

# **FINAL REPORT**

## **FALL INTO CARGO HOLD (LOSS OF LIFE) ON-BOARD SRS WAN HAI 212 AT TAICHUNG, TAIWAN ON 5 NOVEMBER 2017**

MIB/MAI/CAS.028

Transport Safety Investigation Bureau  
Ministry of Transport  
Singapore

26 December 2018

## **The Transport Safety Investigation Bureau of Singapore**

*The Transport Safety Investigation Bureau (TSIB) is the air and marine accidents and incidents investigation authority in Singapore. Its mission is to promote aviation and marine safety through the conduct of independent investigations into air and marine accidents and incidents.*

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## **SYNOPSIS**

On 5 November 2017 at about 0730H, while the Singapore registered container vessel Wan Hai 212 was alongside the port of Tai Chung, Taiwan, one of its crew sustained fatal injuries after falling from a height of about 14 metres during cargo operations.

Witness account indicated that while walking on the catwalk, which was cluttered with loose lashing gears, the crew slipped, lost his balance and fell backwards into the open cargo hold which did not have any safety railings or safeguards.

The crew was attended to by shore medical personnel and conveyed to the hospital. The crew succumbed to his injuries.

The Transport Safety Investigation Bureau classified the occurrence as a very serious marine casualty.

The investigation revealed that the accident was a result of inadequate risk control measures put in place to prevent a fall into an open cargo hold, especially in a walkway which was wet, narrow and cluttered with loose lashing gears.

## VIEW OF VESSEL



Figure 1 showing the vessel secured at No.35 berth, Taichung

## DETAILS OF VESSEL

Name	Wan Hai 212
IMO Number	9048586
Classification Society and ISM RO <sup>1</sup>	China Classification Society (CCS)
Ship type	Cargo Ship (Container) - Gearless <sup>2</sup>
Year Built	March 1993

<sup>1</sup> Recognized Organization (RO) - an organization that has been assessed by a flag State and has the delegation of authority to perform statutory certification and services on behalf of the flag State.

<sup>2</sup> Gearless - the vessel was not fitted with any cargo cranes for loading/discharging of containers

Company / Owner / Operator <sup>3</sup>	Wan Hai Line(s) Pte. Ltd.
Gross tonnage	17,138
Length overall	174.60m
Breadth	27.00m
Depth	14.60m
Designed Draft	9.87m
Main engine(s)	1 set of Hitachi B&W 7S50MC
Propellers	1 Fixed Pitch Propeller
Container Loadable	1329 TEUs <sup>4</sup>
On Deck / In Hold	731 TEUs / 598 TEUs
Total Nos. of Holds / Hatches	5 / 9
Hatch Cover	Pontoon Type
Hatch Opening dimensions	No.1: 6.30m x 16.20m No.2: 12.60m x 21.50m / 16.20m No.3-9: 12.60m x 21.50m

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<sup>3</sup> As defined in the ISM Code, company - means the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the ship owner and who, on assuming such responsibility, has agreed to take over all duties and responsibility imposed by the Code.

<sup>4</sup> TEU - twenty-foot equivalent units (dimension length 6.1m x width 2.44m x Height 2.59m)

# 1 **FACTUAL INFORMATION**

All times (H) used in this report are Taiwan Local Time unless otherwise stated. Taiwan Local Time is eight hours ahead of Coordinated Universal Time (UTC).

## 1.1 **Sequence of events**

- 1.1.1 On 5 November 2017 at about 0218H, Wan Hai 212 was secured starboard side alongside to berth No.35, Tai Chung, Taiwan, for cargo operations.
- 1.1.2 At about 0236H, upon completing port formalities<sup>5</sup>, cargo operations commenced with discharging of deck containers from bay 12, in-way of No.4 cargo hold.
- 1.1.3 At about 0400H a routine change of watch took place. The 0400-0800H watch keepers comprised of the Third Officer (3O) who was in-charge of supervising the cargo operation and was assisted<sup>6</sup> by two ratings, one Able Seafarer Deck (ASD) and one Carpenter, taking turns for making rounds on deck and maintaining a security watch at the gangway.
- 1.1.4 During his watch, the 3O noted that the discharging of deck containers was in progress from bay 12. On completion of deck cargo discharge, the hatch cover was lifted by the shore crane to prepare for back-loading of containers in No.4 cargo hold, as per the cargo plan.
- 1.1.5 At about 0435H, shore crane shifted forward to bay 8 (in-way of No.3 cargo hold) to commence loading of deck containers.
- 1.1.6 At about 0720H, the 3O at the bridge received report via a walkie-talkie from the Carpenter that loading at bay 8 was completed (See **Fig 2** for vessel's orientation).

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<sup>5</sup> Among others, the port formalities include, immigration and custom's clearance, and pre-cargo loading and discharging operations.

<sup>6</sup> Duties of ratings assisting in cargo watch, among others, include, gangway watch, mooring watch, checking container lashing and opening/ closing of hatch covers.

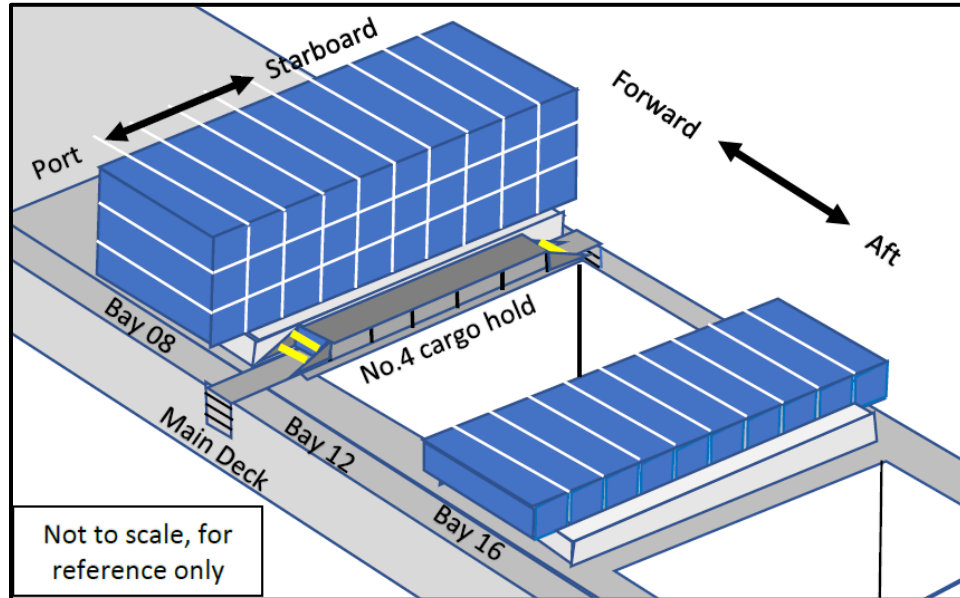


Fig 2 – Vessel's orientation

- 1.1.7 A few minutes later, at about 0730H, the shore Tallyman who was onboard at the time, informed the ASD on duty that one of the ship's crew had fallen into No.4 cargo hold on the starboard side. The ASD immediately informed the 3O, who reported the occurrence to Master and Chief Officer (CO).
- 1.1.8 The 3O sounded the general alarm and followed up with an announcement for all crew to muster at the starboard main deck (near the gangway area).
- 1.1.9 At about 0734H, the CO and ship's first aid team brought a stretcher to the main deck near No.4 cargo hold. The CO noted that the crew who had fallen was the Carpenter and that he was lying motionless in a pool of blood at the bottom of the cargo hold.
- 1.1.10 Cargo operations were suspended and the CO together with the first aid team entered the cargo hold and rendered medical first aid to the Carpenter.
- 1.1.11 The CO updated the Master that the Carpenter seemed to have suffered serious injuries and that the height of fall<sup>7</sup> was likely to be about 14m. The Master informed the local agent and requested for medical assistance.

<sup>7</sup> No. 4 cargo hold was half filled with containers. The location where the Carpenter had fallen was empty.



- 1.1.12 A shore medical team arrived in an ambulance at about 0740H. The medical team noted that the Carpenter's vital signs<sup>8</sup> were not showing any signs of life.
- 1.1.13 The injured Carpenter was transferred to an ambulance and conveyed to the hospital, accompanied by the Second Officer (2O).
- 1.1.14 Subsequently, the local Police and Port Authority boarded the vessel to determine the circumstances of the fall. While assisting the authorities in their inquiries, the Master received a call from the 2O that the Carpenter had succumbed to his injuries and was declared dead by the hospital at about 0905H.
- 1.1.15 At about 1520H, the company's appointed P&I surveyor boarded the vessel for an investigation.
- 1.1.16 At about 1906H, the vessel resumed its cargo operations which were completed at about 2100H. The vessel subsequently departed Tai Chung and proceeded to the next port of Kaohsiung.

## 1.2 **Witness account**

- 1.2.1 There were two witnesses to the occurrence, the shore Tallyman who was onboard the vessel and the crane Operator (shore crane cabin).
- 1.2.2 According to the two witnesses, the Carpenter was initially seen walking on the port side of the main deck, then seen climbing a short fixed vertical ladder and eventually walking across the raised catwalk between bay 8 and bay 12, from the portside to the starboard side.
- 1.2.3 Towards the end of this raised catwalk, he was seen to lose his balance and fall backward into No.4 cargo hold. The hold had been open since the last discharging operation. (see **Fig 3a and 3b**).
- 1.2.4 The Carpenter was observed to have been wearing safety shoes and safety helmet.

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<sup>8</sup> Blood Pressure 0/0, Pulse Rate 0/min, Respirator Rate 0/min and Body temperature below normal (36.5 to 37.5°Celsius)

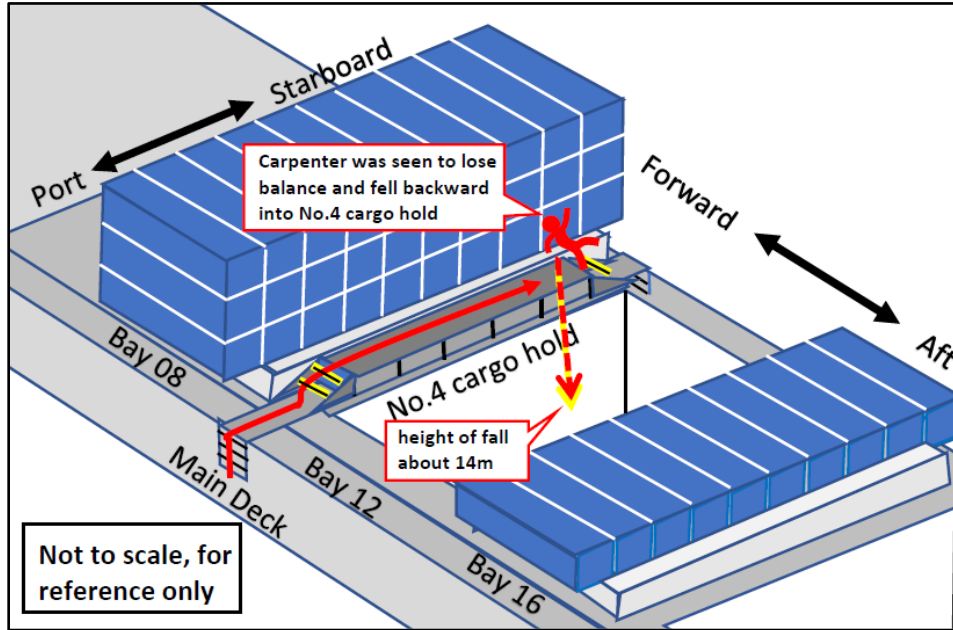


Fig 3a – Carpenter’s route on the catwalk before falling into No.4 cargo hold

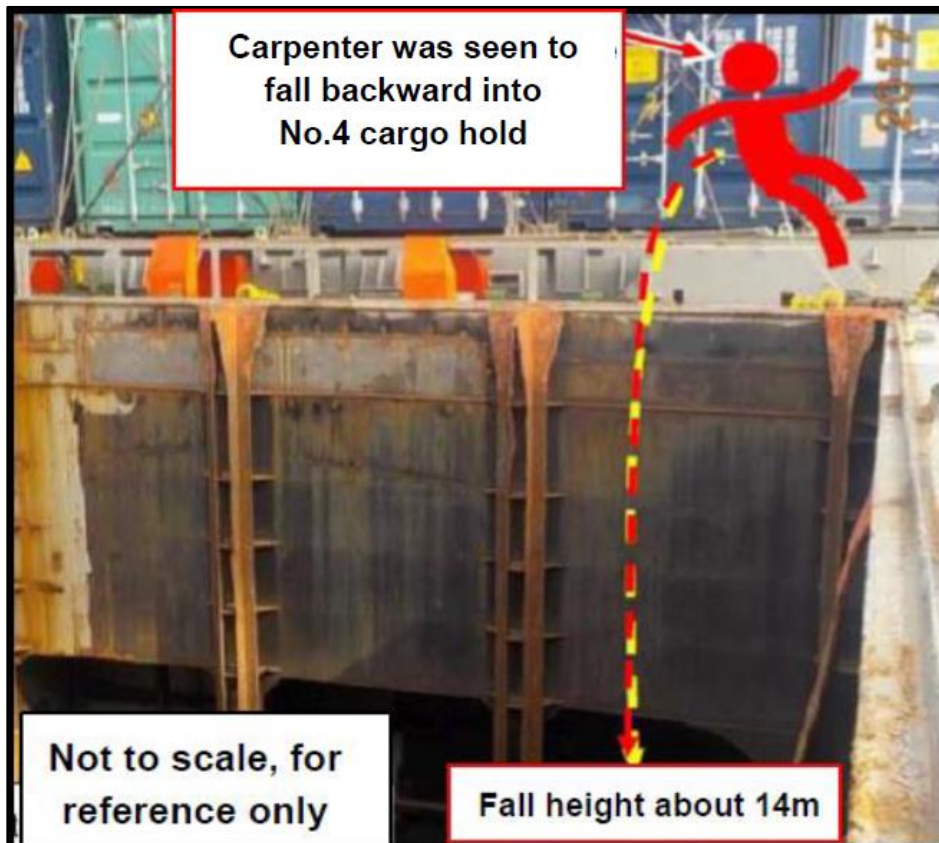


Fig 3b – Witness account of how the Carpenter fell into the cargo hold – viewed from aft

### 1.3 Location of the occurrence

1.3.1 The accident occurred at the catwalk between bay 8 and bay 12.

1.3.2 The width of the raised catwalk was about 70cm. At the time of the occurrence the catwalk was cluttered with loose lashing bars and turnbuckles (see **Fig 4**).

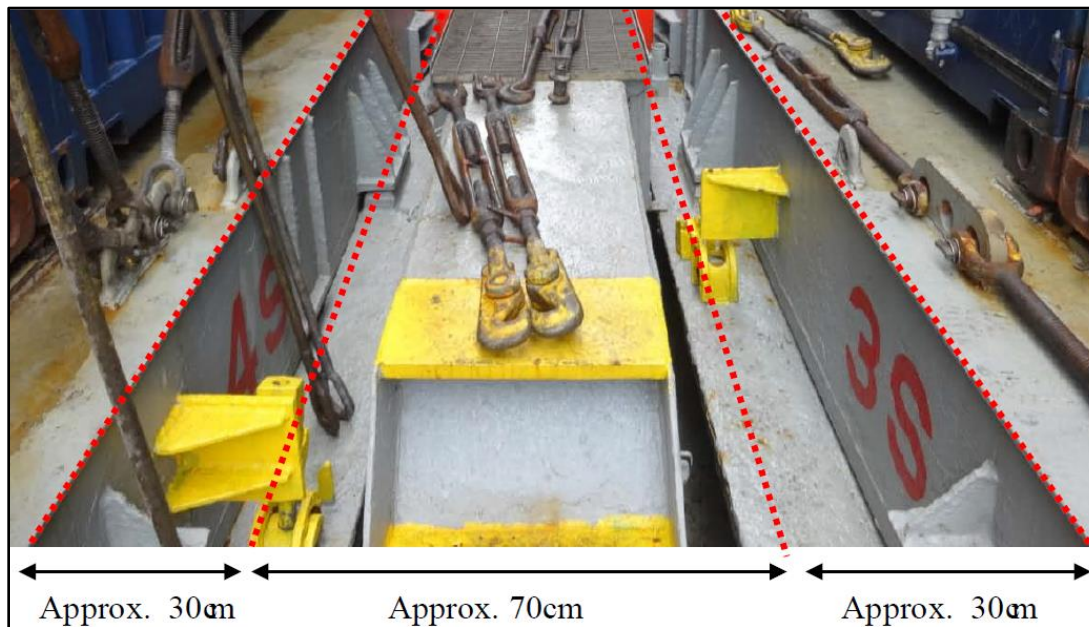


Fig 4 – Illustrating an example of loose lashing gears on raised catwalk

1.3.3 There were no signs of damage to the deck, catwalk and coaming near the location of the occurrence. There were no stanchions/ railings or fencing<sup>9</sup> to guard against accidental fall when the hatch cover was not in place.

1.3.4 There were four sockets<sup>10</sup>, two on each side of the ship, meant for installing portable stanchion near the steps. The portable stanchion provided support when walking up and down the steps. At the time of the occurrence, there were no portable stanchions fitted at the sockets. (see **Fig 5** – stanchion sockets circled in red).

<sup>9</sup> System of fencing means guardrails, safety barriers and similar structures that provide protection against the falls of persons.

<sup>10</sup> The sockets are for stanchions at the steps of the raised catwalk. These stanchions when fitted will provide user with support walking up and down the raised catwalk.

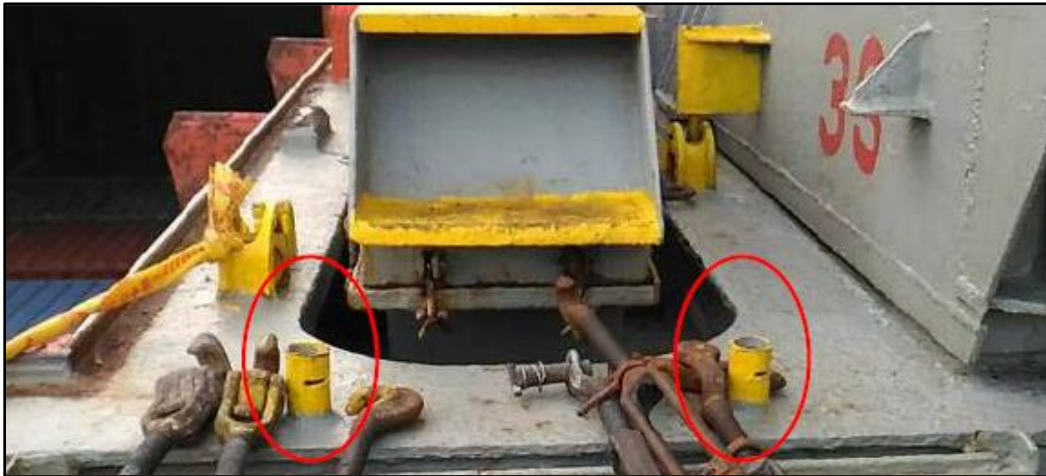


Fig 5 – Stanchion sockets marked red circle

- 1.3.5 The body of the Carpenter was lying motionless in a pool of blood at the bottom of No.4 cargo hold (see **Fig 6**)

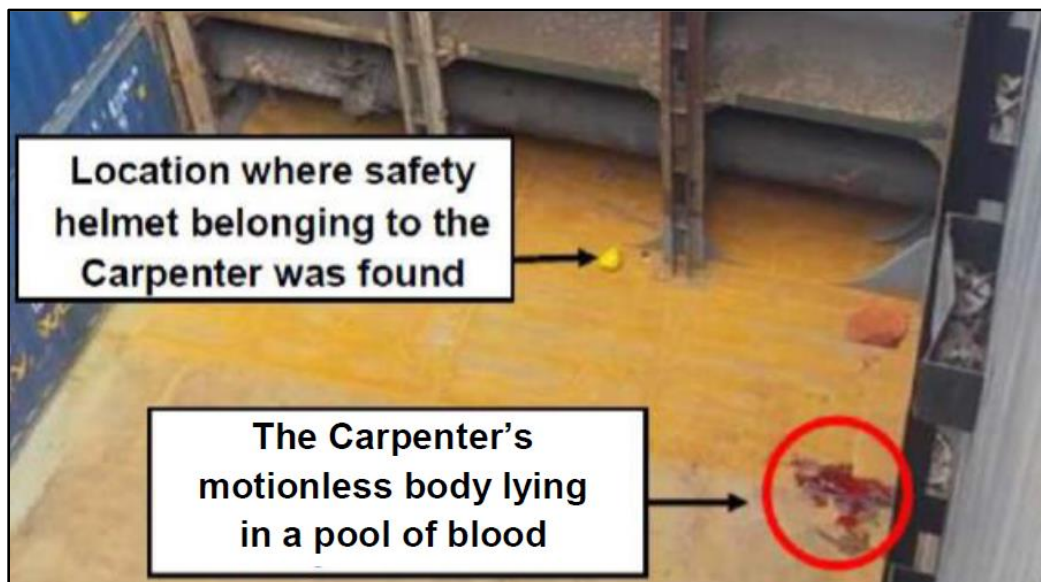


Figure 6 – showing location of the Carpenter's body

#### 1.4 **Qualifications<sup>11</sup>, roster and roles**

1.4.1 Wan Hai 212's manning<sup>12</sup> comprised of 20 Officers and crew of various nationalities.

<b>Rank</b>	<b>Nationality</b>	<b>Joined WH 212</b>	<b>Joined Company</b>	<b>In-Rank Experience</b>
Master	People's Republic of China (PRC)	September 2017	May 2002	13 months
Chief Officer (CO)	PRC	September 2017	November 2001	55 months
Third Officer (3O)	PRC	September 2017	December 2015	4 months
Carpenter	Indonesia	December 2016	February 1995	170 months

1.4.2 The Master held a Certificate of Competency (CoC) issued by China Maritime Safety Administration (MSA). He had been on various types of vessels, predominantly on container vessels.

1.4.3 The CO also held a CoC issued by China MSA and had been on various types of vessels, predominantly on container vessels. The CO assisted Master in day to day running of the deck department on crew management, maintenance and cargo operations. During cargo operations in port, the CO kept a day-work routine. The junior officers rotated their watches in four hourly shifts.

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<sup>11</sup> The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (or STCW), 1978 sets qualification standards for masters, officers and watch personnel on seagoing merchant ships.

<sup>12</sup> Manning comprised 10 PRCs, 5 Taiwanese, 4 Indonesians and 1 Myanmar.

- 1.4.4 The 3O was the Officer in-charge of the 0400-0800H watch during cargo operations. His CoC too was issued by China MSA. His primary role in port was to oversee the cargo operations and adjust the vessel's ballast to comply with stability requirements. Before the occurrence the 3O had not tasked the Carpenter with any role or instruction to be in the area of the catwalk where he fell.
- 1.4.5 The Carpenter, 62 years old age, held a Certificate of Proficiency for Rating as ASD issued by Directorate General of Sea Transportation (DGST), Indonesia. His pre-joining medical certificate indicated that he was "Fit for sea service". There was no known report that the Carpenter was on medication. His primary role during his watch was to assist the 3O in monitoring the cargo operations on deck.
- 1.4.6 The Carpenter's record of hours of rest<sup>13</sup> were as follows:
- Saturday 4 November 2017 indicated 19.5H of rest, with 7 hours each of two uninterrupted rest hours' period.
  - Sunday 5 November 2017 indicated that at 0100-0200H (for one hour) was called for Taichung berthing station, and again at 0400H was called for watch duty until the time of the occurrence.
- 1.4.7 All other officers and crew members too held valid STCW certificates.

## 1.5 **Environmental condition**

- 1.5.1 The weather was reported overcast with fair visibility. The wind was northeast moderate breeze.
- 1.5.2 The accident occurred during daylight<sup>14</sup> hours with the air temperature at about 27° Celsius.

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<sup>13</sup> STCW Convention requires a rating forming part of a watch and those duties involve designated safety, prevention of pollution and security duties shall be provided with a rest period of not less than:

1. A minimum of 10 hours of rest in any 24 hours' period; and
2. 77 hours in any 7 days period

<sup>14</sup> Sunrise at about 0605H

1.5.3 Although, there was no report of precipitation before the occurrence, the ship's crew reported that the steel deck surface, catwalk and coamings were wet as a result of morning dew.

## 1.6 **Safety Management System (SMS)**

1.6.1 The company's SMS<sup>15</sup> included organisational policies, procedures, manuals, checklists, etc. The company had 'Zero Drug and Alcohol' policy.

1.6.2 The SMS also identified hazards of falling as a result of open hatch covers. The SMS manuals provided a caution to that effect - '*No entry at catwalk or passage way*'.

## 1.7 **Code of Safe Working Practices for Merchant Seafarers (COSWP<sup>16</sup>)**

1.7.1 The Code published by the United Kingdom, Maritime and Coastguard Agency (MCA), provides best practice guidance for improving health and safety on-board ship for unguarded opening as follows:

- Chapter 11.6 of the COSWP provided control on guarding of openings to mitigate the risk of accidental fall and that guardrails or fencing should consist of an upper rail at a height of one metre and an intermediate rail at a height of 0.5 metre. The rails may consist of taut wire or taut chain.

1.7.2 The vessel had a copy of the COSWP on-board at the time of the occurrence.

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<sup>15</sup> As required under the International Safety Management Code

<sup>16</sup> Though the COSWP is not a mandatory publication for carriage on Singapore registered ships, the Maritime and Port Authority of Singapore (flag Administration) had issued a circular No.25 of 2017 – Carriage Onboard of Safe Working Practices Publications, indicating that, "...*For SOLAS convention ships (>500 GT), if the SMS makes reference to relevant safe working practices code/guidelines, a copy of these code/guidelines should be made available on board.*"

## 2 ANALYSIS

### 2.1 Risk of falling from height

- 2.1.1 Before the occurrence, at about 0730H, the adjacent bay 8 had just completed loading of containers on deck. It is not uncommon for a catwalk between bays to be cluttered with loose lashing gears (lashing bars, turnbuckles, twist-locks, etc.) especially after discharging of deck containers, as stevedores would reuse the same lashing gears after loading, to secure the containers for sea passage. However, as the catwalk is only 70cm in width, these obstructions could pose a hazard to the crew.
- 2.1.2 Prior to the hatch cover being removed, there was no risk of falling into an empty cargo hold. However, once the hatch cover was removed, in the absence of any safeguards to prevent fall into an open cargo hold, there would be a risk of falling from height if someone was to walk on the catwalk.
- 2.1.3 The Carpenter was about to finish his cargo watch in about 20 minutes and was not assigned any task at the area when he fell. Reasons for the Carpenter to walk on a wet catwalk cluttered with lashing gear could not be established. The wet steel surface, as result of morning dew, had likely contributed to the unsafe condition<sup>17</sup> that would have increased the risks of slips, trips and falls.
- 2.1.4 These unsafe conditions, coupled with an adjacent unguarded opening (cargo hold) had intensified the probability of falling from height.
- 2.1.5 It would be reasonable to conclude that when the Carpenter was walking on this catwalk, there could have been a slip or trip as a result of the wet and cluttered walkway, that caused him to lose balance and fall into the unguarded open cargo hold.

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<sup>17</sup> Unsafe condition or hazard is an event or circumstances that has the potential to result in a mishap.



## 2.2 Safety Management System (SMS<sup>18</sup>)

- 2.2.1 Though the company's SMS identified hazards of falling from height as a result of open hatch covers, and prohibited entry to catwalks, it was unclear whether the Carpenter was aware of these requirements or the provisions within the COSWP.
- 2.2.2 Any risk control measure would typically follow a hierarchy<sup>19</sup> and be used to mitigate the hazards identified. The effectiveness of such controls would best be achieved in the following sequence - elimination, substitution, engineering controls, administrative controls followed by use of Personal Protective Equipment (PPE).
- 2.2.3 While it is not possible to eliminate or substitute the hazard (falling from height when a hatch cover is removed from a cargo hold for loading/unloading operations), engineering risk control measures such as fencing or railing, and warning signs in the vicinity of entrances to catwalk, could have served as reminders of the risks associated with such hazard.

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<sup>18</sup> Element 1.2.2 of the ISM code "*the objective of the code is to ensure safety at sea, prevention of human injury or loss of life...*", Element 1.2.2.2 of the code requires the company to establish safeguards against all identified risks.

<sup>19</sup> Hierarchy of controls:

1. Elimination – physically remove the hazard
2. Substitution – Replace the hazard
3. Engineering Controls – Isolate people from the hazard
4. Administrative Controls – Change the way people work
5. PPE – To protect worker

### 3 CONCLUSIONS

*From the information gathered, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organisation or individual.*

- 3.1 The Carpenter had walked on the narrow catwalk which did not have any safety railings and was cluttered with lashing gears that posed the risks of trips and falls. The Carpenter could have tripped and fallen into the open cargo hold from a height of 14 metres.
- 3.2 The ambient weather conditions, i.e. morning dew was very likely to have made the catwalk slippery, and thus increased the risks of slips and falls, thereby contributing to an unsafe condition.
- 3.3 While falling from height as a result of open hatch covers had been identified as a hazard, there were inadequate risk control measures put in place to mitigate the risks of falling into the open cargo hold.

## 4 SAFETY ACTIONS

*Arising from discussions with the investigation team, the vessel's owner has taken the following safety action.*

- 4.1 Sharing of information and highlighting the circumstances of the accident with all crew members of its fleet of vessels;
- 4.2 The Supervisor responsible for the safety of all crew and shore personnel onboard the vessel shall ensure that all possible risks identified are controlled before commencing work. Work should not commence until personnel involved are made aware of the risks involved;
- 4.3 No work or operation shall be performed by any personnel near an unguarded open cargo hold. "No Entry" signs procured and placed at specific locations to alert any personnel of the hazards;
- 4.4 Conducted training to enhance safety awareness of the crew, on matters relating to good seamanship; and
- 4.5 The company installed safeguards comprising portable stanchions and safety lines along the catwalk for all the cargo holds when in open condition.

## 5 SAFETY RECOMMENDATION

*A safety recommendation is for preventive action and shall in no case create a presumption of blame or liability.*

- 5.1 In view of the safety actions taken, no safety recommendations have been issued.

**- End of Report -**