Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

201504/002 REPORT NO.: 05/2016 April 2016

This safety investigation has been conducted with the assistance and cooperation of the United States Coast Guard.

MV *POLYNESIA*
Fatal fall overboard during cargo operations at Pago Pago, American Samoa 02 April 2015

SUMMARY

The vessel was safely moored alongside at the port of Pago Pago, discharging its cargo of containers.

The second mate was the duty officer at the time, overseeing the cargo operation. At about 0235(LT), whilst on deck, he tried to close one of the ventilation flaps of the hatch covers.

During his actions, he lost his balance, fell on the side railings of the vessel and eventually overboard on the jetty side. Medical assistance was provided to the crew member, who was eventually transferred to a local hospital. Notwithstanding the medical care received, the second mate succumbed to his injuries.

The safety investigation revealed that the incorrect position adopted by the crew member to close the ventilation louver board was the immediate cause of the accident.

Taking into consideration the safety actions adopted by the managers in the aftermath of the accident, no recommendations to the Company have been issued by the MSIU.

MV *Polynesia*

FACTUAL INFORMATION

Vessel

Polynesia, a 16889gt fully cellular container vessel was built in 2015 and is registered in Malta. She is owned by Kingston Shipping Ltd, managed by Eastern Mediterranean Maritime Ltd, and classed with DNV GL.

Polynesia (Figure 1) has a length overall of 171.93 m, a moulded breadth of 27.40 m and a moulded depth of 13.80 m. She has a summer draught of 9.50 m and a corresponding deadweight of 27010 tonnes.

Propulsive power is provided by a 6-cylinder Wärtsilä 6RT-flex58T-E, two-stroke, slow speed direct drive diesel engine, producing 13080 kW at 105 rpm. This drives a single, fixed, five-bladed fixed pitch propeller to give a service speed of 19.70 knots.

The vessel was constructed under the supervision of Germanischer Lloyd and approved for the intended class. There were no reported deficiencies to the vessel's hull and its fittings at the time of the accident. Following her delivery to the Company from the shipyard in China, the vessel was operating a feeder container service between the Polynesia islands and the Western Coast of the United States.

Polynesia has five cargo holds and eight hatches, which are all fitted forward of the accommodation block. Two cargo deck cranes are fitted, each with a SWL of 45 tonnes. *Polynesia* has a capacity of 1704 TEUs, of which, 634 could be loaded in the cargo holds. The deck had a capacity of 1070 TEUs.

The height from the baseline to the top of the cargo hatch cover measured approximately 16.60 m. The mean draft was approximately 8.35 m. Therefore, the height of the cargo hatch cover from the water line at the time of the accident was approximately 8.25 m.

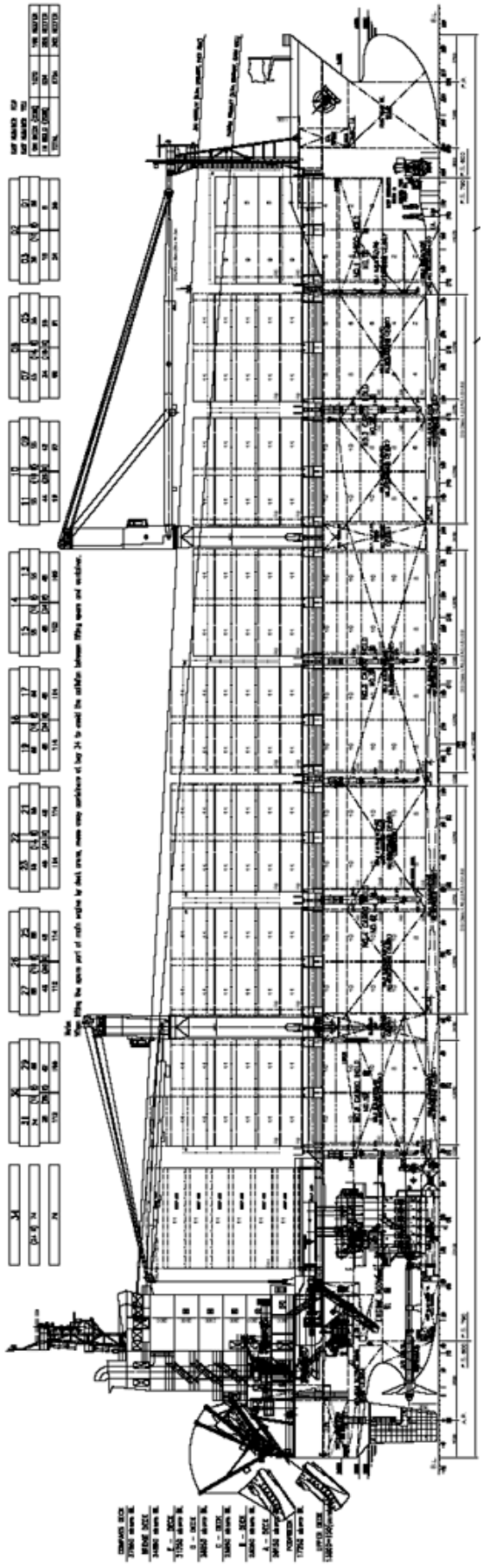


Figure 1: *Polynesia* GA Plan

Crew

Polynesia's Minimum Safe Manning Certificate required a crew of 15, and there were 19 crew members on board at the time of the accident[1]. All the officers and ratings were Filipinos. The master and other officers were all appropriately qualified.

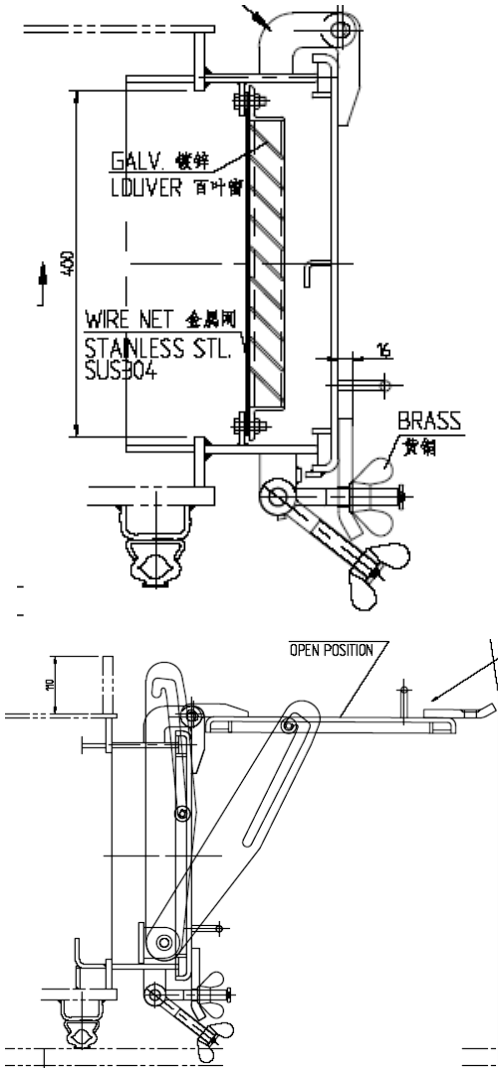
The deceased crew member, who was serving as the second mate, was 35 years old. He had been at sea for six years and seven months of which, four years and nine months were in the rank of a second / third mate. His Certificate of Competency was issued in terms of regulation II/2 of the STCW Convention. The second mate had been employed with the Company for two months and seven days after signing his first contract before he was assigned to *Polynesia*.

The second mate kept the 0000-0400 and 1200-1600 watches when the vessel was at sea. In port, the second mate had been assigned the 0000-0600 and the 1200-1800 cargo watches.

The cargo hold's ventilation louver board

The cargo hold's ventilation louvers consisted of an opening measuring 600 mm by 400 mm, serving all the cargo holds. The maximum height of the ventilation louvers is 2500 mm from the main deck. The opening was protected by means of a stainless steel wire net fitted behind galvanised louvers. A ventilation louver board was also fitted which would open upwards up to a maximum angle of 90° (Figures 2a and 2b).

The closing of the cargo hold's ventilation louvers necessitated that the ventilator's board is pushed upwards, while the support bracket holding the board is pushed inwards to free the board. In order to open / close the cargo hold's ventilation louver board in a safe manner, the crew members had to reach it from the main deck, using a portable ladder (Figure 3).



Figures 2a and 2b: Cargo hold's ventilation louvers

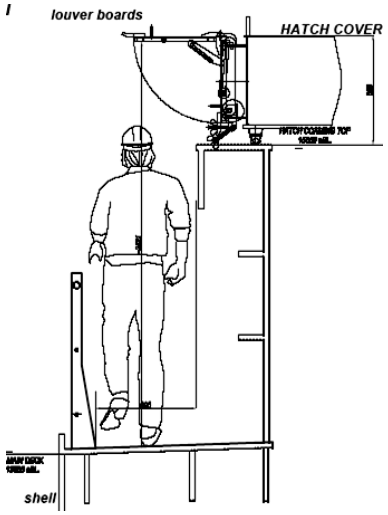


Figure 3: Access from the main deck

[1] The Minimum Safe Manning Certificate specified that an additional engineering watchkeeping officer and an engine rating were required if the UMS or bridge control systems were not operational.

Environment

The Northerly wind was calm. The sea state was also calm with no swell. The air temperature was recorded to be 28°C. Visibility was good.

Narrative[2]

The vessel had arrived at the port of Pago Pago on 01 April 2015 and was safely moored starboard side alongside at about 1504, to discharge her cargo, before proceeding on her voyage to Long Beach, California.

The cargo operations commenced at about 1600. The second mate was the duty officer responsible to oversee the cargo discharge operations. The second mate was relieved by the third mate at about 1800, who continued to work his six-hour shift until 0000.

At about 2345, the gangway watch rang a wake-up call on the second mate's cabin phone. By 0005, the second mate had not yet arrived on deck and another call was made at 0010. The second mate arrived at the vessel's cargo office to take over the cargo watch at about 0015.

The cargo operation was uneventful and just after 0200, the duty AB informed the second mate that the cargo discharge operation in bay 18 had been completed. At about 0230, on 02 April, the second mate proceeded on the hatch cover in way of bay 18 on starboard side. The officer wanted to close the cargo hold's ventilation louver boards (Figure 4) in order to prevent any damage during the cargo operations[3].

Figure 4: One of the hatch cover ventilation louver board

The stevedore recalled that he observed the second mate on the cargo hatch cover bending over and pull the louver board up before letting it go to close. The stevedore also observed that the second mate's left leg was on the edge whereas the right leg was over the edge. The stevedore said that the second mate almost fell down and he asked him whether he was fine. The second mate gave him the 'thumbs up' and walked over the second ventilator to close it down.

This time, the stevedore observed that the second mate's both legs were over the edge (Figure 3). The stevedore stated that he was close enough to the second mate to observe that he seemed tired, with his eyes red.

Figure 3: Stevedore simulating the position of the second mate to close the louver boards

[2] Unless otherwise stated, all times in this safety investigation report are local.

[3] The AB assigned to the gangway watch recalled seeing the second mate passing by the gangway on his way to bay 18 at about 0230.

Suddenly, the second mate flipped over and fell from the top of the hatch cover. The stevedore witnessed the crew member hitting the vessel's side rails with his legs, before eventually falling overboard on the concrete wharf (Figure 4). None of the crew members witnessed the second mate falling. The time was about 0235.

Figure 4: Area in way of bay 18 on starboard side where the accident happened

The alarm was raised, the cargo operations were suspended immediately and all parties were informed of the accident. The agent was contacted and medical assistance requested. An ambulance arrived on site at about 0258 and left to the hospital at about 0308 after first aid was administered to the injured crew member.

A few hours later, the master was informed that the second mate had succumbed to his injuries.

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.

Cooperation

During the course of this safety investigation, the MSIU received all the necessary assistance and cooperation from the United States Coast Guard (USCG).

Fatigue

One of the main concerns for the safety investigation was whether the crew member was fit for duty. This concern was raised due to two main events:

1. The late arrival of the second officer for his cargo watch; and
2. The observations of the stevedores.

The Record of Hours of Work/Rest available to the MSIU date back to February 2015. The records suggest that the minimum hours of rest stipulated by the STCW Convention had been met. Moreover, the vessel arrived at the port of Pago Pago following a long trip with ample time to rest.

The MSIU has considered fatigue issues on a number of other safety investigations. In all these investigations, the MSIU has been provided with hours of work and rest records, which would indicate compliance with the relevant Convention. The problem with these records, however, was mainly related to the lack of reference and records to 'sleep' and 'quality of sleep'[4]. This accident was no different.

While acknowledging that it is challenging to record hours of *quality* sleep, the correlation between quality of sleep and fatigue cannot be ignored. Whereas the records indicated that the second mate had sufficient rest between work periods, there were no records of loss of sleep, if any, and / or quality of

[4] It has to be stated that keeping records of sleep and / or quality of sleep is not a legal requirement in any of the maritime conventions.

sleep[5]. Nonetheless, the Company's Health & Safety Manual (chapter 1, section 2.2), extensively addressed fatigue management and highlighted the importance of uninterrupted sleep.

However, under these circumstances, the Company would have been unable to monitor effectively the condition of the crew members and address potential fatigue issues. Studies suggest that issues with fatigue are slowed thinking and reaction, and delayed / false response.

On the basis of the information available and given that there were no records available on the quality and quantity of sleep, the MSIU was unable to exclude fatigue as a contributing factor to the fall of the second mate.

Fall protection, risk taking and decision-making

Given that the crew member climbed on the top of the hatch cover, irrespective of the rationale behind that decision, the MSIU analysed the potential barriers which could have prevented a fall from a height.

Whereas physical barrier systems on top of the hatch cover would have been the most ideal option to prevent a fall from a height, their installation would have not been practical. It may be argued that under such circumstances, a hierarchy of choices could have been implemented.

Considering that the crew member opted to climb on top of the hatch cover to close the ventilation louver board, then the use of a means of fall restraint system would have been necessary (Figure 5). This did not transpire to have been the case.

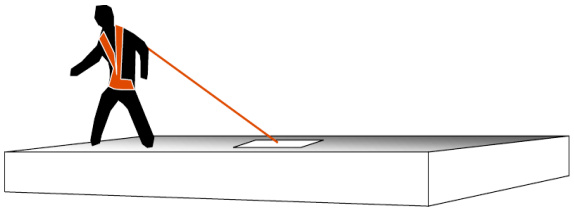


Figure 5: Fall restraint system with anchor point

The intended actions necessitated the crew member to approach the edge of the hatch cover. The personal fall restraint system would have allowed the crew member to approach the edge of the hatch cover but would not have allowed him to go beyond the edge in the event of a slip or fall.

The Company's Health & Safety Manual (Dry Cargo), chapter 1, section 13 addressed working aloft. The section made no direct reference to the cargo hatch covers; rather it referred to the funnel and masts. Reference was also made to the safe use of ladders, although the text was generic and made no reference to the use of ladders to close cargo hold's ventilation louver board.

Nonetheless, safe working practices related to working at a height were well addressed in other parts of chapter 1. Section 1 of the document not only referred to the UK's Code of Safe Working Practice for Merchant Seamen, but in section 5, it also required crew members to wear a safety harness with a shock absorber attached to a lifeline, if the work could potentially lead to a fall in excess of two metres.

The Onboard Training Scheme held on 14 February 2015, *i.e.* less than two months prior to the accident, the opening/closing of the cargo hold's ventilation louver board had been discussed. During the meeting, the master had requested that two crew members had to accompany each other to operate the cargo hold's ventilation louver board during cargo operations.

Evidence suggested that before the accident, the second mate was actually accompanied

[5] There are no requirements to keep records of the hours of (quality) sleep. Moreover, available records did not suggest that the crew member was suffering from sleep disorder.

by one of the ABs. However, whereas the AB was closing the ventilation louver board from the main deck, the second mate climbed on top of the hatch cover. This procedure, which seemed to have been adopted *ad hoc*, allowed for a one-person error situation to develop.

The closing of the louver from above was a very dangerous operation. As explained elsewhere in this safety investigation report, the closing operation necessitated that the louver board is slightly lifted in order to free the support bracket. Once the support bracket had been freed, the weight of the louver board would have had to be carried by the hinges and the crew member.

This was considered to be a significant weight, taking also into consideration the less than optimal position of the crew member holding to the louver board from above.

It would therefore appear to the safety investigation that an uncalculated risk had been accepted by the crew member[6]. The fact that the crew member was on his own, precipitated into a situation where the opportunity for the accompanying crew member to flag and limit the additional risk (through monitoring) had been frustrated.

Further to the above, in the General Remark section of the Onboard Training Scheme document, the participating crew members (including the second mate involved in the accident) were reminded to ensure that they wear adequate personal protective equipment and to use portable ladders if the louver board could not be reached.

The document did not indicate that there was an emphasis on the requirement to operate the cargo hold's ventilation louver board from the main deck. However, it is the view of the safety investigation that the specific reference to the use of a ladder was indicative enough that the cargo hold's ventilation louver board had to be opened / closed from the main deck level.

Symbolic barrier systems - control and buffer zones on the cargo hatch cover

Even if the fall restraint system, in the absence of a physical barrier system would have not been practical, symbolic barrier systems were not present on the hatch cover. For instance, 'control' and 'buffer' zones may be considered to serve as a means of preventing crew members from approaching the edge[7] (Figure 6).

It has to be mentioned, however, that symbolic barrier systems, being the weakest of all barrier systems, would not have physically stopped any crew member from approaching the edge; yet, they would have certainly enhanced his awareness.

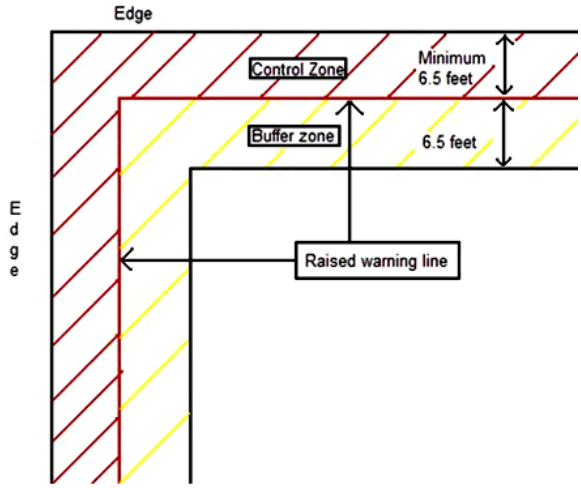


Figure 6: Typical 'control' and 'buffer' zones

[6] The unaccounted risk lies in the fact that the louver board was not operated according to the assumptions made when the louver board was designed and fitted.

[7] The 'control' zone is the area between the unguarded edge and a line which is set back as a safe distance. The 'buffer' zone is the area immediately outside the inner edge of the 'control' zone and extends further in from that edge.

CONCLUSIONS

1. The crew member sustained fatal injuries after falling from the cargo hatch cover to the quay on the vessel's starboard side while attempting to close a cargo hold's ventilation louver board.
2. The position adopted by the crew member to close the ventilation louver board was not appropriate.
3. The MSIU was unable to exclude fatigue as a contributing factor to the fall of the crew member.
4. The crew member was not wearing a fall restraint system.
5. This initiative taken by the crew member to close the cargo hold's ventilation louver board, allowed for a one-person error situation to develop.
6. Once the support bracket had been freed, the weight of the louver board would have to be carried by the hinges and the crew member. This was considered to be a significant weight, taking also into consideration the less than optimal position of the crew member holding to the louver board from above.
7. An uncalculated risk had been accepted by the crew member. The fact that the crew member was on his own, precipitated into a situation where the opportunity for the accompanying crew member to flag and limit the additional risk (through monitoring) had been frustrated.
8. Symbolic barrier systems were not present on the cargo hatch cover.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[8]

During an on board meeting held on 05 April 2015, the operation of the cargo hold's ventilation louver board was discussed. Crew members were reminded that the cargo holds' ventilation louver boards have to be opened / closed from the main deck with the safe use of a ladder. It was also reiterated that the operation of the cargo holds' ventilation louver boards from above (*i.e.* by standing on top of the cargo hatch covers) was strictly prohibited.

Moreover,

- Management has highlighted to all Company's seafarers the importance of safety on board in accordance with Company's Policy. A circular letter was sent to all ships, defining the objective target of zero accidents onboard and ashore;
- A Cargo Operation Booklet was compiled, enabling the recording of potential cargo operations-related hazards and / or high-risk operations identified prior to the start of each cargo operation. Guidelines on the opening and closing of the cargo holds' ventilation louver boards as well as notices prohibiting the access to the cargo hatch covers without Master's authorization were also included;
- The internal audit checklist has been amended with the addition of a supplementary item, requiring the internal auditor to carry out a risk assessment on safe working practices after observing cargo operations in real time;
- Notice boards, indicating the proper practice for the closure of the ventilation flaps, have been placed at

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

both gangway entrances of container vessels in the fleet;

- High caution areas have been marked, as symbolic barrier systems, at the edges of the hatch covers of the entire container fleet, eliminating the risk for the personnel to fall overboard;
- The deck and operation manual for container vessels has been amended with particular reference to the control of hatch covers access. It is now being required that access is only granted following specific instructions and with adequate supervision during cargo operations.

RECOMMENDATIONS

Taking into consideration the safety actions already adopted and implemented by the Company, no recommendations have been issued.

SHIP PARTICULARS

Vessel Name:	*Polynesia*
Flag:	Malta
Classification Society:	DNV GL
IMO Number:	9634658
Type:	Container (Fully Cellular)
Registered Owner:	Kingston Shipping Limited
Managers:	Eastern Mediterranean Limited
Construction:	Steel
Length Overall:	171.93 m
Registered Length:	162.58 m
Gross Tonnage:	16889
Minimum Safe Manning:	15
Authorised Cargo:	Containers

VOYAGE PARTICULARS

Port of Departure:	Apia, Samoa
Port of Arrival:	Pago Pago, American Samoa
Type of Voyage:	Short International
Cargo Information:	Containers
Manning:	19

MARINE OCCURRENCE INFORMATION

Date and Time:	02 April 2015 at 0235
Classification of Occurrence:	Very Serious Marine Casualty
Location of Occurrence:	Port of Pago Pago, American Samoa
Place on Board	Freeboard deck
Injuries / Fatalities:	One fatality
Damage / Environmental Impact:	None
Ship Operation:	Alongside/Moored / Transfer of Cargo
Voyage Segment:	Alongside
External & Internal Environment:	The Northerly wind was calm. The sea state was also calm with no swell. The air temperature was recorded to be 28°C. Good visibility.
Persons on board:	19 (excluding stevedores)