ACCIDENT REPORT

Report on the investigation of

the death of a third officer struck by a freight vehicle

on the stern ramp of the ro-ro freight ferry

Seatruck Progress

Brocklebank Dock, Liverpool

15 May 2019

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 10/2020 JUNE 2020

Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2012 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

ACOP	-	Approved Code of Practice
CCR	-	Cargo control room
CCTV	-	Closed-circuit television
COSWP	-	Code of Safe Working Practices for Merchant Seafarers
DfT	-	Department for Transport
Docklands	-	Docklands Logistics (Europe) Ltd
HSE	-	Health and Safety Executive
ILO	-	International Labour Organization
km/h	-	kilometres per hour
m	-	metre
MCA	-	Maritime and Coastguard Agency
PSS	-	Port Skills and Safety
Seatruck	-	Seatruck Ferries Ltd
SMS	-	Safety management system
t	-	tonne
THC	-	Delta 9 tetrahydrocannabinol
Tractor	-	Ro-ro tractor unit
UHF	-	Ultra High Frequency
VHF	-	Very High Frequency
2/O	-	Second Officer
3/O	-	Third Officer
µg/L	-	micrograms per litre

TIMES: all times used in this report are UTC+1 unless otherwise stated.

Image courtesy of Robbie Cox and www.shipspotting.com

Seatruck Progress

SYNOPSIS

On 15 May 2019, a third officer on board the Isle of Man registered ro-ro freight ferry, *Seatruck Progress*, was fatally injured after being struck by a semi-trailer that was being pushed down the vessel's stern ramp. The driver of the tractor unit pushing the trailer stopped immediately, but the third officer was trapped between the trailer's rear wheels and was declared life extinct by attending paramedics. The tractor unit driver was found to have cannabis in his system, but this was unlikely to have impaired his driving ability or affected his judgment.

The third officer was standing on the stern ramp and was talking on his mobile telephone when he was struck. He was facing down the ramp and was unaware of the trailer approaching from behind. The tractor unit's driver was not expecting any pedestrians to be on the stern ramp and could not see the third officer due to the trailer blocking his view ahead.

This is one of several similar accidents in recent years where both maritime and land-based industry best practice guidance have not been met: there was no physical barrier to segregate vehicles and pedestrians and there were no controls in place to monitor the stern ramp and stop vehicles when pedestrians needed to walk across the stern ramp. The use of mobile telephones and other communications media is also an increasing source of distraction on working decks and in other hazardous workspaces, for which formal guidance is currently lacking.

This was the second work-related death in 5 months to have occurred on board a ferry operated by Seatruck Ferries Ltd and berthed in Liverpool. A crewman was fatally injured when he fell from height on board the ro-ro freight ferry *Seatruck Pace* on 17 December 2018. The circumstances of the occupational accidents, and the findings of a safety climate survey conducted in September 2019, indicate that there was divergence in some areas between the way work was prescribed in onboard procedures and the way it was conducted by the vessels' crews.

A recommendation has been made to Seatruck Ferries Ltd aimed at improving the effectiveness of its procedures, and improving the safety culture of its crews. Recommendations have also been made to the Maritime and Coastguard Agency, and the Isle of Man Ship Registry to raise the awareness of the potential hazards of mobile telephone use. A recommendation to the UK Chamber of Shipping is intended to promulgate the lessons of this accident to the wider ferry industry.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SEATRUCK PROGRESS* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	*Seatruck Progress*
Flag	Isle of Man
Classification society	DNV-GL
IMO number	9506203
Type	Ro-Ro Cargo (max 12 passengers)
Registered owner	Seatruck Shipholding II Ltd
Manager(s)	Seatruck Ferries Ltd
Construction	Steel
Year of build	2011
Length overall	142.00
Registered length	134.20
Gross tonnage	19722.00
Minimum safe manning	12
Authorised cargo	Freight vehicles

VOYAGE PARTICULARS	
Port of departure	Dublin
Port of arrival	Liverpool
Type of voyage	Short international
Cargo information	Freight vehicles
Manning	23

MARINE CASUALTY INFORMATION	
Date and time	15 May 2019 at 1928
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Brocklebank Dock, Liverpool
Place on board	Stern ramp
Injuries/fatalities	One fatality
Damage/environmental impact	None
Ship operation	Discharging cargo
Voyage segment	Alongside
External	It was daylight. The weather was fine and dry, and the wind was east-south-east at Beaufort Force 3. The air temperature was 15°C
Persons on board	22

1.2 NARRATIVE

At 1826 on 15 May 2019, the Isle of Man registered ro-ro freight ferry *Seatruck Progress* berthed at Brocklebank Dock, Liverpool, England **(Figure 1)** following passage from Dublin, Ireland. The stern ramp was lowered on to the dockside **(Figure 2)** and the relieving master and chief officer, who had been waiting on the quay, boarded. Cargo discharge commenced and the relieving master went to his cabin while the relieving chief officer went to the cargo control room (CCR) on the port side of the ferry's main vehicle deck, where the third officer (3/O), Bartosz Wronski, was working. The outgoing chief officer soon joined his relief in the CCR and started to hand over his duties. Meanwhile, the 3/O left the CCR and drove the outgoing master's car off the ferry and parked it on the quay outboard of the stern ramp's starboard side.

The 3/O returned to the CCR and left the outgoing master's car keys on the desk. He then chatted briefly with both chief officers and was asked by the relieving chief officer to oversee cargo operations while he went to his cabin and changed into working clothes. The 3/O also collected the key to the relieving master's car, which required moving on board from the quayside. By about 1900, the main vehicle deck was almost clear of cargo and the 3/O opened the hatch covers over the lower vehicle deck ramp on the main vehicle deck's starboard side **(Figure 3)**.

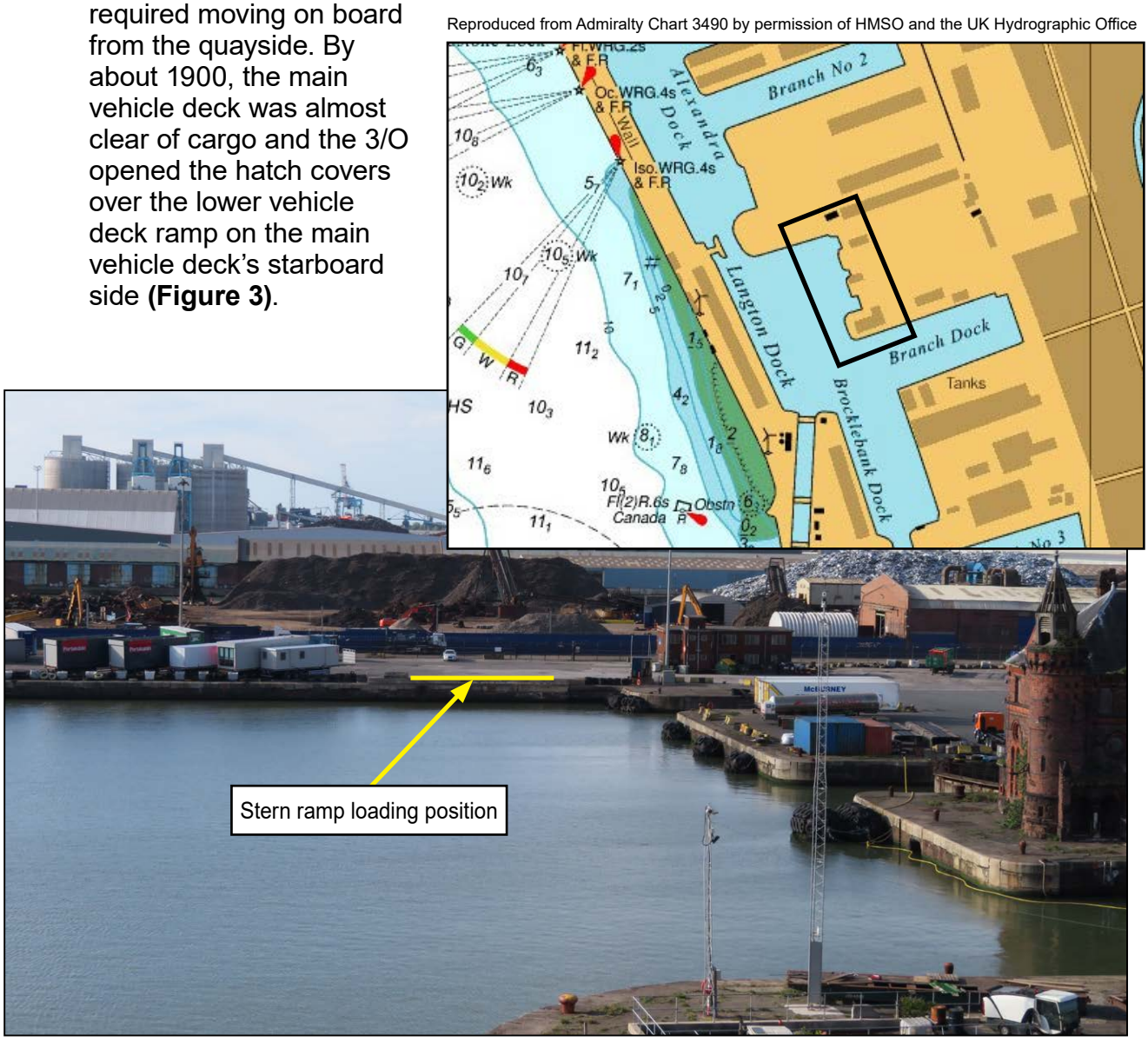

Figure 1: Brocklebank Dock

Figure 2: Stern ramp in its lowered position on the quay

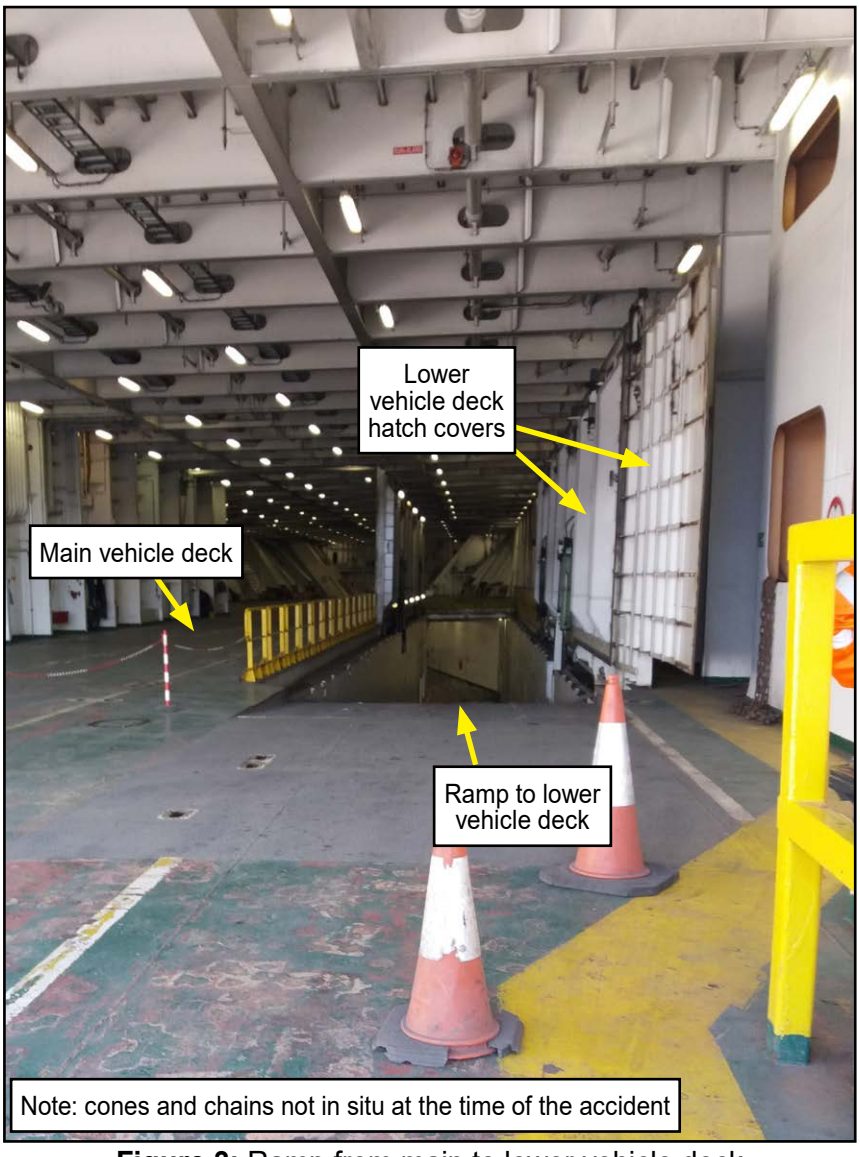

Figure 3: Ramp from main to lower vehicle deck post-accident (hatch covers open)

At 1912, the outgoing chief officer departed the ferry via the stern ramp. Five minutes later, the vessel's chief engineer walked down the stern ramp and sat in a car on the quay to use his mobile phone. By that time, discharge of cargo from the lower vehicle deck had commenced and five semi-trailers[1] had been towed up the internal ramp and off the ferry by the terminal's ro-ro tractor units[2]. Cargo was also being discharged from the upper vehicle deck and the weather deck.

At about 1922, a tractor pushed a semi-trailer up the lower vehicle deck ramp and on to the quay. Two minutes later, another tractor was driven up the stern ramp and down to the lower vehicle deck. At about the same time the 3/O, who was on the main vehicle deck in the vicinity of the CCR, started a personal call on his mobile telephone. While he was talking, he walked along the starboard side of the main vehicle deck and, at 1925, on to the starboard side of the stern ramp.

At 1926, a tractor on the lower vehicle deck started to push a semi-trailer up the vehicle deck ramp towards the main deck and the stern ramp **(Figure 4a)**. Meanwhile, the 3/O loitered on the ramp's starboard side, gradually moving down the ramp towards the quay while talking on his mobile telephone.

At 1926:38, the rear end of the semi-trailer that had been pushed from the lower deck reached the top of the stern ramp **(Figure 4b)**. At the same time, another tractor driver in his cab, who was on the quay and approaching the stern ramp, saw the 3/O facing down the ramp and the semi-trailer moving towards him, so sounded his horn to give warning. Approximately 3 seconds later, the rear of the semi-trailer struck the 3/O **(Figure 5)**.

When the tractor driver, whose semi-trailer struck the 3/O, saw the 3/O entangled between his semi-trailer's right-hand rear wheels he immediately applied the brakes and stopped the semi-trailer **(Figure 6)**. The tractor driver then jumped from his cab and yelled out that he had not seen the casualty and had not been speeding. The chief engineer, sitting in a car on the quay, heard the shouting and on looking round saw an orange boiler suit between the trailer's rear tyres. He immediately alerted the emergency services and then moved to carry out a primary first-aid survey of the 3/O. The chief engineer was unable to detect a pulse, and when the paramedics arrived on scene at 1935 they also assessed the 3/O and declared him deceased.

When the police arrived at the accident site, they tested the tractor driver for the presence of drugs and alcohol. The alcohol test was negative, but an oral saliva drug test indicated that the driver had been using cannabis. The police then conducted a set of practical roadside tests, which indicated that the driver's ability to drive was not impaired. The driver also passed an eyesight test. The results of a subsequent blood test identified that the level of Delta 9 tetrahydrocannabinol (THC)[3] in the driver's blood was 6.5 µg/L.

The 3/O's postmortem toxicology test results showed that he had consumed no alcohol and had not taken any prescribed or recreational drugs.

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[1] Semi-trailer means a trailer designed to be coupled to a semi-trailer towing vehicle. Unaccompanied semi-trailers are towed or pushed on and off the ferries by dedicated port vehicles. Once the semi-trailer is in position on board, it is lowered onto a trestle and the towing vehicle is disconnected.

[2] Ro-ro tractor units – vehicles designed specifically for moving semi-trailers on and off ro-ro ferries and were referred to locally as tugmasters. See paragraph 1.10.3.

[3] THC is the principal psychoactive element that is produced when smoking cannabis (see paragraph 1.13).

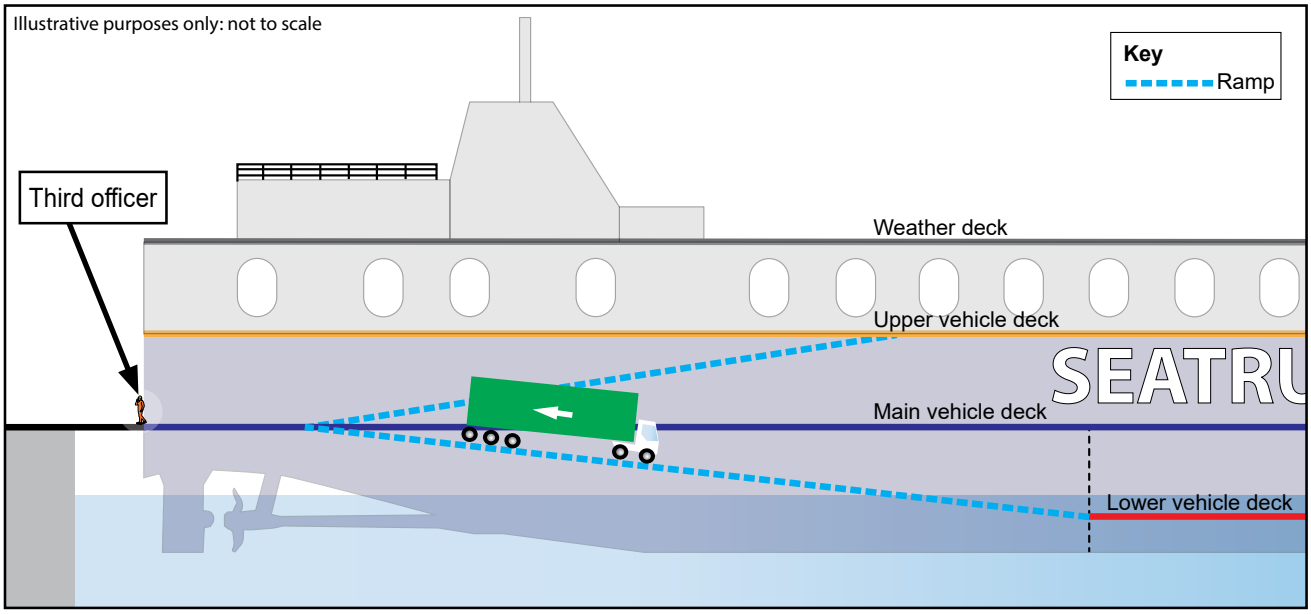


Figure 4a: Route from lower vehicle deck to stern ramp – semi-trailer and tractor unit on lower vehicle deck ramp

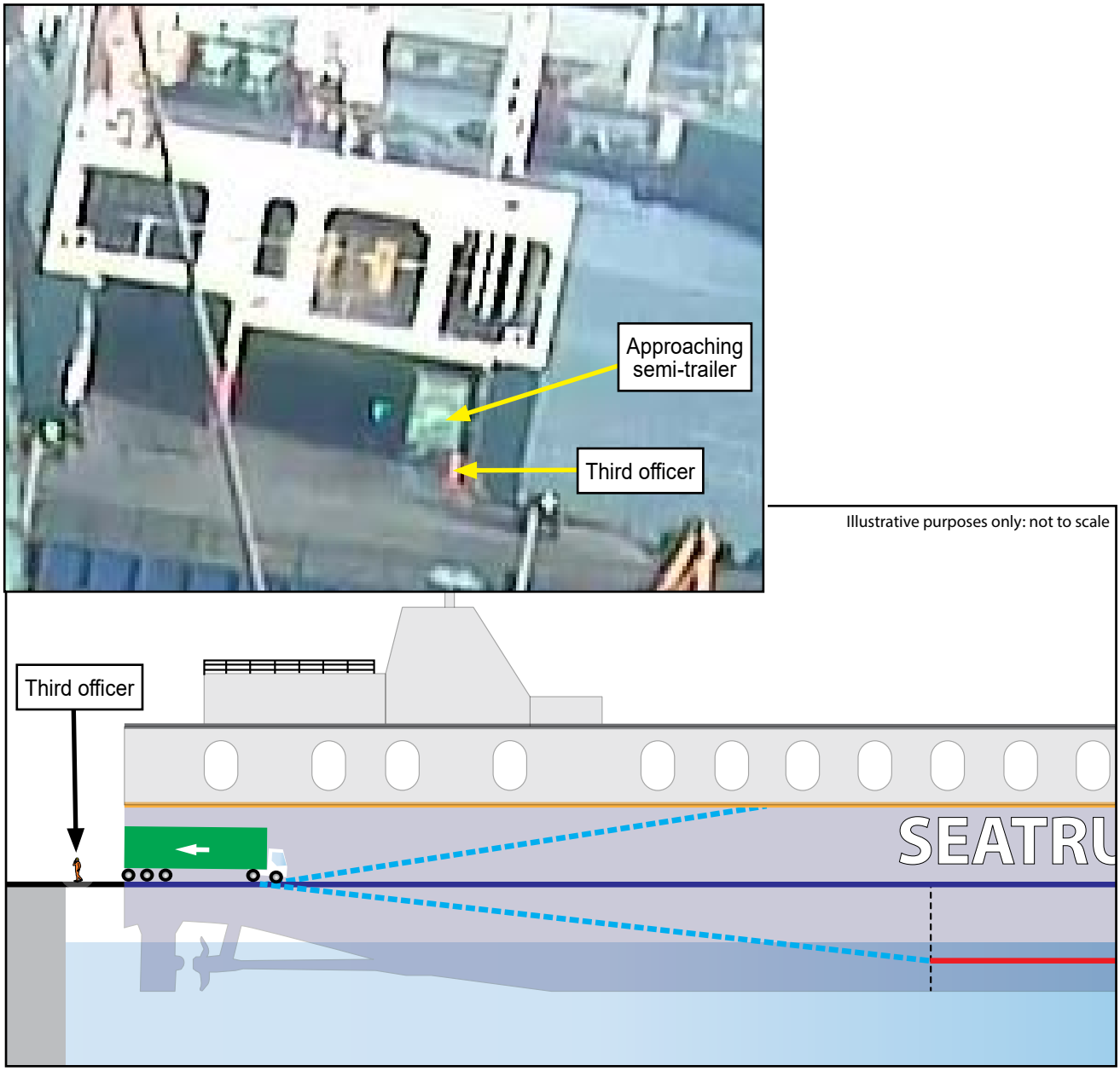
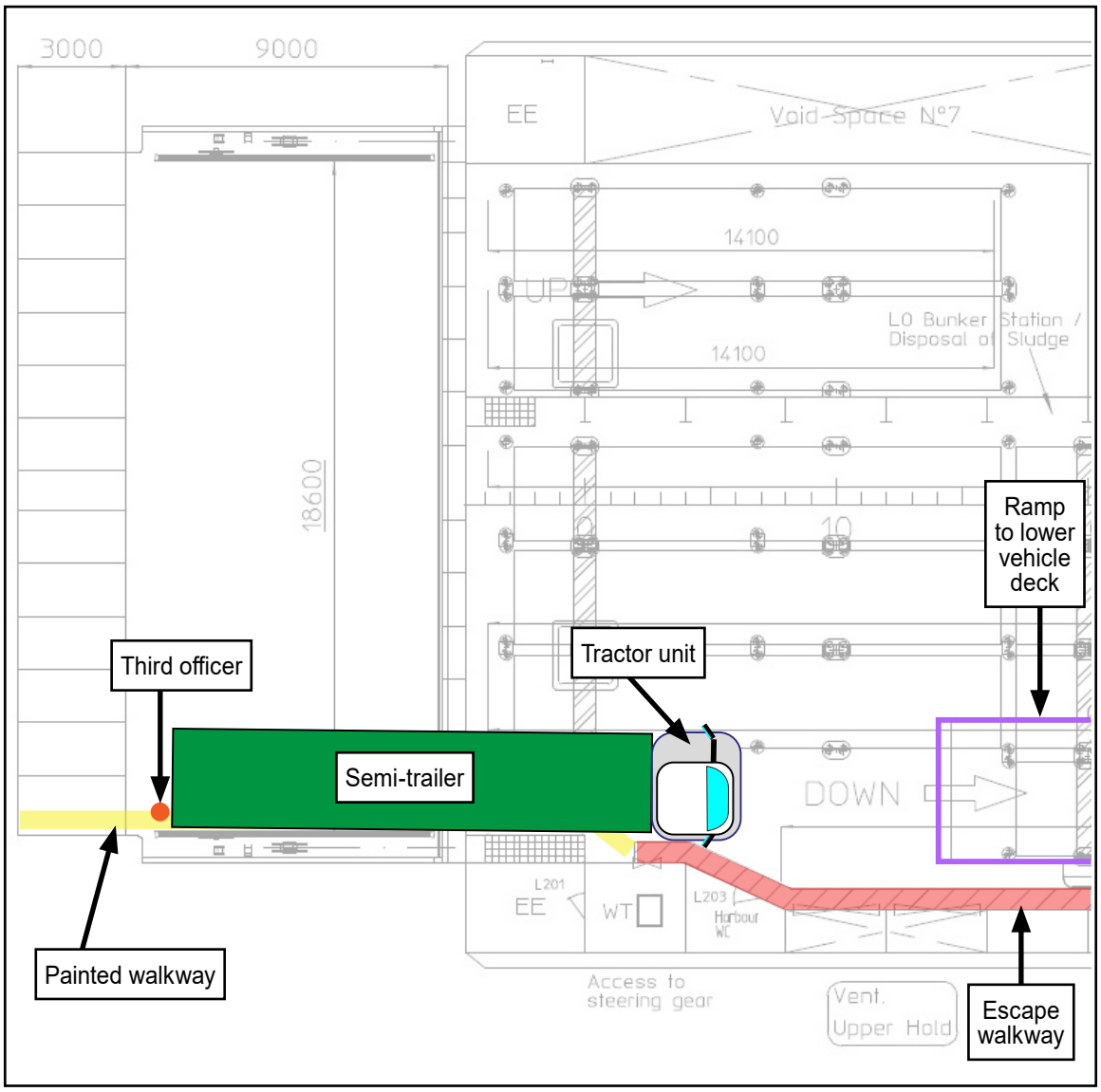


Figure 4b: Semi-trailer and tractor unit approaching the stern ramp



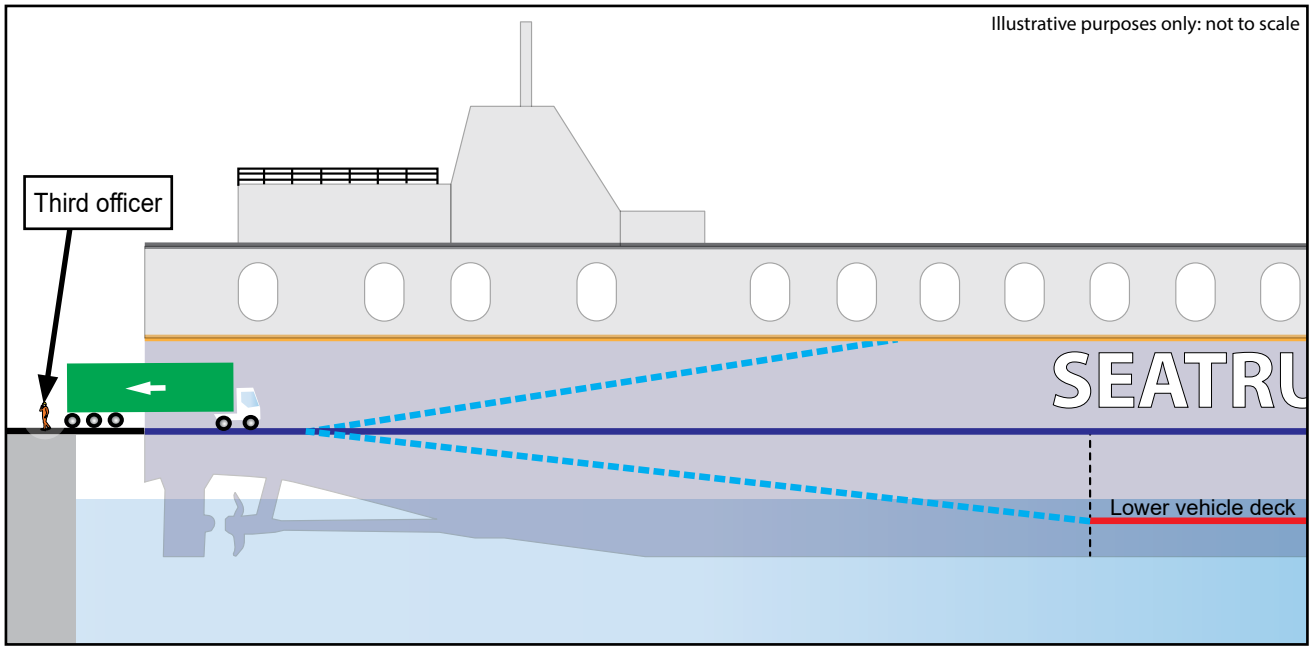


Figure 5: Route from lower vehicle deck to stern ramp

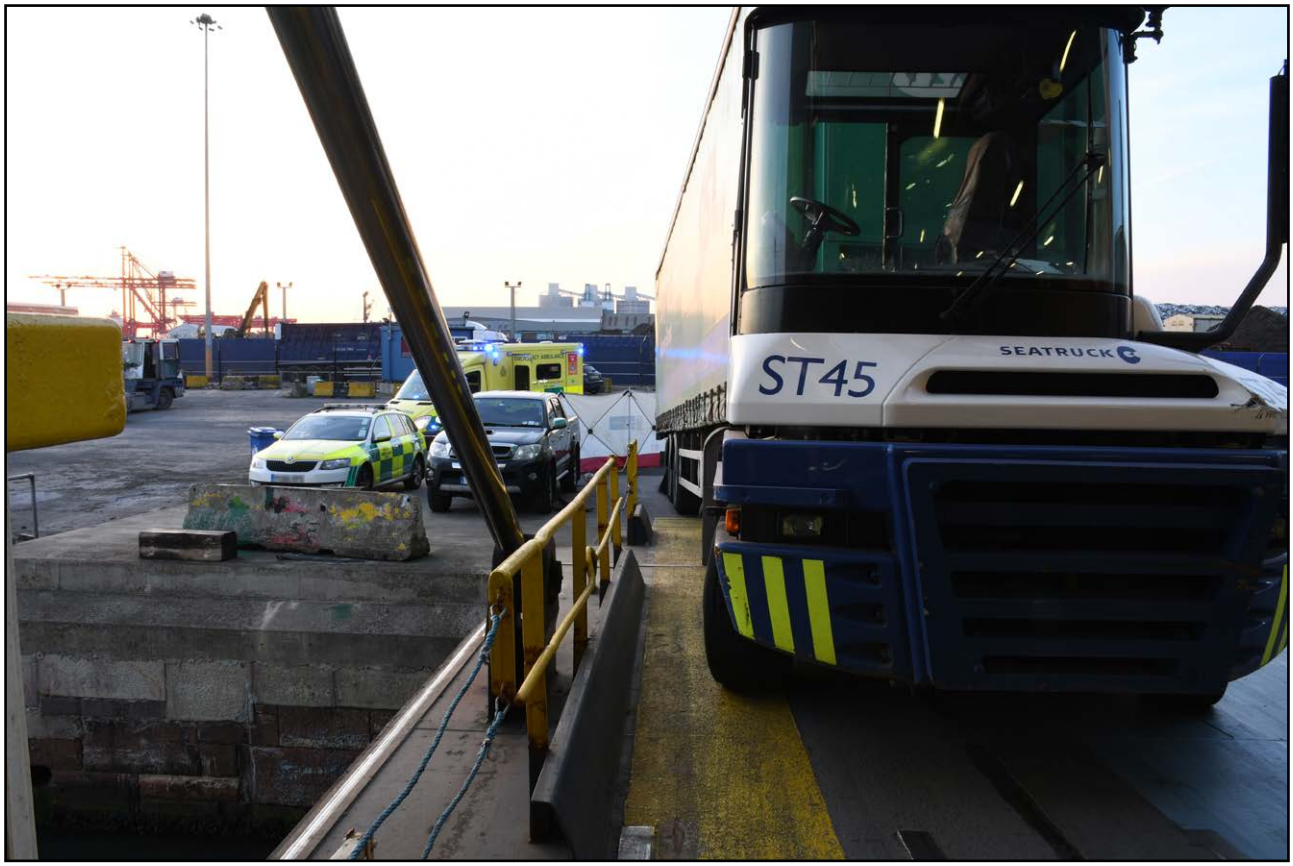


Figure 6: Tractor unit and semi-trailer stopped on the stern ramp

1.3 FERRY CREW

Seatruck Progress's 22 crew comprised UK and Polish nationals. The 3/O was 33 years old, a Polish national, and held a chief mate's STCW[4] II/2 unlimited certificate of competency. He worked opposite the second officer (2/O) in 12-hour watches that started at midday and midnight respectively.

The 3/O had joined Seatruck as an ordinary seaman and had worked for the company for 7 years, during which he had progressed to the rank of 2/O. He had left the company in 2016 to work for other operators on board car carriers and freight ferries. He had returned to Seatruck and joined *Seatruck Progress* as 3/O on 8 April 2019, and had completed familiarisation training in accordance with onboard requirements. The 3/O was married and was held in high regard by other officers and crew.

1.4 *SEATRUCK PROGRESS* AND VESSEL MANAGEMENT

Seatruck Progress was one of four ferries built in Germany for Seatruck in 2011, specifically for use in the Irish Sea. It was one of seven ferries that were operated and managed by the company on its Irish Sea routes, and one of four Seatruck ferries running between Liverpool and Dublin. The ferry completed two crossings each day between Tuesday and Saturday with passage times varying between 7.5 hours and 9 hours. Only one crossing per day was scheduled on Sundays and Mondays to facilitate a 15-hour layover in each port.

[4] STCW – The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

Seatruck was established in 1996 and was based in Heysham, England, which enabled the shore-based managers to regularly visit its Irish Sea fleet outside of periodic internal audits. The company assessed that cargo movements on deck represented the greatest risk of injury on board its vessels. This was particularly so in Heysham, where the port's staff loaded and unloaded the unaccompanied semi-trailers and worked to the harbour authority's safety management system (SMS).

1.5 VEHICLE DECKS

Seatruck Progress had four vehicle decks: the weather deck (uppermost), the upper vehicle deck, the main vehicle deck, and the lower vehicle deck (also known as the lower hold). Vehicular access from the quay to the main vehicle deck was via the stern ramp, which was 17.6m wide and 9m in length with finger plates extending a further 3m over the quay. It had a safe working load of 90t (2 x 45t vehicles). The angle of the stern ramp was less than 5°.

Access from the main deck to the upper and lower vehicle decks was via fixed ramps. The ramp to the upper deck was 6m wide and located on the port aft side of the main deck **(Figure 5)**. The lower vehicle deck ramp was 4m wide and located on the starboard aft side of the main deck. The hatch covers over the lower vehicle deck ramp formed part of the main vehicle deck when closed. Vehicular access between the upper deck and the weather deck was via a 4m wide ramp. Pedestrian access between the vehicle decks was via internal stairways.

The main, upper and weather decks were large enough to allow semi-trailers to be turned and reversed into their stowed positions. Consequently, they were generally towed up and down the ramps by the tractors during loading and discharge.

The lower vehicle deck could accommodate up to 16 semi-trailers, but limited space meant that not all of the trailers could be turned and reversed into position. As a result, the tractors had to push these semi-trailers up/down the lower vehicle deck ramp during discharge/loading. On 15 May, *Seatruck Progress* arrived at Brocklebank with 13 semi-trailers and 5 tank trailers on the lower vehicle deck. The tank trailers were smaller than the semi-trailers and were the first vehicles to be discharged from the deck

1.6 PEDESTRIAN ACCESS TO THE VESSEL

With respect to access to and from its ferries, Seatruck's SMS stated that:

> *Wherever practical, the ship's gangway/accommodation ladder is to be used as the means of access to the vessel.*

And

> *Stern ramps may be used as means of access if no other appropriate means of access is available. Where ramps are used for access the Master is to ensure that either:*
>
> - *A safe pedestrian walkway is clearly marked, or*
> - *Access to and from the ship is controlled whilst working cargo or other hazardous operations are in progress.*

The only access to and from *Seatruck Progress* when moored at the Brocklebank Dock was via the stern ramp. The ferry was built with an accommodation ladder on each side, but the starboard ladder had been removed with the approval of the ferry's Flag State and classification society. This was on the condition that a shore-side gangway was provided when berthing starboard side to the quay. The vessel's port accommodation ladder could not be used as the ladder's foot could not be landed on the quay, and obstructions on the quay prevented access via a gangway.

There were no locally produced onboard instructions concerning safe access to the ship. There were no signs, instructions or out of bounds areas for pedestrians marked near the ship's stern ramp, but a 780mm wide yellow line from the finger plates to the main vehicle deck was painted on the starboard edge **(Figure 7)**. The line was an extension of an escape route marked on the main vehicle deck and indicated a walkway on the stern ramp. It was also intended to assist drivers in keeping vehicles clear of the stern ramp's starboard hydraulic ram. There was no corresponding line marked on the port side of the stern ramp. Markings on the starboard edge of the stern ramps on sister vessels managed by Seatruck varied between similar solid lines and painted footprints.

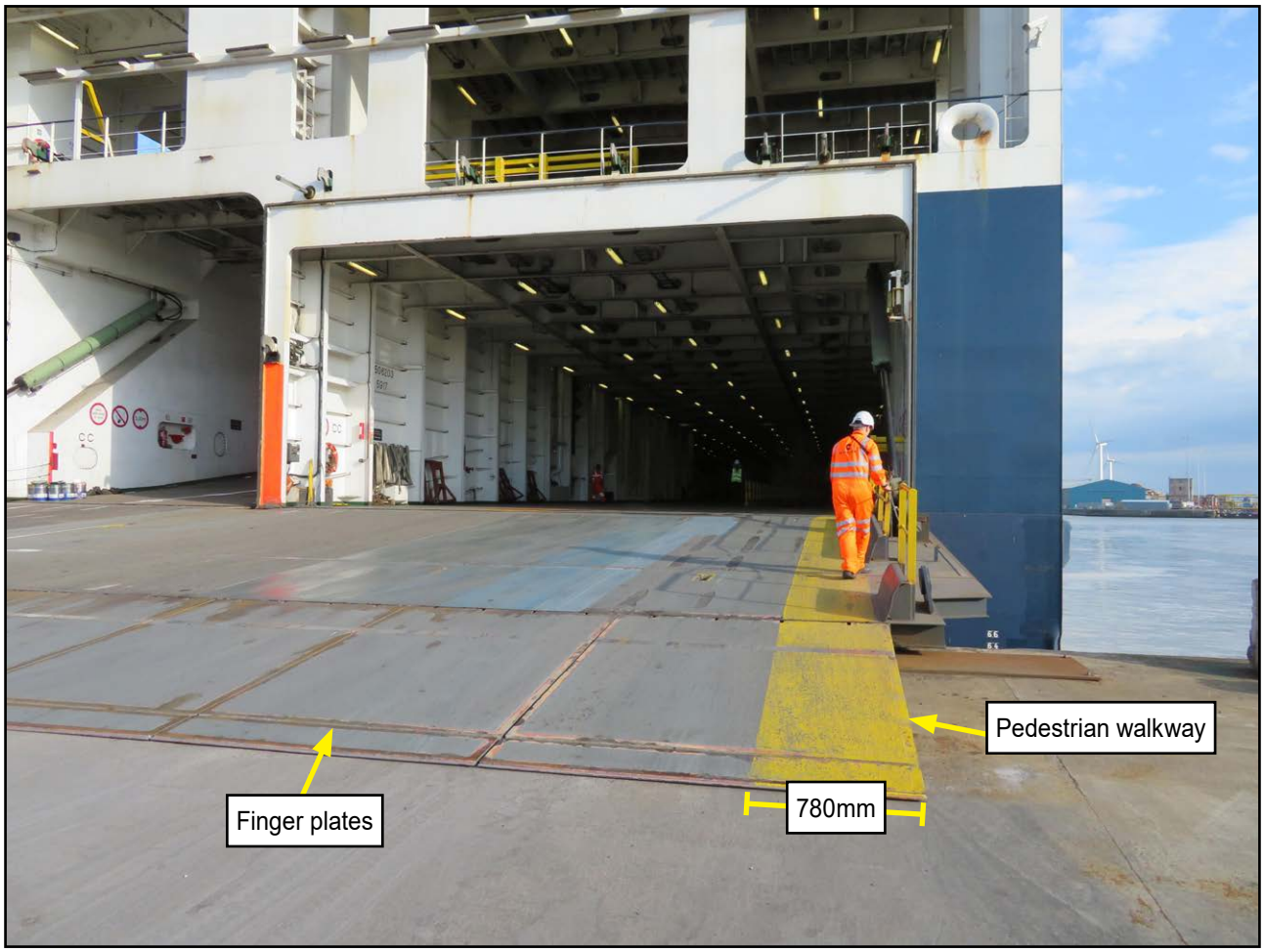


Figure 7: The stern ramp and painted pedestrian walkway

1.7 VEHICLE HANDLING RECONSTRUCTION

On 18 May 2019, MAIB inspectors observed a semi-trailer being pushed ashore from the lower vehicle deck of a sister vessel, *Seatruck Power* **(Figure 8)**. The purpose of the reconstruction was to gain a clear understanding of the driving method, observe the path of the semi-trailer and tractor, and to gauge the effectiveness of the tractor's visual and audible warning devices. Earlier examination had already confirmed that the audible and visual warning devices fitted to the tractor involved in the accident on 15 May had been operating correctly.

When pushing the semi-trailer from the lower to the main vehicle deck **(Figures 4a** and **4b)**, the tractor driver had to keep the semi-trailer in a straight line between the sides of the lower deck ramp. A slight alteration to the right was made towards the top of the ramp to avoid hitting a protective barrier around the stern ramp's starboard hydraulic ram. It was also noted that when transiting down the stern ramp, the semi-trailer was kept parallel and close to the starboard side **(Figure 9)**.

The noise from the tractor's engine as the semi-trailer approached was difficult to distinguish when standing at the bottom of the stern ramp. The tractor's audible reversing and pushing alarm could not be heard until the back end (free end) of the semi-trailer drew level with the observer's position. The tractor's orange flashing warning beacon was obscured by the semi-trailer and could not be seen.

Figure 8: Vehicle handling reconstruction on board *Seatruck Power*

Figure 9: Semi-trailer being pushed down stern ramp during reconstruction (18 May 2019) on board *Seatruck Power*

1.8 REVIEW OF CLOSED-CIRCUIT TELEVISION RECORDINGS

Closed-circuit television (CCTV) cameras were fitted and operating on *Seatruck Progress*'s vehicle decks, but they did not record images. However, review of CCTV footage recorded from a camera located ashore adjacent to Brocklebank Dock showed that:

- Prior to the accident the 3/O was on the stern ramp for 2 minutes, during which four semi-trailers were towed down the upper deck ramp and on to the quay.

- When the 3/O was struck by the semi-trailer, he was close to the bottom of the ramp, approximately 0.7m inboard of the yellow line delineating the ramp's starboard walkway **(Figure 5)**.

- In the hour leading up to the accident the ferry's crew and shore workers used the stern ramp on 14 occasions to board or leave the ferry by foot. Numerous movements of pedestrians were also seen across the main vehicle deck near the top of the ramp leading down to the lower hold.

- Pedestrians were on the stern ramp at the same time as moving vehicles.

- Pedestrians crossing the stern ramp did so at varying angles **(Figure 10)** with only one keeping to the painted walkway.

- Pedestrians used the internal ramps to move between vehicle decks.

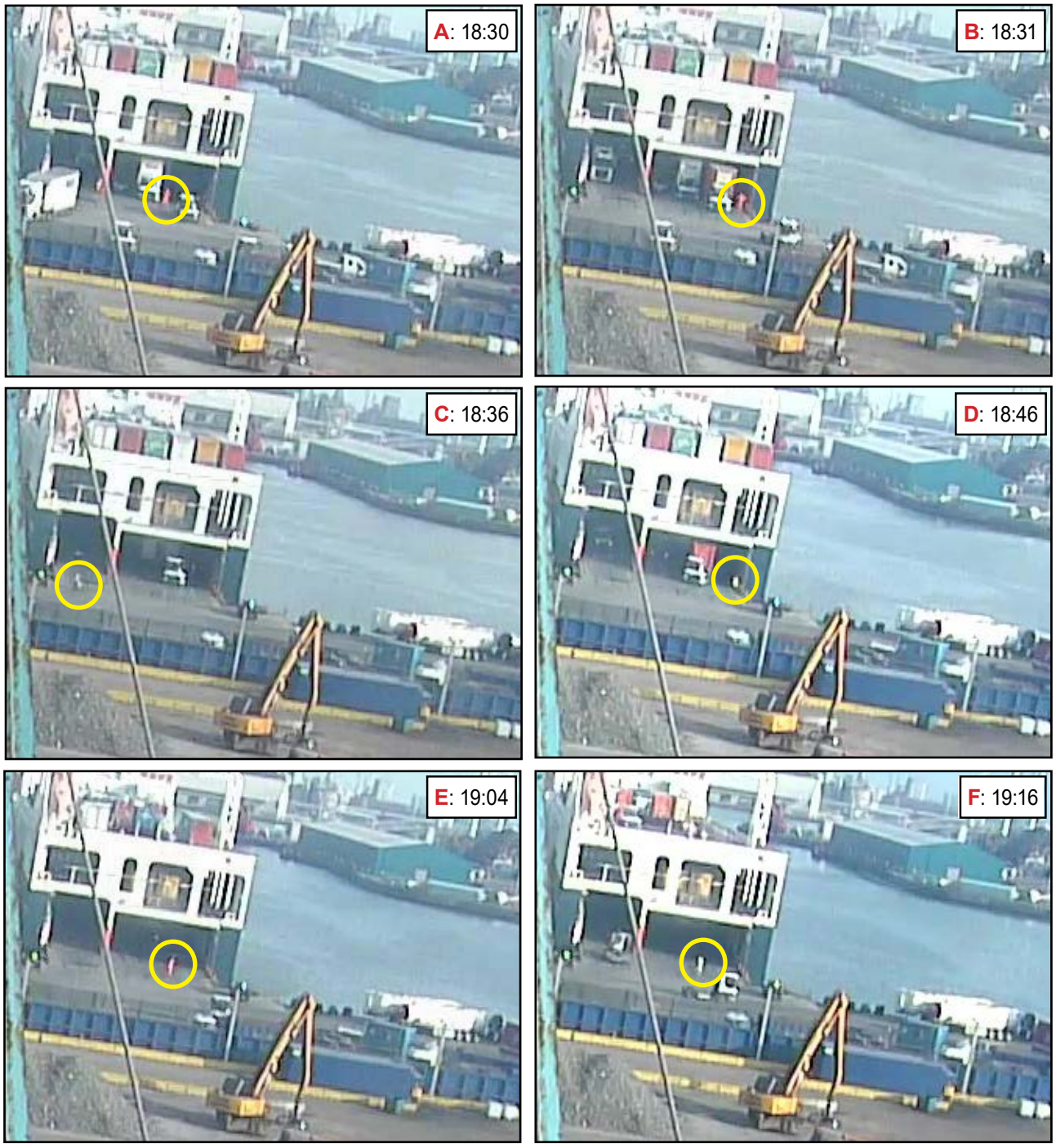


Figure 10: Examples of movements across the stern ramp

1.9 CARGO OPERATIONS

1.9.1 Roles and responsibilities

Cargo operations on board *Seatruck Progress* were undertaken by the ferry's deck department, which comprised the chief officer, 2/O, 3/O, bosun, petty officer, six able-bodied seamen and one ordinary seaman. The chief officer had overall responsibility for cargo operations with respect to oversight, distribution and securing, and stability. The onboard procedures included:

> *Throughout cargo operations the Chief Officer is to remain on duty and is to ensure that:*
>
> - *There is safe access between the vessel and shore linkspan via the stern ramp*
> - *There is control at all times on the movement of vehicles in the vessel to maintain safety of personnel and to minimise damages*
> - *All deck crew are properly attired in hi-visibility clothing and other appropriate safety gear*
> - *All deck crew are equipped with a whistle and are aware of the appropriate signals* [sic]

Internal communications on board *Seatruck Progress* during cargo operations was via portable ultra high frequency (UHF) radio. Whistles were also carried by the deck crew to enable them to communicate with the drivers. A single blast on a whistle or a vehicle horn was the signal to 'stop'.

The chief officer also carried a portable very high frequency (VHF) radio for communications with the shore controller and the tractor drivers. However, as the cargo and stowage information was paper-based, the chief officer had to walk off the ferry periodically to collect documents from the shore controller's portacabin located on the quayside opposite the stern ramp **(Figure 2)**.

The chief officer was assisted by the 2/O or 3/O as the duty deck officer during cargo operations. In addition to monitoring stability and adjusting ballast to keep the ferry within permitted parameters, the duty deck officer was expected to supervise the discharge and loading of the main vehicle deck, monitor traffic and control access at the stern ramp, and open and close the hatch cover over the lower vehicle deck ramp **(Figure 3)**.

The deck ratings were divided among the vehicle decks, with two ratings allocated to each vehicle deck and one to assist the duty officer in supervising the main vehicle deck. The deck ratings allocated to work on the lower vehicle deck assisted on the main vehicle deck until the lower vehicle deck ramp cover was opened. When loading, the ratings were responsible for marshalling tractors into position and putting the trestles under the semi-trailers prior to the tractor drivers lowering the semi-trailers onto them. The process was reversed when the semi-trailers were discharged.

1.9.2 Sequence

The discharge and loading of cargo from and to *Seatruck Progress* followed a routine sequence in both Liverpool and Dublin. On arrival, after the ferry was secured to the berth and the stern ramp had been lowered, the driver-accompanied freight vehicles[5] were discharged from the main deck and upper deck ramp. The unaccompanied semi-trailers on the main and upper vehicle decks were then collected by the terminal's tractors and taken to allocated areas within Brocklebank Dock. The ramp from the upper vehicle deck to the weather deck was then cleared, followed by the weather deck itself.

When the lower vehicle deck ramp hatch cover on the main vehicle deck was cleared of semi-trailers, the hatch cover was opened, and the semi-trailers on the lower vehicle deck were discharged. Tractors with semi-trailers were able to access the stern ramp from the upper vehicle decks and the main and lower vehicle decks at the same time. The vehicles from the main and lower vehicle decks kept to the starboard side of the stern ramp and vehicles from the upper decks kept to the port side. Loading was undertaken in the reverse order.

Priorities and rights of way between vehicles, and between vehicles and pedestrians, were based on custom and practice rather than written procedures. The tractors had priority over other vehicles, and vehicles leaving the ferry on a ramp had priority over tractors waiting to board. Pedestrians were expected to keep out of the way of all moving vehicles.

1.9.3 Procedures and risk assessment

The written procedures on board *Seatruck Progress* covering cargo operations were generic across Seatruck's ferries, and included the roles and responsibilities of personnel, acceptance of cargo, cargo damage, hazardous cargoes, heavy weather, pre-departure checks and cargo operations. The procedures also referenced publications published by the Maritime and Coastguard Agency (MCA), such as the *Code of Safe Working Practices for Merchant Seafarers* (COSWP) and *Ro-Ro Ships – Stowage and Securing of Cargo, Code of Practice*[6].

The risk assessment on board *Seatruck Progress* covering cargo operations was also generic. Being struck by a moving vehicle was identified as a hazard and the control measures listed were:

- *Maintain eye contact with drivers*
- *Ensure passengers and non-crew are supervised and use marked walkways*
- *Maintain awareness of surroundings and hazards*
- *All crew to carry whistle and use correct signal – one blast means STOP*
- *Use the correct hand sign for STOP*
- *Decks maintained in clean condition*

[5] Typically, semi-trailers with their own towing vehicles and drivers.

[6] Published by the MCA in its Marine Guidance Note 418 (M) – *Roll-on/Roll-off Ships Stowage and Securing of Vehicles*.

- *Deck coating maintained in satisfactory condition*
- *Extra vigilance when decks are wet*
- *Wear correct PPE*

The 3/O was wearing an orange boiler suit, a hard hat and protective footwear. He was also carrying a portable very high frequency UHF radio, but he did not carry a whistle. The whistle he had been issued with by Seatruck was later found among his personal effects

1.9.4 Mobile telephone use

Records of the 3/O's mobile telephone usage showed that the phone had been connected to the internet and had been receiving data for up to 4 hours prior to the accident. The records also showed that the 3/O had read three text messages at 1922:03 and that he had started his personal telephone conversation at 1923:49.

On 5 April 2019, Seatruck issued a lessons learned questionnaire to its crews to gain an understanding of their safety awareness and to disseminate lessons learned from recent inspections, audits, defects and incidents. Included was the question "*are crew forbidden from using personal mobile phones when working?*" This had been included in the questionnaire because the company had received two reports of hazardous situations arising from crew using mobile phones while on duty. Analysis of the completed questionnaires indicated that the prohibition of the use of mobile phones when working had been briefed to *Seatruck Progress*'s crew, including the 3/O, on 12 April 2019. The crew had been instructed that if they needed to use a phone when working, they should either request permission to leave the deck and return to the accommodation or go to an area ashore where vehicles were not moving.

1.10 BROCKLEBANK DOCK

1.10.1 Management

Brocklebank Dock was managed by Docklands Logistics (Europe) Ltd (Docklands), which was contracted by Seatruck to provide the manpower to operate the terminal. Docklands managed the terminal's administration, security, tractor drivers, cargo operations controllers, line-handlers and vehicle maintenance. It also monitored the terminal's infrastructure and carried out low level maintenance tasks. However, repairs requiring additional funding were referred to Seatruck for authorisation. Seatruck owned the vehicles used at Brocklebank and leased the land from Peel Ports Ltd.

1.10.2 Procedures and risk assessments

Dockland's policies and procedures were drafted with the assistance of Courtley Health and Safety Ltd, an independent safety adviser. None of the policies or procedures specifically covered the operation of the semi-trailer tractors or their use on board a ferry. The risk assessment for the task of driving tractors in close proximity to people identified the risk of people being struck by the moving vehicle

and recognised the consequences could be fatal. Similarly, the risk assessment also recognised the risk of hitting people when driving on and off the vessel. The risk assessment included the following control measures:

- *Only authorised workers operate the Tugmaster[7] Vehicles.*
- *Segregate pedestrian and vehicle traffic as much as practical.*
- *Restrict the area where the Tugmasters operate to authorised workers only. Visitors are to be accompanied at all times.*
- *A designated supervisor is to be used where effective segregation is not possible.*
- *Access routes are to be kept as clear as practical to allow the free movement of Tugmasters.*
- *Where Tugmaster vehicles and people must be in close proximity, the workers are to wear high visibility clothing.*
- *Ensure operator has 360º Vision from the operating position, use chargehand were vision is obstructed.*
- *No mobile phones to be used whilst operating vehicle.*
- *Drivers to ensure vision is maintained around vehicle.*

Pedestrian walkways were marked within the terminal, but not all markings were clear and there were no walkways marked on the quayside at the bottom of *Seatruck Progress*'s stern ramp.

1.10.3 Ro-ro tractor units

The tractors used to load and unload unaccompanied semi-trailers at Brocklebank Dock were manufactured in the Netherlands by Terberg Group B.V. The terminal had 45 Terberg RT222 tractor units that were specifically designed for use on board ro-ro freight vessels. The driver's seat and console were offset to the right-hand side of the cab **(Figure 11)** and could be rotated through 180°.

A tractor was attached to a semi-trailer by a coupling arrangement bolted to the tractor's chassis, on to which the semi-trailer rested and pivoted. The maximum speed of a tractor moving forward on a level surface was 27km/h. It is estimated that the maximum speed of a tractor going up the lower vehicle deck ramp on board *Seatruck Progress* while pushing a 30t semi-trailer was 10km/h.

To pull or tow a semi-trailer, the tractor drivers faced forward and had an unrestricted view ahead. To push a semi-trailer, drivers rotated the seat and console to face the front end of the semi-trailer **(Figure 12)**. In this position, the driver's view ahead was limited to the line of sight down the left-hand side of the semi-trailer and along the right-hand side of the trailer through a wing mirror.

[7] Ro-ro tractor units – See paragraph 1.10.3.

The tractors were not road vehicles as defined by the UK Road Vehicles (Construction and Use) Regulations 1998, and there was no legal requirement for their drivers to hold a vehicle licence. In Liverpool, there was a local unwritten agreement between Docklands and other ro-ro terminal operators that drivers would hold a UK car driving licence.

It typically took about 6 weeks to train a newly recruited tractor driver. The Docklands training programme included both theory tests and practical assessments, which the trainee drivers were required to pass. Docklands re-assessed its qualified tractor drivers every 2 years, with assessments being overseen by a qualified instructor.

Figure 11: Tractor unit with semi-trailer

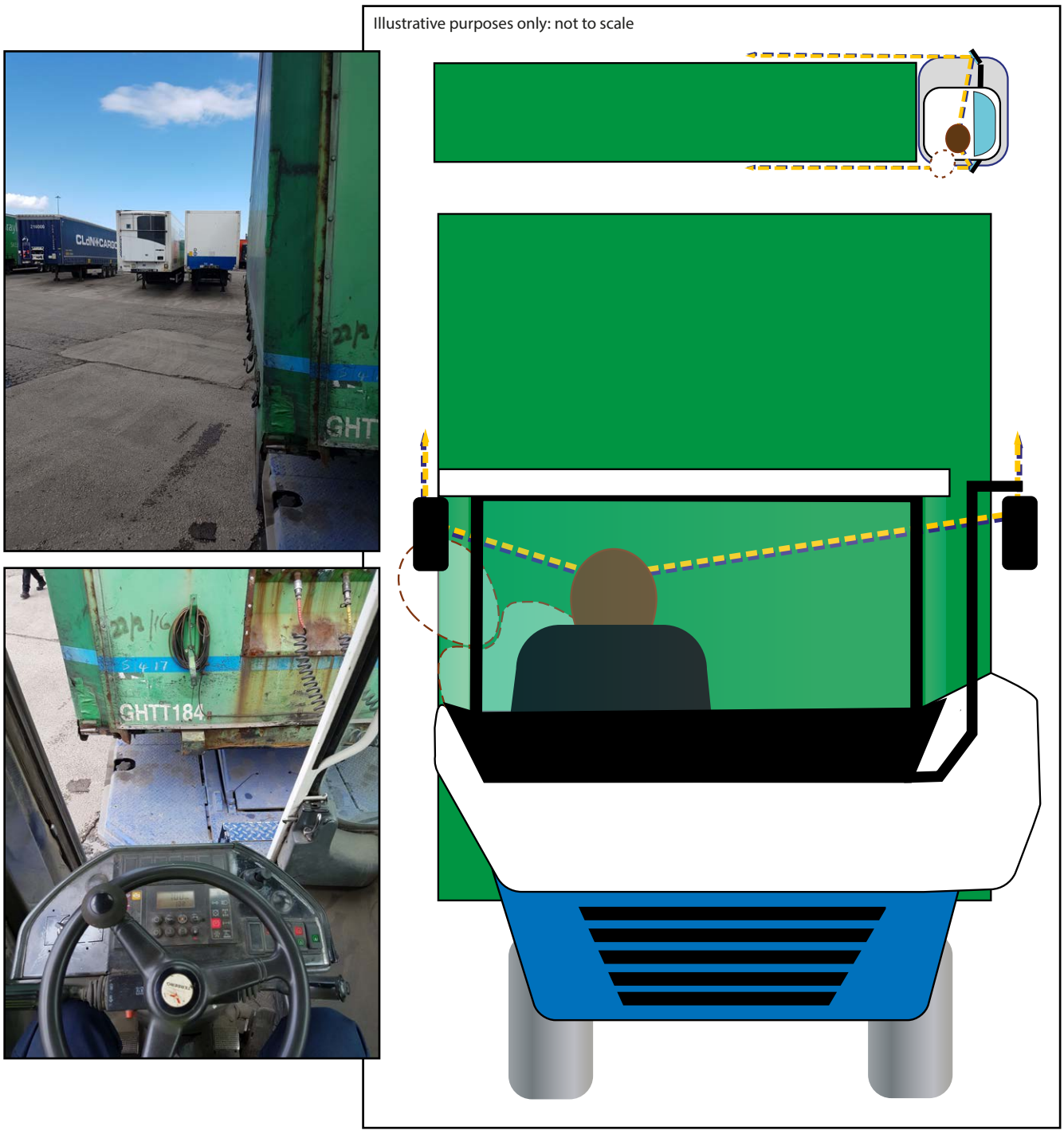


Figure 12: View ahead from tractor unit driving position while pushing a semi-trailer

1.10.4 Semi-trailers

The semi-trailer that struck the 3/O on board *Seatruck Progress* was 13.6m in length, 2.55m wide and 4.65m high. It contained concrete slabs and weighed approximately 30t. The overall length of the semi-trailer and tractor when connected was 16.5m. When coupled, two air lines were connected from the tractor to the semi-trailer to enable the tractor driver to operate the semi-trailer's braking system. There were no electrical connections between the tractor and the semi-trailer.

1.10.5 Shore controller

The movement and storage of semi-trailers inside the Brocklebank terminal were overseen by a Docklands shore controller from a portacabin on the quay opposite the ferry berth. The portacabin windows were partially covered by plastic bags to eliminate glare of the sun on the display screens inside. Despite this, the shore controller had a good view of the vehicle turning area at the bottom of the ferry's stern ramp and of the stern ramp itself **(Figure 13)**.

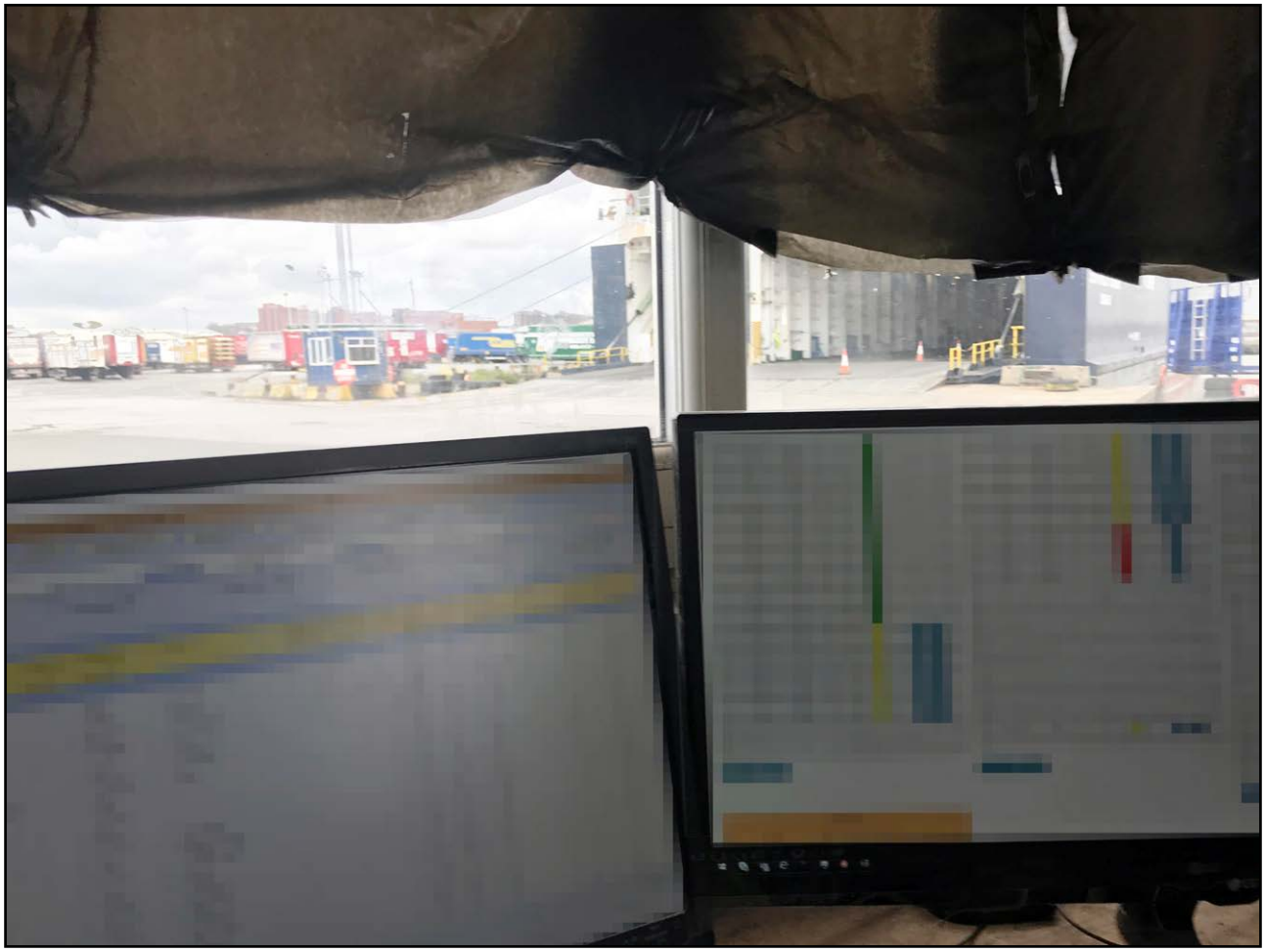


Figure 13: View from shore controller's portacabin

During loading operations, the controller allocated semi-trailers to one of a ferry's vehicle decks in accordance with an electronic loading plan provided by Seatruck. Hazardous cargoes were stowed on the weather deck and heavily loaded semi-trailers were stowed on the lower vehicle deck. The loading plan was printed as a hard copy and collected by the ferry's chief officer.

Changes to the loading plan were passed from the shore controller to the chief officer via VHF radio. VHF radio was also the primary means of communication between the shore controller and the tractor drivers. The controller remained inside the portacabin for the duration of the discharge and loading, but monitored the semi-trailers' movements on and off the ferries to ensure that the tractor drivers had located and moved the semi-trailers they were allocated.

1.10.6 The tractor driver

The tractor driver was 31 years old and had worked for Docklands since March 2016. He completed his initial training and passed the required assessments within 3 weeks and was deemed to be a skilled driver. His driving standard was considered to be instructor level during his last assessment in February 2018.

In September 2017, the driver was disqualified from driving road vehicles for 12 months following a conviction for driving while under the influence of drugs, which was the result of recreational cannabis use. The disqualification did not apply to driving the ro-ro tractor units at the Brocklebank terminal and Docklands, who were aware of the conviction and allowed him to continue to work as a driver.

The driver was also trained as a line-handler and routinely assisted in making fast and letting go the mooring ropes of the vessels transiting the Liverpool dock lock system and when berthing and unberthing.

1.10.7 Drug and alcohol policy

Docklands had a zero-tolerance drugs and alcohol policy. The written policy allowed for the random testing of employees for drugs and alcohol when there was cause to do so. No random drug or alcohol tests had been conducted.

1.11 BEST PRACTICE GUIDANCE

1.11.1 The Code of Safe Working Practices for Merchant Seafarers

Section 27 of the COSWP, *Roll-on/Roll-off Ferries*, gave general advice for the safety of personnel working on vehicle decks. Section 27.6, *Safe movement*, advised that pedestrians should be warned of vehicle movements and should keep to walkways when moving about the vehicle decks. It also stated that:

> *As far as possible, routes used by vehicles should be separated from pedestrian passageways, and the use of ship's ramps for pedestrian access should be avoided. Ramps that are used by vehicles should not be used for pedestrian access unless there is suitable segregation of vehicles and pedestrians. Segregation can be achieved through the provision of a suitably protected walkway, or by ensuring that pedestrians and vehicles do not use the ramp at the same time (see the Code of Practice on the Stowage and Securing of Vehicles on Roll-on/Roll-off Ships, section 2.6).*
>
> *Crew members should exercise great care when supervising the driving, marshalling and stowing of vehicles to ensure that no person is put at risk.*

The precautions to be taken identified in the COSWP included:

- *Personnel required to be on the vehicle decks should wear appropriate personal protective equipment, including high-visibility clothing.*
- *Communications between deck officers and ratings should be clear and concise to maintain the safety of passengers and vehicles.*

- *There should be suitable traffic-control arrangements, including speed limits and, where appropriate, the use of signallers. Collaboration may be necessary with shore-side management where they also control vehicle movements on board ship.*

- *Personnel directing vehicles should keep out of the way of moving vehicles, particularly those that are reversing, by standing to the side, and where possible should remain within the driver's line of sight. Extra care should be taken at the 'ends' of the deck where vehicles may converge from both sides of the ship.*

- *Crew members should be wary that vehicles may lose control on ramps and sloping decks, especially when wet, and that vehicles on ramps with steep inclines may be susceptible to damage. Ramps should have a suitable slip-resistant surface.*

- *Where fitted, audible alarms should be sounded by vehicles that are reversing.*

- *Safe systems of work should be provided in order to ensure that all vehicle movements are directed by a competent person.*

The COSWP did not contain any guidance on the risks associated with mobile phone use on vehicle decks or in any other hazardous working spaces.

1.11.2 The Code of Practice on the Stowage and Securing of Vehicles on Roll-on/ Roll-off Ships

The MCA's *Code of Practice on the Stowage and Securing of Vehicles on Roll-on/ Roll-off Ships*, stated that:

> *Ramps which are used by vehicles should not also be used for simultaneous pedestrian access unless there is suitable segregation of vehicles and pedestrians. Such segregation can be achieved by a separate walkway which may be either a pavement or protected by a suitable barrier or by temporarily halting vehicle movements to allow pedestrians safe passage.*

The Code also identified inadequate supervision of vehicle movements on vehicle decks and ramps as a principal source of danger.

1.11.3 Code of Practice – Safety and Health in Ports

The International Labour Organization's (ILO) Code of Practice *Safety and Health in Ports* (2016 edition) provided practical guidance to governments, ILO constituents and all those responsible for or involved in the management, operation, maintenance and development of ports. Its aim was to help to raise the profile of safety and health issues in ports in all parts of the world, and to contribute to the health, morale and wellbeing of port workers.

The code of practice recognised the dangers posed to pedestrians on ro-ro vehicle decks and access ramps by moving vehicles. It also stated that *Mobile phones and personal electronic devices should not be used at any time while working*.

1.11.4 Safety in Docks: Approved Code of Practice

The UK's Health and Safety Executive (HSE) published its *Safety in Docks Approved Code of Practice* (ACOP)(L148) in 2014. The ACOP was aimed at those who have a duty to comply with provisions of the Health and Safety at Work Act 1974. This included people who control dock premises, suppliers of plant and equipment, dock employers, managers, safety officers, safety representatives and workers. Ships' masters also have duties under the Health and Safety at Work Act when ships' crew work alongside shore-based personnel on the ship, or when ships' plant is used ashore. The ACOP explained that:

> *Where shore-based employees go aboard ship, all dutyholders involved, including the ship's master, should collaborate with one another to ensure that their respective duties are discharged.*

For the loading and unloading of ro-ro vessels, control of vehicle movements may be with either shore-side management or the vessel's master or, in some instances, both. In such cases, collaboration is required to avoid confusion and ensure that clearly defined procedures are followed.

Chapter 58 of the ACOP, *Safe site – design and activity – pedestrian walkways on shore*, stated:

> *Walkways should if possible be so laid out that they do not cross cargo handling areas. If it is necessary that they do, then they should be carefully designed and laid out to provide safe access.*

Chapters 59 and 60, *Vehicle access to ships*, stated:

> *Ramps used by vehicles should not also be used for pedestrian access unless there is suitable segregation of vehicles and pedestrians, whether by providing a suitable protected walkway or by ensuring that pedestrians and vehicles do not use the ramp at the same time.*

And,

> *A suitable and safe traffic movement system, appropriate to the circumstances, which includes the regulation of traffic between ship and shore, should be set up and adequately supervised and monitored.*

Paragraph 105, *Safe driver*, stated:

> *Any employee whose ability to drive a vehicle or operate lifting equipment appears to be impaired by alcohol or other drugs should be considered unfit while that impairment lasts.*

1.11.5 Guidance for ports and terminals

The UK Port Skills and Safety[8] (PSS) guidance documents *SIP-001: Guidance on Port and Terminal Planning (Workplace Transport)*; *SIP-010: Guidance on Ro-Ro and Sto-Ro Operations*; and *SIP-012: Guidance on Ro-Ro Passenger and Cruise Operations*, were produced with the assistance of the HSE and representatives of the UK port industry with the aim of improving safety.

SIP-001 was published in September 2018 and addressed port and terminal planning, including topics such as: transport management; specific hazards; all movements and ***the vital importance of segregating people and plant***. The document highlighted the importance of co-operation and co-ordination between shore-side and ship-side employers and the development of safe systems of work (in consultation with the workers involved). It also recommended a signed agreement, or an agreed and recorded system of work, with the master of each vessel.

SIP-010 was published in March 2019 and considered the workplace transport aspects of ro-ro and sto-ro[9] operations. Being struck or crushed by moving vehicles was at the top of the list of hazards associated with ro-ro operations, and the controls given to eliminate the risk included:

> *Ramps used by vehicles should not also be used for pedestrian access unless there is suitable segregation of vehicles and pedestrians. This could be by providing a suitable protected walkway or by ensuring that pedestrians and vehicles do not use the ramp at the same time.*

When discussing the hierarchy of controls in its section on risk assessment, prohibiting the use of mobile phones in hazardous areas was included in the list of examples for administrative measures.

SIP-012 was published in 2014 and provided guidance on ro-ro, passenger and cruise operations. It also covered activities that are not carried out at dedicated passenger terminals. It stated that:

> *Segregating pedestrians and vehicles is a fundamental safety principle of RoRo/ Cruise operations and should be at the forefront of operating procedures.*

1.12 MOBILE TELEPHONES AND DISTRACTION

Several studies have been conducted to determine the extent to which mobile phone usage leads to distraction, with most focusing on the distraction of drivers in moving vehicles. The findings of these studies suggest that a driver using a mobile phone concentrates on the demands connected with mobile phone use to the detriment of their wider situational awareness. As a result, a driver is up to four times more likely to have an accident while using a mobile phone than when not.

The findings of studies examining mobile phone use by pedestrians walking on a street suggest that 14% of pedestrians using a phone will have collisions with objects or walk across roads without looking beforehand.

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[8] The UK Port Skills and Safety is an industry group that was set up in 2002 by the UK Major Ports Group and the British Ports Association to improve safety standards across the ports sector.

[9] Sto-ro: Stow-on/Roll-off.

1.13 EFFECTS OF CANNABIS ON DRIVING

THC, the main psychoactive element that is produced when smoking cannabis, enters the bloodstream quickly and reaches a peak concentration 3 to 10 minutes after inhalation. The psychoactive effect will typically last for between 2 and 3 hours but, although THC metabolises at an exponentially declining rate (as opposed to the steady metabolisation rate for alcohol), it is fat soluble, and metabolites persist in the body. Carboxy THC, the main THC metabolite, is detectable by saliva swab tests, but levels of THC in the bloodstream can only be measured through blood tests.

There have been many studies on the effects of cannabis on driving and accident risk. In 2007, the Department for Transport (DfT) published a paper entitled *Cannabis and driving: a review of the literature and commentary*, which states:

> *There is only inconsistent (and weak) evidence that detected levels of cannabis correlate with impairment. There have been no attempts to relate detection level to accident risk. Thus, at present there may be limited practical significance of using detection levels to indicate impairment and accident risk. Moreover, there is no agreement on which cannabinoid to detect. Indeed, THC-COOH which is rapidly detectable, is not psychoactive. Since different cannabinoids may have different relation to impairment over time, it is not possible to specify a single reliable model to link blood concentrations and impairment. Given that impairment is a function of time and dose, a valid model must consider both the time and dose functions. Moreover, it may also be necessary to include parameters reflecting the influence of relevant physiological, demographic and psychosocial variables. However, in the absence of a reliable and valid measure of 'impairment', no practical model can be specified. Research is needed to provide standardised impairment tests with which validated models of impairment can be formalised.* [sic]

It is illegal to drive in the UK if a person is unfit to do so due to having consumed legal or illegal drugs or if their blood contains certain levels of illegal drugs (even if their driving is not impaired). The legal limit for THC in the blood stream is 2µg/L.

1.14 PREVIOUS ACCIDENTS

1.14.1 Fatality on board ro-ro ferry *Skane*

On 25 May 2011 at 2100, the ro-ro vessel *Skane* berthed at a ro-ro berth in the port of Trelleborg, Sweden. Shortly after arrival, the passengers disembarked and the unloading of the cargo, consisting of cars, trucks and trailers, commenced.

The chief officer, who was in charge of the cargo handling, was standing on the stern ramp on deck three, preparing for the loading. At the same time, a semi-trailer was being unloaded using a terminal tractor (tug master). The semi-trailer was being pushed out from the ship and onto the stern ramp. The driver of the terminal tractor stopped when the semi-trailer reached the top of the stern ramp as he did not have a view over the area behind the semi-trailer. The chief officer, on the stern ramp, made eye contact with the terminal tractor and indicated that the driver should continue to push the semi-trailer off the vessel.

As the semi-trailer was pushed across the stern ramp, it struck the chief officer, and he fell between the rear wheels of the semi-trailer. A shore worker who saw what had happened rushed towards the terminal tractor and waved to the driver to stop.

The driver stopped, and stepped out of the terminal tractor; he saw the chief officer lying on the ground, face-down between the back wheels of the terminal tractor. He immediately called for help, and the rescue service was alerted.

The chief officer was taken to hospital, where he died from the injuries he had sustained in the accident.

The investigation by the Swedish Transport Authority identified that:

- Both ship and port routines were inadequate.
- The co-ordination of routines between the ship and the port was inadequate.
- The regulation for reversing vehicles was not followed.
- The chief officer did not pay attention to the trailer.
- The prevailing workload and speed during cargo operations had contributed to increased risk-taking.

1.14.2 Fatality on board *Seatruck Pace*

On 17 December 2018, a crewman from the Cyprus registered ro-ro freight vessel *Seatruck Pace* died as a result of falling 4.5m through the hatch over the lower vehicle deck ramp. The crewman was working alone and had crossed a temporary safety barrier guarding the edge of the open hatch. He then walked along a narrow section of deck between the unguarded edge and the ship's side. The conclusions of the MAIB investigation report (9/2019) included:

- *The risk of falling was apparent but was accepted by the assistant bosun, who had probably taken similar risks in the past.*
- *Work practices adopted by other deck ratings during hatch cover maintenance 2 days earlier indicated that adherence to the vessel's safety procedures was more a matter of routine and compliance than of understanding and conviction.*

Following the accident, Seatruck commissioned a staff safety climate survey, which was conducted by the HSE's science and research centre (Health and Safety Laboratories) during September 2019. The survey measured the attitudes and perceptions of Seatruck's workforce about health and safety. The survey identified that the factors with the most unfavourable results were:

- Usability of procedures. Some health and safety procedures were not really practical or were difficult to follow/some jobs were difficult to do safely/some health and safety procedures did not reflect how the job was actually done.
- Peer group attitude. Sometimes it was necessary to take risks to get the job done.
- Health and safety-oriented behaviour. Not all the health and safety procedures were strictly followed.

The survey report's suggestions for improvement included:

- *Efforts should be made to ensure that risk assessments and method statements are usable for all relevant tasks, including, where appropriate, pictures and diagrams.*

- *Focus on training to ensure systems and expectations or procedural compliance are clearly understood.*

- *Foster a supportive environment such that workers feel empowered, valued and equal.*

- *Create an environment that empowers individuals to challenge each other concerning unsafe behaviours. This should extend beyond organisational hierarchies and boundaries.*

- *Praise and recognition for stopping work on safety grounds empowers workers to stop work, and encourages worker engagement, safe behaviours and a positive attitude to health and safety.*

Following the fatality on board *Seatruck Pace* and the safety climate survey, Seatruck introduced several safety initiatives (see Section 4.2).

1.15 SUBSEQUENT SIMILAR ACCIDENTS

On 15 August 2019, a chief officer was fatally injured when he was struck by a semi-trailer being pushed on board a ro-ro ferry in Rotterdam. The accident is being investigated by the Inspectorate SZW of the Netherland's Ministry of Social Affairs and Employment. Initial evidence indicates that the chief officer was standing on the stern ramp and facing toward the vehicle deck, and that the driver did not see him because his view was obscured by the semi-trailer.

On 21 January 2020, a shore rigger was killed on the ro-ro vessel *Norsky*, which had berthed at the port of Tilbury. The rigger was struck by a semi-trailer as it was being reversed into position on the vessel's vehicle deck. The tractor driver who was reversing the semi-trailer into position was also a shore worker. The loading and discharging of semi-trailers, as well as the securing of the semi-trailers, was carried out by the terminal's staff and was not under the control of the ship's crew. The HSE undertook the accident investigation.

SECTION 2 - ANALYSIS

2.1 AIM

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

2.2 THE ACCIDENT

The 3/O was struck and fatally injured by a semi-trailer because he was standing on the stern ramp at the same time as vehicles were being driven on and off the ferry, and neither he nor the tractor unit driver pushing the semi-trailer were aware of the other's presence. This section of the report will analyse the reasons why the tractor driver was not aware of the 3/O on the stern ramp and the 3/O was not aware of the semi-trailer approaching. It will also analyse why the 3/O and other pedestrians were on the stern ramp at the same time as moving vehicles. The underlying factors that contributed to the accident will also be discussed.

2.3 TRACTOR DRIVER'S AWARENESS OF THE THIRD OFFICER ON THE STERN RAMP

At the time of the accident the tractor was pushing a semi-trailer from the lower vehicle deck to the quay. The driver could not see directly ahead and was using lines of sight down the sides of the semi-trailer, with the aid of wing mirrors, to manoeuvre his vehicle and avoid hitting the ship's structure, other vehicles and pedestrians. His speed would have been limited to about 10km/h and there was no banksman to direct him, or traffic controllers monitoring the ship's ramps.

As the tractor pushed the semi-trailer up the lower deck ramp the driver would not have been able to see the stern ramp **(Figure 12)**. At the point at which the rear of the semi-trailer struck the 3/O, the tractor would only just have cleared the lower deck ramp. At that point the driver would have been looking along the side of the semi-trailer closest to the starboard edge of the stern ramp, using the yellow line as a guide. His view ahead was blocked by the semi-trailer, and the 3/O would not have been visible to him. Furthermore, he was not expecting pedestrians to be loitering on the ramp directly ahead of his vehicle.

2.4 THIRD OFFICER'S AWARENESS OF THE APPROACHING SEMI-TRAILER

It was apparent that the 3/O did not see or hear the semi-trailer approaching. Immediately prior to the accident he was facing down the stern ramp, away from the semi-trailer's direction of approach and was engaged in a conversation on his mobile telephone. In addition, the 3/O might not have been aware that a tractor driver was on the lower vehicle deck and about to drive across the starboard side of the stern ramp as he was initiating the telephone call near the CCR at the time the tractor was driven on board.

The reconstruction of the semi-trailer unloading operation on board *Seatruck Power* indicated that the 3/O probably would not have been able to hear the semi-trailer approaching because the tractor's reversing alarm and its engine would have been

masked by the noise generated from cargo discharge operations taking place on the decks above. The tractor's audible warning alarm would also have been absorbed or reflected to some degree by the semi-trailer between the tractor and the 3/O.

2.5 SEGREGATION OF VEHICLES AND PEDESTRIANS

The only means of access to *Seatruck Progress* in Brocklebank Dock was via its stern ramp, and it was apparent from CCTV recordings that the ferry's crew and terminal staff frequently crossed it during vehicle discharge and loading operations. There were many reasons for this, including boarding and leaving the vessel, the collection of documents from the shore controller's portacabin, and the making of mobile telephone calls. The CCTV recordings prior to the accident also showed crew and terminal staff on the stern ramp at the same time as moving vehicles, and that they were not keeping to the marked walkway.

Seatruck's means of access procedures aligned with the guidance contained in COSWP and prescribed the use of either a gangway or an accommodation ladder for pedestrian access wherever practical. However, these means of access were not available in Brocklebank Dock due to the position of the ferry's accommodation ladder and the presence of physical obstructions on the quay. Although the obstructions could have been cleared and a gangway used, this does not appear to have been pursued, possibly due to physical practicalities along with the added pressures on the crew regarding rigging, monitoring and security. Consequently, the use of the stern ramp alone for pedestrians to access the vessel was accepted practice.

Seatruck's SMS authorised the use of stern ramps as the primary means of access to its ferries in such situations providing masters ensured that a safe pedestrian access was clearly marked, or movement on the ramp was controlled. In this case a walkway was marked by a painted yellow line along the starboard edge of *Seatruck Progress*'s stern ramp, but movement on the ramp was not closely monitored or controlled.

Seatruck and Docklands had recognised the risk of a person being struck by a moving vehicle, but the practices adopted placed a reliance on crew and drivers to see and be seen. There was no method in place to segregate pedestrian and vehicle movement, and there was no walkway marked on the quayside at the bottom of *Seatruck Progress*'s stern ramp. The priorities between vehicles, and between vehicles and pedestrians, were based on custom and practice, with the latter placing an onus on pedestrians to keep out of the way.

Nonetheless, the 'see and be seen' safety precaution, and the associated control measures of maintaining eye contact, wearing high visibility clothing, and maintaining an awareness of surroundings and hazards, proved effective most of the time. However, the circumstances of this accident show that the reliance placed on the 'see and be seen' precaution was seriously flawed in mitigating the increased risk posed by a tractor pushing or reversing a semi-trailer. Although the tractor driver's very limited visibility ahead when pushing a semi-trailer in a straight line was known, the likelihood of pedestrians not keeping to the marked walkways, and the potential for them to become distracted and not maintain situational awareness, was clearly underestimated.

Seatruck's policy regarding the use of its stern ramp during cargo operations was not in accordance with clear guidance provided by both shore-side and maritime regulators and industry bodies. The SMS allowed for pedestrians to be on the stern ramp at the same time as moving vehicles provided they kept to a painted walkway. This was not a safe system of work. Seatruck and Docklands need to put robust procedures in place that help ensure ramps are properly monitored and vehicle movements are stopped whenever pedestrian access is necessary. The alternative solution is the provision of walkways with physical barriers that segregate pedestrians and vehicles.

2.6 SHIP-SHORE INTERFACE

The discharge of cargo from *Seatruck Progress* in Brocklebank Dock was a routine procedure, and the ferry's crew and terminal's tractor drivers were aware of their roles and responsibilities. The cargo discharge process was not as complex as the loading because the crew and drivers did not have to ensure the semi-trailers and accompanied vehicles were parked in accordance with the stowage plan. The pushing and reversing of semi-trailers, which was necessary on board *Seatruck Progress* to optimise the volume of cargo transported, particularly on the lower vehicle deck, was an everyday occurrence.

Separating vehicle and pedestrian traffic across *Seatruck Progress*'s stern ramp required a system of work that co-ordinated the activities of the vessel's crew, Docklands' tractor drivers and other employees, and other freight vehicle drivers. However, no method of control was identified, and no resource was allocated despite Seatruck recognising that personnel being struck by a moving vehicle posed a significant risk, albeit in Heysham rather than Liverpool.

The ferry's chief officer and duty officer both had roving duties, which meant that neither was able to dedicate the time to ensure that movements across the stern ramp were controlled, and the shore controller's focus was on cargo management. In addition, Docklands had identified the precaution of using a chargehand to assist its drivers where their visibility was obstructed. However, because a chargehand had not been requested by or funded by Seatruck, none had been provided.

Vehicle deck safety is a key concern in the ferry industry. Although the pushing and reversing of semi-trailers is commonplace in the ro-ro freight industry, the circumstances of this accident along with the number and severity of recent previous similar and subsequent accidents (Paragraph 1.14 and 1.15) indicates the frequency of accidents is increasing. As both shore workers and ferry crews are involved in these operations, the mitigation of risks to pedestrians requires shore and vessel safety management systems to adopt a common approach to risk control.

The importance of co-operation and co-ordination between shore-side and ship side employers and the development of safe systems of work (in consultation with the workers involved) was well understood within the ports industry. PSS recommended that ferry terminal operators have a signed agreement or an agreed and recorded system of work with the master of each vessel. The difficulty of achieving this might be increased by the different practices adopted within different ports, which requires ferry crews to retain a degree of flexibility. However, the adoption of standard practices and agreed methods of control by terminal staff working regularly on ferries, and ferry crews operating on fixed routes, would appear to be less problematic.

2.7 MOBILE TELEPHONE USE

The 3/O was not the only crew member to cross the stern ramp to make a mobile telephone call. The chief engineer and other crew members had walked ashore earlier that day to make telephone calls. However, unlike the 3/O, the chief engineer made his call from the safety of a car that was parked on the quayside in compliance with onboard instructions regarding the use of mobile phones.

In the absence of the chief officer, the 3/O had responsibility for traffic control across the stern ramp. However, by standing on the ramp during cargo operations when engaged in a conversation on his mobile phone, he put himself in a hazardous position. The risk of him being struck by a moving vehicle was increased by the resulting distraction, which was sufficient to result in the loss of awareness of what was occurring around him.

Terms such as ‘Smartphone zombie’ and ‘Smombie’ are used in popular culture to describe pedestrians who walk slowly and without paying attention to their surroundings because they are focused on their smartphone. Such distraction occurs when the phone user’s attention is drawn away from their current task, and can be caused by several psychological factors. In this case the 3/O’s attention might have been captured by the importance and value of the phone call to the extent that he unconsciously focused all his cognitive resource on the call.

Using up one’s cognitive resources in this type of situation is a natural process and can make it very difficult to attend to other surrounding activities, causing one to overlook significant known hazards.

Refocussing attention on surrounding hazards requires people to have a strong visual, auditory or tactile stimulus; something absent in this accident due to the high background noise and the direction in which the 3/O was looking.

A related factor that might have influenced this accident is the complexity/ importance of the phone call. The 3/O might have become immersed due to the nature of the call, it being necessary to stop and focus his attention solely on the phone call, rather than managing to continue to walk and talk.

Mobile phone use has increased significantly in recent years, and provides seafarers an important and ready means of maintaining contact with friends and family. However, the potential for mobile phones to cause distraction in onboard workspaces has yet to be fully recognised and addressed by the marine industry.

The use of mobile phones in the workplace can be very beneficial and the temptation to use them for personal purposes can be extremely strong. This has been recognised and understood in some industries and addressed by the provision of designated mobile telephone use safe zones in hazardous workspaces. The ILO’s Code of Practice *Safety and Health in Ports* states that mobile phones and other portable electronic devices should not be used at any time while working. Furthermore, PSS identified the prohibition of mobile phones on vehicles as a control measure in one of its publications. However, the COSWP contains no guidance or advice on mobile telephone use on board ships. The provision of such advice would help ship operators to develop robust and clear policies and procedures for their crews to follow.

2.8 APPROACH TO SAFETY

The 3/O had been briefed 4 days after joining *Seatruck Progress* on 8 April 2019 that the use of mobile phones when working was prohibited. Although his initiation of a personal call at 1924 on 15 May might have been motivated by the receipt of text messages less than 3 minutes earlier, that the 3/O was carrying his mobile telephone during cargo operations indicates that he had intended to use or monitor it to some degree.

Seatruck's questionnaire, which, among other things, prompted masters to remind crews that they were not allowed to use mobile phones while working, showed that the ship manager was disseminating lessons learned from recent inspections, audits and incidents. As such, it encouraged a learning culture. However, that the 3/O used his mobile telephone and did not carry a whistle, along with other crew not using the marked walkway when crossing the stern ramp and walking on the ramp to the upper deck **(Figure 8)** rather than using the internal stairway, suggests there is divergence in some areas between work prescribed in the onboard procedures and the way it is actually done.

The MAIB's investigation report of the fatality on board *Seatruck Pace* in December 2018 and the safety climate survey of Seatruck employees conducted in September 2019 (paragraph 1.14.2) identified both risk-taking and a lack of crew compliance with onboard procedures. The circumstances of the 3/O's fatality on board *Seatruck Progress*, which occurred within 5 months of the fatality on board *Seatruck Pace*, further highlights the problem. Therefore, action by Seatruck to improve the usability and applicability of its procedures and the safety culture among its employees was warranted.

2.9 DRUG AND ALCOHOL POLICY

Following the accident, the driver of the tractor pushing the semi-trailer that struck the 3/O was found to have been over the legal driving limit for cannabis. However, he had successfully driven a tractor pushing a 2.55m wide semi-trailer up the 4m wide ramp from the lower deck hold. Police tests and review of CCTV recordings also indicated that his driving ability was not impaired. Therefore, the driver's cannabis use was unlikely to have been contributory to this accident.

Tractor driving on board ro-ro ferries is a skilled job and one that requires both co-ordination and alertness, for which Docklands assessed its trainee drivers. As any impairment to a driver through drug or alcohol use inevitably increases the risk of collision and injury, Docklands' policy of zero-tolerance and random testing was an appropriate measure. However, the absence of random drug tests, particularly following the driver's conviction in 2017 for driving while under the influence of drugs, indicates that the policy was not being enforced.

SECTION 3 - CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The 3/O was struck and fatally injured by a semi-trailer because he was on the stern ramp at the same time as moving vehicles, and neither he nor the driver of the tractor pushing the semi-trailer, were aware of the other's presence. [2.2]

2. The tractor driver's view of the 3/O was blocked by the semi-trailer and he was not expecting a pedestrian to be on the ramp. [2.3]

3. The 3/O was focused on a personal call on his mobile telephone. He was facing away from the direction of the semi-trailer's approach and probably did not hear the tractor's engine or audible reversing alarm. [2.4]

4. The stern ramp was the only means of access, but a protected walkway could not be provided and other means of segregating pedestrians from vehicular traffic, as required by the applicable codes of practice, had not been established. [2.5]

5. The pedestrian walkway that was marked on the stern ramp by a yellow painted line was not routinely used by the ferry's crew or terminal staff. The walkway was also not safe to use during cargo operations because it was not protected by a physical barrier and was frequently encroached upon by moving semi-trailers. [2.5]

6. Separating pedestrian and vehicular movement across the stern ramp through a strategy of 'see and be seen', with an onus on pedestrians to keep out of the way, was flawed. It did not take into account the limited visibility from a cab pushing a semi-trailer or the potential for distractions. [2.5]

7. Individual aspects of the Seatruck and Docklands safety management systems were relevant to the safety of pedestrians, but they were either impractical or were not applied. [2.6]

8. Tractors pushing semi-trailers is commonplace in the ro-ro freight industry, but the number and severity of previous similar accidents indicates that it is accompanied by increased risk and warrants the adoption of standard practices and agreed methods of control by terminal staff and ferry crews. [2.6]

9. By conversing on his mobile phone while standing on the stern ramp, the 3/O significantly increased his risk of being struck by a moving vehicle because he lost awareness of what was occurring around him. [2.7]

10. The potential for mobile phones to cause distraction in onboard workspaces has yet to be fully recognised and addressed by the marine industry. [2.7]

11. The circumstances of this accident, along with the circumstances of a fatality on board *Seatruck Pace* in 2018 and the findings of a subsequent safety climate survey of Seatruck's workforce, indicate there is a divergence in some areas between onboard procedures and the way work is conducted. [2.8]

3.2 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The tractor driver was over the legal driving limit for cannabis, but this was unlikely to have been contributory to this accident as his driving ability was tested and found not to have been impaired. [2.9]

2. The Docklands' drugs and alcohol policy was not being fully implemented or enforced. [2.9]

SECTION 4 - ACTION TAKEN

4.1 MAIB ACTIONS

The **MAIB** has:

- Issued a safety flyer **(Annex A)** highlighting the circumstances of the accident and the lessons to be learned regarding the segregation of pedestrians from vehicles and the use of mobile telephones on working decks and other workspaces on board ships.

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

Seatruck Ferries Ltd has, following the fatal accidents on board *Seatruck Pace*, *Seatruck Progress*, and its safety climate survey:

- Introduced a fleet mobile phone policy prohibiting the carriage and use of mobile phones on its vessels' working decks, which must be read and understood by crew before onboard duties are assigned.

- Adjusted the loading on the lower vehicle decks of its vessels to ensure that discharge from the lower hold is by forward driving only.

- Updated company guidelines that prohibit pedestrians, including crew members, from being on the stern ramp at the same time as moving vehicles; except when actively engaged in the loading/unloading of abnormal loads or vehicles with low ground clearance.

- Installed recording CCTV cameras on all ships to monitor that onboard procedures are being followed.

- Established an accident and near miss reporting system for its shore terminals.

- Overhauled its management structure to improve and promote ship-shore relations and procedures.

- Introduced the drug and alcohol testing of shore workers.

- Scheduled regular meetings between the ships' crews and shore workers at its terminals to consider both operational and safety aspects of cargo operations.

- Arranged for senior managers to attend *Behaviour Change - Achieving Health & Safety Culture Excellence*, provided by the HSE.

- Arranged for all masters and safety officers to complete safety officer training courses administered by the MCA.

Docklands Logistics (Europe) Ltd has:

- Introduced a testing regime for drug consumption for prospective employees and following accidents.

The **UK Chamber of Shipping** has:

- Held two workshops for its members to consider safety on vehicle decks.

- Issued, in conjunction with the maritime trade unions, guidelines to shipping companies on vehicle deck safety. Input into these guidelines was provided by Port Skills and Safety.

- Undertaken to keep the subject under review, using its Health and Safety Sub-Committee and Ferry and Cruise Panel for this purpose.

SECTION 5 - RECOMMENDATIONS

The **Maritime and Coastguard Agency** and the **Isle of Man Ship Registry** are recommended to:

2020/120 Issue guidance on the potential distractions caused by the use of mobile telephones on working decks and other workspaces on board ships.

The **Maritime and Coastguard Agency** is also recommended to:

2020/121 Incorporate guidance on the potential distractions caused by the use of mobile telephones on working decks and other workspaces on board ships into the Code of Safe Working Practices for Merchant Seafarers.

The **United Kingdom Chamber of Shipping** is recommended to:

2020/122 Highlight to the ferry industry the lessons to be learned from this accident, through its Health and Safety Sub-Committee and Ferry and Cruise Panel, taking into account, inter alia:

- The importance of segregating vehicular and pedestrian movements across a vessel's ramps, particularly when there is only one means of access.
- The importance of co-ordinating vessel-based and shore-based safety management systems to pedestrian safety.
- The difficulties created by ports and terminals adopting differing work practices.
- The potential hazard of distraction caused by mobile phone use.

Seatruck Ferries Ltd is recommended to:

2020/123 Continue to strive to improve the safety of its crews, considering, inter alia:

- The requirements of the Code of Safe Working Practices for Merchant Seafarers, particularly regarding the segregation of pedestrians and vehicles on a ferry's stern ramp where a protected pedestrian walkway cannot be provided.
- The findings of the recent safety climate survey report and its suggestions to improve procedural compliance and crew attitudes towards safety.
- The importance and benefits of continuing to monitor the safety climate among its workforce.

Safety recommendations shall in no case create a presumption of blame or liability

Annex A

Safety Flyer

MAIB

MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY FLYER TO THE SHIPPING INDUSTRY

Crew fatality during cargo discharge from *Seatruck Progress*, 15 May 2019

Narrative

On 15 May 2019, semi-trailers were being discharged from the Isle of Man registered ro-ro freight ferry, *Seatruck Progress*, in Brocklebank Dock, Liverpool, UK. The ferry's stern ramp was the only means of access for vehicles and pedestrians. The vessel's third officer, who was overseeing the cargo operations, was struck and fatally injured by a semi-trailer that was being pushed down the vessel's stern ramp to the quayside **(Figure 1)**. The driver of the tractor unit pushing the semi-trailer stopped immediately but the third officer was trapped between the trailer's rear wheels and was pronounced life extinct by attending paramedics.

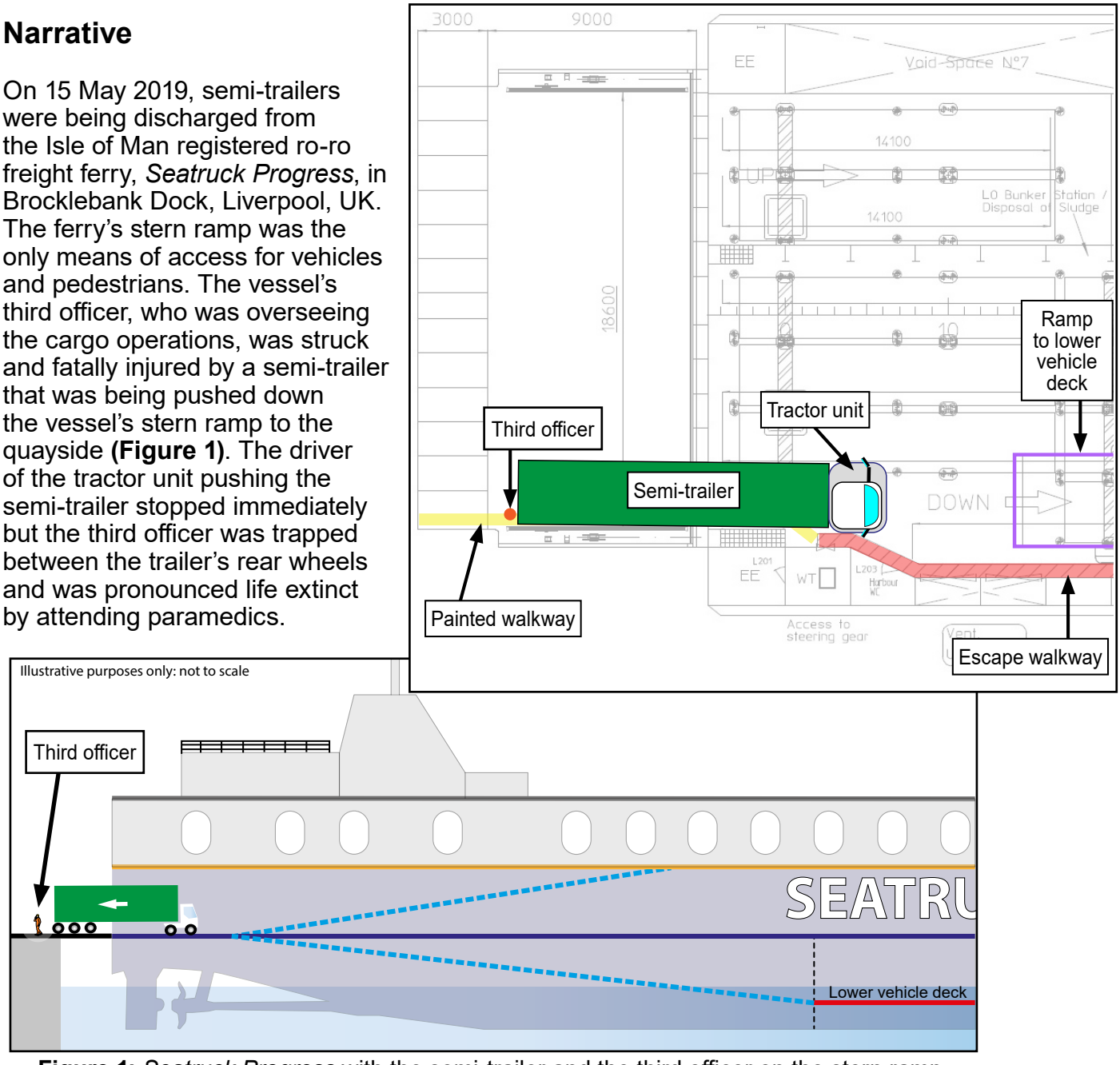

Figure 1: *Seatruck Progress* with the semi-trailer and the third officer on the stern ramp

The third officer was talking on his mobile telephone and was facing down the ramp, away from the direction of the semi-trailer's approach, when he was struck. He probably did not hear the trailer approaching amongst the noise from cargo operations on other decks, and he was standing away from a pedestrian walkway that was painted along the starboard edge of the ramp.

The tug driver was unable to see the third officer due to the semi-trailer blocking his view ahead **(Figure 2)** and he was not expecting any pedestrians to be on the stern ramp.

Safety lessons

- ‘Smartphone zombie’ and ‘smombie’ are used in popular culture to describe pedestrians who walk slowly and without attention to their surroundings because they are focused on their smartphones. Seafarers are not immune from such effects and, although mobile telephones provide a ready means of contact with friends and family, their use on working decks and other workspaces on board ships is a distraction and is potentially hazardous.

- When the stern ramp is the only means of access for pedestrians and vehicles, it is clear in the applicable codes of practice that either a protected walkway or other means of segregating vehicles and pedestrians is provided. Procedures based on a policy of ‘see and be seen’ are fraught with danger.

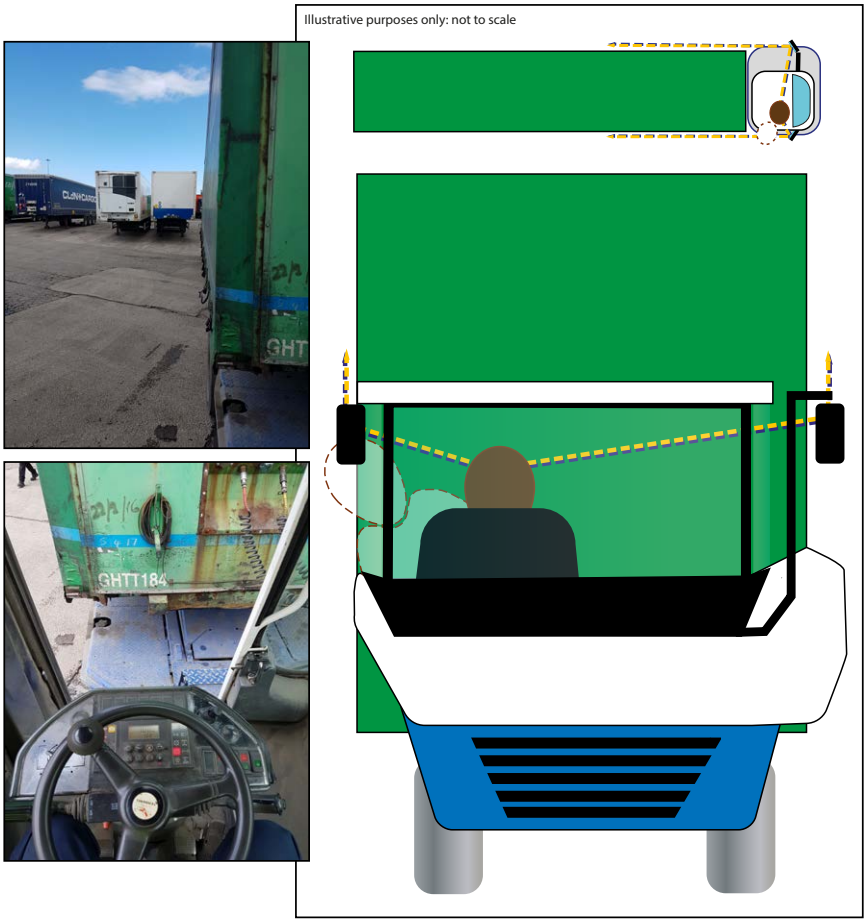

Figure 2: Driver’s view ahead when pushing a semi-trailer

- Painted walkways on vehicle ramps and decks that are not protected are liable to be encroached upon by vehicles and are not safe unless other measures to control pedestrian access and vehicular traffic are also implemented. They are even less safe if they are not used.

This flyer and the MAIB’s investigation report are posted on our website: www.gov.uk/maib

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Extract from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an such investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

This safety flyer is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

Marine Accident Report