

Final Report

FATALITY OF HARBOUR PILOT AFTER FALLING INTO WATER DURING TRANSFER IN SINGAPORE ON 11 FEBRUARY 2023

TIB/MAI/CAS.139

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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The Transport Safety Investigation Bureau of Singapore

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SYNOPSIS

On 11 February 2023, after completion of its cargo operations, a Malaysia registered tugboat, Kencana Raya (KR), with a harbour pilot onboard, was towing a flat-top barge carrying containers (the tow) departed Brani terminal for the pilot disembarkation ground in the Port of Singapore. At about 0232H, while transferring from KR to the pilot launch (GP 30), the harbour pilot fell overboard through a widening gap between the two vessels.

A search and rescue (SAR) operation was launched by the Port regulator, but the harbour pilot could not be located. At about 1050H on the same day, the harbour pilot's body was subsequently recovered under the barge's bottom by divers.

The Transport Safety Investigation Bureau classified the occurrence as a very serious marine casualty.

The investigation revealed that the operator of KR was not aware of Singapore's port regulatory requirements to provide safe pilot transfer arrangement (PTA) and did not have provisions for safe PTA onboard KR. The KR did not reduce its speed to minimal nor stop its engine during the pilot transfer. GP 30 had not come alongside KR before commencing the pilot transfer.

The investigation also revealed that there was lack of proactive reporting of unsafe PTA for transfers on tugboats by pilots to the Port regulator and the PSA Marine.

VIEW OF VESSELS



Tugboat KENCANA RAYA and barge LUNA CAHAYA

DETAILS OF VESSELS

Name	KENCANA RAYA	LUNA CAHAYA
IMO Number ¹	8888575	7429451
Flag	Malaysia	
Classification society	RINA S.p.A. – Registro Italiano Navale	ClassNK - Nippon Kaiji Kyokai
Ship type	Tugboat	Flat-Top Steel Barge
Year Built	1995	2005
Owner / Operator	Lunar Shipping Sdn. Bhd. - Port Klang - Malaysia	
Gross tonnage	124.05	1981.0
Length overall	23.15m	73.15m
Draught	Fwd 1.80m/ Aft 2.20m	1.70m
Moulded Draught	N.A.	4.88m
Main engine(s)	Twin Caterpillar 3412T – Twin Propellers	N.A.

¹ Both vessels are registered for coastal navigation by the Malaysia Marine Department.



Pilot Launch – GP 30

DETAILS OF VESSEL

Name	GP 30
MMSI Number	563010620
Flag²	Singapore
Ship type	Fibreglass – 12 pax Launch Boat
Year Built	2007
Owner / Operator	PSA Marine (Pte) Ltd. (PSAM)
Gross tonnage	26
Length overall	14.50m
Draught	Fwd 1.40m / Aft 1.0m
Main engine(s)	Twin MAN M&E-D2876LE403 – Twin Propellers

² Licensed under Singapore's Harbour Craft Regulations.

1 FACTUAL INFORMATION

All times used in this report are Singapore local time which is eight hours ahead of the UTC (UTC+8), unless otherwise stated.

1.1 Sequence of events

1.1.1 At about 1600H on 10 February 2023, tugboat Kencana Raya (KR) and its tow, a barge carrying containers, Luna Cahaya (LC), were berthed³ at Singapore's PSA Brani container terminal for the loading and unloading of containers.

1.1.2 At about 0010H on 11 February 2023, LC completed the cargo operations⁴. At about 0040H, the master of KR (Master), after being informed of the pilot's boarding time with the availability of two harbour tugboats assisting their departure⁵, manoeuvred KR from the berth towards LC for the transfer of KR's crew⁶ to LC in preparation for departure.

1.1.3 At about 0045H, a Pilot was transferred from a pilot launch, GP 51, to KR (see paragraph 1.2.2 regarding the embarkation process). At about 0050H, the two assist tugboats, Noble Jade and Marina Amazon 2 (MZ), made fast to LC's starboard bow and starboard aft respectively. KR's towline⁷ was rigged to LC and subsequently piloted from the terminal to the pilot disembarkation ground (see **figure 1**). In KR's wheelhouse, the Chief Officer was at the helm and engine throttles while the Master and the Pilot were also present throughout the transit.

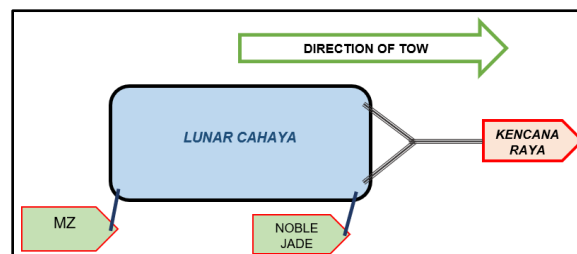


Figure 1: Configuration of the two assist tugs (MZ and Noble Jade), KR and LC. – *Illustration not to scale.*

³ KR's arrival was under pilotage with two harbour tugboats assisting LC for the transit from the pilot boarding ground to the terminal's berth.

⁴ It was raining for about an hour from about 2330H on 10 February 2023.

⁵ Bound for Pasir Gudang Terminal, Johor Port, Malaysia.

⁶ Three crew members of KR embarked LC for the purpose of mooring operations and rigging of towing arrangement.

⁷ The towline was about 50m in length.

- 1.1.4 Between 0200H and 0220H, as the convoy transited south-easterly towards the pilot disembarkation ground at a speed of about 3.0kts. The pilot launch, GP 30, arrived near the port side (from the east) of KR in preparation for the Pilot's disembarkation. The tidal current was westerly and the lay of LC relative to KR's heading was to the starboard (see **figure 2**).

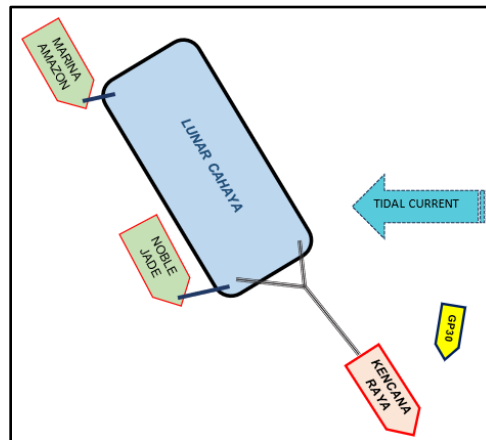


Figure 2: The lay of LC when GP 30 arrived near KR. – *Illustration not to scale.*

- 1.1.5 Noting GP 30's approach, the Pilot communicated with GP 30 on the assigned walkie-talkie that the disembarkation would be at the starboard side, after the crew from LC had been transferred back to KR (see paragraph 1.10 for more information). GP 30 acknowledged and proceeded to the starboard side of KR via the stern of LC. Thereafter, the Pilot instructed both assist tugboats to release their tug lines from LC and for MZ to assist in transferring KR's crew from LC back to KR.
- 1.1.6 Between 0221H and 0225H, following the Pilot's advice to slow down the vessel, KR's speed gradually reduced from about 3.0kts to about 2.5kts⁸ while the crew from LC crossed over to MZ's (forward) gunwale and were brought to the starboard side of KR, where they were transferred from MZ to KR by stepping on the bulwark of KR from the gunwale of MZ.
- 1.1.7 At about 0228H, the Pilot informed the port operations control and the Vessel Traffic Information System (VTIS) control stations via the VHF on the intended voyage of KR and LC to Pasir Gudang Port. The Pilot also briefed the Master

⁸ The speed was obtained from its AIS. KR's particulars indicated its service speed at 12kts, The Master recalled that KR was making way at about 1.8-2kts at the time, and stated that any RPM below 1000, which corresponded to about 1.5-1.8kts, may result in losing steerageway.

about the expected traffic condition before preparing to disembark KR.

- 1.1.8 Between 0229H and 0231H, when GP 30's launch master (LM) and marine assistant⁹ (MA) saw the Pilot standing near to a mooring bitt with a crew member¹⁰ (AB) of KR and waving at them, GP 30 began approaching KR at a speed between 2.5kts and 4kts. At about 0230H, KR was making way at about 2.4kts¹¹. The MA walked out of GP 30's cabin and positioned himself at the foredeck for the transfer.
- 1.1.9 While approaching KR, the LM and MA saw the Pilot climbing from the deck of KR on top of the bulwark and subsequently squatting on the bulwark using the mooring bitt as a support. As GP 30 approached closer to the tyre fenders of KR¹², the Pilot was seen to stand up on the bulwark. The MA recalled stretching his arm for the Pilot to grab (see **figure 3** and paragraph 1.2.4 regarding the Pilot's transfer process). At this moment, the gap between GP 30 and KR became wider. The Pilot, who was in the midst of crossing over to GP 30, fell into the water through the gap between the two vessels.

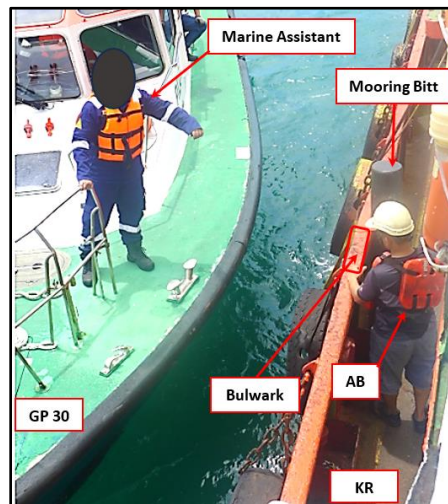


Figure 3: The approximate gap between the two vessels when the Pilot attempted to cross from KR to GP 30 while standing on the bulwark - for illustration only.
(Note: the occurrence took place during the hours of darkness)

⁹ MA performs the role of a deckhand for most service launch and crew boats, to assist the launch master for mooring, transferring of pilots and emergencies. In addition, MA acts as the technician onboard for the engine and machineries, when required.

¹⁰ This crew member was designated as an Able-Bodied Deck and was mainly carrying out deck work like mooring, rigging towline and assisting the master and chief officer on other deck related activities.

¹¹ From VTIS vessels' track list.

¹² Both the MA and AB recalled the distance between GP 30 and KR was about 1.5m.

- 1.1.10 The LM instinctively stopped the engines when the Pilot fell into the water. The MA rushed to the stern along the portside looking for the Pilot while preparing a lifebuoy located at the aft¹³ of GP 30. The AB ran towards the stern along the starboard side of KR and shouted to the wheelhouse of the man overboard occurrence.
- 1.1.11 The Chief Officer of KR was communicating with VTIS when he heard the shout of the AB on the Pilot overboard. The Chief Officer then informed VTIS of the incident. The Chief Officer also stopped the engine immediately at about 0233H. At about the same time, the LM reported via the VHF to the pilotage operations control centre, throttled up the engines and commenced a starboard turn towards the Pilot who was drifting nearer to LC.
- 1.1.12 Witness accounts confirmed that soon after the Pilot emerged from the water with the lifejacket inflated (fluorescent yellow-coloured – see **figure 10**) and was reportedly conscious, the Pilot was drifting away from GP 30 and KR towards LC. Both the MA and AB did not throw their lifebuoys. When asked, reason given was that the position where the Pilot emerged from the waters was too far.
- 1.1.13 At about 0235H, the AB lost sight of the Pilot. The Master, who was still in the wheelhouse, saw (with binoculars) that the Pilot's fluorescent lifejacket went under the starboard rake knuckle of LC. This was also witnessed by the crew onboard GP 30, where the LM subsequently sped up towards the aft and portside of LC anticipating that the Pilot would surface from the stern of LC.
- 1.1.14 In the following 45 minutes, about seven pilot launches arrived on scene separately to join the search and rescue (SAR) operation with GP 30, Noble Jade and MZ. The Port authority (is also the Port regulator) took charge of the SAR operation and deployed three harbour patrol boats which were later supplemented by four boats from the Singapore Police Coast Guard (PCG) and two boats from the Singapore Civil Defence Force (SCDF). KR together with LC were brought to anchor at a nearby anchorage (AEHC)¹⁴ after embarking another pilot. The SAR operation continued till daybreak, but the Pilot could not be found.
- 1.1.15 At about 1020H, divers were deployed to LC at AEHC. Diving commenced at

¹³ There were four lifebuoys on GP 30 located at the foredeck and quarters of each side. Each lifebuoy had attached self-igniting light and a 30m of buoyant heaving line.

¹⁴ Eastern Holding "C" Anchorage (AEHC).

about 1045H, and at 1050H, the Pilot's body was located at the starboard bottom hull of LC. The Pilot was found¹⁵ in a face down position, with the lifejacket inflated and a backpack which was still strapped on the Pilot's shoulders, pushing against the barnacles of LC's bottom hull. The SAR operation was called off at about 1130H.

1.2 Transfer of the Pilot between KR and pilot launches

1.2.1 The PSAM's pilot launches are equipped with a forward-facing CCTV camera¹⁶. GP 51, which transferred the Pilot to KR at the PSA Brani terminal, had a footage showing the process of the Pilot's embarkation (see **figure 4**) prior to the incident.

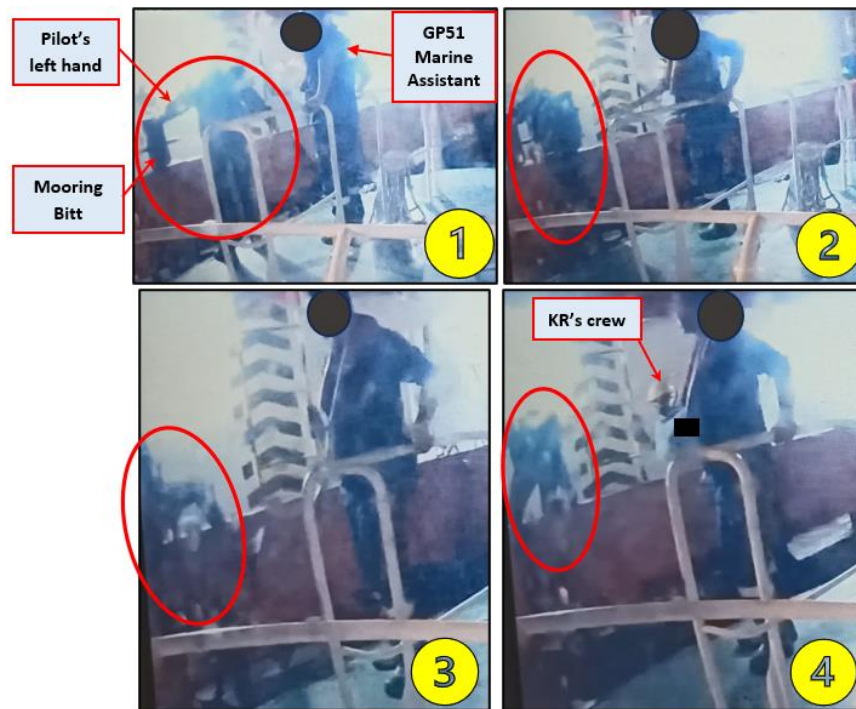


Figure 4: The CCTV camera footage regarding the transfer of the Pilot (circled in red) from GP 51 to KR.

1.2.2 The investigation team corroborated the footage obtained from the security cameras of PSA Brani terminal with those obtained from GP 51. It was noted

¹⁵ Information from the divers' report.

¹⁶ The CCTV camera is not an essential equipment required by the Port regulator. Recordings are solely used for internal training purposes by the PSAM's Fleet Management Department (FMD). FMD is responsible for engineering, crewing and training of personnel on the pilot launches, harbour tugs and water boats.

that from the time GP 51 was pushing against the tyre fenders of KR (which took place at about 0045H), until the time the Pilot was on KR's deck, the transfer took about 12 seconds. The transfer method, and sequence as depicted in **figure 4** was as follows –

- 1) The Pilot leaned towards KR's bulwark putting his left hand on the mooring bitt and the right hand on the bulwark, supporting his weight.
- 2) With the left foot stepping on KR's tyre fender, the Pilot pushed his body upwards and swung the right leg over the bulwark.
- 3) When the right thigh was seated on the bulwark, the Pilot swung his left leg over the fender and could be seen momentarily freeing the left hand from the mooring bitt.

1.2.3 The investigation team also gathered from the crew of KR that when both the legs of the Pilot were over the bulwark, the Pilot stepped onto a plastic chair (see **figure 5**) that was placed (unsecured) on KR's starboard walkway near the mooring bitt, before stepping on the deck of KR.

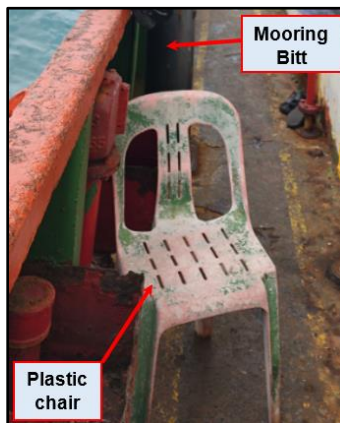


Figure 5: The plastic chair which the Pilot stepped on during embarkation.

1.2.4 The investigation team further gathered that although GP 30 was also equipped with CCTV camera, there was no footage available¹⁷ on the Pilot's disembarkation (see paragraph 1.5.2 on information regarding GP 30) from KR. Based on the narration and enactment by the AB and MA of the disembarkation of the Pilot (see **figure 6**), the investigation team gathered the following -

¹⁷ GP 30 was a standby launch and had not been deployed for about 12 days prior to the incident. The last footage recorded on the CCTV was on 29 January 2023, i.e., there was no footage from 30 January 2023 till the day of incident. A check with the technician of PSAM confirmed that there had been some technical issues with the CCTV recorder which had been identified before the incident and was under review / rectification. According to the PSAM, CCTV was not a mandatory item onboard a launch.

- 1) The Pilot used his left foot to step on the drip-tray near the mooring bitt on the starboard bulwark of KR. His right hand was resting on the mooring bitt while the left hand was on the bulwark.
- 2) The Pilot then pushed his weight from these supporting points and placed his right foot on the bulwark.
- 3) The Pilot then lifted his left foot onto the bulwark.
- 4) The Pilot then squatted on the bulwark, with both hands now on the mooring bitt, awaiting GP 30 to make its approach nearer to KR.
- 5) When GP 30 was approaching KR, the Pilot stood up (in a half-squat position), stretched the left arm and hand (moving it away from the bulwark) towards the MA before stepping off the bulwark of KR for GP 30.



Figure 6: The enactment by the AB for the transfer process of the Pilot from KR to GP 30

1.2.5 Both the MA and AB recalled that the overboard took place within 2-3 seconds from the time the Pilot stood up while in the midst of crossing over to GP 30. In addition, they recalled that the Pilot was wearing safety shoes, a raincoat (windbreaker) and had a backpack strapped on the shoulders underneath the

lifejacket. The Pilot was not wearing any helmet or gloves.

1.3 Transfer arrangement between KR and pilot launches

1.3.1 KR was issued with the cargo ship construction (non-convention) certificate by the Marine Department of Malaysia (MMD). The MMD defined non-convention ship¹⁸ as a ship or barge not covered by the international conventions under a promulgated revised shipping notice “*Notification of Malaysia Shipping Notice (MSN 16/2009) pertaining to the technical standard requirements for non-convention cargo ships*” on 1 July 2021 (under MSN 05/2021).

1.3.2 Covered within the same chapter - GENERAL PROVISIONS – of the shipping notice, a section covering “Management of Safety and Environment Protection” stated that:

- 1) The Company should be responsible for compliance with the applicable provisions of the requirement and for maintenance and operation of the ship; and
- 2) The Company and the Master of the ship should comply with the requirements of the International Safety Management Code (ISM Code) under Chapter IX, SOLAS 1974¹⁹, when and as required by the Surveyor General of Ships.

1.3.3 Accordingly, the MMD clarified that KR would thus, not be required to comply with Chapter V Regulation 23 of the SOLAS on Pilot Transfer Arrangements²⁰ (PTA).

1.3.4 The operator of KR explained to the investigation team that there was no explicit boarding point, material arrangements or required provisions for crew or other personnel including pilots, to board KR. KR was not constructed with bulwark hinged door(s) (see **figure 7**) and access to the deck had to be carried out by climbing/going over the bulwark.

¹⁸ Refers to non-SOLAS commercial vessels engaged on international voyage, which, depending on its gross tonnage, may or may not be covered by the provisions of other IMO Conventions.

¹⁹ Management for the safe operation of ships – which only scoped the ship’s maintenance of condition and certification requirements.

²⁰ Provides technical and operational rules and guidelines for vessels embarking pilots.



Figure 7: Examples of bulwark hinged doors on some tugboats (of a similar size). Some tugboats demarcated this access area as the rescue zone.

1.3.5 When asked regarding pilot transfers, the operator stated that it was not aware of the regulations²¹ or requirements in Singapore for tugboats like KR to have stanchions or handholds on the bulwark or bulwark ladder (step). The operator added that permanent stanchions at any point along the bulwark would subject to incidental damages, considering the typical operations carried out by a tugboat and the walkway on both sides of KR were considerably narrow for any stepladders (which are typically wider) to be placed.

1.3.6 The operator provided general instructions for its crew to oblige to pilots' choice for the transfer point onboard KR and added that the embarkations were usually carried out by stepping on the tyre fender(s) and then climbing over the bulwark, while the disembarkations were usually done by standing on the bulwark while holding on to the fixed vertical ladder from the deck to wheelhouse deck (see **figure 8**). These instructions were corroborated by KR's crew.



Figure 8: Picture to show the method of disembarkation from KR.

²¹ The investigation team also gathered from operators of tugs and similar vessels that there are no specific requirements to have stanchions or handholds to be provided, in the absence of a bulwark hinged door.

1.3.7 The records from the Port regulator and PSAM revealed that KR (and LC) had been provided with 70 pilotage services for the four-month period preceding the occurrence, there was no record of unsafe PTA on KR highlighted to the Port regulator and the pilotage operations control centre of the PSAM. The investigation team further confirmed with the records in KR's handwritten deck logbook that a monthly average of between 14 and 18 pilot transfers were carried out in Singapore. The Master was present throughout these transits and when asked, was generally conversant with the route, port operations reporting and communication procedures, including the roles of the assisting harbour tugboats.

1.3.8 The measurements of the relevant fittings at the transfer point onboard KR and the freeboard difference with GP 30 are shown in **figure 9**.



Figure 9: The measurements of the relevant fittings at the transfer area onboard KR and the freeboard difference between KR and GP 30

1.4 The autopsy, toxicology and laboratory test reports

1.4.1 The backpack of the Pilot (see **figure 10**) was weighed by the PCG to be about 4.6kg containing essential items for pilot's work.

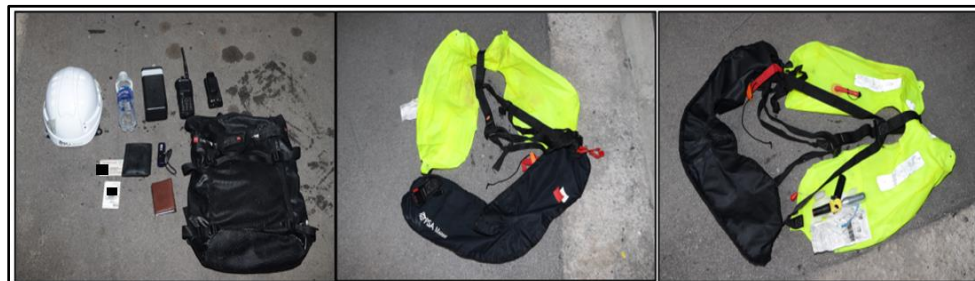


Figure 10: The backpack and lifejacket. (from left – the backpack and the items found inside. The front and back of the lifejacket – after being intentionally deflated)
(Source – PCG)

1.4.2 The safety shoes and lifejacket were sent by PCG for functionality and damage assessments at the Forensic Chemistry and Physics Laboratory of Singapore Health Sciences Authority (HSA).

1.4.3 The laboratory report stated that there was no sign of damage on the safety shoes other than signs of normal wear of the grooves on the soles. The lifejacket’s fluorescent yellow bladder was inflated by the discharge of CO₂ gas cylinder through the auto-firing mode. The two sets of buckles were found to be in proper condition. Scratches and abrasions were found on the surface of the lifejacket which did not affect the functionality of the lifejacket.

1.4.4 The autopsy report from the Forensic Medicine Division of HSA stated that a few grazing abrasions were found on the Pilot’s hands, wrists and the nose with no other significant findings²², concluding the cause of death as drowning. The toxicology report from the Analytical Toxicology Laboratory of HSA also revealed no significant findings²³.

1.5 Qualifications, work experience and rest hours

1.5.1 KR

1.5.1.1 There were eight crew of three nationalities²⁴ onboard KR. Aside from the Master and the Chief Officer performing the navigation duties, three were performing engineering duties while the remaining three were designated as “deck ratings”, including the AB.

1.5.1.2 The crew experience matrix of the Master, Chief Officer and the AB is shown in the table –

Designation onboard	Nationality	Age	Qualification	Duration onboard (month)	In rank service (Year)	Time in Company (Year)	Working schedule onboard
Master	Indonesian	47	STCW II/2 (Jakarta – Indonesia)	10	9.0	0.8	0600-1200 1800-2400
Chief Officer	Indonesian	28	STCW II/1 (Manado – Indonesia)	05	1.0	0.4	1200-1800 2400-0600

²² No bodily fractures and abnormality to the organs.

²³ Both the blood and urine samples tested did not reveal any abnormality.

²⁴ Five Indonesians, two Bangladeshis and one Malaysian.

AB	Malaysian	22	Basic Training (Port Klang – Malaysia)	10	1.1	1.1	0800-1200 2000-2400
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- 1.5.1.3 There were no records of rest hours maintained onboard to which the Master explained that the KR crew practised ad-hoc working cycles and would take rest during cargo work performed by the shore stevedores on LC and when there were no ongoing operations at anchorage or at berth. Both the Master and Chief Officer recalled rested for about 2-3 hours on 10 February 2023, while the AB rested for about 3-4 hours.
- 1.5.1.4 The tug operator explained to the investigation team that KR and LC were on voyage charters²⁵ between Singapore container terminals and Pasir Gudang terminal. The crew were not required to undergo specific training by the operator, and they were trained on-the-job by each master and/or chief officer on towing operations, moorings and for deck work like anchoring. The rest hours were managed by the master, vis-à-vis operational needs.
- 1.5.2 GP 30²⁶
- 1.5.2.1 The LM holds a Singapore harbour craft manning licence issued by the Port regulator since November 2021 as a port limit steersman, which allowed for operating and navigating power-driven vessels within the port limit for the size²⁷ of GP 30.
- 1.5.2.2 The LM had about four months working experience for a different company as a steersman on similar sized boats as the pilot launches, before joining PSAM (FMD). In PSAM, the LM underwent a three-month in-house familiarisation training and assessment²⁸. The last man overboard refresher training the LM attended was two days before this occurrence.
- 1.5.2.3 The MA underwent a five-day in-house familiarisation training²⁹ for his role when he joined PSAM (FMD), which was completed about three months before the occurrence. This training included man overboard recovery drills.

²⁵ Records showed that the charter between Sealion Shipping and Logistics Pte. Ltd. (Singapore) and Lunar Shipping Sdn. Bhd (Malaysia) had been ongoing since October 2022.

²⁶ GP 30 is an operational standby launch which is not explicitly assigned to any pairs of LMs and MAs.

²⁷ Both in GT and LOA.

²⁸ The LM indicated that the assessment was in June 2022.

²⁹ The PSAM's on-boarding training programme, amongst others, include ropework, emergency procedures covering man overboard, usage of life saving appliances and assisting pilots' embarkation and disembarkation.

- 1.5.2.4 The pairing of the launch master and marine assistant to operate assigned pilot launch was according to each individual's work-rest schedule. The operational practice of PSAM FMD for these roles was a repeated cycle of a 12-hour work, followed by a 24 to 48³⁰ hour off-work sequence.
- 1.5.2.5 The LM was on a night shift schedule from 1930H on 7 February 2023 to the following day 0730H and attended the man overboard refresher training on 9 February 2023 (0800H – 1700H), followed by the next night shift (1930H – 0730H) on 10 February 2023.
- 1.5.2.6 The MA was with the LM for the same night shift on the 7 February 2023. The MA then worked on a day shift (0730H – 1930H) on 9 February 2023 followed by the night shift on 10 February 2023.
- 1.5.2.7 The LM and MA were usually assigned to GP 60³¹ pilot launch but was assigned to GP 30 on 10 February 2023 when they reported for work at 1930H. GP 30 was reported to be ready at about 2050H and thereafter assigned for 19 pilot transfers³² before the job for KR's pilot disembarkation. When asked, the pair stated that they were feeling tired after the non-stop transfers performed.
- 1.5.3 Pilot's qualification, work experience and rest hours
- 1.5.3.1 The Pilot was a STCW II/1 holder from 2014 to 2016 after graduating from the Singapore Maritime Academy. The Pilot went through the nine-month pilot training programme required by the Port regulator covering more than 500 day-and-night movements for various terminals, anchorages and shipyards in the Port of Singapore, upon joining PSAM's Pilotage Services Department (PSD) in April 2016. These movements included tug-and-tows.
- 1.5.3.2 After completing the training programme and passing various examinations, the Pilot attained his first pilot licence (C-class) in November 2017, thereafter the Pilot progressed to the B-class licence³³ in April 2020.
- 1.5.3.3 The working-hour of PSAM-PSD pilots was on a shift cycle basis covering a three-day of mornings, afternoons or nights schedule, with about eight hours for each shift. Between each three-day shift cycle, there was a rest period of

³⁰ The 48-hour off-work period occurs about twice a month, which was a "double-day off" system.

³¹ Records show that GP 60 had not returned to Brani base. The LM and MA were required to supplement the pilot launches deployment and were assigned GP 30.

³² The records from the PSAM revealed that a typical pilot launch deployment within each 12-hour shift was about 30 pilot transfers.

³³ One grade higher than the C-class, where GT and LOAs limitations are higher.

about 24 hours to 56 hours. The Pilot was performing the first night shift (started at 2000H on 10 February 2023), with the last work schedule the Pilot performed before this night duty was the afternoon shift from 1100H to 2000H on 8 February 2023. That is, there was a break of about 46 hours between the Pilot's previous work shift and the start of his duty on the occurrence day.

1.5.3.4 There were three assignments the Pilot had completed before embarking on KR at the Brani terminal on 10 February 2023 as following –

- 1) 2020H to 2145H (on an 8450 GT chemical tanker)
- 2) 2155H to 2300H (on an 8025 GT chemical tanker)
- 3) 2320H to 0025H (on a 6000 GT general cargo ship)

1.5.3.5 The records show that the Pilot had performed a similar pilotage for KR on 22 December 2022, between 2040H and 2215H to the Keppel container terminal (which is within the same terminal expanse as the Brani terminal).

1.6 PSAM PSD - pilot transfer arrangements

1.6.1 The PSAM is the licensee granted by MPA for the provision of pilotage services³⁴, harbour towage and other marine related work in the Port of Singapore.

1.6.2 The safe work procedures together with a piloting handbook for pilots were established by the PSAM-PSD and internalised for use by pilots. From the safe work procedures, amongst others, a section on “transfer of pilot from tug or small craft to pilot launch or vice versa” (*sic*), provided guidance to pilots for the transfers from tugs, tows and small craft that are exempted from the SOLAS Convention requirements for pilot ladders. The procedures included the following:

- 1) Ensuring that the transfer point shall be on the leeward side (of the vessel),
- 2) Ensuring that the speed of the vessel shall be at minimal required for (keeping) steerage(way),
- 3) The transfer point should, as far as possible, be of the same level as the pilot launch deck. There should be adequate handhold on the vessel for

³⁴ Provides about 160,000 pilotage services annually undertaken by about 270 pilots.

the pilot and in the absence of the handhold, the pilot should advise the necessary arrangement for safe transfer.

1.6.3 In addition to the above, the PPE required are the safety helmet, non-skid safety shoes and lifejacket.

1.6.4 In a separate section on “proceeding alongside vessel to embark or disembark pilot / passengers”, which was applicable to masters and marine assistants of pilot launches and pilots, the relevant procedures were as follows:

- 1) Using the foredeck of the pilot launch for transfers under normal circumstances and the foredeck and side passageways to the cabin must be clear of obstructions like ropes or fenders etc.
- 2) The vessel should maintain a steady course and its speed reduced to allow the launch to transfer the pilots safely.
- 3) The marine assistant must be present at the foredeck to assist and effectively relay communications between the pilot, ship crew and launch master before the transfer, while safely assisting the transferring personnel.
- 4) Lifebuoys must be handy at all times and ensure lanyard could be loosen easily for use during emergency.
- 5) Use the searchlight to illuminate the access point and foredeck of the pilot launch and not to shine to the face(s) of the working personnel.
- 6) Transfers should take place only on the leeward or the side of the vessel from the wind.
- 7) Maintain the same direction of the vessel during the approach, inform the pilot when the speed of the vessel was too fast and unsuitable for transfers and provide a hand-signal (e.g. OK or thumbs up) to the pilot when the conditions are safe for the pilot to commence transfer.

1.6.5 The investigation team noted that the Pilot’s safety helmet was found to be inside the Pilot’s backpack. The MA informed the investigation team that although his arm was made ready for the Pilot to grab, the MA had not verbally communicated to the Pilot that the condition³⁵ was ready for crossing over from KR.

³⁵ GP 30 had not come in contact with the tyre fenders of KR which would be the normal practice to commence a transfer.

1.6.6 In both the safe working procedures and the pilot's handbook, pilots could exercise discretion to refuse boarding vessels when they deemed the condition of the PTA for transfer unsafe. Any unsafe conditions are to be reported to the PSAM's pilotage operations control centre with photographs taken with regards to the unsafe transfer arrangement.

1.7 Survey on transfer arrangements

1.7.1 The investigation team invited PSAM pilots to a survey to have a better understanding of the general practices for the transfers carried out on vessels of all types, and in particular, those with low freeboards³⁶ and tugboats. The survey also gathered reporting processes of unsafe transfer arrangements, together with pilots' understanding and views on the effectiveness of current measures provided by the PSAM and Port regulator.

1.7.2 The survey which had been kept open for six weeks received 21% responses³⁷ from 270 invites sent. The summarised information -

- 1) All respondents were conversant and with uniform understanding of the PSAM's safe working procedures for safe transfers.
- 2) The respondents also shared the same understanding on their rights to refuse boarding/ transfers when the transfer arrangement(s) and/or environmental conditions were unfavourable and deemed risky.
- 3) When encountered with unsafe transfer arrangements, the respondents had the same understanding to report the matter to the duty "operations manager" at the pilotage operations control centre via VHF or mobile phone calls. They were also required to supplement with photographs taken. About a third of the respondents shared that they were, at times, instructed to inform the Port Marine Safety³⁸ (via VHF or phone calls) themselves.
- 4) Handful of respondents shared their concerns of conducting transfers on non-convention vessels during hours of darkness, like the absence of ladders in compensating the freeboard differences, handholds being too short and some not secured properly and also absence of bulwark

³⁶ A general guide of freeboard difference between the pilot launch and the vessel of 1.5m was used to refer to low freeboard.

³⁷ 5% of the emails sent were responded with addresses that were not valid.

³⁸ Port Marine Safety is under the Marine Environment & Safety Department of the Port regulator handling marine safety and environment protection in the Port of Singapore.

ladders. About half of the respondents shared the provision of unsafe and non-compliant pilot ladders on fishing vessels.

- 5) About a third of the respondents perceived leniency shown to vessels whose unsafe transfer arrangements had been reported and were unsatisfied.

1.7.3 In response to the investigation team, the Port regulator replied that a total of 18 complaints were from PSAM for the period between June 2020 to January 2023. Five were found infringing the regulations and enforcement actions³⁹ were laid, two of which were issued with warning letters.

1.7.4 The infringements were mostly for broken ladders, unsecure pilot ladders and missing stanchions (handholds). Two low-freeboard unsafe conditions involving a dredger and a fishing vessel were raised, and both were concluded with no further actions taken due to lack of evidence. The investigation team further gathered that enforcement actions (outcome of the reports on unsafe transfer arrangements) was an internal process of the Port regulator.

1.7.5 Separately, the PSAM shared a five-year record of the non-compliance transfer arrangements raised by the pilots. There were 29 cases raised where nine resulted in injuries including five man-overboard incidents. When asked, the PSAM revealed that the reporting process to the Port regulator was typically via phone calls, most of which were to the Port Marine Safety. At times, some of the information was sent via email, mainly those that resulted in injuries.

1.8 Regulatory requirements and safe transfer guidance

1.8.1 Under the “Access to Vessels” in the Singapore Port Information publication, the Singapore’s Merchant Shipping (Safety Convention) Regulations on the safety requirements in respect of pilot ladders was cited. The same context from SOLAS Chapter V, Regulation 23⁴⁰ was referred to, which in turn reminds shipmasters that amongst others, pilots may refuse to board unless a safe and satisfactory means of access to vessel is provided. The Port regulator applies the same provisions for PTA on convention vessels to non-convention vessels

³⁹ Evidence of enforcement actions provided to the investigation team included detention and inspection of vessel by the Port State Control officer. The non-compliant matters were brought to the attention of the flag Administrations of the vessels involved for corrective actions.

⁴⁰ Regulation 23 - Pilot Transfer Arrangements, which is also stated in the Merchant Shipping (Safety Convention) Regulations, Chapter V – Safety of Navigation).

and such requirements were in the Merchant Shipping (Non-Convention Ships) Safety Regulations, Chapter IV, Regulation 5⁴¹. These PTA regulations on non-convention vessels, while available on Singapore Statutes Online, were not cited in the Singapore Port Information publication nor promulgated in the Port regulators' Circulars or Notices.

1.8.2 In addition, within the same chapter of the regulations under “access to the ship’s deck”, the following requirements were:

- Means shall 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 appliances, and ship’s deck. Where such passage is by means of:
 - (i) a gateway in the rails or bulwark, adequate handholds shall be provided.
 - (ii) a bulwark ladder, two handhold stanchions rigidly secured to the ship’s structure at or near their bases and at higher points shall be fitted. The bulwark ladder shall be securely attached to the ship to prevent overturning.

1.8.3 The IMO’s Resolution A.1108(29) – Amendments to the Recommendation on Pilot Transfer Arrangements (Resolution A.1045(27)) which provides guidance on access to deck, this guidance is also noted in the UK’s Code of Safe Working Practices (COSWP), Chapter 22 – Boarding Arrangements, supplemented by Annex 22.1 – Standards for Means of Access, the noteworthy requirements and recommendations include -

- 1) Where access to the ship is by a gateway in the rails or bulkhead, adequate handholds should be provided. Shipside doors used for this purpose should not be open outwards.
- 2) Where access is by the bulwark ladder, the ladder should be securely attached to the bulwark rail or landing platform. Two handhold stanchions should be provided, between 700mm and 800mm apart, each of which should be rigidly secured to the ship’s structure at or near its base and at another higher point. The stanchions should not be less than 32mm in

⁴¹ Merchant Shipping (Non-Convention Ships) Safety Regulations, Chapter IV, Regulation 5 – Safety of Navigation requires all ships propelled by mechanical means engaged on voyages including 30-mile limit voyages to comply with provisions as specified in the Regulation 23 of the Merchant Shipping (Safety Convention) Regulations.

diameter and extend no less than 1.2m above the deck to which it is fitted.

1.8.4 The specifications on the bulwark, stanchion and handhold arrangements are also detailed in the section 8 of the ISO 799-3:2022, with the following:

- 1) Where passage through a bulwark opening is by means of a gateway in the rails or bulwark, adequate handholds shall be provided, not less than 0.7m or more than 0.8m apart. Each handhold should be rigidly secured to the ship's structure at or near its base and also at a higher point, be round in shape, not less than 32mm and not more than 36mm in diameter and extend not less than 1.2m above the top of the bulwarks. Stanchions or handrails should not be attached to the bulwark ladder.
- 2) Where passage through a bulwark opening is by means of a bulwark ladder, two handhold stanchions shall be fitted and rigidly secured to the ship's structure at or near their bases and at higher points. The bulwark ladder shall be securely attached to the ship to prevent overturning. Stanchions or handrails should not be attached to the bulwark ladder.
- 3) Each access at the head of a pilot ladder shall have two handholds or handhold stanchions fitted. They shall be not less than 0.7m or more than 0.8m apart. Each stanchion or handhold should be rigidly secured to the ship's structure at or near its base and at a higher point, should be round not less than 32mm and not more than 36mm in diameter and should extend not less than 1.2m above the position it is secured to the ship's structure.

1.8.5 The investigation team noted that the International Maritime Pilots' Association (IMPA) produced a 'Required Boarding Arrangements for Pilot' poster which details the requirements of SOLAS and IMO Resolution A.1045(27). The poster does not depict the amendments in Resolution A.1108(29) and it does not explicitly require the same for vessels, especially non-convention vessels, to have the same arrangements. One guidance which was however related is shown in **Figure 11**.



Figure 11: Boarding arrangement for safe pilot transfer with the need to climb over a bulwark or railing(s) to the deck. *Source – IMPA.*

1.8.6 The investigation team further learnt from IMPA that –

- 1) IMPA does not have recommendations or guidance for pilot transfers involving low-freeboard vessels, including tugboats. This is because SOLAS does not state applicable requirements for SOLAS V/23 for climbs of less than 1.5m and it would be under the discretion of the flag State and/or Port Authorities to apply the requirements.
- 2) Although a variety of vessels with low freeboard are piloted by IMPA's members, providing definitive guidance applicable across tugboats is complex. Notwithstanding, stanchion (i.e. suitable handholds) arrangements (regardless of freeboard) remain an area of focus across the IMPA community because of particular incidents (Safety Survey/Campaign results, 2018 – 2022), which highlighted stanchion arrangements as being an element in well over 25% of non-compliance observations from pilots across the five-year period.
- 3) IMPA further added that developing international recommendations for low-freeboard ship transfer arrangements that will have any effect in practice has proved challenging.

1.8.7 A Code of Safe Practice on the Embarkation and Disembarkation of Pilots was jointly developed by the United Kingdom Maritime Pilots Association (UKMPA) Technical and Training Committee, the UK Harbour Masters' Association

(UKHMA) and the Marine Pilotage Working Group, with the aim for a guide to safe practices and minimise risks for all those involved in all pilot transfer operations. Amongst others, some of the related guidance are as follows:

- 1) Before the transfer takes place, the coxswain and pilot must be satisfied that the pilot boat is sufficiently stable alongside the ship for the transfer operation to be safely completed.
- 2) A side gate entrance should only be used if the gap between the stanchions is 700mm to 800mm, in accordance with SOLAS regulations.
- 3) When making the decision to transfer, the pilot should consider factors including but not limited to:
 - (a) The availability of suitable handholds or stanchions at deck level.
 - (b) The time taken to affect the transfer, particularly in adverse weather.
 - (c) The deck condition including if the deck is awash.
 - (d) Vessel fendering.
 - (e) Interaction between the pilot boat and ship.
 - (f) The physical capability of the pilot.
- 4) Tug and tows - when a pilot transfer is to a tug, the approach may have to be from forward of the beam to avoid the towing equipment. Transfer should be through a gate in bulwark and if no gate is available, provision should be made for suitable stanchions/handholds placed between 70cm and 80cm apart together with a means of climbing over the bulwark. When transferring to an unmanned barge, the transfer arrangements should be closely inspected prior to use.

1.8.8 The Federal Bureau for Maritime Casualty Investigation (BSU) of Germany shared with the investigation team an application installed in mobile phones and tablets meant for Germany's marine and harbour pilots to harmonise the reporting of defective and unsafe pilot ladders or pilot transfers. The photographs and descriptive text sent from the pilot's device would automatically record the date/time and location where the findings were raised. This information, in turn, would be used by the relevant Port State Control to carry out any safety or corrective action(s) and board for enforcement actions, in real time. These data on defective and unsafe pilot ladders or pilot transfer were also archived for statistical purposes.

1.8.9 A similar reporting system was also employed by the AMSA⁴², FFPM⁴³ and the UKMPA (which is also monitored by the UK MCA⁴⁴ for enforcement activities).

1.9 Fatigue risk management

1.9.1 The IMO circular MSC.1/Circ.1598⁴⁵ (2019) defines fatigue as -

"A state of physical and/or mental impairment resulting from factors such as inadequate sleep, extended wakefulness, work/rest requirements out of sync with circadian rhythms and physical, mental or emotional exertion that can impair alertness and the ability to safely operate a ship or perform safety-related duties."

1.9.2 This circular provided guidelines on a risk-based approach to fatigue management, which strongly urged maritime administrations, companies and other relevant stakeholders to take the issue of fatigue into account when developing, implementing and improving safety management systems.

1.9.3 The circular added that, while it is not possible to regulate and oversee the sleeping habits, it is within the company's capability to mitigate the risks of fatigue and one of the mitigations would be through operational and manning policies.

1.9.4 The circular also mentioned that promoting a safety reporting culture is necessary. The company should ensure that processes are in place to provide the opportunity to report situations when the individual has been unable to obtain adequate sleep or feels at risk of making fatigue-related errors, specifically if conducting safety critical tasks. This process should allow for open communication and reporting between these individuals, their supervisors and the company.

1.9.5 There are pilotage service providers who have developed fatigue management plans for pilots, such as the Fatigue Risk Management Plan (FRMP) approved by the Port regulator in Australia, which details minimum rest breaks between pilotage tasks and minimum leave requirements etc. A "Fatigue Management

⁴² Australian Maritime Safety Authority.

⁴³ Federation Francaise des Pilotes Maritimes – French Maritime Pilots Association.

⁴⁴ Maritime and Coastguard Agency (of the United Kingdom).

⁴⁵ IMO MSC.1/Circ.1598 - GUIDELINES ON FATIGUE.

Guide for Canadian Marine Pilots”, developed by a steering committee in Canada, was to be used by marine pilots and trainees in fatigue management educational workshops and also to be used as a reference and guide.

1.9.6 The PSAM did not have a fatigue management system. They applied guidelines under the Maritime Labour Convention, 2006, as amended, (MLC) developed by the International Labour Organization (ILO) with regards to rest hours⁴⁶. In addition, the PSAM also followed the Workplace Safety & Health (WSH) Guidelines for Fatigue Management⁴⁷, published in January 2010 by the Workplace Safety and Health Council in collaboration with the Ministry of Manpower of Singapore. The PSAM scheduled their pilots and launch crew on shift system established where rest periods were catered for. Similarly, the Port regulator did not require a fatigue management system from the pilotage service provider.

1.10 Additional information

1.10.1 According to the tug Master of MZ, he was advised by his examiner(s)⁴⁸ before attaining his tug master licence that, the transfer of the three KR crew from LC to KR via tugboat MZ, although at the request of the Pilot, was prohibited.

1.10.2 The tug Master of MZ also shared that such transfer had been ongoing and had witnessed such practices on various tugs and tows, where the transfers had been made at the request / instructions of pilots.

1.10.3 The investigation team learnt from the operator of MZ, that since the incident, such transfers had been ceased in their fleet.

1.10.4 The Master and Chief Officer of KR, who were with the Pilot for about two hours prior to the occurrence, did not notice any anomalies with the Pilot. The Pilot also did not complain about any illness.

⁴⁶ MLC, Reg 2.3, Hours of work and hours of rest – The maximum hours of work shall not exceed 14 hours in any 24-hour period and 72 hours in any seven-day period; Minimum hours of rest shall not be less than ten hours in any 24-hour period and 77 hours in any seven-day period. Hours of rest may be divided into no more than two periods, one of which shall be at least six hours in length, and the interval between consecutive periods of rest shall not exceed 14 hours. Generally, the seafarers onboard merchant ships are routinely on day work or on shift duty except during ship's arrival or departure ports or dealing with an emergency.

⁴⁷ The general guideline is to provide guidance to assist industries in managing fatigue from the safety and health perspective. It also serves as a source of reference for employers and employees to develop and establish a fatigue management policy and programme.

⁴⁸ These examiners were appointed by MPA for the Tug Training Assessment & Certification (TTAC), which is applicable to all Deck Officers working onboard Approved Tug Service Providers' ST licensed tugs.

- 1.10.5 There were lifebuoys available⁴⁹ in the vicinity of the pilot transfer location onboard GP 30 and KR and could be released quickly (see **figure 12**). According to the MA of GP 30 and the AB of KR, they did not release the lifebuoy because the Pilot was already a distance away (more than 10m) from their vessels (which were making way at about 2.4kts) after he fell into water and the distance was increasing due to the forward movement of both vessels.



Figure 12: The location and placement of the lifebuoys on GP 30 and KR

1.11 Environmental information

- 1.11.1 On 10 and 11 February 2023, the moon phase was a waning gibbous. The predicted tidal stream⁵⁰ was westerly between 0.6 kts and 0.4 kts from the time KR and LC left Brani terminal to the time of occurrence.
- 1.11.2 A weather report from the Meteorological Service of Singapore for 10 and 11 February 2023 indicated that heavy showers were present between 1720H and 2025H on 10 February 2023 and moderate showers on 11 February 2023 between 0015H and 0020H in the vicinity of the occurrence. Wind condition between 2300H and 0400H from 10 February 2023 was between 1.2kts and about 4.4kts.
- 1.11.3 When asked, the LM, the MA, the crew of KR and the duty crew of MZ told the investigation team that the tidal strength experienced was much stronger and

⁴⁹ On the starboard side of KR, there was one lifebuoy placed on the main deck. Two lifebuoys were stowed at the foredeck of GP 30 with quick release latches.

⁵⁰ Singapore Tide Tables 2023 – publication from the Hydrographic Department of MPA.

assessed it to be around 1.0 to 1.5 kts with about 8-10 kts of wind from the north. The observed sea condition was slight about half to one metre with the visibility at about 7nm, while it was 8 oktas⁵¹ recorded by KR.

⁵¹ A unit of measurement for observed cloud coverage from 0 to 8 at the position and/or location at the given time. This descriptive gauge does not include type and level of clouds visually observed.

2 ANALYSIS

2.1 The occurrence

2.1.1 The autopsy and toxicology test reports did not reveal any adverse medical condition of the Pilot. This corroborates that the Pilot appeared normal during the pilotage on the bridge of KR. The cause of death was due to drowning.

2.1.2 According to the witnesses' recollections, GP 30 had not come alongside KR and the gap between them getting wider (more than 1.5m) when the Pilot was attempting to cross over to GP 30, the wider gap resulted in the Pilot falling into the water.

2.1.3 This wider gap could be explained by the effect of bow waves generated by KR and GP 30 when both vessels were propelling forward. As KR has a larger bow area and was ahead of GP 30's bow due to its longer length, the wave generated by KR could likely push the bow of GP 30 away. Although GP 30 had increased speed to 2.5 – 4 kts, it would take a while for GP 30 to counteract the wave effect from KR. The bow waves could have caused GP 30's LM to be confronted with difficulties (being the lighter watercraft) to manoeuvre the launch towards, and get closer to, the intended point for alongside with KR. This effect could be minimised if both vessels were not making way.

2.1.4 While the Pilot stood up from squatting to a half-squatting position and attempted to cross, the MA's action in extending his arm towards the Pilot had likely indicated to the Pilot that it was safe to cross over to GP 30, while ill-timed for an unprepared widening of gap between the two vessels. The lack of a handhold on KR for the Pilot to hold on during the transfer had prevented the Pilot from remaining at the bulwark of KR when the gap between the two vessels had widened.

2.1.5 The barge (LC), towing behind KR, was following KR's ahead movements (akin to making way) at about 2.4kts, posing a risk when a person falls overboard into the water. In this case, the forward movement of the barge had likely resulted in the Pilot getting underneath it and thus hindered the recovery. While underneath the barge, the buoyancy of the lifejacket pushed the Pilot against the bottom hull of the tow making it difficult for the Pilot to get out of the water.

2.1.6 The forward movement of the vessels during the transfer had also resulted in the Pilot being left a distance behind both vessels after falling into the water.

and resulted in lifebuoy not being able to be thrown to the Pilot.

2.1.7 This occurrence reiterates the importance of controlling ship's speed for the safe transfer of personnel from a tug and tow to a pilot launch or vice versa. Reduction of the tug's speed to a minimal is important, while maintaining steerage, so that the pilot launch can go alongside the tug. Subsequently, stopping its engine to allow the pilot launch to rest firmly alongside the tug to facilitate safe transfer. Such practice is important to mitigate the risk of falling overboard of the person performing the transfer and being trapped underneath of the tow.

2.1.8 It is also important to commence the pilot transfer only when the pilot launch has come alongside the tug, not at the time when the pilot launch was approaching the tug with its bow.

2.2 Pilot transfer arrangement and requirements

2.2.1 Although KR is a tugboat, with the height of its gunwale (1m), the tyre fenders attaching to its sides and the difference in freeboard heights (0.8m) between KR and GP 30 makes it challenging for pilot to board. This is more so when there was no proper PTA, such as bulwark hinged door, secured handholds or bulwark ladder, onboard KR to facilitate the safe transfer of personnel onto or from KR. The Pilot was seen climbing over KR's bulwark to the deck through stepping onto a plastic chair when going onboard KR at the terminal. Similarly at the time of disembarkation, the Pilot had to step on the drip-tray before climbing on the bulwark and holding on to the mooring bit as a support. The PTA provided by KR was inappropriate and deemed unsafe.

2.2.2 While pilots had the discretion not to board a vessel if its PTA was deemed unsafe, in normal circumstances, pilots would, within their physical abilities, just take a risk even if the PTA was not ideal. An ideal situation would be to have the safe PTA done through pre-arrangement made by the pilotage service provider, the PSAM in this case, with vessels requiring pilotage services. When the agents and/or operators of the vessels made arrangement for pilotage services, they should be informed on safe PTA requirements and any non-compliant would end up with non-boarding of pilot. This would relieve the pressure on pilots and to avoid pilots taking risks to board when there was unsafe PTA.

- 2.2.3 Being a non-convention vessel, KR was not required to provide the PTA in accordance with the SOLAS requirements under its flag Administration's regulations. However, the Port regulator of Singapore requires all vessels to have appropriate and safe PTA. The PTA requirements for non-convention vessels are regulated under Singapore's Merchant Shipping (Non-Convention Ships) Safety Regulations. These regulations were apparently not well known to non-convention vessels' operators. It is desirable that these regulations be promulgated widely to the industry for awareness and eventual compliant.
- 2.2.4 It is also desirable that the agents, operators and masters of non-convention vessels plying international voyages to check with local authorities of the port on regulatory requirements or other matters relating to the safety of vessels.
- 2.3 Reporting of unsafe PTA
- 2.3.1 PSAM had been providing pilotage services to KR over 70 times. However, there were no report made on the unsafe PTA onboard KR to the Port regulator and the pilotage operations control centre. It is puzzled that such unsafe PTA was not reported.
- 2.3.2 The survey on transfer arrangements revealed that pilots were conversant of the reporting system, which was to the PSAM operations manager on duty. The survey also showed that only handful of respondents shared their concerns of unsafe PTA when performing transfers on non-convention vessels during the hours of darkness. While there were channels established, both directly to the Port regulator and to PSAM on unsafe PTA, there seems to be a lack of close loop feedback to the pilot community on the follow up actions taken either by the Port regulator or PSAM. This may have given an impression to the pilot community at large that not much have been done and likely loss the faith in reporting system. To improve the safety of transfer at sea, it is desirable that the Port regulator updates PSAM of the actions taken after a non-compliance report was made and closes the feedback loop for PSAM to rebuild the confidence of the pilot community to proactively report vessels which do not provide safe PTA.
- 2.3.3 To make reporting easy and simple as well as to provide feedback on actions taken to vessels not providing safe PTA, the Port regulator and PSAM could consider making use of technology, such as a mobile device application. The reporting application could include information such as location and time

together with photographed evidence, to enable a more immediate attention by the Port regulator to take appropriate actions.

2.3.4 The investigation team considered that having a more proactive reporting system in place, more vessels and their operator(s) will make effort to provide safe PTA.

2.4 Incidental observations

2.4.1 Fatigue risk management for pilot and launch crew

2.4.1.1 It is noted that the PSAM manage the work and rest hours of its pilots and launch crew using shift system, taking guidelines from the MLC which are meant for seafarers who are routinely on day work or on shift duty. However, these guidelines may not be suitable and applicable to pilots and launch crew who are having different job nature. It may be desirable for the PSAM to look into the fatigue risk management of pilots and launch crew.

2.4.1.2 Both the LM and MA were having day off the day prior to the incident. On the day of the incident, they were at work for about six hours, on a 12-hour shift duty, had performed 19 transfers. This works out to an average of one transfer in about 20 minutes. The two commented feeling tired after performing the non-stop 19 transfers prior to the incident.

2.4.1.3 The Pilot had a break of about 46 hours before starting his duty on the incident day. Within about four hours duration, the Pilot performed three piloting tasks prior to boarding KR. The Pilot did not complain about any illness and was not noticed feeling unwell during the two-hour duration onboard KR.

2.4.1.4 The working environment of pilots and launch crew is extremely dynamic. Pilots perform transfers between ships, which include high risk activities like climbing pilot ladder, before providing pilotage service. Launch crew have to manoeuvre launch, maintain lookouts for other vessels and assist pilot transfers. Hence, the investigation team opined that guidelines from the MLC may not be suitable for pilots and launch crew. A focused fatigue risk management system, taking into account the dynamic working environment of pilots and launch crew and balancing PSAM's operational needs, should be developed to manage the fatigue risk of pilots and launch crew.

2.4.2 Pilot transfer procedures

2.4.2.1 The safe work procedures on “transfer of pilot from tug or small craft to pilot launch or vice versa” did not state clearly whether pilot transfer should commence only when the pilot launch was alongside the tug or small craft, and to rest firmly alongside till the pilot had safely crossed over onto the pilot launch. This would leave leeway to the crew of the pilot launch and pilot to commence transfer even when the two vessels are not alongside. It would be desirable for the safe work procedures to indicate that pilot transfer should only commence when both vessels are alongside and rest firmly alongside till the pilot had crossed over onto the pilot launch from another vessel or vice versa.

3 CONCLUSIONS

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

- 3.1 The cause of the Pilot's death was due to drowning after falling overboard during the transfer from KR to the launch. The Pilot was wearing a lifejacket which inflated immediately upon his fall into the water. However, the Pilot was stuck below the hull of the barge towed by KR as both KR and the pilot launch were making way during the transfer.
- 3.2 KR did not reduce its speed to a minimal for maintaining its steerage and stop its engine to allow the pilot launch to go alongside KR. The launch had yet to be alongside KR before commencing the pilot transfer.
- 3.3 KR being a non-convention vessel was not required to provide PTA under its Flag's requirement. While the Port regulator of Singapore required non-convention vessels to have PTA under its regulations, these requirements were not well known to these non-convention vessel operators calling the Port of Singapore.
- 3.4 There was lack of reporting of unsafe PTA on non-convention vessels by pilots to the Port regulator and PSAM. There was also lack of close loop feedback to the pilot community on the follow up actions taken either by the Port regulator or PSAM.
- 3.5 The PSAM did not have a focused fatigue risk management system for its pilots and launch crew.
- 3.6 The PSAM's safe work procedures on "transfer of pilot from tug or small craft to pilot launch or vice versa" did not state clearly whether pilot transfer should commence only when the pilot launch was alongside the tug or small craft, and to rest firmly alongside till the pilot had safely crossed over onto the pilot launch.

4 SAFETY ACTIONS

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

4.1 By the PSAM

4.1.1 The PSAM promulgated a pilotage circular “Embarkation/disembarkation of Pilot for tug towing barge” on 9 March 2023 as interim safety measures, which highlighted that, among others, the Master of the tug should ensure both the tug and barge not making any headway prior to the embarkation/disembarkation of pilot, the access area shall be clear from obstacles, to have handholds or stanchions on the tug for pilot.

4.1.2 The PSAM conducted a series of safety briefings and campaigns to all its pilots and launch crew on the PTA and safe transfer, and a practical water confidence course for its pilots to acquire water confidence and know how to react when overboard. All its pilots attended a mandatory theory course on “Safe Transfer by Boat”, continued to disseminate safety message via Pilot Mobile Application⁵² before its pilots start their shifts.

4.1.3 The PSAM also included a feedback mechanism using the “StepUp”⁵³ to encourage all its pilots to report non-compliant PTA to the PSAM. At the time of completion of this investigation, a total of 72 reports had been made by pilots and dealt with accordingly.

4.1.4 The PSAM revised its existing Safe Work Procedure for “transfer of pilot from pilot launch to tug or small craft or vice versa” on 25 April 2023, with the following new requirements:

- (a) The pilot launch shall have life-saving equipment such as self-igniting life buoy and heaving line in the vicinity of the access area;
- (b) Pilot shall allow reasonable time for the pilot launch to rest firmly alongside

⁵² An “IKnowVessel” application which had been embedded in the PSAM issued working iPad for its pilots to use for improving safety culture.

⁵³ Apart from the existing reporting via VHF or mobile phone calls to the Port regulator and the pilotage operations control centre of the PSAM, A QR Code is also introduced to scan for anonymous reporting of deficiencies of vessels including unsafe PTA. These reporting are managed by the PSAM’s Union Subcommittee members, The PSAM, after receiving the reports would acknowledge, inform the Port regulator (if the deficiencies were not reported directly via VHF to the Port regulator) and reply to the reporters on the actions taken by the PSAM and/or by the Port regulator for closing loop.

the shipside before attempting a transfer;

- (c) Pilot shall not attempt a transfer without the presence and assistance of the Launch Marine Assistant. Before the transfer, they shall indicate their intention verbally or signal to the Launch Marine Assistance with a “thumb up” and to proceed the transfer only after received verbal acknowledgement or “thumb up” signal from the Launch Marine Assistant; and
- (d) For a tug towing a barge, prior to the transfer, the tug must be positioned alongside on the leeward side of the barge. If the positioning of the tug is not possible, the tug shall ensure the barge is not making any headway. The pilot shall assess the surrounding environment and identify any potential hazard or danger. The pilot shall not attempt a transfer and to reassess the situation if the transfer arrangement or condition is deemed unsafe. The pilot shall report to Mission Command Centre’s Duty Manager for further instructions if necessary.

5 SAFETY RECOMMENDATIONS

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

- 5.1 For the Operator of the pilot launch [PSA Marine (Pte) Ltd]
 - 5.1.1 To inform the agents and/or operators of non-convention vessels which PSAM is providing pilotage service on the requirements of pilot transfer arrangement. [TSIB Recommendation RM-2024-004]
 - 5.1.2 To evaluate the need for a specific fatigue management system for its pilots and launch crew. [TSIB Recommendation RM-2024-005]
- 5.2 For the Port regulator (the Maritime and Port Authority of Singapore)
 - 5.2.1 To promote awareness of its regulatory requirements on pilot transfer arrangement for non-convention vessels calling the Port of Singapore. [TSIB Recommendation RM-2024-006]
- 5.3 For the Operator of KR (the Lunar Shipping Sdn. Bhd.)
 - 5.3.1 To ensure all its non-convention vessels calling the Port of Singapore are provided with safe pilot transfer arrangements as required by the Port regulator. [TSIB Recommendation RM-2024-007]
 - 5.3.2 To remind all its crew on safe transfer operations such as reducing speed to a minimal while maintaining steerageway and stopping engine to allow pilot launch to remain alongside. [TSIB Recommendation RM-2024-008]