BSAFE

INCIDENT CASE STUDY

No.1 | NOVEMBER 2020

DEATH OF THIRD ENGINEER DUE TO BURN INJURIES

THE THIRD ENGINEER (3/E) ON BOARD A CAPESIZE BULK CARRIER WAS SPLASHED BY HOT SLUDGE WHILE OPENING THE MANHOLE COVER OF A SETTLING TANK. ALTHOUGH HE WAS SUBSEQUENTLY EVACUATED TO A SHORESIDE HOSPITAL BY HELICOPTER, HE TRAGICALLY DIED 12 DAYS LATER.

FIGURE 1 THE LEVEL GAUGE OF NO.2 WASTE OIL SETTLING TANK. SOURCE: HBMCI

The vessel, built in 2010, was anchored off a Brazilian port waiting to enter and commence loading. While at the anchorage, the Second Engineer (2/E) transferred about 1.8 m3 of sludge from the "Bilge Separator Oil Tank" (BSO Tank) to No.2 "Waste Oil Settling Tank" (No.2 WOS Tank) using the sludge pump. After the transfer, it was observed that the level gauge of the No.2 WOS Tank (Figure 1) was not indicating the correct quantity. The transferred quantity was then confirmed by sounding the BSO Tank, and it was concluded the level gauge in No.2 WOS Tank had malfunctioned.

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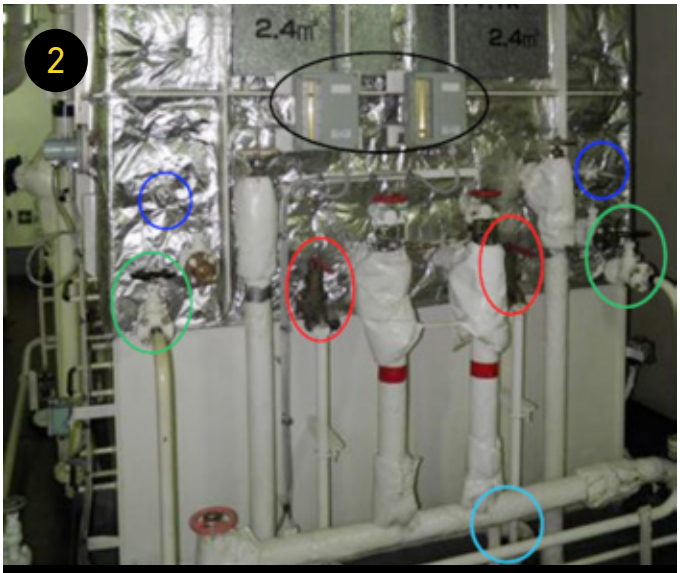

FIGURE 2 THE TWO WASTE OIL SETTLING TANKS. BLUE: THERMOMETER GREEN: DRAIN TO BSO TANK RED: SELF-CLOSING VALVE LIGHT BLUE: SCUPPER BLACK: LEVEL GAUGES SOURCE: HBMCI

FIGURE 3 THE MANHOLE AT THE AFT SIDE OF THE TANK ALMOST ONE METRE FROM THE BULKHEAD AND TWO METRES FROM THE FLOOR. SOURCE: HBMCI

WHAT HAPPENED

The Chief Engineer (C/E) was informed about the gauge malfunction and decided that the No.2 WOS Tank should be cleaned the following day and the level indicator repaired. He therefore prepared a "Job Hazard Analysis" (JHA) for the tank cleaning operation in accordance with the vessel's Safety Management System Manual.

The next morning while still at anchor, the 2/E, assisted by the 3/E was assigned to drain the No.2 WOS Tank which was situated adjacent to No.1 WOS Tank (Figure 2) in order to clean the sludge residues from the tank and repair the level gauge mechanism. The 2/E opened the No.2 WOS Tank drain valve to allow the sludge to drain back to the BSO Tank by gravity. He left the valve open for about 10 minutes until the level gauge indicated 300 litres.

In order to confirm the No.2 WOS Tank was empty, the 3/E got on top of the tank and turned the wire wheel of the scale reduction device and reported to the 2/E that it was working. The 2/E noted a small movement of the level indicator while the drain valve was open. Finally, the 2/E opened the self-closing drain valve used to drain water accumulated in the tank. A small quantity of water flowed through the drain valve and then stopped.

Based on the above, the 2/E was convinced that the tank was empty and told the 3/E to proceed with opening the manhole. The 3/E used a small folding ladder to reach the manhole cover (Figures 3) and (Figure 4, next page), located about two metres above the floorplates, and started removing the cover nuts using an air impact wrench. The 3/E removed most of the nuts from the manhole apart from four, which he then loosened by a half turn. As he did not observe any oil leakage from the cover seat, he loosened the remaining nuts further. Then, without removing the nuts, he pulled the cover which detached from the seat. However, hot oil at a temperature of approximately 86°C started splashing from the manhole bottom onto the 3/E, standing on the ladder.

CONTINUED ON NEXT PAGE

BSAFE

INCIDENT CASE STUDY

No.1 | NOVEMBER 2020

FIGURE 4 THE MANHOLE COVER OF NO.2 WOS TANK AND THE TWO JACKSCREWS FITTED ON THE TOP AND BOTTOM SIDE. SOURCE: HBMCI

WHAT HAPPENED (CONTINUED)

The 2/E, who was about one metre away, pulled the 3/E away and took off his coverall which was soaked with the hot oil. The engine crew then moved the 3/E to the vessel's hospital where it was observed that he had sustained serious burns to various areas of his body. In the meantime, the Master was informed about the incident.

The Master reported the incident to the Company, then contacted the local agent and requested the immediate transfer of the 3/E ashore for treatment. Meanwhile, the C/O provided the 3/E with first aid.

A helicopter arrived about two hours after the accident. The 3/E's condition was considered to be relatively good when he left the vessel and he managed to walk by himself to board the helicopter. The 3/E was transferred to a hospital in Sao Luis, where he was diagnosed with 2nd degree burns to a large part of his body. He was admitted to Intensive Care Unit and remained hospitalized for the next 12 days, until he died from a septic shock.

LESSONS LEARNED ON NEXT PAGE

BSAFE

INCIDENT CASE STUDY

No.1 | NOVEMBER 2020

LESSONS LEARNED

THE FOLLOWING LESSONS LEARNED HAVE BEEN IDENTIFIED BASED ON THE AVAILABLE INFORMATION IN THE INVESTIGATION REPORT AND ARE NOT INTENDED TO APPORTION BLAME ON THE INDIVIDUALS OR COMPANY INVOLVED:

The investigation found that the potential hazards related to the unknown quantity of hot sludge remaining in the tank due to the malfunctioning level gauge had not been identified. A simple, complete and meaningful risk assessment needs to be conducted before starting a task to identify the hazards and precautions required; it will also help the personnel maintain focus when most needed.

Making assumptions about the safety of the work environment can lead to unexpected hazard exposure and injury. Experience and professional knowledge may not be enough to address the safety gaps resulting from a risk assessment based on an incomplete hazard identification.

Confirmation bias (favouring information that confirms one's previously existing beliefs) can create a window of opportunity for an incident. This can be avoided by personally challenging oneself to take a minute and think about the job at hand – to consider what can go wrong and how, and what steps one can personally take to minimize the risk.

Taking shortcuts from an established safe work procedure to save time and effort may be appealing, but can lead to undesirable and even tragic consequences. Other ways of confirming the tank had been drained could have been used, for example, by measuring the quantity of the BSO Tank; this would have helped identify that it was not safe to open the manhole cover.

The vessel's Planned Maintenance System (PMS) did not address the foreseeable and preventable jamming of the level gauges with sludge oil by providing guidelines for periodic routine maintenance/tank cleaning. The provision of an appropriate and regular regime for cleaning the tank would have helped avoid the need for this unplanned and hazardous task.

The WOS Tank was not fitted with a sounding pipe as an alternative means when the level gauge malfunctioned. Although not a requirement, had a sounding pipe been fitted, this would have allowed the two engineers to verify the contents of the tank.

The 3/E was wearing a common cotton coverall provided to him by the company. This would have only provided limited protection from heat and would have allowed the penetration of the hot liquid and transfer of heat to the skin. The investigation identified that an ISO 11612 compliant coverall could have possibly provided better protection to the 3/E despite being intended to protect against heat and flame rather than hot liquids.

CONTACT

For more information on this incident email **lossprevention@tindallriley.com**

THIS CASE STUDY IS DRAWN FROM THE INVESTIGATION REPORT 14/2013 PUBLISHED BY THE HELLENIC BUREAU FOR MARINE CASUALTIES INVESTIGATION – HBMCI AT:
http://www.hbmci.gov.gr/js/investigation%20report/final/14-2013%20CAPTAIN%20PETROS%20H.pdf

THE PURPOSE OF THIS CASE STUDY IS TO SUPPORT AND ENCOURAGE REFLECTIVE LEARNING. THE DETAILS OF THE CASE STUDY MAY BE BASED ON, BUT NOT NECESSARILY IDENTICAL TO, FACTS RELATING TO AN ACTUAL INCIDENT. ANY LESSONS LEARNED OR COMMENTS ARE NOT INTENDED TO APPORTION BLAME ON THE INDIVIDUALS OR COMPANY INVOLVED. ANY SUGGESTED PRACTICES MAY NOT NECESSARILY BE THE ONLY WAY OF ADDRESSING THE LESSONS LEARNED, AND SHOULD ALWAYS BE SUBJECT TO THE REQUIREMENTS OF ANY APPLICABLE INTERNATIONAL OR NATIONAL REGULATIONS, AS WELL AS A COMPANY'S OWN PROCEDURES AND POLICIES.