ACCIDENT REPORT

Report on the investigation into the fatal accident during

pilot transfer between

Sunmi

and

Patrol

River Thames, London

5 October 2016

MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

VERY SERIOUS MARINE CASUALTY REPORT NO 21/2017 OCTOBER 2017

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

COG	-	course over the ground
CPR	-	cardio-pulmonary resuscitation
DPC	-	Duty Port Controller
IALA	-	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	-	International Maritime Organization
IMPA	-	International Maritime Pilots' Association
kts	-	knots
m	-	metre
mg	-	milligram
ml	-	millilitre
ML5	-	A medical certificate issued to UK seafarers serving on coastal vessels
PLA	-	Port of London Authority
RNLI	-	Royal National Lifeboat Institution
SOG	-	speed over the ground
SOLAS	-	International Convention for the Safety of Life at Sea 1974, as amended
STCW	-	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 as amended (STCW Convention)
™	-	Registered trademark
UKMPA	-	United Kingdom Maritime Pilots' Association
VHF	-	Very High Frequency
VTS	-	Vessel Traffic Services

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

SYNOPSIS

At 1812 on 5 October 2016, Gordon Coates, a Port of London Authority sea pilot, was attempting to board the Bahamas registered general cargo vessel *Sunmi* from the pilot launch *Patrol* when he fell and was crushed between the two vessels. Despite prompt medical attention, he died at the scene.

The accident occurred during a routine changeover of pilots at Gravesend Reach pilot boarding station on the River Thames, which marked the boundary for two pilotage areas within the Port of London. Due to the choppy seas, the outbound general cargo vessel had created a lee for the pilot launch to facilitate the boarding process. The difference in freeboard between the two vessels was varying between about 30cm and 130cm. A pilot ladder had been rigged, but the sea pilot attempted to board by stepping up and through an open gate in the railings onto *Sunmi*'s main deck which, although adjacent to the ladder, did not form part of the vessel's designated pilot boarding arrangements.

The MAIB investigation could not establish whether the fall was a result of the sea pilot's use of *Sunmi*'s deck gate, a problem with his knee following recent surgery, loss of co-ordination due to his blood alcohol content being more than double the prescribed limit, or a combination of all three. However, the investigation identified that low freeboard vessel transfers, though not unusual, had not been assessed by the Port of London Authority or international pilot authorities. Consequently, there were no procedures, guidance or regulation covering the transfer of pilots for low freeboard vessels. The investigation also found that the deck gate opening was unsuitable to be used as a means of pilot access.

Following its own investigation of the accident, the Port of London Authority has, inter alia, revised its:

- Drug and alcohol policy.
- Risk assessments covering pilot transfers.
- Fitness assessment procedures.
- Training and guidance for operational staff.

Recommendations have been made to: the International Maritime Pilots' Association aimed at improving the awareness of the requirements for gateways in bulwarks and railings intended for pilot boarding operations; and *Sunmi*'s managers, aimed at ensuring that designated pilot boarding areas are marked and that pilot boarding operations are overseen by a responsible officer.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF *SUNMI*, *PATROL* AND ACCIDENT

SHIP PARTICULARS		
Vessel's name	*Sunm*i	*Patrol*
Flag	Bahamas	United Kingdom
Classification society	Det Norske Veritas -Germanischer Lloyd	N/A
IMO number/fishing numbers	9073581	N/A
Type	General cargo	Pilot vessel
Registered owner	Misje Bulk	Port of London Authority
Manager(s)	Misje Rederi A.S.	Port of London Authority
Construction	Steel	GRP
Year of build	1993	1982
Length overall	90.5m	16.2m
Gross tonnage	2825	-
Minimum safe manning	6	2
VOYAGE PARTICULARS		
Port of departure	Barking, England	Gravesend, England
Port of arrival	Pasajes, Spain	Gravesend, England
Draught	4.7m F/ 5.5m A	1.5m
Freeboard	1.80m	1.0m
Type of voyage	Short international	Internal waters
Cargo information	Scrap metal	N/A
Manning	6	2
MARINE CASUALTY INFORMATION		
Date and time	5 October 2016 1812 UTC+1	
Type of marine casualty or incident	Very Serious Marine Casualty	
Location of incident	Gravesend, London, England	
Place on board	Over the side	Over the side
Injuries/fatalities	None	1
Damage/environmental impact	Pilot ladder damaged	Minor damage to fendering
Ship operation	Under pilotage	Manoeuvring
Voyage segment	Departure	Mid-water
External & internal environment	Easterly Force 4-5, good visibility, twilight, ebb tide running to the east	
Persons on board	6	3

Sunmi

Patrol

1.2 NARRATIVE

On 5 October 2016, the Bahamas registered general cargo ship *Sunmi* was alongside at Barking, London, port side to the quay. At 1545 the vessel was still loading its cargo of scrap metal when the Port of London Authority (PLA) river pilot boarded the vessel by stepping across from a mooring boat. As the two vessels were of similar freeboard, the river pilot used a deck gate in *Sunmi*'s railings to access the starboard main deck before proceeding to the bridge.

Following the completion of cargo operations, at 1620 *Sunmi* departed the berth, bound for Pasajes, Spain. The bridge team comprised the master and the river pilot, who was conducting the navigation and providing pilotage advice to the master. The pilot advised the master that a pilot ladder should be rigged on the vessel's port side in readiness for the changeover of pilots at Gravesend. The master then instructed the duty deck rating to ensure that the pilot ladder was ready as requested.

At 1803, *Sunmi* approached Tilburyness and began its turn into Gravesend Reach, where the sea pilot would board the vessel to take over the pilotage from the river pilot. Its speed over the ground (SOG) was 10.4 knots (kts). One minute later, the pilot launch *Patrol* departed Royal Terrace Pier and headed west, towards *Sunmi* **(Figure 1)**. On board *Patrol* were its coxswain, deckhand and the sea pilot, Gordon Coates, who was to transfer to *Sunmi* to take over from the river pilot. At the same time, the inbound ro-ro vessel *Valentine* entered Gravesend Reach.

At 1807, *Sunmi* was on an easterly heading with a SOG of 10.8kts. The river pilot asked the master to place *Sunmi* into its manual steering mode; he then took the helm and ordered the master to reduce speed to 6-7kts. *Patrol*'s coxswain called the river pilot on the Very High Frequency (VHF) radio and it was agreed that the pilot transfer would be completed on *Sunmi*'s port side. At 1809, the coxswain brought *Patrol* onto a course parallel to *Sunmi*'s and made an approach towards the cargo ship's port side.

The coxswain brought *Patrol* alongside *Sunmi* so that the launch's starboard bow was resting against the cargo ship's hull just forward of the pilot ladder in line with the deck gate in the main deck handrail, which *Sunmi*'s crew had secured open **(Figure 2)**. Immediately aft of the gate, a pilot ladder had been rigged in accordance with the river pilot's instructions **(Figure 3)**.

The easterly winds over the ebb tide resulted in choppy seas with a maximum wave height of 2m. This made a safe transfer difficult and the river pilot and coxswain agreed to wait until *Valentine*, a ferry that was proceeding upriver, had passed clear. The river pilot would then turn *Sunmi* to create a sheltered area on the lee side to make it easier for the sea pilot to board. Accordingly, at 1811 the river pilot turned *Sunmi* onto a heading of 075° to create the lee and *Patrol*'s coxswain duplicated the alteration.

1.2.1 The accident

The sea pilot and the deckhand left *Patrol*'s cabin to make their way to the foredeck. Both men were wearing personal flotation devices and both held onto the permanent handrail as they moved along the launch's port side to the embarkation area. The sea pilot stood on the inboard side of the foredeck with the deckhand behind him.

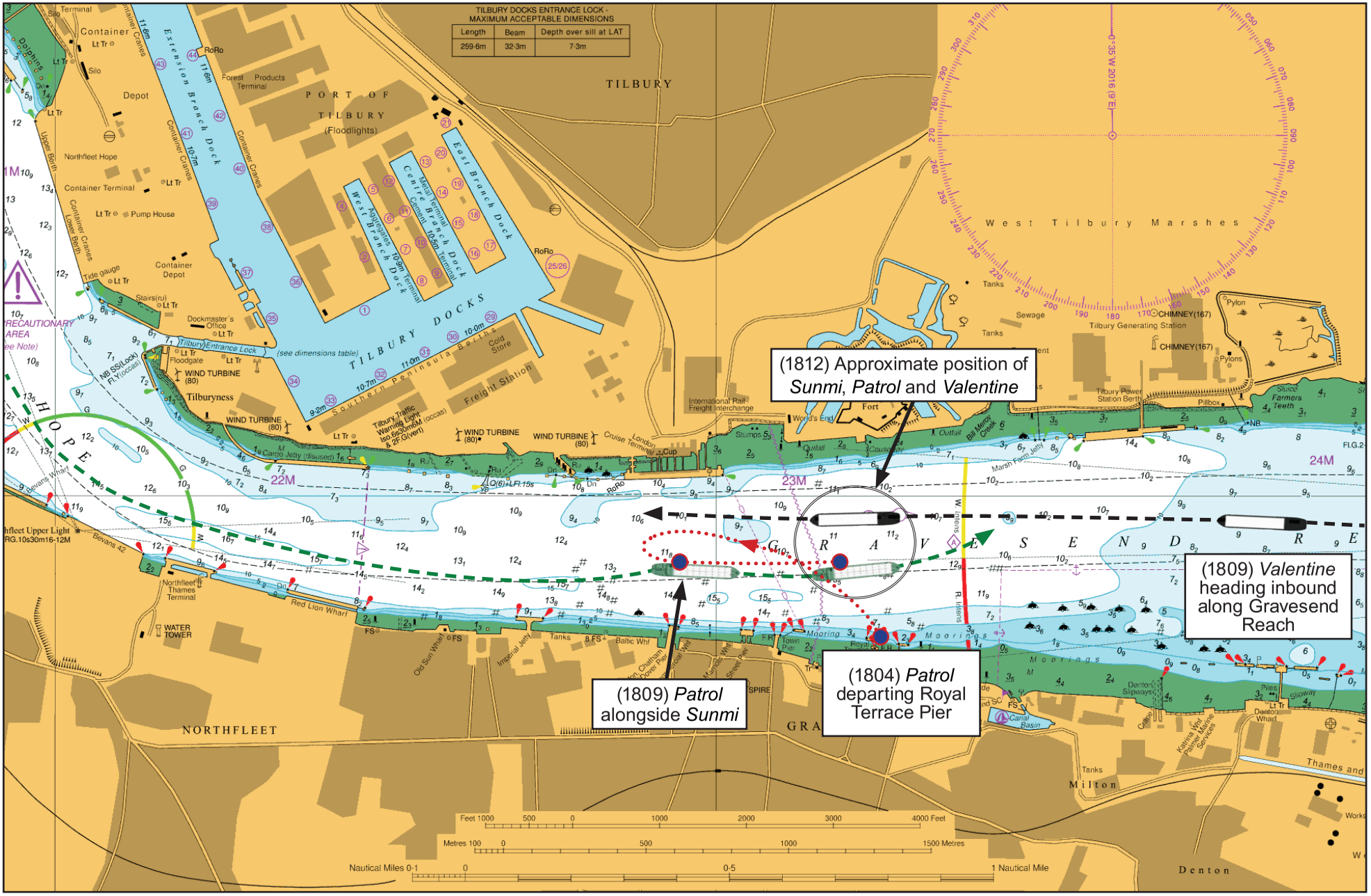

Figure 1: Gravesend Reach showing the relative positions of the vessels

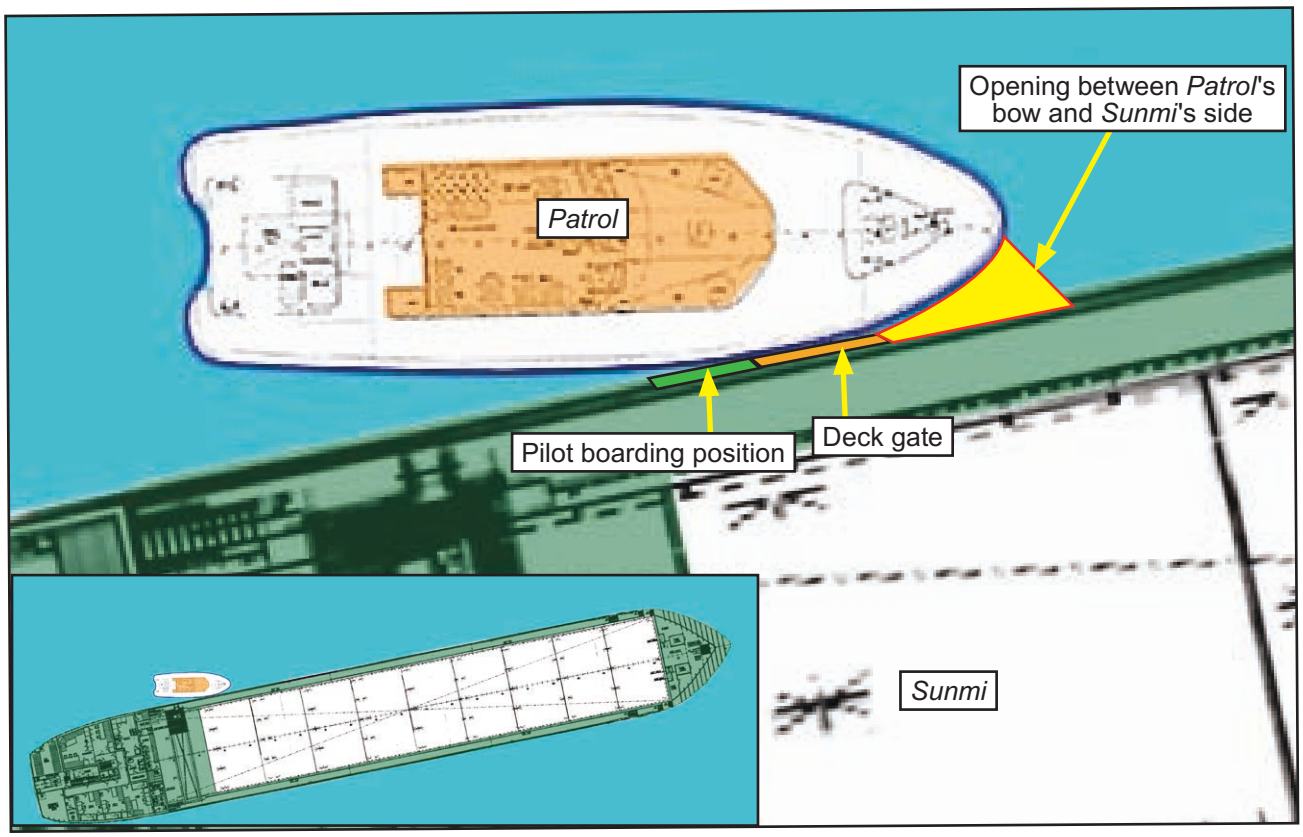

Figure 2: *Patrol*'s position alongside *Sunmi*

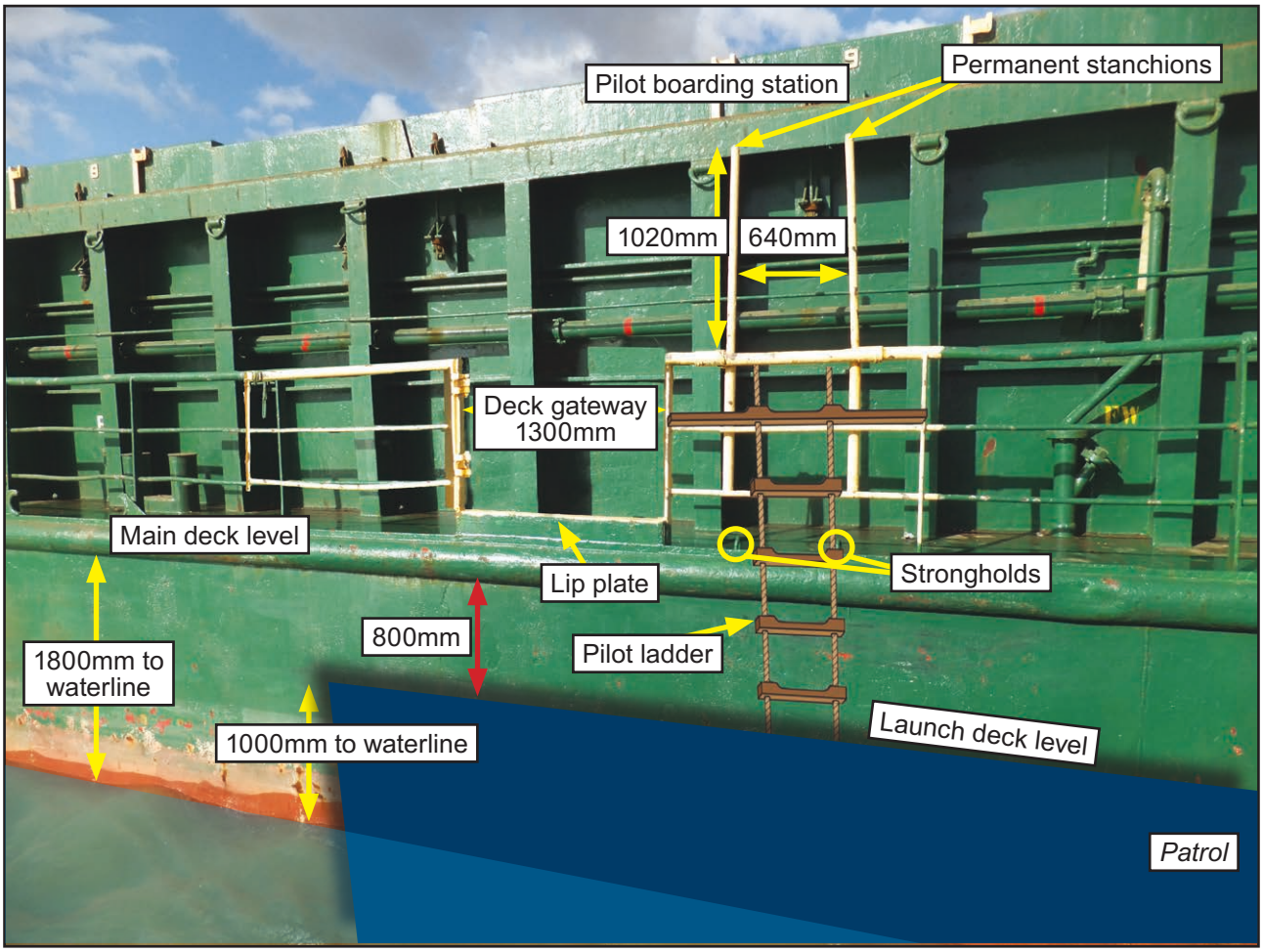

Figure 3: Representation of *Sunmi*'s deck gate and pilot boarding arrangements

The coxswain could see that, despite the lee, there was still some swell and the difference in freeboard between the two vessels varied from 30cm to 130cm as the vessels moved up and down in the seaway.

Directly in front of the sea pilot was *Sunmi*'s open deck gate. On board *Sunmi* a deck rating was standing by the deck gate ready to assist the pilot if required.

Shortly before 1812 the sea pilot lifted his right foot onto *Sunmi*'s deck and grasped the deck gate's uprights with both hands. He then appeared to brace himself to step up and across when the pilot launch dropped against *Sunmi* without warning, causing him to be left hanging by his arms. He was stopped from falling into the water when both *Patrol*'s deckhand and *Sunmi*'s deck rating grabbed hold of him. The sea pilot was then almost sitting on the pilot launch's deck with his legs between the two vessels in the 'V' formed by *Patrol*'s bow and *Sunmi*'s side. As the deckhand and rating struggled to lift the sea pilot onto *Sunmi*, the angle between the two vessels changed, crushing the sea pilot's legs between them. When the angle opened up again, the deck rating and deckhand manhandled the sea pilot onto *Sunmi*'s deck. He was bleeding profusely from his left leg and in obvious pain.

At 1812:09, *Valentine*'s stern was in line with *Patrol*'s bow and passing clear of the pilot launch and ship **(Figure 1)**.

1.2.2 Post-accident actions

As soon as the sea pilot was on *Sunmi*'s deck, *Patrol*'s deckhand told the coxswain that the sea pilot required medical assistance. The coxswain immediately called the vessel traffic service (VTS) on the VHF radio and informed them that the sea pilot had injured his leg, and requested an ambulance. He then manoeuvred *Patrol* away from *Sunmi* but remained close to the ship to be available if required. The VTS Duty Port Controller (DPC) received the coxswain's call at 1812:40 and he immediately telephoned 999 and asked for an ambulance to attend Royal Terrace Pier.

At the same time, two Royal National Lifeboat Institution (RNLI) crew, who had been monitoring the VHF radio from their base at Royal Terrace Pier, notified the coastguard that they would respond. Rather than launch the lifeboat, they quickly arranged for the PLA launch, *Southwark,* which was alongside at Royal Terrace Pier, to transfer them to *Sunmi.* Meanwhile, the river pilot had turned *Sunmi* and was holding the vessel facing upriver to facilitate the boarding of medical assistance.

On board *Sunmi*, a second rating, who had been on the aft deck, saw the first rating lift the sea pilot onto the deck and immediately went to assist. On his arrival, the first rating went into the accommodation and informed the chief officer of the accident before going back to the sea pilot. The chief officer then took a first-aid kit to the sea pilot and started first-aid. On seeing the extent of the pilot's injuries, the chief officer placed a tourniquet on his left thigh to try and stem the blood flow.

At 1828, the requested ambulance arrived at Royal Terrace Pier and two paramedics were transferred to *Sunmi* by *Patrol*. At the same time, the RNLI crew on board *Sunmi* had just completed their preliminary assessment of the river pilot. Both medical teams then worked together to stabilise the sea pilot and prepare him for evacuation ashore. At 1840, the sea pilot went into cardiac arrest and, although cardio-pulmonary resuscitation (CPR) was carried out, the medical teams were unable to revive him and he was pronounced life extinct at 1913.

1.3 *SUNMI*

1.3.1 General

Sunmi was a Bahamas registered general cargo ship. Constructed in 1993 the vessel was owned by Misje Bulk and managed by Misje Rederi A.S., based in Norway.

Sunmi's design was typical for smaller general cargo ships. Its main deck was significantly lower than the hatch tops, and the hull was flat sided for approximately 4/5 of its length. The vessel had a moulded depth of 7.1m and, on departure from Barking, had a forward draught of 4.7m and an aft draught of 5.5m. The resulting draught at the pilot boarding station was 5.3m, giving a freeboard of 1.8m.

1.3.2 Pilot boarding arrangements

Sunmi had two designated pilot boarding stations, one on either side of the main deck approximately one quarter of the ship's length forward of the stern. Each station had two permanent stanchions that extended 1020mm above the rail and were 640mm apart. A pilot ladder could be deployed over the top of the rail and then secured to the strongholds that were welded to the deck. Typically, a bulwark ladder (as shown in **Figure 4**) would be used to facilitate the pilot in climbing over the rail and safely onto the deck. At the time of the accident there was not a bulwark ladder rigged. When deployed for the pilot transfer with *Patrol*, the freeboard difference between the vessels was such that there was a maximum of two ladder steps showing between the two deck levels **(Figure 3)**.

Immediately adjacent to the pilot ladder was a deck gate in the main deck railing designed to take the ship's gangway while alongside. The deck gate opened outboard and could be secured against the rail when fully opened, leaving an opening that was 1300mm wide. There was also a welded lip-plate across the width of the deck gate **(Figure 3)** to enable the gangway to be 'hooked' onto the deck.

1.3.3 Safe manning

*Sunmi'*s minimum safe manning certificate, issued by the Bahamas Maritime Authority on 18 March 2013, required a total of six crew.

1.3.4 Crew

Sunmi's six crew were all Russian nationals and consisted of the master, chief officer, two deck ratings, one cook/deck rating and the chief engineer. At sea, navigational watchkeeping was shared between the master and chief officer who stood 6-hour watches with one of the deck ratings.

At the time of the accident, the chief officer was resting after the cargo operations in port, the chief engineer was in the engine room and the cook/deck rating was in the galley.

Image courtesy of IMO IMPA

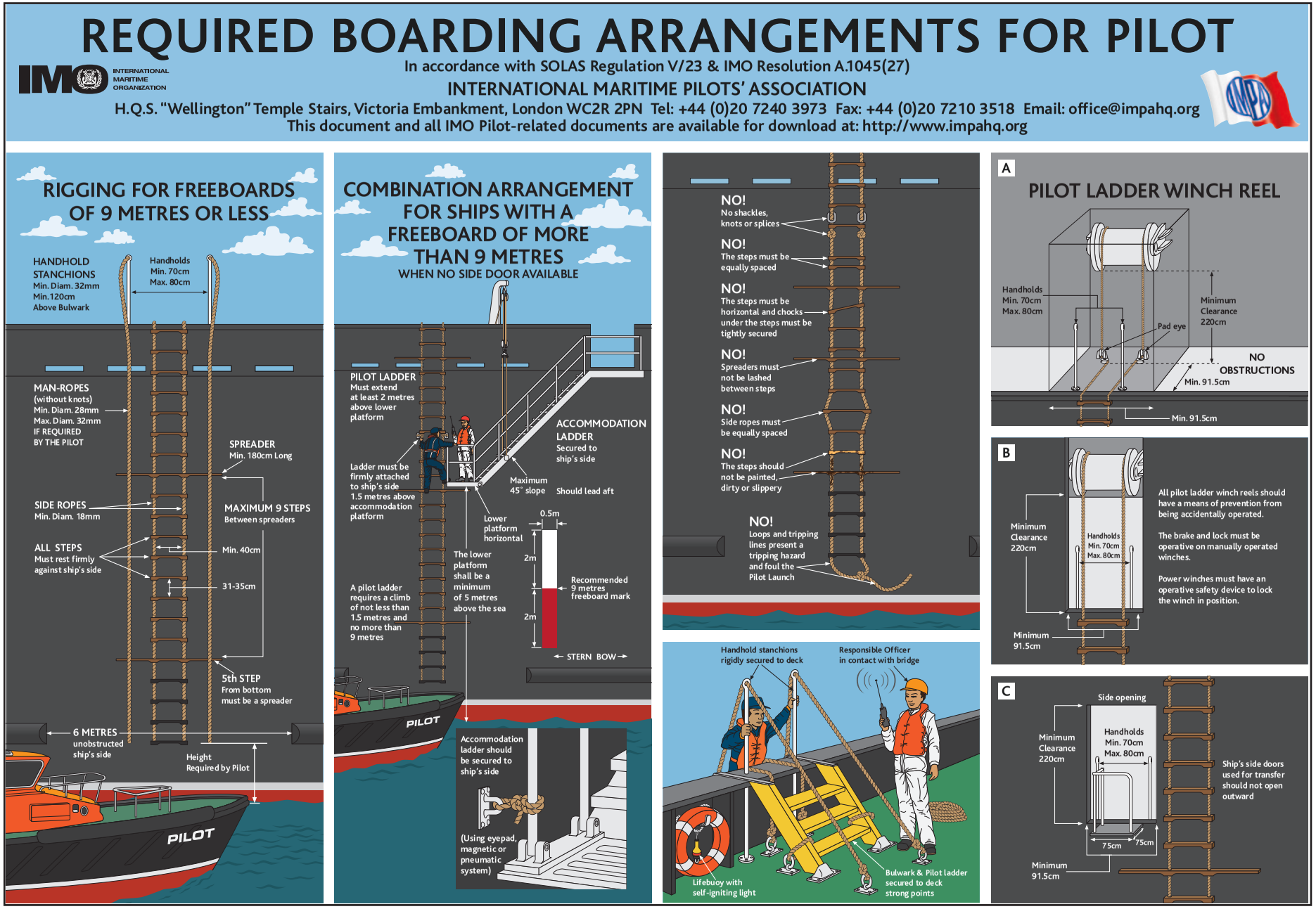

Figure 4: Required Boarding Arrangements for Pilot poster

The master held a Russian STCW[1] II/2 master's certificate for vessels of 3000 gross tonnes or less and a certificate of equivalent competency issued by the Bahamas Maritime Authority. He had joined Misje Bulk 6 years previously and had sailed as master on *Sunmi* several times. Both the master and the chief officer held the STCW Medical Care certificate.

The master was aware that an officer was required to be at the pilot boarding area for transfers, but he often delegated this duty to an able seaman as there were only two deck officers on board.

1.3.5 The river pilot

Following an extensive career at sea, the river pilot had been with the PLA for over 16 years. After 9 years as a sea pilot he had re-trained and had served as a river pilot for 7 years. He was well rested and *Sunmi* was his second pilotage act that day, having departed *Sand Fulmer* at Angerstein's Wharf, Bugby's Reach, at 1420.

1.4 *PATROL*

1.4.1 General

Pilot launch *Patrol* was based at Royal Terrace Pier, Gravesend and was the oldest vessel used for pilot transfers in Gravesend Reach.

Constructed in 1982 by Halmatic Ltd, the vessel was built on an Arun lifeboat hull. Powered by twin Scania diesel engines, the launch had a service speed of approximately 15kts. The engines were controlled by separate throttle controls, which enabled the coxswain to place the launch at an angle to a ship's side under power, thereby holding it fast against the hull **(Figure 2)**.

1.4.2 Crew

Patrol's coxswain had served in charge of a pilot launch for over 20 years, predominantly at Gravesend. He held a Tier 1 Level 2 boatman's licence for the River Thames issued by the Maritime and Coastguard Agency.

The coxswain and deckhand had worked together for several years and had both completed basic first-aid training. While *Patrol* was their usual assigned launch, they had both worked on some of the PLA's other vessels.

1.5 PORT OF LONDON AUTHORITY

1.5.1 General

The PLA was established in 1909 by the Port of London Act, and is the statutory harbour authority for the River Thames. When the PLA was established, pilotage on the Thames was the responsibility of the Corporation of Trinity House and pilots were not directly employed by the port. However, the Pilotage Act 1987 saw the responsibility for pilotage on the River Thames transfer from Trinity House to the PLA, and the pilots became employees of the PLA. The pilots are governed by the PLA's procedures and operational practices.

[1] STCW - International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 as amended

The pilotage district extends from its eastern limit at the Sunk to Putney Bridge. Pilots would be certified by the PLA for a certain section or sections within this district and their roles were named accordingly. The sections and their limits are in **Table 1**.

Table 1: PLA pilotage sections

Section/Role	Eastern Limit	Western Limit
Sea pilot	Sunk/ Tongue/ NE Spit pilot boarding stations	Crayfordness
River pilot	Sea Reach 1 buoy	London Bridge
Bridge pilot	London bridge	Putney Bridge

1.5.2 Required qualifications for PLA pilots

PLA pilots were required to hold an STCW II/2 master's certificate in addition to their PLA pilot certificate. Pilots were responsible for renewing their STCW qualification but the PLA would facilitate the process as required.

In addition to their pilotage duties, several sea pilots had completed V-103[2] training for VTS operations and fulfilled the role of DPC within the VTS team. The DPC role was to liaise and co-ordinate pilotage movements in the district. Sea pilots were the only PLA staff eligible to fill the role of DPC, and were appointed after a recruitment and selection process.

1.5.3 Pilot training

Relevant guidance on pilot training was provided by the International Maritime Organization's (IMO) Resolution A.960(23), Recommendations on Training and Certification and on Operational Procedures for Maritime Pilots other than deep-sea pilots, adopted in 2003. This stated that training standards *should be sufficient to enable pilots to carry out their duties safely and efficiently*. The resolution provided a syllabus for certification, which included safe embarking and disembarking procedures, and encouraged competent pilotage authorities to provide refresher training in, among other things, personal safety training and emergency first-aid.

On joining the PLA, new pilots received a safety briefing on boarding practices and a practical demonstration of ladder use. In addition, new pilots completed a 1-day man overboard training session, a 'Fire and Swim' course and basic first-aid training. The PLA did not require pilots to complete refresher training for any of these courses.

After their initial training, the trainee pilots followed the PLA experience-based training scheme to obtain their first pilotage qualification, a Class 4 licence. Once qualified, a PLA pilot's performance was assessed annually by the pilot manager. As pilots gained experience, they could be assessed at predetermined stages to enable progression through the four pilotage classes up to Class 1.

[2] V-103 is the recognised international standard for training and certification for VTS personnel, developed by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)

1.5.4 Pilot fitness

IMO Resolution A.960(23) states that pilots should have a level of fitness that meets the same standards required by the STCW for seafarers. In the United Kingdom, this is the ENG1[3] medical assessment standard for seafarers' fitness, which is renewed biennially or as required following serious illness or injury.

Merchant Shipping Notice 1839 (M) Seafarer Medical Examination System and Medical and Eyesight Standards: Application of the Merchant Shipping (Maritime Labour Convention) (Medical Certification) Regulations 2010, provided guidance on the standards required for ENG1 and ML5[4] certification. It stated that the statutory standards for medical fitness allowed sufficient flexibility for the normal duties of each candidate to be considered. In practice, neither the ENG1 nor the ML5 assessment involved any active fitness assessment involving physical exercise.

The PLA employed a doctor who conducted return to work assessments and medical fitness assessments under the ENG1 criteria. PLA pilots could choose to complete ENG1 certification either with the PLA's doctor or another MCA approved doctor. If a pilot had a serious injury or illness, then a re-evaluation of the pilot's medical fitness was required before pilotage duties were resumed.

1.5.5 Pilot launch crew training requirements

In addition to holding a boatman's licence, PLA pilot launch crew were required to complete basic first-aid training at 3-yearly periods. There was also a requirement for a 6-monthly manoverboard drill to be completed on every pilot launch. This drill was an action registered against the vessel and not its crew, which varied in accordance with the watch routine.

1.5.6 Drug and alcohol policy

The PLA's drug and alcohol policy had been implemented in 2014 and covered all operational staff, office-based staff and contractors. The policy referred to the Transport and Works Act 1992 and specified that staff should not have an alcohol level above that stated in the Road Traffic Act 1988, which was 80mg of alcohol per 100ml of blood, when on duty.

The PLA policy required that staff do not report for work if they have consumed alcohol or drugs that could impair their ability to work or risk them having a positive result should they undergo a drug and alcohol test. Testing could be required as part of a schedule of random testing, following an accident or at any other time while at work.

Since 2015, 105 PLA staff members had undergone random testing. Staff members were identified for random testing regardless of duty rosters or holiday periods. A PLA review of operational staff for random testing showed that, of the staff tested, in 2015 45% were operational staff dropping to 39% of operational staff in 2016. The failure to capture more operational staff was due to them being selected for testing during periods when not at work.

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[3] A medical certificate issued to UK seafarers serving on foreign-going vessels.

[4] The ML5 certificate follows the same criteria as the ENG1 but is for service on non-seagoing vessels, often used for personnel working on vessels within internal waters.

1.6 THE SEA PILOT - GORDON COATES

1.6.1 General

The sea pilot, Gordon Coates, was 63 years old. He had joined the PLA as a trainee pilot in 1995 and gained his Class 1 sea pilot licence in 1997. He also held a valid V-103 certificate and kept watches as DPC as part of his duty roster. His STCW II/2 master mariner's certificate of competency had expired in August 2013.

In December 2008, the PLA issued pilots with a revised contract of employment, which contained certain provisions regarding their working conditions. These included the required qualifications for pilots, medical standards and the drug and alcohol policy. The sea pilot had received and accepted these on 7 January 2009. Gordon Coates had not been selected for random drug and alcohol testing during his employment with the PLA.

At the time of the accident, the sea pilot was wearing his PLA-issued personal protective equipment comprising a Seasafe™ coat[5] and safety shoes. The coat had last been serviced in April 2015 and his shoes had been issued the same year. Both were in good condition.

The sea pilot, whose home was in Gloucestershire, was held in high professional regard by his colleagues and he would socialise with some of them when staying in Gravesend. While he was known to drink socially, he had no history of alcohol problems.

1.6.2 Health

Throughout his time with the PLA, the sea pilot had suffered from repeated back, knee and ankle problems, which led to periods off work. His knee problems were sufficiently severe for him to require knee replacement surgery on his left knee in 2011, from which he was unable to return to work for over 2 months.

In the personal assessment he prepared for his performance review in 2015, the sea pilot referred to his *'dodgy knees'* affecting his ability to fulfil his duties. This had been acknowledged by his manager and they had discussed the potential for him to move toward working part-time.

In March 2016, the sea pilot had knee-replacement surgery on his right knee. Following assessment by the PLA doctor, he returned to his DPC duties on 1 May. Having passed a medical assessment against the ENG1 standard, the sea pilot was permitted to return to pilotage duties on 8 June, but was initially restricted to 'short climbs' for a period of 2 weeks.

Following his knee operations, the sea pilot had said that he was pain free and he walked recreationally when off duty at home, despite a slightly asymmetric gait.

[5] Seasafe™ – a manufacturer of personal flotation devices and lifejackets that may be contained within an outer garment such as a coat.

1.6.3 Duty roster

Following a period of 12 days off duty, the sea pilot returned to duty at 0800 on 28 September. The dates and times of his arrival and return to the pilot base at Gravesend, together with his availability and time between jobs for his last duty period, are shown in **Table 2.**

Table 2: The sea pilot's times of arrival and return to Gravesend pilot base, availability and time between jobs

Date and time at base	Date and time return	Date and time next available	Time between pilotage acts – hh:mm
N/A	N/A	28/09/2016 08:00	N/A
29/09/2016 16:45	29/09/2016 21:00	30/09/2016 08:00	16:30
30/09/2016 13:30	30/09/2016 18:30	01/10/2016 05:30	13:30
01/10/2016 08:00	01/10/2016 16:15	02/10/2016 03:15	13:00
02/10/2016 05:15	02/10/2016 13:00	03/10/2016 00:00	14:30
03/10/2016 03:30	03/10/2016 10:00	03/10/2016 21:00	25:00
04/10/2016 11:00	04/10/2016 16:20	05/10/2016 03:20	24:25
05/10/2016 16:45	N/A	N/A	N/A

The sea pilot had returned to base the day before the accident at 1620 when he had been informed that *Sunmi*'s scheduled departure the following evening was most likely his next pilotage act. This was subsequently confirmed to him in a telephone call from the pilot co-ordinator at 0915 on 5 October.

The sea pilot was due to begin a period of 10 days off duty on 7 October.

1.6.4 Postmortem examination findings

The postmortem report stated that the sea pilot's death was due to trauma to his left leg. While both of his legs were crushed in the accident, the popliteal artery in his left leg had been ruptured, leading to massive blood loss.

The toxicology report indicated that the sea pilot had a blood alcohol content of 122mg alcohol per 100ml of blood. The pathologist noted:

> *The alcohol in this man's blood had been ingested and may have lead to a degree of in coordination. There were no features at PM to suggest chronic abuse of alcohol.* [sic]

1.7 REGULATIONS AND GUIDANCE FOR PILOT TRANSFER ARRANGEMENTS

1.7.1 International

At the time of its construction, *Sunmi* had to meet pilot transfer arrangements as provided by The International Convention for the Safety of Life at Sea 1974, as amended (SOLAS) Chapter V Regulation 17. The IMO supplemented Regulation 17 in its Resolutions A.275(VIII), A.426(XI) and A.667(16), the provisions of which were to be held in 'due regard' alongside SOLAS. Resolution A.667(16), adopted in October 1989, specified the recommended pilot transfer arrangements and stated the following:

> *5. ACCESS TO DECK*
>
> *Means should be provided to ensure safe, convenient and unobstructed passage for any person embarking on, or disembarking from, the ship between the head of the pilot ladder, or of any accommodation ladder or other appliance provided pursuant to paragraph 4.2.4 above, and the ship's deck. Where such passage is by means of:*
>
> *.1 a gateway in the rails or bulwark, adequate handholds shall be provided;*
>
> *.2 a bulwark ladder, such ladder should be securely attached to the ship to prevent overturning. Two handhold stanchions should be fitted at the point of embarking on or disembarking from the ship on each side which should not be less than 0.70 m or more than 0.80 m apart. Each stanchion should be rigidly secured to the ship's structure at or near its bases and also at a higher point, should not be less than 32 mm in diameter and should extend not less than 1.20 m above the top of the bulwarks. Stanchions or handrails should not be attached to the bulwark ladder.*

The contents of Resolution A.667(16) were later referenced in the SOLAS 1991 amendments to Regulation 17 which also provided that:

> *(a) (iii) Equipment and arrangements for pilot transfer which are provided on ships before 1 January 1994 shall at least comply with the requirements of regulation 17 in force prior to that date and due regard shall be paid to the standards adopted by the Organization prior to that date.*

In 2002, the 2000 amendments to SOLAS V moved the requirements for pilot transfer arrangements to Chapter V Regulation 23. The IMO subsequently adopted a number of resolutions providing amplifying guidance. The current guidance in IMO Resolution, A.1045(27), amended by Resolution A.1108 (29), states:

> *5.1 a gateway in the rails or bulwark, adequate handholds should be provided; at the point of embarking on or disembarking from the ship on each side which should not be less than 0.7 m or more than 0.8 m apart. Each handhold should be rigidly secured to the ship's structure at or near its base and also at a higher point, should be not less than 32 mm in diameter and should extend not less than 1.2 m above the deck to which it is fitted; and*

5.2 a bulwark ladder, two separate handhold stanchions should be fitted at the point of embarking on or disembarking from the ship on each side which should be not less than 0.7 m or more than 0.8 m apart. The bulwark ladder should be securely attached to the ship to prevent overturning. Each stanchion should be rigidly secured to the ship's structure at or near its base and also at a higher point, should be not less than 32 mm in diameter and should extend not less than 1.2 m above the top of the bulwarks. Stanchions or handrails should not be attached to the bulwark ladder.

The International Maritime Pilots' Association (IMPA) produced a '*Required Boarding Arrangements For Pilot'* poster **(Figure 4)**, which details the requirements of SOLAS and IMO Resolution A.1045(27). The poster does not depict the amendments in Resolution A.1108(29), but it does show the requirement for additional equipment such as lifebuoys and a bulwark ladder in addition to a responsible officer, who has a means of communication with the bridge. The poster is not required to be displayed or carried on board merchant ships and it was not displayed on *Sunmi*'s bridge.

1.7.2 Port of London Authority

The PLA's requirements for the conduct of pilot transfer operations are contained within the Code of Practice for the Embarkation and Disembarkation of Pilots on the Thames (the Code), **Annex A**. The latest version of the Code was drafted in 2013 and is currently under revision.

Regarding pilot transfers to low freeboard vessels, the Code states:

When a ship has a low freeboard similar to the pilot boat, the transfer can be particularly hazardous since the boat will have insufficient hull of the ship to work against. Such situations are made more difficult in adverse weather conditions when both the pilot boat and ship may roll or pitch creating an increased risk of injury to the Pilot and/or Deckhand, and possibly damage to the pilot boat should it become 'hung up' on the ship's gunwhale. The increased amount of time necessary to conduct a safe transfer under such conditions means that the intended course and speed is critical to ensure the ship and the pilot boat do not run into danger.

In addition to the Code and in accordance with the requirements of the Port Marine Safety Code, the PLA had completed risk assessments for its pilot transfer operational procedures. The risk assessment for pilot boarding procedures had last been revised on 29 March 2016 and is included at **Annex B**. Stepping between two vessels of similar freeboard had not been included in this assessment.

1.8 SEAFARER ALCOHOL LIMITS

The alcohol limit for seafarers is provided in the STCW Convention, as amended. The STCW alcohol limit was made law in the UK through the Railways and Transport Safety Act 2003. The prescribed limit in the act was amended to reflect the lower limits agreed in the Manilla amendments to STCW through SI 2015/1730 The Merchant Shipping (Alcohol) (Prescribed Limits Amendment) Regulations 2015. This limit was 50mg of alcohol per 100ml of blood and was noted to apply to professional marine staff on duty, including a '*professional pilot'*.

1.9 MAIB RESEARCH

Following the accident, and with assistance from the United Kingdom Maritime Pilots Association (UKMPA), the MAIB conducted two surveys with the purpose of establishing the general practices of UKMPA pilots in the United Kingdom.

The first survey covered the reporting of near misses and accidents when boarding or landing a vessel and the training received for such operations. This survey received 136 responses, not all of which were complete. The results were as follows:

- Of the 136 pilots who responded, 38 (28%) had suffered an accident while boarding or landing from a merchant vessel.
- Of these 38, 31 (82%) reported the accident and 7 (18%) did not.
- Although 76 pilots reported that they had seen the risk assessments for pilotage operations, 60 (44%) had not sighted them.
- With regard to guidance on the use of deck gates, stepping across or not using a pilot ladder, 133 pilots responded. Of these 90 (68%) had not received any such guidance.

The second survey asked about the medical health assessment of pilots required by harbour authorities and self-employed pilot organisations in the United Kingdom. The responses received covered 13 UK ports, all of which complied with the requirements of IMO Resolution A.960(23), requiring either the ENG1 or ML5 as appropriate.

One port extended the basic requirements of the ENG1 assessment by providing annual health surveillance. Another required its pilots to pass an additional fitness assessment using a treadmill test coupled with cardio-vascular monitoring.

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 sea pilot fell while attempting to step across onto the deck of *Sunmi*. Whether the fall was due to a problem with his knee, his use of *Sunmi*'s deck gate, loss of co-ordination due to the alcohol he had consumed, or a combination of all three cannot be known for sure.

2.3 THE BOARDING PROCESS

2.3.1 Decision-making

No one saw what caused the sea pilot's fall. Both *Sunmi* and *Patrol* had altered course to provide a lee to minimise the effect of the seas in the prevailing conditions. The river pilot and coxswain had agreed to wait for the inbound ferry *Valentine* to pass clear to allow sufficient room for this manoeuvre, and to reduce the danger of its wash creating movement between the vessels. However, given that *Valentine* had only just cleared the two vessels, it is possible that its wash caused *Patrol* to drop relative to *Sunmi* just as the sea pilot was attempting to step across.

Gordon Coates was an experienced sea pilot, but before boarding *Patrol* he had consumed a significant quantity of alcohol. This would have impaired both his physical co-ordination and his decision-making ability. He needed to decide whether to use the ladder or the deck gate. Once he had decided to use the deck gate, he had to time his step across based on his perception of the sea conditions, and the physical act of stepping across would have required good co-ordination. Given the circumstances of the accident, it is not possible to state whether his consumption of alcohol was causal. However, given the challenging nature of the transfer, it is likely that it was contributory.

2.3.2 Low freeboard transfers

At 1.8m *Sunmi*'s freeboard was just 80cm more than *Patrol*'s, and the operation was therefore a low freeboard pilot transfer. Low freeboard transfers introduce additional risks to standard pilot transfers since the operations not only involve assessments of step height and vessel movement but also the width and nature of the guardrail opening and an increased risk of entrapment.

While such transfers are commonplace, there are no instructions or guidance available for pilot transfers involving stepping directly between two vessels beyond *a safe and convenient access* as required by SOLAS Chapter V, Regulation 23. Low freeboard transfers were not effectively covered in the PLA's Boarding and Landing Code and the PLA's risk assessment for boarding operations did not include deck to deck transfers or identify the risk of crush injuries to pilots transferring between vessels.

Clear procedures that provide safe means for all recognised boarding and landing operations can only be developed through rigorous assessment by pilot organisations, ports and pilotage authorities. Once developed, these procedures can be widely promulgated to ensure that ships' crews can help facilitate their adoption.

2.3.3 *Sunmi*'s pilot boarding station

The designated pilot boarding station on board *Sunmi* did not accord with the dimensions stated in IMO Resolutions A.667(16) and A1045(27) as amended in that the stanchions were only 640mm apart, rather than the minimum 700mm, and were 1020mm in height, rather than the minimum 1200mm. However, it is unlikely that this would have been noticeable to either the river pilot or sea pilot prior to the accident and so these discrepancies played no part in this accident. The deck gate was not part of the designated pilot boarding station, although it had been opened by the ship's crew when the pilot ladder was rigged.

The river pilot and *Sunmi*'s master followed the generic practices for pilot boarding in providing a ladder for a climb of less than 9m. The river pilot requested the pilot ladder to be rigged and this was completed, although the bulwark ladder was not rigged. Pilots habitually assess the suitability of boarding arrangements as they approach a vessel. The designated pilot boarding area on *Sunmi* was not marked, and it can be difficult to complete a dynamic assessment of boarding arrangements before using them, especially where two apparently suitable options are available. Had the sea pilot chosen to use the ladder without first asking for the bulwark ladder to be rigged, he would have either had to climb down the inboard side of the guardrails or shuffle dangerously along the coaming on the outside of the railing to the deck gate.

The marking of a designated pilot boarding station is not a requirement under current legislation but it is completed on some vessel types, usually where the means of access is through a shell door. A positive method of identifying designated pilot boarding arrangements would be beneficial to pilots who have little knowledge of the vessel's arrangement. In addition, such markings would also be a reminder to crew to prepare a proper and safe means of access.

2.3.4 *Sunmi*'s deck gate

Sunmi's deck gate was not part of the designated pilot boarding station and the crew should not have opened it in preparation for the transfer. However, its location beside the pilot boarding station, coupled with the vessel's low freeboard, had led to the gate being used for pilot access.

The deck gate had been designed to facilitate deployment of the ship's gangway. It opened outboard so as not to create an obstruction when the gangway was landed, and, in accordance with SOLAS V Regulation 23 (5), this made the deck gate unsuitable for pilot transfers. In addition, at 1300mm wide the deck gate was able to accommodate the gangway assembly but was much wider than the maximum 800 mm specified in Resolutions A.667(16), A.1045(27) and A.1108(29) for pilot boarding arrangements. As a result, a person attempting to board by holding on to the uprights would have their arms widely spread, which would have hampered their ability to pull themselves up. Therefore, a loss of balance or footing would inevitably lead to the person either letting go or being left hanging from their arms, as happened with the sea pilot.

The amendments introduced by IMO Resolution A.1108(29) were specifically aimed at ensuring that apertures in bulwarks or railings intended for pilots to access the deck would provide adequate handholds, appropriately spaced to ensure pilots could safely transit the aperture while holding with both hands. *Sunmi*'s deck gate did not comply with these requirements.

2.3.5 Manning

At the time of the accident, *Sunmi'*s deck rating was on station at the pilot boarding station in lieu of an officer. The master was aware of the requirement for a responsible officer to oversee the embarkation of a pilot. However, with just two deck officers on board, it had become routine for the deck rating to standby the pilot boarding station.

Had the chief officer been tasked with overseeing the preparation for pilot boarding, it is possible that he would have recognised the fact that the deck gate was unsuitable, and ensured that it remained closed and that the bulwark ladder was rigged. However, the decision of when and how to board is ultimately the pilot's, and the deck rating's actions in grabbing the pilot when he fell were commendable. Furthermore, the chief officer was at the scene equipped to provide first-aid very soon after the sea pilot was brought on board.

2.3.6 Boarding arrangements poster

The IMPA '*Required Boarding Arrangements for Pilot'* poster **(Figure 4)** provided a clear and easy to understand reminder of the correct procedures to be followed for safe pilot transfer, and was widely used on vessels as a guide for crews. The poster was not required to be posted or carried on board vessels and was not displayed on board *Sunmi*. However, since the poster did not show the amended arrangements for deck gates promulgated in IMO Resolution A.1108(29), it is unlikely to have prompted any change to the boarding arrangements on *Sunmi*, even if it had been displayed.

2.4 ASSESSMENT OF PILOT FITNESS

2.4.1 Assessment of the sea pilot's fitness

During his employment with the PLA, Gordon Coates had taken several periods off work due to illness and injury. The most serious of these were the two knee replacement operations, each resulting in the PLA's own doctor assessing him before he was passed fit to return to work.

After Gordon Coates' knee operation in March 2016, the PLA's doctor set out a phased return to work programme with an obvious emphasis on easing him back to his full pilotage duties. This phased return, and the discussion with his manager in 2015 regarding the potential for him to move toward working part-time, show that the PLA was aware of his health issues. However, he held a valid ENG1, which met the medical standard of fitness required by the PLA.

Given the other contributing factors to this accident, the impact of the sea pilot's knee surgery on his ability to safely complete the transfer cannot be known. However, it cannot be assumed that the minimum standard of ENG1 provides an appropriate measure of fitness for all pilotage operations.

2.4.2 Fitness requirements

The standard of fitness required of pilots will vary according to the nature of their work. Those engaged purely on board low freeboard vessels in sheltered, inland waters would not require the same level of fitness as those who may expect to board large vessels in exposed seaways.

The MAIB survey of the fitness requirements placed on United Kingdom pilots showed that, of the 13 ports represented, all but 2 relied on the minimum standards set by IMO Resolution A.960(23). Appropriate fitness requirements can only be identified through risk assessment of the specific duties of the pilot at their port of employment. Indeed, such a risk assessment led to one UK port including cardio-vascular monitoring on a treadmill in their pilot fitness assessments.

2.4.3 Alcohol consumption

Gordon Coates was aware of the PLA's drug and alcohol policy. However, on the day of the accident he had ingested sufficient alcohol for his blood to contain 122mg alcohol per 100ml of blood approximately 2 hours after reporting for duty. This was more than 1½ times the 80mg alcohol per 100ml of blood limit referred to in the PLA's policy and nearly 2½ times the 50mg alcohol per 100ml blood prescribed by law.

Gordon Coates' next act of pilotage had been confirmed with him by telephone at 0915 on the morning of the accident. He did not have a known history of alcohol consumption, and nothing has been discovered to provide a motive for his drinking on the day of the accident. Further, the MAIB investigation has been unable to trace his movements between 0915 and his arrival at the pilot base at 1645. Therefore, it has not been possible to establish where or why he consumed the alcohol, given that he knew he would be working later in the day. Whatever the reason, to report for work after significant, recent alcohol consumption was a serious misjudgment.

The PLA's drug and alcohol policy's random testing regime did not take account of the duty rosters of the operational staff who were often identified for testing on days they were not at work: there was no record of Gordon Coates ever having been tested. This led to a disproportionate degree of testing of office staff and reduced the incentive effect of the policy on operational staff who knew they were unlikely to be tested.

The limits for operational staff quoted in the PLA's policy were inappropriate given that they were higher than those legally required of professional marine staff on duty by the Railways and Transport Safety Act 2003, as amended.

2.5 PROVISION OF TRAINING

2.5.1 Boarding and landing

There were no common training standards across UK ports and pilotage authorities for boarding and landing. Generic training may not be suitable for all ports given the significant differences in operations and environments. However, the fact that 28% of pilots who responded to the MAIB survey indicated that they had been involved in an accident or near miss when boarding or landing, would indicate that safety training could be improved.

The PLA's training programme for new pilots provided initial training for pilot ladder use and included boarding under supervision. However, the programme did not include any refresher training as recommended by IMO Resolution A.960(23).

Regular refresher training enables changes in best practice to be promulgated along with lessons learned from accidents and near misses. The required extent and periodicity of such training can best be established through a risk assessment process that includes reference to accident and near miss reports.

2.5.2 Low freeboard vessels

Low freeboard vessels frequently arrive at the Port of London, yet the training provided to new pilots did not include low freeboard situations where a step across or a step down was required. Furthermore, the PLA's risk assessments for boarding and landing did not examine the specific hazards associated with such transfers.

The risks associated with boarding a high-sided vessel will not all be the same as those encountered when stepping across or down onto a low-sided vessel. Risk assessments need to be sufficiently specific in order to fulfil their function of identifying the training and operational requirements needed to minimise the risks associated with a task.

2.5.3 Medical training

In this case, the pilot launch crew were not in a position to provide first-aid to the sea pilot since he was pulled on to the deck of *Sunmi* after his accident. The level of medical training on board *Sunmi* was significantly higher than that given to PLA launch crew in that the chief officer held the STCW Medical Care certificate whereas the launch crew had completed basic first-aid training in accordance with the PLA's requirements.

The PLA's risk assessments for boarding operations had not identified the risk of crush injuries. Therefore, their first-aid training had not been developed to equip them with the knowledge required to deal with such injuries.

The level of medical training required by operational staff depends on the potential injuries that are identified in the risk assessments for the activities being undertaken.

SECTION 3 - CONCLUSIONS

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

1. It is likely that the sea pilot's consumption of alcohol contributed to his fall. [2.3.1]

2. Low freeboard transfers introduced additional risks to standard pilot transfers. [2.3.2]

3. The designated pilot boarding station on *Sunmi* was not marked. [2.3.3]

4. *Sunmi*'s deck gate was not part of, nor was it suitable for use as, the designated pilot boarding station, and the crew should not have opened it in preparation for the transfer. [2.3.4]

5. The chief officer might have ensured that the deck gate remained closed and that the bulwark ladder was rigged, had he overseen the preparation for pilot boarding. [2.3.5]

6. On the day of the accident the sea pilot had ingested sufficient alcohol for his blood to contain 122mg alcohol per 100ml of blood approximately 2 hours after reporting for duty. [2.4.3]

7. The PLA's risk assessments for boarding and landing did not examine the specific hazards associated with low freeboard transfers. [2.5.2]

3.2 OTHER SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT

1. *Valentine*'s wash might have caused *Patrol* to drop relative to *Sunmi* just as the sea pilot was attempting to step across. [2.3.1]

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

1. If the sea pilot had chosen to use the ladder, he would have either had to climb over *Sunmi*'s guardrails or shuffle along the coaming on the outside of the railing to the deck gate. [2.3.3]

2. The IMPA 'Required Boarding Arrangements for Pilot' poster did not show the amended arrangements for deck gates promulgated in IMO Resolution A.1108(29). [2.3.6]

3. Appropriate fitness requirements for pilots can only be identified through risk assessment of their specific duties at their port of employment. [2.4.2]

4. The PLA's drug and alcohol policy's random testing regime did not take account of the duty rosters, reducing the incentive effect of the policy on operational staff. [2.4.3]

5. The alcohol limits quoted in the PLA's policy were higher than those legally required of operational staff on duty by the Railways and Transport Safety Act 2003 as amended. [2.4.3]

6. The PLA's risk assessments for boarding operations had not identified the risk of crush injuries. [2.5.3]

3.4 OTHER SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT

1. 28% of pilots who responded to the MAIB survey indicated that they had been involved in an accident or near miss when boarding or landing. [2.5.1]

SECTION 4 - ACTIONS TAKEN

4.1 ACTIONS TAKEN BY OTHER ORGANISATIONS

The Port of London Authority has:

Completed an investigation into the accident and taken the following actions:

- Revised its Drug and Alcohol Policy to bring the limits within the regulatory requirements for pilots and placed greater focus on the random testing of operational staff.
- Introduced a requirement for all pilots' medicals to be completed by the company doctor.
- Provided additional voluntary health checks to pilots.
- Reviewed the emergency exercise schedule to ensure that all launch crews are participating in training exercises.
- Introduced higher levels of training for all first-aiders, including trauma treatment and casualty care.
- Offered first-aid refresher training to pilots to supplement their initial training.
- Adopted the national Embarkation and Disembarkation of Pilots Code of Safe Practice, written by the UKMPA and the British Ports' Association in lieu of the local PLA code. In addition, the PLA is participating in the revision of this code.
- Amended its risk assessments to include an auditable process that shows they have been read and understood by operational staff.
- Revised its risk assessments for the transfer of PLA staff to/from ashore using PLA vessels so that the hazards involved during pilot transfers may be effectively mitigated.
- Developed a database of emergency landing/casualty evacuation points throughout the PLA area to enable their prompt identification in an emergency.
- Installed CCTV on *Patrol* with the intention to install CCTV on other PLA vessels.
- Reviewed the incident checklist for events involving medical assistance to PLA staff.
- Issued a notice to mariners to remind river users of the required bridge manning levels.
- Introduced guidance that includes operational limits for PLA vessels operating in heavy weather.

- Updated the procedures for non-PLA personnel involved in boarding and landing operations from PLA vessels.

Misje Rederi A.S. has:

- Commenced a review of its SMS, which will include the requirement for pilot transfers to be supervised by an officer.

SECTION 5 - RECOMMENDATIONS

The International Maritime Pilots' Association is recommended to:

2017/139 Promulgate the requirements for gateways in vessels' rails or bulwarks intended for pilot boarding operations by updating its *Required Boarding Arrangements For Pilot* poster to include the amendments contained in IMO Resolution A.1108(29).

Misje Rederi A.S. is recommended to:

2017/140 Ensure that the designated pilot boarding areas on *Sunmi* are marked and that pilot boarding operations are overseen by a responsible officer.

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