

MA2013-11

**MARINE ACCIDENT
INVESTIGATION REPORT**

November 29, 2013



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 TIAN FU (TIANJIN)

IMO number: 9142265

Gross tonnage: 5,070 tons

Vessel type and name: Chemical tanker SENTAIMARU

Vessel number: 140827

Gross tonnage: 498 tons

Accident type: Collision

Date and time: 07:15, July 3, 2012 (local time, UTC+9 hours)

Location: In Mizushima Port, Kurashiki City, Okayama Prefecture
Around 131° true, 2,760 m from the Mizushima Ko West No. 1
Breakwater Lighthouse
(approximately 34°27'09"N, 133°45'23"E)

October 17, 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

Container ship TIAN FU (TIANJIN), boarded by a master with 17 crew members, was proceeding northwest along the Mizushima Inner Harbor Passage toward Tamashima district in Mizushima Port. At this time, chemical tanker SENTAIMARU, boarded by a master with 5 crew members, was proceeding northwest toward Mizushima district in Mizushima Port along the same Passage, around 07:15 on July 3, 2012, in the vicinity of Futo-Noji Shima, Kurashiki City, Okayama Prefecture, the two vessels collided.

TIAN FU (TIANJIN) sustained a fracture on the port side shell plate, and SENTAIMARU received damage to the bulwark of the bow, while there were no casualties among the crew on both vessels.

Probable Causes

It is probable that this accident occurred in the Mizushima Inner Harbor Passage due to the collision of TIAN FU (TIANJIN), proceeding northwest toward Tamashima district in Mizushima Port, and SENTAIMARU, proceeding northwest toward Mizushima district in Mizushima Port, when SENTAIMARU came to proceed parallel to the port side of TIAN FU (TIANJIN), which was ahead of her.

It is probable that the reason SENTAIMARU came to proceed parallel to TIAN FU (TIANJIN) on her port side, which was ahead of SENTAIMARU, was that the Master of SENTAIMARU did not grasp in advance at an early stage after entering the Mizushima Traffic Route that TIAN FU (TIANJIN) was going to head along the Mizushima Inner Harbor Passage to Tamashima district in Mizushima Port, and was proceeding on the port quarter of TIAN FU (TIANJIN) while approaching her, and even after understanding this, SENTAIMARU thought that TIAN FU (TIANJIN) was faster than SENTAIMARU and would proceed ahead, and so maintained course and speed at approximately 13 kn.

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

Container ship TIAN FU (TIANJIN), boarded by a master with 17 crew members, was proceeding northwest along the Mizushima Inner Harbor Passage toward Tamashima district in Mizushima Port. At this time, chemical tanker SENTAIMARU, boarded by a master with 5 crew members, was proceeding northwest toward Mizushima district in Mizushima Port along the same Passage, around 07:15 on July 3, 2012, in the vicinity of Futo-Noji Shima, Kurashiki City, Okayama Prefecture, the two vessels collided.

TIAN FU (TIANJIN) sustained a fracture on the port side shell plate, and SENTAIMARU received damage to the bulwark of the bow, while there were no casualties among the crew on both vessels.

1.2 Outline of the Accident Investigation

1.2.1 Setup of the Investigation

The Japan Transport Safety Board appointed an investigator-in-charge and another investigator to investigate this accident on July 3, 2012.

1.2.2 Collection of Evidence

On-site investigation and interviews on July 4 and 5, 2012

Interviews on August 21 and 22, and October 3, 2012

Collection of replies to questionnaire on November 27, 2012

1.2.3 Comments from Parties Relevant to the Cause

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

1.2.4 Comments from Flag State

Comments on the draft report were invited from flag State of TIAN FU (TIANJIN).

1.2.5 Comments from related agencies

Comments on the draft report were invited from the Bisan Seto Vessel Traffic Service Center operated by Japan Coast Guard and the Mizushima Port Radio.

2 FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 The Progress of the Vessels According to VDR Data, AIS Records, and VHF Communication Records

According to the VDR*¹ data of TIAN FU (TIANJIN) (hereinafter referred to as “Vessel A”), the AIS*² data records (hereinafter referred to as “AIS records”) received by the Bisan Seto Vessel Traffic Service Center (hereinafter referred to as “Bisan MARTIS”) from Vessel A, SENTAIMARU (hereinafter referred to as “Vessel B”), Kowamaru (hereinafter referred to as “Vessel C”), and Kisaragimaru (hereinafter referred to as “Vessel D”), as well as the VHF communications records of Bisan MARTIS via VHF radiotelephone (hereinafter referred to as “VHF”), the progress of these vessels leading to the accident were as follows.

- (1) On July 3, 2012 at 07:02:05, Vessel A was proceeding at heading 330° (true, same hereinafter including course over the ground), a course over the ground of 331.4° and at a speed of 11.5 knots (kn) (speed over the ground; regarding speed, same hereinafter except when specially mentioned as speed through the water), while at 07:02:08, Vessel B was proceeding at heading 270°, a course over the ground of 264.8°, and at a speed of 13.0 kn.

At 07:02:09, Vessel C was proceeding at a course over the ground of 262.8° and at a speed of 12.5 kn, and Vessel D was anchored in the north of Kami-Mizu Shima.

At around 07:02, Vessel C received a communication from Bisan MARTIS via VHF stating “Cargo ship Vessel A, between No. 9 and 10 Buoys, is heading from MW line*³ to the quarantine anchorage, so please be cautious,” and replied “Roger”. (No. 9 Buoy and No. 10 Buoy mean the Mizushima Traffic Route No. 9 light buoy and the Mizushima Traffic Route No. 10 light buoy, respectively)

- (2) At 07:05:36, Vessel A was proceeding at heading 319°, a course over the ground of 315.9°, and at a speed of 11.5 kn, while Vessel B was proceeding at heading 242°, a course over the ground of 262.7°, and at a speed of 11.8 kn.

*¹ "VDR: Voyage Data Recorder" refers to a device which can record voyage data of a ship such as location, course, speed, as well as VHF radiotelephone communication and sound from the bridge, into collectable capsules when an accident occurs.

*² "AIS: Automatic Identification System" refers to the device that enables vessels to automatically send and receive information regarding vessels' identification codes, types, names, positions, courses, destinations, etc. in order to exchange information between vessels and navigation aid facilities of land stations. The vessel position refers to the position of GPS antenna.

*³ "MW line" refers to a line drawn from the Futo-Noji Shima trigonometric point to a point of 180°2,000m.

- (3) At 07:06:35, Vessel A was proceeding at heading 320°, a course over the ground of 316.4°, and at a speed of 11.4 kn, while Vessel B was proceeding at heading 283°, a course over the ground of 272.0°, and at a speed of 11.8 kn.
- (4) At 07:07:35, Vessel A was proceeding at heading 320°, a course over the ground of 315.4°, and at a speed of 11.5 kn, while Vessel B was proceeding at heading of 304°, a course over the ground of 301.0°, and at a speed of 12.4 kn.
- (5) At 07:10:14-15, Vessel A was proceeding at heading 322°, a course over the ground of 319.7°, and at a speed of 11.1 kn, while Vessel B was proceeding at heading 325°, a course over the ground of 319.0°, and at a speed of 13.3 kn.

At around 07:10, Vessel B received communication from Bisan MARTIS via VHF stating “The vessel on your starboard bow, foreigner Vessel A, will head west around No. 3 Buoy. If you are going into the port, keep clear distance from her and head north,” and replied “I will reduce my speed.” (No. 3 Buoy means Mizushima Inner Harbor Passage No. 3 light buoy)

- (6) At 07:11:25, Vessel A was proceeding at heading 325°, a course over the ground of 323.0°, and at a speed of 10.9 kn, while Vessel B was proceeding at heading 324°, a course over the ground of 320.0°, and at a speed of 13.5 kn.
- (7) At 07:12:25, Vessel A was proceeding at heading 324°, a course over the ground of 324.1°, and at a speed of 10.6 kn, while Vessel B was proceeding at heading 324°, a course over the ground of 323.1°, and at a speed of 12.9 kn.
- (8) At 07:13:05, Vessel A was proceeding at heading 325°, a course over the ground of 324.9°, and at a speed of 10.5 kn, while Vessel B was proceeding at heading 318°, a course over the ground of 317.0°, and at a speed of 13.2 kn.

At around 07:13, Vessel B received a communication from Bisan MARTIS via VHF stating “Vessel on your starboard side is going to Tamashima,” and she replied “Yes, roger.”

At 07:13:15-45, Vessel A received communication via VHF from Mizushima Port Radio^{*4} stating “I have one information, in Bravo anchor now, Vessel D after about 10 minutes heaves up anchors and proceeds. It proceeds Chugoku Electric Tamashima Wharf. So please attention, over,” and she replied “All roger, reduce the speed, engine.”

- (9) At 07:13:25, Vessel A was proceeding at heading 325°, a course over the ground of 324.2°, and at a speed of 10.4 kn, while Vessel B was proceeding at heading 331°, a

^{*4} "Mizushima Port Radio" refers to an organization which, under contract from the port managers of Port of Mizushima, etc., understands the movements of ships' entry and departure around Mizushima Port and reports this information to related parties.

course over the ground of 318.7°, and at a speed of 13.2 kn.

- (10) At 07:14:25, Vessel A was proceeding at heading 326°, a course over the ground of 324.5°, and at a speed of 10.0 kn, while Vessel B was proceeding at heading 016°, a course over the ground of 350.0°, and at a speed of 8.9 kn, and there was a sound of a collision at 07:14:32.

2.1.2 Destination Data on the AIS Records

According to the AIS records, the destination data (hereinafter referred to as “AIS Destination Data”) of Vessels A, B, C, and D at the time of the accident were as follows.

Vessel name	AIS Destination Data
Vessel A	“JP MIZ OFF”
Vessel B	“>JP MIZ B”
Vessel C	“_”(blank)
Vessel D	“>JP MIZ TS”

(See Table 4: Pamphlet)

2.1.3 Events Leading to Collision According to Statements and Report of Related Parties

According to the statements of the master of Vessel A (hereinafter referred to as “Master A”), the master of Vessel B (hereinafter referred to as “Master B”), the second officer of Vessel B (hereinafter referred to as “Officer B₁”), the person in charge of the Mizushima Port Radio, and the operator at Bisan MARTIS, as well as the Marine Accident Report written by Master B, the events leading up to the collision in the accident were as follows.

(1) Vessel A

Vessel A boarded Master A with 17 crew members, departed from Tokushima-Komatsushima Port, Tokushima Prefecture at around 11:00 on July 2, 2012.

Vessel A planned to arrive at Tamashima district in Mizushima Port at around 8:30 on July 3.

Main engine of Vessel A was at a speed of 175 revolutions per minute (rpm) and at a speed through the water of 12 kn and it was proceeding along the Mizushima Traffic Route from the Bisan Seto East Traffic Route, when it raised the “international signal flags which displays the route” (hereinafter referred to as “Track Signal Flags”) the second substitute, the alphabetical flags T and then S from upper in sequence on the stern mast.

Master A assigned the chief officer to lookout and the able seaman to steering, and while conning the vessel, in the central vicinity of the Mizushima Traffic Route, he

decelerated the main engine to 135 rpm and at the speed through the water the 8.5 kn in order to standby for entering port.

Master A paid attention to Vessel B, which was closing in from the starboard quarter side through the Shimotsui channel, but she passed the stern of Vessel A and gradually came closer to its port side; therefore, he did not clearly know whether she was going to overtake or to proceed on the same way of Vessel A.

Master A thought that, if it was going to overtake, there would be some communication signal such as a whistle, but there was no such signal as it approached, and he also did not see any Track Signal Flags on the vessel; therefore, he thought that it was going to proceed on the same way. Also, he had not confirmed the AIS Destination Data of Vessel B.

Vessel A received a request from the Mizushima Port Radio via VHF to decelerate its speed for the vessel ahead of it, then responded affirmatively and decelerated its speed.

Master A thought Vessel B, which was approaching to the port side at a great angle, was a Japanese vessel, and it came even closer and approached the port side of Vessel A; therefore, he ordered starboard 10° to avoid it, but it collided.

(2) Vessel B

Vessel B boarded Master B with five crew members, had loaded approximately 1,000 t of xylene in Chiba Port, Chiba Prefecture, and then departed for Mizushima Port at about 11:10, July 1.

Vessel B anchored off Kama Shima in Kurashiki City at around 21:35, July 2, and then, after weighing anchors at around 06:30, July 3, it raised the Track Signal Flags second substitute and the alphabetical flag B from upper in sequence on the stern mast, after which she headed for the Mizushima Traffic Route through the Shimotsui channel.

Vessel B planned to anchor in district B at around 07:30 and after bunkering, and then to berth at Mizushima Port Mitsubishi Gas Chemical pier at around 08:40.

Master B maneuvered the vessel by manual steering with the main engine at 350 rpm and at a speed through the water of 12 kn, and he assigned the chief officer to transmit and receive VHF communication and Officer B₁ on lookout.

Master B did not notice any other vessels than Vessel A, which was to the port side of Vessel B and heading north on the Mizushima Traffic Route, and a coastal vessel which was passing through the Shimotsui channel ahead of Vessel B in the same direction, and did not think there was any obstacle in her proceeding path.

At around 07:06, Master B intended to be on the starboard quarter of Vessel A which was going north along the Mizushima Traffic Route on the port side of Vessel B and entered the Mizushima Traffic Route by turning the rudder, but due to such factors as the influence of westward tidal current at an approximately 2 kn, he was unable to pass on to the starboard quarter of Vessel A, and ended up proceeding the Mizushima Traffic Route on the port quarter of Vessel A.

Master B thought that a container ship such as Vessel A was generally faster than Vessel B, and that it would proceed ahead; therefore, he decided to maintain course and speed.

Master B had not been able to confirm the Track Signal Flags of Vessel A, and although he knew that it was headed for Mizushima from the AIS Destination Data; however, he did not know the specific destination area.

Master B received communication via VHF from Bisan MARTIS that the Vessel A which was ahead of Vessel B was going to head west around No. 3 Buoy; therefore, he knew it was headed for Tamashima.

At around 07:12, Master B decelerated its speed in order to pass the stern of Vessel A which was ahead of it, and then head for the starboard quarter of Vessel A; however, Vessel B gradually closed in on Vessel A, resulting in proceeding parallel to Vessel A on her port side.

At around 07:13, Master B received communication from Bisan MARTIS that Vessel A was going to Tamashima district in Mizushima Port and decelerated speed to slow ahead, but felt danger because Vessel A ahead was approaching and put the engine full astern. This caused Vessel B to been pushed its stern to port due to the propeller rotation in reverse, resulting in the vessel's bow turning to starboard and approaching the port side shell plate of Vessel A, and colliding.

After the accident, Officer B₁ thought that it was affected by the speed of Vessel B being too high in restricted visibility. Also, he was unable to confirm the Track Signal Flags of Vessel A, but normally, container ships head for Tamashima district in Mizushima Port, therefore, it was believed that Vessel A would go to port on her way, but thinking that Master B also knew this fact, Officer B₁ did not report this fact to Master B. Moreover, when entering a port, the master maneuvers the vessel; therefore, Officer B₁ were following the orders of Master B, and were not thinking about giving advice regarding the maneuvering.

(3) Mizushima Port Radio

Mizushima Port Radio received communication from Vessel A via VHF on the day of the accident at about 07:13-14 in English that she had passed the MN Line^{*5}, and then warned in English to be cautious of Vessel D.

At about 07:16-17, Mizushima Port Radio communicated Vessel D via VHF that Vessel A would soon be entering the port, and received communication saying that Vessel D wanted to go first. Also, at about 07:17-18, when they communicated Vessel A in English that Vessel D would go first, Vessel A replied affirmatively that they would reduce speed.

(4) Bisan MARTIS

Bisan MARTIS knew that Vessel A's destination was Tamashima district in Mizushima Port via VHF communication with Vessel A.

Because Vessel B was approaching Vessel A from the port quarter side while proceeding on the Mizushima Traffic Route, Bisan MARTIS communicated to Vessel B via VHF that Vessel A was heading to Tamashima district in Mizushima Port and warned Vessel B to be careful not to approach. And Vessel B replied affirmatively that she would decelerate her engine speed.

The accident occurred at 07:15, July 3, 2012, and the location was in the vicinity of the position 131°, 2,760 m from the Mizushima Ko West No. 1 Breakwater lighthouse.

(See Figures 1-3: Estimated vessel tracks; Table 1: AIS records of vessels involved; Table 2: VDR data of Vessel A; Table 3: VHF communication records; Table 4: Pamphlet)

2.2 Injuries to Persons

According to the information from Master A and Master B, there were no injuries or deaths.

^{*5} "MN Line" refers to a line drawn from the Futo-Noji Shima triangulation point to a point of 075° 1,100 m.

2.3 Damage to Vessel

Vessel A suffered a crack in the port side shell plate, and the bulwark of the bow of Vessel B was damaged.

Photo 2.3-1 Damage of Vessel A



Photo2.3-2 Damage of Vessel B



2.4 Information Regarding the Rescue Activity by Japan Coast Guard

After the collision, Bisan MARTIS announced the fact of the collision to vessels in the vicinity, and patrol vessels also came around to the site of the collision.

2.5 Crew Information

(1) Gender, Age, and Certificate of Competence

Master A Male, 35 years old, People's Republic of China nationality

Master of 3,000 gross tons or more (issued by People's Republic of China)

Date of issue: January 4, 2008

(valid until January 4, 2013)

Master B Male, 71 years old

Fourth grade maritime officer

Date of issue: August 12, 1992

Date of revalidation: January 16, 2012

Date of expiry: August 11, 2017

(2) Main Seagoing Experience and others.

According to the statements of Master A and Master B, it was as follows.

(i) Master A

Master A became the master of Vessel A on April 23, 2012, and had experienced entering into Mizushima Port 12 times.

Master A has been a master since 2008, and before becoming the master of Vessel A, he was on board a 3,000 gross ton container ship and on voyages between

the People's Republic of China and the Republic of Korea for 6 months.

His physical condition at the time of the accident was favorable.

(ii) Master B

Master B was the temporary master of a vessel managed by Senko Co., Ltd. (hereinafter referred to as "Company E") from 2009. A temporary master is a master who is dispatched when the original master goes ashore. Master B was planning to be on the vessel in place of the original master of Vessel B as the temporary master from June 15, 2012 for a period of one month. Master B had experienced entering Mizushima Port more than 100 times in the past, but this was his first time to enter as the master of Vessel B.

His physical condition at the time of the accident was favorable.

2.6 Vessel Information

2.6.1 Particulars of Vessel

(1) Vessel A

IMO number:	9142265
Port of registry:	Tianjin (People's Republic of China)
Owner:	TIANJIN INTERNATIONAL MARINE SHIPPING CO., LTD.(hereinafter referred to as "Company F")(Also the management company)
Management company:	Company F
Gross tonnage:	5,070 tons
L×B×D:	97.97 m × 18.40 m × 10.60 m
Hull material:	steel
Engine:	1 diesel engine
Output:	2,751 kW
Propulsion:	1 fixed pitch propeller
Date of launch:	May 1, 1996
Number of crew members:	40

(2) Vessel B

Vessel number:	140827
Port of registry:	Osaka
Owner:	Company E, ROKKOUSENPAKU INC., Shibako Marine Inc.
Gross tonnage:	498 tons

L×B×D:	64.46 m × 10.00 m × 4.50 m
Hull material:	steel
Engine:	1 diesel engine
Output:	1,030 kW
Propulsion:	1 fixed pitch propeller
Date of launch:	October, 2008
Type:	Liquid Chemicals Bulk Carrier and Oil Tanker
Navigational area:	Costal areas
Capacity of persons on board:	6 in total (2 crew members and 4 others)

(See Figure 4: General Arrangement of Vessel A; Figure 5: General Arrangement of Vessel B; Photo 1: Vessel A; Photo 2: Vessel B)

2.6.2 Loading Conditions

(1) Vessel A

Loading the containers, the draught was approximately 3.7 m bow and approximately 5.8 m stern.

(2) Vessel B

Loading approximately 1,000 t of xylene, the draught was approximately 3.7 m bow and approximately 4.5 m stern.

2.6.3 Navigation Equipment and others

(1) Vessel A

(i) Navigation equipment

Vessel A was equipped with two radars, GPS, VDR, VHF, and AIS in the bridge.

(ii) Conditions of vessel's hull, main engine and others at the time of the accident

According to the statement of Master A, there were no malfunction or failure to the hull, main engine, equipment, or steering gear.

(2) Vessel B

(i) Navigation equipment

Vessel B was equipped with one radar, a GPS plotter, VHF, and AIS in the bridge.

(ii) Conditions of vessel's hull, main engine and others at the time of the accident

According to the statement of Master B, there were no malfunction or failure

to the hull, main engine, equipment, or steering gear.

2.6.4 Vessel's Maneuverability

(1) Vessel A

According to the speed table, speed trial data, and the statement of Master A, the maneuverability of Vessel A was as follows.

Speed through the water in a port (ahead)

Classification	Main engine (rpm)	Speed through the water (kn)
Full speed	135	8.5
Half speed	100	7.0
Slow speed	85	6.0
Dead slow speed	70	5.0

(2) Vessel B

According to the sea trial results sheet and the statement of Master B, the maneuverability of Vessel B was as follows.

(i) Speed through the water (ahead)

Classification	Main engine (rpm)	Speed through the water (kn)
Full speed	350	11.5
Half speed	300	9.5-10.0
Dead slow speed	220	7.5-8.0

(ii) Astern trial

The results of the astern trial while proceeding at a speed of 12 kn through the water were as follows.

	Time	Speed through the water (kn)	Sailing distance (m)
From astern order until main engine rotation stop	6 seconds	12.00	37.04
From astern startup until main engine rotation stabilization	1 minute 7 seconds	6.82	356.18
From astern order until vessel stop	1 minute 52 seconds	0.00	434.50

(iii) Turning trial

While proceeding at a speed of 12 kn through the water, maximum advance^{*6} at starboard rudder angle 35° was 212.2 m, and the maximum transfer^{*7} was 233.9 m.

2.7 Weather and Sea Conditions

(1) Weather and sea conditions observation data

(i) The observed data at the Kurashiki City Meteorological Observing Station located about 8 nautical miles (M) north of the site of the accident were as follows.

July 3

06:00 Wind direction: East-northeast; Wind speed: 0.7 m/s; Precipitation: 0.6mm

07:00 Wind direction: East; Wind speed: 0.6 m/s; Precipitation: 6.5 mm

08:00 Wind direction: East-northeast; Wind speed: 1.0 m/s; Precipitation: 8.5 mm

(ii) The observed data at the Okayama Local Meteorological Observatory located about 15M northeast of the site of the accident were as follows.

July 3

06:00 Wind direction: Northeast; Wind speed: 1.7 m/s; Precipitation: 0.5mm

07:00 Wind direction: South-southwest; Wind speed: 0.3 m/s; Precipitation:
4.0mm

08:00 Wind direction: East-southeast; Wind speed: 0.5 m/s; Precipitation:
13.5mm

09:00 Weather: Rain; Wind direction: East-southeast; Wind speed: 1.4 m/s;
Precipitation: 16.5 mm; Visibility: 5 km

(2) Observation by crew and others

(i) Observation by crew

According to the statement of Master B, the condition at the time of the accident was as follows.

Weather: Rain; Wind direction: West; Wind speed: 2 m/s; Tidal current:
Approximately 2 kn west; Visibility: approximately 1 km

(ii) Information from the Mizushima Coast Guard Office

According to information from the Mizushima Coast Guard Office, it was as follows.

Around 08:00 Weather: Rain; Wind direction: Northeast; Wind speed: 3 m/s;
Visibility: Approximately 2,000 m-3,000 m

^{*6} "Maximum advance" refers to the maximum vertical movement distance on the original course.

^{*7} "Maximum transfer" refers to the farthest distance moved horizontally from the original course.

(3) Sunrise and sunset time

According to the nautical almanac published by Japan Coast Guard, the sunrise time at Mizushima Port for July 3, 2012 was 04:56.

(4) Tidal current

According to the tidal current estimates by the Marine Information Service Office of 6th Regional Coast Guard Headquarters, the tidal currents of the area of ocean surrounded by north latitude 34°26'-28' and east longitude 133°44'-46' were as follows.

06:00 0.5-1.6 kn toward 283°-315°

07:00 0.7-1.8 kn toward 288°-325°

08:00 0.6-1.5 kn toward 285°-312°

2.8 Characteristics of the Area

2.8.1 Mizushima Port

- (1) In the Sailing Directions for Seto Naikai published by Japan Coast Guard (March 2009) it was mentioned as follows.

General Information

Mizushima Ko(Port) lies in about 10M W of Uno Ko in the N side of the center of Seto Naikai. It is an industrial and commercial port consisting of Mizushima Chiku(District) in the E side of the estuary of Takahashi Kawa(River) and Tamashima Chiku in the W side. Large tankers come in and out navigating Mizushima Traffic Route.

- (2) In the pamphlet that explains the track signals by signal flags in Mizushima Port published by the Navigation Safety Division, Mizushima Coast Guard Office, the signal flags for each destination as well as the AIS Destination Data are listed.
- (3) In the explanation of Chapter 3 Passage and Navigation, Article 14 (Navigation), Section II Details, the Act on Port Regulations (the 13 edition published in 2008, edited by Japan Coast Guard, published by Kaibundo) , it is mentioned as follows.

6. Clause 2 is a regulation that prohibits navigating in parallel in the passage. This is because 2 or more ships navigating in parallel in sea areas that are narrow and congested with ship traffic not only have a peril of running into one another, but also pose a severe peril to ships on the opposite course.

2.9 Safety Guidance to Crew and others

2.9.1 Operating Management of Vessel A

According to the statement of Master A, Company F is also the operating management

company, and it conducted training before embarking such as how to proceed within a passage, how to do a lookout, how to keep out of the way of another vessel and finally, to confirm the understanding they carried out tests, allowing boarding after awarding passing grades on the tests.

2.9.2 Operating Management of Vessel B

According to the statement of the operating manager of Vessel B, it was as follows.

Master B was planning to be on the vessel temporarily for about one month because the original master of Vessel B was ashore on leave.

Company E had the crew members receive BRM^{*8} training through an externally contracted company at the time of vessel docking, but the Master B had not received the training.

When Vessel B entered a port in the Osaka area, the operating manager visited the vessel as far as possible to give guidance, and gave reminder alerts to prevent accidents while cargo operation or on navigation.

3 ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

According to 2.1, events leading to the accident were as follows.

- (1) It is probable that Vessel A departed from Port of Tokushima-Komatsushima at around 11:00 on July 2, 2012 and Vessel B weighed anchors off Kama Shima at around 06:30 on July 3. It is probable that Vessel A proceeded toward Tamashima district in Mizushima Port, while Vessel B proceeded toward Mizushima district in Mizushima Port.
- (2) At 07:05:36 on July 3, it is highly probable that Vessel A was proceeding along the Mizushima Traffic Route at heading 319°, a course over the ground of 315.9°, and at a speed of 11.5 kn, while Vessel B was proceeding at heading 242°, a course over the ground of 262.7°, and at a speed of 11.8 kn outside the Mizushima Traffic Route on the starboard quarter of Vessel A.

^{*8} "BRM" is an abbreviation for Bridge Resource Management and refers to the idea of using all the available resources on a bridge (personnel, information, knowledge, etc.) to the maximum for more safe and effective operation of a ship.

- (3) At 07:06:35, it is highly probable that, along the Mizushima Traffic Route, Vessel A was proceeding at heading 320°, a course over the ground of 316.4°, and at a speed of 11.4 kn, while Vessel B was proceeding at heading 283°, a course over the ground of 272.0°, and at a speed of 11.8 kn on the starboard quarter of Vessel A.
- (4) At 07:07:35, it is highly probable that Vessel A was proceeding at heading 320°, a course over the ground of 315.4°, and at a speed of 11.5 kn, while Vessel B was proceeding at heading 304°, a course over the ground of 301.0°, and at a speed of 12.4 kn on the port quarter of Vessel A.
- (5) At 07:10:14-15, it is highly probable that Vessel A was proceeding at heading 322°, a course over the ground of 319.7°, and at a speed of 11.1 kn, while Vessel B was proceeding at heading 325°, a course over the ground of 319.0°, and at a speed of 13.3 kn on the port quarter of Vessel A.
- (6) At 07:11:25, it is highly probable that in the Mizushima Inner Harbor Passage, Vessel A was proceeding at heading 325°, a course over the ground of 323.0°, and at a speed of 10.9 kn, while Vessel B was proceeding at heading 324°, a course over the ground of 320.0°, and at a speed of 13.5 kn on the port quarter of Vessel A.
- (7) At 07:13:05, it is highly probable that Vessel A was proceeding at heading 325°, a course over the ground of 324.9°, and at a speed of 10.5 kn, while Vessel B was proceeding at heading 318°, a course over the ground of 317.0°, and at a speed of 13.2 kn in parallel on the port quarter of Vessel A.
- (8) At 07:14:25, it is highly probable that Vessel A was proceeding at heading 326°, a course over the ground of 324.5°, and at a speed of 10.0 kn, while Vessel B was proceeding at heading 016°, a course over the ground of 350.0°, and at a speed of 8.9 kn parallel to Vessel A approximately 72 m to the port side.
- (9) It is probable that the two vessels collided at 07:14:32.

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

According to 2.1 and 3.1.1, it is probable that the time and date of the occurrence of the accident was at around 07:15, July 3, 2012, and the location was in the vicinity of the position 131°, 2,760 m from the Mizushima Ko West No. 1 lighthouse.

3.1.3 Situation of the Collision

According to 2.1 and 3.1.1, it is probable that it was as follows.

As for the collision angle, since the bow heading of Vessel A was 326° at 07:14:25, and the bow heading of Vessel B was 026° at 07:14:32, it was approximately 60° from the port quarter

of Vessel A.

3.2 Causal Factors of the Accident

3.2.1 Situation of Crew Members

According to 2.5(1), Master A, and Master B possessed legal and valid certificates of competence.

3.2.2 Situation of the Vessels

According to 2.6.3, it is probable that Vessel A and Vessel B had no malfunction or failure in the hull, main engine, equipment, or steering gear.

3.2.3 Weather and Sea Conditions

According to 2.7, it is probable that at the time of the accident the weather was rain, the wind was northeast to east, the wind speed was approximately 0.6-3 m/s, and the visibility was approximately 1-5 km.

Besides, it is probable that the tidal current was 0.5-1.8 kn toward the west to northwest direction.

3.2.4 AIS Destination Data

According to 2.1.2, it is probable that it was as follows.

(1) Vessel A

Since Vessel A was planning to berth at the berthing facility in Tamashima district in Mizushima Port, the displayed AIS Destination Data should have been entered as ">JP MIZ TS," but it was ">JP MIZ OFF," which means anchoring near the boundary of Mizushima Port.

(2) Vessel B

Vessel B was planning to arrive at Mitsubishi Gas Chemical wharf at Mizushima district in the Mizushima Port (between E Public Landing Place and the Japan Energy wharf); therefore, the displayed AIS Destination Data was ">JP MIZ B."

(3) Vessel C

Vessel C didn't have any AIS Destination Data input.

(4) Vessel D

Vessel D was planning to berth at Tamashima district's berthing facility in Mizushima Port, therefore, the displayed AIS Destination Data was ">JP MIZ TS."

3.2.5 Situations of Lookout and Maneuvering of Vessel A and Vessel B

According to 2.1, 2.6.4 and 3.1.1-3.1.3, it was as follows.

- (1) At 07:05:36, it is highly probable that Vessel A was proceeding along the Mizushima Traffic Route at a speed of 11.5 kn, while Vessel B was proceeding at a speed of 11.8 kn with heading 242 ° toward the Mizushima Traffic Route approximately 442 m on the port quarter of Vessel A.

Both masters were flying Track Signal Flags and sighted each other, but it is probable that both masters were unable to confirm the Track Signal Flags on the other vessel.

Vessel B entered the Mizushima Traffic Route while turning rudder intending to be on the starboard quarter of Vessel A, but was unable to pass on to the starboard quarter of Vessel A.

- (2) At 07:06:35, it is highly probable that Vessel A was proceeding at a speed of 11.4 kn, and Vessel B was proceeding at a speed of 11.8 kn approximately 367 m on the starboard quarter of Vessel A.

- (3) At 07:07:35, it is highly probable that Vessel A was proceeding at a speed of 11.5 kn, and Vessel B was proceeding at a speed of 12.4 kn approximately 375 m on the port quarter of Vessel A.

- (4) At around 07:10, Vessel B received communication from Bisan MARTIS via VHF while proceeding along the Mizushima Traffic Route that “the vessel on your starboard bow, foreigner Vessel A, will head west around No. 3 Buoy. If you are going into the port, keep clear distance from her and head north,” and she replied “I will reduce my speed.” However, it is highly probable that at 07:10:14, it proceeded at a speed of 13.3 kn.

It is probable that at this time Master B realized that Vessel A was headed for Tamashima district in Mizushima Port and that her course would intersect with Vessel A, but he thought that a container ship such as Vessel A was generally faster than Vessel B, and that it would proceed ahead; therefore, he decided to maintain course and speed.

- (5) It is highly probable that at 07:11:25, Vessel A was proceeding at a speed of 10.9 kn, and Vessel B was proceeding at a speed of 13.5 kn approximately 216 m on the port quarter of Vessel A, and Vessel B approached Vessel A to a distance equivalent to the tactical diameter of Vessel B.

- (6) It is probable that at about 07:12, Master B reduced the number of revolutions of the main engine in an attempt to pass on to the starboard quarter of Vessel A, but at 07:12:25, Vessel B proceeded at a speed of 12.9 kn approximately 157 m on the port

quarter of Vessel A was unable to pass the stern of Vessel A and be positioned at its starboard quarter.

- (7) It is highly probable that at 07:13:05, Vessel A was proceeding at a speed of 10.5 kn, and Vessel B was proceeding at a speed of 13.2 kn approximately 145 m on the port side of Vessel A.

It is probable that at about 07:13, Vessel A received a warning from Mizushima Port Radio regarding the movements of Vessel D which was anchored at Anchorage Berth B; therefore she dropped speed, while Vessel B received communication from Bisan MARTIS that Vessel A was going to Tamashima district in Mizushima Port, and she reduced its speed to slow ahead.

- (8) It is probable that at around 07:13:25, while Vessel B was proceeding at a speed of 13.2 kn, Master B felt danger due to approaching Vessel A and attempted to go full astern.
- (9) It is highly probable that at 07:14:25, Vessel A was proceeding at a speed of 10.0 kn and Vessel B was proceeding at a speed of 8.9 kn; accordingly, the distance between the two vessels was approximately 72 m.

It is probable that at 07:14:32, Vessel A proceeding at a speed of approximately 10.0 kn, while Vessel B proceeding at a speed of 8.0 kn; consequently the two vessels collided.

3.2.6 Analysis Relating to the Collision

According to 2.1, 3.1.1-3.1.3, and 3.2.3-3.2.5 it was as follows.

- (1) It is probable that Vessel B approached the port side of Vessel A along the Mizushima Traffic Route, but Master A did not know whether she was going to overtake Vessel A or to proceed toward the same course, and he did not see Track Signal Flags of Vessel B, nor was he able to confirm AIS Destination Data of Vessel B. Besides, it is probable that he thought that Vessel B was proceeding in the same direction, and afterward, although Vessel B came to proceed parallel to Vessel A on the port quarter, he maintained course and speed.

It is probable that about the time that Vessel B came to proceed parallel to the port side of Vessel A in the Mizushima Inner Harbor Passage, Vessel A received a warning from Mizushima Port Radio regarding the movements of Vessel D and decelerated, then collided with Vessel B, which had approached Vessel A.

It is somewhat likely that from the fact that Vessel A did not find the movements of Vessel B which was proceeding parallel to Vessel A on the port quarter when Vessel A was going to head toward Tamashima district in Mizushima Port, if Vessel A had quickly confirmed destination information of Vessel B from her Track Signal Flags and

the AIS Destination Data or had obtained her destination data from Bisan MARTIS and other means and had given such as signals to attract attention, it could have avoided proceeding parallel to Vessel B in the Mizushima Inner Harbor Passage.

- (2) It is probable that Master B entered the Mizushima Traffic Route while turning rudder with the intention of passing on to the starboard quarter of Vessel A, but it ended up proceeding on the port quarter of Vessel A and approached her. However, it is probable that, Master B was unable to confirm Track Signal Flags of Vessel A, and although knowing that it was headed for Mizushima from the inappropriately input AIS Destination Data, he did not know that it would enter the port at Tamashima district in Mizushima Port.
- (3) It is probable that Company E had the crew members of Vessel B receive BRM training, and the crew member on lookout had also received the training, but although the crew member knew that Vessel A would head for Tamashima district in Mizushima Port and thought that the speed of Vessel B was too fast in restricted visibility, he did not report this to the master, and the BRM did not function, which caused this information not to be shared on Vessel B.
- (4) It is probable that while proceeding along the Mizushima Traffic Route, Master B received a communication at about 07:10 from Bisan MARTIS that Vessel A was going to Tamashima district in Mizushima Port and replied that he would reduce the speed, and so was able to realize that Vessel A was headed for Tamashima district in Mizushima Port, but he thought that a container ship such as Vessel A was generally faster than Vessel B, and that it would proceed ahead; therefore, he decided to maintain course and speed, and then entered the Mizushima Inner Harbor Passage while approaching Vessel A.

It is probable that Master B decelerated its speed in attempt to pass the stern of Vessel A and then head for the starboard quarter of Vessel A at around 07:12; however he was unable to be positioned on the starboard quarter of Vessel A, and maintained her course at a speed of approximately 13 kn. Besides, it is probable that, since Vessel A was maintaining her course and speed at approximately 10-11 kn, Vessel B came to proceed parallel to Vessel A on her port quarter.

- (5) It is probable that Vessel B was proceeding parallel to Vessel A on her port side at around 07:13, and Master B received communication from Bisan MARTIS that Vessel A was going to Tamashima district in Mizushima Port and decelerated her speed, but then about 20 seconds after moving parallel to Vessel A he felt danger due to her

approach; accordingly attempted to go full astern, and then the bow swung to starboard and collided with Vessel A.

- (6) It is somewhat likely that, from the fact that Master B entered the Mizushima Traffic Route, proceeded while approaching Vessel A from her stern on the port side, and was attempting to enter the Mizushima Inner Harbor Passage, and from the facts that proceeding in parallel is prohibited in the Passage and that when going toward Tamashima district in Mizushima Port a vessel that is proceeding in the Passage would turn to port, that as shown in the aforementioned (2), when Master B did not find the destination of Vessel A, if he had obtained her destination information from such as Bisan MARTIS and had grasped the fact that the path of Vessel B was going to intersect with Vessel A at an early stage after entering the Mizushima Traffic Route, he could have quickly altered course and speed and avoided proceeding parallel to Vessel B in the Passage.

Also, it is considered probable that, while proceeding, Master B received a communication from Bisan MARTIS at the vicinity of No.3 Buoy that Vessel A was going to Tamashima district in Mizushima Port and replied that he would decelerate the main engine, and so was able to grasp that Vessel A was headed for Tamashima district in Mizushima Port and understood that the course of Vessel B would intersect with the course of Vessel A. It is somewhat likely that, at this stage, considering such as the influence of the west-northwest fair tide at 0.5-1.8 kn and the fact that Vessel A decelerated her speed to prepare to enter the port if he had quickly decelerated speed as he had said he would in his reply that he would decelerate the main engine, and if Vessel B had proceeded astern at a speed of approximately 13 kn, about one minute later it can be estimated that it would have been approximately 8 kn, and around this time Vessel A was proceeding at about 11 kn; therefore, approaching Vessel A could have been avoided, and the swinging of the bow to starboard caused by the astern could have been used to pass the stern of Vessel A and proceed to starboard.

3.2.7 Situations of the Operating Management of Vessel

- (1) Vessel A

According to 2.9.1, it is probable that it was as follows.

Company F is also the operating management company, and they conducted training for crew members planned to board regarding such as how to proceed within a passage, how to do a lookout, and how to keep out of the way of vessels and finally, to confirm the understanding they carried out tests, allowing boarding after awarding

passing grades on the tests.

(2) Vessel B

According to 2.9.2, it is probable that it was as follows.

Master B was on board for about one month temporarily due to the vacation of the original master of Vessel B.

When the vessel docked, crew members received BRM training through an externally contracted company except Master B.

When entering a port in the Osaka area, the operating manager visited the vessel as far as possible to give guidance, and gave reminder alerts to prevent accidents while cargo operation or on navigation.

3.2.8 Analysis regarding the accident occurrence

According to 2.1, 3.1.1-3.1.3, and 3.2.3-3.2.6, it was as follows.

- (1) At 07:05:36, it is highly probable that Vessel A was proceeding along the Mizushima Traffic Route at a speed of 11.5 kn toward Tamashima district in Mizushima Port, while Vessel B was proceeding at a speed of 11.8 kn with heading 242° toward the Mizushima Traffic Route approximately 442 m on the starboard quarter of Vessel A in order to head toward Mizushima district in Mizushima Port.

It is probable that both vessels sighted each other and were flying Track Signal Flags, but both masters were unable to confirm the Track Signal Flags on the other vessel.

It is probable that Master A was unable to confirm AIS Destination Data of Vessel B, and although Master B confirmed AIS Destination Data of Vessel A, the data was input inappropriately; therefore he only realized Vessel A was headed to Mizushima, and he did not know that the destination was Tamashima district in Mizushima Port. Also, it is probable that the BRM on Vessel B did not function, and the crew member who realized that Vessel A would head to Tamashima district in Mizushima Port did not share this information in the wheelhouse.

It is probable that Vessel B entered the Mizushima Traffic Route while turning rudder intending to be positioned on the starboard quarter of Vessel A, but was unable to pass on to the starboard quarter of Vessel A.

- (2) At 07:06:35, it is highly probable that Vessel A was proceeding at a speed of 11.4 kn, and Vessel B was proceeding at a speed of 11.8 kn approximately 367 m on the starboard quarter of Vessel A.

- (3) At 07:07:35, it is highly probable that Vessel A was proceeding at a speed of 11.5 kn, and Vessel B was proceeding at a speed of 12.4 kn approximately 375 m on the port quarter of Vessel A.
- (4) Around at 07:10, it is probable that while proceeding in the Mizushima Traffic Route, Master B received a communication from Bisan MARTIS that Vessel A would head west around No.3 Buoy, keep clear distance from her and head north, and then replied that he would decelerate the main engine; consequently he was able to realize that Vessel A was headed for Tamashima district in Mizushima Port and would intersect paths with Vessel B. However, he thought that a container ship such as Vessel A was generally faster than Vessel B, and that it would proceed ahead; therefore, he decided to maintain course and speed, and at 07:10:14, it proceeded at a speed of 13.3 kn.
- (5) It is highly probable that at 07:11:25, Vessel A was proceeding at a speed of 10.9 kn, and Vessel B was proceeding at a speed of 13.5 kn approximately 216 m on the port quarter of Vessel A along the Mizushima Inner Harbor Passage.
- (6) It is probable that at about 07:12, Master B decelerated the main engine in an attempt to pass on to the starboard quarter of Vessel A, but at 07:12:25, Vessel B proceeded at a speed of 12.9 kn approximately 157 m on the port quarter of Vessel A, and was unable to be positioned on her starboard quarter.
- (7) It is probable that Master B found that Vessel A was headed for Mizushima, but he did not know that it would head for the port in Tamashima district in Mizushima Port, and after entering the Mizushima Traffic Route, he did not grasp the destination of Vessel A at an early stage and continued to approach the port quarter of Vessel A, and even after he learned that Vessel A would head for the port in Tamashima district in Mizushima Port, he thought that Vessel A was faster than Vessel B and that it would proceed ahead; therefore, he maintained course and speed at approximately 13 kn, and then Vessel B proceeding parallel to Vessel A on her port quarter.
- (8) It is highly probable that at 07:13:05, Vessel A was proceeding at a speed of 10.5 kn, and Vessel B was proceeding at a speed of 13.2 kn approximately 145 m on the port side of Vessel A. It is probable that at about 07:13, Vessel A received a warning from Mizushima Port Radio regarding the movements of Vessel D, and therefore decelerated speed, while Vessel B received communication from Bisan MARTIS on the destination of Vessel A, and decelerated her speed to slow ahead.
- (9) It is probable that at around 07:13:25, Vessel B was proceeding at a speed of 13.2 kn, and felt danger due to approaching Vessel A and attempted to go full astern.

(10) It is probable that at 07:14:23, Vessel A proceeding at a speed of approximately 10.0 kn, while Vessel B proceeding at a speed of 8.0 kn, and the two vessels collided, due to Vessel B having been proceeding parallel to Vessel A on her port side.

(See Figure 6: VTA Analysis)

4 CONCLUSIONS

4.1 Findings

(1) Events leading to the accident occurrence

When Vessel A and Vessel B entered the Mizushima Port, it is probable that while Vessel A was proceeding on the Mizushima Traffic Route, Vessel B was proceeding toward the Mizushima Traffic Route on the starboard quarter of Vessel A and entered the Mizushima Traffic Route while turning rudder intending to be positioned on the starboard quarter of Vessel A, but was unable to pass on to the starboard quarter of Vessel A. It is probable that, after that, in the Mizushima Inner Harbor Passage, while Vessel A, which was ahead, was proceeding northwest toward Tamashima district in Mizushima Port and Vessel B was proceeding northwest toward Mizushima district in Mizushima Port, Vessel B proceeded at a maintained course and speed of approximately 13 kn on the port quarter of Vessel A, which was maintaining a course and speed of approximately 10-11 kn, and then ended up proceeding parallel to Vessel A on her port side, which caused the two vessels to collide. (3.2.5)^{*9}

(2) Situations leading to the collision

It is probable that Master A did not see the Track Signal Flags of Vessel B, and was unable to confirm the direction of her, and that he thought that she was proceeding in the same direction although he could not confirm the AIS Destination Data of her.

Master B was unable to confirm the Track Signal Flags of Vessel A, and although Master B confirmed the AIS Destination Data of her, the data was not entered appropriately; therefore, he only realized that she was headed to Mizushima, and he did not know that the destination was Tamashima district in Mizushima Port. Also, the BRM on Vessel B did not function; consequently it is probable that the crew member who realized that Vessel A would head to Tamashima district did not share this information.

^{*9} The numbers in parentheses appended at the end of the sentences in this section refer to the correspondingly related main section numbers in "3 ANALYSIS."

It is probable that while proceeding in the Mizushima Traffic Route, Master B received a communication from Bisan MARTIS that Vessel A was going to Tamashima district in Mizushima Port and so was able to realize that Vessel A was headed for Tamashima district and would intersect paths with Vessel B, but he thought that Vessel A was faster than Vessel B and that it would proceed ahead; therefore, he maintained course and speed at approximately 13 kn, and then Vessel B was proceeding parallel to Vessel A on her port quarter, after which, Vessel B ended up proceeding parallel to Vessel A on her port side, although Master B felt danger due to approaching Vessel A and attempted to go full astern, Vessel B and Vessel A collided. (3.2.4 and 3.2.6)

(3) Causal factors of the accident occurrence

It is probable that, in the Mizushima Inner Harbor Passage, while Vessel A was proceeding northwest toward Tamashima district in Mizushima Port and Vessel B was proceeding northwest toward Mizushima district in Mizushima Port, Vessel B ended up proceeding parallel to Vessel A, which was ahead, on her port side, which caused the two vessels to collide.

It is probable that Vessel B did not grasp at an early stage after entering the Mizushima Traffic Route that the Vessel A was going to head toward Tamashima district in Mizushima Port and proceeded while approaching Vessel A on her port quarter, and even after understanding this fact, thought that Vessel A was faster than Vessel B and that it would proceed ahead; therefore, he maintained course and speed at approximately 13 kn, and then Vessel B proceeding parallel to Vessel A on her port quarter. (3.2.6)

4.2 Probable Causes

It is probable that this accident occurred in the Mizushima Inner Harbor Passage due to the collision of Vessel A, proceeding northwest toward Tamashima district in Mizushima Port, and Vessel B, proceeding northwest toward Mizushima district in Mizushima Port, when Vessel B came to proceed parallel to the port side of Vessel A, which was ahead of her.

It is probable that the reason Vessel B came to proceed parallel to Vessel A on her port side, which was ahead of Vessel B, was that Master B did not grasp in advance at an early stage after entering the Mizushima Traffic Route that Vessel A was going to head along the Mizushima Inner Harbor Passage to Tamashima district in Mizushima Port, and was proceeding on the port quarter of Vessel A while approaching her, and even after understanding this, Vessel B thought that Vessel A was faster than Vessel B and would

proceed ahead, and so maintained course and speed at approximately 13 kn.

4.3 Other Key Findings

- (1) It is probable that Vessel A did not enter the appropriate AIS Destination Data, and if it had been entered properly, Vessel B would have been able to grasp that Vessel A was going to head for Tamashima district in Mizushima Port before entering the Mizushima Inner Harbor Passage, which it is somewhat likely would have enabled avoidance of the proceeding in parallel in the Mizushima Inner Harbor Passage.
- (2) It is probable that although Company E had the crew members of Vessel B receive BRM training, and the crew member on lookout had also taken the training, and although the crew member knew that Vessel A would head for Tamashima district in Mizushima Port and thought that the speed of Vessel B was too fast in restricted visibility, he did not report this to the master, and the BRM did not function, which caused this information not to be shared on Vessel B. It is somewhat likely that if the crew member had reported these facts to the master, it would have been possible to avoid the proceeding in parallel in the Mizushima Inner Harbor Passage.

5 SAFETY ACTIONS

It is probable that this accident occurred in the Mizushima Inner Harbor Passage due to the collision of Vessel A, proceeding northwest toward Tamashima district in Mizushima Port, and Vessel B, proceeding northwest toward Mizushima district in Mizushima Port, when Vessel B came to proceed parallel to the port side of Vessel A, which was ahead of her.

It is probable that the reason Vessel B came to proceed parallel to Vessel A on her port side, which was ahead of Vessel B, was that Master B did not grasp in advance at an early stage after entering the Mizushima Traffic Route that Vessel A was going to head along the Mizushima Inner Harbor Passage to Tamashima district in Mizushima Port, and was proceeding on the port quarter of Vessel A while approaching her, and even after understanding this, Vessel B thought that Vessel A was faster than Vessel B and would proceed ahead, and so maintained course and speed at approximately 13 kn.

It is probable that Vessel A did not enter the appropriate AIS Destination Data, and if it had been entered properly, Vessel B would have been able to grasp that Vessel A was going to

head for Tamashima district in Mizushima Port before entering the Mizushima Inner Harbor Passage, which it is somewhat likely would have enabled avoidance of the proceeding in parallel in the Mizushima Inner Harbor Passage.

It is probable that although Company E had the crew members of Vessel B receive BRM training, and the crew member on lookout had also taken the training, and although the crew member knew that Vessel A would head for Tamashima district in Mizushima Port and thought that the speed of Vessel B was too fast in restricted visibility, he did not report this to the master, and the BRM did not function, which caused this information not to be shared on Vessel B. It is somewhat likely that if the crew member had reported these facts to the master, it would have been possible to avoid the proceeding in parallel in the Mizushima Inner Harbor Passage.

5.1 Safety Actions Taken

5.1.1 Safety Actions Taken by Vessel A

Vessel A decided to input the AIS Destination Data appropriately and also quickly grasp the movements of other vessels proceeding in the vicinity from the Track Signal Flags and the AIS Destination Data.

5.1.2 Safety Actions Taken by Vessel B

Vessel B decided to quickly grasp the movements of other vessels proceeding in the vicinity from the Track Signal Flags and the AIS Destination Data, and to share this information among the crew members.

5.1.3 Safety Actions Taken by Company E

(1) BRM Training

Company E They decided to further strengthen their vessel visiting activities in order to encourage such activity as sharing of advice among crew members through BRM.

(2) Utilization of AIS

Company E instructed the vessels under its management to utilize AIS Destination Data.

5.2 Safety Actions Required

(1) Vessel A

It is probable that, when Vessel A enters into Mizushima Port, it should proceed

with an understanding of the movements of the other vessels proceeding in the vicinity, and when there is some doubt as to the movements of other vessels, it is necessary for her to quickly obtain information on the other vessels from such as Bisan MARTIS.

(2) Vessel B

It is probable that, when Vessel B enters into Mizushima Port, if it cannot confirm the destination information of other vessels proceeding in the vicinity, it is necessary for her to quickly obtain information on the other vessels from such as Bisan MARTIS and in consideration of safe emergency stopping distance, it must decelerate in order to avoid proceeding parallel to vessel that are ahead of her.

Figure 1: Estimated vessel tracks (Overall figure)

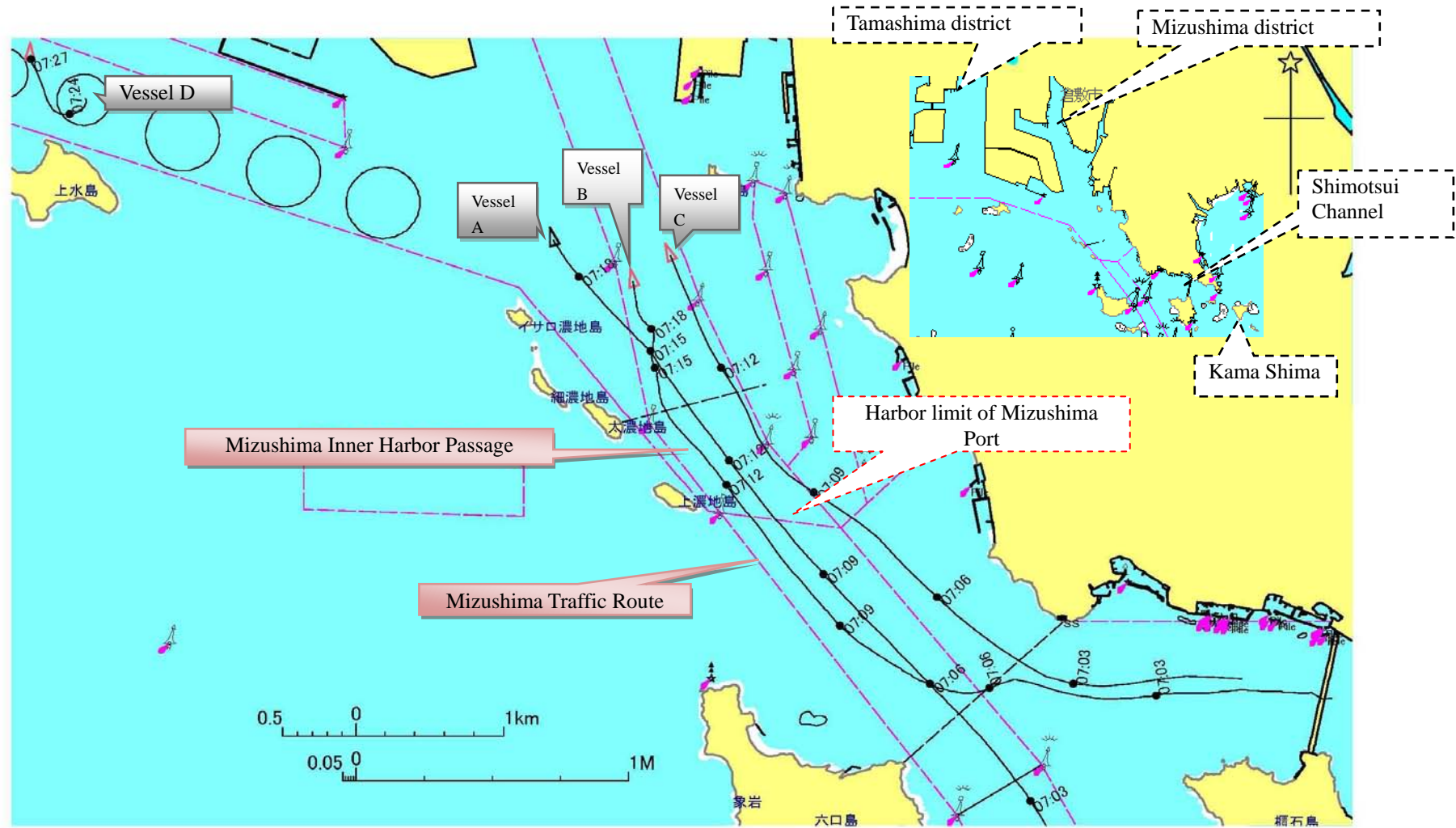


Figure 2: Estimated vessel tracks (enlarged figure 1)

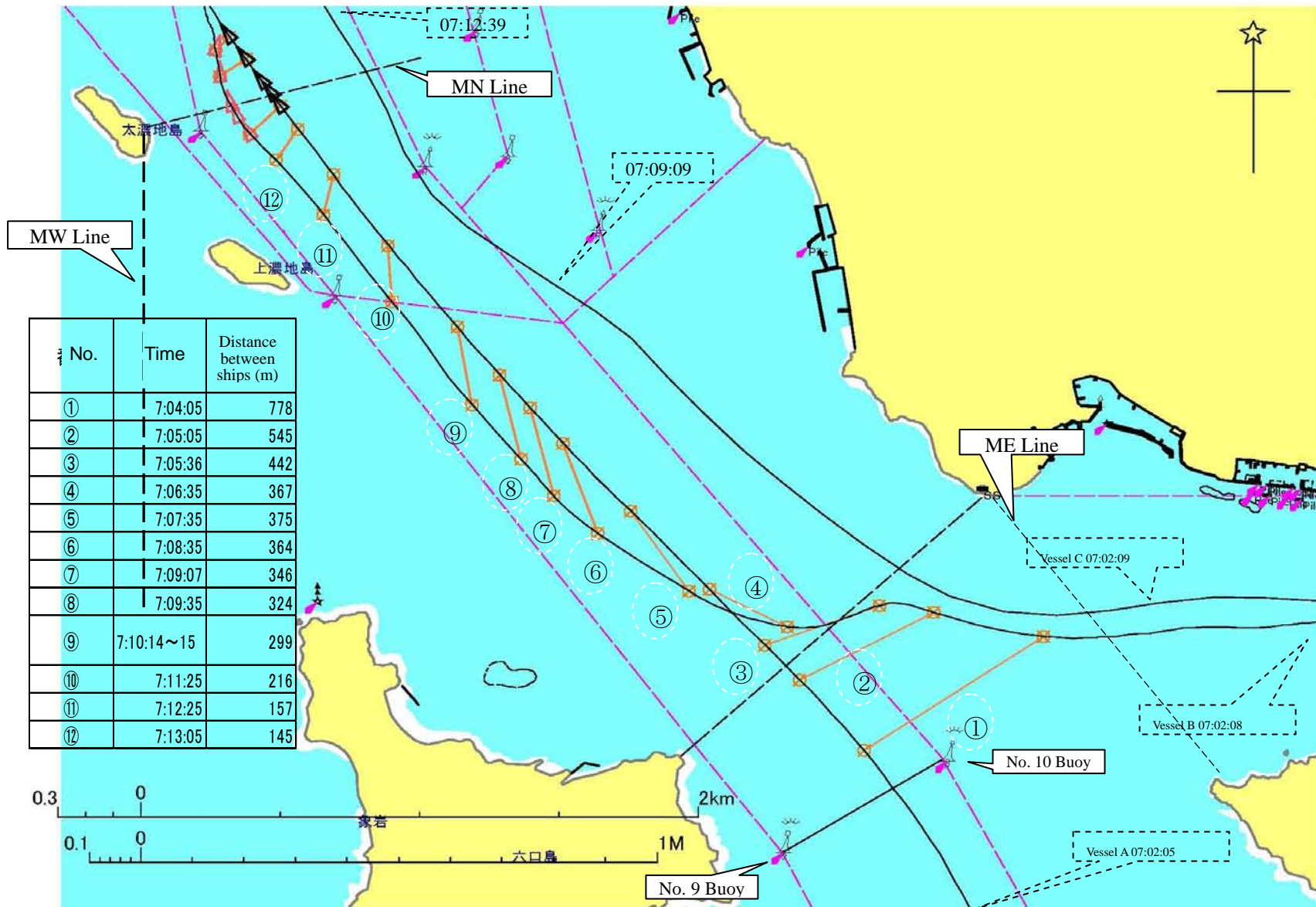


Figure 3: Estimated vessel tracks (enlarged figure 2)

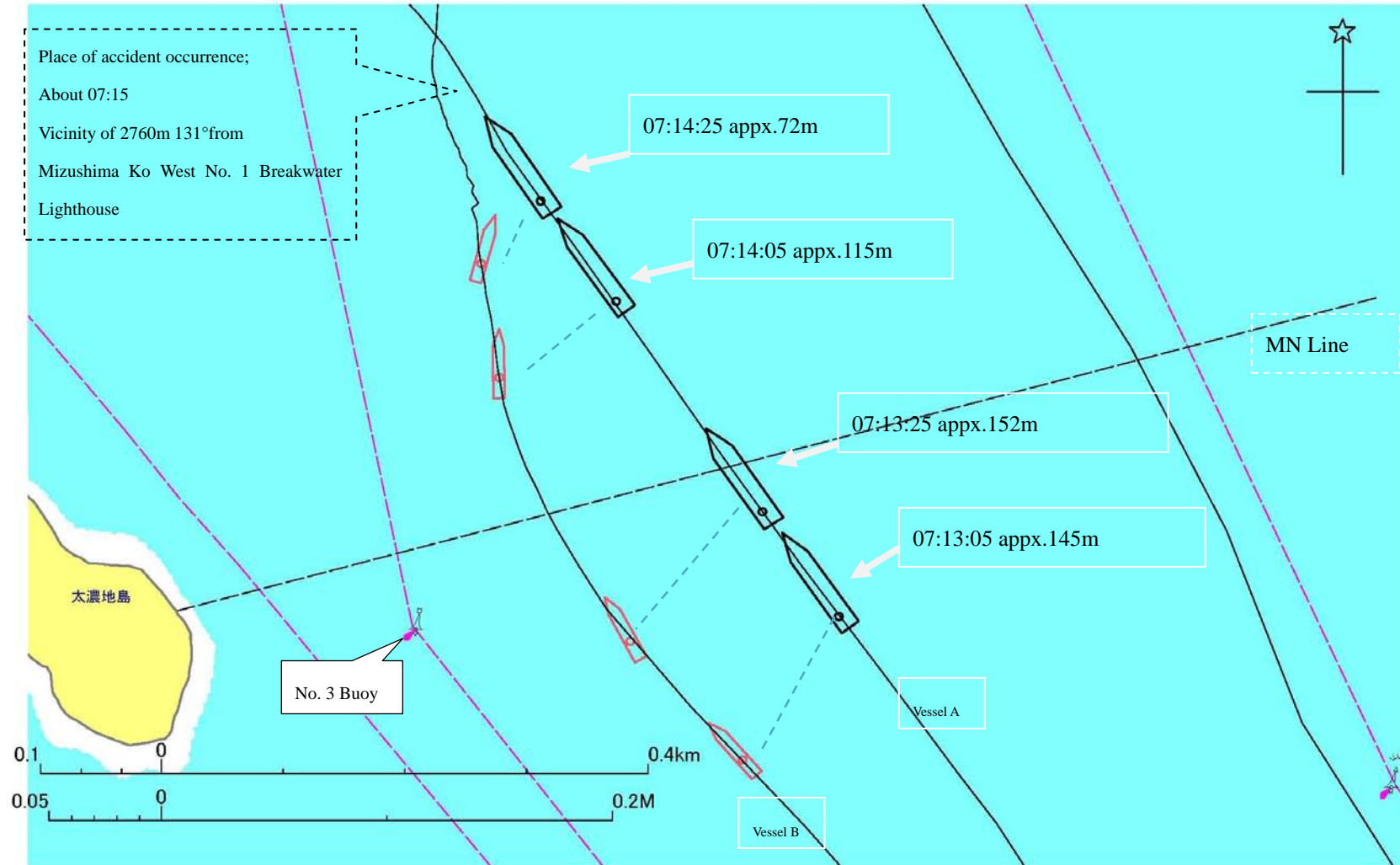


Figure 4: General Arrangement of Vessel A

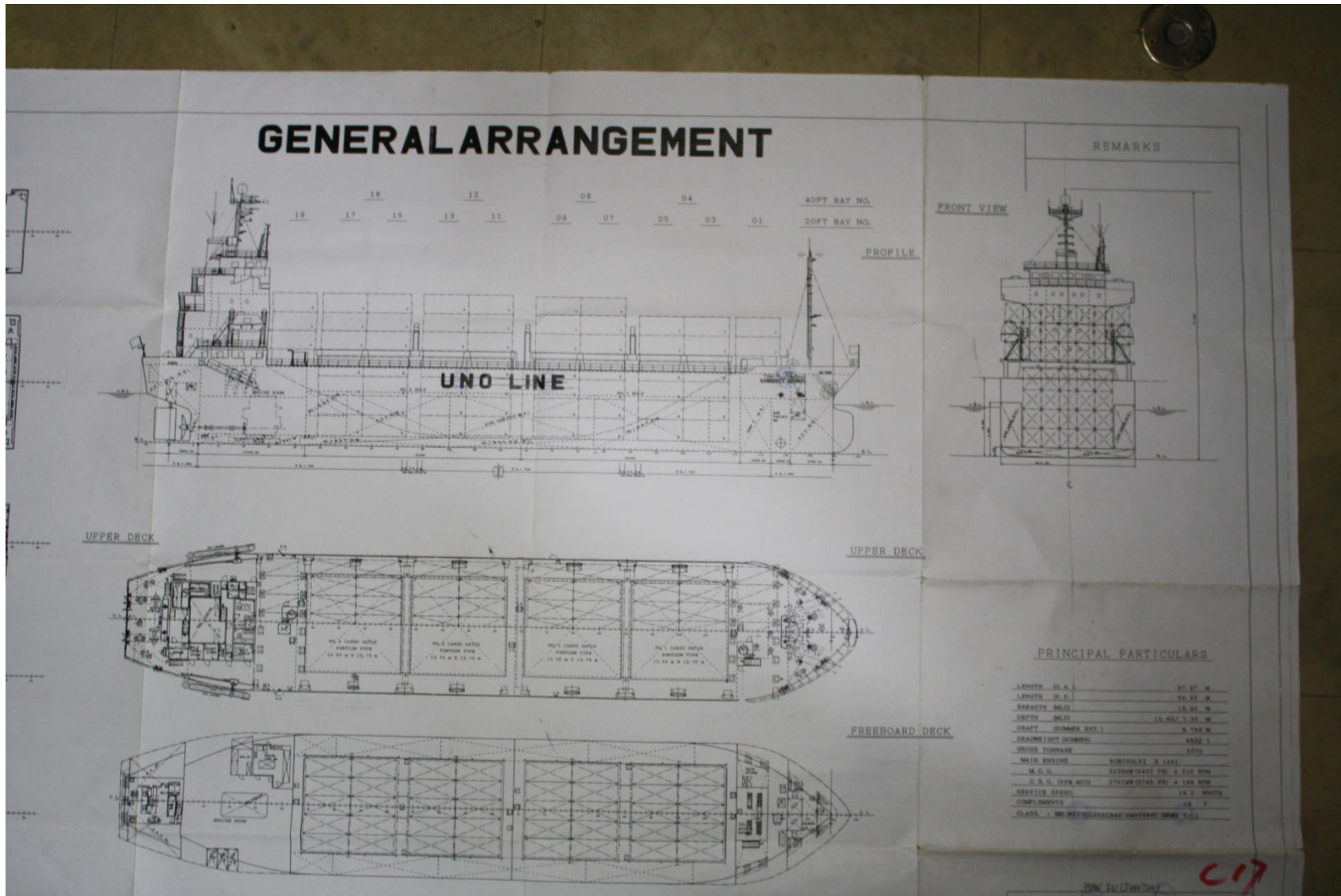


Figure 6: VTA Analysis

Time	Vessel A	Vessel B	Mizushima Port Radio	Bisan MARTIS	Notes
7:14:32		Collision	(5)		
7:14:25	Maintain course and speed (10.0 kn)	Proceeding parallel to Vessel A on her port side at appx. 72 m (8.9 kn)			
7:14:05	Maintain course and speed (10.2 kn)				(5)The speed of Vessel B at the time of collision was 8 kn.
7:13:25	MN Line passage	Proceeded parallel to Vessel A on her port side at appx. 152 m, felt danger and went full astern (13.2 kn)	(4)		
7:13:15 -47	Replied that he would reduce speed		Communication of warning regarding Vessel D, which was ahead of Vessel A		(4)According to the results of the astern trial of Vessel B, the speed after 1 minute while going 12 kn would be appx. 7 kn.
7:13:05	Maintain course and speed (10.5 kn)	Proceeding parallel to Vessel A on her port side at appx. 145 m (13.2 kn)			
About 7:13		Decelerated speed to slow ahead	Communication that The vessel on the starboard is going to Tamashima		
About 7:12		Reduced the number of revolutions of the main engine, but was unable to be positioned on the starboard quarter of Vessel A			
7:11:25		Entered Mizushima Inner Harbor Passage	Communication that the vessel on your starboard bow, foreigner Vessel A, will head west around No. 3 Buoy. If you are going into the port, keep clear distance from her and head north		
7:10:40 -57	Entered Mizushima Inner Harbor Passage (10.4 kn)	Replied that I will reduce my speed		(3)	
7:10:14 -15		Proceeding appx. 299 m the port quarter of Vessel A (13.3 kn)			
7:07:35		Proceeding appx. 375 m on the port quarter of Vessel A (12.4 kn)	(2)		(3) Both vessels were flying Track Signal Flags, but both masters were unable to confirm the Track Signal Flags and the destination of the other vessel.
7:06:35		Proceeding appx. 367 m on the starboard quarter of Vessel A (11.8 kn)			
		Entered Mizushima course			(2) Turned rudder intending to be positioned on the starboard quarter of Vessel A, but was unable to be positioned on the starboard quarter of her
7:05:36	Proceeding within Mizushima Traffic Route (11.5 kn)	Proceeding appx. 442 m to Vessel A's rear starboard side (11.8 kn)	(1)		(1) Entering into Mizushima Traffic Route while turning the rudder to port intending to be positioned on the starboard quarter of Vessel A
	Entering Mizushima Traffic Route	Proceeding Shimotsui channel			
July 3, 06:30		Weighed anchors off Kama Shima			
	Vessel A	Vessel B	Mizushima Port Radio	Bisan MARTIS	

Table 1: AIS records of vessels involved

AIS of Vessel A					
Time	Speed	Latitude	Longitude	Course over the ground	Heading
7:02:05	11.5	34-25-16.7	133-47-10.4	331.4	330
7:04:05	11.4	34-25-36.1	133-46-55.5	321.4	320
7:05:05	11.5	34-25-44.9	133-46-46.5	316.9	318
7:05:36	11.5	34-25-49.2	133-46-41.5	315.9	319
7:06:35	11.4	34-25-57.4	133-46-32.2	316.4	320
7:07:35	11.5	34-26-05.8	133-46-22.7	315.4	320
7:08:35	11.4	34-26-14.1	133-46-13.3	319.2	322
7:09:07	11.3	34-26-18.5	133-46-08.6	319	323
7:09:35	11.3	34-26-22.5	133-46-04.5	319.2	323
7:10:15	11.1	34-26-28.4	133-45-58.5	319.7	322
7:11:25	10.9	34-26-38.6	133-45-48.7	323	325
7:12:25	10.6	34-26-47.3	133-45-41.1	324.1	324
7:13:05	10.5	34-26-53.0	133-45-36.0	324.9	325
7:13:25	10.4	34-26-55.8	133-45-33.5	324.2	325
7:14:05	10.2	34-27-01.6	133-45-28.8	324	324
7:14:25	10	34-27-04.3	133-45-26.4	324.5	326
7:14:36	9.7	34-27-05.7	133-45-25.3	329.5	326
AIS of Vessel B					
Time	Speed	Latitude	Longitude	Course over the ground	Heading
7:02:08	13	34-25-51.3	133-47-50.9	264.8	270
7:04:05	13	34-25-50.2	133-47-20.7	274	282
7:05:05	13.1	34-25-53.1	133-47-05.4	285.9	288
7:05:36	11.8	34-25-54.1	133-46-57.8	262.7	242
7:06:35	11.8	34-25-51.4	133-46-44.7	272	283
7:07:35	12.4	34-25-55.8	133-46-31.0	301	304
7:08:35	13	34-26-03.0	133-46-18.2	305	311
7:09:07	13	34-26-07.6	133-46-11.9	316.3	326
7:09:35	13	34-26-12.2	133-46-07.2	319	325
7:10:14	13.3	34-26-18.8	133-46-00.5	319	325
7:11:25	13.5	34-26-31.5	133-45-49.2	320	324
7:12:25	12.9	34-26-42.3	133-45-42.8	323.1	324
7:13:05	13.2	34-26-49.0	133-45-39.7	317	318
7:13:25	13.2	34-26-52.3	133-45-29.3	318.7	331
7:13:30	13	34-26-53.2	133-45-28.5	322.1	334
7:13:50	12.2	34-26-57.0	133-45-25.9	333	350
7:14:05	10.9	34-26-59.5	133-45-25.1	346	359
7:14:25	8.9	34-27-02.6	133-45-24.5	350	16
7:14:32	8	34-27-03.5	133-45-24.3	352.2	26
AIS of Vessel C					
Time	Speed	Latitude	Longitude	Course over the ground	Heading
7:02:09	12.5	34-25-53.4	133-47-30.0	262.8	/
7:09:09	12	34-26-37.1	133-46-06.0	305.2	/
7:12:39	11.4	34-27-10.5	133-45-38.2	331.6	/
AIS of Vessel D					
Time	Speed	Latitude	Longitude	Course over the ground	Heading
7:15:05	0	34-28-08.5	133-42-48.3	259.8	106
7:21:05	1.5	34-28-07.5	133-42-51.2	93.6	124
7:25:07	4.3	34-28-04.3	133-42-44.1	311.1	337

Table 2: VDR data of Vessel A (Audio recordings)

VDR voice recording of Vessel A		
Time	Speaker	Content
7:01:23	MARTIS	Vessel C, Vessel C, Vessel C which is going from Shimotsui to ME Line, do you have reception? Channel 13, please.
7:01:56	MARTIS	Tanker C, which is currently going from Shimotsui to ME Line, if you have reception please go to channel 13.
7:10:40	MARTIS	Tanker going north on Mizushima Traffic Route. Vessel B, Vessel B. This is Bisan MARTIS.
7:10:52	Vessel B	This is Vessel B.
7:10:56	MARTIS	Channel 14, please.
7:10:57	Vessel B	Vessel B. Channel 14. Roger.
7:12:37-55	Vessel A	Mizushima Port Radio, Motor vessel container vessel, TIAN FU TIANJIN calling.
7:12:57	Port Radio	This is Mizushima Port Radio, channel 18, please.
7:13:12	Vessel A	Mizushima Port Radio, Channel 18. Good morning. Passing report you.
07:13:15-45	Port Radio	Good morning. I have one information, in Bravo anchor now, Kisaragi-maru after about 10 minutes heaving up anchors and proceeds. It proceeds Chugoku Electric Tamashima Wharf. So please attention, over.
7:13:47	Vessel A	All roger, Reduce the speed, engine.
7:13:57	Port Radio	Vessel A, Channel 16.
7:14:32		(Sound of collision)
7:15:32	Vessel B	This is Vessel B. MARTIS.
7:15:47	MARTIS	This is Bisan MARTIS. Vessel B, this is Bisan MARTIS.
7:16:03	Vessel B	This is Vessel B. Go ahead Bisan MARTIS.
7:16:10	MARTIS	Channel 13, please.

Table 3: VHF communication records

Time	Transmission	Reception	Channel	Contents
7:02	MARTIS	Vessel C	16⇒13	Cargo ship Vessel A, between No. 9 and 10 Buoys, is heading from MW line to the quarantine anchorage, so please be cautious
"	Vessel C	MARTIS	16⇒13	Roger
7:10	MARTIS	Vessel B	16⇒14	Where is your vessel headed?
"	Vessel B	MARTIS	"	We will bunker in front of Nikko
"	MARTIS	Vessel B	"	The vessel on your starboard bow, foreigner Vessel A, will head west around No. 3 Buoy. If you are going into the port, keep clear distance from her and head north
"	Vessel B	MARTIS	"	I will reduce my speed
"	MARTIS	Vessel B	"	Please be careful of the vessel to your front starboard
7:13	MARTIS	Vessel B	16	The vessel on the starboard is going to Tamashima
"	Vessel B	MARTIS	"	Yes, roger
7:16	Vessel B	MARTIS	16⇒13	Collided with this vessel
7:22	MARTIS	Vessel B	16⇒13	Did the bow hit?
"	Vessel B	MARTIS	"	The other vessel cut to port, and we tried to go astern but it was too late
"	MARTIS	Vessel B	"	Do you have leaks?
"	Vessel B	MARTIS	"	I don't know if we have leaks or not

Table 4: Pamphlet

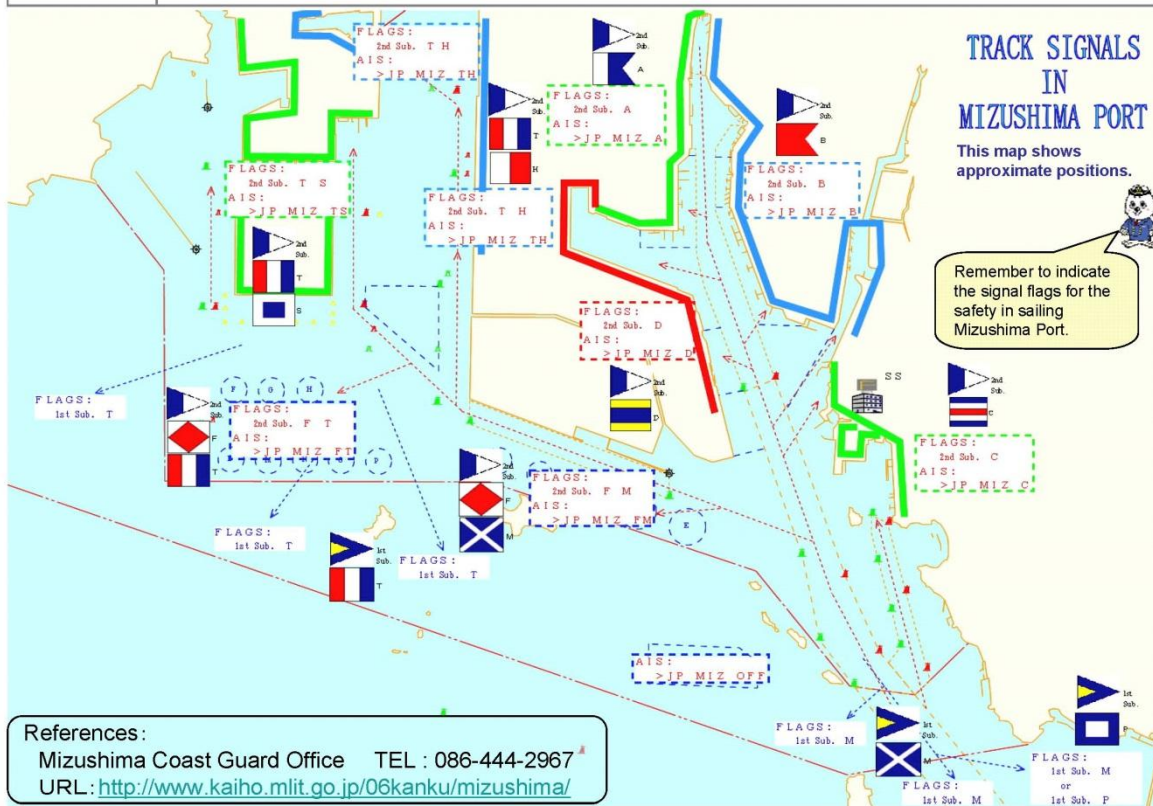
TRACK SIGNALS in MIZUSHIMA PORT

New Regulations in Mizushima Port will be effective as of July 1, 2010.



Indicate the following signal flags while sailing in Mizushima Port during daytime.

1 st Sub. M	Leaving from the east of Kami-Mizu Shima. (Those ships, which are leaving Mizushima Port using the traffic route and required to show 1st sub. P based on the 7 th article of the Maritime Traffic Safety Law when entering Mizushima Traffic Route, are permitted to indicate 1 st sub. P instead of 1 st sub. M.)
1 st Sub. T	Leaving from the west of Kami-Mizu Shima.
2 nd Sub. A	Sailing heading for the berthing facility between West Public -2.6m Landing Place and JX Nippon Oil Energy Corporation A area Pier.
2 nd Sub. B	Sailing heading for the berthing facility between East Public Landing Place and JX Nippon Oil Energy Corporation B area Pier or Yobimatsu Waterway.
2 nd Sub. C	Sailing heading for the berthing facility between Asahi Kasei C7 Pier and Taiheiyo Cement Pier.
2 nd Sub. D	Sailing heading for the berthing facility between JFE Kurashiki A Quay and JFE Kurashiki Coal Loading Pier.
2 nd Sub. T H	Sailing heading for the berthing facility along Takahashi Kawa Waterway or in the Otoshima.
2 nd Sub. T S	Sailing heading for the berthing facility in the Tamashima area (excluding Otoshima).
2 nd Sub. F M	Sailing heading for the southern sea area of JFE (anchorage A to E).
2 nd Sub. F T	Sailing heading for the southern sea area of Tamashima Harbor Island (anchorage F to P).



*Within the pamphlet, "AIS" refers to AIS Destination Data

Photo 1: Vessel A



Photo 2: Vessel B

