Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

202002/002 REPORT NO.: 03/2021 February 2021

MT *VALTAMED*
Fatality in the pump room
at Ceyhan OPL Anchorage, Turkey,
in position 36° 20.6’ N 035° 09.66’ E
03 February 2020

SUMMARY

Whilst *Valtamed* was at anchor awaiting berthing instructions, pre-arrival tests of the high-level alarms of the vessel’s cargo tanks, and the forepeak store and pump room bilges were being conducted by the crew members.

After testing the atmosphere of the vessel’s pump room, the pumpman proceeded to the bottom platform to test the space’s bilge alarms. Although the port side bilge alarm was successfully tested, the chief officer noted that starboard side bilge alarm had not activated within the anticipated time.

Since the chief officer’s calls went unanswered, he notified the bridge.

Soon after, the general alarm was raised, and rescue procedures were initiated. On reaching the bottom of the pump room, the rescue team found the pumpman lying in the starboard side bilge.

The pumpman was hoisted out of the pump room, but he had no vital signs. Thereafter, the vessel proceeded towards the port for medical evacuation.

Considering the safety actions taken by the Company, no recommendations have been issued by the MSIU.

MT *Valtamed*

FACTUAL INFORMATION

Vessel

Valtamed (Figure 1) was an 83,669 gt, double-hull oil tanker, owned by Vassholmen Shipping Ltd. and managed by Navigazione Montanari S.p.A., Italy. *Valtamed* was built in 2004, by Daewoo Shipbuilding and Marine Engineering Co. Ltd. in the Republic of Korea and was classed with Registro Italiano Navale (RINA).

The vessel had a length overall of 274.00 m, a moulded breadth of 48.00 m and a moulded depth of 23.70 m. She had a summer draught of 17.02 m, which corresponded to a summer deadweight of 158,609 metric tonnes (mt). At the time of the occurrence, her forward and aft draughts were recorded as 7.00 m, and 9.00 m respectively.

Propulsive power was provided by a six-cylinder, two-stroke, single-acting, low speed, HSD MAN B&W 6S70MC-C marine diesel engine, which produced 18,623 kW at 91 rpm. This drove a fixed-pitch propeller, enabling *Valtamed* to reach an estimated speed of 15 knots.

Crew

Valtamed's Minimum Safe Manning Certificate stipulated a crew of 15. At the time of the accident, the vessel was manned by 21 crew members. The master and the chief engineer were Italian nationals, while the rest of the crew members were nationals of India.

The fatally injured pumpman was 52 years old. He had 27 years of seafaring experience, almost eight of which served in the rank of a pump man. He had joined the vessel on 13 December 2019, from the port of Mailiao, Taiwan. The vessel's records indicated that he had been familiarized with pump room safety and entry procedures, by the chief officer on 25 December 2019. He was not assigned any watchkeeping duties on

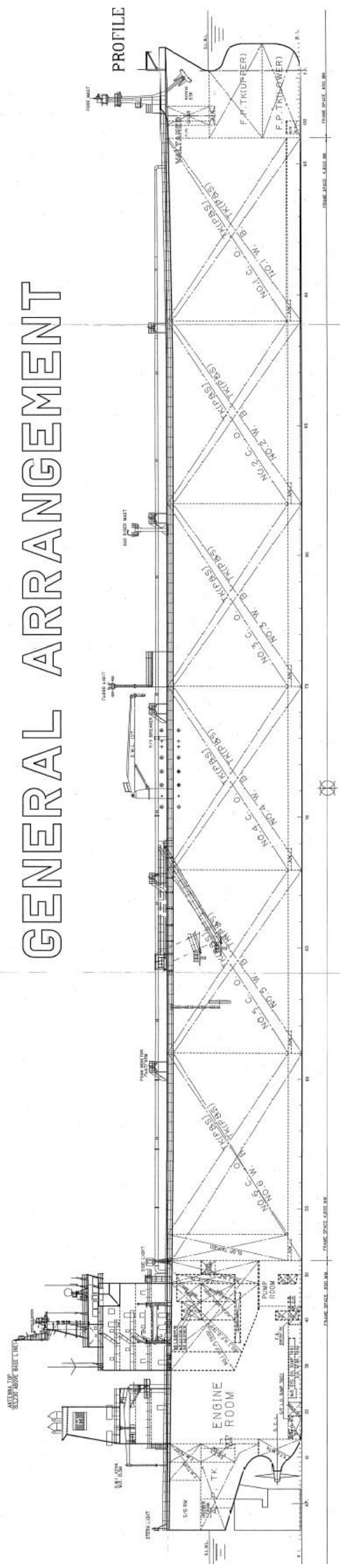

Figure 1: Extract of the General Arrangement Plan – *Valtamed*

board, and his work / rest hour records indicated that he had a rest period of about 15 continuous hours prior to resuming work at 0700 on 03 February 2020.

The master was a 57-year-old Italian national. He had about 35 years of seafaring experience, almost 10 of which were served in the rank of a master. He held STCW[1] II/2 qualifications for a master, and his most recent certificate of competency had been issued by the Italian authorities in 2016. He too had joined the vessel on 13 December 2019, from the port of Mailiao, Taiwan.

The chief officer was 40 years old. He had about 19 years of seafaring experience, of which two years were served in the rank of a chief officer. He held STCW II/2 qualifications for a chief officer, and his certificate of competency was issued by the United Kingdom authorities in 2013. He had joined the vessel on 06 October 2019, from the port of Yalova, Turkey.

Both, the master and the chief officer had previous experience in their respective ranks on board *Valtamed*, while the pump man was serving on board for the first time.

Pump room

The vessel was fitted with a pump room (Figure 2). The vessel's cargo and ballast pumps and fittings extended down from the main deck to the keel. The vessel was fitted with three cargo pumps and two ballast pumps. All cargo pumps were located on the port side of the vessel's centre line, with cargo pump no. 1 lying closer to the centre line and cargo pump no. 3 lying closer to the port side. The pump room was located just forward of the accommodation block.

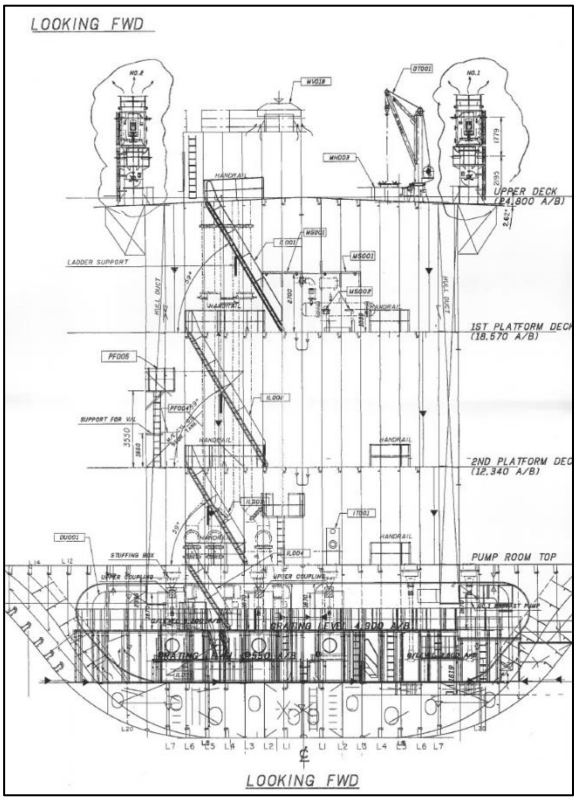

Figure 2: Pump Room Arrangement Plan

Ventilation arrangements consisted of one natural vent of the mushroom type and two mechanical extractor fans, each having an air-flow rate of 27,000 m^3hr^{-1}. The intakes of the extractor fans extended down to the lowest level gratings of the pump room.

The pump room was fitted with two bilge alarm sensors of the float type (Figure 3), located on the port and starboard sides of pump room bottom.

The port side bilge alarm sensor was readily visible and accessible from the lowest level gratings of the pump room (Figure 4).

[1] IMO. (2010). *The Manila amendments to the annex to the International convention on standards of training, certification and watchkeeping for seafarers (STCW), 1978*. London: Author.

Figure 3: Bilge alarm sensor (representative photograph)

Figure 4: Port side bilge alarm sensor (red arrow), as seen from the lowest pump room gratings

The starboard side sensor was located within a more confined area. This area was surrounded by the pump room's bottom floor above, the keel below, and strengthening structural members, in the form of steel plates with lightening holes which allowed access through them, on its sides (Figure 2).

To access the starboard sensor, crew members had to go down below the lowest gratings (Figures 5), access a manhole (Figures 6a and 6b) of about 2.0 m depth and turn into another compartment through a lightening hole (Figure 7).

Figure 5: Access towards starboard side bilge alarm sensor

Figure 6a: Access manhole for starboard side bilge alarm sensor (red arrow)

Figure 6b: Access manhole for starboard side bilge alarm sensor

Figure 7: Access manhole opened (red arrow indicates direction towards starboard side bilge alarm sensor, through a lightening hole)

The sensors activated alarms in the vessel's cargo control room (CCR), bridge and engine control room (ECR). Reportedly, the bilge alarms were last tested on 13 January 2020.

For emergency cases, say, when recovery of a person would be necessary, the pump room was fitted with a rescue davit at the top, the hook and wire of which could be passed through a skylight vertically down to the lowermost gratings (Figure 8).

Reportedly, a stretcher and a harness were placed on the lowermost gratings of the pump room, at the evacuation area.

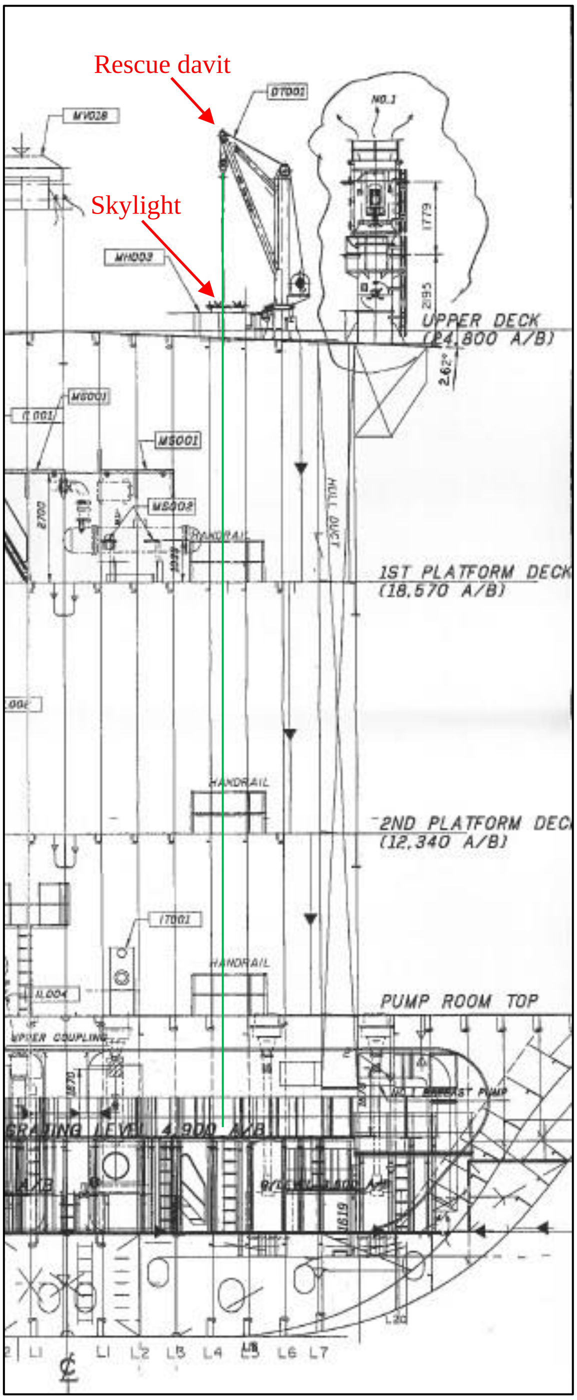

Figure 8: Rescue davit (green line indicates direction through which its wire passes)

Gas measuring arrangements of the pump room

The pump room was fitted with a fixed gas detection system, designed to measure the atmosphere contents of the pump room, in percentages of Oxygen (O_2) and the lower explosive limit of hydrocarbons (LEL), as well as Hydrogen Sulphide (H_2S) in parts per million (ppm).

The sampling tube of this system extended down to the bottom of the pump room, with eight sampling points along its length, located as follows:

- one in each of the exhaust vent ducts to measure the LEL;
- on either side above the lowest gratings to measure the LEL;
- at the pump room's bottom, in way of the separator of cargo pump no. 2, to measure the LEL and O_2 (Figure 9); and
- at the pump room's bottom, in way of the separator of cargo pump no. 1, to measure the LEL and H_2S (Figure 10).

The H_2S sampling point was located 4.5 m to the port side of the access manhole to the starboard side bilge alarm sensor.

Figure 9: Location of LEL and O_2 sampling point

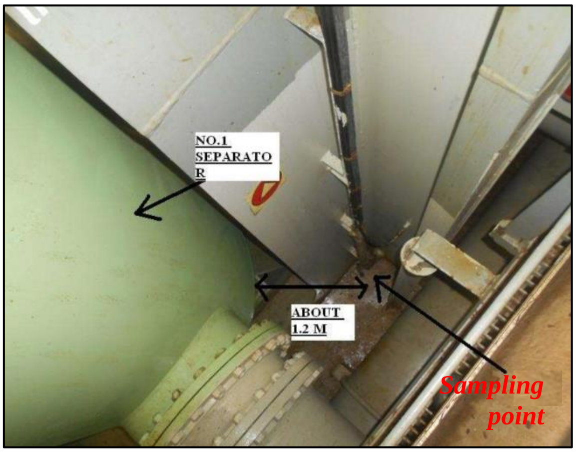

Figure 10: Location of LEL and H_2S sampling point

Reportedly, this system was always kept running, irrespective of whether the vessel was at sea or in port. In case the gases exceeded the pre-set limits, the system was designed to activate audio-visual alarms on the bridge and in the CCR. The system's digital display panel with audio-visual alarms was fitted in the CCR (Figure 11).

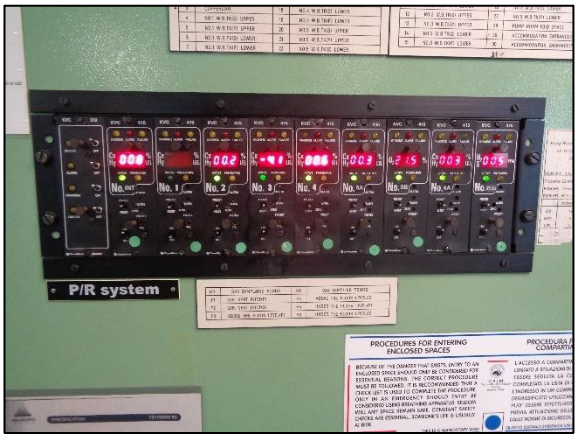

Figure 11: Display panel of the fixed gas detections system

This system was last maintained for checks and calibration by a shore service provider on 27 September 2019. During the calibration procedure, it was observed that the hydrocarbon samples extracted from above the lowest gratings and the pump room bottom, on the port side could not be set to match the contents of the calibration gas used. The same was noticed for the H_2S

samples extracted from the pump room bottom on the starboard side. Furthermore, a smell of the calibration gas was detected, indicating a possible leak in the system. The attending service technicians had recommended retrofitting a new system since the one on board was considered obsolete.

Monthly line integrity and alarm tests were conducted on the system by the chief officer. Prior to the accident, the last tests had been conducted on 13 January 2020, following which, the system was recorded as being in order.

In addition to the fixed gas detection system, a personal multi gas detector (Figure 12) was placed at the entrance to the pump room, with its sampling tube extending down to the bottom of the pump room.

Figure 12: Personal multi gas detector placed at the pump room's entrance

This gas detector was designed to measure the O_2 and LEL in percentages, as well as H_2S and Carbon Monoxide (CO) in ppm. This gas detector was last calibrated by a manufacturer's representative on 20 September 2019 and was last tested on board the vessel on 11 December 2019.

In line with on board procedures, after the initial checks of the pump room atmosphere from above, the person entering the pump room would carry the personal multi gas detector and replace it with a portable gas detector (Figure 13) capable of measuring O_2 and Hydrocarbons / LEL in percentages.

Figure 13: Portable gas detector replacing the personal multi gas detector

Environment

Around the time of the accident, the weather was reported to be clear, with light air, a low Northerly swell, and a visibility of 10 nautical miles (nm). The air and sea temperatures were reported as 13 °C and 18 °C, respectively.

Narrative[2]

Valtamed departed from Santa Panagia, Italy on 28 January 2020, in a ballast condition, to load a cargo of KBT crude oil from the port of Ceyhan, Turkey. During the evening of 01 February, the vessel arrived and anchored at the Ceyhan outer port limits (OPL) Anchorage, approximately 50 nm from the port of Ceyhan. The master had intended to depart from the anchorage at around 1300 on

[2] Unless specified otherwise, all times mentioned in this safety investigation report are in local time (LT = UTC + 3).

03 February, since a pilot was arranged for 1800 of that same day.

During the morning of 03 February, at around 0800, the chief officer discussed the work plan for the day. The bosun was instructed to prepare the vessel for arrival, which included the preparation of the mooring ropes, fire-fighting equipment, *etc*., with the help of other deck ratings. The pump man was instructed to prepare the manifold for cargo loading. All deck crew members carried portable radios to communicate with each other. Soon after, the chief officer started the pump room extractor fans.

At 0900, the chief officer completed the vessel's pump room entry checklist, since an entry was planned for the purposes of pre-arrival checks and tests. At around 1030, after a tea break, the chief officer instructed the pump man to commence testing all alarms on deck, while he would man the cargo control room (CCR) to acknowledge the alarms. It was noted that the pump man was wearing coveralls, a safety helmet and safety shoes.

The pump man first tested the bilge alarms of the forecastle store, followed by the high-level alarms inside the cargo tanks. Thereafter, at around 1105, he reported to the chief officer over the portable radio that he had conducted pre-entry atmosphere checks of the pump room using a personal multi-gas detector, which was placed at the pump room entrance (Figure 10). The chief officer acknowledged this message and authorized the pump man to access the pump room.

At around 1108, the port side bilge alarm was activated. The chief officer confirmed to the pump man over the portable radio, and then acknowledged the alarm. Thereafter, the chief officer instructed the pump man to test the starboard bilge alarm.

About five minutes later, noticing that the starboard bilge alarm had not yet been activated, the chief officer called the pump man over the portable radio. Seeing that there were no responses to his repeated calls, the chief officer called the pump room using the vessel's sound powered telephone; however, this also proved unsuccessful. The chief officer then informed the master, who was on the bridge, about the matter and requested for the emergency alarm to be raised.

At around 1115, following the master's instructions, the navigational officer of the watch (OOW) raised the general alarm and announced the nature of the emergency over the public address system. All crew members mustered at the muster station, where they were briefed by the chief officer about the situation.

Thereafter, two able deck seafarers (AB 1 and AB 2) checked the atmosphere of the pump room using the portable gas detector, which was placed at its entrance (Figure 13). The meter read 20.9% O_2 and 0% LEL and so they entered the pump room wearing self-contained breathing apparatus (SCBA) sets. They also carried personal multi gas detectors and portable radios.

The two crew members first checked the area around the port side bilge alarm sensor and reported to the chief officer that the area was clear. However, on reaching the area above the starboard side bilge alarm sensor, at around 1130, they noticed that the access manhole leading to the sensor was open.

On looking closer, they saw that the pump man lying in the bilge (Figure 14) with his helmet off. They also observed a small amount of oily water in the bilge.

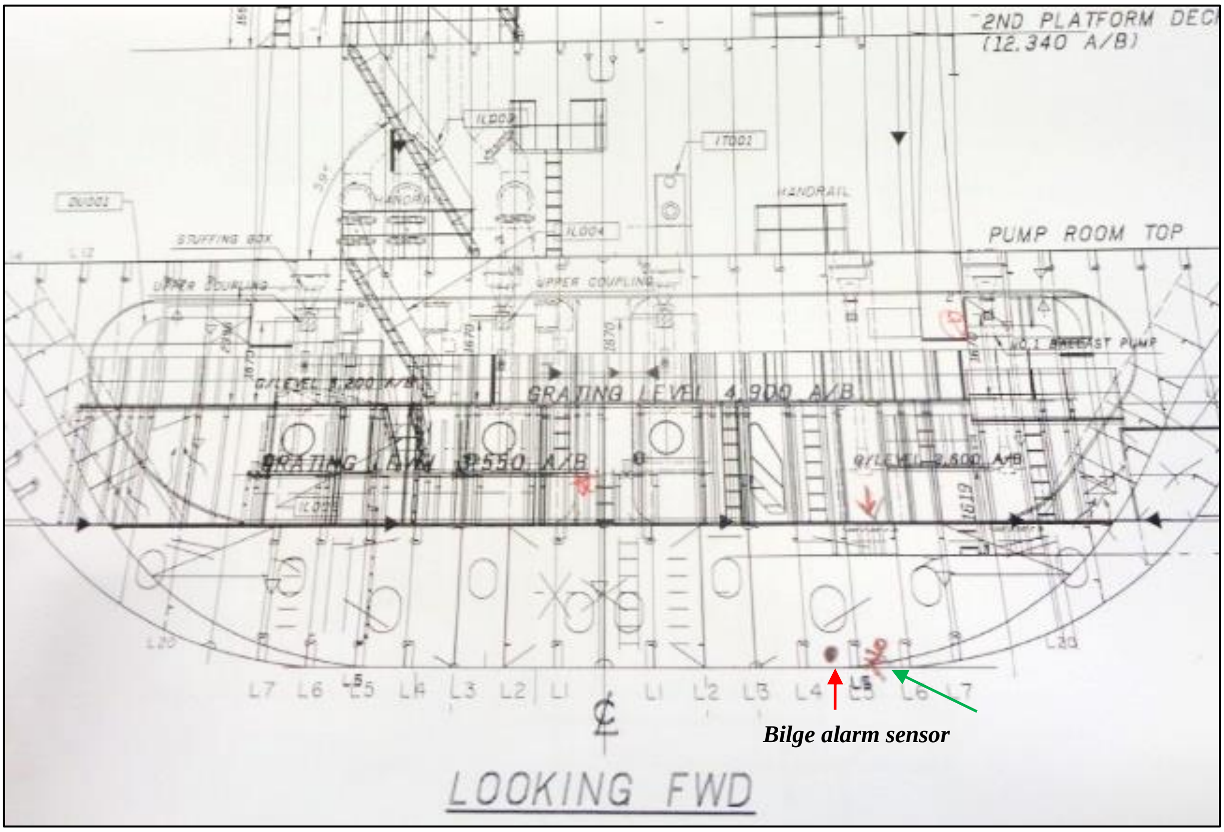

Figure 14: Location where the fatally injured pump man was found (green arrow)

The stretcher, which formed part of the pump room emergency rescue equipment, was lowered down the access manhole. AB 1 descended from the lowermost gratings and entered the bilge to check whether the pump man was conscious.

Noticing that he was not, AB 1 called AB 2 to assist in extracting the unconscious pump man out of the bilge. Once extracted, the two ABs confirmed that the pump man was neither breathing nor did he have a pulse. They strapped him onto the stretcher but were unable to lift him up to the level of the gratings. During the process, the air supply pressure in the SCBA sets ran low, and they informed the chief officer accordingly.

The chief officer ordered a back-up team of two additional crew members, to enter the pump room wearing SCBA sets and carrying spare SCBA cylinders for ABs 1 and 2. The rescue and back-up teams then unstrapped the pump man from the stretcher, lifted him up to the gratings and carried him to the evacuation area. Soon thereafter, the safety harness was strapped around him and was evacuated from the pump room using the rescue davit.

At around 1206, the pumpman was hoisted up to the main deck, where crew members performed CPR. However, their attempts were unsuccessful, and the pump man was pronounced dead.

Post-evacuation actions

The pump man was transferred to the vessel's hospital. The third officer observed that the personal multi gas detector was still in the pocket of the coveralls. However, he did not check whether the detector was switched on or off.

In the meantime, the master notified the Company, as well as the local authorities through the vessel's local agents. The local authorities instructed the vessel to approach and anchor within the inner anchorage area of Ceyhan port.

At around 1730, the vessel anchored within the inner anchorage of Ceyhan, where local authorities, including doctors, boarded the vessel to carry out their investigations. The local authorities disembarked at around 2306, as soon as the vessel was moored alongside at her berth.

Reportedly, post-accident atmosphere checks of the bilge area where the pump man was found, returned H_2S readings between 2 ppm and 20 ppm, although H_2S levels read zero just above the space. These checks were conducted by the Company after the vessel berthed. No other gases, besides 20.9% of O_2, were detected during these checks.

Autopsy and toxicology findings

The autopsy revealed that the pump man had a laceration on the vertex of his scalp, which had caused a hematoma under the scalp around this region. The crew member also suffered from fractured ribs and abrasions to his legs.

A systematic toxicological analysis revealed the presence of *n*-Butane, and the death was recorded to have occurred due to *n*-Butane intoxication. This analysis also stated that *n*-Butane was not detected in the lungs.

***n*-Butane**[3]

n-Butane (normal Butane) is a flammable, colourless and odourless gas. It is heavier than air and may cause a deficiency of Oxygen in spaces where it accumulates. This gas can be absorbed by the body through inhalation and can cause suffocation. The threshold limit value (TLV) of this gas is stated to be 1000 ppm as a short-term exposure limit (STEL). Short-term exposure may affect the central nervous system (CNS).

Hydrogen Sulphide[4]

H_2S is a flammable, toxic, colourless gas which has a characteristic odour of rotten eggs. It is heavier than air and can be absorbed into the body by inhalation. The odour cannot be relied upon as an adequate warning of the presence of H_2S due to paralysis of the olfactory nerve, which is likely to occur at concentrations beyond the exposure limits. The TLV of this gas is stated to be 5 ppm as STEL, effecting the CNS leading to unconsciousness and even death.

Previous cargo

During the vessel's previous voyage, *Valtamed* had carried a cargo of Export Blend Crude Oil (originating from Iraq) from Ceyhan, Turkey, all of which was unloaded at the port of Santa Panagia, Italy. Records indicated that crude oil washing was carried out in all cargo tanks at Santa Panagia.

Amongst other gases, *n*-Butane and H_2S are known to be naturally found in crude oils. The material safety data sheet (MSDS), dated 07 June 2018, indicated that the cargo was highly flammable and was carcinogenic.

While the MSDS stated that this cargo could cause a low to moderate degree of toxicity by inhalation, the toxicological information also stated that *as this product has only just been produced under offshore conditions, the exact nature of this chemical has not been fully investigated* [*sic*.].

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[3] International Labour Organization, World Health Organization, & European Commission. (2017). Butane. Retrieved from https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0232&p_version=2

[4] International Labour Organization, World Health Organization, & European Commission. (2017). Hydrogen sulfide. Retrieved from https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0165&p_version=2

Oily water in the bilge

Following the accident, further investigations revealed a small quantity (approximately 4.0 cm in depth) of an oily-water mixture in the vicinity of the starboard bilge alarm sensor. The source of the oil component of the mixture, was observed to have been a small leak in the suction valve of the bilge space (Figure 15).

Figure 15: Suction valve (circled in green) of the starboard bilge of the pump room

This valve was of the non-return type and was connected to the line used for stripping off the contents of the automatic unloading system's (AUS)[5] drain tank (Figure 16).

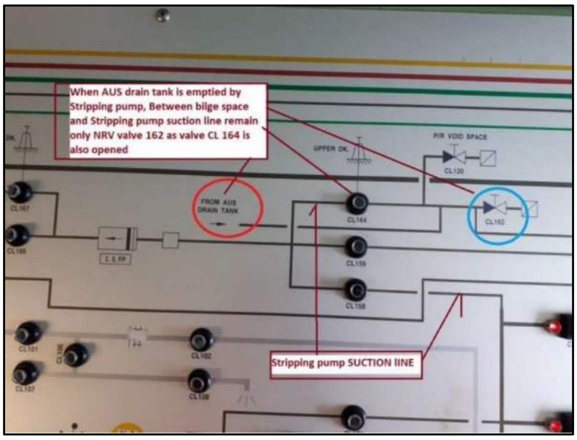

Figure 16: Location of the pump room's starboard bilge suction valve (circled in blue)

The leak was found after Company personnel conducted a pressure test on this valve, while trying to investigate the source of the leak. The water reportedly originated from drain valves of the steam-driven stripping pump, which were drained during the warming-up of the pump at the time of cargo unloading operations.

SMS procedures and recommendations for pump room entry

Prior to entering the pump room, the vessel's safety management system (SMS) procedures required the pump room ventilation fan to be started following which, a pump room entry checklist had to be completed by the duty officer.

The checklist included checks on the atmosphere of the space, the fixed and personal gas detectors, illumination, ventilation, communication, and evacuation procedures. These checks were required every four hours, provided that the conditions of the pump room remained unchanged between these periods and the ventilation remained running continuously.

The checklist also stated that entry into the pump room was prohibited unless 15 minutes would have passed from the starting of the extractor fan(s). Permission to enter could only be granted after the checklist had been completed and ensuring that neither the bilge high-level alarm nor any alarm on the fixed gas detection system had activated.

In addition to the requirements listed in the checklist, the vessel's SMS manual included the following:

- a recommendation that portable radios were used for communication between person(s) in the pump room and the OOW or the deck watch;
- failure to respond to communication was recommended to be considered as a cause to raise the alarm; and

5 An AUS is commonly found on oil tankers. It consists of a vacuum pump, connected to the separator of a cargo pump, which sucks out gases from the separator whenever these increase beyond a pre-set level. The AUS ensures that a maximum amount of liquid is available to the cargo pump, thereby allowing maximum unloading of cargo via the cargo pump.

- the pump room telephone was to be used if communication could not be established;

According to the SMS manual, the pump room bilges were to be maintained and kept in a clean and tidy condition. It also required that any leaks and abnormalities to be reported and rectified as early as possible.

ANALYSIS

Aim

The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Safety investigation actions

Following receipt of a notification from the Company, the MSIU deployed a representative on board *Valtamed*, on the following day, to conduct interviews and gather relevant evidence on the accident.

Cause of death

The autopsy report, based on the toxicological analysis, concluded that the cause of death was *n*-Butane intoxication.

As mentioned earlier in this safety investigation report, post-accident atmosphere checks of the bilge space returned H_2S readings between 2 ppm and 20 ppm. Therefore, the safety investigation did not exclude the possibility that the pump man sensed the presence of H_2S gas (which has a characteristic odour compared to the odourless *n*-Butane) and tried to make his way out of the space.

The safety investigation believes that due to the size of the space and the presence of oily water, the pump man may have slipped while trying to make his way out, striking his head against the steelwork. He must have then lost consciousness, remaining exposed to the present gases (the concentrations of which were most probably higher at that time compared to when the post-accident checks were conducted), until he was extracted from the space.

It was also not excluded that the pump man fell unconscious after being overcome by H_2S, following which he was left exposed to a high concentration of *n*-Butane.

Gas detectors' alarms

Alarms had not been triggered by any of the pump room gas detectors around the time of the accident. The sampling suction point was 4.5 m away from the access manhole to the starboard bilge alarm sensor, which would have compromised the effectiveness of the system in detecting gases present near the sensor[6].

The safety investigation was unable to determine whether there were multiple reasons for the gas not being detected. To this effect, it was not possible to confirm whether the issues noted during the checks and calibration of the pump room's fixed gas detection system could have contributed to the inactivation of the system alarm.

With regards to the personal multi gas detector carried by the pump man, no alarms were reported to have been heard by the rescue team. When the MSIU's representative boarded the vessel, he noticed that the gas detector was switched off and this matter was discussed during the interview sessions on board[7].

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[6] The safety investigation had no information on the assessment carried out when the sampling points had first been installed.

[7] It must be remarked that the MSIU representative reached the vessel almost 24 hours after the accident. During the consultation process, the Company remarked that it was imperative that the personal gas meter would have been switched off.

Given that during the interviews with the crew members, they all reported that they did not notice whether the personal multi gas detector was on or off, the safety investigation considered the following possibilities:

- the battery of the multi gas detector ran out of charge at some point in time while the pump man was within the pump room's starboard bilge space[8];
- the battery of the multi gas detector ran out of charge while the pump man was on his way down the pump room and, considering that the pre-arrival testing of the pump room bilge alarms was routinely carried out on board, and that atmosphere checks of the pump room did not reveal any abnormalities, the pump man may have not sensed an urgency in going back to the CCR to replace the battery;
- the pump man had switched off the detector after checking the atmosphere from above but did not switch it on again; or
- it became soiled with oily-water when the crew member fell in the space and consequently shut down.

Furthermore, it was reported that no alarms had activated on the personal multi gas detectors carried by the rescue team. It was also noted that during the post-accident atmosphere checks, the H_2S alarms were activated only within the bilge space and not above it. This could be attributed to the fact that H_2S is heavier than air and therefore, it would sink below the lowest areas of the space.

Location of the starboard bilge alarm sensor

As mentioned earlier, the starboard bilge alarm sensor was situated in a confined location, beneath the pump room's bottom floor.

The construction of this space was such that it would allow for pockets of gases to get trapped within the area. Therefore, persons accessing this sensor would be exposing themselves to the hazards of this space, which in turn would increase the probability as well as consequences of an accident, thereby increasing the levels of risk.

Fatigue and consumption of drugs/alcohol

The work / rest periods of the fatally injured pump man were compliant with the applicable requirements. The safety investigation, however, could not confirm the quality of his rest hours.

Nonetheless, in the absence of any evidence which could have indicated that his actions or behaviour were symptomatic of fatigue, the latter was not considered contributory to this accident.

As the toxicology did not detect any drugs or alcohol, the same were not considered as a contributory factor to this accident.

CONCLUSIONS

1. The autopsy report concluded that the death of the pump man was caused by *n*-Butane intoxication.
2. The safety investigation believes that the presence of H_2S in the bilge space may have also contributed to the accident, by either causing panic or unconsciousness.
3. A small leak in the suction valve of the pump room's starboard bilge, along with the routine draining of water

During the visit on board, the MSIU representative had not been cautioned on the alteration of the physical status of the meter.

[8] Managers advised that the vessel was equipped with charging and testing stations and the multi gas detectors were always kept fully charged.

during the warming-up of the steam-driven stripping pump, resulted in accumulation of a small quantity of oily water in the starboard bilge space. It is possible that this oily water may have caused the pump man to slip, struck his head and fall unconscious while attempting to exit the space.

4. The pump man was found by a rescue team in the pump room's starboard bilge space, without vital signs, after he did not respond to repeated calls from the CCR.
5. The pump man was conducting tests on the pump room's bilge alarms when the accident occurred.
6. The pump room's fixed gas detection system alarms did not activate at any point in time surrounding the accident.
7. It is likely that the effectiveness of the system was compromised by the distance (4.5 m) between the starboard bilge alarm sensor and the nearest sampling suction point.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[9]

During the safety investigation, the Company took the following measures to prevent similar accidents on board *Valtamed*:

1. The pump room's starboard bilge alarm sensor was shifted to a location from where it was possible to remotely test the alarm without entering the bilge space, using a steel wire (Figure 17).
2. The access manhole to the starboard bilge space was locked and the lightening holes within the space were blocked off using steel bars and is not considered as part of the pump room (Figure 18).
3. The Company required a separate enclosed space entry permit to be completed whenever it was necessary to enter the pump room's starboard bilge space.
4. The pump room's fixed gas detection system was upgraded, and a new sampling suction point was inserted in the vicinity of the starboard bilge space access.

Figure 17: Wire to remotely test the starboard bilge alarm

Figure 18: Lightening holes within the starboard bilge space blocked

[9] **Safety actions shall not create a presumption of blame and / or liability.**

5. All valves on the stripping pump suction line and the suction valves of the pump room bilges were overhauled and pressure tested.
6. The arrangement for stripping the AUS drain tank was modified to eliminate the risk of accidental contamination of the bilge spaces by cargo residue and vapours (Figures 19 and 20).

Figure 19: Modified arrangement for stripping of the AUS drain tank

7. Since *Valtamed* was the only vessel in the Company's fleet to have this pump room layout, a ship-specific training and bilge space entry procedures were implemented on board.

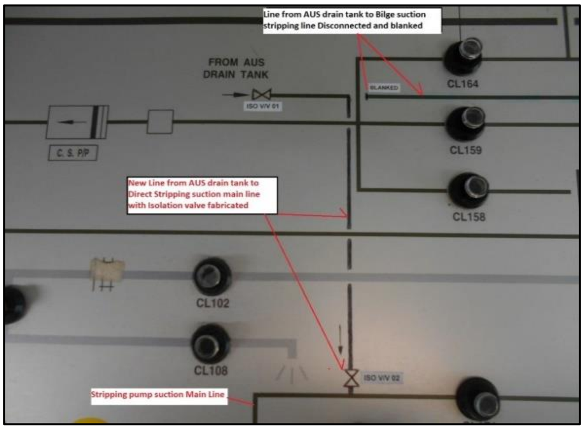

Figure 20: Line diagram showing the modified arrangement for stripping of the AUS drain tank

Moreover, the Company took the following measures on board the rest of its crude oil tankers:

8. It is mandatory for persons entering the pump room to carry an emergency escape breathing device (EEBD) with them.
9. The pump room entry procedures were reviewed, and new procedures were implemented.
10. The software of all personal and portable gas detectors was upgraded with a built-in data logger enabling storage and retrieval of alarms.
11. Five extra EEBD sets were assigned for the pump rooms on all crude oil tankers managed by the Company.

RECOMMENDATIONS

Considering the actions taken by the Company, following this accident, no recommendations have been issued.

SHIP PARTICULARS	
Vessel Name:	*Valtamed*
Flag:	Malta
Classification Society:	RINA
IMO Number:	9292840
Type:	Oil tanker
Registered Owner:	Vassholmen Shipping Ltd.
Managers:	Navigazione Montanari S.p.A., Italy
Construction:	Steel – Double hull
Length Overall:	274.00 m
Registered Length:	265.56 m
Gross Tonnage:	83,669
Minimum Safe Manning:	15
Authorised Cargo:	Oil in bulk

VOYAGE PARTICULARS	
Port of Departure:	Santa Panagia, Italy
Port of Arrival:	Ceyhan, Turkey
Type of Voyage:	International
Cargo Information:	In ballast – 50,215 mt
Manning:	21

MARINE OCCURRENCE INFORMATION	
Date and Time:	03 February 2020 – 1115 LT
Classification of Occurrence:	Very serious marine casualty
Location of Occurrence:	36° 20.6' N 035° 09.66' E
Place on Board	Pump room
Injuries / Fatalities:	One fatality
Damage / Environmental Impact:	None
Ship Operation:	At anchor / Special service – Trials/tests
Voyage Segment:	Arrival
External & Internal Environment:	Clear weather, with light air and low Northerly. Visibility: 10 nautical miles (nm). Air and sea temperatures were 13 °C and 18 °C, respectively.
Persons on board:	21