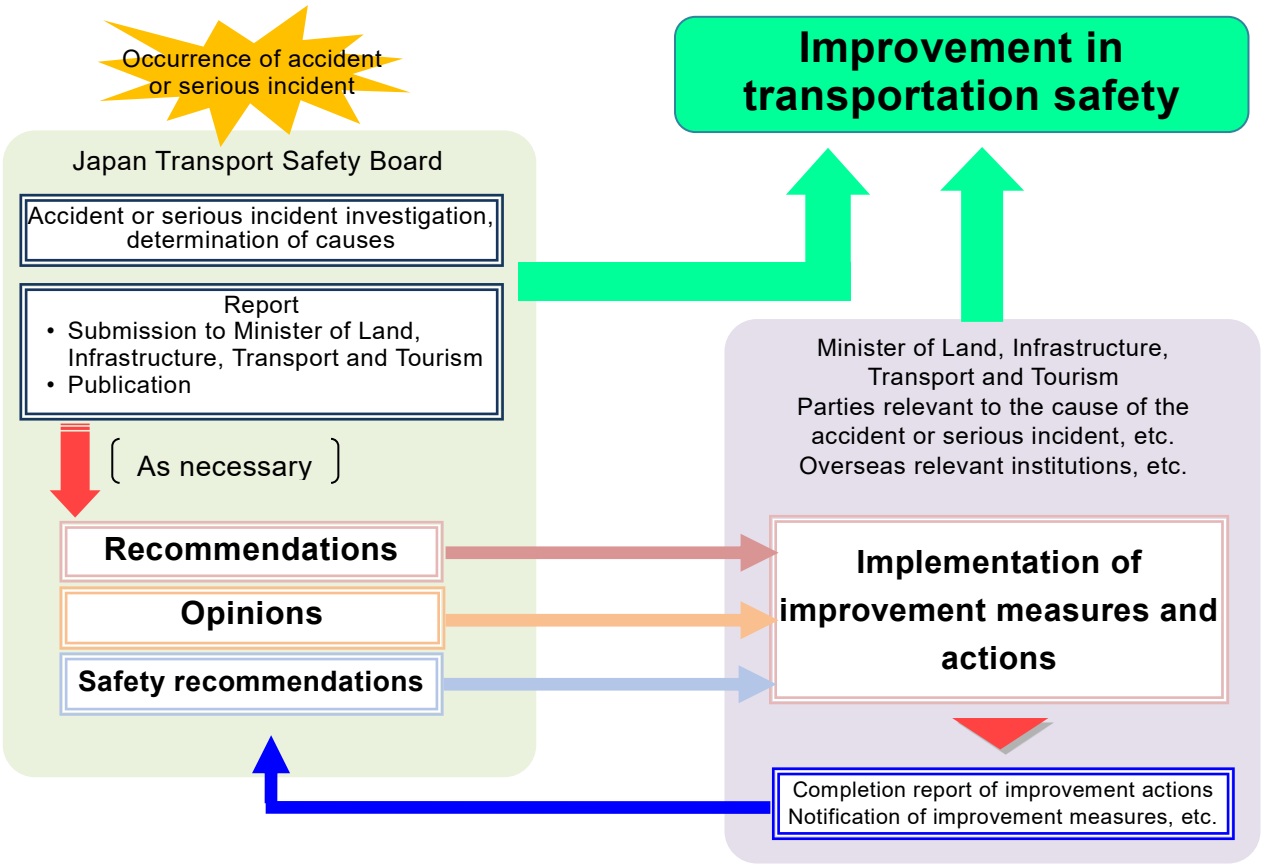
Chapter 1 Summary of recommendations and opinions issued in 2019

In order to fulfill the objectives of the law specified in Article 1 of the Act for Establishment of the Japan Transport Safety Board (hereinafter referred to as “Establishment Act”), the Japan Transport Safety Board has been established as an external bureau of the Ministry of Land, Infrastructure, Transport and Tourism based on the regulations of Paragraph 2, Article 3 of the National Government Organization Act (Article 3 of the Establishment Act). Its duty is to accurately conduct investigations identifying the causes of aircraft, railway, and marine accidents and serious incidents, as well as the causes of damage occurring due to those accidents and serious incidents, while also requesting required measures and actions to be taken by the Minister of Land, Infrastructure, Transport and Tourism or parties relevant to the causes of accidents or serious incidents, based on the results of its investigations (Article 4 of the Establishment Act).

The Japan Transport Safety Board has a system of "recommendations" and "opinions" as important systems along with accurate accident investigations in order to fulfill its mission of improving transportation safety. Specifically, the Japan Transport Safety Board has the ability to give recommendations to the Minister of Land, Infrastructure, Transport and Tourism or parties relevant to the causes of accidents or serious incidents, regarding measures that should be taken for the prevention of accidents or serious incidents, or for reducing their damage, based on the results of its accident investigations. The Minister of Land, Infrastructure, Transport and Tourism must provide notifications to the Japan Transport Safety Board on measures that have been taken based on its recommendations, and if parties relevant to the causes of accidents or serious incidents do not take measures in response to recommendations that have been given, the Japan Transport Safety Board has the ability to publicly disclose that fact (Articles 26 and 27 of the Establishment Act).

In addition to actions based on individual accident investigation results, if it is recognized to be necessary at an interim stage of investigations or from investigation results of multiple past accidents, the Japan Transport Safety Board has the ability to state its opinions to the Minister of Land, Infrastructure, Transport and Tourism or the directors of related government institutions regarding measures that should be taken to prevent accidents or serious incidents and to reduce their damage (Article 28 of the Establishment Act).

In the cases of aircraft and marine accidents and serious incidents, the Japan Transport Safety Board may provide recommendations (safety recommendations) on measures that should be taken quickly in order to improve safety, to related overseas institutions or parties as necessary in any stage of accident investigations, based on international treaties.



The recommendations and safety recommendations issued by the Japan Transport Safety Board in 2019 are summarized as follows.

1 Recommendations

(1) Aircraft accident involving a Socata TMB700 (a privately owned aeroplane)

(Recommendations on July 25, 2019)

Summary of the Accident

On Monday, August 14, 2017, a privately owned Socata TBM700, registered N702AV, took off from Yao Airport at 11:57 for the purpose of leisure flight under Instrument Flight Rules (IFR), deviated from the route instructed by an air traffic controller on the way to Fukushima Airport and crashed into a mountain forest in Yamazoe village, Yamabe-gun, Nara Prefecture after the last communication at 12:13, saying that it would return to Yao Airport.

A captain and a passenger were on board the aircraft and both were fatally injured.

The aircraft was destroyed and a fire broke out.

Probable Cause

In the accident, it is highly probable that the Aircraft lost control during flight, nose-dived while turning, and disintegrated in mid-air, resulting in the crash.

It is somewhat likely that the Aircraft lost control during flight, because the captain did not have pilot skills and knowledge necessary for the operation of the Aircraft, and was not able to perform proper flight operations.

Recommendations to the Minister of Land, Infrastructure, Transport and Tourism

In the accident, it is somewhat likely that the Aircraft lost control during flight, because the captain did not have pilot skills and knowledge necessary for the operation of the Aircraft, and was not able to perform proper flight operations. The captain had a valid Japanese competence certificate in this regard, and in case of the competence certificate in Japan, with regard to the aircraft not requiring the type rating, if the aircraft meet each class rating, pilots can be entitled to operate the aircraft within the scope of services in accordance with each qualification, regardless of the characteristics of each aircraft.

Therefore, in view of the identified matters of the accident investigation, in order to ensure the safety of aviation, the Japan Transport Safety Board recommends to implement the following measure pursuant to the provision of Article 26 of the Act for Establishment of the Japan Transport Safety Board to the Ministry of Land, Infrastructure, Transport and Tourism.

In order to prevent pilots from flying without skills and knowledge necessary for operating the respective aircraft, it is necessary for the Civil Aviation Bureau of the Ministry of Land, Infrastructures, Transport and Tourism to instruct the pilots to master the skills and knowledge required for operating the aircraft which the pilots have never flown before, even in case of operating the aircraft not requiring the type rating.

(2) Oil tanker HOUNMARU collision (bridge) accident

(Recommendations on April 25, 2019)

Summary of the Accident

The oil tanker HOUNMARU, with the master and 10 crew members on board, was anchored off the southeast of the Senshu Port under the situation where Typhoon No. 21 was approaching and a maritime typhoon warning was issued in the Seto Inland Sea including Osaka Bay, was struck by the strong winds which increased with the approach of the typhoon, and being drifted to the north dragging the anchor pushed by the strong wind. As a result, HOUNMARU collided with Kansai International Airport Access Bridge at around 13:40 on September 4, 2018.

HOUNMARU caused the deck of the starboard bow to be crushed, and Kansai International Airport Access Bridge caused the bridge of the road girder to be bent, broken, scratched, etc., the railway girder to be collapsed, the rail to be warped, the gas pipe to be broken, etc., but there were no casualties among the crew members.

Probable Causes

In this accident, while Typhoon No. 21 was approaching and a maritime typhoon warning was issued in the Seto Inland Sea including Osaka Bay, HOUNMARU continued single anchoring at the east side of the oil tanker berth (hereinafter referred to as "the Anchorage") located on the southwest side of the Senshu Port, Osaka Prefecture where Kansai International Airport Access Bridge is located about one nautical miles north of the southeast of the Kansai International Airport first Stage Airport Island (Kanku Island), for the purpose of typhoon evacuation. and HOUNMARU started to drift dragging the anchor pushed by the strong winds and waves with the approach of the typhoon.The master tried to stop anchor dragging using the main engine and it seemed the drift was stopped. He thought that he succeeded to stop anchor dragging so he kept the joystick HOVER position. As a result, HOUNMARU was again drifted and collided with Kansai International Airport Access Bridge in a situation where there was no sufficient distance to control HOUNMARU.

It is probable that the reason why HOUNMARU anchored at the Anchorage, which is located about 1 nautical miles north of the southeast of Kanku Island, was that the master thought that Typhoon No. 21 would pass the east side of the Anchorage and the left semicircle of the typhoon would enter the Anchorage, that the typhoon was traveling at a high speed and that strong wind would not blow for a long time, that other ships were anchored at the time of typhoon evacuation because the area was surrounded by the shore that the seabed material was mud and the anchor would be highly effective, that the next loading was planned to be carried out in the Sakai-Senboku Area of the Hanshin Port, and that he did not know the 2011 leaflet "Let's Prevent Anchor Dragging Marine Accidents." and did not recognize to anchor avoiding the sea area within three nautical miles from Kanku Island.

It is probable that the reason why HOUNMARU kept single anchoring at the Anchorage was that the master thought that the double anchoring would become entangled when the wind direction changed, and that he had the experience of using the main engine to cope with the typhoon wind.
It is probable that the master set the joystick in the HOVER position because he thought that the anchor was stopped when the GPS speed over the ground indicated on the radar became zero, and that HOUNMARU would move forward if the joystick was in the forward position.

It is probable that the reason why the HOUNMARU was drifted down again was that, under the situation where the forward thrust was lost due to the dispersion of the propeller thrust while the joystick was kept in the hover HOVER position, the anchor chain moved away from the seabed as the water depth increased due to the high tide, and the wind pressure on the hull and the wave drifting force increased.

It is somewhat likely that Hinode Shipping Co., Ltd. and Tsurumi Sunmarine Co., Ltd. were involved in the occurrence of this accident because they did not provide the master with confirmation of the rough anchoring, information on the typhoon and information on the anchorage, and did not discuss the safe operation.

Recommendations to Parties Relevant to the Cause of the Accident

In this accident, while Typhoon No. 21 was approaching and a maritime typhoon warning was issued in the Seto Inland Sea including Osaka Bay, HOUNMARU continued single anchoring at the east side of the oil tanker berth located on the southwest side of the Senshu Port, Osaka Prefecture where Kansai International Airport Access Bridge is located about one nautical miles north of the southeast of the Kansai International Airport first Stage Airport Island, for the purpose of typhoon evacuation, and HOUNMARU started to drift dragging the anchor pushed by the strong winds and waves with the approach of the typhoon. The master tried to stop anchor dragging using the main engine and it seemed the drift was stopped. He thought that he succeeded to stop anchor dragging so he kept the joystick HOVER position. As a result, HOUNMARU was again drifted and collided with Kansai International Airport Access Bridge in a situation where there was no sufficient distance to control HOUNMARU.It is somewhat likely that Hinode Shipping Co., Ltd. and Tsurumi Sunmarine Co., Ltd. were involved in the occurrence of this accident because they did not provide the master with confirmation of the rough anchoring, information on the typhoon, and information on the anchorage, and did not discuss the safe operation.

Based on the results of this accident investigation, the JTSB makes the following recommendations to Tsurumi Sunmarine Co., Ltd. pursuant to the provision of Paragraph 1, Article 27 of the Act for Establishment of the Japan Transport Safety Board in order to ensure the safety of ships and facilities in a stable manner.

(1) In order to prevent accidents due to anchor dragging during extremely strong typhoons, Tsurumi Sunmarine Co., Ltd. shall make following things thoroughly known to the master.

1. When a vessel is anchored, basically two anchors must be used and all possible measures must be taken to, for example, ensure that anchors and anchor chains provide secure sufficient anchor-holding power with the anchor chains extended as long as possible.
   The method of anchoring and the amount of extension of the anchor chain should be determined according to the situation of the ship (size, shape, type, cargo, etc.) and the environment of the anchor chain (congestion, bottom sediment, water depth, etc.).
2. It must be ensured that with the engine placed in a standby state, the output is appropriately adjusted by continuously using the engine according to rapidly changing wind directions and velocities so that anchor dragging will not be caused.
3. An anchorage must be chosen so that no important facilities will be located on the leeward side of the anchorage and that sufficient distances to other vessels will be secured.
4. Since the wind direction and wind velocity change rapidly when a typhoon passes, the latest weather information, sea state (typhoon) information, etc. have to be obtained to make accurate predictions.

(2) In the event that there is a risk of danger due to abnormal weather or sea conditions, Tsurumi Sunmarine Co., Ltd. shall provide necessary information to the vessels it operates, examine the safety of the vessels, and revise the operation plan as necessary, by establishing a safety support system.

*For details on the activities of the Japan Transport Safety Board, please see "Major activities in the past year 2" on page 2.

2 Opinions

(1) Opinions on the derailment accident at Nankai Electric Railway Co., Ltd Nankai Main Line

(Recommendations on January 31, 2019)

Summary of the Accident

On October 22, 2017, the outbound Local 6867 train, composed of 4 vehicles started from Namba station bound for Wakayamashi station, Nankai Line of Nankai Electric Railway Co. Ltd., departed from Tarui station on schedule at 16:38. While the train was operated in coasting at about 70 km/h on Onosatogawa bridge, the driver of the train noticed that the track about 50 m ahead had sagged, and applied the brake immediately but the train passed the sagged track and stopped after running for about 250 m.

It was found in the investigation implemented after the occurrence of the accident, that the 2nd axle in the rear bogie of the 3rd vehicle of the train derailed to right on Onosatogawa bridge, and restored after that.

In addition, the pier No.5 of the down track of Onosatogawa bridge had been subsided and tilted, and the track had been sagged and wound. There were about 250 passengers and 2 train crews, i.e., the driver and the conductor, onboard the train, among them 5 passengers were injured.

Probable Cause

It is highly probable that the accident occurred as the 2nd axle in the rear bogie of the 3rd vehicle had derailed to right because the train was running on the track on the bridge significantly deformed by the subsided and tilted pier, after that, the derailed axle restored in the level crossing while passed as being derailed.

It is probable that the pier had subsided and tilted because the ground in around the pier was scoured in wide area by the swollen river water at the time of the occurrence of the accident, while the function to protect the piers from scouring had already been deteriorated before the occurrence of the accident, such as the subsided riverbed in around the pier caused by the concentration of the river water due to the change of the water route, damages of the foot protection as the scour protection work, etc.

It is probable that the deterioration of the function to protect scouring was related with that the measures such as the repair, reinforcement, etc., of the foot protection were not implemented, because the evaluation for the unusual status were not implemented sufficiently, even though the unusual status of the foot protection of the pier was recognized in the inspection of the piers.

Opinions to the Minister of Land, Infrastructure, Transport and Tourism

In view of the result of the accident investigation, the Japan Transport Safety Board expresses its

opinions as follows to the Minister of Land, Infrastructure, Transport and Tourism pursuant to Article 28 of the Act for Establishment of the Japan Transport Safety Board in order to contribute the prevention of recurrence of the accidents of the same kind.

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It is highly probable that the vehicle derailed because the train ran on the track significantly deformed due to the subsided and tilted pier by the occurrence of the scouring in around the pier by the swollen river water, in the concerned accident.

The foot protection had been constructed as the scour protection work to the piers, and Nankai Electric Railway Co. Ltd. had been implemented the diagnosis of the piers by the impact vibration test, as already recognized the unusual status of the pier before the occurrence of the concerned accident. To review the occurrence of the concerned accident, the impact vibration test is the effective method to diagnose the healthiness of the pier at that time, but it suggested that there is the possibility to cause the result to overlook the deterioration of the protecting function of the scour protection works by the swollen water in the future, based on only the diagnosis by the impact vibration test.

In order to prevent the same kind of the scour disasters, it is important to study on the measures by implementing the inspection process properly referring the Standards for Management of Maintenance for Railway Structures, etc., Structure Edition, as the guide line, and to implement the precise investigation steadily for the scour protection works in the individual inspection if necessary. As the Standards for Management of Maintenance for Railway Structures, etc., Structure Edition, have been made well known from the Railway Bureau of the MLIT to the railway and tramway operators by the "On the Establishment of the Standards for Management of Maintenance for Railway Structures", notification from the chief of the Railway Bureau issued on January 16, 2007, the following points should be made well known in the railway and tramway operators having the river bridges, considering that the scour disaster may cause the serious accident, based on the occurrence of the concerned accident.

1. When implement the inspection of the bridges, the Standards for Management of Maintenance for Railway Structures, etc., Structure Edition, should be used as the guideline, and refer to the comments of the Standards on the inspection method, the judging method of the healthiness and the measures, etc. When the unusual status of the scour protection works, etc., were found in the general inspection, implement the judgement of the healthiness considering the inspected results for the scour protection works and judge the necessity of the individual inspection. When the individual inspection was judged as needed, implement the precise inspection for the status around the pier and the maintained status of the protecting function for the scour protection works and study the necessity and the urgency of the measures, then implement the measures systematically.

2. In the comments of the Standards for Management of Maintenance for Railway Structures, etc., Structure Edition, the "marking table to pick up bridges scoured easily" was proposed. The marking table is the optional material in order to pick up the bridges having risks to cause the scour disaster, however, implement the judgement of the necessity of the individual inspection properly and steadily referring to the similar marking table.

Measures based on the opinions

The Japan Transport Safety Board stated its opinion to the Minister of Land, Infrastructure, Transport and Tourism on January 31, 2019, and was notified on September 27, 2019 of the measures taken based on the opinion as follows.

○ Measures taken by the Ministry of Land, Infrastructure, Transport and Tourism based on opinions

Regarding the subject matter of the opinions provided in UN-I-SAN No. 165 dated January 31, 2019, this is to provide notification, with associated materials, that the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) issued " Regarding Response to the Opinions of the Japan Transport Safety Board" (KOKU-TETSU-GI No. 137 and KOKU-TETSU-SHI No. 211) and " Regarding Railway Accident Investigation Reports,etc., of the Japan Transport Safety Board (Published in January)" (administrative communication) on January 31, 2020. MLIT made the railway accident investigation reports and the content of the Japan Transport Safety Board's opinions fully known to railway operators. Additionally, with regard to the Opinion, MLIT instructed railway operators to complete the following items.

1) When conducting the inspection of bridges, the Maintenance Standards for Railway Structures and Commentary(Structure Edition) shall be used as a guideline, and the explanation of the standard shall be referred to for the inspection method, soundness judgment method and measures.

2) When judging the soundness of the bridge, if the alteration of the scour protection work, etc. is confirmed in the general inspection, the necessity of the individual inspection shall be judged using the "Grading Table for Extracting Bridges Susceptible to Scour" shown in the explanation of the Maintenance tandard for Railway Structures Commentary (Structure Edition).

3) When an individual inspection is judged to be necessary, a detailed investigation shall be conducted covering the situation around the bridge pier and the maintenance condition of the protective function of the scour protection work, the necessity and urgency of countermeasures shall be examined, the soundness of countermeasures shall be determined, and countermeasures shall be systematically implemented in accordance therewith.

Besides, the above-mentioned notice also stated that a study is under way to make the scoring table easier to use in light of this case and other factors. However, it is also stated that the implementation system has been established and concrete studies are expected to begin.

In order to ensure that efforts to prevent train derailment accidents by scour around bridge piers will take root in the future, the Government of Japan will continue to provide guidance to sub-rail track operators through regional transport bureaus.

* The contents of the notice, including related materials, are posted on the JTSB website.

http://www.mlit.go.jp/jtsb/railkankoku/railway-iken5re-1_20191031.pdf

(2) Opinion on Crew Injury Accident at Fishing vessel SEIRYOMARU No.3

(Opinions on August 29, 2019)

Summary of the Accident

At around 04:30 on September 14, 2018, the Fishing Vessel SEIRYOMARU No. 3, boarded by the chief fisherman, the master and three other crew members, anchored off the west of Oshima Island, Amakusa City, Kumamoto Prefecture, was seriously injured when the chief fisherman was caught in a side roller.

Probable Cause

It is probable that this accident occurred while the SEIRYOMARU No. 3 was anchoring off the west of Oshima Island, Amakusa City at night, hauling the net by adjusting the winding of the net with the bow side and the stern side roller for gathering a school of the fish to the bow side and making the bottom of the net flat, the chief fisherman who wore rubber gloves tried to fix the net to the stern side roller while the stern side roller was rotating, and so that the fingertips of the rubber gloves on the left hand were caught between the hauling net and the stern side roller, and then the left arm was got caught in the stern side roller.

It is probable that the reason why the chief fisherman tried to fix the net to the stern side roller by himself was because the lifting of the net was proceeding by the stern side roller rather than the bow side roller, and because the bow side of the net became heavy due to the uneven distribution of the fish in the net therefore the crew members except the chief fisherman, who were working to lift the net into the ship by pushing the net to the top of the side roller rotating toward the stern side at the most aft work position, had moved toward the net with the bow side roller.

It is probable that the reason why the chief fisherman wore rubber gloves and tried to fix the net to the stern side roller while the stern side roller was rotating was that he was impatient because he wanted to return to the port as soon as possible and secure a pier with good conditions for landing because of good fishing and prolonged operation time, and that he was used to the work.

Contents of Opinions to the Director-General of the Fisheries Agency

The Japan Transport Safety Board, based on the provisions of Article 28 of the Act for Establishment of the Japan Transport Safety Board, expresses its opinions as follows, taking into consideration the status of occurrence of similar accidents.

If any measures are taken in response to this opinion, please notify us of the details.

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The Director-General of the Fisheries Agency, who has formulated the Basic Plan for Fisheries based on the Fisheries Basic Act and is working to strengthen safety measures for fishing operations by fishing vessels, in view of the situation in which similar accidents have repeatedly occurred in round haul net fishing vessels and stick-held dip net fishing vessels that use side rollers during lifting net poeration, should disseminate the following patterns of similar accidents and measures to prevent their recurrence, which have been clarified in the accident investigation by the Japan Transport Safety Board, and strongly encourage the implementation of measures to prevent their recurrence, including the introduction of emergency stop devices for side rollers, to further improve safety in these fishing operations by fishing vessels.

1. Patterns of similar accident

(1) When preparing to take a school of fish in a net into a fish tank, an operator tried to fix the net to the side roller by manually passing a part of the net hauled by the side roller through the gap between the side roller and the bulwark and sandwiching it between the net and the side roller.

(2) When hauling the nets onto the vessel using the side rollers, a part of the nets hauled onto the vessel came out from between the side rollers and the bulwarks to the outside of the vessel, and was caught between the hauling nets and the rotating side rollers (hereinafter referred to as "Sakasamaki").

2 Safety Actions for Similar Accidents

(1) The hem and the cuff of crew members' jackets should be tightened to prevent them from being caught in the side rollers.

(2) A person in charge of operation shall be attached to the operation lever of the side roller, and the person in charge of operation shall be made to constantly monitor the status of the work performed by the side roller so that the side roller can be stopped immediately in the event of an abnormality.

(3) When fixing the net, the side roller shall be stopped once, and the operator who is fixing the net and the operator in charge of operating the operation lever of the side roller shall talk to each other and carry out the work in cooperation.

(4) The operator who fixes the net wearing gloves shall remove the gloves when fixing the net, because the fingertips of the gloves may be caught between the net during the hauling net and the rotating side rollers.

(5) The following measures shall be taken to Sakamaki winding and efforts shall be made to prevent

Sakasamaki.

① The condition of the net shall be carefully observed. If any part of the net is found to be in a condition that Sakasamaki may occur, the side rollers shall be stopped immediately to eliminate the condition.

② The scratches on the rubber part of the side roller surface shall be repaired as appropriate.

③ When a part of the net hauled into the ship is exposed to the wind and a reverse wind could be occured, a sheet for the wind shield shall be spread on the deck.

④ To prevent a part of the net hauled onto the ship from folded on the bulwark.

⑤ If a bundle of nets is wound up with a side roller, a part of the net hauled on board may be twisted to cause Sakamaki. Therefore, the net should be hauled on board while leveling the net on the side roller.

(6) Even if a person in charge of operation is attached to the operating lever of the side roller, it is highly probable that the appropriate operation of the operating lever may not be performed or that the side roller cannot be stopped immediately as follows. Therefore, it is desirable to introduce an emergency stop device for the side roller for further safety improvement.

① When the operator's hand, etc, is caught between the hauling net and the rotating side roller during the hauling operation using the side roller, the operation lever may not be operated properly under the urgent condition.

②Since Sakasamaki can occur in various situations, it is difficult to predict or prevent all of them. If Sakasamaki occurs suddenly and the hand of an operator who hauls the net onto the ship using the side roller is caught between the net being hauled and the rotating side roller, it is not easy to stop the side roller immediately with the operation lever.

(7) In round haul net fishing vessels that use side rollers for hauling nets, it is desirable to introduce equipment exclusively for fixing nets as an alternative to fixing nets to side rollers.

(8) A side roller, an emergency stop device for a side roller, or dedicated equipment for fixing a net shall be used in accordance with the handling specified by the manufacturer of each equipment.

3. Safety Recommendations

(1) Cargo vessel ERIK Crew fatality

(Safety Recommendations on February 28,2019)

Summary of the Accident

At around 17:26 on September 18, 2018, while the cargo vessel ERIK was moored at the Mitsubishi Naoshima wharf, with the master and 14 crew members on board, 4 crew members were performing the cleaning work of the upper hatch coaming of the cargo holds after unloading cargo, and an able seaman fell from the upper deck to the bottom floor of the cargo hold. The able seaman was pronounced dead after being conveyed from the cargo hold.

Probable Causes

It is considered probable that this accident at around 17:26 on September 18 when Crew Member A fell forward and fell from the upper deck to the bottom of the cargo hold bottom occurred because Crew Member A was working while being in an unstable posture on the Ladder when the vessel was doing the cleaning work while the vessel was moored at Mitsubishi Naoshima wharf. It is considered probable that the vessel carried out the cleaning work by the methods that differed from the Ladder guidelines of the CSWP, and that because there was nothing to support his upper body on the Ladder, Crew Member A was performing the cleaning work while being in an unstable posture on the Ladder. It is somewhat likely that Company A was insufficient in monitoring that the crew members clearly understood the Ladder guidelines of the CSWP and then applied and performed the Ladder guidelines in the cleaning work, because the vessel carried out the working methods being different from the Ladder guidelines in everyday work.

Safety Recommendations

In view of the results of this accident investigation, the Japan Transport Safety Board recommends that Krey Schiffahrts GmbH Co. KG, which is the Management company of the cargo vessel ERIK, takes the following measures for the purpose of preventing the occurrence of a similar accident and reducing damage.

1. Krey Schiffahrts GmbH & Co. KG should have the master of the ERIK supervise the crew members to certainly take preventive measures for fall accident in “the cleaning work of the upper hatch coaming of the cargo holds on the upper deck”.
2. The master of the ERIK and Designated Person Ashore of Krey Schiffahrts GmbH & Co. KG should implement the risk assessment of “the cleaning work of the upper hatch coaming of the cargo holds on the upper deck” on an individual work basis, and Krey Schiffahrts GmbH & Co. KG should take the necessary measures for the ERIK to prevent fall accidents by using a safety harness, etc. based on this assessment.
3. Krey Schiffahrts GmbH & Co. KG should have all the vessels operated by the Company observe the portable ladder guidelines in the chapter “WORK AT HEIGHT” of the “Code of Safe Working Practices for Merchant Seafarers”. On the other hand, Krey Schiffahrts GmbH & Co. KG should take other safety measures for all the vessels operated by the Company including changing the use of the portable ladder if it seems that it is difficult to conform to the portable ladder guidelines in the cleaning work.

4. Krey Schiffahrts GmbH & Co. KG should enhance monitoring of safety education that covers such as appropriately wearing a helmet in all the vessels operated by the Company.

(2) Chemical Tanker GOLDEN SUNNY HANA: Explosion (Cargo oil tank) Accident

(Safety Recommendations on March 28, 2019)

Summary of the Accident

At around 10:05 on April 8, 2018, as the chemical tanker GOLDEN SUNNY HANA, with a master and 14 crew members on board, was proceeding southeast off to the southeast of Kunisaki Port, Oita Prefecture, while conducting cleaning work in a cargo oil tank, an explosion occurred in the cargo oil tank. Two of GOLDEN SUNNY HANA's ordinary seamen were injured and her cargo oil tanks had holes and other damage. At around 10:05 on April 8, 2018, as the chemical tanker GOLDEN SUNNY HANA, with a master and 14 crew members on board, was proceeding southeast off to the southeast of Kunisaki Port, Oita Prefecture, while conducting cleaning work in a cargo oil tank, an explosion occurred in the cargo oil tank. Two of GOLDEN SUNNY HANA's ordinary seamen were injured and her cargo oil tanks had holes and other damage.

Probable Cause

It is probable that the accident occurred when, as the Vessel was conducting the Circulation Work in the No. 2 port cargo oil tank and the No. 2 starboard cargo oil tank during cargo oil tank cleaning work while off to the southeast of Kunisaki Port, Oita Prefecture, an explosion occurred in the No. 2 port cargo oil tank because steam was injected into the No. 2 port cargo oil tank under conditions in which a combustible gas mixture of vaporized pyrolysis gasoline and air in the explosive range was present.

It is probable that the presence of the combustible gas mixture of vaporized pyrolysis gasoline and air in the No. 2 port cargo oil tank was not noticed because the gas concentration in the No. 2 port cargo oil tank was not measured prior to cleaning of the cargo oil tanks. It is somewhat likely that the combustible gas mixture was within the explosive range because flushing of the cargo lines and cargo oil tank bottoms was conducted under conditions in which ventilation and other measures were not implemented even though the gas concentration measurement taken after unloading was within the explosive range and approximately 30 liters of pyrolysis gasoline subsequently remained in both the No. 2 port cargo oil tank and the No. 2 starboard cargo oil tank, and the vaporized pyrolysis gasoline was not expelled outside, its gas concentration increased further with the passage of time, and it became mixed with air. It is probable that steam was injected into the No. 2 port cargo oil tank with the intention of raising the temperature of the seawater used in the work of repeatedly pumping up liquid collected on the cargo oil tank's bottom with a pump installed in the cargo oil tank and then spraying the liquid with the cleaning machine.

Safety Recommendations

It is probable that an explosion occurred in the No. 2 port cargo oil tank when the chemical tanker GOLDEN SUNNY HANA was conducting circulation work in the No. 2 port cargo oil tank and the

No. 2 starboard cargo oil tank during cargo oil tank cleaning work while off to the southeast of Kunisaki Port, Oita Prefecture. It is somewhat likely that the explosion occurred in the No. 2 port cargo oil tank because, under conditions in which a combustible gas mixture of vaporized pyrolysis gasoline and air in the explosive range was present in the No. 2 port cargo oil tank and measurements of gas concentration and ventilation with ventilation equipment were not being conducted, electrically-charged steam was injected into the No. 2 port cargo oil tank and discharged, a spark was generated, and ignited the combustible gas mixture.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends that HNCC Co., Ltd., which is the owner of GOLDEN SUNNY HANA, take the following measures for the purpose of preventing the occurrence of a similar accident: HNCC Co., Ltd., should instruct crew members on chemical tankers on which combustible gas mixtures are present in cargo oil tanks to consistently execute the following.

(1) Sufficiently provide ventilation with ventilation equipment after the flushing of cargo lines and cargo oil tank bottoms.
(2) Measure gas concentration before cleaning work and during cleaning work, cease work immediately when a measurement is in the explosive range, and continue work after providing ventilation with ventilation equipment or introducing inert gas and then confirming safety.
(3) Consider the danger of static electricity present in cargo oil tanks and do not inject steam if safety cannot be confirmed.

(3) Collision (Bridge) Accident of Cargo ship ERNA OLDENDORFF

(Safety Recommendation on October 31, 2019)

Summary of the Accident

At around 00:27 on October 22, 2018, the cargo ship ERNA OLDENDORFF was proceeding east in Obatake Seto toward a privately-operated berth in Etajima City, Hiroshima Prefecture, with a master, a second officer and 19 other crewmembers aboard when she collided with Oshima Bridge. ERNA OLDENDORFF received dents and other damage to three of her four cranes as well as a bent damage to her aft mast; however, there were no fatalities or injuries on the Vessel. Oshima Bridge suffered cracks, dents, and other damage to its girders; an inspection passage that was installed under its girders was broken and fell, and a water pipe was severed, causing a water outage that lasted for forty days affecting almost all of Suo-Oshima Town, Yamaguchi Prefecture; power cables, communication cables and others were severed as well.

Probable Causes

It is probable that the accident occurred when, while ERNA OLDENDORFF was proceeding east in Obatake Seto at night, she collided with Oshima Bridge because she proceeded under a bridge that she was unable to pass through at ‘the heights above the water line at the time of the accident to the top of each cargo crane and the aft mast’ (hereinafter referred to as “the height of crane and mast”).

It is probable that ERNA OLDENDORFF proceeded under Oshima Bridge which she was unable to pass through at the height of her cranes and mast because the Master of ERNA OLDENDORFF

approved the voyage plan, including the route from Onsan to Etajima by way of Obatake Seto, which was prepared by the Second Officer, without being aware of the height of Oshima Bridge, and the Master continued navigating while feeling uncertain about the bridge's height after getting close to the bridge. It is probable that the Master approved the voyage plan, including the route from Onsan to Etajima by way of Obatake Seto, which was prepared by the Second Officer, without being aware of the height of Oshima Bridge because the Master did not check the details of the route assuming that the former master had already checked it.

It is probable that the Master continued navigating while feeling uncertain about the bridge's height after getting close to the bridge because he waited for a report from the Second Officer after the Master ordered the Second Officer to check the height of the bridge, and the Master was concerned that ERNA OLDENDORFF would be pushed toward shore by the westerly current in the situation that the navigable width became narrower after she turned to starboard off the west of Kasasa Shima. It is somewhat likely that although the OLDENDORFF Carriers GmbH & Co.KG specified the procedures of voyage planning, etc. in the Safety Management Manual,etc., the Master and the Second Officer were insufficiently aware of the importance of complying with them, a situation that contributed to the occurrence of this accident.

Safety Recommendation

It is probable that ERNAOLDENDORFF proceeded under Oshima Bridge, which she was unable to pass through at the height of her cranes and mast, because the Master approved the voyage plan, including the route from Onsan to Etajima by way of Obatake Seto, which was prepared by the Second Officer, without being aware of the height of Oshima Bridge, and the Master continued navigating while feeling uncertain about the bridge's height after getting close to the bridge. It is somewhat likely that although the OLDENDORFF Carriers GmbH & Co.KG specified the procedures of voyage planning, etc. in the Safety Management Manual,etc., the Master and the Second Officer of ERNA OLDENDORFF were insufficiently aware of the importance of complying with them, a situation that contributed to the occurrence of this accident.

Therefore, based on the result of the accident investigation, the Japan Transport Safety Board recommends to the OLDENDORFF Carriers GmbH & Co.KG and the authorities of Republic of Malta as follows.

(1) The OLDENDORFF Carriers GmbH & Co.KG is recommended to thoroughly conduct education and training for masters and other crewmembers to ensure voyage planning and implementing in compliance with the Safety Management Manuals revised after the accident.

(2) The authorities of the Republic of Malta are recommended to instruct the OLDENDORFF Carriers GmbH & Co.KG to ensure proper and continuous implementation of above (1).

(4) Collision (Seawall) Accident of Cargo ship, MARINA

(Safety Recommendations on December 19, 2019)

Summary of the Accident

Under the situation where Typhoon No. 24 was approaching, while being anchored at an anchorage in Yokohama section, Keihin Port, acargo ship, MARINA, with 12 crew members, including the master, dragged the anchor and drifted toward to the northeast, and collided with the seawall at Ogishima, Kawasaki section. MARINA suffered dents, etc. to her starboard stern. The seawall suffered collision damage, etc.

Probable Causes

It is probable that in the accident, while being anchored in ballast at Anchorage Y1 at the Keihin Port for the purpose of evacuating from the typhoon under the situation where, during nighttime, Typhoon No. 24 was approaching and a typhoon warning had been announced for the northern part of the waters of the Kanto District, including Tokyo Bay, the vessel dragged anchor when wind waves caused by the typhoon increased because she continued riding at single anchor and that the master set the main engine to full ahead but the vessel could not achieve sufficient forward thrust and drifted toward and collided with the seawall.

Safety Recommendations

In view of the results of this accident investigatiFon, the Japan Transport Safety Board makes the following recommendations to CREDIT OCEAN SHIPPING CO., LTD, which is the management company of the cargo ship, MARINA, for the purpose of contribution to prevention of the recurrence of similar casualties and alleviation of damages:

CREDIT OCEAN SHIPPING CO., LTD shall inform all the vessels it manages of the following safety actions and instruct them to implement those actions without failure:

1. Ensure sufficient holding power with the anchor and chain cable by extending the chain cable to the extent possible during anchoring and let go the anchor on the other side as needed during riding at single anchor to utilize it as an "anti-swinging anchor"
2. Place the main engine on standby in advance, continuously use the main engine and rudder in response to the wind direction and velocity that rapidly change, and maneuver the vessel to have the bow face the wind to restrain swinging motion.
3. Conduct accurate prediction by obtaining the latest weather information, sea condition (typhoon) information, etc. as wind direction and velocity rapidly change at the time of passage of a typhoon.