REPUBLIC OF THE MARSHALL ISLANDS

Office of the Maritime Administrator

MV FELICIA CASUALTY INVESTIGATION REPORT

Third Officer's Loss of Life Due to A Shipboard Injury When Underway,
Approaching the Port of Tianjin, China

4 May 2012

Official Number: 3391

IMO Number: 9492414

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AUTHORITY

An investigation, under the authority of the 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 4 May 2012, at approximately 1700,[1] the Third Officer of the M/V FELICIA died as the result of his injuries sustained when he fell into a forepeak void space from the forepeak stores, i.e., forecastle stores or Bosun stores, through an open manhole. At the time of the marine casualty, the ship was underway, approaching the anchorage of the port of Tianjin, China. FELICIA's crew was preparing the ship for the anchorage. The ship's last port was Marombo, Tanzania where she departed on 24 April 2012. The weather was reported by the Master as: clear visibility, northeasterly wind at Beaufort force 3, and seas at 0.5 meter wave height.

The Maritime Administrator of the Republic of the Marshall Islands (the "Administrator") determined that the Third Officer's fall was attributable to a combination of the following contributing factors:

- the manhole of the forepeak void space, located inside the forepeak stores, was left uncovered, unattended, and not illuminated; and
- the Third Officer entered the forepeak stores without turning on the lights.

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 3 May 2012, at approximately 0830, the manhole located on the ship's centerline providing access from the forepeak stores, i.e., forecastle stores, to the forepeak void space was opened. *See Figure 1*. The forepeak void space, which extends from the ship's stem to the collision bulkhead, is located above the forepeak tank and below the forepeak stores and has a depth of approximately

VESSEL PARTICULARS

Vessel Name
FELICIA

Registered Owner
Teo Shipping S.A.

ISM Ship Management
FML Ship Management Ltd.

Flag State
Republic of the Marshall Islands

IMO No.	Official No.
9492414	3391
Call Sign	**Length**
V7QL5	184.64 meters
Date of Build	**Gross Tonnage**
2010	33,044

Vessel Type
Bulk Carrier

Safety Management System Recognized Organization
Det Norske Veritas

Class
Nippon Kaiji Kyokai

Figure 1: Forepeak stores looking aft. The manhole that was opened is on the centerline; the manhole on the starboard side was left closed.

1 All times are local, UTC +9.

two (2) meters. The manhole was opened in accordance with the Chief Officer's instructions to ventilate the forepeak void space in preparation for a planned visual inspection of the forepeak tank.

3. At 1300, the Chief Officer used a portable meter to measure the oxygen level in the forepeak void space and determined it was safe for personnel entry. The Chief Officer then instructed the Bosun to open both of the manholes to the forepeak tank and transfer the portable ventilating fan to the forepeak tank manhole. At 1330, the manholes accessing the forepeak tank were opened, and the portable ventilating fan was moved to one of the manhole openings. To cordon off the areas around the open manhole leading from the forepeak stores to the forepeak void space, the Bosun reportedly tied small lines to nearby hand-rails in way of the open manhole and posted warning signs.

4. As the crew went about their daily work routine for the remainder of the afternoon, the portable ventilating fan, which was located at one of the access manholes to the forepeak tank, was left unmonitored as it continued to operate. When the crew finished their day's work, the portable ventilating fan was stopped and remained off throughout the night. The manhole in the deck of the forepeak stores leading to the forepeak void space and the manholes leading from the forepeak void space to the forepeak tank remained uncovered.

5. On 4 May 2012, as the crew was preparing to enter the forepeak tank, the Chief Officer noticed "unpumpable water"[2] inside the tank. In consultation with the Master, they decided to discharge the water from the forepeak tank using a portable air-powered Wilden pump. The Wilden pump, along with portable transfer hoses, was placed on location and the water pumped out. Meanwhile, the ship's deck crew went about their daily work, including preparing for the ship's arrival, readying lines, and checking the main deck. Before the start of the lunch break, the Wilden pump was stopped. The manhole leading from the forepeak stores to the forepeak void space as well as the covers leading from the forepeak void space to the forepeak tank remained uncovered.

6. After the crew's mid-afternoon coffee break at 1530, the Third Officer and Deck Cadet conducted final preparations for the ship's arrival at the Tianjin anchorage. Working aft to forward, preparations included performing inspection of the main deck for loose gear, ensuring availability of main deck safety equipment, e.g., ring buoys, portable extinguishers, fire hoses, etc., and readiness of moorings and ground tackle. Both the Third Officer and the Deck Cadet were reportedly wearing boiler suits, safety shoes, gloves, and safety helmets, including their use of the safety helmets' chin straps.

7. At 1700, the Third Officer and Deck Cadet were reported to reach the forward area of the main deck when the Third Officer noticed that the ring buoy designated for the top of the ladder to the forecastle deck was missing. The Third Officer went into the forepeak stores to retrieve the ring buoy. The Third Officer did not turn on the lights when he entered the forepeak stores. The Deck Cadet stated he heard a cry for help and went into the forepeak stores to investigate. The Deck Cadet found the Third Officer, who was conscious, lying at the bottom of the forepeak void space, which is approximately three (3) meters below the manhole located in the deck of the forepeak stores. At approximately 1710, the Deck Cadet called down to the

2 The reference "unpumpable water" is used to describe standing pools of water found inside of the forepeak tank on which the ship's fixed deballasting system is unable to draw suction.

Third Officer telling him that he would get help. At approximately 1715, the Deck Cadet informed the bridge of the Third Officer's accident.

8. The Master sent the Chief Officer forward to assist. The Chief Officer and the Second Officer rushed forward to the forepeak stores, where they found the Third Officer laying on his back in the forepeak void space. At approximately 1730, the Third Officer was removed from the forepeak void space and transferred to the ship's hospital where medical first aid was administered. The Chief Officer determined that the Third Officer's pulse and body temperature were normal. The Chief Officer, Second Officer, and others remained with the Third Officer, continuing to provide him with medical first aid.

9. The Third Officer remained conscious and was reported to have advised the Chief Officer of the pain he was experiencing. On examination, he was reported to have a 2.5 cm deep and 6 cm wide gash on his left thigh. The Second Officer, who was the ship's Medical Officer, cleaned the area, applied antiseptic, and covered the wound with a bandage, stopping the flow of blood. The Third Officer remained conscious and when asked if he felt any other pain, the Third Officer replied with a negative response.

10. At approximately 1745, the Master contacted the local port agent and requested shore medical assistance, including a helicopter to evacuate the injured Third Officer and transport him to the hospital. At the time, FELICIA continued her approach to the Tianjin anchorage and was in radio contact with Tianjin Vessel Traffic Control.

11. At approximately 1900, the Master, who was on the bridge requesting that the Third Officer be evacuated ashore, assigned the Chief Officer to the bridge and the Second Officer to the anchor station; he assigned the Deck Cadet, an Able-body Seaman, an Ordinary Seaman, and the Chief Cook to remain with the Third Officer, who was reported in normal condition, in the ship's hospital. Based on information provided by ship management, a few minutes later the Third Officer reportedly asked the Ordinary Seaman if he had any painkillers. The Ordinary Seaman said he told the Third Officer there was Mefenamic Acid in the medicine chest.[3] The Third Officer asked the Ordinary Seaman for two tablets (500 mg). The Ordinary Seaman provided the Third Officer with the medication and some water; this was not reported at the time to the Master, Chief Officer, or Second Officer. None of the other crewmembers who were in the ship's hospital reported expressing any objection to the Ordinary Seaman giving the Third Officer the pain medication without authorization from either the Master or the Second Officer.

12. At approximately 1915, the Third Officer began complaining about shortness of breath, which is a side effect of Mefenamic Acid.[4] The Chief Cook, who had been in the ship's hospital, went to the bridge and informed the Master. The Master directed the Chief Officer to return to the ship's hospital. The Master then called the Tianjin Harbor Master using the ships bridge-to-bridge VHF radio to urgently request a helicopter to transfer the Third Officer to a shore-based hospital. The Master then called the port agent and again urgently requested a helicopter. The port agent replied that no helicopter was available and that a harbor

3 Mefenamic Acid is a prescription, nonsteroidal anti-inflammatory drug that is used for the short-term treatment of mild to moderate pain. Side effects include dizziness and drowsiness as well as shortness of breath. *See* http://www.nlm.nih.gov/medlineplus/druginfo/meds/a681028.html.

4 *See supra* note 3.

tug was en route. Medical oxygen was administered to the Third Officer and he reportedly began to feel better; his pulse and breathing reportedly became normal.

13. At 2100, the Third Officer again began breathing abnormally. The Second Officer, who was again attending to the Third Officer, was unable to identify a pulse. The Master attempted to call the ship's management by satellite telephone, but was unsuccessful due to an Inmarsat signal not being available. The Master again called the port agent asking if a helicopter was available.

14. At 2115, the Third Officer's breathing and pulse became weak and shallow. The Second Officer, assisted by the attending crewmembers applied cardio-pulmonary resuscitation while continuing to administer medical oxygen.

15. At 2130, the harbor tug JINGANGLUN 24 was along the ship's port side. The Third Officer was transferred by stretcher to the harbor tug; throughout the transfer he was administered medical oxygen. No emergency medical personnel were onboard the tug. The Master sent the Fitter to accompany the Third Officer as he was being taken to a hospital on shore. It was approximately 20 to 25 nautical miles (NM) from the anchorage to the Port of Tianjin.

16. On 5 May 2012, at 0040, the Third Officer and Fitter reportedly arrived at the Tianjin Fifth Central Hospital. Upon arrival, the attending medical doctor declared that the Third Officer was deceased. The port agent informed the Master of the Third Officer's death.

17. Based on a review of the ship's work-rest hours log, the Third Officer had sufficient rest and there were no indications of his having been adversely affected by drugs or alcohol. Furthermore, he was observed as being harmonious with his co-workers and there were no reported personal grudges against anyone onboard.

18. All of the forepeak stores' lights were tested by the ship's crew after the incident and were determined to be in good working order.

Crew Information

19. At the time of the incident, the ship was manned with a multinational crew consisting of Ukrainian, Russian, Indian, and Filipino nationalities. The experience of the Master and deck officers are shown below. All of the officers had been on board FELICIA for just over one (1) month when the incident occurred.

RANK	NATIONALITY	TIME WITH COMPANY	TIME IN RANK	TIME IN SHIP TYPE
Master	Ukrainian	2 y 7 m	5 y 0.5 m	2 y 3 m
Chief Officer	Indian	0 y 7 m	0 y 7 m	2 y 5 m
Second Officer	Filipino	0 y 8 m	0 y 4 m	1 y 3 m
Third Officer	Filipino	2 y 3 m	7 y 8 m	1 y 11 m

20. A review of the rest hour's record for the Third Officer indicated that he had at least 12 hours rest in the 24 hours prior to when he fell through the open manhole and more than 77 hours of rest in the preceding seven (7) days.

21. Based on the report of a physical examination conducted on 15 March 2012, which was submitted with the Third Officer's application for Republic of the Marshall Islands seafarer's documents, he did not have any pre-existing medical conditions and was fit for sea duty.

ANALYSIS

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

Pre-Task Hazards Assessment Process

The initial event that preceded the Third Officer falling through the open manhole was how the task of inspecting the forepeak void space and forepeak tank was initiated. First, a permit to work, formal or informal pre-task hazards assessment, and/or toolbox talk[5] was not completed before the task was started. As a result, the hazards associated with the task and safety measures that would be implemented were not communicated with those assigned to perform the task. Second, as the person in charge of this task, the Chief Officer, addressed some, but not all of its associated hazards. For instance, in preparation for entry into the forepeak void space, which is a confined space, the Chief Officer had the atmosphere in the forepeak void space tested; he also had the area in way of the open manhole partially cordoned off. However, he did not require a grate or similar cover be put over the open manhole while the forepeak void space or forepeak tank was not being ventilated or left unattended. This created an unnecessary hazard. Third, the deck department staff was not reminded of the open manhole before making final preparations to anchor the ship. Such measures would likely have increased the hazard awareness of all deck department staff, including the Third Officer and Deck Cadet.

Third Officer's Personal Situational Awareness

A well-lit workspace is an important aspect of shipboard safety. Although the Third Officer was no doubt familiar with the layout of the forepeak stores, by not turning on the light after entering the forepeak stores from the deck, he would not have been able to see potential safety hazards including the open manhole. As a result of not turning on the lights in the forepeak stores, the Third Officer would not have had full personal situational awareness of the safety hazards. As previously stated, after the accident, the forepeak stores' lights were tested and found satisfactory.

It is noted that a recognized industry best practice is that unattended openings in the deck, e.g., manhole openings, be kept illuminated, or that they be properly covered or blocked off before lights are switched off.[6]

5 "Toolbox talk" is a commonly used reference for personnel to perform an on-the-scene and mostly informal pre-task planning and hazards identification session by those who are directly involved in the work.

6 United Kingdom Maritime and Coastguard Agency, Code for Safe Working Practices for Merchant Seaman (2010), Section 13.4.6.

Treatment for Shock and Administering of Medications

Shock is a potentially life threatening condition that can result from sudden injury or loss of blood due to external or internal bleeding.[7] A primary object of first aid when treating an injured person is to prevent shock.[8] It is noted that symptoms of shock can be missed and that shock can onset even while the person being treated is under observation.[9] Based on medical guidance for ship's officers, first aid should include treatment of the condition that can lead to the onset of shock.[10]

It is noted that the Third Officer was administered Mefenamic Acid by the Ordinary Seaman without authorization from either the ship's Master or the ship's Medical Officer, both of whom were engaged in anchoring the ship. Although no conclusion can be made whether this medication potentially contributed to the worsening condition of the Third Officer, it is noted that potential side effects of Mefenamic Acid are increased drowsiness or dizziness,[11] which are both indicators of shock.[12] These side effects could have masked or contributed to the onset of shock.

Although the Master recognized the potential seriousness of the Third Officer's injuries, the decision to assign the Chief Officer to the bridge and the Second Officer to the forecastle for anchoring left the Third Officer in the care of crewmembers who did not have Advanced First Aid training and may not have been fully aware of the symptoms of shock. The focus on entering the anchorage may also have contributed to neither the Chief Officer nor the Second Officer providing guidance to the crewmembers that remained in the ship's hospital regarding the potential for the Third Officer to experience shock and how it should be treated.

CONCLUSIONS

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

1. The Third Officer died as the result of injuries sustained when he fell into the forepeak void.[13] Contributing factors included that although the open manhole was cordoned off with a small line, it was not covered with a grate or similar cover. Additionally, because the Third Officer did not turn on the forepeak stores' lights, he did not have adequate situational awareness of the safety hazards associated with the open manhole. These contributing factors are the result of human error.

2. The Chief Officer did not initiate either a permit to work, and/or formal or informal hazards assessment prior to having the forepeak stores' and forepeak void space manhole covers removed. This contributed to not identifying the need to put a temporary cover over the manhole access when work was not being performed, which resulted in a hazard to crew safety.

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7 World Health Organization, International Medical Guide for Ships, 3rd Ed. (2007), p. 13. United Kingdom Maritime and Coastguard Agency, Ship Captain's Medical Guide, 22nd Ed., p. 19.

8 Ship Captain's Medical Guide, p. 6.

9 Ibid, p. 19.

10 International Medical Guide for Ships, pp. 13 - 16; Ship Captain's Medical Guide, p. 19.

11 See http://www.nlm.nih.gov/medlineplus/druginfo/meds/a681028.html

12 International Medical Guide for Ships, pp. 14; Ship Captain's Medical Guide, p. 19.

13 Based on the information available it could not be concluded if shock was a factor contributing to the Third Officer's death.

3. The immediate response by the Master and ship's staff after being notified that the Third Officer had fallen into the forepeak void space was appropriate. It is also evident that the Master recognized the potential seriousness of the Third Officer's injuries and made a timely request to have the officer evacuated by helicopter to a hospital on shore. However, as FELICIA approached the anchorage, the Third Officer was not left in the care of the Medical Officer or another member of the ship's crew with an appropriate level of training when it was necessary for the Master, Chief Officer, and Second Officer to go on deck prior to anchoring. As a result, the onset of shock may have gone unnoticed. In addition, the Third Officer was administered Mefenamic Acid without apparent knowledge of the potential side effects or that the side effects might mask or contribute to the onset of shock.

4. The evacuation of the Third Officer to a hospital on shore and professional medical treatment was delayed by the reported non-availability of a helicopter and that emergency medical personnel were not onboard the harbor tug.

CORRECTIVE ACTIONS

FML Ship Management Ltd. has taken the following Corrective Actions based on their investigation of this very serious marine casualty:

1. A shipboard safety meeting was convened during which the following was explained in detail to the crew and officers:
   a. Safety precautions to be taken during critical operations such as hot work, man aloft or over-side, personnel entry into enclosed spaces, including the need for adherence to procedures, and permits to work prior to initiating these tasks;
   b. Proper use of personal protective equipment;
   c. Conducting and logging "toolbox talks" pre-task meetings on a daily basis;
   d. Stop work authority for any unsafe act or work;
   e. Safety precautions during the in-progress ventilation of any confined space including the use of safety covers for open manholes;
   f. Company's concentrated campaign towards the implementation of the "SafeR+"[14] program with respect to all persons being responsible for watching out for each other and an obligation to stop any unsafe act and report the same to the Master; and,
   g. No medicines are to be taken by any crew member without prior permission from either the Master or the Second Officer (ship's designated Medical Officer) unless they have a prescription from a shore-based medical doctor.

2. The use of manhole safety covers was made compulsory on all of the company's vessels.

3. The company commenced a fleet-wide campaign on the daily performance of "toolbox talks".

14 "SafeR+" is a commercially provided safety management system support program.

4. A fleet wide safety alert highlighting the lessons learned from this incident was circulated. In addition, as a case study, post incident lessons learned were reviewed during the company's fleet seafarers' seminar.

5. To identify any potential shortfalls, the company also performed a focused review of the following safety management system reports pertaining to the ship: housekeeping checklists; Master's reviews; and, incident and near-miss reporting.

The Administrator concurs with these Corrective Actions.

RECOMMENDATIONS

The following Recommendations are based on the above Conclusions, and consideration of the Corrective Actions taken by FML Ship Management Ltd.:

1. It is recommended that, unless already done, FML Ship Management Ltd. review and as appropriate revise their ship board training program to ensure the following are addressed on a regular basis so that all ship's staff receive the training at least once per contract:
   a. The areas that were addressed during the ship board safety meeting held after this incident;
   b. Confined space entry procedures, including the use of safety covers when manholes must be left unattended; and,
   c. How to recognize and treat injured seafarers for shock.

2. It is recommended that, unless already done, FML Ship Management Ltd. review their shipboard emergency medical plan, and as appropriate, revise it to address situations when the ship's Master or designated Medical Officer may not be available to provide medical care beyond immediate first aid.

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