

Marine Safety Investigation Report

VERY SERIOUS MARINE CASUALTY | 17 June 2024

The Bahamas
Maritime Authority

Algoma Integrity

Mooring line casualty 21 October 2018

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What happened

On the morning of 21 October 2018, The Bahamas flagged self-unloading bulk carrier Algoma Integrity was running extended mooring lines whilst attempting to come alongside the Morton Salt terminal, Port Inagua, The Bahamas, when a mooring line fouled the propellor.

Whilst the bridge team and aft mooring party were focused on the recovery of the fouled line, a mooring line that was under extreme tension sprung free, severing the leg of an ordinary seafarer below the knee. Despite immediate medical assistance from the crew and medical staff ashore, the ordinary seafarer died a short while later.

Why it happened

The tension on the line was a result of a last-minute change to the mooring plan due to the fouled line aft, resulting in a single line on a warping drum trying to arrest the movement of the ship being influenced by a combination of wind, tidal and manoeuvring effects.

At the time of the casualty, the ordinary seafarer thought he had moved to a safe position but was most likely unaware he was standing in a bight of the coiled rope aft of the warping drum.

What we can learn

All personnel working in areas where mooring lines are under tension, should be aware of the associated risks and ensure they maintain a safe position, free from bights, away from the dangers of snap back and recoil when mooring lines come adrift of mooring arrangements on deck, often resulting in serious injury or fatality.

Alterations and last-minute changes to mooring plans need to be effectively communicated with all parties involved to bring about a shared mental model. Effective communication relies on the importance of recognising concerns raised by crew to bring about a full review of tasks and promote safety.

Narrative

All times in this report are local time (UTC -4)

In the early hours of 21 October 2018, Algoma Integrity, a self-unloading bulk carrier, arrived off Inagua Port, The Bahamas where it was scheduled to pick up a pilot before berthing at the Morton Salt Terminal.

At 04:50 the master contacted Inagua port pilots' office via VHF to confirm berthing arrangements and a location for the pilot to board but received no reply. A short while later the master contacted the pilot via the ship's phone and left a message informing him that they were making their way to the pilot station. Additionally, the pilot had requested an alteration to their standard mooring plan the day before, where he had requested that the crew prepare extended mooring lines to be used forward and aft to aide mooring as the port did not have the use of tugs.

At 05:10 the master checked with the chief officer if the lines had been prepared as requested, to which the chief officer confirmed that the extended lines had been rigged at both fore and aft mooring stations.

The mooring arrangement at the terminal was not considered conventional by the master. The vessel would be secured to a series of dolphins¹. Some were joined by a walkway to the cargo loading jetty, but most were not (Fig. 1). Running lines to the dolphins, or any adjustment, required the use of line boats.

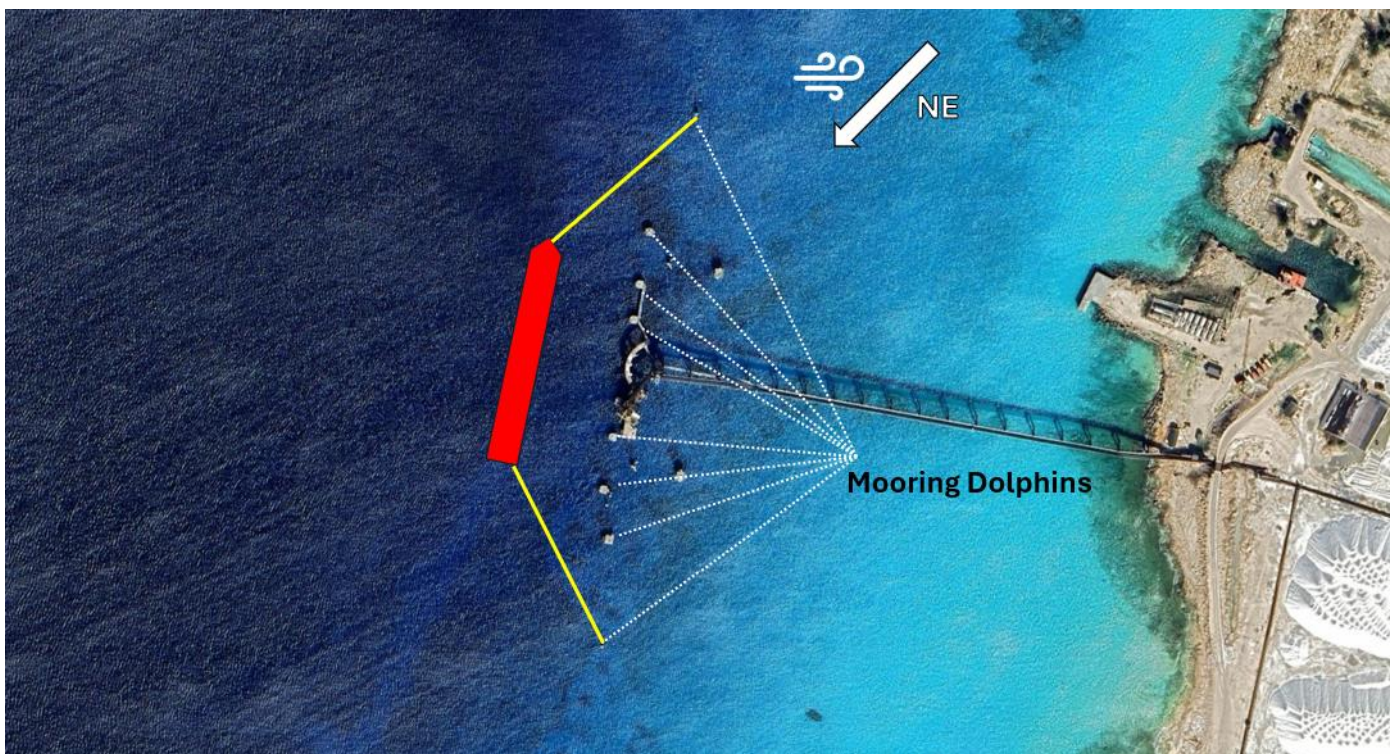


Figure 1. Mooring plan (aerial view depicting proposed lay of extended lines in yellow)

The master received a call from the pilot at 05:58 who informed him that he was to reduce speed and maintain course and heading as he was 10NM away and would advise when in range to board the vessel.

¹ Mooring dolphins are used to assist in mooring and securing a ship to a pier or other secure structure via rope. They are also sometimes used to provide pedestrian access to the ship through a bridge structure. Berthing dolphins reduce the sideways movement of a moored ship.

With the pilot enroute the master contacted the bosun and his deck crew at 06:32 and requested the rigging of the pilot ladder and to standby. The pilot boarded the vessel eight minutes later and made his way to the bridge.

Shortly afterwards, the pilot asked if the extended lines were rigged and ready, and at 06:51 the master and pilot briefly discussed the mooring plan: the ship's propellor and bow thruster would manoeuvre the vessel into position just off the dolphins, the ship's winches would pull the vessel alongside using the extended lines due to the lack of tugboats at the terminal. The pilot requested the stern line to go out first followed by the forward line.

Following the discussion around the mooring plan, the master contacted the chief officer and informed him that he would be notified when it was time to pass down the extended lines.

The pilot contacted the line boat crews at 07:23 and requested them to be on standby to collect the stern line first followed by the forward line and to make fast ashore once it was confirmed that the vessel was within proximity to commence mooring. The line boats would then proceed to secure the remaining lines ashore. During this period the chief officer, bosun, ordinary seafarer (OS) and trainee OS shackled together two 200m long mooring lines and set the line up to be passed down in preparation of mooring. (Figure 2)

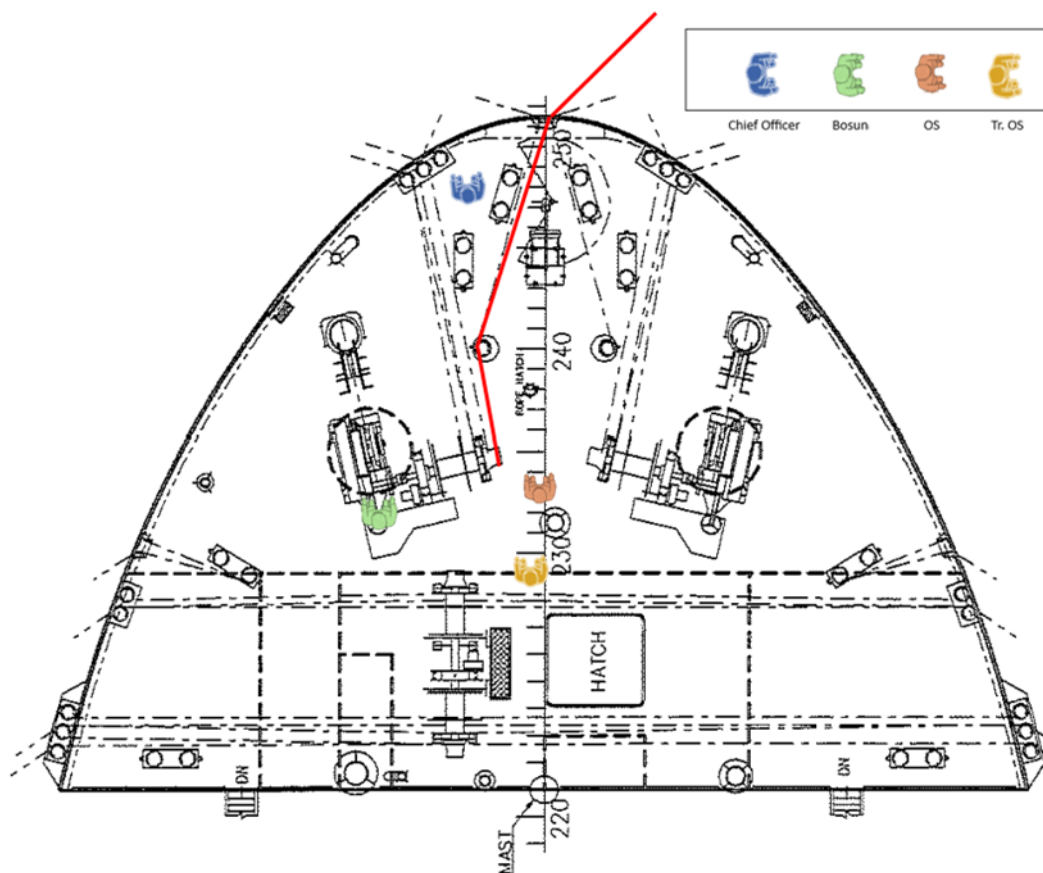


Figure 2. Pre-incident personnel positioning

With the vessel approximately 380 metres from position, the extended line aft was passed down to the line boat at 07:46 and taken towards the dolphin, the pilot then requested that both lines go out simultaneously. At which point, the forward line boat crew collected the extended line up forward and started their way to the dolphin.

Estimating the distance from shore and the amount of line remaining the chief officer instructed the deck crew to attach a third line.

The forward extended line was made fast at 07:51, and the vessel continued to ease ahead at 0.5 knots with the use of its engines whilst the line boat aft made its way to the dolphin to secure the aft long line ashore. The master requested that tension be applied to the forward extended line, at which point the chief officer informed the master that they had to extend the forward line by adding a third length.

With the line now fast ashore, the master requested the forward mooring station to secure the extended line as they were now attending to the extended stern line.

Shortly after the aft line had been collected at 07:58, the pilot requested that the aft line be retrieved back onboard due to a change to the mooring plan [as a result of the vessel drifting with the tide and prevailing wind], the intention was to make the line fast on another dolphin further forward.

On receiving the order from the master to recover the line quickly, the aft line boat crew released the line, and the aft mooring party commenced hauling in the line with the use of the winch.

Following the change to the plan the master directed the forward mooring team to take up the slack and keep the line above water in order to prevent any slack line becoming drawn into the bow thruster.

Shortly after starting the recovery of the aft line, the aft mooring party encountered difficulty in recovering the line onboard most probably as a result of the line being fouled.

At 08:02 the aft mooring station relayed to the master that the line had been fouled by the propellor and were unable to recover it. A minute later the pilot contacted the line boat crew aft for an update and was informed that the line was under the ship and most likely fouled on the propellor.

A decision was taken at 08:05 to stop the engines so that the line could be freed and recovered onboard, at which point the master instructed the forward mooring party to "Hold on" to the forward line. (Figure 3)

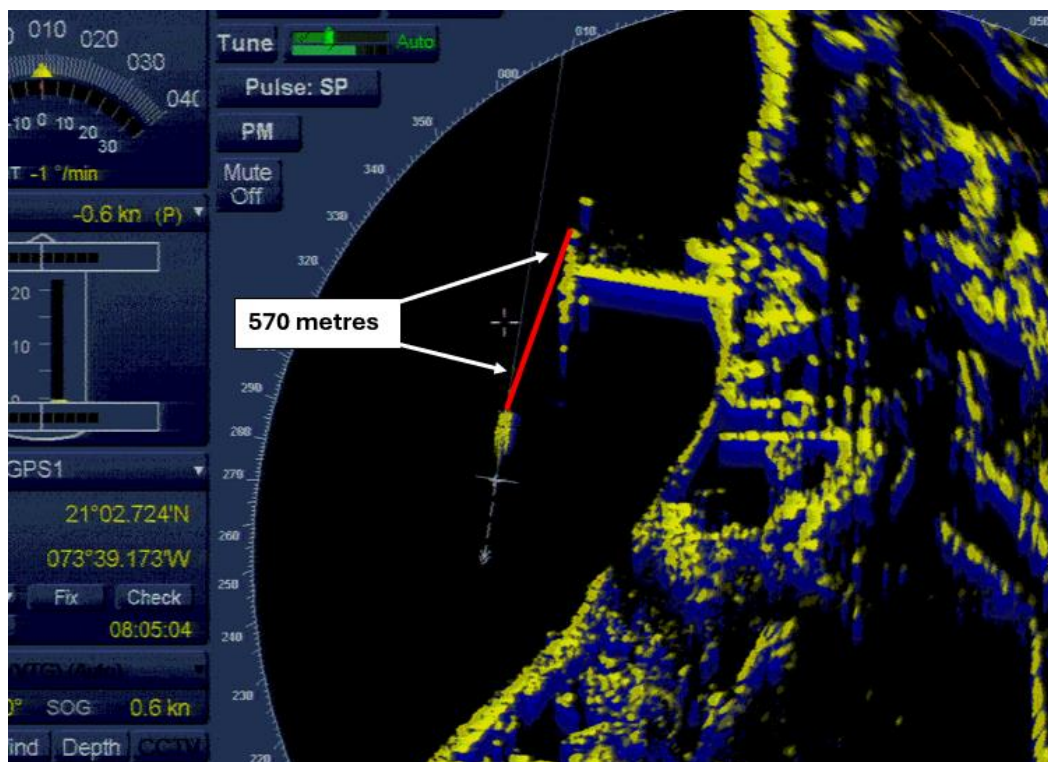


Figure 3. Distance and position from berth when propulsion stopped.

Immediately after the engines were stopped, and with the aft mooring party and line boat crew working to free the line, the pilot and master could not agree on a plan and were becoming anxious due to the vessel drifting aft with only one line ashore.

At the same time that work was being done aft to free the line, the pilot took the decision to thrust the bow to port, away from the jetty to allow the line boats space to pass between the vessel and the dolphins whilst handling lines.

In doing so this placed additional tension on the forward line.

Whilst this was taking place, and with the attentions of the pilot and master focused on the aft line and ship's position, the bosun was becoming concerned with the increasing tension on the forward line and instructed the chief officer to vacate his position forward and proceed to a safe area adjacent to the starboard winch, at which point the chief officer instructed the OS and trainee OS to stand aft of his position adjacent to the ventilation cowl² and keep clear. (Figure 3)

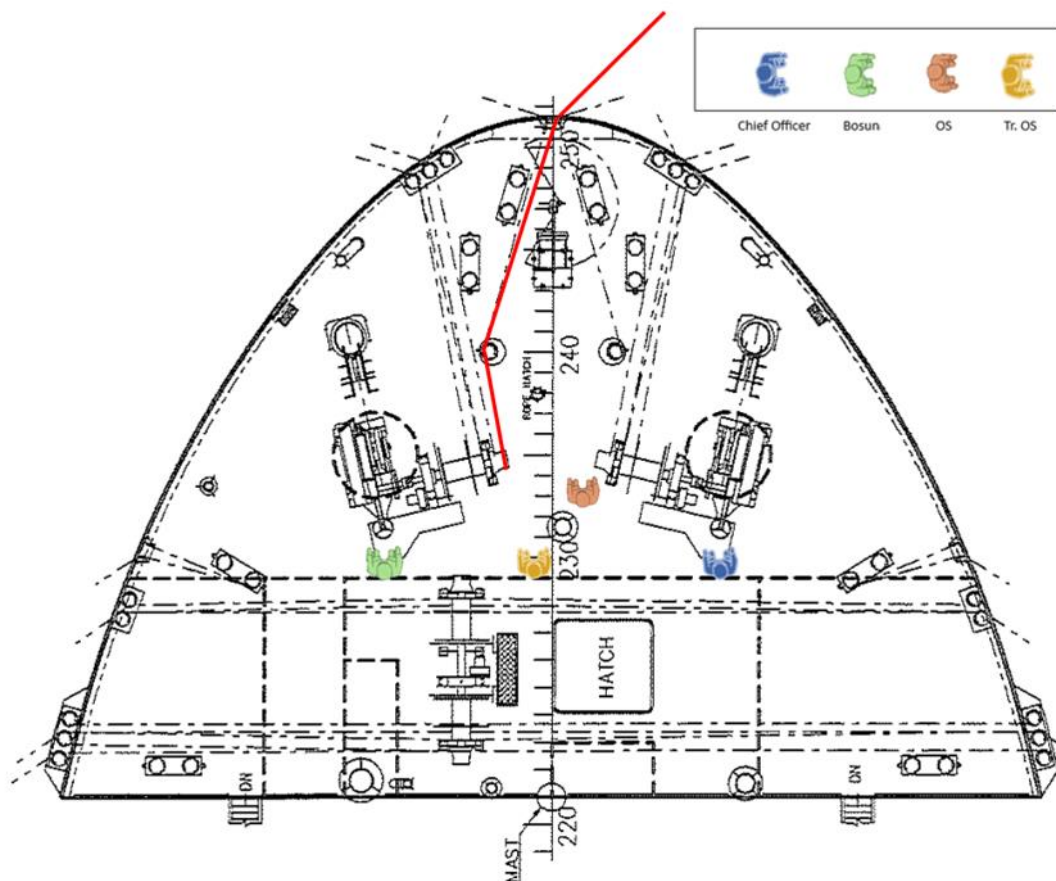


Figure 3. Positions of personnel when requested to stand clear.

At around 08:08 the chief officer had just taken up his position at the starboard side winch, when a loud noise alerted him and the crew towards the tensioned line on the warping drum which had sprung free, running out and the OS who was standing closest to the warping drum was dragged and ended up 3 metres forward of the winch suffering severe injuries to his left leg.

Immediately after witnessing the incident, the chief officer contacted the bridge notifying them that the OS suffered a severe injury and requested immediate medical assistance. On hearing this, the master and pilot who were still considering options for getting the lines ashore did not acknowledge the extent of what had occurred up forward.

The master responded to calls from the chief officer, asking whether it was a snap back and which line, distracted by events unfolding both aft and up forward, whilst the pilot was still communicating with the line boat crew. The chief officer continued to call for help on the radio stating that the OS had lost a leg.

² Ventilation cowl is an often-domed cover for protection against seawater spray and rain. Both for supply and exhaust of air.

The master continued to ask if the rope had parted and also which leg it was, whilst at 08:12 requested that the rope be maintained in place.

Along with the assistance of a fellow deck officer who arrived on scene, the chief officer set about administering first aid to the OS, whose leg had been severed below the knee. Medevac by air was not possible and so a decision was made to transfer the injured OS ashore using the line boat where the pilot mentioned he had a truck which would be used to transfer him to the nearest medical facility due to the unavailability of an ambulance close by.

At 08:17 the master requested that the forward extended line be held fast.

As the vessel did not have the use of a basket stretcher the injured OS was placed in a Neil Robertson stretcher, secured and using the ships davit hoist, he was lowered down in a vertical position to the line boat, accompanied by the second officer and two other crew members where he was transferred ashore.

Once the vessel was secured alongside, the master contacted the local hospital at 10:00 for an update and was informed that the OS had died.

Vessel and Crew

The Bahamian registered Algoma Integrity is a 197 metre self-unloading bulk carrier. Algoma Integrity's 27 crew were made up of 25 Indian nationals and two Ukrainian nationals who all held appropriate qualifications for their respective roles on board.

The pilot was licenced as a pilot for Port Area of Inagua under the Port Authorities Act 1962 (as amended) in May 2018 after a four-year apprenticeship. He had previously worked as a marine supervisor at the terminal and had worked for Morton Salt for 29 years.

The victim was 35 years old and had served with the company for almost eight years. On the day of the incident, he was assigned to the forward mooring deck party and had come off his rest period following a period of 10 hours work from 08:00 to 19:00, preceded by his regular work pattern of day shift.

Rank/Role on board	Master	Chief Officer	Second Officer	OS (deceased)	Bosun	Able Seafarer
Qualification	Master	Master	Officer of the Watch	Able seafarer	Able seafarer	Able seafarer
Certification Authority	India	Ukraine	India	India	India	India
Nationality	Indian	Ukrainian	Indian	Indian	Indian	Indian
Age	59	52	26	35	47	58
Time in rank	10y 5m	11y 7m	3y 5m	7y 10m	2y 10m	16y 3m
Time on board	1 month	1 month	1 week	5 months	6 months	6 months

Previous similar cases

The Bahamas Maritime Authority has recorded three instances of mooring related fatalities in the last ten years. In the same period, there were twenty-five casualties that resulted in serious injuries. There have been several cases where seafarers have been killed by a mooring line that has not parted:

Aruba Pearl (2022) BMA

A Bahamas flagged vessel was manoeuvring into position in preparation for securing its lines to a series of fixed mooring buoys on the Cooper River, Charleston, South Carolina in the United States of America. During mooring operations, an able-bodied seafarer (AB) suffered fatal injuries when a mooring line that was under tension on the mooring winch, sprung free from a bitt that it had been passed around, striking him in the chest.

[BMA-MSI-Final-report-Aruba-Pearl-Mooring-line-fatality-final.pdf \(bahamasmaritime.com\)](#)

Jawor (2021) BMA

A Bahamas flagged vessel whilst on passage, identified areas of damage to its mooring lines and assigned crew to undertake repairs before load testing. Whilst conducting the load testing, an ordinary seafarer was fatally injured when the mooring line he was guiding onto the winch drum sprung free from where it had fouled, striking him in the abdomen.

[BMA-MSI-Report-Jawor-Mooring-line-load-testing-fatality.pdf \(bahamasmaritime.com\)](#)

Teal Bay (2021) MAIB

A Chief officer was fatally injured when he was struck on the head by a tensioned mooring line that sprang out of an open roller fairlead. The Teal Bay was loading grain when moored alongside an anchored bulk carrier.

[MAIB Report 9/2022 - Teal Bay - Very Serious Marine Casualty \(publishing.service.gov.uk\)](#)

Safety Management System

The company operated a safety management system comprising a series of documents including risk assessments, checklists, procedures, and guidance on mooring operations. This included deck department training manuals, covering mooring operations, winches and equipment, as well as defined mooring procedures.

Legislation and Guidance

Recommendation on the distance from ship to berth for picking up lines by line boats is set out in **Chapter 4, Mooring and Anchoring Ships, Volume 1, by the Nautical Institute** which recommends:

- that lines should be picked up for transfer when the ship is within 2.5 x its beam off the berth making handling and operating the line easier.
- that the length of line on a winch should be 5 x its beam thereby allowing for sufficient slack to be made available.

Guidance on the recommended procedures during mooring operations are widely available and useful as part of the work planning and review of the generic risk assessment being used. Extracts from the Code of Safe Working Practices 2015 section 26 offer guidance when working with mooring lines and the dangers associated with recoil and snap-back.

- *26.3.12 Personnel should not, in any circumstances, stand in a bight of rope or wire. Operation of winches should be undertaken by competent seafarers to ensure that excessive loads do not arise on moorings... competent personnel must be used, and a toolbox talk should precede operations with maintenance of good communications with all participants throughout.*
- *26.3.13 When moorings lines are under strain, all personnel in the vicinity should remain in positions of safety, i.e. avoid the snap-back zones. It is strongly recommended that a bird's eye view of the mooring deck arrangement is produced to identify danger areas. Regardless of designated snap-back zones, seafarers should always be aware of other areas of potential danger – the whole mooring deck may be considered a danger zone. Risk exists in any area where there is the potential for lines to come under tension or snapback, including side decks.*

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.

A crew member suffered fatal injuries when a mooring line that was under tension on the warping drum sprung free severing his leg below the knee.

Master-Pilot Exchange/Planning

Prior to arrival at Inagua at 05:57, the master and pilot briefly discussed the mooring plan where the pilot requested that two sets of lines (one fore and aft) needed to be connected end to end to form a "long line" which would then be passed to the line boats to secure on the mooring dolphins. The plan was to use the lines as a means to get the ship alongside due to the unavailability of tugs at the terminal.

Extending mooring lines with shackles is not standard practice and the chief officer raised concerns as to its suitability which the master challenged informed by the assurance from the pilot that this method would be a suitable means of aiding the vessel in coming alongside. There had been several heated exchanges the day

before as well as on the morning of the incident between the chief officer and the master, evidence of a breakdown in bridge team relations. The second officer who had been to the port previously stated that this method of mooring was not used before.

The need to extend the lines increased the risks on the crew handling the lines, thus placing them in danger and contrary to recommendations as set out in **Chapter 4, Mooring and Anchoring Ships, Volume 1, by the Nautical Institute** which recommends that lines should be picked up for transfer when the ship is within 2.5 x its beam off the berth making handling and operating the line easier. This would equate to 80m and not the recorded 380m experienced by the line boat crew.

It also states that the length of line on a winch should be 5 x its beam thereby allowing for sufficient slack to be made available, which would mean that the one line already spooled on the winch of 200m was sufficient and did not need to be extended.

The connecting of lines end to end by means of shackles presented its own set of risks, not only that the length of line being handled by the boat crew would be excessively heavy, but the line being recovered on deck needed to be stowed in such a way that it reduced the likelihood of bights forming, or fouling on deck machinery, as well as the difficulties faced in handling shackles that were not specific for their intended use.

Although a master/pilot exchange form had been completed there was no formal diagram to depict the mooring arrangement plan, the intended number or sequence of lines to be sent ashore, thereby removing any shared mental model for the master, deck officers or those involved with mooring to refer to.

Risk Mitigation

Although the chief officer had discussed respective roles and responsibilities with the mooring team, no consideration had been given to the effects of long line mooring when placed under tension, the effectiveness or safe working load of shackles or any planned safe stowage of lines once recovered on the warping drum.

The instruction to run lines when the vessel was still 380m from the berth meant the risks were compounded.

When it became apparent that the aft lines had potentially fouled the propeller, no consideration was given by either the pilot or master to deploy the ship's anchor in order to reduce the tension on the solitary long line forward. The need to hold the vessel in position whilst crew aft worked to free the line, resulted in rushed and hurried operations.

The decision by the pilot to utilise the bow thruster in order to manoeuvre the vessel to port while the forward line was under tension was not communicated with the mooring party, nor was the manoeuvre assessed or considered a risk.

Post casualty actions

Following the administration of medical care and attempts at stabilising the victim, arrangements for suitable transfer and evacuation were compounded by lack of air support, proximity to the hospital and availability of suitable transfer modes.

Following the incident, no attempts were made by the master or bridge team to sound the general alarm, or muster the emergency medical care team to attend to the casualty.

The patient was landed into the line boat in a Neil Robertson stretcher, using the ship's davit hoist. The transfer was carried out with the patient held vertically contrary to recommended medical guidelines³ on dealing with the management of bleeding which may have had an impact on blood loss.

³ [International medical guide for ships \(who.int\)](http://www.who.int)

Furthermore, the transfer of the patient by truck to a medical facility and not an ambulance reduced the amount of vital medical care and support that could have been provided.

Conclusions

- An ordinary seafarer died as a result of his injuries following a mooring line that sprung free from the warping drum.
- At the time of the casualty, the victim was attempting to avoid the potential for snap back from the line that was under extreme tension. He was most likely unaware he was standing in a bight of the coiled rope aft of the warping drum.
- The mooring process was complicated by the pilot's request to use extended mooring lines and running them ashore whilst the vessel was 380m from the berth.
- The tension on the line was a result of the fouled line aft, resulting in a single line on a warping drum trying to arrest the movement of the ship due to wind, tidal and manoeuvring effects.
- Although the work planned for that day had been discussed, a comprehensive review of the risks around the extended lines and use of shackles was not considered.
- First aid protocols were not effective in managing or controlling blood loss prior to or during transfer to the line boat.

Action taken and Recommendations

Algoma Ship Tech. Ltd has:

- Conducted an internal investigation and made recommendations to review and where necessary amend all of its mooring procedures, suitability of ports and mooring operations in line with guidance as set out in Oil Companies International Marine Forum (OCIMF) publication Mooring Equipment Guidelines, Fourth Edition 2018.
- Reviewed and updated its training programmes and manuals.
- Adopted the use of snap-back resistant mooring ropes.
- Prohibited the practice of extending mooring lines by means of shackles.
- Carried out a full review of the approach and mooring procedures at Morton Salt terminal, refraining from using extended mooring lines.

Vessel particulars

Vessel name	Algoma Integrity
Vessel type	Self-unloading bulk carrier
Flag / IMO number	Bahamas / 9405162
Registered owner	Aruba Pearl Shipping Company Ltd.
Manager	Algoma Ship Tech Ltd.
Classification Society	Lloyd's Register
Built	2009 – Estaleiro Ilha, Sa, Brazil
Length / breadth / moulded depth	197.1m / 32.2m / 17.75m
Gross / net tonnage	33047 / 11140
Minimum safe manning	10
Authorised cargo	Bulk cargo

Voyage Particulars

Departure port	Baltimore, United States of America
Arrival port	Inagua, The Bahamas
Distance / duration	885 NM / 6 days
Cargo information	In ballast
Crew	27 crew

Marine Casualty Information

Severity of casualty	Very Serious Marine Casualty
Date / time	21 October 2018 / 08:20 LT
Geographical location	Inagua, The Bahamas, 21°3.4' N 73°25.5' W
Place onboard	Forward mooring station
Injuries / fatalities	One fatality
Damage / environmental impact	No structural damage/ environmental impact
Ship operation	Mooring/ Manoeuvring
Stage of passage	Arrival
External environment	Daylight. Wind: NE Force 3.
Internal environment	N/A