

MA2014-6

**MARINE ACCIDENT
INVESTIGATION REPORT**

June 27, 2014



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto
Chairman,
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

MARINE ACCIDENT INVESTIGATION REPORT

Vessel type and name: Cargo ship TAIGAN

IMO number: 7533240

Gross tonnage: 497 tons

Accident type: Fire

Date and time: Between about 01:30 and 01:40, May 16, 2013 (local time, UTC+9 hours)

Location: At the west pier of Tenpoku No.2 Wharf in the port of Wakkanai, Wakkanai City, Hokkaido

Around 170° true bearing, 910 m from Wakkanai Ko East Breakwater West Lighthouse

(Approximately 45°24.4'N, 141°42.0'E)

May 29, 2014

Adopted by the Japan Transport Safety Board

Chairman Norihiro Goto

Member Tetsuo Yokoyama

Member Kuniaki Shoji

Member Toshiyuki Ishikawa

Member Mina Nemoto

SYNOPSIS

<Summary of the Accident>

While mooring at the west pier of Tenpoku No.2 Wharf in the port of Wakkanai, Wakkanai City, Hokkaido, cargo ship TAIGAN, with the master and 22 crew members on board, caught fire at around 01:30 to 01:40, May 16, 2013.

The fire on TAIGAN was extinguished at about 13:00 by a fire brigade, leaving six crew members dead and three people injured. Besides, the bridge deck, the poop deck, and the upper deck were burned out.

<Probable Causes>

It is somewhat likely that while the Vessel moored at the Pier of Tenpoku No.2 Wharf in the port of Wakkanai at night, the Ref/E smoked on the bed in the Cabin, and then his bedclothes caught fire; hence, the fire spread to surrounding flammable materials.

<Recommendations>

- Safety recommendation.

It is somewhat likely that this accident occurred as follows. While TIGAN (hereinafter referred to as "the Vessel") moored at the west pier of Tenpoku No.2 Wharf in the port of Wakkanai at night, a crew member smoked on his bed in a cabin though the vessel prohibited smoking onboard except in the indoor work space, and then his bedclothes caught fire; hence, the fire spread to surrounding flammable materials, and smoke and flame climbed the opening of an upward stairway nearby and spread to the above accommodation spaces.

Four out of the six who died in the accident just joined the Vessel on the previous night of the accident. It is somewhat likely that the four, who had not been provided with training and instruction on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers, did not know the escape routes and were late in escaping when the fire occurred.

In addition, when constructed, the Vessel was installed with an escape hatch, which led to the quarter deck on the port in the steering gear room. Later, the escape hatch was welded and it was impossible to escape from the stern. It is probable that when this accident occurred, the four were late in escaping and lost an option to go out through the stairway on the fore side of the accommodation spaces.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends that the MEGANOM SHIPPING LTD. as the management company of the vessel (hereinafter

referred to as “Company A”) and the MEGANOM SHIPPING LTD. as the owner of the vessel (hereinafter referred to as “Company B”) should take the following measures. At the same time, it is recommended that the authorities of the Kingdom of Cambodia should provide adequate instructions to the management companies and owners that are operating similar ships to the vessel.

Company A is recommended to ensure the onboard smoking policy is observed and to instruct the vessel to provide new crew members with training, just after they joined the vessel, on how to act in the event of a fire, which includes information about the escape routes and the location of fire extinguishers.

Company B is recommended to try to secure escape routes regardless where a fire breaks out, for example, by having one on the fore side and another on the aft side.

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

While mooring at the west pier of Tenpoku No.2 Wharf in the port of Wakkanai, Wakkanai City, Hokkaido, cargo ship TAIGAN, with the master and 22 crew members on board, caught fire at around 01:30 to 01:40, May 16, 2013.

The fire on TAIGAN was extinguished at about 13:00 by a fire brigade, leaving six crew members dead and three people injured. Besides, the bridge deck, the poop deck, and the upper deck were burned out.

1.2 Outline of the Accident Investigation

1.2.1 Setup of the Investigation

On May 16, 2013, the Japan Transport Safety Board appointed an investigator-in-charge and a marine accident investigator to investigate this accident.

1.2.2 Collection of Evidence

May 17, 2013: On-site investigation

May 18, 2013: On-site investigation and interviews

May 19, 20, 30, and 31, and August 8, 2013: Interviews

May 24, June 20 and 21, and August 26, 2013: Collection of written replies to the questionnaires

1.2.3 Comments from the Parties Relevant to the Cause

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

1.2.4 Comments from Flag State

Comments on the draft report will be invited from the flag State.

2. FACTUAL INFORMATION

2.1 Events Leading to the Accident

2.1.1 Events Leading to the Accident

According to the statements of the master (hereinafter referred to as "the Master"), the chief officer (hereinafter referred to as "C/O"), the second officer (hereinafter referred to as "2/O"), the chief engineer (hereinafter referred to as "C/E"), the second engineer (hereinafter referred to as "2/E"), the electric engineer (hereinafter referred to as "E/E"), the chief radio officer (hereinafter referred to as "C/R"), and seven ordinary seamen (hereinafter referred to as "O/S A", " O/S B", " O/S C", " O/S D", " O/S E", " O/S F", and "O/S G"), and two cooks (hereinafter referred to as "Cook A" and "Cook B") of TAIGAN (hereinafter referred to as "the Vessel" with the exception of Chapter 6 below), the

second officer who would join the vessel at the port of Wakkanai (hereinafter referred to as "on-coming 2/O"), the shipbuilding worker who rescued a crew member by gas-cutting the side plate, and the representative of shipper, and according to the replies to the questionnaire by the shipbuilder of the Vessel and Wakkanai District Firefighting Office Work Association (hereinafter referred to as "Local Fire Authorities") responsible for the area where this accident occurred:

At around 08:35, May 14, 2013, the Vessel, with the Master, the refrigerator engineer (hereinafter referred to as "Ref/E"), the C/R, and 15 other crew members on board, loaded with approximately 52 tons of king crabs, berthed at the starboard side alongside at the west pier of Tenpoku No.2 Wharf in the port of Wakkanai (hereinafter referred to as "the Pier" with the exception of Chapter 6 below). The Vessel was scheduled to depart on May 16 after unloading the cargo.

At around 20:00, May 15, on-coming 2/O and four other members who were scheduled to join the Vessel at the port of Wakkanai for relief of the crew (the chief officer, the fourth engineer, and two ordinary seamen, hereinafter referred to as "on-coming C/O," "4/E," "O/S H" and "O/S I," respectively) were on board. Because a cabin was not available for him, the on-coming 2/O returned to a lodging facility in Wakkanai City, leaving his baggage on the Vessel. The other four members stayed on the Vessel that night.

At about 20:00, the C/R slept on his bed on the starboard side in a cabin near the center on the bow side of the upper deck accommodation spaces (hereinafter referred to as "the Cabin"). Later, he woke up for suffocation and the smell of smoke. Looking toward another bed in the Cabin, he saw through a gap in the curtain the Ref/E sitting on the bed with his legs toward the aft side and flapping with his hands to put out the flame brazing up around his feet.

The C/R also saw a smoldering cushion falling off the Ref/E's bed and a fire on the wall side spreading to nearby flammable materials. He opened the door and rushed through the corridor to the engine room shouting aloud. He came back to the Cabin with a portable fire extinguisher installed in the engine room. The flames were so fierce that he could not do anything with the fire extinguisher.

A little past 01:30, May 16, O/S A, O/S B and O/S C, who came back from outside to the Vessel and were smoking in the indoor work space on the bow side of the upper deck accommodation spaces, heard a fire alarm sound and cries.

At about 23:30 to 24:00, May 15, O/S D went to bed in his cabin in the foremost section on the starboard side of the upper deck accommodation spaces. Later, uproar outside his cabin woke him up. When opening the door, he saw smoke and fire there, and black smoke came into his cabin. He shut the door, put on his clothes, grasped his mobile phone, opened the door, and got out of the Vessel through corridors and stairways to the pier. At about 01:40, May 16, he informed the representative of shipper about the occurrence of a fire on the Vessel via his mobile phone.

Informed by O/S D of the occurrence of a fire on the Vessel, the representative of shipper called the shipping agent's representative. At about 01:45, the shipping agent's representative of shipping agent dialed 119 (emergency telephone number for fire and emergency medical services in Japan) to report the fire.

The Local Fire Authorities immediately dispatched a fire brigade, which arrived at the site at about

01:56 and started extinguishing the fire. The fire brigade rescued Cook A at about 02:11, 2/E at about 03:47, and O/S E at about 05:20. The fire on the Vessel was extinguished at about 13:00, but six crew members were found deceased within the Vessel.

This accident occurred between about 01:30 and 01:40, May 16, 2013, at around 170° true bearing, 910 m from Wakkanai Ko East Breakwater West Lighthouse.

(See Appendix Figure 1 "Map of Location of The Accident," Photo 1 "Full View of the Vessel (Starboard Side)," Photo 2 "Full View of the Vessel (Port Side)," Photo 3 "Fore Side of Accommodation Space Outer Plate," Photo 4 "Aft Side of Accommodation Space Outer Plate," Photo 5 "Starboard Side of Accommodation Space Outer Plate," and Photo 6 "Port Side of Accommodation Space Outdoor Passage")

2.1.2 Emergency Services for Crew Members

According to the statements of the 2/O, O/S E, and Cook A, and according to the reply to the questionnaire by the Local Fire Authorities:

(1) 2/E

The 2/E, who started watch keeping in the engine room at about 22:00, May 15, patrolled the engine room and took some rest in his cabin on the fore starboard side of the upper deck accommodation spaces. When this accident occurred, the 2/E taking a rest in his cabin heard cries and a subsequent fire alarm sound.

When opening the door of his cabin, the 2/E saw black smoke and fire in the corridor. Because smoke came into his cabin, he shut the door and opened the scuttle to get a fire hose from the crew member who was extinguishing the fire on the deck. He sprayed water from the door toward the corridor using the fire hose. Then, he received an air tank, mask, and flashlight through the scuttle from the fire brigade of the Local Fire Authorities. By using those devices, he went out to the deck through the door and corridor. He was picked up on the deck by the rescue team at about 03:47 and was transported to a hospital in Wakkanai City.

(2) O/S E

When sleeping in his cabin on the aftmost starboard side of the upper deck accommodation spaces, O/S E woke up for suffocation. When opening the door after putting on his clothes, he saw black smoke coming into the cabin. He shut the door and opened the scuttle.

O/S E received an air tank, mask, and flashlight through the Scuttle from the fire brigade of the Local Fire Authorities. Although he saw fire in the corridor when he opened the door to escape with the help of those devices, he decided to get out by going up the stairway. When holding the handrail of the stairway, he realized that it was too hot and he should abandon going up the stairway. In addition, because the air tank did not contain enough air, he returned to his cabin.

O/S E received another air tank from the fire brigade, who told him to stay in his cabin because they would be rescuing him by gas-cutting the outer plate. At about 05:20, O/S E was rescued from an opening about 40cm high and 30cm wide the shipbuilding worker opened on the outer plate on the aft side of the galley. Then, he was transported to a hospital in Wakkanai City. (See Photo ① and Photo ②)

The opening made by gas cutting to rescue O/S E

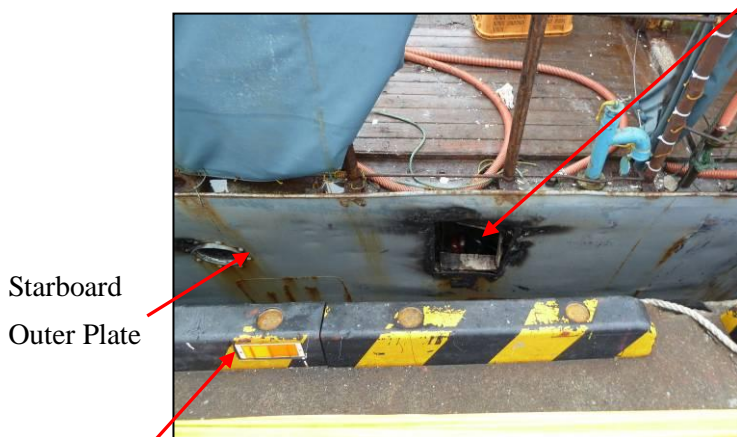


Photo ① "Opening on Galley Outer Plate
(Taken from the Pier)"

Photo ② "Opening on Galley Outer Plate
(Taken from inside Galley)"

(3) Cook A

From about 00:00 to 01:00, May 16, Cook A was sleeping in a cabin near the center starboard side of the upper deck accommodation spaces. Then, he woke up hearing cries outside his cabin and a fire alarm sound. When he opened the door, fire and smoke came into his cabin. Then he shut the door.

After putting on his clothes, Cook A got out of his cabin and went up the stairway on the forward starboard side of the engine room through fire and smoke, escaping from a passage on the poop deck to the pier. At about 02:11, he was picked up by the rescue team and transported to a hospital in Wakkanai City. Then he was sent to another hospital in Asahikawa City, Hokkaido.

(4) Ref/E, Boatswain, on-coming C/O, 4/E, O/S H, and O/S I

At about 11:32, May 16, the fire brigade of the Local Fire Authorities entered the Vessel's accommodation spaces to start searching for the six members who were missing. The fire brigade found one in the aft side corridor in the poop deck accommodation spaces, one in a cabin on the forward port side, one in a cabin on the aft side of the bathroom on the port side, and one in a cabin on the forward starboard side of the upper deck accommodation spaces. The fire brigade also found two near the table in the mess room of the upper deck. The fire brigade confirmed the fatality of all the six. The six deceased members were later identified as the Ref/E, the Boatswain, the on-coming C/O, the 4/E, O/S H, and O/S I.

(See Figure 2.1-1)

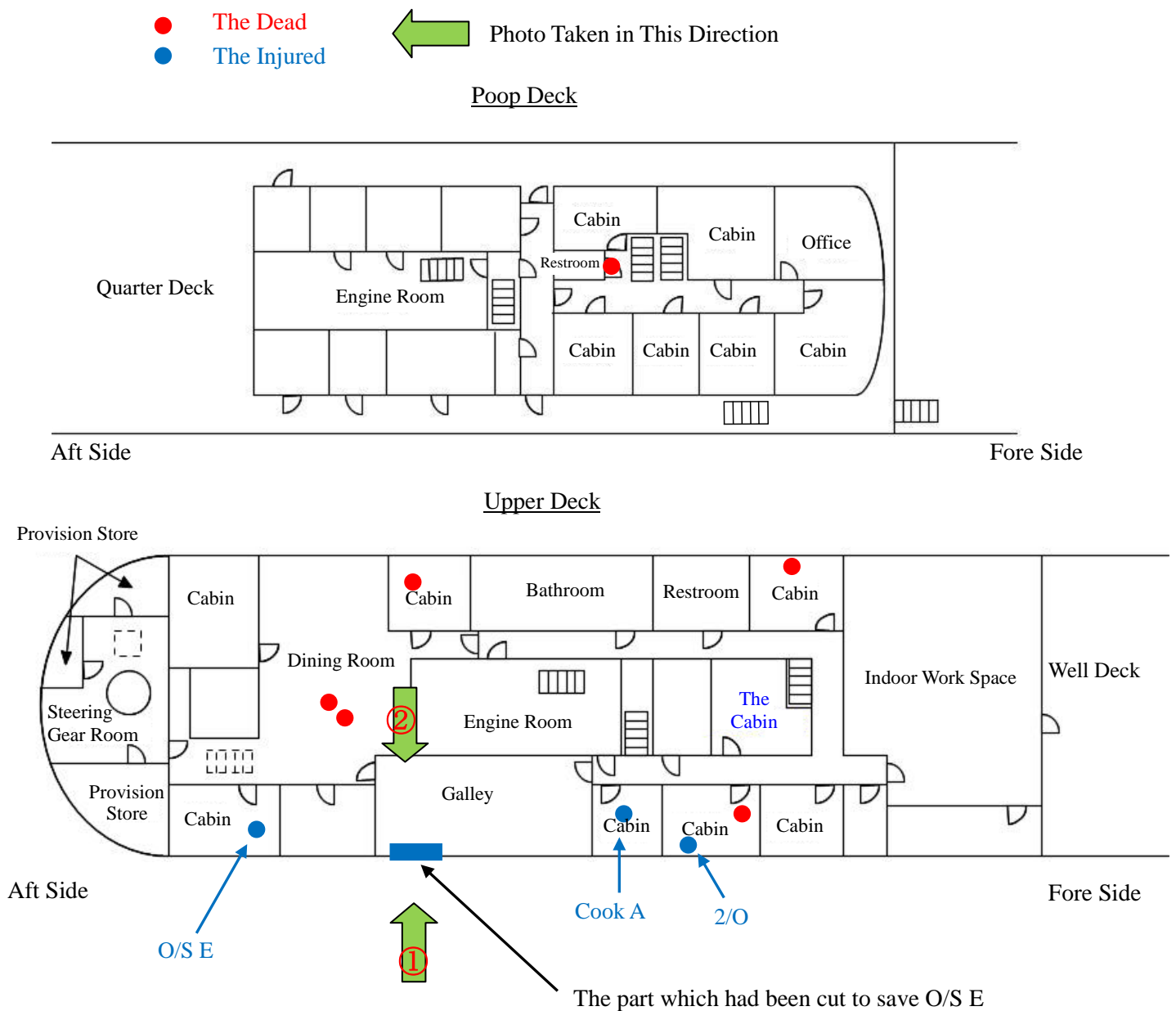


Figure 2.1-1 "Places Where Dead and Injured Crew Members Found"

2.2 Fatality and Injury Information

2.2.1 Dead Crew Members

According to the reply to the questionnaire by the Local Fire Authorities, out of the six deceased crew members, one, who was found in a cabin on the aft side of the bathroom in the port side upper deck accommodation spaces, was burnt to death, and the other five died of carbon monoxide poisoning.

2.2.2 Injured Crew Members

According to the statements of the 2/E, O/S E, and Cook A, and according to the reply to the questionnaire by the Local Fire Authorities, statuses of their injuries were as follows:

- (1) 2/E

The 2/E suffered heat burns in his nasal cavity, requiring a 6-day hospitalization.

(2) O/S E

O/S E suffered carbon monoxide poisoning and received medical treatment at hospital. He left hospital on the day of the accident.

(3) Cook A

Cook A suffered I-II degree heat burns¹ to 40% to 50% of his head, face, chest, both arms, and back, requiring hospitalization for three months or longer.

2.3 Damage to Vessel

The bridge deck of the Vessel burned down. All the cabins on the poop deck and the forward side accommodation spaces on the upper deck were damaged by the fire.

(See Figure 2.6-2 "Bridge Deck Fire Damaged Area," Figure 2.6-3 "Poop Deck Fire Damaged Area," and Figure 2.6-4 "Upper Deck Fire Damaged Area")

2.4 Crew Information

Gender Age Certificate of Competence

- 1) Master male 47 nationality: the Russian Federation
Russian Federation Master Certificate
Date of issue: July 24, 2003
Date of revalidation: July 7, 2009 (valid until March 14, 2014)
- 2) C/R male 46 nationality: the Russian Federation
- 3) Ref/E male 35 nationality: the Russian Federation
- 4) Boatswain male 50 nationality: the Russian Federation
- 5) On-coming C/O male 47 nationality: the Russian Federation
- 6) 4/E male 48 nationality: the Russian Federation
- 7) O/S H male 23 nationality: the Russian Federation
- 8) O/S I male 31 nationality: the Russian Federation
- 9) 2/E male 45 nationality: the Russian Federation
- 10) O/S E male 49 nationality: Ukraine
- 11) Cook A male 53 nationality: the Russian Federation

2.5 Vessel Information

2.5.1 Particulars of Vessel

IMO number:	7533240
Port of registry:	Phnom Penh (the Kingdom of Cambodia)
Owner:	MEGANOM SHIPPING LTD. (Belize)

¹ "Heat burns" represent heat-induced damage to the skin. Heat burn degrees are classified according to how deep the skin is damaged. "I" degree burns are damage only to the epidermis. "II" degree burns are damage to the dermis beneath the epidermis. "III" degree burns are damage to all the dermis and epidermis layers through the subcutaneous tissue.

Management company:	MEGANOM SHIPPING LTD. (the Republic of Korea)
Gross tonnage:	497 tons
L × B × D:	50.60m × 8.60m × 3.90m
Hull material:	Steel
Engine:	one diesel engine
Output:	885kW
Date of keel laid:	December 3, 1975
Date of launch:	January 24, 1976
Classification Society:	Global Marine Bureau Inc. (the Republic of Korea)

2.5.2 Vessel Construction and Modifications

According to the general arrangements at the time of construction and when modified in April 1990, the situation was as follows.

The Vessel was completed at a shipyard in Shizuoka City, Shizuoka Prefecture on March 31, 1976, as a 480-ton class fisheries training ship. The maximum number of complement persons allowed on board at the time of completion was 73. The Vessel was modified in April 1990 at the same shipyard, during which the capacity was decreased to 45 by removal of beds in cabins.

The structure of the Vessel at the time of this accident was different from the general arrangement when modified in April 1990. The Vessel had been modified since April 1990. The cooperation of the owner can not be obtained regarding information about when the Vessel was modified, which shipyard modified the Vessel; therefore what were modified was unknown.

2.5.3 Hull Structure

The Vessel, a well deck² cargo ship to transport frozen or refrigerated cargo, is structured with three layered decks: the upper deck, the poop deck, and the bridge deck. The bridge was set up approximately in the mid-ships of the hull. Under the upper deck, the Vessel had forepeak ballast tanks, fuel oil tanks, fish holds, and the engine room from fore to aft. On the upper deck, she had the boatswain's store, the well deck, the indoor work space, the accommodation spaces, the engine room, and the steering gear room from fore to aft. On the poop deck, she had the accommodation spaces, the engine room, and the quarter deck from fore to aft. On the bridge deck, the Vessel had the wheel house and the chart room.

(See Appendix Figure 2 "General Arrangement Plans")

2.5.4 Information about Accommodation Spaces

The steel bulkheads that are lined with heat-insulating boards divided the accommodation spaces set up on the poop deck and the upper deck.

(1) Poop Deck

- 1) There was an athwartship corridor approximately in the center on the poop deck. From

² A "well deck" vessel means the vessel that has both fore castle and long poop deck on the upper deck.

the corridor bow side were the accommodation spaces. There were two cabins on the port side and four cabins on the starboard side across the corridor in the fore and aft direction.

- 2) In the fore and aft direction corridor, there were two stairways leading to the bridge deck and the upper deck. The stairway down to the upper deck led to the port side corridor on the forward side of the Cabin.
- 3) Behind the entrance door on the center aft side of the athwartship corridor, there were the entrance door to the engine room and the downward stairway to the upper deck. The stairway led to the starboard side corridor on the fore side of the upper deck engine room.
- 4) At the front end of the starboard outdoor passage, there was the downward stairway to the well deck.

(See Figure 2.5-1 "Poop Deck Arrangement")

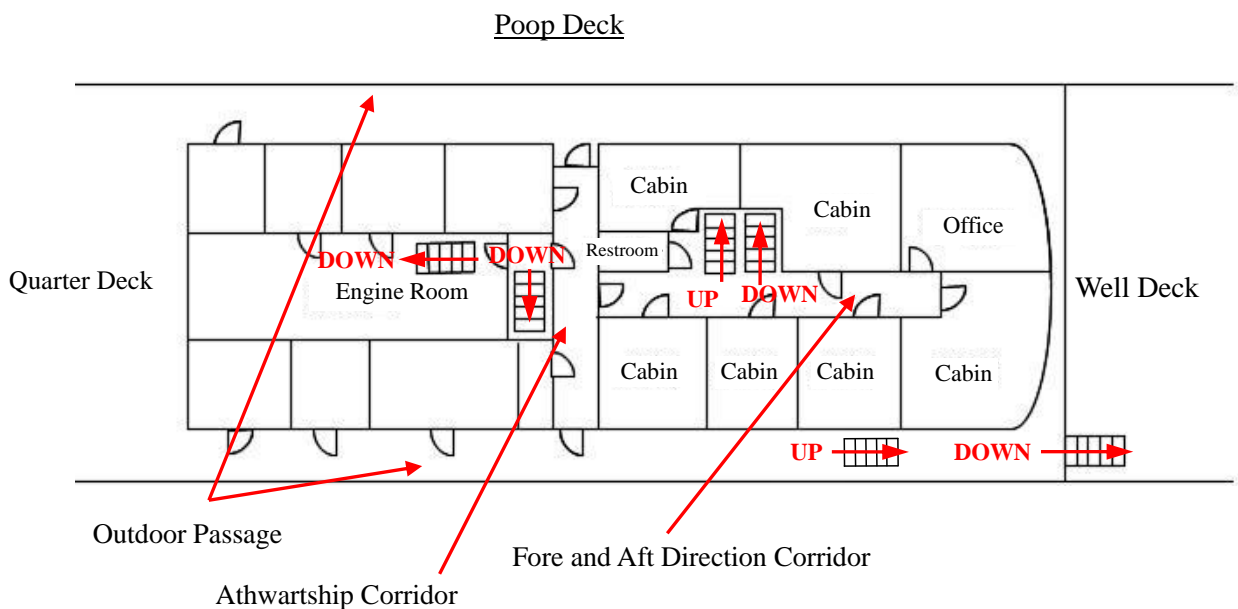


Figure 2.5-1 "Poop Deck Arrangement"

(2) Upper Deck

- 1) The accommodation spaces were on the aft side of the indoor work space on the upper deck.

On the starboard side of the accommodation spaces, there were three cabins, the galley, and a cabin, from bow to stern. On the port side of the accommodation spaces, there were a cabin, a restroom, the bathroom, a cabin, the mess room, and a cabin from bow to stern. The Cabin was on the center fore side, and the engine room was on the aft side. In addition, on the aft side of the aftmost cabins on both sides and the mess room, there were provision stores and the steering gear room.

There was the port side corridor that led to the mess room between the cabins on the portside and the Cabin as well as the engine room. There was the starboard side corridor

that led to the galley between the cabins on the starboard side and the Cabin. There was also the fore side corridor between the Cabin and the indoor work space.

- 2) There were two stairways from the upper deck accommodation spaces to the poop deck, one on the fore side of the Cabin in the port side corridor, and the other on the fore side of the engine room in the starboard side corridor. These stairways led to the corridor in the fore and aft direction on the poop deck, and to the fore side of the engine room, respectively.

In addition, the Vessel was modified to allow one to enter the engine room from the port side corridor and the starboard side corridor on the upper deck, to go up the stairways inside the engine room, and to get out to the athwartship corridor on the poop deck.

- 3) According to the general arrangements at the time of construction and when modified in 1990, there was another stairway from the upper deck up to the poop deck on the starboard quarter of the mess room. In addition, there was an escape hatch on the port side in the steering gear room, which allowed one to get out directly to the quarter deck without having to pass through the corridors and stairways from fore side the upper deck engine room. (See Figure 2.5-2 and Figure 2.5-3)

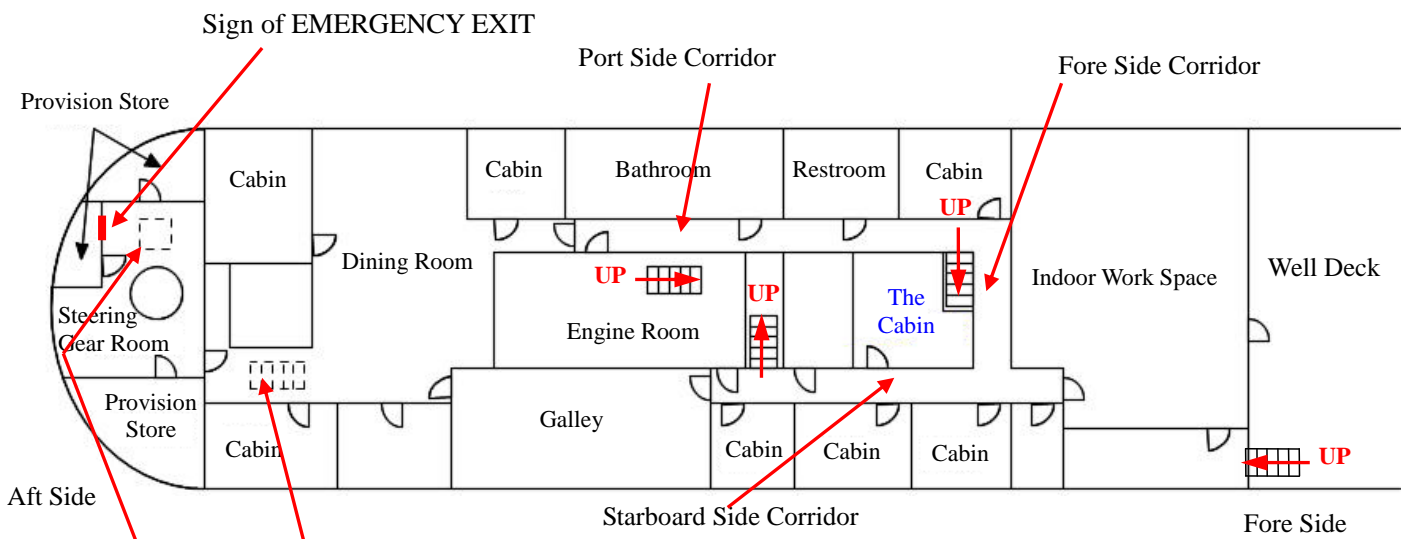


Figure 2.5-2 "Upper Deck Arrangement"

Trace of an upward stairway being removed

Trace of an escape hatch being welded

According to the on-site investigation, the upward stairway in the mess room had been removed; besides, the escape hatch had been welded at the time of the accident, nevertheless there was the sign of EMERGENCY EXIT on the aft sidewall in the steering gear room.

(See Photo 7 "Sign of EMERGENCY EXIT on Upper Deck," Photo 8 "Welded Escape Hatch on Upper Deck Ceiling," and Photo 9 "Welded Escape Hatch on Poop Deck")

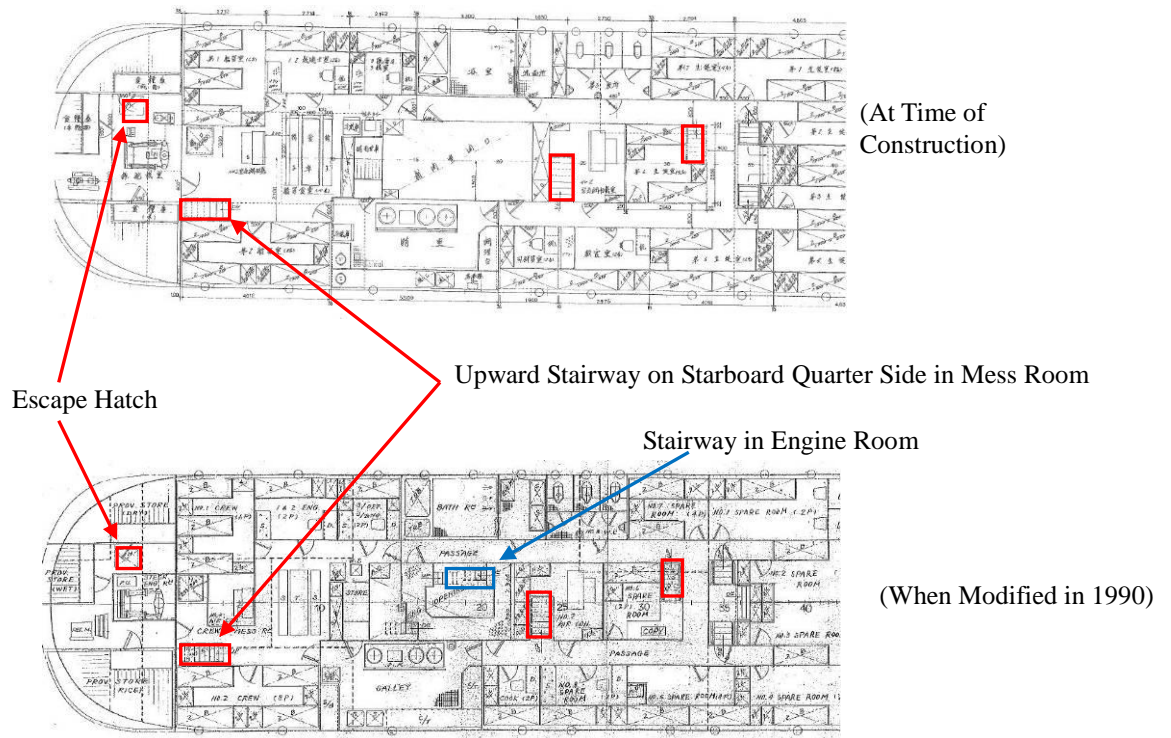


Figure 2.5-3 "General Arrangements at Time of Construction and When Modified in 1990"

2.5.5 The Cabin

According to the statement of the C/R and the reply to the questionnaire by the Local Fire Authorities, the situation of the Cabin was as follows.

The Cabin was about 2.6 m long in the fore and aft direction, about 2.5 m wide in the athwartship direction, and about 2.1 m high. There was an entrance door on the starboard quarter. The wooden stairway that connected the port side corridor to the poop deck protruded into the Cabin at the port side fore corner. Out of the four sidewalls, the one on the aft side was made of steel and the other three were wooden.

In the Cabin, there were two beds (bonks) each on the starboard side and the port side in the fore and aft direction. The C/R used the bed on the starboard side and the Ref/E on the port side, with their heads bow. There were drawers under the beds, a desk against the fore sidewall near the bed on the starboard side, and a refrigerator under the desk. In addition, there were a bookshelf against the stairway wall and a chest of drawers against the aft sidewall facing the bookshelf.

In the Cabin, there were two 100 V outlets each on the port side of the desk and the port side of the bookshelf. In addition, there was a 220 V outlet on the starboard side of the bookshelf. (See Figure 2.5-4)

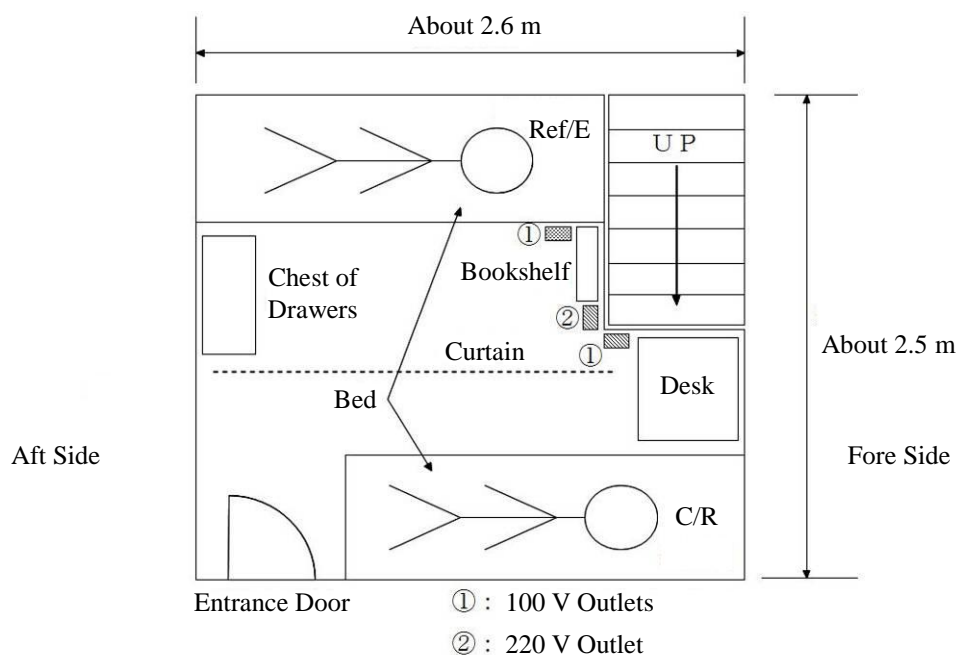


Figure 2.5-4 "Arrangement of the Cabin"

2.6 Accident Conditions and Fire Damage Information

2.6.1 Location and Behavior of Each Crew Member When the Accident Occurred

According to the statements of the Master and each crew member, the location and behaviors were as follows.

(1) Master

The Master was scheduled to leave the vessel to join another vessel in the port of Wakkanai. After the Vessel arrived at the Pier, the Master visited another vessel he was going to join. For this reason, he was not aboard the Vessel when the accident occurred.

The Master, who was sleeping aboard another vessel he would join, heard the news of the fire accident and immediately rushed to the Vessel. By the time he returned, the Vessel had already been covered by large amounts of smoke and intense flames. It was not possible for the Vessel's crew members to try to extinguish the fire.

(2) C/O

When resting watching a movie in his cabin on the poop deck, the C/O heard cries outside his cabin. He opened the door and saw black smoke flowing into his cabin from the corridor.

Because black smoke and fire were coming up through the stairway opening, the C/O was unable to go down the stairway.

(3) 2/O and E/E

The 2/O and the E/E in the wheel house and the chart room, respectively, heard cries

outside. When opening the entrance door leading to the stairway on the aft side of the chart room, smoke came into the room and it smelled of plastic burning. They went down to the poop deck through an outdoor passage and stairway.

(4) C/E

The C/E, who was in his cabin on the poop deck, heard cries outside. Hearing a fire alarm sound, he evacuated to the pier.

(5) O/S A, O/S B, and O/S C

Knowing a fire occurred, O/S A and O/S B immediately escaped to the well deck.

O/S C saw smoke and fire in the starboard side corridor but no smoke or fire in the fore side corridor and the port side corridor. He tried to put out the fire using a portable fire extinguisher installed in the mess room. As smoke grew stronger, he had to escape to the pier.

(6) O/S D

Sleeping in his cabin in the foremost section on the starboard side upper deck, O/S D woke up hearing someone crying outside. When opening the door, he saw black smoke and fire. As black smoke came into his cabin, he evacuated to the pier.

(7) O/S F and O/S G

O/S F and O/S G, who were smoking with a few other crew members in the indoor work space on the upper deck, heard cries outside and saw black smoke in the starboard side corridor.

O/S F tried to put out the fire with a portable fire extinguisher installed on the poop deck. But as the smoke and fire grew stronger, he had to evacuate to the pier.

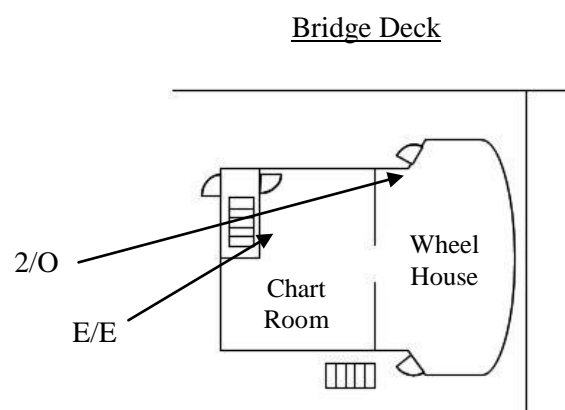
O/S G evacuated to an outdoor passage.

(8) Cook B

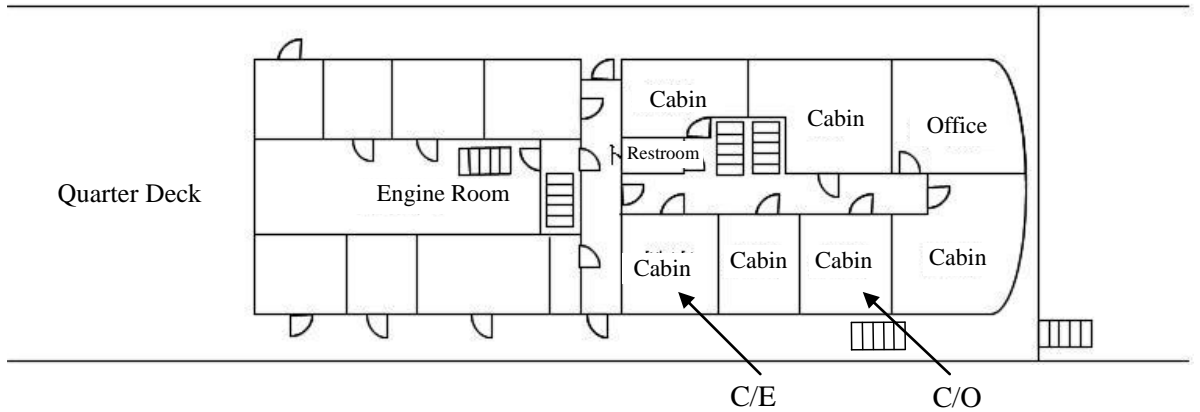
Cook B, who was sleeping in the second cabin on the fore side of the starboard side upper deck, heard someone crying in a corridor and a fire alarm sound. As the smoke came into his cabin, he evacuated to an outdoor passage.

In the meantime, the C/O, the 2/O, O/S A, O/S B, and O/S F, and Cook B tried to extinguish fire with fire-fighting hoses.

(See Figure 2.6-1)



Poop Deck



Upper Deck

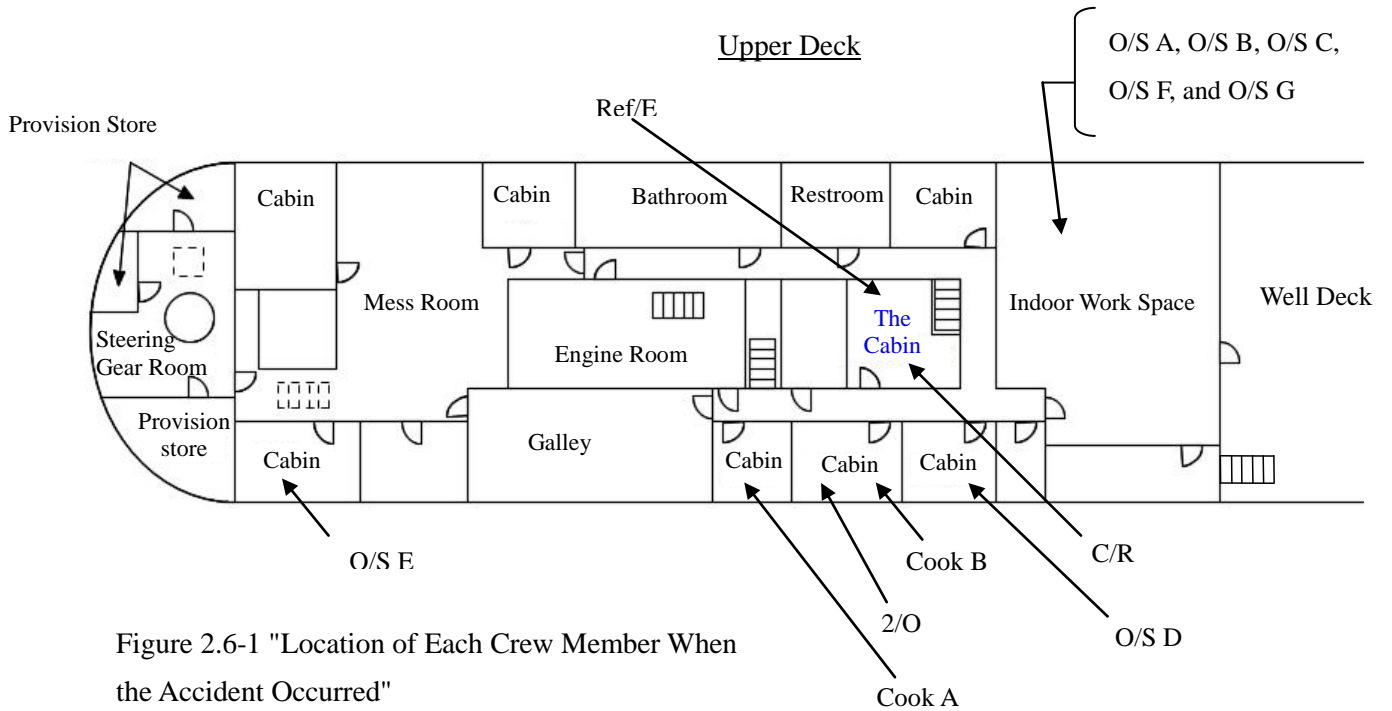


Figure 2.6-1 "Location of Each Crew Member When the Accident Occurred"

2.6.2 Fire Damage Conditions

(1) Bridge Deck

The wheel house and the chart room including the radar, the communication device, and the engine console box almost burned out. All the windowpanes were also broken. In addition, the wooden downward stairway that connected the port quarter of the chart room to the poop deck and the entrance door to the stairway burned down.

(See Figure 2.6-2 "Bridge Deck Fire Damaged Area" and Photos ③ through ⑥)

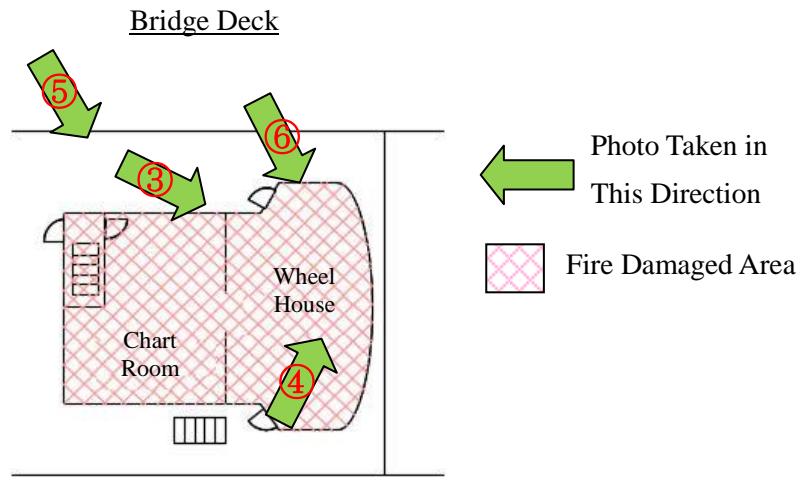


Figure 2.6-2 "Bridge Deck Fire Damaged Area"

Wheel House



Photo ③ "Chart Room"

Radar

Engine Console box



Photo ④ "Wheel House"

Wooden Downward Stairway to Poop Deck (Burned Down)



Photo ⑤ "Stairway on Aft Side of Chart Room"

Windowpanes (Broken)



Photo ⑥ "Wheel House on Forward Starboard Area"

(2) Poop Deck

The wooden stairway between the athwartship corridor and the forward side accommodation spaces as well as the two wooden stairways in the accommodation spaces burned down. The wooden stairway from the athwartship corridor down to the aft upper deck burned out as well.

Inside the engine room on the aft side of the athwartship corridor, plastic materials burned and melted and the upper part of the starboard sidewall was blackened by soot. (See Figure 2.6-3, Photos ⑦ through ⑩, and Photo 10 "Athwartship Corridor on Poop Deck")

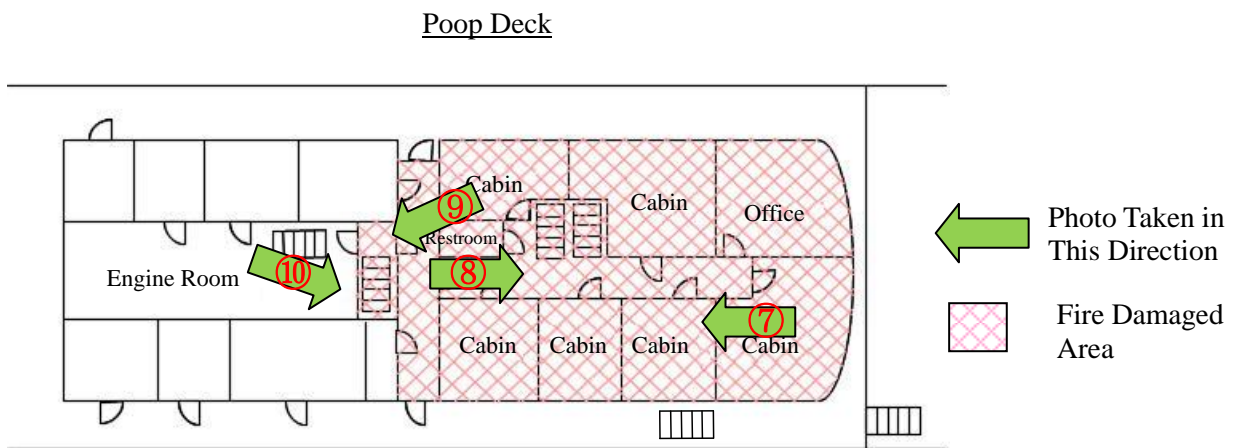


Figure 2.6-3 "Poop Deck Fire Damaged Area"



Photo ⑦ "Photo of Aft Side Taken from Fore Side"

Photo ⑧ "Fore Side of Restroom"

Entrance Door to Engine Room

Stairway to Upper Deck



Photo ⑨ "Entrance Door to Engine Room and Stairway to Upper Deck"

Photo ⑩ "Engine Room Conditions"

(3) Upper Deck

The cabins on the forward side, particularly in the Cabin, burned more severely than other cabins. But the indoor work space and the galley did not burn down, though the upper part of each room was blackened by soot. In the indoor work space, some ashtrays with cigarette butts remained unburned. The provision stores and the steering gear room at the stern were not burned.

(See Figure 2.6-4, Photos ⑪ through ⑯, and Photo 11 "Indoor Work Space on Upper Deck")

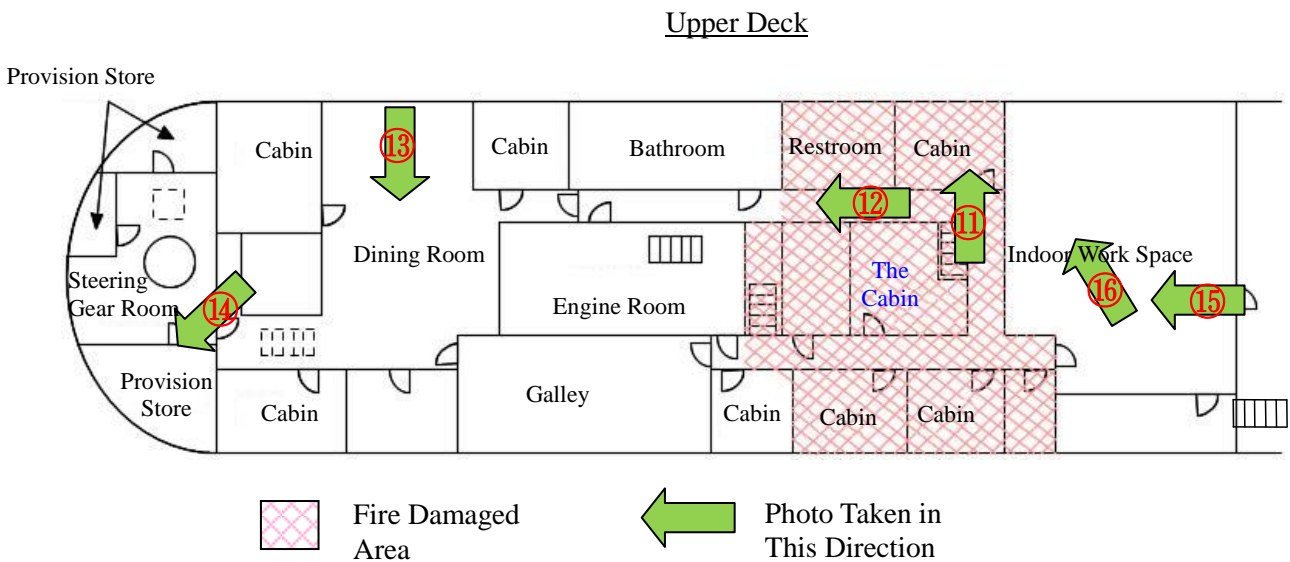


Figure 2.6-4 "Upper Deck Fire Damaged Area"



Photo ⑪ "Forward Port side cabin:
Severely Burned"



Photo ⑫ "Port side Corridor"



Photo ⑬ "Mess Room"

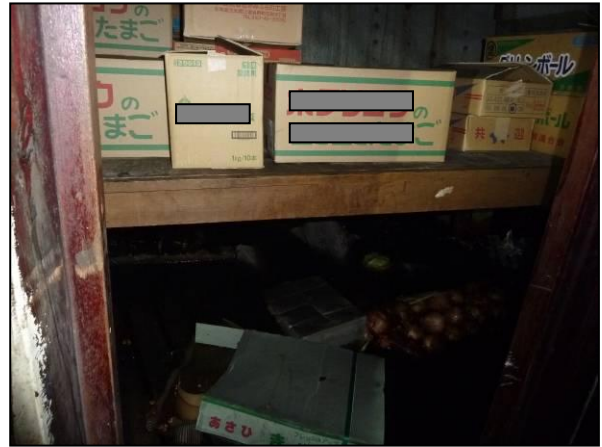


Photo ⑭ "Provision Store at Stern"



Photo ⑮ "Indoor Work Space 1)"

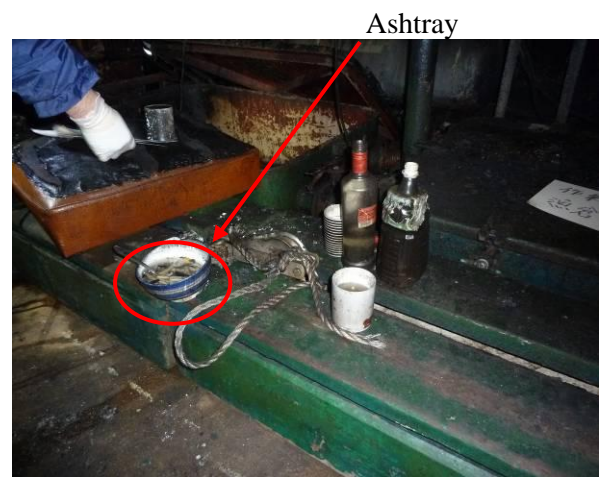


Photo ⑯ "Indoor Work Space 2)"

2.6.3 Fire Damage Conditions of the Cabin

- (1) The aft side steel wall in the Cabin remained but all the three wooden walls burned out.
- (2) The port side bed in the Cabin, particularly on the aft side, was severely burned. The floor under the bed, the wall on the aft side of the bed, and the ducts mounted on the ceiling buckled. Besides, the chest of drawers and other fittings by the port side bed and against the aft sidewall completely burned out. The area around the starboard side bed had less fire damage than the port side bed. The starboard side bed and the drawer under the bed partially remained unburned.
- (3) The upper side of the wooden stairway on the port side burned out, with the lower three steps left unburned.

According to the reply to the questionnaire by the Local Fire Authorities:

- (4) Out of the three outlets installed in the Cabin, the refrigerator's power supply cord was plugged into the 100 V outlet on the starboard side through an extension cord. The outlet, the extension cord, and the power supply cord did not burn out.
- (5) A metal ashtray was found under the stairway on the forward side of the port side bed. There were some cigarette butts in the ashtray.

(See Figure 2.6-5 and Photos ⑰ through ㉓)

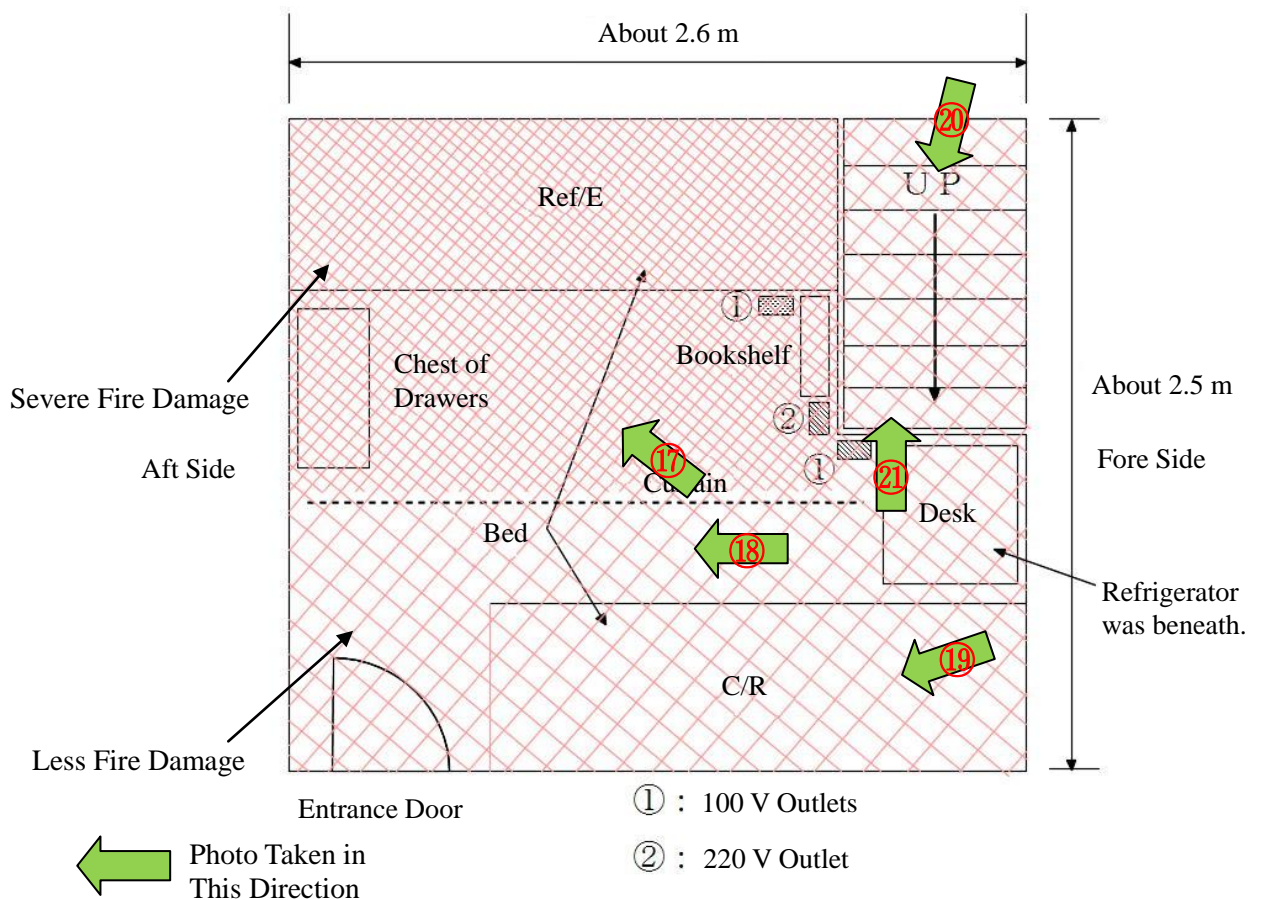


Figure 2.6-5 "Fire Damaged Conditions of the Cabin"

Bed Location



Photo ⑰ "Around Bed of Ref/E"

Buckled Duct on Ceiling



Photo ⑱ "Over Bed of Ref/E"

Bed Location



Photo ⑲ "Around Bed of C/R"

Wooden Stairway



Photo ⑳ "Wooden Stairway to Fore Side of Bed of Ref/E"

Metal Ashtray



Photo ㉑ "Ashtray Found under Stairway"

Cigarette Butts

Metal Ashtray



Photo ㉒ "Ashtray and Cigarette Butts"

2.7 Information about Smoking

2.7.1 Smoking Onboard

According to the statements of the 2/O, the C/R, and O/S F, the Vessel prohibited smoking onboard except the indoor work space on the upper deck where there were ashtrays. Only smoking was allowed in the indoor work space on the upper deck or on the weather deck.

2.7.2 Smoking in the Cabin

According to the statement of the C/R, he was not a smoker but was aware that the Ref/E had a habit of smoking. The Ref/E had been told not to smoke in the Cabin.

2.8 Escape Routes Out of Upper Deck Accommodation Spaces

2.8.1 Conditions When the Accident Occurred

- (1) Available escape routes out of the upper deck accommodation spaces were as follows.
 - 1) A route to go out of the entrance door on the fore side of the starboard side corridor to the well deck through the indoor work space.
 - 2) A route to go up the stairway on the forward port side of the Cabin to the poop deck and go out to an outdoor passage through the athwartship corridor.
 - 3) A route to go up the starboard side stairway on the fore side of the engine room to the poop deck and go out to an outdoor passage through the athwartship corridor.
 - 4) A route to go from the starboard side or port side corridor to the engine room, go up the stairway in the engine room, and go out from the entrance door of the engine room on the poop deck to an outdoor passage through the athwartship corridor.
- (2) In addition to the escape routes mentioned in (1), the general arrangements at the time of construction and when modified in 1990 showed two additional routes:
 - 1) A route to escape from the stairway on the aft side of the mess room to the quarter deck.
 - 2) A route to enter the steering gear room from the mess room and escape to the quarter deck through the escape hatch on the port side in the steering gear room.

(See Figure 2.8-1)

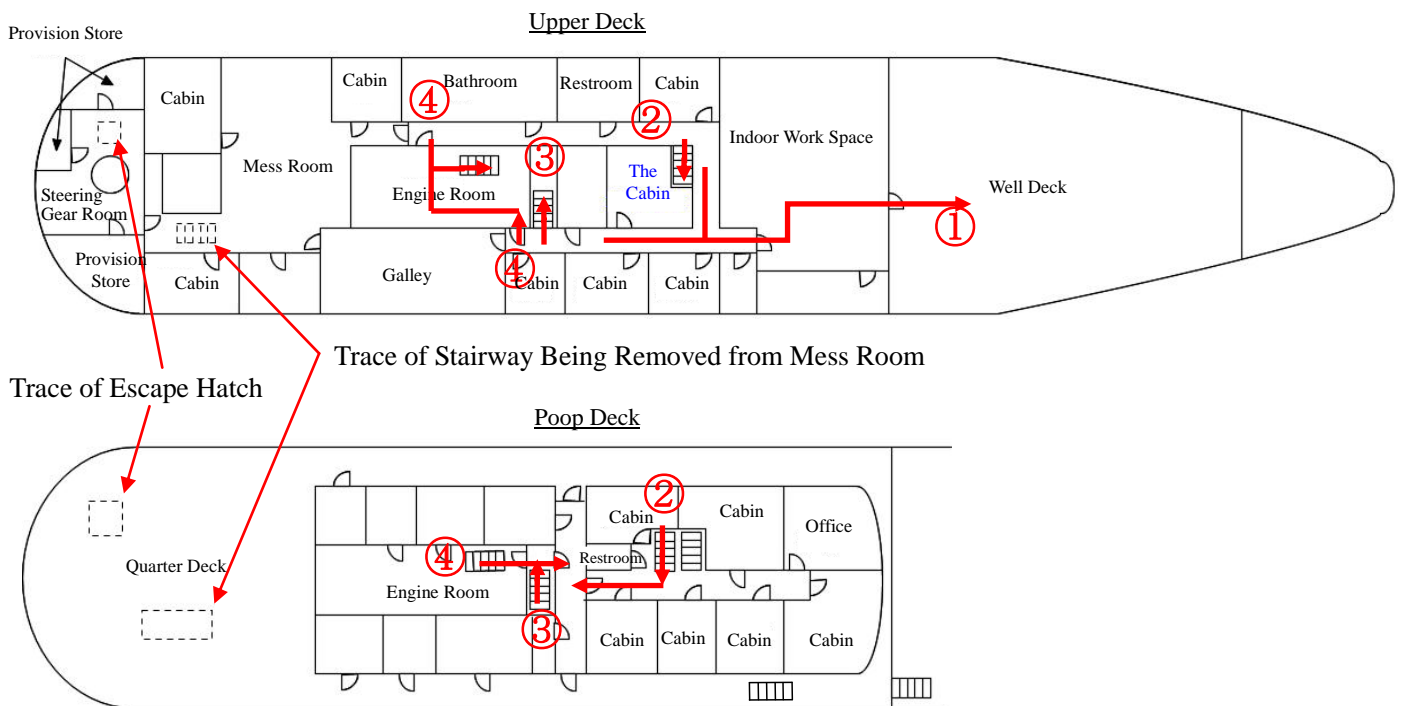


Figure 2.8-1 "Escape Routes"

2.8.2 Regulations on Escape Routes

(1) Regulations of SOLAS Convention

SOLAS Convention (the International Convention for the Safety of Life at Sea) (amended in 1981) Chapter II-2 - Construction (Fire protection, fire detection, and fire extinction) prescribed that cargo ships of 500 gross tonnage and upwards engaged on international voyages should comply with the following.

Regulation 45 Means of escape

Stairways and ladders shall be so arranged as to provide, from all accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces, a ready means of escape to the open deck and thence to the lifeboats and liferafts. In particular the following general provisions shall be complied with:

- .1 At all levels of accommodation there shall be provided at least two widely separated means of escape from each restricted space or group of spaces.*
- .2.1 Below the lowest open deck the main means of escape shall be a stairway and the second escape may be a trunk or a stairway.*
- .2.2 Above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof.*

- .3 *Exceptionally the Administration may dispense with one of the means of escape, due regard being paid to the nature and location of spaces and to the numbers of persons who normally might be quartered or employed there.*
- .4 *No dead-end corridors having a length of more than 7m shall be accepted. A dead-end corridor is a corridor or part of a corridor from which there is only one escape route.*
- .5 Omitted
- .6 Omitted

Note that the SOLAS Convention amended in 1981 shall be applied to ships constructed on and after September 1, 1984. The SOLAS Convention amended in 1960, which shall be applied to ships constructed on and before August 31, 1984, prescribed that accommodation spaces and other spaces in which the crew is normally employed should be provided with at least one escape route. But the SOLAS Convention did not have a provision on dead-end corridors.

(2) Regulations in the Kingdom of Cambodia

According to the reply to the questionnaire by the Government of the Kingdom of Cambodia, the country applies SOLAS Convention to cargo ships of 500 gross tonnage and upwards engaged on international voyages, but there are no regulations on escape routes for other cargo ships.

2.9 Safety Training

2.9.1 Onboard Safety Training

According to the statements of the C/O and O/S E, the C/O typically provided training for new crew members on how to act in the event of a fire, which included information about escape routes, locations of fire extinguishers, and smoking areas. However, the C/O had not provided this training and information before the accident occurred for the crew members who had joined the Vessel on the previous evening.

2.9.2 SOLAS Convention

SOLAS Convention (amended in 2011) Chapter III - Life-saving appliances and arrangements (Regulations 6 through 37) - Emergency training and drills - "3. Drills" prescribed the following.

Regulation 19 Emergency training and drills

3 Drills

3.1 Drill shall, as far as practicable, be conducted as if there were an actual emergency.

3.2 Every crew member shall participate in at least one abandon ship drill and one fire drill every month. The drills of the crew shall take place within 24 hours of the ship leaving a port if more than 25% of the crew have not participated in abandon ship and fire drills on board that particular ship in the previous month. When a ship enters service for the first time, after

modification of a major character or when a new crew is engaged, these drills shall be held before sailing. The Administration may accept other arrangements that are at least equivalent for those classes of ships for which this is impracticable

2.10 Weather Conditions

2.10.1 Weather Data

The weather data observed at Wakkanai Local Meteorological Observatory, about 2.1 km northwest of the location of this accident, were as follows.

00:00 Weather: cloudy, wind direction: northeast, wind speed: 3.2 m/s, temperature: 3.8 °C
01:00 Weather: cloudy, wind direction: northeast, wind speed: 3.5 m/s, temperature: 3.8 °C
02:00 Weather: cloudy, wind direction: east-northeast, wind speed: 3.5 m/s, temperature: 3.7 °C
03:00 Weather: cloudy, wind direction: east-northeast, wind speed: 2.9 m/s, temperature: 3.7 °C

2.10.2 Weather Data Observed by Local Fire Authorities

According to the reply to the questionnaire by the Local Fire Authorities, at the time of the accident, it was cloudy, the wind direction was in the northeast at a speed of 3.5 m/s, the temperature was 3.8 °C, and the humidity was 95 %.

3. ANALYSIS

3.1 Situation of the Accident Occurrence

3.1.1 Course of the Events

According to 2.1.1, 2.6.1, and 2.6.2, it is probable that the following events took place.

- (1) At around 08:35, May 14, 2013, the Vessel, with the Master, the Ref/E, the C/R, and 15 other crew members on board, berthed at the Pier of Tenpoku No.2 Wharf in the port of Wakkanai. The Vessel was scheduled to depart on May 16 after unloading the cargo.
- (2) At around 20:00, May 15, the five crew members who were scheduled to join the Vessel at the port of Wakkanai boarded the Vessel. Four out of the five stayed in their cabins overnight. Because a cabin was not available for him, one of them returned to a lodging facility in Wakkanai City. The Master was not aboard the Vessel that night.
- (3) The C/R, who was sleeping on the starboard side bed in the Cabin, woke up for suffocation and due to the smell of smoke. He saw the Ref/E sitting on the port side bed with his legs toward the aft side and flapping with his hands to put out the flame brazing up around his feet.
- (4) A little past 01:30, May 16, O/S A and some others heard a fire alarm sound. At about 01:40, O/S D informed via his mobile phone the occurrence of a fire to the shipping agent's representative through the representative of the shipper.

- (5) Some crew members tried to extinguish the fire on the Vessel unsuccessfully. Receiving an emergency call from the shipping agent's person in charge, the dispatched fire brigade extinguished the fire at about 13:00, May 16.
- (6) Six crew members were found deceased and three injured, and the bridge deck and other parts of the Vessel burned out.

3.1.2 Date and Time and Location of the Accident Occurrence

According to 2.1.1, a little past 01:30, May 16, O/S A and some others heard a fire alarm sound, and at about 01:40, O/S D informed the occurrence of a fire to the representative of the shipping agent through the representative of the shipper. It is probable that the date and time of the occurrence of the accident was between about 01:30 to 01:40, May 16, 2013, and that the location was around 170° true bearing, 910 m from Wakkanai Ko East Breakwater West Lighthouse.

3.1.3 Damage to the Vessel

According to 2.3, the bridge deck on the Vessel burned down. The accommodation spaces on the poop deck and the fore side of the accommodation spaces on the upper deck also burned out.

3.1.4 Fatality and Injury

According to 2.2, six crew members were deceased and three were injured.

3.2 Causal Factors of the Accident

3.2.1 Crew

According to 2.4, the Master had a legal and valid certificate of competency.

3.2.2 Weather Conditions

According to 2.10, it is probable that at the time of the accident, it was cloudy, the wind direction was in the northeast at a speed of 3.5 m/s, the temperature was 3.8 °C, and the humidity was 95 %.

3.2.3 Onboard Smoking Policy

According to 2.6.3 and 2.7, it is probable that smoking was prohibited in the Vessel except the indoor work space on the upper deck where there were ashtrays.

3.2.4 Analysis on Location Where the Fire Started

(1) Location Where the Fire Started

According to the following descriptions in 2.1.1, 2.5.5, 2.6.2 (3), and 2.6.3, it is probable that the fire started on the aft side of the port side bed in the Cabin.

- 1) The C/R, who was sleeping on the starboard side bed in the Cabin, woke up for suffocation and due to the smell of smoke. He saw the Ref/E sitting on the port side bed with his legs toward the aft side and flapping with his hands to put out the flames blazing

up around his feet.

- 2) The C/R also saw a smoldering cushion falling off the Ref/E's bed and a fire on the wall side spreading to nearby flammable materials.
- 3) The port side bed burned out severely particularly on the aft side.

(2) The Cause of the Fire

According to 2.1.1, 2.1.2, 2.5.5, 2.6.3, and 2.7, possible causes of the fire from the Cabin include an electrical fire, carelessly extinguished cigarette butts, and arson. Based on the following considerations, it is somewhat likely that carelessly extinguished cigarette butts were the cause of the fire.

1) Electrical Fire

The Cabin was installed with two 100 V outlets and a 220 V outlet on the forward side. The power supply cord of refrigerator was plugged in one of the 100 V outlets, but neither the outlet nor the cord burned out. In addition, because there was no electrical wiring on the aft side of the port side bed, which is considered to be an origin of the fire, it is probable that the accident was not caused by an electrical fire.

2) Carelessly Extinguished Cigarette Butts

The Vessel prohibited smoking onboard except in the indoor work space on the upper deck; therefore the C/R had told the Ref/E not to smoke in the Cabin. According to the fact that a metal ashtray with some cigarette butts was found under the stairway on the fore side of the port side bed, the fact the C/R had no habit of smoking, and the fact that all the ashtrays placed in the indoor work space had remained there, which makes it hard to believe that the ashtray found in the Cabin had been brought in from the indoor work space, it is somewhat likely that the Ref/E was smoking in the Cabin.

As the Ref/E was deceased, it could not be determined whether he was smoking.

3) Arson

According to the fact that the Ref/E tried to put out the flames blazing up around his feet by flapping it with his hands, it is probable that the accident was not arson caused by him.

- 4) Based on the above considerations, it is somewhat likely that the Ref/E smoked on the port side bed in the Cabin, his bedclothes caught fire, and then the fire spread to surrounding flammable materials. Because the Ref/E was deceased and because no crew member witnessed the start of the fire, the course of the accident could not be determined.

- 5) Consequently, it is probable that this accident could have been prevented if the Vessel had ensured the onboard smoking policy was observed.

3.2.5 Analysis on Escape Routes Out of Upper Deck Accommodation Spaces

(1) Escape Routes

According to 2.8, there were the following escape routes out of the upper deck

accommodation spaces: 1) a route to go from the fore side of the starboard corridor to the well deck through the indoor work space, 2) a route to go up the stairway on the fore port side of the Cabin to the poop deck and go out to an outdoor passage through the athwartship corridor, 3) a route to go up the starboard side stairway on the fore side of the engine room to the poop deck and go out to an outdoor passage through the athwartship corridor, and 4) a route to go from the starboard side or port side corridor to the engine room, go up the stairway in the engine room, and go out from the entrance door of the engine room on the poop deck to an outdoor passage through the athwartship corridor.

In addition to the above, the vessel had had two other escape routes when constructed: 1) a route to escape from the stairway on the aft side of the mess room to the stern deck, and 2) a route to enter the steering gear room from the mess room and escape to the stern deck through the escape hatch on the portside in the steering gear room.

(2) Regulations regarding Escape Routes

According to 2.5.1, 2.5.4, and 2.8.2, the regulations regarding the escape routes were as follows.

The Kingdom of Cambodia, the flag State of the Vessel, applied regulations on escape routes to cargo ships of 500 gross tonnage and upwards engaged on international voyages. It is probable that there were no regulations on escape routes applicable to the vessel of 497 gross tonnage.

3.2.6 Crew Members' Escapes and Circumstances that Lead to Death of the Others

(1) Crew Members' Escapes

According to 2.1.2, 2.6.1, and 2.6.2, the escapes were as follows.

- 1) When the accident occurred, other crew members than those deceased and injured, and those who were in the cabins on the poop deck and in the wheel house were in their cabins or in the indoor work space. It is probable that they escaped from one of the escape routes mentioned in 3.2.5 (1) after hearing cries, a fire alarm sound, or clamor.
- 2) It is probable that the three crew members who would get injured tried to escape as follows. The fire had grown stronger by the time when they heard cries or became suffocate. Cook A escaped through the smoke and fire. Each of the 2/E and O/S E received and wore an air tank and mask from the fire brigade. The 2/E, who had waited for the timing of escape in his cabin on the forward starboard side of the upper deck accommodation spaces, escaped onto the deck where he was rescued. O/S E was rescued from the opening made on the galley outer plate by gas cutting.

(2) Circumstances that Lead to Death of the Crew Members

According to 2.1.1, 2.1.2 (4), 2.2.1, and 2.9.1, four out of the six who died in the accident just joined the Vessel at about 20:00 on the previous day of the accident. As described later in 3.2.7, it is somewhat likely that they did not fully understand the layout of cabins, corridors, and stairways, and that when escaping after the fire occurred, smoke

prevented them from finding the escape routes. As a result, three died of carbon monoxide poisoning and one was burnt to death. In the meantime, it is somewhat likely that the two crew members, who were found deceased in the mess room, were late in escaping and lost an option to go up the fore side stairway, and that though escaping to the aft side where there was no fire, they died of carbon monoxide poisoning because there was no escape route from the aft area to the poop deck.

3.2.7 Training on Emergency Procedures

According to 2.9, the C/O typically provided training for new crew members on how to act in the event of a fire, which included information about escape routes, the location of fire extinguishers, and smoking areas. However, it is probable that the C/O had not provided this training and information before the accident occurred for the crew members who had joined the Vessel at about 20:00 on May 15.

For this reason, it is probable that the crew members who had joined the Vessel at about 20:00 on May 15 did not fully understand the layout of cabins, corridors, and stairways, and that they were unable to find the escape routes.

3.2.8 Occurrence of the Accident

According to 2.1.1, 2.5.5, 2.6.2 (3), 2.6.3, 3.1.1, 3.2.3, 3.2.4, and 3.2.6 the analyses were as follows.

- (1) It is somewhat likely that while the vessel moored at the Pier of Tenpoku No.2 Wharf in the port of Wakkanai, after unloading the cargo, the Ref/E smoked on the bed in the Cabin, his bedclothes caught fire, and the fire spread to surrounding flammable materials.
- (2) It is probable that smoke and flame caused by the fire spread in the Cabin climbed the opening of an upward stairway, spreading to the above accommodation spaces.
- (3) It is probable that part of the crew members were late in escaping from the Vessel, resulting in six deceased and three injured. The Local Fire Authorities rescued two out of the remaining crew members. The other crew members realized a fire occurred and eventually evacuated to the pier. It is probable that some of the crew members tried to extinguish the fire.
- (4) Four out of the six who died in the accident just joined the vessel at about 20:00 on the previous day of the accident. It is somewhat likely that they were late in escaping and died because they did not fully understand the layout of cabins, corridors, and stairways and because smoke prevented them from finding the escape routes when escaping after the fire occurred.
- (5) It is probable that two out of the three injured crew members could stay in their cabins after the accident occurred because they could keep breathing with the help of air tanks and masks given by the fire brigade of the Local Fire Authorities, and because the fire did not spread to their cabins or the fire was less severe there than other places.

3.2.9 Analysis regarding Damage Prevention and Reduction

According to 2.1.1, 2.5.4 (2), 2.5.5, 2.6.3, 2.7 through 2.9, 3.2.3, 3.2.6 (2), and 3.2.7 the analysis was as follows.

- (1) It is somewhat likely that when the fire occurred and spread, the crew members who just joined the Vessel on the previous night of the accident did not know the escape routes and were late in escaping. It is somewhat likely that the casualties by the accident could have been prevented or decreased if the new crew members, just after joining the Vessel, had been provided with training on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers.
- (2) The escape hatch on the portside in the Vessel's steering gear room, which led to the quarter deck, was welded. Accordingly, it is somewhat likely that the lack of an escape route from the aft part of the Vessel worsened the damage. The fire did not spread to the stern; consequently, it is somewhat likely that the casualties could have been prevented by letting some crew members get out through the escape hatch, if the Vessel had been installed with an aft side escape hatch for emergencies.

4. CONCLUSIONS

4.1 Probable Causes

It is somewhat likely that while the Vessel moored at the Pier of Tenpoku No.2 Wharf in the port of Wakkanai at night, the Ref/E smoked on the bed in the Cabin, and then his bedclothes caught fire; hence, the fire spread to surrounding flammable materials.

4.2 Other Identified Safety Issues

Four out of the six who died in the accident just joined the Vessel on the previous night of the accident. It is somewhat likely that the four, who had not been provided with training and instruction on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers, did not know the escape routes and were late in escaping when the fire occurred. It is somewhat likely that the casualties could have been prevented or decreased if the new crew members, just after joining the Vessel, had been provided with training and instruction on how to act in the event of a fire, which included information about the location of fire extinguishers.

In addition, when constructed, the Vessel was installed with an escape hatch, which led to the quarter deck on the port in the steering gear room. Later, the escape hatch was welded and it was impossible to escape from the stern. Because the fire did not spread to that area, it is somewhat likely that the casualties could have been prevented by letting some crew members get out through the escape hatch, if the Vessel had been installed with an aft side escape hatch for emergencies.

5. SAFETY ACTIONS REQUIRED

It is somewhat likely that while the Vessel moored at the Pier of Tenpoku No.2 Wharf in the port of Wakkanai at night, the Ref/E smoked on the bed in the Cabin, and then his bedclothes caught fire; hence, the fire spread to surrounding flammable materials.

Four out of the six who died in the accident just joined the Vessel on the previous night of the accident. It is somewhat likely that the four, who had not been provided with training and instruction on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers, did not know the escape routes and were late in escaping when the fire occurred. It is somewhat likely that the casualties could have been prevented or decreased if the new crew members, just after joining the Vessel, had been provided with training and instruction on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers.

In addition, when constructed, the Vessel was installed with an escape hatch, which led to the quarter deck on the port in the steering gear room. Later, the escape hatch was welded and it was impossible to escape from the stern. Because the fire did not spread to that area, it is somewhat likely that the casualties could have been prevented by letting some crew members get out through the escape hatch, if the Vessel had been installed with an aft side escape hatch for emergencies.

As a consequence, it is necessary that the management company and the owner should take the following measures to prevent not only recurrence of similar accidents but also damage caused by them.

- (1) The vessel should ensure the onboard smoking policy is observed.
- (2) The vessel should provide new crew members with training, just after they joined the vessel, on what to do in the event of a fire, which includes information about the escape routes and the location of fire extinguishers.
- (3) To avoid the situation where there is no emergency escape route available depending on where a fire breaks out, it is desirable that the vessel should secure at least two escape routes, for example, one on the fore side and the other on the aft side.

6. SAFETY RECOMMENDATIONS

It is somewhat likely that this accident occurred as follows. While TIGAN (hereinafter referred to as "the Vessel") moored at the west pier of Tenpoku No.2 Wharf in the port of Wakkanai at night, a crew member smoked on his bed in a cabin though the vessel prohibited smoking onboard except in the indoor work space, and then his bedclothes caught fire; hence, the fire spread to surrounding flammable materials, and smoke and flame climbed the opening of an upward stairway nearby and spread to the above accommodation spaces.

Four out of the six who died in the accident just joined the Vessel on the previous night of the accident. It is somewhat likely that the four, who had not been provided with training and instruction on how to act in the event of a fire, which included information about the escape routes and the location of fire extinguishers, did not know the escape routes and were late in escaping when the fire occurred.

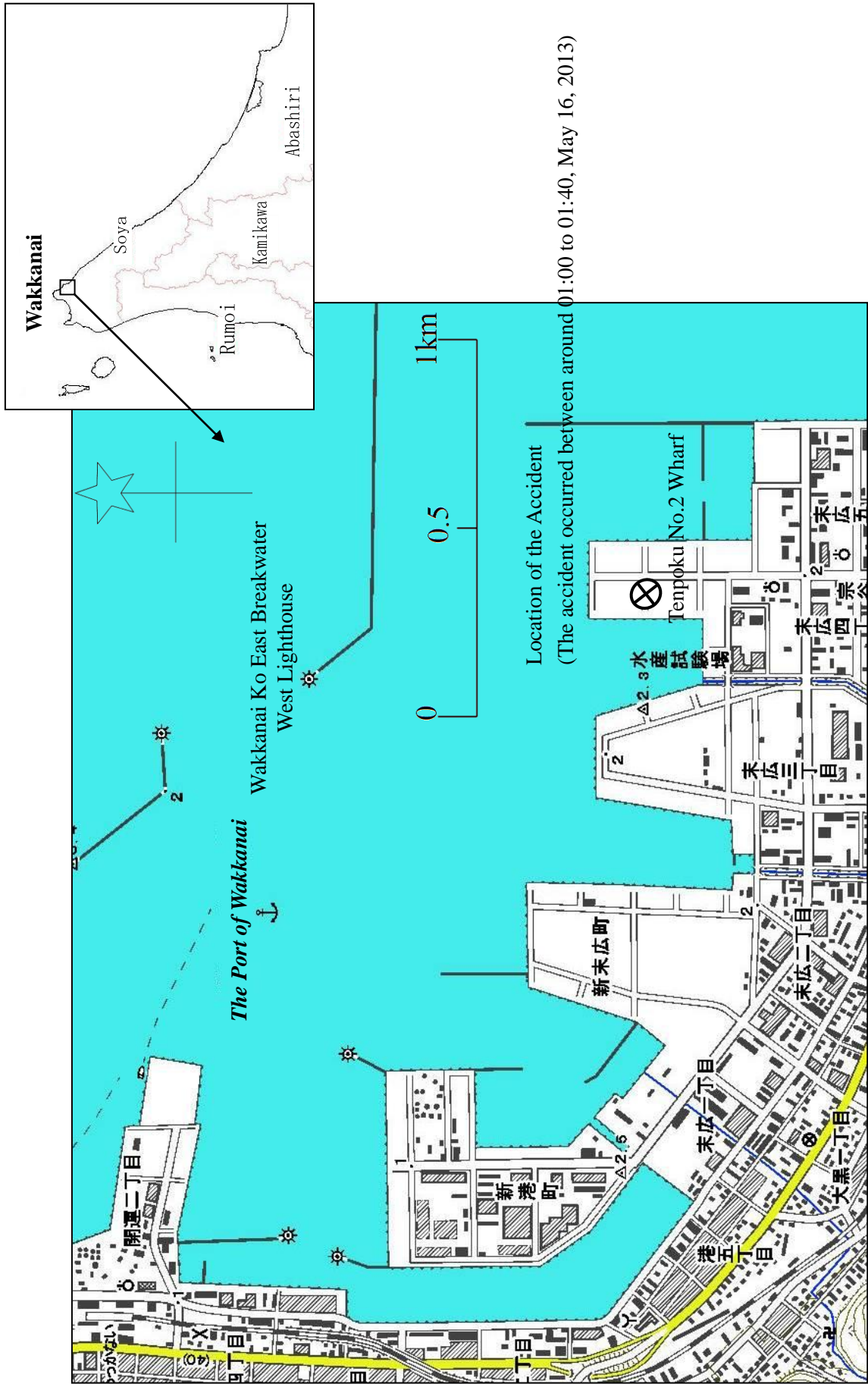
In addition, when constructed, the Vessel was installed with an escape hatch, which led to the quarter deck on the port in the steering gear room. Later, the escape hatch was welded and it was impossible to escape from the stern. It is probable that when this accident occurred, the four were late in escaping and lost an option to go out through the stairway on the fore side of the accommodation spaces.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends that the MEGANOM SHIPPING LTD. as the management company of the vessel (hereinafter referred to as "Company A") and the MEGANOM SHIPPING LTD. as the owner of the vessel (hereinafter referred to as "Company B") should take the following measures. At the same time, it is recommended that the authorities of the Kingdom of Cambodia should provide adequate instructions to the management companies and owners that are operating similar ships to the vessel.

Company A is recommended to ensure the onboard smoking policy in observed and to instruct the vessel to provide new crew members with training, just after they joined the vessel, on how to act in the event of a fire, which includes information about the escape routes and the location of fire extinguishers.

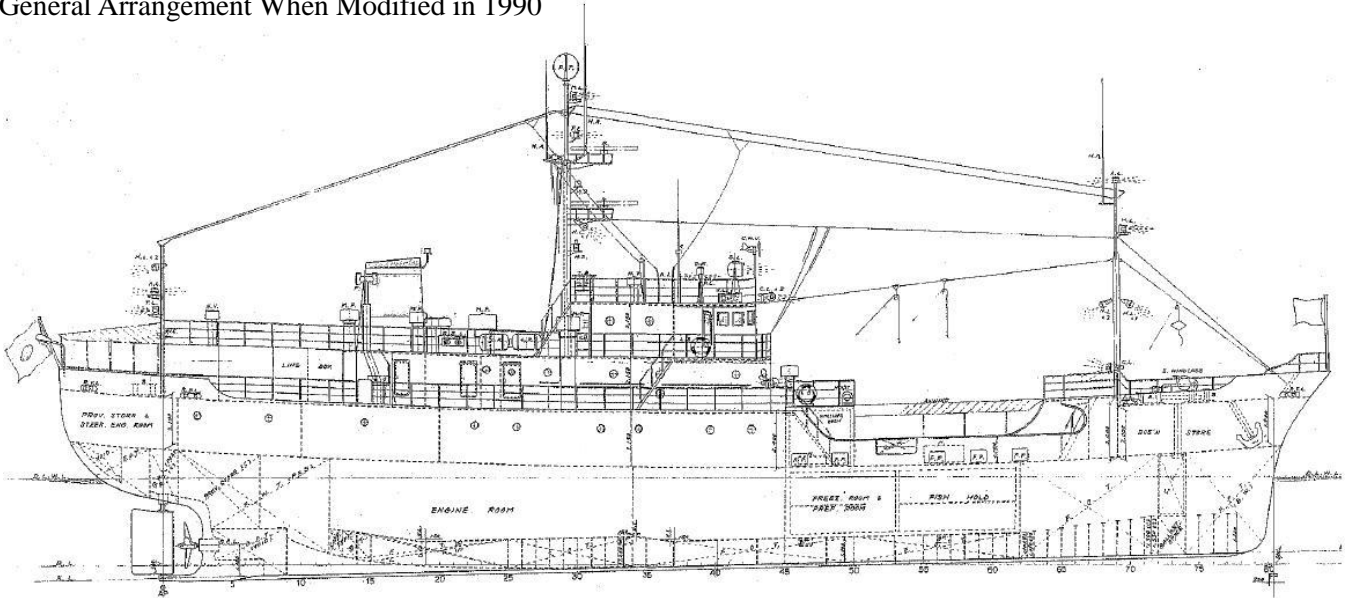
Company B is recommended to try to secure escape routes regardless where a fire breaks out, for example, by having one on the fore side and another on the aft side.

Appendix Figure 1: Map of Location of The Accident



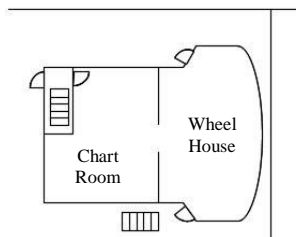
Appendix Figure 2: "General Arrangement Plans"

General Arrangement When Modified in 1990

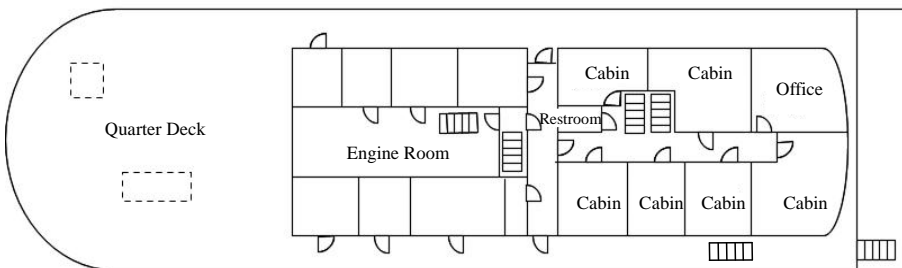


General Arrangement at Time of the Accident

Bridge Deck



Poop Deck



Upper Deck

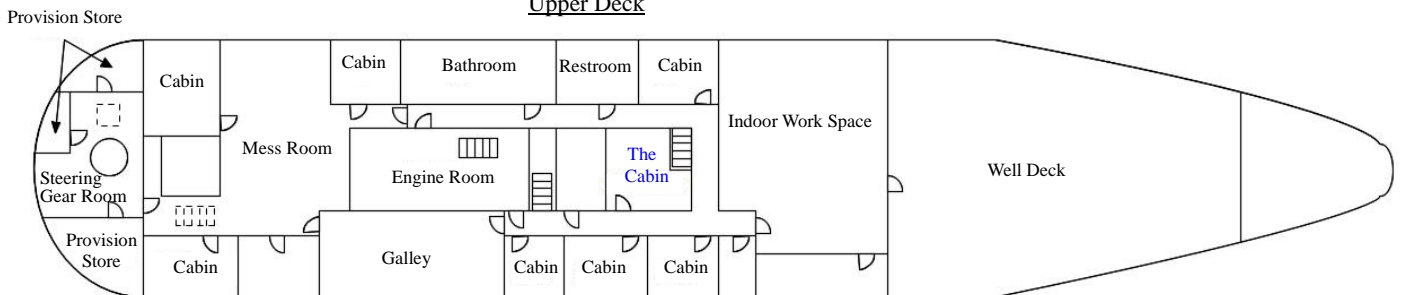


Photo 1 "Full View of the Vessel (Starboard Side)"



Photo 2 "Full View of the Vessel (Port Side)"



Photo 3 "Fore Side of Accommodation Space Outer Plate"



Photo 4 "Aft Side of Accommodation Space Outer Plate"



Photo 5 "Starboard Side of Accommodation Space Outer Plate"



Photo 6 "Port Side of Accommodation Space Outdoor Passage"



Photo 7 "Sign of EMERGENCY EXIT on Upper Deck"

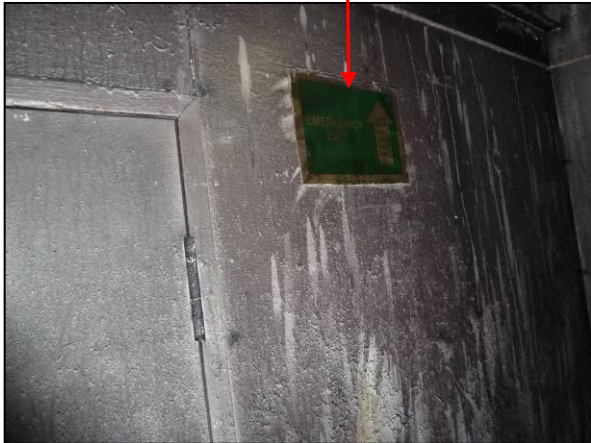


Photo 8 "Welded Escape Hatch on Upper Deck Ceiling"



Photo 9 "Welded Escape Hatch on Quarter Deck"



Photo 10 "Athwartship Corridor on Poop Deck"



Trace of Stairway Being Removed from Mess Room

Photo 11 "Indoor Work Space on Upper Deck"

