LESSONS LEARNED FROM MARINE CASUALTIES
(III 8/19, annex 1)

1 FATAL ACCIDENT

Very serious marine casualty: Enclosed space accident with three fatalities

What happened?

During the passage of a general cargo ship laden with a cargo of wood chips, the bosun sent an able seaman to a forward store to pick up some soap powder to be used to clean the deck. When the able seamen had not returned about 20 minutes later, the bosun and cadet then went to investigate, but also failed to reappear.

Around half an hour later, the chief officer went on deck to check up on the crew members undertaking the cleaning but could not find anybody and decided to also investigate. Arriving at the entrance of the forward store, he looked down the stairway below deck and saw all three fellow crew members lying, unconscious, at the bottom of the stairs. The chief officer raised the alarm and the three crew members were recovered by their colleagues wearing BA sets and first aid was administered.

The crew members were then transferred ashore by rescue helicopter, but despite further medical efforts, were tragically declared deceased. The atmosphere in the store was subsequently found to be oxygen-deficient and the cause of death for all three crew members was hypoxemia (low levels of oxygen in their blood stream).

Why did it happen?

.1 Wood chip cargoes can be subject to oxidation, leading to a depletion of oxygen and an increase in carbon dioxide in the cargo space, which can also pervade into adjacent spaces.

.2 The cargo in the hold was being naturally ventilated, which meant that the atmosphere in the hold would have been transmitted into a fan room situated above the store. A gas tight door between the fan room and the mast house had been left open, which would have allowed the deficient atmosphere to pass into the mast house and then down to the store below, as carbon dioxide is heavier than air.

.3 Another possible route for the deficient atmosphere to pass from the cargo hold into the store was via a non-gas-tight access hatch and door into another store space adjacent to the store where the accident occurred.

.4 The able seamen had not checked the atmosphere and would have been overcome by the deficient atmosphere shortly after entering the store. It appears that in attempting to rescue the able seaman, the bosun and cadet, who also did not check the atmosphere and were not wearing BA sets, also succumbed.

.5 No attention was paid to the dangers that the cargo posed.

.6 The cargo declaration and safety sheet provided by the shipper upon loading highlighted that the risk was not disseminated to the crew members.

.7 The chief officer did not check the IMSBC Code in order to identify the potential risks; no risk assessment was conducted.

.8 Spaces in the vicinity of the cargo hold were entered with no awareness of the possible risk of the atmosphere being deficient.

.9 Set procedures were not followed by the crew members for entering an enclosed space.

What can we learn?

.1 The risks associated with cargoes subject to oxidation need to be carefully considered when loading and carrying them. As indicated in the International Maritime Solid Bulk Cargoes Code (IMSBC Code), regarding woodchips, this cargo may be subject to oxidation leading to depletion of oxygen and increase of carbon dioxide. This can not only affect the cargo space but also adjacent and connecting spaces.

.2 The risks of the potentially hazardous cargo hold atmosphere pervading into adjoining and connecting spaces need to be properly assessed and mitigated.

.3 The ventilation arrangement for the cargo hold was complicated and the network of connecting storerooms to spaces in the vicinity of its fan room and the hold itself meant that a series of connecting spaces could be affected by the atmosphere. When carrying hazardous cargoes, it is vital that the crew understand the implications of ventilating the cargo and the impact that this may have on adjoining and connecting spaces, which may not be directly adjacent to the cargo hold. Any such spaces need to be properly closed and made gas-tight.

.4 To create awareness, prepare and conduct a risk assessment; disseminate the shipper's declaration and cargo information sheet appropriately; and raise awareness amongst crew members of any hazards associated with the cargo.

.5 Senior officers concerned with cargo and safety should collect all available information of the cargo and given risks in order to take all necessary action.

.6 Risk assessments are to be done as per Safety Management System requirements. All necessary enclosed spaces procedures need to be followed and appropriate precautions taken before attempting to enter any potentially enclosed space. This includes undertaking adequate checks of the atmosphere before and during entry using calibrated gas detection equipment as well as appropriate PPE at all times.

.7 Although it can be instinctive to rush to the aid of a stricken colleague, this accident highlights the importance of having an emergency response plan and taking adequate precautions before entering an enclosed space to assist someone. Conducting regular enclosed space drills is an essential part of preparing for such scenarios.

Who may benefit?

Ship operators, masters and navigational officers and crew.

2 SUBMARINE OIL PIPELINE RUPTURE

Very serious marine casualty: Fire, fatalities and pollution

What happened?

The main engine of a laden bulk carrier failed to start in the afternoon, which delayed her departure schedule. The engine crew members therefore worked for more than seven hours to solve it. She departed the berth in the evening to anchor outside the port. En route, the pilot showed the master the intended anchoring position on the chart. Whilst approaching the anchoring position, the master asked the pilot if the port anchor could be lowered 1 metre above water in preparation for anchoring, and the pilot agreed. The ship was transiting a charted-restricted area with submarine oil pipelines in depths of about 18 metres.

The master ordered the chief mate in their native language (which the pilot did not understand) to lower one shackle (28 metres) in the water. One shackle of anchor cable was then lowered into the water. The cable soon became tight, and the master ordered it heaved in. The pilot asked what was happening and the master advised him of the situation. The pilot asked for the anchor to be heaved up quickly as there were oil pipelines in the area.

The main engine was used to stop the ship and half a shackle of cable was heaved in. The pilot reported the lowering of the anchor to the pilot station as the ship moved past the area. The ship anchored near the southern end of the restricted area and the pilot left the ship.

Whilst leaving the bulk carrier, there was no oil odour reported by the pilot and no one was sure of what happened. This situation was not reported to either the local Harbour Master or the oil refinery company for further inspection.

During the night, oil refinery operators detected oil in the water, but they could not define the source of it. At the time, the crude oil was still pumped through the ruptured subsea pipe.

In the morning, locals ashore also reported the presence of oil. About midmorning, a fire on the water started forward of the ship and engulfed it. The cause of the fire could not be established. Fire-fighting ships were deployed and about an hour later the fire stopped. The ship was significantly damaged by fire and a crew member was injured. Five persons in two boats nearby lost their lives due to the fire. Following the blaze, the oil company closed the oil transfer via subsea pipes.

Several days later, the source from the oil was found from one subsea pipe which was cut into two pieces and dragged far from its original location. The surrounding oil companies with local people, harbour master officers, military and police officers working together contained the oil by using manual and automatic methods. However, due to the large amounts of it, some of the oil flowed from the bay to the strait. In this accident, thousands of tonnes of crude oil affected more than 10,000 hectares of marine ecosystem in the bay.

Why did it happen?

.1 The master pilot exchange of essential information was inadequate and was only known by the master and pilot. The given information about the intended anchor position did not include information of subsea pipelines.

.2 A single common working language was not used during the pilotage. This led the pilot to be incapable of revising the master's order to lower the anchor to the seabed and finally fouling and rupturing the pipeline.

.3 The absence of a reporting system for an unusual situation to the local authorities disabled the efforts of minimizing damage to the environment.

.4 The master's workload before the pilotage may have influenced his performance. Some studies suggest that the fatigue and language switch (between native and international language) are linked to the unnoticed error.

.5 Without a leak detection system on the ruptured pipe and occurrence notification, the oil refinery company did not know about the situation and continuously pumped the crude oil. Consequently, a strong oil odour was spread in the city several hours prior to the fire.

.6 The existing procedure of piloting did not cover the reporting of unusual situations or near misses. Therefore, the source of oil spill in the bay could not be located immediately.

What can we learn?

.1 The master and pilot exchanging essential information is vital for effective bridge resource management (BRM).

.2 Using a single, common working language is central to clear, unambiguous communication to support effective BRM.

.3 An anchor must never be lowered in areas where there are submarine pipelines and precautions to prevent its lowering must be in place.

.4 If an anchor is accidentally lowered to the seabed where pipelines exist, authorities must be notified, and the cable released to avoid fouling/rupturing a pipeline.

.5 Adequate measures to manage an emergency response to a pipeline rupture must be in place.

Who may benefit?

Seafarers, shipowners and operators, pilots, pilotage services, oil companies and harbour masters.

3 FALL WHILE LOADING

Very serious marine casualty: Stevedore fatality

What happened?

While conducting cargo loading activities on board a 135 m, 14,000 GT refrigerated cargo/container ship, a stevedore fell about 6 m between decks in the refrigerated cargo hold. The stevedore was fatally injured in the fall.

Why did it happen?

The stevedore was last seen rigging a portable ladder for access between cargo hold decks. He was alone at the time of the fall and the investigation concluded that he lost his balance while rigging the ladder and fell.

What can we learn?

.1 All shipboard activities should be considered from a risk management perspective.

.2 Work at height, including that by contractors or shore labour, should not be conducted alone and without proper assessment of the risks and use of appropriate equipment.

.3 Stevedoring activities on board ship should include formal supervision to monitor tasks and manage risks.

Who may benefit?

Stevedores, seafarers, management.

4 OCCUPATIONAL ACCIDENT

Very serious marine casualty: Crew member squeezed with fatal consequences

What happened?

While assisting on the removal of the pontoon hatch covers on the 5,000 GT containership, a crew member on the hatch coaming signalled that he wanted to hitch a ride on the gantry crane, moving forward. As the crane moved, the crew member was caught between the gantry crane post and the pile of pontoon hatch covers, severely injuring him. The crew member was seen from the quay sitting before he fall from the hatch coming down to the main deck passage 2.7 m below. He was deceased as a result of his injuries.

Why did it happen?

.1 The crew member intended to take a short cut as he moved on the hatch coaming by riding on the gantry crane through a passage that was too narrow, despite the company procedures not allowing such behaviour.

.2 From his position, the crane operator did not see the crew member, as he rode on the crane.

What can we learn?

.1 Managing occupational risk assessment and safety awareness as well as complying safety instructions should always continue.

.2 Proper orientation on the company's SMS procedures and effective pre-work safety meeting should be undertaken by newly–joined cadets and crew members.

.3 Working and walking at hatch coaming while discharging/loading of container cargoes should be prevented.

Who may benefit?

Shipping companies, crew members.

5 FIRE/EXPLOSION

Very serious marine casualty: Fire in cargo hold, resulting in four deceased and one missing

What happened?

A fire started in the cargo hold of the 150,000 GT container ship. The crew failed in fighting the fire and evacuated the ship. However, one crew member was missing and four were dead.

As most of the evidence was destroyed by fire, the cause of the fire has not conclusively been determined. However, there was evidence that the integrity of Sodium Dichloroisocyanurate Dihydrate (SDID) in no. 3 cargo hold had been compromised.

Why did it happen?

.1 The hazards of dangerous goods with oxidizing properties (and those with secondary hazard of chemical decomposition) like SDID, were not captured in the IMDG Code, which allowed an inappropriate placing of the containers.

.2 The containers with this cargo were situated below deck with CO2-arrangements, which was ineffective to fight the fire.

What can we learn?

.1 Secondary hazards may not be captured in the IMDG Code.

.2 Fire-fighting response for an oxidiser requires the use of abundant water, which may not be achieved promptly.

.3 Stowed under-deck, if the main fixed fire-fighting means are CO2, may be ineffective to tackle fires associated with certain materials.

.4 Decision-making to allocate resources for the abandoning of ship while attempting to fight the fire should not be delayed.

Who may benefit?

Seafarers, shipowners, ship operators.

6 LOSS OF LIFE

Very serious marine casualty: Loss of life

What happened?

The tugboat's messenger line snapped and hit both the Chief Mate, who died; and the Boatswain, who suffered injuries.

Following the Chief Mate's order to fasten the tug's line, an AB threw a heaving line to the tug. The Boatswain put the heaving line on the drum in order to heave up the heaving line, the messenger line and tug's line and fasten the latter to the bollards.

He confirmed that the Chief Mate instructed him to pass the heaving line directly to the capstan and to the winch's drum. He stated that the Chief Mate could not have seen the rope since the forecastle ventilator cap obstructed the view. AB confirmed that the end of the rope passed the centre fairlead, i.e. it was inside the forecastle ca 60-70 cm.

He clearly saw that the tug rope was too thick with protection around the end and the splicing part and that it could not pass through the centre fairlead. Later the messenger line parted two meters from the connection point with the tug's rope.

Why did it happen?

.1 The lack of sound judgement or underestimation of the situation.

.2 The Chief Mate's view, in commanding the mooring winch, was completely obstructed by the forecastle ventilator cap hiding the fairlead and the rope passing through it.

.3 The fastening of the tugboat was not in accordance with common practice. The other bollard should have been used for the proper fastening method, i.e. fixing the tug's rope of bollard using rope's stopper.

.4 The overall diameter of the spliced end surpassed the inner height of the centre fairlead.

What can we learn?

Diameters of fairleads and maximum thickness of ropes to be used need to be part of the risk assessments in relation with tug fastening and the berthing processes.

Who may benefit?

Seafarers, shipowners.

7 FIRE/EXPLOSION AND LOSS OF LIVES

Very serious marine casualty: Fire on passenger cargo ship

What happened?

On a 1,000 GT passenger cargo ship in transit the oiler noticed a sudden increase of cooling water temperature and decrease of lube oil pressure on one of the main engines. Shortly after smoke emitted at the sides of the crank case, followed by a sudden burst of flames. The oiler was unable to put out the fire and had to leave the area. Meanwhile, the engine cadet had notified the rest of the crew. The fire was followed by an explosion.

The master prepared for abandoning the ship as new attempts to fight the fire was executed without success, and CO2 was released. The fire was decreased, but after 20 minutes it burst out again.

Coast Guard ships and other nearby ships rendered assistance and began to rescue the 200 passengers.

Why did it happen?

.1 A lube oil pump failed, and subsequently the temperature raised.

.2 The lube oil pump during the last drydocking was replaced by a reconditioned pump.

What can we learn?

.1 An independent fire pump located away from the engine room would make it easier during emergencies.

.2 Routine checks of fuel, lubricating system and hydraulic oil pipes, their fittings, connections and securing arrangements, preferably at the same frequency as crankcase inspections of the main and auxiliary engines; may have discovered the failing standard of the lube oil pump.

.3 Care should be taken not to over tighten fittings during these checks.

.4 Remote closing arrangements on all inlet and exhaust blowers and heat dampers on passenger cargo ships would have made it easier to fight the fire.

.5 Procedures for operating the fixed CO2 system for the officers and crew would make the operation faster and safer.

Who may benefit?

Seafarers, shipowners, passengers.

8 OCCUPATIONAL ACCIDENT RESULTING IN LOSS OF LIFE

Very serious marine casualty: Twist lock falling on head, causing fatality

What happened?

A damaged twist lock fell from container on to a stevedore who was working in the vicinity. The stevedore sustained severe injuries and was deceased during surgical operation.

Why did it happen?

.1 The twist lock was damaged.

.2 Safety gears were not worn by the stevedore.

What can we learn?

.1 Lashing gears maintenance is important if reduction of accidents is going to be successful.

.2 Proper Personal Protecting Equipment are to be used while working.

Who may benefit?

Seafarers, shipowners.

9 CONTACT WITH BOTTOM

Very serious marine casualty: Constructive total loss

What happened?

A bulk carrier with loaded drafts of 21 m contacted the bottom laden with about 300,000 MT of iron ore after a decision to deviate from the buoyed channel while proceeding to sea from the load port. Based on charts of the area, the sea floor was mud and sand. As contact with the bottom appeared, flooding of multiple voids and a WBT was reported almost immediately. It was determined that the fixed and portable pumps could not keep up with the flooding, so the ship was moved into shallower water, where it was intentionally grounded.

The ship was re-floated after about half of the cargo had been lightered. It was then re-anchored in deeper water. The damage survey identified extensive damage of the starboard side main deck, side shell and bottom shell along the entire length of the cargo length. The ship was declared a total constructive loss and scuttled with the remaining cargo on board after all hazardous materials had been removed.

Why did it happen?

.1 The ship deviated from the buoyed channel and then passed within 1 NM of a 20 m shoal.

.2 The decision to deviate from the buoyed channel or how to pass the shoals that were indicated on the available nautical charts was not questioned.

.3 Ineffective Bridge Resource Management (BRM) during the ship's outbound transit.

.4 The ship's manager's navigation watch standing procedures did not provide clear expectations and guidance regarding the use of BRM by members of the ship's bridge team when the Master had the conn.

.5 The charted depths in the vicinity of the shoal did not provide a clear indication of the full range of depths within the 20-30 m contour. There was also a difference between how the shoal was depicted on available nautical charts.

.6 The calculated tides were not updated when the ship's departure from the terminal was delayed by about 45 minutes. In addition, the calculated tides did not consider corrections for both the time and height of the tide that were published in the coastal State's coast pilot and the terminal's guidance.

.7 The available nautical charts did not indicate that a portion of the buoyed channel is dredged or details regarding its minimum dredged depth.

What can we learn?

.1 The importance of remaining in buoyed channels and to avoid passing close to charted hazards to navigation based on minimal charted depths.

.2 The importance of effective BRM, even when the ship's Master has the conn.

.3 The importance of updating calculated tides when there is a change to the ship's arrival or departure time. In addition, calculated tides should consider the corrections included in the coastal State's nautical publications and port guides.

.4 Masters and navigation watch officers should be aware of any differences between how the available nautical charts for an area might depict shoals and other potential hazards to navigation.

.5 The importance of including dredged channels on nautical charts.

Who may benefit?

Ship managers, ship masters, navigation watch officers, and hydrographic organizations.

10 FIRE/EXPLOSION

Very serious marine casualty: Loss of life

What happened?

A tanker berthed to a petrochemical plant to load Propane/Propylene gas. Following the completion of the necessary procedures, loading operations initiated late in the evening with the gas phase, proceeding to the liquid phase.

Approximately 6 minutes after proceeding to the liquid phase, gas leakage started from the loading manifold and within the following seconds a massive explosion occurred, and fire broke out. With the effect of explosion and fire, the crew abandoned the tanker by jumping into the water. The fire was extinguished in 30 minutes with the fire-fighting operations and the cooling continued for a day.

With the search and rescue operations, the crew was evacuated from sea. However, one crew member lost his life due to drowning.

Why did it happen?

As a result of the accident investigation, it was concluded that the fire broke out by the burst of the loading/unloading hose that enables the connection between the ship/terminal since the increasing pressure in the cargo lines remained above the agreed pressure for 6 minutes after proceeding to the liquid loading phase. Possibly one of the valves on the ship cargo circuits that was closed/ had been closed caused the pressure on the lines to increase.

What can we learn?

.1 Importance of active participation to abandonment drills.

.2 Importance of efficient continuous tank level monitoring according to relevant procedures.

.3 Necessity of integrate an early alerting mechanism for rapid pressure changes.

Who may benefit?

Seafarers, terminal operators, shipowners, ship operators.

11 CAPSIZING

Very serious casualty: Loss of large amount of livestock

What happened?

A 3,800 gross live-stock carrier completed loading animals and feed in the morning and the pilot was on board shortly after. Manoeuvre commenced with two tugs. While pulled by tugs, fore & aft, the ship did not move away from the berth and developed a heeling of about 5 degrees to the port side. The pilot used the main engine, running at half ahead and, combined with the side pull/trust rendered by tugboats, managed to move the ship away from the berth. The master and the pilot continued the manoeuvre outbound. The ship seemed to come to an upright position after the pulling action stopped. Very soon after casting off, the ship ordered turn to port, under the effect of fore/aft tug and rudder, reaching new course. Immediately after let go, the aft tug ship commenced to list to starboard, similar to the port side one, by about 3-5 degrees.

The list to starboard did not diminish but furthermore, under the effect of fore tug and rudder port hard over command, the ship continued to quickly heel to starboard. The heeling process continued reaching about 40-45 degrees. The master and pilot became aware that something was wrong with the ship's stability, and they tried to stop the ship, stayed clear of the fairway channel and decided to return to any safe berth. Even once stopped, the list continued and soon reached about 50-60 degrees to starboard, showing the signs of total loss of stability. The master called for Ship Abandonment. All crew were rescued. One crew member fell into water but was immediately recovered and transported by ambulance to the hospital where his condition was checked okay and released same day. However, the livestock of 14,600 heads were lost.

Why did it happen?

The ship completed loading livestock and then the truck with animal feed and hay arrived alongside. Crew attempted to load animal feed received in 1 m big bags, but as found out during the witnesses hearing, the installation used to load such feed into silo tanks was broken at that time and the bags were loaded on top of Sun Deck (upmost deck) and on the deck ahead of the bridge. It is assumed, as per statements, that between 100 to 120 metric tons have been loaded in these positions.

The ship was loaded with aft section aground and this contact was not investigated before the ship left the berth. The ship capsized because of poor distribution/loading of cargo on livestock decks and weights (big bags of animal feed) on the uppermost decks, with no assessment of the initial stability before commencing the voyage. Leaving the berth in an unstable equilibrium, due to heel produced by tug action, centrifugal forces developed at turns at various rudder angles, up to hard over, and created a heeling moment which shifted the livestock and weights on board (the free surface effects of partly filled compartments was also accountable for); combined with negative up righting stability momentum, occurred as a consequence of unstable equilibrium, which lead to a total loss of stability and capsizing.

What can we learn?

.1 Initial stability calculations should be done before leaving port.

.2 Such stability calculation to be reviewed and eventually amended/approved by a qualified and competent harbour master authority and managers.

.3 In the event that a pilot has any concerns about the ability of a ship to safely depart a berth, these should be immediately reported to port and PSC authorities for appropriate action.

Who may benefit?

Seafarers, terminal operators, shipowners, ship operators, pilots.

12 CONTACT WITH FISHING GEAR AND CAPSIZING

Very serious marine casualty: Contact with fishing gear and foundering leading to loss of lives

What happened?

A 19-metre fishing vessel engaged in trawling capsized (foundered) when a laden very large crude carrier (VLCC) passed about 140 metres astern while manoeuvring to avoid collision with multiple fishing vessels. The towline of the fishing vessel may have been hit and the fishing vessel's stern immediately pulled under water. There were between 20-30 fishing vessels engaged in trawling in the area. The fishing vessels were generally proceeding to the southwest at a speed of 2-3 knots. The VLCC was proceeding to the west, northwest at about 7 knots.

Two of the three crew members who were on board the fishing vessel went missing and presumed dead.

The incident occurred about one hour after sunset in coastal waters seaward of the port approach channel. The weather was good with Beaufort Force 4 winds and seas less than 1 m. The VLCC's bridge team included the Master, the Officer on Watch (OOW), an additional Officer in charge of a navigational watch (OICNW), helmsman, and lookout. The bridge team was using all available means to assess the risk of collision, including the ship's Automatic Radar Plotting Aid (ARPA) and the Automatic Identification Systems (AIS) information displayed on both the Electronic Chart Display and Information System (ECDIS) and radar.

The operator of the fishing vessel was alone in the wheelhouse. He stated he was looking forward and was not using the vessel's AIS to monitor vessel traffic in the area. The two crew members were working on the aft deck and did not report seeing the VLCC until it was directly astern. The fishing vessel was displaying the lights for a power-driven vessel when underway. It was not displaying the lights for a vessel engaged in trawling. A white spotlight was pointed aft in the direction to the trawl.

Why did it happen?

.1 The large number of fishing vessels engaged in trawling while crossing almost perpendicular to the ship's course as it approached the anchorage at the entrance of the port approach channel created an increased risk of collision.

.2 The fishing vessel did not maintain an effective lookout as required by the COLREG nor did it display the lights required for a power-driven vessel engaged in trawling.

.3 The bridge team on board the VLCC may not have recognized the potential risk of passing astern of the fishing vessel.

What can we learn?

.1 Dangers of one person on watch only.

.2 The importance of compliance with the COLREG by all vessels.

.3 The importance of using all available means to assess the risk of collision.

.4 The need for ships' masters and navigation watch officers to recognize the potential risks associated with passing close astern of a fishing vessel engaged in trawling.

Who may benefit?

Ship managers, ships masters and navigation watch officers, fishing industry.

13 OCCUPATIONAL ACCIDENT

Very serious casualty: Fall overboard

What happened?

While unlashing the outboard container at unprotected openings near ship side, a crew member fell overboard into the sea while he could not balance himself after removing the long and heavy lashing rod. Search efforts spanned over nearly nine hours by ships and a helicopter in the vicinity, to no avail.

The crew member did not wear a fall arrestor nor a floatation device on the occasion. The Company did not specify that the review of RA for lashing and unlashing tasks must be done on-site, which cast doubt on the effectiveness of the review of the RA. The Company's PPE matrix did not include the need of personal floatation device when performing unlashing task at outboard rows near ship side where there was a potential risk of drowning for a person falling in the water.

Why did it happen?

The investigation revealed that the review of the risk assessment for the unlashing task was ineffective as the safety control measures identified were not implemented. In addition, the Company's SMS did not require wearing of floatation device when working near the ship side.

What can we learn?

Shipping companies should review the SMS procedures to clearly identify risks involved in different tasks and provide clear guidance to its fleet of ships what type of PPE should be worn accordingly. The supervisor and crew onboard ship should carry out risk assessment effectively prior the tasks are commenced. If the risk assessment was done for the same task, then the review of the risk assessment should also be done effectively prior to the commencement of the task.

Who may benefit?

Seafarers, shipping companies.

14 OCCUPATIONAL ACCIDENT

Very serious marine casualty: Collapsing crane causing crane operator loss of life

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 crew members 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 kts 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 SWLs for onboard and offboard lifts. The standards in place when the crane was designed and built did not require that dynamic amplification factors be considered. The crew on board the unit had routinely conducted lifting operations without complying with the operator's procedures.

What can we learn?

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

.2 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.

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

Who may benefit?

Ship operators, crew members, classification society surveyors, flag States.

15 FOUNDERING

Very serious marine casualty: Flooding causing loss of lives

What happened?

A cargo ship, manned with a master and 11 crew members, left a wharf and was anchoring before proceeding. The ship then received winds and waves that had increased due to a typhoon approaching. The ship heeled to the starboard side and subsequently rolled over and was flooded due to taking on sea water into the interior of the cargo holds and thereby foundered around the anchorage.

The master and three crew members were rescued, but the other eight crew members died.

Why did it happen?

It is considered probable that the accident occurred because the cargo ship foundered since sea water, which was being retained due to wave uprush on the upper deck, began flooding due to taking on sea water in the interior of the cargo holds. Moreover, her steering was uncontrollable, and she was receiving winds and wave uprush from the port fore side to port side. Furthermore, her hull greatly heeled to the starboard side, and she continued to be flooded due to taking on sea water in the interior of the cargo holds. Subsequently, the cargo ship rolled over due to her decreasing stability and flooding due to taking on sea water into the interior of the cargo holds progressed, with the result being that she foundered.

It is considered probable that the Retained Water on the deck began flooding due to taking on sea water in the interior of the cargo holds because the lids for opening parts of the ventilation cylinders of the cargo holds were in an open condition, and the water receiver railings at the connection parts between the panels of the hatch covers of the cargo holds had a number of broken holes and some parts of the panels were deformed, and thereby the hatch covers were not securely weather-tight. In addition, it is considered probable that wave uprush on the deck further increased because her dry draft had been decreasing due to ingress water into the interior of the cargo holds and the Retained Water.

It is considered probable that the ship was in a state in which her steering was uncontrollable because ingress water that infiltrated into the marine diesel oil (MDO) tank interior through air vents on the upper deck was supplied to the diesel generator engines with MDO through the fuel oil (FO) supply line of the diesel generator engines, and then the diesel generator engines experienced combustion failure or misfiring, and subsequently stopped, and thereby the blackout occurred.

It is considered probable that after the steering was uncontrollable and the ship was receiving further increased winds and wave uprush from the port fore side to port side, she heeled to the starboard side due to receiving winds and waves and came to roll on that angle, and then heeling to the starboard side gradually increased due to receiving strong wind and heavy waves due to the typhoon. It is considered probable that after she attained the angle of stability in maximum condition, and subsequently the lateral heeling angle increased due to continuous waves, because this thereby led to the lateral heeling angle attaining the angle of loss of residual stability and she rolled over to the starboard side.

What can we learn?

.1 Closing of opening parts on exposed decks such as lids of opening parts of the ventilation cylinders of cargo holds etc., in case stormy weather and rough seas are expected, must be performed.

.2 Masters should secure significant dry draft in any sea condition, and should have crew members carry out adjustment of the ship's condition and arrange loading capacity and the timing of bunkering with the Management company.

.3 Masters should direct crew members to have them carry out the Discharging Operation for fuel oil tanks not only periodically as routine work, but also on a timely basis in a condition of rolling and pitching in stormy weather and rough seas so as not to supply fuel oil with infiltrated water into the FO lines of generator engines, etc.

.4 Masters should conduct refresher training for crew members concerning survival techniques at sea for getting ready for abandon ship, such as taking out belongings, escape behaviour from the interior of the ship, putting on a life jacket and immersion suit, dressing warmly, etc.

.5 The Management company and the owner should implement necessary maintenance including the Receivers to secure weather-tightness of the hatch cover of the cargo holds themselves. Moreover, it is desirable that the air vent pipe construction of ships managed by the Management company and the owner be remodelled to automatically prevent the infiltration of water such as an automatic opening and closing-type air vent head at the top of a pipe head or drain discharging pipe.

Who may benefit?

Masters, crew, owner and management companies.