MARS – Lessons Learned

MARS Report No 376 February 2024

MARS 202406

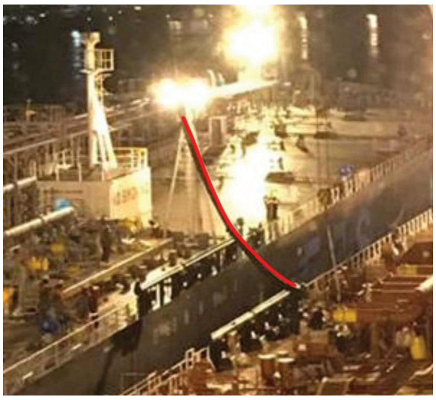
Bad hose blanking practice

→ Two tankers were carrying out a ship to ship (STS) transfer in port. The receiving vessel was moored at dolphins, with the supply vessel secured alongside. Upon completion of the transfer operation, the cargo hose had to be drained to the receiving vessel before the vessels separated.

Under the instructions and supervision of the Person in Overall Advisory Control (POAC – appointed by the voyage charterers of the receiving vessel), the cargo hose was disconnected from the supply vessel. The POAC instructed the crew to put a rag in the flange of the cargo hose to create a small clearance and loosely bolt the blank in order to allow air into the hose to 'facilitate' draining to the receiving vessel when the line was raised. This arrangement was not communicated to the crew of the receiving vessel, so there was no opportunity for crew to challenge this practice or exercise their 'stop work authority'.

The first attempt to lift the cargo hose was unsuccessful. The hose was lifted only 10m over the upper deck, leaving another 14 metres of hose bent in a U shape between the vessels. Due to the improper lifting and U shape, the cargo line could not drain to the receiving vessel and an excessive bend developed at the hose support of the receiving vessel. This created so much pressure in the hose that the oil remaining in the hose was forced up and back out, escaping the hose at the loosely bolted flange at the supply vessel. An estimated 15L of oil was sprayed on deck, onto the fenders, and into the sea between the two vessels.

Incorrect lift causing U in hose



Correct lift for drainage

Lessons learned

- STS guidance specifies blanked flanges should be securely bolted to prevent pollution.
- Introducing atmospheric air to the cargo system constitutes an explosion risk.
- A STS Joint Plan of Operations should include all operations such as cargo hose connection, draining, purging and disconnection.

MARS 202407

Simple mistake turns deadly

As edited from official MAIB (UK) report 4/2023
https://tinyurl.com/MARS20247

→ A liquefied petroleum gas carrier was berthed and preparations were underway to unload the cargo. The engine room team met for a routine toolbox talk to discuss the jobs for that day. At the end of the meeting the daily duties were assigned; the 3rd engineer was tasked with checking the running of Auxiliary Engine (AE)2 and AE3. The 3rd engineer inquired if he could also clean the AE1 fuel filters. When asked if he needed assistance for that job he declined.

The 3rd engineer decided to clean the AE1 fuel filters as his first task. He undid the two locking screws on the splash shield and removed it from the housing to access the duplex fuel filters. As he was undoing the front right-hand nut of the filter, the fuel pressure (5.5 bar) still present in the system lifted the cover and forced the O-ring seal out of its recess, causing it to split. Marine gas oil sprayed out over a large area, covering the crewmember. The spray also reached the nearby AE2's turbocharger and exhaust pipework about 1m away. These engine parts were very hot. The fuel ignited almost immediately and thick black smoke began to emanate from the AE2 exhaust insulation.

The engine room fire alarm sounded, which resulted in an immediate emergency shutdown of cargo discharge operations. All crew except the 3rd engineer were quickly accounted for. On the bridge, the Master saw that the fire control panel was indicating a fire in three engine room zones. He then requested firefighting assistance from the port.

In the meantime, the Master was informed that the CO_2 fixed firefighting system was ready for release. The Master prohibited the CO_2 from being released until the missing 3rd engineer had been found. A vessel search and rescue team wearing breathing apparatus attempted to enter the engine room from the poop deck entrance. A large quantity of smoke and heat was emitted when the team opened the door and their entry was soon aborted because of zero visibility. The search and rescue team attempted a second entry at another location soon afterwards, but they felt unable to proceed due to the intense smoke and having seen flames on the deck above.

Shortly after, a third search party attempt was made via another entry point. Descending the stairs, in thick smoke and with no visibility, the search party followed the starboard walkway aft towards AE3. The AE3 was found still running so it was stopped locally. Through the smoke, the search party could see small flames under the turbocharger at the aft end of AE2. A CO_2 fire extinguisher was used to put these out.

Soon, the visibility in the ER improved to about 2m. The search party saw flames above AE2 on the auxiliary boiler flat and used the aft port side stairs to access the area. They attempted to extinguish the flames with the same CO_2 extinguisher used earlier, but the fire kept reigniting. Then a dry powder extinguisher was used, which initially seemed to extinguish the fire but it soon reignited. They then left the engine room without having sighting of the 3rd engineer.

About 90 minutes after the fire had ignited, a shore-based fire and rescue service team boarded the vessel. They were briefed on the ship's fire plan and the last known location of the 3rd engineer. They then entered the engine room and descended the stairs to A Platform. Using a thermal imaging camera, they located the victim on the starboard mezzanine walkway.

Upon evacuation of the victim to the cargo control room the medical team observed he was alive but his breathing was laboured. He was evacuated by ambulance to a hospital approximately 20 minutes later. In the meantime, the fire on the vessel was extinguished. The victim had not suffered any burns and was placed in a hospital intensive care unit within two hours of his rescue. He had suffered acute cyanide and carbon monoxide intoxication; although he was initially stable, his condition deteriorated and he died nine days later.

Some of the findings of the official investigation were, among others;

- Of the 59 occasions over 16 months that the fuel filters on all auxiliary engines had been noted as cleaned, no lock out/tag out procedures had been completed for the pressurised fuel system.
- The critical factor for survival of fire victims affected by HCN and CO is rapid extraction from the toxic atmosphere. It is likely that finding and removing the victim from the engine room sooner would have increased his chances of survival. Had the vessel been equipped with a Thermal Imaging Camera, and suitably trained on board fire teams drilled in its use, it is possible the victim could have been found earlier.

Post-accident test using water to simulate fuel spray

Lessons learned

- The victim's action to remove the AE1 fuel filter elements without first isolating the fuel from the filter assembly was the major contributing factor to this accident. How could this mistake have been avoided? A procedure? A checklist? Better supervision? Teamwork? Better training?
- The shore-based search and rescue team located the victim in the smoke-filled space using a thermal imaging camera. This device could be a valuable addition to shipboard emergency equipment.
- A ship fire is an imposing challenge for crew and drills that replicate the difficulties that may be faced, such as searching in near zero visibility, can pay dividends.

MARS 202408

Fatal fall

As published by the Dutch Safety Board, March 2022
https://tinyurl.com/MARS202408

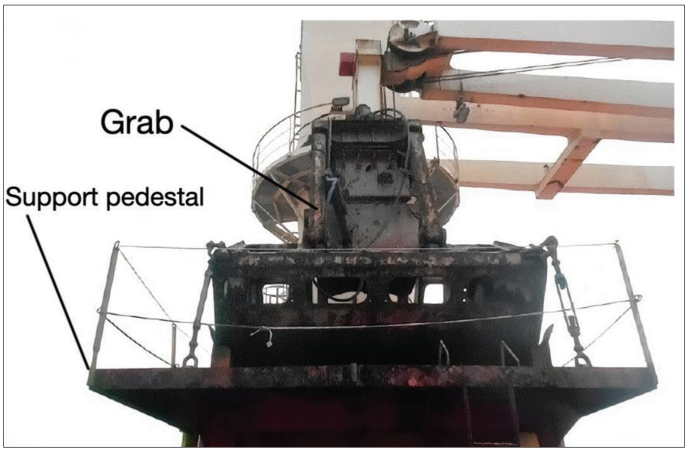
➔ A vessel at anchor was to unload cargo using its own grabs. The grabs needed to be secured to the crane hooks for unloading. The grabs were secured on pedestals that protruded two and a half metres above the deck. Given the height of each grab, the top of the grab to which the crane hook had to be attached was more than six and a half metres above the deck.

The rigging was carried out on all four ship cranes, but other jobs still needed attending to. One deck crew climbed onto the grab via the integrated steps on the grab to release a lashing. The crane operator moved the hook towards the grab. Two ABs used a messenger line to guide the crane hook while the AB on the grab was still working to release the lashing.

The lifting block on the crane swung and hit the crewmember working at the lashing. The victim fell backwards to the deck below, landing on his head. None of the crew members involved were wearing the PPE required, such as a helmet, or using fall protection even though this equipment was available on board.

The Master was informed of the accident and the victim was attended to. He was soon transported to a shore hospital, but his condition worsened en route. On arrival at the hospital he was confirmed deceased.

During the investigation, it was not possible to determine with certainty why the lifting block suddenly swung.



Lessons learned

- Walk the talk? Wearing correct PPE was apparently discussed during the earlier toolbox meeting, including the use of fall protection when working at height. However, during the work, no crew members wore proper PPE or used fall protection, nor did the duty officer object to this practice.
- Management's commitment to safety and the ensuing trust relationship that is created with crewmembers are key elements of a robust safety culture. Senior vessel leaders must walk the talk.

MARS 202409

Shortcut cuts safety short

➔ On a vessel at anchor, a crewmember was assigned to replace a leaking hydraulic pipe on one of the hatch covers. Once the job was completed the crewmember attempted to regain the clear deck area by walking over adjacent deck pipes that were about 50cm above deck level, rather than walking to one of the raised walkways allowing access over the pipelines at regular intervals. While walking over these raised pipes he slipped and fell, with his back striking the raised pipes. He suffered disc lesions to his lower spine.

There are raised walkways allowing access over the pipelines at regular intervals on the main deck.

Lessons learned

- Decisions made for the sake of expediency are rarely compatible with safety.
- Ask yourself, is there a safer way? If the answer is yes, take the safer way.

MARS 202410

Tidy up or trip

➔ A ship was in dry dock and deck crewmember on the night shift was undertaking a safety round. As he reached the bottom of an exterior stairway and began walking, his foot caught a two-inch hose laid on deck. He tripped and fell, but initially thought he was uninjured. Later, his ankle became swollen and a sprained ankle was diagnosed.

Lessons learned

- Dry dock work is notorious for snake-like arrays of hoses and other tripping hazards on deck areas. Keep walkways safe by making them as clear as possible and using high visibility cable ramps (covers) in areas where there is foot traffic over hoses.
- Keep walkways and stair landings well lit during the hours of darkness.

MARS 202411

Over-pressurised keel bladder sends warning shot across the bow

As edited from USCG (USA) Marine Safety Alert 04/23

➔ A cruise vessel in Antarctic waters offered sightseeing excursions to passengers using small inflatable open boats. On one occasion, the keel bladder of the boat suddenly ruptured in an explosion-like occurrence. One passenger was severely injured and another was thrown overboard.

The investigation determined that the rupture was caused by excessive pressure in the keel bladder tube. The recommended manufacturer's operating pressure is 240 millibars. A survey of inflatables on board the cruise ship noted pressures up to and exceeding 620 mb in other keel bladders.

For this model of inflatable, and possibly others, the keel bladder is not protected by a pressure safety relief valve. The manufacturer recommends that they be inflated with a foot pump to reduce the chance of over-pressurisation. In this instance, it was found that crewmembers were routinely using an air compressor to fill the buoyancy chambers (including the keel bladder tube). Pressure levels were not being checked using a manometer as recommended by the manufacturer.

Lessons learned

- Follow all manufacturer recommendations for inflatable boat inflation and maintenance.
- Use manufacturer recommended inflation devices (eg foot pump) and appropriate pressure measurement tools to avoid over-pressurisation.
- Verify that company policy addresses manufacturer recommendations and that crews are properly trained before operating and performing maintenance on inflatable boats.

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