. A wire reel was kept on the starboard side and would have restricted the safe working area.

2. With the benefit of hindsight, the combination of the "Norman Pin" brackets and the "chafer" arrangement represented a potential snagging hazard. However, there had been no such snags during the previous 2 years, and the possibility had never occurred to the otherwise safety conscious crew; in fact following the accident, they couldn't believe they had not spotted such an obvious problem. Carrying out any activity, successfully, over a period of time, can lead to a false sense of safety. This is a perfect example of the value in regularly reviewing deck operations, particularly to ensure no snagging hazards involving tow wire protectors, have arisen.

3. Communication between the wheelhouse and deck was by tannoy, with no talk-back facility from the tug's deck. The system also automatically sounded throughout the vessel, making it less likely to be used when crew were resting. Although its use during this accident might not have made a difference, due to the speed of events, an effective communication system to facilitate two-way dialogue during deck work is vital.

4. The visibility from the wheelhouse to the working deck was badly restricted by the fast rescue craft (FRC), above the aft winch, and also blocking light from the aft deck flood lights. Despite there being no practical options for re-siting the FRC, lighting can generally be re-positioned far more easily. CCTV systems are also available to help remove blind spots and provide unrestricted visibility and effectively illuminated working decks.

5. As often is the case, a robust risk assessment should have identified most of these issues and resulted in mitigating solutions being developed to reduce the risks, such as re-designing the bracket or moving the wire reel. The assessment was generic rather than vessel specific, and did not consider, in detail, different towing and deck operations. Although "toolbox talks" were regularly conducted on board, and are valuable, meaningful risk assessments are also essential in ensuring safe operations, and should not be overlooked.

Full Ahead or Full Astern?

Narrative

A ro-ro ferry was approaching her berth stern first with 40% pitch astern set on her two controllable pitch propellers (CPP) when her engineers noticed that one of the three generators was beginning to take up all the load. The voltage and frequency on the remaining generators was also fluctuating violently, causing them to shed theirs. Before any preventive action could be taken, the vessel suffered a total electric failure. However, because the main engines, which had gear-driven pumps, kept running, so did the shafts.

The pilot was at the port bridge wing manoeuvring console, and saw the indication for both the CPPs suddenly move to 100% pitch astern. By now, the vessel's stern was rapidly approaching the quay, which was only 30m away. The captain immediately shut down the main engines using the emergency stop buttons and let go the starboard anchor. However, the momentum could not be arrested, and the port quarter contacted the quay, causing substantial damage (see figure).

The cause of blackout was later traced to faults in the electrical generation system. Onboard tests showed that if the bus bar frequency dropped from 60Hz to below 58Hz, two of the three generators experienced severe voltage and frequency oscillations. The governors on these generators were found to be rated differently, causing unequal speed adjustment characteristics.

On this occasion, when several items of heavy electrical load were started in quick succession in preparation for berthing, the generator frequency dropped below 58Hz, which caused the voltage and frequency to oscillate, and eventually led to the blackout.

The Lessons

1. The failure behaviour of a CPP system is not standardised, and varies widely with design. Depending on the position at which servo oil pressure is lost the CCP blades can move to their extreme positions of full astern or full ahead. Other designs return pitch to neutral or maintain the last position before failure. When such failures occur when in confined waters, there is usually little time to react. It is therefore important when manoeuvring to know how a vessel's CPP will behave on failure so that effective action can be taken.

2. When several generators operate in parallel supplying the main switchboard, it is imperative that all the AVRs and speed governor motors are properly matched and adjusted to maintain steady voltage and frequency at the main switchboard bus bar.

Trials Can Be Trying

Figure 1: View of the tug's bridge

Narrative

A twin azimuthing stern drive tug grounded while conducting propulsion trials the day after its delivery voyage to the UK. A new master had joined the tug following its arrival, and during the afternoon had received a handover from the delivery master. On the day of the trials, two propulsion engineers joined the tug, and there were also two local tug masters on board who were starting to familiarise themselves with the tug.

Initially, the master believed that the propulsion trials could be conducted within the harbour. However, the engineers required the tug to be run at full speed in a straight line to make their adjustments, so the master had to head for open water outside the harbour.

During the high speed runs, numerous alarms sounded in the bridge. These were cancelled by various members of the bridge team as they determined which item of bridge equipment was alarming. The two propulsion engineers were also on the bridge at various times. There was, therefore, plenty of distraction on the bridge.

The trials were completed and it was decided to head back into port. At this point, one of the masters on board for familiarisation asked if he could take the con to get a feel for the controls. The tug's master agreed, and stood back from the conning position and gathered his thoughts for a couple of minutes, expecting the local master to have no difficulty getting back into the harbour. The tug at this time was in the approach channel to the harbour, still proceeding at full speed.

A few minutes later, the tug master realised the tug was outside of the main channel. He called to the master at the controls, who had also realised he was off course. However, he was unable to take any corrective action before the tug suddenly lurched upwards on the port side, as she struck the ground a glancing blow.

Two of the crew on the bridge went below to check for damage and pollution, initially finding nothing untoward. Once inside the harbour, however, the drive units were tested and it was found that the port drive unit had been disabled. The tug then proceeded on one drive unit back to its berth for further damage assessment.

The port drive unit was found to have been moved out of alignment and the drive shaft had sheared, requiring dry dock repairs.

The Lessons

Sea trials can be stressful, requiring flexibility and patience. However, the master is in command, and must take responsibility for the safety of his vessel. In particular:

1. **Corners must not be allowed to be cut when planning a safe passage and in monitoring the ship's position. If the plan really does need to be flexible, know where the vessel cannot safely go, and ensure the vessel's position relative to these areas is checked frequently.**

2. **Avoid conflicting tasks. In this case the aims of 'sea trials' and 'vessel familiarisation' were not compatible.**

3. **The team's inability to deal effectively with the alarms on the bridge significantly increased the noise and the pressure experienced by the master. Know your ship, and do not attempt to run before you can walk.**

Gone in a Trice

Narrative

While a large bulk carrier was loading cargo in port, an official survey of her Life Saving Appliance (LSA) was conducted.

To meet the requirements of the survey, the surveyor needed to witness one of the lifeboats being lowered to the water. Accordingly, the crew prepared the port lifeboat for lowering, and it was initially lowered to the boat deck.

Once at boat deck level, the bosun entered the boat, which was held alongside by the tricing pennants. He then released the aft tricing pennant before he had attached the bowsing-in tackle. This resulted in the boat swinging outwards, causing the bosun to lose his balance and to fall overboard between the boat and the ship. He struck and broke his leg on the deck edge as he fell 12 metres into the water below.

Despite his injuries, the bosun managed to swim around the stern of the ship to a dockside ladder, from where he was assisted out of the water and given medical treatment.

WRONG! Tricing pennant released before bowsing-in gear fitted.

CORRECT Bowsing-in gear fitted before releasing tricing pennant

The Lessons

1. **The bowsing-in gear should have been fitted once the boat was lowered to the embarkation deck and before the tricing pennant was released.**
2. **Accidents continue to occur during routine lifeboat drills and surveys. The bosun did not follow the correct procedures for the launch of the lifeboat, details of which were posted on an instruction card on the embarkation deck. Make sure you are properly trained and fully familiar with the correct way to prepare and launch the lifeboat.**

CASE 15

Not the Perfect End to an Evening on the River

Narrative

On a winter's evening, a catamaran with a crew of 7, which included an entertainer, picked up 29 passengers before setting off on a 3 hour river cruise. The passengers enjoyed a meal and cabaret while taking in the city sights by night. Towards the end of the cruise, the vessel arrived off the pier where the trip was planned to end about 15 minutes earlier than intended.

To fill in time, the catamaran's skipper, who had worked on the river for 47 years, decided to proceed further upstream to allow the passengers the opportunity to view more local landmarks. Once beyond a nearby bridge, the vessel continued for several minutes before the skipper turned the vessel around and started to head back downriver at a speed of 8 knots. The tide had just started to flood, which was opposite to the direction of the river flow.

As the vessel passed under the arch of the bridge, she was to starboard of her intended track and made contact with the underwater base of the arch buttress. The bump was quite severe and threw several passengers off balance. Within a minute, the bilge alarms in the starboard engine room and steering compartment sounded, and as the vessel approached the destination pier, she started to develop a list to starboard.

The mate, who was with the skipper in the wheelhouse, ran down to the starboard engine room and saw that it was flooded. He then helped to secure the vessel alongside and to disembark the passengers in an orderly

Figure 1: Damage to vessel's starboard pontoon

Figure 2: Removed steel protrusion

fashion. Meanwhile, the skipper alerted the port authorities by VHF radio. The emergency services arrived on the scene within minutes and several pumps were quickly rigged to try and prevent further flooding. However, it was soon realised that the water level in the engine room was the same as the water level outside, and the pumping was ceased. Although the damage to the vessel had breached two compartments, she remained afloat and stable. Divers later inspected the starboard pontoon of the vessel and found a large gash more than 2 metres long extending from the steering compartment all the way to the engine room (see Figure 1).

During the next low water, a sharp piece of steel protruding around 300mm from the arch buttress was found and removed. The steel (see Figure 2) had been torn from a half-pipe of steel which had been fitted to protect the top edge of the submerged base of the buttress.

The Lessons

1. It was extremely fortunate that the passenger vessel in question was able to stay afloat with two of her compartments breached. Many craft, including passenger vessels carrying fewer than 50 passengers, do not have the luxury of such damage stability. Had this accident involved such a vessel, a far more serious accident is likely to have resulted. It is therefore important that vessel operators take into account the design damage stability of their vessels when undertaking risk assessments and when determining operational procedures, routes and areas of operation.

2. The consequences of even a minor bump can often be more serious than first anticipated. In this case, although the crew were not aware of the protruding metal from the arch buttress, they responded quickly to the resulting bilge alarms. If action is not taken to immediately check for damage following contact or collision, no matter how insignificant it seems, there is always the danger that valuable time will be lost and the opportunity for early effective action will be missed.

3. Regardless of how many years a person has worked on a river or other restricted waterway, there will always be the potential to be caught out by tidal and other hydrodynamic factors. This is particularly so at night, when the presence of turbulent water and eddies in the vicinity of obstructions such as bridge buttresses might not be readily apparent until their effects are experienced. It therefore pays dividends for even the most expert mariners to regularly refresh their local knowledge and to err on the side of prudence when unusual conditions are predicted or encountered.

Part 2 – Fishing Vessels

After 25 years fishing I had never seen a person injured or fall overboard.

All that was about to change on 11 February 2009 when I tragically lost one of my crew during a routine trawling shooting operation.

While fishing my 23 metre scallop dredger in Cardigan Bay, 6 mile from shore in good weather conditions, one of my crew lost his balance when a rope parted that was attached to one of the scallop bellys.

The crew raised the alarm and I sighted the man in the water from my port wheelhouse window, he was alive and trying to keep himself afloat. I immediately put the boat hard astern and got back to him pretty quickly. The crew threw a life-ring to him and screamed for him to grab it.

His face was blue and his eyes were large, haunting like. His paddling got weaker, and he didn't respond to the crew shouting at him. He just looked at us, and then turned round lay face down in the water, within 30 seconds his body had sunk beneath the surface.

This came as a huge shock for me because I always believed that someone would last maybe 5-10 minutes in the water, in good sea conditions.

He was in the water no longer than 2-4 minutes.

Unfortunately he wasn't wearing a lifejacket on deck.

That has all changed now. My crew have to wear them on deck, and have signed the Risk Assessment book to say they will wear them.

I myself have worn them when I was a deckhand on one boat, and found them to be no burden at all while working. After a day or two you forget you're wearing them. In my view I think they should be made compulsory to wear on deck by fishermen.

You think that the worst things happen in the worst weather conditions, on this occasion it wasn't.

The risks are there 24/7 regardless of the conditions.

Since the accident I was given a copy of the MAIB SAFETY DIGEST. I had never read one before, but found it a very interesting read and would like to commend it, as it opens your eyes to other incidents you don't otherwise hear of. I found it making me aware of other things to note or to be aware of.

Raymond Strachan

Raymond Strachan, skipper *Maggie Ann* (FR 110)

Raymond Strachan, 41 years old, has been a fisherman since leaving school at the age of 16. He holds a fishing vessel Class 2 Certificate of Competency which he obtained in 1992. He has skippered various fishing vessels for the last 18 years and has worked on scallop dredgers since 2003. He has also completed all mandatory safety training courses, the last one being the safety awareness course which he had completed in December 2002.

CASE 16

Fishing Boat Sunk by Mound of Clay!

Narrative

An over 24m trawler was trawling in the vicinity of seabed pipelines, in around Force 7 and moderate seas, when she came fast. The vessel had an enclosed aft net drum space, with two hydraulically operated transom doors. She immediately began to flood through the port transom door, which had been inadvertently left open from the previous voyage.

A port list quickly developed, and this worsened as water continued to pour in. The crew's attempts to close the door using the hydraulic ram were thwarted when the ram became damaged by a green sea, and the door could no longer be closed.

An electric submersible pump, located at the forward end of the net drum space, had begun to successfully drain the water, until it stopped with a flash from the area of its junction box. The net drum space had also contained six non-return freeing ports, known as tonnage valves, but the owners had welded these up several years before the sinking due to practical concerns about back-flooding. With the pump gone there was no other means of clearing the rapidly rising flood water.

Water was soon seen pouring into the galley through open windows in the watertight bulkhead at the forward end of the net drum space, and further openings would have allowed progressive flooding to continue.

As the port list increased, hydraulic power was lost, resulting in band brakes on the automatic trawl winch system activating. With no safe and easy means of releasing these brakes, the vessel was effectively anchored to the seabed, and by the time the warps were cut with an electric grinder, the vessel's condition failed to improve.

Despite some difficulties, the crew managed to deploy the starboard liferaft, and as the list critically increased, they abandoned into it around 15 minutes after first coming fast. Shortly afterwards, the vessel capsized and sank by the stern. A nearby fishing vessel responded to the earlier "Mayday" and safely recovered the crew.

Given the proximity of the wreck to pipelines, the oil company undertook a video and side scan sonar survey of the seabed. These concluded that the bridle and tickler chains on the trawl gear had snagged on large mounds of boulder clay, probably created when the plough being used to back-fill the trench and cover the pipeline, had either stalled or jumped.

Figure 1: Port transom door open on wreck

Figure 2: Trawl gear embedded into mounds of boulder clay

The Lessons

1. The risks of trawling near pipelines, or other seabed obstructions, with the potential for the gear becoming fast, cannot be underestimated.

2. It is evident that this loss would not have occurred if the transom door had been closed, as it was normally. Simple human error meant that it was left open; a more effective pre-departure routine would have recognised this.

3. The lack of a means of clearing the water from the transom space once the pump failed, led to the vessel's ultimate sinking. Had the tonnage valves and pumps worked as intended, and the flooding been contained, it is likely that the vessel would have survived.

4. Electrical connections on weather decks should be of watertight construction, or located safely away from vulnerable areas.

5. The decision to weld the tonnage vales shut would not have been taken lightly, however the modifications were unauthorised, and were also not spotted during subsequent surveys. Unauthorised modifications relating to a vessel's safety critical equipment can never be condoned; alterations should never be conducted without first seeking expert advice and regulatory approval.

6. The forward bulkhead of the net drum space formed part of the vessel's watertight boundary. However, the windows in this bulkhead were regularly left open at sea for ventilation purposes and, on this occasion, allowed water ingress into the vessel. This case highlights the importance of being aware of which openings are safety critical, and of keeping all watertight openings closed at all times.

7. Although the trawl warps were cut, this required the crew to fetch and operate a grinder. It would have been better to have had a quick and reliable means of releasing the brakes available, preferably integrated into the winch system or, failing that, a simple manual method. Such considerations should be included in the vessel's risk assessment, and a practical method of releasing the gear made known to all crew members.

Tragedy Resulting From Crewman Standing in Bight

Narrative

A 19 metre twin rig trawler was hauling in the first trawl of the trip when the centre warp parted close to the clump. The crew successfully recovered the nets and clump using the outboard warps, and the decision was made to head for the nearest convenient port to collect new wires for all three warps.

As the vessel approached the port, the skipper decided that it would be expeditious to prepare for taking on the new wires by end for ending the inner lengths of wire on all three warps. These would then be connected to the new lengths on arrival in port, allowing the vessel to return to the fishing grounds without undue delay.

The skipper was on deck to assist the crew with end for ending the outboard wires. The operation was completed successfully, leaving only the centre wire to prepare. At this stage the skipper returned to the wheelhouse, keeping the vessel head to sea at about 3 knots and leaving a very experienced senior hand and the rest of the crew to work on the centre wire.

Assisting the senior hand on the aft deck were two crewmen, who had both recently joined the vessel.

End for ending the wire was carried out by putting a stopper on the outboard end of the wire and then paying out the wire over the stern as it came off the winch to form a bight. In this case, about 90 metres were trailing astern of the vessel. As the joining shackle, connecting the inboard end of the wire to the backing wire on the winch, passed onto the deck, the crew put a rope stopper onto the wire at the stern rail. This allowed the joining shackle to be pulled down onto the deck, where the senior hand was ready to punch out the pin and thus break the shackle, allowing it to be connected to the original outboard end of the wire. This would then have been pulled onto the winch, completing the task.

However, the crewman who pulled the wire and joining shackle down onto the deck, had positioned himself inside the bight of wire as the senior hand began work. The pin had just been punched out, the punch tool itself still being in the shackle when, without warning, weight suddenly came onto the bight of wire trailing astern of the vessel.

As the weight came on the wire, both stoppers parted and the crewman in the bight of wire was lifted off his feet and thrown overboard. He was not wearing a lifejacket or buoyancy aid.

Tragically, the man disappeared quickly astern. The skipper initially considered diving over the side to attempt a rescue. However, he sensibly decided against that course of action and, instead, turned the vessel around. But there was no sign of their missing colleague by the time the vessel returned to the position, which the skipper had marked on the chart plotter. Despite an extensive search of the area, co-ordinated by the coastguard and involving a helicopter, five lifeboats and local fishing vessels, no trace was found of the man.

Figure 1: Vessel's net drum and aft working area

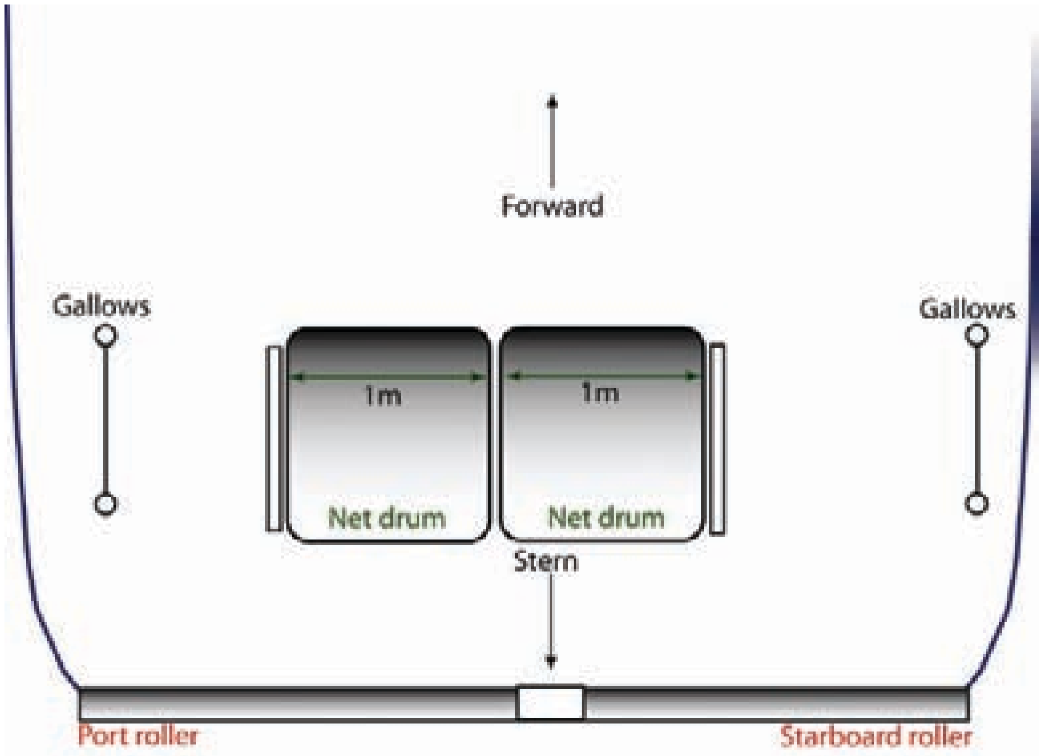


Figure 2: Plan of the stern

The Lessons

1. The skipper had conducted a risk assessment of the routine tasks carried out on the vessel, but he had not assessed the risks associated with foreseeable non-routine tasks such as end for ending wires. A risk assessment of all tasks carried out on board should be conducted to ensure appropriate control measures are in place to safeguard your crew.

2. Never stand in a bight! In this case the crewman positioned himself with thoughts only of getting the job done, and did not consider the potential consequences of the wire becoming snagged on the seabed.

3. Skippers need to ensure that inexperienced crew members are properly briefed and supervised, particularly when non routine tasks are to be carried out. In this case, the supervising senior hand involved himself in the task, so limiting his ability to supervise the safety of his less experienced colleagues.

4. No one on deck was wearing a lifejacket or buoyancy aid. The wearing of lifejackets or buoyancy aids will make the difference between life and death for many man overboard casualties; it is very strongly recommended that crew working on the deck of a fishing vessel routinely wear them.

5. Further advice on these lessons can be found in the MCA publication entitled "Fishermen and Safety – A guide to Safe Working Practices for Fishermen".

CASE 18

Scallop Dredger Capsize and Sinking – "Be Prepared"

Narrative

An under 12 metre stern trawler/scallop dredger (see Figure 1) had been in a family for well over 20 years. The vessel had a good reputation and was well maintained. The owner was very safety conscious; he insisted that the inflatable lifejackets were readily available in the wheelhouse and that the crew had completed the mandatory safety training courses. He had also invested in the safety of the crew by fitting a 4-man liferaft with hydrostatic release and an auto-locator system which sent out an hourly signal giving the vessel's position, course and speed over the ground. The system was also fitted with four personal alarms designed to be worn by the crew. These could be either automatically or manually operated, and would transmit an alert should a crew member have fallen overboard.

To maximise fishing opportunities, the vessel was variously used as a stern trawler and scallop dredger. During the last rig change to the dredger configuration, two of the main warp blocks were changed to smaller throated blocks. A schematic of the rig configuration is at Figure 2.

After taking on fuel and water, the vessel sailed to her fishing grounds, arriving some 9 hours later. The weather was particularly good. The wind was Force 2, the sea glassy calm, visibility was excellent and the swell was negligible. The sea temperature was 15°C; the tide was running at about 2.5 knots although known to reach 4 knots. However, this did not overly concern the skipper; after all, he had fished the grounds before. The omens were good. The crew expected good fishing – and they were not disappointed. By 1625 the following day 52 bags of scallops

Figure 1

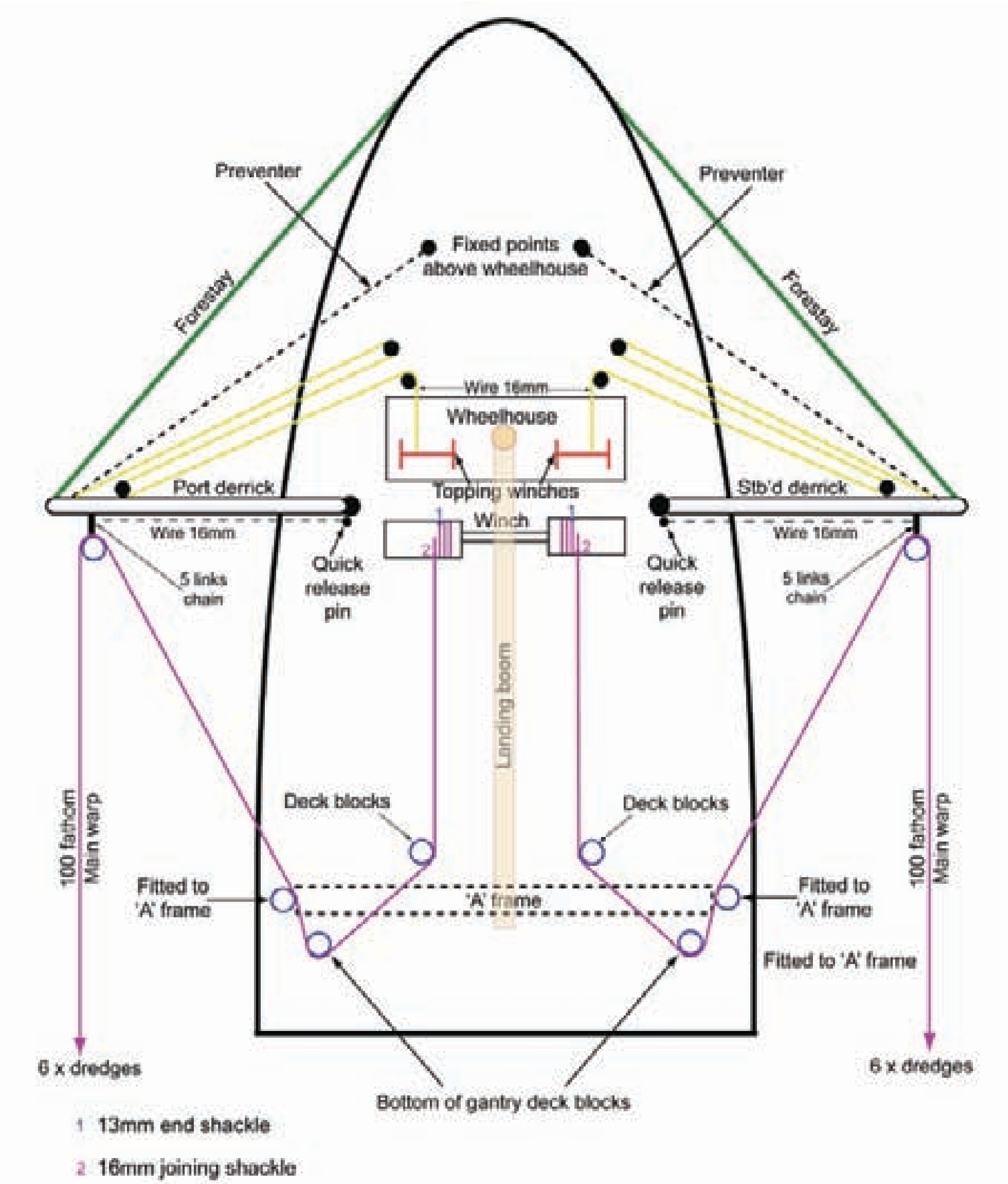


Figure 2: Beam trawler arrangement

had been dredged: 45 bags were in the fish hold and 7 were on the fish hold hatch waiting to be stowed.

At approximately 1630 the dredges hit rough ground and the vessel's speed slowed. The skipper increased the main engine revolutions, but soon afterwards the dredges started to snag. On each occasion, the skipper manoeuvred the vessel and the snag was released. However, at about 1635 the port dredge came fast, the head turned to port and the vessel adopted about a 20° port heel. As the skipper selected neutral, the heel increased under the influence of the strong tide and the head continued to turn to port. By now the port derrick was under water and the starboard derrick was steadily rising as the heel increased. In the rapidly changing situation the skipper did not consider using the quick release mechanism to drop the derrick blocks which would have helped improve stability.

By about 1638 the starboard main warp became entangled around the landing boom crutch located on the "A" frame. This flipped the boom to port at the same time as the seven bags of scallops slid from the fish room hatch to the port side. The starboard warp settled forward of the port quarter, which caused the vessel to be pulled further over to port. At about 1640, and having recognised the seriousness of the situation, the skipper attempted to release both warps from the winch drums. However, the warp joining shackles could not pass through the recently changed blocks. The skipper decided to cut the wires using the gas cutting equipment stowed in the net store. As the gas torch was lit, the heel exceeded 45°, causing rapid down-flooding into the net store through the open hatch.

The crew jumped into the water as the skipper fought his way to the wheelhouse to transmit a "Mayday". Unfortunately the VHF radio handset fell away before he could do so, and he could not reach the DSC button. He did manage to get hold of a hand-held VHF radio but it, too, fell from his grasp before he could complete the "Mayday" transmission. With no further options available to him the skipper jumped into the water. Neither he nor his crew were wearing lifejackets because there was insufficient time to collect them from the wheelhouse stowage before the boat capsized. Additionally, the crew were not wearing their personal man overboard alarms.

After about 5 minutes in the water the inflated liferaft floated free. The skipper calmed his crew down as they fought to reach the liferaft. After 20-25 minutes they managed to haul themselves on board the liferaft and set about checking the equipment and its integrity as instructed during the Sea Survival Course. With the vessel now submerged, the onboard auto-locator beacon failed to transmit its hourly transmission. This information was passed to the Coastguard, who activated the local lifeboat, which was already at sea conducting exercises in the area of the vessel's last known position. A search was made of the area and fortunately the crew were recovered, unharmed, at 1757.

The Lessons

This accident clearly demonstrates just how quickly a snagging situation can lead to capsize and sinking even in the most benign conditions. The skipper was faced with what initially appeared to be a normal snagging problem – one he had dealt with many times before. He was confident that he could deal with it using a combination of engine power and his winches. As the situation deteriorated, the skipper could have dropped the rig using the quick release system. This might not have saved the vessel from capsizing, but it would have bought him time to consider his next move, and would have given the crew the opportunity to don lifejackets.

1. Always carefully consider the full implications of changes to a fishing rig, and test the rig to its full extent to ensure it is free of snags and can be released in an emergency.

2. It is important to carry out risk assessments of fishing operations and make changes to procedures to improve safety, where appropriate. It is also important to ensure that crews are aware of the changes, and of the reasons for making them.

3. Consider the early use of “quick release” systems to lower the pivot points on the derricks and so lower the centre of gravity to improve stability in snagging situations.

4. Where personal overboard alarms are carried, the crew should be encouraged to continually wear them with their lifejackets while on deck and so improve the chances of survival.

5. Conduct regular drills to ensure that actions are instinctive in emergency situations.

6. This accident clearly demonstrates the importance of carrying a liferaft and an auto- locating beacon system. MSN 1813 (F) – The Fishing Vessel Code of Practice for the Safety of Small Fishing Vessels reinforces this and recommends that an EPIRB is carried.

7. Further advice on scalloping operations can be found at MGN 165 (F) – Fishing Vessels: The Hazards Associated with Trawling, Including Beam Trawling and Scallop Dredging – Notice to all Owners, Operators, Skippers, Crews, Managers, Gear Fitters, Shipbuilders and Designers.

CASE 19

Burning the Candle at Both Ends?

The vessel aground 0.5 mile from port

Narrative

It was a very busy time for the skipper of a 10m "Rule Beater" inshore prawn trawler; he was literally trying to be in two places at once!

The main prawn fishing season had started, which meant the skipper and his crew could look forward to earning good money. He needed to be at sea, and was working long days in order to maximise his catch. The skipper and one crewman (his son-in-law) were share fishermen, but they did not own the boat and were employees of a company that operated a small fleet of similar boats. The other two crewmen were foreign nationals on fixed wages, meaning that they had to be paid whether the vessel fished or not.

However, as a witness in an ongoing case, the skipper was required to attend court daily. Because the two demands on his time conflicted, the skipper either had to stop fishing or reverse his ideal work pattern. He felt a huge personal responsibility to his crew and owners, and he was very worried and stressed by this. Therefore, to keep fishing, he attended court by day and fished by night. The skipper was achieving about 2 hours sleep each day, but despite knowing this the managers of the boat did nothing to ease his workload.

This routine continued for 4 days before the skipper fell asleep in the wheelhouse as the boat was returning to harbour at the end of an overnight trip; the remainder of the crew were inside the shelter deck, processing prawns. The autopilot was on, and the boat steamed across the fairway to the port – one used by high speed ferries – to strike a well marked isolated rock, about half a mile off its home port. They were lucky; nobody was injured, and the boat lodged itself in place on the rock. The RNLI lifeboat was with them in minutes. However, the boat was seriously damaged, and repairs meant that she was out of service for weeks – so much for keeping fishing, and that bumper haul of prawns!

The Lessons

While the MAIB could never condone people working as hard as this skipper, we do understand the exceptional personal pressure which he felt, and the stress that resulted.

Fatigue is not something that can just be ignored, particularly cumulative fatigue that builds over a number of days. For the safety of everyone, fatigue is an issue that must be considered and addressed.

Ultimately, the power to do something really effective about this situation lay with the owners and managers ashore; they knew of the skipper's problems, yet let him continue to fish, potentially putting the lives of many people at risk. The company had a 'long-hours' culture, and did not identify the increased risk of the skipper becoming seriously fatigued due to his double commitments. They failed to support the skipper when they could have provided a relief skipper or an additional watchkeeper.

CASE 20

Beware the Bight

Narrative

Two crewmen of a fishing boat were on the deck and had just started to shoot a line of pots. Suddenly the foot of one of the men became trapped in a bight of the rope joining the pots.

As the man was being pulled towards the boat's side he shouted out, and the skipper, who was in the wheelhouse supervising the operation, quickly put the engine astern to take some of the weight off the rope. This enabled the man, who was in real danger of being pulled over the side, to be grabbed by the other crewman.

The second crewman was able to free his colleague's foot from the bight as the skipper manoeuvred the boat to keep the weight off the pot rope. The man's foot was very badly bruised as a result of the accident, and he had to be airlifted off the boat to receive medical attention.

Neither of the men on deck was wearing a lifejacket at the time of the accident.

Figure 1: Position of casualty at time of accident

The Lessons

1. This fisherman was very lucky; it is rare that any crewman who gets caught in a bight while shooting, lives to tell the tale. In this case, the quick reactions of the skipper and the other crewman saved his life.

2. When planning an operation such as shooting nets, it is important to ensure that those involved are able to stand in a place of safety, well clear of the ropes. In this case, ideally, the work would have been planned such that it was not possible for the man to be in a position for his foot to become caught in a bight. As every fisherman knows: if it can happen – it will!

3. A fundamental objective of a risk assessment is to eliminate the risk whenever possible. If this is not possible, those involved must be provided with appropriate protective equipment commensurate with the residual risk.

4. In this case, the men were working on an open deck but were not wearing lifejackets. The MAIB continues to investigate accidents in which lives have been lost when fishermen, not wearing lifejackets, have fallen overboard. Modern lifejackets are not cumbersome to wear – so wear them!

Fast, and it all Happened so Fast

Narrative

A 9.9m fishing vessel was trawling off the south coast of England. Her owner had fitted a liferaft to the boat even though not required to do so, and he had also fitted an auto-locator beacon, which every hour sent the boat's position to a base station ashore.

At about 1300, just as the skipper was about to haul the nets, the nets came fast on an obstruction. Adjusting the engine control to give minimum ahead speed, the skipper put the winch into gear and hauled the gear until the trawl wires were "up and down".

He then attempted to work the fastener clear by alternately heaving and slackening the gear. This had no effect and, realising that the fastener was moving, the skipper decided to tow the object into shallower water and to then try to free it again.

At about 1500, having made little progress, the skipper decided to make another attempt to remove the fastener. He hauled the gear until, once again, the trawl wires were "up and down". Keeping the engine in gear and running ahead, he applied the port trawl wire brake, disengaged the port dog clutch and heaved on the starboard trawl wire. The port wire suddenly slipped, transferring all of the weight to the starboard wire. Under the combined effect of this increased tension in the starboard trawl wire, the wind and tide also acting on the starboard side, and the engine running ahead, the vessel started to capsize to starboard very rapidly.

The skipper, who had been standing at the winch controls, leapt over the starboard side while the crewman, who had been sitting on the step leading into the wheelhouse, leapt over the port side. Neither man was wearing a lifejacket.

Figure 1

The liferaft, still in its canister, floated to the surface close to the skipper. It had not inflated automatically because the painter had not been attached to the weak link of the hydrostatic release unit (HRU). With some difficulty, the skipper managed to pull the painter out of the canister sufficiently to inflate the liferaft.

At 1526, with the vessel having sunk, the onboard auto-locator beacon failed to send its hourly position report. The "missed report" information was passed to the RNLI headquarters at Poole, which subsequently informed MRCC Falmouth that the boat was overdue. As a result, the local lifeboat and a rescue helicopter were tasked to search the area of her last reported position.

Shortly after 1700, the skipper and crewman, who were now in the inflated liferaft, heard the helicopter approaching and fired off a flare. This was seen by the helicopter crew and by 1715 both men had been winched to safety.

WHEN RECOVERING FOULED OR FASTENED GEAR

Recovery of fouled gear can impose extra loads on wires and machinery, particularly in adverse weather conditions. Failure of either may result in excessive rolling or a dangerous list to the vessel.

The vessel's stability reserves may be seriously reduced when hauling on fouled gear with the winches working hard. Additionally winches should not be braked and used in conjunction with a vessel's motions to free fouled gear, a heavier than normal swell may be sufficient to bring about the vessel's capsize in this condition. Dog-clutch winches are particularly hazardous in these circumstances.

Unusual or potentially dangerous operations should always be carried out under the supervision of the skipper.

There should be an emergency means for the fast release of snagged gear.

Figure 2: Extract from MGN 265 (F)

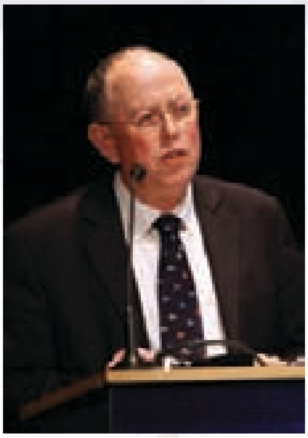
The Lessons

1. When the boat started to capsize, there was little warning, and she rolled over and sank within seconds. The speed of capsize was such that there was no opportunity to send a distress message, and there was no time to don lifejackets or prepare the liferaft. That the liferaft floated to the surface shortly after the sinking, and that the auto-locator system had been fitted, probably saved the crew members' lives. MSN 1813 (F) – The Fishing Vessels Code of Practice for the Safety of Small Fishing Vessels, reinforces this and recommends that a liferaft and an EPIRB are carried.

2. Although the boat carried a liferaft, the painter had not been correctly rigged, and the liferaft did not automatically inflate. The painter should be attached to the weak link of the HRU, which is designed to withstand the force required to initiate the inflation sequence, but will part when the buoyancy of the inflated liferaft acts on it. Information concerning the correct fitting of the painter was supplied with the HRU, but was not available to the skipper when the liferaft was replaced earlier in the year. Is your liferaft painter correctly attached so that the liferaft will inflate and float free if your boat sinks?

3. Advice concerning the recovery of fast gear can be found in Marine Guidance Note 265(F) (see Figure 2). This includes the need to provide an emergency means for the quick release of fastened gear, and to ensure that the crew are practised in emergency procedures and wear lifejackets on deck when carrying out such operations.

Part 3 – Small Craft



I have been involved with the leisure side of the marine industry for most of my life. I was therefore delighted and honoured to be asked to write this introduction to the MAIB Safety Digest. My background is in sailing, mainly with racing yachts although I now cruise with my wife in our own little 29 footer.

To my mind the work of the MAIB is essential and the Safety Digest makes essential reading for anyone who wants to learn by other people's mistakes, rather than making the same errors themselves. The lessons to be learned are often simple and, with the benefit of having them pointed out, very obvious.

In these times of a general 'blame culture', I find it refreshing to see that the MAIB takes a different attitude. While mistakes have often contributed to accidents at sea, the purpose of MAIB investigations is to draw attention to these in a positive way without unnecessarily pointing the 'finger of blame'. Their ultimate aim always being to enhance safety at sea.

During my career as a professional racing navigator and skipper, I have witnessed many near accidents. Most situations I have encountered could have been avoided with better planning and/or more knowledge. In most cases safety is not really about equipment or even training but far more about an attitude of mind. The lessons learned in this admirable publication can only help and I genuinely commend its reading to all seafarers.

Stuart Quarrie

Since 1998, Stuart has been the CEO of Cowes Week Ltd, putting into place all the logistics for the running of the annual sailing regatta ‘Cowes Week’. This takes place each year in the first week of August and has around 1,000 boats racing together with their 8,500 competing sailors.

Prior to Cowes, Stuart worked as a full-time freelance racing navigator and coach. He took part in most regattas around the World. His last major job before Cowes was as navigator on the Dutch entry in the 1997/98 Whitbread Round the World Race.

Stuart’s only major accident was during the 1979 Fastnet when he was navigator on a 34 foot boat which was capsized by a very large wave, and sank. The crew took to the liferaft and all were saved by another competitor (French 36 footer, Lorelei). This really showed the extreme possibilities and changed his attitude to safety afloat for ever.

Stuart is married to Sue and they have a 25 year old son, Robert, and a 28 year old daughter, Lindsey. They are all sailors. They own a 29 foot Vindo 32 long keeled cruising yacht.

Flare Up

Narrative

The coxswain of a RIB safety boat was scheduled to accompany students who were undertaking sailing tuition at an Adventurous Training School. The coxswain had recently joined the school and enjoyed this part of his work, but he was soon to get an unexpected shock.

The school's instructions required coxswains to check and place on board the RIB a single plastic "safety box" comprising: two orange smoke flares, two red pinpoint flares, a 1.5 litre fire extinguisher, a first-aid kit and tape (Figure 1). The instructions also required the coxswain to check that the flares' firing pins were in the "safe" position. The orange flares were operated by aligning a safety pin with slots in the casing and banging the base on a hard surface to initiate the detonator and so fire the flare.

As the "safety box" was put onto the boat it was dropped onto the deck. The coxswain then heard a "fizzing" sound from the box; it was clear to him that one of the flares had detonated. The plastic box started to melt and orange smoke issued from it. The box then ignited and the fire spread to the RIB's inflatable tubes, badly scorching them. The coxswain raised the alarm and took an extinguisher from a nearby boat and tackled the fire. To his credit, the coxswain

Figure 1

Figure 2

extinguished the fire, but not before the RIB's tubes were destroyed and the GRP deck damaged (Figure 2). The remaining flares were later destroyed by the Ministry of Defence's local bomb disposal team.

While the school's new crew induction process covered the requirements for the composition and checks on the "safety box", these points were not covered during the induction period for this particular coxswain.

Following the incident the school's instructors examined the flare firing mechanism and decided to place a band of electrical tape around it to help prevent inadvertent firing of the flare. This was later removed on receiving expert advice.

The Lessons

On investigation, it was discovered that the coxswain did not carry out the required checks to ensure the flares were in the "safe" condition. It was most probable that the flare was not in the fully safe position, and that when the heavy "safety box" was dropped onto the deck of the RIB, the resultant upward force was sufficient to detonate the flare.

While the school's action in placing the tape around the flare's firing mechanism was well intended, it was a departure from the design. It was inappropriate to modify the flare, with the potential of interfering with the firing mechanism and possibly preventing the flare from operating, particularly in a very stressful situation such as having to use the flare at night, in cold water.

The following lessons can be drawn from this accident:

1. Induction procedure checks for new crew should ensure that all aspects of the procedures are covered; checklists and counter signatures may be helpful in this respect.

2. Flares should be regularly checked to ensure that they are in the fully safe position so that the risk of unintended detonation and risk of fire is as low as possible.

3. Do not make any modifications to the firing mechanism of flares. This can cause confusion when they are needed in an emergency; they may mistakenly be thought to be defective and, in the worst case, prevent a rescue from being initiated.

4. If there are concerns about the reliability or functionality of safety equipment, report these to the equipment manufacturer without delay.

Kill Cords and Lifejackets – Your Tools for Survival

Figure 1: 6m RIB

Narrative

A family and a friend were holidaying on the south coast. The friend, who had 6 years boat handling experience, had brought his well maintained, 6m RIB with him (Figure 1). The boat was fitted with a 90 HP engine, and there were two 150N lifejackets and a buoyancy aid carried in a kitbag. There were no flares or VHF radio on board and, although there was anecdotal evidence that a kill cord was occasionally used, it was not found.

It was a bright and sunny afternoon on the day of the accident. There was a bit of a chop to the sea, and the wind was force 4 when the boat's owner took the father for a fast, wave jumping ride. It was an exhilarating trip – but unfortunately, tragedy was just around the corner.

At about 1315 the owner took the daughter out for another wave jumping trip. Neither wore a lifejacket despite them being readily available in the boat. Soon after leaving the slipway, the RIB was sighted going past a ship at anchor and a yacht, at high speed, in the following sea. At 1324 a member of the public contacted the coastguard and informed them that a boat had passed by, again at high speed, and had come to an abrupt stop. There were no signs that anyone was on board.

The coastguard immediately activated the inshore and all weather lifeboats, rescue helicopter and coastal rescue teams to search the area for possible survivors. At 1445 the body of the owner was discovered on the foreshore. The postmortem report showed that he had died from drowning. Despite extensive searches it was not until 9 days later that the female's body was found.The RIB, which had snagged on lobster pot lines, was recovered by the local marine police. It was found in the upright position with all its equipment still on board. Subsequent investigations identified that the engine throttle was in the "full fuel throttle" position and the engine start circuits were set to the "run" position. There was no evidence of a kill cord having been fitted. The engine and steering were found to be in good condition, and there were no defects to explain why the two persons on board were thrown into the sea. It was also proven that, had a kill cord been connected to the engine stop toggle switch, and fitted to one of those on board, the engine shutdown circuit would have operated as the person was thrown overboard.

All the indications suggest that this was an accident that occurred when wave jumping in a following sea. It is possible that the RIB stove into a wave, and if not already at full speed, the throttle might have been inadvertently shifted to the "full fuel" position, tipping both those on board into the sea. As the kill cord was not connected, the boat continued at high speed until it was snagged on the lobster pot lines.

Figure 2: Kill cord toggle-type switch

Figure 3: Example of fitting of the kill cord

The Lessons

There have been numerous accidents, many leading to loss of life, that have been due to people not carrying out the most basic of precautions. Sadly, this case illustrates once more, the importance of connecting kill cords and wearing lifejackets.

The following lessons can be drawn from the accident:

1. Had the kill cord been used, the boat would have remained in the vicinity with its engine stopped, significantly improving the chances of survival. There are many configurations for fitting kill cords. Some operate a toggle type switch (Figure 2) and others hold off a spring-loaded engine circuit isolating switch. Whichever system you have, do check that your kill cord is free from abrasions and that the crimps securing the loops are tight. Always use the kill cord and make sure that it functions and that it is securely fitted to your body or to equipment that you are wearing. An example is at Figure 3.

2. Some engine systems are designed to operate only with the kill cord in place. If you have one of these, it is prudent to carry a spare cord so that the engine can be re-started and you can rescue the person attached to the kill cord if thrown into the water.

3. Always wear your lifejacket – it is your very best friend in this type of situation. Do not be fooled by warm air temperatures. Exposure to cool sea water temperatures can rapidly sap your strength, especially if you have suffered the trauma of being thrown overboard and your boat continues without you.

4. While the lack of a hand-held VHF radio and flares might not have prevented this tragedy, both the RNLI and RYA strongly recommend that they be routinely carried, to raise the alert in the case of an emergency.

CASE 24

Stuck on a Cill

Narrative

A mother and father hired an 18.3m long 4/5 berth narrowboat for a Friday afternoon to Monday morning canal trip with their young daughter and two sons. This was to be their first boating experience. As part of the booking process, the hire company sent them the British Waterways and Environment Agency's *The Boater's Handbook*.

On arrival at the marina the family had to wait some time before the boat was ready. They were shown the 10-minute *British Waterways Code for Boaters* video and, later, the marina staff showed the mother and father around the boat's domestic arrangements. The marina manager carried out the formal handover procedures and gave instructions on how to operate the boat and negotiate locks. He showed them the boat's manual, which included emergency telephone numbers and extracts from *The Boater's Handbook*.

The boat left the marina in the early evening, and about an hour later arrived at the first lock. The transit through the lock was made with another narrowboat, the crew of which operated all the gates and paddles. Later, the family moored for the night and the following morning continued with their trip, which involved no other locks until the evening.

The boat approached the next lock, and the mother and daughter disembarked to open the gates. This time there were no other boaters around to help them. The boat entered the lock chamber, the gates were closed, and the mother and daughter opened the paddles to allow the water out and the boat to descend. The husband reversed the engine to keep the bow away from the bottom gates. The limits of the cill were clearly marked on both sides of the lock (see figure), but as the boat descended, the parents noticed it was trimming by the bow.

The father told his wife and daughter to close the paddles, but they were unable to do so. He and his two sons disembarked to the lock-side. As the boat's stern was hung up on the cill, there was ingress of water into the forward end of the boat and it became jammed in the lock.

The Lessons

1. **If an emergency such as this develops while a boat is negotiating a lock, boaters MUST close all paddles immediately. It would therefore be prudent for boat hire companies to consider placing more emphasis, during handover briefings, to hirers about the actual operation of the paddle mechanisms they are likely to encounter. Companies should consider providing practical demonstrations using model paddle arrangements.**
2. **The British Waterways and Environment Agency's *The Boater's Handbook* introduces the basics of boat-handling, and helps people to spot risks and to avoid accidents, including the danger of hanging up on cills. It also states that all paddles should be closed in the case of an emergency. It would be wise for inexperienced boaters to read the booklet thoroughly[1], and for experienced boaters to refresh their memories.**

[1] Its DVD is also a very good medium to more readily understand the information contained in *The Boater's Handbook*

Well Equipped – Well Done

Narrative

Two anglers, in a 4 metre open boat, were returning to their home port from a fishing trip when they encountered an area of confused seas. As the boat negotiated the waves, which were caused by the change of tide, she was heeled right over by a particularly large wave and one of the men was thrown overboard.

Fortunately, he was wearing a lifejacket, and the other man, who had managed to remain in the boat and call the coastguard on the VHF radio, was able to throw him a line and pull him back to the side of the boat. However, he was unable to pull his friend out of the water and so tied a rope around him and waited for the rescue helicopter, which the coastguard had alerted.

While waiting for the helicopter, the man in the water grew tired. Fortunately, his lifejacket gave him the buoyancy to remain afloat and cling onto the side of the boat until the helicopter arrived. He was airlifted to hospital, where, following a check up, he was released with only minor injuries.

The man returned home, grateful that he had had the foresight to wear a lifejacket and warm clothing, which certainly played their part in his survival.

The Lessons

1. This rescue demonstrates the advantages of being properly equipped when going to sea. The rescued man was wearing a lifejacket and warm clothing which meant that, although unable to be pulled back on board, he could remain afloat until he was rescued.

2. Although they were in a small boat, the men had ensured that she was properly equipped with VHF radio and flares etc. This enabled a prompt distress call to be made to the coastguard, which quickly initiated a helicopter rescue.

3. The men found themselves in a small open boat in unexpectedly adverse conditions. This case demonstrates the importance, not only of carefully checking weather forecasts, but also of having a good appreciation of local conditions, particularly at the change of tide, before going to sea in a small craft.

APPENDIX A

Preliminary examinations started in the period 01/03/09 – 30/06/09

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

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
09/03/09	*Finnhawk*	Ro-ro/lo-lo freight vessel	Finland	11530	Contact
	Svitzer Constance	Tug	UK	285	
11/03/09	*Mornes*	General cargo	Norway	5385	Contact
20/03/09	*Cosco Hongkong*	Container	UK	65531	Grounding
21/03/09	*Loch Awe Dinghy*	Non-commercial angling vessel	Unknown	Unknown	Foundering (4 fatalities)
22/03/09	*Niamh Aine*	Fishing vessel	UK	122	Grounding
28/03/09	*Isle of Arran*	Ro-ro vehicle passenger ferry	UK	3296	Grounding
10/04/09	*Golden Promise* *Buzzard*	Fishing vessel Platform	UK St Vincent & Grenadines	22.80 1796	Contact
14/04/09	*Ocean Ranger*	Small commercial motor vessel	UK	Unknown	Accident to person
03/06/09	*Transcend*	Fishing vessel	UK	171.77	Foundering

Investigations started in the period 01/03/09 – 30/06/09

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
23/03/09	*Stellar Voyager*	Crude oil tanker	Bahamas	58088	Machinery failure
01/04/09	*CSO Wellservicer*	Offshore dive support vessel	UK	9158	Accident to person (1 fatality)
05/04/09	*Royalist*	Sail training ship	UK	83.09	Grounding
06/05/09	*Jo Eik*	Chemical tanker	Norway	12249	Accident to person
19/05/09	*Sooty*	Pleasure craft (RIB)	UK	Unknown	Accident to person (1 fatality)
14/06/09	*Ijsselstroom*	Tug	Netherlands	71	Capsize

Reports issued in 2009

Abigail H – flooding and foundering of the grab hopper dredger, port of Heysham on 2 November 2008.
Published 1 July

Antari – grounding Near Larne, Northern Ireland on 29 June 2008.
Published 19 February

Astral – grounding on Princessa Shoal, east of Isle of Wight on 10 March 2008.
Published 29 January

Celtic Pioneer – injury to a passenger on board the RIB, Bristol Channel on 26 August 2008.
Published 21 May

HMS Westminster/Princess Rose – person overboard during a passenger transfer, River Thames on 24 November 2008.
Published 2 July

Hurlingham – loss of a passenger overboard, Westminster Pier, on the River Thames on 17 August 2008.
Published 9 June

Maersk Kithira – fatal injury of a crew member, and the serious injury of a second crew member in heavy weather, South China Sea on 23 September 2008
Published 28 April

Maersk Newport – heavy weather damage on board the container ship, 50 miles west of Guernsey on 10 November 2008 and fire alongside at the container berth in Algeciras, Spain on 15 November 2008.
Published 27 June

Moondance – electrical blackout and subsequent grounding in Warrenpoint Harbour, Northern Ireland on 29 June 2008.
Published 10 February

MV Norma – hazardous diving incident, Dover Strait on 21 June 2008.
Published 21 January

Pacific Sun – heavy weather encountered by the cruise ship, 200 miles north north-east of North Cape, New Zealand on 30 July 2008, resulting in injuries to 77 passengers and crew.
Published 24 June

Plas Menai RIB 6 – capsize of the RIB 6 while undertaking unauthorised RIB riding activity near Caernarfon, Wales on 1 July 2008, resulting in one injured student.
Published 18 February

Pride of Canterbury – grounding in "The Downs" – off Deal, Kent on 31 January 2008.
Published 14 January

Saga Rose – fatality on board the passenger cruise ship in Southampton, England on 11 June 2008.
Published 6 January 2009

Scot Isles/Wadi Halfa – collision in the Dover Strait on 29 October 2008.
Published 14 May

Vision II – fire on board the fishing vessel alongside at Fraserburgh on 1 August 2008, resulting in three fatalities.
Published 25 March