

**The Bahamas**  
Maritime Authority

# Marine Safety Investigation Report

into a fatal injury sustained during load testing  
of a mooring rope onboard mv Jawor  
on 09 November 2021





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# 1. Summary

Due to restrictions imposed as a result of the coronavirus pandemic, the BMA investigation team could not travel to the vessel. Therefore, this investigation was conducted following the hierarchy of controls recognised by IMO Circular Letter No.4204/Add.16 establishing effective safety control measures and reducing the risk to personnel. The evidence, including the witness testimonies and images, was gathered by the United States Coast Guard on behalf of the BMA.

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## What happened

On 9 November 2021, the Bahamas flagged bulk carrier Jawor was on passage from Rotterdam to New Orleans, in ballast. Continuing with the previous day's maintenance of mooring equipment, three crew set about the repair and load test of a mooring rope.

Shortly after 11:00, an ordinary seafarer was struck in the abdomen by the tensioned mooring line during load testing. Despite immediate first aid from the ship's crew the ordinary seafarer died from their injuries a short while later.

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## Why it happened

The rope that was being guided onto the winch drum, potentially fouled on the roller trestle and once tension was applied, sprung free and struck the ordinary seafarer who was standing in an unsafe position.

The rope when fouled and under load would not have given any audible warning that it was about to recoil, nor was the ordinary seafarer aware that their positioning placed them in any immediate danger.

The work party did not assess all potential risks, including safe positioning of crew, prior to commencing the work.

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## What can we learn

All personnel working in areas where mooring lines are under tension, should be aware of the associated risks of snap-back and recoil when mooring lines part or come adrift of mooring arrangements on deck, often resulting in serious injury or fatality.

Effective mitigation of harm through the conducting of a thorough risk and site assessment can provide effective control measures, which can drastically reduce the potential of serious injury or death.



## 2. Factual Information

### Jawor

<b>Vessel Type</b>	Cargo Bulk Carrier	<b>Flag</b>	Bahamas	
<b>Owner</b>	Fiona Two Shipping Limited	<b>Manager</b>	Polska Zegluga Morska PP	
<b>Classification Society</b>	DNV	<b>Gross/Net Tonnage</b>	43,506 / 27,703	
<b>Built</b>	2010	<b>Propulsion</b>	B&W 7S50MC-C7 Diesel single propellor	
<b>IMO No.</b>	<b>Callsign</b>	<b>Length overall</b>	<b>Breadth</b>	<b>Moulded Depth</b>
9452608	C6YH8	228.96m	32.25m	20.25m
<b>Last BMA Inspection</b>		<b>Last PSC Inspection</b>		
21 September 2021, Odessa, Ukraine. No Deficiencies recorded.		13 October 2021, Rotterdam, Netherlands. 10 Deficiencies recorded. None related to casualty		



## Crew details

Rank/Role on board	Master	Chief Officer	Ordinary Seafarer (victim)	Ordinary Seafarer	Bosun	2 <sup>nd</sup> Officer
Qualification	Master Mariner	Master Mariner	Ordinary Seaman	Ordinary Seaman	Able Seaman	Chief Mate
Certification Authority	Bahamas	Bahamas	Ukraine	Poland	Poland	Bahamas
Nationality	Polish	Polish	Ukraine	Polish	Polish	Polish
Age	60	50	39	27	63	58
Time in rank	17 years	13 years	5 years	29 days	11 months	11.5 years
Time on board	29 days	29 days	29 days	29 days	29 days	29 days

## Environmental Conditions

Wind Direction	Wind Force	Wave Height	Swell Height	Precipitation / Sky	Visibility Range	Light Conditions
SW	6	3m	2m	Clear	Good	Daylight

## Voyage Details

Departure Port	Rotterdam	Arrival Port	New Orleans
Time of departure	29 October 2021	Estimated time of arrival	09:00 LT / 15 November 2021
Voyage duration	17 days @ 14 knots	Voyage distance	5931 NM
Cargo	In ballast	POB	19
Stage of passage	Deep sea	Traffic density	Very low

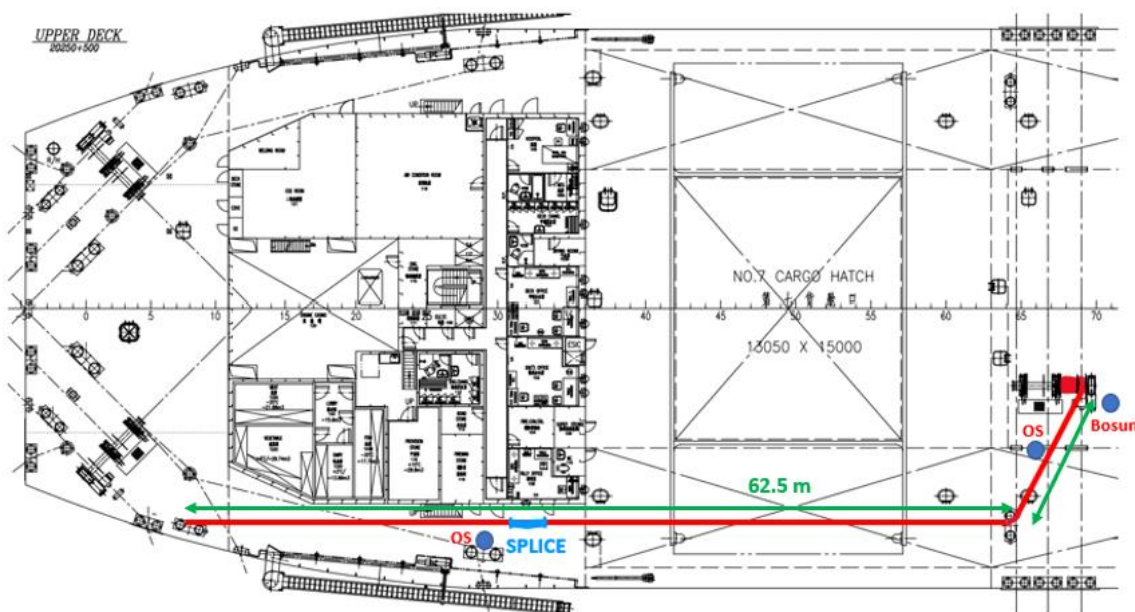
## Narrative

All times in this report are UTC -3.

On the 9 November 2021, mv Jawor was in ballast, underway from Rotterdam to New Orleans. During the morning meeting held by the chief officer it had been decided that the deck department would resume scheduled maintenance tasks including the repair of mooring lines, some of which had shown signs of extensive wear. The repairs required one line to be cut, re-spliced and then load tested to satisfy the chief officer of their suitability for use on board.

As part of the preparation for the task, a work planning meeting was held to outline the work involved and discuss the known risks when operating winches and mooring lines. The task was assigned to the bosun to oversee along with two ordinary seafarers (OS1) and (OS2) who had completed the required training and familiarisation assessment to carry out the task.

After the meeting, the bosun, OS1 and OS2 made their way to the mooring station located on the starboard side between cargo holds No 6 and 7 (approximately 25m forward of the accommodation), uncoiled the mooring rope from the forward most winch and ran it out through a set of mooring bitts (adjacent to the chocks) and past the accommodation. The area of damage was then positioned under cover outside the entrance to the accommodation block to provide shade whilst work on the rope commenced (figure 1).

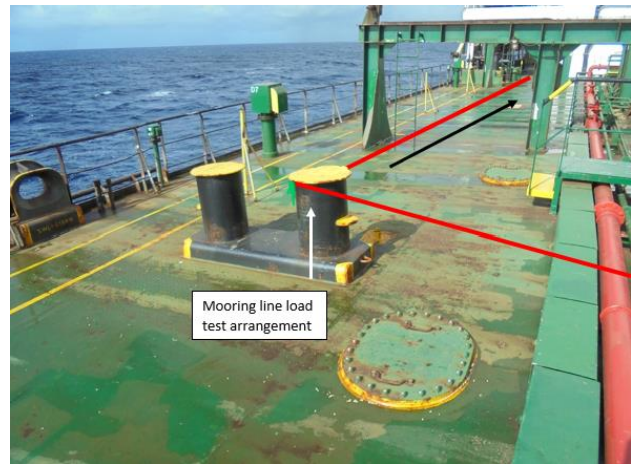


**Figure 1. Planned mooring line arrangement – splice and test of line**

Once the splice was complete, the bosun along with OS1 made their way to the winch to commence with load testing. OS2 remained within the vicinity of the repair, in order to report any concerns to the bosun during load testing and ensure that the area directly outside the accommodation block was kept clear of crew.



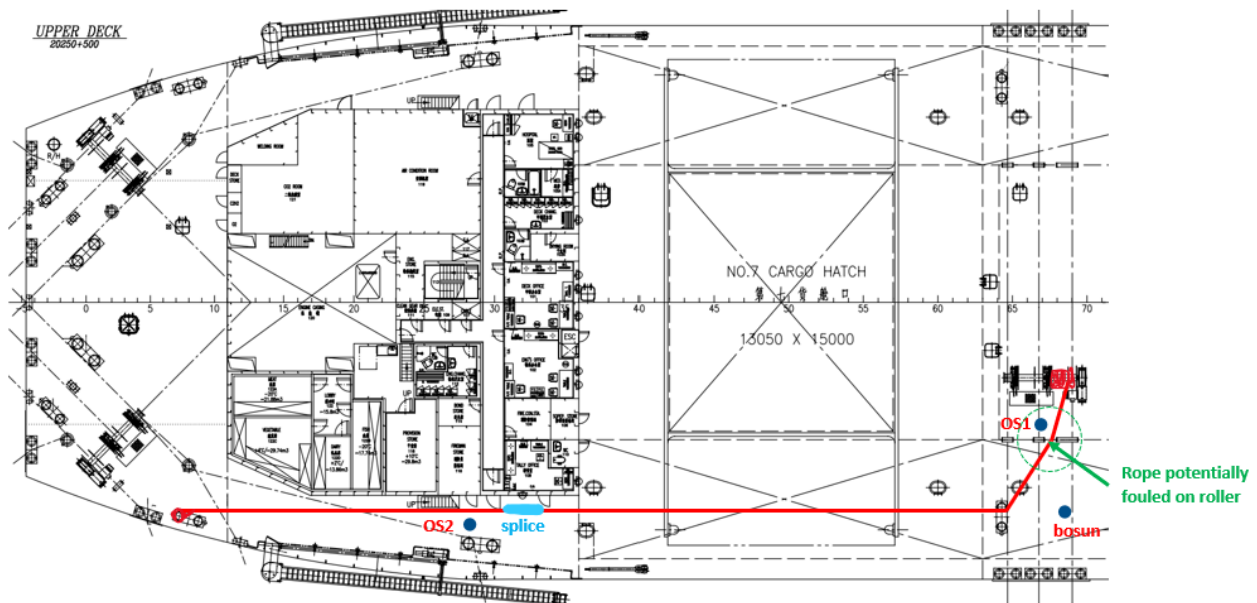
**Figure 2. Mooring station positions**



**Figure 3. Mooring line under load**

Shortly after 11:00, the bosun who's back was turned to the winch drum whilst operating the winch control, started heaving on the mooring winch whilst OS1 guided the rope, making sure it transferred to the split drum before it came in to tension (Figure 2).

OS1's primary role was to ensure that the rope was correctly fed onto the winch's split drum. During normal operations, the mooring line would be paid out and recovered via the chocks with the use of the trestles positioned to assist direct feeding onto the drum. On this occasion the rope was leading aft meaning it needed to be manipulated to ensure it was fed correctly onto the drum without fouling.



**Figure 4. Mooring line arrangement - Position of Bosun (line under tension)**

Once the bosun considered the tension sufficient, he left the control lever in the stop position and walked towards the railing to confirm with OS2 that the splice was holding (Figure 3), whilst making his way to check with OS2, he observed that OS1 was positioned between the roller trestle and the winch drum.

On turning back towards the winch controls, the bosun observed OS1 in a sitting position on the winch platform holding his mid-section complaining of severe pain and requiring assistance.



The bosun immediately ran to get help and on passing OS2 outside the accommodation block, informed him that OS1 had been injured and ordered OS2 to take care of OS1. The bosun raised the alarm through the ships internal intercom system, where the deck officer acknowledged the incident and assembled a team to attend to the injured OS1 who informed OS2 that he had been struck by the rope in his abdomen.

On being informed, the master along with the chief officer made their way on to deck to assess OS1. On arrival a decision was made to transfer OS1 to the ships hospital to monitor his condition and provide treatment. The master and the chief officer decided to return to the master's cabin to notify the company representative and request urgent medical assistance.

Shortly after arriving at his cabin, the master was called from the ship's hospital and informed that OS1 had died.

## Safety Management System

The vessel's safety management system comprised a series of manuals, checklists and risk assessments.

There was no task specific risk assessment or guidance on the repair and load testing of mooring lines but works involving mooring lines fell within the parameters of a Company-generic "Occupational Risk Assessment While Performing Activities On Ordinary Seaman/Boatswain Position" and a detailed risk assessment on mooring, anchoring and towing operations. This was last reviewed and updated in December 2014 (Appendix 1).

The vessel was last inspected by flag at Odessa in September 2021 with no non-conformities or observations being raised against the SMS.

As part of the crew's familiarisation, all crew had signed a form asserting that they met the necessary criteria to perform duties under the Company's Occupational Safety at Work procedures (Appendix 2).



## 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.**

### Cause of injury

The cause of injury which resulted in the death of OS1 was blunt force trauma to the mid-section, as a result of extreme force brought about by the recoil of the rope when it sprung free from where it had become fouled.

The properties of man-made fibre ropes such as polypropylene mean that they can extend up to one third their original length when tension is applied. Once the maximum permissible tension is applied the rope will recoil back to its static position once freed from its fouled position with the force equivalent to over 250 Newtons (1 Newton = 1 kg • m/s<sup>2</sup> - /Newtons 2<sup>nd</sup> Law) (figure 5).



**Figure 5. Illustration of fouled mooring line and directional force when released**

The OS1 at the time of the recoil would have been unaware that the rope if freed would reach the position where they were stood, or that it placed them in the path of the ropes static position.

## Management of Risk

Prior to work commencing on the repair to the mooring ropes, the chief officer held an informal meeting in the morning with the bosun, OS1 and OS2, where they discussed the task planned for that day. The planning centred around running the rope to the aft set of bitts, where the area requiring splicing would be situated undercover so that the crew could carry out the work shaded from the heat and direct sunlight.

The meeting did not focus on risks associated with the task, such as when placing ropes under tension during the testing of the repair. Additionally, the meeting did not consider or factor in whether the plan to test the splice, when recovering the rope back onto the winch drum at an angle, and at some distance would pose any issues such as fouling on roller trestles or whether the OS man-handling the rope in order to keep it in a straight line would place them in danger.

Seeing as similar work had been carried out the previous day without incident, the decision by the deck officer to allow the bosun and two OS to proceed without considering the risks present, such as working in the vicinity of taut lines (figure 6), or the potential for harm with this type of operation was most likely a contributory factor.

In order to mitigate risk, the company's SMS clearly set out guidelines and procedures which are to be adopted when carrying out mooring, towing or anchoring operations. (figure 6) These guidelines include the implementation of a generic risk assessment, which contains a coloured highlighted area requiring an additional risk assessment be conducted as part of the control measures. (figure 7)

Neither the generic risk assessment or the additional controls required were discussed or completed as part of the planning during the meeting. If the risk cannot be identified, then it cannot be effectively controlled.

15. Anchoring, mooring and towing work	lines: strike, crush, caught in line, struck by heaving line	Death, severe injuries	Work is conducted under constant supervision of the officer, lines are in good condition and checked on a regular basis, lines to be run are laid out on the deck, it is forbidden to stand in a bight of line, or to coil the line around the hand, it is forbidden to catch the line slipping away overboard, the crew stands well clear of "sweeping lines" zones, lines are kept well clear of the propeller or bow thruster, seafarers keep safe distance from taut/moving lines, during towing, nobody stays in the vicinity of a towrope, heaving line does not have additional weights, it is forbidden to catch the heaving line on the fly.	Yes Risk of impact, crush, entanglement in the line	Yes
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Figure 6. Extract – Occupational Risk Assessment- performing activities on ordinary seaman/boatswain position

In case where for particular action/activity not all measures were applied, specified in table, detailed risk assessment should be conducted and depending on the result of the assessment, measures essential for its reduction should be planned and applied. Risk assessment during execution of particular action/activity has to be verified on the vessel in the event of accident or "near missing" incident.

The execution of actions specified in items 5, 10b), 11, 15 and 17 requires detailed risk assessment according to the template included in SMS Book, part III, chapter 6, item 12.

Figure 7. Extract – Requirement for review - Occupational Risk Assessment



Guidance on the recommended procedures during mooring operations are widely accessible, 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 (October 2020 amended) 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.*

The mooring, towing or anchoring risk assessment highlighted that, when mooring lines were under tension a deck officer was required to be present as a control measure. This was removed in the morning planning meeting as the task was handed to the bosun to manage, leaving the task to be completed with inadequate supervision.

Unlike natural fibre rope or wire, synthetic fibre ropes provide little or no audible warning that they are about to recoil or part. Consequently the crewmembers did not factor this in as part of their planning as this would have identified the risks associated with lines under tension, requiring them to review their positions, and of the potential snap-back zones or areas of recoil.

The consideration for potential injury due to recoil from a mooring rope under tension was not included in the planning meeting when discussing the task.

There was no effective communication plan in place that day.



## 4. Conclusions

- An ordinary seafarer died when he was struck by a fouled mooring rope that sprung free.
  - In the lead up to the casualty, the ordinary seafarer was standing and operating in a dangerous position.
  - Although the work planned for that day had been discussed, a comprehensive detailed review of the risk assessment was not completed.
  - The chief officer deviated from procedural recommendations to be present during mooring, anchoring and towing operations when lines are under tension, and instead handed the supervision of the task over to the bosun.
  - The risk assessment used was not task specific and did not factor in personnel involved nor their positions in relation to the potential risk of work being carried out.
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## 5. Actions taken


**Polska Zegluga Morska has:**

- Updated its General Work permits to reflect more hazardous tasks being undertaken.
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## 6. Recommendations

**Polska Zegluga Morska is recommended to:**

- Take appropriate actions to improve the safety culture onboard Jawor and its other managed vessels, including but not limited to:
    - Review the effectiveness of its safety management system's procedures and guidelines on load testing rope and associated mooring operations
    - Review occupational risk processes, to include a compulsory review of all high risk activities, to better ensure the safety of its crews
    - Produce and distribute a bulletin to all vessels within the fleet notifying them of the dangers associated with working with lines under load
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## 7. Glossary and Definitions

Chock	Chocks are structural reinforcements on ships which guide the mooring lines to and from the shore / other vessels.
m	metre
Newtons 2 <sup>nd</sup> Law	Newton's second law is a quantitative description of the changes that a force can produce on the motion of a body. It states that the time rate of change of the momentum of a body is equal in both magnitude and direction to the force imposed on it.
OS	Ordinary seafarer
SMS	Safety Management System
Snap-back	A snap-back is the sudden recoil of a mooring line as a result of its failure under tension. A snap-back zone on a mooring deck is the space where it is anticipated that the failed mooring line could recoil with great velocity, possibly resulting in injury or even death to crew present within this zone
VHF	Very High Frequency

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# Appendices

## Appendix 1 - Occupational Risk Assessment While Performing Activities On Ordinary Seaman/Boatswain Position

vicinity of operating equipment	Hot surfaces	Burns	Thermal insulation of hot surfaces, use of working clothes and protective or thermal gloves	None	No
	Toxic products of combustion	poisoning	Functional ventilation of spaces, exhaust manifolds are tight.	None	No
	Being caught, struck from moving elements	Death, severe injuries	Moving elements are shielded. Equipment/ tool is protected from accidental activation. Marks, information and warning signs are used. Adequate lighting is ensured and does not cause strobe effect or glare.	None	No
13. Work in the vicinity of aerials	Electromagnetic field	Severe injuries	Sources and protection zones of electromagnetic fields are marked. Exposure time limits are followed. In the absence of signs it is strictly prohibited to enter the endangered areas (monkey island/compass deck) during operation of radio transmitters. It is strictly forbidden to climb masts and funnel during radar's aerials operation.	None	No
14. Work with electrically powered equipment and installations.	Electric shock, burn, eyesight damage by electric arc	Death, severe injuries	Before commencing work equipment/ installations are disconnected and secured from unwanted connection to power source. Information about conducting work on the equipment/installation	None	No
15. Anchoring, mooring and towing work	lines: strike, crush, caught in line, struck by heaving line	Death, severe injuries	Work is conducted under constant supervision of the officer, lines are in good condition and checked on a regular basis, lines to be run are laid out on the deck, it is forbidden to stand in a bight of line, or to coil the line around the hand, it is forbidden to catch the line slipping away overboard, the crew stands well clear of "sweeping lines" zones, lines are kept well clear of the propeller or bow thruster, seafarers keep safe distance from taut/moving lines, during towing, nobody stays in the vicinity of a towrope, heaving line does not have additional weights, it is forbidden to catch the heaving line on the fly.	Yes Risk of impact, crush, entanglement in the line	Yes <del>work</del>
	mooring winches / windlasses: electric shock, leakage of pressurized oil, losing control over line	Death, severe injuries	Winches are functional and controlled on a regular basis, winches' controllers automatically return to neutral position, indicators and symbols besides controllers are readable, while the winch is running, the operator stays at the controller; coils of lines are wound close together on the drum; the number of coils on a winch head is conditioned by the slip avoidance, during the vessel's berthing, lines are not left on winches' heads.	Yes Risk of impact, crush, entanglement in the line	
	bollards (tripping, falls, losing control over the line, damages to the bollard)	Death, severe injuries	it is forbidden to wrap the line around the bollard; they are not exposed to loads exceeding their safety working load, stopper is operated by a person competent in line fastening, stoppers are in good condition	Yes Risk of impact, crush, entanglement in the line	



M/V JAWOR

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