



REPUBLIC OF THE MARSHALL ISLANDS

Office of the Maritime Administrator

M/V MOONRAY CASUALTY INVESTIGATION REPORT

Provisions Lift – Occupational Fatality

North Sea | 22 May 2016

Official Number: 3250

IMO Number: 9408255



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AUTHORITY

An investigation under the authority of Republic of the Marshall Islands laws and regulations, including all international instruments to which the Republic of the Marshall Islands is a Party, was conducted to determine the cause of the casualty.



*Office of the
Maritime Administrator*

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INTRODUCTION

On 22 May 2016 the Republic of the Marshall Islands Maritime Administrator (hereinafter the “Administrator”) was informed by Primebulk Shipmanagment Ltd. (hereinafter “Primebulk”) that a Messman serving on board their managed ship, MOONRAY, underway in the North Sea, had been found trapped between the lift and the shaft of the Galley provisions lift. It was also reported that the Messman was deceased when he was found.

The Administrator’s marine safety investigation report determined that the provisions lift could be operated when either of the two (2) access doors were open. This was due to the fact that limit switches, or interlocks, for each of the doors were not fitted. It was also determined that the limit switches had not been fitted when the ship was built and had gone undetected since the ship was delivered in 2009.

FINDINGS OF FACT

The following Findings of Fact are based on the information available to the Administrator:

1. Vessel particulars: see chart to right.
2. On the morning of 22 May 2016, MOONRAY was underway in the North Sea on a voyage from Klaipeda, Lithuania to Port Elizabeth, South Africa. At about 1100,¹ the ship's Cook and two (2) Messmen² were in the Galley and Messrooms preparing lunch, which is normally served at 1115. MOONRAY was in international waters in position 51° 27.5' N, 001° 58.3' E, which is approximately 25 miles east northeast of North Foreland, United Kingdom (UK). Based on the ship's deck log, the winds were Force 4 to 5 with a swell of 2 meters (m) on the port bow.
3. At approximately 1110, the Cook stated he told Messman A that he was going to his cabin. Messman B, who was preparing food in the Ratings' Mess, stated that he last saw Messman A in the Galley taking soft drinks out of the provisions lift. No one else was reported to be in the Galley at the time. The provisions lift runs between the Galley and the Provisions Stores on the deck below. The lift has a capacity of 500 kilograms (kg) and is used to bring boxes of provisions up to the Galley. Access to the lift is by a door located in the Galley and the Provisions Stores. *See Figure 1.*



Figure 1: Access door (left) and control panel (right) in the Galley for the Provisions Stores lift. The door and control panel in the Provisions Stores are similar.

VESSEL PARTICULARS

Vessel Name
MOONRAY

Registered Owner
Mirage Finance Inc.

ISM Ship Management
Primebulk Shipmanagement Ltd.

Flag State
Republic of the Marshall Islands

IMO No.
9408255

Official No.
3250

Call Sign
V7PK7

Length
185.54 meters

Date of Build
2009

Gross Tonnage
32,957

Construction
Steel

Persons on Board
24

Vessel Type
Bulk Carrier

Classification Society
Bureau Veritas

**Safety Management System
Recognized Organization**
Det Norsk Veritas - Germanischer Lloyd

¹ Unless otherwise stated, all times are ship's local time (UTC +2).

² In keeping with the Administrator's policy of not including names in reports of marine safety investigations unless necessary, the two (2) Messmen will be referred to as Messman A (deceased crewmember) and Messman B.

4. Messman B returned to the Galley at approximately 1130 and reported seeing blood on the deck in front of the lift shaft. He then saw Messman A hanging down from the top of the lift compartment and trapped between the shaft and the lift compartment. Messman B stated that he alerted the members of the ship's crew who were in the Ratings' Mess that he needed assistance. The Bridge was also informed and an announcement was made for the crew to report to the Galley. Immediately after arriving in the Galley, the Chief Officer examined Messman A as much as possible and determined that he did not have a pulse and he was determined to be deceased.
5. The provisions lift was found off the guide rails with the electric motor running. The bottom of the lift was approximately midway up the Galley access. To stop the electric motor, the ship's electrician secured the power to the lift. Primebulk reported that the provisions lift would remain locked out until repairs were completed.
6. To lower the lift, the crew rigged a wire rope to the bottom of the lift and fastened it to a chain block set up in the lower part of the provisions lift shaft. The crew heaved on the chain block until the lift hoist wire was visible in the Galley. The wire was cut and the lift fell down to the lower level. Messman A's body was laying on top of the lift when it was at the bottom of the shaft.
7. Messman A's body was removed from the lift shaft and reexamined. After reconfirming no vital signs, the body was placed in a body bag and taken to the Ship's Hospital.
8. No members of MOONRAY's crew reported witnessing how Messman A became entrapped in the provisions lift shaft. It was reported that the deck in the Galley was not slippery when the incident occurred. It was also reported that the door from the weather deck to the provisions area was closed at the time of the incident.
9. MOONRAY's Master diverted the ship to Southampton, UK in order to disembark Messman A's body. Following attendance by local law enforcement and a representative of the Administrator on 23 May 2016, Messman A's body was disembarked and MOONRAY resumed her planned voyage.
10. The postmortem examination of Messman A determined the cause of death was injuries to his head and torso. It was also determined that these injuries were consistent with an occupational accident and that there was no indication of foul play.
11. The provisions lift is raised and lowered by a wire rope fitted to an electric motor at the top of the lift shaft. The power for this motor comes from a breaker box located in the Galley. The lift is operated using either the control panel located adjacent to the door in the Galley, or the control panel that is adjacent to the door in the Provisions Stores. The access doors open away from the control panel. *See Figure 1.* The buttons operate by touch only – there is no need for them to be held depressed while the lift is running. The lift has guides which run on two (2) rails, one (1) on each side of the lift shaft. There are limit switches at the upper and lower extents of the shaft that stop the electric motor when the lift is aligned with either of the two (2) access doors. When the lift is in its normal position of use, there is only a small gap between it and the shaft walls.

12. The circuit diagram included in the manual for the provisions lift that was available on board MOONRAY indicates that two (2) door limit switches should have been fitted. See Figure 2. Based on the circuit diagram, these limit switches would cut off the power to the lift's electric motor when either of the two (2) access doors were opened. When examined in Southampton following this incident, the door limit switches shown on the circuit diagram for the provisions lift were found not fitted. In addition, there were not any mounting brackets, holes on either the doors or frames, or wiring in the lift shaft indicating that the door limit switches had been installed at any time since the MOONRAY was built at Hantong Ship Heavy Industry's shipyard in 2009. However, there was wiring fitted in the breaker box for the door limit switches.

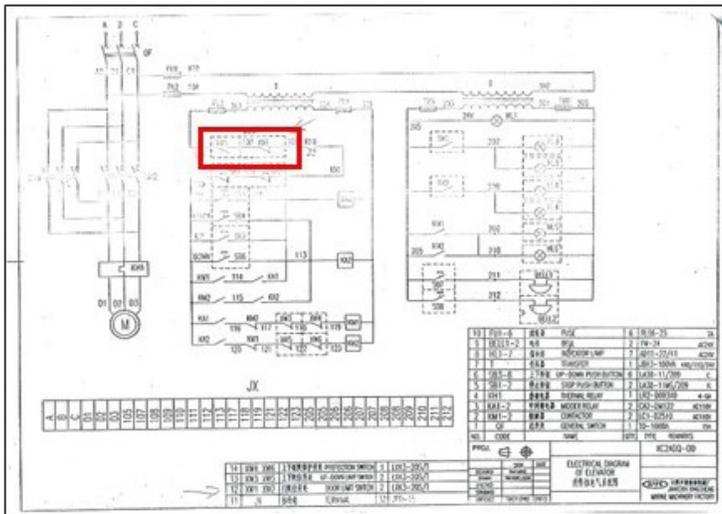


Figure 2: Electric diagram for the provisions lift. The door limit switches are outlined in red. (Source: Jiangyin Xingcheng Marine Machinery Factory, 500kg Marine Food Elevator Final Drawing, drawing No. XC2A500-00)

13. Neither the International Convention for the Safety of Life at Sea (SOLAS), 1974 nor the Republic of the Marshall Islands Maritime Regulations currently include requirements for lifts, whether intended to be used by ship's crew or for provisions.³ Bureau Veritas (BV), the Classification Society (Class) that has classed MOONRAY since the vessel was built in 2009, also does not have mandatory rules that are applicable to the ship's provisions lift.⁴ When requested, BV's rules for lifting equipment can be applied as appropriate to lifts such as the provisions lift on MOONRAY.⁵ The ship's owner or management had not requested BV to examine the provisions lift on board MOONRAY.
14. Primebulk's Fleet Instructions Manual includes a requirement that an operational test of safety devices and interlocks fitted on galley equipment is to be completed during weekly inspections.⁶ Based on available records, the last recorded inspection of the equipment in the Galley was conducted on 24 April 2016. It is noted that the inspection form did not list the galley equipment that was required to be inspected.

3 It is noted that the International Maritime Organization's (IMO's) Subcommittee on Ship Systems and Equipment (SSE) is currently addressing requirements for shipboard lifting gear and appliances. The International Labour Organization (ILO) Occupational Safety and Health (Dock Work) Convention, 1979 (No. 152), has non-mandatory requirements for ship's lifting appliances. It does not address lifts used by personnel or for provisions, like the provisions lift on MOONRAY.

4 BV Rule Note 526, "Rules for the Classification and the Certification of Cranes onboard Ships and Offshore Units" (2007 ed). It is noted that these rules recognize limit switches as safety equipment. See NR526, Section 2.2.

5 In accordance with paragraph 1.1.2 of NR526, these rules can, when requested, be applied all or in part to equipment such as lifts.

6 Primebulk, Fleet Instructions Manual – Engineering, Section F, Rev. 01, paragraph 2.6.5.

15. Primebulk's Fleet Instructions Manual did not specifically address the operation of the provisions lift. It does include a general requirement that the operations in machinery spaces be "performed by a competent person under the supervision of a responsible officer or senior rating."⁷ Primebulk informed the Administrator that based on this requirement, operation of the provisions lift by the Messmen was supposed to be supervised by the Cook. This requirement is not addressed in the portions of Primebulk's Fleet Instructions Manual addressing galley operations or the responsibilities of the Cook or Messman.⁸
16. The provisions lift on board MOONRAY was not included in Primebulk's Preventative Maintenance System (PMS).⁹ It is also noted that the manual for the provisions lift did not include maintenance requirements. The Chief Engineer was not able to locate any records documenting maintenance that might have been performed on the provisions lift.
17. Messman A held the documents required to serve as a Messman on board a Republic of the Marshall Islands registered vessel and signed on board MOONRAY on 16 December 2015. This was his third contract as a Messman on board MOONRAY and he had previously served on board other ships in Primebulk's managed fleet. There was no indication that hours of rest had been exceeded by Messman A or that he was under the influence of alcohol or drugs when the incident occurred.
18. Primebulk's procedures for familiarization training are outlined in the company's Seagoing Staff Training & Appraisal Procedure.¹⁰ In accordance with these procedures, every seafarer signing on board one of their managed ships is required to complete familiarization training to ensure they are familiar with Primebulk's policies and procedures as well as safety and security requirements. The training also includes an explanation of the specific equipment that a seafarer will use while on board.
19. Messman A completed his onboard familiarization on 17 December 2015. It is not known if Messman A was made aware during his familiarization training that the provisions lift would operate when the access doors were open. The Cook reported that he had been shown how to operate the provisions lift when he signed on board MOONRAY on 15 March 2016, but that he was not sure if he knew that it would operate with either of the access doors open. Messman B stated that he was aware that the provisions lift could be operated while either of the doors were open, but did not recall whether he became aware of this as part of his familiarization training when he joined the ship or later. Neither the Cook nor Messman B indicated that they were aware of any restrictions on the use of the provisions lift. Lastly, MOONRAY's officers did not indicate that the Cook was supposed to supervise the operation of the provisions lift.

7 *Ibid.*, Safety & Health, Section B, Rev. 03, paragraph 15.4.

8 *Ibid.*, Safety & Health, Section B, Rev. 03, Section 14, and On Board Organization, Section A, Rev. 02, paragraphs 2.8 and 2.9.

9 MOONRAY is the only ship currently in Primebulk's managed fleet fitted with a provisions lift.

10 Primebulk, Seagoing Staff Training & Appraisal Procedure (QP13, Rev. 02), paragraph 4.2.1.

ANALYSIS

The following Analysis is based on the above Findings of Fact.

Provision Lift Door Limit Switches

Installation

Based on the manual for the provisions lift, it should not have been able to operate when either or both of the two (2) access doors were open. However, neither of these doors were fitted with the door limit switches shown on the circuit diagram included in the manual for the provisions lift that was available on board MOONRAY. See Figure 2. As a result, the electric motor for the provision lift could be activated when a button on either of the two (2) control panels was pressed, whether or not the access doors were closed. Further, because the buttons operate by touch only, it was not necessary for them to be held depressed for the lift to operate. Therefore, it was possible for a person who was loading or unloading the provision lift to cause it to move up or down by accidentally pressing a button on the control panel.

The door limit switches should have been fitted when the provisions lift was installed when MOONRAY was being constructed in 2009. The electric panel that provided electric power to the provisions lift included wiring for the door limit switches. However, there were no mounting brackets, holes on either the doors or frames, or wiring in the lift shaft indicating that these door limit switches had been installed at any time since the MOONRAY was built in 2009. Why the door limit switches were not fitted when the ship was built cannot be determined based on the information available.

Maintenance, Inspection, and Testing

The provisions lift on board MOONRAY was not included in Primebulk's PMS. Further, the manual for the provisions lift did not include maintenance recommendations. However, in the absence of manufacturer's maintenance instructions, it would have been possible to identify the tasks necessary to maintain the provisions lift using good engineering practice and by consulting the drawings and circuit diagrams that are included in the manual for the provisions lift.

Primebulk's Fleet Instructions Manual included a requirement that safety devices and interlocks fitted on galley equipment be inspected and tested weekly.¹¹ Based on available records, the equipment in the Galley was last inspected and tested on 24 April 2016. The form used to document these inspections does not include either a checklist of equipment and interlocks that are to be checked, or a reference to a checklist that should be used to ensure that all safety devices and interlocks were checked. Although experienced seafarers should be able to identify and inspect the safety devices and interlocks in a galley without using a checklist, this increases the likelihood that equipment will be missed. Further, the thoroughness of the inspection is then directly dependent on the individual seafarers conducting the inspection.

It is acknowledged that since there were no mounts, holes, or other visual indications, the absence of door limit switches could go unnoticed even if the provisions lift was inspected regularly. However, since the circuit diagram that is included in the manual for the provisions lift does show the door limit switches, Primebulk's technical staff and the ship's engineers had the information necessary to determine that they were missing.

¹¹ Primebulk, Fleet Instructions Manual – Engineering, Section F, Rev. 01, paragraph 2.6.5.

The provisions lift had not been serviced by a third-party. It is considered likely that if the provisions lift had been serviced by a competent shore side technician that the missing door limit switches would have been identified.

Class Society and Regulatory Requirements

BV does not have mandatory rules that are applicable to the ship's provisions lift.¹² However, when requested, BV's rules for lifting equipment can be applied as appropriate to lifts such as the provisions lift on MOONRAY.¹³ Neither MOONRAY's owner nor Primebulk had requested BV to examine the provisions lift on board MOONRAY since the ship was classed by BV in 2009. The consequence was that BV surveyors would not have examined or tested the provisions lift when the ship was delivered or during surveys conducted since the ship was delivered.

Neither SOLAS, nor the Republic of the Marshall Islands Maritime Regulations, currently include requirements addressing the design and construction of lifts, regardless of their intended service. A result of the lack of international or national requirements is that lifts are outside of regulatory oversight.

Without witnesses it is not known how Messman A entered the provisions lift shaft or how he became entrapped between the provisions lift and the lift shaft with his body inverted. However, based on the information that is available, it is known that because the access doors were not fitted with limit switches, the provisions lift could be operated when either of the two (2) access doors were open. The fact that the provisions lift could operate when either or both of the access doors were open was a significant safety risk. This very serious marine casualty would likely have been prevented if the access door lift limit switches had been fitted when the ship was built or sometime after the ship was delivered, and subsequently were maintained in good working order.

Crew Familiarization

Messman A received familiarization training as required by Primebulk's procedures when he signed on board MOONRAY. Based on the information provided by the ship's Cook and Messman B, it is considered likely that Messman A was shown how to operate the provisions lift as part of his training. Less certain is whether the training that was provided to Messman A included a warning that the provisions lift would operate when either one (1) or both of the two (2) access doors were open.

Based on the information provided by the ship's Cook and Messman B, it is not known whether the familiarization training that was provided to the Galley staff addressed the requirement that the operation of the provisions lift was supposed to be supervised by the Cook. Nor were MOONRAY's officers aware of this requirement.

Although a lift is commonly understood as "machinery," a galley is not commonly associated with being considered a machinery space. Therefore, a seafarer would not be aware of this particular requirement unless it had been communicated through onboard familiarization training or other means since it is not addressed directly in Primebulk's Fleet Instructions Manual.

12 BV Rule Note 526, "Rules for the Classification and the Certification of Cranes onboard Ships and Offshore Units" (2007 ed). It is noted that these rules recognize limit switches as safety equipment. See NR526, Section 2.2.

13 In accordance with paragraph 1.1.2 of NR526, these rules can when requested be applied all or in part to equipment such as lifts.

CONCLUSIONS

The following Conclusions are based on the above Findings of Fact and Analysis:

1. No conclusion is made regarding how Messman A became entrapped inside the provision lift shaft or how his body became inverted. However, based on the information that is available, a contributing cause was that the access doors were not fitted with limit switches as designed. This allowed the lift to be operated when either of the two (2) access doors were open.
2. As designed, the access doors were supposed to be fitted with limit switches. Although it is not known why the limit switches were not fitted, the fact that this was not detected before the ship was delivered indicates that the ship yard's quality assurance and the owner's own oversight were both not as effective as they should have been. Further, the fact that the limit switches were not fitted went undetected since MOONRAY was delivered in 2009 indicates that Primebulk's system of shipboard inspections and preventative maintenance were not as effective as they could have been. Other factors that contributed to the absence of the limit switches going undetected was that the provisions lift was not subject to third-party inspection and maintenance, and the absence of any regulatory oversight.
3. Primebulk's familiarization training was adequate, but it could have been more robust with respect to awareness of the operating requirements for the provisions lift and precautions that should be followed when it was being operated.
4. Based on the postmortem examination conducted by the local authorities in Southampton, Messman A died due to injuries that were received when he was entrapped between the provisions lift and the lift shaft. There were no indications that this incident was the result of foul play.

CORRECTIVE ACTIONS

Primebulk has taken the following Corrective Actions based on their investigation of this very serious marine casualty:

1. Primebulk elected to take the provisions lift permanently out of service. This was accomplished by welding steel bars across the access doors in the Galley and the Provisions Stores.
2. The training schedule in Primebulk's SMS was revised to include topics specific to training in risk assessments and safe work practices.
3. A Circular was sent to all ships in Primebulk's managed fleet emphasizing the importance of safe work practices and the need to conduct a risk assessment even when conducting routine tasks. Masters were directed to hold special Safety Committee meetings to review the Circular and conduct training on safe work practices.
4. Masters were instructed to inform Primebulk of any shipboard equipment that was not included in their ship's PMS.
5. Primebulk is evaluating electronic systems to enhance the Company's oversight of onboard compliance with PMS requirements.

The Administrator concurs with these Corrective Actions.

The Administrator has taken the following actions:

1. On 24 May 2016, the Administrator recommended that ship management not place the provisions lift back in service until door limit switches were installed on the both of the access doors.
2. On 26 May 2016, the Administrator issued Marine Safety Advisory No. 20-16 recommending that ship managers of Republic of the Marshall Islands registered vessels have all lifts on board their managed ships inspected to ensure that safety devices, including limit switches and interlocks as required by the manufacturer, are fitted and operating properly. Other recommendations included locking lifts out of service on the applicable electrical control panel until any missing safety devices are installed or improperly functioning safety devices are repaired.

RECOMMENDATIONS

The following Recommendations are based on the above Conclusions and in consideration of the Corrective Actions taken by Primebulk:

1. It is recommended that Primebulk:
 - (a) Review, and as appropriate, revise their system of developing and validating PMS requirements for ships when they are taken into management.
 - (b) Consider having lifts, whether used by personnel or for provisions, on their managed ships inspected and serviced by a competent third-party. It is acknowledged that MOONRAY was the only ship in Primebulk's managed fleet that was fitted with a provisions lift.
 - (c) Review, and as appropriate, revise their familiarization training program based on the lessons learned from this incident, with particular emphasis on operating requirements for equipment outside of machinery spaces, such as lifts, that commonly require only one (1) person to operate.
2. It is recommended that the Administrator consider:
 - (a) Developing national requirements for personnel and provisions lifts based on the lessons learned from this marine safety investigation.
 - (b) Submitting a proposal to the IMO to establish requirements for personnel and provisions lifts based on the lessons learned from this marine safety investigation.
3. It is recommended that BV consider reviewing, and as appropriate revising, their rules for lifts based on the lessons learned from this marine safety investigation.

The Administrator's investigation is closed. It will be reopened if additional information is received that would warrant further review.