

MA2017-8

**MARINE ACCIDENT  
INVESTIGATION REPORT**

August 31, 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/INCIDENT INVESTIGATION REPORT

Vessel type and name: Cargo Ship “HUNAN”

IMO number: 9714252

Gross tonnage: 24,785 tons

Accident type: Missing crew member

Date and time: Around 12:12 on May 16, 2016 (local time, UTC + 9 hours)

Location: Off the west of Heigun-tou, Yamaguchi Prefecture  
Around 119° true, 2.6 nautical miles from the Murotsu Lighthouse  
(Approximate position: 33°48.6'N, 132°09.8'E)

August 3, 2017

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 >

When a cargo ship HUNAN, with a master and 22 persons on board and having a pilot aboard, was moving northeast on the Heigun Channel off the west of Heigun-tou, Yanai City, Yamaguchi Prefecture toward the Port of Fukuyama, Hiroshima Prefecture, an able seaman fell off an accommodation ladder and although he hanged in midair with a lifeline of “a harness-type safety belt with an expansion-type life jacket” (safety belt) he wore, slip under the water around 12:12 on May 16, 2016 and went missing.

### < Probable Causes >

It is probable that the accident occurred by able seaman who was working on lifting up and stowing a pilot ladder with three crews falling off an accommodation ladder and hanging in midair with a lifeline of the safety belt and going by the board as his body separated from the safety belt when he raised both arms in an attempt to grab a rope or the like when the ship was moving northeast on the Heigun Channel.

It is probable that the separation of the body of able seaman from the safety belt stems from his failure to have two thigh buckles of the safety belt fastened.

It is probable that the reason why he raised both arms in an attempt to grab the rope or the like was because he was not able to the rope or the like as he was in a state of being dragged on the sea surface though he tried to grab one with his left hand.

It is probable that not taking measures to ease the situation of able seaman being dragged on the sea surface such as decelerating or stopping the ship was involved in able seaman remaining in

that situation.

It is somewhat likely that the boatswain and others not having held an advance meeting with regard to the contents such as:

- (1) Necessity of doing the lifting up and stowing work
- (2) Implementation of safety measures such as confirmation of adequate wearing of a safe protector in connection with engaging in the lifting up and stowing work

with the responsible official for work in doing the work of lifting up and stowing the pilot ladder was involved in the occurrence of the accident.

# 1 PROCESS AND PROGRESS OF THE INVESTIGATION

## 1.1 Summary of the Accident

When a cargo ship HUNAN, with a master and 22 persons on board and having a pilot aboard, was moving northeast on the Heigun Channel off the west of Heigun-tou, Yanai City, Yamaguchi Prefecture toward the Port of Fukuyama, Hiroshima Prefecture, an able seaman fell off an accommodation ladder and although he hanged in midair with a lifeline of a harness-type safety belt with an expansion-type life jacket he wore, slip under the water around 12:12 on May 16, 2016 and went missing.

## 1.2 Outline of the Accident Investigation

### 1.2.1 Setup of the Investigation

The Japan Transport Safety Board appointed a chief investigator and one other investigator to investigate this accident on January 12, 2016.

### 1.2.2 Collection of Evidence

May 18 and 19, 2016: On-site investigation and interview

June 17, 18, July 12, 15, August 22, 23, November 16, 2016: Interview

July 13, 16, 21, 23, 28, 29, August 4, 5, 17, 19, September 7, 26, October 3, November 15, December 16, 2016: Collection of questionnaire

### 1.2.3 Comments of Parties Relevant to the Cause

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

### 1.2.4 Comments from Flag State

Comments on the draft report were invited from the flag State of the HUNAN.

# 2 FACTUAL INFORMATION

## 2.1 Events Leading to the Accident

### 2.1.1 Navigation Track of the HUNAN according to AIS

According to the record of information of the automatic identification system<sup>\*1</sup> (hereinafter, referred to as “AIS”) received by a private vessel information company, a navigation track of the HUNAN (hereinafter, referred to as “the ship”) between 11:40:01 and 12:30:10 on May 16, 2016 was as shown in Table 2.1 – 1.

The position of the ship is the position of the GPS antenna provided up above the bridge and the bearing on the ship’s bow is of true bearing.

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<sup>\*1</sup> “Automatic Identification System (AIS)” is an information exchanging device for automatically transmitting/receiving information on the ships’ identification signals, types, names, positions, courses, speeds, destinations, and navigation states and exchanging them between vessels and with navigation aid facilities of land stations.

Table 2.1 – 1 AIS Record of the Ship (excerpt)

Time (HH:MM:SS)	Ship's position		Course Over The Ground (° )	Heading (° )	Speed Over The Ground (kn)
	Latitude (N) (° -' -")	Longitude (E) (° -' -")			
11:40:01	33-45-08.2	132-01-38.8	087.6	091	14.1
11:44:07	33-45-10.0	132-02-46.1	089.4	091	14.7
11:47:01	33-45-10.4	132-03-36.6	089.8	090	14.5
11:47:07	33-45-10.4	132-03-38.4	089.5	089	14.5
11:48:29	33-45-12.4	132-04-02.0	076.9	067	14.4
11:49:13	33-45-16.4	132-04-13.4	061.2	054	14.0
11:50:01	33-45-22.9	132-04-24.8	054.3	054	14.1
11:55:01	33-46-07.0	132-05-34.6	053.7	053	14.9
12:00:01	33-46-51.4	132-06-47.6	053.4	054	14.9
12:01:01	33-47-00.4	132-07-02.0	053.6	055	14.7
12:02:01	33-47-09.0	132-07-16.3	053.8	054	14.7
12:03:01	33-47-17.5	132-07-30.5	053.7	054	14.7
12:04:01	33-47-26.3	132-07.44.7	054.0	054	14.6
12:05:13	33-47-36.6	132-08-01.8	054.5	054	14.6
12:06:13	33-48-45.1	132-08-10.1	054.0	054	14.7
12:07:31	33-47-56.5	132-08-34.7	054.2	054	14.7
12:08:01	33-48-00.9	132-08-42.1	054.3	054	14.7
12:09:01	33-48-09.4	132-08-56.5	055.2	054	14.8
12:10:01	33-48-17.9	132-09-10.8	054.0	053	14.8
12:11:01	33-48-26.6	132-09-25.2	053.8	054	14.7
12:12:01	33-48-35.3	132-09-39.8	055.2	054	14.8
12:12:13	33-48-37.0	132-09-42.8	055.2	054	14.9
12:12:25	33-48-38.7	132-09-45.7	055.1	054	14.8
12:12:55	33-48-43.0	132-09-52.9	054.6	058	14.4
12:13:21	33-48-46.7	132-09-58.6	050.8	068	13.8
12:14:01	33-48-50.8	132-10-07.4	073.6	111	11.3
12:15:01	33-48-49.5	132-10-17.4	122.3	168	6.9
12:16:01	33-48-45.0	132-10-21.6	155.3	206	4.9
12:17:00	33-48-40.8	132-10-22.4	182.4	235	3.8
12:20:02	33-48-34.9	132-10-13.0	244.3	268	4.1
12:25:10	33-48-47.3	132-09-54.1	345.4	339	4.0
12:30:10	33-48-02.2	132-09-56.4	023.0	349	3.2

### 2.1.2 Information of Sounds by Information Record of Voyage Information Recording Device

According to the information record of the ship by the voyage data recorder\*2 (VDR) (hereinafter, referred to as “VDR record”), conversations in the bridge and on the starboard wing in 12:06:05 - 12:14:05 were as shown in Table 2. 1-2.

Note that the description is a tentative Japanese translation of the conversations in English and Burmese.

Table 2.1 – 2 Conversations in the Bridge and on the Starboard Wing (excerpt)

Time (HH:MM:SS)	Main Sounds/Voices
12:06:05	An able seaman on duty (hereinafter, referred to as “AB A”) : ..... (indecipherable) (Burmese)
12:06:11	A second officer (hereinafter, referred to as “2/O”) : What’s going on? (Burmese)
12:06:14	AB A: Man overboard, man overboard, what’s going on? (Burmese)
12:06:22	2/O: I see none. (Burmese)
12:06:35	Pilot: Announce, announce ... (English)
12:06:42	2/O: A man fell overboard (Burmese)
12:07:10	Pilot: Man rope additional, man rope additional... (English)
12:07:17	Master: Chief Officer, Chief Officer (hereinafter, referred to as “C/O”), Captain. (English)
12:07:30	Master: C/O, they are going to the pilot area one them falling down. (English)
12:07:55	Master: Take the gangway to step down. (issued various instructions subsequently) (Burmese)
12:08:21	2/O: I’ll take it down. (Burmese)
12:08:25	Master: Okay, you do. (Burmese)
12:11:12	Pilot: Life jacket, safety belt. (English)
12:12:05	Pilot: Captain, one AB (English)
12:12:10	Master: Okay, one AB, coming to the bridge. (English)
12:12:25	Master: Man overboard. (Burmese)
12:12:33	Master: Man overboard. (English)
12:12:40	Pilot: Hard starboard (English)
12:12:43	Master: No, no, dead slow, island (English)
12:12:45	Master: Hard starboard. (English)
12:12:48	Pilot: Dead slow now. (English)

\*2 “Voyage Data Recorder (VDR)” is a device for recording intercommunications on VHF radio phones and sounds/voices in a bridge besides data about navigation such as a position, a course, a speed etc.

12:12:55	Master: Hard starboard.	(English)
12:13:06	Master: One AB	(Burmese)
12:13:33	Master: Watching now.	(English)
12:13:40	Master: Hard starboard.	(English)
12:13:55	Master: Call for S/O	(Burmese)
12:13:57	2/O: I am here.	(Burmese)
12:14:00	Master: Second, man overboard.	(English)
12:14:05	2/O: Okay.	(English)

### 2.1.3 Events Leading to the Accident according to the Statements of Crews

According to the statements of the master, the C/O, the 2/O, AB A, two ordinary seamen (hereinafter, referred to as “OS A” and “OS B”), the electric engineer, the pilot, and a master of a tug boat which joined the search, they were as follows.

The ship was with a master and 22 persons (19 Republic of the Union of Myanmar nationals, two Republic of China’s Nationals and one Ukraine national) on board and left a dockyard located at the Port of Jinjiang, Jiangsu Province, the People’s Republic of China at around 12:00 on May 12, 2016 (local time) toward the Port of Fukuyama, Hiroshima Prefecture as her first voyage after completion of construction.

The ship boarded a pilot by pilot transfer arrangements consisting of a pilot ladder and a gang way prepared at a slightly rear location in the middle of the starboard off the east of Hesaki, Kitakyushu City, Fukuoka Prefecture at around 07:45 on May 16, 2016 after she passed through the Kanmon Channel and continued the voyage in the state of hanging the pilot transfer arrangements after that.

When the ship was taking the Heigun Channel toward northeast on automatic steering at a speed of about 14.5 kn (ground speed, the same applies hereafter) under the pilot’s piloting, the 2/O and AB A ascended to the bridge at around 11:50 and took over the watchkeeping from a third officer and one of able seamen on duty and the master descend from the bridge to have a meal.

When a boatswain finished deck work at around 12:00 and was heading for a living quarter with one of able seamen (hereinafter, referred to as “AB B”) and two ordinary seamen, the boatswain received a proposal from AB B that AB B wanted to lift up and stow the pilot ladder as it was being banged on the shell plating due to the wind and waves and was also being splashed, and it was decided that they would work on lifting the ladder to be stowed.

The boatswain and the OS A took a position of pulling up a pilot ladder with hands and the AB B took a position of operating a winch lever of the accommodation ladder respectively, and the AB B wore a harness-type safety belt with an expansion-type life jacket (hereinafter, referred to as “the safety belt”) and moved down to the lower end of the accommodation ladder so as to untie a rope which had tied up the pilot ladder to the shell panel for preventing vibration.

The boatswain and the OS A caught the signal for pulling up the pilot ladder from AB B who had loosened the tied rope and came back onto the deck.

Though the boatswain began to pull up the pilot ladder by manpower, he was not able to pull it up and AB B said that since the pilot ladder had got stuck with the accommodation ladder, he would go to unstuck it and sometime after he moved down the ladder again, and sometime later,

the boatswain heard a scream.

Since the boatswain was not able to see all around a lower part of the accommodation ladder from the spot for pulling up the pilot ladder, he leaned over the board and looked down, and saw AB B hanging off a stanchion by the bottom step of the accommodation ladder with a lifeline of the safety belt.

The boatswain ordered the OS A to prepare a rope along with dispatching OS B to report to the C/O.

AB A noticed the boatswain sending a signal toward the bridge, let 2/O know that, and went out to the starboard wing with the pilot and 2/O.

2/O saw a helmet floating in sea surface and AB B hanging off the accommodation ladder, and let the master know what was happening by transceiver.

The master immediately ascend to the bridge let 2/O and AB A head to the side, with ordering C/O to head for the site by intercom.

2/O and AB A returned to the bridge by order of the master. C/O got to the vicinity of the pilot transfer arrangements and lowered a rope and a lifebuoy connected to the rope toward AB B.

AB B was in a state of being submerged under sea surface below the knee and having his face also exposed to the sprays of the waves.

C/O saw AB B try to grab the rope with the left hand but not able to do so with his body being tossed about by the waves, the body fell off the safety belt and him dropped under the water.

C/O ordered to drop a lifebuoy mounted on a handrail on the upper deck and headed for the stern after AB B floating on his back receding backward, but lost sight of AB B.

The master saw AB B went by the board, decreased the speed after checking the environment advised by the pilot, and ordered AB A hard starboard.

2/O was watching for AB B under the water through a binocular, but he lost sight of AB B during the turning round of the ship.

The ship returned to the spot where AB B should have gone by the board and started searching with the line-up of a person for lookout on each board in addition to the master and the crews on duty.

The pilot reported the occurrence of the accident to the Japan Coast Guard at around 12:18 and asked a tugboat cruising nearby for cooperation with the search at around 12:26.

The ship continued the search with the tugboat and a patrol vessel and found two lifebuoys dropped from the ship at around 12:40 and lifted and recovered them.

Though the ship continued the search until around 16:55 on 17<sup>th</sup>, she could not find AB B and decided to head for the Port of Fukuyama, told that regard to the Japan Coast Guard and restarted navigating, and entered the Port of Fukuyama at around 22:50.

The Japan Coast Guard conducted a search with applying a patrol vessel and a rotorcraft, but could not find AB B.

The date and time of occurrence of the accident was May 16, 2016 at around 12:12 and the site of occurrence was a vicinity of 119°, 2.6 nautical miles (M) from the Murotsu Lighthouse.

(See Attached Figure 1 Navigation Course and Attached Figure 2 Navigation Course (enlarged), Photo 2.1 – 1, and Figure 2.1)

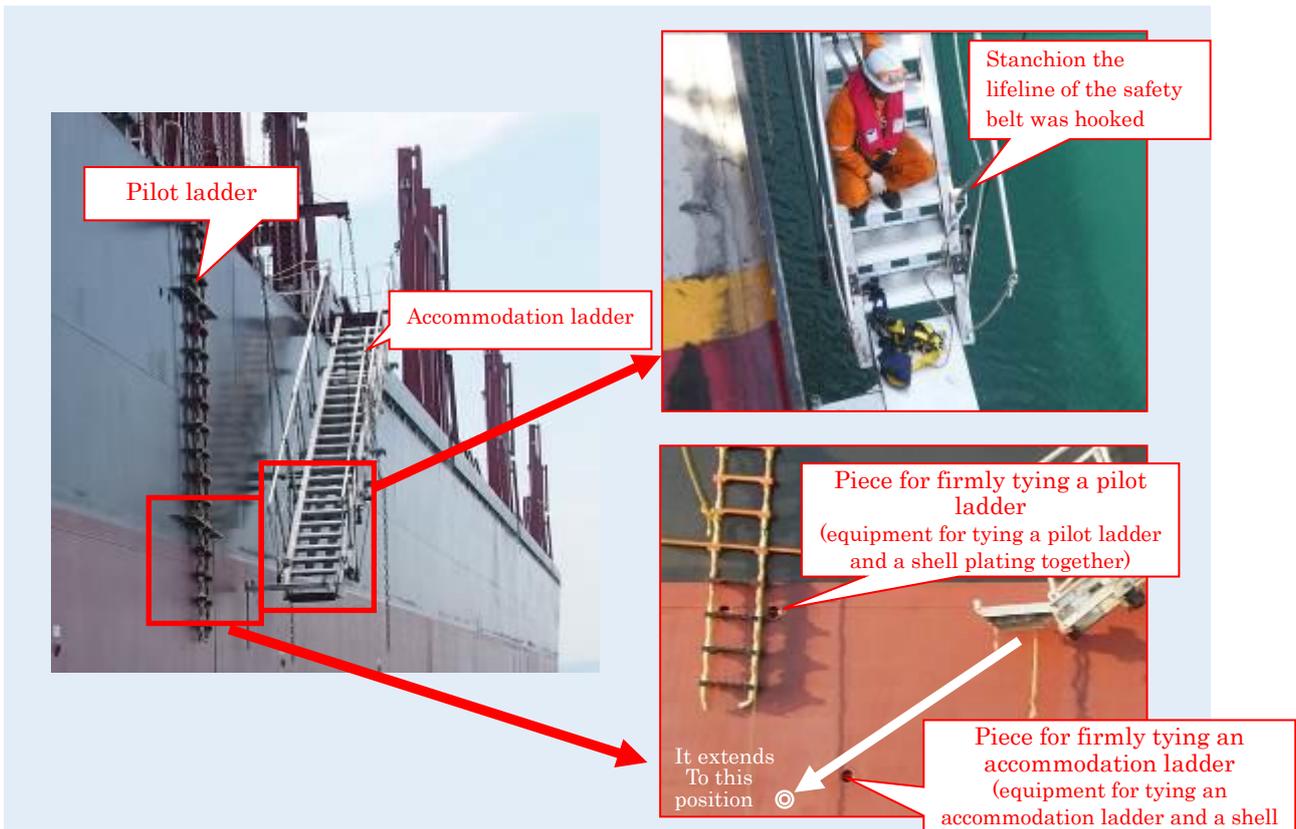


Photo 2.1 Accommodation Ladder

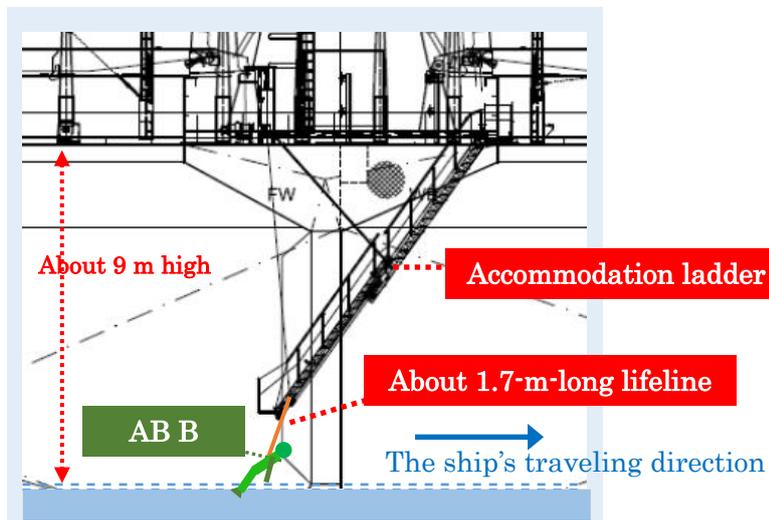


Figure 2.1 Situation of AB B hanging down

## 2.2 Injuries to Persons

According to the information of the Japan Coast Guard, AB B went missing.

## 2.3 Damage to Vessel

There was no damage to the ship.

## 2.4 Crew Information

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

- ① The master Male, 42 years of age  
Nationality: the Republic of the Union of Myanmar  
Endorsement attesting the recognition of certificate under STCW regulation I/10:  
Master (issued by the Republic of Singapore)  
Grant of certificate: February 22, 2016  
(Effective until November 25, 2019)
- ② The boatswain Male, 41 years of age Nationality: the Republic of the Union of Myanmar  
No seamen's competency certificate
- ③ AB B Male, 28 of age  
Nationality: the Republic of the Union of Myanmar  
No seamen's competency certificate

### (2) Major experience in service aboard etc.

According to the statements of the master and C/O and the reply to the questionnaire by THE CHINA NAVIGATION COMPANY PTE LTD (hereinafter, referred to as "A Company"), the vessel management company, it was as follows.

- ① The master  
The master has been a seaman since 1995, has taken a position as a master since 2010 and has been on board vessels owned by A Company since 2014.  
He had experiences of being on board three vessels of the same type as the ship.  
At the time of the accident, he was in good health condition.
- ② The boatswain  
He had experiences of being on board two vessels of the same type as the ship and was on board the ship on April 28, 2016.  
At the time of the accident, he was in good health condition.
- ③ AB B  
He became a seaman in 2009, was on board vessels owned by A Company from 2015, and after having been on board a new vessel of the same kind as the ship, he got on board the ship on April 28, 2016.  
He was about 160 cm tall and weighed about 60 kg, and he seemed to be in good health condition at the time of the accident.

## 2.5 Vessel Information

### 2.5.1 Particulars of Vessel

IMO number: 9714252

Port of registry: Singapore, the Republic of Singapore

Owner: A Company

Management company: A Company

Operator: A Company

Class: Lloyd's Register

Gross tonnage: 24,785 tons

L×B×D: 176.64 m × 30.02 m × 15.00 m

Hull material: Steel

Engine: One diesel engine unit  
Output: 6,050 kW  
Propulsion: One four-blade fixed pitch propeller  
Date of launch: December 3, 2015  
Date of delivery: May 6, 2015  
(See Photo 2.5 – 1)



Photo 2.5 – 1 The ship

#### 2.5.2 Hull, engine, navigational instrument, etc.

- (1) The ship is a docking-bridge-type bulk carrier, comprising five cargo holds, and pilot transfer arrangements were installed nearer the stern from the center.

According to the statement of the master, there was no trouble or failure in the hull, the engine, the devices, and the pilot transfer arrangements at the time of the accident.

(See Figure 2.5 – 1.)

(See Figure 2.5 – 2.)

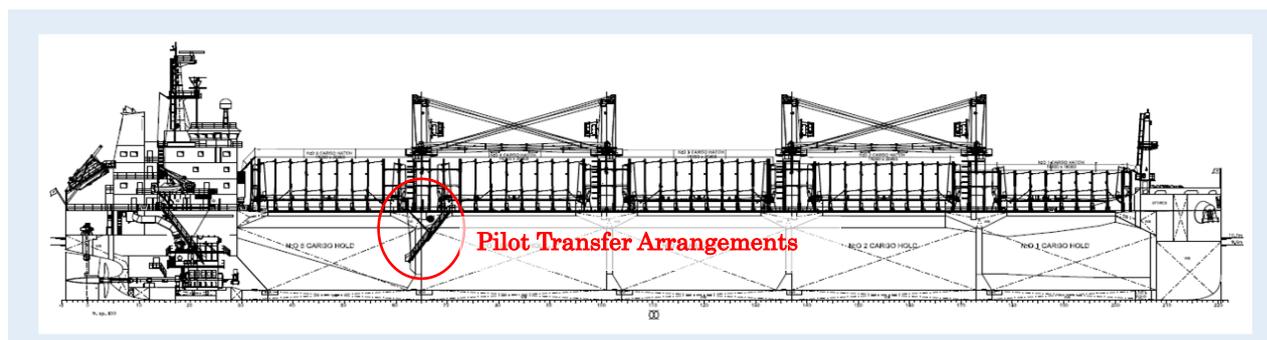


Figure 2.5 – 1 General Arrangement

- (2) In the wheelhouse, a steering stand a radar on each board, an electronic chart display and information system (EDCIS), an engine control panel were arranged at the center slightly nearer the starboard and a lifebuoy coupled to a self-ignition light (hereinafter, referred to as “lifebuoy with a self-ignition light” and a self-activating smoke signal were arranged on the wings of both sides.

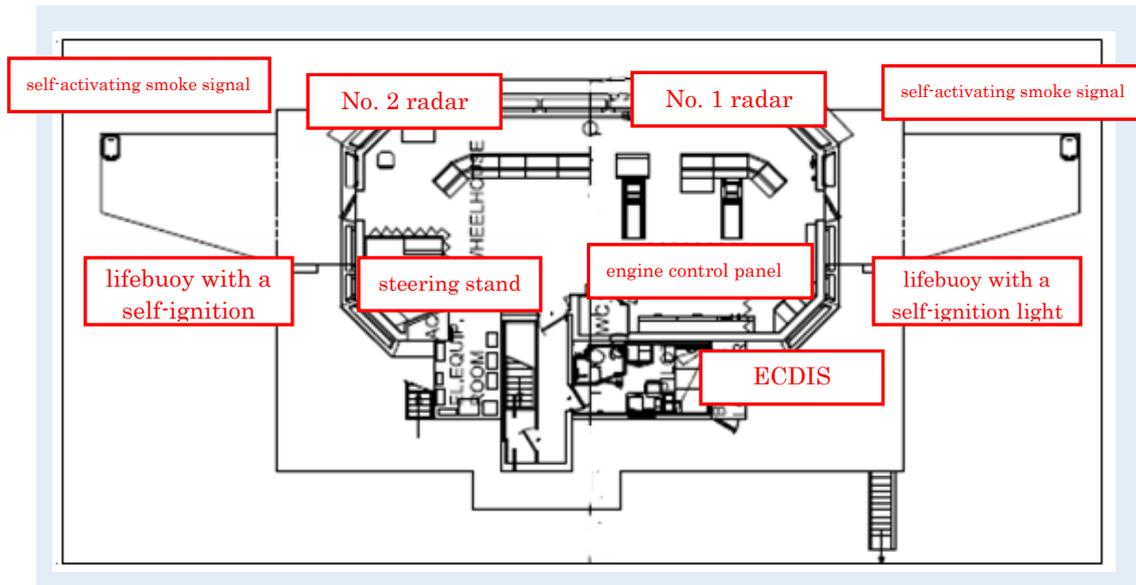


Figure 2.5 – 2 Bridge Arrangement of the Ship

### 2.5.3 Speed

According to the specification chart of the ship, the harbor full speed in the ballast state was 11.5 kn and the sea speed was 14.6 kn.

## 2.6 Weather and Sea Conditions

### 2.6.1 Observed Values of the Weather and the Sea

Observed values at heiguntou\_south\_AIS Signal Station<sup>\*3</sup> located approximately 12 km south-southeast of the site of the accident were as follows.

11:55 on May 16: Wind direction/south-southwest, Wind speed/12.0 m/s, Wave height/1.5 m

### 2.6.2 Observations by Crews

According to the statement of 2/O and the logbook, at the time of the accident, the weather was rainy, the wind direction was west-southwest, the wind power was 5 - 6, wave height was 1 – 2 m, and the sea temperature was about 15.8°C.

### 2.6.3 Tide

According to the tidal table published by the Japan Coast Guard, the sea tide near the light buoy No. 3 on the Iyo Nada Passage located approximately 12 M southeast of the site of the accident was about 05 kn of southwest current at the strongest at 09:32 and about 0.4 kn of northeast current at the strongest at 16:33.

## 2.7 Seawater Temperature and Survivable Hours

According to the literature<sup>\*4</sup>, when dressed in ordinary clothes, the length of time a human can

<sup>\*3</sup> “AIS Signal Station” is a radio navigation beacon to provide location information of structures located on the sea etc. by utilizing the AIS.

<sup>\*4</sup> Supervised by Navigation and Mariners’ Labor Division of the Ministry of Land, Infrastructure, Transport and Tourism (August, 2015), SOLAS TRAINING MANUAL 27<sup>th</sup> edition, the Association for Promoting Safety and Sanitation for Seafarers

survive in water varies depending from person to person, but is generally six hours or less.

## 2.8 Pilot Transfer Arrangements Information

### 2.8.1 SOLAS Convention Provision

Regulation 23 of Chapter V of the SOLAS Convention\*<sup>5</sup> stipulates a pilot transfer arrangements as follows.

#### *Regulation 23 Pilot transfer arrangements*

##### *1 Application*

*1.1 Ships engaged on voyages in the course of which pilots are likely to be employed shall be provided with pilot transfer arrangements.*

*1.2 – 1.6 (omitted)*

##### *2 General*

*2.1 – 2.5 (omitted)*

##### *3 Transfer arrangements*

*3.1 Arrangements shall be provided to enable the pilot to embark and disembark safely on either side of the ship.*

*3.2 In all ships where the distance from sea level to the point of access to, or egress from, the ship exceeds 9 m, and when it is intended to embark and disembark pilots by means of the accommodation ladder, or by means of mechanical pilot hoists or other equally safe and convenient means in conjunction with a pilot ladder, the ship shall carry such equipment on each side, unless the equipment is capable of being transferred for use on either side.*

(the rest omitted)



Photo 2.8 – 1 Example of Pilot Transfer Arrangements (Japan Federation of Pilots' Associations)

### 2.8.2 Pilot Transfer Arrangements of the Ship

According to the statements of the master, the ship has a height of about 9 m from a sea surface to the upper deck and on the ship, when embarking the pilot on May 16, the pilot transfer arrangements were prepared by four to five deck ratings and she had decreased in speed to a slow speed. (See Photo 2.8 – 2)

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\*<sup>5</sup> "SOLAS" refers to the International Convention for the Safety of Life at Sea, 1974.



Photo 2.8 – 2 Pilot Transfer Arrangements of the Ship

## 2.9 Information about the Safety Belt

### 2.9.1 Structure of the Safety Belt

According to the reply to the questionnaire by an import agent of the life jacket, it was as follows.

The safety belt consisted of a harness-type safety belt, an expansion-type life jacket and a lifeline, and details of each part are as follows.

(1) Harness-type life jacket

It is worn by the belt crossed on the back and buckled on the chest at one place and on the root of each leg so that a load which is applied when falling down will be dispersed on several places such as the thigh, shoulder, lower back, etc. and therefore be reduced.

(2) Expansion-type life jacket

① It has a function of automatically expanding by sensing hydraulic pressure as well as being manually expanded.

② Its criteria for use is that the weight is 40 kg and over and the chest measurement ranges 86 – 127 cm.

(3) Lifeline

It is a part consisting of an approximately 1.7-meter-long belt, a hook and other.

(4) Buckle

It is a part for connecting both ends of the belt used by tilting one of the metal frames, putting it through the other metal frame and fastening down the belt to thereby prevent the belt from being detached due to the tension on the belt.

(See Figure 2.9 – 1, Figure 2.9 – 2, Figure 2.9 – 3.)

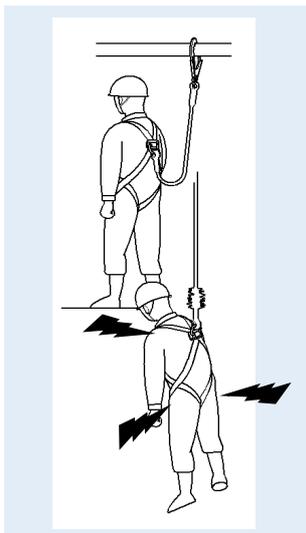


Figure 2.9 - 1

The state where a wearer of the safety belt hanging in midair (provided by a domestic safety belt manufacturing and sales company)



Figure 2.9 - 2

The appearance of the safety belt (except the lifeline) (provided by a life jacket import agent)

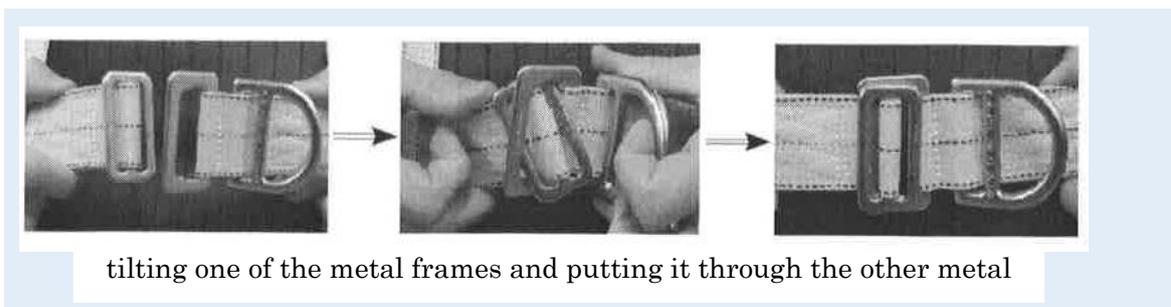


Figure 2.9 - 3 How to fix the buckle of the safety belt (provided by a life jacket import agent)

### 2.9.2 The Safety Belt and Others

According to the statements of 1/O and AB A, they were as follows.

- (1) Two sets of the safety belt are equipped on the ship and they had been used on the occasion such as pilot transfer arrangements installation work.
- (2) 1/O, AB A and AB B had experience of the safety belt.

### 2.9.3 Wearing Condition of the Safety Belt

- (1) According to the statement of AB A, the boatswain, AB A, and AB B did not check the wearing condition of the safety belt of AB B at the time of the accident.
- (2) According to information from the Japan Coast Guard, after the accident, when the safety belt hanging from the stanchion by the bottom step was checked, the buckles of both thigh parts were detached while the chest buckle remained fixed.
- (3) The safety belt had no damage on the two thigh buckles at the time of the on-site investigation.
- (4) According to the statement of a person in charge of the life jacket import agent, the products of an European manufacturing and sales company which is the same type as the safety belt have over 10 years' past record of sales and there was no accident case of

the two thigh buckles disengaging in the fastened state in the safety belt.

#### 2.9.4 Condition where the Body Falls out of the Safety Belt

A research about a condition where a body falls out of the safety belt was conducted and the result was as follows.

- (1) When the belt was pulled up overhead in the state of the belt being worn with the buckles of the chest and the both thighs fastened and both arms lowered, the safety belt did not disengage from the body.

(See the Photo 2.9 – 1)

- (2) When the belt was pulled up overhead in the state of the chest buckle being fixed, the two thigh buckles were detached and both arms lowered, the safety belt did not disengage from the body.

(See the Photo 2.9 – 2)

- (3) When the belt was pulled up overhead in the state of the chest buckle being fixed, the two thigh buckles were detached and both arms held up, the safety belt disengaged from the body.

(See the Photo 2.9 – 3)



Photo 2.9-1



Photo 2.9-2



Photo 2.9-3

#### 2.10 Safety Management Information

- (1) A Company had been issued with Document of Compliance by Lloyd's Register on April 21, 2016.
- (2) The ship had been issued with Interim Safety Management Certificate by Lloyd's Register on April 28, 2016.
- (3) In the work permit guidelines set forth in the safety management manual of A Company, it was specified preparing work permit by the responsible official for work holding an advance meeting with persons engaged in the work and confirming work content, the work commander, protective equipment, etc. as well as promoting awareness on envisaged during that work and prior to the work, and doing work thereafter when engaging in a dangerous task such as outboard work.
- (4) According to the statement of the master, on the ship, the following education etc. was

provided to the crews by the master and a person in charge of A Company before an actual service.

- ① Education on the safety management manual guidelines
- ② Familiarizing training on facilities etc. of the ship
- ③ Risk prediction training

## 2.11 Information about Ship Maneuvering for Life-saving

According to Literature<sup>\*6</sup>, it is as follows.

### *Urgent Treatment Directly After the Occurrence of Fallen Person*

- (1) *The discoverer immediately drops a lifebuoy, a self-activating smoke signal or a self-ignition light nearby.*
- (2) *The discoverer immediately report to a bridge watchman and keeps an eye out so as not to lose sight of the fallen.*
- (3) *The bridge watchman reports to the master and also sets a watch and makes him confirm the location of the fallen.*

## 3 ANALYSIS

### 3.1 Situation of the Accident Occurrence

#### 3.1.1 Course of the Events

As described in 2.1 and 2.5.3, it was as follows.

- (1) It is probable that the ship left a dockyard located at the Port of Jinjiang, Jiangsu Province at around 12:00 on May 12, 2016 (local time) toward the Port of Fukuyama as her first voyage after completion of construction.
- (2) It is probable that the ship boarded a pilot in the waters off the east of Hesaki at around 07:45 on May 16, 2016 and continued the voyage under the pilot's piloting.
- (3) It is probable that the ship entered the Heigun Channel at around 11:47:07.
- (4) It is probable that the ship navigated at a ship's head of 053° - 055° and a sea speed of 14.6 – 14.9 kn during around 12:00:01 – 12:12:25.
- (5) It is highly probable that the ship started deceleration at around 12:12:43 and steered hard starboard at around 12:12:55.

#### 3.1.2 Date and Time/Site of Occurrence

As described in 2.1.1 and 2.1.2, it is probable as follows.

- (1) The date and time of the occurrence of the accident was at around 12:12 on May 16, 2016 from the voice on the VDR to the effect of falling overboard.
- (2) The site of occurrence of the accident was 33°48.6'N, 132°09.8'E (around 119°2.6 M from the Murotsu Lighthouse) from time in (1) above and the AIS record of the ship.

#### 3.1.3 Injuries to Persons

As described in 2.1.3, and 2.2, it is probable that AB B went missing.

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<sup>\*6</sup> Honda, Keinosuke (June 28, 2008) Sōsentsūron, 8<sup>th</sup> Edition, SEIZANDO-SHOTEN PUBLISHING CO., LTD.

### 3.1.4 Damage to Vessel

As described in 2.3, there was no damage to the hull.

## 3.2 Causal Factors of the Accident

### 3.2.1 Conditions of Crews

As described in 2.4, they were as follows.

- (1) The master had lawful and valid endorsements attesting the recognition of certificate under STCW regulation I/10.
- (2) It is probable that the boatswain and AB B were in a good health condition.

### 3.2.2 Condition of Vessel

As described in 2.5.2, it is probable that there was no trouble or failure in the hull, the engine, the devices, and the pilot transfer arrangements.

### 3.2.3 Weather and Sea Conditions

As described in 2.1.1 and 2.6, they were as follows.

- (1) At the time of the accident, it was rainy, a south/southwesterly wind of 12.0 m/s, a wave height was about 1.5 m, and the sea temperature was about 15.8°C.
- (2) From the bearing on the ship's bow around 12:02:01 – 12:12:13 being about 054°, the speed being about 14.7 kn, and (1) above, the relative wind direction and the relative wind speed the ship caught were 75°, a wind of about 5 m/s in the direction at 75° on the starboard side from the right behind of the stern.

### 3.2.4 Circumstances from AB B's overboard to fall into the water

As described in 2.1, 2.5.3, and 3.1.1, they were as follows.

- (1) It is probable that the boatswain received a proposal from AB B to the effect that AB B wanted to lift up and stow the pilot ladder as it was being banged on the shell plating and was also being splashed, and he decided to work on lifting up the ladder to be stowed with AB B, OS A and OS B at around 12:00.
- (2) It is probable that the work of lifting up and stowing the pilot ladder falls under the dangerous task such as outboard work since AB B moved down to the lower end of the accommodation ladder with wearing the safety belt for the purpose of untying a rope which had tethered the ladder to the shell plating.
- (3) It is probable that though the pilot ladder began to be pulled up by manpower after the rope tied up to the shell plating was untied by AB B, a part around the lower end got stuck with the accommodation ladder, but since there was no one who confirmed the hooked state, that situation was not able to be clarified.
- (4) It is probable that after AB B said that he would go to disengage the pilot ladder and moved down the accommodation ladder again, he fell off the accommodation ladder and hang in midair by a lifeline of the safety belt when he was working with hooking a hook of the lifeline of the safety belt to the stanchion by the bottom step of the accommodation ladder, but since there was no witness, the situation which led to hanging in midair was not able to be clarified.
- (5) It is probable that sawing AB B hanging off the accommodation ladder the boatswain sent a signal toward the bridge and he ordered OS A to prepare a rope to be used for the

rescue along with dispatching OS B to report to C/O.

- (6) It is probable that noticing the signal by the boatswain, AB A report the overboard to 2/O at around 12:06.
- (7) It is probable that hearing the overboard from 2/O by transceiver, the master ascended to the bridge and ordered C/O to head to the site at around 12:07.
- (8) It is probable that C/O headed to the pilot transfer arrangements hanged a rope and a lifebuoy tied by a rope toward AB B with other crews.
- (9) It is probable that although AB B tried to grab the rope with the left hand, but it was not successful as his body being tossed about and his body separated from the safety belt and he went by the board when he took action of grabbing the with raising both arms at around 12:12.
- (10) It is probable that the ship was travelling at a sea speed from AB B's fall to the dropping under the water.
- (11) From (9) and (10) described above, it is probable that the ship not taking measures such as decelerating or stop the ship for easing the state of AB B being dragged on the sea surface on the ship was involved in AB B not having been able to grab the rope or others.
- (12) Since it is probable that the accommodation ladder was firmly tethered to the hull, it is somewhat likely that C/O and others could not pull up the accommodation ladder.

### 3.2.5 Circumstances after AB B Dropping under the Water

As described in 2.1, 2.5.2, and 3.1.1, they were as follows.

- (1) It is probable that although C/O ordered dropping of the life buoy set up on a handrail on the upper deck and headed toward the stern to chase AB B floating on his back and receding backward, he lost sight of AB B.
- (2) It is probable that although 2/O in the bridge kept watching AB B, 2/O lost sight of AB B during the turning round.
- (3) It is probable that although the ship began to decelerate at around 12:12:43, take hard starboard at around 12:12:55, returned to the spot where AB B should have gone by the board, and made a search with the line-up of a person for lookout on each board in addition to the master and the crews on duty until 16:55 on 17<sup>th</sup>, they could not find ABB.
- (4) It is probable that although the life buoy set up on a handrail on the upper deck was dropped by order of C/O, the lifebuoy with a self-ignition light and the self-activating smoke signal arranged in the bridge were not dropped.

### 3.2.6 Analysis on the Wearing Conditions of the Safety Belt

As described in 2.1 and 2.9, they were as follows.

- (1) It is probable that when AB B raised both arms in an attempt to grab the rope or others in the state of hanging off the accommodation ladder, the safety belt disengaged from the body and he dropped under the water.
- (2) It is probable that concerning the safety belt, though the chest buckle remained after the accident, the two buckles on the thighs were disengaged.
- (3) An investigation on the wearing conditions of the safety belt was carried out, and a body did not fall out of the safety belt in the case where the belt was pulled up overhead

in the state of the chest buckle being fixed, the two thigh buckles were detached and both arms lowered, whereas the safety belt disengaged from the body in the case where the belt was pulled up overhead in the state of the chest buckle being fixed, the two thigh buckles were detached and both arms held up.

- (4) It is probable that the products of an European manufacturing and sales company which is the same type as the safety belt have over 10 years' past record of sales and that there was no accident case of the two thigh buckles disengaging in the fastened state in the safety belt.
- (5) From (1) – (4) described above, it is probable that AB B did not have the two thigh buckles of the safety belt fastened.

### 3.2.7 Safety Management Analysis

As described in 2.1, 2.4, 2.5.3, 2.10, 3.1.1, 3.2.4, and 3.2.5, it was as follows.

- (1) In the safety management manual of A Company, it was specified holding an advance work meeting with the responsible official for work such as C/O when engaging in outboard work which was a dangerous task.
- (2) It is somewhat likely that while the boatswain and others decided to do the pilot ladder's lifting up and stowing work upon receiving a proposal from AB B, they did not hold an advance meeting with the responsible official for work such as C/O.
- (3) Since no advance work meeting was held with the responsible official for work such as C/O when the boatswain and others decided to do the lifting up and stowing work of the pilot ladder, it is somewhat likely that there was no information sharing between the site of work and the bridge at the time of the accident, and that the work complying with the provisions of the safety management manual was not performed.
- (4) It is somewhat likely that the boatswain and others not having held an advance meeting with the responsible official for work about:
  - ① Necessity of doing the lifting up and stowing work
  - ② Implementation of safety measures such as confirmation of adequate wearing of a safe protector in connection with engaging in the lifting up and stowing work etc. was involved in the occurrence of the accident.

### 3.2.8 Analysis on the Occurrence of the Accident

As described in 2.1, 2.5.3, 2.9, 3.1.1, 3.1.3 and 3.2.4 through 3.2.7, it was as follows.

- (1) It is probable that although the boatswain decided to do the lifting up and stowing work of the pilot ladder with AB B, OS A and OS B, no advance meeting was held with the responsible official for work and that confirmation of adequate wearing of a safe protector was not made.
- (2) It is probable that AB B wore the safety belt and moved down to the lower end of the accommodation ladder for the purpose of loosening a rope which firmly fastened the pilot ladder to the shell plating.
- (3) It is probable that after AB B returned on the deck, he knew that the pilot ladder could not be lifted due to a part near the lower end of the pilot ladder being stuck on the accommodation ladder and that although he decided to move down to the lower end of the accommodation ladder again, he did not have the buckles on both thighs of the safety belt fastened.

- (4) It is probable that AB B fell off the accommodation ladder and hanged in midair with a lifeline of the safety belt when he was working with hooking a hook of the lifeline of the safety belt to the stanchion by the bottom step of the accommodation ladder, but the situation leading to the hanging in midair was not able to be clarified.
- (5) It is probable that although C/O hanged a rope and a lifebuoy tied by a rope toward AB B with other crews, since AB B was in a state of being dragged on the sea surface, he was not able to grab the rope or the like.
- (6) It is probable that when AB B raised both arms in an attempt to grab the rope or the like, his body separated from the safety belt and went by the board at around 12:12.
- (7) It is probable that although the master saw AB B went by the board, returned to the spot where AB B should have gone by the board, and made a search with increasing the number of lookout until 16:55 on 17<sup>th</sup>, he was not able to find AB B.

### 3.3 Analysis on the Rescue and Mitigation of Damage

As described in 2.1.3, 2.7, 2.9, 2.11, 3.2.4 and 3.2.7, it was as follows.

- (1) It is somewhat likely that inadequate wearing of the safety belt by AB B was involved in failure to rescue him and his going missing since his body buoyancy force was not maintained as a result of the all-in-one expansion-type life jacket coming off at the same time when his body came off the safety belt.
- (2) It is probable that the bridge watchmen needed dropping of a lifebuoy with a self-ignition light or a self-activating smoke signal which is an emergency measure when they saw the overboard.

## 4 CONCLUSIONS

### 4.1 Probable Causes

It is probable that the accident occurred by AB B who was working on lifting up and stowing a pilot ladder with three crews falling off an accommodation ladder and hanging in midair with a lifeline of the safety belt and going by the board as his body separated from the safety belt when he raised both arms in an attempt to grab a rope or the like when the ship was moving northeast on the Heigun Channel.

It is probable that the separation of the body of AB B from the safety belt stems from his failure to have two thigh buckles of the safety belt fastened.

It is probable that the reason why he raised both arms in an attempt to grab the rope or the like was because he was not able to the rope or the like as he was in a state of being dragged on the sea surface though he tried to grab one with his left hand.

It is probable that not taking measures to ease the situation of AB B being dragged on the sea surface such as decelerating or stopping the ship was involved in AB B remaining in that situation.

It is somewhat likely that the boatswain and others not having held an advance meeting with regard to the contents such as:

- (1) Necessity of doing the lifting up and stowing work
- (2) Implementation of safety measures such as confirmation of adequate wearing of a safe protector in connection with engaging in the lifting up and stowing work

with the responsible official for work in doing the work of lifting up and stowing the pilot ladder was

involved in the occurrence of the accident.

#### 4.2 Other Discovered Safety-Related Matters

It is probable that the bridge watchmen needed dropping of a lifebuoy with a self-ignition light or a self-activating smoke signal which is an emergency measure when they saw the overboard.

### 5 PREVENTIVE ACTIONS

It is probable that the accident occurred by AB B who was working on lifting up and stowing a pilot ladder with three crews falling off an accommodation ladder and hanging in midair with a lifeline of the safety belt and going by the board as his body separated from the safety belt when he raised both arms in an attempt to grab a rope or the like.

It is probable that the separation of the body of AB B from the safety belt stems from his failure to have two thigh buckles of the safety belt fastened.

It is somewhat likely that the absence of advance meeting with the responsible official for work in doing the lifting up and stowing of the pilot ladder was involved in the occurrence of the accident.

It is probable that the bridge watchmen needed to take emergency measures such as dropping of a self-activating smoke signal when they saw the overboard.

Consequently, in order to prevent a recurrence of accidents of the same kind and reduce damage, it is necessary to take the following measures.

- (1) The management company shall disseminate wearing of protective equipment such as a safety belt and enforce thorough implementation after conducting a review of the work procedure of the safety management manual.
- (2) The management company shall disseminate a response to be given in case of falling overboard occurrence to crews in safety education or the like and instruct them to periodically engage in a response exercise.

#### 5.1 Safety Actions Taken after the Accident

After the accident, A Company took the following actions as preventive actions.

- (1) It disseminated information of this accident and others including sending a report describing events leading to the accident created by A Company, the lessons from the accident, and others to crews of vessels under the control of the company.
- (2) It implemented safety education including a response to unforeseen circumstances such as work which abrupt occurred and falling overboard with exemplifying past accidents to crews of vessels under the control of the company, and educated them in order for them to be thoroughly aware of dangers for preventing human-induced accidents and to implement risk management utilizing (written)work procedures.
- (3) It implemented safety education and training for vessel operation, inboard work, etc. for masters and crews in their early days of manning.
- (4) Learning from the accident, it re-examined their safety management manual and implemented review including addition of matters which were insufficient such as compartmentalization of checklist in special work, decreasing the speed as necessary when engaged in outboard work, and discontinuation of work depending on weather and sea condition.

Figure1 Navigation Paths

