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Seaways

The International Journal of The Nautical Institute

Command and control

What it means to be a Master today p5

The Nautical Institute

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Focus

Avoiding or managing disasters

> "If you are not an attender of branch events, please make a New Year Resolution to share a little time, attend and benefit from the professional debate and networking they offer"

Admittedly, not an optimistic title to start the New Year – so let me soften it by wishing you all a safe and prosperous year, despite the downturn in so many sectors of the industry. Resilience and flexibility are the watchwords to get through this time as an upturn will eventually appear, given the cyclical nature of shipping.

A number of articles and the LinkedIn forum consider the need for professional development to prepare for and handle situations which could lead to a disaster. Experience is certainly essential and can be gained from observing others handling situations as well as personally. Mentoring to pass on experiential learning is invaluable and blended learning in classrooms and simulators ashore have an important role to play.

Leadership and training

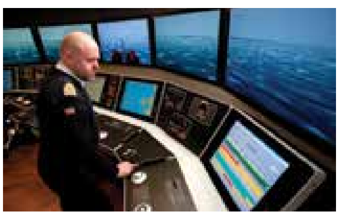
Some 15 years ago the Institute raised the awareness of the need for leadership training to address a centuries' long gap in merchant shipping in this regard. We were told by some that leadership could not be taught, the 'born leader syndrome'. Thankfully, the industry now has mandated Human Element Leadership and Management (HELM) training. But does this go far enough in preparing officers to cope successfully with everything the elements, human nature, company management and authorities can throw at them? Dr Nippin Anand considers what it means to be a ship's Captain these days and identifies some of the challenges, including coping with criticism in the aftermath of an accident, some of which will be from fellow professionals (see pp 5). He asks whether we are able to learn the right lessons when far too many accident investigations do not look beyond the obvious human fallibility at the sharp end. It should be added that there are still too many accidents that do not benefit from any meaningful investigation at all.

Preparing for the future

In the Letters (see pp 32) it is pleasing to see a debate developing about autonomous ships. The South West England Branch had an interesting presentation on one such project to mark the 400th anniversary of the original *Mayflower* sailing to America with an autonomous research vessel (worryingly with the abbreviation MARS). Our own MARS project is innovating and wants to hear from you about the Safety Meetings on your ship as we are not into the crewless era as yet. For those questioning whether autonomous ships are inevitable, the answer is yes, they are. We need to prepare for that eventuality by ensuring that there are appropriate qualification and training requirements in place for their operators. However, what is not inevitable, at least in the lifetime of even our Generation Y members, is that they will take over all shipping activity. The pragmatic view is that there will be a mix of manned and unmanned vessels in the sea lanes and that too must be factored into the design and operation of autonomous ships. Otherwise, they will indeed be a disaster waiting to happen.

Polar shipping

Some, perhaps many, might view the increasing shipping activities in high latitudes as another potential disaster with dire consequences for the marine environment. The IMO should be congratulated for developing the Polar Code (in force from 1st January 2017) after much informed debate even though we would have liked to see more extensive requirements for ice navigation training within it. We are pleased to reproduce the IMO's informative poster covering the key components of the Code (see pp 14). It links with an excellent seminar held by the London Branch on the practicalities of Arctic operations in which it was made clear that rigorous preparation and careful risk assessment are essential to success (see pp 27). There will be those who question the forecast of one presenter that the Arctic will be clear of ice for much of the year, but there is already a significant increase in activity by non-ice class ships in the region. Yet there are no appreciable Search and Rescue (SAR) capabilities or sufficient facilities ashore to cope with a major casualty. Certainly food for thought, as are the subjects covered by the other recent branch meetings reported in this issue. If you are not an attender of branch events, please make a New Year Resolution to share a little time, attend and benefit from the professional debate and networking they offer.



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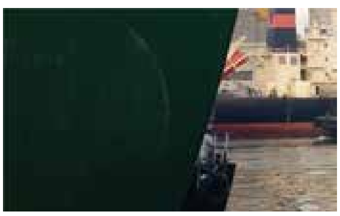

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Mariners' Alerting and Reporting Scheme

MARS Report No. 279 January 2016

New for 2016: The MARS team at The Nautical Institute has chosen a complementary initiative to invigorate discussions on safety and lessons learned, all with a view to sharing these amongst the wider readership.

The first of these 'concentrated campaigns' will be ***Learning Through Safety Meetings***. Of course, we are always on the lookout for readers' MARS reports of near misses or accidents; please keep them coming! But we would also like to hear from you, in your own words, about how and what you have learned from one or more safety meetings on your ship. Have these meetings been effective? How have they affected your work, your outlook on getting the job done, your confidence and trust in the company and in the vessel's senior leaders?

Please share any experience, either positive or negative. I am sure our readers will learn just as much from either. Please send me your thoughts on *Learning Through Safety Meetings* to mars@nautinst.org

MARS 201601

Zinc concentrate kills by asphyxiation

As edited from official report from the Dutch Safety Board, May 2015

➔ Two days before arriving in port, the Master received cargo documents from the shipper, which included an 11-page material safety data sheet (MSDS) on zinc concentrate. On receipt of the documents a safety meeting was held with the crew to discuss the cargo risks.

During the meeting, particular attention was paid to the use of personal protective equipment (full-vision goggles and respiratory particle filters) to protect against exposure to dust during loading. Although oxidation of the zinc concentrate, and thus its ability to reduce the oxygen content of a confined space, was indicated as a risk on the MSDS documentation, this risk was apparently not discussed during the safety meeting.

Loading commenced on arrival. The dust created during loading covered the ship's deck and also found its way into the accommodation. A number of crew members experienced irritated airways and burning eyes as a result. The loading took less than a day and once completed the accommodation was cleaned of dust and the vessel left port.

Five days into the voyage, the first mate intended to inspect the cargo via the access in the forecastle. As he walked past the paint locker he informed the seaman working there that he was going into the hold; he was carrying a breathing mask and a filter. He descended into the hold via an access door, closing the door behind him. Not long afterwards, the seaman opened the door and asked if everything was OK. The first mate responded in the affirmative so the seaman closed the door and went for coffee. The seaman mentioned this to an officer while on their break and the officer decided to take a look. On opening the access door to the hold, the officer saw that the first mate was unconscious, about three metres from the door.

Suspecting a confined space incident, he rushed to get assistance. Two crew members equipped with breathing apparatus went into the hold while others outside assisted with a rope. With some difficulty they managed to evacuate the first mate, but he could not be resuscitated. It was later established that he had died of asphyxiation. Measurements performed the day after the accident showed that the level of oxygen in the air at the stairwell was 2.6%.

Lessons learned include:

- Section 3 of the IMSBC Code states that when transporting solid bulk cargoes, crew must always be aware that such cargoes can be susceptible to oxidation.
- Always read and plan for all risks that are highlighted in the MSDS documentation.
- Before entering a confined space, in this case the hold, always ventilate first and then test for hazardous gases and oxygen content. Follow your company's confined space procedure.
- Never enter an enclosed space on your own. At the very least, a supervisor must be present at the entrance to the enclosed space and must be in communication with the individuals who are entering the space.

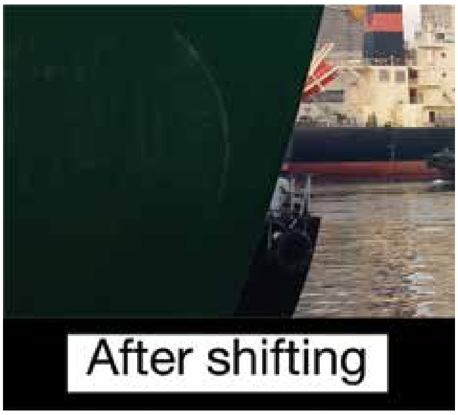
■ **Editor's note:** The Nautical Institute's Knowledge Library on Enclosed Spaces contains a lot of information regarding entry into enclosed spaces. It can be accessed at http://www.nautinst.org/en/forums/enclosed-spaces/index.cfm

MARS 201602

Dangerous overhang

➔ The vessel was port side at berth taking bunkers via a barge on the starboard side. The bunker barge was secured alongside the vessel and was initially overhanging the vessel's stern by 10 to 12 metres. Although the berth immediately astern was vacant at the time, potentially it could have received another vessel. The bunker barge overhang would then become a potential hazard.

After assessing the situation, the bunker barge was subsequently moved forward to reduce the overhang considerably.



Lessons learned

- Masters and mates should always assess the berthing arrangement and think about possible consequences.
- If potentially dangerous situations arise, such as an overhanging bunker barge that cannot be repositioned, the port should be advised.
- Bunker barges should be equipped with flexible hoses to enable a variable range for connections, removing the need for the bunker barge to overhang.

MARS 201603

Beware possible bauxite liquefaction

Edited from official report issued 18 August 2015 by the Bahamas Maritime Authority

➔ A bulk carrier was in port to load 'raw, unwashed' bauxite. Over the course of 13 days, loading took place intermittently due to heavy rain on some days, during which loading had to be stopped and the holds closed. The cargo declaration form supplied by the shipper indicated 10% moisture content for the bauxite. Because of the heavy rains, the Master had some concern over the moisture content, but he did not carry out any tests on board (can test) or ask for independent tests.

Once loaded, the vessel departed. Within a few days the weather deteriorated and the vessel's speed had to be reduced.

Early one morning the general alarm was sounded and the Master made an announcement directing all crew to proceed to the bridge. The chief cook was making his way to the bridge when he met fellow crew members, who instructed him to proceed to the port-side lifeboat. As he made his way to the port-side lifeboat, the vessel suffered a blackout. Emergency lights came on, and the vessel stopped rolling and adopted a list of about 45 degrees to starboard. Now unable to reach the port-side lifeboat station, the cook went outside, where he met the Master. Each wearing his lifejacket, they jumped into the sea. The two men stayed together while swimming away from the vessel. As they looked back from a safe distance, they saw the vessel had almost disappeared beneath the waves. From the time the general alarm had sounded until the foundering was about 20 minutes.

Later that day, the Master and cook were rescued, but only the cook was alive. Another deceased crew member was also recovered during subsequent SAR activities. None of the remaining 16 crew members was found and all are presumed dead.

Bauxite is listed within Appendix 1 to the IMSBC Code, but the individual schedule for bauxite contains no test requirements. The Statement of Facts declared by the Master and the agent acting on behalf of the charterers contained the comment: 'Bauxite cargo transported by truck and stow at open quayside and wetted by the rain prior loading.' Although all knew of the wet condition of the cargo, it is not known if they were aware of any risk involved if the moisture content was above that listed in the Individual Schedule for Bauxite within the Code. The Code is silent on risks due to high moisture content for Group C cargoes such as bauxite. It says nothing about the risk of liquefaction.

Although the moisture content of the bauxite was not known to the Master and the shipping company, the exporter of the product had taken and tested samples for their own purposes. In these tests, the moisture content, on average, was 21.3%.

Some of the findings of the official report were:

- From the records of inspections and Class attendance the vessel appeared structurally sound and seaworthy.
- Because the vessel did not commission an independent inspection of the cargo the bauxite was loaded without its physical properties and moisture content being verified against the parameters of the IMSBC Code schedule or the cargo declaration form.
- It is most probable that either liquefaction or a free surface effect induced an unrecoverable list.
- One of the recommendations of the official report was to propose that the International Maritime Organization initiate a review of the IMSBC Appendix 1 schedule for bauxite and its associated Group C rating and composition.

View of bauxite cargo loaded on another vessel at the same port at about the same period as the casualty vessel

Visit www.nautinst.org/MARS for online database

Lessons learned

Irrespective of the cargo, if you see splatter on the sides of the hold or pooling water on the cargo (see photo) – beware! Have the cargo tested for moisture content and do not transport it if moisture is above the transportable moisture limit (TML).

Appendix 1 of the IMSBC Code describes bauxite as a cargo with:

- moisture content of between 0% and 10%;
- 70% to 90% lumps varying in size between 2.5 mm and 500 mm, and
- 10% to 30% powder.

If any of these properties are not met, there is a possibility that the bauxite can no longer be considered a Group C cargo but may well be similar to a Group A cargo, ie cargo that may liquefy.

Notwithstanding Appendix 1 of the IMSBC Code, for the time being one should assume that any wet or moist cargo of bauxite containing an appreciable amount of fines is Group A unless testing has shown otherwise – even if the shippers have issued a cargo declaration stating the material to be Group C.

■ **Editor's note:** The Nautical Institute's Knowledge Library on Bulk Carrier Safety contains further information on liquefaction, http://www.nautinst.org/en/forums/bulk-carrier-safety/index.cfm

MARS 201604

Hot water scalds three crew

→ The Chief Engineer planned some repairs of minor water and vapour leaks near the turbo pumps of the feed water circuit while the vessel was at anchor. The pump system consists of an expansion bellows, a suction valve, the pump itself and a discharge valve with non-return function.

There was no specific procedure for this work. Nonetheless, around 09.00 three engineers and two oilers under the supervision of the Chief Engineer started closing valves and opening drains. On turbo pump 2, the delivery valve was closed first by one of the oilers. Then the recirculation valve was closed. At 09.20, one of the engineers was standing on a ladder closing the suction valve when the expansion bellows ruptured. Hot water gushed over an engineer standing on the deck and to a lesser extent over the engineer on the ladder who had closed the valve. One of the oilers also received hot water on his ankles. All crew members were wearing full PPE, including helmets.

The suction pressure of the pump is normally at around 3 bar and the discharge pressure near 80 bar. The water temperature in the circuit is about 130°C.

All three injured persons were immediately given first aid and were quickly evacuated by launch. One engineer was diagnosed with 1st and 2nd degree scalding injuries over his face and shoulders. The other engineer was diagnosed with 1st and 2nd degree burns over about 40% of his body (upper torso and face). The oiler had a large 2nd degree scalding injury on his left ankle.

The company investigation found that the rupture of the expansion bellows was caused by an overpressure in the pump system between the suction valve and the delivery valve. This overpressure was caused by a leak in the delivery valve; once the suction valve and recirculation valve were both closed the pressure quickly increased above the design pressure of the bellows, which is the weakest part of the system.

Normally the drain valves (and vent) must initially be cracked open to release the water and to provide confirmation that there is no pressure present in the system. In this case it was determined that the drain valves were probably left closed before the work started.

Findings of the company investigation

Performing this type of work with only 'one-valve segregation' appears to be a common working method, unchallenged throughout the industry. It is clear that this goes against the safety hierarchy of:

- Eliminating the hazard (shut down the boiler);
- Substituting the hazard;
- Isolating the hazard (two-valve segregation).

The design of the vessels means that using double valve segregation is often impossible for this kind of maintenance. Shutting down boilers is a time-consuming operation, which is not always supported due to commercial commitments or operational consequences such as cargo control. This is a topic that needs to be addressed industry-wide (for example, through SIGTTO).

According to the company investigation, the leadership style of the Chief Engineer probably contributed to the accident. He was directly involved in the work, giving short instructions rather than guidelines; he did not ensure closed-loop communication at every step. For example, one of the engineers thought that the Chief Engineer had opened the drains, but he was not certain. The crucial opening of the drains was left to assumption instead of positive confirmation.

The company also found the Chief Engineer's safety awareness (and leadership) to be below standard. Among other things, there was no toolbox meeting or similar preparation just before the job began. A risk assessment of the work was created about 40 minutes after the accident had occurred.

To the Chief Engineer's credit, his insistence on the use of full PPE, and helmets in particular, largely contributed to reduction of consequences to the engineer whose head and face were exposed to the hot water.

Other lessons learned

Instead of working in an ad hoc manner based on the experience of the particular persons on site, procedures should always be developed, and followed, for any work that involves risks that are not acceptable. Procedures should bring risks to the level of as low as reasonably practicable (ALARP).

■ **Editor's note:** In order for safety to 'get done' it is crucial for shipboard leaders to exhibit strong safety leadership. This does not necessarily mean taking dictatorial control of a situation. By opening up communications and listening to workers, as well as ensuring procedures are developed to safeguard against all identified risks, leaders and crew will reap the benefits of increased safety.

Visit www.nautinst.org/MARS for online database

MARS 201605

Possible spontaneous combustion – charcoal-stuffed containers

As edited for UK P&I Club Bulletin 1058 - 09/15

➔ A vessel loaded lumpy charcoal in Walvis Bay, Namibia. The charcoal was loaded into bags, which were stuffed into containers and then stowed on deck. Certificates were presented to the vessel attesting that the cargo had passed the UN test criteria for self-heating cargo and it was described as non-hazardous.

About 12 hours after departure, smoke was seen coming from one of the containers of charcoal. The fire quickly spread to adjacent containers and the crew initiated fire suppression action. The vessel was diverted to the nearest port for assistance. Since the cargo had been loaded on deck, arrangements could be made at short notice to discharge the smouldering containers ashore.

Lesson learned

- Shippers should advise when the cargo sample was tested and when the cargo was stuffed into the containers.
- The IMSBC Code provides that the weathering certificate and UN self-heating test should be carried out not less than 13 days prior to loading on board the vessel.
- Containers containing charcoal should be stowed on deck no higher than the second tier and preferably in a location that permits easy access should a problem arise.
- Containers containing charcoal should be checked at regular intervals.

NI Nautical Affiliates

The Nautical Institute has launched a new Nautical Affiliate scheme through which your organisation can demonstrate its support for our charitable work to improve safety, efficiency and best practice within the maritime industry. Your generous support will be used exclusively to fund our Mariners' Alerting and Reporting Scheme (MARS). The scheme replaces the Institute's previous Corporate Affiliate and MARS Sponsorship schemes.

For an outlay of just £500 a year, organisations that join us as a Nautical Affiliate enjoy a wide range of benefits, including:

- Public acknowledgement of the organisation's support for a key industry safety initiative – our Mariners' Alerting and Reporting Scheme (MARS).
- Heavily discounted membership fees where three or more employees become members of the Institute – in turn providing them with access to a robust CPD programme, networking opportunities, monthly members' journal, professional recognition, etc.
- A discount of up to 40% when buying our specialist books and guides.
- Sizeable reductions in delegate fees for leading industry conferences, thanks to the negotiating power of the Institute.

To find out more simply contact Nautical Institute Chief Executive, Philip Wake MSc FNI at cpw@nautinst.org or call him on +44 (0)20 7928 1351. Further details can also be found online at www.nautinst.org/affiliate or through scanning the QR code.

For more information about our Mariners' Alerting and Reporting Scheme (MARS) please visit www.nautinst.org/MARS

MARS is only possible because of the support of our Nautical Affiliates.