The Nautical Institute
Marine Accident Reporting Scheme
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MARS 200808

Navigation in restricted visibility

Official Report Source: USCG Safety Alert HMRMS 04-07

A ship strikes a highway bridge, causing damage to the fender system and a 53,000-gallon oil spill. A barge strikes a US Navy facility, causing extensive damage. Two tugs, one pushing a loaded gasoline barge, collide, narrowly avoiding a disaster. What do these recent marine casualties have in common? All the vessels were navigating in restricted visibility.

Although the investigation of these incidents is ongoing, they provide an opportunity to remind mariners of the hazards of navigation in restricted visibility and the procedures required to do so safely.

Of course, the best way to avoid an accident in restricted visibility is not to get underway, or to seek a safe haven if conditions change while underway. But that is not always practical, so every vessel must be well prepared for navigation in restricted visibility every time the vessel gets underway. Companies should adopt written policies emphasising that a delay to the vessel is preferable to the undesirable consequences of an accident. Those policies should place the responsibility for sailing a vessel with the vessel's master, and prohibit interference or second-guessing by shoreside managers.

If a vessel must navigate in restricted visibility certain procedures must be followed:

■ **1. Sound fog signals:** Fog signals are required when navigating in or near an area of restricted visibility.

■ **2. Reduce speed.** The state of visibility is one of the most important factors in determining safe speed. Speed should be reduced - to bare steerage if necessary. Slowing the vessel reduces the likelihood of a casualty because it gives more time for the operator to assess the situation, and keeps power in reserve if emergency manoeuvres become necessary.

■ **3. Post lookouts.** Additional lookouts must be posted, at least one as far forward as safely possible. Lookouts should be well rested, have no other duties, and receive periodic training on proper lookout procedures. Lookouts should be relieved regularly to ensure they remain alert. At a minimum, a lookout should have binoculars and a means of communicating with the bridge. Most importantly, lookouts should wear a personal floatation device and non-slip shoes.

■ **4. Take frequent position fixes.** Too often mariners fail to appreciate the importance of frequent fixes while navigating in restricted visibility. Over-reliance on radar and electronic navigation systems can cause a mariner to lose situational awareness, in part because of time delays while the image is refreshed. A vessel can travel several hundred yards, especially if the operator fails to reduce speed, in the time it takes for the track line to update on an electronic chart. In some cases it may be necessary to take fixes as often as every three minutes.

■ **5. Monitor other vessels.** The bearing, range and closest point of approach (CPA) of other vessels should be closely monitored. Communications should be established early to determine the intentions of other vessels. Short and long range scanning by radar should be used to identify targets before they get too close.

■ **6. Summon help to the bridge.** A one-person watch cannot safely navigate in restricted visibility. One person cannot man the helm, monitor the radar, serve as lookout, plot fixes, communicate with other vessels and the bow lookout, and so on. And finally:

■ **7. Train, train, train.** Most well-managed vessels conduct regular fire, abandon ship, and man overboard drills, but very few practice restricted visibility procedures. Every vessel should have a written restricted visibility procedure and hold regular training. This training should include practising taking and plotting fixes by all methods available, in case of a failure of one of the position fixing devices occurs.

MARS 200809

Grounding due to distraction

Official Report (Source: IMO Sub-Committee of Flag State Implementation – Eleventh Session)

While operating along the inner route of the Great Barrier Reef off Australia, the OOW of a cargo vessel was distracted from his duties and missed a planned course change waypoint. As a result, 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.

Root cause/contributory factors

1. The OOW was distracted from his duties by the presence of his wife on the bridge and by making personal telephone calls;

2. The OOW's routine delegation of navigational duties to the lookout on watch, including position fixing and plotting;

3. Failure of the lookout to notify the OOW of the vessel's position, the course change and proximity to danger;

4. The OOW and his wife isolated themselves on the starboard bridge wing due in part to the noise of the lookout vacuuming the bridge.

Lessons learnt

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

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

3. Watchkeepers should not be distracted by activities not related to their primary task of watchkeeping.

MARS 200810
Cell phone assisted grounding

Official Report (Source: Marine Accident Investigation Branch, UK., Report No 17/2006)

A feeder vessel was on a coastal voyage in northern European waters at night. At midnight the bridge watch changed and at 00.30 the OOW sent the lookout down to stand-by in the crew mess. The lookout understood this to mean he could get some rest so he went to his cabin and was asleep by approximately 01.00. After the lookout left the bridge, the OOW became distracted, initially by the VHF and subsequently by sending text messages on his mobile telephone. The ship's position was roughly checked on one occasion, as the OOW walked past the electronic chart display. At that time there was still some distance to run until the next planned alteration of course. It is claimed the text messaging became all-engrossing, resulting in the planned course alteration at 01.15 being missed, and consequently the ship grounded 32 minutes later, at 01.47.

The OOW had been alerted to the imminent grounding by vibration of the ship. He rushed to the central controls, noticed the ship's speed indicated the ship had stopped, so reduced the pitch on the CPP to zero and called the master. After pumping out sufficient ballast the master, using the bow and stern thrusters as well as main propulsion, was able to refloat the vessel at 02.45. Although there were no injuries, the vessel suffered breach of two ballast tanks, significant plating deflections and extensive scraping damage.

Root cause/contributory factors

1. The OOW failed to make an alteration of course in accordance with the navigational plan;

2. The OOW was distracted for more than 40 minutes prior to the grounding, missing the required waypoint;

3. Although fully aware of the requirement for a lookout to be present on the bridge, the OOW stood down the lookout as weather conditions were good and there was little shipping traffic;

4. The 'dead man' bridge alarm system was thought to have been disengaged;

5. The electronic charting system (ECS) was not being used properly. No depth or no go areas, cross track error or waypoint alarms were set on the ECS;

6. The paper charts did not have regular positions marked, even though they were the primary means of navigation onboard;

7. Fixes were recorded in the log, but these positions were only derived from the GPS, and were not cross-checked by independent sources;

8. There was no active management of the use of mobile telephones while on the bridge;

9. The ISM system had failed to detect either the poor navigational practices or the frequent absence of a lookout at night.

Recommendations

The managers of the vessel were advised to review their ISM system to ensure that navigational practices, training with ECS and the inappropriate use of mobile telephones and other personal electronic equipment are addressed.

■ Editor's note: The common thread through all the above three reports highlight the all too familiar violation of the basic rules of bridge watchkeeping: efficient lookout, safe speed, collision avoidance and passage monitoring. The presence of non-watchkeeping personnel on the bridge is bound to distract the OOW and must never be permitted in coastal and congested waters.

The cell phone, in the hands of any member of the bridge team, including the pilot, is indeed becoming a menace. The bridge team must be professional and assertive enough to prevent incidents arising out of the factors identified in the reports above.

MARS 200811
Hand injury during winch greasing (again)

The bosun and a seaman were carrying out routine greasing of a mooring winch. In order to remove the dried old grease around the dog clutch and shaft, it was necessary for the seaman to extend his arm between the drum and the winch drive gear and clear it manually. With the bosun following the instructions from the seaman, the winch was being rotated intermittently, while the seaman proceeded with the task when the winch was immobile.

During one such pause, the shaft suddenly began to rotate unexpectedly, and the sleeve of the seaman's parka got caught in the clutch assembly, quickly drawing his hand into the rotating part.

Fortunately the bosun responded rapidly to the seaman's shouts and the winch was slowly and carefully operated in reverse mode until the hand was freed. First aid was administered for cuts and bruises and subsequent medical examination ashore declared the seaman fit for duty after a few days' rest.

Root cause/contributory factors

1. The winch power supply had not been isolated before commencement of work;

2. Loose fitting parka and inadequately fastened sleeve cuff.

Lessons learnt

1. Machinery or moving gear should be de-activated before any maintenance is carried out on or near them.

▲ View of dog clutch into which the parka sleeve and hand were drawn

2. If work on a moving system cannot be avoided, the job must be carried out by two persons at least, one of them being in position to activate the emergency stop at any moment.

3. Clothing and personal protective equipment (PPE) must not be loose when working on or near moving systems.

4. Risk assessment should take into account every realistic hazard. Past risk assessments should be reviewed during onboard daily meetings so that previously identified hazards are not missed.

■ **Editor's note:** MARS 200641 (September 2006) described a very similar incident where an unfortunate seaman lost his hand. Here is evidence, if any were needed, that such tragic accidents could be avoided if only seafarers had access to, and updated themselves regularly on, the wealth of information available in past MARS reports and other such sources. Shipping companies, safety officers and managers are encouraged to support MARS and, at the very least, effectively distribute past reports to their fleet.

MARS 200812
Unauthorised computer applications

Three different vessels in our fleet reported these worrying incidents:

■ **Vessel 1:** The OOW was found playing games on the bridge computer while navigating in congested waters. Further investigation revealed that he had apparently opened an innocuous short-cut icon on the screen entitled 'Navigation' which once opened, launched a computer game.

■ **Vessel 2:** A non-approved programme was installed on a chart correction computer, which immobilised it. Findings revealed that a deck officer had installed an unauthorised and infected programme. As a result the system became inoperable and until it was fully restored, there was considerable delay in effecting chart corrections.

■ **Vessel 3:** After realising that the chart correction computer was not connected via an uninterrupted power supply (UPS) unit, the ship's staff located a 'spare' UPS and decided to install it. Subsequent difficulties in email exchanges and printing chart correction tracings were later attributed to this incompatible UPS.

Corrective actions

The fleet was reminded about the following company policies:

1. No unauthorized programme should be loaded on any of the ship's computers.

2. All ships' computers should be regularly checked for unauthorised programmes and viruses.

3. The bridge computer is installed solely for chart corrections and watch-keeper programmes and to assist deck officers in administrative tasks and should only be used in port, or only by off-duty staff while at sea.

4. If any unauthorised software is detected, the company is to be consulted on determining a safe method of uninstalling such programmes without damage to equipment or loss of data.

5. The company should be consulted in case of any software or hardware defect or deficiency and hasty, unilateral actions must not be taken.

MARS 200813
Anchor handling tug capsize

Official Report (Source: Condensed from Norwegian Maritime Directorate NIS Circ 7-2007)

The anchor handling tug (AHT) *Bourbon Dolphin* capsized on 12 April 2007 off the Shetland Islands while engaged in anchor handling operations. Preliminary investigations have determined that simultaneous towing/anchor-handling and winching operations by an AHT can seriously affect her stability, especially if these are carried out under greater loads and speeds.

Under such circumstances, if the AHT suffers loss of propulsion or thrust, together with an adverse rudder position, the vessel is very vulnerable. In particular, when towing ahead, the loss of bollard pull will cause the vessel to be pulled astern with great force by the enormous tension in the towline or the anchor chain, and this can easily capsize the vessel. If the load is connected to the towing hook, the AHT may be able to recover from the hazardous situation by operating the emergency release system, but this may not be possible when towing or hauling by winches.

Operators of such vessels must bear in mind that the maximum righting arm (GZ-max) may occur at angles of heel as low as 15 degrees and that the working deck immerses at very small angles of heel. Similarly, the angle of flooding may also occur at a relatively small angle, as compared to other merchant vessels.

The Norwegian Maritime Directorate has implemented the following immediate corrective measures on all their AHTs, including changes to the SMS, as appropriate.

1. Data must be available at the conning position to show the maximum permissible transverse force/tension limiting the vessel's maximum heel to one of the following angles, whichever is least:

- Heeling angle equivalent to a GZ-value equal to 50% of GZ-max;
- The angle at which the working deck immerses ;
- 15 degrees.

2. The approved stability booklet shall specify the maximum

permissible tension in chain or wire during a vertical lift without bollard pull which shall not be greater than the rated anchor handling capacity.

3. A vessel-specific curve must show the maximum continuous bollard pull available (BP) for anchor handling as a function of the total power balance after allowing for the power loads for propulsion, side thrusters and winches.

4. Procedures for emergency release methods, time delays and release speed shall be established and this information shall be displayed at the conning position.

5. Worked examples showing calculations of anticipated forces which may occur in various modes of operation shall be displayed at the conning position, with clear warning that the load must be released if the forces exceed safe limits.

6. During tandem and joint towing operations, the towing gear must be connected to towing hooks with emergency release or in some other way so that in case of a breakage in towing line or loss of power/bollard pull in one of the vessels, the other vessel may quickly release the load. A communication plan for the operation must be established which in particular ensures an effective and coordinated action in case of any unintended incident.

MARS 200814

Propeller damaged by own refuse

A cargo ship had recently renewed some heavy heat exchangers in the machinery spaces and the discarded units were retained for dumping in deep and open waters. They were temporarily stowed on the poop deck. During passage on the high seas, without the knowledge of the bridge watch and with the ship steaming ahead at full sea speed, the units were transferred on to an improvised 'skid' placed on top of pipe lengths laid on deck and were 'rolled' overboard. This involved temporary removal (gas cutting and re-welding) of sections of poop deck railing. The point of jettison was only about 20 metres ahead of the propeller. At the next port, the vessel underwent a routine underwater hull coating inspection and the divers reported damage to the propeller blades.

As well as floating debris, the indiscriminate dumping of large and heavy objects from near the stern can easily damage the propeller and rudder, as the trajectory under the water may be affected by the suction effect of the propeller. If the damage is serious, the vessel may be disabled far from SAR (search and rescue) services, with serious consequences for life, property and the environment.

▲ Heat exchangers on poop deck before unauthorized dumping.