SUMMARY OF LESSONS LEARNED FROM CASUALTIES FOR PRESENTATION TO SEAFARERS (AS REVIEWED AND APPROVED BY THE SUB-COMMITTEE ON FLAG STATE IMPLEMENTATION AT ITS ELEVENTH SESSION)

BACKGROUND

The Sub-Committee on Flag State Implementation (FSI) establishes a Correspondence Group on Casualty Analysis at every session. The Casualty Analysts review reports of investigation into casualties and prepare recommendations based on the findings and analysis thereof. The Members of the correspondence group also prepare a Summary of lessons learned to be made available to seafarers on the IMO website.

The FSI Sub-Committee agreed that the lessons learned should be disseminated to the industry to further encourage masters, ship owners and managers to introduce effective safety management procedures and instructed the Secretariat to publish the aforementioned information on the IMO website so that Member Governments, maritime associations and other interested parties may easily distribute the lessons learned.

COLLISIONS

What happened?

A pleasure craft (8 meters) whilst anchored 28 miles from the nearest land for the night in a shipping lane off the North East coast of Australia, with all hands on board sleeping, was struck by a passing bulk carrier. Fortunately there were no casualties. The collision went unnoticed by the OOW and the lookout on the bulk carrier.

Why did it happen?

Available evidence indicates that proper radar and visual lookout was maintained on the bulk carrier. There could be several possible reasons for the pleasure craft not being observed on the bulk carrier: (i) pleasure craft presented a poor radar target; (ii) anchor light on the pleasure craft was too weak and did not comply with COLREGs; and (iii) reflection of moonlight from the water prevented the pleasure craft hull being seen from the bulk carrier bridge. Another contributory cause to the collision was the lack of a lookout on the pleasure craft which was anchored in a shipping lane at night.

What can we learn?

Numerous collisions occur between large ships and small craft every year resulting from lack of proper lookout on one or both vessels. All watchkeepers need to be aware that small craft may not be readily sighted by radar or visually from the navigating bridge of large ships. The importance of proper lookout on all vessels, large and small, cannot be overemphasized and watchkeepers shall also be guided by Rule 5 on Look-out of the COLREGs. Smaller ships should consider warning larger ships of any developing collision risk by using all available means including light signals, sound signals and radio communication. Larger ships must remember that provision of proper radar lookout does not obviate the need for effective visual lookout and vessels with operational radar shall be guided by Rule 6 (b) of the COLREGs. All ships including small craft, shall avoid anchoring in a known shipping lane.

What happened?

Sudden steering system failure of an oil tanker led to collision with a passing bulk carrier in the Baltic Sea. The collision resulted in serious damage to both vessels and spillage of 2,700 tonnes of fuel oil from the tanker.

Why did it happen?

The cause of the sudden steering failure could not be established. Small passing distance (0.5 miles) between the two vessels precluded effective avoidance action being taken on both vessels. Both vessels unnecessarily restricted their passing distance by choosing the deepwater route although their relatively shallow draft permitted them to use the recommended directions of traffic flow outside the deepwater route.

What can we learn?

Vessels should avoid using deepwater routes when their draft permits them to use a traffic separation scheme. OOW should remain at heightened alert when passing another vessel at close range and should be vigilant for equipment failure and unexpected response from own or other vessel including interaction between vessels passing each other at close distances.

What happened?

A passenger cruise ship collided with a container ship in a crossing situation in the Dover Straits. Both ships sustained serious damage including a very serious fire on the container ship.

Why did it happen?

The attention of the passenger ship's OOW was diverted by other tasks in a heavy traffic situation. The container ship reduced its available options for avoiding action by overtaking another vessel from the port side just when a close quarters situation was developing with the passenger ship. The collision could have been averted if one or both vessels had reduced speed in good time.

What can we learn?

In heavy traffic situations, doubling of the watch should be considered if there is a possibility of the OOW being distracted by other tasks such as need for radio communication for reporting ship's position.

Vessels shall follow Rule 13 of the COLREGs when overtaking any other vessel. In addition, when overtaking another vessel, careful consideration should be given to the side on which to overtake. Factors to be taken into account should include available sea room and possible need to take avoiding action in respect of other vessels in the vicinity.

The OOW should not hesitate in reducing speed to avert collision if circumstances so require and should also be guided by Rule 8 (e) of the COLREGs.

POLLUTION

What happened?

A tankship was properly secured to a monobuoy during cargo discharge operations. At some time during these operations, the chain stopper opened and the chafing chain was released. The ship was then moored only by a pickup rope that parted shortly thereafter. As the vessel drifted from the monobuoy, the rail hoses parted and approximately 12 tons of oil spilled into the sea.

Why did it happen?

The bridge monitor that was used to control the cargo operation used the same function keys to control different operations. The screen colour was different for each operation; however, the function keys and their sequence were not unique to a given operation. It is believed that one of the officers performing cargo operations unintentionally opened the chain stopper and released the chafing chain while attempting to secure a forward hydraulic pump. The function key sequence was the same for each operation and only the screen colour provided an indication as to which operation was being performed.

What can we learn?

Ergonomics, in the form of operator-machine interface, can be a critical element in shipboard safety.

Ship's crew should display warning signs where there is a possibility of confusion in the operator-machine interface.

FIRE

What happened?

A cargo of medium-density fibreboards (MDF) caught fire during loading.

Why did it happen?

The fire was probably started by a discarded lit cigarette end.

What can we learn?

Strictly adhere to the prohibition of smoking. Smoke only in designated areas where it is safe to do so and fully extinguish cigarette ends.

EXPLOSION

What happened?

An explosion occurred during tank cleaning operations resulting in severe injuries and the death of two people.

Why did it happen?

Sparks from grinding work on the tanker's catwalk caused the ignition through an open tank cleaning hatch.

What can we learn?

Always follow strictly the safety procedures and adhere to safe working practices.

Cutting and other hot works should not be conducted while tank cleaning, gas-freeing and other tank operation where flammable gas and vapour may come out from the tanks.

What happened?

An economizer (waste heat boiler) on a passenger ship ruptured during sea trials after a repair period. Two people died from steam burns and three others were injured as a result of the failure.

Why did it happen?

The shipboard economizers were not to be used, or be pressurized, during the sea trials. The necessary steam was to be provided by a temporarily installed oil fired boiler. The engineers decided not to drain the water from the economizers. Instead, they intended to vent them by using the hand easing gear to lift the economizer safety valves from their seats. They did not realize that the safety valves on the port economizer had corroded in the closed position and that they were not venting the economizer despite the position of the indicators on the hand easing gear. When sufficient pressure developed, the port economizer ruptured in way of a circumferential welded joint.

What can we learn?

The pre-occupation of the engineering staff with the shipboard repairs and sea trials may have prevented them from thoroughly considering the consequences of not draining the economizers.

The work underway may also have interfered with the engine room staff making appropriate engine room rounds to verify that the economizer was actually being vented.

The investigation into the casualty also revealed inadequacies in the Safety Management System (SMS). The SMS did not contain adequate procedures to ensure the maintenance and safe operation of the steam generating plant. Adequate risk assessment of boiler safety devices, alarms, means of control and indication; and strict adherence to sea trials procedures may have prevented this accident.

FLOODING

What happened?

A bulk carrier was on a ballast passage and conducting ballast exchange operations when a large gate valve in the engine room on the ballast/bilge system failed, causing severe flooding. Further flooding occurred when the crew attempted to de-ballast and trim the ship until eventually the

flooding in the engine room was over 8 metres deep. Having lost all propulsion and electrical power, the vessel had to be taken in tow as a salvage operation.

Why did it happen?

The valve failed due to high pressure in the system or sudden, shock pressure loading. This was possibly caused by other, hydraulically operated, valves in the ballast system closing too fast, as their actuators were out of adjustment. Also it may have been exacerbated by the practice, used during surveys, of pressurising ballast tanks to show that they were full.

Further flooding, during attempts to de-ballast, was caused by insufficient knowledge of the ballast system on the part of the crew and the fact that no ballasting procedures had been developed for the ship. It was made worse by a lack of communication between bridge and engine room personnel during the crisis.

What can we learn?

Ship's staff must have a thorough knowledge of the vessel's piping systems. Drawings of these systems must be correct and readily available on board. The principles of Bridge Resource Management, such as consultation and cross-checking, are equally applicable to engine room operations, particularly during an emergency.

The ship must have established procedures (as required by the ISM Code) for safely conducting routing operations such as exchanging ballast. These must be known and followed.

What happened?

A fully laden bulk carrier in heavy seas lost steerage due to flooding of the steering gear flat by sea water. The propeller pitch had to be set to zero and the ship drifted for more than 7 hours while attempts were made to control the flooding and restore steering. While not making way, the vessel rolled heavily in starboard beam-on seas and green water was taken over the main deck and hatch covers. As a result of the seas and rolling, the fuel oil service tanks took on sea water and the vessel assumed a port list due to shifting cargo.

Why did it happen?

The dogging devices for the hatch cover to the aft rope locker had not been properly maintained. Sea water entered through the non-tight rope locker hatch cover sealing surface and flooded the rope locker. The bulkhead separating the rope locker from the steering gear compartment was not watertight and progressive flooding of the steering gear flat occurred. Steering was lost when the steering gear motors became submerged in sea water. The fuel oil service tanks took on sea water due to poorly maintained tank breathers.

What can we learn?

The installation of bilge water alarms may have given an early warning that water was accumulating in the steering gear compartment.

The condition of the aft rope locker hatch securing devices and fuel oil tank breathers should have been checked during a recently conducted load line survey. Shipboard personnel should not rely solely upon these surveys to ensure adequate watertight and weathertight integrity of the vessel.

CAPSIZE

What happened?

A small general cargo vessel was loaded with a bulk cargo of 6,000 tonnes of pyrite concentrate. Soon after leaving the port, the cargo liquefied, forming a free surface and causing a severe list and loll. The crew made several attempts to correct the list by ballasting without success, with the vessel taking a severe list first to one side then the other. Eventually it capsized and sank. All the crew, however, were rescued.

Why did it happen?

The moisture content of the cargo was excessive. The cargo had been rained upon while on the wharf before it was loaded. No moisture tests were carried out before loading and no information regarding the characteristics of the cargo had been provided to the ship owner or the Master.

Once agitated by the motion of the ship, the cargo underwent liquefaction. By ballasting incorrectly to correct the list, the ship's staff made the problem worse, until the vessel eventually capsized.

What can we learn?

All relevant information on the characteristics of the cargo being carried, including the TML (Transportable Moisture Limit), must be provided to the ship owner, Master and officers who must all make themselves familiar with this information.

When transporting cargoes subject to liquefaction, the moisture content of the cargo must be measured as close as possible to the time of loading.

The cargo must be inspected before loading.

Ship's officers should have a thorough knowledge of stability, particularly the difference between a static list and a loll caused by free surface and the appropriate ballasting measures to adopt.

Do not correct a list due to free surface (a loll) by ballasting the 'high' side.

GROUNDINGS

What happened?

While proceeding towards the open sea under the conduct of a pilot, the vessel experienced an engine problem, which required the engine to be operated at a reduced speed. While attempting to turn the vessel around to proceed to anchorage, it struck bottom on a shoal of an island. The bottom shell plating forward sustained extensive damage.

Why did it happen?

Time was wasted by the bridge team in trying to understand the situation, and the pilot misunderstood the Master's description of the engine problem, leading to a delay in deciding to

return to a safe anchorage. The vessel made the turn to the anchorage too late with insufficient sea room.

The bridge team did not appreciate the vessel's deep draft manoeuvring characteristics, which were limited when fully loaded at reduced power.

What can we learn?

Good communication is essential in the Master/Pilot relationship, especially as the pilot may be unfamiliar with the vessel, and the Master unfamiliar with the passage. Reference should be made to resolution A.485(XII), annex 2, as amended.

It is important for the bridge team to appreciate the vessel's manoeuvring characteristics according to the vessel's condition and speed.

The Master should always prepare to take sufficient measures against unforeseen danger such as an engine problem during navigation.

What happened?

While deviating from the intended passage plan to avoid sea ice and to seek more sheltered waters in heavy weather, the watch officer failed to properly adjust the ships course to allow for set and drift near shoal waters. Subsequently, the vessel contacted a charted shoal, which rendered the vessel's steering gear inoperative. The vessel required tug assistance to make port.

Why did it happen?

The navigation watch officer's over reliance on the Global Positioning Satellite navigation system and failure to utilize all means of navigation.

The failure of the navigation watch officer to promptly notify the master of the developing dangerous situation.

The failure of the navigation watch officer to adequately plot the vessel's position, monitor its progress, and make allowances for set/drift on the chart used.

What can we learn?

The importance and value of a voyage plan and the need to update the plan accordingly when deviations and adjustments are made. Reference should be made to regulation 34 of SOLAS chapter V.

The value of monitoring and recording a ship's progress by frequently charting positions and projecting a dead reckoning track line including comparison of positions plotted and positions obtained by a Global Positioning Satellite navigation system should be recognized and encouraged.

The need for ship's officers to immediately call the ship's Master if in any doubt or as soon as a dangerous situation is first recognized.

What happened?

While operating along the inner route of the Great Barrier Reef on the West coast of Australia, the navigation watch officer was distracted from his duties, missed a planned course change way-point, and the vessel ran hard aground on a charted reef at approximately 20 knots. Extensive damage was done to the ship's bottom and the reef.

Why did it happen?

The navigation watch officer was distracted from his duties by the presence of his wife on the bridge and by making personal telephone calls.

The navigation watch officer's routine delegation of navigational duties to the able bodied seaman on watch, including position fixing and plotting.

Failure of the able bodied seaman to notify the navigation watch officer of the vessel's position, the course change and proximity to danger.

The navigation watch officer and his wife isolated themselves on the starboard bridge wing due in part to the noise of the able bodied seaman vacuuming the bridge.

What can we learn?

The dangers of allowing non-watch standers to be present on the bridge particularly when a vessel is operating in confined waters.

The importance of good bridge resource management, teamwork and communications.

Watchkeepers should not be distracted by activities not related to their primary task of watch-keeping (e.g. vacuum cleaning).

LIFEBOAT ACCIDENTS

What happened?

A lifeboat with four people on board was being lowered into the water when the stern on-load release hook released inadvertently. Three of the four were killed and the fourth injured.

Why did it happen?

The exact reason why the hooks released was not determined. It was thought that the hook locking mechanism may not have been located in the reset position when it was last lifted out of the water. This, combined with jerking of the lifeboat as the davit landed on its stoppers, resulted in the hook releasing the lifeboat.

What can we learn?

Seamen need to be constantly vigilant to ensure that they are aware of the complications of on-load release hook mechanisms.

Some on-load release mechanisms may release inadvertently when the load is off the hook, a condition difficult to detect during launch and recovery routines.

The hooks need to be checked thoroughly to ensure that they are properly secured and that the release and interlock systems work effectively.

What happened?

A lifeboat that was lowered to the embarkation deck of a ship fell into the water while a three person team was performing maintenance. Two of the three team members were injured and treated at a hospital.

Why did it happen?

The lifeboat was supposed to be suspended by the hang-off pendants while the suspension hooks were disengaged for servicing. The person in charge of the maintenance procedure had inadvertently rigged the recovery pendants rather than the hang-off pendants, and the lifeboat fell into the water when the suspension hooks were released.

What can we learn?

Even personnel that are fully trained and qualified to perform a specific procedure can make errors or omissions that result in a serious casualty.

The casualty would have been prevented if the design of the recovery pendants precluded them being mistaken for, and rigged as, the hang-off pendants.

The error may have been detected if the person in charge of the maintenance had briefed the other maintenance team personnel on the exact procedures. Asking a team member to confirm completion of each step during the procedure would have reduced the risk of an accident.

The casualty may not have occurred if the lifesaving equipment maintenance manual contained detailed procedures for supporting the lifeboat from the hang-off pendants.

ACCIDENTS TO SEAFARERS

What happened?

While closing the hatch covers on a small bulk carrier after hold cleaning, an officer climbed onto a partially-closed hatch cover to unshackle and move the wire leading from the winch. He slipped and fell into the hold and was killed.

Why did it happen?

The ship's crew had been using an incorrect procedure for closing the hatches for a long time. The correct procedure did not require the position of the wire and shackle to be moved during the operation, however it was not written into the vessels' documentation. The decks and hatch covers were wet, oily and slippery and the officer placed himself in a dangerous position by climbing onto, and working at the very edge of, the partially-opened cover. He was wearing neither a safety harness nor a helmet. The vessel did not have any written procedure for opening and closing of hatches. In the absence of any written procedures, the ship's crew were using a procedure which was dangerous. Furthermore the decks and hatch covers were wet, oily and

slippery. This placed the officer in a dangerous situation which was further made worse as he was not wearing a safety harness or a helmet.

What can we learn?

Vessels must have written procedures (as required by the ISM Code) for safely carrying out routine procedures. Ship's crews must be familiar with these procedures and follow them.

Seafarers should not take risks thereby placing themselves, even briefly, in a dangerous position.

Seafarers should always wear safety equipment where appropriate and be alert for any hazards due the presence of oil, grease or water on deck.

What happened?

A crewman on a large stern trawler disappeared at night while the vessel was paying out its nets. He had been standing near the stern of the vessel. A search was initiated soon after it was discovered that he was missing and his inflated lifejacket was soon found. Its light was illuminated but he was not in the lifejacket. His body was never recovered.

Why did it happen?

It is not certain why he fell overboard as nobody saw the incident, however it is likely that he was dragged over the stern by the nets paying out over the stern roller. It seems that he might have drowned because his lifejacket had not been worn properly.

What can we learn?

Always ensure that you do not get too close to moving nets, wires, rollers, etc., especially if you do not need to be there in order to carry out a task.

He might have survived if his lifejacket had been properly worn and securely fastened.

It is advisable for all fishermen to wear lifejackets when paying out ("shooting") nets.

Beacon-equipped lifejackets will greatly improve your chances of being quickly rescued should you fall overboard.

What happened?

Two crewmembers were found dead after entering a tank that had been cleaned.

Why did it happen?

The men entered the tank for unknown reasons without adhering to the procedures which would not have allowed a person to enter a tank without an entry permit duly signed by their Master or the appropriate officer.

What can we learn?

Familiarisation training in accordance with the Safety Manual, in particular the procedures to be followed for tank entry is of utmost importance. Training should include awareness of the concealed dangers of tanks, cargo spaces and other confined spaces which might, even after cleaning or ventilation, consist of a dangerous atmosphere and the necessity of testing the atmosphere inside the tank before attempting entry (refer to resolution A.864(20) - Recommendations for entering enclosed spaces aboard ships).

Advice on entry into enclosed spaces is contained in industry guidelines, circulars issued by IMO and Flag State Administrations regulations/notices to mariners which should be strictly followed.

What happened?

A fishing vessel was hove-to off the coast of Denmark while the crew were stowing the fishing gear. A trawl beam was landed on deck, with the 'beam shoe' landing with the heaviest side uppermost. It was leaning against the bulwark and, as the vessel rolled, its unstable position caused it to fall inboard. A crewman who was standing close by, moved out of its way, but was caught by the towing chain which suddenly tensioned, throwing him overboard. A lifebuoy was thrown to him but, as he could not swim, he could not reach it and by the time the vessel had manoeuvred to recover him, he had drowned.

Why did it happen?

The crewman was not carrying out any particular task in that area, yet was standing in a hazardous position and it seems that he must have been unaware of the danger. No formal risk assessment had been carried out by the vessel's owners, neither were there instructions for crew members to remain in safe locations when not actually carrying out tasks. Had he been able to swim, and had he been wearing a lifejacket, he may not have drowned.

What can we learn?

Always be aware of, and stand well clear of equipment, wires, ropes, etc., which could move unexpectedly.

Remain in a safe area unless you are required to carry out a specific task.

Wear a lifejacket or other buoyancy aid when working on deck during fishing operations.

Anyone employed at sea should be able to swim.

What happened?

The motor of an open outboard-motor-powered harvesting punt failed when it was returning to port with a full load of mussels. The punt drifted broadside to the waves, shipped water, capsized and sank. The two occupants were thrown into the water and drowned. The two persons were wearing heavy rubber pants, a jacket and boots. Neither of them was wearing a life jacket or any floatation device because there were none onboard. No distress call was made. The motor of the punt had a history of intermittent mechanical problems.

Why did it happen?

There was poor maintenance of the outboard motor.

No life jackets were on board.

Persons on board didn't have basic safety training.

Insufficient reserve buoyancy of the punt.

What can we learn?

Importance of the maintenance of the outboard motor.

Open deck fishing boats should have enough reserve buoyancy to support the full equipment, motor, persons on board and fuel when fully swamped.

Anyone who works on board of fishing vessels should have knowledge of minimum basic safety practices and procedures.

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