

FINAL REPORT

MAN OVERBOARD (LOSS OF LIFE)

FROM SUPPLY BOAT OPL 66

AT SEA ON

2 JANUARY 2020

MIB/MAI/CAS.077

**Transport Safety Investigation Bureau
Ministry of Transport
Singapore**

22 February 2021

The Transport Safety Investigation Bureau

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.

The TSIB conducts marine safety investigations in accordance with the Casualty Investigation Code under SOLAS Regulation XI-1/6 adopted by the International Maritime Organisation (IMO) Resolution MSC 255 (84).

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SYNOPSIS

On 2 January 2020 at about 1020H, an engineer on board a supply boat was in the process of lifting cargo to the receiving vessel before falling from a height of about 3m to the deck and into the sea. The engineer suffered severe injuries due to the fall and showed no life signs after being recovered on board the supply boat and succumbed to the injuries.

The TSIB classified the occurrence as a very serious marine casualty and launched an investigation.

The investigation revealed that during the cargo lifting operation, the supply boat was experiencing considerable pitching due to adverse weather. The engineer had likely been caught off-guard and briefly lifted by the crane hook of the receiving vessel and got separated from the supply boat when the stern of the supply boat dipped into the trough of the wave. The crew of the supply boat were not wearing any personal flotation devices and safety helmets.

The investigation also found that there was lack of guidance to abort the cargo lifting operation in adverse weather conditions for both the supply boat and the receiving vessel.

VIEW OF VESSELS



Supply boat OPL 66 (left) and VLCC¹ Falcon (right) – Source: MarineTraffic

DETAILS OF VESSELS

Name	OPL 66	Falcon
IMO/ MMSI Number	563068070 (MMSI)	9238856 (IMO)
Licence Number ²	SC 4907 J	N.A.
International Call Sign	9V9480	C6S2076
Flag	Singapore	Bahamas
Classification Society	Bureau Veritas (B.V.)	DNV-GL
Type	Supply Boat (Non-SOLAS) ³	Oil Tanker
Keel Laid	2018	2002
Material	Aluminum	Steel
Gross tonnage	76.0	160904
Length/ Breath/ Depth (m)	22.37/ 5.50/ 2.80	333.00/ 58.00/ 21.90
Cargo Capacity	40 pallets / Est. 35 tons	N.A.
Owner/ Operator	OPL Services Pte. Ltd.	Yinson Acadia Ltd. / THOME Group Marine & Safety

¹ Very Large Crude Carrier - An oil tanker typically carrying crude oil in bulk.

² OPL 66 was issued a Harbour Craft Licence by the Maritime and Port Authority of Singapore (MPA) under the Harbour Craft Regulations for its operations in Singapore. OPL 66 was also certified to operate in the Singapore Special Limit Voyage Limits

³ Non-SOLAS vessel (Non-Convention) – A vessel which is constructed and built in accordance with lesser stringent requirements, as per the SOLAS Convention. According to the MPA, OPL 66 was certified under its Non-Convention regulations.

1 FACTUAL INFORMATION

All times used in this report is Singapore Time (UTC +8.0H)

1.1 Sequence of events

1.1.1 In the late hours of 29 December 2019, after supplying stores to a bulk carrier, at Eastern Outer Port Limit (East OPL), a supply boat OPL 66, with a crew⁴ of three returned to the port of Singapore. OPL 66 arrived at Sungai Pandan, the base (adjacent to Pasir Panjang Container Terminal), at daybreak on 30 December 2019.

1.1.2 Two days later, on 1 January 2020 at about 1400H, the skipper of OPL 66 received a new job assignment to supply stores and transfer personnel on 2 January 2020, to the Bahamas registered MT Falcon (FLC) which was anchored at East OPL⁵. At about 1410H, stores comprising two big polyethylene (PE) liner bags and 20 pallets⁶ were loaded on OPL 66 (see **figure 1**). The loading of the cargo was completed by about 1700H and there was no other work assigned to the crew.

1.1.3 At about 0230H on 2 January 2020, OPL 66 departed for Harbour Front Terminal (HFT) and embarked 12 passengers (comprising one Class surveyor, five shore technicians and six de-mucking⁷ crew). After immigration clearance, OPL 66 departed HFT at about 0400H.

⁴ The required crew complement was three – a skipper, an engineer and a marine assistant.

⁵ The FLC was initially anchored in Position A (see figure 2). This position was within the Singapore Special Limit Voyage Limits, which were the prescribed limits for OPL 66 to operate within. Refer to Singapore Government Gazette S238/94.

⁶ Including small machinery spares, light equipment, provisions and IBC (intermediate bulk containers) water tanks.

⁷ Tank bottom cleaning operations for oil tankers.



- 5 Qty of IBC tank;
- 1 pallet of mineral water
- 7 pallets of sawdust
- 4 pallets of PE liner bags
- 2 pallets of provisions
- 1 pallet of ship store
- 1 PE liner bag of cooking gas
- 1 PE liner bag of ship store

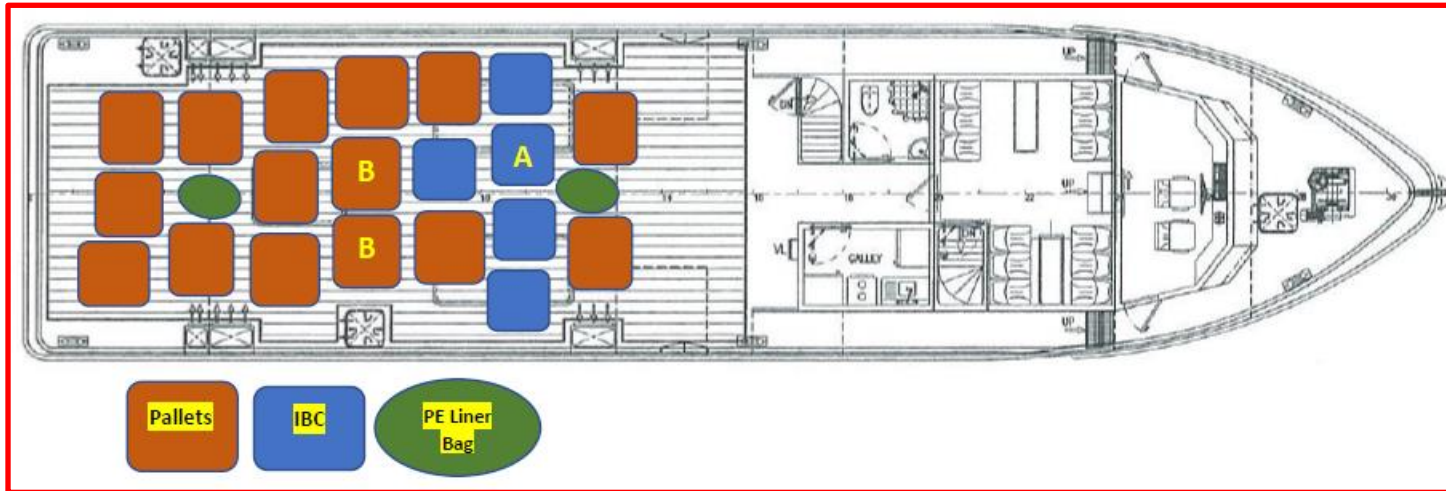


Figure 1: Illustration on the positions of cargo and stores (for FLC) on board OPL 66. Sequence of unloaded cargo denoted as "A" and "B" – *not to scale*. (annotated by TSIB)
Photograph Source: MT Falcon – taken after the occurrence

1.1.4 During the transit, according to the skipper, OPL 66 experienced high swell⁸ with light precipitation when nearing the end of the easterly course at daybreak before heading on a north-easterly direction towards the location of FLC, which was anchored⁹ in position Latitude: 01° 44.46N, Longitude: 104° 28.08E, about 12nm away from OPL 66’s position (see **figure 2**). The skipper recalled reducing the speed of OPL 66 to lessen the pounding of the boat when riding to the swell (indicated by green arrow where OPL 66 started to experience the swell).

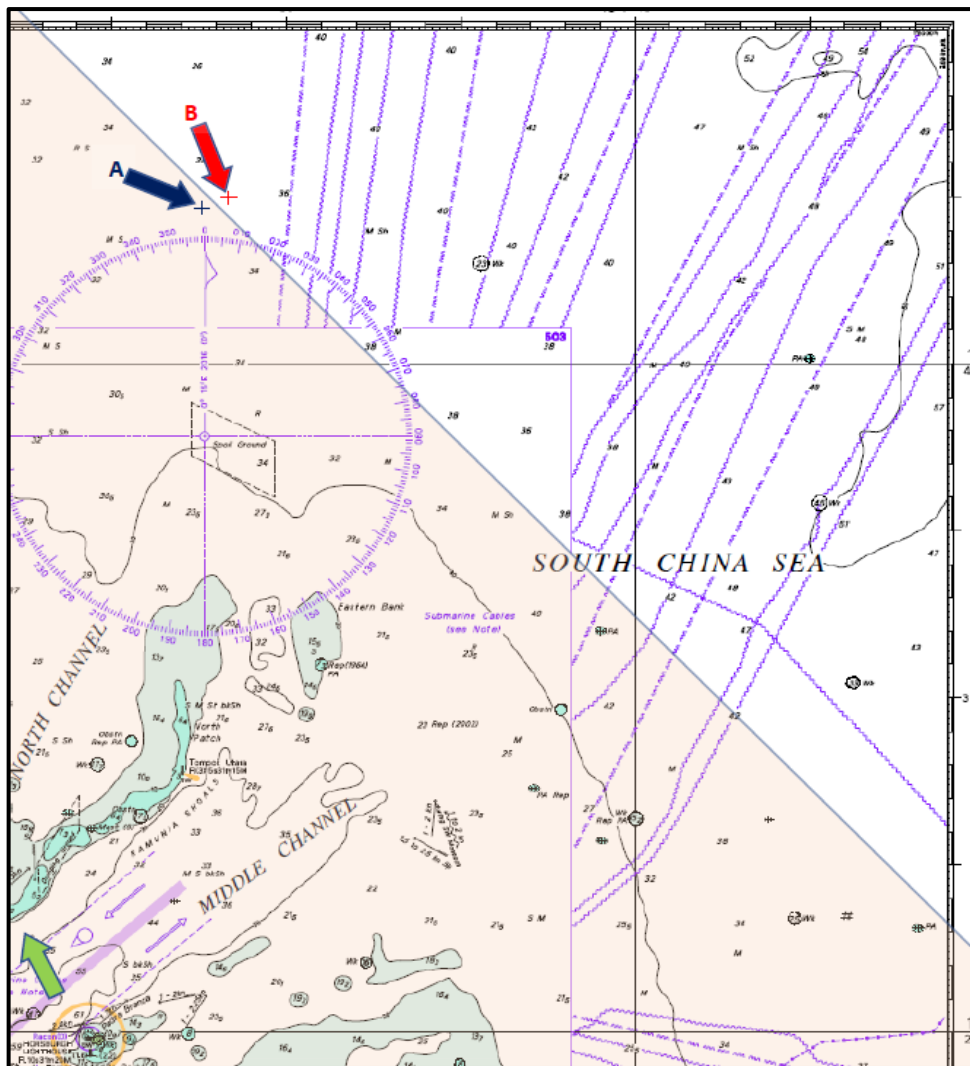


Figure 2: Blue crosshair indicates FLC’s initial anchored position. The Red crosshair indicates FLC’s shifted anchored position. The shaded area shows the Special Limit Voyage Limits (annotated by TSIB) – not to scale

⁸ Swell height was reported by the skipper to be between 2-3m with Force 3-4 wind on the Beaufort Scale. The skipper also informed the investigation team that the passengers were seasick and were throwing up as the boat rode the waves during this leg of transit.

⁹ The investigation team noted that on 25 December 2019, FLC had shifted its anchored position to a new position about 1nm NE of position A. This new position (B) was outside the Singapore Special Limit Voyage Limits.

- 1.1.5 By about 1000H, OPL 66 had come alongside FLC's port side which was anchored on a northerly heading. The swell height was assessed¹⁰ to be about 1-1.5m along with continuous light rain in the area. The skipper assessed that it was calmer on FLC's port side (considering the wind from NNE) and OPL 66 would have less exposure to the wind on the lee side. This was the same understanding by FLC's Master.
- 1.1.6 The Master of FLC and the skipper agreed over the VHF communication for OPL 66's bow to be tied to a bollard on FLC's deck (on the port side) using the boat's line¹¹ so that OPL 66's cargo deck would be directly below the lifting arrangement of FLC's port side crane (see **figure 3**). It was further agreed¹² by the skipper and the Master of FLC that the stores would be lifted first before embarking passengers.

¹⁰ By both the Master of FLC and OPL 66's skipper. According to FLC's logbook, the wind at about 1000H was around 20kts and from NNE.

¹¹ The Operator of OPL 66 shared that the mooring arrangements with receiving vessels are only decided on-site, when the boat skippers assess the environmental situation and the suitability of transfer from the position of the receiving vessel's crane.

¹² Transfer of personnel was to be carried out using a Personnel Transfer Basket (PTB) - Certified Offshore Manlift Cage - after the transfer of stores was completed.

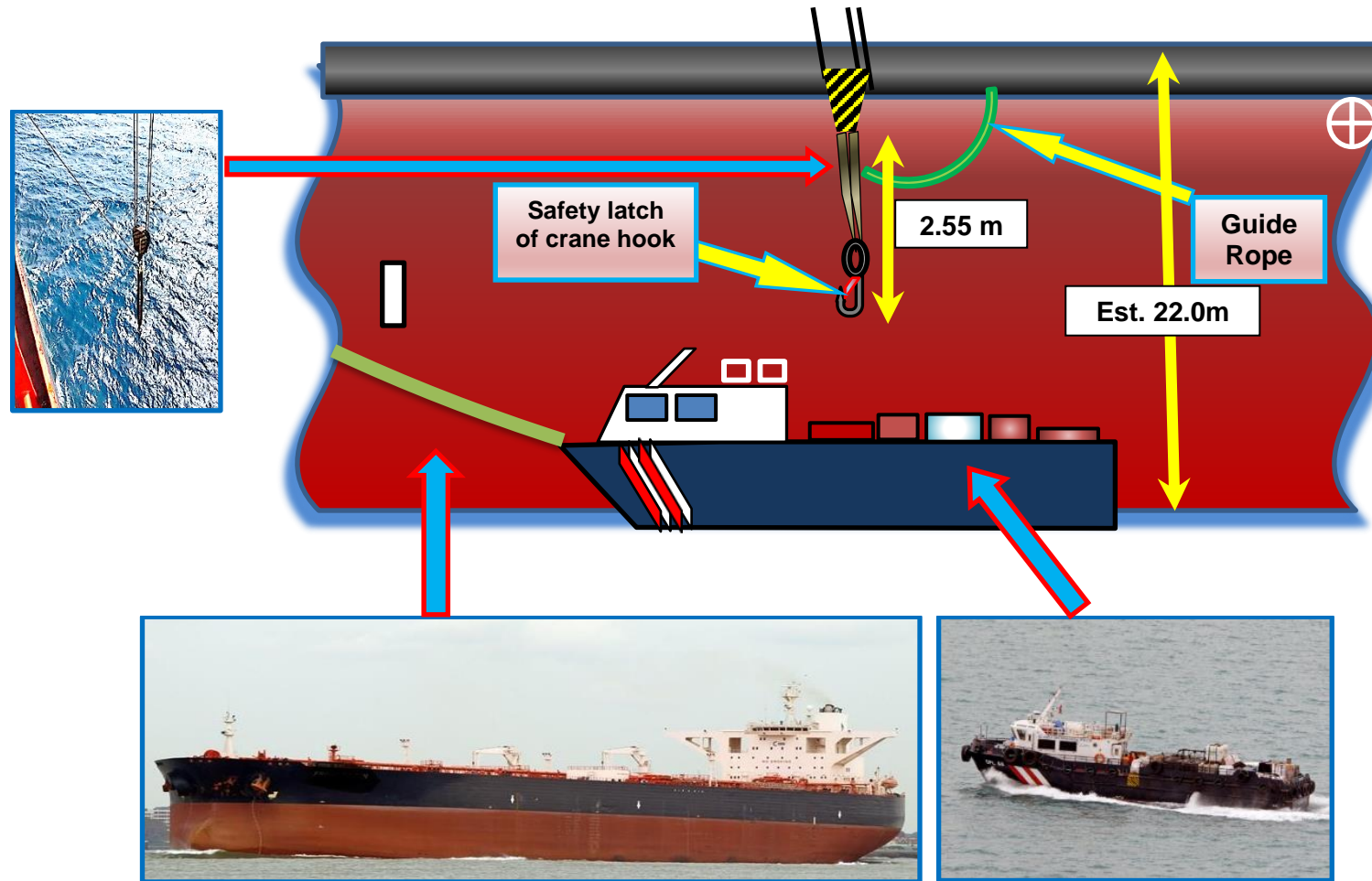


Figure 3: Illustration of the position of OPL 66 when alongside to FLC in preparation for lifting operation – *not to scale*. Lower part of the figure shows the individual images of the two vessels.

- 1.1.7 On board FLC, the storing operation was being supervised by the Chief Officer¹³ who was assisted by an ordinary seaman and a pumpman. The ordinary seaman was guiding the crane block with the guide rope when lowering to the supply boat and the pumpman was providing signals to the crane operator on when to stop lowering or when to lift the crane block¹⁴. FLC's Master was monitoring the operation with a walkie-talkie from the port bridge wing, together with an on-duty Second Officer in the bridge.
- 1.1.8 On board OPL 66, the skipper was standing on top of the wheelhouse within a protected area, conning and monitoring the operation. The marine assistant and engineer were preparing for the cargo lifting operations at the cargo deck.
- 1.1.9 Reviewing the CCTV¹⁵ footage from OPL 66, the investigation team noted that OPL 66 was pitching considerably at the time of commencement of the lift, causing the crane hook, and at times the crane block, to rest on the cargo. The engineer¹⁶ and marine assistant were not wearing any personal floatation devices and safety helmets and they were seen balancing themselves while trying to hook up the eyes of the lifting slings onto the crane hook (see **figure 4**) at the same time.

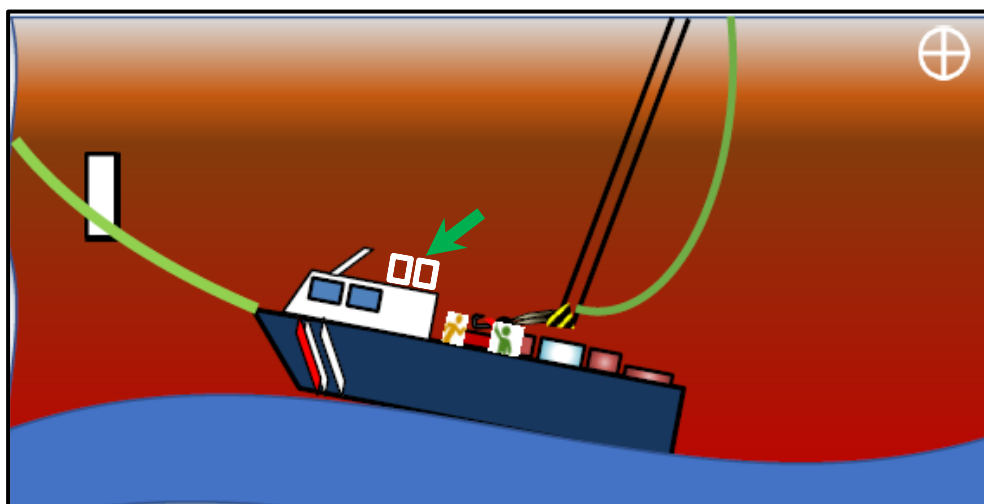


Figure 4: Illustration of the pitching during the first lifting operation with the estimated positions of the marine assistant in yellow and the engineer in green. The green arrow indicates the position of the skipper – *not to scale*.

¹³Standing along the railings on the main deck.

¹⁴ The Bosun was operating the crane and the pumpman providing signals based on the rigging status of the lifting sling(s) of the pallets to the crane hook via walkie-talkie to the Bosun.

¹⁵ The camera was installed inside the wheelhouse, facing the cargo area, which was solely meant for anti-theft purposes as shared by the Operator of OPL 66. The footage was blurry (out of focus) but with some video enhancements it was able to provide some information.

¹⁶ The engineer was donning short cargo pants, safety boots, short sleeves shirt and leather gloves.

- 1.1.10 The first lift was an IBC tank at the second row of cargo (indicated as A in **figure 1**), which was uneventful. For the second lift, according to the marine assistant, the Chief Officer of FLC requested¹⁷ for two pallets of stores and provisions (indicated as Bs in **figure 1**) in the fourth row to be lifted together. From the CCTV footage, the investigation team noted that both the engineer and marine assistant had climbed on top of the cargo. According to the marine assistant, the duo was struggling to put the slings of the two pallets onto the crane hook while holding on to the safety latch of the crane hook.
- 1.1.11 According to the CCTV footage, OPL 66 suddenly took a sharp dip at the stern causing the marine assistant to slip on top of the cargo and the engineer was seen to be lifted up with the crane hook and separated (lifted off) from the cargo. Soon after, the boat's stern rose upwards and at the same time, the engineer was seen falling from the crane hook to the deck.
- 1.1.12 According to the marine assistant, there was a loud thump and the engineer was seen landing briefly on the port quarter's gunwale before falling into the sea¹⁸. The skipper recalled losing his footing and slipping on the roof of the wheelhouse as well as losing sight of the crew temporarily when the boat's stern dipped (see **figure 5**).

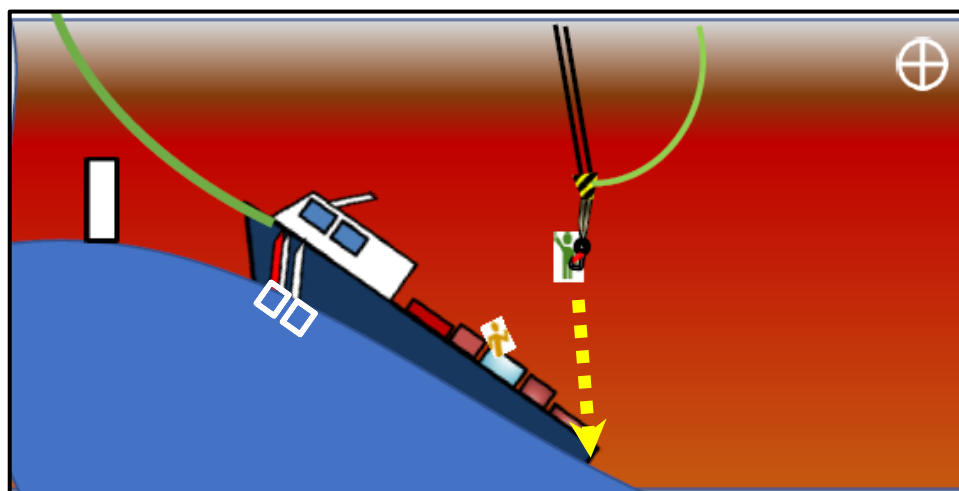


Figure 5: Illustration of the second lifting operation when the boat experienced a sharp dip at the stern at about 1020H. The yellow-dotted arrow shows the subsequent fall of the engineer into the sea – *not to scale*.

- 1.1.13 Soon after, the marine assistant recalled getting up and throwing a lifebuoy towards the engineer, who was drifting face down towards the stern of FLC. FLC's deck crew removed OPL 66's boat line immediately and thereafter,

¹⁷ The investigation team sought clarification from the Chief Officer who stated that there was no such request and the pallets were being planned by OPL 66's crew. The Master of FLC was not aware of the discussions happening on the deck.

¹⁸ The same was stated by the Master and deck crew of FLC.

the skipper began manoeuvring the boat towards the engineer to facilitate recovery.

- 1.1.14 At the same time, FLC's Master informed its Singapore agent¹⁹ regarding the occurrence and issued a safety broadcast via VHF on Ch 16 to other vessels in the vicinity to keep a lookout for the engineer.
- 1.1.15 OPL 66 was manoeuvred close to the engineer who was unresponsive. For about 20 minutes, the marine assistant and the skipper could not pull up the engineer due to the swell and freeboard, from a door access on both the port and starboard side of the boat. FLC's Master noticed the difficulty that OPL 66's crew were facing and called OPL 66 to come alongside to embark an additional person (part of existing de-mucking personnel on board) to assist them²⁰. By about 1054H, OPL 66 embarked²¹ one person and resumed the recovery of the engineer at about 1110H.
- 1.1.16 By about 1130H, the engineer was recovered on board OPL 66. The skipper and marine assistant stated that there were no signs of life and informed FLC's Master, who in turn, advised the skipper to head back for medical assistance.
- 1.1.17 En-route when nearing shore, the skipper communicated with VTIS²². OPL 66 was instructed to head towards Tanah Merah Ferry Terminal (TMFT). The Singapore Coast Guard patrol boat reached them shortly and escorted OPL 66 towards TMFT.
- 1.1.18 The engineer was brought ashore to TMFT at about 1545H and a medical doctor (who was with an awaiting ambulance) pronounced the engineer dead at about 1603H.
- 1.1.19 The autopsy report²³ stated the cause of death as drowning following punctured right lung due to fractured ribs. Most of the external injuries were found on the right-side of the body. A puncture wound on the upper lobe of the right lung with fractures of the right scapula (shoulder blade) and ribs were mentioned. These injuries would also impair the deceased's ability to swim. Toxicology report stated no traces of drugs.

¹⁹ The agent informed the OPL boat Operator of the occurrence via telephone.

²⁰ The passengers on board OPL 66 were not able to assist as they were badly seasick.

²¹ The existing de-mucking crew disembarked FLC to OPL 66 via a combination ladder and was transferred back to FLC after the recovery of the engineer before OPL 66 departed the scene.

²² Vessel Traffic Information Service – managed by the MPA.

²³ From the Health Sciences Authority of Singapore (HSA) – issued by the Forensic Pathologist.

1.2 Personal protective equipment (PPE)

- 1.2.1 The investigation team gathered that each of the OPL boat was provided with three types of personal floatation devices. One of them was a work life-vest available as common stock for the use by their crew. The other two were SOLAS lifejackets as per the LSA²⁴ plan and inflatable lifejackets issued individually to each crew member (see **figure 6**).
- 1.2.2 During the investigation team's interactions, the marine assistant clarified that based on his understanding, the work life-vest was not used, as it hindered cargo lifting operations most of the time and the inflatable lifejackets were meant only for passengers. The safety helmet was not worn by him because it did not come with a chinstrap.
- 1.2.3 The skipper mentioned that the crew members had the choice to use either the inflatable lifejackets or the work life-vests and generally, the work life-vests were meant for better visibility. The skipper could not recall if the safety helmets came with the chinstrap. The skipper separately added that both the engineer and marine assistant had been instructed to wear the PPE²⁵, but these instructions were not followed on many occasions.
- 1.2.4 According to the Operator, all safety helmets provided to the crew came with the chinstrap and were issued individually, in addition to spare safety helmets (stowed on board).

²⁴ Life-saving appliances

²⁵ Personal Protective Equipment – the lifejackets were part of the required PPE.



Figure 6: (Clockwise from top left)
Helmet with chinstrap, work life-vests used on the boats, the PPEs - inflatable lifejacket and clothing of the deceased (engineer) hanging at the engine room access (post incident),
SOLAS lifejackets as per the LSA plan and additional inflatable lifejackets for passenger transfers under the passenger benches of OPL 66
Source – the Operator

1.3 OPL 66 – Crew, experience and rest hours

1.3.1 In accordance with the requirements for a vessel to operate in the Singapore Special Limit Voyage Limits, the Minimum Safe Manning Document (MSMD) for OPL 66 required the boat to carry a Master, a Chief Engineer and a General-Purpose (GP) Rating²⁶.

1.3.2 The skipper and the engineer possessed valid qualifications with certificates issued by the DGST²⁷, Indonesia. The marine assistant was mainly involved in the fishery industry in the past, despite having experience at sea. The marine assistance carried an identification card that was not issued by the Malaysia Marine Department and was not a qualification for a GP Rating²⁸.

Designation	Skipper	Marine Assistant	Engineer
Qualification	Master STCW II/3 Issued 2016	NIL	STCW III/3 Issued 2018
Certification Authority	DGST - Indonesia	N.A.	DGST - Indonesia
Nationality	Indonesian	Malaysian	Indonesian
Age	42	34	40
Experience in Rank	2 years 8 months	4 months	9 months
Period with Company	10 months	9 months	9 months
Period on board	1 month	2 weeks	2 weeks

1.3.3 According to the information provided to the investigation team, the crew's rest period was calculated (by the operations supervisor ashore) from the time the boat returned to base. The boat operations considered typical STCW²⁹ guidelines and rest hours were normally kept to a minimum of eight hours per day, for the crew deployed for jobs to the OPL. Based on the last

²⁶ The Minimum Safe Manning Document issued by the Maritime and Port Authority of Singapore (MPA) did not indicate what specific qualification was required for the GP rating.

²⁷ Directorate General of Sea Transportation

²⁸ The investigation team obtained this clarification from the Marine Department of Malaysia.

²⁹ IMO's international Convention on Standards of Training, Certification and Watchkeeping for seafarers 1978, which sets the minimum qualification standards for masters, officers and watch personnel on seagoing ships.

job, prior to preparing for the job on FLC, the crew had more than 12 hours of continuous rest, according to the Operator.

1.4 Lifting equipment and operations

1.4.1 FLC's crane block was connected to a sling (approximately 2m in length) via a D-Link shackle. The other end of the sling was connected by a shackle to the hook which had a spring-loaded safety latch (see **figure 7**).



Figure 7: Lifting equipment arrangement of FLC. The lifting sling used by OPL 66 (right) for pallet and IBC tanks. The image (on the right) is for reference only and does not indicate the pallets in use at the time of occurrence – annotated by TSIB.

1.4.2 The lifting slings³⁰ on each unit of the cargo (pallets and IBC tanks) on board OPL 66 included an eye at each end. For lifting, these eyes were rigged to the receiving ship crane hook after pressing on the safety latch which was then released to close (to prevent the eyes of the slings from slipping off the hook). All lifting slings had been pre-rigged at the loading berth before OPL 66 departed.

1.4.3 Prudent seamanship in lifting operation requires close coordination between both vessels to ensure the receiving ship crane block is constantly adjusted considering the pitching of the boat.

³⁰ This is the most common sling used, while the Operator also uses chains and wire ropes or cargo nets when required by the receiving ship(s).

1.5 OPL Services – operations, training and safety

1.5.1 The primary operations of these boats were storing operations and passenger transfers. The Operator of OPL 66 was operating 17 boats of similar size and was responsible for the safe management of the operations of its fleet and the wellbeing of the crew. According to the Operator, risk assessments (RA) were conducted ashore by the OPL Services Director (OSD) for the identified hazards, and the associated risk mitigating measures would be shared with each crew member on board the boats by the operations supervisors.

1.5.2 According to the operations executive, a generic RA review was carried out in September 2019 for general lifting activities by the personnel at the office.

1.5.3 Some of the hazards identified in the RA were –

- accidents when en-route or getting to a receiving vessel, such as falling into the sea when transferring between vessels;
- exposure to harsh weather such as lightning and thunder;
- physical injuries when handling machinery, lifting gears and chain blocks etc. Risk controls for falling into the sea were to don a lifejacket / life-vest when boarding (embarking) and to wait for favourable conditions when transferring; and
- drowning, getting hit by the load or falling materials during lifting activities.

There was no hazard identified on drowning for performing storing operation, when encountering adverse weather.

1.5.4 The OSD further added that a six-monthly review of the RA was conducted when new requirements from either the Ministry of Manpower of Singapore (MOM) or the MPA were issued. These reviews were predominantly conducted by the office personnel. Thereafter, the crew would be updated during checks / visits where the crew were briefed³¹ on the understanding of the contents of the revised RA. There was no documented record showing the conduct of such visits. The skipper confirmed that a copy of the RA was on board OPL 66 but could not recollect when the operations supervisor had carried out briefing for the RA.

1.5.5 When asked, the Operator confirmed that FLC's initial position at anchor on 21 December 2019 was verified to be within the prescribed limits for OPL 66

³¹ The crew employed under OPL Services Pte. Ltd. were mainly Indian, Indonesian and Malaysian nationals. Both the Indonesian and Malaysian crew members were not conversant with the English Language. The operations supervisor conducted these verbal sessions with them in Bahasa Melayu.

to operate. The Operator further confirmed that FLC's revised position that was updated on 25 December 2019, was not checked prior to the Operator's deployment of its boats on 28 December 2019 onwards, including that of OPL 66.

- 1.5.6 According to a coordination email³² sent by the Operator to FLC regarding the boat arrangements for 2 January 2020, the following text mentioned –

Current Sea conditions is quite bad³³, so all Passengers to put on Life Vest provided by Boat. Supply Boat will be equip (sic) with a 'Certified Offshore Manlift Cage' for boarding to sbj Vsl. if sea condition is too rough, it's Max. 04 Paxs. each time.

- 1.5.7 The Operator did not subscribe to any weather information for areas of operations especially outside Singapore port limits³⁴. When asked, the investigation team was informed that the navigation aspect and operations laid solely with the skippers, including reporting of unfavourable weather conditions experienced and making assessments to suspend the transit or operations. There was no guidance to determine when to abort an operation when encountering adverse weather.

- 1.5.8 The skipper of OPL 66 was aware of these requirements. When asked the skipper could not provide an explanation on why the operation was not aborted.

- 1.5.9 There was no matrix of what PPE was to be used by the crew when in operations. Inspections of the PPE and verifications whether the crew donned the PPE were typically done on a random basis by office personnel for boats operating within Singapore port limits. For boats deployed at the OPLs, the skippers would be required to ensure compliance and report any non-compliance of the PPE requirements. There had been no reports of non-compliance submitted to the Operator.

- 1.5.10 The CCTV on board was a non-mandatory equipment and was seldom reviewed, unless theft was suspected on board. CCTV footage of past operations could not be viewed as they were overwritten every 24 hours.

³² Dated 30 December 2019

³³ Information based on Operator's experience and feedback from skippers for general weather conditions during this period.

³⁴ Third party (non-official) applications indicating weather forecast, of wind, and swell.

1.6 Additional information from FLC

- 1.6.1 The FLC had a weather information subscription³⁵ to provide live weather updates. Historical records for the incident date indicated that the weather in the area where FLC was anchored, was forecast to have a North-North-East (NNE) wind of about 12kts (translates to a BF 4) and a sea swell height of about 1m.
- 1.6.2 Prior to the incident, three other operations were conducted from 29 December 2019, which included personnel transfers and sludge bag unloading³⁶, using boats from the same Operator (not including OPL 66), which were completed uneventfully. The weather conditions logged in the logbook for those operations were similar to those logged on the day of incident (swell heights between 1m and 1.5m, with wind ranging from BF 4-5).
- 1.6.3 For crane operations and personnel transfers using a PTB, FLC had prepared a RA on 27 December 2019. One of the hazards identified was bad weather / strong currents. Risk mitigating measures to lower the risk were to check the weather report and stop the lifting operations until the weather condition was satisfactory.
- 1.6.4 Subsequently a permit-to-work (PTW) as per the safety management system (SMS) was issued for each separate personnel transfer and/or cargo and sludge bag lifting operations daily.
- 1.6.5 One of the items in the PTW checklist was whether the weather condition had been assessed and was ticked off with a “Yes”. There were no other guidelines on the values or threshold on when the transfers were to be stopped, if the weather deteriorated.

³⁵ SPOS weather subscription service.

³⁶ Sludge from the de-mucking of the tanks on board FLC.

1.7 Environmental information

1.7.1 The location of the incident was exposed to the environmental effects of the South China Sea and during the northeast (NE) monsoon. According to the Meteorological Services of Singapore³⁷, during this monsoon period, dense rain clouds forms over the equatorial region with strong winds (i.e. high swells). Frequent thunderstorms along the coastal region were also a common phenomenon. The NE monsoon is most intense during the period of November to January, where swell heights increases when the swells from open seas enters shallow coastal waters.

³⁷ Information for marine related weather information – www.weather.gov.sg/weather=marine-shipping-bulletin

2 ANALYSIS

2.1 The occurrence

2.1.1 The CCTV footage captured the pitching condition that OPL 66 was experiencing before the first lift. The sling connecting the crane block and crane hook was about 2m long. Correlating the witness accounts and instances where the crane block was seen resting on the cargo and at times the hook was seen separating from the cargo, it is estimated that the swell height was about 2.5m.

2.1.2 During the second lift, both the engineer and the marine assistant were on top of the pallets of cargo for about two minutes trying to rig the sling to the crane hook before the sharp dip of OPL 66's stern happened. The sharp dip had likely caused the crane hook (which was earlier close to the pallets for securing the eyes of the sling to facilitate the lift) to separate from the pallet. The CCTV momentarily captured the engineer being separated from the cargo (and boat) and then falling about 3m in height (shortly after).

2.1.3 It is likely that the engineer was caught off-guard when OPL's stern dipped and was either holding on to the crane hook or getting briefly entangled with the crane hook.

2.2 Weather hazards and risk mitigation

2.2.1 The location where FLC was anchored, exposed OPL 66 to sea swells from the open seas, coupled with the NE monsoon. Notwithstanding the periodic calmer seas from the skipper's observation before the lifting operation commenced, the dynamic risk of the sea swells was still present, given that the boat had already experienced the pounding prior to arrival at FLC's location. The expected adverse weather conditions were also made known by the Operator to FLC (see paragraph 1.5.5). Despite this awareness the operation was not aborted by either of the vessels.

2.2.2 In addition to the close coordination required among the parties involved in the lifting of cargo operation, the weather conditions play an important factor in ensuring that the operation is carried out safely. With the prevailing sea conditions of BF 4 and wave heights of about 1.5m to 2.5m, it would have been appropriate to suspend the lifting operation temporarily till the weather conditions improved.

- 2.2.3 The skipper's decision to continue the operation may have been affected by factors such as long transit time (from 0230H to 1000H) to FLC's location and the lack of specific guidance on when to abort the operation in adverse weather conditions.
- 2.2.4 While it is understandable that the primary role of OPL 66 was to supply stores and personnel at an agreed date, time and place, safety of the persons involved, the vessel and its cargo, are still the responsibility of the skipper. It would be desirable for the Operator to provide written guidance to specify safe or unsafe weather conditions (e.g. based on BF and/or swell heights) for the skipper to make a better assessment so that the pressure of ensuring timeliness of the delivery is not the deciding factor for continuing operations.
- 2.2.5 The decision to commence or delay the operations should also be a two-way process. The Operator should subscribe to weather monitoring services, where information³⁸ (with weather elements of current, wind and swell height information) are updated and discussed with the assigned boat crew before each deployment to the OPL areas. However, such a process would require a routine and regular monitoring ashore by the Operator.
- 2.2.6 Upon deployment, when unfavourable conditions during transit and arrival at the location are encountered by the boat, the status of the actual weather condition could be communicated using appropriate means such as two-way VHF or a video-call (subject to availability of mobile telecommunication signals) to the Operator before continuing the voyage or commencement of the operations. This in-turn would also allow the receiving ship to be informed of the delays, instead of having the skipper jeopardising the safety of the crew in riskier conditions due to implied pressures in fulfilling the delivery.
- 2.2.7 Although there was a PTW checklist for lifting operations as per FLC's SMS, there were no other guidelines on the values (range of weather) or threshold, indicating when the transfers were to be stopped if the weather deteriorated. The investigation team recognised that the receiving vessel being on scene could be considered to provide actual weather conditions prior to deciding whether the operations should proceed as planned. However, being a much larger vessel than the supply boat, such vessel would have a different perception of the weather conditions, relative to what the supply boat could experience. Hence, any assessment on the prevailing weather conditions by the receiving vessel should take into consideration the size of the supply boat.

³⁸ For example, the Meteorological Services of Singapore provides up to 72hrs of weather and sea condition forecasts daily.

- 2.2.8 Lifting operations require close coordination between those operating the crane with those assisting in the lift and operating the boat. It was probable that the crew of FLC had not paid attention to movements of OPL 66 so that the crane hook's position could be adjusted, or the operation suspended, recognising the risk to safety of personnel.
- 2.2.9 Regardless, a stop of work must be called out for ensuring the safety of persons and the vessels involved, until weather conditions are within an acceptable range.
- 2.3 Use of PPE
- 2.3.1 It was apparent that on board OPL 66, the flotation devices (work life-vests or lifejackets) were not used. Although the marine assistant opined that the work life-vest hindered work, there was no evidence to suggest that it was indeed so. Similarly, the marine assistant's perception that inflatable jackets were only meant for passengers was unfounded, as all the crew of OPL 66 were issued with inflatable lifejackets.
- 2.3.2 The inflatable lifejackets, when activated, can turn the seafarer onto their backs if unconscious in the water. It was highly likely that this purpose of the lifejackets was not understood, and its importance not appreciated by the crew of OPL 66.
- 2.3.3 The Operator had provided the PPE on board but there was no process in place to mandate its usage. A PPE matrix to indicate the minimum PPE to be worn under varying conditions of operations of the craft would have been useful for the crew to comply with. Accordingly, regular training and RA briefings should also be recorded, which could serve as a reminder to the crew of the importance of the PPE.
- 2.3.4 The investigation team further noted that although the skipper had reminded the crew to wear proper PPE for their safety, this was not followed on many occasions. The skipper should have reported the non-compliance for the Operator's attention. Recognising that the skipper has the responsibility in ensuring the safety of the crew, the skipper should exert his authority in ensuring that proper PPE is donned.

2.4 Incidental observations

- 2.4.1 The investigation team could not establish the reason on the sequence of the inner pallet being lifted as it would require the crew to climb on top of the cargo. It is noted that the situation for lifting operations can be dynamic and a fixed sequence, if established, may not always be achievable. Thus, the cargo should ideally be stored on the boat with space around them to allow the crew assisting in the lifting operations to perform the work safely (such as rigging the slings to the crane hook). An assessment of the storing space should be carried out so that crew do not need to climb on top of the cargo when rigging the pallet to the crane hook.
- 2.4.2 While it is unclear if the gloves or loose clothing had contributed to the occurrence, there is merit to include in the RA, that appropriate gloves should be worn tight and there should not be any loose ends on the coveralls and personal floatation devices to prevent them from accidental entanglement.
- 2.4.3 All seafarers are required to complete the Basic Safety Course stipulated under the STCW convention (VI/1 and VI/6), which includes personal survival techniques, fire prevention and fire-fighting, elementary first aid, personal safety and social responsibilities and security-awareness training; and in accordance with the MSMD issued. Although not contributing to this occurrence, in this case, the MSMD did not specify the qualification for the GP rating required for OPL 66. Consequently, the Operator had not ensured that the marine assistant was qualified under the STCW Convention.
- 2.4.4 The investigation team could not corroborate the marine assistant's claims that the safety helmet did not come with a chinstrap. Regardless, any concerns on the PPE being fit for purpose should be brought to the attention of the skipper and Operator timely.
- 2.4.5 Although the Operator had verified FLC's initial position prior to accepting the job assignment for its crafts to service FLC, the update on FLC's revised position on 25 December 2019, was not checked to see whether the boats by OPL Services were permitted to operate at that location. It would be desirable for a clear process to ensure that crafts operate within the limits they are prescribed to operate within.

3 CONCLUSIONS

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

- 3.1 OPL 66 was pitching in swells of about 1.5-2.5m at the time of supplying stores to FLC. When the engineer and the marine assistant were in the process of hooking up two pallets for the second lift, the engineer was likely caught off-guard when OPL 66's stern dipped and separated from the crane hook either due to either holding on to the crane hook or becoming briefly entangled with it.
- 3.2 The engineer as a result fell from a height of about 3m and sustained injuries which had impaired his ability to stay afloat in water.
- 3.3 Despite the pitching experienced by OPL 66 even before the first lift, the crew of OPL 66 and FLC had not called for the operations to stop.
- 3.4 For the supply boat, the decision to abort an operation during adverse weather conditions was laid solely on the skipper. However, there was no written guidance from the Operator on when the operations should be aborted in the event of deterioration of the weather conditions.
- 3.5 Although FLC's SMS had a permit to work checklist for lifting operations, there were no guidelines on the threshold for transfers to be stopped if the weather deteriorated.
- 3.6 The crew of OPL 66 had not appreciated the importance and relevance of the PPE on board, such as lifejackets. There was no specific PPE matrix indicating minimum PPE to be worn under varying conditions of operations.
- 3.7 There was a perception that the PPE on board the OPL 66 was not fit for purpose. Steps should have been taken to alleviate these concerns during the visits on board by the shore personnel.
- 3.8 A detailed risk assessment for operations taking into account the stowage of the cargo should have been undertaken to ensure there is sufficient space for the crew to walk around, while taking into consideration that the crew members should not be required to climb on top of the pallets of cargo.
- 3.9 OPL 66 was supplying stores to FLC at a location outside of the prescribed limits.

4 SAFETY ACTIONS

During the course of the investigation and through discussions with the investigation team, the following preventive / corrective action(s) were taken by parties involved.

- 4.1 Taken by the Operator of OPL 66
 - 4.1.1 The risk assessment (RA) was reviewed and updated with the inclusion of the requirement for adequate deck spaces, the sea state conditions and the amended RA was briefed to all the boats' crew with additional safe working practice briefing carried out ashore.
 - 4.1.2 Included a safety checklist for the skipper to ensure that the appropriate PPE are donned by the crew.
 - 4.1.3 The SOP on board each boat was amended to include –
 - a. "Sea state chart" – specifying go and no-go situations according to the weather conditions and for the skipper to report the situation to the Operator;
 - b. A minimum of distance apart for each of the pallet or IBC loaded on the deck;
 - c. Loading and unloading sequence with minimum deck spaces between cargo and walkways; and
 - d. Specifying roles³⁹ of various persons involved in the varying stages of loading/unloading of cargo and personnel transfer operations.
 - 4.1.4 Subscribed to a weather monitoring service (BuoyWeather), which is available for all skippers to use, and is monitored daily by the operations department as well as when job orders are received for deployments outside Singapore port limits.
 - 4.1.5 Reviewing their crew qualifications in accordance with the STCW requirements, as per MPA's MSMD issued.
- 4.2 Taken by the flag Administration of OPL 66
 - 4.2.1 The flag Administration – MPA - revised the safe manning document to reflect the minimum requirement of the required grade/capacity of the individual crew member accordingly.

³⁹ Including the coordination with the receiving vessel, the prohibition of climbing on top of cargo etc.

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 OPL 66

5.1.1 To review the SOP to include a PPE matrix for varying conditions of operations, such as loading/unloading and personnel transfers. **[TSIB-RM-2021-005]**

5.1.2 To review its processes in verifying positions provided by the anchored vessels to be serviced at OPL, so that assigned boats do not operate outside of the prescribed limits. **[TSIB-RM-2021-006]**

5.2 For the Company of FLC

5.2.1 To review its SMS to include guidelines on weather conditions under which lifting operations should be aborted. **[TSIB-RM-2021-007]**

- End of Report -