

MA2017-9

**MARINE ACCIDENT  
INVESTIGATION REPORT**

September 28, 2017



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.

Kazuhiro Nakahashi  
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: Chemical Tanker BUCCOO REEF  
Vessel number: 142281 (IMO number: 9733674)  
Gross tonnage: 21,101 tons

Accident type: Fatality of a crew member  
Date and time: Around 19:15, April 22, 2016 (local time, UTC +2 hours)  
Location: Port of Bordeaux, French Republic  
Around 342° true bearing, 1.8 nautical miles from the Cariette Lighthouse  
(approximately 44°54.9'N, 000°32.7'W)

September 7, 2017

Adopted by the Japan Transport Safety Board

Chairman	Kazuhiro Nakahashi
Member	Kuniaki Syoji
Member	Satoshi Kosuda
Member	Toshiyuki Ishikawa
Member	Mina Nemoto

## SYNOPSIS

### < Summary of the Accident >

While the chemical tanker BUCCOO REEF was docking, with a master, 21 crew members and a pilot onboard, assisted by tugboats at the port of Bordeaux, French Republic, at around 19:15 on April 22, 2016 (local time), an ordinary seaman who was letting out the messenger rope of a tug line was struck on his body by a structural part of the bow and fell overboard and died on April 23.

### < Probable Causes >

It is probable that the accident occurred when, as BUCCOO REEF (Vessel A) was docking in an approximately 2.6-knot upstream current in Bordeaux Port, French Republic, in a state in which the Accident Tug Line had been removed from the Accident Bollard during release of the end of a tug line from RM PAUILLAC (Vessel B) (the Accident Tug Line), and as the ordinary seaman in charge of letting out the tug line (Ordinary Seaman A) was letting out the messenger rope of the Accident Tug Line with it coiled once around a bollard on Vessel A's bow's port side (the Accident Bollard), Ordinary Seaman A fell to the deck and was dragged until his body struck a structure on the foredeck because the messenger rope's exit speed increased, and then his leg had become entangled in the messenger rope.

The circumstances by which Ordinary Seaman A's leg became entangled in the messenger rope could not be determined as there were no witnesses to those circumstances.

It is probable that the increase in the messenger rope's exit speed was caused by an increase in the separation speed between Vessel A's bow end and Vessel B that occurred when Vessel A

gathered sternway while continuing her starboard turn.

It is somewhat likely that chief officer of Vessel A gave Ordinary Seaman A no instructions to keep distance from the messenger rope such as holding the end of the messenger rope in case unexpected tension occur, when having Ordinary Seaman A hold the messenger rope in order to avoid it becoming entangled with the propeller, and that this contributed to the accident.

# 1 PROCESS AND PROGRESS OF THE INVESTIGATION

## 1.1 Summary of the Accident

While the chemical tanker BUCCOO REEF was docking, with a master, 21 crew members and a pilot onboard, assisted by tugboats at the port of Bordeaux, French Republic, at around 19:15 on April 22, 2016 (local time; hereinafter the same), an ordinary seaman who was letting out the messenger rope of a tug line was struck on his body by a structural part of the bow and fell overboard and died on April 23.

## 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 one other marine accident investigator to investigate this accident on June 24, 2016.

### 1.2.2 Collection of Evidence

June 29, September 13, 26, October 5, November 4, 2016, January 6 and February 6, 2017:  
Collection of questionnaire

November 16, 2016: On-site investigations, interviews and collection of questionnaire

### 1.2.3 Cooperation with the Investigation

Investigative information concerning the tugboat MR PAUILLAC was provided by the accident investigatory organization of the French Republic (BEAmer, Bureau d'enquêtes sur les événements de mer (hereinafter referred to as the "French Investigative Authority")).

### 1.2.4 Comments from Parties Relevant to the Cause

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

### 1.2.5 Comments from the Substantially Interested State

Comments on the draft report were invited from the substantially interested state of the BUCCOO REEF.

## 2 FACTUAL INFORMATION

### 2.1 Events Leading to the Accident

#### 2.1.1 Events in Navigation according to the Voyage Data Recorder, etc.

##### (1) Ship's position information

According to the data record of the Voyage Data Recorder\*<sup>1</sup> (hereinafter referred to as "VDR") of the BUCCO REEF (hereinafter referred to as "Vessel A"), the Vessel A's navigation track from 19:05:00 to 19:19:45 on April 22, 2016 was as shown in Table 2.1-1 below.

Table 2.1-1: VDR Record of Vessel A (Excerpt)

Time (HH:MM:SS)	Ship's position*		Course Over the Ground* ( °)	Heading* ( °)	Speed Over the Ground (knots [kn])
	Latitude (N) ( ° - ' - ")	Longitude (W) ( ° - ' - ")			
19:05:00	44-55-39.4	000-33-08.0	169.9	163.8	6.7
19:10:00	44-55-09.1	000-32-53.2	154.8	152.3	5.7
19:13:00	44-54-58.7	000-32-46.2	152.1	234.6	0.7
19:13:15	44-54-58.1	000-32-45.6	149.6	243.6	0.2
19:13:30	44-54-57.5	000-32-45.0	148.9	252.9	0.4
19:13:45	44-54-56.8	000-32-44.4	149.9	261.9	0.8
19:14:00	44-54-56.1	000-32-44.0	152.1	271.1	1.2
19:14:15	44-54-55.5	000-32-43.5	154.8	279.7	1.5
19:14:30	44-54-54.8	000-32-43.1	157.6	289.3	1.8
19:14:45	44-54-54.0	000-32-42.8	161.6	299.2	2.3
19:15:00	44-54-53.4	000-32-42.7	166.2	309.4	2.5
19:15:15	44-54-52.7	000-32-42.4	169.7	319.8	2.8
19:15:30	44-54-52.1	000-32-42.3	173.4	329.9	3.0
19:15:45	44-54-51.7	000-32-42.3	175.3	338.8	2.8
19:16:00	44-54-51.3	000-32-42.2	170.4	345.6	2.4
19:16:15	44-54-51.0	000-32-42.0	158.8	351.0	3.0
19:16:30	44-54-50.7	000-32-41.7	144.2	354.0	1.8
19:16:45	44-54-50.4	000-32-41.3	132.3	354.8	1.4
19:17:00	44-54-50.3	000-32-40.8	121.4	353.8	1.2
19:17:15	44-54-50.1	000-32-40.3	113.4	351.2	1.0
19:17:30	44-54-50.1	000-32-39.8	107.4	347.9	0.8
19:17:45	44-54-50.0	000-32-39.3	103.0	344.1	0.7
19:18:00	44-54-49.9	000-32-38.9	101.6	341.5	0.6
19:18:15	44-54-49.9	000-32-38.6	101.6	340.9	0.7
19:18:30	44-54-49.9	000-32-38.4	098.9	341.3	0.6
19:18:45	44-54-50.0	000-32-38.3	085.3	341.6	0.5
19:19:00	44-54-50.1	000-32-38.1	072.3	341.6	0.4
19:19:15	44-54-50.1	000-32-38.0	063.9	341.4	0.2
19:19:30	44-54-50.2	000-32-37.9	059.6	341.2	0.4

\*<sup>1</sup> Voyage Data Recorder (VDR) is an instrument that is able to record the position, course, speed, and other information about navigation, communication by VHF radio telephone, and voices in the bridge.

19:19:45	44-54-50.2	000-32-37.8	052.4	340.9	0.3
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\*: The vessel position indicates the position of the GPS antenna installed above the bridge, 150.4 meters from the end of the bow, and the courses over the ground and headings indicated in true bearings (hereinafter the same).

(2) Radar images of the VDR Record

According to the record of radar images taken every fifteen seconds between 19:14:00 and 19:16:00 on April 22, 2016, that was recorded in Vessel A's VDR, bearing and distance from Vessel A to the area near the center of the image of RM PAUILLAC (hereinafter referred to as "Vessel B") were as shown in Table 2.1-2.

(See Attached Figure 1 Radar Images from Vessel A's VDR)

Table 2.1-2 Bearing and Distance from Vessel A to the Area Near the Center of Vessel B's Image

Time (HH:MM:SS)	True Bearing (°)	Distance (Nautical Miles [M])
19:14:00	282.5	0.084
19:14:15	292.0	0.084
19:14:30	301.0	0.082
19:14:45	307.0	0.087
19:15:00	312.0	0.090
19:15:15	No image of Vessel B appeared	
19:15:30	322.5	0.110
19:15:45	325.5	0.126
19:16:00	327.5	0.141

(3) Information on voice communication on the bridge

According to the voice record of Vessel A's VDR, communication by VHF radio telephone (hereinafter referred to as "VHF") among the master and chief officer of Vessel A (hereinafter referred to as "Master A" and "Officer A," respectively), the pilot, Vessel B, tugboat RM THOMAS (hereinafter referred to as "Vessel C") and the Bordeaux Harbor Master's Office (hereinafter referred to as the "Harbor Master's Office"); conversation on the bridge of Vessel A; and communication by transceiver between Vessel A's bridge and crew members stationed at the bow between 19:12:25 and 19:29:05 on April 22, 2016, were as shown in Table 2.1-3.

The record indicates that conversation on the bridge between Master A and the pilot, communication by transceiver between Master A and Officer A, and communication by VHF among the pilot and Vessel B and Vessel C, which were assisting in Vessel A's docking, took place.

It should be noted that the conversation on Vessel A's bridge and communication by transceiver were in English, while the communication by VHF was in French.

Table 2.1-3 Audio Record of Communication by VHF, etc.

Time (HH:MM:SS)	Speaker	Content	Communication or Conversation
19:12:25	Master A	When we are in position we will let go the tug on the center lead.	Transceiver
19:12:35	Officer A	Yes, ok.	Transceiver

19:14:11	Pilot	Let go the forward tug. The center lead one.	On bridge
	Master A	Let go the forward tug.	Transceiver
19:14:18	Pilot	Vessel B, you are going to cast off and you go to the aft port side.	VHF
19:15:28	Officer A	Man overboard.	Transceiver
19:15:44	Officer A	He is pulled out by the tug.	Transceiver
19:15:45	Master A	Man overboard.	On bridge
19:15:54	Pilot	Man overboard.	VHF
19:16:32	Master A	Where is there a man overboard?	Transceiver
19:16:33	Officer A	. . . is man overboard, pulled out by the tug. . . .	Transceiver
19:16:38	Vessel B	I don't believe that there is a man overboard.	VHF
19:16:41	Pilot	Well, I don't know, that's what's been said by the mooring crew on the forecastle.	VHF
19:16:47	Vessel C	We have to ask Master B but I believe that his full crew is on deck, only the tug line has whipped a bit, it has passed very close to the head of the deck hand at the moment it was released, but I don't believe there is a man overboard.	VHF
19:16:59	Pilot	Yes, ok, but listen.	VHF
19:17:02	Vessel C	There is no man overboard, I confirm.	VHF
19:17:06	Pilot	It's ok with you, all is clear.	VHF
19:19:06	Pilot	Be careful vessel B, they are saying that someone is at the end of the messenger line.	VHF
19:19:24	Vessel B	There is someone at the end of the rope.	VHF
19:20:13	Vessel C	If there is somebody in the water, it must be somebody of your ship.	VHF
19:20:17	Pilot	Oh, yes, it's someone from vessel A.	VHF
19:20:21	Vessel C	We have seen nobody falling into the water, we have seen that the towline has tightened, well the messenger line tightened, someone retained it from above, the towline got released all of sudden, but we have seen nobody fall into the water.	VHF
19:20:49	Pilot	Well there is a man overboard who has been picked up from the water, a man who went overboard, just picked up by vessel B.	VHF

19:20:51	Harbor Master's Office	Hauled out of the water by vessel B, so everything's ok?	VHF
19:20:54	Pilot	No, no, in principle I don't know if he is still alive.	VHF
19:21:00	Harbor Master's Office	Well received, I call the emergency service.	VHF
19:21:35	Vessel B	Yes, my chief is doing cardiac massage. A defibrillator. Yes, we have to give him oxygen. The emergency service has to be called so that we can disembark him.	VHF
19:24:41	Vessel B	Tell me where I should berth?	VHF
19:26:26	Vessel B	He is breathing. We have put him lie quietly. The crew are providing a first aid.	VHF
19:26:49	Vessel B	The RORO ramp would have been good, no?	VHF
19:26:51	Harbor Master's Office	Yes, that what we thought, yes, we'd better off doing that. Does the man have a heartbeat? You said that he's breathing.	VHF
19:27:06	Vessel B	Well, he has a heartbeat and he's breathing.	VHF
19:27:09	Harbor Master's Office	Received. In this case, you would be better off going to the RORO ramp.	VHF
19:27:17	Vessel B	Ok, we'll berth there, he is wounded on his head.	VHF
19:27:22	Harbor Master's Office	Received, he is wounded on his head. Did you compress?	VHF
19:27:42	Vessel B	Yes, he is bleeding from his mouth.	VHF
19:27:45	Harbor Master's Office	Received.	VHF

### 2.1.2 Events Leading to the Accident according to the Statements

According to the statements of the pilot and person in charge at the Bordeaux Harbor Master's Office, the information of the French Investigative Authority, the replies to the questionnaire by Mitsui O.S.K. Line, which is the operator of Vessel A (hereinafter referred to as "Company A<sub>1</sub>"), and Officer A, the events leading to the accident were as follows.

#### (1) Vessel A

At around 14:20 on April 22, 2016, Vessel A departed her anchorage at the mouth of the Gironde Estuary in the French Republic for the Bassens Terminal in Bordeaux Port, also in France, for the purpose of unloading, with Master A, Officer A, and 20 crew members (19 nationals of the Republic of the Philippines and national of the Republic of Croatia) on board.

At around 14:45, the pilot came aboard Vessel A and conducted a meeting on the navigation plan, docking method, use and stationing of tugboats, and other matters, after

which Vessel A continued navigating Gironde Estuary and then the Garonne River under the pilotage of the pilot.

Because the scheduled place for docking was approaching, Officer A discussed the mooring method with Master A on the bridge. Officer A subsequently took his position on the bow and explained the mooring method to boatswain, the ordinary seaman in charge of letting out the tug line (national of the Republic of the Philippines) (hereinafter referred to as “Ordinary Seaman A”) and another ordinary seaman.

At around 19:00, Vessel A met with Vessel B and Vessel C. After lowering a small line from a Panama chock<sup>\*2</sup> in her bow’s front, Vessel A heaved up a messenger rope and tug line from Vessel B that had been tied to the line and then attached the becket (hereinafter referred to as “eye”) at the end of a tug line from Vessel B (hereinafter referred to as the “Accident Tug Line”) to a bollard<sup>\*3</sup> on her bow’s port side (hereinafter referred to as the “Accident Bollard”), and after lowering a small rope from a mooring hole<sup>\*4</sup> on her bow’s port side, heaved up a messenger rope and tug line from Vessel C that had been tied to the line and attached the eye of tug line from Vessel C to a bollard on her port side. Vessel A then continued sailing.

At around 19:10, Vessel A arrived at a location near her intended wharf and began a starboard turn while moving ahead with assistance from Vessel C for a starboard side head out.

At around 19:14, the pilot decided to release the Accident Tug Line because the turn was two-thirds completed and communicated this decision to Master A. At the same time, the pilot instructed Vessel B to push Vessel A’s port-side stern after the Accident Tug Line was released.

Master A ordered Officer A, who was stationed at the bow, to release the Accident Tug Line. Because the Accident Tug Line had slackened as Vessel B approached Vessel A, the crew members stationed at the bow removed the eye of the Accident Tug Line, which had been hooked on the Accident Bollard.

Ordinary Seaman A stood on the port side of the Accident Bollard and let out the Accident Tug Line from the Panama chock by gradually letting out the messenger rope, which he had wound once around the Accident Bollard, the boatswain placed the leftover messenger rope on the deck near the port anchor hawsepipe<sup>\*5</sup> after paying the messenger rope coiled out<sup>\*6</sup> for Ordinary Seaman A, and Officer A verified that the eye of the Accident Tug Line being let out had reached the water’s surface.

At around 19:15, Officer A and the boatswain noticed that the speed of the messenger rope’s exit had quickened and saw that Ordinary Seaman A was moving to the port side through the space between the bitts of the Accident Bollard. Although they shouted at Ordinary Seaman A to let go of the rope and step clear, Ordinary Seaman A fell to the deck and was dragged with the rope entangled around his leg (whether it was his right or left leg is unknown) until his body struck a structure near the chain stopper<sup>\*7</sup>. He then fell

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<sup>\*2</sup> A “Panama chock” is a mooring hole installed at the bow’s end.

<sup>\*3</sup> A “bollard” is a stationary structure that is fixed to the deck that is comprised of one or two bitts (posts) and used to stop, tie, or control a rope.

<sup>\*4</sup> A “mooring hole” is a fixture installed in a part that passes through a bulwark for the leading of lines.

<sup>\*5</sup> A “hawsepipe” is a tube passing from a ship’s deck to plating shell through which an anchor chain passes.

<sup>\*6</sup> “Coil down” refers to the act of winding a rope on top of itself into a circle.

<sup>\*7</sup> “Chain stopper” refers to a fixture installed on a ship’s structural member. It is a device for holding a chain that is attached to the end of a mooring line when mooring a single mooring line to a buoy.

overboard from the Panama chock.

The crew member stationed at the bow did not see what was happening at the instant that Ordinary Seaman A's leg became entangled in the messenger rope.

Because the speed of messenger rope's exit had quickened, Officer A and the boatswain thought that Ordinary Seaman A had difficulty letting out the Accident Tug Line while holding the messenger rope and therefore moved to take a posture that made the work easier.

Officer A attempted to notify Vessel B of the accident by shouting and waving his hands, but Vessel B did not acknowledge. He therefore notified Master A that Ordinary Seaman A had fallen overboard by transceiver.

Master A notified the pilot that a crew member stationed at the bow had fallen overboard, and then the pilot notified Vessel B and Vessel C that a crew member of Vessel A had fallen overboard by VHF.

The pilot continued piloting while communicating the accident with Vessel B, Vessel C, and the Harbor Master's Office by VHF, and Vessel A docked at Bassens Terminal Berth 436 at around 20:05.

(See Figure 2.1-1, Figure 2.1-2, Photo 2.1-1, Photo 2.1-2, and Photo 2.1-3)

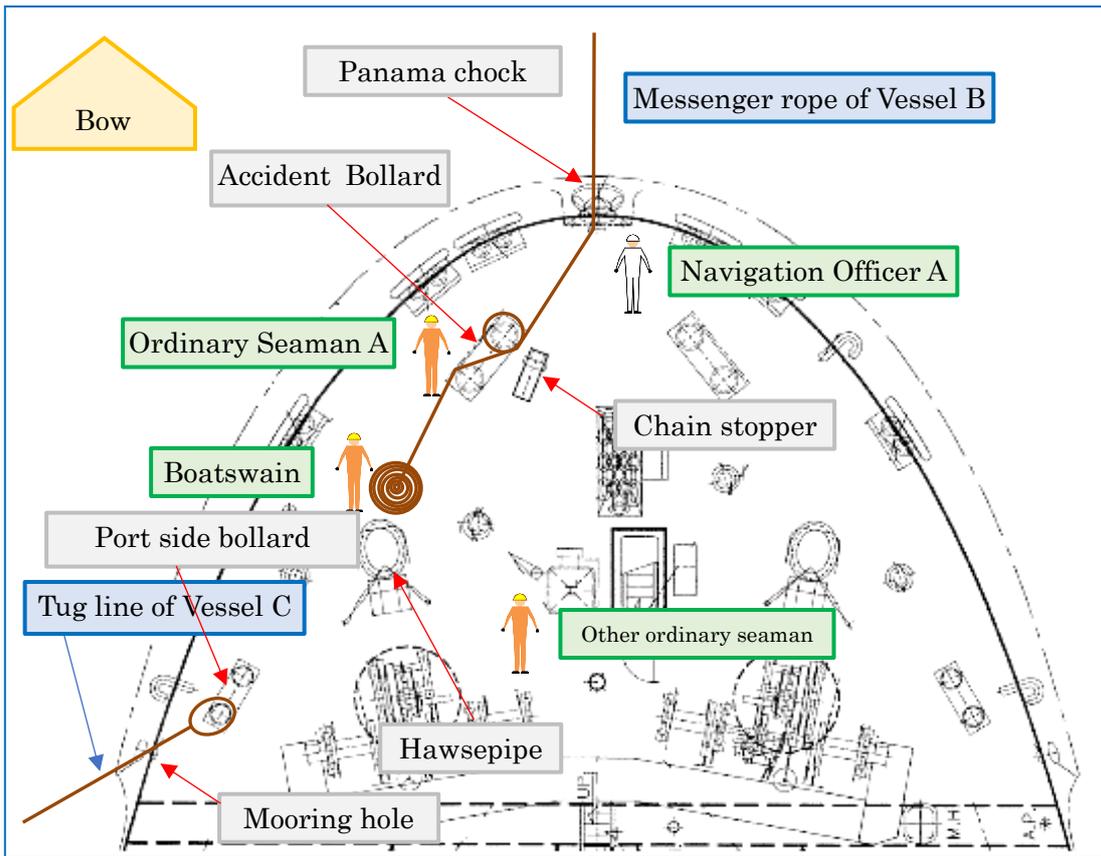


Figure 2.1-1 Stations of Crewmembers on Vessel A's Bow

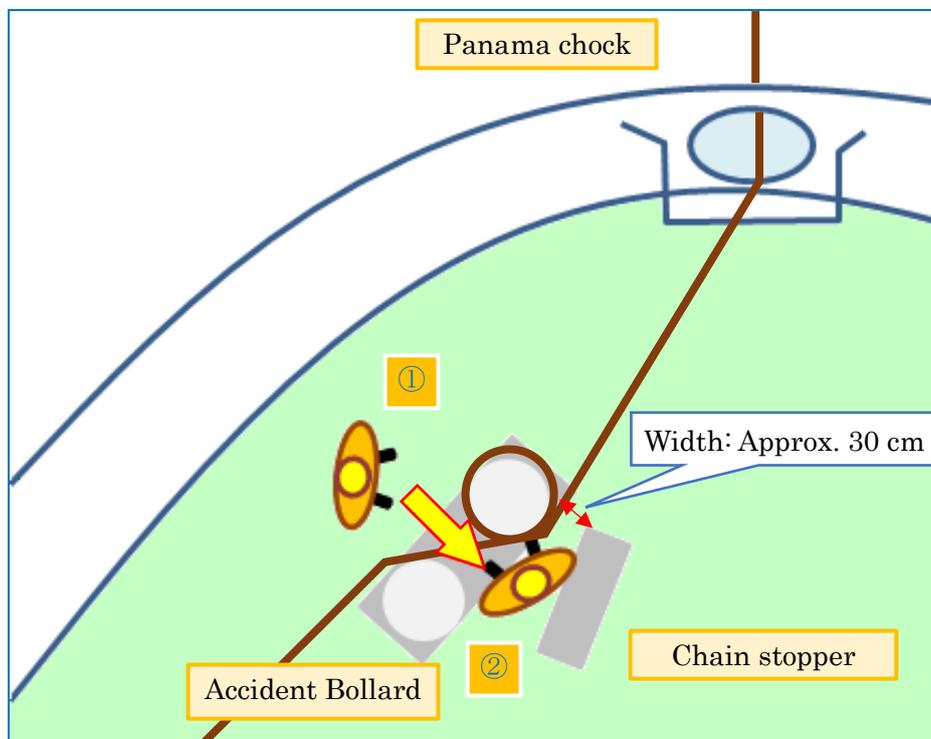


Figure 2.1-2 Ordinary Seaman A's Movement of Work Position

(① indicates position at start of work, ② indicates position just before the accident)

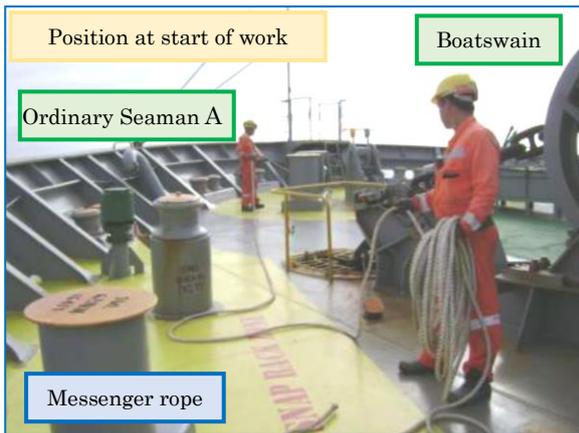


Photo 2.1-1

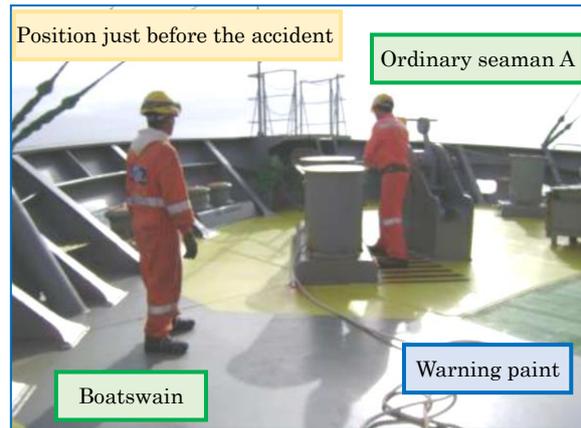


Photo 2.1-2

Reenactment of Ordinary Seaman A's Work by Crew Members of Vessel A (Provided by Company A<sub>1</sub>) (The yellow and black warning paint on the surface of the deck used to reenact Ordinary Seaman A's work positions was applied after the accident.)



Photo 2.1-3 Vessel A's Panama Chock (Provided by Company A<sub>1</sub>)

(2) Vessel B and Vessel C

At around 18:00 on April 22, 2016, Vessel B and Vessel C each departed from Cariette Wharf of Bordeaux Port, Vessel B with a master (hereinafter referred to as "Master B") and three crew members and Vessel C with a master and three crewmembers, for Vessel A, which was navigating the Garonne River, to provide docking assistance to Vessel A.

At around 19:00, Vessel B and Vessel C met Vessel A. Vessel B took a position directly ahead of Vessel A and Vessel C took a position off the port-side bow of Vessel A. Vessel B and Vessel C each tied their own messenger line to a small line lowered by Vessel A and sent their own tug line to Vessel A.

At around 19:10, Vessel C began pushing the port-side bow of Vessel A in response to an instruction from the pilot to begin a starboard turn, and Vessel B locked the Vessel B end of the Accident Tug Line on a tow hook on her aft deck and moved with the turn without pulling on the Accident Tug Line.

At around 19:14, Vessel B was ordered by the pilot to release the Accident Tug Line. After slackening the Accident Tug Line by approaching Vessel A, Vessel B saw that the Accident Tug Line was being let out through Vessel A's Panama chock and thus began manually recovering the Accident Tug Line.

A crew member who was engaged in recovery work on Vessel B's stern saw the Accident Tug Line whip up taut for a moment but then continued recovery because the line immediately slackened again. At that moment, Vessel B received word of a man overboard by VHF.

At around 19:19, while recovering the Accident Tug Line with a winch, Vessel B saw Ordinary Seaman A with his ankle entangled in the messenger rope and lifted Ordinary Seaman A to her deck.

A crew member of Vessel B saw that the messenger rope had wrapped once around Ordinary Seaman A's ankle but did not see a knot.

Ordinary Seaman A had an injury to the back of his head and was bleeding from the mouth. Because he did not have a pulse, a crew member of Vessel B administered a cardiac massage, after which Ordinary Seaman A's pulse returned.

Vessel B was released from docking assistance by the pilot, and at around 19:27 proceeded to the wharf as instructed by the Harbor Master's Office as her crew members administered first aid to Ordinary Seaman A. At around 19:30, Vessel B handed Ordinary Seaman A over to an ambulance that was called by the Harbor Master's Office.

Vessel C continued providing assistance until Vessel A docked.

The date and time of occurrence of the accident were at around 19:15 on April 22, 2016, and the location was at around 1.8 M at 342° true bearing from the Carriette Lighthouse.

(See Attached Figure 2 Outline Map of the Accident Location)

## **2.2 Injuries to Persons**

According to the postmortem certificate of Ordinary Seaman A, Ordinary Seaman A's injuries were as follows.

Ordinary Seaman A died at 19:45 on April 23 at the hospital to which he was transported.

The cause of death was a cerebral contusion.

## **2.3 Crew Information**

### **(1) Gender, Age, and Certificate of Competence**

#### **(i) Master A**

According to the reply to the questionnaire of Company A<sub>1</sub>, Master A's gender, age, and certificate of competence were as follows.

Male, 52 years old, national of the Republic of the Philippines

Endorsement attesting the recognition of certificate under STCW regulation I/10:  
Master (issued by Japan)

Date of Issue: December 5, 2014

(Valid until March 23, 2018)

(ii) Officer A

According to the reply to the questionnaire of Company A<sub>1</sub>, Officer A's gender, age, and certificate of competence were as follows.

Male, 55 years old, national of the Republic of Croatia

Endorsement attesting the recognition of certificate under STCW regulation I/10:  
Chief engineer (issued by Japan)

Date of Issue: July 16, 2015

(Valid until September 4, 2019)

(iii) Ordinary Seaman A

According to the reply to the questionnaire of Company A<sub>1</sub>, Ordinary Seaman A's gender, age, and certificate of competence were as follows.

Male, 26 years old, national of the Republic of the Philippines

(iv) Pilot: Male, 49 years old, national of the French Republic

Gironde pilot's certification

Date of Issue: June 30, 2001

(v) Master B: Male, age unknown, national of the French Republic

According to the information provided by the French Investigative Authority, Master B possessed a master's certificate for vessels of less than 500 gross tonnage.

(2) Sea-going Experience and Status of Health

(i) Master A

According to the reply to the questionnaire of Company A<sub>1</sub>, Master A's sea-going experience and status of health were as follows.

He had approximately 17 years of experience as a master and had served as a master on a tanker for approximately five years.

He was aboard Vessel A from July to November 2015 and again for a second time that began in March 2016.

He was in good health at the time of the accident.

(ii) Officer A

According to the reply to the questionnaire of Company A<sub>1</sub>, Officer A's sea-going experience and status of health were as follows.

He had been aboard tankers as a chief officer since 1997.

He was aboard Vessel A from August to November 2015 and again for a second time that began in January 2016.

He was in good health at the time of the accident.

(iii) Ordinary Seaman A

According to the reply to the questionnaire of Company A<sub>1</sub>, Ordinary Seaman A's sea-going experience and status of health were as follows.

He had served as an ordinary seaman for approximately three years and six months.

He had been aboard Vessel A since January 2016.

He was in good health at the time of the accident.

(iv) Pilot

According to the statement of the pilot, the pilot's sea-going experience and status

of health were as follows.

He became a seafarer in 1998 and served on merchant ships.

After serving as a master on a large tanker for approximately one year and six months, he became a pilot in 2001.

He was in good health at the time of the accident.

(v) Master B

According to the information provided by the French Investigative Authority, Master B's sea-going experience was as follows.

He served as a crew member on a fishing vessel for approximately 23 years, approximately three years of which as a master.

He had approximately three years of experience as a tugboat master.

(3) Clothing, etc., Worn by Ordinary Seaman A at the Time of the Accident

According to the reply to the questionnaire of Company A<sub>1</sub>, Ordinary Seaman A's clothing, etc., at the time of the accident were as follows.

He was wearing orange-colored work clothes, work gloves, a helmet, safety glasses, and safety shoes.

Ordinary Seaman A's left work glove, helmet, safety glasses, and wristwatch remained on the deck after he fell overboard.

## 2.4 Vessel Information

### 2.4.1 Particulars of Vessel

(1) Vessel A

According to the reply to the questionnaire of Company A<sub>1</sub>, the particulars of Vessel A were as follows.

Vessel number:	142281
IMO number:	9733674
Port of registry:	Tokyo
Owner:	FO Rhythm Leasing Ltd.
Operator:	Company A <sub>1</sub>
Management company:	MOL TANKSHIP MANAGEMENT (EUROPE) LTD. (United Kingdom) (hereinafter referred to as "Company A <sub>2</sub> ")
Gross tonnage:	21,101 tons
L×B×D:	175.00 m x 27.70 m x 16.00 m
Hull material:	Steel
Engine:	Diesel engine x 1
Output:	7,230 kW
Propulsion:	4-blade fixed pitch propeller x 1
Date of launch:	August 4, 2014

(See Photo 2.4-1)



Photo 2.4-1 Vessel A (Provided by Company A1)

(2) Vessel B

According to the information provided by the French Investigative Authority, the particulars of Vessel B were as follows.

IMO number:	6618457
Owner:	REMORQUAGE BORDEAUX BASSENS (French Republic)
Gross tonnage:	144 tons
L×B×D:	26.70 m x 7.70 m x 4.20 m
Output:	1,326 kW
Year of launch:	1959
Propulsion:	Kort nozzle x 1

(See Photo 2.4-2)

(3) Vessel C

According to the information provided by the French Investigative Authority, the particulars of Vessel C were as follows.

IMO number:	939826
Owner:	REMORQUAGE BORDEAUX BASSENS (French Republic)
Gross tonnage:	286 tons
L×B×D:	24.99 m x 9.50 m x 4.20 m

(See Photo 2.4-3)



Photo 2.4-2 Vessel B (Port Side)



Photo 2.4-3 Vessel C (Front Side)

### 2.4.2 Vessel A's Load Conditions

According to the reply to the questionnaire by Company A<sub>1</sub>, at the time of the Accident, Vessel A was loaded with approximately 5,000 tons of methanol. Her draft was about 6.92 m in the bow and about 7.61 m in the stern.

### 2.4.3 Hull Structure and Equipment

#### (1) Vessel A

According to the general arrangement plan and the reply to the questionnaire by Company A<sub>1</sub>, the hull structure and equipment were as follows.

Vessel A was a chemical tanker with a docking bridge and mooring equipment installed on her foredeck and quarterdeck.

On the foredeck were installed two pairs of bollards on both sides and one chain stopper on the starboard side of the Accident Bollard. At the end of the bow was an oval Panama chock with an opening measuring 45 cm high by 60 cm across.

The Accident Bollard and the chain stopper were arranged in an inverted open-bottomed "V" shape approximately four meters from the bow's end. The distance at the narrowest point between the Accident Bollard and the chain stopper was approximately 30 cm.

At the time of the accident, the height from the surface of the water to the bottom edge of the Panama chock was about 10.35 meters.

At the time of the accident, there were no malfunctions or failures with the hull, engine and machineries, deck equipment, or communications devices.

(See Figure 2.4.1)

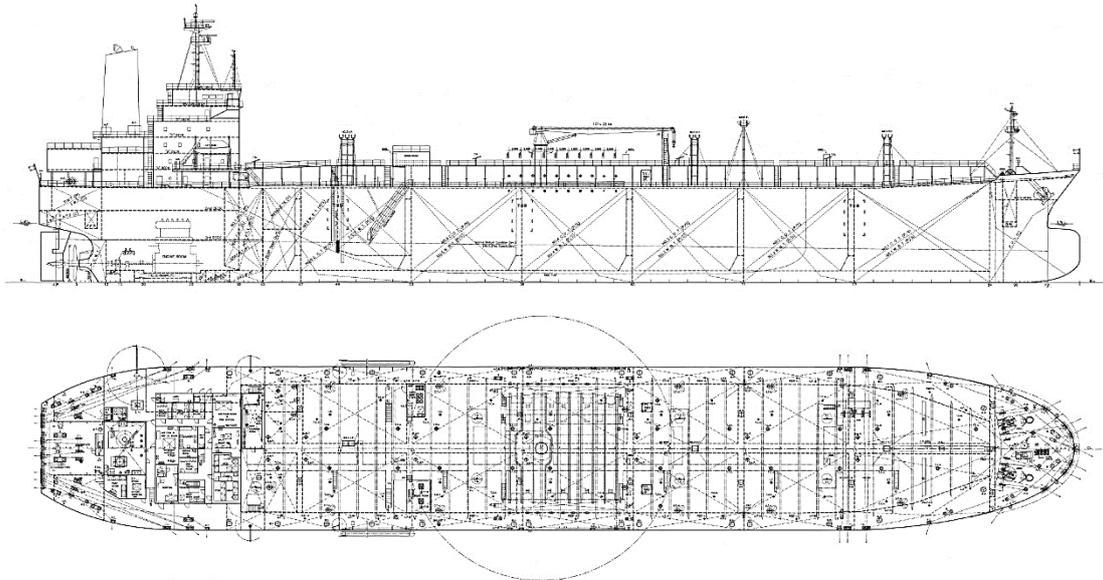


Figure 2.4-1 Vessel A's General Arrangement Plan

(2) Vessel B

Vessel B had a wheel house located slightly forward of hull's center. She was equipped with a tow hook and winch installed on her aft deck.

According to the information provided by the French Investigative Authority, there was a portion of the wheel house's view astern that was blocked by the funnel. (See Figure 2.4-2)

At the time of the accident, there were no malfunctions or failures with the hull, engine and machineries, deck equipment, or communications devices.

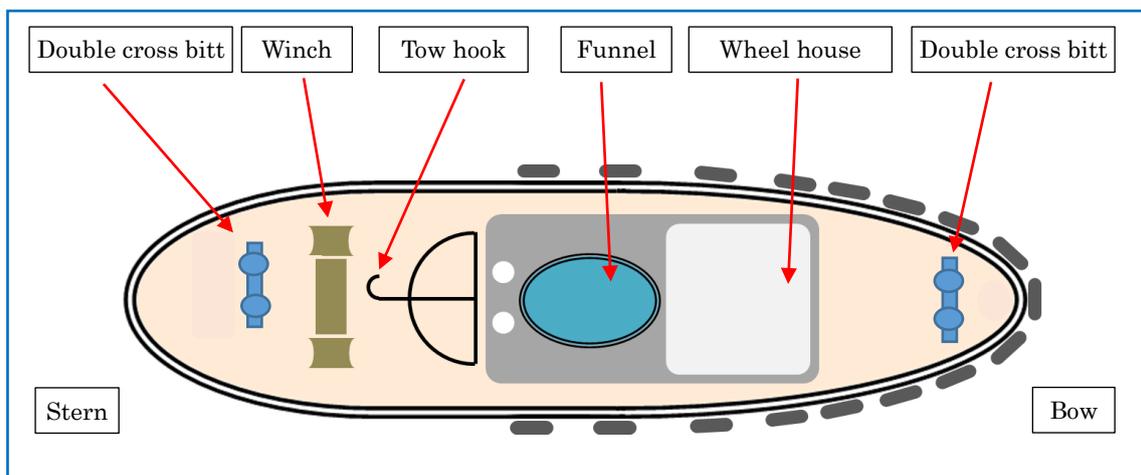


Figure 2.4-2 Plan of Vessel B (Outline)

## 2.5 Information concerning the Accident Tug Line and Messenger Rope

According to the information provided by the French Investigative Authority, the Accident Tug Line and messenger rope were as follows.

The Accident Tug Line had a diameter of approximately 56 mm and a length of approximately 40 meters, and the messenger rope had a diameter of approximately 24 mm and a length of approximately 40 meters.

The end of the Accident Tug Line on the Vessel B side was locked on the tow hook on Vessel B's

aft deck. (See Photo 2.5)

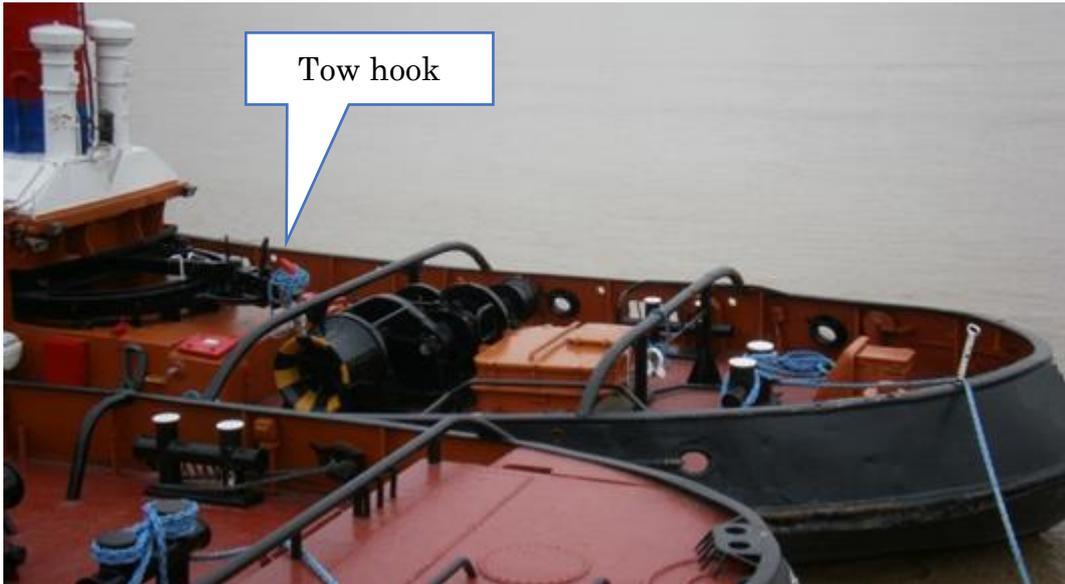


Photo 2.5 Circumstances of Vessel B's Aft Deck

## 2.6 Weather and Sea Conditions

### 2.6.1 Observations by Crew

According to the reply to the questionnaire by Company A<sub>1</sub>, the weather and sea conditions at 19:00 near the accident location were as follows.

Weather: Clear Wind direction: west Wind speed: Approx. 11.6 knots Visibility: Good

Water's surface: Calm

Air temperature: 17°C Water temperature: 12°C

### 2.6.2 Tide Data

According to the tide table issued by the Bordeaux Harbor Master's Office, the incoming tide at Bordeaux was reaching its end at the time of the accident.

According to the reply to the questionnaire by Company A<sub>1</sub>, the current direction near the accident location at 19:00 was south-southeasterly (flowing from downstream to upstream) and the current speed was approximately 2.6 knots.

Sunset on the day of the accident was 20:57.

## 2.7 Handling of Tug Lines

### 2.7.1 Procedure for Releasing Messenger Ropes

According to the reply to the questionnaire of Company A<sub>1</sub>, an ordinary seaman removes the eye of the tug line from the bollard and lowers the tug line to the water's service using the messenger rope. Then, after confirming that tugboat has recovered the tug line and that the messenger rope will not get caught in the tugboat's propeller, the officer in charge orders the ordinary seaman to release the messenger rope that he is holding.

### 2.7.2 Normal Procedure when Vessel B Recovers a Tug Line

According to the information provided by the French Investigative Authority, the normal procedure when Vessel B recovered a tug line was as follows.

Upon receiving the instruction to release the tug line from the pilot by VHF, Master B ordered Vessel B's crew members to prepare to recover the tug line.

Master B approached the towed vessel at reduced speed, causing the taut tug line to slacken, and when he saw the eye of the tug line that was removed from the bollard of the towed vessel from the Panama chock, he had crew members at the stern recover approximately ten meters of the tug line manually and then complete recovery by winding the tug line with the winch.

Master B maneuvered the vessel and the chief engineer operated the winch.

Regarding the timing of this series of steps, Master B did not receive signals from the towed vessel, but rather made judgments based on visual confirmation while looking astern from the wheel house.

## **2.8 Information on Safety Management, etc. of Vessel A**

### **2.8.1 Safety Management System (SMS) Manual**

According to Company A<sub>2</sub>'s SMS Manual, the following procedure and important points when handling tug lines during mooring were established. (Excerpt)

(1) Procedure for SMS Manual

The tug line must be let out in a controlled manner.

(2) Risk assessments in the SMS Manual

1) Handling of tugs lines

- All personnel are fully aware of the hazards in handling tugs lines, in particular the risk of tension coming on the line while it is being handled.
- The OIC on station shall maintain constant over watch and pay particular attention over side to the movement/actions of the tugs while the line is being handled.
- Crew shall also pay attention when letting go tugs lines to ensure the line is not dropped in an uncontrolled manner onto the tugs deck.

2) Sudden and unanticipated tensioning of lines

- This may be caused by vessel movement, tugs, wind or winch operator, personnel to stand clear of working lines and always be aware of the risks.
- Awareness and supervision to ensure personnel do not stand in a crush zone where a tensioning line may trap them against ships structure etc.
- Good oversight, supervision and warnings from OIC and Master.

### **2.8.2 Education and Training concerning Tug Line Handling**

According to the reply to the questionnaire of Company A<sub>1</sub>, education and training for tug line handling were as follows.

All crew members of vessels operated by Company A<sub>1</sub> received training on safe mooring and use of tugboats once every three years. When company instructors visited vessels, they conducted training for safe mooring and handling of tug lines and mooring lines.

For new crew members, Company A<sub>1</sub> provided training and education with computers, videos, and other teaching materials that were in addition to training on mooring and tug line handling, and checked the crew members' level of comprehension using a checklist.

Additionally, Company A<sub>1</sub> provided education and training so that crew members will act with safety foremost in mind in dangerous situations.

### **2.8.3 Information on Mutual Communication**

According to the reply to the questionnaire of Company A<sub>1</sub>, English was used as the common language on Vessel A. Officer A and Ordinary Seaman A possessed the basic language ability needed to execute their assigned tasks and there was no problem in mutual communication between them.

## 3 ANALYSIS

### 3.1 Situation of the Accident

#### 3.1.1 Course of the Events

According to 2.1, it is probable that the following events occurred.

- (1) At around 14:20 on April 22, 2016, Vessel A departed her anchorage at the mouth of the Gironde Estuary in the French Republic and sailed in the Gironde River and Garonne River under pilotage for Bassens Terminal in Bordeaux Port, also in the French Republic.
- (2) At around 18:00, Vessel B and Vessel C each departed from Cariette Wharf of Bordeaux Port for Vessel A, which was navigating the Garonne River.
- (3) At around 19:00, Vessel A met with Vessel B and Vessel C, received one tug line each from Vessel B and Vessel C, and continued sailing. At around 19:10, Vessel A began a turn to starboard while moving ahead with assistance from Vessel C.
- (4) At around 19:14, the crew members stationed on Vessel A's bow removed the eye of the Accident Tug Line that had been hooked to the Accident Bollard and began letting out the Accident Tug Line. Vessel B began recovering the Accident Tug Line and Vessel A began gathering sternway.
- (5) At around 19:15, Ordinary Seaman A fell to the deck and was dragged with his leg (whether it was his right or left leg is unknown) entangled in the messenger rope until his body struck a structure near the chain stopper. He then fell overboard from the Panama chock.

#### 3.1.2 Location of the Accident Occurrence

According to 2.1 and 3.1.1, it is probable that the accident location was Vessel A's location at the time of the accident, which was around 19:15, when Vessel A was 44°54.9'N, 000°32.7'W (around 1.8 M at 342° true bearing from the Cariette Lighthouse).

#### 3.1.3 Injuries to Persons

According to 2.1 and 2.2, it is probable that the injuries to persons were as follows.

- (1) After Ordinary Seaman A fell overboard from the Panama chock, he was rescued by a crew member of Vessel B, given first aid on Vessel B, and then transported to a hospital, but he died at 19:45 on April 23.
- (2) When Ordinary Seaman A was lifted up by a crew member of Vessel B, a messenger rope was wound once around Ordinary Seaman A's ankle, although there was no knot.
- (3) The cause of Ordinary Seaman A's death was a cerebral contusion.

### 3.2 Causal Factors of the Accident

#### 3.2.1 Situation of Crew Members

According to 2.3, the situations of the crew members were as follows.

- (1) Master A

It is probable that Master A possessed a legally valid endorsement attesting the recognition of certificate under STCW regulation 1/10 and was in good health.

- (2) Officer A

It is probable that Officer A possessed a legally valid endorsement attesting the recognition of certificate under STCW regulation 1/10 and was in good health.

(3) Ordinary Seaman A

It is somewhat likely that Ordinary Seaman A had approximately three years and six months of experience as an ordinary seaman and was in good health.

(4) Pilot

It is probable that the pilot possessed a legally valid pilot's certification and was in good health.

(5) Master B

It is probable that Master B possessed a legally valid certificate of competence. Master B's status of health could not be determined.

### **3.2.2 Circumstances of Mutual Communication between Officer A and Ordinary Seaman A**

According to 2.8.3, it is probable that English was used as the common language on Vessel A, that Officer A and Ordinary Seaman A possessed the basic language ability needed to execute their assigned tasks, and that there was no problem in mutual communication between them.

### **3.2.3 Situations of the Vessels**

According to 2.4.3, it is probable that the situations of the vessels were as follows.

(1) Vessel A

There were no malfunctions or failures with the hull, engine and machineries, deck equipment, or communications devices.

(2) Vessel B

There were no malfunctions or failures with the hull, engine and machineries, deck equipment, or communications devices.

### **3.2.4 Weather and Sea Conditions**

(1) According to 2.6.1, the weather conditions were as follows.

At the time of the accident, the weather was clear, the wind was from the west, the wind speed was approximately 11.6 knots, visibility was good, the water's surface was calm, the air temperature was 17°C, and the water temperature was 12°C.

(2) According to 2.6.2, the sea conditions were as follows.

At the time of the accident, the tide at Bordeaux was an incoming tide that was reaching its end. The current direction near the accident location was south-southeasterly (flowing from downstream to upstream) and the current speed was approximately 2.6 knots.

### **3.2.5 Analysis of the Movements and Distances of Vessels A and Vessel B**

According to 2.1, 2.5, 2.6.2 and 3.1.1, the movements and distances of Vessel A and Vessel B were as follows.

(1) It is probable that at around 19:10, Vessel A began a starboard turn. Vessel A completed about two-thirds of the turn at around 19:14 and began gathering sternway.

(2) It is probable that at around 19:14, Vessel B was ordered by the pilot to release the Accident Tug Line, and she slackened the Accident Tug Line by approaching Vessel A.

(3) It is probable that the position of Vessel B and the distance between Vessel A's bow end and Vessel B at time intervals between 19:14:15 and 19:15:45 that were obtained from the ship's position recorded in Vessel A's VDR and radar images are as shown in the following table.

Based on the table, Vessel A's bow end and Vessel B reached their closest distance at around 19:15:00 and then their distance began to widen, and between 19:15:30 and 19:15:45 the speed of separation between the two vessels increased to more than two meters per second. (See Figure 3.2-1 and Figure 3.2-2)

No.	Time (HH:MM:SS)	Ship's position		Distance
		Latitude (N) ( ° - ' - ")	Longitude (E) ( ° - ' - ")	
①	19:14:15	44-54-57.5	000-32-49.7	Approx. 34 m
②	19:14:30	44-54-57.4	000-32-48.6	Approx. 31 m
③	19:14:45	44-54-57.1	000-32-48.3	Approx. 25 m
④	19:15:00	44-54-56.9	000-32-47.9	Approx. 20 m
	19:15:15	No image of Vessel B		
⑤	19:15:30	44-54-57.1	000-32-47.6	Approx. 59 m
⑥	19:15:45	44-54-57.8	000-32-48.1	Approx. 96 m

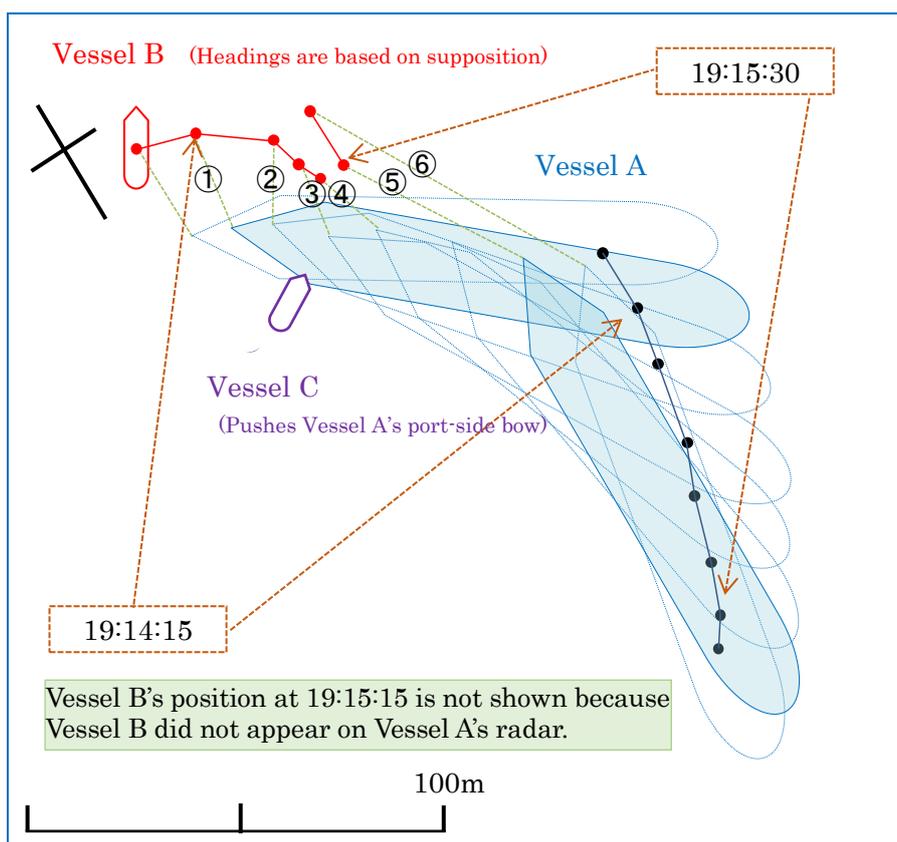


Figure 3.2-1 Movements and Changes in Distance of Vessel A and Vessel B at 15-Second Intervals

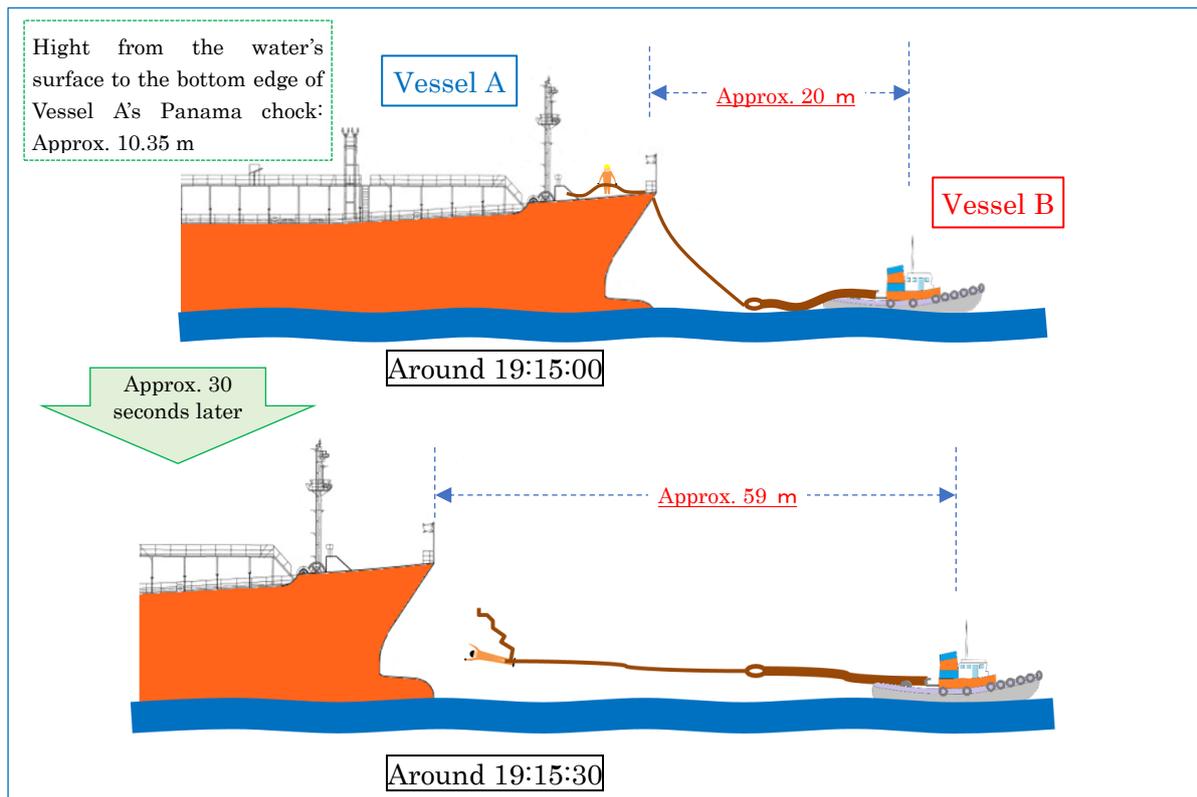


Figure 3.2-2 Circumstances of the Growing Distance between Vessel A's Bow End and Vessel B (Conceptual Image)

- (4) It is probable that Vessel B's position did not change significantly between 19:15:00 and 19:15:30.
- (5) It is probable that from 19:15:00, the exit speed of the messenger rope on Vessel A's deck increased as tension was applied with the increasing speed of separation between Vessel A's bow end and Vessel B.

### 3.2.6 Analysis of Deck Work on Vessel A

According to 2.1, 2.4.3, 2.7.1, 3.1.1, and 3.2.5, the deck work on Vessel A was as follows.

- (1) It is probable that, at around 19:14, the pilot told Master A to release the Accident Tug Line and that Master A instructed Officer A, who was stationed at the bow, to release the Accident Tug Line.
- (2) It is probable that, because the Accident Tug Line slackened as Vessel B approached Vessel A, the crew members stationed at the bow removed the eye of the Accident Tug Line, which had been hooked on the Accident Bollard, and began letting out the Accident Tug Line from the Panama chock.
- (3) It is probable that, on Vessel A, Ordinary Seaman A was standing on the port side of the Accident Bollard and letting out the Accident Tug Line from the Panama chock by gradually letting out the messenger rope, which he had wound once around the Accident Bollard; the boatswain placed the leftover messenger rope on the deck near the port anchor hawsepipe after paying the messenger rope for Ordinary Seaman A, and the Officer A verified that the eye of the Accident Tug Line being let out by had reached the water's surface.

- (4) It is probable that as Vessel A continued a starboard turn and began gathering sternway, the speed of separation between Vessel A and Vessel B increased, and then the messenger rope's exit speed increased.
- (5) It is somewhat likely that because Ordinary Seaman A had not been instructed to release the messenger rope that he was holding, he continued to hold the rope.
- (6) It is somewhat likely that, when the exit speed at which the messenger rope increased, Ordinary Seaman A, when he moved his hold on the messenger rope to the starboard side, straddled the space between where he had been holding the messenger rope and the end of the rope.
- (7) It is probable that, at around 19:15, Officer A and the boatswain noticed that the speed at which the messenger rope was being sent out had increased, shouted at Ordinary Seaman A to let go of the messenger rope and step clear, and, approximately simultaneously, witnessed Ordinary Officer A fall to the deck and be dragged with his leg entangled in the messenger rope.
- (8) Regarding the circumstances of the messenger rope's becoming entangled around Ordinary Seaman A's leg, there were no witnesses and therefore it was not possible to determine the circumstances.

### **3.2.7 Analysis of Accident Tug Line Recovery Work on Vessel B**

According to 2.1, 2.5, 2.7.2, and 3.2.5, the Accident Tug Line recovery work on Vessel B was as follows.

- (1) It is probable that the end of the Accident Tug Line on the Vessel B side was locked on the tow hook on the aft deck.
- (2) It is probable that, at around 19:14, Vessel B was ordered by the pilot to release the Accident Tug Line and that, after slackening the Accident Tug Line by approaching Vessel A, Vessel B saw that the Accident Tug Line was being let out through Vessel A's Panama chock and thus began manually recovering the Accident Tug Line.
- (3) It is probable that a crew member who was engaged in recovery work on Vessel B's stern saw the Accident Tug Line whip up taut for a moment but then continued recovery of the Accident Tug Line because the line immediately slackened again.
- (4) It is somewhat likely that the reason the Accident Tug Line whipped up taut for a moment was an increase in the separation speed between Vessel A's bow end and Vessel B.
- (5) It is probable that, at around 19:19, while recovering the Accident Tug Line with a winch, Vessel B saw Ordinary Seaman A with his ankle entangled in the messenger rope and lifted him to her deck.

### **3.2.8 Safety Management aboard Vessel A**

According to 2.1, 2.8, 3.2.5, and 3.2.6, the safety management situation of Vessel A was as follows.

- (1) Although the Safety Management System Manual established that tug lines must be let out in a controlled manner so that they do not fall onto a tugboat's deck, it is probable that Vessel A had provided education and training so that her crew members will act with safety foremost in mind in dangerous situations during work.
- (2) It is probable that it was established on Vessel A that officers in charge shall constantly pay attention to the tugboat's movements and conditions of workers. Additionally, it is probable that, given that movements of the vessel or a tugboat may cause sudden and

unanticipated tug line tension, it was established that officers in charge shall provide conscious and appropriate supervision to ensure that workers do not enter areas where the danger of being caught by a tug line under tension exists.

- (3) It is somewhat likely that whereas Officer A instructed Ordinary Seaman A to drop the messenger rope when, after letting out the messenger rope, the separation speed between Vessel A and Vessel B increased, Officer A did not instruct Ordinary Seaman A to keep distance from the messenger rope, such as holding the end of the messenger, in case unexpected tension on the messenger rope occur, when Officer A instructed Ordinary Seaman A to hold the messenger rope to avoid it becoming entangled with the propeller of Vessel B.

### **3.2.9 Analysis of the Accident Occurrence**

According to 2.1, 3.1.1, 3.2.1, and 3.2.5 to 3.2.8, the analysis of the accident was as follows.

- (1) It is probable that Vessel A, Vessel B, and Vessel C came together at around 19:00, that Vessel A received one tug line each from Vessel B and Vessel C and then continued sailing, and that Vessel A began a turn to starboard while moving ahead with assistance from Vessel C at around 19:10.
- (2) It is probable that Vessel A gathered sternway while continuing her starboard turn and that Vessel B, after being ordered by the pilot to release the Accident Tug Line and slackening the line by approaching Vessel A, began manual recovery of the line and saw the Accident Tug Line whip up taut for a moment but then continued recovery of the Accident Tug Line because the line immediately slackened again.
- (3) It is probable that Vessel A's bow end and Vessel B reached their closest distance at 19:15:00 and then their distance began to gradually widen, and between 19:15:30 and 19:15:45 the separation between the two vessels increased to more than two meters per second.
- (4) It is probable that the exit speed of the messenger rope being let out by Ordinary Seaman A increased from 19:15:00 as tension was applied to it as a result of the increasing separation speed between Vessel A's bow end and Vessel B.
- (5) It is somewhat likely that, given that the Safety Management System Manual established that tug lines must be let out in a controlled manner so that they do not fall onto a tugboat's deck on Vessel A, Ordinary Seaman A continued holding the messenger rope he was holding because he had not been instructed to let go of it.
- (6) It is somewhat likely that Ordinary Seaman A straddled the space between where he had been holding the messenger rope, which he had wound once around the Accident Bollard, and the end of the coiled down rope.
- (7) It is somewhat likely that whereas Officer A instructed Ordinary Seaman A to drop the messenger rope when, after letting out the messenger rope, the separation speed between Vessel A and Vessel B increased, Officer A did not instruct Ordinary Seaman A to keep distance from the messenger rope, such as holding the end of the messenger, in case unexpected tension on the messenger rope occur, when Officer A instructed Ordinary Seaman A to hold the messenger rope to avoid it becoming entangled with the propeller of Vessel B.
- (8) The circumstances by which Ordinary Seaman A's leg was entangled by the messenger rope could not be determined as there were no witnesses to those circumstances.
- (9) It is probable that Ordinary Seaman A fell to the deck and was dragged with his leg entangled in the messenger rope until his body struck a structure and he fell overboard from the Panama chock.

## 4 PROBABLE CAUSES

It is probable that the accident occurred when, as Vessel A was docking in an approximately 2.6-knot upstream current in Bordeaux Port, French Republic, in a state in which the Accident Tug Line had been removed from the Accident Bollard during release of the Accident Tug Line, and as Ordinary Seaman A was letting out the messenger rope of the Accident Tug Line with it coiled once around the Accident Bollard, Ordinary Seaman A fell to the deck and was dragged until his body struck a structure on the foredeck because the messenger rope's exit speed increased, and then his leg had become entangled in the messenger rope.

The circumstances by which Ordinary Seaman A's leg became entangled in the messenger rope could not be determined as there were no witnesses to those circumstances.

It is probable that the increase in the messenger rope's exit speed was caused by an increase in the separation speed between Vessel A's bow end and Vessel B that occurred when Vessel A gathered sternway while continuing her starboard turn.

It is somewhat likely that Officer A gave Ordinary Seaman A no instructions to keep distance from the messenger rope such as holding the end of the messenger rope in case unexpected tension occur, when having Ordinary Seaman A hold the messenger rope in order to avoid it becoming entangled with the propeller, and that this contributed to the accident.

## 5 SAFETY ACTIONS

It is probable that the accident occurred when Ordinary Seaman A, who was stationed at the bow, continued to hold the messenger rope as its exit speed increased when releasing the Accident Tug Line, Ordinary Seaman A's leg became entangled in the messenger rope, and Ordinary Seaman A fell to the deck, was dragged until his body struck a structure.

It is somewhat likely that Officer A gave Ordinary Seaman A no instructions to keep distance from the messenger rope such as holding the end of the messenger rope, and that this contributed to the accident.

Accordingly, implementation of the following measures is necessary to prevent occurrence of a similar accident.

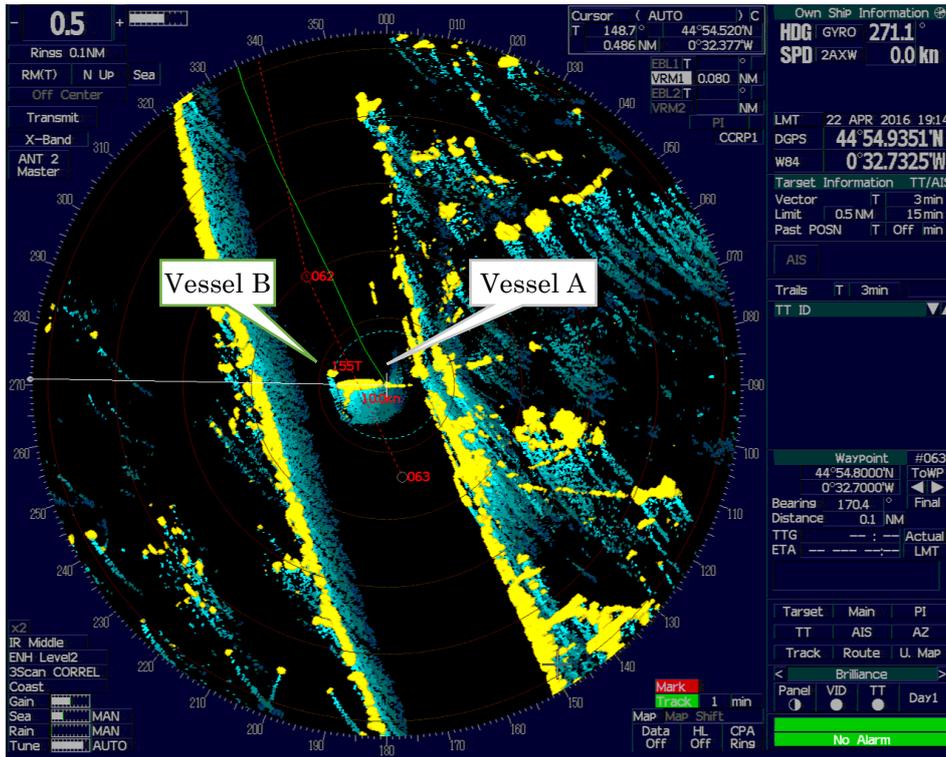
- (1) The operator shall establish response procedures for worker safety that include immediately letting go of a messenger rope when the rope's exit speed increases and it becomes difficult to let out the rope while holding it, provide education and training on those procedures, and have workers adhere to those procedures.
- (2) Work leaders shall instruct workers to keep distance from a messenger rope such as holding an end of a messenger rope in case unexpected tension occur.

### 5.1 Safety Actions Taken

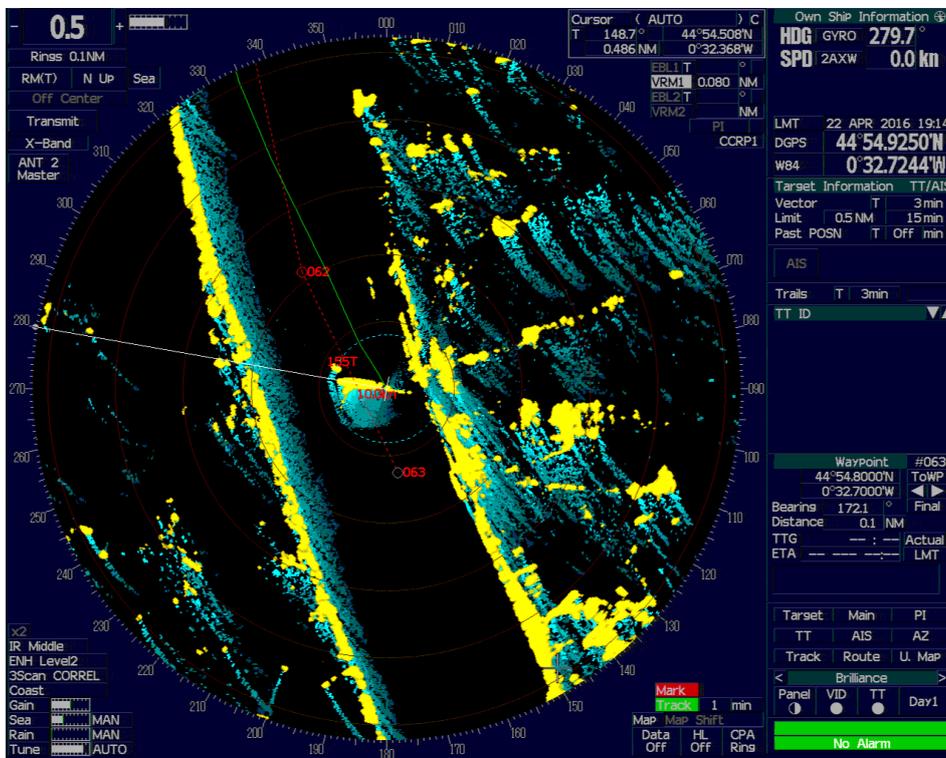
Company A<sub>1</sub> took the following safety actions following the accident.

- (1) Made information on the accident and the results of an internal investigation known to all company ships and made said information and results known at a seminar for company seafarers.
- (2) Instructed all company ships to hold onboard safety meetings and conduct mooring training.
- (3) Revised risk assessment items in the Safety Management System Manual and added an item requiring workers that are letting out a tug line to work in a location where they can immediately let go of the messenger rope if holding it becomes difficult.
- (4) Provided yellow and black warning paint on the deck's floor between the bollard that Ordinary Seaman A was working on and the chain stopper to alert crew members of danger.

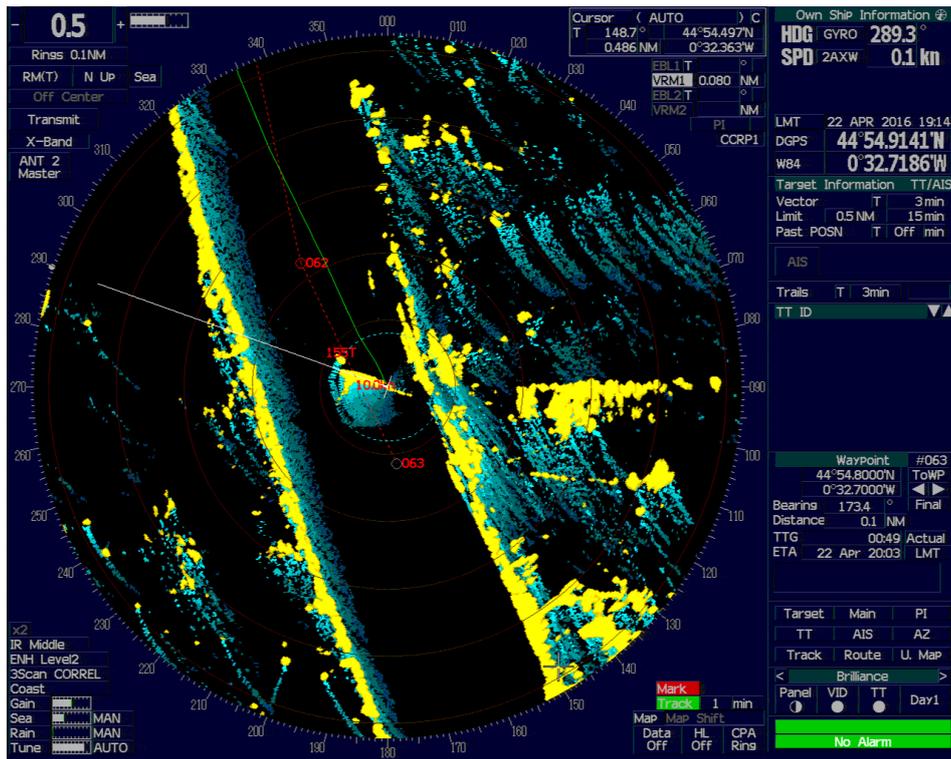
# Attached Figure 1 Radar Images from Vessel A's VDR (19:14:00 – 19:15:45)



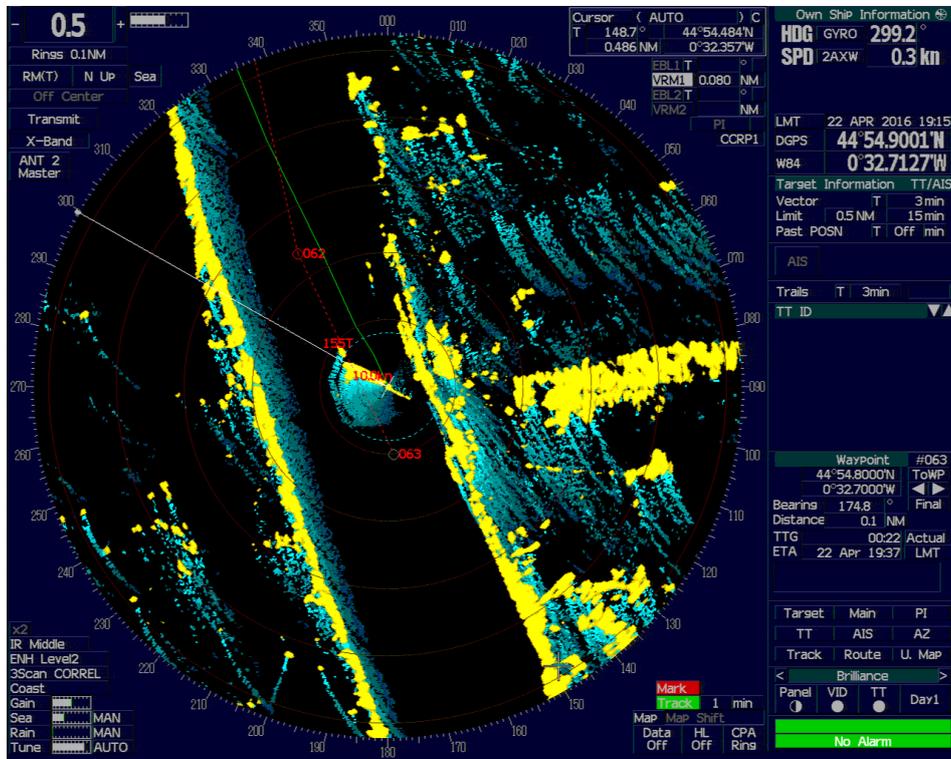
19:14:00



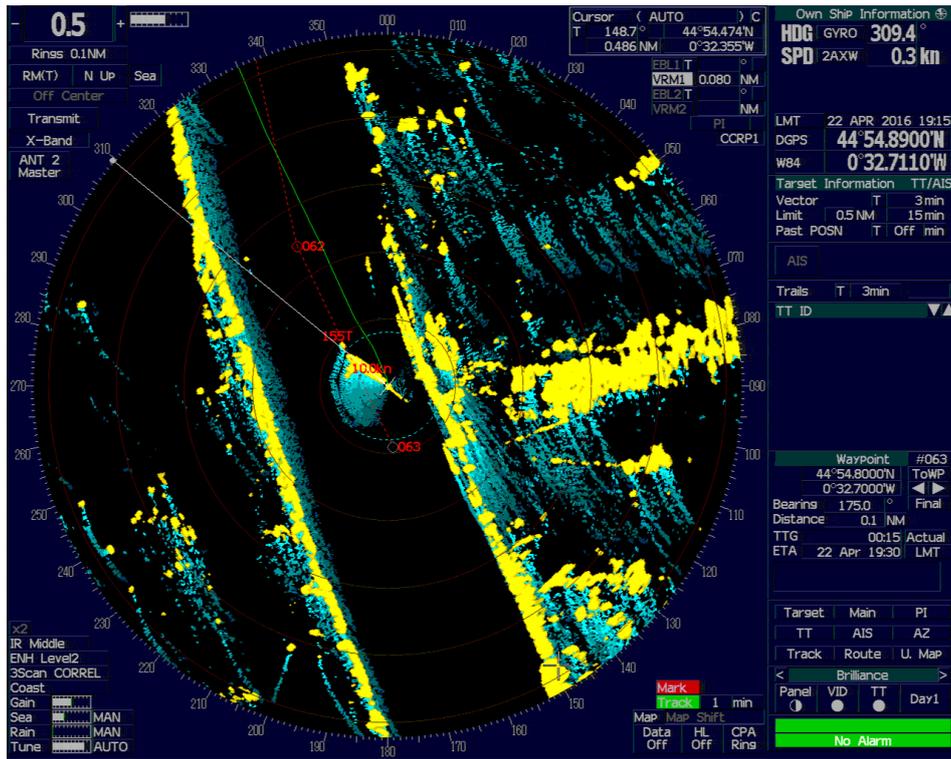
19:14:15



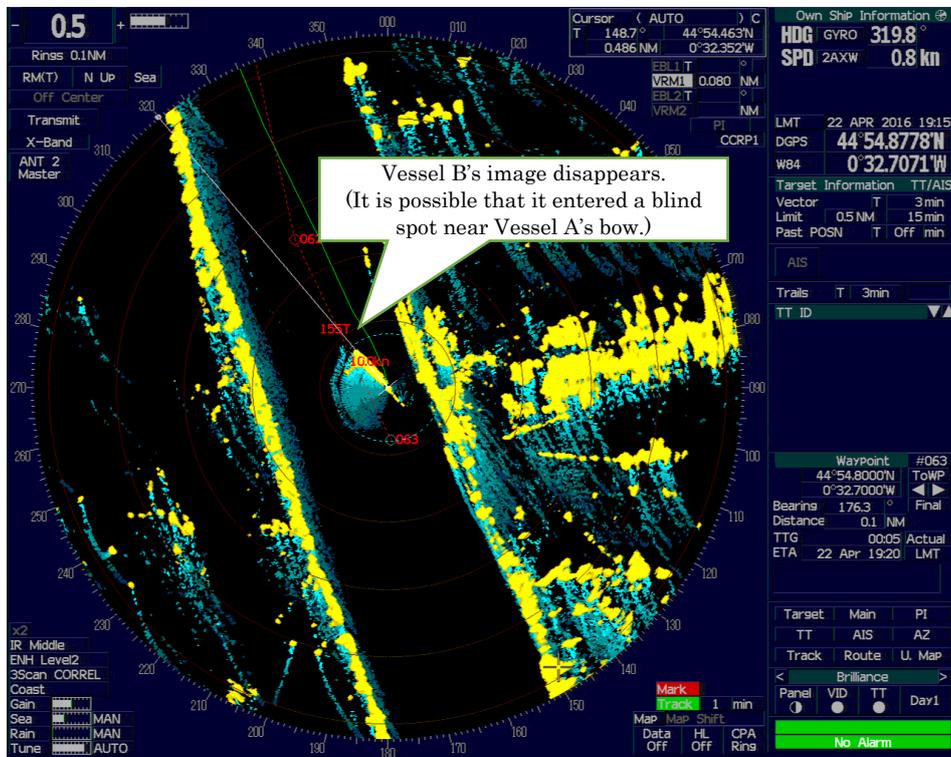
19:14:30



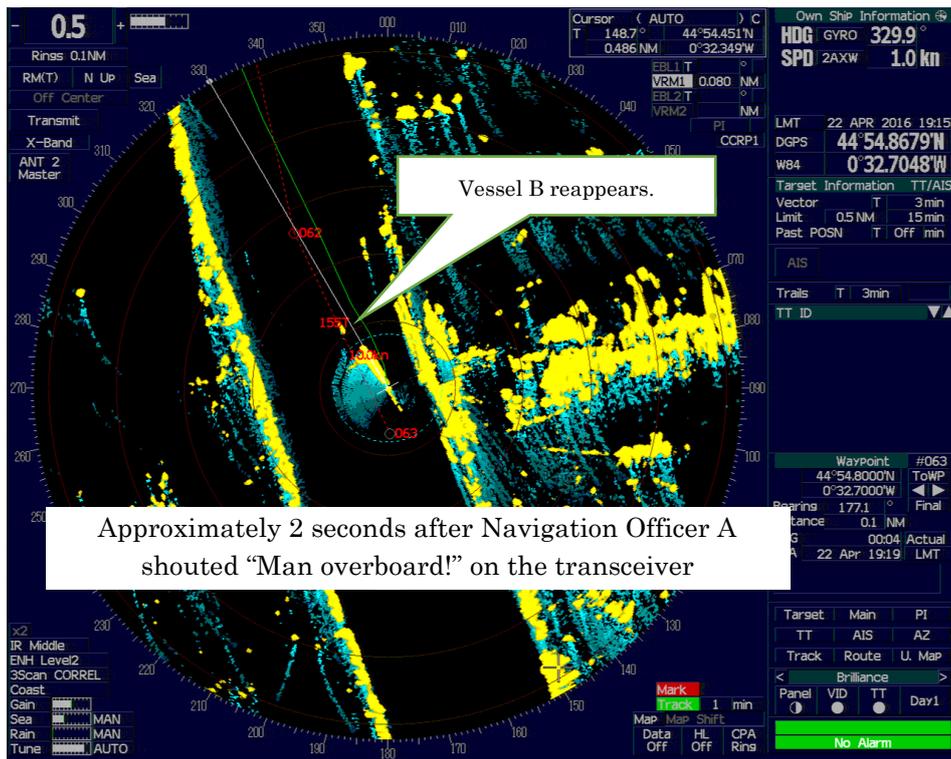
19:14:45



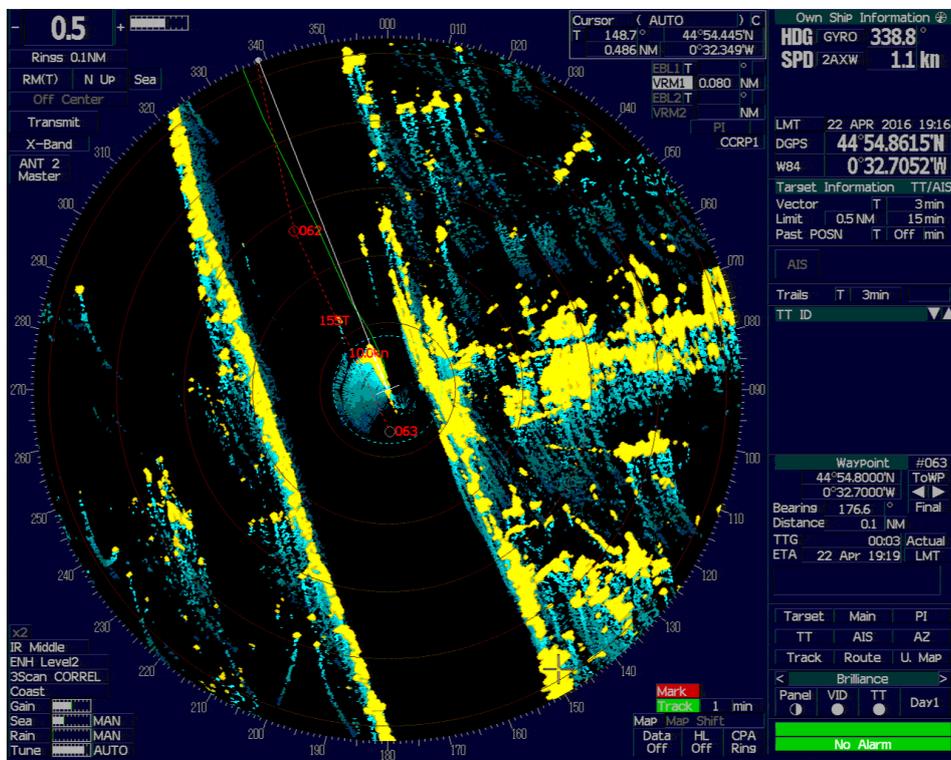
19:15:00



19:15:15



19:15:30



19:15:45

Attached Figure 2 Outline Map of the Location of the Accident Events

