

Report on the investigation of
the fatal accident to a crew member on board the
roll-on/roll-off cargo vessel

Laureline

at Purfleet, England

on 13 July 2024



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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

1/O	-	first officer
2/O	-	second officer
AB	-	able seaman
Anglo-Eastern	-	Anglo-Eastern Ship Management NL B.V.
C/O	-	chief officer
CCR	-	cargo control room
CCTV	-	closed-circuit television
CLdN	-	CLdN Cobelfret SA
ILO	-	The International Labour Organization
ISM Code	-	The International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code) 1994, as amended
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
PPE	-	personal protective equipment
PSS	-	Port Skills and Safety Limited
RA13	-	risk assessment 13
RCOM	-	RoRo and Car Carrier Operations Manual
ro-ro	-	roll-on/roll-off
SiPs	-	Safety in Ports (guidance documents produced by PSS with the support of the Health and Safety Executive that are intended for companies operating in the UK ports industry)
SMS	-	safety management system
SSW	-	safe system of work
UK COS	-	UK Chamber of Shipping
UTC	-	universal time coordinated

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



Laureline

SYNOPSIS

At about 1711 on 13 July 2024, able seaman Alain Canete was fatally injured on board the Malta registered roll-on/roll-off cargo vessel *Laureline* when he was crushed between the rear of a moving trailer and the vessel's structure.

Laureline was alongside at Purfleet, England, loading and discharging trailers using the terminal's tugs under the direction of the ship's crew. One of the two able seamen who were working on the vehicle deck passed behind a trailer while it was being loaded, likely assuming that the tug driver had completed manoeuvring the trailer. Unaware of the able seaman's position, the tug driver reversed the trailer again to realign it. The able seaman was crushed between the trailer and the vessel's structure, causing fatal injuries.

The investigation found that the vessel management company's new vehicle deck cargo operations safety procedure was not well understood by the vehicle deck crew and that they routinely entered the defined danger zone around manoeuvring vehicles and trailers. The lack of understanding highlighted weaknesses in the training and implementation of the new procedure, and that the tug driver's knowledge of danger zones and the requirement to stop when a crew member was out of sight did not align with their actual working practices.

The investigation also established that there was ineffective supervision on the vehicle deck. Although the terminal carried out audits of vehicle deck operations, the vessel's management company had not provided effective assurance to confirm that the new safety procedure had been understood or fully implemented on board.

Since the accident, CLdN Cobelfret SA, the terminal manager, and Anglo-Eastern Ship Management NL B.V, the vessel's management company, have taken several steps to improve vehicle deck safety, including the issuing of safety bulletins; trialling the use of blind spot cameras on tugs; reviewing the positioning of on board closed-circuit television cameras; developing training videos and; introducing new audit procedures.

The Marine Accident Investigation Branch has investigated several similar accidents involving vessel vehicle decks in recent years. These included the fatal injury to a bosun on board *Clipper Pennant*, which resulted in a recommendation to the UK Chamber of Shipping and Port Skills and Safety Limited to work with industry bodies to develop a jointly agreed and consolidated industry Code of Practice for vehicle deck safety on roll-on/roll-off vessels. This recommendation is superseded by an updated and amended recommendation for the development of an industry Code of Practice.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *LAURELINE* AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	<i>Laureline</i>
Flag	Malta
Classification society	Det Norske Veritas
IMO number	9823352
Type	Roll-on/roll-off cargo ship
Registered owner	Shiplux XIII S.A.
Manager(s)	Anglo-Eastern Ship Management NL B.V.
Year of build	2019
Construction	Steel
Length overall	216.47m
Registered length	205.55m
Gross tonnage	50,443
Minimum safe manning	14
Authorised cargo	Vehicles
VOYAGE PARTICULARS	
Port of departure	Zeebrugge, Belgium
Port of arrival	Purfleet, England
Type of voyage	International
Cargo information	Freight vehicles
Manning	28
MARINE CASUALTY INFORMATION	
Date and time	13 July 2024 at about 1711
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	CLdN London terminal, Purfleet
Place on board	Garage deck
Injuries/fatalities	1 fatality
Damage/environmental impact	Minor damage to <i>Laureline</i> vent trunking. Minor damage to road trailer.
Ship operation	Loading
Voyage segment	Alongside
External & internal environment	Enclosed vehicle deck
Persons on board	28

1.2 BACKGROUND

On 13 July 2024, the Malta registered roll-on/roll-off (ro-ro) cargo vessel *Laureline* berthed at Purfleet, England following its passage from Rotterdam, the Netherlands. The vessel had been employed on a variety of routes between the UK, Ireland, Portugal and northern Europe. At the time of the accident *Laureline* was trading between Purfleet, England and Zeebrugge, Belgium.

Laureline had four fixed vehicle decks (**Figure 1**): the tank top, the main deck, the garage deck and the weather deck. When loading and discharging, the terminal used tractor units (tugs) driven by terminal stevedores (known as tug drivers). On board, *Laureline*'s crew marshalled the tugs to load the trailers into stowage spaces before inserting stands (trestles) to support the front of the trailers and then chain lashings to fix the trailers to the deck to prevent movement at sea.

1.3 NARRATIVE

At 1420 on 13 July 2024, *Laureline* berthed at the CLdN London terminal, Purfleet. The stern ramp was lowered and the first officer (1/O) went ashore to discuss the cargo plan with the terminal supervisor. The 1/O then reboarded the vessel and briefed the vessel's crew by radio.

Approximately 15 minutes later, a fleet of tugs began to discharge *Laureline*'s cargo under the direction of the vessel's crew. The 1/O was stationed in the cargo control room (CCR) on the starboard side of the ramp, monitoring the vessel's ballast and adjusting the vessel's trim to ensure that the ramp remained within limits for vehicle operations. The duty second officer (2/O) was working on the bridge, preparing a safety drill that was to be run later that day. A quartermaster stood by the side of the ramp, monitoring the traffic and periodically visited the mooring decks to adjust the vessel's mooring lines. Two able seamen were positioned on each of the four vehicle decks, with a bosun stationed on the main deck.

At about 1650, the tug drivers started loading road trailers into the aft end of *Laureline*'s garage deck marshalled by able seaman (AB) Alain Canete (AB1) and his colleague (AB2). After the first four trailers had been loaded, AB1 was working on the port side of the deck (**Figure 2**). Meanwhile, one of the tug drivers identified that a trailer (trailer A) was blocking the discharge of the final trailer from the previous voyage. Having unsuccessfully attempted to discharge the trailer the tug driver on the starboard side indicated to AB2 that trailer A needed to be unlash and temporarily moved, to allow the final trailer to be discharged.

At 1706, the two ABs were working on either side of the garage deck, with AB1 continuing to work on the port side, while AB2 moved to the starboard side to oversee the discharge of the final trailer. Once on the starboard side, AB2 removed the lashings from trailer A and a tug driver pulled it clear, allowing the final trailer for discharge to be driven away. AB2 then stood on the port side of trailer A and marshalled it into position. When AB2 judged that trailer A was in position they blew their whistle and the trailer stopped. While the tug was still connected, AB2 passed behind the trailer to insert the trestle under the front of the trailer on the starboard side, before rigging the forward lashings. The disconnected tug then moved away to continue loading.

Base image courtesy of Hyundai Mipo Dockyard Co., Ltd

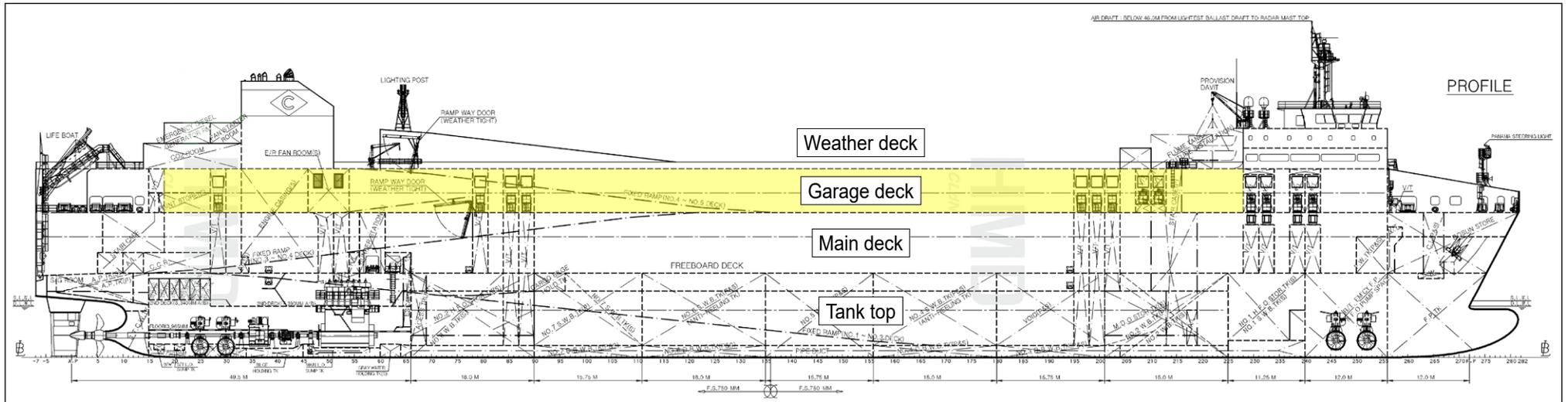


Figure 1: Laureline's deck profile

Base image courtesy of Hyundai Mipo Dockyard Co., Ltd

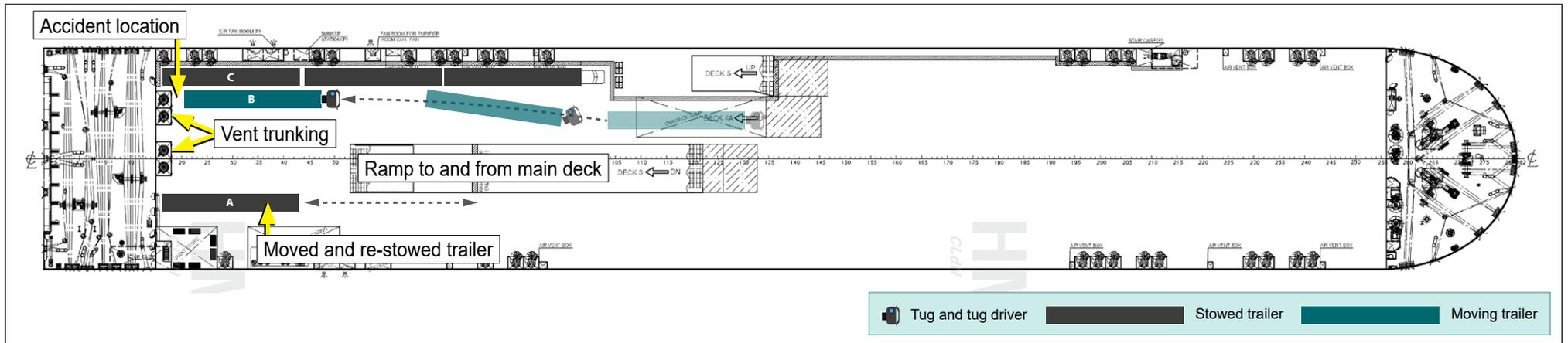


Figure 2: Laureline's garage deck

Meanwhile, another tug and trailer (trailer B) had arrived on the garage deck and was stopped on the port side of the main deck ramp while the tug driver awaited direction from *Laureline's* crew. About 30 seconds later, AB1 finished lashing a trailer on the port side of the deck and walked into the adjacent vehicle lane. He waved over his shoulder to trailer B's waiting tug driver, before walking along the vehicle lane with the tug and trailer behind him (**Figure 3**). The tug driver began to push trailer B towards its planned stowage space at the aft end of the garage deck.

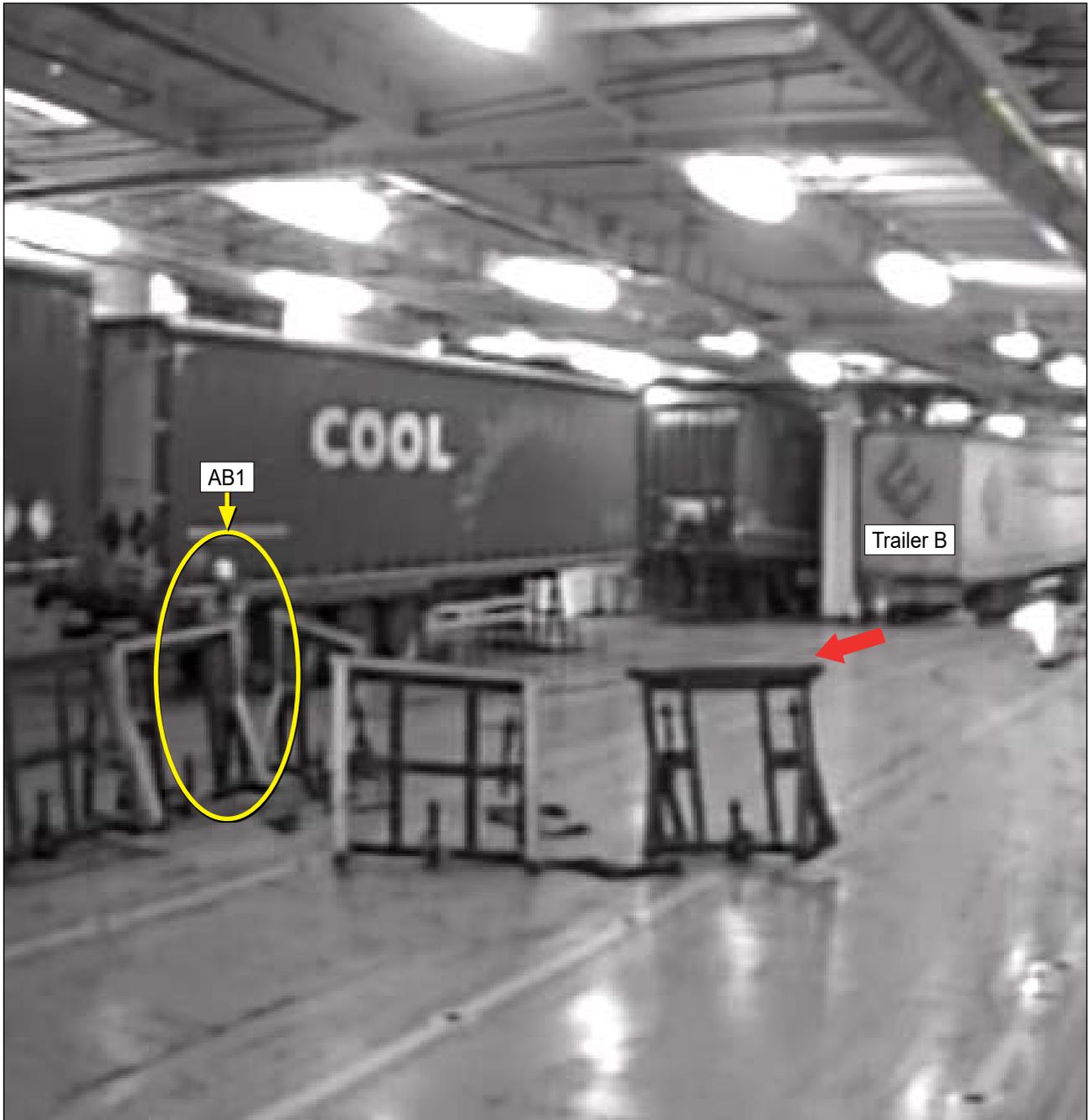


Figure 3: CCTV image of AB1 walking ahead of trailer B as the tug driver pushed it into position

As the tug driver manoeuvred trailer B into position, AB1 positioned himself on the port side of the lane, between the vent trunking and the rear of a stowed trailer (trailer C) (**Figure 4**). The tug driver began to push trailer B into position before momentarily stopping and pulling the trailer ahead to better position it within the lane. The tug driver then continued to push trailer B towards the aft end of the garage deck.

The tug driver paused for approximately 5 seconds as trailer B approached the vent trunking. At about this time, AB1 moved behind trailer B. The tug driver resumed pushing the trailer aft, crushing AB1 between the trailer and *Laureline's* structure. After feeling the trailer jolt, the tug driver pulled the trailer forward again. AB2, who had been lashing trailer A on the starboard side, saw that AB1 had been struck by trailer B and ran from in front of trailer A, waving their arms and shouting at the tug driver. AB2 then rushed towards the rear of trailer B, before returning to inform the tug driver that AB1 had been injured and was lying between the rear of trailer B and the vent trunking (**Figure 4**).

The tug driver and AB2 reported the accident by radio to their respective seniors, the terminal supervisor and 1/O. The terminal supervisor telephoned the emergency services immediately after being informed by the tug driver. Members of *Laureline's* crew quickly attended the garage deck to provide first aid to AB1.

At approximately 1735, the first ambulance paramedics and police officers arrived at the scene. The paramedics examined AB1 and declared him deceased.

Base image courtesy of Hyundai Mipo Dockyard Co., Ltd

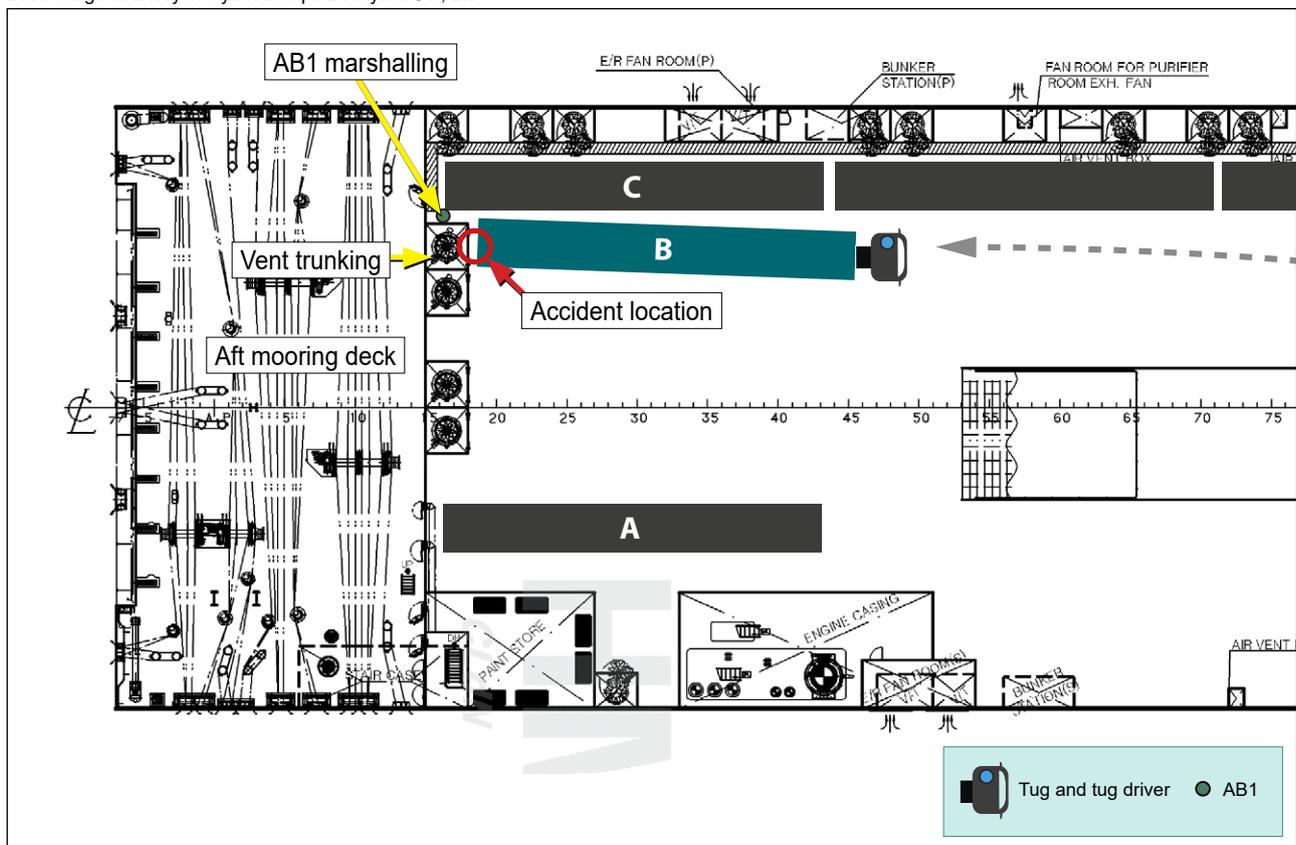


Figure 4: Location of AB1 marshalling trailer B

1.4 LAURELINE

Laureline entered service in 2019 and was a Malta registered ro-ro cargo vessel owned by Shiplux XIII S.A., part of the CLdN Cobelfret SA group (CLdN). The vessel had 5,400 lane metres of freight capacity over four fixed vehicle decks (see **Figure 1**) and could carry 316 unaccompanied trailers and 948 cars.

1.4.1 Vehicle deck operations

Laureline's crew would marshal the tugs and trailers into position during vehicle deck operations. Once a trailer was in position the crew would insert a trestle at the front of it to take the weight of the trailer when the tug disconnected. Chain and turnbuckle lashings were then connected to the trailer to secure it to the deck. On the day of the accident two lashings were being used at the forward section of the trailers.

The fan trunking for vehicle deck ventilation was located at the rear of the garage deck. The sound of the ventilation fans combined with vehicle noise from the tug engines resulted in background noise on the garage deck.

1.4.2 Crew

Laureline's 28 crew comprised Russian, Romanian and Filipino nationals. The vessel's working language was English.

To satisfy the hours of work and rest requirements *Laureline* carried two masters, who each commanded the vessel for 12 hours in any 24-hour period. At the time of the accident a third master was also on board for a handover period.

Laureline's chief officer (C/O) generally led and managed cargo operations and was responsible for safe cargo loading and securing. On the day of the accident the C/O was ashore, and the 1/O had assumed the duty of managing cargo operations.

In port, eight ABs conducted cargo operations working in pairs on each of the four vehicle decks. The two ABs on the main deck were supervised by the bosun. Each AB carried a whistle and each pair of ABs was supplied with a radio for communications.

The deck team also included three watchkeeping quartermasters who acted as lookouts and helmsmen at sea. During cargo operations the duty quartermaster's role was to monitor the vehicle ramp, check the mooring lines and assist the ABs on the weather deck when securing dangerous cargo.

1.4.3 The deceased

Alain Canete (AB1) was a 44-year-old Filipino national who had joined *Laureline* on 25 March 2024. He had been a seafarer since 2012 and had previously completed three contracts on similar ro-ro vessels managed by the company. He was employed on a 5-month contract and his duties included assisting with mooring operations and keeping cargo watches, as well as acting as helmsman and lookout on the bridge. AB1 had finished work at 1900 on 12 July 2024. On 13 July, he started work at 0900, After a 1-hour lunch break, AB1 conducted mooring operations for

Laureline's arrival alongside at Purfleet before starting work on the garage deck. At the time of the accident AB1 was carrying a radio and wearing a safety helmet and high-visibility vest over his work clothes.

A postmortem identified several areas of trauma to AB1's upper body, particularly his head and chest. The pathologist concluded that AB1's death resulted from multiple injuries.

1.4.4 Safety management

Laureline was managed on behalf of CLdN by Anglo-Eastern Ship Management NL B.V. (Anglo-Eastern), based in the Netherlands. Anglo-Eastern's Document of Compliance, issued by Det Norske Veritas, confirmed that the vessel's safety management system (SMS) met the requirements of the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code) 1994, as amended (ISM Code).

1.4.5 RoRo and Car Carrier Operations Manual

Part of Anglo-Eastern's SMS was the RoRo and Car Carrier Operations Manual (RCOM¹), which described the procedures to be used for the safe handling of vehicle cargo on board its vessels. The RCOM provided guidance on hazards and precautions, cargo operations, and detailed the handling of special cargoes and cargo equipment.

On duty officer responsibilities, the manual set out how watches were to be conducted on vehicle decks and stated:

- *Duty Officer must be physically present on the vehicle deck being worked for as much time as possible.*
- *Where more than 1 deck is being worked at the same time, at least 1 staff (either Duty Officer or deck crew) must be present on each vehicle deck where cargo is being worked.*
- *On vessels with CCTV, the Duty Officer may keep a watch from the space where the screens are placed, as long as they are able to monitor all working vehicle decks. However the Duty Officer must take frequent rounds of the decks.*

The RCOM further noted that:

Being physically present in the vehicle deck gives better situational awareness. Spend minimum time in vessels office, even if located on the vehicle deck, unless carrying out ballast operations etc.

1.4.6 New cargo operation safety procedure²

On 2 April 2024, Anglo-Eastern added Section 4.7 – *Safety during (un)loading operations* (new vessel procedure) to the RCOM. This 8-page procedure was developed after an internal investigation into an incident on another company vessel

¹ Anglo-Eastern used the acronym ROCM.

² Referred to as 'the new vessel procedure' within this report.

identified that the danger zone associated with a moving trailer was not clearly defined. The new vessel procedure built on the RCOM's previous guidance to crew in Section 3.1 – Health and Safety to *never stand behind a manoeuvring trailer, between the vessel's side and the trailer being reversed into position.*

Section 4.7 described the personal protective equipment (PPE) to be worn by vessels' crews and required the duty deck officer to hold a toolbox talk with crew members at the beginning of each shift. The new vessel procedure also provided illustrated examples of crew placement and highlighted the danger zone (**Figure 5**) around manoeuvring vehicles, defining it as:

an area around a moving vehicle or trailer (or similar) when a tug is connected. The danger zone is also an area of no or limited escape.

The size of this zone is equal to:

- *The entire lane behind a vehicle*
 - *Crewmembers must always ensure that they avoid standing in this lane and must proceed to a position where they are visible by the Tug master*
- *The length of a cargo unit in front of the vehicle*
- *The width of half a lane on either side of the vehicle*

The procedure noted that the danger zone no longer applied once the tug had been disconnected from the trailer. The new vessel procedure went on to prescribe *three basic rules that must always be followed:*

1. *Keep out of danger zones.*
 - a. *Except when placing or removing a trestle*
 - b. *Except when releasing a parking brake*
 - c. *Except when placing rubber mats (consider placing before cargo unit is stowed)*
2. *Crew to be always on the same side of the cargo unit being loaded.*
3. *Crew to always monitor each other.*

On the whistle used by crew members to direct tug drivers during cargo operations, the new vessel procedure instructed that a single blast should be used to indicate to the tug driver that a vehicle should stop. The procedure described the tug driver's blind spots during manoeuvring (**Figure 6**) and directed that crew should not turn their backs on a moving trailer or stand in the lane being loaded.

Image courtesy of [Anglo-Eastern](#)

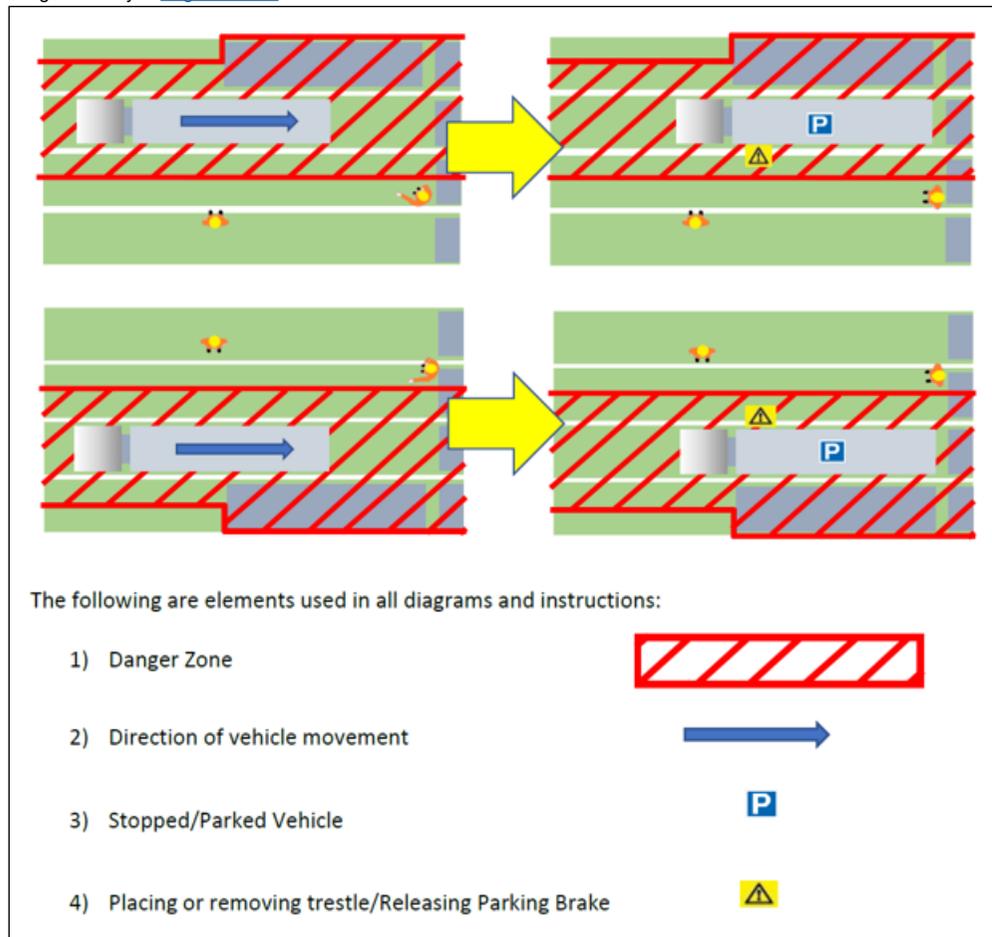


Figure 5: Extract from the new vessel procedure, showing danger zone and examples of crew placement

Image courtesy of [Anglo-Eastern](#)

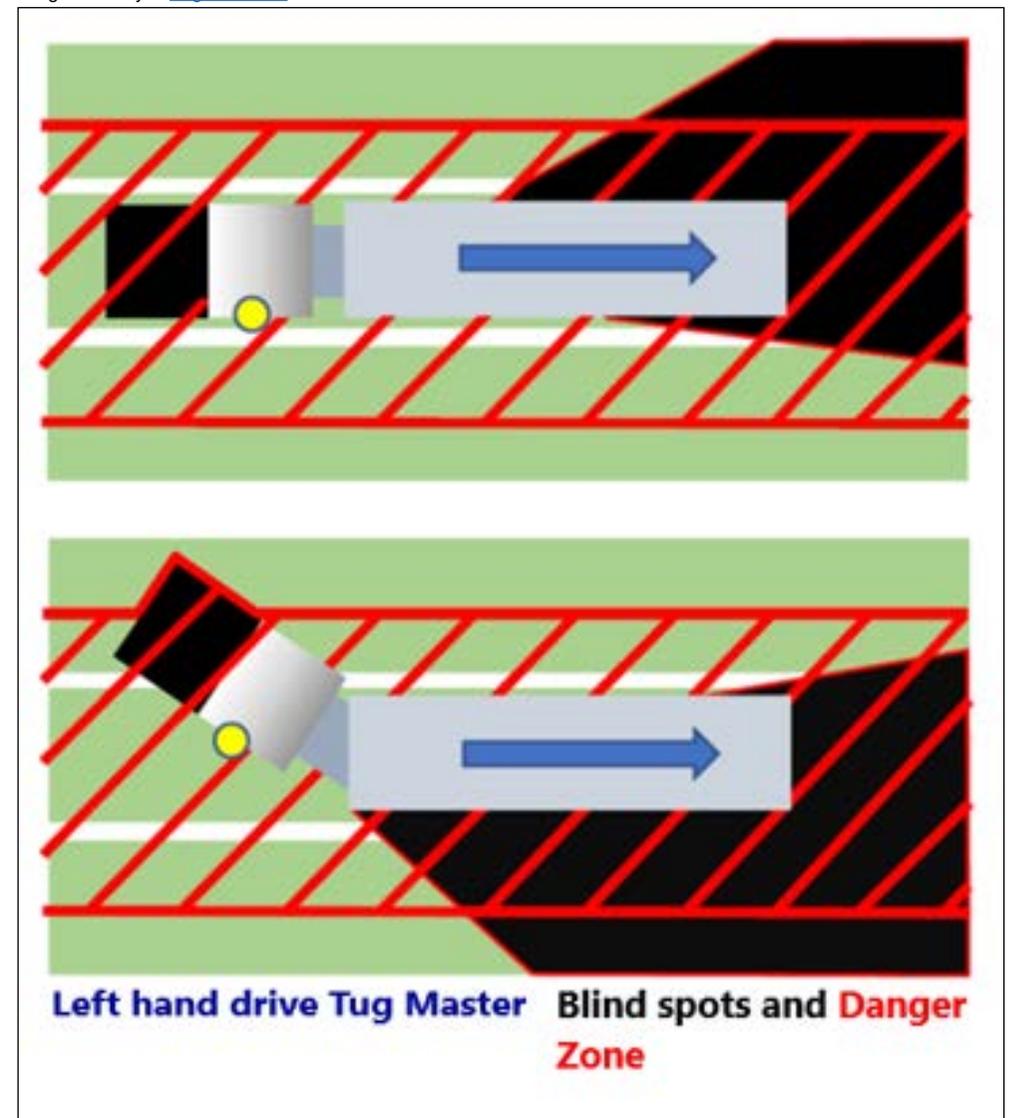


Figure 6: Extract from the new vessel procedure, showing driver blind spots

1.4.7 Cargo operation safety procedure training

The introduction of the new vessel procedure was accompanied by a fleetwide freight deck operations awareness training programme for all ro-ro deck officers, which was initiated by CLdN Malta. The training did not include ABs or other crew members; the deck officers used the training provider's material to instruct the vessel's crew.

The PowerPoint-based training was delivered by an external training provider and comprised slides of the new vessel procedure and previous incident reports, a practical exam and a multiple choice written assessment. An extract of questions included in the 25-question assessment, with the correct answers highlighted, are at **Table 1**. Several of the questions detailed being in the line of sight of the driver; the danger zone was referenced once in the exam as part of an incorrect answer.

Laureline's deck officers received their training on 5 June 2024, then delivered it to the vessel's ABs, quartermaster and bosun on 7 June 2024. AB1 achieved a 100% score in the multiple choice assessment and AB2 achieved a 96% score.

Question	Correct answer
<i>Where does a Vehicle Banksman stand?</i>	<p><i>a. Always at the rear of the vehicle</i></p> <p><i>b. Where they can be seen</i></p> <p><i>c. Always at the front of the vehicle</i></p>
<i>From the list below which is the correct procedure</i>	<p><i>a. Banksman can stand anywhere</i></p> <p><i>b. Banksman can stand on the blindside of the driver</i></p> <p><i>c. Banksman should always stand in the driver's eye line</i></p>
<i>Reversing operations</i>	<p><i>a. Banksman must stand in view of the tug driver</i></p> <p><i>b. Can be done without a banksman</i></p> <p><i>c. Banksman must stand in the reversing lane</i></p>
<i>Prior to starting cargo operations what must happen?</i>	<p><i>a. Go to the danger zone</i></p> <p><i>b. Signal to driver</i></p> <p><i>c. Attend toolbox talk</i></p>

Table 1: Extract of exam questions included in the freight deck operations awareness course

1.5 THE TERMINAL

1.5.1 Background

The CLdN London terminal, Purfleet comprised a large vehicle park ashore with access via a pier and linkspan to the two tidal ro-ro berths on the river. Access to the terminal was controlled by security staff and personnel were required to transit the terminal in a vehicle; they were not allowed to transit on foot.

The tug drivers were organised into four shifts of 11 drivers each, overseen by a supervisor. On the day of the accident the tug drivers had started their shift at 1000, working on another CLdN vessel until 1300 before taking a break and starting cargo operations on *Laureline* at about 1435. The shift was scheduled to end at 1800, and it was planned that *Laureline* would remain on the berth overnight and complete cargo operations the next day before sailing for Zeebrugge.

1.5.2 Terminal safety management

Safety management within the terminal area was described in CLdN's *Terminals Operational Cargo Handling Manual*, supplemented by Purfleet specific risk assessments. Purfleet's operational risk assessment 13 – *Pontoon and Vessel Working Operations* (RA13) assessed 28 hazards and contained a safe system of work (SSW) for cargo operations on ro-ro vessels berthed at the Purfleet terminal.

The cargo handling manual was updated on 16 May 2024 to reflect the RCOM's new vessel procedure and emphasised that, where possible, the crew should stand in full view of the tug driver but away from moving vehicles. This explanation was accompanied by a diagram of a danger zone (**Figure 7**). The manual stated that *no-one should ever stand between the vehicle or trailer and bulkheads or other trailers, where crushing could occur*. The manual did not include a written definition of the danger zone as described in the RCOM's new vessel procedure.

The SSW described in RA13 highlighted that:

- *When loading export cargo, the tug driver must position themselves on the deck for loading and then wait for the ship's banksman³ to guide them into position, using hand signals.*
- *If you lose sight of the banksman, and you can't regain sight via your tug mirrors you "MUST STOP".*
- *Whenever you are reversing a unit into a stow on the vessel and you hear a whistle being blown then you "MUST STOP".*

³ Alternative terms for banksman used in other references include 'signaller' and 'marshaller'.

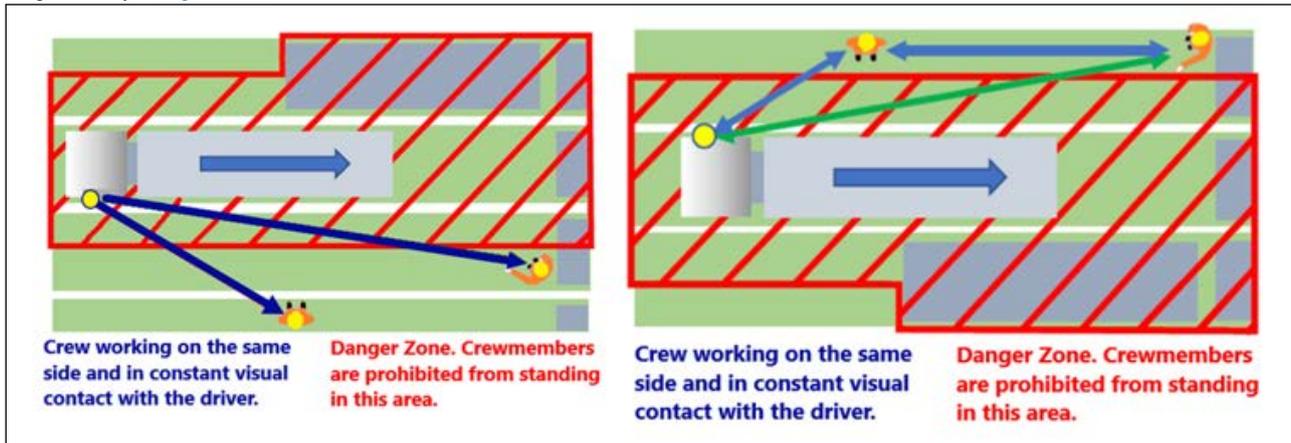


Figure 7: The image used in both the terminal cargo handling manual and the new vessel procedure

1.5.3 Tug driver

Trailer B's tug driver had started working at the CLdN London terminal in 2021 and completed a 6-week tug driver training package before beginning to load and unload trailers on vessels. The tug driver had completed and passed a driver's medical in November 2023 and a practical driving and safety theory test in April 2024.

The tug driver had attended toolbox talks in September 2023 and November 2023. Attendees at the November toolbox talk, which took place after a crew member was struck by a moving vehicle in Rotterdam, the Netherlands, were reminded of RA13's SSW.

The tug driver tested negative for drugs and alcohol following the accident on *Laureline*. The tug driver's hearing and vision were also tested and found to comply with the company's medical standard.

1.5.4 Tug

The CLdN London terminal used Terberg tractor units to move the trailers. The tractor unit's fifth wheel coupling arrangement comprised a horseshoe-shaped device bolted onto the tug unit's rear and a vertical pin that protruded from the trailer's undercarriage. Once connected, the trailer rested and pivoted on the tug's fifth wheel, allowing the trailer to be pushed or pulled. The tug driver then connected the tug's airlines to the trailer so that the trailer's brakes could be operated. There was no electrical connection between a tug and a trailer, so the trailer's brake lights and reversing lights did not operate while it was being manoeuvred on board.

The tug driver's driving position was on the left-hand side when facing forward to pull a trailer. When reversing or pushing a trailer the tug driver rotated their seat, steering wheel and vehicle controls 180° so that they were facing the direction of travel. The tug had rear-view mirrors on either side, providing a view to the tug's offside rear when manoeuvring.

1.5.5 Tug driver and vessel crew safety audits

Supervisors at the CLdN London terminal assessed the performance of tug drivers and vessel crews during cargo operations, with 35 audits conducted between 1 May 2024 and 13 July 2024. Of the 243 tug units checked it was found that 16 (6.6%) were being manoeuvred/marshalled by personnel who were unclear of the danger zone and/or did not have sight of each other when the tug was reversing.

On 6 July 2024, an audit of seven tug units during cargo operations on *Laureline's* weather deck had recorded no issues.

1.6 REVIEW OF VEHICLE DECK OPERATIONS

The investigation reviewed closed-circuit television (CCTV) footage of vehicle operations on *Laureline's* main and garage deck for the period between 30 June 2024 and 13 July 2024. The observations included:

- Crew members working on the main deck appeared to remain clear of the danger zone around trailers.
- Multiple occurrences of crew members on the garage deck appearing to marshal tug drivers while positioned inside the danger zone.
- Several instances of crew members on the garage deck passing behind stopped trailers that were still connected to the tug before inserting the trestle from the other side.
- Crew and tug driver interactions appeared to consist of the marshalling crew member waving towards the intended loading position and then observing the manoeuvre until the trailer was in the stop position.
- The garage deck CCTV's field of view was blocked as soon as a trailer was stowed in front of the camera.

1.7 POST-ACCIDENT EXAMINATION OF THE SCENE

1.7.1 Damage

Inspection of the accident site on *Laureline's* garage deck found that the vent trunking paintwork immediately behind trailer B had been recently damaged, and that this corresponded with damage to trailer B's door.

1.7.2 Post-accident reconstruction

A reconstruction of trailer positions at the accident scene indicated that the person driving the tug would have needed to lean their head out of the window to see a person standing between trailer C and trailer B (**Figure 8**). Post-accident, the gap between the rear of trailer C and trailer B was found to be 20.6cm.



Figure 8: Reconstruction of the tug driver's visibility between trailer B and trailer C

1.8 REGULATION AND GUIDANCE

The International Labour Organization (ILO) Safety and Health in Ports code of practice for ro-ro vessel safety stated:

All large vehicles and trailers being reversed or manoeuvred into stowage positions on deck should do so under the direction of a signaller. Signallers should satisfy themselves that no person is in a position of danger, particularly in any trapping area behind a reversing vehicle. Drivers should not move their load/vehicle unless a signaller so directs. Drivers should immediately stop their vehicles at any time the signaller is not within their field of vision.⁴

The UK Maritime and Coastguard Agency (MCA) issued further guidance on vehicle deck safety via Marine Guidance Note (MGN) 621 (M+F) Roll-on/Roll-off Ships – Guidance for the Stowage and Securing of Vehicles⁵ and the Code of Safe Working Practices for Merchant Seafarers⁶. Both publications included the advice that ro-ro vessel crews should:

- operate within safe systems of work for vehicle operations;
- communicate using unambiguous signals during marshalling; and,
- keep out of the way of moving vehicles, particularly those that are reversing, where possible remaining within the driver's line of sight.

In January 2020, the UK Chamber of Shipping (UK COS) published its Guidelines to Shipping Companies on Vehicle Deck Safety. These guidelines drew on MGN 621 (M+F) and the Port Skills and Safety Limited (PSS) Safety in Ports (SiP) publication SiP010⁷. The guidance advised that vehicle deck risks should be reduced to as low as reasonably practicable by taking preventive measures that prioritised the “*hierarchy of risk controls*”:

- elimination – physically remove the hazard
- substitution – replace the hazard
- engineering controls – isolate people from the hazard
- administrative controls – procedures that change the way people work
- PPE – protect the worker.

The UK COS guidelines also stated that the procedure adopted should require the marshallers to be *visible to the driver at all times, otherwise the driver must stop*.

⁴ Section 7.9.2. paragraph 198.

⁵ Section 2.5 and section 2.8

⁶ Chapter 27: Roll-on/roll-off ferries.

⁷ SiP010 – Guidance on Ro-Ro & Sto-Ro Operations, published March 2019.

1.9 PREVIOUS SIMILAR ACCIDENTS

1.9.1 *Clipper Pennant* – fatal crush injury

At 1353 on 20 July 2021, the bosun of the ro-ro cargo vessel *Clipper Pennant* was fatally crushed when he became trapped between a moving vehicle and the vessel's structure while the vessel was alongside loading a cargo of semi-trailers (MAIB report 16/2024⁸). The investigation found that the accident happened because the tug driver did not stop pushing the trailer when they lost sight of the bosun, who was assigned the role of banksman, during the manoeuvre. The investigation also found that the working practices on *Clipper Pennant* did not reflect industry guidelines and company procedure; that, in the absence of procedures, crew had developed local workarounds for loading some spaces that went unchallenged; and, that organisational oversight was insufficiently effective. The report highlighted four similar accidents involving vehicle deck operations on board ro-ro vessels that had occurred since 2017.

Recommendations were made to the UK COS and PSS to develop a jointly agreed and consolidated industry code of practice for vehicle deck safety on ro-ro vessels. This was to be done by consulting with the MCA and Health and Safety Executive, Interferry, and ro-ro ferry operators, to consider existing best practice guidance and the lessons learned from the *Clipper Pennant* accident and other previous similar accidents (see section 4.1).

1.9.2 Previous accidents and incidents involving Anglo-Eastern vessels

In the 18 months before the accident on board *Laureline*, Anglo-Eastern had issued 41 fleetwide safety notices as a result of various incidents and accidents. Of these, four were issued following crew members being struck, or nearly being struck, by moving vehicles.

⁸ [MAIB report 16/2024: Clipper Pennant](#)

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 OVERVIEW

Alain Canete was fatally crushed between a reversing trailer and *Laureline's* structure. This section of the report will discuss the factors contributing to this accident, including implementation of vehicle deck operation procedures, crew training and the supervision and assurance of cargo operations.

2.3 THE ACCIDENT

The tug driver paused the manoeuvre twice while pushing trailer B into position. The first pause was momentary while the driver readjusted the trailer; however, the second pause, just before the accident, of around 5 seconds was significantly longer.

The location where AB1 was crushed indicated that he was in the process of passing behind trailer B, having initially positioned himself in the corner on the driver's side of the tug and trailer. Although this placed AB1 in the danger zone and was a difficult position to exit, he probably thought he was protected by the vent trunking and trailer C. He might also have assumed that this position allowed him to maintain direct line of sight with the tug driver. Given that trailer C and trailer B were only about 20cm apart, AB1's options to exit his position were limited, though it was possible to transit the garage deck via the aft mooring deck to cross to the starboard side. Once trailer B had stopped moving, AB1 likely decided to pass behind it because it was the shortest and quickest route to the trailer's starboard side to insert the trestle and connect the lashings.

At the time of the manoeuvre, no whistle signal was heard; however, it is possible that, given the noise levels on the vehicle deck, a whistle signal could have been missed. In spite of the lack of evidence of a whistle signal, when the tug paused for the second time it appeared to be in position, which likely gave AB1 the impression that the manoeuvre was complete. It seems likely that the tug driver then reassessed the position of trailer B relative to trailer C in the adjacent lane and concluded that trailer B was too far forward and should be moved back to align with trailer C. This evaluation did not consider the protruding vent trunking behind trailer B, which meant that trailers B and C could not be aligned, and it meant that trailer B struck the vent trunking and AB1 when the tug driver pushed it further back.

The tug driver and AB1 were acting independently of one another during the manoeuvre. While AB1's rationale cannot be known, it seems likely he believed that trailer B had stopped in position, that the danger zone around the moving trailer had consequentially ceased to exist, and it was therefore safe for him to pass behind the back of the trailer. Without a feedback loop to positively assure AB1 that the trailer had finished the manoeuvre AB1 was reliant on his observation that it had stopped moving and would not move again. It is unclear why the tug driver decided to move the trailer again without positively sighting AB1 and verifying he was not behind the

trailer. However, the tug driver was focused on manoeuvring trailer B into position and had limited visibility down the side of the trailer. This meant that the tug driver was unable to simultaneously keep AB1 in sight and manoeuvre.

The interaction between the tug driver and AB1 was based on assumptions instead of positive feedback, with the result that neither had a clear understanding of what the other was doing. This resulted in the tug driver pushing the trailer back, unaware that AB1 had moved behind the trailer and was at risk of being crushed.

2.4 THE NEW CARGO OPERATION SAFETY PROCEDURE

The 8-page cargo operations procedure added to the RCOM and implemented by *Laureline's* operator supplemented existing guidelines and included three basic rules *that must always be followed*. However, several exceptions followed this statement. The new vessel procedure also indicated that crew members were *to always monitor each other* with crew placement represented in the associated danger zone figures (see **Figure 5**).

When the accident happened AB1 and AB2 were working on opposite sides of the garage deck and at various times placed themselves inside the danger zone and in locations contrary to the new vessel procedure. The documented description of the danger zone, and the provision of a list of circumstances that permitted entry to the danger zone, might have eroded the procedure's primary safety message by reducing clarity for crew and potentially giving the impression of operational flexibility. Further, the historic CCTV footage showed multiple instances of garage deck ABs standing behind reversing trailers on the tug driver's side rather than positioning themselves clear of the danger zone.

Procedural controls rely on the understanding and compliance of those involved and the behaviour of *Laureline's* crew indicated a lack of both. The UK COS guidance placed administrative controls second lowest in the hierarchy of preventative measures, highlighting their weakness as a safeguard. In comparison, the controls at the top of the hierarchy focused on physical barriers and the removal of the hazard. Although the new vessel procedure added detail about vehicle deck operations, the clarity of safety messages was reduced and the areas it intended to define were open to misinterpretation.

The new vessel procedure provided a weak safeguard that was neither followed nor clear in its messaging. This meant that ABs regularly entered the danger zone behind moving trailers, placing them at risk.

2.5 THE TUG DRIVER PROCEDURE

Industry guidance issued by the ILO stated tug drivers should stop their vehicles at any time the crew member marshalling the trailer was not within their field of vision. This was reinforced in the tug driver's procedures and in their toolbox talks. However, it was not always possible to keep sight of the marshalling crew member when manoeuvring and a review of *Laureline's* CCTV footage (see section 1.6) showed that tug drivers routinely continued to move their vehicles when the marshalling crew member was not in their field of vision.

The mechanics of a coupled tug and trailer required the tug driver to focus on lane positioning as well as monitoring their proximity to adjacent vehicles and the vessel's structure. This meant that it was difficult to complete the task without at some point losing sight of the marshalling crew member. The use of a whistle for a stop signal instead of a visual signal was indicative that a tug driver's attention would likely be elsewhere during manoeuvres and an audible signal would be the most effective means of telling them to stop. The interaction between *Laureline's* crew and the tug drivers was minimal and appeared to be limited to signalling which bay to load the trailer into and when to stop.

This meant that the marshalling crew member's safety was wholly reliant on them keeping out of the way of the manoeuvring trailer. The new vessel procedure used the concept of a moving danger zone around a trailer rather than simply maintaining sight of the crew as outlined in the cargo handling manual and RA13. The cargo handling manual referenced some of the new vessel procedure's diagrams; however, the fact that there was no definition of the danger zone meant the tug driver might have been unable to identify when crew members did not comply.

That the tug driver and the marshalling crew member were always able to maintain eye contact and that tug drivers would stop when sight of the crew was lost was a misconception that did not reflect operational reality. In practice, tug drivers routinely continued to manoeuvre even when crew were out of their line of sight and the manoeuvring seemed to be conducted largely independently. Trailer B's tug driver was reliant on AB1 being in a safe position when he was no longer in view. However, the terminal's safety management system did not clearly define the danger zone or where crew were expected to stand under the new vessel procedure. This meant that the tug driver did not know that AB1's location was contrary to the new vessel procedure so did not challenge him or stop the loading manoeuvre.

The *Clipper Pennant* investigation also identified the safety issue of tug drivers continuing to move after losing sight of the marshalling crew member, specifically during a manoeuvre that required the bosun to be in an unseen position. To develop a robust SSW it is vital that organisational procedures reflect operational reality.

On *Laureline* the safe execution of the trailer's manoeuvre relied on AB1's positioning because the tug driver moved the trailer after AB1 had moved out of the driver's field of vision. The terminal's cargo handling manual did not explain the new vessel procedure or clearly define the danger zone, which meant that the tug driver was potentially unable to recognise when AB1 was at risk.

2.6 TRAINING

A fleetwide crew training programme had been implemented by CLdN Malta to implement the new vessel procedure. An external company delivered the training to deck officers, who in turn used the course materials to train their respective vehicle deck crews. Although this might have increased training efficiency the two-step training process meant that the crew members who worked directly with the trailers did not receive the training first hand, which could have diluted some of the messaging. The delegation of crew training to individual officers also risked introducing inconsistency and organisational bias to the course content.

The training culminated in a multiple choice exam that was intended to test the crew's understanding of the new vessel procedure. However, none of the questions referred to the danger zone or any explicit instruction not to pass behind a connected trailer. AB1 and AB2 had both scored highly in the exam, but they did not appear to have applied the principles learned during training to their working practices. Further, the training materials and the new vessel procedure were written in English, which was not the first language for any of *Laureline's* crew despite being the working language on board. This might have introduced another barrier to fully understanding the intent and application of the new vessel procedure.

Training of the new vessel procedure was ineffective and did not ensure the ABs understood what was required in practice. This meant that *Laureline's* crew continued to place themselves at risk during cargo operations.

2.7 VEHICLE DECK OPERATIONS

2.7.1 Crew mutual monitoring

Laureline's ABs worked in pairs on each of the vehicle decks, with the two ABs on the main deck supervised by a bosun. To ensure crew safety on the vehicle decks the new vessel procedure required crew members to monitor each other during vehicle deck operations. Although the procedure did not explicitly state that the crew members should marshal vehicles in pairs, the images in the new vessel procedure showed two crew working on each trailer and it was difficult to see how the requirement to monitor each other would be met if working apart.

Despite the new vessel procedure's implied process AB1 and AB2 were working on opposite sides of the vehicle deck at the time of the accident and could not see each other. This meant that neither AB was able to monitor the other and that some of the positioning adopted by the ABs was inconsistent with the crew placement depicted in the diagrams. The procedure did not explain how the lines of sight shown could be achieved if only one crew member was working at the trailer. The investigation found no evidence that the garage deck crew were under time pressure during the loading operation. Although the accident happened towards the end of the working day, the vessel was scheduled to stay overnight and loading was not due to complete until the following day. In this context it is unclear why AB1 and AB2 could not work together and why there was the need to manoeuvre two trailers independently.

Another issue associated with two trailers manoeuvring on either side of the deck was the potential for conflicting whistle signals. If crew members were independently marshalling two trailers, this could cause confusion with tug drivers potentially stopping on the wrong whistle.

The two ABs on the garage deck were working independently of each other. Consequently, they were not monitoring each other's safety and were unable to cross-check or stop trailer movements when unsafe actions occurred.

2.7.2 Supervision

On the day of the accident three of *Laureline's* four vehicle decks were manned with two ABs and only the main deck had an additional crew member, the bosun, acting in a supervisory role. This meant that most vehicle deck movements were

happening without any dedicated supervision and so relied on the ability of the two ABs to monitor each other and identify any safety issues. Without dedicated supervision the role of duty officers took on greater importance.

Laureline's SMS detailed the role of duty officers keeping vehicle deck watches, including the provision that duty officers should be physically present on vehicle decks as much as possible. However, on the day of the accident the 1/O was in the CCR, the 2/O was mainly working on the bridge and the quartermaster was occupied with tending to the moorings. Although the CCR had CCTV, the camera views provided limited visibility of vehicle deck operations and the 1/O was focused on monitoring ballast and adjusting the vessel's trim. This meant that only the main deck had a third crew member with a position of oversight to identify unsafe practices or stop operations when crew members entered a danger zone or passed behind a connected trailer.

The lack of supervision had a detrimental effect on safety as evidenced in the comparisons between CCTV footage captured for the main deck and garage deck. On the main deck where the bosun was supervising, crew members were observed to avoid the danger zones. In contrast, operations on the garage deck at the time of the accident were unsupervised and uncontrolled. This resulted in a lost opportunity to reinforce the safety elements of the new vessel procedure or identify and prevent unsafe practices.

2.7.3 Assurance

Anglo-Eastern had introduced the new vessel procedure in combination with a fleetwide training programme. However, the company had not supported the roll-out with any assurance measures to monitor how the procedure was being used on board. This meant that Anglo-Eastern had no way to verify that the implementation and training of the new vessel procedure had been successfully adopted by all the crew. Though the terminal had its own assurance process for vehicle deck operations, *Laureline* had only started operating the Purfleet itinerary the previous week and had therefore only undergone one terminal audit of its weather deck operations, which did not identify any issues. *Laureline's* garage deck had not been subject to a terminal audit at the time of the accident.

Observations from the investigation's review of CCTV indicated that the garage deck ABs did not always adhere to the new vessel procedure and, on multiple occasions, the footage showed them standing in the danger zone. This apparent shortfall in procedural implementation had not been identified by terminal audits, and without a vessel-based assurance process, the opportunity was missed to review and enhance operational safety on the vehicle decks.

2.8 VEHICLE DECK SAFETY

Vehicle decks are one of the few areas where crew members routinely operate near moving vehicles. Anglo-Eastern had recognised this hazard and had reviewed its SMS procedure governing this area of operations, the outcome being a new vessel procedure accompanied by a fleetwide training programme. However, these changes, and the existing industry guidance, did not prevent AB1's death.

The investigation into the fatal crush accident on *Clipper Pennant* identified several similar examples of vehicle deck fatalities on ro-ro vessels and recommended that the UK COS and PSS develop a jointly agreed and consolidated industry Code of Practice for vehicle deck safety on ro-ro vessels.

This accident on board *Laureline* reinforces the likelihood that the industry guidance on ro-ro vehicle deck safety relies heavily on the misconception that the drivers depend on marshallers to safely position their trailers and will stop their vehicle if they lose sight of their marshaller. Further, in the absence of positive feedback mechanisms, safety is contingent on crew making assumptions about when a trailer has stopped moving and is safe to approach. Consequently, operators continue to develop ineffective procedures and there is increased need for an industry Code of Practice to reduce the persistent risk to personnel working on vehicle decks.

SECTION 3 – CONCLUSIONS

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

1. Alain Canete was fatally injured when he passed behind a reversing trailer and was trapped and crushed against *Laureline's* structure. [2.2]
2. The interaction between AB1 and the tug driver was based on assumptions instead of positive feedback, with the result that neither had a clear understanding of what the other was doing. This placed AB1 at risk from the manoeuvring trailer. [2.3]
3. The new cargo operations safety procedure provided a weak safeguard that did not articulate key safety messages and was not followed. Consequently, ABs regularly entered the danger zone behind moving trailers, placing them at risk. [2.4]
4. The safe execution of a trailer's manoeuvre relied on AB1's positioning because the tug driver moved the trailer after AB1 had moved out of sight. The terminal's cargo handling manual did not explain the new vessel procedure or define the danger zone, which meant that the tug driver was potentially unable to recognise when AB1 was at risk. [2.5]
5. The two ABs on the garage deck were working independently of each other. Consequently, they were not monitoring each other's safety and were unable to cross-check or stop trailer movements when unsafe actions occurred. [2.7.1]

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

1. Industry guidance that tug drivers should stop when they lost sight of the crew member did not reflect the operational reality that it was not always possible to keep the marshalling crew member visible. This probably contributed to the procedure not being followed, placing vehicle deck crew at risk. [2.5]
2. The new vessel procedure's training programme was ineffective and failed to ensure the ABs understood the procedures. This meant that the crew were unsure what to do, placing them at risk. [2.6]
3. The use of a whistle as a stop signal is ineffective when more than one trailer is manoeuvring on the same deck. There is a risk of miscommunication when crew members are marshalling more than one trailer simultaneously. [2.7.1]
4. The ineffective supervision and control of vehicle deck operations on the garage deck resulted in a lost opportunity to reinforce the new vessel procedure's safety elements or identify and prevent unsafe practices. [2.7.2]
5. *Laureline's* ship management company did not provide effective assurance to confirm the latest procedures were effective or had been safely implemented on board, which meant a missed opportunity to review and enhance operational safety on the vehicle decks. [2.7.3]

6. Industry guidance on ro-ro vehicle deck operations relied heavily on the misconception that the drivers depend on marshallers to safely position their trailers and will stop their vehicle if they lose sight of their marshaller. Further, in the absence of positive feedback mechanisms, safety is contingent on crew making assumptions about when a trailer has stopped moving and is safe to approach. Consequently, operators continue to develop ineffective procedures and the risk to personnel working on vehicle decks persists. [2.8]

SECTION 4 – ACTION TAKEN

4.1 ACTIONS TAKEN BY MAIB

The **MAIB**, in its *Clipper Pennant* investigation report, made a recommendation to the UK Chamber of Shipping and Port Skills and Safety Limited to:

2024/148 *Develop a jointly agreed and consolidated industry Code of Practice for vehicle deck safety on roll-on/roll-off vessels by consulting with the Maritime and Coastguard Agency, Health and Safety Executive, Interferry, and ro-ro ferry operators, considering existing best practice guidance and the lessons learned from this accident and other previous similar accidents. The guidelines should cover, inter alia:*

- *The role, responsibilities and positioning of banksman while marshalling on vehicle decks in or near the path of a moving vehicle;*
- *The dynamic nature of vehicle deck loading operation that reflects the moving danger zone around a semi-trailer;*
- *Identification and risk mitigation of vehicle stowage spaces with limited or obstructed areas for escape;*
- *Suitable control measures to reduce the risk to people working in close proximity to moving vehicles, including the development of cargo handling procedures and safe systems of work;*
- *Safe access arrangements for crew during and after cargo operations;*
- *An agreed industry standard for signalling and communication on vehicle decks; and*
- *The use of technology to improve safety on deck.*

4.2 ACTIONS TAKEN BY OTHER ORGANISATIONS

CLdN London terminal has:

- Following a successful blind spot camera trial, fitted all Terberg tugmasters in use at CLdN Ports UK terminals with blind spot cameras.
- Maintained ongoing audits of the positioning of the marshalling crew during vehicle deck manoeuvres.
- Issued a fleet information bulletin about crew positioning.
- Provided crew with the opportunity to see the view from a tug to understand the limitations of visibility.

Anglo-Eastern Ship Management NL B.V. has:

- Issued a fleetwide safety bulletin and completed a focus area campaign on the implementation of cargo operation safety procedures.
- Developed and distributed training videos about personnel safety on ro-ro vessel cargo decks.
- Updated job descriptions to emphasise the responsibility of the master and officers in ensuring compliance with cargo operation safety procedures.
- Reviewed the RCOM Section 4.7 – Safety during (un)loading operations.
- Started a programme of unannounced cargo safety audits.
- Introduced the requirement for vessel masters to perform an unannounced cargo safety audit when instructed by the office.
- Issued translated copies of some of its procedures, including Filipino, Russian, and Ukrainian versions of the RCOM Section 4.7.
- Started a review of the near miss reporting system.
- Started a review of on board CCTV installations in conjunction with CLdN.

SECTION 5 – RECOMMENDATIONS

The MAIB's previously issued recommendation 2024/148 is superseded, and the following amended recommendation is issued in its place:

The **UK Chamber of Shipping** and **Port Skills and Safety Limited** are recommended to:

2026/130 Develop an industry Code of Practice for vehicle deck safety on roll-on/roll-off vessels by consulting with the Maritime and Coastguard Agency, Health and Safety Executive, Interferry, and roll-on/roll-off ferry operators. The guidelines should cover, among others:

- effective separation of personnel and moving vehicles;
- the role, responsibilities, positioning and supervision of crew members and shoreside personnel working on vehicle decks;
- the dynamic nature of vehicle deck operations that reflects the moving danger zone around vehicles;
- the need for positive feedback to assure crew that a trailer is stopped and is safe to approach;
- identification and risk mitigation of vehicle stowage spaces with limited or obstructed areas for escape;
- harmonisation of ship and shoreside cargo handling procedures, including signalling and communication on vehicle decks;
- effective training of harmonised ship and shoreside cargo handling procedures; and
- the use of technology to improve safety on deck.

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

