MA2020-1

MARINE ACCIDENT
INVESTIGATION REPORT

January 30, 2020

JTSB Japan Transport Safety Board

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.

TAKEDA Nobuo
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: Cargo ship SM3
IMO number: 9041899
Gross tonnage: 1,493 tons

Vessel type and name: Oil tanker KOUTOKU MARU
Vessel number: 140793
Gross tonnage: 748 tons

Accident type: Collision
Date and time: Around 14:55, September 29, 2018 (local time, UTC+9 hours)
Location: Wakamatsu district of Kanmon Port, Kanmon Passage
Around 086 ° true bearing, 1,070 m from Wakamatsu Doukaiwankou Lighthouse
(approximately 33° 56.5 'N, 130° 51.7 'E)

December 4, 2019
Adopted by the Japan Transport Safety Board
Chairman TAKEDA Nobuo
Member SATO Yuji
Member TAMURA Kenkichi
Member KAKISHIMA Yoshiko
Member OKAMOTO Makiko

SYNOPSIS

< Summary of the Accident >

While cargo ship SM3, with a master and 9 other crew members on board, was proceeding north-northeast bound for Pohang Port, Republic of Korea, in Wakamatsu Passage of Kanmon Port, and while oil tanker KOUTOKU MARU, with a master, boatswain and 6 other crew members on board, was proceeding southeast bound for Setonaikai in No. 2 Kanmon Passage of Kanmon Port, both vessels collided at around 14:55 on September 29, 2018, after having just

entered Kanmon Passage.

SM3 suffered denting of her shell plate on her port fore side and port aft side, and KOUTOKU MARU lost her starboard anchor and suffered denting of her bulbous bow, etc.; however, there were no casualties or injuries on either vessel.

< Probable Causes >

It is considered probable that the accident occurred because, while SM3 was traveling eastward from Wakamatsu Passage to Kanmon Passage and KOUTOKU MARU was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage in a situation whereby the courses of both vessels would cross in Kanmon Passage, the master of SM3 intended to turn to the left and pass the bow of KOUTOKU MARU and boatswain of KOUTOKU MARU was maintaining the same course and ship speed, as a result of which both vessels collided.

It is considered probable that the master of SM3 intended SM3 to turn to the left and pass the bow of KOUTOKU MARU because of the possibility that he wanted to move ahead of a cargo ship proceeding northwest in Kanmon Passage and because he had the experience that other vessels kept out of the way of SM3 when he called their names by VHF wireless telephone, and that, at the time of the accident, the master of SM3 similarly thought that KOUTOKU MARU would turn to the right and avoid SM3 by passing off her stern.

It is considered probable that boatswain of KOUTOKU MARU was maintaining the same course and ship speed because, according to the navigation rules of Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations, SM3 was in a position whereby she had to keep out of the way of KOUTOKU MARU, and thus he was expecting SM3 to eventually avoid KOUTOKU MARU and diverted his attention to responding to a total three calls by VHF wireless telephone.

<Safety Recommendation>

It is probable that this accident occurred because, while the cargo ship SM3 was traveling eastward from Wakamatsu Passage to Kanmon Passage and the oil tanker KOUTOKU MARU was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage in a situation whereby the courses of both vessels would cross in Kanmon Passage, the master of SM3 intended to turn to the left and pass the bow of KOUTOKU MARU while the boatswain of KOUTOKU MARU maintained the same course and ship speed, as a result of which both vessels collided.

It is considered probable that the master of SM3 turned to the left toward the path of KOUTOKU MARU because it was possible he intended SM3 to go ahead of a vessel proceeding northwest in Kanmon Passage at the time of the accident and because it was his experience

that other vessels kept out the way of SM3 when he called their names by VHF wireless telephone and thus, at the time of the accident, he again thought KOUTOKU MARU would turn to the right and avoid SM3 when he called KOUTOKU MARU's name by VHF wireless telephone.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends that SEMYUNG SHIPPING CO.,LTD. (Republic of Korea), which is the owner and the management company of SM3, take the following countermeasures for the purpose of preventing the occurrence of a similar accident and reducing damage:

SEMYUNG SHIPPING CO.,LTD. (Republic of Korea) shall provide thorough instruction to masters of its vessels to unfailingly execute the following measures and shall also implement training in accordance with said measures:

(1) Masters and duty watch persons should utilize information provided by the Vessel Traffic Service Center, etc., effectively. In particular, they should give immediate attention to dangerous situations based on the content of warnings from the Center, etc., and respond appropriately.

(2) Masters and duty watch persons should navigate in accordance with rules that are established for the navigational area. In particular, when communicating with approaching vessels becomes necessary, they should not only call the vessel's name but also implement VHF wireless telephone communication proactively and mutually confirm the maneuvering intentions.

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

While cargo ship SM3, with a master and 9 other crew members on board, was proceeding north-northeast bound for Pohang Port, Republic of Korea, in Wakamatsu Passage of Kanmon Port, and while oil tanker KOUTOKU MARU, with a master, boatswain and 6 other crew members on board, was proceeding southeast bound for Setonaikai in No. 2 Kanmon Passage of Kanmon Port, both vessels collided at around 14:55 on September 29, 2018, after having just entered Kanmon Passage.

SM3 suffered denting of her shell plate on her port fore side and port aft side, and KOUTOKU MARU lost her starboard anchor and suffered denting of her bulbous bow, etc.; however, there were no casualties or injuries on either vessel.

1.2 Outline of the Accident Investigation

1.2.1 Set up of the Investigation

The Japan Transport Safety Board (JTSB) appointed an investigator-in-charge and two other marine accident investigators to investigate this accident on October 1, 2018.

After this, one local accident investigator (Moji Branch Office) also joined in the accident investigation.

1.2.2 Collection of Evidence

October 1 - 3, 2018: On-site investigations and interviews
October 29, 31: Collection of questionnaire
November 12, 14, 19, 2018: Interviews
November 20 and December 5, 2018: Collection of questionnaire

1.2.3 Comments of Parties Relevant to the Cause

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

1.2.4 Comments from the Flag State

Comments were invited from the flag state of SM3.

2. FACTUAL INFORMATION

2.1. Events Leading to the Accident

2.1.1 The Navigation Track according to the Automatic Identification System

According to the Automatic Identification System (AIS)*1 record (hereinafter referred to as "the AIS record") received by a data company in Japan, the navigation tracks of "SM3" (hereinafter referred to as "Vessel A"), "KOUTOKU MARU" (hereinafter referred to as

*1 "Automatic Identification System" (AIS) is a device that a vessel uses to automatically transmit receive information such as vessel identification code, ship type, name, position, course, speed, destination, and conditions of navigation, and to exchange information with other vessels or land-based navigation aids.

"Vessel B") and a cargo ship proceeding northwest in Kanmon Passage at the time of this accident (hereinafter referred to as "Vessel C") from 14:40 to 14:56 on September 29, 2018, were as shown in Table 1 - 3 below.

The positions of Vessel A, Vessel B and Vessel C are the position of the GPS antenna mounted above the bridge of each vessel respectively. Course over the ground and heading are true bearings (hereinafter the same).

Table 1 AIS record of Vessel A (abstract)

Time (HH: MM: SS)	Vessel position		Course Over the Ground (°)	Heading (°)	Speed Over the Ground*2 (Knots)
	North latitude (°-′-″)	East longitude (°-′-″)			
14:40:04	33-55-56.3	130-49-43.8	102.9	103	4.3
14:41:05	33-55-55.2	130-49-49.5	104.7	105	5.4
14:44:05	33-55-53.4	130-50-10.8	079.9	079	6.5
14:46:05	33-55-55.8	130-50-27.0	080.0	079	7.2
14:48:04	33-55-58.3	130-50-45.6	080.6	079	8.4
14:49:04	33-55-59.9	130-50-56.0	080.8	078	8.9
14:49:34	33-56-00.5	130-51-01.1	081.2	078	8.9
14:50:04	33-56-01.3	130-51-06.6	081.1	079	9.0
14:50:34	33-56-01.9	130-51-11.9	081.5	079	9.0
14:51:04	33-56-02.7	130-51-17.4	077.4	074	9.0
14:51:34	33-56-03.9	130-51-22.5	069.6	062	8.9
14:52:04	33-56-06.0	130-51-27.3	055.2	046	8.7
14:52:31	33-56-08.6	130-51-30.6	038.0	031	8.5
14:53:04	33-56-12.8	130-51-33.5	025.8	023	8.5
14:53:35	33-56-16.8	130-51-35.4	021.1	022	8.6
14:54:04	33-56-20.8	130-51-37.4	021.6	023	8.7
14:54:25	33-56-23.7	130-51-38.8	022.9	024	8.8
14:54:55	33-56-27.6	130-51-40.7	023.6	036	8.7
14:55:02	33-56-28.6	130-51-41.3	030.3	046	8.4
14:55:11	33-56-29.6	130-51-42.3	043.5	063	7.6
14:55:25	33-56-30.4	130-51-44.1	093.2	095	6.4
14:55:35	33-56-30.5	130-51-45.3	081.0	104	6.8

*2 "Speed over the ground" refers to the speed of a vessel as measured against one point on the earth's surface. The speed of a vessel as measured against the water in which the vessel is traveling is called "speed over water."

14:55:44	33-56-30.5	130-51-46.6	101.1	119	6.0
14:56:04	33-56-29.7	130-51-48.7	121.5	134	5.9

Table 2　AIS record of Vessel B (abstract)

Time (HH: MM: SS)	Vessel position		Course Over the Ground (°)	Heading (°)	Speed Over the Ground (Knots)
	North latitude (°-′-″)	East longitude (°-′-″)			
14:40:00	33-57-47.4	130-48-31.3	088.6	088	12.7
14:41:00	33-57-47.7	130-48-46.6	087.3	088	12.6
14:44:02	33-57-48.1	130-49-32.0	094.5	098	12.5
14:46:02	33-57-40.5	130-50-00.0	111.4	111	12.1
14:48:02	33-57-31.2	130-50-26.7	114.6	115	12.0
14:49:01	33-57-26.0	130-50-39.3	126.2	131	11.7
14:49:31	33-57-21.8	130-50-44.3	137.6	135	12.0
14:50:01	33-57-17.4	130-50-49.2	137.7	135	12.1
14:50:31	33-57-12.9	130-50-54.1	137.1	135	12.2
14:51:01	33-57-08.4	130-50-59.1	137.7	136	12.2
14:51:30	33-57-03.9	130-51-04.1	137.8	136	12.2
14:52:01	33-56-59.3	130-51-08.9	139.0	137	12.3
14:52:30	33-56-54.8	130-51-13.8	136.9	135	12.2
14:53:01	33-56-50.3	130-51-19.0	137.3	135	12.4
14:53:41	33-56-44.2	130-51-25.8	136.2	134	12.5
14:54:01	33-56-41.3	130-51-29.4	135.0	134	12.5
14:54:30	33-56-36.8	130-51-34.7	133.6	132	12.5
14:55:02	33-56-32.5	130-51-40.4	130.0	128	11.7
14:55:11	33-56-31.3	130-51-42.1	130.1	123	10.7
14:55:21	33-56-30.6	130-51-43.1	114.5	097	6.1
14:55:30	33-56-30.6	130-51-44.3	078.8	084	5.7
14:55:41	33-56-30.7	130-51-45.4	082.5	079	5.5
14:56:01	33-56-31.2	130-51-47.6	069.0	075	5.2

Table 3　AIS record of Vessel C (abstract)

Time (HH: MM: SS)	Vessel position		Course Over the	Heading (°)	Speed Over the Ground
	North latitude	East longitude			

	(°-′-″)	(°-′-″)	Ground (°)		(Knots)
14:40:03	33-54-30.6	130-55-14.9	253.9	261	11.9
14:41:03	33-54-27.8	130-55-00.6	257.4	261	12.4
14:49:00	33-55-16.6	130-53-31.6	323.5	322	12.2
14:49:30	33-55-21.6	130-53-27.3	325.3	321	12.3
14:50:00	33-55-26.3	130-53-23.0	320.8	320	12.3
14:50:30	33-55-31.3	130-53-18.2	321.3	320	12.3
14:51:00	33-55-36.1	130-53-13.5	321.2	321	12.5
14:51:30	33-55-41.0	130-53-08.8	321.0	320	12.6
14:52:00	33-55-45.9	130-53-04.0	321.7	321	12.7
14:52:30	33-55-51.0	130-52-59.3	321.9	320	12.7
14:53:00	33-55-56.0	130-52-54.5	321.7	320	12.8
14:53:41	033-56-02.9	130-52-47.9	321.9	321	12.9
14:54:00	33-56-06.1	130-52-44.9	322.6	321	12.9
14:54:30	033-56-11.3	130-52-40.2	322.3	320	12.9
14:55:02	33-56-16.4	130-52-35.4	321.8	320	13.0
14:56:01	33-56-26.8	130-52-25.5	321.0	320	13.0

2.1.2 Voice Record Data by VHF Radiotelephone

According to the VHF wireless telephone communication history (hereinafter referred to as "VHF" except in Chapter 6) provided by the Kanmon Kaikyo Vessel Traffic Service Center (hereinafter referred to as "Kanmon MARTIS"), the voice communication record among Kanmon MARTIS, Vessel A and Vessel B from 14:40 and 15:01 on September 29, 2018, were as shown in Table 4.

Because VHF channel 16 is the common channel for calling and responding and the other channels are for individual radio communication, vessels that are sailing or anchoring are obliged to listen to information on channel 16.

Table 4 VHF communication history

Time	Speaker	Receiver	CH	Content
14:40	Vessel A	Kanmon MARTIS	16	KANMON MARTIS. This is Vessel A.
	Kanmon MARTIS	Vessel A	16	One three.
14:41	Vessel A	Kanmon MARTIS	13	Departing from Wakamatsu Port. Going to AS.

	Kanmon MARTIS	Vessel A	13	Information, east-bound vessel on your port bow approaching. Do not obstruct her. And west-bound vessel on your starboard bow Vessel C approaching. Keep good watch.
	Vessel A	Kanmon MARTIS	13	*Yes, understood.* (Hereafter the italic font in the "content" column refers to communications in Japanese.)
	Kanmon MARTIS	Vessel A	13	One six out.
14:49	Kanmon MARTIS	Vessel A	16	Vessel A, Vessel A. This is KANMON MARTIS.
	Vessel A	Kanmon MARTIS	16	This is Vessel A.
	Kanmon MARTIS	Vessel A	16	Change to channel one four.
14:50	Kanmon MARTIS	Vessel A	14	Information, *Vessel C proceeding west is approaching. You are the give-way vessel, please proceed to sail after Vessel C.*
	Vessel A	Kanmon MARTIS	14	*Understood.*
	Kanmon MARTIS	Vessel A	14	*Yes, one six.*
14:52	Kanmon MARTIS	Vessel A	16	Vessel A, Vessel A. This is KANMON MARTIS. Warning, East-bound Vessel B approaching you. Keep clear.
14:53	Kanmon MARTIS	Vessel A	16	Vessel A, Vessel A. This is KANMON MARTIS. Warning, East-bound vessel approaching you. Keep clear.
	Vessel A	Kanmon MARTIS	16	Port to port. *Understood.*
14:55	Kanmon MARTIS	Vessel B	16	*Vessel B, Vessel B. This is Kanmon MARTIS.*
	Vessel B	Kanmon MARTIS	16	*This is Vessel B.*
	Kanmon MARTIS	Vessel B	16	*Yes, Vessel B. Change channel to one four, please.*

14:56	Kanmon MARTIS	Vessel B	14	*Question, has your vessel just collided with Vessel A?*
	Vessel B	Kanmon MARTIS	14	*Yes, Vessel B has.*
	Kanmon MARTIS	Vessel B	14	*Please contact 'Moji Hoan' about it.*
	Vessel B	Kanmon MARTIS	14	*Understood.*
	Kanmon MARTIS	Vessel B	14	*Yes, be back to one six.*
14:57	Kanmon MARTIS	Sailing vessels around this position	16	*Information, a collision occurred off of Wakamatsu. Vessels sailing in this vicinity proceed with care.*
15:01	Vessel A	Kanmon MARTIS	16	This is Vessel A. KANMON MARTIS.
	Kanmon MARTIS	Vessel A	16	This is KANMON MARTIS. One four.
	Vessel A	Kanmon MARTIS	14	*Kanmon MARTIS, this is Vessel A, Vessel A. Our vessel has collided with Vessel B.*

2.1.3 Events Leading to the Accident according to Crew Statements, etc.

According to the statements by the master of Vessel A (hereinafter, "Master A"), a navigation officer of Vessel A (hereinafter, "Officer A"), and chief engineer of Vessel A (hereinafter, "Chief Engineer A") as well as the master of Vessel B (hereinafter "Master B"), boatswain of Vessel B (hereinafter, "Boatswain B"), and an able seaman of Vessel B (hereinafter, "Able Seaman B") and the replies to the questionnaire by Matsushima Yusosen Corporation, which is the owner of Vessel B (hereinafter referred to as "Company B1"), the master of a tanker (hereinafter, "Vessel D") navigating in the same direction approximately 0.6 M behind Vessel B at the time of this accident, and Kanmon MARTIS, the events leading to the accident were as follows.

(1) Vessel A

At around 14:35 on September 29, 2018, Vessel A departed from the public wharf of Hibikinada-south, Kitakyushu City, Fukuoka Prefecture, bound for Pohang Port, Republic of Korea, with Master A (Korean) and 9 other crew members (2 Koreans, 2 Indonesians and 5 Burmese) on board.

Scheduled to sail to the west side of Uma Island, Kitakyushu City, Fukuoka Prefecture,

by way of Kanmon Passage to No. 2 Kanmon Passage, Vessel A proceeded east in Wakamatsu Passage while increasing speed with Master A commanding vessel maneuvering, Officer A handling the wheel, and Chief Engineer A operating the main engine, etc..

At around 14:44 Officer A recognized the existence of Vessel B, which was proceeding east for No. 2 Kanmon Passage, by the GPS plotter monitor with superposed AIS information. The information of Vessel B was indicated on the No. 1 radar screen.

Master A visually recognized Vessel B, which was sailing in the vicinity of the west entrance of No. 2 Kanmon Passage on the port side at around 14:49 and kept watching it because Vessel B's bearing was moving to the port side. He thought it was possible Vessel A would pass the bow of Vessel B. Vessel A was navigating at full ahead with a ship speed of approximately 8.5 knot (kn) (speed over the ground, O.G.).

Master A recognized that, according to navigation rules of the Ordinance for Enforcement of the Act on Port Regulations, Vessel A, which was sailing in Wakamatsu Passage, had to keep out of the way of Vessel B, which was sailing in No. 2 Kanmon Passage, in Kanmon Port; however, due to having had the experience that other vessels kept out of the way of Vessel A when he called their names via VHF in the past, he thought Vessel B would change her bearing to the right side and keep out of the way of Vessel A if he called Vessel B's name via VHF as before. Thinking it was possible to pass the bow of Vessel B if Vessel A changed course in the direction of Vessel B's path, he ordered Officer A to set the rudder 5 degrees to port at around 14:51 and began to turn to port.

From around 14:52, Master A called only Vessel B's name three times repeatedly to communicate his expectation that Vessel B would keep out of the way of Vessel A by changing her bearing to the starboard side. At that time, Vessel B had not responded to the VHF communications from Vessel A; nonetheless, Master A was convinced that his intention was transmitted to Vessel B as before and he thought that Vessel B would eventually turn to starboard and change her direction toward the stern of Vessel A.

At around 14:53, Master A recognized that the fear of a collision existed because Vessel's B direction was changing very little. Nonetheless, Vessel A kept navigating at the same speed because Master A received a communication from Kanmon MARTIS that both vessels were to pass port-to-port and he thought Vessel B received the same communication.

On the other hand, Officer A had no memory of Vessel A's receiving a communication from Kanmon MARTIS that both vessels were to pass port-to-port. Officer A heard a communication urging Vessel A to be cautious of a vessel proceeding east by VHF from MARTIS, and he heard Master A respond "port to port" to MARTIS after misinterpreting the intention of MARTIS's warning.

Master A watched Vessel B approached Vessel A while Vessel A was passing Kanmon Passage's No. 10 light beacon, felt the fear of collision and blew the whistle with three long blasts, and then took hard to starboard and stopped the main engine; however the port fore side of Vessel A collided with the bow of Vessel B.

Another navigation officer of Vessel A reported the occurrence of the accident to

Kanmon MARTIS and Japan Coast Guard. Vessel A subsequently docked at the public wharf of Hibikinada-south under her own power in accordance with Japan Coast Guard's directions.

(2) Vessel B

At around 11:05 on September 29, 2018, Vessel B departed from Hakata Port, Fukuoka City, Fukuoka Prefecture, bound for Setonaikai to seek refuge from a typhoon, with Master B, Boatswain B, and 6 other crew members (all members were Japanese) aboard. Master B handed over the navigation watch to Boatswain B and Able Seaman B at around 11:55.

With Boatswain B handling steering and lookout and Able Seaman B at lookout, Vessel B changed her steering from automatic operation to manual operation for entering the Kanmon Straits at around 14:25 and was proceeding east at a ship speed of approximately 12.5 kn.

Boatswain B usually informed Master B when Vessel B was about to enter the Kanmon Straits, but forgot to do so on the day of the accident.

Vessel B set the course at approximately 107° toward the west entrance of No. 2 Kanmon Passage at around 14:44, and Vessel B entered the passage without Master B being on the navigation bridge.

At around 14:49, Boatswain B observed Vessel A, which was proceeding east in Wakamatsu Passage bound for Kanmon Passage off the starboard bow, and displayed AIS information on the No. 2 radar screen and kept watching her. Because Vessel B's bearing was moving to the left side, he thought Vessel A was going to pass the bow of Vessel B.

Vessel B gradually turned, set her course at approximately 137° and was sailing on the right side of No. 2 Kanmon Passage.

At around 14:52, Kanmon MARTIS informed Vessel B by ship's radiotelephone that Vessel A would depart from Wakamatsu Passage.

When Vessel A passed by Wakamatsu Passage's No. 2 light beacon, she appeared to Boatswain B to turn to port. Subsequently Vessel A's bearing changed very little, and therefore Boatswain B recognized the fear of a collision with Vessel A. However, according to the navigation rules of Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations, Vessel B, which was sailing from No. 2 Kanmon Passage to Kanmon Passage, was given priority over Vessel A, which was sailing from Wakamatsu Passage to Kanmon Passage, and therefore Boatswain B was expecting Vessel A to keep out of the way of Vessel B. Consequently, Vessel B kept navigating at the same ship speed and the same course.

Boatswain B was called by Vessel B's name on VHF channel 16 and he picked up the VHF receiver and responded to the call; however he didn't receive any further information after the first contact. Vessel B continued to be called by VHF repeatedly. Although he sent a response on each call by VHF, he did not know who was calling

Vessel B and what their intent was.

When Boatswain B was responding to the third VHF call, Vessel A was closing to approximately 300 m on Vessel B's starboard side. Because he recognized the risk of collision with Vessel A, he decreased ship speed and stopped the main engine. Able Seaman B blew the whistle with one blast, and Boatswain B took hard to port; however, the bow of Vessel B collided with the port fore side of Vessel A.

The date and time of occurrence of this accident was around 14:55 on September 29, 2018, and the location was around 086° true bearing, 1,070 meters from Wakamatsu Doukaiwankou Breakwater lighthouse.
(See Annex Figure 1: Navigation path diagram of the vessels, and Annex Table 1: Table of the events of this accident)

2.2 Injuries to Persons

According to the statements of Master A and Master B, there were no casualties or injuries on either vessel.

2.3 Damage to Vessels

According to the on-site investigation and the reply of questionnaire from Company B1, these were as follows.

(1) Vessel A suffered a dent with a breach in the shell plate of her fore port part, bent handrails, a dent on the shell plate of her port aft part, etc.
(See Figure 1)

Figure 1　Damage to Vessel A

(2) Vessel B suffered a dent in her bulbous bow, a lost starboard anchor, a dent of a length of 8 m in the shell plate of her aft starboard part, etc.
(See Figure 2)

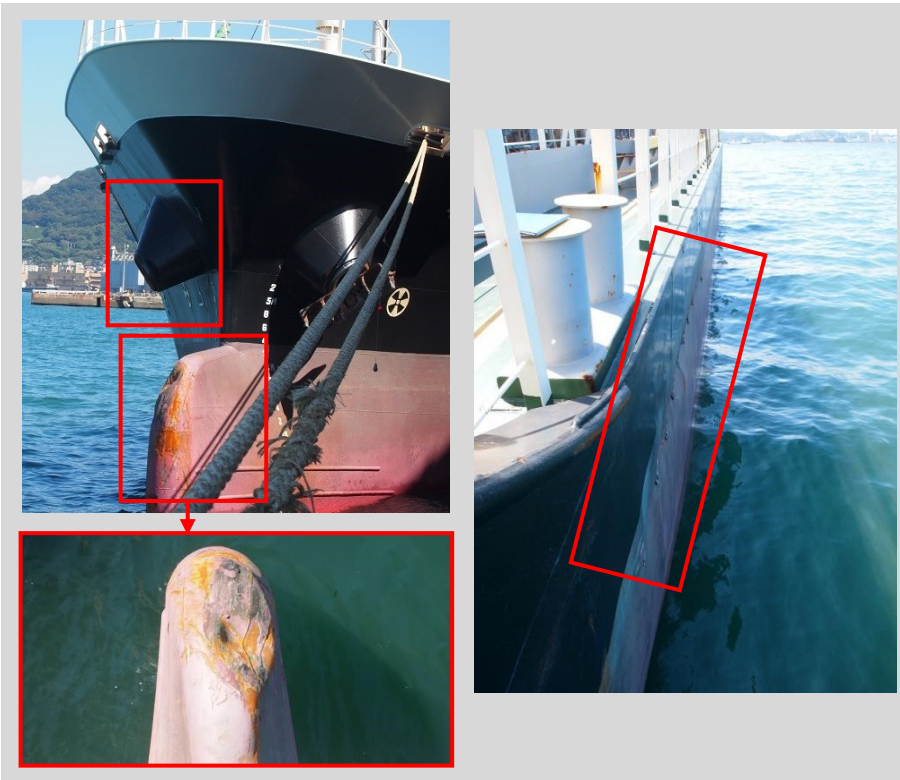


Figure 2　Damage to Vessel B

2.4 Crew Information

(1) Gender, Age, Certificate of Competence

(i) Master A: Male 70 years old, Nationality: Republic of Korea

Third officer license (limited to merchant vessels) issued by the Republic of Korea

Date of Issue: January 26, 2018 (Valid until January 25, 2023)

(ii) Master B: Male 44 years old, Nationality: Japanese

Fourth grade license (navigation) issued by Japan

Date of Issue: April 17, 2000

Date of Revalidation: May 12, 2015

Date of Expiry: May 11, 2020

(iii) Boatswain B: Male 44 years old, Nationality: Japanese

Sixth grade license (navigation) issued by Japan

Date of Issue: May 27, 2005

Date of Revalidation: May 7, 2015

Date of Expiry: May 26, 2020

(2) Seagoing Experience, etc.

According to the statement of Master A, Master B and Boatswain B, seagoing experience was as follows.

(i) Master A

Master A was a seafarer since 1973, and became a master in 1978. He has been on board as a master of Vessel A since 2012, and had experienced sailing in Kannon Passage approximately 60 times a year and more than 10 times a year in Wakamatsu Passage.

He can speak simple Japanese and was in good health at the time of the accident.

(ii) Master B

Master B joined Company B1 and became a seafarer in 1995. He became a master in 2001. He had served aboard Vessel B ever since Vessel B was built, and had passed through Kanmon Passage many times.

He had had a headache in the morning of the day of the accident. After having lunch at around 12:30, he took medicine and rested in his room.

(iii) Boatswain B

Boatswain B was a seafarer since 1971 and had been a boatswain from around 1998. He had served aboard Vessel B ever since Vessel B was built, and had passed through Kanmon Passage many times. He was in good health at the time of the accident.

(3) Other Information

According to the statement of Master A, Officer A, Master B and Boatswain B, the

situation was as follows.

(i) Vessel A

At the time of this accident, on Vessel A, Master A (Republic of Korea), Officer A (Republic of Indonesia) and Chief Engineer A (Republic of Korea) were on watch duty, operational conversation was in English, and there were no problems concerning communication among duty personnel.

(ii) Vessel B

At the time of this accident, on Vessel B, Able Seaman B was on the bridge; however, Able Seaman B was learning about the work of an able seaman under the supervision of Boatswain B since September for the purpose of gaining seagoing experience, and therefore Able Seaman B was not required to assume the responsibility of a deck duty watch person.

Also, Boatswain B was not aware of Master B's physical condition at the time of the accident.

2.5 Vessel Information

2.5.1 Principal of the Vessels

(1) Vessel A

IMO No.:	9041899
Port of registry:	Jeju, Republic of Korea
Owner:	SEMYUNG SHIPPING CO.,LTD. (hereafter "Company A" except in Chapter 6) (Republic of Korea)
Management company:	Company A
Classification Society:	Korean Resister of Shipping
Gross tonnage:	1,493 tons
L x B x D:	74.02 m x 11.70 m x 7.20 m
Hull material:	Steel
Engine:	Diesel engine x 1
Output:	736 kW
Propulsion:	Fixed pitch propeller x 1
Date of launch:	September 29, 1991

(See Figure 3)

Figure 3　Vessel A

(2) Vessel B

IMO No.:	140793
Port of registry:	Kamiamakusa City, Kumamoto Prefecture, Japan
Owner:	Company B1, Independent Administrative Agency Japan Railway Construction, Transport and Technology Agency (Japan)
Management company:	Asahi Tanker Co., Ltd. (hereafter "Company B2")
Gross tonnage:	748 tons
L x B x D:	71.59 m x 12.00 m x 5.20 m
Hull material:	Steel
Engine:	Diesel engine x 1
Output:	1,471 kW
Propulsion:	Fixed pitch propeller x 1
Date of launch:	April 23, 2008

(See Figure 4)

Figure 4　Vessel B

2.5.2 Load Conditions, etc.

(1) Vessel A

According to the bell book of Vessel A, at the time of departure from the public wharf of Hibikinada-south, Vessel A had 2,099 tons of metal scrap.　Her draft was approximately 4.68 m at the fore and approximately 5.45 m at the aft.

(2) Vessel B

According to the statement of Boatswain and the passage plan of Vessel B, at the time of departure from Hakata port, Vessel B was unloaded and in ballast.　Her draft was approximately 1.7 m at the fore and approximately 3.3 m at the aft.

2.5.3 Navigation Equipment, etc.

(1) Vessel A

Vessel A had a steering stand at the center of the navigation bridge, a radar capable of displaying superimposed AIS information on the port side, a maneuvering panel for the main engine, etc., to the starboard side, and a GPS plotter installed on the upper-right side of the steering stand.　On the navigation bridge, the No. 1 radar was installed on the front starboard side and VHF wireless apparatuses were installed on both sides. There was a passage between the steering stand and the front window.

According to the statement of Master A, at the time of the accident, Master A had set the range of the No. 1 radar to 0.5 mile (M) and the No. 2 radar to 0.75 M, and set off-center indication of approximately 1.25 M to the fore side on both radars.

(See Figure5)

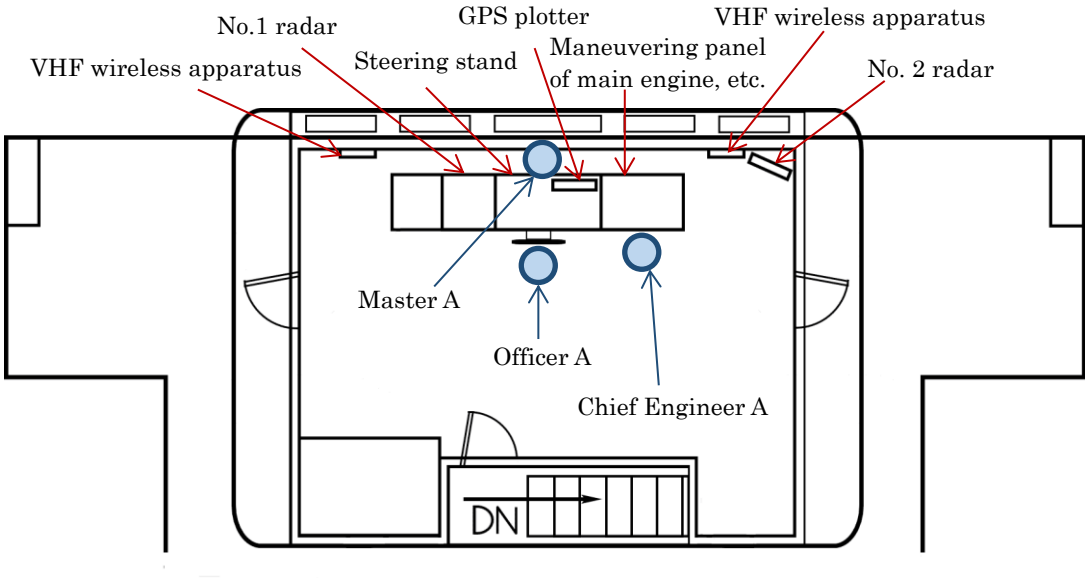


Figure 5　Navigation Bridge status of Vessel A

(2) Vessel B

Vessel B had a steering stand at the front center of the navigation bridge; a GPS plotter, 2 VHF wireless apparatuses, and 2 radar units capable of displaying superimposed AIS information on the port side; and a maneuvering panel for the main engine, etc., on the starboard side.　A ship's telephone was installed on the aft wall.

According to the statement of Boatswain B, at the time of the accident, Boatswain B had set the range of the No. 1 radar to 2 M and the No. 2 radar to 3 M.

(See Figure 6)

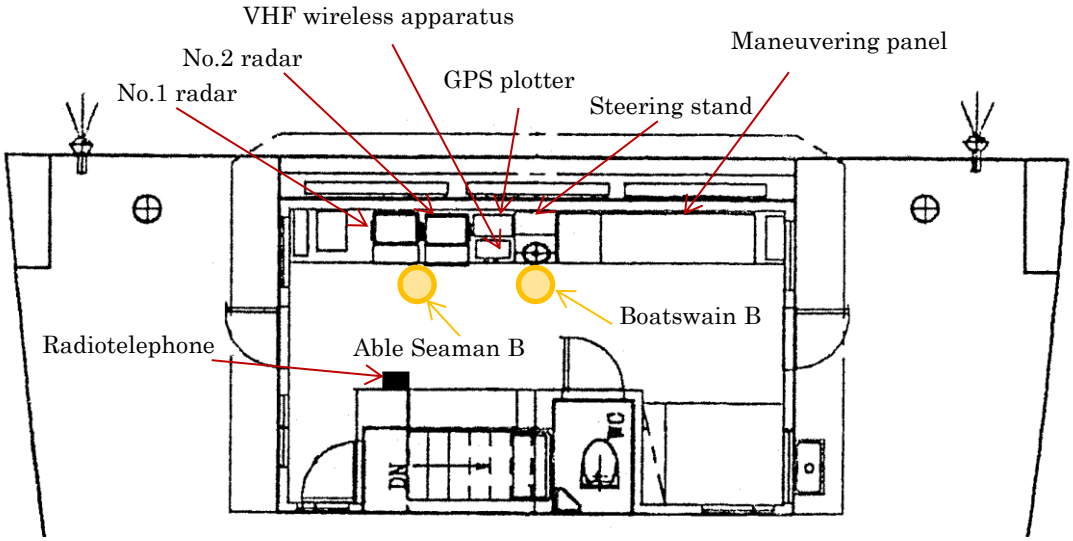


Figure 6　Navigation Bridge status of Vessel B

2.5.4 View from the Bridge

There were no structures that caused a blind spot on the bow of Vessel A or on the bow of Vessel B.

(See Figure 7 and 8)

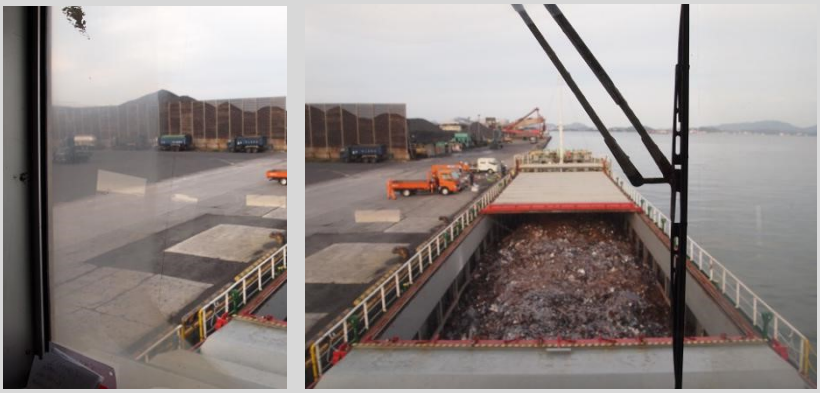


Figure 7　View of the bow and the starboard fore side

Figure 8　View of the bow and the starboard fore side

2.5.5 Other Relevant Vessel Information

According to the statement of Master A and Master B, at the time of the accident, there were no malfunctions or failures in the hull, engine and equipment of either Vessel A or Vessel B.

2.6 Water Area Information in Vicinity of the Accident

(1) Navigation regulations applicable in Kanmon Port

The following regulations are set by the Ordinance for Enforcement of the Act on Port Regulations.

Article 38　Vessels must abide by the following navigational rules in Kanmon Port

1 – 8　Omission

9　When a vessel sailing in the No. 2 Kanmon Passage and a vessel sailing in the

Wakamatsu Passage are expected to meet in the Kanmon Passage, the vessel sailing in the Wakamatsu Passage must avoid the path of the vessel navigating in No. 2 Kanmon Passage.

10, 11 Omission

2 Omission

According to the statement of Master A and Boatswain B, both Master A and Boatswain B were aware of the above-mentioned navigation rules at the time of the accident, and they understood that Vessel A was in a situation in which she must keep out of the way of Vessel B.

(2) "INFORMATION", "WARNING", "ADVICE" and "INSTRUCTION" by VHF radiotelephone from Kanmon MARTIS

In accordance with law, when Kanmon MARTIS issues a message containing "INFORMATION", "WARNING", "ADVICE" or "INSTRUCTION," it uses a corresponding message marker at the beginning of the communication or an appropriate place within the communication sentence whenever possible to properly clarify the meaning.

The usage of the message markers is in accordance with descriptions of the IMO Standard Marine Communication Phrases that are prescribed by the IMO. The meanings of the message markers, etc., are as shown in Table 5.

Table 5 "INFORMATION", "WARNING", "ADVICE" and "INSTRUCTION" by VHF radiotelephone from Kanmon MARTIS

MESSAGE MARKERS	Content, etc.
INFORMATION	This indicates that Kanmon MARTIS is informing observed facts, situations, etc., which contribute to navigational safety. Consequences of INFORMATION will be up to the recipient.
WARNING	This indicates that Kanmon MARTIS is informing any dangerous situation that may impede safe navigation of vessels. The recipient of this message should pay immediate attention to the situation mentioned and consequences of WARNING will be up to the recipient.
ADVICE	This indicates that Kanmon MARTIS is providing advice, pursuant to the Act on Port Regulations, to take any necessary action to keep traffic regulations on the route, such as altering the vessel's way and so forth, to avoid the dangerous situation that may impede safe navigation of the vessel. The recipient of this message should maneuver considering this advice very carefully. The decision whether to follow the ADVICE still stays with the recipient.
INSTRUCTION	This indicates that Kanmon MARTIS is instructing vessels to

	take certain action, pursuant to the Act on Port Regulations. The recipient has to follow this message unless he/she has contradictory safety reasons.

(3) Navigating situation of the other vessel

According to the reply of Kanmon MARTIS and AIS records of Vessel A and Vessel C, at the time of the accident, Vessel C was to the starboard side of Vessel A and was proceeding in the right side of Kanmon Passage at approximately 320° and approximately 13 kn.

2.7 Weather and Sea Conditions

2.7.1 Weather and Sea Observations

(1) Weather observations

Observations at the Shimonoseki Local Meteorological Observatory, located approximately 3.5 M east of the accident location, were as follows. At around 15:00, the weather was rainy and visibility was 15.0 km.

Time	Wind direction	Wind speed (m/s)
14:50	East	3.1
15:00	East	3.2

(2) Wave observations

According to the Tidal Table published by Japan Coast Guard, the tide at the time of the accident in Yahata was the middle phase of ebb tide.

2.7.2 Observations by Crew Members

(1) According to the statement of Master A, the weather at the time of the accident was sunny, the wind was not strong, and the tidal current was flowing east at 1 kn according to the electric bulletin board at Daibahana Tidal Current Signal Station after the occurrence of this accident.

(2) According to the statement of Master B, the weather at the time of the accident was cloudy, the visibility was from 4 M to 5 M, and the tidal current was flowing west at 2 kn according to the electric bulletin board at Daibahana Tidal Current Signal Station when Vessel B entered No. 2 Kanmon Passage.

(3) According to the reply of Company B, the weather at the time of the accident was cloudy, the wind was easterly with a wind speed of approximately 0.5 m, wave height was approximately 0.5 m, the tidal current was flowing east at between 1 kn and 2 kn, and visibility was from 4 M to 5 M.

2.8 Information on Safety Management

In the basic procedure manual for narrow straits navigation of its Safety Management Manual, Company B1 established a procedure whereby bridge watchkeepers notify the master 30 minutes before entering to a narrow strait, and the master will command vessel maneuvering directly during sailing in narrow straits.

According to the statement of Master B, Master B usually received the notice before entering to the Kanmon Straits; however, this notification was occasionally made at a time determined by watchkeepers' own discretion and sometimes at the last minute.

3. ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

According to 2.1, the following events occurred.

(1) Vessel A

(i) It is considered highly probable that Vessel A departed from the public wharf of Hibikinada-south at around 14:35 on September 29, 2018, bound for Kanmon Passage, and was proceeding east under manual steering in Wakamatsu Passage while gradually increasing ship speed.

(ii) It is considered highly probable that Vessel A navigated on a course of approximately 081° and ship speed of approximately 9.0 kn, and then began to turn to the left at around 14:51.

(iii) It is considered highly probable that Vessel A was navigating on a course of approximately 023° in Wakamatsu Passage at around 14:53.

(iv) It is considered probable that Vessel A took hard to starboard and stopped her main engine at around 14:54:30.

(2) Vessel B

(i) It is considered probable that Vessel A changed over from automatic steering to manual steering at around 14:25, and was proceeding east at a ship speed of approximately 12.5 kn.

(ii) It is considered highly probable that Vessel B began to turn to the right, and was navigating for No. 2 Kanmon Passage on a course of approximately 110° to 115° and entered the passage at around 14:48.

(iii) It is considered highly probable that Vessel B was navigating on a course of 137° along the right side of No. 2 Kanmon passage from around 14:49:30.

(iv) It is considered probable that Vessel B was decreasing ship speed at 14:54:30, and furthermore that she stopped her main engine and took hard to port.

3.1.2 Situation of Collision

According to 2.1 and 2.3, it is considered probable that while Vessel A was turning to the right and Vessel B was turning to the left, the port fore part of Vessel A and the bow part

of Vessel B collided, and that after this, the port aft part of Vessel A and the starboard aft part of Vessel B collided.

(See Figure 9)

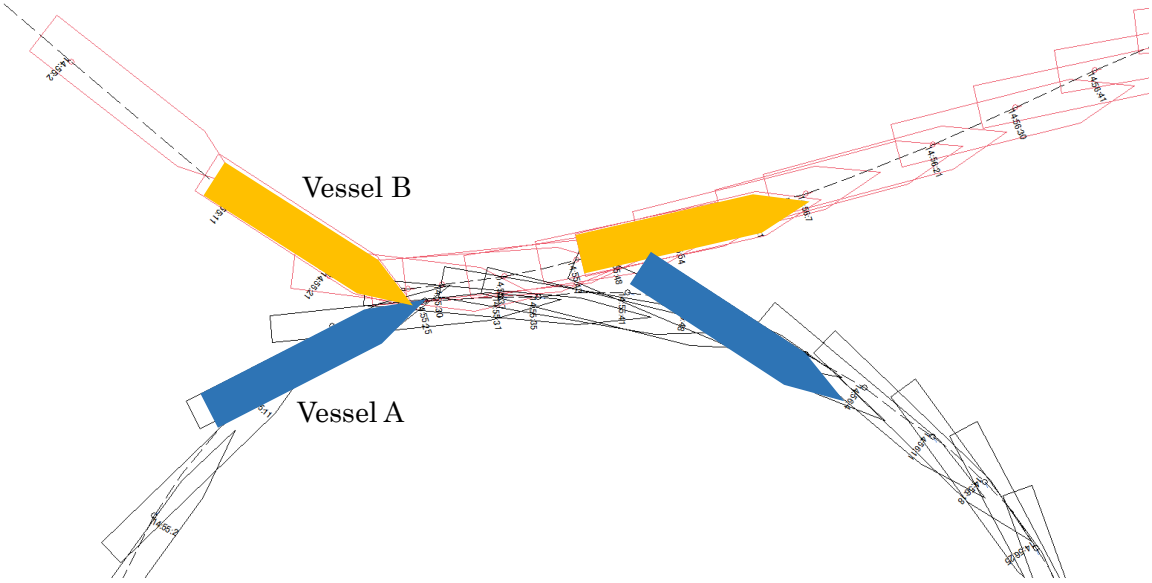


Figure 9　Schematic view of the collision

3.1.3 Date, Time and Location of the Accident

According to 2.1, it is considered highly probable that the date and time of the accident were around 14:55 on September 29, 2018, and the location was 1,070 meters at around 086° true bearing from Wakamatsu Dokaiwankou Breakwater lighthouse.

3.1.4 Information on Casualties or Injuries

According to 2.2, there were no casualties or injuries on either Vessel A or Vessel B.

3.1.5 Damage to Vessels

According to 2.3, damage was as follows.

(1) Vessel A suffered a dent with a breach in the shell plate of her fore port area, bent handrails, a dent in the shell plate of her aft port area, etc.

(2) Vessel B suffered a dent in her bulbous bow, a lost starboard anchor, a dent of a length of 8 m on the shell plate of her starboard aft, etc.

3.2 Causal Factors of the Accident

3.2.1 The Situation of the Crews, etc.

According to 2.4, the situations of the crew members, etc., were as follows.

(1) Vessel A

Master A possessed a legally valid certificates of competence.

It is considered probable that he was in good health at the time of the accident.

At the time of this accident, it is considered probable that the watch persons of Vessel A did not have problem concerning communication among them.

(2) Vessel B

Master B and Boatswain B possessed legally valid certificates of competence.

It is considered probable that Master B had had a headache since the morning of the day of the accident, and that after completing vessel maneuvering to leave port, he handed over the watch and then took medicine and rested in his room.

It is considered probable that Boatswain B was in good health at the time of the accident.

3.2.2 Situation of the Vessels

According to 2.5.5, at the time of the accident, there were no malfunctions or failures in the hull, engine and equipment of either Vessel A or Vessel B.

3.2.3 Situation of the Weather and Sea Conditions

According to 2.7, it is considered highly probable that, at the time of the accident, the weather was cloudy, the wind was easterly and blowing at force 2, visibility was 5 M or more, the tide was in the middle of ebb tide and the tidal current was flowing east at 1 kn.

3.2.4 Provision of Information from Kanmon MARTIS

According to 2.1, 2.6 and 3.1.1, it is considered probable that the situation was as follows.

(1) As information for reference in navigation, Kanmon MARTIS notified Vessel A by VHF that Vessel C was approaching Vessel A and that Vessel A should sail to the stern of Vessel C at around 14:41.

(2) As a dangerous situation that could affect safe navigation between Vessel A and Vessel B occurred when Vessel began turning to port at around 14:51, Kanmon MARTIS twice gave Vessel A warnings by VHF channel 16, at around 14:52 and 14:53, that Vessel B was coming closer and not to approach her, and informed Vessel B by ship's radiotelephone that Vessel A would depart from Wakamatsu Passage at around 14:52.

3.2.5 Analysis of Communication by VHF

According to 2.1 and 3.1.1, communications by VHF among Vessel A, Vessel B and Kanmon MARTIS were as follows.

(1) Given that Master A responded that he understood when he was informed by Kanmon MARTIS via VHF that Vessel C was proceeding west in Kanmon Passage ahead to the starboard side at around 14:41 and, further, that Vessel C was approaching and therefore Vessel A should be sailing to the stern of Vessel C as the give-way vessel at around 14:50,

it is considered probable that Vessel A recognized the situation whereby he had to keep out of the way of Vessel C.

(2) Given that Master had the experience that other vessels kept out of the way of Vessel A when he called their names via VHF in the past, it is considered probable that he called only Vessel B's name 3 times for the purpose of transmitting his expectation that Vessel B would change her bearing to the right and keep out of the way of Vessel A.

(3) Given that, from around 14:52, Boatswain B responded to each contact when Vessel B was called by her name via VHF channel 16, but the calls consisted of Vessel B's name only, it is considered probable that he did not know the reason someone was calling Vessel B.

(4) It is considered somewhat likely that, when Master A received Kanmon MARTIS's warning that Vessel B coming closer and to not approach her by VHF channel 16 at around 14:53, Master A's response of "Port-to-Port. Understood" differed from the intention of MARTIS's warning and he was indicating his expectation that Vessel B would turn to the right and keep out of the way of Vessel A.

3.2.6 Analysis of the Changing Bearings of Vessel A, Vessel B and Vessel C

According to 2.1.1 and 3.1.1, the bearing changes of Vessel B and Vessel C as seen from Vessel A were as shown in Table 6.

Each bearing among the vessels is measured using GPS antenna position as the base point.

Table 6 Bearing changes of Vessel B and Vessel C as seen from Vessel A

Time (hour:min:sec) approximately	Bearing of Vessel B as seen from Vessel A (°)	Bearing of Vessel C as seen from Vessel A (°)	Heading of Vessel A (°)
14:49:00	350.9	108.5	080.8
14:49:30	350.3	107.8	081.2
14:50:00	349.3	107.2	081.1
14:50:30	348.3	106.3	081.5
14:51:00	347.0	105.4	077.4
14:51:30	345.7	104.5	069.6
14:52:00	344.0	104.0	055.2
14:52:30	343.2	103.5	038.0

14:53:00	342.2	104.0	025.8
14:53:30	342.0	104.3	021.1
14:54:00	342.1	104.7	021.6
14:54:30	345.4	105.1	022.9

(1) Vessel A and Vessel B

Although the bearing of Vessel B, which was sailing to the port side of Vessel A, was changing to the left, Vessel A's course changed from 081° to the left at around 14:51 and subsequently there was almost no change in bearing of Vessel B from around 14:53, and therefore it is considered highly probable that, by turning to the left, Vessel A's entered a situation whereby there was the fear of a collision with Vessel B.

(2) Vessel A and Vessel C

The bearing of Vessel C, which was sailing to the starboard fore side of Vessel A, was changing to the left between around 14:49 and around 14:52:30, and subsequently the bearing of Vessel C changed slightly to the right due to Vessel A's change of course to the left, and therefore it is considered highly probable that, when Vessel C was ahead of Vessel A, Vessel A came to be slightly ahead of Vessel C by changing her course to the left and, subsequently, Vessel A moved even further ahead of Vessel C when Vessel A turned to the left bound for No. 2 Kanmon Passage.

3.2.7 Analysis of Watchkeeping and Maneuvering

According to 2.1, 2.4(3), 2.6(1), 2.8 and 3.1.1 - 3.2.6, the situation was as follows.

(1) Vessel A

(i) It is considered probable that, as Vessel A was proceeding east in Wakamatsu Passage bound for Kanmon Passage by manual steering, with Master A conning the vessel, Officer A in charge of handling the steering wheel and Chief Engineer A in charge of operating the main engine, etc., Vessel A recognized the existence of Vessel B proceeding east bound for No. 2 Kanmon Passage by the GPS plotter monitor with an apparatus superposing AIS information at around 14:44.

(ii) It is considered probable that, at around 14:49, Master A visually observed and kept watching Vessel B, which was sailing on the port side in the vicinity of the entrance of No. 2 Kanmon Passage, and, because Vessel B's bearing was changing to the left, Master A thought Vessel A could pass the bow of Vessel B.

(iii) It is considered somewhat likely that even though Vessel C, which was proceeding northwest in Kanmon Passage off the starboard bow of Vessel A, was in a situation

whereby she would pass Vessel A's bow, Vessel A intended to move ahead of Vessel C because Vessel A began turning to the left at around 14:51.

(iv) It is considered probable that, although Master A understood that Vessel A had to keep out of the way of Vessel B according to the navigation rules of the Ordinance for Enforcement of the Act on Port Regulations, he thought that Vessel B would turn to starboard and keep out the way of Vessel A if he called Vessel B's name, and that Vessel A would be able to pass the Vessel B's bow even if Vessel A turned in front of Vessel B.

(v) It is considered probable that after setting a course of approximately 023° at 14:53, Master A recognized the risk of collision with Vessel B because Vessel B's bearing showed almost no change; however, he thought Vessel B would eventually turn to the right and change course toward Vessel A's stern because he was calling Vessel B's name by VHF, and therefore he continued to navigate at the same ship speed.

(vi) It is considered probable that, because Vessel A approached very close to Vessel B when passing the No. 10 Kanmon Passage light beacon at 14:54:30, Master A felt the risk of collision and blew the whistle with three long blasts, turned hard to starboard and stopped the main engine.

(2) Vessel B

(i) It is considered probable that, as Vessel B was proceeding in No. 2 Kanmon Passage under manual steering at 14:48, with Boatswain B in charge of steering and lookout and Able Seaman B in charge of lookout, Vessel B received a communication by radiotelephone from Kanmon MARTIS and observed the presence of Vessel A proceeding in Wakamatsu Passage bound for No. 2 Kanmon Passage.

(ii) It is considered probable that Boatswain B had usually notified Master B that Vessel B would be entering the Kanmon Straits soon before entering the straits; however, on the day of the accident, Boatswain B forgot this notification and entered the straits without Master B's being on the navigation bridge.

(iii) It is considered probable that Boatswain B observed Vessel A on the starboard fore side at around 14:49 and was watching her, and he thought Vessel A would pass Vessel B's bow because Vessel A's bearing was moving to the left side.

(iv) It is considered probable that it appeared to Boatswain B that Vessel A had turned left when passing the No. 2 Wakamatsu Passage light beacon and, subsequently, that Boatswain B recognized the risk of collision because there was almost no change in Vessel A's bearing. However, because Vessel A was in a position whereby she had to keep out of the way of Vessel B according to the navigation rules of the Ordinance for Enforcement of the Act on Port Regulations, he was expecting Vessel A to eventually

move out of the way of Vessel B and thus continued navigating at the same course and ship speed.

(v) It is considered probable that while Boatswain B was making ship maneuvering decisions independently, he received three calls by VHF and diverted his attention to them and then noticed that Vessel A had approached to approximately 300 m off Vessel B's starboard bow. Sensing the risk of collision, he decreased ship speed and then stopped the main engine and, while Able Seaman B blew one blast on the whistle, turned hard to port.

3.2.8 Analysis of the Safety Management System

According to 2.1.3(2), 2.4(3) and 2.8, Vessel B did not observe the procedure provided by Company B1 concerning duty watch persons' notifying the master when entering the Kanmon Straits. Furthermore, it is considered somewhat likely that Boatswain B forgot to make this notification at the time of the accident in part because duty watch persons usually made the notification at a time determined by their own discretion.

3.2.9 Analysis of the Accident's Occurrence

According to 2.1, 3.1.1, 3.1.2 and 3.2.4 - 3.2.8, the situation was as follows.

(1) Vessel A

(i) It is considered probable that Master A visually observed Vessel B, which was sailing on the port side at the vicinity of the west entrance of No. 2 Kanmon Passage in port side at around 14:49 , while Vessel A was traveling eastward from Wakamatsu Passage to Kanmon Passage and kept watching her, and he thought Vessel A could pass Vessel B's bow because Vessel B's bearing was changing to the left side.

(ii) It is considered probable that although Master A understood that Vessel A had to keep out of the way of Vessel B in accordance with the navigation rules for Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations, he turned to port with the intention of passing Vessel B's bow based on the following.

a It is possible that he intended to move ahead of Vessel C.

b Due to having the experience that other vessels kept out of the way of Vessel A when he called their names by VHF, Master A thought Vessel B would turn to the right and avoid Vessel A by passing off her stern.

(iii) It is considered probable that Master A called only Vessel B's name by VHF channel 16 to communicate his expectation that Vessel B would turn to the right and keep out of the way of Vessel A and that, although, after setting a course of approximately 023°

at around 14:53, he recognized the fear of collision when there was almost no change in Vessel B's bearing and he received a warning from Kanmon MARTIS not to approach Vessel B, he thought Vessel B would turn to the right and avoid Vessel B by passing off her stern because he had communicated his expectation to Vessel B by calling Vessel B, and therefore he continued navigating at the same ship speed while calling Vessel B's name by VHF three times.

(iv) It is considered probable that Master A could have avoided the accident by giving immediate attention to the dangerous situation based on the warning from Kanmon MARTIS and taking appropriate actions.

(v) It is considered probable that Master A sensed the fear of collision when he saw Vessel B come very near while passing by the No. 10 Kanmon Passage light beacon at 14:54:30, and that he blew the whistle with three long blasts, turned hard to starboard, and stopped the main engine, but nonetheless Vessel A collided with Vessel B.

(2) Vessel B

(i) It is considered probable that Boatswain B visually observed Vessel A on the starboard fore side at around 14:49, while Vessel B was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage and kept watching her, and that he thought Vessel A would pass Vessel B's bow because Vessel A's bearing was changing to the left.

(ii) It is considered probable that it appeared to Boatswain B that Vessel A had turned left when passing the No. 2 Wakamatsu passage light beacon at around 14:52, and, subsequently, that Boatswain B recognized the risk of collision because there was almost no change in Vessel A's bearing. However, because Vessel A was in a position whereby she had to keep out of the way of Vessel B according to the navigation rules of the Ordinance for Enforcement of the Act on Port Regulations, he was expecting Vessel A to eventually move out of the way of Vessel B, and he had also diverted his attention to responding to three calls by VHF, and he thus continued navigating at the same course and ship speed and measures to avoid a collision were delayed.

(iii) It is considered probable that Vessel B noticed Vessel A, which had approached to approximately 300 m off Vessel B's starboard bow, when the third VHF call was received at around 14:54:30, and that Boatswain B sensed the fear of collision, decreased ship speed and then stopped the main engine, and took hard to port after blowing one blast on the whistle, but nonetheless Vessel B collided with Vessel A.

(iv) It is considered somewhat likely that the point that Boatswain B was making ship maneuvering decisions independently without Master B on the navigation bridge also contributed to the occurrence of this accident.

4. PROBABLE CAUSES

It is considered probable that the accident occurred because, while Vessel A was traveling eastward from Wakamatsu Passage to Kanmon Passage and Vessel B was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage in a situation whereby the courses of both vessels would cross in Kanmon Passage, Master A intended to turn to the left and pass the bow of Vessel B and Boatswain B was maintaining the same course and ship speed, as a result of which both vessels collided.

It is considered probable that Master A intended Vessel A to turn to the left and pass the bow of Vessel B because of the possibility that he wanted to move ahead of Vessel C and because he had the experience that other vessels kept out of the way of Vessel A when he called their names by VHF, and that, at the time of the accident, Master A similarly thought that Vessel B would turn to the right and avoid Vessel A by passing off her stern.

It is considered probable that Boatswain B was maintaining the same course and ship speed because, according to the navigation rules of Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations, Vessel A was in a position whereby she had to keep out of the way of Vessel B, and thus he was expecting Vessel A to eventually avoid Vessel B and diverted his attention to responding to a total three calls by VHF.

5. SAFETY ACTIONS

It is probable that this accident occurred when, while Vessel A was traveling eastward from Wakamatsu Passage to Kanmon Passage and Vessel B was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage in a situation whereby the courses of both vessels would cross in Kanmon Passage, Master A turned to the left and attempted to pass Vessel B's bow because of the possibility that Master A intended Vessel A to move ahead of Vessel C and, given his past experience that other vessels kept out of the way of Vessel A when he called their names by VHF, he likewise thought at the time of the accident that Vessel B would turn to the right and avoid Vessel A by passing off her stern if he called Vessel B by VHF, and also when Boatswain B expected Vessel A to avoid Vessel B when he saw Vessel A turning to the left because Vessel A was the give-way vessel for Vessel B and therefore he diverted his attention to responding to a total of three calls by VHF while maintaining the same course and ship speed, with the result being that both vessels collided.

Accordingly, the following countermeasures should be taken in order to prevent

reoccurrence of similar accident.

(1) Masters and duty watch persons should utilize information provided by the Vessel Traffic Service Center, etc., effectively. In particular, they should give immediate attention to dangerous situations based on the content of warnings from the Center, etc., and respond appropriately.

(2) Masters and duty watch persons should navigate in accordance with rules that are established for the navigational area. In particular, when communicating with approaching vessels becomes necessary, they should not only call the vessel's name but also implement VHF communication proactively and mutually confirm the maneuvering intentions.

(3) Masters should establish a system whereby the master is on the navigation bridge and personally handling ship maneuvering when navigating in narrow straits.

(4) Owners and operators of vessels should have masters of the vessels they own or operate unfailingly implement the above-mentioned items and be thorough in providing directions and training for them.

5.1 Safety Actions Taken

5.1.1 Safety Actions Taken by Company A

After this accident, Company A delivered a document titled "For safe navigation in and around the Kanmon area [Korean language version] published by Japan Coast Guard," which notes important navigational considerations, including navigation laws, tidal currents, places where traffic accidents occur frequently, etc., to the vessels it owns and operates and called its crews' attention to them.

5.1.2 Safety Actions Taken by Company B1

Company B1 revised the "Basic procedure manual for navigation of narrow straits" in its Safety Management Manual by adding the items provided below, directed masters of its owned vessels to give instructions to duty watch persons, and furthermore instructed crews to always utilize the basic procedure manual during visits to vessels by company staff members.

(1) To communicate with other vessels and the Vessel Traffic Service Center when anticipating dangerous situations with other vessels.

(2) To clearly note on charts where the master is to be called to the bridge.

5.1.3 Safety Actions Taken by Company B1

Company B2 implemented a Safety Education Meeting that included a check of the

events leading to this accident, a factor analysis, planning of countermeasures, etc. for the management staff of Company B1 and the crew of Vessel B.

6. SAFETY RECOMENDATIONS

It is probable that this accident occurred because, while the cargo ship SM3 was traveling eastward from Wakamatsu Passage to Kanmon Passage and the oil tanker KOUTOKU MARU was traveling southeastward from No. 2 Kanmon Passage to Kanmon Passage in a situation whereby the courses of both vessels would cross in Kanmon Passage, the master of SM3 intended to turn to the left and pass the bow of KOUTOKU MARU while the boatswain of KOUTOKU MARU maintained the same course and ship speed, as a result of which both vessels collided.

It is considered probable that the master of SM3 turned to the left toward the path of KOUTOKU MARU because it was possible he intended SM3 to go ahead of a vessel proceeding northwest in Kanmon Passage at the time of the accident and because it was his experience that other vessels kept out the way of SM3 when he called their names by VHF wireless telephone and thus, at the time of the accident, he again thought KOUTOKU MARU would turn to the right and avoid SM3 when he called KOUTOKU MARU's name by VHF wireless telephone.

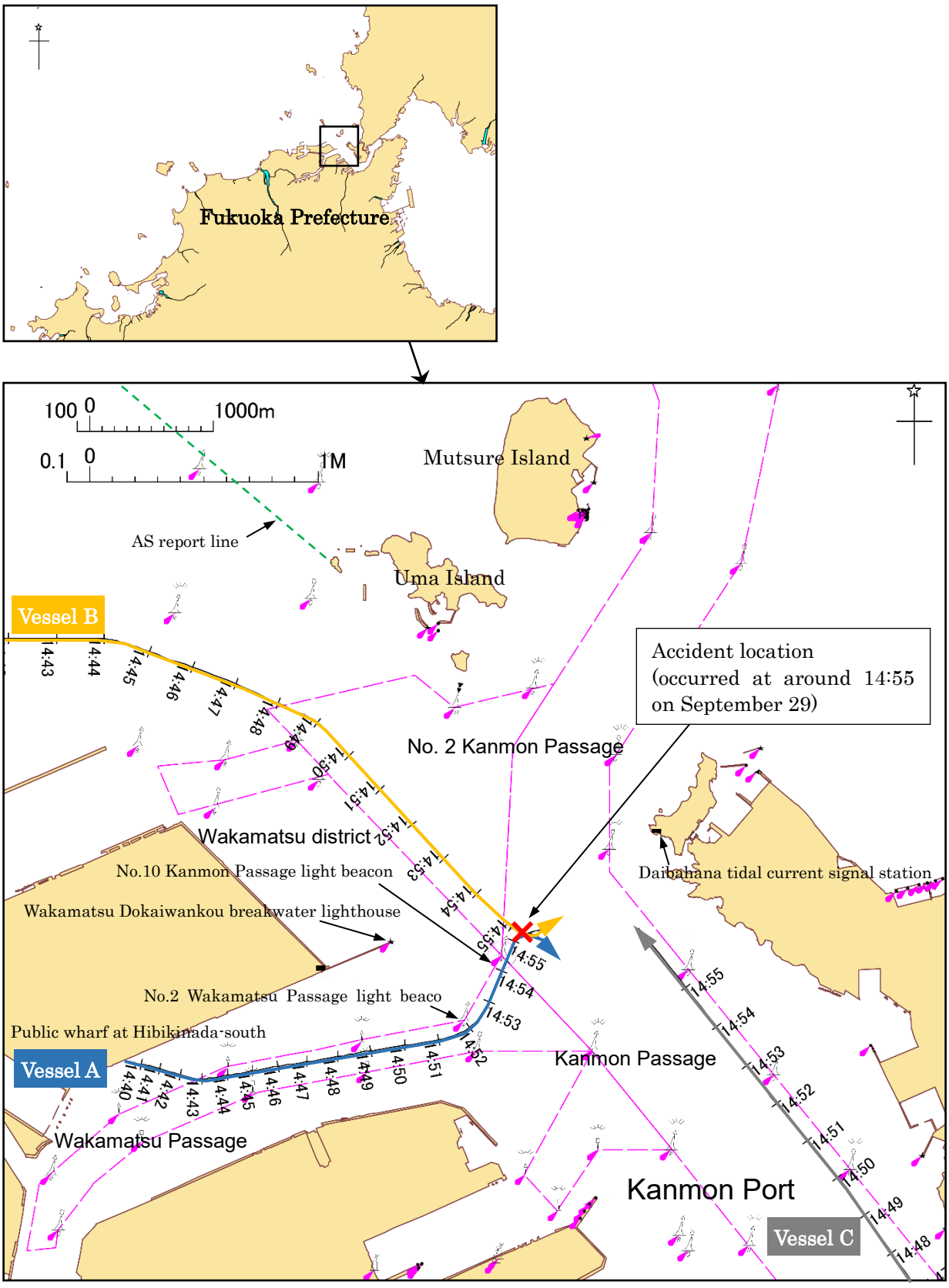
In view of the result of this accident investigation, the Japan Transport Safety Board recommends that SEMYUNG SHIPPING CO.,LTD. (Republic of Korea), which is the owner and the management company of SM3, take the following countermeasures for the purpose of preventing the occurrence of a similar accident and reducing damage:

SEMYUNG SHIPPING CO.,LTD. (Republic of Korea) shall provide thorough instruction to masters of its vessels to unfailingly execute the following measures and shall also implement training in accordance with said measures:

(1) Masters and duty watch persons should utilize information provided by the Vessel Traffic Service Center, etc., effectively. In particular, they should give immediate attention to dangerous situations based on the content of warnings from the Center, etc., and respond appropriately.

(2) Masters and duty watch persons should navigate in accordance with rules that are established for the navigational area. In particular, when communicating with approaching vessels becomes necessary, they should not only call the vessel's name but also implement VHF wireless telephone communication proactively and mutually confirm the maneuvering intentions.

Annex Figure 1: Navigation Path



Annex Table 1　Process and Progress of the Accident

Time approximately	Vessel A	Vessel B	Vessel C	Kanmon MARTIS
14:35	Departed from the public wharf at Hibikinada-south, gradually increasing ship speed and proceeding east by manual steering in Wakamatsu Passage. (Master A, Officer A and Chief Engineer A were on watch duty.)	Proceeding east bound for west entrance of Kanmon Port by manual steering. (Boatswain B and Able Seaman B were on watch duty)	↓	↓
14:41	Reported "Understood" to information on Vessel C from Kanmon MARTIS.	↓	Proceeding west in Kanmon Passage	Notified Vessel A of information on Vessel C by VHF.
14:44	Recognized the presence of Vessel B on the screen of GPS plotter.	Changed course toward the west entrance of Kanmon Port.	↓	↓
14:48	↓	Boatswain B forgot to notify Master B of entry into the Kanmon Straits and entered No. 2 Kanmon Passage without Master B on the navigation bridge.	↓	↓
14:49	Observed Vessel B on the port side. (Subsequently maintained visual monitoring.)	Observed Vessel A on the starboard fore side. (Subsequently maintained visual monitoring.)	↓	↓
	Master A thought Vessel A could pass Vessel B's bow because the bearing of Vessel B was moving to the left.	Boatswain B thought Vessel A would pass Vessel B's bow because the bearing of Vessel A was moving to the left.	↓	↓
14:50	Master A responded "Understood" in response to information on Vessel C from Kanmon MARTIS; however, it is somewhat likely that Vessel A intended to sail in front of Vessel C. Master A recognized that Vessel A had to keep out of the way of Vessel B according to the navigation rules of Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations; however, he	Sailing along No. 2 Kanmon Passage on a course of approximately 137°.	Proceeding northwest in Kanmon Passage.	Notified Vessel A that Vessel A should proceed to the stern side of Vessel C by VHF.

	thought that, if he called Vessel B's name by VHF, Vessel B would move to the right and keep out of the way by moving to the stern of Vessel A.			
14:51	Began to turn to the left to the course of Vessel B.	↓	↓	↓
14:52	Based on past experience, Master A though that Vessel B would keep out of the way of Vessel A if he simply called the other vessel's name by VHF. Therefore Master A called Vessel B's name only three times by VHF to transmit his desire for Vessel B to change her course to the right and keep out of the way of Vessel A.	Boatswain B heard Vessel B's name called on VHF channel 16; however, he did not know the sender or its intention.	↓	Gave Vessel A the warning that Vessel B was approaching and to not approach her. Informed Vessel B by ship's radiotelephone of information on Vessel A.
	↓	It appeared to Boatswain B that Vessel A turned to the left.	↓	↓
14:53	The fear of collision between Vessel A and Vessel B appears			
	Master A responded "port to port, understood," differing from the intention behind the warning from Kanmon MARTIS. It is somewhat likely that Master A intended to express his desire for Vessel B to turn to the right and keep out of the way of Vessel A.	Boatswain B recognized the fear of collision with Vessel A; however, he thought Vessel A was in a position whereby she had to keep out of the way of Vessel B according to the navigation rules of Kanmon Port in the Ordinance for Enforcement of the Act on Port Regulations and was therefore expecting Vessel A to eventually avoid Vessel B. He therefore maintained the same bearing and ship speed.	↓	Gave Vessel A the warning that Vessel B was approaching and to not approach her.
	Master A recognized the fear of collision with Vessel B; however, Vessel A maintained ship speed because Master A thought Vessel B would avoid Vessel A by moving to her stern.	Boatswain B diverted his attention to responding to three calls made by VHF.	↓	↓
14:54:30	Master A blew the whistle with three long blasts and then took hard to starboard and stopped the main	Sensing the fear of collision, Boatswain B decreased ship speed and then stopped the main	↓	↓

	engine.	engine, blew the whistle with one blast and took hard to port.		
14:55	The port fore area of Vessel A and the bow of Vessel B collided.			