Report of investigation into the fatal incident on board the Hong Kong registered chemical tanker "*Melati 5*" on 12 February 2016

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

11 September 2018

Purpose of investigation

The purpose of this safety investigation conducted by the Marine Accident Investigation and Shipping Security Policy Branch (MAISSPB) of Marine Department is to determine the circumstances and the causes of the incident with the aim of improving the safety of life at sea and avoiding similar incident in future.

It is not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAISSPB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

Table of contents Page

1. Summary

1.1 In the morning on 11 February 2016, at about 0848 hours, the Hong Kong registered chemical tanker "Melati 5" (*the vessel*) arrived and berthed at Kuala Tanjung of Indonesia for loading cargo of raw palm oil. A portable gangway (the gangway) was arranged between the main deck at about midship position of *the vessel* and the terminal.

1.2 At about 2130 hours on 12 February 2016, cargo loading was completed. After the pilot had boarded *the vessel* through the gangway at about 2230 hours, the chief officer led nine deck ratings to pick up the gangway for securing it on top of the deckhouse before proceeding to the mooring stations for unmooring.

1.3 In order to pick up the gangway, the chief officer split the deck ratings into four groups. Each group handled a guide rope attached to each of the four corners of the gangway. The guide ropes were used to stabilize the gangway in the air when it was lifted up by the hose handling crane (crane). When the gangway was lifted up, the hooks at the end of the gangway were stuck with *the vessel*'s railing. When the chief officer moved closer to examine the problem, the hooks were suddenly freed from the railing. The sudden release of energy had resulted in driving the gangway inboard in an uncontrolled manner and struck the abdomen of the chief officer. He was pushed by the gangway towards the No.3 starboard water ballast tank vent-head which was located at about 2.8 meters inboard from the railing and fell on the deck. The chief officer then stood up with the assistance of deck ratings and went back to the accommodation. The master conducted a visual inspection of the chief officer's abdomen and instructed him to take a rest. *The vessel* departed as per her schedule.

1.4 At about 1806 hour on 13 February 2016, upon arrival at Pelintung, Indonesia, the chief officer visited doctor in a local hospital. Internal bleeding was found in the chief officer's abdomen by X-Ray check and Ultrasonic (UT) scanning. Despite of local doctor's advice, the chief officer refused to stay in the hospital for further observation and treatment. He received some pain relief pills and returned to *the vessel* in the early morning on 14 February 2016.

1.5 On 14 February 2016, the vessel was loading cargo at the terminal of Pelintung and the chief officer did not take his duty for cargo loading. The chief officer stayed on bed most of the time and felt painful in his abdomen. The vessel's crew placed some ice bags on his abdomen to ease his pain. On 15 February 2016, the chief officer felt weak and at about 1530 hours, the second officer found the body of chief officer becoming cold. During this period, the crew did not ask for the help from shore.

1.6 At about 1640 hours on 15 February 2016, the pilot boarded *the vessel* for departure

after completion of cargo loading and he assisted in arranging an ambulance to send the chief officer to hospital for emergency treatment upon the master's request. By the time when the ambulance arrived at 1655 hours, the shore paramedics declared that the chief officer was dead.

1.7 The investigation into the incident revealed the contributing factors to the injury of the chief officer as follows:

(a) as limited by the crane's arm which could not reach the gangway's centre point, the gangway was lifted under asymmetrical centre line of hoisting thus causing the gangway being subjected to an inboard pulling force when lifted. As a result, the hooks at the end of the gangway were stuck with the vessel's railing. When the hooks were suddenly freed from the railing, the sudden release of energy had resulted in driving the gangway inboard in an uncontrolled manner and struck the chief officer who had failed to observe the company's safe working practice by standing at a location within the danger zone of the gangway's hoisting path ; and

(b) the deployment of four guard ropes failed to withhold the sudden inboard swing of the gangway. The risk assessment and the work plan prepared before the gangway lifting operation had not been done properly.

1.8 The follow safety issue was also observed:

(a) seafarers should always consider to accept doctor's advice when attending medical treatments. The chief officer might save his life if he decided to stay in hospital as originally advised by a local doctor on 13 February 2016.

2. Description of *the vessel*

Name of vessel	:	***Melati 5*** (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO No.	:	9172258
Ship type	:	Chemical tanker
Year built, builder	:	1999, Hyundai Heavy Industries Co. Ltd, USAN, South Korea
Gross tonnage	:	22,116
Net tonnage	:	8,678
Deadweight of ship (tankers)	:	31,975 metric tonnes
Length (Overall)	:	177.15 metres
Breadth (moulded)	:	30 metres
Depth (moulded)	:	15.2 metres
Main engine & power	:	1 x Hyundai B&W 6S50MC MK6, diesel engine, 7,160 kW,
Classification society	:	Bureau Veritas (BV)
Registered owner	:	Roderica Shipping Co. PTE Ltd, Hong Kong
Management company	:	Raffles Technical Services PTE Ltd.

Figure 1 - M.V. *Melati 5*

3. Sources of evidence

3.1 Information provided by the management company of *the vessel*.

4. Outline of events

(All times were local time UTC + 7 unless otherwise stated)

4.1 In the morning on 11 February 2016, at about 0848 hours, *the vessel* arrived at Kuala Tanjung of Indonesia for loading cargo of palm oil. When *the vessel* berthed starboard side alongside the terminal, the crew placed the portable gangway at about midship position as the access between *the vessel* and the terminal since there was no sufficient space for lowering down the accommodation ladder. The hooked end of the gangway was connected to the ship's side and the roller end of the gangway was rested on the terminal.

4.2 At about 2130 hours on 12 February 2016, *the vessel* completed cargo loading and one hour notice was given ready for departure. The "pre-sea test and checklist" was completed at about 2215 hours.

4.3 About 15 minutes later, after the pilot had boarded *the vessel*, nine deck ratings led by the chief officer commenced to pick up the gangway for securing it on top of the deckhouse. The gangway weighed about 2.5 tonnes. The crane (Figure 2) at midship was used to lift up the gangway. The positions of the chief officer and the deck ratings were shown in Figure 3.

4.4 At about 2233 hours, the chief officer split eight deck ratings into four groups. Each group held a guide rope attached to each corner of the gangway. The use of guide ropes was purposed to stabilize the gangway in air during the lift. The team with the guide rope at inboard aft end corner of the gangway had also wrapped the guard rope around the mooring bitt on deck.

4.5 When the crane operator drove the crane above the gangway, one deck rating walked on the gangway and linked up the crane hook with the four lifting wire slings attached to the middle section of the gangway. The deck rating then returned to his position to hold the guide rope. At about 2235 hours, the chief officer ordered to hoist the gangway. When the gangway was about to be lifted up by the crane, the hooks at the hooked end of the gangway were stuck with *the vessel*'s railing. The chief officer then moved closer to examine the problem. All of a sudden, the hooks were freed from the railing and the sudden release of energy had driven the gangway inboard in an uncontrolled manner and struck the chief officer's abdomen, pushing him towards the No.3 starboard water ballast tank vent head which was located at about 2.8 meters from the railing (Figure 3). The eight deck ratings could not stop the gangway's uncontrolled swing by the guide ropes.

4.6 With the help from the deck ratings, the chief officer managed to stand up and went to the bridge to report the incident to the master. The master inspected his injury and

found a small bruise on his left abdomen. The chief officer then took some pain relief pills and sleeping pills in his cabin. *The vessel* departed for the next port, Pelintung of Indonesia.

4.7 On 13 February 2016 at about 1806 hours upon arrival at Pelintung, the chief officer together with the chief engineer and the local agent went to a local hospital. UT scan and X-ray check were taken on the chief officer's abdomen. Internal bleeding was found and the local doctor suggested the chief officer to stay in the hospital for further observation and any necessary medical treatment. The chief officer did not take the local doctor's advice as he wanted to obtain medical treatment at next port of Singapore. He returned to *the vessel* after he got an injection of pain relief and some pain relief pills.

4.8 On 14 February 2016 while *the vessel* was loading at the terminal, the chief officer stayed on board *the vessel* and felt painful. *The vessel*'s crew placed some ice bags on his abdomen to ease his pain.

4.9 On 15 February 2016, chief officer felt weak and cold. At about 1530 hours, second officer found that the body of chief officer became cold. His breathing rate became faster, and blood pressure could not be measured stably. At about 1640 hours when the pilot boarded *the vessel* for departure, the pilot assisted in calling an ambulance to send the chief officer to hospital at the master's request. When the ambulance arrived at the gangway at 1655 hours, however, the shore paramedics declared him dead. At about 1710 hours, the body of chief officer was landed to the ambulance.

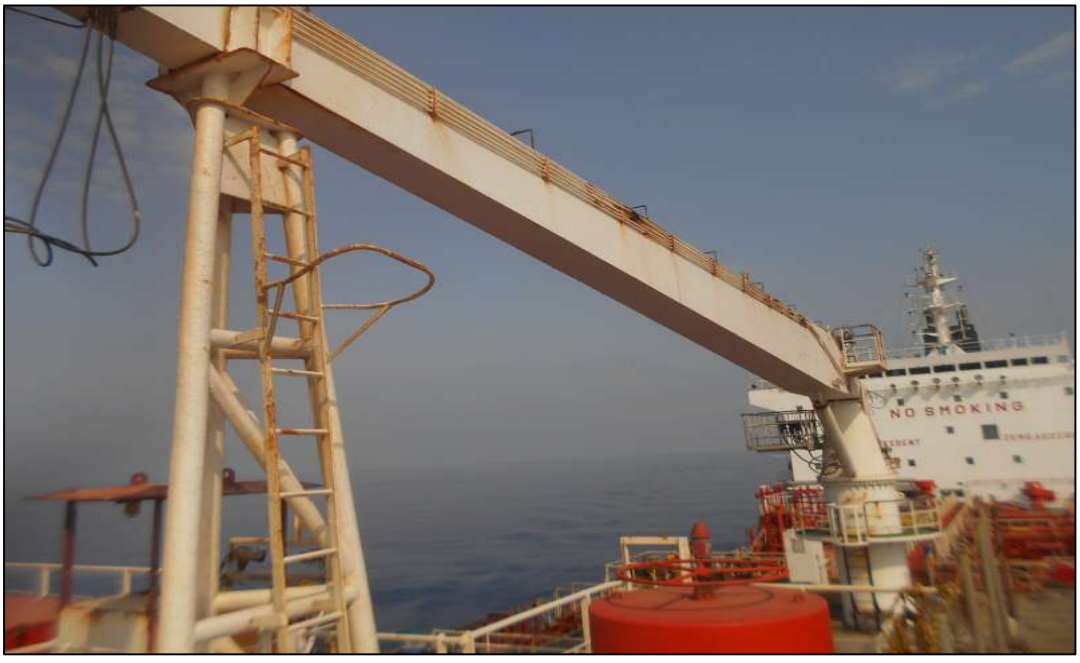

Figure 2 – The crane

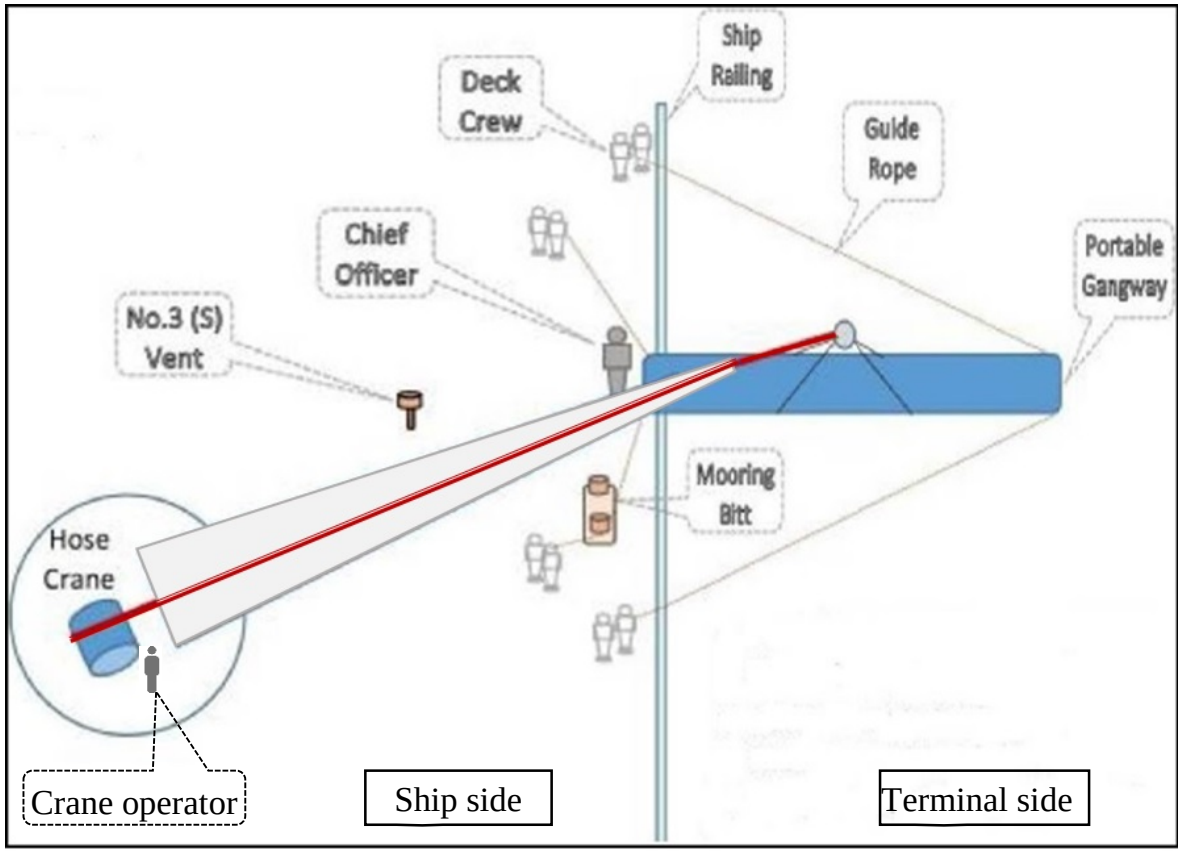

Figure 3 – Layout of the chief office and deck ratings' positions

5. Analysis

The vessel's certificates and manning

5.1 The statutory trading certificates including the Minimum Safe Manning Certificate (MSMC) of *the vessel* were valid and in order.

5.2 The master of *the vessel* held a valid Class 1 Certificate of Competency (CoC). He joined *the vessel* on 11 January 2016.

5.3 The chief officer held a valid Class 2 CoC. He had more than three years of experience as a chief officer on oil and chemical tankers. He joined *the vessel* on 18 October 2015.

5.4 The manning of *the vessel* and experience of the crew met the mandatory requirements.

Access arrangement at the oil terminal

5.5 *The vessel* carried an aluminum portable gangway which was stored on top of the deckhouse at midship for the use as an access between *the vessel* and terminal. According to the guidelines of the "International Safety Guide for Oil Tankers and Terminals", the gangway should be of lightweight built structure with side stanchions and handrails. The guide also requires that while rigging for access between vessel and terminal, the gangway should be rigged perpendicular to *the vessel*'s side and spans between *the vessel*'s rails and the working deck of the terminal.

5.6 No shore gangway was available from the terminal of Kuala Tanjung and there was not sufficient space to utilize *the vessel*'s accommodation ladder. *As such, the vessel*'s gangway had to be used.

5.7 The gangway had the features of having two hooks on one end (the hooked end) for attaching to *the vessel*'s railing, and two plastic rollers on the other end resting on the terminal to cater for the vessel's movement due to the change of vessel's draft in cargo operation and tides (Figures 4, Figure 5 and Figure 6).

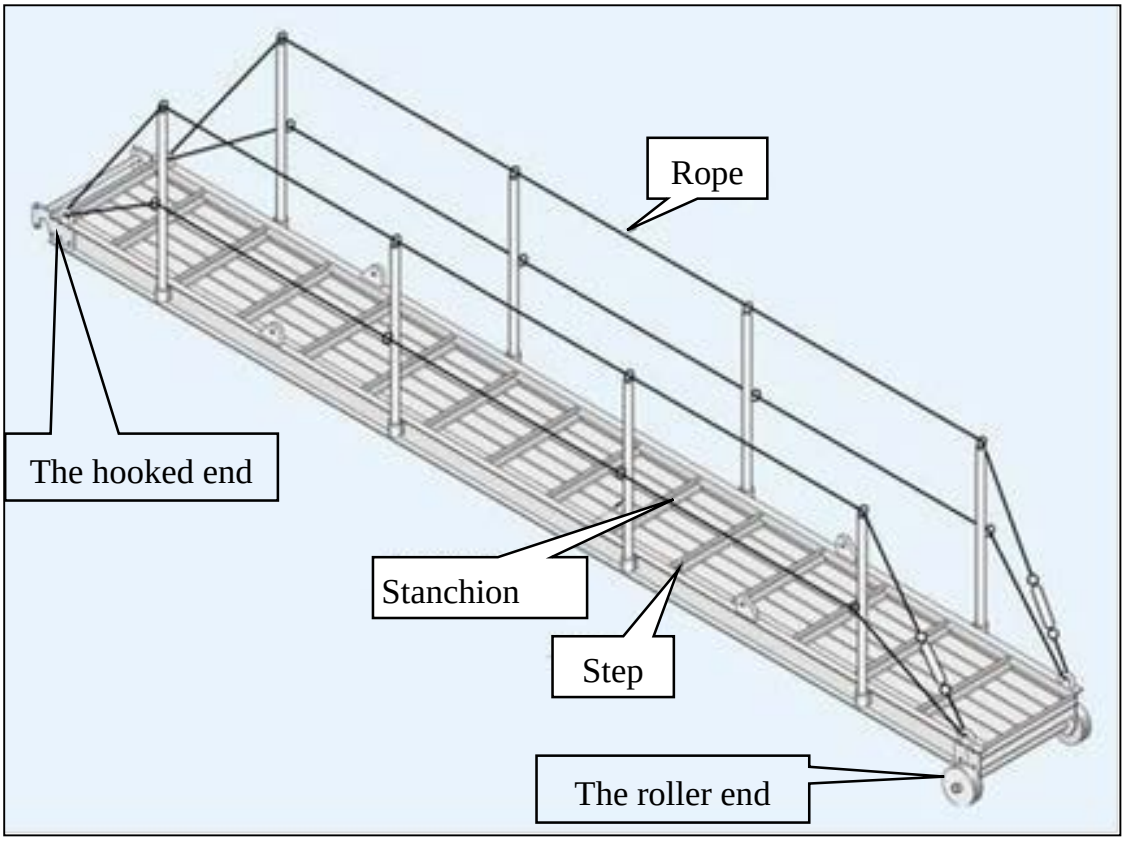

Figure 4 – Diagram of a gangway

Figure 5 – *The vessel*'s gangway on top of the deck house

Figure 6 – Similar gangway arrangement for access between vessel and terminal

Analysis of the lifting operation of the gangway and the cause of the incident

5.8 The crane is a hose handling crane with the primary purpose of lifting cargo hoses for the cargo manifolds located at about the midship section on both the port and starboard sides of the vessel. The pedestal of the crane is more or less along the same line of the transverse axis of the centre points of the port and starboard cargo manifolds. As the gangway could not be placed within the area of the starboard cargo manifold in order to give way to the cargo hose connection, the gangway had to be placed at a distance forward of the cargo manifold thus resulting in a situation that the crane's arm (of a maximum outreach of 21 m) could not reach the gangway's centre point (Figure 7). When lifting the gangway, the lifting would be under an asymmetrical centre line of hoisting thus causing the gangway being subjected to an inboard pulling force causing the hooked end of the gangway pressed hardly against and thereby stuck with the railing in a locking mode. Upon the gangway was lifted to a level where the hooked end was suddenly freed from the railing, the sudden release of energy had driven the gangway inboard in an uncontrolled manner and struck the chief officer who was standing in front of the hooked end of the gangway (Figure 8 and Figure 9).

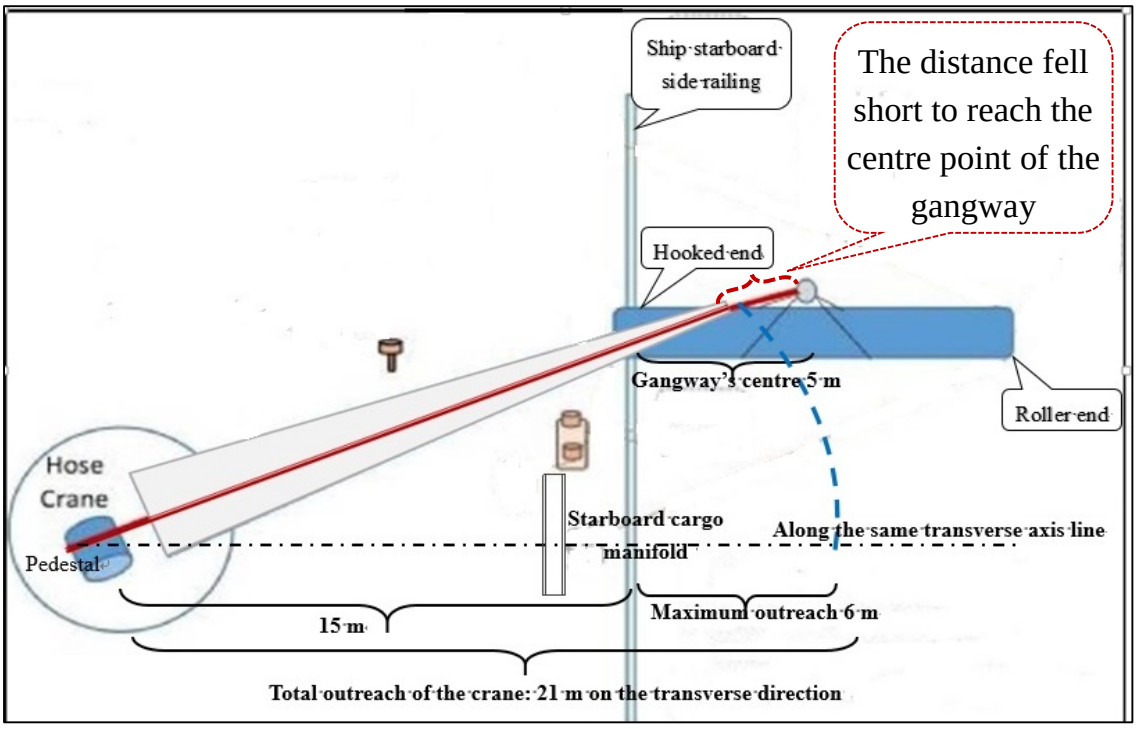

Figure 7 – Illustration of the outreach of the crane

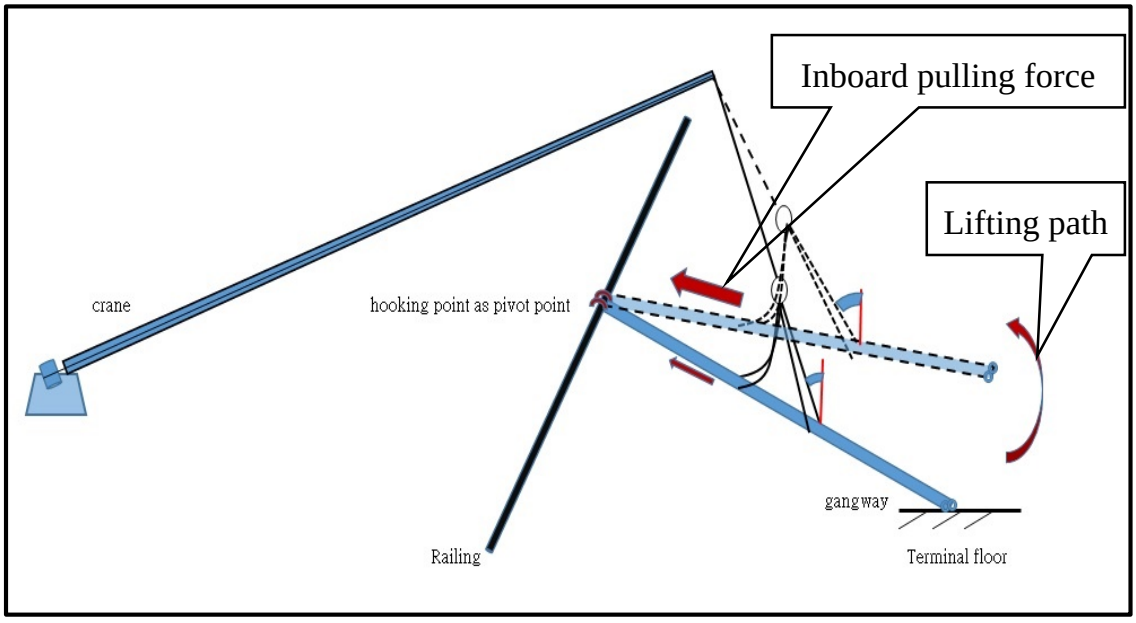

Figure 8 – Analysis of the inboard pulling force when the gangway was lifted in an asymmetrical line

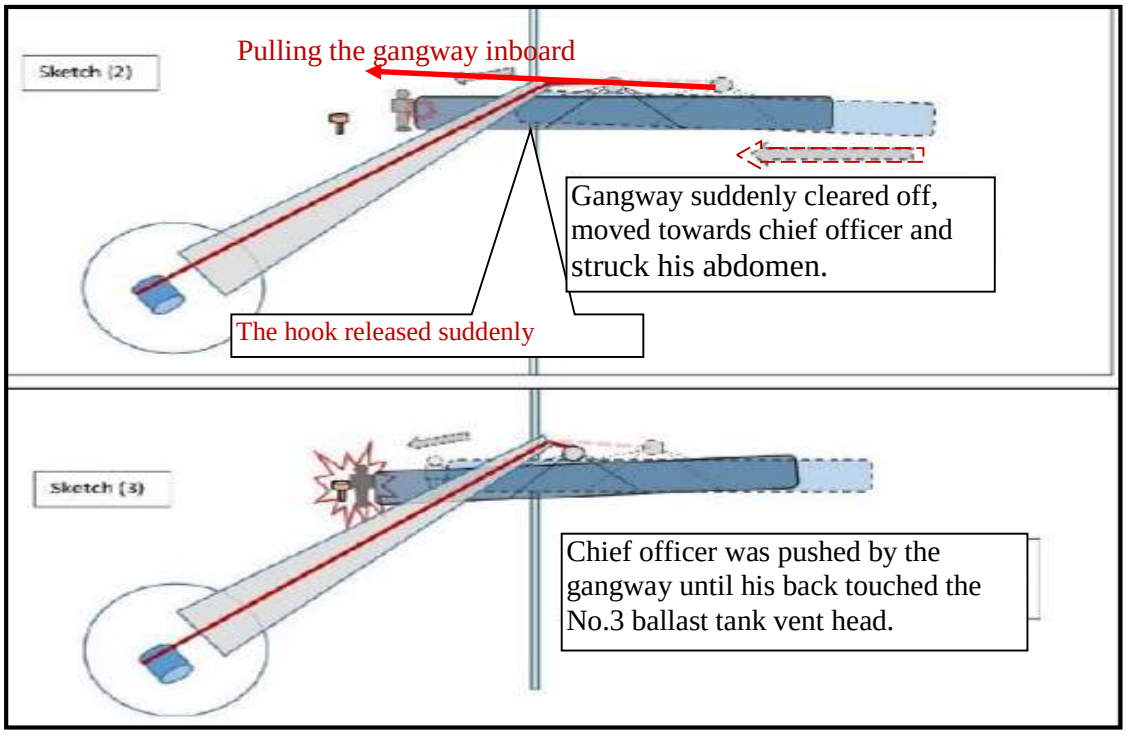

Figure 9 – The inboard movement of the gangway at a level where the hooked end of the gangway freed from the railing

Shipboard safety procedures and risk assessment

5.9 The "*Lifting plant and lifting operation (Crane operation)*" in the shipboard Safety Management Procedure (SMP) provided detailed instructions on the lifting operation. The procedure required that *the vessel* should observe the safe practice provided in the "*Code of Safe Working Practices for Merchant Seaman (COSWP)*" on "*Provision and Care of lifting plant and Carrying out of lifting operation*". Warnings on the potential hazards were described also in the SMP, i.e. "*Lack of control of the swing of the load while it is being lifted*", "*Lack of acknowledge of the crew in the lifting operation particular personal safety, e.g. nobody should put himself in a position of danger like.*" "*LIFTING OPERATIONS*" of the COSWP described also that "*Loads should if possible not be lifted over a person or any access way, and personnel should avoid passing under a load which is being lifted*".

5.10 The company also required that risk assessments should be conducted for critical operations such as lifting heavy object and arrangement of gangway. However the risk assessment on board *the vessel* was obviously not conducted properly before the lifting operation, particularly the above mentioned aspect of "*nobody should put himself in a position of danger like*" was not considered. As the warning on the potential hazards and instructions for lifting operation were overlooked putting together that risk assessment was not conducted properly, the chief officer had placed himself in the danger swing zone of the lifting operation.

5.11 In accordance with the requirements for lifting operation of the "Code of Safe Working Practices for Merchant Seafarers"(COSWP), it is mentioned that "*The use of lifting appliances to drag heavy loads with the fall at an angle to the vertical is inadvisable because of the friction and other factors involved, and should only take place in exceptional circumstances where the angle is small, there is ample margin between the loads handled and the SWL of the appliance, and particular care is taken*." It appears that Ship operation / procedure on lifting operation under asymmetrical centre of lifting should be avoided as far as practicable. Particular care should be taken to control the movement of lifting and to clear from the danger zone if an asymmetrical centre of lifting has to be taken.

Company's action after the incident

5.12 After the incident, the management company developed a new procedure for restoring the gangway in two stages: "…at first stage, half of the gangway should be drawn-in with deck crane. Then the hook end should be landed on deck; at the second stage, re-locate the crane wire to gangway lifting sling (in the middle) and lifted up to stow position (Figure 10)." This newly developed procedure could avoid the hindering of the hooks by the railing, and this lifting practice is apparently better than the practice of hoisting the gangway under an asymmetrical centre lifting.

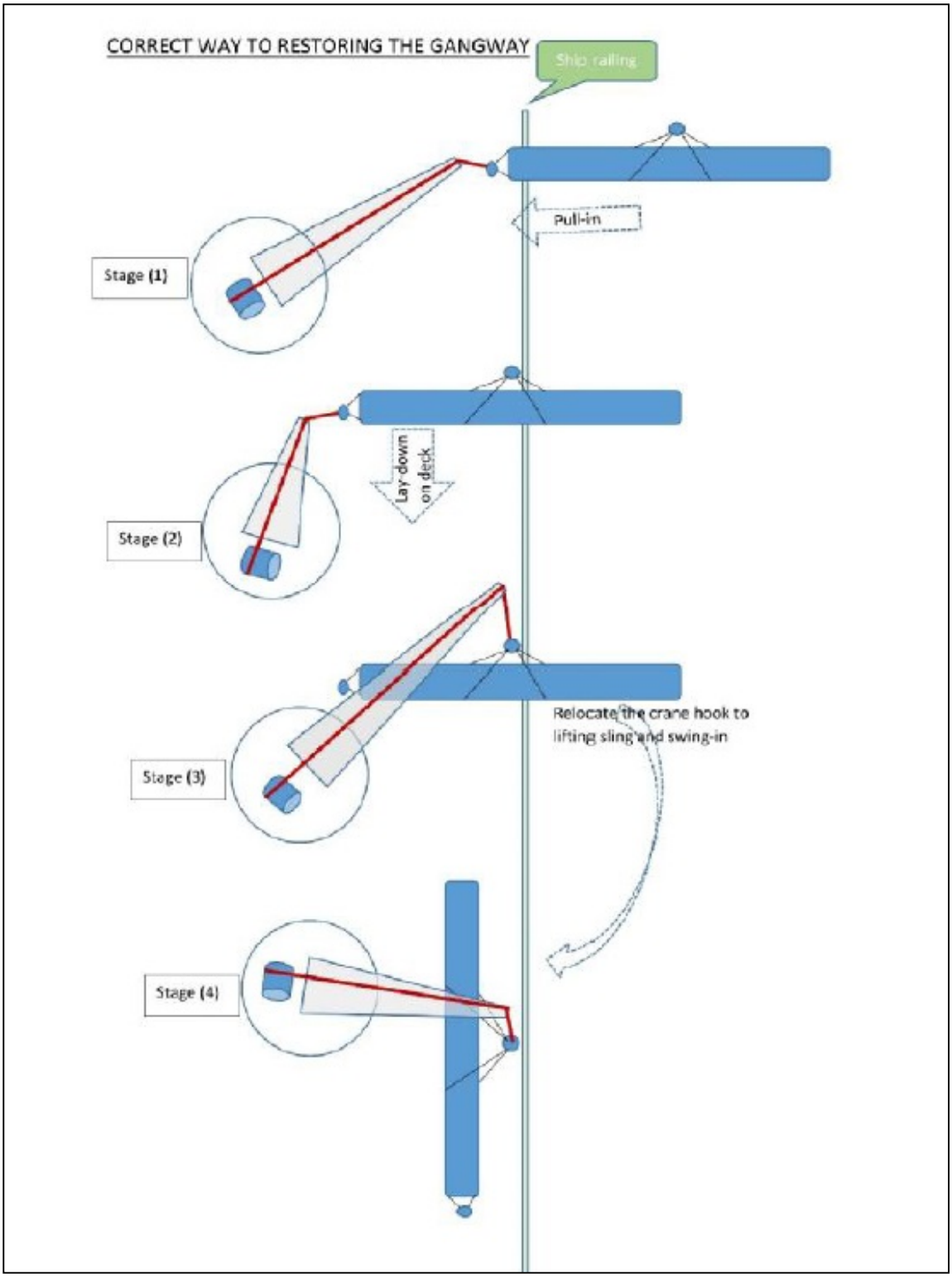

Figure 10 – Diagram to show the new procedure for lifting up the gangway

Working hours and Alcohol Abuse

5.13 There was no evidence to show that the crew including the deceased chief officer suffered from fatigue at work. There was no indication or evidence of alcohol abuse of the chief officer and the crew.

Weather and environment condition

5.14 At the time of incident, the weather was calm. Deck and terminal illumination was proper. The ambient condition was not considered as a contributory factor leading to the incident.

Medical treatment and the company's revision on medical care procedure

5.15 The chief officer visited doctor on 13 February 2016, but he refused to accept the doctor's advice to stay in the hospital for further observation and treatment. He passed away one and half day later before *the vessel* departed from the port.

5.16 The master was not fully aware of the critical condition of the chief officer. Furthermore, the master did not consider the advice of the local doctor and confirm the medical fitness of the chief officer for carrying out his duties on board in order to determine whether he should stay on *the vessel* or not.

5.17 After the incident, the company circulated its investigation report to highlight the lessons learnt "Never take lightly to the injury that had taken place in abdomen". The company had also revised the "shipboard emergency preparedness procedure – Injured /sick person" to state that the master or his appointed representative should caution the sick / injured person who is to insist on his refusal for urgent medical treatment as recommended by medical doctor.

The autopsy report

5.18 The autopsy report revealed that the death of the chief officer was due to "closed injury on aorta and abdomen caused by shock & huge ruptured abdomen." It appeared that the closed injury was caused from striking on the chief officer's abdomen by the gangway.

6. Conclusions

6.1 At about 2230 hours on 12 February 2016, the chief officer was struck by the gangway on his abdomen during lifting up the gangway for securing on top of the deckhouse. The chief officer visited a doctor the next day after *the vessel* arrived at the port Pelingtung, Indonesia, but he refused to accept the doctor's advice of hospitalization. The chief officer was declared dead on board at 1655 hours on 15 February 2016 just before *the vessel* was ready to leave the port.

6.2 The investigation into the incident revealed the contributing factors as follows:

(a) as limited by the crane's arm which could not reach the gangway's centre point, the gangway was lifted under asymmetrical centre line of hoisting thus causing the gangway being subjected to an inboard pulling force when lifted. As a result, the hooks at the end of the gangway were stuck with the vessel's railing. When the hooks were suddenly freed from the railing, the sudden release of energy had resulted in driving the gangway inboard in an uncontrolled manner and struck the chief officer who had failed to observe the company's safe working practice by standing at a location within the danger zone of the gangway's hoisting path; and

(b) the deployment of four guard ropes failed to withhold the sudden inboard swing of the gangway. The risk assessment and the work plan prepared before the gangway lifting operation had not been done properly.

6.3 The following safety issue was also observed:

(a) seafarers should always consider to accept doctor's advice when attending medical treatments. The chief officer might save his life if he decided to stay in hospital as originally advised by a local doctor on 13 February 2016.

7. Recommendations

7.1 In addition to the new developed procedure of recovering portable gangway as mentioned in paragraph 5.12, the ship management company should also:

(a) issue safety circular to inform all masters, officers and crew on board their fleet of the findings and lessons learnt from this incident, particularly of the need to conduct proper risk assessment for critical operations such as lifting heavy objects. In lifting operation, no person should stand in the danger zone and that lifting operation under asymmetrical centre of the lift should be avoided as far as practicable; and

(b) instruct its master to check the medical report of a sick person after consulting a local doctor at shore to confirm whether he/she is still fit for duties on board and take appropriate action accordingly. Furthermore, the company should also remind seafarers to consider duly and accept doctor's advice when attending medical treatments.

7.2 A Merchant Shipping Information Note should be issued to promulgate the lessons learnt from this incident.

8. Submissions

8.1 The draft report was sent to the following parties for their comments:

(a) the ship management company; and

(b) the master of *the vessel*.

8.2 Comments were received from the ship management company. The report was amended as appropriate according to the comments.