

MA2020-5

**MARINE ACCIDENT
INVESTIGATION REPORT**

June 25, 2020



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.

TAKEDA Nobuo
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

May 20, 2020

Adopted by the Japan Transport Safety Board

Chairman TAKEDA Nobuo
 Member SATO Yuji
 Member TAMURA Kenkichi
 Member KAKISHIMA Yoshiko
 Member OKAMOTO Makiko

Accident type	Fatality of a worker
Date and time	Around 03:39 on January 17, 2019
Location	Quay adjacent to Sumitomo Chemical Co., Ltd., Niihama Port, Niihama City, Ehime Prefecture Vicinity of T.B'g 059°/668 m from Niihama Port East Breakwater Lighthouse (Approximately 33°59.0' N 133°16.3' E)
Summary of the accident	While the cargo ship "ISHIZUCHI" was unloading cargo at Niihama Port, a worker was hit by a bulldozer in the hold and died at around 03:39 on January 17, 2019.
Process and progress of the investigation	(1) Set up of investigation The Japan Transport Safety Board appointed a chief investigator-in charge and two other investigators to investigate this accident on February 5, 2019. (2) Collection of evidence February 24, 2019: On-site investigation; February 5, 6, 12, 20, 22, 23 and July 30, 2019: Interview; February 13, 21, March 6, 7, 2019, and January 20, 2020: Collection of questionnaire (3) Comments from parties relevant to the cause Comments on the draft report were invited from parties relevant to the cause of accident. (4) Comments from the Flag State Comments on the draft report were invited from the Flag State of ISHIZUCHI.
Factual information	
Vessel type and name	Cargo ship "ISHIZUCHI" (Republic of Panama)
Gross tonnage	43,605 gross tons
IMO number	9332793
Owner	Erica Navigation, S.A.
Management company	Toyo Sangyo Co., Ltd.
Class	NK
L×B×D, Hull material	219.19 m × 36.50 m × 18.50 m; steel

<p>Engine, Output Date of launch</p>	<p>Diesel engine; 9,855kW November 7, 2006</p>  <p>Photo 1 ISHIZUCHI</p>
<p>Information on the Vessel and on the cargo handling procedures</p>	<p>(1) Vessel information</p> <p>ISHIZUCHI (hereinafter referred to as “the Vessel”) was a bulk carrier that had five holds exclusively for coal, and could carry a maximum of approximately 77,000 tons of coal, and performed unloading by using cargo handling equipment on land.</p> <p>No. 5 hold of the Vessel was square sized with the side of about 36.5 m each and was located at the farthest point on the stern side. The hold had a ‘slope of about 45° from the bottom to a height of about 4.6 m on the side wall on both sides’ (hereinafter referred to as “bilge hopper plate”), and steel plates were placed at regular intervals on the side walls in the hold (hereinafter referred to as “frames”), and lifting equipment such as stairs was installed on the bow side (Figures 2 and 3).</p> <p>(2) Information on cargo handling equipment</p> <p>In the K6 berth of Sumitomo Chemical Co., Ltd. at Niihama Port (hereinafter referred to as “the Berth”), two land cranes were equipped to lift coal with a 4.5 m-wide grab bucket, and work lights that illuminated the interior of the hold were installed on both sides in front of the crane cockpit and above the grab bucket (Figure 4).</p> <p>(3) Information on unloading operations</p> <p>The cargo handling work of the Vessel were carried out by a total of two companies, i.e., Hamasaka Koun Co., Ltd. (hereinafter referred to as “Company A”), which concluded a cargo transportation contract with the shipper company, and another cargo handling company.</p> <p>Company A had a total of eight people engaged in cargo handling: one foreman who managed the entire cargo handling, two deck men who supervised cargo handling, four bulldozer operators, and the Worker called “<i>Otoshigo</i>” (= Scraper) that</p>

	<p>used a stick to scrape the coal remaining in the groove of the frame or wall (hereinafter referred to as “scraping work”).</p> <p>Company A had deck men onboard to issue commands in turn throughout the entire work, and when the amount of remaining coal in the hold decreased to about 1/10, the Scraper and two bulldozers were engaged in collecting the remaining coal from the hold. The scrappers were engaged in collecting the coal by scrapping so that the coal could be easily grabbed with a grab bucket (hereinafter referred to as “the cargo-hold-work”).</p> <p>Company A did not deploy a ‘bulldozer-guiding worker’ (hereinafter referred to as “guider”) in the hold. Instead, the company allowed the Scraper to perform their scrapings away from the bulldozer, and other non-engaged workers waited in the station on land.</p> <p>The deck man was monitoring the cargo-hold-work while sending necessary signal to the crane operator in the cockpit on the upper deck.</p> <p>The Scraper was working while sometimes taking a break.</p>
Crew information	<p>Master (nationality: Republic of the Philippines), male, 62 years old</p> <p>Endorsement attesting the recognition of certificate under STCW regulation I/10, Master (issued by the Republic of Panama)</p> <p>Date of issue: January 7, 2015 (valid until October 22, 2019)</p> <p>The Worker, male, 22 years old</p> <p>After joining Company A in 2015, he was mainly responsible for scraping work. When this accident occurred, he looked fit and in good health.</p> <p>Deck Man A, male, 50 years old</p> <p>After completing the skill training*¹ as the chief of onboard cargo handling in February 2006, he was appointed as the chief of onboard cargo handling and began to work as a deck man from around 2014.</p> <p>Until this accident occurred, he was often operating a bulldozer.</p>

*¹ “Skill training course for operation chief of stevedoring” refers to skill training course for having a qualified person make a command of workers according to the provision of Article 14 of the Industrial Safety and Health Act (Act No. 57 of 1972). In the provision, it is laid down that when the operator loads a vessel, unloads a vessel, or transfers cargo on a vessel (excluding vessels with a gross tonnage of less than 500 tons on which the work is carried out without using a lifting device), the chief worker shall be appointed from those who have completed the skill training concerned.

	<p>When this accident occurred, he was in good health.</p> <p>Operator A (operator of Bulldozer A), male, 26 years old</p> <p>In January 2012, he completed the skill training for operating vehicle-type construction machinery (for leveling, etc.)*2, and was operating a bulldozer since around 2014.</p> <p>Until this accident, he was also engaged in scraping work, and had experience in performing the cargo-hold-work together with the worker in the hold.</p> <p>At the time of this accident, he was in good health.</p>
Injuries to Persons	Death of one person (the Worker)
Damage	Not applicable
Weather and sea conditions	<p>Weather conditions: cloudy, Wind direction: southwest, Wind force: 1</p> <p>Sea conditions: calm, Tide: initial stage of rising tide</p>
Events leading to the accident	<p>The Vessel was boarded by the master and 20 other crew members (all crew members were Filipino). After loading approximately 76,000 tons of coal at Newcastle Port, Australia, the Vessel departed the port, and was moored to the Berth on starboard at about 15:05 on January 15, 2019.</p> <p>At around 01:30 on 16, Company A began unloading about 15,000 tons of cargo loaded in No. 5 hold.</p> <p>Of the two deck men, the deck man who had already been working (hereinafter referred to as “Deck Man B”) ordered the Worker to enter the hold at around 02:30 on 17, and then put two bulldozers (hereinafter referred to as “Bulldozer A” and “Bulldozer B”) into the hold one after another, whereby the cargo-hold-work was started.</p> <p>At about 03:20, Deck Man B took over a command of work on the upper deck of the Vessel from Deck Man A.</p> <p>Operator A positioned on the starboard side and the operator of Bulldozer B positioned on the port side (hereinafter referred to as “Operator B”) both confirmed that the Worker, after doing scraping work from the bow to the vicinity of the fifth frame on both sides by using a stick with a metal plate attached to the tip of this approximately 6 m-long bamboo stick (hereinafter referred to as a “stick”) had returned to a landing near the spiral staircase near the</p>

*2 Skill training for operating vehicle-type construction machinery (for leveling, etc.)” refers to skill training for the operation of leveling, transport, and loading machinery from among construction machinery specified in Appendix No. 7 of the Order for Enforcement of Industrial Safety and Health Act (Cabinet Order No. 318 of 1972), and for the engagement of relevant work.

	<p>bow surrounded by handrails (hereinafter referred to as a “waiting place”).</p> <p>Before this accident occurred, Operator A, Operator B, and Deck Man A had recognized the Worker holding a stick in the waiting place, but they did not notice that the Worker had later moved out of this place with the stick in his hand.</p> <p>At around 03:39, Operator A turned Bulldozer A to the stern and, while moving forward and backward, he was collecting coal on the starboard side into the center of the hold.</p> <p>Operator A, while moving backward near the starboard wall with his face turned to the right rear, noticed that a stick was leaning against the wall on the starboard side, which was on the left front of Bulldozer A. Then, when Operator A stopped Bulldozer A once and moved a little backward, he found the Worker had fallen down in front of Bulldozer A and shouted out to Deck Man A on the upper deck to call for an ambulance.</p> <p>Operator B thought something was unusual because Bulldozer A stopped operating. Then, he rushed in to acknowledge that the Worker was lying there unconscious. He was diving into the coal piled up as high as the surroundings near the center of the wall on the starboard side, with his head facing the port side.</p> <p>Deck Man A noticed this accident by being alerted by Operator A’s scream, and contacted by phone the foreman of Company A (hereinafter referred to as “the Foreman”), who was working on adjusting the amount of coal unloaded on the shore.</p> <p>The Foreman, receiving a phone call from Deck Man A, contacted the responsible division in the cargo handling facility, and the person in charge of the division informed the fire department of the city about this accident and requested for dispatching an ambulance.</p> <p>The Worker was taken to the hospital after a lifesaving operation was carried out by the ambulance crew inside the hold. And in the post-mortem examination, he was found to have died immediately due to multiple traumas.</p>
Additional information	<p>(1) Status of safety management at Company A</p> <p>Company A instructed the Scraper not to enter the forward/backward moving range of the bulldozer when carrying out his work in the cargo-hold, and the operator of the bulldozer was also advised to work while checking the position of the Scraper, thereby preventing any contact with the scrapper</p>

during the work.

Company A, though they did not prepare a clear manual for the cargo-hold-work, they instructed the Scraper:

- ① Not to enter the space under the grab bucket.
- ② To stay in the waiting place until the grab bucket is about 9 m away from the bow.
- ③ To move from the waiting place after waving a signal to the operator of the bulldozer.

During the cargo-hold-work at Company A, a signal was given to the bulldozer operator during work by the Scraper and by a deck man - by waiving and by blowing a whistle, respectively. Company A provided in-house safety training to workers about once a month to prevent accidents during work, though not necessarily regularly.

Bulldozer A could have checked the rear if the operator had turned his face backward from his seat. The bulldozer, however, was not equipped with either devices for checking the surroundings such as mirrors or alarm-issuing facilities allowing for the detection of the approaching Scraper toward the bulldozer.

Company A regularly had undergone specific voluntary inspection by the bulldozer manufacturer once a year, and it was pointed out in the inspection performed on October 25, 2018 that Bulldozer A was found to have malfunctioning headlights and malfunctioning buzzer during backward movements.

According to the Ordinance on Industrial Safety and Health, bulldozers were required to have headlights equipped, but if the workplace had enough illumination as required, it was allowed to operate a bulldozer with the headlights off.

The buzzer for backward movement equipped with Bulldozer A was installed by the manufacturer voluntarily, which was not an alarm device that must be equipped in irregular terrain vehicle structures as a standard item subject to the Industrial Safety and Health Act.

Company A did not judge it necessary to pointed-out the question of the defective part of Bulldozer A as an important issue in continuing the work, and so, no repair was made.

Before this accident occurred, there had not been any such accident in Company A in which the Scraper came into contact

	<p>with a bulldozer in the hold.</p> <p>(2) Situation of the accident occurrence, etc.</p> <p>No one witnessed this accident.</p> <p>The Worker was wearing work clothes, a helmet, safety shoes, a dust-proof mask and a reflective vest as designated by Company A.</p> <p>With regard to the cargo-hold-work, Deck Man A heard from other workers about a contact accident occurring during work between a bulldozer and a grab bucket in another company, and so he was paying attention to contact between Bulldozer A and the grab bucket when this accident occurred.</p> <p>In Operator A's experience, when performing the cargo-hold-work with this Worker, he never failed to appear in a position which was easily visible from the bulldozer and he always gave a signal. Never did he work in dangerous situations, such as moving within the operating range of a bulldozer.</p> <p>While Operator A was working near the side wall, he never expected the Worker to move nearer to the wall concerned. He did not even notice that the Worker had been hit by Bulldozer A.</p> <p>After this accident occurred, there remained traces of being run over by the caterpillar of Bulldozer A upon the body of the Worker having fallen into the coal, ranging from his helmet to the lower part of his body, and the coal was also left on the bilge hopper plate.</p> <p>Inside the hold, brightness was sufficient for performing the cargo-hold-work with the work lights of the Vessel and the land crane.</p> <p>(Figure 1: Map of location of the accident, Figure 2: General arrangement, Figure 3: Situation of the accident occurrence (image), Figure 4: State of the land crane, Figure 5: State of the cargo-hold-work)</p>
<p>Analysis</p> <p>Involvement of crew members</p> <p>Involvement of vessel, engine, etc.</p> <p>Involvement of weather and sea conditions</p> <p>Analysis of the findings</p>	<p>Applicable</p> <p>Unknown</p> <p>Not Applicable</p> <p>(1) Cause of death</p>

The Worker died immediately due to multiple traumas.

(2) Status of occurrence

It is highly probable that the Worker of Company A, while unloading coal in No. 5 hold at Niihama Port where the Vessel moored, was run over by Bulldozer A to death, when it was moving backward.

(3) Actions of the Worker

Although the Worker was instructed by Company A to keep out of the moving range of the bulldozer, it is highly probable that he moved from the waiting place to the center of the wall on the starboard side with a stick and was staying in the backward moving range of Bulldozer A.

When this accident occurred, the Worker was found with his head facing the interior of the hold and there remained the traces of him being run over, ranging from his helmet to the lower part of his body. Therefore, it is somewhat likely that he fell down and was hit during his work. However, since there were no witnesses, the situation could not be determined.

(4) Actions of Operator A

It is probable that Operator A thought that the Worker would not approach the vicinity of the wall while the bulldozer was working near the side wall, based on his own experience of performing scraping work by himself and the cargo-hold-work together with the Worker.

Although Operator A was instructed to carry out the work while checking the position of the Scraper, he did not acknowledge the signals from the Worker and Deck Man A at the time of this accident. And under the circumstances, it was probable that only the Scraper and two bulldozers were working in the hold, as a result of which he thought that the Worker was still in the waiting place and nobody was behind Bulldozer A, and the operator continued to move the Bulldozer backward in the vicinity of the wall on the starboard side without turning his face backward.

It is probable that Operator A did not notice the Worker in the rear.

(5) Actions of Deck Man A

Although Deck Man A, being the chief of cargo handling officer on board, was in a position to issue a command to the cargo-hold-worker directly, but his attention was focused on the

	<p>contact between Bulldozer A and the grab bucket, as a result it is probable that he did not notice the positional relationship between the Worker and Bulldozer A.</p> <p>(6) Safety management at Company A</p> <p>It is highly probable that although Company A instructed those who engaged in the cargo-hold-work to thoroughly enforce signals and informed them of the precautions to be taken during work, the instruction was not well known.</p> <p>Although Company A provided safety training for workers to prevent accidents during work, it is probable that the danger that could occur when an operator moves a bulldozer backward before confirming the position of the Scraper in the hold was not thoroughly known to the workers.</p> <p>The cargo-hold-work at Company A was carried out by each worker mutually confirming the signals, but a proper system was not established that enabled a bulldozer to stop immediately according to the position and actions of the Scraper. Because the company had no means for quick communication and the Scraper's situation was not grasped either.</p> <p>Since Company A was allowed to work with Bulldozer A's headlights off and without a buzzer when the bulldozer moves backward, it is probable that Company A neither judged the maintenance as important nor made any repairs.</p>
<p>Probable causes</p>	<p>It is probable that this accident occurred as follows: The Worker of Company A was unloading coal behind Bulldozer A in No. 5 hold in Niihama Port where the Vessel moored during nighttime, Operator A thought there was nobody behind the Bulldozer A and thus moved it backward, causing the Worker to be run over by Bulldozer A.</p> <p>It is probable that Operator A thought that there was nobody behind and moved Bulldozer A backward because there had been no signal given by either the Worker or Deck Man A.</p> <p>Deck Man A, who was paying attention to the contact between Bulldozer A and the grab bucket, did not notice the positional relationship between the Worker and Bulldozer A, and there was no system established for the cargo-hold-work that enables the bulldozer to stop immediately in response to the position and actions of the Scraper, as a result of which it is probable that this accident occurred.</p>

<p>Safety actions</p>	<p>1. Measures taken by Company A after this fatal accident</p> <p>Company A has put together safety work procedures for the cargo-hold-work and has made the signals and actions of the Scraper and heavy equipment operators in the hold thoroughly well-known as well as it has taken measures for keeping the Scraper out of places where a danger of contact may arise between the Scraper and vehicle-type construction machinery in operation.</p> <p>(1) The Scraper must carry a whistle, and when moving in the hold, he must give a signal to the operator of bulldozer with the whistle to stop the bulldozer and thereafter move to the required position.</p> <p>(2) The operator of bulldozer, when acknowledging the signal of the Scraper, must stop the bulldozer and confirm the position of the Scraper.</p> <p>(3) While a bulldozer works in an area where two bulldozers can stay side by side (about 2.7 m x 2), the Scraper must not enter the space between the side wall and heavy equipment in operation.</p> <p>(4) The Scraper must wear a light-emitting vest so that the deck man and bulldozer operator can find his whereabouts easily.</p> <p>2. Accordingly, the implementation of the following measures would help to prevent recurrence of a similar accident, etc.:</p> <ul style="list-style-type: none"> • The deck man, as the chief of cargo handling officer onboard, must grasp the positional relationship between the Scraper and the bulldozer, and determine the method of work for preventing the Scraper from entering the moving range of the bulldozer, and make a command of the work directly. • Company A is required to conduct internal safety education on a regular basis, and make it well known that the Scraper must not enter the moving range of the bulldozer. • Every time the bulldozer moves backward, its operator is required to point at the position of the Scraper, and the bulldozer must not move backward before the position of the Scraper is confirmed. • If Company A finds it difficult for one deck man to monitor the cargo-hold-work, it is desirable to deploy another person in charge of monitoring the work or guiding the bulldozer. • It is desirable for Company A to have each worker carry a radio so that the deck man can quickly and easily contact the
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	<p>Scraper and the operator of bulldozer.</p> <ul style="list-style-type: none">• It is desirable for Company A to repair the defective part of bulldozer, and to equip the bulldozer with the facilities for checking the surroundings and for issuing an alarm when the Scraper approaches the bulldozer.
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Figure 1 Map of location of the accident

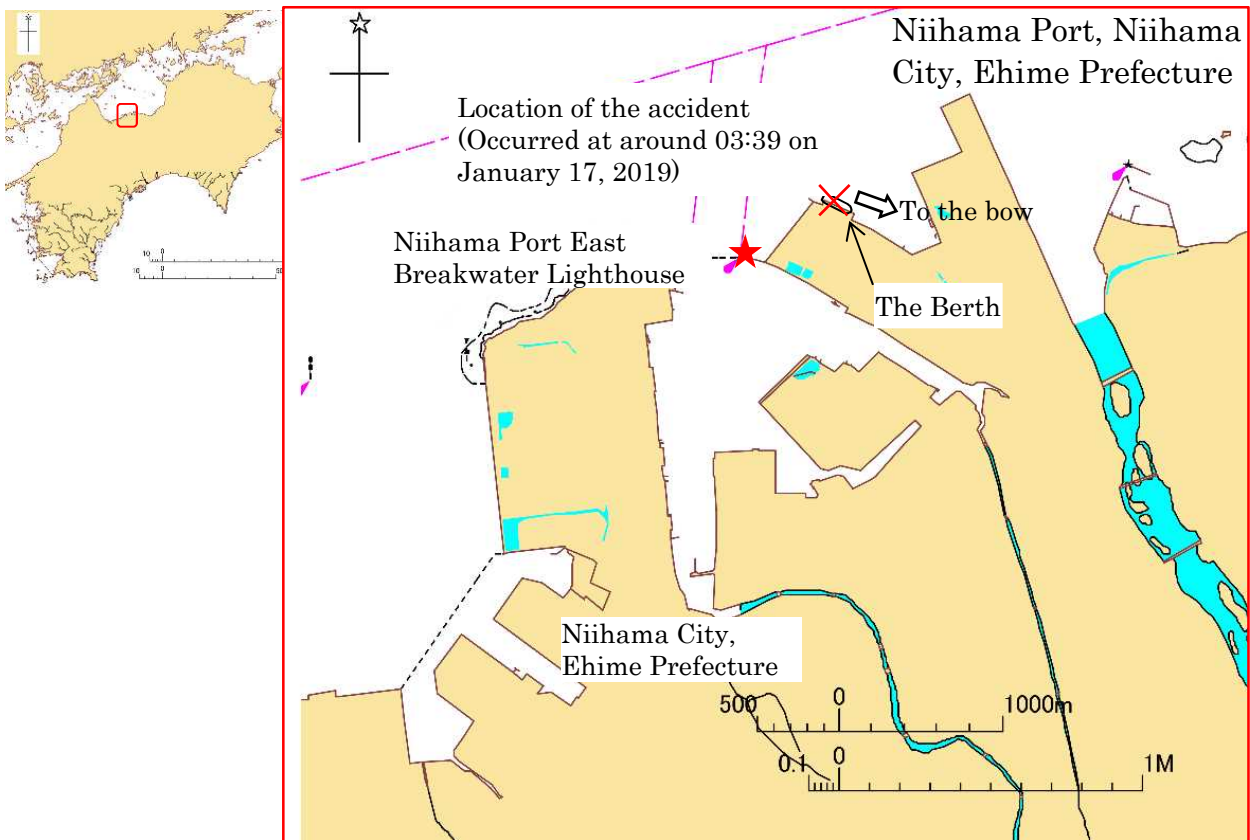


Figure 2 General arrangement

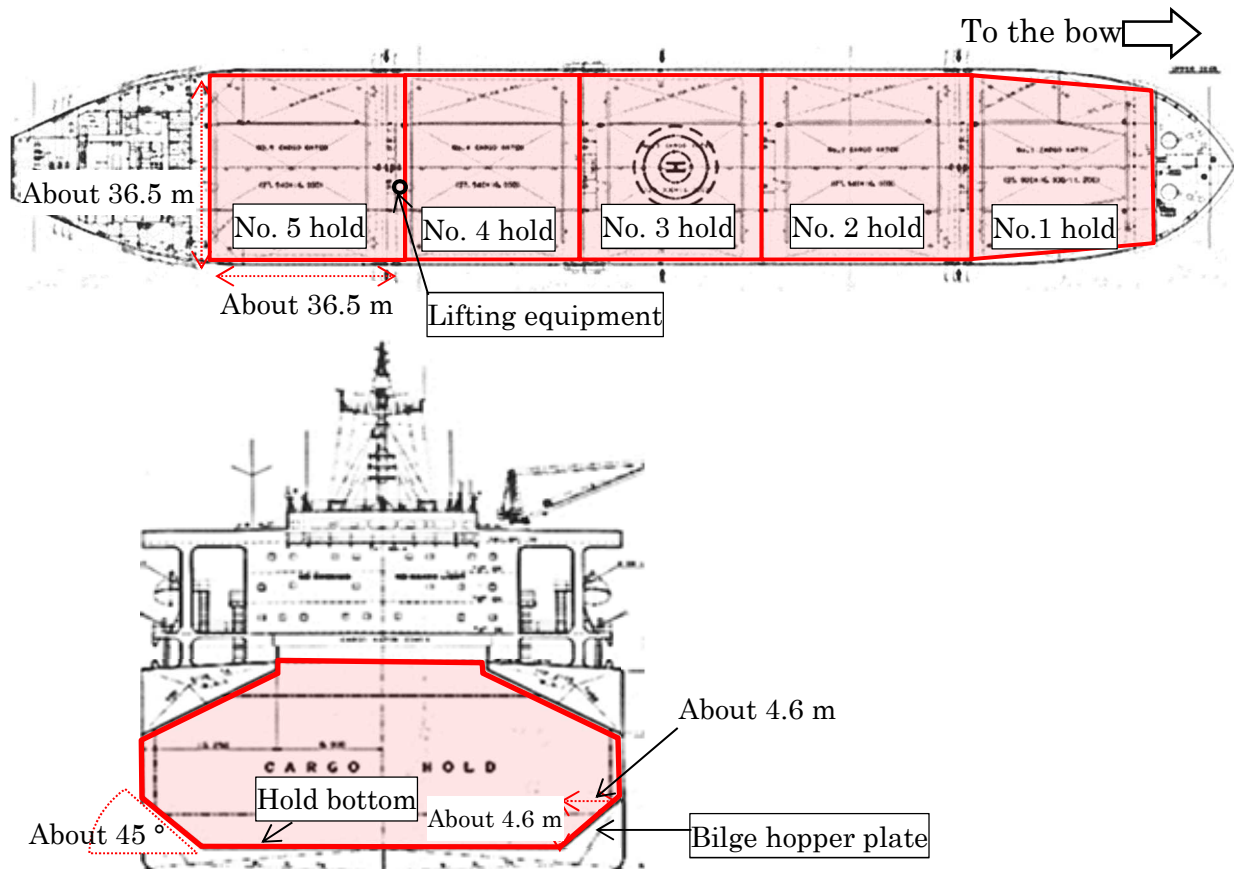


Figure 3 Situation of the accident occurrence (image)

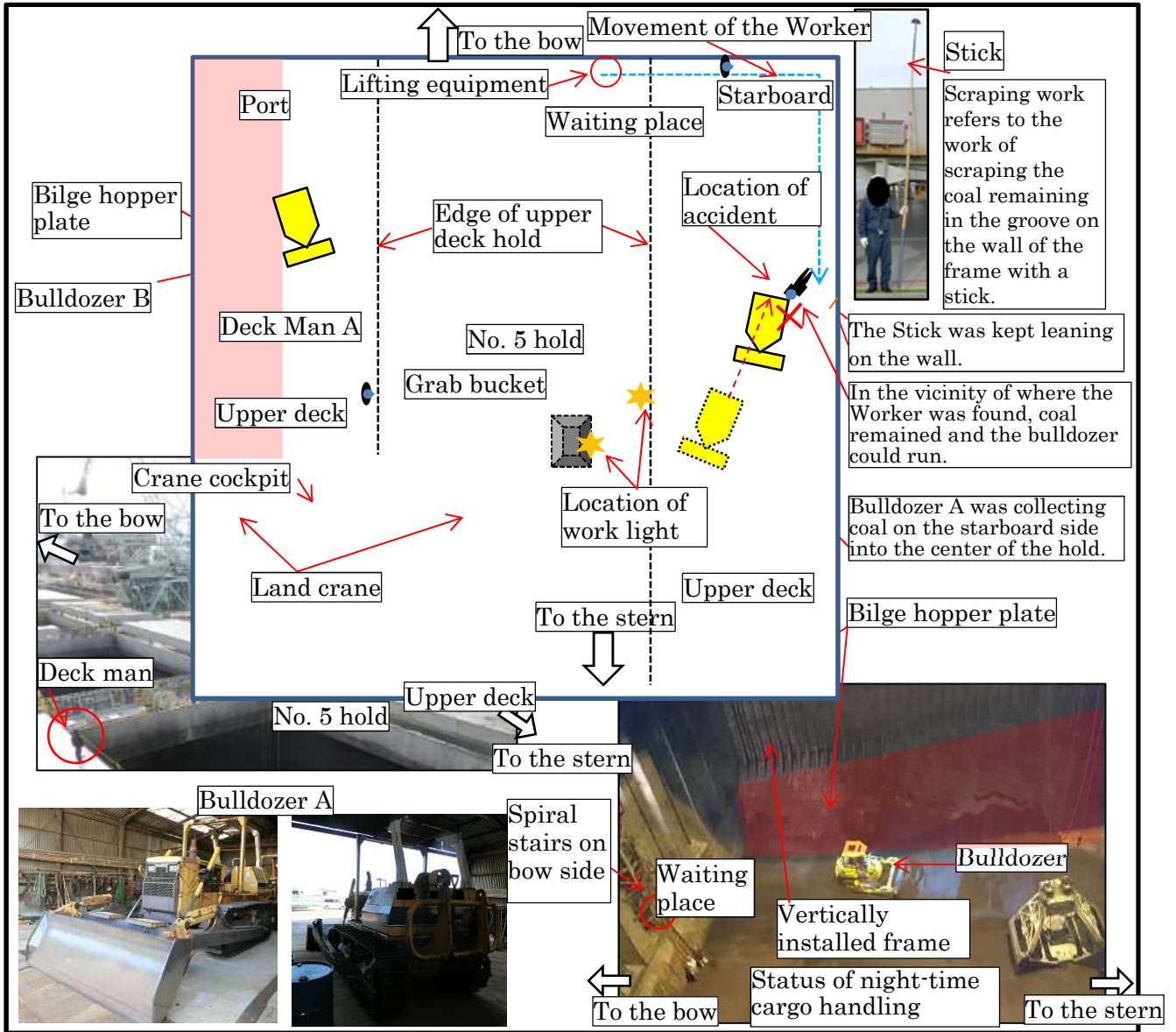


Figure 4 State of land crane

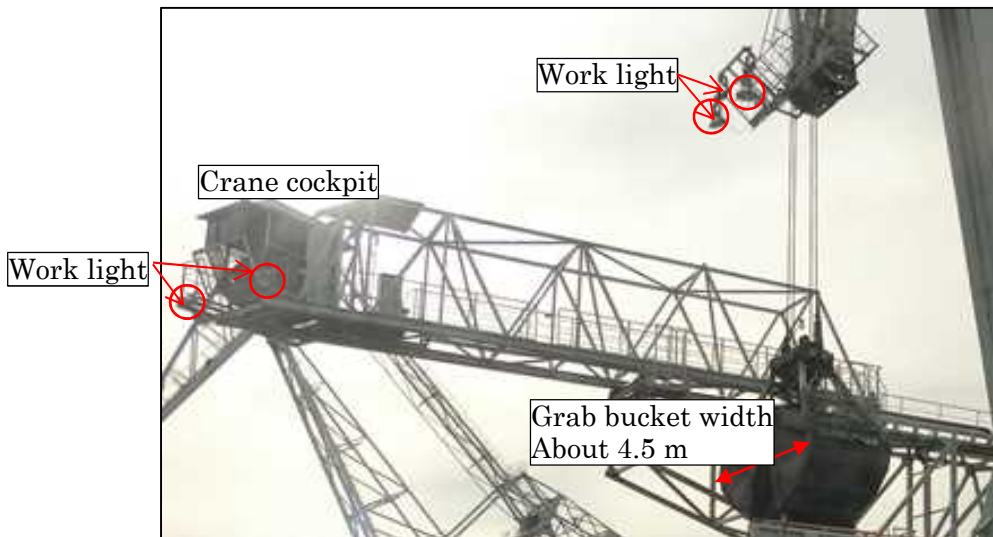


Figure 5 State of the cargo-hold-work (as seen from bow side)

