

# **OUTCOME OF THE SIXTEENTH SESSION OF THE SUB-COMMITTEE ON FLAG STATE IMPLEMENTATION**

## **LESSONS LEARNED FOR PRESENTATION TO SEAFARERS**

### **1 MAN OVERBOARD**

#### **What happened?**

While deploying fishing nets, a crew member became caught in the gear and was pulled overboard. The only other crew member on board the vessel hauled the nets up, but recovered only a boot. Search and rescue resources were called and a search for the body of the crew member was unsuccessful. The crew member's body was recovered by another vessel two weeks later.

#### **Why did it happen?**

The crew member, who was not wearing a personal flotation device, was working on a deck with limited space.

#### **What can we learn?**

Deploying nets can be a high risk operation when working in an area of limited space. Wearing a personal flotation device helps to keep the wearer afloat, thus increasing the ability to survive.

There are numerous types of Personal Floating devices available, having solid buoyancy and manual/automatic self-inflating device. These devices can be cumbersome and bulky and can prevent the wearer from working safely. Floating devices worn by Seafarers should be suitable and fit for purpose when the seafarer is working on a fishing vessel.

### **2 GROUNDING**

#### **What happened?**

A small cargo vessel experienced a main engine breakdown. The vessel was drifting, pushed by a wind towards land. Assistance was requested and a small coastal tanker arrived on scene. Several attempts were made to pass a towing line to the drifting vessel using a small boat. The vessel grounded before towing could commence. Within minutes, the coastal tanker also grounded on a nearby reef.

#### **Why did it happen?**

The master of the cargo vessel had joined the vessel two days before the accident. He was not familiar with the vessel's windlass and ground tackle. No other member of the crew knew how to use the windlass to anchor the vessel.

The lack of navigational precision of the coastal tanker, the less than adequate hydrographical information and the inappropriate chart scale, rendered the close-in manoeuvring near submerged reefs a risky proposition. Also, the engine power and engine control of the vessel were not adequate for rendering assistance of this nature.

### **What can we learn?**

The master and crew should know how to operate and make use of the windlass and ground tackle. Assisting a vessel in distress is another emergency scenario that should be planned for under section 8 of the ISM Code.

Pre-approved tug and salvage arrangements should be negotiated between the state and private industry to ensure that adequate tug assistance is available in the event of an emergency.

## **3 GROUNDING**

### **What happened?**

A small general cargo ship ran aground after it dragged anchor during the passage of a typhoon.

### **Why did it happen?**

The master did not plan well for the anchorage position.

The starboard anchor was difficult to recover and was therefore not used.

Insufficient anchor chain scope put out at initial anchoring.

Crew not trained or briefed adequately prior to or during incident.

### **What can we learn?**

Masters should plan adequately for every situation. Passage planning should include all available information and any restrictions. All crew members should be trained and informed during any voyage or incident to ensure that they react correctly.

## **4 GROUNDING**

### **What happened?**

A small general cargo vessel ran aground whilst seeking a sheltered anchorage in bad weather.

### **Why did it happen?**

There was not an adequate or detailed passage plan (or equipment) for getting to the anchorage even though the possible need to use it had been identified.

Failure of BRM in that the master did not know accurately where the vessel was as he approached a shoal area.

### **What can we learn?**

Masters should plan adequately for every situation. Passage planning should include all available information, equipment and any restrictions. BRM should be practised to reduce the risk of grounding particularly in unfamiliar areas or circumstances.

## 5 GROUNDING

### What happened?

The general cargo ship left port with a pilot on board. When the pilot left, some distance before the pilot boarding area, he gave instructions on changing course when passing the entrance buoy. The master, who was alone on the bridge with the helmsman, since the second officer accompanied the pilot to deck, misunderstood the situation and changed course too early and the ship grounded.

After pumping out some ballast water, the ship was afloat at the following high water. After hull examination, she was allowed to continue the journey.

### Why did it happen?

- No passage plan was made on board for the pilotage phase of the voyage.
- The bridge team was not complete since as the second officer left the bridge to accompany the pilot to deck. Consequently there was no navigator available to check positions and assist the captain.
- The pilot left the ship before he was ensured that the pilot passage was safely completed.
- The pilot did not ensure that the captain fully understood the instructions given.
- The scale difference between the chart and the chart insert may have confused the master in differing the entrance buoy from no.1 buoy. This may have led to the premature course change.
- The scale of the chart was inappropriate, as it did not show the approach in detail.

### What can we learn?

Routines and regulations should be followed. In this case, a complete passage plan or adequate manning on bridge could have prevented the grounding.

Missions should be completed. If the pilot had stayed through the pilotage passage, the grounding is not likely to have happened.

Tools (in this case the chart) should be designed for the user.

## 6 GROUNDING

### What happened?

A ship went up a river on high water. According to the pilot, charts and tide-tables there was a clearance of 0.25m under keel, which was allowed and acceptable according to port restrictions. Still, the ship grounded. The next high water, the ship was afloat and continued the journey, but grounded once again. With assistance of tug boat, the ship eventually continued the journey. Some damage made it necessary to renew some steel in the bottom.

### **Why did it happen?**

Clearance under bottom of 0.25m is a very small margin.

On board they expected the chart datum being the vertical reference. The tide-table used, however, had another vertical reference than the chart datum.

It cannot be excluded that some meteorological factors had an influence on the water level.

### **What can we learn?**

Restrictions, as in these case port restrictions, should not be at the lowest possible margin.

Tide-tables can have different vertical references.

Meteorological factors may have a negative influence on tide.

The importance of adequate and reliable tools cannot be underestimated. Data in charts and tables should be presented and related to in the same way whoever presents the information, thus risk of misunderstanding data can be reduced.

## **7 GROUNDING**

### **What happened?**

The large ship approached the port without large scale charts. The planned route to the pilot boarding area was departed to make a short-cut to reach the berth as early as possible as the agent has urged the ship to arrive. The master received the new route by the pilot station via VHF.

The ship grounded and was not afloat until almost four weeks later. It had sustained considerable damage on the bottom.

### **Why did it happen?**

Company's SMS was violated since the ship approached without a pilot or large scale chart.

The BRM was not effective. Another deck officer could have assisted by checking incoming information and watching instruments like the echo-sounder.

The information from the pilot-station was not reliable.

### **What can we learn?**

Information, as in this case from the pilot-station, should not be relied upon unless confirmed being reliable.

One should not make deviations unless it is necessary and confirmed safe.

Procedures and instructions must be followed.

Short cuts taken in an attempt to save time and money may reduce safety margins and create unsafe situations.

## 8 NEAR MISS GROUNDING

### What happened?

A ship nearly ran aground when it was being navigated in pilotage waters with its auto-pilot in 'automatic track keeping mode'. The ship was equipped with a sophisticated integrated bridge system which allowed the auto-pilot to make course alterations at programmed way-points. The system failed to initiate a course change, and when the ship was very close to running aground, the master engaged manual steering and turned the ship sharply to avert the grounding.

### Why did it happen?

- A sensor failure or error led to the auto-pilot system reverting to another mode of operation.
- The master and chief officer on the bridge were over-reliant on the integrated bridge system and were not adequately monitoring the vessel's progress during the pilotage.
- Both the chief officer and the master lacked appropriate knowledge of the capabilities and limitations of the vessel's auto-piloting system.
- There had been past incidents where the system had failed and procedures had not been appropriately changed as a result.

### What can we learn?

There is a tendency for crew to become too reliant on sophisticated navigational systems, and this must be countered by the appropriate management of bridge resources, a thorough assessment of the risks of the passage (particularly in pilotage waters), contingency plans for when the system fails and good navigational watch keeping practices at all times.

## 9 COLLISION

### What happened?

A double hull crude oil carrier was NE bound in a busy traffic area. At the same time a bulk carrier was proceeding on a SW'erly course to enter the traffic lane. It was early morning. The weather was fine with a light breeze, slight sea, good visibility. The tanker saw the bulk carrier on her starboard bow. Although the bulk carrier was crossing the bow of the tanker, the officer on watch of the tanker predicted, relying on the radar information that it would pass clear on the starboard side. Both ships were following each other's movements, but none of the ships made any evasive action until last moment. There were no acknowledged visual or audible communications between the vessels. They collided at about 06:55 hours. Although there were no injuries and no pollution, structural damage occurred on both ships.

### Why did it happen?

The tanker's officer on watch relied on radar information to conclude that the bulk carrier would safely pass from starboard side. He apparently did not assume that the bulk carrier would cross his bow. The bulk carrier attempted to cross the bow of the tanker from close distance. The officer on watch was apparently relying that he had right of way but the alteration of course (more to starboard) by bulk carrier was not large enough to be easily recognized by the tanker.

The tanker was not sure of the intention of the bulk carrier, but still none of the ships made any action to avoid collision until last moment. In the last moment, the tanker made a hard turn to port, which actually resulted in the collision.

### **What can we learn?**

Both vessels could have applied the COLREGs better. In this case, the best solution would have been for the vessels involved to take avoiding action in good time, such that their actions were readily apparent to the other vessel.

Notwithstanding the narrow crossing angle, one vessel considered itself to be the stand-on vessel. However, it made no attempt to establish the intentions of the other vessel, or to indicate concern about the other vessel's apparent lack of action. Where doubt exists, Rule 17 allows for the stand-on vessel to take action to avoid a collision – such action would have been appropriate here.

## **10 COLLISION**

### **What happened?**

A ro-ro passenger vessel was en route with about 90 passengers on board. The weather was calm with intermittent fog. At about 04:30 hours in the morning, a dry cargo vessel approached from port side and crossed the bow of the ro-ro ship from a close distance. Both ships tracked each other with radar. There was no visual sight as visibility was down to about 0,1 M. Right after crossing the bows, the dry cargo vessel made a violent turn to her starboard and collided with the ro-ro ship. The stem of the dry cargo vessel penetrated the plating of the ro-ro ship and tore a hole in the cargo deck space and engine rooms.

Water poured into the engine rooms of the ro-ro ship and since many watertight doors were open, large parts of the engine area were filled with water. Her power supply and propulsion machinery were put out of action. Passengers and the majority of the crew abandoned the ship by master's orders.

The ro-ro ship was towed into the port. She continued taking in water and was hardly saved from capsizing and sinking with extensive work, which took several days. The ro-ro ship sustained extensive damage resulting both from the collision and the flooding afterwards. There were no injuries and no long-term or permanent pollution. All her cargo was saved.

The dry cargo vessel was able to continue her voyage with a fairly small leak in the stem. She had comparatively minor damage.

### **Why did it happen?**

Although there was fog, none of the ships took steps to avoid development of a close quarters situation in time. The master of the dry cargo vessel misjudged the ro-ro ship's position, course and speed and changed course far too late. Actually this change resulted in the collision. Nothing would have happened if he simply kept his course and speed. The officer on watch of the ro-ro ship apparently did not assume that the dry cargo vessel would make the turn. He was apparently relying that he had right of way and therefore did not feel the need to keep well clear. Moreover, the officer on watch of the ro-ro ship was grown used to accepting meetings in close quarters situations. It is found that he did not receive special instructions regarding minimum distances allowed. By neglecting to avoid a close quarters situation, the officer on watch faced a situation from which he could not escape by his own action when the dry cargo vessel made the unexpected manoeuvre.

The reason that the ro-ro ship became flooded and nearly sunk was because several watertight (WT) doors were open beforehand and were not closed in time after the collision. In this aspect, the shipping company lacked a sufficiently thought-out and implemented safety policy. Electrical systems for closing of WT doors were not watertight and became inoperational during flooding. The crew's skills in closing the watertight doors in a dangerous situation were not sufficiently increased with drills.

### **What can we learn?**

In this case, the master of the dry cargo vessel made a mistake, which resulted in a collision. However, both vessels took insufficient action to avoid a close quarters situation. Remember, Rule 19 applies in restricted visibility and not the rules for vessels in sight of one another. Both vessels therefore had an obligation to avoid the close quarters situation.

Watertight (W/T) subdivision of compartments exist to increase the survivability of a vessel in the event of flooding, however it is caused. W/T integrity should be maintained at all times.

## **11 COLLISION**

### **What happened?**

At late afternoon, an inland motor tanker was proceeding in the main navigational channel with 960 T of sulphuric acid and turning into a secondary channel in a busy port. She was going to proceed further inwards to her discharge port. At the same time, a big container vessel left its berth and she was departing from the secondary channel to enter into the main navigational channel. Visibility was good. Wind was from West 6 to 7 Beauforts.

The two vessels collided in the area where the secondary channel opened into the main channel.

The container carrier suffered only minor damage from the collision. The inland tanker was damaged on her port side. The outer plating in the foreship was deformed, water flooded into the forward port wing tank at the same time, one of her two propulsion units was damaged and became inoperational. However, she remained floating and was able to continue her voyage with only one propulsion unit. She reached her berth and tied up with a slight list to port side. The fire brigade tried to keep the inland tanker floating, but its list to port increased swiftly. About 45 minutes after the collision, the inland tanker capsized and floated keel upwards in the basin. Nearly all the cargo of sulphuric acid was released into the port waters. The rapid dilution of cargo prevented a major environmental pollution. The inland tanker was re-floated after 5 days.

### **Why did it happen?**

Upon the test made right after the accident, the master of the tanker was found to be under the influence of alcohol. The tanker was fully loaded and was very low in the water. The view from the main channel to the secondary channel and vice versa was partly blocked by another berth and cargo/port machinery on the berth. None of the ships were able to see each other in advance until last moment due to this optical barrier. Both ships relied on VHF communications and radar for manoeuvres. Both ships transmitted their compulsory reports to VTS. But when the ships made their reports, there were a number of misunderstandings and reporting mistakes. In some reports the calling vessels' name was not mentioned. In others, it was not clear to whom the message was addressed to. So the ships did not perceive the messages accordingly.

The tanker had her radar turned off. She was unable to detect the big ship in advance. Also the container ship did not use radar for evaluation of the situation.

Due to strong winds, the container ship had to increase its speed to 7 knots right after casting off to ensure steerability. As she was a large vessel, the command directed their concentration to other ships, to tightness of channel, to tugboats, etc. (preoccupied with other work).

The tanker did not take its turn into secondary channel in accordance with the applicable rules. Rules stipulate that; manoeuvre for crossing the main navigational channel and subsequent running into the secondary navigation channel must be designed in such a way that the vessel crosses as close as possible at right angles to the direction of main channel and must take a position to enter that allows subsequent entry into the right hand side of the secondary channel. If the tanker planned and executed its entry manoeuvre in this fashion, both vessels would have seen each other well in advance. But the tanker started its turn too early and thus remained hidden from visual contact by the wharf until the last 400 metres. In the last moment, it did not make any collision avoidance action.

After the accident, the tanker did not start the drainage pump to pump the incoming water. (The master refrained from using the pump. The deckhand did not have any knowledge about the pump.)

### **What can we learn?**

- Due regard should be paid to standard collision avoidance procedures. Proper lookout during sailing in dense traffic areas is at superior importance. Every vessel should at all times maintain a proper look-out by sight and hearing (including listening of the radio communications) as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.
- Every vessel should at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.
- Every vessel should use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk should be deemed to exist.
- Use of radar facilities on board when visual sight is hampered is an indispensable navigational aid. Proper use should be made of radar equipment if fitted and operational, to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.
- Alcohol at the work place endangers not only the person himself, but also all other persons, ships and the environment substantially. Consumption of alcohol on board, although decreasing, continues to be a problem issue. Alcohol may reduce judgment capacity, and may lead persons to act boldly and irresponsible. The master of the tanker did several mistakes in a short time. (He did not report his vessels name, did not apprehend the incoming warnings, did not follow the local traffic regulations regarding turning into secondary channels, did not make room for the much larger vessel, did not make last minute collision avoidance action and after the collision did not utilize the drainage pump on board.)

- All local traffic navigational rules should be closely adhered to in order to avoid close quarters situations. If it becomes necessary to deviate from the regulations due to traffic situations, VTS/other ships should be informed beforehand.
- Clear individual traffic agreements should be made with other vessels at an early stage and unambiguously.
- Clear and open language should be used for VHF communications. All announcements should include the vessels names.
- VTS advisory services and land based radar advice should be sought for getting navigational information, especially during limited visual coverage when entering/exiting navigational channels.
- All crew members should know the presence and operation of drainage pumps on board. Routine training on safety equipment is a very important safety requirement and should not be put aside even for a small vessel working within the port.

## **12 COLLISION**

### **What happened?**

A tug and tow were steaming on location around awaiting passage through some straits. Another vessel collided with the towed vessel.

### **Why did it happen?**

The approaching vessel was keeping poor lookout, and did not alter course or answer radio calls or acknowledge flashing aldis, etc.

The towing vessel did not take any avoiding action. Increased traffic as ships waited near straits entrance. Ships manoeuvring rather than steaming en route (less predicable).

### **What can we learn?**

Tug and tow needed to be aware of the change in their reactions required by their restricted manoeuvrability. Increased traffic density and reduced predictability as ships 'steam around' waiting increases risk of collision. The lookouts task is crucial to avoid accidents.

## **13 COLLISION**

### **What happened?**

The fishing vessel, with the captain alone on the bridge and under the influence of alcohol, left berth for going out with the tide after receiving traffic information and clearance from the VTS. The visibility was restricted. Instead of turning starboard and follow the north, starboard, side of the main channel, she crossed the channel while passing very close (15 m) in front of an inbound ship. After crossing the bow of the other ship, there was not room enough to turn, so she collided with the jetty on the opposite side of the channel, viewed from her on berth.

During that time, both of the two VTS operators were distracted by other duties and did not notice the deviation and up-coming dangerous situation until it was too late.

After the collision, the fishing vessel headed to the north side of the channel and shortly after, passed slowly a tanker with a distance of 9 m. The fishing vessel was later escorted back to the berth.

The VTS did not follow own procedures regarding informing other traffic via VHF about the vessel.

There was some minor damage on the vessel's bow and on the jetty.

### **Why did it happen?**

- The captain was under the influence of alcohol.
- The visibility was restricted.
- There was no lookout on the vessel.
- The captain did not use the radars, though they were switched on.
- The captain neither had a passage plan nor a proper chart available.
- The VTS operators were distracted by other duties and did not survey the radar screens.

### **What can we learn?**

Legislations and procedures should be followed even in known waters, especially when visibility is restricted. Lookout and navigational aids should be in place and used efficiently.

## **14 COLLISION**

### **What happened?**

A stern trawler, which had been fishing in a traffic separation scheme, was heaving in its trawl while proceeding at about two knots to other fishing grounds. Visibility had been reduced because of fog. A container ship was heading in relatively the same general direction as the stern trawler, but at a speed of 16 knots. The container ship struck the after end and starboard side of the trawler.

### **Why did it happen?**

The trawler's radar reflectors were not deployed on the trawler when visibility was reduced. The officer of the watch on board the container ship was inexperienced. No lookout was posted and the speed of the containership was not reduced while in restricted visibility.

### **What can we learn?**

The composition of the watch should include experienced personnel when proceeding in difficult areas of navigation.

Collision avoidance practices should include a greater use of the radar and ARPA, in combination with the use of helm and the main engine.

Closely monitor vessel traffic in the vicinity to enable the early identification of developing collision situations.

## **15 CAPSIZE**

### **What happened?**

The 23.78 m steel hulled beam trawler caught her port trawl gear on a fastener (seabed obstruction) while fishing. During the ensuing attempts to free the gear from the fastener, the vessel listed to port rapidly and capsized. There was only one survivor of the four crewmembers on board.

### **Why did it happen?**

After the vessel became fast, the starboard trawl gear was hauled first to the surface, and the derrick was raised and the net and beam brought clear of the water. The port gear, with its derrick in the normal horizontal towing position, was hauled until the warp was tight, causing the vessel to list to port.

### **What can we learn?**

It was contrary to good practice to have left the starboard derrick topped while exerting force to free the port gear.

The vessel complied with all the required minimum stability and freeboard requirements for a vessel of her size and type. However, in common with all beam trawlers, she was still vulnerable to capsize under certain conditions.

Captains of beam trawlers fitted with the winch emergency release systems have shown a lack of understanding of its design and operation.

Some of the lessons from previous accidents have not been learned. In addition the crew of the vessel were not wearing life jackets while carrying out the hazardous operation to free the port trawl gear from a seabed obstruction.

## **16 CAPSIZE**

### **What happened?**

A trawler came fast while trawling in the vicinity of seabed pipelines. The aft net drum space immediately began to flood through the port transom door, which had been inadvertently left open from the previous voyage. A port list quickly developed, which worsened as more water poured in through the transom door. The crew abandoned into the life raft, around 15 minutes after first coming fast. Shortly afterwards, the vessel capsized, and sank by the stern. Not all of the crew members had been able to put on their lifejackets. A nearby fishing vessel had responded to the earlier "Mayday" issued by the vessel, and safely recovered the crew.

### **Why did it happen?**

The port transom door leading into the net drum space had been left open while the vessel was trawling before the wind and sea.

### **What can we learn?**

The vessel was knowingly trawling in the area of seabed pipelines. It is likely that her net snagged on large boulder clay mounds by a pipeline trench.

The vessel's freeboard was lower than when originally designed due to the fitting of additional ballast.

## **17 CAPSIZE**

### **What happened?**

The snagging occurred during the trawl while the small fishing vessel was stern to the moderate wind and rough sea. Engine power was used to try to free the vessel, but wave broke over the stern and swamped the working deck. The floodwater was trapped within the vessel's shelter and did not have time to clear through her freeing ports. Shortly after, the vessel capsized. The two survivors boarded the life raft and then rescued.

### **Why did it happen?**

The vessel had not been appropriately surveyed by an authorized agency. As a result, inadequate freeboard due to carrying too heavy fittings and equipment and the area of freeing ports were left without giving appropriate measures.

### **What can we learn?**

The skipper operating a small fishing vessel of stern trawler should recognize that:

- in view of the vessel's limited freeboard and the fact that she was stern-to the wind and waves, he should move head to sea and/or wait until slack water;
- a local inshore maritime weather forecast should be obtained instead of a TV weather broadcast;
- if an EPIRB was fitted, the time of rescue could have been shorter;
- self-inflating lifejackets should be worn all time when working on the open deck;
- the benefit of carrying a life raft rigged with a Hydrostatic Release Unit.

## **18 CAPSIZE**

### **What happened?**

While attempting to retrieve the trawl net which contained a heavy weight in the cod end, the small trawler capsized and sank. As the vessel capsized, the crew members launched the life raft, without having time to transmit a distress or don life jackets. Fortunately, the vessel's EPIRB floated free and started to transmit. The crew was rescued by a passing container ship.

### **Why did it happen?**

A heavy weight in the net which the vessel was hauling over the top of a high gantry created a capsizing lever on her and the vessel carried a lot of top weight which was instrumental in jeopardizing her stability.

### **What can we learn?**

- It must be recognized that there is only a certain amount of top weight that can be added to a vessel before she becomes unstable.

- If appropriate daily working life jackets were not worn but were stowed in accommodation, the crew's chances of survival would be limited.
- The life raft and EPIRB carried by the vessel undoubtedly saves the crew's lives.

## **19 CAPSIZE**

### **What happened?**

When the vessel, which had been converted from a dive boat to a dragger including the installation of an A-frame and a cable winch, was under way, one of the drags was deployed over the stern and the cable run out on the winch. The fishing gear became caught on the seabed, the vessel capsized and sunk. No distress call was transmitted. Several days later, the one deceased crew member and two guests were discovered. The operator is still missing.

### **Why did it happen?**

The transverse stability of the small vessel, which is not required to be assessed, was adversely affected due to the added weight from modification and the inherent low free board permitted water to be shipped and retained on deck.

### **What can we learn?**

- Although there is no requirement to equip an EPIRB on the small vessel, the captain should recognize the benefit to equip it in order to increase the chances of survival when the vessel do not have enough time to send a distress message.
- Although there is no requirement to equip a life raft equipped with deep chock or a hydrostatic release unit, the captain should recognize the benefit to equip it in order to increase the chances of survival when there is little time for the crew to manually deploy a life raft.

## **20 HOT OIL SPRAY FROM FILTER COVER JOINT**

### **What happened?**

Hot heavy fuel oil leaked from a cover joint on a filter provided for emergency diesel oil. The escaping oil impinged on a running auxiliary engine, its turbocharger and exhaust line. The fixed CO<sub>2</sub> system had to be used to extinguish the fire.

### **Why did it happen?**

The low pressure emergency diesel supply line was not designed to be exposed to high pressure, high temperature fuel oil. Valves intended to isolate the emergency diesel system from the hot heavy oil system were intended to be non-return valves. However, the valves fitted were not non-return valves, one of them was left open and subsequently exposed the diesel filter to the hot oil. A valve fitted upstream of the emergency diesel oil filter was closed at the time of the incident. This fortunately protected the remainder of the emergency diesel system from exposure to the high pressure heavy fuel oil.

Insulation and/or spray deflectors fitted to hot surfaces were not sufficient to prevent the hot fuel spray to ignite.

## **What can we learn?**

- Clear Work Instructions, in the form of simple schematic diagrams, should be provided which clearly indicate how manually operated valves should be set during normal and emergency operation. These should refer to identifying labels or markings on the valves.
- Care should be taken that all heat shields, insulation and spray deflectors work as expected.
- During operation, when connecting piping systems with different operating pressures, it should basically be ensured by appropriate valve positions that no closed pipe section results in which the pressure can rise uncontrollably above the structurally designed operating pressure due to an operating fault or leaking valve seat and the valve positions for pipe sections to be kept open should be secured and labelled so that changes can be clearly recognized.

## **21 DIESEL FUEL SPRAYS ONTO UNPROTECTED EXHAUST AND IGNITES**

### **What happened?**

The fire occurred as a result of fuel oil escaping from a faulty pressure gauge pipe and spraying onto an unprotected engine exhaust. Approximately 10 minutes after the fire started, it had become so intense that a decision was made to flood the engine room with CO<sub>2</sub> from the fixed fire smothering system.

### **Why did it happen?**

The fuel oil pressure gauge pipe, attached to the compression fitting on one bank of one engine was made of copper and had fractured (all gauge connections originally provided by the engine manufacturer were of steel but the copper pipe which fractured had been fitted as a replacement);

- the high-pressure fuel pipes were jacketed, whereas the low-pressure fuel rail was not;
- the thermal heat shields, which should have been arranged on top of the exhaust manifold of the main engine, were missing;
- the exhaust pipes were inadequately lagged.

The compression fitting that connected the failed gauge tubing to the fuel rail had developed a leak two days before the occurrence and was repaired by tightening the compression nut a little further.

A ring around the outer diameter of the tube suggested that it had been partially cut, perhaps during the installation or tightening process.

Engine-generated vibrations caused the copper tube to work-harden and extend the partial cut in the now brittle tube wall in way of the compression ferrule, which was already biting into the outer surface of the tube and producing an area of high stress. This cut allowed some fuel to leak, and the engine room staff, under the mistaken impression that the leakage of fuel was from a loose connection, tightened the compression nut further, driving the ferrule deeper into the wall of the tube.

### **What can we learn?**

When repairing critical piping systems care should be taken to use appropriate and approved material and/or components.

When insulation material or spray shields are removed for maintenance, care should be taken to replace them correctly before re-entering service.

## **22 MATERIAL BURNS AS A RESULT OF WELDING SPARKS**

### **What happened?**

A fitter was making a weld repair to a save-all which was an integral part of the deck head of the engine room workshop located immediately below. Sparks from the welding set alight electrical cabling stored in the workshop. This produced so much dense black smoke that it was impossible to approach the fire to extinguish it with portable extinguishers. The fire was subsequently extinguished using the fixed CO<sub>2</sub> system. After the main generators were shut down, prior to CO<sub>2</sub> release, it was not possible to start the vessels emergency fire pump to assist in fighting the fire because the emergency fire pump space had also filled with smoke. This was because it was located in a space directly below, and accessed from, the steering gear room and the watertight door in the steering gear room/engine room bulkhead was left open.

### **Why did it happen?**

It appears that molten metal from the welding process fell into the workshop, landing on coiled electrical cables, causing them to ignite.

Although a hot work permit had been issued and an oiler had been designated to keep a fire watch in the workshop, he was temporarily absent – attending to a problem with a ballast pump. He did not inform the fitter carrying out the welding repair that he had left the workshop.

### **What can we learn?**

Instructions contained in work permits should be clear, and unambiguous. Hot-work permits should ensure that all adjacent spaces are monitored during hot work.

When personnel are assigned for fire-watching duties, their responsibilities while undertaking such duties should be clearly defined. The oiler was simply told to standby in the workshop and look out for fire. He was not told that he must remain in the workshop until the hot-work was completed.

Even with a firewatch in place, it is prudent to require all combustible materials to be removed from the immediate vicinity of any repair requiring hot work.

Isolating doors between engine rooms and any space containing an emergency fire pump or its source of power should be kept closed at all times.

Ships' crews should close all means of ventilation before releasing CO<sub>2</sub>.

In connection with the steering gear door left open, when engine room personnel were re-activating machinery, a pocket of CO<sub>2</sub> was discovered in the low-lying emergency fire pump space several hours after the fire was extinguished. This was immediately reported to the chief

engineer and the area was cordoned off and ventilated using a portable fan. This emphasizes the importance of carrying out oxygen checks on all spaces which may have been exposed to CO<sub>2</sub> before any entry of unprotected personnel is permitted.

## **23 BULK CHEMICAL CARGOES – EXPLOSION DURING TANK CLEANING**

### **What happened?**

While in the process of tank cleaning, using the vessel's fixed rotary cleaning equipment, a low pressure explosion occurred in tank 1CS which had previously carried paraffinic solvent. This was followed by another explosion in the adjacent tank 1CP which was fully loaded with ethanol. The deck was fractured in several places and the escaping ethanol caught fire, the fire spreading all the way aft to the deck house. The crew extinguished the fire by using the vessel's foam monitors, and managed to bring the vessel to a nearby roadstead. One able seaman and the Bos'n were badly burned and subsequently died. Had the tanks been correctly inerted the explosion could not have occurred.

### **Why did it happen?**

Rotary tank-washing machines were being used with fresh water and detergent to wash tanks which had contained paraffinic solvent which was subsequently found to have a flash point of minus 40°C. The wash water was being recirculated, contrary to the advice given in the ICS Tanker Safety Guide (Chemicals) and ISGOTT. Although it is not certain, it is highly possible that static electricity was generated by this process.

Although the vessel was fitted with oil burning inert gas generator the cargo tanks were not inerted at the time of the casualty. At the maritime inquiry, the chief mate stated that the inert gas system on board (which was based on oil combustion) was unacceptable to the charterers because of too low purity. However no explanation was given as to why nitrogen was not used for inerting or why, in the absence of an inerting medium the cargo was not rejected.

### **What can we learn?**

It is important that the master is provided with data sheets which include all necessary – and correct - information for the safe handling, storage and treatment of the cargo to be carried.

Proven cleaning procedures should be strictly adhered to; uninformed deviations may lead to unforeseen and tragic consequences (ref. ICS Tanker Safety Guide (Chemicals) and ISGOTT).

The cleaning of tanks should be treated by the ship's safety management and quality assurance system as a critical work operation. Where necessary instructions should provide for the use of inert gas; where such information is provided, allowance should be made for gas generating equipment permanently fitted on board or alternatively, the provision of appropriate and sufficient bottled gas.

When masters are presented with cargoes which require specific conditions of carriage which are not available – e.g., inerting with gas of a specified purity – such cargoes should be refused

Although not considered by the investigators as directly contributing to the cause of this incident, rest periods required by the STCW code should be met (or exceeded).

## **24 PORTABLE BULKHEAD COLLAPSE**

### **What happened?**

Two crew members were in the process of raising a portable bulkhead off its supports, using two separate, portable, hand powered jacks. One jack was operated by each crew member. At one point in time, the bulkhead began to topple, rotating about its lower securing pins and its top edge moving aft. The bulkhead continued to fall aft, generally rotating about the lower securing pins until they became disengaged and the bulkhead fell to the tanktop inside the hold. One of the crew members was fatally crushed between the fallen bulkhead and the tanktop.

### **Why did it happen?**

The crew members were not using the correct lifting equipment as specified by the manufacturer of the portable bulkhead.

Since the lifting of the bulkhead was being done using two hydraulic jacks, it is possible that the lifting was asymmetrical, resulting in the upper securing pins retracting completely from the hold side.

It was a practice on board to operate the portable bulkhead without any reference to the manufacturer's operating and maintenance instructions. These were not found on board nor referenced in the vessel's ISM manuals.

The safety risk involved in the lowering and lifting of the portable bulkhead was not appreciated by crew members and shore personnel alike.

Crew members operated the portable bulkhead without receiving adequate training and no supervision.

### **What can we learn?**

It is important for crew members to ensure that they receive the necessary training before operating any type of equipment fitted on board. Safety committee members on board should also ensure that together with shore based personnel, they conduct risk assessments prior to operating equipment on board. Lack of training should of course be taken into consideration during the risk assessment.

## **25 WATERTIGHT DOOR FATALITY**

### **What happened?**

Two cases have been reported where crew members have been found caught in a watertight door (WT) by co-workers. In one case the seaman was killed while in the other case the seaman suffered severe injuries. In both cases the accidents happened during maintenance work in the engine rooms.

### **Why did it happen?**

- The WT doors were not operated in accordance with manufacturer specifications for minimum closing time. Time from fully opened to fully closed was 7 seconds in one of the accidents, while it was 10 to 13 seconds in the other. The required time is minimum 20 seconds.

- It has been noted from the industry that in some cases crew members do not fully open the WT doors before attempting to pass through the opening.
- In one of the cases the location of the local operating levers for the “accident” door was not optimal. The distance from the edge of the door to one of the levers was 51 cm which required the operator to have a reach of 64 cm to operate the door.

### **What can we learn?**

Personnel should be fully trained in the operation of WT doors. Shortcuts like entering through the door without opening it completely should be avoided. Refresher training in operation of WT doors should be evaluated and implemented.

Checking and adjustment of watertight doors opening and closing time should be included in the ship maintenance program.

Operation levers should be mounted to ensure an optimal operation for the crew. It should be possible to reach both levers when passing through the doors. To avoid mal operations, levers should be standardized as much as possible in accordance with ergonomic principles.

## **26 CRANE ACCIDENT – FATALITY**

### **What happened?**

A ship was loading a cargo of steel products using the ship’s cranes. While lifting some coils of steel, the topping lift wire on one of the ship’s crane failed, the crane’s jib then fell and struck the cargo hook block. The bolts securing the crane’s turret to its pedestal then failed and the crane toppled trapping and fatally injuring the crane operator who was in the cabin.

### **Why did it happen?**

- The topping lift wire was in a poor condition and had not been replaced or adequately maintained since the vessel started service.
- Many of the bolts securing the crane’s turret to the pedestal were found to be broken, missing or incorrectly tensioned.
- The vessel did not have the equipment recommended by the manufacturer to correctly tension the crane’s pedestal bolts.

### **What can we learn?**

Crane wires should be carefully maintained in accordance with the manufacturer’s recommendations. Topping lift wires should be subject to the same maintenance as the crane’s cargo runner wires. Manufacturer’s recommendations should be followed with respect to the maintenance of crane pedestal bolts and each ship should have the equipment necessary to perform this maintenance.

## **27 FALL FROM HEIGHT**

### **What happened?**

During work on deck, a crew member fell from a height of approximately 7 m from the hatch cover onto the pier. The seaman had been in a lashing passage on hatch 2. Here the hatch cover extends up to the outer side of the vessel.

### **Why did it happen?**

There were no structural measures to prevent falling overboard at this place. The seaman was not wearing any personal fall protection equipment.

### **What can we learn?**

All ship operators, the crews and the safety officers should observe the safety at work requirements against falling resulting from the Accident Prevention Regulations and check observance of these on board their vessels. Above all, permanent safeguards should be fitted at dangerous points. Mobile safeguards or protective equipment against falling are always the poorer means.

It is recommended that the ship operators of similar type ships should consider equipping their vessels with permanently installed ladders at both sides of the lashing passages where needed. This would prevent dangerous climbing onto and descending from the hatch and incorrect use of mobile ladders for leaning.

The ship operators, crews and safety officers should pay greater attention to the technical condition of the mobile ladders on board during their checks. Missing parts should be replaced expertly; heavily corroded ladders should be removed.

## **28 FALL FROM HEIGHT**

### **What happened?**

The seaman started work on a catwalk outside the port bridge wing. After a while he fell approximately 24 metres onto the wharf below. He died as a result of the injuries sustained from the fall. He was an experienced seaman who had been inducted in the ship's safety management system and had done this task many times.

### **Why did it happen?**

The harness was not properly attached to the grab rail when the seaman probably lost his footing and fell. The contributing factors to the incident include an inadequate safety harness, the design of the catwalk, an inadequate workplace risk assessment and procedures.

### **What can we learn?**

Shipowners, operators and masters should ensure that safety harnesses and lanyards used by personnel when working aloft are appropriate for the purpose considering all aspects of the tasks to be performed.

Shipowners, operators and masters should ensure that the procedures, permits and risk assessments for personnel working aloft identify all of the hazards and stipulate measures to mitigate all of the risks.

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