MA2019-8

MARINE ACCIDENT
INVESTIGATION REPORT

August 29, 2019

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.

Nobuo Takeda
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 ACX CRYSTAL
IMO number:	9360611
Gross tonnage:	29,060 tons
Vessel type and name:	Missile destroyer warship USS FITZGERALD
Gross tonnage:	8,261 tons
Accident type:	Collision
Date and time:	Around 01:30:34 on June 17, 2017 (Local time, UTC+9 hours)
Location:	South-east off Irouzaki, Minamiizu town, Shizuoka Prefecture Approximately 113° true, 12.3 nautical miles from Irouzaki lighthouse (Approximately N34° 31.3' E139° 04.3')

August 7, 2019
Adopted by the Japan Transport Safety Board

Chairman	Nobuo Takeda
Member	Yuji Sato
Member	Kenkichi Tamura
Member	Yoshiko Kakishima
Member	Makiko Okamoto

SYNOPSIS

< Summary of the Accident >

At around 01:30:34 on June 17, 2017, the container ship ACX CRYSTAL, with a master, a second officer, an able seaman and 17 crewmen on board, proceeding to northeast in the southeast off Irouzaki, Minamiizu town, Shizuoka Prefecture for Tokyo zone of Keihin port, and the missile destroyer warship USS FITZGERALD, with a commanding officer, 3 watch officers, an able seaman, and 288 crewmen on board, proceeding to south in the southeast off Irouzaki, collided.

7 crews died and 3 crews were injured on board the USS FITZGERALD, which was flooded as a result of having holes and other damage in the starboard midship front shell, and the ACX CRYSTAL had curve and other damage in the port bow bulwark.

< Probable Causes >

It is probable that in this accident, at night, in the southeast off Irouzaki, while ACX CRYSTAL was navigating for the northeast and USS FITZGERALD was navigating for the south, USS FITZGERALD navigated while keeping the course and speed without proper lookout for ACX CRYSTAL because the attention was paid to an ocean-going container ship, which navigated parallel in the north of ACX CRYSTAL, and ACX CRYSTAL navigated while keeping the course and speed,

and therefore this accident was caused by the collision of the both vessels.

It is somewhat likely that USS FITZGERALD, because the fact that the ocean-going container ship approached the starboard bow side of USS FITZGERALD and Radar information of ACX CRYSTAL were not surely obtained, paid attention to the ocean-going container ship, which navigated parallel in the north of ACX CRYSTAL, and was not properly on the lookout for ACX CRYSTAL.

It is probable that ACX CRYSTAL, because daylight signalling lamp were emitted to USS FITZGERALD and it was expected that USS FITZGERALD would recognize them and avoid ACX CRYSTAL, navigated while keeping the course and speed.

INDEX

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

At around 01:30:34 on June 17, 2017, the container ship ACX CRYSTAL, with a master, a second officer, an able seaman and 17 crewmen on board, proceeding to northeast in the southeast off Irouzaki, Minamiizu town, Shizuoka Prefecture for Tokyo zone of Keihin port, and the missile destroyer warship USS FITZGERALD, with a commanding officer, 3 watch officers, an able seaman, and 288 crewmen on board, proceeding to south in the southeast off Irouzaki, collided.

7 crews died and 3 crews were injured on board the USS FITZGERALD, which was flooded as a result of having holes and other damage in the starboard midship front shell, and the ACX CRYSTAL had curve and other damage in the port bow bulwark.

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 2 other investigators to investigate this accident on June 17, 2017.

1.2.2 Collection of Evidence

On-site investigation, interview, and collection of questionnaire: June 17, 2017
On-site investigation and interview: June 18, July 8, 18, and 20, all in 2017
On-site investigation: June 19 through 22, 28, 29, all in 2017
Collection of questionnaire: August 14, 2017 and March 23, 2018
Interview: October 19, 2017

1.2.3 Provision of Investigation Documents from Investigation Organization of the Accident

Investigation documents were provided on August 4 and December 20, 2017 by the United States Coast Guard, which conducted an investigation on behalf of the National Transportation Safety Board, which is the marine safety investigating authority of the United States of America.

1.2.4 Investigation Cooperation

Technical aids for analysis of sounds recorded in a voyage data recorder were provided by National Maritime Research Institute of National Institute in Maritime, Port and Aviation Technology.

1.2.5 Comments of Parties Relevant to the Cause

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

1.2.6 Comments from Flag State and others

Comments on the draft report were invited from the flag state of ACX CRYSTAL.

Comments on the draft report were invited from the marine safety investigating authority of the United States of America.

2 FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 Navigation Progress Traced by the Automatic Identification System

(1) Between 00:20:27 and 01:35:15 on June 17, 2017, according to the information record received by the Automatic Identification System (AIS*1) of private information company (hereinafter referred to as "AIS record"), the navigation courses of the ACX CRYSTAL (hereinafter referred to as "Vessel A"), a coastal cement tanker navigating nearby (gross tonnage 3,914 tons, hereinafter referred to as "Vessel C"), an ocean-going container ship (gross tonnage 18,872 tons, hereinafter referred to as "Vessel D"), and one more an ocean-going container ship (gross tonnage 141,716 tons, hereinafter referred to as "Vessel E") were as shown in Table 1 and Table 3-5, respectively.

Vessel position is the position of the GPS antenna mounted above the bridge.

(2) The navigation course of the USS FITZGERALD (hereinafter referred to as "Vessel B") was as shown in Table 2. Between 01:15:12 and 01:32:12 on June 17, 2017, in addition, position and other information of Vessel B was extracted from the information record of Automatic Radar Plotting Aids (hereinafter referred to as "ARPA*2 information") based on Radar recording by Voyage Data Recorder (hereinafter referred to as "VDR*3") of Vessel D, and Radar wave reflection position of Vessel B specified by Radar of Vessel D.

In addition, the time is Japan Standard Time, the course over the ground and the heading are the truth direction (same as hereinafter), and speed (speed over the ground, same as hereinafter) is shown as Knots (kn).

Table 1: AIS record of Vessel A (extract)

Time (Hours: Minutes: Seconds)	Speed (kn)	Vessel position		Course over the ground (°)	Heading(°)
		North latitude (°—′ —″)	East longitude (°—′ —″)		
01:15:01	18.4	034-30-01.1	138-58-53.7	087.6	085
01:16:07	18.4	034-30-02.3	138-59-18.1	086.9	085
01:17:07	18.2	034-30-03.2	138-59-40.3	086.1	081
01:18:01	18.0	034-30-05.5	138-59-59.8	079.4	073
01:19:01	17.9	034-30-10.8	139-00-20.6	070.5	068
01:20:02	18.2	034-30-17.0	139-00-41.2	070.5	070
01:21:02	18.3	034-30-22.9	139-01-02.1	070.6	069

*1 "AIS: Automatic Identification System" is the system for exchanging information such as the identification code, type, name, position, and course of the vessel between vessels mutually and with the navigational aid facilities in the land stations by automatic sending and receiving.

*2 "ARPA: Automatic Radar Plotting Aids" refer to a device that automatically processes by computer changes in the images of other ships that were detected by Radar and displays the other ship's course, speed, closest point of approach and time to closest point of approach, predicted position in the future, and that issues an alarm if a risk of collision is predicted by the approach of other vessels.

*3 "VDR: Voyage Data Recorder" is the system for recording communication by VHF radio telephone or sounds within a bridge in a recoverable capsule when an accident occurs in addition to data related to navigation such as vessel position, course, and speed of the Vessel.

01:21:50	18.4	034-30-27.9	139-01-18.9	070.1	069
01:22:25	18.4	034-30-31.7	139-01-31.4	069.9	069
01:23:02	18.4	034-30-35.3	139-01-44.0	070.8	069
01:24:01	18.4	034-30-41.2	139-02-04.8	071.0	069
01:24:55	18.5	034-30-47.0	139-02-24.0	069.4	068
01:25:08	18.5	034-30-48.3	139-02-28.2	069.6	068
01:26:01	18.5	034-30-53.9	139-02-46.8	070.6	069
01:26:55	18.5	034-30-59.4	139-03-06.1	071.0	069
01:27:20	18.5	034-31-01.8	139-03-14.6	070.7	068
01:27:55	18.5	034-31-05.7	139-03-27.1	069.5	068
01:28:20	18.4	034-31-08.2	139-03-35.5	069.8	068
01:28:43	18.5	034-31-10.6	139-03-43.5	069.9	068
01:29:20	18.4	034-31-14.5	139-03-56.5	070.0	068
01:29:31	18.5	034-31-15.8	139-04-00.3	068.9	070
01:29:55	18.5	034-31-18.5	139-04-09.1	071.2	082
01:30:27	17.3	034-31-19.8	139-04-20.1	088.2	112
01:32:17	12.4	034-31-01.0	139-04-30.0	197.2	177

Table 2: Position and other information of Vessel B

Time (Hours: Minutes: Seconds)	Speed (kn)	Vessel position		Course over the ground (°)
		North latitude (°—′ —″)	East longitude (°—′ —″)	
01:15:12	19.8	034-36-18.5	139-05-55.8	187.7
01:17:12	19.4	034-35-39.8	139-05-48.6	189.0
01:19:12	19.4	034-35-01.6	139-05-41.5	189.1
01:19:57	19.6	034-34-47.0	139-05-37.6	188.7
01:20:12	19.6	034-34-42.4	139-05-38.3	188.7
01:20:57	19.6	034-34-27.4	139-05-34.8	188.6
01:21:12	19.5	034-34-22.3	139-05-35.2	188.9
01:21:57	19.4	034-34-08.1	139-05-32.0	189.3
01:22:12	19.4	034-34-04.0	139-05-29.7	189.4
01:22:57	19.4	034-33-47.7	139-05-27.0	189.3
01:23:12	19.4	034-33-44.0	139-05-26.9	190.0
01:23:57	19.4	034-33-30.6	139-05-23.8	192.8
01:24:12	19.4	034-33-25.5	139-05-21.7	190.0
01:24:57	19.2	034-33-12.0	139-05-17.5	192.8
01:25:12	19.3	034-33-07.5	139-05-14.7	193.7
01:25:57	19.3	034-32-52.8	139-05-08.1	197.5
01:26:12	19.4	034-32-48.6	139-05-06.6	198.5
01:26:57	19.5	034-32-34.8	139-05-01.0	199.9
01:27:12	19.6	034-32-29.9	139-04-58.9	200.0
01:27:57	19.8	034-32-16.1	139-04-52.8	200.2
01:28:12	19.8	034-32-09.7	139-04-50.1	200.2

01:28:57	19.8	034-31-56.7	139-04-44.0	200.1
01:29:12	19.8	034-31-52.8	139-04-42.4	200.0
01:29:57	19.8	034-31-37.9	139-04-36.5	200.0
01:30:12	19.8	034-31-33.2	139-04-34.3	199.9
01:30:27	19.9	034-31-28.8	139-04-32.2	200.0
01:31:12	14.4	034-31-14.1	139-04-24.0	190.0
01:32:12	11.8	034-31-05.2	139-04-30.9	179.7

Table 3: AIS record of Vessel C (extract)

Time (Hours: Minutes: Seconds)	Speed (kn)	Vessel position		Course over the ground (°)	Heading (°)
		North latitude (°—′ —″)	East longitude (°—′ —″)		
00:20:27	12.1	034-31-45.2	138-56-48.3	062	066
00:21:46	12.2	034-31-52.4	138-57-05.9	063	065
00:22:46	12.2	034-31-57.9	138-57-19.2	063	066
00:23:27	12.1	034-32-01.5	138-57-28.0	063	066
00:24:46	12.2	034-32-08.9	138-57-45.7	062	065
00:25:46	12.4	034-32-14.5	138-57-58.9	062	057
00:26:03	12.3	034-32-16.4	138-58-02.3	057	051
00:26:27	12.2	034-32-19.7	138-58-06.7	049	047
00:27:47	12.3	034-32-31.2	138-58-20.9	046	046
00:28:37	12.4	034-32-38.3	138-58-29.3	044	046
00:29:27	12.4	034-32-46.1	138-58-38.5	044	046
00:30:08	12.5	034-32-52.1	138-58-45.5	044	046
00:31:47	12.2	034-33-06.6	138-59-03.2	049	060
00:32:03	12.1	034-33-08.2	138-59-06.6	054	060
00:33:07	12.0	034-33-14.6	138-59-20.0	060	063
00:34:07	11.9	034-33-20.6	138-59-32.6	060	065
00:35:36	11.9	034-33-27.7	138-59-51.8	066	068
00:36:36	11.8	034-33-32.5	139-00-05.0	066	067
00:37:28	11.9	034-33-36.5	139-00-16.3	066	067
00:38:06	11.9	034-33-39.6	139-00-25.2	067	067
00:39:16	11.9	034-33-45.4	139-00-40.0	063	065
00:40:26	11.9	034-33-51.8	139-00-55.6	061	060
00:41:48	11.9	034-34-00.1	139-01-12.1	058	060
00:44:40	11.9	034-34-20.7	139-01-45.4	035	031
00:47:07	12.2	034-34-44.9	139-02-06.5	036	039
00:48:07	12.3	034-34-54.7	139-02-15.6	037	040
00:49:07	12.4	034-35-04.5	139-02-24.9	038	041
00:50:28	12.5	034-35-17.8	139-02-37.2	037	042
00:51:07	12.5	034-35-24.2	139-02-43.6	039	042
00:52:28	12.5	034-35-37.2	139-02-56.4	038	041
00:54:28	12.7	034-35-56.9	139-03-15.7	039	042

00:58:58	12.7	034-36-41.2	139-04-00.5	040	045
00:59:46	12.7	034-36-49.0	139-04-08.6	040	045
01:00:46	12.7	034-36-58.7	139-04-18.5	039	045
01:01:16	12.7	034-37-03.2	139-04-23.2	040	045
01:02:37	12.8	034-37-16.1	139-04-36.7	041	045
01:03:37	12.7	034-37-26.5	139-04-47.3	039	045
01:04:37	12.6	034-37-36.2	139-04-57.1	040	046
01:05:27	12.8	034-37-44.0	139-05-05.2	040	046
01:06:27	12.8	034-37-53.8	139-05-15.4	040	046
01:07:46	12.9	034-38-06.7	139-05-29.0	040	045
01:08:46	12.9	034-38-16.6	139-05-39.1	040	045
01:09:06	12.9	034-38-19.8	139-05-42.6	040	045
01:09:56	12.9	034-38-27.7	139-05-50.6	040	045
01:10:56	12.8	034-38-37.5	139-06-00.7	040	046

Table 4: AIS record of Vessel D (extract)

Time (Hours: Minutes: Seconds)	Speed (kn)	Vessel position		Course over the ground (°)	Heading (°)
		North latitude (°—′ —″)	East longitude (°—′ —″)		
01:01:23	16.2	034-31-54.7	138-54-25.7	085.0	085.0
01:06:23	16.1	034-31-57.2	138-56-03.7	092.0	092.0
01:11:23	16.2	034-31-53.6	138-57-41.7	092.0	092.0
01:12:23	16.2	034-31-52.9	138-58-01.4	092.0	092.0
01:13:23	16.4	034-31-52.2	138-58-21.2	091.0	092.0
01:14:23	16.4	034-31-51.5	138-58-41.1	092.0	092.0
01:15:23	16.4	034-31-50.9	138-59-00.7	092.0	092.0
01:16:23	16.5	034-31-50.3	138-59-20.7	091.0	092.0
01:17:23	16.5	034-31-49.6	138-59-41.3	092.0	092.0
01:18:29	16.4	034-31-49.0	139-00-02.9	092.0	091.0
01:19:29	16.3	034-31-48.9	139-00-22.4	088.0	087.0
01:20:29	16.2	034-31-50.1	139-00-42.4	084.0	082.0
01:21:17	16.2	034-31-51.8	139-00-57.7	081.0	081.0
01:22:22	16.3	034-31-55.1	139-01-19.3	077.0	077.0
01:23:34	16.3	034-31-59.8	139-01-42.1	075.0	076.0
01:24:47	16.4	034-32-05.2	139-02-05.3	074.0	075.0
01:25:47	16.5	034-32-09.7	139-02-24.7	074.0	075.0
01:26:46	16.5	034-32-14.0	139-02-43.7	074.0	075.0
01:28:17	16.5	034-32-20.6	139-03-13.0	074.0	075.0
01:29:10	16.6	034-32-24.5	139-03-30.5	075.0	075.0
01:29:40	16.6	034-32-26.8	139-03-40.5	074.0	075.0
01:30:40	16.6	034-32-31.3	139-03-59.2	073.0	075.0
01:31:40	16.5	034-32-35.9	139-04-19.3	074.0	075.0
01:32:40	16.4	034-32-40.1	139-04-38.5	074.0	075.0

Table 5: AIS record of Vessel E (extract)

Time (Hours: Minutes: Seconds)	Speed (kn)	Vessel position		Course over the ground (°)	Heading (°)
		North latitude (°—′ —″)	East longitude (°—′ —″)		
01:25:39	19.7	034-27-15.6	139-01-01.9	058.7	060
01:26:39	19.6	034-27-25.6	139-01-22.3	059.0	060
01:27:39	19.5	034-27-35.7	139-01-42.8	058.8	059
01:28:39	19.5	034-27-45.9	139-02-02.9	058.5	059
01:29:39	19.5	034-27-55.8	139-02-22.7	058.6	059
01:30:15	19.5	034-28-02.1	139-02-35.2	058.7	059
01:30:39	19.5	034-28-06.0	139-02-42.9	058.9	060
01:30:57	19.5	034-28-09.2	139-02-49.4	059.4	060
01:32:03	19.5	034-28-19.9	139-03-11.5	059.6	060
01:33:09	19.5	034-28-30.9	139-03-33.9	059.0	059
01:34:39	19.5	034-28-46.1	139-04-04.3	059.0	059
01:35:15	19.5	034-28-52.1	139-04-16.5	059.3	060

2.1.2 Sounds and Events in Bridge of Vessel A

Between 01:17:05 and 01:34:50 on June 17, 2017, according to the VDR record of Vessel A, the information of the main sounds and events in the bridge of Vessel A was as shown in Table 6.

At around 01:26, 27 and 01:29, in addition, unclear sounds of a second officer of Vessel A (hereinafter referred to as "officer A") and an able seaman (hereinafter referred to as "able seaman A") were recorded in the sound record. Conversation in Tagalog could not be decoded.

Table 6: VDR sounds and others of Vessel A (extract)

*: Information about warning and signals

Time (Hours: Minutes: Seconds)	Main sounds and events
01:17:05	6…, 6…Sir. 60 Sir?
01:27:35	* A clicking sound similar to the sound a daylight signalling lamp would make. [*4]
01:29:02	* Warning sound (Electric sound like navigational devices and others).
01:29:13	* Rudder angle indicator shows starboard 15°.
01:29:25	* A series of clicking sounds similar to the sound a daylight signalling lamp would make.
01:29:48	* A clicking sound similar to the sound a daylight signalling lamp would make.
01:29:55	* Rudder angle indicator shows starboard 30°.

[*4] "Daylight signalling lamp" is mandatory maritime item required for vessels with 150 gross tonnage or more that engaged in international voyages, which communicates with Morse code by emitting daylight, but it is also used to urge other vessels to call for attention, and the minimum light reach distance is 2 nautical miles.

01:30:16	Officer A: Hard starboard. Able seaman A: Roger, hard starboard.
01:30:18	* Rudder angle indicator shows hard starboard (35°).
01:30:25	Officer A or able seaman A: There's boat.
01:30:34	* Crashing sound
01:30:36	* Warning sound
01:30:52	Officer A: Midship, midship.
01:30:56	Able seaman A: Rudder midship sir.
01:30:59	Officer A: Hard starboard.
01:31:03	Able seaman A: Rudder hard starboard sir.
01:31:21	* Warning sound is stopped.
01:31:26	Officer A: Midship.
01:31:32	Officer A: Hard port.
01:31:38	* Marine phone rang
01:31:42	Officer A: … Hard port.
01:31:54	Able seaman A: Rudder hard port sir.
01:32:24	Officer A: Hard Port.
01:32:24	* Marine phone rang
01:32:31	Able seaman A: Rudder hard port sir.
01:33:00	Officer A: Midship. Able seaman A: Midship.
01:33:15	Able seaman A: Rudder midship sir.
01:33:21	Vessel E: ACX CRYSTAL ACX CRYSTAL. Officer A: Yes, This is ACX CRYSTAL.
01:33:40	Officer A: … Collision on navy ship.
01:33:51	Vessel E: ACX CRYSTAL, ACX CRYSTAL. Officer A: Yes, This is ACX CRYSTAL. Vessel E: What is your intention.
01:34:00	Vessel E: What is your intention.
01:34:15	Vessel E: Passing my port side.
01:34:50	Officer A: … Hard starboard.

2.1.3 Progress of Operation by Statement of Crew

(1) Vessel A

It was as follows according to the statement of a master (hereinafter referred to as "master A"), officer A, a third officer of Vessel A, and a navigator of NYK CONTAINR LINE CO., LTD. (current Ocean Network Express Japan Co., Ltd., hereinafter referred to as “Company A_1”), and collection of questionnaire of master A, and a logbook of Vessel A.

At around 16:48 on June 16, 2017, Vessel A, with master A, officer A, able seaman A, and 17 crewmen on board (crew’s nationality: Republic of the Philippines only), set sail from Nagoya port, Aichi Prefecture for Oi container terminal in Tokyo zone, Keihin port.

Officer A took over bridge watch from the third officer of Vessel A off Izu Peninsula in Shizuoka Prefecture, assigned lookout to able seaman A, and set the measurement range of

No.1 Radar (X-band[*5]) at 12 nautical miles (M) with Guard ring[*6] at 3M and the measurement range of No.2 Radar (S-band[*7]) at 6M.

At around 01:17 on 17th, officer A changed the course of the automatic steering system from 088° to 069° with a speed of about 18kn.

At around 01:25, officer A recognized a vessel for which AIS information was not shown (it was found to be Vessel B after the collision) by Radar and sight at about 40° and about 3M from the port bow side, went toward the south because the starboard side light was seen, and thought that Vessel B would avoid his vessel because his vessel was a stand-on vessel.

At around 01:27, officer A, who did not see Vessel B take action to avoid Vessel A during navigating at a constant course and speed, emitted a daylight signalling lamp several times to Vessel B, but was not able to see reactions to the light, such as VHF radio telephone or other signals.

Officer A recognized that Vessel B was a warship by sight when Vessel B approached to about 10° and about 1,000m from the port bow side.

At around 01:30, although officer A instructed able seaman A to take the right rudder 10° and then hard starboard by manual steering, the collision occurred between the port bow section of Vessel A and the starboard midship front section of Vessel B.

Officer A received contact from TOKYO WAN VESSEL TRAFFIC SERVICE CENTER, being told that it collided with Vessel B, and canceled a reservation of 05:00 when it would arrive at the pilot station[*8] for Japan Federation of Pilots' Associations.

Officer A explained the situation to master A, who noticed the collision and came to the bridge, but missed reporting to the master that Vessel A and Vessel B had approached in a shape of crossing before collision.

After the collision, crews of Vessel A checked ballast quantity of Vessel A and confirmed that there was no flood.

(2) Vessel B

It was as follows according to the report of US Navy[*9] (hereinafter referred to as "NAVY report"), the factual report of US Coast Guard[*10], and the written statement of a commanding officer of Vessel B (hereinafter referred to as "commanding officer B") and three bridge watch officers (hereinafter referred to as "watch officer B_1", "watch officer B_2", and "watch officer B_3") made by US Coast Guard.

At around 11:30 on June 16, 2017, Vessel B, with commanding officer B, watch officer B_1, watch officer B_2, watch officer B_3, able seaman (hereinafter referred to as "able seaman B") and 288 crews on board (crew's nationality: the United States of America only), set sail from Yokosuka port for the Port of Subic Bay, Republic of the Philippines.

At around 04:00 to 06:00 on 16th, watch officer B_1, watch officer B_2, and watch officer B_3 got up, participated in various types of training in Sagami bay, and after finishing the training,

---

[*5] "Radar (X-band)" means a Radar for navigation which uses radio wave with frequencies of 9GHz band (3cm wave).

[*6] "Guard ring" means a function of warning observers by visual and auditory signals about all distinguishable targets which approach to the distance selected by observers or invade the selected area in a Radar for navigation.

[*7] "Radar (S-band)" means a Radar for navigation which uses radio wave with frequencies of 3GHz band (10cm wave).

[*8] "Pilot station" means set waters in order for a pilot to join and board a pilot request vessel.

[*9] "Report of US Navy" refers to a final report on the collision accident published on the website of US Navy on November 1, 2017.
(URL:http://www.navy.mil/submit/display.asp?story_id=103130)

[*10] "Factual report of US Coast Guard" refers to a report (dated on July 28) on the collision accident provided to Japan Transport Safety Board by US Coast Guard on December 20, 2017.

at around 22:00, watch officer B_1 took on the watch duty while directing watch officer B_2 and watch officer B_3. Watch officer B_1, watch officer B_2, and watch officer B_3 took a break before the watch duty.

At around 23:00, Vessel B started to navigate to southwest heading 230° at a speed of about 20kn by able seaman's manual steering.

At around 23:00, commanding officer B went down from the bridge and at around 23:30 an executive officer did the same.

Although commanding officer B was scheduled to navigate at a speed of 16kn under the original PIM[*11], a night standing order said the instruction was to navigate at a speed of 20kn for 4 hours in order to ensure time for conducting engineer training. In addition, the change permissible range from the scheduled course was changed from 500 yards[*12] which was the original distance to 1,000 yards.

While watch officer B_1 used a bridge Radar which was set at 12M range, watch officer B_2 and watch officer B_3 were on the lookout mainly by sight.

At around 00:22 on 17th, Vessel B altered the course from 230° to 220°.

At around 00:30, watch officer B_1 recognized 4 vessels passing from starboard side to port side within about 6,000 yards (about 3M) according to DCPA (distance of closest point of approach) information and reported it to commanding officer B, and then was responded no specific order.

At around 00:33, Vessel B altered the course to 215° and, at around 00:52, to 190°, respectively.

At around 00:58, no report was made to the Commanding Officer as required by his Standing Orders procedures even though watch officer B_1 recognized 3 vessels passing within about 6,000 yards (about 3M).

At around 01:05, watch officer B_1 recognized Vessel D and Vessel A at the starboard bow side by Radar. It was expected that her vessel would pass at about 1,500 yards (about 0.7M) of the ahead of Vessel D, which was the closer vessel of them, but CPA (closest point of approach) information on Vessel A, which navigated further, could not be obtained due to the target frequently dropping from the Radar picture.

At around 01:09, Vessel B passed ahead of Vessel C when DCPA information on Radar was about 0.6 to 0.7M.

At around 01:17, watch officer B_1 did not notice that Vessel A made any turns

At around 01:20, watch officer B_2 recognized Vessel A by sight and the risk of collision and reported it to watch officer B_1 with a suggestion about deceleration. Watch officer B_1, who was preparing to make a report to commanding officer B, considered the report of watch officer B_2, but kept the speed of about 20kn because she was concerned that the deceleration would confuse the surrounding vessels.

At around 01:24, watch officer B_1 commenced to alter the course from about 190° to about 200° in order to navigate along the scheduled course.

At around 01:25 to 27, it was difficult for watch officer B_1 to check vessels within clutters (which are the conditions where targets are hidden by interference on a Radar display) because the clutters occurred in the range of 2 to 3M around Vessel B on the Radar display due to insufficient adjustment of the Radar.

[*11] "PIM (Position of Intended Movement)" means intension of position and action of a warship. (Navigation plan)

[*12] "Yard" is a basic unit of length under yard-pound system. 1 yard = about 0.91 meter

At around 01:27, although watch officer B_1 gave the direction to alter the course to 240° in order to navigate between Vessel A and Vessel D, she rescinded the order within a minute and gave another direction to turn to port and increase the speed to 25kn, which was not performed.

Vessel B did not send or receive VHF radio telephone or other signal lights with Vessel A and there was no communication between Vessel B's bridge watch officers and its CIC[*13] watch standers regarding Vessel A's DCPA information and risk of collision.

At around 01:29, after watch officer B_1 gave the direction to take hard port, at around 01:30, the collision occurred between the port bow section of Vessel A and the starboard midship front section of Vessel B.

Watch officer B_1, watch officer B_2, and watch officer B_3 did not notice daylight signalling lamp emitted from Vessel A to Vessel B.

After the collision, control on damage was done by crews (treatment for minimizing effects on restoration by controlling watertight doors and others for flood as a result of damage.

(3) Vessel C

It was as follows according to the statement of a master of Vessel C (hereinafter referred to as "master C") and a logbook of Vessel C.

At around 00:25 on June 16, 2017, Vessel C, with master C, a second officer (hereinafter referred to as "officer C"), and 11 crews on board, set sail from Ako port, Hyogo Prefecture for Chiba port, Chiba Prefecture.

At around 00:26 on 17th, officer C took over watch off Izu Peninsula and altered the course from 078° to 040° by autopilot at a way point off Mikomotoshima lighthouse.

At around 00:32, officer C, after altering the course, saw a port light of Vessel B right ahead recognizing it to be a meeting vessel and turned to starboard to make the course 068° in order to go in a manner of port versus port.

Officer C thought that Vessel B would be a warship due to the small interval of masthead lights when Vessel B approached at the distance of about 5M.

At around 00:43, when officer C turned to port to bring back the course to the scheduled course of 040°, Vessel B started to turn to port and therefore, at around 00:52, officer C emitted a search light seven times, but was not able to see reactions from Vessel B.

Vessel C turned to starboard for avoiding Vessel B, but Vessel B continued to turn to port and therefore officer C emitted the search light seven times again.

At around 01:09, Vessel C was in the closest point of about 0.6 to 0.7M to Vessel B in a manner of starboard versus starboard.

Officer C found in the moonlight that the meeting vessel was a warship.

(4) Vessel D

It was as follows according to the statement of a master (hereinafter referred to as "master D"), a second officer (hereinafter referred to as "officer D"), and a third officer of Vessel D, and a logbook of Vessel D.

Vessel D, with master D, officer D, and 20 crewmen on board, set sail from Shimizu port, Shizuoka City, Shizuoka Pref. for Yokohama-ku, Keihin port on June 16, 2017.

VHF radio device of Vessel D was inspected including function testing and found no problem before departure.

[*13] "CIC (Combat Information Center)" means a combat information center in a warship where information on the status of the vessel is brought together. It performs mutual communication with the bridge to contribute to safety navigation while sharing information.

Officer D had experience of navigating along the course (from Shimizu Port to Yokohama Port) many times and recognized 10 vessels or more by Radar at the time of taking over the watch (00:00 on June 17) before the accident.

Officer D had recognized Vessel A which was following at the starboard side and grasped that a vessel (Vessel B) was approaching from the port side to the bow.

Officer D did not notice daylight signalling lamp emitted from Vessel A to Vessel B.

At around 01:15 on 17th, although officer D noticed that Vessel B was a warship, and at around 01:28, confirmed that Vessel B passed at about 1.2M of the bow of Vessel D.

(5) Vessel E

It was as follows according to the statement of a master (hereinafter referred to as "master E") and a second officer (hereinafter referred to as “officer E”) of Vessel E, and a logbook of Vessel E.

Vessel E, with master E, officer E, and 24 crewmen on board, set sail from Xiamen port, People's Republic of China for Long Beach port, United States of America on June 14, 2017.

At around 01:30 on 17th, officer E confirmed that Vessel A altered the course to starboard by impact after Vessel A and Vessel B had collided.

At around 01:34, officer E suspected the movement of Vessel A, confirmed the intention by communication with Vessel A by VHF radio telephone, and urged it to navigate through the port side of Vessel E. In addition, he gave the direction to take the right rudder 20° from the movement of Vessel A, and after confirming that Vessel A turned to the port side and judging the distance to Vessel A was far enough, returned to the original course.

At around 01:30:34 on June 17, 2017 was the date of occurrence of this accident and the place of occurrence was in the vicinity of 113° true and 12.3M from Irouzaki lighthouse.
(Refer to Attached figure 1: Estimated navigation path, Attached figure 2: Estimated navigation path (enlargement), Attached figure 5: Radar image of Vessel D)

2.1.4 Rescue Progress after Collision

Communication situation with each vessel and rescue progress to Vessel A and Vessel B were as follows according to the questionnaire of the 3rd Regional Coast Guard Headquarters.

(1) Rescue progress by Japan Coast Guard

① Communication situation

At around 02:25 on June 17, 2017, the operation center of the 3rd Regional Coast Guard Headquarters (hereinafter referred to as “the operation center”) commenced and continuously communicated with Vessel A and Vessel B by VHF radio telephone (in English) to identify a vessel in distress, locate the distress point, and hear situations from crew.

At around 02:34, the operation center found from the communication with Vessel A that Vessel B had requested some rescue and therefore started to call Vessel B by VHF radio telephone (in English) to hear of damage to Vessel B and the detailed rescue request.

At 15:15 on 18th, the operation center was informed from Commander of U.S. Naval Forces Japan, “there are no missing crew on the sea.” and therefore finished the search.

② Contents

Marine rescue, situation investigation, search for missing persons, request of dispatching Japan Maritime Self-Defense Force for disaster relief, adjustment with relevant organizations for search waters, and others

③ Number of used vessels (total)

10 patrol vessels, 5 aircrafts of Japan Coast Guard, special rescue team, 7 vessels and 6 aircrafts of Japan Maritime Self-Defense Force, 2 police aircrafts

④ Period

June 17 and 18

(2) Rescue by private vessels

Vessel B was towed into Yokosuka port by tugboat while being drained.

2.2 Injuries to Persons

It was as follows according to the statement of master A and NAVY report.

(1) Vessel A

There were no human casualties.

(2) Vessel B

7 crewmen in a second accommodation space of the starboard bow under water surface drowned by flood as a result of holes, commanding officer B was injured in a commanding officer room, and 2 crewmen were injured.

2.3 Damage to Vessel

(1) Vessel A

Damaged recessed part and abrasions of port bow bulwark, laceration in bow chock, damaged recessed part of port anchor and damaged recessed part in the bulbous bow (Refer to Figure 1 to Figure 3 and Attached figure 3: Damaged part of Vessel A (plan view and side view))

Figure 1: Damage of Vessel A (bow)

Laceration in bow chock
(from the inside of fore peak tank)

Damaged recessed bulwark

Figure 2: Damage of Vessel A (port bow)

State in dock

Damaged recessed port anchor shank

Figure 3: Damage of Vessel A (bottom section and anchor)

(2) Vessel B

Damaged recessed part and broken holes in the starboard midship front shell and in a second accommodation space of the starboard bow under water surface (Refer to Figure 4, Figure 5 and Attached figure 4: Damaged part of Vessel B (side view))

Figure 4: Damage of Vessel B (near the starboard midship front section)
(provided by US Coast Guard)

Outside damage ①

Outside damage ②

Outside damage ③

Inside damage ①

Inside damage ②

Figure 5: Damage of Vessel B (provided by US Coast Guard)

2.4 Crew Information

(1) Gender, Age, and Certificate of Competence

① Master A: Male 48 years of old
Nationality: Republic of the Philippines
Master's License (Republic of the Philippines)
Date of issue: February 3, 2016 (valid until February 3, 2021)

② Officer A: Male 54 years of old
Nationality: Republic of the Philippines

Officer's License (Republic of the Philippines)
Date of issue: December 3, 2015 (valid until December 3, 2020)

③ Able seaman A: Male 41 years of old
Nationality: Republic of the Philippines
He had a certificate for deck watch.

④ Commanding officer B: Male
Nationality: the United States of America

⑤ Watch Officer B_1: Female (Director of operation when the accident occurred)
Nationality: the United States of America

⑥ Watch Officer B_2: Female
Nationality: the United States of America

⑦ Watch Officer B_3: Male
Nationality: the United States of America

Information such as ages and certificates of competency about crews of Vessel B could not be checked.

(2) Major Seagoing Experience or Others

It was as follows according to the statement of master A, office A and able seaman A, the questionnaire of Company A_1, and the written statement of commanding officer B, watch officer B_1, watch officer B_2 and watch officer B_3.

① Master A

Master A had been a crew since 1995 and taken the position of master since 2009. He had been on board Vessel A since April 23, 2017. He had experienced navigating near the place where the accident occurred more than 50 times.

② Officer A

Officer A had been a crew since 1987 and on board Vessel A since April 23, 2017. He had experienced navigating near the place where the accident occurred more than 50 times.

③ Able seaman A

Able seaman A had been a crew since 2001 and on board Vessel A since November 27, 2016.

④ Commanding officer B

Commanding officer was on board Vessel B as executive officer in November 2015, received training in United States for several months and assumed the position of commanding officer on May 13, 2017.

⑤ Watch officer B_1

Watch officer B_1 entered the US Navy via the officer training center in August 2013 and Vessel B was the second one which she served. She started her service on board Vessel B in May 2016 and assumed the position of an officer in January 2017.

⑥ Watch officer B_2

Watch officer B_2 entered the US Navy in 2012 and Vessel B was the third one which she served on board in her 5-year career.

⑦ Watch officer B_3

Watch officer B_3 entered US Navy in October 2016, graduated from the United States Naval Academy in January 2017 and served on board Vessel B. He took the officer basic course between March and May, 2017.

2.5 Vessel Information

2.5.1 Particulars of Vessel

(1) Vessel A

IMO number:	9360611
Port of registry:	Manila, Republic of the Philippines
Owner:	SINBANALI SHIPPING INC. (Republic of the Philippines)
Operator:	Company A_1
Management company:	SEA QUEST SHIP MANAGEMENT INC. (Republic of the Philippines) (hereafter referred as to "Company A_2")
Classification:	Nippon Kaiji Kyokai
Gross tonnage:	29,060 tons
L×B×D:	222.60m × 30.10m × 16.80m
Hull material:	Steel
Engine:	Diesel engine unit 1
Output:	28,880kW
Propulsion:	One fixed-pitch propeller
Date of launch:	June 20, 2008
Date of construction:	April 24, 2008

(Refer to Figure 6)

Figure 6: Vessel A

(2) Vessel B

Owner:	US Navy
Operator:	US Navy
Gross tonnage:	8,261 tons
L×B×D:	153.90m × 20.10m × 9.40m
Hull material:	Steel
Engine:	Gas turbine engine unit 4
Output:	73,500kW
Propulsion:	Two controllable variable-pitch propellers
Date of launch:	January 29, 1994

(Refer to Figure 7)

Figure 7: Vessel B (provided by US Coast Guard)

2.5.2 Loading Condition of Vessel A

According to the questionnaire of Company A_1 and the logbook of Vessel A, Vessel A was loaded with container 1,879TEU*14 at the time of departure from Nagoya port. In addition, the draft was, about 9.42m at the bow and about 9.55m at the stern.

2.5.3 Information about the Structure and the like of the Vessels

(1) Vessel A

There was a steering stand in the central part of the bridge, two Radars and Electronic Chart Display and Information System (ECDIS)*15 on the starboard side, and the operation board of main engines on the port side, respectively. (Refer to Figure 8)

*14 "TEU: Twenty feet Equivalent Unit" is a unit of container quantity considering 20-feet container as 1.

*15 "ECDIS: Electronic Chart Display and Information System" is the system for displaying the position of the vessel on an official electronic navigational chart (Electronic Navigational Chart or Raster Navigational Chart) which complies with the standard of IHO (International Hydrographic Organization) while superposing other information such as Radar or scheduled course, and having the function of issuing approach warning to shallow waters.

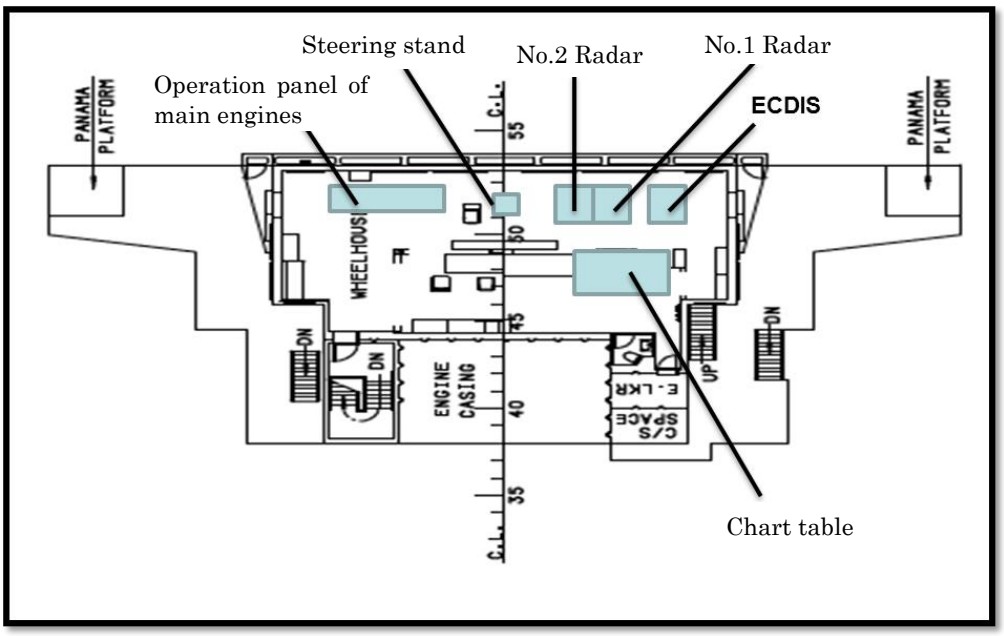


Figure 8: Bridge arrangement of Vessel A

The Radar could superimpose AIS information on the display and was equipped with echo trail[*16] and ARPA.

According to AIS record, position of GPS antenna was at 177m from fore, 8m from Port side.

Although ARPA was used on No.2 Radar at the time of this accident according to the statement of officer A, there was only the record of No.1 Radar picture in VDR and therefore the use status of ARPA soon before the accident occurred could not be checked.

According to the questionnaire of Company A_1, at the time of this accident, there was no trouble or failure of the hull, engine and equipment.

(2) Vessel B

According to the NAVY report, the bridge was established in the front part of the hull center, and in accordance with written statement of watch officer B_1, own vessel AIS information were not linked with Radar display and unable to be sent[*17]. In addition, the arrangement situation about Radar, AIS, VDR, VHF radio telephone, and ECDIS in the bridge of Vessel B could not be checked.

2.5.4 Maneuverability

(1) Vessel A

According to the sea trial results of Vessel A, maneuvering characteristics in the fully-loaded

*16 "Echo trail" means that to display the wake of the Radar image of the target in the form of the afterglow.

*17 "SOLAS convention" refers to the international convention for the safety of life at Sea, 1974.
Warship is excepted carriage requirement of AIS on the basis of SOLAS convention.
Chapter1 Regulation3 Exception
The present regulation, unless expressly provided otherwise, do not apply to:
(ⅰ) Ships of war and troopship
(ⅱ) Cargo ship of less than 500 gross tonnage.
(ⅲ) Ships not propelled by mechanical means.
(ⅳ) Wooden ships of primitive build.
(ⅴ) Pleasure yachts not engaged in trade.
(ⅵ) Fishing vessel.

condition were as shown in Table 7-9.

At around 00:00 on 17 June, according to the statement of a fourth engineer of Vessel A, the rotation speed of main engine was 83 RPM.

Table 7: Speed standard table

	Rotation speed of main engine per minute (rpm)	Speed (kn)
Sea full ahead	104	22.4
Harbour full ahead	56	12.0
Half ahead	47	10.1
Slow ahead	38	8.2
Dead slow ahead	28	6.0

Table 8: Turning characteristics etc table (in MCR[*18] operation (104 rpm))

	Turn to port (23.0kn)	Turn to starboard (23.1kn)
Transfer[*19]	506.0m	627.0m
Advance [*20]	901.0m	1,000.0m
Tactical diameter[*21]	1,219.0m	1,389.0m
Minimum stopping distance (Required time)	2,949.462m (7 minutes 21 seconds)	

Table 9: Turning characteristics etc table (in SLOW operation (56 rpm))

	Turn to port (12.1kn)	Turn to starboard (12.2kn)
Transfer	451.0m	424.0m
Advance	932.0m	900.0m
Tactical diameter	1,029.0m	1,144.0m
Minimum stopping distance (Required time)	1,064.836m (4 minutes 12 seconds)	

In addition, turning characteristics and required time for turning in a ballast fully-loaded condition were as shown in Table 10 and Table 11.

[*18] "MCR (Maximum Continuous output Rating)" refers to a continuous maximum output of the main engine.

[*19] "Transfer" refers to the lateral movement distance on the original course between the hull center of gravity when the steering was turned and the center of gravity when the vessel turned at 90°.

[*20] "Advance" refers to the vertical movement distance on the original course between the hull center of gravity when the steering was turned and the center of gravity when the vessel turned at 90°.

[*21] "Tactical diameter" refers to the lateral movement distance on the original course between the hull center of gravity when the steering was turned and the center of gravity when the vessel turned at 180°.

Table 10: Turning characteristics table (in MCR operation (104 rpm))

	Turn to port (24.7kn)	Turn to starboard (24.8kn)
Transfer	304.0m	377.0m
Advance	711.0m	789.0m
Tactical diameter	843.0m	961.0m

Turning angle	Required time (Turn to port)	Required time (Turn to starboard)
90°	01 minute 24 seconds	01 minute 30 seconds
180°	02 minutes 51 seconds	02 minutes 57 seconds
270°	04 minutes 30 seconds	04 minutes 32 seconds
360°	05 minutes 58 seconds	06 minutes 15 seconds

Table 11: Turning characteristics table (in SLOW operation (56 rpm))

	Turn to port (13.1kn)	Turn to starboard (13.2kn)
Transfer	271.0m	255.0m
Advance	735.0m	710.0m
Tactical diameter	712.0m	791.0m

Turning angle	Required time (Turn to port)	Required time (Turn to starboard)
90°	02 minutes 22 seconds	02 minutes 09 seconds
180°	04 minutes 26 seconds	04 minutes 34 seconds
270°	06 minutes 24 seconds	07 minutes 01 seconds
360°	08 minutes 34 seconds	09 minutes 06 seconds

(2) Vessel B

Maneuvering characteristics of Vessel B could not be checked.

2.5.5 Outlook from the Bridge

(1) Vessel A

Vessel A was designed to meet requirements of navigation bridge visibility based on Chapter 5, Regulation 22, SOLAS convention

At the time of this accident, containers were loaded in up to 5 tiers on the deck and there were no obstacles to lookout in visibility from the bridge to the bow.

(2) Vessel B

Visibility from the bridge to the bow of Vessel B could not be checked.

2.6 Weather and Sea Conditions

2.6.1 Observed Values

(1) The observed values near Irouzaki special regional meteorological observatory which was located at about 12.3M to the west-northwest direction from the accident place were as follows.

At 01:00 on 17th, Temperature 20.8℃, Wind speed 7.3m/s, Wind direction east-northeast

At 01:30, Temperature 20.5℃, Wind speed 7.5m/s, Wind direction east-northeast

(2) According to the website of National Astronomical Observatory of Japan, at the time of this accident, moonrise time, moonset time, and the age of the moon were as follows.

Moonrise time: 23:32 on June 16

Moonset time: 11:14 on June 17

The age of the moon: 21.8 on June 17

(3) The situation of ocean currents based on ECDIS data of Vessel A was as follows.

Between around 01:17 and 01:30 on June 17, Vessel A was influenced by ocean currents with a speed of 0.1 to 0.7kn from the port side in the southeast off Irouzaki.

2.6.2 Observation by Crew

(1) Vessel A

At around 02:00 on June 17, according to the logbook of Vessel A, the weather was cloudy, the wind blew north at 4, and visibility was good.

The Navigation Handbook (issued by Kaibundo in May, 2004) says the wind with scale grade 4 makes quite many whitecaps on the sea.

(2) Vessel B

According to the NAVY report, the sea was calm, the length of waves was 0.6 to 1.2m, the weather was slightly cloudy with moonlight, and visibility was good.

2.7 Characteristics of the Area

2.7.1 Information on Vessel Congestion

According to the reference to course warnings between Tokyo bay and Kyushu, Southwestern Islands in section 2, Kinkaikouroshi (Japanese coastal waters navigation book), 402 issue, which was published in March 2013 and authored by Japan Coast Guard, the description of the accident waters was as follows.

Off south coast area of Honshu is most congested waters in Japan coastal area, especially there are a lot of traffic which chance to encounter crossing situation at off Mikomotoshima, off Daiozaki, off Shionomisaki, off Murotomisaki, off Ashizurimisaki.

2.7.2 Operational Point of Fishing Vessels around the Accident Waters

It was as follows according to “Agreement on fishery of splendid alfonsino and Japanese bluefish” of Kamo district shipowner union liaison council.

The vicinity of the accident waters is the best fishery grounds with the large catch of splendid alfonsino in Japanese coasts, where there are rules on non-fishing day, time for casting a net, fishing implements, and operational waters.

Both of Inatori branch and Shimoda branch of Izu fishery cooperative had specified Saturday as non-fishing day which was the same day of the week when the accident occurred. Fishing points are ① waters in Figure 9 at a depth of 200m to 600m. At around 03:00 to 04:30, in addition, fishing is done in any branch and at around 15:00, vessels return to port.

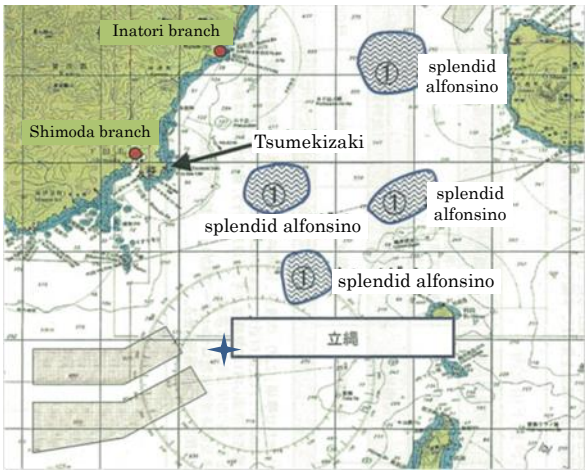


Figure 9: Operational point (✦ : the accident place)

(Extracted from documents of the Japan Association of Marine Safety)

2.8 Information on Bridge Organization and Operation Management of the Vessels

2.8.1 Vessel A

(1) Bridge organization

From 00:00 to 04:00 on 17th, according to the statement of officer A and a watch arrangement table of Vessel A, the bridge watch was two-person system (4-hour shift) and officer A and able seaman A were on the shift at the time of this accident.

(2) Operation management

It was as follows according to a safety management procedure manual of Company A_2.

Company A_2 had established safety management system to ensure safety navigation for the vessel which complies with international safety management regulation based on SOLAS Annex IX, specified a procedure manual related to the bridge watch in the system, and equipped Vessel A with the manual. According to standing order "*Pay attention to vessels shall maintain CPA of not less than one(1) nautical mile and shall closely monitor such vessels if TCPA is 6 minutes. He must call master if unable to maintain such CPA.*"

2.8.2 Vessel B

(1) Bridge organization

According to NAVY report, bridge situation at the time of this accident of Vessel B was as Figure 10. A watch arrangement table of Vessel B, however, could not be checked.

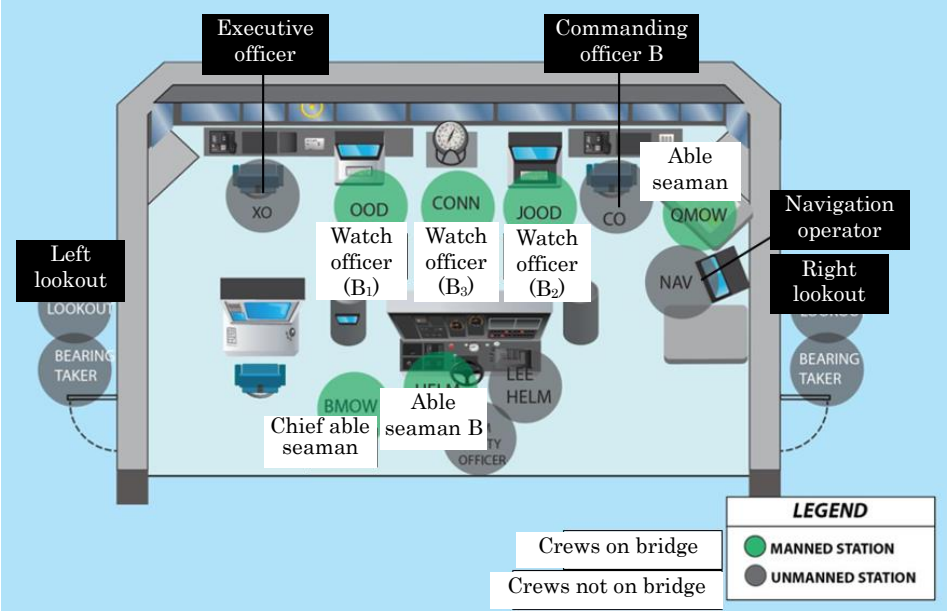


Figure 10: Summary of crews on the bridge

(2) Operation management

According to NAVY report, it was specified in a standing order of Vessel B that a report to commanding officer shall be done when DCPA to other vessels becomes less than 3M.

2.9 Information on Search, Rescue and Mitigation Measures of Damages

It was as follows according to the statement of master A and NAVY report.

In the second accommodation space of Vessel B, a total of 40 people were placed, of whom 5 people were on duty at the time of this accident and of whom 28 people were rescued and 7 people were found dead later.

The second accommodation space had a structure with 3 exits including watertight doors and Vessel B was listed 5° to 7° to the starboard side, but avoided capsize due to control in damage.

3 ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

From 2.1, it is probable that it was as follows.

(1) Vessel A

① At around 16:48 on June 16, 2017, Vessel A set sail from Nagoya port for Tokyo zone, Keihin port.

② At around 01:17:07 on 17th, Vessel A started to turn to port heading 081° at a speed of 18.2kn and, at around 01:19:01, navigated in the east-north-east direction heading 068° at a speed of 17.9kn in the southeast off Irouzaki.

③ Between 01:19:01 and 01:29:20, Vessel A navigated heading 068° to 070° at a speed of 17.9 to 18.5kn.

④ At around 01:29:13, Vessel A started to turn to starboard.

⑤ At around 01:30:34, Vessel A collided with Vessel B during turning to starboard.

(2) Vessel B

① At around 11:30 on June 16, 2017, Vessel B set sail from Yokosuka port for the Port of Subic Bay, Republic of the Philippines.

② At around 23:00, Vessel B navigated in the southwest direction heading 230° at a speed of about 20kn, at around 00:22 on 17th, heading 220°, at around 00:33, heading 215°, at around 00:52, heading 190°, and, at around 01:17:12, navigated in the south-south-west direction heading 189° at a speed of 19.4kn.

③ At around 01:09 Vessel B passed at about 0.6 to 0.7M of DCPA information by Radar to Vessel C in a manner of starboard versus starboard.

④ At around 01:24, Vessel B started to turn to starboard heading 190° at a speed of 19.4kn and at around 01:27:12, navigated heading 200° at a speed of 19.6kn.

⑤ At around 01:28, Vessel B passed at about 1.2M of the bow side of Vessel D while heading about 200° at a speed of about 20kn.

⑥ At around 01:30:34, Vessel B collided with Vessel A during turning to port.

(3) Vessel C

① At around 00:25 on June 16, 2017, Vessel C set sail from Ako port, Hyogo Prefecture for Chiba port.

② At around 00:26 on 17th, Vessel C altered the course from 078° to 040° at a way point off Mikomotoshima lighthouse.

③ At around 00:32, Vessel C turned to starboard to make the course 068° after altering the course.

④ At around 00:43, Vessel C turned to port in order to return the course to the scheduled course of 040°, and at around 01:09, Vessel B passed ahead of Vessel C navigated heading 045° at a speed of about 12.9kn in a manner of starboard versus starboard when DCPA information on Radar was about 0.6 to 0.7M.

(4) Vessel D

① Vessel D set sail from Shimizu port for Yokohama-ku, Keihin port on June 16, 2017.

② At around 01:28 on 17th, Vessel D navigated heading 075° at a speed of 16.5kn and Vessel B passed at about 1.2M of the ahead of Vessel D.

(5) Vessel E

① Vessel E set sail from Xiamen port, for Long Beach port, United States of America on June 14, 2017.

② At around 01:30 on 17th, Vessel E continued to keep the course and speed to navigate in the east-north-east direction.

③ At around 01:34, Vessel E navigated headings 059° at a speed of about 19.5kn, the movement of Vessel A aroused suspicion, which led to the issuance of a direction to take the right rudder 20°, but the course was returned to the original one because it was judged that the distance to Vessel A was far enough.

3.1.2 Analysis on Bearing and Distance between Vessel A and Vessel B

From 2.1.1, the bearings and distances between Vessel A and Vessel B were as Table 12 based on AIS record of Vessel A (extract) (Table 1) and position and other information of Vessel B (Table 2).

It is probable that Vessel A and Vessel B were within view from each other and they approached

in a manner of crossing the courses of each other while Vessel A saw Vessel B at the port side and Vessel B saw Vessel A at the starboard side.

After, at around 01:17, Vessel A altered the course (turn to port by 13°) and, at around 01:24, Vessel B altered the course (turn to starboard by 10°), for about 3 minutes from around 01:24:01 to 01:26:55, the change of relative bearings between Vessel A and Vessel B was about 0.7° and the distance between Vessel A and Vessel B was changed to be closer from about 3.9M to about 2.2M by about 1.7M, and therefore it is probable that it was that situation where the risk of collision must be considered for both vessels.

Table 12: Bearings and Distances between Vessel A and Vessel B

Time (Vessel A) (h:mm:ss)	Time (Vessel B) (h:mm:ss)	Bearing of Vessel B from Vessel A (°)	Distance between vessels (M)	Bearing of Vessel A from Vessel B (°)	Bearing change for 1 minute (°)
1:20:02	1:19:57	42.1	6.05	222.1	
1:21:02	1:20:57	42.5	5.53	222.5	0.4
1:21:50	1:21:57	43.4	5.05	223.4	0.9
1:23:02	1:22:57	43.3	4.43	223.3	−0.1
1:24:01	1:23:57	44.0	3.93	224.0	0.7
1:24:55	1:24:57	44.5	3.37	224.5	0.5
1:26:01	1:25:57	44.4	2.76	224.4	−0.1
1:26:55	1:26:57	44.7	2.24	224.7	0.3
1:27:55	1:27:57	44.9	1.67	224.9	0.2
1:28:43	1:28:57	47.2	1.13	227.2	2.3
1:29:55	1:29:57	49.4	0.50	229.4	2.2
1:30:27	1:30:27	46.7	0.23	226.7	−2.7

3.1.3 Date and Time, and the Place of Accident Occurrence

From 2.1, it is probable that the date and time of the occurrence of this accident was at around 01:30:34 on June 17, 2017 when an impact sound was recorded in VDR of Vessel A and the place of accident occurrence was the vicinity of 113° and 12.3M from Irouzaki lighthouse based on AIS information of Vessel A at 01:30:27.

3.1.4 Situation of Casualties

From 2.2, it is probable that 7 crewmen of Vessel B were in a second accommodation space of the starboard bow under the water surface at the time of the collision and drowned by flood as a result of holes, and commanding officer B was injured in a commanding officer room and 2 crewmen were injured in the inside of the vessel.

3.1.5 Situation of Damage

From 2.3, it is probable that it was as follows.

(1) Vessel A had a damaged recessed part and abrasions of port bow bulwark, a laceration in bow chock, a damaged recessed part of port anchor and a damaged recessed part in the bulbous bow.

(2) Vessel B had a damaged recessed part and broken holes in the starboard midship front shell and in the second accommodation space of the starboard bow under water surface.

3.1.6 Situation of Collision

From 2.1 and 3.1.2 to 3.1.5, it is probable that the port bow section of Vessel A collided with the starboard midship front section of Vessel B and that bulbous bow of Vessel A collided with around second accommodation space of Vessel B .

3.2 Causal Factors of the Accident

3.2.1 Situation of Crews

(1) Vessel A

From 2.4 master A and officer A had legal valid certificate of competence and able seaman A had a certificate for deck watch, respectively. In addition, from 2.8.1 it is probable that at around 00:00 on 17th, officer A and able seaman A were on duty.

(2) Vessel B

From 2.1.3(2) it is probable that at around 04:00 to 06:00 on 16th, watch officer B_1, watch officer B_2, and watch officer B_3 got up and had participated in various types of training in Sagami bay and, at around 22:00, watch officer B_1, watch officer B_2, and watch officer B_3 were on duty.

3.2.2 Situation of Vessels

From 2.1.3(2) and 2.5.3, it is probable that it was as follows.

(1) Vessel A

At the time of this accident, there was no trouble or failure of the hull, engine and equipment.

(2) Vessel B

Although the status of the hull, engine and equipment could not be confirmed at around 01:25 and 01:27 clutters occurred in the range of 2 to 3M around Vessel B on the Radar display due to insufficient Radar adjustment.

3.2.3 Situation of Weather and Sea Conditions

From 2.6, it is probable that the weather was cloudy, the wind blew east-north-east at 4, visibility was good, there was a moon whose age was 21.8, and ocean currents ran at a speed of 0.1 to 0.7kn in the east direction at the time of this accident.

3.2.4 Situation around the Place of Accident Occurrence

From 2.7, although surroundings of the place where this accident occurred were congested waters with a lot of traffic, it is probable that fishing vessels belonging to Inatori branch and Shimoda branch of Izu fishery cooperative did not go fishing because the day of the accident was Saturday.

3.2.5 Situation of Operation Management of Vessels

From 2.1.3 and 2.8, it is probable that it was as follows.

(1) Vessel A

Although officer A was obliged to pay attention and report to the master based on a standing order of Vessel A when DCPA to other vessels is within 1M or TCPA (time to closest point of approach) is less than 6 minutes, he did not make a report because he thought Vessel B would avoid Vessel A.

(2) Vessel B

Although watch officer B_1 was obliged to report to commanding officer B based on a standing order of Vessel B when DCPA to other vessels became less than 3M, she did not make a report at around 00:58 while she reported to commanding officer B at around 00:30 and then was responded no specific order.

3.2.6 Situation of Lookout and Maneuvering

From 2.1, 2.5.3, 2.5.4, 3.1 and 3.2.2(2), it was as follows.

(1) Vessel A

① It is probable that officer A and able seaman A were on the lookout by sight and two Radars which were No.1 Radar (X-band) set at 12M range and No.2 Radar (S-band) set at 6M range.

② It is probable that at around 01:25 on 17th, officer A and able seaman A recognized approaching Vessel B at about 24° and about 3M from the port bow side by Radar and sight (although there was about 40° from the port bow side according to officer A, here was about 24° from the port bow side between Vessel A's heading 068° and the course 44.5° from Vessel A to Vessel B in Table 12.) and thought that Vessel A was a vessel required to keep her course and speed that Vessel B should avoid navigation heading 068° at a speed of 18.5kn.

③ It is probable that at around 01:27:35, officer A had suspicion from no change of relative bearings against Vessel B in the situation where the risk of collision must be considered, emitted a daylight signalling lamp to Vessel B, thought that Vessel B would notice and avoid Vessel A if emission of the daylight signalling lamp was repeated though Vessel B did not have reaction to the first emission, and therefore he navigated at the constant course and speed. The distance between A ship and B ship was about 1.7 M. It is somewhat likely that B ship was sailing within the distance of light of daylight signalling lamp emitted from A ship. It is certain that warning signal[*22] on the basis of COLREG convention is by giving more than five short and rapid blasts on the whistle, this emission of daylight signalling lamp does not mean as warning signal.

④ It is probable that officer A did not see Vessel B take action to avoid Vessel A and the change of relative bearings, and therefore, at around 01:29:13, turned to starboard by 15° by manual steering and, at around 01:29:25 and 01:29:48, emitted the daylight signalling lamp to Vessel B again.

⑤ It is probable that, at around 01:29:55, officer A took the starboard side rudder 30° when the distance to Vessel B became about 0.5M during navigation heading 082° at a speed of 18.5kn, and at around 01:30:18, the starboard side rudder 35°.

⑥ It is probable that it was late for officer A to take the cooperative action to avoid collision, taking the turning characteristics of Vessel A into consideration.

(2) Vessel B

① It is probable that watch officer B_1 used the Radar set at 12M range and watch officer B_2 was on the lookout mainly by sight together with watch officer B_3.

② It is probable that watch officer B_1 recognized Vessel D and Vessel A at the starboard bow side by radar at around 01:05. It was expected that her vessel would pass at about 1,500 yards (about 0.7M) of the bow of Vessel D, which was the closer vessel, but it was probable

[*22] "Warning signal " is signal on the basis of convention on the international regulations for preventing collisions at sea, 1972 (COLREG convention) rule 34(d).

that CPA information on Vessel A, which navigated further, could not be obtained due to frequent blinking on its radar display.

③ It is probable that, at around 01:09, Vessel B passed at about 0.6 to 0.7M of DCPA to Vessel C in a manner of starboard versus starboard.

④ It is probable that, at around 01:20:12, watch officer B_2 recognized the risk of collision to Vessel A during course over the ground 188.7° at a speed of 19.6kn and reported it to watch officer B_1 with a suggestion about deceleration. It is probable that watch officer B_1, who was preparing to make a report to commanding officer B, was worried about disruption of surrounding vessels and therefore navigated while keeping the course and speed, paying attention to Vessel D, which navigated parallel in the north of Vessel A, without lookout for Vessel A.

⑤ It is somewhat likely that, at around 01:24, Watch officer B_1 started to alter the course from about 190° to about 200° in order to navigate along the scheduled course because watch officer B_1 thought that it could pass at the bow side of Vessel A.

⑥ It is probable that Vessel B had not performed mutual communication between its bridge and CIC about DCPA information of Vessel A and the risk of collision.

⑦ It is probable that, at around 01:25 to 27, watch officer B_1 did not grasp the movement of Vessel A due to clutters in the range of 2 to 3M around Vessel B on the Radar display in the situation where risk of collision must be considered.

⑧ It is probable that watch officer B_1, watch officer B_2, and watch officer B_3 did not notice daylight signalling lamp emitted from Vessel A to Vessel B by improper lookout.

⑨ It is probable that, at around 01:27, watch officer B_1 belayed the direction soon, which was given to alter the course to 240° in order to navigate between Vessel A and Vessel D, and gave another direction to turn to port and increase the speed to 25kn, which was not performed.

⑩ It is probable that, at around 01:28, Vessel B passed at about 1.2M of the bow side of Vessel D while heading about 200° at a speed of about 20kn.

⑪ It is probable that, at around 01:29, watch officer B_1 gave the direction to take a hard port to avoid collision with Vessel A.

3.2.7 Analysis on Accident Occurrence

From 2.1, 2.4(2), 2.5.4, 3.1.1, 3.1.2 and 3.2.6, it was as follows.

(1) Vessel A

① It is probable that, at around 16:48 on June 16, Vessel A set sail form Nagoya port, from around 01:17:07 on 17th, gradually altered the course to port during navigation in the southeast off Irouzaki, and, at around 01:19:01, navigated in the east-north-east direction heading 068° at a speed of 17.9kn.

② It is probable that, at around 01:25, officer A recognized Vessel B at about 24° and about 3M from the port bow side and thought that Vessel B would avoid Vessel A because Vessel A was a vessel required to keep her course and speed.

③ It is probable that, at around 01:27:35, officer A emitted daylight signalling lamp to Vessel B in the situation where the risk of collision was considered, thought that Vessel B would notice and avoid Vessel A, and therefore navigated at a constant course and speed, which led to the collision between Vessel A and Vessel B.

(2) Vessel B

① It is probable that, at around 00:22 on 17th, Vessel B, which navigated for the Port of Subic Bay, altered the course to 220°, at around 00:33, 215°, and at around 00:52, 190°, and, at around 01:17:12, navigated in the south-south-west direction heading 189° at a speed of 19.4kn.

② It is probable that watch officer B_1 recognized Vessel D and Vessel A at the starboard bow side by radar at around 01:05. It was expected that her vessel would pass at about 1,500 yards (about 0.7M) of the bow of Vessel D, which was the closer vessel, but it was probable that CPA information on Vessel A, which navigated further, could not be obtained due to frequent blinking on its radar display.

③ It is somewhat likely that watch officer B_1 was not properly maintaining a lookout for Vessel A because Vessel D approached the starboard bow side of Vessel B and Radar information of Vessel A were not surely obtained.

④ It is probable that at around 01:20, watch officer B_1 received a suggestion of deceleration due to risk of collision to Vessel A from watch officer B_2, but was worried about disruption of surrounding vessels and therefore continued to keep the course and speed and was not properly maintaining a lookout for Vessel A because the attention was paid to approaching Vessel D, which navigated parallel in the north of Vessel A.

⑤ It is probable that, from around 01:24, Vessel B gradually altered the course to starboard by watch officer B_1 and, at around 01:27, navigated heading 200° at a speed of 19.6kn.

⑥ It is probable that, at around 01:25 to 27, watch officer B_1 did not grasp the movement of Vessel A due to clutters in the range of 2 to 3M around Vessel B on the Radar display in the situation where risk of collision must be considered.

⑦ It is probable that at around 01:27, watch officer B_1 gave a direction to alter the course to 240°, but drew it back soon, and then order of change rudder to port side and increase speed up to 25kn. However, the reason why she drew it back and why change rudder and speed up were not implemented could not be clarified.

⑧ It is probable that watch officer B_1, watch officer B_2, and watch officer B_3 did not notice daylight signalling lamp emitted from Vessel A to Vessel B by improper lookout.

⑨ It is probable that Vessel B passed at the front of Vessel D at around 01:28.

⑩ It is probable that, at around 01:30:34, the vessel collided with Vessel A during turning to port.

(Refer to Attached table 1: Course of the Events)

4 CONCLUSIONS

4.1 Probable Causes

It is probable that in this accident, at night, in the southeast off Irouzaki, while Vessel A was navigating for the northeast and Vessel B was navigating for the south, Vessel B navigated while keeping the course and speed without proper lookout for Vessel A because the attention was paid to Vessel D, which navigated parallel in the north of Vessel A, and Vessel A navigated while keeping the course and speed, and therefore this accident was caused by the collision of the both vessels.

It is somewhat likely that Vessel B, because the fact that Vessel D approached the starboard bow side of Vessel B and Radar information of Vessel A were not surely obtained, paid attention to Vessel

D, which navigated parallel in the north of Vessel A, and was not properly on the lookout for Vessel A.

It is probable that Vessel A, because daylight signalling lamp were emitted to Vessel B and it was expected that Vessel B would recognize them and avoid Vessel A, navigated while keeping the course and speed.

4.2 Other Identified Safety-Issues

(1) Strict lookout by properly adjusted Radar

It is probable that it was necessary that Vessel B remove clutters by properly adjusting the Radar, although the movement of Vessel A was not grasped due to clutters in the range of 2 to 3M around Vessel B on the Radar display.

(2) Implementation of warning signals

When Vessel A fails to understand the intensions or actions of other vessel, or there is doubt that other vessels are taking sufficient action to avoid a collision, it is probable that it was necessary to implement of warning signals.

(3) Proper performance of the rules of standing order

It is probable that it was necessary to perform proper measures according to the standing orders in both vessels, although the report on approach information of other vessels to the master based on the standing order was not performed in Vessel A and the action to the commanding officer under the standing order was not performed in Vessel B.

5 SAFETY ACTIONS

In this accident, in the southeast off Irouzaki, while Vessel A was navigating for the northeast and Vessel B was navigating for the south, Vessel B navigated while keeping the course and speed without proper lookout for Vessel A because the attention was paid to Vessel D, which navigated parallel in the north of Vessel A, and Vessel A navigated while keeping the course and speed because Vessel B was recognized but it was expected that Vessel B would avoid Vessel A, which led to the collision of the both vessels. In addition, the standing orders were not observed in the both vessels.

Therefore, in order to prevent recurrence of the same type of accidents, it is necessary to enforce the following measures.

(1) Crews on the watch duty shall be always properly on the lookout after properly adjusting Radars (including ARPA) and other navigation devices so as to sufficiently judge surrounding situations and the risk of collision with other vessels.

(2) When there is vessel fails to understand the intensions or actions of other vessel, or there is doubt that other vessels are taking sufficient action to avoid a collision, warning signals shall be sounded.

(3) Cooperative action to avoid collision shall be taken if it is expected that collision cannot be avoided only with the action of another vessel, even if her/his own vessel may keep the course and speed.

(4) Crews shall observe the rules of standing order.

5.1 Safety Actions Taken

5.1.1 Measures taken by Company A_1 and Company A_2

(1) Company A_1 conducted guidance for crews of Vessel A on the vessel in order to make watchkeeping arrangement or methods to use navigation devices well known again.

(2) Company A_2 conducted as follows.

① Proposal for review of procedures for the bridge watch (BTM[*23]) on the basis of ISM Code.[*24]

② Retraining for officer A for the purpose of avoiding collision accidents

③ Review of contents communicated in taking over the watch duty (including confirmation of targets or traffic situation on the Radar)

④ Adoption of evaluation for the watch ability by master

5.1.2 Measures taken by US Navy

US Navy conducted as follows.

(1) Modified employment schedules of vessels based in Japan to ensure adequate time for maintenance, training, and crew certification.

(2) Readiness assessments of all forward-deployed vessels in Japan.

(3) Manning policies to ensure Japan-based ships, which operate at a higher tempo in congested waters, are appropriately manned with qualified officers and enlisted personnel.

(4) Restructured surface warfare officer (SWO) career paths to ensure sufficient time at sea and time to improve maritime skills training.

(5) A standardized program to assess seamanship and navigation skills over the course of a surface warfare officer's career.

(6) Improved seamanship and individual skills requirements and training for surface warfare officer candidates, surface warfare officers, quartermasters, and operation specialists.

(7) Implemented near-miss reporting and critique/lessons learned policy.

(8) Consolidated responsibility and authority for bridge system modernizations.

(9) Direction to U.S. Navy vessels to broadcast AIS information in high-density traffic areas unless operating under threat conditions.

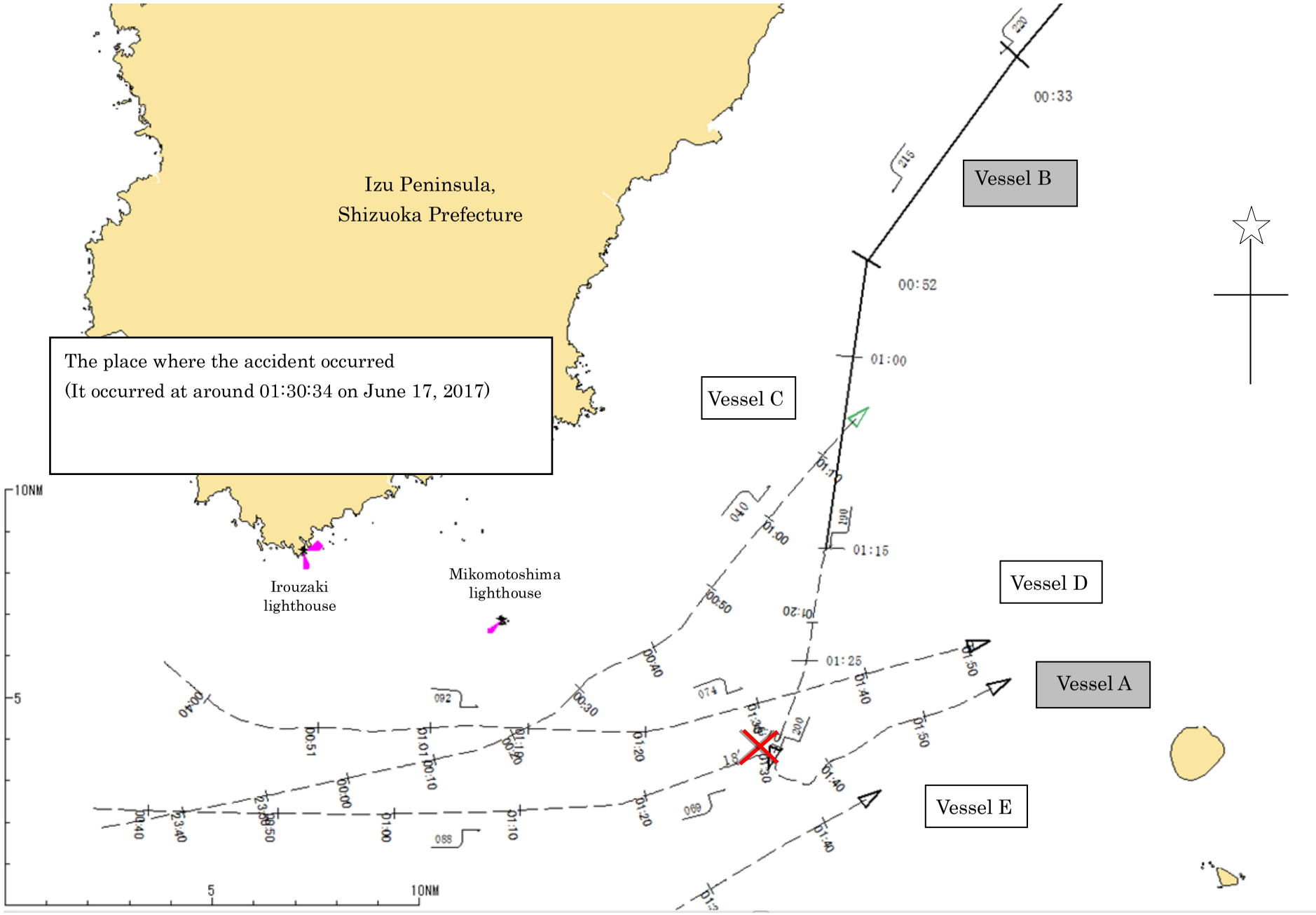
(10) Implementation of watch schedules that account for circadian rhythms.

(11) Changes to the way steering control and propulsion control system are used on board U.S. Navy vessels.

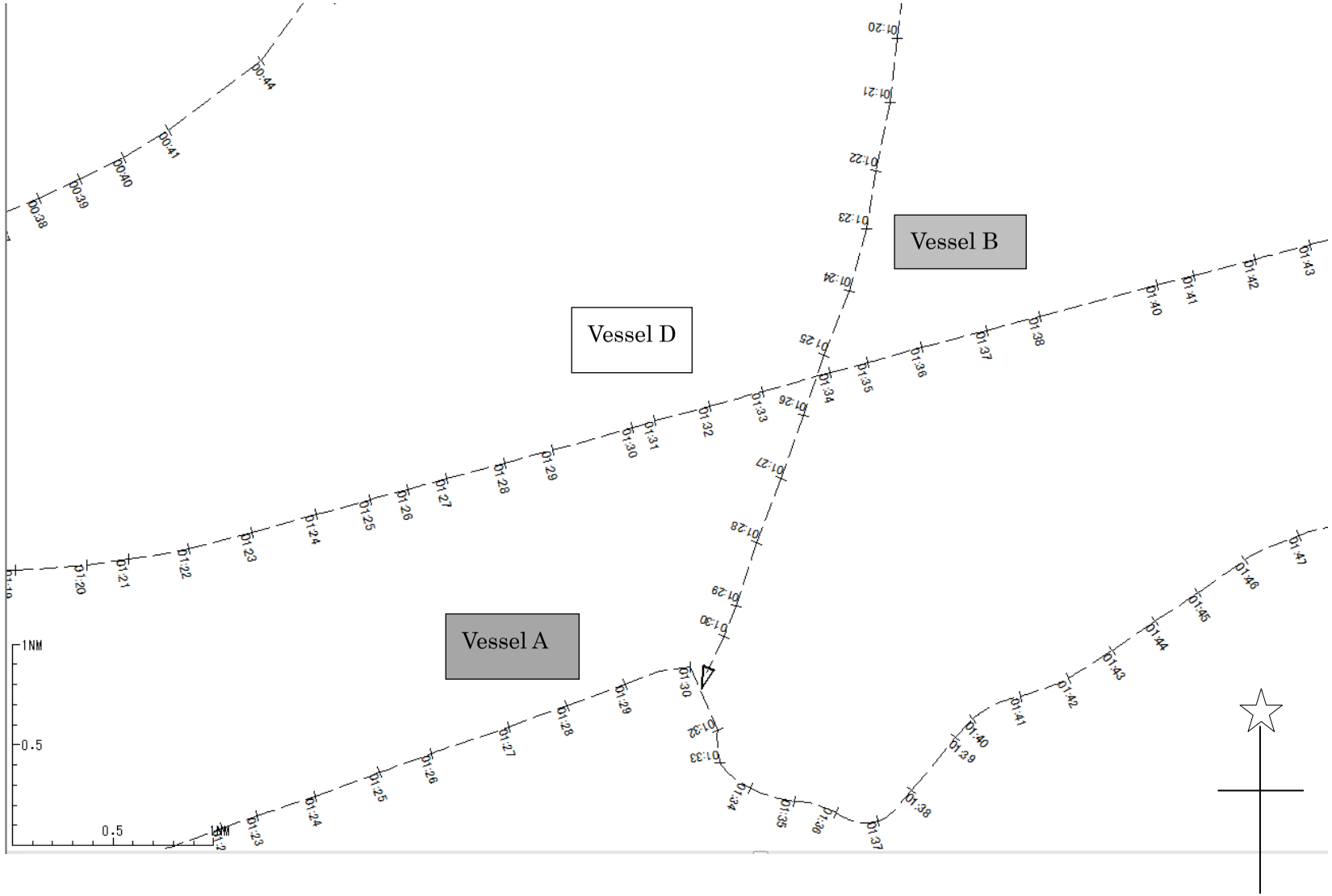
[*23] "BTM (Bridge Team Management)" means the concept of focusing on functions which not only a manager of resources but also each member (individual crews including master) in a team organized in the bridge should perform for the same purpose as BRM. Meanwhile, "BRM (Bridge Resource Management)" means effective management and utilization of resources available in the bridge such as crews, equipment or information for the purpose of keeping and improving operation functions in the bridge, and the concept of focusing on functions which the manager of resources (mainly master) should perform.

[*24] "The International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention" (ISM Code) was adopted by the International Maritime Organization (IMO) on November 4, 1993, for the purposes of ensuring the safe navigation of vessels and protecting the environment. It was incorporated into the Annex of the 1974 SOLAS Convention and entered into effect on July 1, 1998, following a revision of the SOLAS Convention in 1994. It applies to all passenger vessels as well as all vessels with a gross tonnage of 500 tons or more that engage in international navigation.

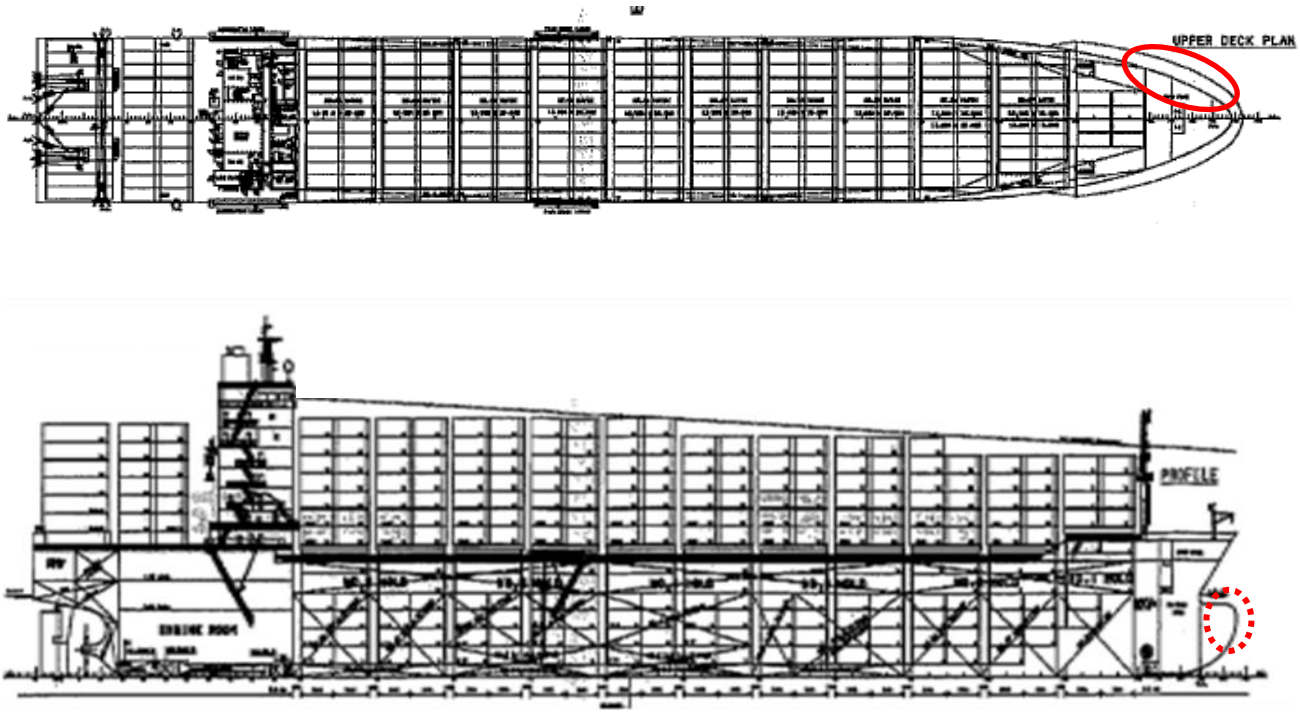
Attached figure 1: Estimated navigation path



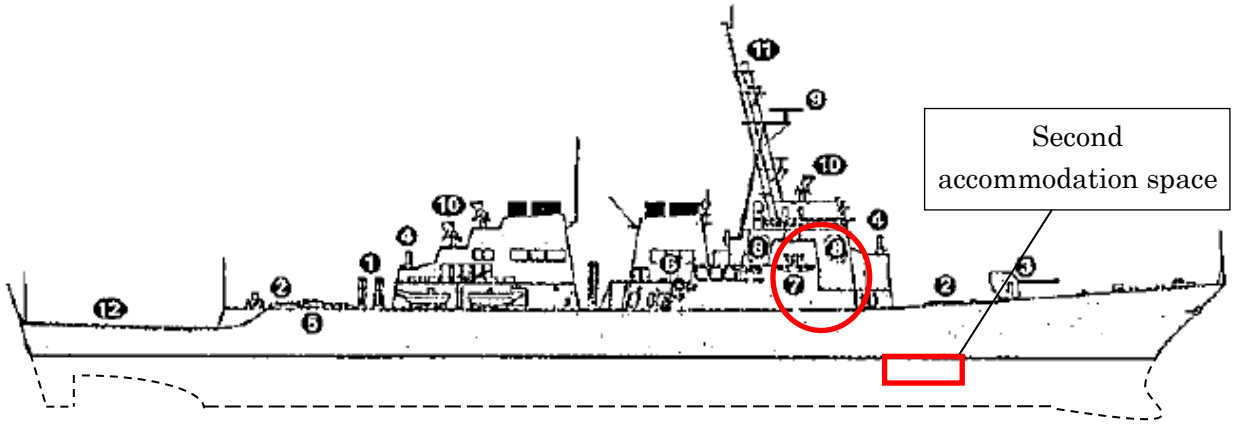
Attached figure 2: Estimated navigation path (enlargement)



Attached figure 3: Damaged part of Vessel A (plan view and side view)



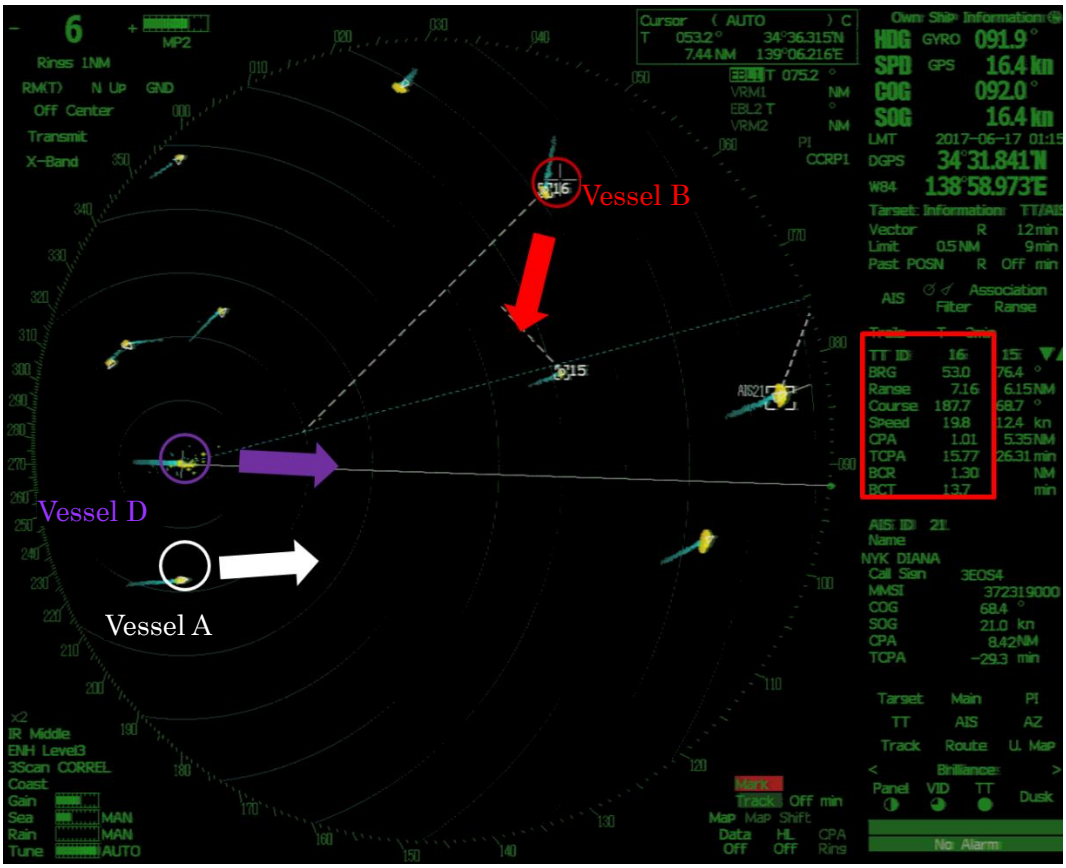
Attached figure 4: Damaged part of Vessel B (side view)



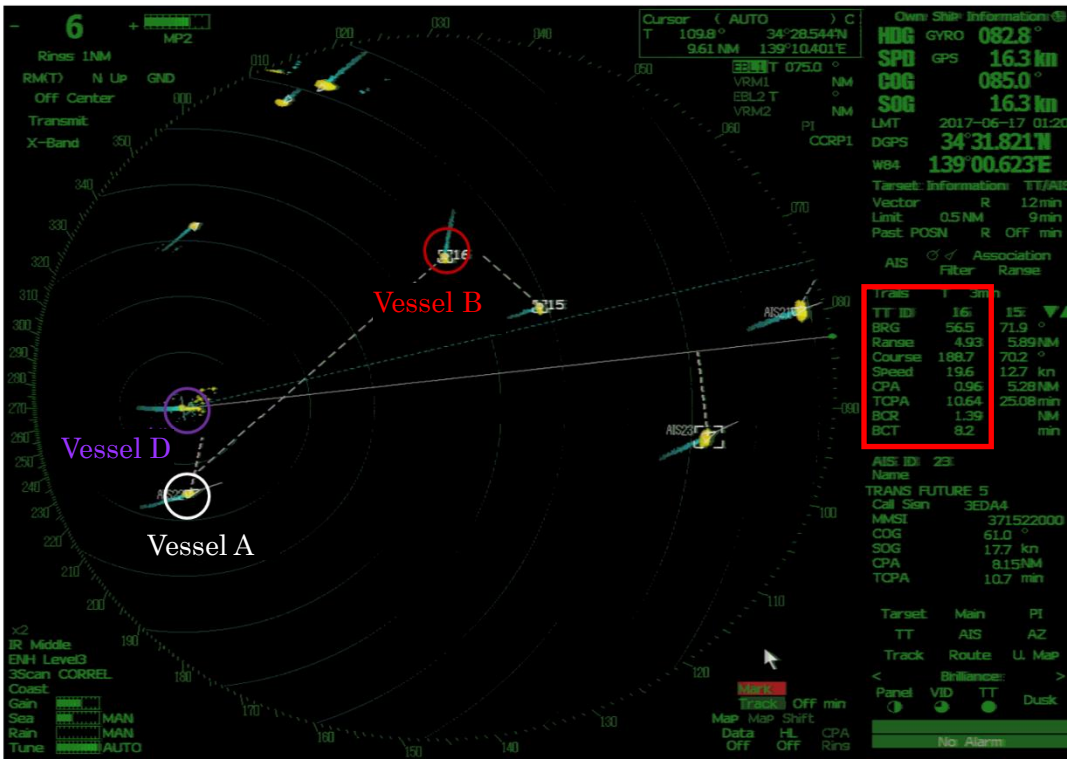
Attached figure 5: Radar image of Vessel D

(1) Around 01:15:12

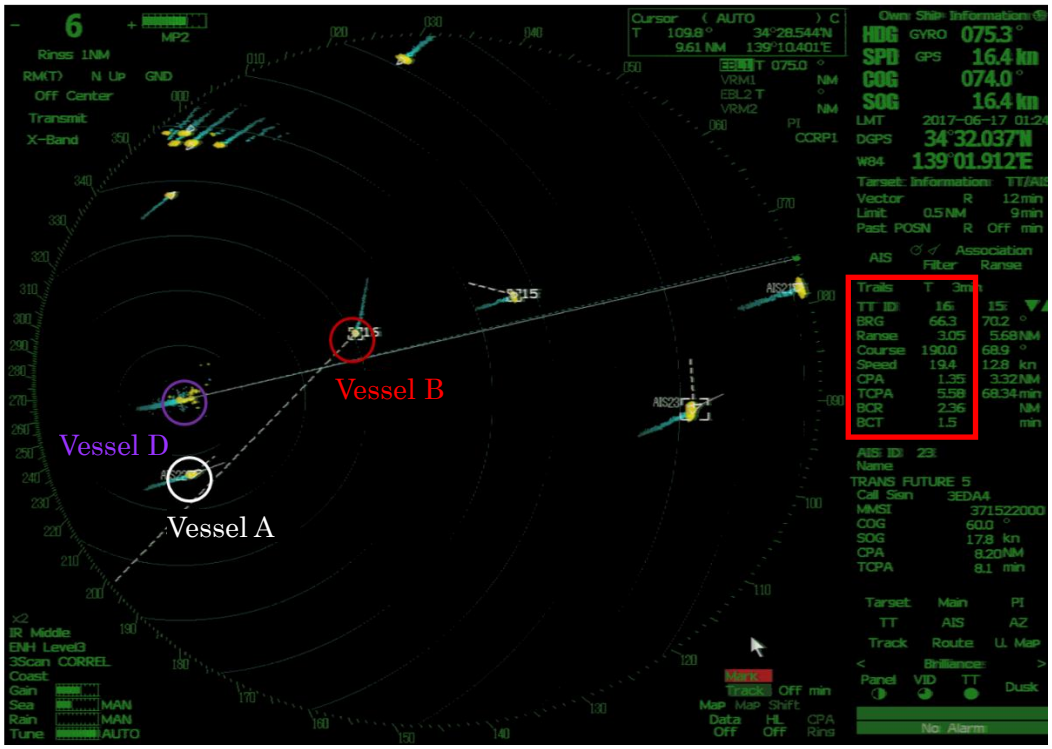
ARPA information of Vessel B



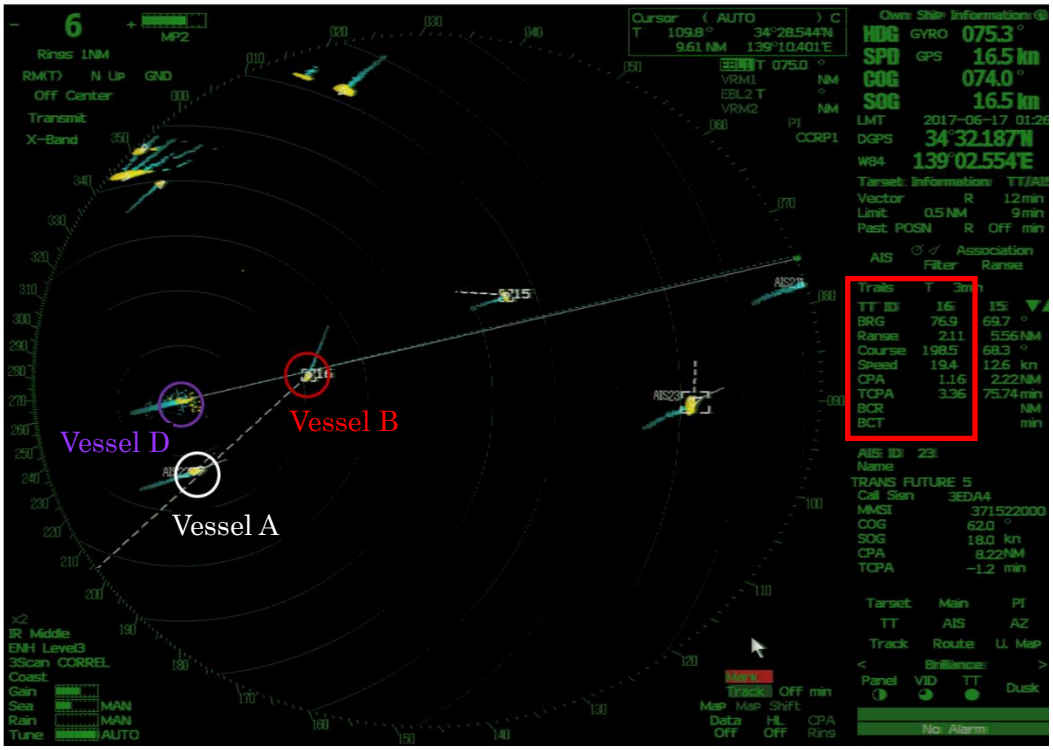
(2) Around 01:20:12



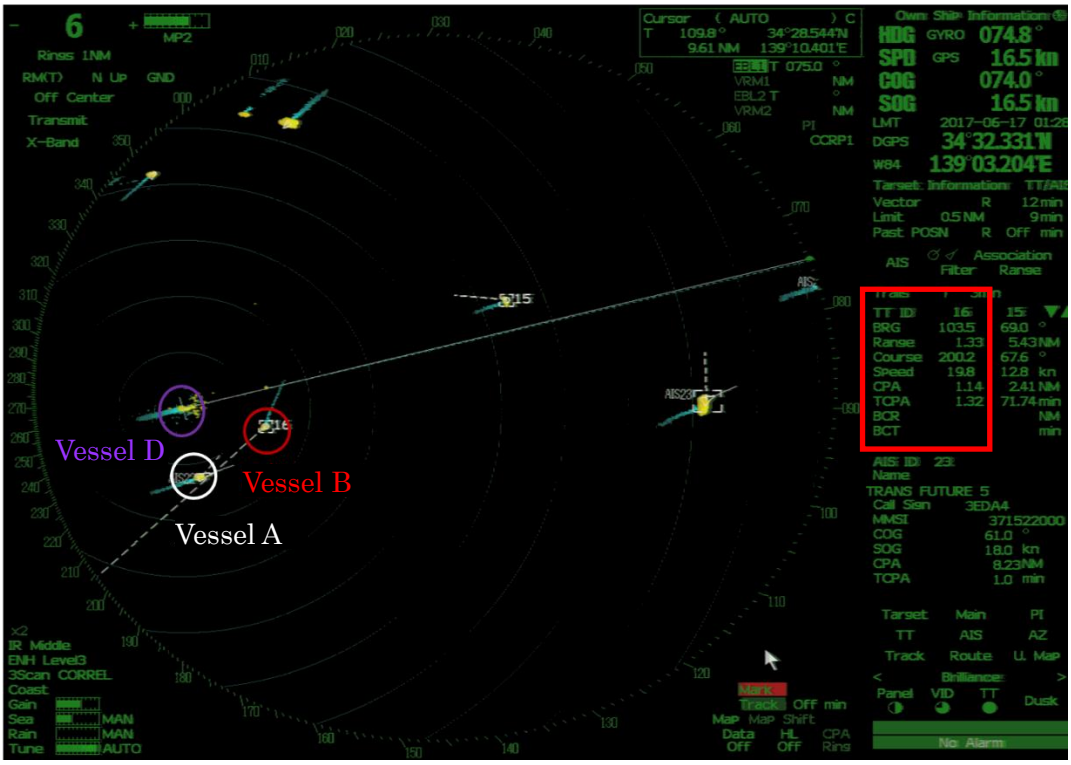
(3) Around 01:24:12



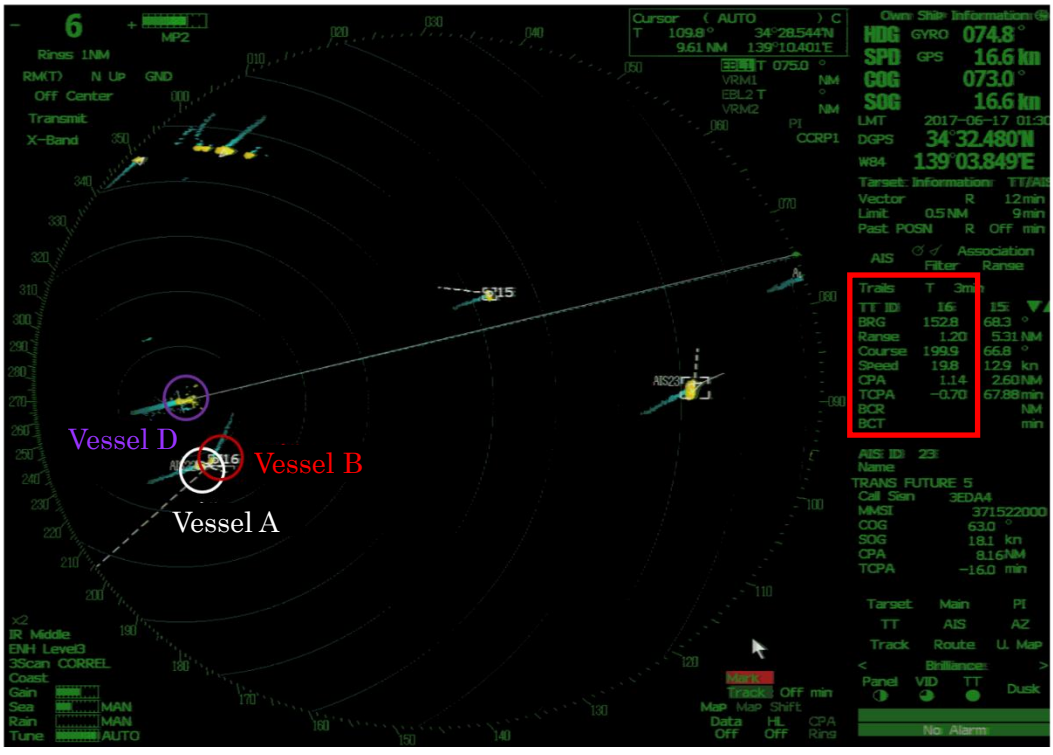
(4) Around 01:26:12



(5) Around 01:28:12



(6) Around 01:30:12



Attached table 1: Course of the Events

Time	Vessel A	Vessel B	Note
Around 11:30 on 16th		It set sail from Yokosuka port for the Port of Subic Bay, Republic of the Philippines.	
Around 16:48	It set sail from Nagoya port for Tokyo zone, Keihin port.		
Around 22:00		Watch officer B_1, watch officer B_2, and watch officer B_3 were on the watch.	
Around 23:00		It left Sagami bay and navigated for the southwest at 230° and a speed of 20kn. Commanding officer B went down from the bridge.	
Around 23:30		Executive officer went down from the bridge.	
Around 00:22 on 17th		It altered the course to 220°.	
Around 00:26			Vessel C altered the course from 078° to 040° off Mikomotoshima lighthouse.
Around 00:32			Vessel C recognized Vessel B and turned to starboard 068° to cross it in a manner of port versus port.
Around 00:33		It altered the course to 215°.	
Around 00:43			Vessel C altered the course to 040° to bring back the course to the scheduled course.
Around 00:52		It altered the course to 190°.	Vessel C emitted search lights to Vessel B. (7 times x 2)
Around 01:05		Watch officer B_1 recognized Vessel D and Vessel A at the starboard bow side. It was expected that her vessel would pass at about 1,500 yards (about 0.7M) of the ahead of Vessel D, which was the closer vessel of them, but CPA information on Vessel A, which navigated further, could not be obtained due to the target frequently dropping from the Radar picture.	
Around 01:09			Vessel C passed at about 0.6 to 0.7M to Vessel B in a manner of starboard versus starboard.
Around 01:15			Vessel D confirmed that Vessel B was a warship during navigating alongside at the port side of Vessel A.
Around 01:17:07	It started to turn to port at 081° and a speed of 18.2kn.		
Around 01:17:12		It navigated for the south-south-west at 189° and a speed of 19.4kn.	
Around 01:19:01	It navigated at 068° to 070° and a speed of 17.9 to 18.5kn until around 01:29:20.		

Time	Vessel A	Vessel B	Note
Around 01:20		Watch officer B_2 recognized Vessel A by sight and the risk of collision and reported it to watch officer B_1 with a suggestion about deceleration. Watch officer B_1 was preparing to make a report to commanding officer B, and kept the speed and course without deceleration.	
Around 01:24		It started to alter the course from 190° to 200°in order to navigate along the scheduled course.	Vessel D navigated alongside at the port side of Vessel A.
Around 01:25	During navigation at 068° and a speed of 18.5kn, it recognized the approaching Vessel B at about 24° and about 3M of the port bow side by radar and sight.		
Around 01:27		The instruction to alter the course to 240° was given but drawn back soon. The instruction to turn port side and increase speed up to 25kn, but it was not implemented.	
		Mutual communication about risk of collision and DCPA information of Vessel A among duty officer between bridge and CIC was not performed.	
Around 01:27:35	Officer A emitted daylight signalling lamp to Vessel B, because officer A had suspicion from no change of relative bearings against Vessel B in the situation.	Watch officers B_1, B_2, and B_3 did not notice the emission of daylight signalling lamp from Vessel A without sufficient lookout.	
Around 01:28		It passed at about 1.2M of Vessel D bow side at about 20kn.	
Around 01:29		There was an instruction to take hard port.	
Around 01:29:02	Warning sound started to ring in the bridge.		
Around 01:29:13	Starboard 15° (Rudder angle indicator)		
	Officer A recognized that it was a warship by sight when Vessel B approached within 1,000m.		
Around 01:29:25	Officer A emitted daylight signalling lamp to Vessel B again.		
Around 01:29:48	Officer A emitted daylight signalling lamp to Vessel B again.		
Around 01:29:55	Starboard 30° (Rudder angle indicator)		
Around 01:30:16	There was an instruction to take hard starboard.		
Around 01:30:18	Hard starboard (Rudder angle indicator)		
Around 01:30:34	Collision with vessel B	Collision with vessel A	