

MA2009-12

**MARINE ACCIDENT
INVESTIGATION REPORT**

December 18, 2009

Japan Transport Safety Board

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

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: Recreational fishing vessel Koyo Maru No. 7
Vessel number: 220-17774 Niigata
Gross tonnage: 3.2 tons

Accident type: Foundering
Date and time: About 0645 hours on September 21, 2008 (local time, UTC + 9 hours)
Location: Waters off the east coast of Sado-ga-Shima Island
117° true, 22.4 nautical miles from Hajiki-saki lighthouse
(approximately 38° 09.7' N 138° 55.9' E)

December 3, 2009

Adopted by the Japan Transport Safety Board

Chairman Norihiro Goto
Member Yukio Kusuki
Member Tetsuo Yokoyama
Member Tetsuya Yamamoto
Member Mina Nemoto

1 PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident

The recreational fishing vessel Koyo Maru No. 7 left the East Section of Niigata Port, Niigata City, Niigata Prefecture, on September 20, 2008, carrying ten persons on board, namely, her skipper, owner, and eight passengers. At about 0500 hours on the 21st of the same month, on her return trip to Niigata, after fishing in fishing grounds north of Sado-ga-Shima Island, Niigata Prefecture, seawater found its way into the vessel through her propeller inspection port in the aft section, and the recreational fishing vessel sank halfway between Sado-ga-Shima Island and Niigata Port, at about 0645 hours.

The skipper and two passengers drowned and two other passengers were hospitalized for pneumonia or otherwise.

1.2 Outline of the Accident Investigation

1.2.1 Appointment of Investigators

The Japan Transport Safety Board designated an investigator-in-charge and another one and took over an investigation into this accident, from Sendai Marine Accident Investigators' Office, on October 1, 2008.

1.2.2 Collection of Evidence

October 8 to 10, 2008

Interviews

November 12 to 14, 2008

On-site investigation and interviews

1.2.3 Comments from Parties Concerned

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

2 FACTUAL INFORMATION

2.1 Events Leading to the Accident

The investigators obtained information about events from the initial stage to the foundering of the vessel and to the rescue of relevant persons as outlined below, according to oral statements made by those on board the vessel. Of all the people that were on board the Koyo Maru No. 7 (hereinafter called 'Vessel A') when the accident occurred, namely, her skipper (hereinafter called 'Skipper A'); her owner (hereinafter called 'Shipowner A'), who is a recreational fishing vessel operator in the Act on recreational fishing vessel operators (hereinafter called the 'Recreational Fishing Act'), and was onboard her; and eight passengers (hereinafter called, in descending order of age from the eldest, 'Passenger A1' (male, 69 years old), 'Passenger A2' (male, 68), 'Passenger A3' (male, 67), 'Passenger A4' (male, 62), 'Passenger A5' (male, 59), 'Passenger A6' (male, 56), 'Passenger A7' (male, 48), and 'Passenger A8' (male, 46)), the investigators interviewed all except Skipper A and Passengers A1 and A7, who lost their lives in the accident.

2.1.1 Events until foundering

(1) From departure to start of a return trip after finishing recreational fishing

On September 20, 2008, Shipowner A and eight passengers (Passengers A1 to A8) gathered, together with Skipper A, at the Ajiro-hama mooring basin for small craft (hereinafter called the 'Ajiro-hama mooring basin') in the East Section of Niigata Port, Niigata City, Niigata Prefecture. Each of them brought fishing rods, batteries for fishing, a cooler boxes containing ice, boxed meals, and other things.

At around 1600 hours, they boarded Vessel A and left the port as scheduled. At around 1900 hours, they arrived in fishing grounds off Futatsu Game (hereinafter called 'waters off Futatsu Game'), the north end of Sadoga-Shima Island, and anchored, when they began fishing.

During the outward trip the sea was calm. Weak swells of less than 1 m high still remained as the after effect of Typhoon No. 13, which had skirted off the Pacific Coast of Honshu on the previous day, but there were no breaking wave crests.

There were no other vessels off Futatsu Game.

Vessel A was burning fish collecting lamps by the generator driven by the propulsion engine.

While the passengers were fishing, Skipper A rested in the wheelhouse, but Shipowner A participated in fishing. Each of them ate a boxed meal when convenient.

As it began to rain on the morning of the 21st, some put on raincoats.

Each of them caught 4 to 12 yellow tails of about 3 kg and, at 0500 hours on the 21st, they finished

fishing through the night and began to get ready to return to the port after putting away their fishing gear.

(2) From the start of the return trip to about 0600 hours on the 21st

Vessel A weighed anchor past 0500 hours to return to her home port and started to sail toward the Ajiro-hama mooring basin.

It stopped raining and the surrounding area began to lighten slightly. The freeboard (height from the sea surface to the upper deck plate) was about 15 to 20 cm.

Skipper A was maneuvering the vessel in the wheelhouse and Shipowner A was lying on the sofa in the same space. Passenger A1 was resting on the starboard bow; Passengers A3 and A6 inside the cabin; Passenger A2 on top of the engine room; and Passengers A7 and A8 on the starboard, and Passengers A4 and A5 on the port, of the aft deck.

At about 0530 hours, the cooler boxes containing fish, which had been placed near the center line of the aft deck, shifted to the port. Passengers A4 and A8 tried returning the boxes to the original location twice. However, the boxes still shifted to the port side thereafter. For this reason, the passengers left the boxes as they were displaced.

The hull listed to the port and water sprays came in from the starboard. There were times when the upper surface of the port bulwark came close to the sea level.

(3) From about 0600 hours to about 0630 hours

Skipper A instructed the passengers to shift to the starboard in order to rectify the list which was inclining to port. Passengers A4 and A5 shifted to the starboard; and Passenger A7 to the starboard, outside of the engine room.

At about 0625 hours, the vessel speed dropped. Skipper A appeared in the aft in order to see the general situation and started an inspection because of the vessel's list to the port and the further immersion of the aft part.

In order to open the hatch cover of the after end compartment and the propeller inspection port compartment, Skipper A gave instructions so that the cooler boxes which were placed on the hatch cover be removed to forward.

Passengers A4, A5, A7 and A8, who was in the aft, cooperated in shifting the five cooler boxes, heavy with fish, and they themselves shifted to the forward section. At this point in time no seawater was seen on the upper deck. After a while, the vessel speed dropped further, and the accumulation of seawater, up to about 10 cm high, was observed on the aft upper deck between the after end of the engine room and the stern (hereinafter called the 'aft upper deck').

Skipper A woke Shipowner A up and let him move to the bow.

As it was noisy on deck, Passengers A3 and A6 came out from the cabin.

(4) From about 0630 hours to foundering

At 0630 hours, Passenger A2, who was lying near the funnel on top of the engine room, felt the list of the vessel because the funnel was coming closer to him. He got up to his feet and went down to the upper deck, but he found no one in the aft.

Noticing that seawater had accumulated to an approximate depth of 20 cm on the aft upper deck and that his cooler box containing his fishing gear was floating, Passenger A2 alone began to bail water

out with a bucket. At this point in time, Vessel A was sailing at a speed of 2 to 5 knots (speed over the ground, hereinafter the same), with her propulsion engine still in operation.

Seawater accumulated further on the aft upper deck and entered the engine room through the sliding doors to it as they were left open for the purpose of releasing heat.

Passenger A2 attempted to bail out seawater, together with Skipper A, who came to the aft, using buckets. However, the amount of accumulated seawater did not decrease. While they were still engaged in the operation, Skipper A opened the hatch cover of the compartment of the propeller inspection port. He noticed that the compartment was full of seawater and that seawater was gushing out of the inspection port, with its glass cover removed.

Skipper A made an attempt to close the inspection port. They could not cope with the increase of seawater by bailing out with buckets. The aft began to immerse gradually and, when the aft upper deck fell down to the sea level, Passenger A2 escaped to the bow.

At about the time the upper deck near the wheelhouse was inundated with seawater in the process of its spread from the aft upper deck toward the bow, all of the people on board, except Skipper A, gathered on the bow. At this point in time, the main engine came to a halt and Vessel A was, in effect, drifting.

When Skipper A told, from the aft, the passengers to don lifejackets, Shipowner A and Passengers A3, A6 and A7 did so.

When the inundation on the upper deck spread to the forward of the wheelhouse, nobody reported to a search and rescue organization and Skipper A jumped into the sea from the stern, and Shipowner A and the passengers jumped from the bow, at their respective discretion.

Vessel A sank from the stern at about 0645 hours, and, the hull disappeared eventually, with cooler boxes and other things floating.

The accident in this case occurred at about 0645 hours on September 21, 2008, at an approximate position 117° (true bearing, hereinafter the same), 22.4 nautical miles from Hajiki-saki lighthouse. (Refer to Attached Fig. 1 Estimated path; Attached Fig. 2 Schematic arrangement plan of Vessel A and location of persons upon commencement of return trip; Photo 1 Vessel A before accident.)

2.1.2 Situation from foundering till rescue of persons

The persons who had been on board Vessel A, were separated, while drifting, into two groups: One group of six persons, composed of Skipper A, Shipowner A, and Passengers A2, A3, A5 and A8 (hereinafter called 'Group A'); and the other group of four persons, composed of Passengers A1, A4, A6 and A7 (hereinafter called 'Group B'). Both groups moved apart from each other to a distance of from 100 to 200 m.

(1) Group A

Connecting cooler boxes with ropes Group A drifted as a group.

While clinging to a cooler box, Shipowner A kept holding Skipper A, who had lost consciousness immediately after the foundering of the vessel, so as to keep the skipper close to him.

The two cooler boxes Passenger A2 was clinging to, tended to go away from him by waves. So he bundled them up together with another one, by fastening their handles with the cushion he wore to sit on when fishing.

Passenger A5 was holding on to the handles of two cooler boxes with both hands, his right arm put through a life buoy which had been floating nearby. In order to prevent the persons in his group from being scattered, he connected several cooler boxes with the rope of the life buoy and other things.

With his right hand, Passenger A8 was grabbing the opposite handle of the cooler box Passenger A5 was using, while keeping his left arm around a smaller cooler box. While he was drifting he found a lifejacket floating nearby and put it on.

(2) Group B

Group B, who were clinging to floating cooler boxes, did not take any measure, in particular, to keep them from going away.

Passengers A6 and A7 were drifting while giving moral support to Passenger A1, who showed signs of fatigue.

Passenger A4, who was floating with his both arms passed through the handles of two cooler boxes, was more than 10 m away from Passengers A1, A6 and A7.

About one hour before they were rescued (at about 1245 hours), Passenger A6 gradually lost his consciousness and the strength of Passenger A1 failed him and he sank into the water. Passenger A7 lost vitality and was gradually drifting away from the group as if his strength had failed him.

(3) Situation until rescue of persons (common to both groups)

While they were drifting, they noticed a bottom trawler engaged in fishing operations in the distance and heard the sound of her propulsion engine, and they shouted in loud voices or blew whistles attached to lifejackets. They did not receive any response from the fishing vessel because it was out of the reach of their voices, or whistles did not make clear sounds since they contained water inside. They also sighted a helicopter and Cessna flying above.

At about 1345 hours, nine persons were rescued by a Coast Guard patrol vessel which was engaged in search and rescue operations.

(Refer to Photo 4—Rescue Operation (1); Photo 5—Rescue Operation (2).)

2.1.3 Lifejackets and other relevant matters

(1) Lifejackets on board the vessel and the situation of wearing

Vessel A was equipped with several lifejackets in the wheelhouse and an additional few (red ones) in the cabin. Other than those, at least three passengers had brought their own private ones to the vessel.

Shipowner A and Passengers A3 and A7 put on lifejackets of the vessel before jumping into the sea, and Passenger A8 did so, after jumping into the sea. Passenger A6 donned his private one before the foundering of the vessel. Passenger A2, who was sleeping, with his private lifejacket used as a pillow, on top of the engine room, extended his hand—when the vessel started to list—but could not grasp and, hence, to put it on. Other persons were not wearing lifejackets because no lifejackets were found nearby.

(2) Other buoyant objects

1) Life buoy

Passenger A5 was using a life buoy with an internal diameter of about 20 cm, with his right arm

passed through it. He found it floating after the foundering of the vessel.

2) Cooler boxes

Shipowner A and eight passengers were clinging to cooler boxes floating after the foundering of the vessel. The number of cooler boxes the passengers had brought to the vessel was 11 and they had a capacity of 15 to 80 liters each.

(Refer to Table 1 Situation of wearing lifejackets.)

Table 1—Situation of wearing lifejackets

	Group A						Group B			
	Skipper A (Dead)	Ship-owner A	Passenger A2	Passenger A3	Passenger A5	Passenger A8	Passenger A1 (Dead)	Passenger A4 (Affected)	Passenger A6 (Affected)	Passenger A7 (Dead)
Age	64	23	68	67	59	46	69	62	56	48
Life jacket worn: Y or not :N	N	Provided Y	N	Provided Y	N	Provided Y	N	N	Private Y	Provided Y

2.1.4 Situation of fatigue while drifting

The fatigue of each person while drifting was as follows. Their mouths were partly filled with seawater because of waves.

(1) Skipper A, and Passengers A1 and A7, all of whom died

Skipper A lost consciousness immediately after the vessel sank.

Passenger A1 had been conscious till about one hour before the rescue.

Passenger A7 (wearing a lifejacket) had been still vigorous till about one hour before the rescue.

(2) Passengers A4 and A6 who suffered pneumonia or otherwise

Passenger A4 initially felt seawater warm, but, with the lapse of time, he began to feel it cold. He was conscious but had a cramp in his legs.

As time wore on, Passenger A6 (wearing a lifejacket) felt numbness and pains in the lower part of his body and, when he was rescued, he was almost unconscious.

(3) Shipowner A, and Passengers A2, A3, A5 and A8, who found themselves healthy after the accident

Shipowner A (wearing a lifejacket) felt fatigue as he was holding Skipper A in his arm.

Passenger A2 was not feeling seawater cold.

Passenger A3 (wearing a lifejacket) was not feeling seawater cold.

Passenger A5 did not feel seawater cold initially, but he gradually came to feel it cold.

Passenger A8 (wearing a lifejacket) was feeling seawater cold from the first.

2.1.5 Use of mobile telephones

The scene of the accident was outside the service area publicized by the mobile telephone company Skipper A had a contract with, but his mobile telephone was communicable because Vessel A was installed

with an antenna available on the market. Skipper A was engrossed in draining operations and did not report the accident.

In addition, Passengers A2, A3, A4 and A6, who carried mobile telephones, did not try to use them before the foundering of the vessel. They tried communicating after they jumped into the sea, but the telephones were unusable as they had become wet with seawater.

2.1.6 Experiences of recreational fishing on board Vessel A

Passengers A2 and A6 had experienced more than 30 fishing trips on board Vessel A.

Passenger A3 had experienced seven or eight trips.

Passenger A5 had experienced a few trips before, but this was his first trip in 2008.

Passenger A8 had experienced more than ten trips before the conversion of the main engine of Vessel A, but this was his first trip after the conversion.

For Passenger A4, this was his first trip.

Shipowner A began to enjoy fishing trips on board Vessel A from April 2008 and have participated in fishing together with passengers.

As they had the experience of fishing on board other vessels, Passengers A2, A4 and A6 had a feeling that the sound and vibration of the main engine of Vessel A were greater in comparison with other vessels.

Passenger A2 had a feeling, after the conversion of its main engine, that Vessel A had gained speed and that the engine sound and vibration had increased.

2.1.7 Loads on board

The total body weight of the passengers on the day of the accident was approximately 624 kg, the weight of the batteries for night fishing was about 72 kg in total, and four to twelve fished yellow tails—each weighing about 3 kg—per passenger.

2.2 Report to search and rescue organization

2.2.1 Statement of person responsible for communication

The statement made by Skipper A's family member who was the person responsible for communication (hereinafter called 'Liaison Officer A') in the Recreational Fishing Service Manual (to be described in 2.14.1 (1) 2)) for Vessel A, under the Recreational Fishing Act, are as follows:

(1) Liaison Officer A was at home, before the foundering of the vessel, and received a message by mobile telephone from Skipper A to the effect that he would be able to return to the port past 0800 hours since it would take about an additional hour.

(2) At about 0900 hours, Liaison Officer A went to the berth of the vessel to check the situation there as it was already past the estimated time of arrival. However, nothing other than Skipper A's pickup truck and passengers' cars were seen there. Vessel A was not found there.

(3) Thinking that the vessel had not returned yet, he went back home and tried to contact Skipper A through the mobile phone. He only received a recorded announcement saying that the telephone was out of the service range. As he knew that the vessel was equipped with a special antenna which enabled the

vessel to catch radio waves outside the ordinary service range, even in Sado, he wondered why. Hence, he went to the berth again, but the vessel was not seen there. He returned home.

(4) Slightly before 1000 hours, he made telephone calls to the skipper (Skipper B) of another vessel (Vessel B) which was in the business of offering recreational fishing services, and other colleagues, but could not ascertain the whereabouts of Vessel A. He tried to contact various persons as he was unable to communicate with Skipper A even after 0930 hours. However, the Coast Guard should have received the information about 1030 hours.

(5) He received a telephone call from the skipper (hereinafter called Skipper C) of another vessel (Vessel C) in the same business as Vessel A, telling him to give a telephone call to the skipper if something happened.

2.2.2 Statements by Skipper B

The statement made by Skipper B was as follows:

(1) On the day of the accident, at about 1030 hours, when Skipper B was engaged on a recreational fishing in waters close to the port, he received a telephone call from Skipper C to the effect that he could not come in touch with Vessel A.

(2) At about 1045 hours Skipper B made a report to the Japan Coast Guard at telephone number 118. He also had telephone conversations with Liaison Officer A, but he just repeated, 'It's strange,' 'It's strange.'

(3) After making the report at 118, the Japan Coast Guard made several telephone calls to Skipper B to ask the situation or whereabouts of Vessel A. As he did not know anything about the situation of Vessel A, he replied that he did not know.

2.2.3 Statement made by Skipper C

The statement made by Skipper C was as follows:

(1) On the 20th, Vessel C was scheduled to go on a fishing trip to Sado-ga-Shima Island with Vessel A, but Skipper C decided to cancel the trip on the 19th because of the approach of Typhoon No. 13.

(2) On the 20th, after the departure of Vessel A, he had several communications with Skipper A on the mobile phone in order to check the sea state, the fish catch and other relevant matters.

(3) When Skipper C attempted to contact Skipper A with mobile telephone at 0800 hours on the 21st, Skipper C received a recorded announcement to the effect that communication was not possible.

Following this, when he contacted Liaison Officer A, he told me that Vessel A had not yet returned.

Receiving the information, Skipper C suggested him to report the fact to the Japan Coast Guard and, in addition, relayed the same information to Skipper B.

(4) The Japan Coast Guard told Skipper C with telephone that they did not know the whereabouts nor the situation of Vessel A. So he let them know the position of the fishing ground near Sado-ga-Shima Island marked on the GPS of his vessel, which position he had shown to Skipper A before.

2.3 Other information obtained from Skippers B and C

2.3.1 Skipper B

According to a statement made by Skipper B, he had associated with Skipper A for a long time, and he had been engaged on recreational fishing in waters at a closer distance from the shore, without going to areas near Sado-ga-Shima Island because, although he had a certificate of competency as a first class boat's operator, he had a three-year experience of offering recreational fishing and, furthermore, his vessel was smaller than Vessel A both in length and width. On the day of the accident, when Vessel B sailed out, north east winds of 4 to 5 m/sec were blowing with waves of about 1 m high.

2.3.2 Skipper C

The following is a story obtained from statements made by Skipper C:

(1) Skipper C has an approximate 30 years' experience of providing recreational fishing and began to go out on fishing trips, three or four years ago, together with Skipper A, who had been his friend for many years. Skipper C disclosed to Skipper A the fishing ground off Sado-ga-Shima Island. Vessel C, with a length of about 22 m, is larger than Vessel A and is allowed to sail in waters off Sado-ga-Shima Island. Skipper C has a certificate of competency as a first class boat's operator.

(2) Skipper A seems to have bought a second-hand propulsion engine, for an engine conversion about two years ago, and Skipper C saw him disassemble the engine on board Vessel A.

(3) As to communications of Vessel A, the vessel was equipped with fishery radio equipment, and, in addition, for the purpose of preventing communication problems of the mobile telephone, during a voyage to Sado-ga-Shima Island, a special antenna—a device to increase sensitivity—available on the market, was purchased and fitted on top of the wheelhouse.

(4) The freeboard of Vessel A was about 20 cm. Her fuel tank had a capacity of about 500 liters, because she seemed to use up the fuel when she had returned after sailing out, at a speed of 16 to 17 knots, to waters off Sado-ga-Shima Island.

2.4 Injuries to Persons

(1) Skipper A and Passenger A7—stiffened because of hypothermia, with water in their lungs—drowned.

(2) The dead body of Passenger A1 was found on November 10, 2008. He drowned.

(3) Passengers A4 and A6 were hospitalized for one week for symptoms of pneumonia and for two days for minor symptoms of pneumonia, respectively.

2.5 Information on crew and shipowner

(1) Gender, Age, Certificate of Competency

Skipper A—male, 64 years old

Second class boat's operator with passenger service licence/personal water craft operator

Date of issue: July 10, 1989

Date of revalidation: January 28, 2008

(Valid until January 28, 2013)

Shipowner A—male, 23 years old

No certificate of competency as a small boat's operator

(2) Main sea service experience

Shipowner A and Liaison Officer A stated as follows:

1) Skipper A had employed the vessel—which had been used as a fishing vessel by the previous owner—for providing recreational fishing ever since he had purchased the vessel on January 8, 2003.

2) Skipper A was in good health condition. He did not suffer from any chronic disease other than lumbago. He did not take medication regularly. His blood pressure was normal. He rarely drank alcohol.

3) Shipowner A had been taking trips on board the vessel since April 2008 because he loved fishing rather than succeeding Skipper A, who was a family member. In day time, he helped Skipper A to repair the vessel or did jobs, if any, given through a temporary staffing agency. He was told by Skipper A, five to six years ago, that the vessel had been under his ownership (shipowner).

2.6 Vessel Information

2.6.1 Particulars of Vessel

Vessel number:	220-17774 Niigata
Port of registry:	Seiro-town, Niigata Prefecture
Shipowner:	Owned by an individual
Gross tonnage:	3.2 tons
L × B × D:	11.30 m × 2.36 m × 0.65 m
Hull material:	FRP
Engine:	One diesel engine
Output:	244 kW (at maximum continuous rating)
Propeller:	One fixed-pitch propeller
Date of launch:	October 1985
Type of service:	Recreational fishing
Navigation area:	Restricted coastal area
Capacity of persons on board:	12 passengers and one crew member, 13 persons in total
Date of survey:	April 27, 2007
Surveying body:	The Japan Craft Inspection Organization
Ship builder:	Eikoshi Shipbuilding Co. (hereinafter called "Shipbuilder A")

(Refer to Attached Fig. 2—Schematic arrangement plan of Vessel A and location of persons upon commencement of return trip; Photo 1—Vessel A before accident.)

2.6.2 Lifesaving Appliances

The vessel inspection records say as follows:

- (1) Lifejackets for small boats (solid type), 13
- (2) Life buoys, 2; hand flares, 2
- (3) Marine VHF radio equipment (channel 16)
- (4) Red bucket, bilge pump

2.6.3 Navigational equipments

According to a statement by Shipowner A, Vessel A was equipped with a radar set, fish detector, GPS plotter, and radio equipment, all of which were properly operating.

2.7 Information about Propeller Inspection Port

2.7.1 Structure of the Propeller Inspection Port of Vessel A

(1) The person in charge who worked for the ironworks (hereinafter called the “Ironworks Person in Charge”)—a company located in the same area as Shipbuilder A—which contracted the installation of the main engine of Vessel A, stated as follows:

1) In the aft section, the vessel was equipped with a propeller inspection port made of FRP, a cylinder of 30 cm in diameter, with a height of 30 cm from the bottom. Its top end was flanged to fit a window of about 30 cm in diameter.

2) To the top of the propeller inspection port, an approx. 8 mm thick, FRP cover was fixed—with a rubber packing in between—with 12 stainless bolts and nuts.

3) It was surrounded by a casing^{*1} with a height of from 26 to 36 cm from the bottom (from 20 to 30 cm below the upper deck).

(2) Passenger A2 stated as follows:

1) The propeller inspection port was cylindrical in shape, about 30 cm in diameter and about 30 cm in height.

2) The window for closure on top of the propeller inspection port was a transparent glass piece, of about 25 cm in diameter, placed inside a brass frame of about 30 cm in diameter. It was fixed at four locations with a bolt of 1 cm in diameter and a nut, each.

*1 “Casing” is an enclosure designed to contain the leak of seawater from the propeller inspection port, thereby to prevent it from spreading to the entire compartment.

3) The relevant inspection port was surrounded by a casing slightly higher than that.

(3) According to a statement made by the person in charge at the Niigata branch of the Japan Craft Inspection Organization, there was no record or data in relation to the propeller inspection port.

(Refer to Attached Fig. 2—Schematic arrangement plan of Vessel A and location of persons upon commencement of return trip; Photo 2—Vessel A upon its construction; Photo 3—Port stern of Vessel A upon its construction)

2.7.2 Opening of the Window of the Propeller Inspection Port

(1) Passenger A2 stated as follows:

1) At the material time of the accident, when Skipper A opened the hatch cover of the compartment of the propeller inspection port, the window of the propeller inspection port had been displaced and seawater was gushing out from the upper end.

Seawater was dirty and brown in color, which prevented a clear view of the same compartment. The window was not seen nearby. Skipper A went to the wheelhouse to bring back a tool to cover the propeller inspection port. However, Passenger A2 did not see how the situation developed after that, since he escaped to the forward part thereafter.

2) When he was fishing cod about 1 km northeast of Hime Saki of Sado-ga-Shima Island, with a total of six persons on board, in early May 2007, the propeller was entangled with a fishing line. The entangling line was observed from the window of the propeller inspection port.

When Skipper A opened the window of the propeller inspection port—in an attempt to remove the line—by loosening the bolts with a wrench, seawater came up, starting to flow out of the upper end of the cylinder, threatening to overflow the casing. He abandoned the attempt to remove the fishing line and closed the window. Passenger A2 had the impression, at that time, that the seawater gradually came up unlike the seawater which gushed out at the material time of the recent accident.

The window frame was dirty, stained with verdigris. Before the opening of the window, the cylinder was filled with seawater up to 5 cm from the top.

It had not been opened after departure from the port as cooler boxes and other articles had been placed in the vicinity of the compartment of the propeller inspection port.

The freeboard at that time was 25 to 30 cm. It was cloudy, with a calm sea.

(2) The Ironworks Person in Charge stated that:

When he opened the window of the propeller inspection port of Vessel A while the vessel A was at rest before 1995, then the water level was about one third from the bottom of the vessel and did not overflow the relevant inspection port.

2.7.3 Vessel Having a Cylindrical Propeller Inspection Port Similar in Structure to Vessel A

(1) The investigators inspected, at a fishing port near Shipbuilder A, a vessel (hereinafter called 'Vessel D') similar in structure to Vessel A in the aspect of having a cylindrical, propeller inspection port. The following facts were found:

1) The cylindrical, FRP propeller inspection port of Vessel D was about 30 cm high. The top end was covered with an about 0.3 cm thick, FRP lid of about 35 cm in diameter, which was fixed, on a rubber packing, with 12 stainless bolts and nuts.

2) The compartment of the propeller inspection port was about 69 cm in height, from the bottom to the upper deck, and the casing was about 15 cm high.

3) The upper deck was not made of plywood but of a new material*². The compartment of the propeller inspection port had a steering engine in it. There were gaps of an approximate thickness of a post card between the upper deck and the upper part of the bulkheads of the relevant compartment, through which gaps light came in. In addition, the forward bulkhead of the same compartment had penetration holes to lead electric cables and hydraulic pipes for the steering gear and they were not provided with measures to prevent ingress of water.

4) The main particulars of the vessel were as follows:

Vessel name: Vessel D

Shipowner: Owned by an individual

Gross tonnage: 4.8 tons

L × B × D: 11.00 m × 3.31 m × 1.19 m

Freeboard: Bow 62 cm, Midship 30 cm, Stern 45 cm

Hull material: FRP

Date of launch: November 1987

Type of service: Fishing

Shipbuilder: Shipbuilder A

(2) According to statements by the skipper of Vessel D:

1) The propeller inspection port is opened up once every year, but he has not yet experienced any escape of water through the hole into the compartment. In the event of opening the FRP cover while the vessel was at rest, the water of the relevant inspection port used to be at a level of about 17 cm from the vessel bottom and he has not experienced any overflow of water from the inspection port.

2) The vessel was equipped with a vinyl chloride pipe to guide, to the engine room, bilge water accumulated in the compartment of the propeller inspection port. However, after learning the accident of Vessel A, he blocked the pipe.

(Refer to Attached Fig. 4—Propeller inspection port of Vessel D; Photo 6—Vessel D.)

2.7.4 Vessels of a Type Similar to Vessel A

(1) When investigators investigated five vessels (hereinafter called ‘Vessel E’, ‘Vessel F’, ‘Vessel G’, ‘Vessel H’ and ‘Vessel I’ in the order of building), similar in type to Vessel A, at the fishing port which

*² ‘New material’ means synthetic wood made from hard urethane resin reinforced by a mat of glass fiber.

Vessel A used as her base port, the following facts were found:

Except Vessel E, all of them were built by Shipbuilder A.

1) Vessels F, H and I were each equipped with a propeller inspection port, the window for which was fitted directly to the bottom. Vessel F had a casing of about 32 cm in height, Vessel H about 35 cm, and Vessel I about 31 cm.

2) Vessel E had an upper deck made of plywood, with its lower part peeled off. The upper decks of the other vessels were made of a new material.

3) The five vessels of the similar type had a gap, between the upper deck and the upper part of the bulkhead, of an approximate thickness of a post card, through which light came in. In addition, the forward bulkhead of the same compartment had penetration holes to lead electrical cables, etc. to the engine room and they were not provided with measures to prevent ingress of water.

(2) According to statements by Skippers of Vessels F, G and H:

1) Flooding on board Vessel F

While returning at a speed of about 20 knots after fishing operations around the year 2001, all of the four butterfly nuts used to fix the window of the propeller inspection port fractured and the window came off, resulting in seawater gushing out. Consequently, the hatch cover of the upper deck came off. Seawater accumulated up to 20 cm on the upper deck in the aft, listing the vessel to about 20 degrees to the portside. However, the engine room was not flooded by seawater and, as a result, the vessel returned to her home port under her own power. Thereafter, the method to tighten the window of the inspection port was changed so as to use bolts and nuts. When the window was opened, while the vessel was at rest, seawater used to accumulate about 10 cm in the casing surrounding the inspection port, without overflowing the relevant casing.

2) Flooding on board Vessel G

On a return trip after finishing fishing operations, all of the four butterfly nuts used to tighten the window of the propeller inspection port fractured and the window came off, resulting in seawater gushing out. As a result, the hatch cover on the upper deck was also displaced. Even the wheelhouse was flooded, the vessel returned to her home port, from which she was at a short distance, under her own power. At a later date, the propeller inspection port was removed.

3) Flooding on board Vessel H

One of the four butterfly nuts used to fix the window of the propeller inspection port fractured and water found its way through the gap between window and inspection port. However, she returned to her home port under her own power. Thereafter, the vessel was reinforced by the addition of longitudinal members, partly because it had excessive vibration.

(Refer to Attached Table 1—Investigation result of vessels of a similar type; Photo 7—Vessel F; Photo 8—Vessel G; Photo 9—Vessel H.)

2.7.5 Similar accident cases

Among judgments delivered by the former Japan Marine Accident Inquiry Agency, six accidents of flooding through propeller inspection ports, like Vessel A, of FRP vessels engaged in fishing or in recreational fishing, have occurred since 1991.

These propeller inspection ports were of a type attached directly to the vessel bottom, 20 to 22 cm in diameter, with casings 42 to 70 cm high. They were tightened with four to eight butterfly nuts.

The flooding cases are all attributed to the window of the propeller inspection port coming off, while under way—as a result of the inspection port having been left open or for some other reason—and seawater finding its way into the vessel.

(Refer to Attached Table 2—Cases of flooding through propeller inspection ports.)

2.7.6 Structural Standards for Propeller Inspection Ports

The standards for the structure of propeller inspection ports are set forth as follows:

(1) Safety Regulations for Small Craft

With regard to propeller inspection ports, the Safety Regulations for Small Craft prescribe in Article 12 that windows or other openings attached to the shell plating must be closed watertight unless the surveying body permits otherwise.

(2) The Japan Craft Inspection Organization's detailed regulations of the inspection procedure manual

The detailed regulations specify the requirements for propeller inspection ports, in Title 1, Chapter 2, as follows:

(4) The propeller inspection port shall be structurally capable of being opened and meet all of the following requirements:

(i) The bottom window shall be structured so that its seating be capable of being easily fitted with a frame having a piece of glass set in, and, prevent bolts and nuts used to attach the glass frame to the seating, from coming off the seating and bolts, respectively.

*(ii) The thickness of the glass shall meet 10.2 (c)^{*3} (However, P in the calculation expression shall be 0.5 MPa (5 kgf/cm²)).*

(iii) The aft compartment where a bottom window is installed shall be watertight. However, if the relevant compartment is not watertight, a watertight casing surrounding the bottom window shall be put up, and, the upper end of the casing shall be 75 mm or more above the water level at the draft when the vessel is fully loaded and seawater has found its way into the relevant casing (without considering trim or heel caused by water ingress), in either event of a heel of 20 degrees or a trim of 5 degrees.

^{*3} The Japan Craft Inspection Organization's Detailed Regulations of the Inspection Procedure Manual, 10.2. (c), which specifies the thickness of glass used for the window.

(iv) The casing fitted in (iii) shall have a closing device, in its upper part, capable of maintaining it water-tight. (This may not apply if the surrounding casing comes in touch with the upper deck watertight.)

2.8 Other Information about Vessel A

(1) The fishing vessel register of the prefecture says that Vessel A was built by Shipbuilder A, located in Itoigawa-shi, Niigata Prefecture, in October 1985. It had a length of 8.7 m, a width of 2.87 m, a depth of 0.68 m, and a gross tonnage of 2.9 tons.

(2) The fishing vessel register also says that the main engine of the vessel in October 1985 was 1.272 m in length, 0.802 m in width, 0.971 m in height and weighed about 600 kg.

According to the maintenance inspection records of The Japan Craft Inspection Organization, the vessel underwent, in January 2006, a conversion of her propulsion engine to a larger one of 1.615 m in length, 0.904 m in width, and 0.979 m in height, and about 940 kg in weight; and her propeller shaft was replaced with a larger one of 60 mm in diameter.

(3) The general arrangement plan of Vessel A (hereinafter called the 'General Arrangement Plan'), prepared by Shipbuilder A, who constructed Vessel A, carries L 8.80 m, B 2.40 m, D 0.70 m on it. However, measurements taken from the same plan indicate a length overall of 10.71 m, a maximum beam of 2.80 m, and amidships depth of 0.75 m.

The maintenance and inspection records of The Japan Craft Inspection Organization show that the vessel had a length overall of 9.15 m, a width of 2.88 m, a depth of 0.89 m, and a gross tonnage of 3.2 tons.

(4) The Ironworks Person in Charge stated as follows:

1) In accordance with the request of her owner at that time, the vessel was changed to have a bulbous bow, which was not drawn on the General Arrangement Plan.

In addition, Vessel A, at the time of the accident, was extended to the aft by the length of a toilet, in comparison with the length drawn on the General Arrangement Plan. She had been additionally installed with a cabin forward of the wheelhouse and a toilet toward the aft of the engine room.

The propeller shaft of the main engine, installed by the shipowner when she was built, was about 50 mm in diameter. I heard, when he transferred the vessel to the next owner, that he did so because the vessel did not ride well due to vibrations and rolling.

2) Vessel A had a threshold of about 20 cm high at the entrance to the engine room in order to prevent the ingress of seawater from the upper deck.

3) The upper deck of Vessel A was made of water-resistant plywood about 1.2 cm thick, with its upper surface (upper deck) covered with FRP but not its underside. The upper deck and the bulkhead were connected merely with nails, not making the bulkheads watertight. With the passage of time, the gap between them grew wider as a result of the plywood having deteriorated.

4) Vessel A had two 300 liter fuel tanks. However, it was unusual to fill them up and they normally contained about 500 liters.

5) Vessels built by Shipbuilder A had greater vibrations in comparison with other vessels partly because of the smaller number of structural members in the aft. Some vessels built there were reinforced with aggregate after building.

6) Shipbuilder A closed its business in the year 2003 or 2004.

(5) Skipper C stated that Skipper A had obtained from Vessel C, and, attached to his vessel, about ten electrical ballasts, in order to use them for fish gathering lamps.

(6) Passenger A2 stated that the upper deck on both sides of the Vessel A's wheelhouse and engine room was squashy, giving the impression that the adhesive used to bind component sheets of the plywood had deteriorated, resulting in sheets separating from each other.

(7) Passenger A3 stated that: Vessel A anchored, this time, at a depth of about 70 m, using about 200 m of a synthetic fiber rope; she had a rope of 300 to 400 m in length because she had the experience of anchoring at a depth of about 150 m.

(Refer to Attached Fig. 3—General arrangement plan of Vessel A; Photo 1—Vessel A before the accident; Photo 2—Vessel A upon its construction.)

2.9 Operation of Vessel A before the Accident

Passengers A2, A3 and A6 stated, in relation to the operation of Vessel A, as follows:

(1) In September 2007, the main engine of the vessel overheated because of its cooling water pipe having clogged, and, the vessel did not go out to sea for fishing for three months thereafter.

(2) In December 2007, the vessel departed but returned to port because her engine developed trouble before reaching her destination.

(3) In a recreational fishing off Sado-ga-Shima Island from Saturday, August 30 to Sunday, August 31, participated eight persons in total, namely, Skipper A, Shipowner A, Passengers A1, A6 and A7, and three other passengers. They fished yellow tails at the same place as at the time of the accident. The weather was calmer than at the time of the accident.

(4) In a recreational fishing off Sado-ga-Shima Island from Saturday, September 6 to Sunday, September 7, 2008, participated eight persons in total, namely, Skipper A, Shipowner A, Passengers A2 and A3, and four other passengers. They fished sea breams at the same place as at the time of the accident. The weather was cloudy and the sea was calm.

Vessel A returned to the port at around 0745 hours on the 7th, but during the return trip, the main engine developed trouble with fuel injection and she had to reduce her speed.

After that, at about 0900 hours, she left the port and participants fished sea breams off the East Section of the port, but, as it began raining more heavily, she returned to the port before the planned time.

(5) Vessel A was planned to go on a recreational fishing off Sado-ga-Shima Island from Saturday, September 13 until Sunday, September 14, 2008, but she did not sail out because of a main engine problem.

2.10 Weather and sea conditions

(1) Observed weather values

Weather values observed at the Niigata Local Meteorological Observatory, located about 16 nautical miles SSE of the scene of the accident, were as follows from 0600 hours to 1400 hours on the day of the accident:

0600 hours	Cloudy; Wind direction South; wind velocity, 2.5 m/sec.; air temp., 21.1°C
0700 hours	Wind direction South; wind velocity, 2.5 m/sec.; air temp., 21.6°C
0800 hours	Wind direction South; wind velocity, 3.0 m/sec.; air temp., 22.8°C
0900 hours	Rainy; Wind direction SSW; wind velocity, 2.2 m/sec.; air temp., 22.6°C
1000 hours	Wind direction SW; wind velocity, 2.5 m/sec.; air temp., 22.3°C
1100 hours	Wind direction SW; wind velocity, 3.6 m/sec.; air temp., 21.4°C
1200 hours	Cloudy; Wind direction SW; wind velocity, 3.1 m/sec.; air temp., 21.3°C
1300 hours	Wind direction SW; wind velocity, 2.5 m/sec.; air temp., 22.6°C
1400 hours	Wind direction SSW; wind velocity, 1.9 m/sec.; air temp., 22.8°C

(2) Observed values near the site of the accident

1) Weather values observed by a Coast Guard patrol vessel from 1400 hours to 1430 hours, on September 21

Wind direction SW; wind velocity, 1 m/sec.; north swells 1 m height; good visibility

2) Surface water temperature from September 14 to 21, by the 'Quick Bulletin of Ocean Conditions' 25°C

(3) Japan Sea Data Assimilation Experiment (Fisheries Research Agency)

September 21 Sea temperature 2.5 m below the sea surface, 25°C

(4) Weather and sea conditions passengers felt on the day of the accident

Cloudy weather, mild winds and swells of about 0.5 m high

(5) Times of sunrise and sunset

The times of sunset and sunrise at Niigata were as follows, according to the Nautical Almanac issued by the Japan Coast Guard:

September 20, 2008 Sunset, 1745 hours

September 21, 2008 Sunrise, 0530 hours

2.11 Site of the Accident

The scene of the accident lies in the halfway point between Hajiki Saki of Sado-ga-Shima Island and the East Section of Niigata Port and about 8 to 10 nautical miles north of the sailing route of regular services of car ferries and jetfoils linking the West Section of Niigata Port and Ryotsu Port of Sado-ga-Shima Island.

2.12 Search and Rescue Operations

The following is information according to the 9th Regional Coast Guard Headquarters:

(1) The 9th Regional Coast Guard Headquarters obtained, at about 1046 hours, information, by a report through 118, that a vessel was overdue, and, instructed, at 1110 hours, the deployment of an aircraft and patrol vessels.

(2) A helicopter engaged in a patrol around the Noto Peninsula was instructed to deviate and began a search and rescue operation from the Ajiro-hama mooring basin toward Hajiki Saki.

At about 1230 hours, the helicopter discovered a patch of oil welling up to the sea surface in waters about 117°, about 22.4 nautical miles from Hajiki-saki lighthouse, but not a drifting survivor or Vessel A. It proceeded with its search toward the direction of Hajiki Saki.

(3) At about 1345 hours, a patrol vessel discovered and recovered nine survivors drifting near a position 121°, 24.8 nautical miles from Hajiki-saki lighthouse.

(4) Skipper A, Shipowner A and Passengers A6 and A7 were sent to a hospital by the helicopter of the Japan Coast Guard.

(5) The patrol boat recovered not only the survivors but also cooler boxes to which they clung while drifting, and other relevant things.

(6) The recovered lifejackets were Vessel A's four red ones passengers wore which were marked with production numbers of their manufacturer (hereinafter called 'Manufacturer J').

2.13 Other Relevant Matters

2.13.1 Instructions Manual, concerning the Propeller Inspection Port, by Another Manufacturer

Another manufacturer which installs vessels with propeller inspection ports, prepares and distributes instructions manuals, as a safety measure, as follows:

1. As safety precautions

1.2 Safety precautions

Operational precautions

Precautions for the use of the propeller inspection port

• *Never sail with the propeller inspection port left open. There is a danger of seawater coming in.*

Open/close the propeller inspection port only after the engine has come to a halt and the vessel is at

rest. After the finish of an inspection, ensure to close the inspection window and drain bilge water with a bilge pump, or otherwise. Check that there is no water leak before starting to sail again.

5. Handling of Equipment and Various Parts

Propeller inspection space and inspection window

There is a propeller inspection space in the middle of the aft section. In the same space, there is a propeller inspection window, which can be opened by loosening its eye bolts.

Inside the same space, a bilge pump is provided for draining sea water and its switch is inside the box on the immediate port side.

This compartment is watertight and, for extra piping work, consult, before hand, your nearest dealer or the dealer from whom you purchased the vessel.

2.13.2 Pre-departure Inspection

(1) It is prescribed that the small boat's operator must, in accordance with Article 23-36, Paragraph 5 of the Law for Ship's Officers and Small Boat's Operators, abide by the pre-departure inspection, the maintenance of a proper lookout, and the items necessary to ensure navigational safety of a small vessel, as specified by a Ministerial Ordinance (Regulations, Article 138) of the Ministry of Land, Infrastructure, Transport and Tourism. It specifies, as matters to be inspected as a pre-departure inspection, the amounts of fuel and lubricating oil, the hull, the engine, lifesaving appliances, and other facilities.

(2) In the textbook used in a training course for boat's operators (published, in September 2004, by Japan Educational Institute for Seamen), the maintenance and inspection of the hull and engine, before proceeding to sea, is described as follows:

Chapter 1 Navigation Planning

(3) Maintenance and inspection before proceeding to sea

You check to see whether there is nothing wrong with the hull, the engine and scuppers or if there is bilge water, and test the operation of the bilge pump and the navigation lights.

(3) The textbook used by National Recreational Fishing Guides Association Inc. in a training course for fishing trip guides says:

Chapter 3 For the safe operation of recreational fishing vessel service

No. 2 Safe navigation of recreational fishing vessels

Matters a small boat's operator must comply with:

5) In addition, the pre-departure inspection, maintenance of a proper lookout, and other matters, shall be complied with, in order to ensure the safety of navigation of a small boat.

Chapter 5 Conduct manual for a Chief Guide for fishing trips

No. 1 Before departure

7) Inspection of the hull and the engine

• Whether bilge water has accumulated in the vessel bottom?

No. 2 While under way/during recreational fishing

8) *Inspection of the hull and the engine*

- *Whether bilge water has accumulated in the vessel bottom?*

(4) The points to check (1) for safety and good manners and (2) before departure, both of which are found in 'For safe navigation' publicized on the Internet by the Japan Coast Guard, are as follows:

Do you inspect the hull and the engine before proceeding to sea?

Is the bottom plug securely in place?

Hasn't bilge water accumulated in the vessel bottom?

In the engine room, aren't there locations, including pipes, wet with seawater or partly covered with salt, indicating the leak of seawater?

Is there no damaged part?

2.13.3 Reports on Examination of Lifejackets

(1) The report on the examination, for type approval, of Manufacturer J's (solid type) lifejackets for small boats says:

1) Buoyancy test

From a test specimen, from which internal air layers have been removed, an iron piece is hung in freshwater. Then, the weight of the iron piece is increased gradually. When the specimen has completely immersed and yet is floating in water, the weight of the iron piece (initial buoyancy) is measured. Then, the specimen from which a 7.5 kg iron piece is hung, is left in water for 24 hours. After that, its buoyancy is measured.

The test resulted in 8.1 to 8.2 kg as its initial buoyancy; and 8.0 to 8.2 kg as its buoyancy after 24 hours.

2) Floating test

When a subject wearing a lifejacket is ordered to take intentionally a posture inclining backward in freshwater, and the angle of his posture against the vertical line is measured.

The result was 40 to 55 degrees.

(2) The requirements for the floatation of lifejackets for small vessels, specified by the Safety Regulations for Small Craft, were amended, by the Ministerial Ordinance No. 91, on July 26, 2002, of the Ministry of Land, Infrastructure, Transport and Tourism, as follows. However, concerning Vessel A, the lifejackets already provided for small vessels, upon the enforcement of the new ministerial ordinance, may be used if they conform, by an interim measure, with the former requirements (*when in water, a lifejacket shall be capable of supporting the face of the wearer above the water surface*).

The lifejacket shall be so designed to support the face of a wearer above the water surface, with the body inclined backwards from the vertical position, maintaining a safe floating attitude.

(3) The floatation requirements for lifejackets on board SOLAS vessels*⁴—Vessel A is not

*⁴ 'SOLAS vessels' mean passenger ships engaged on international voyages and cargo ships of 500 gross tonnage or more engaged on international voyages.

included—which is stipulated in the International Life-saving Appliances Code, based on the SOLAS Convention*⁵ are as follows:

It shall be so designed as to lift the mouth of an exhausted or unconscious person not less than 120 mm clear of the water, with the body inclined backwards at an angle of not less than 20 degrees from the vertical position.

2.13.4 Information regarding Hypothermia

(1) The ‘International Aeronautical and Maritime Search and Rescue Manual’, a guide adopted by the International Maritime Organization—an item contained in the equipment list, based on Article 146-3 of the Regulations for Installations of Ships—shows in its Volume 3:

1) According to the graph showing symptoms of hypothermia, the change in body temperature affects as follows:

When the body temperature falls close to 34.5°C, no useful activities can be performed.

When it falls close to 34°C, consciousness is clouded and memories are lost.

When it falls close to 33°C, shivering ceases, with the survival chance dropping to 50%.

When it falls close to 32.5°C, consciousness is lost.

2) The following are found in the ‘Guide to the survival time for persons without special protective clothing in water of various temperatures’:

In seawater of 15 to 20°C, the survival time is less than 12 hours.

In water equal to or higher than 20°C, the survival time is indefinite (depending on fatigue).

(2) The United States Coast Guard publicizes, on the Internet, data showing that, in water between 21 to 26.5°C, people may fall unconscious in 2 to 12 hours.

2.14 Registry of recreational fishing vessels

2.14.1 Vessel A

(1) Registry

1) Shipowner A, a family member of Skipper A, was a recreational fishing vessel operator (Niigata Governor No. 3191, on November 1, 2006) under the Recreational Fishing Act.

2) He submitted a ‘Manual for the provision of recreational fishing services’ (hereinafter called the ‘Recreational Fishing Service Manual’) to the Niigata Governor on February 26, 2007.

3) Skipper A received a lecture course for Chief Guides for fishing trips in July 2006 and a practical training course concerning the recreational fishing vessel businesses in October of the same year, and was appointed as person in charge (hereinafter called the Chief Guide) to ensure safety, and protection of the interests, of users of his recreational fishing vessel, on the basis of Article 12 of the Recreational

*⁵ The ‘SOLAS Convention’ means the International Convention for the Safety of Life at Sea, 1974 as amended.

Fishing Act.

4) As the liaison officer in the Recreational Fishing Manual, Liaison Officer A, a family member of Skipper A, was appointed.

(2) Recreational fishing vessel operator

For the registration as a recreational fishing vessel operator under the Recreational Fishing Act, a vessel operator is required to submit to the governor of the relevant prefecture an application form together with other necessary documents. On this occasion, it is required, in Paragraph 3, Article 4, of the Regulations for the Enforcement of the Recreational Fishing Act, to submit a copy of the Chief Guide's certificate of competency as a small boat's operator. In addition, in relation to insurance to compensate for injuries, including deaths, of users of recreational fishing vessels, if the vessel operator does not take out an insurance policy that covers no less than 30 million yen per person and for up to the maximum allowable number of passengers on board, his application for registration as such will be rejected.

The situation of Vessel A, for which Skipper A was the Chief Guide, was as follows:

1) Skipper A's certificate of competency as a small boat's operator was as described in 2.5 (1). A person in charge, the Niigata Prefectural Government, orally stated that, in almost all the cases of recreational fishing vessel operators in Niigata Prefecture, the Chief Guide, who holds a certificate of competency as a small boat's operator, operated his fishing vessel as a skipper.

2) When Skipper A registered himself as a recreational fishing vessel operator, he was insured by a pleasure-craft multi-section insurance policy for a period of one year (from October 24, 2006 to October 23, 2007) against liability up to 30 million yen per person.

However, he did not renew the insurance policy against liability when it expired.

(3) Chief Guide

Liaison Officer A orally stated that: Skipper A, also a Chief Guide, was a type of person who would make every decision by himself, and, documents related to the vessel were retained not in his house but on board the vessel. Skipper A also recorded, by himself, fishing spots and passenger names on a wall-hung calendar in his house.

On the October calendar was entered his schedule of going on a recreational fishing to waters off Sado-ga-Shima Island each on Saturday 4th and Saturday 11th.

(4) Liaison officer

Liaison Officer A orally stated that: He rarely had the experience of boarding the vessel, except for the purpose of delivering meal boxes, and had entered the wheelhouse two or three times only.

(5) Business closure

The Niigata Prefectural Government received, from Shipowner A, a notice of closure of business as a recreational fishing vessel operator, on September 29, 2008, and removed him as such from the

register on October 2.

2.14.2 Response by Niigata Prefectural Government

The person in charge, Niigata Prefectural Government, orally stated:

(1) The Niigata Prefectural Government provides the Chief Guides of about 300 recreational fishing vessel operators, with a training course for the purpose of issuing certificates of completion of training as Chief Guide, valid for five years.

(2) He did not know the fact that Vessel A constantly took fishing passengers to fishing spots off Sado-ga-Shima Island, which was not included in the Recreational Fishing Service Manual of the business concern. The period of the majority of the liability insurance policies was one year, but they did not check the renewal of such policies.

2.14.3 Other Relevant Information

The Recreational Fishing Service Manual of Vessel A contained the following passages:

(1) *Article 5 Fishing passengers will be guided to such fishing grounds, and allowed to catch such principal marine fauna and flora, as specified in Attached Table 2.*

Attached Table specified waters off Aga, off the East Port, off Iwafune, and off Awa Shima Island.

(2) *Article 9, Paragraph 2 The recreational fishing vessel operator will provide education in the contents of this manual and actively attend training courses, if any, other than those for Chief Guides, held by the prefectural government, etc. so that he, himself, and other employees may be able to properly perform their duties.*

(3) *Article 14 The skipper will sail safely by complying with safety-related maritime laws, including the Ship Safety Act, Act on Port Regulations, Law for Ship's Officers and Small Boat's operators, Maritime Traffic Safety Act, and Act relating to the Prevention of Collisions at Sea, and take sufficient care to ensure safety of passengers on board while under way.*

(4) *Article 15 In the event of a marine accident or other unusual situation, we will take action, adhering to the following principles:*

1) We will endeavor to ensure the safety of life in precedence over other things.

2) We will take action with the worst scenario in mind, without taking an optimistic view of the situation.

2 If a marine accident has occurred or is threatening to occur, the skipper will take thoroughgoing measures to ensure the safety of life, measures to prevent the accident becoming more serious, and measures to remove passengers' concerns.

3 In the event of a marine accident, the skipper and the Chief Guide will take the necessary measures enumerated in the previous paragraph, and, then, make a prompt report to the search and rescue

organization or other relevant bodies by means of communication specified in Attached Table 10. After that, we will report the situation of the accident to the liaison officer.

Attached Table 10 specifies the following organizations as the recipients of the report by means of 27M-1W radio and mobile telephone:

Coast guard station 118

Police station 110

Emergency medical agency 119

4 Upon learning the occurrence of a marine accident, the liaison officer will promptly communicate the fact to the passengers' homes and, if the situation demands medical care, take necessary measures such as the arrangement of an ambulance car or communication to medical agencies.

3 ANALYSIS

3.1 Crew, Passengers and the Vessel

(1) Analysis of crew and others

1) Skipper A

From 2.1.1 (1) and 2.5, Skipper A did not hold a legal and valid certificate of competency as a small boat's operator to sail over to Sado-ga-Shima Island. It is considered probable that he was physically fit after a sufficient rest. However, it could not be determined why he lost consciousness immediately after the foundering of the vessel.

2) Shipowner A

From 2.1.1 (1) and 2.5, Shipowner A did not hold a certificate of competency as a small boat's operator. It is considered probable that he was lying on a sofa and taking a rest because of fatigue after he had enjoyed fishing throughout a weekend night, though he had had a night meal.

3) Passengers

From 2.1.1 (1), it is considered probable that the eight passengers were lying on deck, or otherwise, and taking a rest because of fatigue after they had enjoyed fishing throughout a weekend night, though each of them had had a night meal.

(2) Analysis of the vessel

From 2.8, it is considered probable that the vessel gained additional weight in comparison with when she was built because she underwent a conversion of the main engine, installed a cabin and a toilet, and extended the aft section.

3.2 Freeboard when the Accident Occurred

It is considered probable, from the general arrangement plan of Vessel A, that her freeboard and other

relevant matters were as follows:

3.2.1 Values, upon her Building, Obtained from the General Arrangement Plan

(1) Freeboard

The freeboard at the bow was about 62 cm and that at the stern was about 47 cm; the freeboard in the vicinity of the propeller inspection port was about 38 cm.

(2) Height from the vessel bottom to the upper deck in the vicinity of the propeller inspection port

The height, near the propeller inspection port, from vessel bottom to upper deck, was about 56 cm.

(3) Tons per centimeter immersion

The water plane area was about 19.95 (m²). The value of tons per centimeter immersion*⁶ at the design draft*⁷, if calculated, was—on the assumption of the density of seawater being 1.025 (g/cm³)—about 0.204 (tons/cm).

3.2.2 Freeboard Affected by Weight Increase after Building

From 3.2.1 (1) and a change in weight of Vessel A after her building, as described below, her freeboard reduced about 13 cm. As a result, it is considered probable that the forward freeboard at the time of the accident was about 49 cm and that the aft one about 34 cm, with the one near the propeller inspection port being about 25 cm.

(1) By additional installations

1) By the conversion of the main engine

From 2.8 (2), 2.8 (4) 1 and 3.2.1 (3), a weight increase of about 340 kg, caused by the conversion of the propulsion engine, plus that of about 60 kg brought about by the conversion of the propeller shaft and the propeller itself, brings about an approximate weight increase of 400 kg in total, contributing to a freeboard reduction of about 2 cm.

2) By additional installations

The additional weight of about 800 kg, resulting from the installation of the following facilities after her building—as evidenced by 2.6.3, 2.8 (3) through (7); Attached Figs. 2 and 3; and Photo 1—contributed to a reduction of about 4 cm in freeboard.

Cabin, toilet, extension of the aft section (calculated on the basis of a plywood thickness of 12 mm with a density of 0.6 g/cm³) About 300 kg

Equipment (navigational equipments, electrical ballasts, masts, fish gathering lamps, etc.) About 300 kg

Miscellaneous things (sofa, ropes and other equipment) About 200 kg

(2) At the material time of the accident

1) By fuel oil

*⁶ 'Tons per centimeter immersion' means the number of additional weight required to immerse a vessel 1 additional centimeter of draft.

*⁷ 'Design draft' means a planned draft shown on a general arrangement plan.

From 2.3.2 (4), 2.8 (4) 4 and 3.2.1 (3), the fuel oil retained on board before proceeding to sea was about 500 liters at a maximum. Since the propulsion engine stopped almost in the middle of her return trip, it is considered probable that the maximum amount of fuel remaining on board at the material time was about 125 liters. If it is the case, the weight of the fuel oil, if calculated on the basis of the density of gas oil being no more than 0.86 g/cm^3 , was about 108 kg, resulting in a reduction of about 1 cm in freeboard.

2) By loaded weights

From 2.1.7 and 3.2.1 (3), the total weight of passengers, their baggage and fish catch, was 1,256 kg, which reduced the freeboard by about 6 cm.

a. Persons on board

If we assume 2 kg as clothing worn by each person, in addition to the total body weight of those on board (about 624 kg), we reach a weight of about 644 kg.

b. Baggage

The total weight of batteries for night fishing (about 72 kg), plus the fishing tackles of each person, which we assumed to have been about 10 kg, results in about 162 kg.

c. Fish catch

If we assume the weight of the cooler boxes containing ice and the fish caught by the nine persons (eight passengers and Shipowner A), was about 50 kg/unit, the total weight would have been about 450 kg.

3.2.3 Freeboard of Vessel A Obtained by Oral Statements

The situation of the freeboard varied from 15 to 46 cm according to oral statements and it is considered difficult to identify it.

(1) From 2.1.1 (2), the freeboard at the material time of the accident was 15 to 20 cm.

(2) From 2.3.2 (4), the freeboard was about 20 cm.

(3) From 2.7.2 (1) 2), the freeboard when at rest early in May 2007 was 25 to 30 cm.

(4) From 2.7.2 (2), the freeboard was about 46 cm, which was obtained by using the general arrangement plan, on the basis of the fact that the water level was about one third from the vessel bottom when the propeller inspection port was opened while at rest before 1995.

3.3 Analysis of How the Vessel Foundered

From 2.1.1 (2) through (4), it is considered probable that Vessel A foundered through the following process: The propeller inspection window came off, which allowed the ingress of seawater through the propeller inspection port; the seawater overflowed the surrounding casing and filled up the compartment of

the propeller inspection port; the accumulated seawater on the aft upper deck entered the adjoining compartments forward and aft, resulting in the vessel losing her buoyancy; and the hull came down below the sea surface and finally the vessel sank.

3.3.1 Propeller inspection port

From 2.7.1 and 2.7.3, it is considered probable that the propeller inspection port was in the following situation:

(1) The propeller inspection port was a cylindrical FRP product with a diameter of about 30 cm and a height of about 30 cm from the vessel bottom. It was an inspection port identical to the one on board Vessel D in 2.7.3.

(2) The height of the casing of the propeller inspection port was considered to be in a range of height from 26 to 36 cm, on the basis of an oral statement that its height from the vessel bottom was 26 to 36 cm and of another statement that it was slightly higher than the upper end of the propeller inspection port; and it was decided to be about 31 cm as their mean value.

(3) The window for the propeller inspection port was replaced with a glass plate in a brass frame, which was fixed with four bolts and nuts.

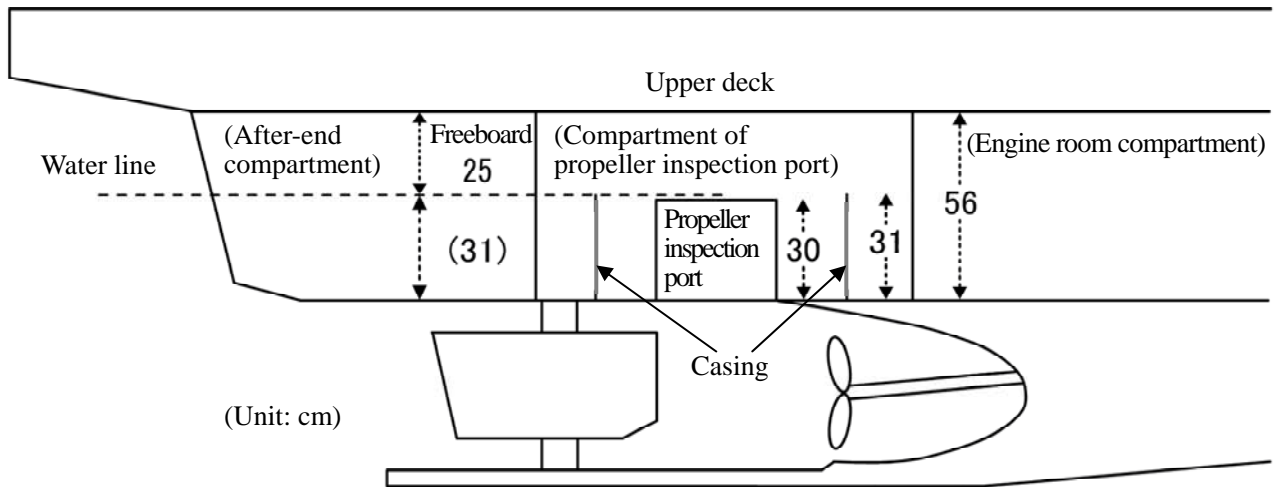
3.3.2 Displacement of the Window of the Propeller Inspection Port

From 2.1.1 (4), 2.1.6, 2.7.4 (2), 2.7.5 and 2.8 (4) 5), it is considered somewhat likely that the said window came off as a result of fractures of the bolts used to fix the window, or otherwise, owing to vibrations or for other reasons.

3.3.3 Ingress of water from the Propeller Inspection Port and from the Inside of its Casing

From 2.7.2 (1), 2.7.4 (2), 2.7.5, 2.7.6, 3.2.2 and 3.3.1, the freeboard near the propeller inspection port was about 25 cm, and the water line (about 31 cm) was about 1 cm above the upper end of the propeller inspection port (about 30 cm), therefore, it is considered probable that seawater gushed out of the inspection port.

In addition, although the upper end (about 31 cm) of the casing surrounding the propeller inspection port was of the same level as the water line, it is considered probable that the seawater entered, from the same casing, and filled up the compartment of the propeller inspection port, as a result of vessel oscillation caused by Vessel A's movement through the water and waves, and water pressure caused by propeller revolutions. The vessel passed a renewal survey in April 2007, which means that the vessel is considered to have probably met the requirements at that point in time. However, it could not be determined if the vessel satisfied the structural standards of the propeller inspection port, as specified in 2.7.6, at the material time of the accident.



Arrangement around the propeller inspection port compartment

3.3.4 Entry of Seawater into Adjoining Compartments from that of Propeller Inspection Port

From 2.7.3 to 2.7.5, 2.8 (4) and 2.8 (6), it is considered probable that seawater entered onto the aft upper deck, to the after-end compartment and the engine compartment, through the gap between upper deck and hatch cover, the gaps between the upper deck and the upper parts of bulkheads, and the penetration holes for electrical cables (hereinafter called the 'gaps of bulkheads, etc.').

3.3.5 Summary of Analysis from the Displacement of the Window of the Propeller Inspection Port to the Foundering of the Vessel

From 2.1.1, 2.6.2 (4), 3.2.1 (3), 3.2.2 and 3.3.2 through 3.3.4, it is considered probable that the relevant events followed the process described below. The window of the propeller inspection port came off, and seawater entered through the port, inundating its casing, then, overflowing into the compartment of the same inspection port, and finally onto the aft upper deck, after-end compartment, and the engine-room compartment. As a result, Vessel A lost buoyancy, and sank.

(1) Past 0500 hours, the vessel started a return trip. At about 0530 hours, she gradually began to list to port by waves from the south, making the cooler boxes shift. During this period, the window of the propeller inspection port came off and seawater entered, of which fact no one was aware.

(2) At about 0625 hours, Skipper A took notice of the vessel's port list and slowed down her speed in order to make a check. He recognized the ingress of seawater onto the aft upper deck.

(3) At this point in time, the compartment of the propeller inspection port was full of water. The weight of seawater inside that compartment, is calculated to have been about 2.28 tons, which means a level immersion of the hull of about 11 cm.

(4) Seawater entered onto the aft upper deck through the gaps of bulkheads, etc. and already accumulated

to a depth of about 20 cm. The weight of the accumulating water at this time is calculated to have been about 1.95 tons, further immersing the hull by about 10 cm. People there initially responded to the situation by removing seawater with buckets but the attempt was not successful as the amount of the accumulated water was excessive and the rate of the additional water coming out of the propeller inspection port was overwhelming.

(5) Seawater found its way from the compartment of the propeller inspection port into its adjoining compartments through the gaps of bulkheads, etc. filling up the after-end compartment. The weight of seawater inside the after-end compartment at this moment, is calculated to have been about 1.56 tons, which means a level immersion of the hull of about 8 cm.

(6) The ingress of seawater continued through the entrances to the engine room, sliding doors of which were left open, and through gaps of bulkheads, etc., resulting in the main engine coming to a halt. The engine room compartment, which became almost full, is calculated to have contained seawater weighing about 1.75 tons. This means a level immersion of the hull of about 9 cm.

(7) The sum total of (3) through (6) above, results in an immersion of about 38 cm, exceeding the aft freeboard of about 34 cm.

(8) At this moment, the forward freeboard was about 11 cm. However, the inundating seawater on the upper deck reached the vicinity of the wheelhouse, and, the seawater, if assumed to have accumulated to an approximate depth of 20 cm, is calculated to have weighed about 1.11 tons. If we suppose the tons per centimeter immersion at this point in time being half the value for the design draft, we obtain a figure of about 0.102 (tons/cm). The accumulating water on the upper deck weighed to bring down the hull about 11 cm, eliminating the freeboard fore and aft, which means a loss of buoyancy.

(9) At about 0645 hours, Vessel A sank below the sea surface, from her stern. Although the vessel was equipped with a bilge pump, it could not be determined whether it was used to drain the accumulated seawater or not.

3.4 Course, speed and time and place of sinking

From 2.1.1 and 2.12 (2), the following are considered probable:

(1) The course of the vessel was about 118° from the bearing of a line drawn from waters off Futatsu Game to the Ajiro-hama mooring basin.

(2) Her sailing speed was about 16 knots, from the period from past 0500 hours when the vessel left off Futatsu Game till 0630 hours when the vessel became adrift, and the distance of about 23.8 nautical miles from off Futatsu Game to the location where oil came welling up.

(3) The time when the vessel sank was about 0645 hours.

(4) The location where the vessel sank was in the vicinity of a point 117°, 22.4 nautical miles from

Hajiki-saki lighthouse, on the basis of the oil-welling location.

3.5 Weather and sea conditions

From 2.10, it is considered probable that: it was a rather calm day, changing from cloudy to rainy and to cloudy in weather, with northerly winds blowing at a speed of 1.9 to 3.6 m/sec. and about 1 m swells to the north; the visibility was good, with the air temperature from 21.1 to 22.8°C, and sea temperature of about 25°C.

3.6 Pre-departure Inspection

From 2.1.1 (1), 2.7.2 (1), 2.9 and 2.13.2, it is probable that Vessel A did not conduct a sufficient inspection, as described below, of bottom bilge water, the propeller inspection port and other relevant parts before departure from the port.

(1) The compartment of the propeller inspection port was dirty and the brass frame of the window was partly stained with verdigris, indicating a lack of daily maintenance.

(2) Cooler boxes and other articles were placed near the compartment of the propeller inspection port before the vessel departure from port, preventing the opening of the hatch cover of the compartment.

(3) The main engine experienced a malfunction immediately before the accident, preventing her departure from port. As indicated by such an event, the skipper's attention was directed to the repair of the engine.

It is considered probable that, as part of an inspection before departure, the skipper should have opened the hatch cover to check for the presence of bilge water in the compartment of the propeller inspection port, and to inspect the condition of the inspection port itself.

3.7 Analysis of Survival Factors

3.7.1 Drifting

From 2.1.2 through 2.1.4, it is considered probable that, while drifting, both Groups A and B were fatigued by the effect of the seawater temperature and drinking of seawater. They parted in two groups and, in Group A, all but Skipper A, who had lost consciousness immediately after the vessel sank, were rescued alive. On the other hand, in Group B, two persons died and another one was rescued with consciousness clouded.

Concerning this matter, it is considered somewhat likely that: The following factors reduced the loss of the physical strength and the mental burden of Group A. On the other hand, Group B did not fasten cooler boxes with ropes—so that the group members might not part from each other—resulting in their separation more than 10 m apart, which contributed to the loss of their physical strength and to the increase of their mental burden.

(1) Group A were able to hold onto cooler boxes in a rather stable manner, without losing excessive physical strength. They connected cooler boxes with rope and this fact helped prevent the boxes from rolling or being separated apart, because of waves.

(2) None of Group A was separated from each other, which fact helped set their mind at rest and gave them moral support.

From the above, it was desirable, at an early stage after the foundering of the vessel, for the survivors to take measures to cluster together and not to be separated from each other.

3.7.2 Effects of Seawater Temperature and Drifting Time

From 2.1.1 (4), 2.1.2, 2.1.4, 2.10 and 2.13.4, the drifting period was about 7 hours, air temperature 21.1°C to 22.8°C, and seawater temperature about 25°C. As a consequence, it is considered somewhat likely that all of the survivors were close to unconscious.

3.7.3 Effect of Delay in Reporting the Accident

From 2.1.1 (4), 2.1.5, 2.2, 2.12 and 2.14.3, it is considered probable that the delay in reporting the accident led to the delay in discovery of the survivors. It is considered necessary to study a system to detect an unusual situation at an early stage by, e.g., establishing an arrangement to have contact from the shore side of a recreational fishing vessel operator at regular intervals.

(1) At some point in time between past 0500 hours when Skipper A finished fishing and began a return trip and about 0625 hours when he noticed water ingress, he reported to Liaison Officer A to the effect that he could return to port past 0800 hours. After that, however, he was so absorbed in preventing further water ingress that he did not report in order to seek assistance. In addition, other persons on board the vessel did not think of reporting the matter, either.

(2) Liaison Officer A took notice, at about 0900 hours, that it was impossible to make contact with Vessel A, but he did not report the fact to the search and rescue organization. As a result, there was a delay till about 1046 hours for the Coast Guard to obtain information about the vessel, which was overdue. However, the Recreational Fishing Service Manual does not specify that the liaison officer should, as his duty, to actively report to a search and rescue organization when he cannot communicate with the vessel. He was also accustomed to the manner in which Skipper A used to make decisions about anything by himself, and, therefore, he could not initiate his action at his own discretion even in the unusual situation where he had received no further report from Skipper A. These factors contributed to the delay in reporting the accident.

(3) When a Coast Guard helicopter was conducting a search, without information from the recreational fishing vessel operator, on a line connecting Hajiki Saki and the Ajiro-hama mooring basin, it discovered oil coming up to the sea surface at about 1230 hours. The spot where those who were drifting were discovered later was, because of the effect of tidal and sea currents, at an approximate position 152°, 2.8 nautical miles away from the location where oil was seen coming up, and the helicopter was unable to find them this time. Accordingly, it ended up continuing the search toward the direction of Hajiki Saki.

3.7.4 Use of Radio Equipment

From 2.1.1 (4), 2.1.5, 2.2.1 (3), 2.3.2 (3), 2.6.2 (3) and 2.6.3, it is considered probable that the radio equipment was not put to use as follows. Reporting to the relevant organization at an early stage before

foundering, could have led to an earlier rescue.

(1) Marine VHF

No communication was made to vessels sailing nearby or the Coast Guard via Channel 16 of the international VHF radio installed on board the vessel.A

(2) Radio equipment for communicating on radio waves assigned to the fisheries industry

No report was made to fishing vessels sailing nearby or a fishery radio station via the fishery radio equipment installed on board Vessel A.

(3) Skipper A's mobile telephone

Although the antenna had been extended on top of the wheelhouse (which enabled telephone communication over almost all fishing areas of the vessel), no report was made to the Coast Guard.

3.7.5 Use of Lifesaving Appliances

(1) Hand flares

From 2.6.2 (2), if the hand flares had been taken out before foundering of the vessel and used when a vessel or airplane, if any, was found approaching, those on board the vessel could have been discovered before sinking.

(2) EPIRB

Vessel A was not required, by the Safety Regulations for Small Craft, to install an EPIRB*⁸ on board. However, if she had been equipped with it, its radio signal could have been received at about 0645 hours when she sank since the EPIRB is designed to automatically send signals to the Coast Guard upon vessel sinking.

On the day of the accident, the Coast Guard received the information of the vessel having been overdue, at about 1046 hours. This means that the drifting time could have been reduced by about 4 hours if she had been equipped with an EPIRB.

3.7.6 Donning of Lifejackets

From 2.1.3 (1), 2.1.4, 2.6.2 (1), 2.12 (6), 2.13.3 and 3.7.2, we have concluded as follows:

(1) It is considered probable that lifejackets, if worn, prevented those wearing them from sinking and alleviated fatigue while they were drifting.

(2) Concerning Passenger A7, who drowned, with a lifejacket on—although he was initially vigorous—we are left with the following possibilities. However, it could not be determined whether he had donned the lifejacket properly or not.

- 1) He was immersed up to the neck and was forced to drink seawater;
- 2) He lost consciousness; and

*⁸ 'EPIRB(Emergency Position-Indicating Radio Beacon)' is a piece of equipment designed to automatically transmit distress signals, together with vessel information, toward a satellite in orbit around the earth, when it senses a certain water pressure.

3) He lost consciousness and his head bent down, making his mouth immersed below the sea surface, and, as a result, he was suffocated.

(3) As for those who wear lifejackets for small vessels, when they are drifting, we consider it necessary to rescue them before they lose consciousness.

3.8 Analysis of Recreational Fishing Vessel Service Businesses

3.8.1 Action of Recreational Fishing Vessel Operator

From 2.5 (2), 2.14.1 (2), 2.14.3, the safety awareness of the recreational fishing vessel operator of Vessel A is considered to have been weak as follows. We consider it necessary to raise safety awareness, with special emphasis on human life from the view point that the recreational fishing vessel service is a business conducted with fishing passengers on board.

(1) Lack of awareness

On board Vessel A, Skipper A, who was the Chief Guide, managed all things of his business, partly because it was a family business; on the other hand, Shipowner A, who was a recreational fishing vessel operator, was not deeply involved in the business, relying on Skipper A. He did not provide education for employees and was lacking a respect for human life and a law abiding spirit.

(2) Non compliance with recreational fishing service manual

He had not provided proper education as specified in the service manual.

(3) No participation in liability insurance

Despite the fact that he had accommodated fishing passengers on board, he did not participate in liability insurance—though it was a requirement for registration—after the expiration of the initial insured period.

3.8.2 Action by Chief Guide for Fishing Trips (Skipper A)

From 2.1.1, 2.5, 2.7.2 (1), 2.14.1 (2), 2.14.1 (3) and 2.14.3, the compliance of the Chief Guide of Vessel A (Skipper A) with legal aspects is considered to be as follows. In such a situation, it is considered necessary to provide guidance in legal compliance in the aspects of vessel operation and business management, for the Chief Guide for fishing trips (Skipper A).

(1) Irregularity in terms of the navigation area on the basis of the certificate of competency as vessel operator

Waters off Futatsu Game, to which passengers were guided, are inside the navigation area of the vessel as evidenced by the ship inspection certificate, but outside the area of the certificate of competency as a small boat's operator (navigation area within 5 nautical miles from the shore line) held by Skipper A, who was a Chief Guide.

(2) Noncompliance with the recreational fishing service manual

1) The recreational fishing service manual did not include Futatsu Game in the firm's destinations for fishing trips, precluding a voyage carrying passengers to the area.

2) The necessary pre-departure inspections were not conducted.

3) In the event of an unusual situation, such as a marine accident, it is required to take action giving top priority to human life, and not taking an optimistic view of the situation, with the worst scenario always in mind. However, the skipper did not distribute lifejackets nor take out hand flares from the storage place.

4) When the vessel was inundated, the Chief Guide (Skipper A) did not report the fact to the search and rescue organization or communicate to Liaison Officer A.

3.8.3 Action by Liaison Officer

From 2.2, 2.14.1 (4) and 2.14.3, the response action by Liaison Officer A is considered to have been as follows:

Even when Vessel A was excessively overdue, Liaison Officer A did not report the fact to the search and rescue organization, or take other measures considered necessary by common sense.

When no communication had been received from the Chief Guide (Skipper A), Liaison Officer A, who relied too much on the Chief Guide in business matters, was not able to take action, in spite of the occurrence of an accident, with the worst scenario always in mind, as stated in the recreational fishing service manual.

3.8.4 Examination of Guidance and Supervision

From 2.14.2, it is found that the Niigata Prefectural Government provided chief fishing trip guides with a training course for license renewal once every five years. However, given the fact that vessels, like Vessel A, held fishing trips to waters not included in their fishing trip service manual, it is considered necessary to ascertain fishing trip service manuals and to strengthen their guidance to have their manuals complied with, by recreational fishing vessel operators.

4 CONCLUSIONS

4.1 Findings

(1) When Vessel A was on a return trip to Niigata Port at an approximate speed of 16 knots, it is considered to have occurred the following: The window for the propeller inspection port came off as a result of fractures of its tightening bolts or otherwise, and seawater found its way through it; its casing filled up and overflowed; and, because of the vessel motion and the water pressure of the propeller, seawater in the casing overflowed into, and filled up, the compartment of the propeller inspection port.

(2) It is considered probable that, after that, seawater found its way, through the gaps of bulkheads, etc., onto the aft upper deck, and into the after-end compartment and the engine compartment, further immersing the aft part of the vessel; in addition, the seawater which had accumulated up to about 20 cm on the aft upper deck entered the engine compartment through the sliding doors at the entrances to it, which had been left open, almost filling up the same compartment, thereby sinking the bow and stern down below the sea surface; in this way, the vessel lost her buoyancy and sank.

(3) Vessel A, which was initially built as a fishing vessel, came to serve later as a boat to offer recreational fishing, converting the engine to a larger one, installing a cabin and an additional toilet, all of which are considered to have served to increase her weight and, accordingly, to reduce her freeboard. It is considered probable that this fact has played a part in seawater having continued to overflow the casing of the propeller inspection port when the window fell off the same port.

(4) It is considered somewhat likely that the tightening bolts of the window for the propeller inspection port have fractured because of the vibration of the engine.

(5) It is considered somewhat likely that if the inside of the compartment of the propeller inspection port had been included as an item in the pre-departure inspection, the unusual condition of the tightening bolts could have come to the attention of the inspector, prompting measures such as their replacement, and, therefore, prevented this accident.

(6) It is considered probable that the delay in reporting to the search and rescue organization has led to an extended time of drifting of those who had been on board the vessel, resulting in three persons dead and two hospitalized for pneumonia or otherwise.

4.2 Probable Causes

It is considered probable that this accident has occurred as follows: During a trip from waters off the east coast of Sado-ga-Shima Island to the Ajiro-hama mooring basin for small vessels, the window for the propeller inspection port of Vessel A came off, and, seawater which found its way through the port, overflowed its casing, filling up the compartment of the propeller inspection port and flowing onto the aft upper deck, into the after-end compartment and the engine compartment, resulting in the loss of buoyancy, which led to the sinking of the same vessel.

It is considered somewhat likely the window of the propeller inspection port came off as a result of fractures of the bolts used to fix the window, or otherwise, owing to vibrations or for other reasons.

It is considered probable that the flooding from the propeller inspection port and its casing is due to the motion of the vessel on the seaway, and, the entry of seawater onto the aft upper deck, after-end compartment and engine compartment, has occurred, after the compartment of the propeller inspection port having filled up, through the gaps of the bulkheads of the compartment.

It is considered probable that the fact that some passengers died and others got sick is attributable to the delay in reporting to the search and rescue organization.

5 OPINIONS

In view of the result of this accident investigation, the Japan Transport Safety Board expresses its opinions as follows to the Director-General, Fisheries Agency, the Ministry of Agriculture, Forestry and Fisheries, pursuant to Article 28 of the Act for Establishment of the Japan Transport Safety Board, in order to ensure safety of passengers on board vessels providing recreational fishing:

To help develop the recreational fishing vessel service businesses, from the viewpoint of ensuring safety of those using such services, the agency should provide necessary assistance and advice to prefectural governors, in relation to the following matters:

(1) Safety consciousness

Further measures to raise safety awareness should be taken, such as intensifying training courses for recreational fishing vessel operators and liaison officers, in addition to those for Chief Guides for recreational fishing trips.

(2) Pre-departure inspection

Guidance should be provided for recreational fishing vessel operators to ensure that the skipper of a recreational fishing vessel will open the hatch cover before going to sea and check the compartment under the cover to see whether bilge water is present and how the window for the propeller inspection port is tightened, since fishing passengers will bring their baggage, including cooler boxes, and place them on the hatch cover, making it difficult to check inside by opening the hatch cover while at sea.

(3) Early report of accidents

Guidance should be provided concerning the following matters so that a prompt communication may be given to relevant organizations upon the occurrence of an accident:

1) Even in the event of a family business, the scope of responsibilities of each person in charge, on the basis of the recreational fishing service manual, shall be clarified and communication methods confirmed.

2) The agency shall participate in emergency reporting training in coordination with relevant organizations by using radio equipment and mobile telephones on board a recreational fishing vessel and, if possible, organize by itself such training. This training shall include not only direct reporting to the relevant organizations but also reporting via the liaison officer.

3) The recreational fishing vessel operator shall study the establishment of an arrangement to detect an unusual situation at an early stage, such as the introduction of a practice for the shore side to make periodical contact with his/her vessels.

(4) Handling of lifesaving appliances

Guidance about the following matters should be provided for recreational fishing vessel operators

so as to ensure that passengers will be able to don lifejackets and that the skipper will handle hand flares properly:

1) The skipper and the Chief Guide for fishing trips shall communicate to passengers the storage location of lifejackets and have them donned properly.

2) The skipper shall understand the location where hand flares are stored and undergo periodical training to handle them.

(5) Thorough dissemination of the need for participation in insurance for fishing passengers

There is a need to disseminate a system, introduced on April 1, 2009, in which insurance for fishing passengers shall be continued as far as the recreational fishing vessel service business is in operation.

6 REMARKS

The examination of the following safety measures is desirable:

(1) Safety measures for human life

1) Lifejackets

a. The skipper should ascertain the storage location of lifejackets and their donning methods before going to sea and have those on board wear them at all times, as far as possible, while they are on board.

b. Those involved in the production of lifejackets should consider the requirement to develop a safer model which will help the wearer to take a safe floating posture by supporting the face above the water surface, so as to prevent choking, even in the event of unconsciousness.

2) Installation of an EPIRB, a distress signal transmitter

The skipper should equip his vessel with an EPIRB, which automatically transmits signals to the Coast Guard via a satellite, in the event of sinking of the vessel.

(2) Safety measures for the vessel hull

1) Pre-departure inspection

On board a vessel installed with a window for the propeller inspection port, the skipper should ensure to make pre-departure inspections, paying attention to the vessel's age, reduction in freeboard by remodeling the vessel. If he has noticed, while proceeding, an unusual situation such as a speed reduction, he should stop driving the propeller and check the window for the propeller inspection port for abnormality.

If his vessel was built by the shipbuilder that constructed Vessel A or experiences excessive vibrations, the skipper should be particularly careful when making such inspection.

2) Inspection of propeller inspection port

The Japan Craft Inspection Organization has already taken further safety measures for propeller inspection ports. However, when inspecting vessel hulls, they should keep records when they have found defects and taken corrective action, and analyze such records for some period and if a considerable number of deficiencies have accumulated, they should communicate such information to ship owners in order to contribute to daily maintenance and upkeep.

7 ACTIONS TAKEN

7.1 The Niigata prefectural government notified, on September 26, 2008, recreational fishing vessel operators, in writing, in the name of the Director of Fisheries Division, Agriculture, Forestry and Fishery Department, to do their business properly, based on the Recreational Fishing Act, while ensuring the safety of, and protecting the interests of, passengers, and to give particular consideration to the matters listed below.

Attaching the same document, they also provided guidance, in writing, on the same day, to presidents of associations of fisheries cooperatives representatives in the prefecture so that the recreational fishing vessel operators in their cooperatives will conduct their business properly.

- (1) Participation in a liability insurance scheme
- (2) Proper operation of the recreational fishing service manual
- (3) Submission to the prefectural government of changes in registered matters as a recreational fishing vessel operator
- (4) Posting of the label and the number as a registered recreational fishing vessel operator

7.2 Following this accident, the Niigata prefectural government surveyed all recreational fishing vessel operators under their control and discovered defects in items entered in the passenger list, in the registration label, and in the recreational fishing service manual. They took the following steps:

- (1) The Niigata prefectural government produced a sample form of the passenger list and disseminated it to all recreational fishing vessel operators.
- (2) The Niigata prefectural government provided guidance on the recreational fishing service manual, both orally on site and in writing.
- (3) The Niigata prefectural government produced a data base of recreational fishing vessel operators, containing necessary information such as their addresses, registration periods, and periods of insurance coverage, thereby to establish a system to facilitate confirmation.

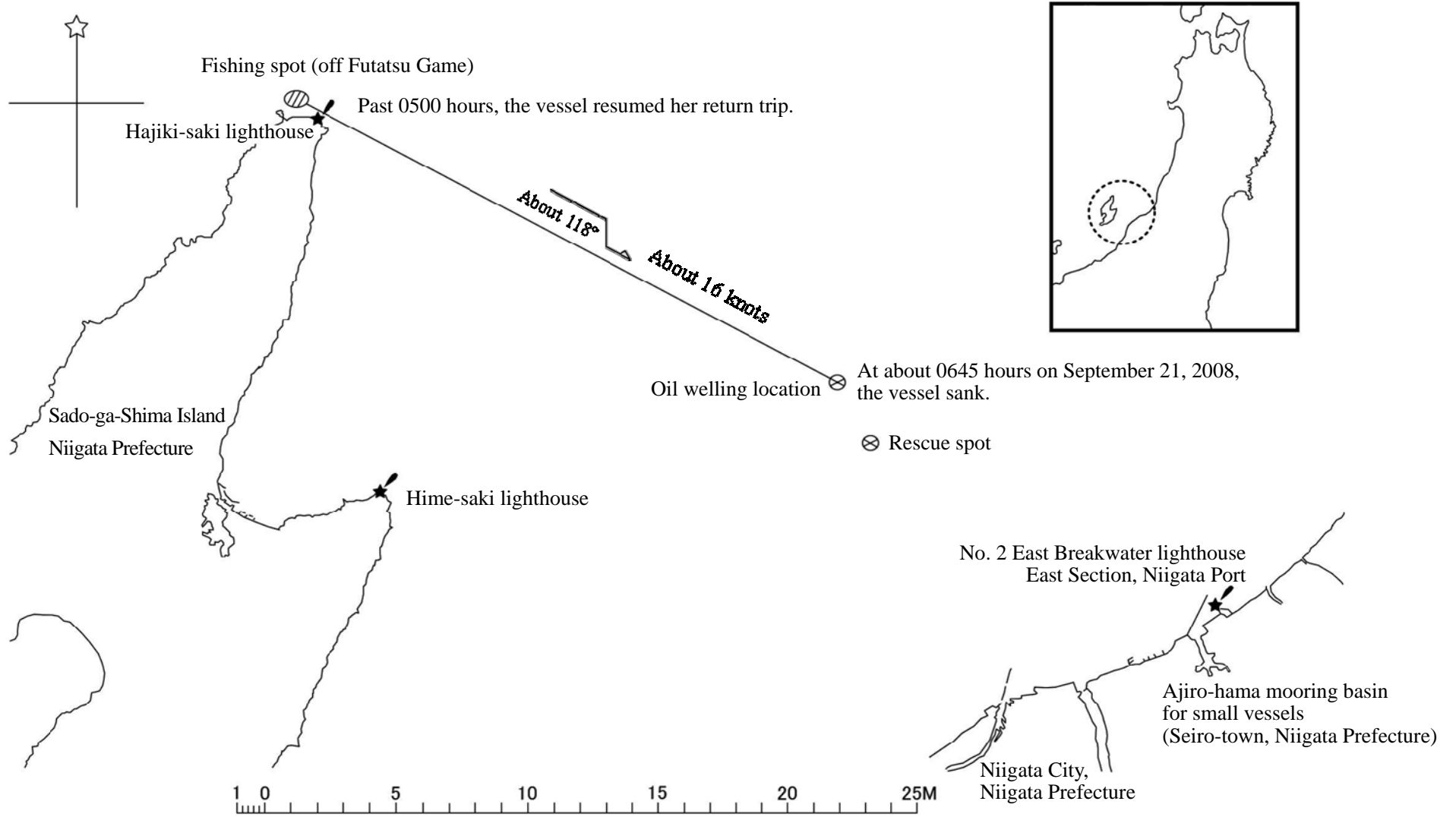
7.3 Following this accident, the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism communicated, on October 8, 2008, to fisheries-related organizations, the need for thorough

compliance with laws and regulations based on the Ship Safety Law, and, thorough maintenance and upkeep, in relation to propeller inspection ports. They also gave instructions to the District Transport Bureaus and the Japan Craft Inspection Organization to make further efforts to carry out proper inspections.

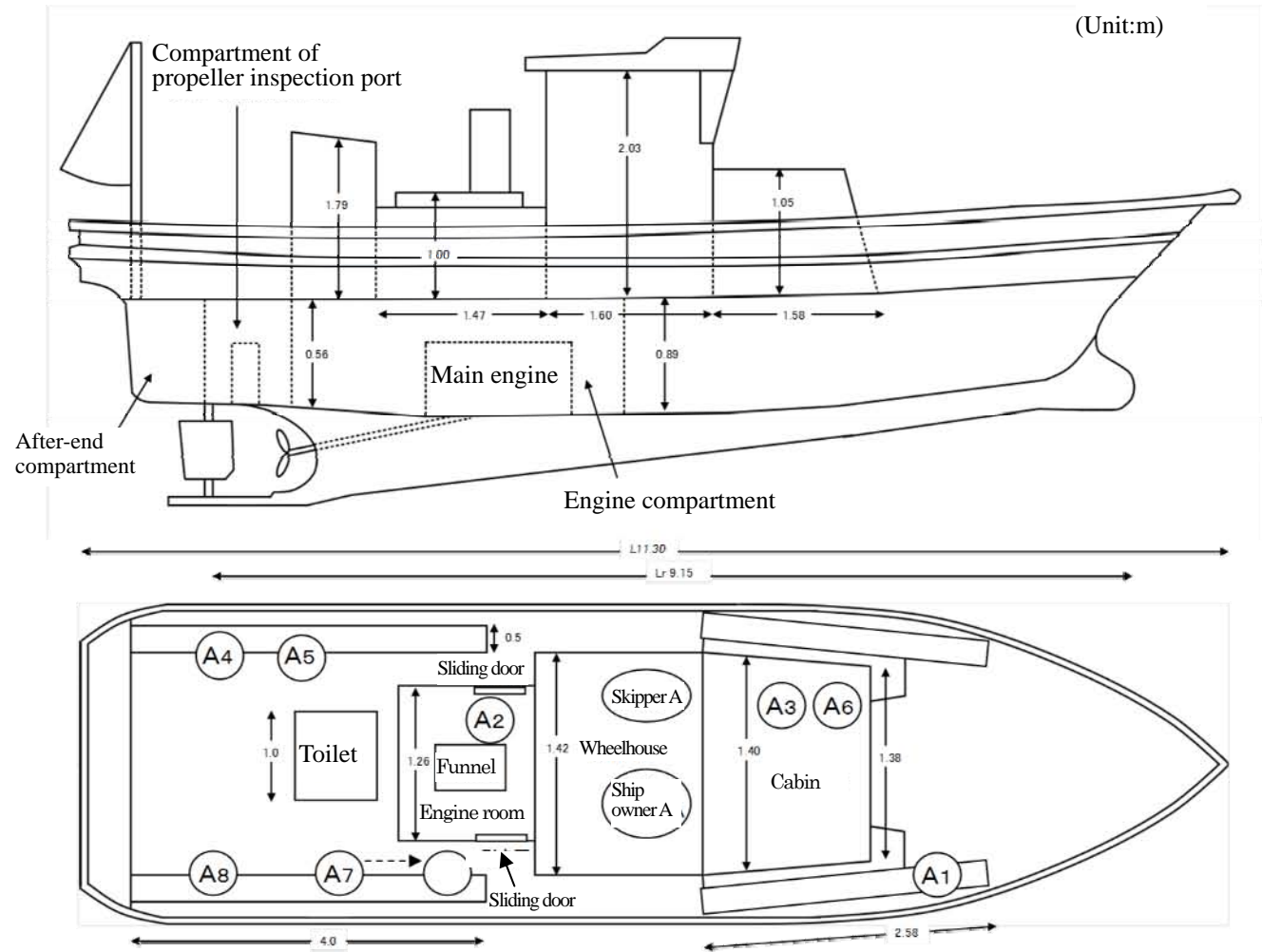
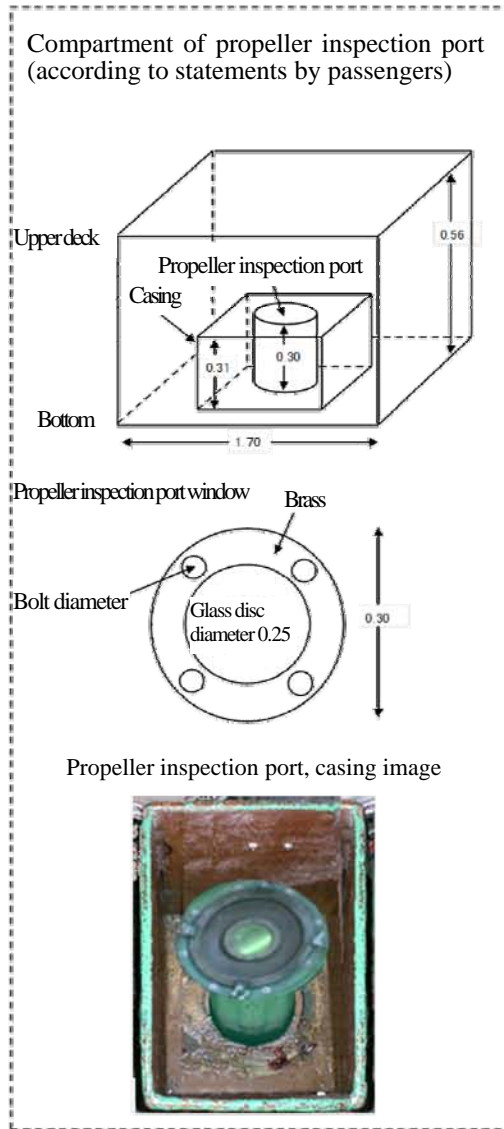
Following this, on November 5, 2008, the Japan Craft Inspection Organization communicated the importance of the propeller inspection port to the regional branch chiefs across Japan and instructed them to make further efforts to conduct proper inspections.

7.4 The Ministry of Agriculture, Forestry and Fisheries amended the Regulations for the Enforcement of the Recreational Fishing Act, on April 1, 2009, so as to provide continued liability coverage for passengers on board recreational fishing vessels and added the entry of the period of insurance in the label of their registration, which is required to be posted in the business offices and on board such vessels.

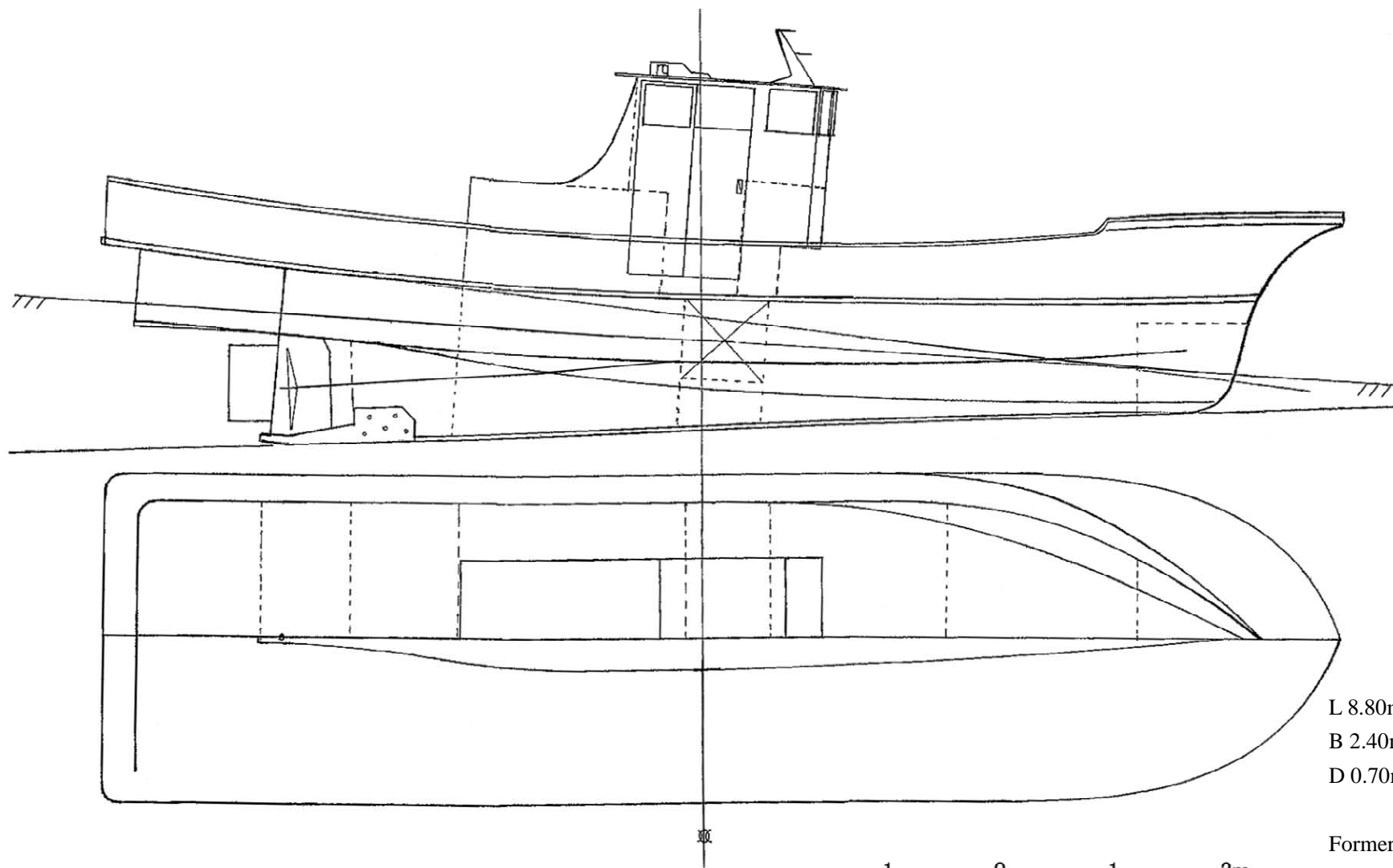
Attached Figure 1 Estimated path



Attached Figure 2
 Schematic arrangement plan of Vessel A and location of persons upon commencement of return trip



Attached Figure 3 General arrangement plan of Vessel A



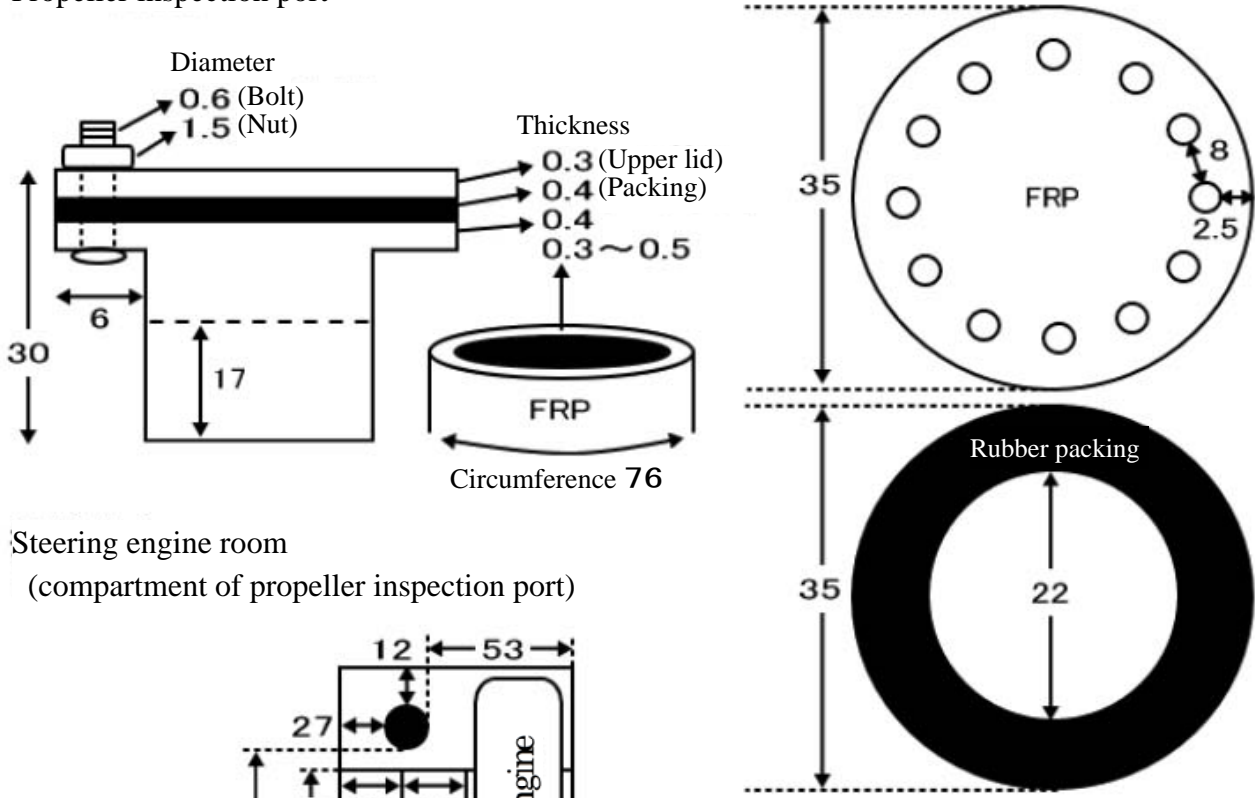
L 8.80m
B 2.40m
D 0.70m

Former tonnage: 3.2 tons
New tonnage: 2.8 tons
Shipbuilder A

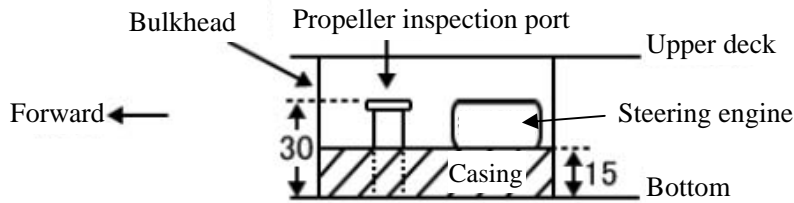
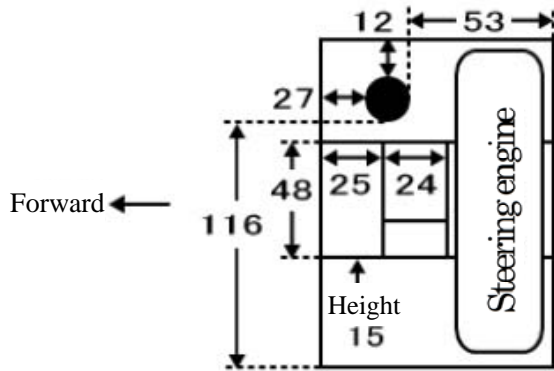
Attached Figure 4 Propeller inspection port of Vessel D

(Unit: cm)

Propeller inspection port



Steering engine room
(compartment of propeller inspection port)



Attached Table 1 Investigation result of vessels of a similar type

Vessel name	Launched	Gross tonnage (tons)	L(m)	B(m)	D(m)	Forward freeboard (m)	Midship freeboard (m)	Aft freeboard (m)	Non-cylindrical propeller inspection port (unit: cm)	Casing height (m)	Height of compartment of propeller inspection port (m)	Gap between upper deck and upper part of bulkhead	Penetration holes for electrical cables to engine room	Remarks
Vessel E	Jan. 1972	3.31	9.78	2.38	0.65	Grounded	Grounded	Grounded	Nil	—	—	Present	Present	Peeling off of lower layers of the plywood, upper deck plate
Vessel F	May 1991	4.4	10.68	3.18	1.33	Grounded	Grounded	Grounded	Brass, diameter of about 34, Glass part with a diameter of 9	0.32	0.68	Present	Present	The upper deck of a new material
Vessel G	Nov. 1991	3.8	10.45	2.99	1.15	0.61	0.32	0.55	Brass, approx. diameter of 34, Glass part with an approx. diameter of 9(Currently removed)	—	0.6	Present	Present	Ditto
Vessel H	Jan. 1994	3.8	10.39	3.03	1.18	0.61	0.35	0.43	Brass, approx. diameter of 34, Glass part with an approx. diameter of 9	0.35	0.61	Present	Present	Ditto
Vessel I	Nov. 1996	4.2	11.04	3.04	1.21	0.45	0.45	0.45	Brass, approx. diameter of 35, Glass part with an approx. diameter of 9	0.31	0.62	Present	Present	Ditto

Attached Table 2—Cases of flooding through propeller inspection ports

	Type of accident	Date of occurrence	Location	Type of vessel	Gross tonnage (tons)	Length (m)	Propeller inspection port	Casing	How flooding occurred	Injury or death involved	Weather
1	Capsizing	Aug. 28, 2005	Waters to the east of Monbetsu Port, Hokkaido	Fishing vessel (FRP)	8.38	13.6	An opening of 20 cm in diameter was provided in the bottom plating of the steering engine compartment; it was covered with a lid which had, around its circumference, 4 U-shaped radial projections to hold it down with as many butterfly nuts.	A casing 70 cm high from the bottom (projecting 7 cm from the upper deck), 40 cm long and 60 cm wide; its upper opening was provided with a plastic cover.	While the vessel was sailing—in order to borrow tools from a fellow fishing vessel—with the inspection port window left open (opened at 1419 hours) because of the propeller shaft having been entangled, seawater found its way into, and flooded, the engine room at 1440 hours, causing the engine to stop. The vessel listed and capsized at 1500 hours.	Nil	Fine weather, wind force 2, wave height 0.4 m
2	Capsizing	Mar. 24, 2003	Waters to the east of Yakumo Fishing Port, Hokkaido	Fishing vessel (FRP)	6.6	16.2	An opening of 20 cm in diameter was provided in the bottom plating of the steering engine compartment; it was covered with a lid which had, around its circumference, 8 U-shaped, radial projections to hold it down with as many hinged butterfly nuts.	A casing 42 cm high from the bottom, 35 cm long and 53 cm wide was installed.	After the window of the inspection port was opened half a month before the accident, because of entanglement with a line, while the vessel was sailing, seawater entered through the inspection port and, then, found its way into the engine room through a vinyl chloride pipe. As the low hydraulic pressure alarm of the clutch went off at 0643 hours, the skipper of the vessel reported his distress by radio to a fellow vessel at 0645 hours. With the steering engine room entirely inundated, the vessel listed and capsized at 0657 hours.	Nil	Fine weather, wind force 2
3	Sinking	Aug. 30, 2002	Waters to the NE of Iwanai Port, Hokkaido	Fishing vessel (FRP)	9.7	17.64	An opening of 22 cm in diameter was provided in the bottom plating of the inspection port compartment, below the deck plate in the aft	A sub-compartment was set inside the steering compartment (no measurements taken).	The window for the inspection port was renewed while the vessel was grounded in dock in June of the previous year. While the	Nil	Fine weather, wind force 2, wave

							section; it was covered with a lid—a frame containing a reinforced glass disc of 7.1 cm in diameter—which had, around its circumference, 4 U-shaped, radial projections to hold it down with as many hinged butterfly nuts.		vessel was sailing for gill net fishing, hearing a strong sound in the aft bottom at 0032 hours, the skipper checked the bilge water but found no unusual condition. However, seawater which found its way to the steering engine room, reached the engine room through an opening installed when the main engine had been converted in 1996. As the aft section of the vessel immersed further, preventing the skipper from seeing the lights of a fellow vessel sailing ahead, and, her own sailing speed dropped, he requested assistance from the fellow vessel. At 0051 hours, the vessel sank.		height 0.5 m.
4	Sinking	June 8, 2000	Waters to the east of Komatsuji ma Port	Fishing vessel (FRP)	13.01	12	Inspection port of a cylindrical shape of 50 cm in diameter, projecting from an opening in the bottom to a height of 100 cm; the upper lid was fastened with 4 butterfly nuts.	Unknown	While the vessel was drifting, the top of the inspection port was at a height of 20 cm above the water line; by further immersion of the aft section because of the hauling of her fishing net, seawater leaked through the inspection port since the lid was not sufficiently secured. The skipper was rescued by a fellow vessel, but the vessel sank thereafter.	Nil	Fine weather, wind force 2, wave height 0.5 m
5	Sinking	Apr. 18, 1998	Waters to the NW of Rumoi Port, Hokkaido	Recreational fishing vessel (FRP)	—	14.7	An opening of 20 cm in diameter was provided in the bottom plate in the compartment of the inspection port window, below the upper deck in the aft section; a steel lid with the same structure as a port-hole (a glass disc of 6 cm in diameter was set in the frame) was fastened with 4 butterfly	A partition board was established toward the aft, separating the section from the steering engine compartment; it projected 10 cm above the upper deck plating, forming coamings, into which a cover fit.	The packing of the steel lid of the window was leaking and a square lumber was pressed to it by use of a jack, as a measure to prevent water leakage; at 0540 hours, the vessel sailed out of the port with 10 passengers on board; at 0630 hours the jack was displaced, and, seawater found its way over the	Nil	Fine weather, wind force 3, wave height 0.5 m

							nuts.		partition board into the steering engine compartment; it flowed into the engine room through the draining pipe of the same compartment leading to the engine room; at 0840 hours, the engine speed dropped and the aft portion became immersed; at 1330 hours the vessel sank.		
6	Sinking	Dec. 15, 1991	Tokyo Bay	Fishing vessel (FRP)	6	11.9	An opening of 22 cm in diameter was provided in the bottom plate in the compartment of the inspection port window, below the upper deck of the aft section; it had a lid—a glass piece in a frame—which was fastened with 4 brass hinge bolts and 4 ring nuts.	A casing 60 cm high and 35 cm long as well as wide, was installed; a 10 cm high, FRP hatch cover was set in the hatch opening on the upper deck.	When she was grounded in dock in January of the same year, the inspection port was opened and restored; thereafter, while she was sailing, at 0950 hours, the skipper noticed that seawater was entering onto the upper deck through the freeing port in the aft, resulting in the aft section having immersed; when he opened the hatch cover of the steering engine room, he realized the ingress of seawater in it; he requested assistance from a fellow vessel; the vessel sank at 0957 hours.	Nil	Fine weather, wind force 1

Photo 1 Vessel A before the accident

Main facilities additionally installed:
Cabin, handrail, toilet, bench, mast, fish gathering lamps, spanker



Sliding door of engine room

Photo 2
Vessel A upon its construction



Photo 3
Port stern of Vessel A
upon its construction



Propeller inspection port

Photo 4 Rescue operation (1)



Photo 5 Rescue operation (2)



Photo 6 Vessel D



Photo 7 Vessel F



Photo 8 Vessel G

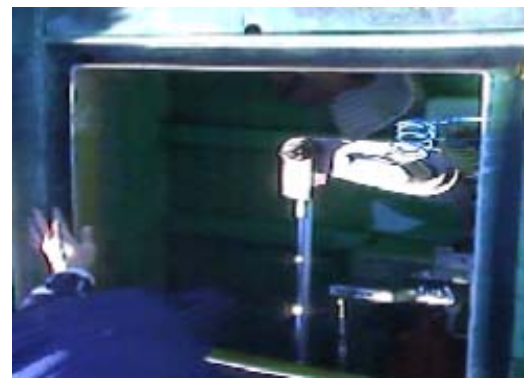


Photo 9 Vessel H

