OUTCOME OF THE FIFTEENTH SESSION OF THE SUB-COMMITTEE ON FLAG STATE IMPLEMENTATION

LESSONS LEARNED FOR PRESENTATION TO SEAFARERS

1 MAIN ENGINE TURBO CHARGER FAILURE

What happened?

The second engineer was in the engine-room carrying out some maintenance jobs when he noticed that the main engine's turbo charger was over speeding at a dangerous rate. Before he could reach the control room to shut down the main engine, the turbo charger exploded. This was the second turbo charger explosion in four months, but no one was injured.

Why did it happen?

- The turbo charger compressor sustained a centrifugal overload condition, resulting in a radial fracture of the impeller;
- A scavenge fire may have provided sufficient energy to the turbo charger turbine to over speed to a dangerous rate;
- Poor cleanliness of the scavenge space;
- A leaking piston crown O-ring resulted in oil forming a gummy residue on the scavenge reed valves and liner ports; and
- Blocked liner ports contributed to fuel after burning.

What can we learn?

- Thorough scavenge space inspection and cleaning is very important, especially when the vessel is operating on short voyages with prolonged low load running of the main engine.

2 A COLLISION LEAVING PORT

What happened?

A ship left port in the late evening with a pilot onboard. Just before passing the harbour entrance, the pilot left and the ship proceeded full ahead. On the starboard bow was another ship, approaching the pilot pick-up area.

The pilot to the approaching ship was still in the pilot boat and delayed. He saw that a close-quarter situation was coming up and called the outgoing ship via VHF, asking for intentions. He was answered that the outgoing ship was keeping course, due to obstructions. He therefore advised the incoming ship to go to port, which it did. However, it was too late and a collision occurred.

The outgoing ship had damage in the hull and took in water. The anchors were dropped, but with assistance of tug-boats and after the anchor chains were cut, the ship was beached close by. The approaching ship could berth without assistance.

Why did it happen?

If the pilot on the outgoing vessel had stayed a little longer, the accident may have been prevented. Both ships claim that they did not hear the conversation of the other ship. The outgoing ship did not apply to the COLREGs, claiming obstructions. The investigation shows however, that there was space and water enough for her to change course.

What can we learn?

- Keeping a VHF-traffic listening watch help you to keep up to date with what is happening around you.
- Follow the COLREGs and keep to standard procedure. It may reduce confusion.
- Pilots should stay on board until their task is completed.

3 SHIP MISSING

What happened?

A tug, towing an unmanned ship, left port for a long and slow journey. Fifteen days later the last noon-report was received at the company. Another 4 days later, the company requested a radio station to call the tug. No answer was received.

A month later, an EPIRB-signal was picked up and traced to the tug. The position was searched, but only the EPIRB, a small drifting plate and a small oil-slick was found.

Investigation found that the EPIRB had been manually activated. The batteries last for only 92 hours.

Later, the towed unmanned ship was found, but not the tug. The rescuer found the tow rope snapped and two emergency towing rigs had failed.

The tug and a crew of 13 were never found.

Why did it happen?

The reason why the tug was lost is unknown.

What can we learn?

If the company asked for search earlier, there might have been better possibilities finding the crew.

4 CONTROLLABLE PITCH PROPELLER FAILURE

What happened?

While entering the port, the Master noticed that the speed of the vessel was greater than usual and that it did not correspond to the pitch settings. The emergency system was selected, but the starboard propeller remained set on full ahead. The starboard anchor was let go, causing the vessel to deviate from its course. Subsequently, the vessel struck a dolphin. The shock from the impact resulted in a blackout and a loss of propulsion.

Why did it happen?

The starboard propeller pitch failed to reverse. The servo control piston had seized inside the cylinder. It was later determined that there was presence of water and rusted particles in the hydraulic pitch control system. The master opted to engage the emergency system and not to stop the starboard engine.

What can we learn?

- Regular tests of various pitch commands are necessary to confirm the operational state of the equipment.
- Regular maintenance of the hydraulic control systems and the frequent testing of the oil, prevents the degradation of the equipment and allow for early detection of water and other particles in the system.

5 COLLISION BETWEEN AN OIL TANKER AND RO-RO VESSEL

What happened?

An oil tanker was proceeding in a westerly direction. Visibility was good. The OOW of the oil tanker saw a ro-ro vessel ahead, proceeding in an easterly direction. The oil tanker made a number of small alterations to starboard with the intention to pass ahead of the ro-ro vessel. When the two vessels were about one-half mile apart, the oil tanker called the ro-ro vessel. The ro-ro vessel proposed a "green-to-green" passing. Realizing that it would have to make a large course alteration to port, the oil tanker proposed a "red-to-red" passing and, because it was not permitted to be closer than two miles from shore, it would maintain its course and speed. Two minutes before the collision, the ro-ro vessel indicated that it would manoeuvre toward the oil tanker. The ro-ro vessel struck the port side of the oil tanker. Both vessels sustained damage, but there was no release of pollution. Escorted by a tug, the vessels proceeded to port under their own power.

Why did it happen?

Neither vessel monitored the developing situation involving a risk of collision and did not take frequent relative bearings. The arrangement for passing was made only a few minutes prior to the vessels colliding with each other. Furthermore, the OOW on board the ro-ro vessel became perceptually confused by the discussion with the oil tanker to make passing arrangements. The OOW only called the master when the oil tanker was about one mile away.

What can we learn?

- Closely monitor vessel traffic in the vicinity to enable the early identification of developing collision situations.
- Take early and substantial action to keep well clear of vessels. A succession of small alterations of course is to be avoided. Avoid taking action that does not conform to International Regulations for Preventing Collisions at Sea.

- If in any doubt as to the other vessel's actions or intentions, the OOW should seek clarification from the vessel and, if doubt still exists, notify the master immediately and take whatever action is necessary before the master arrives.

6 EXPLOSION ON BOARD A CHEMICAL TANKER

What happened?

A chemical tanker docked at a terminal to discharge a cargo of methanol. About 15-20 minutes into the unloading of the cargo, an explosion occurred in way of one of the cargo tanks. The fire was extinguished by the crew. There was minor damage to the vessel, but there were no injuries.

Why did it happen?

There was an accumulation of combustible vapours in the cargo tank – the vessel was not equipped with an inert gas system. The intermediate shaft of the cargo pump was rubbing against the casing, providing a source of ignition. An inert gas system was available in port; however, its use was not imposed by the port authority.

What can we learn?

- Suitable maintenance of shipboard machinery and equipment used in hydrocarbon-related cargo operations is necessary to ensure the safety of the vessel and crew.

- Use of systems that effectively inert tankers helps to prevent explosions in cargo tanks.

- Shore-based inert gas systems may be available for use in some ports.

7 KILLED BY THE RELEASE OF CARBON DIOXIDE

What happened?

While attempting to release a large quantity of high pressure CO_2 to atmosphere, to rectify an earlier error, the resulting reaction from the force of the gas exiting the open unsecured pipe fractured the gas manifold in the CO_2 room. The escaping gas killed all four people within the CO_2 room at that time.

Why did it happen?

The Chief Engineer did not fully understand the Fixed Fire Installation and during maintenance work inadvertently discharged CO_2 from storage cylinders into the discharge manifold where it was trapped.

The Management of the vessel failed to take the opportunity of calling in expert assistance to rectify the original mistake while the vessel was in port and, instead, embarked on a misguided and dangerous attempt to release the trapped gas to atmosphere.

Ship's staff failed to understand the reactive forces occurring when high pressure gases are released from an open pipe/nozzle. Whenever a high pressure fluid – especially a gas – is allowed to discharge through a nozzle the pipe must be adequately restrained from movement.

In the attempts to rectify the situation, the ship was placed in an unsafe condition since the Fixed Fire Installation had been rendered inoperable.

What can we learn?

- Utmost care should be taken when carrying out any maintenance, inspection or testing of CO_2 Fixed Fire Installations. Full instructions must be available and studied before commencing work. Effective training in the maintenance and operation of such systems is essential.

- Maintenance work should only be carried out by fully competent personnel.

- When in doubt – ask.

- If a Fixed Fire Installation is rendered inoperable, the Flag Administration, Classification Society and, in some instances, the Port Authority must be informed immediately.

- The energy content of compressed gases should never be under-estimated.

8 A FATAL DRY BULK CARGO OPERATION

What happened?

Three days after a bulk carrier loaded a cargo of DRI Fines, and while the crew were routinely opening cargo hatches to ventilate the cargo, a series of explosions occurred, resulting in the death by injury of the master. Five members of the engineering staff remain missing, presumed dead. The vessel was lost.

Why did it happen?

There was some confusion over the nature of the cargo and the manner it should be cared for during transit. However it was known that there was a possibility that the cargo would give off hydrogen gas if in contact with water and there were instructions from the shippers to open hatch covers if the temperature of the cargo was seen to rise. The accident investigation concluded that an accumulation of hydrogen ignited. The source of ignition was not determined but was most probably from hot spots within the cargo.

What can we learn?

- Vessel's Master and Crew should be properly informed and instructed on the handling of cargoes of doubtful hazard characteristics, such as DRI, and be made aware of all associated hazards. The recognized competent person and the vessels owners and managers should be involved in the loading and transport process. Shipper's certification should be double-checked and records verified ascertaining the pre-loading condition of the cargo; the cargo should be stabilised as far as possible prior to loading.

- Any discrepancy between the instructions on cargo care and monitoring provided by the prospective shipper, the vessel's owner/manager and external guidance such as the BC Code should be settled to the mutual agreement of all parties and the satisfaction of the Master before commencing loading.

- Special consideration should be given to the potential evolution of hydrogen gas during transport of some cargoes, such as DRI. Also, operators of vessels required to carry bulk cargoes susceptible to exothermic reactions should ensure that suitable and appropriate monitoring equipment, correctly calibrated to a recognized standard, is carried and utilised throughout the loading period and subsequent voyage. Full instructions on the use of the equipment, supplemented if necessary by appropriate training, must be provided. Records of the condition of the cargo should be maintained.

9 A FATAL TANK CLEANING OPERATION

What happened?

A chemical tanker caught fire and exploded while the crew was engaged in cleaning residual MTBE from one of several opened cargo tanks, resulting in the loss of the vessel. Only six of 27 crew members survived.

Why did it happen?

The crew opened up the tanks and entered one of them for cleaning before the tanks were fully gas-freed. Opening the tanks exposed the crew to toxic fumes, permitted flammable vapours, that were heavier than air, to accumulate on deck. They diluted the rich atmosphere in the cargo tanks, bringing them into the flammable range. The ignition source could not be precisely determined, but it was noted that one person was in the tank wearing an SCBA. On that occasion it was considered unlikely that metal-to-metal contact from the SCBA and tank surfaces was unlikely to have been the cause, but the practice is not recommended.

Other possible sources of ignition included:

- electrostatic discharge;
- mechanical sparks caused by metal-to-metal contact;
- faulty electrical equipment; hot soot or particles from the funnel; and
- sparks from changing the batteries of portable electrical equipment in a hazardous location.

What can we learn?

- Venting of toxic and flammable gas during gas freeing should be through the vessel's approved gas freeing outlets. No escape of cargo vapours should be possible at deck level (Tanker Safety Guide, Chemicals, ICS).
- If portable ventilation equipment is to be used to blow air into a tank, tank openings should be kept closed until work on that tank is about to commence (Tanker Safety Guide, Chemicals, ICS).
- The extreme hazard of entering cargo tanks for cleaning is emphasized – especially with SCBAs which may themselves give rise to a spark through metal to metal contact. No entry should be allowed until the oxygen level has been confirmed to be sufficient and that there are not any explosives/flammables or toxic gases present.
- Ships' operators and senior officers should properly implement the company and vessel SQES, including referenced documents such as the Cargo and Ballast Operations Manual. Where any such documents leave uncertainty in the minds of the senior officers, clarification and, if necessary, subsequent amendments should be sought; under no circumstances should unapproved tank cleaning operations be undertaken.

10 EMERGENCY DISEMBARKATION AFTER EXPLOSIONS ON BOARD

What happened?

Six out of 27 crew members survived an explosion on board a chemical tanker. All six had evacuated the vessel in a liferaft. All the other crew members evacuated to the water. Only three of these were recovered by rescue services – one was found dead, the other two died en route to hospital.

In another incident involving explosions on board a dry bulk carrier, the surviving members of the crew evacuated the vessel via a lifeboat. Four crew members remained on board to launch the lifeboat, and then jumped into the sea, one of which was able to swim to the lifeboat. The other three remained in the water for 12 h, arms interlocked, until picked up by a passing vessel.

Why did it happen?

In the case of the chemical tanker lack of an organised response to the explosions contributed to the high loss of life. The master abandoned ship without sending a distress signal, without attempting to contact a nearby ship, without conducting a proper muster or search for injured crewmen, and without attempting to launch primary lifesaving appliances. Both the Master and Chief Engineer abandoned ship within 10 minutes of the first explosion, leaving behind crewmembers they knew to be alive. Their premature action exposed the crewmen who entered the water with them to the cold water far earlier than necessary, and contributed to the high loss of life.

In the case of the bulk carrier, it is not known why four men, instead of one, were required on board the vessel, to launch the lifeboat. Neither is it known why none of them managed to enter the boat via the embarkation ladder.

What can we learn?

The importance of regular and meaningful emergency and evacuation drills cannot be over-stressed.

11 A CAPSIZE OF A CARGO SHIP IN FAIR WEATHER

What happened?

On approaching port in fair weather with a load of 107 containers the vessel started to list to starboard. The transfer of 5 tons of gas oil reduced the list. One hour later the vessel began to list to port. It was then noticed that water flowed into the cargo hold through a hole in the breather pipe of a ballast tank. Due to the increasing list the ships derrick broke loose and swung to port and several containers rushed to port and created port list still further. The crew abandoned the vessel. 10 crew members were rescued, one lost his life. The vessel capsized and sank.

Why did it happen?

The ship was old and the maintenance standard poor. There was lack of reliable inspections. There was an underlying pressure by the owner on the master to “keep the boat running” although several certificates were outdated.

Serious hull failures caused water ingress and a free surface effect due to water in the cargo hold created the list. Further water ingress due to failure to close the emergency escape hatch between the engine room and the hold increased the list to the point of capsizing.

What can we learn?

A careful, qualified and documented maintenance is of great importance for the safety of the ship, especially for old ships, and its crew.

12 VEHICLE DECK FIRE ON BOARD A RO-RO FERRY

What happened?

A fire was discovered on the lower vehicle deck of a non-Convention roll-on/roll-off ferry. The deluge system was activated and the fire was fought by ship staff as the ferry continued to its destination. Passengers were safety evacuated to shore and the fire was declared extinguished by the shore fire brigade. The "vehicle deck 1" suffered extensive smoke damage and considerable heat damage.

Why did it happen?

The fire originated in or around a tractor-trailer parked on "vehicle deck 1"; the cause of the fire is undetermined. However, one of the possible contributing factors was that passengers, particularly commercial truck drivers, continued to remain in their vehicles during transit despite inherent risks in doing so.

What can we learn?

- For safety reasons, passengers should not be allowed to remain in their vehicles while the roll-on/roll-off ferry is underway.
- Crew members on board passenger vessels must be readily identifiable to passengers and follow all procedures in the Vessel's Emergency Response Manual in emergencies.
- It is important that crewmembers on board non-Convention passenger vessels should also be provided with training courses in crowd management, crisis management and human behaviour.
- The installation of low-location lighting on board non-Convention passenger vessels can assist passengers and crew to identify escape routes and exits.

13 A SERIES OF EXPLOSIONS ON BOARD A CHEMICAL TANKER

What happened?

A series of explosions and subsequent fire occurred inside the cargo tanks on a chemical tanker when unloading chemical to a shore terminal. Two seamen on the main cargo deck were killed and the chief officer was injured. The fire was eventually brought under control by the local fire brigade. The damage caused a constructive total loss of the vessel.

Why did it happen?

The most probable cause of the initial explosion was due to a static or electrical discharge of sufficient strength to create an ignition source within a volatile environment that had developed on board the vessel.

What can we learn?

- General confusion surrounding the actual connection of the ship/shore electrical continuity bonding cable, particular when the national or local regulations are not in line with the current industry guidelines. There is a clear need for agreement on International Standards to be adopted with respect to the precautions required to minimize the risks associated with static, electrical charge generation and discharge.
- The use of systems that effectively inert tanks on board of chemical tankers, irrespective of ships' size, can enhance fire or explosion safety.

14 FAILURES OF PILOT LADDERS

FAILURE 1

What happened?

A pilot was disembarking from a ship when both rope sides of the pilot ladder failed. The pilot then fell approximately 27 feet to the deck of the pilot cutter below and was seriously injured.

Why did it happen?

- The rope pilot ladder was old and had not been adequately maintained.
- The pilot ladder may have been damaged or strained when it was trapped between the ship's hull and the pilot cutter immediately before the accident.
- The pilot ladder was not rigged high enough above the waterline which led to it being trapped between the pilot boat and the side of the ship.
- There were no man ropes fitted which may have allowed the pilot a 'grab' when the pilot ladder started to fail.

What can we learn?

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- Pilot ladder needs to be properly stowed, carefully inspected and maintained and correctly rigged.
- Man ropes should be ready to be rigged, at the pilot's request, especially in adverse sea conditions.

FAILURE 2

What happened?

As a pilot was boarding a ship, the pilot ladder's side ropes parted approximately five steps up from the bottom. The pilot was uninjured and subsequently boarded the ship using the pilot ladder on the port side.

Why did it happen?

- The pilot ladders on the vessel were old and had not been adequately inspected or maintained.

- The pilot ladders were permanently rigged and subject to weather damage.

What can we learn?

- Pilot ladders should be manufactured and certified in accordance with appropriate standards.
- They need to be properly stowed, carefully inspected and maintained and correctly rigged.

15 INADVERTENT RELEASE OF A DAVIT WINCH BRAKE

What happened?

While a ship was at sea, the bosun was sitting astride of a davit cradle, under a lifeboat, securing a trigger line for the davit's harbour pin. In the course of his work, another seaman inadvertently stood on the davit winch brake operating handle which released the winch brake. The lifeboat started to move and its lashing lines, which were secured, failed under the load which allowed the boat to move further. The bosun was knocked backwards off the cradle and into the sea 15 metres below. Despite search and rescue efforts by local authorities and the crew, the bosun drowned.

Why did it happen?

- The bosun had placed himself in a risky situation and was attempting to perform a two man job on his own.
- The location of the davit winch brake operating handle near the lifeboat davit cradle ladder resulted in the accidental operation of the brake.
- The safety pin arrangement on the davit winch brake operating handle was not correctly adjusted and it allowed the brake to be disengaged with the safety pin in the locked position.
- The wire rope in the lifeboat's lashing line was severely corroded and resulted in its failure under the weight of the moving lifeboat.
- The bosun had had only four hours off duty in the previous 24 as a result of the ship being short staffed. At the time of the accident he was likely to have been suffering from some effects of fatigue.

What can we learn?

- Shipboard operations, tasks and/or work methods which place the crew in danger should be avoided.
- Safety equipment, like the davit winch brake handle safety pin, operating handles in way of access ladders and the lifeboat's lashing lines in this accident, should be properly designed and maintained to ensure that they are operating correctly at all times.

16 ALCOHOL AND GROUNDING

What happened?

A ship, after undertaking some survey work, was returning to port when it ran aground. After some time, it floated free and then re-grounded nearby. The crew were evacuated but the master remained on board and grounded the ship again whilst attempted to get it to port. He took the ship off again and sailed back to port.

Why did it happen?

- The master made a navigational error leading to the first grounding caused by excess alcohol consumption (it was a dry ship).
- Crew were aware of rules being broken but took no action.
- Independent actions by some crew members may have contributed to a more serious outcome.

What can we learn?

- Violations (rule breaking) should not be ignored as it may lead to an incident. Seafarers should ensure that they are familiar with the correct use of any equipment supplied.

17 SLEEPING ON WATCH

What happened?

A ship ran aground, at night, when the master (OOW) fell asleep on watch.

Why did it happen?

- The master was under the influence of alcohol.
- There was no lookout on watch.
- Previous incident involving the master was not properly investigated or followed up by the company.
- Poor navigation practices.
- Watch alarm was not used.

What can we learn?

- Violations (rule breaking) should not be ignored as it may lead to an incident.
- Lookouts need to be posted, especially at night.
- Watch alarms should be used if fitted.

18 COLLISIONS IN THE PORT APPROACHES

COLLISION 1

What happened?

Two small tankers (no pilots required), one inbound, one outbound, collided in the port approaches, in a confined section of the main channel. The ships had to pass in an area that was restricted due to long term dredging activities. Both ships suffered significant damage.

Why did it happen?

- The reduced width of the channel in the area of the dredging.

- Poor promulgation of information by the port.
- VTS allowed ships to make their own arrangements.
- There was a blind sector in the VTS coverage.
- Glare from shore lights affected inbound ship.
- Unsafe speed by both ships.
- Inadequate communications between the two masters.

What can we learn?

- Any communications involving collision avoidance need to be unambiguous and need to be made early.
- Uncertainty needs to be resolved before continuing into close quarters. The faster the ships travel to earlier decisions need to be made.
- Higher speeds reduce the chance of correcting mistakes and increase the consequences.

COLLISION 2

What happened?

A collision occurred between two large container ships in the approaches to a high traffic port.

Why did it happen?

- A high traffic volume of both larger high speed ships and small fishing vessels.
- Ships proceeding at high speeds, and changing speeds, as they approach and depart the port area making risk assessment and collision avoidance more difficult.
- Failure of the AIS signal on one ship may have distracted the watchkeepers on the other as they tried to communicate.
- Voyage plan did not identify the high risk imposed by the area of high traffic density.
- Fishing vessels complicated the manoeuvres of the larger ships.

What can we learn?

- Higher ship speeds require longer range risk assessment and continuous monitoring. A safe speed needs to take into account the traffic types and density.
- Voyage planning should identify areas of increased risk from traffic.
- Higher speeds reduce the chance of correcting mistakes.

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