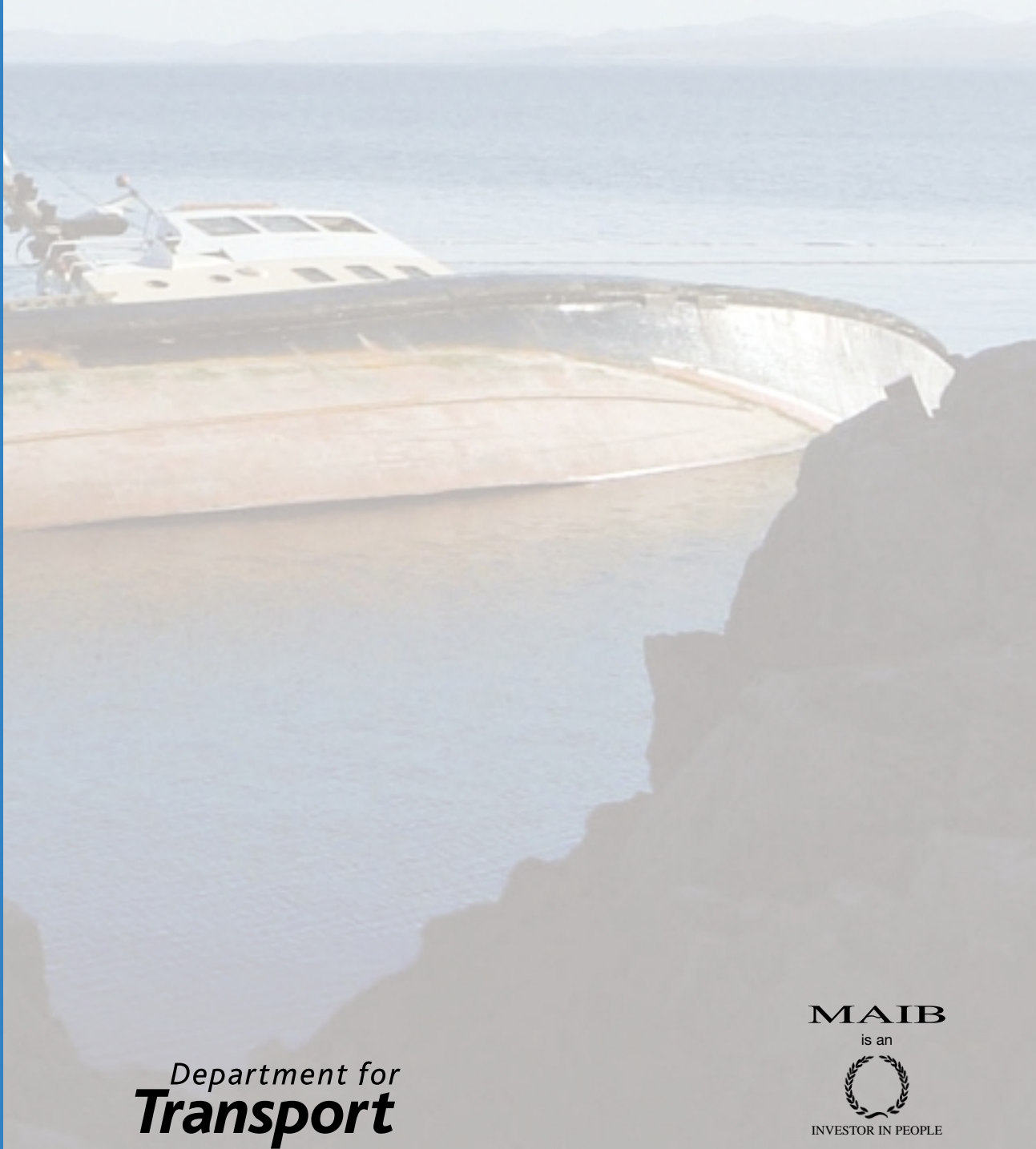


MARINE ACCIDENT
INVESTIGATION BRANCH

MAIB

SAFETY DIGEST

Lessons from Marine Accident Reports 1/2005



Department for
Transport

MAIB
is an

INVESTOR IN PEOPLE

SAFETY DIGEST

Lessons from Marine Accident Reports

No 1/2005



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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.

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

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**



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 1999**

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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Glossary of Terms and Abbreviations

AB	–	Able Seaman
AIS	–	Automatic Identification System
ARPA	–	Automatic Radar Plotting Aid
CO ₂	–	Carbon Dioxide
CPA	–	Closest Point of Approach
EEBA	–	Emergency Escape Breathing Apparatus
EPIRB	–	Emergency Position Indicating Radio Beacon
GRP	–	Glass Reinforced Plastic
MCA	–	Maritime and Coastguard Agency
MHWS	–	Mean High Water Springs
OOW	–	Officer of the Watch
“Pan Pan”	–	The international urgency system
Ro-ro	–	Roll on – roll off
SFIA	–	Sea Fish Industry Authority
TSS	–	Traffic Separation Scheme
VDR	–	Voyage Data Recorder
VHF	–	Very High Frequency
VTs	–	Vessel Traffic Services

Introduction

The work of the MAIB over the past 4 months has once again been dominated by 2 types of accidents: collisions and the fatal foundering of under 15m fishing vessels (Code boats).

Collisions: There is nothing new to learn from any of the collisions we have investigated, just the same old chestnuts! You will not have a collision if you follow 3 basic principles:

1. Lookout. Keep a good lookout, both visually and by radar. At night, in poor visibility, in heavy shipping or in navigationally constrained waters, you **MUST** have an additional dedicated lookout in accordance with STCW. In virtually every collision we investigate, the additional lookout has *not* been on the bridge when he should have been. Not using a lookout, means not using one of the most important safety nets the OOW has.
2. Electronic navigational equipment. All too often, OOWs just use radar target trails to judge CPAs, sometimes with catastrophic results. Facilities such as automatic plotting, electronic bearing lines, variable range markers and radar guard alarms, are normally provided to assist the OOW. Using them to assist in maintaining a good situational awareness of other shipping is the professional thing to do.
3. Taking early action. If you are the give way vessel, the sooner you take action, the less dramatic the action has to be, and the sooner the risk of collision is avoided. Leaving alterations until the last minute endangers your vessel and presents the other officer of the watch with a quandary. Similarly, if you are the stand-on vessel, do not assume "he will alter at the last minute". Use the appropriate signals laid down in the ColRegs, and, if necessary, initiate a manoeuvre under Rule 17, as soon as it becomes apparent that the vessel required to keep out of the way is not taking appropriate action.

Fishing vessel losses: In the 10 days prior to writing this article, the MAIB has been finalising the reports into 3 founderings of under 15m fishing vessels, all of them fatal. Last night, we had yet another double fatality reported. Just because there is no mandatory stability testing requirement for Code boats, does *not* mean good stability is not vital to the survival of your boat. If you are not certain of the stability of your vessel, or if you are planning any structural alterations (extra deck house, net drums, A-frames etc) seek expert advice.

Whilst we would ideally wish for our vessel not to sink, it is essential to have appropriate equipment in case the unthinkable happens. A well positioned liferaft, an EPIRB, and a good lifejacket ready-to-hand, could save your life one day. It is a false economy not to be prepared for the worst.

Fatigue: Unusually, in this edition of the Safety Digest we have a piece of research, which affects the readers of all three sections of the Digest. It has therefore been placed after this introduction. Fatigue is not well considered at sea, and yet its effects are insidious. *Please* take the time to read this short article, and ponder on how safe *you* may be when you are tired.

Finally, the MAIB developed a new website at the end of 2004. For those who have not visited it, it can be found at www.maib.gov.uk. We hope you will find it faster and easier to use.

Safe sailing.



Stephen Meyer
Chief Inspector of Marine Accidents
April 2005

A Pause for Thought

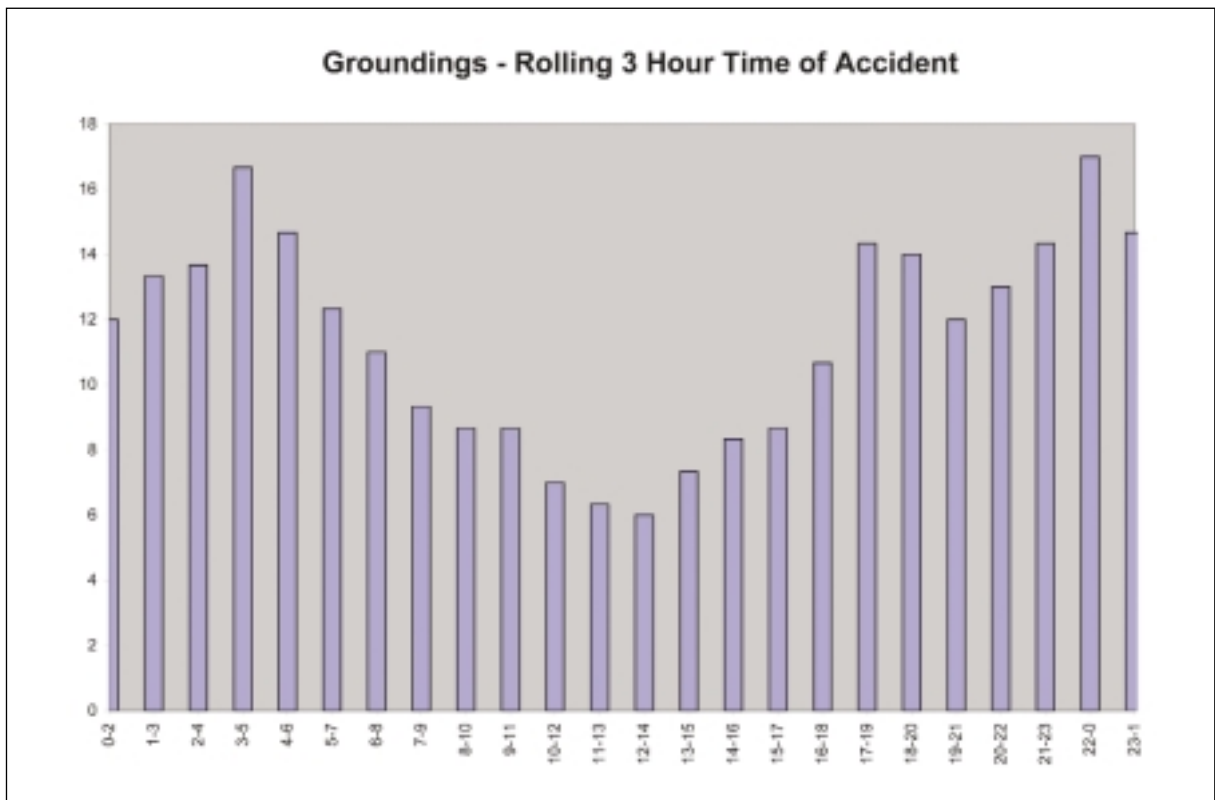
Watchkeeping, Fatigue and How to Stay Alert!

The investigation files on 66 collisions, groundings, contacts and near collisions were reopened recently for a safety study into watchkeeping practices. The evidence was thoroughly reanalysed, focussing on the makeup and performance of the bridge watchkeeping teams. In addition, the MAIB's database was used to extract broader information from over 1,600 relevant accidents which had been reported to the Branch during a 10-year period. This data was used to look at trends and anomalies. The safety study, which was published in 2004, concluded that, among other things, watchkeeper fatigue was a major factor in many of the accidents and particularly in groundings. This accords with the general experience that MAIB inspectors have gained from meeting crews after accidents, and will be no surprise to officers involved in the short sea trade in particular.

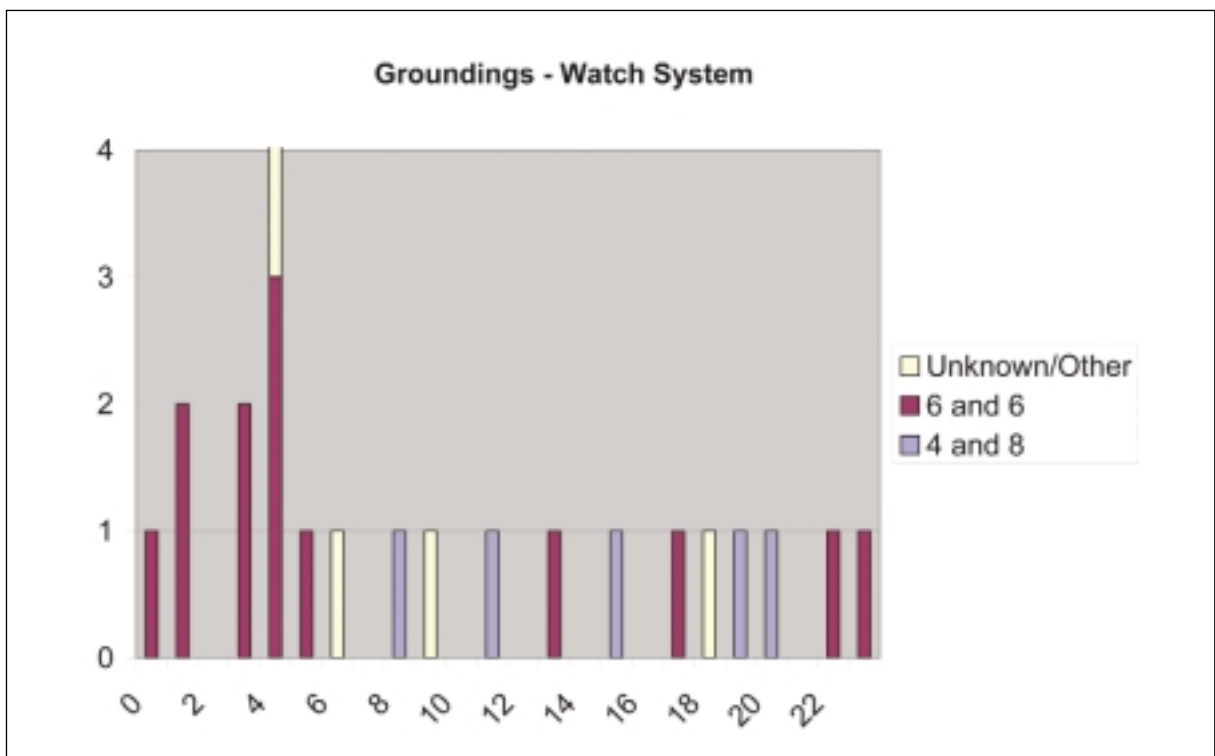
A number of the accidents in the study were caused as a direct result of a lone watchkeeper falling asleep, *but* fatigue was a factor in many more of them. Long before a watchkeeper has reached the stage where he cannot keep his eyes open, fatigue is affecting his performance. It can cause the following:

- Inability to concentrate, including being less vigilant than usual
- Diminished decision-making ability including:
 - Misjudging distance, speed, time etc
 - Overlooking information required for complex decisions
 - Failing to anticipate danger
- Poor memory, including forgetting to complete a task or part of a task
- Slow response, including responding slowly to normal, abnormal or emergency situations
- Reduced competence in interpersonal dealings
- Attitude change, including:
 - Being too willing to take risks
 - Displaying a “don’t care” attitude
 - Disregarding warning signs

The data used in the safety study, especially that associated with grounding accidents, indicated a strong link between fatigue and watchkeeping arrangements.



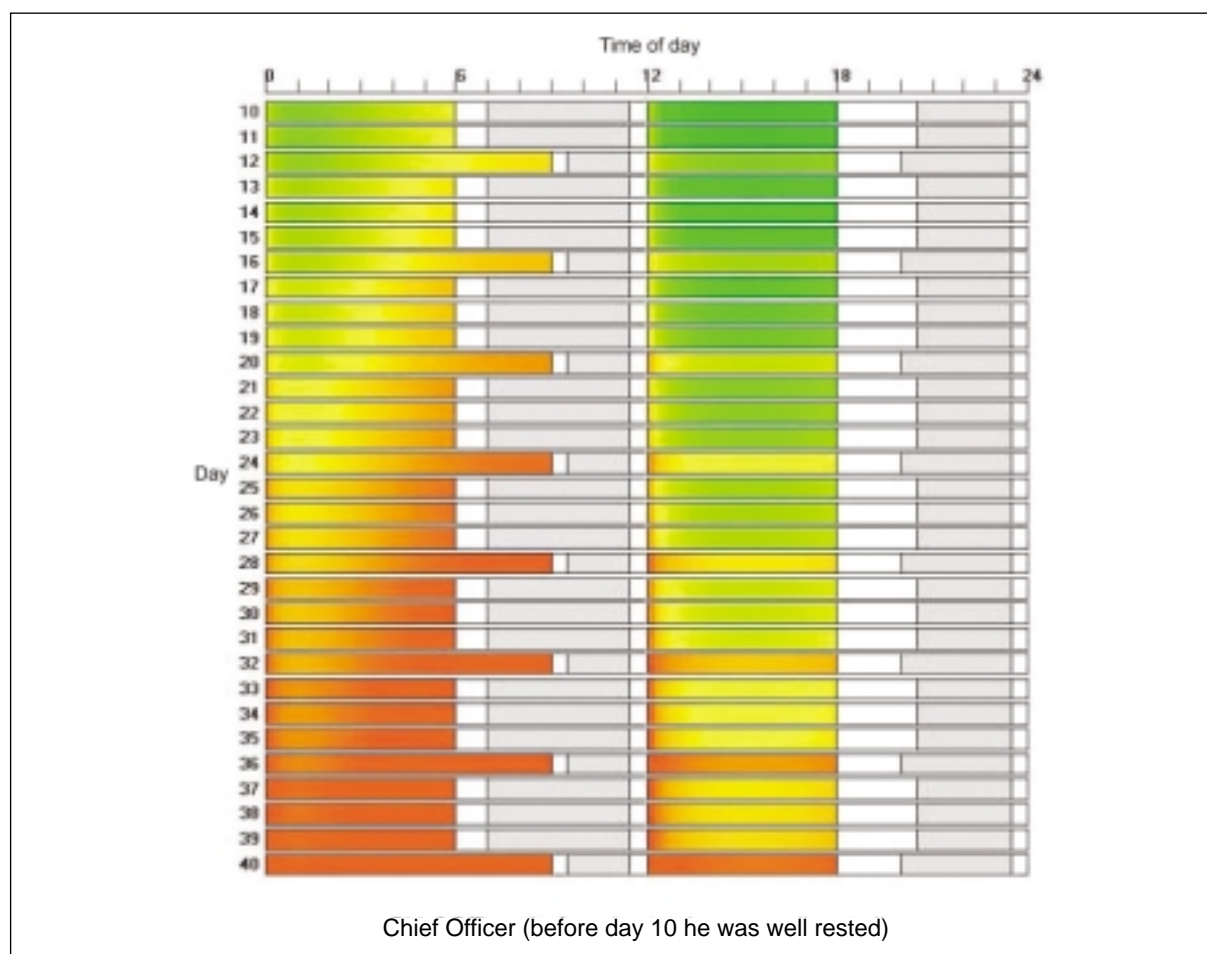
The above figure, which uses data from all groundings in UK waters that were reported to MAIB over a 10-year period, and which involved a merchant vessel of over 500gt, shows that groundings are much more likely to occur at night. It can also be seen that they are much more likely to happen towards the end of a watch. The most common times being 0400 to 0500, 1700 to 1900 and at about 2300. This clearly indicates that fatigue is likely to be a factor.



There were 23 groundings considered in detail in the study. The above diagram shows the watchkeeping arrangements in each of those groundings. The link between 6-on 6-off watchkeeping, and groundings that occur at night, can be clearly deduced.

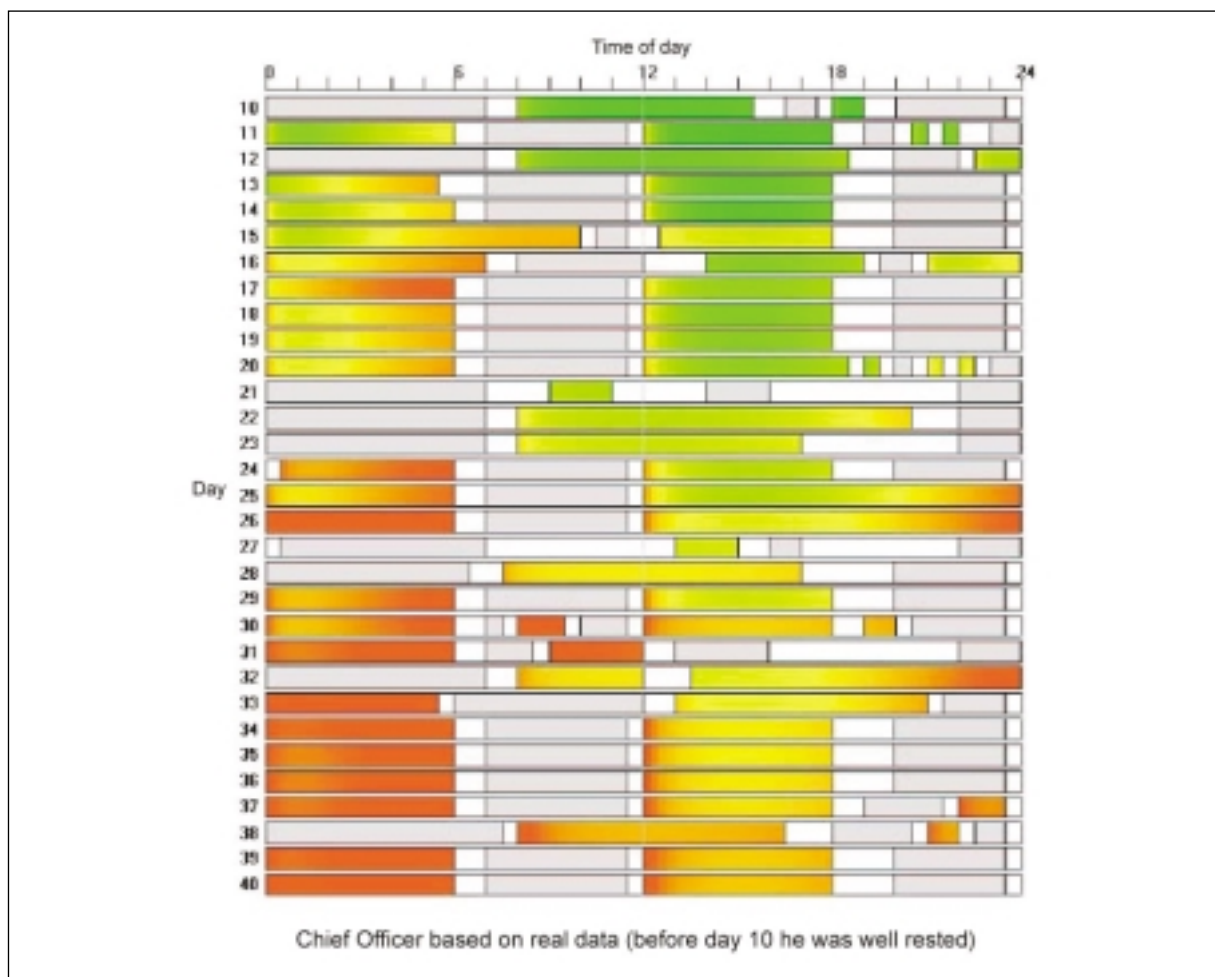
Since concluding the study the MAIB, along with QinetiQ Centre for Human Sciences has been looking more closely at the effects on watchkeepers of 6-on 6-off watchkeeping routines. As part of this study, typical marine work/rest routines were fed into a previously developed programme designed to test whether air crews are fit to fly. The parameters used for air crews were adjusted to account for some of the differences in the conditions of work and rest for marine officers. The effect of these adjustments was to make them considerably more lenient for the marine application. The parameters were then adjusted even further, by a factor of 25%, to allow for the fact that marine crews may become hardened to a punishing routine in time.

The following figures, which, bearing in mind their provenance must be treated with caution, indicate the apparent levels of fatigue of the 12 to 6 watchkeeper on a fictional vessel. The times used are based on an idealised routine which is compliant with STCW. The vessel has only two officers, who each work 6-on 6-off. She arrives in a port at about 0600 every fourth day and sails again at about 1800. The chief officer has some extra duties on arrival in port while the master is dealing with port entry and other paperwork, otherwise the 6-on 6-off routine is maintained. The work periods are shown coloured, with green indicating 'well rested and alert' and red, at the other end of the scale, indicating 'dangerously fatigued'. The grey areas indicate the periods when the chief officer was off duty and asleep.



It can be seen that the chief officer appears to begin to get dangerously tired after about 3 weeks of this routine. However, no allowance is made for the **quality** of rest which is assumed to be good. To test the effectiveness of days off in port, a rest day was introduced into the programme at every second port call. It was found that these rest days did not make an appreciable difference to the levels of fatigue indicated.

The above diagram is based on an idealised routine, which most officers will recognise as being unworkable in practice. Real ships do not operate on such orderly schedules: emergency drills have to be conducted, rough weather disturbs sleep, breakdowns and rain prolong cargo work, long pilotages require both officers to be on duty and many other occurrences interrupt the schedules. As a comparison, a month of real data gained from the chief officer of a small, about 2,000gt general cargo vessel was fed into the programme with the following result:



It can be seen that, despite the chief officer getting several nights in port, the programme indicates that dangerous levels of fatigue are likely to exist after 2 or 3 weeks in the routine. The most dangerous times appear to occur towards the end of the midnight to 0600 watch, which ties in closely with the results shown in figures 1 and 2.

The diagrams serve to reinforce the MAIB's long-held belief that fatigue, brought on by minimal manning and arduous watchkeeping and operational routines, is endemic at sea, especially in the short sea trade.

The Lessons

1. Minimum safe manning levels need to be increased so that each seagoing vessel of over 500gt has at least a master and two bridge watchkeeping officers.
 - Always post a designated lookout as a second watchkeeper at night in accordance with STCW. If used properly, he will not only help to keep an efficient lookout but will also help to keep the officer alert.
2. Watchkeepers should:
 - Be aware of fatigue, how it affects performance and how best to guard against its incipient build up.
 - Make the best of off duty periods for resting, should not drink alcohol and try to eat good nutritious food regularly.
3. On minimally manned vessels, the workload should be shared equitably between the officers, even if this means the master turning-to on deck.
4. Masters and owners should ensure that a vessel does not leave harbour unless all the watchkeepers, including the master where appropriate, are well rested.

Part 1 – Merchant Vessels



It's no surprise that safety is one of the key campaign issues for NUMAST. The sea is a dangerous place, ships are inherently hazardous workplaces and seafaring is by far the most risky occupation – with death and injury rates many times greater than shore-based employment.

Tracing NUMAST's history back to its predecessor organisations in the middle of the 19th century shows that one of the most pressing reasons for the foundation of seafarer unions was safety.

Looking back through the safety of our industry over the past 150 years, one could well be forgiven for asking: does anything ever change? Well over a century ago, our archives show our forerunners voicing concerns over such issues as mixed-nationality crewing, working hours and ship standards.

As we need history to remind us not to repeat the mistakes of the past, so we need the Marine Accident Investigation Branch to show us not to repeat the mistakes of others.

We need publications such as the Safety Digest and the more detailed investigation reports to show us that change can be achieved – provided the will is there.

As a people-orientated organisation, NUMAST is primarily concerned with the importance of the human element in shipping safety. It's now well known that around 80% of accidents at sea (and more than 90% in cases of collisions and groundings) involve so-called 'human factors'. But less widely acknowledged is the way that technical issues continue to overshadow people-based issues when the industry and the regulators respond to accidents and seek to improve maritime safety.

Once again, this latest issue of the MAIB Safety Digest serves to demonstrate the pressing need for 'human issues' to be treated with the priority they deserve.

In an industry where fierce cost-cutting pressures often seem to dominate decision-making, the report on the prompt response of officers to a fire onboard a ferry in a UK port should remind us all how investment in skills, professionalism and experience can lead to long-term savings rather than the short-term approach so often pursued by companies.

Similarly, the report on the 'near-miss' between two gas tankers in the Channel – both using AIS and ARPA – highlights the truism that all the technology in the world will not provide a substitute for high standards of seamanship.

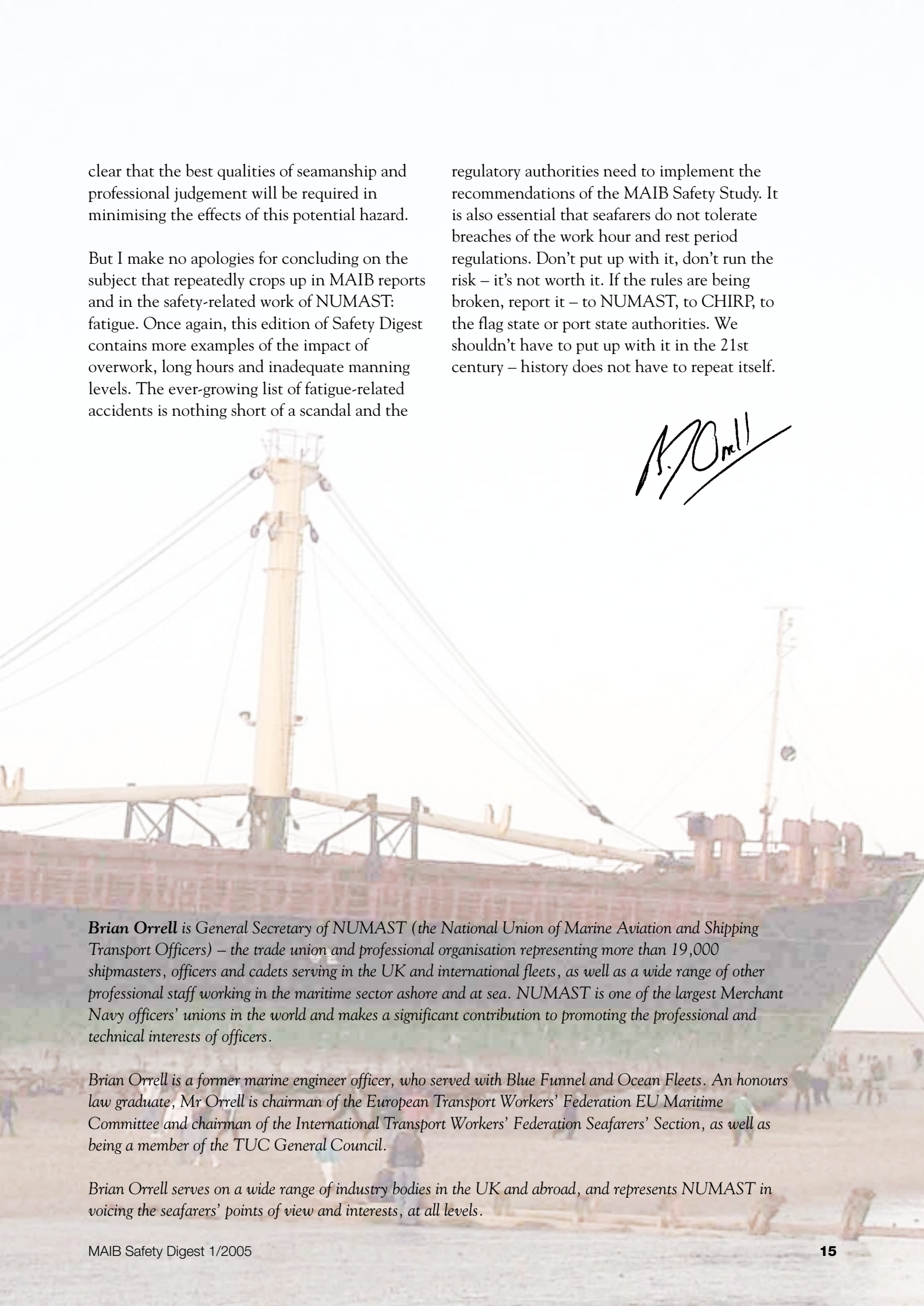
Indeed, as other reports demonstrate, if people are not properly factored into the design of ships and their equipment, technology can even act as a barrier to safe operations. Good ergonomics – as the case of Wrong Switch, Big Trouble! demonstrates – deserve much greater attention.

This edition of Safety Digest also highlights the way in which even the most modern and contemporary ship designs can generate new problems and new challenges to maritime professionals. As our understanding of the phenomenon of parametric rolling increases, it is

clear that the best qualities of seamanship and professional judgement will be required in minimising the effects of this potential hazard.

But I make no apologies for concluding on the subject that repeatedly crops up in MAIB reports and in the safety-related work of NUMAST: fatigue. Once again, this edition of Safety Digest contains more examples of the impact of overwork, long hours and inadequate manning levels. The ever-growing list of fatigue-related accidents is nothing short of a scandal and the

regulatory authorities need to implement the recommendations of the MAIB Safety Study. It is also essential that seafarers do not tolerate breaches of the work hour and rest period regulations. Don't put up with it, don't run the risk – it's not worth it. If the rules are being broken, report it – to NUMAST, to CHIRP, to the flag state or port state authorities. We shouldn't have to put up with it in the 21st century – history does not have to repeat itself.



Brian Orrell is General Secretary of NUMAST (the National Union of Marine Aviation and Shipping Transport Officers) – the trade union and professional organisation representing more than 19,000 shipmasters, officers and cadets serving in the UK and international fleets, as well as a wide range of other professional staff working in the maritime sector ashore and at sea. NUMAST is one of the largest Merchant Navy officers' unions in the world and makes a significant contribution to promoting the professional and technical interests of officers.

Brian Orrell is a former marine engineer officer, who served with Blue Funnel and Ocean Fleets. An honours law graduate, Mr Orrell is chairman of the European Transport Workers' Federation EU Maritime Committee and chairman of the International Transport Workers' Federation Seafarers' Section, as well as being a member of the TUC General Council.

Brian Orrell serves on a wide range of industry bodies in the UK and abroad, and represents NUMAST in voicing the seafarers' points of view and interests, at all levels.

Quick Response to Fire not Recorded on VDR

Narrative

A 29 year old Bermudan registered ferry was alongside in a UK port when the on watch engineer smelt smoke in the control room.

The ferry had finished discharging and was taking a break from cargo operations to allow the ship's staff to have breakfast before loading started. The engineer called the chief engineer who, along with the chief officer, immediately attended the control room to investigate – as per company procedures. It was quickly established that there was a fire in the main switchboard, so the chief officer set about finding the seat of the fire, feeling each back panel door in turn.

The chief engineer was in contact with the master on the bridge who had sounded the ship's emergency alarms as soon as the fire had been confirmed to him. The vessel was fully mustered 3 minutes later. The engineer on watch left the control room to don breathing apparatus, as the smoke was becoming heavier.

The chief officer, having found the seat of the fire and being aware that a party wearing breathing apparatus would be on scene within minutes, felt sufficiently confident to don an emergency escape breathing apparatus (EEBA), stored at the end of the switchboard, and return to the fire with a hand-held CO₂ extinguisher. He knew that the EEBA offered only about 7 minutes of air, but was confident that he could put the fire out and exit the control room in this time. The chief engineer also donned an EEBA and remained in the control room as back up. The chief officer extinguished the fire with his first, short burst of CO₂ but followed this with a longer burst to make sure.

At this point, the engineer on watch re-entered the control room, wearing BA, and relieved the chief officer at the scene to keep watch until the smoke had been cleared.

Once the situation was under control and the vessel had been stood down from emergency stations, the master went to secure the VDR data and was surprised to discover that the VDR was not switched on.

The damage was limited to the area immediately surrounding the contactors of one of the auxiliary generators, the operating mechanism of which had suffered a mechanical failure leading to the fire. The vessel was inspected by the MCA and was allowed to sail with certain restrictions until the affected breaker was replaced. Having loaded, the vessel sailed 5 hours later.



Photograph showing breaker

The Lessons

1. The rapid response to the initial smell of burning was instrumental in bringing the situation quickly under control with a minimum of damage. Do not wait until you can see the smoke: raise the alarm as soon as you recognise that something is wrong.
2. Emergency escape breathing apparatus should not be used to tackle fires; all on board the vessel were aware of this. However, under certain situations, training, experience and initiative must be allowed to overrule best practice to prevent a hazardous situation becoming gravely serious. This was such an occasion, and the officers concerned are to be commended for their prompt actions.
3. The master was extremely disappointed to discover that the VDR was not running during this incident, as he felt that the ship's company had acted efficiently throughout, and he was expecting this to be clear on the VDR replay. The pre-sailing checklist on board contained instructions to check that the VDR alarm panel on the bridge showed no alarms, and this was done. Unfortunately, this panel was not equipped with a running light to show that the VDR was switched on. The instructions now include procedures to ensure this is checked.

All operators should make certain that their daily routines include procedures to ensure that their VDR is not only clear of alarms, but is also running. Remember, the VDR replay will not only give an accurate indication of the problems you might have faced, but will also be a record of the actions you took to resolve them.

Hanging From The Yardarm

Narrative

A Tall ship was approaching port and furling sails. An experienced volunteer crew member was on the fore topsail yard showing a less experienced crewman how to furl the sail properly. Both were wearing safety harnesses. During the course of the demonstration, it was stressed that care must be taken to ensure that the safety line was not tied into the sail lashings. Unfortunately, once the job was completed, this was found to be exactly what had happened.

The experienced crew member leaned back to get a better view of what had become entangled, and, in doing so, his left foot slipped on the footrope. This left him holding on with both hands to the safety line, which ran along the top of the yard. His legs were bent at the knee, forcing the footrope forwards and leaving him

without the strength to return to the upright position. In this position, the thigh straps of the safety harness had slipped down his legs to knee level, allowing the back plate of the harness to ride up to neck level. The unfortunate crew member could not regain position on the yardarm, and his safety harness no longer offered effective protection from falling. The crew member's efforts to regain position allowed the harness to slip yet further. With his shoulders being drawn forward by his body weight, the crew member could have slipped backwards out of the harness and fallen.

The ship's permanent crew then very quickly set in motion the rescue aloft procedure, and within a matter of minutes, the stranded crew member was standing on the foretop, shaken but otherwise well.



Photograph showing the displaced safety harness

The Lessons

1. The rescue aloft procedure is one that is well practised on this vessel. The value of regular drills and exercises can be seen here. Within minutes, and in fact before the volunteer crew member was fully aware of his predicament, two members of the ship's permanent staff were on hand. The procedure was very effective, and is to be commended.
2. The safety harness, more properly termed a 'fall arrest harness', met the relevant standards for fall arrest, but was designed to protect against a simple fall. This incident could not be described as such, and the manner of the slip obstructed the correct deployment of the harness.

In deciding on the type of fall arrest harness to purchase, there are a number of factors to be considered. In this particular case, the harness needs to be of simple construction, and so designed that a competent person can check that it

is correctly worn by a large number of people in a short time. The fewer the adjustments that can be made the quicker this will be. A balance has to be found, however, between a straightforward harness with few adjustments, and a more complex one that will fit a wider range of body shapes and sizes. Does your harness offer effective protection for everyone on board?

3. In a similar vein, the harness design may not protect against the type of falls that may occur on your vessel. The simplest style may be designed just to protect if you fall feet or head first, with the body vertical. Will it provide protection if falling in a seated or any other position?

Many different types of fall arrest harnesses are available. Vessel operators should ensure that the equipment they are providing on their vessels will provide suitable protection for the type of fall likely to be encountered when working aloft.

Fatal Accident to a Chief Officer of a Dry Cargo Ship

Narrative

The following narrative illustrates the importance of taking extreme care when moving about on deck at night, especially during freezing conditions.

After a cargo of timber had been discharged from the forward part of the single hold of a vessel berthed in a dock, the forward hatch covers (consisting of 4 sections, hinged together and operated by hydraulic power) were then closed and battened down.

By the evening, all cargo had been discharged from the after part of the hold and the stevedores left the vessel through an open gate in the starboard side bulwark. As the main deck was level with the quay, the stevedores did not use the after accommodation gangway, which was about 13m further aft. It was dark and the air temperature was at freezing point.

Shortly afterwards, the chief officer and an AB went onto the main deck to close the after four hatch covers. The hydraulic controls for the after four hatch cover sections were in a metal box mounted high up on the starboard side of the hatch coaming and close to the open bulwark gate. To access the box, the operator had to

climb several steps of a hatch coaming ladder and then step onto a grated platform, which was 0.92m above the deck and 0.6m from the bulwark. There was a 0.5m gap between the ship and the quay.

The AB went to the port side of the hatch to release one of two hatch cover restraining hooks so that the first two sections could be lowered, while the chief officer went to the starboard side to release the opposite one. Once the AB had released the hook, he climbed the 2m high coaming ladder to signal to the chief officer that he had released the hook. The AB expected to see the chief officer standing at the hydraulic control platform, but he was not there.

The AB went round to the starboard hydraulic control platform and could not find the chief officer. The AB sought the bosun's assistance, and together they went in search of their missing colleague. When the bosun shone his torch over the side between the ship and the quay, they saw the logo of the ship's company on the back of a jacket in the water; they knew at once that they had found the chief officer.

A post mortem examination found that the chief officer had died from a head injury.



Starboard hydraulic control platform

The Lessons

1. There was no clear explanation for how the chief officer fell between the ship and the quay. He was an experienced seafarer, who was wearing correct personal protective clothing, was not suffering from fatigue and had no mental or physical health problems. All seafarers, including experienced ones, should remember the perils of moving around on deck and carrying out even routine tasks, especially in darkness and near freezing conditions.
2. Unguarded openings in bulwarks or side rails should be secured as soon as possible after usage – even in still water conditions such as when berthed in a dock.
3. Short-cuts to, or alternative use of ladders and platforms can result in trips and falls with, possibly, fatal consequences.

Don't I know you?

Narrative

A gas tanker was on a course of 230° and travelling at a speed of 18 knots in the south-west bound lane of the traffic separation scheme in the Dover Strait. The bridge team consisted of the master, chief officer and a lookout. It was dark with good visibility.

Another gas tanker, coincidentally belonging to the same company, was on a course of 320°, travelling at 11.5 knots and crossing the traffic lane, after having passed the MPC buoy (see extract of chart). The bridge team consisted of the chief officer and a lookout, who was manually steering the vessel at the helm.

Both ships were visible to each other; both acquired each other on their ARPA's, and both had been positively identified to each other by AIS.

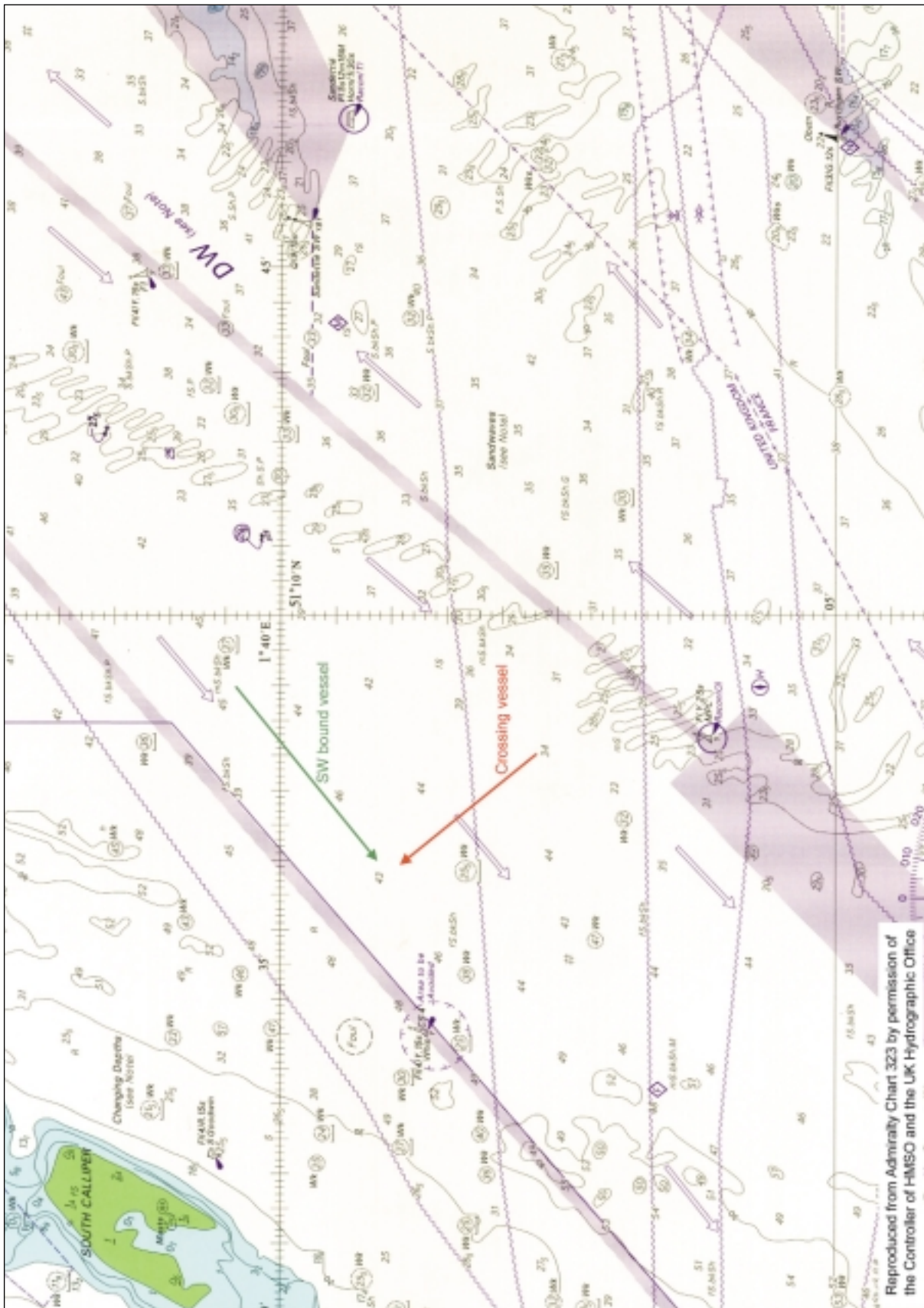
The crossing vessel had the south-west bound vessel 6 points on the starboard bow and the chief officer determined by ARPA that his vessel was going to pass ahead of the other at close

range.

When the two vessels were a little over 4 miles apart, the south-west bound vessel called on VHF channel 16 to inquire into the crossing vessel's intentions. This resulted in a prolonged VHF conversation, in which the crossing vessel requested that the south-west bound vessel alter her course to port and pass around his stern. The reason given by the crossing vessel was that he only had a mile to run until he was out of the traffic lane, at which point he would be altering course to the north. By now the vessels were about 2.5 miles apart, and about 6 minutes away from a very close passing distance.

However, both vessels then decided to take action to avoid collision, with the south-west bound vessel taking a round turn to starboard, and the crossing vessel altering initially to port to parallel the other's course, before altering again to starboard to resume crossing the lane.

The vessels passed each other at a distance of about 5 cables.



The Lessons

1. The use of AIS to identify the other vessel prompted a prolonged conversation between the two vessels to debate a departure from the collision regulations. This debate was ill advised and not least because valuable time was being wasted while a dangerous situation was developing.
2. The crossing vessel's chief officer should not have relied on the VHF to ask the stand-on vessel to alter course for him because of his reluctance to make a large alteration of course to starboard. His responsibilities as the give-way vessel are clear under the collision regulations.
3. Alterations of course in excess of 100° may be necessary to fulfil the obligations under Rule 15 (Crossing Situation) of the collision regulations. In this case, the stand-on vessel had to make a 360° turn to avoid a close quarter situation.
4. The crossing vessel's passage plan called for a crossing of the south-west bound traffic lane at a point where it is relatively narrow and where ships are funnelled together. An improved passage plan should allow, where possible, for alternative crossing points, in case the first one is busy with traffic.
5. After altering course, ARPA has an information processing delay and can give unreliable information for up to 3 minutes, once steady on the new course. During this time, reference should be made to alternative methods of assessment of risk of collision, such as a series of compass bearings.
6. No matter how many times a navigating officer has undertaken crossings of traffic separation lanes, overconfidence can lead to assistance not being called for when a dangerous situation is developing. The master is there to be called on and the officer should have no hesitation to do so.

A Mutually Exclusive Plan

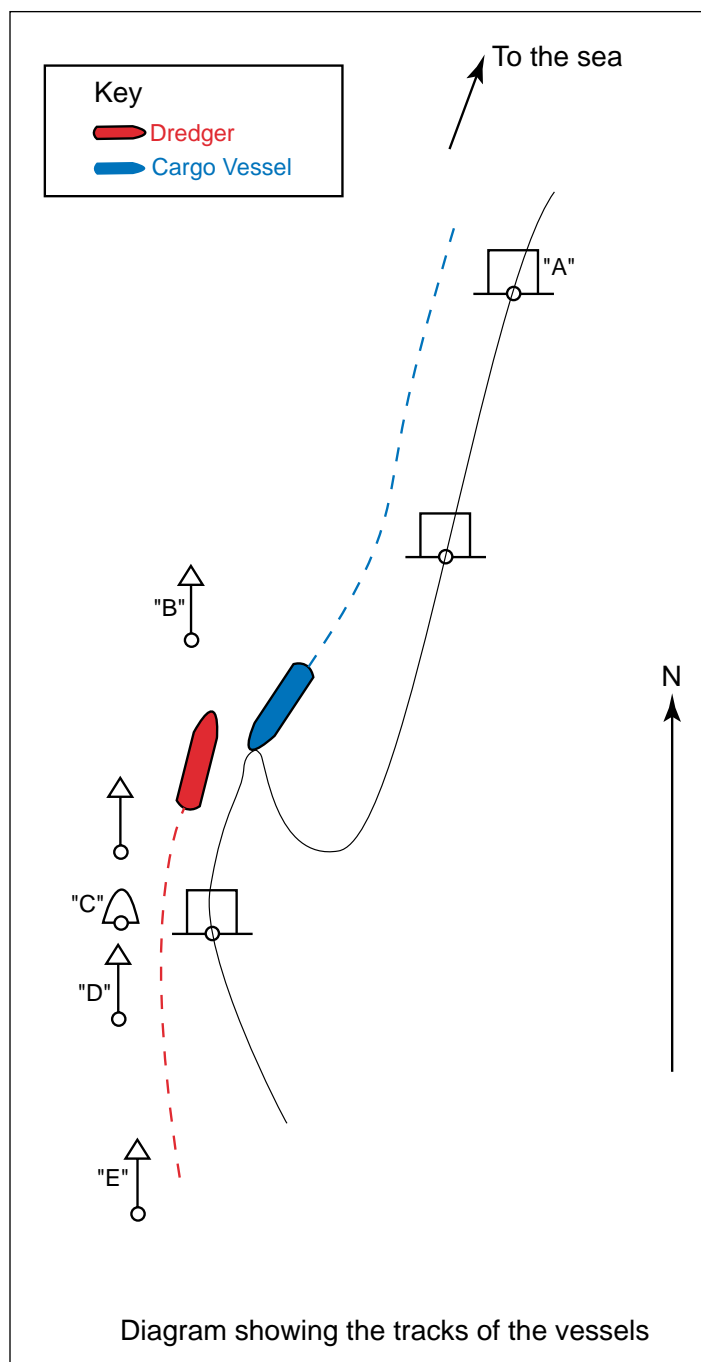
Narrative

A cargo vessel was inbound in a narrow channel. A pilot was on board. It was twilight and nearing high water.

After passing buoy "A", the pilot decided to keep to the deeper eastern side of the channel until beacon "B" was almost abeam, at which point he intended to cross to the western side. He passed

this information by VHF radio to the pilot of a dredger that was currently outbound between beacons "D" and "E".

On approaching beacon "B", the cargo vessel reduced speed and altered course to starboard. However, the dredger had by now passed buoy "C" and restricted the amount by which the cargo vessel was able to alter course, causing the cargo vessel to run aground.



The Lessons

1. This accident occurred at a particularly narrow point in the channel where there was room for only one vessel to pass safely. It could have been avoided if either one of the vessels had slowed down in advance to allow the other to pass first. However, this required a need for action being recognised and at least one of the parties being willing to act.
2. In this case, the intentions of the cargo vessel's pilot were made known to the dredger. However, no action was taken by either vessel to determine the consequences of those intentions, or to offer a plan to mitigate against any potential conflict. Actions not only speak louder than words, they are essential if such accidents are to be avoided.

Wash Out!

Narrative

A high speed craft carrying 309 passengers left its berth shortly after midnight. The late night sailing was an additional scheduled sailing for that day due to high passenger numbers. Once clear of the berth she proceeded outbound, positioning herself at a safe distance astern of a conventional ro-ro ferry, which was also outbound. The high speed craft was slightly behind its revised schedule, and was unable to overtake the ro-ro ferry due to navigational constraints within a narrow dredged channel.

The master of the high speed craft was keen to overtake at the first available opportunity, to regain lost time and to ensure he was not further delayed by the developing navigational situation, pressures which he felt were consistent with achieving commercial schedules.

The decision was made to overtake the ferry at the earliest opportunity through an area of deeper water, but without giving due consideration to the speed, time and distance required to complete the manoeuvre safely. Having also identified an inbound vessel, the

master ascertained that by maintaining a safe distance astern of the outbound ro-ro, he would have to pass the inbound vessel in an area of restricted navigable water. The situation was further compounded by the master's concern that he would not be able to accelerate within an upcoming area of shallow water where the wave effect resulting from his vessel's acceleration would be significant.

In the final event, the speed required to overtake prior to entering more confined waters, and meeting the inbound vessel, was greater than anticipated. The subsequent acceleration resulted in a significant increase to the craft's wave wash, which was later observed breaking over an adjacent terminal berth. Fortunately, there were no people present on the berth, therefore, on this occasion, no injuries were sustained.

The wave wash was undoubtedly caused by the acceleration of the high speed craft attempting to overtake the ro-ro ferry, and might have been made worse by combining with the wave pattern produced by the vessel being overtaken.

The Lessons

1. Familiar with the area of operations, the master identified that there were no vessels alongside the berth, but he had not considered the possibility of there being people on or close to the jetty. Although the incident occurred in the early hours of the morning, potentially people could have been working in the area and suffered the catastrophic consequences associated with the wave wash.
2. Well established company operating procedures provided clear guidelines on the use of excessive speed and the creation of wave wash. In this particular case, the perceived commercial pressure to meet the timing of the additional scheduled sailing appeared to undermine the master's basic responsibility of maintaining a safe speed, resulting in the potential for structural and physical damage. Commercial pressures are inevitable, but must be carefully balanced against the risks involved. Safety must be paramount at all times.

Don't Drink and Drive



Damage to the pier

Narrative

One of the oldest piers in Britain was split in two after a 54m dredger slammed into it, attracting much media attention. Many people had been on the pier just moments before the accident; it is incredible that nobody was hurt.

The chief officer had returned to the vessel, having spent some time ashore in a local pub consuming a few pints of alcohol. The master had called him by mobile telephone to ask him to return to the ship to take over, but had gone to bed by the time the chief officer returned, so there was no face-to-face handover.

Suspecting that the chief officer had been drinking, the berth manager informed the senior engineer. Similar concerns were also raised by another crew member, but no action was taken. It was late evening and dark when the vessel departed, with the chief officer at the con. Calamity then ensued as the dredger made her way downriver: she narrowly avoided hitting the

quayside; she drifted over to the other side of the channel and nearly hit a buoy; instead of following the intended plan, the vessel crossed a main shipping channel and entered shallow water, nearly hitting the marina. Finally, she struck the pier, severing it.

The chief officer voluntarily submitted to an alcohol/breath test about 4 hours later: he was about 2.5 times over the legal road driving limit. He was tired at the time of the accident because he had worked excessive hours, he was also taking prescribed anti-depressant medication.

VTS had captured the vessel's progress, and had become concerned about the chief officer after noticing some slurring of his speech. However, VTS operators were overseeing a very large port area, at a particularly busy time, and were very heavily stretched with other duties. This meant that the dredger's actions were not closely monitored. Although a warning was eventually passed, it was too late to prevent the collision.



Damage to vessel

The Lessons

1. Conning a vessel while under the influence of alcohol or other drugs can be just as dangerous as driving a car while drunk. An Act of Parliament came into force last year, enabling port officials to detain vessels where it is suspected that crew members have been drinking. Port officials are encouraged to exercise this power: it may avert a major accident.
2. Some of the actions of the dredger's crew indicate a degree of tolerance to alcohol abuse, which, it is believed, is still prevalent in some of the coasting trade. If you suspect that a fellow crew member has been drinking and is not fit for duty, this should be reported to the master. Or if it is the master who you suspect is unfit for duty, you should inform the port authority or the company. Drinking alcohol just before going on duty is reckless: in this case it could so easily have led to major loss of life.
3. When you hand responsibility for the ship or the watch to another person, you must ensure that the other person is fit for duty in all respects. A face-to-face handover is essential.
4. Over 58% of the collisions and groundings investigated by the MAIB over the last 5 years can be attributed, in part, to single-handed bridge watchkeeping. A bridge watchkeeper should not be alone at night. Had an additional crew member been on the bridge, this accident might never have happened. STCW also requires that a dedicated lookout should also be on duty during the day when operating in port areas.
5. Long hours are worked routinely on many vessels in the coasting trade. The working hours of crew members should be closely monitored and, if a person's hours exceed 14 in any 24 hour period, arrangements should be put in place to allow them sufficient rest before they are required to perform watchkeeping duties. If necessary, the vessel should be taken to a lay over berth or anchorage for this purpose.
6. Crew members who are taking prescribed medication should be encouraged to declare this to their employers. The safety of the vessel could be compromised if medication or illness affects a watchkeeper's performance.

What You See is Not Always What You Get

Narrative

A large container vessel was leaving port. The master and third officer were on the bridge, together with a local pilot, cadet, helmsman, and a deep-sea pilot ready to take the con for the forthcoming passage through the Dover Strait and English Channel. It was dark with clear visibility, and the sea was slight. However, a strong south-westerly tide was running.

The plan was to disembark the local pilot at the end of the buoyed channel, and then alter course so as to pass to the north of a light-float, taking account of the south-westerly tidal stream.

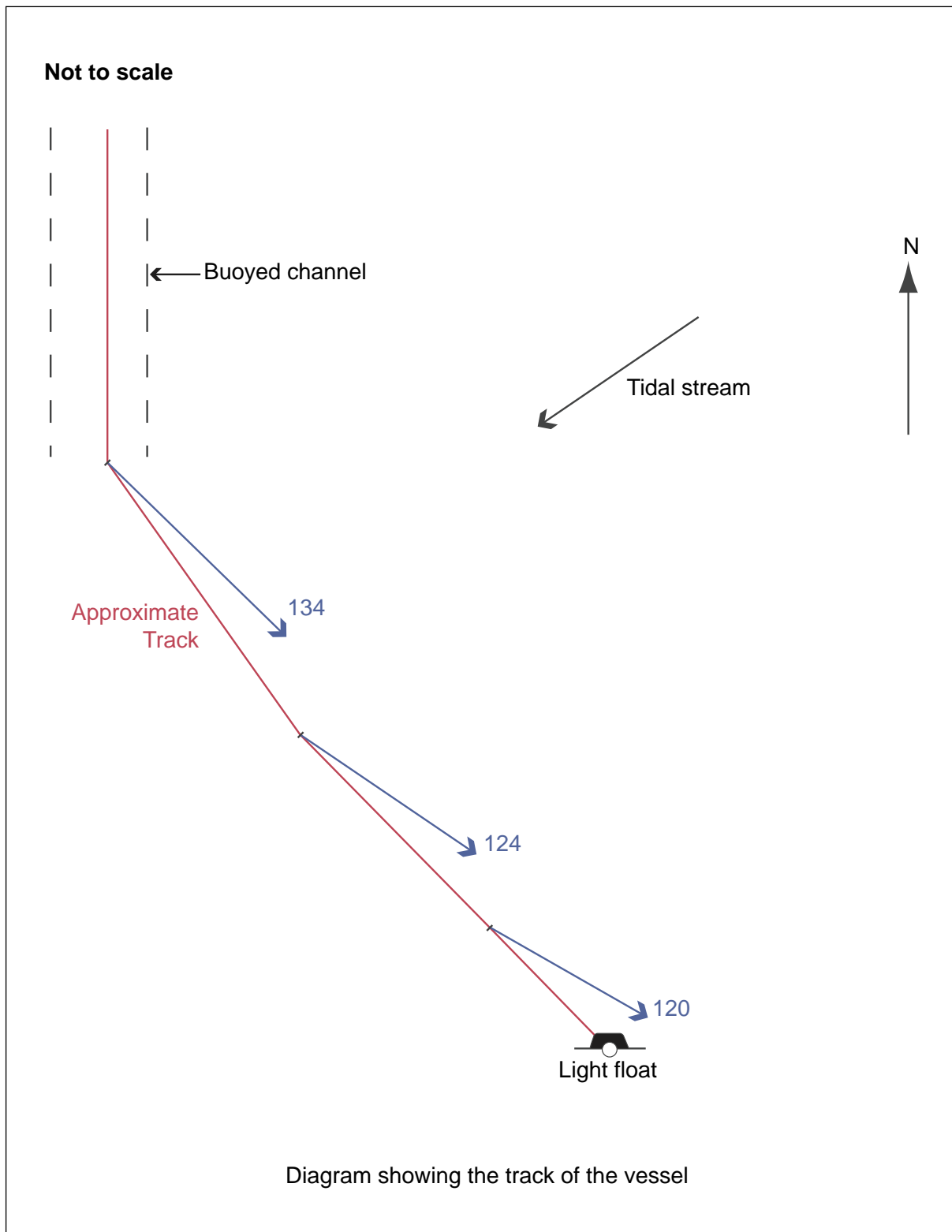
The local pilot disembarked at the planned position, and the master altered course from 180° to 134°, increasing speed to full ahead. He then handed over the con to the deep-sea pilot, confirming the need for him to give the light-float a wide berth to starboard. The deep-sea pilot was content to take the con and ordered 124°, which put the light-float about 12° on the starboard bow.

The master went to the chart room to review the forthcoming passage plan, leaving the third officer, cadet and helmsman in the wheelhouse with the pilot. He emerged a few minutes later and proceeded to the bridgewing to regain his night vision.

Although the light-float remained on the starboard bow, the vessel was being set by the tide and was on a collision course. Her track was being monitored by VTS, who became concerned and called the vessel on VHF radio, asking which side of the light-float the vessel intended to pass and indicating a prevailing risk of collision. The pilot confirmed that he intended to leave the light-float to starboard.

The master, who had heard the VHF radio call, entered the wheelhouse and asked the pilot what had been said. The pilot indicated that VTS had merely asked him which side of the light-float he intended to pass and that he had told them he would pass to the north. The pilot then ordered a course alteration to 120°, and the master proceeded to the starboard bridgewing, from where he monitored the situation visually. The pilot also went outside and stood in front of the lookout window.

Two minutes later, when the light-float was at 300 metres range, VTS called the vessel and again warned her that she appeared to be on a collision course with the light-float. In the absence of the pilot, the third officer answered the call and told VTS that the vessel intended to leave the light-float to starboard. The master, realising that a collision was imminent, then entered the wheelhouse and both he and the third officer called out to the pilot. But it was too late: the vessel's starboard side struck an end of the light-float several times, with consequential damage to both vessels.



The Lessons

1. The need to steer a course to counter the effect of the south-westerly tide was recognised by all parties, and on taking the con, the deep-sea pilot altered course to 124° which put the light-float on the starboard bow. However, the selected heading was arbitrary; no one calculated accurately an appropriate heading to take account of the predicted tide, and no one was assigned to monitor the effect of the selected heading other than by visual estimation of the vessel's track in relation to the light-float.

In anything other than calm, non-tidal conditions, monitoring a vessel's track by visual estimation alone is totally inadequate. In this case, the vessel had operational radar and sufficient personnel to enable the vessel's track to be monitored continuously using parallel indexing techniques; even a simple series of compass bearings would have established that the vessel was on a collision course. Instead, the pilot, master, third officer and cadet were all prepared to rely solely on visual estimation, and were effectively "tricked" into thinking that, since the light-float remained on the starboard bow, all would be well!

A further prohibitive factor to effective visual monitoring was that it was a dark night; two flashes of a white light every 20 seconds was insufficient to maintain an accurate assessment of the light-float's relative position.

2. Although no effective monitoring was being maintained on board, the vessel's track was in fact being followed by VTS, who on two separate occasions told the vessel that she appeared to be on a collision course with the light-float.

In the first instance, it seems the pilot assumed that VTS was referring to the

vessel's previous course and, now that he had altered to 124°, he was confident that the vessel would clear the light-float to starboard. However, on reflection, he then decided to alter a nominal further 4° to port.

In the second instance, the third officer seemingly dismissed the possibility of a collision, because the pilot intended to leave the light-float to starboard, and that was exactly where the light-float was, and had been for some time.

The master was not privy to either of the warnings given by VTS and, like everyone else on the bridge, did not appreciate the imminent risk of collision until it was too late.

3. The third officer's role should have been to monitor the actions of the pilot and the master, rather than simply to ensure that their orders were carried out. Teamwork should go far beyond a hierarchical chain of command; it should complement all of the facets of passage planning and execution, essential elements of which are effective monitoring and two-way communication.

In accordance with the International Chamber of Shipping's *Bridge Procedures Guide*, effective bridge resource and team management should eliminate the risk that an error on the part of one person could result in a dangerous situation. In this case, several bridge personnel made the same error and no one, other than VTS, succeeded in identifying it until it was too late to avoid the consequences.

4. And finally, why leave the light-float to starboard when there was plenty of sea room to the south? Leaving the light-float to port would have eliminated – at the outset – the risk of the vessel being set down. No risk, no accident!

Zzzzzz – Bump – Where am I?

Narrative

In the early hours of a summer morning, a foreign general cargo vessel ran aground on the west coast of Scotland. The single-hold vessel was built in 1990 and was carrying 3300 tonnes of zinc concentrate. She subsequently sank, prompting fears of serious environmental damage in an area of outstanding natural beauty.

The vessel carried 7 crew, with the master and chief officer holding the 6 to 12 and the 12 to 6 watches respectively. In addition to watchkeeping, the chief officer was responsible for overseeing cargo operations in port.

The able seaman assigned to the watch was absent from the bridge for at least an hour before the vessel grounded. No watch alarm was fitted on the bridge.

The chief officer fell asleep while alone on the bridge, missing an intended change of course. He was awoken, standing at the engine controls, by the impact of the vessel grounding. The sea was calm, there was no swell and the visibility was good. It was daylight, although the sun was yet to rise. The vessel was stationary aground.

The circumstances of this accident are, unfortunately, not uncommon. In fact, watchkeeper incapacitation or absence leads to about 6 groundings a year in UK waters alone, and over 58% of all the collisions and groundings investigated by the MAIB over the last 5 years, can be attributed to single-handed bridge watchkeeping.

The Lessons

1. Six-on six-off watches are tiring in any event, and this problem was made worse by the regular port visits, during which time the chief officer was still required to work, regardless of how this disrupted his watch pattern. He fell asleep as a result of very high levels of fatigue caused by the cumulative effect of this irregular working pattern. It is also likely that his decision to allow the AB to leave the bridge was as a result of poor perception of the risks, also caused by fatigue.

If you are tired, not only are you more likely to fall asleep, but your judgment will also be affected, often without you realising it. Working within the hours of work regulations does not necessarily protect you from fatigue. If you are in any doubt as to your fitness for duty, tell the master. The company will not thank you for saving a few hours if its vessel is lost as a result!

2. The only real protection from fatigue is adequate manning for the work being done. The manning level on this vessel was within that stated on the vessel's Safe Manning Certificate. However, this is a minimum requirement, and does not take account of the vessel's trading pattern.

Had the able seaman been on the bridge, or had the bridge been equipped with a working and switched on watchkeeper alarm, it is likely that the mate would not have been asleep long enough for the vessel to have run aground. He would, however, have been just as tired, and likely to make serious errors of judgment as a result.

Had there been another mate on board, all the navigating officers would have been able to gain sufficient rest. Fatigue would not then have been an issue.



Photographs showing the vessel aground



Wrong Switch – Big Trouble

Narrative

A 9,000gt dive support vessel was in the process of entering harbour. Prior to entry, the master lined up the approach using the autopilot. He then switched to “manual control” as the vessel made her way in. Both stern azimuths appeared under control, since the vessel and heading were acting as desired.

However, as the vessel approached the breakwater, it became apparent to the master that she was setting to the north of the desired track. He then adjusted the vessel’s head with the use of the stern azimuths. The vessel did not respond, and continued to be set onto the breakwater. He then tried using the bow thrusters, but they were ineffective. In a last

ditch attempt to prevent the vessel colliding with the breakwater, the master put the azimuth thrusters astern. However, his actions failed to prevent the vessel from making heavy contact with the breakwater on her starboard quarter. As a result, both the vessel and the breakwater overhang sustained damage.

Once control of the vessel was regained, it was discovered that the master had mistakenly pressed the wrong switch for “manual control”. This left the vessel in the autopilot mode as she entered the breakwater, and meant that she would not respond to his alterations of helm.

Once the error was detected and rectified, the vessel proceeded into harbour safely.

The Lessons

1. We all make mistakes: some prove costly, others embarrassing. But our aim must always be to try to minimise them or, ideally, prevent them happening in the first place. In the case of bridge operations, it is prudent to have fail safe procedures in place, such as the testing of manual steering, before entering any harbour, coupled with the function of astern movement on any propulsion units.
2. In addition, when crucial operations rely on the correct switch being pressed, it is a good idea to ensure that *positive* action is required and confirmed. This can be achieved by fitting a switch cover which needs to be manually lifted before pressing, and which gives confirmation by illuminating.
3. In the long term, it is also a good idea to look closely at bridge console ergonomics, ensuring you are fully familiar with them.

Parametric Rolling Causes Loss of Containers

Narrative

A 278m length container vessel encountered heavy weather while crossing the Pacific Ocean. The depression was tracked and, in an effort to avoid the worst of the weather, she altered course. But conditions remained hazardous. Concern grew as the height of the waves and the pitching and rolling of the vessel increased. Speed was reduced. An exceptional roll of about 30 degrees parted the lashings, resulting in 50 containers being lost overboard and causing the vessel to list to port.

The vessel was hove to, and a starboard ballast tank was filled to bring her closer to the upright. Some flooding of forward spaces was caused by wave damage to ventilation pipes when the vessel was hove to, but she reached port without further problems.

Modern container ships can be subjected to a phenomenon known as **parametric rolling**, where the pitching motion excites the natural

rolling frequency, leading to large angles of heel. The origin of the problem lies in the hull shape of container ships. They have to be fast, hence the fine lines forward, but also they have to have their deck area maximised, hence the full hull shape aft. An initial angle of heel is necessary to get the mechanism going. This will normally be caused by wind blowing against one side. There will be an imbalance of buoyancy at the aft end with an angle of heel, because one side of the aft end will be more fully immersed. The imbalance of buoyancy will increase when the ship pitches stern down, and conversely the imbalance will be relieved when the ship pitches with the stern up. The rolling motion will be excited if the pitching frequency is similar to the natural rolling frequency.

The pitching frequency can be the same as the natural rolling frequency in large container ships; if this occurs in heavy weather, the rolling motion can build up until very large angles of heel are experienced, resulting in cargo loss, as was the case here.

The Lessons

1. Bridge crews of large container vessels should be aware of the parametric rolling phenomenon*. Changing course and/or speed is a way of separating the pitching and rolling frequencies.
2. This vessel was fitted with a computer system that could predict when parametric rolling was likely to be a problem. This facility was used when the
3. heavy weather was encountered, and, as a result, the ship was slowed. However, the master believes that parametric rolling caused the exceptional roll, therefore the computer system did not provide good information. Such systems may give a false sense of security.
3. Bearing in mind that container ships are subject to this phenomenon, good weather routing to steer clear of the worst of the heavy weather is essential.

*See *The Management of Merchant Ship Stability, Trim and Strength*, published by the Nautical Institute, for further explanation.

Fingers and Rotating Vee Belts Don't Mix



Narrative

An engineer on board a vessel was required to order spares for the accommodation fan units. As both fans were running, he switched off the power to number 1 fan, closed the delivery flap and opened the air conditioning unit access panel. He then waited for the fan to stop before checking the identification markings, condition and tension on the three vee belts.

Unknown to the engineer, number 1 fan delivery flap had not closed and sealed its duct, because

the locking screws on the vent flap handle were slack (**Figure 1**). Both fans supplied a common air delivery duct, and the airflow from the running fan caused the fan on number 1 to rotate in the reverse direction soon after it stopped.

Unable to react quickly enough, the fingers of the engineer's right hand were drawn into, and became trapped between the vee belts and the electric motor pulley (**Figure 2**).

The very graphic photographs illustrate the consequences.



Figure 1: Accommodation fan unit – delivery flap handle



Figure 2: Motor fan unit and vee belts



The Lessons

1. If you are required to work on rotating or other moving equipment, ensure that all precautions are taken to isolate and prove that it cannot restart unexpectedly. By issuing warning notices, locking off starter controls, removing fuses, and fitting locking devices on the plant, you will be reducing the opportunity for an unexpected, and probably very painful, accident to take place.
2. If the equipment is linked to other operating plant, ensure that the operating plant cannot affect the equipment you are working on. If it can, and only if safe to do so, isolate the linked plant as well, and advise a responsible officer of your actions.
3. If equipment operates unexpectedly, it will almost certainly happen when your fingers are in very close proximity to it. Where possible, make use of tools – specialist or otherwise – to carry out maintenance, and keep your fingers safe.
4. An effective risk assessment should have shown that the sealing of the common air delivery duct by the number 1 fan delivery flap was critical to prevent reverse running of the fan. This should have then identified the unsuitable precautions taken to prevent inadvertent rotation.

Poor Risk Assessment Causes Contact and Puts Passengers at Risk

Narrative

A Class V pleasure vessel certified for daytime use only was on her final river tour of the day, with eight passengers onboard. The crew comprised the captain and a seasonal crew member who also acted as the tour guide. The crew member had received superficial emergency procedure training, but this was never exercised.

Although approaching darkness, the visibility was good, the wind was force 2 to 3 and there was an ebb tide running of about 2.5 knots. The vessel was heading against the tide between a mooring barge – with a vessel alongside, and the riverbank – where the tidal stream conditions were more favourable. About 60 metres ahead of the mooring barge was a recently built pier used by a wide variety of craft.

As the pleasure vessel closed on the mooring barge, she was overtaken by a 35 metre passenger vessel. The vessel tied up, bows to the pier with engines at idle, to embark passengers, reducing the gap between the mooring barge and the stern of the passenger vessel to about 30 metres. This type of berthing was not unusual, especially when other vessels were berthed at the pier.

The captain of the pleasure craft came broad onto the ebb tide as he manoeuvred between the mooring barge and the passenger vessel's stern.

The craft was swept under the bow of the vessel at the mooring barge by a combination of the ebb tide and wash effects from the passenger vessel. The craft adopted a list of about 15 – 20 degrees to starboard.

The captain of the pleasure vessel made no attempt to alert the authorities of the potentially fatal accident. Neither was he aware of any assistance being provided, as it was his normal procedure to switch off his radio to prevent “alarming” the passengers.

Despite attempts to manoeuvre away from the mooring, the vessel remained held fast. The captain of the passenger vessel recognised the danger and alerted the harbour authorities, who, in turn, called out the emergency services. By that time, the light had faded and it was dark, but no consideration was given to switching on internal lighting which would have aided evacuation should it have become necessary. Neither the captain nor the crew member of the pleasure craft, gave the passengers any information regarding rescue arrangements or assisted them in donning lifejackets.

The passengers and crew were safely evacuated and the vessel was taken into tow. Soon after, the crew were able to re-embark, the tow was slipped and the pleasure craft made her own way downriver.

The Lessons

1. The Domestic Safety Management System stresses the need for risk assessments to be made. Where new structures affect the normal operational patterns, the owners should conduct a risk assessment to ensure that these do not affect the safe passage of vessels. If they do, measures must be taken to mitigate the risk.
2. Owners should ensure that vessels are operated within the limits laid out in the MCA passenger certification. Where there is a limit for daylight use only, tours should not start unless they can be completed during these hours.
3. Skippers have a clear responsibility for the safety of their passengers, and they must alert the authorities when at risk. Radios should remain on at all times in order to respond to emergencies and to alert the rescue services if they are in need of assistance.
4. Understandably, passengers faced with an emergency on board a vessel, will be feeling anxious and afraid, and will be seeking reassurance that their rescue is progressing well. Their fear will increase if they are in darkness. Switching on internal lighting, giving instruction in donning lifejackets, and keeping them abreast of what is happening, will do much to lessen their anxiety.
5. Temporary seasonal crew should undertake a structured, assessed training programme to ensure they are competent to deal with emergency situations.

Always Tie Up Your Vessel Securely

Narrative

A 12 metre length workboat was being used to lay anchors at a fish farm in Scottish waters. The wind was westerly and the visibility was good, but it was a cold January day. The crew were wearing heavy clothing.

After working since the early morning, the two crew members berthed the workboat alongside a dumb barge, which formed part of the fish farm. The two vessels were tied together only loosely. To complete the day's work, they moved two lengths of mooring rope from the workboat to the barge. The skipper jumped onto the barge, clutching the end of one of the ropes, and then pulled the rest of this rope on board, coiling it onto the deck as he did so. The other crewman stayed on the workboat and coiled up the other rope. When he finished, he lifted up the coil and passed it up to the skipper on the barge. The skipper was struggling with the weight, so the crewman jumped onto the barge to help.

The two men pulled the coil onto the barge and then dropped it down in a suitable area. When they looked back, they saw that the workboat had become untied and had drifted about 4 metres away. The crewman suggested that he

jump in and swim after it, but the skipper said no. The skipper grabbed a line and moved to the stern of the barge, intending to try and lasso one of the bollards on the workboat as it drifted by. Before he could attempt this, he heard a splash from behind him. He turned round to see the crewman swimming frantically towards the workboat. The skipper watched with increasing concern as his colleague failed to catch it. The skipper threw him a lifebuoy, which the crewman was unable to grasp, and tried to attract the attention of passing vessels by waving his jacket, but without success. He then broke into the barge, but found neither flares nor a working radio to raise the alarm. Returning outside, he watched helplessly as the workboat and his colleague were carried away by the force of the wind and tide. Darkness was falling rapidly.

The workboat drifted ashore and was found that evening. A lifeboat rescued the skipper, who had managed to get a light working on the barge and had used this to attract attention. The crewman's body was found the next day. He was wearing a buoyancy waistcoat under his outer clothing. Although he died from drowning, it is likely that he was, at first, incapacitated by the bitterly cold water.

The Lessons

1. It was not anticipated that both crewmen would disembark, so the workboat was not tied up properly to the barge. This turned out to be a fatal error.
2. The crewman who was lost was a strong swimmer, and this probably gave him a false sense of security. He took no account of the extremely cold water and how rapidly this would incapacitate him. Never attempt to swim after a drifting vessel in a cold climate, if alternative shelter is available. These two crewmen would have been quite safe, if a little uncomfortable, had they remained on

board the barge that night. They would almost certainly have been found early the next day because they would have been missed and because the barge was close to the shore.

3. The effect of the wind on a vessel is much greater than on somebody in the water, due to the relative areas above and below the surface. If there is a wind blowing, the chances of catching a vessel by swimming after it are slim, especially if heavy clothing is worn.
4. It would have been wise to have carried some means of communication on the barge for use in such emergencies.

Being House-Proud Has Its Limits

Narrative

During a short sea passage on a twin-engined ship, a motorman was cleaning around the turbo-blower of one of the main engines. While working, he noticed a particularly dirty area in the region of the engine's turning gear and flywheel guard.

He decided this mess needed cleaning up. In attempting to wipe the area, his hand became trapped in the gap between the turning gear's worm and the flywheel. As the engine was running, his hand suffered severe lacerations.



The gap between the turning gear's worm and the flywheel

The Lessons

1. It is an admirable and very desirable aim to keep machinery spaces clean – but it should not be at the expense of personal safety.
2. When an engine or any other rotating machinery is running, it is sensible to keep hands and cleaning materials well clear of moving parts. If there is mess near to moving parts, wait until the machine is stopped before attempting to clean up.
3. The teeth on the flywheel of this engine are of substantial size. The motorman was extremely fortunate he did not suffer more serious injuries.

Risk Assessment Could Have Prevented a Serious Accident

Narrative

A United Kingdom flagged ro-ro/lo-lo ferry was alongside overnight prior to loading.

The chief officer instructed that the main deck and lower hold were to be washed in accordance with the appropriate work order. The water was supplied from a connection that could only be accessed via an unprotected 1.2 metre wide platform adjacent to the main deck ramp and ship's side. A personnel barrier was located at each end of the platform. When the ramp was in the 'down' position, there was a 5-metre drop from the platform (Figure 1).

When the main deck wash down was completed, the three main deck ramps were lowered in preparation for washing the hold. An AB then went to the main deck platform, which was wet, to disconnect the hose and transfer it to the hold position (Figure 2).

The normal process was to shut the valve, relieving the pressure at the hose end; this then allowed the hose to be disconnected. However, the AB was out of sight of the other ratings and it appears that the pressure was not relieved. While attempting to disconnect the hose, the isolating valve fractured and the AB fell backwards onto the ramp 5 metres below. He survived the fall, but suffered two broken wrists and a broken leg. It could have been far worse!



Figure 1: Ramp shown in the down position



Figure 2: Photograph of the main deck platform showing the hose connected to the water supply

The Lessons

1. A risk assessment of the wash down procedures would have identified the serious hazard associated with walking on a wet, narrow and unprotected platform.
2. Where there is an unavoidable requirement to access a narrow platform, guardrails should be fitted to provide personnel protection.
3. Individuals should recognise that a personnel barrier is there to alert them to the presence of danger ahead, and should exercise caution if intending to pass beyond it.
4. If operating services are sited where individuals are exposed to danger, urgent consideration should be given to relocating the services to somewhere safe.

Part 2 – Fishing Vessels

All of us who go to sea as a profession, have confidence in our boats, and do not want to think about the unthinkable. But vessels *do* sink, so we have to be prepared for the worst.

In fishing vessels, catastrophes occur very rapidly. Many of the cases in this section were almost instantaneous – certainly too rapid for preparations to be made for abandoning the vessel. Liferafts, fitted with automatic releases, save lives. The vessel in Case 21 was not required by the Code to carry a liferaft. The fact that it *was* carrying one saved the lives of two of its three crew.

Sadly, yet again, we have more tales of fishermen dying for lack of a lifejacket. Wearing a lifejacket is the safest way to be prepared. If you really don't want to wear one, at least have one readily available in a container on the deck or wheelhouse roof. You will not have time to go below to fetch one when things go wrong.

Case 20 reports another close call between a merchant ship and a fishing vessel. Please report these to us – we will follow them up with the ship concerned.

Finally, Case 19 gives the account of a good news story, where the effective actions taken by the crew of a fishing vessel on fire meant that she sustained only limited damage. Are *you* prepared for the worst?

Man Overboard – Fatal Accident

Narrative

A 16m fishing vessel was returning to port after spending the day fishing for crabs using creels. On board were the skipper and three crew members; all three crew members were turned in. The weather conditions were good: a light south-easterly wind and slight seas.

When the vessel reached a position about a mile from the harbour entrance, all three deck crew members were called to make ready the vessel's moorings and fenders. Before going to their mooring stations, they gathered on the aft deck to finish their coffee and cigarettes. The skipper was in the wheelhouse with the port side window open.

Two members of the crew proceeded forward and the other went to his station, port side aft. The

height of bulwarks aft was significantly less than the required minimum.

None of the crew were wearing working type lifejackets. None were on board.

When the vessel eventually came alongside in the harbour, the crewman who had been stationed aft was nowhere to be found. The remaining deck crew quickly searched ashore, thinking he might have jumped off the fishing vessel for some reason. However, he was not found.

The skipper raised the alarm immediately with the emergency services, and a full air and sea search was conducted. The search continued for several hours without success. A month later, the body of the missing crewman was found washed ashore on a local beach.

The Lessons

1. This is another accident involving a fisherman losing his life after having fallen over the side. An exemption had permitted the vessel to operate with bulwark heights aft well below the minimum required under the *Code of Safe Working Practice for the Construction and use of 15m Length Overall to Less Than 24m Registered Length Fishing Vessels*. Ironically, during the several years she had crabbed, creels had neither been hauled, nor shot over the stern. It is always easy to be wise after the event, but this tragic accident could so easily have been prevented if the height of the bulwarks aft had been increased using portable stanchions and wires.
2. Had the casualty been wearing a working type lifejacket or buoyancy aid, he might still have been alive to tell his tale. Always wear a working type lifejacket or buoyancy aid in case it happens to you. No matter how awkward or cumbersome they may seem, they save lives.
3. If you haven't already carried out a risk assessment, or been involved in one onboard your vessel, make sure you do. It is a handy tool for identifying the risks on board any fishing vessel. Dangers, such as low bulwark heights, will then become obvious.

Capsized – With Assistance

Narrative

A well found 7m GRP fishing vessel sailed from an east coast port with a crew of three to begin fishing in a river estuary. Onboard were the skipper, who was an experienced fisherman; a 14 year old boy, acting as deckhand; and a 9 year old boy, along for the trip as a passenger. Weather conditions were good.

Shortly after leaving her mooring, the vessel started trawling for dover soles in approximately 7 metres of water in an area of known underwater obstructions. Fishing was good, and approximately 38 kilos of soles had been landed when the trawl came fast on what the skipper believed to be an underwater obstruction.

Once fast, the skipper attempted to free the trawl by alternate heaving on the port and starboard warps pulling the vessel towards the fastener against the prevailing tidal stream, at times submerging the gunwale. The skipper had not considered the wearing of lifejackets for himself or his crew throughout the operation. Once the vessel was heaved back and still fast, the skipper decided to turn her head into the tide and run back over the fastener in a further attempt to free the gear. On completion of the turn, the dog rope from the cod end fouled the propeller and the vessel lost all manoeuvrability.

Realising he now required assistance, the skipper made a mobile telephone call to a friend, who liaised with the local lifeboat. The lifeboat subsequently arrived at the scene, the coxswain was briefed en-route by the skipper, who was aware of the tenderness of his vessel and specifically requested the lifeboat not to tow him from forward. Consequently the lifeboat secured alongside (bow to bow) and secured 4 lines with the intention of using minimum power to free the fishing vessel from the fastener. Fortunately, it was decided to transfer the 9 year old boy across to the lifeboat for safety.

Shortly afterwards, the coxswain applied minimum power in an attempt to free the vessel. Immediately power was applied, the fishing vessel began capsizing to starboard, away from the lifeboat. The skipper and crew were thrown overboard by the momentum, and the vessel came to rest on her starboard side. After swimming, in full working gear, to the stern of the lifeboat, both crew members were assisted onboard by the lifeboat crew. A decision was then taken to cut the lines and allow the fishing vessel to founder. The crew were transferred safely to the shore and luckily on this occasion no one suffered injury.

A salvage operation performed the following day located the vessel on its second attempt. After a 6 hour operation, the trawls were cut and the vessel raised, pumped out and safely returned to her mooring. Divers were not able to identify the nature of the obstruction due to poor visibility.

CASE 18



Photographs taken during the salvage operation



The Lessons

1. All too often, the MAIB finds in its investigations that the wearing of lifejackets has been ignored; this case was no exception. The wearing of lifejackets had not been considered at any time since the vessel left her mooring, even though two young people were onboard. Occasionally, lifejackets can be cumbersome when handling fishing gear, however once this vessel was disabled it should have been evident to the skipper that lifejackets were a sensible precaution and could only have assisted with the rescue operation.
2. Fouling of the propeller effectively disabled the vessel. Earlier on, when the skipper had encountered little success freeing his nets, he should have made the decision to slip and buoy the gear for recovery at a later date. This would have proved the safer AND more cost-effective option.
3. The coxswain of the lifeboat agreed to tow after a direct request from the skipper. Before starting the operation, it would have been prudent for the coxswain to have removed all crew from the vessel, or, at the very least, advised them of the benefits of wearing lifejackets. It is also important for people involved in similar operations to have an awareness of the risks involved in assisting vessels, especially fishing vessels that are in danger of capsizing and possibly foundering.
4. Analysis of the lessons learnt from this accident shows that a better awareness of the risks involved, and a plan to minimise those risks, could quite easily have saved the vessel from foundering. Marine Guidance Note 265(F) clearly identifies some of the hazards associated with trawling, and explains in a straightforward manner some of the considerations to be taken into account in order to minimise risks associated with such hazards.

Quick, Sensible and Effective Action

Narrative

The watchkeeper in the wheelhouse of a 16 metre wooden fishing vessel was alerted to a problem by the engine room fire alarm. A quick inspection found a small fire in the region of the switchboard and batteries. It was immediately tackled using a portable foam extinguisher. This appeared to put out the fire, but this was replaced by large quantities of acrid smoke.

The engine room was immediately evacuated, the hatch and fire flaps were closed, the engine was stopped and the fuel supply shut off using the remotely operated valves. A "Pan Pan" was broadcast and acknowledged by the coastguard. The liferaft was prepared for launching but, in the event, was not required.

Fortunately, a nearby fishing vessel was in a position to respond and she soon came alongside the casualty. A towline was secured and, mainly due to the large quantities of foul smoke still being generated, all crew of the casualty transferred to this vessel. The good weather conditions made this operation straightforward.

The casualty was towed to a nearby port where the fire brigade attended. They entered the engine room and found no signs of fire, although there were still significant amounts of heat. Damage appeared to be confined to a group of electrical switchboxes just above the battery bank. It was presumed that an electrical fault started the fire.



Damaged area above batteries

The Lessons

1. Following their successful attempt to extinguish the fire, the crew made no attempts to remain in the engine room once acrid smoke began to be generated. This was very sensible as the heat was in the region of the batteries, and much of this 'smoke' might have been fumes from the acid within the batteries and hot electrical insulation. Closing down the engine room contained this potentially dangerous atmosphere until the vessel was brought into port, where the specialist resources of the fire brigade were available.
2. The engine room fire alarm obviously worked as intended and alerted the crew to the problem before the fire had a chance to spread. This showed the value of properly functioning fire detection systems.
3. When discovered, the fire was not very large. By tackling it in the very early stages, the crew limited the damage so they were not forced to abandon their vessel prematurely.

Fisherman Uses Rule 17 to Good Effect

Narrative

A fishing vessel was returning to port on a westerly course. It was dark with good visibility. A cargo vessel was approaching on a north-westerly course and was expected to cross ahead of the fishing vessel at a range of about 0.2 mile. Both vessels were displaying normal steaming lights.

The fishing vessel skipper interpreted that a risk of collision existed and became concerned that the cargo vessel was taking no action to keep out

of the way. He indicated his concern on VHF radio, but the cargo vessel's OOW failed to understand what he was saying and made no response. Believing the cargo vessel's bridge to be unmanned, the skipper then stopped his vessel, and the cargo vessel passed ahead at a range of about 0.3 mile.

The fishing vessel skipper reported this incident to the MAIB, which enabled us to take it up with the company concerned. It is worth reporting such incidents to us – we will take action as appropriate.

The Lessons

1. Rule 17 (a)(ii) of the Collision Regulations empowers a stand-on vessel to take avoiding action as soon as it becomes apparent that the give-way vessel is not taking appropriate action in compliance with the Rules. In this case, the fishing vessel's skipper used it to good effect in eliminating what he considered to be a risk of collision.
2. The skipper's accent was such that the cargo vessel's OOW failed to understand what he was saying, and highlights the potential danger in using VHF radio for collision avoidance. As shown in this case, the use of VHF radio is unnecessary provided that the Collision Regulations are strictly complied with.
3. Although a perceived collision was avoided by the actions of the stand-on vessel alone, the situation could have been avoided altogether had the cargo vessel's OOW taken early action in compliance with Rule 15.

Liferafts Do Save Lives



Painting depicting the fishing vessel

Narrative

A 20 year old open, under 10m wooden gill netter sailed out of port with three crew, in the early hours of a spring morning.

The crew intended to recover wreck nets laid the previous day, and arrived at the first wreck just after dawn. The next 12 hours were spent retrieving the nets and gutting and stowing the fish. Having completed a good day's fishing, at about 6pm they headed back to port with about 1 tonne of fish on board.

The wind was force 4 to 5 on their port quarter and there was a moderate swell; conditions normal for the area.

About an hour into their passage back to port, the engine suffered a slight drop in revs. The

skipper recognised the symptoms of a choked fuel filter and went below to change it, a job which took only a few minutes. While down below, the skipper took the opportunity to look around the engine room space and noticed that there was very little water in the bilges and all looked well. He then returned to the control position and put the kettle on.

A few minutes later, the skipper became aware that water was being shipped over the port quarter, not unusual in itself, but this was quickly followed by more water. He became alarmed, and instructed the crew to get the liferaft out. Before they could reach the liferaft, the boat listed sharply to port and the skipper told them to get clear of it. He then made for the radio to call a "Mayday" but was forced off the boat before he was able to do this. The boat sank quickly by the stern, leaving only the bow out of the water.

Once in the water, the skipper retrieved the liferaft from its stowage and managed to inflate it, although it was upside down. One of the crew was very weak and clinging to the bow of the boat, while the other was swimming about 3 metres away from the raft. Neither of the men was wearing a survival suit or a lifejacket.

Though weak himself, the skipper was able to assist the crewman from the bow of the boat onto the top of the upturned liferaft, while shouting to the remaining crewman to swim to the raft. Tragically, the remaining crewman never made it

to the raft, and was lost. The survivors rested, then righted the raft and were able to shelter inside while still searching for their fellow crew member.

The boat was missed in the early hours of the following morning, and after an extensive search and rescue effort, the survivors were winched from the raft by helicopter. They had been adrift for 12 hours. The liferaft was only equipped with hand-held flares and these were not sufficient to raise the alarm or draw attention during the search and rescue.

The Lessons

1. The boat was not required to carry a liferaft. The skipper's decision to carry one anyway, undoubtedly saved his and the other survivor's lives. All users of small boats are recommended to learn from this accident and carry a suitable liferaft, properly mounted on their boat.
2. No EPIRB was required and none was fitted. Had one been carried and been used, it would not, in this case, have saved the crewman's life, but it would have raised the alarm earlier, allowing the survivors to be picked up sooner.
3. Lifejackets were available on board, but these were not worn at all times. Survival suits were not required or available on board. Boats often sink far faster than expected, and it is not uncommon for there to be insufficient time to don a lifejacket, never mind a survival suit. All users of small boats are recommended to find a lifejacket or survival suit incorporating a lifejacket, that can be worn while working and to wear it at all times.
4. When buying or leasing a liferaft, it is usually possible to specify additional flares to those supplied as standard. Where only hand-held flares are supplied, all users of small boats are recommended to specify additional parachute flares.

A Fatal Decision



General view of the vessel

Narrative

A 7m potting vessel, which was being operated single-handedly by her skipper/owner, failed to return to harbour.

After other fishermen in the harbour reported the vessel missing, the coastguard conducted a full air and sea search. Some time later, the missing vessel was discovered, 2 miles from land and with no-one on board.

A further search the following day located the vessel's fishing gear. With the aid of a local fishing vessel and her crew, the gear was hauled.

After three pots were hauled on board, the skipper/owner's body was found entangled in the gear. His ankle was caught in the bight of back rope. It is believed that he had been in the process of shooting pots when his ankle became entangled in the back rope of a fleet of pots, which then dragged him over the side.

The skipper/owner had bought the vessel about 3 months before the accident. The vessel had been fitted with a shooting table, which prevented the back rope coming into contact with the crew when the gear was shot. However, for ease of single-handed operation, the skipper had removed it: a fatal decision.



General views of the vessel

The Lessons

1. The majority of crews on potting vessels are well aware of the hazards involved when shooting pots, and take care to avoid them. Too often, however, accidents still happen. Time and again, family and friends are left mourning a loved one who became entangled in a bight of back rope and was dragged helplessly over the side of the vessel.
2. When shooting pots, always stand clear of them and any associated ropes, paying particular attention to keeping your feet out of the bights of back rope.
3. If the deck space on your vessel allows, try adopting an alternative system whereby the back rope is detached from the pots and stored independently. When shooting, the rope is then separated from the crew. Information on these alternative systems is available from the Sea Fish Industry Authority (SFIA). If the deck space does not allow such a system, the use of a shooting table is a good alternative.
4. It is not advisable to put to sea alone. If you have an accident, no one will be available to offer immediate assistance. If you fall over the side, there will be no one on hand to inform the rescue services and your chances of survival will be slim.
5. It has to be said that this skipper's fate was probably not determined by whether or not he was wearing a lifejacket. Nevertheless, this doesn't alter the fact that a working type lifejacket, worn on deck, will greatly improve the chances of survival in very many accident situations. Wear one. You never know when you might depend on it.

Part 3 – Leisure Craft

Last winter's RYA Yachtmaster Instructor Conference saw a large group of highly experienced seafarers examining a yachting fatality resulting from a stranding in the Bay of Biscay. The MAIB report on which their discussions were based was concise, factual, and defined the important issues. A number of awkward questions were addressed that day, but it was unanimously agreed that if the skipper had been more experienced, he and the vessel would probably not have been lost.

Faced with issues such as this, there has been a growing tendency for official bodies to ignore such self-evident facts and retreat instead to the barricades of further regulation, demanding the purchase of expensive equipment or the mandatory attendance on some course or other to prevent a recurrence. MAIB has been successful in not falling into this trap and so is steadily gaining respect, not only from those of us who conduct our business on the water, but from leisure users as well.

In addition to the clarity of the MAIB analyses, I am encouraged to find that the lessons learned are refreshingly non-didactic. The events MAIB describes are de-personalised and couched in terms that make it almost impossible to identify the places and vessels concerned. The finger of accusation never wags. Instead, the recommendations are delivered in a non-patronising way to which people of the sea will respond with enthusiasm.



As a sailor, I am personally grateful for this particular edition of *Safety Digest*. Anyone who has been a boat operator for some length of time will sympathise with the poor skipper whose sleeve becomes caught up in his whirling propeller shaft. We all know we should take no such chances, but who among us has never done so? Yet MAIB offers no unhelpful, 'Well we told you so,' remarks. The writers of these reports have enough respect for their readers to understand that we will draw the obvious conclusions without assistance. Rather than antagonising us with authoritarian bombast, MAIB talks the affair quietly through over a cup of tea. The approach really works. I for one will be taking no liberties with my machinery this summer. I'll also make sure that if I have decided to wear my lifejacket, I have fastened it up properly.

A handwritten signature in black ink that reads "Tom Cunliffe". The signature is stylized with a large, sweeping flourish at the end.

Tom Cunliffe is a lifelong professional sailor who has served before the mast in small sailing ships, skippered yachts for private owners, raced offshore, been to sea as mate on a British-registered coasting vessel and taught sailing, seamanship and navigation at all levels. He is one of the country's senior Yachtmaster Examiners and has acted as a consultant for the governing body of sailing in the United States.

He is author of many nautical text books on subjects as diverse as astro-navigation and the global history of pilotage in the days of sail. He is also the compiler of *The Shell Channel Pilot* and writes regular columns for *Yachting Monthly*, *Yachting World* and *SAIL*.

Three Lives Lost Due to Overloading and Unseen Flooding

Narrative

A privately owned sea angling dory capsized and sank on a loch in the north-west of Scotland. Although just 100 metres from the shore, three of the six anglers onboard lost their lives. None were wearing lifejackets.

Five adults and one child had set off in the 4.3m dory for a day's fishing. Weather conditions were perilous, with steep sided large waves. They rod fished at several places and, by mid-afternoon, were heading home. According to an eyewitness account, as the dory rounded a headland, a large wave broke over its forward end. The person seated forward on the starboard side was thrown back over the steering wheel; such was the force

of the wave. Shortly afterwards, the dory lost stability, capsized and sank. Three people were rescued, the others perished.

Later inspection and loading trials (see **photograph overleaf**) showed that water had accumulated over a period of time, without anyone's knowledge, and had penetrated the void between the main hull and the deck. This had two serious effects: it caused the boat to sit lower in the water (see **photograph below**), making her more prone to swamping, and the sloshing of the trapped water reduced her stability. The situation was made worse because the dory was overloaded; it was designed to seat four, but on the day of the accident was carrying six people.



Photograph highlighting low freeboard



Photograph taken during loading trials to assess the freeboard

The Lessons

1. A dory with water in its void space is a potentially unstable vessel. To ensure that water is not lurking in the void space of your dory, when it is beached, slipped or put on a trailer, check for water leaking from the void space. At the same time, listen for water sloshing about, by rocking the dory. If it is, find out why and fix it, or seek expert advice before attempting to use it.
2. If the weather conditions are poor, postpone the trip – despite the disappointment this may cause.
3. Always ensure that your boat is seaworthy. If you don't have the relevant knowledge and experience, ask someone who does. In setting sail in an unseaworthy boat, you are putting your life in jeopardy as well as the lives of your fellow crew members. Ensure your boat is properly maintained, and check carefully for any damage to its hull and decks.
4. Do not overload your boat. A dory is designed to rise to the sea and swell, but is limited in its ability to do so if heavily laden, especially forward. This dory was heavily overloaded, which further reduced its freeboard. Once it had shipped a substantial amount of water, and lost all its stability, capsize was inevitable.
5. Wear a lifejacket at all times.

Dangers of Rotating Machinery

Narrative

A substantial 10 metre yacht had recently been recommissioned after her winter lay up. The engine had been run and the owner had nipped up the stern gland during one short trip.

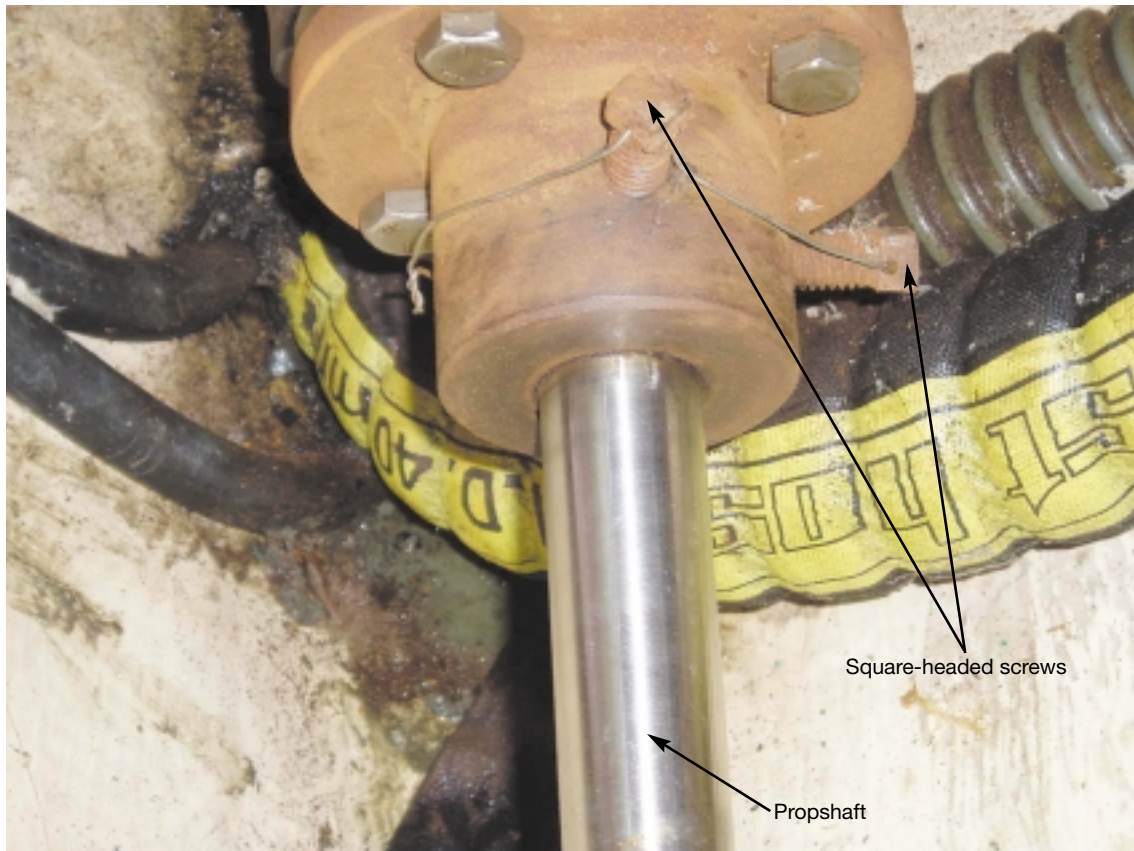
On a later occasion, the owner was on board with his son, and was motoring the boat a few cables from her mooring to a marina to take on stores for a weekend's sailing. The weather was excellent, with negligible wind and a flat calm sea.

During this relatively short run, the owner decided to again check the stern gland. After checking the cuffs of his jacket were properly secured, he lifted the hatch to the stern gland/propshaft space. To gain the best indication of the rate of water ingress through the stern gland, he decided to remove a small amount of water that had collected in the bilge space beneath. To do this, he used a sponge, wringing it out once saturated. He did this a couple of times without problems.

Unfortunately, on the next occasion, the left sleeve of his jacket became entangled with a coupling on the rotating propeller shaft (**see photograph**). His arm was dragged around the shaft and, before he could free it, was very seriously injured.

The owner's shouts were heard by his son on the helm, who promptly stopped the engine and immediately used his mobile telephone to dial 999 and ask for coastguard assistance. He then used the boat's first-aid kit to dress his father's arm, using a wooden spatula from the galley as a splint and cottonwool pads to stem the flow of blood. The injury was serious, with a length of broken bone exposed.

Emergency services were very quickly on scene, with helicopter and lifeboat both available to evacuate the casualty. It was decided to use the lifeboat to transfer the owner to an ambulance and then hospital. Because of the benign weather conditions, the owner was able to climb, unaided, from his boat onto the lifeboat.



Engine/propshaft coupling arrangements

The Lessons

1. However smooth and polished they might sometimes appear, spinning propeller shafts should still be considered as rotating machinery, capable of causing serious injury. It is always safest to stop machinery whenever hands, clothing etc. are close to exposed moving parts.
2. The securing arrangements of this coupling could have been rather less hazardous. The square-headed screws, shown in the figure with 'locking wire' through their heads, might reasonably be replaced by items that protrude less. 'Grub' screws of suitable length, tightened with a hexagonal 'Allen' key, could be fitted so that their ends are flush with the coupling's outer surface. Alternatively, or even additionally, a metal guard over the shaft and coupling would keep personnel safe and would prevent other parts of the boat's safety critical systems, such as water or exhaust hoses, from coming into contact with these moving parts.
3. The response of the owner's son in this emergency showed great presence of mind. In particular, his use of the spatula as a splint was an example of clear thinking that we all would hope to demonstrate in such an emergency; but probably with less success.

Narrow Escape from Overhead 11kV Lines



Narrative

A small GRP sailing yacht (6.7m) was temporarily anchored in a quiet tidal river while she was being prepared to be taken to her summer anchorage. The owner and his son were standing in the tender alongside the cockpit, detaching some empty drums which had been used to heel the yacht over to reduce her draught for the transit downstream from her winter berth.

Unknown to them, the increasing ebb caused the yacht's anchor to drag. The yacht, and the two men in the tender, drifted towards overhead 11kV power cables that spanned a bend in the river. The masthead made contact with cables, and the father, who was holding onto the aluminium towrail, received a serious electric shock, which caused his breathing to stop and badly burned his arm.

The injured man's son was able to clear his father's airway (he had probably swallowed his tongue as a result of the electric shock) and got him breathing again. He then laid him, unconscious, in the bottom of the tender, and motored away from the yacht which, by this time, had thick smoke coming from the anchor well and then up through the companionway.

A 999 call was made using a mobile telephone, and the son then motored back upstream to the nearest point of access to the river where they were met by the emergency services. The father had begun to regain consciousness, but was taken to hospital where he was placed in intensive care and subsequently received skin grafts for his burns.

The yacht was totally destroyed by the fire.



The Lessons

1. It is vitally important to know the height of your masthead above the waterline, and the existence and height of any hazards you are likely to encounter. Heights above MHWS of cables and other overhead obstructions such as bridges will normally be found on charts, but this stretch of river was uncharted. Warning signs and other information have been distributed since this accident.
2. The course of the river had almost certainly undercut on the outside of the bend, slowly bringing the deep water closer to the line of the cable over time. All concerned, but particularly electricity supply companies, and other organisations responsible for overhead works close to or crossing waterways, should ensure that such effects are closely monitored. Since this accident, the height of these cables has been raised.

Preliminary examinations started in the period 01/11/04 – 29/02/05

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

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
17/11/04	<i>Travestern</i>	Tanker	Isle of Man	11423	Grounding
11/02/04	<i>British Enterprise</i>	Tanker	UK	23682	Grounding
19/12/04	<i>Audacious</i>	Fishing vessel	UK	24.77	Grounding
21/12/04	<i>Yves Marie Amil</i>	Fishing vessel	Channel Islands	74.42	Fire
06/01/05	<i>Sea Fox</i>	Dry cargo vessel	Latvia	2219	Listing
08/01/05	<i>European Highlander</i>	Dry cargo	Bahamas	21188	Grounding
16/01/05	<i>Aquarius</i> <i>Alfa Germania</i>	Fishing vessel Oil tanker	UK Bahamas	29.44 56115	Collision
08/02/05	<i>Freedom 90</i> <i>Hampshire</i>	Hovercraft Pilot boat	unknown ..	unknown ..	Hazardous inc. ..
14/02/05	<i>Higher Dartmouth ferry</i>	Chain ferry	unknown	unknown	Hazardous inc.
23/02/05	<i>Arklow Sand</i>	Dry cargo	Netherlands	2316	Grounding

Investigations started in the period 01/11/04 – 29/02/05

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
02/11/04	<i>Dorthe Dalsoe</i> <i>Scot Explorer</i>	Fishing vessel Dry Cargo	Denmark UK	Unknown 1852	Collision
10/11/04	<i>Emerald Dawn</i>	Fishing vessel	UK	9.05	Capsize
17/11/04	<i>Jann Denise II</i>	Fishing vessel	UK	9.12	Founding/flooding
22/11/04	<i>Cepheus J</i> <i>Ileksa</i>	Dry cargo Dry cargo	UK Malta	6454 4955	Collision
17/12/04	<i>Brenda Prior</i> <i>Beatrice</i>	Dry cargo Amphibian	UK UK	198	Collision
29/12/04	<i>Isle of Mull</i> <i>Lord of the Isles</i>	Dry cargo Passenger vessel	UK UK	4719 3504	Collision
11/01/05	<i>Sardinia Vera</i>	Passenger vessel	Italy	12107	Grounding
23/01/05	<i>Tor Dania</i> <i>Amenity</i>	Dry cargo Oil tanker	Norway UK	21491 1453	Collision

Reports issued in 2004

Breakaway 5 – capsized of *Breakaway 5*, River Bure, Norfolk on 19 July 2003
Published 12 February 2004

Dart 8 – injury to person on *Dart 8* while berthing at Europort Terminal, River Thames on 21 March 2004
Published 30 September 2004

Chelaris J – investigation of the capsized and sinking of the fishing vessel *Chelaris J* and loss of all crew members, Banc de la Schole (near Alderney), 1 October 2003
Published 16 July 2004

Chelaris J – French version of above report sent 12 August 2004

Elegance – investigation into 2 engine room fires, subsequent flooding and foundering of the fishing vessel *Elegance*, 30 miles north-west of Shetland on 30 January 2004, and 8.5 miles west of Shapinsay on 5 March 2004
Published 11 August 2004

Elhanan T – flooding and foundering of the fishing vessel *Elhanan T* on 14 August 2003
Published 4 March 2004

Hoo Finch/Front Viewer – investigation into the near collision between *Hoo Finch* and *Front Viewer*, off the River Humber on 25 February 2004
Published 25 August 2004

HC Katia – investigation of the grounding of *HC Katia* while undergoing sea trials in the Solent on 3 December 2003
Published 30 July 2004

Kingfisher II – investigation of the fire on board the fishing vessel *Kingfisher II* whilst on passage to recover creels, 5 miles east of North Uist, on 26 April 2004
Published 30 November 2004

Swamping of unnamed cabin cruiser in Lady Bay on Loch Ryan, 3 September 2003, and associated wave generation issues
Published 22 April 2004

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