KISH P&I CLUB

KISH P & I LOSS PREVENTION CIRCULAR KPI-LP-50-2012
(Sampled MARS Accident Reports & Lessons to be Learnt)

❖ **Accident No.1-Injury from burst hydraulic valve:**

On a cargo vessel in dry-dock; the crew was testing the operation of an electro-hydraulic mooring winch after completion of repairs.

The team, led by the C/E, and comprising of the 3/E, J/E and an OS, entered the hydraulic machinery room and started the main pump motor. Without warning, the return line gate valve before the filter disintegrated and the detached bonnet flew through the air, hitting the J/E on his face and fracturing his skull and nose. He was immediately hospitalised ashore. Very fortunately, he narrowly escaped more serious injury that could have resulted in permanent damage to the eyes and brain and was able to recover fully from this accident.

►Result of investigation:

During an earlier trial, it was noticed that one of the valve flanges next to the filter was leaking. After isolating the line, the crew renewed the gasket, and then opened the valve before the filter, but forgot to open the one after the filter. When the pump was subsequently started, the sudden build up of high pressure on the upstream side of the valve resulted in its violent disintegration.

►Lessons learnt:

1-It is extremely important that, before commissioning hydraulic systems, all line valves are verified to be fully open and the system is thoroughly purged of air and primed with the correct quantity/type/grade of hydraulic fluid;

2-Return lines are not designed to take high pressure in most hydraulic systems.

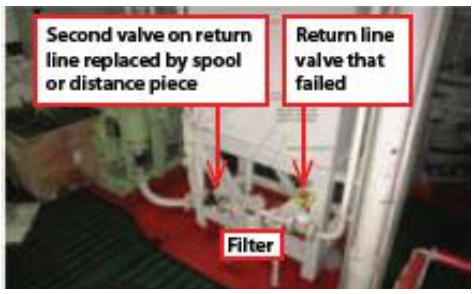
3-The persons involved in such operations need to have carried out a risk assessment and undergone proper familiarization by the responsible & experiences supervisor.

►Corrective/preventative actions:

1-The second valve (after the filter) was considered redundant. It was removed and replaced with a spool piece, reducing the risk of the inadvertent closure of the return line;

2-A sign was permanently installed next to the hydraulic pump motor starting switch warning personnel to "Ensure all return line valves are fully open"

3-The dangers involving work with high pressure system & lines should be reiterated and explained during various ship board drills & training sessions.



Redundant valve replaced by Spacer Pipe

The Broken Valve

❖ **Accident No.2- Hand injury in engine room:**

After a routine overhaul, the engine crew was re-assembling an air compressor in the E/R workshop. In keeping with good engineering practice, the various components were cleaned and coated with lubricant prior to fitting. The 4/E was putting together and tightening the parts in the correct order but due to the oil coating, found that he was unable to grip the assembling tools firmly. For a better hold, he removed his gloves and proceeded to tighten the fasteners with an open spanner. While exerting force on a nut, his hand suddenly slipped off the spanner and struck a hose clamp (also referred to as a jubilee or worm drive clip) fitted on a pipe in the vicinity, resulting in a deep gash on his left palm.

►Root cause/contributory factors:

1-Failure to use correct type of personal protective equipment (PPE) – i.e. gloves;

2-Work place and tools were not wiped clean of the oil resulting in poor hand grip;

3-Restricted space around work area with sharp obstructions and fittings in close proximity.

►Corrective/preventative actions:

1-Injured crew member was given first aid treatment and temporarily taken off work;

2-C/E and 2/E conducted a meeting with ship staff to discuss the incident and stressed the importance of using appropriate PPE and adopting safe working practices;

3-C/O and 2/E were assigned responsibility for ensuring proper toolbox briefing is conducted prior to commencing any task within their departments;

4-The investigation report was shared within the fleet to focus attention on using appropriate PPE at all times and to prevent recurrence of similar incidents;

5-The incident will be featured in a forthcoming seminar and become part of senior officers' pre-boarding office briefing.

❖ **Accident No.3- Excess chemical cargo discharged:**

A chemical tanker was loaded with three parcels for multiple ports. At one of the discharge ports, as per manifest, the vessel was to discharge a major portion of Di-ethyl glycol (DEG) – a total of 2,408 tonnes from two tanks, along with small quantities of the other two cargoes. After discharge, ullages and tank calculations showed that the vessel had inadvertently discharged a quantity of 2,606 tonnes, an excess cargo quantity of 198 tonnes.

►**Result of investigation:**

1-In the original discharge plan, the stopping ullages of the DEG cargo tanks were found to be correct, but when recalculating prior to discharge, the C/O had obtained different figures due to a clerical error. Believing the original plan to be incorrect, he amended the ullages in the discharge plan;

2-The C/O did not discuss the discrepancy and revised stopping ullages with the OOW and Master, resulting in a one-man error.

►**Corrective/preventative actions:**

1-The management office and the charterer were immediately informed of the error;

2-P&I Club surveyor was urgently summoned to attend;

3-Master and C/O independently re-calculated the cargo quantities for the remaining discharge ports and relayed the figures to the charterer;

4-Shipboard procedures were amended to include the instruction that the Master shall personally verify the C/O's pre-loading and pre-discharge cargo calculations, supervise cargo operations at critical stages and that all cargo and tank cleaning plans, and any revisions shall be verified / approved / signed by the Master and OOW;

5-Investigation report shared within the fleet and to form part of pre-boarding briefing for all senior officers;

6-Future crew changes to allow for sufficient overlap of deck officers when vessel is scheduled to call at multiple load or discharge ports.

❖ **Accident No.4- Improper bridge procedures and ECDIS use caused grounding:**

A self-unloading bulk carrier sailed in the morning after loading a cargo of aggregates. The pilot disembarked soon after un-berthing, and the vessel proceeded at Full Ahead (about 12 knots) with the Master, 3/O and a helmsman manning the bridge. Visibility was good with a moderate breeze.

Besides the two radars, the bridge team was using an ECDIS, on which, a safety contour of 10 metres (inappropriate, considering a sailing draught of 10.63 metres), a cross-track deviation limit of 0.2 mile and an anti-grounding warning zone that covered a narrow arc ahead to a range of about ten minutes' steaming had been set.

About an hour after departure, the vessel entered a narrow strait, where the Master instructed the helmsman to engage the autopilot on a heading of 290 and handed over the con to the 3/O. He then proceeded to the communications desk on the after port side of the bridge, increased the volume of a portable music system and busied himself with sending routine departure messages.

A few minutes later, the vessel was approaching a planned waypoint requiring an alteration of 24 degrees to starboard to 314. At this time, the 3/O visually sighted an inbound sailing vessel about 3 NM on the starboard bow. After coming on to the new course on the autopilot, he decided to pass the sailing vessel to port and adjusted the course to 321.

Simultaneously, he observed another small vessel about a mile away, right ahead and coming head on, and altered more to starboard to 324.

The ECDIS anti-grounding warning zone alarm then activated on the display, but no audible alarm sounded, a deficiency not known at the time. As a result, the 3/O, who was monitoring the situation from the forward console, did not realise that the vessel was heading towards shoal ground. He also sounded two long blasts on the ship's whistle to alert the nearest vessel, which soon passed clear to port. Thereafter, the 3/O focussed his attention on the sailing vessel ahead, which was now about a mile away. Two minutes later, the vessel ran onto a charted shoal at full speed. The severe vibrations lasted several seconds.

The Master ran to the ECDIS display and, recognising that his vessel had run aground, instructed the helmsman to switch to manual steering and ordered the wheel to hard-a-port. The sailing vessel also altered course to port and the vessels narrowly avoided colliding.

After he steadied the vessel on a heading to return her to the planned track, the Master discovered that there was water ingress in No 3(P) ballast deep tank. Further checks revealed no other damage, and a preliminary report was sent to the office.

Proceeding at reduced speed, tank soundings confirmed that the ship's pumps were able to cope with water ingress. Nevertheless, the Master ordered the breached compartment to be opened at sea and for a party consisting of the C/O, C/E and a seaman to internally inspect the damage.

After they identified a 3-metre longitudinal fracture in the hull bottom plating, the inspection team safely vacated the tank and re-secured its access.

With company's and class approval, the vessel continued on its short passage towards the discharge port, where, after unloading, she entered dry-dock to effect permanent repairs.

►**Findings of investigation:**

1-The vessel was fitted with two ECDIS units that were used as the primary means of navigation, thus removing the need for paper charts to be carried. All bridge officers, including the Master, had completed a generic ECDIS training course in their home country, but no training or familiarisation on the type of ECDIS fitted on board had been provided by the ship management company;

2-Before reaching the waypoint, the 3/O wrongly assumed that risk of collision existed with the sailing vessel on the next planned heading and prematurely initiated a turn to starboard and then continued to alter course to starboard, illogically intending to pass between the sailing vessel and the steep-to shore;

3-After initiating the course alteration, the 3/O did not monitor the vessel's position and projected track on the ECDIS display-for over 15 minutes- and failed to notice that the visual grounding warning alarm had been activated;

4-Both the present and past crews were unaware that the ECDIS anti-grounding audible alarm had been disconnected in the past for unknown reasons;

5-The ECDIS display was located some distance abaft the bridge front and orientated so that the OOW had to face to starboard to look at the screen. Had the ECDIS display been located on the forward console, the OOW would have been more likely to routinely consult it when monitoring the navigational situation and also been alerted by the visual grounding warning alarm;

6-A safety contour setting of 10 metres was inappropriate for the voyage as the sailing draft of 10.63 metres meant that the vessel would have grounded at a charted depth of 10.13 metres, before crossing the safety contour;

7-Despite having attended approved ECDIS training courses, the bridge watch-keepers lacked an understanding of the ECDIS equipment's safety features;

8-The 3/O remained confident in functioning as the sole navigator in restricted waters, but soon after the multiple small alterations of course, he became sufficiently concerned about the intentions of the nearest vessel ahead to sound two long blasts on the ship's whistle.

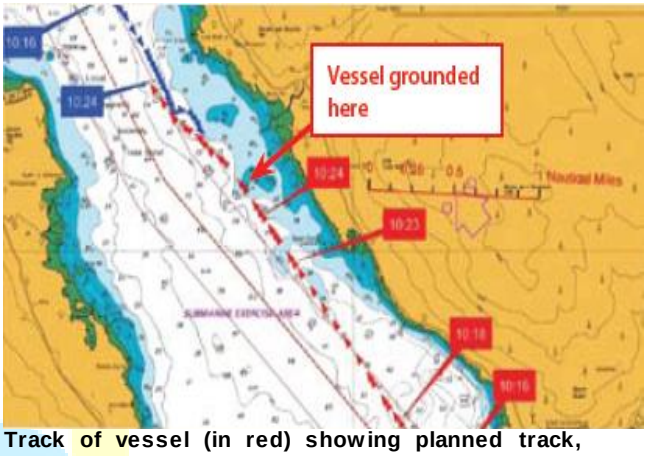
9-The Master failed to react to this inappropriate signal and did not leave the communications console at the rear of the bridge to assess the situation or challenge the 3/O's actions;
10-Following the grounding, the bridge team failed to follow the company's emergency checklist or maintain a proper record of follow-up actions taken, as a result of which, some important responses were missed;
11-No risk assessment or consideration of potential consequences was undertaken prior to opening up and ordering entry into the breached ballast tank with the ship at sea and proceeding at near full speed.

►Lessons learnt:

1- Lack or inadequacy of Bridge Resources Management is evident here. Leaving a 3/O alone on the bridge; listening to music especially in an area requiring extra-vigilant navigation; misunderstanding the priorities; inappropriate workmanship based on less experience and overconfidence are prominent signs;
2-ECDIS provides the bridge team with an efficient and effective means of navigation. However, its ability to continuously provide the vessel's current position and projected track, and to warn of approaching dangers, can lead to over-reliance and complacency;
3-It is imperative that navigators be given equipment-specific training and onboard instructions and guidance to monitor the vessel's position and projected track at regular intervals and to fully understand the equipment's safety features in order to make best use of them;
4- The area where the accident occurred required careful navigation in view of the vessel's size, speed, restricted sea room and the likelihood of her encountering other traffic. In other words in deciding for the safe speed the requirements of the Rule 6 of the Colregs with respect to limitations of the equipment & the traffic density as well as the proximity of shoals & other dangers had not been taken into consideration;
5-The Master placed undue trust in the 3/O's abilities, offering him no support despite the navigational demands of the passage;
6-The Master should have delayed sending the routine departure messages until the vessel was clear of the narrow passage;
7-Loud music can impair the keeping of a proper lookout as required by Rule 5 of the Colregs. Had the ECDIS audible alarm been functioning, it might still not have been heard by the 3/O due to the background noise pollution provided by the loud music;
8-As it was established that the ballast pump was capable of stemming the inflow of water, the opening of a breached compartment and entry by personnel constituted an unacceptable and unnecessary risk. Assessing a situation should not involve taking additional risks. To know the extent of damage, attempting to open up a tank & sending crew in while underway in full speed is beyond good practices of seamanship & due diligence.
This action based on complacent attitude could lead to serious consequences burdening the ship/company with endangering lives on board; breach of seaworthiness & great losses.

►Corrective/preventative actions:

1-The ship operator implemented the following corrective actions in the dry-dock:
i. Repositioned the main ECDIS unit adjacent to the starboard radar, enabling its viewing while facing forward;
ii. Reconnected the ECDIS unit to the bridge alarm monitoring unit to provide a functioning audible alarm;
iii. Arranged for the vessel's bridge officers, and company's Designated Person (DPA) and marine / nautical superintendent to attend an equipment-specific training course on the ECDIS type fitted on board;
2-Arranged for the fleet's bridge officers to attend a bridge resource management course;
3-Arranged for the marine / nautical superintendent to provide on board ECDIS training to the other vessels in the fleet fitted with ECDIS or electronic charts.



Track of vessel (in red) showing planned track, unchecked deviation to starboard, site of grounding, subsequent track recovery and near-miss with incoming sailing vessel (in blue).

Recommendations by MAIB:

The ship operator was advised to issue written instructions and guidance to the fleet and carry out regular verification visits to its vessels to ensure that ships' staff:

1-Have a clear understanding of how ECDIS should be used;

2-Understand the vessel's emergency procedures,

3-Understand the need to properly evaluate routine operations after an accident to ensure that any new risks are identified and mitigated as appropriate.