REPUBLIC OF THE MARSHALL ISLANDS

Maritime Administrator

BARU MARINE SAFETY INVESTIGATION REPORT

Fatal Fall From Height

Offshore Anchorage, North Sea | 20 July 2021

Official Number: 8005

IMO Number: 9813096

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DISCLAIMER

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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

2/O . . . . . Second Officer

3/O . . . . . Third Officer

ASD . . . . . Able Seafarer Deck

C/O . . . . . Chief Officer

IACS . . . . . International Association of Classification Societies

ICCL . . . . . International Convention on Load Lines, 1966, as Amended by the Protocol of 1988

IMO . . . . . International Maritime Organization

IMSBC Code . . . . . International Maritime Solid Bulk Cargoes Code

ISM . . . . . International Safety Management

m . . . . . Meters

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

MRCC . . . . . Maritime Rescue Coordination Center

OICNW . . . . . Officer in Charge of a Navigation Watch

OOW . . . . . Officer of the Watch

OS . . . . . Ordinary Seafarer

PPE . . . . . Personal Protective Equipment

SMS . . . . . Safety Management System

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

STCW Convention . . . . . International Convention on Standards of Training, Certification and Watchkeeping for Seafarers

VHF . . . . . Very High Frequency

PART 1: EXECUTIVE SUMMARY

On 20 July 2021, the Republic of the Marshall Islands-registered combination carrier BARU, managed by Klaveness Ship Management AS (the "Company"), was anchored offshore of Rotterdam, Kingdom of the Netherlands (hereinafter "Netherlands") awaiting berthing instructions. Planned work for the day included chipping and painting the free-fall lifeboat davit platform.

Soon after 1030,[1] the ASD and OS, who had been assigned the task of chipping and painting the free-fall lifeboat davit platform, started work. After chipping the area closest to the inclined ladder used to access the platform, the ASD tied a rope to the top rails of the ladder two or three steps below the top of the ladder. The purpose of the rope was to create a physical safety barrier for preventing access to the platform. The ASD and OS also led an air hose that they were using over the ladder's intermediate rails beneath the rope used to establish a physical safety barrier. They then removed the section of platform grating closest to the ladder and resumed chipping.

At approximately 1110, the Deck Cadet was reported to have fallen and landed on the Poop Deck directly below the platform. The Deck Cadet had not been assigned to the work being done on the free-fall lifeboat davit platform. He apparently fell while approaching the crewmembers who were working on the platform to get their slop chest orders. The platform was approximately 8.5 m above the Poop Deck.

The ship's crewmembers responded immediately to provide first aid to the unconscious Deck Cadet. Within minutes, the Master contacted the Netherlands Coastguard to request emergency assistance. Just after 1230, a launch with an emergency medical team arrived alongside. After embarking the ship, the emergency medical team evaluated the Deck Cadet and began preparing him to be evacuated for medical treatment on shore. A helicopter arrived a few minutes later. At 1355, the helicopter departed and transported the Deck Cadet to a hospital in Rotterdam. It was reported that the Deck Cadet died on 10 August 2021 while receiving medical treatment for the injuries he had received when he fell.

The marine safety investigation conducted by the Republic of the Marshall Islands Maritime Administrator (the "Administrator") identified the following:

1 Unless otherwise stated, all times are ship's local time (UTC +2).

1. Causal factors that contributed to this very serious marine casualty include:
   (a) the Deck Cadet's apparent inadequate recognition of the potential safety hazards associated with the work being performed by the ASD and OS by crossing over the safety barrier that was in place across the inclined ladder leading to the free-fall lifeboat davit platform;
   (b) inadequate implementation of the Company's SMS due to:
      (i) the Safety Standby Person leaving the area to get additional rope and not monitoring the work or surrounding area when the Deck Cadet fell without directing the ASD and OS to stop working and informing either the C/O or the 3/O before leaving the area; and
      (ii) the absence of warning signs on the Poop Deck and the inclined ladder leading from the B Deck to the free-fall lifeboat davit platform to reinforce the physical safety barrier.
2. Additional causal factors that may have contributed to this very serious marine casualty include:
   (a) ineffective supervision of the Deck Cadet, who may not have recognized that obtaining the crewmembers' slop chest orders was not a high priority task.
3. Additional issues that were identified but that did not contribute to this very serious marine casualty include:
   (a) the difficulty for one person to effectively monitor both the access to the inclined ladder leading from B Deck to the free-fall lifeboat davit platform and the Poop Deck directly beneath the platform for potential hazards simultaneously and to warn crewmembers or other persons who might approach a safety barrier;
   (b) the Company's SMS did not clearly indicate that the Safety Standby Person should sign the work permit; and
   (c) the crewmembers' difficulty lifting a stretcher with a person on it from the Main Deck up to the top of hatch cover for Cargo Hold No. 3, which was the ship's designated helipad.

SHIP PARTICULARS

Vessel Name
BARU

Registered Owner
KCC Shipowning AS

ISM Ship Management
Klaveness Ship Management AS

Flag State
Republic of the Marshall Islands

IMO No.	Official No.	Call Sign
9813096	8005	V7LH2

Year of Build	Gross Tonnage
2019	54,043

Net Tonnage	Deadweight Tonnage
21,106	83,500

Length x Breadth x Depth
224.8 x 34.5 x 23.2 m

Ship Type
Combination Carrier

Document of Compliance Recognized Organization
DNV

Safety Management Certificate Recognized Organization
DNV

Classification Society
DNV

Persons on Board
25

PART 2: FINDINGS OF FACT

The following Findings of Fact are based on the information obtained during the Administrator's marine safety investigation.

1. Ship particulars: *see* chart on page 9

2. On 20 July 2021, the seven cargo hold combination carrier BARU *(see Figure 1)* was anchored off Rotterdam, Netherlands in offshore anchorage No. 4W while awaiting berthing instructions. The ship's drafts were 13 m forward and aft.

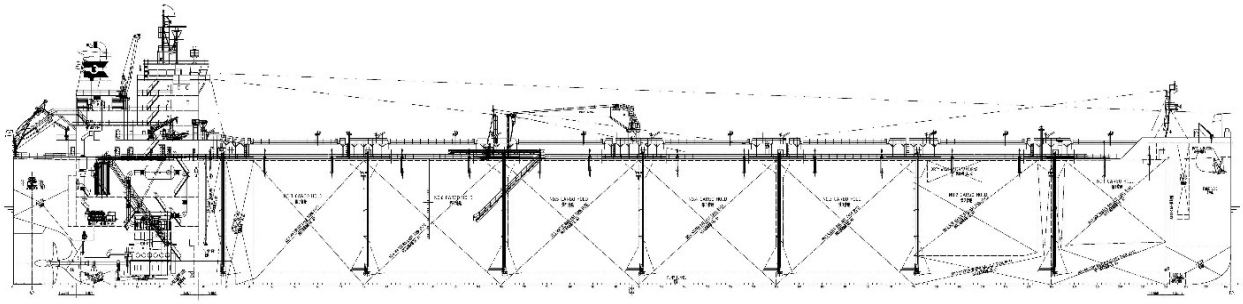

Figure 1: BARU General Arrangement.

3. The weather on the morning of 20 July 2021 was reported to have been good, with clear to partially cloudy sky. The winds were Beaufort Force 1 and the sea was calm, with a swell of approximately 0.5 m.

Daily Work Planning

4. Between 0720-0730, the C/O met with the Bosun and Pumpman to review the jobs that were planned to be completed that day. These included chipping and painting on deck in the vicinity of Cargo Holds Nos. 5 and 6 and the free-fall lifeboat davit platform. They also reviewed the PPE that was required for these jobs and the need to secure the areas where work was being performed.

5. After breakfast, the C/O, the Bosun, and the Pumpman met with the deck ratings to conduct a daily Toolbox Talk to review the work planned for the day, the required PPE for each of the planned jobs, and the risk assessment for working aloft since chipping and painting of the free-fall lifeboat davit platform required the seafarers assigned to this task to work from height. The PPE required for this task included the use of safety harnesses and fall arresters.

6. The risk assessment identified hazards for working aloft, including inadequate preparation of the work area and falling while working from height.[2] The barriers in place for these hazards included:

   (a) assessment (e.g., inspection) of the work area;

   (b) issuing a work aloft permit;

   (c) inspecting the fall arresters and safety harnesses before the work started;

2 Other hazards that were identified were inadequate job planning, lack of a rescue plan, falling equipment, and unauthorized use of portable ladders.

(d) use of fall arresters and safety harnesses with two lifelines; and

(e) posting warning signs / blocking access to the area where the work was being done.

7. The risk assessment was signed by the Master, C/O, 3/O, Pumpman, Bosun, ASD, and OS.

8. The C/O and Bosun went on deck after the Toolbox Talk was completed to inspect the areas where work would be conducted in the vicinity of Cargo Holds Nos. 5 and 6 and the free-fall lifeboat davit platform. While they were on deck, the C/O told the Bosun to not start the work on the free-fall lifeboat davit platform until after 1030. This was to ensure there was time for both the Master to approve the working aloft permit and that the work did not start until after the 2/O was awake.

Working Aloft Permit

9. At 0820, the C/O went to the Ship's Office to prepare a working aloft permit, which was required by the Company's SMS, for the work planned to be done on the free-fall lifeboat davit platform. The completed permit identified the C/O as the Person in Charge of the work, the 3/O as the Safety Coordinator, and the Pumpman as the Safety Standby Person.[3]

10. The working aloft permit included the location and description of the planned work. It also included a checklist of items that were supposed to be checked or verified before the planned work was started or that were supposed to be in place as the work was being conducted. These included:

    (a) inspecting the fall arrestors and safety harnesses to ensure they were working properly and in good repair;

    (b) reviewing the current and forecast weather, as well as determining if it or the ship's movement might have an impact on the ability to perform the work safely;

    (c) verifying the competence of the crewmembers assigned to conduct the work and that they had received the required minimum amount of rest;

    (d) verifying that the planned work had been reviewed with the crewmembers assigned to perform the work;

    (e) confirming that the requirements in the Company's SMS for working aloft were complied with;[4] and

    (f) identifying any potential fall zone and blocking / roping it off to protect against inadvertent entry.

11. The working aloft permit indicated that safety harnesses connected to fall arresters were supposed to be worn at all times by the crewmembers working aloft.

12. After he completed the working aloft permit, the C/O assigned the Deck Cadet to take it to the ASD and OS so they could sign it. The C/O reported that he explained the planned work and reviewed the working aloft permit with the Deck Cadet in response to a question he had asked before going out on deck to where the two deck ratings were working.

13. At 1030, the Master approved the working aloft permit, which had been signed by the ASD, OS, 3/O, Pumpman, and C/O.

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3 The responsibilities of the Person in Charge, Safety Coordinator, and Safety Standby Person are defined in the Company's SMS and are discussed later in the report.

4 The SMS requirements are discussed later in the report.

Free-fall Lifeboat Davit

14. The free-fall lifeboat davit was located aft of the Accommodation on BARU's starboard side. Access to the platform of the davit was by an inclined ladder between the B Deck and the platform *(see Figure 2)*. The platform was approximately 8.5 m above the Poop Deck and consisted of four sections of removable grating.

Figure 2: Free-fall lifeboat davit. The inclined ladder between the B Deck to the platform on the davit is circled in red on the portion of the General Arrangement drawing that is shown on the left. The platform with the four removable sections of grating is shown in the picture on the right.

15. The guard rails around the perimeter of the platform consisted of a top rail and two intermediate rails. The top rail was 1,000 mm high when measured from the top of the platform. The opening between the platform and the bottom rail was 230 mm and the opening between each of the rails was 380 mm.[5]

16. The inclined ladder sloped approximately 45° from the vertical. The ladder's handrails consisted of two equally spaced rails (e.g., tiers). The top of the top rail was 1,000 mm high when measured from the leading edge of the tread.[6]

Chipping and Painting on the Free-fall Lifeboat Davit Platform

17. At approximately 0930, the Bosun directed the ASD and OS to take the fall arrestors, safety harnesses, and tools they would need to the free-fall lifeboat davit platform so that they could start work at 1030, after coffee break. He also reminded them to make sure they wore their safety harnesses with one of the lifelines connected to a fall arrester and the other one attached to the guard rail. He additionally reminded them to put out a barrier to prevent access to the free-fall lifeboat davit platform. They rigged the fall arresters and established a safety barrier by roping off the starboard side of the Poop Deck before stopping for a coffee break.

18. At 1030, the ASD and OS put on their safety harnesses, which were both equipped with two lifelines. They both connected one of their lifelines to a fall arrester and the second lifeline to the guard rail. The fall arresters were

5 These dimensions meet the requirements of the ICCL, regulation 25.

6 These dimensions are consistent with the recommendations for stair handrails in IACS Recommendation No. 132, Human Element Recommendations for Structural Design of Lighting, Ventilation, Vibration, Noise, Access and Egress Arrangements (IACS Recommendation No. 132), which was issued in 2013. Based on these recommendations, the tiers of two-tier handrails should be equally spaced with the vertical height of the top of the upper tier being between 915-1,000 mm above the leading edge (e.g., nose) of the tread.

attached to the guard rail. They then started chipping around the section of grating that was located closest to the inclined ladder using pneumatic tools.

19. The 3/O was the designated Safety Coordinator for the work on the free-fall lifeboat davit platform since he could monitor the work from the Bridge and by portable VHF radio, while also on duty as the OOW.

20. The Pumpman, who was the designated Safety Standby Person, went out on deck to monitor the work. A few minutes after going out on deck, he left to get some more rope to better secure the area. He did not direct the ASD and OS to stop working or inform either the C/O or the 3/O before leaving to get the additional rope.

21. After they had chipped around the section of grating closest to the inclined ladder, the ASD and OS disconnected the lifelines that were connected to the guard rail.[7] The ASD then rigged a physical safety barrier across the ladder by tying a rope to the top rails. An air hose that was being used by the ASD and OS was led over the intermediate rail directly below the rope used to create a barrier. Both the rope and air hose were positioned so that they were about two to three steps below the top of the ladder *(see Figure 3)*. A warning sign was not posted.

Figure 3: Access ladder to the free-fall lifeboat davit platform showing the rope used to establish a physical safety barrier and the air hose. Note:This picture was taken after the Deck Cadet had fallen and the barrier rope had been retied.

22. After rigging the safety barrier, the ASD and OS removed the section of grating that was closest to the inclined ladder *(see Figure 4)*. The ASD and OS then both reconnected the lifelines that had previously been disconnected from the guard rail. After checking to make sure that the lifelines were securely connected, they started chipping the portion of the platform structure to which the grating was secured.[8] This portion of the structure could not be chipped with the grating in place.

7 Their second lifeline remained connected to the fall arresters.

8 This consisted of lengths of angle iron that was welded to the primary structure.

Figure 4: View of free-fall lifeboat davit platform from below with the section of grating closest to the inclined ladder removed.

23. At 1040, the C/O went out on B Deck to check the ASD and OS. He reported seeing that they were both wearing safety helmets, safety googles, and safety harnesses connected to the fall arresters. He also reported that a rope barrier was tied across the inclined ladder *(see Figure 3)*.

Incident Description

24. At 1100, the Master directed the Deck Cadet to obtain slop chest orders from each of the ship's crewmembers. When interviewed after the Deck Cadet fell, the Master stated this was not an urgent task, but that the timing was convenient. There is no indication he told the Deck Cadet that the task was not urgent when he directed him to obtain the slop chest orders.

25. At approximately 1110, the ASD and OS reported hearing a thud. They looked down and saw the Deck Cadet lying on the Poop Deck directly below where the grating had been removed. They immediately stopped working. The ASD went to check the Deck Cadet and the OS went to the Bridge to notify the OOW.

26. The ASD and OS stated they had neither seen the Deck Cadet on B Deck or the inclined access ladder nor had they heard him while they were working on the free-fall lifeboat davit platform.

27. The ASD and OS reported observing that the rope safety barrier was untied at one end as they went down the inclined ladder. They also reported seeing the Deck Cadet's safety helmet lying on its side on B Deck, approximately 2 m from the base of the ladder.

28. Based on the information available to the Administrator, it is not known if the Deck Cadet was using the chin strap on his safety helmet to secure it on his head before he fell. The chin strap was loose with both ends connected to the safety helmet when it was examined after he fell *(see Figure 5)*.

Figure 5: Deck Cadet's safety helmet. Note the position of the chin strap.

29. The ASD stated that the Deck Cadet was unconscious when he reached him. He told two crewmembers who had come out on deck to get assistance. He then went to the Fire Control Station, which was located on the starboard side, aft of the Accommodation, to call the OOW on the Bridge. After reporting that the Deck Cadet was unconscious, he returned to the Poop Deck.

30. The OOW (3/O) was inside the Bridge performing watch related tasks when the Deck Cadet fell.

31. The OS went directly to the Bridge and notified the OOW.[9] The OOW directed the OS to remain on the Bridge. He then went down to C Deck and saw that the Deck Cadet was lying motionless on the Poop Deck. He immediately went to the Ship's Office and informed the Master and C/O. The OOW then returned to the Bridge.

32. By 1112, the Master, C/O, and 2/O, who was the ship's designated Medical Officer, and other members of the ship's medical team had arrived on scene. The Deck Cadet was reported to be lying face up and unconscious. It was also reported that he was breathing and had a pulse.

33. At 1114, as the ship's medical team assisted the Deck Cadet, the Master contacted the Netherlands Coastguard to request emergency assistance. After he had advised the duty doctor of what had happened and of the Deck Cadet's condition, the Master was informed that a launch with emergency medical providers would arrive in about 20 minutes and that a helicopter would arrive in about 30 minutes. It was not reported how long this call was.

34. The 2/O and the ship's medical team continued assisting the Deck Cadet, who remained unconscious. The assistance included administering medical oxygen. The Deck Cadet's condition was reported to have remained unchanged.

35. At 1236, the launch arrived alongside and two emergency medical providers embarked BARU. They immediately began aiding the Deck Cadet and preparing him for a medical evacuation.

36. At 1238, a Netherlands Coastguard helicopter landed on BARU's designated helideck, which was the hatch cover for Cargo Hold No. 3.

9 As stated previously, the 3/O who was designated as the Safety Coordinator for the work on the free-fall lifeboat davit platform was on duty as the OOW.

37. BARU's crewmembers reported that they had difficulty transporting the Deck Cadet by stretcher from the Poop Deck to the helicopter. They also were unable to lift the stretcher with the Deck Cadet on it from the Main Deck up to the hatch cover so that the stretcher could be placed directly onto the helicopter.

38. At 1350, the helicopter took off and then hovered over the ship while the hoist cable was then lowered and connected to the stretcher. The stretcher was then hoisted and taken on board the helicopter.

39. At 1355, the helicopter departed and transported the Deck Cadet to a hospital in Rotterdam for medical treatment. It was reported that he sustained multiple fractures, including his skull, and had serious brain injuries.

40. The Deck Cadet died on 10 August 2021 while receiving medical treatment in Rotterdam. The medical statement from the forensic medical doctor who examined the Deck Cadet's remains stated that Dutch law prohibited the disclosure of the exact cause of death since it was determined to have been due to an unnatural cause.

41. When examined after the Deck Cadet fell, the inclined ladder, including its handrails, the free-fall lifeboat davit and platform, and the guard rails around it were all found in good condition and free of structural defects.

BARU's Crew

42. On 20 July 2021, BARU had a complement of 25 crewmembers, nine more than what was required by the Minimum Safe Manning Certificate issued by the Administrator. All seafarers held the appropriate Republic of the Marshall Islands-issued seafarer documentation for their positions on board the ship.

43. The experience of the involved crewmembers is in the table below.

RANK	TIME ON BOARD BARU	TIME IN RANK	TIME WITH COMPANY	TOTAL TIME AT SEA
Master	3.5 months	3 years, 0.3 months	5 years, 2 months	10 years, 3.5 months
C/O	2.6 months	2 years, 8.7 months	8.7 months	11 years, 5.9 months
Pumpman	2.6 months	2 years, 2.6 months	1 year, 5.7 months	7 years, 1.8 months
Bosun	2 days	3 years, 9.6 months	13 years, 0.3 months	13 years, 0.3 months
ASD	2 days	9.8 months	2 years, 5 months	2 years, 5 months
OS	2 days	18.2 months[10]	9.8 months	2 years, 6.6 months
Deck Cadet	3.5 months	10.4 months	10.4 months	10.4 months

44. The Deck Cadet had previously completed a 6.5 month contract on board another Company-managed ship prior to signing on board BARU in April 2021. STCW Convention, regulation II/1 requires a minimum of 12 months of seagoing service as part of an approved training program for certification as an OICNW.[11] It was reported that he was familiar with the Company's safe work procedures and that he understood the purpose of safety barriers.

10 This includes 8.4 months as an ASD before he started working for the Company.

11 The training program must meet the requirements of the STCW Code, section A-II/1.

45. The Deck Cadet was assigned to the 0800–1200 / 2000–2400 watch with the senior 3/O.[12] During the early afternoons, he would generally perform jobs that were assigned to him by the Master or C/O. It was reported that he would occasionally assist other crewmembers with their assigned jobs.

46. Each of the involved seafarers had completed the Company's required familiarization training within two days of signing on board BARU. This training included an overview of the importance of adhering to safe work practices at all times.

47. Training addressing the Company's requirements for working permits and procedures for working aloft was conducted on board BARU on 15 May 2021. A review of these requirements and procedures was included as part of an enclosed space entry drill that was conducted on board the ship on 10 July 2021. The Master, C/O, Pumpman, Bosun, and the Deck Cadet all participated in the training that was held on 15 May 2021 and the drill that was conducted on 10 July 2021.

48. There is no indication that any crewmembers involved with this incident had failed to receive the required amount of rest mandated by the STCW Code, Section A-VIII/1, paragraphs 2 and 3 and MLC, 2006, Regulation 2.3.

SMS

49. 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 had also issued a Safe Work Handbook, which provided practical guidance for implementing the procedures in the SMS. The Company's SMS also included procedures for conducting initial and ongoing safety familiarization training.

50. The Company's general safe work procedures require that a risk assessment be completed for any routine job that involves significant hazards and all non-routine jobs. The Company maintains a library of risk assessments for different shipboard jobs. This library includes a risk assessment for working aloft. The Company's procedures also require that the risk assessment be signed by each crewmember assigned to complete the job before they start working.

51. This generic risk assessment for working aloft is the one that the C/O and Bosun reviewed while planning the work to be undertaken on the free-fall lifeboat davit platform. This was then signed by each of the crewmembers who were involved with this job.

52. The Company's general safe work procedures also required that a permit be approved by the ship's Master for jobs that involve increased or high risk, which included working aloft. Work permits are required to be reviewed and signed by the Safety Coordinator and the Person in Charge before being approved by the Master.

53. Based on the Company's SMS, the Person in Charge of a task can be any member of the Shipboard Management Team.[13] The Person in Charge is responsible for ensuring that:

    (a) the task is well planned and that it is conducted safely and efficiently;

12 There were two 3/Os on board BARU.

13 The Shipboard Management Team consists of the Master, C/O, C/E, and 2/E.

(b) the crewmembers assigned to conduct the work were aware of the potential hazards, including how they might be injured, and how to prevent injuries;

(c) an onsite review is conducted of the location where the planned work will be completed;

(d) the precautions listed on the work permit are followed; and

(e) the crewmembers assigned to complete a task are competent to do so.[14]

54. The designated Safety Coordinator, who cannot be the Person in Charge, can be any competent officer or crewmember. The Safety Coordinator is required by the Company's SMS to:

(a) monitor the overall safety through the entire task;

(b) identify and prevent unsafe acts;

(c) sign and ensure compliance with the work permit; and

(d) stop and re-evaluate the work being conducted if:

(i) there are any changes in the conditions noted on the work permit;

(ii) there is an unplanned, unexpected, or unsafe event or emergency; and

(iii) any person has concerns regarding safety.

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

55. The Company's SMS requires that a Safety Standby Person be designated for hot work, work aloft, work on electrical systems, and enclosed space entry. The Safety Standby Person is required by the Company's SMS to:

(a) monitor both the work being performed and the surrounding area for both internal and external hazards;

(b) have a clear communication with the crewmembers performing the work and the OOW; and

(c) raise the alarm if required.

The designated Safety Standby Person should not be assigned any other duties or tasks. Only experienced seafarers who can identify circumstances when intervention from the Person in Charge is required is supposed to be designated as a Safety Standby Person.

56. The Company's general safe work procedures include a statement indicating that every crewmember has the right and responsibility to stop work if it cannot continue without risk to life or health. The crewmember who stops the job is supposed to inform the Master, who will determine when the work can be restarted. Neither the Company's SMS nor the Safe Work Handbook address how this right and responsibility is supposed to be exercised.

57. The Company's SMS defines work aloft as any work that is performed at a location where there is a risk of falling. A work aloft permit is required for any work that is 2 m or more above the deck. The Company's SMS requires that when working aloft, crewmembers wear a safety harness, with two safety lines, that is connected to a fall arrester.[15]

14 The Person in Charge is also responsible for ensuring atmospheric testing is conducted when required.

15 The working aloft procedures in the Company's SMS also addressed the use of fixed and portable means of access to reach the location where the work will be performed, use of equipment such as portable ladders and scaffolding, work on or near the ship's whistle or funnel, and PPE requirements for working over the ship's side.

Crewmembers with less than 12 months experience at sea are not supposed to be assigned tasks that require working aloft unless it is required as part of their training, and they are accompanied or supervised by a competent person.

58. The Company's Safe Work Handbook includes practical guidance for complying with the requirements in the SMS for working aloft. This guidance addresses:
    (a) when, based on the height of the planned work or if there is a risk of falling over the side, work permits, risk assessments, and Toolbox Talks are required;
    (b) PPE requirements;
    (c) use of safety harnesses and fall arrestors;
    (d) restricting access to the area under where work aloft is being conducted;
    (e) preventing tools from falling; and
    (f) lockout radars and other antennas when working near the mast on which they are located.

59. The Company's SMS included a matrix of safety familiarization training that was required to be completed every two months. The training topics listed included the Company's procedures for issuing work permits, including the roles and responsibilities of crewmembers assigned specific duties (e.g., Person in Charge, Safety Coordinator, and Safety Standby Person), and procedures for working aloft.

PART 3: ANALYSIS

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

The Deck Cadet's Fall

Based on the information available to the Administrator, it appears that the Deck Cadet fell while approaching the ASD and OS to get their slop chest orders while they were working on the platform for the free-fall lifeboat davit. None of the crewmembers on board BARU reported seeing him fall. The ASD and OS, who were the first crewmembers to become aware that the Deck Cadet had fallen, reported seeing him lying on the Poop Deck directly below the location where the platform grating had been removed.

To reach the free-fall lifeboat davit platform, the Deck Cadet would have had to go past the safety barrier that had been established by both the rope that had been tied to the upper tiers of the handrail and the air hose that was led over the lower tier of the handrail about two to three steps below the top of the ladder *(see Figure 3)*. The C/O stated that he saw the rope barrier tied across the inclined ladder when he checked on the work at 1040. The ASD and OS reported finding one end of the rope that had been used to establish the safety barrier untied when they went down the inclined ladder immediately after the Deck Cadet fell at about 1110.

How or why the Deck Cadet fell cannot be determined with certainty since no one witnessed the fall. Considering that he was lying directly below the location where the section of grating had been removed, it is likely he fell through the open space where the grating had been removed *(see Figures 2 and 4)*. It is possible he slipped while attempting to step

over or around the open space, or that he had not noticed that the section of grating was missing as he stepped from the ladder onto the platform. Another possibility is that he tripped and fell forward.

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

Company's Safe Work Procedures

The Company had procedures in place for ensuring the safety of crewmembers while working aloft. These procedures also included provisions for ensuring the safety of other crewmembers and other persons who might be on board a Company-managed ship while work aloft was being conducted. The provisions that were especially intended to ensure the safety of crewmembers and other persons not engaged in working aloft include:

(a) blocking or roping off access to the location where the work was being performed and the area under it and posting warning signs; and

(b) designating a Safety Coordinator and a Safety Standby Person.

The available information indicates that the area under the free-fall lifeboat davit platform was roped off before the ASD and OS started work and that they rigged a barrier to block access to the inclined ladder before they removed a section of the platform grating. Although warning signs were not posted as required by the Company's SMS, the ropes created both a physical and visual safety barrier even without signs being posted.

Both a Safety Coordinator and a Safety Standby Person were designated for the planned work on the free-fall lifeboat davit platform. The designated Safety Coordinator was the 3/O, who at the time the Deck Cadet fell was also the OOW. Based on the Company's SMS, the Safety Coordinator was responsible for monitoring the work and had the authority to stop it if there was an unsafe event (e.g., a crewmember not assigned to the job passing a safety barrier). However, the Safety Coordinator was not prohibited from also being assigned other duties. The implication is that although the 3/O was expected to check on the work being performed on the free-fall lifeboat davit platform, he could not be expected to monitor it continuously.

The designated Safety Standby Person was the Pumpman. The Pumpman was getting additional rope to better secure the area and was not monitoring the work when the Deck Cadet fell. He had not directed the ASD and OS to stop working and had not informed either the C/O or the 3/O before he left to get the additional rope.

Per the Company's SMS, the Safety Standby Person was required to monitor both the work and the surrounding area for any hazards and raise the alarm if required. Unlike the Safety Coordinator, the Safety Standby Person was prohibited from being assigned any other duties or tasks while the planned work was being conducted. The implication is that the Pumpman was expected to continuously monitor the work and surrounding area. Although not included in the list of the Safety Standby Person's responsibilities, based on the Company's general safe work procedures, all crewmembers regardless of their position on board, had the right and responsibility to stop the job if he or she observed an unsafe condition (e.g., a crewmember not assigned to the job passing a safety barrier).

The duties assigned to the Safety Standby Person are of utmost importance for helping to ensure the safety of both the crewmembers assigned to work aloft or to perform certain other tasks (e.g., enclosed space entry) and other crewmembers and persons in the vicinity of where such work was being conducted. The Company's SMS requires that the Safety

Coordinator sign the work permit, however, it did not clearly indicate whether the Safety Standby Person was required sign the work permit.[16]

Although the Company's general safe work procedures provide all crewmembers the right and responsibility to stop a job if an unsafe condition is observed, neither the SMS nor Safe Work Handbook address how this right and responsibility is supposed to be exercised. Based on the circumstances of the Deck Cadet's fall, it is not likely that the absence of such procedures contributed to this very serious marine casualty.

Monitoring the Work Site and Surrounding Area

As discussed above, the 3/O was the designated Safety Coordinator for the work on the free-fall lifeboat platform and the Pumpman was the designated Safety Standby Person. Both were responsible for monitoring the work site and the surrounding area. As permitted by the Company's SMS, the 3/O was permitted to be assigned other duties and was inside the Bridge performing watch related tasks when the Deck Cadet fell.

The Pumpman, who was prohibited by the Company's SMS from having any other assigned duties, had gone out on deck to monitor the work, but did not direct the ASD and OS to stop working when he went to get additional rope to better secure the area, nor inform either the C/O or the 3/O that he had gone to get additional rope to better secure the area. He was not back out on deck by the time that the Deck Cadet fell.

The Pumpman would have needed to have clear sight of both the inclined ladder leading from B Deck to the free-fall lifeboat davit platform and the Poop Deck directly beneath the platform to effectively monitor both the work and the surrounding area for any hazards. The Pumpman would have had a good view of both where the ASD and OS were working on the platform and the area beneath it if he had been on either the B Deck or the Poop Deck. If he had been on the Poop Deck, the height of B Deck above the Poop Deck and the location of the inclined ladder *(see Figure 2)*, might have made it difficult for him to see someone either approaching or starting up the ladder in time to stop them before they reached the safety barrier.

If the Pumpman had been on the Poop Deck, the noise of the pneumatic tools being used by the ASD and OS would likely have made it difficult for him to have been heard by a person approaching or starting to go up the inclined ladder between the B Deck and free-fall lifeboat davit platform. Similarly, if the Pumpman had been on the B Deck, the noise of these tools would have made it difficult for him to have been heard by someone on the Poop Deck who might have approached the safety barrier that had been established to prevent access to the area below where the ASD and the OS were working.

The 3/O would have had a clear view of B Deck and the inclined ladder from the starboard bridge wing. However, the noise of the pneumatic tools would likely have made it difficult for him to be heard by someone approaching the ladder.

The implication is that a single person may not have been able to effectively monitor both the access to the inclined ladder leading from B Deck to the free-fall lifeboat davit platform and the area of the Poop Deck directly beneath

16 It is noted that both the 3/O and Pumpman had signed the work permit for the work aloft on the free-fall lifeboat davit in the space provided for the Safety Coordinator.

the platform for potential hazards (e.g., a crewmember or other person passing a safety barrier) as required by the Company's SMS.

Safety Barrier

As discussed above, the Deck Cadet would have had to cross a safety barrier (e.g., the rope barrier) to reach the free-fall lifeboat davit platform. By 20 July 2021, the Deck Cadet was less than 2 months from fulfilling the 12 months required by the STCW Convention, regulation A-II/1 for certification as an OICNW and was reported to be familiar with the Company's safe work procedures and the purpose of safety barriers. This was based on both his regular participation in training that was conducted on board and by assisting with different shipboard tasks during the 10.5 months he had been on board Company-managed ships. In addition, earlier that morning, the C/O had explained to him the work that was planned to be done on the free-fall lifeboat davit platform and the requirements of the work permit, which included the required PPE and blocking/roping off the fall zone to protect against inadvertent entry.

As previously stated, the C/O had reported seeing both ends of the rope that had been tied to the upper rails of the inclined ladder to establish a safety barrier at 1040. The ASD and OS reported finding one end of this rope untied when they went down the ladder to assist the Deck Cadet. This suggests that the Deck Cadet may have untied the rope to reach the free-fall lifeboat davit platform and that he knowingly crossed over the physical safety barrier.

It cannot be determined, based on the information that is available, if the Deck Cadet had attempted to get the attention of the ASD and OS before he crossed past the physical safety barrier.

Although the Deck Cadet was still in a training program, he was reported to have had experience on board Company-managed ships and familiarity with the Company's safe work procedures. It is not known why he crossed over the safety barrier; however, it is an indication of the Deck Cadet's apparent inadequate recognition of the hazards associated with the work being conducted by the ASD and OS.

Supervision

The Master had signed the permit authorizing the ASD and OS to work aloft before he tasked the Deck Cadet with obtaining the crewmember's slop chest orders. Taking into consideration his experience on board Company-managed ships and as a seafarer, he would be expected to have been aware that working aloft involved significant safety hazards. He should also have been aware that physical safety barriers were supposed to have been established to prevent crewmembers and other persons who might have been on board the ship from entering the area where the work was being performed. Although the Master stated that obtaining the slop chest orders was not an urgent task, there is no indication he had told the Deck Cadet that it was not an urgent task.

The Deck Cadet had been on board Company-managed ships for 10.5 months. Although he had sufficient experience to recognize the purpose of a safety barrier, he may not have had enough experience to recognize that getting the crewmembers' slop chest orders was not a high priority task. He might not have gained sufficient confidence to tell the Master he could not complete this task until after the ASD and OS were off the free-fall lifeboat davit platform.

Service on board a ship as either a Deck or Engine Cadet is an integral part of a seafarer's professional training. It is during this time that an aspiring officer is provided an opportunity to develop practical skills and to put theoretical knowledge into practice under the supervision of a ship's officer or rating. Although the reason why the Deck Cadet crossed over the safety barrier cannot be determined with certainty, the circumstances of this very serious marine casualty reinforces the importance of supervision as part of a cadet's training.

Design of Guard Rails and Handrails

The inclined ladder, including its handrails, and the free-fall lifeboat davit and platform and the guard rails around it were all found in good condition and free of structural defects when examined after the Deck Cadet fell. Further, the dimensions of the handrails and guard rails were consistent with those in IACS Recommendation No. 132. This is an indication that the design and construction of the inclined ladder or the guard rails around the free-fall lifeboat davit platform likely did not contribute to the Deck Cadet's fall.

Evacuation of the Deck Cadet

BARU's crewmembers reported they had difficulty transporting the Deck Cadet by stretcher from the Poop Deck to the helicopter, which had landed on the ship's designated helipad (hatch cover for Cargo Hold No. 3). They were also unable to lift the stretcher with the Deck Cadet on it from the Main Deck up to the hatch cover so the stretcher could be placed directly on board the helicopter. These factors required the helicopter to take off and hover over the ship while the stretcher was hoisted on board. The difficulty the crewmembers had transporting the Deck Cadet on the stretcher and the need for the helicopter to hover over the ship while the stretcher was hoisted may have delayed the Deck Cadet's evacuation, however, any delay was brief.

PART 4: CONCLUSIONS

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

1. Causal factors that contributed to this very serious marine casualty include:
   (a) the Deck Cadet's apparent inadequate recognition of the potential safety hazards associated with the work being performed by the ASD and OS by crossing over the safety barrier that was in place across the inclined ladder leading to the free-fall lifeboat davit platform;
   (b) inadequate implementation of the Company's SMS due to:
      (i) the Safety Standby Person leaving the area to get additional rope and not monitoring the work or surrounding area when the Deck Cadet fell without directing the ASD and OS to stop working and informing either the C/O or the 3/O before leaving the area; and
      (ii) the absence of warning signs on the Poop Deck and the inclined ladder leading from the B Deck to the free-fall lifeboat davit platform to reinforce the physical safety barrier.

2. Additional causal factors that may have contributed to this very serious marine casualty include:
   (a) ineffective supervision of the Deck Cadet, who may not have recognized that obtaining the crewmembers' slop chest orders was not a high priority task.

3. Additional issues that were identified but that did not contribute to this very serious marine casualty include:
   (a) the difficulty for one person to effectively monitor both the access to the inclined ladder leading from B Deck to the free-fall lifeboat davit platform and the Poop Deck directly beneath the platform for potential hazards simultaneously and to warn crewmembers or other persons who might approach a safety barrier;
   (b) the Company's SMS did not clearly indicate that the Safety Standby Person should sign the work permit; and
   (c) the crewmembers' difficulty lifting a stretcher with a person on it from the Main Deck up to the top of hatch cover for Cargo Hold No. 3, which was the ship's designated helipad.

PART 5: PREVENTIVE ACTIONS

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

1. A medevac planning campaign was conducted on board all ships in the Company's fleet to identify the most efficient evacuation routes. These routes were marked on each ship's General Arrangement drawing and were posted in the Ship's Hospitals.

2. A stop work policy was developed and added to the Company's SMS.

3. An assessment was conducted of the lock out equipment on board each ship in the Company's fleet to ensure that ships were provided with sufficient quantities and types of equipment. This assessment took into consideration the particular needs of the different types of ships managed by the Company.

4. A standard lock out (e.g., warning) placard for use when setting up safety barriers was developed and added to the Company's standard forms. The placard includes space to state why an area is blocked off (e.g., locked out) to better warn persons attempting to pass beyond the safety barrier.

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) review and, as necessary, revise the content of onboard safe work training on all ships in the Company's fleet taking into account the lessons learned from this very serious marine casualty;
   (b) review and, as necessary, revise the scope of on-signing briefings for senior officers to address the Company's expectations regarding:

(i) the supervision of cadets who might be on board the ship to which the officer is being assigned; and

(ii) compliance with the Company's safe work procedures;

(c) revise the safe work procedures in their SMS to require:

(i) that when planning a task for which a Safety Standby Person is required, that the assessment of the site where the work will be performed includes a determination if additional Safety Standby Persons are needed to effectively monitor the entire work area for hazards and to ensure other crewmembers or other persons do not enter the area while the planned work is being conducted; and

(ii) that all designated Safety Standby Persons acknowledge their assigned duties by signing the relevant work permit.

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