

MA2014-1

**MARINE ACCIDENT
INVESTIGATION REPORT**

January 31, 2014



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto
Chairman,
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

MARINE ACCIDENT INVESTIGATION REPORT

Vessel type and name: Container ship FLEVODIJK
IMO number: 9412488
Gross tonnage: 9,994 tons
Accident type: Collision (Sea Wall)
Date and time: Around 0439 hrs (local time, UTC+9 hours), August 19, 2011
Location: The Sea Wall on the northern side of the Akashi Kaikyo Bridge, Kobe City, Hyogo Prefecture, Japan
Around 053°, 4,470 m from the Esaki Lighthouse located in Awaji City, Hyogo Prefecture
(Approximately 34° 37.9' N, 135° 02.0' E)

December 19, 2013

Adopted by the Japan Transport Safety Board

Chairman Norihiro Goto

Member Tetsuo Yokoyama

Member Kuniaki Shoji

Member Toshiyuki Ishikawa

Member Mina Nemoto

SYNOPSIS

<Summary of the Accident>

On August 19, 2011, the container ship FLEVODIJK, with a master, a Second Officer and 13 crew members on board, while she was proceeding north-eastward on the Harima Nada Sea off the western coast of the Awajishima Island, Hyogo Prefecture, collided with the Sea Wall on the northern side of the Akashi Kaikyo Bridge at around 0439 hrs.

The FLEVODIJK was damaged on its bulbous bow and along with some recesses and broken holes, and she broke part of the Sea Wall at the same time, but there were no casualties.

<Probable Causes>

It is probable that the accident occurred because a Second Officer who was on the sole look-out on the bridge had fallen asleep, while FLEVODIJK was proceeding north-eastward through the Harima Nada Sea toward the west entrance of the Akashi Strait with the autopilot steering at night, and she proceeded toward the Sea Wall and collided with it.

As to why the Second Officer had fallen asleep, is probable that he was sitting on the Chair without his drowsiness relieved, even though he began to feel drowsy and walked around in the bridge to relieve his drowsiness.

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

On August 19, 2011, the container ship FLEVODIJK, with a master, a Second Officer and 13 crew members on board, while she was proceeding north-eastward on the Harima Nada Sea off the western coast of the Awajishima Island, Hyogo Prefecture, collided with the Sea Wall on the northern side of the Akashi Kaikyo Bridge at around 0439 hrs.

The FLEVODIJK was damaged on its bulbous bow and along with some recesses and broken holes, and she broke part of the Sea Wall at the same time, but there were no casualties.

1.2 Outline of the Accident Investigation

1.2.1 Setup of the Investigation

The Japan Transport Safety Board appointed an investigator-in-charge from the Kobe Office and one other investigator to investigate this accident on August 19, 2011.

Later, the board appointed a marine accident investigator as an investigator-in-charge from JTSB headquarters to investigate this ship accident.

1.2.2 Collection of Evidence

August 19 and 22, 2011: On-site investigation and collection of written reply to questionnaires

August 24 and 25 and September 5 and 29, 2011: Interviews and collection of written reply to questionnaires

1.2.3 Participation of Foreign Investigative Authority

The Japan Transport Safety Bureau notified to the Kingdom of the Netherlands, the flag state of the container ship FLEVODIJK, and then the Japanese Government was appointed as the marine safety investigating state upon consultation between both the governments.

1.2.4 Cooperation for the investigation

From the Dutch Safety Board of the Kingdom of the Netherlands, we have obtained information regarding the status of its national laws.

1.2.5 Comments from Parties Relevant to the Cause

Comments on the draft report were invited from parties relevant to the cause of the accident.

1.2.6 Comments from Flag State

Comments on the draft report were invited from the flag State.

2 FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 Events leading to the Accident According to the Records of Automatic Identification System

According to the records of the Automatic Identification System*¹ (hereinafter referred to as "the AIS Records") received by a private information-related company, the navigational conditions of the FLEVODIJK (hereinafter referred to as the "Ship") during the time from 0420.08 to 0439.31 hrs on August 19, 2011 were as shown in the table below.

Although the Ship had used its own internal ship time that delayed one hour from JST when the Ship departed from the Lianyungang Port, the People's Republic of China, all of these times are converted to JST and indicated in the following.

Time (hh:mm:ss)	Ship Position		Heading (°) (True bearing)	COG (°) (True bearing)	SOG (knot) (kn)
	North Latitude (deg.-min.-sec.)	East Longitude (deg.-min.-sec.)			
04:20:08	34-35-54.1	134-55-47.0	067	064.3	17.3
04:25:03	34-36-29.8	134-57-21.5	066	066.5	17.5
04:30:02	34-37-04.7	134-58-59.1	067	067.5	17.7
04:32:02	34-37-17.5	134-59-39.4	067	069.6	17.8
04:34:08	34-37-28.0	135-00-22.6	065	073.8	17.0
04:36:08	34-37-37.3	135-01-02.0	066	074.8	16.8
04:37:02	34-37-41.2	135-01-19.3	066	074.3	16.7
04:38:44	34-37-48.9	135-01-52.6	063	074.7	15.9
04:38:56	34-37-49.0	135-01-53.9	056	095.3	5.0
04:39:04	34-37-49.0	135-01-54.1	054	114.0	1.6
04:39:14	34-37-49.6	135-01-55.0	052	140.5	0.8
04:39:31	34-37-49.2	135-01-54.6	051	143.4	0.4

(Note) The ship position (latitude and longitude) indicates the position of the GPS antenna installed on the Ship.

2.1.2 Events Leading to the Accident According to the Statement of Crews

According to the statements of Master (hereinafter referred to as the "Master") and the Second Officer (hereinafter referred to as "Officer A"), the navigational conditions were as follows.

The Ship was boarded by the Master, Officer A and 13 other crew members and loaded 242 containers, and departed from the Lianyungang Port, the People's Republic of China, and headed for the Osaka District in the Hanshin Port at around 2055 hrs, August 16, 2011.

After the departure, Officer A was on watch on the bridge for four hours from 01 hours to 05 hours and another four hours from 13 hours to 17 hours. After passing through the Kanmon Strait,

*¹ An "Automatic Identification System (AIS)" is a system that enables ships to automatically exchange information, such as call sign, type, name, position, and course, with other ships or other ships or shore facilities.

around noon on the 18th, he was alone on watch on the bridge for six hours from 01 hours to 07 hours and another six hours from 13 hours to 19 hours while passing through the Seto Inland Sea.

When Officer A went up to the bridge at around 0045 hrs on the 19th, he was informed by the Master in the bridge that the ship would arrive to the Osaka Area of the Hanshin Port at around 0630 hrs on that day and was instructed to wake him up one hour before arriving at Osaka and also wake him up if something arose that might not be able to be judged by Officer A himself, and then he take over the navigational watch duty from the Chief Officer. At around 0100 hrs, both the Master and the Chief Officer went down from the bridge and Officer A was on the sole look-out at the time when the Ship navigated near the northern coast of the Ogijima Island, Takamatsu City, Kagawa Prefecture and proceeded through the Bisan Seto East Traffic Route at a speed of approximately 12 kn with the autopilot steering.

Officer A was standing at the beginning of the watchkeeping duty. There was good visibility around the Ship and some navigating ships were sighted but no fishing vessels.

Around the northern coast of the Inageshima Island, Takamatsu City, Officer A set the Ship's speed to approximately 15.5 kn in order to adjust the time to arrive in port.

When the Ship passed through the No. 1 Light Buoy in the Harima Nada Traffic Route, there was no particular ship to be aware of around the Ship. At around 0220 hrs, while the Ship navigated with the course set at approximately 068° (true bearing, the same shall apply hereafter) toward the west entrance of the Akashi Strait (Akashi Kaikyo) approximately 34 nautical miles (M) ahead, Officer A began to feel drowsy and walked around in the bridge for a while to relieve his drowsiness. After that, even though he failed to relieve his drowsiness, he sat on the chair (hereinafter referred to as the "Chair") in front of the No. 1 radar on the starboard side and continued on his watchkeeping duty without reporting to the Master that he began to feel drowsy, because he had not slept during his watchkeeping duties in the past and had confidence that he would not fall asleep even while sitting on the Chair.

After approximately 20 minutes when Officer A sat on the Chair, he entered into a twilight state.

Officer A remembered that the Ship had passed by the No. 4 Light Buoy in the Harima Nada Traffic Route, but he had no memory after passing by the No. 5 Light Buoy of that route. After that, he woke up when he was thrown out of the Chair by the impact of collision and knew that the Ship had collided with the Sea Wall (hereinafter referred to as the "Sea Wall") on the northern side of the Akashi Kaikyo Bridge. And then, he engaged in emergency measures including depth measurement of the tanks in accordance with the instructions from the Master who came up to the bridge.

After coming up to the bridge, the Master confirmed that the time of the collision was around 0440 hrs with the clock in the Ship, which was verified as 0439 with the AIS records after further investigation. The location where the accident was occurred was at around 053°, 4,470 m from the Esaki Lighthouse, according to the measurement by Officer A.

The Ship was pulled apart from the Sea Wall with the help of the tugboats that came at around 1730 hrs, and then towed to the Kobe Area in the Hanshin Port by the tugboats.

The time and the location of this accident were at around 0439 hrs, August 19, 2011 and at around 053°, 4,470 meters from the Esaki Lighthouse.

(See Figure 1: Estimated Ship Positions and Photo 1: Appearance of the Wheelhouse (around the Chair))

2.2 Injuries to Persons

There were no casualties.

2.3 Damage to Vessel

The Ship was damaged around the bulbous bow along with cracks, recesses and scratches including broken holes, in addition to water flooding of the forepeak tank^{*2}.

(See Photo 2- Collision Status with the Sea Wall and Photo 3- Damage to the Bulbous Bow)

2.4 Damage to Other Facilities

For the Sea Wall, three pillars were lost and partial damage occurred on two pillars.

(See Photo 4: Damaged Part of the Sea Wall)

2.5 Crew Information

(1) Gender, Age, and Certificate of Competence

[1] Master: Male, 49 years old,

Nationality: the Russian Federation

Endorsement attesting the recognition of certificate under STCW regulation I/10, Master (issued by the Kingdom of the Netherlands)

Date of issue: July 19, 2011

(Valid until October 21, 2015)

[2] Officer A: Male, 26 years old,

Nationality: Ukraine

Endorsement attesting the recognition of certificate under STCW regulation I/10, chief officer (issued by the Kingdom of the Netherlands)

Date of issue: January 20, 2009

(Valid until November 26, 2013)

(2) Major Seagoing Experience

According to the statements of the Master and Officer A, their major seagoing experiences are as follows.

[1] Master

a Major seagoing experience

After graduating, he boarded various types of ships such as cargo ship, but excluding fishing vessels, from 1982. He boarded the Ship as the Master from July 22, 2011. He had navigated the Seto Inland Sea (Seto Naikai) three times.

b Health conditions

He was in good health conditions, with the eyesight of 1.0 in both eyes and normal hearing ability.

^{*2} A "forepeak tank" is a tank located under the upper deck of the bow part and is used to adjust trim, as well as to store freshwater to be used in the ship.

[2] Officer A

a Major seagoing experience

After graduating in 2004, he boarded cargo ships, ore carriers, and container ships and served as a Second Officer from 2006. He boarded the Ship from May 3, 2011. He had navigated the Seto Inland Sea ten times.

b Health conditions

He was in good health conditions, with the eyesight of 1.0 in eyes, normal hearing ability and a weight of approximately 65 kg.

While navigating the Ship, he was used to taking an approximately four-hour sleep twice a day during off watch periods to maintain a total sleep time of approximately eight hours.

Officer A had dinner at around 2030 hrs on the day before the day on which the accident occurred. At that time, he drank two cans of beer (330 ml, alcohol percentage of 4.8%).

2.6 Vessel Information

2.6.1 Particulars of Vessel

IMO number:	9412488
Port of registry:	GRONINGEN, the Kingdom of the Netherlands
Owner:	Beheermaatschappij m.s. Flevodijk B.V. (Kingdom of the Netherlands)
Management company:	Navigia Shipmanagement B.V. (Kingdom of the Netherlands)
Class:	Germanischer Lloyd (GL)
Gross tonnage:	9,994 tons
L×B×D:	140.70 m × 23.20 m × 11.50 m
Hull material:	Steel
Engine:	One diesel
Output:	9,240 kW
Propulsion:	Single 4-brade controllable pitch propeller
Date of keel lay:	December 31, 2008
Date of launch:	March 1, 2010
Number of persons on board:	15 (Master and a crew member (Nationality: Russian Federation), Officer A and a crew member (Nationality: Ukraine), a crew member (Nationality: Republic of Belarus), ten crew members (Nationality: Republic of the Philippines))

2.6.2 Loading Conditions

According to the statement of the Master, the forward draught was approximately 6.6 meters and the after draft is approximately 7.7 meters at time of departure.

2.6.3 Other Relevant Vessel Information

The Ship was equipped with the navigation console on the center of the wheelhouse and the wheel stand was installed on the center of the navigation console. The radar units were equipped on both left and right sides of the wheel stand and a Chair was provided behind each radar unit. The Ship was designed so that both forward lookout and radar monitoring for watchkeeping were performed by sitting on the Chair.

According to the statements of the Master and Officer A, the Ship was equipped with a gyro compass, an autopilot, two radar units, a GPS plotter and an AIS. At the time when the accident occurred, all these apparatuses were operating and there were no malfunctions or failures to the hull, engine, equipment and the instruments of the Ship. There was no Bridge Navigational Watch Alarm System^{*3} on the Ship.

2.7 Weather and Sea Conditions

2.7.1 Weather Observation Values

The weather observations at the time of the accident observed at the Akashi Local Meteorological Weather Station (AMEDAS: Automated Meteorological Data Acquisition System) located approximately 16 km away to north-west from the location of the accident were as follows:
Time: 0440 hrs, Wind direction: WSW, Wind velocity: 10.2 m/s, and Temperature: 27.2°C.

2.7.2 Observation by Crew

According to the statement of Officer A, the weather was fine with good visibility.

2.7.3 Tide and Current

According to the tide tables issued by the Japan Coast Guard, the tide and current were as follows.

(1) Tide

The tide of the Akashi Port located approximately 4.5 km away to west from the location of the accident at the time of the accident was at the time of low water.

(2) Current

The current in the vicinity of the location of the accident (near the bend section of the Akashi Kaikyo Traffic Route) changed its direction at 0139 hrs on the 19th, becoming maximum at 0439 hrs in the direction of east-southeast with a flow velocity of 4.3 km.

2.8 Characteristics of the Area

According to Sailing Directions for Seto Naikai issued by the Japan Coast Guard, the characteristics of the marine areas where the Ship passed through were as follows.

Seto Naikai

It is an ocean area with around 240M from E to W, and 10 ~ 30M from N to S, surrounded by about 3,000 islands. It is linked with the Pacific Ocean through Kii Suido in the SE side and Bungo Suido

^{*3} A "Bridge Navigational Watch Alarm System" is a device that issues a warning in the bridge and the accommodation space if the timer is not reset within the set time due to that if a watcher falls asleep or leaves the bridge.

in SW side, and 10 also with the Japan Sea through Kanmon Kaikyo in W extremity. It is an ocean area, which is one of the most congested areas with marine traffic and there are a number of traffics of huge vessels and the vessels towing or pushing long objects. There is a general tendency to fog up and are the parts with shallow channels or with strong tidal streams. Furthermore there are many fishing boats doing the seasonal or local unique fishing operation and the passage conditions of vessels are rather tough.

Harima Nada

General Information *Harima Nada is an area surrounded by Awaji Shima and Shodo Shima in E and W and by Shikoku and Honshu in S and N. In the center there is a track (Harima Nada Koro), which is a recommended track. The distance between Akashi Kaikyo and the E entrance of Bisan Seto is about 40M.*

In the northern area there is a large vessel sailing in and out of Higashi-Harima Ko, Himeji Ko and Aoi Ko and many small vessels sailing E and W bound in Seto Naikai.

Fishery *1 Many fishing boats are sometimes in operation in the area of the W side of Akashi Kaikyo Koro Western Side Light Buoy and S of Shika-no-Se.*

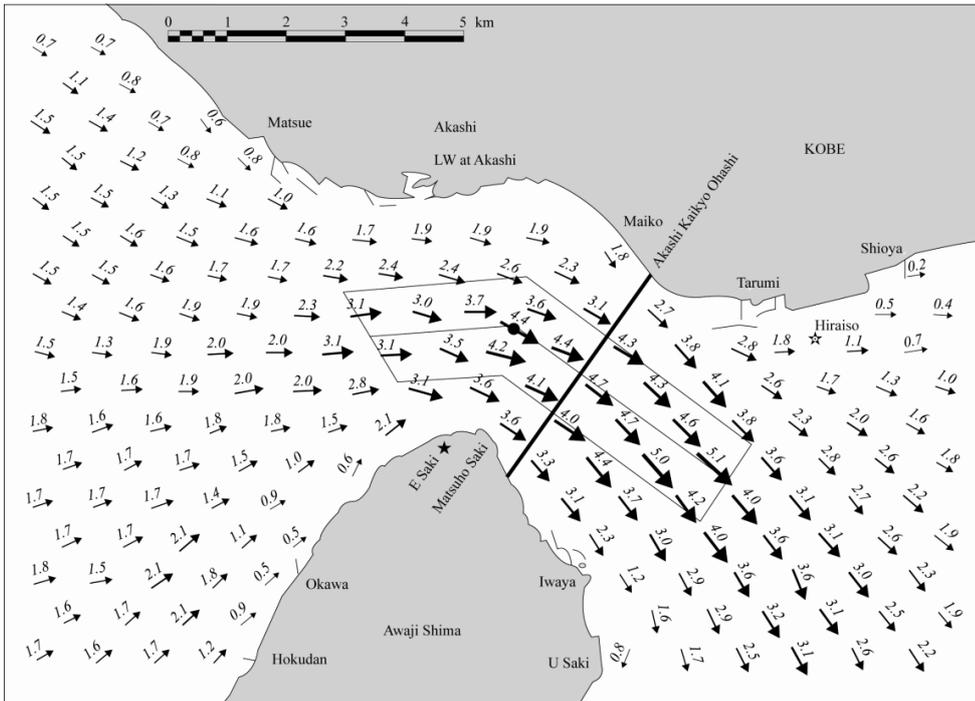
The rest is omitted.

Akashi Kaikyo

General Information *Akashi Kaikyo is one of the important places of marine traffic in Seto Naikai. The width is about 2M with a rather strong current and there are some points where the current direction and the traffic route are crossing. There is a big traffic with many vessels as the result of convergence of four routes from Hanshin, Tomogashima, Harima Nada and the N of Ieshima Shoto. And there are many fishing boats in operation since this area is a good point of boat seine fishery. Within the channel, there is Akashi Kaikyo Traffic Route designated in Maritime Traffic Safety Law. In that traffic route vessels must follow traffic method regulated in the same law. There is Akashi Kaikyo Ohashi striding over the traffic route which could be a good mark from a distance. Near the channel the depth is deep enough but in the N part relatively is shallow. Especially, from the N side of W entrance of the channel to Higashi-Harima Ko there is a shallow area with depth of 10m or less the area expands up to the 4M from the coast.*

Tidal currents *W-going current is the strongest at high water in Akashi, while E-going current is strongest at low water. The maximum velocity of W-going current is 6.7kn., E-going current is 5kn.*

Tidal current chart of Akashi Kaikyo (Maximum E-going Current)



2.9 Information Regarding Safety Management

2.9.1 Management company: Navigia Shipmanagement B.V. and the Ship

(1) Document of compliance

Issuer: BUREAU VERITAS (France)
Date of issue: October 31, 2008
Date of expiry: September 18, 2011

(2) Safety management certificate

Issuer: BUREAU VERITAS
Date of issue: August 30, 2010
Date of expiry: August 29, 2015

2.9.2 Information Regarding Navigational Situations

According to the statement of the Master, the information regarding navigational situation was as follows.

- (1) Navigational watchkeeping procedures and other documents for the Ship had been established based on the International Safety Management (ISM) Code.^{*4}
- (2) The navigational watch duty was performed by three officers in rotation for four hours by each single officer, but multiple persons performed this duty as required by the situation.
- (3) The Master trusted Officer A, because he was qualified as the Chief Officer.

^{*4} The International Management Code for the Safe Operation of Ship and for Pollution Prevention, or the "ISM code" in short, is aimed at the safe navigation of ships and vessels, as well as the preservation of marine environment, becoming effective on July 1, 1998, followed by the amendments of the SOLAS Convention in 1994, after this code was adopted as the resolution in the IMO General Meeting on November 4, 1993 and included in the Annex of the SOLAS Convention in 1974, and is applied for all passenger ships and other ships and vessels with a gross tonnage of 500 or more which engaged on international voyage.

- (4) The Master judged that the sole navigational watch duty by Officer A was acceptable because there was good visibility and there was only a few fishing vessels sighted when he was leaving the bridge.
- (5) The Master had 24 years of experience as a master and he had not experienced in the past any crew in charge of the navigational watch falling asleep while on duty.

2.9.3 Information Regarding Navigational Watch Procedures

- (1) The Navigational Watch Procedures prepared on the Ship describes as follows.

*The Master has to make sure that there is enough watchkeeping personnel on the bridge, this to ensure a safe navigation at all times. When the Master finds it necessary, extra watchkeeping personnel may be added. He will have to follow the rules and regulations as set forth by the STCW*⁵ and the flag state.*

- (2) The reference regarding the STCW Convention*⁶ describes as follows in terms of the general rules to be observed to maintain the bridge watch duty.

The officer in charge of the navigational watch is the master's representative and is primarily responsible at all times for the safe navigation of the ship and for complying with the International Regulations for Preventing Collisions at Sea, 1972.

In addition to the lookout, the reference describes as follows.

The look-out must be able to give full attention to the keeping of a proper look-out and no other duties shall be undertaken or assigned which could interfere with that task.

The duties of the look-out and helmsperson are separate and the helmsperson shall not be considered to be the look-out while steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper look-out. The officer in charge of the navigational watch may be the sole look-out in daylight provided that on each such occasion:

1. *the situation has been carefully assessed and it has been established without doubt that it is safe to do so;*
2. *full account has been taken of all relevant factors including, but not limited to:*
 - *state of weather,*
 - *Visibility,*
 - *traffic density,*
 - *proximity of dangers to navigation, and*
 - *the attention necessary when navigating in or near traffic separation schemes ; and*
3. *assistance is immediately available to be summoned to the bridge when any change in the situation so requires.*

- (3) The reference*⁷ regarding the International Regulations for Preventing Collisions at Sea, 1972 describes as follows in terms of the lookout rules.

*⁵ The "STCW Convention" refers to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978.

*⁶ Reference: "1995 AMENDMENT TO THE INTERNATIONAL CONVENTION ON STANDARDS OF TRAINING, CERTIFICATION AND WATCHKEEPING FOR SEAFARERS (STWC), 1978" (Official translation) The Second Revision, supervised by the Maritime Bureau, the Ministry of Land, Infrastructure, Transport and Tourism, published by the Seizando-Shoten Publishing Co., Ltd.

Article 5 Look-out

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

- (4) Domestic laws of the flag state (the Kingdom of the Netherlands) regarding the lookout

According to the reply to the questionnaire by the Dutch Safety Board of the Kingdom of the Netherlands, in the Kingdom of the Netherlands, domestic laws of the flag State of the Ship stipulate the requirements regarding the lookout for merchant vessels in accordance with the International Regulations for Preventing Collisions at Sea, 1972 and the STCW Convention.

2.10 Information Regarding the Bridge Navigational Watch Alarm System

In the 86th Maritime Safety Committee held on June, 2009, the amendment of the SOLAS Convention^{*8} regarding the obligatory installation of a Bridge Navigational Watch Alarm System was adopted, and the system is required to be installed for all passenger ships and the cargo ships with a gross tonnage of 1,500 or more which were constructed after July 1, 2011 (effective date), and all of which engaged on international voyage. As the transitional measure, the ships and vessels constructed before July 1, 2011 must be fitted with the system not later than the applicable due dates shown below, according to the type of ship and the classification of gross tonnage.

- (1) For all passenger ships built before July 1, 2011, they shall be fitted with the system by the first periodical survey to be implemented after July 1, 2012.
- (2) For cargo ships with a gross tonnage of 3,000 or more built before July 1, 2011, they shall install the system by the first periodical survey to be implemented after July 1, 2012.
- (3) For cargo ships with a gross tonnage of between 500 or more and less than 3,000 built before July 1, 2011, they shall be fitted with the system by the first periodical survey to be implemented after July 1, 2013.
- (4) For cargo ships with a gross tonnage of between 150 or more and less than 500 built before July 1, 2011, they shall be fitted with the system by the first periodical survey to be implemented after July 1, 2014.

^{*7} Reference: "1971 Amendment to the Interpretation of the International Regulations for Preventing Collisions at Sea, 1972," written by Fumio Shintani and Shushin Sato, published by the Seizando-Shoten Publishing Co., Ltd.

^{*8} The "SOLAS Convention" is the abbreviation of "The International Convention for the Safety of Life at Sea," an international treaty for the safety of human life at sea, 1974.

3 ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

According to 2.1 and 2.8, it is considered probable that the situation was as follows.

- (1) The Ship, where Officer A was on the sole look-out on the bridge from around 0100 hrs, passed by the No. 1 Light Buoy in the Harima Nada Traffic Route at around 0220 hrs, set its course approximately 68° toward the west entrance of the Akashi Strait approximately 34 M ahead, and navigated with a speed of approximately 15.5kn with using the autopilot steering to enter into the Osaka Area of the Hanshin Port.
- (2) While the Ship navigated with the autopilot steering through the Harima Nada Sea toward the west entrance of the Akashi Strait, Officer A began to feel drowsy and walked around in the bridge for a while to relieve drowsiness. Afterward, he sat on the Chair without his drowsiness relieved.
- (3) While Officer A continued his watchkeeping duty on the bridge sitting on the Chair, he had fallen asleep after the Ship passed by the No. 4 Light Buoy in the Harima Nada Traffic Route, and then the Ship, navigating toward the west entrance of the Akashi Strait, collided with the Sea Wall.

3.1.2 Date, Time and Location of the Occurrence of the Accident

According to 2.1, it is considered probable that the date and time of occurrence of the accident was at around 0439 hrs, August 19, 2011 and the location was around 053°, 4,470 m from the Esaki Lighthouse.

3.2 Causal Factors of the Accident

3.2.1 Situation of the Crew and the Ship

(1) Officer A

According to 2.1 and 2.5, the situation was as follows.

- [1] Officer A had a legal and valid certificate.
- [2] It is considered probable that Officer A was in good health condition and he had maintained a total sleep time of approximately eight hours a day, as he was used to taking an approximately four-hour sleep twice a day during off watch periods.
- [3] Officer A had two cans of beer with a volume of 330 ml and an alcohol percentage of approximately 4.8% when he had dinner (at around 2030 hrs) of the day before the day of the accident. According to the calculation using an alcohol concentration calculation method (Widmark formula^{*9}), while based on the Officer A's weight of approximately 65 kg, and taking into account the aforementioned volume of alcohol, the alcohol concentration value inside his body would be "0" approximately four hours after he had drunk alcohol. So

^{*9} The "Widmark formula" is a calculation method for alcohol and other concentrations in the blood (breath) at the time of the accident if the amount and time of alcohol intake are known.

it is considered probable that all of the alcohol was dissolved at the time when he fell asleep.

(2) Vessel

According to 2.6.3, it is considered probable that there were no malfunctions or failures to the hull, engine, equipment and the instruments of the Ship at the time when the accident occurred.

3.2.2 Situations of Weather and Marine Phenomena

According to 2.7, it is considered probable that the weather was fine with good visibility at the time when the accident occurred, the wind was a west-southwest wind with a velocity of 10.2 m/s, and the tide was at the time of low water. It is considered probable that the current was flowing east-southeast with a flow velocity of approximately 4.3kn at around the bend section of the Akashi Kaikyo Traffic Route.

3.2.3 Analysis Regarding the Situation of Bridge Watchkeeping

According to 2.1, it is considered probable that the situation was as follows.

(1) Situation of bridge watchkeeping

While Officer A was on the sole look-out on the bridge sitting on the Chair, after the Ship passed by the No. 4 Light Buoy in the Harima Nada Traffic Route with no particular ships that he should be aware of around the Ship, navigating with the course set at approximately 068° toward the west entrance of the Akashi Strait approximately 34 M ahead, he began to feel drowsy.

(2) Reporting situation of the Master

Even though Officer A began to feel drowsy, he thought he would not fall asleep because he had not slept during his watchkeeping duties in the past, so he did not report to the Master that he began to feel drowsy.

(3) Situation where Officer A had fallen asleep

Officer A began to feel drowsy and walked around in the bridge to relieve his drowsiness. Even though he failed to relieve his drowsiness, he thought he would not fall asleep because he had not slept during his watchkeeping duties in the past and continued on the watchkeeping duty by sitting on the Chair without his drowsiness being relieved. After approximately 20 minutes, he went into a twilight state, but kept sitting in the Chair without his drowsiness relieved. Finally, he had fallen asleep.

According to the following ① and ②, it is considered probable that Officer A had fallen asleep after the Ship had passed by the No. 4 Light Buoy in the Harima Nada Traffic Route until the Ship collided with the Sea Wall.

① He remembered that the Ship had passed by the No. 4 Light Buoy in the Harima Nada Traffic Route, but he had no memory afterwards.

② Officer A woke up when he was thrown out of the Chair by the impact of the collision.

3.2.4 Analysis Regarding Solo Watchkeeping

According to 2.1.2, 2.8 and 2.9, the analysis is as follows.

- (1) When the Master was leaving the bridge at the time when the Ship navigated near the northern coast of the Ogijima Island, he instructed Officer A to keep a sole watch, because the weather was fine with good visibility, and there was only a few fishing vessels around the Ship. However, it is considered probable that the instruction to make Officer A perform look-out alone in that situation was inappropriate, because the Seto Inland Sea including the Harima Nada Sea where they passed through at that time is one of the most sea traffic congested areas. In addition, it was night-time. If the navigational watch duty was performed by multiple persons on the Ship, it is considered somewhat likely that the accident could have been prevented.
- (2) When Officer A failed to relieve his drowsiness, he did not report to the Master that he began to feel drowsy. However, if he appropriately reported to the Master, and the Master replaced or increased the persons in charge of watchkeeping, it is considered somewhat likely that this accident could have been prevented.

3.2.5 Installation Situation of the Bridge Navigational Watch Alarm System

The Ship was a cargo ship with a gross tonnage of 3,000 or more and was constructed before July 1, 2011, therefore, it is considered that there was no responsibility to install any Bridge Navigational Watch Alarm System at the time the accident occurred.

3.2.6 Analysis Regarding the Occurrence of the Accident

According to 2.1, 2.6.3, and 2.9, it is considered probable that the accident occurred as follows.

- (1) While the Ship navigated on the Harima Nada Sea and proceeded toward the west entrance of the Akashi Strait with the autopilot function, Officer A, who was on the sole look-out on the bridge, began to feel drowsy when the Ship passed by the No. 1 Light Buoy in the Harima Nada Traffic Route and navigated with the course set at approximately 068° toward the west entrance of the Akashi Strait with a speed of approximately 15.5 kn using the autopilot steering.
- (2) Officer A began to feel drowsy and walked around in the bridge to relieve his drowsiness. Even though he failed to relieve his drowsiness, he thought he would not fall asleep because he had not slept during his watchkeeping duties in the past and he continued on the watchkeeping duty by sitting on the Chair without his drowsiness relieved and without reporting to the Master that he began to feel drowsy.
- (3) As Officer A kept sitting on the Chair without his drowsiness relieved, he had fallen asleep after the Ship passed by the No. 4 Light Buoy in the Harima Nada Traffic Route.
- (4) Because Officer A had fallen asleep, the Ship navigated toward the Sea Wall and collided with it.

4 CONCLUSIONS

4.1 Probable Causes

It is probable that the accident occurred because Officer A who was on the sole look-out on the bridge had fallen asleep, while the Ship was proceeding north-eastward through the Harima Nada Sea toward the west entrance of the Akashi Strait with the autopilot steering at night, and the Ship proceeded toward the Sea Wall and collided with it.

As to why Officer A had fallen asleep, is probable that he was sitting on the Chair without his drowsiness relieved, even though he began to feel drowsy and walked around in the bridge to relieve his drowsiness.

4.2 Other Key Findings

When the Master was leaving the bridge at the time while the Ship navigated near the northern coast of the Ogijima Island, he instructed Officer A to look out alone. However, it is probable that the instruction to make Officer A to look out alone in that situation was inappropriate, because the Seto Inland Sea including the Harima Nada Sea where they passed through at that time is one of the most sea-traffic congested marine areas. In addition, it was night-time. If the watchkeeping duty was performed by multiple persons on the Ship, it is somewhat likely that it was possible to avoid this accident.

It is considered probable that Officer A did not report to the Master that he began to feel drowsy when he failed to relieve his drowsiness, because he had not slept during his watchkeeping duties in the past and he thought that he would not fall asleep. However, if he appropriately reported to the Master, and the Master of the Ship replaced or increased the persons in charge of watchkeeping, it is somewhat likely that the accident was avoided.

5 SAFETY ACTIONS

It is probable that the accident occurred because, while the Ship proceeded north-eastward through the Harima Nada Sea toward the west entrance of the Akashi Strait with the autopilot steering at night, Officer A who was on the sole look-out on the bridge had fallen asleep while sitting on the Seat without his drowsiness relieved, even though he began to feel drowsy and walked around in the bridge to relieve his drowsiness, and the Ship proceeded toward the Sea Wall and collided with it.

When the Master was leaving the bridge while the Ship navigated near the northern coast of the Ogijima Island, he instructed Officer A to perform the navigational watch duty alone. However, it is considered probable that the Master should not have made Officer A look out alone. Because the Seto Inland Sea including the Harima Nada Sea where they passed through at that time is one of the most sea-traffic congested areas. In addition, it was night time.

If the watchkeeping duty was performed by multiple persons on the Ship, it is somewhat likely that the accident was avoided.

It is probable that Officer A did not report to the Master that he began to feel drowsy when he was failed to relieve his drowsiness, because he had not slept during his watchkeeping duty in the past and he thought that he would not fall asleep. However, if he appropriately reported to the Master, and the Master replaced or increased the persons in charge of watchkeeping, it is somewhat likely that this accident was avoided.

Therefore, while navigating through the Seto Inland Sea at night, it is desirable to always perform the navigational watch duty appropriately by assigning multiple persons to reinforce the lookout, as well as by replacing or increasing the persons in-charge of watchkeeping, if someone feels drowsiness.

In addition, it is desirable to perform the navigational watch duty without sitting on a chair, if there is a possibility that the person in charge of watchkeeping might fall asleep.

5.1 Safety Actions Taken

5.1.1 Safety Actions Taken by the Master

- (1) The Master has recently developed a watch bill and has established the composition of the watch to always perform navigational watch duty with two persons while navigating through the Seto Inland Sea.
- (2) The Master has made a rule to be present in the bridge as much as possible.

5.1.2 Safety Actions Taken by the Officer A

Officer A has made a rule for watchkeeping arrangement to be sure to call another person to perform the navigational watch duty with at least two persons, if he feels any drowsiness at all while he is on navigational watch.

5.2 Safety Actions Required

When the Ship navigated through the Harima Nada Sea at that night, an officer was on the sole look-out. However, because the Seto Inland Sea, including the Harima Nada Sea, is one of the most sea-traffic congested areas, it is desirable to always perform the navigational watch duty appropriately by assigning multiple persons to reinforce the lookout, as well as by replacing or increasing the persons in-charge of watchkeeping, if someone feels drowsiness.

In addition, if a ship is designed so that both forward lookout and radar monitoring are able to be performed by sitting on a chair, it is desirable to perform the navigational watch duty without sitting on a chair, if there is a possibility that the person in charge of watchkeeping might fall asleep.

The Kingdom of the Netherlands, the flag State of the Ship, is a Party to the International Regulations for Preventing Collisions at Sea, 1972 and the STCW Convention. In accordance with the STCW Convention, the sole look-out may be allowed in daytime only if the requirements are met. As the accident was occurred at night and the location of the accident was in a sea traffic congestion area, it is probable that the requirements for the sole look-out were not met. Therefore, the Master should not instruct Officer A to look out alone.

The Japan Transport Safety Board, based on the result of the accident investigation and with view to contributing to the prevention of reoccurrence of similar accidents, requests for cooperation of the associations that ship owners or shipping agents join to make this report public, as well as to observe compliance to the International Regulations for Preventing Collisions at Sea, 1972 and the STCW Convention and to bring attention of the importance of always performing appropriate look-out to foreign vessels.

Attached diagram 1: Estimated Ship Positions

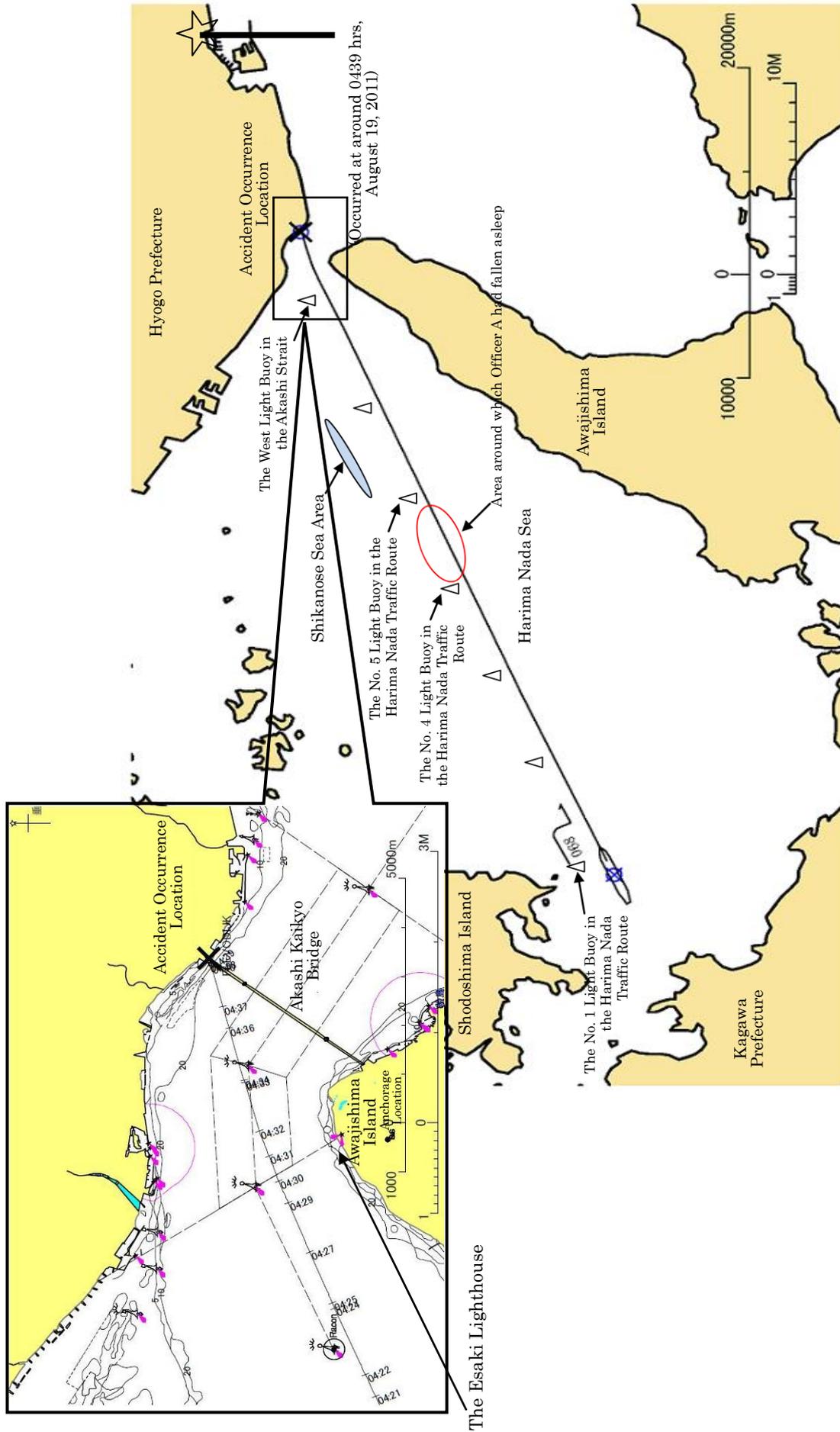


Photo 1: Appearance of the Wheelhouse (around the Chair)



The Chair

Photo 2: Collision Status with the Sea Wall



Photo 3: Damage to the Bulbous Bow



Photo 4: Damaged Part of the Sea Wall

