MA2013-1

MARINE ACCIDENT
INVESTIGATION REPORT

January 25, 2013

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.

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: Cargo ship AQUAMARINE
IMO number: 9371127
Gross tonnage: 4,095 tons

Vessel type and Name: Fishing vessel HIRASHIN MARU
Fishing vessel registration number: KN3 - 13479
Gross tonnage: 4.9 tons

Accident type: Collision
Date and time: Around 06:14, July 6, 2011 (local time, UTC+9 hours)
Location: Off the southeast of Daikoku Wharf, Yokohama Section No. 3, Keihin Port
Around 118° true, two nautical miles from Yokohama Daikoku Breakwater West Lighthouse, Yokohama City, Kanagawa Prefecture
(approximately 35° 25.9′ N, 139° 43.8′ E)

December 20, 2012
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 >

The cargo ship AQUAMARINE, with a master and twenty-one crew members on board, cleared the Tsurumi Passage established within Yokohama Section No. 3 of Keihin Port, and was proceeding southeastward. The fishing vessel HIRASHIN MARU, with a skipper and one crew member on board, was making a turn while drawing a trawlnet. At around 06:14[1], July 6, 2011,

[1] Japan Standard Time (JST): UTC +9 hrs, unless otherwise stated all times are indicated in JST on a 24-hour clock.

both vessels collided with each other off the southeast of Daikoku Wharf, Yokohama Section No. 3 of Keihin Port.

The skipper of HIRASHIN MARU died and a deckhand was injured, and the vessel sustained a buckling and a fracture to the keel, whereas AQUAMARINE sustained a dent to the bulbous bow.

< Probable Causes >

It is somewhat likely that the accident, whereby AQUAMARINE, proceeding southeastward, and HIRASHIN MARU, turning to the left with the intention of drawing the trawlnet in the southwest direction, collided, occurred at off the southeast of Daikoku Wharf, Yokohama Section No. 3 of Keihin Port, because the master of AQUAMARINE paid attention to vessels anchored ahead and small-sized cargo ships underway, and continued sailing without being aware of HIRASHIN MARU until she came very close to the port bow of AQUAMARINE, while the skipper of HIRASHIN MARU was sailing without being aware of HIRASHIN MARU coming close to the bow of AQUAMARINE.

It is probable that the master of AQUAMARINE was proceeding without being aware HIRASHIN MARU until she came very close to the port bow of AQUAMARINE and paid attention to vessels anchored ahead and small-sized cargo ships underway, because he determined that HIRASHIN MARU would pass on the port side of AQUAMARINE if he kept her course and speed due to the fact that HIRASHIN MARU had crossed ahead of AQUAMARINE to the port side and its bearing was changing to the left.

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

The cargo ship AQUAMARINE, with a master and twenty-one crew members on board, cleared the Tsurumi Passage established within Yokohama Section No. 3 of Keihin Port, and was proceeding southeastward. The fishing vessel HIRASHIN MARU, with a skipper and one crew member on board, was making a turn while drawing a trawlnet. At around 06:14, July 6, 2011, both vessels collided with each other off the southeast of Daikoku Wharf, Yokohama Section No. 3 of Keihin Port.

The skipper of HIRASHIN MARU died and a deckhand was injured, and the vessel sustained a buckling and a fracture to the keel, whereas AQUAMARINE sustained a dent to the bulbous bow.

1.2 Outline of the Accident Investigation

1.2.1 Setup of the Investigation

The Japan Transport Safety Board (JTSB) appointed an investigator-in-charge and three other marine accident investigators to investigate this accident on July 6, 2011.

1.2.2 Participation of foreign marine safety authority

The JTSB notified Socialist Republic of Viet Nam as flag State of AQUAMARINE of initial information regarding the accident and the board did not receive any information about conducting investigation by the flag State.

1.2.3 Collection of Evidence

July 6 to 8, 10, 13, and 26, 2011: On-site investigations and interviews

July 11, 19, and 26, 2011: Interviews

1.2.4 Opinions of Parties Relevant to the Cause

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

1.2.5 Comments from Flag State

The comments were invited from Socialist Republic of Viet Nam according to the request as the flag State.

2 FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 Progress of Navigation of AQUAMARINE according to the Records of Voyage Data Recorder (VDR)

According to "the records of the Voyage Data Recorder[*1] (hereinafter referred to as "VDR records") equipped with AQUAMARINE" (hereinafter referred to as "Vessel A"), the progress of navigation of Vessel A during the time of around 05:44 to 06:16, July 6, 2011 was as shown in the table below.

In the table, time of the events is indicated in the Japan Standard Time (JST), while heading is indicated in true bearing and speed in knot (kn) (speed over the ground, and the same will apply hereinafter). "−(minus)" which is shown in the column of speed indicates a speed moving astern.

Also, in the column of Information on Communications and Conversations, "P" stands for a pilot for Vessel A (hereinafter referred to as "Pilot A"), "T" for a crew member aboard a tugboat, "A" for the master of Vessel A (hereinafter referred to as "Master A"), and "3/O" for a third officer of Vessel A (hereinafter referred to as "Third Officer A"), all of which are showing who the voice were recorded.

Time hh:mm:ss	Position Information of Vessel A				Information on Communications and Conversations
	Latitude North (°-′)	Longitude East (°-′)	Heading (°)	Speed (kn)	
05:44:54	35-28.073	139-42.610	329	0.1	
05:48:02	35-28.040	139-42.570	343	-1.0	P: Go ahead
05:50:02	35-28.002	139-42.520	032	-1.0	
05:50:34	—	—	055	-1.0	T: Anchor cleared P: Roger, dead slow ahead
05:50:50	—	—	067	-1.0	P: Stop the tug, hard starboard
05:51:06	—	—	075	-1.0	P: Slow ahead
05:53:26	35-28.035	139-42.470	135	1.1	P: Stop the tug, let go the tug line
05:53:35	—	—	142	1.2	P: Steady the course 180°
05:53:57	35-28.031	139-42.490	155	1.3	P: Half ahead
05:59:19	—	—	180	5.0	P: Port 10°, port 15°, steer 140°
06:01:42	—	—	139	6.7	P: Tug, will disembark after passing through No. 1 and No. 2 light buoys
06:03:50	35-27.236	139-42.812	140	7.6	P: Slow ahead
06:04:20	Passed between		140	7.9	Conversation between Master A and

[*1] VDR (Voyage Data Recorder) is an on-board device to record navigational data including the position, course and speed of the vessel as well as radar images, international VHF radio telephone communication, and conversations in the bridge.

	Tsurumi Passage Light Buoys No.1 and No.2				Pilot A (sound inaudible due to overlapping of VHF communications)
06:05:50	—	—	141	6.8	A: Half ahead
06:07:06	—	—	140	7.1	Buzzer sound of telegraph
06:08:22	—	—	140	7.6	
06:08:59	35-26.680	139-43.350	149	7.9	
06:10:14	35-26.507	139-43.457	155	8.3	
06:13:41 ～ 06:13:47	—	—	155	9.0 ～ 8.8	A: ・170° ・Midships
06:14:02 ～ 06:14:16	35-25.928 ～ —	139-43.759 ～ —	153 ～ 148	8.8 ～ 8.7	・Buzzer sound of telegraph ・Blowing of one second long blast on the whistle for 7 times in a row
06:14:22 ～ 06:14:45	35-25.879 ～ —	139-43.785 ～ —	147 ～ 146	8.4 ～ 8.0	A: ・Throw life buoys ・Stand by anchoring, be at bow station ・Why has the vessel come?
06:15:32	—	—	152	7.0	Two prolonged blasts on the whistle
06:15:50	—	—	152	6.7	A: ・Hard starboard ・Hard port
06:16:23	35-25.646	139-43.938	143	6.1	A: Record the time when the accident occurred
06:16:37	35-25.623	139-43.953	136	5.8	3/O: It was 06:15
06:16:53	—	—	126	5.2	A: It has capsized
06:16:56	35-25.595	139-43.976	125	5.2	A: Bow station, let go anchor

2.1.2 Progress of Navigation of the Vessel which Came Closest to Vessel A according to Radar Echo Images in VDR Records

From among the radar echo images recorded during around 06:06 to 06:13, July 6, relative positions of the image of the vessel ("echo" in the table below) from Vessel A which came closest to Vessel A are shown in the table below.

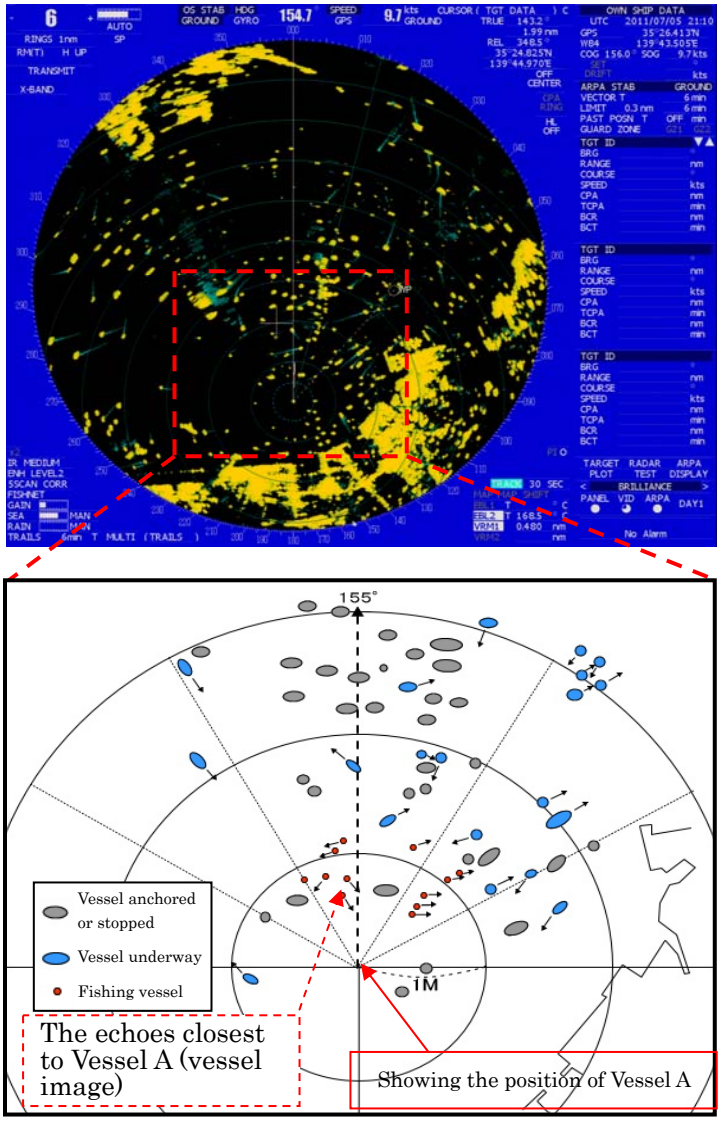
Time hh:mm:ss	Position Information of Vessel A				Bearing of Echoes from Vessel A (°)	Distance of Echoes from Vessel A (nautical miles: M)
	Latitude North (°- ′)	Longitude East (°- ′)	Heading (°)	Speed (kn)		
06:06:14	35-26.979	139-43.063	140	7.0	Dead ahead	1.6
06:07:14	35-26.880	139-43.160	140	7.2	Dead ahead	1.4
06:08:15	35-26.765	139-43.271	139	7.7	Dead ahead	1.13
06:09:15	35-26.645	139-43.374	149	7.8	Port bow 10	0.93
06:10:14	35-26.507	139-43.457	155	8.3	Port bow 15	0.73

06:11:14	35-26.357	139-43.535	155	8.3	Port bow 14	0.53
06:12:15	35-26.203	139-43.616	154	8.7	Port bow 9	0.38
06:13:14	35-26.050	139-43.697	155	8.6	Port bow 5	0.15

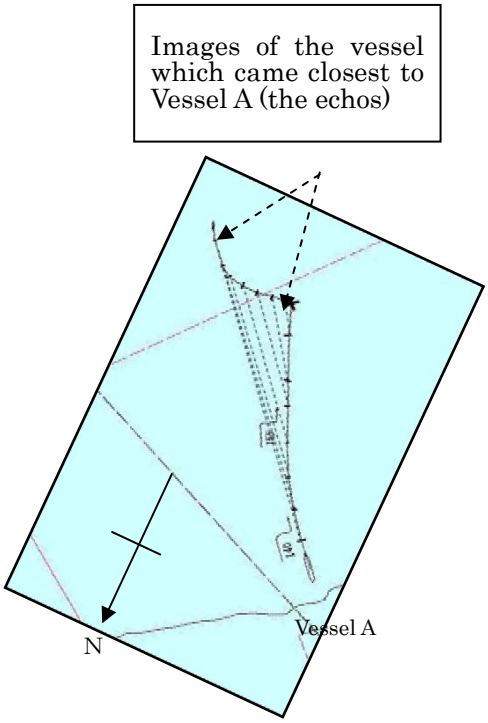
2.1.3 Situation in the Water Area where the Accident Occurred

According to the radar echo images from among the VDR records, the situation in the water area where the accident occurred is showed in "Situation in the Area within 3 M of Vessel A at around 06:11" as shown below.

Also, from among the vessel images (echos) recorded during around 06:06 to 06:14, July 6, relative positions of the image of the vessel (the echo) which came closest to Vessel A to the position of Vessel A are indicated in "Correlation Diagram of the Echo and Vessel A" as shown below. (For more details, see Figure 1: Plots of Estimated Ship Positions)



"Situation in the Area within 3 M of Vessel A at around 06:11"



"Correlation Diagram of the Echoes and Vessel A"

2.1.4 Events leading to the Accident according to the Statements of Crew Members

According to the statements of Master A, a chief officer of Vessel A (hereinafter referred to as "Chief Officer A"), Third Officer A, a helmsman who was engaged in the steering of Vessel A (hereinafter referred to as "Helmsman A") and Pilot A as well as a deckhand (hereinafter referred to

as “Deckhand B”) aboard HIRASHIN MARU(hereinafter referred to as “Vessel B”) and skippers of two consort vessels which were operating near Vessel B (hereinafter referred to as “Consort Vessel C” and “Consort Vessel D”), and according to the entries in the logbook of Vessel A, events leading to the accident were as follows.

(1) Vessel A

Vessel A, boarded by Master A and twenty-one crew members, berthed starboard side alongside at Product C Wharf for JFE Steel Corporation’s East Japan Works, at Yokohama Section No. 3 of Keihin Port, situated at Ogishima, Tsurumi Ward, Yokohama City, and it completed loading operations of the steel materials for the Kingdom of Thailand at around 03:30, July 6.

At around 04:00, Vessel A had conducted a pre-departure check, and it was confirmed that the navigational equipmens, the steering apparatus and others were in good condition.

Pilot A boarded Vessel A at around 05:30, and after mooring a tug line to the port stern, while unmooring all the mooring lines and heaving up the cable of the port anchor at around 05:45, he had a tugboat pull the stern of Vessel A to make Vessel A leave the berth, and after making Vessel A turn round with a right turn, he ordered slow ahead, and then half ahead.

Pilot A made the Vessel A sail along the Tsurumi Passage by setting the course 140°, and with the intention of handing over the course of 140° to Master A which was almost the same as 139° which had been described on the chart as the course to take after clearing the Tsurumi Passage, he prepared for disembarking Vessel A by reducing the engine output from half ahead to slow ahead.

After obtaining approval from Master A for Vessel A to clear the Tsurumi Passage and for him to disembark upon completion of pilotage, Pilot A disembarked Vessel A and boarded the tugboat at around 06:05.

Master A kept a lookout with two radars with a range scale of 3 M and 6 M, and followed a pure car carrier sailing ahead, which he regarded as an escort ship.

At around 06:07, when Master A ordered in-harbour full ahead, he saw many fishing vessels ahead, most of which he recognized moving from right to left of Vessel A, and he ceased from following the pure car carrier sailing ahead, and altered the course from 140° to 155° in order to avoid the group of the fishing vessels.

When Master A watched carefully, recognizing Vessel B and another vessel turning slowly to the left, from among the fishing vessels which crossed ahead of Vessel A to the port side, he noticed the bearing of both vessels changing to the left, which made him think that Vessel B and the other vessel would pass on the port side of Vessel A if he kept sailing while keeping her course and speed.

While Master A was sailing by paying attention to vessels anchored ahead and small-sized cargo ships underway, he sighted Vessel B coming very close to the port bow of Vessel A with an attitude crossing from left to right.

As Master A realized that collision with Vessel B was already unable to avoid, he altered the course to 170° to alleviate the damage which would arise from the collision, immediately after which he noticed Vessel A had collided with Vessel B, ordered midships and stop engine.

Situations about crew members aboard Vessel A before and after the occurrence of the accident were as follows.

[1] Third Officer A

After escorting Pilot A to the disembarkation facilities and making sure that Pilot A disembarked safely, Third Officer A came back to the bridge and stood near the engine telegraph, and while keeping a lookout, he operated the engine telegraph by the order of Master A, and shifted the engine to half ahead, and then to full ahead.

Around the time when Third Officer A noticed for the first time that Vessel B was coming close with an attitude crossing ahead at 10 to 20 meters to the port bow of Vessel A, he operated the engine telegraph by the order of Master A, and stopped the engine.

[2] Helmsman A

Helmsman A had been engaged in manual steering since Vessel A left the berth.

When Helmsman A saw Vessel B which came very close to Vessel A and another fishing vessel before the occurrence of the accident, he was about to alter the course from 155° to 170° by putting the helm hard to starboard by the order of Master A to take "the course of 170°."

However, Helmsman A ported the helm by the order of Master A to "midships," and then to alter "the course to 150°" when the rudder angle indicator pointed to starboard 5°, and when it pointed to port 15°, he realized that Vessel A had collided with Vessel B.

[3] Chief Officer A

Having been stationed at the forecastle deck with a boatswain, two ordinary seamen and an apprentice seaman before Vessel A left the berth, Chief Officer A felt a vibration while winding up the mooring lines around the drums, but he did not think at that time that Vessel A had collided with another vessel.

(2) Vessel B

Vessel B, boarded by the skipper (hereinafter referred to "Skipper B") and Deckhand B, departed from Shiba Fishing Port, Yokohama City, Kanagawa Prefecture at around 04:40, July 6, and when it became 05:00, at the lifting time of the ban on fishing operations, she departed from off the coast of Yokohama Heliport, Kanazawa Ward, Yokohama City, and proceeded for a fishing spot off the coast of Honmoku Wharf, Naka Ward, Yokohama City.

Vessel B cast a trawlnet into the sea at around 05:35, and started to draw the net to the northeast at a speed of about 3 kn with the "trawl warp wire" (hereinafter referred to as "Trawl Warp") slacked away about 240 meters long, which was shortened to about 225 meters later.

With the intention of drawing the net in the southwest direction, Vessel B passed by the stern of Consort Vessel D which was positioned to the west of Vessel B, and started to turn to the left at a low speed to prevent the angle between the fishing net on the seabed and Trawl Warp from becoming greater.

Sitting on the hatch leading to the engine room at the rear of the wheel house, Deckhand B was looking at Trawl Warp while facing to the stern, and when he recognized that Consort Vessel D, which was sailing away astern, began lifting the net. And because Vessel B was approaching a large-sized vessel anchored while turning to the left at a low speed, he was anxious to know by which side of the large-sized vessel Vessel B was going to pass, and although he looked back to the bow, he did not recognize Vessel A.

Feeling a significant shock all of a sudden, and seeing the black body of the vessel, Deckhand B realized that Vessel B had collided with Vessel A.

And although Deckhand B called out to Skipper B to get out of the wheel house, he did not have time to make sure of the situation Skipper B was in. In less than twenty seconds after that, Vessel B listed to the port side and capsized, and he fell into the sea.

(3) Consort Vessels

[1] Consort Vessel C

The skipper of Consort Vessel C departed from Honmoku Fishing Port, Yokohama City, and cast a trawlnet into the sea when arriving at a fishing spot off the coast of the Fishing Port, while he was drawing Trawl Warp slacked away about 240 meters long to the northeast, he recognized that Vessel B had become positioned parallel to the starboard side of Consort Vessel C.

Recognizing that Vessel B turned the bow to eastward, made a left turn at about 50 meters to the stern of Consort Vessel C, and sailed away from the port stern of Consort Vessel C after a while, the skipper of Consort Vessel C started lifting the net.

[2] Consort Vessel D

Consort Vessel D departed from Shiba Fishing Port with Vessel B, and when arriving at a fishing spot off Minami Honmoku Wharf, Consort Vessel D cast a trawlnet into the sea and drew the trawlnet to the northeast, about 400 meters behind Vessel B.

The speed at the time of drawing the net was about 5.2 to 5.3 km/h (about 2.8 to 2.9 kn).

When Consort Vessel D was making a turn, the speed increased to about 7 km/h (about 3.8 kn), as the vessel turns around on a fishing net, which lessens the force applied to the drawing of the net.

The skipper of Consort Vessel D thought that the speed would be almost the same with Vessel B, as there was not much difference in the type of ship and engine output between them.

While Consort Vessel D started a left turn behind Vessel B which had just started a left turn, the skipper of Consort Vessel D heard a crew member aboard Consort Vessel D utter "Oh my god, that's done for," and witnessed Vessel B which was capsizing at a point about 500 meters away.

Crew members aboard Consort Vessel D had not been aware of the presence of Vessel A, either, until Vessel A collided with Vessel B.

The skipper of Consort Vessel D supposed that, at the time of the occurrence of the accident, Vessel B had been paying attention, like Consort Vessel D, to the display of the GPS plotter which had recorded anchored vessels and obstacles on the seabed in order to avoid them.

The accident occurred at around 06:14, July 6, 2011, and the location was in the vicinity of the position 118° true, two M from the Daikoku Breakwater West Lighthouse, Yokohama Section No. 3 of Keihin Port.

(See Figure 1: Plots of Estimated Ship Positions)

2.1.5 Events after the Occurrence of the Accident

According to the statements of Master A, Chief Officer A, Deckhand B and skipper of Consort Vessel D, events after the occurrence of the accident were as follows.

(1) Vessel A

Master A took the following measures after the occurrence of the accident.

[1] Knowing that the bow of Vessel A was pushing Vessel B, he ordered Helmsman A to port helm in order for Vessel B not to get under the bottom of Vessel A.

[2] He ordered the crew members engaged in the storing of mooring ropes on either deck at the forecastle and the poop to throw life buoys onto the sea and to stand by for launching a lifeboat, while ordering Chief Officer A to let go anchor.

[3] He ordered the crew members to launch the lifeboat and to conduct a search and rescue operation for the crew members aboard Vessel B.

(2) Vessel B

As the surroundings became darkened, Deckhand B found that he was in the sea under Vessel B which had capsized.

Coming up above the surface of the sea, Deckhand B held on to a life buoy cast from Vessel A, swam to Vessel B and got on the bottom of Vessel B, where he searched the sea surface around him for Skipper B.

Although Deckhand B was instructed to leave Vessel B by a patrol boat of the Japan Coast Guard and a lifeboat from Vessel A, he remained on the bottom of Vessel B to search for Skipper B with a life jacket delivered by the patrol boat, and after being advised that divers of the Japan Coast Guard would conduct searching for Skipper B, he went aboard the patrol boat and was rescued.

Skipper B was found inside the wheel house and transported to a hospital, where he was confirmed dead.

After that Vessel B was lifted up by consort vessels which were operating in the vicinity, and then the fishing gear were collected, Vessel B was towed to Shiba Fishing Port.

2.2 Injuries to Persons

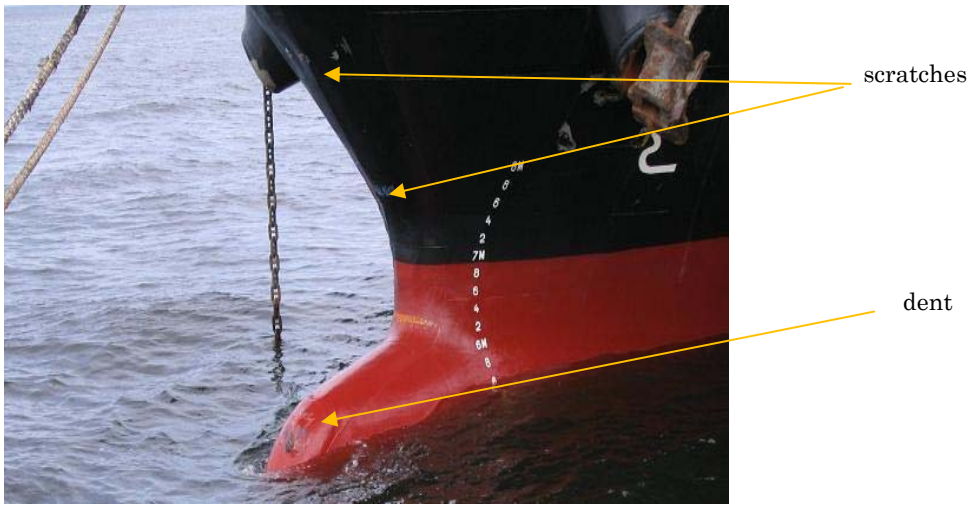
According to the postmortem certificate for Skipper B and the medical certificate for Deckhand B, Skipper B died from drowning, while Deckhand B suffered a left thigh bruise which would take a week to heal completely.

2.3 Damage to Vessels

(1) Vessel A

Vessel A sustained a dent on the bulbous bow, and scratches to the stem.

(See “Damage to Vessel A” as shown in the picture below)



“Damage to Vessel A”

(2) Vessel B

Vessel B sustained a buckling and a fracture to the keel, a dent on the shell plating at the central part of the starboard side, and a bent to the mast for drawing a fishing net, while a wet damage to the main engine and navigational equipment.

Because Vessel B capsized and had the GPS[*2] equipment soaked in the sea, it was unable to obtain the records of GPS information.

(See "Damage to Vessel B" as shown in the pictures below)

"Damage to Vessel B" (Left: a buckling and a fracture to the keel, Center: a dent to the shell plating at the central part of the starboard side, Right: a bent to the mast for drawing a fishing net)

2.4 Crew Information

(1) Gender, Age and Certificate of Competence

[1] Master A: Male, 36 years old

Nationality　Socialist Republic of Viet Nam

Master's license issued by the Socialist Republic of Viet Nam

Date of Issue　December 4, 2008

(Valid until December 4, 2013)

[2] Skipper B: Male, 79 years old

First class boat's operator, personal water craft operator, with passenger service license

Date of Issue　August 5, 1977

Date of Revalidation　November 5, 2007

(Valid until March 16, 2013)

(2) Major Seagoing Experience

[1] Master A

(a) Major Seagoing Experience

[*2] GPS: Global Positioning System is a navigation system. While receiving radio waves from multiple satellites, and accurately calculating the distance to each of the satellites, GPS enables its ground receivers to pinpoint their geographical location.

According to the statement of Master A, his major seagoing experience was as follows:

Master A became a seaman in 1995, was promoted to the master in 2008, and boarded Vessel A on August 18, 2010.

Before the accident, he once had cleared the Tsurumi Passage as a master of Vessel A. As he did not have any problems when coming across fishing vessels at that time; therefore he thought that it was possible to navigate without difficulty in a sea area with many vessels.

(b) Port Calling Experience

According to the list of ports of call (Voyage Memo) by Vessel A, information on the ports in Japan which Master A had called aboard Vessel A before the occurrence of the accident was as follows.

Date of Port Called		Port Called
2010	September 9	Kisarazu Port (Kimitsu)
	December 6	Kanmon Port (Yahata)
	December 26	Himeji Port (Hirohata)
2011	January 25	Fukuyama Port
	February 27	Niihama Port
	June 13	Yokohama Section, Keihin Port
	June 15	Nagoya Port
	June 19	Kawasaki Section (Ogishima), Keihin Port

[2] Skipper B

According to the statement of Deckhand B, the major seagoing experience of Skipper B was as follows:

Since around 1946, he was engaged in fishing with Shiba Fishing Port as his base. Since around the summer of 1990, he was engaged in trawlnet fishery with Deckhand B, a relative of Skipper B's.

(3) Health Condition

According to the statements of Master A and Deckhand B, Master A and Skipper B were in good health condition.

2.5 Vessel Information

2.5.1 Particulars to Vessels

(1) Vessel A

IMO number: 9371127
Port of registry: Saigon, Socialist Republic of Viet Nam
Owner: INTERNATIONAL SHIPPING AND LABOUR COOPERATION JOINT STOCK CO. (Socialist Republic of Viet Nam)
Management company: INTERNATIONAL SHIPPING AND LABOUR COOPERATION JOINT STOCK CO. (Socialist Republic of Viet Nam)
Gross tonnage: 4,095 tons
L x B x D: 102.79 m x 17.00 m x 8.80 m

Hull material: Steel
Engine: One diesel engine
Output: 2,647 kW
Propulsion: One fixed pitch propeller
Date of keel laid: March 5, 2005
Classification society: Nippon Kaiji Kyokai (Class NK)
(See the picture below, and Figure 2: "General Arrangement of Vessel A")

"Vessel A"

(2) Vessel B
Fishing vessel registration number: KN3 - 13479
Base port: Yokohama City, Kanagawa Prefecture
Owner: Privately owned
Gross tonnage: 4.9 tons
Lr x B x D: 11.84 m x 3.10 m x 1.09 m
Hull material: Light alloy
Engine: One diesel engine
Output: 77 kW (according to powered fishing boat registration form)
Propulsion: One fixed pitch propeller
Date of launch: December 12, 1991
(See the picture below, and Figure 3: "General Arrangement of Vessel B")

"Vessel B"

2.5.2 Loading Conditions

(1) Vessel A

According to the statement of Chief Officer A, loading conditions of Vessel A were as follows:

Vessel A was loaded with 947 pieces of steel coil made of steel (about 5,115 tons) on board at Keihin Port, with the draught about 5.7 meters at fore and 6.6 meters at aft.

(2) Vessel B

According to the statement of Deckhand B, there was no catch for Vessel B because the accident occurred when Vessel B was drawing the trawlnet for the first time on the day of the accident.

2.5.3 Equipment, Instruments and Performance

(1) Navigational Equipment

[1] Vessel A

The wheel house was equipped with two radars with Automatic Radar Plotting Aid (ARPA)[*3] function on the port side of the steering stand placed in the center of the room, and also with Automatic Identification System (AIS)[*4] and GPS equipment.

(See "Wheel House of Vessel A" as shown in the picture below)

"Wheel House of Vessel A"

[2] Vessel B

There was a GPS plotter on the starboard side of the steering apparatus placed in the center of the front part of the wheel house, while a fish finder on the port side.

(See "Wheel House of Vessel B" as shown in the picture below)

According to the statement of Deckhand B, obstacles identified before at the seabed were recorded in the GPS plotter, and the locations of such obstacles at the seabed were displayed on the GPS plotter with such a mark as "△" or "○."

(See the pictures next)

[*3] ARPA: Automatic Radar Plotting Aid is an instrument which, by using a computer, will automatically process changes in the displayed positions of other vessels detected by a radar. By doing so, it will display the course, speed, closest point of approach, closest distance and predicted future position of the object vessel, while it is capable of issuing an alert to warn a possible collision with an excessive approach by other vessels.

[*4] AIS: Automatic Identification System is an instrument with which a vessel will be able to send and receive information automatically by using international VHF frequencies on the position, speed and direction of the vessel to and from vessel stations around and coastal AIS stations.

"Wheel House of Vessel B"

"Display of GPS Plotter of Consort Vessel"

(2) Sound Signal Devices

[1] Vessel A

(a) Master A stated as follows:

Vessel A was equipped with a whistle (air horn). However, at the time of the occurrence of the accident, Vessel A did not blow the whistle as it was unable to afford to.

(b) Chief Officer A stated as follows:

At the time of the occurrence of the accident, he heard a blast on the whistle. He thought that it was the blast blown by the tanker anchored in the vicinity to notify Vessel A of the occurrence of the accident.

[2] Vessel B

According to the statement of Deckhand B, although Vessel B was equipped with a whistle (electronic horn), it was not blown.

(3) Shapes Exhibited on Vessel B

Around the mast for drawing a fishing net on Vessel B which was landed after the occurrence of the accident, "a shape consisting of two cones with their apexes together in a vertical line one above the other" (hereinafter referred to as "the Shape") was exhibited, for the purpose of letting other vessels know that Vessel B was "engaged in fishing."

(See "the Shape" as shown in the pictures next)

"The Shape"

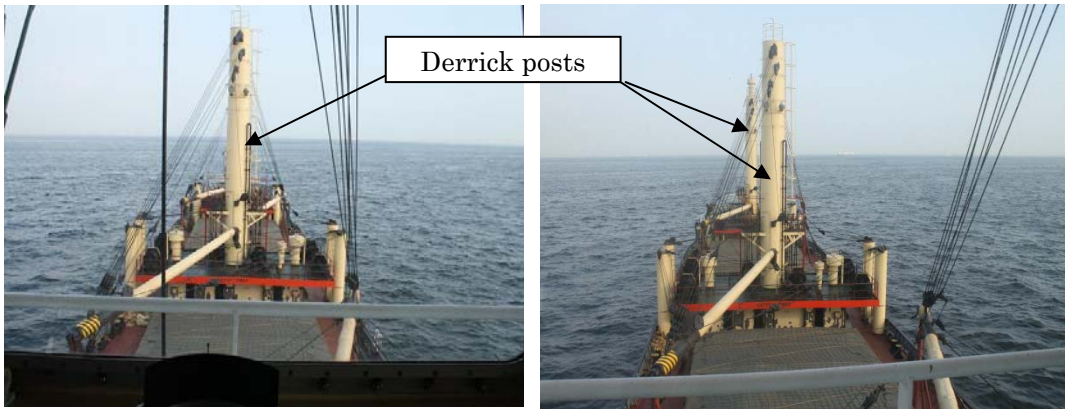
(4) Forward Visibility

[1] Vessel A

When looking forward to the bow from the center of the front part of the derrick posts situated dead ahead generated a dead angle, which, however, could be cleared by changing the position by moving from the center of the front part to sideways.

There was no structure to generate a dead angle except the derrick posts.

(See the pictures below)



"Visibility in the Bow Direction of Vessel A"

[2] Vessel B

As there were three windows installed on the front, and two windows on either side of the wheel house, and navigational equipment were placed under the windows on the front of the wheel house, there was no structure to generate a dead angle.

(See the picture next)

"Visibility in the Bow Direction of Vessel B"

(5) Maneuverability of Vessel A

According to "The Maneuverability Table" posted in the bridge of Vessel A, the period of time required since taking the helm until the heading changed "from 0° to 90°," from "90° to 180°," "from 180° to 270°," and "from 270° to 360°" were 57 seconds, 52 seconds, 60 seconds and 61 seconds, respectively, and the turning radius was 145 meters.

Also, according to "The Harbour Revolution Speed per Minute of the Main Engine" posted in the bridge, the revolution per minute of the main engine of Vessel A in proportion to each speed range was shown as follows:

HARBOUR REVOLUTION SPEED		
ASTERN	FUNCTION	AHEAD
80	DEAD SLOW	80
120	SLOW	120
180	HALF	180
216	FULL	216
	RUNG UP	227
BARRED SPEED RANGE*5: 140 – 170		

"The Harbour Revolution Speed per Minute of the Main Engine"

(6) Fishing Method of Vessel B

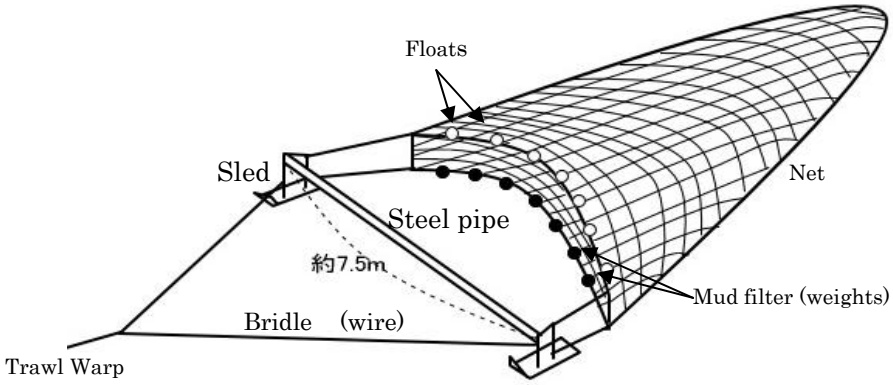
According to the statements of Deckhand B and the skipper of Consort Vessel D, the fishing method of Vessel B was as follows:

Vessel B adopted what was called a sled trawlnet fishing method, which was a kind of small-scale trawlnet fishery: its fishing gear was equipped with an iron sled attached to both ends of a 7.5 meter long steel pipe, and a fishing net attached to the section behind the pipe, as in "Illustration of Sled Trawlnet" which is shown below. Vessel B caught benthos like conger-eel and squilla by drawing the fishing gear on the seabed.

Trawl Warp made of wire was wound around the winch drum on Vessel B over the

*5 "Barred Speed Range" refers to critical revolution range. It is the speed of revolution of the main engine when the natural frequency of a rotating object, such as a main engine and a propeller begins to resonate with that of the main engine, which dramatically increases axial system vibration. It is also called critical speed.

length of about 350 meters, she adjusted the length of Trawl Warp according to the depth of the sea at a fishing spot.



"Illustration of Sled Trawlnet"

(7) Ways of Keeping out of the Way of Other Vessels while Vessel B Was Drawing a Trawlnet

According to the statement of Deckhand B, the ways of keeping out were as follows.

[1] In principle, keep out of the way of other vessels by steering the helm.

[2] When urgent measures are necessary like when other vessels are sailing at a high speed, keep out of the way by extending Trawl Warp.

[3] In the case of deep water, try to keep out of the way by extending Trawl Warp fully to the end.

2.5.4 Other Relevant Vessel Information

(1) Vessel A

[1] The management company had a Document of Compliance (DOC) issued under the ISM Code, and Vessel A had a Safety Management Certificate onboard.

[2] According to the statement of Helmsman A, the steering gear of Vessel A went through a pre-departure operational test as usual, and the operation was in good condition.

[3] According to the entries in the logbook, navigation facilities and the steering gear went through a test at around 04:00, July 6, and their operation was in good condition.

(2) Vessel B

According to the statement of Deckhand B, no defects or malfunctions were found to the hull and the machinery of Vessel B.

2.6 Information on Operation

2.6.1 Voyage Planning of Vessel A

On the chart used by Vessel A, a course was indicated which was proceeding southeast at a course of 139° along the Tsurumi Passage, and sailing toward the Uraga Channel Passage after altering to 205° at a point 113°, 4,050 meters from the Yokohama Daikoku Wharf Breakwater West Lighthouse.

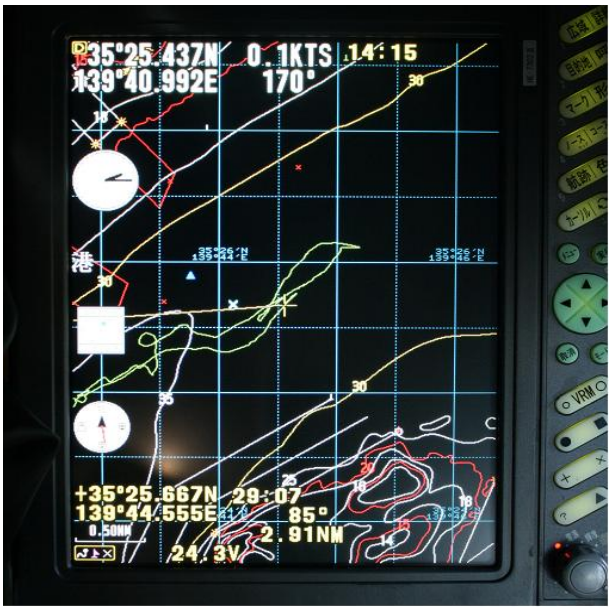
(See the picture next)

"Chart Used by Vessel A"

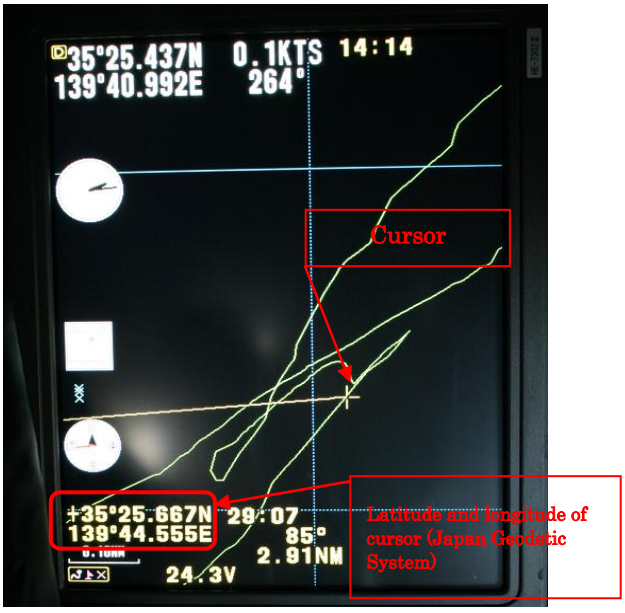
2.6.2 Navigation of Vessel B during Fishing

According to the statement of the skipper of Consort Vessel C and the record of tracks of Consort Vessel C stored in the GPS plotter, Vessel B moved at a distance about 50 meters behind Consort Vessel C from the starboard side to the port side at around the point displayed by the cursor (See the pictures below, in which the point is displayed by "+"), and sailed away from Consort Vessel C while making a left turn. After that, Consort Vessel C stopped and started lifting the net, leaving behind tracks of having went astern for the distance as long as Trawl Warp.

The position at around the point displayed by the cursor on the monitor screen of the GPS plotter (35° 25.667' N, 139° 44.555' E) was expressed by the Japan Geodetic System (Tokyo datum), and was 35° 25' 51.8" N, 139° 44' 21.7" N when converted to the World Geodetic System.



"Tracks of Consort Vessel C"



"Enlarged Picture of Tracks"

2.7 Weather and Sea Conditions

2.7.1 Weather Observation Data and Tide

(1) The weather data observed at the time of the occurrence of the accident by the Yokohama Local

Meteorological Observatory located at about 7 km west of the accident site was as follows:

03:00 Weather: Fine, Wind Direction: N, Velocity: 2.0 m/s, Visibility: 20.0 km

06:00 Wind Direction: N, Velocity: 3.7 m/s

07:00 Wind Direction: N, Velocity: 3.1 m/s

09:00 Weather: Slightly cloudy, Wind Direction: E, Velocity: 3.2 m/s, Visibility: 20.0 km

(2) According to the first volume of the tide table for 2011 published by the Japan Coast Guard, the time of high tide and low tide in Yokohama Bay was 01:59 and 07:40, respectively, while the tide was at the end of the flood tide at the time of the occurrence of the accident.

2.7.2 Observation by Crew

The following entries were mentioned in the logbook of Vessel A at the time of the occurrence of the accident:

04:00 Weather: Misty, Wind Direction: NE, Velocity: 3, Visibility: 4 M

08:00 Weather: Misty, Wind Direction: NE, Velocity: 4, Visibility: 4 M

3 ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Analysis of the Radar Echo Image of the Vessel Closest to Vessel A

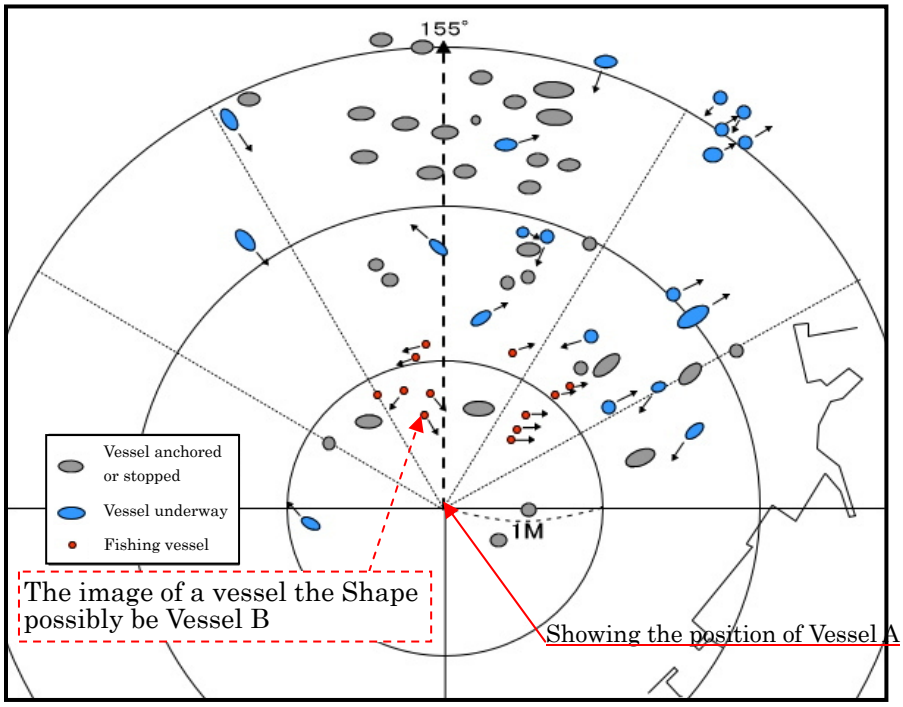
A series of radar echo images and according to 2.1, it have revealed the following as regards the image of the vessel (the echo) which came closest to Vessel A among the VDR records on Vessel A.

(1) The image of the vessel (the echo) which came closest to Vessel A approached Vessel A gradually from the port bow of Vessel A, and disappeared at a point very close to Vessel A at around 06:14.

(2) The movement of the echo was consistent with the movement of Vessel B which became available from the statements of Master A and the skippers of Consort Vessel C and Consort Vessel D.

Accordingly, it is probable that the vessel indicated by the echo was Vessel B.

(See the figure below)



"Situation in the Area within 3 M of Vessel A at around 06:11 (excerpt)"

3.1.2 Course of the Events

According to 2.1 and 2.5, it is probable that events leading to the accident were as follows.

(1) Vessel A

[1] Pilot A had Vessel A leave the wharf at Yokohama Section No. 3 of Keihin Port at around 05:45, sailed along the Tsurumi Passage by setting the course 140° at around 06:00, and after Vessel A cleared the Tsurumi Passage, he disembarked from Vessel A and boarded the tugboat at around 06:05 after obtaining approval from Master A.

[2] Master A kept a lookout with two radars with a range scale of 3 M and 6 M, while following a pure car carrier sailing ahead, which he regarded as an escort ship.

[3] At around 06:07, when Master A ordered in-harbour full ahead, he saw many fishing vessels ahead, most of which he recognized moving direction from starboard to port of Vessel A, and

at around 06:10, he altered the course from 140° to 155° and sailed at a speed of 8 kn in order to avoid the group of the fishing vessels.

[4] When Master A watched Vessel B and another vessel carefully, he noticed the bearing of both vessels changing to the left, which made him think that Vessel B and the other vessel would pass on the port side of Vessel A if he continued sailing while keeping her course and speed as described in [3].

[5] While Master A was sailing by paying attention to vessels anchored ahead and small-sized cargo ships underway, he sighted Vessel B coming very close to the port bow of Vessel A with an attitude crossing from left to right.

[6] As Master A realized that collision with Vessel B was unable to avoid, he altered the course to 170° to alleviate the damage, immediately after which he noticed Vessel A had collided with Vessel B, ordered midships and stop engine.

(2) Vessel B

[1] Vessel B, leaving Shiba Fishing Port, Yokohama City, Kanagawa Prefecture at around 04:40, departed from off the coast of Yokohama Heliport, Kanazawa Ward, Yokohama City at around 05:00 when the lift of the ban of fishing operations, and navigated for a fishing spot off the coast of Honmoku Wharf, Naka Ward, Yokohama City.

[2] Exhibiting the Shape to let other vessels know of Vessel B being engaged in fishing, Vessel B cast a trawlnet into the sea at around 05:35, and started to draw the net to the northeast at a speed of about 3 kn with Trawl Warp slacked away about 240 meters long, which was shortened to about 225 meters later.

[3] Vessel B passed on the stern of Consort Vessel D which was positioned to the west of Vessel B, and started to turn to the left at a low speed.

[4] Vessel B approached a large-sized vessel anchored while turning to the left at a low speed.

[5] Vessel B collided with Vessel A while turning to the left at a speed about 2.8 to 3.6 kn.

3.1.3 Situation of the Collision

According to 2.1 and 2.3, it is probable that the bow of Vessel A collided with the central part of the starboard side of Vessel B, causing the bulbous bow of Vessel A to push the keel of Vessel B and the hull of Vessel B to get on the bulbous bow of Vessel A; consequently, Vessel B capsized to the port side.

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

According to 2.1, it is probable that the time and date of the occurrence of the accident was around 06:14, July 6, 2011, and the location was in the vicinity of the position 118° true, two M from the Yokohama Daikoku Breakwater West Lighthouse.

3.2 Causal Factors of the Accident

3.2.1 Situations of the Crew and the Vessels

(1) Crew

According to 2.4, situations of the crew were as follows:

Master A and Skipper B held a legal and valid seamen's competence certificate or a boat operator's license.

It is also probable that both Master A and Skipper B were in good health condition.

It is probable that Master A thought it possible to maneuver without difficulty in a sea area

with many vessels because he once had cleared the Tsurumi Passage, and he did not have any problems when coming across fishing vessels. However, it is somewhat likely that he did not precisely understand operational conditions of fishing vessels in the sea area, considering his sailing experience in the sea area where the accident occurred.

(2) Ship Condition

According to 2.5.3 and 2.5.4, it is probable that there were no defects or malfunctions to the hull and the instruments of Vessel A and Vessel B.

3.2.2 Situations of Lookout and Vessel Maneuvering

Judging from 2.1 and 2.5, the situations of lookout and the vessel maneuvering were as follows.

(1) Vessel A

[1] It is probable that after taking over the maneuvering of Vessel A from a pilot, Master A kept a lookout with two radars with a range scale of 3 M and 6 M, and he sailed at a course of approximately 140°.

[2] It is probable that at around 06:07, when Master A ordered in-harbour full ahead, he saw many fishing vessels ahead, most of which he recognized moving direction from starboard to port of Vessel A, and he altered the course from 140° to 155° and sailed at a speed of about 8 kn in order to avoid the group of the fishing vessels.

[3] It is probable that when recognizing Vessel B and another vessel which crossed ahead of Vessel A to the port side turning to the left, Master A noticed the bearing of both vessels changing to the left, which made him think that Vessel B and the other vessel would pass on the port side of Vessel A if he continued sailing while keeping her course and speed as described in [2].

[4] It is probable that while sailing by paying attention to vessels anchored ahead and small-sized cargo ships underway, Master A sighted Vessel B coming very close to the port bow of Vessel A with an attitude crossing ahead of Vessel A.

[5] It is probable that Master A paid attention to vessels anchored ahead and small-sized cargo ships underway, and continued sailing without being aware of Vessel B until she came very close to the port bow of Vessel A. Accordingly, it is probable that collision was unable to avoid when he saw Vessel B, and he altered the course to 170° to alleviate the damage, immediately after which he noticed Vessel A had collided with Vessel B, ordered midships and stop engine.

[6] It is probable that while keeping a lookout, Third Officer A noticed immediately before the collision that Vessel B was coming close with an attitude crossing at 10 to 20 meters to the port bow of Vessel A.

[7] It is probable that although five crew members consisting of Chief Officer A, a boatswain, two ordinary seamen and an apprentice seaman were stationed at the forecastle deck and were engaged in winding up the mooring lines at the time of the occurrence of the accident, they were not keeping lookouts.

(2) Vessel B

[1] It is probable that exhibiting the Shape to let other vessels know of Vessel B being engaged in fishing, Vessel B cast a trawlnet into the sea at around 05:35, and started to draw the net to the northeast at a speed of about 3 kn with Trawl Warp slacked away about 240 meters long, which was shortened to about 225 meters later.

[2] It is probable that with the intention of drawing the net in the southwest direction, Vessel B passed on the stern of Consort Vessel D which was positioned to the west of Vessel B, and started to turn to the left.

[3] It is somewhat likely that Vessel B collided with Vessel A, because Skipper B continued sailing without being aware that Vessel B was coming close to the bow of Vessel A, while turning to the left at a speed of 2.8 to 3.6 kn.

[4] It is somewhat likely that while Skipper B paid his attention on how to avoid the obstacles and the vessel anchored ahead displayed on the screen of the GPS plotter, he continued sailing without being aware that Vessel B was coming close to the bow of Vessel A. However, because Skipper B died, it was unable to clarify the reason why he continued sailing without being aware that Vessel B was coming close to the bow of Vessel A.

[5] It is probable that although Deckhand B looked at Trawl Warp while facing to the stern at the rear of the wheel house, and was not keeping a lookout at the time of the occurrence of the accident, he did not recognize Vessel A when he looked to the bow.

3.2.3 Weather and Sea Conditions

According to 2.7, it is probable that, at the time of the occurrence of the accident, the weather was misty with a wind direction of NE, a wind velocity of 3 to 4, and the visibility of about 4.0 M, while the tide was at the end of the flood tide.

3.2.4 Occurrence of the Accident

According to 2.1, 2.5, 2.6, 3.1, 3.2.1 and 3.2.2, situations leading to the accident were as follows:

(1) Vessel A

[1] It is probable that while proceeding southeast after clearing the Tsurumi Passage, Vessel A sighted many fishing vessels ahead including Vessel B, altered the course to the right in order to avoid the group of the fishing vessels, and continued sailing at a course of 155°, at a speed of about 8 kn.

[2] It is probable that when Master A watched carefully, recognizing Vessel B and another vessel which crossed ahead of Vessel A to the port side turning to the left, he noticed the bearing of Vessel B changing to the left, which made him think that Vessel B would pass on the port side of Vessel A if he kept her course and speed as described in [1].

[3] It is probable that after turning the course of Vessel A to the right, Master A paid attention to vessels anchored ahead and small-sized cargo ships underway, and continued sailing without being aware of Vessel B until she came very close to the port bow of Vessel A, and the collision was unable to avoid when he saw Vessel B, and he altered the course to 170°, immediately after which he noticed Vessel A had collided with Vessel B, ordered midships and stop engine.

(2) Vessel B

[1] It is probable that exhibiting the Shape to let other vessels know of Vessel B being engaged in fishing, Vessel B cast a trawlnet into the sea, drew the net to the northeast, and started to turn to the left with the intention of drawing the net in the southwest direction.

[2] It is somewhat likely that Vessel B collided with Vessel A, because Skipper B continued sailing without being aware of coming close to the bow of Vessel A, while turning to the left.

4 CONCLUSIONS

4.1 Probable Causes

It is somewhat likely that the accident, whereby Vessel A, proceeding southeastward, and Vessel B, turning to the left with the intention of drawing the trawlnet in the southwest direction, collided, occurred at off the southeast of Daikoku Wharf, Yokohama Section No. 3 of Keihin Port, because Master A paid attention to vessels anchored ahead and small-sized cargo ships underway, and continued sailing without being aware of Vessel B until she came very close to the port bow of Vessel A, while Skipper B was sailing without being aware of Vessel B coming close to the bow of Vessel A.

It is probable that Master A was proceeding without being aware of Vessel B until she came very close to the port bow of Vessel A and paid attention to vessels anchored ahead and small-sized cargo ships underway, because he determined that Vessel B would pass on the port side of Vessel A if he kept her course and speed due to the fact that Vessel B had crossed ahead of Vessel A to the port side and its bearing was changing to the left.

4.2 Other Key Findings

(1) It is probable that although five crew members consisting of Chief Officer A, a boatswain, two ordinary seamen and an apprentice seaman were stationed at the forecastle deck at the time of the occurrence of the accident, they did not keep lookouts. In addition, it is probable that the lookout was not properly done, as it was only immediately before the collision that Third Officer A became aware of Vessel B coming very close to the port bow of Vessel A, although he was keeping lookout.

It is somewhat likely that Vessel A was sailing in a sea area where many fishing vessels were engaged in operation, and vessels which were underway or anchored were present, and Vessel A could have earlier recognized Vessel B coming close to the bow of Vessel A, if the crew stationed at the forecastle deck had been directed by Master A to keep lookouts, and at the same time, Third Officer A who was keeping a lookout had been directed to pay attention to vessels coming close to Vessel A.

(2) It is somewhat likely that Master A once had cleared the Tsurumi Passage, and based on that experience, he thought it possible to maneuver without difficulty in a sea area with many fishing vessels present; however, Master A did not precisely understand operational conditions of fishing vessels in the sea area.

It is somewhat likely that Master A could have practiced safety measures including the one described in (1), and recognized Vessel B before the collision became inevitable, if he had collected information on operational conditions of fishing vessels from pilot, vessel management company, agent and others, and examined beforehand navigational safety measures including lookout.

(3) On vessel B, at the time of the occurrence of the accident, Deckhand B looked at Trawl Warp while facing toward the stern at the rear of the wheel house, and did not keep a lookout. Therefore, it is somewhat likely that while Vessel B was engaged in fishing in a sea area with many vessels underway, Vessel B could have recognized Vessel A coming close to Vessel B, if Deckhand B had been ordered to keep a lookout.

5 SAFETY ACTIONS

5.1 Safety Actions Required

It is somewhat likely that the accident, whereby Vessel A, proceeding southeastward, and Vessel B, turning to the left with the intention of drawing the trawlnet in the southwest direction, collided, occurred at off the southeast of Daikoku Wharf, Yokohama Section No. 3 of Keihin Port, because Master A paid attention to vessels anchored ahead and small-sized cargo ships underway, and continued sailing without being aware of Vessel B until she came very close to the port bow of Vessel A, while Skipper B was sailing without being aware of Vessel B coming close to the bow of Vessel A.

It is somewhat likely that Vessel A was sailing in a sea area where many fishing vessels were engaged in operation, and vessels which were underway or anchored were present, and Vessel A could have earlier recognized Vessel B coming close to the bow of Vessel A, if the crew stationed at the forecastle deck had been directed by Master A to keep lookouts, and at the same time, Third Officer A who was keeping a lookout had been directed to pay attention to vessels coming close to Vessel A.

It is somewhat likely that Master A once had cleared the Tsurumi Passage, and based on that experience, he thought it possible to maneuver without difficulty in a sea area with many fishing vessels present; however, Master A did not precisely understand operational conditions of fishing vessels in the sea area. It is somewhat likely that Master A could have practiced safety measures including the one described in 4.2(1), and recognized Vessel B before the collision became inevitable, if he had collected information on operational conditions of fishing vessels from pilot, vessel management company, agent and others, and examined beforehand navigational safety measures including lookout.

On vessel B, at the time of the occurrence of the accident, Deckhand B looked at Trawl Warp while facing toward the stern at the rear of the wheel house, and did not keep a lookout. Therefore, it is somewhat likely that while Vessel B was engaged in fishing in a sea area with many vessels underway, Vessel B could have recognized Vessel A coming close to Vessel B, if Deckhand B had been ordered to keep a lookout.

Accordingly, in order to prevent recurrence of similar accidents, the following measures are expected to be taken.

(1) Even after taking actions to avoid other vessels by altering the course, those who operate vessels should cautiously keep making an evaluation of the effectiveness of such actions until the other vessels have passed by their vessels and become distant enough.

(2) Masters of cargo ships departing from Yokohama Section of Keihin Port should give directions to the crew stationed at the bridge and the forecastle deck to focus their lookout attention on other vessels coming close, and should make appropriate lookout arrangements in order to enable early monitoring of the movement of other vessels.

(3) Fishing vessels which are drawing a trawlnet in the vicinity of Yokohama Section of Keihin Port, with multiple crew members onboard, should make appropriate lookout arrangements, including station of a dedicated lookout, in order to become aware of getting close with other vessels.

(4) Cargo ships departing from Yokohama Section of Keihin Port should collect information of operational conditions of fishing vessels from “Tokyo Bay Fishery Information Map” published

by the Japan Association of Marine Safety (which can be downloaded from, http://www.nikkaibo.or.jp/material_figure.html, and is published in both Japanese and English) and from agents to examine navigational safety measures including lookout.

The Japan Transport Safety Board, based on the result of the accident investigation, and with a view to contributing to the prevention of recurrence of similar accidents, requests for cooperation of the Japanese Shipowner's Association, the Japan Foreign Steamship Association and the Fisheries Cooperative Association of Yokohama City to disseminate this investigation report to foreign seafares and fishery employees for reminding them of the importance of lookout while being engaged in navigation and fishing in the vicinity of Yokohama Section of Keihin Port.

Figure 1: Plots of Estimated Ship Positions

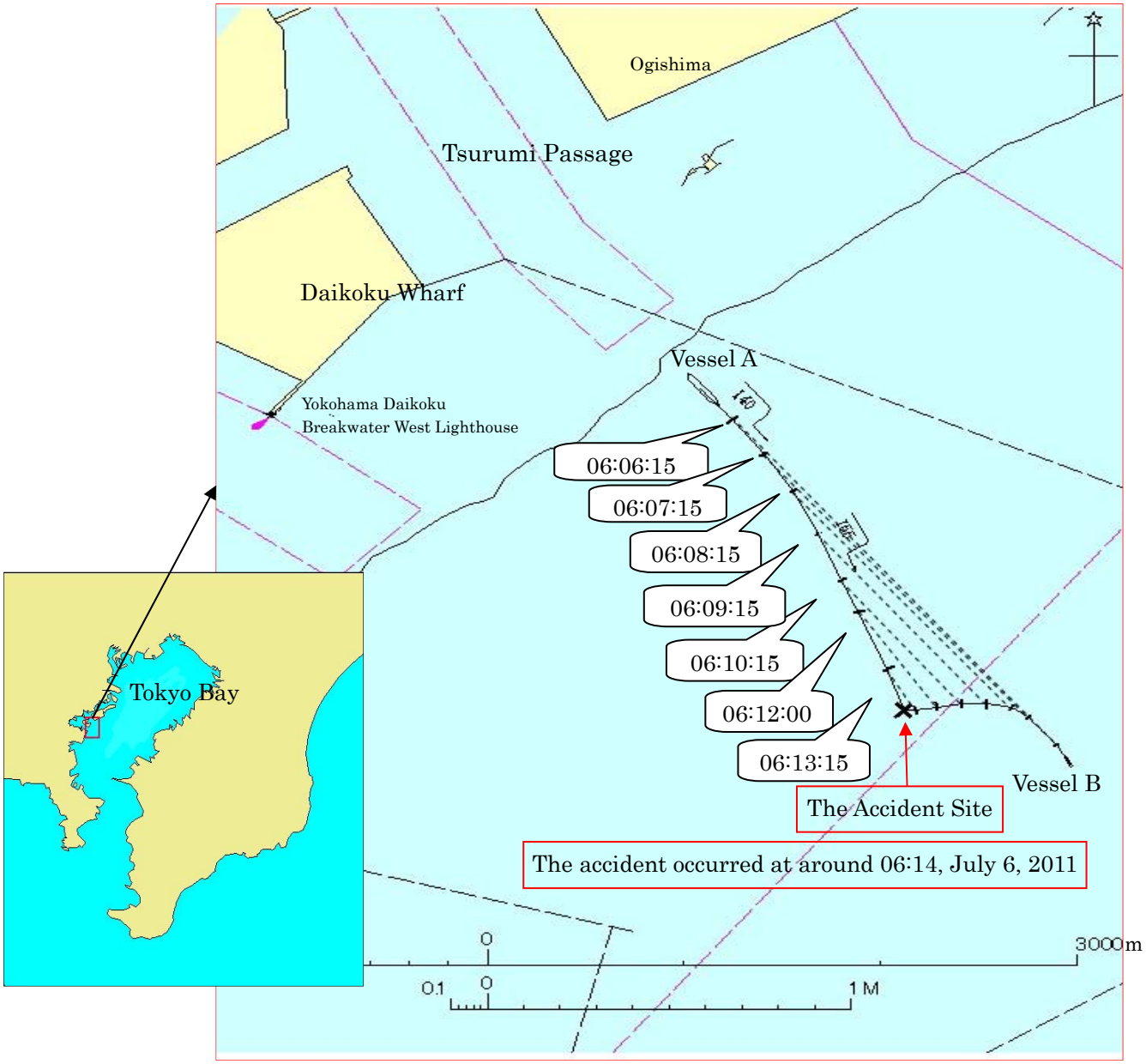


Figure 2: General Arrangement of Vessel A

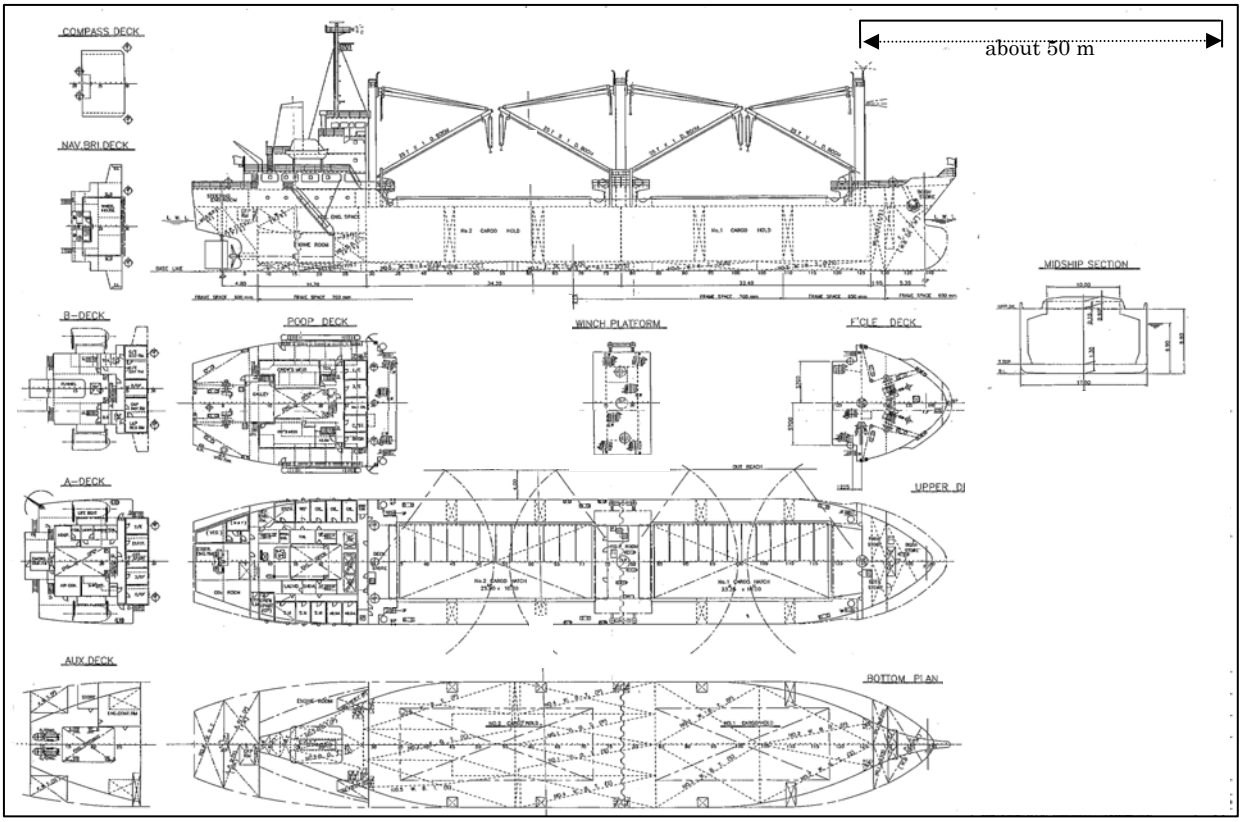


Figure 3: General Arrangement of Vessel B