

MA2012-2

**MARINE ACCIDENT
INVESTIGATION REPORT**

February 24, 2012

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

January 26, 2012

Adopted by the Japan Transport Safety Board

Chairman Norihiro Goto

Member Tetsuo Yokoyama

Member Kuniaki Shoji

Member Toshiyuki Ishikawa

Member Mina Nemoto

Accident type	Fatality of stevedore
Date and time	At around 1830–1832 hours on August 18, 2010
Location	Pier P, Hattaro Area of the Port of Hachinohe, Hachinohe City, Aomori Prefecture, Japan (Approximate position: 40°33.8'N 141°29.3'E)
Summary of the accident	<p>At around 1830–1832 hours on August 18, 2010, while cargo was being discharged from the No. 4 cargo hold on the cargo ship STAR KVARVEN moored at a pier in the Port of Hachinohe, a signal person, who was traveling from the hatch covers laid on the No. 3 cargo hold to the hatch covers on the No. 5 cargo hold, fell from either a hatch cover on the No. 3 cargo hold or the maintenance ladder at the foot of the gantry crane.</p> <p>The signal person was taken to a hospital, but was later pronounced dead.</p>
Process and progress of the investigation	<p>(1) Setup of the investigation The Japan Transport Safety Board appointed an investigator-in-charge, a marine accident investigator and a regional investigator (from the Sendai Regional Office) to investigate this accident on August 20, 2010.</p> <p>(2) Collection of evidence August 20, 2010: Interviews August 20 and 23, 2010: Collection of questionnaires August 22, 30 and 31, 2010: On-site investigations and interviews</p> <p>(3) Comments of parties relevant to the cause Comments on the draft report were invited from parties relevant to the cause of the accident.</p> <p>(4) Comments from the flag State Comments on the draft report were invited from the flag State of the STAR KVARVEN.</p>

Factual information
(1) Vessel
information

Particulars of the vessel:

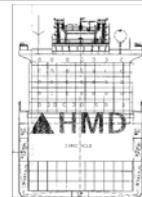
Vessel type and name: Cargo ship STAR KVARVEN (Norwegian registered)
 Gross tonnage: 37,158 tons
 IMO number: 9396153
 Owner: GRIEG SHIPPING AS (Kingdom of Norway)
 Management company: GRIEG SHIPPING II AS
 Charterer: GRIEG STAR SHIPPING AS (Kingdom of Norway)
 Ship's Classification: Det Norske Veritas AS (DNV)
 L x B x D: 208.73 m x 32.20 m x 19.50 m
 Hull material: Steel
 Engine: Diesel engine
 Output: 11,900 kW
 Built: April 2010

(See the vessel's full-view photo and general arrangement (excerpt) in figures (1) to (3))

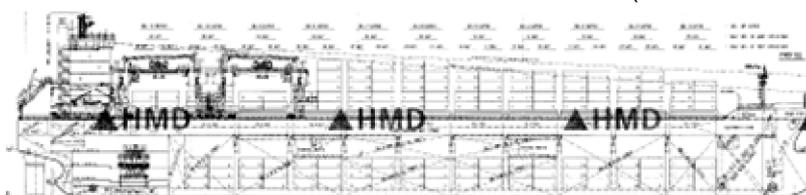


Vessel's full view

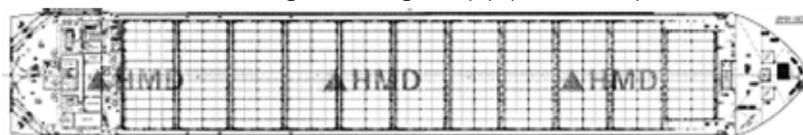
Gantry cranes
(See Factual
information (2))



General arrangement
figure (1)
(Center sectional view)



General arrangement figure (2) (Side view)



General arrangement figure (3) (Plan view: Upper deck (Main deck))

(2) Gantry crane

STAR KVARVEN (hereafter referred to as “the Ship”) was equipped with 11 cargo holds beneath the upper deck in front of the bridge house and two gantry cranes on the deck.

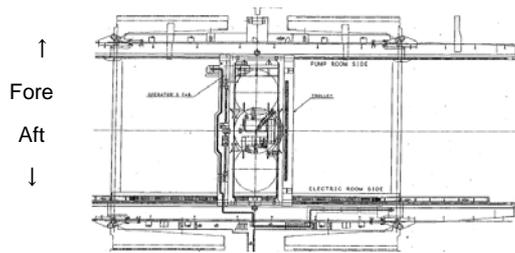
Gantry cranes



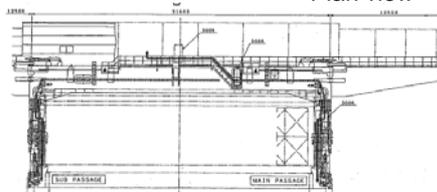
Photo – Gantry crane seen from starboard side



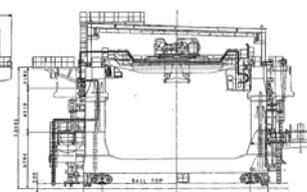
Photo – Gantry crane seen from beneath



Plan view



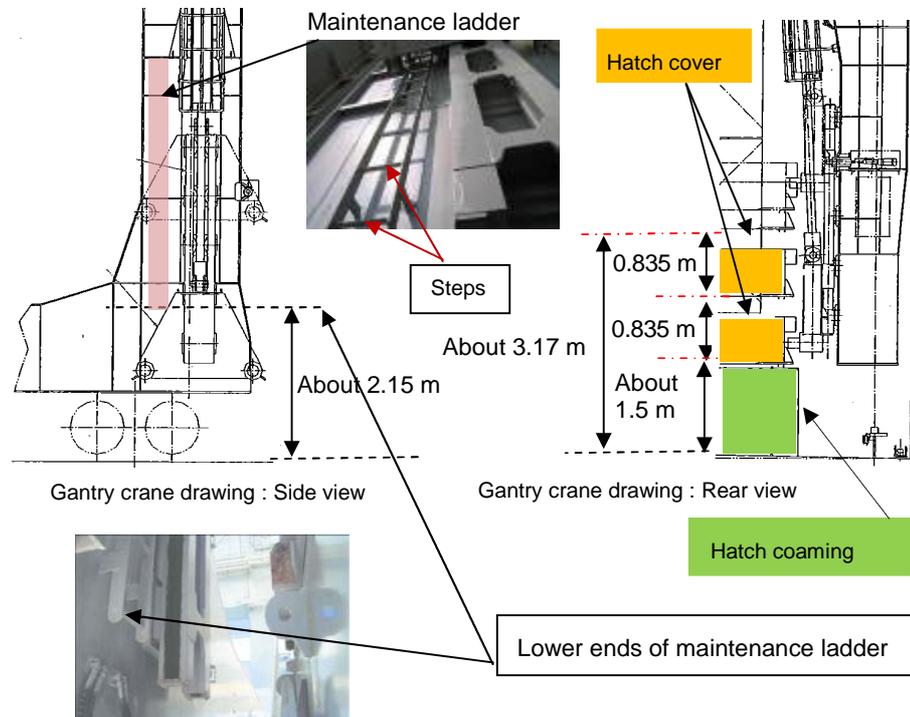
Rear view



Side view

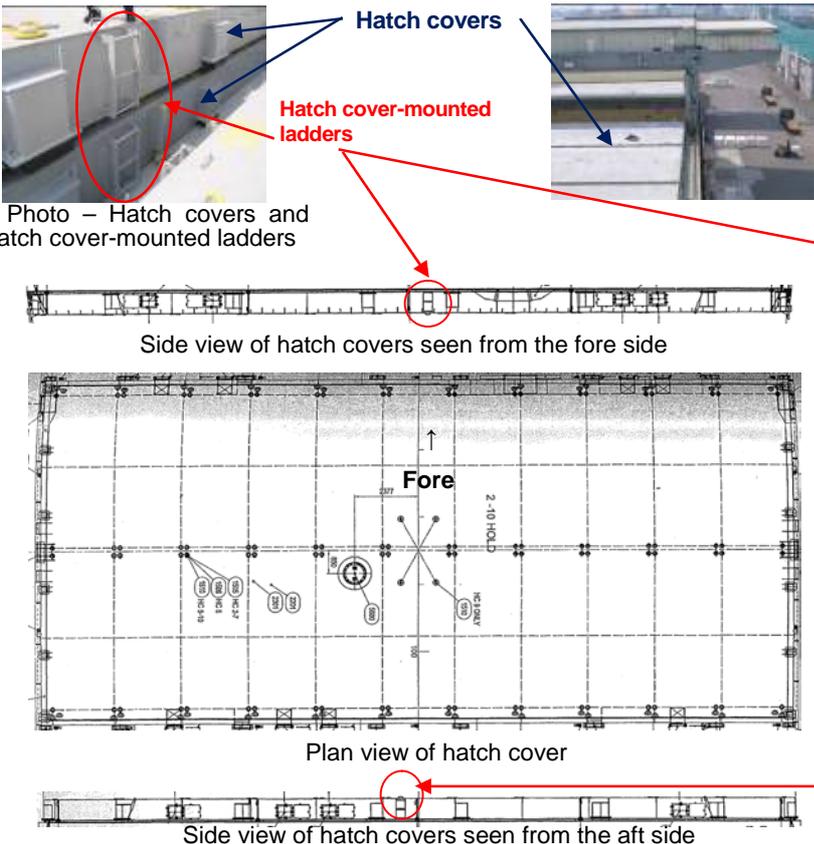
(3) Maintenance ladder

- 1) A maintenance ladder was provided at the forward legs of both sides of the gantry crane.
- 2) The lower end of the maintenance ladder was located at about 2.15 m above the upper deck. Each step of the ladder was made of a steel square bar, with each side measuring about 2 cm. The steps were about 23 cm apart from each other.



(4) Hatch covers, hatch coaming and vertical ladders

- 1) The hatch covers on the Ship were of a Pontoon type where an open cover can be laid over other closed hatch covers.
- 2) Each hatch cover was 0.835 m thick and made of steel.
- 3) The upper end of the hatch coaming (steel plates erected vertically around the hatch) was about 1.5 m above the upper deck. The hatch coaming was equipped with a vertical ladder extending to the upper deck between the adjoining cargo holds (hereafter referred to as a “hatch coaming-mounted ladder”).
(See [Specified route to the upper deck](#) on Page 9.)
- 4) A vertical ladders were provided at around the center of the front and rear sides of the hatch covers on the No. 2 to No. 11 cargo holds (hereafter referred to as a “hatch cover-mounted ladder”).

	 <p>Photo – Hatch covers and hatch cover-mounted ladders</p> <p>Side view of hatch covers seen from the fore side</p> <p>Plan view of hatch cover</p> <p>Side view of hatch covers seen from the aft side</p>
<p>Loading conditions at the time of arrival at the Port of Hachinohe</p>	<p>(1) Draft: Fore 9.96 m, Aft 10.27 m</p> <p>(2) The Ship arrived at the port loaded with about 34,000 tons of clay, wood pulp and others.</p>
<p>Stevedores (1) Composition and duties</p>	<p>When the accident occurred, the following stevedores from Shinmaru Kouun Co., Ltd. (hereafter referred to as “the stevedores” and “Company A” respectively) were discharging cargo from the No. 4 and No. 7 cargo holds. The composition and duties of the stevedores were as follows. The stevedores, excluding the foreman, were grouped into four units, A to D.</p> <ol style="list-style-type: none"> 1) Foreman <p>The foreman, while monitoring the entire cargo handling operation, issued orders, including from which cargo hold the cargo was to be discharged, and when the hydraulic excavator was to enter a cargo hold.</p> 2) Signal person <ol style="list-style-type: none"> a. The signal person acted as a unit chief. b. The signal person relayed the foreman’s orders to the crane operator and the onboard worker. c. The signal person kept the worker in the cargo hold informed of any emerging danger such as crane movement. d. The signal person logged the volume of cargo that had been discharged. 3) Onboard worker <p>The onboard worker worked in the cargo hold, removing foreign matter,</p>

	<p>releasing cargo attached to the walls and others. When the accident occurred, the worker was counting the number of times that the grab bucket had carried clay from the hold to the hopper.</p> <p>4) Crane operator The crane operator controlled a grab bucket to scoop cargo in the hold and discharge it into the hopper on the pier.</p> <p>5) Hydraulic excavator operator The hydraulic excavator operator controlled the excavator to move the cargo at or near the cargo hold walls toward the center of the hold to make it easier for the crane operator to grab cargo.</p>
(2) Gender, age, certificate of competence and training received	<p>1) Signal person: Male, 45 years old, 26 years with Company A</p> <p>2) Foreman: Male, 26 years old, 3 years with Company A</p> <p>3) Crane operator: Male, 44 years old, 18 years with Company A, Certified mobile crane operator, Completed slinging skills training</p> <p>4) Onboard worker: Male, 31 years old, 2 years with Company A, Certified small mobile crane operator, Completed slinging skills training</p>
Crew information	<p>Gender, age and certificate of competence</p> <p>(1) Master (Nationality: Republic of the Philippines): Male, 52 years old Endorsement attesting the recognition of certificate under STCW regulation I/10: First Grade Certificate (issued by Kingdom of Norway) Date of issue: April 22, 2010 (valid until February 7, 2015)</p> <p>(2) Third Officer (Nationality: Republic of the Philippines): Male, 39 years old Endorsement attesting the recognition of certificate under STCW regulation I/10: Fourth Grade Certificate (issued by Kingdom of Norway) Date of issue: April 18, 2007 (valid until December 18, 2011)</p>
Fatalities and injuries	One fatality (Signal person)
Damage to vessel	None
Events leading to the accident (1) Movement of the Ship	<p>The Ship, with 18 crew members onboard including the Master (all Philippine nationals), loaded cargoes at seven ports in the United States of America. After the last cargoes were loaded at the Port of Mobile, Alabama, the Ship left for Japan on July 11, 2010.</p> <p>The Ship was scheduled to discharge its cargoes at the ports of Tomakomai, Niigata, Hachinohe, Shimizu and Mishima-Kawanoe, in that order, before discharging the remaining cargoes in Republic of Korea and then in People's Republic of China.</p> <p>The Ship arrived at the Port of Hachinohe at around 1012 on August 14, 2010.</p>
(2) Cargo handling	<p>1) At around 1240 on August 14, Company A started the cargo handling operation to discharge, by August 19, the entire clay cargo (about 13,100 tons) from the Ship's No. 1, No. 4 and No. 7 cargo holds.</p> <p>2) On August 18, at around 0630, the stevedores arrived at the pier where the Ship was moored, and at the meeting that commenced at around</p>

	<p>0650, they decided which ladders were to be used to enter the cargo holds and confirmed that they should never go under the grab bucket.</p> <p>3) Discharging operation was scheduled to run from around 0700 to around 2000.</p> <p>4) In the discharging operation, the Ship's crew members were in charge of opening and closing the hatch covers while the stevedores were in charge of discharging the cargoes.</p> <p>5) The foreman was in charge of issuing orders to all stevedores in Units A to D.</p> <p>6) The stevedores in Units A and B were in charge of discharging the cargo from the No. 4 cargo hold while the stevedores in Units C and D were in charge of discharging the cargo from the No. 7 cargo hold.</p> <p>7) Unit A consisted of three of the stevedores mentioned in the "Stevedores" section above, namely the signal person (hereafter referred to as "Signal Person A"), the crane operator (hereafter referred to as "Operator A") and the onboard worker (hereafter referred to as "Onboard Worker A").</p>
<p>(3) Course of the events</p>	<p>The foreman, Onboard Worker A and Signal Person A were standing on the hatch cover of the No. 4 cargo hold laid above the hatch cover of the No. 3 cargo hold (hereafter "the hatch cover laid on the No. 3 cargo hold") to keep watch on the cargo handling operation at the No. 4 cargo hold, etc.</p> <p>At around 1800, the Third Officer received handover briefing by the Second Officer on starboard side upper deck between No.2 and No.3 hold, and switched on the light of gantry crane then climbed to the hatch cover laid on No.5 cargo hold and began keeping watch on the ongoing cargo discharging operation and others.</p> <p>Onboard Worker A found that a shackle for the gantry crane's grab bucket lift chain (hereafter referred to as "the shackle") was twisted, and informed Signal Person A of that fact. The cargo handling operation was then suspended. At that time, the Third Officer checked his wrist watch, which showed 1830, to log the time at which the operation was suspended.</p> <p>Signal Person A instructed Operator A over the transceiver to rest the grab bucket on the hatch cover for the No. 5 cargo hold to correct the twisted shackle.</p> <div data-bbox="497 1668 737 1975" data-label="Image"> </div> <div data-bbox="470 1989 890 2020" data-label="Caption"> <p>Photo – Grab bucket and shackle</p> </div> <div data-bbox="976 1662 1343 1908" data-label="Image"> </div> <div data-bbox="1029 1937 1257 1966" data-label="Caption"> <p>Grab bucket drawing</p> </div>

Operator A responded to Signal Person A by saying that he would start moving the gantry crane towards the No. 5 cargo hold after the grab bucket was lifted from the No. 4 cargo hold to a point above the hold's hatch coaming. In response, Signal Person A sent his acknowledgment.

Onboard Worker A, thinking that he could reach the hatch cover on the No. 5 cargo hold more quickly by using the maintenance ladder at the starboard-bow foot of the gantry crane (hereafter referred to as "the Maintenance Ladder") that just happened to come into his view at that time, traveled from the hatch covers laid on the No. 3 cargo hold to the Maintenance Ladder, and then moved along the hatch coaming and the gantry crane foot members to the starboard upper deck.

The standard route to the upper deck was as follows: down the hatch cover-mounted ladder to the hatch coaming, walk along the hatch coaming, then down the hatch coaming-mounted ladder to the upper deck.

The foreman, thinking that the Maintenance Ladder that just happened to come into his view at that time would provide a quicker route, followed the same route that Onboard Worker A took and descended to the starboard upper deck, then walked to the No. 5 cargo hold and climbed the hatch coaming-mounted ladder to the hatch cover on the No. 5 cargo hold.

When Onboard Worker A and the foreman took the route described above using the Maintenance Ladder, they realized that the ladder ended short of the upper deck.

Onboard Worker A and the foreman had never before used the Maintenance Ladder to go down from the hatch cover to the upper deck.

When Operator A saw that Onboard Worker A and the foreman were ready on the hatch cover for the No. 5 cargo hold, he moved the gantry crane with the grab bucket from the No. 4 cargo hold to the No. 5 cargo hold.

After the grab bucket was set down on the hatch cover for the No. 5 cargo hold, the twisted shackle was corrected in about 30 seconds.

Onboard Worker A signaled Operator A that the twist had been eliminated. In response, Operator A responded and moved the grab bucket from the hatch cover on the No. 5 cargo hold towards the No. 4 cargo hold.

In the meantime, the foreman traveled from the hatch cover on the No. 5 cargo hold to the hatch cover on the No. 6 cargo hold to check the progress of cargo handling at the No. 7 cargo hold.

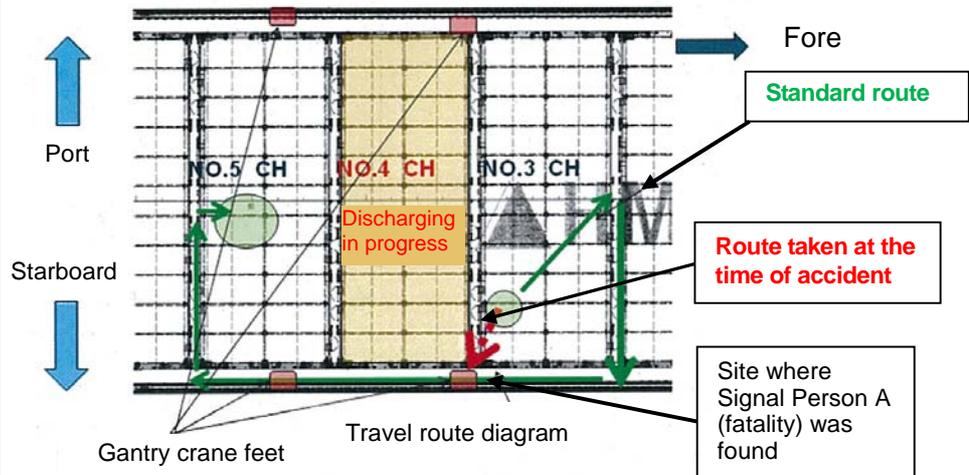
Onboard Worker A, who thought that Signal Person A had been following him, was unable to find him anywhere near the hatch cover on the No. 5 cargo hold. When he looked toward the starboard upper deck, he discovered Signal Person A lying there. He ran to Signal Person A.

Onboard Worker A shouted to the foreman that he found Signal Person A lying on his side bleeding profusely from the mouth and unresponsive.

Third Officer ran quickly to Signal Person A and pull emergency stop

string to stop the gantry crane.

Signal Person A was taken by ambulance to a hospital in Hachinohe City, Aomori Prefecture, but was pronounced dead at 2057. (See the travel route diagram.)



Near the accident site



Hatch cover on No. 3 cargo hold
Photo – Near Maintenance Ladder (1)



Starboard upper deck
Hatch cover on No. 3 cargo hold
Photo – Near Maintenance Ladder (2)

Site where Signal Person A was found

Specified route to the upper deck



Use upper hatch cover-mounted ladder to descend to hatch coaming.



Walk along hatch coaming.



Use hatch coaming-mounted ladder to descend to upper deck.

Death to persons

The cause of death and other information regarding Signal Person A were as follows:

- (1) The cause of Signal Person A's death as indicated in the postmortem certificate was pulmonary contusion.
- (2) Signal Person A sustained no external injuries.
- (3) Signal Person A sustained broken ribs on the left back. It was not clear whether or not the broken ribs had punctured his lung.
- (4) Pulmonary contusion is a trauma, or ruptured alveoli and/or capillary vessels, caused by the direct application of blunt force to pulmonary

	tissue due to traffic accident, fall from a high place, chest compression or assault, or by increase in internal alveoli pressure.
Weather and sea conditions	<p>Weather conditions:</p> <p>Weather – Clear</p> <p>Wind direction – East-southeast</p> <p>Wind force – 1 (Average wind velocity: 1.5 m/s)</p> <p>Temperature – 24.9°C</p> <p>Sea conditions: Calm</p> <p>Sunset time at the Port of Hachinohe: About 1829</p>
Other matters	<ol style="list-style-type: none"> (1) The Ship had never before called at the Port of Hachinohe. (2) The maintenance ladder was not in any way intended as an access for going down to upper deck from the position top of hatch covers and hatch coaming. (3) The gantry cranes on the Ship were designed to set off an acoustic alarm and turn on a warning light whenever they are in motion. (4) The stevedores had previously handled cargoes on vessels equipped with gantry cranes, but never on vessels with maintenance ladders installed at the foot of the gantry crane. (5) On a grab bucket, a twisted shackle shortens the related lift chain, which applies greater load on other lift chains and their shackles, possibly leading to trouble. Therefore, the twisted shackle on the Ship's grab bucket had to be corrected. (6) At the time of the accident on the Ship, fall-prevention ropes were in place at the hatch covers. (7) At the time of the accident, the foreman, Signal Person A and Operator A were carrying a transceiver for communication. (8) Signal Person A was wearing a two-piece work suit, a pair of nylon overalls, a helmet, a mask and a pair of visual correction glasses. (9) Signal Person A was behaving as he normally would.

Analysis	
Contribution of stevedores	Yes
Contribution of crew members	No
Contribution of vessel, engine, etc.	Yes
Contribution of weather and sea conditions	No
Analysis of the findings	<p>(1) The cause for Signal Person A's death was pulmonary contusion.</p> <p>(2) It is considered probable that, during discharging of cargoes from the Ship moored at Hachinohe Port, and while the foreman, Signal Person A and Onboard Worker A were engaged in operations on the hatch covers laid on the No. 3 cargo hold associated with cargo discharging from the No. 4 cargo hold, a twisted shackle was found, which then had to be corrected after moving the grab bucket onto the hatch cover for the No. 5 cargo hold, which made it necessary for the three men including the foreman to travel to the hatch cover on the No. 5 cargo hold.</p> <p>(3) It is considered probable that the foreman and Onboard Worker A, while traveling to the hatch cover, found the Maintenance Ladder that just happened to come into their view to be handy as it would provide a quicker route, and therefore used the Maintenance Ladder, instead of taking the specified route, to descend to the starboard upper deck.</p> <p>(4) Based on the location where Signal Person A was found and the route that Onboard Worker A and the foreman took before the accident, it is considered somewhat likely that Signal Person A intended to use the Maintenance Ladder as he traveled and, in doing that, fell from the hatch covers laid on the No. 3 cargo hold or from the Maintenance Ladder to his death. Due to the fact that Signal Person A was dead and that there were no witnesses, it was not possible to determine why Signal Person A fell.</p> <p>(5) It is considered highly probable that the top face of the hatch cover laid on the No. 3 cargo hold was about 3 m high above the upper deck.</p> <p>(6) It is considered highly probable that the lower end of the Maintenance Ladder was short of the upper deck, ending at about 2 m above the upper deck.</p> <p>(7) It is considered somewhat likely that Signal Person A intended to travel to the hatch cover on the No. 5 cargo hold by following the route of the foreman and Onboard Worker A.</p>

	<p>(8) It is considered somewhat likely that, had Signal Person A traveled to the upper deck by using the specified route via the hatch cover-mounted ladders and the hatch coaming-mounted ladder, this accident could have been avoided.</p>
Probable causes	<p>It is considered somewhat likely that during the discharging of cargoes from the Ship moored at the Port of Hachinohe, the accident occurred when Signal Person A fell from the hatch covers laid on the No. 3 cargo hold or from the Maintenance Ladder as he tried to use the Maintenance Ladder to travel from the hatch covers laid on the No. 3 cargo hold to the hatch cover on the No. 5 cargo hold.</p>
Remarks	<p>It is considered somewhat likely that this accident occurred as a result of Signal Person A using the Maintenance Ladder, which was not included in the specified route.</p> <p>It is desirable that Company A should implement a program whereby the foreman checks and establishes the safety of travel routes for stevedores during the cargo handling operations and ensures that the stevedores fully understand the safe routes.</p>
Actions taken	<p>(1) After the accident, Company A implemented following measures:</p> <ol style="list-style-type: none"> 1) Only the signal person shall issue orders to the crane operator. 2) Traveling to/from hatch covers shall be made via the hatch coaming-mounted ladders (steps). The use of the maintenance ladders installed on the gantry cranes shall be banned. 3) Travel between work sites and other operations shall be carried out by at least two persons wherever practically possible to ensure cross monitoring of each other's working conditions. <p>(2) The management company for the Ship implemented following measures:</p> <ol style="list-style-type: none"> 1) Soon after learning of the accident, the company instructed all its managing ships to paint one metre wide around all hatch covers with anti slip paint same as the ship and her sister ships that already painted when delivered to owner. 2) In order to facilitate the lifting from the upper deck to the hatch covers, the ladders were moved or redesigned.