Final Report

FATAL INJURY OF CREW AFTER FALLING FROM HEIGHT ONBOARD GLORY CHALLENGER AT SEA 2 MAY 2022

TIB/MAI/CAS.123

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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The Transport Safety Investigation Bureau of Singapore

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SYNOPSIS

During the daylight hours on 2 May 2022 while on voyage towards East Malaysia, five crew members on the Singapore registered general cargo ship, Glory Challenger, were tasked to carry out general cleaning in the lower (tween-deck) cargo hold, with one of the tween deck's pontoon opened for natural lighting and ventilation.

After the crew had completed the cleaning, while walking along the walkway on the tween deck to prepare to close the pontoon, one of the crew members, the Carpenter (CP), fell about 7.40m down to the lower hold. The CP was found bleeding from his head, ears, and nose and was unresponsive but was still breathing. A subsequent MEDEVAC was initiated, and the CP was evacuated by a helicopter from the Republic of Singapore Air Force. Enroute to the hospital ashore, the crew member lost the vital signs.

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

The investigation revealed that when the pontoon was removed, the crew members had forgotten to erect the safety barriers and the on-site verification by the responsible officer to ensure the placement of such safety barriers was not carried out, as required by the Company's safety management system. There was also no signages displayed after the pontoon was removed.

There was no eye-witness as to how the CP fell, the probable cause is likely to be a misstep at the edge of the walkway on the tween deck. It is noted that the colour of the walkway and the edge of the tween deck was similar, which could increase the probability of such missteps to occur especially in the absence of barriers such as safety lines.

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VIEW OF VESSEL

DETAILS OF VESSEL

Name	GLORY CHALLENGER
IMO Number	9675042
International Call Sign	9V6061
Flag Registry	Singapore
Classification society/ ISM[1] Recognised Organisation	NIPPON KAIJI KIYOKAI (ClassNK)
Ship type	General Cargo
Year Built	2013
Owner/ Company[2]	Glory-Pacific Shipping (S) Pte. Ltd. / Glory Navigation Co., Ltd.
Gross tonnage	8696
Length overall	116.94m
Breadth	19.60m
Draught	9.115m (Summer)
Main engine(s)	Makita Mitsui – MAN B&W 6L35MC (Tier II)

[1] In accordance with ISM Code – SOLAS Chapter IX, IMO Res.A.741(18) as amended thereof.
[2] Responsible for the safe management of the ship under the ISM Code.

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1 FACTUAL INFORMATION

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

1.1 Sequence of events

1.1.1 MV Glory Challenger (GC) departed Jurong Port (Singapore) at about 2120H on 1 May 2022, bound for the Port of Sarawak, East Malaysia. After the Pilot disembarked, the Master, who was the officer-in-charge of the navigation watch - OOW[3] at the time, was informed by the Chief Officer (CO) of his intention to have some crew to clear lashing wires, ropes and dunnage from the cargo hold no.2 (lower hold[4]) on the following day during daytime, which was noted by the Master.

1.1.2 At about 0800H on 2 May 2022, when GC was at open sea (South China Sea[5]), the CO handed over the bridge watchkeeping duty to the Master. Together with the duty watchkeeping able-seafarer deck (ASD1), the CO briefed a group, comprising ASD2, an Ordinary Seaman (OS), a Carpenter (CP), and a mess-boy (MB), in the crew mess room regarding the cleaning job for cargo hold no.2. The CO instructed the crew to open up the tween deck pontoon for ventilation and (natural) lighting[6] and to barricade the opening at the tween deck with the safety railings before the cleaning work starts in the lower hold[7]. Thereafter, the CO went to the ship's office.

1.1.3 According to the information obtained by the investigation team, the group of five crew opened the hatch cover for cargo hold no.2 and thereafter, lifted up the second pontoon (counting from forward as indicated in **figure 1**) with the ship's deck crane (operated by ASD1) and stacked it on the first pontoon. Thereafter, the group went for a tea break as per routine.

1.1.4 At about 0930H after the tea break, the group then entered the lower hold and

[3] The Master kept the 0800-1200 and 2000-2359 bridge watch. This arrangement was an ad-hoc arrangement for the voyage. Details in paragraph 1.2.3.
[4] GC was constructed with a tween deck for each of the two cargo holds. After the discharge, the tween deck for cargo hold no. 2 was closed as was the hatch cover.
[5] GC's position was at 01°40.8" N, 105°52.9" E.
[6] According to the Company, lights can be mounted on the cargo hold coamings to illuminate each cargo hold separately, when required.
[7] Safety railings include the safety lines and stanchions as per Company's SMS. Instructions were given by the CO to rig the safety railings on both the port and starboard side of the opened pontoon, a normal practice each time a pontoon is opened.

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commenced the cleaning work which continued till about 1015H. The crew then separated into two groups and ascended to the tween deck via the port side ladder access[8] and commenced their walk on the port and starboard side walkways toward the stacked pontoons, in preparation to close the pontoon.

1.1.5 Three of them (ASD2, OS and CP) used the port side walkway, while the other two (ASD1 and MB) were on the starboard side walkway. When the crew were about to reach the stacked pontoons, a loud thud was heard. On looking around they saw that the CP had fallen inside the cargo hold and was lying on the tank top (see **figure 1**).

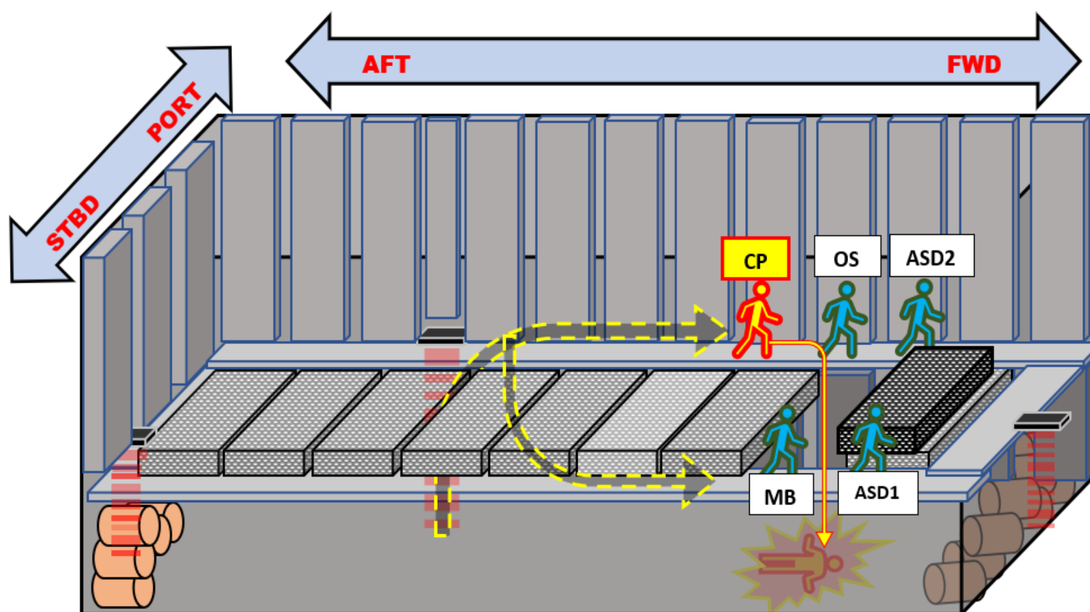

Figure 1: View of cargo hold no.2 from the starboard. The dark-shaded block shows the (second) pontoon that was stacked on the first pontoon. The dashed arrows show the route taken by each group towards the stacked pontoons. – *Illustration not to scale*.

1.1.6 The four remaining crew rushed down to the cargo hold to check on the CP and saw him bleeding from his head, ears, and nose. The CP's safety helmet was noted lying a distance away. The CP was unresponsive to call and touch of the crew but was still breathing. The ASD1 went to the accommodation and informed the Master and the CO.

[8] Both the ladder access at each end of the forward and aft were blocked by the cargo (steel coils)

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1.1.7 The Master called the 3rd Officer (3O) to the bridge, handed over the navigation watch and headed to the location of the occurrence together with the CO who took a first aid kit along.

1.1.8 When the Master and CO arrived at the occurrence site, the Master instructed the CO to render first aid immediately to the head wound and to stop the bleeding. The CO bandaged the CP's head and covered the body with blankets (brought out by some of the deck crew) while continuously calling out to the CP for a response.

1.1.9 The Master went back to the bridge and notified the designated person ashore (DPA) of the Company and in consultation with the DPA, diverted GC back towards Singapore. Concurrently a MEDEVAC[9] request was initiated.

1.1.10 A rescue helicopter deployed by the Republic of Singapore Air Force arrived at about 1630H and evacuated the CP from GC to a Singapore hospital[10] and GC resumed its voyage to Sarawak. It was later established that enroute to the hospital, the CP had succumbed to the injuries and was pronounced dead at about 1839H.

1.1.11 On being asked by the investigation team, the Master recalled that he did not sound any general or emergency alarm[11] for all crew to muster at the location of occurrence when he made an announcement on the public address (PA) system. The Master further clarified that owing to the nature of the injury as seen at the site, portable breathing device to administer oxygen was not considered to be brought on-site.

1.1.12 In its interaction with the crew, the investigation team gathered that the crew had forgotten to rig the safety railings after lifting the pontoon, before going for their tea break. After the break, they entered the cargo hold without the safety railings rigged.

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[9] The Marine Rescue Coordination Centre (MRCC) Singapore received the MEDEVAC at 1532H of a crew suffering head injury due to fall from height onboard.

[10] The investigation team was informed that, according to the Master, the CP had lost his vital signs before the rescue helicopter arrived.

[11] The Master explained that he was desperate to see the condition of the CP before deciding what further actions might be appropriate including administering medical care. Upon seeing the condition, a MEDEVAC was considered imminent.

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1.2 Crew experience, work schedule and rest hours

1.2.1 At the time of the incident, GC's manning comprised 19 officers and ratings. Among the crew, 17 were Chinese while two were Indonesians. The official and working language onboard was either English or[12] Chinese.

1.2.2 The investigation team gathered that an ASD who was scheduled to join GC in April 2022, could not do so due to medical reasons. As a result, the Second Officer (2O) was re-designated as ASD3 to maintain the safe manning requirements of the flag Administration. Consequently, the Master took over eight hours of watchkeeping in a 24-hour period for the subsequent voyages[13].

1.2.3 The crew experience matrix of relevant persons is shown in the table below.

Designation onboard	Nationality	Age	Qualification	Duration onboard (month)	In-rank service (Year)	Time in Company (Year)	Working schedule onboard
Master	Chinese	41	STCW II/1, IV/2	05	01	12	0800-1200 2000-2400
Chief Officer	Chinese	36	STCW II/1, IV/2	05	01	0.4	0400-0800 1600-2400
ASD1	Chinese	22	Deck Rating STCW II/4	10	02	2	0800-1200 2000-2400
ASD2	Chinese	22	Deck Rating STCW II/4	10	02	0.8	0000-0400 1200-1600
ASD3[14]	Chinese	31	STCW II/1, IV/2	05	NA	0.4	0400-0800 1600-2400
OS	Chinese	20	Deck Rating STCW II/4	05	01	0.4	0800-1700
MB	Chinese	52	Basic Safety Training	05	01	0.4	0800-1700
CP	Chinese	31	Basic Safety Training	05	01	0.4	0800-1700

1.2.4 The Company confirmed that all crew including the CP received their familiarisation training, before and upon joining GC[15], as per the SMS

[12] If crew members cannot understand orders (Circulars) given in Chinese, the Master should designate Officer or Engineer for giving orders in a language (such as English) which they understand. **Source:** *SMS (GA03-02): 3.15 Working Language.*
[13] From Singapore to East Malaysia (Sarawak) then China and back to Singapore.
[14] Redesignated from 2O.
[15] The CP's checklist on the completion of this training was signed on 13 December 2021.

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requirements. The pre-joining medical records of the CP, by an international travel health care centre which was authorised by the China Maritime Safety Administration, declared the CP medically fit for service at sea, in accordance with the STCW[16] Code.

1.2.5 According to work/rest hour records maintained onboard GC, for the 24-hour period prior to the occurrence, the CP had a total of 13.0 hours of rest and about 9.0 hours of rest before the briefing by the CO in the crew's mess. For the last 7-day period, the CP had 118 hours of rest. These records indicated compliance with the STCW and MLC Convention's requirement, concerning the hours of work and rest[17], as documented onboard. According to the Company, the safety shoes worn by the CP had a non-slip sole and were suitable for marine use.

1.3 GC's tween decks, pontoons and safety railings

1.3.1 GC was constructed with a tween deck for each of the two cargo holds, separating each cargo hold into upper and lower decks. The tween deck for cargo hold no. 2 had nine steel pontoons of the lift-off type, each with the same length but of different widths. The first five pontoons were about 15.37m in length and width of 3.31m each while the other four pontoons were about 3.70m each.

1.3.2 The height from the tank top in the cargo hold to the tween deck pontoon (measuring from the upper surface[18]) was about 7.40m. The width of the port and starboard walkways from the bulkhead to the edge of the pontoons was about 1.40m. When the safety railing (yellow stanchions) is rigged, the distance between it and the edge of the pontoon is about 0.20m, leaving about 1.20m of walking space (see **figure 2**).

[16] STCW Code, A-1/9 which defines the standards of medical fitness for seafarers.
[17] STCW Ch. VIII and MLC, Reg 2.3 - Minimum hours of rest shall not be less than ten hours in any 24-hour period; and 77 hours in any 7-day period.
[18] About the same level as the surrounding walkways of the tween deck.

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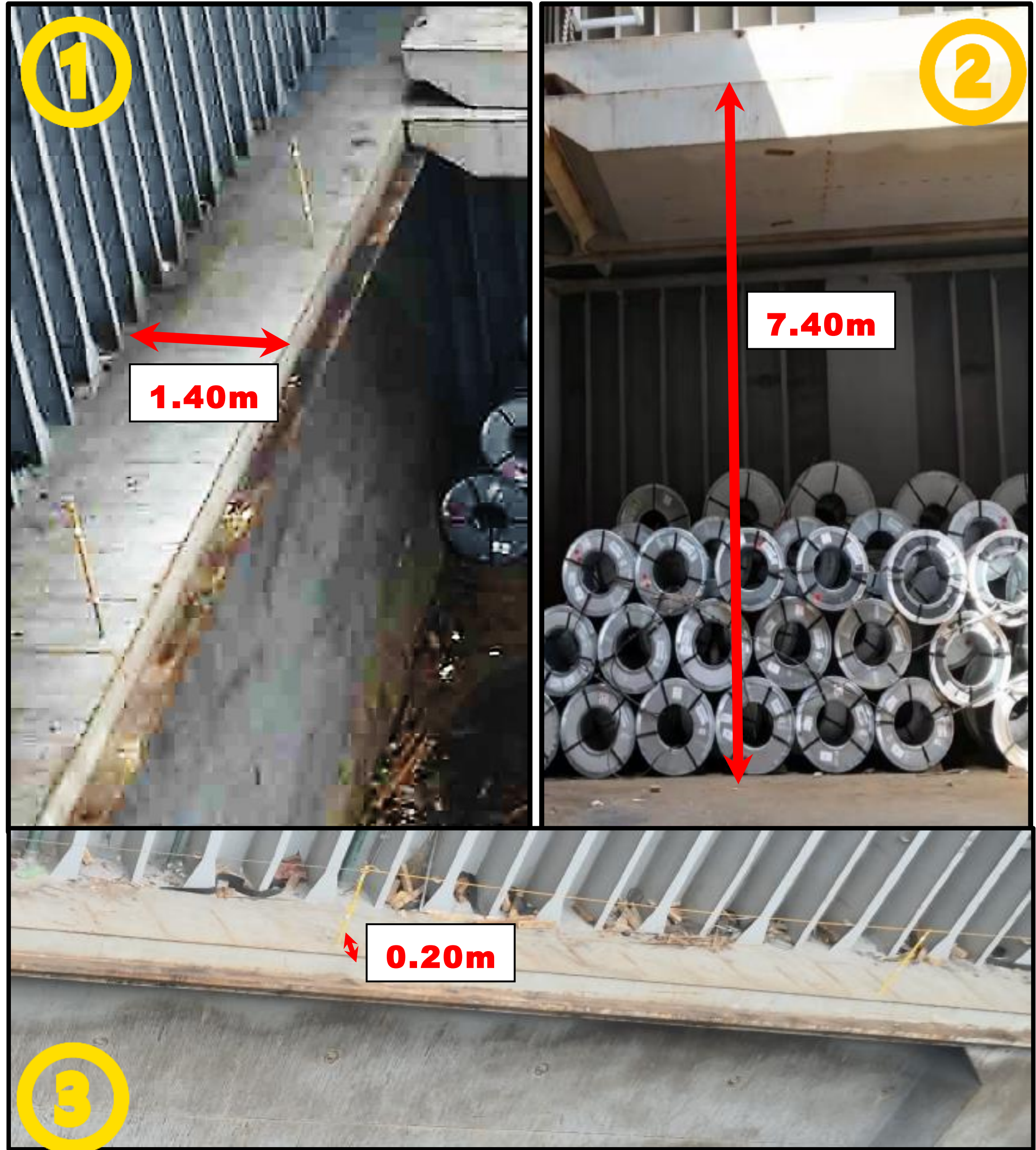

Figure 2: Cargo Hold No.2.
Picture-1 shows the approximate dimension of the portside walkway.
Picture-2 shows the approximate height from tank top to the tween deck.
Picture-3 shows the typical safety cordon comprising yellow-coloured stanchions with a single wire.
(*Source:* The Company - annotated by TSIB)

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1.3.3 It was further established that the location where the CP fell was not slippery. The colour of the painted walkway and the 0.20m edge was similar – grey. Looking from a “plan view” the walkway and the edge appeared similar (see **figure 3**.)

Figure 3: Zoomed in view of the walkway and edge showing similar colour - grey.

1.3.4 According to the Company, the average time taken to rig the safety railings surrounding the tween deck was about 20 mins, while the estimated time to rig at both the port and starboard sides of one opening (i.e. lift-off pontoon) was less than 10 mins.

1.4 SMS requirements and additional information from the Company

1.4.1 According to the Company’s SMS requirements, a pre-boarding induction training and briefing was conducted ashore by the crew manning agency. A copy of the CP’s completed induction checklist was provided to the investigation team. The scope included:

- Understanding of the Company’s SMS and personal responsibility aboard;
- Understanding of the ship’s particulars;
- Understanding of the shipboard safe operations procedures and rules; and
- Pollution prevention training.

1.4.2 The SMS for the “Procedure for Risk Assessment and Control” stated that any risks in the workplace (*sic*) should be assessed before work begins, by the senior

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most person-in-charge or a responsible officer onboard. Amongst the identified hazards, falling from height was listed. Subsequent risk controls and mitigation were also required when hazards of a particular workplace are identified before the commencement of work.

1.4.3 A risk register that contained a risk assessment form for the entry of cargo hold(s) for cargo operations was provided to the investigation team. The content included the risk of falling from (height) the tween deck, with the risk control as the rigging of the safety lines and stanchions. Being assessed as a moderate risk within the form, the additional control measures included the donning of proper PPE[19] and checking[20] that the safety lines and stanchions are fit-for-purpose.

1.4.4 The SMS for “Cargo Loading Procedure” stated that tween deck pontoons when opened and stacked at the tween deck in preparation for cargo works, a safety line (cordon) must be rigged around the opening.

1.4.5 The investigation team gathered from the crew that their understanding of these requirements was the same as required by the SMS, i.e. rigging the safety lines and stanchions even for the opening of one tween deck pontoon, during non-cargo loading work in the cargo hold.

1.4.6 The Master confirmed that as the OOW, he was aware of the watchkeeping duty rating’s (ASD1 in this case) location during the time of the occurrence. He was also aware of the estimated time for the completion of the task (i.e., cleaning the cargo hold) at that time.

1.4.7 The SMS for bridge watchkeeping did not state any requirement for the watchkeeping duty rating to carry any means of communications when tasked for other permitted work at other locations. The Master added that when required, watchkeeping duty ratings could communicate with the bridge via the telephone (line) onboard.

1.4.8 The SMS had specific requirements for responding to various emergencies typical for most ships, e.g. medical assistance team, rescue team. Designated crew members had defined roles to be performed in the event of an emergency,

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[19] The investigation team noted that the CP had donned safety shoes issued by the Company and the soles were not worn out. The safety helmet was also worn by the CP; however it could not be established whether the chinstrap was in place prior to the fall (Note: The CP’s safety helmet was found at a distance away from where the body was found lying on the tank top).

[20] Depending on the various tasks, the check could be done by the Chief Officer / Officer-in-charge of the task or sometimes even the Bosun.

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as per the muster list[21].

1.4.9 The SMS in the “Shipboard Safety Operation Rules” for personal safety during work on deck stated that crew/ working personnel shall keep away from the opening of cargo hold when hatch(es) is/are removed, amongst others. Within the same section, working at height required a checklist to be completed and approval prior to the work to be sought from the Chief Officer and the Master. The Company clarified that the type of work identified for working at height were typically at locations such as - at the mast and near the vicinity of the shipboard radar scanner. The tween deck walkway was not such a location where this checklist would be applicable.

1.5 Code of safe working practice (COSWP)[22]

1.5.1 In the section on “Safe Movement On Board Ship” of the COSWP, areas used for transit, loading or unloading of cargo or for other work processes, an adequate level of lighting should be provided. Any opening, open hatchway (referred to as walkway in this report) or dangerous edge into, through or over which a person may fall should be fitted with secure guards or fencing of adequate design and construction.

1.5.2 In addition, where the opening is a permanent access way, or where work is in progress which could not be carried out with the guards in place, guards do not have to be fitted during short interruptions in the work (e.g. for meals), although warning signs should be displayed where the opening is a risk to other persons. There were no warning signs placed when the crew went for their tea break.

1.5.3 Under the section of “Dry Cargo Work” of the COSWP, in the tween decks, guidelines should be painted around tween deck hatchways at a distance of one metre from the coamings. There were no such markings around the tween deck inside the cargo holds onboard GC.

[21] The 2O who was designated as the ASD3, was the appointed Officer of the Medical Assistance Team as per muster list. The ASD3 was present at the occurrence site when the medical assistance team was required.

[22] The COSWP published by the UK Maritime and Coastguard Agency (MCA) provides best practice guidance for improving health and safety on board ships. It is not a mandatory publication to be carried on Singapore registered ships. The Company’s SMS made reference to the COSWP and a copy of the publication was onboard GC.

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1.6 Environmental information

1.6.1 The location of the incident was about 120 nautical miles to the east of Singapore, in the South China Sea. The wind was recorded as Force 4 on the Beaufort scale from 180° and the swell height was recorded to be 1.0m. The interviewed crew members cited good weather before and at the time of the occurrence. Overcast with light precipitation occurred about an hour into the occurrence when GC had diverted towards Singapore.

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2 **ANALYSIS**

2.1 The occurrence

2.1.1 Prior to the occurrence, there was no known adverse medical condition of the CP or indication of him being unwell. None of the deck crew members who were with the CP, witnessed how he fell into the cargo hold.

2.1.2 In spite of a noticeably wide walkway (1.40m), the risk of falling from height into the lower cargo hold exists, each time the pontoon(s) is removed from the tween deck. Established risk mitigation, which was the rigging of the safety railings when a part of the tween deck was left open, was not carried out on the day of the occurrence.

2.1.3 There was no evidence to suggest poor illumination of the cargo hold as well as debris or wet/slippery surface which posed the risk of slips and/or trips, existed at the walkway on the tween deck, at the time of the occurrence. The investigation team however noted that the colour of the walkway and the edge was similar. The likelihood of a misstep thus existed, especially when walking close to an unguarded opening. It would be desirable to have markings painted at the edge with a contrasting colour to that of the walkway, so that it serves as a warning to the crew to stay away from the edge and to prevent a misstep.

2.1.4 The investigation team opined that the CP had likely walked near the edge and missed a step and fallen about 7.40m into the cargo hold. The fall was fatal after he fell into the lower hold.

2.2 The SMS – working at height and familiarisation

2.2.1 The investigation team noted that the walkway(s) of tween deck(s) when the pontoon(s) is/are removed were not considered as locations where a checklist and approval process for working at height was applicable.

2.2.2 The crew reportedly understood the procedure which required safety lines and stanchions to be rigged whenever a pontoon was removed. On the day of the occurrence, there was also no oversight on this task to be carried out after the pontoon had been removed, leaving an opening of about 3.31m of a significant height from the lower hold. In addition, when the crew went for their tea break, no warning signs were placed, as recommended in the COSWP.

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2.2.3 Although the crew stated that they had forgotten to rig the safety stanchions and lines, it appeared that the risk of falling into the cargo hold from the walkway had not been assessed by the crew.

2.2.4 The investigation team recognised that the time taken to rig the safety lines and stanchions for the tween deck with all pontoons removed, and for the opening with only the second pontoon removed, was about 20 minutes and 10 minutes respectively. It is also noted that the time spent while on the walkway near the opening on the tween deck (with the second pontoon removed) was short, as the main task was at the lower hold. Nevertheless, the occurrence demonstrated that as long as an opening presents a risk of falling from height, safety lines and stanchions should be rigged, and warning signs placed to warn other crew members.

2.2.5 The occurrence also reiterates the need for the verification, by a responsible officer (such as the CO), of the risk mitigating measures against falling from height as stipulated in the SMS.

2.3 Incidental Finding

2.3.1 While the SMS allowed for the duty watchkeeping ASD to be assigned with other jobs when the weather is fair and during daylight hours, it is important for the OOW to maintain communications with the watchkeeping duty ASD.

2.3.2 The investigation team noted that after the occurrence, the ASD1 had to climb from the cargo hold (lower tween deck) to the main deck and thereafter into the accommodation to inform the Master and CO of the incident.

2.3.3 This time could be minimised with a portable communication means. Having such a provision, would allow a two-way communication between the OOW and the watchkeeping duty ASD. With a two-way communication, the watchkeeping duty ASD would not have to spend time to access to the nearest telephone and this also allows the OOW to recall the watchkeeping duty ASD without delay whenever there is an emergency on the bridge.

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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 CP had likely fallen into the lower cargo hold due to a misstep along the edge of the removed pontoon.

3.2 After one of the pontoons was removed, the mitigating measure to prevent personnel from falling into the lower cargo hold, by rigging the safety railings (safety lines and stanchions) was not carried out. There were no signages displayed and on-site verification these risk mitigating measures by a responsible officer was also absent.

3.3 The colour of the walkway and the edge of the tween deck was similar, which could cause such persons to have a misstep, especially in the absence of physical barriers.

3.4 Although not contributing to the occurrence, the means of communications between the OOW and the watchkeeping duty ASD deployed for other tasks was not established, which could be crucial to save time.

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4 SAFETY ACTIONS

During the course of the investigation and through discussions with the investigation team, the following preventive / corrective action(s) were taken by the Company of GC.

4.1 The Company amended the SMS with regards to the requirement of conducting and recording the toolbox safety meeting by the Chief Officer or Chief Engineer, as appropriate, before commencing work onboard. The content of the meeting would have to be recorded into a “Daily Toolbox Safety Meeting Form” with information pertaining to the work location, work scope, potential hazards, safety measures and precautions to be taken. This form will be signed off by the responsible supervisor and all participating crew members.

4.2 The SMS also included a new instruction with regards to the requirements to cordon any opening of the pontoon(s) on the tween deck with the stanchions and wire-cable, to prevent person(s) from walking too close to the opening, aside from the existing requirement only for cargo work.

4.3 The Company promulgated to the fleet of the new requirement to paint the surrounding perimeter of the tween deck (pontoon) openings with yellow paint, for visibility to person(s) walking near the edge (see **figure 4**).

Figure 4: Painted markings on the perimeter of the tween deck pontoon edges.
Source – the Company

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4.4 The Company amended the SMS on the “work at high position” section, to include the required consideration that any location where a person is at a height of more than two metres and where the risk of falling from height exists, the relevant existing risk mitigation would have to be carried out.

4.5 The Company promulgated to the fleet with the new requirement on the carriage of walkie-talkie(s) by the crew (officers or rating) during deck operations and when being absent from the bridge during duty hours.

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5 SAFETY RECOMMENDATIONS

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

In view of the safety actions taken by the Company, no safety recommendations have been issued.

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