

MA2016-8

**MARINE ACCIDENT
INVESTIGATION REPORT**

August 25, 2016



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: Cargo ship YONG SHENG VII

IMO number: 9578220

Gross tonnage: 2,982 tons

Vessel type and name: Dredger carrier HOKUEI No.18

Vessel number: 141234

Gross tonnage: 960 tons

Accident type: collision

Date and time: Around 19:19 on November 15, 2014 (Local time, UTC+9hours)

Location: Nakagusukuwan-shinko, Port of Kin-nakagusuku, Okinawa prefecture
Approximately 311° true and 1,500m from Kinnakagusukuko Nakagusuku
Shinko East breakwater West Lighthouse
(Approximately N26 ° 19.0 ' E127 ° 51.7')

August 4, 2016

Adopted by the Japan Transport Safety Board

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

SYNOPSIS

<Summary of the Accident >

The cargo ship YONG SHENG VII, with the master and 13 crews were on board proceeding to southeast, and the Dredger HOKUEI No.18, with the master and 4 crews were on board proceeding to northwest collided in the fairway of the Nakagusukuwan- Shinko , Port of Kin-nakagusuku, Okinawa prefecture at around 19:19 on November 15, 2014.

HOKUEI No.18 flooded as a result of having a hole in the starboard side midship, rolled-over to the starboard side and grounded to the seabed , but all the crews were rescued. YONG SHENG VII had abrasions and other damages from the bow to the starboard side midship, but there were no casualties.

<Probable Causes>

It is probable that in this accident, at night, in Nakagusukuwan-shinko, Port of Kin-nakagusuku, while YONG SHENG VII was navigating in the sea area which was located between the line connecting the south-east quay tip of the Nakagusukuwan-shinko, Port of Kin-nakagusuku, Kinnakagusukuko NakagusukuShinkoNo.4 light buoy, and the vicinity of the Kinnakagusukuko Nakagusukushinko East breakwater West lighthouse and the line connecting the vicinities of Kinnakagusukuko Nakagusukushinko No. 5 light buoy, Kinnakagusukuko Nakagusukushinko No. 3 light buoy, and the Kinnakagusukuko Nakagusukushinko West breakwater East lighthouse, slightly right to the center bound for south eastward, HOKUEI No.18 was navigating in the sea area slightly left to the center bound for north westward, Master of YONG SHENG VII navigated at half ahead or full ahead but had lost the chance of the actions to avoid a collision, and Master of HOKUEI No.18, because he made left turn of HOKUEI No.18 towards the front line of YONG SHENG VII without being aware of the existence of YONG SHENG VII , this accident was caused by the collision of the both vessels.

It is probable that Master of YONG SHENG VII , because he had been convinced that HOKUEI No.18 would navigate at any rate on the right side of the sea area which was located between the line connecting the south-east quay tip of the Nakagusukuwan-shinko, Kinnakagusukuko NakagusukuShinko No.4 light buoy, and the vicinity of the Kinnakagusukuko Nakagusukushinko East breakwater West lighthouse and the line connecting the vicinities of Kinnakagusukuko Nakagusukushinko No. 5 light buoy, Kinnakagusukuko Nakagusukushinko No. 3 light buoy, and the Kinnakagusukuko Nakagusukushinko West breakwater East lighthouse, continued to navigate at half ahead or

full ahead, led to loosening the timing for taking the operation to avoid a collision.

It is probable that concerning Master of HOKUEI No.18, the reason for turning to left towards the front line of YONG SHENG VII without noticing its presence, was from the fact that in the vicinity of the Kinnakagusukuko Nakagusukushinko east breakwater saw the radar screen and thought that there are no departing Vessels because there was no radar image of other Vessels, and concentrated the attention to a vessel looked like a fishing boat which was crossing in front of HOKUEI No.18 to the left only, it is probable HOKUEI No.18 did not perform appropriate watch but made an attempt to shorten the route, which might have caused the accident.

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

The cargo ship YONG SHENG VII, with the master and 13 crews were on board proceeding to southeast, and the Dredger HOKUEI No.18, with the master and 4 crews were on board proceeding to northwest collided in the fairway of the Nakagusukuwan- Shinko , Port of Kin-nakagusuku, Okinawa prefecture at around 19:19 on November 15, 2014.

HOKUEI No.18 flooded as a result of having a hole in the starboard side midship, rolled-over to the starboard side and grounded to the seabed , but all the crews were rescued. YONG SHENG VII had abrasions and other damages from the bow to the starboard side midship, but there were no casualties.

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 other investigators to investigate this accident on November 16, 2014.

1.2.2 Collection of Evidence

On-site investigation and interview: November 17 through 20, 2014 and January 9, 2015, respectively.

Collection of questionnaire: On November 28, 2014, January 20, 23, April 13, 17, June 30 and December 1, all in 2015

interview: On December 10, 2014, March 20, 26, April 28, June 25, all in 2015

1.2.3 Comments from Parties Relevant to the Cause

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

1.2.4 Comments from Flag State

Comments on the draft report were invited from the flag state of YONG SHENG VII.

2. FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 Navigation progress of YONG SHENG VII and the HOKUEI No.18 traced by the automatic identification system

According to ‘the information record received by the Automatic Identification System (AIS*1) of Japan Coast Guard, (hereinafter referred to as "AIS record”) the navigation course of YONG SHENG VII (hereinafter referred to as “Vessel A”) between November 15, 2014, 19:18:13 and 19:32:04 and the HOKUEI No.18 (hereinafter referred to as “Vessel B”) between November 15, 2014, 15:37:20 and 19:32:13 was as shown in Table 2.1-1 and Table 2.1-2.

Table 2.1-1 AIS record of Vessel A (abstract)

<u>Time(Hours:</u> <u>Minutes:</u> <u>Seconds)</u>	<u>Vessel position</u> [*]		<u>Course over</u> <u>the ground</u> [*] (°)	<u>Stem</u> <u>direction</u> [*] (°)	<u>Speed over</u> <u>the ground</u> (Knot(kn))
	<u>North latitude</u> (°-')	<u>East longitude</u> (°-')			
19 : 18 : 13	26-19.12002	127-51.52998	123.2	119	7.9
19 : 18 : 33	26-19.09698	127-51.56700	124.4	121	7.2
19 : 18 : 53	26-19.07898	127-51.60198	124.7	123	6.0
19 : 19 : 04	26-19.07400	127-51.60900	076.9	132	1.8
19 : 19 : 09	26-19.07502	127-51.60900	062.3	137	0.9
19 : 21 : 13	26-19.05900	127-51.61602	161.5	142	0.8
19 : 21 : 43	26-19.05300	127-51.62100	144.3	140	1.0
19 : 25 : 05	26-19.01898	127-51.66300	162.6	206	1.2
19 : 31 : 14	26-19.00200	127-51.66498	321.1	231	0.2
19 : 32 : 04	26-19.00398	127-51.66402	299.6	227	0.0

*1 The "Automatic Identification System" (AIS is the system for exchanging information between Vessels mutually and with the navigational aid facilities in the land stations by automatic sending and receiving of each Vessel about the identification code of the Vessel, type, name of the Vessel, and position, course, and speed of the Vessel.

Table 2.1-2 AIS record of Vessel B (abstract)

<u>Time(Hours:</u> <u>Minutes:</u> <u>Seconds)</u>	<u>Vessel position</u> *		<u>Course over</u> <u>the ground</u> *	Stem direction*	Speed over the ground (kn)
	<u>North latitude</u> (°-')	<u>East longitude</u> (°-')			
15 : 37 : 20	26-11.50500	127-27.36600	342.6	054	1.1
15 : 40 : 03	26-11.45202	127-27.50598	131.1	121	6.8
16 : 00 : 03	26-09.42798	127-30.44598	124.7	124	10.3
17 : 00 : 01	26-03.90198	127-40.17600	104.4	093	9.6
18 : 00 : 53	26-07.23300	127-50.44698	065.5	067	9.9
18 : 50 : 02	26-14.40798	127-53.51700	015.0	016	10.8
19 : 00 : 02	26-16.17000	127-53.67798	328.9	334	10.8
19 : 14 : 03	26-18.41502	127-52.24398	329.4	331	11.1
19 : 15 : 03	26-18.5760	127-52.14198	330.3	331	11.0
19 : 15 : 13	26-18.60198	127-52.12500	329.6	331	11.0
19 : 15 : 23	26-18.62898	127-52.10802	330.3	330	11.0
19 : 16 : 52	26-18.85698	127-51.94500	328.6	326	10.9
19 : 17 : 03	26-18.88500	127-51.92502	326.5	321	10.9
19 : 17 : 13	26-18.91002	127-51.90498	324.5	312	10.9
19 : 17 : 15	26-18.91500	127-51.90102	323.3	311	10.9
19 : 17 : 19	26-18.92298	127-51.89202	319.9	308	10.8
19 : 17 : 48	26-18.97800	127-51.81402	307.3	308	10.6
19 : 17 : 59	26-18.99702	127-51.78900	310.4	299	10.6
19 : 18 : 03	26-19.00500	127-51.77898	309.8	295	10.6
19 : 18 : 13	26-19.02000	127-51.75198	301.8	284	10.2
19 : 18 : 15	26-19.02198	127-51.74700	300.0	282	10.0
19 : 18 : 19	26-19.02702	127-51.73602	296.6	280	9.6
19 : 18 : 33	26-19.03698	127-51.70200	287.0	268	8.2
19 : 18 : 55	26-19.04202	127-51.66000	271.6	257	5.5
19 : 18 : 58	26-19.03998	127-51.65898	259.7	260	4.4
19 : 19 : 03	26-19.03698	127-51.65898	227.3	264	2.1
19 : 25 : 00	26-18.97800	127-51.63600	222.2	034	1.0
19 : 30 : 02	26-18.94500	127-51.60000	243.4	054	0.1
19 : 32 : 13	26-18.94398	127-51.59898	243.4	054	0.1

※ The vessel position indicates the position of the GPS antenna installed above the bridge, and the courses over the ground and headings indicated in true bearings (hereinafter the same).

2.1.2 The operations process of Vessel A known by GPS

According to the wake of the GPS plotter data of Vessel A, it was navigating in the south-east direction. (See Photo 2.1)

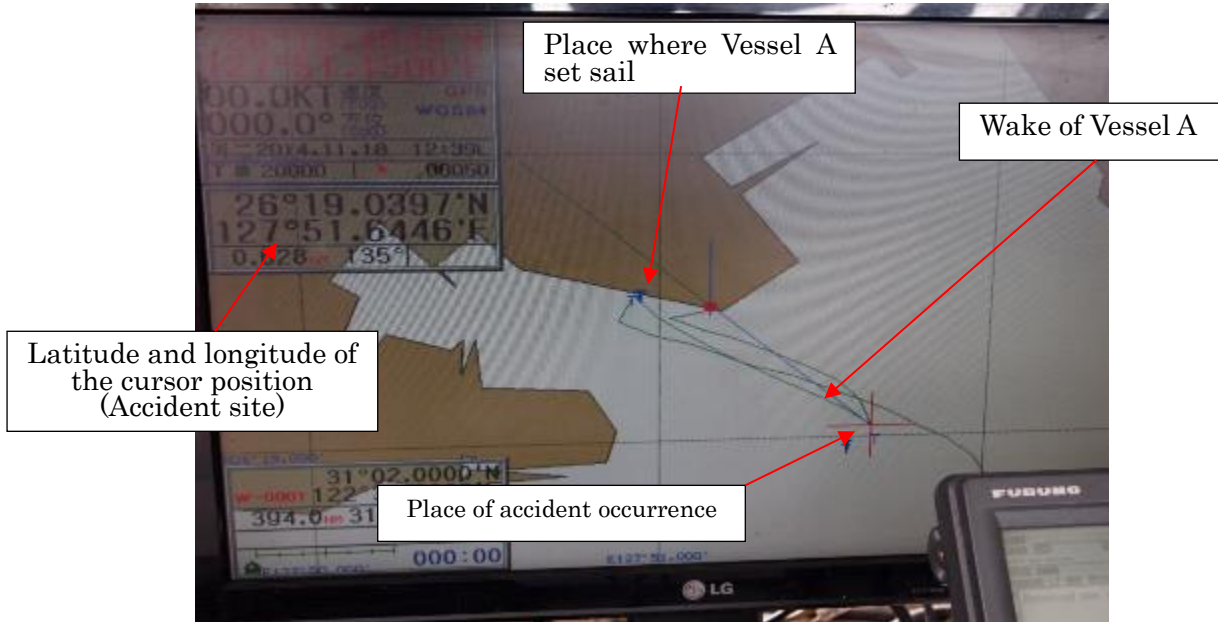


Photo 2.1 Wake of the GPS plotter data of Vessel A

2.1.3 The progress of this accident by the statement of crew

(1) Progress until the collision

① Vessel A

It was as follows according to the statement of master of Vessel A (hereinafter referred to as "master A"), chief officer of Vessel A (hereinafter referred to as "chief officer A"), second officer of Vessel A (hereinafter referred to as "second officer A"), boatswain and able seaman of Vessel A (hereinafter referred to as "able seaman A").

Vessel A, master A and 13 crews (all are the People's Republic of China nationals) were on board, while master A took a maneuvering command; able seaman A took steering; chief officer A and both of boatswain and able seaman A were in the bow placement; second officer A and both of third officer and stoker were in the stern placement, displaying the legal lamplight, set sail the quay of 'Nakagusukuwan-shinko, Port of Kin-nakagusuku' (hereinafter referred to as "Nakagusukuwan-shinko") for port of Republic of Korea, at around 19:05 on November 15, 2014.

Second officer A, after finishing the stern placement, took the operation of the engine telegraph and watches on the bridge, and put the power of the AIS.

Master A, while lowering the anchors on both sides of the Vessel to the vicinity of the seawater surface so that they can be anchored at any moment, navigated Vessel A at slow ahead at around 5 to 6 kn (speed over the ground, same shall be applicable to the cases hereinafter) in south-east direction in the dug waterway (hereinafter referred to as "this matter dug waterway") which was entered in the marine chart W241 (Nakagusukuwan-shinko) (hereinafter referred to as "this matter chart") recognized a Vessel entering the port by the radar and the naked eyes in the south-southeast direction of the Kinnakagusukuko Nakagusukushinko east breakwater (hereinafter referred to as "this matter breakwater"), and knew the name as Vessel B by the AIS.

Master A, who had been scheduled to navigate in the center of this matter dug waterway, but thinking that Vessel B would navigate in this matter dug waterway, navigated the right-center section*2 of the sea area (hereinafter referred to as "this matter waterway") which was located between the line connecting the south-east quay tip of the Nakagusukuwan-shinko, Kinnakagusukuko NakagusukuShinko No.4 light buoy ("Kinnakagusukuko Nakagusukushinko" will be neglected hereinafter, if it refers to the light buoy and the lighthouse), and the vicinity of the East breakwater West lighthouse and the line connecting the vicinities of No. 5 light buoy, No. 3 light buoy, and the West breakwater East lighthouse.

Master A, while admitting that Vessel B was navigating on the left side of this matter waterway and that it was slowly turning toward left at the bent portion of this matter waterway (hereinafter referred to as "this matter bending portion"), displaying the masthead light and the port side, he was still thinking that Vessel B might sooner or later start to navigate on the right side, however, when he found two masthead lights of Vessel B almost on the vertical line he thought Vessel B was rapidly approaching Vessel A, he began to feel the danger of collision.

Master A, along with the blowing more than five times the short sound with the intention of promoting the right turn to Vessel B, issued more than 5 times flash toward Vessel B in the daytime signal lights by going out on the port wing, and let the second officer call Vessel B with the international VHF radio telephone equipment (hereinafter referred to as "VHF") but because there was no response, and Vessel B was imminent, he ordered chief officer to throw down the port anchor and to take a full astern.

As for Vessel A, although throwing the anchor, approximately 20 seconds later than it blew whistles, collided at the bow section of Vessel A and the starboard

midship part of Vessel B.

② Vessel B

It was as follows according to the statement of the master of Vessel B (hereinafter referred to as "master B"), chief officer of Vessel B (hereinafter referred to as "chief officer B"), and able seaman of Vessel B (hereinafter referred to as "able seaman B").

Vessel B, master B and 4 crews were on board, left the gravel excavation water off Maejima-island, Tokashiki-village Okinawa Prefecture at around 15:40 on November 15, 2014, scheduled to arrive -5.5m quay in the Nakagusukuwan-shinko at around 19:00.

Master B, while letting both chief officer B and able seaman B be engaged in the operation of grease coating operation of the gravel collecting equipment, took a watch on the bridge alone and was navigating at full ahead at around 11kn by automatic steering.

Master B, at offshore of the Itoman-city Kiyan-cape, Okinawa Prefecture, took over the bridge watch to both chief officer B and able seaman B who just finished the grease coating operation and get off the bridge, after knowing that the expected arrival time might be delayed about 30 minutes under the influence of wind waves from the bow side by the expected arrival time which is displayed on the screen of the GPS plotter.

Master B, came to the bridge again at about 6 miles (M) south-west to Kudakakuchi, took over the bridge watch from both chief officer B and able seaman B, displayed the legal lights, stood near the steering stand and navigated the Vessel by the automatic steering using the radar and the GPS plotter.

Chief officer B and able seaman B, in order to be prepared for entering the port, performed the task of pulling out the mooring rope on the deck, and finished the task at around 18:50 later than the Vessel entered into the Nakagusuku-bay after passing the Kudakakuchi, they decided to wait in the residential area because there was enough time before the Vessel to shore.

Master B, in the vicinity of this matter breakwater, saw the radar screen set at 2.5M range, thought that there are no departing Vessels because there was no radar image of the other Vessels.

Master B was in a hurry because there occurred about 30 minutes behind the schedule, after passing through this matter breakwater, navigated left side of this matter waterway by holding the speed.

Master B, recognizing a white light of a vessel looked like a fishing boat

(hereinafter referred to as "Vessel C") in front of Vessel B to the left to the east of this bending portion and crossed to the left, was carefully watching Vessel C.

Master B, after Vessel C had passed through the bow side of Vessel B, turn to the course setting knob of the automatic steering system to left by 10°degree, while looking the No. 3 light buoy in this bending portion in the port side.

Master B, further turned knob around 10° to the left, and when Vessel B was finishing the around 10° turning to the left, admitted the two masthead lights of Vessel A lined up in the vertical direction for the first time, felt the danger of collision, shifted to the manual steering, took left rudder to the full and full astern, thinking that Vessel B was turning to the left.

Vessel B collided with Vessel A, when chief officer B and able seaman B went out of the residential area, who had been waiting in the area, because they thought it was close to the scheduled quay when they heard the engine sound applying a astern.

(2) Progress until the rescue

It was as follows according to the statement of master A, chief officer A, second officer A, master B, chief engineer of Vessel B (hereinafter referred to as "chief engineer B"), and chief officer B and able seaman B.

Chief officer B, in order to investigate the damage situation, went to the starboard side passage provided between the upper deck and the second deck down from the quarter deck to the engine room, but when passing through the door on the front side of the engine room, because seawater had been vigorously flowed through the starboard side passage, turned back to the stern deck and told to able seaman B that there is a risk of foundering of Vessel B.

Chief officer B, chief engineer B, first engineer and able seaman B, who had been staying in the stern deck of the Vessel B, intending to change ride to Vessel A, moved to the bow section on the port side upper deck of Vessel B which inclined greatly to the starboard side.

Master A, when reversing away from Vessel B after the collision, at the request of the rescue from the crew of Vessel B, moved forward again and put the starboard bow of Vessel A on the starboard bow of the Vessel B.

Crew of Vessel, let chief officer B, chief engineer B, first engineer, and able seaman B, who were gathering on the starboard bow of Vessel B, move to the forecastle deck of Vessel A.

Master B, who was still remaining in the bridge of Vessel B, communicated by the

mobile phone at around 19:29 to the Vessel owner (Hokuei Co., Ltd. (hereinafter referred to as "Company B")) to the effect that this accident had occurred and the Vessel B was inclining.

Master A, thinking that all crews had been rescued, reversed Vessel A to be separated.

At that time, chief officer B heard a noise of wire that hang the gravel extraction pump of Vessel B was broken because it coiled itself round Vessel A.

Vessel B, then had the right tilt increased ,and rolled-over to the starboard side and grounded to the seabed.

Master A, when hearing from chief officer A that master B was still remaining in Vessel B, instructed to stop the engine, and ordered second officer A to drop the starboard lifeboat and rescue master B.

Second officer A, at around 20:10, rescued master B who jumped into the sea.

Date and time of the occurrence of this accident, was at around 19:19 on November 15, 2014, and the place of occurrence was in the vicinity of 311°and 1,500 m from the east breakwater west lighthouse.

(Refer to Figure 1: Accident outbreak schematic, Figure 2: Navigation path diagram of Vessel B)

2.2 Injuries to Persons

According to the statement of master A and master B, there were no human casualties.

2.3 Damage to Vessel

(1) Vessel A

Broken hole and damaged recessed part on the bow section, curve damage to the bow handrail, and abrasions arose from the bow section to the side shell of the starboard center. (Refer to Photo 1: Damage of Vessel A)

(2) Vessel B

According to the written reply of the salvage company, a broken hole (length of about 5.6 m width of about 4.4 m) and curve damage were caused from the downward about 2 m of the upper deck and the upper edge of the starboard side shell plate, toward the stern side starting from the position of the stern side about 5.4 m from the hull center, and the occurrence of drop of the gravel extraction pump of the starboard bow section. In addition, Vessel B, after being salvaged at the location was in the vicinity of 302 °

1,460m from the east breakwater west lighthouse on January 8, 2015, it has been treated as a waste vessel.

(Refer to Figure 2.3 and Photo 2: Damage of Vessel B)

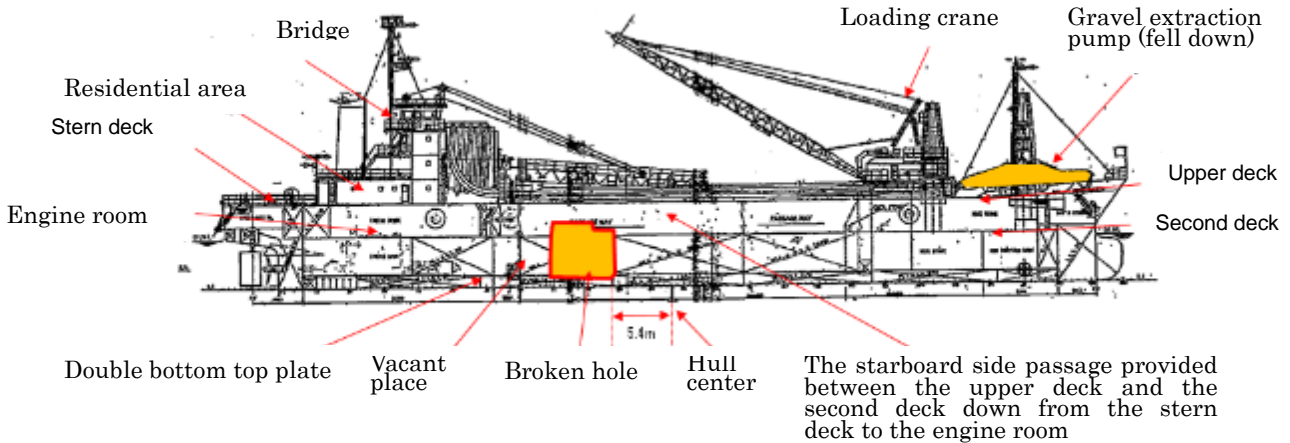


Figure 2.3 Damaged part schematic of vessel B

2.4 Crew Information

(1) Gender, Age and, Certificate of Competence, and so on

① Master A Male 40 years of old

Nationality: People's Republic of China

Endorsement attesting the recognition of Certificate under STCW regulation :

Master (Panama Republic)

Date of issue: December 10, 2012 (valid until October 8, 2015)

② Master B Male, 69 years of old

4th grade maritime officer (navigation)

Date of issue of certificate: July 30, 1971

Date of grant of certificate: April 11, 2012

Certificate validity expiration date: July 18, 2017

③ Chief officer B: 68 years of old

5th grade maritime officer (navigation)

Date of issue of certificate: September 11, 1970

Date of grant of certificate: November 5, 2010

Certificate validity expiration date: March 18, 2016

(2) Major seagoing experience or others

① Master A

According to the statement of Master A, he has been on board as master of Vessel

A since February 2014.

At the time of this accident, his health condition was good.

② Master B

It was as follows according the statement of Master B.

After 51 careers as a sailor, he started to work for Company B on March 25, 2010, and he has been on board as master of Vessel B from March 30 of the same year. Before he entered into Company B, he was mainly on board as master of tuna fishing boat. At the time of this accident, his health condition was good.

③ Chief officer B

It was as follows according the statement of chief officer B.

He started to work for Company B on March 17, 2014, and he had been on board as chief officer of Vessel B from March 18 of the same year. Before he entered Company B, he was mainly on board as master of gravel extraction boat. At the time of this accident, his health condition was good.

2.5 Vessel Information

2.5.1 Particulars of vessel

(1) Vessel A

IMO number: 9578220

Port of registry: Panama in the Republic of Panama

Owner: OCEANUS MARINE LIMITED (Republic of Panama)

Management company: WEIHAI YONGSHENG INTERNATIONAL
SHIP MANAGEMENT CO.,LTD (Peoples Republic of
China) , (Company A, hereinafter)

Classification: Inter maritime Certification Services (Peoples Republic of China)

Gross tonnage: 2,982 tons

L × B × D: 98.2m X 16.2m X 6.9m

Hull material: Steel

Engine: Diesel engine unit 1

Output: 2,000kW

Propulsion: One fixed-pitch propeller

Usage: Cargo ship

Built year/month: October 2008

(See Photo 2.5-1)



Photo 2.5-1: Vessel A

(2) Vessel B

Vessel number:141234

Port of registry: Urasoe-city, Okinawa Prefecture

Owner: Company B

Gross tonnage: 960 tons

L×B×D: 86.0 X 14.7m X 7.8m

Hull material: Steel

Engine: Diesel engine unit 1

Output: 1,471kW

Propulsion: One fixed-pitch propeller

Usage: Dredger career

Date of launch: November 30, 1997

(See Photo 2.5-2)



Photo 2.5-2 Vessel B

2.5.2 Loading condition

(1) Vessel A

According to the statements of Master A and the certification of the load line, the vessel was loaded with wood chips about 1,621t, which is almost full at Nakagusuku wan-shinko, and at the time of departure, the draft was, about 3.1m at the bow and about 4.8m at the stern.

(2) Vessel B

According to the statements of Master B, the vessel was loaded with gravel (sea sand) about 2,450t, which is almost full at set-off of the gravity extraction sea area, and at the time of departure, the draft was, about 3.0 m at the bow and about 4.0 m at the stern.

2.5.3 Information about the structure and the like of the vessels

(1) Vessel A

It was as follows according to the statement of Master A and the general layout chart.

- ① It was the model of the forecastle to bow, the bridge was the hull of the bow with forecastle flat deck type provided in the stern section.
- ② The anchor chain was comprised of nodes*² in 9 to the starboard, and nodes in 8 to the port.

(2) Vessel B

It was as follows according to the statements of Company B representative, Master B, chief engineer B, first officer B, the general layout chart, and the freeboard statement.

- ① Two levels of completion decks were established, and, between the upper deck and the second deck, the passage where the crew could pass the engine room and the bow section to the both the port side and the bow section.
- ② A door was established on the passage side of the engine room as mentioned in the above ①.
- ③ The second deck was freeboard deck*³. Between the second deck and double bottom top plate of the freight storehouse part both the port side and the right side, a ballast tank and a blank space were established.
- ④ The gravel collection pump and the loading use crane were installed in the bow section.

(See Figure 2.5)

*² A "node" refers to a unit of length of the anchor chain attached to the anchor, the length of each anchor chain node is of 27.5m length.

*³ "The freeboard deck" means the completion deck of a top layer, which becomes to be the standard when measuring a freeboard. According to ship structure rule Article 49, the part below the freeboard deck must be made watertight.

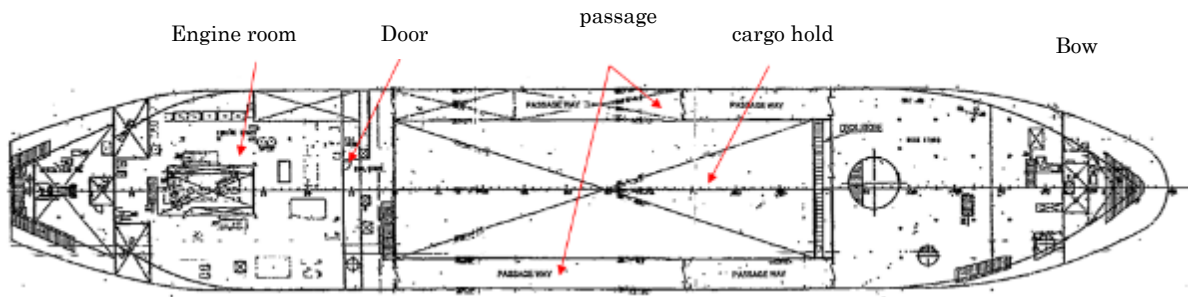


Figure 2.5 Ground plan of the second deck of Vessel B

2.5.4 Hull and main navigational equipment, or else

(1) Vessel A

① Bridge

The upper portion of the front side of the bridge is provided with a vessel clock, and daytime signal lights to the wing of the port side had been placed. There was a steering wheel to the front center of the bridge, to its right on the starboard side, the main engine remote control panel, GPS plotter, and AIS superimposed function and echo trail ^{*4} function of the radar had been installed. On the port side of the steering device, repeater compass, whistle sounding button of, AIS display unit, the radar of VHF and starboard side and the same type had been installed. There was a chart table on the starboard side of the rear, GPS plotter and AIS display unit was placed on the chart table, display board for displaying the lighting status of navigation lights, or else in the rear center had been established.

According to the statements of master A, at the time of this accident, there was no trouble or failure of the hull, engine and equipment.

(See Photo 2.5-3)

^{*4} The "echo trail" means that to display the wake of the radar image of the target in the form of the afterglow.



Photo 2.5-3 Bridge of Vessel A

② Boat deck

The lifeboats on both sides of the vessel were equipped with one vessel, respectively.

(2) Vessel B

① Bridge

A vessel clock, an anemoscope, an anemometer and a clinometer were established in the upper front of the bridge. There was a steering wheel in the central part of the bridge and the blowing button of the whistle, main plane remoteness operation board were established on the starboard side, and, on the port side, GPS plotter and in addition, AIS indication region were established with two radars. Chart table was in the rear, the display panel for displaying the lighting status of navigation lights, transceivers, VHF, or else had been installed.

The power supply was in the condition of put on and the knob of the volume has been set in the vicinity of the large.

According to the statements of master B, at the time of this accident, there was no trouble or failure of the hull, engine and equipment.

(See Photo 2.5-4 and Photo 2.5-5)



Photo 2.5-4 Bridge of Vessel B (repatriation of after lift-up situation)



Photo 2.5-5 VHF (repatriation of after lift-up situation)

② Boat deck

Equipped with one of the inflatable life raft (15 person capacity) on the small boat deck, also was equipped with one work boat.

2.5.5 Maneuverability

(1) Turning diameter and a maximum vertical distance

① According to the speed table of Vessel A, when in full speed ahead, by taking the right rudder 35 ° and 35 ° left rudder, the turning diameter*⁵ were about 410m and about 420m, respectively.

② According to the speed table of Vessel B, when in full ahead, by taking the helm to starboard at 35 ° and to port at 35 ° the turning diameter*⁶ were about 238m and about 222m, respectively.

*⁵ The "turning diameter" refers to the lateral movement distance of the hull center of gravity when the bow from the center of gravity position of the steering if the vessel was turning to stem at 180 °h.

*⁶ The "maximum vertical distance" refers to the maximum vertical movement distance on the original course of the hull center of gravity when the stem turning from the center of gravity position of the steering of the vessel.

(2) Speed and stopping distance

① According to the speed table of Vessel A, it was as follows:

Speed classification	Speed (kn)
Harbour full ahead	9.5
Harbour half ahead	7.0
Harbour slow ahead	5.5
Harbour dead slow ahead	3.5

According to the sea trial results in in document of Vessel A, in the condition of the draft at bow of 2.1m, in the ballast condition at the stern of 3.2m, and when issued a full astern in the navigation at half ahead, the distance required for the hull is stopped was 1,503m.

② According to the sea trial results document of Vessel B, full ahead was 11.4kn, shortest stopping distance at the time of the full astern from full ahead was about 570m.

According to the statements of Master B, the harbor half ahead was about 7kn.

2.5.6 Outlook from the bridges

(1) Vessel A

When viewed the bow direction from the bridge, there was no structure to produce a blind spot.

(2) Vessel B

① When viewed forward from the bridge loading crane which was provided on the bow portion was a blind spot, and it was not possible to see the upper deck bow where chief officer B and able seaman B were performing the preparatory work for the port entry, however, the outlook was good.

② According to the statements of Master B, there was no impact on the lookout by the loading crane (See Photo 2.5-6)



Photo 2.5-6 Forward outlook situation from the bridge center
(repatriation of after lift-up situation)

2.6 Information relating to the signal by whistle and by the light emission, and VHF

It was as follows according to the statement of Master A, chief officer A, second officer A and Master B.

- (1) Master A, before occurrence of this accident, along with the blowing more than five times the short sound with the intention of promoting the right turn to Vessel B, issued more than 5 times flash toward Vessel B vessel in the daytime signal lights by going out on the port wing, and let the second officer call Vessel B with the VHF.
- (2) Chief officer A, who was in the bow placement, before this accident, heard the whistle emitted by Vessel A.
- (3) Master B, before this accident occurred, was not aware of the signal by whistle and light emission from Vessel A.
- (4) Master B had powered on the VHF and set to 16 channels made to the listening state, before this accident, did not hear the call of Vessel B from Vessel A.

2.7 Weather and Sea Conditions

2.7.1 Meteorological observations, tide, or else

(1) Observed value

- ① The observed value of the Okinawa Meteorological Observatory Naha Local Weather Station which was located to the north about 8 miles to Kiyon cape, was as follows.

At 15:00, Wind direction east-northeast, Wind speed 7.8m/s, The weather sunny

At 16:00, Wind direction east-northeast, Wind speed 7.2m/s

At 17:00, Wind direction east-northeast, Wind speed 7.2m/s

- ② The observed value of the Okinawa Meteorological Observatory Miyagijima Local Weather Station which was located to the north about 7 miles north-east to this accident waters was as follows.

At 18:00, Wind direction east-northeast, Wind speed 8.8m/s

At 19 :00, Wind direction east-northeast, Wind speed 7.4m/s

At 20:00, Wind direction east, Wind speed 7.4m/s

- ③ According to the information of the Japan Coast Guard, weather and sea conditions at 21:00 of this accident location, the weather was sunny, blowing wind was of the east-northeast at the speed of 7m/s, visibility was good, the sea was calm.

(2) Sunset time

According to the celestial calendar of the Japan Coast Guard publication, sunset time of this accident day, it was at 17:40.

2.7.2 Observation by crew Member

- (1) According to the Navigation Diary of Vessel A, at around 19:00, the weather was cloudy, the wind blew northeast at 5 to 6 m/s, and visibility was good.
- (2) According to the statements of Master B, waves of height at about 2 to 3m of easterly had been received from the bow side until it passed the Kiyon-cape off the coast from Maejima off the coast.
- (3) According to the statements of chief officer B and able seaman B, outside of Nakagusuku-bay the waves were high receiving blowing the wind of at about 10m/s, however, there were no waves in the inside of the said bay.

2.8 Information about this accident waters

2.8.1 Nakagusukuwan-shinko

It was as follows according to this matter chart.

There was this matter dug waterway (water depth 13m, a width of about 230m) from the East breakwater West lighthouse to the neighborhood of the quay, and No. 4 light buoy near the middle point of this matter dug waterway had been installed. No. 3 light buoy and No. 5 light buoy were placed to the west side of this matter dug waterway and these light buoys were in the 10m depth contour.

The No. 3 light buoy and the No. 4 light buoy were provided in this bending portion, the

distance between these light buoys was about 350m, and the distance between the northeast side boundary line of this matter dug waterway and the No. 5 light buoy was about 440m, at about 350m to southwest direction from this accident location, there was a 5m depth contour.

Around this matter dug waterway, except for the south bound, there were shallow depth and land area.

2.8.2 Information of the vessels in the surrounding areas

According to the statement of Master A, chief officer A, and Master B, at the time of this accident, the vessels sailing in this matter waterway were only Vessel A and Vessel B.

2.9 Information on the lighting and lamps or else on the coast and the lights of Vessel A

- (1) When looking the coast in the north-west direction from the entrance area of this matter dug waterway in order to know about the condition of lighting and lamps on the coast near this accident waters at 18:40 on January 9, 2015, there was little lighting or lamps in the vicinity of the quay A where Vessel A departed to sail. It should be noted that the weather at the time of the survey was sunny, and the sunset time was at 17:53. (See Photo 3 Situation of coast lighting and lamps)
- (2) According to the statements of chief engineer B who was in the stern arrangement, he had been viewing the lights of Vessel A before Vessel B reached this matter bending portion.

2.10 Information on the safety management and the operation and so on of the vessels

2.10.1 Safety management of Vessel A

It was as follows according to the statement of Master A and the Navigation Diary of Vessel A.

- (1) Company A had established the Safety Management Manual in accordance with the ISM code*⁷ and when Vessel A entered the ports in the People's Republic of

*⁷ The "ISM Code", relates to the establishment of the company overall safety management system that manages all of the passenger vessels and 500 gross tons or more of the vessel, as well as it is engaged in the international voyages, functional requirements for the safety management system, certificate, refers to the international rules defined for inspection, or else, it came into effect on July 1, 1998 which was incorporated into the Annex of the 1974 SOLAS Convention.

China, a safety personnel visited Vessel A and conducted guidance on the safety of the navigation.

- (2) Vessel A, which had regularly conducted drills for the emergency that had been defined in the SOLAS Convention Annex Chapter III Part B the first Section 19 Rule 3, in 2014 November 13, and they had conducted the lifeboat drills on November 13, 2014.

2.10.2 Safety management and the operation and so on of Vessel B

It was as follows according to the statements and the written reply of Company B representative, Master B, and chief engineer B.

- (1) The safety management

- ① Company B had performed a notification of private vessels pursuant to the provisions of Act on Coastal Shipping Businesses, Article 25-4, paragraph (1) and had been granted an Identification of Ship Report Acceptance for Private Use issued by the Cabinet Office Okinawa General Bureau in February 2014. (To Company B, the provisions of Act the Safety Management Manual pursuant to Act on Coastal Shipping Businesses, Article 9 is not applied.)

- ② Company B had left the safety of the navigation to Master B because Master B is familiar with the maneuvering of vessels.

- (2) Information on the performing of the preparatory work for the port entry of Vessel B

- ① Chief officer B, although the timing or waters for making the port entry preparatory work had not been instructed by Master B, as the action of his regular work, started the same work after passing the Kudakakuchi and finished around the vicinity of this matter breakwater, and was staying the bow section until the vessel docked to Nakagusukuwan-shinko.

- ② Chief officer B, after taking over the watch duty to Master B in about 6M southwest to Kudakaguchi, along with the able seaman B, started the port entry preparatory work in the bow section, and as the work around was finished earlier than usual at around 18:50 minutes and there was enough time to shore, decided to wait in the residential areas, however, he did not report to the effect that they leave the bow section to Master B.

- ③ Master B, at the time of entry into the Nakagusukuwan-shinko, thought that chief officer B was staying in the bow section.

2.11 Information on the impact of oil spills to the environment and the prevention control of it

It was as follows according to the information of the Japan Coast Guard.

- (1) After Vessel B was grounded to the seabed, by the oil spill skilled in the art that Company B had arranged, the oil fence was stretched to the surrounding waters of Vessel B at around 02:18 on November 16, 2014, and on November 23 the heavy oil of about 25kl remaining in Vessel B was withdrawn.
- (2) Flew oil of thin strip to the west sea area of the accident site was observed, but on November 18, it was spread and extinguished by the wind waves. In addition, the mount of spilled oil is unknown.
- (3) Damage to the farming of Aasa (edible seaweed) in the Okinawa-City Awase coastal was caused by the spilled oil.

2.12 Information on the impact of the port services

It is as follows according to the statement of the Japan Coast Guard.

The zones to prohibit the navigation and berth were specified in this matter waterway and near the sea areas of Nakagusukuwan-shinko at 22:30 on November 15, 2014, and the sea areas where Vessel B was grounded was also specified as such area at 09:00 on November 16, however, all of them were released on January 19, 2015

3. ANALYSIS

3.1 Situation of the Accident occurrence

3.1.1 Events Leading to the Accident

It was as follows from 2.1 and 2.5.5 (2) ①

(1) Vessel A

- ① Vessel A was thought to have left the quay of Nakagusukuwan-shinko at around 19:05 on November 15, 2014, towards the Port of Inchen .
- ② Vessel A, after leaving the quay, was thought to have navigated toward the south-east direction in this matter waterway being accelerated and at half ahead or full ahead.
- ③ Vessel A, between 19:18:13 and 19:18:53, was thought to have navigated in this matter waterway slightly right to center, heading direction was 119° to 123° , Speed at 7.9 to 6.0 kn in this matter waterway being accelere.

- ④ Vessel A, was thought to have collided with Vessel B, although dropped the port anchor and took a full astern.
- (2) Vessel B
- ① Vessel B was thought to have left the gravel seawaters off the Maejima at around 15:40, bound for Nakagusukuwan-shinko.
- ② Vessel B was thought, after passing this matter breakwater at 19:14:03 heading 331° at the speed 11.1 kn, to have turned left (hereinafter referred to as "the 1st left turn") and navigated at around 11.0 kn.
- ③ Vessel B, at around 19:17:03, turned to left at this bending portion while looking the No. 3 light buoy in the distance of around 120m on the port side (hereinafter referred to as "the 2nd left turn"), therefore it was estimated that the heading direction is changed from around 321° to 311°.
- ④ Vessel B was thought to have turned left (hereinafter referred to as "the 3rd left turn") at around 19:17:15, therefore it was estimated that the heading direction is changed from around 311° to 299°.
- ⑤ It is probable that Vessel B, around the occasion when finishing around 10° left turn as the 3rd left turn, Master B admitted the two masthead lights of Vessel A lined up in the vertical direction for the first time, at around 19:17:59, took the left turn and with which the heading direction was changed from around 299° to 257° and the speed was decreased to around 5.5kn.
- ⑥ Vessel B, while slackening the speed and turning to the left, is thought to have collided with Vessel A.

(Refer to Figure 3: Movements of Vessel A and Vessel B)

3.1.2 Date and time, and the place of accident occurrence

It was as follows from 2.1 and 3.1.1.

- (1) It is estimated that concerning Vessel A, between 19:18:53 and 19:19:04 the direction over the ground was changed from 124.7° to 076.9°, the speed was changed from 6.0kn to 1.8kn.
- (2) It is estimated that concerning Vessel B, between 19:18:55 and 19:18:58, the direction over the ground was changed from 271.6° to 259.7°, and the heading direction was changed from 257° to 260°, it means that the directions of the direction over the ground and the bow heading were in different directions.
- (3) From above (1) and (2), It is probable that the date and time of the occurrence of this accident was at around 19:19 on November 15, 2014, and the place of accident

occurrence was the position of Vessel B, that is, at vicinity of 26 ° 19.0 ' 127 ° 51.7' (in the vicinity of around 311 ° 1,500m from the East breakwater West lighthouse).

3.1.3 Situation of damages

It was as follows from 2.3.

(1) Vessel A

Broken hole and damaged recessed part on the bow section, curve damage to the bow handrail, and abrasions arose from the bow section of the side shell of the starboard center.

(2) Vessel B

A broken hole (length of about 5.6 m width of about 4.4m) and curve damage were caused from the downward about 2m of the upper deck and the upper edge of the starboard side shell plate, toward the stern side starting from the position of the stern side about 5.4m from the hull center, and the occurrence of drop of the gravel extraction pump of the starboard bow section lead to the total loss.

3.1.4 Situation of the collision

From 3.1.1 and 3.1.3 it is probable, that Vessel A was in the advancement while slowing down, Vessel B was in the left turn while slowing down, the bow section of Vessel A and the starboard midship part of the Vessel B had collided.

3.2 Causal Factors of the Accident

3.2.1 Situation of crews

From 2.4, Master A had Endorsement attesting the recognition of Certificate under STCW regulation and Master B had legal and valid Certificates of Master. At the time of this accident, the health condition of Master A and Master B is thought to be good.

3.2.2 Situation of the vessels

From 2.5.4, both Vessel A and Vessel B, had no defect, or failure in their hulls, engines, and equipment.

3.2.3 Analysis on the weather and sea conditions

From 2.7, it is probable that in the site of this accident, at the time of the accident, the weather was cloudy, east-northeast easterly wind speed at 7m/s to 7.4m/s was blowing, visibility was good, the sea was calm, and the sunset time was around 17:40.

3.2.4 Analysis of the area of the accident

It was as follows from 2.5.2 (1)、2.5.5 (1) ① and 2.8.

- (1) It is probable that at the time of this accident, the vessels sailing in this matter waterway were only Vessel A and Vessel B.
- (2) It is estimated from the fact that in the southwest about 350m of the site of this accident there was a 5m depth contour, the seawaters that Vessel A, in order to avoid the collision with Vessel B, could navigate to starboard the helm was limited.

3.2.5 Analysis on grounding of Vessel B

It was as follows from 2.1, 2.3 and 2.8.1.

- (1) Circumstances leading to the on-grounding
 - ① It is probable that chief officer B, in order to investigate the damage situation after the collision, went to the starboard side passage provided between the upper deck and the second deck down from the stern deck to the engine room, but when passing through the door on the front side of the engine room, because seawater had been vigorously flowed through the starboard side passage, turned back to the stern deck.
 - ② It is probable that when 4 crews of Vessel B were moving from the stern deck to the bow section, Vessel B had already heeling to the starboard side.
 - ③ It is probable from the fact that Vessel A, although at the bow flagpole and the front mast provided had no damage and the starboard anchor was no placed down to the vicinity of the surface of the water in the bow, there is a possibility that the starboard anchor of Vessel A might have entangled with a wire that hangs the gravel extraction pump of Vessel B.
 - ④ It is probable that from the fact of ③ in the above and the gravel extraction pump of Vessel B had been installed in the upper deck, there is a possibility that after the collision, the deck on the starboard side of Vessel B was in a state to be submerged.
 - ⑤ Therefore It is probable that there is a possibility that Vessel B after the broken hole had been generated on the starboard side when the shell plate collides with Vessel A, seawater entered the starboard side passage between the starboard side cavity and the upper deck and the second deck, and the engine room through the front door of the engine room, it laterally inclined to the starboard side, therefore the starboard side was led to the on-grounding.

(2) Place of the grounding

From the fact that Master B, after the collision, took a full astern, as well as from the AIS record and repatriation location of Vessel B, It is probable that Vessel B, after the collision, turning the head to the right, reversed toward south-west direction, at around 19:32, had grounded at the point of location at about 200m in the direction of south-west from the location of the collision.

3.2.6 Analysis on maneuvering and lookout

It was as follows from 2.1, 2.6, 2.9, 3.1.1 through 3.1.3, and 3.2.4.

(1) Vessel A

- ① It is probable that concerning Vessel A, Master A took the maneuvering command, the second officer was on the operation of the engine Telegraph and watch who turned on the power of the AIS, and able seaman A was on the steering, it navigated toward south-east in this matter dug waterway.
- ② It is Master A, who had a schedule to navigate in this matter dug waterway center, however, by the radar and the naked eye, admitted Vessel B which was entering the port in this matter breakwater south-southeast direction, thinking that Vessel B would be navigating in this matter dug waterway took the slightly right side of this matter waterway.
- ③ It is probable that Master A, since he had been observing the movements of Vessel B on the radar and by the naked eye, recognized that Vessel B, during its period from the 1st left turn through the 2nd left turn, had been navigating on the left side of this matter waterway.
- ④ It is probable that Master A, although admitting that Vessel B had turned left by showing the masthead lights and port lights in the vicinity of this matter the bent portion had believed that Vessel B would sooner or later navigate on the right side of this matter waterway.
- ⑤ It is probable that Master A, around 19:18, admitting that the two masthead lights of Vessel B lined up in the vertical direction felt the danger of the collision.
- ⑥ It is probable that Master A, feeling the danger of the collision, along with the blowing more than five times the short sound with the intention of promoting the right turn to Vessel B, issued more than 5 times flash toward Vessel B in the daytime signal lights, and tried to call Vessel B with the VHF.
- ⑦ It is probable that Master A, because there was no response, and Vessel B was imminent, threw down the port anchor and took a full astern.

⑧ It is probable that Master A, until feeling the danger of a collision, because he had been convinced that Vessel B would navigate at any rate on the right side of this matter waterway, continued to navigate at half ahead or full ahead, led to loosening the timing for taking the operation to avoid collision.

⑨ It is probable that Master A, at the time when admitting that Vessel B was navigating on the left side of this matter waterway left, could have avoided this accident of collision, if measures had been taken, including to whistleblowing and signal light emission, call by the VHF and reduce the speed.

(2) Vessel B

① It is probable that Master B, after coming to the bridge at around 6 miles (M) south-west of Kudakaguchi, took over the watch duty from chief officer B and able seaman B, he did the bridge duty alone by himself.

② It is probable that Master B, in the vicinity of this matter breakwater, saw the radar screen set at 2.5M range, thought that there are no departing Vessels because there was no radar image of the other Vessels. It was not possible to clarify the situation that Master B did not recognize the radar image that had no other vessels.

③ It is probable that Master B, being in a hurry because about 30 minutes behind schedule was caused, and after passing through this matter breakwater, after making the 1st left turn he had been navigating in this matter waterway slightly left side at the speed of around 11.0kn, there is a possibility that he has been trying to reduce the distance made without noticing a vessel.

④ It is probable that Master B, recognizing a white light of Vessel C crossing in front of Vessel B to the left concentrated full attention to the movement of this vessel only.

⑤ It is probable that Vessel B, at around 19:17:03, turned to left at this bending portion while looking the No. 3 light buoy in the distance of around 120m on the port side, therefore it was estimated that the heading direction is changed from around 321° to 311°. It is probable that in this case, Vessel B had sailed about 55m left of this matter waterway center.

⑥ It is highly probable that at around 19:17:15, Vessel B made the 3rd left turn therefore with which the heading direction is changed from around 311° to 299°.

⑦ From the next thing, it is probable that Master B, for the first time acknowledged Vessel A on the bow side in the distance of about 540 to 640m before

finishing 10°turn in the 3rd left turn, between 19:17:48 to 19:17:59.

- a) That Vessel B, around the occasion when finishing 10°left turn as the 3rd left turn, Master B admitted the two masthead lights of Vessel A lined up in the vertical direction.
- b) That Vessel A is presumed to have navigated straight in this matter waterway to the south east, and if supposed to have navigated until 19 :17: 48to 19 :17:59s, on the same course as in 19:18:13 in the same heading and at the same speed, the direction and distance between Vessel A and Vessel B, if seen from Vessel B, should have been what is displayed in Table 3.2.

Table 3.2 Direction and other items of Vessel A if seen from Vessel B

Time(Hours: Minutes: Seconds)	Guessed position of Vessel A		Direction of Vessel A if seen from Vessel B		Distance (m) between the vessels
	North latitude (°-')	East longitude (°-')	True bearing (°)	Relative bearing (°)	
19:17:48	26-19.15000	127-51.47833	299.8	Port side by bow about 8	640
19:17:59	26-19.13500	127-51.50167	298.3	Port side by bow about 1	540

- ⑧ It is probable that Master B, since he was not aware of the existence of Vessel A, considered to have made left turns toward the front path of Vessel A.
- ⑨ It is probable that Master B, feeling the danger of collision, shifted to the manual steering, took a hard port and a full astern, thinking that Vessel B was turning to the left.
- ⑩ It is probable that Master A, along with the blowing more than five times the short sound with the intention of promoting the right turn to Vessel B, issued more than 5 times flash toward Vessel B in the daytime signal lights, and tried to call Vessel B with the VHF, because he made the vessel handling of what is mentioned in ⑨above, there is a possibility that it was not possible to respond to Vessel A by whistle blow or VHF, however, it was not possible to clarify such situation.
- ⑪ From the fact that Master B, in the vicinity of this matter breakwater, saw the radar screen set at 2.5M range, thought that there are no departing Vessels because there was no radar image of the other Vessels, that Master B, recognizing a white light of Vessel C crossing in front of Vessel B to the left concentrated full attention to the movement of this vessel only, that chief engineer B is had been

viewing the navigation lights of A vessel from before reaching in this matter the bent portion, and that in the vicinity of quay Vessel A's sailing lighting or lighting light of the coast, as it was not a situation becomes difficult to visually recognize with lights, therefore since it was recognized for the first time Vessel A immediately before the collision as in ⑦above, it is probable Vessel B did not perform appropriate watch by the radar and with the naked eyes.

(See Figure 4: Approaching situation figure of Vessel A and Vessel B)

3.2.7 Analysis on the safety management and the operation and so on of the vessels

It was as follows from 2.10.

(1) Vessel A

Vessel A had regularly conducted drills for the emergency that had been defined in the SOLAS Convention Annex Chapter III Part B the first Section 19 Rule 3.

(2) Vessel B

- ① It is probable that Company B had left the safety of the navigation to Master B.
- ② It is probable that Vessel B's chief officer B, although the timing or waters for making the port entry preparatory work had not been instructed by Master B, as the action of his regular work, started the same work after passing the Kudakakuchi and finished around the vicinity of this breakwater, and was staying the bow section until the vessel docked to Nakagusukuwan-shinko.
- ③ It is probable that chief officer B, after taking over the watch duty to Master B in about 6M southwest to Kudakaguchi, along with the able seaman B, started the port entry preparatory work in the bow section, as the workaround was finished earlier than usual at around 18:50 and there was enough time to shore, decided to wait in the residential areas, however, he did not report to the effect that they leave the bow section to Master B.
- ④ It is probable that Master B, at the time of the accident, thought that chief officer B was staying in the bow section.
- ⑤ It is probable that from above ① through ④, Vessel B at the time of the accident, in the circumstances that have not been established timely or waters for the making of the entry into port preparatory work, chief officer B, after completion of the same work, was not staying in the bow section. For Vessel B, if it had been in the circumstances that timing and seawaters had been established for the making of the entry into port preparatory work, and chief officer B had maintained the bow placement to perform the watch, he might have notified the existence of Vessel A

and could notified Master B to that effect, there might be a possibility to recognize Vessel A earlier.

3.2.8 Analysis of the accident occurrence

It was as follows from 3.1.1, 3.1.4 and 3.2.6.

(1) Vessel A

- ① It is probable that Master A, who had a schedule to navigate in this matter dug waterway center, however, by the radar and the naked eye, admitted Vessel B which was entering the port in this matter breakwater south-southeast direction, thinking that Vessel B would be navigating in this matter dug waterway, took slightly right side of this matter waterway.
- ② It is probable that Master A, at the time when admitting that Vessel B was navigating on the left side of this matter waterway left, between the 1st left turn and the 2nd left turn, could have avoided this accident of collision, if measures had been taken, including to whistleblowing and signal light emission, call by the VHF and reducing the speed when there was a margin of distance and time, however, as such measures were not taken by Master A, it must be said that Master A was involved in this matter accident.
- ③ It is probable that Master A, although admitting that Vessel B had turned left by showing the masthead lights and port light in the vicinity of this matter the bent portion, had believed that Vessel B would sooner or later navigate on the right side of this matter waterway.
- ④ It is probable that Master A, around 19:18, admitting that the two masthead lights of Vessel B lined up in the vertical direction felt the danger of the collision.
- ⑤ It is probable that Master A, until feeling the danger of a collision, because he had been convinced that Vessel B would navigate at any rate on the right side of this matter waterway, continued to navigate at half ahead or full ahead, led to loosening the timing for taking the operation to avoid collision.
- ⑥ It is probable that Master A, feeling the danger of a collision, blew more than five times of the short sound and signal light emissions and called by the VHF with the intention of promoting the right turn to Vessel B, but because there was no response, and Vessel B was imminent, threw down the port anchor and took a full astern, but the bow section of Vessel A and the starboard side midship of the Vessel B had collided.

(2) Vessel B

- ① It is probable that Master B, being in a hurry because about 30 minutes behind schedule was caused, and after passing through this matter breakwater, after making the 1st left turn he had been navigating in this matter waterway slightly left side at the speed of around 11.0kn.
- ③ From the next thing, it is considered somewhat likely that Master B, for the first time acknowledged Vessel A on the bow side in the distance of about 540 to 640m before finishing 10°turn in the 3rd left turn, between 19:17:48 to 19:17: 59.
- ③ It is probable that Master B, from the fact that in the vicinity of this matter breakwater, saw the radar screen set at 2.5M range, thought that there are no departing Vessels because there was no radar image of the other Vessels and that as recognizing a white light of Vessel C crossing in front of Vessel B to the left concentrated full attention to the movement of this vessel only, it is probable that Vessel B did not perform appropriate watch.
- ④ It is probable that Master B, since an attempt is made to shorten the route without noticing Vessel A there is a possibility to have navigated slightly left side in the center of this matter waterway.
- ⑤ It is probable that Master B, since he was not aware of the existence of Vessel A, considered to have made left turns toward the front path of Vessel A.
- ⑥ It is probable that Master B, feeling the danger of a collision, shifted to the manual steering, took a hard port and a full astern, thinking that Vessel B was turning to the left but the starboard wing center of the Vessel B had collided with the bow section of Vessel A.

3.3 Analysis of the rescue and mitigation measures of damages

It is probable that From 2.1.3 (2) and 2.10.1, because Vessel A had regularly conducted drills for the emergency that had been defined in the SOLAS Convention Annex Chapter III Part B the first Section 19 Rule 3, quickly responding to the request of rescue from Vessel B, it was possible for them to let the 4 crews move to the forecandle deck and to drop the lifeboat in order to rescue Master B.

4. CONCLUSION

4.1 Probable Causes

It is probable that in this accident, at night, in Nakagusukuwan-shinko, while Vessel A was navigating in this matter waterway slightly right to the center bound for south eastward, Vessel B was navigating in this matter waterway slightly left to the center bound for north westward, Master A navigated at half ahead or full ahead but had lost the chance of the actions to avoid a collision, and Master B, because he made left turn of Vessel B towards the front line of Vessel A without being aware of the existence of Vessel A, this accident was caused by the collision of the both vessels.

It is probable that Master A, because he had been convinced that Vessel B would navigate at any rate on the right side of this matter waterway, continued to navigate at half ahead or full ahead, led to loosening the timing for taking the operation to avoid a collision.

It is probable that concerning Master B, the reason for turning to left towards the front line of Vessel A without noticing its presence, was from the fact that in the vicinity of this matter breakwater saw the radar screen and thought that there are no departing Vessels because there was no radar image of other Vessels, and concentrated the attention to Vessel C which was crossing in front of Vessel B to the left only, it is probable Vessel B did not perform appropriate watch but made an attempt to shorten the route, which might have caused the accident.

4.2 Other Identified Safety-Issues

It is probable that Vessel B, at the time of the accident, in the circumstances that have not been established timely or waters for the making of the entry into port preparatory work, chief officer B, after completion of the same work, was not staying in the bow section. For Vessel B, if it had been in the circumstances that timing and seawaters had been established for the making of the entry into port preparatory work, and chief officer B had maintained the bow placement to perform the watch, he might have notified the existence of Vessel A and could notified Master B to that effect, there might be a possibility to recognize Vessel A earlier.

5. SAFETY ACTIONS

It is probable that in this accident, at night, in Nakagusukuwan-shinko, while Vessel A was navigating in this matter waterway slightly right to the center bound for eastward, Vessel B was navigating in this matter waterway slightly left to the center bound for westward,

Master A navigated at half speed or full speed forward but had lost the chance of the actions to avoid a collision, and Master B, since being not aware of the existence of Vessel A, since an attempt was made to shorten the route without noticing Vessel A there is a possibility to have navigated slightly left side in the center of this matter waterway. This accident was caused by the collision of the both vessels.

Therefore, in order to prevent a recurrence of the same type of accident, it is desired that the following measures are enforced.

- (1) The operator must, by taking advantage of the navigational equipment, such as by the naked eye and radar, always perform appropriate lookout.
- (2) The operator must, as long as it is safe and suitable for the execution, navigate on the right end of the waterway.
- (3) The operator must, when it is not possible to understand the intentions or behavior of other vessels, or when there is a doubt about if sufficient actions to avoid a collision had been taken, whistleblowing and signal light emission, call by the VHF and reducing the speed when there was a margin of distance and time.
- (4) Master must establish timing and seawaters for the making of the entry into port preparatory work, the crew in the bow placement must keep the position of bow duty at the time when the vessel enters the port.
- (5) The vessel owner or vessel management company must communicate the guidance to the crews on the above items (1) to (4), and regularly check if the contents instructed are carried out in the vessel to secure the safety of the navigation.

5.1 Safety Actions Taken

Company B, having owned one vessel in order to continue the gravel industry, let 6 crews are onboard and made the bridge with 2 crews.

5.2 Safety Actions Required

In order to prevent a similar collision accident, it is desired to take the following measures to both Company A and Company B.

- (1) Company A

Let the masters be guided, when it is not possible to understand the intentions or behavior of other vessels, or when there is a doubt about if sufficient actions to avoid a collision had been taken by another vessel, to take measures, including to whistleblowing and signal light emission, call by the VHF and reducing the speed when there was a margin of distance and time.

(2) Company B

- ① Let the masters be guided, by taking advantage of the navigational equipment, such as by the naked eye and radar, to always perform appropriate lookout.
- ② Let the masters be guided, as long as it is safe and suitable for the execution, to navigate on the right end of the waterway.
- ③ Let the masters be guided, to establish timing and seawaters for the making of the entry into port preparatory work, the crew in the bow placement must keep the position of bow duty at the time when the vessel enters the port.

The company must, concerning the above items ① to ③, regularly check if the contents instructed are carried out in the vessel to secure the safety of the navigation.

Figure 1: Accident outbreak schematic

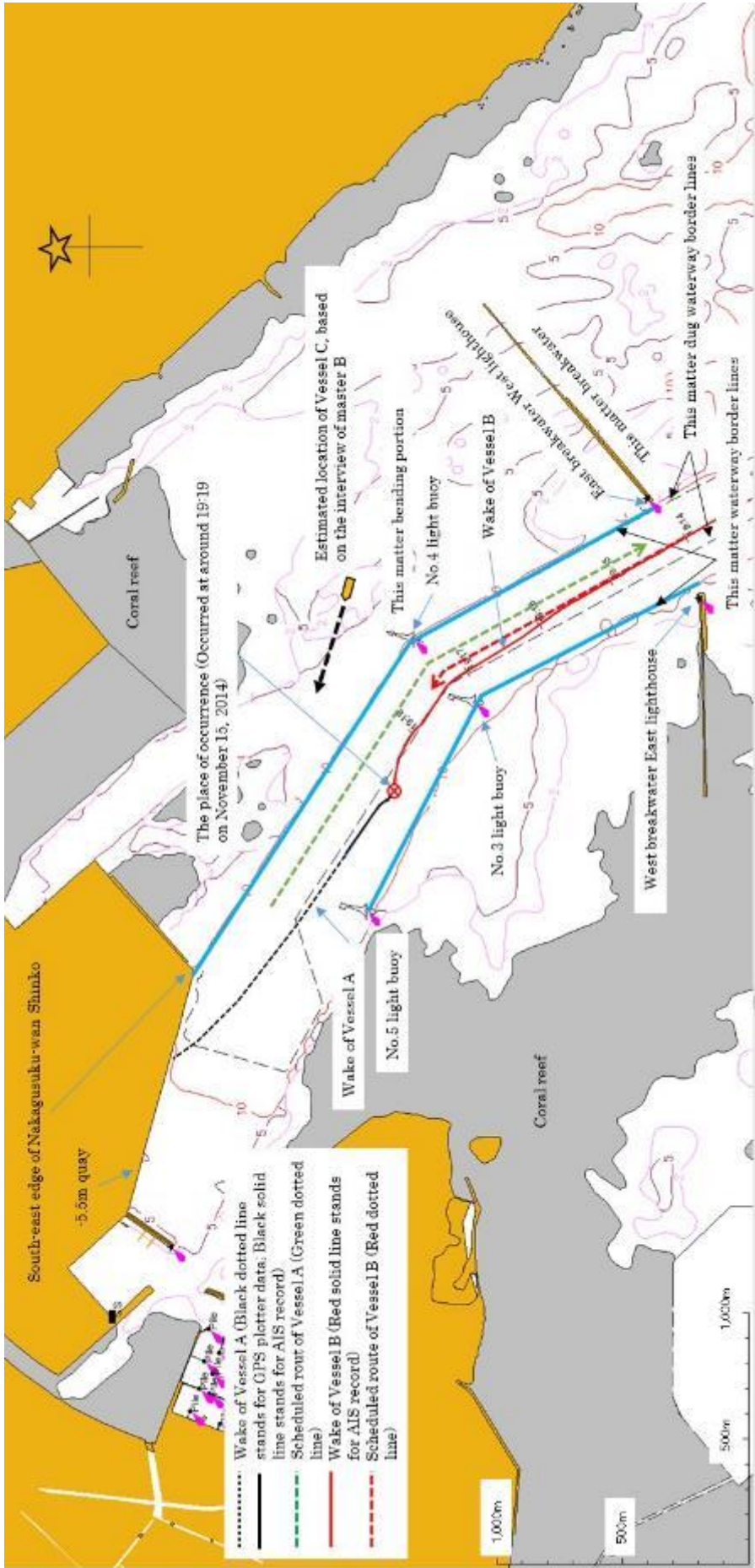


Figure 2 : Navigation path diagram of Vessel B

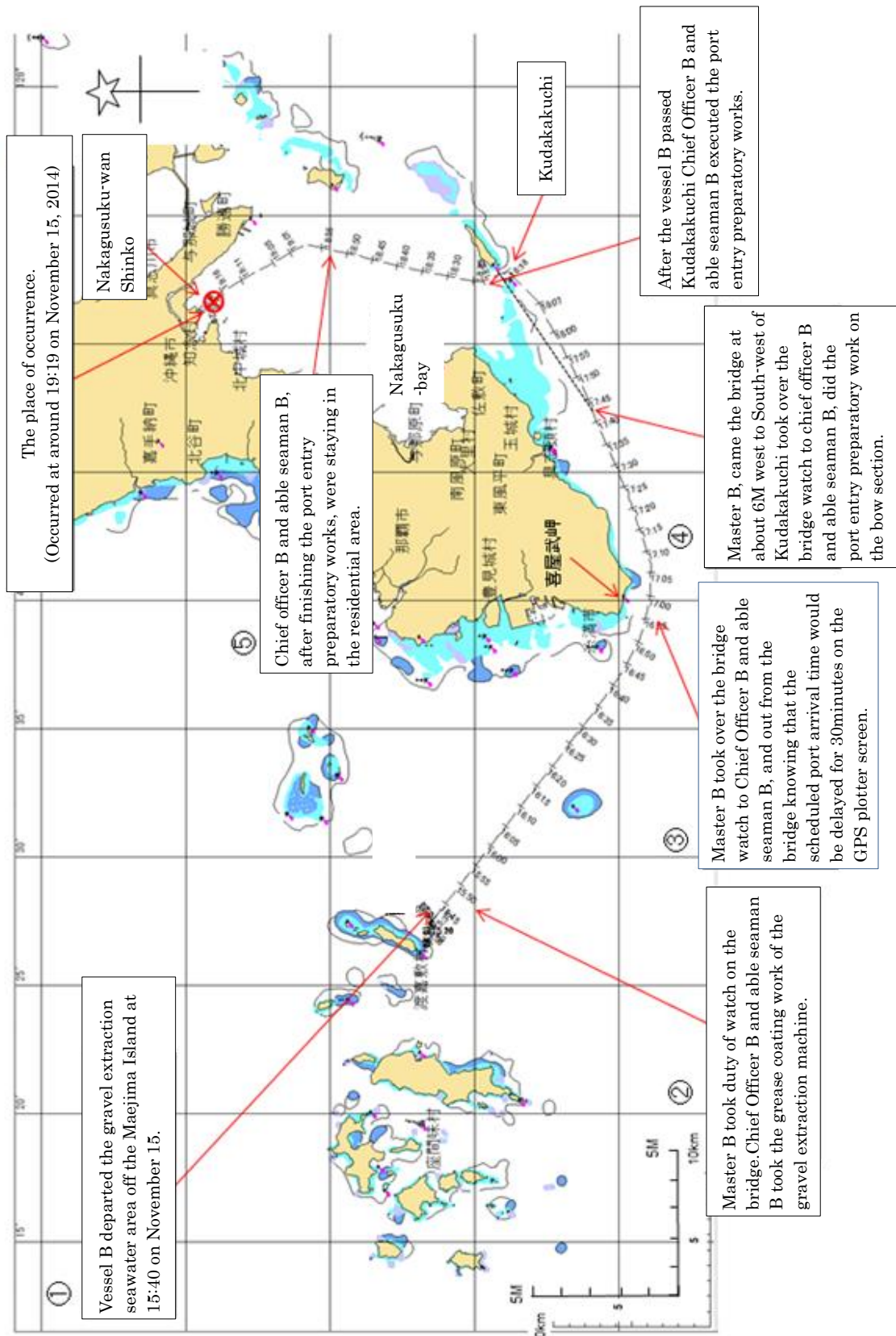


Figure 3 : Movements of Vessel A and Vessel B

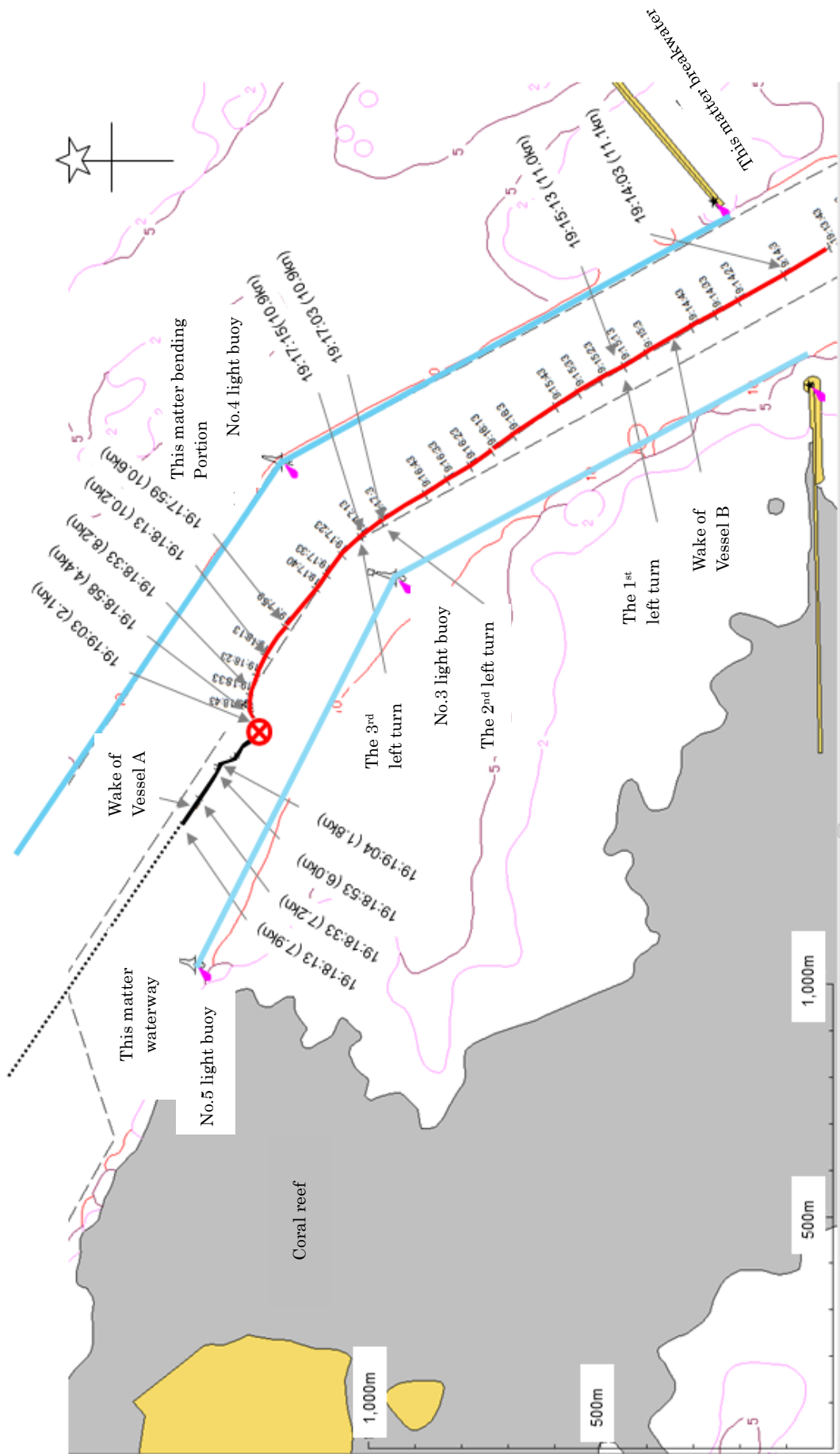


Figure 4 : Approaching situation of Vessel A and Vessel B

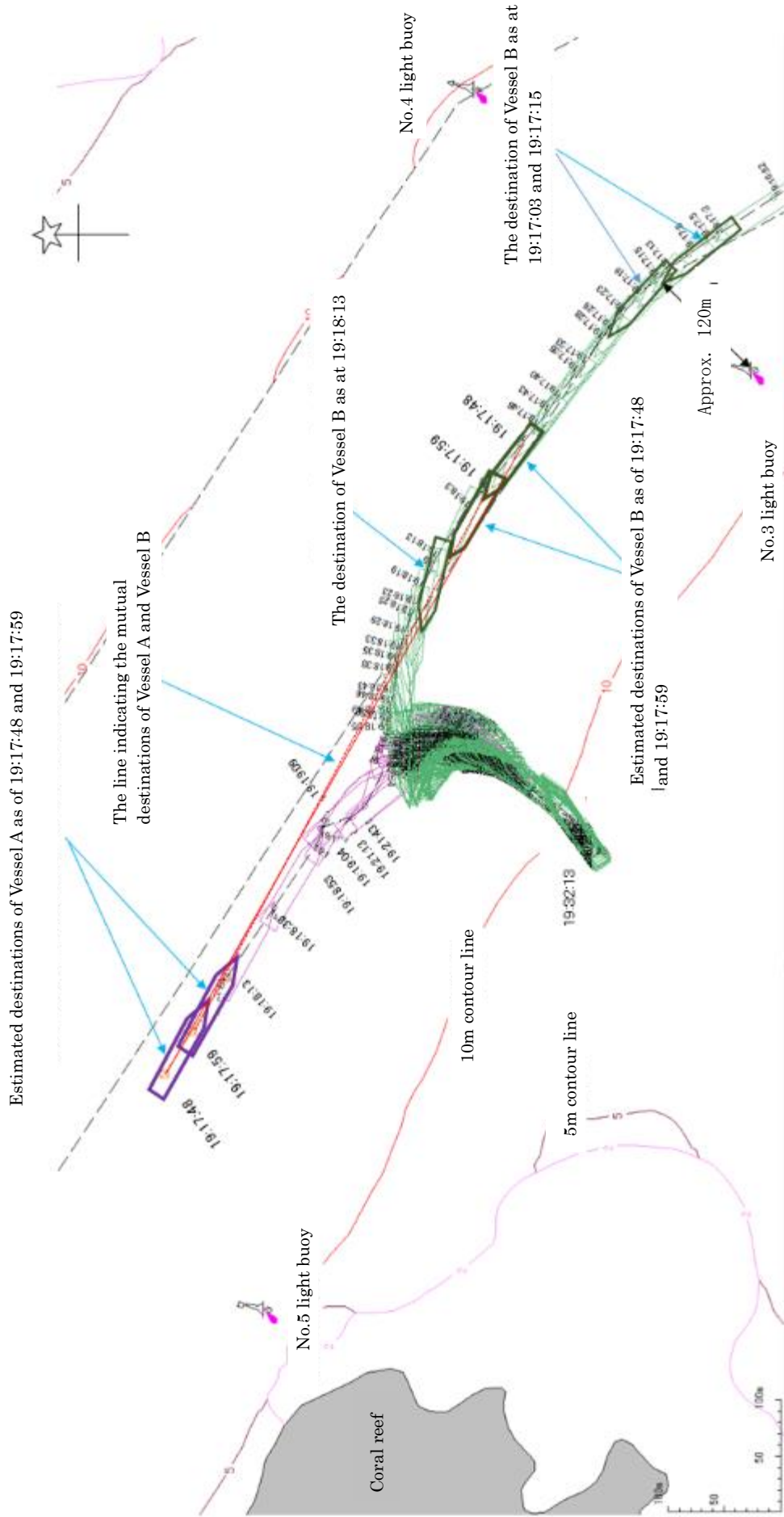


Photo 1 : Damage of Vessel A

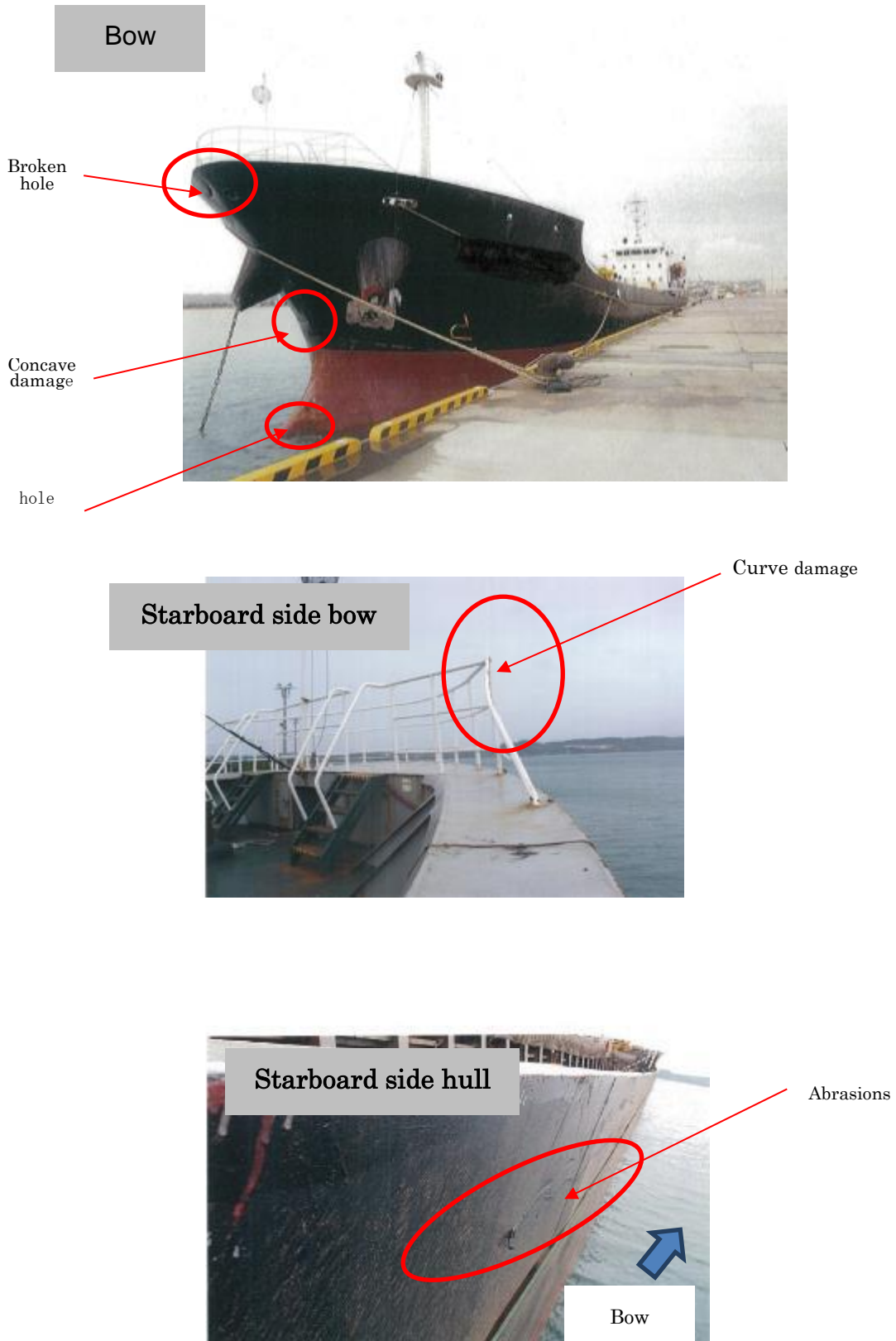


Photo 2 : Damage of Vessel B
(Repatriation of after lift-up situation)



Photo 3 : Situation of coast lighting and lamps

