Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

201704/006 REPORT NO.: 08/2018 April 2018

MV *POMPANO*

Fall from a height into a cargo hold resulting in fatal injuries to one crew member in Port Hedland Anchorage, Australia 08 April 2017

SUMMARY

At 1705 on 08 April 2017, while carrying out repairs in cargo hold no. 3, the third engineer fell approximately six meters from the cargo hold's ladder, just under the cargo hold's access ladder lower platform, to the tank top.

One of the crew members who was in the cargo hold raised the alarm. The injured crew member was attended by the chief and fourth engineers, who were on the main deck near the cargo hold no. 3.

Paramedics boarded the vessel some time later but the injured crew member was pronounced dead.

The safety investigation found that the immediate cause of the accident was the crew member losing his footing and grip whilst carrying out repairs on the ladder.

Considering the safety actions taken by the Company during the course of the safety investigation, no recommendations have been issued by the Marine Safety Investigation Unit.

MV Pompano

FACTUAL INFORMATION

Vessel

Pompano is an 88,845 gt bulk carrier, which was built in 2006 and registered in Malta. She was owned by Innovative Investments Ltd., managed by TMS Dry Ltd. and was classed with BV. *Pompano* had an overall length of 289.0 m, a moulded breadth of 45.05 m and a moulded depth of 45.00 m. The vessel had a summer draught of 18.10 m, corresponding to a summer deadweight of 174,219 tonnes. The capsize bulk carrier was fitted with 9 steel cargo holds with a total grain capacity of 193,134 mt. The vessel was strengthened for heavy cargoes.

Propulsive power was provided by a 6-cylinder MAN-B&W 6S50MC-C, two-stroke, slow speed, single acting and direct drive diesel engine, producing 16,860 kW at 91 rpm. This drove a single fixed pitch propeller to reach a service speed of 15 knots.

Crew

Pompano's Minimum Safe Manning Certificate stipulated a crew of 17. At the time of the accident, the vessel had a crew complement of 19. The crew compliment included the master, chief mate, the second and third mates, a chief engineer, second, third and fourth engineers, a bosun, three ABs, two OS, two oilers, one engineering cadet, one motor man and a cook. All crew members were Filipino nationals, except for the master who was Greek.

The fatally injured third engineer was 35 years old. He had spent the previous five years at sea, three of which with the current Company. He had been serving as third engineer for a month; prior to that, he was an oiler for four months and a fourth engineer for two years.

Repairs inside cargo hold no. 3

The crew members had been tasked to repair the damaged cargo hold access ladder platform's safety rails. The repair job involved the removal and replacement of several safety rail sections, necessitating fabrication and the use of gas cutting and arc welding equipment.

Environment

On the day of the accident, the weather was clear with calm seas. Logbook records indicated that the Westerly wind was force 2 and the air temperature was 32 °C. The sea temperature was recorded at 30 °C.

Narrative

On 08 April 2017, the chief engineer was informed by the master that some lengths of railing on the lower platform of the straight ladder on the forward bulkhead of cargo hold no. 3 required repairs. The chief engineer verified the availably of material on board and confirmed to the master that the job could be done.

The 'Hot Work' and 'Work Aloft' permits had been completed and approved. The chief mate instructed the bosun and the third engineer to prepare the site with materials and tools while the chief engineer proceeded down to the cargo hold no. 3 to evaluate the job. After making the preparatory work, at around 1130, the chief engineer suggested to proceed to the accommodation for lunch and continue the work after lunch.

After lunch, the chief engineer, along with the third engineer and one of the OS, proceeded to cargo hold no. 3 to commence the repairs. The chief engineer and third engineer went inside the cargo hold to take measurements and eventually start the job.

The third engineer was wearing a safety belt and a safety helmet, in addition to welding PPE. The repairs had to be carried out in way of the lower platform, which was about 5.9 m above the tank top (Figure 1).

The third engineer started to cut the damaged rails. In the meantime, one of the OS went down inside the cargo hold to assist him. Later on, the chief engineer and the OS went

up to the main deck to heave up the damaged rails cut by the third engineer.

the engine-room to cut the flat bars and pipes. On his way to the engine-room, he saw the

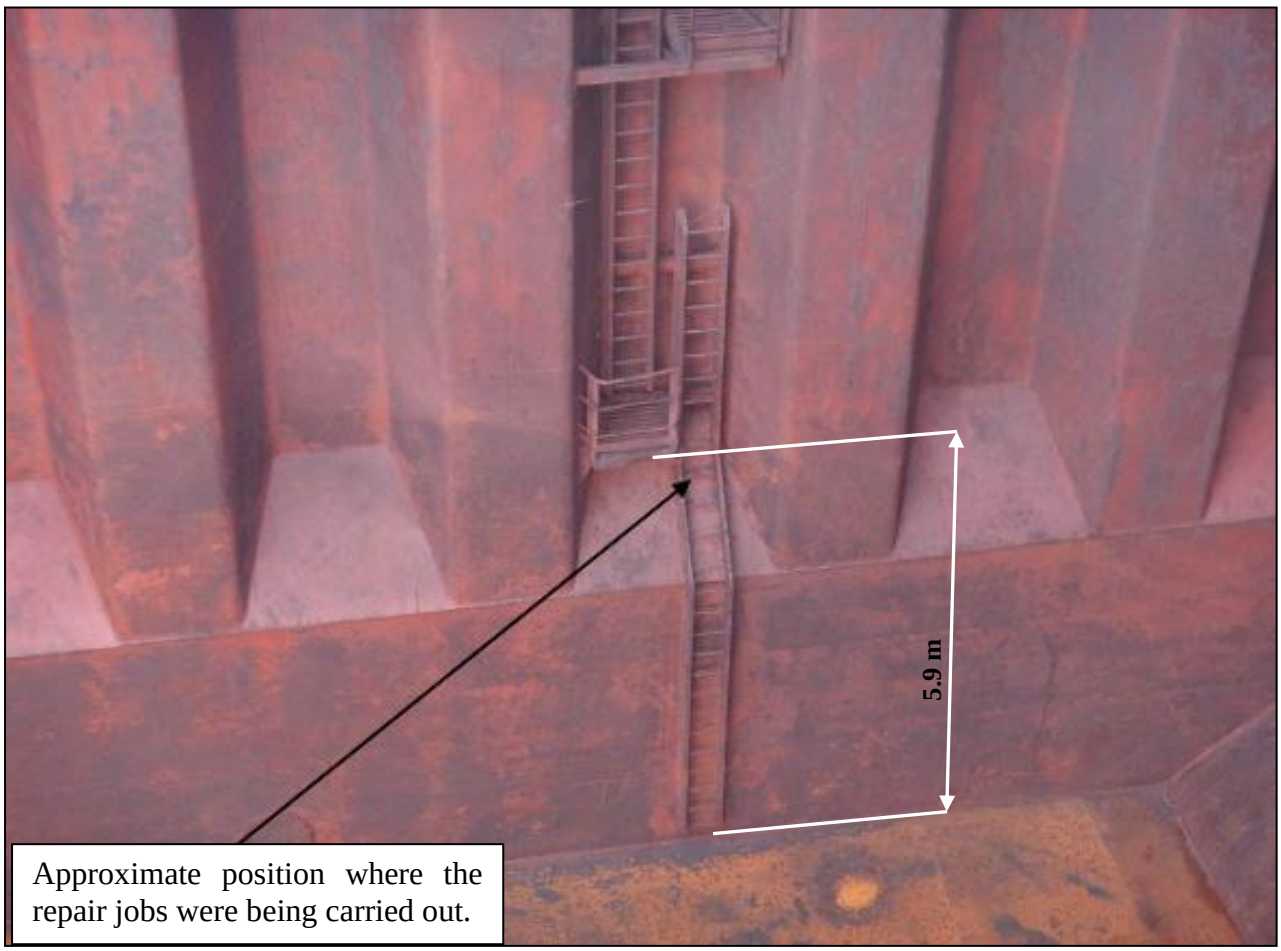

Figure 1: The ladder down cargo hold no. 3

Once the damaged rails were pulled on deck, the crew members inside the cargo hold went back to the accommodation for a rest break.

After the break, the third engineer and the OS went back inside the cargo hold, while the chief engineer went to the engine-room to prepare the angle bars for fabrication. Once he finished with the angle bars, he carried them to the cargo hold. He lowered the angle bars into the cargo hold to the OS, which he passed over to the third engineer.

The chief engineer could make visual contact with the third engineer on the tank top, as well as when he was climbing the ladder to reach the lower platform to weld the angle bars. The chief engineer went again back to fourth engineer and asked him to assist in the cutting of the flat bars and pipes.

Once they finished, the chief engineer instructed the fourth engineer to carry the material to the cargo hold. The chief engineer remained for a few minutes in the engine-room to secure the long pipes back to their place in the steering gear flat.

At about 1705, while the third engineer was shifting his position to climb down the ladder, he fell down to the tank top. Immediately, all available hands rendered assistance. The OS raised the alarm and the second mate administered first aid.

The injured crew member was observed to bleed profusely and was also unresponsive. The local VTS was contacted to report the emergency and to request urgent assistance.

Although the second mate and other crew members continued to give medical assistance, the third engineer could not be resuscitated. At 1845 and 1852, paramedics and a doctor arrived on board respectively. At 1908, the doctor pronounced the third engineer dead, noting also a very severe head injury at back of his head.

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, MSIU received all the necessary assistance and cooperation from the Australian Maritime Safety Authority (AMSA).

Immediate cause of the accident

It was established that the third engineer had fell off from the sloping section of the forward cargo hold access ladder, just below the lower most platform to the cargo hold tank top.

Drug and alcohol consumption

Both the autopsy and toxicological reports confirmed that the third engineer was not under the influence of drugs and alcohol and therefore, these were not considered to have contributed to the accident.

Fatigue

The Record of Hours of Work and Rest document for the month of April was made available to the MSIU. The Record showed that the third engineer's minimum hours of rest stipulated in the STCW Convention had been met.

It has to be remarked that at 1705 on 08 April, when the accident occurred, the third engineer had worked 11 hours over a period of 17 hours, commencing at midnight on 07 April 2017. Nonetheless, until the time of the accident, there was no indication that the actions of the third engineer suggested that he was fatigued.

Design of the ladder and the dynamics of the fall

The ladder providing access to the cargo hold was considered to be of the conventional design, going down along the corrugated transverse bulkhead, over the bulkhead's lower stool and down to the tank top (Figure 2).

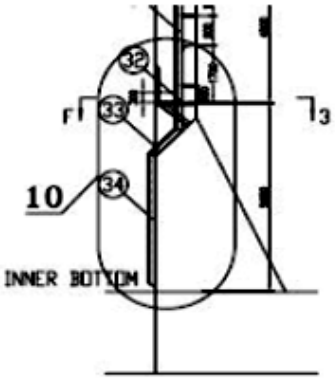

Figure 2: Ladder along the length of the corrugated transverse bulkhead

In view of this arrangement, it may be noticed that the ladder's vertical angle had to decrease against the lower shelf plating and then increase against the inner bottom plate. Although the ladder was in a good condition, it was not excluded that the third engineer lost his footing as he negotiated the different

angles of the ladder, on his way down to the tank top.

The safety investigation did not come across any evidence which would suggest a loss of balance because of some abrupt movements by the vessel at the time of the accident. Neither was there any evidence of slippery ladder rungs. One of the crew members, who witnessed the fall, had reported that the third engineer had been welding on the vertical ladder's handrails without any issues. He recalled that sometime later, on his way back down, it seemed that his hand had accidentally slipped off and he fell down to the tank top.

Therefore, although the reason the third engineer fell from the ladder was not clearly identified by the safety investigation, the evidence supports the possibility that he fell off the sloping section of the forward cargo hold access ladder, just below the lower most platform.

Physiological condition of the fatally injured crew member

At the time of the accident, the third engineer was 35 years old and had been declared fit for sea duty. The MSIU came across no evidence which suggested that the he had exhibited symptoms of illness or any other physiological condition that would have contributed to the fatal fall.

Personal protective equipment – missing protective barrier systems

During the course of the safety investigation, the use of two pieces of evidence was taken into consideration, *i.e.*, the safety helmet and the safety belt.

It was noticed that the safety helmet (Figure 3) was old, stained by oil and what appeared to be less than adequate upkeep.

Figure 3: Safety helmet in use by the third engineer

Of more concern, however, was the plastic band, which served as a chin strap (Figure 4). Given that the plastic band was rigid and not elastic, and considering that the safety helmet fell off, it has been concluded that the safety helmet had not been secured to the chin.

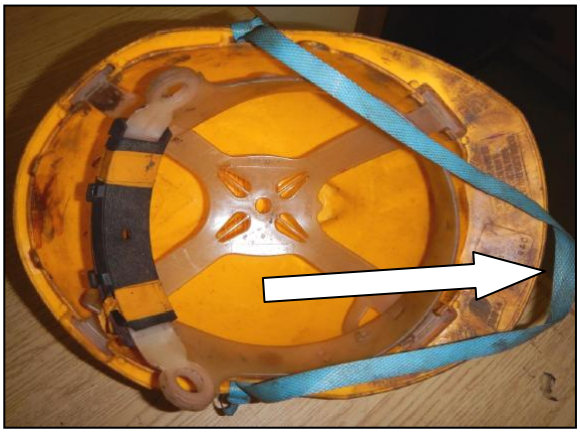

Figure 4: Plastic band serving as a chin strap

Notwithstanding this, it was highly probable that the safety helmet would have not prevented the head injuries sustained by the third engineer.

It was also noticed that rather than an appropriate fall arrestor, the third engineer was wearing a safety belt (Figure 4).

Figure 4: Safety belt worn by the third engineer

The safety belt was also observed to be in a poor condition, with a corroded belt buckle, rigid belt lanyard and a defective safety clip. Evidence collected during the course of the safety investigation suggested that a five-point fall arrestor was available on board but not used during the repair works inside the cargo hold.

The type of fall preventer used by the third engineer was not of the best design for vertical movements. For instance, a fall arrestor with a double lanyard would have ensured that a person could move from one anchor point to another, whilst ensuring that there would always be a permanent connection at a time when an accidental fall was more likely to happen, *i.e.* during a transition from one point to another.

Trade-offs prior to and during the course of the work

A prima facia, it would appear that a number of safety management system procedures had not been followed by the crew members. These will be highlighted in the coming sections, followed by a discussion on the acceptance of risk.

Preparation for the tasks

The ship's ISM procedures and the Company's Safety Circulars included instructions and guidance with respect to preparation of work and safety equipment to be used. Information was also provided on jobs necessitating work aloft. Notwithstanding, a number of procedures were not followed prior to the initiation of the work.

For instance, the safety investigation did not have evidence of toolbox meetings prior to the repair works being initiated in cargo hold no. 3. Moreover, although a risk assessment had been carried out, it was noticed that the wrong risk assessment template had been used. In fact, the template used was for work aloft carried out on the monkey bridge mast.

As expected, identified hazards (ship's whistle, funnel exhaust gases, radar emissions, *etc.*) were not applicable. Then, actual hazards which would have been expected inside a cargo hold had not been cited.

Supervision during the execution of the task

The safety investigation revealed that during the course of the repairs, the officer responsible for the overseeing of the tasks was engaged in the engine-room workshop, cutting the material to size, in preparation for the welding process.

There was no evidence to suggest that another officer had been appointed to oversee the work inside the cargo hold and flag out any actions or inactions which could have become potentially dangerous.

Perception and acceptance of risk

The safety investigation was of the view that risk had not been accepted blindly by the crew members. For instance, the filling of the risk assessment form (albeit the wrong one), and the work and hot work permits, were suggestive that the crew members were not willing to accept any level of risk. Thus, the factors explained above may be indicative of a

perception that risks were well under their control and did not require extraordinary efforts to mitigate.

Actually, this also reflected the importance of toolbox meetings and detailed risk assessments. Risk assessments and toolbox meetings are ways of making the boundaries of system performance more visible and would have enabled the crew members to address the identified risks.

This did not mean that risks would not have been taken by the crew members. In fact, given that the crew members were not doing anything beyond their capabilities, the safety investigation could not exclude the possibility that a perceived 'safe' task could have led to acceptance of higher risks.

Actions by the third engineer on his way down the ladder

The design of the ladder exposed the crew member to a precarious situation. This risks were inherent in the work assigned to him and, as indicated above, the crew members were aware of the risks involved and which, out of necessity, they had accepted (otherwise there would have been no option but to refrain from carrying out the repairs).

Yet again, it does not mean that the acceptance of risk was taken in a vacuum. There were a number of influential factors which would have played a crucial role on whether risk was acceptable or not, and which were applicable in this case. Risk perception is actually influenced by cultural, social, and psychological contexts. Scholars suggest that risk perception is also influenced by psychometric paradigma.

The fact that the fatally injured crew member selected to release his safety belt from its anchor point is actually a risk which he had chosen; on the basis that in reality, it was the best alternative available to him. Had there been alternatives, it was then legitimate to state that choosing the best alternative meant that the crew member possibly rejected other options that may have been seen as less adequate options. Research suggests that the rejection of less attractive options may be seen as actually an improvement and makes the acceptance of risk more plausible.

Similarly, risk tends to be more accepted if it is perceived to be under the control of the person. Therefore, if the third engineer did perceive that the situation was under control (even because this was not a complex task to complete), then his perception of risk would have been influenced towards accepting the risk of releasing the safety belt from its anchor point.

Perception of control, however, does not mean actual control and more often than not, it is more of an over-estimation of the capabilities of the person to control the situation.

CONCLUSIONS

1. The third engineer fell off the sloping section of the forward cargo hold access ladder, just below the lower most platform to the cargo hold tank top;
2. Although the ladder was in a good condition, it was not excluded that the third engineer lost his footing as he negotiated the different angles of the ladder on his way down to the tank top;
3. The plastic band was rigid and not elastic, and considering that the safety helmet fell off, it has been concluded that the safety helmet had not been secured to the chin;
4. Rather than an appropriate fall arrestor, the third engineer was wearing a safety belt;
5. A five-point fall arrestor was available on board but not used during the repair works inside the cargo hold;

6. The type of fall preventer used by the third engineer was not of the best design for vertical movements;
7. The safety investigation did not have evidence of toolbox meetings being carried out prior to the repair works being initiated in cargo hold no. 3;
8. The officer responsible for the overseeing of the tasks was engaged in the engine-room workshop, cutting the material to size, in preparation for the welding process;
9. No other officer had been appointed to oversee the work inside the cargo hold and flag out any actions or inactions which could have become potentially dangerous;
10. The crew members' perception was that the risks involved were well under control and which did not require extraordinary efforts to mitigate;
11. A perceived 'safe' task could have led to acceptance of higher risks;

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[1]

During the course of the safety investigation, the Company:

1. Conducted a fleet wide review of safety harnesses, with either upgrading or replacements carried out where necessary;
2. Distributed a fleet safety circular, highlighting the issues of risk/hazard assessment, rigour to work permit systems and appropriateness / condition of PPE;
3. Painted the top of the lower stool yellow to highlight the change in the ladder's inclination and distinguish it from the cargo hold tank top;
4. Reviewed its ISM internal audit and marine inspections' scope and process in terms of rigour, objectivity and frequency;
5. Amended the SMS in order to further formalise the work inside cargo holds (in terms of height and hot work). Working procedures have been added, including provisions for risk assessments, work permit and general HSE considerations. Visual aids have been included;
6. Reviewed and updated the risk assessment template DM10;
7. Briefed all crew members on this accident;
8. Reviewed its senior officers' familiarisation process, to include topics on risk assessments and safety culture in general;
9. Issued safety bulletins on this accident.

RECOMMENDATIONS

Taking into consideration the safety actions taken by the Company, no safety recommendations have been issued.

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

SHIP PARTICULARS

Vessel Name:	*Pompano*
Flag:	Valletta
Classification Society:	Bureau Veritas
IMO Number:	9346768
Type:	Bulk Carrier
Registered Owner:	Innovative Investments Ltd.
Managers:	TMS Dry Ltd.
Construction:	Steel
Length Overall:	289.00 m
Registered Length:	279.00 m
Gross Tonnage:	88853
Minimum Safe Manning:	17
Authorised Cargo:	Dry Bulk

VOYAGE PARTICULARS

Port of Departure:	Fangcheng, China
Port of Arrival:	Port Hedland, Australia
Type of Voyage:	International
Cargo Information:	In ballast
Manning:	19

MARINE OCCURRENCE INFORMATION

Date and Time:	08 April 2017 at 17:05 (LT)
Classification of Occurrence:	Very Serious Marine Casualty
Location of Occurrence:	20° 05.27’ S 118° 32.50’ E
Place on Board	Cargo hold
Injuries / Fatalities:	One fatality
Damage / Environmental Impact:	None reported
Ship Operation:	On anchor
Voyage Segment:	Arrival
External & Internal Environment:	On the day of the accident, the weather was clear with calm seas. The Westerly wind was force 2 and the air temperature was 32 °C. The sea temperature was recorded at 30 °C.
Persons on board:	19