Taiwan Transportation Safety Board

Major Marine Occurrence Final Report

July 20th, 2023

The Palau-flagged Container Ship ANGEL Sank off near the Port of Kaohsiung

Report Number: TTSB-MOR-25-01-001

Report Date: January, 2025

In accordance with the Transportation Occurrences Investigation Act, and the Casualty Investigation Code (CI Code) approved by International Maritime Organization Resolution MSC.255(84), this report is intended solely to enhance maritime navigation safety.

Article 5, Transportation Occurrences Investigation Act:

The objective of the Taiwan Transportation Safety Board's investigation of major transportation occurrences is to prevent the recurrence of similar occurrences. It is not the purpose of such investigation to apportion blame or liability.

CI Code of the International Maritime Organization (IMO) Chapter 1, Section1.1

Marine safety investigations do not seek to apportion blame or determine liability. Instead a marine safety investigation, as defined in this Code, is an investigation conducted with the objective of preventing marine casualties and marine incidents in the future.

This report is written in both Chinese and English, with the Chinese version being the main one.

Abstract

On July 20th, 2023, a Palau - Flagged container ship named ANGEL (hereafter referred to as "the ANGEL") with a gross tonnage of 16,145 and IMO number 9256406, was anchored at the second anchorage in Kaohsiung Port. The ship had 19 Azerbaijani crew members on board and was carrying 1,349 brand-new 20-foot empty containers. From July 4th to July 20th, the ship's cargo holds experienced continuous water ingress, the cargo holds no.4 and no.5 reaching a depth of approximately 4.5 meters.

On July 20th, at 0824 hours, the ANGEL's generator failed, resulting in a total power loss on the ship, the bilge pumps were unable to pump out the water from the cargo hold. At 0931 hours, the ship listed to the port side about 8 to 9 degrees, prompting the master of the ANGEL to issue a distress signal. At 1000 hours, the master declared the abandoning of the ship, and subsequently, 19 crew members were safely evacuated to shore by a Coast Guard vessel. At 05:30 on July 21st, the ANGEL sank in waters 2.8 nautical miles west of Kaohsiung Port. This incident resulted in a total loss of the ANGEL, with containers drifting and sinking in the surrounding waters.

According to the Transportation Incident Investigation Act of the Republic of China and the relevant provisions of the International Maritime Organization's guidelines for maritime accident investigations, the Taiwan Transportation Safety Board (hereafter referred to as "the TTSB") is an independent agency responsible for investigating transportation occurrence. The investigation team included members from: Flag State (Palau International Ship Registry, PISR), Maritime and Port Bureau of the Ministry of Transportation and Communications (MPB/MOTC), Taiwan International Ports Corporation Ltd, the Taiwan branch of Hong Kong's S5 Asia Limited, Lead Shine Marine Consultant Company, Chen

Chian Marine Engineering Co., Ltd., and Classification Society (International Register of Shipping, INTLREG).

The draft Investigation Report for this occurrence was completed in August 2024. Following the procedure, it was preliminarily reviewed and approved during the 69th board meeting of the TTSB on November 8th, 2024, and then submitted to relevant agencies and organizations for comments. After consolidating the feedback on December 25th, 2024, the investigation report was reviewed and approved during the 71st board meeting of the TTSB on January 10th, 2025, and the final report was released in January, 2025.

The investigation identified 13 findings based on a comprehensive review of factual data and analyses and issued 7 safety recommendations to the relevant organizations.

I. Findings

Findings Related to Probable Causes

1. The ANGEL had long suffered from inadequate maintenance, resulting in damage to the cargo hold floor structure. After departing from Colombo, the floor of the no. 3 cargo hold on the starboard side cracked, causing ballast water from the starboard side of ballast tank no. 3 to leak into no. 3 cargo hold. Following cargo loading at Dalian, the severe corrosion of the cargo hold floor led to its rupture due to the pressure from the container weight. This caused ballast water from the ballast tanks beneath the no. 4 and no. 5 cargo holds to leak into the no. 4 and no. 5 cargo holds. Furthermore, the ANGEL's remote ballast water control system was malfunctioning. After departing from Dalian, the fully loaded cargo holds made it impossible for the crew to enter the cargo holds to handle the water ingress and leakage.

2. On the day of the occurrence, the ANGEL's fuel pipeline was blocked by sludge and residue, which caused the main generator to shut down. This led to a total loss of power, and consequently, the ballast water pump ceased operation. The ship continued to list to port side at 45 degrees, resulting in a large volume of seawater rushing into the aft cargo holds and the engine room, ultimately causing the ANGEL to sink.

Findings Related to Risk

1. The ANGEL sailed with a full load of containers, the flooding issue in the cargo holds exceeded the crew's capacity to handle it due to a combination of factors including: (a) Damage to the hull, ballast water pipelines, and valves due to long-term lack of maintenance; (b) blockage, rust, or breakage of the sounding pipes; and (c) blockage of the bilge sewage wells and potential failure of the check valves to close properly.

2. The ship had not undergone a dry-dock inspection for over 5 years, and the ship owner and management company did not conduct an underwater hull inspection at the first convenient port or anchorage, as required by the Classification Society. They also did not carry out an additional International Safety Management (ISM) audit or complete 17 recommendations and 4 recommendation memorandums within the deadline set by the Classification Society. These failures led to a missed opportunity to prevent the occurrence.

3. Ten days before the occurrence, the Flag state (Palau) was aware that the ANGEL was in an unseaworthy condition but failed to notify Taiwan’s maritime authorities. This prevented them from requesting assistance regarding the ANGEL prior to the occurrence.

4. Four days before the occurrence, the shipping agent (S5 ASIA) was busy handling ANGEL's emergency entry into the port and planning backup plans. The agent failed to notify the port authority that the cargo holds of ANGEL were flooded and the ship had almost lost its seaworthiness.

5. Despite the ship management company (ZULU) establishing a safety management system and work guidelines before departure, it failed to effectively implement training for the handover of new and old crew members and did not promptly provide resources to address the water ingress issue. The ship's engine room had numerous problems, and severe flooding in the cargo holds during navigation made it impossible for the crew to resolve the listing issues.

6. Before the occurrence happened, the crew of the ANGEL was changed, and the chief officer, facing threats to their safety, sent an emergency (Pan-Pan) email to the International Transport Workers' Federation (ITF) and the Singapore Maritime and Port Authority.

7. When this accident occurred, the Kaohsiung VTS adopted the trust principle for anchoring ships. When a ship applied for anchoring upon arrival, the shipowner was not required to provide information about Protection and Indemnity Insurance (P&I).

Other Findings

1. At the time of the occurrence, the ship had carried a master and 18 crew members, all of Azerbaijani nationality. All 19 crew members held valid certificates of competency issued by the competent authority of the ship's Flag state.

2. There is no evidence indicating that the ANGEL was subjected to external force impacts or contacted navigational obstacles. There is no evidence

indicating that crew fatigue, crew qualifications, and weather factors as related to this occurrence.

3. After the sinking of the ANGEL, there were discrepancies in the ship-related certificates provided by the shipowner (Navramar), the Classification Society (INTLREG), and the ship management company (ZULU), making it impossible to confirm the validity of the ANGEL vessel's relevant certificates at the time of the occurrence.

4. After the occurrence, the Port of Kaohsiung, Taiwan International Ports Corporation, Ltd. revised its anchorage management regulations. The anchoring period for ships is set at 7 days, during which the ship must maintain seaworthiness and valid shipowner's liability insurance (Protection and Indemnity Insurance, P&I). Additionally, it requires ship agents to register relevant certification documents in the maritime administration system and to affirm that the vessels they represent are safe and seaworthy.

II. Safety Recommendations

To Maritime and Port Bureau of the Ministry of Transportation and Communications

1. Continue to maintain communication with the Palau Maritime Authority, proactively grasp and mutually provide information on flagged ships that have concerns regarding seaworthiness, in order to ensure the timeliness of port state control inspections between the two countries.

To Taiwan International Ports Corporation, Ltd.

1. Actively disseminating information to ship agencies is essential to ensure they have a comprehensive understanding of the ships they represent. If there are concerns about seaworthiness, they should promptly report to the

competent authorities to ensure port safety and navigation order.

2. Re-examine the management regulations for anchorage use, enhance training on anchorage operational procedures, and promote the submission of valid shipowner's liability insurance (Protection and Indemnity Insurance, P&I) documents for ships anchoring in port, to improve navigation operations in the port area and anchorage.

To S5 ASIA (HONG KONG) Limited Taiwan Branch

1. Comply with the management regulations for shipping agents, and accurately understand the conditions of the ships they represent entering the port. If there are any concerns regarding seaworthiness, they should promptly report to the competent authorities to ensure port safety and navigational order.

To Palau International Ship Registry (PISR)

1. Supervise the registered ships and their management companies. If there are concerns regarding the seaworthiness of a ship, they should promptly report them to the relevant port state and coastal state maritime authorities to ensure port safety and the safety of ship navigation.

2. Reference the pertinent provisions of the International Maritime Organization (IMO) convention), supervise the ship inspection quality and certificate management procedures of the International Register of Shipping (INTLREG) to ensure that inspected ships comply with the safety regulations of the Flag State and the IMO. Strengthen oversight of ships with time-bound improvement deficiencies and take timely control measures to reduce the risk of ships losing their seaworthiness while in navigation.

To International Register of Shipping (INTLREG)

1. Enhancing the quality of ship inspections and certificate management procedures to ensure that inspected ships comply with the safety regulations of the Flag State and the IMO. Strengthen control over ships with time-bound improvement deficiencies and take timely control measures to reduce the risk of ships losing their seaworthiness while in navigation.

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Glossary of Abbreviations and Acronyms

Term or acronym	Definition or meaning
AB	Able Seaman
AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aids
BWMP	Ballast Water Management Plan
BWMS	Ballast Water Management System
BWS	Bilge Water System
DBT	Double Bottom Tank
DOC	Document of Compliance
DSC	Digital Selective Calling
G	Center of Gravity
GM	Metacentric Height
GZ	Righting Lever
HFO	Heavy Fuel Oil
IFO	Intermediate Fuel Oil
IMO	International Maritime Organization
INTLREG	International Register of Shipping
ISM CODE	International Safety Management Code
ITF	International Transport Workers' Federation
M	Transverse Metacenter
MAIB	Marine Accident Investigation Branch
MGO	Marine Gas Oil
MT	Metric Ton
MTNet	Maritime Transport Network
MOTC	Ministry of Transportation and Communications
MPA	Maritime and Port Authority of Singapore
MPB	Maritime Port Bureau

MRCC	Maritime Rescue Co-ordination Centre
PISR	Palau International Ship Registry
P&I	Protection and Indemnity
PSC	Port State Control
S-VDR	Simplified Voyage Data Recorder
SMC	Safety Management Certificate
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
TEU	Twenty-foot Equivalent Unit
TIPC	Taiwan International Ports Corporation, Ltd
TPNet	Taiwan Port Service Network
TTSB	Taiwan Transportation Safety Board
VHF	Very High Frequency
VTS	Vessel Traffic Service
WT	Wing Tank

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Chapter 1 Factual Information

1.1 History of the Voyage

During the period from July 4th to July 7th, 2023[1], the Palau-flagged container ship ANGEL, with a gross tonnage of 16145[2], IMO[3] number 9256406, carried 18 crew members (3 Turkish and 15 Azerbaijani) and was loaded with 1,349 twenty-foot standard empty containers. The ship was anchored at the second anchorage of Kaohsiung Port (see Figure 1.1-1, mark X indicates the anchorage position of the ANGEL). On July 8th, the shipowner's representative arranged for 7 crew members to disembark (3 Turkish and 4 Azerbaijani) and 8 new crew members (all Azerbaijani) to board. From July 4th to July 20th, the ship's cargo holds experienced continuous water ingress, the cargo holds no.4 and no.5 reaching a depth of approximately 4.5 meters[4] (see Figure 1.1-2, where the red circle indicates the drainage location of the portable pump).

On July 20th, at 0824[5] hours, the ANGEL's generator failed, resulting in a total power loss on the ship, the bilge pumps could not pump out the water from the cargo hold. At 0931 hours, the ship listed to the port side about 8 to 9 degrees, prompting the master of the ANGEL to issue a distress signal. At 1000 hours, the master declared the abandoning of the ship, and subsequently, 19 crew members were safely evacuated to shore by a Coast Guard vessel. On July 21st at 0530 hours, the ANGEL sank completely in the waters 2.8 nautical miles west of the port of Kaohsiung. During the occurrence, the offshore area of the Port of

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[1] This report, when referring to international affairs, uses the Gregorian calendar (AD), meaning 2023 AD corresponds to the 112th year of the Republic of China (R.O.C.).

[2] Gross tonnage (GT) is a measurement of a ship's overall internal volume and is expressed in cubic meters without units

[3] International Maritime Organization (IMO).

[4] The chief engineer's mobile phone photo record started on June 2nd. The logbook recorded a maximum depth of 4.3 meters, while the crew interview indicated a depth of 4.5 meters.

[5] The time provided in this report are in Taipei time (UTC+8 hours), and the occurrence timeline is based on VDR time.。

Kaohsiung experienced Beaufort scale 4 winds and waves between 1 and 2 meters high. The occurrence resulted in the total loss of the ANGEL, with containers drifting and sinking in the surrounding waters.

The following is divided into 6 sections: change of classification, Society and Flag state of the ANGEL, first voyage information, occurrence voyage information, altering voyage plan and headings to Kaohsiung for anchorage, applying for emergency entry, and the master of the ANGEL announcement of abandoning ship and sinking.

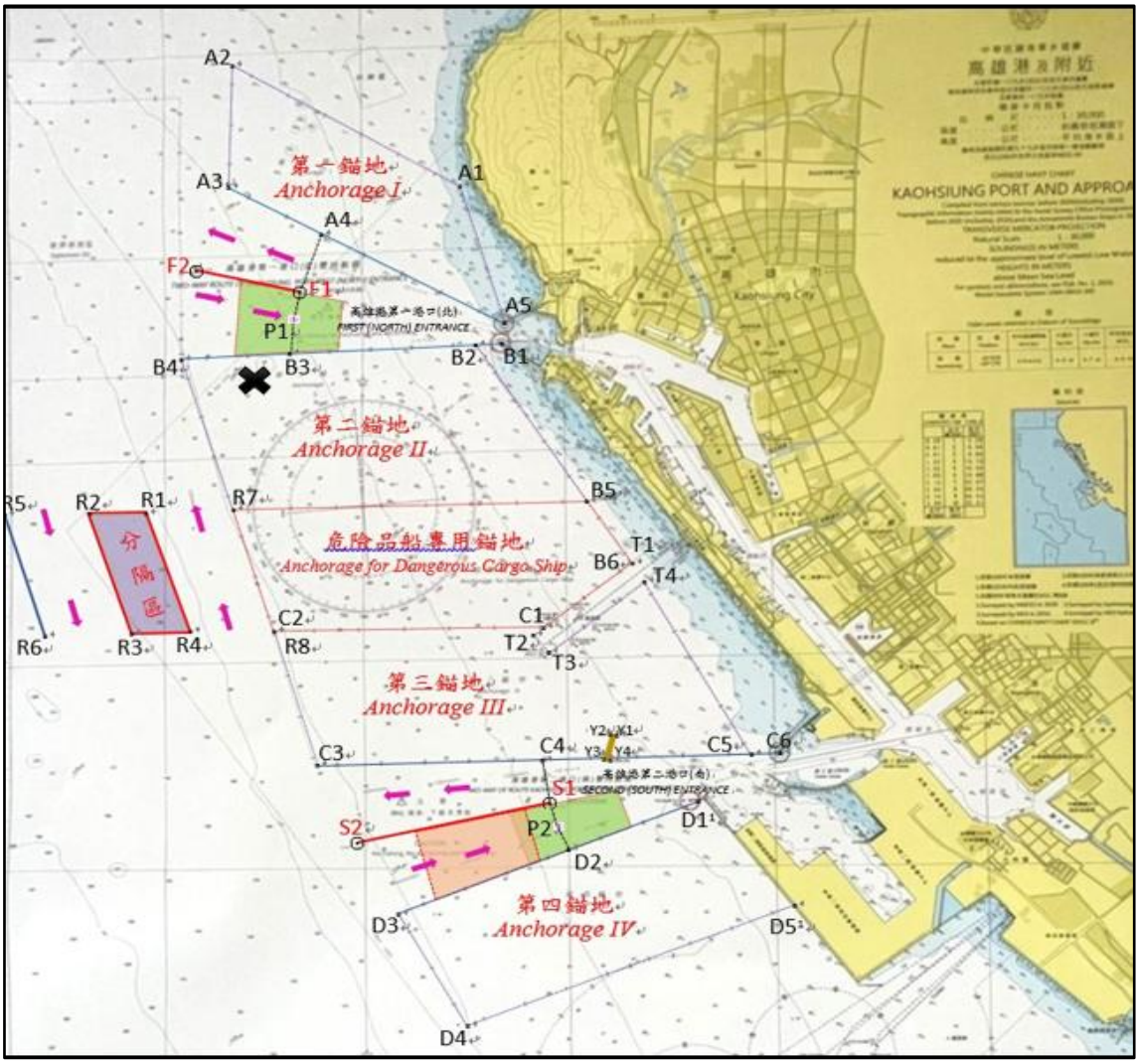

Figure1.1-1 Port of Kaohsiung Traffic Separation Scheme and anchorage configuration diagram

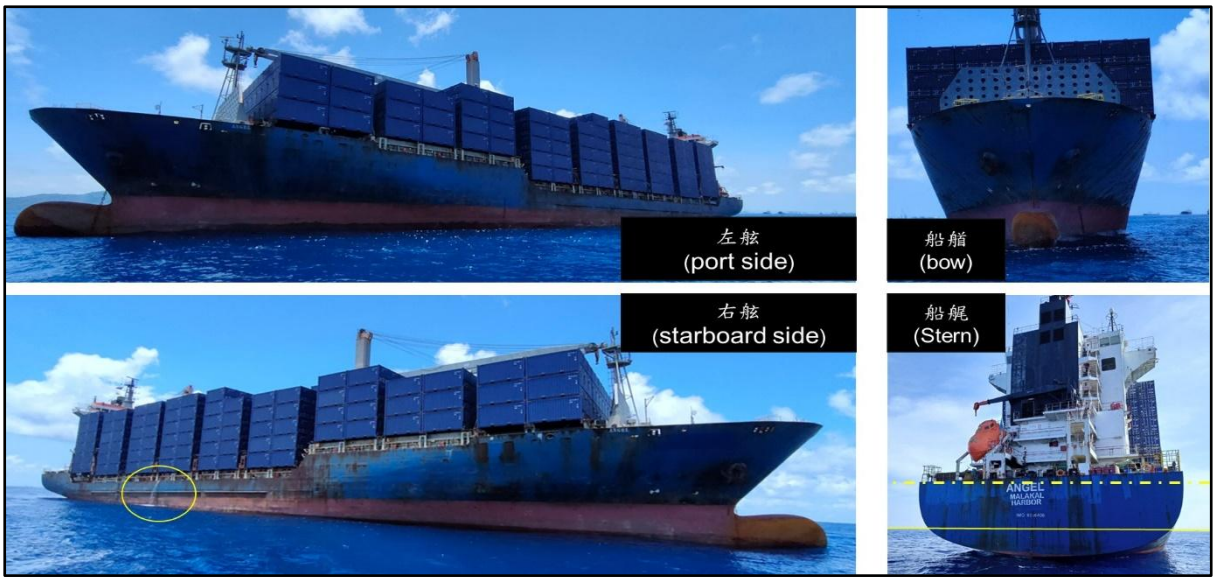

Figure1.1-2 Appearance of the ANGEL during Anchored. (taken on July 20, 2023)

1.1.1 Change of Classification Society and Flag State of the ANGEL

This ship has undergone multiple changes in ship owners, ship names, ship registries, and ship classifications. On June 1st, 2003, the new ship was launched and named H Langeland, with a class by Germanischer Lloyd. From June 2013 to June 2018, the ship was classified by the Indian Register of Shipping (IRS). From June 2018 to May 2023, the ship was renamed SSL GANGA and had a dual class, with both IRS and the Norwegian Classification Society.

In late May 2023, the ship was docked at the Port of Colombo, Sri Lanka. On May 30th, the new owner, Navramar Shipping INC., renamed the ship, ANGEL, changed the Flag state to Palau, and the Classification Society to the International Register of Shipping (INTLREG). The ship management company is ZULU Shipping LLC (hereinafter referred to as ZULU). The ANGEL's protection and indemnity (P&I) was insured with HYDOR AS, and the hull insurance was insured with ARGO Syndicate 1200.

1.1.2 First Voyage Information

This voyage refers to the period from May 31st to June 24th, 2023. According to the deck logbook of the ANGEL and the crew's interview records, the new ship owner replaced all crew members between May 24th and 30th, 2023, and the master and crew did not complete the handover procedures properly. Between May 31st and June 2nd, INTLREG dispatched one surveyor who boarded the ship to conduct the renewal statutory survey.

According to the AIS track data of the ANGEL. From June 9th to June 24th, the ANGEL heaved up anchor and sailed from the Port of Colombo via the Singapore Strait, docked in Hong Kong for supplies, and sailed along the west side of the Taiwan Strait to the Port of Dalian in China. At approximately 1010 hours on June 24th, 1,349 new 20-foot empty bulk containers began to be loaded in Dalian. During this period, the insurance company HYDOR AS dispatched a surveyor on the ship, to perform the renewal statutory survey[6].

According to international conventions, ship inspections are divided into renewal survey (once every 5 years), intermediate survey, annual survey (once every 1 year, within 3 months before and after the deadline), and bottom survey (twice every 5 years or shall not exceed 36 months).

According to the interview record with the chief engineer of the ANGEL and his mobile phone records on June 2nd, 2023, there are photos showing fuel leaked from the front section of the cargo hold no.4 to the middle aisle of the cargo hold no.4 (as detailed in Figure 1.1-3).

[6] According to International Conventions, ship inspections are divided into Renewal Survey (once every 5 years); Intermediate Survey; Annual Survey (once every 1 year, within 3 months before and after the deadline); Bottom Survey (twice every 5 years; or shall not exceed 36 months).

Figure1.1-3 Showing fuel leakage in the forward section of the cargo hold no. 4 on the ANGEL, reaching the middle passageway of the cargo hold no. 4.

Based on interviews and relevant photos from the crew of the ANGEL, it was discovered that after the ship sailed from Colombo, a broken metal plate was found under the base of the container in the cargo hold no.3 at “110504”. This breakage resulted in the rupture of the ballast water wing tank within the cargo hold no.3 (starboard side no. WB-DT3S), causing water to leak into the cargo hold no.3. The water ingress reached a height of approximately 1.3 meters, with the remaining cargo (coffee beans) and bilge debris previously loaded floating on the water surface (as detailed in Figures 1.1-4 and 1.1-5). On June 19th and 20th, the master (the following will be referred to as the former master, who left the ship on July 8th, 2023.) reported the water ingress situation in the cargo holds of the ANGEL to ZULU.

Figure 1.1-4 illustrates the layout of the ANGEL's cargo holds and the ballast water tank within the cargo hold no.3. The red star on the diagram mark was the

point of water ingress. As the crew faced difficulties in removing the water from cargo hold no.3, the former master entered the cargo hold and uncovered the manhole[7] of the ballast water double bottom tank no.3 (located on the port side, designated as no. WB-DB3P). This action facilitated the drainage of the flooded water into the tank. Subsequently, the crew utilized the ballast water pump to expel the water, leading to the discharge of a significant volume of remaining cargo and bilge debris into the ballast tanks (refer to Figure 1.1-5).

1.1.3 Occurrence Voyage Information

This voyage refers to the period from June 25th to June 29th, 2023. The ANGEL was docked at the Port of Dalian from June 24th to 25th. The HYDOR survey report indicated water and fuel leakages in cargo holds no.4 and no.5. Around 1730 hours on June 25th, the ANGEL's crew did not record the next port information in the deck logbook and when she departed from Dalian. In addition, the chief engineer mentioned that the intended ports of call were St. Petersburg, Russia, or Tallinn, Estonia.

On June 26th, the Deck Log Book documented that the initial measurement of water ingress in cargo hold no.3 was 10 centimeters. Subsequent entries on June 27th indicated a rise in water ingress levels from 30 centimeters to 50 centimeters in cargo hold no.3, accompanied by a 5-degree listing to both the port side and starboard sides. The former master reported to the ZULU continued to operate the ballast water system and proceeded to engage the ballast water system and portable pumps for water pumping operations (refer to Figure 1.1-2).

[7] After the ship loaded and left the Port of Dalian, there was no loading in the cargo hold no.3 row 02 and 04, the location of the manhole cover.

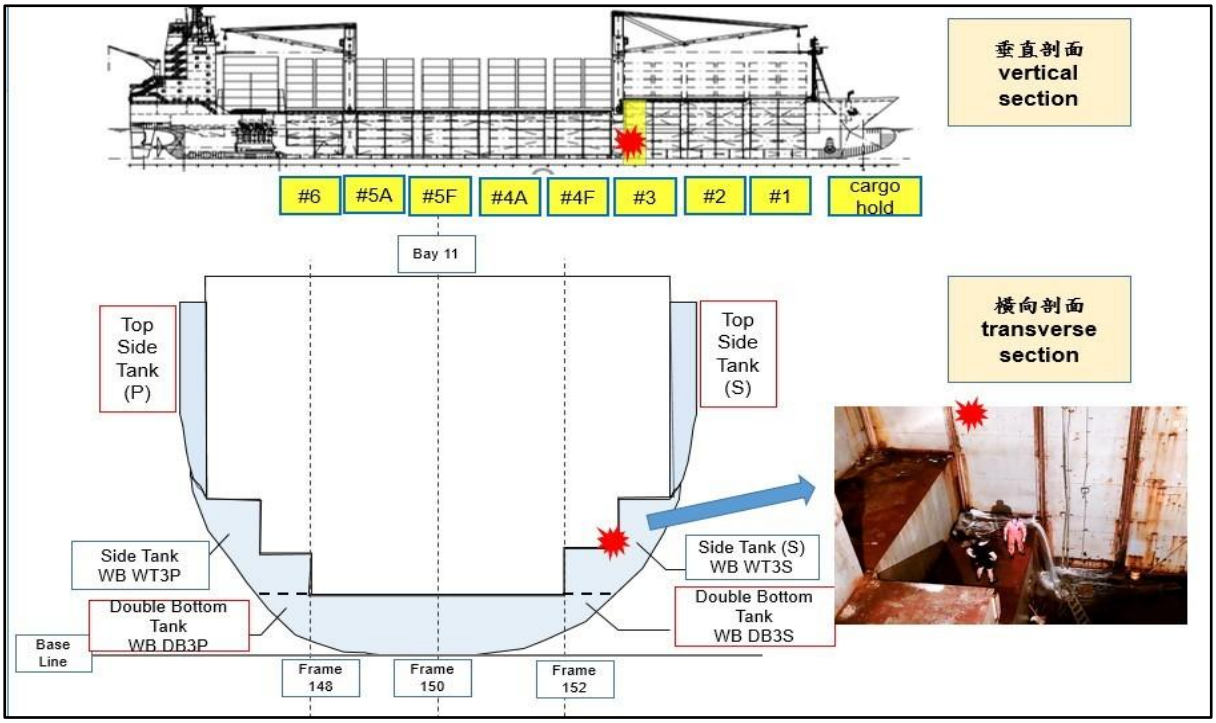

Figure1.1-4 Schematic diagram of the cargo hold distributions on the ANGEL and the ballast water in the cargo hold no. 3.

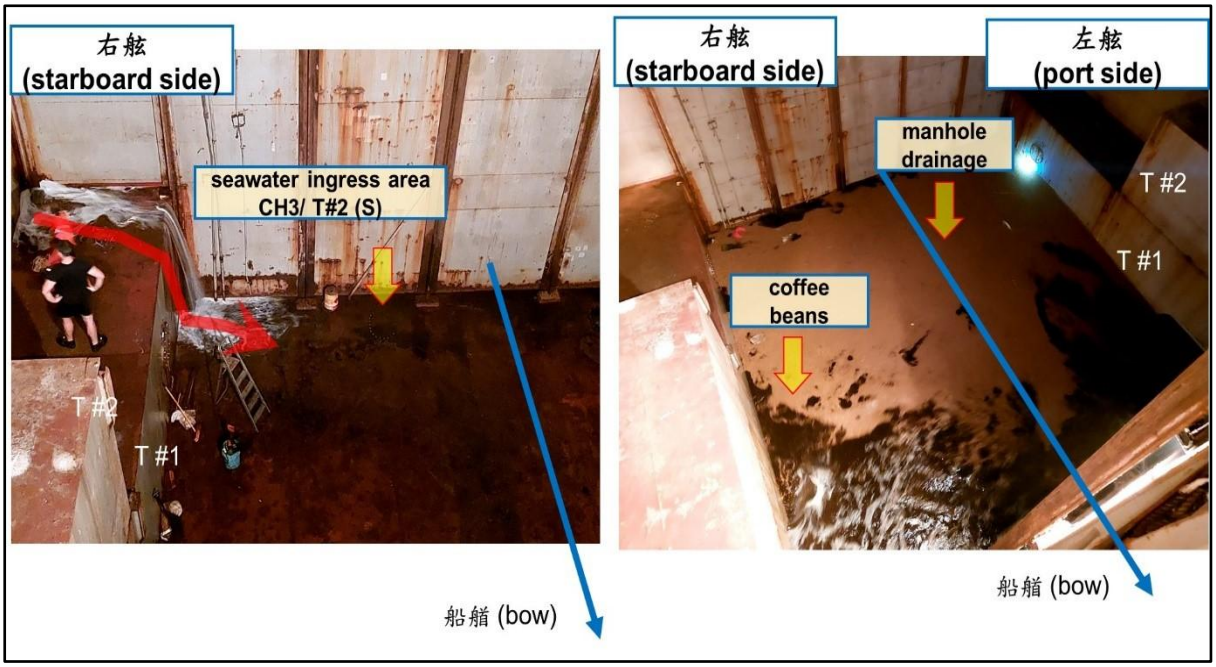

Figure 1.1-5 Water ingress in the cargo hold no. 3 of the ANGEL, and the exterior view before the crew's cleanup efforts

Between June 28th and June 29th, the ANGEL navigated southward along the coastline of China's Yellow Sea and East China Sea. A malfunction occurred in the jacket of the fourth cylinder of the main engine, leading to loss of electrical power causing the ship to drift in the East China Sea. Subsequently, it was anchored near Taizhou, Zhejiang, where it underwent engine repairs that lasted for over 10 hours.

On June 29th, the former chief officer (he left the ship on July 8th) of the ANGEL submitted a pan-pan letter (refer to Fig.1.10.1). to the International Transport Workers' Federation (ITF) and the Maritime & Port Authority of Singapore (MPA), listing10 major deficiencies of the ANGEL.

1.1.4 Altering Voyage Plan and Headings to Kaohsiung for Anchorage

This voyage refers to the period from June 30th to July 17th, 2023. On June 30th, the MPA Singapore transmitted the urgent pan-pan letter received from the former chief officer of the ANGEL to the Flag state of Palau. At 1250 hours, the Palau Flag state authority contacted the INTLREG via email with a brief message stating: 1. The ANGEL's situation has been reported to the Maritime Safety Administration of the People's Republic of China (China MSA); 2. The Palau Flag state authority has directed the vessel to expeditiously proceed to Taiwan for inspection by a local Palauan inspector who will board the ship.

The deck logbook records showed that at about 0100 hours on July 1st, the former master changed the course and sailed for the Port of Kaohsiung. Between 0840 and 1400 hours on the same day, ZULU assigned S5 ASIA (Hong Kong) Limited Taiwan Branch (S5 ASIA) to manage in-port maintenance issues and reached out to Golden Port Asia CO., LTD to schedule an underwater hull survey.

At approximately 1230 hours on July 2nd, S5 ASIA made contact with the South Taiwan Maritime Affairs Center of the Maritime Port Bureau (MPB) via

telephone. S5 ASIA proposed single port entry and emergency entry for the ANGEL, but both requests were denied. About 1600 hours, the ship had reached Kaohsiung, situated approximately 10 nautical miles west of the 1st Harbor of Port of Kaohsiung. On July 4th, at 2046 hours, the ship dropped anchor and temporarily moored in the second anchorage area of the Port of Kaohsiung.

On July 8th, a representative of the shipowner of the ANGEL brought aboard 8 new crew members, dismissed 7 crew members, and then departed the ship. The crew replacements included the master and the chief officer. Between approximately 1120 and 1830 hours on July 10^{th,} the Palau Flag state sent a surveyor to board (refer to section 1.7.5.3). On July 14th, the INTLREG dispatched a surveyor and a diver from Golden Port Asia CO., LTD on board the ship to conduct an underwater survey of the hull. Due to adverse weather conditions, the task was not fully completed.

From July 2nd to July 15th, water ingress into the cargo holds no. 4 and no.5 of the ship reached a depth of 4.5 meters. The crew members used ballast pumps to regularly pump out the ballast water wing tank no.6 (the port and starboard sides) every few hours to maintain the ship's balance (Figure 1.1-4). The two masters of the ANGEL did not report the actual water ingress situation to the Vessel Traffic Service of Kaohsiung Harbor (Kaohsiung VTS).

At 1218 hours on July 15th, Golden Port Asia CO., LTD contacted ZULU, "*The hull paint shows a lot of areas with missing paint, these areas also have heavy barnacle growth ... (skip). The leak is under the barnacle growth because that would be the area with rust and corrosion. Without water being sucked out of the tank, we cannot see where the leak is coming from. The diver attempted to remove the barnacles at some areas of concern but still did not find the puncture leak.*"

At 2107 hours on July 16th, ZULU contacted S5 ASIA, stating briefly, "*we*

are kindly requesting you to arrange a safe berth to wait for better weather conditions and complete all possible maintenance while the coming typhoon hits the area in the next few days… (skip) we would need a least 2 or 3 tugs."S5 ASIA immediately contacted various ports in Taiwan to arrange for the ANGEL to arrive for berthing and maintenance.

The deck logbook on July 17th indicated that the water ingression height records in the cargo hold no.3, no.4, no.5, and no.6 of the ANGEL were 10 centimeters, 4.3 meters, 4.3 meters, and 20 centimeters, respectively. At 1047 hours, the Kaohsiung VTS contacted the ANGEL to ask about the ship's condition, and the master responded by stating," *engine in good condition"*, and he did not mention the problem of water in the cargo holds. Later, at 1419 hours, S5 ASIA contacted ZULU that all ports were unavailable for vessel maintenance due to impending typhoon warnings. According to port regulations, it is required to leave the port upon typhoon warnings, and seeking shelter in the open sea would not be permitted. Subsequently, S5 ASIA and the management company initiated discussions on arranging a tugboat from China to tow the ANGEL to Guangzhou. At 2100 hours on July 17th, the master of the ANGEL contacted ZULU and recorded on the logbook that "The *vessel is almost losing seaworthiness, company has been contacted about the situation*."

1.1.5 Applying for Emergency Entry

This voyage refers to the period from July 18th to July 19th, 2023. At 0725 hours and 1042 hours on July 18th, S5 ASIA contacted ZULU, stating briefly, "*We need P&I Rep to contact port authority urgently, the port may request a financial guarantee from P&I ... (skip) The MPB still refuse our proposal due to regulation*." At 1050 hours, ZULU responded to S5 ASIA, "*this is request an emergency port call of our vessel ANGEL to Kaohsiung ... (skip) This situation as very critical and discuss necessary permissions with authorities asap*."

Between 1058 hours and 1110 hours on July 18th, the Kaohsiung VTS called the ANGEL, and the master responded briefly, "*the cargo hold water ingress, and pumping operations have been ongoing for several days. Divers have been dispatched to inspect the situation, and fortunately, no abnormalities have been detected, indicating that there is no immediate danger;...it is dangerous to leave the anchorage area to take refuge, because we cannot control the situation of water ingress into the cargo hold...Because there is a problem with the ship, water is pumped out of the cargo hold under pressure, but there is goods in the cargo hold, we cannot pump water*."

At 1716 hours on July 18th, The master contacted S5 ASIA, stating briefly, "*I kindly want to inform you that the performance of passage of the vessel to any place is considered impossible because seaworthiness of the vessel is missing due to below reason:(9 reasons)…At the moment, the situation is stable, we often pump out ballast from one tank, but if it fails, we will also have the risk of a non-return roll and the ship will capsize, which will lead to irreversible consequence; In connection with the above, I kindly ask you to send an official request to the port authorities to provide us with an emergency call to the port for the rescue of cargo, ship and crew."* (Appendix 2)

The Deck Log Book showed that the crew of the ANGEL did not fill in the information about the water height in the cargo hold on July 19th and 20th. At 0939 hours on July 19, Port of Kaohsiung Taiwan International Port Corporation Ltd. (TIPC-Kaohsiung) notified S5 AISA by fax (English translation), "1. Our company has officially received the port entry maintenance application rejection from the Maritime Port Bureau (hereinafter referred to as the MPB) under the Ministry of Transportation and Communications (MOTC)... (1) Before sunset on July 19th, 2020, the vessel should sail away from the anchorage area to take shelter... (3) Please take the initiative to report the water pumping situation and bow listing situation to the VTS tower of TIPC-Kaohsiung at 00:00, 06:00, 12:00

and 18:00 daily.*”* (Appendix 3)

At 1555 hours on July 19th, S5 ASIA submitted an official letter to the MPB, primarily requesting emergency entry for repairs to the ship due to a malfunction (refer to Appendix 4). The letter omitted to address critical concerns such as water ingress in the cargo hold, the ship's compromised seaworthiness, and the failure to complete the form for emergency entry. On the afternoon of July 19th, S5 ASIA engaged in discussions with the ZULU regarding contingency plans and arranged for a tugboat from Guangzhou to tow the ANGEL to Guangzhou.

At 1832 hours on July 19th, the master of the ANGEL contacted S5 ASIA and ZULU, and stated briefly “*As we agreed before we will try to start our ME for leaving anchorage area, but unfortunately we are faced with problem, now all engine crew trying fix this problem. I kindly ask you send this information to MPB and Port Authorities and in additional to VTS.”*

At 1857 hours, S5 ASIA contacted the Kaohsiung VTS, and stated briefly (English translation), “The master just contacted me... He said there was a problem with the main engine and he was trying to fix it. I asked him to report it to you”; “If the main engine comes back there’s no problem. The problem is, it hasn’t been activated in the past few days or 2 weeks.”

1.1.6 Announcement of Abandon Ship and Its Consequence

At about 0000 hours on July 20th, the Kaohsiung VTS contacted the ANGEL to inquire about the ship's condition, and the master responded briefly, “*no, we are finding question*.” The master did not report to the VTS operator that the water in the cargo hold was as high as 4.5 meters. At 0601 hours, the Kaohsiung VTS called the ANGEL, and the master responded briefly, “*yeah, in very good condition. but now engine crew members are working in engine room and they are find their problems. and they are keeping the problem when finish the problem*

we will call you again”

According to interviews with the master and chief engineer of the ANGEL, at 0542 hours on July 20th, the main generator of the ANGEL failed for the first time. The emergency generator was activated, which resulted in a complete power outage throughout the ship. Power was restored at about 0630 hours. At about 0830 hours, S5 ASIA went to the Harbor Management Division of TIPC-Kaohsiung and requested a 40hours extension for the ANGEL to remain anchored at the anchorage area, allowing the shipowner to arrange for a tugboat from China to provide assistance. At 0851 hours, the Kaohsiung VTS called the ANGEL and inquired about the availability of any tugboats to assist the ANGEL. The master responded briefly, “*Not now, tug boat assistance.*”

At 0824 hours, the main generator failed for the second time. The emergency generator was activated, but the power was insufficient to supply the ballast water pumps to stabilize the ship's list. The crew was unable to restore the generator to normal operation, and the ship's hull gradually was listing to the left by approximately 8 to 9 degrees. At 0921 hours, the owner's representative of the ANGEL notified S5 ASIA via WhatsApp (Appendix 5), “*We need emergency help, we have a blackout situation on board, can’t run our ballast pumps, and vessel getting heeled. It seems master calls mayday*” and instructed S5 ASAIA: “*We need a vessel alongside to give us a power.*” At about 0945 hours, the master of the ANGEL gave the order to abandon the ship and close the oil tank valve.

Crew interviews indicated that when all crew members gathered and began to abandon ship at 1000 hours, the ship's hull listed about 8 to 9 degrees to the portside (as detailed in Figure 1.1-6). At about 1015 hours, the TIPC-Kaohsiung established an emergency response team to respond; at 1235 hours, the Coast Guard completed the rescue of 19 crew members of the ANGEL.

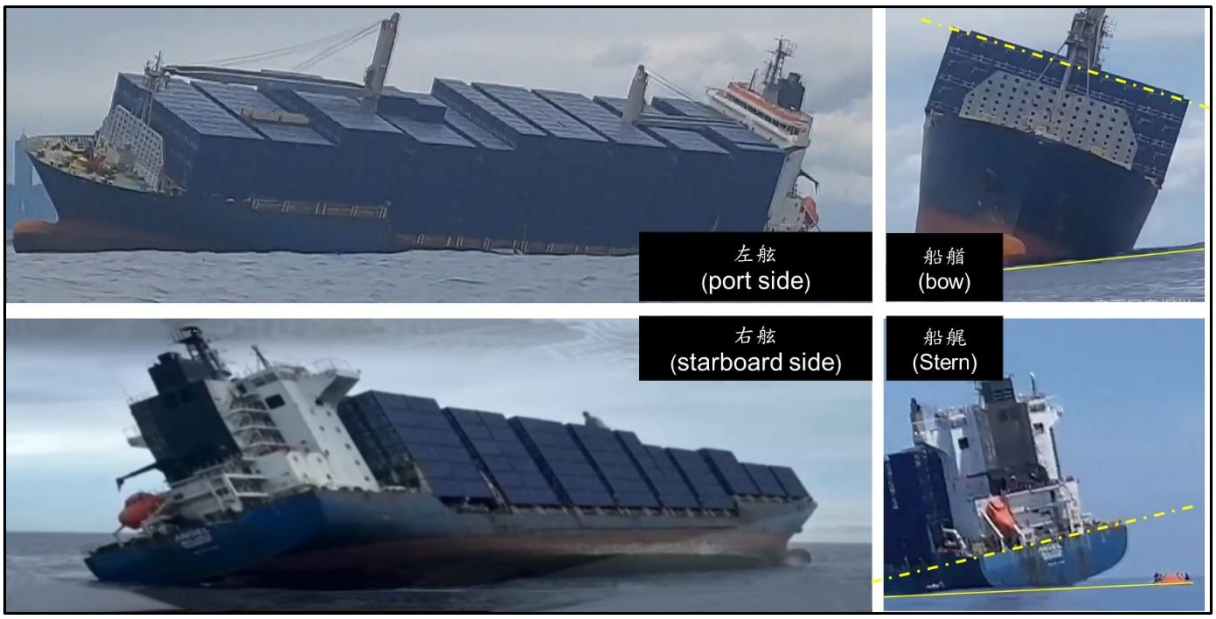

Figure1.1-6 The exterior view of the ANGEL as the master abandoned the ship

Figure1.1-7 Exterior view of the containers scattered from the ANGEL

At about 0019 hours on July 21th, the ship's hull continued to list severely to the portside until the deck made contact with the sea, resulting in water ingress at the stern. The hull gradually sank, leaving only the bow floating on the water.

At about 0530, the ship completely sank to the bottom approximately 2.8 nautical miles[8] of the south breakwater of the 1st Harbor of the Port of Kaohsiung, the ship's hull listed 3 degrees to the starboard side, and the reference water depth was about 37 meters. All hatch covers were fully detached from the ship's hull, and 1,349 empty 20-foot bulk containers on the hatch cover and in the ship's holds either floated on the sea surface or sank in the surrounding sea area. (Fig.1.1-7).

1.2 Injuries to Persons

During the process of abandoning the ship, the chief engineer incurred a minor hand injury. Refer to Table 1.2-1 for detailed statistics on fatalities and injuries.

Table1.2-1 Statistics on Fatalities and Injuries[9]

Fatality and Injury Situation	Master	Crew	Pilot/Passenger	Total
Death	0	0	0	0
Severe Injury	0	0	0	0
Minor Injury	0	1	0	1
No Injury	1	17	0	18
Total	1	18	0	19

1.3 Damage to the Vessel

The ANGEL sank, a total loss.

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[8] North Latitude 22° 36’ 33”, East Longitude 120° 12’ 44”

[9] According to the National Transportation Safety Investigation Commission's principles for determining casualties in major transportation accidents, any of the following conditions qualifies as a serious injury: fractures excluding those of fingers, thumbs, or toes; amputations; dislocations of the shoulder, hip, knee, or spine; temporary or permanent loss of vision in one or both eyes; chemical or thermal burns from hot metals, or any penetrating injury causing harm to one or both eyes; hypothermia or heat-related illnesses; injuries requiring resuscitation; hospitalization for more than 24 hours; loss of consciousness directly resulting from the injury; or acute illnesses requiring medical attention due to inhalation, ingestion, or absorption of a substance through the skin.

1.4 Other Damage

1.4.1 Environmental Pollution

According to the ANGEL's engine logbook record, the remaining fuel was 491.848 metric tons of oil, comprising 393.4 metric tons of low-sulfur fuel, 98.1 metric tons of light diesel oil, and 0.348 metric tons of lubricating oil. This occurrence led to the sinking, which was a total loss.

On July 29th, 2023, a narrow fuel oil pollution approximately 13 kilometers long was discovered on the surface of the water in the area where the ANGEL sank, extending in a north-northwest direction.

On September 21st, 2023, TIPC-Kaohsiung, in collaboration with pertinent departments, successfully concluded the extraction of the remaining oil from the ANGEL. The residual oil, stored in 14 oil tanks, amounted to a total of 470 metric tons.

Following the occurrence, neither the shipowner of the ANGEL nor the insurance company addressed issues related to the shipwreck, residual oil containment, drifting empty containers, or losses incurred by fishermen.

1.4.2 Other Damage

Not Applicable (N/A).

1.4.3 Search and Rescue Information

N/A.

1.5 Personnel Certification and Experience

1.5.1 Key Crew Background and Experience

Upon investigation, the crew list of the ANGEL departing from Dalian, China, the actual number of crew members at the time of departure, and the qualifications of the crew all comply with the requirements of the minimum safe manning certificate for that vessel.

There was a master and 18 crew members, a total of 19 seamen on board, all of whom were Azerbaijani nationals. They all held certificates of competency issued by the relevant authorities.

The information of the key crew members is as shown in Table 1.5-1.

Table1.5-1 Basic Details of Key Crew Members

Item	Master	Chief Officer (C/O)	Chief Engineer (C/E)
Nationality/ Gender	Azerbaijan/ Male	Azerbaijan/ Male	Azerbaijan/ Male
Year of Birth	1990	1986	1963
Sea Service Experience	Seafarer 11 Years Master 3 Years	Seafarer 14 Years C/O 3 Years	Seafarer 31 Years C/E 23 Years
Time on Board	12 Days	12 Days	1 Month and 26 Days
Certificate Type	Master on ships of 3000 gross tonnage or more [10]	Chief Officer on ships of 3000 gross tonnage or more[11]	Chief Engineer of ships powered by main propulsion machinery of 3000 kW propulsion power or more[12]

1.5.2 Activity in the Last 72 hours within 7 days

According to crew interview records, all crew members had normal rest

[10] Issued by the Republic of Azerbaijan, State Maritime Agency, issued date: 2020/10/13.
[11] Issued by the Republic of Azerbaijan, State Maritime Agency, issued date: 2021/03/04.
[12] Issued by the Republic of Azerbaijan, State Maritime Agency, issued date: 2020/08/13.

hours before the occurrence.

1.6 Weather and Sea Conditions Information

At the time of the occurrence, Kaohsiung Harbor had sunny skies, good visibility, southeasterly winds, Force 4 on the Beaufort scale, and wave heights of 1 to 2 meters.

On July 20th around 0200 hours, there was a tropical depression (numbered TD06) located about 1,640 kilometers southeast of Taiwan, moving north-northeast, and developing into a mild typhoon. At 0800 hours on July 21st, the TD06 was located in the sea southwest of Guam and strengthened into Typhoon ”Doksuri”. On July 24th, Typhoon “Doksuri” moved northwestward, approaching the sea surface of the Bashi Strait.

1.7 Vessel Information

This section is segmented into 5 sub-sections: vessel basic information, cargo holds basic information, cargo holds bilge water system (BWS), ballast water management system (BWMS), and ship inspection and certificates.

1.7.1 Ship Basic Information

Table 1.7-1 Ship Basic Information

Ship Basic Information	
IMO No.	9256406
Call Sign	T8A4295
Ship's Company	ZULU Shipping LLC
Ship Owner	Navramar Shipping INC
Flag state	PALAU
Port of Registry	MALAKAL HARBOR
Type of Ship	Container ship
Hull Material	Steel
Length Overall Length	172.5 meters
Width	25.1 meters
Midship Depth Molded	14.2 meters
Gross Tonnage	16145
Ship Completion Date	2003/06/30
Classification Society	International Register of Shipping
Main Engine Model	6S60MC-C
Number of Crew per Minimum Manning Certificates	16
Number of Crew for which Safety Equipment is Provided	30

1.7.2 Cargo Hold Basic Information

The ANGEL had a capacity of 1,541 twenty-foot equivalent units (TEU), allowing for containers to be loaded in both the cargo holds and on the main deck. Its hull featured a double hull design, with ballast tanks situated in the bottom and sides of the cargo holds, and segmented into bilge and wing tanks. Figure 1.7-1 illustrates a transverse and vertical cross-section of the ANGEL. During its most recent voyage, it had 1,349 new 20-foot empty bulk containers at Port of Dalian.

The ANGEL was equipped with a total of 6 cargo holds and 2 cargo derricks, in addition to a bow thruster. A detailed illustration can be found in Figure 1.7-2,

showing the distribution of the cargo holds and derricks on the ANGEL.

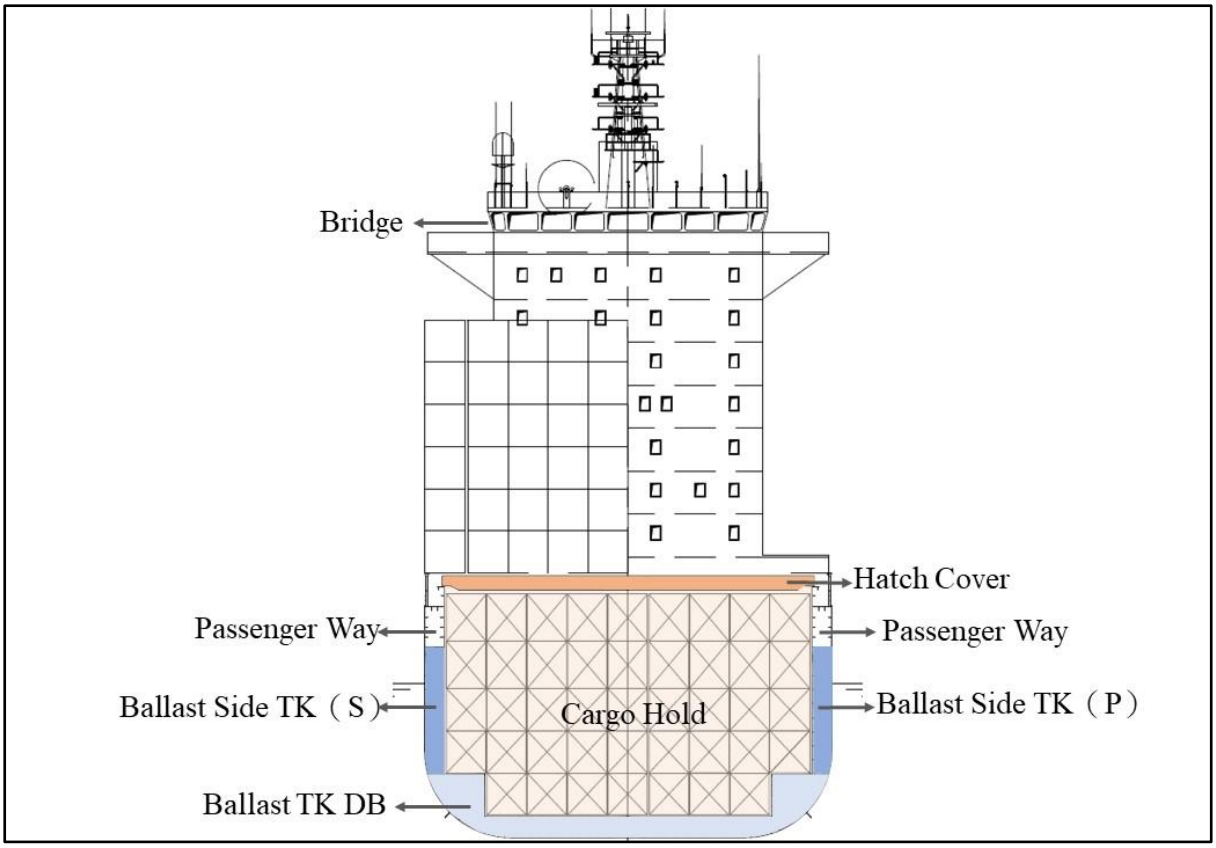

Figure1.7-1 Horizontal and vertical cross-section of the ANGEL

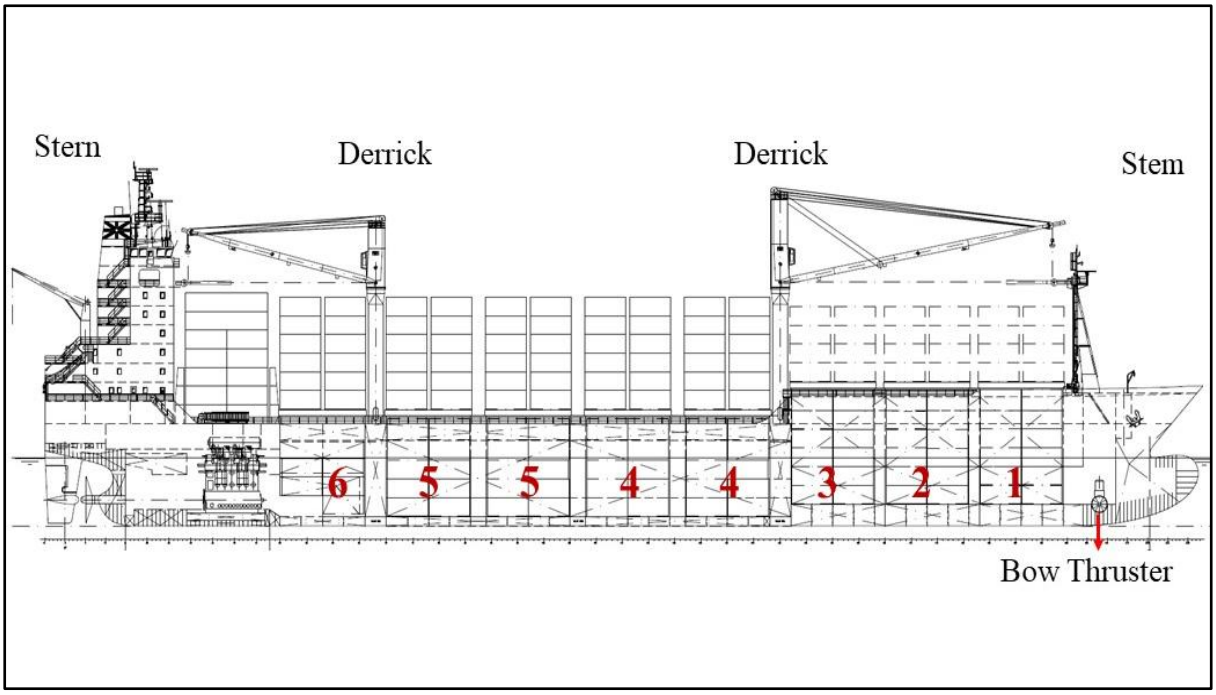

Figure1.7-2 Cargo holds and boom distributions sketch of the ANGEL

1.7.3 Cargo Hold Bilge Water System (BWS)

Bilge water is caused by insufficient watertightness of hatch covers, pipeline leakage, leakage of tail shaft sleeve and rudder sleeve stuffing box, and moisture condensation caused by temperature differences during ship transportation.

The ship's bilge water system (BWS) comprises bilge wells, bilge alarms, bilge water pumps, bilge water pipelines, oil-water separators, slop tanks, and associated valves. The BWS serves to eliminate flooded water directly from the cargo holds, while water in the engine room requires separation from the oil before being discharged into the sea. This process facilitates the removal of accumulated oil and water in the ship's bilge. The primary function of the bilge water system is to promptly expel flooded water from various compartments of the ship (such as the engine room, boiler room, cargo holds, living cabin below the waterline, isolation compartments, void compartments, etc.) to ensure navigation safety, the proper functioning of mechanical and electrical equipment, and the integrity of cargo.

The cargo hold bilge water system of the ANGEL was equipped with a bilge water and firefighting pump as the main operational pump. This pump could discharge flooded water from all cargo holds overboard through the pipeline (refer to Figures 1.7-3, 1.7-4, and 1.7-5). If the bilge water and firefighting pump failed, the ballast pump could be used to discharge the bilge water.

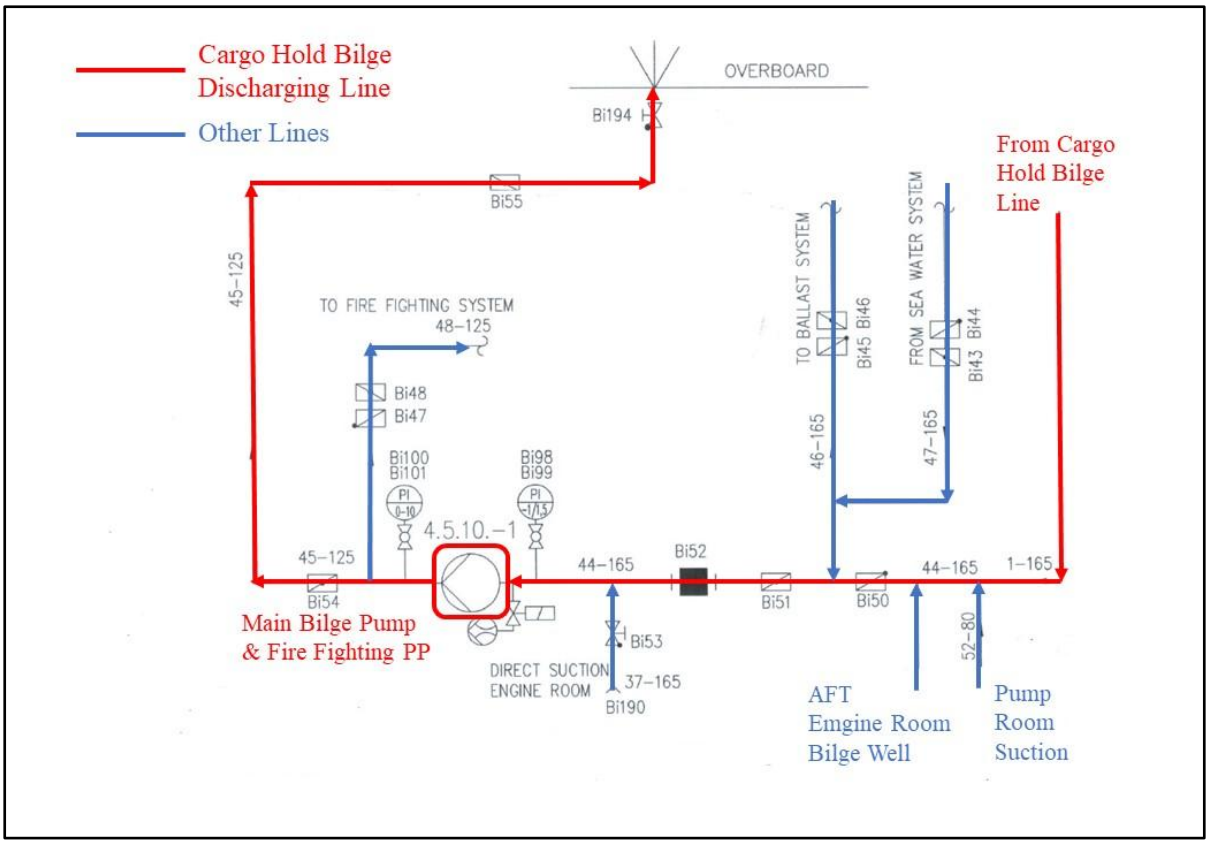

Figure1.7-3 Diagram of cargo hold bilge water system pipelines.

1.7.4 Ballast Water Management System (BWMS)

The ship's Ballast Water Management System (BWMS) is used to treat and manage ballast water. Proper use of ballast water can reduce the pressure on the hull, provide lateral stability, improve propulsion and maneuverability, and Compensates for various cargo load levels and weight changes due to fuel and water consumption.

The ANGEL utilized seawater as ballast water. Seawater entered the ballast water system pipeline from the sea chest, and it could be conveyed to the ballast water tank through 2 ballast water pumps (or called ballast pump). In addition to the front and rear peak tanks, the ANGEL ballast water tank also had 10 ballast double bottom tanks (DBT) and 10 ballast wing tanks (WT). The total ballast water volume was 6,796.9 cubic meter (m^3). The ballast tank water filling port

and suction port of each ballast water tank were the same, that is, the water filling port and suction port were shared.

The ANGEL used seawater as ballast water. Seawater entered the ballast water system pipeline from the sea chest. Seawater could be transported to the ballast water tank through 2 ballast water pumps (Ballast Pump); the path is shown in Fig. 1.7-4 in blue lines. If seawater was to be discharged from the ballast water tank overboard, a ballast water pump was also used to pump out the ballast water from the ballast water tank and send it through the ballast water system pipeline to the discharge outlet. The path is shown in Fig. 1.7-4 in yellow lines. Fig. 1.7-5 is a diagram of the distribution of the ballast water tanks and ballast water pipelines of the ANGEL.

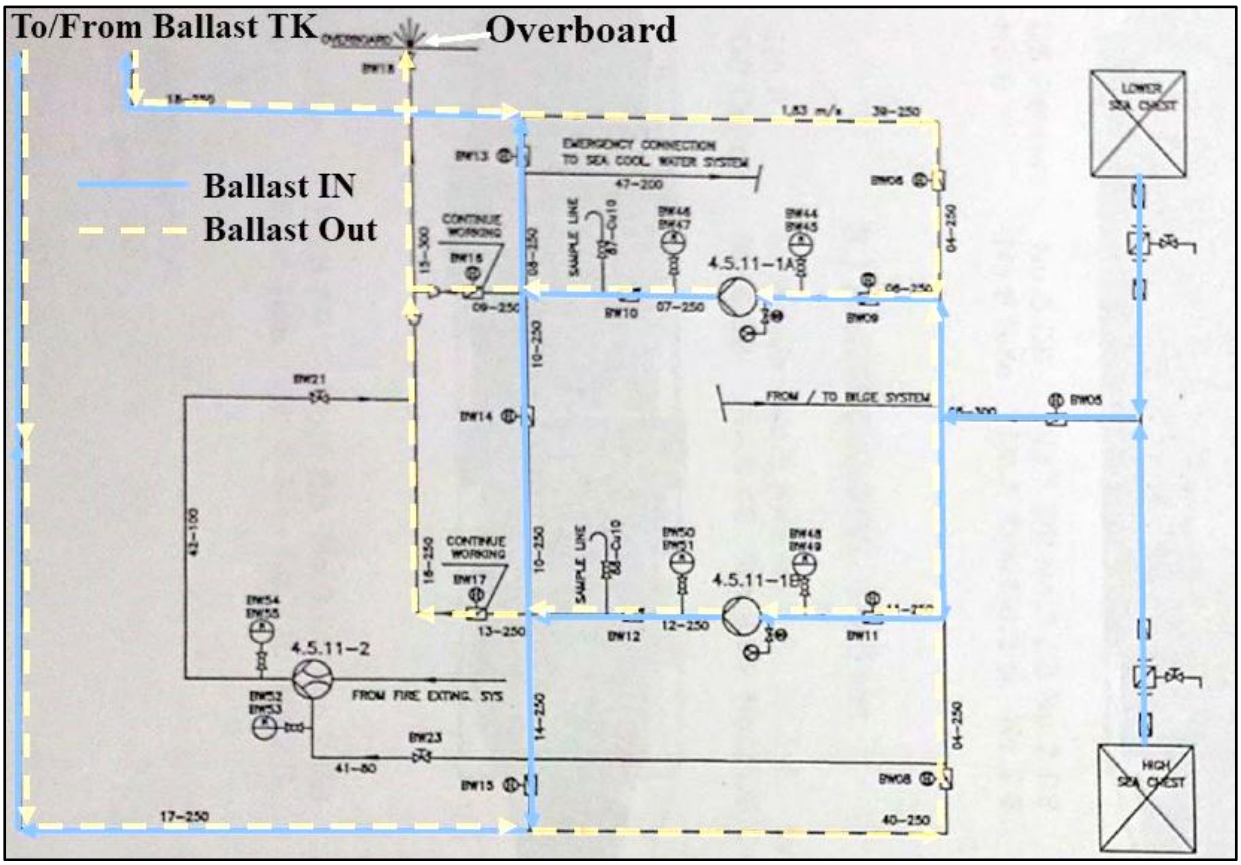

Figure 1.7-4 Diagram of the ballast water system pipelines.

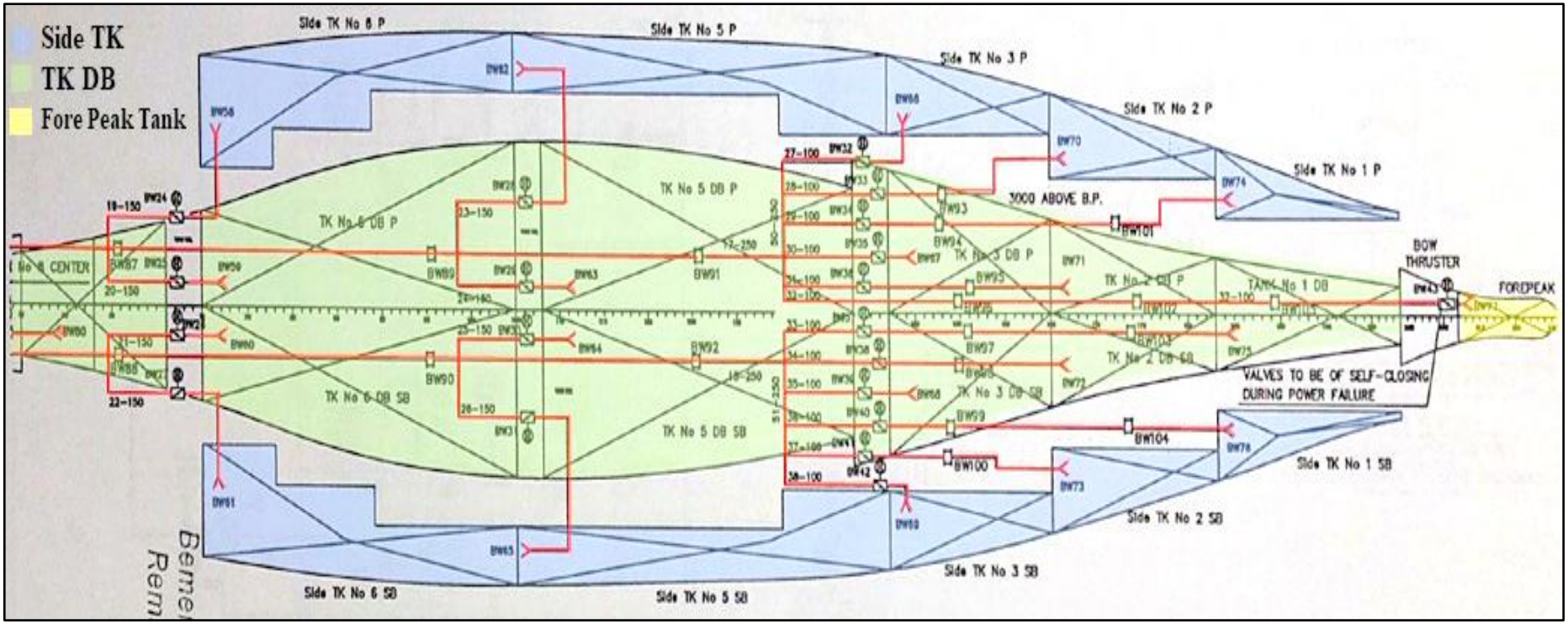

Figure 1.7-5 Diagram of the distribution of the ballast water tanks and ballast water pipelines of the ANGEL.

1.7.5 Ship Inspections and Certificates

This section includes 3 sub-sections to explain the ANGEL's inspection records and related certificates. The certificates related to the ANGEL included five certificates issued by the Flag state of Palau, 18 certificates issued by INTLREG, and one certificate issued by HYDOR AS (as detailed in Appendix 6).

1.7.5.1 Due Date of the ANGEL's Ship Certificates

On July 4th, 2023, INTLREG commissioned Lead Shine Service Co., LTD (Lead Shine) to board the ship for an inspection on July 14th, 2023.

From July 21st to 24th, 2023, the investigation team obtained the relevant certificates for the ANGEL from the shipping agent, S5 ASIA (Hong Kong) Limited Taiwan Branch (S5 ASIA). S5 ASIA obtained the relevant certificates for the ANGEL on July 2nd, 2023. The relevant certificates were valid at that time. On July 25th, 2023, the investigation team obtained the relevant certificates for the ANGEL from the country of registration, Palau. The relevant certificates were not yet due. On August 2nd, the investigation team obtained the status of the relevant certificates for the ANGEL from Lead Shine Marine Consultant Company. During the period from July 20th to July 30th, 2023, Lead Shine logged into the INTLREG shipping registry to download the relevant certificates for the ANGEL. At that time, the relevant certificates were not yet due.

On September 8th, 2023, the INTLREG provided 2 ship inspection reports of the ANGEL, 1 Classification Society warning letter (Class Warning Letter) issued by INTLREG to ZULU, and 1 notification letter from the Flag state requesting the suspension of the ANGEL's certificates, as well as the ship survey narrative report (Narrative Survey Report), the ship survey status report (Ship

Survey Status) and related documents. Appendix 6 is a comparison table of the due dates of certificates related to the ANGEL. Five certificates were issued by the Palau Flag state, 18 certificates were issued by INTLREG, and 1 certificate was issued by HYDOR AS. The 24 certificates mentioned above have different validity periods due to varying acquisition times. In addition, Table 1.7-2 is a comparison table of the Classification Society's remarks on the ANGEL's inspection report. The note refers to the underwater inspection of the hull on July 14 and the INTLREG website showing two different results.

On April 20th, 2024, the TTSB received a letter from the attorney appointed by HYDOR AS. The letter also provided a screenshot of the status of the ANGEL's certificate on the Classification Society's website on August 3rd, 2023 (as detailed in Figure 1.7-6). The content shows "Inactive/Total Loss on 10-Jul-2023 (The certificate was revoked based on the flag Administration's request".

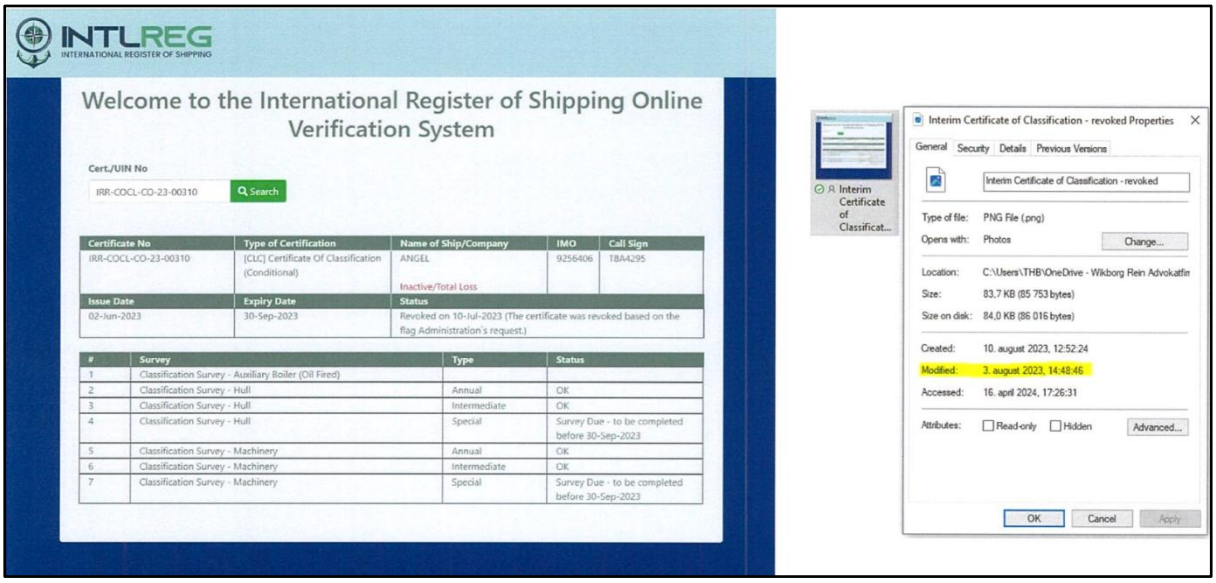

Figure 1.7-6 Screenshot of the ANGEL's certificate status from the INTLREG (taken on August 3rd, 2023)

Table 1.7-2 Comparison table of the Classification Society's remarks on the ANGEL's underwater Survey Report

NARRATIVE SURVEY REPORT （Remarks）	
Kaohsiung Inspection Reports (2023.08.18 provided by Chinese Maritime Law Firm)	The occasional underwater examination was carried out on 14th July 2023 while the vessel anchored at Kaohsiung Anchorage. The attendance to the vessel was made by launching a boat, the examination was carried out by IACS members approved Diving firm - Golden Port Asia Co., Ltd., and the Surveyor witnessed the examination through CCTV connected to the divers' video camera. As far as can be seen, there were various damages found on the ship's hull which resulted in the list of ship due to water ingress. Please refer to the diving report and final report for various damage details. Upon completion of the survey, an Outstanding Recommendation was given to request the completion of the damages before the due date, further the repair proposal is to be submitted for review before the crew commences of repairs.
Kaohsiung Inspection Reports (2023.09.08 provided by INTLREG) (2023.09.18 provided by Lead Shine)	The occasional underwater examination was carried out on 14th July 2023 while the vessel anchored at Kaohsiung Anchorage. The attendance to the vessel was made by launching a boat, the examination was carried out by IACS members approved Diving firm - Golden Port Asia Co., Ltd., the Surveyor witnessed the examination through CCTV connected to the divers' video camera. As far as can be seen, there was no damage found on the ship's hull. Please refer to the diving report and final report for further details. Upon completion of the survey, an Outstanding Recommendation was given to request the official diving report.

1.7.5.2 HYDOR AS Inspection

It was found that on June 24th and 25th, 2023, T&A Marine Consultants and Surveyors Co. Ltd conducted an Entry Survey on the ANGEL in the Port of Dalian, China. The TTSB obtained t2 reports on August 25th, 2023. One was the

defects list of the ANGEL (as detailed in Appendix 7); the other was the Protection and Indemnity (P&I) inspection report of HYDOR AS.

There were 24 issues listed in the defects list and records of the ANGEL (as detailed in Appendix 7). Key excerpts from the survey report are as follows.

3. Risk Profile

The main reason that we rated the risk assessment categorized the hull failure as 'Medium', ballast tank as 'High', Cargo Hold as 'High', and cargo damage as 'High' due to several factors. Observations revealed apparent water leakage in cargo holds no.3 and no.5, originating from adjacent ballast tanks, indicating a history of poor maintenance and potential structural integrity issues in the cargo holds. Additionally, evidence of fuel oil leaking into the cargo hold no.4 from the heavy fuel oil (HFO) no.4 (S) led to the pollution rating being classified as 'Medium'. It is important to note the crew members had identified the source of the oil leakage and were implementing corrective actions.

1.7.5.3 Flag State Inspection and Certificate Handling

According to the deck logbook of the ANGEL, at 1120 hours on July 10th, the Palau Flag state dispatched an inspector on board, and he left the ship at 1830 hours. The TTSB obtained the preliminary inspection report[13] on August 8th, 2023. The Flag state did not inform the TTSB that the ship had lost its flag registration with Palau and the classification from the INTLREG's Classification Society. The inspection report identified 31 deficiencies that needed to be addressed within a specified deadline for improvement. Key excerpts from the report are as follows:

[13] CL031_Narrative_Report_Checklist_v.2023.03.01.1.pdf

Part 2: Narrative Report

The following defective items were verified as follows:

- The ship had a crew change. There was no implementation of PMS system onboard. (Obs No. 24)
- ISM & ISPS implantation was in progress and improvement of the SMS system was needed.
- Rescue boat emergency operation remains faulty. (Obs No.16)
- AE No.3 power management system display was non-operational and AENo.2 power management system displayed was discovered to be non-operational too. (Obs No.18)
- Ballast water treatment system was not fitted at the time of inspection. Vessel was using Type D-1 and the BWMP was approved by Class IRS on 03 July 2023.
- Composite boiler was shut down and not in use. (Obs No.19)
- Emergency generator blower flap and limit switch not functional. (ObsNo.03)-Steering gear vent flap remains frozen in open position. (Obs No.04)
- Water ingress inside cargo holds no.4 & 5.–No.4 cargo hold ingress water level was 3 meters and no.5 cargo hold ingress water was 1 meter. Portable pump was currently being used to pump the water out of cargo hold no 4. (Obs No.2)
- Fresh water generator was not working. (Obs No.31)

Areas unavailable or not inspected: Under water hull areas, Cargo holds

except for no.4 and 5, Cargo hatch cover.

Comments or conclusions: Vessel was not in a seaworthy state at the time of inspection. Critical attention is required for the ingress of water in the cargo hold no.4 and no.5 with water level up to 3 meters. Vessel had afresh change of crew and SMS implantation was still in progress. Based on listed deficiencies mentioned below, vessel was liable for Port Sate Control (PSC) detention. Valve chambers are located under the cargo holds they are full of water.

According to the documents provided by the INTLREG on September 8th, 2023. On the same day, July 10th, the Palau Flag state officer submitted an email to the INTLREG (refer to Appendix 8), where it was emphasized that the "*surveyor to the international Register of Shipping did not attend the ship today, as was agreed.*" The email listed what was described as "major deficiencies" and stated that "*Within the above context, this Administration is requesting from international Register of Shipping to* ***suspend with immediate effect*** *the validity of ALL statutory certificate issued on behalf of Palau Flag Administration.*" (refer to Appendix 8)

On October 24th, 2023, the TTSB, the Flag state representatives of Palau, and the Taiwan MPB held a meeting to discuss relevant issues in the ANGEL investigation. The conclusions are described as follows:

(1) The Palau Flag state did not receive the email[14] sent by Norwegian HYDOR Insurance Company on August 17th, 2023, on behalf of the Norwegian law firm Wikborg Rein. Afterward, the Flag state learned about this document from the TTSB.

(2) Before the ship owner was changed, the ANGEL had 2 classification

[14] Document No. 526492-104. This email is sent to the MPB and TIPC and Kaohsiung Port Branch, with the purpose of sending HYDOR AS to collect relevant information on the ANGEL's incident.

societies, namely the DNV and Indian Register of Shipping (IRS). After changing to a new ship owner, the Classification Society of the ANGEL was the International Register of Shipping (INTLREG). The INTLREG is a Classification Society recognized by the Palau Ship Registry.

(3) The P&I's insurance company (HYDOR AS) carried out a boarding inspection of the ANGEL. The insurance company was not obligated to report the inspection results to the Flag state. The insurance company's survey report should be obtained from the ship owner and ship management company.

(4) On July 10th, 2023, the Flag state dispatched an inspector to the ANGEL to perform an inspection. Based on the inspection results on that day, the Flag state submitted an email to notify ZULU. The Flag state did not use the word "revoke". But rather "***suspend with immediate effect*** *the validity of ALL statutory certificate issued on behalf of Palau Flag Administration.*" (Appendix 8) The Flag state has not provided any comments on the claims and legal terms presented by the lawyers of the ANGEL's P&I insurance company.

1.8 Voyage Information

1.8.1 Voyage Data and Loading Condition

The last port of call for the ANGEL before arriving at the anchorage area in Kaohsiung was Dalian, China, where it loaded empty containers. According to crew interviews, the destination port for the ANGEL was Tallinn, Estonia. At the time of the occurrence, the draft was 6.3 meters at the bow and 9.8 meters at the stern.

The ANGEL is an all-container ship with a maximum loading capacity of

1,541 TEUs. Upon its arrival at the anchorage area of the Port of Kaohsiung, it was carrying 1,349 empty 20-foot-high containers. The cargo loading plan (Stowage plan) declared the unloading port as LED (St. Petersburg, Russia).

1.8.2 Ship Stability Information

On September 16th, 2023, the first officer of the ANGEL used the Task Master software to calculate the ANGEL's stability data, and he submitted the result to ZULU (as detailed in Appendix 9).

On September 8th, 2023, the TTSB obtained the stability data of the ANGEL. According to crew interviews and comparisons, the chief officer of the ANGEL virtually increased the weight by 4,400 tons (including cargo and some water tank weight) to adjust the ANGEL's draft to match the actual situation. The calculation results indicated that the ANGEL listed 16.1 degrees to the starboard side (see Appendix 9), which did not correspond with the actual situation during the ANGEL's anchorage period (listing within 5 degrees).

1.9 Vessel Traffic Services and Monitoring

This section is divided into 3 sub-sections: Port of Kaohsiung Vessel Traffic Services, Port of Kaohsiung Anchorage Area Scope and Management Regulations, and Highlights of the revised version of the Regulations Governing the Anchorage of Vessels in the Port of Kaohsiung.

1.9.1 Port of Kaohsiung Vessel Traffic Services

The Port of Kaohsiung is geographically separated by 2 main sections, namely the North Harbor (First Harbor) and South Harbor (Second Harbor), with the Former Zhen River acting as the demarcation line between the 2. The outer port region encompasses the Port of Kaohsiung. Routing System designated anchorage zones (refer to Figure 1.1-1). The Kaohsiung Vessel Traffic Services

Center, known as Kaohsiung VTS, is overseen and operated by the Vessel Traffic Service Section within the Harbor Management Department of the Port of Kaohsiung under the TIPC's jurisdiction. Its primary role involves delivering vessel traffic services for the Port of Kaohsiung. In external communications with vessels, the standard radio call utilized is “Kaohsiung VTS.”

The Kaohsiung VTS is divided into “Vessel Information Service (VIS)”, “VTS North Sector (First Harbor)”, and VTS South Sector (second Harbor). The VIS operator is tasked with ship-to-shore and shore-to-ship port radio communication, reporting ship emergency rescue events, entering ship arrival data, providing real-time typhoon warnings, and monitoring vessel movements. Additionally, the VIS operator facilitates communications between the Kaohsiung VTS and the ANGEL.

According to the communication records of the Kaohsiung VTS, during the period when the ANGEL was anchored in the second anchorage area of the Port of Kaohsiung. On July 16th at 1148 hours, the Kaohsiung VTS inquired if the ANGEL had dragged anchor. On July 17th, the Kaohsiung VTS inquired about the status of the ANGEL's main engines. It was not until July 18th at 1058 hours, that the master of the ANGEL reported to the Kaohsiung VTS that” *the vessel another condition because we have the water into…the cargo hold, we have the water…to starboard…for us it’s so dangerous now to stay out of anchorage for sheltering because we cannot control with the …water …inside the tank.*”

1.9.2 Regulations Governing the Anchorage of Vessels in Kaohsiung International Commercial Port

According to the Regulations Governing the Anchorage of Vessels in Kaohsiung International Commercial Port, Taiwan International Ports Corporation, Ltd. (hereinafter referred to as Kaohsiung Port Anchorage Regulation), there are five anchorage areas in the Port of Kaohsiung (refer to

Figure 1.1-1).

The Kaohsiung Port Anchorage Management Regulations stated that the 4 conditions for ships to apply for anchoring include: Inbound vessels, Outbound vessels, Vessels that shift berth, and Anchor on arrival. Anchor on arrival means that the ship does not enter Kaohsiung Port and anchor at anchorage for a short period, such as taking on water, resupplying, repairs, crew changes, or standby. There is no time limit for this type of anchoring, but the vessel must depart the anchorage area immediately after the task is completed.

The shipping agent submitted an anchoring permission through the Taiwan Port Service Network (TPNet) using the Anchorage Application Form (IFA_A051). The ANGEL had already submitted a "Pre-Arrival Notification (registration number)" through the Maritime Transport Network (MTNet), so the TPNet could retrieve and import the basic vessel information. For vessels without a pre-arrival notification, the shipping agent must input the relevant information manually. When the TPNet is unavailable, the application can be submitted in writing to the Kaohsiung VTS (the Anchorage Application Form as detailed in Appendix 10).

The shipping agent (S5 ASIA) of the ANGEL met the conditions for “anchor on arrival".S5 ASIA submitted an application through the TPNet on July 4th, 2023, at 1527 hours. The Kaohsiung VTS reviewed the vessel's basic information and assisted in arranging the anchorage position. On the same day at 2046 hours, the ANGEL completed the anchoring operation (refer to Figure 1.9-1).

錨泊申請單(IFA_A051)

本公司代理之船舶預計抵達高雄港錨區停留，停留錨地期間僅遵守港務當局等各項規定並且由本公司負擔一切相關之責任以及依「高雄港錨泊管理費方案」計收費用，
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錨泊申請單

簽證編號	XKHH112000659	序號	1
船舶號數			
拋錨類別	到港下錨	船舶呼號	T8A4295
中文船名	天使	英文船名	ANGEL
船舶種類	請選擇	船舶總長	172.00公尺564.16英尺
船舶國籍	請選擇	總噸位(T)	16145.00 噸
國際海事組織號碼	9256406	實際最大吃水	9.100 公尺30英尺
預計錨泊時間	2023/07/05 06:00	預計離開時間	2023/07/06 17:00
是否有船舶自動識別系統	是	是否有危險品	否
最近一次停泊於高雄外錨地日期(無則免填)		申請事由	待命
地點	第一港口外	其他原因	
		等待裝卸碼頭	請選擇
已申請優先靠泊	請選擇	非入港船申請前6或24小時定額錨泊費	是
申請日期	2023/07/04 15:27	港代理	香港商伍航亞洲有限公司台灣分公司

「拋錨類別」如有變動，如「進港下錨」改「到港拋錨(不進高雄港)」、或「移泊下錨」改「離港下錨」...，
請另新增一張申請單並通知信號台。

Figure1.9-1 Record of the ANGEL's application form in the Port of Kaohsiung Anchoring System (IFA_A051)

1.9.3 Highlights of the Revised Regulations Governing the Anchorage of Vessels in the Port of Kaohsiung

Following the occurrence, in order to strengthen the management of the anchorage area of the Port of Kaohsiung, on December 22, 2023, the Taiwan International Ports Corporation, Ltd. revised the Regulations Governing the Anchorage of Vessels in the Port of Kaohsiung, including:

1. Limiting the anchoring period to 7 days, unless otherwise agreed.

2. For the "anchor on arrival" category, the reason "standby" has been deleted. If a vessel applies to anchor again within 60 hours after heaving up anchor, it must provide proof of the vessel's seaworthiness, and the cumulative stay shall not exceed 21 days. If necessary, the MPB will coordinate with the

Coast Guard to evacuate the vessel.

3. The application review mechanism has been strengthened. The regulations stipulate that vessels applying to anchor must maintain seaworthiness and have valid P&I insurance. The relevant certificates must be verified in the maritime administration system. If the vessel has no records in the system, the shipping agent must provide a statement guaranteeing the vessel's seaworthiness.

4. Temporary anchorage positions have been added, with priority given to emergency anchoring. Emergency anchoring requires a special application, and the vessel's main engine must be ready for operation at all times. The vessel must report its status hourly and provide a deposit or P&I insurance guarantee within 12 hours of the application.

The early warning mechanism has been strengthened. If the average wind force reaches level 5 and lasts for one hour, vessels should consider whether to heave up anchor and depart based on the situation, and the anchorage application process will be temporarily suspended.

1.10 Vessel Tracking Information

After the occurrence happened, the TTSB obtained the AIS track data of the ANGEL (as detailed in section 1.10.1).

In accordance with the International Convention for the Safety of Life at Sea (SOLAS), the bridge of the ANGEL shall be equipped with a Simplified Voyage Data Recorder (S-VDR). On August 18th, 2023, Seagreen Enterprise Company retrieved the S-VDR from approximately 37 meters underwater where the ANGEL sank. On August 19th, the company handed over the S-VDR to the TTSB for processing and readout (refer to section 1.10.2).

1.10.1 AIS Tracking Information

Figure 1.10-1 shows the AIS tracking information[15] of the ANGEL's voyage during the occurrence. The recording time included the period from 0023 hours on June 25th to 2309 hours on July 20th. Important changes in the ANGEL's tracking information are summarized below:

- Between 0010 hours and 0330 hours on June 28th, the ANGEL turned to sail north and stopped its main engine for maintenance. The reference ship's position was along the east coast of Ningbo, China, and the ANGEL drifted in the East China Sea.
- Between 0230 hours and 1400 hours on June 29th, the ANGEL turned and sailed westward to leeward to anchor and stop for more than 10 hours to repair the main engine. The reference ship's position was along the east coast of Taizhou.
- At about 1125 hours on July 1st, the ANGEL sailed southward through the waters on the west side of Dongyin Island.
- At about 2313 hours on July 1st, the ANGEL turned westward toward the center line of the Taiwan Strait.
- At approximately 0600 hours on July 2nd, the ANGEL entered Taiwan's 12 nautical miles of territorial waters.
- At approximately 1950 hours on July 4th, the ANGEL adjusted its course and speed and sailed to the Anchorage Area no. 2 of Port of Kaohsiung.

[15] Source: SHIPXY website.

Figure1.10-1 AIS tracking information of the ANGEL's voyage during the occurrence.

- At about 2154 hours on July 4th, the ANGEL reported its anchor position to the Port of Kaohsiung VTS.
- At 2205:30 on July 20th, the last ship position information of the ANGEL was recorded.

1.10.2 S-VDR Data and Information

According to ANGEL's annual performance test report, which was provided by the original manufacturer, the S-VDR recorded bridge audio into 3 channels,

recorded 12 parameter data[16], and radar/AIS data, the length of the data downloaded surpassed 14 hours during the detection period.

After the TTSB obtained the S-VDR, no physical damage was found during the visual inspection (Figure 1.10-2). The TTSB obtained technical assistance from the British Marine Accident Investigation Branch (MAIB) to download the original VDR data. The length of the ANGEL's S-VDR data was 23 hours, 50 minutes, and 20 seconds (from approximately 2327:46 on July 19th to approximately 2318:06 on July 20th, Taiwan time).

The audio transcripts of the ANGEL is available in the factual date report[17].

Figure 1.10-2 Visual inspection of the appearance of the S-VDR CSM.

[16] Date, time, longitude, latitude, course over ground, ship heading, speed over ground, speed over water, UTC time difference, number of GPS satellite observations, GPS satellite observation accuracy attenuation factor, GPS satellite antenna height, etc.

[17] The TTSB factual data report no.: TTSB-MFR-24-01-001

1.11 Interview Summaries

Except for the master and first officer of the ANGEL who can communicate in English, other crew members use Azerbaijani or Russian.

On July 24th, 2023, the TTSB interviewed 7 crew members of the ANGEL, including the master, first officer, second officer, third officer, Chief Engineer, and 2 Able Seaman (AB) in Kaohsiung.

In addition, from July 25th to July 31st, the TTSB continued to communicate and make interviews with the chief officer and second officer through WhatsApp, and obtained multiple photos and videos provided by the crew.

The TTSB contacted the ship owner of the ANGEL, the former master, and the former chief officer through email but received no response. The TTSB obtained information regarding the former chief officer's PAN PAN Letter to the Singapore Maritime and Port Authority and the International Transport Workers' Federation (ITF) through Lead Shine Marine Consultant Company. Additionally, ZULU was unwilling to provide relevant information. Based on interviews with the TTSB, interview records from the MPB, a summary of interviews[18] with relevant personnel is described as follows:

1.11.1 PAN PAN Letter from the Former Chief Officer

On June 29th, 2023, the former chief officer of the ANGEL reported relevant deficiencies of the ANGEL to the Maritime & Port Authority of Singapore and the International Transport Workers Federation (ITF) via email. The original email is attached in Appendix 1. Key information is summarized as follows:

[18] The initial interviews with the crew of the ANGEL were mainly conducted in English. Later interviews were conducted in Azerbaijani. After on-site translation by professionals, they were written into English written records, which were then translated into Chinese by the investigation team.

I am a chief officer of my angel with ex name SSL GANGA. IMO 9256406. The vessel changed owner on 30.05.2023. All crew joined to vessel on 30.05.2023 in Colombo anchorage. There was no pre-inspection carried out before the vessel owned. There was no familiarization, no handover notes. The systems that they tell us working, actually not working.

There are so many problems on this vessel but the main problem is the ship always lists side to side by herself and we still don't know why. (I assume there is a hole on the hull) When list exceed 6-7 degrees we make ballast to other side. Ballast remote system is not working. Crew and I always go to the valve chambers and open-close valves manually. Valve chambers are located under the cargo holds they are so small and full with water inside. No matter what time it is we go to valve chambers and come back to pump room and start to make the vessel upright. Also, there are many holes in the tank tops. Also, there are holes on the tank tops in the cargo holds.

When we take ballast, the water come inside the cargo holds. This is also serious problem. There are so much water in the cargo holds no.3 and no.4 now. Also, so many problems in engine room. Boiler is burned. We are using funnel boiler now. Funnel boiler has too much leakage and it consumes great amount of fresh water every day. ... (skipped) Day by day another problem being occurred. Also, GM is another problem. Without ballast our gm is so low. SO OUR LIVES ARE IN DANGER. PLEASE HELP US.

1.11.2 The Master

The interviewee, an Azerbaijani national with 11 years of seaman experience and about 3 years as a master, holds a certificate of competency and an approval certificate from Azerbaijan. He joined the ANGEL as a master on July 8th, 2023. During a brief conversation with the former master, he learned about the water in

some cargo holds. However, there was no thorough handover, lacking information about the charterer and documentation. The ANGEL's last port call was in Dalian, China, and the most recent Flag state inspection occurred on July 10, 2023.

The interviewee stated that it was his first time working for NAVRAMAR and had no comments about the company. It was his first time working for the ANGEL. There were ISM documents on board and the company did not perform an audit; he did not know the owner and the contact information.

The interviewee stated that the shipowner’s representative brought 8 new crew members onboard the ship on July 8th. The shipowner’s representative told him that he would arrange for divers to perform underwater surveys. After boarding the ship, he found something strange in the hull and thought there might be holes in the hull, rusty decks, rusty hatch covers, and no sealed compartments or cargo holds. At that time, the cargo hold of the ANGEL was flooded with water. The water came from the ballast tanks no. 5 and no. 6 at the bottom of the ship (Note: The interviewee mentioned in the first interview that the water came from the ballast tanks no. 4 and no. 5 at the bottom of the ship); many pipelines were damaged, and the water depth of the ballast water tank was only a rough estimation. The crew was unable to conduct a comprehensive and appropriate water depth measurement of the ballast water tank. The interviewee instructed the crew to check the water level in the cargo holds and mark them. After the inspection, he reported such findings to ZULU.

There was a Ship Flooding Muster List posted on the ANGEL. Crew members were supposed to carry out emergency procedures in accordance with the Flooding Muster List. The ship has sunk and the Ship Flooding Muster List cannot be provided. The ANGEL had 2 ballast pumps in the engine room for discharging ballast water. Four to 5 days before the occurrence, the company

provided 4 submersible pumps. Nearly all of the ANGEL's ballast water valves were inoperable (flooded), the pneumatic systems were inoperable, and the anti-rolling system was inoperable.

The interviewee stated that the Flag state dispatched a surveyor conduct an inspection on July 10th, 2023. The survey report was given after the fact. On July 14th, 2023, divers from Golden Port Asia Co., LTD performed an underwater survey. Due to weather conditions and the double hull, the divers were not able to complete all underwater surveys. On July 14th, the INTREG also dispatched a surveyor on board the ship, but the surveyor did not give any instructions.

On July 17th, the interviewee contacted ZULU of the current situation of the ANGEL and requested emergency entry. The company has also contacted the shipping agent (S5 ASIA). On July 18th, he received notice from the shipping agent that it took 3 to 5 days to process the application. On July 18th, the interviewee formally contacted the shipping agent directly via email, requesting emergency entry into the port. Unfortunately, the shipping agent took no further action.

The interviewee stated that on July 20th, 2023, at 0547 hours (S-VDR time 0542 hours), the main generator of the ANGEL failed for the first time. Power was restored at approximately 0630 hours. During this period, the interviewee answered a VTS call, informing them that there was water in the cargo holds, but that water level was stable, stating, "*There is water inside the cargo holds, and our situation is critical, but the water level is stable*."

When the generator failed for the second time at 0830 hours (S-VDR time 0824 hours), the crew was unable to restore power. This failure prevented the crew from pumping out the water in the cargo holds, causing the ANGEL to list and eventually sink. On the day of the occurrence, the interviewee contacted the shipping company by phone, announcing MAYDAY and deciding to abandon the

ship because the ANGEL was listing severely to the port side. Before abandoning the ship, the ANGEL was listed 16 degrees to the port side. The crew could not stop the list because of water ingress due to ballast problems. Unable to pump out water (we can't pump out water due to ballast problems), the interviewee gathered the crew and abandoned the ship after making safety preparations. The GM of the ANGEL was lower than the required minimum, and the GZ range between 30 and 40 was also lower than the required value. Since the ANGEL was fully loaded, the crew could not accurately obtain the roll angle when the ship capsized. In order to avoid casualties among the crew, the interviewee decided to abandon the ship. The time to abandon ship was announced at 1000 hours on July 20th. The Deck Log Book and Engine Log Book were carried out when abandoning the ship. During the process of abandoning the ship, the chief engineer's hand was slightly injured and there was no oil leakage.

The interviewee stated that (the first time, July 24th) he did not receive any notification from the shipowner or ZULU that the ship’s related certificates had been suspended, during the last interview (July 31st), he changed his statement. He had seen documentation of the Angel’s certificates being suspended 1 to 2 days before the occurrence.

1.11.3 The Chief Engineer

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had about 31 years of sea service experience, and had been serving as chief engineer for about 23 years. On May 24th, 2023, he was serving as chief engineer of the ANGEL.

According to the interviewee, the ANGEL had one main engine MAN B&W 6S60/MC-C, and 3 auxiliary engines MAN B&W 6L28/32H. He did not know the latest port state control inspection, and the management company did not have

an internal audit; after taking over the ship, the Flag state and insurance company (P&I) had boarded the ship to conduct a survey, he did not know the specific survey time and location. He knew that the owner of the ANGEL was NAVAMAR, the management company was ZULU, and the Classification Society was the International Register of Shipping. ISM documentation was available on board; no contingency plan for cargo hold water ingression was seen.

The interviewee stated that after boarding the ship, he discovered the condition of the hull and provided photo evidence (a total of 11 photos and 7 video clips), problem including: (1) The auxiliary boiler was in poor condition; (2)The air starter of the auxiliary engine no. 3 was not operating. ; (3) 80% of the lights on the ship needed to be replaced; (4) One ballast pump was operating, but the effective capacity of the other one was reduced and needed to be repaired. The ballast water system and seawater-related valves needed repairs, most of which needed to be replaced. Crew members were contacted that we would be heading to the shipyard for repairs and overhaul in the near future. The boiler was not used to heat the heavy oil when the main engine was shut down. The master had been asked to report to the company for repairs. The company responded that repairs would be carried out after cargo discharging.

On June 5th, the auxiliary boiler[19] failed while the ANGEL was in Sri Lanka. After arriving at the anchorage area in the Port of Kaohsiung, the main generator on the ship was used, using IFO fuel. The normal temperature of the fuel was set to 70°C (Settling tank), 80°C (daily tank), and 115°C (main engine inlet).

The interviewee said that about 10 days after sailing from Sri Lanka, the crew visually discovered that about 0.5 meters of water had entered a cargo hold

[19] The steam generated by the auxiliary boiler is mainly used to heat fuel and oil to drive auxiliary equipment and meet the needs of heating, hot water, drying clothes, etc.

no. 3 for the first time. At that time, the water had not yet flooded other cargo holds. The crew used ballast pumps to pump out water. Around June 19th and 20th, the former master reported the ship's condition to the management company via email and phone. At that time, the engine room was not flooded. Under the 2 sets of deck booms of the ANGEL, there are four heavy oil tanks: TK04 (S & P) and TK07 (S & P). The crew discovered that heavy oil was leaking into the cargo hold no. 4. Upon inspection, they identified the leaking oil tank as TK04 (S). This tank is situated between the largest tank no. 3 and no. 4. To address the leak, the crew used wooden plugs and cement to seal the hole in TK04 (S). They also used sawdust to absorb and clean up the oil leakage in the cargo hold no. 4 (refer to Figure 1.11-1).

Before departing from Dalian on June 25th, the interviewee supervised the main engine, auxiliary engine, and steering gear tests by the engineer, and the results were all normal. Two pumps, one emergency pump, and 3 starters all tested normal and there were no problems; at that time, the auxiliary boiler and air compressor no. 2 needed repairs. The interviewee did not know where the hull of the ANGEL was cracked (crack). The water intrusion may have come from the ballast water system or the hull of the ship was damaged. The interviewee stated that his responsibility was to ensure that the ballast water pumps were working properly and that the ballast water system operation was the responsibility of the deck department.

The interviewee said that on the way from Dalian to Kaohsiung, the jacket of cylinder no. 4 of the main engine ruptured, and the ABGEL drifted for about 34 hours at sea for repairs. The ANGEL did not hit rocks, obstructions, or other ships during its voyage from Dalian. The crew could not verify the valve status of the ballast water system. The underwater inspection was scheduled in Kaohsiung but could not be completed.

Figure 1.11-1 Crew cleaning up oil leakage in the cargo hold no.4

The ANGEL did not use diesel when it docked in Dalian. Because the docking period was only one day, the heavy oil in the oil supply pipeline could still maintain a certain temperature. Therefore, the interviewee decided to continue to use heavy oil to supply the generator while it was in the port. The economizer function was normal, so the economizer could be used to heat heavy oil for use by the generator and the main engine during navigation. However, when the main engine was shut down for too long, the heavy oil could not be heated by the economizer, and the oil temperature would continue to drop, increasing the heavy oil viscosity to an excessive value, rendering the heavy oil unusable by the main engine and generator. At this time, diesel oil was used instead.

On July 2nd, the ANGEL sailed to the anchorage area of the Port of Kaohsiung. It did not anchor in the port on July 2nd, had to wait until July 4th to anchor. The interviewee said that the temperature of the heavy oil began to drop

during this period. By the afternoon of July 12th, the generator's oil supply was switched from heavy oil to diesel. The crew found sludge at the bottom of both sides of the MGO daily tank, which may have been caused by mixing with HFO fuel, ultimately leading to the generator failure. On July 14th, 2023, the underwater survey of Golden Port Asia CO., LTD. was not completed due to strong currents and winds.

The interviewee said that while in Dalian, water entered the cargo hold but not the engine room. Regarding the water pump problem, when the ANGEL was in Dalian, the shipowner sent 4 submersible pumps to the ship to pump out the water in the cargo holds. However, 3 of them broke before arriving at the anchorage area of the Port of Kaohsiung, and only one was left operational, which was placed in chamber no. 4 to pump water; on July 14th, the shipowner sent another 4 submersible pumps to the ship, but they were not used.

The interviewee said that at about 0545 hours on July 20th, the generator suddenly tripped and the power was restored at 0620 hours. After inspection, it was found that the oil supply pipeline was full of sludge and oil residue. The interviewee judged that this phenomenon was due to the mixture of heavy oil and diesel in the pipeline producing a large amount of sludge, so the interviewee led engine room personnel to clean all the fuel filters in the fuel supply pipeline. After cleaning, the generator was restarted and it ran normally. However, after the generator had been running for about an hour (about 0824 hours) the power tripped again. After inspection, the interviewee found that the oil supply pipeline was again blocked by sludge and oil residue.

The emergency generator was started after the 2 power outages, but the emergency switchboard was not designed to supply power to the ballast water pump. The auxiliary engine could not be restarted, but the emergency generator operated automatically. During the power blackout, many alarms were triggered

in the engine room. The problem was immediately reported to the master who stated that it could not be solved; if the generator could not be started, the ballast pump could not be used, and there was no other way to adjust the balance of the ship. At about 0945 hours, the master gave the order to abandon the ship. All crew members began abandoning the ship at 1000 hours.

The interviewee stated that there was no handover process, so he was unaware of the structural condition of the ship's hull. He also did not know why water entered the ship or if the ship had undergone any recent major modifications. Additionally, he was not contacted about the ship's docking repairs and hull maintenance.

1.11.4 The Chief Officer

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had served as a seafarer for 14 years, and had worked as the ship's officer for 3 years. On July 8th, 2023, he began to serve as the chief officer of the ANGEL. He and the former chief officer carried out the handover process in an emergency situation. The ANGEL came into port for maintenance. He inspected the ship with the former chief officer, and the former chief officer showed all the problems. During the handover, he learned that the devices that needed to be repaired included: the automatic ballast system on the deck; the remote valve control system; the holes in the cargo hold, and the starboard anchor.

The interviewee stated that when he boarded the ship on July 8th, the cargo holds were already flooded with water. The manhole covers of the ballast water tank in the cargo hold no.3 had not been closed, but the water ingress had not worsened and the water depth was maintained at about 50 centimeters; the cargo holds no.4 and no.5 were flooded with about 4.5 meters of water; the cargo hold

no.6 was flooded with water up to about 15 centimeters; the test results showed that it was fresh water. The interviewee stated that he used the Task Master software to simulate the stability of the ANGEL on July 16th (Appendix 6), and it was found that the stability was insufficient, and he informed this situation to the master. The ship's hull listed both the port side and starboard side, and wing tank no. 6 (port and starboard) was required to maintain the hull's balance.

During the interview, the interviewee presented water depth data of the ballast water tank. The water measuring pipes in many places of the ANGEL were blocked. The measurement data of the ballast water may be inaccurate. Some water tanks without water measurement records (Figure 1.11-2 noted as "broken") were mostly water tanks that could not be measured or measurements were inaccurate. Many pipelines were damaged, and the water depth of the ballast water tank was only an estimation. The crew was unable to fully measure the water depth of the ballast water tank.

The interviewee stated that at 0547 hours (S-VDR time 0542 hours) on July 20th, 2023, the ANGEL lost power for the first time and immediately notified the VTS; the last time it lost power and could not be restored, the shipowner was notified, and the shipowner responded (they accepted the information).

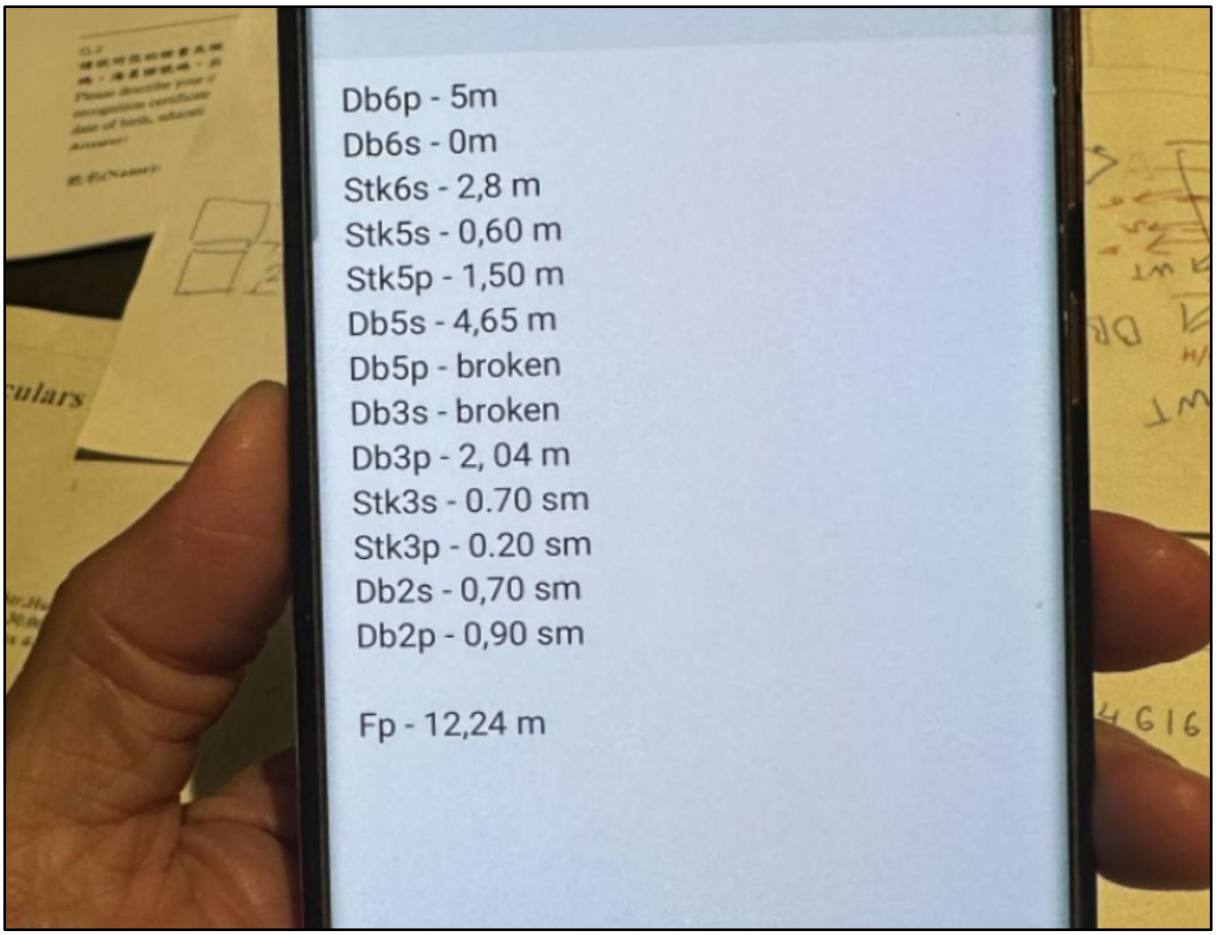

Figure 1.11-2 Water depth data on the ANGEL's ballast water

The interviewee reported that the darkness observed in the cargo hold no. 3 was not due to an oil leak but rather caused by coffee beans and bilge debris floating on the water's surface. As the crew encountered difficulties in pumping out water from the tank, they decided to open the manhole cover of the ballast water double bottom tank no. 3 on the port side (WB-DB3P). This allowed the flooded water to drain into the tank, leading to the flow of debris into the ballast tank. Additionally, after departing from Dalian, the former master of the ship accessed the cargo hold no. 3 and supervised the crew while they cleared the debris from the double-bottom tank. They used a submersible pump to remove the water.

The ship is equipped with 3 valve rooms located as follows: one at the base

of chamber room no. 4 in front of the deck, another in the lower sections of the compartments in the cargo holds no. 4 and no. 5, and the third in the lower part of chamber room no. 7 behind the deck. These are designated as the valve rooms 1st, 2nd, and 3rd, respectively.

1.11.5 The Third Officer

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had served as a seafarer for 38 years, and had served as a second engineer for about 26 years; on May 30th, 2023, he was serving as the third officer (3/O) on the ANGEL. The chief engineer and the interviewee requested the engine room personnel to perform the inspection and testing of the ANGEL's main engine, auxiliary engine, and steering gear, and no problems were found.

At the time of the abandoned ship on July 20th (1000 hours), there was an alarm indicating a decrease in fuel pressure from the ANGEL's generator. At that time, both the main engine and the engine order were normal; at 0545 hours (S-VDR time is 0542 hours) on July 20th, the ANGEL was powered off for the first time; at 0830 hours (S-VDR time 0824 hours), the power was cut off for the second time.

1.11.6 The Second Engineer

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, and had served as a seafarer for 5 years. On May 30th, 2023, he began to serve as the second engineer (2/E) on the ANGEL. When picking up the ship, the interviewee did not carry out the handover procedures with the previous third officer. At that time, he found that some navigation instruments could not be operated: The S-band radar

antenna could not rotate, the starboard side anchor could not operate, the hull parts were rusted, and the ballast water tanks at the bottom and side of the cabin had holes, etc.

The interviewee stated that after water entered the cargo holds of the ANGEL, the former master who had received the ship reported this issue to the management company. The crew began pumping the water out using handheld submersible pumps and the ballast water system. They instructed the interviewee to pay close attention to the list of the ANGEL. It departed from Dalian on June 25th, 2023; before departure, the inspection and testing of the main engine, auxiliary engines, and steering gear of the ANGEL were carried out by the former master and chief engineer, and everything was normal. The bow and stern drafts of the ANGEL were 5.1 meters and 9.1 meters; the next port of the voyage plan was the Port of Tallinn, Estonia.

The interviewee stated that when the ANGEL listed 3 to 4 degrees, the crew used the ballast water pump in the engine room and the hand-held submersible pumps to pump out the water. Four to 5 days before the occurrence, the management company provided four additional hand-held submersible pumps to the ship. On the day of the accident, the ANGEL was listed 16 degrees to the portside and the crew was unable to stop the list.

1.11.7 The Third Engineer

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had served as a seafarer for 3 years, and had served as a third engineer for about one year; on May 30th, 2023, he began to serve as the third engineer (3/E) on the ANGEL. After picking up the ship in Colombo, no handover procedures were carried out between him and the previous third engineer. The chief engineer and engine crew

members performed inspections and tests on the main engine, auxiliary engines, and steering gear of the ANGEL. There were some minor problems in the engine room.

1.11.8 Able Seaman A

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, and had served as a seafarer for 10 years. On May 30th, 2023, he worked as an able seaman (AB) on the ANGEL after boarding the ship; he discovered that there were serious problems with the ship's hull condition, engine room equipment, company management, etc. The deck of the ANGEL was rusty, there were many holes in the hatches and cargo holds, and the container lashing equipment was rusty, the ANGEL was in very bad condition, posing a danger to the crew during the lashing process of the containers. The ship's cargo hold bilge water system was not operative. The bilge wells were blocked with debris, making it impossible for the crew to use pumps to drain the water in the cargo hold. Due to a hole and flooding in the cargo hold, the ballast water system was unable to operate properly. Because the ballast valve room was located in the cargo hold, the crew could not operate it underwater.

He thought there was a hole in the side of the ship through which seawater was flowing in. All the ship's anchors and windlasses were out of commission, and the starboard anchor was inoperable. Two derricks on the ship were not functioning properly. There were also some problems in the engine room. The boiler in the engine room once caught fire, but it was put out immediately. The fire pump was not functioning properly at all.

The interviewee submitted photo evidence (with 55 photos in total) that the ANGEL did not have normal safe working conditions, and the living and working

conditions on board were unhygienic. Four to 5 days after boarding the ship, the toilet on the ship broke and we had to put our waste in plastic bags. Although these problems were reported to the company many times, the management company did not take any action and the management was very poor. The management company did not transfer the paychecks to the crew's accounts on time and was sometimes late in paying half of the expenses. When we boarded the ship, the company's technical department personnel boarded the ship with our crew. I heard that the technical department personnel did not inform the company of the problems and said that the ship was in good condition.

The interviewee confirmed that the photos he provided were all taken on the ANGEL. Some were captured before arriving in Dalian, some after departing from Dalian, and the timing of others was unknown. He was unsure about the specific location of the water ingress, which he had hand-drawn to cover the areas of cargo holds no. 3 to no. 5. Among these, cargo hold no. 4 experienced the most severe water ingress. Seawater continued to enter the ship, and the crew was using pumps to remove the water. However, a generator failure led to a power outage, rendering the pumps inoperative. Without the ability to pump out the water, the ship continued to flood and eventually sank.

1.11.9 Able Seaman B

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had served as a seaman for 15 years, and had begun to serve as an able seaman (AB) on the ANGEL on May 30th, 2023.

After boarding the ship, the interviewee discovered that there were no normal safe working conditions on the ANGEL and that the living and working conditions on board were unhygienic. The statement that there were serious

problems with the ship's hull condition, engine room equipment, company management, etc. was the same as AB A's statement, and photo evidence was provided. (refer to Figure 1.11-3).

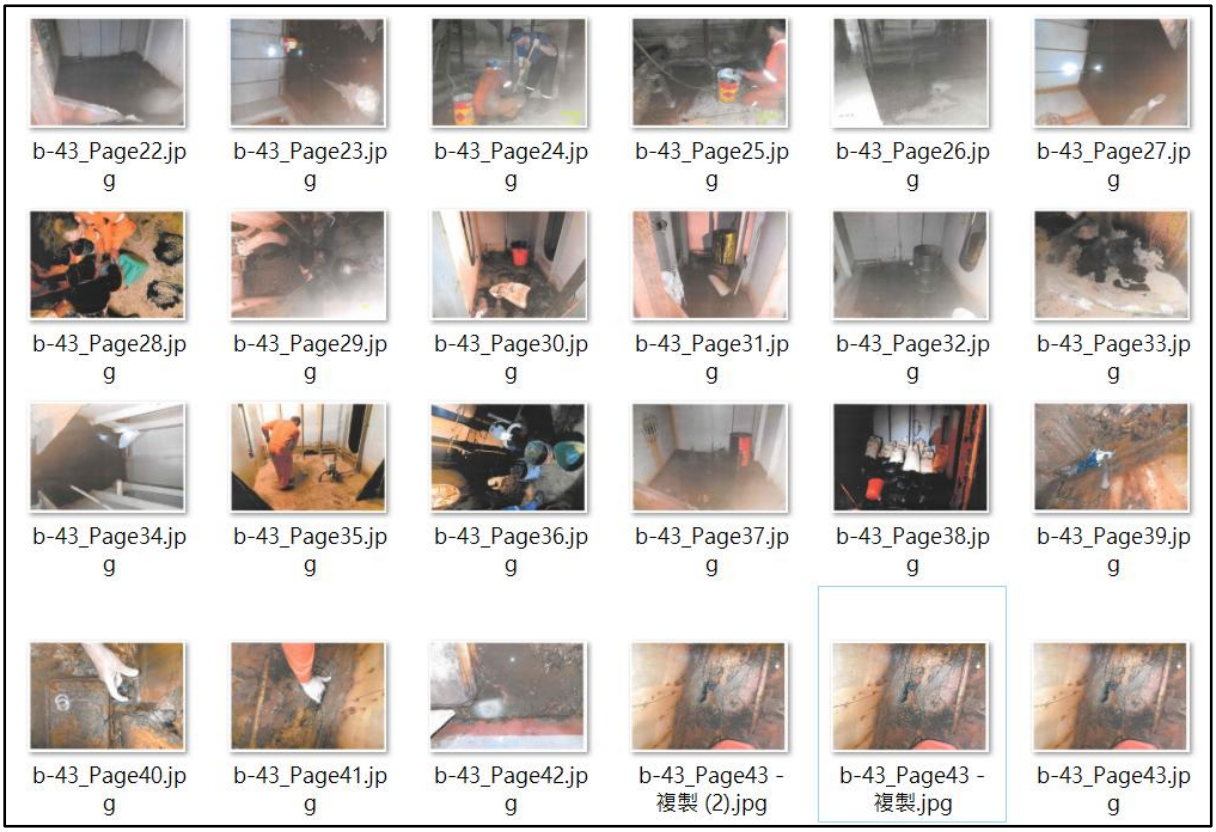

Figure 1.11-3 Photos of damage and water accumulation in the cargo hold of the ANGEL, and corrosion between valves.

1.11.10 Able Seaman C

The interviewee stated that he was a national of Azerbaijan, held a certificate of competency and an approval certificate from Azerbaijan, had served as a seaman for 3 years, and had served as an able seaman (AB) on the ANGEL from July 8th, 2023.

Other crew members provided a video taken on July 17th, 2023. The video was filmed by several ABs during boarding the ship and inspecting the deck. The

dialogue (foreign language translation) between the crew and the AB in the film shows them saying: "Everything is rotten and cannot be operated", and " There are some holes in the deck walkway between the cargo hold, and it may break and fall if you step on it", "It's like hell", "The cargo holds are full of water", "The rust problem is very serious", etc. (refer to Figure 1.11-4)

Figure1.11-4 Photos of holes and rust on the main deck of the ANGEL

1.11.11 Supervisor of the Classification Society

The interviewee is the head of the quality control department of the INTLREG and responded to the TTSB by email. The interviewee stated that on

May 31, 2023, the INTLREG dispatched a surveyor to inspect the ANGEL in Colombo, and issued the certificate on June 2nd, 2023.

The interviewee stated that after leaving Colombo, the ANGEL did not enter the repair shop for repairs, but went to Dalian Port in China for loading. On June 30th, 2023, the INTLREG technical headquarters issued a Class Warning Letter to ZULU, requiring the company to arrange for the ANGEL to be inspected at the next port or anchorage. The letter included 3 actions to be carried out in total: (1). a survey for rectification of the Outstanding Recommendations. (2) a general examination inspection with an underwater survey to be carried out by an approved diving company under the supervision of the INTLREG surveyor, and (3) ISM shipboard additional audit.

The interviewee attached the first set of survey documents in the email, including the Colombo survey report, Taiwan survey report, and ANGEL Certificate Status Form.

The interviewee stated that on July 10th, 2023, the INTLREG revoked the classification certificate and statutory certificate of the ANGEL. On the same day, a suspension letter (the Classification Society suspension letter) for the classification certificate and statutory certificate was sent to ZULU. The interviewee attached to the email the second set of inspection documents, which is the email record of the certificate related to the suspension of the ANGEL from the Palau Flag state on July 10th. On the same day, the INTLREG headquarters sent relevant information about the revocation of ANGEL's certificate to ZULU and ANGEL's ZULU offices in Turkey via email.

The interviewee stated that ZULU failed to provide clear information on the underwater survey arrangements for ANGEL to INTLREG, which caused a delay of 12 days for the INTLREG headquarters to issue 6 inspection instructions to the local surveyor in Taiwan.

On July 14th, 2023, the ANGEL anchored in the Port of Kaohsiung. The shipowner arranged for a Taiwanese maritime company (Golden Port Asia CO., LTD) to perform an underwater hull inspection on the ANGEL. The INTLREG Classification Society sent a surveyor from Lead Shine Marine Consultant to embark the ship for inspection and instructed the surveyor to conduct a general inspection, ISM audit, and Colombo survey. The recommended follow-up actions were not implemented and the reported deficiencies were not examined.

On July 14th 2023, Lead Shine Marine Consultant's survey report concluded: "*The underwater survey was performed by Golden Port Asia CO., Ltd., a diving company recognized by IACS members. The surveyor witnessed the inspection through CCTV connected to the diver's camera. It is understood, no damage was found to the hull, please refer to the dive report and final report for details*."

On December 17, 2024, the interviewee stated that: "*INTLREG did not have a direct communication with ZULU Shipping LLC, our communications were handled via an INTLREG representative in Turkÿe - TSR Marine, who forwarded the two letters regarding warning and subsequent suspension of Class, attached herewith.*"

On December 22, 2024, the interviewee forwarded an email record. The key information in the email is: "*1. This email was sent by ZULU Shipping LLC on August 8, 2023, after the ship sank. ZULU requested an online meeting to persuade INTLREG to reinstate validity and class certificates up to the date of sinking. 2. ZULU requested to restore our Class from the date of suspension up to the vessel's complete loss and issue a Class Maintained Certificate accordingly. This request was refused by INTLREG."*

1.11.12 Ship Agent Manager

The interviewee stated that the ANGEL departed from Dalian. On July 2nd,

the agent applied for replenishment and an underwater survey of the Port of Kaohsiung. The ANGEL was waiting for anchorage near the First Harbor anchorage of the Port of Kaohsiung. The anchoring position was obtained on July 4 and then the ANGEL dropped anchor.

On July 4th, the interviewee uploaded information to the MPB's online system to apply for the ANGEL's general entry into the port. At that time, all certificates were complete and valid. The application for general entry on the voyage was unsuccessful; after that, the interviewee called the Division Chief of the South Taiwan Maritime Affairs Center to discuss the emergency entry for maintenance reasons. The division chief reminded the agent to attach a class report and photos of the flooding on the ship. The Bureau then assessed whether the ANGEL met the emergency entry conditions or not. The interviewee stated that he contacted the ANGEL owner's representative regarding the results of the above communication, and the shipowner's representative said that he would discuss the matter of applying for emergency port entry after he arrived in Taiwan and brought new crew members on board.

On July 8th, the shipowner changed the crew in the anchorage area of the Port of Kaohsiung 7 crew members disembarked and 8 crew members boarded the ship. The former master of the ANGEL also disembarked. The main purpose of the shipowner's representative boarding the ship was to find out the water ingress situation, he went to the ship to confirm whether there were any cracks, and then through the interviewee, found a diver to go offshore to repair it. Once the shipowner brought new crew members on board, he assumed that the water ingress problem had been e solved.

Around July 10th, the shipowner's representative again to find a diver. Golden Port Asia CO., LTD. eventually took on the task, and on July 14, their diver conducted the underwater survey. On July 18th, the interviewee conveyed

the opinion of the MPB to the shipowner’s representative, stating that the ANGEL should be repaired at another port, and asked the shipowner’s representative to propose a backup plan. The shipowner's representative considered that the condition of the ANGEL was deteriorating, and asked the interviewee to explore the possibility of going to a port around Taiwan. Later, there were 2 backup plans, one going to Suao Port and the other to Guangzhou. The final plan of the shipowner’s representative was to go to Guangzhou, which would take 4 days, and to find a guard ship from Guangzhou.

On the morning of July 19th, the interviewee received a fax document from the Port of Kaohsiung, whose subject was translated into English: "During the ANGEL’s anchoring in the second anchorage area the Port of Kaohsiung, it was reported that the ship was flooded." This document requires that "(1) The ship should leave the anchorage area to take shelter from the wind before sunset on July 19th." In the afternoon of that day, the Port of Kaohsiung called to ask if the fax had been received and reiterated the time required for the departure of the ANGEL. In the afternoon of the same day, the interviewee also received a phone call from the South Taiwan Maritime Affairs Center of the MPB, asking the interviewee to resubmit documents according to the emergency entry application procedure. The MPB had not responded to the outcome of the review of this official document.

At about 0830 hours on July 20th, the interviewee went to the Port of Kaohsiung to discuss the delay of the ANGEL's departure from the anchorage area by 2 to 3 days, because the shipowner had arranged for the ANGEL to go to China for repairs, and it would take time to wait for China's escort ship to come to Kaohsiung. At around 0900 hours, they were about to return to S5. Not long after, the Port of Kaohsiung notified the interviewee that the ANGEL was listing and asked 2 tugboats to guard the ANGEL.

At 0921 hours on July 20th, the shipowner's representative notified the interviewee by "WhatsApp" software and stated "*we have a blackout situation on board. Problem with power, can't run our ballast pumps. Vessel getting heeled. We need emergency help…(skip) it seems captain calla mayday.*" (screenshot of conversation in Appendix 5).

1.11.13 Flag State Inspector

On August 1st, 2023, 2 inspectors from the Palau Flag state, one of whom was the interviewee, convened with the TTSB investigators at the South Taiwan Maritime Affairs Center of the MPB to exchange information.

The interviewee reported that on the morning of July 10, he was directed by the Palau Maritime Authority of the Flag state to proceed to the Port of Kaohsiung to board the ANGEL in order to conduct a survey. Upon boarding the ship that day, he discovered that all 1,349 containers on the ANGEL were devoid of cargo. While the accumulation in the cargo hold no. 3 was not significant, the level in the cargo holds no. 4 and no. 5 reached up to 3 meters. The cargo hold no. 6 was inaccessible as it was sealed.

The interviewee stated that there were many deficiencies on the ANGEL, such as crew change, ISM system files, ISPS system files, the emergency generator could not operate, and the emergency pump could not be started. These were all items for which the ship was detained. The crew used a portable pump to pump the water out, but the water depth was 3 meters and the pumping speed was too slow. The rescue boat could not be started; the generator and boiler could not be used.

The interviewee stated that after the Flag state inspector was carried out on July 10, he believed that the ANGEL was in urgent condition and no longer suitable to continue sailing. He reported this condition to the Flag state. The Flag

state also notified the shipowner and inquired about the corrective plan, but before the owner could respond, the ship sank.

The interviewee believed that the main cause of the occurrence in this case was the water in the cargo holds. The ANGEL should not left Dalian, and related deficiencies and water ingress conditions should have been improved before sailing. However, it was only because ANGEL came to Taiwan that he was able to go up and inspect it. The inspection report of the Flag state must wait for approval by the Flag state before being provided to the TTSB.

On August 23rd, 2023, Surveyor A provided the survey report for the events of July 10th to the TTSB. The conclusion remarks for this document are described as follows:

Vessel was not in a seaworthy state at the time of inspection. Critical attentions required for the ingress of water in the cargo hold no.4 and 5 with water level up to 3 meters. Vessel had a fresh change of crew and SMS implantation was still in progress. Based on listed deficiencies mentioned below, vessel was liable for PSC detention.

1.11.14 Manager of the Lead Shine Marine Consultant Company

The interviewee stated that Lead Shine Marine Consultant Company was the contract surveyor of the INTLREG. On July 4th, the INTLREG contacted the interviewee and requested to dispatch a surveyor to survey the ANGEL on its behalf. Subsequently, the entrustment was formally entrusted by email. Attached to the email were a Survey Status Report (June 30) and an email (including the chief officer’s complaint to the ITF), a reply from the Singapore MPA, a letter from the Palau Flag state, and a letter with instructions from the INTLREG and the shipowner.

On June 2nd, in accordance with the instruction of the Flag State, the INTLREG boarded the ship in Colombo to conduct a special inspection and extension survey of the ANGEL in accordance with the instructions of the Flag State, the surveyor found many shortcomings and issued 17 recommendations and 4 memorandums (appendix 11). On June 29th, the chief officer of the ship filed a complaint with the ITF and the Maritime Authority of Singapore. Therefore, the requested inspection content (inspection number 23-07-059), in addition to the above-mentioned deficiencies and memos, also included confirmation of the content of the chief officer's complaint.

The interviewee said that on July 10th, the INTLREG sent another email to commission a temporary underwater survey. The ANGEL owner, through the assistance of S5 ASIA, hired Golden Port Asia CO., LTD to perform the underwater survey on July 14th. On the same day, a surveyor was also dispatched by Lead Shine to embark the ship and conduct the inspection. Since the shipping agent confirmed that no maintenance work was arranged after the ship arrived at the anchorage area, only a temporary underwater survey was conducted on July 14th (inspection number 23-07-075).

The underwater survey was an occasional underwater inspection. According to the diver's video, corrosion was found on the hull, there were no damages found in the ship's hull. Because the diving survey report and video could not be obtained immediately, and the ship owner was contacted through an agent, the surveyor left the missing items and requested the ship owner to provide the diving report for the occasional underwater examination dated 14th July 2013, which should be provided for further evaluation

The interviewee stated that issues related to the special inspection conducted in Colombo on June 2nd, according to the survey status report (June 30th) received, the ANGEL was supposed to be docked and inspection should have

been completed before June 30th. Only after this inspection was concluded could the special inspection be completed. However, the owner and the management company of the ANGEL (ZULU) could not find a slot for the docking inspection at the shipyard and applied to the Flag state of Palau for a special inspection extension. Then, the Flag state also issued a letter of consent on May 30th and agreed to grant an extension to September 30th, 2023. Accordingly, the INTLREG completed the relevant inspection in Colombo and extended the certificate to September 30th, 2023. However, the consent letter did not require an underwater survey, which seems to be different from the relevant recommendations[20] of IMO MSC-MEPC.5/Circ.1.

The interviewee believed that the report email from the chief officer on June 29th showed that the condition of the ANGEL and the living environment of the crew were very poor. When the ANGEL arrived in Dalian, the shipowner only arranged for loading and did not repair the ship. When a ship undergoes repairs and violates inspection deficiencies requirements and arrives at a convenient port or anchorage for the first time, correction of deficiencies and additional ISM audit requirements must be completed. (be carried out at the first convenient port and/or anchorage area.)

The interviewee believed that the chief officer submitted a complaint letter to the ITF and the MPA Singapore at the same time after the crew members felt desperate in the face of the long voyage after leaving port. It can be seen from the inspection request document that on June 30th, MPA Singapore forwarded the chief officer's complaint via email to the Palau Flag state and the China MSA to request attention to the situation on the ship. However, the Palau Flag state immediately sent a letter to the INTLREG and ANGEL’s shipowner requiring the

[20] SURVEY AND CERTIFICATION – RELATED MATTERS Recommended conditions for extending the period of validity of a certificate

ANGEL to deviate to Taiwan, anchor, and undergo Flag state inspections in order to avoid inspections by China and Singapore. The shipowner also did not notify the Taiwan maritime authorities. The interviewee also believed that this did not seem to be an appropriate approach.

The interviewee believed that after the ANGEL arrived at the anchorage area in Kaohsiung on July 4th, Lead Shine Marine Company did not any notification from the shipowner to arrange for a surveyor to board the vessel for inspection. Lead Shine Marine Company was informed by the shipping agent that on July 10th, the Palau Flag state inspector surveyors boarded the ship for inspection on July 10th. Also, on board was a navigation instrument company employee to inspect the radar. Said employee boarded the ship in a small boat together with the surveyor from the Palau Flag state.

The interviewee said that the underwater inspection carried out on board the ship on July 14th was another task carried out at short notice. It was more like the shipowner was trying to reassure the crew because the replacement master refused to sail the ANGEL. The underwater inspection video by the Golden Port's diver was also played on the bridge for the crew of the ship to watch.

The interviewee inquired on the EQUASIS website and learned that in 2018, the ANGEL had a special docking inspection in Hong Kong, and in 2020, an underwater survey was carried out to replace the docking inspection.

When the investigation team conducted another interview with the interviewee by phone on August 24th, he stated that because it was an agency inspection, it was not mentioned in the inspection email and that he did not know about the Suspension of Class declared by the INTLREG on the same day. The interviewee also stated that there are several situations in which a ship is subject to Suspension of Class, such as: (1) Automatic Suspension of Class due to overdue certificates or periodic surveys. For example, when the ship is sailing,

yet an inspection is not arranged in a timely way (2) due to an accident or serious defect, for example, after being detained by the PSC, the shipowner does not actively deal with and repair the ship, and the Classification Society declares Suspension of Class on its own. (3) The Flag state notifies the Classification Society of the Suspension of Class for the ship due to specific reasons.

The interviewee suggested that the TTSB could inquire about the relevant actions of the INTLREG headquarters and the Palau Flag state in accordance with the provisions of SOLAS Chapter 1 General Provisions, Part B Survey and Certificate Article 6.

1.11.15 Senior Officer of the South Taiwan Maritime Affairs Center

On July 21th, the director of the Marine Technology Division of the South Taiwan Maritime Affairs Center stated that preliminary information determined that the ANGEL carried a large number of empty containers, which were originally intended to be transported to Europe. Later, the ANGEL applied to enter the Port of Kaohsiung, probably to unload the empty containers, the ship might have had some malfunctions and applied to enter the port. The ANGEL needed repairs, but the master unable to report the water ingress situation in time, sought assistance from the Port of Kaohsiung, Taiwan International Port, after which the ship listed and sank.

On August 2nd, the director of the Marine Technology Division of the South Taiwan Maritime Affairs Center stated that the master of the ANGEL was newly hired and boarded the ship on July 8 to confirm the conditions of the ship. From July 4th to July 18th, the master of the ANGEL did not report any abnormal conditions to the VTS.

The interviewee stated that it was only on July 18 that the master of the ANGEL told the S5 ASIA that he wanted to apply for emergency entry into port.

The VTS asked if there was anything wrong with the ANGEL, and the master reported that there was water in the cargo holds that this was being dealt with and that there were no major issues. The Port of Kaohsiung, Taiwan International Ports called the shipping agent and the agent replied that there were no problems with the ship and only water leakage occurred in the cargo hold. On July 19th, the ANGEL's shipping agency sent a letter to the MPB to apply for emergency entry into the port. The Port Affairs Division is responsible for this business. At about 0601 hours on July 20th, the VTS asked about the condition of the ANGEL (after investigation, the ANGEL lost power for the first time), and the master replied: "*in very good condition*."

The interviewee said that in response to the official document from S5 ASIA on July 19, the MPB did not reply to the ANGEL's application for emergency entry until the sinking of the ANGEL.

1.11.16 Manager of the Harbor Control Center of TIPC-Kaohsiung

The interviewee stated that under the current emergency port entry procedures of the MPB, a ship requiring urgent entry should report this to VTS. However, the Kaohsiung VTS did not receive any such emergency port entry request or notification for a ship during the specified period. In a genuine emergency, it is the master's responsibility to directly apply to the VTS. The ANGEL did not report any such request between July 4th and July 20th. Furthermore, it is the duty of ANGEL's shipping agent to promptly inform about the ship's status, liaise with the relevant authorities, and submit the necessary application.

The interviewee stated that on the morning of July 18, 2012, he received a call from the manager of the monitoring center stating that a ship of S5 ASIA had arrived at the anchorage area, but he did not know the name of the ship. He then learned through the system that it was the ANGEL; at that time, the VTS operator was asked to contact the ANGEL via VHF to understand the situation, and the

ANGEL contacted him that water was entering the hull. It had asked people to check but did not know the reason. Regarding the fax of July 19th, the preparation was completed on July 18th. At that time, a typhoon was already approaching Kaohsiung, and the anchorage area needed to be cleared for typhoon prevention. At the same time, the manager of the monitoring center contacted the ANGEL that the MPB had refused entry to the port. Therefore, On July 19th, the shipping agent was notified to inform the master to leave the anchorage area.

The interviewee said that the VTS also contacted the ANGEL in the early morning of July 20th to inquire about the status of the ship. The ANGEL stated that everything on the ship was fine and that personnel were still looking for problems and trying to eliminate them. The VTS also asked the ANGEL on the morning of July 20th whether a tugboat had gone to provide support and assistance, but the ANGEL said that no tugboat had come. At 0937 hours, the master of the ANGEL announced MAYDAY. At about 0830 hours, the shipping agent personnel went to the Director's Office of the Harbor Management Division of our company to coordinate and allow the ANGEL to wait at the anchorage area for 40 hours for the owner to arrange for a tugboat to come to the rescue from China. The director told him that such a tugboat had no navigation rights and could not enter Taiwanese waters, fearing that there might be a problem. Shortly after the shipping agent left, the ANGEL announced MAYDAY.

The interviewee believes that for the container that fell into the sea from the ANGEL, the company had arranged for manufacturers to conduct scanning and surveying to confirm the location of the containers that sank to the seabed, and had also issued navigational notices, and notified the Naval Meteorological and Oceanographic Office and the Electronic Chart Center to issue navigational notices; most of them were at a depth of 30 meters, and would not hinder navigation.

The interviewee provided the following opinions on the future management of the anchorage area of the Port of Kaohsiung:

Discussions are ongoing with the MPB and the Coast Guard on how to

involve public authorities. Since the anchorage area is divided into anchoring in and out of the port and anchoring in the port, the first 2 need to apply for entry and exit procedures from the shipping administration authority, and seaworthiness and the ship certificates must be reviewed. However, the current situation is that ships anchoring at the port do not need to apply for a visa from the shipping administration authority. The condition of the ship is thus difficult to handle, so further communication with the MPB is required. At the same time, the CIQS[21] border management also needs to take correspondence.

For future planning, the protocol for managing ship repairs at anchorage will be more stringent. It will necessitate not only project applications but also mandatory inspections by relevant ship engineering companies to assess the vessel's condition. Prior to anchoring, comprehensive documentation and a review process will be required. Additionally, THE VTS will verify the ship's condition within 24 hours of anchoring. In the future, vessels will not be allowed to apply for anchoring at the port. Vessel anchoring locations will be designated, the number of vessels in the anchorage area will be controlled, and the duration of anchoring for vessels will also be regulated. Vessels anchoring for more than 7 days will be required to weigh anchor and re-determine the anchoring sequence outside the harbor.

1.11.17 Manager of the Control and Monitoring Center of TIPC-Kaohsiung

The interviewee stated that on July 18, the manager of S5 ASIA came to the monitoring center of the TIPC- Kaohsiung, and he stated that a vessel they were agent for had water ingress while moored in the anchorage area, and the vessel wanted to enter the port for repairs. The monitoring center contacted the S5 ASIA that managing the anchorage area is the responsibility of the Harbor Control

[21] Border management (CIQS): **C**ustoms clearance for foreigners is carried out by Customs, **I**mmigration, **Q**uarantine, **S**ecurity and other units.

Center. Any issues with the ship need to be reported to the Harbor Control Center first. When asked if the manager of S5 ASIA had reported to the navigation center, he did not respond and left the monitoring center.

The interviewee stated that he immediately notified the manager of the Harbor Control Center by phone that one of the ships represented by S5 ASIA was currently anchored, and there may be a situation of water ingress on board. The agent of the ship asked if the relevant information had been received. The manager of the Harbor Control Center stated that they had not received any report, and the navigation center immediately proceeded to verify and check the situation.

Regarding whether they received emails from S5 ASIA on July 18th, the interviewee stated that due to the information security integration management, emails that were not set to the whitelist would be transferred to spam. Therefore, we had not seen any emails regarding the master of the ANGEL or S5 ASIA before the occurrence.

The interviewee stated that on July 19th, a manager of S5 ASIA stated on the phone that the ANGEL wanted to apply for emergency entry into port, but it had been rejected by the MPB. The interviewee was told at that time that he must provide the corresponding documents required by the MPB to apply because the application for emergency entry requires the Bureau's review and approval according to the Commercial Port Act. After approval, relevant information and true ship conditions would be provided to the Port of Kaohsiung, Taiwan International Ports. Only then could a suitable dock be arranged for docking, and the corresponding pilot or tugboat would be arranged to assist the ship in entering the port.

The interviewee recounted that on July 18, a manager from S5 ASIA visited the monitoring center and reported that a ship he represented was experiencing

water ingress while moored in the anchorage area and needed to enter the port for repairs. The interviewee informed the S5 manager that the Harbor Control Center is responsible for managing the anchorage area and that any issues with a ship must first be reported to the Harbor Control Center, including the ship's status. The interviewee questioned whether the S5 ASIA manager had notified the Harbor Control Center. After receiving no response to this query, the S5 ASIA manager departed the control center.

The interviewee mentioned that he promptly contacted the manager of the Harbor Control Center by phone to report that a ship, represented by S5 ASIA, was anchored in the anchorage area and might have water on board. He inquired if the Center had received any related information. The manager of the Harbor Control Center responded that no notification had been received, prompting the Center to initiate a verification and assessment process.

1.12 Medical and Pathological Information

N/A.

1.13 Fire

N/A.

1.14 Survival Aspects

N/A.

1.15 Wreckage and Impact Information

N/A.

1.16 Tests and Research

N/A.

1.17 Organization and Management

The ANGEL is registered under the Palau flag. The ship held an interim Safety Management Certificate (SMC) issued by the Classification Society of the INTLREG on June 2nd, 2023. Furthermore, it had a valid Document of Compliance (DOC) until December 1st, issued on May 21st, 2023. The INTLREG is a Recognized Organization (RO) of the Palau International Ship Registry.

Following the inspection report of the ANGEL by the Flag state inspector, it was discovered that the International Safety Management (ISM) system on the ANGEL was not fully established. The Ship Safety Management System (SMS) had not been implemented on the ship. Additionally, the crew did not have a printed copy of the safety management manual to review, and there were no signed records of crew members having read the manual onboard.

1.18 Relevant Regulations and Reference Documents

In order to analyze the organizational and management issues involved in this occurrence, relevant information regarding 2 key issues are summarized below: Relevant regulations relating to application to enter Taiwan's commercial ports by foreign ships, and relevant international regulations and reference documents are also summarized below:

1.18.1 Relevant Regulations Related to the Application to Enter Taiwan's Commercial Ports by Foreign Ships

This section includes the Commercial Port Law and Enforcement Directions for Applying Ships in Distress or Taking Shelter to Enter Commercial Ports by

the Harbor Bureau of the Ministry of Transport. And new procedure for protection and indemnity policy review implemented by the MPB of MOTC.

1.18.1.1 Commercial Port Law

Chapter 4 Security and Pollution Prevention

Article 19

1. *The ship owner or her agents shall fill in a prior declaration form for the ship's entrance or departure for international commercial ports, 24 hours before the ship's arrival, or 12 hours before the ship's departure, and file the form with the commercial port authority for inspection and arranging berthing. However, if ships due to certain matters arrive in 12 hours after departure, entrance procedures should be handled again after commercial port authorities have given their approval.*

3. *Regarding the goal and ship status of the entrance of ships actually entering the port that do not fit with the prior declaration of the entrance of ships, the owner of the ship and its representative should make amendments accordingly.*

4. *If the ship is likely to affect the functions and the public security of the commercial port, the commercial port authority is entitled to reject the application for her entrance into the port until such a possibility no longer exists.*

Article 21

When a ship encounters an emergency event and requires urgent berthing, the commercial port authority shall consults with relevant authorities to inspect the situation, and is entitled to reject the application for her entrance into the port when one of the following conditions is met:

3. *The body of the ship has been seriously damaged, or the ship is in danger of sinking.*

4. *Other violation of regulations or entering the port is not necessary..*

1.18.1.2 New Procedure for Protection and Indemnity Policy

In order to maintain the environmental safety and orderliness of territorial waters and harbors, and to prevent any instances of Protection and Indemnity (P&I) insurers failing to manage casualties, the Maritime and Port Bureau (MPB) will implement a strengthened review procedure for P&I policies starting from September 1st, 2022, named the 'New Procedure for P&I Policy[22].' Shipping agents must complete the necessary information on the P&I Policy Registry of MT Net and upload the P&I policy or certificate of insurance.

The MT Net system categorizes applications for port entry and departure into 2 types: 'one-voyage/direct voyage, mini 3 links on a per-vessel and per-voyage basis' and 'pre-reporting for port entry and departure.' All P&I insurers are classified into 4 categories: white list, general list, alerted list, and blacklist.

Subsequent to the occurrence, on December 11th, 2023, the Maritime and Port Bureau placed HYDOR AS on the blacklist, prohibiting vessels insured or covered by HYDOR AS from entering Taiwan's international commercial ports[23].

1.18.2 International Regulations and Reference Documents

This section consists of 5 parts, including the United Nations Convention on the Law of the Sea, the International Convention for the Safety of Life at Sea (SOLAS), The International Safety Management (ISM) Code, the Instruments for

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[22] https://web02.mtnet.gov.tw/Upload/MTV2_ResourceFile/bdb37757-7180-4cee-8ade-0154317c80ee.pdf
[23] https://www.motcmpb.gov.tw/Information/Detail/61b7144d-bbfa-4a3e-9848-8a6ec3c50f22?SiteId=1&NodeId=103.

the Implementation of IMO Mandatory Instruments, and the Guidelines for the Authorization of Organizations Acting on Behalf of the Administration

1.18.2.1 United Nations Convention on the Law of the Sea

Article 94 Duties of the Flag state

1. *Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.*

   ... (skip)

3. *Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea with regard, inter alia, to:*

   (a) the construction, equipment and seaworthiness of ships;

   (b) the manning of ships, labor conditions and the training of crew members, considering the applicable international instruments;

1.18.2.2 International Convention for the Safety of Life at Sea

International Convention for the Safety of Life at Sea (SOLAS)

SOLAS Chapter I - General Provisions

Part B – Surveys and Certificates

Regulation 6 - Inspection and Survey

...(skip)

(c)When a nominated surveyor or recognized organization determines that the condition of the ship or its equipment does not correspond substantially with the particulars of the certificate or is such that the ship is not fit to proceed to sea without danger to the ship, or persons on

board, such surveyor or organization shall immediately ensure that corrective action is taken and shall in due course notify the Administration. If such corrective action is not taken the relevant certificate should be withdrawn and the Administration shall be notified immediately; and, if the ship is in the port of another Party, the appropriate authorities of the port State shall also be notified immediately. When an officer of the Administration, a nominated surveyor or a recognized organization has notified the appropriate authorities of the port State, the Government of the port State concerned shall give such officer, surveyor or organization any necessary assistance to carry out their obligations under this regulation. When applicable, the Government of the port State concerned shall ensure that the ship shall not sail until it can proceed to sea, or leave port for the purpose of proceeding to the appropriate repair yard, without danger to the ship or persons on board.

1.18.2.3 International Safety Management Code

Articles on ship safety management, excerpted from the International Safety Management Code (ISM Code) as follows:

3. Company Responsibilities and Authority

3.1 If the entity who is responsible for the operation of the ship is other than the owner, the owner must report the full name and details of such entity to the Administration.

3.2 The Company should define and document the responsibility, authority and interrelation of all personnel who manage, perform and verify work relating to and affecting safety and pollution prevention.

3.3 The Company is responsible for ensuring that adequate resources and

shore-based support are provided to enable the designated person or persons to carry out their functions.

5. Master's Responsibility and Authority

5.1 The Company should clearly define and document the master's responsibility with regard to:

1. *implementing the safety and environmental-protection policy of the Company;*
2. *motivating the crew in the observation of that policy;*
3. *issuing appropriate orders and instructions in a clear and simple manner;*
4. *verifying that specified requirements are observed; and*
5. *periodically reviewing the safety management system and reporting its deficiencies to the shore-based management.*

5.2 The Company should ensure that the SMS operating on board the ship contains a clear statement emphasizing the master's authority. The Company should establish in the SMS that the master has the overriding authority and the responsibility to make decisions with respect to safety and pollution prevention and to request the Company's assistance as may be necessary.

6. Resources and personnel

6.3 The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarization with their duties. Instructions which are essential to be provided prior to sailing

should be identified, documented and given.

7. Shipboard Operations

The Company should establish procedures, plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the personnel, ship and protection of the environment. The various tasks should be defined and assigned to qualified personnel.

8. Emergency Preparedness

8. 1 The Company should identify potential emergency shipboard situations, and establish procedures to respond to them.

8.2 The Company should establish programmed for drills and exercises to prepare for emergency actions.

8.3 The safety management system should provide for measures ensuring that the Company's organization can respond at any time to hazards, accidents and emergency situations involving its ships.

9. Reports and Analysis of Non-conformities, Accident and Hazardous Occurrences

9.1 The SMS should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analyzed with the objective of improving safety and pollution prevention.

9.2 The Company should establish procedures for the implementation of corrective action.

11. Documentation

11.2 The Company should ensure that:

1. *valid documents are available at all relevant locations;*
2. *changes to documents are reviewed and approved by authorized personnel; and*

3. *obsolete documents are promptly removed.*

1.18.2.4 IMO Instruments Implementation Code

Relevant excerpts from the IMO Instruments Implementation Code A.1070(28) are announced by the IMO described as follows:

20. The Flag state should establish or participate in an oversight programmed with adequate resources for monitoring of, and communication with, its recognized organization(s) in order to ensure that its international obligations are fully met, by:

1. *exercising its authority to conduct supplementary surveys to ensure that ships entitled to fly its flag effectively comply with the requirements of the applicable international instruments;*
2. *conducting supplementary surveys as it deems necessary to ensure that ships entitled to fly its flag comply with national requirements, which supplement the international mandatory requirements; and*
3. *providing staff who have a good knowledge of the rules and regulations of the Flag state and those of the recognized organizations and who are available to carry out effective oversight of the recognized organizations.*

21 A Flag state nominating surveyor(s) for the purpose of carrying out surveys, audits and inspections on its behalf should regulate such nominations, as appropriate, in accordance with the guidance provided in paragraph 18, in particular subparagraphs 3 and 4.

23 A Flag state should develop and implement a control and monitoring programmed, as appropriate, in order to:

1. *provide for prompt and thorough casualty investigations, with reporting to the Organization as appropriate;*

2. *provide for the collection of statistical data, so that trend analyses can be conducted to identify problem areas; and*
3. *provide for a timely response to deficiencies and alleged pollution incidents reported by port or coastal States.*

1.18.2.5 Guidelines for the Authorization of Organizations Acting on Behalf of the Administration

Relevant excerpts of the Guidelines for the Authorization of Organizations Acting on Behalf of the Administration (A.739(18)) as announced by the IMO are as follows:

1. *Under the provisions of regulation, I/6 of SOLAS 74, article 13 of Load Lines 66, regulation 4 (now regulation 6) of Annex I and regulation 10 (now regulation 8) of Annex II of MARPOL 73/78 and article 6 of Tonnage 69, many Flag states authorize organizations to act on their behalf in the surveys and certification and determination of tonnages as required by these conventions.*

…. (skip)

3. *The Administration should establish a system to ensure the adequacy of work performed by the organizations authorized to act on its behalf. Such a system should, inter alia, include the following items:*

   (1) Procedures for communication with the organization

   (2) Procedures for reporting from the organization and processing of reports by the Administration

   (3) Additional ship's inspections by the Administration

   (4) The Administration's evaluation/acceptance of the certification of the organization's quality system by an independent body of auditors

recognized by the Administration

(5) Monitoring and verification of class-related matters, as applicable.

…(skip)

Appendix 1 Minimum standards for recognized organizations acting on behalf of the Admiration

Specific provisions

3. The organization should be established with:

3.1 a significant technical, managerial and support staff, catering also for capability of developing and maintaining rules and/or regulations; and

3.2 a qualified professional staff to provide the required service representing an adequate geographical coverage and local representation as required.

4. The organization should be governed by the principles of ethical behavior, which should be contained in a Code of Ethics and as such recognize the inherent responsibility associated with a delegation of authority to include assurance as to the adequate performance of services as well as the confidentiality of related information as appropriates.

…(skip)

6. The organization should be prepared to provide relevant information to the Administration.

1.19 Sequence of Events

The sequence of key events that occurred in this occurrence is shown in Table 1.19-1.

Table 1.19-1 Sequence of Events

Date/(Time)	Content Description	Source
05/30	The ANGEL changed ship owner and Flag state the boiler of the ANGEL was not working, the former Master requested for repair.	DLB crew interview
06/01 | **06/02**	The INTLREG conducted a renewal statutory survey The chief engineer's mobile phone contained photos of water ingress in the cargo holds.	DLB crew interview
06/02	Eleven photos were found on the personal mobile phone of the chief engineer officer showing the flooded cargo holds. The water ingress was not recorded in the log book.	DLB
06/09 | **06/10**	The ANGEL heaved up the anchor and began sailing. Its destination was the Port of Dalian, China.	DLB
06/19	Destination the Port of Hong Kong.	DLB
06/24 | **06/25**	The ANGEL heaved up the anchor, the pilot boarded the ship and berthed at Dalian the Port of Dalian. T&A Marine Consultants and Surveyors Co., Ltd conducted inspections on the ANGEL. The ANGEL began loading operations with a total of 1,349 empty containers The ANGEL was sailing at full speed, and the destination port was not recorded in the logbook.	DLB crew interview
06/26		
(0510 – 1710)	The visual inspection by the crew found water in cargo holds no. 3, no. 4, and no. 5, and the former Master reported this to ZULU. The crew continued to check the water levels in the cargo holds. The water depth was 10 cm.	DLB
06/27		
(0200 – 1400**)**	At 0200 hours, the water depth in the cargo holds was 30 cm.	DLB

Date/(Time)	Content Description	Source
	At 1400 hours, the water depth in the cargo holds was 50 cm, listing to the port side and starboard side, and the GM was insufficient.	
(2200 – 2300)	The ANGEL listed to the port side and starboard side, almost losing GM. The ANGEL listed to the starboard side is about 5 degrees. The former Master reported this situation to ZULU and carried out operations with ballast water pumps.	DLB
06/28		
(0010 – 0330)	The 4th cylinder of the main engine had a crack in its sheath, so The ANGEL changed course and sailed northbound for maintenance. The ANGEL began drifting in the East China Sea. At 0300 hours, The ANGEL listed 3 degrees to the starboard side. Crew members began pumping out ballast water (0300-0330).	AIS DLB crew interview
(1025 – 1045)	The ANGEL listed 4 degrees to the starboard side Crew members began pumping out ballast water (1025-1045)	DLB
(1345 – 1620)	The ANGEL anchored at N29 45.61, E123 23.35 The crew continued to monitor cargo holds no.3, no.4, and no.5, which were flooded, and the water depth was 90 cm. The ANGEL listed 4 degrees to the port side. Crew members began pumping out ballast water (1555-1620)	DLB
(2110-2140)	The ANGEL listed 4 degrees to the port side. Crew members began pumping out ballast water (2110-2140)	DLB
06/29		
(0230 – 0500)	The ANGEL changed course and sailed westward, anchored in the leeward, and parked for more than 10 hours to repair the main engine.	AIS DLB

Date/(Time)	Content Description	Source
	The crew continued to monitor cargo holds no.3, no.4, no.5, and no.6 which were flooded and the water depth was 1 meter.	
(0600-0625)	The ANGEL listed 3 degrees to the starboard side. Crew members began pumping out ballast water (0600-0625)	DLB
1150	The main engine of the ANGEL was repaired and the anchor was weighed.	DLB
(1218-1425)	The ANGEL sailed after weighing anchor, listed 3 degrees to the starboard side. Crew members began pumping out ballast water (1400-1425)	DLB
(1727)	The Chief Officer (C/O-1) of the ANGEL submitted a "Pan Pan" letter to the International Transport Workers Federation (ITF) and the Singapore Maritime Authority via email and announced 10 major deficiencies of the ANGEL.	email
06/30		
	The INTLREG issued a Classification Society warning letter to ZULU, requiring ZULU to arrange for the ANGEL to be inspected at the next port or anchorage.	email
(0000 – 0250)	At 0130 hours, the water in the cargo holds no.3, no.4, no.5, and no.6 increased. The ANGEL listed 3 degrees to the port side. Crew members began pumping out ballast water (0230-0250)	DLB
(0900 – 0930)	The ANGEL listed 5 degrees to the starboard side. Crew members began pumping out ballast water (0900-0930)	DLB
(1226)	The Maritime Authority of Singapore notified the Palau Flag state via email regarding the email information provided by the Chief Officer (C/O-1) of the ANGEL.	email
(1250)	The Flag state of Palau notified the Classification Society INTLREG, highlighting the following information: 1. The	Crew interview

Date/(Time)	Content Description	Source
	status of the ANGEL has been reported to the China Maritime Safety Administration.; 2. The competent authority of the Flag state of Palau required the ship to arrive in Taiwan immediately to arrange for local Palau inspectors to embark and perform an inspection.	email
(1405)	The ANGEL sailed after weighing anchor.	DLB
(1705 – 1730)	The ANGEL listed 4 degrees to the starboard side. Crew members began pumping out ballast water (1705-1730)	DLB
07/01		
(0100-0200)	At 0100 hours, the deck logbook of the ANGEL recorded that the destination was the Port of Kaohsiung. Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed 5 degrees to the starboard side. Crew members began pumping out ballast water (0140-0200)	DLB
(0844)	ZULU notified S5 ASIA, highlighting the following information: (1) handled entry and exit formalities; (2) arranged for an underwater survey of the hull and possible further underwater welding (it was suspected that water had entered through the underwater part of the hull).	email
(0852)	S5 ASIA notified CCME LTD and ZULU about arranging an underwater survey for the ANGEL	email
(1334	ZULU contacted S5 ASIA and CCME LTD, stating briefly that "There are suspected holes or cracks between FR70 and FR165 on the bottom shell."	email
(1350-1415)	The ANGEL listed 4 degrees to the starboard side. At 1350 hours, the crew started pumping ballast water. At 1415 hours, the crew stopped pumping ballast water.	DLB
(2210-2230)	The ANGEL listed 3 degrees to the port side. Crew members began pumping out ballast water (2210 - 2230)	DLB

Date/(Time)	Content Description	Source
(2310)	The ANGEL changed course and sailed to Kaohsiung Port. The logbook recorded the destination was Kaohsiung Port.	AIS ELB
07/02		
(0100 – 0510)	Increased water ingress in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed 5 degrees to the starboard side. Crew members began pumping out ballast water (0450 - 0510)	DLB
(1130)	CCME LTD contacted S5 ASIA and ZULU, stating briefly that "*(1) Locating the leak…; (2) once the leakage is found if the inspection can be successfully carried out, we will proceed with risk assessment and decide how to make the relevant repairs.*"	email
(1317)	ZULU informed CCME LTD that "*We suspect that there are 2 areas with holes or cracks on the bottom shell: (1) No.5 DB (port) between FR105 and FR143 and (2) No.3 DB (port) between FR147 and FR165.* *Bottom shell thickness is 15mm.*"	email
(1600	The ANGEL drifted after arriving about 10 nautical miles west of First Harbor Entrance, Port of Kaohsiung.	AIS
(2017)	ZULU informed S5 ASIA via email about the relevant certificates and documents prior to arriving at the Port of Kaohsiung. These documents were provided by the master of the ANGEL.	email
(2040)	S5 ASIA responded to ZULU and the former Master, stating briefly that "1. Receive relevant certificates and documents before arriving at the port, and apply for entry; 2. Receive notification from the S-MPB/MOTC that the ANGEL did not comply with the entry regulations."	email
(2045-2110)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed 5 degrees to the starboard side. Crew members began pumping out ballast water (2045 -	DLB

Date/(Time)	Content Description	Source
	2110)	
07/03		
(0510-0530)	The ANGEL listed 5 degrees to the port side. Crew members began pumping out ballast water (0510 - 0530)	DLB
(1425-1510)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed 5 degrees to the port side. Crew members began pumping out ballast water (1425 - 1510)	DLB
(2200)	The ANGEL listed 3 degrees to the port side. Crew members began pumping out ballast water.	DLB
07/04		
(0200 – 0220)	The ANGEL listed 5 degrees to the port side. Crew members began pumping out ballast water (0200 - 0220)	DLB
(0800-1200)	S5 ASIA received an email from the master of the ANGEL, all of the certificates were valid.	email personal interview
	S5 ASIA oral contact with MPB and asked for entry to the Port of Kaohsiung for supplies. S5 ASIA did not apply using the relevant application forms.	PIR
(1020-1340)	The ANGEL listed to the port side/ starboard side every 2 hours. The crew pumping out ballast water. Crew members began pumping out ballast water (1320 - 1340)	DLB
(2046)	The ANGEL anchored at the second anchorage area of Kaohsiung Port, N22 36.2, E 120 12.7.	DLB
07/05		
(0220 -1340)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed to the port side/starboard side every hour.	DLB

Date/(Time)	Content Description	Source
	Crew members began pumping out ballast water (1310 - 1340)	
(1442	S5 ASIA the ship's condition with ZULU and the former Master, stating briefly that "ZULU instructed the ship to remain in the anchorage area and wait for the shipowner's representative and new crew members to embark the ship before making any decisions."	email
(1900 – 2000)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed to the portside/ starboard side every 2 hours. Crew members began pumping out ballast water.	DLB
07/06		
(0200 – 2300)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. The ANGEL listed 5 degrees to the starboard side, and crew members pumped out ballast water (0000-0020). The ANGEL listed 4 degrees to the port side, and crew members pumped out ballast water (1330-1350). The ANGEL listed 4 degrees to the starboard side, and crew members pumped out ballast water (2210-2230).	DLB
07/07		
(0200 – 2300)	Water ingress increased in cargo holds no.3, no.4, no.5, and no.6. listed 5 degrees to the starboard side, the crew pumping ballast water (0000 -0020) listed 4 degrees to the port side, the Crew members began pumping out ballast water (1330 -1350) listed 4 degrees to the starboard side, Crew members began pumping out ballast water (2210 -2230)	
07/08		
(0130-1100)	The ANGEL listed 5 degrees to the port side or starboard side every 2 hours	DLB

Date/(Time)	Content Description	Source
	The ANGEL listed 5 degrees to the port side, and the crew pumped ballast water (0130-0145)	
(1100 – 1700)	The ship owner of the ANGEL changed the crew, including the master and chief officer.	Crew interview
07/09		
(1320-1345)	Water ingress increased in cargo holds no. 3, no. 4, no. 5, and no. 6. The ANGEL listed 5 degrees to the starboard side, and crew members pumped out ballast water (1320-1345) The ANGEL listed to the port side, and crew members pumped out ballast water (1715-1745). The ANGEL listed 5 degrees to the starboard side, and crew members pumped out ballast water (2310-2330).	DLB
07/10		
(0100 – 0600)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/3.8/3.9/0.15 m. The ANGEL listed to the port side/starboard side every 2 hours. Crew members pumped out ballast water.	DLB
(0800 – 1200)	S5 ASIA assisted in arranging for the Flag state inspector to perform an onboard inspection, and one navigation technician boarded the ship to repair the ANGEL's radar. S5 ASIA assisted in arranging for CCME LTD to discuss underwater survey matters with the shipowner's representatives.	DLB personal interview
(1200 – 1600)	The navigation technician boarded the ship to repair the ANGEL's radar. Supply ships came to the ANGEL for supplies.	DLB
(1400-1430)	The ANGEL listed 5 degrees to the starboard side. Crew members pumped ballast water (1400-1430).	DLB
(1722)	The Flag state of Palau notified the INTLREG Classification Society to suspend the certificates related to the ANGEL.	appendix 8 email
(1830)	The Flag state inspector left the ANGEL.	DLB

Date/(Time)	Content Description	Source
	The INTLREG notified ZULU and the Flag state of Palau regarding the suspension of Class/Statutory Certificates of the M/V ANGEL. The office of the ANGEL in Turkey was also notified.	email
(2000 – 2210)	The ANGEL anchored with the third officer on duty at the bridge. The ANGEL listed to the port side/starboard side every 2 hours. Crew members pumped out ballast water.	DLB
(2400)	The ANGEL anchored with the second officer on duty at the bridge.	DLB
07/11		
(0000 – 0400)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/3.9/4.0/0.15 m. The shipowner representative of the ANGEL (Greek) left Taiwan.	DLB personal interview
(0400)	The ANGEL anchored with the chief officer on duty at the bridge.	DLB
(1200)	The ANGEL anchored with the second officer on duty at the bridge.	DLB
(1400)	Cargo holds were flooded. The ship listed to the port side. Crew members pumped out ballast water.	DLB
(1600)	The ANGEL anchored with the chief officer on duty at the bridge.	DLB
(2000)	The ANGEL anchored with the third officer on duty at the bridge. The ANGEL listed to the port side/starboard side every 2 hours. Crew members pumped out ballast water.	DLB
07/12		
(0000 – 0200)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.0/4.1/0.2 m. The ANGEL listed to the port side/starboard side every 2	DLB

Date/(Time)	Content Description	Source
	hours. Crew members pumped out ballast water. The main engine started; At 1310 hours, the engine began using diesel oil.	
(0625-2400)	Water ingress increased in cargo holds no. 3, no. 4, no. 5, and no. 6. Cargo holds were flooded. The ANGEL listed on the port side. Crew members pumped out ballast water. The ANGEL listed 5 degrees to the port side, crew members pumped out ballast water (1500-1540). The ANGEL listed to the port side/starboard side every hour. Crew members pumped out ballast water (2200-2304).	DLB
07/13		
(0000 –1725)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.1/4.2/0.2 m. Water ingress increased in cargo holds no. 3, no. 4, no. 5, and no. 6. The ANGEL listed on the port side. Crew members pumped out ballast water (0910-0930). The ANGEL listed 5 degrees to the port side. Crew members pumped out ballast water (1400-1425). The ANGEL listed 5 degrees to the starboard side. Crew members pumped out ballast water (1700-1725).	DLB
07/14		
(0000 – 0600)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.3/4.3/0.2 m. The ANGEL listed to the port side/starboard side.	DLB
(0800 – 1515)	At 1030 hours, a surveyor of the INTLREG Classification Society boarded the ship for inspection. At 1120 hours, a diver performed an underwater survey and found no holes in the hull. At 1330 hours, the diver left the ship. At 1515 hours, the surveyor left the ship.	DLB Personal interview

Date/(Time)	Content Description	Source
(1740-2130)	The ANGEL listed to the port side/ starboard side every hour. Crew members pumped out ballast water.	DLB
07/15		
(0000-1200)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.3/4.3/0.2 m. The ANGEL listed 5 degrees to the port side/starboard side every hour. Crew members pumped out ballast water.	DLB
(1218)	CCME LTD contacted ZULU and S5 ASIA, stating briefly that: "*Attached is the video of the inspection conducted on the ship at anchorage. From hull frame 50 – 165, which was completed, (1) the hull paint shows a lot of areas with missing paint, these areas also have heavy barnacle growth; (2) …. from the video, there is brown rust and the metal's surface displays a silver shade as a result of corrosion… (3) … the diver attempted to remove the barnacles in some area of concern, but could not find the leak.*"	email
(1410-1800)	The ANGEL listed to the port side/starboard side every hour, and crew members pumped out ballast water.	DLB
07/16		
(0000 – 1100)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.3/4.3/0.2 m. The ANGEL listed 5 degrees to the starboard side, and crew members pumped out ballast water (1040-1100).	DLB
(1148)	The Kaohsiung VTS contacted the ANGEL to confirm whether the anchor had broken.	VTS
(1320 - 1730)	The ANGEL listed 5 degrees to the port side, and crew members pumped out ballast water (1040-1100). The ANGEL listed 3 degrees to the starboard side, and crew members pumped out ballast water (1320-1340). The ANGEL listed 3 degrees to the port side, and crew members pumped out ballast water (1700-1720).	DLB
(2107)	The shipowner of the ANGEL informed S5 ASIA that taking	email

Date/(Time)	Content Description	Source
	into account the conditions of the ANGEL and the possibility of a typhoon in the near future, in preparation for an upcoming storm, the shipowner sought details on ports in Taiwan for shelter and ship maintenance.	
(2115)	The ANGEL listed to the port side. At 2115 hours, the crew started pumping ballast water.	DLB
07/17		
(0000 - 1800)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.3/4.3/0.2 m. The ANGEL listed 3 degrees to the starboard side, and crew members pumped out ballast water (0220-0240). The ANGEL listed 3 degrees to the port side, and crew members pumped out ballast water (1015-1035). The ANGEL listed 4 degrees to the port side, and crew members pumped out ballast water (1740-1800).	DLB
(2100)	The ANGEL almost lost seaworthiness, the master notified ZULU, and the DLB recorded: "Vessel almost lost seaworthiness company informed about the situation."	DLB email
07/18		
(0000 - 0530)	Cargo holds no. 3, no. 4, no. 5, and no. 6 were flooded, and water depth was, respectively, 0.1/4.3/4.3/0.2 m. The ANGEL listed 3 degrees to the port side, and crew members pumped out ballast water (0240-0300). The ANGEL listed 3 degrees to the port side, and crew members pumped out ballast water (0450-0510).	DLB
(0725 - 1050)	At 0725 hours, S5 ASIA contacted ZULU, stating briefly that: "*The MPB still did not allow emergency entry to the port for the ship…, please ask your P&I representative to contact the agent to engage in further discussions.*" At 1050 hours, ZULU responded briefly: "*This is to request an emergency port call for our ship the ANGEL to the Port of Kaohsiung. Our ballast system is experiencing problems with water seeping in... Please accept this situation as very*	email

Date/(Time)	Content Description	Source
	critical and discuss necessary permissions with the authorities asap… We should need at least 2 tugs… FYI, we will let the Flag state and Classification Society know about the above-mentioned request shortly as soon as …"	
(1058 - 1110)	The Kaohsiung VTS called the ANGEL, and the master responded briefly: "*Yeah, actually now the ship's condition has changed because water got into… the cargo holds… there is water inside… because we cannot control the… water... inside the tank… we cannot pump out… in the cargo holds.*"	VTS
(1200)	The ANGEL anchored with the second officer on duty at the bridge.	DLB
(1300 - 1325)	The ANGEL listed 4 degrees to the starboard side, and crew members pumped out ballast water (1300-1325).	DLB
(1410)	The Kaohsiung VTS contacted the S5 ASIA and said, "There is currently no place in the port for her to rely on...ask her to go elsewhere for repairs...it seems that 0200 hours is the deadline."	VTS
(1500)	The ANGEL listed to the port side. Crew members pumped out ballast water.	DLB
(1600)	The ANGEL anchored with the chief officer on duty at the bridge.	DLB
(1716)	The master contacted S5 ASIA, stating briefly: "*To inform you that the performance of passage of the ship to any place is considered impossible because seaworthiness of the vessel is missing due to below reasons… (skip)*"	email
(1749)	S5 ASIA notified the S-MPB/MOTC and the KH-TWPORT [24] by email, but neither of them received this email. The email contained "*the reason why the ANGEL requested to enter the port for maintenance*."	email
07/19		

[24] The Port of Kaohsiung Taiwan International Ports Corporation, LTD. (KH-TWPORT)

Date/(Time)	Content Description	Source
(0000 - 0900)	The ANGEL listed 5 degrees to the port side, and crew members pumped out ballast water (0045-0110). The ANGEL listed 4 degrees to the starboard side, and crew members pumped out ballast water (0515-0540). The ANGEL listed to the port side, and crew members pumped out ballast water (0820-0840).	DLB
(0939)	The KH-TWPORT notified S5 ASIA of the following information by fax: "*(1) Our company has received the official rejection of the ANGEL's application for entrance into the port for maintenance from the S-MPB/MOTC... (1) The ship should leave before sunset on July 19, 2020, and move out of the anchorage area to take shelter from the wind... (3) Please report the ballast water pumping situation and bow listing status to the VTC tower at 00:00, 06:00, 12:00, and 18:00 every day.*"	email personal interview
(1145)	The ANGEL listed to the port side. At 1145 hours, crew members started pumping ballast water.	DLB
(1200)	The ANGEL anchored with the second officer on duty at the bridge.	DLB
(1342)	S5 ASIA contacted Kaohsiung VTS and said, "*We are currently discussing the possibility of using a tugboat from China to pick her up... to find a solution. If she needs to leave in the end... she needs a guardship to follow her. It's safer together.*" The VTS responded, "*Please let the ship navigate to a distance of 12 nautical miles on its own, and then request the tugboat to pick her up.*"	VTS
(1345)	S5 ASIA contacted Kaohsiung VTS and said, "*Discussions are currently in progress, the ANGEL will definitely leave. I just want her to stay in the anchorage area, probably for the next 2 days.*"	VTS
(1400)	The ANGEL listed 3 degrees to the port side/starboard side every hour.	DLB

Date/(Time)	Content Description	Source
(1555)	S5 ASIA submitted an official letter to the MOTC, with the main purpose of applying for emergency entrance to the port for repairs due to issues on the ANGEL (Letter No.: Wu-Gao-Zi No. 112071902).	Email personal interview
(1715)	The Kaohsiung VTS contacted the master of the ANGEL, and the master responded, " I will heave tomorrow... (the signal is VHF poor)"	VTS
(1726 - 1752)	The Kaohsiung VTS contacted the master of the ANGEL, the master responded, “we are ready to leave, ... there will be tugboats to assist in the next 40 hours.”	VTS
(1800 - 1820)	The ANGEL listed 4 degrees to the starboard side. At 1800 hours, the crew started pumping ballast water.	DLB
(1832)	The master of the ANGEL informed S5 ASIA and ZULU that "we will try to start our ME for leaving the anchorage area, but unfortunately, we are faced with problem, now all Engine crew try to fix this problem. As soon as we are finished repair works in Engine Room we will inform you accordingly. I kindly ask you to send this information to MBP and Port authorities and in addition to VTS.”	email
(1857)	S5 ASIA contacted the Kaohsiung VTS, stating briefly: "The master just informed me that the main engine of ANGEL has a problem and is being troubleshooter. I asked him to report it to VTS." "The main engine of ANGEL will be fine once it starts running. It may not have been operating for the past few days, as it has not been used for the last two weeks."	VTS
(2100 - 2330)	The ANGEL listed 5 degrees to the port side, crew members pumped out ballast water (2100-2120). The ANGEL listed to the port side, and crew members pumped out ballast water (2240-2305).	DLB
(2359)	The Kaohsiung VTS officer contacted the master of the ANGEL, and asked the master: "ANGEL this is VTS. .... is everything all right now" The master responded "no, continue repairing " “no we have no any question”	VTS VDR

Date/(Time)	Content Description	Source
07/20		
(0000 - 0400)	The water ingression in the cargo holds was not recorded in the Deck Log Book. The ANGEL listed to the port side/starboard side every hour. The ANGEL anchored with the chief officer on duty at the bridge.	DLB
(0540 - 0600)	At 0542 hours, the generator of the ANGEL failed for the first time. The crew cleaned the filters in the oil circuit. At 0547 hours, the VDR lost power and stopped recording. At 0552 hours, the emergency generator of the ANGEL started; the power supply was restored to the VDR and it continued recording.	DLB ELB VDR
(0601)	The Kaohsiung VTS contacted the master of the ANGEL, asking the master: "ANGEL this is Kaohsiung VTS are you still in good condition". The master responded “yeah we are in very good condition but now engine crew members is working in engine room and they are finding their problems and they are fix problem when we fix the problem we will call you again”	VTS VDR
(0620)	The backup main engine of the ANGEL was started and the ship's status was OK.	PIR
(0700)	The ANGEL listed 5 degrees to the port side. At 0710 hours, the crew stopped pumping ballast water.	DLB
(0800)	The ANGEL anchored with the third officer on duty at the bridge.	DLB
(0810 - 0825)	At 0810 hours, the generator of the ANGEL failed for the second time, and the generator was re-started. At 0824 hours, the VDR lost power and stopped recording. At 0825 hours, various alarms on the bridge were activated.	DLB ELB VDR
(0830)	At 0830 hours, the ANGEL lost power completely. The master of the ANGEL gave instructions on the bridge, saying that "all crew-everybody ready for emg. Situation." The ANGEL listed 5 degrees to the port side. “*ballast pump*	DLB crew interview

Date/(Time)	Content Description	Source
	not working" was recorded in the DLB.	
(0830 - 0900)	S5 ASIA went to meet the senior manager of the TW-PORT to negotiate the emergency entry of the ANGEL.	PIR
(0851)	The Kaohsiung VTS contacted the master of the ANGEL, asking him: "ANGEL question have you any tug boat around you for assist you". The master responded "not now tug boat assistance"	VTS VDR
(0921)	The owner's representative of the ANGEL notified S5 ASIA by WhatsApp, saying via text: "we have a blackout situation on board. Problem with power. Can't run our ballast pumps. Vessel getting heeled. We need emergency help…It seem captain calls mayday. We need a vessel alongside to give us a power.")	email crew interview
(0931 - 0933)	The master of the ANGEL contacted the Kaohsiung VTS, saying "listing to the port approximately in eight …I am informed that I am in the MAYDAY."	VTS VDR
(0937)	S5 ASIA called the Kaohsiung VTS: "Is the ANGEL called MAYDAY?" VTS officer responded that: "Your ship said she couldn't control it and wanted MAYDAY."	VTS
(0938 - 0945)	The master of the ANGEL contacted the Kaohsiung VTS, saying: "I think no assistance from the Coast Guard but we need to salvage our crew the most important thing this one because this vessel listing to the port we need to disembark the all crew to the same boat and we'll leave the vessel"	VTS VDR
(1000 - 1001)	The master of the ANGEL contacted the Kaohsiung VTS, saying: "for your information ten zero zero local time uh official abandon motor vessel announcement"	DLB VTS VDR
(1008)	The master of ANGEL contacted the Kaohsiung VTS, "Kaohsiung VTS I will inform you that I cannot stay more on the bridge. I take the radio and go to the main deck please advise after how many minutes tug assistance tug will come to our boat"	VDR

Date/(Time)	Content Description	Source
(1009)	The master presses GMDSS abandon ship button	VDR
(1015-1225)	The KH-TWPORT established an emergency response team and set up a command post. All 19 crew members of the ANGEL were rescued by reuse boats of the Coast Guard and landed in the port.	personal interview
(1338)	ZULU contacted S5 ASIA with the following text: "Assign the Asian Marine Service PCL to assist in the rescue."	email
(1838)	The Coast Guard reported to the VTS that the port deck of the ANGEL listed 45 degrees close to the water.	VDR
(2309)	The VDR stopped recording	VDR
07/21		
(0019)	At 0019 hours, the ANGEL sank. The TTSB contacted the Flag state (Palau) and discussed the marine casualty investigation.	personal interview email
07/22 **|** **07/25**	The Flag state (Palau) agreed to participate in the TTSB's investigation. Two technical representatives were appointed and the ANGEL's related certificates (all valid) were provided.	email
Feb. 1st, 2024	The Kaohsiung District Prosecutor's Office in Taiwan issued an international warrant for two Azerbaijani nationals (namely, the CEO of ZULU Company and the former captain of the Angel) on charges of public endangerment under Article 185, Paragraph 1 of the Criminal Code.	Press release from the Kaohsiung District Prosecutor's Office.

Chapter 2 Analysis

2.1 General

On July 8th, 2023, after the crew of the ANGEL was changed, the ship carried a master and 18 crew members, all of Azerbaijani nationality. All 19 crew members held valid certificates of competency issued by the competent authority of the ship's Flag state. In the 72 hours leading up to the occurrence, the rest hours of the master and bridge watch officers of the ANGEL were within normal limits. During its voyage, the ANGEL did not collide with any ships or underwater objects. (refer to sections 1.5.1, 1.11).

On July 14th, 2023, the divers were only able to complete a partial underwater inspection of the ANGEL's hull due to weather and sea conditions. The inspection results did not reveal any holes in the hull. The TTSB cannot rule out the possibility of holes in the ANGEL's underwater hull, but there is no concrete evidence regarding the ship's sinking.

On July 20th, 2023, favorable weather and sea conditions prevailed in the port of Kaohsiung, ruling out weather as a contributing factor to the accident. Nevertheless, on July 21st, a tropical depression in the southwest Taiwan Sea area intensified into moderate typhoon status. The drifting containers from the sunken ANGEL during this period presented a safety hazard to nearby vessels and the port. (refer to section 1.6)

In summary, there is no evidence indicating that the ANGEL was subjected to external force impacts or contacted navigational obstacles. There is no evidence indicating that crew fatigue, crew qualifications, and weather factors as related to this occurrence.

The analysis of the occurrence covered 4 main issues, including hull damage and water in the cargo holds, probable causes of the sinking of the ANGEL,

anchorage management of the Port of Kaohsiung, and supervision and inspection of the ANGEL, which are described as follows:

2.2 Hull Damage and Water in the Cargo Holds

This section discusses the factors associated with the hull damage and water ingress into the cargo holds of the ANGEL. These factors including the ship's history and classification, hull damage and its effects, and the water ingress in the cargo hold along with changes in stability.

2.2.1 The Ship's History and Classification

Under normal circumstances, when a ship's hull has multiple issues, they are not caused in a short period but rather indicate a gradual deterioration of the ship's condition. While there may not be immediate danger in the short term, if repairs and measures are not taken in a timely manner, it is highly likely that it will develop into an irretrievable accident.

On May 30th, 2023, after the crew boarded, they discovered that the condition of the ANGEL's hull was poor, including rust on the deck, numerous holes on the hatches and in the cargo hold, rusted container securing equipment, and significant corrosion and holes inside the cargo hold. By the time of the occurrence on July 20th, 2023, the water ingress issue in the cargo holds had not been resolved, indicating that not only was the condition of the ANGEL poor, but the subsequent maintenance efforts by the crew were also significantly delayed, which increased the difficulties in repairs. This situation placed the ANGEL in a highly risky and uncontrollable state. (refer to sections 1.11.1 to 1.11.10)

Evidence of the ANGEL's poor condition is detailed in the ANGEL's class renewal inspection report, which contained 17 recommendation items and 4 recommendation memorandums, all of which were not implemented by ZULU

(refer to section 1.7, Appendix 11). Four items directly related to this occurrence, and the relevant evidence has been compared and analyzed as follows:

1. Conduct an underwater hull inspection at the first convenient port or anchorage (due by July 10, 2023) - The actual inspection date was July 14th, with a diver not finding any hull breaches, and the inspection report not being officially submitted by Golden Port Asia Co., LTD to the INTLREG.

2. Significant corrosion was found on the main deck and associated equipment, requiring comprehensive repairs to the hatch covers and fittings until the surveyor is satisfied (due by July 10, 2023) - On June 25th, the surveyor appointed by HYDOR AS found deficiencies in the maintenance of the hatch covers, cargo holds, ballast tanks, ventilation fans, and transverse walkways. On July 8th, the master and chief officer also identified issues in the main deck, cargo holds, and ballast tanks. The ship management company (ZULU) has not taken any improvement measures.

3. The ANGEL's hull, machinery, safety structures, ballast water management system, and underwater hull inspection are pending further inspection - ZULU did not complete these items. The ship management company (ZULU) has not taken any improvement measures.

4. Conduct an additional audit of the International Safety Management (ISM) system at the first convenient port or anchorage (due by July 10th, 2023) - HYDOR AS’s inspection report showed that the ANGEL's ISM system was not fully implemented on board.

The ANGEL had not undergone a dry-docking inspection for over 5 years (ship age exceeds 20 years). The previous owner conducted an underwater hull inspection as an alternative to the docking inspection in Hong Kong in 2018, and an underwater hull inspection was done in 2020. After the ANGEL was classified

with the INTLREG, the Classification Society originally required a dry-docking inspection by June 30th, 2023. According to the interview record with the Lead Shine Marine Consultant Company, as the shipowner could not find a suitable shipyard, ZULU applied to the Flag state for an extension of the special survey deadline to September 30th, 2023. It was later advanced to July 10th, 2023. (refer to section 1.11.14)

The TTSB believes that during the ANGEL's voyage from Colombo to Dalian, the shipowner should arrange for a dry-dock inspection as soon as possible to properly repair the cargo hold bilge water system, the ballast water system, and the damaged flooring and piping inside the cargo hold, in order to ensure the safety of the ANGEL and its crew.

In summary, the ship had not undergone a dry-dock inspection for over 5 years. Additionally, the ship owner and ship management company failed to conduct an underwater hull inspection at the first convenient port or anchorage, as required by the Classification Society. They also did not complete 17 recommendations and 4 recommendation memorandums within the deadline set by the Classification Society, missing the opportunity to prevent this occurrence.

2.2.2 Hull Damage of the ANGEL

To assess the damage and implications of the ANGEL ship's hull structure, 4 key areas were examined: the sounding pipeline and air pipeline of the ballast water remote control system, and the bilge water system.

2.2.2.1 Cargo Hold Floor Structure of Cargo Holds.

The cargo hold floor, also known as the tank top, on a cargo ship is comprised of steel plating that serves as the upper surface of the oil tanks or ballast water tanks. The area consisting of the cargo hold bottom and the ship's

bottom[25] shell is referred to as the double bottom, while the space separating them is designated as the double bottom tank. Because containers are loaded in the cargo hold of a container ship, the upper part of the steel plate at the bottom of the cargo hold needs to be welded to the container base, and the lower part of the base needs additional reinforced steel plates to disperse and withstand the impact force of each load. In order to avoid long-term impact force causing cargo hold floor rupture, ship management companies should conduct regular inspections and establish a complete maintenance plan to ensure the seaworthiness and safety of the ship.

According to the crew's interviews and relevant photo evidence, after departing from Sri Lanka, the ANGEL experienced a rupture on the cargo hold floor on the starboard side of the cargo hold no. 3, leading to leakage of ballast water from the starboard side ballast tank of the hold no. 3 into the cargo hold no. 3. Subsequently, after loading containers at Dalian, the flooding situation in the cargo holds were exacerbated[26]. The significant corrosion of the cargo hold floors caused them to rupture due to the pressure exerted by the container weight, which may result in leakage of ballast water from the ballast tanks beneath the cargo holds no. 4 and no. 5 into the respective holds. (refer to sections 1.1.2, 1.11, and Figure 2.2-1)

In summary, the ANGEL had long suffered from inadequate maintenance, resulting in damage to the cargo hold floor structure. After departing from Colombo, the floor of the no. 3 cargo hold on the starboard side cracked, causing ballast water from the starboard side of ballast tank no. 3 to leak into no. 3 cargo hold. Following cargo loading at Dalian, the severe corrosion of the cargo hold

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[25] Double Bottom: is a space formed between the inner and outer bottom of a ship's hull. It is essentially a second, lower hull constructed within the main hull, creating a void space between the two.

[26] When the insurance company boarded the ship for inspection in Dalian, it was discovered that water had entered the cargo holds no.3 and no.5. The logbook began to record the water ingress heights of cargo holds no.3, no.4, no. 5, and no. 6 on June 28th.

floor led to its rupture due to the pressure from the container weight. This caused ballast water from the ballast tanks beneath the no. 4 and no. 5 cargo holds to leak into the no. 4 and no. 5 cargo holds.

Figure 2.2-1 shows the appearance of the breached cargo hold bottom in the cargo hold no.3 of the ANGEL

2.2.2.2 Sounding Pipes and Air Pipes

To ensure the stability and navigational safety of cargo, it is common practice to equip the ballast water tanks with one or two air pipes, also known as vent pipes, to allow air to enter and exit the ballast tanks. These air pipes run from the upper part of the ballast water tanks to the open deck, where a vent head is positioned at the top to prevent seawater ingress into the tanks during deck submersion caused by waves. The air pipes play a crucial role in maintaining pressure equilibrium within the ballast water tanks during the intake or discharge of ballast water.

The sounding pipe is a steel pipe that extends from the bottom of the ballast tank through the top of the tank. The sounding pipe for the ballast tank penetrates the bottom plates of the cargo hold and extends through the cargo space. Crew members use a depth measure tape to insert into the sounding pipe to measure the depth of each tank, and then they refer to tables to estimate the water volume in each ballast tank. (refer to section 1.11.4)

According to interviews with the crew of the ANGEL, it was found that a significant number of sounding pipes were obstructed, corroded, or fractured, leading to the provision of inaccurate ballast water measurement data. Consequently, this condition facilitated the ingress of ballast water into the cargo holds via the sounding pipes. Upon identifying these areas of damage, the crew resorted to using wood as a temporary measure to seal the breaches in the bottom of the cargo hold, thereby preventing the overflow of ballast water into the cargo holds when the tanks reached full capacity (refer to Figure 2.2-2). Furthermore, it is possible that some of the air pipes on the ANGEL had also suffered from corrosion or breaches, which could allow ballast water to flow into the cargo holds through these air pipes

In summary, the ship's multiple sounding pipes were blocked, corroded, or broken, preventing the crew from measuring the ballast water quantities and calculating the ship's stability. Some of the corroded or broken sounding pipes and air pipes led to ballast water leaking into the cargo holds.

Figure 2.2-2 shows the ANGEL's crew using wooden plugs to temporarily seal the breaches in the cargo hold bottom sounding pipes.

2.2.2.3 Ballast Water Remote Control System and Pipelines

According to the crew’s interview records, the ballast water remote control system had already failed when the crew boarded, requiring them to repeatedly go between the engine room and the three-valve chamber rooms (refer to Figure 2.2-3, marked with blue triangle marks) to manually operate the ballast water system to prevent water ingress into the cargo holds and stabilize the ship.

The crew frequently used the ballast water system to maintain the ship's stability, and went to the valve chamber room and pump out water frequently. The ship is 20 years old and had not undergone dry-docking inspection and maintenance for over five years. After departure, the crew discovered that the remote control function of the ballast water system was damaged. Photos and

damage reports provided by the crew indicated that some ballast water pipelines were likely old and deteriorated and that the ballast water valves were unable to close properly. Since the ship's departure from Dalian, severe water ingress in the cargo holds no.4 and no.4 caused the area between the 1st and 2nd valve chambers to be submerged, preventing the crew from operating the ballast water valves in that area. The crew could only access the 3rd valve chamber room and the engine room to check and operate the 6th ballast water tank valves (wing tanks and double bottom tanks).

In order to maintain the ship's level, the crew continuously operated the ballast water pumps to remove ballast water from the 6th wing tanks (left and right tanks) (see Figure 2.2-3), This operation could lead to the unintended extraction of ballast water from other ballast tanks. When the ship was stable and the ballast water pump stopped, external seawater would flow back into the ballast tanks through the sea bottom valves, or unknown holes in the hull could allow water to seep into the ballast tanks. When the ship listed again, the crew needed to restart the ballast water system to pump out the ballast water from the ballast wing tank no.6 to maintain stability. The crew's repeated actions resulted in increasing water accumulation in the cargo holds, leading to a decrease in the ship's stability. When the ship was affected by wind and currents, it became more susceptible to irregular tilting to the port or starboard side, and the free surface effect[27] further reduced the ship’s stability.

In summary, the lack of docking inspection and maintenance for over 5 years, which likely to result in some ballast water pipelines being old and damaged, and the ballast water valves not being properly closed. This prevented the remote control system for the ballast water from functioning correctly. When the crew

[27] The free surface effect refers to the surface of a liquid that can flow freely within the internal compartments of a vessel. When the ship rolls or tilts, the surface of the liquid also moves in accordance with the rolling or tilting motion.

needed to adjust the ballast water levels, they had to manually operate the ballast water system between the valve chambers. the ANGEL's remote ballast water control system was malfunctioning. After departing from Dalian, the fully loaded cargo holds made it impossible for the crew to enter the cargo holds to handle the water ingress and leakage.

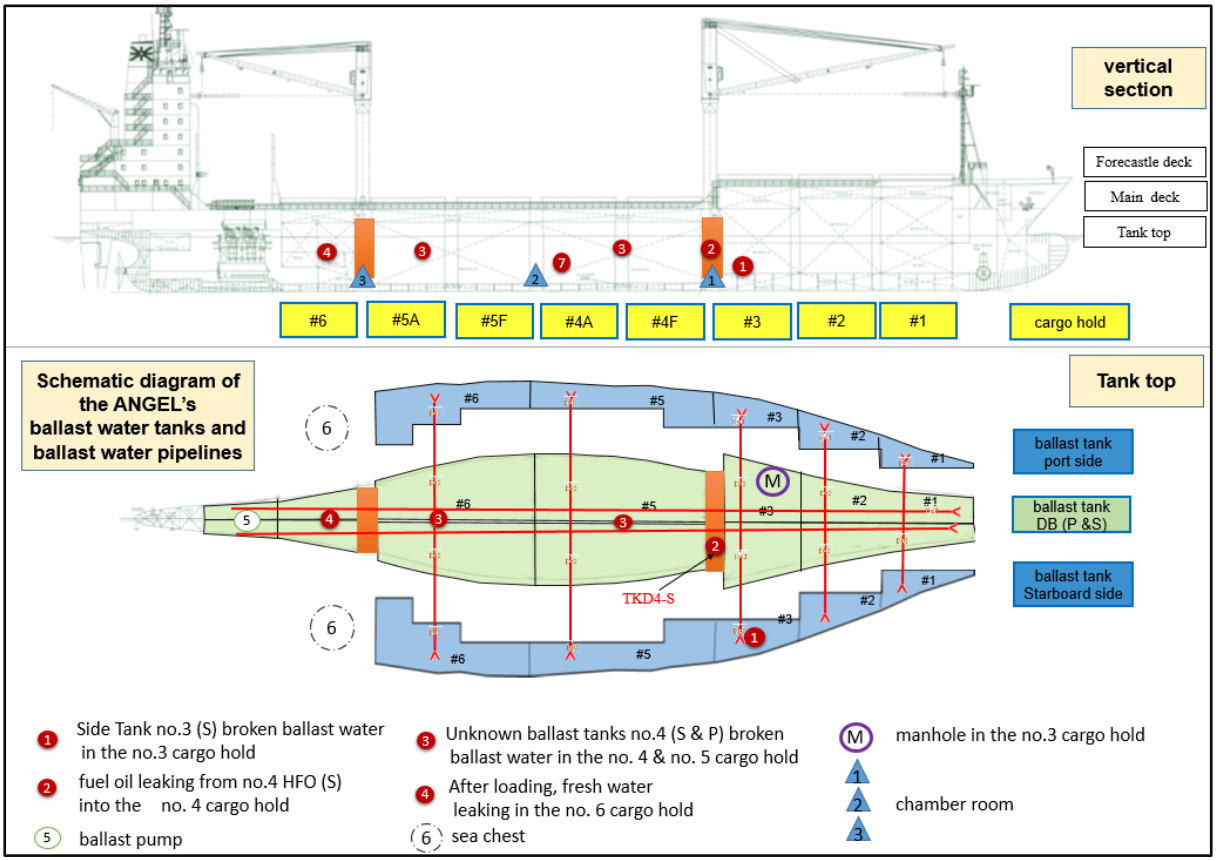

Figure 2.2-3 Illustrates the water ingress locations in the cargo holds of the ANGEL, as well as the locations of the ballast water tanks, ballast water piping, ballast water pumps, and sea chests.

2.2.2.4 Bilge Water System

According to the ship's information, the cargo hold bilge water system had a bilge water pump and fire pump, which could discharge the flooded water in the cargo hold overboard through this pipeline. If the bilge water pump failed, the connecting pipeline of the ballast water system could be used to drain the bilge

water from the ballast water pump. (refer to sections 1.7.3 and 1.7.4)

According to crew interview records, the ship's cargo hold bilge water system was inoperative, the bilge wells were blocked with debris, making it impossible for the crew to use pumps to drain the water in the cargo holds. The cargo hold bilge water system of a cargo ship is located at the pipeline extraction inlet of the cargo holds. In a cargo ship's cargo hold bilge water system, in addition to the valve controls, non-return valves (check valves) are also installed at the suction points in the cargo holds. If the non-return valves are not properly maintained, blocked by debris, or improperly operated, they may fail to close completely, allowing the external seawater to flow back into the cargo holds. According to the underwater hull inspection on July 14th, the divers did not find any puncture leaks in the hull. Therefore, it is very likely that the check valves of the ANGEL's bilge water system failed, causing the seawater outside the hull to enter the cargo hold from the sea chests through the bilge water system. The schematic diagram of the ANGLE's bilge water system and ballast water system pipelines is shown in Figure 2.2-4. (refer to section 1.11.8)

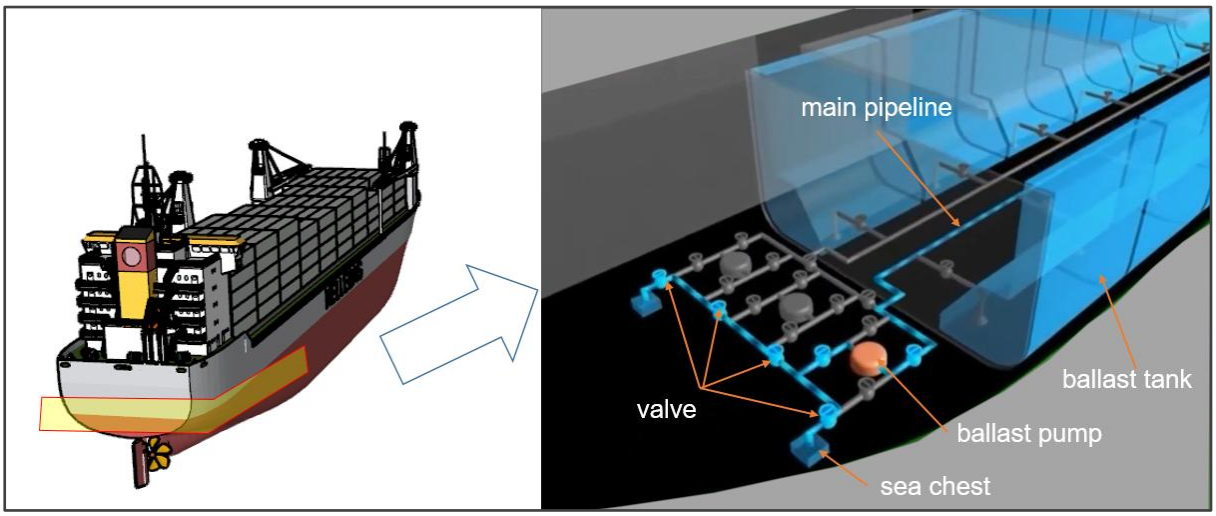

Figure 2.2-4 Schematic Diagram of the ANGEL's bilge system and ballast water system piping, ballast pump, valves, and Sea Chest.

In summary, the ship's bilge wells were blocked with debris, making it impossible to use the bilge water system's pump to drain the flooded water from the cargo holds. Additionally, the check valve in the bilge water system has failed, which is likely to cause seawater to flow back into the cargo holds through the bilge water system, resulting in further flooding in the cargo holds.

2.2.3 Water Ingress into the Cargo Holds and Changes in Stability

After the ANGEL departed from Colombo, the water level in the cargo hold no. 3 reached a maximum of about 1.3 meters, but the crew was able to control the water level to around 50 cm by continuously pumping out. After the ship was loaded with 1,349 containers at Dalian. Subsequently, after the ship departed from Colombo, the water level in the cargo holds no. 4 and no. 5 reached a maximum height of approximately 4.5 meters. ZULU provided 4 portable pumps at Dalian, but 3 of them were damaged within a few days. Furthermore, the former master of the ANGEL led the crew into the cargo hold no. 3 and installed a portable pump in chamber room no. 4 to pump out the water. However, the amount of water in the cargo holds was too large and the submersible pump's pumping function was limited. (refer to section 1.11)

The ballast waterside wing tank no.3 was damaged and continued to leak into the cargo holds. The water volume in some of the ship's ballast water tanks continued to decrease and the crew continued to pump out ballast water, causing the ship to lose stability. The center height (GM) was reduced, and the cargo holds no.4 and no.5 were flooded, exacerbating the irregular listing to the port side or starboard side. (refer to section 1.19)

On July 8th, the chief officer of the ANGEL used the Task Master software to calculate the stability data of the vessel based on its cargo, fuel, water levels, and water ingress conditions. To align the calculated waterline with actual

conditions, an additional 4,400 tons of cargo weight and some weight from the water tanks were virtually added. The stability calculation indicated that the hull listed 16.1 degrees to the starboard side, which did not match the actual situation during the ANGEL's anchorage period (where the list remained within 5 degrees). The master and chief officer discovered this error after being interviewed by the TTSB. This stability calculation was the basis for the ship's crew to believe that the stability of the ANGEL was insufficient (refer to sections 1.8 and 1.11)

After the ship was fully loaded with empty containers, the crew was unable to enter the cargo holds no.4 and no.5. The crew could only continue to pump out the ballast water from the sixth ballast wing tanks (port and starboard) to maintain the ship's stability. As the water in the ballast tanks was continuously removed, this resulted in the ship’s center of gravity rising upwards and a decrease in GM, further worsening the ship's irregular left or right listing. Additionally, the chief officer had made errors in the stability calculations for the ANGEL prior to the occurrence. Furthermore, three days before the occurrence, the master reported to ZULU and S5 ASIA that the ship had almost lost seaworthiness. The relevant evidence showed that ZULU's designated onshore personnel (DPA) did not develop an effective solution and did not discover the chief officer's negligence.

In summary, three days prior to the occurrence, the master of the ANGEL informed ZULU and S5 ASIA that the ship was at risk of losing seaworthiness. The Designated Person Ashore (DPA) of ZULU failed to actively contact the master or the Classification Society to ensure the safety of the crew, vessel, cargo, and the environment.

2.3 Probable Causes of the Sinking of the ANGEL

The ANGEL experienced listing and sinking while in a stationary state. The sinking of the ship involved 3 key issues: crew handover (lack of proper

maintenance of the ship's hull, piping lines, and navigation equipment), loss of power (main generator failure, ballast pump stopped operating), and probable causes of listing and sinking.

2.3.1 Crew Handover

During the full crew change operation on a ship, the ship management company should require the new crew members joining the ship to conduct comprehensive handover procedures with the outgoing crew. The procedures should cover all important documents and records. This ensures that the new crew members are familiar with the ship's safety equipment and emergency procedures and that they fully understand the ship's safety environment and operating procedures, enabling the ship to operate safely.

The typical handover tasks should include but are not limited to: at a minimum, duty handover records, navigation logs, engine room logs, safety inspection records, ship condition reports and cargo manifests should be jointly reviewed, and crew members should conduct onboard familiarization and emergency drills.

According to the International Safety Management (ISM) Code, "*5.2 The Company should ensure that the SMS operating on board the ship contains a clear statement emphasizing the master's authority. The Company should establish in the SMS that the master has the overriding authority and the responsibility to make decisions with respect to safety and pollution prevention and to request the Company's assistance as may be necessary.*" And "*6.3 The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarization with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given.*" (refer to section 1.18.2)

According to the complaint letter from the former chief officer and the crew interview records, the shipowner and ZULU did not inform ANGEL's crew of the ship's condition in advance. The handover between the outgoing and incoming crew was rushed. After the crew change, many equipment malfunctions were discovered, which prevented normal operations. For example, flooding in cargo holds, auxiliary boiler damage, extensive corrosion or breakage of depth sounding pipes, leakage of heavy fuel oil into the cargo hold no.4, the need for maintenance of the ballast water system and seawater-related valves, failure of the pneumatic valve system, and inoperative anti-heel system. After the 2 masters reported these problems to ZULU. ZULU's actual response was limited to sending portable pumps to the ship, arranging for divers to conduct underwater inspections, and replacing the crew again. The TTSB determines that the shipowner and the ship management company did not properly handle the crew handover process, resulting in the new crew being unable to grasp the condition of the ANGEL, which led to subsequent difficulties in vessel operation and maintenance. (refer to sections 1.11.1 to 1.11.4)

In summary, despite the ship management company (ZULU) establishing a safety management system and work guidelines before departure, it failed to effectively implement training for the handover of new and old crew members and did not promptly provide resources to address the water ingress issue. The ship’s engine room had numerous problems, and severe flooding in the cargo holds during navigation made it impossible for the crew to resolve the listing issues. Before the occurrence happened, the crew of the ANGEL was changed, and the chief officer, facing threats to their safety, sent an emergency (pan-pan) email to the International Transport Workers’ Federation (ITF) and the Singapore Maritime and Port Authority.

2.3.2 The Entire Ship Lost Power

According to the ANGEL crew's interview records, after the ship departed from Colombo, the auxiliary boiler was damaged, resulting in the inability to heat the heavy fuel oil. During the voyage, the crew used a steam heater[28] to heat the heavy fuel oil for supply to the main engine and generator. From July 4th to July 20th, the ship was anchored for an extended period, and the main engine was shut down for a long time. The steam heater was unable to heat the heavy fuel oil, causing the oil viscosity to increase to an unacceptable level, making it unusable for the main engine and generator. The engineering crew switched to using diesel fuel to supply the main generator. (refer to section 1.11.3)

On the day of the occurrence at 0542 hours, the ship's main generator experienced its first blackout. After inspection by the engineering crew, it was found that the fuel supply piping was completely clogged with sludge and residue, blocking the fuel filters and preventing the supply of diesel to the generator. After cleaning the fuel filters. At 05:52 hours, the fuel supply was restored. At 06:20 hours, the main generator was started. The ballast water pumps briefly regained power and continued to pump out ballast water to maintain the ship's hull level. At 08:24 hours, the main generator tripped again. The engine crew failed to restart the main generator, resulting in a total loss of power on the ship, and the ballast water pumps stopped operating, preventing the ANGEL from pumping out ballast water and maintaining the ship's level.

In summary, on the day of the occurrence, there was sludge and oil residue in the fuel supply pipeline of the ship, which clogged the fuel filter and supply, causing the main generator to stop operating. This led to a complete loss of power on the ship, and the ballast water pump ceased to function. The ship continued to

[28] steam heater When the ship is underway, the waste heat from the main engine is used to heat the boiler water to generate steam, which can serve as a substitute for the auxiliary boiler.

list to the port side at 45 degrees, resulting in a large amount of seawater flooding into the aft cargo holds and engine room, leading to the sinking of the ANGEL.

2.3.3 Probable Causes of Listing and Sinking.

To investigate the probable causes of the ANGEL's listing and sinking, the following 3 issues were analyzed: situational awareness of the master, abandon ship announcement from the master of the ANGEL, and conclusions on the reasons behind the ship's listing and sinking, which are described as follows:

2.3.3.1 Situational Awareness of the Master

In the 3 days before the occurrence, at 1048 hours, the Kaohsiung VTS called the ANGLE's master to ask about the condition of the ship’s main engine, and the master responded, "*Our engine is in good condition*." In the 2 days before the occurrence, at 1058 hours, the Kaohsiung VTS called the ANGLE's master to ask about the ship’s condition and listing status, and the master responded, "*We have water inside the cargo tanks, and it is still continuing...to starboard."* On the 1 day prior to the occurrence, at 2359 hours, the Kaohsiung VTS called the ANGLE's master to ask whether there were any problems or abnormalities, and the master responded, *"No, we are still in the process of repair, we are trying to find the problem*."

Relevant evidence indicated that the master of the ANGEL failed to adequately evaluate the threat posed by the ship's irregular listing and he did not recognize the high risk of relying on only one ballast water pump and one main generator for the ship’s power. When the main generator and the ballast water pump failed, the ship's listing quickly escalated into an uncontrollable situation.

In summary, the master of the ANGEL lacked situational awareness on the irregular listing problem of the ship, and he did not accurately report that water

had flooded the cargo holds that had exceeded 4 meters to the Kaohsiung Vessel Traffic Services (VTS).

2.3.3.2 Abandon Ship Announcement from the master of the ANGEL

At 0824 hours on the day of the occurrence, the ANGEL lost power for the second time and the crew could not repair it. Ballast water continued to leak into the cargo holds, reducing the stability and buoyancy of the ship. At 0830 hours, the master made a broadcast to the entire ship and declared an emergency situation. Between 0900 hours and 0920 hours, the master first contacted ZULU to discuss abandoning the ship. Between 0931 hours and 0945 hours, the master called a "MAYDAY" to the Kaohsiung VTS and informed them that the ship was listing to the portside at about 8 degrees and requested rescue.

At 1000 hours, the master announced to abandon ship; at 1009 hours, the master pressed the abandon ship alarm signal and broadcast to the whole ship, summoning the crew to abandon ship. At 1225 hours, all 19 crew members were rescued ashore by Coast Guard patrol boats. Between 0931 hours and 1225 hours on July 20th, the ANGEL continued to list about 16 degrees to the port side, and all the containers on board had not yet fallen into the sea. At 1835 hours, a guard ship reported to the Kaohsiung VTS that the ANGEL was listing to the port side about 45 degrees (details in Figure 2.4-2 and 2.4-3, pink marks); at 2138 hours, the containers carried by the ANGEL began to fall into the sea and float in the nearby areas. (refer to sections 1.1, 1.11, and 1.19)

The TTSB believes that after the master reported the loss of seaworthiness of the ANGEL to ZULU three days prior to the occurrence, he did not receive any technical assistance, and the condition of the ship continued to deteriorate. Faced with the dangerous situation of the ship listing rapidly, the Master decided to abandon the ship and then contact the shipowner in order to ensure the safety of

the crew, in accordance with Regulation 8[29] of Chapter XI-2 of the SOLAS.

In summary, on the day of the occurrence, the ship's main generator stopped, causing a complete power loss that ceased the ballast water pumps. This resulted in an 8-degree port side list, prompting the master to declare an emergency situation and discuss abandoning the ship with ZULU.

2.3.3.3 Conclusions on the Reasons behind the Ship's Listing and Sinking

Since the ANGEL departed from Colombo until she sank in the anchorage area of the Port of Kaohsiung, the analysis of the factors involved in the water ingress in the cargo holds, the ship's listing, and the eventual sinking is described as follows:

1. After loading in Dalian, the cargo holds no.4 and no.5 started flooding, causing the ship to list to the port side or starboard side. The crew had to continuously pump out the ballast water from wing tank no. 6 of the ballast tank (port side or starboard side) multiple times per day to maintain the ship's hull level condition.

2. On the day of the occurrence at 0824 hours, the ship's main generator failed due to a loss of fuel supply and stopped operating, resulting in a total blackout and the stopping of the ballast water pumps. At this time, the ANGEL began to list to the port side. At 0931 hours, the hull had listed approximately 8 degrees. At about 1000 hours, the master ordered the crew to abandon the ship, and the ship had listed approximately 13 to 15 degrees to the port side.

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[29] Master's discretion for ship safety and security. The master shall not be constrained by the Company, the charterer or any other person from taking or executing any decision which, in the professional judgement of the master, is necessary to maintain the safety and security of the ship. This includes denial of access to persons (except those identified as duly authorized by a Contracting Government) or their effects and refusal to load cargo, including containers or other closed cargo transport units.

3. After the ballast water pump of the ANGEL stopped operating and the hull listed to the port side, ballast water from the right ballast tank continued to flow out. At the same time, seawater and ballast water from the right side flowed into the left ballast tank. The accumulated water in the cargo hold shifted to the port side, causing the ship to list uncontrollably to the port side, with the list gradually worsening. On-site photos showed the ship continuing to list to the port side.

4. On the day of the occurrence at 1838 hours, the hull of the ANGEL continued to list approximately 45 degrees, with the upper deck making contact with the sea surface. At 2138 hours, seawater began to enter the aft cargo hold and engine room, and the hull started to gradually sink from the stern. By July 21st at approximately 0019 hours, only the bow of the ship remained above the water. (details in Figures 2.3-2 to 2.3-3).

5. At 0530 hours on July 21st, the ship completely sank in the waters 2.8 nautical miles south of the Port of Kaohsiung South Breakwater. According to the information provided by the salvage company, the ship's hull rested on the seabed at a depth of approximately 37 meters, with a list of about 3 degrees to the starboard side. All hatch covers had completely detached from the hull, and the 1,349 empty 20-foot containers on board had floated to the surface or sunk in the surrounding waters (details in Figures 2.3-4).

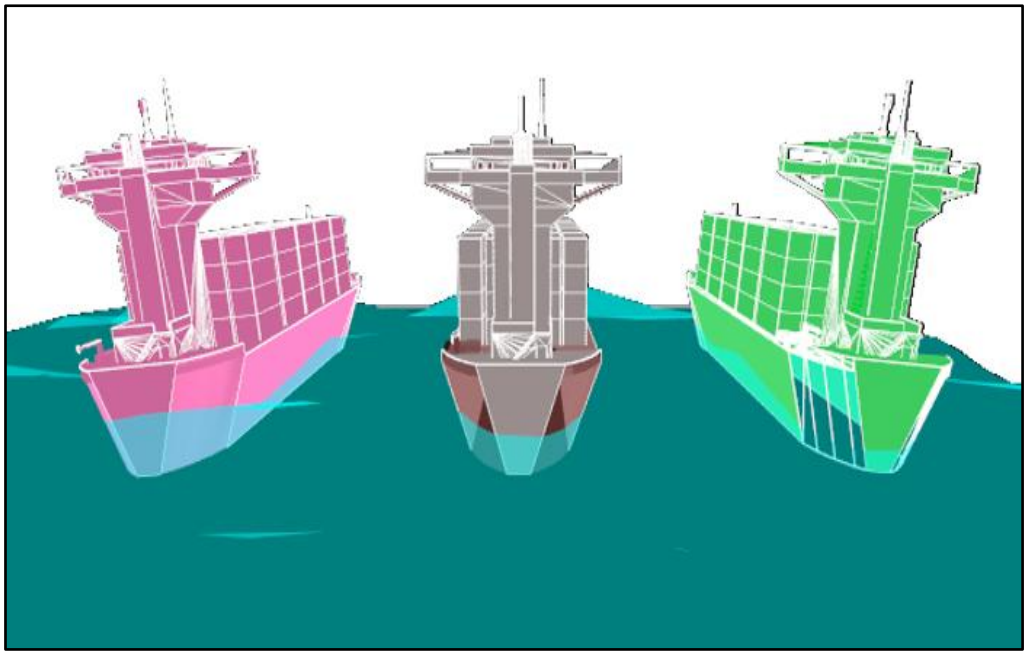

Figure 2.4-1 Schematic diagram of the ANGEL's irregular listing to port and starboard (within 5 degrees) after cargo hold flooding

The TTSB believes that the long-term neglect of hull and piping system maintenance of the ship led to the breach of the cargo hold bottom and piping, massive flooding in the cargo holds, inability to measure most of the ballast tanks, and multiple failures and interconnections in the ballast water system. On the day of the occurrence, the main generator ceased operation, and the ship quickly listed 45 degrees to the port side, resulting in a large amount of seawater ingress into the cargo holds and engine room, leading to the complete sinking of the ship early the next morning.

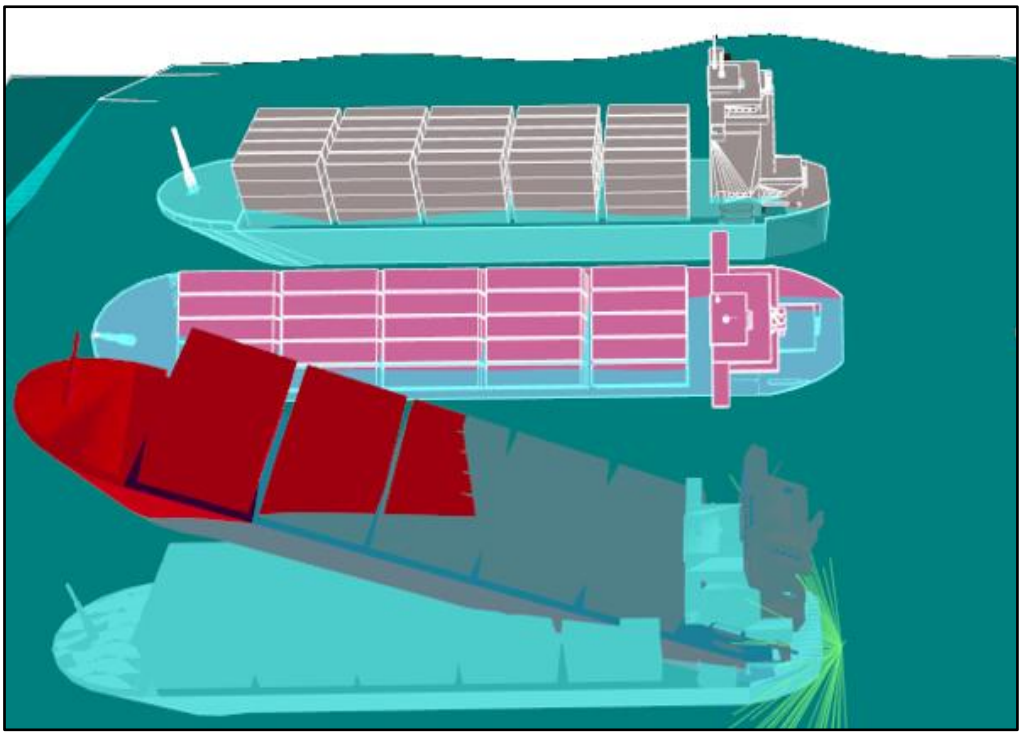

Figure 2.4-2 Schematic diagram of the listing and sinking after the cargo holds of the ANGEL were flooded (plan view)

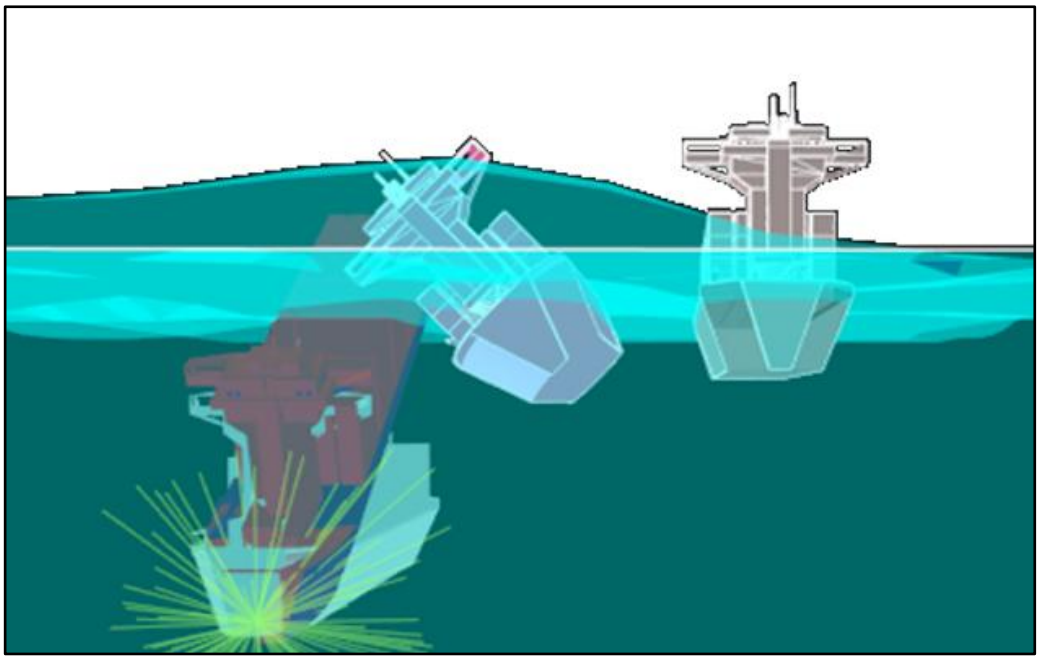

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Figure 2.4-3 Schematic diagram of the listing and sinking after the cargo holds of the ANGEL were flooded (vertical cross-section view)

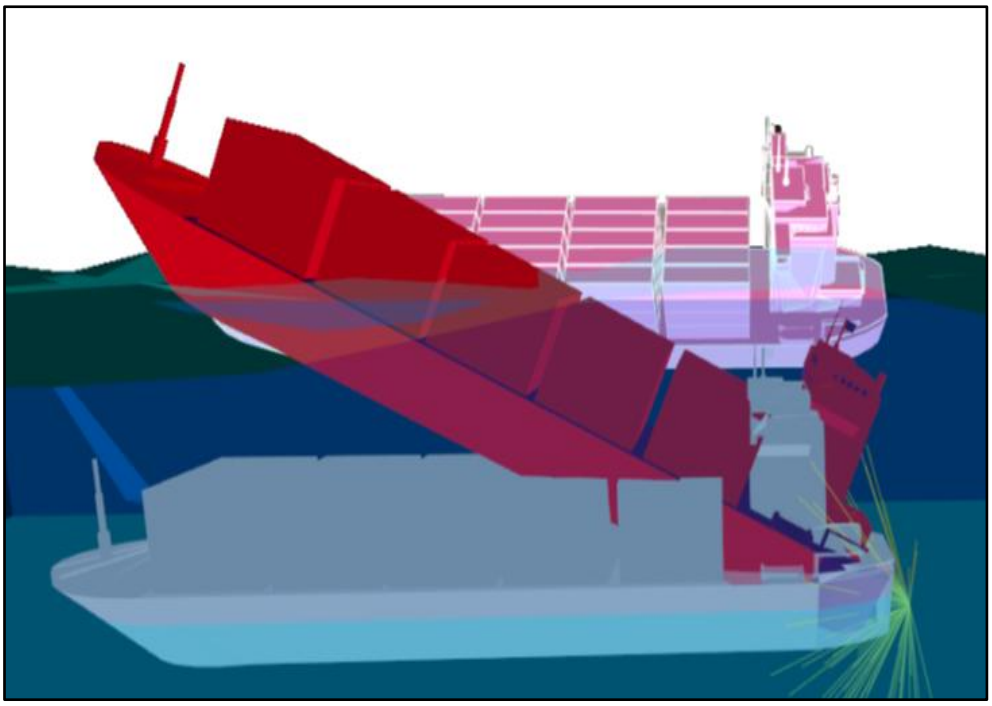

Figure 2.4-4 Schematic diagram of the listing and sinking after the cargo holds and engine room of the ANGEL were flooded. (plan view)

In summary, the ANGEL sailed with a full load of containers when the flooding issue in the cargo holds exceeded the crew's capacity to handle it due to a combination of factors, including: (a) damage to the hull, ballast water pipelines, and valves due to long-term lack of maintenance; (b) blockage, rust, or breakage of the sounding pipes; and (c) blockage of the bilge sewage wells and potential failure of the check valves to close properly.

2.4 Kaohsiung Port Anchorage Management

In order to understand the situation in which the ANGEL cannot make an emergency entry into the port to handle the water ingress in the cargo holds and the potential rollover of the ship, this section discusses the shipping agent's application for emergency entry into the port and the management of the anchorage area of the Port of Kaohsiung.

2.4.1 Shipping Agent's Application for Emergency Port Entry

Shipping agents are liaisons between shipping companies and ports. They are responsible for coordinating and arranging various matters for ships entering and leaving the port, including handling emergencies of ships at the port, such as emergency repairs, safety issues, etc., which need to be responded to and resolved in a timely manner[30].

According to the interview record, S5 ASIA was entrusted by ZULU to handle the "one voyage" and "emergency entry" business of the ANGEL to the Port of Kaohsiung on July 2nd, 2023. On July 5th, the South Taiwan Maritime Affairs Center of the MPB, MOTC informed S5 ASIA that applying for "emergency entry" requires providing the Classification Society's un-seaworthiness certificate and photographic evidence related to water in the cabin. ZULU did not provide the information to S5 ASIA. (refer to sections 1.11.12, 1.11.16, and 1.11.17)

At about 2100 hours on July 17th, 2023, the ANGEL's logbook recorded that the master informed ZULU that the " *Vessel almost lost seaworthiness company informed about situation*." Therefore, ZULU instructed S5 ASIA to communicate with port authorities (MPB and TIPC) as soon as possible and handle the "emergency entry" of the ANGEL. However, S5 ASIA did not report the ANGEL's actual situation to the MPB or TIPC. At 1042 hours on July 18th, S5 ASIA contacted ZULU and requested information related to the shipowners' liability insurance (P&I). Subsequently, ZULU did not provide the information.

Four days before the occurrence, S5 ASIA was busy handling the emergency entry of the ANGEL and planning the backup plans (alternating to Suao or

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[30] According to the Regulations for Administrating Shipping Agency, Article 23: "*The shipping agency industry accepts agency business from the client and should regularly investigate its financial status, international reputation and ship performance to maintain normal operations and shipping order.*"

Guangzhou) required by ZULU. However, ZULU, the Flag state, and the Classification Society did not provide relevant contact and discussion information for the period from July 16th to July 20th, which prevented the TTSB from verifying the ANGEL's class certificate and shipowner's liability insurance (P&I) related information.

In summary, four days before the occurrence, the shipping agent (S5 ASIA) was busy handling ANGEL's emergency entry into the port and planning backup plans, and failed to notify the port authority that the cargo holds of ANGEL was flooded and the ship had almost lost its seaworthiness.

2.4.2 Management of the Anchorage Area of the Port of Kaohsiung

According to the Regulations Governing the Anchorage of Vessels in Kaohsiung International Commercial Port, established by Taiwan International Ports Corporation, Ltd. (hereinafter referred to as the Kaohsiung Port Anchorage Regulation), there are four categories of applications for vessels wishing to anchor in the Kaohsiung Port anchorage area, including Inbound vessels, Outbound vessels, Vessels that shift berth, and Anchor on arrival. Among them, Anchor on arrival means that the ship does not enter Kaohsiung Port and anchor at anchorage for a short period. The MPB's "Maritime Transport Network (MTNet)" contains information regarding ship arrival forecasts, while the Taiwan International Ports Corporation's "Taiwan Port Service Network (TPNet)" can import ship arrival notice information (visa number) from MTNet. For vessels categorized as "Anchor on arrival," the MTNet does not provide relevant information. It is the responsibility of the shipping agency to input the necessary ship-related information; thereafter, Kaohsiung VTS will review and verify the vessel's basic information before assigning appropriate anchorage positions. Prior to this occurrence, the Kaohsiung Port Anchorage Regulation and the TPNet application permit process did not require vessels categorized as "Anchor on

arrival " to submit relevant ship certificate documents, proof of ship owner's liability insurance (P&I), or other documentation (refer to sections1.9.2, 1.9.3 and 1.18.1.2).

After the ANGEL has anchored on July 4th at 1527 hours, the shipping agency S5 ASIA completed the anchoring application for ANGEL under the "Anchor on Arrival" category via TPNet , and the Kaohsiung VTS conducted the necessary information verification. The ANGEL completed its anchoring at 2046 hours on July 4th. During this period, the Kaohsiung VTS did not receive any notifications from the ANGEL until July 16th, when the VTS inquired whether the anchor was drifting. the master of the ANGEL responded that the condition was normal. The following day, at 1047 hours, in preparation for the typhoon, the Kaohsiung VTS asked the ANGEL whether the main engine was operating normally; however, the master of the ANGEL reported no abnormalities. It was not until July 18th, after multiple inquiries by the Kaohsiung VTS, that the master of the ANGEL reported a problem regarding water ingress in the cargo holds, which had persisted for several days. The ANGEL did not report this critical condition to the Kaohsiung VTS, and the VTS monitoring system was unaware of the severity of the water ingress, posing a risk of sinking.

In summary, the Kaohsiung VTS adopted the trust principle for anchoring ships. When a ship applied for anchoring upon arrival, the shipowner did not need to provide information about shipowners' liability insurance (P&I).

The TTSB believes that the Kaohsiung Port VTS should enhance the monitoring mechanism of ships in the anchorage area and strengthen the monitoring of suspicious ships. If the master conceals and fails to report the ship's danger, relevant personnel should be trained to enhance their response and crisis decision-making capabilities. Following this occurrence, the Kaohsiung Port has revised the Kaohsiung Port Anchorage Regulation. The anchoring duration for

vessels is now limited to seven days, and vessels arriving to the anchor must maintain seaworthiness and possess valid ship owner's liability insurance (P&I). Additionally, shipping agents are required to register relevant certification documents in the shipping administration system (MTNet) and ensure the vessel's safety and seaworthiness (see section 1.18.1.2).

2.5 Supervision and Inspection of the ANGEL

The ship's registering country is responsible for the supervision and inspection of registered ships under its jurisdiction[31]. It shall ensure that the ship complies with international and national safety standards and issue corresponding regulations and guidance documents to ensure the safe operation of ships. Inspecting ships by classification societies ensures that the inspected ships meet the safety standards of the IMO and the Flag state[32].

This section is divided into 2 topics that discuss the supervision and inspection of the ANGEL by the Flag State and Classification Society, including Palau suspending the ANGEL's statutory certificates, and maritime safety cooperation between Palau and Taiwan.

2.5.1 Palau Suspending the ANGEL's Statutory Certificates

Neither the shipowner of the ANGEL nor ZULU cooperated with the safety investigation; the CEO of ZULU and the former master of the ANGEL are under arrest by the Chinese judicial authorities for committing public danger crimes. According to relevant information, there are significant differences in the expiration dates of ANGEL's statutory certificates and ship classification certificates, and the TTSB cannot determine which are genuine or fake. (refer to

[31] IMO III CODE A.1070 (28) Delegation of authority Article 20
[32] IMO A.739(18) Article 3

section 1.19, Appendix 6),

After the sinking of the ANGEL, the TTSB immediately issued an occurrence notification to the Flag state (Palau) and invited Palau to participate in the investigation. On July 25th, the Palau International Ship Registry (PISR) provided 5 statutory certificates and 13 class certificates, all of which were in a valid state. Until Oct. 24th, 2023, the PISR stated that the ANGEL's statutory certificates had been suspended on July 10th. (refer to Appendix 8)

The inconsistencies in the validity of the ANGEL's certificate are as follows: (1) On July 10, the flag state (Palau) suspended the ANGLE's registration, and the Classification Society (INTLREG)revoked its certificate. However, INTLREG still commissioned surveyors from Taiwan Lead Shine Marine Consultant Company to conduct inspections. On July 14th, they engaged divers from Chen Chian Marine Engineering Company to perform underwater inspections of the hull, which resulted in two different inspection reports. (2) The master initially claimed not to know that the ship had lost its classification and flag on July 10th but later admitted he was aware. (3) The Flag state inspector indicated that after the inspection on July 10th, he believed the condition of the ANGEL was urgent and that she should not sail until the relevant defects and water ingress issues were addressed. During a subsequent interview, the inspector did not inform anyone that the ship's certificates had been suspended.

The TTSB believes that the Flag state (Palau) suspension of relevant certificates for the ANGEL cannot solve the safety problem. PISR should follow the relevant regulations of the IMO and re-examine and improve its ship inspection and certificate management system to avoid similar situations from happening again.

In summary, after the sinking of the ANGEL, there were discrepancies in the ship-related certificates provided by the shipowner, Classification Society, and

ship management company. The validity of the relevant certificates for the ANGEL at the time of the occurrence could not be confirmed. Additionally, the shipowner and the insurance company did not address the issues of the shipwreck and marine pollution issue due to disputes over the validity of the certificates.

2.5.2 Ship Inspection and Safety Management

After the ANGEL leaving Colombo, the former master notified ZULU of water ingress in the cargo hold on June 19th, but ZULU did not arrange for repairs in Hong Kong on June 20th. Upon arriving in Dalian on June 24th, ZULU still did not address the water ingress issue before starting to load cargo. The TTSB believes that ZULU did not provide adequate resources and support, which threatened the safe operation of the ANGEL.

According to the Classification Society's inspection report (dated May 30, 2023), the ANGEL had multiple defects that needed to be rectified within a specified timeframe. However, ZULU failed to address these issues in a timely manner, making the ship unseaworthy. The former master informed ZULU that the cargo hold was flooded on June 19th, but ZULU did not arrange for the ship to be repaired in Hong Kong on June 20th. After the ship arrived in Dalian on June 24th, ZULU started loading the cargo without dealing with the water ingress problem. On June 30th, after receiving a notification from the Flag state, the Classification Society INTLREG issued a warning letter to ZULU, requesting an inspection at the next port. However, the ANGEL had already left Dalian, and the situation of water ingress in four cargo holds worsened. During its voyage, the ship also experienced a main engine failure, drifting for an extended period and putting the entire ship in a dangerous state.

The TTSB believes that after ZULU received a notification from the former master of the ANGEL about the water ingress problem in the cargo hold, INTLREG failed to effectively supervise ZULU's management of the ANGEL

and should establish a robust oversight mechanism to ensure compliance with safety standards. Furthermore, ZULU did not follow the inspection recommendations to rectify the defects during the first port call, and after being notified of the water ingress by the former master, did not actively provide shore support.

2.5.3 Maritime Safety Cooperation between Palau and Taiwan

According to Article 94 of UNCLOS, the Flag State shall effectively exercise its jurisdiction and control in administrative, technical, and social matters over ships flying its flag, and conduct investigations into marine casualty or incidents. When the Flag state inspector discovers significant deficiencies on a ship, he should promptly notify the shipowner, the ship management company, and the port state to ensure that the relevant parties can quickly understand the major deficiencies of the vessel and collaborate to resolve the issues, thereby ensuring the safety of the vessel's navigation and port facilities.

On July 10th, 2023, Palau dispatched an inspector to examine the ANGEL. The inspection report identified 31 deficiencies and concluded that the ANGEL was unseaworthy, with severe flooding in cargo holds no. 4 and no. 5 up to 3 meters deep. The inspector recommended detaining the ship under Port State Control. The report was submitted to the Palau International Ship Registry (PISR) office in Greece, which promptly informed the INTLREG to suspend the ANGEL's relevant certificates.

However, the Flag state (Palau), the Class (INTLREG), and ZULU failed to report the ANGEL's unseaworthy condition to the Taiwanese maritime authority. One week before the occurrence, ZULU still attempted to apply for emergency entry to repair the ship; however, it failed to truthfully provide the ship's emergency status and relevant insurance certificates, resulting in its unsuccessful application for port entry. Ultimately, hundreds of containers floated in the

surrounding waters outside Kaohsiung Port, causing significant harm to ships and neighboring ports.

In summary, 10 days before the occurrence, the Flag state (Palau) was aware that the ANGEL was unseaworthy but failed to promptly report this to the Taiwanese maritime authority, thus missing the chance to prevent the occurrence.

After this occurrence, the Maritime and Port Bureau (MPB) blacklisted the Classification Society (INTLREG) of the Flag state (Palau). If Palau Flagged Ships or INTLREG's ships enter Taiwan's commercial ports, the MPB will send emails to each maritime affairs center through the MTNet system to conduct Port State Control (PSC). Those ships with serious defects will be detained, and Palau-flagged vessels will promptly be notified to address and rectify the defects to ensure the safety of ships and Taiwan's ports.

Chapter 3 Conclusions

In this Chapter, the Taiwan Transportation Safety Board (TTSB) presents the findings derived from the factual information gathered during the investigation and the analysis of the occurrence. The findings are presented in 3 categories: findings related to the probable causes, findings related to risk, and other findings.

The findings related to probable causes identify elements that have been shown to have operated in the occurrence, or almost certainly operated in the occurrence. These findings are associated with unsafe acts, unsafe conditions, or safety deficiencies associated with safety significant events that played a major role in the circumstances leading to the occurrence.

The findings related to risk identify elements of risk that have the potential to degrade transportation safety. Some of the findings in this category identify unsafe acts, unsafe conditions, and safety deficiencies including organizational and systemic risks that made this occurrence more likely; however, they cannot be clearly shown to have operated in the occurrence alone. Furthermore, some of the findings in this category identify risks that are unlikely to be related to the occurrence but, nonetheless, were safety deficiencies that may warrant future safety actions.

Other findings identify elements that have the potential to enhance transportation safety, resolve a controversial issue, or clarify an ambiguity point which remains to be resolved. Some of these findings are of general interests that are often included in the International Maritime Organization (IMO) format accident reports for informational, safety awareness, education, and improvement purposes.

3.1 Findings Related to Probable Causes

1. The ANGEL had long suffered from inadequate maintenance, resulting in damage to the cargo hold floor structure. After departing from Colombo, the floor of the no. 3 cargo hold on the starboard side cracked, causing ballast water from the starboard side of ballast tank no. 3 to leak into no. 3 cargo hold. Following cargo loading at Dalian, the severe corrosion of the cargo hold floor led to its rupture due to the pressure from the container weight. This caused ballast water from the ballast tanks beneath the no. 4 and no. 5 cargo holds to leak into the no. 4 and no. 5 cargo holds. Furthermore, the ANGEL's remote ballast water control system was malfunctioning. After departing from Dalian, the fully loaded cargo holds made it impossible for the crew to enter the cargo holds to handle the water ingress and leakage. (1.1.2, 1.7.2, 1.11.2~1.11.10, 1.19, 2.2, 2.3)

2. The ANGEL had long suffered from inadequate maintenance, resulting in damage to the cargo hold floor structure. After departing from Colombo, the floor of the no. 3 cargo hold on the starboard side cracked, causing ballast water from the starboard side of ballast tank no. 3 to leak into no. 3 cargo hold. Following cargo loading at Dalian, the severe corrosion of the cargo hold floor led to its rupture due to the pressure from the container weight. This caused ballast water from the ballast tanks beneath the no. 4 and no. 5 cargo holds to leak into the no. 4 and no. 5 cargo holds. Furthermore, the ANGEL's remote ballast water control system was malfunctioning. After departing from Dalian, the fully loaded cargo holds made it impossible for the crew to enter the cargo holds to handle the water ingress and leakage. (1.11.2~1.11.10, 2.2, 2.3)

3.2 Findings Related to Risk

1. The ANGEL sailed with a full load of containers when the flooding issue in the cargo holds exceeded the crew's capacity to handle it due to a combination of factors, including: (a) damage to the hull, ballast water pipelines, and valves due to long-term lack of maintenance; (b) blockage, rust, or breakage of the sounding pipes; and (c) blockage of the bilge sewage wells and potential failure of the check valves to close properly. (1.11, 2.2, 2.3.3)

2. The ship had not undergone a dry-dock inspection for over 5 years, and the ship owner and ship management company did not conduct an underwater hull inspection at the first convenient port or anchorage, as required by the Classification Society. They also failed to complete the additional audits for the International Safety Management (ISM) and did not fulfill 17 recommendations and 4 recommendation memorandums within the deadline set by the Classification Society, missing the opportunity to prevent this occurrence. (1.1.2, 1.7.2, 1.11, 2.2.1)

3. Ten days before the occurrence, the Flag state (Palau) was aware that the ANGEL was in an unseaworthy condition but failed to notify Taiwan’s maritime authorities. This prevented them from requesting assistance regarding the ANGEL prior to the occurrence. (1.7.5.3, 1.18.2, 2.5.3)

4. Four days before the occurrence, the shipping agent (S5 ASIA) was busy handling ANGEL's emergency entry into the port and planning backup plans, and failed to notify the port authority that the cargo holds of ANGEL were flooded and the ship had almost lost its seaworthiness. (1.7.5, 1.16, 1.11, 2.4.1)

5. Despite the ship management company (ZULU) establishing a safety management system and work guidelines before departure, it failed to effectively implement training for the handover of new and old crew members

and did not promptly provide resources to address the water ingress issue. The ship's engine room had numerous problems, and severe flooding in the cargo holds during navigation made it impossible for the crew to resolve the listing issues. (1.11, 1.18.2, 2.3.1)

6. Before the occurrence happened, the crew of the ANGEL was changed, and the chief officer, facing threats to their safety, sent an emergency (pan-pan) email to the International Transport Workers' Federation (ITF) and the Singapore Maritime and Port Authority. (1.11, 1.18.2, 2.3.1)

7. When this accident occurred, the Kaohsiung VTS adopted the trust principle for anchoring ships. When a ship applied for anchoring upon arrival, the shipowner was not required to provide information about Protection and Indemnity Insurance (P&I). (1.7.5,1.9.3, 1.18.1.3,2.4.2)

3.3 Other Findings

1. At the time of the occurrence, the ship had carried a master and 18 crew members, all of Azerbaijani nationality. All 19 crew members held valid certificates of competency issued by the competent authority of the ship's Flag state. (1.5, 1.11, 2.1)

2. There is no evidence indicating that the ANGEL was subjected to external force impacts or contacted navigational obstacles. There is no evidence indicating that crew fatigue, crew qualifications, and weather factors as related to this occurrence. (1.6, 1.8, 1.11, 2.1)

3. After the sinking of the ANGEL, there were discrepancies in the ship-related certificates provided by the shipowner (Navramar), the Classification Society (INTLREG), and the ship management company (ZULU), making it impossible to confirm the validity of the ANGEL vessel's relevant certificates

at the time of the occurrence. (1.7.5, 1.11, 2.5.1)

4. After the occurrence, the Port of Kaohsiung, Taiwan International Ports Corporation, Ltd. revised its anchorage management regulations. The anchoring period for ships is set at 7 days, during which the ship must maintain seaworthiness and valid shipowner's liability insurance (Protection and Indemnity Insurance, P&I). Additionally, it requires ship agents to register relevant certification documents in the maritime administration system and to affirm that the vessels they represent are safe and seaworthy. (1.9, 1.11.16, 2.4.2)

Chapter 4 Safety Recommendations

After the occurrence, the Taiwan Transportation Safety Board (TTSB) made multiple attempts to contact ANGEL's Management Company (ZULU Shipping) but received no response. The TTSB has no information to contact the shipowner of the ANGEL (Navramar Shipping). Consequently, the TTSB does not issue recommendations to either ZULU Shipping Company or Navramar Shipping Company.

To Maritime and Port Bureau of the Ministry of Transportation and Communications

1. Continue to maintain communication with the Palau Maritime Authority, proactively grasp and mutually provide information on flagged ships that have concerns regarding seaworthiness, in order to ensure the timeliness of port state control inspections between the two countries[33].

To Taiwan International Ports Corporation, Ltd.

1. Actively disseminating information to ship agencies is essential to ensure they have a comprehensive understanding of the ships they represent. If there are concerns about seaworthiness, they should promptly report to the competent authorities to ensure port safety and navigation order[34].

2. Re-examine the management regulations for anchorage use, enhance training on anchorage operational procedures, and promote the submission of valid shipowner's liability insurance

[33] The recommendation was made in response to the findings related to the probable causes, specifically findings no.1 through no.2, as well as the findings related to risk, specifically findings no.3 and no.4.

[34] The recommendation was formulated in response to the findings related to probable causes, particularly no.1 through no.2, as well as the findings related to risk, particularly findings no.4.

(Protection and Indemnity Insurance, P&I) documents for ships anchoring in port, to improve navigation operations in the port area and anchorage[35].

To S5 ASIA (HONG KONG) Limited Taiwan Branch

1. Comply with the management regulations for shipping agents, and accurately understand the conditions of the ships they represent entering the port. If there are any concerns regarding seaworthiness, they should promptly report to the competent authorities to ensure port safety and navigational order[36].

To Palau International Ship Registry (PISR)

1. Supervise the registered ships and their management companies. If there are concerns regarding the seaworthiness of a ship, they should promptly report them to the relevant port state and coastal state maritime authorities to ensure port safety and the safety of ship navigation[37].

2. Reference the pertinent provisions of the International Maritime Organization (IMO) convention), supervise the ship inspection quality and certificate management procedures of the International Register of Shipping (INTLREG) to ensure that inspected ships comply with the safety regulations of the Flag state and the IMO. Strengthen oversight of ships with time-

[35] The recommendation was formulated in response to the findings related to probable causes, particularly no.1 through no.23, as well as the findings related to risk, particularly findings no.7.
[36] The recommendation was formulated in response to the findings related to risk, particularly findings no.3, no.4 and no.7.
[37] The recommendation was formulated in response to the findings related to probable causes, particularly no.1 through no.2, as well as the findings related to risk, particularly findings no.1 through no.7.

bound improvement deficiencies and take timely control measures to reduce the risk of ships losing their seaworthiness while in navigation[38].

To International Register of Shipping (INTLREG)

1. Enhancing the quality of ship inspections and certificate management procedures to ensure that inspected ships comply with the safety regulations of the Flag state and the IMO. Strengthen control over ships with time-bound improvement deficiencies and take timely control measures to reduce the risk of ships losing their seaworthiness while in navigation[39].

[38] The recommendation was formulated in response to the findings related to probable causes, particularly no.1 through no.2, findings related to risk, particularly findings no.1 through no.7, and other finding no.3.

[39] The recommendation was formulated in response to the findings related to probable causes, particularly no.1 through no.2, findings related to risk, particularly findings no.1 through no.7, and other finding no.3.

Appendix1 Pan-Pan Letter Submitted by the Former Chief Officer of the ANGEL

From: @gmail.com>
Sent: Thursday, June 29, 2023 5:27 PM
To:
Subject: Panpan- panpan-panpan

Hi dear all

I am a chief officer of mv angel with ex name ssl ganga.imo 9256406. The vessel change owner on 30.05.2023. All crew joined to vessel on 30.05.2023 in colombo anchorage. There was no pre inspection carried out before the vessel owned. There was no familiarisation, no hand over notes. The systems that they tell us working, actually not working. There are so many problem on this vessel but the main problem is the ship always list side to side by herself and we still dont know why.(i assume there is a hole on the hull) When list exceed 6-7 degrees we make ballast to other side. Ballast remote system is not working. Crew and me always go to the valve chambers and open-close valves manually. Valve chambers are located under the cargo holds they are so small and full with water inside. No matter what time it is we go to valve chambers and come back to pump room and start to make the vessel upright. Also there are many holes in the tanktops. Also there are holes on the tanktops in the cargo holds. When we take ballast the water come inside the cargo holds. This is also serious problem. There are so much water in no3 and No4 cargo holds now. Also so many problem in engine room. Boiler is burned. We are using funnel boiler now . Funnel boiler has too much leakage and it consumes great amount of fresh water everyday. Fresh water capacity 180 mt total consumption is 15mt/day. So destination is st. Petersburg or Tallin. Fresh water generator is not working. When we go china luckly we dropped anchor and supply fresh water in hong kong. But we will be on indian ocean in 12 days. Crew worry about their lives. Nobody wants to be on this vessel anymore. Day by day another problem being occured. Also gm is another problem. Without ballasr our gm is so low. SO OUR LIVES ARE IN DANGER. PLEASE HELP. Manager : zulu shipping- owner: Navramar shipping

Appendix 2 Email from the master of the ANGEL Requesting the Shipping Agent to Apply for Emergency Port Entry

From: Angel Vessel <angel@zulushipping.com>
Sent: Tuesday, July 18, 2023 5:16 PM
To:)s-5.org>; Dzulushipping.com>
Cc: m@zulushipping.com>; !@zulushipping.c
zulushipping.com>; @zulushipping.com>; S5Asia-TW-KAO Operation
Subject: RE: Port call request to Kaohsiung

Dear Mr.
Good day,

I kindly want to inform you that the performance of passage of the vessel to any place is considered impossible because seaworthiness of the vessel is missing due to below reason:

1.Propulsion qualities
2.Floodability
3.Stable equilibrium (Now is almost neutral equilibrium-danger of capsize)
4.Free surface effect-(Water in cargo holds)
5.Righting lever is more than accept
6.Metacentrci Height(GM)-Not enough
7.Angle of loll
9.Dynamic stability:GZ area to 30 and to 40 less than required

At the moment, the situation is stable, we often pump out ballast from one tank, but if it fails, we will also have the risk of a non-return roll and the ship will capsize, which will lead to irreversible consequence

In connection with the above, I kindly ask you to send an official request to the port authorities to provide us with an emergency call to the port for the rescue of cargo, ship and crew.

Best Regards
Master of m/v Angel
Captain
Email:angel@zulushipping.com

Appendix 3 Fax Letter from the Port of Kaohsiung-TIPC to the ANGEL

臺灣港務股份有限公司高雄港務分公司

TIPC PORT OF KAOHSIUNG TAIWAN INTERNATIONAL PORTS CORPORATION, LTD

敬啟者

有關貨櫃輪「天使 ANGEL」(IMO:9256406，16145 總噸) 於 112 年 7 月 4 日 20 時 46 分申請於高雄港第二錨區下錨期間，遭檢舉船舶進水案，說明如下：

1. 本分公司已接獲交通部航港局正式拒絕該輪進港維修申請。
2. 考量本週末將有颱風形成，該輪錨泊位置及船況恐無法因應颱風外圍環流所產生的湧浪或強風，爰請儘速通知該船配合辦理：
   (1) 船舶應於 112 年 7 月 19 日當天日落前，駛離錨區避風。
   (2) 該輪下錨期間，應全時備便主機及守聽無線電，並與本分公司 VTC 塔台保持聯繫。
   (3) 請船方持續維持抽水作業，並請於每天 00:00、06:00、12:00 及 18:00 主動向本分公司 VTC 塔台回報抽水情形、船艏傾斜狀況。

此致

順頌 鈞安

TEL:

FAX:

高雄港務分公司 船舶交通服務中心

Appendix 4 Official Letter Submitted by Shipping Agent S5 ASIA to the MPB

香港商伍航亞洲有限公司台灣分公司　　【函】

地址：8014
電子信箱：

交通部航港局 南部航務中心 112.7.19 收件章

受文者 ： 交通部航港局 南部航務中心

發文日期：中華民國 112 年 07 月 19 日
發文字號：伍高字第 112071902 號

主旨：有關帛琉籍貨櫃船“ANGEL“ 因船隻故障申請緊急進港維修，懇請貴局惠予核准後函覆。

說明 ：

一、 M.V ANGEL 已於 2023 年 7 月 4 號 20:40 於高雄港 2 錨區下錨進行維修補給，因近日氣候多變，海象狀況不良，維修人員無法順利於錨區執行維修工作，今適逢颱風季，船長評估該船現況無法安全航行至下一港並抵禦惡劣氣候，故要求申請緊急進港靠泊合適碼頭以利維修工作進行.

二、 該船主機動力正常，車機操控無虞，可以正常航行進出港，附件為船長聲明書及船籍社驗船報告.

三、 懇請 貴局能准予所請並回覆，讓該船得以順利進港靠泊為荷。

Limited Taiwan Br.

正本：交通部航港局南部航務中心
副本：香港商伍航亞洲有限公司台灣分公司

Appendix 5 Communications between the Shipowner and S5 ASIA before Abandoning Ship

Appendix 6 Comparison Table of the Due Dates of the ANGEL's Related Certificates

1. The shipping agent (S5ASIA) obtained the relevant certificates for the Angel Ship on July 2nd, 2023;

2. Lead Shine Marine Consultant Company logged into the INTLREG shipping registry between July 20th and 30th, 2023, to download the relevant certificates for the ANGEL, and handed them over to the TTSB on August 2nd;

No.	Name of Certificate	Issuer	Certificate Status (the TTSB obtained date)					Due Date (Note, based on documents provided by Lead Shine)
			(07/24) S5 ASIA	(07/21)[40] ZULU	(07/25) Palau	(08.02) Lead Shine	(09/08) INTLREG	
1	C001 - Certificate of Registry	Palau	Valid	Not provided	Valid	Not provided	Not provided	2023.11.29
2	C002 - Ship Radio Station License	Palau	Valid	Not provided	Valid	Not provided	Not provided	2023.11.29
3	C003 - Minimum Safe Manning	Palau	Not provided	Not provided	Valid	Not provided	Not provided	2023.11.29
4	Nairobi International Convention on the Removal of Wrecks (C111)	Palau	Not provided	Not provided	Valid	Not provided	Not provided	2024.05.30
5	Bunker Convention Certificate (C112 - BCC)	Palau	Not provided	Not provided	Valid	Not provided	Not provided	2024.05.30
6	Certificate of Classification (COC)	INTLREG	Not provided	Not provided	Valid	Valid	Revoked	Special survey to be completed

[40] ZULU email response to TTSB: "Reference to our correspondence and your confirmation that DLC departure list is already obtained from port authorities and not required to be sent to you anymore."

								and dry-docking of the vessel to be carried out not later than 2023.09.30
7	Cargo Ship Safety Equipment Certificate (S/E)	INTLREG	Valid	Not provided	Valid	Valid	Expired	Rectification of malfunction of accumulator of the rescue boat to be carried out not later than 2023.07.05
8	Cargo Ship Safety Construction Certificate (S/C)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	Class special survey to be completed and bottom survey carried out not later than 2023.09.30
9	Cargo Ship Safety Radio Certificate (S/R)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	
10	Dangerous Goods Regulations	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
11	International Air Pollution Prevention Certificate (IAPP)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
12	International Anti-Fouling System Certificate (IAFS)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
13	International Load Lines Certificate (ILL)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30

14	International Oil Pollution Prevention Certificate (IOPP)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
15	International Sewage Pollution Prevention Certificate (ISPPC)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
16	International Ship Security Certificate (ISSC)	INTLREG	Valid (Interim)	Not provided	Valid	Valid (Interim)	Revoked	2023.12.01
17	International Tonnage Certificate (ITC)	INTLREG	Valid	Not provided	Valid	Valid	Revoked	2023.09.30
18	Maritime Labor Certificate (MLC)	INTLREG	Valid (Interim)	Not provided	Valid	Valid (Interim)	Revoked	2023.12.01
19	Safety Management Certificate (SMC)	INTLREG	Valid (Interim)	Not provided	Not provided	Valid (Interim)	Revoked	2023.12.01
20	International Ballast Water Management Certificate (BWM)	INTLREG	Not provided	Not provided	Not provided	Valid	Revoked	2028.05.30
21	Ship Energy Efficiency Management Plan (SEEMP)	INTLREG	Not provided	Not provided	Not provided	Valid	Revoked	2028.05.30
22	International Energy Efficiency Certificate (IEE)	INTLREG	Not provided	Not provided	Not provided	Valid	Revoked	2023.09.30
23	Complies with SEEMP documents (SEEMP)	INTLREG	Not provided	Not provided	Not provided	Valid	Revoked	2023.09.30
24	Protection & Indemnity Insurance (P&I)	HYDOR	Valid	Not provided	Not provided	Not provided		

Appendix 7 Survey Report by HYDOR (P&I)

List of defects all ship types

Ship's name:	Angel
Survey type:	Entry Survey
Survey port:	Dalian, China
Date of survey:	24-25 June 2023
Survey company:	T&A Marine Consultants and Surveyors Co. Ltd.
Surveyor:	

Hydor

Each item must be numbered and correspond to the "Survey form" numbering. Photos must support each item.

1. 4.2 The safety meeting had not yet carried out since the Vessel was acquired on 2 June 2023.

   -The SMS Manual had not yet printed out for familiarization and no reading signature record was available on board.

2. 6.1 Latest Class Status was not available on board since the Classification was changed to International Register of Shipping on 2 June 2023. Four Attestation Letters were issued, including the extension of dry dock for special survey, BWMS, CSR and repairing accumulator of rescue boat davit.

3. 7.2 -The bolts and nuts for fire line shore connection flange and vent head for FWT (1P & 2P) were not properly secured.

   -Cable secured bar on the transverse deck between No.5 and No.6 cargo hold was broken.

   The lifting device of the mast on the forecastle was damaged.

   -The window glass in way of E-Deck's stair way was cracked.

4. 7.4 -Portside gangway's aft vertical securing standing (aft) was bent damaged, the handrail was damaged.

   -The brake holder of portside mooring winch (P&S) on poop deck appeared severely corroded and thinned.

   -The mooring ropes were secured on the wrap head of mooring winch on forecastle deck and poop deck.

5. 8.1 The deck cargo crane latest load test was recorded on 31 August 2019. The last thorough examination was on 31 August 2017. The control panel in No.1 deck crane was without indication lamp's cap. The floor plat was holed in No.1 deck crane operation cabinet. Both cranes' save-all appeared oily and dirty.

6. 8.2 The latest record in register book was on 31 August 2019.

7. 10.1 No Main Engine and Aux-Engine running hours information was available on board.

8. 10.3 No fuel oil analysis report was available on board although the Vessel had received fuel oil bunker on 13 June 2023.

9. 10.4 & 10.6 The PLC panel on main switchboard of No.3 D/G was malfunctional, the air starter motor was out of operation.

   No insulation mats were provided for control box in engine room.

   The save-all of aux-engine, fuel supply unit, and the bilge floor in way of aft section appeared oily and dirty.

10. 10.5 The RPM indicator of No.1 T/C of M/E was malfunctional.

11. 10.7 No boiler water test was carried out since the vessel was acquired by the present owners. The aux-boiler was out of operation due to the burner malfunction.

12. 11.1 Material list and crew list in SOPEP locker was not provided.

13. 11.2 The record of change-over to low sulphur fuel was not recorded in related logbook.

14. 12.1 The locker for the Fish/Meat room was temporarily repaired which could not open from internal of the room.

15. 13.1 Company and Master standing order was not yet posted on bridge. The officers'

training record for type specific ECDIS was not available on board.

16. 13.2 The rudder mechanical indicator was not in accordance with the electrical indicator in steering gear room and the bridge.

17. 13.2 Signal light was failed to test at the time of survey.

18. 14.1 Several handrails in No.3, 4 & 5 cargo hold were noted broken. Several lights in bosun store, bow thruster room and transverse walkway were unlit.

19. 14.1 No portable gas detector was supplied on board.

20. 14.4 Smoke detecting system for cargo hold was showed 'Fault' on the panel in fixed CO2 room.

21. 16.1 Cargo hold inspection: Significant water was accumulated in hold No.3 & 5. The evidence showed the ballast water was leaking from No.3 WBT(S).

    -Evidence showed fuel oil had been leaked from No.4 HFO(S) tank to No.4 cargo hold iwo forward bulkhead, oil clean sawdust and residue were noticed at aft of the No.4 hold.

    -Lots of the electrical air ventilations for these three cargo-holds appeared in poor condition with holed on the air tunnel.

    -Access manhole appeared poor condition with severely corroded, lack of open/close level, broken hinges.

    -The mesh for air ventilation was poor condition.

22. 16.2 Hatch cover appeared in poor condition with severely corroded and rust on the rubber grooves, the vertical/ corner of joint section, edge of the hatch panel, corroded and thinned D-rings and sockets and damaged drain channel, pitting and rust of hatch deck plate.

    The transverse walkway handrails and deck plate in way of coaming table appeared corroded, rust and thinner/holed deck plate.

Non-Inspection Item:

23. 9.0 Ballast water tank was not available for inspection due to cargo operation.

24. 16.2 Ultrasonic test for hatch covers were not conducted as the cargo operation was in progress.

Capt. _____ _____ _____

Master signature | Owners' representative signature | Surveyor signature

Appendix 8 Palau Flag state Suspends Relevant Certificate of the ANGEL

From:
Sent: Monday, July 10, 2023 11:22 AM
To:
<To
Cc:
Subject: M/V "ANGEL" - IMO 9256406

***CAUTION:** This email originated from outside of your organization. Do not click links or attachments unless you know the content is safe*

Dear Sirs,

Palau Flag Inspector did attend the subject vessel today (10.07.2023) for carrying out the Flag Inspection on account of verifying the ship's seaworthiness condition following the received notification regarding potential damage in the underwater part of the vessel.

Please be advised that, as was confirmed onboard by the Palau Flag Inspector, the surveyor to International Register of Shipping **did not** attend the ship today, as was agreed.

Also, ship's agents confirmed that the arrangements for appointing diving company to carry out UWS have been almost concluded in order for the UWS to be performed by tomorrow. Thus, it appears there was never an issue for granting permission to arrange the UWS at the ship's current location.

Furthermore, as per the received feedback from the attending flag inspector, major deficiencies have been reported, which up to now can be summarized as follows (we would expect to receive the final survey report and relevant supporting records the soonest):

1. The ship suffers extensive water ingress in Cargo Hold No.4, most probably by hull crack, while the crew members are constantly attempting to pump out the water with pumps.
2. Also, the ship suffers water ingress in Cargo Hold No.5, most probably by hull crack as well,
3. It is apparent that the ingress of water is a result of cracks/holes in double bottom/side ballast tanks, thus the stability of the vessel has been affected by such an incident,
4. The inspector also preliminarily reported that the vessel has only one generator in operable condition and that the emergency generator is not working.

We would like to remind you that surveyor(s) to International Register of Shipping carried out Renewal Statutory Surveys to the vessel on June 04th, 2023, in Colombo, Sri Lanka.

Within the above context, this Administration is requesting from International Register of Shipping to **suspend with immediate effect** the validity of ALL statutory certificate issued on behalf of Palau Flag Administration.

Meantime, we look forward to your further inputs from tomorrow's surveys.

Thank you for your kind attention,

Best Regards,

PALAU INTERNATIONAL SHIP REGISTRY

Technical Department
Palau International Ship Registry

5,
Pi

Contact Us

Appendix 9 Deadweight and Stability Details of the ANGEL

SSL GANGA : SSL GANGA16-Jul-23 07:51:22
Voyage : Port: (Rotn:0)
Deadweight and Stability Details SW Dens : 1.025

Draft Aft = 10.13 m.		Displacement	= 19,129.33 t.
Draft Lcf = 8.23 m. Draft Mean= 8.08 m.			
Draft Fwd = 6.04 m.		Deck CARGO	= 2,435.40 t.
Trim = 4.09 m.		U~Dk CARGO	= 5,681.20 t.
		Break Bulk	= 0.00 t.
GM Solid = 1.025 m.		Stores etc.	= 10.00 t.
F.S. Corr = 0.285 m.		BALLAST	= 2,702.20 t.
GM Fluid = 0.740 m.		FUEL OIL	= 405.72 t.
KG Fluid = 11.122 m.		DIESEL OIL	= 113.67 t.
		LUB. OIL	= 17.55 t.
Area up to 30° = 0.01 M.Rads		FRESH WATER	= 103.96 t.
Area up to 40° = 0.08 M.Rads		MISC.	= 11.24 t.
Area 30° - 40° = 0.07 M.Rads			
Max GZ = 0.64 M. @ 49.6°		Total DeadWeight	= 11,480.93 t.
Eq. Heel Angle = 16.1° To Stbd			
Wind Heel = 12.92°			

WARNING * GM is less than required minimum
WARNING * GZ Area to 30° < 0.055 M-Rads
WARNING * GZ Area to 40° < 0.090 M-Rads

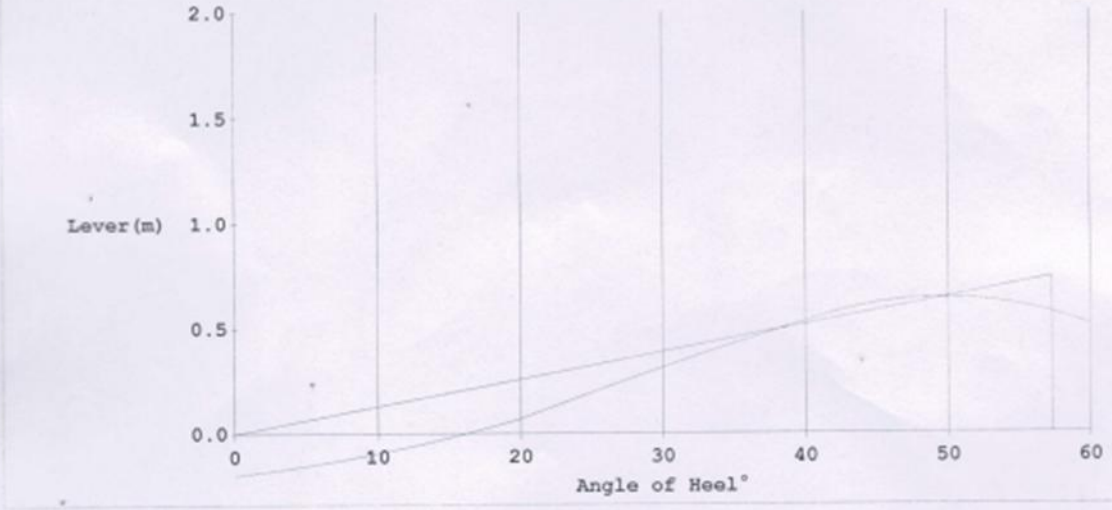
present situation,
Simulated water in Hold N° 4,5 ~ 4,400mt

SSL GANGA : SSL GANGA16-Jul-23 07:51:22
Voyage : Port: (Rotn:0)

Deadweight and Stability Details SW Dens : 1.025

Draft Aft = 10.13 m.		Displacement	= 19,129.33 t.
Draft Lcf = 8.23 m. Draft Mean= 8.08 m.			
Draft Fwd = 6.04 m.		Deck CARGO	= 2,435.40 t.
Trim = 4.09 m.		U-Dk CARGO	= 5,681.20 t.
		Break Bulk	= 0.00 t.
GM Solid = 1.025 m.		Stores etc.	= 10.00 t.
F.S. Corr = 0.285 m.		BALLAST	= 2,702.20 t.
GM Fluid = 0.740 m.		FUEL OIL	= 405.72 t.
KG Fluid = 11.122 m.		DIESEL OIL	= 113.67 t.
		LUB. OIL	= 17.55 t.
Area up to 30° = 0.01 M.Rads		FRESH WATER	= 103.96 t.
Area up to 40° = 0.08 M.Rads		MISC.	= 11.24 t.
Area 30° - 40° = 0.07 M.Rads			
Max GZ = 0.64 M. @ 49.6°		Total DeadWeight	= 11,480.93 t.
Eq. Heel Angle = 16.1° To Stbd			
Wind Heel = 12.92°			

GZ Curve



WARNING * GM is less than required minimum
WARNING * GZ Area to 30° < 0.055 M-Rads
WARNING * GZ Area to 40° < 0.090 M-Rads

present situation,
Simulated water in Hold N° 4, 5 ~ 4,400mt

Appendix10 Application for Anchoring in the Anchorage Area of the Port of Kaohsiung

Application of Anchoring at Kaohsiung port Anchorage

To: Kaohsiung Vessel Traffic Service Center

On behalf of this following vessel, I hereby submit her statement to you for having permission to stay in anchorage. She shall observe the regulations of Port Authority of Kaohsiung and all related Responsibilities and formalities will be undertaken by agent. In the period of anchoring, I will supervise and assist her to follow the rules and instructions issued by commercial port authorities.

The details of this vessel are as follows:

Name of ship:_____

Call sign:_____

Type of ship:_____

Length over all:_____meters

Vessel Nationality:_____

Gross Tonnage:_____

International Maritime Organization (IMO) Number::_____

Arrival maximum draft in the port area:_____meters

Estimated Time of Arrival:_____

Estimated Time of Departure:_____

Is there AIS on board:_____

Is there dangerous cargo on board:_____

Is there valid for P&I Certificate：_____

The late date of anchoring at Kaoport anchorage(if any) :_____

Purpose of application

□ Anchoring and waiting for entering Kaohsiung port

□ Anchoring after leaving Kaohsiung port

□ Anchor for shifting

□ Anchor on arrival (□ Anchorage of North Entrance;□ Anchorage of South Entrance)

Name of local agent:

Name of agent representative:

Agent's TEL:

Mobile phone number:

KaoPort registration code(four numbers):

(Stamp of agent)

Date:____/___/____

Appendix 11 The INTLREG Inspection Records in Colombo: Recommendation and Memorandum

INTLREG conducted a special inspection extension survey on the Angel Wheel during the docking in Colombo. The surveyor's inspection report listed 17 recommendations items and 4 recommendation memorandums, summarized as follows:

17 recommendations

Class / Statutory Survey / Audit / Inspection Status			
A. Class			
		Due Date	Source [41]
Classification Survey - Hull	Special	30-Jun-2028	a
		10-Jul-2023	b
	Annual	30-Sep-2024	a
	Intermediate	30-Sep-2025	a
Classification Survey - Machinery	Special	30-Jun-2028	a
		10-Jul-2023	b
	Annual	30-Sep-2024	a
	Intermediate	30-Sep-2025	a

[41] a: obtained from Lead Shine Service Co. LTD on July. 26.; b: obtained from the class of INTLREG on Sep. 9th.

Dry Docking - Bottom Survey	Renewal	30-Sep-2023	a
		10-Jul-2023	b

Recommendations / Conditions of Class:

Recommendation	***Due Date***	**Source**
Vessel Main deck and appurtenances were found rusted. Hatch covers found repaired temporarily with doubles. Hatch coaming found corroded and wasted. Cleats were found missing. Rubber packing found aged/hardened. Complete overhaul of Hatch covers and appurtenances to be repaired to the satisfaction of the IRS Surveyor.	10-Jul-2023	a & b
Rescue boat emergency operation to be found faulty. To be repaired not later than 5thJuly 2023. Ref Flag state attestation letter.	05-Jul-2023	a & b
Battery operated telephone nonoperational from Bow Thruster room to be repaired.	10-Jul-2023	a & b
AE No.3 Power Management system display nonoperational. To be rectified.	10-Jul-2023	a & b
Type Approved Ballast Water Treatment Plant to be fitted on board and function tested. BWMP to be approved.	10-Jul-2023	a
	30-Sep-2023	b
EEXI Calculation and SEEMP III to be approved and provided onboard.	10-Jul-2023	a
	01-Sep-2023	b
Exhaust Gas leaks from the composite boiler to be arrested at the earliest opportunity and system to be made operational in AUTO mode.	10-Jul-2023	a & b

1. Emergency generator blower flap and limit switch to be made functional. 2. Steering gear vent flap found frozen in open position 3. Oxygen room vent flap is wasted 4. Lashing Bridges on deck were found corroded wasted	10-Jul-2023	a & b
Sewage treatment Plant internal examination to be carried out in Dry Dock.	30-Sep-2023	a & b
Fuel oil Sampling point(s) for taking representative samples of fuel oil being used onboard the (in-use fuel oil) in accordance with MEPC.1/Circ.864/Rev.1 is to be fitted not later than 2023-09-30.	30-Sep-2023	a & b
New SOPEP sighted onboard and to be approved by IRS.	10-Jul-2023	a & b
Cargo holds to be inspected and certified safe electrical equipment to be verified as per DG certificate. **One light cover was found damaged.**	10-Jul-2023	a & b
Broken lights in no.1 cargo holds to be repaired. No DG Cargo to be carried until repaired.	10-Jul-2023	a & b
Cargo hold bilge system to be operation tested prior loading cargo	10-Jul-2023	a & b
Oxygen/ explosive meters to be provided onboard at the first opportunity.	10-Jul-2023	a & b

4 Memorandums

Memorandum	Issue Date	Source
General examination with underwater survey (bottom inspection) to be carried out at the first convenient port and/or	02-Jun-2023	a & b

anchorage area not later than July 10, 2023.		
ISM additional audit to be carried out at the first convenient port and/or anchorage area not later than July 10, 2023.	02-Jun-2023	a & b
Survey for rectification of the Outstanding Recommendations to be carried out at the first convenient port and/or anchorage area not later than July 10, 2023.	02-Jun-2023	a & b
Special/Renewal of Class Hull and Machinery, Safety Construction, Ballast Water and bottom survey has not been credited and pending follow up surveys.	02-Jun-2023	b

Attachment

The following attachments no.1, no.2, and no.3 and have been provided by the national judicial authority and are not included in the published information. Attachment no.4 had published on the factual data report.

Attachment 1 Related photos and video provided by the Chief Engineer

Attachment 2 Photo provided by the ANGEL's AB A

Attachment 3 Photo provided by the ANGEL's AB B

Attachment 4 History of the M/V ANGEL and the ship's classifications