

Final Report

Man Overboard

Lanpan 35

**At Nasr Oil Field, Abu Dhabi, United Arab
Emirates**

ON 25 November 2018

MIB/MAI/CAS.053

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

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The Transport Safety Investigation Bureau of Singapore

The Transport Safety Investigation Bureau (TSIB) is the air, marine and rail accidents and incidents investigation authority in Singapore. Its mission is to promote transport safety through the conduct of independent investigations into air, marine and rail accidents and incidents.

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SYNOPSIS

On 25 November 2018 at the Nasr Oil Field off Abu Dhabi, Singapore flagged anchor handling tug (AHT) Lanpan 35 (LP 35) reported that the Chief Officer (CO) and the Bosun (BSN) who had gone on deck with two other crew members, were washed overboard.

Weather forecast received on the day of incident occurrence predicted heavy weather conditions. Prior to the occurrence, LP 35 supporting the offshore project requirements for barge HD-2500, was requested to send a single towing line to hold HD-2500 in its position.

A few hours after the tow line was connected, the deck crew of LP 35 took heavy weather precautions as instructed by the Master. To ensure that the mooring ropes on the crash rail were well secured, the CO went on deck with the BSN and two Able Seafarers Deck, without wearing lifejackets (floatation devices). While checking the mooring ropes, a wave washed over the cargo deck causing the CO and BSN to be swept overboard.

At the request of LP 35, a rescue boat from HD-2500 was deployed to recover the CO and Bosun, while LP 35 simultaneously prepared to cast off the tow line. The duo were recovered from the water and medical assistance rendered by the doctor on board HD-2500, who subsequently confirmed that the CO had unfortunately passed away.

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

The investigation revealed that LP 35 could have taken more robust heavy weather precautions earlier, especially when weather forecast was received as early as five days prior and showed a progressive increase of wind speeds. In addition, there were no means to install lifelines on board LP 35 as required for heavy weather precautions in the Company's Safety Management System (SMS). Further, despite the risk of falling overboard regardless of the prevailing weather conditions, the Company's SMS and personal protective equipment (PPE) matrix had not required persons working on deck to wear a lifejacket to mitigate the risk of drowning in a man overboard (MOB) situation.

The investigation also revealed some gaps in the effectiveness of the MOB drills as the MOB buoy was not released by the Officer of the Watch and the emergency signal was not sounded, despite monthly MOB drills being carried out.

VIEW OF VESSEL



Lanpan 35



HD-2500¹

¹ Photo referenced from offshore-chris.blogspot.com

DETAILS OF VESSEL

Name	LP 35	HD-2500
IMO Number	9739915	8766739
Flag	Singapore	Republic of Korea
Call Sign	9V2758	3FRA3
Classification society / Recognised Organisation	Bureau Veritas	American Bureau of Shipping
Ship type	Anchor Handling Tug	Derrick / Pipelay Barge
Year Built	2015	1980
Owner	Lanpan Pte Ltd	Hyundai Heavy Industries Co., Ltd.
ISM Manager	MARCAP LLC	
Gross tonnage	1,285	15,548
Length overall	49.6m	130.0m
Breadth	13.8m	36.0m
Designed Draft	6.0m	10.5m
Summer Freeboard	5.2m	7.5m
Main engine(s)	2 x Yanmar 8EY26W Diesel at 3,481 MHP each	4 x 1,600kW (AC 450V, 3PH, 60Hz) / 4 x 2,400PS
Propellers	2 x CPP, Berg BCG850 solid bronze manganese propellers at 3,500mm (Ø) each,	-

1 FACTUAL INFORMATION

All times (H) used in this report are Local Time (LT) unless otherwise stated. United Arab Emirates is four hours ahead of Coordinated Universal Time (UTC).

1.1 Narrative

1.1.1 LP 35 was contracted for anchor handling, towing, supply and other construction works to support the offshore project requirements for barge HD-2500, at Nasr Oil Field.

1.1.2 On 25 November 2018 at about 1230H, LP 35 was on standby duties near HD-2500. In view of incoming heavy weather, the Master of LP 35 received instructions from the Master of HD-2500 to send a single towing line to the barge's starboard midship bollard to hold the barge in position.

1.1.3 By about 1335H, LP 35 was connected to the barge using a line from LP 35's aft mooring deck. At about 1625H, another tug, Lanpan 31 (LP 31) arrived and connected her tow line to the HD-2500's port side. See illustration of arrangement according to the Master of LP 35 in figure 1.

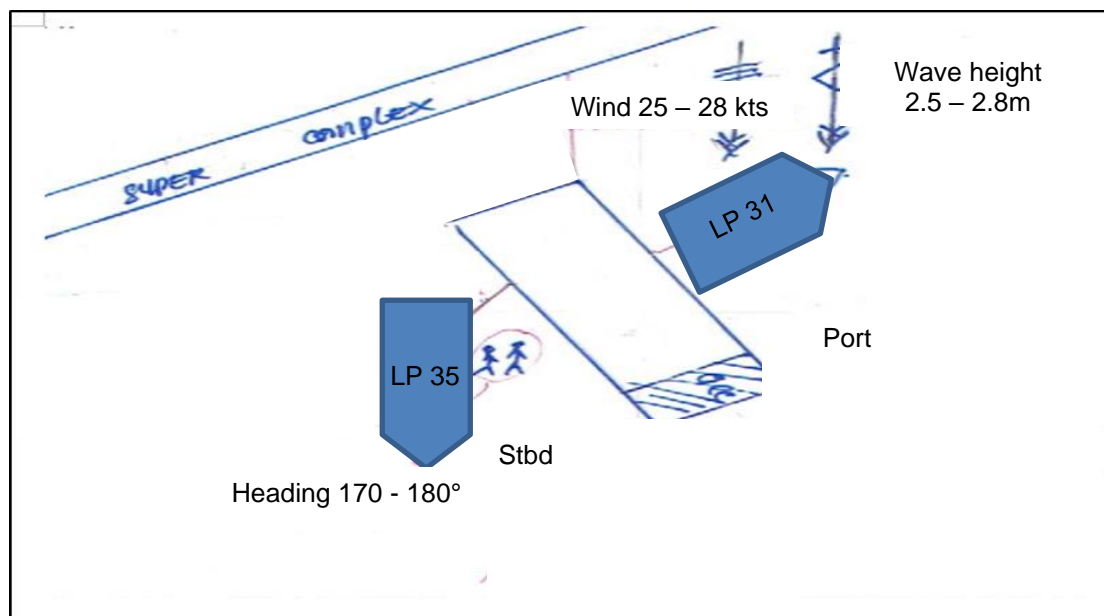


Figure 1 – Illustration of diagram representation provided by the Master of LP 35 showing the towing lines arrangement to HD-2500 – not to scale – annotated by TSIB

1.1.4 Between 1715H and 1730H, seeing squally weather approaching from a distance

of about 5nm, the Master of LP 35 instructed the Chief Officer (CO), who was keeping watch on the Bridge, to ensure that all watertight doors, escape hatches of LP 35 were closed and that all mooring ropes were secured on the crash rail². By 1745H, the CO informed the Master that all these tasks had been reported as completed by the Bosun (BSN) and Able Seafarer Deck (ASD) 1 and 2.

1.1.5 At about 1805H, the CO handed over the Bridge watch³ to the 2nd Officer (2O), and together with the BSN and both ASDs went on the main cargo deck aft to double check⁴ that the mooring ropes reported to be secured earlier, had been secured appropriately.

1.1.6 The 2O was not aware of or informed that these four persons would be on deck. Once on deck, the CO noted that the lashings of the mooring ropes had come off from the support of the crash rail. The CO instructed the crew to secure the ropes on the bulwark⁵ (main deck). The ASD-2 recalled standing behind the staircase near the towing winch at that time (see **figures 2a** and **2b**).



Position where the CO and BSN were prior to the occurrence. The ASD-1 was standing next to them while the ASD-2 was standing behind the towing winch.

Figure 2a – Location of occurrence viewed from main deck – annotated by TSIB

² Guard rails on offshore vessels fitted to prevent damage to cargo stowed on aft main deck.

³ At about this time, according to the logbook records the weather condition was logged as – wind: BF 7, sea state 6, cloudy skies. See **figure 6b**.

⁴ According to the Master, this was because the CO had likely suspected that one of the mooring ropes had been released.

⁵ Fore-and-aft vertical plating directly above the upper edge of the ship side surrounding the exposed deck(s).

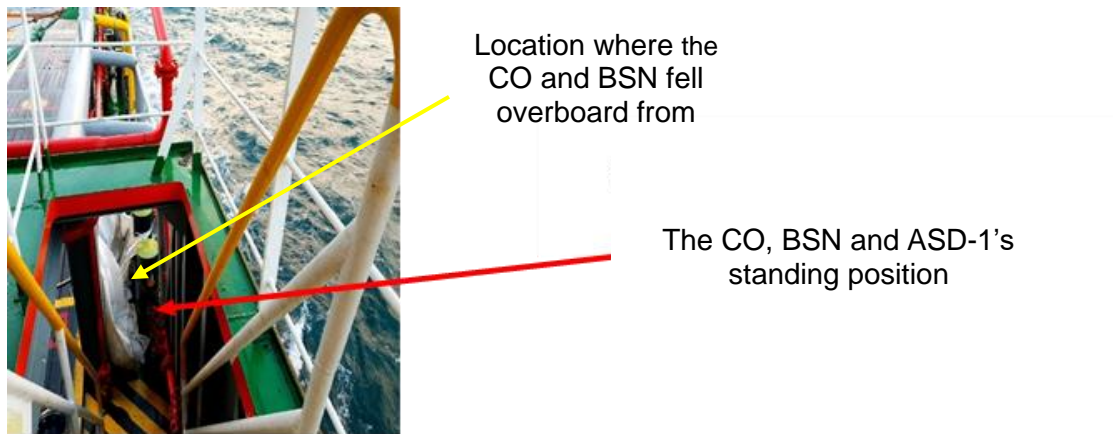


Figure 2b – Location of occurrence viewed from A-deck (top of staircase) – annotated by TSIB

1.1.7 At about 1818H, both ASDs saw a wave wash over the main cargo deck suddenly causing the CO and BSN to be swept overboard. According to the Master's incident report, the weather conditions at that time were:

- (a) Wind – Direction/Speed: North by West 355°/25 to 28 knots⁶ – equivalent to BF⁷ 6/7
- (b) Sky – Cloudy
- (c) Wave height – Between 2m to 3m

1.1.8 Seeing this, the ASD-1 ran up to the Bridge and informed the 2O and Master (who was also on the Bridge) of the man overboard (MOB) situation. Announcements were made on the Public Address (PA) system immediately to inform the other crew. For the safety of the persons in the water, LP 35's Master requested HD-2500 to launch a rescue boat to recover the two crew; LP 35's Master concurrently communicated the intention to cast off⁸ the tow line to HD-2500. By 1825H, HD-2500's rescue boat was launched.

⁶ Nautical miles (nm) per hour. 1nm = 1852m.

⁷ Beaufort Scale – e.g. BF 5: 17-21 knots, BF 6: 22-27 knots. Strong breeze. Large waves begin to form; the white foam crests are more extensive everywhere. BF 7: 28-33 knots. Near gale. Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of wind.

⁸ The investigation team understood from the Company that this was because a tow line under tension may pose a risk to the crew overboard and the recovery process.

- 1.1.9 By about 1846H, although the tow line was disconnected, the snatch rope got caught in LP 35's propeller causing the port side main engine to shut down. The Master then used LP 35's starboard main engine to swing clear from the persons in the water, who were being recovered by the rescue boat of HD-2500.
- 1.1.10 During the recovery process, the BSN was noted to be conscious, while the CO appeared unresponsive in the water. The CO and BSN were subsequently recovered on to HD-2500 by 1849H and medical assistance, including CPR, was rendered by the doctor on board. At about 1925H the doctor informed LP 35's Master that the CO had passed away and that the BSN had survived.
- 1.1.11 The CO's post-mortem report conducted by the Health Authority of Abu-Dhabi indicated that the intermediate cause of death was drowning, and the immediate cause was cardiac arrest.

1.2 Location of occurrence

- 1.2.1 Prior to the occurrence, LP 35 was stationed in the vicinity of HD-2500 at Nasr Oil Field⁹ (see **figure 3**).



Figure 3 – Location of occurrence – annotated by TSIB
(Source: www.nexans.com)

⁹ An oil field in United Arab Emirates (UAE) territorial waters.

1.3 Crew's qualifications and experience

1.3.1 At the time of the occurrence, all the 14 crew on board LP 35 were Indonesian and the working language as per the SMS was English. The information relating to key persons is in **Table 1**.

Designation	Age at time of incident	Qualification (Issuing Authority)	Date joined	In-rank service (yrs)	Service with Company (yrs)
Master	40	Deck Officer Class 1, II/2.1, DGST Indonesia	12/10/2018	7	1.5
CO (deceased)	49	Deck Officer Class 1, II/2.1, DGST Indonesia	17/09/2018	6.4	1
2O	47	Deck Officer Class 2, II/2.1, DGST Indonesia	25/07/2018	5	5
BSN (survived)	34	Deck Officer Class 5, DGST Indonesia	17/09/2018	1	8
ASD-1	46	Ratings as Able Seafarer Deck, II/5, DGST Indonesia	27/06/2018	15	2
ASD-2	36	Deck Officer Class 5, DGST Indonesia	26/09/2018	14	4

Table 1 – Crew matrix of LP 35

1.4 Actions taken in response to the MOB

1.4.1 When the 2O became aware of the MOB, in addition to the PA announcements, the port and starboard search light were switched on for maintaining a lookout on the positions of the CO and BSN.

1.4.2 Upon hearing the announcement, the 2nd Master, 2nd Engineer, 3rd Engineer,

ASD-1, ASD-3 and ASD-4 on board LP 35, proceeded to the rescue boat, to await instructions¹⁰ for launching the rescue boat (located on the port side of the forecastle deck) for recovery¹¹ of the crew.

- 1.4.3 The Chief Engineer went to the Bridge to assist the Master and to maintain a lookout on the positions of the CO and BSN and subsequently assisted to spool in the tow line using the winch controls on the Bridge.

1.5 Weather conditions in the vicinity

- 1.5.1 LP 35 had been receiving twice daily weather forecasts which showed a progressive increase in weather conditions.

- 1.5.2 The investigation team reviewed the weather forecasts¹² received by LP 35 and HD-2500 since 20 November 2018. Winds were expected to gust up to 28 knots over the next five-day period. The forecast issued on 24 November 2018 (evening) further had a warning of thunderstorms and squalls expected to cover the northern gulf region. Winds were expected to gust to 22 knots and above (BF 6) from 1800H with maximum wave height forecasted to be about 2m to 2.4m (see **figures 4a, 4b and 4c**).

¹⁰ The request to HD-2500 for launching its rescue boat had not been conveyed to the crew who were waiting for further instructions to launch LP 35's rescue boat.

¹¹ LP 35 had a 'Person In Water Recovery Manual' (PIWRM), as required by IMO Resolution MSC.1/Circ. 1182 (Guide to Recovery Techniques) and 1447 (Guidelines for the Development of Plans and Procedures for Recovery of Persons From the Water) respectively, which documented the duties of the Master including (but not limited to) the use of ship's recovery equipment based on Master's decision, depending on the particular circumstances of the recovery scene. In addition, the recovery vessel was to be upwind and kept sufficiently off the wind to minimise swinging and to create a lee for enabling recovery.

¹² Provided by Fugro Marine Weather Services, twice daily.

To	Hyundai Heavy Industries UAE		Attention Operations										
Subject	Weather Forecast for Project, Nasr Field - 25.4N 53.5E.												
Validity	Forecast valid 240 hours from 18:00 24 November 2018 (UTC+4)												
WARNING	THUNDERSTORMS AND SQUALLS (30% RISK TOMORROW)												
Met Situation: Trough of low pressure still over the western and central KSA has drifted eastward slowly, crossing the northern Gulf today, giving unstable weather conditions. High pressure area covers western Iran.													
Weather	Mainly fair today, slight risk of a thunderstorm or squall up to 35KT from tomorrow.												
Time	10m Wind Dir	10m Wind Spd [kts]	10m Gust [kts]	50m Wind Speed [kts]	Wind Wave Height [m]	Swell Dir	Swell Height [m]	Swell Period [s]	Sig Wave Height [m]	Max Wave Height [m]	Sunrise/Sunset	Surface Current Dir Towards	Surface Current Speed [kts]
24/1800	E	11	14	15	0.4	E	0.2	4	0.5	0.8	0649	329	0.8
24/2100	ENE	12	16	17	0.5	E	0.2	4	0.5	0.9	1735	57	1.1
25/0000	E	16	21	22	0.7	E	0.3	4	0.8	1.3	0650	118	1.2
25/0300	E	17	22	23	0.9	E	0.3	4	1.0	1.6		217	0.8
25/0600	ESE	16	21	22	0.9	E	0.3	4	1.0	1.6		255	1.1
25/0900	ESE	18	24	26	0.8	E	0.3	4	0.9	1.4		189	0.1
25/1200	ESE	10	13	14	0.6	E	0.3	4	0.7	1.1		192	0.2
25/1500	SSE	8	10	11	0.5	E	0.3	4	0.6	1.0		276	1.3
25/1800	ENE	11	14	15	0.5	E	0.3	4	0.6	1.0		329	0.7
25/2100	E	13	17	19	0.5	E	0.2	4	0.5	0.9	1735	58	1.3

Figure 4a – Weather forecast received on 24 November 2018 / 1731H

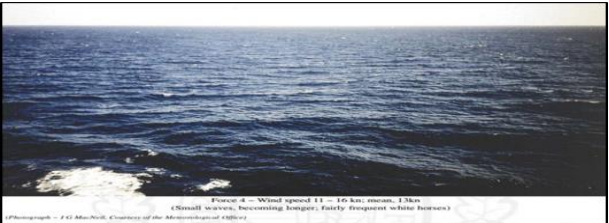



To	Hyundai Heavy Industries UAE		Attention Operations										
Subject	Weather Forecast for Project, Nasr Field - 25.4N 53.5E.												
Validity	Forecast valid 240 hours from 06:00 25 November 2018 (UTC+4)												
WARNING	THUNDERSTORMS AND SQUALLS (30%)												
Met Situation: Trough of low pressure over the central KSA drifts slowly eastward crossing the northern Gulf today, giving unstable weather conditions. The trough drifts SE with unstable conditions spreading into the southern Gulf this evening, clearing the northern Gulf overnight into tomorrow. The trough weakens as it progresses SE clearing the southern Gulf area tomorrow													
Weather	Risk of showers or thunderstorms today with chance of a squall up to 35KT, clearing Mainly fair tomorrow afternoon.												
Time	10m Wind Dir	10m Wind Spd [kts]	10m Gust [kts]	50m Wind Speed [kts]	Wind Wave Height [m]	Swell Dir	Swell Height [m]	Swell Period [s]	Sig Wave Height [m]	Max Wave Height [m]	Sunrise/Sunset	Surface Current Dir Towards	Surface Current Speed [kts]
25/0600	ESE	18	24	25	1.0	-	0.0	-	1.0	1.7	0650	275	1.5
25/0900	SE	19	25	27	0.9	-	0.0	-	0.9	1.5		271	0.5
25/1200	S	14	18	20	0.7	-	0.0	-	0.7	1.2		251	0.7
25/1500	E	13	17	18	0.6	-	0.0	-	0.6	1.0		289	1.7
25/1800	NNE	20	26	28	0.9	-	0.0	-	0.9	1.5		322	1.2
25/2100	ENE	19	25	27	1.1	NE	0.1	4	1.1	1.8	1735	32	0.8

Figure 4b – Weather forecast received on 25 November 2018 / 0532H

To	Hyundai Heavy Industries UAE		Attention Operations										
Subject	Weather Forecast for Project, Nasr Field - 25.4N 53.5E.												
Validity	Forecast valid 240 hours from 18:00 25 November 2018 (UTC+4)												
WARNING	STRONG WINDS, THUNDERSTORMS AND SQUALLS (60%)												
Met Situation: Trough of low pressure over the southern KSA drifts slowly eastward crossing the Gulf between today and tomorrow, giving unstable weather conditions. The weather is expected to improve from the north this evening, as a high pressure over northern KSA, brings in more stable conditions and shamal flow.													
Weather	Showers or thunderstorms today with risk of squalls of up to 35KT, clearing Mainly fair tomorrow morning.												
Time	10m Wind Dir	10m Wind Spd [kts]	10m Gust [kts]	50m Wind Speed [kts]	Wind Wave Height [m]	Swell Dir	Swell Height [m]	Swell Period [s]	Sig Wave Height [m]	Max Wave Height [m]	Sunrise/Sunset	Surface Current Dir Towards	Surface Current Speed [kts]
25/1800	NNE	20	26	28	1.2	-	0.0	-	1.2	2.0	0650	322	1.2
25/2100	ENE	22	29	31	1.4	NE	0.2	4	1.4	2.4	1735	32	0.8

Figure 4c – Weather forecast received on 25 November 2018 / 1740H

1.5.3 The weather conditions recorded on LP 35's deck logbook entries are tabulated below –

Date / Time	Weather condition	Sea states
24 November 1200H-1800H	BF 4	 <p>Figure 4 – Wind speed 11 – 16 km; mean, 13 km <small>(Small waves, succumbing longer; fairly frequent white horses) (Photograph – 440 Albatross, Courtesy of the Meteorological Office)</small></p>
24 November 1800H-2400H	BF 5	 <p>Figure 5 – Wind speed 17 – 21 km; mean, 19 km <small>(Moderate waves, taking a more pronounced long form; many white horses are formed (Chance of some spray)) (Photograph – 440 Albatross, Courtesy of the Meteorological Office)</small></p>
25 November 0001H-0600H	BF 6	 <p>Figure 6 – Wind speed 22 – 27 km; mean 24 km <small>(High waves, regular height to crest; the white horses are more distinctive (Probably some spray)) (Photograph – 440 Albatross, Courtesy of the Meteorological Office)</small></p>
	BF 7	 <p>Figure 7 – Wind speed 28 – 33 km; mean, 30 km <small>(Ultra long and white foam from breaking waves; progress is too slow to observe along the obstruction of the wind) (Photograph – 440 Albatross, Courtesy of the Meteorological Office)</small></p>
Table 2 – Deck logbook weather records		<p>Figure 5 – Illustration of the sea state at various BF scales</p> <p>(Source: The Mariner's Handbook – NP100)</p>

DECK LOG BOOK															
M.T. AKS UNPAN 35										VOYAGE NO. _____					
FROM Noen field										TOWARDS _____					
TOWING _____										RPM _____					
HOURS	COURSES				ERROR		WINDS		WEATHER CONDITIONS					REMARKS	
	True	Gyro	Standard	Steering	Gyro	Standard	Direction	Force	Sea	Sky	Visibility	Barometer	Air Temp.		Sea Temp.
01															24th Sunday day of NOVEMBER 2015
02															00 ³⁰ left off from Loupan 30 @ US1 buoy due strong wind
03															
04															
05															
06	-VAR-						E 74	6	4	C	7	1021	26		06 ⁰⁰ US1 still steaming close to S buoy.
07															
08															
09															09 ⁰⁰ FIRE AND SAFETY PATROL AROUND THE BOAT.
10															
11															
12	-VAR-						E 74	6	5	C	6	1020	29		12 ⁰⁰ US1 still steaming close to S buoy.

Figure 6a – LP 35’s deck logbook

14															14 ⁰⁰ RX INSTALLATION FROM HD-2000 FOR PREPARED TOWING LINE
15															15 ⁰⁰ ~15 ³⁰ TOOL BOX MEETING CARRIED OUT.
16															16 ⁰⁰ CONNECTED TOW LINE TO MIPLE OF HD-2000.
17															17 ⁰⁰ INSTRUCTION TO BOSSUN BOSSUN & AB DUTY TO close ALL
18	-VAR-						N	7	6	C	6	1021	27		WATER TIGHT DOOR, EMERGENCY HATCH NO CREW OUT SIDE.
19															18 ⁰⁰ CH. OFF IN BOSUN, AB DUTY GO TO MAIN DECK TO SECURE
20															THE MOORING ROPE & SECURE ONLY. SEE WIREMAN SWEEPED 1/2 BOAT

Figure 6b – Deck logbook showing entry for heavy weather precautions

1.5.4 An entry in the deck logbook (see figures 6a and 6b) for the day of the occurrence stated, “no crew outside”. There was no such entry for the days preceding the occurrence.

1.6 Company’s SMS procedures

1.6.1 The Company managed a diverse fleet of over 20 vessels and provided marine services to oilfield and construction companies in the Gulf region.

1.6.2 A Document of Compliance certificate was issued to the Company by Bureau Veritas for LP 35 on 27 May 2015 based on the verification audit completed on

25 May 2015 and it was valid until 7 June 2020.

- 1.6.3 A Safety Management certificate was issued by Bureau Veritas to LP 35 on 2 August 2018 based on the verification audit completed on 20 March 2018 and was valid until 19 March 2023.
- 1.6.4 According to the SMS, when the officer of watch (OOW) was notified of a MOB occurrence, one or both lifebuoys on the Bridge¹³ should be deployed, lifeboat signal¹⁴ should be sounded and the Master should be informed. The procedures also required the nearest and most appropriate¹⁵ lifebuoy to be deployed by anyone witnessing a MOB occurrence.
- 1.6.5 When asked on the rationale¹⁶ of having a lifeboat signal instead of a typical MOB signal of three long blasts, the Company deemed that if the time and location of a person falling overboard were known, the lifeboat signal would be an appropriate signal, instead of the MOB signal.
- 1.6.6 The investigation team also noted that though the OOW, the 2O in this case, made an announcement regarding the MOB occurrence, neither the lifeboat signal nor the MOB signal was sounded.
- 1.6.7 As per the SMS, when encountering heavy weather¹⁷ the Master was required to inform all the crew and issue warnings such as avoiding weather decks, unless necessary and to take precautions against slip and moving objects. Elsewhere in the SMS for ensuring personal safety on deck, in order to avoid accidents on deck, there was a statement which stated – *Never come out on deck in rough (heavy) weather.*

¹³ Neither of the lifebuoys on the Bridge (a quick release lifebuoy fitted with light and smoke signal) were deployed by the 2O.

¹⁴ Lifeboat signal is seven short blasts followed by one prolonged blast. The intention of this is to prepare for the recovery of a person in the water. According to the Company, MOB signal of three long blasts is to be sounded when the time and location of a person falling overboard is not known.

¹⁵ On witnessing the MOB, the ASD-1 deployed a lifebuoy. Another lifebuoy was deployed by the Cook after the announcements were made. Both lifebuoys were subsequently recovered on board. It could not be established which were the lifebuoys deployed by the crew.

¹⁶ A lifeboat signal refers to an abandon-ship situation following the Master's verbal order, and the MOB signal (three prolonged blasts) is used in situations where a crew or passenger on board the vessel has fallen into the water and requires to be rescued.

¹⁷ According to the SMS, heavy weather, in principle, refers to weather and sea conditions such that the wind force 6 or above on the Beaufort scale **and** significant wave height is greater than 5m.

- 1.6.8 The Master was also required to ensure that the CO close all the openings for ensuring the water-tightness of the hull, including but not limited to hatches, emergency exits, and paint stores.
- 1.6.9 As per the SMS, the Master was required to ensure that heavy weather preparations were made in all parts of the vessel and to install lifelines if deemed necessary. The SMS did not have a checklist for these preparations at the time of the occurrence. The investigation team noted that after the incident, the Company introduced a 'Heavy Weather Checklist'.
- 1.6.10 The COSWP¹⁸ was incorporated into the Company's SMS procedures and was carried on board its fleet of ships. Under general precautions of the COSWP, it was recommended that if working on deck cannot be avoided during bad weather, lifelines¹⁹ should be rigged on the working deck to facilitate safe movement.
- 1.6.11 The Company could not provide a response as to how many lifelines were available on LP 35 or whether the crew had any means to install lifelines on deck.
- 1.6.12 As per the annual drill schedule (see **figure 7**), MOB drills were to be conducted monthly²⁰. The investigation team reviewed three monthly MOB drills that had been conducted on LP 35 prior to the incident on 24 September, 10 October and 8 November 2018. Rescue boat was recorded to be launched during all these drills including recovery of persons from the water. The drill record did not indicate actions taken by the OOW regarding the deployment of the MOB lifebuoys or the sounding of either the lifeboat signal or the MOB signal. There was no specific record for recovery of persons from the water drill being conducted on LP 35.


¹⁸ Though not a mandatory publication for carriage on Singapore registered ships, the company's SMS had incorporated the Code of Safe Working Practices for Merchant Seafarers (COSWP) as the part of procedures for reference. The COSWP, edition 2015, published by the UK Maritime and Coastguard Agency (MCA), provides best practice guidance for improving health and safety on board ships. A copy of COSWP was on board at the time of the accident.

¹⁹ The purpose of the lifelines is for use by crew in the event some task is to be performed during the heavy weather on the exposed deck. A safety harness or fall arrestor can be connected to the lifelines accordingly.

²⁰ MOB drill is conducted to ensure that the crew are aware of their duties for a MOB situation, starting from raising the alarm, deploying lifebuoys, maintaining a lookout for the person in the water, and subsequently steps to be taken to launch a rescue boat for recovery. A person in water drill is to ensure that crew are familiar with the plans, procedures and equipment for recovery of persons from the water and may be conducted in conjunction with routine MOB drills. As per the Company's SMS, rescue of persons from water drill were required to be conducted on a quarterly basis.

MANAGEMENT SYSTEM FORMS		Vessel Yearly Drill Schedule											
Year: 2018													
Vessel Name:	Form ref #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
EMERGENCY DRILLS/ OTHERS													
Fire (Fire at Sea & Fire at Port)	MSP-A-05-01	X	X	X	X	X	X	X	X	X	X	X	X
Man overboard (immediate discovery & Unknown time)	MSP-A-05-14	X	X	X	X	X	X	X	X	X	X	X	X
SOPEP Drill (pollution from engine room or tanks or pollution on deck as per the vessel Sopep scenarios)	MSP-A-05-04	X	X	X	X	X	X	X	X	X	X	X	X
Abandon Ship	MSP-A-05-02	X	X	X	X	X	X	X	X	X	X	X	X
Gas Drill (H2S)	MSP-A-05-06	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX
Rescue from Enclosed Space	MSP-A-05-10	X		X		X		X		X		X	
Rescue Boat Drill (Maneuvering at sea/ check engine/ lowering)	MSP-A-05-15	X			X			X			X		
Person In Water	MSP-A-05-03	X			X			X			X		
Steering Control failure	MSP-A-05-09		X			X			X			X	
Main Engines Failure/Power failure	MSP-A-05-09			X			X			X			X
Grounding/Collision	MSP-A-05-07				X				X				X
Salvage	MSP-A-05-12					X						X	
Personal Injury	MSP-A-05-08						X						X
ISPS DRILLS													
Piracy / Security	MSP-A-05-13	X			X								
Stowaway / Bomb Threat	MSP-A-05-05							X			X		
EMERGENCY CONTACT DRILLS													
ERT Drill (Exercise with one of selected vessel)	MSP-A-05-11						X						

Note:
1. Drills/Exercise is to be carried out as per schedule as far as practicable.
2. Valid reasons must be provided to the Head Office if drills cannot be conducted for a particular month.
3. Drill Forms must be completed and filed.

Prepared by: HSEQ Manager, DP & CSO  Approved by: GM Operations

Section: MSP-C Prepared by: HSE Approved by: MD

Figure 7 – LP 35's drill schedule

1.7 Crew familiarisation with SMS

1.7.1 There was no specific familiarisation document of the crew in respect of a MOB occurrence. The Company provided a declaration document which stated that the crew were familiar with the Company's SMS manual and aware of their duties. The investigation team further noted that of all the crew on board LP 35, only the Master had acknowledged contents of the PIWRM.

1.8 Provision for PPE

1.8.1 According to the SMS, the Company was required to ensure that suitable PPE were provided to the employees and others who might be exposed to a risk to their health and safety whilst at work, unless the risk had been controlled adequately by other means (see matrix in **figure 8**). Comprehensible and suitable information, instruction and training must be provided to employees so that they understood the purpose of the PPE, the risks in which the PPE was to protect against, the correct method of use and how to maintain it in an efficient state.

1.8.2 According to the SMS SOM-B-03, the main cargo deck of the ship was the most accessed area by both ship's crew (on duty and off duty) and visitors. It was therefore also the highest accident-prone area of the ship. When on deck, there

were several hazards²¹ one should be aware of. Lifejackets were required to be worn under six situations²² (at all times) and two situations (painting and chipping) where lifejacket was to be worn as required.

1.8.3 A separate section of the SMS stated that lifejackets were to be worn when handling/securing cargo²³ in rough weather.

	COVERALLS	SAFETY BOOTS	SAFETY HELMET	LIFE JACKET	GLOVES	GOGGLES	EAR MUFFS	SAFETY HARNESS	DISPOSAL FACE MASK	CHEMICAL GLOVES	WELDING GLOVES	WELDING MASK	WELDING APRON	FACE SHIELD	BA SET
CARGO OPERATIONS	✓	✓	✓	✓	✓	•									
CRANE OPERATIONS	✓	✓	✓	✓	✓	•									
MOORING / UNMOORING	✓	✓	✓	✓	✓	•									
MACHINERY SPACE	✓	✓	✓	✓	✓		✓								
HEIGHT OVER 2 M	✓	✓	✓	✓	✓			✓							
WORKING OVERBOARD	✓	✓	✓	✓	✓										
PAINTING	✓	✓	•	•	✓	•		•	•						
CHIPPING	✓	✓	•	•	✓	✓	•	•	•						
GALLEY	•	✓													
BATTERIES	✓	✓	•			✓				✓				✓	
ENCLOSED SPACES	✓	✓	✓		✓	•			•						•
WELDING / CUTTING	✓	✓	✓		✓						✓	✓	✓		
BENCH GRINDER	✓	✓	✓		✓										
POWER TOOLS	✓	✓	•		✓		•								✓
CHEMICALS / SOLVENTS	✓	✓	✓		✓				•	✓					✓
ANCHOR HANDLING	✓	✓	✓	✓	✓										
Passenger transfer	✓	✓	✓	✓	•	•									

Figure 8 – PPE matrix as per SMS MSP-B-04

1.8.4 The investigation team obtained a similar matrix from other companies operating similar vessels. The matrix for those companies had a specific line item – *General work on deck* - which required the crew to wear a lifejacket if the work was being performed in heavy weather²⁴.

²¹ Details of these hazards were not elaborated in the SMS.

²² These six situations were typically when the person would be on the main cargo deck exposed to the sea. LP 35 carried additional nine pieces of work vests and four pieces of inflatable lifejackets, as part of the Charterer's requirements.

²³ Includes usage of cranes for offshore interface with rigs/platforms etc.

²⁴ According to the SMS of one of these companies, heavy weather refers to weather and sea conditions of Beaufort Scale wind force greater than 4 and wave heights greater than 2m. The Master was permitted to commence heavy weather preparation checklist early if the wave height in relation to the freeboard was deemed to pose a risk.

1.9 Life-Saving Appliances (LSA)

1.9.1 Lifebuoys

1.9.1.1 According to the approved LSA plan, LP 35 had a total of nine lifebuoys of the following distribution –

Item	Number	Location
Lifebuoy with self-igniting light	3	<ul style="list-style-type: none">• Main deck (starboard)• Upper forecastle deck (port)• Upper forecastle deck (starboard)
Lifebuoy with buoyant line (30 metres)	2	<ul style="list-style-type: none">• Upper forecastle deck (port) [Nearest to the occurrence location]• Bridge deck (starboard)
Lifebuoy	2	<ul style="list-style-type: none">• Upper forecastle deck (starboard)• Bridge deck (port)
Lifebuoy with light and smoke signal ²⁵ - MOB buoy	2	<ul style="list-style-type: none">• Bridge deck (port)• Bridge deck (starboard)

Table 3 – Distribution of lifebuoys on LP 35 as per the LSA plan

1.9.2 Rescue boat

1.9.2.1 LP 35 had a rigid fast rescue boat which was located at the forecastle deck (aft), with a capacity of six persons, fitted with a diesel engine and ran with a maximum speed of five knots.

1.9.3 SOLAS maintenance requirements

1.9.3.1 LSA such as lifebuoys and rescue boat were inspected on a weekly and monthly basis as required by SOLAS. Similarly, the Company's SMS required records maintained on board using a checklist. There were no known defects of any of the items recorded in the checklist.

²⁵ With reference to SOLAS Chapter III, Life-saving appliances and arrangements, Part A – General, Regulation 7.1 Lifebuoys, not less than 2 of the lifebuoys [complying with the requirements of paragraph 2.1.1 of the International Life-Saving Appliance (LSA) Code] provided with self-igniting lights (complying with paragraph 2.1.2 of the Code) and self-activating smoke signals (complying with the requirements of paragraph 2.1.3 of the Code) shall be capable of quick release from the navigation Bridge.

1.10 Additional information

- 1.10.1 The Company's SMS stated that the purpose of a Risk Assessment (RA) was to formulate a system of control for hazards associated with daily working environment and working practices.
- 1.10.2 A RA had been documented on board for performing the static tow to HD-2500 in bad weather. Two hazards were identified, and their risk control measures were recorded (see **figure 9**). One of the hazards was MOB. The risk control measure was to ensure 'no crew on deck'. Additional control measures introduced were to wear full PPE²⁶, have a toolbox meeting and use radio communication.
- 1.10.3 A toolbox meeting was reportedly carried out from 1505H-1520H on 25 November 2018 for this RA and documented to have been completed before LP 35 was connected to HD-2500 and all the crew were reminded about safety, to don proper PPE and work vest (floatation device).
- 1.10.4 In reviewing the RA for different operations on board LP 35, the investigation team noted that the process of assessing risk factors based on the risk matrix varied and was inconsistent (see **figures 10a and 10b** below). In addition, there were nil mitigating measures to bring the risk factor to an acceptable level for some of the tasks when the hazard numbers were in the red segment (e.g. 6D and 6E).
- 1.10.5 The investigation team noted that the Company was unable to retrieve the medical records for both the CO and BSN, aged 49 and 34 respectively at the time of the occurrence.

²⁶ Personal Protective Equipment. The scope of this PPE was not specified.

MANAGEMENT SYSTEM FORMS
RISK ASSESSMENT FORM

MSF-B-06-05
Page 1 of 1
Rev: 2
Date: 25 Sept 2018

Ship name: LANPAN 35
Assessment date: 25 November 2018
Work activity being assessed: STATIC TOW TO HQ-2500, BAD WEATHER

Section 1 hazard Analysis of the Intended Work Activity

Hazard no.	Description of Identified Hazards	Existing Control Measures to Protect Personnel from Harm
1	wire towing Tension & Pressure contact to body	• Tool Box Talk. • Clean Deck • STAY RADIO COMMUNICATION & USE FULL PPE.
2	MAN OVER BOARD	• Close All Water Tight Door • LASHING ALL MOVING ITEM ON DECK OR DECK OR ON DECK.
3		
4		
5		

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
60	✓		✓
60	✓		✓

People at risk

Name	Sign
ANDRINUS TIEN	Talk
ANSHAR HAQ	Jan
ADAR J. ALWA	Jan
MUDI LAKSANA	Jan
SUTAWAN ACHMAD	Jan

Section 3 Additional Control measures to Reduce the Risk of Harm

Hazard no.	Further Risk Control Measures	Remedial Action Date	Review Date
1	Tool Box Talk	25-11-2018	25-11-2018
2	USE FULL PPE	25-11-2018	25-11-2018
3	LASHING ALL MOVING ITEM ON DECK	25-11-2018	25-11-2018
4	STAY RADIO COMMUNICATION CH-08.	25-11-2018	25-11-2018
5			
6			

To assess the risk factor arising from the hazard:
1. Select the expression for likelihood which most applies to the hazard;
2. Select the expression for severity of harm which most applies to the hazard;
3. Cross reference using the Risk Estimator table (above left) to determine the level of risk; 4. If the Risk Factor is MEDIUM or above (Yellow, Orange or Red) additional control measures should be implemented and recorded in Section 3.

Additional comments:
Risk assessment conducted by: [Signature]

MV-LANPAN-35
IMO No.: 9739915
Official No.: 399402
Call Sign: 9V2758
GT: 1265 NT: 385

Section: MSF-B Prepared by: HSE Approved by: MD

Figure 9 – Extract of RA documented on LP 35 dated 25 November 2018

Severity rating/ Likelihood	Rare (A)	Unlikely (B)	Possible (C)	Likely (D)	Very Likely (E)	Almost Certain (F)
6 (Disastrous)	6A	6B	6C	6D	6E	6F
5 (Catastrophic)	5A	5B	5C	5D	5E	5F
4 (Major)	4A	4B	4C	4D	4E	4F
3 (Serious)	3A	3B	3C	3D	3E	3F
2 (Minor)	2A	2B	2C	2D	2E	2F
1 (Notable)	1A	1B	1C	1D	1E	1F

Figure 10a – RA matrix in use on LP 35 as per SMS

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
3C			.
3D			
4C			
4D			

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
6C	✓		✓
6D	✓		✓
6E	✓		✓
3C	✓		✓
3D	✓		✓

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
4E	Personal injury		Personal Inj.
4D	fire		Smoking
3C	pollution		airpollu
3D	pollution		Water Pollu
5B	fire		

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
6C	knock from beam/hose		knock
3C	finger/hand		finger/hand
3D	beam injury		Smoking

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
6C	✓		✓
6D	✓		✓

Section 2 Assessment of Risk Factor

Hazard no.	Likelihood of Harm	Severity of Harm	Risk Factor
1	3	2	6
2	3	2	6
3	3	2	6

Figure 10b – Assessment of risk factor of various tasks obtained from LP 35

2 ANALYSIS

2.1 Preparation for heavy weather operations

- 2.1.1 The weather forecast was available on LP 35 since 20 November 2018. The preparation to secure loose items on LP 35 began only when HD-2500 requested for a single tow, by which time, the weather was already BF 6. Prior to this, there were no evidence to suggest that the requirements as per the SMS on preparation for heavy weather had been carried out despite the predicted weather included a risk of thunderstorms and squalls, which was communicated the day prior to the occurrence (see paragraph 1.5.2).
- 2.1.2 Although the predicted wave height was about 2m – 2.5m, there was merit for the warnings contained in the forecast to be considered earlier by the Master of LP 35 and the corresponding safety actions to be taken as per the SMS. This would have ensured that the vessel was secured at the onset of increased wind and risk of thunderstorms/squalls.
- 2.1.3 While the SMS defined heavy weather²⁷ (see paragraph 1.6.7), the presence of the word ‘and’ could be interpreted that both the conditions of minimum BF 6 and wave height of 5m must be satisfied. Considering that even a wave height less than 5m could have a wash-wave effect over the cargo deck of an AHT, there is merit for this definition to be reviewed to avoid ambiguity.
- 2.1.4 The installation of lifelines on deck during heavy weather would aid in reducing the risk of a crew falling overboard if they were working without wearing a floatation device.
- 2.1.5 The Company’s SMS had a requirement to install lifelines across appropriate locations on deck, so that the risk of falling overboard due to heavy weather could be minimised. The Company was unable to provide the investigation team with evidence of such safety harness or means to install lifelines on board. The lack of these provisions could have deprived the crew’s option in taking additional safety measures during heavy weather to mitigate the risk of falling overboard.
- 2.1.6 The investigation team also noted that despite the heavy weather being experienced on the day, none of the crew donned full PPE such as a suitable

²⁷ Heavy weather was defined as a weather of BF 6 and above **and** a wave height of 5m according to the Company’s SMS.

floatation device or lifejacket when performing checks on the cargo deck.

2.2 Risk of falling overboard

- 2.2.1 The investigation team noted the six prescribed situations in the PPE matrix where the crew would be required to don the floatation device when working on deck. Considering the risk of falling overboard due to the typical low freeboard (often with an exposed cargo deck)²⁸ on board AHTs, prudent industry practice is for the crew to wear an appropriate floatation device to perform any work on deck, regardless of the weather condition.
- 2.2.2 Although a RA was carried out for the static tow, which contained a MOB hazard and risk mitigating measures for the crew to don appropriate PPE and floatation device, none of the crew who went on deck, including the CO, followed those requirements. If indeed going on deck was necessary for securing the ship, a RA for heavy weather should have been conducted so that additional control measures could be implemented such as installation of lifelines.
- 2.2.3 To ensure personnel safety on deck and avoid accidents, the Company's SMS did not permit crew to venture out on deck in heavy weather. However, it may be necessary at times, as in the case of LP 35, to go on deck. Nevertheless, the safety of the vessel remains the Master's responsibility. Safety measures must be in place before performing any tasks which may pose a risk to the safety of the crew. Had the risk of falling overboard been categorically identified, the PPE matrix could have reflected the requirement of wearing a floatation device when working on deck, regardless of the weather conditions.

2.3 Actions taken during MOB

- 2.3.1 Based on the distribution of lifebuoys on board LP 35 (see **Table 2**), the nearest lifebuoy with buoyant line from the MOB location was located on the upper forecastle deck (port), while the rescue boat was located on the forecastle deck (port).
- 2.3.2 Reasons for the OOW not deploying the MOB buoy or sounding the three prolonged blasts (as per the emergency muster list) or the lifeboat signal as required by the SMS could not be established. It is important for the MOB buoy

²⁸ Height of a ship's deck above the waterline

to be deployed as it aids in identifying the location of person(s) in the water as well as allows the person(s) to swim towards the lifebuoy emitting smoke and light. The drill records did not indicate whether the release of MOB buoy had been simulated to be launched. There is merit for the SMS to be reviewed to include the deployment of MOB buoy in the MOB drill. This would help to provide more realistic training, better prepare the OOW to react appropriately in MOB situation.

- 2.3.3 Similarly, although a PA announcement was made by the OOW, sounding the appropriate signal for an emergency allows the crew to react accordingly. The investigation team held the view that the SMS should have included the sounding of a MOB signal as the first action, regardless of the situation, i.e. if the situation happened immediately or the location and time was not known.
- 2.3.4 Sounding the MOB signal in a MOB situation would let the Master and crew be prepared for initiating the process of recovering the person in the water rather than focusing on preparations for abandon-ship. If the time/location of the MOB is known, then following the MOB signal, an announcement of follow-up actions, such as preparation of launching of rescue boat, can be made accordingly. Sounding an abandon-ship signal in the event of MOB would cause confusion on actions to be taken.
- 2.3.5 In view of LP 35's prevailing static tow arrangement with HD-2500, the Master's decision to use HD-2500's rescue boat, instead of deploying LP 35's lifeboat, was deemed appropriate. As HD-2500 was upwind²⁹, this had helped to facilitate a swift launching of her rescue boat (time taken was five minutes to launch the rescue boat as recorded) which resulted in an efficient recovery.

2.4 Incidental observations

- 2.4.1 Upon reviewing the RA (see **figures 10a** and **10b**), the investigation team noted that there was a varying degree on the comprehension of risk factors (in prevailing weather conditions) and methodologies in filling out the forms. This inconsistency in interpreting the matrix table to mitigate risks further led to varying control measures being taken which may not have been the most suitable actions when carrying out captioned operations on the RA.
- 2.4.2 To better mitigate the risks and to implement the appropriate control measures,

²⁹ Wind – Dir. / Speed: North by West W 355° / 25 to 28 knots

it is desirable that proper training be given to the crew to provide a common understanding of the risk factors and harmonise the methodologies in filling out the relevant forms.

- 2.4.3 Similarly, proper familiarisation and training should be carried out for the crew to ensure proper drill forms are used for various drill records.

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 Despite receiving heavy weather forecast for almost five days prior to the occurrence, the heavy weather precautions to secure loose items on LP 35 only began when HD-2500 requested for a tow line to be connected, by which time the weather was already BF 6.
- 3.2 Although the SMS had some guidance for actions to be taken for heavy weather, there was no specific checklist to serve as a reminder for checks to be carried out for preparation for heavy weather.
- 3.3 The Company's SMS required the installation of lifelines across appropriate locations on deck to mitigate the risk of falling overboard in heavy weather condition, but there was no evidence of means to install lifelines on board.
- 3.4 The risk of a wave height of less than 5m washing over the deck of the AHT had likely been underestimated, possibly as a result of the definition contained in the Company's SMS regarding heavy weather.
- 3.5 The risk of falling overboard had not been categorically identified in the SMS, i.e. wearing a floatation device when working on deck, regardless of the weather conditions.
- 3.6 Though the 2O made a PA announcement when being notified of the MOB, neither the lifeboat signal nor the MOB signal was sounded. The MOB buoy was not released as per the SMS, casting doubt on the effectiveness of the MOB drills conducted in the months preceding the occurrence.
- 3.7 While a RA and toolbox meeting were reportedly conducted prior to the occurrence, they were for the static tow. A detailed RA for going on deck in heavy weather to secure the loose items on board should have been conducted so that additional control measures could be implemented such as installation of lifelines and donning of floatation device.
- 3.8 A varying degree of comprehension of risk factors and methodologies in filling out the forms suggested that the knowledge of RA process on board was insufficient,

thus allowing for a subjective interpretation of the matrix table to mitigate operational risks.

4 SAFETY ACTIONS

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

4.1 Actions taken by the Company

4.1.1 The following safety actions had been taken to address the concerns and prevent a similar recurrence:

- (a) Mail sent to all vessels reminding against working on deck during heavy weather.
- (b) Work on deck during heavy weather should be authorised by the Master only and the Bridge team should be informed.
- (c) Revised the definition³⁰ on heavy weather in the SMS procedure, and added a heavy weather checklist which contained checks on items in various locations e.g. forecastle, main deck, accommodation, aft deck and Bridge.
- (d) Ensured all vessels receive a proper approved Personal Flotation Device (PFD) and to be used instead of work vest during work on deck. All work vests to be removed from the vessel.
- (e) If required to work on deck in adverse weather, the crew should also don a PFD and a safety harness which can be attached to deck lifelines. A risk assessment should also be carried out prior working on deck in heavy weather.
- (f) The alarm signal for MOB is amended to reflect three long blasts in the SMS, corresponding MOB drill form and emergency muster list.
- (g) Audits done on board all vessels to ensure proper implementation of the

³⁰ Heavy Weather is defined as combination of strong winds of Beaufort scale 7 or more and the significant waves with height of 4 meters or more / any gusting activities, with intense of Very Low Pressure. The investigation team noted the continued use of “and” in the revised definition, which implies both wind and wave conditions must be met before the vessel takes heavy weather precautions. Having such a definition is ambiguous especially considering that the low freeboard of an AHT could still experience a wash-over effect with a swell height of lesser than 4 metres.

SMS, drills and safety meetings.

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 MARCAP LLC

- 5.1.1 To ensure means of installing lifelines for crew usage when going on deck. **[TSIB-RM-2021-001]**
- 5.1.2 To include in the personal protective equipment matrix the requirement of donning an approved personal flotation device when working on deck, regardless of the weather condition. **[TSIB-RM-2021-002]**
- 5.1.3 To ensure proper training is carried out for the crew on the risk assessment process, especially in interpreting the risk matrix table, and implementing suitable control measures. **[TSIB-RM-2021-003]**
- 5.1.4 To review the definition of 'heavy weather' in the SMS as either a condition of wind force or wave height, in view of the low freeboard of an AHT, for the safety of the personnel on board. **[TSIB-RM-2021-004]**

-End of Report-