



SAFETY INVESTIGATION REPORT

201903/020

REPORT NO.: 06/2020

March 2020

The Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 prescribe that the sole objective of marine safety investigations carried out in accordance with the regulations, including analysis, conclusions, and recommendations, which either result from them or are part of the process thereof, shall be the prevention of future marine accidents and incidents through the ascertainment of causes, contributing factors and circumstances.

Moreover, it is not the purpose of marine safety investigations carried out in accordance with these regulations to apportion blame or determine civil and criminal liabilities.

NOTE

This report is not written with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The report may therefore be misleading if used for purposes other than the promulgation of safety lessons.

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MV VERMONT TRADER **Serious injury to crew member** **in position 22° 09.63' N 114° 09.44' E** **21 March 2019**

SUMMARY

On 21 March 2019, *Vermont Trader* was lying at anchor at the Southeast Lamma anchorage, in Hong Kong.

The second engineer, fourth engineer and an able seafarer (AB) set out to open the engine-room's hatchway. The second engineer positioned himself beside the counterweight. As both the fourth engineer and the able seafarer lifted the engine-room hatchway cover, the second engineer, placed his body weight onto the counterweight to assist in the opening of the engine-room

hatchway.

During this operation, the second engineer's left leg slipped and became trapped between the hatchway coaming and the counterweight, resulting in a fractured shinbone. He was subsequently evacuated by helicopter and transferred to the nearest hospital, for treatment.

The MSIU has issued three recommendations to the Company designed to prevent the recurrence of similar unsafe practices.



FACTUAL INFORMATION

Vessel

Vermont Trader, a 54,271 gt container ship, was built in 2004 and registered in Malta. She was owned by MS “Vermont Trader” GmbH & Co. KG., managed by Columbia Shipmanagement (Deutschland) GmbH, of Germany and was classed with Det Norske Veritas – Germanischer Lloyd (DNV-GL). The vessel had a length overall of 294.05 m and a moulded depth of 21.60 m. *Vermont Trader* had a total container capacity of 4,992 TEU.

Propulsive power was provided by a 9-cylinder MAN B&W 9K90MC, two-stroke, internal combustion engine, producing 41,130 kW at 104 rpm. This drove a single, right-handed fixed pitch propeller to reach an estimated service speed of 24 knots.

Crew

Vermont Trader’s Minimum Safe Manning Certificate required a crew of 15. There were 21 crew members on board at the time of the accident. All crew members were from the Philippines, except for the master, who was a Croatian national.

The injured second engineer was 48 years old. He had a total of 16 years of seagoing experience. He had obtained his chief engineer’s Certificate of Competency in 2016, which was issued by the Republic of the Philippines, and had been sailing as a second engineer for a total of eight months.

Environment

On the day of the accident, the weather was clear with calm seas. The wind was blowing from the South Southeast with a light breeze and the air temperature was 28 °C. The sea temperature was recorded at 23 °C.

Narrative¹

On the morning of 21 March, *Vermont Trader* was lying at anchor at the Southeast Lamma anchorage area, in calm weather.

The second engineer started work at 0800, following more than 14 hours of rest. Reportedly he was in his working gear which consisted of a pair of safety shoes, a boiler suit, a safety helmet and a pair of gloves.

At around 1000, the engineers were informed that spare parts for the main engine crosshead bearings had arrived and needed to be transferred to the engine-room. The chief engineer conducted a work plan to discuss the transfer to the engine-room. The second engineer was designated to lead the operation to transfer the spare parts to the engine-room through the engine-room hatchway (Figure 1). The operation was coordinated with the deck crew; with the deck crew operating the ship’s crane and the engine-room crew to open the hatchway with the help of an AB.



Figure 1: The engine-room hatchway in the open position

¹ Unless otherwise stated, all times are ship times (UTC + 8).

The second engineer went to inspect the packaged spare parts and instructed the deck crew to lift the packages, following which, the second engineer proceeded to the hatchway area to help the fourth engineer and the AB to open the access.

The fourth engineer and the AB lifted the hatchway cover from the front access of the opening, while the second engineer put his weight on the counterweight to assist with the opening process (Figure 2).

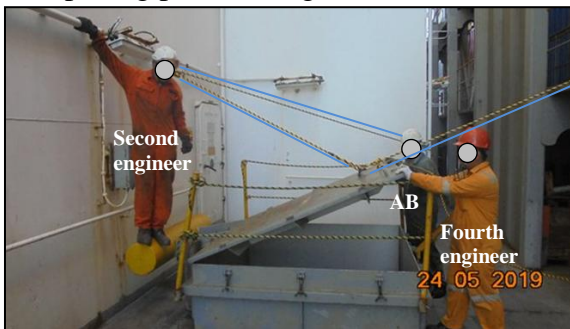


Figure 2: Simulation of the accident (the line traced in blue was used as a safety measure during the crew's simulation of the accident)

The second engineer intended to secure the hatchway cover in the open position by inserting a safety pin, at the hinge of the hatchway. However, the second engineer fell during the opening and his left leg was caught in between the counterweight and the hatchway coaming (Figure 3).

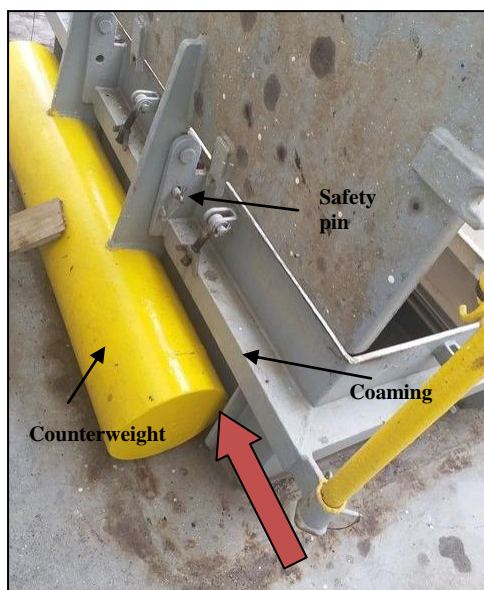


Figure 3: Red arrow showing the location where the lower leg of the second engineer was stuck

The second engineer immediately alerted the crew he was working with, and they managed to free his leg. Soon after, they informed the bridge and asked for assistance from the shipboard medical team, as they suspected that his leg was broken.

First aid was administered on board, while the shore authorities were informed and a request for shore medical assistance was sent. Shortly thereafter, the second engineer was airlifted by a helicopter to the nearest hospital.

Injuries

The master requested immediate transfer of the injured seafarer to a local hospital for treatment. At the hospital, it was confirmed that the second engineer's left tibia was fractured. He was kept in the hospital for further treatment.

On 03 April 2019, the crew member was repatriated to the Philippines

Industry Guidelines

The UK's Code of Safe Working Practices for Merchant Seafarers (COSWPMS) identifies the hazards involved for personnel handling steel-hinged inspection/access lids:

- *Adequate handgrips should be provided in accessible positions to lift inspection/access hatches by hand without straining or endangering personnel.*
- *Heavy or inaccessible hatch lids should be fitted with counterweights so that they can easily be opened by one or two persons. Where a counterweight cannot be fitted due to inaccessibility, the hatch lids should be supplied with a purchase or pulley with eye-plates or ringbolts fitted in appropriate positions so that the hatch can be opened and closed without straining or endangering personnel.*

The engine-room hatchway

The engine-room hatchway was located on the freeboard deck, in between the aft part of the accommodation and cargo hatch no. 15 (Figure 4).

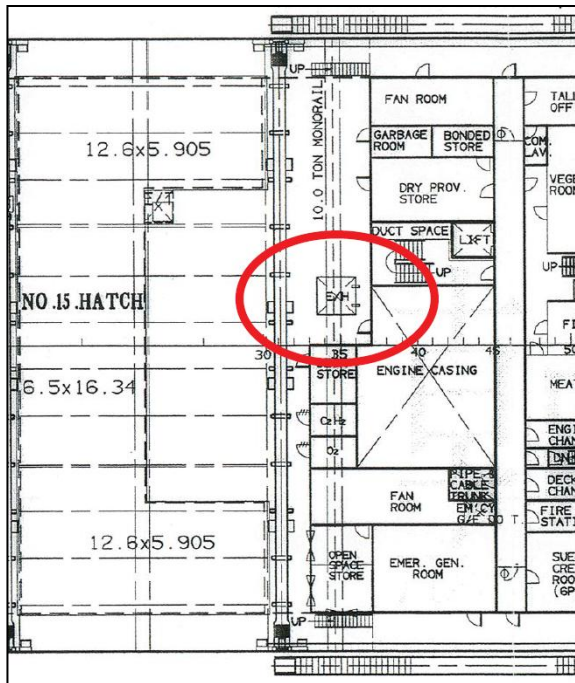


Figure 4: Extract from the GA plan showing the location of the engine-room hatchway

Its approximate dimensions are listed in Figure 5.

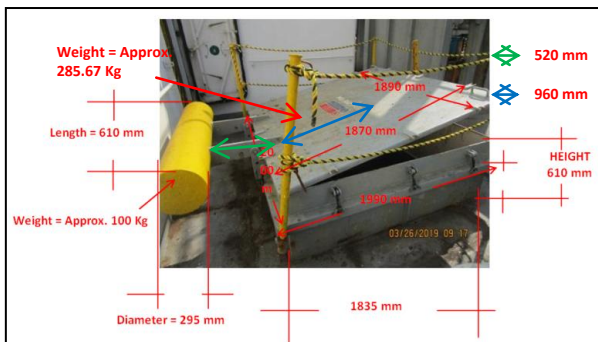


Figure 5: Dimensions of the engine-room hatchway

The Company identified the safest manner to open the engine-room hatchway, to be as follows:

- Ensure that the safety pin located at the hinge is removed (Figure 3);
- Unscrew the butterfly nuts (Figure 6);

c) Lift the hatch manually by pulling it upwards from the handgrips (Figure 6) (can be done by a single person as the weight of the hatch is countered by the counterweight);

d) Secure the hatch from unintended closing by fitting the safety pin at the hinge (Figure 3).

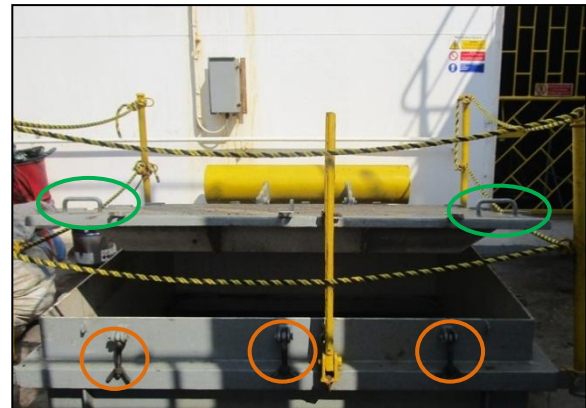


Figure 6: Handgrips on either side of the opening, circled in green, butterfly nuts circled in orange

Symbolic safety barriers

Photographic evidence of the area did not indicate any symbolic barrier systems fitted (e.g. Operating procedures / dos and don'ts) to caution the crew members on the correct opening and closing procedures and to highlight the hazards of such an operation.

ANALYSIS

Aim

The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Weather conditions as a contributory factor

The vessel's motion in the prevailing weather conditions was negligible. The weather at the time of this occurrence was not

considered as a contributing factor to this occurrence.

Fatigue

The second engineer's records of work and rest hours indicate that he had 14.5 hours of rest prior to starting work on the 21 March at 0800 (LT). Although the MSIU could not confirm the quality of rest of the second engineer, the records did not indicate that fatigue was a contributing factor.

Probable cause of the accident

The counterweight created a downward turning lever, which eventually takes over the need to lift the hatchway cover from the front access. The movement may become uncontrollable if remained unchecked and the counterweight would eventually slam with the hatchway coaming. It is highly likely that the second engineer was thrown off balance once the rotational movement of the counterweight took effect.

Photographic evidence of the second engineer's safety shoes indicated that there was adequate depth to the shoe's sole (Figure 6).



Figure 6: Shoe's sole in good condition

The second engineer was standing on a cylindrically shaped counterweight. It cannot be excluded that the safety shoes could not be placed flat on the counterweight, thus reducing the surface area whereby friction could have been provided.

Opening the hatchway

The second engineer had just given instructions to the deck crew to lift the engine spare parts, after which he proceeded towards the engine-room hatchway. When the second engineer arrived near the engine-room hatchway area, the cover was still closed.

The AB and the fourth engineer were positioned directly in front of its opening. While passing their hands in between the stanchions and safety ropes, they cracked open the hatchway cover by the use of the handgrips, (Figure 7).



Figure 7: Simulated opening – crew lifting the hatchway cover; with their hands passing in between the stanchions and rope (the line traced in blue was used as a safety measure during the crew's simulation of the accident)

To be able to lift the hatchway cover to a higher level, the AB and the fourth engineer had to place their hands over and above the upper safety rope (Figure 7) to access beyond the physical safety barrier and resume lifting unhindered. This operation in itself would have been strenuous to the crew, as the weight of the hatchway cover was not yet taken by the counterweight at that level. The second engineer, at this point, was in a sitting position on the counterweight, with the intention to ease off the weight of the hatchway cover while the crew handle an awkward part of the opening.

When the hatchway cover reached in level with the height of the stanchions (Figure 2), the downward force of the counterweight still

did not start acting. The second engineer opted to stand up on the counterweight to continue assisting during the opening. As the counterweight began to act, it caused the cover to swing open, probably during which time, the second engineer fell.

Calculated moments

By using the estimated figures provided by the Company, moments of force² for the counterweight and the engine-room hatchway cover were calculated.

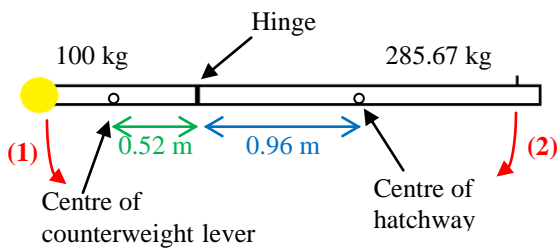


Figure 8: Anti-clockwise and clockwise moments experienced by engine-room hatchway cover

Moment (1) refers to the anti-clockwise rotational force in play by the counterweight, while, moment (2) refers to the clockwise rotational force present by the engine-room hatchway cover.

For calculation purposes both weights were converted to force in Newton, as below:

$$F = m * a^3$$

(Counterweight)

$$980 \text{ N} = 100 \text{ kg} * 9.8 \text{ ms}^{-2}$$

(Engine-room hatchway cover)

$$2799.6 \text{ N} = 285.67 \text{ Kg} * 9.8 \text{ ms}^{-2}$$

$$\text{Anticlockwise Moment}^4 = F * d$$

$$509.6 \text{ Nm} = 980 \text{ N} * 0.52 \text{ m}$$

$$\text{Clockwise Moment} = F * d$$

$$2687.6 \text{ Nm} = 2799.6 \text{ N} * 0.96 \text{ m}$$

² A moment is a measure of its tendency to cause a body to rotate about a specific point or axis.

³ Force (N) = mass (kg) * acceleration due to gravity (9.8 ms⁻²)

⁴ Moment (Nm) = Force (N) * Distance (m)

The calculations revealed that an additional anti-clockwise moment of 2178 Nm would have been required at the engine-room hatchway cover, to open it. This meant that a mass of 231.5 kg would still be required to lift the cover from its front access, despite the counterweight being installed.

While the Company's safest manner to open the engine-room hatchway seems to indicate that this may be lifted by one person alone, to the safety investigation this seemed impracticable.

Furthermore, whilst noting that this engine-room hatchway cover was fitted with a counterweight, in the opinion of this safety investigation, the counterweight did not prevent straining or endangering personnel while opening it.

In addition, as much as they served as a passive physical safety barrier, the presence of the stanchions and safety lines, and the absence of additional systems to facilitate opening of the cover, could have made it more strenuous for the crew to open the cover through the initial stage.

Acceptance of Risk

During the work planning meeting, the chief engineer designated three persons to transfer the spare parts through the engine-room hatchway, with second engineer being the leader. The fourth engineer and the AB were the ones opening the engine-room hatchway; however, the second engineer opted to assist with the operation.

The reason behind this decision was not available to the safety investigation; however, the MSIU hypothesized that the second engineer may have opted to ease off the hatchway cover's weight by increasing the effect of the downward pivotal motion with his added weight because it was strenuous for his shipmates to open it on their own.

Engine-room hatchway condition

All machinery and equipment were reported to have been fully operational at the time of the incident. The MSIU did not find any indication of lack of maintenance; therefore, the condition of the engine-room hatchway was not considered to have attributed to this occurrence.

CONCLUSIONS

1. The prevailing weather conditions were not contributory to this accident;
2. It is highly likely that the second engineer lost his balance once the hatchway cover started swinging at full measure;
3. His safety shoes had adequate soles, although the curvature of the counterweight reduced the surface area whereby friction could have been applied – thus increasing the chance of slipping;
4. Accessing the handrails of the hatchway cover through the safety ropes and stanchions makes it difficult for the crew to open it without interruption;
5. The process of opening the engine-room hatch cover by one person alone seems impracticable;
6. The condition of the engine-room hatch cover was not considered to have attributed in this accident.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION⁵

During the course of the safety investigation the Company had discussed the occurrence with the shipboard management team, highlighting the need to operate equipment correctly.

Furthermore, during the HSEE meeting, an exercise was intended to be carried out where possible additional training requirements related to the correct use of equipment were to be identified. The training needs would then be forwarded to the vessel's Master and Safety Officer for follow up.

RECOMMENDATIONS

Columbia Shipmanagement is recommended to:

06/2020_R1 Share this safety investigation report with its fleet to highlight the hazards of unsafe practises with other vessels;

06/2020_R2 Reassess the opening procedure of the engine-room hatchway and consider other means to facilitate its opening;

06/2020_R3 Install symbolic barriers visible from the engine-room hatchway's location, to warn crew of the improper opening procedure.

⁵ **Safety actions and recommendations shall not create a presumption of blame and / or liability.**

SHIP PARTICULARS

Vessel Name:	<i>Vermont Trader</i>
Flag:	Malta
Classification Society:	DNV-GL
IMO Number:	9292149
Type:	Container Ship
Registered Owner:	MS "Vermont Trader" GmbH & Co. KG
Managers:	Columbia Shipmanagement GmbH, Germany
Construction:	Steel
Length Overall:	294.05 m
Registered Length:	283.75 m
Gross Tonnage:	54,271
Minimum Safe Manning:	15
Authorised Cargo:	Containerised cargo

VOYAGE PARTICULARS

Port of Departure:	Shekou, China
Port of Arrival:	Hong Kong, Special Administrative Region, China
Type of Voyage:	Coastal
Cargo Information:	In ballast
Manning:	21

MARINE OCCURRENCE INFORMATION

Date and Time:	21 March 2019 at 1040 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	Coastal waters
Place on Board	Freeboard deck
Injuries / Fatalities:	One serious injury
Damage / Environmental Impact:	None reported
Ship Operation:	Normal service - at anchor
Voyage Segment:	Anchored
External & Internal Environment:	Weather was clear and the visibility was good. Light airs were recorded. Air and sea temperatures were recorded at 28 °C and 23 °C respectively.
Persons on board:	21