



# Annual Digest 2019

Reports and Insight Articles

[www.chirpmaritime.org](http://www.chirpmaritime.org)



# Annual Digest of Reports and Insight Articles

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# Introduction

Welcome to the fourth annual review of *CHIRP* Maritime reports, covering all the cases we published during 2019 and including a number of in-depth articles specially commissioned to highlight important safety topics.

This has been another busy year, so we were delighted when Capt. Ranjith Cheerath joined our team as a Maritime Advisor. Ranjith is based in Singapore and is an expert in HSE and chemical carriers, so he adds to our scope both geographically and professionally. Our UK-based team of Jeff Parfitt (Director, Maritime), Ian Shields and Howard Nightingale, ably assisted by Stephanie Dykes, are now supported by two Maritime Advisors – Ranjith in Singapore and me in Hong Kong – so we are covering more of the world’s major maritime centres. Nonetheless, we are still a very small team and none of us are employed full-time, so we manage quite well in the circumstances.

As always, we are guided by our Maritime Advisory Board (MAB) who are an outstanding group of men and women with over 700 years of combined shipping experience. They volunteer to vet our reports and provide comments and expertise, and also contribute many of the Insight articles which appear in the Annual Digest. All our work is supervised by Chief Executive Ian Dugmore and a distinguished team of Trustees, and our Ambassadors

continue to promote our work around the globe.

Our Maritime FEEDBACK magazine is now published in English, Chinese, Filipino and Portuguese, so we are most grateful to all the sponsors and translators who help make this happen. Please let us know if there are other languages you would like to receive or, even better, if you would like to sponsor a version in another language.

Speaking of sponsorship, we have again been fortunate in finding generous donors who have made it possible to produce this Annual Digest. They are listed at the end of the Digest and we are extremely grateful for their support and their ongoing commitment to safety.

A major initiative in 2019 was the publication of our booklet and video on Making Critical Decisions at Sea. This is our second collaboration with University College London, and it contains important information and advice for everyone involved in operating ships. The booklet is reproduced in full in this Digest, and is on our website, where the accompanying video can also be found. For readers who are interested in how we make our videos, there is a brief explanation within these pages.

The reports this year are as varied as ever, but some are sadly familiar. Basic mistakes are still being made, despite our efforts. In an era when young seafarers may not always

have more experienced colleagues to guide and monitor them at all times, we offer a means for them to learn from the mistakes of others and absorb the lessons which may help them to avoid making the same mistakes.

You may have noticed we have introduced a new logo and changed the format of Maritime FEEDBACK this year. It is now more appealing, easier to read and easier to print out on board; and we have also introduced a new *CHIRP* Maritime promotional video that outlines in 2 minutes who we are and what we do. This video is available on our Facebook page and from our website. It is a very useful tool in understanding what we do, and we believe it will be helpful to shipping people throughout the industry, so we urge you to take a look. We hope all these changes will be beneficial, and we welcome your comments.

The magazine is now included in Witherby's seamanship CD, and we continue to receive approaches from organisations around the world who wish to cooperate with us, which is proof that we are contributing to safety in many ways. To give just one example, we were very pleased to receive a letter from the Nigerian Maritime Administration and Safety Agency commending *CHIRP* for the Annual Digest content and informing us the information would be used to raise safety awareness amongst seafarers in West Africa.

It is worth repeating that we firmly believe everyone who works at sea deserves to return safely to their family at the end of their tour of duty. This should be the ambition of every ship manager, every administrator and everyone else who supervises the business of shipping, but there is still a long way to go. Seafarers' lives matter, but there are still people who do not fully embrace a safety culture.

Fortunately, our reporters and sponsors are committed to safety. The generosity of all our sponsors is acknowledged in our publications, and we could not function without them, but our reporters (both individuals and companies) remain anonymous for obvious reasons. It is a pleasure for me to acknowledge them all and thank them for their support, without which we would not exist. In 2019, we received one rather unusual donation from a sponsor – a number of tickets for high-speed ferry travel between Hong Kong and Macau. We decided to use the tickets as prizes for a safety competition open to local maritime students and challenged them to propose ways of enhancing the safety of disabled passengers on passenger ships. The entries were of a very high standard, and a report on the best suggestions is included in this Digest. Regular readers will be aware that there are no comprehensive international regulations for the treatment of disabled passengers, and this is one of the topics we have focused upon in this edition.

Once again, we have divided the Digest into themed sections to assist readers to find the topics which most interest them, but many of the reports could have been assigned to more than one section, so we urge you to study them all.

Within most sections you will also find Insight articles that illuminate topics covered in that section or provide additional information. They are written by experts and are well worth reading.

The appendices contain some very important documents, including the latest flow chart describing what happens when a report is submitted to *CHIRP*. We include it to demonstrate that we make every effort to maintain the anonymity of our reporters while we process a report. To date, we have never revealed the identity of anyone who

contacted us, and you will see the steps we take to ensure confidentiality is maintained.

All our videos and databases are easy to access through our website, so we hope you will look at them when time permits. For more detailed and focused searches, we recommend the searchable database on the website. There is a useful guide in the banner on our home page which explains how to use our site if you are in any doubt.

We hope you will find this Annual Digest both interesting and informative, but please let us know. Your comments are important and will help ensure *CHIRP* Maritime continues to provide the information you need to make our industry safer.

Until next time, take care and may all your voyages lead you safely home.



**Editor: Captain Alan Loynd**  
FNI FITA MCI Arb BA(Hons)

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*Please note all reports received by CHIRP are accepted in good faith. Whilst every effort is made to ensure the accuracy of any editorials, analyses and comments that are published in this digest, please remember that CHIRP does not possess any executive authority.*

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## Section one

# Human Factors

We make no apology for once again opening the Digest with a section on Human Factors. The safety of people at sea should be the primary focus of everyone involved in shipping. Unfortunately, there are still companies where crew safety does not seem to be given any very high priority, and where the watchkeeping practices could be better.

We therefore decided to open with our new study undertaken in cooperation with University College London. *Making Critical Decisions at Sea* follows on from our earlier research into *Perception, Decision Making and Fatigue at Sea*, and contains advice which will be of benefit to all watchkeepers, and anyone who wishes to understand how critical decisions can be made in more effective ways. The document can also be downloaded from our website, where the accompanying video will also be found.

In this section we also read about the consequences of trying to operate a ship effectively in the Persian Gulf without air conditioning, and an example of poor engine room safety. There is also a more reassuring report about a ship where a helm error was noticed and corrected before it could cause a problem.

We finish with an excellent Insight article from the MCA about Human Element reporting and investigation, which discusses the way we normally investigate accidents and apportion blame. More importantly, it then goes on to discuss the flaws in most investigations and describes a more effective way of dealing with the topic. As readers will be aware, we work closely with the MCA in the United Kingdom, and they responded most generously when we asked them for their perspective on the current situation. This article will reward careful study and should be required reading for all seafarers and managers.



## Article 1

## Making Critical Decisions at Sea – Practical advice for the operational mariner



The following Insight Article is the second in the series of collaborations with the University College London (UCL), and follows on from the “Perception, Decision Making and Fatigue at Sea” booklet published in 2018. It was published as a PDF Booklet and an accompanying video, both of which may be found on the [chirpmaritime.org](http://www.chirpmaritime.org) website. The link for the PDF is given below.

<https://www.chirpmaritime.org/wp-content/uploads/2019/07/Making-Critical-decisions-72dpi-RGB-for-online.pdf>

### Introduction:

Every stage in a ship’s journey depends on the decisions made. To make sure each voyage is as safe and efficient as possible, we call upon all our training and experience. The process of learning at sea is never-ending and gives us the knowledge and skills to perform tasks to the best of our abilities.

When at sea, the environment can rapidly change, and we can find ourselves in unfamiliar and unpredictable situations. We often work alongside other seafarers we don’t know very well, who may have a different culture and may work differently from us. For all of these reasons, we must develop our skills in critical decision making. If we do this properly then we learn to evaluate decisions that we and others make to deal with situations effectively. Good decision making is the foundation for the continued safety of the ship and everyone on board.

This booklet complements and expands upon the CHIRP/UCL Booklet “*Perception, Decision Making and Fatigue at Sea*” published in 2018. It draws upon scientific research to give readers the knowledge and tools to improve their critical decision making. It will cover the following key points:

- making critical decisions as an individual
- making critical decisions as a group
- communicating in challenging conditions
- creating a positive error culture around mistakes and responsibility
- understanding the role of intuitive decisions, and how to develop critical decision
- making abilities through training

The booklet provides a guide for seafarers and introduces new techniques and skills that we can develop to enhance our job performance. Its goal is to help us become more effective decision makers, in every situation. These situations may be “routine”, with which we may become over-familiar and thus perhaps let down our guard, or high-pressure events. All decisions at sea are important, and severe consequences can be created by seemingly small factors that, independently, do not appear to be significant. This contributes to the pressure which is inherent to our job.

### Case Studies:

To help understand critical decision making better, it may be useful to see where decision making mistakes have been made in the past. A recent, well-known example is the ‘Costa Concordia’ disaster.

This incident happened in 2012, when the cruise ship hit a rock near an island off the coast of Tuscany, causing the vessel to capsize and resulting in the tragic death of 32 passengers and crew. In the following investigation, the captain was declared responsible for the accident, and was imprisoned after being charged with manslaughter. Notwithstanding any critical decision making by the company, or lack thereof, the captain made several decision-making errors that could have been avoided. Reportedly, he:

- required no concrete handover by the chief mate, despite arriving on the bridge later than planned and without time for his eyes to adapt to the dark conditions on the bridge (see “Perception, Decision Making and Fatigue at Sea” study 2018).
- had turned off the alarm for the navigation system, having confidence in himself to guide the ship.
- misjudged the distance of the ship to the reef and realised his mistake too late.
- had not ensured the correct scale of paper chart for close water navigation was onboard which would have provided a more accurate assessment of the hazards to navigation.
- had forgotten his reading glasses, so the officer had to interpret the radar for him.
- brought onto the bridge a partner, along with the manager of the ship’s restaurant.
- maintained an inappropriate speed of approach in darkness.

Each of these mistakes would have distracted the captain’s focus and, although each individual element may seem understandable (and even familiar to experienced seafarers), added together they led to the disaster. The total cost of the accident, alongside the loss of 32 lives, was \$2 billion, including passenger compensation, the rescue operation, and towing and disposal of the wreck.

Another example is the 2014 ‘Sewol’ ferry disaster in South Korea. ‘Sewol’ was heading from Incheon to Jeju when it capsized, resulting in over 300 deaths. The reported cause of this incident was the low quantity of ballast water remaining onboard the ship to facilitate more cargo. In addition, the cargo was poorly stowed which led to cargo shift and listing, (the root cause goes back to modifications based upon an illegal redesign of the ship 2012-13). The company also ignored warnings from the regular captain with respect to stability and steering gear issues. On the day of the incident, the ships’ cargo was overloaded to about three times its permitted limit. When a sudden turn was made, the cargo shifted and caused the ship to list uncontrollably, leading to the capsizing. NB: No formal investigation report has been issued to date.

These two incidents demonstrate the potentially serious consequences of poor decision-making at sea, both before sailing and during the voyage. These incidents were caused by numerous, significant errors. Our day to day sailing is full of similar decisions that need to be made. In isolation they may not have serious consequences but can still affect the smooth and effective running of the ship. It is important to remember that a normal situation can quickly develop into something more serious if care is not taken with the small decisions.





Music on the radio...



Officers chatting...

### Small distractions can add up...

Let's consider a common situation we have all experienced. When navigating in a narrow/restricted channel where there is dense traffic, decisions on corrections of course must be made. It is easy for us to forget just how many decisions we make, and the following aspects should be considered during the decision-making process;

- what are the speeds and courses of the other vessels as well as our own?
- what are the environmental factors, e.g. current, wind, visibility?
- what may the crew on other vessels do?
- which of you is required by the Collision Regulations to take avoiding action by an alteration of course and/or speed?
- are sound signal warnings to indicate close proximity needed?
- what do my bridge team think?
- what local knowledge do we have about the channel?
- are there some "local customs" to consider?

A proficient bridge team may be able to guide the ship to safety, but doing this without large diversions, which increases fuel consumption, or without significantly affecting the safe passage of ships in the vicinity, requires a lot of skill. All together this is a lot of information to consider.

As highlighted in the "Perception, Decision Making and Fatigue at Sea" booklet, our brains have limits, and seafaring constantly makes demands beyond those limits. **Given that we are only capable of having in mind around four pieces of information at any time**, if we consider all the things we attend to on the bridge at sea, it's hard to think of any decision that does not immediately put us at or beyond our limits. In all circumstances, then, effective decision-making is vital.

By taking the time to reconsider the complexity and seriousness of what we do, we can avoid the adverse consequences listed in the case studies above and prevent them.

The following sections and examples aim to equip the crew of any ship with the knowledge to perform all operations on board smoothly. You will be able to trust both your own decisions and those of your crewmates, and also be able to work more effectively together to make

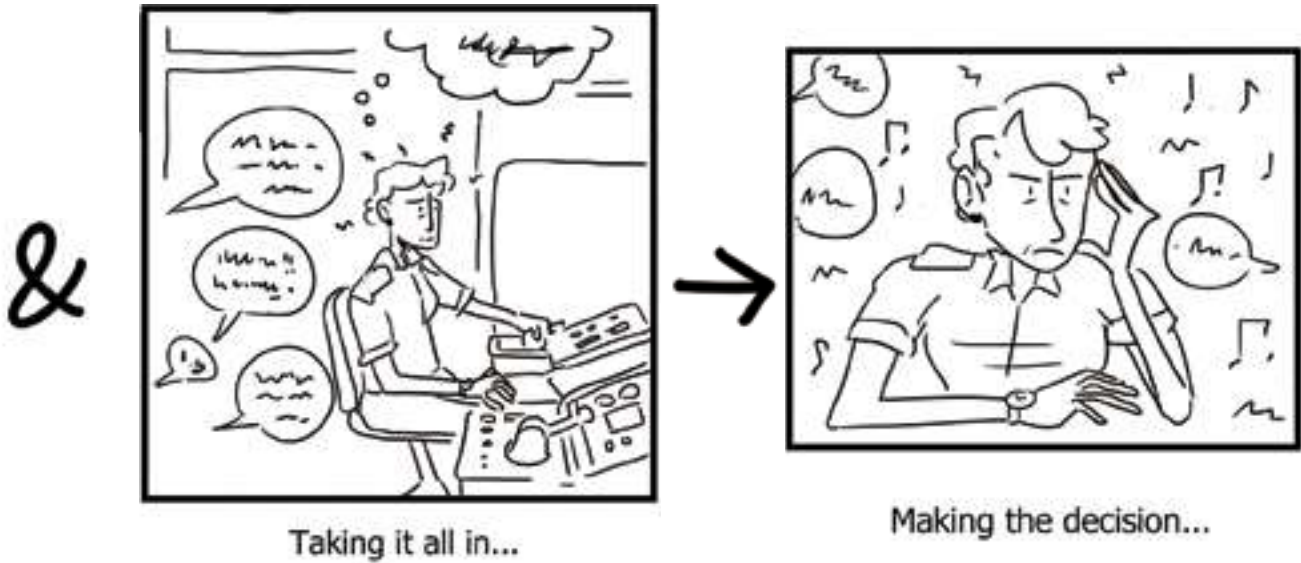
decisions as a team. By understanding how decision-making processes work, and how to use this knowledge to your advantage, you will become a more well-rounded mariner, and in any unexpected situations you will be more prepared.

### Group Decisions:

There has been plenty of academic research for many years now which shows that working in a team brings many advantages such as spare capacity, diverse perspectives and safety (ref BRM/ERM). Effective teamwork can go even further and provide synergy, meaning the product of the team is more than the sum of its members combined. But we know that sometimes working in a team brings challenges, which can impair the decision-making process. Therefore, it is important to be aware of the different components of our team to ensure the best performance.

At sea a crew may often be a new or temporary team. Officers may have never met before, and there is no time for any team development before starting a voyage. Despite internationally agreed standards including the STCW Convention (The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), crew members, who are often from different cultural backgrounds, will probably have different levels of experience, different levels of education, and will have undergone different training. All this can affect social conduct and communication. It is therefore important that we all know about the basics of group behaviour and how to make the best of the team we are in.

We all know people act and behave differently in groups compared to when they are on their own. People take on different roles in their social, family and professional environment. Taking on a role is a subtle and temporary change in our identity. Roles can be informal (e.g. friendship groups, family) or formal. Formal roles are usually tied to positions and job descriptions. Each role is associated with internal and external expectations that predict a person's behaviour, speech, and so on. We all recognize that we would behave differently if sailing with a group of people from our training days than with a group of strangers. But should we? Roles are especially valuable in a professional context, because they give newcomers a reference point



... even the best of us couldn't work at our best in conditions like this

from which to model their behaviour. In addition, these roles can create hierarchical structures within the crew. Of course, in one sense roles are established by the ranking hierarchy on board the vessel but it is the efficient interaction between the hierarchy that needs to be established. If, as a crew, we confirm and agree upon our roles and standards before we leave port, we will be making a sound decision that will improve all subsequent ones on the voyage.

There are some dynamics in decision making that create biases and errors that are unique to groups.

One of the most significant biases is "groupthink", which prevents members of a group from challenging the decision of a group (or its leader), asking questions, or raising controversial issues, even when they do not agree. Everyone has been in a situation in which they think differently from the group but are unable to voice their opinion. The reasons for this phenomenon are numerous: in many cases people want to maintain their own position in the group (e.g. being favoured by the leader) or preserve good group relationships and unanimity. When decision making is affected by groupthink it can focus too narrowly and ignore the risks identified by individuals.

Groupthink prevents us from seeking out alternative information. Every crew member needs to be comfortable asking the question, "are WE wrong?"

Given our knowledge about role taking and the special challenges that crews at sea are faced with, how can these biases be mitigated?

#### Know your Crew:

Research has also shown that the composition of a group plays an important role in mitigating errors such as groupthink. Well integrated, diverse groups are known to outperform homogenous groups at decision-making. This diversity can be role-related, e.g. occupation, rank and specialised knowledge, or inherent to the person, e.g. age, gender, nationality and experience. Role-related diversity is very important for decision making at sea, since we all have very different sets of expertise and information available. We also need to allow for the human element as we have different ways of thinking about things, based on our training, experience, and personality. These differences

are a strength and give us more ways of viewing a situation and therefore more options for getting the right solution and avoiding groupthink. In terms of size, teams of four to five people are most effective because we can only process information coming from two or three people at a time. There is a reason that the world's elite military units operate in teams of four.

#### Set the right tone:

Because the crew may not have a lot of time to get to know each other, it is important that crewmembers set the right tone straight away (to take on appropriate roles) otherwise small relationship problems can become ingrained and reinforced. A key ingredient of this is 'first impressions', which are important for establishing the right "authority gradient" between leader and follower roles and help to build trust and confidence among fellow crew members.

To avoid biases, open communication should be encouraged from the beginning. This is partly the responsibility of the captain but also good practice for all team members. The captain should encourage deck and engineering officers to raise questions and concerns regarding a decision: officers should not feel afraid or embarrassed to speak up even if information turns out to be not relevant or the original decision proves to be correct. This behaviour should also be encouraged as part of the role of a good crew member, because if it is perceived as part of the professional role, then it will happen with less effort for most officers. The buck has to stop somewhere, the captain maintains the final responsibility for all critical decisions and will act independently as the leader if a situation demands it. In offering alternatives and asking questions, however, every crew member is more likely to help the captain become a better leader. It is the captain's duty to encourage these roles, and every crew member's responsibility to fulfil them. This can be achieved by the captain detailing the decision-making process aloud to his team while making it, so that he can still leave room for a challenge by team members.

To avoid groupthink and to encourage independent decision making within the crew, captains are advised to avoid leading or suggestive questions and instead use open questions.

**Leading question:** "He said five miles didn't he?"

**Suggestive question:** "Did he say five miles?"

**Open question:** "What distance did he tell us is remaining?"

**Have standard practices:**

With shipping being an international industry, it is not uncommon to find yourself working in a diverse cultural team. This can be challenging at the beginning as we get to grips with what others know and are best at. Following standard practices and procedures can help increase familiarity and ease, as these are the accepted norms we all know. This then helps build confidence, trust, and forms the basis for a cohesive and effective team.

**Communication:**

Communication arguably has the biggest impact on group decision making. In general, complexity, unfamiliarity and unnecessary length of messages lead to communication failures. Crew members are therefore advised to use familiar phrases, sequencing and standard operational terms, to restrict the used vocabulary and to use different types of messaging: sometimes a message is best delivered visually, and at other times verbally, for example.

To encourage lower ranked crew members to speak up when they see things differently from their officers, it is helpful to use simple and approved protocols for communication in challenging situations. One method that is used in aviation is the **PACE** system, which provides a four-step procedure to raise concerns. PACE stands for **P**robe, **A**lert, **C**hallenge, **E**mergency. Here is a possible scenario, using PACE:

**Probe** 'Captain, what other options are you considering if we can't stop the ship fast enough?'

**Alert** 'Captain, the speed is 16 knots and hasn't dropped in the last 7 minutes, what about making a turn?'

**Challenge** 'Captain, we need to make a turn now or we will collide with the other ship'

**Emergency** 'I'm alerting the Engine Control Room and going to manual steering to carry out a turn'

The process suggests questions that are graded according to the seriousness of the consequences. The language is clear and should be recognised by all captains and crew. This is no more difficult for us to adopt than a traffic-light system. The Probe is green, the Alert is amber, and the Challenge is red. The Emergency is beyond challenge and demands action. (ref: IMO Standard Marine Communication Phrases).

**Creating a Positive Error Culture:**

To increase cohesiveness and inclusivity within the group it is important to emphasise shared goals. This can happen early on, for instance by taking opportunities to stress joint tasks and even simply by using the first-person plural for shared tasks and goals (we will/ let's do this and that first).

We can conclude that the following elements are at the core of good decision-making in groups:

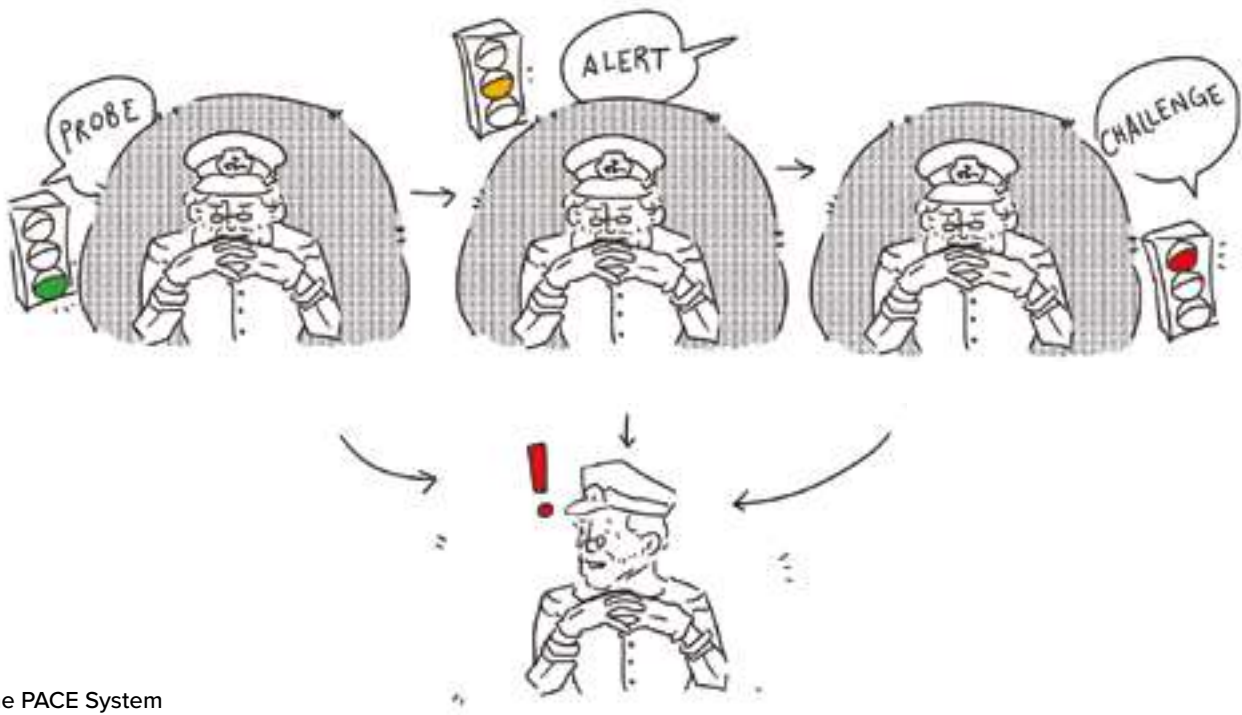
- constructing a shared view of our operations, our methods, and our situation
- gathering and sharing information openly and effectively
- creating an inclusive atmosphere that encourages different viewpoints

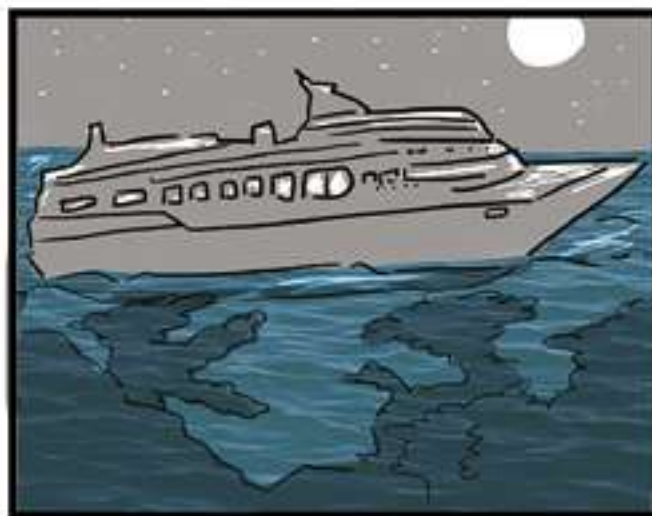
**Putting A Stop To Mistakes:**

Mistakes are normal and happen in everyday life. According to a study by Allianz, human error in the shipping industry was estimated to make up 75% of insurance losses, equating to around \$1.6 billion, in 2018 alone. Most tragic were those mistakes which led to the loss of human life. Creating the right culture to support risk and error is an effective way of making shipping safer.

**Creating a Positive Error Culture?**

We all know the saying "you learn from your mistakes," but we often do that learning in private, and prefer not to reveal our near misses. By adopting a positive error culture, we can learn from and support each other in the pursuit





A Positive Error Culture – It may seem like they’ve gotten away with it this time...

of better seamanship. A positive error culture is one which encourages the transparency of both decision-making processes and errors. In other words, crew members are not inhibited by the threat of embarrassment, or to career progression if they discuss their own mistakes or take responsibility for other people’s errors.

Instead, they are supported to openly discuss mistakes that are made and work towards preventing future errors. None of us is perfect and we need to find ways of sharing our difficult decisions. Simply changing our language from “did anyone make any screw ups today?” to “is there anything anyone thinks we could have done better today?” will encourage openness and reduce threat. Improving ourselves as seafarers should be made into an ongoing challenge, not an ever-present threat.

**POSITIVE ERROR CULTURE IN OTHER INDUSTRIES:**

**Lessons from the Medical Industry:**

To bring a positive error culture to the shipping industry, it is helpful to look at how it has been done elsewhere. The medical industry is one where defensive decisions have sometimes resulted in repeated mistakes. This has resulted in economic losses, health issues and loss of life. In the US, an estimated 44,000 to 98,000 patients are killed each

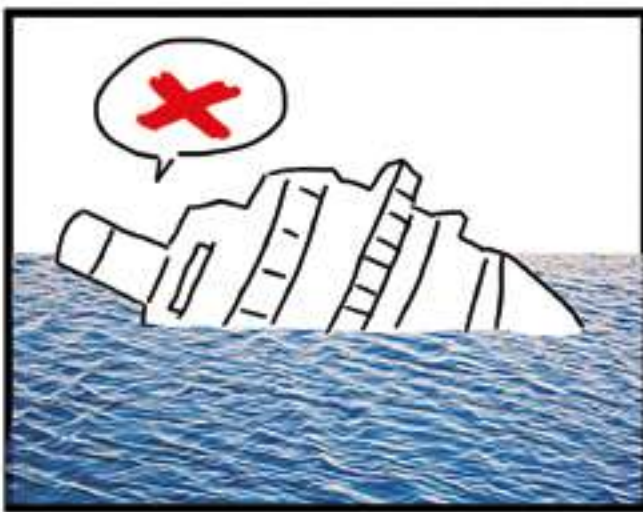
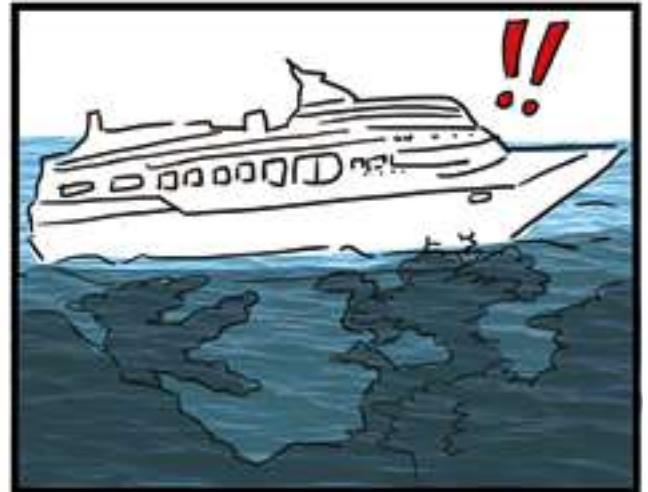
year because of preventable medical errors. Doctors fear legal action and can be guarded about reporting mistakes. The hierarchical separation between doctors and nurses also makes it difficult to challenge decisions and so the same mistakes persist. The John Hopkins Hospital tackled their high number of errors in one area through a very simple initiative; introducing check lists where currently none exist. These were inexpensive but promoted a positive error culture between all medical staff. If doctors missed a step from the list, nurses were now able to point it out to them via the checklist. Over one year, this simple move to a positive error culture saved 8 lives, stopped 43 infections and saved \$2 million.

For seafarers and captains, a similar approach would help build a positive error culture onboard by promoting safety above hierarchy and give all crew members the confidence to spot and highlight things that have been missed, or a better way of doing something.

**Lessons from the Aviation Industry:**

One reason that aviation accidents always make news is because they happen so rarely. In fact, the likelihood of an aeroplane falling from the sky is 1 in 10 million flights. But another reason for their incredibly low catastrophe rate is the industry’s positive error culture. This is a combination of safety measures e.g. carrying extra fuel onboard in case of





...reflecting on our near misses can help prevent big mistakes in the future.

an emergency, and free reporting of errors. The aviation industry is open about how probable it is that a crash will occur. This transparency is very important and filters throughout the industry to include the individuals taking decisions. While it is a company's responsibility to report information on errors to the entire community, it is also the duty of the individual to document their own serious mistakes. This is then taken back to a higher body of people from across the industry which discusses how they can learn from this mistake to make flying safer. This level of openness at every level of the business allows pilots and crew to feel confident in admitting to mistakes, knowing they are a common, shared experience and something everybody else can learn from.

**Understanding Behaviour Onboard:**

Shipping can be a difficult, stressful, and sometimes traumatic industry. Under severe pressures we all make decisions differently. We can be under the physical pressure of tiredness because of watchkeeping, the mental pressure of having to deal with too many factors, the time pressure of needing to make decisions quickly, or the emotional pressure of fearing consequences. If an accident happens unexpectedly, the shock of the event can lead us to freeze due to the effect of stress which makes it much harder to make decisions. Onboard, it is important to be

aware of, and honest with ourselves about the pressures we are under. We also need to be aware of the pressures on our fellow crew members. The positive error culture allows us to discuss such pressures. You will find that everyone recognises them but have probably never felt comfortable admitting to them. Sometimes the response to pressures and situations results in a change in behaviour that requires someone to take over decision making.

A follow-up report into the 'Costa Concordia' highlighted how the captain's behaviour quickly changed after he realised that they had run aground. Although it was the series of bad decisions which led to the accident, the captain's change in behaviour after the grounding meant further important decisions were delayed, for example, giving the general emergency signal. Video footage showed how he froze and was incapable of making important decisions quickly.

Promoting openness in these high-pressure situations could once more help to reduce mistakes and save lives, for example by letting others know if you feel yourself becoming distressed so that someone else can take those critical decisions, or telling the captain or officer of the watch if you notice a fellow crew member go into this state.

The 'Costa Concordia' report looked at several signals which might help us identify whether we or a fellow seafarer are suffering from shock. These were:

- disbelief or denial
- emotional numbing
- nightmares / other sleep disturbances
- anger
- moodiness
- irritability
- forgetfulness

Encouraging us to be transparent about our own reactions under pressure and training seafarers to spot how these affect the behaviour and choices of others, is another way of reducing the likelihood and the cost of accidents at sea.

**Building A Positive Error Culture In Shipping:**

If shipping is to reduce the cost of bad decisions made at sea, it needs to create a positive error culture, similar to that in aviation. The 2014 'Sewol' disaster was blamed on continuously overloading cargo and illegal changes to the ship's structure which decreased its stability. No one reported these huge errors and eventually the ferry capsized killing 304 passengers. The official inquiry into the 2011 grounding of the container vessel 'Rena' in New Zealand determined that the grounding was a result in part of not





following standard good practices during planning, execution, navigation and watchkeeping. In addition, shortcuts were taken to reach port early. The result was long term damage to the local environment despite spending \$108 million on clean-up and \$700 million ship salvage operations. Again, no one challenged these bad decisions. And this isn't the only time this type of choice was made. For example, the grounding of 'Hoegh Osaka' in Southampton waters was due to instability as a result of shortcuts being taken in the interest of expediency in getting the ship to sea.

Currently, there is reluctance across the industry to discuss and learn from our mistakes, we hope this booklet will help to change that mentality.

Moving towards a positive error culture need not be difficult. Emphasis should be placed on error transparency and challenging bad decisions. This is in order to help us all get better at discussing our own and others mistakes, see them as points to learn from and resist pressures which might force us to bend standard procedure e.g. industry pressure to arrive at a port as quickly as possible. This could be done through;

- encouraging seafarers and captains to report and discuss their own mistakes and taking responsibility for the mistakes of those in their charge (ref: Just Culture/Reporting Culture).
- rewarding those who participate in creating this culture and are transparent about the mistakes they have made (ref: Just Culture/Reporting Culture).
- taking away the fear of punishment if an error is reported so that more people come forward.
- holding regular conferences or workshops with

people from all roles in the shipping industry with the specific aim of discussing mistakes and how to stop them from happening.

- requiring Flag State shipping accident reports to be released for general public viewing as soon as possible and ideally within 12 months, as in the aviation industry. This is over and above the information released to the IMO Global Information System (GISIS).
- making better use of safety checklists so that standard good practices are not skipped. ISM has given the industry checklists but in far too many cases these are simply a tick the box exercise. It is thus essential that checklists should be meaningful and be regularly reviewed in order that they are fit for purpose.
- building a non-hierarchical error culture, in which every crew member is able to challenge a decision.
- ensuring all crew members are trained in recognising patterns of behaviour which might indicate that a person's decision-making capabilities are impaired.
- taking pride in constantly improving as a seafarer.

**It should be noted that much of the above equally applies to the attitude of the company towards the personnel on board and the interaction between the ship and shore.**

#### Training for intuitive decision-making:

Expert knowledge is often associated with years of studying and knowing more than others, but the difference between experts and beginners is not simply how much they know. Instead, that knowledge combined with years



A junior officer seeing first-hand how the job should be done, sharing our experience is a great way to learn from each other.

of experience makes experts more sensitive to patterns of meaningful information. This allows them to assess situations more quickly without needing to compare multiple options. This skill is developed through years of experience and is called tacit knowledge - knowledge that is learnt through experience, insights, observation, emotion and intuition, as opposed to learning facts and rules.

The fact that it takes years to master intuitive decision making might seem obvious, but researchers are trying to find methods which speed-up how we teach tacit knowledge. But since it is gained from real world incidents, it is difficult to train. Each event a person comes across is unique, and factors outside our control often greatly affect the decisions taken in the moment.

However, experts have been able to come up with a framework to explain how experts use their experience to make their decisions in real-world scenarios. There are three main characteristics of these scenarios:

**Dynamics** – Every decision made has consequences for the decision made after.

**Uncertainty** – Information is never perfect in real world environments.

**Task sharing** – Real world situations are often too complex for one individual to make all the decisions, so decisions must be distributed amongst team members.

The good news is there are ways to improve how we become experts, which we would encourage trainees and trainers to consider. These include;

- Tactical Decision Games (TDGs) – short paper-and-pencil exercises that describe a situation, a goal and the resources available. TDGs are often presented in small groups, under the supervision of an organiser. At one point, he adds an unexpected and challenging twist that requires a quick decision. After announcing the unexpected twist, the organiser typically calls on a group member to make a decision with little time to think or analyse, just as they will have to in a real-life situation. It aims to prepare for uncertainty and time pressure, as well as improving communication skills. It also shows individual trainees how other crew members make decisions, which allows for easier exchange of knowledge.
- Protocol – this represents good practices, which everyone on the team needs to know. An effective way of learning protocol is through TDGs. In cases of a wrong decision, the organiser “punishes” the group by introducing variations that reflect the consequences of mistakes made in real life. This allows the decision-

makers to understand the reasons for the methods described in the protocol.

- On-the-job learning – this is effectively mirroring skilled decision makers as they perform difficult tasks and test out different strategies. A session of on-the-job learning should be followed by a review of the reasons for successes and failures to maximise the learning. In this case, the expert seafarer takes up the role of a mentor for a student.

#### On the job learning:

- Learning through discussion. This is similar to the review following on-the-job learning but can be carried out in a group of seafarers. This is best illustrated with an example: a class of 15-20 Navy pilots gathers for a debrief. An experienced pilot describes a night flight in which he lost all electrical power shortly after take-off but managed to navigate back to the aircraft carrier and land his plane safely. The class asks him questions about possible solutions to the problem. By the end of the discussion, it becomes apparent what sort of knowledge the pilot needed to safely operate the plane. The trainees agreed that they learned more about the system than when they were shown a wiring diagram and asked to memorize it.
- ShadowBox method – This was originally developed by the New York Fire Department. It is similar to Tactical Decision Games, but no organiser is required for this exercise. It also resembles on-the-job learning but does not require being on site. In this case, a group of experts read through a scenario, explain what they would do and why. The beginners are given the same scenarios and are asked to give their responses and reasons why, without knowing the experts' answers. Once they are finished, they are presented with the experts' answers and asked to compare their own to pick up any differences in decision making. They learn by seeing the situation through the eyes of the experts. A recent assessment of the method showed that the beginners significantly increased their match to experts after only a few hours.

These training methods have been used extensively by trainers in aviation, firefighting, the US Marine Corps, the Navy, and in medical fields. The Marine Corps went a step further when it came to Tactical Decision Games and incorporated virtual reality technologies to further improve the learning experience. During their 2017 Spartan Week organised with the Office of Naval Research to train decision making, they created something called the Interactive Tactical Decision Game - a web technology-

based application that serves the same purpose as the paper-and-pencil exercises in TDGs, but is more realistic, thanks to an augmented-reality headset.

It inserts virtual objects (e.g. vehicles) or effects (e.g. extreme weather conditions, or explosions in the case of the Marines) into a real environment to create situations that truly resemble real-life. One of the lieutenants taking part in the training stated that the simulation was a good simulation of past field exercises and a tool for giving valuable debrief on what they did wrong and what could be improved. He called it a real “a-ha” moment.

The advantage of using virtual reality in training is that it gives a sense of presence to the learner, it eliminates the boundary between a theoretical, imagined simulation and its correspondent, real-life situation.

### Summary:

In this booklet we discussed how we can improve our decision making as individuals and in groups, in various circumstances, and how to create an environment where the best decisions can be made. The following points summarise the key information that we hope can help you to improve yourself as a seafarer.

- We understand that diversity of thinking in a team gives greater perspective
- and helps to improve the quality of the decisions made
- We can improve the decisions we make as groups by communicating relevant information clearly.
- We can improve our decisions as groups by creating a comfortable and open atmosphere, which helps us to work at our best.
- We can avoid accidents by creating an environment where reporting mistakes and discussing them is welcomed and leads to better understanding of processes, avoiding the same mistakes in the future.
- We can help avoid mistakes by being open and informing others if we cannot perform at our best due to fatigue or any other personal circumstances, to reduce the chances of making a poor decision.
- We can improve the decisions we make as groups by establishing standard practices (the PACE method) and knowing our individual roles and those of our crewmates.
- There are several tools that we can use to train our intuitive decision making, make learning easier, and improve our understanding of our training.

### Further Reading:

Costa Concordia Investigation: [https://www.msb.se/Upload/Insats\\_och\\_beredskap/Brand\\_raddning/RITS/Concordia\\_Mission\\_final\\_report.pdf](https://www.msb.se/Upload/Insats_och_beredskap/Brand_raddning/RITS/Concordia_Mission_final_report.pdf)

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### Article. 2

## Heat and fatigue

**Outline: A report covering many issues, but primarily the story boils down to uncaring ship managers.**

### What the Reporter told us:

The report was initially received by the International Seafarers' Welfare and Assistance Network (ISWAN) who, with the consent of the caller, put him in contact with CHIRP. It involves several aspects including both seafarer welfare and safety / environmental issues.

Firstly, there were alleged MARPOL breaches with both oil and garbage being disposed of in a MARPOL Special Area, namely the Persian Gulf. CHIRP was asked for advice regarding this, (by the reporter through ISWAN). We responded with a breakdown of the regulations, direct to the reporter, whilst requesting more details of the location and nature of the garbage and oil that was discharged.

In the meantime, ISWAN were addressing other problems. The seafarer also mentioned that the vessel was in the Persian Gulf during August and for some time the generator had not worked and there was no air conditioning leading to a lack of sleep and fatigue. The seafarer requested that Flag State and the ITF be made aware – which ISWAN did. The vessel's Flag State investigated with the company who “seemed to be responding”.

CHIRP understands from the ISWAN / reporter dialogue that the crew were all signed off at the next port and although the reporter promised follow-up on the MARPOL issues raised above, this did not materialise. Discussions with ISWAN reveal that this is not uncommon – once a problem is partially resolved there is often no further follow up.!

### CHIRP Comment:

CHIRP is grateful to the Flag State in question for their intervention without which the seafarers' suffering on the vessel would almost certainly not have been attended to. It is important to note that intervention of the Flag State

should not have been necessary – any decent company would have addressed the issues well beforehand. This report goes to the heart of what bad operators get up to - quite simply, there is a complete lack of management responsibility and safety culture from top to bottom. But it also shows how several stakeholders can work together in this type of scenario. Further reports on these issues are welcomed by both ISWAN and *CHIRP* – If you do not report, then we cannot assist. ISWAN and *CHIRP* have a close working relationship and with the consent of the caller we may exchange reports of particular relevance. It is emphasised that both organisations treat reports in the strictest of confidence.

*CHIRP* notes that the fatigue and lack of sleep in this report was purely heat related. Prolonged exposure can lead to heat exhaustion. A crew that cannot sleep cannot operate, and any fatigue is more likely to lead to a loss of concentration and potentially an accident. A vessel without air conditioning demonstrates many human element issues – latent failures come down to lack of spares, possible financial constraints, and an insufficient management commitment.

The International Maritime Organization has recently updated a Maritime Safety Committee Circular relating to Guidelines on Fatigue. [MSC.1/Circ.1598](#) supersedes the previous Circular MSC.1/Circ.1014.

The new guidelines include;

- Introduction
- Module 1: Fatigue
- Module 2: Fatigue and the company
- Module 3: Fatigue and the seafarer
- Module 4: Fatigue awareness and training
- Module 5: Fatigue and ship design
- Module 6: Fatigue, the Administration and Port State authorities

Administrations, seafarers, companies, naval architects/ship designers and training providers are encouraged to take these guidelines into consideration when designing or modifying ships, when determining minimum safe manning and when developing pamphlets, video training modules, seminars and workshops, etc. on fatigue. Companies are strongly urged to take the issue of fatigue into account when developing, implementing and improving safety management systems under the ISM Code.

It is worth noting that the Maritime Labour Convention 2006 as amended does have a complaints procedure. Although intended to be used on board, the procedure does allow for escalation to the company, which must respond within a designated time frame. [Marine Shipping Notice 1849](#) gives further details for UK vessels, and other Flag States have issued similar guidance.

The environmental issues need to be highlighted – any company (or indeed on-board management) that deliberately violates MARPOL as alleged in this report, deserves to receive the full consequences for their actions. The company in question may consider themselves extremely fortunate that in this case the reporter declined to follow up, so *CHIRP* was unable to take the matter further.

Finally *CHIRP* and ISWAN both urge seafarers to fully follow up upon their reports since it is only when we get the full story that we are properly able to assist.

**The above article was published in MFB 54**

### Article. 3

## An error corrected

**Outline: Whilst under pilotage an error by the helmsman is picked up by both the pilot and the bridge team.**

### What the Reporter told us:

Recently, whilst piloting an inbound vessel, I gave a helm order of Port 10. The helmsman responded, “Port 10”, but only put 5 degrees of helm on. This was immediately noticed by myself and the master, and in order to rectify the matter I said, “Port 10” and pointed at the rudder angle indicator. The master also corrected the helmsman at which time the helm was adjusted to Port 10 and the helmsman apologised.

### CHIRP Comment:

This is a very simple example but is worth highlighting since it shows that we also receive examples of good practice with a pilot and bridge team working in harmony.

We often talk about the importance of “closed loop reporting” when discussing communications. Repeating back an instruction (or in this case the helm order) so as to ensure that the message has been clearly received is very important. The underlying lesson therefore is always to double check by an independent means. Here, the bridge team did so, since both the master and pilot noticed the error and corrected it.

*CHIRP* also notes that the language being used is important – are both parties speaking in their native or second language and are the orders being given in “standard marine vocabulary”? These are important factors to take into account when considering the closed loop communications cycle.

**The above article was published in MFB 54**

### Article. 4

## Can I have a permit?

**Outline: An engine room rating was assigned a task in the machinery spaces. He requested a permit to work for working at heights and asked for scaffolding to be erected to allow safe access. The Chief Engineer refused to issue a permit. Relationships rapidly spiralled downhill.**

### What the Reporter told us:

I am assigned as an engine fitter and was told to do a job in the engine room but there was no proper permit for the job or proper safety requirements like scaffolding. When I refused to do this job, the Chief Engineer charged me with refusing to work and told me I would be relieved at the next port. I am currently excluded from engine room duty.

### Further Dialogue:

The reporter was six months into a nine-month contract and had previously worked on the ship. The job in question was the installation of a new steam condenser and fuel coolers with associated pipework and brackets - it involved working between 2m and 5m above the engine room deck plates.

Apparently, the reporter was summoned to the bridge for a hearing / investigation at which he was found guilty of ‘insubordination, incompetence and inefficiency’ and summarily dismissed with repatriation at his own expense from the next port.



The correspondence from the reporter highlighted other concerns, many of which were outside CHIRP's remit – the main safety concern was the reported poor safety regime in the engine room. For other issues, it was obvious from early in the correspondence that the situation onboard involved several separate but interrelated issues, and further that onboard relationships had completely broken down. CHIRP advised the reporter to contact his employment office, the ITF and ISWAN concerning his employment status and welfare issues. The reporter confirmed that his employment office and the ITF had been contacted and had responded.

With respect to the safety concerns, CHIRP contacted the company DPA who confirmed that the safety issues would be investigated.

Subsequently CHIRP learnt that the reporter was safely repatriated and as the safety issues were still under investigation, he had not been charged any airfare and in addition he had been given 2 months compensatory basic wages for early repatriation.

#### CHIRP Comment:

The members of the MAB noted the following points:

- the positive response and engagement by the DPA are commendable.
- any working aloft requires a permit to work.
- any working aloft requires a safe platform to work from, a ladder can be used to access the safe platform or even the job site for inspection purposes but most tasks that require two hands cannot be carried out safely from a ladder as a ladder requires three points of contact.
- a formal task or job risk assessment involving both the chief engineer and the reporter plus the ship's safety officer would have highlighted the hazards, risks and safety requirements to mitigate them and would in all probability have prevented this situation from ever arising.
- on board a ship there is and must be a chain of command or hierarchy and this cannot be undermined. However, seniority carries responsibility and obligations with regards to man management and leadership skills which in this age of multi-cultural, multi-lingual and multi-national crews can be very difficult.
- there are very good HELM (Human Element, Leadership and Management) courses available which might be worthwhile for senior staff from all departments to attend either before promotion or as a periodic refresher.

The above article was published in MFB 57

#### Article. 5

## Accidents – how much are humans really to blame?

The following thought-provoking article was written for CHIRP Maritime by the Human Element team at the UK Maritime and Coastguard Agency, for inclusion in the 2019 Annual Digest. The message is clear – from a human element perspective there is so much more to achieve in order to highlight the interaction between people and technology, and to reduce accidents and incidents.

When something goes wrong, we always seem to blame someone. Why? Is this fair? Is it just? Is it even sensible or pragmatic?

Human fallibility is a fact, one that we must recognise, accept and live with. But that raises questions about how we view and approach safety. The traditional view may be to find out what happened, who did it and punish them. However, does this accurately recognise what accidents are, does it enable effective learning and therefore possible prevention of a repeat occurrence, and is it fair on those who are blamed?

People generally try to do their jobs as well and as safely as possible. But everyone operates within a natural performance range, fluctuating from very good to occasionally poor depending on the circumstances and a number of external performance-influencing factors. When performance is degraded, people are much more prone to making mistakes. People make mistakes all the time, but as we are quite good at catching our own mistakes, and other peoples' in good time, this does not inevitably lead to a negative consequence. This, ability to intervene before a mistake occurs means people actually prevent far more accidents than they cause.

It may be relatively easy and appealing to identify the immediate and active cause of an accident, but that is to do accident investigation a disservice and is an injustice to both "victims" and "culprits". Very few accidents or incidents have a single source or a single route cause. Rather, the causes are usually multiple, often complex and difficult to untangle, some extending back a long way in time, lying dormant in the system waiting to pounce on the unwary.

The traditional viewpoint may see it as a case of fallible, imperfect people operating otherwise perfect systems. If the system had been working perfectly well until someone broke it, it may seem to make sense to punish the person for being so careless.

However, we should take a step back and ask if that view, of perfect systems and imperfect operators, is correct.

The view that people are somehow separate from the systems they operate is wrong. People are an integral part of the system – a system with perhaps mechanical and electrical components, software components and yes, biological components. Hopefully an effective safety management system and operating procedures will make the whole lot work perfectly.

But let's deconstruct the system's components. The one part of the system that cannot be changed is the human. We can select and recruit the best people for the job, and we can provide the best training in the world, but the basic human being is the same as it has been for thousands of years. The constraints on our physical, mental and emotional capabilities are the same as they were for our cave man ancestors – but now we have to know a lot more and do much more difficult things. To modify a human to fit a system is impossible.

The concept of human-centred design should help address this. We have great flexibility over how we design the mechanical, electrical, software and other parts of any system (within the laws of physics). We also have great control over how we design the operating procedures and the safety management system. The component parts of the system often appear to work very well when viewed in isolation, from the perspective of the designer, but the key question is how well we design these parts of the system to match the operating capabilities of the human. From the perspective of the user the answer is often "not very well". Certainly not as well as some other industries. Meeting end user technical performance requirements is one thing, but accounting for natural human performance capabilities is another.



Some view the discipline of the human element (human factors) as being all about the people, however we need to look much wider. We need to look at the overall system and how it works; how it guides people to safe, error free performance; or how it can push people unwittingly towards making errors; and how it fails to prevent those errors in the first place. Basically, we need to set people up to succeed, not fail. In terms of safety, we need to evaluate the system holistically, not just the human bits, and preferably evaluate the system before an accident happens.

If we look at the human part of the system, there are a number of well-established things that can go wrong.

Firstly, there are the honest mistakes and errors, instances where people are genuinely trying to do the job properly and safely, but an error occurs. Slips, where an operator tries to carry out the correct action but doesn't do it correctly; lapses where the operator accidentally omits an intended action; and knowledge-based errors where an operator doesn't have sufficient knowledge to undertake a task are all commonplace. The common factor in each of these scenarios is that the operators' intentions are to carry out the task properly to the best of their ability. There is no intention to disobey any work procedure or instruction and the error is as much a surprise and disappointment to the operator as anyone else. Many of these errors are system-induced, often resulting from multiple failings within the overall system.

More serious are procedural violations where the operator knowingly breaks the rules but does so without any intention to cause a bad outcome. There are many reasons for violating the rules. The speeding motorist takes a calculated risk that no harm will come from driving above the speed limit, maybe to get to the destination more quickly or possibly simply because the speed limit feels boring. A maintenance engineer short cuts a procedure without any intention to cause damage or injury to get the job done more quickly or because following the full procedure is tedious. These would appear to be for personal reasons. However, if an engineer uses an incorrect tool because the correct tool isn't available, and he feels pressure to get the job done – he or she is acting in the organisation's interest. It is not unknown for organisations to turn a blind eye to this type of violation – until something goes wrong and it becomes expedient to find someone to blame.

Occasionally however, it may be essential to break a written procedure, where in a given scenario the procedure just doesn't work. This of course is understandable; it is simply impossible to produce procedures that cover every scenario and variation and the operator may have to rely on professional skill and judgement alone, combined with effective dynamic risk assessment.

Human error should not be the end of the investigation, it is just the start. The frequent conclusion, "human error" is usually too simplistic and prevents a deeper understanding of what is actually going on in the system. If we are to address human error effectively, we need to look at how the other parts of the system failed to prevent the error(s) and how we can adapt the system components to reduce error and system failure. For instance:

- Is all equipment available and easy to use?
- Is all specialist equipment available and working correctly?
- Does the design of equipment assist the operator to use it properly as intended?
- Are all displays easy to see and read?

- Do displays and controls follow logically and are they located according to importance, function, sequence and frequency of use?
- Are controls and inputs easy to use or do they contain unnecessary and frustrating steps?
- Is operator access easy?
- Are any of the controls and inputs likely to cause the operator to feel frustration, irritation or boredom and therefore be tempted either not to use them or miss out steps altogether?

Similar analysis should be carried out with work instructions and procedures:

- Are they available and understood?
- Do they work effectively and make sense in the real world faced by seafarers?
- Have operators had input into their development?
- Do they help the operator carry out the task or do they contain unnecessarily difficult steps, or cause frustration or boredom that may prompt an operator to miss them out?
- Are all operators adequately trained?
- Does the safety management system contain effective barriers to prevent and catch errors?
- Where can errors fully penetrate the defences in the safety management system?
- In terms of latent errors, some of the weaknesses and fallibilities in the SMS may have been set many years previously. Have new procedures taken into account those already in place, and do they support or contradict them?
- How well has normal human behaviour been taken into consideration when designing equipment and procedures?
- Are human performance and limitations understood effectively?
- Has human physical and mental capability been considered, including physical, mental and emotional states; competence, and awareness to carry out the tasks in hand; individual motivation; and natural human cognitive biases that affect how humans behave, particularly our tendency to prioritise being efficient over being thorough, which can have serious implications in safety-critical work?

This is in no way condoning poor operator performance, simply recognising the facts about normal human behaviour.

Organisational culture plays a major role in safety and accident prevention.

- Is the organisation really committed to preventing accidents?
- Does it have an effective learning culture with the mechanisms in place to achieve that?
- Is its ethos proactive or reactive?
- Does the organisation actively and routinely seek safety information in order to predict and prevent accidents happening? Does the organisation try to learn in the aftermath of accidents?

High Reliability Organisations (HROs) actively seek out bad news because it gives them the best chance of predicting and preventing accidents. They generally know where the problems are because their staff tell them, on a basis of mutual trust where everyone feels safe to speak up about safety concerns in the knowledge that they will not be blamed, punished or otherwise treated unfairly for doing so. Do staff in your organisation share that feeling of trust?

How well people perform at any given time also depends on a great range of external factors, many of

which are largely outside our control. This includes weather, climate, other shipping, performance of suppliers and sub-contractors, port authorities or distractions from shore side management - all of which can negatively impact individual performance at any given time.

- How are staff treated after an accident?
- Are they singled out and blamed or are they treated with fair-minded accountability, recognising that they were probably doing their best in difficult circumstances, possibly under stress, and that very many other components of the system were combining against them?

It is important to differentiate between a no-blame culture and fair-minded accountability (or a Just Culture). Malicious, reckless or negligent behaviour should not be tolerated. It is right that everyone should be accountable for their actions, but that does not automatically mean they should be blamed for error – after all that is akin to being blamed simply for being human. We need to recognise that the human in the system is just that, one part of a system that has failed overall.

80% of conditions leading to errors are in the control of the organisation. Organisations need to recognise this and take effective action. It is rare that an accident is caused by a lone rogue operator, and it is much more likely to be caused by systemic organisational weaknesses. It is possible to investigate organisational systems, identify weakness and take corrective action. It is hard but it can be done, and those with a real commitment to improving safety and protecting the welfare and lives of their crew will do so. We don't just need to look at the hardware and software, we need to understand how we integrate the liveware too.

## Section two

# DECK SAFETY

In these days of increasing automation and shrinking crew sizes, perhaps we should not be surprised that fairly basic errors continue to be made during routine operations. Indeed, perhaps we should be grateful that we do not receive more reports like the ones appearing here.

We start with a potentially deadly method of loading oil drums using a wooden pallet which was not designed for the job and, as it turned out, was completely unsuitable. There is also a report about poor communications between the wheelhouse and the forward mooring party during an attempt to moor at a CBM.

This is followed by an almost unbelievable account of a ship where liferafts were unshipped and stored in the accommodation in bad weather, which completely ignores the reason for having liferafts in the first place.

We also learn about a port which insists on making tugs fast in positions which can only be described as dangerous, and finish with an account of a near-miss with an H<sub>2</sub>S vapour lock.

The Insight article in this section is an excellent paper by our Maritime Advisor, Capt, Ranjith Cheerath, about the dangers of H<sub>2</sub>S and how to deal with them – vital reading for everyone at sea, because this very nasty gas can crop up in some very unexpected places.



## Article. 6

## Lifting Operations

**Outline:** A report describing a lifting operation which highlights several areas where there is a high potential for an accident to occur.

### What the Reporter told us:

Recently, I observed lifting operations being performed on a research vessel and on the basis of a single observation, the operation fell short of the minimum expectations under SI 2006 No.2184. The Merchant Shipping and Fishing Vessels (Lifting Operations and Lifting Equipment) regulations 2006. The deficiencies identified could lead to serious harm to the vessel's crew, third parties and/or pedestrians.

Specifically, four oil drums were lifted unsecured on a wooden pallet using web straps. During the lifting operation the wooden pallet, which had not been designed for this purpose, began to break up. The area had not been cordoned off and the load passed over the single gangway access to the vessel which was not secure.

On the basis of these observations we contacted the vessel operator.

### Lessons Learned:

The vessel operator reacted in a positive way, performing an investigation that identified failings against their SMS. They have since procured additional equipment which, if used correctly, should ensure that similar operations are performed safely in future.

The purpose of issuing this report is that it is the experience of the reporter that lifting of goods on wooden pallets using web straps that have not been designed for this purpose is not unique to this lift. As an ex-mariner and having seen loads fail in similar situations, I find this deeply concerning.

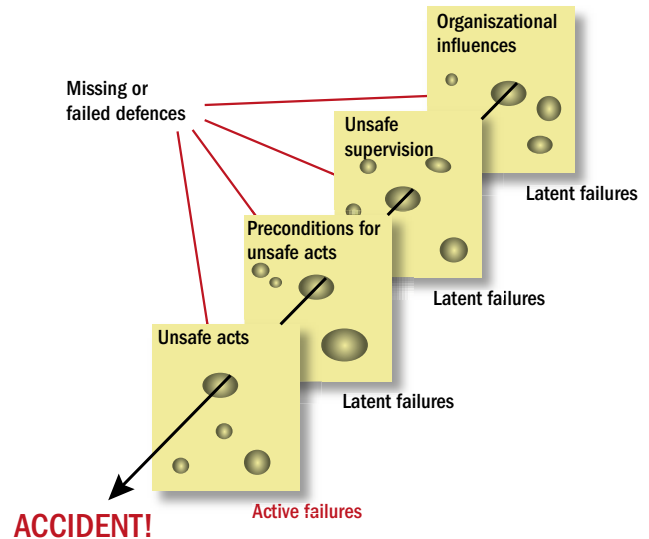
### CHIRP Comment:

Having discussed this report, the Maritime Advisory Board commented that the reporter raises several important issues and agreed entirely with the concerns, which deserve analysis and promulgation.

In terms of Near Miss reports, the lifting incidents received by CHIRP and other organisations such as the International Marine Contractors Association (IMCA) and the Marine Safety Forum (MSF), are almost entirely associated with routine lifting operations. It is rare that problems have been associated with a lifting plan itself, but rather with how it has been executed. It is also rare to receive a report concerning heavy lifts or complex operations – "routine" is the key word here.

Reading the report, you are led through a series of failures of the Swiss Cheese model (see diagram) where each defence which has been breached, no matter how minor, could lead to an injury or worse. The more defences that are breached – the more holes in the Swiss Cheese and the greater the likelihood of all of the holes lining up leading to the increased probability of an incident.

Looking more closely at the report to identify the failings, the first part states that oil drums were lifted **unsecured** on a **wooden pallet** using **web straps**. That is three defences breached in less than a dozen words. During the lifting operation the wooden pallet, **which had not been designed for this purpose, began to break up**. The **area had not been barriered off** and the **load passed over the single gangway access** to the vessel which was not secure.



**Swiss Cheese model showing breaches of defences with potential for an incident**

A considered risk assessment treating each lift as an independent operation (i.e. not a generic risk assessment) and backed up by an on-site toolbox talk prior to commencement of an operation, should be able to eliminate poor seamanship practices, incorrect lifting techniques and incorrect apparatus used for lifting. Training should also be taken into account. It is equally important that the location of the lifting is considered. In this case the load passed over a gangway and the consequences of anybody boarding as the load fails do not bear thinking about – simply due to the area not being cordoned off.

This is a clear example of one area where, if companies looked into their procedures sufficiently, it would uncover the complete panoply of missing elements of a safety culture, including procedures, training, lack of workforce empowerment, communications, incompatible goals, etc. In this particular case the company in question solved a particular problem but could have learnt so much more.

The Code of Safe Working Practices devotes all of Chapter 19 to lifting operations and lifting plant. This includes correct signalling, and information on regulatory requirements supplemented by Marine Guidance Notes. An extract succinctly sums up this report;

19.11 Lifting operations.

19.11.1 Every lifting operation must be:

- subject to risk assessment;
- properly planned;
- appropriately supervised; and
- carried out in a safe manner.

**In short, ask whether a risk assessment and toolbox talk have been conducted prior to commencement – if not, stop the job until they have been carried out.**

### Useful reading:

The International Marine Contractors Association (IMCA) has several safety flashes relating to lifting operations these may be found [HERE](http://www.imca-int.com/alert/alerts/safety-flash/) (www.imca-int.com/alert/alerts/safety-flash/) and are replicated in the CHIRP reference library. IMCA also publish useful offshore lifting guidelines. The Marine Safety Forum also publishes Safety Alerts on the subject.

The above article was published in MFB 54

## Article 7

## Incident at a Conventional Buoy Mooring (CBM) system

**Outline: A report highlighting the importance of proper communication between all parties during mooring operations.**

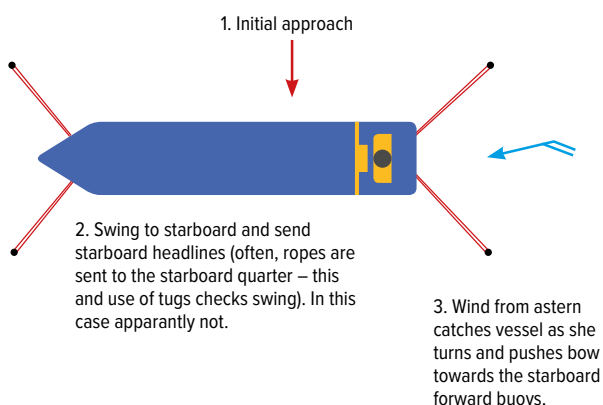
### What the Reporter told us:

The vessel was mooring at a CBM during daylight, with four crew manning the forward mooring station. Two starboard headlines had been sent and were secured to a mooring buoy. A tug was made fast at the centre lead aft (while no tug was provided forward). At the time of the incident, the vessel was being swung to starboard into position, prior to sending the port headlines. Astern propulsion was used to counter the wind, which was blowing from astern, and causing the vessel to drift closer to the forward starboard mooring buoy. At the forward mooring station, winches for the starboard headlines remained in gear, but as the vessel moved astern, they were not paid out quickly enough. As a result of the vessel moving astern, excessive tension was applied on the two headlines, which unfortunately caused both to part in quick succession.

Although there was no injury to the crew on this occasion, it vividly highlights the inadequate communication between the bridge and the forward mooring teams.

### Lessons Learned:

- To highlight the need for open and continuous communication between the bridge and mooring stations, this should be fully discussed during the pre-mooring toolbox talk and risk assessment meeting.
- For situational awareness, the bridge team should ALWAYS notify the mooring stations of any intended actions. Similarly, both mooring stations should also provide a continuous status report for the bridge team's awareness.



Schematic of a Conventional Buoy Mooring system

### CHIRP Comment:

Having discussed this report, the Maritime Advisory Board agreed that a lack of communication was central to this incident and that all aspects of the intended operation including hazards should have been covered at the pre-mooring meeting.

Mooring to a CBM requires extreme precision and timing in order to safely conduct the operation. All personnel should be fully aware of the requirements. Sometimes an anchor may be used to effect a turn. This requires a minimum of two people at the anchor station, the windlass operator and the officer in charge. If we now add winchmen running lines to the buoys we are rapidly running out of available personnel. Therefore, it can be seen that it is easy to become distracted or preoccupied with one particular task and not keep a full overview of the situation.

And what of the tug? The prevailing weather conditions should have made it clear that the tug would be required to pull astern to check the vessel. In addition, the pull (if on the starboard quarter) could have checked the natural transverse thrust caused by the astern movement.

Above all, if control of the operation had been lost, then releasing the headlines and steaming out may have been the better option.

The above article was published in MFB 55

## Article 8

## Heavy weather checklists – life rafts

**Outline: A disturbing report from a ship's crew member concerning non-availability of life rafts.**

### What the Reporter told us:

Whilst transiting the North Atlantic in very rough weather, all of the vessel's life rafts were secured inside the accommodation. This resulted in the freefall lifeboat being the only equipment immediately available in the event of having to abandon ship.

### Further Dialogue:

The reporter declined to name the vessel or company for fear of reprisals / loss of job. The life rafts were moved inside the accommodation on the direct instructions of the master after the vessel received a severe weather warning from the company. There was a severe weather check list as part of the SMS, but there was no reference to securing life rafts inside the accommodation.

### CHIRP Comment:

The Maritime Advisory Board noted that this was a terrible practice – life rafts will not float free in the accommodation. They have a purpose, which is of course abandonment, and thus need to be effectively secured on deck.

The fact that there was a severe weather checklist suggests a level of competence and integrity on the part of the company, but is it fit for purpose or just a 'tick box' exercise? When the ship's crew are so worried about reprisals that they will not notify either the master or the DPA, there is something wrong with the culture onboard and within the company. In this case the self-monitoring function of the DPA has broken down.

CHIRP highlights this question to all mariners. How best can you ensure the integrity of your Life Saving Appliances to ensure they are ready for use in any emergency?

The above article was published in MFB 55



## Article. 9

## Unsafe tug securing arrangements

**Outline: A report from a large container ship highlighting difficulties securing tugs in a specific port.**

### What the Reporter told us:

My container vessel regularly calls at a container terminal in a specific port where, during mooring operations, we often experience problems taking the tug's line.

The problem is that the line presented by the tug is of such a size and weight that it is impossible to take the line by hand. In addition, the panama lead and bollards preferred by the pilot and tugs are remote and not accessible from any of our mooring winches.

The pilots and tugs are extremely reluctant to make the tugs fast at the vessel's mooring stations fore and aft, where the mooring winches could be used to lift the tug's line. We have only been able to convince the pilots/tugs to make fast with the winches at the mooring areas on very rare occasions.

The current stop-gap solution is to use a small portable gasoline powered winch, which was originally used for forestry and moving logs, to lift the tugs line. These small winches have a rated pulling capacity of 770kg but in practice they are unable to safely hoist the tug's lines due to the lines large and heavy construction. The eye splice is approximately 25cm in diameter, with chafing rope served around the eye which makes it particularly inflexible. When attempting to bring this eye through the panama chock it must be squeezed through, which drastically increases the tension on the messenger line and on occasions requires crew members to lean outboard in an attempt to feed the eye through the panama lead – which is obviously unsafe.

Regrettably, as the tugs and pilots refuse to make the tugs fast where ship's winches are installed, we are forced to continue to use the small winch which presents a myriad of safety concerns.

On the part of the tug company and the pilots, there seems to be little concern given to the safety of the ship's crew making fast the line. They have to lift a line that is much too heavy and lift it in an area of the ship that was not designed for lifting lines. There should be some regulation governing the maximum size and weight of a tug line that a ship's crew are expected to manhandle. If large tug lines continue to be used, then they should only be used where there is suitable mechanical lifting capacity.

Our operating company would like to solve this problem, but it has proven difficult, as the root of the issue lies with the weight of the line and the placement of the tug which is at the advice of the pilot and tugboat operator. My company is investigating adding machinery to the vessel, but this will take years and might not work at all. Any Master refusing to take a line from a tug due to safety concerns would feel exposed to criticism for exposing the vessel to additional risks during berthing.

### Further Dialogue:

The reporter supplied extracts of the vessels General Arrangement plan and other information at CHIRP's request. Discussion highlighted the following issues:

- design issue – the ship was built with panama fairleads and mooring bits in remote locations not serviced by any appropriate mooring machinery.

- the size of the tugs mooring lines in this terminal exacerbated by the fitting of chafing lines served around the eyes further add to the overall diameter and weight of the lines.
- the lack of flexibility of the tugs line when trying to pass it through the panama fairlead and turn 90° at the fairlead to secure on the bits.
- the insistence of pilots and tug operators to make fast at specific fairleads rather than at ones serviced by appropriate mooring equipment.

The design issue is for the company to address but that will take time, as the reporter noted. Equally, trying to change the size and arrangement of the tug's line is not in the vessels immediate control. However, the vessel can refuse to take tugs at the problem locations on the grounds of safety. The precedent already exists "We have been able to convince the tugs/pilots to make fast with the winches at the mooring areas, but only occasionally."

CHIRP suggested a formal risk assessment be carried out on board, duly signed off and stamped by the master with a copy forwarded to the company. The company could confirm the findings of the risk assessment and write to the port, vetoing the use of the upper deck chocks by all tugs. This could be achieved directly or through the ship's agents. The issue with making the tugs fast should be fully highlighted at the Master/Pilot information exchange.

### CHIRP Comment:

The members of the Maritime Advisory Board noted the following:

- lack of suitable winches at these locations is a basic design issue which can be resolved over time but that will not solve the problem for the crew presently on board.
- If the company is fully aware of the problem, the members were disappointed with the idea that captains would feel exposed to criticism for refusing to take a tug's line at those locations on the grounds of safety.
- risk assessments carried out on board are your friend. If a formal risk assessment for a specific task deems it unsafe and there are no practical mitigating actions available, then that task should not be undertaken. It would be unwise to override the risk assessment unless new mitigating actions or equipment were made available.
- the portable gasoline powered winches are not suitable for the task and should not be used.
- crew members leaning outboard to manhandle the eye of the tug's line while the messenger is under tension is simply not safe.
- if a task cannot be done safely it should not be done.
- most ships have towage plans. Armed with a formal risk assessment these can be amended even for a specific port. Seal up the panama leads prior to arrival at the specific port. The leads can also be marked as 'not for harbour towage'.
- there are lighter tug lines available on the market, but the board members recognised that the reporter's company has no direct control over the tug operators.
- going back to basic design issues, a ship of nearly 300m length needs robust tugs and mooring lines. Nowadays it is unreasonable to install panama leads and bitt sets suitable for those lines without a mechanical winch or capstan to handle them. The days of hauling ropes hand over hand should be over.

As vessels increase in size, ports need to adapt in order to accommodate them. This report is a classic example of traditional procedures not being updated to serve modern needs.

The above article was published in MFB 57

#### Article. 10

## H<sub>2</sub>S incident

**Outline:** The following report highlights a near miss with H<sub>2</sub>S

### Initial Report:

A tank inspection was being carried out on board a tanker on completion of discharge. The inspection involved the Chief Officer, cargo inspector and an AB – they were checking tanks with a portable (closed type) gauging tape, which is achieved through a vapour lock arrangement.

At 5P COT the AB opened the vapour lock valve without checking if the cap was securely screwed on or manually holding the cap in place. The inert gas pressure inside the tank (about 500mmwg) ejected the cap and detached it from the safety chain to a height of about 50cm, nearly hitting the AB in the face and releasing cargo vapours on deck with H<sub>2</sub>S content of 700ppm. Fortunately, nobody was injured.

### CHIRP Comment:

The members of the MAB noted the following points:

- the dangers of H<sub>2</sub>S are well known. Equally H<sub>2</sub>S and carelessness are not a good combination
- this simple act of carelessness very nearly resulted in an injury and could easily have proved fatal. One breath in and a person could be unconscious with that level of H<sub>2</sub>S.
- a surveyor was killed some time ago carrying out a similar operation when he took one breath of air contaminated with 2000ppm H<sub>2</sub>S.
- it was considered that 500mmwg was an excessive IG pressure to be undertaking post discharge tank inspections. Allowing the IG pressure to reduce towards the end of the cargo operation would have reduced the hazard of this incident and reduced the potential for pollution.
- there were three people involved in the tank inspections. If they had worked as a team there could have been better monitoring, and if they were dealing with two tanks at once then adding an extra person would have aided oversight and probably have prevented this incident.

The above article was published in MFB 57

#### Article. 11

## Insight Article: H<sub>2</sub>S – Exposure, toxicity, and good practices to adopt

### Introduction

In our Maritime FEEBACK issue 57 we published a report relating to an incident that involved the dangerous

exposure of three persons to hydrogen sulphide (H<sub>2</sub>S), aboard an oil tanker.

This paper follows up on that report. It focuses on human exposure to H<sub>2</sub>S by inhalation and highlights safe work practices that, if adopted, will greatly reduce the likelihood of dangerous exposure to H<sub>2</sub>S on board. Special attention will be given to operations on oil tankers as the above-mentioned incident report concerned an oil tanker.

### Toxicity of hydrogen sulphide

Hydrogen sulphide is absorbed into the body by inhalation. H<sub>2</sub>S is an extremely toxic colourless gas at ambient pressure and temperature. It has a distinctive odour of rotten eggs. The gas is 1.189 times heavier than air and therefore has a tendency to first sink to the lower parts of a compartment, deck or space. A widely recognized occupational exposure limit for airborne concentrations has been established by the American Conference of Governmental Industrial Hygienists (ACGIH), and the definitions of the terms they use are shown in figure 1.

**ACGIH currently recommends a Threshold Limit Value – Time Weighted Average (TLV-TWA) of 1 ppm and a Threshold Limit Value – Short-Term Exposure Limit (TLV-STEL) of 5 ppm for hydrogen sulphide.**

Threshold Limit Value (TLV®) refers to an airborne concentration of the chemical substance and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects.

Threshold Limit Value–Time-Weighted Average (TLV–TWA)

The TWA concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, for a working lifetime without adverse effect.

Threshold Limit Value–Short-Term Exposure Limit (TLV–STEL)

A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the 8-hour TWA is within the TLV–TWA.

Threshold Limit Value–Ceiling (TLV–C)

The concentration that should not be exceeded during any part of the working exposure.

Refer to <https://www.acgih.org/tlv-bei-guidelines/tlv-chemical-substances-introduction> for a detailed ACGIH definition of TLVs.

Figure 1 – Threshold Limit Value Definitions

The odour threshold for hydrogen sulphide is extremely low. In the air, the gas can be smelled at concentrations of 0.01 ppm (when the rotten egg smell is first noticeable to some). For a toxic gas, this should be considered as a positive attribute.

In the case of H<sub>2</sub>S, at concentrations of around 100 ppm, the victim can have olfactory fatigue and soon cease to smell the gas, so after initially smelling H<sub>2</sub>S the subsequent absence of smell does not indicate that the

atmosphere is safe. Although most people can smell very low concentrations of H<sub>2</sub>S, it is dangerous to assume that the odour provides adequate warning. At concentrations of around 150 ppm paralysis of the olfactory nerve has been observed, so sense of smell is totally deadened. Progressively higher concentrations of hydrogen sulphide have even more harmful effects, and exposure to very high concentrations causes immediate death. Also, death or permanent injury may occur after very short exposure to small quantities. The gas acts directly upon the nervous system resulting in paralysis of respiratory centres.

The following table summarises the negative health effects of inhalation of hydrogen sulphide:

<b>Human health effects of hydrogen sulphide at various concentrations – exposure via inhalation</b>	
<b>H<sub>2</sub>S Concentration (ppm vol. in air)</b>	<b>Physiological Effects</b>
0.00011-0.00033	Typical background concentrations
0.01-1.5	Odour threshold (when rotten egg smell is first noticeable to some). The odour becomes more offensive at 3-5 ppm. Above 30 ppm, odour described as sweet or sickeningly sweet.
2-5	Prolonged exposure may cause nausea, tearing of the eyes, headaches or loss of sleep. Airway problems (bronchial constriction) in some asthma patients.
20	Possible fatigue, loss of appetite, headache, irritability, poor memory, dizziness.
50-100	Slight conjunctivitis (“gas eye”) and respiratory tract irritation after 1 hour. May cause digestive upset and loss of appetite.
100	Coughing, eye irritation, loss of smell after 2-15 minutes (olfactory fatigue). Altered breathing, drowsiness after 15-30 minutes. Throat irritation after 1 hour. A gradual increase in severity of symptoms over several hours. Death may occur after 48 hours.
100-150	Loss of smell (olfactory fatigue or paralysis).
200-300	Marked conjunctivitis and respiratory tract irritation after 1 hour. Pulmonary oedema may occur from prolonged exposure.
500-700	Causes staggering collapse in 5 minutes. Serious damage to the eyes in 30 minutes. Death after 30-60 minutes.
700-1000	Rapid unconsciousness, “knockdown” or immediate collapse

	within 1 to 2 breaths, breathing stops, death within minutes.
1000-2000	Nearly instant death
<i>Developed from the table provided in the US Department of Labor website: <a href="https://www.osha.gov/SLTC/hydrogensulfide/hazards.html">https://www.osha.gov/SLTC/hydrogensulfide/hazards.html</a></i>	

**Figure 2 – Human Health Effects of Exposure to H<sub>2</sub>S by Inhalation.**

**Where is hydrogen sulphide likely to occur on board?**

On board ships there are several circumstances where personnel can be subject to H<sub>2</sub>S exposure. Strict monitoring and detection methods along with appropriate use of personal protective equipment will greatly reduce the risk of hazardous exposure to H<sub>2</sub>S. Following are some of the common sources of H<sub>2</sub>S on board:

- H<sub>2</sub>S can be generated by the decay of organic matter in the absence of air. Whenever there is:
  - a mixture of vegetable oils or animal oils with seawater.
  - a mixture of slops from drilling operations with seawater.
- shipboard sewage systems and piping are prone to release H<sub>2</sub>S when opened without ensuring that they are isolated, cleared of all sewage, and ventilated/flushed to ensure safe atmospheres within them.
- cargo hold bilges and pumping systems containing residues of grain or similar cargoes which are exposed to seawater and allowed to decay are likely to generate H<sub>2</sub>S.
- all enclosed spaces. Treat every enclosed space on board as a suspect for H<sub>2</sub>S until proven otherwise by detection and monitoring device(s).
- H<sub>2</sub>S can occur in the vapour space of tanks carrying bunker oils or petroleum oil cargoes (including crude oil) due to the inherent chemical composition of the oil. The concentration of H<sub>2</sub>S in the liquid can be readily discovered by examining the quality certificate of the oil. The concentration of H<sub>2</sub>S in the liquid is usually expressed in ppm by weight whereas the concentration of H<sub>2</sub>S in the atmosphere is expressed in ppm by volume. Although it is not possible to predict the likely vapour concentration from any given liquid concentration, it is known that the H<sub>2</sub>S concentration in the vapour can be higher - for example crude oil containing 70 ppm (by weight) H<sub>2</sub>S has been shown on occasion to produce a concentration of as much as 7,000 ppm (by volume) in the gas stream leaving the tank vent. H<sub>2</sub>S can be encountered in crude oils as well as refined products such as naphtha, fuel oil, bunker fuels, bitumens and gas oils. All precautions for H<sub>2</sub>S should be taken for every oil bunker/cargo until the absence of H<sub>2</sub>S has been confirmed through relevant cargo information (including Material Safety Data Sheets) and by onboard monitoring.

**Training of shipboard personnel**

The best way to prevent H<sub>2</sub>S exposure, injury and death on board is through good planning, risk assessments, and targeted training of all seafarers. The following topics may be considered for inclusion in the training;

- identification of the characteristics, sources, and hazards of H<sub>2</sub>S.

- symptoms of H<sub>2</sub>S exposure.
- use and operation of the H<sub>2</sub>S detection devices on board.
- recognition of, and proper response to, H<sub>2</sub>S warnings and alarms, including alarms of portable and personal H<sub>2</sub>S gas detection devices.
- use and maintenance of PPE including Emergency Escape Breathing Device (EEBD) and Self-contained Compressed Air Breathing Apparatus (SCABA). Appropriate respiratory protection for normal and emergency use.
- rescue techniques and first-aid procedures to be used in an H<sub>2</sub>S exposure incident.
- emergency response procedures, corrective actions, and shutdown procedures.
- general safe working practices to prevent accidental exposure to H<sub>2</sub>S during routine work and maintenance procedures.
- enclosed space entry procedures.
- wind direction awareness; using it to advantage during operations on board.
- corrosion and metal fatigue to ship's systems and equipment caused by H<sub>2</sub>S exposure. The corrosive nature of H<sub>2</sub>S can adversely affect electronic H<sub>2</sub>S gas detection devices over a period.

The training, focused upon H<sub>2</sub>S hazards or potential hazards on board, should serve as a supplement to the shipboard familiarization training and all existing mandatory training and drills required by ISM.

In addition to the training mentioned above, shipboard personnel should include a task-specific risk assessment review of the likelihood of H<sub>2</sub>S and additional precautions to be taken, in the toolbox meeting before any task.

### Detection and monitoring of hydrogen sulphide

Sense of smell provides the earliest detection of H<sub>2</sub>S.

**However, sense of smell should never be relied upon as a warning device for H<sub>2</sub>S** because the sense of smell will be deadened as the concentration of H<sub>2</sub>S increases. The only reliable means for detection of hydrogen sulphide in the atmosphere is by using purpose-built gas detection devices.

Since there are several circumstances where personnel can be subject to H<sub>2</sub>S exposure on board, the risk of H<sub>2</sub>S exposure should always be considered during job / risk / hazard assessments. In all cases where exposure of personnel to H<sub>2</sub>S is likely, the ship's safety management system should require that areas accessed by personnel are monitored by gas detection devices to establish that the area is free of harmful levels of H<sub>2</sub>S and to establish the level of personal protective equipment needed in that area. Care should be taken to ensure that the measurement units of the gas detection device are in ppm to facilitate easy comparison with the published TLV of the gas.

Monitoring of H<sub>2</sub>S in an enclosed space before and during enclosed space entry is mandated by international regulations. Regulation 7 of SOLAS Chapter XI-1 states "Every ship to which chapter I applies shall carry an appropriate portable atmosphere testing instrument or instruments. As a minimum, these shall be capable of measuring concentrations of oxygen, flammable gases or vapours, hydrogen sulphide and carbon monoxide prior to entry into enclosed spaces. Instruments carried under other requirements may satisfy this regulation. Suitable means shall be provided for the calibration of all such instruments."

**Whenever risk assessment establishes a risk of H<sub>2</sub>S exposure, personnel should wear personal H<sub>2</sub>S gas detection devices** in addition to appropriate personal protective

equipment. **H<sub>2</sub>S gas detection devices should be set to alarm at an airborne concentration of hydrogen sulphide at TLV-TWA.** If there is more than one alarm provided in the device the first alarm (LOW) should be set at TLV-TWA and the second alarm (HIGH) should be set at TLV-STEL.

Persons responsible for use and calibration of these devices should be fully familiar with the contents of the equipment manual and capable of operating/calibrating the devices in accordance with the guidance provided in the manual.

Personnel involved in gauging, sampling, cleaning filters, entering a pumproom, connecting and disconnecting loading lines, draining to open containments and mopping up spills of bunkers or petroleum cargoes which may release harmful concentrations of H<sub>2</sub>S should also wear personal H<sub>2</sub>S gas detection devices. Personal sampling badges should not be used as a means of detection of H<sub>2</sub>S.

An H<sub>2</sub>S gas detection device based upon an electrochemical sensor is the most practical type of H<sub>2</sub>S detector because it responds in seconds to gas exposure. When selecting an H<sub>2</sub>S gas detection device it is extremely important to ensure it has the sensitivity and accuracy needed to measure airborne concentrations of H<sub>2</sub>S from below TLV-TWA through to extremely high concentrations that may be operationally encountered. Ideally, the device should be:

- conveniently small and portable;
- intrinsically safe for use in areas where a combustible atmosphere may exist;
- response time of 15 seconds or less;
- a lower detection limit (sensitivity) of no more than 0.5 ppm;
- ppm resolution (smallest detectable change);
- an accuracy of ± 5% over its calibrated range of at least 0-100 ppm;
- an accuracy of ± 0.05 ppm at 1 ppm (± 5%) to meet the requirement of a reliable alarm;
- a built-in data-logging function for data collection and analysis;
- a low probability of false alarms. Generally, this requires a design with low-temperature drift (typically, less than 0.1 ppm for the zero reading) and high selectivity for H<sub>2</sub>S in the presence of interfering gases, such as sulphur dioxide, nitrogen dioxide, and hydrocarbons. Reliable H<sub>2</sub>S measurements at sub-ppm levels and selectivity to discriminate H<sub>2</sub>S from interfering materials in the work environment are crucial elements of a monitoring device.

If reliable electronic H<sub>2</sub>S gas detection devices are not available, due to breakdown or defect, detector tubes should be used to monitor H<sub>2</sub>S.

### PPE for hydrogen sulphide

- Filter respirators should not be used as inhalation protection against H<sub>2</sub>S because airborne concentrations of the gas may exceed the operational capability of the respirator being used. This situation could prove fatal.
- Although measurements may not reveal hazardous levels of H<sub>2</sub>S, whenever there is a known H<sub>2</sub>S hazard in an area, all persons working in that area should be equipped with Emergency Escape Breathing Devices (EEBD) in addition to personal H<sub>2</sub>S gas detection devices. These persons should have been trained to respond to the personal H<sub>2</sub>S gas detection device alarm when it activates. In particular, when the first alarm activates (TLV-TWA alarm or LOW alarm), they should don the EEBD and immediately leave the area and



report to the predetermined muster location and staying, as far as practicable, upwind of the H<sub>2</sub>S gas source.

- When the atmosphere in an area is known to be at TLV-TWA for H<sub>2</sub>S concentrations or higher, all persons entering that area must don SCABA and be equipped with personal H<sub>2</sub>S gas detection devices. These persons must have been trained to respond to the personal H<sub>2</sub>S gas detection device alarm when it activates. In particular, when the second alarm activates (TLV-STEL alarm or HIGH alarm), they should immediately leave the area and report to the predetermined muster location while staying, as far as practicable, upwind of the H<sub>2</sub>S gas source. This degree of breathing protection should also be adopted in all spaces/areas where the nature of the atmosphere is unknown. In addition, a “buddy system” is recommended – i.e. two persons must make a coordinated entry into the space/area together. The breathing protection should be reduced to EEBD only when it is confirmed by repeated measurement that the H<sub>2</sub>S concentration in the atmosphere is below TLV-TWA.

#### First aid measures for persons affected by H<sub>2</sub>S

- persons overcome by H<sub>2</sub>S gas should be removed to clean fresh air as soon as possible.
- if breathing, maintain the victim at rest and administer oxygen.
- keep the victim lying down, with soft padding under the neck and shoulders to keep the airway open.
- after the evacuation of the victim, even if heart and breathing seem normal, keep the victim under continuous observation for a period of at least 2 hours, or until medical assistance is available.
- if the victim is not breathing, start artificial respiration immediately and continue until oxygen can be made available at the site.
- if the eyes are affected by H<sub>2</sub>S, wash them thoroughly with water.
- for eyes mildly inflamed due to H<sub>2</sub>S, apply cold compresses.

#### Other precautions for hydrogen sulphide

When the risk of harmful H<sub>2</sub>S exposure is likely to affect the atmosphere in accommodation and machinery spaces, the following measures should be adopted:

- every effort should be made to identify the source of H<sub>2</sub>S and stop/control the release of the toxic gas. While at sea, consideration should be given to adjusting the course and speed of the vessel to ensure that the relative wind direction carries the gas away from the accommodation.
- bridge, control rooms, accommodation and machinery spaces should be monitored for airborne H<sub>2</sub>S concentrations.
- routine access to the accommodation should be restricted to one or two locations.
- accommodation ventilation and the air-conditioning system should be operated on one hundred per cent recirculation with all external intakes fully closed to ensure that positive pressure is maintained within the accommodation – it may be necessary to consider stopping or minimising the number of forced exhaust vent fans serving the accommodation (e.g. sanitary space exhaust vent, galley exhaust vent).
- as far as practicable, machinery space ventilation systems should be operated in such a manner as to prevent H<sub>2</sub>S vapour from entering the machinery space.
- the vapour space of bunker tanks should always be

- monitored for H<sub>2</sub>S before, during and after bunkering.
- periodical monitoring of the vapour space of the bunker tank should be established as a routine until the tank is free of that parcel of bunkers and free of H<sub>2</sub>S.
- ventilation to lower the concentration of H<sub>2</sub>S in the vapour space should be carried out as soon as practicable. Care should be taken to ensure that such ventilation does not adversely affect the atmosphere in the accommodation and machinery spaces. Even after the tank has been ventilated to reduce the concentration to an acceptable level, subsequent transfer, heating and agitation of the fuel within a tank may cause the concentration to reappear.

Certain crude oil and refined petroleum cargoes on an oil tanker may contain hazardous concentrations of H<sub>2</sub>S. The vapour space of such cargo tanks is likely to have H<sub>2</sub>S concentrations in excess of 100 ppm. These cargoes may be considered to be **high H<sub>2</sub>S cargoes**. The following precautions should be taken when preparing for these cargoes:

- test and confirm that all cargo piping and valves are leak tight.
  - ensure vent valves serving the cargo system operate according to design.
  - tank openings should be ensured gastight.
  - heating coils in cargo tanks should be tested to ensure leak tightness.
  - fill liquid pressure vacuum breakers to correct levels, as per design.
  - ensure that doors and ports leading to the cargo area and open deck are capable of being sealed shut without any possibility of gas or air leaking through.
  - make a cargo operation plan having due regard to the hazardous nature of the cargo.
  - conduct shipboard drills for a dangerous gas leak where the complete emergency response plan for H<sub>2</sub>S hazards is exercised.
  - rig a windsock or lightweight flag at a clear location above the cargo deck, so it can be easily observed from the cargo control room in order to monitor wind direction.
- During the loading operation of high H<sub>2</sub>S cargoes on an oil tanker:

- adopt a closed loading procedure.
- monitor H<sub>2</sub>S concentrations on the cargo deck regularly.
- all venting of vapours from cargo tanks should be through a mast riser or high-velocity vent valve.
- H<sub>2</sub>S vapour is heavier than air and will tend to sink to the cargo deck if there is low velocity at the point of egress;
- in ship-to-ship operations bear in mind the relative freeboard of the vessels when choosing the safer venting option.
- stop loading cargo if there is no wind, if vapour from the cargo tank does not disperse or if the wind direction takes cargo tank vapour towards the accommodation.
- only essential personnel with designated cargo and security duties should be permitted on the cargo deck.
- only essential shore personnel should be permitted on the cargo deck. They should be duly briefed of the prevalent H<sub>2</sub>S hazard and escorted by responsible shipboard personnel.
- prohibit all maintenance activity in the cargo area and on all systems related to cargo operations except emergency maintenance.

The International Safety Guide for Oil Tankers and Terminals (ISGOTT) may be consulted for further information relating to H<sub>2</sub>S properties and the good practices which should be adopted. See <https://www.witherbyseamanship.com/isgott.html>

## Section three

# ENGINEERING, TECHNICAL AND ENVIRONMENTAL

We appear to have received more reports on technical topics this year, which is encouraging, although some of them make quite depressing reading. With new emissions regulations coming into force, there is every chance that problems in the engine room will increase, so please keep sending us your reports.

We begin this year with a report about poor communications between the engine room and the bridge. The problem was due to bad design, so no blame attaches to the officers and crew, who were left to make the best of the situation. There are several other examples of poor design within these pages, which indicates that some naval architects are not complying with (or perhaps are not aware of) all the design rules. To avoid problems after delivery, we recommend that owners spend more time on plan approval, then put competent officers in the yard during construction and give them the authority to demand changes when they find any deviation from the rules, or anything which will hamper smooth

operation once the vessel comes into service.

Of course, not everything can be blamed on the designers, and there are plenty of reports here which are a result of failures by the crew, including a potentially deadly report about the removal of heat protection from machinery. We also feature a number of cases where main engines failed at critical moments, or failed to start altogether, and we offer practical advice on how such incidents may be prevented.

There are also a worrying number of reports about MARPOL violations and deliberate pollution. Such acts are unforgivable, but we also note that many ships may lack sufficient holding tank capacity to cope with modern demands upon the vessel, so perhaps it is time for the regulatory authorities and classification societies to reconsider the question and ensure there is adequate capacity on all ships.

The section concludes with an Insight article about deck oil spill arrangements on oil tankers, which we highly recommend.





## Article. 12

## Correspondence received – Bridge/Engine Room communications

**Outline: A detailed report giving some feedback to the article published in Maritime Feedback number 52.**

### What the Reporter told us:

I was a master on a ferry approaching a berth – head in, with control on the starboard wing. Difficulties were experienced in reducing the ahead movement of the vessel, and with a strong wind off the berth, the vessel was blown away from the berth towards a breakwater.

Communication between the engine room and bridge was by phone – one phone number for the centre console, a second number for the bridge wing positions. As a result of both the weather and the bow thruster, noise in the wheelhouse was loud. At the time, the manning consisted of the Master and Chief Officer, both of whom were on the starboard bridge wing.

Changing control to the port bridge wing, the Chief Officer heard the centre phone ringing and ran in to answer it. The Chief Officer was told that the port engine had de-clutched and to put the pitch on that engine to zero. The engine was then clutched in. The vessel subsequently berthed without problem (apart from raised pulse rates on the bridge).

This incident highlighted the problem of Bridge / Engine Room communication on this vessel. Shortly afterwards, a dedicated talk back system was installed by ship's staff with one microphone and speaker in the engine control room and three on the bridge (centre position and both bridge wings). All verbal communication subsequently used this system which allowed instant communication and encouraged feedback from both ends. I am amazed that such a simple system, which encourages inter-departmental communication, has not been adopted more widely. Even the person conning the ship could just press the button and say "Control Room we have a problem / delay, etc" without the need to pick up the phone. Many times afterwards, using the talk back system, technical problems were reported and heard by the entire bridge team. Had the talk back failed, then the phones were still available.

I have always felt that the incident published in [MAIB Report 18-2012](#) would have been less likely with a talk back system like the one we installed.

Physiologically, the act of pressing a button and speaking near a stalk microphone is far more effective, and far quicker, than passing your order to someone else to phone through, or hearing a message repeated by whoever answered the phone, especially at times of maximum concentration. The added bonus is that all the bridge (or control room) team can hear what is said, and are instantly briefed, so the chance of a misunderstanding is reduced. As with bow and stern door indicator lights it was, in my experience, a low-cost addition with immense potential benefit, and helped to "bridge the gap" between deck and engine. I served on the vessel until it left the area, and that one installation made for a far more cohesive team and allowed us to deal with problems more effectively.

As background to this incident, the vessel was a new build, deep sea ro-ro, converted to a ferry with a limited

passenger capacity. She operated at a lighter draft than the original design, resulting in reduced astern power. A second factor was that the bridge wings (totally enclosed bridge), did not extend over the ship's side. When berthing, the master leaned out of the bridge wing window whilst reaching inwards to operate the two engine combinators and bow thruster.

The normal port arrival procedure was for the seaman on the wheel to leave once the master had taken over the con. The master and chief officer were then the only two people left on the bridge.

At the time of the incident the ship was approaching the berth starboard side to with a strong off the berth wind. The con was on the starboard side, master's head out of the window, port engine astern, starboard engine ahead. When it became apparent that speed was not reducing, both engines were put astern. However, this caused the stern to move downwind. When the starboard engine was put ahead to check the movement the sternway increased. Given the likelihood that the ship would end up on the nearby breakwater, control was changed to the port bridge wing (the danger side) which is when communication with the control room was established. Once the situation was resolved, the berthing was completed.

### CHIRP Comment:

It is agreed entirely that instant communication through a talkback system or similar is far more effective and allows for both closed loop reporting and understanding, rather than the possibility of miscommunication through a third party - even more important these days with multinational crews. The loss of control at a critical part of an operation could have extremely serious repercussions, thus instant communication is very much a necessity. It is important to note that we are still discussing the same communications issues today that we were discussing many years ago.

IMCA offers some useful guidance on the subject of Operational Communications (<https://www.imca-int.com/publications/293/guidance-on-operational-communications/>).

It remains true today that conversions are never ideal. From a good practice perspective:

- Who would allow a design where situations like this need managing in order to do the job properly?
- Hanging out of the bridge window to berth a passenger ferry is not an ideal solution.
- Lighter drafts and reduced astern power obviously impact upon manoeuvrability – thus the vessel was being run outside of the original design parameters and was therefore susceptible to problems which onboard staff were expected to manage.

Risk Management is the systematic approach to minimizing an organization's exposure to risk. A sound risk management programme includes policies and procedures that work together to identify, analyse, evaluate and mitigate risk. Management should consider these issues both in terms of the primary communications between the bridge and engine room, and when utilising change management for any proposed retrofit.

There is a concern that, whether the subject is a new build or retrofit of an existing vessel, mariners' expertise has not been fully utilised at the design stage – bridge ergonomics (including the subject matter in the report) is simply not being fully considered. The whole concept of a ship's design (or even part of it such as a mooring system) should be subjected to Human Centred Design analysis from the concept stage through to the retirement

of the vessel. This requires human element expertise and, currently, shipyards do not have it.

For new build vessels, there is often a “standard” design for many types of vessel and there is often very little owner involvement since additional “extras” are cost prohibitive. There are issues, however, which are worthy of further consideration. One of the concerns is that, as ships get bigger, the effect of windage becomes greater – this requires a different approach to berthing vessels and may require a change in the maximum environmental criteria by companies and ports for berthing vessels. Another issue is engine management – new ships are expected to be cost efficient with bunker savings which fully meet with the approval of shore management as a purely commercial consideration. This wonderful technology sometimes gives the latest generation of pure car carriers (high windage again) a dead slow ahead speed of seven knots. This requires a completely different mindset when berthing, and such a high speed is less than ideal when approaching a berth or locks!

The above article was published in MFB 54

#### Article. 13

## Removal of heat protection from machinery

**Outline:** CHIRP has received several reports concerning removal of heat protection from engines including jacketed fuel lines, fuel pump covers and, in the report below, indicator cocks. This can lead to fuel spraying onto hot surfaces with a high risk of fire.

#### What the Reporter told us:

Recently, I noticed that indicator cock covers had been removed from the engine which was in an operational mode. When I questioned this, I was told that it was too troublesome and too hot to remove the cocks with the engine running. During my next watch, I noticed all the indicator cocks had been removed and hidden to prevent re-fitting. I attempted to raise the matter with the Company, but I did not receive a positive response. I am now reluctant to contact the DPA. I will continue to challenge this unsafe behaviour and amend the checklists to include the line “Fit Indicator Cock Covers”. The next time there is an ISM audit or classification survey, the surveyors can see that it was a conscious decision to ignore using them.

#### CHIRP Comment:

The Maritime Advisory Board noted that this report highlights both technical and human element related issues. Primarily it demonstrates a cavalier and dangerous attitude towards safety from some quarters. It also demonstrates that such an attitude has repercussions – in this case the unwillingness of the reporter to approach the DPA, which is a significant issue. CHIRP has many examples where the attitude of others, whether deliberate or otherwise, deters personnel from approaching the DPA.

From the technical viewpoint, indicator cocks are steel valves that are fitted to the cylinders of an engine. The valve is a direct link to the combustion space of each cylinder which allows compression and firing pressures to be taken from an engine in service for maintenance/ diagnostic purposes. Due to their nature, indicator cocks

are extremely hot when the engine is in operation and need to have protection to avoid becoming a source of ignition from any fuel that may impinge upon the surface.

SOLAS Reg. II-2/15.2.10 states that “All surfaces with temperatures above 220° C which may be impinged as a result of a fuel system failure shall be properly insulated.”



**An unprotected indicator cock – non-compliant and a high-risk area for igniting a fire**

The purpose of insulating hot surfaces is to prevent any flammable liquid from coming into contact with them, thereby minimising the risk of ignition. This should

ensure that no exposed surface has a temperature above 220°C. The insulation material must be fit for purpose, i.e. made of non-combustible material with a non-oil absorbing surface. It is important to ensure proper insulation of flanges, indicator cocks, bolts and studs and other protruding parts. Even water-cooled exhaust manifolds may have flange connections with temperatures exceeding 220°C. Known trouble spots are;

- indicator valves (cocks)
- exhaust pipes from each cylinder
- exhaust manifold, in particular overlaps between steel sheets and lagging
- turbochargers, in particular flanges
- cut outs for pressure / temperature sensors, etc

CHIRP would highlight that it is good practice to have a regular thorough inspection of all equipment to ensure that any deficiencies may be rectified, and any potential sources of leakage identified. Searching for hot spots and insulation defects with infra-red thermal imaging equipment is also useful.

We encourage more reports of this nature since they demonstrate a hazard with a high potential for disaster.

The above article was published in MFB 55

#### Article. 14

## Main engine failures

**Outline:** CHIRP has received several reports recently concerning main engines failing to start, and associated issues.

#### What the reporters told us:

- Two separate reports where the main engine failed to go astern during final approach to the berth.
- Fully laden log carrier departing port and heading to China. When pulled off the wharf with tugs, ME failed to start. Although the ME was tested in my presence when boarding, after the first unsuccessful attempt to start it the starting air pressure reading appeared too



low. Vessel was brought back alongside with tugs and secured with moorings. After 1 hour of subsequent work/testing of ME the vessel sailed without further incident.

- Vessel drifting for more than thirty-six hours awaiting a berth. When instructed to proceed to the pilot boarding area there was an issue with the main engine fuel filters. As a result, the vessel was two and a half hours late. Main engine tested astern to the pilot's satisfaction before proceeding inwards. The Master said that the ship had been rolling, which may have resulted in air locks in the fuel oil system.
- Main Engine failed on departing port. Tug re-attached and steering maintained. Engines restored after approximately five minutes. Pilot informed that a sensor failure was the cause.
- When manoeuvring this vessel into port the main engines failed to start astern. The vessel was stopped, swung and berthed without the use of her main engine, using the two tugs and the starboard anchor.

#### Further Dialogue:

Regarding the last report, CHIRP queried whether the pilot knew whether the vessel had conducted pre-arrival engine tests and whether the use of an anchor was a standard procedure for berthing. This was the response. "The vessel came to the pilot station from her anchorage and as part of the pilot/master exchange, I specifically asked if the engine has been tested astern, which the master confirmed it had. Anchors are cleared away as part of our pilotage procedures. In this case the starboard anchor was lowered to the waterline and made ready during the vessels swing in the basin, because I knew I did not have main engines available - I wanted another braking source in addition to the tugs. After numerous failed starts, the Captain stated that they needed more air and it would be two minutes. I continued to swing the vessel using the two tugs and prepared the anchor for use. During the astern approach to the berth, the captain said the engine was back online, but only for ahead movements, not astern. I tested the engine and it failed to start, from there I dredged the starboard anchor and used the tugs to finally berth the vessel."

#### CHIRP Comment:

Having discussed this report the Maritime Advisory Board commented as follows;

#### Engineering Perspective:

Marine diesel engines can fail to start for any number of reasons, most of which are entirely predictable and therefore avoidable. Filters can become blocked, service and circulating pumps can fail, starting air pressures can drop.

Knowledge of equipment and systems cannot be guaranteed so simple tests are all that are required to prove equipment reliability and provide confidence to the Master and pilot when entering or leaving port.

When already under way, these procedures can be as simple as test starting any stopped engines and proving ahead and astern operation.

If the engine is to be shut down for a period of time, the Master should inform the bridge and engine room of the acceptable period of notice before the engines are required.

Longer readiness states will allow all circulating pumps to be stopped, starting air and fuel to be isolated from the engine, indicator cocks to be opened and turning gear to be engaged. A full testing procedure will be required to ensure the engine is fully ready.

The readiness state can be reduced through leaving the circulating pumps running and turning the engine on turning gear every hour, and further reduced by using turning gear every 30mins, followed by kicking on air leaving only a test run on fuel should the engine be required in the intervening 30mins.

If immediate readiness is required, the engine should be kicked over ahead and astern on fuel every 30 minutes with the engine ready to be passed to bridge control immediately if required.

Routine tasks need to be maintained even with an engine shut down, Sumps still need to be checked with many engines having a "running" and "stopped" level which should be adhered to. Additionally, weather conditions should be considered because rough weather can cause confusing oil level readings such that a low oil level might not be identified by engineers and this might prevent an engine start when required. Rough seas can result in dirt and debris being stirred up and drawn into fuel and lubricating systems which in turn may cause filters to block more rapidly than usual.

It is essential that system checks are carried out during readiness state routines or when starting an engine. Are filter differential indicators showing green? Are system pressures and temperatures correct? This information can be recorded in the movement book providing a log for the next engineer who has to conduct the readiness routine.

A check list will ensure common practice between personnel, either due to crew rotation or simply a watch change over and will prevent complacency. The simple act of leaving a starting air bottle supply valve closed may allow a test start of an engine due to the residual pressure in the system but will not allow future engine starts when the Master tries to manoeuvre the ship.

Finally, good communication between the Master, bridge officers and engineers will ensure everyone knows what they have to do and when. Early communication of any issues with the machinery will allow the Master to assess the situation and take the corresponding corrective action.

#### Nautical Perspective – good seamanship responses to engine failure

- Mitigating the risk of a machinery failure lies generally with the Engineering Department. But mitigating its effects on safe navigation rests squarely with the Bridge and Deck teams, in the spirit of the 'ordinary practice of seamen'.
- In terms of planning and preparation, routine 'good seamanship' precautions for the loss of ship's engines should include:
  - having a proper pilotage plan for every approach to port, berthing, unberthing and departure. This should include intentions for tug usage, and should incorporate 'escape' options at various points, based on a clear understanding of the weather and tidal conditions, and the available room for manoeuvre
  - briefing that plan well in advance to all personnel and departments involved
  - (even where a tug is not normally used, it is a wise precaution to have lines and manpower available to take one quickly in emergency)
  - having at least one anchor ready for letting go whenever in pilotage waters
  - thoroughly testing communications (both equipment and procedures) between bridge, engine control room and relevant parts-of-ship

- o proceeding at a speed slow enough for an effective response (manoeuvre, anchor etc.) to take effect
  - o rigorously enforcing the ship's watertight integrity
- Classic 'good seamanship' responses in the event of actual engine failure will depend overwhelmingly on the prevailing spatial, resource and environmental conditions. Considerations should include;
  - o if sea-room allows, turning immediately away from the nearest point of impact
  - o employing tug assistance
  - o deploying anchor(s) to check the way and inhibit drift/leeway
  - o if a collision and/or grounding is inevitable, opting always for the least damaging impact aspect
  - o minimising the high risk to personnel from ropes/lines under strain.
- Occasional table-top discussions among deck, engine and bridge teams can greatly help reinforce awareness of the risk of engine failure, and of the seamanship options available for its mitigation.

The above article was published in MFB 55

#### Article. 15

## MARPOL – environmental violations and concerns

**Outline:** CHIRP continues to receive many reports relating to MARPOL. One report below details concerns with grey water, with the other highlighting a potential pollution scenario.

### What the Reporter told us (1):

Our vessel transferred a quantity of bilge water from the engine room bottom plates to the grey water tank using an air pump. The bilge water was not treated, nor was the event recorded in the oil record book. The grey water tank was subsequently discharged to sea as normal grey water, which of course by-passed the oily water separator.

### Further Dialogue:

With the consent of the reporter CHIRP wrote to the DPA of the company and received the following detailed response:

We are aware of the case you refer to, and we have recently completed an extensive investigation into the matter. Our investigation has concluded that in the case witnessed by your reporter, an amount of fresh water from a leaking laundry pipe was indeed pumped from the tank top into a greywater tank. However, as soon as the Chief Engineer became aware, the greywater tank was immediately isolated.

The grey water tank in question had not been emptied since well before the incident date, hence nothing was pumped overboard. The tank content was later delivered to a shore facility as oily bilge water. Our investigation pointed out several corrective actions, one of them being a Safety Bulletin for discussion and circulation to all fleet vessels. This stated inter alia;

- MARPOL regulation 1.33 states *Oily bilge water means water which may be contaminated by oil resulting from things such as leakage or maintenance work in machinery spaces. Any liquid entering the bilge system including bilge wells, bilge piping, tank top or bilge holding tanks is considered oily bilge water.*

- Any water collected from tank tops must be considered and handled as bilge
- All crew are obligated to comply with MARPOL and to report any incident and unsafe act/condition to their supervisor immediately when noticed.
- Any incident (accident, near-accident and non-conformity) and unsafe act/condition (hazard observation) must be reported for follow-up.
- *All personnel are reminded to take "time out for safety" to properly plan before any operation is conducted and "stop the job" if you see and/or are in doubt as to the successful outcome of any operation.*
- *Any person that considers work to be unsafe has the authority and duty to temporarily stop it, and report to the proper authority onboard. No retribution will follow a stop work action initiated in good faith even if it is deemed unnecessary.*

### What the Reporter told us (2):

During maintenance on a diesel generator, the low temperature cooler was removed for cleaning, but the SW supply isolation valve failed to hold. With the cooler already removed, sea water was able to flood into the engine room. The bilge level reached 0.3m before a decision was made to operate a pump to reduce the flood level and prevent damage to other machinery. Additional isolations were made to stop the water entering the space. Bilge water mixed with floodwater was pumped directly to sea. On reflection, it was realised that the threat posed to the ship from the flood was less than the potential impact of releasing contaminated water to the sea and the floodwater should have been held onboard in the bilge holding tank before being discharged through the separator.

### CHIRP Comment:

Notwithstanding the differences in opinion between reporter and company in the first report, the message as stated in the company bullet points is clear. MARPOL must be complied with, and all water from E/R bottom plates or tank tops must be considered as bilge water and treated accordingly through the oily water separator.

The second report highlights a concern for protection of the environment – albeit in hindsight. It also highlights the subtle difference between an emergency and a situation where saving the vessel overrides MARPOL (which was not the case in this instance).

CHIRP is becoming increasingly aware that regulations prohibiting discharge (such as within special areas) is having a knock-on effect so that a vessel's capacity to hold all of its bilge, waste oil or grey water is becoming increasingly strained. Designers take note! We would like to hear more about these issues for further debate.

The above article was published in MFB 55

#### Article. 16

## Could have been embarrassing

**Outline:** A report highlighting a delay to the berthing of a cruise liner due to a faulty stabiliser fin.

### What the reporter told us:

Our vessel, a large cruise liner, was entering port. Upon arrival at the final approach to the inward channel, the

vessel's port stabilizer failed to house. Recognising the serious problems that this might incur, the vessel aborted the entry to allow the issue to be resolved. The ship's engineers managed to overcome the problem and house the port stabiliser by manually overriding the automatic system after a delay of about 30 minutes. The vessel then recommenced port entry with no further issues.

#### CHIRP Comment:

The Maritime Advisory Board members, after discussion, noted the following points

- This could have been a serious incident with very expensive consequences.
- The ER / Bridge communications were good on this ship.
- The ship's operating procedures worked.
- If there is any suspicion that an automatic system may have malfunctioned it is essential that the personnel responsible for the equipment or system carry out whatever checks are necessary to positively confirm the actual status of the equipment and to rectify any defect.
- Safety critical systems should be checked and be proven to be operational well ahead of the time they may be needed. Manual override of remote-control systems should also be tested at the same time to ensure that they operate correctly.

From a navigational perspective it is worth noting that the report states that the vessel was on the final approach to the inward channel. The fact that the vessel did abort the inbound transit is a very good indication that the bridge team were well aware of the "final abort position", where you are fully committed to the port approach, and acted accordingly before it was too late.

The above article was published in MFB 56

#### Article. 17

## Illegal bilge discharge

**Outline: An alleged MARPOL contravention in the Caribbean Sea area.**

#### What the reporter told us:

I would like to report an illegal discharge of oily water from my previous ship. The engine crew were discharging oily water from the bilge of the main engine, bilge tank and dirty oil tank using rubber hose and an air pump. The hose was connected by a flange to a pipe going to an overboard valve of the freshwater generator.

I queried this with the 2nd Engineer who told me that since he joined the ship, the oily water separator had never been used for discharging oily water, nor the incinerators used for burning sludge, because the vessel discharged sludge and oily water to port facilities or a barge.

Please make this report confidential

Photographs were attached to the report, but they were inconclusive.

#### Further Correspondence:

CHIRP requested further details whilst confirming that the confidentiality of the reporter would be respected. Suggestions that CHIRP, or indeed the reporter himself, contact the vessel's DPA were met with derision as the reporter had no faith in the DPA.

CHIRP made offers to the reporter to contact the flag state administration and additionally to inform the USCG

(in their capacity as Port State Control), since the vessel was trading in the Caribbean Sea area. We highlighted that we could potentially request that the vessel be put on the USCG watchlist. During these exchanges, the reporter belatedly advised CHIRP that he had also been in contact with the ITF and, through them, Port State Control.

Before CHIRP could take further action, we received notice from the reporter supported by an official letter from the authorities that the vessel had been boarded by PSC officials upon her most recent port visit, and that an inspection had been carried out. With respect to the specific allegations, nothing definite had been found. However, the official letter also advised that all appropriate authorities within the Caribbean area had been advised to put the vessel on their watch lists.

Considering the above there was no further action from CHIRP.

#### CHIRP Comment:

The Maritime Advisory Board members, after discussion, noted the following.

- This report was dealt with by a Port State Control inspection of the suspect vessel once the authorities had been notified of a potential violation. The Port State Control authorities are to be commended for their rapid response to the information received.
- CHIRP takes all reports of pollution of our seas and oceans very seriously, there is nothing more reprehensible than acts of deliberate pollution. CHIRP will take whatever action it can and actively support any and all initiatives to stop acts of pollution and prevent further pollution incidents.
- CHIRP will co-operate with and assist all Port State Control and flag state authorities with all credible reports of pollution which we receive provided the reporter agrees.

Following the reporter's request for confidentiality, CHIRP would like to reinforce the fact that all reports are treated in the strictest confidence. The name of the reporter is known only to the CHIRP Maritime Advisor who is dealing with the correspondence, and the reporter's name is never divulged to any other party, company or otherwise. Equally, upon completion of correspondence, the reporter's name is deleted from all of our records.

We also note once again the lack of willingness to approach the DPA. This is disappointing in the extreme, and CHIRP reinforces the fact that the DPA should be a direct conduit between ship and shore, have access to the highest levels of company management, and be seen to be the seafarers' friend, able to proactively deal with their concerns.

The above article was published in MFB 56

#### Article. 18

## Air emissions alongside – boiler flame failures

**Outline: Two reports highlighting issues with smoke emissions.**

#### What the Reporter told us (1):

Our vessel, a tanker, was discharging her cargo with all systems working normally. At 08:15 the auxiliary boiler "Flame Failure" alarm activated, and the boiler shut down.

The engineers responded and attempted to restart the boiler on several occasions, without satisfactory results. At 09:25 and 10:50 the shore terminal warned the vessel that smoke had been observed emitting from the funnel. These times corresponded with the vessel's attempts to restart the auxiliary boiler. Following this, the engineers removed the burner and replaced it with an overhauled spare. The auxiliary boiler was then started without any emissions being observed from the funnel and without any further impact to the vessel's operation.

Examination of the removed burner showed that it was partially clogged. One month previously, the boiler had undergone a full test in the presence of a class surveyor. Prior to arrival at the port, all boiler pre-arrival checks had been undertaken with no problems noted. The burner had been subjected to routine overhaul two weeks prior to the incident. Additionally, the quality of the fuel was checked and found to be satisfactory.

It should be noted that the normal automatic operation of a boiler following a flame failure will result in smoke emissions, since the burner fan will start the purging cycle which removes any gases present in the furnace through the funnel. This process is important since it allows for the correct ratio of air to fuel when the boiler is reignited, (thus preventing a non-stoichiometric initial combustion with potential for drumming and/or firebox explosions).



**Air Pollution (library image).**

### What the Reporter told us (2):

Shortly after our vessel departed port, increased smoke emission from the vessel's funnel was observed. The bridge reported this to the engine control room. Simultaneously the alarm of the opacity monitor (high smoke) activated.

In response to the alarm, the engineers started No 2 boiler and stopped No 1 boiler to investigate the cause of the malfunction. During the investigation it was found that a fuel oil sensor was damaged. A new sensor was available on board and the defective one was replaced. As soon as the vessel was in open sea, boiler No1 was restarted and confirmed to be operating satisfactorily.

It was concluded that the excessive smoke generated was due to the damaged pick-up sensor. Specifically, due to the damage to the sensor, the amount of fuel supplied to the boiler for the required load was incorrect, which resulted in incorrect air/fuel ratio, incorrect combustion and the generation of excessive smoke.

It was noted that the sensor was supposedly maintenance free with replacement being condition- based. The malfunction of the sensor was discussed with the boiler manufacturers and advice was requested as to any measures required in order to prevent similar problems in the future. The manufacturer advised that there is no preventative maintenance for the sensors but suggested an

upgrade of the existing fuel oil control system with a modern, more robust one, without moving parts. This is being implemented on all our vessels with this type of boiler.

### CHIRP Comment:

Both reports highlight the importance of fuel combustion equipment maintenance in order to avoid air pollution. Ports are generally taking a more active role in advising vessels of excessive smoke emissions, and port state control is equally taking a greater interest in MARPOL Annex VI regarding NOx, SOx and particulate matter (PM) emissions.

The above article was published in MFB 56

### Article. 19

## MARPOL – reported deliberate pollution

**Outline: Report received from a member of the engine room crew on a ship where deliberate acts of pollution were allegedly carried out on a nightly basis.**

### What the Reporter told us:

I have observed every MARPOL violation on my ship. At night, the crew throw overboard every kind of waste oil, sludge, bilges, used rags and other garbage including plastic and cans. The oily water separator and incinerator do not work, but at annual surveys they manage to pay a bribe to the surveyor for clear reports. Chief Engineer told to do these things as ordered by the Master. I have proof of crane waste oil being dumped in the Black Sea.

The reporter further stated that a large fee had been paid by himself to a seafarer's employment agency to secure his berth on the ship.

NOTE: The reporter's vessel is on both the Paris MOU Black List and Tokyo MOU Grey List, (indicating a flag with a high detention rate following inspection, and being considered high risk), and was trading in the eastern Mediterranean and Black Sea. There was a photograph attached to the report, but it was inconclusive – whilst there was obviously some pollution astern, there was nothing to identify the vessel.

### Further Dialogue:

The reporter mentioned that the owner of the ship also owned two other vessels and that on each ship 4 or 5 seafarers from his home country had paid up to \$8000 for a berth and were being used as oilers and wipers rather than in their designated positions. The reporter was very concerned about his safety and that of the other seafarers on board the three ships.

CHIRP advised the reporter that seafarer's welfare and financial abuse issues were best dealt with by the ITF and ISWAN and offered to pass on his report to either or both organisations but only with the reporter's express instruction, which in this case was not given.

CHIRP contacted the flag state administration of the reporter's ship and received an immediate response. Subsequently the administration notified CHIRP that one of their inspectors attended the named vessel and carried out an inspection to ascertain the validity of the report. The inspection found no evidence to support the reporter's allegations and in every way the vessel appeared to be operating in compliance with the appropriate rules and regulations.



**CHIRP Comment:**

The members of the MAB noted the following:

- the prompt and positive engagement by the flag state administration should be highlighted and commended.
- the fact that a flag state inspection was carried out in response to the report forwarded by CHIRP is also worthy of note.
- the inspector's report recorded no evidence of pollution but that alone does not prove that acts of pollution did not take place, just that no evidence was found.
- for the sake of good order, a dis-identified copy of the initial report should be passed to EMSA (European Maritime Safety Agency) for their attention because they have access to satellite monitoring facilities with hours of darkness capabilities. This has been done.

The above article was published in MFB 57

**Article. 20**

## Insight Article: Deck oil spill containment & control – “unsafe” safety systems?

**Introduction**

CHIRP Maritime recently received a report relating to “unsafe” safety systems. The report was quite lengthy, and without losing too much of the impact, it proved to be too long for publication in Maritime FEEDBACK. The report was ship-type specific, but the concept of unsafe safety systems could be applied anywhere within the maritime sector and thus the topic was felt worthy of further promulgation as an Insight article.

The reporter has recently retired following a career of 58 years in the marine industry. During that time the reporter observed, experienced, and was made aware of several safety systems which could be deemed to be “unsafe”. He wanted to share some of this experience with interested parties in order to identify lessons that could be learned.

One example is systems fitted in most oil tankers for dealing with oil spills on deck, which are usually located as follows;

- port and starboard at the aft end of the main deck - these systems are designed to contain and deal with major oil spills on deck due to cargo pipe failure etc.
- similar systems to deal with drainage of cargo manifold drip trays both on the port and starboard side. Any oil leaks at the manifold, such as those caused by gasket failure, would initially be contained within the manifold drip trays and then drained to an adjacent cargo tank.

**Problem identified**

The reporter was initially made aware of a problem as a Superintendent of oil tankers. Ship's staff on various vessels were asked by either a Port State Control or a Vetting Inspector to open the oil spill dump valve located at the aft end of the main deck. Occasionally, and much to everyone's surprise, opening this valve resulted in oil leaking “out” onto the deck. Subsequently, investigations were conducted into the system design to discover why this was happening

The systems fitted at the aft end of the main deck are simple “U” tubes which are located in the vessel's slop tanks as shown in figure 1.

Midship systems which allow manifold drip trays to be drained to adjacent cargo tanks also use simple “U” tubes, or similar devices which work on the same principle.

For the “U” tubes to work as designed, the open end of the “U” tube in the slop tank or the cargo tank must not be submerged below the level of oil in the tank. When the “U” tube systems were first introduced, the usual practice was for slop tanks to remain virtually empty. Slop tanks were only used for tank cleaning to allow for in-service cargo tank inspections or in preparation for drydocking. Therefore, the oil spill drainage system to the slop tank was always ready for use.

More recent practice is to use the slop tanks as cargo tanks, and they are usually filled to their maximum capacity in order to maximise cargo capacity for the voyage. This means however that the “U” tube system cannot work, and the pipework right up to the underside of the deck oil spill dump valve, (see figure 3), is now under cargo pressure as shown in figure 2. The problem becomes more evident under high inert gas pressure. Thus, opening this deck oil spill dump valve, when the slop tanks are filled with cargo, invariably results in oil leaking out onto the main deck.

**“U” tube operation as per design – an example**

- the location of the “U” tube within the slop tank is determined by the maximum allowable inert gas pressure and the magnitude of the deck camber.
- the maximum inert gas pressure in the slop tank is 1,647 mm of oil with a specific gravity of 0.85.
- on a VLCC, the deck camber can be in the order of 1,000 mm
- the open end of the “U” tube must be located approximately 2,400 mm below the bottom of the deck oil spill dump valve
- initially the “U” tube pipework has to be filled with a suitable fluid (such as hydraulic oil). This should be poured in from the open dump valve until oil starts overflowing from the open-ended pipe into the slop tank.
- the “U” tube system will then work as designed, both when the slop tank is empty or filled to a level below the “safe level” as indicated in figure 1.
- any main deck oil spill, which is collected and contained at the aft end of the main deck, can now be safely drained from main deck into the slop tank when the deck oil spill dump valve is opened.

**Situation when slop tank is filled with cargo**

As can be seen in figure 2 the oil spill dump valve will be under oil pressure whenever the slop tank is filled to any level above the safe level. This is due to the inert gas pressure in the tank and the head of oil in the slop tank. Opening the oil spill dump valve under these conditions will result in oil being discharged onto the maindeck. If the oil spill dump valve is not closed immediately, oil will continue to be discharged onto deck until the following conditions prevail:

- the inert gas pressure decreases to a value low enough to stop overcoming the head of oil in the “U” tube pipework. This will depend on the actual level of oil in the slop tank. Additionally, the decrease of inert gas pressure will be a slow process unless the inert gas supply line to the slop tank is shut immediately.
- if the slop tank is filled to maximum capacity, the cargo oil will be above the level of the oil spill dump valve. This means that, even if the inert gas pressure is zero, there will be an outflow of oil to deck until the level of oil in slop tank falls and reduces the head to zero.

This is why the deck oil spill dump valve must always be secured in the shut position

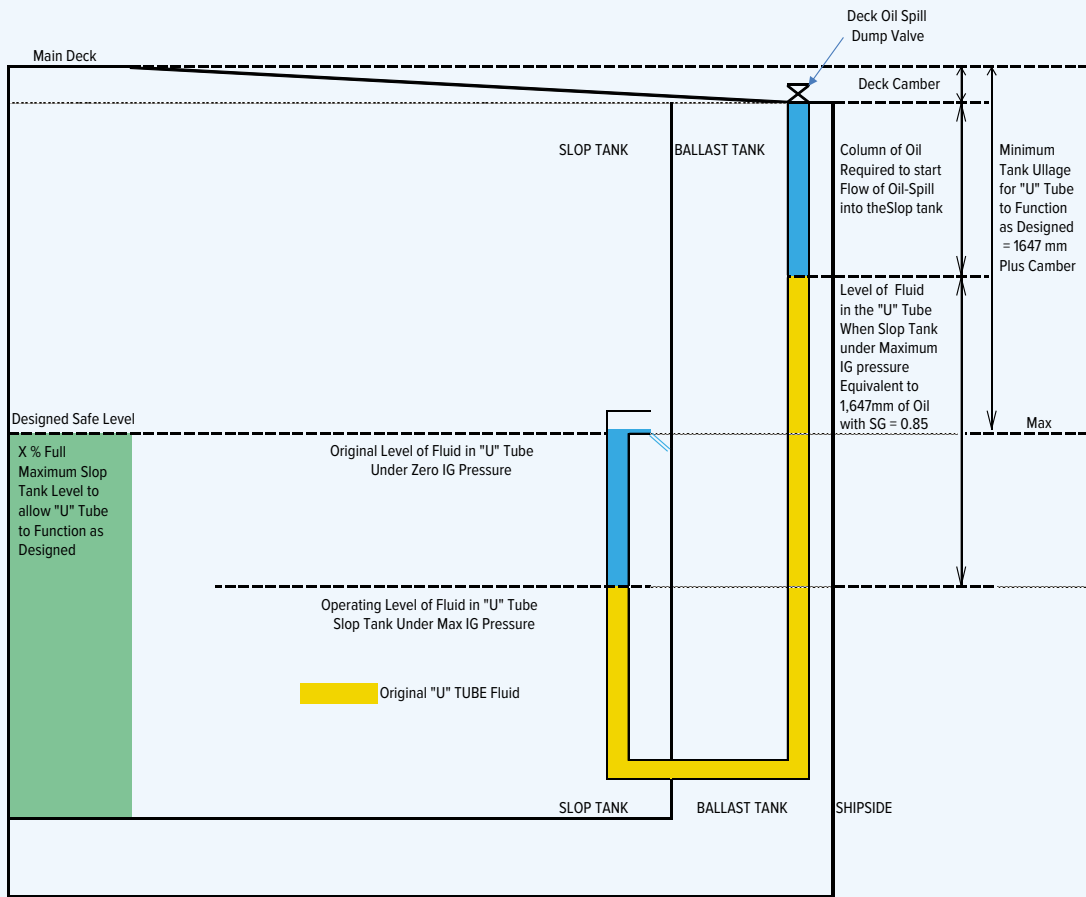


Figure 1 – “U” tube arrangement

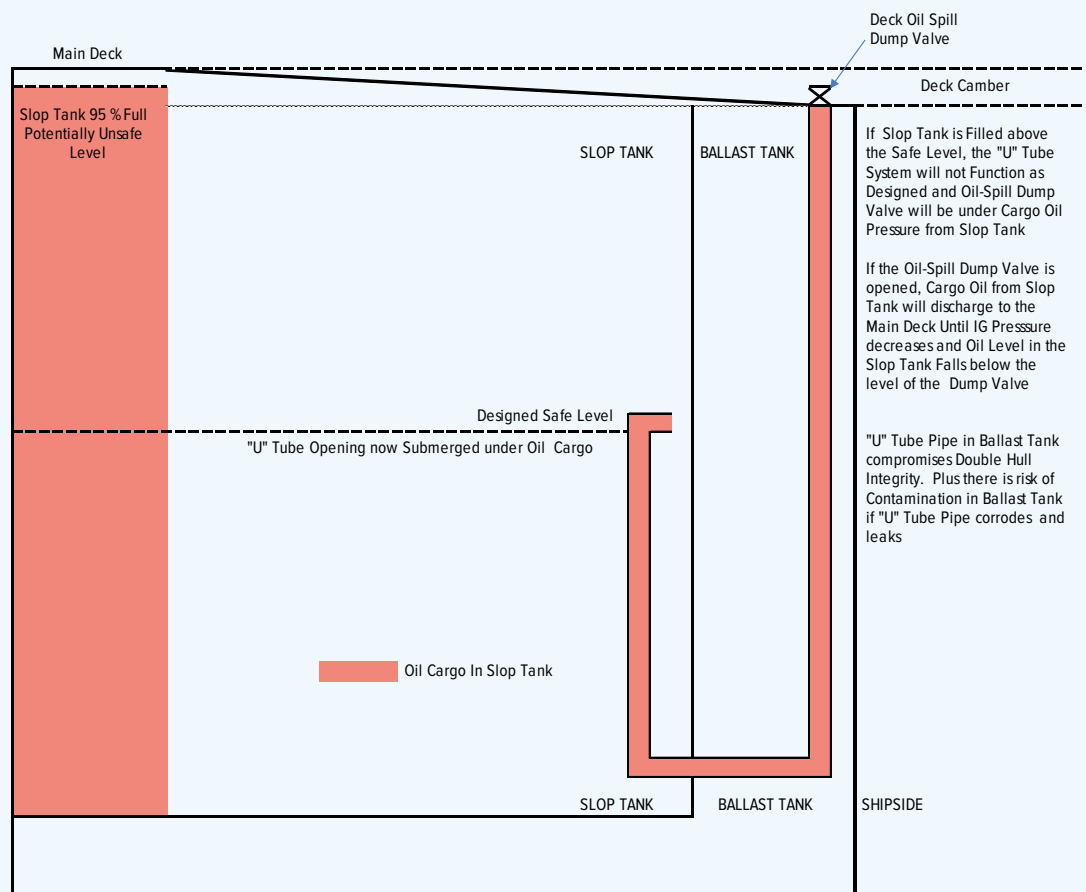


Figure 2 – Dump valve under pressure

**Rules and regulations**

When initially investigating which Rules/Regulations covered the installation and operation of the “U” tube systems, no information could be found in SOLAS, Classification Society rules or OPA/90. It is however possible that in the subsequent years Class rules governing these “U” tube systems have been developed.

Although when investigating the problem, it was not a Class requirement to fit such systems, it was a requirement of one of the oil majors. An employee in the vetting department of that oil major was contacted and it was confirmed the “U” tube system was originally designed on the assumption that slop tanks would be empty. It was also mentioned that the original operating philosophy was for the oil spill dump valve to be left in the “open” position during cargo operations. This meant that, in the event of a major oil spill on deck, no human action would be needed to drain the oil spill to the slop tank.

**Deck oil-spill dump valve**



**Figure 3 – Deck oil spill dump valve**

The diagram above shows a very basic “plate type” valve located close to the ship’s side. On most vessels

this valve is locked “shut” and secured as shown above or provided with a chain & padlock to prevent unauthorised or accidental operation. Warning notices to prevent operation may also be found posted next to this valve.

The pipework connected to this valve passes through the ballast tank and then via a bulkhead penetration piece into the slop tank. This valve is the only separation between oil in the slop tank and the open deck - it is under oil pressure whenever the slop tank is filled with cargo.

Classification societies do not currently appear to request overhaul, inspection, or proof of operation of this valve during the vessel’s class survey cycle.

**Alternative pumping arrangements**

It was noted that some owners/managers are aware of the problem with the “U” tube system when slop tanks are filled with cargo. In addition to locking the oil spill dump valve in the “shut” position, many prudent owners/managers have fitted alternative pumping arrangements for deck oil spills on their vessels (see Figures 4, 5 & 6).



**Figure 4 – Aft end Wilden pumping arrangement**



**Figure 5 – Wilden pump discharge connection to slop tank**



**Figure 6 – Midship pumping arrangement at manifold**

Compared to the properly engineered midship pumping system shown in figure 6, the portable air driven

Wilden pump usually fitted at the aft end of the main deck appears to be a makeshift system.

These alternative pumping arrangements are apparently accepted, as an alternative to the “U” tube system for dealing with deck oil spills, by Class, Flag State and oil major vetting inspectors. Without specific knowledge of the submission of such systems for approval it is difficult to comment on the approval process.

In summary the following arrangements have been observed on a variety of oil tankers

- portable Wilden pump used aft plus properly engineered system amidships.
- portable Wilden pump used at both aft and amidships locations.
- portable Wilden pump used aft and nothing fitted amidships.
- No alternative pumping system fitted.

Typical newbuilding manifold drainage arrangement without pumping system

As shown in figure 7, many oil tankers are not fitted with alternative pumping arrangements at the time of delivery from a newbuilding yard. Therefore, Class surveyors, oil major vetting inspectors, and Port State Control inspectors will periodically inspect many oil tankers, some with and some without an alternative pumping arrangement.



**Figure 7 – Typical new build with no manifold drainage pumping arrangement**

Action or comment (if any) by inspectors regarding oil tankers which

are not fitted with alternative pumping arrangements has apparently not resulted in effective change to vetting procedures in order to mitigate the risk.

As per the design of these systems, the “U” tube needs to be filled with a suitable oil in order to function. It could be reasonably expected that this would be done at delivery from the new building yard and periodically during the life of the vessel. New building commissioning and test procedures dealing with initial filling of these “U” tubes do not appear to be in place. It is true to say that many shipyards will build to a certain specification, and it is not uncommon for owners to specify “latest SOLAS standard” and, for tankers, “latest vetting requirements”.

**Inherent risks with “U” tube systems**

It may be assumed that the slop tanks and cargo tanks, in which the “U” tubes are fitted, are often filled with cargo up to 95% capacity. This gives rise to the following risks, both real and potential;

### Aft Systems

- opening the oil spill dump valve will result in oil leaking onto deck
- any major deck oil spill cannot be drained to the slop tank unless an alternative pumping arrangement is provided.
- if there were a minor collision at the ship's side close to this valve, there is a danger that the simple "plate type" valve would distort and pop open allowing oil to leak onto the deck. Since the damaged valve could not be closed, there could be a significant oil leak to the deck.
- a major collision could result in shearing the "U" tube pipe within the ballast tank. This could result in serious oil contamination in the ballast tank.
- the integrity of double hull design is impaired by a pipe, which is under cargo oil pressure, being contained within the ballast tank and close to the ship's side.
- corrosion and leakage of the "U" tube pipework in the ballast tank could lead to oil contamination of the ballast tank.
- in some vessels a non-return valve has been fitted the "U" tube pipework at the bulkhead penetration piece in the ballast tank. Essentially, this is an acknowledgement and acceptance that the function of the "U" tube, which is in itself a non-return system, is rendered ineffective due to filling the slop tanks with cargo.

### Mid-ship systems

- the manifold drip tray "U" tube drainage system will not work.
- in the event of an oil leak at the manifold, the drip trays can only be drained if an alternative pumping arrangement is provided.
- the drainage pipework for the main deck cargo lines is usually connected to the manifold drip tray "U" tube drainage system. Therefore, drainage of main deck lines can be impaired when the relevant cargo tank is full.
- it is also possible for oil to migrate from one cargo tank to another via these main deck line drains. Some owners have fitted non-return valves in the drainage pipework system for the main deck cargo lines to prevent cross contamination when loading more than one grade of cargo.
- This is another example of an acknowledgement and acceptance that the "U" tube systems are rendered ineffective by maximum filling of the relevant cargo tanks

### Summary

- The deck oil spill drainage "U" tube systems fitted in most oil tankers appears to be a vetting requirement and not a Class requirement
- These deck oil spill drainage "U" tube systems will be rendered ineffective when the tanks in which they are located are filled with cargo.
- This appears to be common knowledge among owners, managers, Flag State, classification society and vetting inspectors
- Some owners/managers have fitted alternative pumping systems, which apparently have been approved by the relevant authorities
- The "approved" alternative pumping systems show great variation in design & effectiveness.
- Other owners/managers have not fitted any alternative pumping systems in their vessels.
- Class surveyors and vetting inspectors do not appear to make any comment regarding oil tankers which are not fitted with an alternative pumping system.

- Some owners have fitted non-return valves to try to mitigate the problems caused by the ineffective "U" tube systems.
- The "U" tube pipework in the ballast tanks will be under oil pressure and this affects the integrity of a double hull design.
- When slop tanks are cleaned / gas freed for drydocking there is a possibility of some cargo oil remaining trapped in the "U" tube pipework. If this pipework is not drained and flushed through, a hidden risk during drydock repairs is created.

### Conclusions

The commercial requirement to fill slop tanks and all cargo tanks to maximum level needs to be acknowledged and accepted by all parties. In view of this, the ineffective "U" tube systems are a definite safety/pollution risk.

Consideration should be given to removing "U" tube systems already fitted in existing oil tankers. Likewise, consideration should be given to not fitting "U" tube systems in new vessels.

Until the "U" tube systems are removed from existing oil tankers, the slop tanks and the cargo tanks in which the "U" tubes are fitted should only be filled to a level which ensures the open end of the "U" tube is not submerged. This would necessitate a tank ullage of about 3,000 mm.

To deal with main deck oil spills, all oil tankers should be fitted with properly engineered and Class approved pumping systems at both the aft end of the main deck and amidships in way of manifold drip trays.

### CHIRP comment

Although this is a type-specific issue, the concept of "unsafe" safe systems may be applied across many areas within the maritime sector. In the case quoted, it would seem that a good idea has become set in stone and not engineered out when circumstances changed. This is also true in many other cases.

It should be highlighted that the oil industry states that they are aware of the risk and "manage" it. Within the marine sector tankers are one of the few ship types that self-regulate through a highly effective vetting system. Even so, as this example shows, one should never be complacent. One of the more widely used methods currently employed for deck oil spill containment is using Wilden pump(s) at the after end of the main deck to pump to designated spill containers. This is excellent for minor spills but would be impractical for a major event such as a pipeline failure.

The reporter has highlighted an important issue. Since there are lessons that can be learned, the first step is for new vessels and human-centred design to effectively engineer out the problem and provide a solution.





## Section four

# PILOT BOARDING AND PILOTAGE

Once again this is probably the longest section in the Annual Digest, which is depressing. As we have stated repeatedly, it is not very difficult to rig a pilot ladder correctly, and there are many sets of instructions and posters which demonstrate how it should be done, yet still it seems that some crews are unable to manage such a relatively simple job.

On a brighter note, there are now signs that some ports are refusing to allow pilots to board ships which do not have properly-rigged access arrangements, and we include a number of reports on this topic.

We also feature reports about poor design (again) and several examples where the same ships have featured in multiple reports from different ports. There is also an interesting discussion about who should be regarded as a 'responsible officer' at the pilot ladder.

Readers will also notice that the problems of getting a pilot aboard safely have become so prevalent that we are starting a new section in Maritime FEEDBACK. This 'pilots corner' will become a regular feature until the problems are solved.

We also feature two excellent Insight articles, the first containing an analysis of some of the problems, and the second written from a pilot's perspective. Our pilot makes the interesting point that some of the problems encountered stem from the fact that several ships using the port have pilotage exemptions, so a pilot ladder is only rigged on rare occasions when a pilot boards to verify the master's piloting ability. The crews of such ships might have the excuse that they seldom rig a pilot ladder, although CHIRP Maritime still thinks they should be capable of doing the job properly, but other mariners have no such excuse. It is time for all seafarers to examine their pilot ladder arrangements and ensure they are fit for purpose. Reading the reports in this section will be a very good starting point, and we hope to see an improvement in the situation in future editions.





## Article. 21

## Proactive port authority

**Outline: A report of a combination ladder deficiency and the follow up which involved both the port authority and the regulatory authority (Port State Control).**

### What the Reporter told us:

This vessel presented itself for a pilot boarding with the following deficiencies;

- The accommodation ladder was steeper than 45 degrees and was not secured to the ship's side, while the pilot ladder was not attached to the ship's side 1.5m above the accommodation ladder platform.
- The accommodation ladder was attached to the pilot ladder, but neither the accommodation ladder nor the pilot ladder were attached to the hull - despite all the necessary sunken fixtures being available.
- Catastrophic rust was noted in way of stanchions and fittings.
- Manropes were rigged incorrectly, had knots or splices in the length of the rope, and were fitted with spliced eyes and shackles on the end of the rope.

There was only a very limited spoken English on board, leading to communications difficulties when trying to rectify the situation.

The manager of the Port Authority wrote to the vessel's managers detailing the deficiencies and **requiring** them to examine the arrangement. The vessel was instructed to replace any equipment which did not meet the required standard (in this case the country's regulatory enactment of SOLAS V23).

The managers were informed that if the vessel presented itself at the port in the future with a deficient pilot transfer arrangement, then the pilot service would be refused. The managers were also advised that the port would not provide pilotage services unless there was unequivocal evidence showing that all corroded pilot transfer arrangement equipment had been remedied. *CHIRP* note – this is an edited extract of the letter with names of port and country omitted.

### Further Dialogue:

*CHIRP* was impressed with the nature of this intervention and further dialogue revealed the following.

At this port we started an initiative two months ago to educate Industry (charterers, exporters, shipping agents, owners, etc). In short, we advised that from January 01st 2019 we would take a more prescriptive approach, so industry needs to be aware that delays to shipping may result from inadequate pilot transfer arrangements. The two months lead time was in acknowledgement of the fact that charters may have been arranged already - basically, we are trying to get charterers in particular to consider pilot boarding arrangements in their vetting processes (assuming of course that they actually utilise a vetting process). The relevant advice to industry consisted of a letter to thirteen managers / charterers or their agents who have been found to be non-compliant in the recent past.

**We now require the ship's pilot ladder certificate as part of our pre-arrival regime and this simple tool has already raised awareness.**

Our approach is at all times to educate and assist as much as we possibly can, and the response from ships has been excellent to date, with vessels doing hot work at times to ensure adequate fixing points or stanchions.

Many ships simply need a bit of seamanship advice which we freely offer. We have also purchased equipment (pilot ladder and magnets) which we will supply to ships to avoid delays. Equipment is provided on a 'you use it, you own it' basis.

### CHIRP Comment:

This is the first time *CHIRP* has seen a port authority acting in unison with the regulator and proactively trying to educate vessels in order to bring down the number of vessels with deficiencies. Although we are happy to promulgate this message, it is ground that has been covered before. The suggestion that certificates need to be provided as part of the pre-arrival information is a good initiative and is fully encouraged.

*CHIRP* is aware of the pilots in this particular country being very proactive in highlighting issues and bringing them to the attention of the regulator and the port authority. Whilst it is appreciated that the actual authority comes from the regulator (i.e. Port State Control), this report demonstrates their willingness to proactively interact with ports / pilots, to discourage poor practices and to take action.

Historically the tendency to deal with deficiencies was to use phraseology such as "The next time you visit we will..." This report demonstrates that when a vessel turns up ill equipped, this regulator is prepared to take immediate action. Hitting owners and managers in the pocket by delaying the ship will certainly get their attention and help change behaviours!

Reports being properly actioned so as to prevent a repetition might put an end to situations like the one illustrated below. In this scenario, the pilot actually placed his weight on the ladder and the ropes simply collapsed. Fortunately, this was whilst testing the ladder prior to disembarkation, but had this not been the case then the consequences might have been tragically different.



**Deathtrap – pilot placed his weight on this ladder prior to disembarking and both side ropes parted!!**

Of note – in the last few months *CHIRP* has received in excess of 30 pilot ladder and / or combination ladder deficiencies, so the topic is still "hot" and needs addressing. Another Insight article on the subject will be published on the chirpmaritime.org website in the near future.

**The above article was published in MFB 54**

Article. 22

# I'm not going to board until you rig a compliant ladder

**Outline: Two reports - one highlighting a new vessel that is non-compliant with SOLAS, the other describing how an overboard discharge was situated in close proximity to the pilot boarding station.**

**What the Reporter told us (1):**

When disembarking from this new passenger vessel (built in 2018), the pilot boat was caught momentarily on the ship's belting which caused it to dislodge the pilot boat's fendering. As the sea conditions were slight it was not a serious problem. However, in heavier seas it could have caused damage to the pilot boat or resulted in the pilot boat suddenly heeling if its belting was caught above or below that of the ship.

The gap in the ship's belting was estimated to be approximately 1 metre, significantly less than the requirements of IMO Resolution A1045(27) which states "Where rubbing bands or other constructional features might prevent the safe approach of a pilot boat, these should be cut back to provide at least 6 metres of unobstructed ship's side." See photo below. There are currently a series of new builds joining the fleet, and online images indicate they are all configured in the same way.



New build passenger vessel – and non-compliant

**CHIRP Comment:**

The vessel in question should be compliant with all the relevant rules and regulations. Naval architects, classification societies and flag administrations should consider how they assess all legislation that comes from IMO in order to make new builds fully compliant. Note that the vessel is a 2018 new build and the IMO resolution was issued in 2011. CHIRP has addressed this topic before in FEEDBACK 46 – page 3. Same company, different ship, different part of the world and different reporter.

**What the Reporter told us (2):**

During a pilot boarding operation, the pilot noticed water falling from a discharge adjacent to the boarding position. As the water stopped flowing, he assumed the deck party had blocked the scupper. The pilot commenced boarding but shortly thereafter another stream of water fell from the same discharge onto the pilot. The risk was closely monitored, and boarding effected without further incident.

When on board, the pilot tried to explain the situation to the responsible officer who failed to understand the seriousness of the risk. The water was on deck and it appears that the vessel's rolling motion led to the intermittent discharge.

**Further Dialogue:**

CHIRP contacted the vessels DPA who responded positively as follows;

We have investigated the reported incident and discovered that the crew had recently washed the deck, including the pilot embarkation area, with fresh water. During the pilot's embarkation, as a result of the vessel turning, the vessel heeled causing water to flow through the scupper.

Therefore, in order to avoid re-occurrence of such an incident, we have instructed all our company's vessels to ensure that the pilot embarkation is clear of any water accumulation and also to ensure that no water can drain from the scuppers during pilot boarding / disembarking.

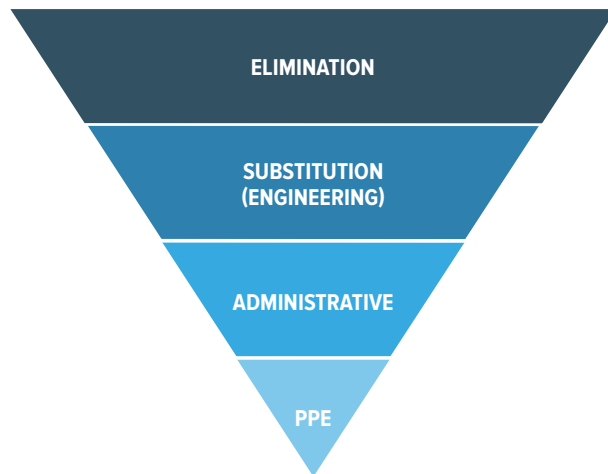
**CHIRP Comment:**

SOLAS V 23 Regulation 3.3.1.1 states that pilot transfer arrangements are to be clear of any "possible discharges from the ship" The presence of a discharge pipe in close proximity to the pilot boarding station is a design fault in the vessel. Such faults often only come to light when a vessel becomes operational and it is left to the crew to deal with. Fitting a scupper plug prior to each pilot operation would be an easy solution.

Having initially identified a problem, the pilot failed to positively confirm that the discharge had been stopped before commencing his climb and will undoubtedly not make the same mistake again.

The observation that the responsible officer apparently failed to understand the potential for a serious incident is of concern.

**Hierarchy of controls to mitigate hazards**



**Eliminate the hazard – New builds need the assistance of shipyards, naval architects and regulators to achieve this.**

**Design out the issues so that all potential discharges or the pilot boarding area are moved elsewhere**

**Ensure checklists, and training regimes are fit for purpose. Ensure manpower demands are realistic.**

**Ensure sufficient, suitable and viable equipment is available onboard and personnel are trained in its use.**

Note that the crew related issues are at the bottom of the triangle.

**The above article was published in MFB 55**



## Article. 23

## Non-compliant by design

**Outline:** Two reports describing how pilot boarding was suspended until satisfactory arrangements were provided.

### What the Reporters told us:

- Accommodation ladder did not have safety stanchions rigged on bottom platform and ship had only partially rigged the safety ropes. Suspended pilot boarding for 15 minutes for crew to rectify deficiency and make safe. Crew had poor communication skills and did not appear to understand what was required to provide safe pilot transfer arrangements.
- Before embarking at the pilot station, a pilot noticed that the combination ladder was not secure to ship's side. Vessel was turned around for corrective actions which entailed securing pilot ladder and gangway with magnets which were available on request.

### CHIRP Comment:

The Maritime Advisory Board highlights the potential for vessels to be refused a pilot with consequential delays and cost implications. One member advised that a vessel was refused a pilot for departure until a new ladder was purchased, with the consequential cost of 4 tugs to shift the vessel on and off a layby berth.

The above article was published in MFB 55

## Article. 24

## A positive result following engagement with the DPA

**Outline:** This report involves two sister ships operated by a major shipping company with the same pilot ladder rigging issue. On this occasion, the DPA readily engaged with CHIRP, acknowledged the issue raised and thanked CHIRP for bringing it to their attention.

### What the reporter told us (1):

The weight of the pilot ladder was supported by a bracket into which the step fits. This resulted in the weight being taken by the whippings around the chocks directly above the wooden step. I explained the issue to the master and advised him that the weight should be supported by the side ropes. I went to the ladder after berthing and explained to the Chief Mate how ropes should be secured to the side-ropes to take the weight if the pilot boat puts additional weight on the ladder.

### What the reporter told us (2):

This class of vessel has a side door access. The ladder is rigged via slots in an angle bar bracket, thus putting the load on the step lashings rather than on the side ropes. By my reading of the rules and Witherby's Pilot Ladder Manual, this arrangement is not compliant.



Pilot ladder rigged via an illegal angle bar bracket rather than side rope lashings.

### Further Correspondence:

The DPA was contacted and readily engaged with CHIRP, responding as follows;

*Thanks for bringing this to our attention. The observations are fully acknowledged. As per design the weight should be on the ladder ropes and not the whippings. We are working on rectifying actions with particular vessels in this series. Again, thanks for bringing this to our attention.*

### CHIRP Comment:

The Maritime Advisory Board members, after discussion, noted the following points;

- Although starting as a non-compliance report the MAB took the view that due to the good communications with, and the positive response by, the DPA this is considered a successful outcome to the initial report.
- The following questions remained unanswered. Who designed the securing arrangement?
- Who approved and signed off this non-compliant, by design, arrangement?
- For the record the major shipping company that currently operates these vessels inherited them through mergers and route sharing agreements and was not involved in the original design and construction of the ships.

The above article was published in MFB 56

## Article. 25

## Ships that feature in multiple reports

**Outline:** Occasionally a ship features in more than one report, sometimes about a single issue and on other occasions about different issues.

Recently CHIRP received three reports about a single ship from different reporters at different locations but concerning the same issue. It would appear that some ships do not (or will not) learn.

A second vessel was the feature of two reports, again by different reporters at different locations, but about different issues. At first reading, this does not look good, but at least the second report closed out the first deficiency which demonstrates that some vessels do try to rectify their defects.

**Vessel One:** A vessel which, due to its freeboard, is required to use a combination pilot boarding arrangement. The arrangement is a trap door-type combination.

**What the reporter told us (1):**

Upon boarding as a pilot, I noted that the man ropes were rigged incorrectly and that the pilot ladder was not attached to the ships side 1.5m above the accommodation ladder platform. The vessel has a trap door arrangement with the pilot ladder shackled under the platform, but this is non-compliant. As this vessel is likely to be regularly calling at this and other ports on the coast, the issue needs to be resolved as soon as possible to avoid future refusal of pilotage services and to remove the risk to pilots. Report dated 05th April.

**What the reporter told us (2):**

This vessel presented herself for pilot boarding on the 18th May with the following defects.

- The man ropes are too small being less than 28mm in diameter.
- The pilot ladder is not attached to the ships side 1.5m above the accommodation ladder platform.
- The trap door combination ladder arrangement is not compliant.

**What the reporter told us (3):**

The pilot ladder not attached to the ships side 1.5m above the accommodation ladder platform. Although I safely boarded the vessel using the starboard side ladder it was noted that the trap door arrangement was non-compliant. Report dated 01st July

CHIRP made two attempts to contact the vessel's DPA, but our attempts to engage in correspondence did not receive any acknowledgement or response.



**Non-compliant combination boarding arrangement with the pilot ladder shackled to the underside of the accommodation ladder platform.**

**Vessel Two:** A vessel whose size and freeboard allows it to use a direct pilot ladder as opposed to a combination arrangement.

**What the reporter told us (1):**

On this vessel the starboard pilot ladder was noted to be old and very worn, with both side ropes chafed and flattened. The ladder steps were slippery with Palm Kernel Expeller cargo. There was no visible construction plate attached to the ladder. The tripping line was rigged to the aft side of the ladder instead of being led forward. I requested that this ladder be replaced before the vessel's departure. Report dated 24th May.

**What the reporter told us (2):**

As a follow up to a previous pilot ladder report (as highlighted above) I boarded this vessel using the port side ladder which was in a satisfactory condition. The master advised me that the starboard ladder had been condemned and that a new ladder had been ordered. This was expected to be delivered when the vessel arrived alongside. Report dated 29th May

These two reports highlight evidence that some ships do take heed of deficiency reports and take positive action to rectify the issue. This is encouraging and is to be applauded.

**CHIRP Comment:**

After considerable discussion, the Maritime Advisory Board members noted the following points;

- Pilot ladders and combination arrangements are one of the visible faces of SOLAS. Pilot ladders and other pilot boarding arrangements come under the SOLAS regulations and are no less vital for safety than lifeboats, liferafts and lifebuoys. If the condition of the pilot ladders featured in these reports is indicative of the other SOLAS equipment on board it does not bode well in the event of having to abandon ship. Similarly, the safe and compliant rigging of the pilot boarding arrangements on board a ship is comparable to the ability of the crew to launch a lifeboat or liferaft.
- The reports that CHIRP publishes relating to pilot boarding arrangements are a small sample of the numerous reports received on the subject. Virtually every report received includes the phrase "Spoke to the master", but this does not appear to be reducing the number of deficiencies and reports. Perhaps it is time for pilots to become more formal and issue a standard Letter of Non-Compliance to the master of the vessel. This can be achieved through the vessel's agents and as such can be directed both to the vessel and the vessel's managers.
- The issuance of such a letter would be a matter to be passed on to the local port state control office for relay to the flag administration of the vessel, thereby becoming a form of alerting.
- Pilots have the right to refuse to use non-compliant boarding arrangements but that still puts the onus on pilots to make that decision. Perhaps it is time for the national maritime authorities to issue directives instructing pilots not to use visibly non-compliant pilot boarding arrangements.
- These reports also raised the question as to what role CHIRP should take with regard to reports received. CHIRP has always followed a course of promulgating to the wider maritime readership with a view to informing and educating. However, in certain situations, is there a case for us to inform maritime authorities and administrations?

Further reading: There is a lot of material in CHIRP Insight articles which may be found on the publications page of our website – <https://www.chirpmaritime.org/publications/>

The above article was published in MFB 56

**Article. 26**

## Where is the responsible Officer?

**Outline:** This report concerns a large cruise liner operated by one of the major passenger ship operators departing from port. The reporter in this instance was the disembarking pilot.

**What the Reporter told us:**

The pilot ladder presented for pilot disembarkation was not rigged in accordance with SOLAS regulations.

A metal bar had been placed between the ladder side ropes which relied solely on the whipping on the chocks to hold the weight of the ladder and the pilot. The side ropes were left on the deck and not secured to anything. I refused to use the arrangement and provided advice to the crew to correctly rig the ladder. There were strong points provided at the head of the side door where the manropes had been secured. In view that there were no other strong points provided, I suggested that this would be a better securing point for the side ropes of the ladder. At first the crew informed me that they always rig the ladder in the presented manner, that it was safe and there were no issues with it. After some discussion the crew eventually re-rigged the ladder so that the weight of the ladder was carried through the side ropes in line with SOLAS regulations. The manropes provided were left with a large knot at termination which would prove a snagging issue to the pilot boat should it roll. There was also a pre-rigged orange line to a lifeboat/tender which impinged over the pilot ladder spreader bar, (photo below from pilot boat shows this). After disembarkation I reported to the vessel via VHF that they should review their pilot ladder arrangements to ensure compliance with SOLAS regulations.

The crew showed no awareness of the SOLAS requirements for correctly rigging a pilot ladder. There was no officer overseeing the operation, only two AB's and a security team member who had escorted me from the bridge. This is a common issue on cruise ships where it is very rare for a deck officer to be present for pilot transfer.



**Completely illegal and highly dangerous method of rigging a pilot ladder**

#### Further Dialogue:

The reporter confirmed he had also reported the matter to the port and national authorities. *CHIRP* in turn contacted the company who investigated the incident. This resulted in the DPA issuing a Company Circular Letter to the fleet entitled "Pilot Transfer Arrangements – "Safe Rigging of Pilot Ladders".

The Circular Letter also included an annex applicable for certain classes of vessels which illustrated modifications required to be carried out at the next available opportunity to allow those vessels to comply with the requirements of the circular letter and, more importantly, SOLAS and IMO requirements.

The necessary elements and fittings required for these modifications would be supplied directly to the vessels concerned without need to raise a requisition.

The company asserted that the member of the security team who escorted the pilot down from the bridge to the pilot embarkation point was a responsible officer – this may be challenged since he did not intervene in the discussion between the pilot and the crew as to the correct rigging of the ladder.

#### CHIRP Comment:

The Maritime Advisory Board found it worrying that it fell to *CHIRP* to address this fundamental issue. If some of the company's vessels required actual modifications to comply with the SOLAS and IMO requirements it begs the question what are the classification societies and flag state authorities doing?

Nevertheless, once the company were made aware of the non-compliance highlighted in the report, their positive engagement and response was encouraging. However, the question should be asked why none of the ship's officers and crew had made the company aware of the ships inability to provide a compliant pilot transfer arrangement? Since the pilot transfer arrangements come under SOLAS the whole safety culture on board must be questioned.

With respect to the security personnel escorting the pilot, the regulations require the transfer of a pilot to be overseen by a responsible officer and in this context the definition of a responsible officer is a certificated officer or a person of appropriate training. Overseeing of the pilot transfer by a member of the security team is good utilisation of available manpower **provided they are suitably trained to carry out that role.**

**The above article was published in MFB 57**

#### Article. 27

## Pilot's corner

By far the largest number of reports received by *CHIRP* Maritime originate from marine pilots, so the members of the MAB have approved a new section for each issue of Maritime FEEDBACK. Regardless of any specific reports concerning pilot boarding arrangements and pilotage issues featured in the main body of each edition of Feedback, there will be a separate article about pilotage. Written by a member of the *CHIRP* editorial team or by a guest writer, the piece might discuss a specific report, a compilation of reports, or might be a general article on good practice.

Why do pilots submit more reports than other seafarers? The reasons for this are varied but:

- whilst the average seafarer may join a small number of different ships every year, a pilot can join or leave many different ships in a week or in a single shift cycle.
- pilots have a focused view of things - when your eyes are only 45cm from the rungs of a pilot ladder you are quite focused.
- pilots are independent, even detached. They feel no reticence about reporting a defect, deficiency or anomaly which reflects badly on the ship or crew. Their sole concern is safety, of themselves and future pilots who are going to board or disembark from the ship using the same pilot boarding arrangement.

Reports suggest that one in five pilot boarding arrangements do not comply with SOLAS requirements and are potentially unsafe, which makes being a marine pilot potentially one of the most hazardous occupations at sea.

If you are involved with pilot boarding or disembarkation in any way, ask yourself these questions:

- is there a copy of the IMPA Pilot Boarding Poster\* on board, on the bridge and where the pilot ladders are stowed?
- when was the last time you read it?
- do you know the correct way to rig the pilot boarding arrangements on your ship – not just the way that it's always done, but the correct way?

\*The IMPA Pilot Boarding Poster is available to download in English, Chinese, French and Spanish from the IMPA website [www.impahq.org/downloads.php](http://www.impahq.org/downloads.php). A laminated version is also available to buy from Witherby Seamanship <https://www.witherbyseamanship.com>

The above article was published in MFB 57

#### Article. 28

## Insight Article: Pilot Ladders: Error Enforcing Conditions and Deficiencies

### Introduction

CHIRP Maritime continues to receive plenty of reports related to problems for pilots getting on and off ships. Looking beyond the easy scenario of blaming the crew, CHIRP has analysed the reports to look a little more closely at what is going wrong.

It was Sir Isaac Newton who stated in his Third Law that “Every action has an equal and opposite reaction”. Fast forward a few centuries and an apt corollary might be that “Every introduction of a change to regulation can lead to unintended consequences”. Pilot embarkation and disembarkation is a case in point.

### Regulation Change and Unintended Consequences

The last major SOLAS revision on the subject, (Chapter V - Regulation 23), was in 2012 and was accompanied by IMO Resolution A.1045(27). One of the new requirements related to the safe access at deck level. Fixed handhold stanchions are now required at the point of entry and the ladder must be secured at a strong point or points on the deck - this effectively means that securing a pilot ladder by means of the ships side handrails is prohibited. Quite right too – who has not seen bent or fractured handrails? Ships’ side rails are not designed or certified to be load bearing.

So now you have a pilot ladder which must be rigged at a gate in the railings, or at the bulwark with support stanchions and a bulwark ladder. This is straightforward if the freeboard is less than 9 metres, and if the pilot ladder requires raising or lowering a little to match the size of a pilot launch then this should not pose a problem for the crew.

But what happens if the freeboard is greater than nine metres? In effect, because the pilot ladder is now in a fixed position (i.e. you cannot move it forward or aft), a combination ladder arrangement will only work at one position. This may be fine when you have vessels which carry a homogenous cargo, but frequently today’s trading patterns may make this less likely. The problem may equally apply to a fixed reel pilot ladder when it has to be used in a combination arrangement. Crews are ingenious and try many different methods to “get around” the issue, (more on this further in the article), but it remains a fact that the introduction of regulation has created an unintended problem. For new ships constructed after the regulation change it is equally plausible that the regulation is simply not given proper consideration at the design stage. Some of the examples which follow are from vessels constructed after 2012 and so there is really no excuse not to comply. Class, Shipyards, and Company Management should address potential non-compliance at the design stage, not as an afterthought.

### Solutions?

There are solutions of course, but it takes a little thought and the assistance of naval architects either at the design stage or in the refit period of a vessel. If the problem is that a ladder (whether it be a pilot ladder or fixed upon a reel) cannot be moved in a fore and aft direction to meet a certain height for an accommodation ladder, then surely the introduction of a longitudinal track with suitable securing arrangements to lock the ladder and stanchions in place would enable a ladder to be effectively rigged in a combination arrangement. The modification would need Class certification that the strength was equal to or greater than the 24 kilo-Newtons (close to 2.5 tonnes) required by SOLAS V Regulation 23. This is not impossible – in the words of a pilot who regularly corresponds with CHIRP, “I just left a tanker with a totally compliant ladder on a reel with tracks to have it moved sideways to deal with any changes in draft. Not complicated or expensive and easy for the crew to use. It can be done ...” CHIRP agrees – it can indeed be done with a little thought.

Additionally, it may involve having several removable sections of a ship’s side rail, but it is not difficult to comply. “Easy on a tanker with loads of deck space”, we hear you mutter, but what about vessels which are tight on space such as container vessels? Often a pilot ladder reel is squeezed onto a space between container stacks so there is no possibility for a longitudinal track. True, but we are not suggesting that the reel needs to be on a track, and the track can easily be located on the adjacent deck if sufficient slack is arranged where the ladder comes off the reel.

### What have we missed?

The solution above appears ideal to overcome the problem but in the introduction, it was stated that every new regulation introduces problems... so, what have we missed? For all of the good points which were added to Regulation 23 in 2012, one was missing – there is absolutely no mention of how to rig the ladder at deck level! Again, we hear howls of outrage – “We know how to rig a pilot ladder!”. Judging by the large number of reports that we receive on the subject, CHIRP would disagree. Since there is no description of how to do it, and since we now appear to live in a world where, if it is not laid down in black and white it just does not get done, crews have invented their own methods and, in many cases, traditional seamanship has been ignored.

So, we now have a ladder with two lengths of side rope on deck, and the length of the rope from the top step gives sufficient flexibility to allow the ladder to be raised or lowered a few metres. Surely it is a simple enough matter to lash these securely to an eyebolt? Sadly, in many cases it seems that it is easier to jury rig arrangements which are non-compliant and often downright dangerous, as shown in the following examples:



Figure 1 – Well-worn ladder with shackles impacting against the side chocks



In this example, the ladder had its weight effectively taken by the chocks. Whether they are plastic or wooden, chocks can be damaged if the shackles take the weight of the ladder directly against them. As it happens this example also resulted in the ladder being secured at the deck level in a manner which caused the steps to lie at an uneven angle. A cursory glance at the photo should be enough to tell you that this ladder is not fit for purpose and is (probably) not certified.



**Figure 2 – Ladder weight supported by a bracket which the step fits into**

With Figure two, the weight is taken by an uncertified bracket and by the whippings around the chock above the step. Additionally, should the ladder jump for any reason there is the potential for a serious accident.



**Figure 3 – Ladder supported by strops and not the side ropes**

In addition to the lack of stanchions and the ladder running over a wire, it is important to note that the strops in figure 3 are purple (which signifies 1 tonne SWL). This is significantly less than the 24 kN required by regulation and again the ladder weight is not being taken by the side ropes.



**Figure 4 – A simple illustration of how to correctly rig a pilot ladder at deck level**

**What other material is CHIRP receiving on the subject?**

In addition to the lack of proper securing of pilot ladders at deck level, CHIRP continues to receive a considerable amount of correspondence which can generally be broken down into three categories;

- Non-compliant combination rigs
- Non-compliant trapdoor rigs
- Non-compliance associated with worn ladders

**Non-Compliant Combination Rigs:**



**Figure 5 – Ladder weight is actually supported by the whippings of the thimbles**

This picture shows side ropes terminating at thimbles below deck level. Lines through these thimbles run up to the deck where shackles are used to support the ropes. This was pointed out to the crew on deck, but they stated that a single line leading down to the top step was taking the weight! Definitely not compliant and a longer ladder is required so that side ropes can be secured directly on deck.



**Figure 6 – Ladder not attached to hull**

CHIRP has received many reports where a combination rig is non-compliant. For the most part these relate to the ladder not being attached to the ship's side (with either magnets or purpose made lugs) and attaching the pilot ladder to the combination ladder. Reports have also been received relating to the security of the stanchions at the lower step of the accommodation ladder. In the figure above the vessel was not permitted to sail from the port until the deficiency was rectified.

**Non-Compliant Trapdoor Rigs:**

Trapdoor rigs have proven to be the most difficult area to address in order to achieve compliance with the current regulations. The issues reported to CHIRP are varied, but there is not a single instance where pilots are happy using these rigs – they are universally described as an accident waiting to happen.

Invariably, problems are encountered when making the transition through the trapdoor with inadequate handholds. Ladders are found to have been rigged with the lower ladder attached directly to the accommodation ladder as shown below. This ladder did not extend 1.5 metres above the platform. Some vessels have made this a two-stage arrangement with a second ladder in order to try to achieve compliance, but this also poses issues.



**Figure 7 – Ladder does not extend 1.5 metres above the trap door – how do you transit from ladder through the trap door?**

A single length of ladder, lying flat against the hull and secured 1.5 metres above the accommodation ladder trapdoor is the requirement – this however often means that the pilot has to lean back in order to effect access through the trapdoor. This is illustrated in the following two pictures where the two-stage ladders are also non-compliant. Pilot ladders are suspended from the accommodation ladder frames rather than directly from their side ropes.



**Figure 8 – Two stage non-compliant ladder – weight is not held by man ropes at all**



**Figure 9 – Pilot has to lean back to gain access to trapdoor**



**Figure 10 – Pilot ladder steps not horizontal, chocks missing. Ladder needs replacing**



**Figure 11 – The step on this ladder gave way whilst the Pilot was disembarking**



**Figure 12 – loose chocks – spreader replaced and not constructed of one piece of wood**



**Figure 13 – No stanchions provided to assist pilot boarding**

Given the foregoing, it should be no surprise that pilots universally dislike these arrangements and, in many cases, wonder who approved them. Part of the worry is that the systems are roughly similar to pilot hoists, which have been banned for many years. Additionally, the gangways and their winch/wire assembly are not covered by the pilot ladder regulations. There is an assumption that all of these arrangements are Class approved. If so, then there is a disconnect between accommodation ladder and pilot ladder regulations and, in our opinion, this needs to be addressed. Above all, the actual practicality of conducting the operation in a safe manner should be taken into account at the design stage well before any Class approval – it's called Human Centred Design.

**Non-Compliance associated with a lack of maintenance/inspection:**

The following examples do not need much of a description because the captions are clear, but all are indicative of human element issues. The examples do not mean there is a problem with the regulations about pilot ladders but indicate that the safety culture of the vessel and company is inadequate. A thorough maintenance and inspection regime would go a long way towards stopping the near miss reports that are being received.



**Figure 14 – Stanchion provided for manropes – but failed dramatically when crew on pilot cutter tested the weight**

**(Dis)honourable mentions:**

- Manropes greater than 32mm so unable to hold a grip effectively. In addition, they were incorrectly rigged
- Steps of ladder painted – slipping hazard
- Manropes 16mm and not 28-32mm
- Ladder secured to ships side with only one magnet instead of two (one either side of the side ropes)
- Large loop under ladder which may be a tripping hazard or get caught up in gunwale of pilot boat
- Tripping line (retrieval line) fastened below bottom spreader and leading aft not forward

**Conclusions**

From the foregoing it can be surmised that there remains a great deal of work to do in order to make the transfer of pilots to and from a vessel safer. A change in regulation may help, but all mariners can certainly assist by ensuring that their pilot ladders and combination rigs are properly and safely rigged and inspected regularly. All pilot ladders should now be certified – it is readily apparent from some of the examples given to *CHIRP* that they are not.

We at *CHIRP* Maritime continue to be astonished at the poor level of seamanship regularly presented to us in these pilot ladder reports. We accept that there is no current good practice available on securing ladders, but seafaring is about applying common sense with practical skills to solve problems. It's what we do, and it sets us apart from other professions. There is a right way to rig and maintain ladders that uses these skills and as we see so many deficiencies it leads us to ask the question - is the quality of basic training meeting the requirements of STCW? It would appear not. In fact, it seems to be getting worse as the years go by.

**Article. 29**

## Insight Article: Pilot ladders and beyond – A Pilot's Perspective

The following article was written by a serving Maritime Pilot and thus gives a Pilots perspective on the continuing issue with respect to vessels complying, (or otherwise), with Pilot Ladder Regulations.

**Pilot Ladders and Beyond**

There has always been a great deal of emphasis on the safety of pilot ladders and boarding / disembarkation of pilots. The UKMPA are closely involved with the review of ISO 799 through the International Maritime Pilots Association (IMPA) and they also work closely with a number of other bodies including *CHIRP*, the MCA, and other sister organisations abroad.

Speaking as a serving pilot I have found that most vessels do comply with the pilot ladder regulations, but experience has shown some don't, mainly the smaller coasters. Pilot ladders have been found in a poor condition and rigged to handrails rather than a secure point on deck. Also, I often witness the lack of safety equipment at the pilot boarding / disembarkation position, with the absence of a responsible officer, and no communications to the bridge. Some masters argue that the bridge wing lifebelt will suffice in place of a lifebelt at the pilot ladder, and for communication the parties can shout to each other. Usually a polite but firm chat with the

master or a direct order from the pilot launch rectifies this. On rare occasions an inexperienced deck officer has the con of the vessel when picking up a pilot because the master is resting. As well as this being a danger, the inexperienced officers have trouble manoeuvring the vessel to create a sufficient lee, especially in traffic.

I have on several occasions refused to board or disembark until the regulations are complied with.

Normally these coasters are sailing with minimum manning – sometimes only five persons – so the person rigging the pilot ladder and associated safety equipment may not be properly supervised. Although this is no excuse for poor seamanship, I do put it down as a contributing factor. Company management and masters must ensure that the arrangements comply with SOLAS and they should have an inspection regime with properly-kept records. A replacement ladder should always be available.

In our port, during the first contact with both inbound and outbound vessels, VTS will enquire if the pilot ladder is properly constructed, recently inspected and rigged to IMO regulations. Since we commenced this system the standard and condition of pilot ladders has improved appreciably but there are still areas of concern. The rigging of the associated safety equipment has not improved, so more training in this area is required.

Another problem we come across is the access between the pilot ladder and the bridge. We frequently have to negotiate walkways blocked with cargo and/or lashing equipment with, in some cases, very poor lighting. On some container vessels the walkways have been littered with steel lashing bars and twist locks, although storage facilities for these are available.

The occasional ro-ro vessel has lashing chains and wheel chocks laid in dedicated walkways and has raised walkways which have been damaged by vehicles and trailers. Again, storage facilities are provided but not used. This can be put down to poor onboard management and ineffective planned maintenance systems. It is the responsibility of the crew to correctly stow all redundant lashing equipment in observance of good seamanship. The onboard management system should also include procedures for reporting and repairing broken walkways.

One of the contributing factors, I believe, is the crew being out of practice with pilot boarding procedures, because most of the container feeder and ro-ro vessels have masters with a Pilot Exemption Certificate (PEC) allowing them to pilot their own vessel within the port. The only time an authorised pilot will board, will be to carry out an assessment of the PEC holder for revalidation purposes, or when the vessel does not have a PEC holder on board. Such vessels can sometimes go years without taking a pilot.

Sometimes a polite but firm talk with the master does resolve the problem, but not always. Pilots are the first point of contact with an inbound vessel so a good assessment can be made starting with the pilot ladder, but without reports from pilots or a port state control visit unsafe procedures will go uncorrected.

My own conclusion is that these problems are a result of a poor standard of seamanship and lack of supervision and training, exacerbated by the minimum manning levels. It is the management and the master's responsibility to ensure the seafarers involved receive the necessary training and have a full understanding of the requirements.



## Section five

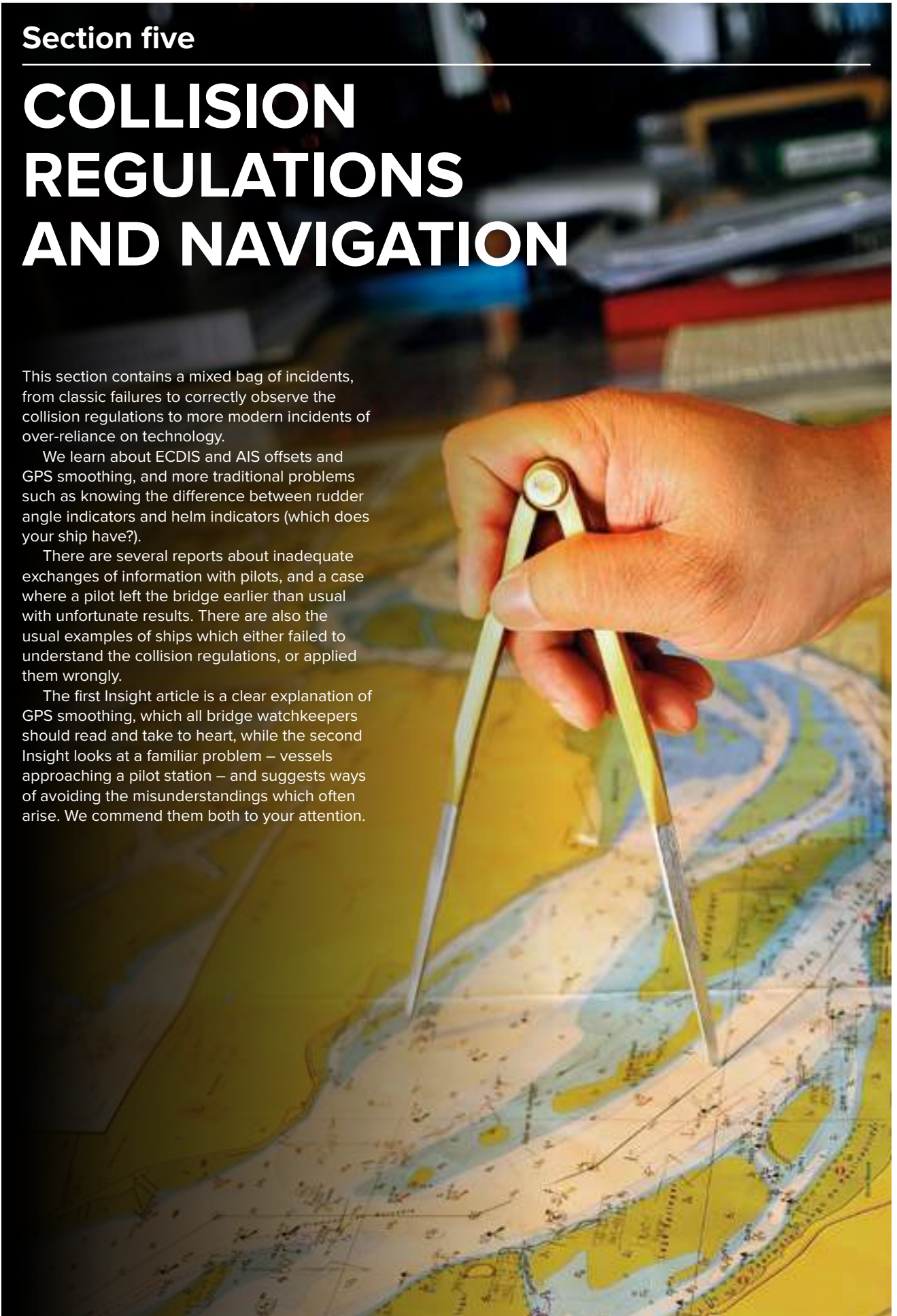
# COLLISION REGULATIONS AND NAVIGATION

This section contains a mixed bag of incidents, from classic failures to correctly observe the collision regulations to more modern incidents of over-reliance on technology.

We learn about ECDIS and AIS offsets and GPS smoothing, and more traditional problems such as knowing the difference between rudder angle indicators and helm indicators (which does your ship have?).

There are several reports about inadequate exchanges of information with pilots, and a case where a pilot left the bridge earlier than usual with unfortunate results. There are also the usual examples of ships which either failed to understand the collision regulations, or applied them wrongly.

The first Insight article is a clear explanation of GPS smoothing, which all bridge watchkeepers should read and take to heart, while the second Insight looks at a familiar problem – vessels approaching a pilot station – and suggests ways of avoiding the misunderstandings which often arise. We commend them both to your attention.





## Article 30

## AIS and ECDIS offsets

**Outline:** We have received several reports which outline position anomalies between a vessel's AIS and ECDIS, and positions obtained from a PPU or by visual / radar position fixing.

### What the Reporter told us (1):

Prior to getting underway, there was no error on the ECDIS displays. However, once moving, an error was evident. The position displayed on the ECDIS was observed to be lagging behind the visual and radar positions, with the lag increasing as the speed of the vessel increased. The AIS position replicated the ECDIS and both indicated a position approximately 160m behind the vessels actual position. This is not the first vessel with this issue.

### Further dialogue:

CHIRP offered to contact the ISM managers of the vessel, but the reporter advised that the port had been in contact with their national administration who had flagged the report for a PSC visit should the vessel return. They had also forwarded the issue to the PSC authorities for the country of the next port of call.

### What the Reporter told us (2):

Recently, I noticed that the AIS position of a vessel was out by approximately 20 metres. Once offsets were checked, the independent Portable Pilot Unit (PPU) showed the difference visually on the screen. AIS data indicated that the antenna was forward on the bridge front and 3 metres in on the starboard side.

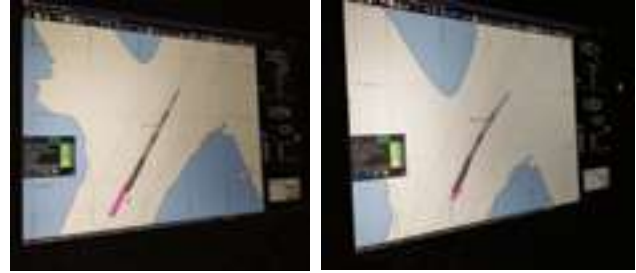
Upon inspection of the antenna plan, it became obvious that the error was due to differences between the offsets for the AIS GPS antenna and No 2 GPS antenna. No 1 GPS antenna was situated close to the AIS GPS antenna. The Second Mate showed me a selector switch, and the Captain requested that it be switched to No1. Within seconds, the vessel's AIS position on my PPU changed and aligned with the independent PPU position. The Captain agreed to post a notice on the AIS to require the AIS external GPS input to be sourced from No1 GPS.

### What the Reporter told us (3):

Upon arrival in port, I observed that the AIS data was showing the vessel behind the data presented on the PPU. Whilst passing a beacon, I asked the master to tell me where it was from looking at the ECDIS, "On the port bow" was the answer, but it was actually on the beam. After the vessel was secured alongside, there was no error.

I asked the Captain if it was possible to look at the settings on the GPS. We found under GPS SETUP, a section called GPS SMOOTHING which allowed for data entry. The "Position" was set at 20 seconds, "Speed" at 30 seconds and "Average Speed" at 120 seconds. The master reset them all to zero and confirmed that the result had been effective with accurate positions displayed following departure.

This type of error has been reported before, but at those times there was no assistance from the Captains involved.



PPU showing GPS smoothing on the left with vessel "lagging" and smoothing removed on the right

### CHIRP Comment:

The Maritime Advisory Board commented that these reports raise several issues including some apparent common failings such as an over reliance on ECDIS. Clearly it is vital that the correct data inputs are always utilised.

Of note, the antenna height must be input correctly, and the bridge team must be aware of which GPS is the master unit. From the second report, it is admirable that an antenna plan was produced in short order and that the issue was both identified and rectified.

In addition to the above, accurate positioning depends upon correct speed inputs, and any WGS84 offsets being input to the master equipment.

With respect to GPS smoothing, CHIRP issues a note of caution. The removal of all smoothing may well have solved the position lag in the third report, but smoothing does have a purpose. It can affect course over the ground (COG), course made good (CMG) and time to go to an alteration point (TTG). Thus, it is important to build in the necessary checks and balances for this vital equipment, as reliance on ECDIS and other electronic equipment can and will only increase – this factor will become increasingly important with the advent of autonomous shipping.

Equally there is a responsibility of those installing the equipment to provide advice and warning. For ship managers signing off an installation, there is a need for due diligence to ensure equipment has been correctly tested and that thorough operator familiarisation has taken place, perhaps enhanced with manufacturers training courses, commissioning engineers' instructions and demonstrations - because from this initial point, information can be progressively lost to subsequent operators as successive handovers omit small items of information.

Every ECDIS system has the facility to input manual positions, visual bearings and radar distances, and every manufacturer advises carrying out cross checks/ comparisons with other methods of position fixing. In confined waters the Mk1 human eye is a very effective tool. If ECDIS shows a beacon on the bow but you can see it is on the beam something is not right, question it – don't always assume that the beacon is out of position.

Finally, CHIRP notes that ECDIS is a very clever and useful tool, but it is only one of many tools in the mariners' toolbox. A regular check on GPS, ECDIS, AIS etc., versus visual and radar positions should always be maintained. Overlay the radar with ECDIS and any discrepancy will become apparent. It should also be noted that AIS is not intended for position reference but for vessel identification.

A question for our bridge watchkeeping readers, when was the last time you entered a manual position into the ECDIS on your ship?

The above article was published in MFB 54

## Article. 31

## Correspondence received: Rudder angle indicators

**Outline: Follow-up correspondence to an article in Maritime FEEDBACK 51**

### What the Reporter told us:

I experienced a near collision due to rudder angle discrepancy. The vessel was approaching an anchorage at dead slow speed with a following flood tide, and we applied port helm to clear an anchored vessel ahead. The rudder angle indicator clearly showed port helm applied, and later hard port helm, but the ship did not respond. Collision appeared to be inevitable with the other vessel close to starboard. We put the helm hard to starboard and the ship responded immediately, clearing the other vessel. We then anchored.

The steering gear was not the conventional dual ram type, but a "rotary vane" type. Close inspection did not reveal any way to determine the actual rudder angle. Management were advised, and subsequently we found almost invisible alignment markings showing a discrepancy which we were able to re-adjust. After making adjustments, I was still unable to confirm the rudder angle. Further investigation proved that the bridge rudder angle indicator did not actually show the rudder angle, but the helm angle – misleading at best.

### Lessons Learned:

- On any ship, ascertain how the rudder angle indicator actually works, and if it is only acting as a helm indicator inform management, requesting modification.

### CHIRP Comment:

There is an increasing reliance on technology and therefore a need to validate all instruments on board. A helm indicator is not a rudder angle indicator which records actual feedback. It is vital that personnel confirm the actual angle displayed on the rudder in the steering gear matches what is shown on helm or rudder indicators. In addition, a rudder angle indicator is a Class requirement and must be accurate to +/- 1°.

The above article was published in MFB 55

## Article. 32

## Inadequate Master / Pilot exchange

**Outline: In recent months, CHIRP has received three reports where the Master/Pilot information Exchange was less than fully comprehensive.**

### What the reporter told us (1):

During the Master/Pilot Information Exchange, (MPX), the Master mentioned some defects which in his opinion were minor, of no concern and would have no effect on the inward pilotage. Over and above these, I observed that the Rate of Turn Indicator was not functioning, the radars were on unstabilised head up display with no heading indication, and all analogue gyro repeaters I checked were

not working. The helmsman was using a digital display on the console.

When asked about the faults, the master said he had requested a technician to attend the vessel on arrival alongside. All these defects could delay the vessel's arrival because the pilot can decide if it is only safe to bring the ship in to port in daylight and fair weather. The defects should have been declared in advance and highlighted during the MPX.

### What the reporter told us (2):

Upon entering the swing basin, we attempted to kick the engine astern to stop the headway from a speed of 3.5 knots. However, the main engine failed to start after two attempts, and so we used the tugs to arrest the headway. Once stopped the main engine was tested ahead and astern and it worked correctly. The berthing continued without further incident.

After the ship was safely berthed, the master informed me that the engine failed because the speed was too high. The master also commented that the speed must be below 3 knots for the engine to start astern. The speed was 3.5 knots when the attempted astern function failed. I advised the Master that this was very important information for the pilot to know and that he must inform pilots of this in the future. This piece of information should have been exchanged during the MPX since it was critical to the success of the manoeuvre.

### What the reporter told us (3):

I was piloting an outbound vessel and when safely in the channel a course to steer was given, at which point the rudder angle indicator went hard to starboard. I immediately ordered midships but there was no change in the position of the indicator. It was quickly determined that the rudder angle indicator was not working. The vessel in fact responded correctly to helm, so I continued the transit and had tugs escort the vessel out.

Subsequently from next port: Departing the berth I found both bridge wing rudder angle indicators out of order (despite a similar problem at the previous port). The starboard bridge wing indicator was stuck at 'hard over' and the port bridge wing indicator was stuck at Port 20°. The indicator in the wheelhouse worked properly during the pilotage. During the MPX, the master had not mentioned these defects at all.

### CHIRP Comment:

The Maritime Advisory Board members raised the following points:

- The pilot card as required by IMO Res A601(15) should be completed fully and accurately ready to present to the pilot upon boarding. The completing of the pilot card is frequently assigned to a junior bridge watchkeeper or cadet, and this is quite acceptable provided the completed form is assiduously checked by the master before it is presented to the pilot.
- Why are ships unwilling to report defects? Failure to communicate defects reflects badly on the ship's staff, the management, owners and operators. One purpose of the ISM Code which combines both SOLAS and the STCW Convention is to deal with issues like this.
- The master has an obligation to report defects, deficiencies and anomalies that impinge upon the operability of the vessel to the shore management. Such reports of deficiencies should be thoroughly

followed up to a satisfactory closure (defect rectified with measures in place to prevent reoccurrence).

- The pilot may also have an obligation to report defects, deficiencies and anomalies that impinge upon the operability of the vessel to the port authorities.
- Non-disclosed defects can raise suspicion and act as a trigger for a Port State Control visit.
- The shipping industry should listen to and learn from other industries, such as aviation, where an open disclosure policy is embraced.

Arrival at, berthing in and sailing from a port are potentially the most hazardous parts of a voyage. Vessels must enter and operate in shallow and confined waters, probably with increased traffic and other hazards such as squat and interaction.

On the other hand, the vessel takes on board a local pilot with specialist knowledge to compensate for these additional hazards. But although the pilot has intimate local knowledge, he or she may have only general knowledge about the ship and, unless told otherwise, must assume that the ship and all its machinery and equipment is fully operational. The captain, wary of the potential dangers, is looking for guidance and confirmation that the information gleaned from pilot books and other sources is correct and that the vessel is in safe hands.

This is where the MPX is of vital importance. If the MPX is full, frank and comprehensive then barring unforeseen events the pilotage will proceed smoothly. On the other hand, if the MPX is not comprehensive, the pilotage may not be so smooth.

The above article was published in MFB 56

#### Article. 33

## Collision Regulation contravention

**Outline: A report from a North Sea pilot on board a loaded VLCC approaching the SW lane of the Dover Straits highlighting a Colregs contravention.**

#### What the reporter told us:

I was piloting a VLCC with a 20.3m draft en route from Skagen to Ningbo via Brixham. As we left the deep water route at the Nord Hinder junction we turned to starboard to proceed in a SW direction towards the Dover Strait TSS. We observed a target approaching the SW bound lane with a small CPA and a TCPA of approximately 20 minutes. The target appeared to have come from the River Thames and according to the AIS data the vessel was proceeding to Rotterdam.

I contacted the vessel on VHF 16/77 to ask his intentions. His reply was that he intended to pass astern of the vessels ahead of me. I advised him that his planned routing was not really acceptable and that he should really head up to the NHR-S buoy before turning to starboard to head for Rotterdam. He actually agreed with my statement. I also pointed out Rule 10 and that he should be aware of Coastguard/VTS surveillance.

As the vessel approached the SW lane he passed ahead of my ship safely but did not act in accordance with Rule 10 and blatantly continued on a NE heading towards Rotterdam.

#### Further Correspondence:

Additional information confirmed that the reporter was on a 333m x 60m loaded tanker following the recommended

routing and that the vessel was exhibiting the three red lights in a vertical line as required by Rule 28 to signify a vessel constrained by its draft. In addition, the vessel was included in the Channel Navigation Information Service (CNIS) broadcasts by Dover Coastguard.

The contravening vessel was a 140m x 22m feeder container vessel and was a frequent trader on the Thames, Rotterdam and Kingston-upon-Hull route. It appeared to be taking a direct line between the Thames estuary and Rotterdam approaches. Such a course is contrary to the TSS and recommended routing.



Screen shots of the contravening vessel making no attempt to cross TSS lane at 90°

#### CHIRP Comment:

The Maritime Advisory Board members, after discussion, noted the following points.

- The location is a very busy area with various TSS's and recommended routing areas converging and diverging.
- The Collision Regulations, including Rule 10 in this case, are obligatory for all vessels and as such must be complied with.
- Deep draft vessels can advise the local Vessel Traffic Service and/or Coastal Radio Station of their presence i.e. ETA at given points and speed of transit. Such information will then be promulgated in broadcasts. A rogue ship will still ignore the rules but such information broadcasts will assist most ships to avoid the large deep draught vessels that navigate our narrow, shallow, congested coastal waters.
- The frustrating thing about this report is that even in an area of intense vessel monitoring and surveillance there is no effective enforcement of the regulations or penalty for non-compliance.
- Vessels should be actively encouraged to report rogue vessels that are blatantly contravening the Collision Regulations, particularly in areas where radar surveillance or monitoring is in place to draw the attention of the authorities to these rogue ships. Hopefully this will reduce the number of these incidents especially if there is a realistic expectation of prosecution by the maritime authorities.

The above article was published in MFB 56

#### Article. 34

## More on GPS smoothing

As a follow up to the article published in MFB54 entitled 'AIS and ECDIS offsets', CHIRP is concerned about the effect of randomly altering the smoothing curve settings of a GPS since there may well be unexpected consequences.

We are currently engaging with GPS manufacturers in order to obtain some clarity as to the cause and effect of

making changes to the smoothing curve settings. Once this process has been completed, we intend to publish an Insight Article with our findings, learnings, and advice.

In the meantime, we repeat our current advice to shipboard navigators that there is likely to be significant position discrepancy between radar derived positions and GPS derived positions if the smoothing settings are not adjusted according to the GPS manual available on board. In addition, good practice dictates that for coastal and inland water navigation GPS derived positions must be frequently cross-checked against radar derived positions and visually derived positions.

The above article was published in MFB 56

Article. 35

## Inappropriate time to leave the bridge

**Outline: Whilst sailing from a port in adverse weather conditions, a tanker in ballast collided with a channel buoy. The pilot had departed from the bridge beforehand to facilitate an early disembarkation because of the bad weather.**

### What the Reporter told us:

Upon completion of cargo discharge, a pre-departure bridge team meeting was held, and navigation equipment tested. The Master/Pilot exchange was carried out in line with company standing instructions.

The vessel departed the berth and proceeded to sea. Bridge manning consisted of two pilots, the Master, Chief Officer, OOW and the helmsman. The pilotage from the berth to the fairway buoy was just over three hours.

The channel at the seaward end is nominally 250m wide with a heading of 180°. Pairs of buoys are spaced every mile with a further mile from the final pair (No 1 buoys) to the Fairway buoy.

As soon as the vessel passed No.2 buoys the pilot informed the bridge that he would get off after the first set of buoys and before reaching the fairway buoy. The weather at the time was wind easterly 30-35kts gusting 50kts and the swell was reported as 2-3m. The pilot advised the vessel to make a course of 221° after passing No.1 buoys in order to provide a good lee for a safe pilot disembarkation.

The OOW left the bridge in order to assist the pilot, while the Master and Chief Officer remained monitoring the vessel's movement in the channel. No one replaced the OOW.

Once the pilot had left the wheelhouse, the bridge team realized that the vessel was drifting and getting closer to buoy No. 1 to starboard. To counter the drift, the helmsman was ordered to alter the wheel hard to port, but as the vessel started developing port swing the wheel was then ordered hard over to starboard to counter the swing and maintain a course parallel to the buoy.

Our vessel slowly responded and swung to starboard. The bow passed clear of the buoy but No.1 buoy struck our starboard side, where it fouled and was dragged along at the ship's side for 2.5 miles before coming free.

It should be noted that:

- vessel hit the buoy whilst pilot was still on board but not on the bridge.
- after hitting the buoy, the pilot did not return to the bridge.

- the pilot was disembarking early because of the weather conditions.
- planned speed for the pilot transfer was 6.5kts.
- vessel was able to proceed on passage without delay. A subsequent in-water survey found only minor propeller damage which did not affect the vessel's operational capability

### Lessons Learned:

- the pilot should hand over the con in a safe navigational position with ample time for the next manoeuvre.
- the Bridge Team should intervene immediately when the pilot's instructions may place the vessel in a hazardous situation.
- any risk assessment should take into consideration the effect of current and wind as well as the time required to conduct the task.
- cross verification of buoys and other navigational marks with radar should be carried out to ascertain the present position and leeway.

### CHIRP Comment:

The Maritime Advisory Board discussed this report extensively. There are many lessons to be learnt from this incident with some of the comments below being rhetorical questions where specific answers were not available:

- did the vessel sail in marginal conditions, in which case was the early departure of the pilot planned at the master / pilot exchange before sailing or had the weather deteriorated during the lengthy pilotage resulting in a deviation from the pilot's standard operating procedures? If it was the latter, a revised risk assessment should have been carried out. The pilot has a responsibility to hand over the conning of the vessel safely having due regard to the prevailing conditions.
- there were many references to the bridge team and the pre-sailing bridge team meeting, which is good, but the master is part of the bridge team and whilst the master is on the bridge it should be he who challenged the pilot if there were any concerns about the prudence of the pilot getting off early.
- it is presumed that all members of the crew were suitably rested and although no reference to fatigue was mentioned in the report, the MAB noted that during cargo operations on tankers the chief officer tends to work extended hours and might be more fatigued and therefore less alert than normal.
- there appears to be a loss of situational awareness by the bridge team when both the pilot and the OOW left the bridge at the same time. The master needed to ensure that someone was navigating at all times and that there was continuity even when members of the bridge team left the bridge. Additionally, the act of reducing speed from full manoeuvring to 6.5kts for the pilot's disembarkation would have affected the vessels leeway and reduced the vessel's responsiveness to the helm. Both of these facts appear to have been overlooked by the remaining members of the bridge team.

Regardless of the prevailing conditions and for the sake of a mile, was it necessary or prudent for the pilot to leave the bridge at this stage to facilitate an early departure? Hopefully this was a lesson learned by the pilotage authority.

The above article was published in MFB 57



## Article. 36

## Collision Regulations – Rule 15 non-compliance

**Outline: A report received concerning non-compliance when two vessels were approaching a major port.**

### What the Reporter told us:

My own vessel (A) was proceeding westerly at 11kts with the other vessel (B) proceeding WNW at 11kts to the south and just forward of my beam. Her CPA was fluctuating between 0.2-0.35nm ahead. This was a crossing situation with my own vessel as the stand on vessel.

Both vessels had reported to the Vessel Traffic Service stating their intention and were listening on VHF Channel 12. As the TCPA approached ten minutes with a CPA of less than 0.25nm, I contacted vessel (B) on Channel 12 and asked his intention - he suggested that I alter course to port. I told him I would not be doing that and intended to halt the conversation there and abide by the regulations. Vessel (B) then questioned why I wouldn't alter to port and under which Rule, which concerned me slightly.

I contacted the VTS who I expected would have wished to intervene as we were in their VTS area - they suggested I make a bridge to bridge communication with the other vessel. I then made a bold reduction in speed, which by my action alone avoided the close quarters situation and risk of collision, allowing the other vessel to pass well ahead. Rule 15 situations involving converging courses with a risk of collision seem too often to result in the give way vessel being reluctant to meet her obligations. This is something I regularly find working in the Dover Strait and English Channel. The fact that this was in pilotage waters and will be supported by the VTS recordings, should you wish to obtain them, prompted my submission. I regularly see the give way vessel not taking action in crossing situations with vessels on similar courses and speeds and hope that your publication will be able to raise awareness of the issue.



Screen dump image from the VTS recording - vessel names edited to A + B

### Further Dialogue:

The VTS were contacted and, quoting the date and time of the incident, a request was made for any available records of the incident. The VTS were most helpful and provided a video recording of the VTS radar image. Unfortunately, there was no recording of the VHF channels available.

### CHIRP Comment:

After discussion the members of the MAB noted the following points:

- this was a classic converging vessel situation.
- the encounter took place in daylight which added to the ambiguity of the situation. At night the cut off angles of navigation lights would have added clarity to interpreting if this was a crossing situation or an overtaking situation.
- vessel A interpreted the situation as crossing vessels governed by Rule 15.
- it is possible that Vessel B construed it to be an overtaking situation governed by Rule 13(a)
- if the above points are correct, then both vessels by their own interpretation of the situation were the stand on vessel.
- whatever the case, as the vessels drew closer both would have been governed by Rule 17(a) (ii) and ultimately by Rule 17(b).
- in the above report, vessel A acted under Rule 17(a) (ii) and complied with Rule 17(c)
- whatever the situation Colregs should work, even if a vessel fails to comply with a rule or misinterprets a situation.
- it is refreshing to note that the avoiding action taken in this case was a significant reduction in speed

The above article was published in MFB 57

## Article. 37

## Insight article: GPS smoothing – removing discrepancies in received positions

### Introduction

There is an age-old saying that “Navigation is the precise art of knowing where you were”. Not so much nowadays it would seem – with the advent of GPS and ECDIS we are very close to knowing precisely where we are, all the time. However, the continuing trend to rely solely on this means of navigation rather than to cross-check with other independent and reliable navigation techniques introduces a significant risk.

CHIRP Maritime published reports in Maritime FEEDBACK (MFB) issue 54 which were inter alia related to discrepancies in positions between a marine pilot's PPU, (Portable Pilot Unit), and the vessels ECDIS position. It was determined at the time that the discrepancy was due to settings of the GPS – specifically the smoothing.

CHIRP subsequently received further reports of a similar nature and, as reported in MFB 56, we engaged with GPS manufacturers in order to study the subject in further detail. In this Insight article, we provide a simple explanation about GPS smoothing and good practices to follow in this regard.

### What is GPS smoothing?

The accuracy of a GPS position obtained on board a vessel can be affected by the quality of satellite signals received at the GPS receiver's antenna. In addition, the accuracy may be affected by satellite geometry, satellite system errors, and other factors such as signal blockage, atmospheric conditions, and receiver design features/quality. The shipborne marine GPS receiver computes the ship's position several times per minute. Each of these positions is affected

by these errors to varying degrees and thus, if all were plotted, the track might appear erratic.

Erratic position and speed data from the GPS receiver can lead to errors in determining the ship's speed and ship's course. GPS smoothing is embedded as software within the GPS receiver and is utilised to overcome this problem. The basic principle of smoothing techniques is to reduce erratic data points used for providing the ship's GPS position. Thus, the smoothing settings can affect the GPS display for speed over the ground, course over the ground, and course made good since all of these are computed from the positional data being received.

GPS receivers employ a filtering algorithm to compensate for data points beyond known variances and provide a stable position display output and position output signal for other navigational aids / navigational instruments. The filtering algorithm uses a series of position measurements over time to provide position outputs that tend to be more accurate than individual position measurements for navigational use.

If all obtained positions (several times a minute), on a stationary vessel, were to be plotted on an ECDIS chart of appropriate scale, the plotted position would appear scattered around an extremely small area of the chart, however, they are unlikely to overlap. When the receiving conditions at the shipborne marine GPS receiver are unfavourable, the GPS fix obtained may change significantly even if the vessel is stationary. Appropriate adjustment of the Latitude and Longitude GPS smoothing setting in the GPS receiver can reduce this phenomenon.

If we now consider the ship to be moving at sea speed, the position plots would appear to be more scattered. The shipborne marine GPS receiver directly measures the ship's speed over the ground (SOG) and ship's course (COG) during the position fixing process. If every position fix that is obtained is utilised to directly derive SOG and COG, both these values would appear to be changing randomly depending on receiving conditions and other factors. Appropriate adjustment of the Speed and Course GPS smoothing setting in the GPS receiver can reduce this apparent random change of SOG and COG.

### Should the GPS smoothing be adjusted?

The shipborne marine GPS receiver's GPS smoothing setting can be adjusted appropriately by the shipboard navigator. The GPS will have reduced accuracy of displayed position, COG and SOG output if the shipboard navigator does not set the GPS smoothing setting correctly for the actual navigation environment of the vessel. The onboard manual for the shipborne marine GPS receiver provides steps for conducting this adjustment. In general, the correct setting depends upon the expected dynamics of the vessel. If a ship is highly dynamic (i.e. moving rapidly), it should be set to a lower value since the filtering window needs more frequent input, resulting in a more responsive measurement. However, if a vessel is less dynamic and has much more resistance to change in its motion, this value can be increased to reduce measurement noise.

The advice from the manufacturers that CHIRP Maritime contacted is that SOG and COG smoothing should only be adjusted if the operators know what they are doing. If the operator is not sure, then the specific GPS manufacturer and the manufacturer's instruction manual should be consulted. The smoothing settings are (in general) entered by the attending service technician when the GPS unit is installed on the vessel, and it seems they are seldom adjusted

thereafter. Considering the problems highlighted in Maritime FEEDBACK 54, perhaps a change of mindset is needed.

Ask yourself the question – *On the current leg of the passage, is my vessel on a steady course and speed for a long time?* If the answer to the question is affirmative, the smoothing setting needs to be applied to ensure that the COG and SOG outputs derived from GPS positions do not seem to change erratically.

### Precautions

- The shipboard navigator should be aware that LAT/LONG smoothing and COG/SOG smoothing parameters can be adjusted by the user to adjust the level of responsiveness of the shipborne marine GPS receiver. The ship's GPS User Manual should be consulted on how to adjust the GPS smoothing setting. The smoothing setting of shipborne marine GPS receivers should be correctly adjusted according to the expected dynamics of the vessel.
  - *If the vessel is navigating near harbour entrances, harbour approaches and coastal waters, where the passage plan requires the vessel to frequently change course and/or speed, the GPS smoothing settings should be set low so that small changes in the vessel's course/speed over the ground (COG/SOG) and position (LAT/LONG) are tracked closely by the GPS.*
  - *If the vessel is navigating in ocean waters, where the passage plan requires the vessel to maintain a steady course and speed for relatively long periods of time, the GPS smoothing settings should be set around mid-range so that scattered positions obtained by the GPS receiver are smoothed to obtain a stable course/speed over the ground output (COG/SOG) and a steadily changing position (LAT/LONG).*
- Failure to appropriately adjust the GPS smoothing settings, as above, can lead to situations where there is a significant offset (reported to be as high as 160 metres) between the displayed position on the ECDIS and the ship's actual position derived from visual observations (bearings/distances) or from radar overlay.
- Whenever a ship's passage plan is being prepared, choice of position fixing methods to be used for each leg of the passage must take into consideration that prevailing IMO performance standards for a marine GPS receiver (without differential GPS capability) require, in ocean waters, that the system should provide positional information with an error not greater than 100 metres with a probability of 95%. *Such a position fixing system should not be chosen as the primary position fixing system near harbour entrances, harbour approaches and coastal waters, where the latest IMO standards prescribe that the positional information error should not be greater than 10 metres with a probability of 95%.*
- Where the ECDIS on board provides a radar overlay facility it must be used at every available opportunity to verify the GPS position. *If there is a discrepancy between the radar overlay picture and ECDIS display it must be recognised as an indication of an underlying inaccuracy in the GPS position received.* This is also the reason why good seamanship suggests that we should cross-check the GPS position against the radar by means of LOPs and visual bearings during coastal navigation.

- The shipboard navigator must not abandon the basic tenets of navigating by sight and sound. Where available, maintain visual verification of the vessel's position to ensure situational awareness and safe navigation.

### Conclusions

From the above it can be determined that there are two distinct issues, namely the accurate knowledge of where the vessel is, and the adjustment of GPS smoothing to compensate for inaccuracies. It should also be noted that this discussion is related to GPS units and not DGPS (which should automatically correct the errors that have been discussed in this article).

CHIRP Maritime has repeatedly highlighted the importance of traditional navigation and keeping a good lookout. It is imperative that critical sections of every passage are carefully planned and executed. Transits, wheel over positions, turning curves, visual bearings supplemented by radar ranges, and parallel indexing are just a few of the tools available to the navigator.

In today's electronic age it seems that far too much reliance is being placed upon GPS derived positions displayed on ECDIS with reluctance, in some cases, to use other available and reliable means of navigation to verify the ship's position. This being the case, it is imperative that the information being displayed is correct. Clearly, as we highlighted in FEEDBACK Issue 54, this is not always the case.

It seems to CHIRP that there is a case for having two distinct settings for GPS smoothing, (perhaps one for deep-sea and another for port arrival). The manufacturers that we spoke to stated that there are no general recommendations in this respect and pointed out that it is up to the operators, dependent upon the dynamics of the vessel in question. They also highlighted the importance of traditional navigation. Whilst it is disappointing that the manufacturers were unable to provide specific advice, it is understood that a particular marine GPS model may be fitted on a variety of tonnage from fishing vessels, to high-speed ferries, large tankers, container vessels, general cargo ships and yachts. Nevertheless, the potential problems have been discussed and the question for bridge teams and company management is simple – are we going to do something about it?

### Article. 38

## Insight Article: Pilot Boarding Ground – Avoiding misunderstandings between vessels

### Introduction

CHIRP Maritime recently received a near miss report which raised concerns over misunderstandings that might occur in the interpretation of the Collision Regulations by two vessels using the same pilot boarding ground.

The report described a situation where an outbound vessel leaving a pilot station encountered an inbound vessel. Risk of collision was deemed to exist by the outbound vessel (which was the stand on vessel in this instance) and having observed the situation for some time noted that the inbound vessel was not taking action in accordance with the Collision Regulations. A VHF conversation determined that the give way vessel was

inbound to the pilot station and expected the outbound vessel to keep clear. Under Collision Regulations 17 (a) (ii) the outbound vessel altered course because the inbound vessel did not seem to be taking appropriate action.

The reporter correctly identified the specific Collision Regulations that were applicable and was quite correct in saying that the Collision Regulations apply in the vicinity of a pilot boarding ground just as much as they do in any area of the high seas.

This paper addresses the particular circumstances that should apply to all vessels when approaching a pilot station and embarking or disembarking a pilot. Full compliance with the Collision Regulations and proper communications are the key factors. This is particularly true when there is potentially a need to interact with other vessels in the vicinity, in order to avoid unnecessary confusion and anxiety relating to the intentions of either vessel. Although the correct application (and interpretation) of the Collision Regulations is overarching, there are other considerations which may be taken into account in order to avoid misunderstandings at or in the vicinity of a pilot board ground.

### Scheduling a pilot from sea – speed/time/distance management.

This topic has been highlighted by CHIRP previously but is worth re-stating as it emphasises good practices in the planning and approach leading to a reduction in any potential conflict by resolution at an earlier stage.

Proper planning of scheduled boarding times by port authorities and vessels should ensure that traffic flows smoothly in the vicinity of boarding grounds. Inbound and outbound shipping movements are often co-ordinated with the pilot on board the outbound vessel being assigned to take the inbound vessel. Due consideration should be given to both the actions of the outbound vessel, (perhaps creating a lee or sudden increase or decrease in speed) and the available sea room. Good communications ensure that the inbound vessel keeps well clear until the outbound pilot has disembarked and also gives the inbound vessel knowledge of the intentions of the other vessel.

Delays are inevitable and this may result in pilot boarding times being re-scheduled. Once again it is vital that communication is maintained so that all parties are fully aware of any adjustments. When re-planning an arrival at the boarding ground, speed management is a vital element. Some vessels may need to make fine speed adjustments at an early stage in order to meet the new arrival time. We have all seen vessels taking round turns, effecting zig-zag dog legs, and upon occasion drifting in high density areas of traffic with two black balls being raised in abuse of the Collision Regulations. This is where speed management and control of the operation has abjectly failed, and it has the potential to cause chaos with other vessels in the vicinity.

It is also desirable to avoid early arrival, particularly when there is more than one inbound vessel making for the same pilot station at the same time. There is no point in having your vessel and several others sitting on the charted "purple diamond" jostling for position since low speed, tidal effects and restricted sea room may inhibit manoeuvrability, and is a recipe for disaster. It is far safer to be at a reasonable distance from such activity, still inbound at slow speed and in control of the situation, rather than becoming involved in multiple close-quarters situations. Speed, distance and time management, plus listening to the port authority or pilot's VHF should ensure that you are aware of any potential problems long before they arise.

During the approach to any port, AIS information may be helpful. However, the accuracy of updated information cannot be relied upon. AIS-derived information may be helpful, but it is only one of the tools available to you and thus *CHIRP* advises that caution is needed unless this information is used in conjunction with other sources.

The point where you become committed to the final approach requires careful consideration. High density traffic areas may well result in you becoming committed long before the pilot finally approaches you.

### Other vessels in the vicinity.

Some pilot boarding grounds offer limited sea room, and traffic congestion should be avoided. Proper pilot scheduling, concise communications, prompt timekeeping and situational awareness of other traffic all helps to ensure that all parties are fully aware of what is going on and what is expected of them.

Safe distances are maintained by keeping to the boarding schedule. If these are changed, then adjusting speed to keep a safe distance from the boarding ground and other traffic is paramount. Collision Regulations apply where the risk of collision exists, and **will take precedence over all other factors**, but a prudent Master may be guided by the following:

- The inbound vessel should allow room for the outbound vessel to clear the pilot boarding ground since she will generally have more room to manoeuvre than an outbound vessel.
- The outbound vessel may have the same pilot who will be transferred to the inbound vessel.
- Ship/pilot VHF communications assist greatly with situational awareness during pilot transfer as long as the discussion is limited to the pilot boarding arrangements. The danger of over-reliance on VHF communications with respect to the Collision Regulations cannot be overstated and has been the direct cause of many incidents.
- When safe passing distances are assured by good scheduling and communications between pilots, ports authorities and masters, no Collision Regulation issues arise since the risks are being effectively managed.

The above pointers should ensure that vessels leave enough room in both space and time to safely enter the pilot boarding ground and safely execute the pilot transfer. The key to the safe conduct of vessels during this critical operation is timing - allowing each vessel to concentrate on this task and exercise good seamanship.

### Creating a lee and pilot ladder arrangements.

The correct rigging of any pilot ladder or combination ladder and the seamanlike practices for boarding or disembarking a pilot are well covered in many publications. The IMPA "Required Boarding Arrangements for Pilot" chart is a useful simplified schematic which details the requirements. This section highlights some additional aspects of the embarkation and disembarkation operation.

The pilot should advise the required height of the pilot ladder above the water and the pilot transfer speed. The pilot may advise which side to create a lee but, if not, it is good practice to double check rather than to exercise a seamanship judgement which may not match the actual intention of the pilot. At night, any unilateral action may not be obvious to an approaching pilot boat especially if they are anticipating a different manoeuvre.

The timing of creating a lee to match the precise pilot boarding time in exactly the correct position at the pilot

station is a matter of professional pride. Those who have taken an Uruga Channel Pilot into Tokyo Bay will be aware of the efficient timekeeping that is required.

In general terms, start the turn early in order to place the weather on the windward side approximately four points on the bow. This gives the pilot ladder on the leeward side the very best shelter. If there is a swell, this will affect the best heading to achieve the lee. Any final adjustments can be decided by conversations with the pilot launch. Try to board the pilot just before a steady course is achieved since the vessel is likely to roll less during a turn than she would on a steady course. Once the pilot is safely on board, the ship may return to the original course or the next leg. Note that small freeboard vessels may experience decks being awash due to rolling so the safety of the pilot should be fully taken into consideration when determining both the lee, the boarding operation, and when to resume course.

On large high freeboard vessels, it is very difficult to judge the height of the lowest pilot ladder step above the water. "Dipping and heaving back up" ensures the height of the ladder from the water level is always correct.

For situational awareness, the Master should be on the bridge wing to ensure the safety of the transfer. The Master will need to keep a close eye on the sea and weather for the lee and con the vessel remotely. Bridge team management and good communication are essential at this critical time, to ensure the vessel's position and traffic in the vicinity are being effectively monitored.

Creating a lee and boarding/disembarking a pilot requires professional skill. It is essentially a narrow window in time, position and weather. The lee should be co-ordinated with the pilot and launch. Preparation, planning and constant situational awareness are necessary so that it is safely and efficiently performed in one synchronised movement.

### Conclusion

To summarise the above:

- Plan well in advance. Commence the required speed, time and distance management calculations twelve hours prior to arrival at the pilot boarding ground. Any adjustments should be limited to minor changes of speed as opposed to large course alterations, particularly in areas of dense traffic.
- Prepare the pilot boarding arrangements properly
- Ensure that VHF communications are limited solely to the pilot scheduling and boarding operation. Any discussion relating to traffic management and application of the Collision Regulations is strongly discouraged.
- Keep to your ETA and constantly review your progress.
- Create a timely and efficient lee for the pilot transfer with the Master on the bridge wing. Ensure that situational awareness and effective bridge team management is maintained.
- Give every vessel at the pilot boarding ground space and time for them to conduct their operations in a safe and seamanlike manner.
- Let the outbound vessel disembark the pilot and clear first. They invariably have the tightest constraints.
- The inbound vessel has the bigger challenge to make all the above happen safely and without causing confusion or anxiety to others. This requires proper planning and constant monitoring to ensure that timing is correct upon approaching a pilot boarding ground at a manageable steady speed.





## Section six

# YACHTS, TUGS, FISHING AND RECREATION

We begin this section with a report about a near miss between a recreational fishing boat and a tug, in which neither vessel appears to have been keeping a particularly good lookout. This is followed by another instance of crew members washing down an expensive yacht without bothering to use safety gear.

We also consider the case of a tug which was towing with a maindeck door wide open, and report on a yacht winch which failed unexpectedly. It is worth

repeating the advice that most yacht fittings do not have to meet the rigorous construction standards imposed upon larger vessels, so regular checking and maintenance is essential.

This is a relatively short section, albeit an important one, so please keep sending us your reports. More and more people are taking up recreational boating these days, often without in-depth training, so your reports can help save lives and show people how to avoid disaster.





## Article. 39

## Near miss – recreational fisherman and tug

**Outline:** Whilst fishing at anchor a pleasure vessel had to cut its anchor rope and fishing lines in order to avoid a drifting tug.

### What the Reporter told us:

My fishing boat was anchored on a fishing mark. The boat is fitted with a radio, a 'radar sounder' transmitter and was exhibiting a black anchor ball and an anchor light at night, to indicate that I was at anchor.

Just before dawn, I had been watching a vessel for several hours approximately a mile away passing up and down and I felt that he would have noticed me since my anchor light is quite bright. Later, during another check on vessels around me, I noted that this particular vessel was now about 2-3 miles to the west of me.

After a while I checked again and, to my horror this vessel was drifting towards me at a distance of no more than 100 yards and closing fast. I shouted as loudly as I could and used the foghorn but there was no movement from the other vessel.

As I was rapidly running out of time I decided to take what action I could – there was no time to raise the anchor and so I started the engine and cut the anchor rope. My fishing lines were still deployed, and so I was unable to retrieve them. I managed to motor away as the other vessel continued to drift, apparently unaware of the near miss.

I tried to call the vessel on VHF Channel 16, then Channel 12 (the local shipping channel) but there was no reply. I made my way back to the harbour, thoroughly shaken.

### Further Dialogue:

CHIRP learned that the reporter had notified the Harbour Master's office as the near miss occurred within their jurisdiction. The Harbour Master advised the reporter they had contacted the vessel's owners, who responded as follows:

*We have looked at this incident in depth including interviewing the captain. We have concluded from the information available to us that although the vessel was close to you, the watchkeeper was fully aware of your position and due to the good conditions, continued to drift as the CPA would not get any closer. He commented that he had not witnessed anyone onboard. Additionally, the VHF was continuously monitored, and nothing was heard from yourself or the local VTS.*

### CHIRP Comment:

The Maritime Advisory Board highlighted the following;

- all vessels must maintain a proper lookout at all times.
- perception of risk differs depending on aspect - the view from an enclosed wheelhouse fitted with ARPA and ECDIS is very different from that of a pleasure boat with a height of eye of only 1.5m.
- for both vessels, engines should be at immediate readiness.

In addition, timely VHF communications are prudent and useful but if a situation requires immediate action then VHF calls are probably not the best use of the available time.

The above article was published in MFB 56

## Article. 40

## Unsafe working at heights

**Outline:** CHIRP continues to receive reports primarily from the yachting sector concerning unsafe working at height. These highlight practices where the potential for serious personal injury or even death are present.

### What the Reporter told us:

Recently I witnessed several deck personnel on the yacht on our port side working at height without any safety equipment. They were working at a considerable height above the waterline washing down with detergent, which in my opinion increased the risk of slipping and falling over the side. As you can see in the photos attached, certain crew members were leaning over the side of the vessel trying to clean the superstructure.



The photos clearly demonstrate the lack of crew safety awareness and a poor on board safety culture.

### CHIRP Comment:

The Maritime Advisory Board noted that this report highlights both human element and technical considerations. Too often naval architects and designers, when designing a vessel – in this case a luxury yacht - give scant consideration to the practicalities of everyday operations such as washing down or routine access for inspection purposes. Rounded or sloping housings and decks may be aesthetically pleasing but without suitable handrails, fishplates or securing points for safety harness carabiners or similar devices, are potentially lethal for crew members carrying out their everyday jobs. Long-handled brushes will only go so far to compensate for thoughtless design.

Every member of a ship's company is fully responsible for their own safety. In addition, all members of the ship's company (and especially those in positions of authority) have a responsibility for the safety of other crew members – they should ensure that the necessary tools and equipment such as safety harnesses and life vests are to hand so that tasks can be carried out in a safe manner, and should intervene when such work is not being conducted in a safe manner. It is simply unacceptable to turn a blind eye to safety.

**IS ANY JOB WORTH RISKING YOUR LIFE FOR?**

The above article was published in MFB 56

**Article. 41**

## Hazardous towing practice

**Outline: An account of an unsafe towing practice observed aboard a harbour tug assisting a container vessel during a port manoeuvring operation.**

**What the Reporter told us:**

The photograph shows a tug engaged in towing operations assisting a large container vessel during departure. Despite many incidents in the towing industry where watertight integrity has been the cause of numerous accidents and deaths of tug crews, the crew of this tug failed to exercise proper controls to close and secure the watertight door to the accommodation.

The warnings, training and instructions contained in the tug owner's safety manual are clear and were understood by all. Unfortunately, on this occasion those warnings, training and instructions were not complied with.



A tug towing with an open watertight door – highlighting the risk of flooding.

**Further Dialogue:**

CHIRP learned from the reporter that his initial attempts to alert the towing company to this near miss incident had been ignored and his concerns dismissed. However, he felt strongly enough about the issue to submit a report to CHIRP.

CHIRP subsequently contacted the DPA who readily engaged with us and confirmed that the photograph did regrettably confirm the report, and that the aft accommodation watertight door may have been open without cause. This was indeed contrary to the company's safety procedures and industry best practice.

The issue was subsequently raised locally for action and a safety flash was promulgated by the company reminding all tug personnel of the importance of maintaining watertight integrity.

**CHIRP Comment:**

Tugs are particularly vulnerable to flooding through any watertight openings that might be open. This is due, in part, to the external forces being applied when towing. Obviously, anyone working in the engine room or below decks is at maximum risk in the event of flooding. **The inherent reserve buoyancy of a tug is based on all the watertight doors being closed.** Over-familiarity and complacency are insidious and are always waiting to catch the unwary.

It is appreciated that tugs operate with a small crew, but the question was asked if the SMS needs to be re-examined in case crew members have to multi-task and move frequently through the watertight door. The best SMS in the world is only as good as the people who operate it. The end users need to be positively encouraged to take ownership of the SMS and not view it as something imposed from above.

Re-examination of the SMS to see if it is fit for purpose applies to all commercial vessels. Too often the SMS is produced by the office ashore and put onto the ship with minimal input from the seafarers onboard who have to operate the ship whilst complying with the requirements of the system.

The above article was published in MFB 57

**Article. 42**

## Winch sheared

**Outline: A sailing yacht suffered a winch failure whilst hoisting the mainsail when departing harbour.**

**What the Reporter told us:**

After leaving harbour the mainsail was being hoisted under normal load when the mast halyard winch sheared off its mounting. Closer examination of the winch identified that the centre stem casting had failed.

The winch, which was manufactured by a well-known name in yachting, is only 3-4 years old and, furthermore, the boat is only used for fair weather cruising - never raced.

Since use of the main mast halyard for man overboard recovery is a recommended practice, a failure such as this could have been catastrophic. Further, we were informed that the winch has never been subject to heavy load or severe shock.



Photograph of failed casting.



### Further Dialogue:

CHIRP learnt that the incident had occurred one month prior to the report being submitted. Initially the reporter had corresponded with the winch manufacturer who had offered to send the failed component away for engineering analysis with the proviso that if there was no fault found with the casting then the reporter would be liable for the costs involved, a sum in excess of £1,500. The reporter declined the offer but advised the manufacturer that as it was a safety concern, he would be submitting a report to CHIRP to see if his was an isolated incident or not.

Subsequently the reporter received a further e-mail from the manufacturer stating, "that although they have a very low failure rate of these winches, on this occasion as a gesture of good will, they would send the reporter a new replacement centre stem". This was duly done.

Meanwhile CHIRP sought expert advice and opinion as to the failure – it was confirmed that similar failures had not been reported and were thus unknown. In addition, the manufacturer was indeed well respected for the quality of its products.

### CHIRP Comment:

Members of the MAB raised the following points concerning this report:

- leisure boat construction, including equipment and fittings, cannot be presumed to be as robust as commercial vessel construction. A deep-sea vessel built to Lloyd's classification will have each aspect of the construction inspected and signed off by a Lloyd's surveyor. Equally, all class machinery and equipment installed will be individually inspected and approved. In the case of leisure craft, many are self-certified by the manufacturers themselves. Much of the equipment is bought in, with the components being fabricated on a batch and line QA process – the components are then assembled during final installation of the craft.
- it was noted that the MCA are reviewing the current Leisure and Pleasure Boat Code.

In addition to using the main halyard and winch for recovery of a man overboard in an emergency, it is also a common practice to utilise masthead halyards and winches to hoist crew members aloft for routine work. In the latter cases it is recommended that two lines are utilised, one to hoist aloft and the second as a safety line.

**The above article was published in MFB 57**

## Section seven

# SAFETY CULTURE

It is more than 20 years since the introduction of the ISM Code, so it might be reasonable to expect that shipping companies would have established a robust safety culture by now. Indeed, there is evidence that safety has generally improved, but there is also plenty of evidence that not everyone has embraced the provisions of the Code.

This section illustrates how far we have to go to ensure that safety is taken seriously by everyone. We learn of passengers who refused to obey safety instructions given by the crew, senior officers who had only a rudimentary grasp of English (the international language of the sea) and almost caused a disaster due to their inability to understand advice and instructions, and a whole host of common safety violations about which we receive numerous reports. We also learn about a ship where there were serious hours of rest violations.

Our Insight articles are particularly interesting. We begin by investigating whether the personal protective equipment available on board is suitable for female mariners, and the results are alarming. This is an area which has received little attention in the past, but with increasing numbers of women at sea in all ranks and positions, it is something which shipping companies should address as a matter of urgency. We hope our article will encourage all employers of female mariners to deal with the issues raised.

We then turn to the fact that there are no international regulations on the treatment of passengers with disabilities. This is really quite worrying, and we have an excellent article which discusses the problem. We also include some very sensible suggestions from maritime students in Hong Kong, who were invited to investigate ways of dealing with disabled passengers. I am tempted to suggest that, if young people who have not yet been to sea can come up with so many good ideas, it should not be beyond the abilities of IMO to implement some sensible rules. Of course, the better companies already have procedures in place, but this is by no means universal and standards vary widely, so we suggest it is time for some industry-wide regulations.

Finally, we include the causal analysis prepared by Capt. Ian Shields MNM, which looks at the root causes of the incidents reported in this Digest and compares them with his earlier analyses. Ian goes beyond the 'human error' which is blamed for most incidents, to discover the underlying causes. This is vital work, because it is easy enough to blame individuals and then do nothing about it, but when we know the underlying causes we can deal with them and, hopefully, prevent them happening in the future. Ian's work also provides an ideal template for all companies to attempt their own causal analysis. It is worrying, though, that the findings of the analysis have hardly changed since we first undertook the exercise, so we do not appear to be learning from the results of these important studies. Shipping companies would do well to study the findings and attempt to correct the causative factors.





## Article. 43

## RN Insight: Improving safety culture – the reporting element

### Introduction

The importance of having the right culture for safety is an oft discussed topic with a variety of views held on what such a culture should look like and how to achieve it. That said, there does seem to be majority agreement that there are five key elements that promote the right culture:

- Just
- Reporting
- Flexible
- Questioning
- Learning

This Insight article looks at how the Royal Navy is developing the Reporting element by providing some context about the current reporting landscape and showing how our reports are analysed. We then share two case studies that provide examples of how safety can be improved directly as a result of reporting.

### Context

The Royal Navy employs an occurrence reporting tool known as the Navy Lessons and Information Management System (NLIMS). This tool has been in use since 2013 and so is now starting to provide a statistically credible source of data. Reports are submitted in an Excel spreadsheet form sent by e-mail to be quality checked by a team of data inputters prior to entry into the database (not far different from CHIRP). This quality check is an essential part of ensuring the reports move up the DIKW pyramid; often reporters miss out key parts of the metadata needed to turn the raw data of a report into information that can then be analysed.

In 2018 there were 4165 reports received into the NLIMS system of which 1139 were directly attributable to occurrences on Royal Navy surface ships. Of these, 129 covered injuries classed as Serious or above, where Serious covers injuries leading to no more than 24 hours in hospital but greater than 7 days off work.

### Near Misses

Encouragingly 560 of the 1139 (49%) are Near Miss reports. Encouraging because these reports are not mandatory, which must mean that sailors recognise the value in submitting these reports or else they might not bother. This provides a warm feeling that the Navy's culture does encourage reporting of occurrences but, as ever, there is always more we can do.

### Analysis

The treasure trove of information contained within NLIMS could become a little overwhelming and so we break down our analysis into three distinct groups, focussed on the needs of those requiring the analysis.

**a. Weekly Summary.** Those in the shore organisations closest to the delivery of shipping operations receive a summary of reports received in the last 7 days. This fulfils two key functions, firstly it ensures that they are able to react to any occurrences of concern and direct further investigation if required, and secondly it provides a regular rhythm of reporting against which trends or patterns can be spotted. A trend might be receiving

reports of sailors falling down the same ladder (is it too steep, too narrow, is it exposed to weather and needs non-slip treads?) whilst a pattern might be an increase in heat related injuries amongst ships undergoing an annual exercise. An example of the weekly summary is at Figure 1.



Figure 1: Weekly LfE / NLIMS Summary (indicative figures for illustrative purposes only)

**b. Monthly Deep Dive.** Having spotted a trend or pattern, the monthly deep dive provides a way for managers to direct a much more thorough analysis. This deep dive might look back over a number of years, or across a range of different organisations. It aims to provide evidence for decision making by those controlling the resources used to control risks. Recent issues examined include: a comparison of occurrence frequency during maintenance periods compared to operating at sea; identification of the activities that cause the most harm thus need greater control; and analysis of occurrences across each ship type/class to ensure that we are not unduly exposing a particular population of sailors to risk.

**c. Governance Performance.** The most senior leaders in the Royal Navy are very mindful of their duties and accountability for safety. They therefore demand safety performance management information at their regular governance meetings to allow them to review the safety management system in order to identify shortfalls and direct action for continuous improvement. The dashboard (Figure 2) produced for these meetings covers a range of leading and lagging indicators but draws heavily on the information contained in NLIMS.



Figure 2: Safety Performance Management Dashboard (indicative figures for illustrative purposes only)

### Case Studies

The provision of information as described above is all very well but unless it provides the information managers and commanders require to take decisions then the effort is worthless, and in time those making the reports will lose interest. Demonstrable learning and the improvements that it drives is critical to the success of reporting. Here are two case studies that show tangible improvements made as a direct result of reports raised by individual sailors or ships.

### Case Study 1 – Repeated Navigational Near Misses

The Royal Navy has a requirement to understand the signatures of its ships and has, for many years, used fixed arrays on the seabed to measure this data either on an opportunity basis as ships operate in the vicinity or as part of a programmed trial.

For years a measurement range facility was used regularly but measurements were continually compromised by the presence of other traffic in the vicinity (predominantly small fishing vessels leaving and returning to harbour at the ends of the day). As the range was situated in relatively shallow water fairly close to the shore, on almost every occasion the Operating Authority had to be asked for dispensation to breach standard under keel clearance minima, and lateral separation requirements. Finally, ships were often programmed to conduct these trials overnight, however charting in the area was fairly poor and the main visual references used to keep the ship in safe water were unlit.

Near Miss reports associated with this activity were increasing, providing a growing body of evidence of close passes, interrupted measurements, and fatigue of a crew operating in a highly stimulated environment for many hours. Analysis of these reports and the investigation of resulting trends highlighted the wider issues that had not been evident when each incident was viewed in isolation.

Simple measures to improve the situation were implemented which included moving the range by a mere 200m which took it further off the coast, into deeper water and off the direct route between the local harbour and the fishing grounds. The UK Hydrographic Office was engaged to produce a new chart centred on the revised range position, including the major visual fixing marks. A formal Notice to Mariners was issued which resulted in reduced instances of craft inadvertently straying into the range when it was in use and the decision was taken to only use the range during daylight hours to reduce crew fatigue.



The cumulative effect of the control measures put in place reduced the overall risk of the task and has seen the number of Near Miss reports dropping to almost zero.

### Case Study 2 – Upward Trend in Hydrogen Sulphide Reports

In the middle of 2018, weekly analysis of NLIMS Reports indicated an increasing number of Near Miss reports where sailors reported the unexpected presence of Hydrogen Sulphide (H<sub>2</sub>S). H<sub>2</sub>S is a colourless gas with the

odour of rotten eggs but becomes odourless in higher concentrations. It is heavier than air, poisonous, corrosive, flammable and explosive. It can be found from a variety of natural sources, but specific to our area of concern, it is produced as the by-product of the breakdown of organic matter in the absence of oxygen. As such it may be present in fridges, sewage treatment plants, contaminated bilges, black/grey water, fuel, sullage and contaminated oil tanks.

Further analysis of the reports indicated that nearly all incidents were related to the discharge of sullage tanks - on many occasions where the tank lid had been removed to allow a hose from a tanker or barge to be placed directly into the tank, rather than using the fixed discharge pump (i.e. a closed system). Personnel were not breaking any rules but the NLIMS reports had identified an unexpected exposure of personnel to a hazard.

Prompt reporting allowed a working group with appropriate expertise (ships engineering staff, port operations personnel, headquarters staff, and so on) to meet quickly and identify the key issues and how to stop them. It quickly became apparent that there was a gap in our procedures. We had policy for discharging sullage and entering confined spaces, but no policy for the removal of tank lids; we had not anticipated that sailors would need to remove tank lids unless they were preparing to enter the tank. The Royal Navy's procedure for quickly issuing safety related notices was put to good use and new instructions were issued to the Fleet and briefed by supervisors.

Since then the number of reports received concerning H<sub>2</sub>S has halved, and trust between our ships and their support contractors has improved.

### Conclusion

Reporting is a vital element in building a culture for safety but unless you take the data that those reports provide, turn it into information by the addition of metadata to allow it to be analysed and then use the knowledge the analysis provides to make decisions for demonstrable improvements in safety to encourage continued reporting, then your efforts will not be sustainable.

### Article. 44

## Safety briefings are given for a reason

**Outline: A report detailing an incident where a wilful failure to fully comply with a safety briefing led to an injury to a passenger.**

### What the reporter told us:

I am the skipper of a Rigid Hulled Inflatable Boat (RHIB) which offers tours of the local area to observe the wildlife, fauna and flora. We give a thorough safety briefing prior to departure. On this particular occasion, our passengers were advised several times before the trip began and in the safety briefing on board, to sit toward the back of the boat as it was more stable.

We left the port in relatively calm conditions (sea state 2), travelling at a slow speed of 5 knots. As we approached the sandbar at the edge of the estuary there was an increase of swell to 1–2 feet due to the shallower conditions.

When we were almost over the sandbar, the last wave was much steeper / sharper so we slowed down just as the wave approached. Both passengers stood up as we



travelled over the wave, resulting in one of them slamming back down onto the seat with force.

The boat was immediately stopped. The crew went to check on the passenger, who appeared to be in a dazed state and was complaining of sore lower back muscles. The skipper drove very slowly back into the bay, and the crewmember remained with the passenger making sure she was squeezing her hands and moving her toes. She was kept warm with blankets and was not moved. Following a VHF call to the operations base in the marina, an ambulance was called. Roughly 5 minutes after arriving back at the pontoon, a paramedic arrived. Following an examination, the patient was advised that the pain was just sore lower back muscles and to take some pain relief and to go home and rest.

#### Lessons Learned:

There should be a greater emphasis on customers staying seated at all times during the trip

#### Further Dialogue:

In further discussion between *CHIRP* and the reporter the following points were made;

- It was confirmed that the injuries sustained were simply diagnosed as muscular.
- The crew of the RHIB quite rightly gave basic treatment for shock and potentially serious spinal injury.
- It was agreed that the learnings could be applicable to any RHIB operation and indeed many other activities within the leisure sector where passengers are involved.
- There was uncertainty as to why the two passengers, who were in their early 70's, decided to stand up since they were told several times throughout the trip to remain seated at all times.
- It was emphasised that briefings are conducted prior to the excursions, and on slightly rougher weather days this includes suggesting that the excursion could be postponed to a calmer day. In this particular case the advice was given to postpone, but they insisted on going because they were a "fit couple".

#### CHIRP Comment:

Having discussed this report the Maritime Advisory Board commented that the operator's concern as to "What do we need to do better in order to prevent this from happening again?" is both commendable and very valid. In a wider context, spinal injuries can be severe and the passengers in this case were fortunate that the end result was simply bruising.

In all operations involving passengers, their safety must be given the highest priority. *CHIRP* considers that there are potential additions to the safety briefing that may reinforce the request to remain seated. Firstly, a notice at the boarding point **requiring** passengers to remain seated. Although simple, the word "required" carries a completely different weight than requested. Additionally, where practicable, a notice on the rear of the seats, or on athwartships seating may be beneficial. Both of these steps would reinforce the safety briefing(s). The possibility of the passenger signing a waiver was discussed but eventually it was thought that, from a passenger perspective, this would involve signing a piece of paper (with a lot of legal terminology) as opposed to fully reinforcing the danger.

A more difficult assessment may be to determine a passengers' suitability to undertake the trip under the prevailing weather conditions, or a company decision as to the weather being sufficiently inclement to postpone the

trip. This is subtly different from a passenger stating that they are fit to undertake the trip. It may impact upon commercial considerations but does provide another level of safety.

The Marine Accident Investigation Branch (MAIB) has several reports related to RIB's and perhaps the most relevant to this report is **10-2017** involving a collision between two RIB's resulting in serious injuries to one passenger. The report highlights other incidents and gives information on published guidance and regulations. Spinal injuries are also discussed in the report, as are safety briefings.

The above article was published in **MFB 54**

#### Article. 45

## Communications issues – do you fully understand what is being said?

**Outline: A vessel was the subject of two reports, the former being a pilot ladder deficiency but there was also a communications issue when trying to address the deficiency. The communications issue led to a near grounding.**

#### What the Reporter told us:

Recently, whilst climbing a pilot ladder on an inbound bulk carrier, I noticed that the ladder was well-worn with very loose chocks. After berthing, I informed the master, however with his very poor English I am not convinced that he fully understood. I also experienced difficulties in explaining various matters during the inbound pilotage.

Prior to disembarking alongside, I was concerned about the condition of the gangway, the ropes running through the stanchions at the top platform appeared in poor condition. A lot of fibre came off the ropes as they were pulled through the stanchion rings, indicating possible degradation of the ropes.

Five days later in an inner anchorage, whilst a severe wind warning was in place, the same vessel was dragging anchor towards a headland. The local signal station had been monitoring the vessel and advised them they were dragging. They responded that they were holding position using the engine. When asked if they needed assistance, they declined the offer.

Having completed its discharge, the vessel was at anchor waiting to re-load. At the time of anchoring the forecast did not include a severe wind warning. However, the master was advised to closely monitor the position and to rapidly get the vessel underway should the vessel start to drag anchor. During the afternoon I became aware of a severe wind warning. As we were due to have other ship movements, consideration was given to shifting this vessels' position. However, the wind halted operations in the port and so these decisions were deferred to the following day. The ships' agent was requested to "advise the master to closely monitor their position overnight and have the main engine available at short notice, which should include an engineer on duty". The signal station also advised the ship of this message and monitored the ship closely at my request.

Later, I was called by the signal station and informed that the ship was dragging. I checked the position of the vessel and called the vessel using my home VHF. I advised the master to heave up his anchor and get underway, to move NE towards the middle of the harbour, and that a pilot would be dispatched to his vessel.

The quickest option was to divert a pilot from an outbound vessel. Once onboard, the pilot found the vessel was not underway and was only about 1 cable from grounding. The master had shortened the cable from 7 to 5 shackles but had not attempted to get underway or recover his anchor. Due to language issues, it appeared that the master had not fully understood the earlier instructions to get underway and had not developed a plan to deal with the situation. The pilot who boarded found the situation very challenging but eventually managed to drive the vessel away from the nearby shore and also recovered the anchor. Re-anchoring was considered but winds of 50-60 knots were experienced and so the vessel was taken out of the port.

There are a number of factors that contributed to this serious situation, and not all are attributable to the ship. With the benefit of hindsight, I am reviewing my own decisions.

Having berthed the vessel, I reported a deficient pilot ladder and raised concerns about the poor understanding of English by the master, which I now feel may have significantly contributed to the vessel's near grounding.

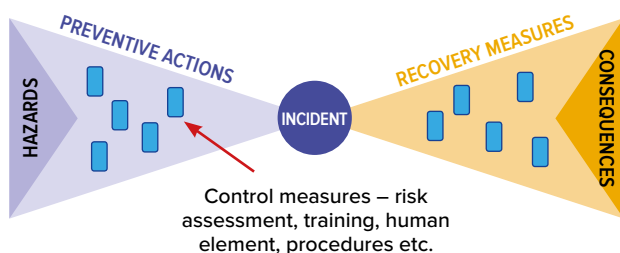
#### CHIRP Comment:

The Maritime Advisory Board commented that the reports highlight several issues.

With respect to communications, SOLAS V Regulation 14.4 states that *“English shall be used on the bridge as the working language for bridge-to-bridge and bridge-to-shore safety communications as well as for communications on board between the pilot and bridge watchkeeping personnel, unless those directly involved in the communication speak a common language other than English.”* The report clearly indicates that the knowledge of the English language by the bridge team was insufficient for them to fully understand what was being requested of them. **(Human Element – Communications)**.

The report highlights a potential cultural issue on board – a vessel's personnel tend to respond in a certain manner depending on their background. It can be inferred that both culture and communications have led to a suspicion that pilotage was not being effectively monitored and that bridge team management was poor. **(Human Element – culture, competence, complacency, alerting, situational awareness and teamwork)**

The self-criticism by the reporter is a very good point – not everything may have been attributable to the ship. Perhaps in hindsight, the inner anchorage may not have been the best place to anchor if weather conditions were subject to sudden change. A suggested learning point is to consider how pilots, port authorities and VTS manage these situations and how they could have controlled things better. The bow tie diagram illustrates the issue.



Bow tie diagram highlighting prevention of threats on the left-hand side to avoid recovery measures and consequences on the right

The above article was published in MFB 55

#### Article. 46

## Hours of rest violations

**Outline:** CHIRP has received several reports concerning the pressure that some seafarers are placed under with respect to hours of work, hours of rest, and fatigue. One such example is given below.

#### What the Reporter told us:

The vessel in question constantly violates the rest hours requirements, and this is ongoing despite having been warned previously by the national regulator and nearly having the vessel's Document of Compliance withdrawn. This is entirely due to commercial pressure from the company - the master is constantly under pressure from the company over the telephone because they never make their demands in writing. He only wants to do his best and to keep his job as do all of us.

Currently one of the vessel's masters has handed in his resignation based on commercial pressure, having been bullied by the management when he objected to their practices.

How long can this abuse of rest hours which leads to fatigue continue? How long will the Masters' overriding authority under SOLAS be abused? How long until an accident or incident occurs with its root cause being commercial pressure? On this vessel the shore-side management could not care less.

CHIRP offered to take this to the vessel's national administration, at which point correspondence ceased. It was considered that, on this basis, any report to the DPA would prove ineffective.

#### CHIRP Comment:

CHIRP would like to hear of any other issues with fatigue, hours of rest, or harassment by company management. If it is difficult for you to discuss these matters with your Company, then we can approach them on your behalf (in confidence). If there remains a problem, we can again in confidence approach Port State Control and/or the flag administration. All mariners should be aware however that if you feel forced to falsify the Hours of Rest, then this will result in PSC and Administrations being unable to prove your complaint since records will show exactly what the company wish them to see.

This report also demonstrates that if correspondence is discontinued, there is little we can do to assist. In order for us to help you, you need to help us and provide evidence for the maritime authorities to work with.

The above article was published in MFB 55

#### Article. 47

## Sounds familiar?

**Outline:** Several brief reports containing subject matter that CHIRP continues to receive with monotonous regularity. Why do these incidents continue to occur? We are not describing any complicated situations – common sense and a little thought would go such a long way to eliminate these types of reports.

#### What the Reporter told us (1):

The fire alarm sounded, and all crew commenced mustering. Upon reaching the bridge, the master found

that the electrician was testing the system, but the officer on watch had not made any public address announcement to inform the crew about this test. Quite apart from the false alarm, crewmembers could have been hurt by the automatic-closing accommodation doors.

#### What the Reporter told us (2):

Whilst transferring an electrical motor to the engine room by crane, it was noted that a non-certified wire sling was being used. The crane operator noticed an AB attempting to connect a hand-made sling for lowering the motor to the engine room. Work was suspended until a suitably certified sling was located.

#### What the Reporter told us (3):

Whilst undertaking purging operations to reduce H<sub>2</sub>S levels in cargo tanks, the bridge OOW saw an ER fitter on deck heading to a midship's store. Being on deck during purging operations was prohibited due to the high concentration of H<sub>2</sub>S in the area. The fitter was instructed to clear the deck immediately.

#### What the Reporter told us (4):

A high-level alarm was activated in the engine room bilge. Whilst transferring the bilges to the bilge holding tank, the duty engineer noted a small amount of water leaking into the bilge well on a continuous basis. This was traced back to a water tap in the engineers' changing room. The tap had been left partially open, presumably as a result of carelessness by an unknown party.

#### What the Reporter told us (5):

During routine chipping/maintenance of the MARPOL cargo drain line at the starboard manifold, an OS discovered a hole in the line from the manifold drip tray to the main line leading to 3S COT. The hole was not as a result of the current maintenance but seemed to be rather old, the result of a previous temporary repair, hidden and painted. The OS reported this to the Chief Officer who checked the drain line and asked the pumpman to remove it in order for a new one to be fitted.

#### What the Reporter told us (6):

On this vessel, the emergency fire pump must be continuously run during laden voyages to cool the main engine jacket. At 07:30 the engineer on duty found the emergency fire pump stopped. No one on the bridge or the engine control room could understand how or when the emergency fire pump stopped. As a direct consequence of the stoppage, the temperatures of the main engine were increasing and the engineer on duty reduced the RPM without informing the bridge. The vessel was due to arrive in port later that morning but the reduced RPM, which the bridge OOW was unaware of, caused a reduction in speed resulting in a delay to the port arrival.

#### CHIRP Comment:

CHIRP frequently highlights the importance of the Human Element in all aspects of shipboard operations and makes no apology for repeating the message. Reading the above reports there are several themes that are immediately apparent – primarily Communication! Communication! Communication! Work planning which was properly communicated would have gone a long way to preventing any of these reports becoming near misses. Other aspects of the Human Element that are missing in the reports above are

situational awareness, culture, local practices and teamwork. It will be no surprise that CHIRP's analysis of all reports received highlight these areas of the Human Element as the ones that consistently show failings. Overall the message is clear – **Plan what you do, do what you plan, and record it.**

The above article was published in MFB 56

#### Article. 48

## Insight Article: Personal protective equipment for female mariners – fit for purpose?

Recently, CHIRP Maritime received a request from a significant sector of the maritime industry to comment and offer opinion concerning the suitability and availability of Personal Protective Equipment, (PPE), for female seafarers and whether the PPE is fit for purpose.

Historically, seafaring has principally been the domain of men. With respect to concerns related to suitable PPE, the comparatively small number of women seafarers have been largely ignored. From a male perspective, CHIRP Maritime is certain that many mariners will have experienced unsuitable PPE at some point in their careers with few of us having correctly fitting garments or equipment 100% of the time. In an industry that promotes itself as being extremely safety conscious this is somewhat incongruous.

However, times have changed, considerably. These days, there are far more women at sea, particularly due to the huge expansion of the cruise ship industry, but also in all seagoing departments, from all sectors of the industry. It is not uncommon to find female deck officers and engineers, and the offshore industry has a considerable number of women not only mariners, but also on board as contractors or in a project capacity, all of whom require PPE.



CHIRP Maritime would therefore argue that the topic of specific PPE tailored for women has relevance to our industry and is deserving of further debate. To that end, we conducted a limited survey of female seafarers in order to gauge the opinion of those most affected. The initial response took us by surprise, as the number of respondents surged as the survey spread.

We based our survey on the points raised in the initial request, namely:

- A typical woman's foot is both shorter and narrower than a typical man's foot so even if a smaller size man's boot or shoe is the correct length it would still be too wide.
- A woman's face is generally smaller and finer than a man's so protective eye wear made for a man could leave gaps at the temples allowing ingress of foreign bodies.
- With regards to hand protection, the average woman has shorter, narrower fingers and a smaller palm circumference so even a small size glove designed for a man would be loose and risk catching and entrapment.
- Slips and falls protection is not properly addressed by an improperly sized safety harness which can hinder movement and the ability to work safely.
- A woman wearing a hard hat designed for a man may risk having her vision obscured if it slips over her eyes.
- A woman who cannot find correctly fitting and comfortable PPE is less likely to wear items of PPE and thereby puts herself at increased risk of injury.

CHIRP Maritime believes that these concerns have largely been ignored, and the issue has never been seriously considered. As an example, we are all well aware that men and women have different shaped faces but had never considered this in any safety sense - it was never really a consideration that safety goggles are manufactured in male and female styles / sizes. Can shipping companies' honesty state that their procurement departments take the above into account?

Thus, the points raised would appear to have merit and add more weight to the argument that much of the PPE, as supplied to them, can be unsuitable for women. A recent report forwarded to us concerned a fire team where the boots were all sizes 11 & 12. Whilst most men are also not of this foot size, they can and do cope with slightly over-sized boots. However, as women tend to be considerably smaller, such over-sized footwear becomes a hindrance if not a dangerous encumbrance to the job, and therefore precludes them from the fire team or results in them using inappropriate footwear.

Having decided to conduct a survey, CHIRP Maritime developed a series of questions based on the previously mentioned criteria and then approached female seafarers with a view to collating the response and looking for common trends. These were the questions:

Specific Questions:

1. Do you currently have suitable and correctly sized PPE; coveralls, shoes/boots, gloves, eye protection, hard hat?
2. If yes, was this provided by your employer or self-provided?
3. Have you ever joined a ship where no suitable or correctly sized PPE was available to you? If so, how was this problem solved?
4. Have you ever considered yourself to be placed at risk by lack of, or unsuitable PPE onboard a ship?
5. Any other comments, views or opinions that you, your colleagues and network contacts would like to provide on the subject would be gratefully received. As a confidential reporting programme, any and all replies will be disidentified before inclusion in any document that CHIRP puts forward.

The response we received from female seafarers was very interesting. It became clear very quickly that there is in fact an issue relating to all manner of PPE.

Once the process began, it rapidly gained traction as the topic began to be discussed across the industry. It then

became apparent that other issues, whilst not concerning the actual quality and provision of PPE, were also relevant - in particular changing room facilities. What now appears to be obvious has seldom or never been properly addressed in any serious manner.

Certainly, whilst separate changing facilities do exist on many cruise ships and some more modern offshore vessels, by and large women's changing room requirements are not considered and have not been met, leading to exclusion from the facilities or potentially embarrassing compromises for all parties. Whilst that particular issue is outside the scope of this document, we thought it important to mention that we have recognised the issue and it is perhaps worthy of a more substantial study in the future.

A brief sample of some of the responses to our survey are shown below. We have disidentified comments in order to give examples of the relevant issues:

#### **Respondent A:**

*I am female deckhand and will happily answer questions regarding PPE issues:*

#### **1. Do you currently have suitable and correctly sized PPE, coveralls, shoes/boots, gloves, eye protection, hard hat?**

**A:** Trousers, shirts, overalls, coats and fleeces are all designed for men, so I would say, "No, I do not have correct size uniform provided". Trousers are large and baggy and uncomfortable (even with a belt on). Men's shirts are provided by the company. I could use mine as a night dress as it does nearly reach my knees. Exactly the same issue with a winter coat. It does affect my job as everything is rather large on me and I really struggle to walk around and do the job. The only part of PPE that was a good fit was steel toe-cap boots and a hard hat!

#### **2. If yes, was this provided by your employer or self-provided?**

**A:** I did buy myself very similar colour shirts and trousers for work and in my Hi viz I did put a safety pin in it, so it is not too wide and does not get caught in machinery. I also bought small size gloves.

#### **3. Have you ever joined a ship where no suitable or correctly sized PPE was available to you? If so, how was this problem overcome?**

**A:** I was given the smallest man-sized clothing but as a very small female, everything given was large! I was told just to put a belt in the trousers and advised to find a tailor and adjust my coat. (which I did not do as I didn't think I should pay for my uniform to be adjusted).

#### **4. Have you ever considered yourself to be placed at risk by lack of, or unsuitable PPE onboard a ship?**

**A:** There was no suitable emergency gear provided for smaller persons/females. For example, Fire Safety gear! If some men would be XXL there would be special fire protective jackets/trousers provided on the ship, same with the boots, size 13. The smallest size you can find in the safety locker are size 10. I am a size 8 female and my feet are size 4. If there was a fire on board, I would really struggle in an XXL fire suit with size 10 or 13 boots. I would not expect to have the exact size, but I think a smaller option of gear should be provided for ships!



**Respondent B:**

*I spent 11 years at sea as a master mariner before coming shore side.*

**1. Do you currently have suitable and correctly sized PPE, coveralls, shoes/boots, gloves, eye protection, hard hat?**

**A:** I have the correct sized shoes/boots, eye protection and hard hat but I do not have suitably sized overalls or gloves. The PPE was provided by my employer.

**2. Have you ever joined a ship where no suitable or correctly sized PPE was available for you?**

**A:** I have joined ships that do not have suitable/correct sized PPE. They swapped crew duties around, so I covered positions that the PPE was available for. The PPE was ordered and arrived within 3 weeks.

**3. Have you ever considered yourself placed at risk by the lack of or unsuitable PPE onboard a ship?**

**A:** Yes, I believe I have been put at risk. The PPE is designed for the male shape and to get the clothing to fit I have to go up multiple sizes. This means there are large amounts of wasted material in places which causes a snagging hazard. Gloves can be a major issue as the sizes are for larger hands and you can feel like a clown trying to use them and, in most cases, you don't wear them as they are more of a hazard. Safety boots are normally not so much of an issue but the boots for fire suits are really difficult as they keep generic sizes onboard and do not normally cater to smaller sizes. This means when wearing them you can feel like a clown and it is very difficult to move around effectively.

**Respondent C:**

*Serving Chief Officer*

**1. Do you currently have suitable and correctly sized PPE, coveralls, shoes/boots, gloves, eye protection, hard hat? If yes was this provided by your employer or self-provided?**

**A:** I self-provided some of my PPE and so it correctly fits (part of the cost was reimbursed by my company). I bought boots and prescription safety glasses.

**2. Have you ever joined a ship where no suitable or correct size PPE was available to you? If so, how was this problem overcome?**

**A:** I try to bring my own from my previous ship. Most of the PPE is issued by my company and although there are a selection of sizes, it does not fit me properly. The biggest problem is the boiler suit and high viz jacket. They are bulky and easily catch on parts of the ship. I have to roll sleeves up etc. Some captains are happy for crew to buy things up the road if nothing is suitable onboard.

**3. Have you ever considered yourself to be placed at risk by lack of, or unsuitable PPE onboard a ship?**

**A:** Not at risk as such from everyday PPE but I have been made to feel belittled by asking for certain PPE that fits. Some officers say it's stupid to buy PPE for every size onboard e.g. FRC suits. But it is my role to go in the FRC and the suits are much too big. Also, fire suits are much too big. So, if I had to really fight a fire I would struggle with the large size of the suit and boots.

Sometimes, I would like my own budget to buy PPE which I would look after and take from ship to ship. The company are trying to improve the PPE and have picked a new company provider, but they don't have a large range of women's PPE.

I am made to feel the odd one out for asking. So, there are some positive steps, but there is still a way to go.

This is just a short sample of approximately 40 respondents, and we are grateful to them for taking part in our survey, we have précised the findings below:

The respondents ranged from AB's and deckhands to captains, engineer's, a CEO of a ferry company (former captain) and a United Kingdom Maritime and Coastguard Agency marine surveyor (former captain). Without exception they have all experienced issues regarding availability or sourcing of correctly sized PPE.

The majority feel they have been potentially put at risk, not so much from standard PPE but certainly by unsuitably sized fire-fighting suits, boots and gloves. A majority take some elements of self-provided PPE with them when joining a vessel. Attitudes to this necessity range from pragmatic to resentment.

A sizeable minority make reference to 'looking stupid', 'looking like a clown', and 'feeling stupid' in oversized PPE.

The vast majority are reasonably happy with the hard hats and safety glasses provided although one respondent did mention not being able to get a seal on a BA face mask. With regards to standard PPE boots, gloves and boiler suits are the biggest issues, with respondents noting that excessive material or voluminous size risks entanglement or entrapment with machinery or ropes. Over-sized boots can induce slip and trip hazards.

The respondents are aware of, and critical of the comfort (or lack of it) with regards to PPE. We do not have any evidence of the opinion of male seafarers regarding these issues but perhaps they, too, have never been asked. However, it is true to say, that PPE is designed around the "standard male" physique. Of course, it is not so long ago that many seafarers were expected to provide their own PPE, and in some cases that culture still exists.

Once our survey results started to accumulate it was evident that there is an issue, which raises the question of how to resolve it? Whilst there is obviously a requirement for appropriate PPE, how reasonable is it to expect the employer to provide a wide range of PPE that can accommodate all shapes and sizes? For sure, there are many male seafarers who have experienced ill-fitting PPE but there does appear to be a yawning gap when defining the acceptable criteria of "ill-fitting" between genders. This becomes even more important when "ill-fitting" becomes "unsafe".

In conclusion, CHIRP Maritime would argue that there is clearly an issue that needs to be recognised and addressed by employers if women are to be respected in the workplace and treated as equals. The MCA have recently updated their PPE Merchant Shipping Notice M1870 with Amendment 1, which provides for updated safety standards. It should be noted that employers are required to ensure that PPE is to be provided to employees where they are at risk from a hazardous work activity. Unsurprisingly nowhere do regulations or shipping notices mention that PPE should increase the risk!! The Code of Safe Working Practices devotes a full chapter to PPE – one salient section is repeated below;

*Suitable equipment should:*

- be appropriate for the risks involved, and the task being performed, without itself leading to any significant increased risk;
- fit the seafarer correctly after any necessary adjustment;
- take account of ergonomic requirements and the seafarer's state of health; and

- *be compatible with any other equipment that the seafarer has to use at the same time, so that it continues to be effective against the risk.*

A quick internet search reveals that there are manufacturers who supply female-specific personal protective equipment – all BS, EN, and ISO compliant as applicable (although they may lack company logos on helmets and boiler suits). Nevertheless, the correct equipment is available on the market. The challenge is to increase awareness in order for it to become readily available on board merchant vessels.

In order to widen the debate, *CHIRP* Maritime would like to receive correspondence from others who have issues with the suitability of PPE supplied to them or indeed it's availability.

#### Article. 49

## Insight: Passengers with disabilities – correspondence received

### Introduction

Further to an article published in FEEDBACK Issue 51, relating to passengers with disabilities, *CHIRP* Maritime has received much correspondence on the subject both from (ex) mariners and those without any seagoing experience. The correspondence has been varied in nature both with respect to the standards that the reporters expected prior to embarking, and what was actually experienced.

The correspondence has been discussed with the cruise industry and the *CHIRP* Maritime Advisory Board, (MAB), who have commented upon the concerns and suggestions of the various reporters. This article describes in general terms the correspondence received from reporters, and the resultant advice given to *CHIRP* Maritime by the cruise industry and MAB. It should be read in conjunction with the article published in FEEDBACK 51 (link – <https://www.chirpmaritime.org/wp-content/uploads/2018/05/CHIRP-MFB-51.pdf>)

### Reporters' comments

The following comments are a précis of reports from several correspondents. It should be noted that there are both positive and critical comments within the various dialogues.

- at all muster stations, there are lifejacket lockers on the outside deck immediately adjacent to any muster stations where disabled passengers are liable to be called in the 'unlikely event' of an emergency so it would usually not be necessary for a return to the cabin to collect a jacket.
- crew members assigned to muster stations scan passengers attending with a bar code reader which identifies the passengers' names and cabin number, and also any disabilities. There are crew members dedicated to looking after such passengers - and we have been assured that these crew will be alerted to 'meet and greet' should the occasion arise. Wheelchair passengers will normally be last to embark into lifeboats so that there is no need to go to the lower seating level common in lifeboats that are also used as tenders in anchorages.

- when mustering for drills, arriving passengers were checked off using a key card system (not dissimilar to the bar code reader mentioned above).
- there are suitable means on each deck to avoid the use of lifts and crew members are trained and assigned in their use. The means of getting disabled passengers down what could be many flights of stairs is similar to the arrangement that one often finds in tall buildings – a small portable arrangement which can be carried by 2 or 4 people, and not dissimilar to that used in aircraft to enable wheelchair users to pass up and down narrow aisles.
- as to grab-bags, surely every passenger would have one containing essential medicines - in fact on our most recent cruise in June 2018, our cabin steward asked without any prompting if we would need one and if so, said he would arrange for one to be supplied before the ship sailed.
- my wife has been wheelchair bound for several years – if we were not happy about the arrangements made for disabled passengers, then we would not cruise!
- specific joining instructions highlighting all issues/ requirements for disabled passengers including a pre board emergency brief might be a useful idea to explore.
- trolleys blocking alleyways – This should be quite simple to rectify as it is a housekeeping issue. The industry has for years highlighted unsafe conditions where emergency exits were obstructed for any variety of reasons. Similarly, oilskins over BA sets and the like. This is not a million miles away from that line of thought and perhaps should be promoted as blocking an exit.
- it was reassuring to learn that crew member(s) are assigned to assist each disabled passenger. My wife and I had wondered if this were the case with our Muster Point not being near the disabled Muster Point. (*CHIRP Note – this is a case in point where the information could have been given prior to or immediately upon boarding. It also reinforces the need for passengers to ask if they are uncertain.*)
- it is tempting to dismiss passenger's concerns as ill-informed whinging... I know from my days at sea I endeavoured to persuade my colleagues to take criticism constructively and not to resent it.
- as usual there was the mandatory drill when we left port and this was conducted well from our point of view, at our Muster Point. The departure drill was marked by orders being given to passengers, as they arrived, so that the Theatre filled quickly and efficiently. A good example of crowd control.
- there was also a drill later in the voyage since this was a lengthy cruise. This drill was poorly conducted, I wasn't the only person to think this, as there were retired seafarers onboard and they were also of this opinion. Other passengers looked on it as another lot of nonsense to be endured and the impression we got was that the crew thought the same.
- ten minutes prior to commencing the drill, stewards began to direct people towards their Muster Stations. The only benefit was to get people into the Muster Stations, and seated, before the bells were rung. This surely partly compromises the exercise since one of the reasons for a drill is to analyse the pattern of passenger behaviour and response times from the alarm sounding until Muster Points report everyone being present. The time, in this case, was meaningless.

- once at the Muster Point it was immediately obvious that no-one was in charge. This drill was anarchic, passengers arrived and decided for themselves where they were going to sit or, indeed, if they were going to sit at all because the aisles and stairs were crowded with people just waiting to get out as soon as the word was given. The instructions were also poor, compared to the first drill. This was the case at other Muster Points, according to others that we spoke to - hearsay evidence, I know, but believable.

### Comment from the cruise industry

The cruise industry and CHIRP Maritime Advisory Board have reviewed the issues highlighted above. The following comments are generic and not specific to any one cruise company. The comments show an awareness of some of the concerns raised, with steps being taken to ensure that passengers with disabilities are both aware of the procedures to follow in any given emergency and are properly assisted throughout.

- when passengers initially consider booking a cruise it is important to identify the precise individual needs. Whilst this factor might not be fully considered by travel agent(s), it should certainly be mentioned by the passenger(s). If the travel agent is not able to answer queries, the cruise industry suggested that direct contact be made with the individual company – many of the major cruise operators have specific personnel to assist with resolving any concerns that disabled passengers may have. There is a concern that some passengers fail to declare their disability which lends itself to problems when actually on board a vessel.
- the cruise sector stressed the importance of the vessel and her crew being aware of specific disabilities both prior to boarding and immediately upon boarding. The following comments were highlighted;
  - it is important to identify the exact nature of the disability – vibration pillows, flashing lights, etc. can be provided to assist with awareness in emergency situations, but prior knowledge is required.
  - there are a restricted number of adapted cabins available at any one time. This may include passengers who are travelling for therapeutic respite as an integral part of their recovery.
  - prior to boarding passengers should ensure that they are on a list indicating that they would need assistance in the event of an emergency.
  - from both the crew and the passengers' perspective it is important to fully engage upon boarding. Many cruise operators have specific crew personnel to assist with disabled passengers – these personnel become the key contact throughout the voyage. An emergency briefing highlighting specific actions to take in an emergency should be given by the key contact. This may well be dependent upon the exact disability but could be "stay in the cabin and assistance will come, or if not in your cabin then proceed to the muster station". If not in a cabin and unable to proceed to a muster station, then ask the nearest crewmember for assistance – trained crew will then be able to come to help. From the passenger perspective, if at all in doubt as to what would be required in any given emergency then ask.
- one cruise company highlighted the fact that their nominated disabled cabins were clustered around one muster station. Another company mentioned that their cabins are spread out so that they are not clustered. The rationale for this is as follows;
  - with the majority of disabled personnel in a single location trained expertise can be at hand to assist with boarding.
  - conversely one of the biggest challenges is boarding a lifeboat rapidly and effectively. The last few passengers, (disabled) will take the longest to board.
  - SOLAS requires 30 minutes maximum to evacuate – this is based on a lifeboat capacity of 150 persons. Lifeboats (marine evacuation systems) can now hold 400 persons. Add in worried passengers and this becomes challenging.
- one of the biggest changes being considered is the use of lifts. The thought process of "do not use" is being challenged due the larger number of personnel to evacuate which might be as many as 6,000 on some of the larger passenger vessels. One line of thinking is that if the lift in question has an independent power supply and the emergency is not fire, then it might be considered safer and more effective to transfer passengers up ten decks in 10-20 person lifts. It would be a judgement call for each company as to the safety of doing this and as to prioritizing disabled passengers. However, the subject is being widely discussed across the cruise sector.
- many cruise companies have "stair chairs" at every stairwell for use in an emergency for those passengers who have severe mobility issues.
- one cruise company mentioned that they do not advise passengers to go back to their cabin to collect lifejackets. Many operators are moving away from this "historic" practice which might potentially send persons into danger. Lifejacket lockers may now often be found by the muster point and/or lifeboat / liferaft embarkation point. In part the ability to do this is linked to the age of the vessel, and the physical practicality of relocating jackets from cabins to locations near to the lifeboats or rafts.
- one cruise company commented that they specifically train crews in "Crisis Management and Control", including refresher training. With respect to the comment of passengers being directed towards muster stations prior to commencement of a drill, this is done simply because passengers often turn up early. Thus, a part of the crowd control is settling the early arrivals prior to the onrush when the bells are rung.
- the industry confirmed that best practice with the management of disabled passengers is up to the individual cruise company. The regulations in the US (American Disabilities Act [ADA]) and similar EU regulations are followed to the letter but anything above this is entirely down to the company.
- without specific knowledge of the exact nature of a passenger's disability or disabilities, then there remains the potential problem of having trained crew to cater for the exact requirements of the passenger – a case in point is manual handing of a passenger. CHIRP received one comment to the effect that there is a thought process where if a passenger cannot board without limited assistance, then travel may not be permitted.

The Maritime Advisory Board also commented that although the more well-known cruise companies do implement good practice with respect to disabled passengers, there is a huge diversity between best and worst in the industry. The airline industry limits the number of disabled passengers for flights – but one passenger vessel was stated to have 89 disabled passengers amongst a total of 2,500.

### Conclusions

Overall *CHIRP* would comment that in the absence of any common rules or practices, possibly the best advice is to ensure that all of your requirements are known prior to boarding. If the booking agent cannot help in this respect, then go directly to the shipping company who should be able to help with any specific queries. Once on board, the specific requirements should be confirmed as soon as possible.

With respect to drills, if they are not taken seriously then they can quickly turn into chaos. This of course is universal and not restricted to either the cruise sector or disabled personnel. If drills are treated with disdain or just as a “tick box” exercise, then the conduct of the drills becomes a safety culture issue to be addressed.

Potentially, a crew member being asked a question and giving a quick “don’t worry” response rather than a considered, informative response is again a safety culture issue.

As an analogy to this article, there is a question related to hotels. “What is the first thing you do once you have checked in?” The correct answer is not to unpack, nor to head to the bar, but to carefully read the emergency instructions – usually on the back of the door or close by. In this way you become aware of the correct actions to take in an emergency and know the way out via the emergency exit. The same thought process should apply for passengers on cruise vessels and it does not matter whether you are disabled or not – the thinking should be “If I need to, how do I make my way to safety?”

In the unlikely event of a full emergency, the fresh, well maintained resort that will comfortably accommodate your dream holiday can quickly transform into a nightmare of chaos and confusion. Take a few minutes at the commencement of your voyage to familiarise yourself with your escape and survival plan. It may make all the difference.

### Article 50

## Passengers with disabilities – *CHIRP* Competition

### Background

In early 2019, with generous sponsorship from Cotai Ferry Company, it was decided to hold a safety competition for trainees from the Maritime Services Training Institute in Hong Kong. The trainees were invited to propose a system for ensuring the care and safety of passengers with disabilities who embark upon cruises. The three winning entries were of a very high standard, and the winners all received free high-speed ferry tickets between Hong Kong and Macau. After careful consideration, the judges awarded the following prizes:

- First: CHU Long-him
- Second: LAI Cheuk-piu
- Third: KUNG Hin-shun



**Chu Long-him receives his prize**

The following paper is a summary of the proposals contained in the three winning entries.

### Booking Procedures

All websites, brochures and travel agencies should clearly state whether cruise ships have accessible cabins and public areas suitable for the disabled. Available technology such as text telephones and induction loop systems should be listed. In addition, potential difficulties for disabled passengers should be listed. These might include:

- accessibility issues in all ports
- areas of the vessel inaccessible to wheelchair users
- cabin details – width of doors, furniture placement, raised sills etc.
- limitations on service animals on board and in ports
- any special transport arrangements for disabled passengers

Passengers should be requested to state the nature of their disability when they make their booking, and list emergency contacts and any special needs. Those who require specific medication should be asked to bring a supply of extra medicine to be placed in a ‘go bag’ in case there is an emergency and passengers are required to take to the lifeboats.

Cruise lines should use this booking information to ensure suitable cabins are available, and there are sufficient crew members available to assist. It may be necessary to cap the number of disabled passengers to ensure they can all be properly looked after. Crew assistants assigned to hearing-impaired passengers should know sign language.

### Embarkation

The trainees stressed that disabilities come in many forms, and dedicated crew members should be trained to assist with all of them. Whilst mobility impairment is the most common disability in the UK, arrangements also need to be in place to cater for visual impairment, hearing impairment and mental difficulties.

There may need to be separate boarding arrangements for disabled passengers and their carers, and ship’s staff should be available to assist. For wheelchair users, it might be sensible to offer them another wheelchair designed for use on board and capable of being folded and stowed in a lifeboat.

Check-in staff should go over the passenger’s requirements and ensure all the details are correct, then give them a detailed briefing about the facilities on board and safety procedures.

Passengers requiring medication should provide spare medicine for the ‘go bag’. These bags should be made up for each disabled passenger and include warm clothes, a lifejacket and other suitable items.

Disabled passengers should be fitted with brightly-coloured wrist bands so they can be readily identified in an emergency. However, the trainees rejected the idea of having a system to track the location of the wearer, citing



personal privacy issues. They also pointed out that no disabled passenger should be forced to accept assistance if he or she is capable of getting around unaided.

### Drills

A special briefing for disabled passengers and their carers should be held as soon as embarkation is completed. Assigned crew members should all attend and meet the passengers they will be responsible for. This meeting could be followed by a familiarisation tour of the parts of the ship accessible to disabled passengers.

During emergency drills, disabled passengers should muster in a comfortable inside space close to the lifeboat embarkation points. They should be issued with their 'go bags', don lifejackets and wait to be escorted to the boats by the crew.

### In an emergency

Cabins and alleyways should have call stations in readily accessible locations, with facilities such as Braille labels and clear instructions. Exit routes should be clearly marked at a convenient height and should include Braille instructions. Lettering should be large, and all signs should have a non-reflective surface. Passengers who are unable to make their way to the muster station can then be collected by the assigned crew members from whichever call station they are using.

All call stations should have a general distress button.

All announcements should be made slowly, clearly and be repeated on a screen at each call station.

Emergency signals should be supplemented with flashing lights, which should be repeated on all call stations.

Whenever possible, a disabled passenger should have a dedicated crew member to assist them in an emergency and, if possible, should have a means of communicating directly with that crew member. Cruise companies should consider issuing an intercom device to all disabled passengers.

Disabled passengers who cannot keep low during a fire, such as wheelchair users, should have an anti-smoke mask in their cabins.

### Additional use of technology

Laminated room cards for disabled passengers (or possibly their wrist bands) could operate lifts that may be closed to able-bodied passengers in an emergency.

On-screen accounts records, in their cabins could reduce the need for disabled passengers to visit reception.

There are a number of new designs available which may assist in the care of disabled passengers. Wheelchairs which can easily be transformed into stretchers could be carried on board, and consideration should be given to the use of wheelchairs which can be folded into a small lantern-shaped arrangement which can easily be stored in a lifeboat.



Portable wheelchair

### Concluding thoughts

The trainees who took part in this competition have never been to sea – indeed, one of the winners is only in his first year – but their research was impressive and many of their ideas are worthy of consideration by the cruise lines. If newcomers to our industry can come up with such good suggestions, then it should not be impossible for professionals to devise guidelines which will make it safe for disabled people to enjoy a cruise. The trainees all paid tribute to those cruise lines which already have effective policies in place, but there are many which do not, so perhaps it is time for IMO to consider this important topic.



The three prizewinners with the judges and staff from the Maritime Services Training Institute

Article. 51

# CHIRP Maritime – 2019 Causal Analysis

## Introduction

In the 2017 Annual Digest, CHIRP Maritime published a causal analysis of latent failings and human factors for every article that we had published in our quarterly FEEDBACK magazine. The analysis was also posted on the [Chirpmaritime.org](http://Chirpmaritime.org) web site. This article updates the analysis to the end of 2019. We intend to regularly update the analysis both in the Digest and upon the website.

## Latent Failings and Human Factors

The analysis of the articles is undertaken in order to identify the root cause(s) behind the reports and is based upon James Reason’s research which dates back to 1990 and his book *Human Error*. The underlying principle is described by the Swiss Cheese model which shows clearly the defences which have been missed in order for an incident to occur.

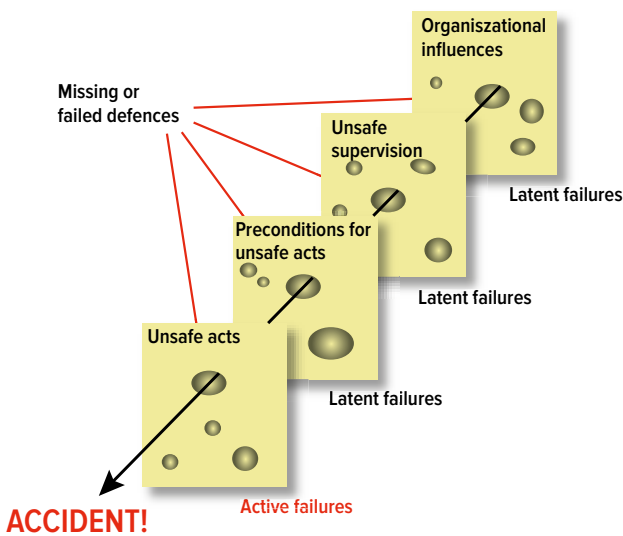


Figure 1 -Swiss Cheese Model

The latent failures are grouped into ten categories; these are Communications, Defences, Design, Error Enforcing Conditions, Hardware, Housekeeping, Incompatible Goals, Maintenance Management, Organisation, Procedures and Training. James Reason further subdivided these “basic” failures based upon causal explanations for the failed defences. There are many of these for each basic category, and CHIRP Maritime has identified three of the more common failed defences in order to produce the analysis. These are shown on graphs in the following sections, and terminology is further explained.

In addition, we analyse articles in order to identify Human Element issues – this uses the information from the [MCA Guidance Notice MGN520 – The Deadly Dozen](#), and is categorised as follows; Alerting, Capability, Communications, Complacency, Culture, Distractions, Fatigue, Fit for Duty, Local Practices, Pressure, Situational Awareness, and Teamwork.

## Latent Failings – Basic Causal Analysis

The analysis has been produced in the form of a pie diagram and shows the number of incidents for each

category where a latent failure has been identified. The number is also shown as an overall percentage.

It should be noted at the outset that the analysis is only based upon the information received. In many cases there is insufficient data to truly identify the root causes behind a near miss, and thus the graph and those that follow, are simply a rough and ready indication of where the maritime sector is today. Also worthy of note is the fact that CHIRP conducted a similar exercise to that shown, but using only recent reports, (from 2014 onward). The graphs were almost identical, which indicates that the same age-old problems are not being rectified.

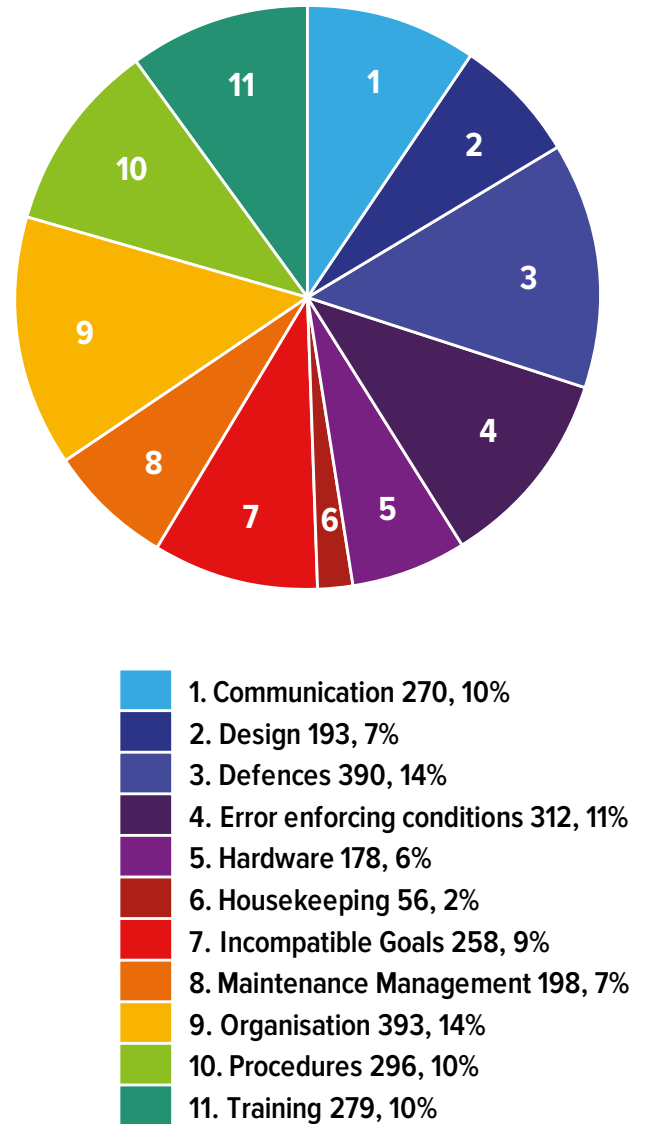


Figure 3 – Latent Failures – Basic Causal Factors

It is perhaps not surprising that **Housekeeping** produces a relatively low score – the maritime sector has concentrated on this for many years as a part of accident prevention. But look at some of the higher scores – **Defences** which have been breached, **Organisational failings**, and **Procedures** not being complied with. We should perhaps ask ourselves why this is so. Just to take organisation as an example, if we are really looking at a root cause the organisation being referred to is generally not shipboard organisation, but often commitment from the Company, and even organisational failings at the ship design and construction

# The Deadly Dozen

## SITUATIONAL AWARENESS

**Do you know what's REALLY happening?**

Understanding what is really happening and assess its impact on your voyage now and in the future.

## ALERTING

**Do you REALLY speak up when you should?**

Bringing concerns about actions, situations or behaviour to the attention of others in a timely, positive and effective way.

## COMMUNICATION

**Do you REALLY understand each other?**

Transmitting and receiving full and correct information ensuring sender AND receiver share the same understanding.

## COMPLACENCY

**Is everything REALLY OK?**

A misplaced feeling of confidence that everything is OK

## CULTURE

**Do you REALLY have a good safety culture?**

The blend of understanding, beliefs and attitudes of people and organisations that result in behaviour and actions.

## FIT FOR DUTY

**Are you REALLY fit to carry out your duties safely?**

The combination of physical and mental state of people which enables them to carry out their duties competently and safely.



## FATIGUE

**Just tired OR dangerously fatigued?**

A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities including: strength; speed; reaction time; co-ordination; decision making; or balance.

## DISTRACTIONS

**Multi-tasking OR dangerously distracted?**

An event that interrupts your attention to a task.

## PRESSURE

**Busy OR dangerously overloaded?**

Real and perceived demands on people. Do you REALLY have the resources you need.

## CAPABILITY

**Is your crew REALLY capable?**

The blend of knowledge, skills and attitude to enable effective, safe performance. Do they have tools and resources to perform competently?

## TEAMWORK

**Do you work REALLY well together?**

Working together effectively towards a shared common goal.

## LOCAL PRACTICES

**Efficiency OR dangerous short cuts?**

Behaviour and actions applied locally that differ from the official documented practices. Also known as procedural violations.

Figure 2 – Human Factors

stage which might involve classification societies, flag, and naval architects. There is much to reflect upon in order to make permanent improvements in this respect. It should be understood that the analysis is based upon near miss reports – when the same rationale is applied to actual incidents then surely something should be done by the “powers that be” to address these failings – this includes organisations at company, national and international levels. And yet examination of the vast majority of accident reports worldwide suggests that the root cause is nowhere close to being properly identified. Until this mindset changes, seafarers’ lives will continue to be endangered, accidents will continue, and blame will be laid to rest upon personnel, shipboard procedures or non-compliance with the SMS.

The introduction mentioned that the basic latent failures were broken down into three sub-categories for each latent failure. These are shown on the diagrams that follow and some significant data is shown which is worthy of note. Let’s examine some of these failed defences in a little more detail.

**Communications** – By far the greatest communications failing has proven to be ambiguous or incorrect communications. In this age where multinational crews are the norm, language problems are not the real issue, and nor is communication overload. It is simple messaging, whether this be verbal or from over-complicated procedures. It shows that closed loop communications where a message is known to be clearly understood requires a lot more attention.

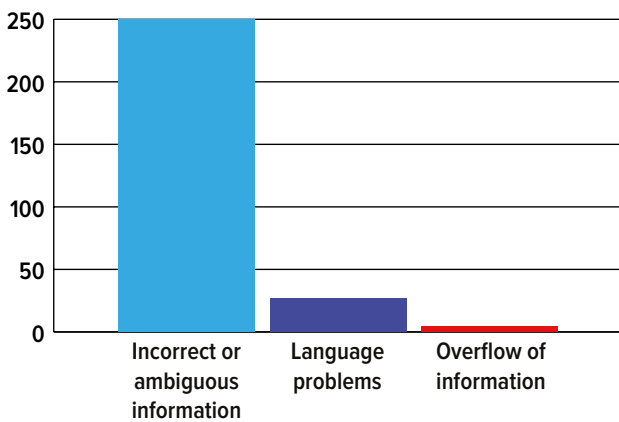


Figure 4 – Communications: causal explanations for failed defences

**Design** – Where design has been identified as a failed defence, it can be seen that there are a high number of latent failings due to a lack of standardisation, followed by a lack of indication of the condition of the equipment. We need look no further than quick release hooks on life saving appliances, and the high number of wire rope failures to show why this is so.

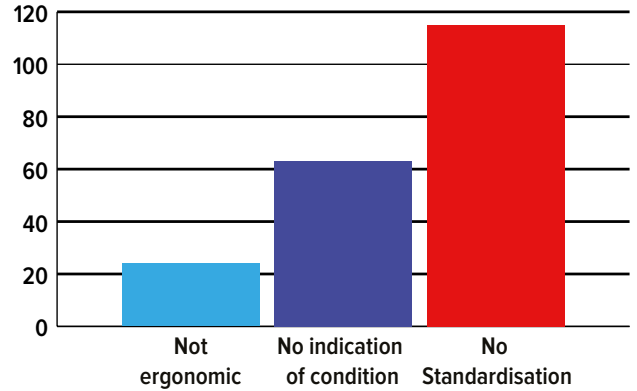


Figure 5 – Design: causal explanations for failed defences

**Defences** – The following tends to show that we are all experts in writing procedures and instructions – following them is another matter entirely judging by the number of reports received where it was determined that one of the factors was insufficient awareness of risks. This is often attributed to an individual; the true root cause however lies with management, and not necessarily company management. In order for all to become aware, the causes need designing out and procedures need to be put in place which prevent defences from being breached.

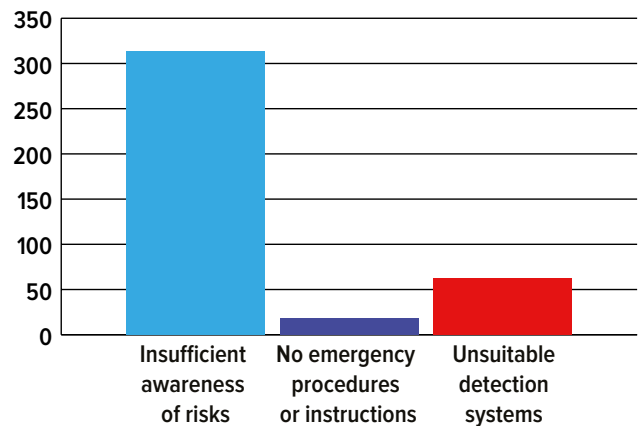


Figure 6 – Breached defences: causal explanations for failed defences

**Error Enforcing Conditions** – The term “error enforcing conditions” simply means that no matter what the near miss was, it would have happened anyway due to external factors. Abuse or addiction is extremely rare with the near misses that have been reported. However external influences, primarily weather related, and human physical restraints, (it is not possible for a person to do the task without endangering himself), are both frequent root causes. For the former, proper planning and risk assessment can prevent the danger, while for the latter the problems need to be engineered out, preferably at the design stage.



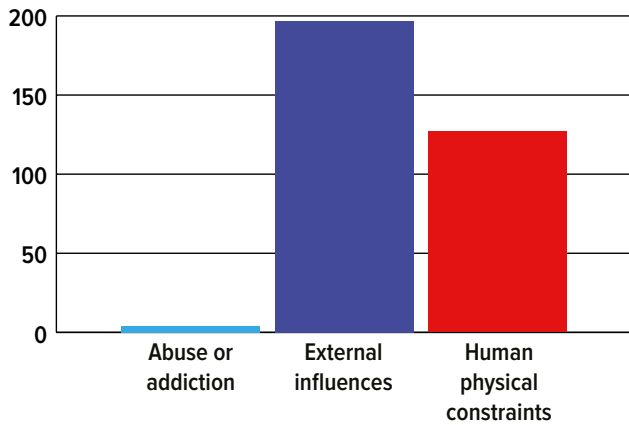


Figure 7 – Error Enforcing Conditions: causal explanations for failed defences

**Hardware** – The largest number of reports where hardware is an issue result from the hardware not being suitable for purpose. For example, an uninsulated screwdriver is not fit for purpose for any type of electrical work. Another factor has been the condition of the equipment – wear and tear or corrosion. Wire is an obvious example, particularly when it is sheathed – don't use it!

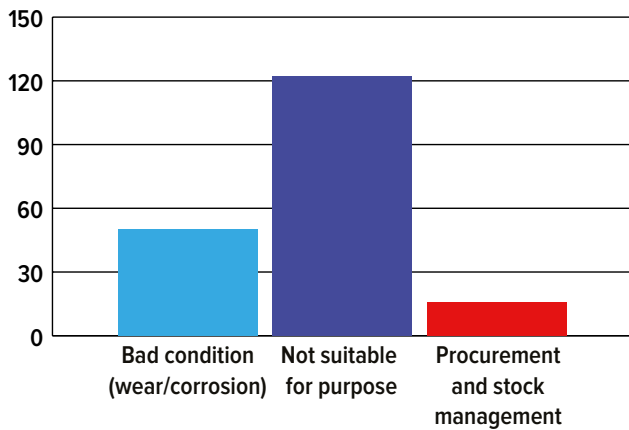


Figure 8 – Hardware: causal explanations for failed defences

**Housekeeping** – As previously indicated there have been very few reports received by CHIRP where housekeeping has been identified as a root cause. In very general terms much of the housekeeping is now addressed by behavioural safety programmes where storage, cleanliness, and personal protective equipment are being effectively monitored. However, from the reports that we have received, the main issue is planning.

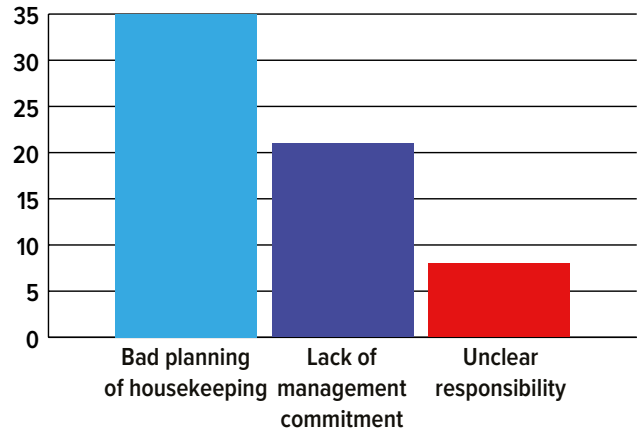


Figure 9 – Housekeeping: causal explanations for failed defences

**Incompatible Goals** – The term “incompatible goals” simply refers to a conflict between two parties – they have different objectives. This might include a task which cannot be performed correctly without disobeying instructions in the Safety Management System. In the graph below, we see a large number of discrepancies between formal procedures (the SMS), and what is actually carried out in practice at the work site. To a lesser extent there may well be financial constraints and time pressure – these are uncommon in near miss reports but would almost certainly be higher for any formal investigations of an incident.

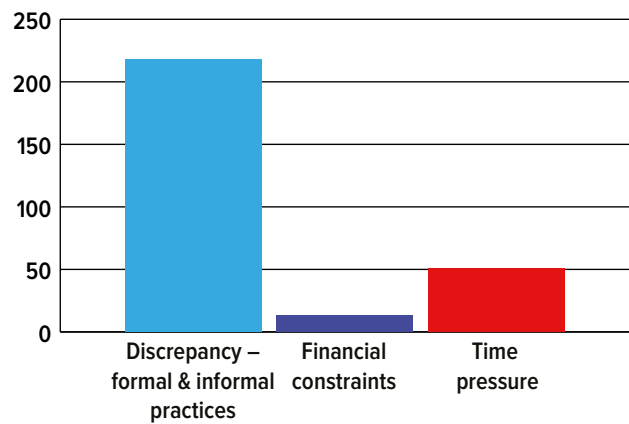


Figure 10 – Incompatible Goals: causal explanations for failed defences

**Maintenance** – For the near miss reports that CHIRP has received relating to maintenance, most relate to activities on the deck – more engineering reports would be extremely useful. Nevertheless, it would seem that the documentation (whether this be instructions or procedures) is in place - the main problem is planning and supervision. Once again this is often at a higher level than the on-board management.

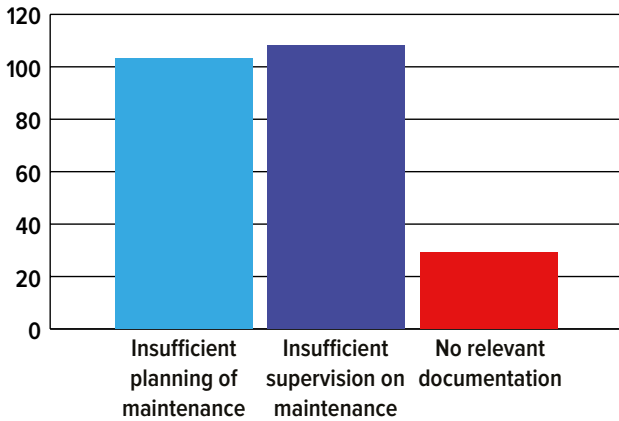


Figure 11 – Maintenance: causal explanations for failed defences

**Organisation** – The breakdown of defences with organisation once again shows us that tasks are usually properly assigned or have procedures in place. The failings, however, are generally in the planning – this may be on board departmental or shore instruction and has upon occasion been the organisation at a shipyard on new build tonnage. There is also a high level of incidence where the procedures and instructions are fine, but the execution of them is poor, resulting in a near miss.

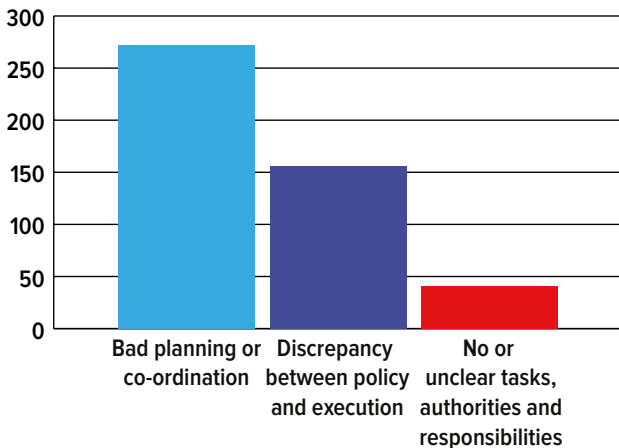


Figure 12 – Organisation: causal explanations for failed defences

**Procedures** – With Safety Management Systems having been in place for many years it is somewhat incongruous to find that we have to experience an incident or near miss in order to determine that procedures are difficult to find or are completely missing. There is, to a lesser extent, evidence to show that the scope is unclear – poorly written in other words, and there is often a lack of feedback as to the use of the procedures – i.e. “it is difficult to do this because...”

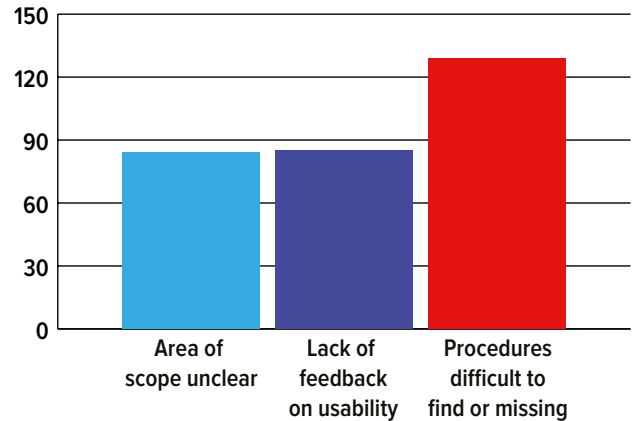


Figure 13 – Procedures: causal explanations for failed defences

**Training** – This graph speaks for itself. There is plenty of training available from many sources – fleet instructors, computer-based training, formal courses etc., but it remains a key defence failure that in many cases training was not provided or was ineffective. For the most part the word ineffective is the correct interpretation. For whatever reason, the lessons that were supposed to be learnt from training were not put into practice.

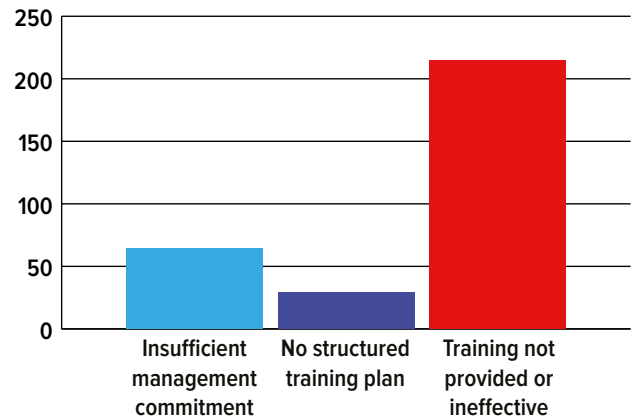


Figure 14 – Training: causal explanations for failed defences

There are a lot of lessons in the above graphs and with a little forethought many can easily be adopted in order to reduce the number of near misses and incidents that are currently being experienced in our industry.

**The Human Element – Analysis**

The introduction mentioned that CHIRP also analyses articles for human factors. The graph below is a representation of the “Deadly Dozen” – these are the twelve areas where human behaviour impacts upon safety. As referenced in MGN520, the Deadly Dozen has been around since 1993, with origins in the airline industry. If it is considered to be relatively new in the maritime sector, then this is simply evidence that we have a lot of catching up to do. It is also worthy of note that the airline industry does not commence an investigation until all human factors have been identified.

It is often found that near miss reports will contain several of these behavioural factors, since an incident is generally not attributable to a single cause. Just to give

a simple example – a cylinder is being replaced on the main engine. The job has been assessed, discussed, and planned. At the critical moment of lifting the cylinder with the main engine crane the operator becomes distracted and fails to check if the lifting clamps are properly secured. They are not, and this is discovered when the unit disengages from the clamps just after the lifting operation commences. There is an almighty thump but fortunately no damage. A human element analysis may well identify situational awareness as an issue, and distractions have already been mentioned. But what about teamwork? What about alerting – did anybody else intervene to stop the operation? In fact, many of the deadly dozen could be factors in this case depending upon the exact circumstances.

As with the causal analysis, CHIRP can only analyse the articles with the information that is available – we do not conduct full investigations which might lend themselves to a more thorough analysis and so the graphical representation is simply a rough and ready indication of human factors from reports received. Having said that, it is a fair indication of the various safety related behaviours that are impacting upon incidents and near misses.

The graph shows some surprising results. The largest failing is a lack of situational awareness and then there is a fairly even spread between alerting, communication and culture, followed by teamwork, local practices and capability. However, there is very little on fatigue, and given the knowledge that fatigue is a very real issue, (see the Project MARTHA findings in CHIRP publications), it is perhaps surprising that it scores so low. It is entirely possible that, although fatigue would almost certainly be an issue when reporting an accident, it is not really considered for near misses. This is also true for the “fit for duty” and “distractions” categories.

It should be mentioned that, as with the latent failings, CHIRP compared all reports with those from 2014 onwards. The difference in the graphs was negligible and thus the same conclusions were reached – the maritime sector needs to address these issues to be able to move forward.

**Simple Root Cause Analysis**

Some of the latent failings may seem to be complex but there is a very simple method that anybody can use to drill down through any event, whether it be a near miss or serious incident, in order to determine the root cause of the event. The method is called “Five Whys”. Quite simply for any incident you take the starting point and ask what happened? To that answer you ask “Why?”. At this point there may be two or more reasons and so a small matrix begins to be built up. For the answer to each “Why” you ask “Why?” again. Some of the matrix may well end up as a dead end with no particular learnings, but the other parts of the matrix should be followed through. When you get to the fifth “Why?” you will be at or very close to the true root cause of the event and be in a position to identify the causal factors and failed defences. Throughout the “Why” questions all aspects of the Deadly Dozen should be incorporated to ensure that all human factors are adequately addressed.

If the above is carried out correctly then it will almost certainly be found that the conclusions are not, “Non-compliance with company instructions or the SMS” or “Human Error”. Human error is not a root cause – the sequence of events that caused the human error will identify the true root cause. The old adage that “an accident on board a vessel has its roots in the company boardroom” is very true.

**Conclusions**

This paper certainly shows that there are many areas in which improvements can be made, but to do so requires commitment from all sectors of the maritime industry. In very general terms ships and their crews act responsibly but play with the cards that have been dealt to them. Thus, the areas where analysis such as the foregoing reveals a need for improvement starts with commitment in company boardrooms, at Flag State administration level, with classification societies and indeed at the naval architect’s drawing board. The analyses being discussed now can only bear fruit if future decision-making takes note of the findings.

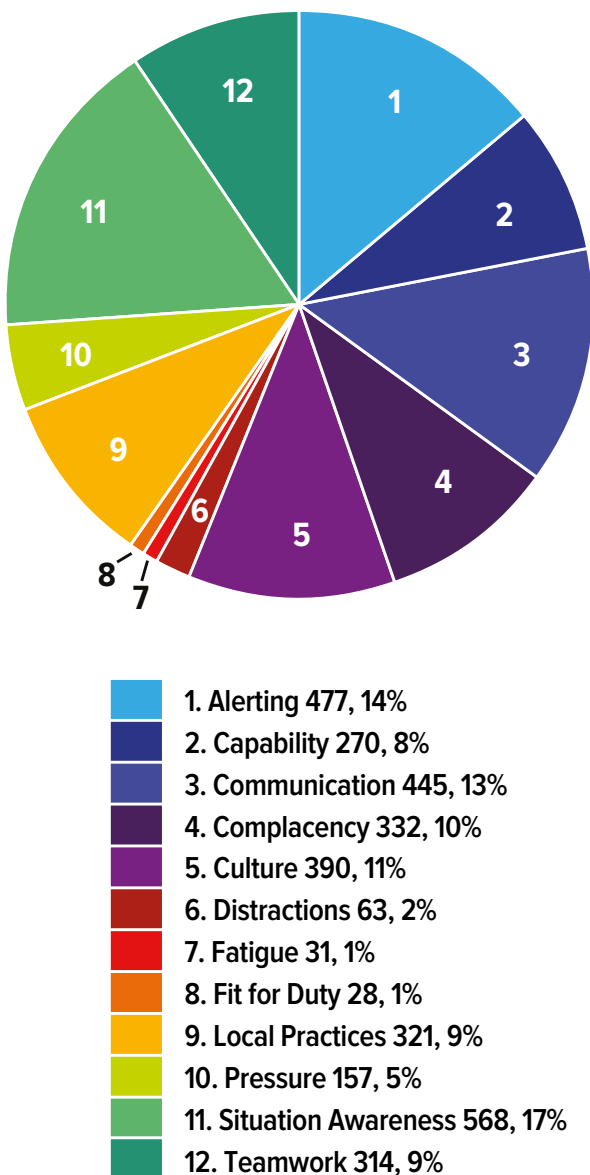


Figure 15 – CHIRP Human Element Analysis

## Section eight

# HEALTH

This section contains an Insight article written by Dr. Tim Carter, who is a former member of our Maritime Advisory Board and an expert on the health and safety of seafarers. We felt it was important enough to be given its own section in the Digest, and we hope it will encourage more reports on health issues.

Dr. Carter points out that our industry does not collect data on health in the same way as we collect data on collisions and groundings, so we really have no idea what is going on, how health in the industry has changed, or how we compare with other industries. He also has very interesting comments on how health is linked to a robust safety culture.

It is an important and thought-provoking paper, and we hope it will spur the industry into action.





## Article. 52

## Insight Article: Missing the Hits: *CHIRP* Maritime and information gaps on seafarer injury and illness

Tim Carter –Norwegian Centre for Maritime and Diving Medicine, Bergen, recently retired from the *CHIRP* Maritime Advisory Board, having been Chief Medical Adviser Maritime and Coastguard Agency (MCA) 1999-2014.

### Introduction.

The work of *CHIRP* Maritime has its main justification in the assumption that reporting and publicising near misses and dangerous incidents will, through the education of mariners and shipping companies alike, reduce the scale and severity of harm to people, the marine environment and vessels. My article gives a personal view on whether this assumption is well-founded.

I became a member of the *CHIRP* Maritime Advisory Board at its start in 2003 as the lone medical adviser among many experienced mariners; this has been a wonderful educational experience on the cultures of the maritime sector! At the time I joined I was well aware of the success of near miss reporting in aviation. Indeed, it was Tony Nicholson, one of the originators of the aviation system and former director of the Institute of Aviation Medicine, who encouraged me to join. This was because considerations of health and human performance had repeatedly contributed to the analysis of aviation accidents and dangerous incidents. He did caution me that, just like aviation, it might take ten years for the maritime industry to recognise its importance. Here he was just about right, as shown by the recent work on vision, perception and alertness that *CHIRP* Maritime has initiated.

I came to maritime safety with a background in the Health and Safety Executive and before that in the petrochemical industry. Both based priorities on well-developed systems for recording accidents and in the latter also on dangerous occurrence data and on asking 'What if?' questions about the consequences of engineering or human failure, in the course of plant design and commissioning.

### Evidence of harm.

One of my first questions about maritime health and safety issues was 'Where is the data on incidents, injuries and major disasters?' Even in the UK, with greater long-term continuity of statistics than most other countries I found that, while investigations of major ship disasters were available, information on serious and fatal injuries was limited, and information on ill-health of seafarers even scarcer, something which, with hindsight, I should have given a higher priority to while working for the MCA. Since its formation in 1989, the Marine Accident Investigation Branch has investigated most fatal accidents involving UK shipping, UK subjects or UK waters, an improvement on its predecessors. The Registry of Shipping and Seamen has traditionally recorded and/or registered deaths at sea among UK subjects or in UK vessels, although less so in recent years. Death rates from injury and illness have

only been analysed and published occasionally either by academics from a limited range of traditional maritime countries, often on behalf of maritime authorities, or by maritime insurers. Insurers' findings are rarely published. One of the biggest gaps has been the lack of any clear information on the population at risk: how many seafarers, in what jobs? How much of their year was spent at sea? Knowing how many people are at risk is key to any attempt to look at the level of risk to any individual and to assess the relative importance of any harmful event. Some population-based studies have, however, been published from countries including the Nordic states,<sup>1-4</sup> the UK,<sup>5,6</sup> Poland,<sup>6,7</sup> and Germany.<sup>8</sup>

### Lessons from the past.

In addition to my work as medical adviser to the MCA I pursued my interest in the risks to seafarers by studying the history of seamen's health, and in 2014 wrote a book on this.<sup>9</sup> In particular I was concerned at how seafarers' health had been neglected in comparison with many lower-risk groups of workers ashore and I noted the existence of what seemed to be an unstated conspiracy between employers, insurers and government agencies to obscure their high level of risk for much of the last 150 years. I later started to work with Stephen Roberts, based at Swansea University, building on his earlier investigations and publishing studies on long-term trends (late nineteenth century to the present) in mortality by causes of death in UK seafarers. Despite the limitations of the available information sources, we have shown that, despite major improvements in risk management and healthcare, the incidence of deaths from injuries and from certain diseases has fallen much more slowly in seafarers than in other populations and in some cases, such as the fishing sector, there have been few recent improvements in mortality rates.<sup>10,11</sup> However it is clear that the proportion of seafarers who die in ship disasters has reduced over the years, with individual fatal injuries now a more common cause of death. Illness is harder to chart, but some diseases that took a major toll, such as infections, are now rare.<sup>12</sup> Our data have necessarily been limited to fatalities, as that is all we can access, and we have been unable to take account of the more numerous, yet disabling and career ending, conditions.

### Present and future.

Internationally the position on access to data on incidents and deaths is even worse. A recent follow-up study by the Seafarer's International Research Centre in Cardiff has shown how few maritime authorities have consistent information over a number of years on fatalities among seafarers.<sup>13</sup> With international crewing and diverse flagging the norm, searching for information on harm, let alone relating it to the population of seafarers at risk becomes almost impossible. What I originally suggested was a national conspiracy to hide information on risks to seafarers has now taken on global dimensions.

What are the implications of this state of affairs for the place of *CHIRP* Maritime and other dangerous occurrence and near miss reporting systems? First it is hard to judge their effectiveness. A good example of this would be the regular reporting of defective pilot boarding arrangements; from frayed rope ladders on poorly maintained vessels, to design failures in the placement of access doors on newly built ships. We know about such reports, but without information on pilot boarding injuries it is impossible to look at trends to see if the concerns expressed by *CHIRP* have reduced injuries or to judge how important these are as a

cause of harm to pilots compared, say, with their pattern of duties or their personal fitness.

Many of the reports to CHIRP Maritime relate to navigational issues and to the adequacy of engineering standards for design and maintenance. Again, relating the value of a reporting system for dangerous occurrences to actual harm, in the absence of information on injuries and non-catastrophic damage to vessels is difficult. However, onshore safety practice is increasingly adopting approaches based not merely on compliance with regulatory requirements but on building a set of attitudes where continuous improvement in safety is accepted as the goal. One of the features of such an approach, based on developing a positive safety culture, is openness about anything that went wrong and sharing the lessons that can be learnt from it. Near miss reporting of the sort developed by first CHIRP Aviation and more recently CHIRP Maritime is an important contributor to this. All the onshore evidence is that a positive safety culture brings reductions in harm and sensitises people to look critically at activities and to propose practical solutions that will further reduce risks.

#### A positive safety culture.

The development of a positive safety culture may still be a long way from the prevailing approaches to safety in much of the maritime industry where a seafarer may find that a future contract for work is not offered if they have been assertive about safety during their last contract. There is the hope of a 'trickle-down effect' from the adoption, with benefit, of positive approaches to safety by some of the more organised and caring shipping companies.

A final example from CHIRP reports is the repeated reporting of poor safety practices on super-yachts. Sleek designs demanded by purchasers mean that guard rails are often missing and a gung-ho approach by poorly supervised crew members to keeping the vessels clean and shiny means that work that should require safety harnesses and protective clothing or be automated is carried out in shorts and slip-on sandals. Perhaps here we have to wait until the super-rich super-yacht owners join the minority of maritime transport companies who see their crews as an asset and not a disposable commodity.

What we need to aim for is to gain recognition that near miss reporting does contribute to a no-blame safety culture and such a culture has been shown in other sectors to reduce harm to people, vessels and the wider environment. At the same time steps need to be taken to improve the information on injury and illness in seafarers until it is at least as good as that on ship disasters. To use this as a driver for improving risk management also needs population data so that rates for both actual harm and dangerous occurrences can be derived and used as the basis for setting priorities for improvement. It is a big but not impossible agenda but one that CHIRP Maritime is well placed to champion!

Thanks to Stephen Roberts, Sue Stannard (my successor on the CHIRP Maritime Advisory Board) and to the team at CHIRP Maritime for their contributions to the text of this article.

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## Section nine

## APPENDICES

## Appendix I: Acronyms

<b>AB</b>	Able Bodied Seaman	<b>MEPC</b>	The Marine Environment Protection Committee – IMO
<b>ACGIH</b>	American Conference of Governmental Industrial Hygienists	<b>MFB</b>	Maritime FEEDBACK
<b>ADA</b>	American Disabilities Act	<b>MGN</b>	Marine Guidance Note
<b>AIS</b>	Automatic identification system	<b>MLC</b>	Maritime Labour Convention
<b>ARPA</b>	Automatic Rader Plotting Aid	<b>mmwg</b>	millimetres of water gauge
<b>BA</b>	Breathing Apparatus	<b>MNM</b>	Merchant Navy Medal
<b>BRM</b>	Bridge Resource Management	<b>MOU</b>	Memorandum of Understanding
<b>BS</b>	British Standards	<b>MPX</b>	Master / Pilot Information Exchange
<b>CBM</b>	Conventional Buoy Mooring	<b>MSC</b>	Maritime Safety Committee (IMO)
<b>CD</b>	Compact Disc	<b>MSF</b>	Marine Safety Forum
<b>CHIRP</b>	Confidential Human Factors and Incident Reporting Programme	<b>NB</b>	Nota Bene
<b>CNIS</b>	Channel Navigation Information System	<b>NM</b>	Nautical Mile
<b>COLREGS</b>	The International Regulations for Preventing Collisions at Sea	<b>NOx</b>	Nitrous Oxides
<b>COG</b>	Course Over the Ground	<b>OOW</b>	Officer of the Watch
<b>COT</b>	Cargo Oil Tank	<b>OS</b>	Ordinary Seaman
<b>CPA</b>	Closest Point of Approach	<b>PACE</b>	Probe, Alert, Challenge, Emergency
<b>DGPS</b>	Differential Global Positioning System	<b>PDF</b>	Portable Document Format
<b>DPA</b>	Designated Person Ashore	<b>PEC</b>	Pilot Exemption Certificate
<b>ECDIS</b>	Electronic chart data information system	<b>PM</b>	Particulate Matter (Nox and Sox)
<b>EEBD</b>	Emergency Escape Breathing Device	<b>PM</b>	Planned Maintenance (System)
<b>EMSA</b>	European Maritime Safety Agency	<b>PPE</b>	Personal Protective Equipment
<b>ER</b>	Engine Room	<b>Ppm</b>	parts per million
<b>ERM</b>	Engine Room Resource Management	<b>PPU</b>	Portable Pilot Unit
<b>EU</b>	European Union	<b>PSC</b>	Port State Control
<b>FRC</b>	Fast Rescue Craft	<b>QA</b>	quality Assurance
<b>GISIS</b>	The International Maritime Organization's Global Information System	<b>RHIB</b>	Rigid Hulled Inflatable Boat
<b>GPS</b>	Global Positioning System	<b>RIB</b>	Rigid Inflatable Boat
<b>H<sub>2</sub>S</b>	Hydrogen Sulphide	<b>RN</b>	Royal Navy
<b>HE</b>	(The) Human Element	<b>RPM</b>	Revolutions per Minute
<b>HELM</b>	Human Element Leadership and Management	<b>SCABA</b>	Self-Contained Breathing Apparatus
<b>HRO</b>	High Reliability Organisation(s)	<b>SI</b>	Statutory Instrument
<b>HSE</b>	Health, Safety and Environment	<b>SMS</b>	Safety Management System
<b>IG</b>	Inert Gas	<b>SOG</b>	Speed Over the Ground
<b>IMO</b>	International Maritime Organization	<b>SOLAS</b>	International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended
<b>IMCA</b>	International Marine Contractors Association	<b>SOx</b>	Oxides of Sulphur
<b>IMPA</b>	International Maritime Pilots Association	<b>STCW</b>	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 as amended
<b>ISM</b>	International Safety Management Code.	<b>STEL</b>	Short Term Exposure Limit
<b>ISGOTT</b>	International Safety Guide for Oil Tankers and Terminals	<b>SWL</b>	Safe Working Load
<b>ISO</b>	International Organization for Standardization	<b>TCPA</b>	Time to Closest Point of Approach
<b>ISWAN</b>	International Seafarers Welfare and Assistance Network	<b>TDG's</b>	Tactical Decision Groups
<b>IT</b>	Information Technology	<b>TLV</b>	Threshold Limit Value
<b>ITF</b>	International Transport Worker's Federation	<b>TSS</b>	Traffic Separation Scheme
<b>LOP</b>	Letter of Protest	<b>TWA</b>	Time Weighted Average
<b>MAB</b>	CHIRP Maritime Advisory Board	<b>UCL</b>	University College London
<b>MAIB</b>	Marine Accident Investigation Branch	<b>UK</b>	United Kingdom
<b>MARPOL</b>	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978	<b>UKHO</b>	United Kingdom Hydrographic Office
<b>MCA</b>	The United Kingdom Maritime and Coastguard Agency	<b>UKMPA</b>	United Kingdom Maritime Pilots Association
		<b>US</b>	United States
		<b>USCG</b>	United States Coast Guard
		<b>VHF</b>	Very High Frequency (radio)
		<b>VLCC</b>	Very Large Crude oil Carrier
		<b>VTS</b>	Vessel Traffic Services

## Appendix II: A day in the life of... the making of a **CHIRP** video



All Images courtesy of J.Rose Associates Ltd

Over several years *CHIRP* Maritime has produced films on safety issues mentioned in our *FEEDBACK* publication. During 2018 and 2019, *CHIRP* entered into collaboration with Arts & Sciences, and Neuroscience Departments at University College London to produce study papers on “Perception, Decision Making and Fatigue at Sea” and most recently “Making Critical Decisions at Sea” which is featured in this Annual Digest. Each study has an accompanying video and we thought it appropriate to end this year’s Digest with a description of making the video entitled “Critical Decision Making”.

The production starts with an outline of the project. *CHIRP* Maritime uses their trusted partners Maritime Films UK and Copia Productions to guide and formulate the entire production process from start to finish. Rob White is the seasoned producer and was the man behind our previous production “Vision & Decision” where he also doubled as cameraman and editor. A former ITV news producer and winner of 4 television awards, Rob is well versed in handling projects from scratch and dealing with the vagaries of temperamental amateur actors (and demanding Maritime Directors)!

Once the project has been outlined, it needs a script. The basis of the script is the study paper “Making Critical Decisions at Sea” and a discussion then follows with the producer on how to break the 20 page paper down into manageable sound bites and scenes that meet the 10 minute video production requirement.

Rob produces the script and after further consultation with the Director Maritime, Jeff Parfitt, to ensure the salient

points and objectives are covered, the final script is agreed and issued. The recruitment of the actors and identification of scene locations can then begin.

In this production, Rob insisted on using maritime professionals as actors as he believed the use of genuine maritime personnel brought a sense of realism to the simulator scenes. In fact, the captain in the simulator is our own Deputy Director, Howard Nightingale, who spent 42 years at sea. If you observe his performance closely, you will note his temperament in the film is a little too realistic - as witnessed by the expression on the Second Mate’s face! Our Chief Mate was Victoria Dittman, and our Second Mate was Anshie Patel. Both ladies have previously appeared in other maritime productions and may well qualify for an Equity card!

Finding filming locations can be tricky, as we are dependent upon the generosity and goodwill of cooperating partners and of course the availability of the venue, whilst causing as little disruption as possible. For the simulator scenes, we approached the Solent University Maritime Simulation Centre, Southampton. The simulator is a brand new, multi-million pound, state of the art facility that opened in 2019. It boasts over 8 full-mission navigational bridges, a full-mission dynamic positioning simulator, a full-mission engine room simulator and de-brief classrooms.

The Simulation Centre is ideally situated in the centre of the city and easily accessible by rail and road and the staff were most amenable to our approach for the making of our video. Once an available date for filming had been agreed, it was a simple case of co-ordinating all the actors, film crew and simulator staff along with costumes (theatrical



term for uniforms) and train time-tables. The simulator staff are all highly qualified senior mariners and experts in their field and were most helpful with their time and advice. This was demonstrated by their remarkable patience in dealing with our mercurial requirements and their willingness to help us to succeed with the project.

Whilst Rob White is both the producer and director of the film, Andy Jones is the creative force behind the camera. It is Andy that frames the shots, records the sound and ultimately edits the whole shoot to create the final product, pulling together a combination of vision and sound for maximum impact. Whilst the whole shoot produced hours of footage, it is Andy we rely upon to have the creative vision of the end product and be able to identify and break the hours of footage down into a 10 minute video that meets the requirements of the original objectives of the script and complements the study paper. The paper and the video must run together.

After a slightly anxious beginning to the filming, the actors settle down under the control of Rob, and Andy has decided on the initial camera angles. The simulator staff adjust the bridge and select the vessel type and background along with visibility, other vessel traffic and even the background noise of bridge radios, vessel air conditioning and vibration. Once the simulator programme is running, it is completely immersive - even the effect of ships' movement on the participants is evident. To an observer, the participants can be seen swaying side to side as the ship takes an apparent roll even though it is completely stationary! A bizarre trick of the mind.

Each scene is patiently worked, and worked again and again, until Rob has his desired result. In one particularly infamous shoot, the previous Director Maritime needed 62 takes before Rob was happy! As the filming progresses, so every shot is checked by Andy for quality in vision and sound before moving on to the next scene. It is of little use discovering a scene is unusable at the editing process as the whole scenario cannot be recreated.

Finally, and after several hours of shooting and re-shooting, Rob announces that the filming is complete. By that time, nearly an entire day has been dedicated to the shoot at the simulator and all parties are starting to feel somewhat fatigued. However, they are not too fatigued to refuse coffee, cake and a round-up in the college cafeteria.

Following on from the raw collection of footage, Andy begins the challenging process of editing and bringing "all his powers" to create a polished finished product that will be publicised across the *CHIRP* media platform and hopefully watched by thousands. Like all *CHIRP* material, the video is freely available online from [www.chirpmaritime.org](http://www.chirpmaritime.org) and most recently, following a regional request, had the addition of Portuguese (Brazilian) subtitles for distribution across Brazil.

Fortunately, *CHIRP* Maritime is supported by several maritime organisations that seek nothing more than to contribute to our programme, and this also includes the goodwill of many unrecognised individuals, without whom this project would never be as good. *CHIRP* Maritime acknowledges this generosity and is most grateful.

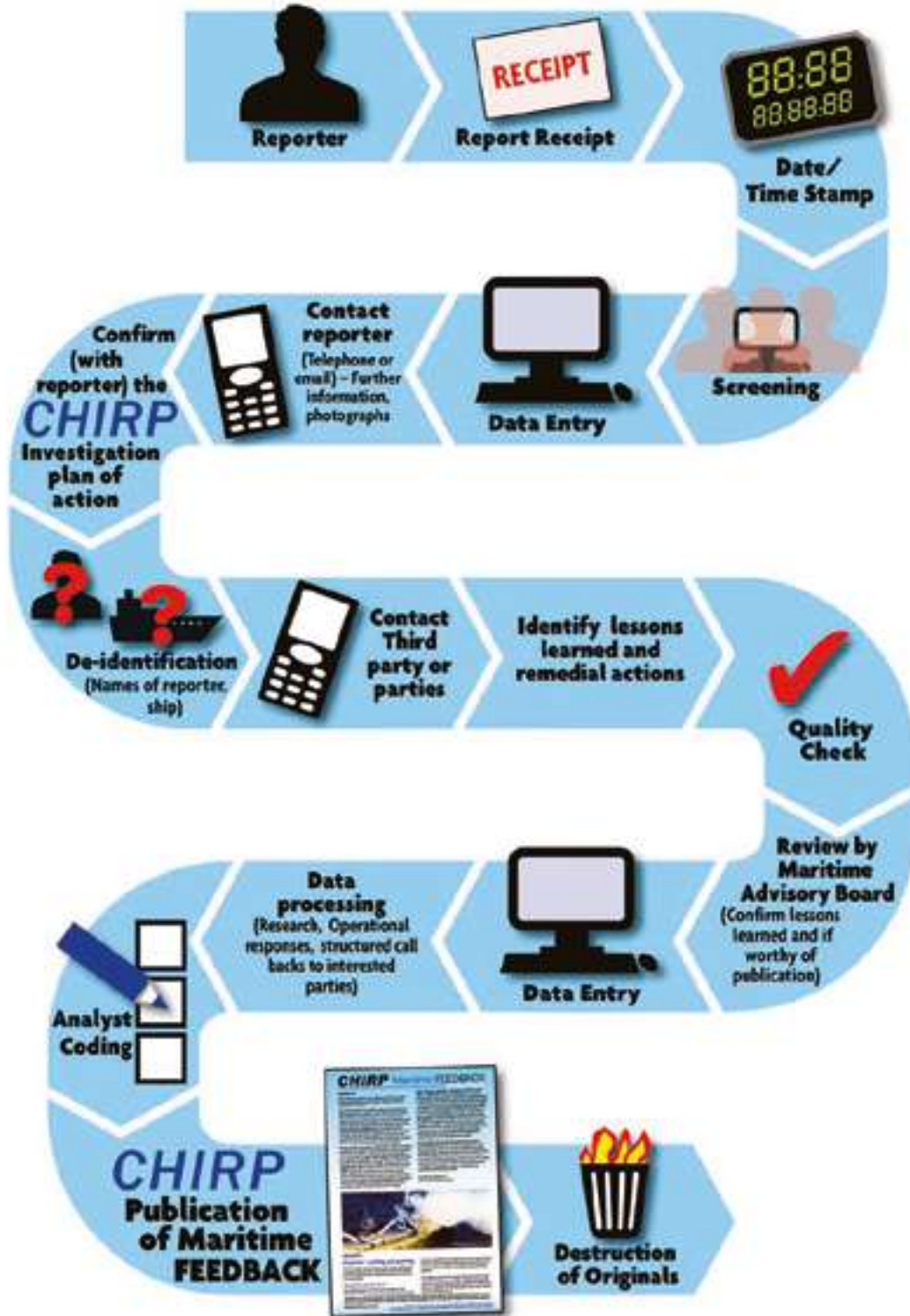
### **CHIRP Maritime putting the Mariner FIRST.**

#### **Jeff Parfitt**

Director (Maritime), *CHIRP* Maritime  
The *CHIRP* Charitable Trust

## Appendix III: How the CHIRP reporting process protects your identity

# Report processing flow – CHIRP Maritime



**Guiding Principles:**  
Confidentiality Protection / Non-Punitive / No “Whistle Blowing”

## The Maritime Programme – How it works

- Report can be generated either online (through our secure website [www.chirpmaritime.org](http://www.chirpmaritime.org), by email ([reports@chirp.co.uk](mailto:reports@chirp.co.uk)) as a written report (via post), or by telephone to the Charitable Trust's office in Fleet (+44 1252 378947).
- CHIRP currently receives confidential incident reports from professional and amateur participants in the maritime sector, throughout the world and across all disciplines. For all potential reporters, they can be reassured the identification of all reporters is always protected even if their reports are, ultimately, not used.
- Every report that is received is acknowledged and investigated, with feedback provided to the reporter before closure of the report.
- On being received, reports are screened then validated as far as is possible and reviewed with the objective of making the information as widely available as possible whilst maintaining the confidentiality of the source.
- Anonymous reports are not acted upon, as they cannot be validated.
- CHIRP is not a "whistle blowing" organisation.
- Each report is allocated its own unique reference identification. Data is entered into the internal network computer system.
- When appropriate, report information is discussed with relevant agencies with the aim of finding a resolution.
- Only depersonalised data is used in discussions with third party organisations and the confidentiality of the reporter is assured in any contact with an external organisation.
- The report in a disidentified format will be presented to the Maritime Advisory Board (MAB). The MAB meets every quarter January, April, July and October. The MAB discuss the content of each report, they then provide advice and recommendations for inclusion in Maritime FEEDBACK. All reports are analysed for casual factors and potential risk.
- No personal details are retained from any reports received, including those not acted upon. After ensuring that the report contains all relevant information, all personal details of the reporter are removed with an acknowledgement email sent to close the report.
- After the return of personal details, CHIRP is unable subsequently to contact the reporter. The reporter may, if he/she wishes, contact the CHIRP office for additional information by using the report reference identification.
- The Maritime FEEDBACK publication is written by the Maritime Advisors with the assistance of volunteers from the MAB who are experts in the written article to be published. All published "Lesson Learned" are disidentified and therefore the possibility of identifying the Company, Ship or Seafarer reporting or involved shall be almost impossible. Finally, the depersonalised data is recorded in a secure database at the headquarters in Fleet, it can be used for analysis of key topics and trends.
- Disidentified data can be made available to other safety systems and professional bodies.

# Appendix IV: CHIRP Maritime Near Miss report form

Please use the online report available using mobile phone, tablet or personal computer at [www.chirpmaritime.org](http://www.chirpmaritime.org) or by email to [reports@chirp.co.uk](mailto:reports@chirp.co.uk) or use this hand written form.

## CHIRP Maritime REPORT FORM

**CHIRP IS TOTALLY INDEPENDENT OF ANY ORGANISATION IN THE MARITIME INDUSTRY**

PAGE 1 of 2



Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Postcode: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Personal e-mail for reply: \_\_\_\_\_

- CHIRP is a reporting programme focussing upon safety related issues in COMPLETE CONFIDENCE. Your personal details are required only to enable us to contact you for further details about any part of your report. Please do not submit anonymous reports.**
- On closing this Report, NO RECORD OF YOUR NAME AND ADDRESS WILL BE KEPT.**

**On receipt of this report CHIRP may seek your approval to contact the owner or manager of your vessel, or if your report relates to non-compliance with regulations, those of a third party. The identity of you as the reporter is never disclosed.**

**On completion of our review, if your report relates to safety issues that may apply generally to seafarers, it may be considered for publication in MARITIME FEEDBACK. Reports may be summarised. THE NAME OF THE REPORTER, THE NAMES OF VESSELS AND/OR OTHER IDENTIFYING INFORMATION ARE NOT DISCLOSED.**

### PLEASE COMPLETE RELEVANT INFORMATION ABOUT THE EVENT/SITUATION



Date of the incident: \_\_\_\_\_ Time (local/GMT): \_\_\_\_\_

Your vessel name: \_\_\_\_\_

Flag: \_\_\_\_\_

IMO number if known: \_\_\_\_\_

Vessel type: \_\_\_\_\_

*(Tanker, bulk carrier, cruise, ferry, fishing, yacht etc)*

Vessel location: \_\_\_\_\_

Your position onboard or in the organisation: \_\_\_\_\_

*Please place the completed report form, with additional pages if required, in a sealed envelope to:*

**The CHIRP Charitable Trust, Centaur House, Ancells Business Park, Ancells Road, Fleet, GU51 2UJ, UK  
Confidential Tel: +44 (0) 1252 378947**

Report forms are also available on the CHIRP website: [www.chirp.co.uk](http://www.chirp.co.uk)



# CHIRP Maritime REPORT FORM

CHIRP IS TOTALLY INDEPENDENT OF ANY ORGANISATION IN THE MARITIME INDUSTRY

## DESCRIPTION OF EVENT

PAGE 2 of 2

**Photographs, diagrams and/or electronic plots are welcome:**

Your narrative will be reviewed by CHIRP who will remove all information such as dates/locations/names that might identify you. Please bear in mind the following topics when preparing your narrative: *The chain of events / type of communication / any decision making / equipment / training / situational awareness / weather / task allocation / teamwork / sleep patterns.*

**The description of the near-miss / hazardous incident:**



**Safety lessons learned from the near-miss / hazardous incident:**



*Please place the completed report form, with additional pages if required, in a sealed envelope to:*

**The CHIRP Charitable Trust, Centaur House, Ancells Business Park, Ancells Road, Fleet, GU51 2UJ, UK**

**Confidential Tel: +44 (0) 1252 378947**

Report forms are also available on the **CHIRP** website: **www.chirp.co.uk**

# Appendix V: Our Publications

## Reference Library



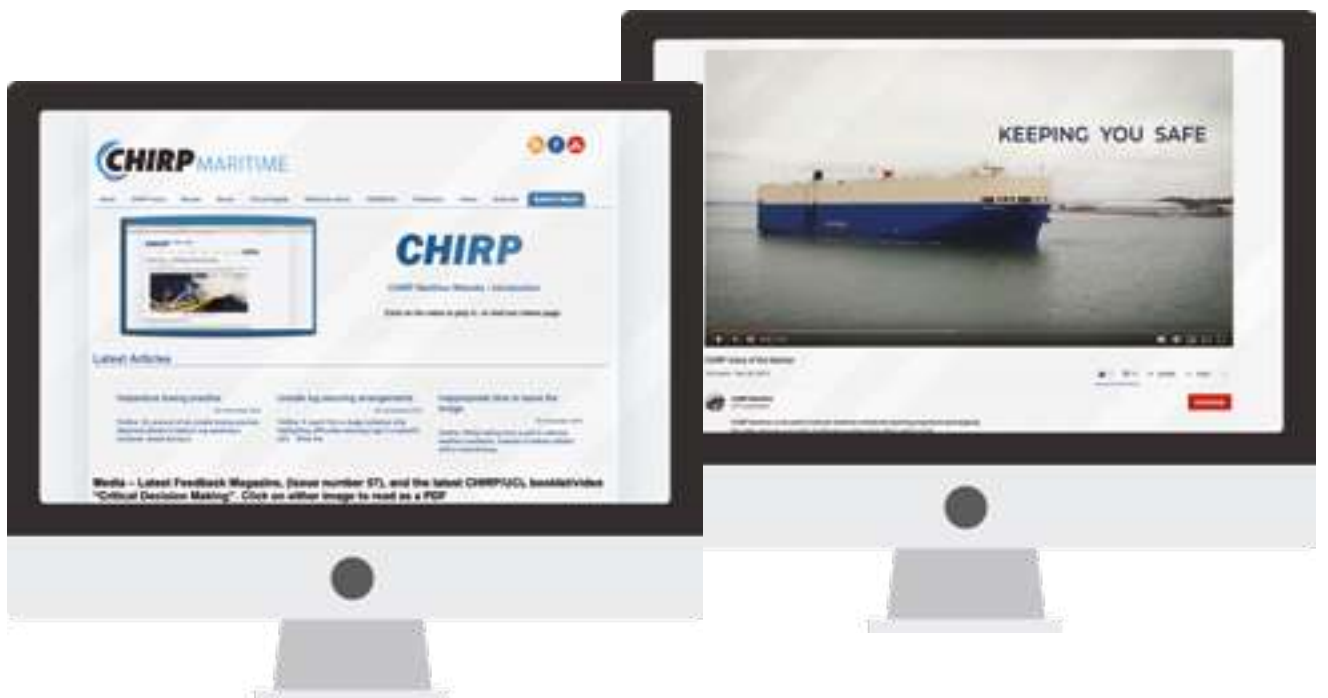
The link below will take you to the reference library page on the CHIRP website. From there you can download an Excel workbook which contains links to a comprehensive list of incident investigations, near miss reports and safety alerts issued by a selection of government maritime agencies and shipping industry sources around the world.

The library has been written in Microsoft Excel on a Windows 10 operating system – the browser used for links was Google Chrome. With these in place, all links should open automatically. It has been found that when viewing the files on an Apple Macintosh, that links to the internet tend to open correctly, but links to a specific PDF file do not open. If this is the case, then copy and paste the link into your browser – the requested file should then open.

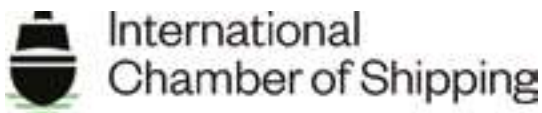
We should emphasise that that the official source of information is the actual web sites of the Agencies included in the workbook. The links to these sites may be found at the top of each sheet of the workbook and should be consulted for the most current data.

The library is updated on a regular basis – any suggestions for further enhancements of the library will be very much welcomed.

[www.chirpmaritime.org/reference-library](http://www.chirpmaritime.org/reference-library)



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To submit email reports, please use: [reports@chirp.co.uk](mailto:reports@chirp.co.uk)

Please add as much detail as possible about the incident/safety issue, including date, time and location. Please note that *CHIRP* does not recommend the use of unencrypted email for reports and the preferred method of reporting should be online at [www.chirpmaritime.org](http://www.chirpmaritime.org).

Telephone: 01252 378947

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