Report of investigation into a serious injury accident on board the Hong Kong registered bulk carrier "*Grand Demeter*" at sea on 22 May 2022

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

15 December 2022

Purpose of Investigation

The purpose of this investigation, conducted by the Marine Accident Investigation Branch (MAIB) of Marine Department, is to determine the circumstances and the causes of the incident with the aim of enhancing the safety of life at sea and avoiding similar incidents in future.

It is not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAIB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

Table of contents **Page**

Summary

At 0730 hours on 22 May 2022, a Hong Kong registered bulk carrier "*Grand Demeter*" (*the vessel*) completed her cargo discharging of iron ore at the port of Fangcheng, China (*the discharging port*). At 1218 hours, *the vessel* departed *the discharging port* for the next loading port at Quy Nhon, Vietnam.

The deck crew carried out cargo hold cleaning work after departing *the discharging port*. Two groups of deck crew were assigned to clean the No.3 and the No.5 cargo holds using the seawater supplied from the fire main[1]. The Able Seaman 1(AB1), Able Seaman 2 (AB2) and the Deck Cadet 1(D/C1) were assigned to clean the No.5 cargo hold, including its hatch coaming[2] (*the hatch coaming*). The bosun, the Deck Cadet 2 (D/C2), and the Able Seaman 3 (AB3) were assigned to clean the No.3 cargo hold. At 1600 hours, the AB1 participated in the cargo hold cleaning in charge of cleaning *the hatch coaming* on the main deck with the assistance of the D/C1. At 1756 hours, the AB1 fell from the top of *the hatch coaming* to the main deck at a height of over 2 meters. During the fall, his crotch hit against the fire main followed by his head banging on the main deck causing him unconscious with bloodshot eyes. Afterwards, the Master of *the vessel* steered *the vessel* back to *the discharging port*. At 0238 hours on 23 May 2022, the AB1was sent ashore to a local hospital for medical treatment. He was discharged from the hospital on 1 August 2022.

The investigation revealed the contributory factors led to the accident were that the crew failed to follow the requirements of shipboard safety management system (SMS) to wear proper safety equipment when cleaning *the hatch coaming* onboard; failed to follow the requirements of the "Code of Safe Working Practices for Merchant Seafarers" (*the Code*[3]) to obtain a

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[1] a seawater supply system for fire hydrants. It consists of sea inlets, suction piping, fire pumps, and a distributed piping system supplying fire hydrants, hoses and nozzles throughout the vessel.

[2] the cargo hold hatch coaming is any vertical surface on a vessel designed to deflect or prevent water entry. It usually consists of a raised section of deck plating around an opening. It also provides a frame onto which to fit a hatch cover.

[3] *the Code* is a publication required to be carried onboard Hong Kong ships pursuant to the Merchant Shipping (Seafarers) (Code of Safe Working Practices) Regulation (Cap. 478M).

permit to work at height before cleaning *the hatch coaming*; the shipboard safety supervisor failed to follow the requirements of shipboard SMS to supervise onsite when the crew was working at height for cleaning *the hatch coaming*; the shipboard training of the crew for working at height was ineffective; the shipboard toolbox meeting was ineffective, including identifying the risk of cleaning hatch coaming and its risk assessment; and the shipboard SMS failed to follow the requirements of *the Code* to cover risk assessment and issuing a permit to work for working at height.

1. Description of *the vessel*

Ship name	:	*Grand Demeter* (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO number	:	9445174
Type	:	Bulk Carrier
Year built, shipyard	:	2010, China Changjiang National Shipping Group Nanjing Jinling Shipyard
Gross tonnage	:	33,042
Net tonnage	:	19,132
Length overall	:	189.97 meters
Breadth	:	32.26 meters
Depth	:	18.00 meters
Engine power, type	:	9480 kW, MAN B&W 6S50 MC-C7
Classification society	:	DNV AS
Registered owner	:	ARIES SHIPPING CO., LIMITED
Management company	:	HUAYANG MARITIME CENTER

Figure 1: *Grand Demeter*

2. Sources of evidence

2.1 Information provided by the Master, the crew members and the management company (*the Company*) of *the vessel*.

3. Outline of events

(All times were local time UTC + 8 hours)

3.1 *The vessel* berthed at *the discharging port* for discharging iron ore and changing all crew members on 20 May 2022.

3.2 At 0830 hours on 22 May 2022, the Chief Officer (C/O) held a toolbox meeting to prepare for the departure from *the discharging port* and the cargo hold cleaning with its related shipboard risk assessment.

3.3 At 1218 hours, *the vessel* departed *the discharging port* after completing discharging her cargo for the next loading port at Quy Nhon, Vietnam.

3.4 Two groups of deck crew were assigned to clean the No.3 and the No.5 cargo holds using the seawater supplied from the fire main. The AB1, AB2 and the D/C1 were assigned to clean the No.5 cargo hold, including its hatch coaming. The bosun, the D/C2 and the AB3 were assigned to clean the No.3 cargo hold.

3.5 At 1600 hours, the AB1, who was on duty from 0400 to 0800 hours and 1600 to 2000 hours daily, participated in the cargo hold cleaning work. He was assigned to be in charge of the cleaning for *the hatch coaming* on the main deck with the assistance of the D/C1.

3.6 In order to clean the cargo residue piled up on top of *the hatch coaming*, the AB1 planned to position himself there with the folding type hatch cover partially open (Figure 2). At 1756 hours, the AB1 fell from the handrail, which was part of the structure of the platform connected to *the hatch coaming,* onto the main deck (position 3 of Figure 3) while he was climbing up to the top of *the hatch coaming* (position 1 of Figure 3) from the platform for cleaning there. As a result of the falling, AB1's crotch hit against the fire main (position 2 of Figure 3) followed by banging his head on the main deck causing him unconscious with bloodshot eyes.

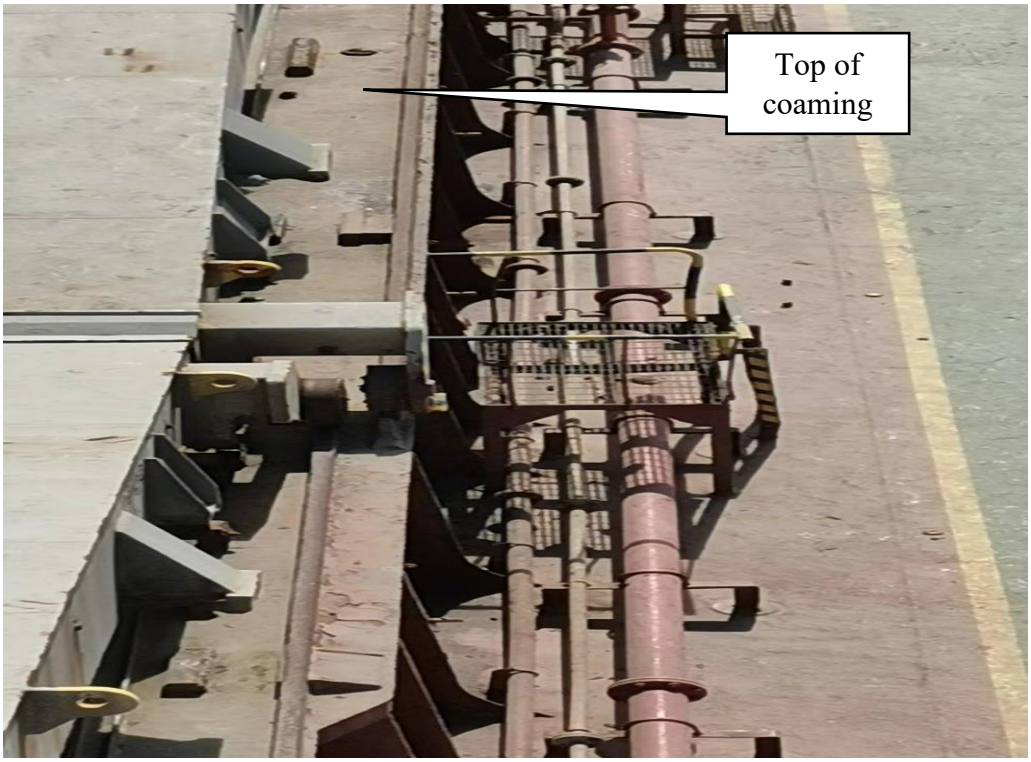

Figure 2: overlook the main deck and hatch coaming

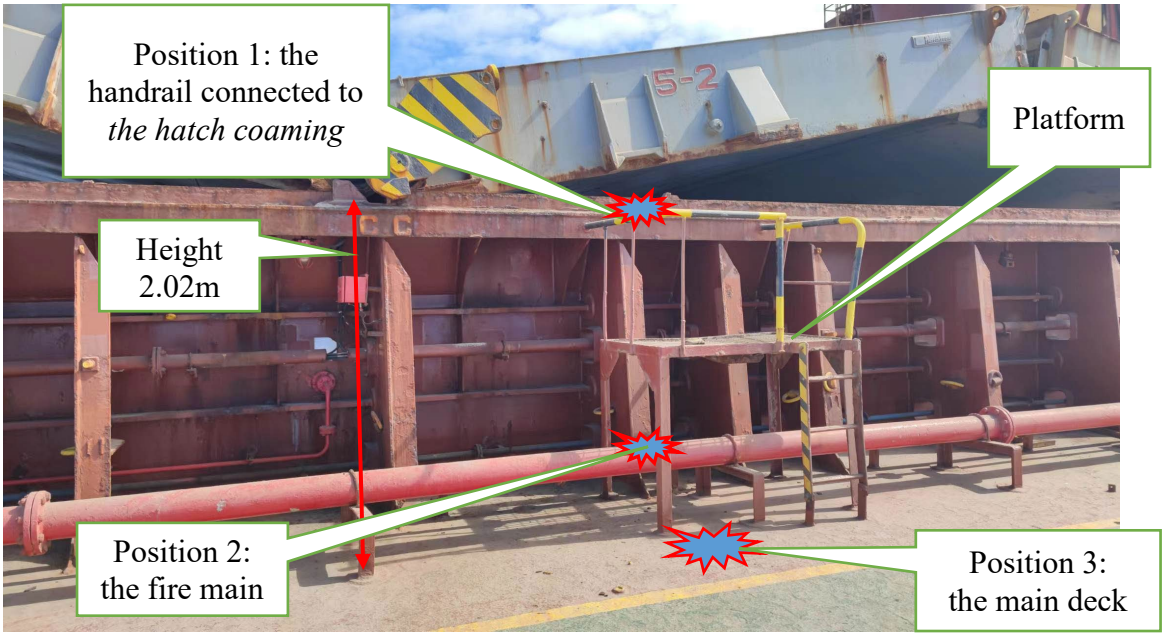

Figure 3: the falling accident site

3.7 The D/C1, who was tidying up the fire hose on the starboard side main deck adjacent to the No.5 cargo hold, found the AB1 lying on his side without consciousness. The D/C1 immediately reported the accident to the C/O, who was on duty on the bridge. Afterwards, the C/O reported the accident to the Master and

broadcasted it to all crew via the public address system for the rescue operation.

3.8 The Master immediately organized the rescue team to shift the AB1 to the hospital of *the vessel*. AB1 was found seriously injured upon checking. His upper thigh was congestive, his right forehead and brow ridge were torn, the thumb of his left hand was swollen, etc. The AB1 recovered consciousness about 20 minutes later and claimed pains in many parts of his body. Fortunately, his vital signs were stable.

3.9 Upon knowing the accident, the Master steered *the vessel* back to *the* discharging *port* for emergency medical treatment ashore for the AB1. The Master also sought medical instructions from doctors via *the Company* to conduct proper treatment of the AB1 on board.

3.10 At 0238 hours on 23 May 2022, the AB1 was transferred to a local hospital for medical treatment after berthing at *the discharging port* with the assistance of the local Vessel Traffic Service and agent.

3.11 At 0644 hours, the local agent informed that the AB1 had suffered a cerebral hemorrhage and pelvis fractures in his body after thorough examination at the local hospital.

3.12 On 1 August 2022, the AB1 was discharged from the local hospital as reported by *the Company.*

4. Analysis

Certificates and manning

4.1 The statutory trading certificates of *the vessel* were valid and in order. *The vessel* was manned by 23 crew members, including the Master. The Minimum Safe Manning Certificate of the vessel was issued by the Hong Kong Marine Department (HKMD) on 23 November 2016, and the manning of *the vessel* fulfilled the requirements. All crew members joined *the vessel* on 20 May 2022.

4.2 The Master had about 3 years of sea experience as a master. The Master possessed a Master Certificate of Competency issued by China, and a Class 1 License (Deck Officer) issued by the HKMD valid until 25 February 2024.

4.3 The C/O had 5 months of sea experience as a chief officer. The C/O possessed a chief officer Certificate of Competency issued by China, and a Class 2 License (Deck Officer) issued by the HKMD valid until 27 May 2026.

4.4 The Second Officer (2/O) had 4 months of sea experience as a second officer. The 2/O possessed a second officer Certificate of Competency issued by China, and a Class 3 License (Deck Officer) issued by the HKMD valid until 5 February 2026.

4.5 The Third Officer (3/O) served the rank of third officer for the first time. The 3/O possessed a third officer Certificate of Competency issued by China, and a Class 3 License (Deck Officer) issued by the HKMD valid until 31 March 2027.

4.6 The Chief Engineer (C/E) had about 4 years of sea experience as a chief engineer. The C/E possessed a chief engineer Certificate of Competency issued by China, and a Class 1 License (engineer officer) issued by the HKMD valid until 25 September 2023.

4.7 The Second Engineer (2/E) had about 10 months of sea experience as a second engineer. The 2/E possessed a second engineer Certificate of Competency issued by China, and a Class 2 License (engineer officer) issued by the HKMD valid until 15 January 2025.

4.8 The third engineer (3/E) had about 4 months of sea experience as a third engineer. The 3/E possessed a third engineer Certificate of Competency issued by China, and a Class 3 License (engineer officer) issued by the HKMD valid until 6 January 2026.

4.9 The fourth engineer (4/E) had about 9 months of sea experience as a fourth engineer. The 4/E possessed a fourth engineer Certificate of Competency issued by China, and a Class 3 License (engineer officer) issued by the HKMD valid until 27 December 2024.

4.10 The bosun had about 10 years of sea experience as a bosun.

4.11 The AB1 had about 6 months of sea experience as an ordinary seaman.

4.12 The D/C1 joined *the vessel* as cadet for the first time.

4.13 There was no abnormality onboard with regard to the certification and qualification of the crew concerned.

Fatigue, alcohol and drugs abuse

4.14 There was no evidence to show that the crew on board suffered from either fatigue at work or abuse of alcohol and drugs.

Weather and sea conditions

4.15 On the day of the accident, the weather was fine with northeastly wind of Beaufort wind scale Force 4. The sea had small waves with numerous whitecaps, and *the vessel* experienced no rolling and pitching. The visibility was good. The weather and the sea conditions were not considered to be the contributory factors to the accident.

Cause of injury

4.16 Paragraph 3.6 mentioned that the AB1 fell from the handrail of the platform while he was climbing up to the top of *the hatch coaming* to clean the cargo residue there. The investigation found that the AB1 lost balance due to a missing step or slippery at the top of *the hatch coaming* while he was holding the fire hose with him, resulting in the falling and injury.

Working at height

4.17 Section 1 of the "Precautions for working aloft" (i.e., HMC-SBM-018) of the shipboard *SMS* defines working at height as work at the height of 2 meters or more. It also states that personnel working at height should wear proper safety equipment, such as a safety harness, skid-proof shoes, a safety belt, a portable ladder, or other arresting devices.

4.18 According to the information provided by *the Company*, the height of *the hatch coaming* is 2.02 meters from the main deck of *the vessel*. As mentioned in above paragraph 4.17, the cleaning of *the hatch coaming* was identified as working at height. At the time of the accident, *the* AB1 did not wear safety harness, and no other arresting device (Figure 4) was used during the cleaning of *the hatch coaming.*

4.19 Section 4.7 of the "Personnel Safety Protection Onboard" (i.e. HMC-SBM-026) of the shipboard *SMS* states that safety precautions should be observed, and the safety measures should be checked and supervised by a supervisor at the work site during working at height. According to the information provided by *the Company*, the bosun was designated as the safety supervisor for the cargo hold cleaning because the C/O was on duty watch on the bridge at the time of the accident. However, the evidence indicated that the bosun left the accident scene and went to No.3 cargo hold for the cleaning work there when the AB1 and the D/C 1 were going to clean *the hatch coaming*. The accident might have been avoided if the bosun had been onsite and prevented the action of the AB1 timely.

Figure 4: Personnel protective equipment of *the AB1* for cleaning *the hatch coaming*

Toolbox meeting, Risk assessment and Permit to work

4.20 Section 4.6 of the "Personnel Safety Protection Onboard" (HMC-SBM-26) of the Shipboard SMS states that a toolbox meeting should be held every morning on board *the vessel* to discuss the safety issues of daily work and carry out a risk assessment of the shipboard operations for identifying the potential hazards and the appropriate safety preventive measures. It also states that all the day shift crew should attend the meeting.

4.21 According to the shipboard toolbox meeting and risk assessment records, the toolbox meeting and risk assessment for the cargo hold cleaning work were carried out on board *the vessel* on 22 May 2022. However, the risk of cleaning hatch coaming and its potential risk of falling from the hatch coaming were not identified and assessed before the cleaning work.

4.22 In addition, the toolbox meeting record on the day of the accident showed that the signature of the AB1 for attending the meeting had been tampered. According to the crew rest record, the AB1 was taking rest at the time of the toolbox meeting. He actually did not attend the toolbox meeting on the day of the accident, which has been confirmed by *the Company*.

4.23 The investigation found that the toolbox meeting and risk assessment were solely a formality and not executed professionally and responsibly.

4.24 The AB1 was not a day shift crew on board *the vessel*. However, no evidence showed that the AB1 had received the related training or safety instruction on the cargo hold cleaning work and the precaution on the risk of falling from *the hatch coaming* before conducting the cleaning work.

4.25 Chapter 17.1.2 of *the Code* states that working at height should be subject to risk assessment, and suitable control measures should be taken to protect, including issuing a permit to work.

4.26 However, the investigation found that the crew did not obtain a permit to work at height before the cleaning of *the hatch coaming*.

Shipboard training

4.27 Section 4.4 of the "Procedure for ensure new employee to be familiar with responsibility" (HMC-SPM-001) of the shipboard SMS states that the new employed crew should be trained before boarding the vessel, including completing the "Duty training Forms for New Employee."

4.28 Paragraph 3.1 mentioned above that all vessel crew were changed on 20 May 2022 at *the discharging port*. The training for the newly employed crew, including the AB1, was carried out ashore on 16 May 2022, i.e., four days before joining *the vessel.* The training covered critical operation procedures, such as enclosed space entry, hot work, working at height, etc. However, no evidence showed that these newly employed crew, who carried out the cargo hold cleaning, attended the training of that item including the cleaning of the hatch coaming before the cleaning work. It was deduced that the shipboard training was ineffective as the training on cargo hold cleaning and working at height was lacking.

Shipboard safety management system

4.29 Chapter 17.1.2 of *the Code* states that work at height should be subject to risk assessment and suitable control measures should be taken to protect those who may be put at risk. Depending on the severity of the risk, a permit to work may be required.

4.30 The "Precautions for working aloft" (i.e., HMC-SBM-018) of the shipboard SMS states that working at height on board *the vessel* should only be conducted by competent persons using the necessary and appropriate tools and personnel protective equipment with precautionary measures. However, it did not cover the requirements of carrying out a risk assessment and issuing a permit to work at height, which did not follow the requirements of Chapter 17.1.2 of *the Code*.

5. Conclusions

5.1 At 0730 hours on 22 May 2022, *the vessel* completed the discharging cargo of iron ore at *the discharging port*. At 1218 hours, *the vessel* departed the discharging port to the next loading port at Quy Nhon, Vietnam.

5.2 The deck crew carried out a cargo hold cleaning on board *the vessel* after departing *the discharging port*. Two groups of deck crew were assigned to clean the No.3 and the No.5 cargo hold using the seawater supplied from the fire main. The AB1, AB2 and the D/C1 were assigned to clean the No.5 cargo hold, including *the hatch coaming*. The bosun, the D/C2, and the AB3 were assigned to clean the No.3 cargo hold. At 1600 hours, the AB1 participated in the cargo hold cleaning in charge of cleaning *the hatch coaming* on the main deck with the assistance of the D/C1. At 1756 hours, the AB1 fell from the top of *the hatch coaming* onto the main deck at a height of over 2 meters. During the fall, his crotch hit against the fire main followed by his head banging on the main deck causing him unconscious with bloodshot eyes. Afterwards, the Master of *the vessel* steered the vessel back to *the discharging port*. At 0238 hours on 23 May 2022, the AB1was sent to a local hospital for medical treatment. He was discharged from the hospital on 1 August 2022.

5.3 The investigation revealed that the contributory factors led to the accident were as follows:

(a) the crew failed to follow the requirements of shipboard *SMS* to wear proper safety equipment when cleaning *the hatch coaming* onboard;

(b) the crew failed to follow the requirements of *the Code* to obtain a permit to work at height before cleaning *the hatch coaming;*

(c) the shipboard safety supervisor failed to follow the requirements of shipboard *SMS* to supervise onsite when the crew was working at height during cleaning *the hatch coaming;*

(d) the shipboard training of the crew for work at height was ineffective;

(e) the shipboard toolbox meeting was ineffective, including identifying the risk of cleaning hatch coaming and its risk assessment; and

(f) the shipboard SMS failed to follow the requirements of *the Code* to cover risk assessment and issuing a permit to work for working at height.

6. Recommendations

6.1 The management company should issue circular informing all masters, officers and crew members of its fleet of the findings of the investigation and the lessons learnt from this accident and instruct them to:

(a) strictly follow the requirements of shipboard SMS to wear proper safety equipment when cleaning the hatch coaming onboard;

(b) strictly follow the requirements of *the Code* to obtain a permit to work in a location where there is a risk of falling, such as at the top of the hatch coaming, before conducting the cleaning work there;

(c) strictly follow the requirements of shipboard SMS to supervise onsite when the crew was working at height during cleaning the top of the hatch coaming;

(d) enhance the shipboard training of the crew for work at height; and

(e) ensure the shipboard toolbox meeting carry out effectively including identifying the risk of cleaning hatch coaming and its risk assessment.

6.2 The management company should consider revising the shipboard SMS to cover the requirements of *the Code* on working at height and conduct an internal audit on *the vessel* to ensure that the crew onboard strictly follow the requirements of *the Code* and the shipboard SMS when carrying out the cargo hold cleaning.

6.3 A Hong Kong Merchant Shipping Information Note is to be issued to promulgate the lessons learnt from this accident.

7. Submission

7.1 The draft investigation report, in its entirety, was sent to *the Company* and the Master of *the vessel* for comments.

7.2 By the end of the consultation, there was no comment received from the above-mentioned parties.