

The Bahamas
Maritime Authority

Marine Safety Investigation Report

into a fall resulting in one fatality onboard
Curacao Pearl
on 10 June 2022



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1. Summary

What happened

On the morning of 10 June 2022, the Bahamas registered general cargo vessel, Curacao Pearl, was at anchor off Freetown, Sierra Leone. In preparation for the vessel's next cargo, the crew were conducting hose tests of the hatch covers – with two crew on deck and the chief officer and bosun in the holds below.

Having completed tests on five of the seven hatches, they stopped for a coffee break. At the end of the break, with the chief officer busy with another task, the bosun decided to continue the testing, and proceeded to hold 6 alone. The test was completed and the team moved to hold 7.

On completion of the last test, and having heard no response from the bosun, the deck team proceeded to the hold's entrance where they could see the bosun lying motionless on the tanktop. They then entered the hold and raised the alarm.

The vessel's first aid team mobilised to provide care, but the bosun was declared dead by the shore medical team when they arrived onboard the vessel approximately three hours after the fall.

Why it happened

Neither the ladder or its platform had any fall protection and the bosun was not wearing a harness or other fall protection device. Aside from the hazards posed by ladder design, the hold was dark and, as the victim was working alone, he needed both hands to operate the torch and radio, leaving him particularly vulnerable to any slip or trip.

The risk of falling whilst completing the task was not obvious to the bosun or chief officer at the time and there were no risk control measures identified by the Company (or anyone else with the power to affect change) to protect seafarers entering and working within the cargo holds.

What can we learn

There are numerous instances of seafarers falling from height to their death but risk perception, within organisations and individuals, remains low.

This casualty shares many of the common factors found in fatal falls within the maritime industry; the industry may benefit from a switch of focus from controls on "working at height" to identification and management of risk of falls from height.

2. Factual Information

Curacao Pearl

Vessel Type	General cargo vessel	Flag	Bahamas		
Owner	Curacao Pearl Shipping Company Ltd.	Manager	SMT Shipping Poland sp. z o.o.		
Classification Society	Det Norske Veritas (DNV)	Gross/Net Tonnage	27,818 / 12,649		
Built	Ulsan, South Korea. 1984	Propulsion	B&W 2 stroke, single acting, in-line engine driving a fixed pitch propeller		
IMO No.	Callsign	Length overall	Breadth	Depth	
8308147	C6JG6	179.8m	29m	16.9m	
Last BMA Inspection			Last PSC Inspection		
Charleston, USA, 07 September 2021. Two deficiencies (not related to casualty).			Barranquilla, Colombia, 9 March 2022. Four deficiencies (not related to casualty).		



Curacao Pearl (source: SMT Shipping Poland)

Crew Details

Rank/Role on board	Master	Chief officer	Bosun (victim)	AB1	AB2
Qualification	Master II/2	Chief Mate II/2	Able Seafarer Deck	Able Seafarer Deck	Able Seafarer Deck
Certification Authority	Poland	Russian Federation	Poland	Philippines	Poland
Nationality	Polish	Ukrainian	Polish	Filipino	Polish
Age	56	38	52	38	59
Time in rank	11 years	3 years	3 years	15 years	15 years
Time onboard	3 months	1½ months	4 months	1½ months	4½ months

Environmental Conditions

Wind Direction	Wind Force	Wave Height	Swell Height	Precipitation / Sky	Light Conditions
NW	3 (Beaufort)	1.5m	N/A	Clear skies	Artificial and limited

Voyage Details

At the time of the casualty, Curacao Pearl was anchored off Freetown, Sierra Leone, in ballast.

Narrative

All times used in this report are UTC.

On 10 June 2022, Curacao Pearl was at anchor off Freetown, Sierra Leone in ballast and awaiting clearance to sail to Trinidad & Tobago, to load a cargo of pellets of direct reduced iron. Direct reduced iron is particularly sensitive to water damage so, as part of preparations to load, the vessel was tasked to conduct hose tests of the hatch covers.

At around 07:30 the bosun went to the bridge to discuss the day's work with the chief officer: a team of two would be needed to operate the hose on deck whilst the bosun and chief officer would monitor for leaks below. The rest of the deck crew were to continue maintenance and cleaning tasks from the previous day.

After handing over the watch to the third officer at 08:00, the chief officer changed into deck working clothes and met the crew on the main deck for their morning safety meeting where safety precautions for completing the day's work were briefly discussed. Whilst two able seafarers (AB1 and AB2) prepared the hose, the chief officer fetched the ship's gas meter and a high-power torch then, together with the bosun, went to cargo hold 1 via the starboard underdeck passage.

After rigging cargo lights, entering cargo hold 1 via its vertical ladder and positioning themselves on the resting platform, the bosun confirmed (by handheld radio) with the team on deck that hose testing could start. Testing started at the forward starboard corner and continued anti-clockwise with the deck team confirming their position as they reached each corner and the bosun acknowledging each call.

On completion of the test at hold 1, equipment was moved to facilitate testing on hold 2 and the process was repeated, working aft along the vessel. At around 09:50, part way through testing of hold 6, the deck team informed the bosun they needed to stop and change hydrant so work was halted and the team went for their morning coffee break.

Having returned the torch and gas meter to the ship's office, the chief officer went to the bridge to discuss Company feedback of the next port's preliminary loading plan with the master over coffee. With a new plan in mind, they went to the ship's office to adjust the plan on the cargo / stability computer.

At around 10:25 the bosun passed the office, saw the chief officer and master working together and proceeded on deck, indicating to AB1 & AB2 that work should restart. He then went to hold 6 via the starboard under deck tunnel and, when in position, radioed the deck team to tell them he was ready. Hose testing continued as before and on completion they transferred to hold 7.

Once the hose was in position, the deck team radioed to the bosun that they were ready to start but heard no response. They then started the hose test, relaying their position at each corner without a response. Not hearing a response on completion of the test, they decided to go to the hold entrance.

From the top of the vertical ladder the hold was dimly lit but AB2 could see the bosun lying on the tanktop – he climbed down and found the bosun unresponsive and bleeding from a head injury. AB1, who had also entered the hold, then radioed the chief officer who raised the alarm. On arrival at the tanktop the chief officer started CPR, assisted by the third officer when he arrived, but no vital signs could be found.

After the hatches were opened, the bosun was placed in a stretcher and recovered to deck using a gantry crane. The crew continued CPR until he was declared dead by medics when they arrived from shore at 14:28.

Safety management system

The vessel's safety management system included a safety manual and a series of 19 risk assessments. The safety manual included sections on *preparations for carrying cargo* and *cargo operations* – neither section specified any controls or procedures for hose testing of hatches or entry to the holds.

Risk assessments were available for generic tasks such work aloft or entry into enclosed spaces but application was limited and there was no risk assessment for entry in to the cargo holds or for lone working. Risk of falls from height was identified in one risk assessment – work on gantry cranes.

Legislation and guidance

The Bahamas Maritime Authority's Marine Notice 36: Management of Occupational Health & Safety describes the general duties of employers and employees in relation to health and safety, in line with Merchant Shipping (Health and Safety – General Duties) Regulations 1984.

Marine Notice 36 does not provide specific guidance on working safely onboard ships but states that the shipowner shall comply fully with the International Labour Organization's Code of Practice "Accident prevention on board ship at sea and in port" or other recognised Codes of Practice including the United Kingdom's Maritime & Coastguard Agency "Code of Safe Working Practices for Merchant Seafarers".

Previous similar casualties

The SMT fleet has suffered two significant fall from height casualties – a fatal fall from an unprotected opening inside a crane in 2017 (the report of the investigation, conducted by Ghana, is awaiting publication) and, in 2019, a failure of a flooring sheet in a gantry crane resulting in serious injuries¹.

Excluding loss of persons overboard, the Bahamas Maritime Authority has recorded twelve instances of work-related fatalities as a result of a fall in the last ten years. In the same period, there were over 230 reported falls that resulted in injury, including 14 that occurred in almost identical circumstances to this casualty and resulted in serious injuries.

Across the global merchant fleet, there have been numerous seafarers killed or seriously injured in similar circumstances. These are just three examples:

Star Planet, 2021 ([BMA](#))

Chief officer sustained fatal injuries whilst climbing a vertical ladder in a cargo hold during a hold inspection. The safety manual identified the holds' vertical ladders as an "emergency exit only" and risk assessments required the use of a climbing harness when using them to climb higher than two metres. However, the policy was not effectively communicated or enforced.

Seoul Express, 2021 ([BSU](#))

AB sustained fatal injuries after falling from a vertical ladder in a container vessel's cargo hold whilst undertaking routine daily inspections of cargo.

¹ The victim survived the fall but died five months later due to complications during air transport.

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Tropical Star, 2019 ([BMA](#))

Bosun sustained fatal injuries after falling whilst descending a crane's external ladder. The ladder was identified as for use as an emergency exit only but provided the fastest access to the crane cab, so was regularly used.

Common factors in these cases include failure to recognise exposure to the hazard of falling; a lack of safe systems of work or, where those systems exist, a failure to ensure they are followed; inadequate provision of appropriate safety equipment.



3. Analysis

The purpose of the analysis is to determine the contributory causes and circumstances of the casualty as a basis for making recommendations to prevent similar casualties occurring in the future.

The bosun died as a result of internal injuries consistent with a fall from height. The cause of the fall could not be conclusively determined and a precipitating medical event could not be ruled out. Nevertheless, the circumstances of the fall, the shipboard approach to mitigating risks of falling from height and the crew’s response to the casualty all highlight lessons to be learned.

Mechanism of fall

Post casualty, the torch was found on the resting platform, the bosun’s radio was found at the bottom of the ladder. The bosun’s body was found approximately 3.5m from the ladder, lying athwartships - indicating that the fall was most likely from the platform rather than from the ladder. The bosun was not carrying a gas meter when he entered the hold.

The cargo holds were accessed via a booby hatch located in the under-deck tunnels. A first ladder lead approximately 2.5m down to a resting platform. Access to the tanktop was then down a further 8m via a single ladder.



Access to hold 7, looking from forward

There was no fall protection built in to any part of the ladder structure but, despite their experience, neither the chief officer nor the bosun recognised the hazard of falling whilst they were accessing the hold or stood on the resting platform during the hose tests. Interviews with crew highlighted that the perceived risk of falling when going down in to a space was far less than associated with climbing to access an equivalent work site above deck.

Other than a single light at the booby hatch, the holds were not fitted with any means of lighting – insufficient lighting was recognised as a risk by the chief officer and he included the need for headtorches in his pre-task briefing. However, to facilitate the hose testing, progress of the hose was followed with a torch. When working alone, the need to hold a torch and operate a radio meant that the bosun did not have a free hand to secure his position or brace himself against any unexpected movement.



Access to hold 7, looking down from cross-deck tunnel and ladder platform, hatches closed

Rescue efforts

The crew members that discovered the bosun entered the hold after seeing him (in poor light conditions) lying face down on the tanktop. The first responder entered the hold exactly as the bosun had done and descended to the tanktop, followed closely by another crew member who radioed for help from the tanktop.

Whilst there is nothing to indicate that the atmosphere was dangerous, at no point was the atmosphere tested to confirm it was safe. The assumption that the hold was safe to enter may have been informed by the use of the vessel over the previous weeks (hatches has been open frequently and hold 7 had not carried cargo for several months) and the knowledge that the other holds had been safe. Nevertheless, the enclosed space rescue training and education the crew had received was not sufficient to highlight a potential risk posed by the atmosphere before placing themselves in the way of potential harm.

No-one entering the cargo hold considered that they would be exposed to the same risk of falling that resulted in the injuries they were attending.

Hazard identification

The ISM Code requires that the safety management objectives of the Company should, amongst other things, assess the risks associated with all identified hazards in respect of its ships, personnel and the environment, and establish appropriate safeguards.

The risk assessments forming part of the safety management system were last reviewed on 30 July 2021², with all 19 risk assessments reviewed and signed by the Chief Officer and / or the Chief Engineer on the same day. Comparisons with risk assessments completed on other vessel in the fleet indicate that the content of risk assessments could be provided by shipboard personnel but the reviewing and updates were infrequent and appear to be a result of triggering events. Other than working aloft, the risk of falling was only identified in one instance – working on gantry cranes, created in the wake of the fall from height casualty in 2019.

No.	1 Hazard			2 3 4 Consequence to: People The maritime environment Hull, machinery and equipment			5 Existing Control Measures			6 7 8 Likelihood to: People The maritime environment Hull, machinery and equipment		
	1	FALLING DOWN FROM GANTRY CRANE			SEVERE	N/A	N/A	USE PERSONAL PROTECTIVE EQUIPMENT, CHECK WORKING ENVIRONMENT BEFORE START OF WORK,ISSUING PERMITS, CONTINUOUS MAINTENANCE			VERY UNLIKELY	N/A
2	SLIPPING ON ACCES LADDER/PLATFORM			MINOR	N/A	N/A	CHECK GANTRY ACCESS LADDER/PLATFORM BEFORE PROCEEDING,REPORT ANY SIGNS OF RUST/SPILLS,CONTINUOUS MAINTENANCE OF MEANS OF ACCES			UNLIKELY	N/A	N/A
3	FALLING DOWN FROM CABLE INSPECTION PLATFORM			SEVERE	N/A	N/A	USE P.P.E. CHECK CONDITION OF METAL AND WOODEN PLATFORMS BEFORE ENTERING,CONTINUOUS MAINTENANCE,ISSUING PERMITS			VERY UNLIKELY	N/A	N/A

No.	9 10 11 Risk to: People The maritime environment Hull, machinery and equipment			12 Causes of Very High, High and Medium Risks (Refer to points 8 and 9 of procedure SM B2)			13 Additional Control Measures (Refer to points 8 and 9 of proceure SM B2)			14 15 16 Re-assessed risk to: People The maritime environment Hull, machinery and equipment		
	1	VERY HIGH RISK	N/A	N/A	FALLING DOWN CAN CAUSE SEVERE INJURIES AND LOSS OF LIFE			WORKING ALOFT DRILLS,INCREASING SAFETY AWARENESS IN CREWMEMBERS,REPORTING ANY DEFICIENCIES,ADDITIONAL SAFETY SIGNS POSTED,SAFE AREAS MARKED			LOW RISK	N/A
2	MEDIUM RISK	N/A	N/A	SLIPPING CAN CAUSE INJURIES			SAFETY MEETINGS,INCREASING SAFETY AWARENESS IN CREWMEMBERS,,REPORTING ANY DEFICIENCIES			LOW RISK	N/A	N/A
3	VERY HIGH RISK	N/A	N/A	FALLING DOWN CAN CAUSE SEVERE INJURIES AND LOSS OF LIFE			WORKING ALOFT DRILLS,INCREASING SAFETY AWARENESS IN CREWMEMBERS,REPORTING ANY DEFICIENCIES,ADDITIONAL SAFETY SIGNS POSTED,SAFE AREAS MARKED			LOW RISK	N/A	N/A

Extract from Risk Assessment 3: [work] on gantry cranes

Despite this risk assessment identifying the need for additional control measures to avoid repetition of this fall, the control measures were limited in scope to this particular environment. They were also, in the main, pre-existing. No further work was done by the Company or shipboard safety officers to identify falling hazards beyond work being completed above the height of deck.

As standard practice, the chief officer took the ship’s gas meter when entering the cargo holds but the bosun did not consider it necessary to take the same precaution. The cargo holds were not identified as enclosed or dangerous spaces and there was no control on entry or any recorded identification of hazards associated with entry or work within cargo holds. The chief officer’s morning meeting included a “tool box meeting / daily risk assessment” on the hose testing but precautions for work in the hold were limited to the use of headtorches and the need to “be careful”. The whole morning meeting took approximately five minutes.

None of the risk assessments identified any hazards that resulted from lone working and neither the bosun nor the deck team thought that the bosun going into the hold alone was intrinsically risky.

² Risk assessments required by the Ship Manual are also subject to review ashore as part of the Company’s annual Management Review.

Review of risk assessments was not included in the scope of the Company's internal audit of the Curacao Pearl's safety management system (29 April 2022) but was included in the Master's review of the SMS (30 June 2021) which stated that "risk assessments were reviewed and found satisfactory".

The last external audit of the SMS (by DNV, 28 June 2021) did not identify any shortcomings with the ship's risk assessments, review or internal auditing processes.

Falls from height – an industry-wide problem

As well as the significant injuries seen from falls from height in the SMT fleet and in Bahamian ships, falls from height are common in the global merchant fleet.

The 2022 report of *Lessons Learned and Safety Issues Identified from the Analysis of Marine Safety Investigation Reports* submitted to the IMO's sub-committee on Implementation of IMO Instruments included detail on Correspondence Group's analysis of occupational accidents - falls from height. The analysis included review of seventy marine safety investigation reports involving falls from height, occurring between 2016-2021.

Sixty-nine of these casualties resulted in a loss of life while one caused serious injuries. More than 90% of the reports were related to falls occurring onboard bulk carriers, container ships, tankers, and general cargo ships. The analysis identified a number of common safety issues:

- the procedures in ship managers' safety management systems for working from height or over the side are not always effectively implemented and are not always achieving their intended purpose
- tasks that involve the risk of falling from height are not always considered as "working from/at height" so that no control measures to avoid falls or minimize their consequences are implemented
- Personal protective equipment intended to reduce risk of falling from height or over the side, is not being used, or may not be the most appropriate for the planned work
- onboard safety training does not appear to be achieving its intended purpose
- onboard management supervision and control of seafarers performing shipboard tasks that require working from height or over the side is ineffective

Amongst their recommendations, the Correspondence Group recommended that flag States be encouraged to give attention during external ISM audits to addressing the apparent:

- non-implementation of safety management system procedures for working from height and over the side, and pre-task hazard assessments
- ineffectiveness of pre-task risk assessments and safety meetings
- non-use of PPE
- ineffective supervision of seafarers working from height or over the side
- ineffectiveness of onboard training regarding the use of PPE for working from height and over the side



4. Conclusions

- The bosun was alone in the cargo hold when he fell approximately 8 metres to the tank top from an unprotected platform. At the time of the casualty the hatches were shut and the only light source was from his head torch and the portable torch he was carrying. He was not wearing a harness or any other fall protection device.
 - The risk assessments forming part of the safety management system did not include any assessment of risks for work in cargo holds, access/egress that includes risk of falling or any controls on lone working.
 - On discovery of the casualty, the crew entered the hold without consideration to the cause of the bosun's fall – potentially putting themselves in harm's way.
 - This casualty shares many of the common factors found in fatal falls within the maritime industry.
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5. Lessons to be learned

- There are numerous instances of seafarers falling from height to their death but risk perception remains low. There are numerous ways to cost-effectively control the risk of falls from height but these are often only employed when completing specific “work at height” tasks, above deck level, that require a permit to work.
- A consistent and exhaustive definition of working at height may lead to more effective hazard identification and mitigation measures but talking to seafarers about work in terms of likelihood and potential outcomes of falls from height may be a more successful strategy.
- Risk assessments dealing with routine and low-risk tasks should be conducted on each vessel by those involved in the work and be supplemented by task-specific risk assessments for high-risk jobs that are not routine, such as cargo hold preparation.
- An effective toolbox talk includes discussion of how the task will be completed and what could go wrong. Encouraging the seafarers doing the work to talk through the hazards and mitigation measures reinforces what precautions need to be taken to complete the job safely and makes sure hazards aren’t missed.

6. Actions taken

SMT Shipping Poland sp. z o.o. has:

- Redefined “working aloft” as being exposed to a fall of more than two meters and expanded their risk assessments and permit to work system accordingly.
 - Introduced controls and guidance and for working in cargo holds that includes restriction on lone working, minimum lighting and a three points of contact rule.
 - Conducted training sessions on working at height and first aid in the fleet and with senior officers prior to joining ship.
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7. Recommendations (draft)

SMT Shipping Poland sp. z o.o. is recommended to:

- Continue to review its risk assessment process to ensure that all risks of falling are identified, assessed and mitigated.
- Ensure adequate provision of fall protection equipment (and other equipment that would facilitate safe access and egress), along with training in its use.
- Work with crews to ensure fall hazards can be clearly identified and the potential outcomes of a fall are understood.
- Review the effectiveness of its emergency response procedures with specific regards to ensuring the safety of first responders.

The Bahamas Maritime Authority is recommended to:

- Continue to work with member States through the auspices of IMO sub-committee on Implementation of IMO Instruments (III) to address occupational accidents (falls from height), draw conclusions and make recommendations.
 - Consider, together with other interested States, proposing to the International Maritime Organization the introduction of construction standards to ensure safe access and egress to ship's cargo holds.
 - Review the effectiveness of its Recognised Organisation's external ISM audits to address apparent failures to mitigate risks associated with falls from height.
 - Consider conducting a concentrated inspection campaign to highlight and address the risks of falling on Bahamian ships.
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8. Glossary and Definitions

AB	Able-bodied seafarer
Athwartships	Direction in relationship to the construction of the vessel - perpendicular to the forward/aft line.
BMA	Bahamas Maritime Authority
Ballast	Additional weight added to the vessel to provide sufficient stability when no cargo is carried.
Booby hatch	Access hatch for vertical entry, on a raised frame above the deck
Company	Owner of the ship or any other organization or person such as the Manager, or the Bareboat Charterer, who has assumed the responsibility for operation of the ship from the Shipowner and who on assuming such responsibility has agreed to take over all the duties and responsibility imposed by the Code (ISM Code, section 1.1.2)
CPR	Cardiopulmonary resuscitation
DNV	Det Norske Veritas – Classification Society and Recognised Organisation
Hazard	A source of potential injury, harm or damage.
IMO	International Maritime Organization
ISM Code	International management Code for the safe operation of ships and for pollution prevention
m	Metre. Unit of measurement: 1 metre = 1000mm
Risk	Risk is a product of the <u>likelihood</u> that harm or damage may occur, considered against the potential <u>severity</u> of the harm or damage.
SMS	Safety Management System
Tanktop	Lowest level of a cargo hold – plating forming the topside of a void or ballast tank below.
