REPUBLIC OF THE MARSHALL ISLANDS

Maritime Administrator

GREEN FUTURE MARINE SAFETY INVESTIGATION REPORT

Fatal Fall From Height

Kii Suido, Japan | 20 August 2024

Official Number: 9104

IMO Number: 9889631

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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.

Maritime Administrator

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LIST OF ABBREVIATIONS AND ACRONYMS

ASD	Able Seafarer Deck
C/E	Chief Engineer
CH	Cargo Hold
Circ.	Circular
C/O	Chief Officer
DWT	Deadweight Tonnage
GT	Gross Tonnage
ILO	International Labour Organization
IMO	International Maritime Organization
m	Meter
MSC	Maritime Safety Committee
No.	Number
OOW	Officer of the Watch
OS	Ordinary Seafarer
PPE	Personal Protective Equipment
RA	Risk Assessment
RCC	Rescue Coordination Centre
SMS	Safety Management System
UK MCA	United Kingdom Maritime and Coastguard Agency
UTC	Universal Coordinated Time

DOCUMENTS CITED

COSWP . . . . . Code of Safe Working Practices for Merchant Seafarers

COSWP Annex 13.1 . . . . . Checklist for Safety Officer's Inspection

ISM Code . . . . . International Management Code for the Safe Operation of Ships and for Pollution Prevention

IMO Assembly Resolution A.772(18) . . . . . Fatigue Factors in Manning and Safety

IMO Resolution MSC.133(76) . . . . . Adoption of Technical Provisions for Means of Access for Inspections

MLC, 2006 . . . . . Maritime Labour Convention, 2006

MSA No. 10-24 . . . . . Marine Safety Advisory No. 10-24, Fatalities Due to Falls from Height

MSA No. 12-25 . . . . . Marine Safety Advisory No. 12-25, Stop-work Authority

SOLAS . . . . . International Convention for the Safety of Life at Sea, 1974

STCW Code . . . . . Seafarers' Training, Certification, and Watchkeeping Code

PART 1: EXECUTIVE SUMMARY

On 20 August 2024, at 0042[1] the Republic of the Marshall Islands-registered general cargo ship GREEN FUTURE commenced drifting in vicinity of Kii Suido, Japan while awaiting a berth schedule at Fukuyama JFE Port Terminal. The ship was in ballast condition preparing to load a cargo of steel coils.

At approximately 1000, six crewmembers commenced cleaning CH Nos. 1 and 2. The cargo hold cleaning work party was divided equally between each cargo hold with one additional crewmember located outside and between CH Nos. 1 and 2. The hatch covers of CH Nos. 1 and 2 were partially open to provide adequate ventilation and additional light.

Both cargo holds were designed with a removable portable pontoon deck[2] separating the upper and lower portions of each cargo hold. Within CH No. 2, one pontoon was removed in preparation for cleaning the cargo hold tank top later in the day. A single safety line was rigged athwartships in the upper cargo hold adjacent to the removed pontoon. At 1500, the C/O, ASD2, and OS1 were located in the upper hold of CH No. 2 on top of the pontoon deck with a charged fire hose washing and sweeping the pontoon deck. No crewmembers located within either upper CH Nos. 1 or 2 were wearing a harness or fall arrestor. Shortly thereafter, the ASD2 heard the OS1 shout and upon looking around, realized that the OS1 was

1 Unless stated otherwise, all times are ship's local time (UTC +9).

2 Pontoon deck is commonly referred to as 'tween deck' which is a colloquial name for the deck in-between a cargo hold.

no longer on the pontoon deck. He then saw the OS1 lying on the tank top below. The ASD2 immediately informed the C/O who in turn called the Master on the radio transceiver. On receiving the notification from the C/O, the Master sounded the emergency alarm and announced for all crewmembers to muster in preparation to conduct a rescue inside the lower CH No. 2.

The rescue team congregated inside the lower CH No. 2 with a stretcher and medical oxygen. Upon arrival, the OS1 was conscious and complained of severe pain on his lower back and left and right extremities. The OS1 was hoisted from CH No. 2 and carried on the stretcher to the ship's Hospital. Meanwhile, a medical evacuation by way of a helicopter was ordered from Japan-Kobe RCC. At 1930, a rescue helicopter arrived at the scene and the OS1 was transferred from the ship's Hospital to the helicopter before the helicopter departed for Minami Wakayama Medical Center.

Shortly after arrival at the hospital, the OS1 lost consciousness, and with no vital signs, was declared deceased.

The Republic of the Marshall Islands Maritime Administrator's (the "Administrator's") marine safety investigation determined that the OS1 fell from the pontoon deck to the tank top between the removed portable pontoon deck.

The below lessons learned were identified.

- The importance of proper supervision of crewmembers while working in vicinity of areas where a risk of falling from height exists.
- Temporary safety barriers must be adequately rigged to provide sufficient protection from the risk of falling.
- Adequate procedures must exist defining the standards required for rigging a temporary safety barrier.
- Suitable PPE should always be worn when the risk of falling from height exists.
- Prescribed visual aids should also be worn while working on deck and PPE should be adapted to accommodate prescribed visual aids.
- The use of stop-work authority can prevent marine casualties. For stop-work authority to be effective, crewmembers must not

SHIP PARTICULARS

Vessel Name
GREEN FUTURE

Registered Owner
Cedar Valley S.A.

ISM Ship Management
Kyowa Sansho Co., Ltd.

Flag State
Republic of the Marshall Islands

IMO No.	Official No.	Call Sign
9889631	9104	V7A4323

Year of Build	Gross Tonnage
2020	9,943

Net Tonnage	Deadweight Tonnage
4,527	13,559

Length x Breadth x Depth
114.2 x 21.2 x 14.1 m

Ship Type
General Cargo

Document of Compliance Recognized Organization
Nippon Kaiji Kyokai

Safety Management Certificate Recognized Organization
Nippon Kaiji Kyokai

Classification Society
Nippon Kaiji Kyokai

Persons on Board
20

only be aware that they have this authority, but they must also have confidence that the authority is non-negotiable and can be exercised without fear of repercussion. Crewmembers must also be as familiar with how to issue and respond to a stop-work action or instruction as they are with their other shipboard duties.

PART 2: FACTUAL INFORMATION

The following Factual Information is based on the information obtained during the Administrator's marine safety investigation.

GREEN FUTURE Cargo Hold Layout

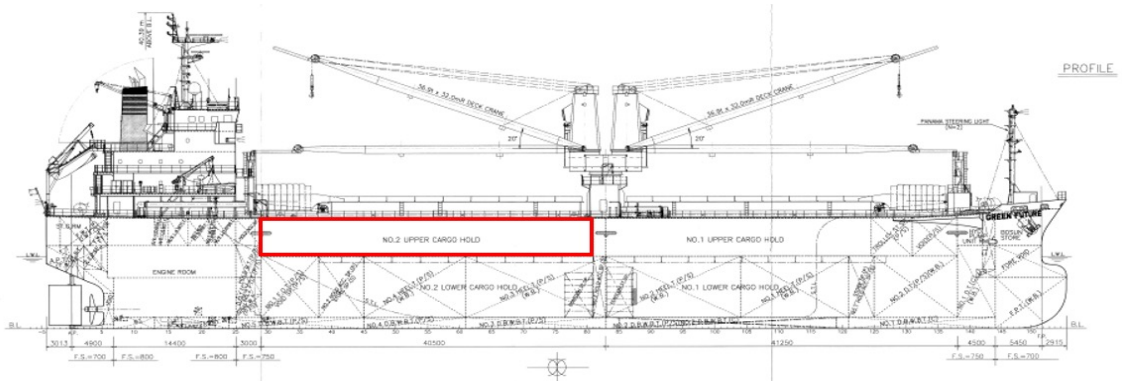

Figure 1: GREEN FUTURE General Arrangement Plan. The location of upper CH No. 2 is highlighted in red.

GREEN FUTURE is a general cargo ship built in 2020 in Kochi, Japan. The ship has two main cargo holds (Nos. 1 and 2) located fore and aft of each other. Each cargo hold is further separated into a lower and upper cargo hold *(see Figure 1)*.

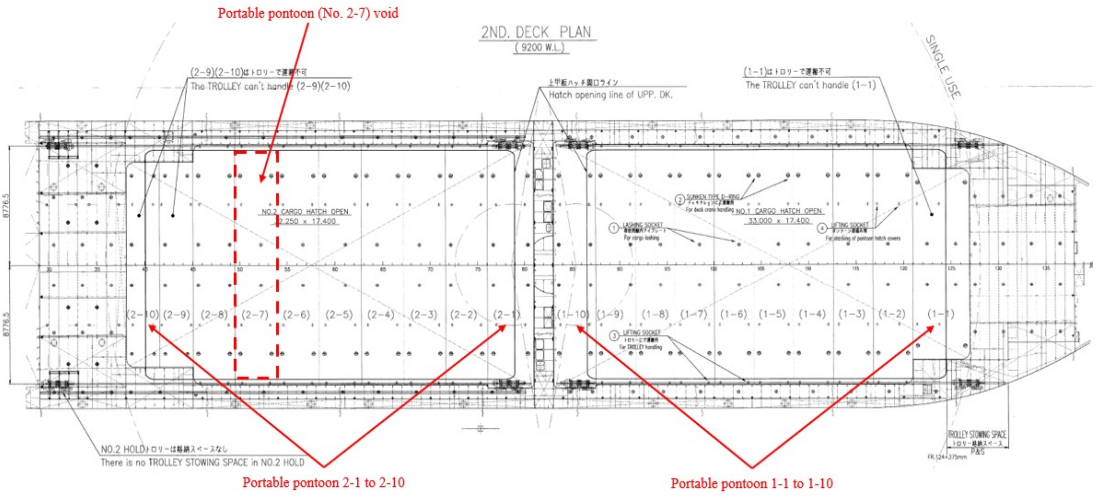

Figure 2: General Arrangement Plan of portable pontoons with portable pontoon[3] No. 2–7 indicated in red.

3 Pontoons are numbered from fore to aft with the first number indicating the cargo hold and the second number indicating their respective position.

The lower cargo hold is separated from the upper cargo hold by 10 portable pontoons *(see Figure 2)* which are hoisted into position using a mechanical trolley hoist located within the upper cargo hold *(see Figure 3)*.

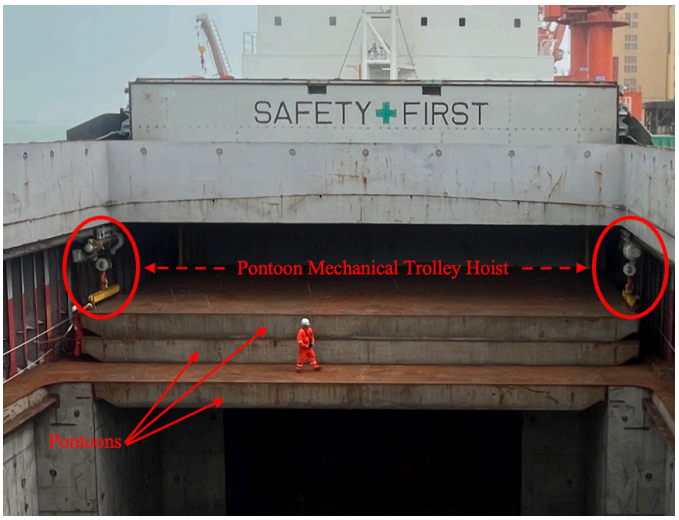

Figure 3: CH No. 2 pontoon and pontoon mechanical trolley hoist.

Above each upper cargo hold is a series of hatch covers provided to protect the cargo within each cargo hold from the environment *(see Figure 4)*.

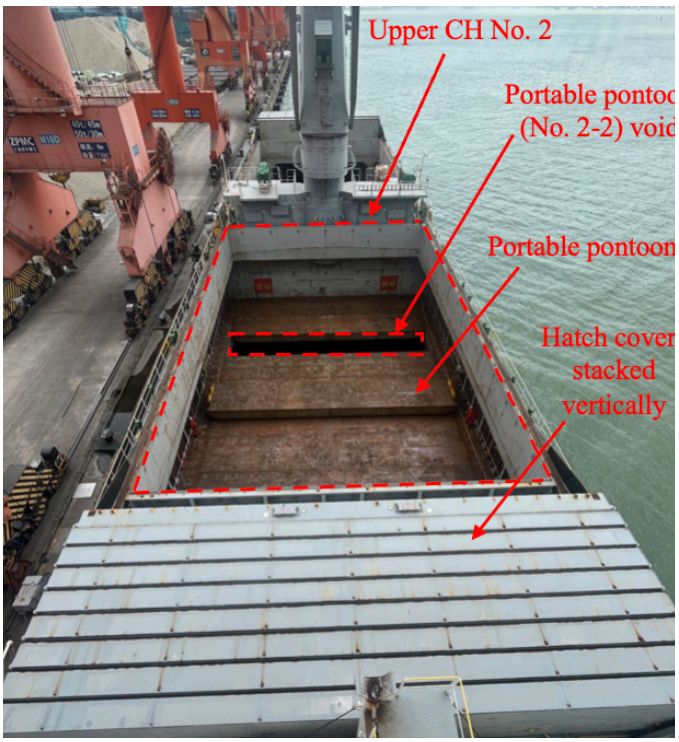

Figure 4: Upper CH No. 2 and vertically stacked hatch covers aft. Portable pontoon No. 2-2 as pictured was located in place (i.e., no void) at the time of the accident.

The height between the top of the pontoon to the tank top within CH No. 2 was 7.8 m.

Crew

GREEN FUTURE had a complement of 20 crewmembers, four more than what was required by the Minimum Safe Manning Certificate issued by the Administrator. All crewmembers were medically fit and held the appropriate Republic of the Marshall Islands-issued seafarer documentation for their position on board.

The seagoing experience of the Master and relevant crewmembers on board GREEN FUTURE and involved in this marine incident was:

RANK	TIME ON BOARD GREEN FUTURE	TIME IN RANK	TIME WITH COMPANY	TOTAL TIME AT SEA
Master	4 months	10 years	4 months	30 years
C/O	9 months	4 years	7 years	19 years
OS1	2 months	1 years	2 years	2 years
ASD1	5 months	2 years	7 years	7 years

The OS1 was a 29-year-old Filipino national who joined the Company in 2022 and had one year in rank. On 27 May 2024 he was declared medically fit for duty without restrictions and later joined GREEN FUTURE on 10 June 2024 in Manila, Republic of the Philippines. The OS1's Seafarer Medical Certificate stated that he wore visual aids (spectacles). The Snellen[4] far-sighted visual acuity eye test conducted on 27 May 2024 recorded a result of 20/150 on the right eye and 20/100 on the left eye. With spectacles, the OS1 recorded a result of 20/25 in the right eye and 20/30 in the left eye. The near visual acuity test resulted in a Jaeger[5] score of J2 unaided and J1 aided. Based on the results of the two eye tests, the OS1 was far-sighted and required spectacles in order to see objects clearly. Without spectacles, the OS1's distance visual acuity is categorized as moderate visual impairment.[6] The OS1 was wearing coveralls, safety shoes, helmet, gloves, headlight, non-prescription safety glasses, and a hand-held radio. The OS1 was not wearing prescription spectacles.[7]

In the 24-hour period prior to the OS1 falling, he had worked a total of six hours. On 19 August 2024, the OS1 stopped work at 1500 and rested until required to commence work again at 0800 on 20 August 2024.

The C/O's Hours of Work and Rest Record indicated that the C/O was working between 1600–2000 on 19 August 2024. On 20 August 2024, the Hours of Work and Rest Record indicated that the C/O was on watch from 0400–0800 and again from 1600–2000. The intervening period between 0800 and 1600 indicated that the C/O was resting and did not record that the C/O was working within CH Nos. 1 and 2. For the 24-hour period prior to the accident, the C/O worked a total of 15 hours, 11 hours of which were consecutive.

4 A Snellen standardized eye test assesses far-sighted visual acuity and consists of 11 rows of capital letters, descending in size and placed 20 feet away from the reader. Normal visual acuity is achieved if the reader can identify all 11 rows of letters. The result is recorded as 20/20 vision.

5 A Jaeger eye chart is used to test and document near visual acuity at a normal reading distance. The test consists of 11 blocks of text of different font size, J1 being the smallest text, J11 being the largest text, read at a distance of 14 inches.

6 *See* Dandona L, Dandona R., Revision of visual impairment definitions in the International Statistical Classification of Diseases. BMC Med. 2006 Mar 16;4:7. doi:0.1186/1741-7015-4-7. PMID: 16539739; PMCID: PMC1435919.

7 The OS1 was not wearing any other visual aid such as contact lenses.

With the exception of the C/O, the Administrator did not find any indication that the remaining crewmembers involved with this marine casualty did not receive the required amount of rest mandated by the IMO's STCW Code, Section A-VIII/1, paragraphs 2 and 3 and the ILO's MLC, 2006, Regulation 2.3.

The C/O's job description contained within the Company's SMS listed the following accountabilities and responsibilities which were considered relevant to the incident as discussed within Part 3 of this report.

1. To plan and oversee maintenance of the hull, decks, superstructure, accommodation, cargo spaces, and cargo machinery. To ensure that the vessel is always in a seaworthy, safe, and efficient condition;
2. to ensure that Company regulations, guidelines, and policies are followed in respect of vessel operations and maintenance;
3. to assess training needs of subordinate crewmembers under his control and impart the appropriate training to ensure that they are aware of safe working practices and the need to operate the vessel in an environmentally friendly manner;
4. to carry out RAs for all daily tasks, i.e., maintenance and cargo operations. All important and critical jobs require a documented RA to be carried out. To carry out Toolbox Talks daily for all tasks planned for the day prior to start of work and on-site as the situation demands;
5. the organization of cargo work and for tank or hold cleaning, and will direct Junior Officers accordingly; and
6. as the designated Safety Officer, the C/O is required to ensure that an RA has been carried out to identify hazards for important and critical operations[8] with a goal to prevent injury to personnel.

The Company's SMS does not prohibit the designated Safety Officer from being assigned other duties while also serving as the Safety Officer.

SMS

As required by the ISM Code, the Company's SMS included procedures for shipboard operations. These included general safe work procedures and specific procedures and PPE requirements for working aloft. The Company's SMS also included procedures for conducting initial safety familiarization training.

The Company's SMS included general reference to the COSWP throughout and that the procedures documented within the COSWP should be followed.

The Company's SMS included specific procedures to prevent slips, trips, and falls and required that the following be observed.

1. To prevent falls, every opening in a deck or walkway must be protected to prevent an accident. The openings should be protected by barricades, railings, or roped off, or constantly attended.

8 The Company's SMS defines a critical job or operation as those which have a significant risk of causing injury or illness to people, or damage to the ship, cargo, other property and/or, the environment.

2. When working in elevated locations where falls are possible:
   (a) take special precautions in locations without handrails;
   (b) wear safety lines when working in locations unprotected against falling more than about four feet. Lesser heights may also call for safety lines;
   (c) temporary barriers should be rigged to prevent falling where safety lines cannot be used; and
   (d) use safety harnesses rather than safety belts, since harnesses provide more protection against injury.

The Company's general safe work procedures required that an RA be completed for all important and critical jobs to identify hazards involving important and critical operations. The Company maintained a library of RAs for different critical jobs. This library included an RA for work involving cleaning and washing cargo holds and the shifting of pontoons within the upper cargo hold. The Company's procedures also required that the RA be signed by the C/O and the Master before commencement of work.

The Company's general safe work procedures also required that a permit to work shall be used for all work aloft or overside. The work supervisor and head of department should consider all the safety factors contained within the permit to work checklist, which includes identification of an on-deck supervisor, and verify that the appropriate safety equipment is being used, such as the fall preventer device, fall protection harness, and safety lines.

Additionally, the Company's general safe work procedures required a Toolbox Talk to be conducted prior to commencement of the associated work activity. All crewmembers involved in the work activity were required to sign the Toolbox Talk proforma affirming that they had received a brief on the hazards to be encountered, equipment to be used, and critical safety considerations to be observed. On completion of the Toolbox Talk, the Master and C/O are required to sign the proforma stating that the Toolbox Talk has been conducted.

The Company's general safe work procedures did not include a specific statement that every crewmember has the right and responsibility to stop work.[9]

Narrative

On 20 August 2024, at 0042 GREEN FUTURE was underway and drifting off Kii Suido, Japan awaiting a berthing schedule at Fukuyama JFE Port Terminal. The two cargo holds were empty and required cleaning to remove any residue from the previous cargo of palm kernel before loading a cargo of steel coils.

Between 0400 and 0750 the C/O was on watch on the Bridge. At 0755 the C/O met with the Bosun, ASD2, ASD3, OS1, and Deck Cadet in the Ship's Office to conduct a Toolbox Talk to discuss the planned work for the day. On completion of the Toolbox Talk the C/O proceeded to the Officer's Mess for breakfast while members of the working party[10] commenced rigging the necessary equipment in preparation for cleaning CH Nos. 1 and 2.

9 Stop-work authority can prevent marine casualties by allowing crewmembers, regardless of their position on board, to manage safety in real time by giving them the responsibility, obligation, and right to stop work that poses or creates an imminent danger to themselves, others, the ship and cargo, or the environment.

10 The working party consisted of the Bosun, ASD1, ASD2, ASD3, OS1, Deck Cadet, and Deck Boy. The ASD1 and Deck Boy were not present at the Toolbox Talk due to taking rest following their watch.

At 0900, the C/O completed the Permit to Work[11] and proceeded to the cargo holds to check on progress. Upon arrival, the hatch covers to CH Nos. 1 and 2 had been partially opened to allow for ventilation and illumination. At approximately 1000, pontoon 2–7 was hoisted from the pontoon deck and placed on top of portable pontoon 2–6 forward. At the same time, the Bosun, OS1, and ASD2 rigged a temporary safety barrier between two vertical stanchions located on the port and starboard side on the pontoon deck to provide a temporary barrier between pontoon 2–8 and the void located where pontoon 2–7 had been removed *(see Figure 5)*.

Figure 5: Pontoon 2–8 and void (2–7) with pontoon 2–7 positioned on top of pontoon 2–6. Temporary safety barrier connected to a stanchion on the port side within upper CH No. 2 and positioned athwartship between pontoon 2–8 and pontoon void 2–7.

Between 1000 and 1015, all work within the upper cargo holds had stopped while the working party took a coffee break. On completion, the ASD1 joined the working party following a safety brief by the C/O and proceeded to the upper CH No.1 and commenced sweeping the pontoon deck. Between 1145 and 1305, the working party had lunch before resuming work. At 1400, the C/O, OS1, ASD1, and Deck Cadet proceeded to the upper CH No. 2 and commenced washing the

11 *See* Safety Manual Document 05, Permit to Work – Aloft and/or Overside.

pontoon deck with a fire hose. The fire hose valve was located outside CH No. 2, amidships between CH Nos. 1 and 2. The Deck Cadet was instructed to remain in the vicinity of the fire hose valve to control the water pressure.

At 1520, the ASD1 and OS1 were holding onto the fire hose and maneuvering the hose into the correct position while the C/O was scraping the aft section of the upper CH No. 2. At that moment, the ASD1 heard the OS1 shout. The ASD1 turned around and saw that the OS1 had fallen into the void of pontoon 2-7 from pontoon 2-8 and onto the tank top below, within the lower cargo hold.

Immediately, the ASD1 raised the alarm and called for help from the C/O. The C/O called the Master on the Bridge using his radio transceiver initiating a medical emergency within CH No. 2. At 1523, the Master sounded the emergency alarm and announced over the public address system that an emergency rescue was required within CH No. 2. The Master then informed the Designated Person Ashore of the medical emergency. The crew mustered within CH No. 2 with a stretcher, medical oxygen, resuscitator, and first aid kit obtained from the ship's Hospital. The OS1 was conscious and able to describe to the rescue team that he felt pain in his back, left and right sides, and numbness in his right wrist. The OS1 was able to describe to the rescue team that he fell from pontoon 2–8 but was able to briefly hold onto the temporary safety barrier with his left hand for a short time before falling to the tank top.

At 1550, the OS1 was carried from CH. No. 2 to the ship's Hospital where his vitals were monitored. At approximately 1600, the Master requested a medical evacuation from Japan-Kobe RCC who responded that a helicopter would arrive at 1920. The Master instructed the OOW to proceed toward the coast of Japan to facilitate the rescue helicopter's arrival. At 1930, the Japan-Kobe RCC helicopter rendezvoused with GREEN FUTURE and recovered the OS1 before departing for Minami Wakayama Medical Center, Japan at 1955.

At 2112, the OS1 was declared deceased at the hospital due to traumatic subarachnoid hemorrhage.

PART 3: ANALYSIS

The following Analysis is based on the above Factual Information.

The OS1's Fall

Based on the information available to the Administrator, it appears that the OS1 fell while assisting the ASD1 to maneuver the fire hose into position to facilitate cleaning in the vicinity of pontoon 2–8. None of the crewmembers working within or outside the upper CH No. 2 witnessed the OS1's fall.

The OS1 was able to communicate with the rescue team while lying on the tank top within CH No. 2 and stated that he was initially able to hold onto the safety barrier before falling. It was determined by the Administrator that the temporary safety barrier did not break while being held onto by the OS1.

It could not be determined with certainty how the OS1 fell between pontoons 2–8 and 2–6. The OS1 would have been aware that pontoon 2–7 was removed and that a void existed between pontoons 2–8 and 2–6 as he was working within

the upper CH No. 2 from 0800, and was further present when pontoon 2–7 was hoisted and placed on top of pontoon 2–6. The temporary safety barrier was rigged by the working party inside upper CH No. 2 although it could not be determined by the Administrator if the OS1 was involved in the rigging of the temporary safety barrier.

It is possible that the OS1 slipped while maneuvering the fire hose into position, or that he tripped and fell while in the vicinity of the edge of pontoon 2–8. The exact reason could not be determined but in consideration of his visual acuity, which was categorized as moderate visual impairment, it could be considered likely that with a reduction in visual field, he may not have been able to readily identify a tripping hazard or differentiate where the edge of pontoon 2–8 was located or clearly see the location of the temporary safety barrier. The Company's SMS did not provide any direction or guidance requiring the use of prescription spectacles which would be necessary to correct a crewmember's visual impairment. The decision not to wear prescription spectacles could have been three-fold.

1. The wearing of prescription spectacles was incompatible with non-prescription safety glasses being worn by the OS1 at the time.
2. Prescription spectacles did not provide adequate eye protection and therefore necessitated the need to wear only non-prescription safety glasses.
3. Prescription spectacles may not have been routinely worn by the OS1 during deck work activities.

The hazard associated with a crewmember working in vicinity of an open pontoon while visually impaired presented a significant hazard which the Company's SMS failed to properly take into consideration.

The partial opening of hatch covers to CH Nos. 1 and 2 provided sufficient illumination for the working party to visually identify that pontoon 2–7 had been removed and a temporary safety barrier installed.

Based on the reported weather conditions, it is not likely that the movement of the ship contributed to the fall.

Company's Safe Work Procedures

The Company had procedures in place for cleaning cargo holds and to prevent slips, trips, and falls. An RA was issued on 17 August 2024 for the designated work activity of "shifting pontoon to upper hold tween deck." An identified hazard included the risk of "falling down due to tween deck open." The documented control measure included within the RA required a safety line to be installed and properly secured. The Company's SMS included procedures to prevent slips, trips, and falls and described that when working in elevated locations where falls were possible, that temporary barriers should be rigged to prevent falling where safety lines cannot be used and that wearing a safety line is required when working in unprotected locations.

The provisions contained within the Company's SMS to prevent slips, trips, and falls did not contain specific parameters[12] for the rigging of the temporary safety barrier beyond a requirement that the safety barrier should be rigged to prevent falling. The temporary safety barrier rigged was not sufficient to prevent the OS1 from falling. Although the OS1 managed to temporarily hold onto the temporary safety barrier, it was not determined if he was aware of its presence moments before temporarily holding on to it.

12 Specific parameters might include the following: height of safety line, number of safety lines, securing points, number and distance of stanchions required, dimensions of safety line, and tension of safety line.

The Toolbox Talk conducted on the morning of 20 August 2024 detailed necessary safety parameters to be observed and specifically required a "safety line on open pontoon" to be rigged. The Toolbox Talk did not require the use of fall protection such as a fall preventer device, fall protection harness, and lifeline attached to a strong point.

The signed Permit to Work Aloft and/or Overside contained a check-off list which positively indicated that a fall preventer device, fall protection harness, and lifeline attached to a strong point was present within upper CH No. 2.

The Permit to Work Aloft and/or Overside did not contain any reference to a safety barrier to be rigged and in place to prevent a fall from height from the upper cargo hold to the tank top below.

Prior to the commencement of the work activity of cleaning the cargo hold, a temporary safety barrier was rigged by the working party. Prior to, and during the rigging of the temporary safety barrier, the working party was exposed to the risk of falling, without adequate PPE in the form of a fall preventer, fall protection harness, and lifeline attached to a strong point. The rigging of the temporary safety barrier commenced prior to the permit to work being completed and while the C/O was eating breakfast. The check-off list contained within the permit to work, indicated positively that the fall preventer device, fall protection harness, and lifeline attached to a strong point were present, was not verified until after the C/O had attended CH No. 2 on completion of breakfast and only after the permit to work had been signed.

The PPE matrix contained a list of work activities and the minimum required PPE to be worn for a particular work activity. The work activities included within the PPE matrix listed working aloft as an activity but did not include the work activity for cleaning the cargo holds. The PPE matrix identified that additional PPE for a listed work activity should be determined after an RA. The PPE matrix did not contain any guidance if a work activity to be conducted is not contained within the PPE matrix.

The Administrator was able to determine that a fall preventer device, fall protection harness, and lifeline attached to a strong point had not been required to be worn by any crewmember during previous occasions of cleaning the cargo holds with a removed pontoon. It was common practice for the crewmembers to rig a temporary safety barrier to prevent a fall from height and this was the first instance of a crewmember falling from the upper cargo hold on board GREEN FUTURE.

It was further determined by the Administrator that crewmembers interpreted the SMS[13] to conclude that the wearing of a fall preventer, fall protection harness, and lifeline attached to a strong point was not required since a temporary safety barrier was in place. The crewmembers relied on the temporary safety barrier to prevent falling between a vacant pontoon in lieu of affixing a fall preventer and lifeline to a strong point in accordance with documented procedures. The work activity being undertaken was not considered by the crewmembers involved as working aloft, but in fact considered as cleaning the cargo hold.

The crewmembers did not recognize that the temporary safety barrier rigged was inadequate. The SMS did not contain specific guidance on stop-work authority, however the crewmembers indicated that they were familiar and aware of the

13 The Company's SMS included procedures to prevent slips, trips, and falls and described that when working in elevated locations where falls were possible, that temporary barriers should be rigged to prevent falling where safety lines cannot be used and that wearing a safety line is required when working in unprotected locations.

application of, and their individual responsibility to initiate, a stop-work order. A stop-work order was not considered necessary by the crewmembers since they did not recognize the inadequacy of the temporary safety barrier.

Work Activity and Supervision

In the 24-hour period prior to the OS1 falling between the void of pontoon 2–7, the C/O worked a total of 15 hours. The Hours of Work and Rest Record for 19 August 2024 indicated that the C/O had worked 10 hours, with 14 hours of rest. The Administrator determined that the accuracy of the Hours of Work and Rest Record could not be relied upon as an accurate record of actual hours worked and hours rested.

IMO Assembly Resolution A.772(18)1[14] defines fatigue as resulting "in the degradation of human performance, the slowing down of physical and mental reflexes and/or the impairment of the ability to make rational judgments." Factors considered to induce fatigue are described within this resolution as "prolonged periods of mental or physical activity, inadequate rest, adverse environmental factors, physiological factors and/or stress or other psychological factors."

In considering the C/O's routine in the days leading up to the incident, it is considered that the C/O may have experienced fatigue at the time of the incident, and that the C/O's performance may have been demonstrative of a fatigued individual. This was evidenced by a reduced appreciation of the identification of risk from falling between pontoons 2–6 and 2–8, the adequacy of the temporary safety barrier, a permit to work which was not fully implemented, and that he maintained a watch schedule and working routine without recognizing that his judgment may be impaired through lack of adequate rest.

Under the ISM Code,[15] Companies are strongly urged to take the issue of fatigue into account when developing, implementing, and improving SMSs. A mitigation strategy for the management of Hours of Work and Rest was not considered by the Master or Company prior to the incident. The working party involved in cleaning CH Nos. 1 and 2 were assigned based on their position on board and familiarity with the work activity. The SMS did not provide for an assessment of the level of compliance with the STCW Code, Section A-VIII/1 ensuring crewmembers involved in the work activity had received the required amount of rest.[16]

The C/O, assigned as designated Safety Officer, with the responsibility of ensuring that an RA had been carried out to identify hazards for important and critical operations with the goal to prevent injury to personnel. This responsibility included the planning and oversight of cargo spaces on board. The check-off list contained within the signed permit to work positively noted that an on-deck supervisor had been identified. The Company's SMS pertaining to bulk carrier practice[17] did not contain the specific guidance and instruction on the role and responsibility of an on-deck supervisor or the role and responsibility of a Safety Officer. In consideration of the hazard presented with the removal of pontoon 2–7, it could be considered that an on-deck supervisor's role for the proper supervision of the work activity should be incorporated within the SMS and included as a control measure within the RA.

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14 *See* IMO Resolution A.772(18), Fatigue Factors in Manning and Safety.

15 *See* MSC.1/Circ. 1598, Guidelines on Fatigue.

16 ISM Code Section 1.2.3 which states that the "SMS should ensure compliance with mandatory rules and regulations; and that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account."

17 *See* the Company's SMS Chapter 7, Hold Cleaning.

The work activity of cleaning CH Nos. 1 and 2 was left to the working party without proper supervision. In accordance with the Company's SMS, the C/O was not prohibited, in the capacity of a Safety Officer, from being assigned other duties while also serving as the Safety Officer. The implication is that the C/O may not have been able to effectively monitor both the work activity and all potential hazards as required by the Company's SMS.

The routine nature of the work activity being conducted and that no previous related incidents had occurred on board may have contributed to the C/O and crewmembers who were working in CH No. 2 having a false sense of safety or lack of awareness of the increased risks involved with working in proximity to the void between pontoons 2–8 and 2–6.

Work Planning

The COSWP states in Chapter 17.1 that a crewmember should: "work from height only if there is no reasonably practicable alternative." The planning of the cleaning of the upper cargo hold did not take into account any alternative planning where the cleaning could take place without causing a risk for falling.

Temporary Safety Barrier Design

A temporary safety barrier was rigged prior to the commencement of the work activity. The Company's SMS required that: "openings should be protected by barricades, railings, roped off, or constantly attended." No additional specification was included within the SMS describing the characteristics of a barricade, railings, rope, or definition of constantly attended. The temporary safety barrier in use on 20 August 2024 was described by the C/O as sufficiently meeting the requirement contained within the SMS. The height of the temporary safety barrier was inconsistent across the breadth of the void (*see Figure 5*). At either end of the barrier, where the barrier was made fast to the stanchion, the temporary safety barrier's height was approximately 1 m. As the distance from the stanchion increased, the height of the temporary barrier decreased until equidistance from the port and starboard extremities. The height of the barrier in the center of the void (mid-ships) was approximately 0.2 m from the top of the pontoon.

In accordance with COSWP[18] a temporary safety barrier for safe movement on board should consist of an upper rail at a height of 1 m and an intermediate rail at a height of 0.5 m.[19] The rails may consist of taut wire or taut chain. Each course of rail should be kept substantially horizontal and taut throughout their length. In addition, there should be appropriate warning signs next to the void. Annex 13.1 of COSWP provides a checklist[20] for a Safety Officer's inspection and provides an example of questions that a Safety Officer should ask. The checklist highlights that a Safety Officer should assess if all guardrails are in place, secure, and in good condition. The checklist contained within COSWP Annex 13.1 was not incorporated within the procedures and therefore did not address Company expectations regarding securing a temporary safety barrier or provide guidance regarding the height, strength, or choice of material.

The Administrator was unable to determine if wire or chain was available on board for the purpose of a temporary safety barrier. It is understood that the temporary safety barrier in use on 20 August 2024 had been used on multiple previous occasions as a means of preventing crewmembers from falling between open pontoons.

18 *See* COSWP Section 11.5, Guarding of Openings.

19 It is noted that these heights are the same as those required for guardrails on elevated walkways inside of cargo holds. *See* IMO Resolution MSC.133(76), Section 3.

20 The list provided is not exhaustive and will likely vary according to the design or conditions of a particular ship.

PART 4: CONCLUSIONS

The following Conclusions are based on the above Factual Information and Analysis and shall in no way create a presumption of blame or apportion liability.

1. The cause of the OS1's unwitnessed fall cannot be definitively determined.

2. Causal factors that contributed to this very serious marine casualty included:

   (a) the OS1's visual impairment which increased the risk of tripping, particularly if he was unable to see or distinguish the edge of pontoon 2–8 and inadvertently stepping over the edge;

   (b) insufficient guidance to construct a suitable temporary safety barrier preventing inadvertent or accidental crossing between pontoon 2–8 and the vacant pontoon 2–7; and

   (c) risk normalization through the continuous application of an inadequate temporary safety barrier deemed sufficient for the intended work activity without taking into account the hazard associated with working at height.

3. Additional causal factors that may have contributed to this very serious marine casualty included:

   (a) the Company's procedures for cleaning CH No. 2 which did not address:

      (i) an alternative method to clean the holds without working in proximity of open pontoons and temporary safety barriers;

      (ii) requirements and specifications for the securing of a temporary safety barrier to remove the hazard associated with falling within CH No. 2;

      (iii) the requirement to use a fall preventer device, fall protection harness, and lifeline attached to a strong point in proximity of removed pontoons;

      (iv) adequate terms of reference for the role and responsibilities of the Safety Officer in the conduct of supervising the work activity within CH No. 2; and

      (v) a requirement for a crewmember with moderate visual impairment to wear prescription spectacles when on duty.

   (b) allocation of onboard work activities which failed to take into consideration mandated Hours of Work and Rest requirements as stipulated by the STCW Code, Section A-VIII/1;

   (c) the Company's consideration of planned work activities in relation to available personnel resources to adequately mitigate the probable effects of fatigue; and

   (d) the lack of an unambiguous statement regarding crewmembers having stop-work authority or guidance for how that authority should be exercised in the Company's safe work procedures.

PART 5: PREVENTIVE ACTIONS

In response to this very serious marine casualty, the Company has taken the following Preventive Actions.

1. Required crewmembers to set up strong and tensioned barricades using wire rope and turnbuckles rather than rope.
2. Ensured that PPE is worn properly during cargo hold cleaning operations. For crewmembers who wear glasses, required the use of safety goggles that can be worn over glasses.
3. Reminded all crewmembers to conduct Toolbox Talk meetings and raise any risks for the job during the Toolbox Talk meeting.

The Administrator has taken the following Preventive Actions.

1. Issued MSA No. 10-24 addressing fatalities due to falls from height. MSA No. 10-24 includes recommendations based on a review of fatal falls from height that have occurred on board Republic of the Marshall Islands-registered ships since 2019 through the date it was released. It also includes a safety flyer intended to be posted on board ships in areas where seafarers are likely to see it on a daily basis.
2. Issued MSA No. 12-25 addressing how stop-work authority can contribute to preventing marine casualties by allowing seafarers, regardless of their position on board, to manage safety in real time by giving them the responsibility, obligation, and right to stop work that poses or creates an imminent danger to themselves, others, the ship and cargo, or the environment. MSA No. 12-25 included a number of recommendations for improving the implementation of stop-work authority on board Republic of the Marshall Islands-registered ships.

PART 6: RECOMMENDATIONS

The following Recommendations are based on the above Conclusions and in consideration of the Preventive Actions taken.

1. It is recommended that the Company:
   (a) revise the Company's general safe work procedures to ensure:
      (i) where cleaning of cargo holds presents a risk of falling, that either a temporary safety barrier is rigged in accordance with COSWP Section 11.5 and/or a fall preventer device, fall protection harness, and lifeline attached to a strong point is used by all crewmembers exposed to a risk of falling;
      (ii) that all hazards associated with the risk of falling within a cargo hold are adequately addressed for the designated work activity of cleaning cargo holds;
      (iii) the role and responsibilities of a Safety Officer are clearly defined to ensure proper supervision and oversight of work activities within a cargo hold is maintained; and
      (iv) that prescription spectacles are compatible with required PPE in accordance with the PPE matrix.

(b) ensure a documented procedure is incorporated within the Company's general safe work procedures detailing crewmembers' responsibility, obligation, and right to stop work and ensure every crewmember is aware of their responsibility as it relates to stop-work authority; and

(c) conduct a gap analysis to identify non-compliance of Hours of Work and Rest Records on board and implement an appropriate strategy to ensure crewmembers receive required mandated hours of rest in accordance with the STCW Code, Section A-VIII/1, paragraphs 2 and 3 and the ILO's MLC, 2006, Regulation 2.3.

The Administrator's marine safety investigation is closed. It will be reopened if additional information is received that warrants further review.