Report of investigation into the fatal accident on board the Hong Kong registered bulk carrier "Hebei Universe" at Qingdao anchorage, China on 17 December 2021

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

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Purpose of Investigation

The purpose of this investigation, conducted by the Marine Accident Investigation Branch (MAIB) of Marine Department, is to determine the circumstances and the causes of the incident with the aim of enhancing the safety of life at sea and avoiding similar incidents 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 MAIB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

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Summary

On 17 December 2021, a fatal accident happened on board the Hong Kong registered bulk carrier "Hebei Universe" (*the vessel*) at Qingdao Chaoliangdao anchorage, China.

At 1735 hours, the duty Oiler (*the Oiler*) informed the Electrician Officer (*the ETO*) that the common alarm (*the alarm*) of the elevator of *the vessel* (*the elevator*) activated. *The ETO* replied that he would check *the elevator* the next day. At 2130 hours, the duty Engine Trainee (*the M/M*) discovered some blood came out from the entrance door of *the elevator* (*the entrance door*) on the upper deck and immediately reported the situation to the Third Engineer (*the 3/E*). *The 3/E* shouted to *the entrance door* but nobody answered. He then immediately reported the incident to the Chief Engineer (*the C/E*) and the Master. The engine room crew removed *the entrance door* on the upper deck and found *the ETO* was unconscious, lying on the cage top of *the elevator* bleeding from his nose and mouth. Afterwards, *the vessel* shifted to the inner anchorage of Qingdao with the permission of the port authority to seek shore medical treatment for *the ETO*. Unfortunately, *the ETO* was declared dead after the examination by the shore medical officer in the early morning of 18 December 2021.

The investigation identified the contributory factors leading to this accident were that the crew members failed to follow the Caution of Inspection or Maintenance of the Operation Manual for Elevator provided by the manufacturer (*operation manual*) and the requirements of the Code of Safe Working Practices for Merchant Seafarers (*the Code*)[1] in carrying out work on *the elevator* in a safe manner onboard; failed to conduct a risk assessment and follow the permit-to-work system before commencing the work on *the elevator*; lacked sufficient safety awareness in the work on *the elevator* and effective communication among the crew members onboard in executing their duties; underestimated the inherent risk of hazards associated with work on *the elevator*. The investigation also found that the shipboard Safety Management System (*SMS*) failed to follow the requirements of *the Code* to identify work on elevator, including work requiring access to its trunk, as one

[1] *The Code* is a publication required to be carried onboard Hong Kong ships pursuant to the Merchant Shipping (Seafarers) (Code of Safe Working Practices) Regulation (Cap. 478M).

of the main risks onboard.

1. Description of the vessel

Ship name	:	Hebei Universe (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO number	:	9420590
Type	:	Bulk Carrier
Year built, shipyard	:	2009, Dalian Shipbuilding Industry Co., Ltd.
Gross tonnage	:	94,710
Net tonnage	:	60,617
Summer deadweight	:	182,459 tonnes
Length overall	:	295 metres
Breadth	:	46 metres
Engine power, type	:	18,660 kW, MAN B&W 6S70MC-C MK7
Classification society	:	China Classification Society
Registered owner	:	Hebei Arrow Shipping Co., Ltd.
Management company	:	Golden Top Shipping Co., Ltd.

Figure 1: Hebei Universe

2. Sources of evidence

2.1 Information provided by the Master, the crew members and the management company of *the vessel* (*the company*).

3. Outline of events

(All times were local time UTC + 8 hours.)

3.1 At 0318 hours on 16 December 2021, *the vessel* arrived and anchored at Chaoliandao anchorage of Qingdao, China, waiting for berthing instruction.

3.2 At 1735 hours on 17 December 2021, *the Oiler* telephoned *the ETO* upon receiving *the alarm* in the engine control room. *The ETO* instructed *the Oiler* to reset *the alarm* directly in the elevator motor room located in between the upper deck and the top of the engine control room. *The Oiler* reset *the alarm* but without success. *The alarm* indicator light was still on. He reported the situation to *the ETO,* who was having dinner in the messroom. *The ETO* replied that he would check *the elevator* the next day.

3.3 At 1825 hours, *the alarm* displayed on the alarm panel in the engine control room was reset successfully, but it was re-activated at 1835 hours. *The Oiler* acknowledged *the alarm* and then checked *the elevator* position indicator at *the entrance door* on the upper platform deck in the engine room. He found *the elevator* was stopped at the A-deck.

3.4 *The 3/E* and the Assistance Engineer (*the A/E*) came to the engine control room to check *the alarm*. At 1900 hours, *the 3/E* and *the A/E* left the engine control room and backed to accommodation using stairways, and no abnormality of *the elevator* was observed except *the alarm*.

3.5 At 2130 hours, the duty *M/M* left the engine room to the toilet on the upper deck and discovered some blood came out from *the entrance door* on the upper deck. He immediately reported the situation to *the 3/E*. Afterwards, *the 3/E* arrived at the scene and shouted to *the entrance door* to check whether any person was staying inside *the elevator* cage, but nobody answered. He then immediately reported the incident to the Master and *the C/E*.

3.6 *The 3/E* and the Second Engineer (*the 2/E*) attempted to manually open *the entrance door* on the upper deck without success. Later, the engine room crew removed *the entrance door* on the upper deck and found *the ETO* was unconscious, curling on the top of *the elevator* cage (Figure 2), bleeding from his nose and mouth, head tilting downward, and facing *the entrance door*.

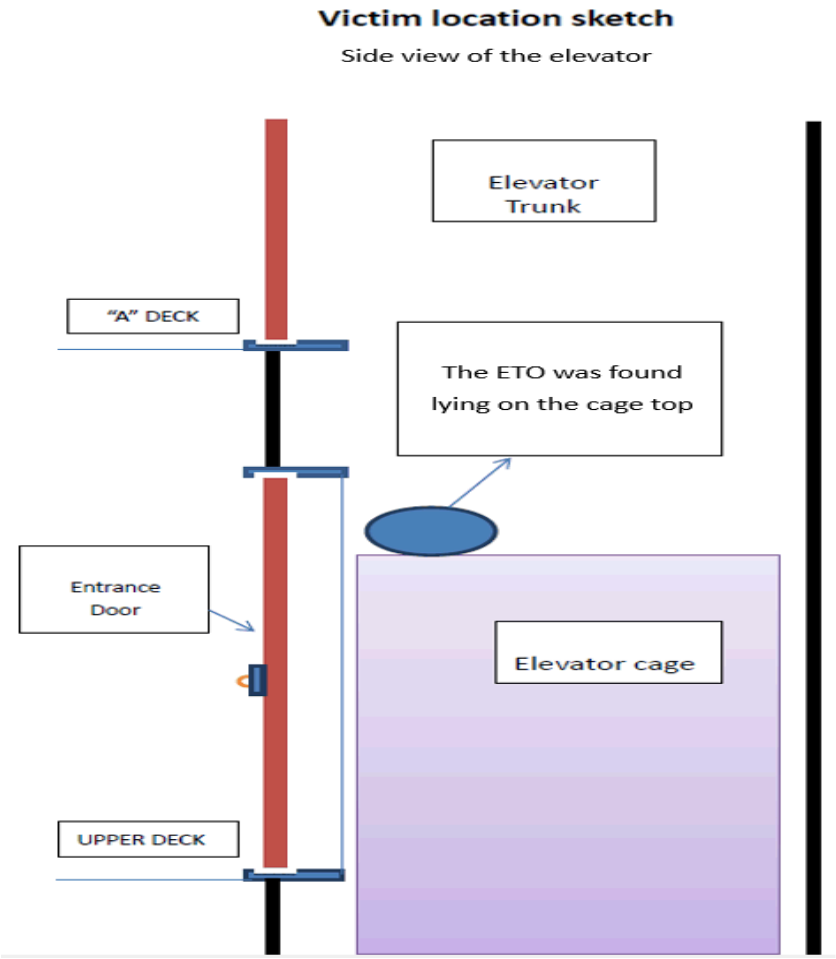

Figure 2 Victim's location inside the elevator trunk

3.7 At 2144 hours, the Master reported the accident to *the company*, the vessel traffic service center of Qingdao, and the local agent for assistance. The engine room crew slowly lowered *the elevator* by manually operating the traction machine in the elevator motor room to align the upper edge of *the elevator* cage with the upper deck floor level. They then moved *the ETO* from the cage top of *the elevator* and placed him on the floor.

3.8 The crew members examined *the ETO* and only observed bleeding from his nose and mouth but without trauma on his body. The cardiopulmonary resuscitation was not applied to *the ETO* because his injury was unknown.

3.9 Due to strong wind, shore medical officer was unable to board *the vessel* by helicopter. As such, *the vessel* started to shift to the inner anchorage of Qingdao with the permission of the port authority at 0001 hours on 18 December 2021.

3.10 At 0426 hours on 18 December 2021, *the vessel* anchored at No.1 anchorage of Qingdao. The shore medical officer boarded *the vessel* and examined *the ETO*. Unfortunately, *the ETO* was declared dead on board after the examination by the shore medical officer.

4. Analysis

Certification and experience of the crew

4.1 The statutory trading certificates of *the vessel* were valid and in order. *The vessel* was manned by 23 crew members, including the Master. The manning scale of *the vessel* complied with the Minimum Safe Manning Certificate issued by the Hong Kong Marine Department (HKMD) on 21 May 2021.

4.2 The Master joined *the vessel* on 19 June 2021. He had about nine years of experience as a master. He possessed a valid master certificate of competency issued by the Government of the People's Republic of China and held a valid a class 1 license (deck officer) issued by the HKMD on 20 April 2020.

4.3 The Chief Engineer joined *the vessel* on 19 June 2021. He had about nine years of experience as a chief engineer. He possessed a valid chief engineer certificate of competency issued by the Government of the People's Republic of China and held a valid class 1 license (marine engineer officer) issued by the HKMD on 10 April 2019.

4.4 *The ETO* joined *the vessel* on 04 April 2021. *The ETO* had about seven and half years of experience as an electrician officer. He possessed a valid certificate of proficiency issued by the Government of the People's Republic of China on 1 September 2017. *The ETO* served as an electrician officer on four sister vessels under *the company* for about three years. All these vessels were fitted with similar types of elevators. He was familiarized with the operation and maintenance of elevators.

4.5 There were no abnormalities noted with regard to the certification and experience of the crew members concerned.

Weather and sea condition

4.6 At the time of the accident, the weather was cloudy with northwesterly wind of Beaufort Wind Scale force between 5 and 7. The sea was moderate to rough and the visibility was good. According to the

crew statement, *the vessel* was quite steady on the day of the accident though the weather outside was unpleasant as *the vessel* was in full loading condition. It was deduced that the weather should not be a contributory factor to the accident.

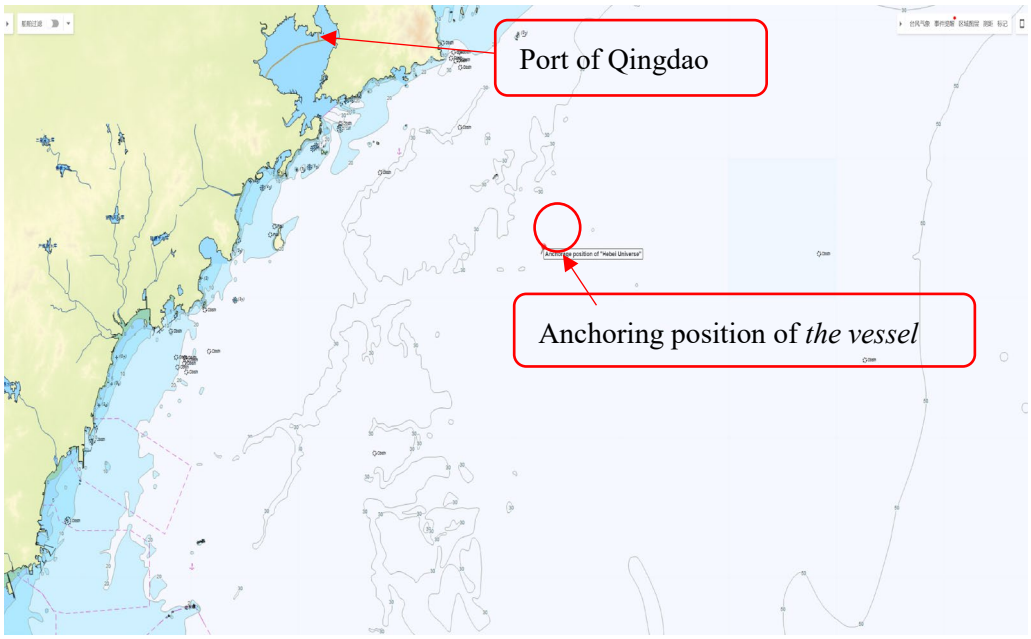

Figure 3: The anchoring position of *the vessel* at the time of the accident

Duty and supervision of the ETO

4.7 The shipboard *SMS* manual of *the vessel* explicitly stated in the document number SHI/003/001 that *the ETO* was in charge of the management and maintenance of the electrical equipment, including *the elevator* on board, responsible to *the C/E* and *the 2/E*. *The C/E* or *the 2/E* would generally assign work to *the ETO* during the morning toolbox meeting.

4.8 In the morning of 17 December 2021, a routine toolbox meeting was held by *the 2/E* to assign jobs to the engine room crew. No elevator work was assigned to t*he ETO* in the meeting.

4.9 *The ETO* planned to carry out elevator repair the next day upon receiving the notification of the problem of *the alarm* in the late afternoon of 17 December 2021. However, he did not inform *the C/E, the 2/E,* or any other crew members for the change of his decision to

work alone on the cage top of *the elevator* during his non-working hours on the day of the accident. This indicated the lapse of discipline across the vessel in terms of maintaining effective communications among the crew members when executing their duties.

Fatigue, alcohol and drug abuse

4.10 There was no evidence to show that any crew members on board including *the ETO* suffered from fatigue at work, alcohol or drug abuse.

Probable cause of death

4.11 According to the information provided by *the company*, *the ETO* had a history of hypertension and his cabin was found with many medicines for treating hypertension. However, with the *ETO's* family refused to conduct an autopsy for *the ETO*, his death if caused by hypertension could not be established

4.12 When *the ETO* was found lying on the cage top of *the elevator*, he was bleeding from his nose and mouth with his face turned into purple. But no trauma was found on his body after being examined by the crew members.

4.13 The death certificate of *the ETO* issued by the hospital in Qingdao stated that the external compressive force of machinery might have caused his death. The police report stated that there was no trauma found on the body of *the ETO* thus ruling out the factor of homicide. It could be deduced that *the ETO* might have been crushed by the moving elevator while repairing *the elevator* on the cage top, resulting in his death.

Elevator operation

4.14 *The vessel* is fitted with a typical single wrap traction geared shipboard elevator with a capacity of four persons with a maximum of 350 kg. *The elevator* operates within a hoistway for seven levels from the engine room upper platform deck to the E-deck. According to the specification of the drawing plan of *the elevator* (DWG No. K070176-180) provided by the manufacturer (*the maker's instruction*), the

operating condition of *the elevator* is limited to 10° pitching and 15° rolling of *the vessel.* In addition, paragraph 2.7 of the document number SHI/006/002 of the shipboard *SMS* manual (*Safe Operations of the Elevator*) also stated that the shipboard elevator was not allowed for use in case of the vessel's rolling exceeds 5°.

4.15 As mentioned in paragraph 4.6, *the vessel* was quite steady of staying in the anchorage when the accident happened. It was unlikely that the accident was caused by the vessel's movement.

4.16 *The elevator* can be operated in "auto"[2] mode, "manual"[3] mode (Figure 3), and mechanical[4] mode. An emergency stop switch is provided on the operating panel of the *elevator* located at the top of the cage. A call button is installed at the side of entrance door on *each deck* and inside *the elevator* cage.

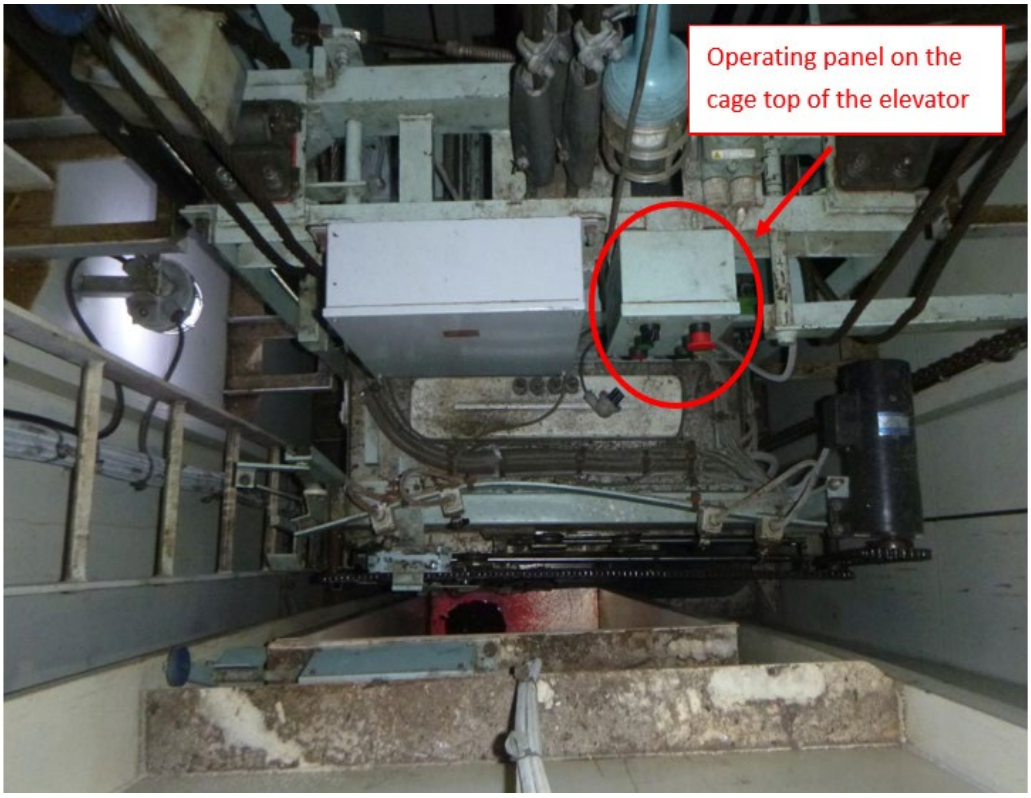

Figure 3 Operating panel on the cage top of *the elevator*

[2] *The elevator* moves freely upon receiving call request.
[3] *The elevator* moves by pressing the up and down buttons on the operating panel at the top of the elevator cage.
[4] *The elevator* is manually operated using the turning handle and brake releasing lever attached to the traction machine in the elevator motor room without a power supply.

4.17 Chapter 19.19.9 of *the Code* stated that the appropriate safety signs must be prominently displayed in the area and on control equipment, such as call elevator buttons when work on the elevator is carried out.

4.18 *The operation manual* stated that a post of "Out of service" or "Don't use" (*safety sign*) should be displayed on the entrance door of each deck and more than two engineers with effective communications should attend the work on *the elevator*. *The operation manual* also stated that the operation mode of *the elevator* should be switched to the "manual" mode, and that the emergency stop switch should be changed to the "trip" position while working on the cage top of *the elevator*.

4.19 The investigation revealed that during the repair of *the elevator*, the operating panel on the cage top was set in "auto" mode and the emergency stop switch was not in the "trip" position. *The ETO* was found working alone on the cage top without displaying any *safety signs*. He was exposed to serious safety hazards while carrying out the repair work on *the elevator* alone. He did not follow the requirements of the *operation manual* and *the Code*, resulting in his trapping between the cage top and upper edge of the upper deck entrance door.

Risk assessment and permit-to-work

4.20 Chapters 19.19.6 and 19.19.8 of *the Code* stated that an initial risk assessment must be carried out to identify hazards associated with the work on each elevator installation, including work requiring access to the elevator trunk; a permit-to-work system should apply to the work based on the findings of its risk assessment with risk control measures provided to ensure personal safety while working on *the elevator*. Any person working alone on *the elevator* is not allowed.

4.21 Paragraph 1 of *the operation manual* also required that a permit of authorized person should be obtained before commencing elevator inspection or work on board *the vessel*.

4.22 The investigation revealed that prior to conducting the work on the cage top of *the elevator*, no risk assessments were carried out, and no work permits were issued. The investigation also revealed that the

requirements of *the Code* and *the operation manual* regarding work on *the elevator* were not followed.

Safety Awareness

4.23 Paragraphs 4.17, 4.18, and 4.22 above revealed that *the ETO* had insufficient safety awareness and underestimated the inherent risk of hazards associated with the work on *the elevator*.

Shipboard Safety Management System

4.24 The investigation also found that the shipboard SMS did not identify the work of the elevator is one of the risk items onboard the vessel. If *the company* had identified the work on *the elevator* as a risk item according to the shipboard *Risk Assessment Procedure*, thus providing a safe working guide to the crew members, the accident might have been avoided.

5. Conclusions

5.1 On 17 December 2021, a fatal accident happened on board *the vessel* at Qingdao Chaoliangdao anchorage, China.

5.2 At 1735 hours, *the Oiler* informed *the ETO* that *the alarm* of *the elevator* activated. *The ETO* replied that he would check *the elevator* the next day. At 2130 hours, *the M/M* discovered that some blood came out from *the entrance door* on the upper deck and immediately reported the situation to *the 3/E*. T*he 3/E* shouted to the entrance door but nobody answered. He then immediately reported the incident to the Chief Engineer (*the C/E*) and the Master. The engine room crew removed *the entrance door* on the upper deck and found that *the ETO* was unconscious, lying on the cage top of *the elevator* bleeding from his nose and mouth. Afterwards, *the vessel* shifted to the inner anchorage of Qingdao with the permission of the port authority to seek shore medical treatment. Unfortunately, *the ETO* was declared dead after the examination by the shore medical officer in the early morning of 18 December 2021.

5.3 The investigation identified the contributory factors leading to the accident were as follows:

(a) the crew members failed to follow the requirements of shipboard *operation manual* and *the Code* to carry out work on *the elevator* in a safe manner;

(b) the crew members failed to conduct a risk assessment and follow the permit-to-work system before commencing the work on *the elevator*;

(c) the crew members lacked sufficient safety awareness in the work on *the elevator*, effective communication among the crew members onboard in executing their duties, and underestimated the inherent risk of hazards associated with work on *the elevator*; and

(d) the shipboard *SMS* failed to follow the requirements of *the Code* to identify work on *the elevator*, including work requiring access to its trunk, as one of the main risks onboard.

6. Recommendations

6.1 The management company should issue circulars informing all Masters, officers, and crew members of its fleet of the findings of the investigation and the lessons learnt from this accident and instruct them to:

(a) strictly follow the shipboard *operation manual* and *the Code* requirements when carrying out the work on the elevator in a safe manner on board;

(b) ensure that the risk assessment and the permit-to-work system are followed before commencing the work on the elevator*;* and

(c) enhance safety awareness and safety culture on board in order to ensure that the crew members have sufficient safety awareness in the work on the elevator.

6.2 The management company should revise the shipboard *SMS* to identify work on elevator, including work requiring access to its trunk, as one of the main risks onboard and conduct an internal audit on *the vessel* to ensure that the crew members strictly follow the safety requirements when carrying out work on *the elevator*.

6.3 A Hong Kong Merchant Shipping Information Note is to be issued to promulgate the lessons learnt from this accident.

7. Submission

7.1 The draft investigation report, in its entirety, was sent to the management company and the Master of *the vessel* for their comments.

7.2 By the end of consultation period, comment from the management company was received and amended as appropriate.