

FINAL REPORT

MAN OVERBOARD FROM THE CONTAINER SHIP MAERSK PATRAS IN ST. LAWRENCE RIVER ON 19 MAY 2019

MIB/MAI/CAS.065

**Transport Safety Investigation Bureau
Ministry of Transport
Singapore**

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The Transport Safety Investigation Bureau of Singapore

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SYNOPSIS

On 19 May 2019, at about 0930H, the Singapore registered container ship, Maersk Patras, was approaching Escoumins pilot station in the St. Lawrence river, Quebec, Canada at about 15 knots, bound for the Port of Montreal, Canada.

Due to the non-guaranteed availability of stevedores for lashing and unlashng of containers, ships calling the Port of Montreal would typically make use of ship's crew to perform these tasks during the river passage from / to the port. The Second Officer, who was not wearing a safety harness and floatation device while unlashng a container at the outermost row, fell into the sea through an opening on deck.

Under the coordination of the Maritime Rescue Coordination Centre Quebec Sub-Centre, search efforts spanned over nearly nine hours by ships and a helicopter in the vicinity, to no avail.

The Transport Safety Investigation Bureau classified the occurrence as Very Serious Marine Casualty and launched a marine safety investigation.

The investigation revealed that the review of the risk assessment for the unlashng task was ineffective as the safety control measures identified were not implemented. In addition, the SMS did not require the wearing of floatation device when working near the ship side.

DETAILS OF THE SHIP

Name	Maersk Patras
IMO Number	9168221
Flag	Singapore
Classification society	American Bureau of Shipping (ABS) ¹
Ship type	Container ship
Hull	Steel
Delivery	11 November 1998
Owners	A.P. Moller Singapore Pte. Ltd.
Operators / ISM ² Managers	Maersk Line A/S
Gross tonnage	31333
Length overall	210.10m
Moulded breadth	32.20m
Moulded depth	16.20m
Summer draft	12.50m
Container capacity / Cargo onboard	2890 TEU ³ / 1943 TEU



Maersk Patras
(Photo source: Fleetmon.com)

¹ ABS was the Recognised Organisation (RO) for carrying out ISM audit and issuance of ISM related certificates, as well as for survey and issuance of other statutory certificates.

² As per the International management code for the safe operation of ships and for pollution prevention – ISM Code. Referred to as the Company in the report.

³ Twenty-foot equivalent unit.

1 FACTUAL INFORMATION

All times used in this report are ship's mean time of Maersk Patras, which was four hours behind the UTC (UTC - 4H), unless otherwise stated.

1.1 Sequence of events

- 1.1.1 On 19 May 2019, at about 0830H, Maersk Patras (MP) was underway, at a speed of about 15 knots towards Escoumins pilot station⁴, Quebec, Canada, for subsequent arrival at the Port of Montreal, Canada. The Master of MP was in conn of the ship having taken over from the duty officer (Third Officer⁵) and was alone on the bridge.
- 1.1.2 In preparation for the arrival at the Port of Montreal, the Chief Officer⁶ had prepared a work permit for a planned task of unlash containers⁷ to be carried out by the ship's crew. At about 0850H, the Chief Officer conducted a safety briefing for the 17 crew regarding the unlash of containers at ship's cargo office. The safety briefing included the unlash procedures and formation of teams, as well as the donning of personal protective equipment (PPE)⁸.
- 1.1.3 By about 0905H, all 17 crew had been briefed and were dismissed to proceed to unlash the containers on deck. At about the same time, the Second Officer⁹ who had been called by the Chief Officer, arrived at the cargo office. The Chief Officer conducted a separate safety briefing for the Second Officer about the unlash task.
- 1.1.4 After the briefing, the Second Officer went to the aft of bay 22 to join the Ordinary Seaman (OS1) and the Chief Cook in unlash containers.
- 1.1.5 Observing that the Second Officer was attempting to unlash containers at the outboard row and noting that the Second Officer was not wearing a safety harness, the OS1 told the Second Officer not to unlash the outboard long

⁴ To receive pilot for St Lawrence River passage, estimated time of arrival pilot station was scheduled at 1000H on 19 May 2019.

⁵ Kept sea watches (0800H-1200H and 2000H-2400H).

⁶ Kept sea watches (0400H-0800H and 1600H-2000H).

⁷ It was a routine task specific for the Port of Montreal. Lashing and unlash of containers in most ports is done by Stevedores or longshoremen at the berth. Details in a separate paragraph.

⁸ Safety harnesses to be used when working at outboard rows.

⁹ Kept sea watches (0000H-0400H and 1200H-1600H). The Second Officer was resting when the safety briefing was conducted for the other crew. The Chief Officer did not call the Second Officer to join the other crew for the briefing earlier so as to allow more rest time for the Second Officer.

lashing rod. It could not be established whether the Second Officer responded to the advice from the OS1. The Second Officer was then seen to walk to the forward of bay 22 and join the Able Seafarer Deck (ASD1¹⁰), who was housekeeping the loose lashing gears (turnbuckles).

1.1.6 Meanwhile, at about 0925H, the Master obtained permission from Escoumins Traffic for MP to proceed to Escoumins pilot station to receive pilots.

1.1.7 At about 0930H, the ASD1 recalled¹¹ seeing the Second Officer removing a vertical long lashing rod¹² from the third-tier container at the outermost row of the port side. At that time, the turnbuckle of the long lashing rod had been removed by the Second Officer and the Second Officer was attempting to stabilise the rod (see **figure 1**).

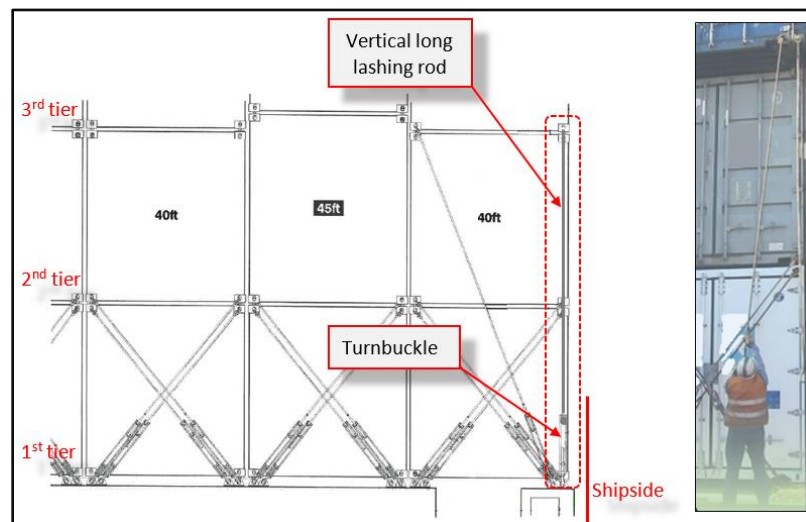


Figure 1 – Viewed from the bow - location of the vertical long lashing rod (on left picture) (Source: the Company) – annotated by TSIB; and illustration of removing the long lashing rod (picture on the right) (Source: Marineinsight.com)

1.1.8 Soon after, the Second Officer was seen unable to control the rod and started swaying towards the seaside before falling into the sea while holding the rod. At that time, MP was still doing about 15 knots and was about two nautical miles from Escoumins pilot station.

1.1.9 The ASD1 immediately shouted man overboard (MOB) on the portable radio. The Master overheard the MOB from the portable radio and activated the MOB

¹⁰ Kept sea watches for the same period as the Second Officer's navigation watch (0000H-0400H and 1200H-1600H).

¹¹ Based on the statement of the ASD1.

¹² This was the first long lashing rod the Second Officer unlashed.

button on the ECDIS¹³ to mark the ship's position (Latitude 48° 20.0'N, Longitude 069° 21.4') and pulled the engine telegraph to the stop position to slow down the ship. Thereafter, the Master went to the port bridge wing and tried to release the MOB lifebuoy¹⁴ but was not successful (details in a separate paragraph).

- 1.1.10 At about 0933H, the Master was heard¹⁵ over the portable radio asking for another person to report to the bridge. Another Able Seafarer Deck (ASD2¹⁶) heard the Master's call and rushed to the bridge, as did the Third Officer from deck.
- 1.1.11 The rest of the crew on deck stopped their work after hearing the MOB report from the portable radio. Another Ordinary Seaman (OS2) who was working aft grabbed a lifebuoy near the poop deck and threw to the Second Officer¹⁷. The Chief Officer also ran towards aft but could not see the Second Officer anymore.
- 1.1.12 At about 0934H, the Master reported to Escoumins Traffic regarding the MOB occurrence while concurrently transmitting a distress message on the VHF radio. After being notified by the Master, the pilot boat which was approaching MP for embarking pilots proceeded directly to the MOB location to assist.
- 1.1.13 The Chief Officer was instructed to prepare the ship's starboard lifeboat, the designated rescue boat (hereinafter referred as the rescue boat), as per the emergency actions in response to the MOB situation. The Third Officer and the duty ASD2 who by then had arrived on the bridge, were instructed to keep a sharp lookout for the Second Officer.
- 1.1.14 At about 0937H, the Chief Officer together with the Second Engineer and OS2 boarded the rescue boat, tested its engine and lowered it into the water. The Master informed the Company regarding the occurrence, who in turn reached out to the local authorities for search and rescue (SAR) assistance.
- 1.1.15 When the rescue boat was waterborne, the engine could not be started. The

¹³ Electronic Chart Display and Information System, a system displays the information from electronic navigational charts and integrates position information from position, speed and heading and other sensors connected to the system. It has a button to quickly mark the ship's position.

¹⁴ SOLAS, Chapter III/7.1.3, Personal Life-saving Appliances - Lifebuoy with light and self-activating smoke signals and capable of quick release from the navigation bridge.

¹⁵ Recorded on the ship's VDR.

¹⁶ kept same sea watches as the Third Officer's.

¹⁷ According to statements gathered from crew working at aft, they could see the Second Officer's head appearing out of water twice, thereafter, could not see him anymore.

Master then ordered the Chief Officer to recover the rescue boat and to launch the port lifeboat. The rescue boat was unable to be recovered from the water, and subsequently the crew inside the boat used the embarkation ladder to exit and climb up to the main deck.

- 1.1.16 By about 1017H, the port lifeboat had been lowered into water (after testing its engine) and proceeded to the last known MOB location to carry out a search for the Second Officer.
- 1.1.17 At about 1031H, a Quebec Coast Guard boat (Cap De Rabast) arrived at the MOB location and assumed the role as the On-Scene Commander (OSC) to carry out the search together with the pilot boat and MP's lifeboat.
- 1.1.18 At about 1107H, the Master contacted the Maritime Rescue Coordination Centre Quebec Sub-Centre (MRSCQ)¹⁸ and updated the status of the SAR operations. Additional resources were deployed by MRSCQ for the SAR operations which included another Coast Guard boat (Sipu Muin) and a helicopter from the Royal Canadian Air Force. One Canadian registered commercial ship (NACC Quebec) also assisted in the SAR operations.
- 1.1.19 The SAR¹⁹ operations continued till about 1918H, when the OSC called off²⁰ the search operations. However, MP and its lifeboat continued the search until about 2052H when the daylight faded. After consulting the Company, the Master also called off the search and reported to the Escoumins Traffic.
- 1.1.20 After updating the MRSCQ, the river passage pilots subsequently boarded the ship, and MP resumed its passage to the Port of Montreal. The Second Officer remained missing.

1.2 The ship

- 1.2.1 MP was a container carrier deployed to trade between North America and Europe. She had previously called the Port of Montreal 13 times²¹ since 1

¹⁸ Coordinates search and rescue operations in St. Lawrence River among other places.

¹⁹ Expanding Square Search (ESS) and Parallel Track Search (PTS) were being used as guided by the International Aeronautical and Maritime Search and Rescue manual (IAMSAR). ESS is most effective when the location of the search object is known within relatively close limits. PTS is used to search a large area when the survivor location is uncertain and most effective over water.

²⁰ As advised by the MRSCQ to the Company, the initial theoretical survivability was determined to be six hours using the most optimistic value, and a model using the Second Officer's actual height and weight projected a survivability of three hours. The search efforts officially reduced at 2000H, at which point the police authorities took over the responsibility of the incident as a missing person case.

²¹ According to the Port of Montreal, MP had called the port for 127 times from 2006 to the time of occurrence.

January 2018.

- 1.2.2 At the time of occurrence, MP was drawing a draught of 10.5m forward and 10.7m aft. The height of fall from the standing platform to the sea level was about 12.5m.
- 1.2.3 At the cross deck on the port side between bay 18 and bay 22, three platforms were used for lashing or unlashng operation (see **figure 2**). The platforms in red dotted boxes were for lashing and unlashng 40-foot containers loaded at bay 18 and bay 22 respectively. The platform in green dotted box was for lashing and unlashng 20-foot containers loaded at both bays. A permanent safety railing erected at the ship side was to guard a person performing operations while standing in the green dotted box, from falling. Gaps of about half a meter each without any fencing²² existed when both bays (18 and 22) were loaded with 40-foot containers. These gaps would not exist if 20-foot containers were loaded. 40-foot containers were loaded at bay 18 and bay 22 at the time of the occurrence.

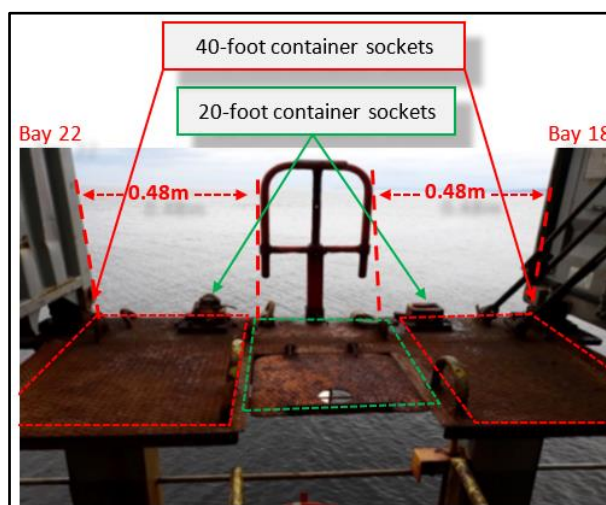


Figure 2 – View of the cross deck on the port side between bay 18 and bay 22
(annotated by TSIB)
(Source: the Company)

1.3 The crew

- 1.3.1 There were 21 crew of eight different nationalities on board MP. All the crew held valid STCW²³ competency certificates required for their respective

²² Some container ships are arranged with welded sockets, so that portable stanchions with ropes could be tied temporarily in the area when performing work at sea. There were no such sockets on MP.

²³ The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (or STCW), 1978 sets qualification standards for masters, officers and watch personnel on seagoing merchant ships.

positions on board and the working language was English. Being employed on a Singapore registered ship, all the crew were under a collective bargaining agreement (CBA)²⁴ between the Company and the respective unions in Singapore for officers and crew.

1.3.2 The qualification and experience of the Master, relevant officers and crew are tabulated in table-1:

Designation onboard	Nationality	Age	Qualification	Duration on board (month)	In rank service (Year)	Service in Company (Year)	Experience in unlashing task on MP (No. of voyages ²⁵)
Master	Romanian	42	COC – Master	2.5	1.5	13.6	N. A
Chief Officer	Ukrainian	40	COC – Master	<1	3.4	0.8	First voyage
Second Officer	Sri Lankan	31	COC – OOW²⁶ (Deck)	<1	1.6	10.1	First voyage
Third Officer	Filipino	28	COC - OOW	5.2	3.3	7.6	> 4
Chief Engineer	Ukrainian	43	COC – Chief Engineer	<1	3.3	11.3	N.A.
Second Engineer	Polish	50	COC – Chief Engineer	<1	4.1	3.6	First voyage
Third Engineer	Filipino	45	COC – OOW ²⁷ (Engine)	5.2	6.2	9.2	> 4
Electrical Engineer	Myanmar	32	Electro-Technical Officer ²⁸	<1	5.7	0.8	First voyage
Engine Cadet	Indian	21	Pre-sea Marine Engineering Training	1	<0.5	<0.5	<4
Fitter	Filipino	47	Deck/Engine/Catering Rating per STCW relevant requirements	<1	<0.1	5.6	First voyage
ASD1	Filipino	40		7.5	2.0	2.0	> 4
ASD2	Filipino	43		5.5	2.4	4.3	> 4
ASD3	Filipino	40		5.5	2.2	6.9	> 4
ASD4	Filipino	42		1.5	2.0	2.0	<4
OS1	Filipino	43		3	1.9	1.9	<4

²⁴ The CBA was a general scope agreement and stated that ship’s crew shall not perform cargo handling and other work **traditionally** or **historically** (emphasis added by TSIB) done by dock workers. If to be performed by ship’s crew, prior agreement of the International Transport Workers’ Federation (ITF) Dockers Union or ITF Unions was required and provided individual seafarers volunteer to perform such works and were to be compensated adequately.

²⁵ The unlashing experience for each individual crew on previous ships was unknown. The Company traced available records for the Second Officer sailed on previous ships. According to the Company, the Second Officer had no experience of lashing and unlashing of containers.

²⁶ Officer in-charge of a navigational watch as per STCW Convention, Chapter II, Section A-II/1.

²⁷ Officer in-charge of an engineering watch as per STCW Convention, Chapter III, Section A-III/1.

²⁸ As per STCW Convention, Chapter III, Section A-III/6.

OS2	Filipino	32		2.9	3.5	6.4	<4
Motor Man 1	Filipino	48		3	5.1	5.1	<4
Motor Man 2	Filipino	22		<1	<0.1	1.1	First voyage
Wiper	Filipino	41		5.5	1.7	3.7	> 4
Chief Cook	Filipino	40		5.2	1.4	15.3	> 4
Steward	Filipino	28		5.2	2.0	0.8	<4

Table-1

- 1.3.3 The Second Officer joined the Company as a deck cadet in 2009, and was promoted to the rank of Second Officer in January 2016, having sailed on four ships as Second Officer before joining MP on 9 May 2019.
- 1.3.4 The Second Officer was declared medically fit for service at sea by a medical centre approved by Director Merchant Shipping of Sri Lanka in Colombo dated 18 March 2019, which was valid for two years, without any medical restrictions. The medical report also indicated that the Second Officer did not have any eyesight or hearing problems and was not under any prescribed medication.
- 1.3.5 The Chief Officer mentioned that all the crew involved in unlash activities had been briefed verbally on the safety procedures for lashing and unlash operations, and had also undergone a computer-based training (CBT) on Container Lashing Basics as per the Company's requirements and that the Second Officer had completed the CBT within a week of joining MP.
- 1.3.6 The Third Officer confirmed that there was a physical demonstration on handling the lashing gears²⁹ conducted by the Chief Officer on 17 May 2019, and some of the crew³⁰ had physically handled the lashing gears during the demonstration. The demonstration was conducted at aft of the bay 34, which was in front of the accommodation³¹.
- 1.3.7 According to MP's work/rest hour records, maintained electronically, the

²⁹ Physical handling of all types of materials: short, long, vertical bars, turnbuckles and spanners. Such a physical demonstration was not a part of the Company's requirements but had been carried out on MP as a routine practice.

³⁰ The Chief Officer could not recall how many crew volunteered for the physical handling of the lashing gears. The Second Officer was present during this demonstration but did not physically handle the lashing gears.

³¹ Refer to figure 5 for the illustration on the location where the demonstration was done and the locations where the unlash tasks were carried out.

Second Officer had 13 hours of rest on the previous day (18 May 2019³²). After keeping four hours of bridge watch (0000H-0400H) in the early morning on the day of the occurrence, the Second Officer went for rest till the Chief Officer's call at about 0900H. The Second Officer also had a total of 95.5 hours of rest in the last 7-day period (12-18 May 2019), indicating compliance (as documented) with the STCW and MLC Convention's requirements concerning the hours of work and rest³³.

1.4 Lashing gears used on board

1.4.1 According to the ship's cargo securing manual, MP was provided with twistlocks, turnbuckles, short and long lashing rods used for securing containers loaded on deck.

1.4.2 The long lashing rod was used for the third-tier containers at the outermost rows of each bay on deck, had a length of 4.43m and weighed at 22.5kg (see **figure 3**).

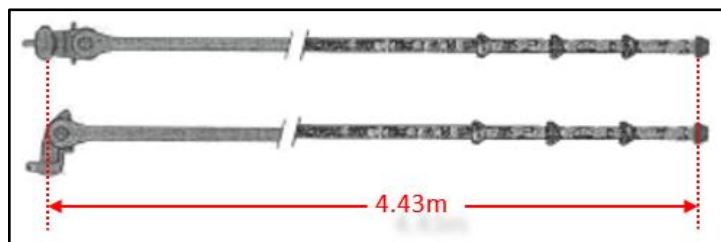


Figure 3 – Different views of the long lashing rod – annotated by TSIB
(Source: the ISM Manager)

1.5 Unlashing activity

1.5.1 According to MP's logbook records, unlashing activity was carried out twice for this voyage. The first³⁴ was carried out on the morning of 18 May 2019, after

³² An error was noted by an attending auditor from ABS after the occurrence on 22 May 2019 that, the Second Officer had signed the work permit on 18 May 2019, but the work/rest hour records shown he was at rest. The Company confirmed that the Second Officer had participated in the unlashing operation together with the other crew on 18 May 2019, that was, the day before the occurrence. The 13 hours of rest did not include the two hours (0900H-1100H) of unlashing task performed.

³³ STCW Chapter VIII and MLC, Reg 2.3 with regards to rest hour - Minimum hours of rest shall not be less than i) ten hours in any 24-hour period; and ii) 77 hours in any seven-day period. Hours of rest may be divided into no more than two periods, one of which shall be at least six hours in length, and the interval between consecutive periods of rest shall not exceed 14 hours.

³⁴ The period of the first unlashing operation was to be carried out between 0900H at position (Lat 48° 14.9'N Long 061° 14.7'W) and 1130H at position (Lat 48° 37.2'N Long 062° 15.3'W).

the ship entered the Gulf of St. Lawrence (see **figure 4**). The second³⁵ was on the morning of 19 May 2019 about two hours passage before arrival Escoumins pilot station.

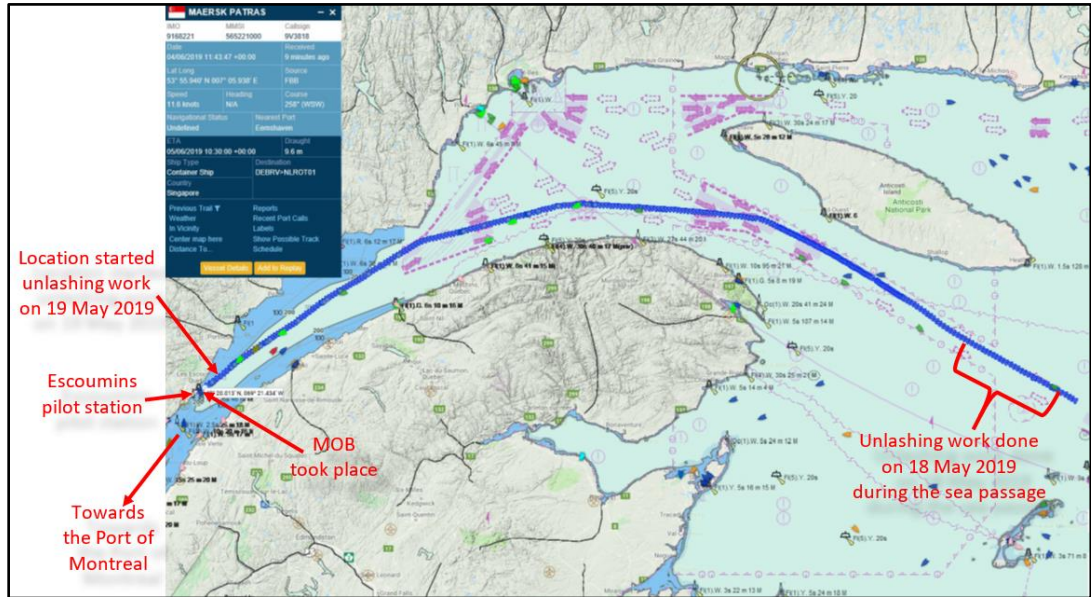


Figure 4 – Location view of the unlashing activities after MP entered the Gulf of St. Lawrence, solid blue line indicates the passage track of MP
(Source: the Company)

- 1.5.2 The tasks on the first day covered removal and housekeeping of lashing gears (short and long lashing rods and turnbuckles) from 7-9 centre rows³⁶ on deck, and the cross-deck hatch cleats³⁷ to be unlocked. The remaining rods (about 4-6 rows) on the outboard side were to be unlashied on the second day together with the unlocking of the semi-automatic twistlocks and base locks. The semi-automatic twistlocks and base locks on the outermost rows were to remain in locked position till the ship berthed.
- 1.5.3 According to the approved work permit on 19 May 2019, like the first day, both the Master and the Chief Engineer were alone on the bridge and in the engine room respectively. The rest of the 19 crew members were all to be on deck for the planned tasks. The Second Officer, had been called at 0900H, like on the first day and assisted in the planned tasks³⁸.

³⁵ The second unlashing operation was commenced at about 0900H at position (Lat 48° 25.4'N Long 069° 09.8'W).

³⁶ There were total 13 rows at each bay except the bay 02 was 11 rows on MP, 7-9 were referred to those centre rows not at outboard.

³⁷ Used to lock the hatch covers.

³⁸ Details of the tasks done by the Second Officer could not be established.

1.5.4 The 19 crew members were grouped into four teams, with a leader in-charge and a person designated to wear a set of fall arrestor (safety harness and lifeline) for removing the outermost lashing rods. The Second Officer was assigned to be in-charge of Team 2 (see table-2 and figure 5³⁹).

	Team 4	Team 3	Team 2	Team 1
Leader	ASD4	Chief Officer*	Second Officer	Third Officer
Members	OS2*	ASD3	ASD1	ASD2
	Fitter	Second Engineer	OS1*	Electrical Engineer
	Motor Man 2	Engine Cadet	Third Engineer	Motor Man 1
	-	Steward	Chief Cook	Wiper*
Assigned bays	38, 42, 46	26, 30, 34	14, 18, 22	02, 06, 10
Note: * Person assigned to wear fall arrestor to unlash most outward row of lashings				

Table-2

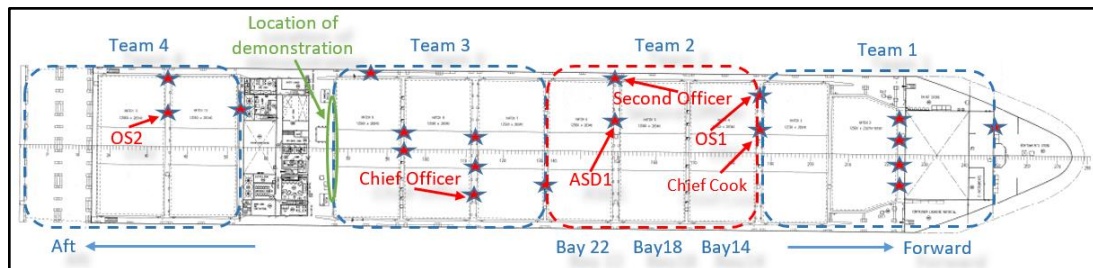


Figure 5 – Main deck view of ship's General Arrangement plan indicating: a) the location of the physical demonstration on 17 May 2019 indicated in green colour; and b) the positions of the relevant crew involved in unlash operation on 19 May 2019 indicated in red colour – annotated by TSIB
(Source: the Company)

1.6 The Company's SMS

1.6.1 The Company managed a fleet of container ships and had a few ships which would regularly call the Port of Montreal like MP.

³⁹ The Fitter from Team 4, after finishing the assigned tasks, was walking towards Team 3 to assist them, at the time of accident.

- 1.6.2 A Document of Compliance certificate was issued to the Company by Lloyd's Register on 4 September 2018 based on the verification completed on 5 September 2017 and it was valid until 3 November 2022. The last verification audit for this issuance was carried out on 31 October 2018.
- 1.6.3 A Safety Management certificate was issued by American Bureau of Shipping to MP on 27 September 2018 based on the verification completed on 11 April 2016 and was valid until 14 March 2021.
- 1.6.4 There was a separate chapter in the Company's SMS procedures, regarding lashing and unlashings of containers by ship's crew. Such work would only take place if it was unavoidable and under exceptional circumstances⁴⁰, e.g. when the ship would call a specific port, where stevedores were not available due to local restrictions.
- 1.6.5 The Company explained that at the Port of Montreal, the lashing and unlashings of containers had been historically done by ship's crew instead of stevedores, as there were insufficient trained stevedores for performing these tasks⁴¹. The investigation team gathered that, as such, it was operationally treated as a routine task for the ship's crew to perform lashing and unlashings of containers and that this procedure (exceptional circumstances) in the SMS was not applicable to the Port of Montreal⁴² (see paragraph 1.8 for more details).
- 1.6.6 When ship's crew were required to do the lashing and unlashings tasks, the Master of the ship would be required to evaluate the manpower required and ensure a review⁴³ of the risk assessment (RA) was carried out for the lashing and unlashings tasks and submit the intent for the tasks to the Company for approval⁴⁴. The Master was to seek agreement from the ship's crew if they would volunteer to perform the tasks. Thereafter, if the approval⁴⁵ was granted

⁴⁰ The example provided in the procedures was when shore stevedores were not available due to local restrictions such as labour strikes. In such situations, confirmation was formally required to be obtained by the Company's local representative from the dockworker's union and the terminal/port captain. The investigation team gathered that this procedure was not applicable to the Port of Montreal and that there were no such records available for the preceding voyages for the Port of Montreal.

⁴¹ The Company further added that terminals had raised concerns with expected labour shortages at the Port of Montreal.

⁴² There were thus no records of any confirmation sought from dockworkers union and terminal/port captain by the Company's local representatives for the preceding voyages for the Port of Montreal.

⁴³ The review referred to the RAs in the ship's records carried out in the past on the same scope of the task.

⁴⁴ The ship's Master would submit a form to the Company including information of number of container units lashed or unlashings and the list of crew involved. The Company would have the final decision to grant or object to such lashing and unlashings tasks to be performed by the ship's crew.

⁴⁵ Other than requirement to undergo a CBT, there was no pre-requisite experience required before approving the crew for these tasks. If the crew volunteered for the tasks, there were no other requirements.

by the Company to the volunteers, those crew would be remunerated by the Company for the lashing and unlashng work done. In this case, all the crew had volunteered for the unlashng work and the Company had approved this work.

- 1.6.7 The Company had a permit to work system which was required to be prepared before the commencement of task. A permit to work was valid for 24 hours. A safety toolbox meeting and RA were also required for any task requiring a permit to work.
- 1.6.8 The RA for a specific task on board had a system generated validity for two years. Prior to using any previous RA as a template⁴⁶, according to the Company's procedures, a review⁴⁷ by the participating crew and person-in-charge of the task was required every time before performing the work. The Company's expectation of the review was to evaluate the risk based on the existing conditions, e.g. ship at berth or underway, add documentation, hazards, controls, levels, mitigating measures, etc. if the condition was different from the RA template. If the review did not reveal any changes to be made, the same RA could be used.
- 1.6.9 Accordingly, a permit to work was to be issued. Lashing and unlashng works were identified as tasks requiring this permit. The Chief Officer had prepared the permit to work and approved by the Master electronically for the two unlashng tasks scheuled on 18 and 19 May 2019 and were signed by all participating crew including the Second Officer.
- 1.6.10 The RA for lashing and unlashng containers were last performed on 11 December 2017 by the ship's crew who had participated in the lashing and unlashng tasks at that time. The same RA was used as a template by the Chief Officer for briefing during the toolbox meeting for this voyage and no amendments were made to the RA and the associated control measures. A copy of the template RA was provided to the investigation team. Some of the relevant hazards identified with control measures (for the RA done in 2017) are extracted and shown in table-3.

⁴⁶ If some changes were required to be done in the RA, shore approval was required as per the SMS procedures. The investigation team established that since 2017, prior to the lashing and unlashng tasks performed by the crew on MP (arrival / departure Montreal), no changes had been proposed to the Company and the RA was deemed fit-for-purpose, based on the tool box meetings conducted and the subsequent permits to work. This was in line with the Company's expectations of the SMS.

⁴⁷ In the section of the Risk Assessment of the Company's SMS procedures, it was silent on how this review was to be carried out on board, example a paper review of the template RA or a physical review by going around the deck to assess its prevailing condition.

Hazards Identified	Control Measures
Working close to the ship side (unguarded)	Use fall arrestors (safety harness and lifeline)
Falling over the ship side	Toolbox talk, work in pairs, use fall arrestors, use experienced persons and on-site training given
Working near unprotected openings	Rig safety lines ⁴⁸

Table-3

- 1.6.11 The Company's SMS procedures regarding Personal Protective Equipment (PPE) matrix⁴⁹ for deck required crew members performing lashing and unlashings tasks at the outboard⁵⁰ side to wear a safety harness which was to be tied to a lifeline. At the time of occurrence, there were four sets of safety harnesses distributed to each team and one person of each team had been assigned to don the safety harness.
- 1.6.12 Under the Toolbox Talk, which was a part of the Company's SMS procedures, Stop Work⁵¹ authority was one of the items to be briefed. It was stated that all personnel were responsible for bringing attention to and using the Stop Work authority. However, there was no mention of how the Stop Work authority was to be exercised. In seeking clarification from the Company, the investigation team was informed that every crew was expected to stop an unsafe act or unsafe condition, when it was observed. To do so, the crew could give a verbal instruction and then raise a report afterwards.
- 1.6.13 The Company's SMS did not explicitly prescribe bridge watchkeeping manning levels⁵² under various conditions of navigation. According to the Company, this was to give room for Master's discretion to decide the appropriate bridge

⁴⁸ This control measure was not implemented for this voyage to address the two openings at the ship side which were due to the 40-foot containers.

⁴⁹ A list of tasks developed by the Company corresponding to the types of PPEs were required to be worn. As per this matrix, only two activities were deemed to require the need for wearing an inflatable (equipment), working overside and while rigging pilot ladders. There was no definition on what was deemed as working overside.

⁵⁰ The Company's SMS procedures did not explicitly contain a procedure defining the scope of the working overside, but the matrix indicated the type of PPE to be worn for lashing and unlashings of containers at the outboard side.

⁵¹ According to the Company, the Stop Work was a concept embedded and encouraged to be followed by all crew (including officers and ratings) within the Company and its fleet of ships as a part of the overall safety culture.

⁵² Bridge Procedures Guide - A publication, which is mandatory for carriage on the Company ships, contains (appendix B2) a manning matrix to assist in preparing ship specific requirements for watchkeeping levels under different conditions.

manning levels under prevailing circumstances, taking into consideration traffic, weather conditions complexity of situations and ship handling needs. At the time of the incident, the Master was alone in the bridge conning MP on autopilot and making approach to the pilot station.

- 1.6.14 The Company's SMS procedures relating to the search and rescue for a MOB situation was to carry out the listed actions⁵³ immediately and notify the nearest Rescue Coordination Centre and the Company. The procedures also provided some guidance on the survivability of a person fallen into the sea considering the temperature of the sea water⁵⁴.
- 1.6.15 During the last Port State Control (PSC) inspection which was carried out in the Port of Montreal on 24 October 2018, there was no deficiency raised. After the occurrence, the PSC officers boarded MP and carried out another inspection when MP was berthed at the same port. MP was issued with six deficiencies⁵⁵ and subsequently detained⁵⁶ on 21 May 2019. MP was released from detention on 23 May 2019 after rectification of the deficiencies.
- 1.6.16 Arising from the PSC detention, the ABS was required to carry out an audit on 22 May 2019. Three non-conformities⁵⁷ were raised for corrective actions to be followed up within a 90-day period, and an observation was raised summarising the deficiencies indicated in the PSC report.

⁵³ To display/sound MOB signal (comprising three prolonged blasts), release the bridge wing MOB buoy, post lookouts to keep the person in sight, change to hand steering for manoeuvring the ship to recover the person (launching rescue boat as appropriate), while continually plotting the ship's positions and recording weather and sea conditions.

⁵⁴ In a sea water temperature of 5-10°C, unconsciousness was estimated to be about 30 minutes to one hour with a survivability of about 1-3 hours depending on exhaustion levels.

⁵⁵ The list of deficiencies identified: 1) small font size of muster list posted for crew to read; 2) MOB lifebuoys at both port and starboard sides of bridge wings were stuck at stowage position and unable to release; 3) the stop button of the lifeboat engine could not allow the engine to be started; 4) insufficient numbers of safety harness and communication device on board; 5) the Second Officer fell overboard without wearing proper equipment, due to lack of risk evaluation, training and instructions to seafarers; and 6) failure and ineffective implementation of ISM Code. The 5th item was the ground for the detention.

⁵⁶ Refers to an action taken by a PSC Officer, if there are one or more detainable deficiencies found on a ship. Also known as a detention. In this case, the inspection report indicated the detention was due to deficiencies related to ISM Code and MLC Convention 2006.

⁵⁷ NC1075 - Various removable handrails, stanchions and sockets found damaged and wasted, lack of effective inspection of deck equipment and lack of appropriate corrective action in a timely manner; NC1076 - not all crew participated in lashing operations in previous voyage signed the work permit as required. Errors were noted in work/rest hours recorded for the Second and Third Engineers where they signed work permit but records indicated that they were at rest on 22 April 2019; and NC1077 - lack of effective risk assessment and implementation of the control measures for the identified hazards as evident that the Second Officer did not wear safety harness and personal floatation device but performed unlash work at the ship side.

1.7 Life-saving appliances

Lifeboat

- 1.7.1 The ship's rescue boat was a davit launch gravity-type⁵⁸. As indicated in the ship's routine inspection and maintenance records, the engines for both port and starboard lifeboats were tested⁵⁹ on a weekly basis per requirements in SOLAS⁶⁰.
- 1.7.2 Prior to lowering the rescue boat, the rescue team comprising the Chief Officer, Second Engineer and OS2, boarded the boat at the stowage position. The Second Engineer started the engine as a part of pre-launching procedures, tested it to satisfaction and switched it off. When the boat was subsequently lowered into the water, the engine could not be started. A few attempts were made by the Chief Officer and the Second Engineer but were unsuccessful.
- 1.7.3 When the rescue boat engine failed to start, the deck crew⁶¹ assisted to hoist the rescue boat (using the winch) back on deck. During this process, the hoisting got suspended midway and it was decided to lower the rescue boat again by gravity to the water. The rescue crew then exited the rescue boat using the embarkation ladder and climbed up to the deck. It was later established that the winch brake lever on deck (which had a safety mechanism) was at an incorrect position and had not been properly positioned causing the hoisting to stop midway. The rescue boat was eventually recovered on board prior to the ship resuming its passage.
- 1.7.4 After the PSC inspection (see paragraph 1.6.14), a close-up inspection of the rescue boat was carried out by the crew by opening the operating panel. Although there was no evidence of debris or carbonisation found inside the panel, the spring inside the 'STOP' button was found stuck. The 'STOP' button was replaced, and the engine was able to be started.
- 1.7.5 While carrying out the SAR operations, the crew reported that the engine of the port lifeboat had tripped twice. After hoisting the port lifeboat on board, the crew found that the fuel valve controlling the fuel supply from the tank to the engine was partially open, causing the engine to trip. The fuel valve was in an

⁵⁸ Requires the winch brake lever to be lifted to launch the lifeboat by gravity.

⁵⁹ By the Fourth Engineer, the test included running the engine for a period of not less than three minutes. There were no known issues recorded with either of the engines.

⁶⁰ SOLAS Chapter III, regulation 20, Operational readiness, maintenance and inspections.

⁶¹ The Bosun and ASDs, supervised by the Chief Engineer.

inconvenient location as such a long metal rod had been fabricated⁶² for ease of opening/closing it (see **figure 6**).



Figure 6 – View of the long metal rod fabricated for ease of opening/closing the fuel valve (Source: the Company)

Releasing MOB lifebuoy⁶³

- 1.7.6 After confirming that the Second Officer had fallen overboard, the Master activated the quick release of the MOB lifebuoy unsuccessfully. It was found out later that the self-activating smoke signal, which was attached to the MOB lifebuoy with a lanyard, when deployed, got stuck at the mounting bracket on the ship's structure and resulted in the MOB lifebuoy hanging in the air.
- 1.7.7 A closer inspection of the unit was carried out after the occurrence and it was noted that the plastic grip securing the smoke signal to the mounting bracket was still in place, preventing the smoke signal from being released (see **figure 7**), i.e. the lanyard attached to the lifebuoy did not pull the grip off to release the smoke signal from the bracket. A new set of MOB lifebuoy with self-activating smoke signal was replaced during the port stay in Montreal.
- 1.7.8 The records of life-saving appliances on board indicated that the self-activating smoke signal was manufactured in January 2017 with a validity of three years. Both MOB lifebuoys (port and starboard) with self-activating smoke signal had been last inspected⁶⁴ on 16 May 2019 according to the records maintained on

⁶² This rod was not a part of the original design and it could not be established when this had been fabricated. According to the Company, sister ships of MP also had same long metal rod fitted in the lifeboat.

⁶³ Was installed with a quick-release arrangement, which by a single action was designed to automatically release the lifebuoy into the water, activating the smoke as well as the light signal.

⁶⁴ SOLAS, Chapter III/20.7.2, Operational readiness, maintenance and inspections - monthly inspection requirements.

board. Similarly, the records also indicated that the last lowering and maneuvering of the two lifeboats in the water as per the requirements in SOLAS⁶⁵ were in April 2019.

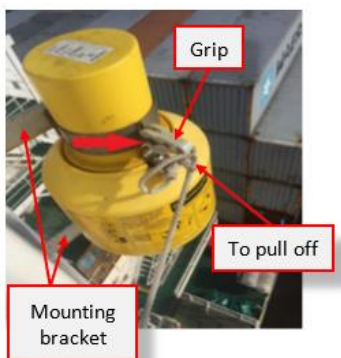


Figure 7 – View of the self-activating smoke signal mounted on ship's structure
(Source: The Company)

1.8 Lashing and unlashng tasks

1.8.1 Lashing and unlashng of containers are tasks commonly performed by shore stevedores in most of the container ports in the world. The Port of Montreal is located 261nm upstream from the Escoumins pilot station in the St. Lawrence River. For decades, it had been a common practice for ship's crew to perform lashing and unlashng operations while the ships transited the river. This practice applied to all ships calling the Port of Montreal.

1.8.2 Transit time in the river passage averages about 20 hours, during which shipping companies and their respective Masters had a common understanding that the use of this time to lash and unlash containers expedited turnaround times for the vessels, especially considering the non-guaranteed availability of stevedores and challenges with contractual agreements between longshoremen, as well as matching the tidal window at Quebec for safe passage.

1.8.3 Transport Canada advised the investigation team that the Master of a ship has to observe section 105⁶⁶ of Canada's Cargo, Fumigation and Tackle

⁶⁵ Chapter III, Regulation 19. 3.4, each lifeboat shall be launched, and manoeuvred in the water by its assigned operating crew, at least once every three months during an abandon ship drill.

⁶⁶ Refers to the Cargo Securing Manual, which requires the Master of a ship engaged on or about to engage on a voyage to ensure that requirements of SOLAS VI/5.6, as amended, are met, i.e. cargoes other than in bulk types shall be loaded, stowed and secured throughout the voyage in accordance with the approved Cargo Securing Manual.

Regulations. Section 109 of the Canada Shipping Act, 2001 further requires the Master of a ship to take all reasonable steps to make sure that the people on board, including workers, are safe. The Master of a ship also has the overall responsibility for making sure that the securing of all cargoes, including containers lashing and unlashings, is done safely and follows the approved Cargo Securing Manual and the Company SMS's procedures.

- 1.8.4 The Port of Montreal does not regulate lashing and unlashings activities. The investigation team was further advised that the stevedores at the Port of Montreal work for an independent corporation⁶⁷ that manages and trains the container terminals workforce. A small group of workers are trained for lashing and unlashings of vehicles on roll-on/roll-off carrier prior to departure from the berth or after arrival at berth. Lashing and unlashings of containers by stevedores were carried out only exceptionally⁶⁸ in the Port of Montreal and there was no further information available to determine how many stevedores would be available for containers lashing and unlashings.
- 1.8.5 The Company's representatives, who attended a discussion⁶⁹ in July 2019, shared with the investigation team that the MOB occurrence on MP was an exceptional case in the Port of Montreal, at least in the last 10 years. The investigation team further established that officials from Transport Canada had carried out random inspections on ships arriving the Port of Montreal. More than 20 ships inspected in 2018 by Transport Canada were found to have adequate safety procedures for performing the unlashings tasks while ships were underway and approaching the port. It could not be established whether MP had been a part of those random inspections.
- 1.8.6 According to Annex 14 of the Code of Safe Practice for Cargo Stowage and Securing (CSS Code⁷⁰), workers⁷¹ who are involved in securing cargo should be trained in the lashing and unlashings of containers as necessary to carry out their duties in a safe manner, to develop the knowledge and mental and physical manual handling skills that they require to do their job safely, and also

⁶⁷ Montreal Maritime Employers Association (MEA).

⁶⁸ In the past 10 years, this task was done by stevedores only about three times.

⁶⁹ Participants at this discussion were representatives from the Transport Canada, Port of Montreal, shipping lines calling the Port of Montreal and other relevant stakeholders with interest in lashing and unlashings tasks in the port. The Company expressed that stevedores should be available for lashing and unlashings tasks at the Port of Montreal, like in other ports of the world, and the ship's crew should focus on the preparation of ship's arrival or departure operation work.

⁷⁰ This mandatory Code applies to cargoes carried on board ships (other than solid and liquid bulk cargoes and timber stowed on deck).

⁷¹ The code does not differentiate or specify who these workers are.

to develop general safety awareness to recognise and avoid potential dangers.

- 1.8.7 Similarly, the ISM Code⁷² puts the onus on the Company's SMS to ensure that appropriate procedures are in place for the safety of persons.

1.9 Environmental condition

- 1.9.1 From 0900H to 2100H on 19 May 2019, the ship's logs indicated that there was northerly or north-northeast wind at speed of about 4-10 knots (Beaufort scale, force 2-3), and the wave height was about half a meter or less (see **figure 8**). The sea current was southerly at rate of less than one knot. The sky was overcast throughout the period, and the visibility was approximately at about 15 nautical miles.

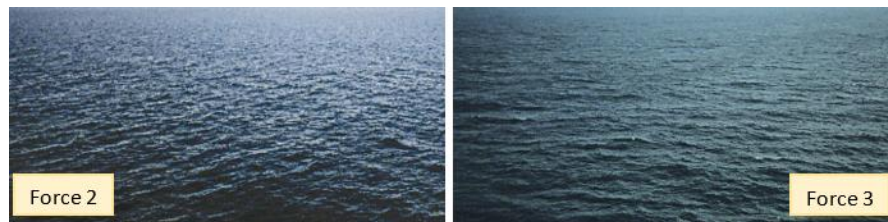


Figure 8 - Illustration of sea state at Beaufort scale of wind force
(Source: The Mariner's Handbook, NP100)

- 1.9.2 The accident occurred during daylight hours. There was no alteration of course or rolling movement experienced by the ship at the time of occurrence. According to the ship's logs, the sea water surface temperature was between 5°C and 7°C and air temperature was between 6°C and 8°C.

⁷² Element 7, Shipboard operations – The Company should establish procedures, plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of personnel, ship and protection of the environment. The various tasks should be defined and assigned to qualified personnel.

2 ANALYSIS

2.1 The occurrence

- 2.1.1 The Company's SMS procedures allowed the ship's crew to perform lashing and unlashng tasks for ports where there was insufficient support of stevedores, such as the Port of Montreal. Utilising the time for the crew to perform unlashng of containers while underway in the long river passage by liners seemed reasonable.
- 2.1.2 Based on the information available, there was no evidence to suggest MP experienced rolling or alteration of course that could have contributed to the occurrence. Although the chilly weather at that time might increase the difficulty in the unlashng operation, there was no evidence to suggest this has contributed to the occurrence.
- 2.1.3 Despite being briefed on the roles of the persons, it could not be established why the Second Officer went to the outmost row and attempted to remove the outboard lashing rod, since this role was to be performed only by persons wearing a safety harness attached to a strong point, e.g. the OS1 in Team 2.
- 2.1.4 The location where the Second Officer was, prior to the fall, had two openings, each of about half a metre, without fencing near the ship side (see paragraph 1.2.3). Removal of a long and heavy vertical rod from the outmost row on the third tier would require careful handling and tactful skills to lower it down and at the same time to maintain balance as it was near the ship side. Prior to the occurrence, the Second Officer had attended a CBT. The Second Officer also witnessed the demonstration where the other crew had physically handled the lashing gears on 17 May 2019, and participated in the unlashng operation once on 18 May 2019 (the day before the occurrence).
- 2.1.5 The Second Officer was sleeping (about five hours after the bridge watch) prior to being called to perform the unlashng task. It could not be ruled out that sleep inertia⁷³ might somewhat have affected the Second Officer's ability in assessing the risk involved in handling the long and heavy rod near the ship side.
- 2.1.6 A combination of insufficient experience in these tasks, lack of a physical handling of lashing gears, in particular a long and heavy rod, and possibly as

⁷³ Sleep inertia refers to the transitional state between sleep and wakefulness, indicated by impaired performance and reduced vigilance. The intensity and duration of the effect vary depend on each individual and situational factor, its present may last minutes to several hours.

a result of sleep inertia would have likely caused the Second Officer to underestimate the difficulties in controlling the long rod. Consequently, the Second Officer lost balance when the rod swayed towards the seaside and causing the Second Officer to fall into the water through the opening on deck.

2.1.7 Recognising that due to shipboard operations short periods of sleep experienced by the crew could result in sleep inertia, it is desirable for the senior officers to assess the individual's condition and mental readiness before a task is assigned. The individuals should also be aware of the effects of sleep inertia and get themselves to freshen up prior to performing a task.

2.1.8 The Second Officer was not wearing a floatation device and was sighted by the crew to be at the water surface twice before disappearing. A fall from a height of 12.5m into the water could have resulted in serious injuries and affected the Second Officer's ability to stay afloat.

2.2 **Risk assessment (RA) for lashing and unlashng tasks**

2.2.1 To perform lashing and unlashng tasks by the ship's crew, a permit to work, toolbox meeting and RA were required. The Chief Officer prepared the permit to work and used a template RA established in 2017. While the Company required the template RA to be reviewed each time prior to performing the lashing and unlashng tasks, there was no instruction on how the review was to be carried out. The RA was reviewed as a part of the toolbox meeting which also covered safety briefing, assignment of teams/tasks, etc. with all participating crew for this voyage in a period of less than 15 minutes.

2.2.2 The RA required safety lines to be rigged at openings as a risk control measure to prevent falling overboard, there were no such safety lines rigged at the two openings between bay 18 and bay 22 (refer to figure 2). According to the additional control measures listed in the RA, a toolbox meeting pertaining to the unlashng task was also required to be done on-site. While it is unclear of the need for the toolbox meeting to be carried out on-site, the review of the RA should be done on-site as the conditions on board at the time of carrying out the current task could be different from the 2017's which may result in different hazards.

2.2.3 There was, however, no evidence of a review of the RA being done on-site. Had the review of the RA been done on-site, the unfenced openings could have been noticed and addressed. Hence, it would be desirable for the Company to specify that the review of the RA template is to be done at the

work site to improve the effectiveness of the RA reviewing process.

2.3 **PPE matrix**

2.3.1 Though the Company's PPE matrix provided guidance on the use of PPE, there was no requirement in the matrix for donning a floatation device to mitigate the potential risk of drowning for a person falling in the water while performing a task near the ship side. Had the requirement to wear a floatation device, been stipulated, and had the Second Officer worn it, there would be an increased chance of staying afloat even if the Second Officer had been injured, and thus capable of being sighted by the search teams who had promptly responded.

2.4 **Stop Work for unsafe act**

2.4.1 Though the OS1 had verbally asked the Second Officer not to go near the ship side for unlashing as the Second Officer was not wearing safety harness, this verbal advice only managed to stop the Second Officer from performing an unsafe act momentarily but did not stop the unlashing activity. The Second Officer continued with the unsafe act at the forward of bay 22, which resulted in him falling into the sea.

2.4.2 In this case, it appeared that OS1's communication with the Second Officer was more of an advice or a reminder, rather than exercising a Stop Work authority, to the Second Officer. Exercising a Stop Work authority would result in the the activity being performed at that time to be stopped and a review of the unsafe act to be carried out, prior to resuming the activity again.

2.4.3 The investigation team opined that if the Company had intended for an immediate Stop Work authority to be issued verbally, it should have been specified in the SMS procedure and appropriate training provided to the crew accordingly. That would allow all the crew, regardless of rank, to take verbal advice seriously.

2.4.4 It would have been desirable to raise a physical safety observation card on the spot, which would allow for any crew observing an unsafe act or a condition to stop the work so that the Company's concept of safety culture (see footnote 51) permeates effectively. Having such a provision would also allow to overcome any barriers that may arise due to cultural differences or authority gradient, while motivating the crew to work safely at all times.

2.5 **Practice on lashing and unlashng tasks**

- 2.5.1 The crew on board MP had undergone a CBT and attended a safety briefing prior to the commencement of the unlashng task. It is known that CBT has its limitations as it is not able to provide the actual feel and touch of the task such as, in this case, appreciating the difficulties on the handling of the long and heavy lashing rod. This is more so for those who lack experience in carrying out lashing and unlashng operations. This difficulty was evident from the Second Officer's last action (see paragraph 1.1.8) of not being able to control the long lashing rod after removing it from the third tier.
- 2.5.2 As highlighted in the CSS Code workers should be trained in the lashing and unlashng containers to carry out the tasks in a safe manner. It is not routine for ship's crew to perform lashing and unlashng of containers as these are historically and traditionally performed by stevedores. As such, if there is a need for the ship's crew to perform such duties, it is important for any inexperienced crew to have physical hands-on practice under the supervision and guidance by experienced crew to assist them in appreciating the challenges and likely hazards associated with performing such tasks.

2.6 **Assignment of lashing and unlashng tasks**

- 2.6.1 The crew members were split into four teams for the unlashng task, each team had a leader. However, the role of the leader was not clear from the RA or the toolbox meeting. If the leader's role was to primarily supervise the safe operation of all team members, then this should have been clearly articulated in the plan. For instance, the Chief Officer was assigned to wear a safety harness to unlash the outermost row of lashings. To have a better supervision of the team, this job could have been delegated to another crew.
- 2.6.2 It was also noted that the Chief Officer and Second Officer lacked experience (see table-1) in performing the lashing and unlashng tasks but were assigned to be the team leader(s). It must be recognised that a team leader should be a person who is familiar with the tasks and thus in a better position to recognise the hazards, anticipate potential risks and ensure that the safety of team members is not compromised.
- 2.6.3 When the Master submitted the crew list to the Company for performing the unlashng task, although the crew who seldom perform work on deck (such as Chief Cook and Steward) had volunteered (for being remunerated), these crew should not have been considered to perform this task as it would be difficult for them to appreciate the risks involved with manual handling skills and working

near containers, even if a safety briefing was carried out.

2.7 **Bridge manning level**

- 2.7.1 The Company's SMS procedures did not explicitly prescribe bridge watchkeeping manning levels under various conditions of navigation, as it was left to the Master's discretion. If additional persons were on the bridge at the time of occurrence, such as helmsman and officer of the watch, the actions for the MOB could have been better carried out. For instance, the displaying/sounding of MOB signal to alert ships in the vicinity, changing to hand steering for manoeuvring the ship to avoid the person fallen into the sea from getting towards the propeller.
- 2.7.2 On the same note, MP was proceeding at about 15 knots with a single watchkeeper in a shipping channel, approaching a pilot station about two nautical miles away. Under such a situation, a medical event resulting in incapacitation of the sole watchkeeper could have had immediate serious consequences for the safety of the ship and crew on board.
- 2.7.3 The investigation team thus held the view that having a guidance on manning level allows better allocation of resources instead of leaving it to individual's discretion.

2.8 **Issues related to Life-saving Appliances**

- 2.8.1 The malfunctioning of the rescue boat engine, issue on release of the MOB lifebuoy and incorrect procedure to hoist the rescue boat suggested there was a lack of effective maintenance and training on the life-saving appliances on board.
- 2.8.2 The modification of the port lifeboat fuel valve with a long metal rod, while had made it easier for the crew to operate the valve, had introduced a hazard which resulted in tripping of the engine as a result of the valve being insufficiently opened. The modification of such life-saving appliances has an implication on safety and the lifeboat maker should have been consulted for a suitable solution.
- 2.8.3 The MOB lifebuoy was still within the three-year validity and despite the monthly inspection carried out, the grip holding the self-activating smoke signal was not released by the weight of the MOB lifebuoy. While the reason for the grip not releasing could not be established, the inspection routine on board

should be enhanced to detect any issues early to ensure MOB lifebuoy is able to deploy at any time.

2.8.4 The crew took about 45 minutes from the onset of the MOB occurrence to successfully launch the lifeboat. As indicated in the Company's SMS, in a sea water temperature of 5-10°C, unconsciousness was estimated to be about 30 minutes to one hour. The delay in launching the lifeboat for recovering a person in water would reduce the time for the person to stay conscious and hence reduced the survivability, even if the person was able to stay afloat. This occurrence highlighted the importance of proper maintenance and inspection of life-saving appliances on board as well as the proper training of the ship's crew to operate them.

2.9 **Party performing lashing and unlashng tasks**

2.9.1 The investigation team noted that lashing and unlashng tasks are commonly performed by shore stevedores in most parts of the world. These stevedores are specifically trained for physical manual handling to carry out the task in a safe manner, by being able to recognise associated risks. This physical skill requires time and practice to develop, which may have its limitations for the ship's crew to achieve as such tasks are not their primary roles.

2.9.2 The investigation team also noted that without much prior experience of lashing and unlashng, would require an even longer time for the ship's crew to develop these skills. Limiting the tasks to be performed to only those who have sufficient experience on board could also extend the time taken for these tasks to be completed or affect the rest hours of the limited crew with such experience.

2.9.3 The investigation team thus opined that even with hands-on training⁷⁴ for the ship's crew, a ship's crew would still not be able to achieve the same level of skill sets as that of a shore stevedore. It would thus be desirable for the Port of Montreal to establish a framework where shore stevedores are available to avoid deploying ship's crew for these tasks. In the interim, lashing and unlashng tasks by the ship's crew should only be considered to be performed safely and whenever practically viable, at berth or at the anchorage.

⁷⁴ Also depends on when the volunteered crew joined the ship. In this case, the Second Officer joined ship less than a month when MP was calling the Port of Montreal. If large crew change was happened in previous port, and the next calling port would require ship's crew to carry out unlashng tasks, chances of hands-on practice would be limited.

3 CONCLUSIONS

From the information gathered, the following findings, which should not be read as apportioning blame or determining liability to any particular organisation or individual, are made.

- 3.1 The Second Officer did not wear a fall arrestor nor a floatation device while unlashng the outboard container at unprotected openings near ship side.
- 3.2 The Second Officer could not balance himself after removing the long and heavy lashing rod and fell overboard into the sea.
- 3.3 Prior to performing the unlashng task, the Second Officer was sleeping and was called to attend a briefing by the Chief Officer. Sleep inertia might have affected the Second Officer's ability to assess the risk and balancing himself.
- 3.4 While unprotected openings had been identified as hazards with appropriate control measures in the RA, the unprotected openings were not installed with safety lines as required by the RA.
- 3.5 The Company did not specify that the review of RA for lashing and unlashng tasks to be done on-site which cast doubt on the effectiveness of the review of the RA.
- 3.6 The Company's PPE matrix did not include the need of personal floatation device when performing unlashng task at outboard rows near ship side where there was a potential risk of drowning for a person falling in the water.
- 3.7 The verbal advice from the OS1 did not stop the Second Officer from performing the unsafe act at another location.
- 3.8 While the Company indicated that a verbal advice constituted a formal Stop Work authority, this was not specified in the SMS procedure and there was no specific training in this regard. It would also have been desirable for provision to raise a physical safety observation card to overcome any barriers that may arise due to cultural differences or authority gradient.
- 3.9 Although there was a safety briefing conducted and the crew had undergone a CBT, the Second Officer did not participate in the physical handling of the lashing gears. As a result, the hazards associated with these tasks were likely underestimated.

- 3.10 The role of the team leader for the unlashing task was not clearly defined, which should have included primarily supervising the safe operation of the team members.
- 3.11 Crew who were not familiar with shipboard operations were also assigned to perform the unlashing task.
- 3.12 The Master was alone on the bridge when MP was approaching pilot station and thus was not able to carry out all the actions required for a MOB scenario. There were no clear guidelines or matrix in the SMS on what the bridge manning levels were supposed to be under varying conditions of navigation.
- 3.13 Several life-saving appliances did not function properly during the MOB situation highlighted the lack of proper maintenance and effective inspection of the life-saving appliances as well as the lack of proper training of the ship's crew in operating the life-saving appliances.
- 3.14 The improper modification done on the fuel valve had resulted the lifeboat engine to trip twice during the search.
- 3.15 The grip securing the self-activating smoke signal attached to the MOB lifebuoy did not release.
- 3.16 There was insufficient support of skilled stevedores at the Port of Montreal, and the ship's crew were deployed to perform lashing and unlashing of containers.

4 SAFETY ACTIONS

During the course of the investigation and through discussions with the investigation team, the following safety actions were initiated by the relevant stakeholders.

4.1 Actions taken by the Company

4.1.1 The following safety actions had been taken to address the gaps for preventing similar recurrence:

- a) The findings of the occurrence were shared with its fleet of ships after the Company's internal investigation was completed.
- b) Conducted a fleet wide emergency preparedness drill / safety campaign on board ships on launching and testing of lifeboats, including the dedicated rescue boat, and performing of MOB manoeuvre together with emergency steering.
- c) Reviewed existing PPE matrix on lashing and unlashings of containers, included the floatation device to be donned when performing lashing and unlashings tasks.
- d) Developed new guidelines for selecting crew who have the level of knowledge and skill to perform the lashing and unlashings tasks and provide training as required. Crew who are not familiar with shipboard operations, e.g. cooks, are excluded for lashing and unlashings tasks.
- e) Developed a list of precautions for safe lashing and unlashings in the revised procedures, evaluating individual crew's physical capabilities when forming teams, training of proper techniques for handling lashing gears, wearing fall arrestor and a floatation device when working on outboard rows, establishing a plan and sequence of the operation, highlighting the permit to work, toolbox meeting and risk assessment before operations, etc.
- f) While conducting internal audit across its fleet of ships, sampling checks will be more focus towards toolbox meeting, permit to work, and adhering to work instructions.

- g) The lashing pattern on same class of ships as MP was amended. The long lashing rods are no longer required in the outermost row. The vertical wind lashing pattern was removed from the default lashing pattern. Relevant amendments in the ships' loading computer and cargo securing manual, had been made and approval obtained from the ship's classification society.

4.2 Actions taken by Transport Canada

- 4.2.1 Transport Canada issued a ship safety bulletin⁷⁵ (No.14/2019) on 26 November 2019 after this occurrence. The bulletin was to remind ship's agents, terminal operators and ship's Masters about the requirements of Canadian and International regulations for safe securing of cargo on ships.

⁷⁵ Title of the bulletin – Requirements for safe securing of containers and other cargoes on board vessels (website: www.tc.gc.ca/ssb-bsn).

5 SAFETY RECOMMENDATIONS

A safety recommendation is for the purpose of preventive action and shall in no case create a presumption of blame or liability.

- 5.1 For the Company (the Operators / ISM Managers)
 - 5.1.1 To establish a structured training programme so that inexperienced crew performing the lashing and unlashng tasks receive hands-on practice before the actual deployment. **[TSIB-RM-2020-038]**
 - 5.1.2 To review the SMS procedure for Stop Work authority, e.g. introduction of physical safety observation cards. **[TSIB-RM-2020-039]**
 - 5.1.3 To establish clear guidelines in the SMS with a matrix of minimum bridge manning level under varying environmental and traffic conditions for enabling an effective response and decision making. **[TSIB-RM-2020-040]**
 - 5.1.4 To enhance the inspection regime on board to ensure all life-saving appliances are always functional and kept ready for use. **[TSIB-RM-2020-041]**
 - 5.1.5 To review the processes on board for modification of equipment especially life-saving appliances. **[TSIB-RM-2020-042]**
 - 5.1.6 To raise the awareness of sleep inertia which could affect the safety of crew. **[TSIB-RM-2020-043]**
- 5.2 For the Port of Montreal
 - 5.2.1 To consider establishing a framework to ensure skilled stevedores are available at the Port of Montreal for lashing and unlashng tasks of containers. **[TSIB-RM-2020-044]**

- End of Report -