

Final Report

MAN OVER-BOARD (LOSS OF LIFE) FROM THE HARBOUR TUG, RESILIENT AT BANYAN BASIN, SINGAPORE ON 22 DECEMBER 2016

MIB/MAI/CAS.006

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 22 December 2016 at about 0050H, a Singapore registered harbour tug Resilient completed her assignment to assist in the berthing of a tanker vessel at Jurong Island Jetty (OVL2). The tug was operated by a Tug Master and an Engineer Officer.

As the tug's next assignment, to assist in an un-berthing operation at Jurong Island Jetty 1 (OVL1), was in two hours' time, the Tug Master decided to moor his tug at a mooring buoy at Banyan Basin, rather than going back to the tug operator's West Coast Base (WCB) station, which would mean a 1.5-hour return trip to OVL1.

At about 0104H, the tug arrived at the Banyan Basin mooring location. The Engineer Officer (EO), who had been tasked to secure the tug to the buoy, fell into the sea while attempting to secure the tug to the buoy. Search and rescue operation was unsuccessful. Two days later, the body of the EO was found in Indonesian waters off Karimun Island, about 19 nautical miles southwest of the Banyan Basin.

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

The investigation reiterated the importance of wearing a floatation device/ life-vest while working on-board a vessel. Other factors contributed to the occurrence included the mooring of the tug at a non-designated location and the lack of risk assessment of potential hazards involved in mooring operation, particularly, involving a tug with two-man crew.

VIEW OF VESSEL



DETAILS OF VESSEL

Name	Resilient
IMO Number	9727675
Licence No.	ST 1520Z
Classification society	Lloyds Register
Ship type	Towing / Pushing Tug
Year Built	2015
Company / Operator	PSA Marine ¹ (Pte) Ltd
Gross tonnage	493
Length overall	32.00m
Breadth	12.40m
Designed Draft	4.20m
Summer Freeboard	1.20m
Main engine(s)	2 x 1654 kW Nigata 6L28HX @ 750rpm
Propellers	2 x Nigata ZP-31B (FP)

¹ PSA Marine Pte Ltd, provides marine services to the maritime and shipping industry, mainly towage and pilotage.

1 FACTUAL INFORMATION

All times used in this report are Singapore Local Time (LT) unless otherwise stated. Singapore Local Time is eight hours ahead of Coordinated Universal Time (UTC).

1.1 Sequence of events

1.1.1 At about 2130H on 21 December 2016, a Singapore-registered harbour tug Resilient started to assist in the berthing of the tanker vessel MARAN CYGNUS at Jurong Island Jetty 2 (OVL2). The berthing was completed at 0050H on 22 December 2016. The tug was operated by a two-man crew comprising the Tug Master (TM) and Engineer Officer (EO).

1.1.2 The TM reported to the tug operator's deployment office on completion of the berthing of MARAN CYGNUS and received the next assignment of assisting an un-berthing operation at Jurong Island Jetty 1 (OVL1), which was adjacent to OVL2.

1.1.3 Since the next deployment was two hours away, the TM and EO discussed their options and the TM decided to moor their tug to the Banyan Basin mooring buoy, which was about 20 minutes' steaming distance, rather than going back to the tug operator's West Coast Base (WCB) station (see **Figure 1**), of about 40 minutes steaming distance (which would mean a 1.5-hour return trip to OVL1).

1.1.4 During the pre-mooring brief, while approaching Banyan Basin location, the TM was said to have reminded the EO not to repeat the unsafe act² of jumping onto the buoy from a moving tug to secure the tug's rope. He instructed the EO to instead stay on board the tug, try and throw the eye of the outboard end of the tug's rope near the shackle of the buoy, and then use the boat-hook to pull the rope back on board the tug for securing. The TM further instructed the EO to wait for his instructions before attempting to moor the tug. After the briefing, the EO left the bridge to prepare the mooring rope at the aft mooring deck. The EO did not carry any communication device with him.

² An unsafe act is defined as an error or violation that is committed in the presence of a hazard or potential unsafe condition. An unsafe condition or hazard is an event or circumstance that has the potential to result in a mishap – According to the TM, the EO had been reprimanded by the TM in the past and further cautioned that his unsafe actions would be reported to the tug operator if he were to repeat it.



Figure 1: Resilient's location relative to Banyan Basin buoy and WCB

- 1.1.5 The TM was aware of a Port Marine Notice by the Maritime and Port Authority of Singapore (MPA), the regulator of the port, about Banyan Basin mooring buoys and its usage designated specifically for mooring of bulk carriers³. However, the TM and EO had moored their tug to a Banyan Basin buoy on one other occasion in the last two years.
- 1.1.6 The TM was also aware of the tug operator's policy as follows:
- Tugs waiting between operations to be secured at designated locations/ berths depending on their sector⁴.

³ Mooring buoys located at Banyan Basin are used for mooring of bulk carriers involved in Jurong Island Westward Extension (JIWE) reclamation project area.

⁴ West Sector – at West Coast Base (WCB). East Sector – at Brani 9 (B9). North Sector – at Sembawang wharves.

- Where there is a need to secure the tug at non-designated locations/ berths, the TM is to seek approval from the relevant terminal / control centre for such berthing and inform the tug operator after seeking approval⁵.
- 1.1.7 As the tug was nearing Bayan Basin, the TM noticed that only the third mooring buoy⁶ from the entrance of the basin, i.e. BBB-6, was unoccupied and decided to manoeuvre his vessel towards the buoy. The TM did not seek approval from the regulator to moor at BBB-6 and did not inform his company of his intention to moor at Banyan Basin buoy to wait for the next job.
- 1.1.8 At about 0106H, with BBB-6 about 300m away, the TM steered the tug on a northerly heading at about 4 knots. The TM's intention was as follows –
- To slowly approach the buoy while keeping it fine on the starboard bow;
 - At a distance of about 50m to the buoy, to give a starboard helm, turning clockwise (to starboard) towards south, and finally to stop the tug in water beside the buoy for mooring.
- 1.1.9 At about 0108H, the tug was moving at about 3 knots and heading north easterly and BBB-6 was about 50m fine on the starboard bow, i.e. almost right ahead. The TM gave short astern kicks on the engine while at the same time gave the bow a thrust to starboard. The tug began its clockwise turn whilst at the same time reducing its speed.
- 1.1.10 At about 0112H, with the tug heading east at about 0.9 knots, the TM, standing at the port bridge wing, observed BBB-6 passing-by close along the tug's port side. As BBB-6 was passing near the tug bulwark door, the TM suddenly saw the EO, with the tug's rope⁷ in hand, crossed over to the buoy⁸. The EO was not wearing any life-vest⁹.
- 1.1.11 The TM rushed into the bridge, and used astern engine movement to try to stop

⁵ The regulator did not allow for mooring of unauthorised craft to mooring buoys like BBB-6. The tug operator, however, allowed for its tug crews' discretion to moor at a location not designated by the operator as long as the entity having oversight of such a location granted the permission, such as mooring to a berth. However, the oil terminals and berths near the tug's location, for safety and security reasons would not allow idle mooring of craft unless the craft is performing work at that terminal / berth.

⁶ First and second mooring buoys (BBB-1 and BBB-2) from the entrance to Banyan Basin had vessels secured to them.

⁷ Tug's rope specification: 4" CIR x 180ft 3-strand 100% nylon rope

⁸ Tug's freeboard was about 1.20m while BBB-6 freeboard was about 1.0m. Therefore, the height difference was about 0.20m.

⁹ The crew was issued with rigid type 93-3 type life-vest by the company which complied with 96/98/EC, MSC-48(66), MSC-207(81) and MSC-226(82).

the tug's forward momentum. The TM then rushed back to the port bridge wing but he could not sight the EO anywhere on top of the buoy. Fearing that the EO might have fallen into the sea, the TM thrust the tug's bow to port, to keep the stern away from the buoy. The thrust was eventually stopped after the buoy was seen to clear away from the tug's port quarter.

- 1.1.12 According to closed-circuit television (CCTV) footage of the tug, as the tug was approaching the buoy, and unknown to the TM, the EO used the bulwark door at the mid-ship to cross over to the buoy with the tug's rope in hand, while the tug was still moving. The tug's wake caused the buoy to rotate around its fixed anchors, sway and move in the sea.
- 1.1.13 CCTV footage showed the EO holding onto the rope making a few temporary turns on the lantern's metal protective cage. The rope had been passed through the shackle on the buoy. The tug's forward momentum and the buoy's rotation caused the rope to create a bight around the metal cage and tilting of the buoy forward (see **Figure 2**).

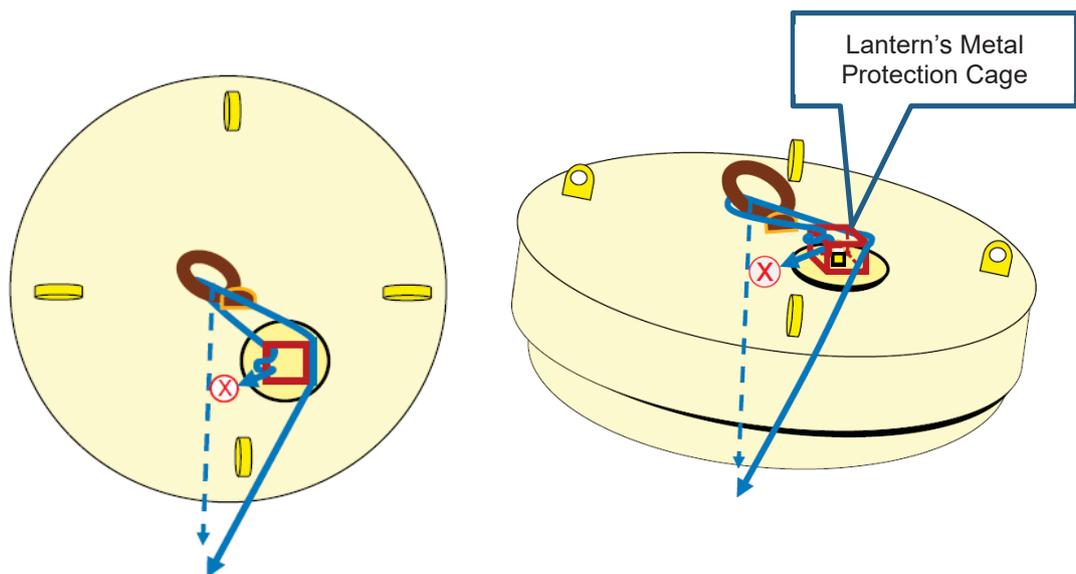


Figure 2: Illustration of CCTV footage

- 1.1.14 The footage also showed the EO squatting on the tilted buoy (marked by X in above figure within the bight of the rope, seemingly trying to keep himself in balance on the buoy. Then the taut rope slipped off the metal cage and sprang to hit the EO in his leg and caused the EO to fall into the water.
- 1.1.15 In the meantime, the TM, after confirming the tug's position and that the

- engines and thrusters were stopped, left the bridge and rushed to the aft deck to look for the EO. There he called out to the EO. He heard faint responses from the direction of the tug's port quarter.
- 1.1.16 Leaning over the bulwark of the tug on the port quarter, he saw the EO holding on to the tug's rope, by the shipside in the water. The TM pulled him along the tug's port quarter towards the bulwark door at the midship section using the rope. At the bulwark door, the TM tried to pull the EO out of the water but was unsuccessful.
 - 1.1.17 The TM lowered a lifebuoy with lifeline and instructed EO to pass the lifebuoy under both armpits for support to stay afloat. The EO told the TM that he might have hurt his leg from the impact of the tug's rope while attempting the balance on the buoy. He could only manage to pass the lifebuoy under the left armpit while his right hand was still holding on to the tug's rope.
 - 1.1.18 Soon after, the TM noticed that the EO had become unconscious. The rope and the lifebuoy slipped out of his hands and arm respectively. The TM called out to the EO several times that help was on the way but did not receive any response.
 - 1.1.19 At 0120H, the TM rushed up to the bridge and reported the accident to the tug operator's control station on VHF Channel 20. He then returned to the aft station. The tug operator informed MPA's Port Marine Safety on VHF Channel 07 for assistance and dispatched its other craft.
 - 1.1.20 On the way down from the bridge to the aft station, the TM grabbed the ship's mobile phone, took a life-vest and threw it close to the EO who was still floating near the tug. The TM continuously called out to the EO to use the life-vest, but received no response. After several minutes of failed attempts to communicate with the EO, the TM called and updated the tug operator's control station of the situation. At the same time, the TM also observed that the motionless EO (lying on his back) was drifting astern, in a southerly direction towards the entrance of Banyan Basin.
 - 1.1.21 As the tug was drifting southerly towards the buoy BBB-1, the TM rushed to the bridge, restarted the engines and moved the tug away. He repositioned the tug, and returned on deck, but could not sight the EO.
 - 1.1.22 At about 0136H, the first of the tug operator's craft arrived and commenced search and rescue (SAR) operation. Shortly afterwards craft from the Police Coast Guard (PCG), MPA and more craft from the operator joined in the SAR operation.

- 1.1.23 At about 0200H, a life-vest belonging to the tug was recovered from the sea near the entrance to Banyan Basin.
- 1.1.24 The SAR operation continued for two days. On 23 December 2016, the EO's body¹⁰ was recovered by Indonesian Police in the waters of Karimun Island, Indonesia, about 19 nautical miles southwest of Singapore (see **Figure 3**).

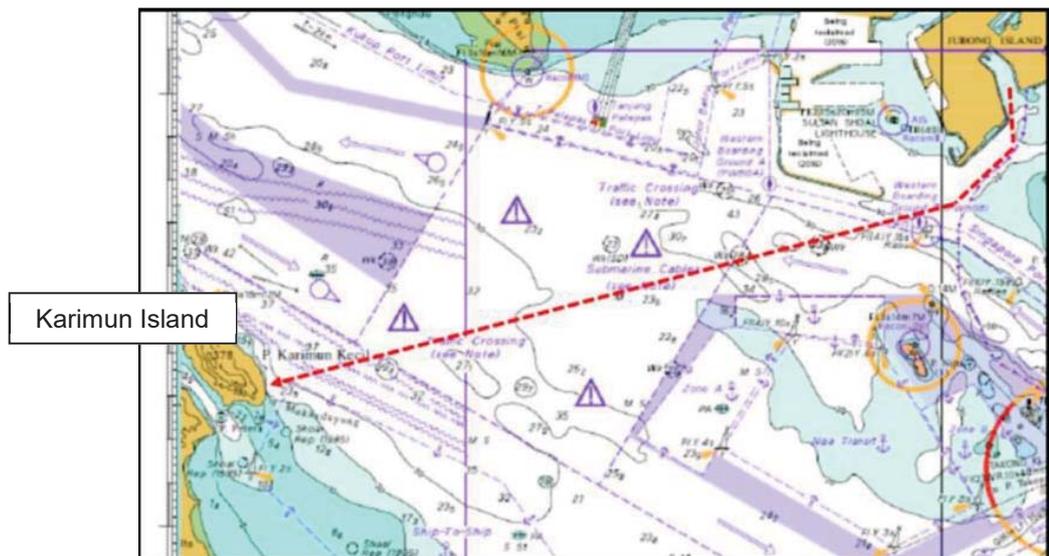


Figure 3: Location of Karimun Island relative to Banyan Basin

- 1.2 Crew's qualifications, roster and roles
- 1.2.1 The TM and EO had been assigned together on board the tug Resilient since 1 July 2015. They both held Harbour Craft Manning Licences issued by MPA. The TM was a licensed¹¹ Helmsman and the EO was licensed as a Class 2 Engine Driver. Both licenses covered generic training in Safety at Sea, proficiency in survival craft in addition to technical competence.
- 1.2.2 As a part of their in-house training programmes, they had undergone additional training on two-man tug operations and safety matters.
- 1.2.3 The duo was on a two-day on and two-day off 12-hour duty roster¹². The tug's

¹⁰ At the request of the EO's NOK, no autopsy was conducted by the Indonesian Authority.

¹¹ Complied with the regulator's requirement for minimum manning requirements stipulated Singapore (Harbour Craft) Regulations.

¹² The TM and EO started their duty on 21 December 2016 at 1930H. Their previous duty period was 0730-1930H on 20 December 2016.

operation involved towage, assisting in vessels' berthing/ un-berthing and any other operations as required by the tug operator's deployment office. During operations, the TM would navigate the tug from the bridge, while the EO would tend to the mooring lines on deck. The EO was also in-charge of maintenance of on-board machinery.

1.3 Mooring the tug to a buoy

1.3.1 **Figure 4** shows a typical buoy like the BBB-6. BBB-6 had a diameter of 3.5m and depth of 2m and had a flat top surface for the mooring personnel to stand on during mooring operation.

1.3.2 For mooring the occurrence tug to the buoy (see **Figure 5**), a rope from the tug would have to be passed through the shackle on the buoy and returned back to the tug for securing. Considering the tug's size and personnel available, it is considered unsafe to try to do this mooring task while standing on the surface of the buoy. So it was not a recommended practice to cross over to the buoy to perform the mooring task. A proper way was for the mooring personnel, while remaining on the vessel, to throw the outboard eye end of the tug's rope to as close as possible the shackle on the buoy and then use a boat hook to guide the eye end through the shackle and pull the rope back on board the tug for securing. The TM was aware that this method was tedious, time consuming and required more skill on the part of the mooring personnel, but was considered safer.

1.3.3 The TM was aware that he was not supposed to moor the tug at the Banyan Basin. Nevertheless, he was aware that, typically, for the tug to be moored to a buoy, the tug had to be brought to a complete stop in the water alongside the buoy.

1.3.4 The accident occurred at night. The buoy's area was lit by the working lights of the tug on the aft deck when the buoy moved abaft of amidships.

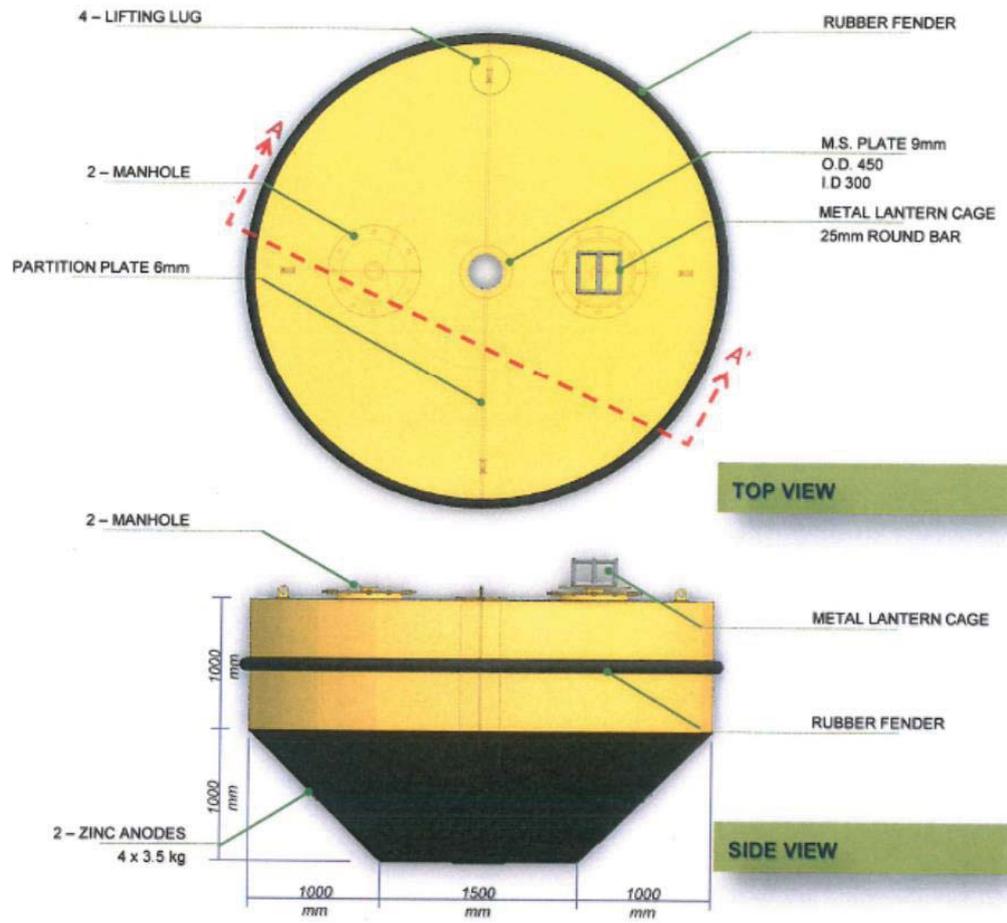


Figure 4: Specification details of BBB-6

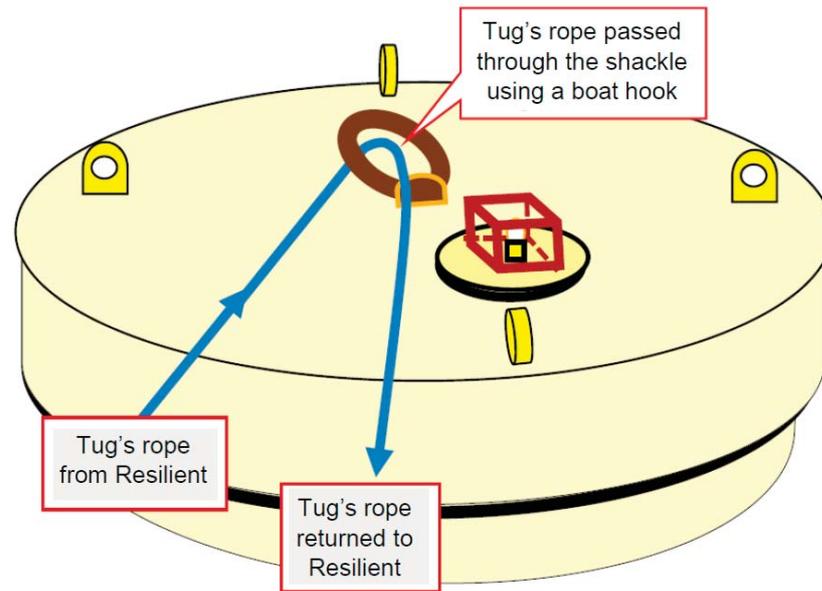


Figure 5: Mooring of buoy from the tug

- 1.4 Post-accident inspection
 - 1.4.1 There was no report of malfunction of the tug's machinery, navigational equipment and communication equipment prior to the accident.
 - 1.4.2 There was no sign of damage to the rope used to secure the tug boat. There was no sign of damage to the life-vest and lifebuoy involved.
 - 1.4.3 Visual inspection of BBB-6 and its shackle did not reveal any damage.
 - 1.4.4 The TM affirmed to the company that he was not on any medication at the time of the accident and was not aware of the EO being on any medication either.
- 1.5 Operator's procedures and system
 - 1.5.1 The tug operator's Safety Management System (SMS) included, amongst others, organisational policies, procedures, manuals and checklists and complied with regulations for workplace safety, health and environmental protection policy. The operator had a Zero Drug and Alcohol policy.
 - 1.5.2 The operator's Quality Health Safety Environmental (QHSE) policy circular No.2/2010 provides a Standard Operating Procedure (SOP) which states that,

to minimise the risk of drowning in the event that a person falls into the sea, contractors supplying goods and services to the operator and any other users of the operator's wharves and craft are required to furnish suitable life-vests to their own employees and the life-vest must be worn under the following circumstances:

- Within the "Life-vest areas" on the operator's wharf at WCB and B9 forward station and any other marine base operated by the operator;
- On-board or transiting between tugs, launches, water boats and any other marine craft owned or operated by the operator in Singapore and outside of Singapore ("craft"); and

1.5.3 The operator's Safe Working Procedure (SWP) provided guidance on berthing of tugs. The guidance included, among others:

- "...lines are only to make fast at designated wharf's...."
- "...deck crew when making fast shall not jeopardise himself by standing close to the tug edge or standing on areas that increase risk of him falling overboard...", and
- "...deck crew shall at all times practise care and caution to stay clear of bight of line and tension line...."

1.6 Regulatory requirements on flotation device

1.6.1 The regulator's legislation in force at the time of the accident required all licensed harbour and pleasure craft to carry approved life jackets for every person on board as a part of the life-saving appliances (LSA) requirements, which were predominantly for anticipated abandon-ship scenarios. There were no specific legislation for donning of floatation devices/ life-vest by persons on-board the craft, when the craft was in operation¹³.

¹³ The regulator had been carrying out safety campaigns for port users for personal safety at sea during various industry programs to raise awareness of crew working on harbour craft, ferries, tugs and barges.

- 1.6.2 Singapore's regulatory authority for Workplace Safety and Health required¹⁴ employers of persons exposed to the risk of falling into water and of drowning, to provide suitable life jackets or other equipment for keeping such persons afloat in the event that they fall into the water¹⁵.
- 1.7 Meteorological information
- 1.7.1 The weather was fair, with clear visibility and was partly cloudy. The wind was light air with calm sea and swell. The accident occurred at night. Lighting from the tug's aft station illuminated the aft deck.

¹⁴ Workplace Safety and Health Regulations (General Provisions) Regulations 23(11) [Relevant extract]-
Measures to be taken to prevent falls

23

(11) It shall be the duty of the employer of a person who is exposed to the risk of falling into water and of drowning to provide —

(a) equipment and means of rescuing and resuscitating drowning persons; and

(b) suitable life jackets or other equipment for keeping such persons afloat in the event that they fall into the water.

¹⁵ Harbour craft is required to comply with MOM's Workplace Safety and Health Act and Regulations. It is also the responsibility of the individual person at work to use any protective equipment as provided by his employer. Ref: WSH Act Section 15(1) (a). The risks of falling overboard also apply to any vessel without safeguards.

2 ANALYSIS

2.1 The occurrence

2.1.1 The EO may have drowned following his fall and subsequent recovery attempts. The following unsafe conditions that were present in this accident include the following:

- The EO used an unsafe method to perform the mooring task.
- The EO did not wear a life-vest when working onboard the tug.
- The EO was positioned near (within) the bight of the rope.

2.2 Performing mooring task on a buoy

2.2.1 The method to perform the mooring task in a safe way as described in paragraph 1.3.2 was tedious, time consuming and required skill. It was challenging for a person to perform such a mooring task single-handedly.

2.2.2 The EO used an unsafe method of perform the mooring task. He crossed over to BBB-6 without wearing a life-vest. When he was crossing over to the buoy, the tug was still moving and the tug's wake caused the buoy to rotate around its fixed anchors, sway and move in the sea. It cannot be established whether the EO had been aware of the danger he could put himself in by trying to perform the mooring task on a buoy.

2.3 Donning of floatation device/life-vest

2.3.1 The risk of personnel falling into water from a craft always exists. Yet, falling into water would not necessarily result in fatality. What contributed to the fatality in this accident is the fact that the EO had not donned a life-vest and that he was injured. It may not always be possible to recover quickly a person who has fallen in water.

2.3.2 Therefore, the good safety practice of donning a flotation device or life-vest while working on a craft cannot be overemphasised. The regulatory authority for the port had been engaging the industry regularly to remind the industry of the importance of personal safety at sea through the donning of proper personnel protective equipment. However, the regulatory authority did not have a requirement for operational personnel to don floatation devices or life-vests

- when a craft is in operation.
- 2.3.3 Recognizing that the regulatory authority for the port promotes a culture of safety awareness and ensures regulatory compliance in port waters, it is desirable that the authority work closely with regulatory authority for workplace safety and health to ensure WSHA requirements are met with, for improvement of safety within the port.
- 2.4 Designated mooring locations for tugs
- 2.4.1 The frequency and operations for tug deployment were beyond the operator's control as they depended on the need for arrivals, departures and movement of other vessels within port. Thus it couldn't be expected that a tug would return to base after completion of every deployment. The tug operator had designated mooring/berthing locations¹⁶ when its tugs needed to wait for their next deployment. The nearest base from the tug's location was WCB, about 40 minutes away. Considering the two hours' duration before the next deployment, the operator likely expected the craft to return to the base, which in this case happened to the nearest designated mooring location and did not query the tug's whereabouts.
- 2.4.2 After completing the berthing of MARAN CYGNUS at OVL2, the tug had to wait for two hours before its next deployment to assist in the un-berthing of a vessel at OVL1. The TM was aware that BBB-6 was not a designated mooring location approved by the tug operator and that he did not have any specific permission for mooring at BBB-6. Nevertheless, he elected to wait nearby and moor his tug at BBB-6 rather than going back to the tug operator's WCB station. The alternative terminals / berths, being oil terminals did not allow for craft to idle moor at their berths. This was likely known to the TM¹⁷. As going to WCB would mean a 1.5-hour return trip to OVL1, his concern was, less resting time between deployments. He did not communicate his concerns to the tug deployment office and made his own decision and assessment by mooring at a non-designated location.
- 2.5 Operator's Safety Management System and Operations
- 2.5.1 The operator's guidance on safe working procedures included specific instructions for crew to wear a life-vest when the tug was in operation, not be in areas where there was a risk of falling overboard and stay clear from the

¹⁶ Operator had provided its tug crews with the flexibility to use alternative mooring/berthing locations if appropriate approvals were granted by other parties concerned.

¹⁷ May have had an influence in his decision making of choosing the easy way out.

bight of a rope under strain. It was evident that the guidance was not implemented on the tug. There was no evidence to suggest that the operator was aware that its crew had not been wearing flotation devices when the craft was in operation.

- 2.5.2 Recognising that an emergency situation onboard a two-man tug can become unmanageable within a short span, the operator's existing system of ensuring personnel safety, by restricting tasks so that they were performed from within the tug's bulwark boundary, was not able to minimise the risk of such occurrences,. Any task to be performed outside of this boundary should be escalated to a critical operation and deployment of additional resources would be necessary.

3 CONCLUSION

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 causal factor of this occurrence was an unsafe act performed by the EO by standing on a moving buoy at night, holding on to a rope connected to a moving tug, without donning a life-vest or floatation device in an attempt to moor the tug to the buoy.
- 3.2 An inappropriate mooring location, without any risks associated with mooring at a buoy having been assessed (especially in consideration of the limitations of a two-man tug), contributed to the occurrence.
- 3.3 The tug operator's safe working procedures for crew to wear a life-vest when the tug was in operation, not be in areas where there was a risk of falling overboard and stay clear of the bight of a rope under strain were not complied with.
- 3.4 This incident suggests that the operator's system of restricting tasks to be performed from within the tug's bulwark boundary was not effective in ensuring personnel safety.
- 3.5 The regulatory requirement for the donning of life-vest or flotation devices for personnel working where there is a risk of falling into the water within port waters, resides under legislation of the authority responsible for workplace safety and health, and not under the authority for the port.

4 SAFETY ACTIONS

Arising from discussions with the investigation team, the tug operator has taken the following safety action.

4.1 The tug operator has taken the following safety actions:

- (a) Sharing of information and highlighting the circumstances of the accident with all crew members of its fleet of vessels, and stressing in particular the importance of not performing any mooring activity at non-designated locations;
- (b) Carrying out daily safety briefings by the operator's office to all crew on the importance of wearing proper Personal Protective Equipment (PPE), in particular, on donning of life-vest at all times when the craft is in operation; and
- (c) Conducted in-house retraining (classroom and practical) for all crew, in particular, on performing rescue operation for Man Overboard occurrences.

4.2 The tug operator has also revised a circular with the following reminders:

- (a) To secure/tie craft only at designated locations/berths, namely WCB, B9 and Sembawang wharves; and
- (b) Securing/tying craft at locations other than the above stated is prohibited.

4.3 The tug operator has also revised a standard operating procedure to stress the use of life-vest on board craft when:

- (a) Working or attending to mooring and unmooring on all crafts;
- (b) Transiting from craft to wharf and vice versa; and
- (c) Transiting from craft to craft.

4.4 To enhance the tug operator's inspection regime of its fleet, the tug operator has also included random checks on live video feeds on vessel's location and on compliance with safety regulations.

5 SAFETY RECOMMENDATION

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

- 5.1 It is recommended that the tug operator:
 - 5.1.1 Review the operational needs of the tugs and the typical waiting time between deployments, so that the crew moor their tugs safely at designated locations. **[TSIB Recommendation RM-2018-006]**
 - 5.1.2 Review its risk assessment on two-man tugs operations to ensure personnel safety. **[TSIB Recommendation RM-2018-007]**
 - 5.1.3 Review its implementation of Safety Management System to instil positive safety culture for its staff with regard to adherence to the operator's safety policies and to ensure unsafe acts are not performed under any circumstances. **[TSIB Recommendation RM-2018-008]**

- 5.2 It is recommended that the regulator of the port:
 - 5.2.1 Establish a working arrangement with the Ministry of Manpower to ensure Workplace, Safety and Health requirements for donning of life-vest or flotation devices when there is a risk of falling into the water are met with, for improvement of safety within the port. **[TSIB Recommendation RM-2018-009]**
 - 5.2.2 In the interim, issue a "Port Marine Circular" to all harbour crafts, on the importance of donning a proper floatation device/ life-vest when in operation in the port of Singapore. **[TSIB Recommendation RM-2018-010]**