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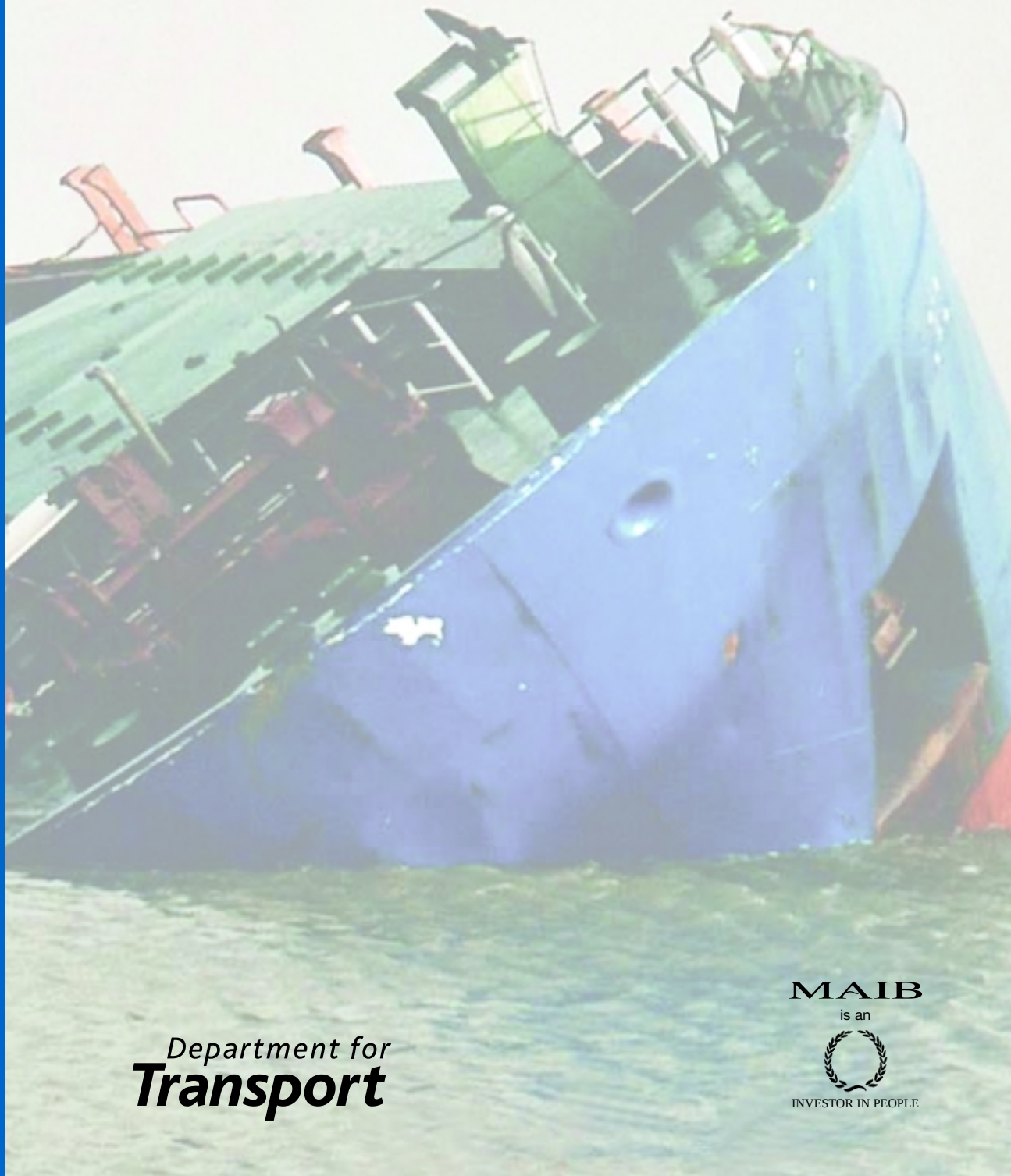
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY DIGEST

Lessons from Marine Accident Reports 3/2007



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Lessons from Marine Accident Reports

No 3/2007

Department for Transport
Great Minster House
76 Marsham Street
London SW1P 4DR
Telephone 020 7944 8300
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Marine Accident Investigation Branch
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MARINE ACCIDENT INVESTIGATION BRANCH

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

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

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

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

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

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

The telephone number for general use is 023 8039 5500.

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

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

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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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APPENDICES 66

Glossary of Terms and Abbreviations

AB	–	Able Seaman
ARPA	–	Automatic Radar Plotting Aid
Cable	–	0.1 nautical mile
CO_2	–	Carbon Dioxide
CPA	–	Closest Point of Approach
CPR	–	Cardiopulmonary Resuscitation
DSC	–	Digital Selective Calling
EPIRB	–	Emergency Position Indicating Radio Beacon
FRC	–	Fast Rescue Craft
GMDSS	–	Global Maritime Distress and Safety System
GPS	–	Global Positioning System
GRP	–	Glass Reinforced Plastic
ISAF	–	International Sailing Federation
ISM	–	International Safety Management Code
kW	–	kilowatt
m	–	metre
MGN	–	Marine Guidance Note
MOB	–	Man Overboard
OOW	–	Officer of the Watch
OSR	–	Offshore Special Regulations
PEC	–	Pilotage Exemption Certificate
RIB	–	Rigid Inflatable Boat
RNLI	–	Royal National Lifeboat Institution
RORC	–	Royal Ocean Sailing Club
RYA	–	Royal Yachting Association
SAR	–	Search and Rescue
SFIA	–	Sea Fish Industry Authority
SOLAS	–	International Convention for Safety of Life at Sea
STCW	–	International Convention on Standards of Training, Certification and Watchkeeping
TSS	–	Traffic Separation Scheme
VHF	–	Very High Frequency
VTS	–	Vessel Traffic Service

Introduction

I have just returned from the annual meeting of the Marine Accident Investigators' International Forum (MAIIF). Attended this year by the senior investigators of 25 countries, it rapidly became apparent that we all had the same overriding safety concerns. Three of these - fatigue, complacency and poor Bridge teamwork - are amply illustrated in the Merchant Vessel section of this edition of the Safety Digest. Please read these cases and then consider, if accident investigators from around the world all see these same issues time and again in accidents, how confident are you that you/your ship/your company are getting them right?

The other key concern we all shared was the apparent growth in the number of accidents involving entry into enclosed/confined spaces. Although there are no examples in this Safety Digest, MAIB is currently dealing with three such cases, two of them fatal, and many other countries at MAIIF reported similar. Please look again at your systems and re-brief your crews on the importance of correct ventilation and entry procedures. This is a critical area, where complacency cannot be allowed to grow.

The Fishing Vessel and Leisure Craft sections again provide a cross section of accidents, many tragic. Better awareness of risk would stop most accidents - before a trip, or before a specific evolution, just think through with your crew: "What are the dangers?"; "What do we need to do to avoid each one happening?"; "What should we do to minimize the effect if it were to happen?"; and "how would we deal with it if it does happen?" Such a quick and simple discussion could save lives.

Think safety and stay safe.

Stephen Meyer
Chief Inspector of Marine Accidents
December 2007

Part 1 – Merchant Vessels

Who can afford to ignore free advice when it is readily available? This MAIB Safety Digest is commended as a wonderful source of such advice. From cradle to grave we humans learn by experience. It was Oscar Wilde who wrote (in Lady Windermere's Fan) "*Experience is the name everyone gives to their mistakes*". How much better to learn from the experience of others and avoid the stress of making the mistakes yourself!

We work in a heavily regulated industry for which most regulation can be traced back to one of a number of major shipping casualties that occurred during the twentieth century. One such regulation gave us the ISM Code, an excellent framework for robust safety management which requires that each company's objectives include the continuous improvement of safety management skills. The Code also requires procedures to ensure that accidents and hazardous situations are reported, investigated and analysed with the objective of improving safety. How many of the major shipping casualties referred to could have been prevented by an earlier focus on continuous improvement through learning from mistakes?

Our industry has been poor at learning from its mistakes, but as a result of the ISM Code and a more enlightened attitude by management, a change has taken place in recent years to correct this weakness; there is a gradual move towards a culture where when things go wrong we now look for lessons to learn rather than people to blame.

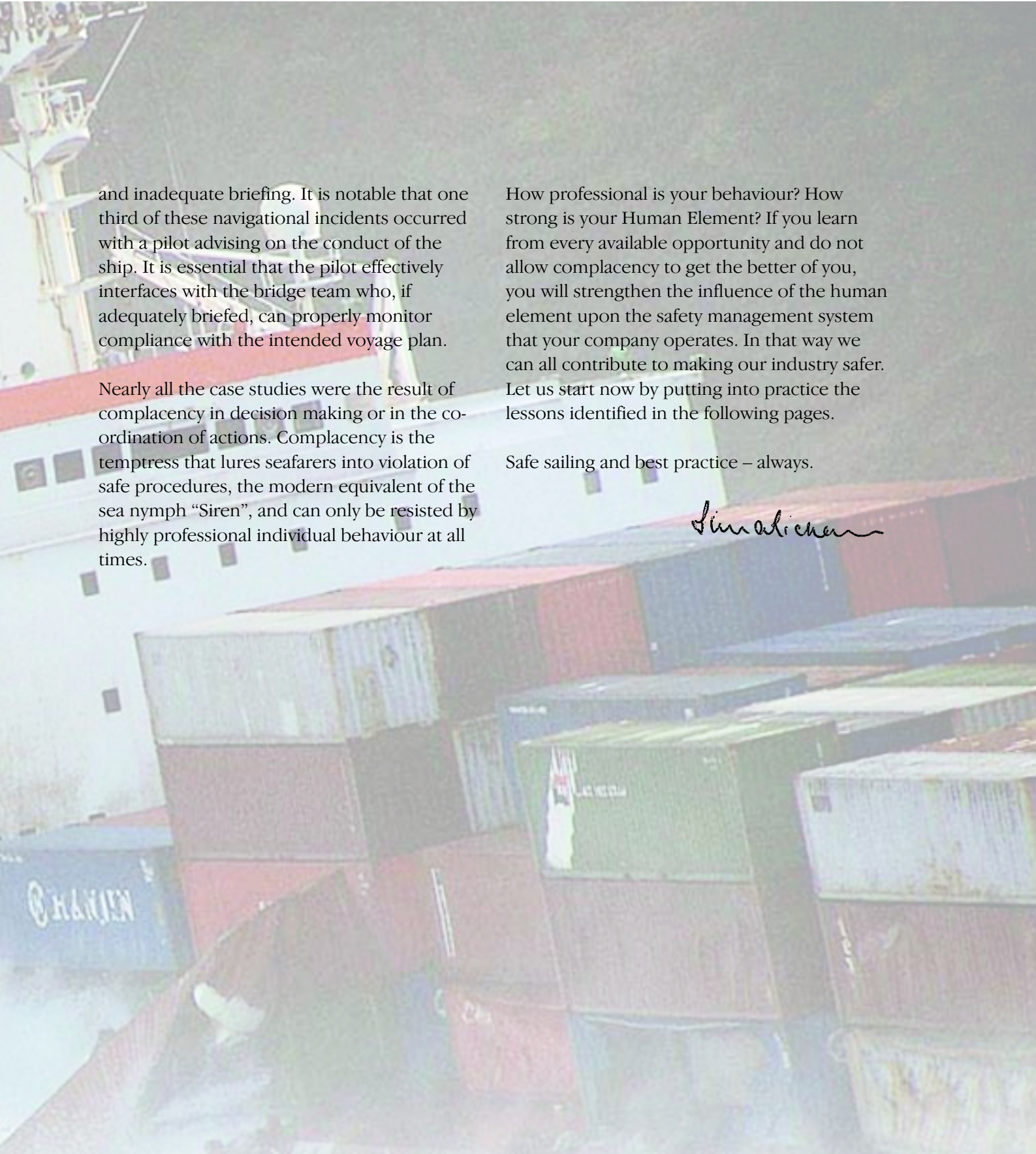
It is only by identifying the lessons to learn from incidents that we will encourage continuous improvement. I have no doubt that the most influential factor upon the safety management system for which I am responsible, is our standard agenda item "Safe Learning Events". This ensures that fleet management meetings thoroughly consider all lessons to learn from any unplanned event in order to improve procedures and guard against risk.

Safe learning events are not limited to own company incidents but can usefully be extended to include those published by CHIRP (The independent marine Confidential Hazardous Incident Reporting Programme), MARS (The Nautical Institute's Marine Accident Reporting Scheme) and of course the MAIB Safety Digest.

I am convinced that the MAIB makes a major contribution to safety at sea through its investigation of accidents and identification of lessons to be learned. The lessons identified in MAIB Safety Digests and Investigation Reports should be the staple diet of a healthy safety management system.

Human behaviour is fundamental to the effectiveness of even the healthiest safety management system. Any procedure is only as good as the behaviour of those tempted to violate it. Unchecked, humans easily succumb to complacency. We should rise above this weakness and extract the learning points from all unplanned events, whether in our experience or the experience of others. In this context we should also ensure and encourage a level of reporting that enhances organisational learning and fosters continuous improvement in safety management.

The case studies included in this section of the digest clearly reflect the significant risks to safe ship operation, although it might be argued that the number of 'fire' incidents reported is disproportionately light. The majority of studies relate to collision or grounding which resulted from weak bridge team management



and inadequate briefing. It is notable that one third of these navigational incidents occurred with a pilot advising on the conduct of the ship. It is essential that the pilot effectively interfaces with the bridge team who, if adequately briefed, can properly monitor compliance with the intended voyage plan.

Nearly all the case studies were the result of complacency in decision making or in the co-ordination of actions. Complacency is the temptress that lures seafarers into violation of safe procedures, the modern equivalent of the sea nymph "Siren", and can only be resisted by highly professional individual behaviour at all times.

How professional is your behaviour? How strong is your Human Element? If you learn from every available opportunity and do not allow complacency to get the better of you, you will strengthen the influence of the human element upon the safety management system that your company operates. In that way we can all contribute to making our industry safer. Let us start now by putting into practice the lessons identified in the following pages.

Safe sailing and best practice – always.

Captain Simon Richardson

Captain Richardson is Head of Safety Management for P&O Ferries. He has 30 years experience in the ferry industry, 9 years of which was spent in command. Since coming ashore into fleet management 10 years ago he has held the positions of P&O Group Marine Audit Manager, Fleet Manager for P&O Stena Line and moved into his current role upon the restructuring of P&O Ferries to include all the company's ferry operations.

He is a Fellow of the Nautical Institute, a member of the Marine Advisory Board for CHIRP and a Younger Brother of Trinity House. His preferred leisure activities include walking and narrowboat holidays.

No Easy Withdrawals From This Bank

Narrative

At 1544, an 1857gt general cargo ship slipped from her berth. Before departing, the pilot and master had agreed that the pilot would disembark before the ship reached the port limits because of the potential difficulty in getting off in the swell which could be seen towards the open sea. They did not discuss the ship's engine power, which the master considered was 1000kW, but which was actually 600kW. By 1551, the ship had turned off her berth and was heading toward the departure channel. The channel was 50m wide, just over 1 mile long, and its centre marked by two sets of leading lights. It was semi-darkness, raining, and the wind was a force 5 to 6 from the south. The master was on the helm and was steering courses as advised by the pilot, who monitored the ship's position using leading lights astern. Speed was increased to 6 knots.

At about 1600, course was adjusted to follow the second set of leading lights astern, the base course of which was 091°, to clear the channel. The pilot then advised the master that he was disembarking into the pilot cutter, and that the master should put the engine to full ahead, and aim for the red buoy marking the south side of the entrance to the channel as soon as he was clear.

Escorted by the chief officer, the pilot disembarked at about 1602. The ship was fewer than 5 cables from the end of the channel and about 7 cables from the pilot's usual disembarkation position. The master then increased to full ahead, but the ship started to be set to the north. This was seen by the pilot following in the cutter astern, and he immediately repeated his previous advice to the master via VHF radio. To assess the ship's position, the master used the

Figure 1: Damage to the vessel's steering gear

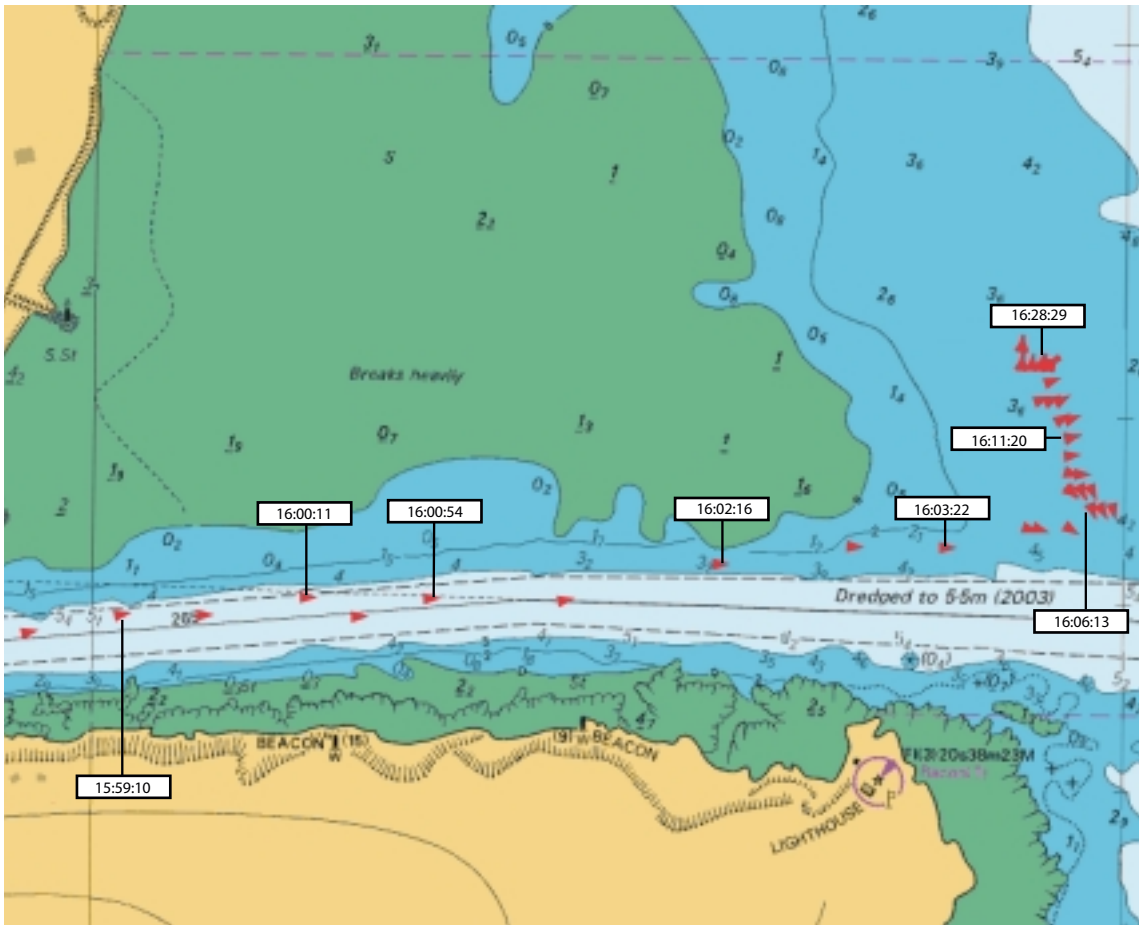


Figure 2

lateral buoys ahead, supported by single radar range and bearing fixes provided by the chief officer on his return to the bridge, and was not immediately aware of the degree of the set being experienced. When he did realise the ship was to the north of the channel, the master was reluctant to alter too far to starboard because of the narrowness of the channel and the dangers on its southern side.

At about 1605, the ship started to pitch heavily and slowed quickly as she started to take the ground on a sandbank. Her main engine was kept at full ahead, but was stopped when the chief engineer reported to the master that the steering gear was badly damaged (Figure 1). The ship was now on a south easterly heading, and as she continued to be set to the north by the wind and the swell, her forward part made contact with a green lateral buoy marking the north side of the channel. Both anchors were then let go and the ship came to rest at about 1628.

The ship's ground track from leaving her berth until 1630 is at Figure 2. She remained aground for 6 days, and was only refloated after her bunkers and some of her cargo were removed.

The Lessons

1. The need for compulsory pilotage is based on a risk assessment undertaken by the relevant port authority. It is therefore likely to be appropriate for such a requirement to apply in highly adverse conditions, particularly those which make boarding or landing a pilot too dangerous. These conditions inevitably make the safe passage through restricted waters more difficult than usual, and the premature departure of a pilot can place the master in an extremely difficult situation, and one which he might lack sufficient experience and local knowledge to successfully resolve. Therefore, where circumstances dictate that a pilot is unable to disembark or embark as intended, the postponement of a sailing or arrival must be seriously considered by both the port authority and the master concerned. As a minimum, the port authority should satisfy itself that the ship and crew are prepared and capable of safely navigating within the port limits without the benefit of a pilot.

2. Without basic manoeuvring information, such as the power output of a ship's engine, it is impossible for either a master or a pilot to properly assess a vessel's suitability to transit very restricted waters in adverse conditions. In the first instance, such information needs to be accurate, and where marginal conditions make the manoeuvrability of a vessel a major consideration, it should be discussed between the master and the pilot before sailing.

3. Where there is little margin for error in a narrow channel, the use of leading marks or lights in transit frequently provides the quickest and most accurate means of keeping a ship safe. However, the use of these aids at night and when they are astern is not always easy. Unfortunately, although the use of buoys is much easier, it is far less reliable, and fixes based on single radar ranges and bearings are nowhere near as accurate.

4. Bridge organisation is an extremely important aspect of navigation through restricted waters, and adjustments to normal practice are occasionally required to meet the demands of differing situations. In this case, the master was alone on the bridge during the disembarkation of the pilot, and had to focus much of his attention on the helm. The use of a helmsman would have allowed the master to move around the bridge to monitor the leading lights astern, to keep an eye on the pilot transfer, and to maintain a good overall situational awareness.

Odd Ship, Odd Handling

Narrative

A 4,966gt ship, originally built for service on the large rivers of Russia, was approaching a port in the UK. The ship had an unusual propulsion and manoeuvring system consisting of twin propellers in steerable nozzles with a single centreline rudder. Normally the rudder and nozzles acted together to steer the ship but, for manoeuvring, both the rudder and each nozzle could be operated independently. The vessel was also fitted with a bow thruster.

Before boarding the ship, the pilot had decided that tug assistance would not be needed for berthing because the north-westerly winds were light and her two propellers and bow thruster should have made her quite manoeuvrable. Once on board, the pilot handed the master a 2-page port's pilotage passage plan, on which was marked the proposed route. The pilot and master discussed the vessel's speed, and it was confirmed that she had two fixed propellers and a bow thruster. The master did not give the pilot a ship-specific pilot card, and he did not tell him about the two steerable nozzles around the propellers or that there was a single centreline rudder.

The engines were placed on full ahead, giving a speed of about 7.5 knots, and the ship started her approach. The master was stationed at the two telegraphs and the chief officer was steering the vessel, with the pilot giving a mixture of helm orders and courses to steer. As the ship approached the inner harbour, speed was reduced to half ahead, giving about 4.5 knots.

The pilot was judging his approach to the inner harbour, by eye, watching the movement of navigational lights against the shore lights in

The bridge showing the telegraph and steering positions

the background. The ebb tide was causing the ship to set to starboard, and because of her slow speed and poor manoeuvrability she did not return to her planned track. She was still trying to regain the centreline of the channel as she passed very close to the inner breakwater, on a heading 30° to port of the planned track. Just inside the breakwater, there was a planned track alteration to starboard of a further 30°. The ship was now required to alter course through 60° to follow the plan. She was slow to respond. The pilot gave orders for increasing amounts of starboard helm, until the rudder was hard-to-starboard. Realising that the ship was still not turning fast enough, the pilot ordered the starboard engine to full astern, and the bow thruster full bow to starboard. In an effort to increase the rate of turn further, he also instructed the pilot boat to push on the port bow.

The ship's head began to turn to starboard, but it soon became apparent that she was closing the shallows and would not be able to complete the turn. The pilot ordered full astern on both engines and the ship began to slow. But these efforts were not enough to prevent the ship from grounding forward on a mixture of mud and sand, and on a falling tide. Attempts to refloat her, even with the assistance of two tugs, were unsuccessful until the tide had risen after low water.

An underwater survey by divers found there was no damage to the ship.

The Lessons

1. **The pilot had noted that the ship was fitted with twin shafts and a bow thruster, and considered that a ship with this arrangement would be very manoeuvrable. Unfortunately, the master/pilot exchange was short, and the particular manoeuvring characteristics of this ship were not passed on to the pilot. The pilot was not prepared for the ship's low power and poor turning ability.**

2. **Although a navigational checklist for arrival in port had been signed by the OOW to verify, among other things, that a completed pilot's card had been given to the pilot, and that the master and OOW were monitoring the vessel's progress, it was clear that most of the actions on the checklist had not been taken. The checklist is there for a purpose: to remind the OOW of the actions he must take to prepare the ship for a safe pilotage, and to record that the actions have been carried out. Signing the checklist without completing the actions totally undermines the ship's ISM procedures, which are designed to promote safe ship operation.**

3. **The port mentioned in this article requires pilots to decide whether or not tug assistance is needed. This decision depends on the ship's manoeuvrability, weather conditions, and it also takes account of the wishes of the master. Although this ship had visited the port before, there was no guidance from the port authority for its pilots, which would have identified the particular characteristics of this ship and might have prompted the pilot to arrange tug assistance.**

4. **SOLAS V requires that the plan should be from berth to berth, to ensure that the ship's staff can monitor the pilot's actions. The passage plan for this voyage finished at the outer breakwater, so it was not possible for the master or OOW to monitor the passage.**

A Bridge Too Far

Damage to the vessel's bow

Narrative

A laden cargo vessel made contact with the supports of a bridge when making her way upriver, at night, before a 2.5 knot tidal stream. The vessel's pilot was very experienced and was an expert at negotiating this difficult stretch of water, which had a history of accidents. The bridge was situated about a cable beyond a bend in the river, allowing little room for error in the run-up to the bridge. Due to the moonless sky and very still river it was extremely difficult to visually differentiate between the water and the riverbank. As the vessel made its way upriver, on the flood stream, it was essential she made enough way to maintain steerage. There were transit lights on the bridge; no other marks or lighting were available to guide masters and pilots during their approach.

As the pilot neared the bend in the river, he reduced the vessel's speed from 10 knots over the ground, but did not check to confirm his new speed. His view from the wheelhouse was affected by the flood-lighting on the bridge, which coincidentally was in line with the vessel's very low wheelhouse windows and caused a "dazzle effect" as the ship neared the bridge; this was exacerbated by the reflection of the lights from the mirror-like surface of the river. The pilot misjudged the vessel's position, and by the time this became apparent to him it was too late to take corrective action to prevent her from hitting the bridge, causing substantial damage to the cargo vessel and bridge supports. Fortunately no one was injured.

The Lessons

1. Even the most experienced mariners can make mistakes, and the risk of this happening can often be exacerbated when performing tasks that have been done many times before. Familiarity and complacency can lead to shortcuts being taken, often with tragic consequences. Do not rely on experience alone when negotiating difficult waterways; use the navigational aids provided to assist you to navigate safely, no matter how confident you may feel about the developing situation.

2. The vessel was running before a 2.5 knot tidal stream, and a further 3 to 4 knots were needed to maintain steerage, giving a speed over the ground of at least 5.5 knots. Although the pilot did instinctively take action to reduce the speed of the vessel from 10 knots before attempting to negotiate the bend in the river and pass under the bridge, he did not verify that the vessel was proceeding at a suitable speed before she reached the bridge. No matter how experienced the bridge team, difficult areas should always be transited at the minimum safe speed, thus allowing more time for corrective action to be taken and damage to be minimised if things do go wrong.

3. Over the years, numerous accidents involving this bridge had occurred at night, yet nothing had been done to assist masters and pilots to better position their vessels during their approach to it. Harbour authorities have an obligation to ensure that appropriate navigation marks and lights are in place in areas under their jurisdiction, and thus to help protect harbour users, their facilities and the environment from harm.

Rain, But No Rainbow

Narrative

Shortly after a large container ship had cleared an area of restricted waters, involving an extended period of slow speed manoeuvring, a fire was noticed in the top tier of the deck containers aft of the funnel. The unit affected was an empty flat rack with a wooden floor.

The fire alarm was sounded, fire parties mustered and the vessel's speed reduced to minimise wind over the deck.

Fire hoses were rigged and directed at the fire from the nearest accessible position on a lashing bridge. But these efforts were unsuccessful because the water could not reach the top of the stack, which was 7 tiers high.

The master decided to alter course and speed to give a relative wind of 12 knots from forward to aft. Two water jets, from hoses, were then played at 45° into the air from the aft end of the bridge. Although the jets still did not reach the affected unit, the 'rain' effect was sufficient to extinguish the fire.

The vessel was able to regain her original course and speed. An overnight watch was kept on the area of the fire, but there were no further problems.

The Lessons

1. **After a long period of slow speed operation, the main engine probably discharged some sparks as the vessel increased speed. These might have fallen on the wooden decking of the flat rack, initially causing the wood to smoulder and then, with the increasing airflow over it as speed increased, burst into flames.**
2. **Access to fire-affected containers on large vessels is often difficult. In particular, access to the upper deck tiers is a problem, even with the approved fire-fighting equipment required by SOLAS. In this case, the master used his initiative successfully to apply fire-fighting water to a unit that was at the extreme operating limit of the equipment on board.**

CASE 5

A Tale of Two Lookouts

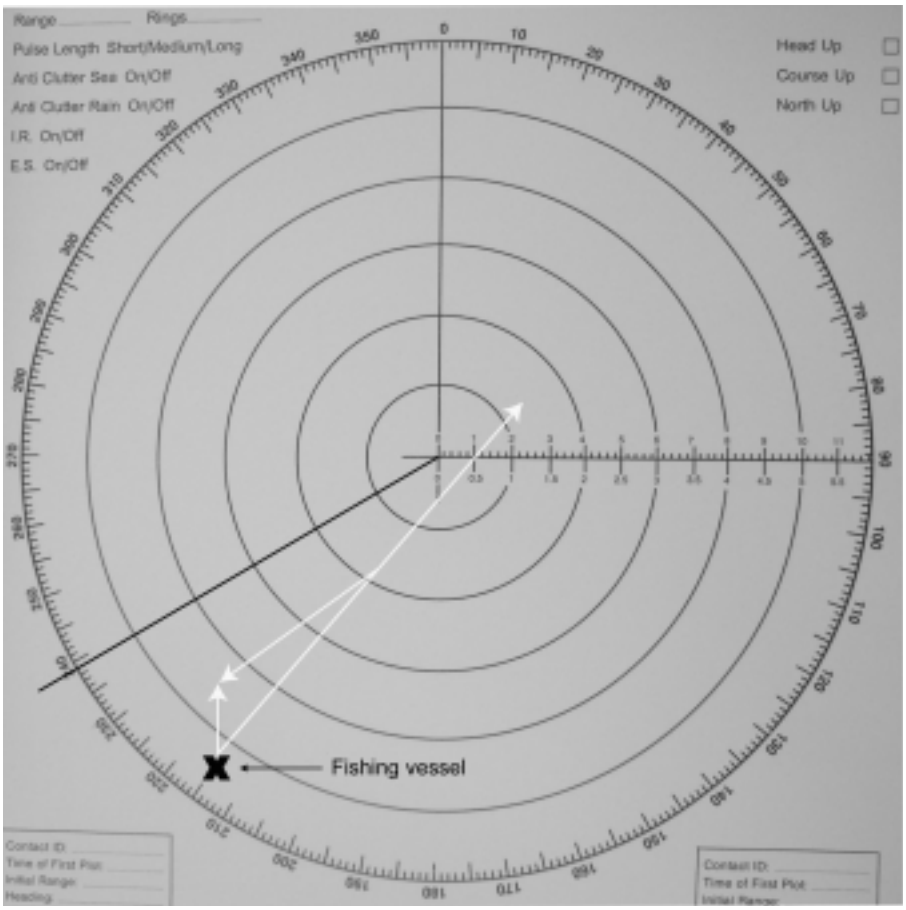
Narrative

A coastal tanker was enroute to her loading port around the southern coast of England. The weather was fine with good visibility, and moderate traffic conditions were expected. The master was on the bridge and was busy with his administrative duties. He left the watchkeeping officer, who had recently joined the vessel as an additional OOW on a training voyage, to navigate the vessel.

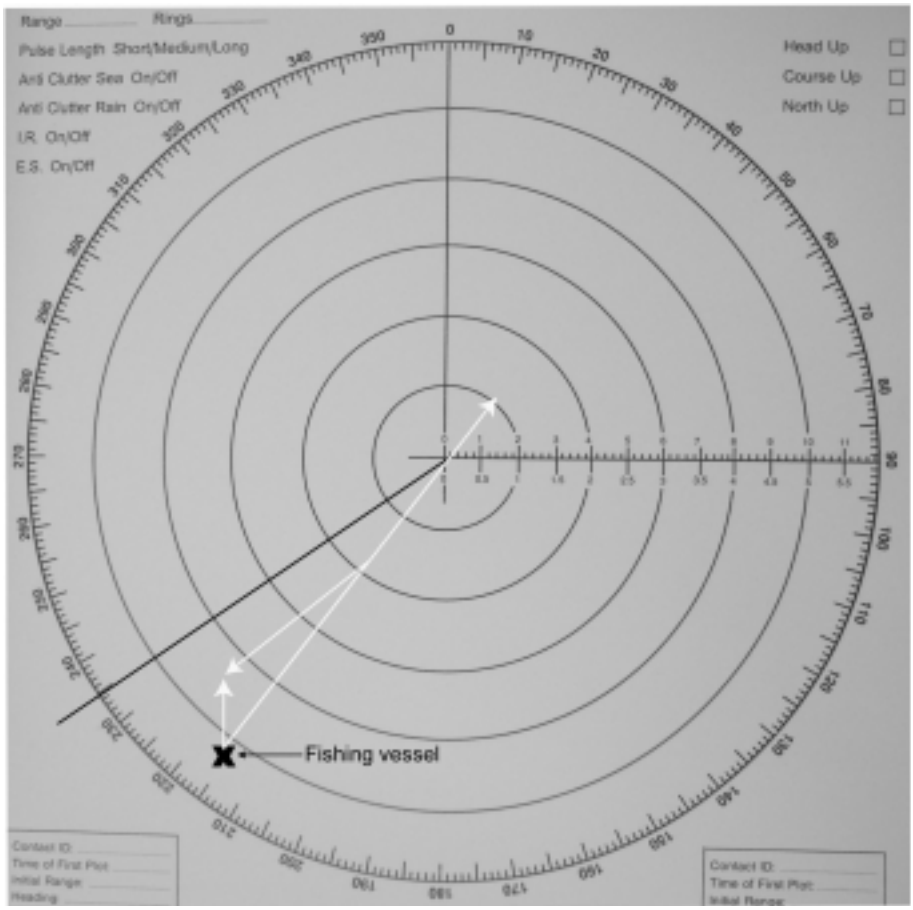
Meanwhile, a single-handed fishing vessel had completed laying her nets and was heading back into port. On setting the course and engaging the autopilot the skipper left the wheelhouse to tidy up the working deck. From that position, he could not maintain a lookout because his view was obscured by the wheelhouse.

The OOW on the tanker was monitoring the traffic using the two radars, and also by sight. To do this he was using the 3-minute relative target trails on the radars, and if he thought that they indicated a close quarters situation or collision, he would then acquire the target with the ARPA so as to monitor it more closely. All other targets were discarded and not monitored.

The fishing vessel was initially sighted on the port bow, and the radar trails indicated that it would pass about 3 cables astern of the coastal tanker, so no plot was initiated. Soon after that, the OOW adjusted the vessel's course (4°) to port to allow her to pass clear of a wreck which lay close by the course line. This change of course was sufficient to change the CPA to zero, but he did not look again at the fishing vessel's target (see plot below).



Plot A: Radar as viewed on the tanker



Plot B: Radar plot after alteration of course

The skipper of the fishing vessel, who was still cleaning up, claimed that some 'sixth sense' made him look up, whereupon he saw his vessel about to collide with another vessel. He then just managed to leap to the engine controls and go full astern. This action did not prevent a collision, but it did manage to reduce the severity of the impact. The fishing vessel sustained damage to its prow and gunwale; the tanker a little paint damage to her hull.

The Lessons

1. It is imperative that a lookout be maintained at all times. Both of these vessels failed in their obligation to do so.

2. The collision regulations require that risk of collision should be determined by all available means. Although in this case the radar was being used by the tanker, the OOW was basing his assessments on scanty information. He was not using the full capability of the ARPA to assist in his decision making.

3. When, or preferably before, the OOW altered course, he should have rechecked each of the relevant targets to ensure that he was not altering into danger. The ARPA facility would have made this task easy.

4. The OOW held the required certificate of competency to stand the watch, but his experience as an OOW had been on fishing vessels, and his perception of what constituted a safe passing distance was based on his previous experience. The master should have been monitoring the performance of the officer and instructing him in the required standard.

CASE 6

Don't Take Chances in Heavy Seas

Narrative

A 38,000gt vehicle carrier engaged on a regular liner service between the Aegean and NW European ports was approaching Land's End from the English Channel in very heavy weather. The master, who prudently had reduced the vessel's speed to a minimum off Lizard Point for several hours when the vessel was pitching violently in a westerly swell, then decided that the weather had improved sufficiently for the vessel to resume its passage towards the Bristol Channel. Thus, as the vessel entered the Land's End Traffic Separation Scheme (TSS) in gale force winds and very heavy seas, course was altered to north to round Land's End, which placed the heavy swell on the beam.

The vessel was carrying a mix of cars, vans and heavy earth-moving vehicles on its nine decks. The crew had checked the lashings on all the various vehicles in the hours leading up to the vessel rounding Land's End, and extra lashings were placed on several vehicles, including a 76 tonne excavator unit, which was secured alongside other vehicles weighing between 30 and 60 tonnes adjacent to the vessel's stern ramp.

When the vessel altered course off Land's End, it began to roll violently and also continued to pitch heavily, effectively adopting a corkscrewing motion. After a short time a lashing on the 76 tonne unit parted, and this signalled the start of a chain reaction as other lashings then also started to part. The vehicle began to slide around the deck, crashing into and parting the lashings on the adjacent vehicles. The master was quickly made aware of the fact that some of the cargo lashings had parted, but considered he was unable to reduce the vessel's motion as he was in a TSS and did not think he could alter course.

As the vessel continued to move violently, the situation on the main deck deteriorated as there were now 6 cargo units, together weighing over 200 tonnes, on the move, colliding with one another and the side of the ship. The ability of the units to move around the deck was made worse when the hydraulic tanks of some of the vehicles were ruptured, causing the vessel's deck to become very slippery.

Once clear of the TSS, the vessel altered course onto a north easterly heading and the motion began to improve, but by that time the damage to both ship and cargo had been done.

The vessel made port, but was delayed for several days while the damage to both the cargo and the hull was assessed and repaired.

The ship's cargo

The Lessons

1. The master's decision to resume passage when the wind remained at gale force and with a heavy swell still running, was premature, since the vessel had to turn beam onto the swell to pass around Land's End. Whether this decision was based on the fact that the vessel was on a liner service, and was already behind schedule and in danger of missing another tide at its next port if it did not resume passage, is not clear, but remains a possibility.

2. The master took the decision to resume passage after many hours on the bridge, in heavy weather. Mariners must be aware that their cognitive processes will be affected by fatigue and that this will have an adverse impact on their ability to make clear and rational decisions in such situations.

3. Once the vessel entered the TSS, the master was adamant that he could not alter course, even though he was aware of the extent of the damage being caused to both the cargo and to his vessel. He should have considered the safety of his vessel ahead of the need to keep rigidly to a particular heading within a TSS. Rule 2(b) of the Colregs anticipates this and makes proper allowance for such circumstances.

Bridge Team's Multiple Failures Lead to Grounding

Narrative

A 25,000 tonne container vessel was approaching port following a short coastal passage. The bridge team consisted of the master, the OOW and the helmsman; the master had the con' of the vessel and the OOW was plotting the vessel's position on a paper chart using only GPS.

The approach to the port required the vessel to enter an inlet several miles wide and then alter course into a bay in which the port was located.

The passage had been planned to take the vessel to a suitable position in which the alteration of course into the bay would take her clear of a bank, marked by a South Cardinal buoy, and then into the approaches to the port. The passage plan did not include any parallel indexing, clearing bearings or ranges, nor were any "no-go" areas marked on the chart for this stage of the passage.

The vessel approached the alter course position in daylight on a warm, calm day with a slight haze and with no significant tide. The engines were on stand-by and speed had been reduced to approximately 14 knots. The master, aware that the next alteration of course would require the vessel to turn to port through some 40°, decided that he would put the wheel over slightly before the actual position in order to bring the vessel onto the new heading. However, he did not advise the OOW of his intentions.

At the chart console behind the master, the OOW was in the process of changing charts, and was transferring the vessel's position onto the new chart when the master called out to ask him if the vessel was 0.5 mile from the alter course position. The OOW, presumably not

wishing to point out that he had yet to put a position on the next chart, replied "yes", and the master accordingly ordered the helmsman to bring the vessel to port onto the next course.

The OOW plotted the vessel's position on the new chart using the GPS receiver, which he could see without moving from the chart table. At no point was the vessel fixed by any other means, even though both radars, located on the console at which the master was stationed, were apparently operating correctly, and the coast, just a few miles away, provided identifiable, radar conspicuous targets which should have permitted visual bearings to be taken as well as radar ranges. Further, although the sea bed shoaled steeply just 0.5 mile to port of the vessel's course line, a fact mentioned in the Admiralty Sailing Directions for the area as being a potential hazard, the echo sounder was not running.

When the OOW plotted the vessel's position on the next chart, he realised that they had altered too soon and that the vessel was, in fact, still a mile from the alter course position. Thus, she was proceeding at 14 knots towards shallow water. The OOW alerted the master to the vessel's position just as the master observed visually, and on the starboard bow, the South Cardinal buoy which he had expected to be on the vessel's port bow on the heading the vessel was now on.

The master immediately ordered the helmsman to put the wheel hard to starboard. She had just started to swing when she grounded.

The vessel spent 24 hours aground before being pulled off by salvage tugs. Fortunately, the bottom in the area was soft mud and the vessel was found to be undamaged. After a full divers' survey she was able to continue unconditionally in service.

The crew's actions after the grounding were creditable: they quickly assessed the vessel's watertight integrity and the depth of the water surrounding her; they informed the coastal state authority, owners, insurers and Flag State; they also checked the vessel's grounded position by radar, which revealed that there was a significant difference between the radar and the GPS positions. A little late to find this out!

The Lessons

1. **The fundamental requirements of planning and executing a safe navigational passage must be clearly and fully understood and implemented by all bridge officers. Annexes 24 & 25 of the MCA's 2002 SOLAS V publication clearly define the requirements for the planning and conduct of a safe navigational passage, the key elements of which are: Appraising, Planning, Executing and Monitoring.**

2. **The annexes refer to the need to consider all available information when planning the passage, and of the need to ensure a systematic bridge organisation which provides close and continuous monitoring of the vessel's position ensuring, as far as possible, that different methods of determining the position are used to check against errors in any one system.**

3. **Navigators should use all available means to check the position of their vessel, but they must regularly verify the accuracy of positions displayed by electronic position fixing systems by reference to visual bearings and transits whenever available.**

4. **This was a classic example of people on a bridge not working as a team.**

CASE 8

Same Old Story…

Narrative

A 79-metre general cargo vessel was on passage through UK waters in the early hours of a winter's morning. Conditions were good, with winds of around force 4, generally from the west, and good visibility.

A cargo of 1900 tonnes of ferro silicon was embarked, a product used in the steelmaking process, which can emit flammable and toxic gases when exposed to moisture. Also on board were the 7 crew; although the vessel's Safe Manning Certificate required a crew of 6, she had an additional AB/rigger on board to assist with the 30-year old vessel's maintenance. Only the master and chief officer took navigational watches, working a 6 on, 6 off shift pattern, with the chief officer also responsible for overseeing cargo operations in port.

The vessel's passage plan required the transit of a channel, and at 0235 the chief officer, who was on watch alone on the bridge, made the course alteration for the passage through this stretch of water. The passage speed was 8 knots.

The vessel was on autopilot, and the chief officer made some minor adjustments to try to keep her on track. Both doors were closed on the bridge, making it extremely stuffy, and at around 0300 the chief officer fell asleep in the chair. The vessel immediately began to drift north of the track, set by the tidal stream, although still on a constant heading. No watch alarm was fitted on the bridge and the chief officer didn't wake up until 0432 when the vessel heavily impacted the rocky western side of a small uninhabited island at a speed over the ground of 9.8 knots, assisted now by the start of the flood tide.

Initial attempts to free the vessel by going astern were unsuccessful, and the master who, like the rest of the crew had been woken by the impact, contacted the coastguard, using VHF (but not DSC) to inform them of the incident.

Two harbour tugs and the local lifeboat were immediately deployed to the scene. However, they were unable to provide immediate assistance because of the swell and shallow waters. The vessel refloated at around 0650 on the rising tide and the two tugs were then able to tow her to a nearby port where she was boomed off alongside.

Diver surveys confirmed extensive bottom damage to the vessel, with penetration to all double bottom tanks forward of the engine room, including a central fuel tank containing 10 tonnes of marine gas oil. Fortunately there was only limited pollution and the holds remained intact throughout. No injuries were sustained.

The Lessons

1. Unfortunately this is still an all too common story for the MAIB, with cumulative fatigue and lone watchkeeping contributing to a serious accident, the consequences of which could have been even worse given the hazardous cargo on board. The master commented that he had chosen not to use the ABs for watchkeeping, and preferred to reserve them for maintenance day work, which he considered more important given the age of the vessel. The STCW Code requires that, during the hours of darkness, there is an additional person on the bridge with the sole purpose of keeping a lookout, and it is probable that had this been adhered to, this accident would have been avoided.

2. It is clear, too, that owners must take some responsibility for the effective utilisation of crew, to ensure safe watchkeeping levels. A Port State Control inspection of this vessel several months before the grounding had identified from the logbook that the ABs were not being used as night lookouts. The owners subsequently issued a Non-Conformity notice to prohibit this practice, yet it had been allowed to continue on the vessel, unchecked. Further, the vessel's ISM Manual did not stipulate the requirement for a lookout, and no watch alarm had been fitted. Perhaps a stricter audit regime, and a more emphatic safety culture, would have ensured that AB lookouts were being used to prevent a scenario exactly such as this.

3. The chief officer had been working a 6 on, 6 off routine for around 3½ months. The cumulative effects of these watches, exacerbated by the cargo work during the vessel's regular port visits, were a recipe for fatigue. If ever you do feel the first signs of sleep approaching, think about what simple measures you could take to try to minimise the chance of an unplanned nap catching you out. None the less, the most effective solution to fighting fatigue is sufficient and appropriately organised manning. In hindsight, perhaps an additional mate to reduce the watchkeeping burden would have been a more sound investment than another AB on this vessel.

4. Finally, although not significant this time, it must be emphasised that it is always better to use DSC to initially report an incident. A vessel's position and the time are automatically included in distress and urgency alerts if a DSC radio set is interfaced with the GPS, and even if it isn't, the position can still be manually input. A digital alert is generally more likely to reach a maritime rescue centre than a VHF voice transmission, and it also frees up Channel 16 for use during the emergency.

Never Mind the Waypoint – Mind the Ship

Damage to the starboard side of the ship

Narrative

A small coaster was following a route south west bound in the English Channel. It was dark and the OOW was navigating by GPS, using the cross-track error function to monitor the ship's position relative to the planned track and to make appropriate course adjustments to reach the next waypoint. He saw an overtaking ship astern and slightly to starboard. Both of her sidelights were visible and her masthead lights were nearly in line, though open, indicating that the other ship would pass down the starboard side. The OOW monitored the other ship's approach, and identified her from the AIS.

When the overtaking ship was about 7 cables astern, the OOW tried to call her by VHF radio. Receiving no response he switched on the accommodation floodlights to make his ship more visible. There was still no action from the overtaking ship, and so, in a further attempt to attract attention, he switched on his searchlight and directed it at the other ship. Again he called by VHF radio, with no response.

With the other ship now fewer than 4 cables astern, the OOW altered course by 10° to port. However, after 2 or 3 minutes, with both sidelights of the other ship still visible, he altered back to his original course to take his stern away from the overtaking ship's bow.

When the overtaking ship was less than a cable away, the OOW called by VHF radio, again with no response, and then sounded a long blast on the ship's whistle. The other ship, which was now about 50m on the starboard beam, then altered course to starboard, causing her port quarter to collide with the coaster's starboard side.

The OOW stopped the engines, switched on the deck lights and mustered the crew to check for damage. After identifying minor damage only, and exchanging relevant information, both ships resumed their respective voyages.

The Lessons

1. The overtaking ship failed to take early and substantial action to keep well clear, and the coaster's OOW failed to take effective avoiding action when he became concerned that the overtaking ship was not taking appropriate action. WHY? Because both were more intent on keeping to their respective planned tracks, regardless of the fact that, given their position in a traffic separation scheme, both tracks were likely to lead to the same waypoint. Navigation by the sole use of the GPS means that the OOW loses spatial awareness, and without reference to a chart is uncertain as to how much safe water there is on either side of the planned track and, hence, how much sea room is available in which to manoeuvre for the purpose of collision avoidance. The OOW needs to maintain an overall appraisal of the situation and be prepared to modify the planned track to meet the demands of collision avoidance.

2. The OOW's action in illuminating his own ship and in directing his searchlight towards the overtaking ship to attract attention was appropriate. However, he should have also sounded at least five short and rapid blasts on the whistle and supplemented this with a light signal of at least five short and rapid flashes as soon as he became doubtful that the overtaking ship was taking appropriate action to keep clear.

3. Identification of another ship, by AIS, provides no guarantee that subsequent use of VHF radio for collision avoidance will be successful. There is still the possibility of a misunderstanding due to language difficulties and, of course, of action being chosen that may not comply with the COLREGS and may lead to the collision the VHF radio call was intended to prevent.

4. The OOW's action in temporarily altering course by 10° to port was neither large enough, nor was it sufficiently sustained to be readily apparent to the overtaking ship. What was needed was positive action, made in ample time, and with due regard to the observance of good seamanship. Although a stand-on ship is required to keep her course and speed, and may take action as soon as it becomes apparent that the ship required to keep out of the way is not taking appropriate action, she MUST take action when collision cannot be avoided by the action of the give-way ship alone. By the time the overtaking ship was abeam and altering her course to starboard, the point by which a collision could then be avoided by her action alone had already passed.

Contain Containers

Remaining containers being lifted by crane after collapsing on deck

Narrative

A general cargo/container vessel was on passage in heavy weather with a full deck load of containers. The vessel was pitching heavily in force 9 conditions with the wind and waves about 30° on her port bow. During a period of particularly heavy pitching, the vessel shed 20 containers from the deck into the sea; other containers toppled from their stowed position onto the hatches.

The containers were required to be fastened to the deck using securing devices known as twistlocks. However, it was later found that a number of twistlocks for retaining the lost containers were in the open position during the passage. The vessel had a large mixture of both left and right-handed manual twistlocks; this mixture of securing devices made it very difficult to establish if inboard twistlocks were in an open or shut position, not only before sailing but also before discharging.

Additionally, the stowage of the containers, on this occasion, was such that heavier containers were stowed on top of lighter ones, which created toppling effects in the stack and induced severe leverage on the deck fittings.

The Lessons

1. Over a period of time, the vessel had acquired a mix of left and right-handed twistlocks. When damaged units were put ashore for repair they would be replaced with exchange units; unfortunately these were not always of the same orientation as the originals. A ship's crew should check exchange units and refuse to accept anything other than same "handed" locking devices. Only by maintaining a strict operating regime will deck crew (and stevedores) be able to tell at a glance whether these items are "open" or "closed".

2. Highlighting the locking levers on twistlocks with fluorescent paint would greatly assist personnel in identifying operational mode.

3. Stowing heavy containers above lighter ones will have an effect on local stack stability and put unnecessary strains on securing devices and deck fittings. Before loading containers check and double check that the stowage plan conforms to industry best practice, with no "heavies over lights".

CASE 11

Hatch Hazards

Narrative 1

A bulk carrier had completed discharging cargo alongside and the final hatch cover was to be closed. Two ABs were sweeping out cargo residue from the trackways between the side-rolling hatch covers and the cargo-hold coaming when the bosun decided to remove the securing pins in anticipation of closing the hatches. He removed 3 of the 4 pins, but the 4th was stuck. He therefore applied hydraulic power and moved the hatch cover slightly to release the pin. He then instructed one of the ABs to remove the 4th pin, which he did. Once the final pin was clear, the bosun proceeded to close the hatch. As he did so, the other AB, who was still in the trackway, was crushed between the hatch and the coaming (see figure). He sustained fatal crush injuries.

The accident was caused by a casual attitude to safety on board and a failure to appreciate the dangers involved. Not only did the bosun fail to check that all personnel were clear of the hatch before closing it, but also he removed the securing pins and applied hydraulic power while the ABs were in a vulnerable position. However, the ABs were willing to continue working in a vulnerable position once hydraulic power had been applied, indicating that poor practices had been the norm for some time.

Narrative 2

A bulk carrier was in the process of discharging a cargo of soya beans from number 5 hold. The second officer and two ABs were on deck. It had been raining, so the side opening hatch covers were closed but not secured. The rain abated, so the second officer climbed on to the hatch covers and removed the central bolt. He asked the AB at the hatch controls which hatch he wanted to open first, to which the response was, 'starboard'. The second officer gave the order to open the hatch, while he stood on the port hatch cover.

Indication of the casualty's position

He stayed on the hatch cover while he assessed if it was likely to rain again. He then moved to the forward end of the port hatch cover to climb down. The AB at the hatch controls was at the aft end of the hatch and was not able to see the second officer climbing down. As the second officer placed his left foot on the hatch cover runner, the AB started to open the port hatch, even though he had received no instruction to do so. The hatch roller ran over the second officer's left foot as he climbed down, crushing his toes. He was wearing safety boots at the time.

The second officer was evacuated to hospital where, sadly, all the toes on his left foot had to be amputated and a skin graft applied.

The Lessons

1. **When regularly operating hatch covers, it is easy to become complacent about the hazards, and for bad practice to creep in, especially if there are time pressures to get the ship to sea. Review the procedures on your vessel to ensure that measures exist to ensure personnel are clear of the danger areas before hatch cover securing pins or locks are released and power applied.**
2. **Ensure there are clear communications and that all involved know what is going to happen. Making assumptions that personnel are clear is dangerous; positive checks must be made before moving hatch covers.**

Blocked Sea Suction Prevents Engine Room Flood

Vessel's eductor system valve

Narrative

A small ro-ro ferry was used to operate a daytime only service. Once the ferry was tied up for the night, the local crew secured her and left for home.

It had become normal practice for the engineers to leave the ship's side valves open. This was to expedite preparations for sea, which were carried out early each morning. The crew did not consider this to be an issue because there had never been a flood as a result of this routine. Little did the crew realise how close they came to a disaster.

During early morning, routine, pre-sailing checks the engineer was stunned by what he discovered. He found that the starboard main engine bilge eductor system valve, which was out of sight, behind the engine, had completely sheared off from the sea water suction pipe. It was very fortunate that the pipe was completely blocked by a "plug" of corrosion products which prevented the engine room being completely open to the sea.

On investigation it was found that the pipe between the valve and the ship's side was so badly corroded that the engine vibration had finally caused it to part (figure).

The Lessons

It is not very often that the by-products of corrosion save the day. However, had it not been for the extensive corrosion blocking the pipe, the engine room would have suffered severe flooding damage when the pipe parted, and would have been out of service for a long time. Had the bilge ejection system been checked periodically, the blockage, and therefore the corrosion, would probably have been spotted and attended to.

General guidance on the prevention of flooding can be found at MGN 165(F) "Fishing Vessels – Risk of Flooding". Although directed towards the fishing industry, the MGN nevertheless provides examples of best practice.

The following lessons can be drawn from this "near miss" incident:

1. It is always good engineering practice to close ship side valves whenever possible and so reduce the expensive risk of back-flooding from sea. This also applies to non-return valves because debris often accumulates in the valve body, preventing the non-return action.

2. Have you a procedure for checking the functionality of systems that are not in regular use? In this case, the bilge ejection system would have been ineffective and could not have been used to pump out bilge water in an emergency.

3. Do not forget to survey pipe systems that are not in regular use – they will be subject to the risk of corrosion and pipe wall thinning, leading to eventual perforation and flooding.

I See No Ships

Converted fishing vessel shortly before sinking

Narrative

A 2137gt chemical tanker, fully loaded by volume with a cargo of Cyclo Hexane UN 1145, departed from a north east coast port. Once the pilot had disembarked and the vessel was in open water, the master handed over the watch to the chief officer. It was dark, and a lookout was present on the bridge.

A 13.28m converted fishing vessel, now a commercially coded pleasure yacht, had departed from an east coast harbour with the skipper and two crew members on board. The planned passage took the vessel 37 miles north, to its home port. The skipper had obtained a weather forecast from the coastguard prior to the late afternoon departure. The forecast was for a north westerly wind veering to the north, force 4 to 5, sea state slight. The predominant swell was also northerly, the prevailing direction on this stretch of coastline.

At about 2140, the OOW on the chemical tanker observed a red side light and a single masthead light of another vessel about 20° off the starboard bow, at a range of approximately 4 miles. The OOW knew that he had to make a planned 21° alteration of course to starboard 10 minutes later and, because the ARPA radars would not acquire the contact, he decided that the planned alteration would also suffice as a collision avoidance manoeuvre. There had been no successful attempt to determine whether a risk of collision existed, and what the effect of the planned manoeuvre would be.

Once steady on the new course, and still observing the red sidelight of the other vessel, the OOW assessed by eye that its closest point of approach was about 0.5 mile down the port side. While the OOW attempted to acquire the contact on the X and S band ARPA displays, the pleasure yacht made a 20° alteration of course to port. By the time the OOW looked up, a green sidelight was showing on the port side of the chemical tanker, and collision was assessed as imminent. The OOW engaged hand steering, applied maximum starboard rudder, and sounded a long blast on the ship's whistle. The pleasure yacht struck the chemical tanker amidships.

After leaving port, the pleasure yacht had headed into the wind and swell. Ship motion took its toll on the crew, who took turns to steer by hand and maintain a lookout. The ship's position was monitored by GPS waypoint navigation and the helmsman maintained a distance of 1.5 to 2 miles off the coast using the radar range marker. Although the skipper was on watch prior to the incident, he could not recall seeing a vessel ahead, either visually or on the radar prior to altering course. He consequently altered 20° to port to pass through the waypoint, and on to the final destination only 4 miles away. Shortly afterwards, the collision with the chemical tanker occurred.

The chemical tanker stood by the stricken yacht, which transmitted a GMDSS distress signal. The yacht was taking on water. As a precautionary measure, the crew inflated a liferaft, but in the event were safely rescued by the local lifeboat. The vessel foundered about 2 hours after the initial collision.

The Lessons

1. **The chemical tanker did not properly establish whether a risk of collision existed. The OOW had two options available to him:**

   - **To take a series of compass bearings, or**
   - **Acquire the contact on ARPA and assess the results.**

   Once he had properly determined whether a risk of collision existed, an appropriate and measured response could have been taken.

2. **Both the OOW and the lookout on the chemical tanker identified the lights of the pleasure yacht. As the situation changed, neither kept the other informed of developments. The lookout could have told the OOW that the aspect and colour of the lights had changed, and he could also have been tasked to try and acquire the contact on the S band radar display. Further, in the absence of any information, the OOW could have adopted hand steering earlier until the situation clarified.**

   The key figures employed on the bridge are often referred to as the 'bridge team'. In this case, the absence of 'team work' was evident.

3. **The skipper of the pleasure yacht did not identify the presence of the chemical tanker until the collision occurred. The lookout and radar watch were clearly ineffective due, in part, to the crew suffering from sea sickness. Before setting sail on a small vessel, consider the experience of the crew, the prevailing weather and sea conditions, and the possibility of the crew (including the skipper!) becoming disabled due to sickness.**

Unsecured Electrical Fan Causes Cabin Fire

Narrative

An oil tanker was carrying out a replenishment of a smaller tanker while underway. The weather conditions were good and it was a calm, warm and pleasant day.

One of the ABs decided to take advantage of the warm weather and take a dip in the swimming pool. As he exited his cabin, he decided to leave his electric, oscillating fan running on a table, on slow speed, to keep his cabin cool.

About 20 minutes later the AB returned to his cabin. As he opened the door he was immediately confronted by dense smoke. He noticed that the fan had fallen to the deck. The plastic fan motor casing was badly burnt (Figure 1) and this had caused the carpet to catch fire (Figure 2). The AB immediately unplugged the fan and fought the fire using a foam extinguisher located in the adjacent alleyway.

In the meantime, the ship's fire detection system alarm sounded. The fire party were called and quickly made their way to the cabin area. On arrival, they found that the fire had already been extinguished by the AB.

There are two possible explanations for the cause of the fire:

- The fan developed an electrical fault while on the table, and this caused the plastic casing to ignite. Once the casing had burnt through, the metal fan dropped, toppled to the deck and ignited the carpet.

- The oscillations of the unsecured fan caused it to move across the table and fall to the deck. Once on the carpet, the fan blades could not rotate because the front guard was missing, and this caused the fan motor to overload and overheat. This, in turn, led to the casing igniting and then the carpet.

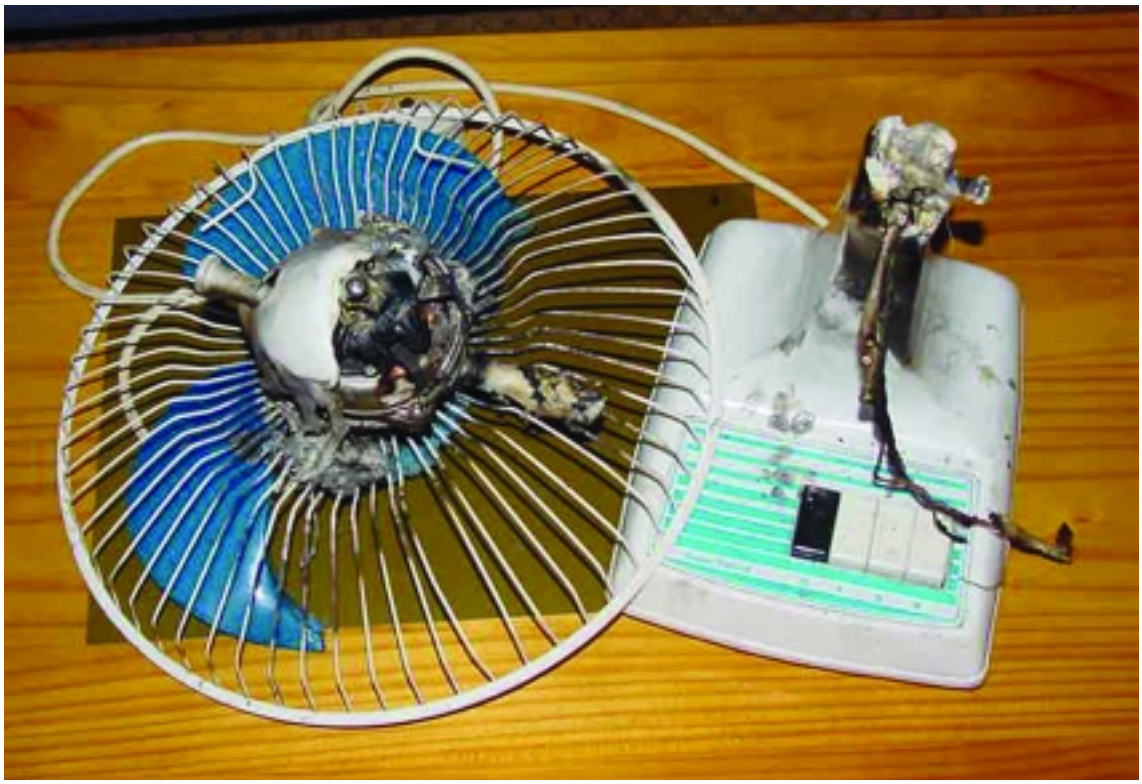


Figure 1

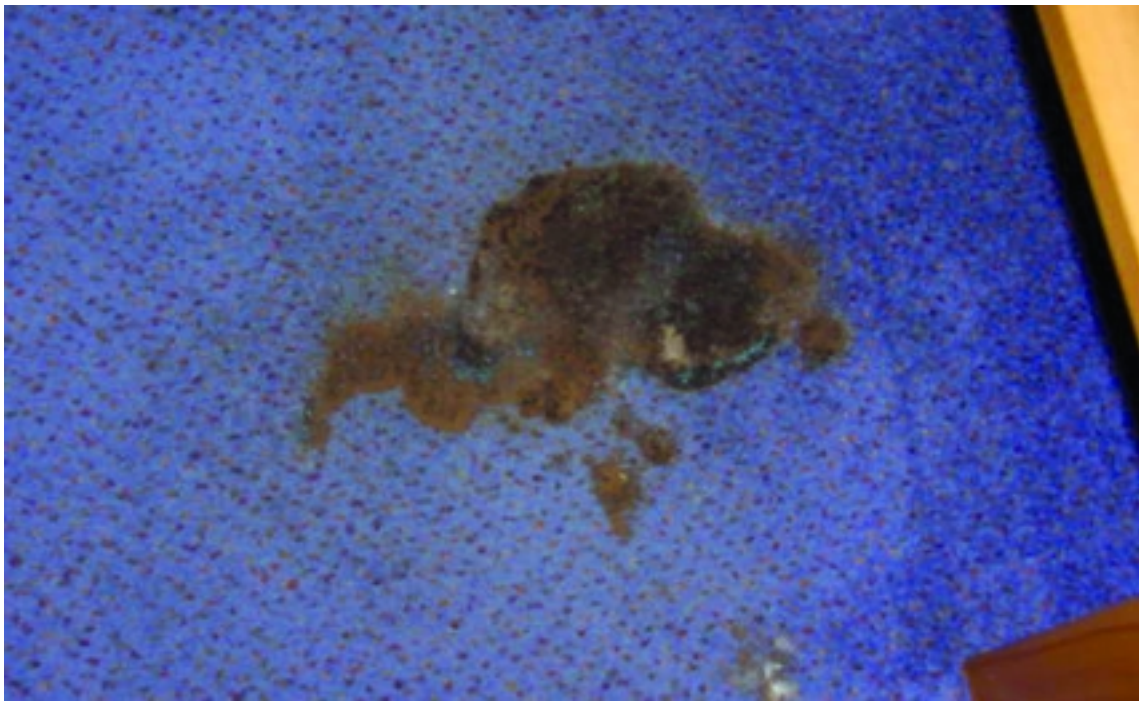


Figure 2

The ship's managers were conscious of the fire risk posed by electrical equipment, so operated a policy of recording all of its portable and individuals' private electrical equipment. The equipment listed on the register was periodically tested and results recorded.

The subsequent ship's investigation found that the AB's fan was not on the register, although while its history was unknown, it did have an electrical test sticker on it, dated 2 years previously.

The Lessons

Although the AB did not raise the alarm, he did respond quickly and instinctively to the fire situation. He was aware of the need to isolate the fan from the electrical supply before tackling the fire with the foam extinguisher. His calm and prompt action certainly prevented the fire from spreading and the risk it would have posed to the crew.

The following lessons can be drawn from this accident:

1. **If it is not possible to isolate electrical equipment, it is far safer to use a CO_2 rather than a foam extinguisher to fight an electrical fire.**

2. **Do not forget the importance of the loud vocal alarm when discovering a fire. The loud shout of *"Fire, Fire, Fire"* focuses people on the emergency situation.**

3. **It is good practice to record and periodically test the ship's portable and individuals' private electrical equipment. Do not forget to update the register when crew join and leave the ship.**

4. **Equipment with the potential to cause fire or injury should be secured to prevent unintended movement. In this case, the fan could have been secured to the table, another work surface or a shelf.**

5. **Do ensure that rotating machinery is guarded to prevent injury. Although the fan was a small piece of equipment, the missing front guard should have been replaced. It is all too easy to inadvertently place a hand or finger among the rotating blades.**

CASE 15

Pretty But Dangerous

Narrative

What started out as a routine onboard activity on a fine and sunny day ended in a painful experience for a seasoned bosun.

The vessel had to shift to another berth across the river to complete loading operations. The bosun was assisted by two other seamen at the aft mooring station who were told to let go the starboard stern and spring lines and heave them in. The bosun then proceeded to the port stern line, which was made fast to the capstan with five turns and backed up with additional turns around the bits. He removed the turns from the bits and then three turns from around the capstan. It was his intention to surge the rope while heaving so that just enough slack was given for the linesman on the quay to cast off, and the rope could then be retrieved smartly to keep the propellers clear.

After signalling to the linesman to keep his hands clear, the bosun set the capstan to 'haul' with his left hand and attempted to surge the mooring rope using his other hand. The capstan initially tightened the mooring rope, causing tension to be put on it. It then unexpectedly surged, sharply jerking the bosun's right wrist.

Subsequent investigation of the incident revealed that the capstan had been painted about 4 days prior to the incident, and that paint applied to the drum/rope contact area had not fully cured. This paint caused the mooring rope to stick on the drum when the capstan was operated, causing it to come under tension instead of slacking off.

The bosun was sent ashore for medical attention and was lucky to escape major injuries.

The Lessons

1. **The winch or capstan drum/rope contact area should never be painted, because in addition to causing excess friction it can damage the mooring ropes. It might be pretty, but it is also dangerous.**
2. **Making mooring ropes fast on drum ends on capstans is contrary to good mooring practices and was, in this case, also contrary to company procedures.**
3. **Mooring ropes should not be surged on moving capstans or winch drums. The machinery should be stopped, and then the rope surged, if necessary.**

Hurry Aground

Narrative

A 154m bulk carrier was leaving a port. The master, who held a PEC for the port, the chief mate, helmsman and cadet were on the bridge. The ship was ready to leave some 20 minutes ahead of the scheduled sailing time, and the master decided to leave. The mooring gang was already in attendance so permission to sail was obtained from the VTS service for the port, moorings were let go and the ship left her berth.

The bridge team on the bulk carrier was informed by VTS that there was a ship inbound to the port and that a small barge was also in the approach channel. Some time later, the inbound ship was heard communicating with the barge on VHF radio, telling her to keep to the south of the channel and out of the way of the traffic. As the bulk carrier approached the final bend in the channel before the sea reach, speed was reduced and course altered to allow the inbound ship to clear the bend. Once the inbound ship was clear, the bulk carrier again increased speed and altered course to regain her original track.

As the bulk carrier came round the bend in the river, she was confronted by the barge which was apparently in the centre of the channel. The master of the bulk carrier decided that his only course of action was to alter hard-to-port to clear the barge. This he managed to do, but the alteration resulted in the bulk carrier leaving the navigable channel and running aground.

The vessel was refloated on the next high tide, without tug assistance, and continued to her next port, where an underwater survey confirmed that, luckily, no damage had been sustained.

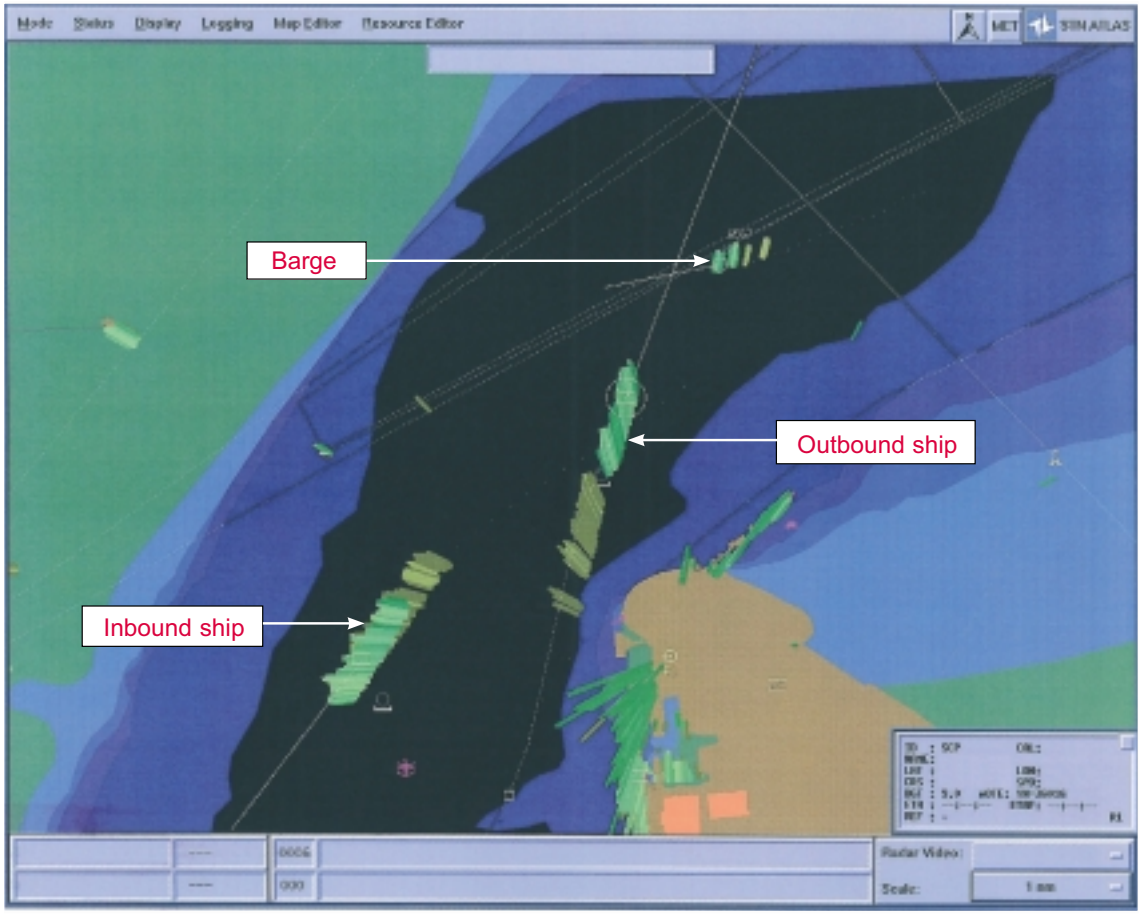


Figure 1: Shore based radar plot

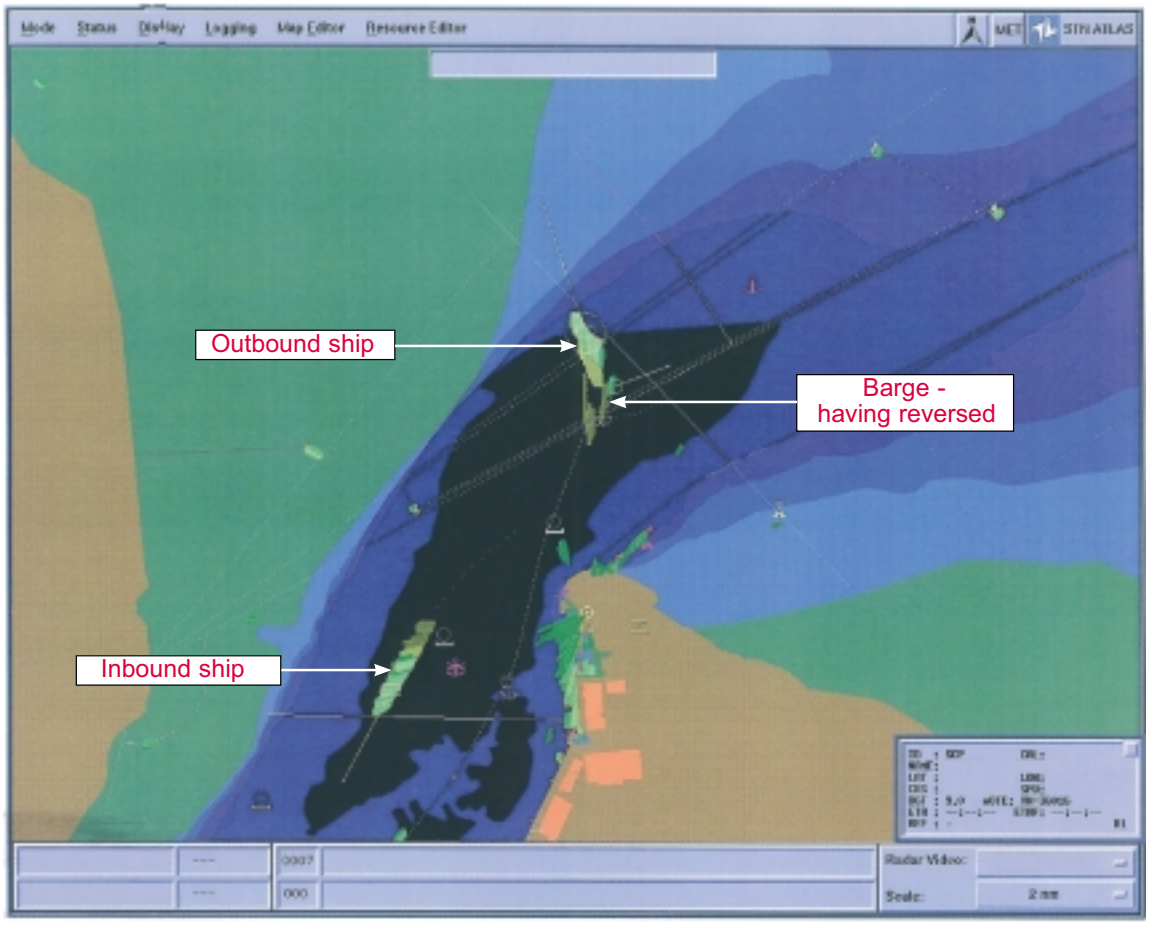


Figure 2: Shore based radar plot

The Lessons

1. The master of the bulk carrier was not fully aware of where other ships using the navigable channel were, even though he had been monitoring the VTS broadcasts. He had monitored VHF communications which had warned the barge to remain south of the channel and clear of traffic, and yet did not appear to recognise that the barge would be encountered shortly after rounding the bend in the channel. Had he done so, he would have been better placed to make an informed decision when considering his options for avoiding a collision.

2. The master of the barge was fully aware of the presence of outbound vessels that were constrained by their draught and could only navigate in the marked channel. Notwithstanding this fact, he chose to navigate the barge along the south side of the channel (i.e. the port side of the channel for inbound vessels) even though this was likely to risk a close encounter with outbound traffic. While there was sufficient depth of water either side of the marked channel for the barge to safely navigate in, the master was of the opinion that there was also sufficient room within the channel for any outbound vessel to safely pass the barge.

3. When the master on the bulk carrier finally realised the barge lay directly ahead, there was very little time to assess the situation. The initial action taken had the desired effect of missing the barge, but resulted in the grounding. Had there been more time to assess the situation, it is probable that by continuing the turn to starboard the bulk carrier would have still avoided a collision with the barge but remain in the navigable channel.

4. Had the master utilized those on the bridge as a "bridge team", it is likely that the danger would have been recognised earlier, and the accident avoided.

Part 2 – Fishing Vessels

It gives me great pleasure to provide this introduction to the fishing vessels' section of the MAIB Safety Digest 3/2007.

I have been involved with safety since the inception of the National Federation of Fishermen's Organisations in 1977, when the government of the day adopted the Holland Martin Report on The Safety of Fishing Vessels, which included deep sea trawlers and inshore vessels of 40 feet and over. The fishing industry and the government department worked very hard to bridge the gap between large company owned vessels and skipper owned vessels to implement the new safety rules. Problems arose. Fishermen viewed the department with suspicion, suspecting they were being manipulated out of business. Surveyors were not familiar with the great variety of fishing vessels and their working practices. The majority of the fishing vessels were of wooden construction, the surveyors were more used to large steel vessels. Consistency was a difficulty; one surveyor could interpret the rules differently to another. However, problems were eventually resolved, standards of fishing vessel safety improved over the years, until today all fishing vessels are subject to code inspections and surveys.

The make up of the fishing fleets has altered dramatically since the early days of the Fishing Industry Safety Group. In 2005, from a total of 6341 UK registered commercial fishing vessels, over 85% were under 16.5 metres registered length and over 98% of the fleet had engine power less than 750 kilowatts. Consequently most fishermen are required only to undertake a mandatory basic training in Survival, Fire Fighting, First Aid and Safety Awareness. It is only when a vessel is over 16.5 metres that skippers' tickets and engineering certificates are required. However, the mandatory courses do raise the fisherman's awareness of the dangers of his work, and the vast majority of fishermen are diligent in all aspects of their fishing operations. Fishermen are by nature very independent, and although they have often resented what they see as 'interference' in their way of life, they are now accepting of the necessity of compliance with fishing vessel safety regulations.

Making the fishing industry a safer occupation is essential, and training and education can make a significant contribution. Attending training courses other than the mandatory ones can sometimes be costly and inconvenient for the self employed fisherman, and if there is a charge for the training this is a disincentive. Nevertheless, the short courses, i.e. watchkeeping, radar, engineering, enable fishermen to build up their knowledge and skills. FIFG funding has been available, but unfortunately the funding programme is drawing to a close. The fishing industry should be on a par with the merchant service which has funding available year on year.

The Sea Fish Industry Authority provides the UK fishing industry with a network of Group Training Associations, and together with the three training centres, Banff and Buchan College, The Mallaig Marine Training Centre and the Whitby and District Fishing Industry Training School, training at port level is readily available. Courses include a 5-day watchkeeping course and a 1-day stability awareness course.

The Marine Accident Investigation Branch, in its role of safety at sea, investigates incidents and makes recommendations. The MAIB teases out the root causes of the incidents and raises fishermen's awareness of the consequences of neglect, fatigue or even carelessness.

The six fishing industry reports in this issue of MAIB's Safety Digest detail some of the dangers of trawling and potting and, tragically, the loss of life which can occur. I would urge fishermen to continue to read the Safety Digest, to continue to learn from the reports, and to commend the Digest to their fishing colleagues.

Safe fishing!

GH Traves, MBE

George Traves began his career at sea working as a wireless operator on deep sea trawlers operating out of Hull and Grimsby. For over 40 years he has worked as a skipper/owner of fishing vessels and was awarded an MBE in 1990 for his services to fishing. George was a founder member of the National Federation of Fishermen's Organisation, was Chairman between 1987 and 1989 and President between 1989 and 1991 representing the organisation on FISG and SFIA training. He is a MAFF appointee to the North Eastern Sea Fisheries Committee (Chairman) and is Chairman of the Association of Sea Fisheries Committees.

CASE 17

Too Much Up Top!

Photograph showing the vessel's point of suspension for the dog rope and cod end

Narrative

A 10m GRP trawler was 3 hours into a tow when she slowed down. It was felt that a trawl door had possibly fallen on its back, but when attempts to rectify this showed no increase in the vessel's speed, it left the crew with little option other than to haul the gear.

As the trawl wires were hove in, it became apparent that there was an abnormal weight in, or on, the gear. Because of the strain on the winch, it took some time to ease the doors up to the gallows but, eventually, they were retrieved, secured alongside and unfastened from the trawl warps. The sweeps were transferred from the warp ends onto the net drum, and as the net built up on the drum the hydraulic relief valve started to lift, radically reducing the speed of hauling. In an attempt to take the strain off the net drum the dog rope, which led to the cod end, was taken up over the Gilson gantry and onto the winch drum ends. The crew were still unable to establish the cause of the weight in the net although it was not unusual for boulders to become caught in the cod end in this particular region.

By systematically hauling on the dog rope and winding slack netting onto the drum, recovery of the net continued. Until then, the boat had been idling at dead slow ahead before the wind. To further take strain off the gear, the skipper put the vessel into neutral. The vessel then started to fall off the wind and, as this happened, the weight of the net suspended from the high gantry affected the vessel's transverse stability, resulting in a dramatic list. This was apparent only when starboard deck edge immersion occurred and water was building up on deck.

Recognising their perilous situation, the crew launched their liferaft as the boat rolled over, giving no time to transmit a distress or don lifejackets. As the vessel lay capsized, the two crewmen untied the liferaft painter before getting into the raft; they were unaware that there was a knife inside the raft specifically for cutting the painter. Fortunately, the vessel's EPIRB floated free as the vessel sank, and its transmissions alerted SAR services to a possible emergency.

Once in the raft, the two men dried it out and checked the equipment. Although no potential rescuers were in the area, the skipper let off one of their three red pinpoint flares to see if they worked. An hour later, the crew were rescued by a passing container ship whose watchkeeper spotted their second pinpoint flare.

The survivors were transferred to an RNLI lifeboat and returned to shore, uninjured.

The Lessons

1. **Small trawlers seldom have the ability, or stability, to handle excessive weights. In these situations serious consideration should be given to jettisoning the gear and obtaining help from a larger, more able vessel to retrieve it later.**

2. **The danger of lifting/hauling from high points cannot be ignored on any vessel. Weights suspended from heights seriously compromise stability, as do fish in hoppers above deck level. Operators should take all necessary steps to reduce top weight as much as possible and keep the vessel in a stable condition.**

3. **When trawling on hard or stony ground operators should give consideration to fitting their nets with stone traps and flip up ropes. These provide both safety and economic benefits by reducing the chances of boulders finding their way into the cod end. Information on these can be obtained from the SFIA (Sea Fish Industry Authority).**

4. **The crew had not undertaken the mandatory Sea Survival course. Had they done so, they would not have jeopardised their survival by trying to untie the painter while in the water. Instead, they would have known that a knife was available on board the raft for this specific purpose. This same course also trains participants on the appropriate use of location aids such as pinpoint flares; these are held in the hand and can only be seen within the visible horizon. Using them when no potential rescuer is to hand is a waste of valuable resources**

5. **Vessels of this size are not required by regulation to carry either liferafts or EPIRBs. Undoubtedly these items saved this crew's lives; all owners, regardless of their vessel's size, should give serious consideration to carrying such equipment, which in many cases is provided free of charge under Government funded initiatives.**

CASE 18

Not Dressed For The Job

Photograph demonstrating the vessel's lifting area and height of rails

Narrative

An injured fisherman was being airlifted in gale force conditions by a SAR helicopter when it became necessary for the helicopter crew to guillotine the winch wire because the casualty was being dragged violently towards the boat's rail. This resulted in the fisherman striking the rail hard and going overboard, in darkness, without a lifejacket. Fortunately the man was wearing a flotation suit and, because he was conscious, he was able to float face-up with the aid of the suit.

The SAR helicopter had no secondary winch on board and was therefore unable to retrieve the casualty from the sea. It was, however, able to lower a flotation aid on the end of a spare highline to the casualty and pinpoint his position for the fishing vessel. The fishing vessel skipper skilfully manoeuvred the boat alongside the casualty to enable his colleagues to recover him on board.

The fishing vessel's crew administered first-aid treatment to the casualty while they steamed ashore at full speed. Once in the lee of the land, the casualty was transferred to an all-weather lifeboat and then onwards to hospital by waiting ambulance.

The Lessons

1. Helicopter rescue is fraught with danger. This case clearly illustrates the importance of wearing both a lifejacket and a flotation suit (or immersion suit) during helicopter transfers. Although a flotation suit will provide protection from the cold, and will keep the wearer afloat, there is no guarantee that it will also float the wearer face-up. A lifejacket will turn the person onto their back and ensure the nose and mouth are above the water – even if they are unconscious.

2. The skipper manoeuvred his vessel skilfully alongside the casualty and gave him a slight lee as he was dragged from the sea by two of his crewmates hanging out over the bulwarks. The crew were wearing neither flotation suits nor lifejackets, simply because they did not expect the airlift to go wrong. The skipper could quite easily have ended up with more men to rescue and, without being suitably dressed they would have had little chance of survival. Always be prepared for the unexpected, and do all that is possible to minimise risks; a pre-emptive risk assessment and crew discussion on MOB recovery, before it is ever needed, will help prepare the crew for the day it happens.

3. This vessel carried mandatory type approved lifejackets which, although ideal for abandonment, are impossible to wear on a regular basis and would have been extremely cumbersome during this rescue. Daily wear self-inflating lifejackets are already in use on many fishing vessels as an addition to the abandonment type. These have been proven as suitable for regular wear and are ideal for deck crew during most operations. Fishing vessel operators should give serious thought to obtaining and promoting daily wear lifejackets, thus maximising the protection afforded to their crewmen when the unexpected happens.

Shrimp Boiler Lights up the Engine Room

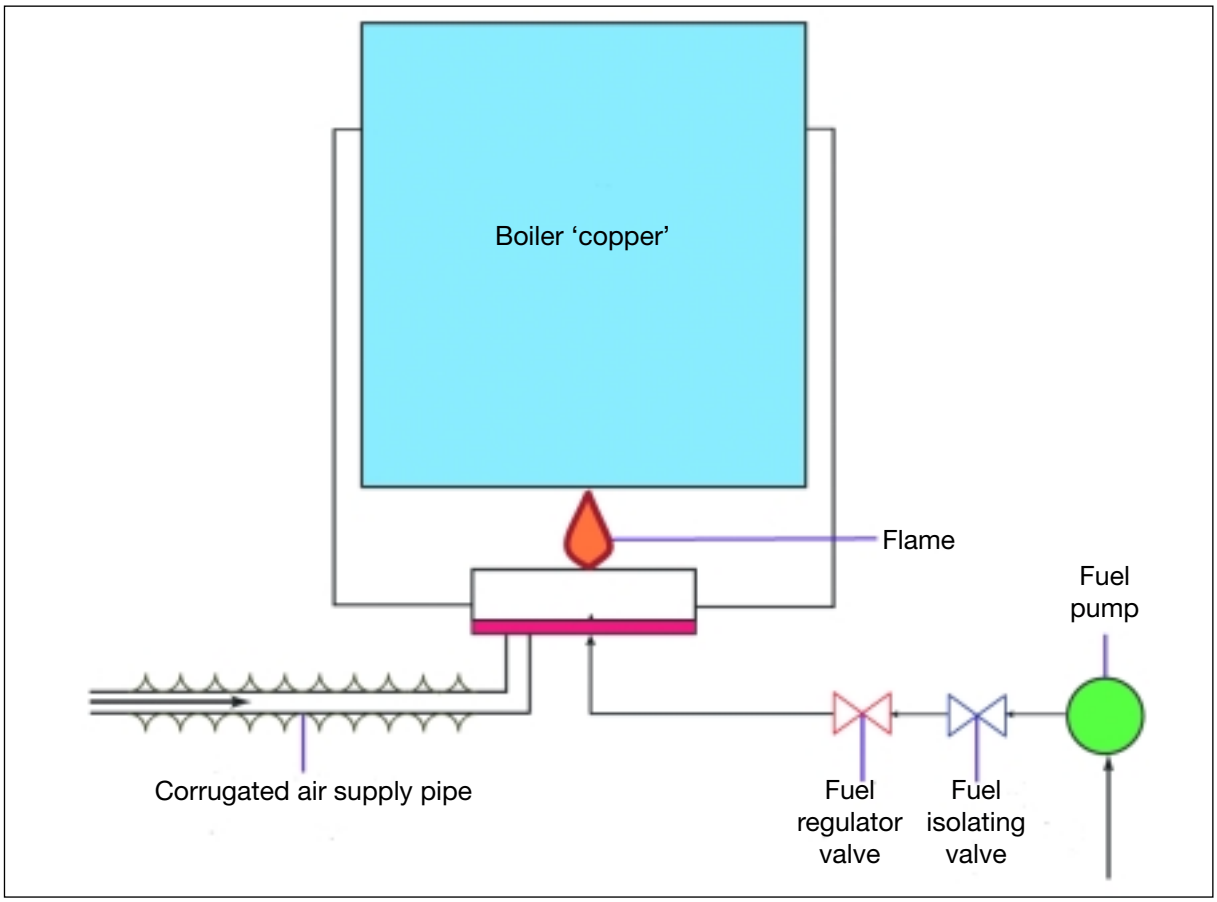


Figure 1

Narrative

The skipper and 2 crew of a 9.9 metre beam trawler had just completed an uneventful passage to nearby shrimp fishing grounds. The weather was pleasant, and after shooting away the gear the crew relaxed in the wheelhouse, looking forward to the day's fishing. Meanwhile, the skipper lit the diesel-fuelled shrimp boiler, located on the main deck, just forward of the wheelhouse. The purpose of doing this was to bring the water up to temperature ready for the first haul.

It was a very basic boiler: an electrically driven blower supplied air through a flexible, plastic corrugated hose, and a small pump delivered the diesel fuel (Figure 1). Both the blower and fuel pump were located in the engine room and were switched on from the wheelhouse by two identical switches fitted within a common electrical box.

The boiler was so basic that operating instructions were considered unnecessary.

Once the water had boiled, the skipper thought that he had switched off the fuel pump, leaving the air blower running to allow any unburned fuel to burn off, and to purge the boiler furnace.

The boat continued its towing course as normal – but normality was about to end!

Five minutes later, the skipper noticed a flickering light on deck, in the vicinity of the boiler. He raised the alarm, grabbed a fire extinguisher from the wheelhouse and made

Figure 2: Shrimp boiler after the fire, with melted air supply pipe

his way forward to attack the fire with one of the crew carrying the deck wash hose. The fire was quickly extinguished, but it had melted the boiler's plastic corrugated air supply pipe (Figure 2).

Aware that the air supply pipe led from the engine room, the skipper opened the engine room hatch located in the wheelhouse. Once in the engine room, he assessed that the seat of the fire was in the vicinity of the blower, so he discharged the remains of his extinguisher in that direction. The smoke by that time was black and very thick and acrid, forcing him to retreat.

Back in the wheelhouse, the skipper closed the engine room hatch and instructed the crew to haul in the fishing gear and don their lifejackets. Unfortunately, only two of the three lifejackets could be found because one was hidden under the large amount of surplus equipment on board. Soon after calling the coastguard, the skipper attempted to stop the engine using the remote fuel pump stop in the wheelhouse. But this was unsuccessful because the fuel pump linkage had broken. The engine continued to run, at idling speed.

A short time later, the local RNLI lifeboat arrived on scene and the crew transferred from the vessel. The trawler was towed back to port and was met by the emergency services. The Fire and Rescue Service extinguished a small carbonaceous fire in the engine room. Meanwhile, the skipper was transferred to hospital for treatment following smoke inhalation. He was released a short time later.

The Lessons

On investigation, it was found that the small bore ventilation air pipes to the engine room were completely blocked by rust flakes. This meant that the air supply for the engine had to come either through the engine room hatch – which was shut tight – or back through the boiler air blower pipe work.

In attempting to shut down the boiler, it is probable that the skipper inadvertently switched off the air blower. This caused the engine to draw air through the blower system, and the boiler flame to be drawn into, and ignite, the plastic section of pipe work. The flames from the burning plastic would have been drawn into the engine room, through the blower. Electrical cable insulation then caught fire, dropped onto foam and plastic materials left on the floor plates, and caused these to ignite also.

The following lessons can be drawn from this accident:

1. Do not neglect maintenance of less obvious systems such as engine room ventilation. Out of sight should not mean out of mind!
2. Engine remote shut-down systems need to be maintained and tested on a regular basis.
3. Fully investigate systems that are not operating correctly – in this case the engine had been running "rough" for some time and this would have been due to air supply starvation.
4. Although the boiler was of a basic design, it caused a potentially serious fire because it was most likely not shut down correctly; a risk assessment should have identified the need for safe operating instructions and clearly identified operating switches.
5. Where there is a risk of incorrect start up or shut-down sequences, consider fitting interlocks to prevent maloperation.
6. Remove unnecessary gear: it can cause blockage to pumping systems, become a fire hazard, prevent access to safety equipment, and can impede escape in the event of an emergency.

Spot the Difference

Narrative

Do you notice any differences between the two photographs? – Concentrate on the ramp at the centre of the vessel's stern and imagine lines of pots being shot out through this opening. This is a common way of laying a line of pots and involves them being carefully stowed on deck, with the associated ropes, in such a manner that they are free to pass through the stern opening, without assistance from the crew, once the process has commenced.

You will, by now, have realised that the two photographs are in fact the same, but please read on, as two similar accidents occurred within days of one another, in different parts of the country. However, although they had the same cause, the accidents had tragically different outcomes.

The two boats were both laying fishing pots in strong winds. In both accidents a crew member's foot became caught in the pot ropes as they paid out, and they were pulled over the stern of their vessel. Tragically, one of the men lost his life; happily the other was rescued and, after being airlifted to hospital, made a full recovery.

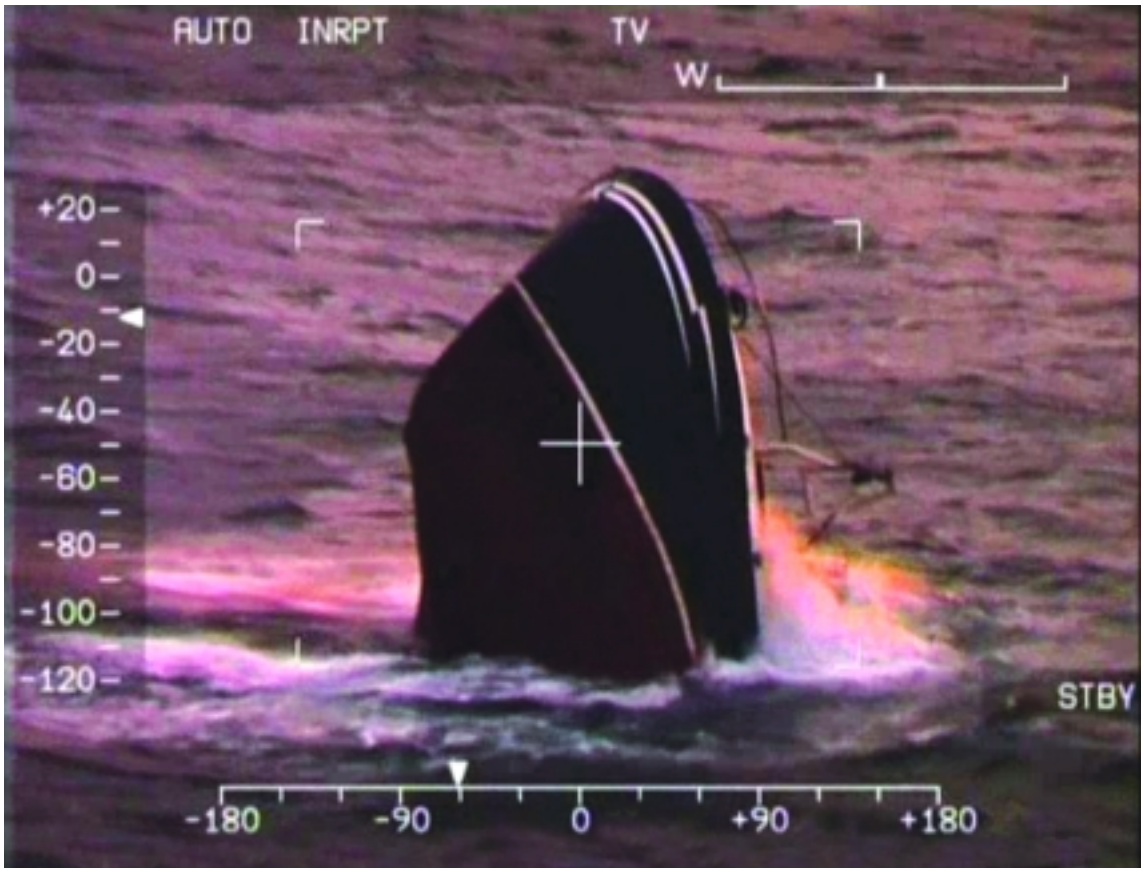
The man who lost his life was a young fisherman with a few years experience; the man who was rescued had been fishing for over 50 years. Neither of the men was wearing a lifejacket.

The operation on both boats had been risk assessed to ensure that the crew remained well clear of the rope as it paid out, and both men were trained and experienced in this type of fishing. However, in each case, the fishermen became trapped in the rope and were quickly dragged over the side and into the sea.

The Lessons

1. **When risk assessing any operation at sea, consider the question "What if a person does something they shouldn't?" If you cannot ensure their safety at all times, which on the deck of a fishing vessel is unlikely, then you must consider the last resort – the provision of suitable Personal Protective Equipment: in this case a lifejacket and suitable clothing, to make the operation as safe as reasonably practicable.**
2. **The wearing of a lifejacket when working on deck should be considered an essential safety control measure. It is noteworthy that, after 50 years as a fisherman, the survivor's first priority was to purchase a suitable lifejacket before he returned to sea. He now intends to wear this at all appropriate times in the future. He learnt his lesson the hard way – you now have the opportunity to learn yours from his lucky escape and from the tragic death of a young fisherman.**

Trim For Safety, Not For Catching Fish



Narrative

A 20m trawler was returning to port after 6 days of poor fishing, during which time she had used all the fuel in her forward tanks and most of her fresh water from the tank in her forepeak. Due to the poor fishing experienced over the 6 days, there was little weight in the forward fish room to counteract the effect of a stern trim which had developed as fuel and water were consumed. Additionally, in normal operating conditions, the vessel had very little freeboard aft, and had been granted a 20% aft freeboard reduction due to her age. The induced stern trim and very low freeboard meant that the vessel's aft deck was almost constantly awash as she rolled in the force 6 seas with the wind on her starboard bow.

The skipper became aware of a starboard list developing, so went to investigate. The cause of the list was traced to an obsolete fuel tank in the vessel's transom, which was gradually filling with seawater (it was a requirement of the vessel's stability criteria that the aft fuel tanks remained void at all times). The skipper was not unduly alarmed as he knew the water was contained within the tank. Furthermore, he had encountered water in the tank several months previously due to a crack in the deck; on that occasion the vessel made shore safely, whereupon the water was drained from the tank, pumped overboard and the deck repaired.

As the list increased, the skipper attempted to drain the water from the tank into the steering flat and pump it overboard. Unfortunately, the main bilge pump failed to function, possibly due to it drawing air through a perforated suction pipe, or debris in the valve chest. An emergency electrical submersible pump was rigged to pump the water, but unfortunately this burned out soon after being started,

leaving the skipper with no option but to stop draining water from the tank and call the coastguard for assistance.

The vessel continued steaming ashore, awaiting the arrival of a salvage pump from the SAR services, trimming even further by the stern and listing more to starboard until the aft deck became totally submerged to the extent that the bulwark rail was dipping in the sea. Unfortunately, the vessel's engine room vents, positioned on the starboard side of an aft facing bulkhead, were open.

By the time the skipper realised this additional danger, it was too late to put a man onto the exposed deck to close the vent flaps. As the vessel trimmed further by the stern, and listed to starboard, seawater found its way into these vents and drained down below decks.

The wind decreased and the sea state improved as the vessel got closer to shore. Consequently the vessel stopped rolling and remained listed on her starboard side, and this alerted the skipper to the angle of loll developing. Aware of the worsening situation, the skipper ensured all his crew were in lifejackets and instructed them to prepare a liferaft. He stopped the vessel, which immediately settled on her side, allowing the crew to step into the liferaft, taking with them their EPIRB and portable VHF radio. Within minutes of abandoning, the crew were winched to safety by a SAR helicopter, which had been summoned earlier by the coastguards. Soon afterwards, the vessel sank by the stern.

The Lessons

1. The skipper preferred to use fuel from the forward tanks before the aft tanks and thus keep the vessel trimmed by the stern to improve towing capability. This was contrary to the vessel's stability criteria, which required the aft tanks to be used first to maintain adequate freeboard aft. On the day in question, this was further aggravated by poor fishing and lack of weight in the fish room to compensate for the stern trim. Once the aft void started to fill with water, the vessel's stability was totally compromised, leading to further stern trim and list.

   It is essential that operators give due credence to stability criteria at all times and trim their vessels to maintain optimum vessel safety (not optimum fish catching potential). The SFIA offers a 1-day Intermediate Fishing Vessel Stability Awareness Course, which is currently offered free of charge by Group Training Associations throughout the UK. All fishermen should take advantage of this highly recommended course, which gives sound practical advice and "hands on" interaction on stability matters.

2. Having successfully overcome a similar incident previously, the skipper might not have appreciated the danger his vessel was in. However, the conditions were not exactly the same: the trim was different, due to fuel consumption and loading in the fish room; the void tank might not have been completely full of water; the weather conditions were different, causing the vessel to roll continuously with water over her decks. So many variables at sea mean that situations are seldom exactly the same – it is essential to be alert for subtle changes that can make a big difference.

3. In view of the previous flooding incident, where the vessel made shore safely, the skipper was not initially concerned about locating the source of ingress. By the time it became apparent that a serious situation had developed, it was too late to put crew on the deck to search for a cause and possibly prevent further ingress. Even the most insignificant damage should be investigated as soon as possible to prevent situations developing into emergencies.

4. The open vent flaps allowed water to find its way below decks and subsequently sink the vessel. Seafarers should be acutely aware of the dangers of downflooding through openings, at all times, and take all due precautions where there is a possibility of this happening. Had the vents been closed early on during this emergency, it would have prevented further ingress, and allowed the crew a good margin of safety until the SAR salvage pump arrived.

5. The crew abandoned safely with the presence of mind to wear lifejackets and to take their EPIRB and portable VHF radio into the liferaft. Although on this occasion they were rescued swiftly, things could have been very different if it had been dark or out of immediate reach of SAR services. By using available survival equipment, this crew greatly enhanced their chances of a safe rescue.

Two Sides of the Same Coin

For a collision to occur, both vessels must have applied the COLREGS incorrectly. In this incident, the story is viewed from both sides.

Heads:

Narrative

A fishing vessel returned to port to land a catch and to allow the skipper to attend a doctor's appointment. The usual mate had not sailed with the boat on its last trip, but was to take over as skipper on the next voyage.

Having landed the catch, collected new fish boxes and loaded more ice and fuel, the fishing vessel left the port at about 2300. It was the new skipper's intention to take the watch until they reached the fishing grounds. However, one of the crewmen insisted that it was his turn to take the watch, so the skipper turned in. The time was about 0200.

The crewman had received 5 hours sleep the previous morning, and had not slept for the 24 hours before that. He was very tired, and sitting in the wheelhouse chair he soon fell asleep. The watch alarm was on and working, but it could be reset without the crewman having to leave the chair (see Figure 1). The crewman described the watch alarm as a snooze alarm, and used it as such to rouse himself sufficiently to check the course before returning to his slumbers.

At about 0425, the crew of the fishing vessel were woken by the impact of their vessel with a much larger vessel. They all hurried to the bridge and then, under the skipper's direction, checked the vessel for damage. The only visible damage was a dent to the starboard bow (see Figure 2). and some damage to the cladding in the cabin.

There were no injuries or pollution, and after contacting the other vessel, and confirming names and ports of registry, they returned to port.

Figure 1: Vessel's watch alarm cancel button, next to the crewman on watch

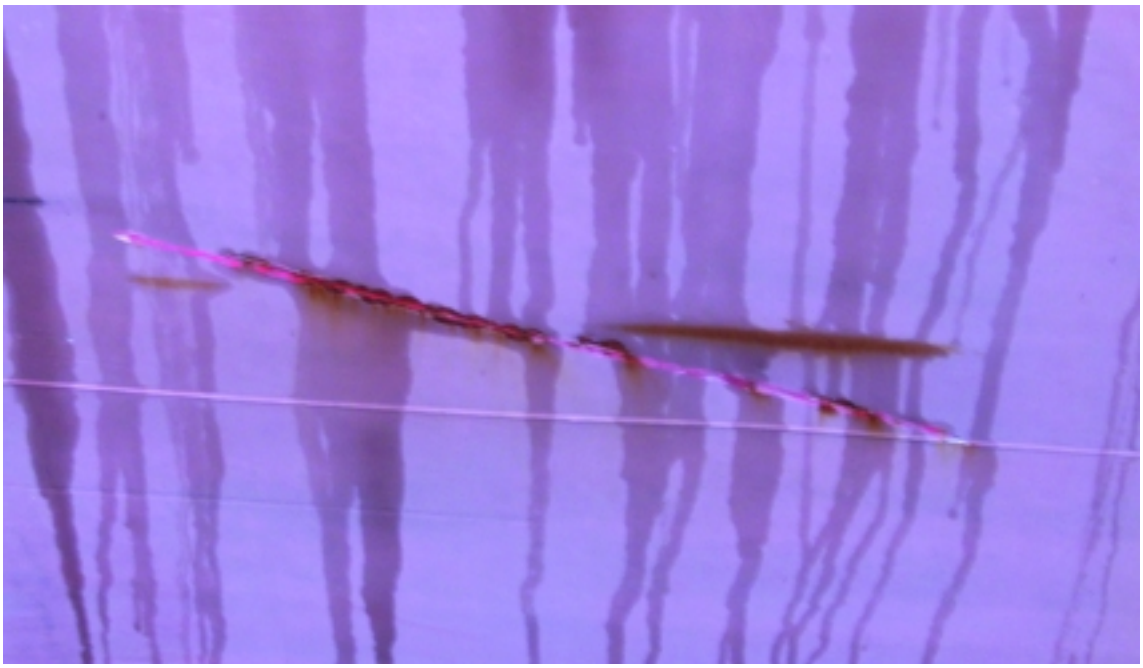


Figure 2: The damage to the tanker's side

The Lessons

1. **The watchkeeper was very tired, and used the watch alarm in the same way as he would use a clock snooze alarm. The positioning of the reset button so close to his chair meant that he did not have to move from his chair to cancel the alarm.**

2. **The skipper was not tired, having only just joined the boat. It would have been prudent for him to have remained on watch, and to allow his severely fatigued crew member to sleep.**

Tails:

Narrative

A 57,000gt tanker was approaching the coast at slow speed with the intention of anchoring at 0600. At 0352 the OOW noted a small contact on his radar at 6 miles and about 30º on his port bow. He acquired the target with the ARPA, and the initial tracking information showed the target to have a CPA of 1 mile to port. Checking through the binoculars, the OOW could see the lights of a small power driven vessel showing a green sidelight, making him the stand-on vessel in this situation.

It was about this time that the relieving OOW arrived on the bridge and the watch handover commenced. This included information concerning the small vessel, including the initial ARPA data giving a CPA of 1 mile to port. Once the handover was completed, and the off-going OOW had left the bridge, the new OOW checked the radar again and noted that the small contact was now at 2 miles and had a much reduced CPA. The time was 0415. Concerned that the give way vessel was still standing on, the OOW started to try and attract the other vessel's attention using the Aldis lamp. When this had no effect, he sounded five short blasts on the ship's whistle, and shortly afterwards started to alter course to starboard.

The whistle signal woke the master, who arrived on the bridge to find the fishing vessel alongside his starboard side but moving clear, and his own ship swinging to starboard. Ordering port helm to stop the swing, contact was made with the small vessel via the VHF radio. It was established that there were no injuries or pollution, and the vessel continued to her anchorage.

The Lessons

1. The small vessel was first noticed just before watch handover, and the initial ARPA data noted. The OOW then concentrated on handing over the watch, and the collision risk was not determined again for approximately 20 minutes. By this time the approaching vessel was at 2 miles, allowing little time to assess the situation and to take avoiding action. The handover of the watch took precedence over the collision situation, and the approach of the other vessel was not monitored.

2. The initial CPA data is displayed after 1 minute of tracking. The most accurate data is not available until the target has been tracked for a full 3 minutes. In this case, the OOW made his assessment of the situation based on the initial information, i.e. on scanty radar information. Had the handover included continually checking the latest ARPA data of the approaching vessel, more time would have been available to properly assess the situation and take effective action.

3. In this case, a lookout was on the bridge, but took no part in the action. A lookout is no use if he is not briefed and used as an important part of the bridge team. In this case, he could have played an important role in monitoring this closing contact while the OOWs were handing over. OOWs *must* use their bridge teams effectively if they are to remain safe.

4. When a large stand-on vessel is approached by a substantially smaller give-way vessel there is a point at which a decision must be made that an alteration of course is required. Often, an alteration is needed at a greater distance than the smaller vessel considers necessary. The OOW is left with a choice of standing on – assuming that the smaller give-way vessel is going to alter course – or taking avoiding action, which may not, in fact, be necessary due to the small vessel's imminent alteration. Following the rules and taking "early and substantial action to keep well clear" removes this dilemma.

Part 3 – Leisure Craft

The Royal Ocean Racing Club (RORC) was founded 80 years ago to promote offshore racing and the development of offshore racing yachts. In that time, we have seen massive developments in the sport related to the design of racing yachts, the materials from which they are built and the standards and intensity to which they are sailed. At the outset, there were no safety regulations whatsoever! Now, there are comprehensive international regulations, the Offshore Special Regulations (OSR) published by the International Sailing Federation (ISAF), used on an international basis consistently by the great majority of clubs organising offshore races.

The OSR have been developed over the years from experience (sometimes but rarely bitter) from all around the world. As well as the RORC, input also comes from experienced yachtsmen, designers, race organisers and others with specific knowledge and expertise. Importantly the MAIB's reports and similar reports from other national accident investigation bodies and, increasingly, International Standards also make significant contributions. Conversely, the OSR were used as a basis for many of the ISOs developed in support of recreational craft safety e.g. ISO 15085 – *Man overboard prevention and recovery,* closely mirrors the OSR as does ISO 9650 – 1 dealing with offshore liferafts.
Safety is not an issue which can be dealt with once. It is no good setting a set of regulations in stone. Developments in design, novel materials, technology, etc all influence safety. Safety regulations therefore need continuous review and updating. In the UK, contribution to OSR is through the Royal Yachting Association (RYA) largely based on submissions from the RORC's own Special Regulations Committee. This in turn receives input from industry, from the RORC's Technical Committee and others with specialist knowledge and experience.
Safety is however far more than just standards for the construction, fitout and equipping of yachts. It is much more an attitude of mind. The best, most comprehensive, most rigorously enforced standards are useless if individual boats pay lip service only. Or if, despite properly equipped yachts, their crews have no experience or knowledge of what to do in an emergency or how to use the safety equipment carried. Training and education are thus of equal, or perhaps even greater, importance. These two areas have probably seen the most development in the last few years.

This is of course all developed for and related to racing. There is however no reason whatsoever why cruising yachtsmen should not use the Offshore Special Regulations as the basis for their own safety standards. They are encouraged to do so. The Regulations are freely available and are published by both ISAF and the RORC through their respective websites. The RYA also publishes them together with a comprehensive guide to safety offshore.

But does all of this work? Is offshore racing generally safe? Do we learn from accidents and incidents? I think it does, that it is and that we do. OSR are up to date; they do reflect modern developments; they do incorporate changes reflecting actual events at sea. Yachtsmen in this context are open and communicative. So when something happens, or somebody comes across a good idea, it does get passed into the system, and if on review is thought to be generally applicable, it will get enshrined in the regulations. But anything that can be done to improve this process is to be applauded. And that very definitely includes the work of the MAIB.

Mike Urwin
Royal Ocean Racing Club Technical Director

Mike Urwin started sailing dinghies in the 1960's on the Thames and has progressed through small one design keelboats to offshore racing including races such as the Fastnet Race. With a degree in mechanical engineering, the early part of his career was spent carrying out research into hovercraft, flight simulators, wave energy and wind energy. He has worked for the RORC for 14 years, initially as Technical Manager, carrying responsibility for rating rules managed by the club, for advice to the club on safety related matters, and the development of safety standards applied to boats competing in the club's races. He is also an ISAF International Judge and has officiated at races all around the world. He sits on various RORC and RYA Committees, and also the ISO working party responsible for ISO 12217-2, the International Standard on the stability and buoyancy of sailing boats.

Relaxing Canal Trip Ends in Tragedy

Narrative

Two elderly couples and an elderly gentleman hired a 20m narrowboat for a 1-week holiday. They were all experienced at canal boating, and although the single gentleman was partially paralysed on his right-hand side, he was still very able to helm a canal boat using his left hand. When he was on the helm, another member of the crew would operate the throttle.

The party loaded their stores on to the hired canal boat and then completed the safety handover with a member of the boat yard staff. The brief did not include any mention of manoverboard action, or the use of the life-ring, which was stored amidships on top of the canal boat, and the party declined lifejackets when offered. The boat had a semi-traditional stern, which had no rail around the transom.

Two days into the holiday, the party were heading downstream in a meandering section of a river, which was flowing relatively quickly due to recent rain. The weather was windy with frequent heavy showers. The partially paralysed gentleman was steering, standing on the right side, helming with his left hand. One of the ladies was sitting down operating the throttle as needed.

The boat entered a particularly sharp right-hand turn, and it became apparent that they were not going to get round in one go. Astern thrust was applied, but at the same time the wind caught the bow and the boat gently bumped into the left-hand bank of the river. The stern, pushed by the current, edged closer to the right-hand bank. At some point, the gentleman on the tiller lost his footing and fell off the right-hand side of the boat, into the river, and drifted downstream. There was a cry of 'man overboard', and the lady who had been down below dived into the river to help. She swam to the casualty and attempted to keep his head above water. Meanwhile, another gentleman climbed on top of the canal boat to deploy the life-ring. The lanyard for the life-ring was wrapped around it like a yo-yo. Unfortunately, the life-ring lanyard didn't unravel as it was thrown, resulting in the life-

Aft section of the narowboat

Demonstrating use of the life-ring

ring dropping into the water beside the boat. The lanyard was pulled back in, and fully unravelled, before a second attempt at a throw was made. The throw did not reach the pair in the water, the lady having now managed to raise the casualty's head above water.

The gentleman on top of the canal boat then untied the life-ring lanyard from its securing point on the boat, and took the life-ring on to the left-hand riverbank so that he could get into a better position to throw it again. Two farmers, who happened to be in a nearby field, then helped in the rescue, throwing the life-ring and pulling the two people out of the water. The emergency services were called and CPR was administered to the elderly gentleman.

The accident site was quite remote, so paramedics arrived sometime later. The gentleman was flown to hospital by helicopter, where he was pronounced dead. After hospital checks, the other four members were released shortly afterwards, with only the lady who entered the water having suffering mild hypothermia.

The Lessons

1. **Make sure you have a manoverboard procedure and that you know how to use the safety equipment on your hire boat. Throwing the life-ring correctly might have ensured vital seconds were saved while those in the water were trying to remain afloat. It was very lucky, in this case, that the rescuer who dived in did not also perish.**

2. **Lifejackets, although often seen as unnecessary on a canal boat, are really essential if there are any non-swimmers or physically impaired members in your party. Diving into a river to assist a weak or non swimmer can put you at great risk.**

3. **Ensure you hire a canal boat that is suitable for your party. For example, you may wish to consider:**

   - **a cruiser stern, which includes a rail around the stern**
   - **easier access steps into cabin**
   - **other child-friendly safety features if travelling with children.**

Lookout – Above and Below the Water

Dive vessel displaying the Alpha flag and the American Territories flag

Narrative

A 30 foot (9.1m) yacht was returning to the UK at the end of a charter period, heading for a breakwater entrance.

Eight divers from a diving vessel positioned between the yacht and the breakwater entrance had begun diving operations.

Weather conditions were good, the wind northerly at 15 knots and visibility excellent. The yacht was on a north easterly heading and making good a speed of about 7 knots. It was close hauled and intended to pass to the north of a 'fishing boat' that the skipper and his crew had already identified.

Similarly, the diving vessel had identified the yacht and assessed that it was heading for the western breakwater entrance, and continued monitoring diving operations; the skipper had probably underestimated the speed made good by the yacht.

The diving vessel was displaying clearly and conspicuously the international code flag Alpha, drawing attention to the fact that it was engaged in diving operations and that vessels were to keep well clear and pass at slow speed. As a precautionary measure, the dive vessel was also displaying the American Territories flag, orange with a white diagonal stripe, which had the same meaning as flag Alpha. Both flags were 1m2 and were hoisted 2.5 metres above deck level.

As the yacht approached, the divers released two orange inflatable delayed surface marker buoys, which indicated that they were returning to the surface. Although the marker buoys were shielded by the sails, the skipper had identified two orange markers and assumed that they were lobster pot marker buoys. His intention was to clear them, all be it at close range.

At no point prior to the incident had the skipper positively identified the flags displayed by the diving vessel. As a result, the yacht passed over the top of the divers as they surfaced, blissfully unaware of the diving operations beneath them. Attempts by the Coastguard and the dive vessel to contact the yacht by VHF radio failed. Thankfully on this occasion there were no injuries sustained by any of the diving party.

The Lessons

1. A proper lookout must be maintained by all vessels at all times. Remember that a proper lookout means not only identifying the presence of another vessel, but also checking whether that vessel is displaying lights, shapes or flag signals that indicate it is engaged in special operations.

2. Once the lookout has identified a shape or flag, the skipper and the crew must be familiar with its meaning. Specifically, crews should actively familiarise themselves with the International Code of Signals.

3. Maintaining a good VHF listening watch should be a standard part of every vessel's watchkeeping arrangements. Owners spend significant sums of money to purchase the latest hi-tec radio equipment; unless the radio is turned on and set to the correct frequencies, with the volume control properly adjusted, it is of little use to anyone.

How Safe is Your Safety Boat?

Stern view of the safety boat

Narrative

Two young boys were undertaking some sailing training on a privately-owned Hobie Cat dinghy in sheltered waters. Although they had both previously sailed monohull dinghies together, it was their first time in a Hobie Cat. They therefore spent the morning with a sailing coach, who helped them familiarise themselves with the dinghy and then accompanied them in a rigid inflatable (RIB) safety boat from a nearby sail training centre while they got used to the catamaran's characteristics.

The boys continued to sail the dinghy into the afternoon. Although the coach had by now been dropped off ashore, the safety boat, with two qualified Royal Yachting Association (RYA) safety boat handlers on board, continued to keep station about 50 metres ahead of them. All was well until the helm of the safety boat noticed that one of the boys was in the water, with the dinghy still upright.

As the safety boat manoeuvred close, it was evident that the boy helming the dinghy was struggling to recover the other boy, whose trapeze harness was catching on the lip of the dinghy's starboard hull.

Given their ongoing difficulties, the crew of the safety boat decided to help. The helmsman placed the engine in neutral and the crewman

began to move across the boat to assist. However, as he did so, he slipped and inadvertently grabbed hold of the throttle to prevent his fall. This forced the engine into gear. Although he immediately pulled the kill cord, the stern of the RIB momentarily slewed to port before the engine stopped, and the propeller struck the boy's left leg, causing serious injuries.

The safety boat crewman immediately called for an ambulance using his mobile phone, and the injured boy was recovered to the safety boat and taken back to the sailing centre. The boy was subsequently transferred to a local hospital, where his left leg had to be amputated above the knee.

The Lessons

1. **This accident highlights the dangers posed by unprotected rotating propellers. Had a propeller guard been fitted to the safety boat, the terrible injuries would probably have been prevented. Such guards can lead to reduced acceleration, speed and manoeuvrability of the boat; however, the benefits of a safely guarded propeller have to be given consideration compared to the boat's potential loss in performance. It is suggested that the requirement for a propeller guard will depend on the exact role and particular operational conditions that a safety boat is likely to encounter.**

2. **The throttle on this particular RIB was in a relatively exposed position, which made it vulnerable to unintentional operation, as so tragically demonstrated here. Extra caution must be taken when moving around the area where exposed throttles are situated, particularly when people are nearby in the water. Consideration should also be given to the fitting of guards or rails around such throttles to reduce the risk of accidental operation.**

3. **If you are in a safety boat which is attempting to recover a person from the water, try to turn the boat's bow towards the person. This will shield them from the propeller as much as possible. When conditions allow, ideally the engine should be shut down when approaching somebody in the water. This will remove the chance of its inadvertent operation.**

4. **Although both of the boys were familiar with general manoverboard drills, they had not practised these in this particular design of dinghy. Had they done so, they would probably have been aware of the problem with the harness and the lip of the hull, and found a way of overcoming it.**

APPENDIX A

Preliminary examinations started in the period 01/07/07 – 31/10/07

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 Incident	Name of Vessel	Vessel Type	Flag	Size (gt)	Incident Type
15/07/07	Kinghorn RNLI	RNLI lifeboat	UK		Acc. to person
28/07/07	*Barlovento 2*	Yacht	Unknown		Hull failure
	Time Flies	Pleasure craft (non-commercial)	UK		Hull failure
31/07/07	*Velazquez*	Container	UK	7519.00	Acc. to person
	Smit Collingwood	Tug	UK	281	
04/08/07	5m angling boat	Angling	UK		Acc. to person (2 fatalities)
05/08/07	*Stena Britannica*	Ro-ro vehicle/passenger ferry	UK	55050.00	Hazardous incident
**/08/07	*Ellie May*	Fishing vessel	UK	7.23	Foundering (1 fatality)
08/08/07	*MSC Columbia*	Container	UK	51931.00	Acc. to person (1 fatality)
11/08/07	*Barbary Partridge*	Small commercial motor vessel	UK		Flooding
20/08/07	*Smit Cymyran*	Survey/research	UK	105.00	Grounding
22/08/07	*Buccaneer Elan 33*	Small commercial sailing vessel	UK	1.50	Acc. to person (1 fatality)
03/09/07	*Apollo*	Fishing vessel – stern trawler	UK	246.00	Acc. to person (1 fatality)
07/09/07	*Fingal*	General cargo single deck	Netherlands, Antilles & Aruba	1409.00	Grounding
2/10/07	*Shayne*	Angling vessel	UK	Unk	Flooding/ Foundering (2 fatalities)
14/10/07	*Panurgic II*	Workboat	UK	Unk	Acc to person
18/10/07	*Unnamed powerboat*	Powerboat	UK	Unk	Capsize
21/10/07	*Nordsee*	General Cargo	Antigua & Barbuda	2579 grt	Contact
23/10/07	*Luvly Jubbly*	tug	Honduras	144 grt	Machinery failure
	Longsands	Crane barge	Unk	Unk	Machinery failure
30/10/07	*Monika*	General Cargo	Antigua & Barbuda	1768 grt	Acc to person (1 fatality)

Investigations started in the period 01/07/07 – 31/10/07

Date of Incident	Name of Vessel	Vessel Type	Flag	Size (gt)	Incident Type
10/07/07	*Pacific Star*	Cruise ship	UK	35144	Heavy weather damage
28/07/07	*HD1*	Ro-ro vehicle/passenger ferry	Bahamas	2357	Contact
28/07/07	*Lady Candida*	Megayacht	UK	143	Fire/explosion
03/08/07	8m rigid raider	Other (non-commercial)	UK		Capsize/listing
07/08/07	*Dublin Viking*	Ro-ro vehicle/passenger ferry	UK	21856	Acc. to person (1 fatality)
23/09/07	*Viking Islay*	Offshore supply	UK	928.00	Acc. to person (3 fatalities)
03/10/07	*Lady Hamilton of Helford*	FV	UK	6.73 grt	Collision
	Blithe Spirit	FV	UK	0.85 grt	
11/10/07	*Flourish*	FV	UK	40.11 grt	Collision
	Nautica	General Cargo	St Vincent & Grenadines	1587 grt	

Reports issued in 2007

***Annabella* –** collapse of cargo containers while in the Baltic Sea on 26 February 2007
Published 13 September

Aqua-boy – grounding, Sound of Mull on 11 November 2006
Published 4 July

Arctic Ocean and Maritime Lady – collision between *Arctic Ocean* and *Maritime Lady*, the capsize of *Maritime Lady*, and contact with wreck of *Maritime Lady* by *Sunny Blossom*, and its subsequent grounding in the Elbe River on 5 December 2005
Published 1 February

Brothers – grounding of vessel with the loss of two lives off Eilean Trodday on 1 June 2006
Published 31 January

Calypso – engine room fire on board the passenger cruise vessel 16 miles south of Beachy Head on 6 May 2006
Published 19 April

Danielle – major injuries sustained by a deckhand 17 miles south-south-east of Falmouth on 6 June 2006
Published 29 March

Ennerdale – major LPG leak from the gas carrier while alongside Fawley Marine Terminal on 17 October 2006
Published 25 May

FR8 Venture – loss of two lives, plus one seriously injured person on board the Singaporean registered tanker close to the west pilot station to Scapa Flow in the Orkney Islands on 11 November 2006
Published 18 July

Haitian sloop – capsize of an un-named Haitian sloop with the loss of at least 60 lives while under tow by Turks and Caicos police launch *Sea Quest* 1nm south-east of Providenciales, Turks and Caicos Islands on 4 May 2007
Published 1 August

Harvest Caroline – grounding, Tanera More, Summer Isles, north west coast of Scotland on 31 October 2006
Published 22 June

Hilli – starboard boiler explosion resulting in one fatal and one serious injury on board the liquid natural gas tanker, *Hilli*, Grand Bahama shipyard, Freeport, Grand Bahama on 10 October 2003
Published 27 March

Hooligan V – report on the investigation of the fuel failure, capsize, and loss of one crew member from the Max Fun 35 yacht 10 miles south of Prawle Point on 3 February 2007
Published 14 August

Maersk Doha – investigation of the machinery breakdown and subsequent fire, Chesapeake Bay, off Norfolk, Virginia, USA 2 October 2006
Published 6 July

Lindy Lou – fire on board the canal boat at Lyme View Mariner, Adlington, Cheshire, resulting in 1 fatality on 20 January 2007
Published 3 October

Maersk Dover/Apollonia/Maersk Vancouver – close-quarters situation between the ro-ro passenger ferry *Maersk Dover*, the tanker *Apollonia* and the container vessel *Maersk Vancouver* in the Dover Strait on 17 October 2006
Published 17 May

Meridian – loss of the fishing vessel and her four crew 160nm due east of Aberdeen on 26 October 2006
Published 4 September

Octopus/Harald – grounding of the jack-up barge *Octopus* towed by the tug *Harald*, Stronsay Firth, Orkney Islands, 8 September 2006
Published 14 August

APPENDIX B

Ouzo – loss of the sailing yacht and her three crew, south of the Isle of Wight during the night of 20/21 August 2006
Published 12 April

Sea Express and Alaska Rainbow – collision on the River Mersey on 3 February 2007
Published 27 September

Sian Elizabeth – injury to a member of the crew, 3 miles north of Kings Lynn on 14 September 2006
Published 12 March

Skagern/Samskip Courier – collision, Humber Estuary, on 7 June 2006
Published 4 April

Thomson Celebration – fatal accident to person, at anchor in St Peter Port, Guernsey, Channel Islands on 26 September
Published 4 June

Thunder – grounding at the approaches to the Dee Estuary on 10 August 2006
Published 12 June