RISK ALERT

Pumproom Fatality

Written by
Captain John Taylor
Loss Prevention

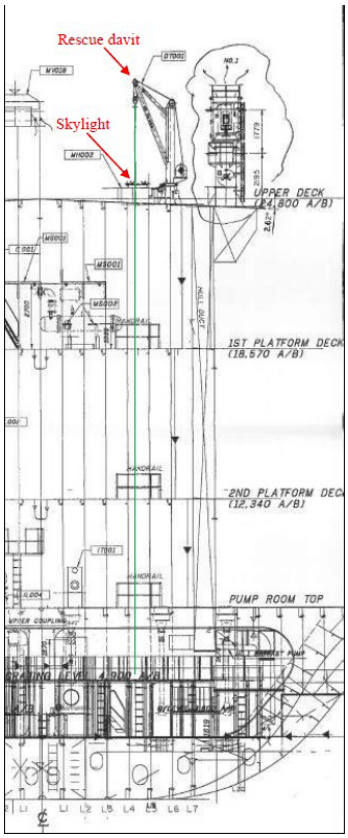
The Club would like to draw Members' attention to the recently issued Transport Malta Safety Investigation Report No 03/2021 concerning a fatality in the pumproom of a crude oil tanker.

In the course of undertaking what could be considered routine pre-arrival tests of the pumproom bilge alarm system, the pumpman was found collapsed in a confined bilge area. When recovered, the pumpman had no vital signs and was declared deceased.

This risk alert reviews the investigation report and some of the identified factors that could have contributed to this unfortunate fatality:-

Location of the **bilge alarms and access** for testing. Whilst the port bilge alarm was quite readily accessible, access to the starboard bilge alarm required entering a restrictive and confined area of the bilges, where it is possible that concentrations of gases may have built up that were not detected by the fixed gas detection system.

The location of the starboard bilge alarm, and the proximity of the pumpman to the alarm, meant that when he collapsed the pumpman was not readily visible to the rescue party. The awkward and confined location of the bilge also meant that,when strapped into the rescue stretcher it was not possible to lift him to the level of the gratings, from where the rescue davit could be utilised to recover him from the pumproom. It was ultimately necessary to remove the pumpman from the stretcher and manually lift him to the gratings to effect recovery.



Ref TM Report 03/2021 - Rescue davit (green line indicates direction through which its wire passes) - © Copyright TM, 2021

The autopsy of the pumpman revealed that he had a laceration on the vertex of his scalp and that this had caused a hematoma under the scalp. He also suffered fractured ribs and abrasions to his legs. A toxicological analysis revealed the presence of *n*-Butane and death was recorded to have occurred due to *n*-Butane intoxication.

Post accident atmosphere checks of the bilge area where the pumpman was found returned H2S readings of between 2 and 20ppm (these checks were conducted some 24 hours post incident and after the vessel had berthed). The Threshold Limit Value (TLV) of H2S is stated to be 5ppm as Short Term Exposure Limit (STEL) and both *n*-Butane and H2S are known to be naturally found in crude oil. The investigation could not exclude the possibility that the pumpman was overcome by H2S and was then left exposed to high concentrations of *n*-Butane. (*n*-Butane and H2S are both heavier than air).

Points for consideration:

The **gas detection** alarms were not activated around the time of the incident, and the nearest gas sampling suction point was 4.5m from the access manhole to the starboard bilge alarm sensor. It is reported that the location of the sampling point would have compromised the effectiveness of the gas detection system in detecting the presence of gas near the sensor. The system was last maintained by a shore service provider approximately 4 months prior to the incident. At the time of the service, it was observed that hydrocarbon samples collected from the portside of the pumproom bottom, and above the lowest grating, could not be set to match the contents of the calibration gas. The same was noted for H2S samples extracted from the pumproom bottom on the stb'd side.

The report identifies that the pumpman was carrying a **personal multi gas detector**, no alarms from which were reported to have been heard by the rescue team. When the investigators attended on board, some 24 hours after the incident, the multi gas detector was found to be switched off, and whilst there are a number of theories as to why this might have been, the exact reasoning could not be determined. This is explored within the investigation report.

The autopsy identified that the pumpman **struck his head** and it is possible that this happened as the pumpman was trying to exit the bilge space. Whilst not proven, there is a theory that the pumpman may have sensed the presence of **H2S** and, that as a consequence, he may have been trying to make his way out of the bilge space. There was also a small quantity of **oily water** in the starboard bilge space and it is thought that this may have caused the pumpman to slip and strike his head, rendering him unconscious and further exposing him to the toxic gases.

Ref TM Report 03/2021 - Location where the fatally injured pump man was found (green arrow) - © Copyright TM, 2021

The investigation also looked at **fatigue and drugs/ alcohol.** Whilst it was not possible to confirm the quality of the pumpman's rest hours he was in compliance with the applicable requirements, and there were no indicators to suggest that his actions were the result of fatigue. Toxicology tests did not detect any drugs or alcohol.

Whilst the investigation report does not identify a clear root cause for this sad fatality there are a number of learning opportunities that have been identified, and it is some of these that the Club would like to highlight:

The presence of ***n*-Butane** and **H2S** are a recognised hazard of crude oil and require to be treated with appropriate precautions including risk assessment, gas testing and robust entry procedures and protocols. The full functionality and reliability of all gas detection and ventilation systems is of paramount importance.

Enclosed and restricted space recovery procedures, as was experienced in this instance, access to some locations on a vessel, particularly in areas such as pumprooms and bilge spaces, may be restricted due to the layout and structure of the vessel. Emergency exercise and drills should be utilised to identify potential problem areas and risk assessments and contingency measures should be identified, implemented and exercised against. Whilst not highlighted in the investigation report, the availability of an Emergency Escape Breathing Device (EEBD) may have been beneficial. Had the pumpman detected gas and donned an EEBD he may have been able to leave the bilge spaces in a controlled fashion. The provision and carriage of EEBD's being one of the corrective actions implemented post incident.

Ref TM Report 03/2021 - Access manhole for stb'd side bilge sensor (Red arrow) - © Copyright TM, 2021

Gas detection systems, fixed and personal. Verify and test the effectiveness of such systems and where any anomalies are identified, as was identified by the shore service provider in September 2019, investigate and

rectify the anomaly. There should be clear guidance on the use and inter-relationship between the use of fixed, personal and portable gas detection systems.

Maintenance and **house keeping**:- The small leak in the suction valve of the pump-room's starboard bilge, combined with the routine draining of water during the warming up of the stripping pump, could potentially have contributed to this incident and highlights the necessity to address and rectify deficiencies and to always maintain appropriate standards of cleanliness and housekeeping. Robust maintenance regimes and good housekeeping should be implemented to prevent slips, trips and falls

Ref TM Report 03/2021_ - Suction valve (circled in green) of the starboard bilge of the pump room - © Copyright TM, 2021

This unfortunate incident once again draws attention to the need for appropriate and robust risk assessments, ensuring that safe systems of work are in place for all activities and that rescue plans are fully understood and practiced on a regular basis.

Members are reminded of IMO Resolution A.1050 (27) "Revised recommendations for entering enclosed spaces aboard ships", which makes specific reference to pumprooms, and also the utilisation of stand-by personnel. Additional guidance is also provided in the **International Safety Guide for Oil Tankers and Terminals (ISGOTT)**

Members are reminded of the following previously issued Risk Alerts and some of the key messages that they convey:

RA 16 – The Dangers of Confined Spaces – Identifying an enclosed space and the potential causes / sources of oxygen deficiency together with
guidance on how to effect safe entry of a confined space.

RA 47 – Concentrated Inspection Campaign (CIC) on Enclosed Space Entry Drills – In addition to Reminding Members of the CIC that the Maritime Administrations of Paris and Tokyo were undertaking in 2015 this RA also provided the list of ten questions that PSCO's of the participating MOU's would be asking, the first 8 of which hold good as questions to be addressed when considering all enclosed space entry activities.

RA 62 – Safety in Enclosed Spaces – A reminder of the varied natures of enclosed spaces.

The International Group of P&I Clubs short video "Enclosed Space Entry" highlighting the risks of enclosed space entry.

Should Members have any questions in regard to this or any of the referenced Risk Alerts then please contact the Club's Loss Prevention Department.