LESSONS LEARNED FROM MARINE CASUALITIES
(III 10/18, ANNEX 1)

1 Category of safety issues:

- Anthropometric or personal factors
- Maintenance
- Planning and procedures
- Management factors

Type of marine casualty or accident: Occupational accident – electrical problems, explosion, fire. Welding causing electrocution.

Level of severity: Very serious marine casualty

What happened:

Engine-room watch standers observed that the seawater discharge pipe for the main engine cooling pump was leaking on board an 8,900 deadweight (DWT) oil tanker that was under way on the high seas. The Chief Engineer determined that the leak could be repaired by pad welding over the corroded area of the discharge pipe. He informed the Fitter and instructed him to prepare to weld the pipe.

As required by the ship manager's safety management system (SMS), the Chief Engineer completed a risk assessment and a hot work permit for the planned work. The risk assessment and hot work permit both indicated that the discharge pipe was dry, and that the welding equipment was free of defects. The risk assessment also indicated that the worksite was inspected and was free of water. It was also indicated that the ground cable for the welder would be connected to the saltwater discharge pipe. The risk assessment and hot work permit were both approved by the Master.

With assistance from another crew member, the Fitter started work after the risk assessment and hot work permit had been approved. The Fitter was wearing insulated gloves, a welding helmet, overalls and safety shoes.

The Chief Engineer and other crew members who were in the engine-room reported hearing the Fitter yelling about 40 minutes after he had started working. They immediately responded and saw the Fitter lying on the tank top. The crew members disconnected the welding leads from the welder and also disconnected the welder from the power supply. They then lifted the Fitter, who was not breathing and did not have a pulse, up onto the deck plating. They administered cardiopulmonary resuscitation, but the Fitter did not respond and was determined to be deceased.

Why did it happen:

- The tank top was free of water but was damp in the area where the Fitter was working. This created an electrocution hazard.

- The pre-task hazards assessment conducted by the Chief Engineer was insufficient since it did not identify the hazards associated with the tank top being damp.

What can we learn:

- The importance of risk assessments of ensuring that the potential hazards associated with the conditions that exist at the time that a task is going to be performed are identified and addressed when planning the task.

- That consideration should be given to using insulating mats when operating electric welding equipment or portable electric tools in wet or damp areas.

- The importance of conducting regular, periodic inspections of machinery and associated piping systems to identify signs of deterioration before failure and conducting the necessary repairs in a timely manner.

Who may benefit:

ISM managers, seafarers.

2 Category of safety issues:

- Safety assessment review
- Legislation, standards and compliance

Type of marine casualty or accident: Fire, causing occupational accident

Level of severity: Very serious casualty – safety harness damaged by fire, causing fatal fall

What happened:

A pipe laying ship was mobilizing for a project at anchor. Work was conducted by crew and subcontractors, with each team independently completing their own permits to work. Permit controlled work included work aloft by a rope access team and hot work at a higher level. The welders had already started work when the rope access technician and assistant arrived at their work area. The assistant raised concerns about visible sparks, but the rope access technician assured him that the risk was negligible and proceeded to climb to the work area with an open container of paint thinner attached to his safety line. Meanwhile, the welder's assistant noticed the rope access technician, but did not mention anything to the welder.

Shortly afterwards, sparks from the hot work ignited the paint thinner. The rope access technician pushed the paint thinner container away, but the ignited material splashed onto the safety harness, causing it to melt and fail. The rope access technician fell approximately five metres to the deck and died from his injuries.

Why did it happen:

The following factors that contributed to the casualty:

- Lack of full team representation and involvement in pre-planning meetings.

- Safety management system requirements were implemented, but in isolation: rendering them ineffective by other simultaneous operations.

- Inadequate high-level supervision and control for multiple activities.

- The ship's "stop work" policy was ineffective.

What can we learn?

While conducting simultaneous operations, effective supervision means maintaining oversight of the entire operation to enable identification of areas which overlap and the associated potential risks. During simultaneous operations, job safety analyses, permits to work and risk assessments lose their effectiveness if each team completes their own in isolation. It is important to think of ship and crew safety holistically, not as isolated departments. Stop work authority is a safety policy that authorizes employees to put a stop to unsafe work, even when they normally do not have that level of authority. It is only effective when considered more than a written policy and actually utilized.

Who may benefit:

Crew companies, operators and managers.

3 Category of safety issues:

- Planning and procedures
- Management factors
- Tool and hardware (design or operation**)**

Type of marine casualty or accident: Ship/equipment failure – collapsing crane causing fatality

Level of severity: Very serious marine casualty

What happened:

During cargo operations with an Offshore Supply Vessel (OSV), the starboard pedestal mounted crane on board a 1966 built, self-elevating accommodation unit collapsed. The incident occurred while the crane was being used to shift the position of a container that was on board the OSV. The crane cab, gantry structure and boom fell onto the OSV's deck. It then slipped overboard and sank with the crane operator in the cab.

The crane operator's body was recovered from the crane cab during a subsea search. No crewmembers on board the OSV were injured. The OSV suffered minor damage.

The weather at the time of the incident was good with winds of 10 knots and seas of less than 1 m.

Why did it happen:

The crane collapsed as a result of a structure failure in the pedestal structure. The likely cause of this failure was material fatigue. The manufacturer of the crane had previously issued service letters addressing fatigue cracks in cranes of similar design and construction but had not indicated that these letters could also apply to the model of the crane that failed.

The operator's procedures for lifting operations did not establish requirements for managing dynamic amplification factors when making offboard lifts nor did the load chart posted in the cab of the crane include Safe Working Loads (SWLs) for onboard and offboard lifts.

The crew on board the unit had routinely conducted lifting operations without complying with the operator's procedures.

The standards in place when the crane was designed and built did not require that dynamic amplification factors be taken into account.

What can we learn:

- The need for ship operators and third-party inspectors to be aware of the potential for material fatigue in older equipment.

- The need for ship operators to ensure that procedures for use of lifting gear are appropriate for the types of operations that will be conducted.

- The importance of conducting all lifting procedures in accordance with established procedures.

Who may benefit:

Ship operators, crewmembers who conducting lifting operations, classification society surveyors, flag States.

4 Category of safety issues:

- Planning and procedures
- Safety assessment review
- Emergency handling

Type of marine casualty or accident: Occupational accident – dangerous/enclosed space fatalities

Level of severity: Very serious marine casualty

What happened:

A 5,000 GT chemical/product tanker was drifting in the Mediterranean, preparing for a new cargo. On the day of the casualty, crew were on the sixth day of tank cleaning – clearing remnants of the previous soybean oil cargo in two of the cargo tanks.

During the afternoon, the watchman who was on duty at the entrance to the port tank saw the bosun and Able Seaman (AB) had collapsed and raised the alarm. When the Master and Chief Officer arrived, they found that the watchman had also entered the tank and collapsed. The Master then also entered the tank (without Personal Protective Equipment (PPE)) and collapsed as soon as he reached the bottom of the tank.

A rescue team eventually recovered the victims from the tank and medics boarded by helicopter but the Master, bosun and AB were deceased. The watchman survived.

Why did it happen:

After completing tank washing, wash water had been collected in the two cargo tanks. During the final stages, problems were experienced with the cargo pumps and remnants were being removed with a portable hose – requiring multiple entries. The crew had little concern about tank entry because of the non-toxic and non-flammable nature of the previous cargoes, and as such, no atmospheric measurements were taken as the job extended. No one that entered the tanks had a gas detector.

Post-casualty testing of the tank's atmosphere identified dangerous levels of Hydrogen Sulphide (99 ppm) – a result of chemical breakdown of the cargo residues.

What can we learn?

- The case highlights that the properties of a tank's atmosphere can change with time, so dangerous/enclosed space entry procedures need to be followed at all stages of work.

- The human urge to help those in danger cost the master his life – an unplanned an ill-equipped emergency response, made the situation worse. This highlights the need for realistic drills to imprint an appropriate response in emergency situations.

Who may benefit:

Ship and company.

5 Category of safety issues:

- Safety assessment review
- Management factors

Type of marine casualty or accident: Occupational accident – uncoiling rope causing fatality during maintenance

Level of severity: Very serious marine casualty

What happened:

A bulk carrier was on the Atlantic passage in ballast. Continuing with the previous day's maintenance of mooring equipment, three crew set about the repair and load test of a mooring rope. During the work, an ordinary seafarer was struck in the abdomen by the tensioned mooring line during load testing. Despite immediate first aid from the ship's crew, the ordinary seafarer died from their injuries a short while later.

Why did it happen:

The rope that was being guided onto the winch drum, potentially fouled on the roller trestle and once tension was applied, sprung free and struck the ordinary seafarer who was standing in an unsafe position. The rope when fouled and under load would not have given any audible warning that it was about to recoil, nor was the ordinary seafarer aware that their positioning placed them in any immediate danger. The work party did not assess all potential risks, including safe positioning of crew, prior to commencing the work.

What can we learn:

- All personnel working in areas where mooring lines are under tension should be aware of the associated risks of snap-back and recoil when mooring lines part or come adrift of mooring arrangements on deck, often resulting in serious injury or fatality.

- Effective mitigation of harm through the conducting of a thorough risk and site assessment can provide effective control measures, which can drastically reduce the potential of serious injury or death.

Who may benefit:

Seafarers, management.

6 Category of safety issues:

- Maintenance
- Planning and procedures

Type of marine casualty or accident: Fire/explosion – fire

Level of severity: Very serious marine casualty

What happened:

A fire was detected in the engine-room of an oil-chemical tanker. The crew mustered on the poop deck, where it was confirmed that the duty engineer officer of the watch and the motorman were missing. Quick closing valves (QCVs) were activated, and the engine-room fire dampers were closed. Although the fire was brought under control and extinguished in a relatively brief period of time, the two missing crew members did not survive.

Why did it happen:

- The fire appeared to be related to either accidental spillage or spray of diesel oil/waste oil onto the incinerator, directly from the deck above, whilst the incinerator was either in use or hot after being operated just before the fire.
- The main diesel oil non-return valve spindle assembly was found missing, possibly dismantled to investigate the lack of diesel oil flow and left unattended.
- The spilled diesel oil came in contact with the hot incinerator's furnace door.
- Both crew members tried to escape the space by wearing an Emergency Escape Breathing Device (EEBD) hood. However, one EEBD was not activated and the other EEBD ran out of air.
- There was no indication that the two crew members were heading towards the space's emergency escape routes.

What can we learn:

- A risk assessment to clearly understand the related hazards has to be done before starting a job.
- Parts on fuel oil systems need to be either isolated or bypassed before they are dismantled.
- The need for realistic drills to ensure that crew members are fully conversant with the use of emergency equipment and familiar with all the emergency escape routes from the machinery spaces in restricted visibility.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers.

7 Category of safety issues:

- Maintenance
- Management factors
- Legislation, standards and compliance

Type of marine casualty or accident: Ship/equipment failure – sling failed whilst lifting

Level of severity: Very serious marine casualty

What happened:

A 10,000 DWT ship was alongside the shipyard quay undergoing its scheduled five-yearly inspection and survey programme. As part of the scheduled work, two main engine cylinder liners were being exchanged for spare ones located in a storage compartment in the bow of the ship. A yard shore crane would be used to carry out the exchange. Whilst lifting the second liner from the engine-room, a wire sling failed, resulting in the liner falling 18 metres to the engine-room below and striking two service technicians who were working in the vicinity. One sustained a serious injury, and the other was killed.

Why did it happen:

The wire sling failed due to the slipping of an eye splice. The sling's manufacture did not meet industry standards and it had not been subject to load testing or adequate inspection.

Its recorded safe working load of 3 tonnes was less than the weight of the suspended load.

There was no lifting plan or task-specific risk assessment for the handling of the liners and a lack of effective controls on movement of personnel meant that workers with no knowledge of the operation being conducted above them were exposed to risk.

What can we learn:

- When conducting lifting operations on board it is vital that industry best practice is followed.
- Those responsible for the lifting operation should ensure that the lift is planned, and conducted using certified lifting equipment with sufficient strength and that all elements are checked before the lift starts.
- Personnel involved in the operation should be utilized to identify all the hazards associated with the particular task in order to establish meaningful safeguards and implement an effective communication plan.

Who may benefit:

Ships' crew, management.

8 Category of safety issues:

- Maintenance
- Safety assessment review
- Tool and hardware (design or operation)

Type of marine casualty or accident: Occupational accident – breakage, bursting, splitting, fall or collapse of material agent

Level of severity: Very serious marine casualty

What happened:

A crew member serving on board an oil/chemical tanker was found in the steering room compartment trapped and unresponsive between a collapsed stack of heavy steel plates and a guard rail. The crew member, who was suffering from serious injuries was evacuated to a shore hospital by helicopter; however, he was pronounced dead upon arrival.

Why did it happen:

- The turnbuckle securing pin and its split pin forming part of the steel plates' securing arrangement may have either been removed or slipped out at one point, resulting in the collapse of the stack of spare steel plates.

- No formal risk assessment had been carried out prior to the removal of the securing arrangement.

What can we learn:

- The need to consider a proper storage system (cage system or vertical rack) to ensure that the steel plates remain stable even with the movement of the ship at sea.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers.

9 Category of safety issues:

- Management factors
- Tool and hardware (design or operation)

Type of marine casualty or accident: Fire/explosion – leaking hose causing cause for fire

Level of severity: Very serious marine casualty

What happened:

A 4,000 DWT chemical tanker was located in a shipyard for repair works. In one of the ballast tanks hot works took place for cutting some bolts (to dismantle a valve). It was done by workers of the subcontractor company. On the morning the following day, two workers from the company re-entered the tank. No new hot works were planned for the day. Nevertheless, a fire broke out a little later. After the fire was extinguished, one of the workers was found dead.

Why did it happen:

The marine safety investigation determined that the primary cause of the very serious accident was a mechanical failure (rupture) of the methane hose of the gas-oxygen cutter located in the tank, which resulted in the leakage of a large amount of gas and its subsequent ignition by an unknown security source of ignition (most likely defective cable with lighting fixtures, "garland" type).

What can we learn:

Contributing factors to the fire are:

- non-observance of safety measures during fire works by those working in the ballast tank;
- lack of appropriate protective clothing;
- lack of forced ventilation to remove the released gas;
- lack of an automatic gas analyser; and
- lack of control by the responsible persons of the tanker, charged with compliance with safety measures.

Who may benefit:

Shipowners and operators.

10 Category of safety issues:

- Maintenance
- Safety assessment review
- Tool and hardware (design or operation)

Type of marine casualty or accident: Fire/explosion – fire

Level of severity: Very serious marine casualty

What happened:

While a bulk carrier was adrift awaiting berth, a number of crew members observed a fire rising from the main deck. Soon after, they saw one of the crew members covered in flames and jumping overboard. The crew member was recovered from the water. Although he was transferred to a shore hospital for intensive medical treatment, he succumbed to his injuries a few days later.

Why did it happen:

- The deck fitter used oxy-acetylene to cut bolts off a flange on a leaking section of a hydraulic pipe of the hatch cover operating system.
- The fire may have either been caused by a flashback at the hose connections of the oxy-acetylene torch, or by ignition of a spray of hydraulic oil from the pipe that the deck fitter was working on.
- Considering the location of the worksite, it is highly likely that hydraulic oil would have permeated the deck fitter's overalls, which caught fire after the flashback/ignition of hydraulic oil.
- No risk assessment had been carried out prior to the commencement of the hot work.

What can we learn?

- The use of hot work, even on open deck spaces, on pipework which carries flammable liquids or oil requires a thorough assessment of the risk in order to identify potential alternative and safer means of work.

- The permeation of flammable liquid and oils in the working clothes results in an elevated hazard to the crew member, which would need to be addressed prior to the commencement of the work.

- The importance of using non-return valves and flashback arrestors on oxy-acetylene equipment.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers.

11 Category of safety issues:
- Anthropometric or personal factors
- Planning and procedures
- Tool and hardware (design or operation)

Type of marine casualty or accident: Occupational accident – slipping, stumbling, falling of person overboard

Level of severity: Very serious marine casualty

What happened:

Before arrival at a factory, a member of the deck crew fell overboard as he was moving from the hatch deck down to the main deck. None of the other crew members witnessed the incident, and it consequently took about 20 minutes before they realized that the deck cadet was missing. Shortly after it was discovered that the cadet was missing, the rescue services were notified, and a comprehensive search was initiated. The missing person was not found.

Why did it happen:

Preparing for unloading was considered a routine operation by the crew and shipping company, and they had therefore not considered or identified any risk reduction measures relating to this type of operation. No special safety measures had been introduced to prevent crew members from falling overboard from the hatch deck, nor had sufficient measures been taken to reduce the consequences of falling into the sea. The ship had no physical safety barriers against falling overboard from the hatch deck.

What can we learn?

The risk associated with routine tasks becomes normalized in the individual over time, resulting in the risk gradually being ignored or not perceived. Shipping companies and other stakeholders must therefore consider the need for risk assessments and safe job analyses in all areas of operation that may entail risk, including those defined as routine operations.

Who may benefit:

Seafarers, shipping companies, training institutions.

12 Category of safety issues: • Safety assessment review

Type of marine casualty or accident: Occupational accident – fatal crush/fall injury

Level of severity: Very serious marine casualty

What happened:

The Oiler on a 95,000 GRT bulker informed the Electro-Technical Officer (ETO) that the alarm of the elevator had activated. The ETO replied that he would check the elevator the next day. At 21:30 hours, the M/M discovered that some blood came out from the entrance door on the upper deck and immediately reported the situation to the Third Engineer (3/E). The 3/E shouted to the entrance door but nobody answered. He then immediately reported the incident to the Chief Engineer (the C/E) and the Master. The engine-room crew removed the entrance door on the upper deck and found that the ETO was unconscious, lying on the cage top of the elevator bleeding from his nose and mouth. Afterwards, the ship shifted to the inner anchorage with the permission of the port authority to seek shore medical treatment. Unfortunately, the ETO was declared dead after the examination by the shore medical officer in the early morning the following day.

Why did it happen:

- the requirements of the shipboard operation manual to carry out work on the elevator in a safe manner were not followed;
- a risk assessment and follow the permit-to-work system before commencing the work on the elevator were not conducted;
- the crew members lacked sufficient safety awareness in the work on the elevator, effective communication among the crew members on board in executing their duties, and underestimated the inherent risk of hazards associated with work on the elevator; and
- the requirements of the Code to identify work on the elevator, including work requiring access to its trunk, as one of the main risks on board, were not followed.

What can we learn:

- the importance of following the shipboard operation manual requirements when carrying out the work on the elevator in a safe manner on board;
- the importance of ensuring that the risk assessment and permit-to-work system are followed before commencing work; and
- the importance of safety awareness and safety culture on board in order to ensure that the crew members have sufficient safety awareness in the work.

Who may benefit:

Crew, company.

13 Category of safety issues: • Anthropometric or personal factors

Type of marine casualty or accident: Occupational accident – slipping, stumbling, falling of person to a lower level

Level of severity: Very serious marine casualty

What happened:

Cargo discharge operations were under way on board a bulk carrier. The Second Officer asked one of the ABs to check the forward mooring arrangement. After about 30 minutes, the AB had not yet returned and calls over the portable radio remained unanswered. Ultimately, during a search conducted by the second officer and two other crew members, the duty AB was found at the bottom of the aft access trunk of the cargo hold. Shore medical personnel arrived on board but confirmed that the duty AB had passed away.

Why did it happen:

- It was probable that the copper concentrate on board had created an oxygen-deficient atmosphere within the cargo holds after access trunking.
- The duty AB was probably not aware of the hazards of copper concentrate in an enclosed space.
- The duty AB may have not considered the access trunking as a confined/enclosed space any longer, since the hatch cover for the cargo hold had been long opened and the bulldozer driver had already been working inside the cargo hold without any difficulties.
- The symbolic barrier posted on the aft access hatch did not seem to have deterred the duty AB from entering the space.

What can we learn:

- The need for all crew members to be informed of the hazards related to the cargo being carried on board.
- Warnings, notices, and fleet circulars may be effective preventive barrier systems but are nonetheless very weak because they can easily be missed, ignored or forgotten. Clear and unambiguous communication remains a critical safety tool in the prevention of accidents on board.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers, stevedores.

14 Category of safety issues:

- Maintenance
- Planning and procedures
- Safety assessment review

Type of marine casualty or accident: Occupational accident

Level of severity: Very serious marine casualty

What happened:

A bulk carrier departed under ballast condition to her next port for loading coal.

The deck crew of the ship was divided into three groups to wash No. 6 cargo hold by using fire hoses with seawater (the hold cleaning) during the voyage. Before the hold cleaning, the Chief Officer conducted a toolbox meeting which included issues on risk assessment for the hold cleaning, briefing of safety control measures when working aloft, and issue of a permit for working aloft by the Master.

At about 08:48 hours, two Able-bodied Seafarers, i.e. the AB2 and the AB3, as members of the No.3 group, were on the athwartships forward Permanent Means of Access platform to wash the forward upper part of the hold. When the AB3 walked to the port side of the hold on the fore platform with a pressurized fire hose, the grating detached from its support frame where the AB3 was standing. As a result, the AB3 lost his balance and together with the detached grating fell onto the tank top from a height of about 15.8 metres. The Bosun immediately reported the accident to the C/O and the Master. The Master then assembled the rescue team to provide first aid to the AB3 and altered the ship's course heading to seek shore emergency medical assistance. Afterwards, the AB3 was transferred to a local hospital by a patrol boat of the Coast Guard for further medical treatment. Unfortunately, he was certified dead on the same day.

Why did it happen:

The crew did not (i) follow the requirements of the shipboard Safety Management System (SMS) to effectively carry out a risk assessment on board before the hold cleaning including identifying the risk of the dislocation of the grating of the fore platform; (ii) wear a safety belt when working aloft during the hold cleaning; (iii) supervise the hold cleaning on the spot while working aloft; (iv) carry out proper maintenance of the fore platform in the hold; (v) identify the defective fore platform in the last detailed inspection of the hold; and (vi) check the condition of the fore platform in the hold before entry for the hold cleaning. The accident also revealed that the shipboard training on working aloft for the crew was ineffective.

What can we learn:

- strictly follow the shipboard SMS to carry out an effective risk assessment before cargo holds cleaning and identify risks of dislocation of gratings of Permanent Means of Access (PMA) platforms;
- ensure the crew wear safety belts when working aloft;
- enhance supervision of the person in charge on the spot during the cargo hold cleaning;
- ensure PMA platforms and their gratings are properly maintained and inspected;
- ensure the conditions of PMA platforms and their gratings to be checked before entering into the cargo holds for cleaning and maintenance; and

- enhance shipboard training of the crew on working aloft and their safety awareness on the use of safety belt.

The crew members strictly follow the requirements of the shipboard SMS for working aloft and the maintenance of the ship.

Who may benefit:

Crew, company.

15 Category of safety issues:
- Anthropometric or personal factors
- Planning and procedures

Type of marine casualty or accident: Occupational accident

Level of severity: Very serious marine casualty

What happened:

A container ship was alongside, discharging containers. At around 03:30 hours, with discharge continuing in close proximity, a deck fitter began hot work in bay 34, repairing a stopper from the lashing bridge. With the repair almost completed the fitter was kneeling on a container in the cargo area to gain better access to the work area when he was struck by the container spreader attached to the ship's gantry crane. He did not survive his injuries.

Why did it happen:

The deck fitter was working alone and unsupported. His location had been relayed to the person controlling the cargo operations, but this information did not alter the cargo discharge plan. The design of the ship's gantry crane meant that the operator's view of the casualty location was obstructed. There was no hatchman present to mitigate this hazard. The officer overseeing the work expected the repair to be completed from inside the lashing bridge's rails but the task could not be completed in the manner imagined – the victim moved onto the adjacent container in order to complete the repair.

What can we learn:

- Personnel involved in any potentially hazardous operation should be consulted to identify the hazards associated with completion of the task. If you don't understand the task, you cannot identify the hazards. If you haven't identified the hazards, you cannot assess the risk or implement effective controls.

- Risk assessments are ineffective if risk control measures are not implemented. When conducting work in-port, clear and effective communication between the ship and terminal is key.

Who may benefit:

Shipping community.

16 Category of safety issues: • Natural environment

Type of marine casualty or accident: Capsizing

Level of severity: Very serious marine casualty

What happened:

A large passenger ship was anchored. In the afternoon, residents were being taken to and from shore in the ship's inflatable boats, driven by staff from a specialist expedition company that had joined the ship for this section of its itinerary.

After several shuttle runs had been completed without incident, a boat with its coxswain and 10 passengers was shaping up to enter the harbour when it was caught in a breaking wave. In the trough of the swell, the boat's propellor touched the seabed, stopping the engine and halting the boat's momentum. Subsequent waves washed passengers overboard and took the boat close to the beach.

As passengers were being helped ashore the coxswain noticed someone was trapped under the boat. Once freed the unconscious victim was transferred to shore where a medical team made efforts to resuscitate but he could not be revived.

Why did it happen:

Entry into the harbour was made difficult by the passage of a larger set of swells than had been experienced previously and complicated further by the presence of surfers in the water nearby.
The boat's engine stopped when its propellor touched the seabed, leaving the boat and its passengers at increased risk from breaking waves.

Once passengers were washed out of the boat, the coxswain had to deal with multiple issues without support of another member of crew in the boat. Once in the water, any effort to conduct an immediate head count was confounded by the distribution of passengers on the beach and the presence of people coming to assist.

What can we learn:

- The use of inflatable boats for tendering operations or coastal expeditions is not addressed by any specific International Maritime Organization (IMO) instruments. The industry could benefit from further assessment of risks posed and a legislative framework to operate in.

- The operation was prepared to deal with an onshore emergency with a nurse and defibrillator present at the landing site but with the coxswain as the sole member of crew in the boat, their ability to instantly respond to multiple passengers overboard may have been a factor.

Who may benefit:

Exhibition cruise ship operators and contractors.

17 Category of safety issues:

- Anthropometric or personal factors
- Planning and procedures

Type of marine casualty or accident: Occupational accident

Level of severity: Very serious marine casualty

What happened:

A general cargo ship was at anchor. In preparation for the ship's next cargo, the crew were conducting hose tests of the hatch covers – with two crew on deck and the Chief Officer and bosun in the holds below.

Having completed tests on five of the seven hatches, they stopped for a coffee break. At the end of the break, with the Chief Officer busy with another task, the bosun decided to continue the testing, and proceeded to hold six alone. The test was completed, and the team moved to hold 7.

On completion of the last test, and having heard no response from the bosun, the deck team proceeded to the hold's entrance where they could see the bosun lying motionless on the tank top. They then entered the hold and raised the alarm.

The ship's first aid team mobilized to provide care, but the bosun was declared dead by the shore medical team when they arrived on board the ship approximately three hours after the fall.

Why did it happen:

Neither the ladder or its platform had any fall protection and the bosun was not wearing a harness or other fall protection device. Aside from the hazards posed by ladder design, the hold was dark and, as the victim was working alone, he needed both hands to operate the torch and radio, leaving him particularly vulnerable to any slip or trip.

The risk of falling whilst completing the task was not obvious to the bosun or Chief Officer at the time and there were no risk control measures identified by the company (or anyone else with the power to affect change) to protect seafarers entering and working within the cargo holds**.**

What can we learn:

- There are numerous instances of seafarers falling from height to their death but risk perception, within organizations and individuals, remains low.

- This casualty shares many of the common factors found in fatal falls within the maritime industry; the industry may benefit from a switch of focus from controls on "working at height" to identification and management of risk of falls from height.

Who may benefit:

Shipping community.

18 Category of safety issues:

- Anthropometric or personal factors
- Planning and procedures
- Management factors

Type of marine casualty or accident: Collision

Level of severity: Very serious marine casualty

What happened:

A 20,000 GRT bulker was proceeding on a southerly course approximately 45 Nautical Miles (NM) west of an island when it encountered a fishing vessel. At about 17:30 hours the bulker and the fishing vessel collided. The fishing vessel, with a crew of 20, then passed down the starboard side of the bulker before capsizing, resulting in the loss of seven crewmembers.

Why did it happen:

The bulker was unable to maintain an adequate lookout due to ineffective navigational watchkeeping standards being maintained on board while navigating an area known to contain small conspicuous vessels. The Officer of the Watch (OOW) on board demonstrated an inability to recognize the necessity to use all available means to maintain a proper lookout while on watch. Management on board repeatedly deviated from company documented procedures that required a lookout to be on duty, this practice was consistently normalized on board.

The fishing vessel did not have an assigned Lookout on duty and therefore was unaware of the presence of the bulker until danger of collision was imminent.

What can we learn:

- Thorough understanding and application of the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) is paramount to ensuring safety of navigation. Deviation from COLREGs and failure to implement the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Code's principles for navigational watchkeeping will result in a collision.

- External navigational audits should be utilized to test the effectiveness and application of navigational watchkeeping standards.

- Ships must be properly manned by qualified individuals in possession of valid certification for their assigned position on board.

- Maintenance of a Lookout is paramount regardless of the ship and the navigational situation.

Who may benefit:

Masters, navigational watchkeepers, DPA's, ship managers, DOC holders, training institutions.

19 Category of safety issues:
- Anthropometric or personal factors

Type of marine casualty or accident: Occupational accident – slipping, stumbling, falling of person to a lower level

Level of severity: Very serious marine casualty

What happened:

A general cargo ship had just come alongside and was about to complete the final mooring operations. The Chief Officer called the Master over the walkie-talkie and informed him that he would be proceeding to the poop deck to assist with the securing of the aft mooring ropes. On his way to the mooring platform, the Chief Officer fell down the stairway, landing at the bottom of the stairs. Seriously injured, he was transferred to a local hospital, where he succumbed of his injuries several days later.

Why did it happen:

- The crew member either missed a step or slipped while standing on the stairs on his way down.
- The tread of the stairs was shorter than the shoe's size of the crew member.
- The distance between the bottommost step and the open fire door was too short and considered a hazard, should a person fall down the stairway.

What can we learn:

- The injuries from falling down a staircase can vary widely – from a minor sprain or bruise to a fatal head injury.
- The tread of a stairway is not standard and may vary from one ship to another.
- The use of contrasting stair edging is encouraged to improve visibility of the stairs and assist in the ability to gauge the depth.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers.

20 Category of safety issues:
- Safety assessment review
- Tool and hardware (design or operation)

Type of marine casualty or accident: Ship/equipment damage – ship/equipment damage

Level of severity: Very serious marine casualty

What happened:

Two crew members were assisting in the transfer of heavy scrap from the engine-room to the port side of the accommodation block, on board a containership, using the ship's overhead monorail crane. After the drum with the metal scrap was placed in the intended location, and whilst one of the crew members was hoisting the wire rope, the latter parted, and the block fell on the other crew member. The crew member suffered fatal injuries.

Why did it happen:

- A metallurgical laboratory analysis showed that the failure was caused by the overloading of the wire rope.
- Deformations found on the port side block, its sheave and the crane's sheave suggested that the crane's sheave had come into contact with the block as well as the block's sheave, while the block was being hoisted, thereby overloading the wire to cause its failure.
- The hoist limit switch's drive chain had disengaged from its small sprocket at some point in time, prior to the occurrence, rendering the hoist limit switch inoperative.
- Wear on one of the chain sprockets and adherent paint on the internal surface of the drive chain rollers prevented full chain contact, potentially leading to the disengagement of the chain from the sprocket.

What can we learn:

- The importance of including all deck equipment in the vessel's planned maintenance schedule.
- The need to avoid standing right below hanging loads and establishing "No Go Areas".

Who may benefit:

Seafarers, shipowners, ship operators, ship managers, stevedores.

21 Category of safety issues:
- Safety assessment review

Type of marine casualty or accident: Occupational accident

Level of severity: Very serious marine casualty

What happened:

On 18 November 2022, a bulk carrier was alongside by her port side at the loading port for loading cargo of petroleum coke in bulk.

At 17:48 hours the ship commenced loading operation. Due to the operational limits of the loading machine of the terminal, the ship was required to be shifted forward or backward for loading cargo to different cargo holds of the ship according to the loading plan. At 23:38 hours the crew started to shift the ship for about 60 metres ahead for loading cargo into holds Nos. 2, 3 and 4. At 23:56 hours, the Master of the ship instructed the Second Officer to heave the slack aft spring line when the ship was in position. Afterwards, 2/O relayed the order to an Able Seaman (AB1) by VHF radio to heave the slack aft spring line by winch and he then ran forward to the position near the port side bunker hose crane (the accident site) to check the condition of the spring lines. Unfortunately, 2/O was hit heavily in a flash by the aft spring line due to sudden escaping from the edge of the fender, lying on the main deck with blood in his mouth and nose without breathing and pulse. Despite shipboard first aid carried out by the crew and medical treatment was initiated by shore medical team for the 2/O, the 2/O was declared dead on board by shore medical team at 00:38 hours.

Why did it happen:

The investigation identified that the contributory factors leading to the accident were that the crew did not follow the requirements of the "Code of Safe Working Practices for Merchant Seafarers" (the Code) of section 26.3.13 to remain in a safe position when mooring lines are under strain and its recommendation to identify the dangerous areas by using a bird's eye view of the mooring deck arrangement during the shifting operation including the provision of illumination around the fender area which was far from the ship; the crew did not follow the requirements of the Code of section 26.3.12 to hold a toolbox meeting before the shifting operation; the crew lacked a safe working culture of good communication and clear leadership during the shifting operation; the shipboard training on mooring/unmooring operations to 2/O was ineffective; the shipboard risk assessment for mooring and unmooring operations was ineffective; and 2/O lacked safety awareness of the risk of the snap-back zone of the mooring lines when they were under strain.

What can we learn:

- strictly follow the requirement of the Code to remain in a safe position and its recommendation to identify dangerous areas by using a bird's eye view of the mooring deck arrangement during the operation of shifting ship including the provision of illumination around the fender area which is far from the ship;

- strictly follow the requirements of the Code to hold a toolbox meeting before the operation of shifting ship;

- strictly follow the requirements of the Code and shipboard Safety Management Manual (SMM) to carry out an effective risk assessment for the operation of shifting ship;

- enhance safety awareness of the crew to the risk of the snap-back zone of mooring lines during the operation of shifting ship;

- ensure the operation of shifting ship be carried out a under safe working culture, including good communication and clear leadership; and

- ensure effective onboard training to the crew for safe mooring and unmooring, including the operation of shifting ship.

Who may benefit:

Seafarers, shipowner and operator.

22 Category of safety issues:

- Natural environment
- Safety assessment review
- Management factors
- Planning and procedures

Type of marine casualty or accident: Occupational accident (in heavy weather)

Level of severity: Very serious marine casualty

What happened:

A fatal accident happened on board a container ship when it was en route to the destination port. On the day of the accident, while the ship was approaching the destination, the weather became worse and caused the ship to roll and pitch heavily. An Electro-Technical Officer (ETO) was found lying unconsciously outside the accommodation block near the gangway on the port side of the main deck. He was later airlifted to a local hospital for medical treatment but was declared dead on the same day.

Why did it happen:

The shipboard toolbox meeting did not follow the requirements of the "Code of Safe Working Practices for Merchant Seafarers" (the Code) to identify the hazards and associated risks of the routine inspection of the room; the ETO did not to follow the instruction of the toolbox meeting of not to go outside the accommodation block to inspect the room under adverse weather unless permission is given by the Master; the ETO did not to follow the requirements of the Code and shipboard "Safety Management Manual" (SMM) when working in adverse weather; the shipboard training for the ETO on the SMM procedures, especially the familiarization with the procedure for "Work on Deck in Heavy Weather" was ineffective; and the ETO lacked safety awareness on working outside the accommodation block in adverse weather.

What can we learn:

- prior to the commencement of work, strictly follow the requirements of the Code to identify the hazards and associated risks for all involved work in a toolbox meeting;
- strictly follow the requirements of the Code and shipboard SMM on working outside the accommodation block in adverse weather;
- ensure shipboard training on the SMM procedures be conducted effectively, especially the familiarization with the procedure for working on deck in heavy weather; and
- enhance safety awareness of the crew on board on working outside the accommodation block in adverse weather.

Who may benefit:

Crew, owner, management company.

23 Category of safety issues:

- Anthropometric or personal factors
- Maintenance
- Planning and procedures
- Management factors

Type of marine casualty or accident: Fire – crew trapped in fire, causing fatality

Level of severity: Very serious marine casualty

What happened:

The fire alarm on a 6,000 DWT oil/chemical tanker built in 2009 activated during the evening hours while the ship was at sea. The OOW checked the panel alarm panel on the bridge and determined that the smoke detectors on the starboard side of the upper deck passageway had activated. The OOW then announced over the ship's public address system that all crew members should report to the muster station. Two crew members were missing when the muster was taken as the crew members prepared to respond to the fire. The cabins of an Able-Seafarer Deck (ASD) and an Oiler who were not accounted for were located on the starboard side of the upper deck. A short time later, the Oiler arrived at the muster station. He reported he had been asleep in his cabin but was able to escape to the main deck.

The Master was able to contact the ASD by calling the phone in his cabin. The ASD told the Master that he was unable to leave his cabin, which was located on a dead-end corridor, due to the heavy fire and smoke in the upper deck passageway. The fire parties were also unable to reach the ASD's cabin due to heavy fire and smoke and high temperatures in the passageway. A fire team was eventually able to use a line to lower an emergency escape breathing device (EEBD) to the ASD through an open port hole, which was located in the side shell. The port hole was not large enough for a self-contained breathing apparatus (SCBA) to be passed through. Contact with the ASD was lost approximately one hour after the fire alarm activated.

The fire teams continued to fight the fire and were able to reach the ASD's cabin approximately four hours after the fire alarm activated. The ASD was found, unresponsive and without a pulse, directly below the open port hole. He was taken to the main deck, where crew members started to administer cardiopulmonary resuscitation (CPR). He did not have any visible injuries or burns. The ASD did not respond and was determined to be deceased. It was later determined he died due to carbon monoxide inhalation.

The fire teams were able to extinguish the fire within an hour after being able to reach the ASD's cabin.

The fire-fighting teams used 10 of the ship's 12 spare SCBA cylinders and four additional SCBA cylinders that were provided by another ship that was standing by to assist.

The fire was determined to have started in the cabin of a crew member who was on watch when the fire started. The cabin was adjacent to the cabin of the Oiler who was initially not accounted for. The crew member had not been in his cabin for approximately four hours. It is not known how long the fire had been burning inside the cabin before the smoke detector in the passageway activated.

The cabin where the fire started had the heaviest damage, with all surfaces showing evidence of direct flame exposure. The passageway outside of this cabin also had significant fire damage. The damage extended from the deck to the overhead. The door of the ASD's cabin was found closed when the fire team first reached it. The inside of the door showed signs of exposure to high heat. There was no evidence of direct flame contact inside the cabin.

Why did it happen:

- The cause of the fire could not be determined with certainty but was likely electrical. The most likely source of ignition was a personal electronic device that was charging while the crew member who occupied the cabin was on watch.
- The ship's safety management system did not address the charging of personal electronic devices or the inspection of these devices and their associated power cords.

What can we learn:

- The dangers of personal electronic devices being unattended while being charged.
- The importance of having a sufficient number of EEBDs located throughout the Accommodations so that they are readily accessible to crew members when exiting their cabins in an emergency.
- The importance of fire teams being trained to access and evacuate space within the Accommodations, including accessing spaces located on dead-end corridors.
- The importance of ensuring that all thermal and structural boundaries intended to contain a fire are well maintained.
- The need to have an adequate number of spare SCBA bottles or the means to recharge them available on board.

Who may benefit:

ISM managers, seafarers, flag and port State inspectors, classification society surveyors.

24 **Category of safety issues:**

- Anthropometric or personal factors
- Planning and procedures
- Management factors
- Safety assessment review
- Fatigue
- Legislation, standards and compliance

Type of marine casualty or accident: Occupational accident – fatal hit by mooring line

Level of severity: Very serious marine casualty

What happened?

On the morning a general cargo ship was manoeuvring into position in preparation for securing its lines to a series of fixed mooring buoys. During mooring operations, an able-bodied seafarer (AB) suffered fatal injuries when a mooring line that was under tension on the mooring winch sprung free from a bitt that it had been passed around, striking him in the chest. Despite immediate medical assistance from the crew and ambulance crew ashore a short while later, they were unable to revive him.

Why did it happen?

The mooring line that was being guided onto the winch drum had been placed on the wrong side of the bitt in preparation for applying the stopper. Once tension was applied and increased it sprung free and struck the AB who was standing in close proximity to the bitt. The work party did not assess all potential risks, including safe positioning of crew, prior to commencing the work, as the AB was not aware that his positioning placed him in any immediate danger.

What can we learn?

- All ship's personnel working in areas where mooring lines are under tension should be aware of the associated risks of snap-back and recoil when mooring lines either part or come adrift of mooring arrangements on deck, often resulting in serious injury or fatality.
- Never tension mooring lines with an upward lead around bitts so that it is retained by the flange – the likelihood of it slipping up and off is incredibly high.

Who may benefit:

Shipping community.

25 **Category of safety issues:**

- Anthropometric or personal factors
- Planning and procedures
- Safety assessment review

Type of marine casualty or accident: Occupational accident – fatal fall into cargo hold

Level of severity: Very serious marine casualty

What happened:

A bulk carrier departed for loading bulk maize.

For preparing cargo holds to load the cargo of maize in the loading port, the ship crew carried out the paintwork in two groups by means of the pneumatic painting machine. Four deck crew (i.e. bosun, carpenter, purser and steward) were assigned as a group to conduct the paintwork for the hatch coaming of the No. 3 cargo hold, and six engine crew were assigned to do the paintwork in the No. 4 cargo hold. The bosun was the leader of the paintwork with the purser and the steward assisting the painting on-site. When the deck team completed the paintwork at the fore hatch-coaming of the No. 3 cargo hold, they planned to shift to the starboard main deck to paint the hatch-side coaming of the hold. Thus, the bosun turned off the pneumatic painting machine and collected the paint rod and pipe. When the bosun walked forward and was about 6 to 7 metres away from the fore hatch-coaming of the hold, he suddenly heard someone screaming and the sound of a falling object hitting against the tank top of the hold. The bosun immediately ran to check the hold and found the purser lying on the tank top. The crew of the ship was organized immediately to rescue the purser. The purser was found to have no pulse, pupils appeared dilated, both legs broken without apparent wounds and bleeding in other parts of his body. Although first aid was applied to the purser on board by the crew immediately, including cardiopulmonary resuscitation (CPR) and shore emergency telemedicine, the steward (i.e. the doctor of the ship) declared the purser dead on board the ship at 13:40 hours. Afterwards, the ship deviated, and the body of the purser was delivered ashore.

Why did it happen:

The investigation identified the contributory factors leading to the accident were that the shipboard risk assessment for the paintwork was not carried out properly according to the requirements of the "Code of Safe Working Practices for Merchant Seafarers" (the Code); the crew did not follow the requirements of the Code and the shipboard safety management system (SMS) to take necessary preventive measures when working aloft; the paintwork was not supervised properly on-site according to the Code and shipboard SMS requirements; the shipboard training plan was not planned properly to follow shipboard SMS requirements; and the shipboard training on working aloft was ineffective.

What can we learn:

- follow strictly the requirements of the Code to carry out a shipboard risk assessment for painting work;
- follow strictly the requirements of the Code and shipboard SMS to take preventive measures when working aloft;
- follow strictly the requirements of the Code and shipboard SMS to supervise the painting work on-site;
- follow strictly the shipboard SMS requirements to make a shipboard training plan;
- enhance shipboard training of the crew on working aloft; and
- the crew follow strictly the requirements of the shipboard SMS when working aloft.

Who may benefit:

Seafarers, shipowner and operator.

26 **Category of safety issues:**

- Maintenance
- Planning and procedures
- Safety assessment review
- Natural environment

Type of marine casualty or accident: Occupational accident – fatal hit by wave

Level of severity: Very serious marine casualty

What happened:

During the ship's voyage through the Atlantic Ocean, although the depression had moved away, the ship encountered high waves of heavy weather and experienced the slamming effect caused by the waves which resulted in strong sea sprays on deck.

Though the Master had issued a standing order which included an instruction of not to go on deck during heavy weather, the Chief Officer assessed that weather conditions had improved and assigned work activities on deck at the aft section; he did not inform the Master.

When the Bosun was tasked by the Chief Officer to carry out some de-rusting work at the aft station, the Bosun went to the Bosun store to get the relevant tools. Inside the Bosun store, water was noticed flowing on the floor which was suspected to have entered from the mushroom ventilator on the forecastle deck.

While inspecting the mushroom ventilator, both the Bosun and Ordinary Seaman (OS) were likely hit by sea spray that came on deck resulting in the OS to be fatally injured and the Bosun to suffer head injuries.

Why did it happen:

Going to the forecastle deck to inspect the mushroom ventilator was an unplanned work and was not made known to any other crew, including the Officer of the Watch and the Chief Officer.

The Bosun and the OS had missed the discussion on the Risk Assessment (RA) for navigating in the English Channel and out of the Channel in heavy weather.

The mushroom ventilator had been defective and resulted in seawater entering and flooding the Bosun store. The ventilator was not identified as an item to be secured (covered with a canvas) during the heavy weather preparation prior to departing the previous port.

What can we learn:

- Defective items on board should be addressed as early as possible.
- RA should involve all personnel when the ship's passage is expected to enter/pass heavy weather areas, so that all crew are aware of the associated risks and are prepared and have necessary safety precautions in place before executing any tasks on deck.
- Any tasks to be carried out on deck during heavy weather should be made aware to the OOW and supervisors.
- Preparation for the ship entering heavy weather should be discussed and thoroughly checked to avoid any missing items which are supposed to be taken care of, like in this case, the defective mushroom ventilator at the forecastle deck was not covered at all resulting in sea spray water entering into the Bosun store.

Who may benefit:

The shipping company, the ship and crew on board.

27 Category of safety issues: • Safety assessment review

Type of marine casualty or accident: Equipment failure – broken hydraulic hose causing fatality

Level of severity: Very serious marine casualty

What happened:

A fatal accident happened on board a bulk carrier when the ship was en route for loading cargo of salt in bulk with an estimated time of arrival two days later.

The deck crew of the ship was engaged with the main deck cleaning and cargo hold coating work. One able seafarer (AB), one ordinary seafarer (OS), and one deck cadet (D/C) conducted the lime-coating operation in the No.5 cargo hold. The bosun and other deck crew cleaned the lime residues between the No.4 and No. 5 cargo holds on the main deck. The Chief Officer (C/O) coordinated the lime-coating operation on the main deck. While the

C/O was checking the cargo hold condition and taking photos through the partially opened hatch cover with his upper body placed underneath, the hydraulic operated hatch cover suddenly closed crushing the C/O to death on the spot. At the time of the accident, the hydraulic hose of the hatch cover hydraulic operation system (the operating system) was ruptured at the coupling area leaking the hydraulic oil of the operation system, resulting in the sudden closure of the hatch cover.

Why did it happen:

The C/O was lacking in safety awareness of the safe operation of the hatch cover; the crew members did not carry out the maintenance of the hydraulic operating system in compliance with the requirements of the shipboard manual, namely, "Operating and maintenance manual of the hydraulic operated folding hatch cover" (the Manual); the shipboard Safety Management System (SMS) missed identifying the hydraulic system as an item that required maintenance to comply with the requirements of the Manual; and the crew members did not follow the requirements of "Code of Safe Working Practices for Merchant Seafarers" and the Manual when operating the hatch cover.

What can we learn:

- enhance safety awareness and training on board in conducting the safe operation of the hatch cover including its effective risk assessment, and requiring a valid permit to work aloft;
- strictly follow the requirements of the Manual to carry out the maintenance of the hydraulic operating system of the hatch cover; and
- strictly follow the requirements of the Code and the Manual to operate the hatch cover.

Who may benefit:

Crew, company, environment.

28 Category of safety issues:

- Natural environment
- Planning and procedures
- Management factors

Type of marine casualty or accident: Occupational accident – entering cargo hold with dangerous atmosphere

Level of severity: Very serious marine casualty

What happened:

On the morning on an anchored bulk carrier an Ordinary Seafarer collapsed in a cargo hold containing soya beans. The alarm was raised and the Chief Officer who entered to help also collapsed.

Both the Chief Officer and Ordinary Seafarer were recovered from the hold by a team wearing breathing apparatus. Both were transferred to hospital ashore where the Chief Officer made a full recovery. The Ordinary Seafarer died as a result of exposure to lethal levels of phosphine gas.

Why did it happen:

The crew were carrying out a routine check on the condition of the cargo in the holds before discharge. Whilst the cargo had been fumigated at the load port, the holds were not considered to be dangerous as the ship was in possession of a gas free certificate, issued by fumigant removal contractors, and the hatches had been open and ventilated for some time. This was re-enforced as entry into the other holds had occurred without incident the previous days.

There was no effective hazard identification, so work commenced as planned.

As part of the pre-planning for discharge an opportunity was missed to retest the space prior to crew entering to inspect the cargo for wet spots.

What can we learn:

- Fumigated cargoes are incredibly dangerous.
- Cargo holds that contain fumigated cargo should not be entered.
- Lethal doses of fumigant may remain in pockets or trapped within the cargo.
- A gas free certificate does not guarantee your safety; therefore precautions should always be taken to mitigate the risk and likelihood of gas poisoning.

Who may benefit:

Shipping community.

29 **Category of safety issues:**

- Maintenance
- Tool and hardware (design or operation)

Type of marine casualty or accident: Equipment damage – ruptured fire extinguisher causing fatality

Level of severity: Very serious marine casualty

What happened:

A tanker was alongside, attending to several scheduled maintenance tasks. During the late morning, officers from the deck department were preparing to dispose of several condemned fire extinguishers to garbage facilities ashore. Preparation of decommissioning the portable foam extinguishers involved removing the CO_2 charge cartridge. Having successfully removed the cartridge from one extinguisher, the officers could not remove the valve assembly from the second. One took the decision to discharge the extinguisher into some waste rags. During discharge, the body of the extinguisher ruptured at the base and struck the officer in the chest. Despite immediate first aid from the crew, he died from his injuries.

Why did it happen:

The fire extinguisher failed following the release of carbon dioxide, when the handle was depressed, causing the base to rupture due to severe corrosion, propelling it upwards.

The officer deviated from the requirements of the safety management system, instructions given by the Chief Officer and failed to appreciate the dangers associated with condemned pressurized systems, or the safety measures to be considered when handling them.

What can we learn:

- Servicing by shoreside personnel may not be sufficient to control risks. Crew should inspect each extinguisher for signs of corrosion, and where concerns arise, then these are to be raised and discussed with the safety officer on board.

- Pressure vessel failure can be catastrophic. Crew should be made aware of the potentially fatal risks associated with handling compromised pressure vessels and systems, and where possible, decommissioning and disposal of fire extinguishers should be conducted by suitably qualified contractors.

Who may benefit:

Shipping community.

30 Category of safety issues: • Anthropometric or personal factors

Type of marine casualty or accident: Collision with other ship – tanker in collision with fishing vessel

Level of severity: Very serious marine casualty

What happened:

The 84,850 GT petroleum tanker was on her way to the next loading port in the east Mediterranean Sea. Around twilight (early morning) the bridge was manned with the Officer of the Watch (OOW) and one lookout crew. At the same time, the 95 GT fishing vessel sailed from the fishing area to her home port with a crew of five.

In a distance of about 6-7 nm the fishing vessel appeared on the radar screen of the tanker, and it was optically visible on the port bow. There were about five fishing vessels in the vicinity. During this time, the tanker ran with a speed of about 13 knots, the fishing vessel with a speed of about 6 knots. The OOW of the tanker detected that the fishing vessel would pass the stern. Both vessels met in a crossing situation in which the fishing vessel was the give-way vessel.

During the approach of both vessels the closest point of approach (CPA) decreased, although the tanker had started a small course alteration to starboard. Upon noticing four minutes before the collision that the fishing vessel had altered her course to port, OOW of tanker ordered the lookout crew to take the helm. When the tanker executed the port 5 helm order, the distance between the tanker and fishing vessel was 1.1 nm.

1.5 minutes before the collision, the tanker was executing port 20 degrees and the fishing vessel crossed ahead of the tanker to starboard. Meanwhile, as the tanker headed towards the port, her course was 234.5 degrees, and her speed was 13.2 knots. At that time, the course of fishing vessel was 16.2 degrees, and her speed was 5.9 knots, with a distance 0.5 nm between both ships.

The tanker continued with a bigger course alteration to port. Shortly afterwards the fishing vessel made a 66 degrees course alteration to starboard which led to the collision of both ships.

The fishing vessel was struck by the bulbous bow of the tanker on the port side amidships and suffered severe damage with a massive intake of seawater. This caused the foundering of the fishing vessel shortly thereafter. Five persons on the fishing vessel lost their lives.

Why did it happen:

- The fishing vessel as the give-way vessel did not take early and substantial course alteration.
- The OOW of the tanker did not use the whistle in order to alert the fishing vessel.
- The OOW of the tanker altered the course too late to avoid the collision and also to the wrong side.
- The tanker that could not contact the fishing vessel did not ask for assistance from Vessel Traffic Service (VTS) after calling and receiving no response from the fishing vessel.
- It is discovered that the Orders by the Tanker's Master to call the Master on the Bridge at the closest approach distance (2 nautical miles), indicated in the night orders given by the Master, and sufficient time before the collision were not followed.
- The crew on the navigational watch of both vessels did not attempt to request any navigational aid from VTS on the risk of collision.

What can we learn:

- All vessels should act in accordance with COLREGs and should take early and substantial action to avoid a collision.
- It is essential during the navigational watch to make use of all means in order to maintain situational awareness.
- In cases where it is not possible to contact the give-way vessel, the use of VTS Communications at an early stage to avoid collision is important in order to request any navigational aid from VTS on the risk of collision.
- Adherence to the Master's Standing order with respect to navigating in areas of fishing vessels.

Who may benefit:

Maritime Administration, ship's operators, vessel traffic services, seafarers.

31 Category of safety issues:

- Planning and procedures
- Legislation, standards and compliance

Type of marine casualty or accident: Occupational accident – crew entering hold with dangerous atmosphere

Level of severity: Very serious marine casualty

What happened:

Some deck crew on a 29,000 GT general cargo ship loaded with steel scraps were carrying out maintenance work comprising hot work and painting on the booby hatch covers and D-rings, while the ship was at sea.

The Bosun was supervising the hot work being done by the Fitter on one of the booby hatch covers. When the hot work was almost completing, the Bosun left the site to get a wire brush from the forward deck store. Upon the Bosun's return, the Fitter was found lying on top of the steel scraps inside the cargo hold, next to the vertical ladder of the booby hatch and was unconscious. An emergency rescue was initiated but the Fitter could not be resuscitated.

Why did it happen:

- The Fitter had likely entered the cargo hold to retrieve dropped or fallen item(s) and had succumbed to the oxygen-deficient atmosphere. Although the cargo hold was deemed as an enclosed space as per the Safety Management System (SMS), the Fitter had likely perceived the entry to be safe and overlooked the hazards associated with the cargo of steel scraps.
- There was no ship-specific list of enclosed spaces maintained on board as required by the SMS.
- Although the booby hatch covers were painted with warnings to caution personnel about entering the cargo hold, there were no additional signages in the vicinity or physical barriers in place to prevent an unauthorized entry.

What can we learn:

- Cargo holds, regardless of the type of cargo carried are to be treated as an enclosed space which must require proper authorization to be granted for entry so that the appropriate risk assessment with all the mitigating measures is introduced.
- Even if an enclosed space's opening has been kept open, the space should not be treated safe for entry unless its atmosphere has been thoroughly checked and the space verified safe for entry.
- Absence of warning signs or physical barriers such as a rope or a chain can lead to a presumption that a space with an open hatch is ventilated and safe for entry, which may not be the case.
- The ship's specific list of enclosed spaces should be drawn up and posted in conspicuous places for the crew to have a proper understanding when performing their work. Additional signage(s) and poster(s) in conspicuous places highlighting the risks associated with enclosed space entry, especially unplanned and unauthorized can serve as a reminder to the crew.

Who may benefit:

Seafarers, shipowners, ship managers.

32 Category of safety issues:

- Safety assessment review
- Planning and procedures
- Management factors

Type of marine casualty or accident: Occupational accident – crew entering hold with dangerous atmosphere

Level of severity: Very serious marine casualty

What happened:

After completing the loading of coal cargo, a nearly 60,000 TDW bulk carrier was anchored. While waiting for cargo export documents and the scheduled pilot to embark, four crew members were tasked to grease the booby hatch dog handles for the No. 5 cargo hold. During the greasing process, one of the four crew members, an Able Seafarer Deck (ASD), was discovered lying inside the cargo hold on top of the coal cargo. An emergency rescue was initiated but could not save the ASD.

Why did it happen:

The investigation revealed that the ASD had entered the cargo hold to retrieve a dropped dog handle and had likely succumbed to the oxygen-deficient atmosphere while exiting the cargo hold. The investigation also determined that the greasing task was unplanned, and the hazards associated with the coal cargo were overlooked. there was no proper signage to warn the crew to treat the cargo hold as an enclosed space. The crew used inappropriate equipment for the rescue operation and did not follow the assigned duties as per the ship's muster list.

What can we learn:

- To treat a cargo hold as an enclosed space when it has been sealed for some time and to ensure the space atmosphere has been checked and safety measures have been taken before entering the cargo hold.

- To follow the respective company's established enclosed space entry procedures.

Who may benefit:

Ship's crew and the shipping company.

33 Category of safety issues:

- Anthropometric or personal factors
- Planning and procedures
- Safety assessment review
- Legislation, standards and compliance

Type of marine casualty or accident: Collision with fishing vessel

Level of severity: Very serious marine casualty

What happened:

A 5,000 GT tanker, after completion of loading operations, departed from the port early in the year. Four days later after midnight, the Master of the ship communicated with the Vessel Traffic Services (VTS) before the northern entrance of the Strait. The tanker kept on course 241° to go to the anchorage site as instructed by the VTS.

On the same day with the tanker before sunrise, a 140 GT fishing vessel departed from fishing port for fishing. While the fishing vessel was getting close to the tanker, she was sailing at 340°.

The bridge crew of the tanker noticed the cluster of fishing vessels heading towards them at a distance of approximately 3 nautical miles on the radar early in the morning. When they set the distance of the radar to 1.5 nautical miles, they noticed the fishing vessel sailing towards them for the first time. When they saw the fishing vessel with their eyes, the distance between their vessel and the fishing vessel was around 300-500 metres. When the tanker was visible by the fishing vessel, the distance between the two vessels was 10 metres.

While the tanker maintained her course and speed without any alteration within the traffic separation scheme, the fishing vessel first commanded a full head with her engine and then manoeuvred towards her starboard at the very last-minute by switching the rudder from autopilot to manual mode. However, since the manoeuvres of both vessels to avoid collision could not be executed in time, the collision took place in the early hours of the morning.

The collision resulted in the fishing vessel being stuck in front of the bulb of the tanker and starting to drift. Although the Master of the fishing vessel manoeuvred full speed back and forth with the engines to avoid drifting, he could not avoid getting adrift. Thereafter, the fishing vessel began to take water from the bridge by listing to her starboard under the effect of the drift. Meanwhile, since the Master of the fishing vessel couldn't get out of the bridge door, he got out of the windscreen and tried to warn the tanker by shouting out.

After the fishing vessel drifted for nearly 0.5 nautical miles for around 3 minutes as stuck to the bulb of the tanker, the tanker stopped and manoeuvred full astern propulsion and disengaged from the fishing vessel. Immediately after the tanker disengaged from the fishing vessel, the fishing vessel capsized and sank approximately 5 minutes later. Although three out of six crew members on board survived, two people lost their lives and one is missing. The tanker sustained no damage due to the collision.

Why did it happen:

- No effective audible watch and lookout were conducted on both vessels in accordance with the requirements of the Regulations for Preventing Collisions at Sea.

- The tanker did not identify the fishing vessel before the collision.

- The fishing vessel identified the tanker just before the collision and manoeuvred, but the last-minute manoeuvre was not effective to avoid the collision.

- Although the fishing vessel, which noticed the tanker just before the collision, altered her course, she did not take any action to slow down her speed before the collision.

- It was revealed that all the fishing vessels, including the wrecked fishing vessel, were sailing in a convoy in the opposite direction of the separation in violation of the COLREG rules.

- It was found that the AIS device of the fishing vessel could not send any data before the accident, which indicates that the AIS was out of operation.

What can we learn:

- All vessels should act in accordance with COLREGs and should take early and substantial action to avoid a collision.

- It is essential during the navigational watch to make use of all means in order to maintain situational awareness.

- In cases when it is not possible to contact the give-way vessel, the use of VTS Communications at an early stage to avoid collision is important in order to request any navigational aid from VTS on the risk of collision.

Who may benefit:

Seafarers, ship operators and Vessel Traffic Services.

34 **Category of safety issues:**

- Anthropometric or personal factors
- Planning and procedures
- Safety assessment review
- Natural environment

Type of marine casualty or accident: Occupational accident – slipping, stumbling, falling of person overboard

Level of severity: Very serious marine casualty

What happened:

While descending the pilot ladder to the service boat, the crew member, who had just signed off, lost his balance and fell into the water. The lifejacket inflated upon immersion and a lifebuoy was released immediately, but it took about 15 minutes to recover him from the cold water, after he lost his grip on the lifebuoy. Despite attempts to revive him, the master died of cardio-respiratory arrest associated with cold water immersion.

Why did it happen:

- The crew member lost his balance while descending and transferring his weight from the right leg on to the left leg. His left leg slipped, and he eventually lost his balance.

- The loss of balance was likely to have been exacerbated by the heavy backpack he was carrying.

- The heavy, wet backpack worn under the lifejacket would have exacerbated the flushing process.

- The recovery of the crew member was hindered by the backpack.

What can we learn:

- Disembarkation/embarkation at anchor carries an elevated degree of risk in comparison to a disembarkation when the ship is alongside.

- The acceptance of risk is not necessarily an objective action, influenced by the gap between perceived and actual risk.

- Flushing, which is the process of cold water penetrating through the clothing is detrimental and may limit the use of limbs and hands, and eventually the ability to grab and hold on to flotation devices.

Who may benefit:

Seafarers, shipowners, ship operators, ship managers.

___