ANNUAL REPORT 2023

Japan Transport Safety Board
Annual Report 2023
[March 2023]

JTSB Japan Transport Safety Board

Celebrating 15 Years of the Transportation Safety Board

The Japan Transport Safety Board (JTSB) was established in October 2008 as an administrative organ under Article 3 of the National Government Organization Act, the so-called Article 3 organ, by integrating the then Aircraft and Railway Accidents Investigation Commission and the investigation functions of the Japan Marine Accident Inquiry Agency, and we are now in our 15th year. As a new organization, not only have the three modes of investigation been expanded to include aircraft, railway, and marine, but also the authority has been strengthened with the establishment of a new system that can make recommendations to parties involved in the cause of the accident, the appointment and dismissal of secretariat staff and the establishment of regulations independently. In addition, the provision of information to accident victims has been newly and clearly stipulated. Based on the results of accident investigations, etc., 123 recommendations, opinions, and safety recommendations have been issued since its establishment, and we believe that efforts have been made to prevent accidents from occurring through appropriate measures and efforts by the relevant parties and organizations concerned based on these recommendations.

The accidents and serious incidents that the JTSB handles are often of great social concern. Last year, in March, a train derailed on the Tohoku Shinkansen in Miyagi Prefecture, and in April, the passenger ship KAZU Isank off the western side of the Shiretoko Peninsula in Hokkaido, tragically killing many people or leaving others missing. We are continuing to investigate these accidents with a view to releasing a report on them as soon as possible. In recent years, there was a fatal accident involving a pleasure boat on Lake Inawashiro in Fukushima Prefecture in September 2020, a serious aviation incident in which the engine of a B777-200 was damaged off the northern coast of Naha Airport in December of the same year, and a collision between a foreign cargo ship and a Japanese submarine off Cape Ashizuri in Kochi Prefecture in February 2021. We published the investigation reports on these incidents last year and have made recommendations for accident prevention as necessary. On the other hand, accidents involving small aircraft operated by individuals, such as ultralight plane and gliders in the aircraft mode, accidents causing injuries to passengers and cabin crew due to aircraft turbulence, fatal accidents at Class 3 and 4 level crossings without crossing gates in the railway mode, and accidents involving marine leisure vessels such as pleasure boats and fishing vessel in the marine mode were also reported. We would like to make the contents of accident investigation reports on such cases more widely known to the public. In order to widely inform the public of the causes of such accidents and points to prevent them, the JTSB also focuses on public awareness activities, such as publishing the "JTSB Digest," a safety awareness document that summarizes trends and common factors of accidents based on statistics of the investigation results and data analysis.

In the investigation of accidents and other incidents, the collection and analysis of interview and eyewitness information from the parties involved is extremely important and constitutes a major part of the information required to determine the cause of the accident.

On the other hand, from the perspective of further enhancing scientific investigations, we are also actively promoting the use of more quantitative analysis. In particular, in the marine mode, we have recently been investigating causes using quantitative collision risk analysis and evaluation methods based on AIS (Automatic Identification System) records of the vessels involved. We have also introduced 3D scanner, precision scanning electron microscopes, and X-ray CT imaging equipment to promote objective data acquisition and enhance digital analysis techniques, and have established "Research and Analysis Office" engaged across modes to enable quantitative analysis and improve investigation techniques in the JTSB.

In addition, in order to provide timely and appropriate information to accident victims, prepare easy-to-understand accident investigation reports, and disseminate information such as the chairperson's press conference to further implement appropriately recurrence prevention and detriment mitigation measures, the JTSB is actively and continuously hiring and training administrative and technical staff to strengthen its structure.

Furthermore, since last December, the JTSB has also been investigating accidents and serious incidents involving unmanned aircraft. In the case of accidents involving unmanned aircraft, factors such as pilot error, poor maintenance, airframe or equipment defects, and weather conditions can be considered, but in reality, these factors are complex and intertwined, making it difficult to immediately identify the cause of the accident. In the event of a fatal accident, there is a strong social demand for appropriate investigations and recommendations to prevent recurrence and mitigate detriment. We will work to secure and train accident investigators who are familiar with unmanned aircraft, conduct appropriate investigations that take into account the characteristics of unmanned aircraft, and strive to scientifically and objectively determine the cause and prevent recurrence of accidents involving this new investigation target.

The JTSB will continue to contribute to the prevention of accidents and mitigation of detriment by steadily accumulating factual information on each case, conducting more scientific and objective analysis, compiling reports and making necessary recommendations at an early stage, and also the JTSB will actively contribute to fostering a culture of transportation safety in Japan, providing information necessary for safety in an appropriate manner.

We appreciate your understanding and cooperation.

March 2023

TAKEDA Nobuo
Chairperson
Japan Transport Safety Board

Japan Transport Safety Board

Annual Report 2023

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Appendices

○ On the usage of terms

In the text of this annual report, aircraft accidents and the signs of aircraft accidents are described as "aircraft accidents and serious incidents," railway accidents and the signs of railway accidents as "railway accidents and serious incidents," and marine accidents and the signs of marine accidents as "marine accidents and serious incidents."

Major activities in the past year

1. Commencement of investigation of unmanned aircraft accidents - Subjects of investigation of accidents -

In recent years, unmanned aircraft (drones, etc.) have been used for various purposes. Due to the revision of the Civil Aeronautics Act, it has become possible to fly unmanned aircraft remotely on an inhabited area in the situation of no access control measure on the ground and their fields have been increased further. As a result, in the future, they are expected to play an active role in a variety of fields, including in infrastructure inspection, logistics, grasping the damage situation in the event of a disaster, transportation of emergency supplies and others.

However, while the demand for unmanned aircraft continues to grow, accidents that have a large impact on society, such as accidents and serious incidents involving third parties (hereinafter referred to as "accidents, etc."), are also expected to occur. Therefore, the law was amended to add "serious accidents" caused by unmanned aircraft to accidents, etc., to the scope of investigation by the Japan Transport Safety Board (JTSB), and the Ordinance to define their details was revised to allow the JTSB to conduct investigations into unmanned aircraft accidents from December 5, 2022. The specific subjects of investigation of accidents related to unmanned aircraft by the JTSB are the following:

○ Accidents

・Injury or death[*2] of any person[*1] caused by unmanned aircraft

・Damage of any object[*3] caused by unmanned aircraft,

－Destruction[*4] of buildings in which a person is actually present, or mobile facilities, such as vehicles, ships, etc.

－Electricity supply facilities, telecommunications facilities, transportation facilities, educational facilities, medical facilities, government facilities, and other public facilities[*5] the operation of which has been disrupted[*6]

－Other accidents which are recognized as particularly exceptional

・Collision or contact with aircraft

○ Serious incidents

・Situation where it is recognized that there was a risk of collision or contact with aircraft[*7]

・Injury[*8] of a person[*1] caused by unmanned aircraft, loss of control[*9] of the unmanned aircraft and or fire during flight[*10], which are recognized as particularly exceptional

*1 “Person” include not only third parties but also pilots and parties relevant.

*2 “Injury or death” means death and serious injury or more, including injuries caused by external factors such as bad weather (there is no negligence in the person flying the unmanned aircraft).

*3 “Damage of any object” means properties (artifacts) owned by third parties, including minor damage such as cracks in roof tiles and damages to the walls of structures due to the collision.

*4 “Destruction” means causing such harm as to cause all or part of the original functions or utility of an object to be lost.

*5 “Public facilities” means physical facilities that benefit society in general.

*6 “The operation of which has been disrupted” means the cause where the use of facilities is suspended or a significant use restriction with a large social impact occurs.

*7 “Situation where it is recognized that there was a risk of collision or contact with aircraft” means the

case where aircraft in flight is observed on the flight path of the unmanned aircraft or in its surrounding airspace, and where collision avoidance measures such as causing the unmanned aircraft to land on the ground for collision prevention have been taken.

*8 “Injury” means injuries of a person, excluding “injury or death” corresponding to accidents.

*9 “Loss of control” means a situation in which an unmanned aircraft becomes uncontrollable due to a malfunction during flight, including cases where the unmanned aircraft is lost as a result. Provided, however, that, inability to control due to pilot error is excluded.

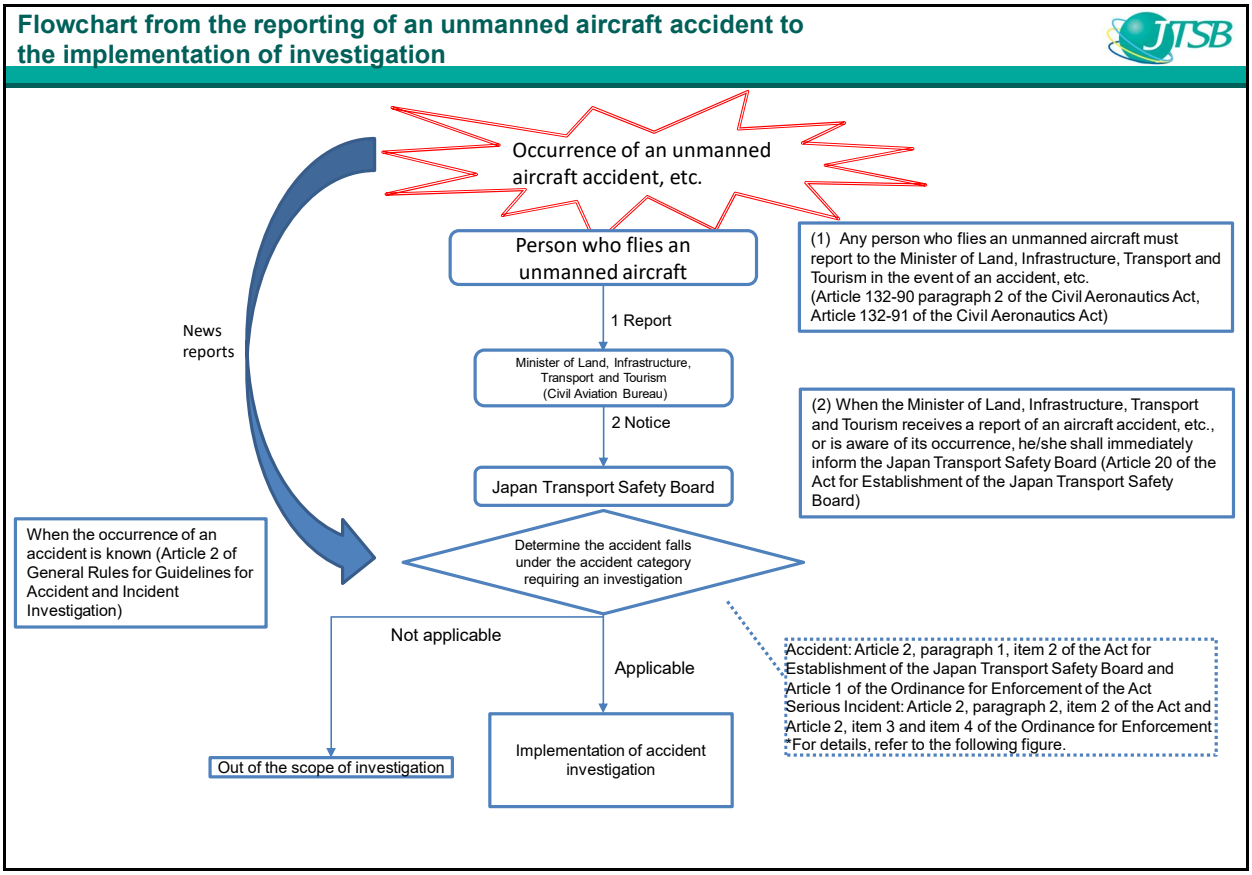
*10 “Fire during flight” means the case which occurred when the propulsion device of the unmanned aircraft is in operation for flight. Fires that do not fall under this category (for example, fire in a stored battery of the unmanned aircraft) are excluded.

In addition, since all unmanned aircraft weighing 100 g or more that fall under the aforementioned categories, some people may be interested in how the JTSB recognizes accidents.

In this regard, the law stipulates that those who fly unmanned aircraft must report to the Minister of Land, Infrastructure, Transport and Tourism in the event of an accident, and the law stipulates that when informed of the accident, or when becoming aware of the occurrence of the accident, the Minister of Land, Infrastructure, Transport and Tourism must inform the JTSB.

Furthermore, the law stipulates that when the JTSB independently becomes aware of the occurrence of an accident, etc., it must commence an accident investigation. The mechanism is such that when the JTSB becomes aware of the occurrence of an accident, etc., by the report from the Minister of Land, Infrastructure, Transport and Tourism or through other methods, it will conduct an accident investigation.

The chart below shows the reporting procedure from the occurrence of an accident caused by an unmanned aircraft to the commencement of a fact-finding investigation by the JTSB.



In addition, the chart below lists the reporting obligations of those who fly unmanned aircraft to the Minister of Land, Infrastructure, Transport and Tourism and the investigation targets of the JTSB.

Unmanned aircraft accidents subject to investigation by the Japan Transport Safety Board

	Civil Aeronautics Act (Obligation to report to the Minister of Land, Infrastructure, Transport and Tourism)	Article 1 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board (investigation targets)
Accident	Injury or death caused by unmanned aircraft	Same as left
	Property damage caused by unmanned aircraft	Situations listed on the left and listed below: a. Destruction of buildings in which a person is actually present or mobile facilities, such as vehicles, ships, etc. b. Electricity supply facilities, telecommunications facilities, transportation facilities, educational facilities, medical facilities, government facilities, and other public facilities the operation of which has been disrupted. c. Other accidents which are recognized as particularly exceptional, in addition to what are listed in a and b
	Collision or contact with aircraft	Same as left
	Civil Aeronautics Act and Ordinance for Enforcement of Civil Aeronautics Act (Obligation to report to the Minister of Land, Infrastructure, Transport and Tourism)	Article 2 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board (Investigation target)
Serious incident	Risk of collision or contact with aircraft	Same as left
	1. Injury of a person caused by an unmanned aircraft (excluding those falling under the category of accidents) 2. Loss of control of the unmanned aircraft 3. Fire on an unmanned aircraft (only those that occurred during flight)	Situations listed on the left and recognized as exceptional cases

The JTSB will devote to elucidating the causes of accidents, preventing recurrences and reducing damage by appropriately implementing accident investigations also on accidents caused by unmanned aircraft in the same manner as in the past.

2. Aircraft serious incident investigation report published regarding the damage of engine

[Summary]

The Aircraft was climbing after take-off from Naha Airport for Tokyo International Airport on December 4, 2020, there occurred an abnormal sound accompanied by shaking of the Aircraft, and the instrument displayed anomaly in the left engine. The captain shut down the engine and landed back at the Airport. In the post-flight inspection, it was confirmed that fan blades of the left engine were fractured, the fan cowl door and other fragments from the nacelle had separated and departed the Aircraft, and the fuselage and horizontal stabilizer were damaged from impact of fragments. (See Photo 1)

There were no injuries.

[Probable causes]

It is certain that the fan blades of the left engine were fractured during take-off climb, resulting in parts and cowlings of the engine were departed, and the airframe was damaged by scattered parts.

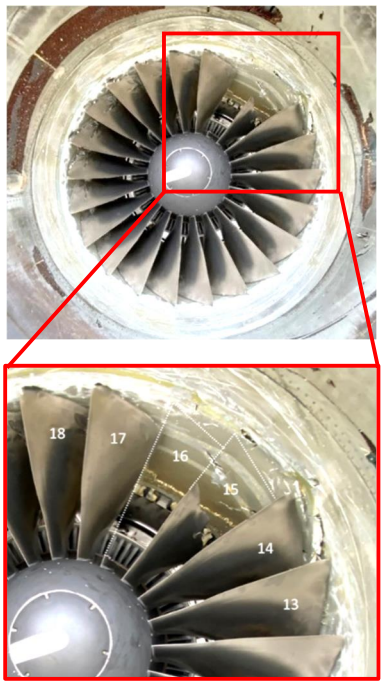


Photo 1 Left engine of the Aircraft

Since traces of fatigue fracture were found on the fracture surface of the fractured fan blades in the investigation of this serious incident, the Japan Transport Safety Board provided information on the state of the fracture surface of the fan blades to the Civil Aviation Bureau on December 28, 2020 (See Photo 2). In response to this, the Civil Aviation Bureau instructed domestic operators that operate airplanes of the same type to inspect the fan blades, and it was confirmed that there were no abnormalities. However, in the wake of the occurrence of an incident in which the fan blades of an airplane of the same type of another company were fractured in February 2021 in the United States, the Civil Aviation Bureau ordered the suspension of operations of all airplanes of the same type.

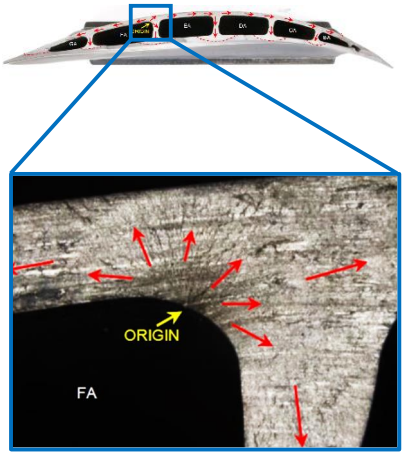


Photo 2 Fractured surface of the fan blade

In this investigation, with the cooperation of the National Transportation Safety Board (NTSB) of the United States, which designed and manufactured the engine and airframe, an analytical investigation was conducted to determine the cause of the fan blade fracture. As a result, it is highly probable that the fracture of the fan blade had started from the nodule, which bonded to the internal surface of a hollow structure during the polishing process of manufacturing of the fan blades, and the crack occurred, in addition to this, the Aircraft continued flights without detecting the crack at the subsequent regular inspections led to fatigue fracture. It was revealed that the cracks were not detected in the subsequent regular inspections were contributed by method and intervals of the used inspection were insufficient to detect the defect in the fillet region.

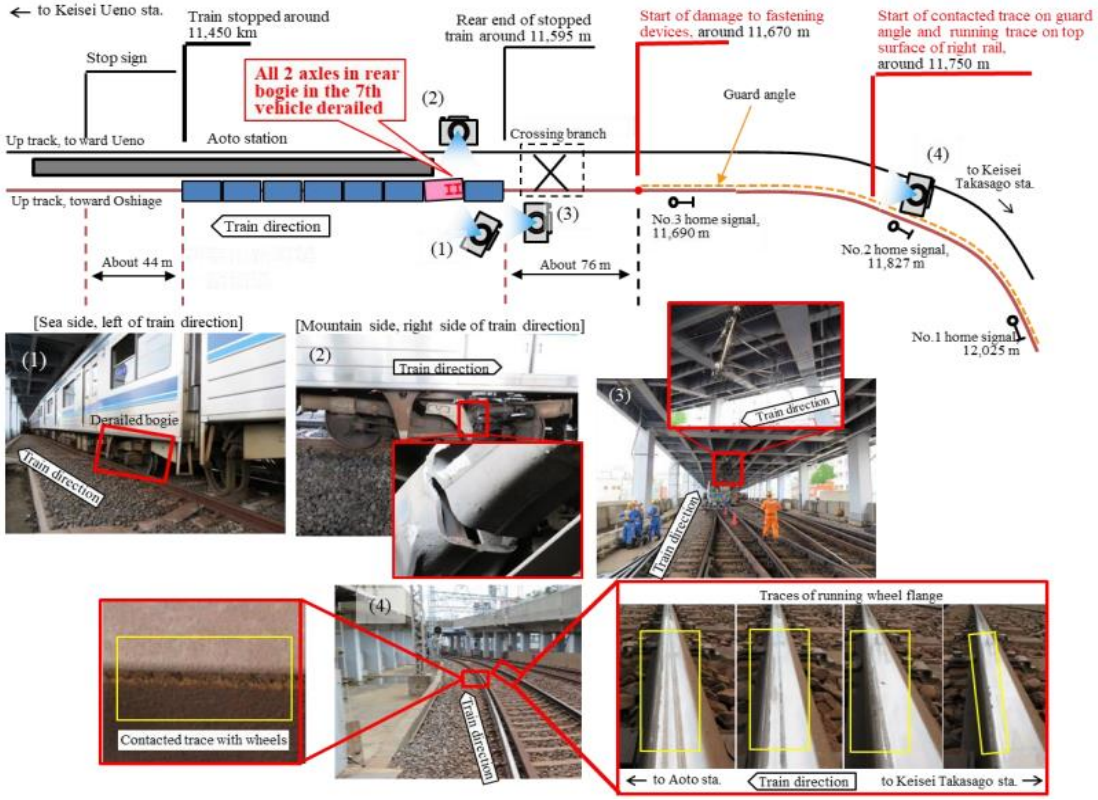
Based on the results of these investigations, the engine designers and manufacturers revised the inspection method and inspection intervals of the fan blades, while the airframe designers and manufacturers implemented recurrence prevention measures, such as the strengthening of the protection of the cowling, etc., in the event of fan blade fracture (see Chapter 3 (page 70) for details).

3. Publication of investigation reports on the derailment accident caused by cracks in a bogie

[Summary]

On June 12, 2020, the train started from Keisei Takasago station bound for Haneda Airport No.1 and No.2 Terminal station. While the train was entering the platform of Aoto station, the emergency brake was applied and the train stopped. The conductor checked the train and found it tilted to right and derailed. After that, the staffs of the railway company checked the derailed status and found that there was the crack in the bogie.

About 100 passengers, the driver and the conductor were boarded on the train, but no one was injured.



Schematic map of the accident site

[Probable causes]

It is probable that the wheel climbed up rail and derailed because the vehicle ran in the status that the crack of the bogie was generated and expanded, the unbalance of the wheel loads in the axle of the bogie became large, and the train passed the curved track in that status.

In the investigation of this accident, an analytical survey was conducted on the occurrence of the cracks in the bogie that had caused the derailment.

As a result, it was found that it is likely that the concentration of stress on the welded parts of the bogie caused a high stress to occur locally and to generate and expand the crack.

In addition, it was found that the strength of the bogie was reduced by the cracks in the bogie, making it impossible to share the vertical load, and the increased unbalance of the load on the wheels caused the wheels to climb onto the rails, leading to derailment.

4. Accident investigations related to the train derailment caused by an earthquake

As of the end of December 2022, there are two train derailment accidents possibly caused by earthquakes among the railway accidents under investigation by the JTSB.

The summary and implementation status of the investigation of these accidents are described below.

(1) Train derailment accident caused by the Nippori-Toneri Liner

[Summary]

On October 7, 2021, a train leaving from Nippori Station bound for Minumadai Shinsui Koen Station derailed at a junction within the premises of Toneri Koen Station. An earthquake with a maximum seismic intensity of upper 5 had occurred with an epicenter in the northwestern part of Chiba Prefecture immediately before the accident. Incidentally, eight passengers were injured in this accident.

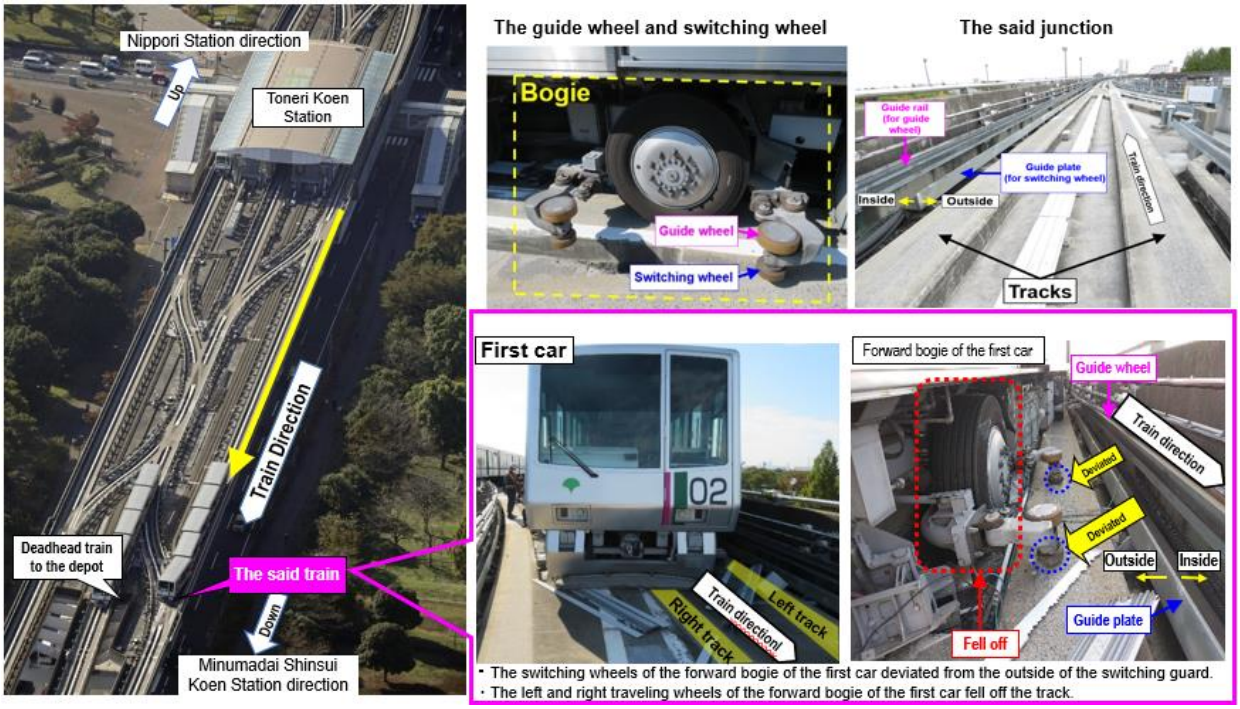
[Investigation implementation status]

The JTSB made an analysis of the relationship between the earthquake that occurred immediately before the accident and the train derailment in addition to hearing from relevant parties and checking the operation records and damage to facilities and the train.

The Nippori-Toneri Liner is a new transport system that operates unmanned by an automated operating system over 9.7 km railway business mile from Nippori Station to Minumadai Shinsui Koen Station. Each bogie of the train is equipped with guide wheels to guide the train in the train direction and switching wheels to pass through junction.

Guide rails are laid on both the left and right sides in a normal track, and the train is guided in the train direction by the contact of the guide wheels on the left and right of the train with the lateral surface of the guide rails. On the other hand, the guide rail is laid only on one side at the junction and the guide plate for the switching wheel is laid on the lower side of the guide rail close to the train. The train passes through the junction by being guided by the switching wheel inside the guide plate.

The switching wheel of the forward bogie of the first car of the derailed train deviated outside of the guide plate at the junction and the left and right traveling wheels of the bogie fell off the track to the right side in the train direction and derailed.



*The leftmost figure was created using a photo provided by Kyodo News.

Situation of the accident site

The JTSB published an accident investigation report on this accident on February 16, 2023. The published report is posted on the website of the JTSB below.

http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2023-2-1.pdf

Incidentally, the JTSB plans to publish the summary of the accident investigation report in the next Japan Transport Safety Board Annual Report 2024.

(2) Train derailment accident caused by Tohoku Shinkansen

[Summary]

On March 16, 2022, a 17-car train (Yamabiko No. 223) departing from Tokyo Station bound for Sendai Station derailed between Fukushima Station and Shiroishi-Zao Station. An earthquake with a maximum seismic intensity of upper 6 had occurred off the coast of Fukushima Prefecture immediately before the accident. Incidentally, six passengers were injured in this accident.

[Investigation implementation status]

The JTSB made an analysis of the relationship between the earthquake that occurred immediately before the accident and the train derailment in addition to hearing from relevant parties and checking the operation records and damage to facilities and the train.

It was confirmed that 60 of the 68 wheels and axles of the 17 cars were derailed in this accident. In the future, the JTSB will continue to investigate for the elucidation of the cause of the accident and prevention of recurrence including the analysis of the relationship between the earthquake that occurred immediately before the accident and the train derailment.

5. Accident investigation related to the flooding accident of the passenger ship

On April 23, 2022, a passenger ship navigating the west side of the Shiretoko Peninsula in Hokkaido Prefecture was flooded and sank off the coast of Kashuni-no-taki waterfall, resulting in a tragic accident in which many passengers and crew members died or went missing.

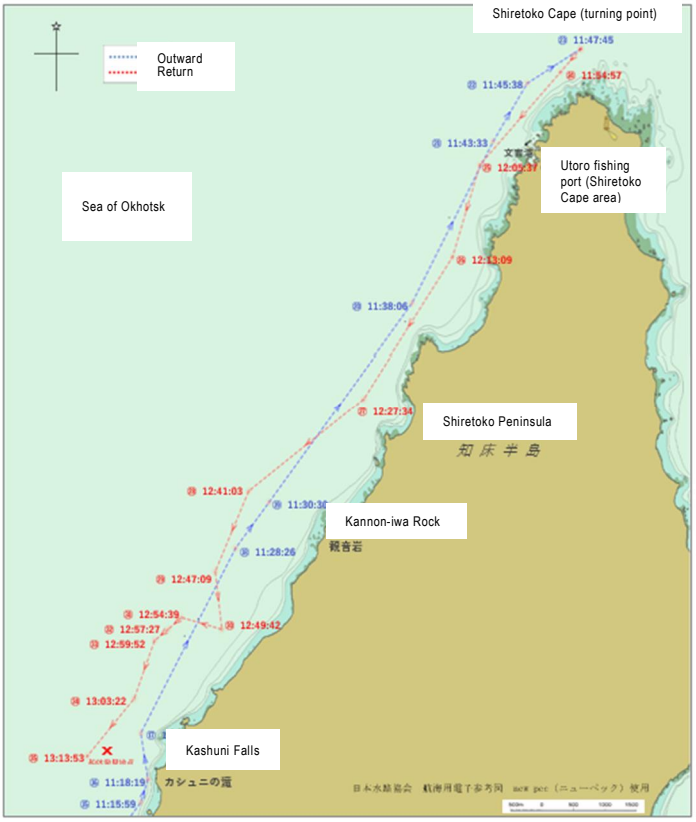
The JTSB dispatched marine accident investigators to the site on the day after the accident to launch an investigation to elucidate the cause of the accident, not only by contacting interviews with local relevant parties, but also by collecting information on the ship's operations as well as on the ship and equipment.

In addition, since a lot of people were died and went missing in the accident and a large impact was made on society, the JTSB decided to discuss this accident as a "particularly serious accident" in the General Committee.

Later, the wreckage of the ship was recovered from the place of foundering and stored at Abashiri Port. In July 2022, when it was possible to conduct an investigation on the ship, the JTSB dispatched marine accident investigators to conduct investigation on the ship. At that time, three Board Members with specialized knowledge, including the Chairperson, also visited the ship.

Condition of the passenger ship before the accident

In addition, in the course of the accident investigation, since the JTSB obtained information on the past navigation route of the ship, the JTSB provided the information to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism in August 2022 in order to contribute to safety measures for small passenger ships in the future (see Chapter 5 (page 128) for details).



Navigation route at the time of the accident

In this accident, while it was difficult to obtain direct information on the situation when the ship sank, it was possible to understand the navigation route of the ship on that day because one of the passengers was using the mobile phone location information service.

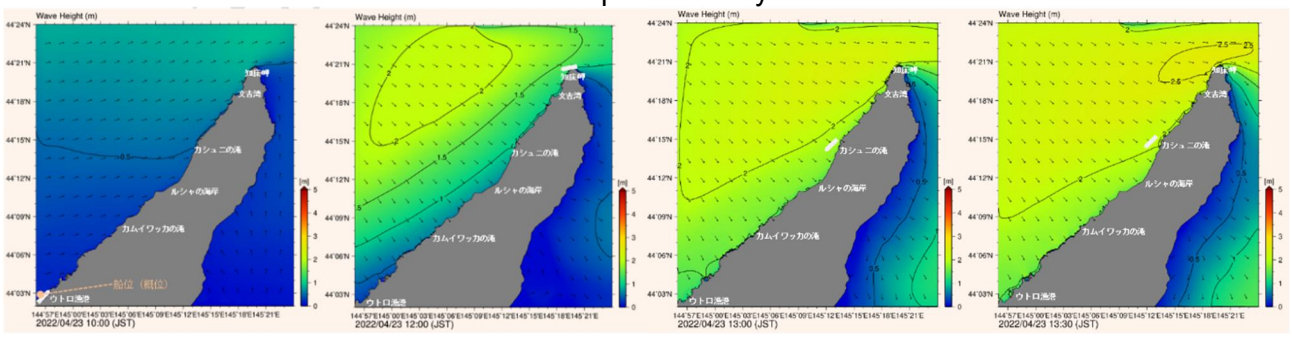
In addition, it was found from the results of the investigation of the ship that although the bottom plating was damaged, the damage did not penetrate into its inside, that the hatch cover at the bow deck was missing due to the destruction of the hinge of the mounting part, and that there was an opening in the bulkheads of the ship and the seawater that flooded from the hatch in the bow spread to each compartment under the upper deck.

Based on these facts, the JTSB did not only entrust the analysis of the weather conditions in the sea area west of the Shiretoko Peninsula on the day of the accident to the Japan Weather Association for its estimation, but also entrusted analysis to the National Maritime Research Institute to calculate the state of the trim of the ship with respect to the amount of

water flooding into the ship based on the flooding of water from the hatch at the bow deck section, in order to clarify the navigation conditions of the ship on the day of the accident and the mechanism from flooding to foundering.

Based on this, from the perspective of preventing accidents and reducing damage to small passenger ships of the same type, the JTSB provided an interim report on the factual information so far verified with the focus on these findings along with the progress of this accident investigation on December 15, 2022 (see Chapter 1 (page 18) for details).

Wave distribution map on the day of the accident



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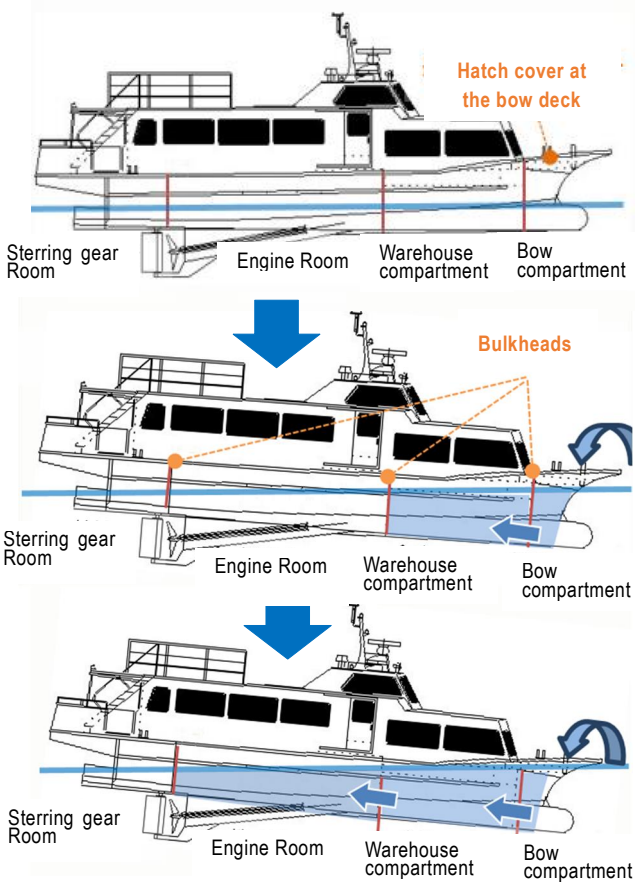


Mechanism from flooding to foundering

It is probable that the hatch cover at the bow deck which was not firmly closed was opened due to pitching motions in the situation where the weather and hydrographic conditions were deteriorating, thereby allowing sea water to flood into the bow compartment from the hatch and the flooding to spread to the warehouse compartment and engine room through the opening in the bulkhead.

In the interim report, we did not only instruct small passenger ship operators to check (1) the opening at the bow deck of small passenger ships whose navigation area were changed from the smooth water area to the limited coasting area and (2) the use of evacuation ports as measures to prevent recurrence as early as possible, but also expressed our opinion to the Minister of Land, Infrastructure, Transport and Tourism to consider water-tightness of the bulkheads of small passenger ships sailing in limited coasting areas from the perspective of enhancing safety (see Chapter 2 (page 30) for details).

Incidentally, in addition to the aforementioned issue related to the ship structure, it is probable that the factors that contributed to the occurrence of this accident include (1) the issue related to the determination to sail out and to continue the navigation, (2) the issue that the operating company did not comply with the safety management manual, (3) the issue of the effectiveness of audits to the operating company by the Regional Transport Bureau and of the inspection of the ship, (4) deficient lifesaving equipment and communication equipment and (5) the issue related to the search and rescue system, and the JTSB is currently conducting further investigation and analysis.

The JTSB is working toward the early publication of an accident investigation report summarizing the causes of this accident and measures to prevent recurrence.

6. Publication of the accident investigation report in which a pleasure boat caused fatality and injuries on the surface of the lake

[Summary]

On September 6, 2020, when the pleasure boat (Vessel A) with the master and nine passengers including his/her friends on board was heading northeast near the training buoy for small boats laid off the west coast of Nakatahama at Lake Inawashiro, Aizuwakamatsu City, Fukushima Prefecture, and the four people who were waiting for their turn to board the floating body to be towed by the personal watercraft were floating near the training buoy for small boats, Vessel A collided with the waiting floating people and the propulsion equipment, etc., came into contact with them.

One of the four waiting people was died and two were injured.

[Probable causes]

It is probable that the accident occurred in the situation in which Nakatahama was very congested with pleasure boats, which sailed at various speeds, when Vessel A headed northeast and came close to the waiting people near the buoy, and the four people were in floating waiting for their turn to board the floating body to be towed by the personal watercraft near the buoy, the master did not notice the presence of the waiting people near the buoy and caused Vessel A to collide with them and the propulsion equipment, etc., also came into contact with them.

Aspect around the accident site

This is a tragic accident occurred in Lake Inawashiro compared to “Tenkyoko (sky-mirror lake)” in which, while many people were enjoying marine sports, the master of Vessel A did not notice the four people floating on the surface of the lake and caused Vessel A to approach them. In the unique environment of water where no trace of navigation is left unlike on land, the investigators visited the site many times to gradually accumulated facts to wrap up the report.

Regarding the process leading to the accident why the master of Vessel A did not notice the presence of the waiting people, the JTSB clarified the reason why by actually conducting real sailing tests to perform a variety of measurements and by comparing the analyzed measurement results with the statements of parties involved.

On the other hand, regarding the state of safety and order which is the most important factor for enjoying marine sports as the background of the accident at Lake Inawashiro, the JTSB will find out and clarify by hearing from the local government and relevant parties as well as users of the lake.

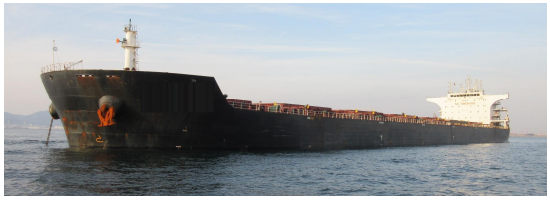
The number of people who enjoy marine sports is increasing year by year, and the number of new license holders for sailing small boats is also increasing nationwide to probably enjoy leisure time by avoiding crowded places in the midst of COVID-19. In such an environment, users are required to comply with the rules even further. The publication of the investigation report of this accident has enabled the local government and related groups to recognize and understand the current situation in which consistent response to ensuring safety of users is required from the perspective of ensuring safety of users. The JTSB expects that the report will provide the opportunity to significantly improve the environment for marine sports at Lake Inawashiro (see Chapter 5 (page 124) for details).

7. Publication of investigation reports on the collision between a cargo ship and a submarine

[Summary]

On February 8, 2021, off the south-southeast coast of Cape Ashizuri-misaki, Tosashimizu City, Kochi Prefecture, a cargo ship heading northeast toward Mizushima Port, Kurashiki City, Okayama Prefecture, and a submarine heading south-southeast while navigating by ascending to the periscope depth (to navigate underwater with a part of the periscope over the sea surface) collided with each other.

Three crew members of the submarine were injured and the submarine rudder (a single rudder installed on both sides of the hull upper structure) was bent, etc., while the cargo ship sustained dent damage with cracks in the bulbous bow plating.



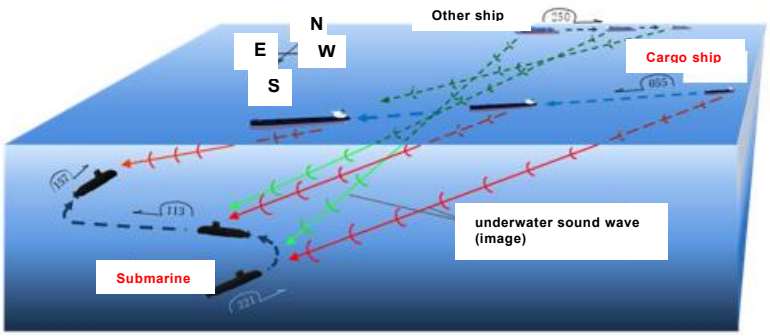
Cargo ship

Submarine

[Probable causes]

It is probable that the direct cause of the collision lies in the fact that the officers of the submarine determined that there was a sufficient distance to the ship detected by the passive sonar and there was no vessel that would interfere with the navigation at the periscope depth and started the work to navigate at the periscope depth work (work to change the depth of the submarine to the periscope depth) towards the sea surface on the course of the cargo ship.

In the investigation of this accident, in order to identify the source (ship) of the underwater sound wave detected by the submarine's passive sonar, the JTSB conducted analysis by taking into consideration the characteristics of underwater sound whose speed varies depending on the underwater environment in order to analyze the detection status of underwater sound waves, and in light of the work procedure before the ascension to the periscope depth and the implementation status of education and training based on the lessons learned from similar accidents in the past, the JTSB analyzed the factors leading to the determination by the submarine that there was no ship to interfere with the ascension to the periscope depth at that time.



Situation at the time of the accident (image)

As a result, it was found that a variety of factors occurred in a combined situations, such as that it was difficult for the submarine to recognize the cargo ship until it was decided to start the work to navigate at periscope depth, and that a complex event occurred such that the heading of the cargo ship and other were overlapped and the hearing in the heading changed from the sound radiation of the other ship to that of the cargo ship.

Based on these results of the investigation, in order to contribute to the prevention of recurrence of similar accidents and the reducing of damage, the JTSB expressed our opinion to the Minister of Defense to establish an on-board system in which submarine operators, etc. can timely and appropriately recognize and determine the presence of surrounding ships and the risk of collision and to strengthen the monitoring system for passive sonar, as well as to consider revising the guidelines for detection operation with sonar and reporting (see Chapter 2 (page 28) and Chapter 5 (page 125) for details.).

8. Implementation of the IMO Member State Audit Scheme (IMSAS)

In the wake of the occurrence of many accidents in the world by ships that do not meet the international standards stipulated in the SOLAS Convention (International Convention for the Safety of Life at Sea), such as the Nakhodka accident occurred in 1997, it has become clear that flag state administrations are not fully fulfilling their obligations to monitor and supervise their own flagged ships to ensure that they comply with international standards.

In response to this, the IMO Assembly in December 2003 approved the creation of a "Voluntary IMO Member States Audit Scheme", and in December 2005, the implementation of audits under this scheme was adopted. Under the scheme, a team of auditors selected by the IMO will audit member states with respect to six international conventions, including SOLAS and MARPOL (International Convention for the Prevention of Pollution from Ships), etc. Although the scheme was voluntary at the time of approval of its creation as stated above, it has become mandatory in 2016 and remains so to this day.

Japan has not been subject to audit since 2007 when the scheme was voluntary. And then, it was decided in 2020 that Japan would be audited. Since the JTSB was established, it is the first time that we would be audited, and we proceeded with the preparations for the audit. However, the implementation in 2020 was postponed due to the global pandemic of COVID-19, and it was eventually implemented online from September 26 to October 11, 2022.

The audit was conducted by an IMO audit team consisting of three auditors selected from third countries and one staff member of the IMO Secretariat during the aforementioned period, and relevant Japanese governmental organizations including the JTSB were in charge of Q&A of the areas related to affairs under their respective jurisdiction.

The JTSB was audited on September 30 in areas related to accident investigations, and the auditors mainly asked the following questions.

- Whether the contents stipulated in the Casualty Investigation Code and IMO Instruments Implementation Code are properly implemented.
- When an accident involving an another flag state ship occurs in Japanese territorial waters, whether the necessary information for the accident investigation agencies of the flag state and other interested countries is properly notified.
- Whether training for marine accident investigators is properly implemented.
- Whether the final accident investigation report required to be submitted to the IMO is properly submitted.

The audit response team of the JTSB explained the implementation status thereof by appropriately submitting related evidence to these questions.

As a result, the IMO audit team did not indicate any deficiencies regarding the implementation status of the JTSB in areas related to accident investigations, and the audit was successfully completed. Since the scheme is to go through all the member countries in seven years, the next audit of Japan will be roughly seven years from now.

9. Signing of the Declaration of Intent to promote cooperation with the Argentine Transport Safety Board (JST: Junta de Seguridad en el Transporte)

On September 6, 2020, the JTSB signed the Declaration of Intent (DOI) with the Argentine Transport Safety Board (JST) to cooperate on accident and incident investigations related to transportation (aircraft, marine and railway). This Declaration of Intent to promote cooperation was concluded in response to a request to conclude a memorandum of cooperation with the JST on the occasion of its establishment in May 2020.

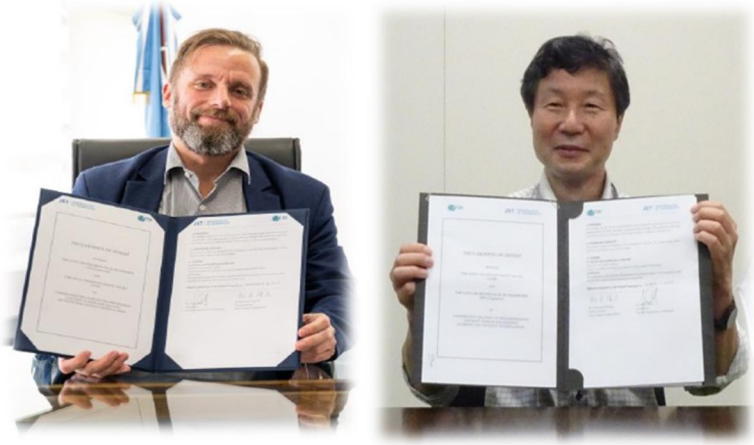
To date so far, the JTSB has concluded the DOI to promote cooperation in accident investigations with eight countries. All of them related to one or two modes of aircraft, marine and railway. The DOI to cooperate with Argentina relates to all three modes for the first time for Japan.

The declaration is to confirm that the accident investigation authorities of both countries will cooperate to assist transportation safety by exchanging information on general methods of investigating accidents and incidents and cooperating in areas of human resource development and capacity building of accident investigators. We expect that this cooperation will greatly contribute to the improvement of transportation safety in both countries.

Argentine is far away from Japan. However, Japanese-made vehicles, both second-hand*1 and newly-built*2, in the railway sector, have been exported traditionally, and even today, many Japanese-made vehicles are used in Argentine. Therefore, the JTSB expects that the establishment of this cooperative relationship will contribute to the further development of the relationship of trust between the two countries by contributing to the reduction of accidents.

*1 Total of more than 200 second-hand vehicles of the Tokyo Metro Marunouchi Line, the Transportation Bureau City of Nagoya Higashiyama Line and Meijo Line has been exported, and some are still in operation.

*2 These vehicles were manufactured and exported by Kawasaki Heavy Industries, Kinki Sharyo, Nippon Sharyo, Tokyu Car Corporation, Toshiba, etc. Since the electric equipment was exclusively manufactured by Toshiba, they are commonly called Toshiba. More than 600 vehicles were exported in the 1970s and 1980s and many of them are still in operation on both national and private routes.



Mr. Obaid, Chairperson of JST, and Mr. Kashiwagi, Director General of the JTSB

10. Improvement of functions for searching accident investigation reports on the website

The JTSB has published more than 16,000 reports on its website, including those published by its predecessors, the Aircraft Accident Investigation Commission and the Aircraft and Railway Accidents Investigation Commission. We provide a report search function to allow you to find what you want to read and what you need from among such a large number of reports.

In order to make the search function easier to find the desired report, we have improved the search functions by adding search conditions and started the operation on November 25, 2022.

Information such as the reports accumulated by the JTSB is an important resource for reducing safety risks. In order to make the most of this information resource, we will continue to make improvements to more effectively and appropriately disseminate information.

○Overview of the functional improvements

(1) Addition of the multi-mode cross search function

In addition to the conventional search by field of aviation, railway, and marine, we have added a new function that allows you to search across multiple fields.

(2) Expanding the scope of keyword searches to include the full text of reports

In addition to the "Summary" and "Probable causes" columns on the summary page of accidents eligible for search so far, the full text of reports (*) are now eligible for search.

*Reports published since 1999 are eligible for search in the aviation sector. We will expand the scope of search gradually.

(3) Addition of "NOT" search to the keyword search function

In addition to the existing "AND" and "OR" searches, a new "NOT" search has been added.

(4) Addition of the search result download function

It is now possible to download search results in CSV format.

(Contents that can be downloaded)

Date of occurrence, type of accident, location of occurrence, type of aircraft and vessel, casualties, gross tonnage of vessel, category of railway operator, etc.

(5) Enhancement of the search function by mode

1. Aviation mode
   - "Accident classification (36 types)," "Flight stage (13 types)," and "Casualties" have been added to the search conditions.
2. Railway mode
   - "Classification of level crossing (4 types)" and "Casualties" have been added to the search conditions.
   - Selection of multiple search conditions from the pull-down menu is now possible, where only one could be selected in the past.
3. Marine mode
   - "Casualties" have been added to the search conditions.
   - Selection of multiple search conditions from the pull-down menu is now possible, where only one could be selected in the past.

Chapter 1 Summary of major investigation activities in 2022

In the case of occurrence of aircraft, railway, or marine accidents, the JTSB designates an investigator-in-charge and accident investigators who begin investigations to determine their causes. Since we can never know when or where accidents may occur, the personnel of the Board, including accident investigators, are making continuous efforts to be able to conduct investigation activities immediately when accidents should occur.

Accident investigators conduct investigations and invite comments from parties relevant to the cause of the accident; accordingly, they make draft recommendations or opinions regarding the measures to be taken to prevent the recurrence of accidents and to mitigate damage caused by accidents. Therefore, they shall endeavor to improve their level of skill and knowledge by participating in national and international training; moreover, they share accident information among international society by attending international conferences.

In 2022, accident investigators not only have conducted on-site investigations and interviews with parties relevant to the causes of the accidents, taking measures for COVID-19 as being taken continuously since 2021, but also put efforts, such as holding a council meeting with a Web form for an accident investigation report, to minimize the impact on the investigation activities.

In the future, we will continue to carry out thorough investigations into the causes of aircraft, railway, and marine accidents, and will publish our investigation reports as soon as possible. Based on the results of our investigations, who will also make recommendations and state our opinions as necessary to related government institutions and parties relevant to the causes of accidents to prevent the recurrence of accidents. [Regarding recommendations and opinions, see “Chapter 2. Summary of recommendations and opinions issued in 2022” (page 22).]

1 Major accidents and serious incidents occurred in 2022 for which investigations commenced

The accidents and serious incidents also occurred in 2022. The primary investigations which the JTSB commenced are listed below:

(1) Aviation mode

- **Crash of a Beechcraft A36 (small aeroplane), the non-profit organization MESH Support at Iejima Airport (Occurred on March 12)**
- **Fatal accident of a Fuji Heavy Industries FA-200-160 (small aeroplane) a privately owned, due to ditching in the Ariake Sea (Occurred on April 18)**
- **Crash of an Aerospatiale AS350B (Rotorcraft), a privately owned, in Jinseki Kogen-cho, Jinseki-gun, Hiroshima Prefecture (Occurred on August 15)**
- **Crash of a Scheibe SF-28 Tandem Falke aircraft (power glider), a privately owned, in Takayama City, Gifu Prefecture (Occurred on October 26)**
- **Crash of a Rans S-7 Courier R582L (ultralight plane), a privately owned, in Bando City, Ibaraki Prefecture (Occurred on November 20)**

(2) Railway mode

- **Train derailment in the premises of Takamiya Station on the Taga Line of the OHMI Railway Co., Ltd. (Hikone City, Shiga Prefecture) (Occurred on February 7)**
- **Train derailment between the Tohoku Shinkansen Fukushima Station - Shiroishi Zao Station (Shiroishi City, Miyagi Prefecture) of East Japan Railway Company (Occurred on March 16)**
- **Train derailment between Yodo Line Hanke Station and Ekawasaki Station (Shimanto City, Kochi Prefecture) of Shikoku Railway Company (Occurred on August 25)**
- **Train derailment in the premises of the Suita General Depot Kyoto Branch of the Tokaido Line (Muko City, Kyoto Prefecture) of West Japan Railway Company (Occurred on September 6)**
- **Serious incident because of vehicle damage between the Bungo Ogi Station and Bungo Taketa Station on the Hohi Line (Taketa City, Oita Prefecture) of Kyushu Railway Company (Occurred on October 17)**

In 2022, 14 railway accidents were subject to investigation, with investigations into the causes of 27 accidents conducted, including 13 ongoing accident investigations from the previous year. Further, 2 railway serious incidents were subject to investigation, with investigations into the causes of 3 serious incidents conducted, including 1 ongoing serious incident investigation from the previous year.

(3) Marine mode

- **Fire accident of the fishing vessel No. 51 YUJIN MARU (on the sea about 185 km southeast of Tanegashima Island, Kagoshima Prefecture) (Occurred on March 21)**
- **Flooding of the passenger ship KAZU I (in the sea area near Kashuni Falls on the west side of Cape Shiretoko) (Occurred on April 23)**
- **Fatality of a visiting angler on the recreational fishing vessel No. 2 EBISU MARU fishing fatality (near Jinoshima Island, Wakayama City, Wakayama Prefecture (to be confirmed)) (Occurred on June 5)**

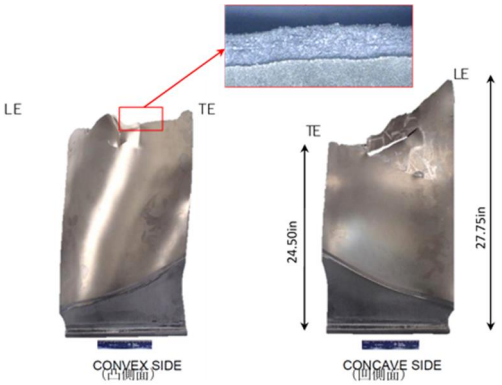
In 2022, 714 marine accidents were subject to investigation, with investigations into the causes of 1,366 accidents conducted, including 669 ongoing accident investigations from the previous year (excluding 17 incidents deemed to not be an accident as a result of investigations). Further, 192 marine incidents were subject to investigation, with investigations into the causes of 308 (excluding 11 incidents deemed to not be an incident as a result of investigations) incidents conducted, including 127 ongoing incident investigations from the previous year.

2 Major accidents and serious incidents for which investigation reports were published in 2022

Completed investigation into the causes of accidents and incidents undergo committee (subcommittee) review/resolution, investigation reports are submitted to the Minister of Land, Infrastructure, Transport, and Tourism and published on the Japan Transport Safety Board website. Major accidents and incidents published on the website are as follows.

(1) Aviation mode

- **A serious incident in which the captain of the Beechcraft A36 (small aeroplane) a privately owned, acknowledged that there was a risk of collision or contact with an Airbus A320-214 (large aeroplane) operated by SPRING AIRLINES.CO., LTD.(Occurred on December 21, 2019)**
- **Accident in which cabin crew members were injured, the Airbus A320-232 (large aeroplane) operated by Tigerair Taiwan, at FL 300 over about 100 km north-northeast of the Miyazaki Airport, due to the shaking of the aircraft (Occurred on December 25, 2019)**
- **A serious incident involving an ATR 42-500 (large aeroplane) operated by JAPAN AIR COMMUTER CO.,LTD. in which the aircraft deviated from the runway at Amami Airport (Occurred on January 8, 2020)**
- **Accident in which a bombardier DHC-8-402 aircraft (large aeroplane) operated by ORIENTAL AIR BRIDGE CO., LTD. suffered damage to the aircraft due to a tail strike during landing at Fukue Airport (Occurred on October 23, 2020)**
- **Serious incident in which the engine of a Boeing 777-200 (large aeroplane), Japan Airlines Co., Ltd. was broken (broken pieces penetrated into the engine) in the sky about 50 km north of Naha Airport (Occurred on December 4, 2020)**



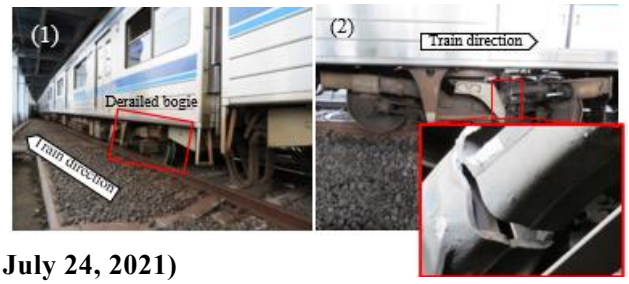
The fan blade and the fractured surface of Japan Airlines' aircraft

Completed investigation reports into 5 aircraft accidents and 14 serious aircraft incidents have been published.

(2) Railway mode

- **Train derailment in the premises of the Aoto Station (Katsushika-ku, Tokyo) of Keisei Electric Railway Co., Ltd. (Occurred on June 12, 2020)**
- **Train derailment between Madaki Station and Rikuchumonzaki Station on the Ofunato Line (Ichinoseki City, Iwate Prefecture) of East Japan Railway Company (Occurred on July 5, 2021)**
- **Train derailment in the premises of the Joban Line Sumidagawa Station (Arakawa-ku, Tokyo) of Japan Freight Railway Company (Occurred on July 24, 2021)**
- **Level crossing accident between Sekiyama Station and Nihongi Station of the. Myoko Haneuma Line (Joetsu City, Niigata Prefecture) of Echigo TOKImeki Railway Company (Occurred on September 27, 2021)**
- **Serious car failure incident in the premises of Ise-Asahi Station of the Nagoya line (Asahi-cho, Mie Prefecture) of Kintetsu Railway Co., Ltd. (Occurred on November 23, 2021)**

(Left side in the train direction) (Right side in the train direction)

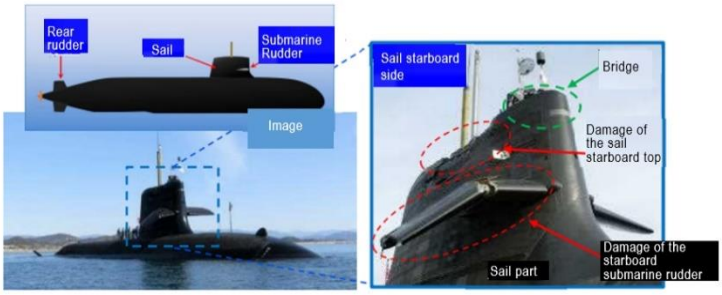


Train derailment of Keisei Electric Railway Co., Ltd.

Completed investigation reports into 11 railway accidents and one serious railway incident have been published.

(3) Marine mode

- **Collision with the bridge by Cargo ship BUNGO PRINCESS (Minami Honmoku Hama Road, Keihin Port) (Occurred on September 9, 2019)**
- **Collision between the container ship SITC BANGKOK and the container ship RESURGENCE (Shimizu Port, Shizuoka City, Shizuoka Prefecture) (Occurred on October 24, 2019)**
- **Fatality of people waiting for the pleasure boat Goken III in a floating state (Lake Inawashiro) (offshore Nakadahama, Aizuwakamatsu City, Fukushima Prefecture (Lake Inawashiro)) (Occurred on September 6, 2020)**
- **Collision between the cargo ship Hayato and the recreational fishing vessel No. 5 Fudomaru (Kashima Port, Ibaraki Prefecture) (Occurred on November 28, 2020)**



Collision between the cargo ship OCEAN ARTEMIS and the submarine SORYU

- **Collision between the cargo ship OCEAN ARTEMIS and the submarine SORYU (south-southeast off Cape Ashizuri, Tosashimizu City, Kochi Prefecture) (Occurred on February 8, 2021)**

Completed investigation reports into 728 marine accidents and 129 incidents have been published.

Among the published investigation reports, the JTSB made recommendations to An-ei Kanko Company regarding the "grounding accident of the passenger ship No. 12 An-ei" on June 30.

In addition, the JTSB expressed its opinion to the Minister of Defense on August 25 regarding the “collision between the cargo ship OCEAN ARTEMIS and the submarine SORYU” and on December 15 to the Minister of Land, Infrastructure, Transport and Tourism regarding the “Flooding of the passenger ship KAZU I”, respectively.

(For details, see “Chapter 2 Summary of recommendations and opinions issued in 2022,” pages 23-25 and 28-31.)

3 Major accidents and serious incidents for which progress reports were published in 2022

Accident progress reports are made to the Minister of Land, Infrastructure, Transport, and Tourism and published on the Japan Transport Safety Board website where deemed necessary during accident and incidents investigations to prevent a recurrence of such accidents. Major accidents and incidents of which progress reports were published on the website are as follows.

(1) Railway accident

・Railway accident investigation related to Nippori-Toneri Liner train derailment (Occurred on October 7, 2021)

The JTSB has been conducting investigations to determine the cause of this accident. However, it will still take a certain amount of time for us to obtain factual information, analyze the cause, and consider measures to prevent a recurrence. For this reason, as it is expected that it will be difficult to complete the investigation within one year from the date of the accident, we will publish an interim report after its submission to the Minister of Land, Infrastructure and Transport on September 29.

This progress report has been published on the Japan Transport Safety Board website.

（https://www.mlit.go.jp/jtsb/railway/rep-acci/keika20220929-1.pdf）

(2) Marine accident

・Marine accident investigation on the grounding accident of the Cargo Ship WAKASHIO (Occurred on July 25, 2020)

Regarding this accident, the JTSB has obtained agreement from the Republic of Panama as the flag state and the Republic of Mauritius as the coastal state to act as a country to perform maritime safety investigations, and we are proceeding with the investigation in an intensive manner, accordingly. However, in order to conduct further investigation and analysis of the oil spill, it is expected that more time will be required to compile the final report. From the perspective of preventing the occurrence of similar accidents, however, we submitted a progress report to the Minister of Land, Infrastructure, Transport and Tourism on June 30 and stated our opinion on the matter.

This progress report has been published on the Japan Transport Safety Board website.

（https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/keika20220630-0_2020tk0010.pdf）

For opinions related to the progress report, see Chapter 2, page 26.

・Marine accident investigation on the flooding of the passenger ship KAZU I" (Occurred on April 23)

The JTSB is currently conducting an intensive investigation into this accident. However, since it is necessary to conduct further detailed investigation and analysis, it is expected that more time will be required before we can compile a final investigation report. Since the direct cause of the flooding and the mechanism from flooding to foundering has been elucidated substantially by the investigations to date, we will not only submit a progress report to the Minister of Land, Infrastructure and Transport on December 15, but also publish the same and state our opinion on the matter.

This progress report has been published on the Japan Transport Safety Board website.

（https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/keika20221215-0_2022tk0003.pdf)

For opinions related to the progress report, see Chapter 2, page 30.

Column

Preparation of the Basic Policy for the Training Courses for Accident Investigators Review Meeting for Career Advancement by Mid-Career Staff

1. Background of the preparation of the policy

In order to review the vision of the career advancement in future of the staff recruited by the JTSB, the “Review Meeting for Career Advancement by Mid-Career Staff” was organized in FY2021, and after much debate, the “Basic Policy for the Training Courses for Accident Investigators” for promoting the appointment of technical staff started to be recruited in FY2020 to accident investigators was prepared in 2022.

2. Purpose

In order to consistently develop mainly young technical staff as accident investigators who meet the qualifications for the appointment by the JTSB, this policy aims to develop courses for them to acquire knowledge and on-site experience in each mode of aviation, railway, and marine and to acquire knowledge and experience for accident investigation.

In addition, as the final goal for the career path, the aim of this policy is that they will provide instructions to other investigators while conducting accident investigations as investigators in a managerial position and hand over their accident investigation skills to those in future generations.

3. Content

We did not only organize the skills and experiences to be acquired in each department of the JTSB for fulfilling their duties as accident investigators, but also developed model cases of the career path by studying places for external secondment to allow them to acquire on-site experiences in each mode which cannot be acquired with these alone and by combining them.

In addition, we reviewed systematic training programs according to the level of each staff, including an increase in the number of staff for the existing training, creation of a new training, etc.

Incidentally, technical staff is mainly taken into consideration in the “Basic Policy for the Training Courses for Accident Investigators.” However, we have also established the requirements for enabling clerical staff to be engaged in the training courses of aviation and railway accident investigators into which clerical staff has not been appointed so far.

In order to continue to maintain the system to allow the JTSB to conduct appropriate accident investigations, the JTSB will perform necessary revisions based on its operational status.

The development plans for each position including career path and others are the following:

(1) Official (about 5 years)

Their goal is to gain practical experience in each mode, acquire technical knowledge, and become knowledgeable about accident investigation work. After their placement in sections within the secretariat for about 2 years, they will be seconded to business operators, etc. In addition, they will receive training on the principles and basics of public servants as well as basic knowledge training for each mode.

(2) Official ~ Chief Official (about 5 years)

They will take part in actual investigations work based on the knowledge and on-site experience acquired as a staff member in order to gain experience to become an accident investigator. In addition, they will be given opportunities to get involved in the planning of accident investigation systems and international projects in various administrative agencies or within the secretariat. Incidentally, in the fields of aviation and navigation, we will aim to train accident investigators who are well versed in international affairs.

Further, in addition to the training on techniques for each mode, they will receive training specialized in accident investigations, such as accident investigation techniques, etc.

(3) Completion of the training courses ~ Deputy Director (appointment to the position of an accident investigator)

After the completion of the training courses, if there is still some time before being appointed to an accident investigator, they will be provided with opportunities to cash in on their experience cultivated so far in other departments within the secretariat, in addition to accident investigation work.

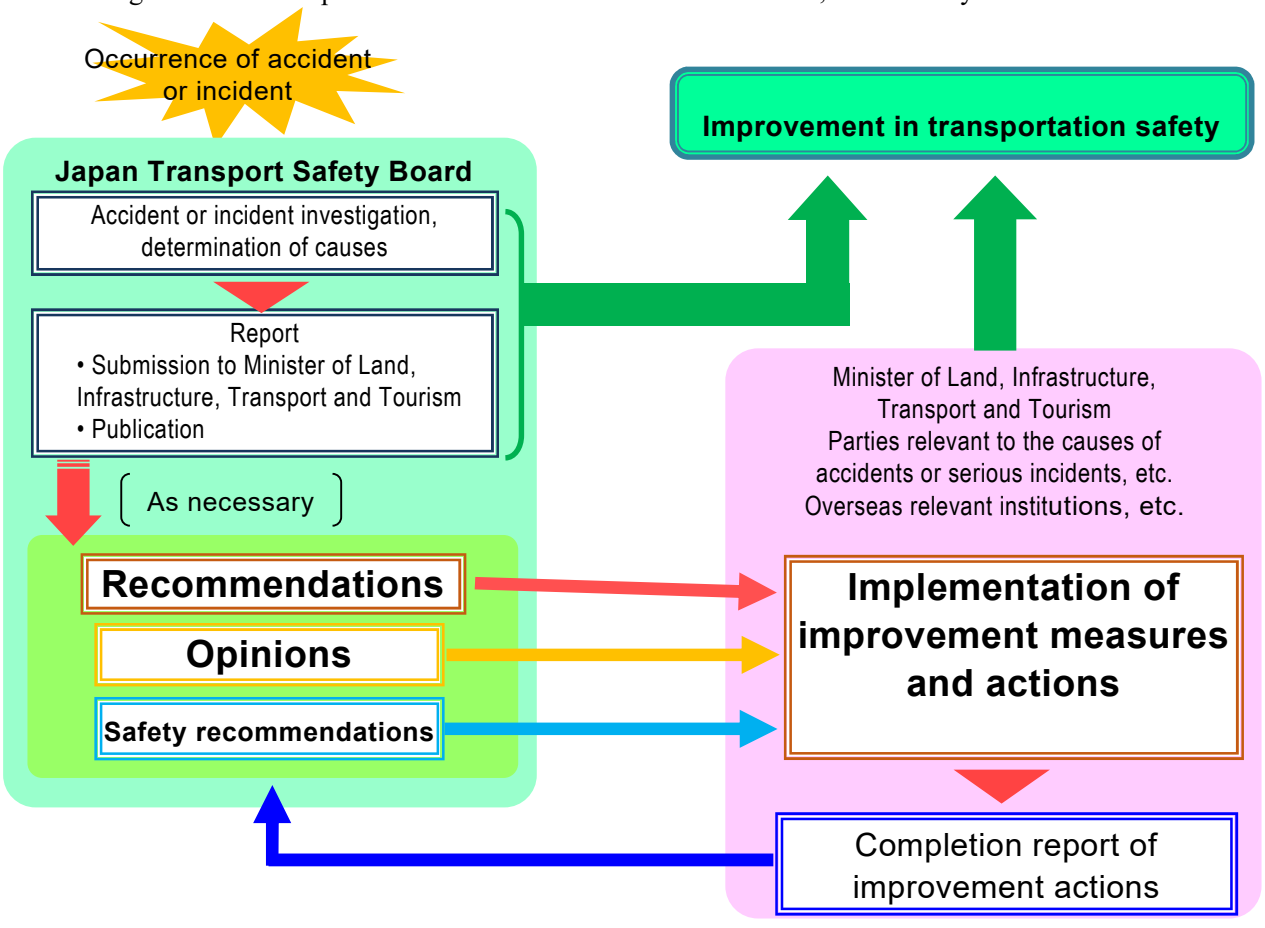
Chapter 2 Summary of recommendations and opinions

The Japan Transport Safety Board (hereinafter referred to as “the JTSB”) is an organization established as an external organ of the Ministry of Land, Infrastructure, Transport and Tourism in order to achieve the purposes stipulated in Article 1 of the Act for Establishment of the Japan Transport Safety Board (hereinafter referred to as the "Act for Establishment") (Article 3 of the Act for Establishment), and it is stipulated that its mission is not only to appropriately conduct investigations to determine the causes of accidents and incidents involving aircraft, railway, and marine and the causes of damage caused by the accidents, but also to demand the Minister of Land, Infrastructure, Transport and Tourism or parties relevant with the cause to implement necessary policies or measures based on the results of these investigations. (Article 4 of the Act for Establishment)

In order to fulfill its mission of improving transportation safety, the JTSB has a system of "recommendation" and "opinion" as an important system along with accurate accident investigation. Based on the results of investigations into accidents, the JTSB can make recommendations to the Minister of Land, Infrastructure, Transport and Tourism and other parties concerned about measures that should be taken to prevent accidents and reduce damage. It is stipulated in the act that the Minister of Land, Infrastructure, Transport and Tourism must notify the JTSB of the measures taken based on the recommendations, and if the parties concerned with the cause do not take measures related to the recommendations, the JTSB is entitled to make a public announcement to that effect. (Articles 26 and 27 of the Act for Establishment)

On the other hand, when it is determined not only based on the results of investigations into individual accidents, but also on the interim results of investigations or results of investigations of past accidents. The JTSB is entitled to state its opinion to the Minister of Land, Infrastructure, Transport and Tourism about policies and measures to be taken to prevent accidents and reduce damage, if necessary. (Article 28 of the Act for Establishment)

Incidentally, in the case of aircraft and marine accidents, the JTSB may recommend measures to be taken swiftly to enhance safety (recommendations on safety) in the course of accident investigations to relevant overseas organizations and parties based on international conventions, if necessary.



1 Recommendations

The recommendations issued by the JTSB in 2022 are as follows. The status of measures taken in response to the recommendations reported during the same year is posted including its summary.

(1) Recommendations related to the grounding of the passenger ship No. 12 An-ei and the status of measures taken in response to the recommendations

(Recommendations on June 30, 2022)

○Summary

On August 29, 2021, the passenger ship No. 12 An-ei grounded on a shallow reef while proceeding southeast.

The ship suffered bending damage in her both rudder shafts.

○Probable Causes

It is Probable that in this accident, while the ship was sailing southeast off the northwestern coast of Taketomi Island, since the master thought that time could be saved by sailing in the waters south of the normal standard route deviated from the normal standard route and sailed in an area close to shallow reefs only visually, the ship entered the waters with rocks located north of Hidehama called Hamashima off the northwest coast of Taketomi Island and grounded on a shallow reef.

○Details of recommendations to An-ei Kanko Company

It is probable that in this accident, while No. 12 An-ei was sailing southeast off the northwestern coast of Taketomi Island, Taketomi Town, Okinawa Prefecture since the master thouoght that time could be saved by sailing in the waters south of the normal standard route deviated from the normal standard route and sailed in an area close to shallow reefs only visually, the ship entered the waters with rocks located north of Hidehama called Hamashima off the northwest coast of Taketomi Island and grounded on a shallow reef.

An-ei Kanko Company is a general passenger liner operator that connects Ishigaki Island and remote islands by standard routes and transports a large number of passengers daily on these standard routes considered as the life routes. On the other hand, around these standard routes, there is a wide sea area with shallow reefs made of coral reefs unique to the Nansei Islands. It is needless to say that it is necessary to sufficiently recognize that there is a risk of grounding and a serious accident may be caused in which not only the ship but also passengers suffer damage when sailing only visually close to the wide sea area with shallow reefs, and to take care of safe navigation, accordingly.

However, since October 2008, there have been 11 incidents in which passenger ships operated by An-ei Kanko Company grounded on shallow reefs during navigation. Although measures such as safety education for crew members have been taken by the company, recurrences of grounding accidents show that the crew members are not sufficiently aware of the importance of safe navigation. Therefore, it is considered necessary in the future that not only the crew members are enforced to sail the standard routes stipulated in the safety management manual, but also An-ei Kanko Company as a whole engage in ensuring the passengers to be safety transported by continuously providing guidance on the need to check the heading properly.

Therefore, in order to prevent the recurrence of similar accidents, based on the results of this accident investigation, the JTSB recommends the following to An-ei Kanko Company based on Paragraph 1, Article 27 of the Act for Establishment.

In addition, based on the provisions of paragraph 2 of the same article, the JTSB will request a report on the measures taken based on this recommendation.

Recommendations

(1) Continuous guidance on the compliance with the sailing of the standard routes stipulated in the safety management manuals and the checking of the accurate heading should be provided to all crew members of all ships operated based on the understanding of their navigation records.
(2) The standard routes stipulated in the safety management manuals should be checked and second standard routes in which safety is ensured should be established and made known to the whole company.
(3) Guidance should be provided to all crew members of all ships operated so that information regarding safety during navigation can be shared among persons on watch duty regardless of their ranks.
(4) For crew manning, consideration should be given so that specific crew members are not burdened in an unbalanced way, such that late hour work is continuously assigned to them.

○**Measures taken by An-ei Kanko Company based on the recommendations**

In response to the "Recommendations related to the grounding accident of the passenger ship No. 12 An-ei" sent through the notification UN-I-SOU No. 102 dated June 30, 2022, we inform you of the measures taken based on the recommendations as follows:

Recommendations

1. Continuous guidance on the compliance with the sailing of the standard routes stipulated in the safety management manuals and the checking of the accurate heading should be provided to the crew members of all ships operated based on the understanding of their navigation records.

[Improvement measures]

*We are not only providing guidance on the compliance with the sailing of the standard routes stipulated in the safety management manuals, but also are providing guidance continually on the checking of the accurate heading using the GPS plotters and the like to crew members of our company at our monthly seminars on safety. (See Attachment 1)

* We have posted the notice in the steering house of each ship to ensure strict adherence to the standard navigation routes, the use of GPS plotters, and the matters to be strictly complied with when the target object is lost. (See Attached Photo 1) In addition, on July 7, 2020, we decided to post the “Observance of the standard routes stipulated in the safety management manuals” as a priority safety measure. (See attached photo 2)

* We are checking the operational status and navigation records of each ship using IP radios, etc. install on each ship, (See attached photo 3)

2. The standard routes stipulated in the safety management manuals should be checked and second standard routes in which safety is ensured should be established and made known to the whole company.

[Improvement measures]

* Regarding the standard route on the Ishigaki-Uehara, since the navigation on the standard route is susceptible to the effects of waves when the south wind is strong, we have established the second

standard route by sufficiently considering the safety of the route. (See Attachment 2)

* The second standard route is made known to each crew member through monthly seminar on safety, in-office meetings, and bulletin boards in the office. (See attached photo 4)

3. Guidance should be provided to all crew members of all ships operated so that information regarding safety during navigation can be shared among persons on watch duty regardless of their ranks.

[Improvement measures]

* We are providing guidance to the crew members of our company at our monthly seminar on safety, so that information regarding safety during navigation can be shared among persons on watch duty, regardless of their ranks.
* We have posted a notice in the steering house of each ship to remind the crew members to share what they noticed during navigation with each other and keep safe navigation in mind. (See attached photo 5)

4. For crew manning, consideration should be given so that specific crew members are not burdened in an unbalanced way, such that late hour work is continuously assigned to them.

[Improvement measures]

* We are making the manning plan by exercising utmost care so that late hour work is not assigned in an unbalanced manner to specific crew members.

*The details of the completion report of improvement actions is posted on the website of the JTSB.
https://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku24re_20221118.pdf

2 Opinions

The opinions issued by the JTSB in 2022 are as follows. The status of measures taken in response to the opinions reported during the same year is posted including its summary.

(1) Opinions related to the grounding of the cargo ship WAKASHIO and the status of measures taken in response to the opinions

(Opinion on June 30, 2022)

○Summary

The cargo ship WAKASHIO (hereinafter referred to as "the Ship"), with the master and 19 crew members on board, was navigating to Tubaran Port in the Federative Republic of Brazil at around 19:25 on July 25, 2020 (Mauritius time) and grounded on shallows off the southeastern of the island of the republic of Mauritius.

No crew member was neither died nor injured, but the Ship sustained buckling damage on the hull and fuel oil spilled later.

○Details of the opinion to the Minister of Land, Infrastructure, Transport and Tourism

The JTSB is currently conducting an intensive investigation into this accident. However, since it is necessary to conduct further detailed investigation and analysis about the oil spills caused by the accident, it is expected that more time will be required before the JTSB can wrap up a final report.

It is considered probable according to the investigation and analysis to date so far that while the Ship was proceeding west-southwest off the east-northeast coast of Mauritius without a nautical chart with the detailed coastlines of the Mauritius Island, she continued her navigation on a course approaching the island for the purposes of receiving signal for the smartphone of the crew member and grounded on shallow off the southeastern of the island.

It is considered necessary at this time, not only to obtain a nautical chart with the detailed coastlines of the sea area in advance, but also not to take unsafe actions such as approaching the coasts for private reasons, in order to prevent the recurrence of this accident, when navigating in coastal waters.

On the other hand, it has become clear through this investigation that the crew members of the Ship did not comply with the matters stipulated in the safety management manual, and that the ship management company did not have a system in place to immediately recognize the unsafe actions of the ships and call attention to them. The JTSB believes that these may jeopardize the safety of operating ships.

In addition, such a situation of operation as that of the Ship in which multiple companies are involved may also apply to other Japanese merchant fleets.

In order to deal with these problems, it is necessary for companies involved in the operation of ships, not only to ensure thorough guidance on safe operation through education and training for crew members of similar ships, but also to build a system for close coordination and cooperation between companies regarding safety measures and develop a system to timely share the positional information of ships.

Furthermore, it is considered important to consider the working environment of seafarers, such as ensuring the convenience of life on board, in order to ensure safe navigation.

Based on the above, the JTSB states the following opinion in order to enhance the safety of the Japanese merchant fleets in which multiple companies are involved in the operation of ships and prevent the occurrence of similar accidents based on the investigation and analysis to date so far and based on the provisions of Article 28 of the Act for Establishment.

Opinions

(1) Ship management companies should be given guidance to implement the following matters.

① Thorough guidance should be provided to crew members not to try risk-taking and prevent them from taking unsafe actions such as changing course for personal reasons by repeatedly providing education and training.

② Thorough guidance should be provided to the master and officers to obtain appropriate nautical charts and others for the planned navigation area in order to develop a voyage plan that fully ensures the safety of the ship, and to ensure her safe operation by keeping a proper lookout and checking her position at all times.

③ Thorough guidance should be provided to crew members to ensure that the watch duty at the bridge to be carried out by the appropriate number of personnel specified in the company's safety management manual.

④ Crew members who will newly board the ship under management should be allowed to board the ship with accurate understanding of the contents of the company's safety management manual, and training on the manual should be continuously provided even after boarding.

In addition, it is desirable that guidance be provided to develop a system to timely share the position information of the ship between the master and the ship management company until a system to grasp and monitor the movements of the vessel is built ashore.

(2) Charters should be given guidance to implement the following matters.

In order to ensure the safe navigation of chartered vessels, they should be actively involved in the safety measures implemented by the ship management companies ((1) above).

In addition, in view of the special nature of life on board unlike on land, it is desirable that guidance be given to operators of ships making long international voyages to improve the working environment for seafarers by ensuring the convenience of life on board, such as introducing devices that enable data communication with a flat-rate billing system.

Incidentally, regarding this matter, as shown in the attachment, the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism issued an administrative notice to the Japanese Ship owners' Association for the prevention of recurrence and safety improvement based on this accident in March, 2021. However, the JTSB would request them to renew their efforts on the basis of the analysis of the factual information and accident occurrence situation described in the interim report.

*The full text of the opinion, including attachments, is available on the website of the JTSB.
https://www.mlit.go.jp/jtsb/shiphoukoku/ship-iken16_20220630.pdf

○Policies and measures taken by the Minister of Land, Infrastructure, Transport and Tourism based on the opinions

Regarding the above subject matter referred to the opinion UN-I-SOU No. 101 dated June 30, 2022, the Maritime Bureau Bulletin No. 30 was issued to the Japanese Shipowners' Association dated June 30, 2022 to request persons concerned of the ship management companies and charterers to actively work toward improving the safety of the ocean shipping business and fostering a safety culture.

*The details of the completion report of improvement actions is available on the website of the JTSB.

https://www.mlit.go.jp/jtsb/shiphoukoku/ship-iken16re_20220630.pdf

(2) Opinions on the collision between the cargo ship OCEAN ARTEMIS and the submarine SORYU

(Opinion on August 25, 2022)

○Summary

See Chapter 5, page 125.

○Details of opinions to the Minister of Defense

It is probable that in this accident, while the submarine SORYU was navigating fully submerged off the south-southeast coast of Cape Ashizuri-misaki without noticing the azimuth line (line which is drawn when the heading of the radiation sound from the sound source is continuously displayed over time on the sonar screen) as a ship with a passive sonar (sonar), she determined that there was no ship that would interfere with the navigation at the periscope depth (to navigate underwater with a part of the periscope over the sea surface) and started to work to navigate at the periscope depth towards the sea surface on the course of the cargo ship OCEAN ARTEMIS which continued navigate without noticing SORYU underwater, and collided with OCEAN ARTEMIS.

On the other hand, it is probable that in the collision accident occurred off the coast of Miyazaki Prefecture between the submarine ASASHIO and the chemical tanker SPRING AUSTER, although ASASHIO detected SPRING AUSTER with the sonar and made necessary reports to the master, the submarine continued the work to navigate at the periscope depth while no sufficient communication within the command post was established and the monitoring of her movements was insufficient, resulting in the collision despite recognizing the approaching SPRING AUSTER.

In response to the opinions on the assumption that the other ship is recognized from the former Japan Marine Accident Inquiry Agency in the aforementioned accident of the submarine ASASHIO, Japan Maritime Self-Defense Force has taken measures including lessons learned from the accident and provided education and training following them since then.

It is probable, however, that it is impossible to prevent the occurrence of the same type of accidents with the aforementioned measures so far implemented alone because potential risks in sonar monitoring have become apparent in this accident, which was caused by the combined occurrence of various factors, including the fact that the navigating sound of the approaching ship could not be perceived with sonar when preparing work for the navigation at the periscope depth, that it was difficult to recognize the azimuth line of the ship as that of the ship because the detection range ability was high in the vicinity, that such an event as that the azimuth line of the ship was in the same heading of the azimuth line of another ship thereby overlapping with each other occurred, and further that since such an event as that the hearing sound near the heading changed from the radiation sound of another ship to the radiation sound of the approaching ship occurred when the submarine changed the course, the submarine understood that the hearing sound of another ship changed due to the change of the position of the submarine's course to and determined that the situation did neither call for emergency nor seriousness, accordingly.

Therefore, in consideration of the importance of grasping the presence of surrounding ships with sonar and of securely transmitting changes in the situation by the submarine to ensure further the safety of the transportation of ships navigating on the surface of the sea, it is considered necessary that the Japan Maritime Self-Defense Force take measures in this regard.

Consequentry, based on the results of this accident investigation, the JTSB states the following opinion in order to contribute to the prevention of recurrence of similar submarine accidents and the reducing of damage based on the provisions of Article 28 of the Act for Establishment.

Opinions

(1) Ensuring safety during work to navigate at the periscope depth

On the basis of the lessons learned, such a system should be built onboard the submarine, where not only the search and movement monitoring of ships by sonar are carried out reliably and appropriately, but also all the collected information for determining the risk of collision with other ships is gathered into the hands of the ship operator, etc., to allow the him/her to recognize the presence of surrounding ships and determine the risk of collision in a timely and appropriate manner.

(2) Revision of the reporting guidelines

In order to realize the above (1), the revision of the contents of the guidelines should be considered, including specifying their description so that the operating procedure for detecting the azimuth line with sonar and the reporting procedure when a change in the sound of the detected ship is recognized may function more safely.

(3) Enhanced monitoring with sonar

In consideration of the events of this accident, the monitoring system with sonar should be enhanced, including building a system onboard the submarine in which all information collected by sonar is put together to be rechecked by a plurality of people.

(4) Prompt reporting at the occurrence of an accident

From the perspective of protecting human lives and preventing damage to the ship, a system should be built which will allow the practice of prompt reporting on the assumption of the occurrence of such a situation as this accident by installing satellite mobile phones.

(5) Continuing education and training

The lessons learned from this accident should be thoroughly disseminated to all crew members, etc., and more effective education and training incorporating the lessons should be continuously implemented.

○Policies and measures taken by the Minister of Defense based on the opinions

Regarding the aforementioned matter, We will reply to your opinions (1) to (5) as follows.

1 Ensuring safety during work to navigate at the periscope depth

In order to build such a system onboard the submarine, where not only the search and movement monitoring of vessels by sonar are carried out reliably and appropriately, but also all the collected information for determining the risk of collision with other ships is gathered into the hands of the ship operator, etc., to allow the him/her to recognize the presence of surrounding ships and determine the risk of collision in a timely and appropriate manner, we implemented the improvement measures as described in "2. Revision of the reporting guidelines" and "3. Enhanced monitoring with sonar" below.

In addition, in order to clarify the responsibilities of the executive officer as a safety officer for ensuring safety during work to navigate at the periscope depth, we revised the related regulations.

2 Revision of the reporting guidelines

In order to ensure safety during work to navigate at the periscope depth, the following has been adopted as matters to be complied with by submarine crew that when only an image is detected on the sonar system screen, it should be managed as a detection target unless it is clearly determined as fish sound or other noise, and that when a change in hearing sound is recognized, not only the fact is reported to the master, but also it should be managed as a new detection target unless it is determined to be the same target.

3 Enhanced monitoring with sonar

In order to enhance the monitoring system with sonar, including building a system onboard the submarine in which all information collected by sonar is put together to be rechecked by a plurality of people, we established a system in which information collected by each sonar technician is checked and put together by the chief sonar technician and rechecked by a plurality of people through the verification of the situation by the executive officer.

4 Prompt reporting at the occurrence of an accident

In order to build a system which will allow the practice of prompt reporting on the assumption of the occurrence of a contingency situation from the perspective of protecting human lives and preventing damage to the ship, we enforced all submarines in operation to carry satellite mobile phones onboard immediately after the accident.

In addition, based on the lessons learned from this accident, we have been conducting regular training on reporting on the assumption of the occurrence of a contingency situation including senior commanders Head-Quarters (roughly once every six months).

5 Continuing education and training

In order to thoroughly disseminate the lessons learned from this accident to all crew members, we have been providing education and training for all crew members during our regular safety education (once in a quarter).

In addition, the master provides safety education and training on the navigation at the periscope depth when the patrol officer is changed as a result of staff reshuffle.

* For details on the activities of the JTSB, see page 11 of “Major activities in past year 7.”

(3) Opinions related to the flooding of the passenger ship KAZU I

(Opinion on December 15, 2022)

○Summary

When the passenger ship KAZU I (hereinafter referred to as "the Ship") with master (hereinafter referred to as "the Master"), one ordinary seaman (hereinafter referred to as "the Ordinary seaman") and 24 passengers on board was proceeding southwest off the Kashuni-no-taki waterfall, on the west side of the Shiretoko Peninsula, the ship was flooded and sank off this fall in a short time after 13:26 on April 23, 2022.

In this accident, 18 passengers, the master and the ordinary seaman died and 6 passengers went missing.

○Details of opinions to the Minister of Land, Infrastructure, Transport and Tourism

The JTSB is currently conducting an intensive investigation into the flooding of the passenger ship KAZU I occurred off the Kashuni-no-taki waterfall, on the west side of the Shiretoko Peninsula on April 23, 2020, since it is necessary to conduct further detailed investigation and analysis, it is expected that more time will be required before the JTSB can wrap up a final report.

The JTSB will further analyze the factors leading to the occurrence of this accident in the future. However, the recurrence prevention measures have become clear from the navigation route of the ship, the estimated weather and hydrographic conditions, and the mechanism from flooding to foundering described

in a focused manner in the interim report of the accident investigation.

It is most likely that the direct cause of the Ship's foundering was the fact that the waves hitting the bow deck entered the ship through the hatch on the bow deck, allowing the flooding to spread into each section below the upper deck through the opening of the bulkhead from the bow section. Therefore, the water-tightness of the bulkhead is possible to contribute to the improvement of safety of small vessels.

Furthermore, it became clear that despite the fact that the Ship encountered weather and hydrographic conditions that met the criteria for requiring it to take measures, such as canceling navigation, returning to the port, evacuating or temporarily calling at a port on the return trip, the Ship did not take measures, such as evacuating into the Utoro fishing port (Shiretoko-misaki Cape area) to wait for rescue.

Based on these facts, and in consideration of the current situation that many small passenger ships are operated nationwide, in order to prevent accidents of operators that operate small passenger ships like that of the Shiretoko Sightseeing Ship Company.,Ltd. based on the results of this accident investigation, the JTSB states the following opinion on the basis of the provisions of Article 28 of the Act for Establishment.

Opinions

The Minister of Land, Infrastructure, Transport and Tourism should make the following matters known to operators operating small passenger ships and provide guidance.

(1) Inspection of the opening on the bow deck of small passenger ships whose navigation area were changed from the smooth water area to the limited coasting area.

The presence or absence of the risk of flooding of the ship should be checked in an emergency manner by ensuring that the opening on the bow deck is securely closed and not easily opened when hit by the waves.

(2) Use of evacuation ports, etc.

The existence and use of evacuation ports in the sea area to be navigated should be rechecked.

In addition, in order to further enhance safety in the future, the Minister of Land, Infrastructure, Transport and Tourism should consider on the enhancement of water-tightness of the bulkhead of small passenger ships which navigate the limited coasting area.

*For details on the activities of the JTSB, see page 8-9 of “Major activities in past year 5.”

3 Safety recommendations

In 2022, the JTSB did not issue any safety recommendations.

4 Implementation status of measures taken in response to the recommendations, opinions, etc. issued in the past

The following is summaries of the implementation status of measures taken in response to the recommendations and opinions reported in 2022. See 1 to 3 of this chapter for the implementation status of measures taken in response to the recommendations and opinions issued in 2022.

(1) Measures taken based on the recommendations related to the railway accident with injuries occurred at the Shin-Sugita Station of Yokohama Seaside Line Company

(Recommendation issued on February 18, 2021)

The JTSB did not only publish an accident investigation report on February 18, 2021 on the railway accident with injuries occurred at the Shin-Sugita Station on June 1, 2019, but also made a recommendation to the Minister of Land, Infrastructure, Transport and Tourism. The JTSB received the following report on the measures taken in response to the recommendations on March 7, 2022.

*For a summary of the accident and probable causes, see the website of the JTSB.
https://jtsb.mlit.go.jp/jtsb/railway/detail.php?id=1952

○Details of recommendations to the Minister of Land, Infrastructure, Transport and Tourism

The direct cause of the accident was probable that the forward and reverse circuit of the train was disconnected, causing the train to start traveling with the motor driving direction facing the upward direction at the end of the track. It is probable that the reason why such a dangerous event could not be avoided at the occurrence of the failure lies in the lack of sufficient "checking and adjustment of design systems," "extraction of safety requirements," and "verification of safety" in the vehicle design and manufacturing process.

In the design of trains which are becoming increasingly complicated in recent years, it is important to build a design system for performing a system integration in order to thoroughly extract and assess all conditions that may lead to dangerous events before designing and reflect the countermeasures as the safety requirements for designing, manufacturing and modifying the automated operating system of the train in which a driver on the railroad track or a staff member to operate an emergency stop at the front of the train is absent. In addition, the safety management for the lifecycle as a whole including the manufacturing and operation is necessary. In these circumstances, it is probable that railway operators and train manufacturers establish a stage in which the design system, etc., is carefully checked and adjusted and the safety requirements are extracted and the verification of the safety after the completion of the designing is fully performed.

For this reason, based on the results of this accident investigation, in order to prevent railway accidents and reduce damage in the event of a railway accident, the JTSB recommends the Minister of Land, Infrastructure, Transport and Tourism to take the following measures on the basis of the provisions of Paragraph 1, Article 26 of the Act for Establishment.

Recommendations

The Railway Bureau of the Ministry of Land, Infrastructure, Transport and Tourism should thoroughly instruct railway operators nationwide and manufacturers involved in the design and manufacture of railway vehicles on the following matters.

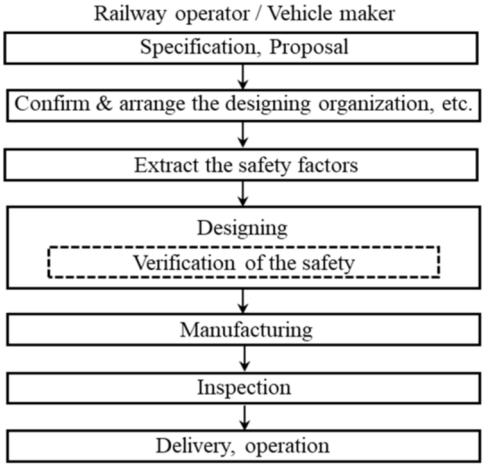
(1) Each stage in which “the design system, etc., is checked and adjusted,” “the safety requirements are extracted” and “the safety is verified” respectively should be established for designing, manufacturing and modifying the automated operating system of the train on which no driver is present in refer to the design and manufacturing process shown in the attachment.

(2) In the phase in which “the design system, etc., is checked and adjusted,” a design system for performing a system integration should be built, in which the roles and responsibilities of each company, the standard specification of each company or the specification generally recognized as the global standard for each device shall be checked and adjusted.

(3) In the phase in which “the safety requirements are extracted,” systematic safety analysis, etc., should be implemented according to the system characteristics so that comprehensive verification of safety is performed against an expected occurrence of abnormal state, and the necessary requirements for ensuring safety shall be established.

(4) In the phase in which “the safety is verified,” the design results should be verified with respect the safety requirements extracted in the phase (3) to check whether or not the system as a whole ensures safety.

（Attachment）



Design and manufacturing process

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

In response to the aforementioned recommendation by the UN-I-SAN No. 99 dated February 18, 2021 (hereinafter referred to as the "recommendation"), the Railway Bureau of the Ministry of Land, Infrastructure, Transport and Tourism has taken the following measures. Therefore, we notify to the effect on the basis of the provisions of Paragraph 2, Article 26 of the Act for Establishment.

(1) We held the “Review meeting on the prevention of accidents on the railway tracks on which the train operation is unmanned and automated” established in June of 2018 after the accident in October last year (fifth meeting) and confirmed that the measures described in the recommendation were being implemented by the 6 operators that are conducting unmanned and automated operation except for the Yokohama Seaside Line company. Therefore, we summarized the efforts as “the efforts for the designing of manufacturing and modifying unmanned and automated railway system (hereinafter referred to as the "Efforts").

(2) We did not only issue Attachment 1 to the Regional Transport Bureaux and the Okinawa General Bureau, Cabinet Office, and Attachment 2 to related organizations, respectively. In addition, we provided the “Efforts” to railway operators and manufacturers involved in the design and manufacture of railway vehicles and provided guidance so that the evaluation on safety and reliability may be performed appropriately for designing, manufacturing and modifying railway tracks in future, on which the train operation is unmanned and automated.

In addition, we notified the “Efforts” to the Japan Railway Rollingstock&Machinery Association, the Japan Railway Electrical Engineering Association, and the Japan Assosiation of Signal Industries.

* The details of the completion report of improvement actions is available on the website of the JTSB.
https://www.mlit.go.jp/jtsb/railkankoku/railway-kankoku6re_20220309.pdf

(2) Report based on the recommendations on the passenger injury accident involving pleasure boat GURILAND 900

(Recommended on August 26, 2021)

Regarding the investigation of the accident with passenger injuries of the pleasure boat GURILAND 900 occurred off the northern coast of Ogura Peninsula, Towada City, Aomori Prefecture (east of Lake Towada) on September 19, 2019, the JTSB did not only publish the accident investigation report on August 26, 2021, but also made recommendations to the non-regular route business operator, general safety manager and operation manager. The JTSB received the following report on the measures taken in response to the recommendations on January 14, 2022.

*For an overview of the accident and its cause, please refer to the website of JTSB.
https://jtsb.mlit.go.jp/jtsb/ship/detail.php?id=13266

○Contents of recommendations to the non-regular route business operator, general safety manager and operation manager

The west-northwest wind gradually getting stronger with a strong wind warning announced, the master of the pleasure boat GURILAND 900 continued to navigate at the speed unchanged while proceeding east at approximately 18 knots in the vicinity of the north side of the Ogura Peninsula in the east area of the Towada Lake with a wave height of approximately 50 cm. For this reason, the boat rode on the first wave with a wave height of approximately 50 cm and then hit the surface of the water, repeating the same situation on the second and subsequent waves. Therefore, the injury of a passenger who sat on the front seat of the starboard side was probable that the passenger received the impact to the buttocks caused by falling onto the seating surface time and again.

On boat operated by the non-regular route business operator, general safety manager and operation manager (hereinafter referred to as "the Operator"), a similar case of accident occurred in the past. The Operator has been providing safety education and training and so on to crew members, etc. after the similar case of accident.

However, although the master of the pleasure boat GURILAND 900 had to stop the standard navigation pursuant to the safety management manual and the navigation standard, the master continued to navigate the boat keeping the speed of approximately 18 knots at the time when the standard for decelerating, etc. was reached, consequently the accident occurred.

On the basis of the investigation results, in order to prevent the recurrence of similar cases of accident, the JTSB recommends the Operator to take the following measures on the basis of the provision of Article 27, paragraph (1) of the Act for Establishment:

In addition, it is required to submit a report on measures taken in response to these recommendations pursuant to the same Article, paragraph (2).

Recommendations

The Operator must take the following measures to prevent the recurrence of similar cases of accident.

(1) The Operator should ensure its masters and crew members to stop the standard navigation pursuant to the safety management manual and the navigation standard when high waves are recognized, decelerate sufficiently to a speed that is appropriate for the wave height when the standard for decelerating, etc. is reached, and take other measures to reduce the vessel oscillation.

(2) The Operator should instruct its master to convey instructions using a loudspeaker, etc., and also to confirm that the instructions have been certainly transported to passengers by carefully monitoring the movements of passengers because oral instructions provided by the master may not be heard to passengers due to the influences of winds and/or engine noise while the boat is sailing.

(3) The Operator should not allow elderly passengers, etc. to sit on front seats as much as possible. If it is impossible to securely provide rear seats for elderly passengers, etc., allocate those passengers to another ship for safety reason.

○**Measures taken by the Operators based on the recommendations**

In response to the “recommendations related to the accident with personal injuries of the pleasure boat GURILAND 900" sent by the UN-I-SAN No. 37 dated August 26, 2021, we are pleased to report on the measures taken based on the recommendations as follows.

Recommendations

Details of the recommendation (1)

The Operator should ensure its masters and crew members to stop the standard navigation pursuant to the safety management manual and the navigation standard when high waves are recognized, decelerate sufficiently to a speed that is appropriate for the wave height when the standard for decelerating, etc. is reached, and take other measures to reduce the vessel oscillation.

Measures taken based on the recommendations

We instructed each master involved in the operation of owned ships to take measures on recognizing high wind and waves by sufficiently reducing the speed in line with the wave height when the criteria to reduce the speed, etc., is met.

Incidentally, we also instructed them to consider the latest weather information, the wind direction and wave direction on the navigation course and changes in wind and waves due to topography when making a decision to stop the voyage, even if it is possible to continue sailing under the operating standards.

Implementation date: August 26, 2021

Implementation method: Training for each master and oral guidance at the meeting before voyage

Recommendation (2)

The Operator should instruct its master to convey instructions using a loudspeaker, etc., and also to confirm that the instructions have been certainly transported conveyed to passengers by carefully monitoring the movements of passengers because oral instructions provided by the master may not be heard conveyed to passengers due to the influences of winds and/or engine noise while the boat is sailing.

Measures taken based on the recommendations

We placed a megaphone on the owned ships and instructed each master involved in the operation of owned ships to use the megaphone for verbally giving instructions to passengers.

In addition, we instructed them not only to reduce the speed or stop the ship with a view to reducing the effects of the wind, engine noise, etc., much as possible when giving instructions to passengers, but also pay attention to the movements and reactions of the passengers to check that the instructions have been securely conveyed.

Incidentally, we have confirmed that instructions given by the megaphone could be clearly heard at all seats on the owned ships.

Implementation date: August 26, 2021

Implementation method: Training for each master and oral guidance at the meeting before voyage

Recommendation (3)

The Operator should not allow elderly passengers, etc. to sit on front seats as much as possible. If it is impossible to securely provide rear seats for elderly passengers, etc., allocate those passengers to another ship for safety reason.

Measures taken based on the recommendations

Elder Passengers are guided to sit in the rear seats including those who wish to sit in the front seats. In addition, we make it a rule to take safety measures such as assigning them to another ship when rear seats are not secured for elderly passengers.

Implementation date: August 26, 2021

*The details of the completion report of improvement actions is available on the website of the JTSB.
https://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku22re_20220218.pdf

(3) Report based on the recommendations related to the collision between the cargo ship SENSHO MARU and the cargo ship SUMIHOU MARU

(Recommended on August 26, 2021)

Regarding the investigation of the collision between the cargo ship SENSHO MARU and the cargo ship SUMIHOU MARU occurred off the southern coast of Inubozaki, Choshi City, Chiba Prefecture on May 26, 2019, the JTSB did not only publish the accident investigation report on December 16, 2021, but also made recommendations to the NS United Kaiun Kaisha, Ltd. and the Otokura Domestic Shipping Cooperative Association. The JTSB received the following reports on the measures taken in response to the recommendations from the NS United Kaiun Kaisha, Ltd. on February 14, 2022 and from the Otokura Domestic Shipping Cooperative Association on March 1, 2022.

*For an overview of the accident and its cause, see website of the JTSB.
https://jtsb.mlit.go.jp/jtsb/ship/detail.php?id=11445

○Details of the recommendations to the NS United Kaiun Kaisha, Ltd. and the Otokura Domestic shipping Cooperative Association

It is probable that this accident was happened during the night, off the southern coast of the Inubozaki under limited visibility caused by a thick fog, while SENSHO MARU was navigating southwest and SUMIHO MARU was navigating northeast, both ships were approaching dead ahead.

In that situation, while SENSHO MARU was approaching up to about 1,600 meters to SUMIHO MARU, SENSHO MARU turned right keeping the speed to pass by port side to port side, and while SUMIHO MARU was approaching up to about two nautical miles to SENSHO MARU, SUMIHO MARU changed its course slightly to the left to pass by starboard side to starboard side and navigated visually keeping the course and the speed. Therefore, it was too late to notice they are approaching each other, resulting in collision.

In this accident, if the watch officer on both of the ships confirmed the movement of each other on the radar screen and also used acoustic signals or communicated each other through VHF earlier, it is probable that they could have been taken measures to avoid the collision by decelerating, etc. while confirming mutual movements and operational intentions.

And, if each master was notified by their watch officer on duty the situation under the condition of the limited visibility, and reinforced the watch system pursuant to the safety management manual and the navigation standard, it is probable that they could have been able to confirm mutual movements and operational intentions, leading to the avoidance of the occurrence of this accident.

Therefore, on the basis of the investigation results, in order to prevent the recurrence of similar cases of accident, the JTSB recommends the NS United Kaiun Kaisha, Ltd. and Otokura Domestic Shipping Cooperative Association to take the following measures on the basis of to the provision of Article 27, paragraph (1) of the Act for Establishment.

In addition, it is required to submit a report on measures taken in response to these recommendations pursuant to paragraph (2) of the same Article.

Recommendations

(1) NS United Kaiun Kaisha, Ltd. and Otokura Domestic Shipping Cooperative Association should continuously instruct crew members of their operating ships to communicate with other ships using VHF and acoustic signals where approaching other ships under the condition of limited visibility.

(2) NS United Kaiun Kaisha, Ltd. and Otokura Domestic Shipping Cooperative Association should continuously instruct crew members of their operating ships to know the importance of instructions given by their master on the bridge and strengthening the watch standingunder the condition of limited visibility.

○Measures taken by NS United Kaiun Kaisha, Ltd. based on the recommendation

We are pleased to report on the measures taken based on the recommendations as follows.

Recommendations

1. Recommendations

(1) Instruction should be provided to the crew members of the operating ships continuously so that communication is conducted using VHF and acoustic signals if they are close to other ships under conditions of restricted visibility.

(2) Not only the importance of the master going up to the bridge and giving instructions under conditions

of restricted visibility should be made known to the crew members of the operating ships, but also instruction should be provided on the strengthening of the watch standing continuously.

2. Completion report for the recommendations

We are continuously implementing the following measures in response to the recommendations (1) and (2).

(1) Heads up document

We provided instructions to the operating vessels using the heads up document on the accident.

① May 26, 2019 "Regarding the collision accident in the fog" (Document 1-1)

We provided instruction on the occurrence of accidents in the fog and strengthening of the watch standing.

② August 20, 2019 "Ensuring the prevention of marine accidents in the fog" in order not to forget the serious marine accident (Document1-2)

We provided written guidance on the dissemination of the presumed cause of the accident and on measures to prevent recurrence of the collision accident in the fog (including the master going up to the bridge).

③ March 26, 2020 "Importance of safe operation" (Document 1-3)

We made known the details of the written guidance issued by the Kanto Regional Transport Bureau and made known again the measures to prevent the recurrence including the master going up to the bridge to the operating ships.

④ May 26, 2020 "Ensuring the prevention of marine accidents in the fog" in order not to forget the serious marine accident (Document1-4)

On the day of the accident, we provided written guidance again on the measures to prevent the recurrence (including the master going up to the bridge).

⑤ May 26, 2021 "Ensuring the prevention of marine accidents in the fog" in order not to forget the serious marine accident (Document1-5)

On the day of the accident, we provided written guidance again on the measures to prevent the recurrence (including the master going up to the bridge).

⑥ February 3, 2022 "Marine accident inquiry and accident investigation report related to SENSHO MARU accident" (Document 1-6)

We provided instruction on the secure handover of the master as an additional measure to prevent accident recurrence.

(2) Provision of information on maritime warnings and advisories related to the weather and hydrographic conditions nationwide (Document 2)

From December 2019, we provide information on the nationwide maritime warnings and advisories (stormy weather, heavy fog, etc.) issued by the Japan Meteorological Agency twice a week (Tuesdays and Fridays) to the operating ships to share the information with ships navigating in rough sea areas and heavy fog sea area in order to strive for safe operation. We provide instruction on the importance of the master going up to the bridge under restricted visibility conditions, strengthening of the watch standing, engine S/B, use of VHF radio telephone, blowing of the whistle and others along with the provision of the information.

(3) Distribution of a leaflet (Document 3) <Addition of the response to the visibility of 3 miles or less to the Safety Management Manuals >

We revised partly the leaflet about the obligation to be performed by the ship according to the article

related to “Navigation of ships under restricted visibility conditions (in heavy fog)” of the Act on Preventing Collisions at Sea (excerpt) on September 20, 2019 and distributed it to the operating ships. (4) Holding of the safety promotion meetings

We dealt with the SENSHO MARU accident in the safety promotion meeting held for ship owners as a key safety measure to be implemented and gave instruction on the importance of the master going up to the bridge under restricted visibility conditions, importance of the strengthening of the watch standing and recurrence prevention measures.

① Held on July 22, 2019 with an attendance of 32 ship owners (40 people) and 20 staffs of our company including the president (Document 4-2)

We provided an explanation of the outline of the SENSHO MARU accident and we requested the placement of lifejackets at the bridge.

② Held on January 30, 2020 with an attendance of 13 ship owners (18 people) and 13 staffs of our company including the president

As a summary of the safety promotion campaign, we the importance of the master going up to the bridge under restricted visibility conditions, significant course change and use of the engine.

② Held on February 4, 2020 with an attendance of 32 ship owners (37 people) and 19 staffs of our company including the president

As a summary of the safety promotion campaign, we the importance of the master going up to the bridge under restricted visibility conditions, significant course change and use of the engine.

⑤ Since the holding the safety promotion meeting was cancelled due to the spread of COVID-19, we sent only the meeting materials dated July 27 and August 6, 2020 to ship owners. (Document4-3)

⑥ Held online on January 28, 2022 due to the spread of COVID-19 with an attendance of 38 ship owners (63 people) and 25 staffs of our company including the president. (Document 4-4)

We explained about the marine accident inquiry and the accident investigation report.

(5) Holding of the safety promotion campaign

We dealt with the SENSHO MARU accident in the safety promotion campaign implemented by visiting all operating ships and gave instruction on the importance of the master going up to the bridge under restricted visibility conditions, importance of the strengthening of the watch standing and recurrence prevention measures.

① Holding of the 1st Safety Promotion Campaign in 2019: May 7 to July 8, 2019

After the accident, we explained about the early detection, early avoidance, and continuous monitoring as a heads up when the visibility is limited.

② Holding of the 2nd Safety Promotion Campaign in 2019: October 21 to December 20, 2019 (Document-5-1)

We explained about the “prevention of accidents under restricted visibility conditions” as a “matter to be implemented for accident prevention”.

③ 2020 Safety Promotion Campaign

As the activity to visit ships was suspended voluntarily due to the spread of COVID-19, we sent only the materials to the operating ships. (Document 5-2)

We explained the “accident cases in dense fog and measures.”

④ 2021 Safety Promotion Campaign

We sent a similar document of the Safety Promotion Campaign of 2020 to the operating ships.

(6) Implementation of safety training at the time of the docking and implementation of internal audit (Document 6)

When an operating ship entered the dock, safety training to the ship owner and crew members was provided by our company staff and the guidance on the prevention of accident recurrence including the explanation of accident cases including the SENSHO MARU accident and heads up, as well as hearing of the operating status of each ship and request for improvements was also provided.

In addition, at that time, we checked directly with the master and crew members about the importance of the master going up to the bridge under restricted visibility conditions, importance of the strengthening of the watch standing and recurrence prevention measures on the basis of the internal audit checklist.

We have been unable to conduct dock safety training and internal audit in 2020 and 2021 due to the cancellation of ship visiting activities.

(7) Implementation of the annual safety action plans (2019, 2020, and 2021) (Document 7)

We distribute the monthly targets and actions to be taken of the following month as the safety action plan of each operating ship at the end of each month.

(8) Confirmation of the transfer details, including the presence or absence of matters to be reported to the master (Document 8)

In order to ensure the system where when the ship is likely to face a danger, the master issues a clear instruction to the watch officer to provide a report to the effect, the watch officer reports to the master following the instruction and the master him/herself takes command, we decided to keep and store the transfer checking record. Currently, the record is entitled as "Alcohol check and confirmation of the transfer details," which will be eventually changed to "Confirmation of the transfer details, including the presence or absence of matters to be reported to the master."

Since the matters to be implemented in response to the recommendation of the item 2 above are implemented since the occurrence of the accident, we will continue to implement them in the future following the recommendation.

○Measures taken by the Otokura Domestic Shipping Cooperative Association based on the recommendation

We have prepared and submitted the completion report in response to the recommendation of the "UN-I-SAN No. 83 dated December 16, 2021."

1. Purpose

(1) Instruction should be provided to the crew members of the operating ships continuously so that communication is established conducted using VHF and acoustic signals if they are close to other ships under conditions of restricted visibility.

(2) Not only the importance of the master going up to the bridge and giving instructions under conditions of restricted visibility should be made known to the crew members of the operating ships, but also instruction should be provided on the strengthening of the watch standing continuously.

2. Implemented matters

(1) Measures of each person concerned

(Measures taken for the operator)

① The operator should make every effort to ensure smooth communication between the crew members and ground personnel.

② The operator should install and operate communication equipment and other necessary equipment to ensure the communication described in the preceding paragraph.

(Measures taken for the master)

The master should always notify the ship operator in the following cases:

① The master should make every effort to ensure smooth communication between the crew members and ground personnel.

② The master should obtain information on the weather and hydrographic conditions using observation equipment and observed information, and share this information with all of the crew members of the ship.

③ The master should obtain weather information from any information source before departure, and should discuss the navigation system in advance with the crew members if visibility restricted conditions are expected.

④ When the point stipulated in the operating standards (visibility of 500m or less) is reached.

(On the operator side)

① We will request the master to provide a written report at least once in a quarter on whether the safety operation system of the ship (safety management manuals and operation standards, in particular, strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing) has been established and complied with thoroughly by crew members, and we will visit the ship at least once in a quarter to check the understanding of the master and the crew members about the establishment of the safety operation system of the ship and provide the corrective instruction if it is insufficient.

② We will implement the following in order to strengthen the communication using VHF and acoustic signals, and the measure of the master going up the bridge under restricted visibility conditions and the watch standing when we visit the ship.

A: We will provide a workshop based on the hearing of the actual situation of the ship to allow the crew VHF and acoustic signals without hesitation.

B: We will provide a workshop based on the hearing of the actual situation of the ship to enforce the master to go up to the bridge and stay there in the fog, etc., without hesitation.

③ We will install AIS and electronic nautical charts on our operating ships not equipped with them for the purpose of improving the operational safety.

(On the ship side)

① In order to ensure thorough response when visibility becomes restricted, excerpts of the safety management manuals and operational standards will be posted in easily visible locations on the bridge.

② When visibility restricted conditions are expected from the weather information obtained before departure, the navigation system will be discussed in advance and shared among the crew members.

③ Meeting on the safety operation system of the ship (safety management manuals and operation standards, in particular, strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing) will be held on board the ship at least once a month in order to thoroughly build a safe operation system including response to restricted visibility conditions in a continuous manner.

The details of the measures for safety operation implemented after the accident are as follows.

① SUMIHO MARU

[Emergency safety meeting after the accident]

Date: July 2, 2019
Venue: Conference room at the Mukaishima Dock Co., Ltd. (864-1 Mukaishima-cho, Onomichi City, Hiroshima Prefecture)
Participants: SUMIHO MARU crew members
Operator: Otokura Domestic Shipping Cooperative Association
Nippon Steel Nisshin Shipping Co., Ltd.
Contents of the meeting: Education using marine accident cases in the fog, strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing, use of navigation equipment and looking back of the accident

[Special safety training]
Date: July 31, 2019
Venue: Conference room at the Ship Safety Service Co., Ltd. (4th floor, at Hiroshima Marine Building, 2-33-36, Ujina Kaigan, Minami-ku, Hiroshima City, Hiroshima Prefecture)
Participants: SUMIHO MARU crew members
Operator: Otokura Domestic Shipping Cooperative Association
Ship Safety Service Co., Ltd.
Contents of the meeting: Crew training, boarding diagnosis, in particular, the key points of lookout, matters that require attention in restricted visibility conditions (strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing), and a workshop including the display of the radar screen and azimuth method

[Boarding diagnosis]
Date and time: 11:00 on August 1, 2019 to 12:00 hrs on August 2, 12:00 (1st time)
Venue: SUMIHO MARU
Participants: SUMIHO MARU crew members
Assessor: Ship Safety Service Company
Assessment contents: We installed a ship track recording device on board the ship and diagnosed the ship maneuvering status and navigational watch standing of the master and other crew members during the voyage from the Takaramachi Wharf, Kure Port to the Hanshin office of the Nippon Steel Nisshin Shipping Co., Ltd. at the Hanshin Port via the Nippon Steel Nisshin Wharf.
Date and time: 15:20 to 21:30 on February 3, 2022 (2nd time)
Venue: SUMIHO MARU
Participants: SUMIHO MARU crew members
Assessor: Ship Safety Service Co., Ltd.
Assessment contents: We diagnosed the use status of AIS, checking of watch-keeping support and the ship maneuvering status and navigational watch standing of the master and other crew members during the voyage from the pier of Etajima Shipyard to the Utenberth of Shunan Works of Nippon Steel Stainless Steel Corporation.

[Safety meeting at the time of docking]
Date: February 22, 2021

Venue: Conference room at the Etajima Shipyard Co., Ltd. (3-17-15 Etajima-cho, Etajima City, Hiroshima Prefecture)
Lecturer: Ship Safety Service Co., Ltd.
Participants: SUMIHO MARU crew members
Operator: Otokura Domestic Shipping Cooperative Association
Contents of the lecture: Communication of the efforts in the Maritime Safety Plan and various matters that require attention, and sharing of information on accident cases and heads-up (including strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing)

② Other operating ships
[Safety meeting at the time of docking and workshop on the use of radar]
October 13, 2020 No. 7 SANNO Okajima Shipyard
October 19, 2020 DAIKOKU MARU Etajima Shipyard
November 16, 2020 SHINSEI MARU Kanda Shipyard
January 13, 2021 TAIYO Nakata Shipyard
January 14, 2021 SHINTATSU MARU Etajima Shipyard
February 26, 2021 HAKUSHIN MARU Etajima Shipyard
May 11, 2021 URUME Kanda Shipyard
June 3, 2021 DAIICHI OKURA MARU Etajima Shipyard
June 29, 2021 KAN-EI MARU Asakawa Shipyard
October 13, 2021 Daiichi KEISHO MARU Etajima Shipyard
November 18, 2021 DAIKOKU MARU Etajima Shipyard
November 19, 2021 SHINSEI MARU Kanda Shipyard
December 22, 2021 No. 7 SANNO Kanda Shipyard
January 19, 2022 TETSURYU MARU Etajima Shipyard
Contents of the meeting: Communication of the efforts in the Maritime Safety Plan and various matters that require attention, and sharing of information on accident cases and heads-up (including strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing)
[Information sharing and heads-up by visiting ships and using phone and FAX]
2019 (after the accident): A total of 28 ships were visited.
Main contents of communication: Sharing of the information of the accident, request to strengthen look-out under restricted visibility conditions, early give-way to avoid danger (including strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the duty system) and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing)

2020: A total of 25 ships were visited.
Main contents of communication: Sharing of the information of the recent accidents, heads-up (including strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing) and of the measure of the master going up the bridge under restricted visibility conditions and of

the watch standing), prohibition of Prohibition of bringing smartphones to the bridge during watch duty, and prohibition of creating documents unrelated to the voyage during watch standing

2021: A total of 44 ships were visited.

Main contents of communication: Sharing of the information of the recent accidents, heads-up (including strengthening of communication using VHF and acoustic signals, and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing) and of the measure of the master going up the bridge under restricted visibility conditions and of the watch standing), matters to be compulsorily complied with for the appointment of the master, measures to avoid contact with fixed fishing gear, etc., and the proper speed when docking

[Equipment installation status]

AIS SUMIHO MARU July 25-26, 2019 (installation work)

Installation completed Installed on all 12 other operating ships

Electronic chart SUMIHO MARU June 21 and 29, 2020 (installation work)

Installation completed Installed on all 12 other operating ships

Lifejackets Completion of deployment of lifejackets on the bridge of all ships

*The details of the completion reportof improvement actions is available on the website of the JTSB.
https://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku23re_20220322.pdf

(7) Report based on the opinions related to the accident with a crew member injuries of the fishing vessel NO. 3 SEIRYO MARU

(Opinion on August 29, 2019)

Regarding the investigation of the accident with a crew member injuries of the fishing vessel NO. 3 SEIRYO MARU occurred on September 14, 2018, off the west of Oshima, Amatsu-City, Kumamoto Prefecture, the JTSB did not only publish the accident investigation report on August 29, 2018, but also expressed its opinions to the Director-General of the Fisheries Agency. The JTSB received the following reports on the measures taken in response to the opinions on October 6, 2022.

*For summary and probable causes, see the website of the JTSB.
https://jtsb.mlit.go.jp/jtsb/ship/detail.php?id=11617

○Details of the opinions to the Director-General of the Fisheries Agency

Based on the occurrence of similar accidents, the JTSB provides the following opinion based on the provisions of Article 28 of the Act for Establishment.

Opinions

The Director-General of the Fisheries Agency with the duty to formulate the Basic Plan for Fisheries based on the Fisheries Basic Act and strengthen safety measures for fishing vessels and fisheries, in light

of the repeated occurrence of similar accidents involving purse seine fishing vessels and stick-net fishing vessels which use side rollers during, in order to draw the attention of fisheries to similar accidents, the JTSB will not only disseminate information on the following forms of similar accidents clarified by accident investigations as well as the recurrence prevention measures, but also strongly recommends the implementation of recurrence prevention measures, including the introduction of an emergency stop device for the side rollers with a view to further improving safety.

1 Forms of similar accidents

(1) During the preparation work to bring fishes in the nets into the fish hold, one worker alone tried to fix the nets to the side rollers by manually passing a part of the nets lifted by the side rollers through a gap between the side rollers and the bulwark outboard and sandwiching it between the net being lifted and the side rollers in a state in which the side rollers were rotating.

(2) During the work to lift the net onto the ship using the side rollers, a part of the nets lifted onto the ship went outboard through between the side rollers and the bulwark and got caught to be wound up by being sandwiched between the net and the rotating side rollers (hereinafter referred to as "reverse winding").

2 Measures to prevent recurrence of similar accidents

(1) The hem and cuffs of the crew's jacket should be tightened so as not to get caught and wound up by the side rollers.

(2) An operator to operate the operation lever of the side rollers should be placed to cause him to monitor the situation of the work performed by the side rollers at all times so that they may be stopped immediately in the event of an abnormality.

(3) When fixing the net, the side rollers should be temporarily stopped, and the worker to fix the net and the operator to operate the operation lever should work together by communicating with each other.

(4) Since the worker who fixes the net performs the work wearing gloves, the fingertips of the gloves may get caught between the net being lifted and the rotating side rollers, he/she should remove the gloves when fixing the net.

(5) The following measures to prevent reverse winding should be taken in order to prevent it from occurring beforehand.

① The situation of the net should be carefully observed, and when a part of the net susceptible to reverse winding is recognized, the side rollers should be stopped immediately to eliminate such a situation.

② Scratches on the rubber part on the surface of the side rollers should be repaired appropriately.

③ In a situation in which reverse winding is likely to occur when a part of the net lifted onto the ship is blown by the wind, air screens should be spread out on the deck.

④ A part of the net lifted onto the ship should not be on top of the bulwarks.

⑤ When nets in bundle are lifted by the side rollers, since a part of the nets lifted onto the ship may be twisted to thereby cause reverse winding, the nets should be lifted onto the ship by evening them out on the side rollers.

(6) Even if an operator to operate the operating lever of the side rollers is placed, since there is a possibility that the operating lever may not be operated properly or the side rollers may not be stopped immediately as below, it is desirable to introduce an emergency stop device for the side rollers with a view to further improving safety.

①There are cases in which when the nets are being lifted onto the ship using the side rollers, if a worker's hand, etc. is caught between the nets being lifted and the rotating side rollers, the operation lever may not be operated properly.

②Since reverse winding can occur in various situations, it is difficult to predict or prevent all such situations, and in the case where reverse winding occurs all of a sudden and a worker's hand, etc. is caught between the nets being lifted and the rotating side rollers, it is not easy to immediately stop the side rollers with the operation lever.

(7) It is desirable to introduce equipment for fixing nets as an alternative measure to fixing the nets to the side rollers in purse seine fishing vessels in which the side rollers are used for lifting the nets.

(8) The side rollers, emergency stop devices for the side rollers, or special equipment for fixing the nets should be used in accordance with the handling specified by the manufacturer of each equipment.

○**Measures taken by the Director-General of the Fisheries Agency based on the opinions**

In response to the aforementioned opinions by the JTSB through the UN-I-SAN No. 37 dated August 29, 2019, we are pleased to inform that the directors of prefectural fisheries affairs, representatives of related organizations, and directors of fisheries coordination offices were notified as attached on September 9, 2018 for ensuring the operational safety of purse seine and stick seine fishing vessels.

In addition, the Fisheries Agency has not only designated October as a month to promote the safety operations of fishing vessels, but also developed a norm to raise awareness of operational safety to be address by onsite operators as "new measures for work safety for agriculture, forestry, fisheries and food industries" in order to promote the efforts for work safety.

*The details of the completion report of improvement actions is available on the website of the JTSB.
https://www.mlit.go.jp/jtsb/shiphoukoku/ship-iken15re_20221020.pdf

Column

Cutting Edge Investigation Techniques
(Use of a 3D Scanner and Introduction of a CT Scanner)
"In Search of the World between 1s and 0s"

JTSB Lab

The accident investigation work of the JTSB begins with steadily accumulating factual information as the "first step," and there is a strong demand for scientific and objective analysis based on the state of accident sites and conditions of accident articles obtained in the course of the investigation. For this reason, the JTSB Lab engages itself in steady work to find out the information that is the key to the causes of an accident by converting so-called "digital data consisting of 1s and 0s" into visual numerical values, graphs, images, or videos. In such circumstances, there are some devices which are playing a very active role for the elucidation of the causes of accidents in accident investigations and which are used for more sophisticated analysis in recent years.

< 3D Scanner >

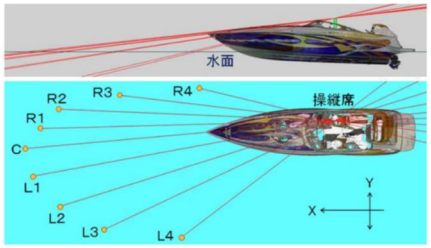
In principle, a 3D scanner applies a laser beam to a target and the coordinates of each point obtained by reflection are acquired as data. The data consisting of the collection of these points is commonly called "point cloud data." When the point cloud data is processed with specialized software, it is possible to create a cubic"3D model" of the surrounding conditions of the accident site and the state of the aircraft or the ship to be investigated. This 3D model allows a precise measurement and drawing creation and a 3D model of an aircraft or a ship obtained by precisely reproducing the real ones may be used for various simulations. Achievements in recent years include a three-dimensional measurement of the part of an aircraft with which a bird collided and the prediction of the blind spot range according to the speed of a small boat. Thus, the device is capable of calculating numerical values with high accuracy. In addition, it is under consideration to use the device for the investigation of railway accidents.

Currently, it has become possible to faithfully reproduce not only the terrain around the accident site, but also the interior of the accident object with a 3D scanner, by synthesizing data obtained by a 3D scanner from the ground and aerial photography obtained by a drone for investigation purposes. We are confident that the devices are useful for verifying objective facts more than ever.

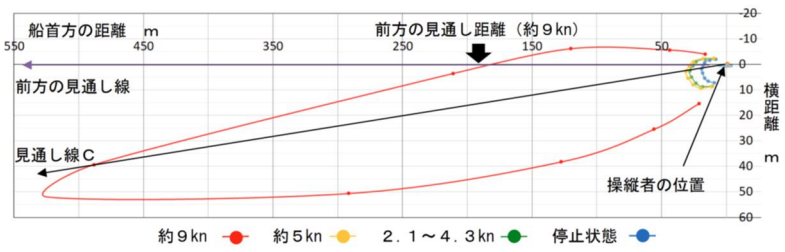
Fixed type

Handy type

Drone for investigation purposes



A船の速力	船体縦傾斜角	操縦者からC点までの距離
停止状態0kn	1．8°	約19m
2．1～4．3kn	3．8°	約28m
約5kn	4．8°	約31m
約9kn	7．6°	約480m



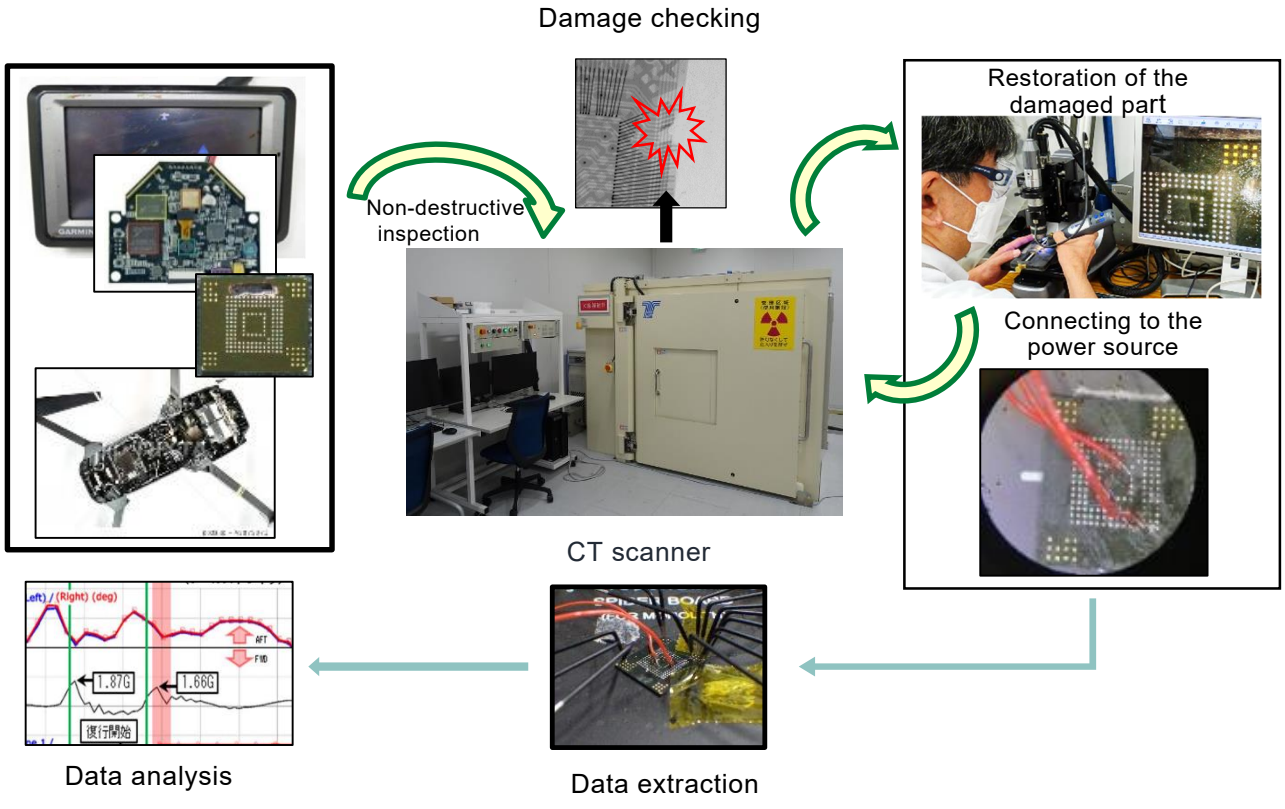
Relationship among the speed, ship inclination angle and visibility in the bow direction

<CT Scanner >

A CT scanner is generally used for “non-destructive inspection”, etc. It is a device that can see through the inside of an object in a three-dimensional manner without disassembling it and was introduced for the first time in January 2023 by the JTSB. Investigative agencies in other countries that already have CT scanners use them to check the inside of the flight recorder of the accident aircraft and check the cracks of the damaged parts of the accident as well as to check the structure of the memory chip in which “digital data consisting of 1s and 0s” is recorded. It is necessary in these days to “retrieve, restore and analyze” the data composed of “1s and 0s” recorded in all sorts of electronic devices. With the progress of digitalization in aircraft, train and ship, the JTSB Lab is also actively incorporating the device into investigations as a very useful means for elucidating the causes and preventing recurrences.

The CT scanner is a very effective device for the JTSB to obtain information from data recorded in electronic devices. For example, when extracting data from electronic devices such as the GPS receiver used in the aircraft related accident, mobile phones and cameras carried by passengers in order to reproduce the estimated route of this aircraft and images taken at the time of the accident, there is likelihood that the data is lost or the data cannot be extracted upon connecting to the power source carelessly in cases in which these electronic devices are wet with water or the internal electronic boards are severely damaged. In these cases, it is necessary to carefully proceed with work such as disassembling, restoring, connecting, etc., for extracting the data. The CT scanner allows the work to be performed speedily and securely. The example below shows a flow to check the damage on the memory chip and perform repair work thereof using a CT scanner in which extremely thin wires are connected to the damage memory chip to supply power and to finally extract the recorded data.

We have just introduced CT scanner which will be used extensively for accident investigations of aircraft, railway and marine in the future.



Chapter 3 Aircraft accident and serious incident investigations

1 Aircraft accidents and serious incidents to be investigated

<Aircraft accidents to be investigated>

◎Article 2, paragraph (1) of the Act for Establishment of the Japan Transport Safety Board

The term "Aircraft accident" as used in this Act means the accident prescribed as follows:

(i) an accidents prescribed in Article 76, paragraph (1), each of the items of the Civil Aeronautics Act (Act No. 231 of 1952), regarding the aircraft.

(ii) an accidents prescribed in Article 132-90, paragraph (1), each of the items of the Civil Aeronautics Act, which are serious ones as may be specified in Order of the Ministry of Land, Infrastructure, Transport and Tourism (Article 1 of Regulation for Enforcement of the Act for Establishment of the Japan Transport Safety Board), regarding the unmanned aircraft

1. Accidents related to aircraft

○Article 76, paragraph (1) of the Civil Aeronautics Act

(i) crash, collision, or fire of aircraft

(ii) injury or death of any person, or damage of any object caused by aircraft

(iii) death (except those specified in Order of the Ministry of Land, Infrastructure, Transport and Tourism) or disappearance of any person on board the aircraft

(iv) contact with other aircraft

(v) other accidents relating to aircraft specified in Order of the Ministry of Land, Infrastructure, Transport and Tourism

・Article 165-3 of the Regulation for Enforcement of the Civil Aeronautics Act

Accidents related to aircraft prescribed in Order of the Ministry of Land, Infrastructure, Transport and Tourism referred to in Article 76, paragraph (1), item (v) of the Act are cases (excluding cases where the repair of the aircraft does not fall under the major repair work among the work classifications listed in the Table of Article 5-6) where aircraft in flight is damaged (except the sole damage of engine, cowling, propeller, wing tip, antenna, tire, brake or fairing).

2. Accidents related to unmanned aircraft

○Article 132-90, paragraph (1) of the Civil Aeronautics Act

(i) injury or death of any person, or damage of any object caused by unmanned aircraft

(ii) collision or contact with an aircraft

(iii) other accidents relating to unmanned aircraft which are serious ones as may be specified in Order of the Ministry of Land, Infrastructure, Transport and Tourism (*Currently, there is no order)

・Article 1 of the Regulation for Enforcement of the Act for Establishment of the Japan Transport Safety Board

(i) injury or death of any person caused by unmanned aircraft

(ii) damage of any object caused by an unmanned aircraft prescribed below.

(a) damage of buildings for which a person is actually present or movable facilities such as vehicles, ships, etc.

(b) case where electricity supply facilities, telecommunications facilities, transportation facilities, educational facilities, medical facilities, government facilities, or other public facilities operations are disrupted.

(c) other cases which are recognized as particularly exceptional in addition to those listed in (a) and (b)

(iii) collision or contact with an aircraft

< Aircraft serious incidents to be investigated >

◎Article 2, paragraph (2), item (ii) of the Act for Establishment of the Japan Transport Safety Board (serious incidents involving aircraft and unmanned aircraft)

A case recognized a risk of aircraft accident as may be specified in the Order of the Ministry of Land, Infrastructure, Transport and Tourism (Article 2 of the Regulation for Enforcement of the Act for Establishment of the Japan Transport Safety Board).

○Article 2 of the Regulation for Enforcement of the Act for Establishment of the Japan Transport Safety Board

3. Serious incidents related to aircraft

(1) The following cases*. However, item (viii), (xi) and (xii) are limited to the cases occurred to an aircraft during flight.

(i) case where a pilot in command of an aircraft, during a flight, recognized a risk of collision or contact with any other aircraft

(ii) takeoff from a closed runway, a runway being used by other aircraft, a runway which is different from the instructed one or a taxiway, or aborted takeoff

(iii) landing on a closed runway, a runway being used by other aircraft, a runway which is different from the instructed one or a location where an aircraft is not normally supposed to land such as a taxiway or a road

(iv) case where engine cowling, wingtip or component other than landing gear is contact with ground surface during landing

(v) overrun, undershoot and deviation from a runway (limited to when an aircraft is unable to perform taxiing)

(vi) case where emergency evacuation was conducted by using the emergency evacuation slide

(vii) case where aircraft crew executed an emergency operation during flight in order to avoid crash into water or contact with the ground

(viii) damage to the engine (limited to a case where fragments penetrated the casing of the engine or a major damage occurred inside the engine)

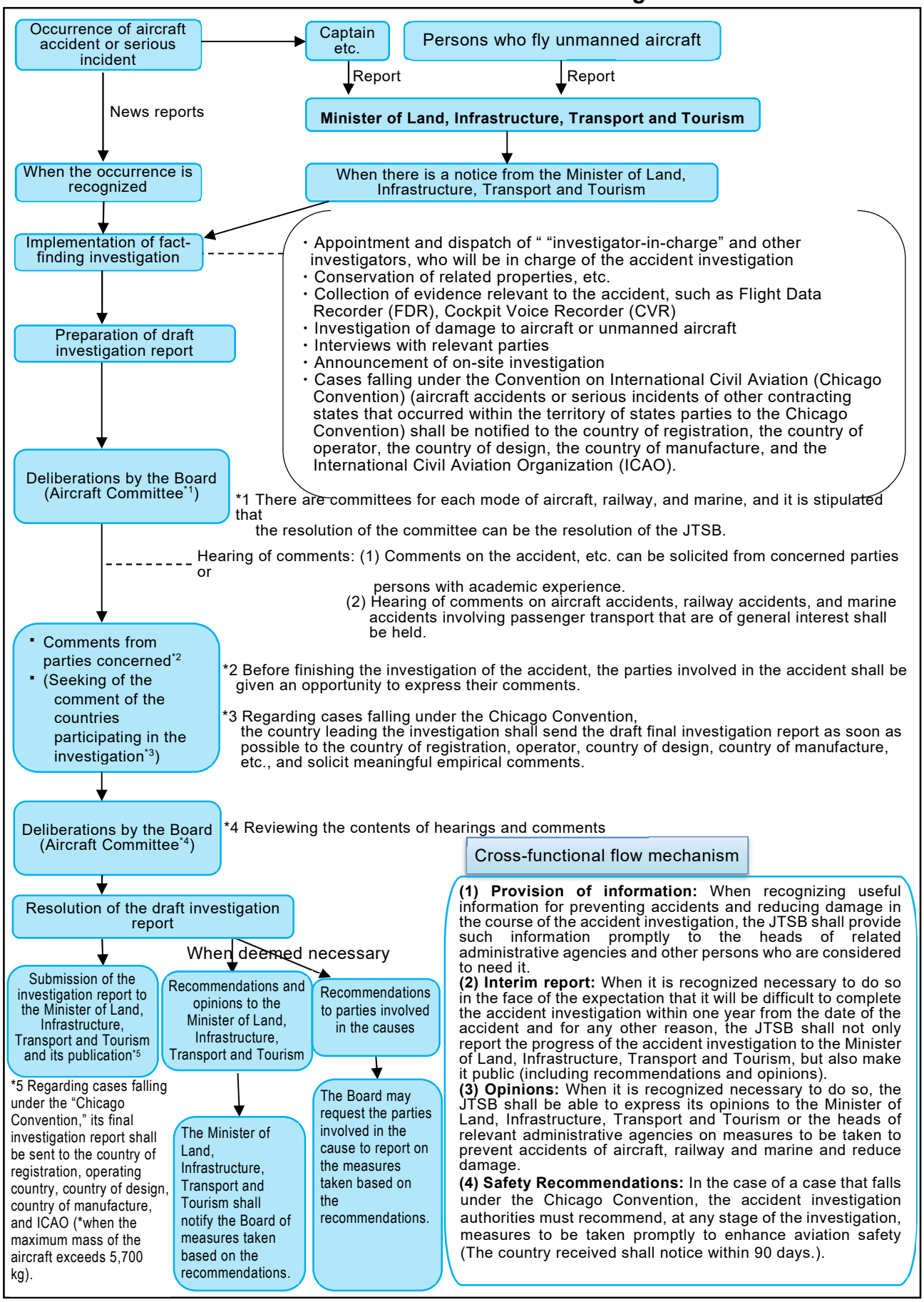
(ix) the engine is stopped continuously or loss of power or thrust thereof (except when the engine(s) are stopped with an attempt of assuming the engine(s) of a motor glider) of engines (in the case of multiple engines, 2 or more engines) in flight

(x) case where any of aircraft propeller, rotary wing, landing gear, rudder, elevator, aileron or flap is damaged and thus flight of the aircraft may not be continued
(xi) multiple malfunctions in one or more systems installed on aircraft impeding the safe flight of aircraft
(xii) occurrence of fire or smoke inside an aircraft and occurrence of fire within an engine fire-prevention area
(xiii) abnormal decompression inside an aircraft
(xiv) shortage of fuel requiring urgent measures
(xv) case where aircraft operation is impeded by an encounter with air disturbance or other abnormal weather conditions, failure in aircraft equipment, or a flight at a speed exceeding the airspeed limit, limited payload factor limit operating altitude limit
(xvi) case where aircraft crew was unable to perform normal duties due to injury or disease
(xvii) case where an object which attached to the exterior of the aircraft, suspended, or towed dropped unintentionally or it dropped as an emergency operation from the aircraft.
(xviii) case where parts fell from aircraft collided with persons
(xix) case equivalent to those listed in the preceding items
* Item (ii) through (xix) are the cases listed in Article 166-4 of the Regulation for Enforcement of the Civil Aeronautics Act, which are cited in Article 2 of the Regulation for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

(2) The following cases, and an unusual case in particular:
(i) case listed in item (viii), (xi) and (xii) of 1 above occurring with an aircraft other than during flight
(ii) case where an aircraft other than during flight is damaged[*1*2]
*1 except the sole damage of engine, cowling, engine accessories, propeller, wing tip, antenna, tire, brake or fairing
*2 case which refers to the case corresponding to “major repair.” “Major repair” means a repair that has a significant effect on airworthiness.
(iii) case where any of aircraft propeller, rotary wing, landing gear, rudder, elevator, aileron or flap is damaged and thus flight of the aircraft may not be started
(iv) case equivalent to those listed in the preceding items

4. Serious incidents related to unmanned aircraft
(1) case where a pilot in command of an unmanned aircraft, during a flight, recognized a risk of collision or contact with any other aircraft
(2) The following cases, and an unusual case in particular :
(* cases listed in each items of Article 236-86 of the Regulation for Enforcement of the Civil Aeronautics Act)
(i) injury to persons caused by an unmanned aircraft (excluding serious injuries)
(ii) case in which an unmanned aircraft becomes uncontrollable
(iii) case in which an unmanned aircraft ignites (restricted to that occurred during flight)

2 Procedure of aircraft accident/serious incident Investigation



3 Statistics of investigations of aircraft accidents and serious incidents

The JTSB carried out investigations of aircraft accidents and serious incidents as follows:

In 2022, 17 accident investigations were carried over from 2021 and 21 accident investigations were newly launched. Besides, five investigation reports were published, and thereby 33 accident investigations were carried over to 2023.

Moreover, 21 serious incident investigations were carried over from 2021, and 15 serious incident investigations were newly launched in 2022. Furthermore, 14 investigation reports were published in 2021, and thereby 22 serious incident investigations were carried over to 2023.

Among the 19 investigation reports published in 2022, none was issued with recommendations and none was issued with opinions.

Investigations of aircraft accidents and serious incidents in 2022

(Cases)

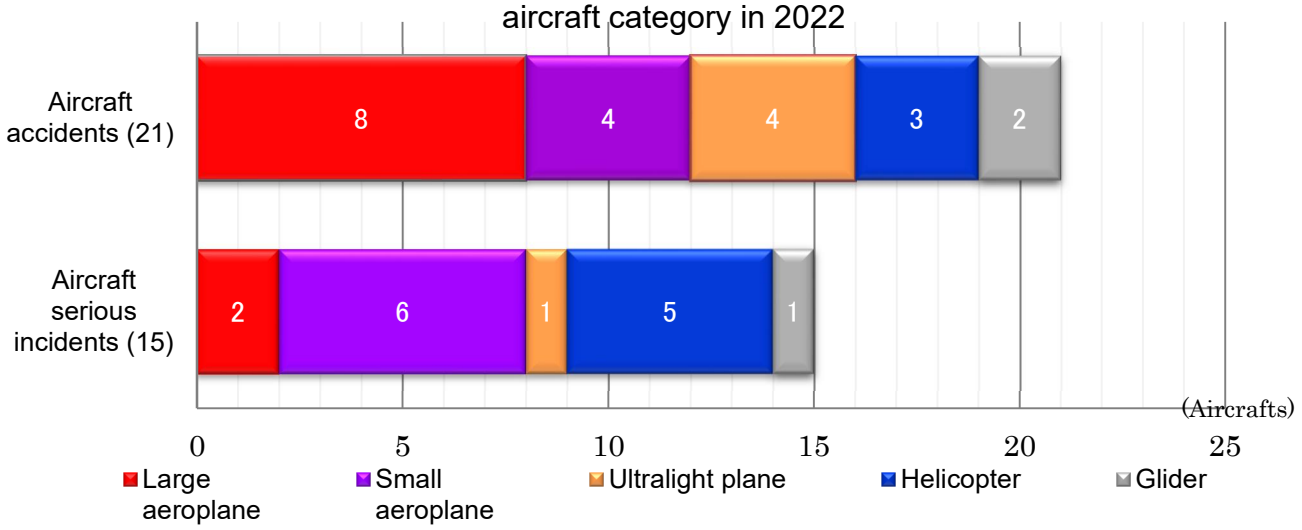
Category	Carried over from 2021	Launched in 2022	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2023	(Interim report)
Aircraft accident	17	21	38	5	(0)	(0)	(0)	33	(9)
Aircraft serious incident	21	15	36	14	(0)	(0)	(0)	22	(4)

4 Statistics of investigated aircraft accidents and serious incidents in 2022

The aircraft accidents and serious incidents that were newly investigated in 2022 consisted of 21 aircraft accidents, which increased by 10 from 11 for the previous year, and 15 aircraft serious incidents, which increased by five from 10 for the previous year.

By aircraft category, the aircraft accidents included eight cases involving large aeroplanes, fourcases involving small aeroplanes, four cases involving ultralight planes, three cases involving helicopters, and two cases involving gliders. The aircraft serious incidents included two cases involving large aeroplanes, six cases involving small aeroplanes, one case involving ultralight plane, five cases involving helicopters, and one case involving glider.

Number of investigated aircraft accidents and serious incidents by aircraft category in 2022



* Large aeroplane refers to an aircraft of a maximum take-off mass of over 5,700 kg.

* Small aeroplane refers to an aircraft of a maximum take-off mass of under 5,700 kg except for ultralight plane and self-made aircraft.

* Ultralight planes include self-made aircraft in the form of ultralight planes.

The number of deaths, missing and injured were 23 in 21 cases, including nine deaths and 14 injuries.

The number of casualties (aircraft accident)

(Persons)

2022							
Aircraft category	Fatal Injuries		Missing		Serious/Minor Injuries		Total
	Crew	Passengers and others	Crew	Passengers and others	Crew	Passengers and others	
Large aeroplane	0	0	0	0	5	3	8
Small aeroplane	2	2	0	0	0	0	4
Helicopter	1	0	0	0	0	2	3
Ultralight plane	1	1	0	0	3	0	5
Glider	1	1	0	0	1	0	3
Total	5	4	0	0	9	5	23
	9		0		14		

*The above statistics include incidents under investigation so may change depending on the status of the investigation and deliberation. In addition, for the number listed as “passengers” on the website in the number of injuries of an aircraft accident currently under investigation, the minimum number of pilots required to fly the aircraft are counted as “crew.”

5 Summaries of aircraft accidents and serious incidents which occurred in 2022

The aircraft accidents and serious incidents which occurred in 2022 are summarized as follows: The summaries are based on information available at the start of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Aircraft accidents)

1	Date and location	Operator	Aircraft registration number and aircraft type
	January 16, 2022 In the sky over near Okayama City, Okayama Prefecture, at an altitude of about 8,500 m	Star Flyer Inc.	JA24MC Airbus A320-214 (Large aeroplane)
	Summary	During the flight after taking off from the Tokyo International Airport, one passenger was seriously injured when the aircraft shook near the above location. The aircraft continued its flight and landed at the Kitakyushu Airport.	

2	Date and location	Operator	Aircraft registration number and aircraft type
	February 15, 2022 About 55 km north-northwest of the Osaka International Airport, at an altitude of about 2,700 m	Japan Air Commuter, Co., Ltd.	JA04JC ATR 42-500 (Large aeroplane)
	Summary	During the flight after taking off from the Tajima Airport, one passenger was injured when the aircraft shook near the above location. The aircraft continued its flight and landed at the Osaka International Airport.	

3	Date and location	Operator	Aircraft registration number and aircraft type
	March 12, 2022 On the premises of the Ie Island Airport	(NPO) MESH Support	JA4577 Beechcraft A36 (Small aeroplane)
	Summary	While the aircraft was undergoing the training of continuous takeoff and landing at the Iejima Airport, it crashed on its premises.	
4	Date and location	Operator	Aircraft registration number and aircraft type
	March 21, 2022 Kisogawa Gliding Field	The General Incorporated Association Tokai/Kansai Student Aviation League	JA2151 Alexander Schleicher ASK13 (Glider)
	Summary	When the aircraft landed at the Kisogawa Gliding Field, it bounced and stopped on the runway.	
5	Date and location	Operator	Aircraft registration number and aircraft type
	March 26, 2022 About 90 km east of the Nagoya Airfield, at an at an altitude of about 8,500 m	Japan Airlines Co., Ltd.	JA603J Boeing 767-300 (Large aeroplane)
	Summary	During the flight after taking off from the Tokyo International Airport, one cabin attendant was injured when the aircraft shook near the above location. The aircraft continued its flight and landed at the Oita Airport.	
6	Date and location	Operator	Aircraft registration number and aircraft type
	April 3, 2022 In the sky over near Iwaizumi-cho, Shimohei-gun, Iwate Prefecture, at an altitude of about 30 m	Iwate Prefectural Disaster Prevention Aviation Corps	JA10TE Agusta Model AW139 (Rotorcraft)
	Summary	When the aircraft was spraying water to extinguish a forest fire near the above location, the water sprayed hit a firefighter working on the ground and injuring him.	
7	Date and location	Operator	Aircraft registration number and aircraft type
	April 18, 2022 Ariake Sea, about 10 km west of Miike Port, Omuta City, Fukuoka Prefecture	Privately owned	JA3803 Fuji-FA-200-160 (Small aeroplane)
	Summary	The aircraft ditched into the Ariake Sea.	
8	Date and location	Operator	Aircraft registration number and aircraft type
	June 23, 2022 On the runway of the Kochi Airport	Jetstar Japan Co., Ltd.	JA05JJ Airbus A320-232 (Large aeroplane)
	Summary	When the aircraft landed at the Kochi Airport after taking off from the Narita International Airport, a cabin attendant was injured.	
9	Date and location	Operator	Aircraft registration number and aircraft type
	June 25, 2022 About 40 km west-southwest of the Tokushima Airport, at an altitude of about 5,200 m	ANA WINGS CO., LTD.	JA854A Bombardier DHC-8-402 (Large aeroplance)

	Summary	While the aircraft took off from Kumamoto Airport and was cruising around the above location, a cabin attendant who was working at the rear galley fell and hit her hips on the floor strongly and got injured. The aircraft landed at the Osaka International Airport.	
10	Date and location	Operator	Aircraft registration number and aircraft type
	July 16, 2022 About 120 km southwest of the Naha Airport, at an altitude of about 7,800 m	Solaseed Air Inc.	JA807X Boeing 737-800 (Large aeroplane)
	Summary	While the aircraft was climbing after taking off from the Naha Airport, the aircraft shook near the above location, injuring one cabin attendant. The aircraft continued its flight and landed at the New Ishigaki Airport.	
11	Date and location	Operator	Aircraft registration number and aircraft type
	August 15, 2015 At Jinseki Kogen Town, Jinseki District, Hiroshima Prefecture	Privately owned	JA9727 Aerospatial AS350B (Rotorcraft)
	Summary	The aircraft was found near the above location. One passenger was later confirmed that got fatal injury.	
12	Date and location	Operator	Aircraft registration number and aircraft type
	August 28, 2022 Near the off-field airfield in Ubuyama Village, Aso District, Kumamoto Prefecture	Privately owned	JX0135 Rans S-6 Coyote II-R582L modified (Self-made aircraft)
	Summary	Immediately after taking off from the Ubuyama Auxiliary Airfield, the aircraft crashed and burst into flames at the location mentioned above.	
13	Date and location	Operator	Aircraft registration number and aircraft type
	September 10, 2022 At the Tone River riverbed in Tamamura-cho, Sawa-gun, Gunma Prefecture	Privately owned	JR0878 Kolb Twinstar MKIIR503L (Ultralight plane)
	Summary	While flying after taking off from the Isesaki Auxiliary Airfield and crashed near the above location during flight.	
14	Date and location	Operator	Aircraft registration number and aircraft type
	September 22, 2022 Around the apron of the Yao Airport	Privately owned	JA3969 Cessna 172P (Small aeroplane)
	Summary	While the aircraft was taxiing after landing at the Yao Airport, its left wing touched the apron floodlighting (light for illuminating the parking apron).	
15	Date and location	Operator	Aircraft registration number and aircraft type
	October 3, 2022 In the sky over near the Miho Airport, at an altitude of about 11,300 m	Japan Transocean Air Co., Ltd.	JA07RK Boeing 737-800 (Large aeroplane)
	Summary	During the flight after taking off from the Naha Airport, one cabin attendant was injured when the aircraft shook near the above location. The aircraft landed at the Komatsu Airport.	
16	Date and location	Operator	Aircraft registration number and aircraft type
	October 9, 2022 Rice fields in Nanporo-cho, Sorachi-gun, Hokkaido	Privately owned	JR1039 Quicksilver GT400SR447L (Ultralight plane)

	Summary	During the flight after taking off from the auxiliary airfield in Nanporo-cho, Sorachi-gun, Hokkaido, the aircraft made an emergency landing near the above location because the engine stopped.

17	Date and location	Operator	Aircraft registration number and aircraft type
	October 26, 2022 Near Ikegahora, Takane Town, Takayama City, Gifu Prefecture	Privately owned	JA2177 Scheibe SF28A Tandem Falke (Power glider)
	Summary	The aircraft was found crashed near the above location.	

18	Date and location	Operator	Aircraft registration number and aircraft type
	November 7, 2022A runway at Kagoshima Airport	Japan Air Commuter Co., Ltd.	JA06JC ATR 72-212A (Large aeroplane)
	Summary	One passenger was seriously injured when the aircraft took off from Tanegashima Airport and landed at Kagoshima Airport.	

19	Date and location	Operator	Aircraft registration number and aircraft type
	November 20, 2022 Oyama Bando Flying Club Auxiliary Airfield, Bando City, Ibaraki Prefecture	Privately owned	JR0628 Rans S7 Courier R582L (Ultralight plane)
	Summary	The aircraft crashed into a field about 100m from the end of the airfield runway.	

20	Date and location	Operator	Aircraft registration number and aircraft type
	November 28, 2022 In the sky over the Kirishimayama (Ohachi), at an altitude of about 8 m	SHIKOKU AIR SERVICE CO., LTD.	JA6977 Bell Type 412EP (Rotorcraft)
	Summary	When the aircraft hoisted the supplies slung outside of the aircraft for the purpose of transporting them and a ground worker grabbed the swaying supplies, he floated together with the supplies. Immediately after floating, he let the supplies go and got injured when he landed on the ground.	

21	Date and location	Operator	Aircraft registration number and aircraft type
	December 10, 2022 While approaching the Kounan Airport, at an altitude of about 45 m	Okayama Air Service Co., Ltd.	JA123R Cessna 172R (Small aeroplane)
	Summary	When the aircraft was approaching the Kounan Airport after taking off from same airport, it collided with a bird. Damage to the aircraft was confirmed in the inspection after landing.	

(Aircraft Serious Incident)

1	Date and location	Operator	Aircraft registration number and aircraft type
	January 8, 2022 On the runway of the Kagoshima Airport	New Japan Aviation Co., Ltd. (Aircraft A)	JA4061 Cessna 172P (Small aeroplane)
		Japan Air Commuter, Co., Ltd. (Aircraft B)	JA04JC ATR 42-500 (Large aeroplane)

	Summary	Since Aircraft A which had been instructed by the air traffic controller to hold short of runway entered into the runway, Aircraft B which was approaching with the clearance of landing on the runway made a go-around by following instruction of the controller.		
2	Date and location		Operator	Aircraft registration number and aircraft type
	March 6, 2022 On the runway A of the Yao Airport		Privately owned	A007Z Socata, Type TBM700 (Small aeroplane)
	Summary	When the aircraft was landing at the Yao Airport, it redid the landing due to strong winds and its propeller contacted withthe runway. The aircraft landed at the airport later.		
3	Date and location		Operator	Aircraft registration number and aircraft type
	March 7, 2022 On the runway of the Kumamoto Airport		Kumamoto Prefectural Disaster Prevention and Firefighting Air Unit (Aircraft A)	JA90MT Airbus Helicopters AS365N3 (Rotorcraft)
			The Educational Corporation Kimigafuchi Gakuen (Aircraft B)	JA47UK Textron Aviation 172S (Small aeroplane)
	Summary	Since Aircraft A which had been instructed by the air traffic controller to hold short ofrunway at the Kumamoto Airport entered into the runway, Aircraft B which was approaching with the clearance to make a touch-and-go landing made a go-around by following instruction of the controller.		
4	Date and location		Operator	Aircraft registration number and aircraft type
	April 18, 2022 About 200km northeast of the Fukuoka Airport, at an altitude of about 9,800 m		IBEX Airlines Co., Ltd.	JA07RJ Bombardier CL-600-2C10 (Large aeroplane)
	Summary	During the flight after taking off from the Sendai Airport, unreliable airspeed indication occurred temporarily on both Primary Flight Displays for the Pilot in Charge (PIC) and the First Officer (FO), the PIC declared a state of emergency. Thereafter during the descent, the problem with the airspeed indication was resolved, and the aircraft landed at the Fukuoka Airport.		
5	Date and location		Operator	Aircraft registration number and aircraft type
	April 22, 2022 About 900 m east of the takeoff and landing point for helicopters in the Kansai International Airport, at an altitude of about 150 m		Japan Coast Guard	JA687A Eurocopter EC225LP (Rotorcraft)
	Summary	When theaircraft was approaching the take-off and landing field for helicopters in the Kansai International Airport with the clearance to land from the air traffic controller, the captain visually confirmed the presence of an inspection vehicle near the take-off and landing field. Therefore,the aircraft made a go-around following air traffic controller's instruction after notifying the air traffic controller to that effect.		
6	Date and location		Operator	Aircraft registration number and aircraft type

	April 23, 2022 On the runway of the Fukui Airport	Privately owned	JA01KT Scheibe SF-25 (Motor glider)
	Summary	Upon landing on the ranway of the Fukui Airport, the aircraft's propella contacted with the runway surface because the aicraft bounced two times.	
7	Date and location	Operator	Aircraft registration number and aircraft type
	May 20, 2022 Near the west runway of the Hyakuri Airfield	Fuji Dream Airlines Co., Ltd.	JA10FJ Embraer ERJ 170-200STD (Large aeroplane)
	Summary	When the aircraft was entering the west runway with the clearance to land from the air traffic controller, since the controller recognized the presence of a vehicle on the runway, the controller instructed the aircraft to make a go-around. The aircraft landed at the airport after making a go-around.	
8	Date and location	Operator	Aircraft registration number and aircraft type
	June 2, 2022 Kagoshima Airport	Civil Aviation College (Aircraft A)	JA74MD Cirrus SR22 (Small aeroplane)
		Kagoshima International Aviation Co., Ltd. (Aircraft B)	JA02KG Agusta A109E (Rotorcraft)
	Summary	At the Kagoshima Airport, Aircraft A followed the air traffic controller's instruction to hold short of runway and stopped on the taxiway in order to take off, , the controller gave clearance to Aircraft B in flight to make a touch and go landing at the take-off and landing point for helicopters established on the taxiway. Thereafter, when the controller recognized the aircraft at a standstill on the taxiway in front of the runway for taking off, the controller ordered Aircraft B to make a go-around.	
9	Date and location	Operator	Aircraft registration number and aircraft type
	June 26, 2022 Vineyard in Kasumigaura City, Ibaraki Prefecture	Privately owned	None Details to be confirmed (Ultralight plane)
	Summary	The plane took off from an airfield in Kasumigaura City, Ibaraki Prefecture, contacted witha tree in flight, and made an emergency landing in a vineyard in Kasumigaura City, Ibaraki Prefecture.	
10	Date and location	Operator	Aircraft registration number and aircraft type
	August 15, 2022 In the sky over near the Menuma Gliding Field, at an altitude of about 150 m	Japan Students Aviation League	JA4083 Cristen Industry A-1 (Small aeroplane)
	Summary	When the aircraft was flying after taking off from the Menuma Gliding Field while towing a glider (Alexander Schleicher ASK21, JA2520, with 2 people on board), a part of the towline (about 7 mm in diameter, about 60 m in length, and about 500 g to 1 kg in weight, made of nylon) fell off from the aircraft near the above place after the glider had been released aircraft.	
11	Date and location	Operator	Aircraft registration number and aircraft type
	October 15, 2022 On the runway of the Noto Airport	JANET CORPORATION (Aircraft A)	JA6113 Bell Type 206B (Rotorcraft)

		Japan Coast Guard (Aircraft B)	JA871B Textron Aviation Type B300C (Small aeroplane)
	Summary	When Aircraft B landed at the Noto Airport and was taxiing on the runway towards the parking apron, Aircraft A that had received the information meaning that the runway was clear from the remote flight information officer to provide remote air-ground communication service took off from the runway.	
12	Date and location	Operator	Aircraft registration number and aircraft type
	October 18, 2022 On the runway A of the Yao Airport	Asahi Airlines Co., Ltd.	JA80AP Cessna 172S (Small aeroplane)
	Summary	The aircraft took off from the Yao Airport for training. The aircraft landed after performing a touch-and-go on the runway A of the airport. During the inspection after landing, Scratches were found underside of the aft fuselage.	
13	Date and location	Operator	Aircraft registration number and aircraft type
	October 24, 2022 In the mountains of Ono City, Fukui Prefecture, about an altitude of 210m	Nakanihon Air Service Co., Ltd.	JA02AH Eurocopter AS350B3 (Rotorcraft)
	Summary	During the flight to return to the work base (loading place) after transporting supplies suspended outside the aircraft and unloading them at the transport destination (unloading place), the wire used for sling cargowhich was suspended outside the aircraft was brought into contact with the power transmission line, and a part of the wire and the hook at the tip (length: about 5m, weight: about 25kg) were dropped from the aircraft.	
14	Date and location	Operator	Aircraft registration number and aircraft type
	December 12, 2022 While approaching the Saga Airport, at an altitude of about 150 m	SGC Saga Airlines Co., Ltd.	JA4121 Cessna 172P (Small aeroplane)
	Summary	When the aircraft was approaching the Saga Airport after receiving the information from the flight information officer that the runway was clear (there is neither an aircraft in operation nor an obstacle on the runway), since a bird-sweep vehicle which had been instructed by the flight information officer to hold short of runway entered the runway by crossing the stop line, the aircraft made a go-around for landing following the instruction from flight information officer.	
15	Date and location	Operator	Aircraft registration number and aircraft type
	December 26, 2022 On the runway of Amakusa Airport	Japan General Aviation Service Co., Ltd.	JA01TC Cirrus SR20 (Small aeroplane)
	Summary	When the aircraft took off from the Kagoshima Airport and at the Amakusa Airfield for continuous take-off and landing training, it stopped on the runway due to damage to the propeller and nose landing gear.	

6 Publication of investigation reports

The number of investigation reports of aircraft accidents and serious incidents published in 2022 was 19, consisting of 5 aircraft accidents and 14 aircraft serious incidents.

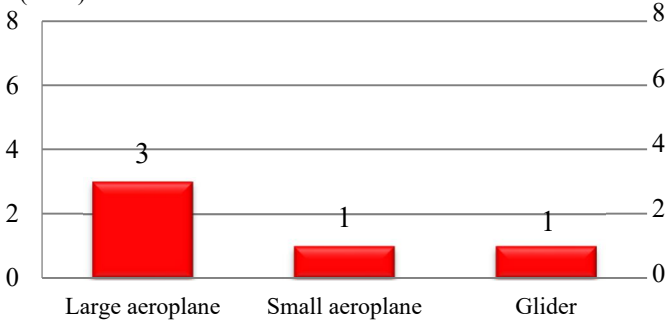
Breaking them down by aircraft category, the aircraft accidents involved 3 large aeroplanes, 1 small aeroplane, and one glider. The aircraft serious incidents involved 3 large aeroplanes, 4 small aeroplanes, 2 helicopters, 2 ultralight planes, and 3 gliders.

Note: In aircraft accidents and serious incidents, two or more aircraft are sometimes involved in a single case. See page 61

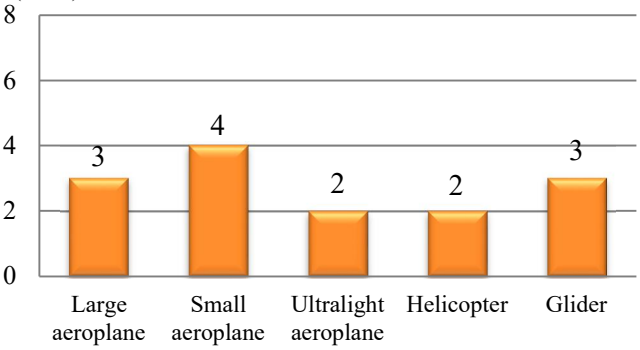
to 76 for details.

In the 5 accidents, the number of casualties was 4, consisting of 4 injuries.

Number of published aircraft accident reports (5 cases) by aircraft category in 2022

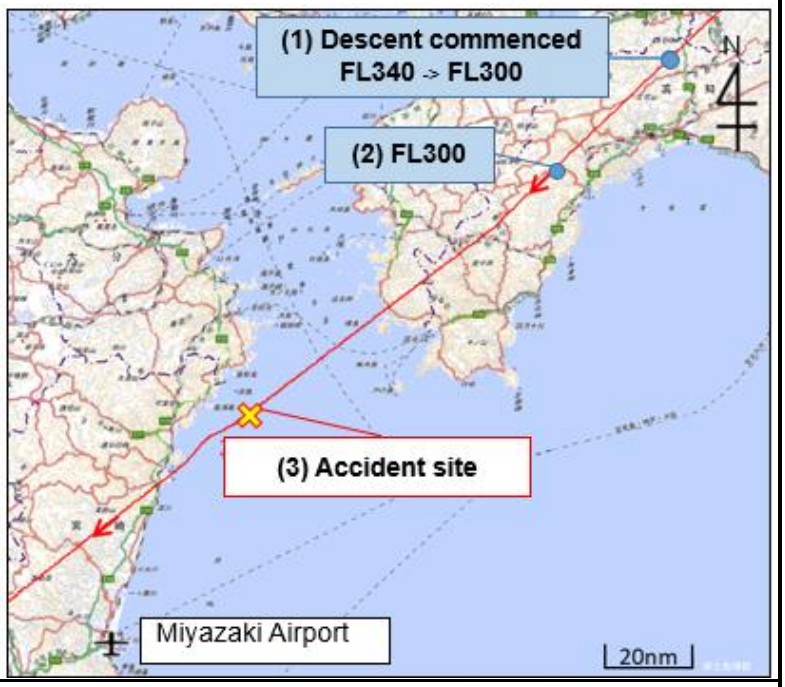


Number of published aircraft serious incident reports (14 cases) by aircraft category in 2022



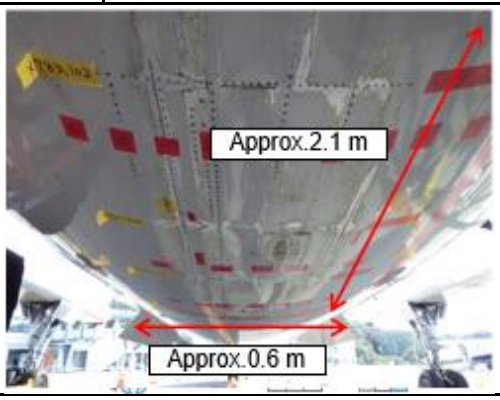
The aircraft accidents and serious incidents which occurred in 2022 are summarized as follows.

Aircraft accident investigation reports published in 2022

1	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	March 24, 2022	December 25, 2019 At FL300 over approximately 100 km north-northeast of Miyazaki Airport	Tigerair Taiwan	B50001 Airbus A320-232 (Large aeroplane)
	Summary	During the flight from the Hakodate Airport to the Taiwan Taoyuan International Airport as the scheduled flight 237 of the company, the aircraft shook and one cabin attendant was seriously injured, and one passenger and two cabin crew members were slightly injured, respectively.		
	Probable causes	It is highly probable that the accident occurred because when the aircraft was greatly shaken when it encountered wind shear near the jet stream, causing cabin crew member who was moving on the aisle in the passenger cabin to fall and sustain serious injury.		

<table>
<tr><td></td><td>Safety Actions</td><td colspan="3">Measures taken by the company to prevent recurrence
(1) FOM*1 was revised to incorporate that flight crew conduct a short briefing on flight time and weather conditions through crew in charge or passenger address system even in return flight of the round flight
(2) As the Operation Control Center duty, they were decided to receive by system SIGMET*2 released any time by the Japan Meteorological Agency and automatically transfer such information to flight crew in flight using ACARS*3.

*1 “FOM” is an abbreviation of Flight Operation Manual that defines basic policy, practical maneuvering, procedures, and criteria, etc. that persons engaged in flight operations follow in executing their duties when the company undertakes aviation transport businesses.
*2 SIGMET (Significant meteorological information) is released by the Japan Meteorological Agency on all the altitudes in the entire Fukuoka flight information region (Fukuoka FIR) when any significant weather phenomenon is observed or predicted to impair aircraft operations.
*3 “ACARS” is an abbreviation of Aircraft Communication Addressing and Reporting System that enables information necessary for flight operations to be exchanged between aircraft and the ground station as air-ground digital data link system via communication networks of ARINC. Data such as departure and arrival times, departure and destination aerodromes, flight number, and fuel loaded are transmitted to ACARS radio station on the ground via radio communication system of data link.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/B50001.pdf</td></tr>
<tr><td>2</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>March 24, 2022</td><td>August 29, 2020
About 17 km east-northeast of the Tokyo International Airport, at an altitude of 8,500 ft</td><td>Skymark Airlines Inc.</td><td>JA73NM
Boeing 737-800
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The aircraft, with 76 persons on board, consisting of the captain, 5 crew members, and 70 passengers, took off at Tokyo International Airport to Fukuoka Airport as its scheduled flight 21 and sustained damage to the airframe from bird strike in climbing.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is highly probable that the aircraft collided with the bird in take-off climb from Tokyo International Airport and sustained damage to the airframe at an altitude of 8,500 ft over approximately 17 km east-northeast of the airport.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA73NM.pdf</td></tr>
<tr><td>3</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>June 30, 2022</td><td>April 14, 2021
About 2 nm west of the Yao Airport, at an altitude of about 500 ft</td><td>Privately owned</td><td>JA001T
Cessna 525A
(Small aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">During the take-off climb from the airport, the aircraft collided with a bird and sustained damage to the airframe.
The captain and six passengers were onboard, and there were no injuries.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is most likely that the aircraft collided with the bird approximately 2 nm west of Yao Airport at an altitude of approximately 500 ft during the take-off climb from the airport that caused damage to the airframe.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">Measures taken by the Yao Airport Office of the Osaka Civil Aviation Bureau to prevent recurrence
To clarify bird strike preventive measures in the surroundings of Yao Airport, the Airport Office amended the Yao Airport wild animal collision prevention procedures (dated October 28, 2021), surveyed the ecology of the birds’ environment in the surroundings of the airport (situation of lakes</td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="3">and wildlife sanctuary) and its maintenance program in collaboration with personnel and organizations concerned, on top of that to consider measures to reduce the risk of bird strike.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA001T.pdf</td></tr>
<tr><td>4</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>June 30, 2022</td><td>October 10, 2021
Aso Temporary Airfield, Aso City, Kumamoto Prefecture</td><td>Kita-Kyushu Glider Club</td><td>JA2189
Alexander Schleicher ASK13
(Glider)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">When the aircraft with solo trainee onboard for training flight landed at the Aso Temporary Airfield in Aso City, it deviated from the runway, collided with shrub. The aircraft sustained substantial damage, but the pilot was not injured.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">When the aircraft attempted the crosswind landing, the attitude was disturbed due to the wind just before the touchdown, the probable cause of the accident was the trainee could not correct appropriately. Therefore the aircraft touched down with the nose facing the leeward left direction deviated the runway, collied with shrub and sustained damage.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA2189.pdf</td></tr>
<tr><td>5</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>August 25, 2022</td><td>October 23, 2021
Fukue Airport, Nagasaki Prefecture</td><td>ORIENTAL AIR BRIDGE CO., LTD.</td><td>JA845A
Bombardier DHC-8-402
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">When the aircraft landed on Runway 03 at Fukue Airport, the lower side of its tail contacted the runway and sustained damage to the airframe. With 54 persons in total on board, consisting of the captain, three crew members, and 50 passengers, there were no injuries.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is probable that the Aircraft was most likely in an excessive nose-up attitude and the lower side of its tail contacted the runway because the captain continued the nose-up operation until moments before the touchdown since the Aircraft did not stop descending due to the airspeed reduction caused by turbulence during the landing flare.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">Measures taken by the company to prevent recurrence
(1) Relevant flight crewmembers
The Company implemented retraining regarding procedures for the items possibly caused by the crewmembers' operations and knowledge and made an extraordinary examination.
(2) All flight crewmembers
The Company made the outline of the accident well known to all flight crewmembers and issued the relevant instructions to reconfirm precautions for landing in turbulence generated due to strong winds.
(3) Development of rules and regulations
i. In order to take advantage of the PM*1's monitoring and assertion, the Company revised the AOR*2 (Airplane Operations Reference) and specified that the PM should</td></tr>
</table>

		call, “PITCH” when the pitch angle exceeds 5° after passing the runway threshold. ii. The Company analyzed the meteorological characteristics at remote islands airports where its service is provided and documented precautions for aircraft operations. iii. In regard to flight operations for the same type of aircraft, the Company documented precautions for landing and approaching including technological considerations. (4) Education and training To the flight crewmembers who have few experiences in flights to and from remote islands in service of the Company, metrological characteristics according to each airport were made known again. *1 The PM abbreviates Pilot Monitoring and mainly monitors the flight status of the aircraft, cross checks operations of the PF, and undertakes other non-operational duties. *2 The “AOR” of the Company is a reference material for the flight of the same type of aircraft and gives addendum and explanation to the Aircraft Operation Manual.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA845A.pdf

Aircraft serious incident investigation reports published in 2022

1	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	January 20, 2022	December 21, 2019 Matsuyama Airport	Privately owned	JA36HK Diamond aircraft HK36R Super Dimona (Motor glider/two seat)
	Summary	Due to the reduced engine power during takeoff climb from Matsuyama Airport, Ehime Prefecture, the aircraft returned to the airport and landed back on parallel taxiway. The captain and one passenger were on board and there was no injury to them. 		
	Probable causes	The probable cause of this serious incident was that the engine malfunction occurred during takeoff due to the failure in appropriate supply of the fuel from the left carburetor of the engine that led to continuous loss of the engine power. From the deformed insert of the float inside the carburetor, the failure in appropriate supply of the fuel from the left carburetor is likely to have been caused by the faulty motion of the float.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA36HK.pdf		
2	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	January 20, 2022	February 3, 2021 On the runway of the Kitakyushu Airport	Japan Coast Guard	JA393A Textron Aviation 172S (Small aeroplane)
	Summary	The aircraft executed go-around due to an instable attitude in landing during solo flight training, and the lower part of the aft fuselage contacted on the runway surface at Kitakyushu Airport. A trainee who was alone on board the incident aircraft was not injured. 		

<table>
<tr><td></td><td>Probable causes</td><td colspan="3">It is considered highly probable that this serious incident occurred because when the aircraft made a go-around due to its unstable posture at a low altitude during the landing approach, the underside of the aft fuselage touched the runway surface before starting to rise.
It is considered probable that the fact that the unstable posture of the aircraft at a low altitude was caused not only the turbulence encountered immediately before touchdown, but also a significant nose-up operation was performed under its influence.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">Recurrence prevention measures implemented by the Kitakyushu Aviation Training Center, Miyagi branch school of the Japan Coast Guard School
(1) Revision of the Solo flight supervising procedures
(i) Reviewing the procedures whether to conduct solo flight or not
In the case that forecasted wind direction is between 270°and 280°, crosswind component of the runway is computed by assuming that wind velocity with 20 % increment is a virtual wind velocity. Besides, a monitoring aircraft conducts weather conditions survey (including air current conditions in approach landing) beforehand as needed to decide to conduct training or not.
(ii) Modification of the Supervising procedures
Instructors supervise overall training at the Center, let a monitoring aircraft with other instructor on board to fly prior to a solo flight aircraft, report weather conditions and aircraft conditions to the Center, and provide necessary advice to the solo flight aircraft. When the monitoring aircraft judged that training is to be suspended due to aggravated weather conditions, etc., it reports the situations to the Center and instructs the solo flight aircraft to return to the airport.
(iii) Clarifying response at the time of aggravated weather conditions, etc.
When crosswind component of the runway is expected to exceed the Safety Criteria, a solo flight aircraft in approach landing executes go-around and a monitoring aircraft first performs approach landing to determine landing of the solo flight aircraft.
When crosswind component of the runway does not exceed the Safety Criteria and approach landing is determined to be practicable, the monitoring aircraft provides necessary advice (confirmation of go-around procedures and air stream conditions, etc.) with the solo flight aircraft.
When approach landing is judged to be impracticable, the monitoring aircraft instructs the solo flight aircraft to hold in the air or divert to an alternate aerodrome for landing.
(2) Wind direction and wind velocity in takeoff and landing are recorded in the training instruction sheet to grasp educational situations of crosswind takeoff and landing of trainees.
(3) Education on landing to all trainees
(i)Education on the ground
・Reeducated situations where go-around is to be executed and attention to be paid in executing go-around.
・Reeducated procedures for go-around using a simulator.
(ii)Training on board aircraft
・Additional training (continuous takeoff and landing training) was planned and conducted to evaluate skill for takeoff and landing and go-around.
・Takeoff and landing or go-around training was additionally conducted in navigation training after trainees, who had had a blank period, had resumed training although a syllabus of navigation training does not include a takeoff and landing course.
(4) Others
Reviewing suitable airports as alternatives for the Cross Country Solo Flights, and coordinating familiarization flight training using the same airports with an instructor on board before the Cross Country Solo Flights.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA393A.pdf</td></tr>
<tr><td>3</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>March 24, 2022</td><td>January 8, 2020
Amami Airport</td><td>Japan Air Commuter, Co., Ltd.</td><td>JA07JC
ATR 42-500
(Large aeroplane)</td></tr>
</table>

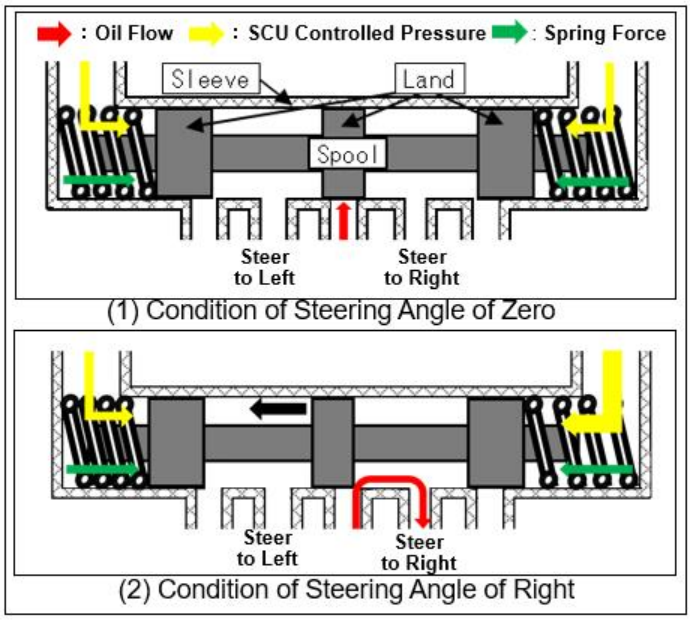
	Summary	The aircraft ran off the side of Runway 03 at landing and was disabled to perform taxiing. There were 21 persons on board consisting of the captain, two flight crew members and 18 passengers, and no one was injured. 		
	Probable causes	The JTSB concludes that the probable cause of this serious incident was the delay in correcting the deviation to the left immediately after the touchdown at landing in a crosswind from the left, which resulted in the Aircraft running off the side of the runway, halting in the grass area and being disabled to move on its own.		
	Safety Actions	**Recurrence prevention measures taken by the company and the designer/manufacturer** (1) The Company 1) Revised Manuals a. Regarding landing performed when a gust is reported, it is stipulated in Operations Manual (OM) Supplement that judgment, whether to continue approach or halt for a go-around, is made based on the guide that crosswind component of the gust is 1.5 times the maximum crosswind in addition to that the crosswind component of the mean wind velocity satisfies the maximum crosswind stipulated in Airplane Operating Manual (AOM). b. AOM is revised to incorporate the revisions of Flight Crew Operating Manual（FCOM）by the Design and Manufacturer in terms of normal procedures in landing roll. c. “OPERATIONS IN WIND CONDITIONS” is newly incorporated in AOM that reflects what is described in FCOM. d. Descriptions in FTG*1 regarding takeoff and landing in crosswind are revised. 2) Relevant Flight Crew a. Captain Ground school training, simulator training, and check and line flight training and check. b. FO Ground school training, simulator training, and line flight training and check. 3) Other Flight Crew Member Holding Type Rating for ATR Aircraft a. Conducting ground school training and simulator training to establish knowledge and technique of crosswind landing maneuver recommended by the Design and Manufacturer. b. Conducting ground school training for appropriate operations of Stabilized Approach. (2) The Design and Manufacturer Reviewed the procedures for normal operation in landing roll to revise FCOM. 1) Clarified that braking was a primary role in deceleration after touchdown. 2) Clarified to set power levers to ground idle at the time of touchdown of a nosewheel and use the reverse as required. *1 “Flight Technical Guide (FTG)” is to supplement for the AOM regarding basic procedures that the Company aims to standardize actual operations, education, and training. *2 According to OM Supplement and AOM of the Company stipulate, that Stabilized Approach means an aircraft is in the position where it can land safely while conducting an approach normally until starting a flare maneuver since passing 1,000 ft AGL to eliminate any unsafe factors in an approach and a landing and to ensure a safe and stable landing.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA07JC.pdf		
4	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type

	March 24, 2022	August 28, 2020 Nagaoka City, Niigata Prefecture	Tohoku Air Service Co., Ltd.	JA332T Eurocopter AS332L1 (Rotorcraft)
	Summary	While transporting a cargo (removed materials from a steel tower weighing approximately 790 kg) by cargo sling after take-off from the Chuetsu substation temporary helipad in Nagaoka City, Niigata Prefecture, the helicopter dropped the cargo on a grassy area in the vicinity of the temporary helipad. There was no damage to the helicopter, or no injury to persons onboard or on the ground. 		
	Probable causes	In the serious incident, it is probable that the sling cargo dropped during the external cargo sling operation since the load beam was suddenly unlocked and open. The probable cause of the unlocked load beam could not be determined.		
	Safety Actions	**Recurrence prevention measures taken by the Company** After the serious incident, the company suspended the use of the subject external cargo sling system, and external cargo sling operations were performed by other existing equipment (manual hook) that was allowed to be equipped to the subject helicopter until improvements in fail-safe of the system operation and enhanced information function to flight crew are implemented.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA332T.pdf		
5	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	March 24, 2022	July 18, 2021 Niigata Airport	Privately owned	JA201M Piper type PA28RT-201T (Small aeroplane)
	Summary	When landing at Niigata Airport, the aircraft halted after deviating to the grassy area on the north side of the runway and was disabled to perform taxiing. The captain and two persons were on board and none of them was injured. The tire of the right main landing gear sustained air leakage. There was no other damage to the airframe. 		
	Probable causes	It is highly probable that the serious incident occurred by the captain's own steering, who recognized that the tire of the right main landing gear had punctured during landing roll, to deviate to the grassy area in the north side of the runway.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA201M.pdf		
6	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 28, 2022	September 23, 2021 Nagasaki Airport	Privately owned (operated by OGAWA AIR Co., Ltd.)	JA76EL Robinson R44 II (Rotorcraft)

	Summary	When taking off from Nagasaki Airport, the aircraft was cleared for take-off from the runway by the air traffic controller, but took off from a taxiway. 		
	Probable causes	The probable cause of this serious incident was more likely the captain's misinterpretation that, when cleared by the Tower for take-off from T2 intersection at Runway 32, the aircraft was cleared for take-off from Taxiway T2 that led to the take-off from the Taxiway T2.		
	Safety Actions	**Recurrence prevention measures taken by the company** On the day of the serious incident, the company reminded all employees for their thorough understanding that take-off from any area other than runway or helipad is not authorized.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA76EL.pdf		
7	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 28, 2022	November 27, 2021 Menuma Gliding Field (temporary operation site), Kumagaya City, Saitama Prefecture	Privately owned	JA4083 Cristen Industries A-1 (Small aeroplane)
	Summary	The airframe leaned to the left during landing roll, and the left wingtip contacted with the ground surface. The pilot alone was onboard, and did not sustain injury. 		
	Probable causes	The probable cause of this serious incident was likely that the aircraft was shaken by the gusty wind from the right direction during landing roll that caused the right wing to float and the aircraft to lean to the left, and the left wingtip contacted with the ground surface.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA4083.pdf		
8	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	June 30, 2022	September 16, 2019 In the sky over near the Komatsu Airfield, at an altitude of about 150 m	Japan Students Aviation League (the League) (Aircraft A)	JA01KY Diamond aircraft HK36TTC Super Dimona (Power glider)
			Japan Students Aviation League (the League) (Aircraft B)	JA2471 Alexander Schleicher ASK21 (Glider)
	Summary	When the Aircraft A (with one person onboard) took off from Fukui Airport towing the Aircraft B (with two persons onboard), and was performing demonstration flight at Komatsu Airport, part of a tow rope connecting both aircrafts (7 mm diameter, approximately 61 m long, and		

		approximate weight of 1.7 kg) dropped.
	Probable causes	The probable cause of the serious incident was most likely that, when the Aircraft A was flying towing the Aircraft B in the serious incident, the tow rope connecting both aircraft was fractured on the Aircraft A side, and the knot made within the end piece[*1] on the Aircraft B side was untied almost simultaneously, which led to dropping of the tow rope on the grassy area of the Airport. *1 "End piece" is a fitting attached to the tip of the tow rope on glider side, that connect to the glider via a ring pair and contains a knot made at the end of the tow rope threaded thereto.
	Safety Actions	**(1) Measures taken by the Design and Manufacturer of the aircraft A** Supplement Aircraft Flight Manual prepared by the Design and Manufacturer and cited in the Flight manual addendum No. 9 was revised reading "DAI-WI No. 28" from "DAI-WI No. 27." In 6.9 EQUIPMENT LIST of the Flight manual addendum No. 9 "OPERATIONWITH TOWROPE RETRACTION DEVICE," the materials used in the tow rope was revised reading "polyester, PVC, or polyamide" from "PVC, or polyamide." Furthermore, the Design and Manufacturer revised DAI-WI No. 28 stipulating that a knot within the stop egg[*2] is to be a single knot. **(2) Major measures taken by the League** After the serious incident, the League decided to take safety measures as described below, and is set to review the safety measures as needed. Besides, the measures i. and ii. described below were released in association with taking the measures iii. through vi. described below: i. Level flight in towing and meandering flight are suspended until the cause of the serious incident is determined since towing in level flight such as demonstration flight within an airport and meandering flight are prone to generate loosened tow rope compared to towing at launching. ii. Tow rope retraction device is suspended until the cause of the serious incident is determined. iii. Tow rope used in the Aircraft A is to be a genuine one of the design and manufacturer of the tow rope retraction device, which meets the requirements of the Flight manual addendum No. 9. iv. Knots within the stop egg and end piece are appropriately made in accordance with DAI-WI No. 28-/3. v. A knot within the end piece has a longer remainder of the rope after knotted so that sliding of the knot can be visually confirmed. vi. Latest engineering information (AFM, and WI, etc.) is confirmed for reflecting on the Flight manual. Besides, safe flight in accordance with the Flight manual is performed. *2 "Stop egg" is an egg-shaped fitting attached to the tow plane side of the tow rope with a knot contained therein. The stop egg is to receive a load that generates in towing when a retracted tow rope is pulled out to capacity and strikes the stop egg detent.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA01KY_JA2471.pdf

9	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	June 30, 2022	September 7, 2021 Gifu Airport	Kawasaki Heavy Industries, Ltd.	7033 P-1 Fixed-wing patrol aircraft (Large aeroplane)
	Summary	The aircraft ran off to the right side (north side) of Runway 28 at Gifu Airfield when landing, and was disabled to perform taxiing after stopping in a grassy area. There were ten persons on board in total, consisting of the captain and nine other crew members, and no one was injured.		

	Probable causes	The probable cause of this serious incident was that the Aircraft most likely veered to the right (north side), ran off the runway, stopped in a grassy area, and was disabled to perform taxiing because it was not able to control the travel direction during landing roll. The reason why the Aircraft failed to control the travel direction, was the foreign materials mixed into the steering control valve (SCV) were more likely caught between the sleeve and the spool[*1] of the SCV and then restricted the spool movement while the neutral position of the spool had remained in the position where the hydraulic oil would flow in the right steering direction.  *1 "Spool," which is used mainly as a direction switching valve, means an internal structure part to switch oil flow. It is skewer-shaped and the part, which largely spreads in the radial direction, is called "Land."
	Safety Actions	**Measures taken by the Manufacturer** (1) Measures to protect steering systems from contamination caused by foreign objects 1. They requested the Manufacturer of the Parts to clearly specify in the work instructions about the cleaning operation for each component performed in production job site. 2. They implemented education for persons in charge of work so as to fully enforce preventive measures against contamination by foreign objects when those related works are performed during aircraft manufacture and regular maintenance. (2) Removal of foreign objects In order to ensure capturing of foreign objects in the function test of steering systems during the manufacturing process, they increased the number of times of steering operation with the SCV return port filter removed. (3) Clarification of procedures to respond to steering system failure They clarified the Emergency Operation Procedures to switch the steering mode using the "STEER MODE" switch to the Caster Mode[*2] when a failure is found in the steering systems. *2 "Caster Mode" refers to the mode to make the nose landing gear steering "Free" status.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/7033.pdf

10	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	August 25, 2022	December 4, 2020 About 50km north of the Naha Airport, FL170	Japan Airlines Co., Ltd.	JA8978 Boeing 777-200 (Large aeroplane)
	Summary	While the Aircraft and operated by the Company as its scheduled flight 904, was climbing after take-off from Naha Airport for Tokyo International Airport, there occurred an abnormal sound accompanied by shaking of the Aircraft, and the instrument displayed anomaly in the left engine (No. 1 engine) at an altitude of FL170[*1] over the sea approximately 50 km north of Naha Airport. The captain shut down the engine and landed back at the Airport after declaring a state of emergency to the air traffic controller. In the post-flight inspection, it was confirmed that two fan blades of the left engine were fractured, the fan cowl door and other fragments from the nacelle had separated and departed the		

		airplane, and the fuselage and horizontal stabilizer were damaged from impact of fragments. There were 189 people onboard, consisting of the captain, 10 crew members, and 178 passengers. There were no injuries. *1 "FL" means a pressure altitude in the standard atmosphere. FL is expressed in the value obtained by dividing the reading on the altimeter (unit: ft) by 100 when the altimeter is set to 29.92 inHg. Flight altitude over 14,000 ft is generally expressed in FL in Japan. For instance, FL170 stands for an altitude of 17,000 ft. Damage to LH FWD fuselage Damage to LH strut and fairings Damage to LH H/STAB L/E  Damage to LH ENG and cowling Damage to LH flaperon Damage to LH AFT fuselage
	Probable causes	This was a serious incident certainly caused by the fan blades of the left engine were fractured during take-off climb, resulting in parts and cowlings of the engine were departed, and the airframe was damaged by scattered parts. It is highly probable that the fracture of the fan blade had initiated from the nodule*2, which bonded to the internal surface of a hollow structure during the polishing process of manufacturing of the fan blades, and the crack was generated, in addition to this, the Aircraft continued flights without detecting the crack at the subsequent regular inspections led to fatigue fracture. It is probable that the cracks were not detected in the subsequent regular inspections were contributed by method and intervals of the used inspection were insufficient to detect the defect in the fillet region. *2 In this report, "nodule" means a small lump of granular grains adhered to the base material.
	Safety Actions	**Safety Actions by Pratt&Whitney (P&W)** (1) P&W reviewed the inspection method and intervals of the Fan Blade of the similar type of engine, issued Special Instruction (No. 29F-21, No.85F-21 and No.130F-21) and Alert Service Bulletin (ASB) PW4G-112-A72-361, and significantly shortened TAI inspection intervals from every 6,500 FC to every 1,000 FC. Furthermore, UT inspections were set to be conducted every 275 through 550 FC in addition to TAI inspections. (2) The NDIP-1065 Revision G was issued on March 4, 2021 – Revision G incorporates a change in the accept / reject criteria requiring the inspector to refer indications in the high stress area to Team Review instead of being able to accept. Added references to Foreign Material (FM) sample images were added and modified. Flowcharts were updated to reflect G revisions. **Safety Actions by Boeing** Boeing has developed an interim solution and issued multiple Alert Service Bulletins. The service bulletins include fan cowl inspections and modification to the inlet cowls and thrust reversers to strengthen the integrity of the engine cowling for increased protection for engine fan blade failure events on 777-200 and 777-300 Airplane(s) equipped with Pratt & Whitney PW4000 series engines. (1) Alert Service Bulletin 777-71A0092 issued on January 13, 2022 Fan cowl Fluid Ingression Inspections. This service bulletin provides instructions to inspect fan cowls for possible fluid ingression damage, and do on-condition action(s) to make sure fan cowls are serviceable.

The work scope for the left and right fan cowl panels of Engine 1 and Engine 2 includes detailed inspection of the outer surface top coat, a general visual inspection of the upper edge, and a Thermography Inspection or X-Ray Inspection of the inner surface as well as applicable on condition action(s).

(2) Alert Service Bulletin 777-71A0085 issued on May 16, 2022 Engine Inlet Cowl Modification.
This service bulletin gives instructions to replace affected inlet cowls with changed inlet cowls to strengthen the integrity of the engine inlet cowls for increased protection for engine fan blade failure event. The changed inlet cowls include the following features:
・Inlet aft-bulkhead reinforced with metal plates
・Ballistic shields installed additionally inside of the inlet to prevent fan blade fragments from penetrating the outer barrel.
・Inlet outer barrel panels inspected for fluid ingression and repaired if any defect found.
・Inlet outer barrel panels inspected for prior repairs near aft edge and external metal doublers installed if necessary.

(3) Alert Service Bulletin 777-78A0103 issued on May 16, 2022 Left and Right Thrust Reverser Halves, Lower Bifurcation Wall Reinforcement Plate Installation
This service bulletin gives instructions to install metal reinforcement plates on the left and right halves of lower bifurcation wall inner surface of each thrust reverser to improve cowling durability.

Safety Actions by the Federal Aviation Administration (FAA)

(1) The FAA issued the FAA Emergency Airworthiness Directive (AD2021-05-51) on February 23, 2021.
"Boeing 777 equipped with PW 4000 series engines must undergo a TAI inspection before further flight."

(2) Issued Airworthiness Directive (AD2022-06-09) on March 4, 2022.
"Boeing 777 equipped with PW 4000 series engines must undergo repetitive TAI and UT inspections in accordance with P&W ASB PW4G-112-A72-361."

(3) Issued Airworthiness Directive (AD2022-06-10) on March 4, 2022.
"Boeing 777 equipped with PW 4000 series engines must undergo an inspection of the fan cowl doors for fluid ingression, and a functional check of the hydraulic pump shutoff valves, and reinforcement plate on thrust reverser must be installed, in accordance with Boeing Alert Requirements Bulletin 777-71A0092RB."

(4) Issued Airworthiness Directive (AD2022-06-11) on March 4, 2022.
"Boeing 777 equipped with PW 4000 series engines must undergo modification of the engine inlet to withstand fan blade failure event loads."

Safety Actions by the Civil Aviation Bureau

(1) On February 21, 2021, the Civil Aviation Bureau instructed domestic air carriers to ground all Boeing 777 aircraft equipped with PW4000 series engines and issued NOTAM in order that those aircraft may avoid take-off, landing and overflight within Japan's territory and airspace.

(2)The Civil Aviation Bureau issued Airworthiness Directive (KOKUKUKI No.1158 TCD-9736-2021) on February 24, 2021 in accordance with the FAA Emergency Airworthiness Directive (AD2021-05-51): "For the purpose of preventing the in-flight failure of a fan blade that could result in the inflight blade release, damage to the engine, and damage to the airplane, the inspections and replacement, if required, are to be performed, unless already done in accordance with AD2021-05-51 issued by the FAA."

(3) Issued Airworthiness Directive (KOKUKUKI No. 1131 TCD-9736A-2022) on March 18, 2022 in accordance with the FAA Airworthiness Directive (AD2022-06-09): "For the purpose of preventing the in-flight failure of a fan blade that could result in the in-flight blade release, damage to the engine, and damage to the airplane, repetitive inspections and replacement, if required, are to be performed except as already done in accordance with AD2022-06-09 issued by the FAA."

(4) Issued Airworthiness Directive (KOKUKUKI No. 1132 TCD-9928-2022) on March 18, 2022 in accordance with the FAA Airworthiness Directive (AD2022-06-10): "For the purpose of preventing in-flight failure of a fan blade that could lead to separation of inlet

<table>
<tr><td></td><td></td><td colspan="3">cowl, fan cowl doors and thrust lever cowl, and that could lead to engine in-flight shutdown, the damage to the empennage and the engine fire, which could result in loss of control of the airplane, forced off-airport landing and injury to passengers, the actions, repetitive inspections and replacement, if required, are to be performed in accordance with AD2022-06-10 issued by the FAA, except as already done.”
(5) Issued Airworthiness Directive (KOKUKUKI No. 1133 TCD-9929-2022) on March 18, 2022 in accordance with the FAA Airworthiness Directive (AD2022-06-11): “For the purpose of preventing in-flight failure of a fan blade that could lead to separation of inlet cowl, fan cowl doors and thrust lever cowl, and that could lead to engine in-flight shutdown, damage to the empennage and the engine fire, which could result in loss of control of the airplane, forced off-airport landing and injury to passengers, modification is to be made in accordance with AD2022-06-11 issued by the FAA, except as already done.”
(6) On March 18, 2022, the Civil Aviation Bureau lifted the order to suspend operations of Boeing 777s equipped with PW4000 series engines on the condition that the safety measures indicated in the airworthiness improvement reports (3) through (5) above be taken and issued NOTAM on March 22, 2022 that those aircraft should avoid take-off, landing and overflight within territory of Japan, unless already done proper corrective actions in accordance with AD2022-06-09 AD2022-06-10 and AD2022-06-11 issued by the FAA or similar documentation.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA8978.pdf
https://www.mlit.go.jp/jtsb/aircraft/p-pdf/AI2022-5-1-p.pdf (Explanatory Materials)</td></tr>
<tr><td></td><td>Reference</td><td colspan="3">Major activities of the previous year (Page 4)</td></tr>
<tr><td>11</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>September 29, 2022</td><td>July 5, 2021
Nagano City, Nagano Prefecture</td><td>Privately owned</td><td>JX0167
Zenith Aircraft Company CH701 (Self-made aircraft ,two seats)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">When the aircraft made a jump flight*1 at the Nagano City Gliding Field in Nagano City, Nagano Prefecture, it did not only deviate from the grassy area on the north side of the runway, but also both main landing gears fell off, making it unable to perform taxiing.
The pilot and one passenger were on board the aircraft, but no one was injured.

*1 “Jump flight” refers to a flight category permitted as a flight in the first stage in the procedure related to flight permission, which is specified in “Permission for test flights for self-made aircraft (Ministry of Land, Infrastructure, Transport and Tourism Civil Aviation Bureau Circular No. 1-006 Partially revised December 24, 2020),” and to a flight in which the aircraft floats slightly in the air (altitude of 3 m or less) on the ground surface where takeoff and landing are performed.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is probable that this serious incident occurred because the aircraft touched down on the runway in a going-down way while deviating to the left after taking off, and the momentum caused it to deviate from the runway and both main landing gears to fall off.
It is possible that the reason why the aircraft touched down on the runway while deviating to the left in a going-down way is due to the fact that the propeller effect of the aircraft was not properly corrected, and further that the engine output was reduced while maintaining a high nose-up attitude.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/aircraft/rep-inci/AI2022-6-1-JX0167.pdf(Japanese only)</td></tr>
<tr><td>12</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td></td><td>October 27, 2022</td><td>December 21, 2019
In the sky about .1 nm west-southwest of</td><td>Privately owned
(Aircraft A)</td><td>JA3815
Beechcraft A36</td></tr>
</table>

		the Saga Airport		(Small aeroplane)
			Spring Airlines.Co., Ltd. (Aircraft B)	B-9940 Airbus A320-214 (Large aeroplane)
	Summary	The Aircraft A was in level flight toward Fukue Airport from Yao Airport, when the Aircraft B was descending to Saga Airport after taking off from Shanghai Pudong International Airport on a scheduled Flight 8577 of the company. Then, both aircraft were closely approaching each other about 1.1 nm west-southwest over Saga Airport, and the Aircraft B took evasive action executing instructions provided by Traffic Alert and Collision Avoidance System. On February 21, 2020, the captain of Aircraft A submitted a Near Collision Report to the Ministry of Land, Infrastructure, Transport and Tourism (A report pursuant to the provision of Article 76-2 of Civil Aeronautics Act and Article 166-5 of 2 Ordinance of the Enforcement of the Civil Aeronautics Act). Consequently, it was classified as a serious incident on February 26, 2020.		
	Probable causes	The JTSB concludes that the probable cause of this serious incident was that Aircraft A in level flight on VFR[*2] approached Aircraft B without predicting the existence of Aircraft B, because Aircraft A did not obtain the information on Aircraft B, which was flying on IFR[*1] and descending toward Saga VOR/DME on the direct route, from ATC facility and others. In addition, it is probable that there was no risk of collision or contact even at the time of closest proximity. *1 "VFR" which stands for Visual Flight Rules are defined as any flight not predicated on the instrument flight rules. While operating in VFR, a pilot is responsible for the clearance from the terrain and obstacles in addition to the separation from other aircraft and clouds at all time. * 2 "IFR" which stands for Instrument Flight Rules govern the procedures for conducting flights under the ATC clearances or instructions at all time.		
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA3815_B9940.pdf		
13	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	December 1, 2022	November 3, 2020 In the sky over near Koizumi, Kitami City, Hokkaido, at an altitude of about 150-200 m	Privately owned	JR0392 Beaver RX550-R503L (Ultralight plane with two-seats)
	Summary	While the aircraft was flying northwest in the sky over near Koizumi, Kitami City, Hokkaido for leisure purposes, its engine stopped causing the aircraft to make a forced landing in a nearby field. The pilot and one passenger on board the aircraft were not injured.		
	Probable causes	It is probable that since the needle bearing[*1] that connects the connecting rod of the engine No. 2 piston and the crank pin of the aircraft was damaged, the area around the connecting part became hot due to friction and the connecting part between the connecting rod and the crank arm got tied up due to the thermal expansion, causing the engine to stop in flight in this serious incident. It is probable that the reason why the malfunction of the engine was not discovered until it stopped was due to the fact that the maintenance had not been carried out properly based on the maintenance manual. *1 A "needle bearing" is a type of rolling bearing in which an elongated cylindrical roller (needle pin) with a diameter of 5 mm or less and a length of 3 to 10 times the diameter is used as the rolling element. Iron-based bearing steel with excellent wear resistance, such as high-carbon chromium steel, is mainly used.		

<table>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/aircraft/rep-inci/AI2022-8-2-JR0392.pdf (In Japanese only)</td></tr>
<tr><td rowspan="4">14</td><td>Date of publication</td><td>Date and location</td><td>Operator</td><td>Aircraft registration number and aircraft type</td></tr>
<tr><td>December 1, 2022</td><td rowspan="2">September 8, 2021
On the traffic pattern on the west side of the Menuma Glider Airfield, Kumagaya City, Saitama Prefecture</td><td>Chuo University (Aircraft A)</td><td>JA2379
Alexander Schleicher ASK21
(Glider)</td></tr>
<tr><td>Suisan Aviation Co., Ltd. (Aircraft B)</td><td>JA3904
Cessna U206G
(Small aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">The Aircraft A was performing a flight training after being launched from Menuma Gliding Field, when the Aircraft B was flying to take aerial photos after taking off from Chofu Airfield of the Tokyo Metropolitan Government. Then, both aircraft closely approached each other over the west traffic pattern of Menuma Gliding Field, and the pilot in command (PIC) of Aircraft A took evasive action as he was unable to predict the movement of other aircraft and felt uneasy.
On September 9, 2021, the PIC of Aircraft A submitted a Near Collision Report to the Ministry of Land, Infrastructure, Transport and Tourism (A report pursuant to the provision of Article 76-2 of Civil Aeronautics Act and Article 166-5 of Ordinance of the Enforcement of the Civil Aeronautics Act), and consequently it was classified as a serious incident.</td></tr>
<tr><td>Probable causes</td><td colspan="3">The probable cause of this serious incident was that Aircraft B, which was flying to take aerial photos, most likely entered over the Gliding Field and approached close to Aircraft A, which was launched from Menuma Gliding Field.
In addition, it is probable that there was no risk of collision or contact for both aircraft.</td></tr>
<tr><td>Safety Actions</td><td colspan="3">Recurrence prevention measures taken by Suisan Aviation Co., Ltd.
(1) In the wake of this serious incident, Suisan Aviation Co., Ltd. decided to hold a safety promotion conference in order to share the situation of this serious incident within the company and take safety actions as follows:
1. They should have a grasp of the current conditions of radio communication between the gliding field and gliders in the vicinity of the gliding field (such as the voice from gliders 13 cannot be received on the frequency of VHF radio in the flight service and others, depending on the gliding fields).
2. In case of flying around the gliding field, the contents of the flight should be informed in advance and a pre-coordination with the gliding field should be made as much as possible.
3. In case of flying around the gliding field, it must be thoroughly observed to transmit the messages by using the frequency of the gliding field (VHF radio frequency of flight service and others) whether there is a response or not.

Recurrence prevention measures taken by the Japan Student Aviation Federation
(2) The Japan Students Aviation League to which Chuo University belongs shared the contents of this serious incident with the league member aviation club managers, instructors and training center chiefs across the country and took safety actions in Menuma Gliding Field as follows:
1. They created a document to ask for a pre-coordination at the time of flying around the gliding field and informed government agencies and aircraft operators with small airplanes of the document.
2. They mounted VHF receivers on gliders so that the gliders would be able to listen to the VHF radio communications between general aircraft flying around the gliding field and Menuma Flight Service.
3. Other than in the First Gliding Field Bankside Piste[*1] that operates Menuma Flight Service, VHF receivers were installed in the First Gliding Field Riverside Piste and the Second Piste in the Second Gliding Field so that each Piste would be able to have a grasp of the flight status of aircraft flying around the gliding field in real-time and provide the gliders with necessary traffic information by listening to the VHF radio communications.
4. They conducted an online training session of the glider radio and its communication method for the leaders and students in each school who use Menuma Gliding Field to deepen their</td></tr>
</table>

		knowledge of radio communication. *1 “Piste” refers to a facility that communicates with gliders and other aircraft in flight to exchange information concerning the gliding field, and air traffic in the surrounding area, in order to ensure safe and smooth operation of the gliding field. In Menuma Gliding Field, “Menuma Piste” is established to the bank side, “Riverside Piste” to the riverside in the First Gliding Field, and the “Second Piste” in the Second Gliding Field, respectively, in order for dispatchers to control glider launches and landings.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA2379_JA3904.pdf

7 Provision of factual information in 2022 (aircraft accidents and serious incidents)

The JTSB provided no factual information in 2022.

Column

Training to Support the Technical Skills of Aircraft Accident Investigators

Aircraft Accident Investigator

This column explains the training that aircraft accident investigators conduct with the aim to improve their technical skills to carry out appropriate investigations.

The JTSB conducts investigations of accidents and serious incidents caused by aircraft. Those who have been engaged in aviation-related work for many years and who have professional knowledge of the fields of engagement (piloting, aircraft inspection, flight control, traffic control technology, airport operation, unmanned aircraft, etc.) are appointed as investigators. However, extensive knowledge related to human factors (human behavior characteristics) and to the aviation as a whole is required in addition to the knowledge of piloting and of aircraft for the investigation of accidents. In addition, the development and progress of the aviation technology have been remarkable and many cutting edge technologies have been adopted. Therefore, aircraft accident investigators undergo a variety of training while conducting investigations in order to acquire new skills and knowledge at all times.

Photo 1: An aspect of the training for piloting

In the recent past, a new training which was started in December, 2022 designed to acquire knowledge required for the investigation of accidents related to unmanned aircraft has been underway. In addition, since the JTSB has adopted drones for taking photographs of the scene for the investigation of accidents, accident investigators are required to learn piloting skill newly, and this is also one of the important training. A total 6 investigators have completed the training for piloting drones by the end of FY2021. In order to maintain the skills of these 6 investigators, they received training on the piloting skills necessary for photographing accident sites from the air in 2022 (Photo 1). Since the number of places where drone piloting training can be carried out is limited, dedicated training grounds in Chiba and Ibaraki Prefectures are used.

Photo 2: Japan Drone Exhibition 2022 UTM session (June 23, 2022, Makuhari Messe)

In addition, in preparation for the investigation of accidents related to unmanned aircraft, we did not only inspect the latest drones by attending at exhibitions of unmanned aircraft, but also collected information on drones and flying techniques (Photo 2). We expect that the outcome of such training will be made use of in the investigation of accidents related to unmanned aircraft to appropriately elucidate the causes and to formulate measures to prevent

recurrence in the future.

On the other hand, a variety of overseas training that had been cancelled due to the spread of COVID-19 was resumed in FY2022, and the JTSB has participated in the training for the investigation of accidents caused by unmanned aircraft and the training on the technology to extract data from flight recording devices which were held in the United States. There is a high language barrier in overseas training and all investigators experience great difficulties in understanding their contents. However, it is very meaningful to take lectures directly from overseas engineers and deepen engagement with aviation authorities from other countries. Such engagement has been very useful for making communications and contacts and building a cooperative relationship with foreign investigative organizations and manufacturers in future accident investigations. Furthermore, it is one of the recent features that overseas training conducted online has been increasing and we took part in the online training on human factors organized by the Southern California Safety Institute in the United States.

In addition to the training shown so far, airline companies hold pilot training using simulators, training on aircraft structure and systems, language training, etc., every year. Nobody knows when a case of investigation will occur and there are some cases that the JTSB forced to change the plan all of a sudden like canceling participation in a training course at the last minute. However, aircraft accident investigators are endeavoring to make most of the provided training opportunities in order to improve our own knowledge and technical skills.

Chapter 4 Railway accident and serious incident investigations

1 Railway accidents and serious incidents to be investigated

<Railway accidents to be investigated>

◎Article 2, paragraph (3), of the Act for Establishment of the Japan Transport Safety Board (Definition of railway accident)

"Railway accidents" mean accidents of (1) to (3) and serious accidents of (4) below.

(1) Accidents occurred during the operation of a train or vehicle (Article 19* of the Railway Business Act)

(2) Train collision, fire, or other accident during the operation of a train or vehicle occurred on dedicated railways

(3) Train collision, fire, or other accident during the operation of a train or vehicle occurred on tramways

(4) Serious accidents prescribed by the Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism (Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board)

* Train collision, fire, or other accident during the operation of a train or vehicle, which is prescribed by the Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism (Paragraph 1, Article 3 of the Ordinance on Report on Railway Accidents)

○Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board (Serious accidents)

1 Accidents listed in items (1) to (3) in Paragraph 1, Article 3 of the Ordinance on Report on Railway Accidents

(1) Train collision: An accident in which a train collides or contacts with another train or a vehicle.

(2) Train derailment: An accident in which a train derails (excluding those related to snowplows in operation).

(3) Train fire: An accident in which a train catches fire.

2 Accidents listed in items (4) to (6) in Paragraph 1, Article 3 of the same Ordinance, which are listed in any of (a) to (d) below.

(4) Level crossing accident: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a level crossing road.

(5) Accident against road traffic: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a road other than a level crossing road.

(6) Other accidents with casualties: An accident causing injury or death in the operation of a train or vehicle.

(a) An accident involving the death of a passenger, crew member, etc.

(b) An accident involving five or more casualties with at least one of the casualties dead.

(c) A fatal accident that occurs at a level crossing with no automatic barrier machines.

(d) An accident found to have likely been caused by a railway worker's error in procedure or due to the malfunction, damage, destruction, etc. of vehicles or railway facilities, which resulted in the death of a person.

3 Accidents listed in items (2) and (4) to (7) in Paragraph 1, Article 3 of the same Ordinance, which are recognized as exceptional.

(2) Train derailment: An accident in which a train derails
(4) Level crossing accident: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a level crossing road.
(5) Accident against road traffic: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a road other than a level crossing road.
(6) Other accident with casualties: An accident causing injury or death in the operation of a train or vehicle.
(7) Heavy property loss without casualties: An accident in which the operation of a train or vehicle causes damage to property of 5 million yen or more.

4 Accidents equivalent to those listed in items (1) to (7) in Paragraph 1, Article 3 of the same Ordinance occurred in dedicated railways, which are recognized particularly exceptional. (Accidents related to dedicated railways)

(1) Train collision: An accident in which a train collides or contacts with another train or a vehicle.
(2) Train derailment: An accident in which a train derails.
(3) Train fire: An accident in which a train catches fire.
(4) Level crossing accident: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a level crossing road.
(5) Accident against road traffic: An accident in which a train or vehicle collides or contacts with a person or vehicle passing on a road other than a level crossing road.
(6) Other accidents with casualties: An accident causing injury or death in the operation of a train or vehicle.
(7) Heavy property loss without casualties: An accident in which the operation of a train or vehicle causes damage to property of 5 million yen or more.

5 Accidents specified by the public notice of the Japan Transport Safety Board as an accident equivalent to the above 1 to 3 accidents that occurred on tramways (accident under Article 3, Item 5 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board and the situation under Article 4, Item 7 of the same Ordinance) (Accidents related to tramways)

・Article 1 of the public notice stipulating the accident specified in Article 3, Item 5 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board and the situation specified in Article 4, Item 7 of the same Ordinance (Accidents related to tramways)

1 Accidents specified in (1) to (6) in Article 1, Paragraph 1 of the Ordinance for Report on Track Accidents, etc., which are listed in any of A to C.

(1) Vehicle collision accident: An accident in which a vehicle operating on the main track collides with or contacts with another vehicle.
(2) Vehicle derailment: An accident in which a vehicle operating on the main track derails.
(3) Vehicle fire accident: An accident in which a vehicle operating on the main track catches fire.
(4) Level crossing accident: An accident where a vehicle collides or contacts with a person or vehicle on a level crossing road.
(5) Accident against road traffic: An accident in which a vehicle collides or contacts with a person or vehicle on a road other than a level crossing.
(6) Other accidents with casualties: An accident causing injury or death in theoperation of a vehicle.

(a) An accident involving the death of a passenger, crew member, etc.
(b) An accident involving five or more casualties with at least one of the casualties dead
(c) A fatal accident that occurs at a level crossing with no automatic barrier machines

2. Accidents specified in the items (1) to (7) of the same Ordinance, which are recognized as particularly exceptional

(1) Vehicle collision accident: An accident in which a vehicle operating on the main track collides or contacts with another vehicle.
(2) Vehicle derailment: An accident in which a vehicle operating on the main track derails.
(3) Vehicle fire accident: An accident in which a vehicle operating on the main track catches fire.
(4) Level crossing accident: An accident in which a vehicle collides or contacts with a person or vehicle passing on a level crossing road.
(5) Accident against road traffic: An accident in which a vehicle collides or contacts with a person or vehicle passing on a road other than a level crossing road.
(6) Other accidents with casualties: An accident causing injury or death in the operation of a vehicle.
(7) Heavy property loss without casualties: An accident in which the operation of a vehicle causes damage to property of 5 million yen or more.

3. The operation of new tramways and shared tramways that are laid other than on the road surface shall follow the items (1) to (3) in Paragraph 1, Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

Railway accidents to be investigated

<table>
<tr><td>Category</td><td>Train collision</td><td>Train derailment</td><td>Train fire</td><td>Level crossing accident</td><td>Accident against road traffic</td><td>Other accidents with casualties</td><td>Heavy property loss without casualties</td></tr>
<tr><td rowspan="2">Railway
[Act 2-3]
(including tramway operated as equivalent to railway)
[Notice 1-3]</td><td colspan="3">All accidents*1
[Ordinance 3-1]
(Tramway operated as equivalent to railway shall follow this [Notice 1-3])</td><td colspan="4">・Accidents involving the death of a passenger, crew member, etc.
・Accidents involving five or more casualties with at least one of the casualties dead
・Fatal accidents that occur at level crossings with no automatic barrier machines
・Accidents found to have likely been caused by a railway worker's error in procedure or due to the malfunction, damage, destruction, etc. of vehicles or railway facilities, which resulted in the death of a person
[Ordinance 3-2]</td><td></td></tr>
<tr><td></td><td>Accidents that are particularly rare and exceptional [Ordinance 3-3]</td><td></td><td colspan="4">Accidents that are particularly rare and exceptional [Ordinance 3-3]</td><td></td></tr>
<tr><td>Dedicated railway</td><td colspan="7">Accidents that are particularly rare and exceptional [Ordinance 3-4]</td></tr>
<tr><td rowspan="3">Tramway
[Ordinance 3-5]</td><td>Train collision</td><td>Train derailment</td><td>Train fire</td><td>Level crossing accident</td><td>Accident against road traffic</td><td>Other accidents with casualties</td><td>Heavy property loss without casualties</td></tr>
<tr><td colspan="6">・Accidents involving the death of a passenger, crew member, etc.
・Accidents involving five or more casualties with at least one of the casualties dead
・Fatal accidents that occur at level crossings with no automatic barrier machines
[Notice 1-1]</td><td></td></tr>
<tr><td colspan="7">Accidents that are particularly rare and exceptional [Notice 1-2]</td></tr>
</table>

*1 Except for derailment accidents of working snowplows. [Ordinance 3-1] However, accidents that are particularly rare and exceptional are to be investigated. [Ordinance 3-3]

(Note) In the table, “Act” refers to the Act for Establishment of the Japan Transport Safety Board; “Ordinance” refers to the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board; “Notice” refers to the Public Notice by the Japan Transport Safety Board; and the numbers refer to the Article and Item numbers. (*In “Act”, the Article and Paragraph are abbreviated)

<Railway serious incidents to be investigated>

◎Article 2, paragraph (4), item (ii), of the Act for Establishment of the Japan Transport Safety Board (Definition of railway serious incident)

A situation prescribed by the Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism (Article 4 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board), deemed to bear a risk of accident occurrence.

○Article 4 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

*The names of the situations listed in 1 to 6 are abbreviations.

1 "Incorrect management of safety block"

A situation where a train starts moving for the purpose of operating in the relevant block section before completion of the block procedure and another train or vehicle had existed in the zone.

2 "Incorrect indication of signal"

A situation where a signal indicates that a train should proceed even though there is an obstacle in the route of the train or the route of the train is obstructed while the signal indicates that the train should proceed and a train had entered into the route.

3 "Violating red signal"

A situation where a train proceeds regardless of a stop signal, thereby obstructing the route of another train or vehicle and another train or vehicle had entered into the protected area of the signal which protects the zone of the route.

4 "Dangerous damage in facilities"

A situation that causes a malfunction, damage, destruction, etc., of facilities and which caused malfunction, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train.

5 "Dangerous trouble in vehicle"

A situation that causes a malfunction, damage, destruction, etc., of a vehicle, and caused malfunction, damage, destruction, etc., bearing particularly serious risk of collision or derailment of or fire in a train.

6 Any of "Incorrect management of safety block," "Incorrect indication of signal," "Violating red signal," "Main track overrun[*1]," "Violating closure section for construction[*2]," "Vehicle derailment[*3]," "Dangerous damage in facilities," "Dangerous trouble in vehicle," "Heavy leakage of dangerous object[*4]" and "A situation equivalent to the prior 9 items (others)," which is recognized as particularly exceptional.

*1 "Main track overrun" refers to a situation in which a train or vehicle overruns a main track between stations.

*2 "Violating closure section for construction" refers to a situation in which a train runs in a section during construction or maintenance work that should be done by stopping train operation.

*3 "Vehicle derailment" refers to a situation in which a vehicle derails, and includes the following situations;

・A vehicle derailed on a main track.
・A vehicle derailed on a side track and disrupted a main track.
・A vehicle derailed on a side track, and the cause can be attributed to a cause other than the equipment or handling specific to the side track.

*4 “Heavy leakage of dangerous object” refers to a situation in which hazardous materials, explosives, etc., leak significantly from a train or vehicle.

7. Situations which are specified by the public notice (Article 2 of the Public Notice which defines the accident of Item 5, Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board and the situation of Item 7, Article 4 of the same Ordinance), as those equivalent to the situations of the items 1 to 6 above occurred on tramways.

・Article 2 of the Public Notice which defines the accident of Item 5, Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board and the situation of Item 7, Article 4 of the same Ordinance (Serious incident related to tramways)

*The names of the situations listed in 1 to 4 are abbreviations.

1 “Incorrect management of safety block”

A situation where a vehicle is operating on a main track for the purpose of operating in the relevant safety zone before the completion of safety system procedures and another vehile operating on the main track had existed in the zone.

2 “Dangerous damage in facilities”

A situation that causes malfunction, damage, destruction, etc., of tracks, facilities, etc. that disrupts the safety of a vehicle operating on a main line, and caused malfunction, damage, destruction, etc., bearing a particularly serious risk of collision, derailment, or fire in the vehicle operating on the main track.

3 “Dangerous trouble in vehicle”

A situation that causes a malfunction, damage, destruction, etc., of running device, braking device, electrical device, coupling device, etc., that disrupts the safety of a vehicle operating on a main line and caused malfunction, damage, destruction, etc., bearing a particularly serious risk of collision, derailment, or fire in the vehicle operating on the main track.

4 “Incorrect management of safety block” “Violating red signal[*1],” “Overrun on main track[*2],” “Dangerous damage in facilities,” “Dangerous trouble in vehicle,” “Heavy leakage of dangerous object[*3]” and “A situation equivalent to the prior 6 items (others),” which is recognized as particularly exceptional.

*1 “Violating red signal” refers to a situation in which a vehicle operating on a main track overruns a stop signal and obstructs a course of another vehicle.
*2 “Overrun on main track” refers to a situation in which a vehicle overruns a main track.
*3 “Heavy leakage of dangerous object” refers to a situation in which hazardous materials, explosives, etc., leak significantly from a vehicle.

5. The operation of new tramways and shared tramways that are laid other than on the road surface shall follow the items 1 to 6 in Article 4 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

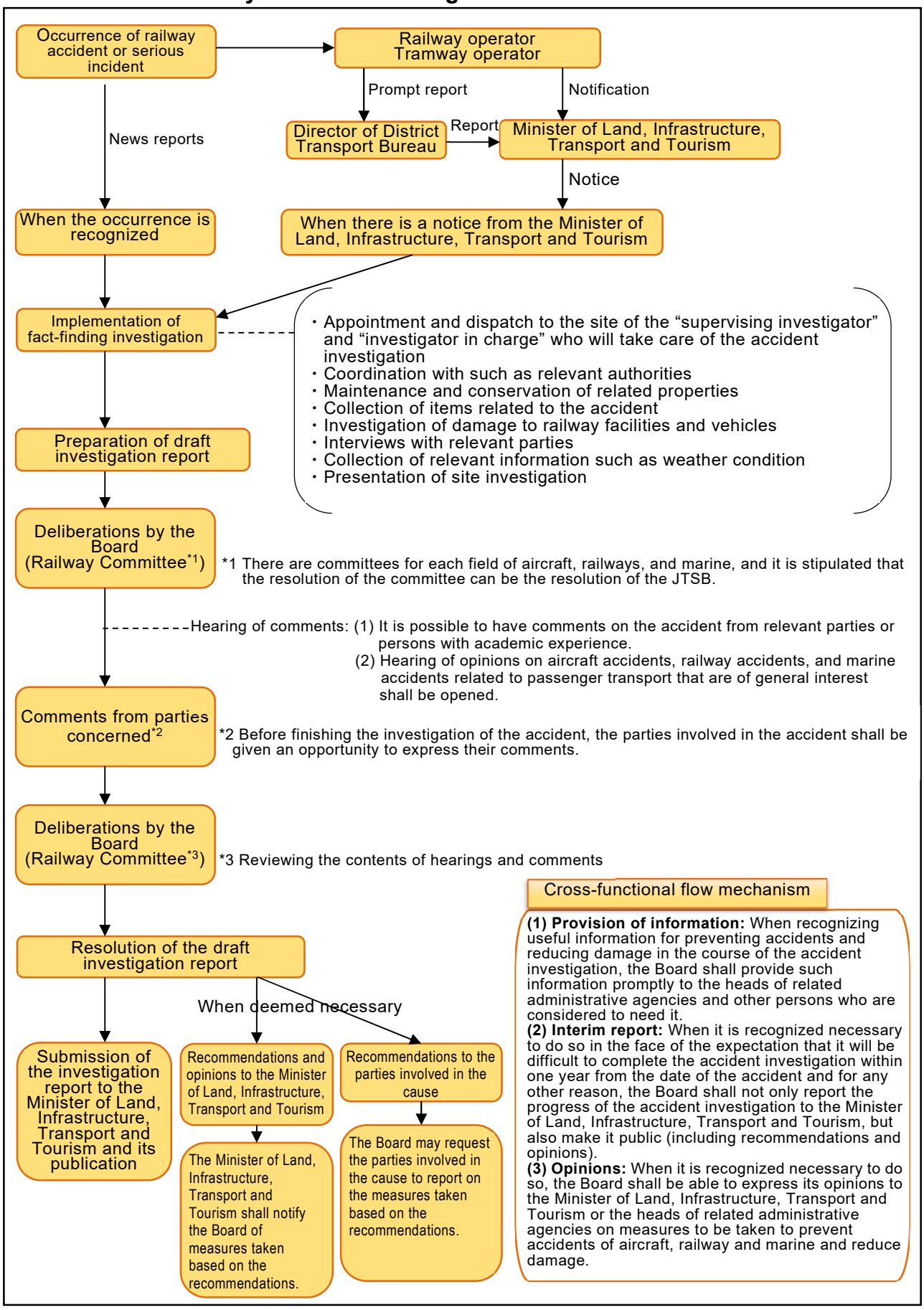
Serious incidents to be investigated

<table>
<tr><td>Category</td><td>Incorrect management of safety block</td><td>· Incorrect indication of signal
· Violating red signal</td><td>Dangerous damage in facilities</td><td>Dangerous trouble in vehicle</td><td>· Main track overrun
· Violating closure section for construction
· Vehicle derailment
· Heavy leakage of dangerous object
· Others</td></tr>
<tr><td rowspan="2">Railway
[Act 2-4-2]
(including tramway operated as equivalent to railway
[Notice 2-5])</td><td colspan="2">Certain conditions such as the presence of another train [Ordinance 4-1, 4-2, 4-3]</td><td colspan="2">Risk of collision, derailment or fire [Ordinance 4-4, 4-5]</td><td></td></tr>
<tr><td colspan="5">Incidents that are particularly rare and exceptional [Ordinance 4-6]</td></tr>
<tr><td></td><td>Incorrect management of safety block</td><td>Violating red signal</td><td>Dangerous damage in facilities</td><td>Dangerous trouble in vehicle</td><td>· Main track overrun
· Heavy leakage of dangerous object
· Others</td></tr>
<tr><td rowspan="2">Tramway
[Ordinance 4-7]</td><td>Certain conditions such as the presence of a vehicle [Notice 2-1]</td><td></td><td colspan="2">Particularly remarkable risk of collision, derailment or fire [Notice 2-2, 2-3]</td><td></td></tr>
<tr><td colspan="5">Incidents that are particularly rare and exceptional [Notice 2-4]</td></tr>
</table>

(Note) In the table, “Act” refers to the Act for Establishment of the Japan Transport Safety Board; “Ordinance” refers to the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board; “Notice” refers to the Public Notice by the Japan Transport Safety Board; and the numbers refer to the Article and Item numbers. (*In “Act”, the Article, Paragraph, and Item are abbreviated)

*For details, see each case on the website of the JTSB.
https://www.mlit.go.jp/jtsb/example.pdf (in Japanese only)

2 Procedure of railway accident investigation



3 Statistics of investigations of railway accidents and serious incidents

The JTSB carried out investigations of railway accidents and serious incidents in 2022 as follows:

13 accident investigations were carried over from 2021, and 14 accident investigations were newly launched in 2022. Among these, 11 investigation reports were published in 2022, and 16 accident investigations were carried over to 2023.

Moreover, one railway serious incident investigation was carried over from 2021, and two serious incident investigations were newly launched in 2022. Among these, one investigation report was published in 2022, and two investigations were carried over to 2023.

Among the 12 investigation reports published in 2022, none was issued with recommendations and none was issued with opinions.

Investigations of railway accidents and serious incidents in 2022

(Cases)

Category	Carried over from 2021	Launched in 2022	Total	Published Investigation reports	(Recommendations)	(Opinions)	Carried over to 2023	(Interim report)
Railway accident	13	14	27	11	(0)	(0)	16	(3)
Railway serious incident	1	2	3	1	(0)	(0)	2	(0)

4 Statistics of investigated railway accidents and serious incidents in 2022

Regarding the number of railway accidents and incidents investigated in 2022, there were 14, an increase of three from 11 in the previous year, and there were two serious railway incidents, an increase of one from one in the previous year.

The breakdown by type of accidents and serious incidents is as follows: The railway accidents consisted of five derailments, eight level crossing accidents, and one other accident with casualties. As for railway serious incidents, there were two dangerous troubles in vehicle.

There were 22 persons killed or injured in 14 accidents, nine of whom were killed and 13 were injured.

The number of casualties (in railway accidents)

(Persons)

2022							
Category	Dead			Injured			Total
	Crew	Passenger	Others	Crew	Passenger	Others	
Casualties	0	0	9	0	7	6	22
Total	9			13			

* The above statistics include incidents under investigation so may change depending on the status of the investigation and deliberation.

5 Summaries of railway accidents and serious incidents which occurred in 2022

The railway accidents and railway serious incidents which occurred in 2022 are summarized as follows. The summaries are based on information available at the start of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Railway accidents)

1	Date and accident type	Railway operator	Line section (location)
	January 4, 2022 Level crossing accident	Nagaragawa Railway Co. Ltd.	Shimo-Manba No.5 level crossing, class 3 level crossing equipped with road warning device without crossing gate, between Manba station and Kami-Manba station, Etsumi-south Line, Gifu Prefecture
	Summary	See “6 Publication of investigation reports” (No.10 on page 91)	
2	Date and accident type	Railway operator	Line section (location)
	February 7, 2022 Train derailment	Ohmi Railway Co., Ltd.	In the premises of Takamiya Station of Taga Line, Shiga Prefecture

	Summary	While the accident train was entering Takamiya Station, all axles (2 axles in the front bogie + 2 axles in the rear bogie) of the first car and the 1st axle of the front bogie of the 2nd car derailed at a curve section to the left in the train direction.	
3	Date and accident type	Railway operator	Line section (location)
	February 7, 2022 Train derailment	Iyo Railway Co., Ltd.	In the premises of Minara Station of Yokogawara Line, Ehime Prefecture
	Summary	While the accident train was entering Minara Station, the two axles in the front bogie of the first car derailed to the left in the train direction near the point.	
4	Date and accident type	Railway operator	Line section (location)
	March 16, 2022 Train derailment	East Japan Railway Company	Between Fukushima Station and Shiroishi Zao Station of Tohoku Shinkansen, Miyagi Prefecture
	Summary	While the accident train was running between the stations, an earthquake was detected and the train was stopped automatically. When the vehicles were checked later, all axles of the 1st to 4th cars, all axles of the 6th to 8th cars, all axles of the rear bogie of the 9th car, all axles of the front bogie of the 10th car, and all axles of the 11th to 17th cars had derailed.	
5	Date and accident type	Railway operator	Line section (location)
	April 5, 2022 Level crossing accident	Tenryu Hamanako Railway Co., Ltd.	Kubota level crossing, class 4 level crossing without crossing gate nor road warning device, between Gansuidi Station and Miyaguchi Station of Tenryu Hamanako Line, Shizuoka Prefecture
	Summary	While the accident train was coasting (moving without power) at 64 km/h, its driver, who had spotted a pedestrian waving his/her hand 120 meters before the level crossing, applied an emergency brake immediately, but the train stopped at 84 m past from the crossing. The pedestrian was later confirmed dead.	
6	Date and accident type	Railway operator	Line section (location)
	April 5, 2022 Level crossing accident	Fukushima Transportation, Inc.	At the 6k961m level crossing, class 4 level crossing without crossing gate nor road warning device between Hirano Station and Iojimae Station of Iizaka Line, Fukushima Prefecture
	Summary	The driver of the train, who saw a car entering the level crossing from the left in the train direction, applied the emergency stop, but the train hit the car. The driver of the car was later confirmed dead.	
7	Date and accident type	Railway operator	Line section (location)
	July 19, 2022 Other accident with casualty	West Japan Railway Company	In the premises of Nada Station of Tokaido Line, Hyogo Prefecture
	Summary	When the train was passing through the station at about 95 km/h, the driver noticed an unusual sound and applied the emergency brake to stop the train. A passenger was later confirmed dead.	
8	Date and accident type	Railway operator	Line section (location)
	August 25, 2022 Train derailment	Shikoku Railway Company	Between Hanke Station and Ekawasaki Station of Yodo Line, Kochi Prefecture
	Summary	When the accident train was running between Ekawasaki Station and Hanke Station, the driver detected a falling rock about 50 cm in size and applied the emergency brake. However, the train hit the falling rock and ran over it, causing all the four axles to derail.	
9	Date and accident type	Railway operator	Line section (location)
	September 6, 2022 Train derailment	West Japan Railway Company	West departure track No. 11 in the premises of Suita General Depot Kyoto branch of Tokaido Line, Kyoto Prefecture
	Summary	When the accident train departed, it departed with the rearmost wheel with the wheel chock on and ran up onto the wheel chock and derailed.	
10	Date and accident type	Railway operator	Line section (location)
	September 20, 2022 Level crossing accident	Takamatsu Kotohira Electric Railroad Co., Ltd.	Nakadai No. 1 level crossing, class 4 level crossing without crossing gate nor road warning device between Omachi Station and Rokumanji Station of Shido Line, Kagawa Prefecture

	Summary	The driver of the train, who saw a pedestrian entering the level crossing from the left in the train direction, applied the emergency stop, but the train hit the pedestrian. The pedestrian was later confirmed dead.	
11	Date and accident type	Railway operator	Line section (location)
	September 26, 2022 Level crossing accident	West Japan Railway Company	Niiya No. 4 level crossing, class 4 level crossing without a crossing gate nor road warning device, between Nakahama Station and Takamatsucho Station of Sakai Line, Tottori Prefecture
	Summary	The driver of the train, who saw a pedestrian entering the level crossing from the left in the train direction, applied the emergency stop, but the train hit the pedestrian. The pedestrian was later confirmed dead.	
12	Date and accident type	Railway operator	Line section (location)
	October 17, 2022 Level crossing accident	Japan Freight Railway Company	Yanagida level crossing, class 3 level crossing without crossing gate, but with road warning device, between Nihonmatsu Station and Adachi Station of Tohoku Line, Fukushima Prefecture
	Summary	While the train was running at about 80 km/h, the driver of the accident train spotted a public person entering the level crossing by walking fast from the left side of the trian direction and applied the emergency stop, but the train hit the public person. A dead body was later found in a nearby river.	
13	Date and accident type	Railway operator	Line section (location)
	October 31, 2022 Level crossing accident	Kyushu Railway Company	Ipponyanagi level crossing, class 4 level crossing without crossing gate nor road warning device, between Igaya Station and Saga Station of Nagasaki Line, Saga Prefecture
	Summary	The driver of the train, who saw a car entering the level crossing from the right in the train direction, applied the emergency stop, but the train hit the car. The driver of the car was later confirmed dead.	
14	Date and accident type	Railway operator	Line section (location)
	December 21, 2022 Level crossing accident	Nagaragawa Railway Co., Ltd.	Manba level crossing, class 3 level crossing equipped with road warning device without crossing gate, between Manba station and Kami-Manba station, Etsumi-south Line, Gifu Prefecture
	Summary	The driver of the train, who saw a car entering the level crossing from the left in the train direction, applied the emergency stop, but the train hit the car. The drive of the car was later confirmed dead.	

(Railway serious incidents)

1	Date and incident type	Railway operator	Line section (location)
	July 24, 2022 Dangerous trouble in vehicle	Enoshima Electric Railway Co., Ltd.	In the premises of Kugenuma Station of Enoshima Electric Railway Line, Kanagawa Prefecture
	Summary	When the train was on the point of entering the platform of Kugenuma Station, a passenger of the accident train reported that a door was open. When the conductor checked from inside the train, he/she confirmed that one of the rear boarding doors of the rearmost vehicle on the right side in the train direction was fully open. No passenger fell out of the train through the open door.	
2	Date and incident type	Railway operator	Line section (location)
	October 17, 2022 Dangerous trouble in vehicle	Kyushu Railway Company	Between Bungo Ogi Station and Bungo Takeda Station of Hohi Line, Oita Prefecture
	Summary	When the train arrived at Bungo-Takeda Station, the driver of the accident train received a report from a passenger that “one of the doors had been opening and closing while the train had been running.” When Kyushu Railway Company checked the train traveling data recorder, the order to open the side sliding door on the right side of the train direction was recorded. No passenger fell out of the train through the open door.	

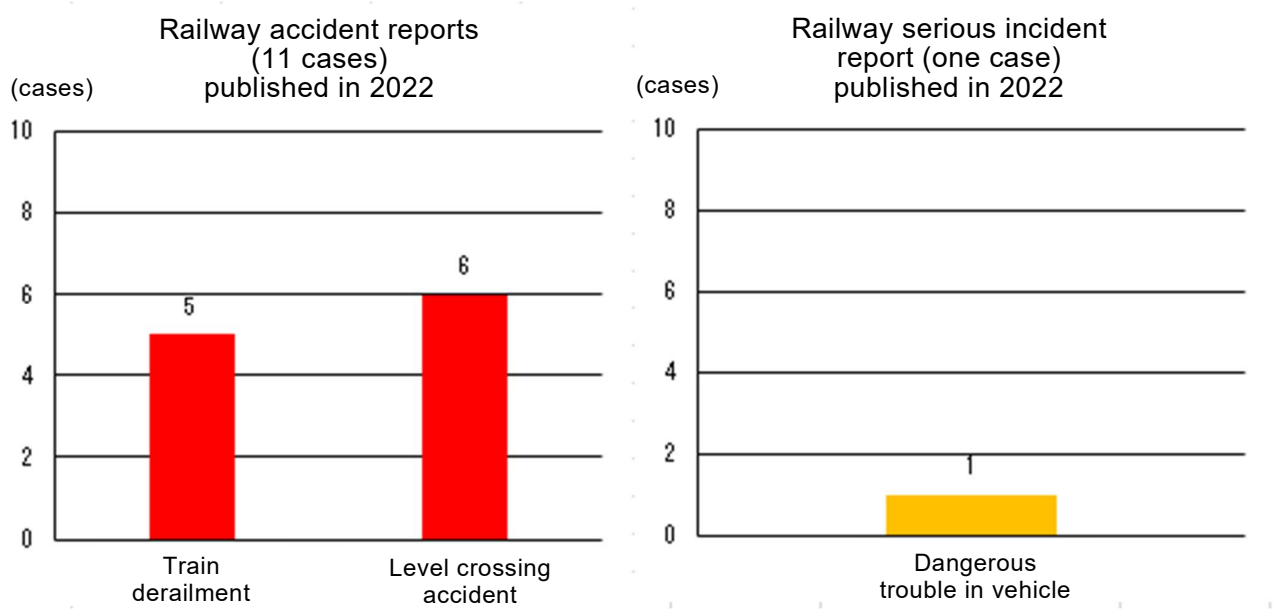
6 Publication of investigation reports

The number of investigation reports of railway accidents and serious incidents published in 2022 was 12, consisting of 11 railway accidents and one serious incident.

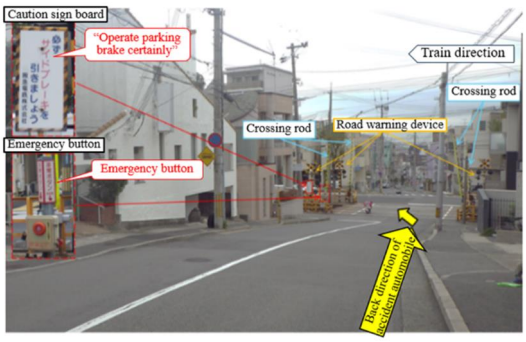
Breaking them down by type, the railway accidents contained five train derailment accidents and six level crossing accidents, while the railway serious incidents contained one dangerous trouble in vehicle.

In the 11 accidents, the number of casualties was eight, consisting of six deaths and two injuries.

The investigation reports on railway accidents and serious incidents published in 2022 are summarized as follows.



Railway accident investigation reports published in 2022

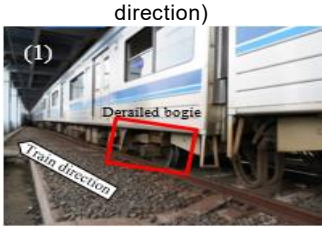
1	Date of publication	Date and accident type	Railway operator	Line section (location)
	February 17, 2022	November 23, 2020 Train derailment	Hankyu Corporation	Takaha level crossing, class 1 level crossing equipped with crossing gate and road warning device, between Rokko station and Mikage station, Kobe Line, Hyogo Prefecture
	Summary	The train was running between Rokko station and Mikage station at the velocity of about 85 km/h, the driver of the train noticed the light motor truck entering Takaha level crossing, class 1 level crossing, so that applied the emergency brake immediately, the train collided with the light motor truck, and all two axles in the front bogie of the first vehicle derailed to left. The light motor truck had been going down the slope as no one was boarded. One passenger was injured in this accident.		
	Probable causes	It is highly probable that the train derailed because an unattended light motor truck backed the sloping road, and entered Takaha level crossing in the status as the crossing rod lowered responded to the approaching train, and collided with the approaching train. As for that the train had derailed, it is probable that left wheel of the first axle ran onto the rail and derailed due to the impact of the light motor truck which collided with lower left front part of the train, in addition, some parts of the light motor truck was caught between left wheel of the first axle of the front bogie of the first vehicle and rail, furthermore, left wheel of the second axle ran onto the rail and derailed due to the impact acted by these parts and the vibration acted by the derailed wheel. It is probable that the light motor truck had backed because the driver of the light motor truck left from the light motor truck in the status that the measures required to keep the stopping status of the light motor truck had been insufficient, although the stopped place was the sloping road.		

<table>
<tr><td></td><td>Safety actions</td><td colspan="3">(1) Measures Taken by the Company
1. In December 2020, the company requested the city of Kobe in charge of road management to take safety measures, such as installing warning signs to indicate the gradient of Takaha Kita Route 2. In addition, in May 2021, the company requested the installation of warning signs on roads connecting to the level crossings with the alignment and gradient similar to those of the road.
2. In October 2021, as a measure to reduce damage to railway facilities in the event of an accident, the company installed protective fences near the damaged instrument boxes and signal pole ladders.
3. In December 2020, the company replaced the warning sign “Be sure to pull the parking brake” with a new warning sign to warn drivers coming down the sloping road.

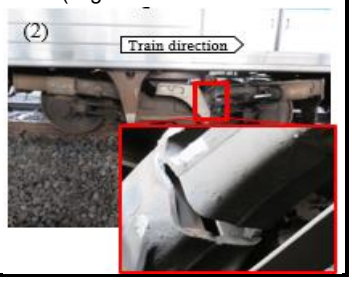
(2) Measures taken by Kobe City
In July 2021, in response to the request of (1)1, they installed a warning sign indicating “there is a steep slope ahead”.
(3) Measures taken by the Nada Police Station of Hyogo Prefecture
After the accident, not only that various traffic guidance regulations have been strengthened near Takaha level crossing, but also the area has been designated as a priority application area of the Parking Warden Activity Guidelines to share information with parking wardens*1 and strengthen monitoring of abandoned vehicles*2. In addition, in April 2021, an alert flyer was prepared as a warning message when parking and leaving a car on a sloping road with the aim to remind the driver to apply the parking brake, put the gear in the manual car, move the change lever to P (parking) in the automatic car, and use wheel stoppers, not only to display it on the website, but also to hand out to people on the streets during the national traffic safety campaign period.
*1 A “parking warden” is a person who patrols the area based on the Parking Warden Activity Guidelines to check abandoned vehicles and attach the identification mark under a corporation entrusted by the chief of the police station.
*2 An “abandoned vehicle” means a vehicle which is recognized as being illegally parked (in case of light vehicles, attached with a structure and device for being towed, and with the gross vehicle weight exceeding 750 kg) and which is unable to be driven immediately because of the absence of the driver.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-1-1e.pdf(Synopsis)
https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-1-1.pdf(Japanese)
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-1-1-p.pdf (Explanatory material)</td></tr>
<tr><td>2</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>February 17, 2022</td><td>March 26, 2021
Train derailment</td><td>East Japan Railway Company</td><td>Between Tsuchiura station and Kandatsu station, Joban Line, Ibaraki Prefecture</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The train was running between Tsuchiura station and Kandatsu station at the velocity of about 97 km/h, the driver of the train noticed an automobile on the down line track halting as crossed. The driver applied the emergency brake immediately but it was too late, the train collided with the automobile. The train stopped after ran for about 267 m as dragging the automobile. All two axles in the front bogie of the first vehicle derailed to right in this accident.
There were 66 passengers and two train crews boarded on the train, but no one was injured.
 
</td></tr>
</table>

	Probable causes	It is highly probable that the running train collided with the automobile which entered the track and was stopping on the railway track, and right wheels of all two axles of the front bogie of the first vehicle ran onto the rail and derailed to right side of the track, because the automobile got into the space between lower left part of the front surface of the first vehicle and the railway track. It is probable that the automobile had been enter the railway track because the automobile broke through the net fence and enter the railway track and became stuck, because the driver of the automobile mishandled the steering wheel in the situation that the driver could not drive calmly in order to escape from the pursuit by the police.		
	Safety actions	**Measures taken by Road Administrator** After the accident, at the request of the company, the road administrator who has jurisdiction over the net fence took the following measures before June 3, 2021 at the location where the automobile entered. (1) The damaged net fence was repaired. (2) A guardrail was installed on the net fence side of the prefectural road 141.		
	Report	https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-1-2e.pdf(Synopsis) https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-1-2.pdf(Japanese) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-1-2-p.pdf (Explanatory material)		
3	Date of publication	Date and accident type	Railway operator	Line section (location)
	March 24, 2022	June 12, 2020 Train derailment	Keisei Electric Railway Co., Ltd.	In the premises of Aoto station, Main Line, Tokyo Metropolitan
	Summary	The train departed from Keisei Takasago station about one minute behind the scheduled time. While the train was entering the platform of Aoto station at the velocity of about 30 km/h, the emergency brake was applied and the train stopped about 44 m before the stop sign. The emergency brake had been applied by the conductor because the conductor felt the abnormal vibration of the train and pulled the conductor's valve. After the train had stopped, the conductor checked the side surface of the train, and found that the seventh vehicle had been tilted to right and derailed. After that, the staffs of the railway company checked the derailed status and found that there was the crack in the side beam in front right of the rear bogie. About 100 passengers, the driver and the conductor were boarded on the train, but no one was injured.		

(Left side in the train direction)

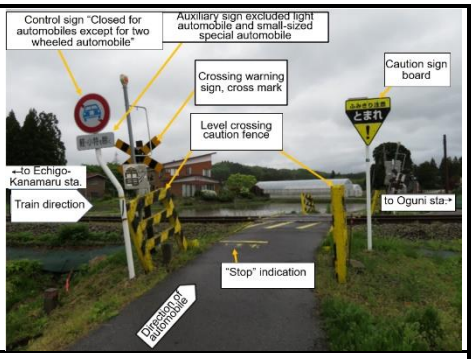


(Right side in the train



	Probable causes	It is probable that the right wheel climbed up on rail and derailed at around the edge in the direction to Aoto station which is the end edge of the guard rail where derailment could not be protected. It is probable the vehicle passed the curved track in the status that the unbalance of wheel loads in the front axle of the bogie became large and the wheel load of right wheel had been decreased and the lateral force[*1] increased, while the vehicle ran in the status that the crack was generated from the lower surface to upper part of the side surface of the side beam of the bogie and expanded. It is probable that the unbalance of the wheel loads in the front axle of the bogie became large because the shared vertical load could not be supported by the decreased strength of the side beam due to the crack. Furthermore, it is likely that the crack had occurred in the side beam because the large stress was generated locally by the stress concentration in the inside of the side beam where the reinforcing plate was welded, and became to the origin of the crack and the crack had expanded due to the fatigue failure. It is likely that the railway operator could not find the crack expansion in the periodic inspection, because there was the possibility that the crack had not been opened when the latest general inspection before the occurrence of this accident was conducted, even though there was the possibility that the crack had already been reached to the surface of lower surface of the side beam at that time, and the place to be inspected by the magnetic particle testing[*2] for the side beam had not been prescribed precisely. *1 "Lateral force" refers to the horizontal component force acting between the wheel and rail, which is in the plane perpendicular to the longitudinal direction of the rail. *2 "Magnetic particle testing" is the nondestructive test to detect flaws in the surface and in the neighborhood of surface by visualizing flaws by the leakage magnetic field. The proper test materials including magnetic powders are used.
	Safety actions	**Measures Taken by the Company** The Company added the implementation of the visual inspection and the hammering test after wiping in the similar place as the place where the crack had occurred in the train inspection and the monthly inspection, targeted all bogies owned by the company and Hokuso Railway. Additionally, the company implemented the measures, for the point where the crack had occurred and the similar point, to indicate the important inspecting points on real object using the chalk clearly, to make thoroughly the removal of paints on the lower surface of the side beam, and to add the double check system by two inspectors, in the magnetic particle tests in the critical part inspection and the general inspection, targeted the same type of the bogie. Furthermore, the company prescribed to conduct education on the magnetic particle test once a year, and to conduct the magnetic particle test every two years until the causes of this accident were identified. **Measures Taken by the Ministry of Land, Infrastructure, Transport and Tourism** On June 12, 2020, the Ministry of Land Infrastructure, Transport and Tourism instructed the railway and tramway operators who own the bogies of the similar structure, to conduct the urgent inspection by the visual check, etc. It was reported that there was no abnormality in the targeted bogies, about 9,900 bogies including the company, as the result of the inspection.
	Report	https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-2-1e.pdf https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-2-1-p.pdf (Explanatory material)
	Reference	Major activities in the past year (page 5)

4	Date of publication	Date and accident type	Railway operator	Line section (location)
	March 24, 2022	May 16, 2021 Level crossing accident	East Japan Railway Company	Masuoka level crossing, class 4 level crossing without crossing gate nor road warning device, between Echigo-Kanamaru station and Oguni station, Yonesaka Line, Yamagata Prefecture

	Summary	The train was running between Echigo-Kanamaru station and Oguni station at the velocity of about 52 km/h, the driver of the train noticed the light automobile entering Masuoka level crossing, class 4 level crossing, so that applied the emergency brake immediately, but the train collided with the light automobile. The driver of the light automobile was dead in this accident. 
	Probable causes	It is certain that this accident was caused by the collision of the train and the light automobile which entered Masuoka level crossing, the class 4 level crossing where the crossing gate and road warning device were not equipped, in the status that the train was approaching to the level crossing. Although it is likely that the driver of the light automobile did not notice the approaching train, it could not be revealed the details of the reason the light automobile entered the level crossing in the status that the train was approaching because the driver of the light automobile was dead.
	Safety actions	**(1) Measures Taken by the Company** 1. On May 20, 2021, the company conducted an on-site inspection of the level crossing with the town office of Oguni Town, police and local residents and repainted the zebra pattern inside the level crossing and removed unnecessary billboards in order to further improve visibility. In addition, during the on-site inspection, the company informed those present that the company wished to abolish the level crossing. However, the local residents showed disapproval to the idea and no agreement on its abolishment was reached. 2. On May 20, 2021, the company conducted enlightenment activities to prevent level crossing accidents at a supermarket near the Oguni station. **(2) Measures taken by the town office of Oguni** On May 20, 2021, the town of Oguni, together with the company, the local police, and local residents, conducted an on-site inspection of the level crossing and decided to repaint the "STOP" sign in front of the level crossing to ensure that there is more room between the stop position and the level crossing.
	Report	https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-2-2e.pdf(Synopsis) https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-2-2.pdf(Japanese) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-2-2-p.pdf (Explanatory material)

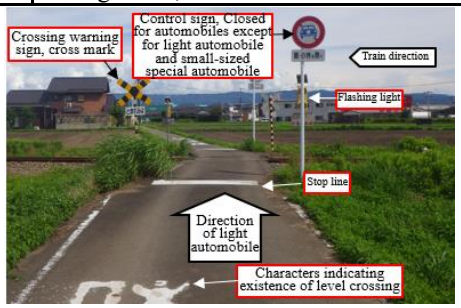
5	Date of publication	Date and accident type	Railway operator	Line section (location)
	May 26, 2022	July 21, 2021 Level crossing accident	Hokkaido Railway Company	Naito level crossing, class 4 level crossing without crossing gate nor road warning device, between Shikaribetsu station and Niki station, Hakodate Line, Hokkaido
	Summary	The train was running between Shikaribetsu station and Niki station at the velocity of about 81 km/h, the driver of the train noticed the pedestrian entering Naito level crossing, class 4 level crossing, from left side of the train direction, at about 100 m before the level crossing, so that sounded the whistle and applied the emergency brake immediately, but the train collided with the pedestrian. The pedestrian was dead in this accident.		
	Probable causes	It is probable that this accident was caused by the collision of the train and the pedestrian who entered Naito level crossing, the class 4 level crossing where crossing gate and road warning device were not equipped, in the status that the train was approaching. It could not be revealed the reason why the pedestrian entered the level crossing and continued to walk in the status that the train was approaching because the pedestrian was dead.		

<table>
<tr><td></td><td>Safety actions</td><td colspan="3">(1) Measures Taken by the Company
1. A discussion on the abolition was held with the landowner on October 12, 2021. However, the landowner rejected the idea because of its actual status of usage and no agreement on the abolition was reached.
2. Leaflets to call attention to the use of the level crossing was provided. On October 19, 2021, warning signs “Accident occurred here. Check left and right” were installed at the level crossing. (See Fig.1)

(2) Measures taken by the Landowner
On August 12, 2021, the landowner installed colored cones and a safety bar in front of this level crossing to remind people to stop before it. (See Fig. 2)

Fig. 1 Implementation status of the safety measures taken by the company
 

Fig. 2 Implementation status of the safety measures taken by the landowner</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-3-1e.pdf(Synopsis)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-3-1.pdf(Japanese)
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-3-1-p.pdf (Explanatory material)</td></tr>
<tr><td>6</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>June 30, 2022</td><td>July 12, 2021
Level crossing accident</td><td>Amagi Railway Co. Ltd.</td><td>Minami-Tsuchitori level crossing, class 4 level crossing without crossing gate nor road warning device, in the premises of Yamaguma station, Amagi Line, Fukuoka Prefecture</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The train was running between Nishi-Tachiarai station and Yamaguma station, the driver of the train noticed a light automobile approaching to Minami-Tsuchitori level crossing, class 4 level crossing, from left of the train direction, and entered the level crossing, therefore, the driver of the train applied the emergency brake and sounded a whistle immediately, but the train collided with the light automobile which entered the level crossing.
The driver of the light automobile was dead in this accident.
 
</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is certain that this accident was caused by the collision of the train and the light automobile which entered Minami-Tsuchitori level crossing, the class 4 level crossing without crossing gate nor road warning device, in the status that the train was approaching.
It could not be revealed the detailed reason the light automobile entered Minami-Tsuchitori level crossing in the status that the train was approaching, because the driver of the light automobile was dead.</td></tr>
</table>

<table>
<tr><td></td><td>Safety actions</td><td colspan="3">(1) Measures taken by the Company
In October 2021, the company and the Ogori Police Station handed out leaflets to increase awareness in front of the Ogori station of the Amagi Railway.
(2) Measures taken by the Road Administrator
Since the width of the municipal road on the north side is about 4 m and the width of the level crossing is about 3 m*1, outside lines (including zebra) and a text display (“the road ahead is narrower”) were installed.

*1 This means the road width (boundary width) of the narrow part of the road adjacent to the level crossing, and the part measured differs from the “level crossing width” of the railway.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-4-1e.pdf(Synopsis)
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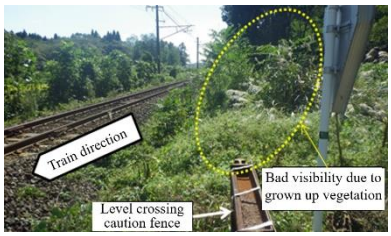
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-4-1-p.pdf (Explanatory material)</td></tr>
<tr><td>7</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>June 30, 2022</td><td>September 27, 2021
Level crossing accident</td><td>Echigo TOKImeki Railway Company</td><td>Fukuzaki level crossing, class 4 level crossing without crossing gate nor road warning device, between Sekiyama station and Nihongi station, Myoko-Haneuma Line, Niigata Prefecture</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The train was running between Sekiyama station and Nihongi station at the velocity of about 92 km/h, the driver of the train noticed a motorized bicycle entering Fukuzaki level crossing, Class 4 level crossing, from left, so that sounded a whistle and applied the emergency brake, but the train collided with the motorized bicycle.
The driver of the motorized bicycle was dead in this accident.
 
</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is certain that this accident was caused by the collision of the train and the driver of motorized bicycle, because the driver of the motorized bicycle entered Fukuzaki level crossing, which is a class 4 level crossing without crossing gate nor road warning device, in the status that the train was approaching.
It could not be revealed the detailed reason why the driver of the motorized bicycle entered the accident level crossing in the status that the train was approaching because the driver of the motorized bicycle was dead.</td></tr>
<tr><td></td><td>Safety actions</td><td colspan="3">After the accident, the company and the municipal government of Joetsu City continued talks based on the recognition of the need to take measures, and the municipal government took the initiative to discuss with local residents by listening to their wishes and opinions. As a result, an agreement on the abolition of the level crossing was reached with the relevant neighborhood associations in December, 2021.
As a result of discussions, the company and the municipal government of Joetsu City plan to abolish this level crossing in FY2022.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-4-2e.pdf(Synopsis)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-4-2.pdf(Japanese)
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-4-2-p.pdf (Explanatory material)</td></tr>
<tr><td>8</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>July 28, 2022</td><td>July 24, 2021
Train derailment</td><td>Japan Freight Railway Company</td><td>In the premises of Sumidagawa station, Joban Line, Tokyo Metropolitan</td></tr>
</table>

Summary

The train departed from the arrival and departure No.5 track of Sumidagawa station on schedule. While the driver of the train was operating in the powering operation at the velocity of about 18 km/h in the pushing operation by locomotive[*1] toward the turn-back track in the premises of the station, noticed a cloud of dust rising at around the freight wagon in ahead to the train direction, therefore, applied the emergency brake immediately.

After the train stopped, the driver got off the train and checked the situation, and found that all two axles of the front bogie of the third vehicle had been derailed. Furthermore, vehicles are counted from the locomotive. One driver was boarded on the train, but the driver was not injured.

*1 "Pushing operation by locomotive" means to control of train movement from other than the leading car, and according to the JR's freight operating standards, it is defined as operating a train by a place other than by the front driving seat of the foremost vehicle.

Probable causes

It is probable that the train, coupled with 19 freight wagons, derailed while running by the pushing operation by locomotive, in the concerned accident, because right wheel of the front axle of the front bogie of the third freight wagon climbed up on the guard rail of branch line side at the crossing part of the turnout, after that left wheel entered the wrong track side.

It is probable that the back side of the right wheel of the freight wagon climbed up on the branch line side guard rail at the missing part of the turnout, because the lateral force[*3] of the front axle of the front bogie increased and the wheel load[*4] of the right wheel decreased. It is probable that the vehicle body displaced horizontally and the excessively compressive automatic coupler force[*2] was generated in the status that the coupler swing angle of the freight wagon was expanded, while the empty loaded freight wagon was running around the turnout.

It is probable that the excessive compressive coupler force had been generated because the operation of the main handle of the mascon[*5] had not been implemented obeyed to the prescribed operation, related with that the setting of the weight selecting switch before started the pushing operation by locomotive was not in the prescribed position, and that the driver had been understood that the rule of handling operation in the pushing operation by locomotive did not applied to the concerned train, and the driver's consciousness had been concentrated to velocity and stopping position, although the velocity had not exceeded the limited velocity, just before the front bogie of the third freight wagon was running in around the crossing part of the 192B turnout.

It is likely that the education to understand the contents of the works in the pushing operation by locomotive correctly had been insufficient, related with that there was the difference of recognitions for the concerned rule between in the head office, the branch office and the engine division of the JR Freight, as the background of that the driver had been understood that the rule of handling operation in the pushing operation by locomotive was not applied to the concerned train.

*2 The "automatic coupler force" means force acting on the coupler between vehicles in the axial direction.
*3 The "lateral force" means the horizontal component force acting between the wheel and rail, which is in the plane perpendicular to the longitudinal direction of the rail.
*4 The "wheel load" means the vertical component force acting between the wheel and rail, which is in the plane perpendicular to the longitudinal direction of the rail.
*5 "Mascon" means "Master Controller", which is a device operated by the driver to control the acceleration and deceleration of the train.

Safety actions

Measures Taken by the Company

As an emergency measure in light of the occurrence of the accident, in order to make thoroughly known about the handling of the main steering wheel of the master controller stipulated in the "Driver Operation Standards" as a countermeasure against the horizontal buckling[*6] during the pushing operation by locomotive, the company issued a notice to each

<table>
<tr><td></td><td></td><td colspan="3">railway operation group to make known about the following contents.
(1) At the time of the startup, the lock shall be set to 3 notches*7 or less for the EF210 and EF510 models and to 2 notches or less for the EH200 and EH500 models.
(2) At the time of increasing the notch, an interval of 5 seconds or more shall be left between each notch. In addition, the same procedure shall be applied when increasing power (accelerating).
(3) The load selection switch shall be set to the medium load or less for the EF210 model.
In addition, when performing a pushing operation by locomotive between the arrival and departure track and the turn-back track of the Sumidagawa station, the operation method has been revised, such that the course which passes the branch line side of the No. 8 simple turnout shall not be used, and when it is used, a conventional locomotive with the traction force smaller than that of the new type locomotive shall be used. Furthermore, it has been decided to launch the work to replace the No. 8 simple turnout with the No. 8 curve crossing simple turnout as the No. 192 Ro turnout in FY2022.

*6 “Horizontal buckling” means the phenomenon of train buckling, in which when an excessive load acts on the train in the longitudinal direction, train cars deviate significantly in the horizontal direction from each other at the connecting surfaces.
*7 “Notch” means the notch on the steering wheel operated by the driver.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-5-1e.pdf(Synopsis)
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https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-5-1-p.pdf (Explanatory material)</td></tr>
<tr><td>9</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>September 29, 2022</td><td>July 5, 2021
Train derailment</td><td>East Japan Railway Company</td><td>Between Mataki station and Rikuchu-Kanzaki station, Ofunato Line, Iwate Prefecture</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The train departed from Mataki station on schedule. The driver of the train, while the train was running in the section between Mataki station and Rikuchu-Kanzaki station in the dark circumference at the velocity of about 67 km/h, found fallen trees in ahead and applied the emergency brake, but it was too late, the train collided with the fallen trees and all 2 axles in the front bogie derailed to left side of the train direction.
There were 5 passengers and a train crew, i.e., the driver, boarded on the train, but no one was injured.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is highly probable that the train ran onto the fallen trees, and derailed as being involved the fallen trees, in this accident, because the train collided with the fallen trees which had been invaded the structure gauge and hindered the route of the train.
It is highly probable that the fallen trees had been invaded the clearance gauge and hindered the route of the train, because the trunk of the tree, which had been grown up in the cut slope in right side of the train direction, broke at around the root where hollowed partly due to the progress of the deterioration, and collapsed toward the railway track.</td></tr>
<tr><td></td><td>Safety actions</td><td colspan="3">Measures Taken by the Company
The measures taken by the company's Morioka branch office after the accident are the following:
(1) That, a field investigation of trees of nearby trees along the railway line at places in which serious damage is expected to occur when a train collides with a fallen tree (places in which a train overturns, falls off or collides with a tunnel entrance when the train derails) was conducted in an emergency manner and about 80 trees in 5 line sections which were considered to be attended to immediately were taken care of (cutting them down or fixing them with wire) in an emergency manner by October 19, 2021.
(2) That, about other 180 trees which were to be cut down in a planned manner based on the investigation of the item (1) above were taken care of, such as by cutting down by December 24, 2021.
(3) That, it was decided to conduct an inspection of soundness of trees by tree experts at places in which there is a risk of a train overturning, falling off or colliding and assign priorities based on the investigation result and take measures such as cutting down in a planned manner from FY2022 onward.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-6-2e.pdf(Synopsis)</td></tr>
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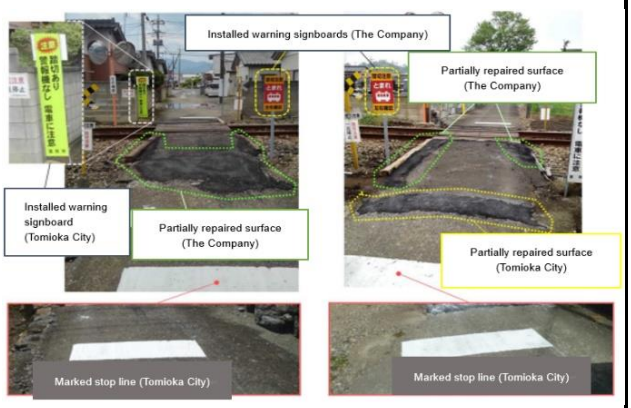
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-6-2-p.pdf (Explanatory material)</td></tr>
<tr><td rowspan="5">10</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td>September 29, 2022</td><td>January 4, 2022
Level crossing accident</td><td>Nagaragawa Railway Co., Ltd.</td><td>Shimo-Manba No.5 level crossing, class 3 level crossing equipped with road warning device without crossing gate, between Manba station and Kami-Manba station, Etsumi-south Line, Gifu Prefecture</td></tr>
<tr><td>Summary</td><td colspan="3">The train was running between Manba station and Kami-Manba station at the velocity of about 50 km/h, the driver of the train noticed the automobile entering the Shimo-Manba No.5 level crossing, class 3 level crossing, from left side of the train direction, therefore, sounded a whistle and applied the emergency brake immediately, but the train collided with the automobile.
The driver of the automobile died and the fellow passenger was seriously injured in this accident.
 
</td></tr>
<tr><td>Probable causes</td><td colspan="3">It is highly probable that this accident was caused by the collision of the train and the automobile, because the automobile entered the level crossing in the status as the train was approaching, in Shimo-Manba No.5 level crossing, the class 3 level crossing equipped with the road warning device.
It could not be determined the precise reason the automobile entered the level crossing in the status as the train was approaching, although it is likely that the driver could not notice only the approaching train but also could not notice the flashing of the red flashing lamps and the warning sound, because the driver of the automobile was dead and the fellow passenger lost memories of before and after of the collision.</td></tr>
<tr><td>Safety actions</td><td colspan="3">The measures taken by the company and Gujo City about this level crossing are the following:
(1) Measures taken by the Company
1. On January 18, 2022, the company, the police station and Gujo City jointly called for users who use Shimo-Manba No.5 level crossing to make a stop before crossing the level crossing and not to enter it while the crossing signal is sounding.
2. On April 20, 2022, the faded level crossing warning signs and alarm posts were repainted.
(2) Measures taken by Gujo City
1. On March 10, 2022, the city painted the level crossing in color to improve visibility.
2. On March 28, 2022, in order to draw attention of users of the level crossing to check safety, the city newly installed a warning signboard with the description “Make a stop before the level crossing and check safety.”</td></tr>
<tr><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-6-1e.pdf(Synopsis)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-6-1.pdf(Japanese)
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-6-1-p.pdf (Explanatory material)</td></tr>
<tr><td rowspan="3">11</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td>October 27, 2022</td><td>December 30, 2021
Level crossing accident</td><td>Joshin Dentetsu Co. Ltd.</td><td>Seiunji level crossing, class 4 level crossing without the crossing gate nor the road warning device, between Higashi-Tomioka station and Joshu-Tomioka station, Joshin Line, Gunma Prefecture</td></tr>
<tr><td>Summary</td><td colspan="3">The train was running between Higashi-Tomioka station and Joshu-Tomioka station, the driver of the train noticed a passerby squatdown in Seiunji level crossing, class 4 level crossing, and applied the emergency brake and sounded a whistle, but the train collided with</td></tr>
</table>

		the passerby. The passerby was dead in this accident.
	Probable causes	It is certain that this accident was caused because the train collided with the passerby and the bicycle who entered and staying in Seiunji level crossing, the class 4 level crossing without crossing gate nor road warning device. It could not be revealed the detailed reason the passerby was staying in the level crossing because the passerby was dead, although it is likely that the passerby did not notice the approaching train due to be concentrated the consciousness to some actions as the bicycle fell down in the accident level crossing, or the passerby could not move the body due to some causes.
	Safety actions	**(1) Measures taken by the Company** As shown in the figure, warning signboards were installed on both sides of the level crossing, and some grooves and holes in joints in the asphalt pavement were repaired. In addition, in the wake of this accident, the company together with the Gunma Prefecture conducted a survey on the pros and cons of abolishing the class 4 level crossing to each municipality along Joshin Line (on February 10, 2022) and decided to proceed with the discussion with the road administrator to abolish 7 level crossings which had been confirmed to be abolished (this level crossing is not included because it is installed in a private land only accessible to a municipal road) in future. Furthermore, the company abolished one of the class 4 level crossings "Under the up line signal level crossing" which had been determined to be abolished in March 2022. **(2) Measures taken by the Road Administrator** As shown in the figure, the Tomioka City, as the road administrator, marked stop lines on both sides of the level crossing, partially repaired the road surface on the south side, and added warning signs.
	Report	https://www.mlit.go.jp/jtsb/eng-rail_report/English/RA2022-7-1e.pdf(Synopsis) https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2022-7-1.pdf(Japanese) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2022-7-1-p.pdf (Explanatory material)



North side of the level crossing　　South side of the level crossing

Fig. Measures taken by the company and government of Tomioka City for this level crossing

Published Investigation Report on Railway Serious Incidents (2022)

1	Date of publication	Date and accident type	Railway operator	Line section (location)
	December 1, 2022	November 23, 2021 Dangerous trouble in vehicle	Kintetsu Railway Co., Ltd.	In the premises of Ise-Asahi station, Nagoya Line, Mie Prefecture

Summary

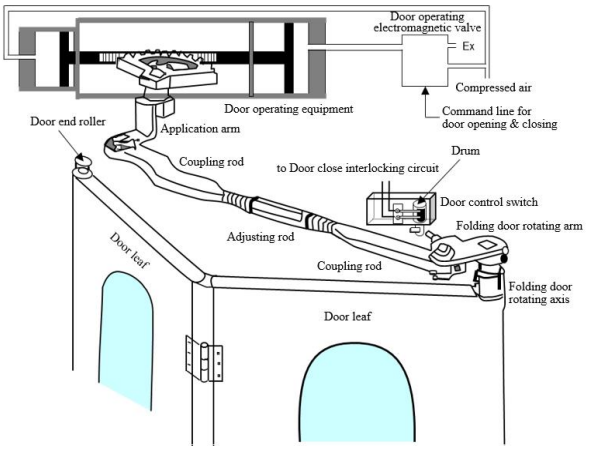
The conductor for passenger management in charge of the train noticed that the left door for entraining and detraining passengers in the rearmost of the train had been opened at around Ise-Asahi station, and communicated to the driver to stop the train. The driver, as received the communication, applied the brake to stop the train.

After the conductor for passenger management locked the concerned door and checked all doors obeyed to the instruction from the train dispatcher, the train resumed the operation with monitoring the concerned door. The train took an emergency stop at the next station, Kawagoe-Tomisuhara station, and let the deputy stationmaster boarded on the train to watch the concerned door, and continued the operation till to Kintesu-Yokkaichi station, but the operation of the train beyond this station was suspended.

There were 127 passengers and 3 train crews, i.e., the driver, the conductor, and the conductor for passenger management, boarded on the train, but there was no injury due to fall off, etc.

Probable causes

It is probable that this railway serious incident was caused because the folding door moved and opened since the force, by the wind pressure and the swaying and vibration of the vehicle body while the train was running in high speed, which exceeded the resistive force against opening door, was acted, in the status that the pushing force generated in the door operating equipment did not transmit and the folding door would open if the external force had acted due to the breakage of the welded part between axis part and plate part of the rotating axis of the folding door, in the door in left side of the train direction in the rear most of the train, while the train was running.



It is probable that the welded part between the axis part and the plate part of the rotating axis of the folding door was broken, because, it is probable that the strength had been lacked due to the poor welding when manufactured the folding door due to the existence of the poor fusion penetration in the groove weld and had not been implemented obeying to the design drawings when implemented the welding works, besides, the proper treatment had not been taken before broke, since the welded status of the rotating axis of the folding door had not been checked visually, because the welded part had been covered by the door frames, the outer boards and the ornamental boards, etc., in the periodic inspection by the operators implemented after that.

It could not be revealed the details of why the welding had not been conducted obeying to the design drawings, because few materials at that time were kept in each related operator and the company charged in the welding works had been closed, as the long time had passed from the time when the doors were manufactured.

Safety actions

Measures taken by the vehicle division of the Company

(1) Between November 23 to 24, 2021, an emergency visual inspection was undertaken to check the presence or absence of anomaly in the welded parts of the folding door rotating axes of all the folding doors and the presence of absence of anomaly at the time of the opening and closing operations (no anomaly was found as a result of the inspection).

(2) On November 24, 2021, an instruction was given to visually perform a general inspection of the site and no anomaly was found. Thereafter, an instruction was given to perform a visual inspection at the time of train inspection (checking the presence or

absence of looseness by opening and closing doors manually, checking the presence or absence of anomaly of the folding door rotating axes and checking the opening and closing state by switch operation by the conductor) (no anomaly has been found so far).

(3) On November 25, 2021, an instruction was given to visually to check the presence or absence of anomaly of closing state of the folding door when going back and forth through the aisles of the train (no anomaly has been found so far).

(4) On November 30, 2021, the vehicle manager who had received an instruction from the safety supervisor conveyed the instruction to the field operations department.

(5) Between November 30 and December 2, 2021, a general inspection of the upper part of the folding door rotating axes was visually performed to check the state of the welded parts (it was confirmed that there were several types of welding and the manufacturing companies were identified).

(6) On December 3, 2021, the folding door rotating axes of the accident door were newly manufactured and replaced.

(7) Between December 4 to 27, 2021, a magnetic particle testing[*1] and a welding re-repair were performed on all the doors with the welding types (A-, B, C, C+) (cracks were found in 15 out of 35 doors of the welding type C, but there was no crack in doors of the other welding types).

(8) On July 8, 2022, instructions on the measures against the serious incident were provided to parties concerned on site (to conduct a magnetic particle testing and a welding re-repair of the welded parts of the folding door rotating axes in a general inspection and inspection of important parts in the future, and to conduct a magnetic particle testing in a general inspection and inspection of important parts after the re-repairing). Additionally, between December 4, 2021 and the end of September 2022, the magnetic particle testing and welding re-repair of 153 out of 353 doors of the welding type A have been completed, and the present measures will be also applied to the remaining 200 doors in future.

(9) Other efforts

- On February 7, 2022, a weld strength analysis by the finite element method[*2] (the design strength and the strength of the accident product which caused the present serious incident, etc.) was performed and it was confirmed that the stress calculated from the design was larger than the evaluation standard value (the safety factor is greater than 1).
- On April 18 and 26, 2022, the actual stress of the folding door rotating axes (on the 18th: the current product, and on the 26th: the product after welding repair) was measured.
- On July 6, 2022, a weld strength analysis by the finite element method (strength analysis after welding repair) was performed, and it was confirmed that the stress calculated from the design was larger than the evaluation standard value (the safety factor is greater than 1).

Measures taken by the transportation department of the Company

(1) On November 24, 2021, the transportation department instructed conductors and conductors for passenger management to check the folding doors (when on duty onboard an express train equipped with folding doors, they shall check the state of the doors by necessarily touching them by hand when performing inspection tour of the train, and when an anomaly is found, they shall report accurately without hesitation to the train operation dispatcher and relevant parties) (no anomaly was found as a result of the inspection).

(2) Between November 25 and 28, 2021, at the study group of the train dispatchers, the details of the serious incident were made known to check the handling of radio communication commands and events which require hearing from a train crew and discussed the improvement of the vehicle failure procedure chart used by train dispatchers (it was decided to revise the procedure chart as a result of the discussion).

(3) On November 30, 2021, the vehicle manager who had received an instruction from the safety supervisor conveyed the instruction to the field operations department.

(4) On November 30, 2021, the Operation Liaison Council explained the events to the field operations department.

		(5) On December 15, 2021, the Council of Railway Depot Directors instructed the workplace directors to thoroughly check the initial actions and ensure information transmission. (6) On February 5, 2022, regarding the "handling at the time of a door failure" in the vehicle failure procedure chart used by train dispatchers, the description was changed from "when the door is not closed, the door-closed light is off" to "when the door is not closed, the door-closed light is off and the door opens during running) with the aim to unify the criteria for handling and prevent handling omissions by adding the response ability of each train dispatcher. *1 "Magnetic particle testing" is the nondestructive test to detect flaws in the surface and in the neighborhood of surface by visualizing flaws by the leakage magnetic field. The proper test materials including magnetic powders are used. *2 The "finite element method" is the numerical analysis technique in which a structure is finely divided into elements with simple shapes, the equation of each element is defined and the strain and stress occurring in parts of the element are estimated.
	Report	https://www.mlit.go.jp/jtsb/eng-rail_report/English/RI2022-1-1e.pdf(Synopsis) https://www.mlit.go.jp/jtsb/railway/rep-inci/RI2022-1-1.pdf(Japanese) https://www.mlit.go.jp/jtsb/railway/p-pdf/RI2022-1-1-p.pdf (Explanatory material)

7 Provision of factual information in 2022 (railway accidents and serious incidents)

The information (on serious railway incidents) provided in 2022 was 1 case and the details thereof is as follows:

The information provided on the serious railway incident (dangerous trouble in vehicle) that occurred on Hohi Line of Kyushu Railway Company

(Information provided on November 4, 2022)

The Japan Transport Safety Board is currently conducting investigations and analyses on the serious railway incident (dangerous trouble in vehicle) occurred on Hohi Line of Kyushu Railway Company on October 17, 2020, and On November 4, 2022, information was provided to the Railway Bureau of the Ministry of Land, Infrastructure, Transport and Tourism on the factual information revealed in the investigation.

1. Summary of the serious railway incidents (dangerous trouble in vehicle)

Date and time of occurrence: Around 6:30 on Monday, October 17, 2022

Place of occurrence: Between the Bungo Ogi Station and Bungo Taketa Station, Taketa City, Oita Prefecture

Summary: When the train arrived at Bungo-Taketa Station, the driver of the local train 4427 leaving Bungo-Ogi Station for Bungo-Taketa Station received a report from a passenger that “one of the doors had been opening and closing while the train had been running”. When Kyushu Railway Company checked the train traveling data recorder, order to open the side sliding door on the right side of the train direction was recorded.

No passenger fell outside of the train through the open door.

2. Details of the information provided to the Railway Bureau

The details of the information provided are as attached.

The JTSB is currently investigating the relationship between this serious incident and the details of the information provided, and the JTSB plans to conduct a detailed investigation into the causes of this serious incident in the future.

*The details of the information provided, including the attachment, are available on the website of the JTSB.

https://www.mlit.go.jp/jtsb/iken-teikyo/JRkyuusyuu20221104.pdf

Column

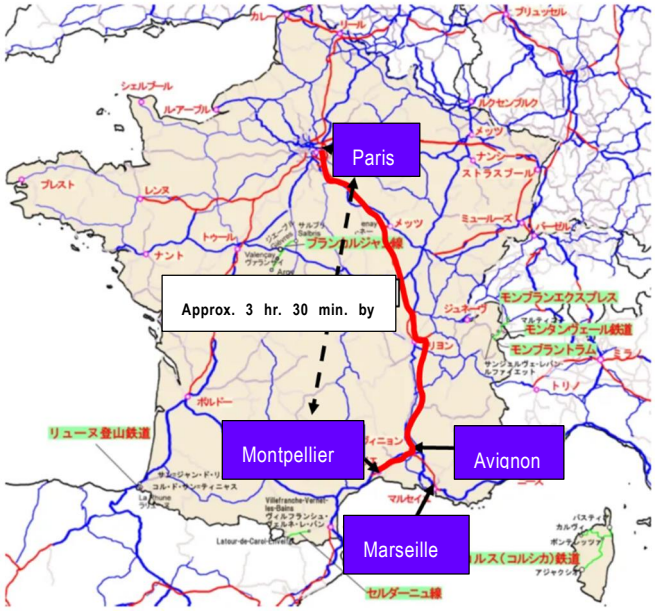
Participation in the Fifth International Conference on Railway Technology

Railway Accident Investigator

The International Conference on Railway Technology (Railways 2022: The Fifth International Conference on Railway Technology: Research, Development and Maintenance) is an international conference on railway technology held every two years. However, since the conference was postponed for two years due to the effect of COVID-19, this conference was held for the first time in four years from the previous conference. The Fifth International Conference was held in Montpellier, France, and we used the High-Speed Train TGV to travel between Paris and Montpellier. Montpellier facing the Mediterranean Sea has been an academic city since the Middle Ages. It has beautiful streets and an old city area leading to a triumphal arch, and many tourists both France and outside France were visiting the city. The city of Montpellier has a total of four lines of streetcars which are operated frequently and used as a means of transportation by common people.

A total of 489 people from 47 countries participated in the International Conference, where a total of 314 presentations were made. In addition to participants from Western Europe, China, and Japan, many people from Eastern Europe participated. Many presentations were made by university-related people, railway operators and manufacturers' engineers. Due to the effect of COVID-19, there were also a few online presentations. Railway accident investigators of the JTSB participated from the third conference, not only to endeavor to transmit information on Japanese knowhow on accident investigations and recurrence prevention measures, but also to collect the latest knowledge on railway safety and share information and exchange opinions with people concerned of each country.

Presentations were made on aerodynamic issues, noise and vibration, wheel-rail boundary issues, maintenance, accident analysis, state monitoring technologies, simulations and others in the main sessions of the conference. In particular, there was an active debate on various state monitoring technologies and data analysis technologies. In addition to new technologies, we were able to learn about overseas trends that are directly relevant to our accident investigations. We will endeavor to make use of the knowledge and information obtained through the conference to further improve our technologies for accident investigations in the future.



Traveling route from Paris to Montpellier

Streetcars in the city of Montpellier

Chapter 5 Marine accident and incident investigations

1 Marine accidents and incidents to be investigated

<Marine accidents to be investigated>

◎Article 2, paragraph (5), of the Act for Establishment of the Japan Transport Safety Board (Definition of marine accident)

The term "Marine Accident" as used in this Act shall mean as follows:

1. Damage to a ship or facilities other than a ship related to the operations of a ship.
2. Death or injury of the people concerned with the construction, equipment or operation of a ship.

<Marine incidents to be investigated>

◎Article 2, paragraph (6), item (ii) of the Act for Establishment of the Japan Transport Safety Board (Definition of marine incident)

A situation, prescribed by Ordinance of Ministry of Land, Infrastructure, Transport and Tourism, where deemed to bear a risk of Marine Accident occurring.

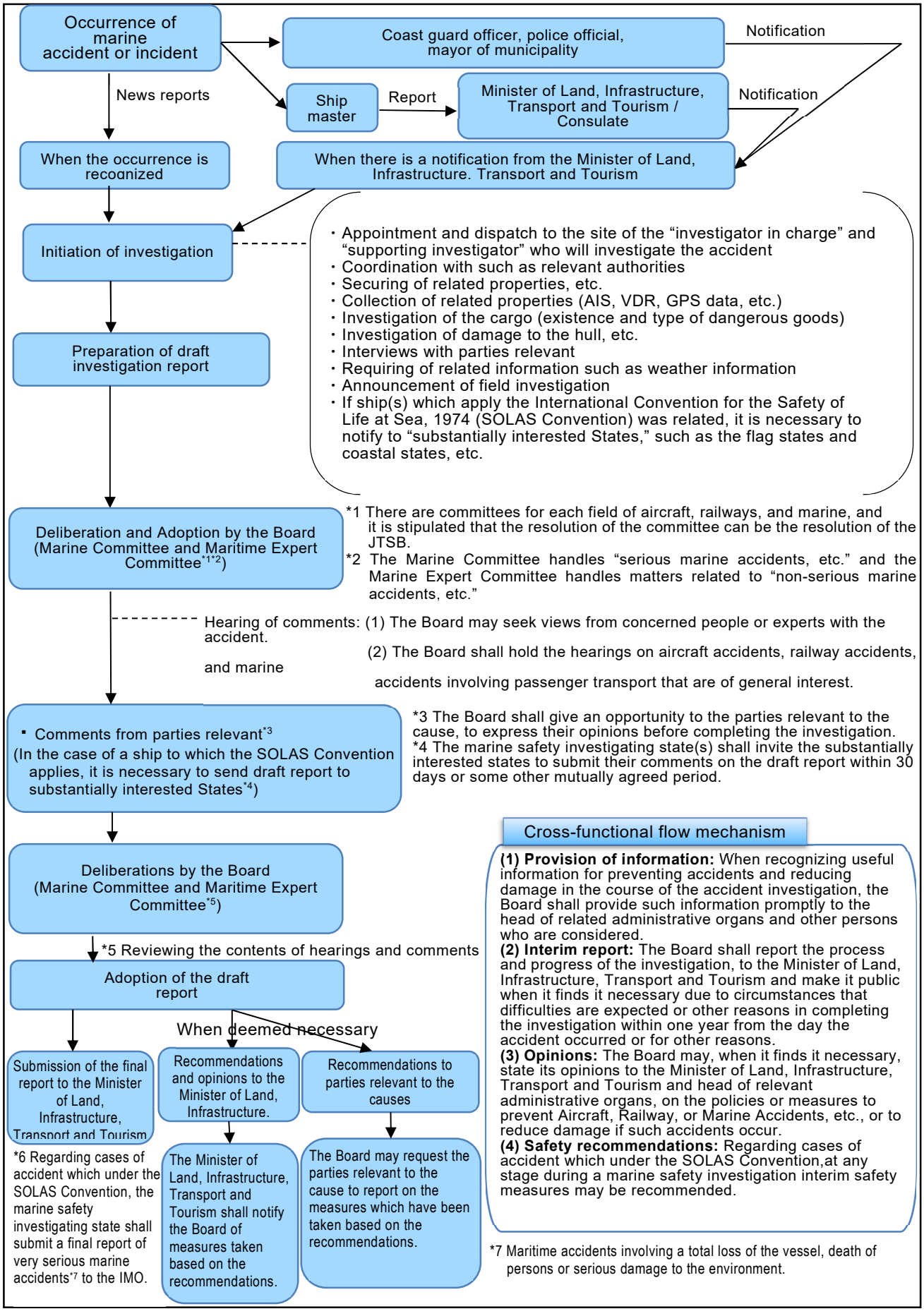
○Article 5 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

1. The situation wherein a ship became a loss of control due to any of the following reasons:
(a) navigational equipment failure;
(b) listing of a ship; or
(c) short of fuel or fresh water required for engine operation.
2. The situation where a ship grounded without any damage to the hull; and
3. In addition to what is provided for in the preceding two items, the situation where safety or navigation of a ship was obstructed.

Category of marine accident and incident

Marine accident and incident to be investigated		Type of marine accident and incident
Marine accident	Damage to ships or other facilities involved in ship operation	Collision, Grounding, Foundering, Flooding, Capsizing, Fire, Explosion, Missing, Damage to facilities
	Casualty related to ship structures, equipment or operations	Fatality, Fatality and injury, Missing person, Injury
Marine incident	Navigational equipment failure	Loss of control (engine failure, propeller failure, rudder failure)
	Listing of ship	Loss of control (extraordinary listing)
	Short of fuel or fresh water required for engine operation	Loss of control (fuel shortage, fresh water shortage)
	Grounding without hull damage	Stranded
	Obstruction of ship safety or navigation	Safety obstruction, Navigation obstruction

2 Procedure of marine accident/incident investigation



3 Organizations, Committees, etc., in charge of investigations by category of accidents and incidents

"Serious marine accidents and incidents" are investigated by marine accident investigators of the secretariat in Tokyo, and deliberations are conducted at the Marine Sub-Committee. Incidentally, "Particularly Serious Accident*1" and "Very Serious Accidents*2" are deliberated at the General Committee, etc.

"Marine accidents and incidents" are investigated by local accident investigators at local offices located in eight locations across Japan, and deliberations are conducted at the Maritime Expert Committee.

*1 The General Committee is responsible for matters related to the following particularly serious accidents (aircraft accidents, railway accidents, and marine accidents, excluding those deliberated by the Aircraft Committee, the Railway Committee, the Marine Committee, and the Maritime Expert Committee) and matters deemed necessary by the Board*2 (Paragraph 2, Article 1, of the Rules of Management of the Japan Transport Safety Board).

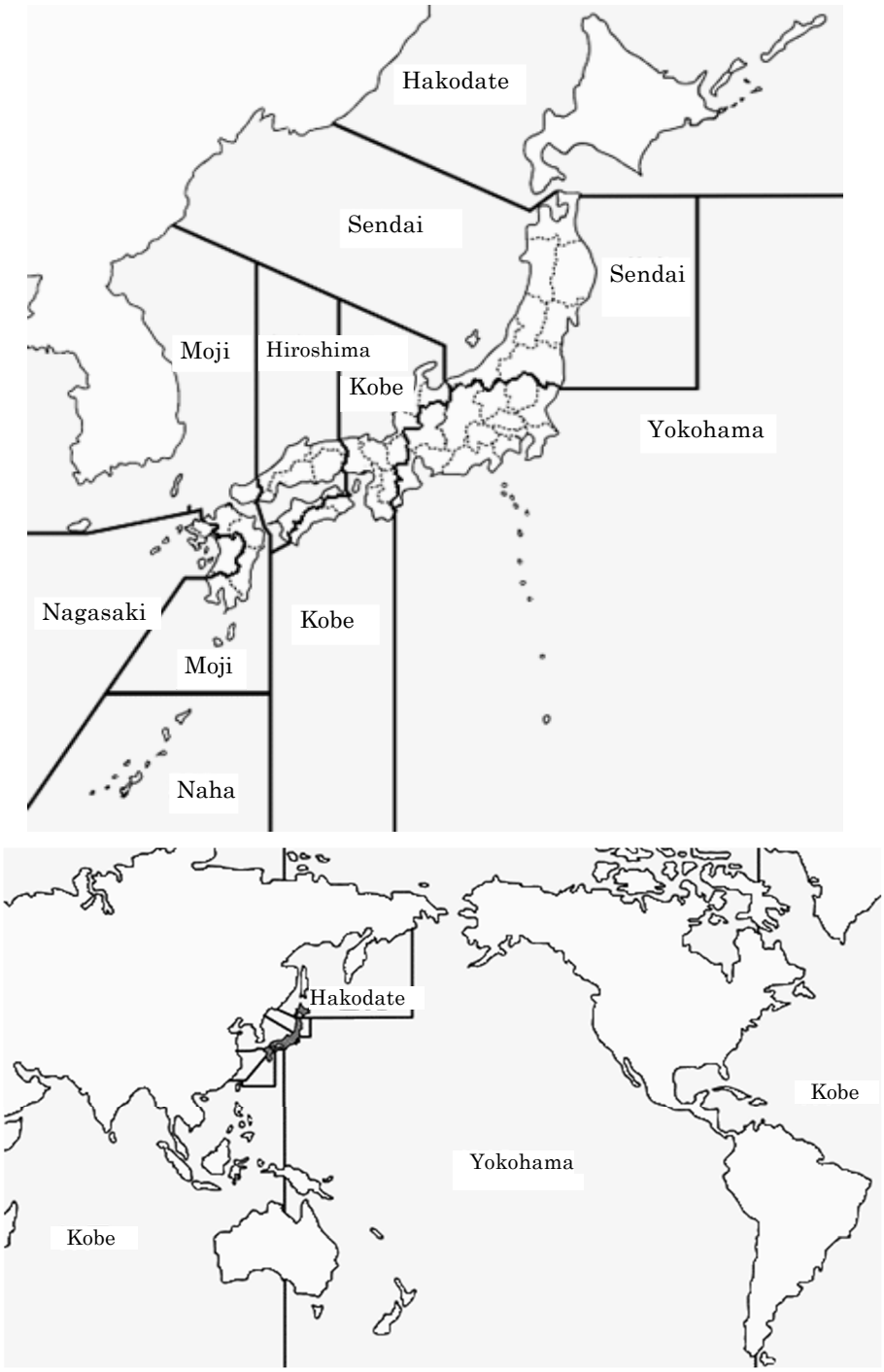
① Accident in which 10 or more people were killed or missing
(In the case of aviation accidents and marine accidents, only those involving aircraft or ships used for business that transports passengers. The same shall apply to (2).)
② Accident in which 20 or more people were killed, missing or seriously injured.

*2 The resolution on very serious accidents recognized by the Board and on matters deemed necessary by the Board shall be taken at the Board in consideration of the occurrence situation of damage, social influence and other circumstances (Paragraph 5, Article 2, of the Rules of Management of the Japan Transport Safety Board).

<table>
<tr><td>Serious marine accidents and incidents</td><td>Office in charge of investigation: Marine accident investigators in the Headquarters
Committee in charge of deliberation and adoption: Marine Committee</td></tr>
<tr><td colspan="2">Definition of "serious marine accidents and incidents" (Article 9, Ordinance on Organization of Secretariat of the Japan Transport Safety Board)
・an accident involving two or more passengers killed, missing or seriously injured
・an accident involving five or more persons killed or missing
・a marine accident of a ship*2 engaged in international voyage*1, in which caused total loss of the ship, or which resulted in the death or disappearance of any person.
*1 meaning voyage between a port of one state and a port of another state.
*2 excluding vessels used for the business of transportation of goods with a gross tonnage of less than 500 gross tonnage to be used to be used for shipping service of the goods, and also excluding all fishing vessels.
・an accident which caused a serious impact on environment by spilling of oil, etc.
・a marine accident, etc. or a marine accident as a result of which any unprecedented damage has arisen
・in addition to what is listed in the preceding items, the accident determined by the Board to fall under any the following items (a) to (c) inclusive
a) an accident which had particularly serious influence on the society
b) an accident the identification of the cause of which is extremely difficult; and
c) an accident which would teach an important lesson for prevention of marine accident, etc. and for alleviating damage in the cases where marine accident takes place.</td></tr>
<tr><td>Marine accidents and incidents</td><td>Office in charge of investigation: Regional investigators in the regional offices
Committee in charge of deliberation and adoption: Maritime Expert Committee</td></tr>
</table>

4 Jurisdiction of the Offices over Marine Accidents and Incidents

Our jurisdiction covers marine accidents and incidents in the water areas around the world, including rivers and lakes in Japan, and regional accident investigators placed in local offices (8) are in charge of marine accidents other than serious accidents. Marine accident investigators in the Tokyo Office (Headquarters) are in charge of marine serious accidents and incidents.



Local Office Jurisdiction Map

5 Statistics of investigations of marine accidents and incidents

(As of end of December 2022)

The JTSB carried out investigations of marine accidents and incidents in 2022 as follows:

In 2022, 669 accident investigations had been carried over from 2021, and 714 accident investigations were newly launched. Besides, 728 investigation reports were published in 2022, and thereby 638 accident investigations were carried over to 2023.

Moreover, 127 incident investigations were carried over from 2021, and 192 incident investigations were newly launched in 2022. Furthermore, 129 investigation reports were published in 2022 and thereby 179 incident investigations were carried over to 2023.

Among the 857 investigation reports published, one was issued with recommendations, and one was issued with opinions.

Investigations of marine accidents and incidents in 2022

(Cases)

Category	Carried over from 2021	Launched in 2022	Not applicable	Transferred to Tokyo Office	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2022	(Interim report)
Marine accident	669	714	−17	0	1,366	728	(1)	(0)	(1)	638	(9)
Tokyo Office (Serious cases)	21	3	0	1	25	7	(0)	(0)	(1)	18	(9)
Regional Offices (Non-serious cases)	648	711	−17	−1	1,341	721	(1)	(0)	(0)	620	(0)
Marine incident	127	192	−11	0	308	129	(0)	(0)	(0)	179	(0)
Tokyo Office (Serious cases)	0	0	0	0	0	0	(0)	(0)	(0)	0	(0)
Regional Offices (Non-serious cases)	127	192	−11	0	308	129	(0)	(0)	(0)	179	(0)
Total	796	906	−28	0	1,674	857	(1)	(0)	(1)	817	(9)

Note 1: The figures for “Launched in 2022” includes cases which occurred in 2021 or earlier, and which the JTSB was notified of in 2022 as subjects of investigation.

Note 2: The column “Not applicable” shows the number of cases which did not come under the category of accident or incident as defined in Article 2 of the Act for Establishment of the Japan Transport Safety Board.

Note 3: The column “Transferred to Tokyo Office” shows the number of cases where the investigation found out that it was serious and the jurisdiction was transferred from the regional office to the Tokyo Office.

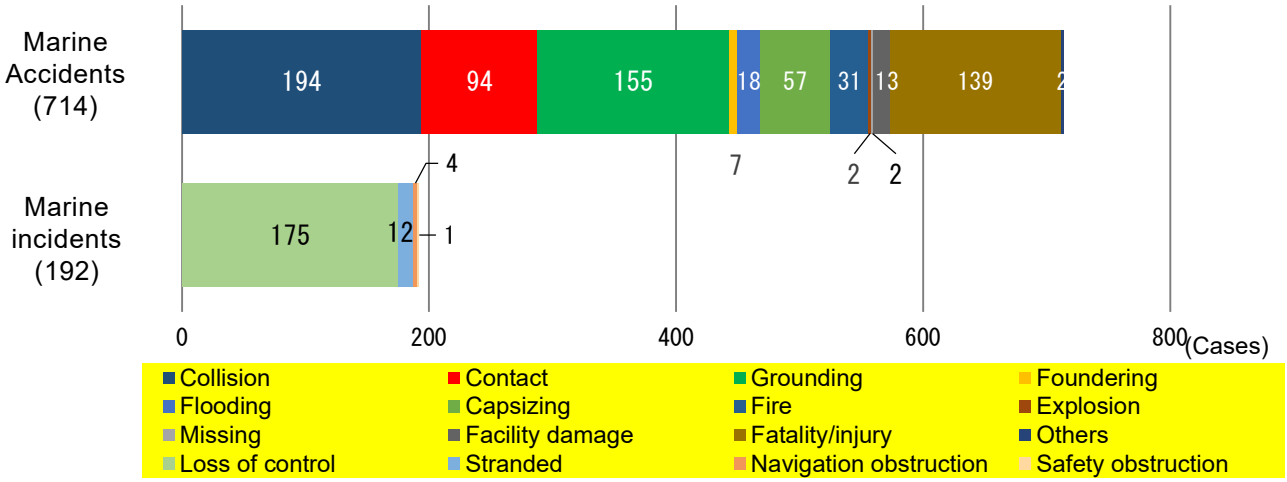
6 Statistics of investigated marine accidents and incidents

(As of end of December 2022)

(1) Types of accidents and incidents

The breakdown of the 906 investigations launched in 2022 by type of accidents and incidents is as follows: The marine accidents included 194 cases of collision, 155 cases of grounding, 139 cases of fatality/injury (not involved in other types of accidents), and 94 cases of contact. The marine incidents included 175 cases of loss of control, 12 cases of stranded, four cases of navigation obstructions, and one case of safety obstruction. Objects that contacted with ships included quays in 28 cases, breakwaters in 15 cases, and piers in 10 cases.

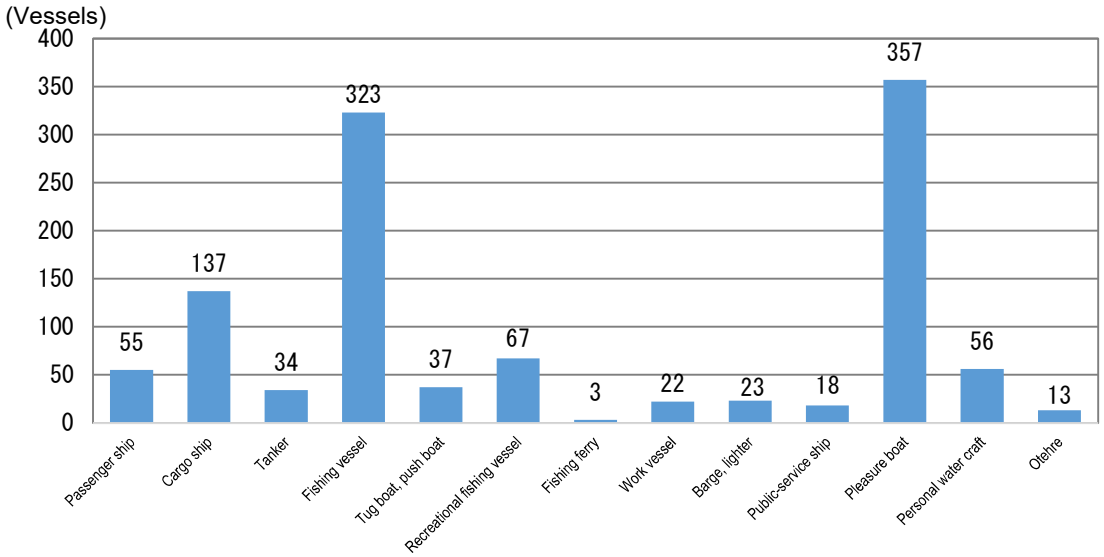
Number of investigated marine accidents and incidents by type in 2022



(2) Types of vessels

The number of vessels involved in marine accidents and incidents was 1,145. By type of vessel, they included 357 pleasure boats, 323 fishing vessels, 137 cargo ships, 67 recreational fishing vessels, and 56 personal water craft.

Number of vessels involved in marine accidents and incidents by type in 2022



The number of foreign-registered vessels involved in marine accidents and incidents was 32, and they

were classified by accident type as follows: 20 vessels in collision, five vessels in contact, and four vessels in grounding. As for the flag of vessels, 14 vessels were registered in Panama, seven vessels in Republic of Korea, three vessels in Belize.

Number of foreign-registered vessels by flag

(Vessels)

Panama	14	Republic of Korea	7	Belize	3
Hong Kong	3	Others	5		

(3) Number of casualties

The number of casualties was 351, consisting of 78 deaths, 15 missing persons, and 258 injured persons. By type of vessel, 114 persons in fishing vessels, 74 persons in pleasure boats, and 51 persons in passenger ships. By type of accident, 139 persons in fatality/injury, 85 persons in collision, 35 persons in contact, 29 persons in flooding, and 26 persons in capsizing.

With regard to the number of person's dead or missing, 40 persons were involved in fishing vessel accidents, 26 persons in passenger ship accidents 15 persons in pleasure boat accidents, indicating dead or missing cases occurred frequently in fishing vessels.

Number of casualties (marine accident)

(Persons)

2022										
Vessel type	Dead			Missing			Injured			Total
	Crew	Passengers	Others	Crew	Passengers	Others	Crew	Passengers	Others	
Passenger ship	2	18	0	0	6	0	5	19	1	51
Cargo ship	2	0	0	0	0	0	5	0	0	7
Tanker	1	0	0	0	0	0	0	0	0	1
Fishing vessel	33	0	1	6	0	0	73	0	1	114
Tug boat, push boat	1	0	0	0	0	0	2	0	0	3
Recreational fishing vessel	0	0	0	0	0	0	4	32	0	36
Fishing ferry	0	0	0	0	0	0	0	13	0	13
Work vessel	2	0	0	0	0	0	4	0	1	7
Barge, lighter	0	0	0	0	0	0	1	0	0	1
Public-service ship	1	0	0	0	0	0	2	0	0	3
Pleasure boat	10	0	2	2	0	1	27	0	32	74
Personal water craft	0	0	0	0	0	0	10	0	23	33
Others	2	0	3	0	0	0	1	0	2	8
Total	54	18	6	8	6	1	134	64	60	351
	78			15			258			

*The figures above include accidents under investigation and therefore are subject to change depending on the course of investigations and deliberations.

7 Summaries of serious marine accidents and incidents which occurred in 2022

The serious marine accidents which occurred in 2022 are summarized as follows. The summaries are based on information available at the start of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Marine accident)

1	Date and location	Vessel type and name, accident type
	March 21, 2022 Approximately 185 km southeast of Tanegashima Island, Kagoshima Prefecture	Fishing vessel No.51 YUJIN MARU Fire
	Summary	The fishing vessel caught fire on the sea approximately 185 km southeast of Tanegashima Island, Kagoshima Prefecture.
2	Date and location	Vessel type and name, accident type
	April 23, 2022 Off the coast of Kashuni Falls on the western side of Cape Shiretoko, Hokkaido Prefecture	Passenger ship KAZU I Flooding
	Summary	When Passenger ship KAZU I with the master and one deckhand carrying 24 passengers on board was sailing southwest off the coast of Kashuni Falls on the west side of the Shiretoko Peninsula, the ship was flooded and sank in a short time off the Falls. 18 passengers, the master and the ordinary seaman died and six passengers were missing. (As of the end of December 2022)
3	Date and location	Vessel type and name, accident type
	June 5, 2022 Near Jinoshima Island, Wakayama City, Wakayama Prefecture	Recreational fishing boat EBISU MARU No.2 Fatality
	Summary	While the ship was sailing, one angler went missing, and although he was found by another ship, he was confirmed dead at the hospital.

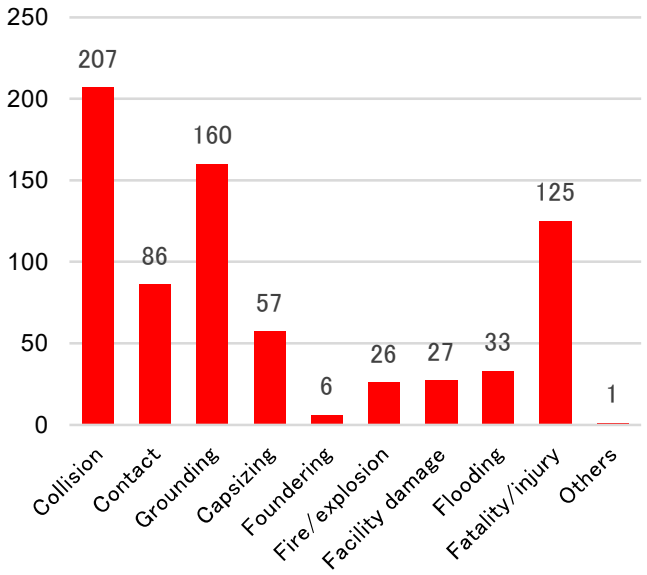
8 Publication of investigation reports

The number of investigation reports of marine accidents and incidents published in 2022 was 857, consisting of 728 marine accidents (among them, seven were serious) and 129 marine incidents.

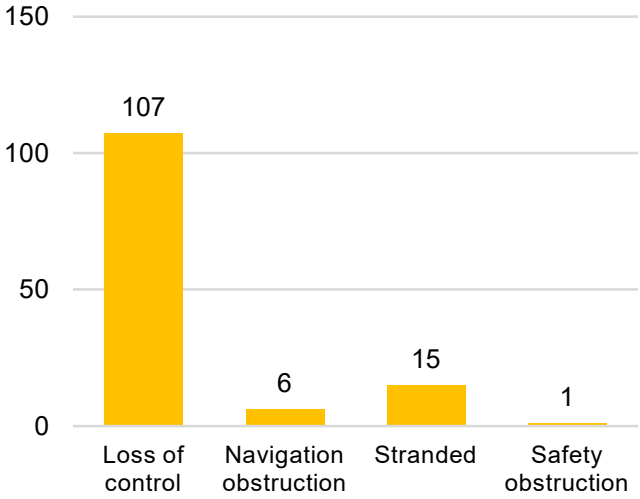
Breaking them down by type, the marine accidents included 207 cases of collision, 160 cases of grounding, 125 cases of fatality/injury, and 86 cases of contact. The marine incidents included 107 cases of losses of control, (98 cases of navigational equipment failure, nine cases of fuel shortages, etc.), 15 cases of stranded, six cases of navigation obstruction, and one case of safety obstruction.

As for the objects of contact, 26 were quays, eight were buoys, and eight were pier.

Marine accidents (728 cases): reports publicized in 2022



Marine incidents (129 cases): reports publicized in 2022



The number of vessels involved in marine accidents and incidents was 1,124. Breaking them down by type, the marine accidents involved 282 fishing vessels, 262 pleasure boats, 153 cargo ships, 48 recreational fishing vessels, and 47 personal water crafts. The marine incidents involved 79 pleasure boats, 22 fishing vessels, seven passenger ships, and six cargo ships.

Number of vessels by type involved in marine accidents and incidents for which reports were publicized in 2022

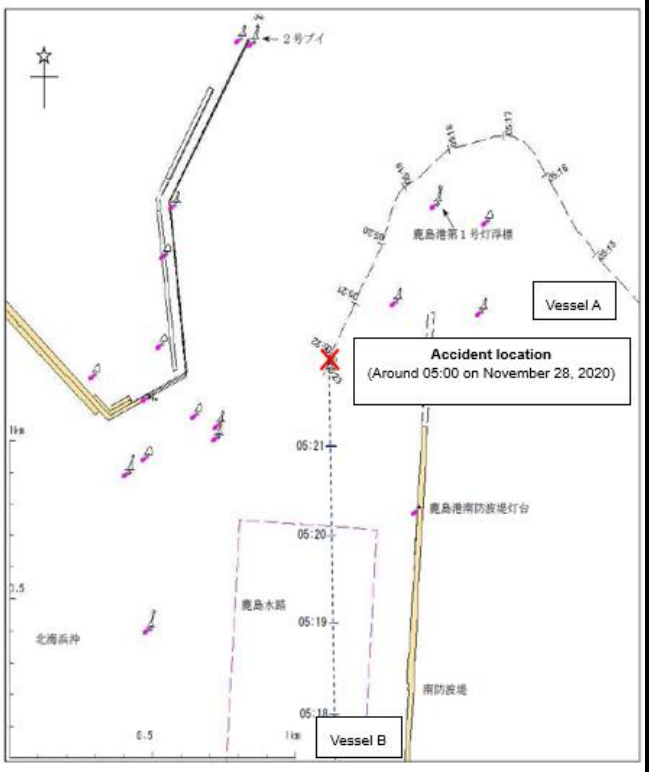
(Vessels)

Classification	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, Push boat	Recreational fishing vessel	Fishing ferry	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
Marine accident	37	153	41	282	45	48	3	25	27	17	262	47	7	994
Marine incident	7	6	5	22	1	5	1	2	0	0	79	1	1	130
Total	44	159	46	301	46	53	4	27	27	17	341	48	8	1,124
Composition ratio %	3.9	14.2	4.1	27.0	4.1	4.7	0.4	2.4	2.4	1.5	30.3	4.3	0.7	100.0

The marine accidents and serious incidents which occurred in 2022 are summarized as follows:

Marine serious accident reports published in 2022

1	Date of publication	Date and location	Vessel type and name, accident type
	February 17, 2022	November 28, 2022 Kashima Port, Ibaraki Prefecture	Cargo ship HAYATO (Vessel A) Recreational fishing vessel No. 5 FUDOMARU (Vessel B) Collision
	Summary	While Vessel A with the master and four crew members on board was sailing south-southwest and Vessel B with the master and one crew member carrying 10 visiting anglers on board was sailing north, they collided with each other at Kashima Port, Ibaraki Prefecture. Not only one angler died and the master and seven anglers were injured on board Vessel B, but also Vessel B sustained a crack in the center of her starboard side, while Vessel A suffered scratches at the end of the bulbous bow.	
	Probable causes	t is probable that the accident occurred because while Vessel A was proceeding south-southwest toward the anchorage in the waters in front of the North Seashore of Kashima Port and Vessel B was proceeding north toward a fishing spot off the coast of Oarai Town at night near the mouth of Kashima Port, the master of Vessel A continued to sail in the same course at the same speed believing that Vessel B would avoid her course, and the master of Vessel B continued to sail with the focus on the course toward the vicinity of the No. 2 Light Buoy of Kashima Port which served as the target course to the fishing spot by believing that Vessel A would sail south toward the Kashima Waterway and pass on the starboard side of Vessel B, resulting in the collision of both vessels. It is probable that the reason why the master of Vessel A continued to sail in the same course at the same speed believing that Vessel B would avoid her course was because he thought that an approaching small ship would avoid the course of own ship inside the port according to his past experience and conviction that small ships avoid the course of other ships at specified ports in accordance with the Port Regulations Act. It is probable that the reason why the master of Vessel B believed that Vessel A would sail south toward the Kashima Waterway and pass on the starboard side of Vessel B was due to the fact that he had seldom seen a cargo ship sailing toward the waters in front of the north seashore of Kashima Port and that he had believed that his own ship was on the left side (west side) of the Kashima Waterway. It is probable that the reason why the master of Vessel B had selected the course going toward the vicinity of No. 2 Light Buoy of Kashima Port was due to the fact that he had little experience as a master of a recreational fishing vessel and had little experience navigating at night, that the consort ship on which he had relied for navigation was out of the range of the radar and its image could not be confirmed, and that he had been told by the master of the consort ship during the ship maneuvering training that it was the target course when heading for the fishing spot off the coast of Oarai Town. It is likely that the reason why the master of Vessel B did not notice the situation where Vessel A was approaching and did not become aware of Vessel A until she was very close to his own ship was due to the fact that in addition to that he had little experience as a captain of a recreational fishing vessel and in navigation at night, he was not only used to the work before departure and had little time to spare for preparing the ship for recreational fishing, but also he was unable to check the movements of other ships through AIS information, and he felt uneasy and upset for operating Vessel B to which he was not used in terms of her maneuvering and operation of equipment, which caused him to operate the ship not in the right frame of mind.	

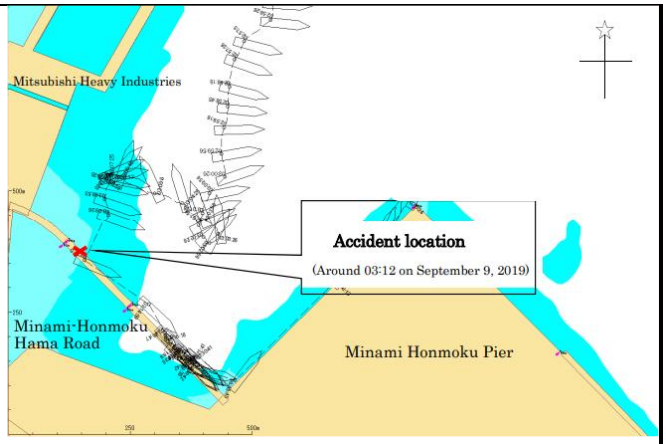


	Safety Actions	**Measures taken by the owner of Vessel A** After the accident, the owner of Vessel A held a safety meeting with her crew members and disseminated information on the accident to his owned ships. **Measures taken by the operator of Vessel A** After the accident, the operating company of Vessel A did not only distribute a document to draw attention to the prevention of collision with small ships to the masters of operating ships and ship owners, but also provided guidance on safety to the master and four crew members of Vessel A by holding a safety meeting to look back on the accident and explain accident cases. **Measures taken by the operator of Vessel B** The operator of Vessel B compiled safety measures and decided to provide periodic guidance to crew members, not only on the compliance with the matters (1) to (3), safety verification in accordance with the check list (inspection of the recreational fishing vessel at the time of leaving the port), prevention of injuries or accidents due to falls or falling overboard, handling of a marine accident and the selection of a fishing spot or the restriction of fishing to oblige them to acquire knowledge of safety response during angling and enhance their awareness, but also on conducting 5 activities consisting of tidying up, ordering, cleaning, grooming and discipline). (1) Keeping a proper lookout at all times while sailing to and from the fishing points and moving between them. (2) Keeping a lookout even while drifting or anchoring, and performing give-way if necessary. (3) Endeavoring to ensure the safety of users by abiding by the contents of the business rules based on the understanding of the characteristics of collision accidents, in addition to (1) and (2). **Measures taken by the Fisheries Policy Division, Agriculture, Forestry and Fisheries Department, Ibaraki Prefecture** In the wake of this accident, the Fisheries Policy Division, Agriculture, Forestry and Fisheries Department, Ibaraki Prefecture, issued a document entitled “Regarding the enlightenment of safety related to the prevention of accidents of recreational fishing vessels (Notice)” to the presidents of fisheries cooperatives under its jurisdiction and a document entitled “Ensuring the safety of recreational fishing ships (Notice)” to the president of the Recreational Fishing Ship Council on December 12, 2020, respectively, to enlighten safety for accident prevention and ensure the safety of the uses of recreational fishing vessels.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-2-1_2020tk0013.pdf https://www.mlit.go.jp/jtsb/ship/p-pdf/MA2022-2-1-p.pdf (Explanatory material, in Japanese only)

2	Date of publication	Date and location	Vessel type and name, accident type
	April 28, 2022	September 9, 2019 Minami-Honmoku Hama Road at the Keihin Port	Cargo ship BUNGO PRINCESS (Panama) Contact (with a bridge)
	Summary	The vessel, with a master and 16 other crew members aboard, was at anchor off of Honmoku Pier in the Yokohama district of Keihin Port under conditions in which Typhoon No.15 of 2019 (Faxai) was approaching and a typhoon warining had been issued for the Northern Sea off Kanto, including Tokyo Bay, whe she dragged anchor under intensifying wind and waves from the approaching typhoon, was pushed to the south, and collided with the Minami-Honmoku Hama Road (bridge). The vessel sustained crushing damage and other damage to her hull’s starboard side plating and shell and bulbous bow, and the Minami Honmoku Hama Road Bridge sustained crushing, cracking and other damage. There were no fatalies or injuries among the crew members.	

Probable causes

It is probable that this accident occurred when, as the vessel was anchored in nearly ballast condition at night in the Anchorage to take sheklter under conditions in which Typhoon No.15 was approaching and a typhoon warning had been issued for the Northern Sea off Kanto, including Tokyo Bay, she dragged anchor and, despite setting her main engine to full ahead, she was pushed without being able to control her hull's atitude and collided with the Bridge because she continued riding at single anchor when the wind and waves intesified due to the typhoon.



It is probable that the vessel continued to riding at single anchor because the master had no personal experience using a multiple anchors at the same time during anchoring, and was aware that problems could occur when using multiple anchors, such as the possibility of tangled anchors and reduce freedom of maneuvering, and, additionally, because the master assumed that the effects of the typhoon would not exceed his previous experience and thought that the vessel would be able to withstand the wind and waves by letting out eight shackles of anchor chain for storm anchoring in preparation for the typhoon.

It is probable that the hull's attitude could not be controlled despite main engine's being set to full ahead because sufficient forward propulsion could not be obtained, as propulsive power was lost when the hull moved backward under the effects of the wind and waves and the propeller blades lost thrust .

Safety Actions

Measures taken by the Japan Coast Guard, etc.

(1) Following anchor dragging accident caused by the effect of Typhoon No. 15, and with Typhoon No.19 approaching, the Japan Coast Guard recognized the need to implement additional, readily practical measures to prevent anchoring accidents and therefore provided strong guidance to maritime offices to, among other actions, issue a public awareness statement recommending moving outside of Tokyo Bay and sheltering outside of the bay. Additionally, harbor masters and the Tokyo Wan Vessel Traffic Service Center joined to take measures that included making prior fonfirmations of anchoring methods for vessels prone to anchor dragging accidents, providing guidance concerning self-restraint in anchoring, and issuing incremental and multiple recommendations on shifting anchorage and heaving to*1 in the early stages of anchoring. The additional measures to prevent anchor dragging accidents functioned effectively and no collisions of vessels dragging anchor occurred as a result.

(2) In response to the collision of oil tanker with the Kansai International Airport's access bridge causeed by Typhoon No. 21 in September 2018, and from the standpoint of ensuring the sefety of marine traffic, the Japan Coast Guard began applying new regulations based on the Maritime Traffic Safety Act in the sea areas around the airport as from January 31, 2019. Moreover in addition to the sea area around the that airport, JCG but also selected 40 locations as important facilities (i.e., facilities such as transport facilities and essential utilities that would bring detrimental if interrupted or for which alternative means are nonexistence) in the sea areas of Japan in April 2019 and implementing stormy weather anchoring restrictions in those sea areas.. In response to the accident, JCG decided to newly designata the Minami-Honmoku Hama Road as an important facility and to manage an area with a 2-M radius (excluding some sea areas) centered on the over-sea bridge section of said road in an integral manner with the existing Reinforced Dragging Anchor Prevention Area.

(3) In June 2020, the Study Committee prepared a report (Regarding countermeasures against accidents caused by anchor dragging during stormy weather in Tokyo Bay) that included the basic items of measures to prevent anchor dragging accidents, measures to prevent anchor dragging accidents for facilities and sea areas trageted for priority study, and verfication of meansures to prevent anchor dragging accidents during the typhoon season in 2019. The Study Committee also made recommendations for promoting sheltering outside of Tokyo Bay, measures concerning shipboard responses, and measures concerning operational management and measures by facility managers.

In particular, recognized the necessity of providing ship operators (including masters) with a board range of knowledge and skills concerning measures to prevent anchor dragging accidents, the Study Committee is working with the public and private sectors to raise awareness so that such knowledge and skills will be consistently conveyed to ship operators by sending out guidelines ("Guidelines for Preventing Anchor Dragging Accidents") and leaflets ("Guide to Harborage in Tokyo Bay During Stormy Weather." etc.) and organizing training courses as measures relating to shipboard response.

(4) Taking into account the aforementioned recommendations of the Study Committee concerning current systems and measures to be taken, the Council of Transport Policy began a study in July 2020 on the expansion and reinforcement of new maritime traffic safety infrastructure to appropriately respond to accidents caused by anchor dragging and other phenomena due to the increasingly frequent and severe occurrence of abnormal weather of recent years. On January 28, 2021, the Council submitted a report titled "Regarding the expansion and reinforcement of maritime traffic safety infrastructure to respond to increasingly frequent and severe natural disasters and other new traffic environments" to the Minister of Land, Infrastructure, Transport and Tourism.

(5) In response to the developments described in (4) above, the Japan Coast Guard submitted a "Bill for partial amendment of the Maritime Traffic Safety Act" (creation of a system for issuing recommendations and orders to shelter outside of Japan's three major bays (Tokyo Bay, Ise Bay, and Osaka Bay, etc.), to better ensure the safety of navigation by preventing hazards to maritime traffic caused by abnormal weather, etc., and ensuring the prompt restoration of and other navigation aids managed by JCG. The amendment was approved by the Cabinet on March 2, 2021, enacted on May 25, and entered into force on July 1.

This amendment makes it possible to recommend to large high freeboard vessels, vessels carrying hazardous cargoes, and other vessels that they leave Tokyo Bay when a typhoon is approaching, thereby relieving congestion in the bay.

It is therefore anticipated that recommendations to shelter outside a port or Tokyo Bay and other advisories will be issued according to the anchor dragging risk and seaworthiness of each vessel, and that this will reduce congestion throughout the bay, including its ports, and help prevent anchor dragging accidents.

(6) In light of the oil tanker collision with the Kansai International Airport's access bridge that was caused by Typhoon No. 21 in September 2018, and other incidents, the Ministry of Land, Infrastructure, Transport and Tourism has been implementing comprehensive measures to prevent recurrence of accidents in which vessels are pushed by strong wind during typhoons and other stormy weather, and collide with other vessels or shore facilities (I,e., anchor dragging accidents). As one of such measures, the Maritime Bureau developed a "Risk Assessment Application for Dragging Anchor System" (nicknamed "IKARI-ing") that helps mariners determine the anchor dragging risk of their vessel's dragging and then take measures to prevent an anchor dragging accident according to that risk (for example, by changing the anchorage or anchoring method). The system was made available to the public on July 1, 2021 (the English version was released on August 6).

Measures taken by the ship management company of the Vessel

(1) Drew attention to the accident by providing information on the accident to all masters of the vessels it manages and distributing a summary of the events of the accident with comments (including cautionaty points and lessons learned) by email.

(2) Issued General Instructions to the vessels it manages titled "Anchoring when approaching Typhoon or Rough weather is expected," and issued instructions on conuntermeasures for preventing similar anchor dragging accidents and a summary of the accident.

(3) Revised and made additons to the section on "Procedures for Anchoring" in the SMS Manual. The following points were added.

1)Endeavor to detect anchor drag quickly by conducting anchor drag detection work at least once an hour.

2)Maintain a safe distance from onshore facilities and structures in the procedure for anchor watch during stormy weather.

3) Take into account the time required to weigh anchor in the procedure for anchor watch during stormy weather.

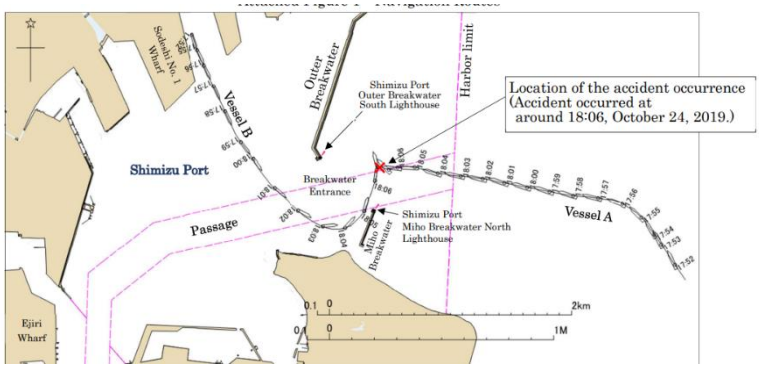
(4) Changed its anchor watch checklist.

(5) Alerted the vessels it manages of the possibility of anchor dragging accidents when stormy weather is anticipated

*1 "Heaving to" is a method of ship maneuvering for keeping a vessel in place by using enough forward propulsion from the engine to maintain the rudder's effectiveness during stormy weather and catching the wind and waves at slight angle to the bow.

Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-4-1_2019tk0020.pdf https://www.mlit.go.jp/jtsb/eng-mar_report/2022/2019tk0020e.pdf

3	Date of publication	Date and location	Vessel type and name, accident type
	June 30, 2022	October 24, 2019 Shimizu Port, Shizuoka City, Shizuoka Prefecture	Container ship SITC BANGKOK (Vessel A, Hong Kong) Container ship RESURGENCE (Vessel B, Bahamas) Collision

Summary	Vessel A, with her master and 18 crew members aboard, was entering the Shimizu Port, Shizuoka City, Shizuoka Prefecture, navigating the passage of the port toward the Shimizu Port Sodeshi No.1 Wharf under the pilotage of a pilot, while Vessel B, with her master and 16 crew members aboard, left that wharf and was departing the port toward the Busan port, the Republic of Korea. Both vessels collided near the breakwater entrance between the Outer Breakwater and the Miho Breakwater. Vessel A sustained a hole in her bow plating, while Ship B suffered dents on the plating of her starboard bow. There were no casualties on either ship.
Probable causes	It is probable that during the nighttime in the Shimizu Port while Vessel A was entering the port toward the Sodeshi No. 1 Wharf and Vessel B left the wharf and was departing toward outside of the port, the master and the pilot of Vessel A continued to enter the port, believing that Vessel A would be able to pass Vessel B port-side to port-side within the passage of the Shimizu Port, whereas the master of Vessel B made Vessel B turn to port toward the Breakwater Entrance at a delaying timing, causing Vessel B to deviate from the passage to the south and approach the Miho breakwater, and then master of Vessel B put the helm hard to port in order to avoid collision with the breakwater, taking a sharp turn toward the north, after which Vessel B sailed out of the port by crossing the passage to the north-northeast, and consequently Vessel A and Vessel B collided with each other. It is probable that the master and the pilot of Vessel A continued to enter the port, believing that Vessel A would be able to pass Vessel B port-side to port-side within the passage, because they believed that Vessel B would sail out by using the passage, and would not sail out by crossing the passage to the north-northeast. It is probable that the master of Vessel B made Vessel B turn to port toward the Breakwater Entrance at a delayed timing, due to believing thati if Vessel B turned to port toward the Breakwater Entrance, Vessel B would approach the tugboat sailing on the bow of the Vessel A in a manner that her starboard stern would collide with the tugboat, and the master continued to con the vessel while focusing attention on the tugboat's movements.  The fact that reconfirmation of the order of entry and departure was not made when Vessel A started to enter the port by using the passage ware likely involved in the occurrence of the accident.
Safety Actions	**Actions taken by the Shimizu Pilot District Pilot's Association** After the accident, the Shimizu Pilot District Pilot's Association to which the pilot of Vessel A is a member informed all members of the following safety actions and ensured thorough implementation of those actions. (1) If risky meeting is expected to occur between entering and departing vessels, etc., advance confirmation on the intention of the other vessel and the expected passing time, etc. is to be made between those vessels or through the Shimizu Shipping Information Center, by using VHF communication. (2) If a vessel has a risk of meeting another vessel, particularly one without a pilot aboard, in the vicinity of the port entrance, the vessel is to adjust her course and speed so as to be able to pass the other vessel port-side to port-side while keeping a safe distance outside the port, and enter the port after confirming that the other vessel has passed the breakwater entrance. (3) The Shimizu Shipping Information Center is to ensure navigation time adjustment that allows for sufficient time, based on the Guidelines for Traffic Organization of Shimizu Port, and to reinforce its framework for communicating and sharing that information. In addition, the Shimizu Pilot District Pilot's Association took the following actions against the pilot of Vessel A. (1) After the day following the occurrence of the accident, all pilotage operations were suspended for 10 days for the purpose of dealing with the accident. (2) It was decided that a safety training program sponsored by the Japan Federation of Pilot's Association was to be held at their own expense in order to rebuild their awareness of safe operation.

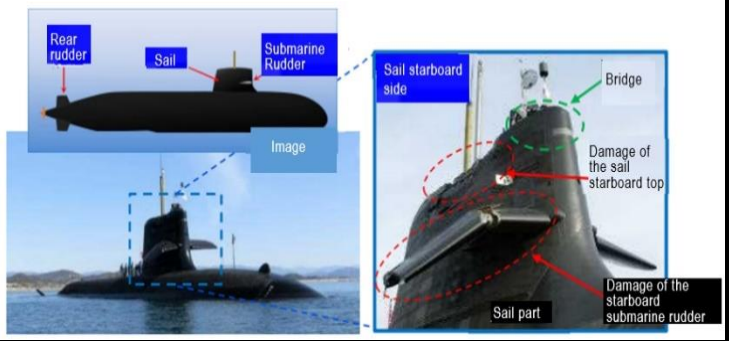
		Measures taken by Shimizu Shipping Information Center In response to this accident, the Shimizu Shipping Information Center decided to contact the pilot in the control of vessel directly in case of emergency.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-6-1_2019tk0024.pdf https://www.mlit.go.jp/jtsb/eng-mar_report/2022/2019tk0024e.pdf

4	Date of publication	Date and location	Vessel type and name, accident type
	July 28, 2022	August 7, 2020 East Berth, Keiyo Sea Berth, Chiba Port, Chiba Prefecture	Tanker KAIMON MARU Contact (with a pier)
	Summary	A vessel, with the master and 21 crew members, a pilot and a berth master*1aboard, was pushed to the northwest to contact with the pier, while working to dock the vessel at the berth for unloading. The vessel sustained a dent with a crack on the port bow, while the pier was partially damaged. *1 The "berth master," as a person responsible for the berthing, supervises the acceptance and cargo handling of tankers entering the berth, and although he is not directly involved in ship operation, he does not only give pilots and masters information on berthing and unberthing operations, but also declares their suspension when it is judged that the weather conditions such as strong winds do not allow a safe operation.	
	Probable causes	It is probable that this accident occurred because when, in the situation in which the current speed of the tidal current heading for the pier was about 30 to 52 cm/s, the pilot who had expected that the actual current speed would drop below 30cm/s which was his rough indication to stop the docking operation by ignoring the measured value of the fixed tidal current meter started to maneuver the vessel in Chiba Port allowing her to be pushed towards the pier from the planned stopping position and collided with the pier. It is probable that since the pilot was distrustful of the current speed of the fixed tidal current meter because its second current speed value had decreased and the current speed value measured by the patrol boat was less than 20cm/s, he who had expected that the actual current speed would drop below 30cm/s which was his rough indication to stop the docking operation started to maneuver the vessel to dock to the pier. It is probable that since the pilot was veteran, the master and the berth master who had entrusted him with the ship maneuvering and had not obtained the tidal current information sequentially were late in canceling or declaring to cancel the docking operation.	
	Safety Actions	**Actions taken by the Tokyo Bay Licensed Pilot Association** After the accident, the Tokyo Bay Licensed Pilots Association did not only make known an outline of the accident to its members, but also disseminated the following as the recurrence prevention measures. ・In Tokyo Bay, abnormal tidal currents are sometimes observed in the spring tide period in summer. Therefore, when abnormal tidal currents are observed, it shall be determined early to cancel the docking operation in consultation with parties concerned. ・When the draft is shallow and there is a sufficient sea area in front of the berth as in this case at the time when there is a strong tidal current, the appropriateness of the docking operation shall be determined by temporarily stopping the ship with a sufficient distance from the pier and checking the effect of the tug towing. ・Although it depends on the situation when it was determined to cancel the docking operation, since it reduces the force of the tug to move forward at low speed to pass the pier while receiving pressurized flow due to strong tidal currents, it would have been an appropriate decision to turn back by going astern after reducing the speed to zero and securing a sufficient distance from the berth. **Measures taken by the ship owner** After the accident, the ship owner did not only make known an outline of the accident to the masters of the ships under its management, but also took the following improvement measures as the measures to prevent recurrence. ・Clearly state "the compliance with the terminal standards" in the in-house standards.	

		・Clearly state “that when there is a doubt about the application of the terminal standards, stricter standards shall be adopted” in the in-house standards. ・The past accident cases shall be documented in the system, including horizontal deployment of this incident to all ships under its management and presentation thereof at the training sessions for the masters. **Actions taken by the berth management company** After the accident, the management company of the berth did not only notify all shipping companies that use the berth through agents to provide guidance to the masters entering the port to maneuver the ship by monitoring the effect of the external force during the ship at all times, but also took the following improvement measures as the recurrence prevention measures. ・Thorough observance of the ”compliance with the ship berth maneuvering chart” ・Clarification of the standard flow velocity value for 120,000 DWT (dead weight tonnage) ship class in the berthing and unberthing operation standards described in the “Request for Approved Wharf Designated for Loading or Discharging Dangerous Goods*2.” *2 “Request for Approved Wharf Designated for Loading or Discharging Dangerous Goods” is defined as a “a wharf designated for handling dangerous goods” called “D Wharf” designed for loading or discharging a large quantity of specific dangerous goods, which is distinguished from wharfs and piers to handle general cargo and the cargo handling can be started only with the approval of the port master, where it is necessary not only to provide facilities such as a wharf and a pier in line with the cargo ship, but also establish a cargo handling safety management system that assigns people with knowledge and experience, arrange disaster prevention materials and equipment according to the dangerous goods to be handled in order to ensure the safety of ships navigating the port and local residents.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-7-2_2020tk0007.pdf (Japanese only)
5	Date of publication	Date and location / Vessel type and name, accident type
	July 28, 2022	September 23, 2020 Mitsushima, Tsushima City, Nagasaki Prefecture / The cargo vessel CHANG SHUN I Grounding
	Summary	The vessel adrift in the west channel of the Tsushima Strait with the main engine stopped. Since the main engine failed to start, the vessel was pushed by wind and waves and grounded on shallows on the north side of Mitsushima. The master of Vessel was injured and the vessel sank after the hull was split into several blocks.
	Probable causes	The cause of this accident is probable the vessel with both anchors disabled, having left port at night for the purpose of avoiding the typhoons, was unable to start the main engine while drifting in the west channel of the Tsushima Strait for the purpose of waiting to enter the Busan port, and was pushed southward by wind and waves, and then grounded on shallows on north side of Mitsushima. It is probable that the vessel left port with both anchors out of service because the vessel was unable to complete repairs to the starboard anchor chain and the port anchor brake due to the typhoon approaching while having been moored at the Busan port. It is probable that the vessel’s main engine did not start because the internal mechanism did not work according to the fuel supply volume setting scale of the governor.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-7-1_2020tk0009.pdf https://www.mlit.go.jp/jtsb/eng-mar_report/2022/2020tk0009e.pdf

6	Date of publication	Date and location	Vessel type and name, accident type
	August 25, 2022	September 6, 2020 Off the coast of the Nakatahama (Lake Inawashiro), Aizuwakamatsu City, Fukushima Prefecture	Pleasure boat GOKEN III Fatalies and injuries waiting for their turn to board the floating body to be towed
	Summary	 When the Vessel with the master and nine other passengers including his/her friends on board was heading north east near the training buoy for small boats laid off the west coast of Nakatahama at Lake Inawashiro, Aizuwakamatsu City, Fukushima Prefecture, and the four people who were waiting for their turn to board the floating body to be towed by the personal watercraft (hereinafter referred to as "Vessel D") were floating near the training buoy for small boats, the Vessel collided with the waiting floating people and the propulsion equipment, etc., came into contact with them. One of the four waiting floating people was died and two were injured.	
	Probable causes	It is probable that the accident occurred in the situation in which Nakatahama was very congested with pleasure boats, which sailed at various speeds, when the Vessel A headed north east and came close to the waiting people near the pale red-colored buoy (hereinafter referred to "the Buoy") located at the south end of the east-side row of the two rows of training buoy for small boats (hereinafter referred to as "the Rows of Buoys"), and the four people were in a floating state waiting for their turn to board the floating body to be towed by Vessel D near the buoy, the master of the vessel did not notice the presence of the waiting people near the buoy and caused the Vessel to collide with them and the propulsion equipment, etc., also came into contact with them. It is probable that the reason why the Vessel approached toward the waiting people near the Buoy by proceeding northeast was due to the fact that when the Vessel proceeded east-northeast from her drifting state, the pleasure boat (hereinafter referred to as "Vessel B") of a friend of the master of the Vessel which was located near the starboard bow turned to the left to head for the left end of the Zaimoku Yama toward the center of the lake to come toward the front of the bow of the Vessel, and with this in sight, the master of the Vessel increased the speed and took the course more on the west side than Vessel B by turning left with the Zaimoku Yama in sight in order to avoid Vessel B and overtake her on the port side. It is probable that the reason why the master of the Vessel did not notice the people waiting to board near the Buoy was due to the fact that since he did not expect that people would be floating near the Rows of buoys off the west coast of Nakatahama from the his past experience, he did not check visually the direction of the Buoy, that he was paying attention to the situation where a plurality of watercraft was speeding off the west coast of the place generating sailing waves and Vessel B was turning to the left, and that when he increased the speed of the Vessel to overtake Vessel B, the visibility to the bow deteriorated and the blind spot was widened. It is probable that the reason why the four people waiting to board were floating near the buoy because the master of Vessel D and his friend, the master of the personal watercraft, were off the east coast of Nakatahama and in the ship navigation area, which was crowded with pleasure boats, etc. The master of the personal water craft moved off the west coast of the beach thinking that it would be possible to operate a personal watercraft on the Lake Inawashiro usage Category Map. At the west coast, he thought that he can immediately detect the status of preparing departure and movements of pleasure boats moored the pier, and only personal water craft groups sail at safety speed or drift around there, so if the pleasure boats came closely, he believed masters of pleasure boats found people. Based on what he thought, it is probable that he intended to tow the towed floating body by personal water craft near the Rows of Buoys. It is probable that the reason why the ship, Vessel D and the people waiting to board were engaged in water sports activities in the preservation-focused zone set off the west coast of Nakadahama was due to the fact that since the zoning of Nakadahama and the usage rules thereof, etc., in the Aizuwakamatsu Zoning Plan were not sufficiently made known to water surface users and business operators using the water surface, there was a situation where water surface users were not well cognizant of the zoning and the usage rules thereof, pleasure boats, personal watercraft, towing of floating bodies to be towed were	

		all mixed up, and they sailed and drove the water areas within 150 m from the shore of the lake at their respective speed regardless of the zoning, etc.
	Safety Actions	**Measures taken by the Council to Promote the Basic Plan for the Use of Lake Inawashiro's Water Surface and relevant parties including its members** (1) Holding of the Aizuwakamatsu Regional Subcommittee After the accident, on September 15, 2020, the Aizuwakamatsu Regional Subcommittee was held to share information on and discuss the following matters. 1) Water accident at Nakadahama 2) Measures for safe usage and utilization Mainly the zoning at Nakadahama was discussed. (2) Installation of bulletin boards for the usage rules of Nakadahama After the accident, the Aizuwakamatsu Regional Subcommittee installed two A2 size bulletin boards regarding the "Rules for Using Nakadahama" (hereinafter referred to as the "Bulletin board regarding the rules for using Nakadahama"), in which the areas prohibited to be used and the matters that require attention are stated. 1) Windsurfers, canoes, personal watercraft, paddle boats, and motorboats are not permitted to enter the prohibited areas. 2) As a general rule, all vessels are obliged to be driven slowly before entering the navigation area. 3) When using a wakeboard, etc., within the navigation area, users shall pay due attention to the safety of the surroundings by keeping a look-out person, etc. 4) When navigating a ship in the bay, users shall pay due attention to the safety of the surroundings (3) Installation of guide buoys in the ship navigation area After the accident, the Nakadahama Ship Safety Association and the Minatomachi Tourism Association installed guide buoys in series in the ship navigation area, thereby all ships are obliged to navigate slowly in the ship guiding area and navigate along the guide buoys in the ship navigation area. (4) Updating and publication of the information on the rules for the use of each beach on Lake Inawashiro. The Secretariat of the Council to Promote the Basic Plan for the Use of Lake Inawashiro's Water Surface wrapped up the zoning, the use category and others of each beach of Lake Inawashiro, including Nakadahama defined by each regional subcommittee and reported the information to the Advisory Council formed by relevant organizations within the Inawashiro Town, and the Council updated and published the latest version of the Lake Inawashiro's Category Map on July 1, 2021, by reflecting the information therein. "Lake Inawashiro's Category Map" https://www.town.inawashiro.fukushima.jp/cb/hpc/Article-25-5351.html
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-8-2_2020tk0008.pdf https://www.mlit.go.jp/jtsb/ship/p-pdf/MA2022-8-2-p.pdf (Explanatory material)
	Reference	Major activities in the past year (page 10)

7	Date of publication	Date and location	Vessel type and name, accident type
	August 25, 2022	February 8, 2021 Off the south-southeast coast of Cape Ashizuri-misaki , Tosashimizu City, Kochi Prefecture	Cargo ship OCEAN ARTEMIS (Vessel A, Hong Kong) Submarine SORYU (Vessel B) Collision
	Summary	When Vessel A with the master and 20 crew members on board was heading northeast toward Mizushima Port, Kurashiki City, Okayama Prefecture and Vessel B with about 90 crew members on board including the captainwas heading south-southeast while navigating underwater with a	

		part of the periscope over the sea surface by ascending to the periscope depth from the state in which the ship body was fully submerged under the sea surface, they collided with each other off the south-southeast coast of Cape Ashizuri-misaki, Tosashimizu City, Kochi Prefecture. Three crew members of Vessel B were injured and the submarine right rudder (sail) (a single rudder installed on both sides of the hull upper structure) was bent, etc., while the cargo ship sustained dent damage with cracks in the bulbous bow plating.
	Probable causes	It is probable that the accident occurred while Vessel A was heading northeast and Vessel B was cruising underwater in a fully submerged state*1, the captain and chief patrol officer*2 determined that there was a sufficient distance to the ship detected with the passive sonar*3 (hereinafter referred to as " the Sonar") and there was no ship around which might cause problem in navigating at the periscope depth (to navigate underwater with a part of the periscope over the sea surface) and started to proceed south-southeast toward the sea surface on the course of Vessel A that continued to sail without noticing Vessel B under the sea surface and to work for navigating at the periscope depth (work to change the depth to the periscope depth), resulting in the collision with Vessel A. It is probable that the reason why the captain and chief patrol officer determined that there was a sufficient distance to the ship detected with the passive sonar and there was no ship around which might cause problem in navigating at the periscope depth was due to the fact that they evaluated that the azimuth which combined the azimuth (the line drawn by the continuous display over time on the sonar screen*4 of the heading of the radiation sound) of the container ship proceeding west southwest and the azimuth of Vessel A as the azimuth only of the container ship. It is probable that the reason why the captain and chief patrol officer evaluated the azimuth which combined the azimuth of the container ship and the azimuth of Vessel A as the azimuth only of the container ship was due to the following fact. (1) Before the fact that the azimuth of Vessel A and that of the container ship overlapped with each other in nearly the same heading, the azimuth of Vessel A was not detected and thus, the azimuth of Vessel A was interpreted as a sound source other than a ship and was not recognized as that of a ship. (2) As they had not been informed of a change in the hearing sound near the azimuth of the container ship, they did not notice the possibility that they had heard the sailing sound of another ship. (3) The azimuth of Vessel A was detected automatically*5 again as the azimuth of the container ship. It is probable that the reason why the chief sonar watchkeeper*6 of Vessel B did not conduct the detection operation of the azimuth of Vessel A and did not report that the hearing sound near the azimuth of the container ship had changed, and the azimuth of Vessel A was automatically detected again as that of the container ship was due to the combination of the following factors. (1) Before the fact that the azimuth of Vessel A and that of the container ship overlapped with each other in nearly the same heading, since the sensitivity of the image near the azimuth of Ship A was not high and the sailing sound of a ship was not heard, the azimuth of Vessel A was not recognized as that of a ship. (2) For the reason of the item (1) above, after the overlapping of the azimuth of Vessel A and that of the container ship in nearly the same heading, since the azimuth of a ship continued to be displayed and there was only one container ship near the heading, it was recognized that the azimuth of the container ship continued to be displayed. (3) Since there was the recognition as the item (2) above and it was after the change of the course of own ship when a change in the hearing sound near the azimuth of the container ship was noticed, the change in the hearing sound was interpreted as a change of the hearing sound of the container ship due to the change of the attitude of own ship caused by the change of the course, etc, and it was determined that the change did not pose any emergency or seriousness. Incidentally, it is probable that the reason why the chief sonar watchkeeper of Vessel B did not conduct the detection operation of the azimuth of Vessel A and did not report the change of the hearing sound of the detected ship was due to the fact that the appropriateness of reporting on the detection operation of the azimuth by sonar and the recognition of a change in the hearing sound of the detected ship was up to each crew member in the Japan Maritime Self-Defense Force. *1 "Fully submerged" means a state in which the entire ship hull is submerged under water. *2 "Chief patrol officer" means the officer on duty who steers the ship under the command of the captain *3 "Passive sonar" refers to a technique or device designed to receive and analyze sound waves emitted by sound sources such as other vessels and obtain information on the sound sources (presence, heading, characteristics, etc.), without emitting any sound wave itself. On the other hand, "Active sonar" refers to a technique or device which receives and analyzes sound waves emitted by

		itself and reflected by a distant object and returned to obtain information of the heading of the object and the distance *4 “Sonar screen” refers to a screen that displays the heading on the horizontal axis and the elapsed time, signal level, etc., on the vertical axis, and displays the signal level as an image using luminance, etc. *5 “Automatic detection” refers to the process in which the value of the heading of the emitted sound detected by sonar is automatically displayed continuously on the sonar screen, and when an azimuth is automatically detected, a target number is assigned. On the other hand, the process in which the operator operates each time to cause the value of the heading of the emitted sound by assigning a target number to be displayed is referred to as “manual detection,” and the “manual detection” and “automatic detection” are collectively referred to as “detection operation.” *6 “Chief sonar watchkeeper” refers to the chief sonar technician on duty (person who is engaged in detecting underwater sound sources using SONAR (Sound Navigation and Ranging)).
	Safety Actions	**Actions Taken by the Japan Maritime Self-Defense Force** After the accident, the Japan Maritime Self-Defense Force has taken the following measures to prevent recurrence, and is considering necessary measures for sonar search procedures, criteria for determining the appropriateness of cruising at the periscope depth and future education and training. (1) Order on the thorough implementation of the monitoring of the movements of ships sailing on the sea surface during the preparations for cruising at the periscope depth*7 was issued. (2) Education on the re-confirming of the manual for navigating at the periscope depth and education on the similar accidents in the past were given to all submarine crew members. (3) Education on the determination of the attitude of a target is underway to all submarine crew members. (4) Satellite mobile phones were distributed to submarines in action. *7 “Preparations for navigating at the periscope depth” refers to the station in which not only crew members take up their designated positions, but also they search ships in the surrounding with sonar, detect their movements and check the safety for cruising at the periscope depth.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2022/MA2022-8-1_2021tk0001.pdf https://www.mlit.go.jp/jtsb/ship/p-pdf/MA2022-8-1-p.pdf (Explanatory material, in Japanese only)
	Reference	Major activities in the past year (page 11) and Chapter 2 (page 28)

9 Provision of factual information in 2022 (marine accidents and incidents)

In 2022, information was provided on one case (marine accident) only, and the details are as follows.

Provision of information on the flooding accident of the passenger ship KAZU I

(Information provided on August 10, 2020)

The Japan Transport Safety Board provided the factual information so far known on the flooding accident of the passenger ship KAZU I occurred off the Kashuni-no-taki waterfall, on the west side of the Shiretoko Peninsula on April 23, 2020 and information on the past marine accidents occurred in the sea areas near Shiretoko Peninsula to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism.

Summary of a marine Accident

While Passenger ship KAZU I, with the master and one crew member, and 24 passengers on board, was sailing after leaving the Utoro fishing port in Shari Town, Hokkaido Prefecture at around 10:00 on April 23, 2022, the ship was flooded, after the communication with the master to be disrupted, and it was confirmed that the ship had foundered at a point about 14 km southwest of the lighthouse at the Cape Shiretoko-misaki. A total of 26 people including two crew members and 24 passengers were died or went missing.

Details of the information provided to the Maritime Bureau

The details of the information provided are as attached.

A detailed investigation is scheduled to be conducted to determine the cause of this accident.

* For details of the information provided including the attachment, see the website of the JTSB.
https://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo20_20220810.pdf
(Japanese only)

Column

Realization of the Importance of International Cooperation through Investigations Overseas

Marine Accident Investigator

On July 25, 2020, an accident occurred in which a Panamanian-flagged cargo ship operated by a Japanese shipping company grounded on a shallow on the southeastern of Mauritius Island. After the accident, the vessel was buckled and the fuel oil spilled out and was contaminated ashore on the coast of the southeastern of the island, causing oil pollution damage in a wide range of area.

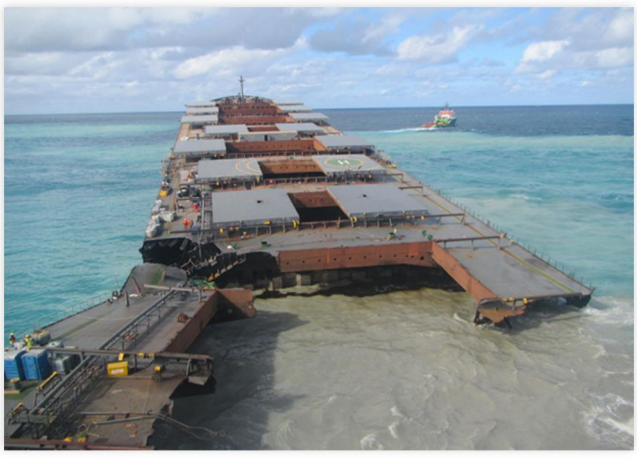
This accident fell under the classification of “a very serious marine casualties” under the international treaties, which was involved by a Japanese merchant fleet. Since it was agreed based on the treaties with Panama in which the ship was registered and Mauritius as the coastal state that Japan would be the marine safety investigating state, the JTSB dispatched an investigation team to conduct the investigations. It was the first time for Japan to dispatch an investigation team for an accident involveded a foreign flagged ship in foreign territorial waters.

In June 2022, the JTSB published the outline of the accident confirmed up to that point and the factual information on the grounding ashore as an interim report from the perspective of preventing the occurrence of the same type of accidents in the Japanese merchant fleet. The analysis of the circumstances leading up to the accident was that “while the cargo ship was proceeding west-southwest off the east-northeast coast of Mauritius without a nautical chart with the detailed coastlines of the Mauritius Island, she continued her navigation on a course approaching the island for the purposes of receiving signal for the smartphone of the crew member and grounded on shallows off the southeastern of the island.”

In addition, as measures to prevent recurrence based on the analysis of these circumstances leading to the occurrence of accidents, the analysis says that “it is necessary not only to obtain a nautical chart with the detailed coastlines of the sea area, but also not to approach the coasts for private reasons when the crew member navigates a ship along a coastal area.”

Furthermore, in order to enhance the safety performance of the Japanese merchant fleet in which multiple companies are involved in the operation of their ships like the cargo ship that involved the accident this time and to prevent similar accidents, the JTSB stated an opinion to the Minister of Land, Infrastructure Transport and Tourism in this interim report that instructions should be given to ship management companies and others on crew memmer training, by the ship management companies and charterers.

Oil spilling out from the grounded vessel



The severed vessel

In this investigation, we met various difficulties in conducting the onsite investigations in a foreign country, including the response to COVID-19. For example, the trial related to the accident was underway and there were restrictions in getting into contact with the crew memers including the captain as the parties involved. For these reasons, there were concerns initially about whether or not the necessary investigation could be conducted smoothly.

However, thanks to the understanding and cooperation of the Mauritian government authorities, the JTSB was able to efficiently proceed with interviews with relevant parties, verification of the accident area and the ship, etc. within a limited dispatch schedule. In addition, the JTSB was able to receive a lot of support from the governments of the related countries regarding the investigation procedure for the publication of the aforementioned interim report wrapped up on the basis of these investigations.

This was made possible thanks to the efforts of not only the governments of the related countries , but also the Japanese authorities, such as the Ministry of Foreign Affairs of Japan, including the Embassy of Japan in Mauritius as the diplomatic establishment abroad.

Investigations abroad differ greatly from normal domestic investigations in the fact that a considerable amount of time is required for coordinating matters depending on the circumstances. Through the investigation on this occasion, the JTSB realized the importance of building relationships with related countries based on careful and polite response and of further promoting it with a view to smoothly conducting investigations abroad.

The JTSB will continue to work toward the publication of the final report while maintaining good international cooperative relationships with the governments of related countries.

Visit to the government authorities of Mauritius

Interviews with crew members

Chapter 6 Information dissemination for accident

1 Information dissemination for accident prevention

The Japan Transport Safety Board prepares and issues various publications as well as individual reports, regarding specific cases so that it can better understand the efforts being made to prevent recurrence and contribute to accident prevention.

We place these publications on our website and, in order to make them more accessible to the public, we also introduce them through our JTSB E-Mail Magazine service (only available in Japanese).

The e-mail magazine distribution service is being used by people, including aviation, railway, and ship-related businesses, government agencies, and educational and research institutions.

Moreover, we are exchanging opinions with business operators and other parties regarding how the JTSB should disseminate its information and an effective and appropriate dissemination method. Also in the future, we will make improvements based on opinions we receive.

JTSB Website

2 Issuance of the JTSB Digest

With the aim of fostering awareness of safety, and preventing similar accidents from occurring, we issue "JTSB Digests." This publication introduces you to statistics-based analyses and must-know cases of accidents.

We also issue the English version of "JTSB Digests" as part of our efforts to disseminate information overseas.

In 2022, we released two issues of "JTSB Digest" (January and March: Issue Nos. 38 and 39).

The contents of the issues are as follows.

(1) JTSB Digest No. 38 [Collection of Analysis of Marine Accidents] “Toward the Prevention of Collisions of Recreational Fishing Vessels” (issued on January 18, 2022)

Regarding collisions of recreational fishing vessels which have been increasing in recent years, we have analyzed their factors by the recognition status of the other ship and by the navigation status and recommended important points toward their prevention, not only by calling for the installation of a radar or the use of a simplified AIS and AIS application, but also for keeping a proper lookout at all times.

- Occurrence status of marine accidents in which people died or went missing
- Presentation of the accident case: When a recreational fishing vessel was sailing back to port, she continued to navigate with a blind spot on the bow and collided with a blind spot on the bow and collided with a drifting pleasure boat
- Presentation of the accident case: When a recreational fishing vessel and a pleasure boat were navigating while looking at the fish-finder, they came close and collided with each other
- Presentation of the accident case: When a recreational fishing vessel was drifting with her attention centered on the state of anglers, she was late in noticing an approaching fishing vessel and collided with it
- Column: Proposals for accident prevention from the perspective of lecturers at training courses for recreational fishing vessel operators, etc.

(2) JTSB Digest No. 39 [Collection of Analysis of Aviation Accidents] “~ For Enjoying the Sky Safely ~ Safe Flight of Ultralight Planes” (issued on March 22, 2022)

Since there are many cases in which serious damage is caused such as casualties and injuries when an accident of an ultralight plane which is popular as leisure activity in the sky occurs, we have analyzed the occurrence factors of accidents to present the important points for enjoying the sky safely.

- Occurrence status of accidents and damage caused by ultralight planes
- Matters to bear in mind for enjoying the sky safely ~Analysis of factors considered to have been involved in the accident~
- Presentation of accident cases: Inappropriately maneuvering
- Presentation of accident cases: Weather (wind)
- Presentation of accident cases: Deficient knowledge, skills, and experience
- Presentation of accident cases: Malfunctions of aircraft and parts etc.

3 Issuance of the Analysis Digest Local Office Edition

The JTSB has issued the analysis digest local office edition (only available in Japanese). It has issued this publication in order to provide various kinds of information to help prevent marine accidents. The information is based on the analyses made by our regional offices and relates to specific accidents that occurred in their respective jurisdictions. This information focuses on cases with characteristic features such as the sea area, the type of vessel, and the type of accident.

(Analysis Digest Local Office Edition in 2022)

Hakodate	**To prevent recurrence of accidents related to squid pole-and-line fishing vessels** (Main contents) ・Occurrence trend of accidents related to squid pole-and-line fishing vessels ・Collision accident cases ・Fire accident cases ・Accident cases caused by falling asleep ・Summary 
Yokohama	**J-MARISIS related to pleasure boats in Tokyo Bay** (Main contents) ・Occurrence status of accidents related to pleasure boats in Tokyo Bay ・Trends and cases of accidents in six accident-prone sea areas in Tokyo Bay 1. Off Arakawa River (Sanmaisu): Grounding 2. Off Edogawa River : Intrusion into fishing facilities 3. Off Kisarazu City (Banzu): Grounding 4. Off Cape Futtsu: Intrusion into fishing facilities 5. Off Yasuda fishing port: Intrusion into fishing facilities 6. Near Cape Kannonzaki: Collision ・Summary 
Kobe	**To prevent collision accidents of pleasure boats with port facilities at night** (Main contents) ・Occurrence status of collision accidents with port facilities at night ・Case 1: While the ship was returning to port from a fireworks display, the master steered the ship only visually, and the ship collided with the breakwater. ・Case 2: While the ship was returning to port from a fireworks display, the master made a wrong assumption, and the boat collided with a mooring pile. ・Case 3: When the master was maneuvering the ship while taking care of fellow passengers, the ship collided with the breakwater. ・Points for accident prevention and damage reduction 

Naha	**To prevent accidents in diving fishery** **“Is your diving equipment safe?”** (Main contents) ・Occurrence status of accidents related to diving fishery in Okinawa Prefecture ・Overview of diving fishery in Okinawa Prefecture ・Case 1: Failure of automatic unloader ・Case 2: Insufficient V-belt tension ・Matters to bear in mind for handling diving equipment 

As you read these local office digests, you can not only find out the circumstances of local accidents, but can also gain some tips for accident prevention. The local offices will make further efforts to regularly issue the analysis digest local office editions. By doing so, they will ensure that you will be provided with more satisfactory content.

4 Issuance of the JTSB Annual Report

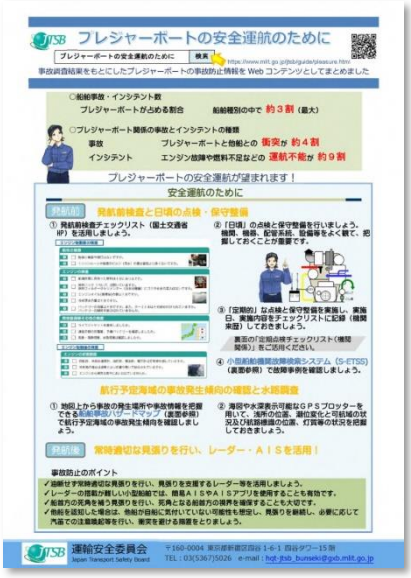
In order to publicize the JTSB's general activities in 2021 and prevent the occurrence of accidents based on what was learned in past accidents, the JTSB issued the "JTSB Annual Report 2022" in March 2022.

As part of our efforts to provide information overseas, we issued the English version of the report "Japan Transport Safety Board Annual Report 2022" in September 2022. We did so to let people overseas know about the topics in this Annual Report.

5 Preparation of safety leaflet

The Japan Transport Safety Board prepares leaflets as needed in order to spread information contributing to safety when issuing the JTSB Digest. In 2022, with the publication of “For safe navigation of pleasure boats” as the web contents for safety enlightenment, we created a leaflet with a checklist for periodic check by briefly summarizing the web contents to make known them to many people.

We are proceeding with activities to promote and disseminate safety awareness actively through calling for cooperation of handing out these safety leaflets to related organizations.



Leaflet to make known the web contents for safety enlightenment “For safe navigation of pleasure boats”

Column

To prevent collision accidents of pleasure boats with port facilities at night

Kobe Office, Secretariat

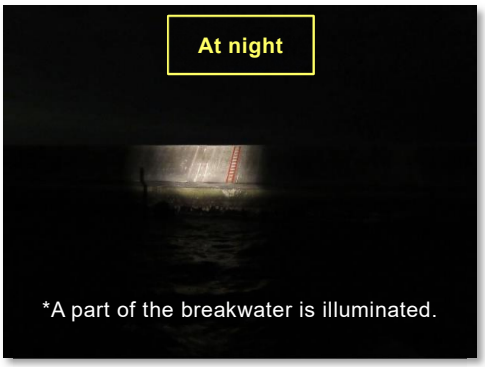
The jurisdictional areas of the Kobe Office include sea areas such as the Seto Inland Sea and Wakasa Bay which are calmer than the open ocean and there are many marinas along these sea areas in which people enjoy leisure activity with pleasure boats.

In addition, because of the spread of the new coronavirus, the popularity of marine leisure that can be enjoyed while avoiding crowds has been increasing, and the number of people who have acquireded the license to operate small boats such as pleasure boats has also been increasing.

On the other hand, 30 to 40 accidents involving pleasure boats occur every year, and it has been found that there is a high percentage of casualties in collision accidents with port facilities during night navigation.

In light of this situation, the Kobe Office has published an analysis digest of the investigations of past accidents so as to sail with pleasure boats safely.

Now, how does the view during night navigation differ from that during the day?



The two photos above are of the same breakwater. t is true that the breakwater is barely visible at night, isn't it?

"Even if you can sail the area by avoiding the breakwater during the daytime, what will happen if you sail at night without the knowledge on the existence or its exact location?

"Even if the boat is equipped with navigational instruments such as a GPS plotter, what will happen if you are unable to manage them?"

"What will happen if you increase your speed in the belief that you are safe because you are navigating the usual course?

You may collide with unseen "something" and end up in a tragic accident.

"The points you need to bear in mind as the captain of your own boat" learned as the occurrence factors from more than 500 accidents involving pleasure boats are described as safety measures in the analysis digest.

The Kobe Office has sent this analysis digest to about 150 marinas for dissemination and cooperation. It is our wish that users of pleasure boats read them and enjoy marine leisure safely and securely.

Column

To allow gaining an easy understanding of “the sea areas in which accidents of the same type occur frequently” using the “J-MARISIS”

Yokohama Office, Secretariat

There are several sea areas in Tokyo Bay where similar accidents involving pleasure boats have occurred frequently. We have engaged ourselves in the preparation of the analysis digest local office edition in which their occurrence status, accident cases, causes and recurrence prevention measures are summarized.

Based on a collation between the “J-MARISIS” and the sea areas in which accidents of the same type occur frequently, three more places other than the sea areas on which information calling for attention has been currently issued and classified as the sea areas in which accidents of the same type occur frequently have been newly found. Therefore, with the publication of the analysis digest, we have added “Information Calling for Attention” as below to “Off Arakawa River (Sanmaisu)”, “Off Kisarazu City (Banzu)” and “Near Cape Kannonzaki” as new sea areas in the “J-MARISIS”.

We did not only send the analysis digest to marinas in Tokyo, Chiba, and Kanagawa, the Japan Marine Recreation Association, and the Kanto Small Boat Safety Association, but also made public relation to the press. As a result, an introductory article was published in the local edition of national news papers and Japan Coast Guard Newspaper as an initiative of the JTSB.

We will continue to provide easy-to-understand information useful for accident prevention and safety improvement through the publication of the analysis digest local office edition in the future.

Trends of and measures for the sea areas where “Information Calling for Attention” has been newly added

Collection of analyses	J-MARISIS
	
Accident trends: Accidents caused by the fact that despite the existence of shallow waters was known, its extension was not understood accurately to ground. Measures: Use nautical charts before starting to sail in order to conduct a hydrographic check of the sea area to navigate and create a safe navigation plan.	

Accident trends: Grounding caused by the fact that the existence of seaweed farming facilities or shallow waters was not known, causing ships to ground

Grounding caused by the fact that the installation period of seaweed farming facilities was not known

Measures: Recognize that there is a time period when seaweed farming facilities are installed, and yachts and motorboats, obtain information on the installation of seaweed farming facilities from reference books and the MDA Situational Indication Linkage (Umishiru), and input the location information into a GPS plotter.

Users are advised to stay away from the seaweed farming facilities.

Accident trends: Collision caused by not noticing approaching ships while paying attention to the movements of other ships.

Collision caused with small vessels, especially mini-boats and rowboats.

Measures: During the navigation, the person who steers the ship should keep a lookout at all timed without paying attention only to obstacles on one side.

The person who steers the ship should keep a lookout of the surrounding without concentrating only on fishing, even while drifting.

6 Dissemination of information to prevent accidents involving pleasure boats and fishing boats

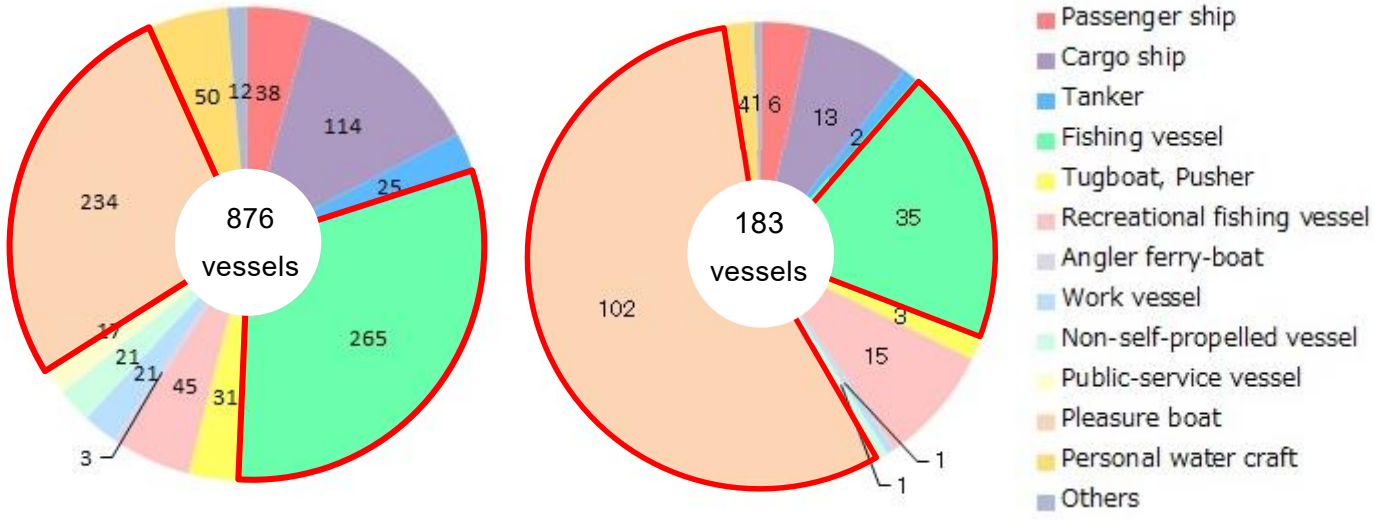
Regarding the number of ships by ship types involved in marine accidents occurred in 2022 and investigated by the JTSB, the highest number was that of fishing vessel with 265 (30.3%), followed by pleasure boats with 234 (26.7), and these two types of ships account for about 60% of the total.

Regarding the number of ships by ship types involved in ship incidents occurred in 2022, the highest number was that of pleasure boats with 102 (55.7%), followed by fishing boats with 35 (19.1%) and these two types of ships account for about 70% of the total.

Number of ships involved in marine accidents and incidents occurred in 2022

(Accidents on the left and Incidents on the right)

As of December 31, 2022



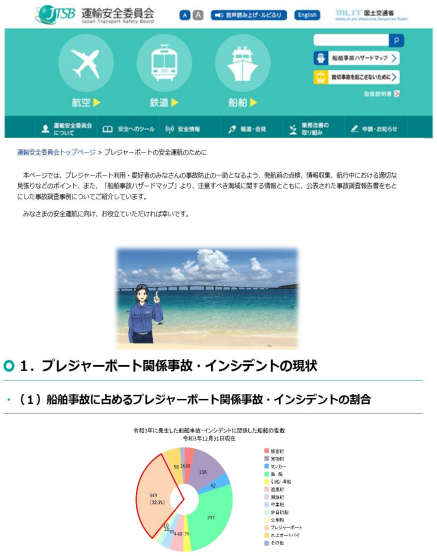
In addition, the number of accidents involving small boats with less than 20 tons of the marine accidents investigated by the JTSB reached 678 mainly including pleasure boats and fishing vessels and accounted for 64.0% to the total number of marine accidents investigated.

In light of this situation, the JTSB did not only post the web contents “For safe navigation of pleasure boats” in which information on the prevention of pleasure boat accidents is summarized (see Section 7 in this chapter (p.128) for details) on the JTSB website in April 2020, but also issued the analysis digest local office editions “To prevent collision of pleasure boats with port facilities at night” in June 2022 (Kobe Office), “J-MARISIS related to Pleasure Boats in Tokyo Bay” in July (Yokohama Office), “To prevent recurrence of accidents related to squid pole-and-line fishing vessels” (Hakodate Office) and “To prevent accidents in diving fishery. Is your diving equipment safe?” (Naha Office) in August (see Section 3 in this chapter (p.121) for details), with a view to strengthen the efforts to disseminate information to prevent accidents involving pleasure boats and fishing vessels.

7 Website in which information on the prevention of pleasure boat accidents is summarized ～For safe navigation of pleasure boats～

In April 2020, the JTSB posted the web contents “For safe navigation of pleasure boats” in which information on the prevention of pleasure boat accidents is summarized on its website.

As shown in Section 6 in this chapter, the number of accidents involving pleasure boats accounts for as large a proportion as about 30% of all marine accidents. In addition, in terms of the number of accident ships by accident type of pleasure boats, collisions between pleasure boats and other ships accounted for about 40% of the total by accident type, and incidents due to non-navigability, such as the engine failure, deficient fuel, etc, account for about 90% of the total by incident type.



Web page of "For safe navigation of pleasure boats"

Under the circumstances, in order to prevent accidents caused by pleasure boats, we decided to provide accident prevention measures, such as daily check before departure, use of radar, AIS, etc. during the sailing, together with cases of accident investigation on this website. In addition, not only information of each sea area which requires precautions during the sailing using the “J-MARISIS” published on the website is posted, but also the overview and method of use of the “Small ship - Engine Trouble Search System (S-ETSS) are posted on the website. Users of pleasure boats are recommended to use the information as an aid for accident prevention (see Section 8 in this chapter (p.139) and subsequent pages).

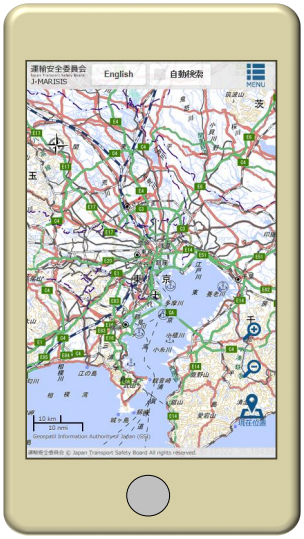
8 J–MARISIS – Now even easier to use

With the aim to allow the published Marine Accident Report to be made effective use of, the JTSB started to provide the “J-MARISIS” as an internet service in which the report can be searched from the end of May, 2013.

Given the increase in the number of people using the Internet on mobile terminals, as well as requests to make this system easier to use on smartphones and tablets, we released the mobile version of J-MARISIS at the end of June 2015.

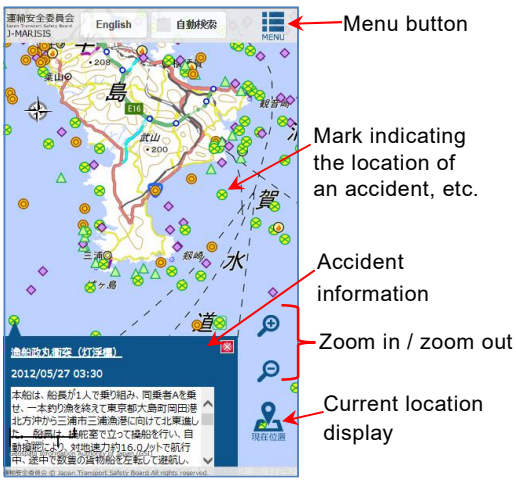
With touch panel support as well as revised display buttons and layouts, its ease of use has been increased, and the GPS functions of mobile terminals can be used to display information on areas near the user’s current location. As a result, users on pleasure boats, recreational fishing vessels or other small vessels can easily check information on accidents and other relevant information on navigation in sea areas they are planning to visit.

J-MARISIS https://jtsb.mlit.go.jp/hazardmap/mobile/index.html



Top page

Screen showing the information of current location using GPS function



Screen showing accident information

○ The service can be used free of charge, excluding the connection fee. The traffic volume of ships and fishing points will also be indicated.

9 Engine Trouble Search System ～ Easy Search with Click ～

The Japan Transport Safety Board established the Engine Trouble Search System (ETSS) in response to requests from people involved in maritime affairs for tools that can easily search and utilize accident investigation reports from engine trouble parts. This system has been available since April 2019.

ETSS is designed to search for marine accidents and incidents from engine failure parts and parts, and to use reports that are appropriate for the purpose of use. You can use ETSS free of charge, excluding the communication fees.

Engine Trouble Search System https://jtsb.mlit.go.jp/hazardmap/etss/

10 Small ship - Engine Trouble Search System ～ Easy search of small vessel engine trouble ～

The Japan Transport Safety Board established the Small ship Engine Trouble Search System (S-ETSS) as an effective provision of information on accident prevention and safety for users of small vessels of less than 20 gross tons. This system has been available since April 2021.

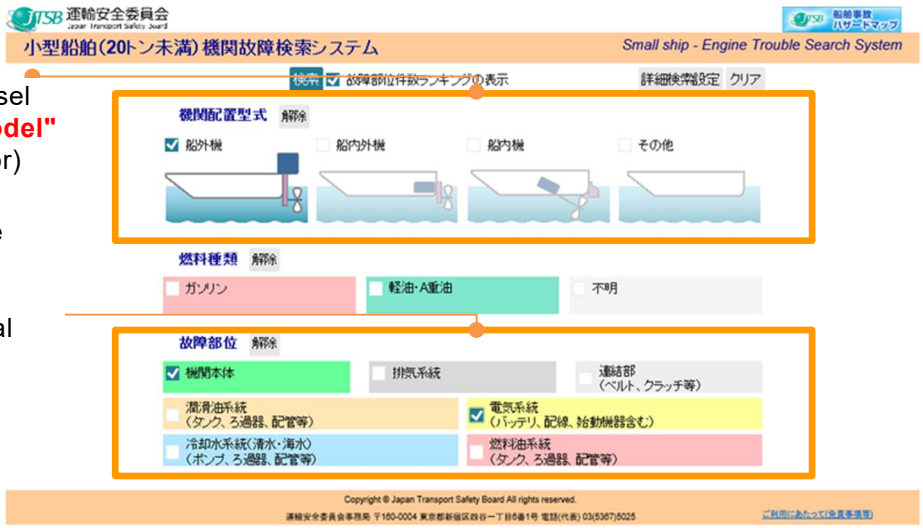
Accidents and incidents involving small vessels account for many of the overall marine accidents and incidents investigateed by the JTSB. Among them, many cases are involved with small vessels from failure in handling, maintaining engines, etc. In order to enable easy search of small vessel accidents, the S-ETSS shows parts that are likely to be defective, matters to be checked before pre-departure, and periodic check items, etc. in a ranking format, and also enables users to see reports of individual accidents and incidents for more information.

Thus, this system can be used as reference to pre-departure and periodic checks for assumed engine failure, etc.

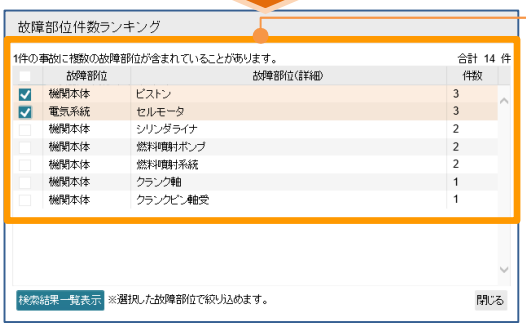
<Usage Example>
When searching an accident involving an engine itself and an electrical system in the engine layout of your vessel

Select a typel of your vessel in the **"Engine layout model"** field (here, outboard motor)

Select failure part you are concerned with in the "Failure parts" field (here, Engine itself and Electrical system)

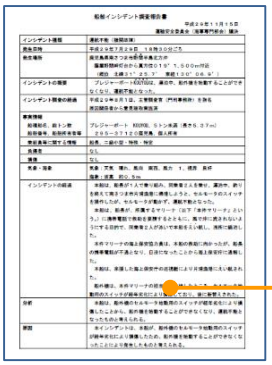


Click the 検索 button.



The **"Ranking of the cases with the failure parts"** will appear.
Select the parts (details) you concern.
(Here, the piston and the cell motor)

Click the 検索結果一覧表示 button.



Clicking the relevant part of the accident name field enables you to see the details of the investigation report.

Column

Exhibition in events for pleasure boat users

Analysis, Recommendation, Opinion Office

With the aim to allow the published Accident Investigation Report to be made effective use of, the JTSB has created safety tools, including the J-MARISIS, JTSB Digest, analysis digest local office edition, and in order to make known these tools by as many people as possible, we exhibit at events for pleasure boat users to implement safety enlightenment activities.

The JTSB exhibits at the "Yokohama Floating Yacht Show" and "Yokohama Boat Fair" held every year between September and October. Although we gave up participating in the exhibition in 2021 due to the effect of the COVID-19 pandemic, we were able to exhibit at both events for the first time in two years. Exhibitors related to navigation from all over Japan gathered in both events, and during the events, a variety of events were held, including training for the renewal of the license for operating small boats, exhibitions and sales of marine equipment, exhibition on the sea of yachts and boats, demonstration cruise, etc.

We did not only give a demonstration of the J-MARISIS using tablet, but also distributed materials including the leaflet to present the web contents for safety enlightenment posted on the website, the collections of analyses of region version, etc, at the booth of the JTSB.

Demonstration of the Marine Accident Hazard Map at the booth of the JTSB

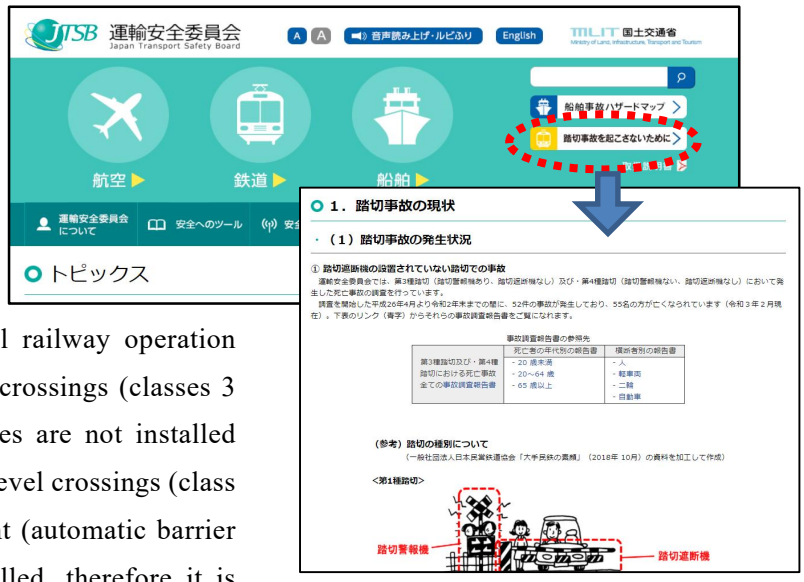
Aspect of the venue during the event

Many more people than originally expected, including not only people who use pleasure boats daily, but also those who had just obtained their licenses visited our booth during the event thanks also to the good weather. In addition, we could hear the opinions of those who actually use these contents, and thus, the event served as a good opportunity for us to conduct safety enlightenment activities in the future.

We hope that these events will serve as an opportunity for many people to learn about the activities of the JTSB and the safety tools we provide will help those who sail ships safely.

11 Website summarizing information on the prevention of level crossing accidents ～ To prevent level crossing accidents from occurring～

In February 2021, the Japan Transport Safety Board posted the "To prevent level crossing accidents from occurring," summarizing information on the prevention of level crossing accidents, on our website.



Web page on “Preventing level cross accidents from occurring

Level crossing accidents comprise a large percentage (40.0%) of the overall railway operation accidents (in 2021). In particular, level crossings (classes 3 and 4) where automatic barrier machines are not installed have higher accident risk, comparing to level crossings (class 1) where level crossing safety equipment (automatic barrier machine, road warning device) is installed, therefore it is important to comply with rules when crossing level crossings, and also take measures, such as abolishing level crossings without such safety equipment or installing such safety equipment (i.e., upgrading to class 1 level crossings).

The promotion of such measures needs to be understood by many people, including the users. Therefore, the JTSB has been calling for complying with the rules for crossing level crossings with slogans, e.g., "Stop, look, and listen" for users of level crossings. Moreover, for railway operators, road administrators, and other relevant parties, we provide examples of initiatives, e.g., abolishing level crossings, as references for proceeding with discussions and taking measures in order to prevent accidents, so we hope refering them to reduce level crossing accidents.

12 Outreach lectures (dispatch of lecturers to seminars, etc.)

The Japan Transport Safety Board holds a series of outreach lectures as part of its efforts to raise awareness on the work of JTSB, and to create an opportunity for collecting the feedback and opinions of the general public. Seminars that lecturers can be dispatched to cover topics that are useful in preventing or reducing damage from aircraft, railway, and marine accidents. The JTSB staffs are dispatched to or remotely participated in various seminars and schools as lecturers.

Scene of an outreach lecture

We can provide flexible support for the content of lectures, such as by incorporating content to match the needs of participants, based on courses chosen by requesting groups.

For the application method, see the JTSB website.

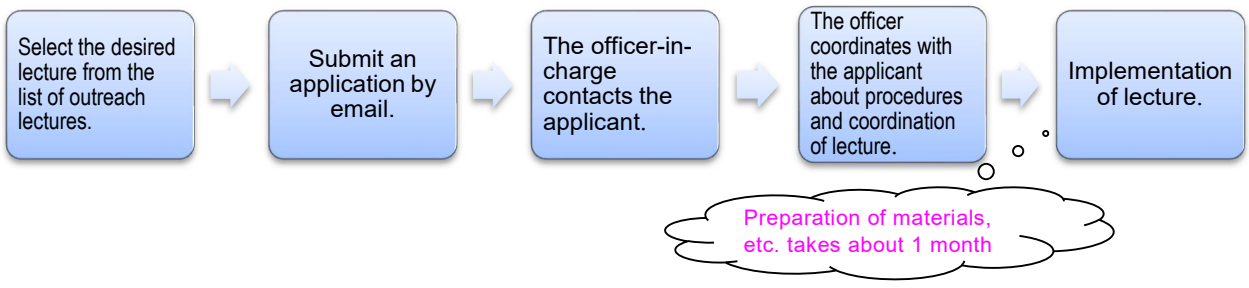
https://www.mlit.go.jp/jtsb/demaekouza.html

List of outreach lectures

No.	Course	Main targets	Contents
1	About the Japan Transport Safety Board	General (High school students and older), transportation businesses, etc.	Easy-to-understand explanation about the organizational background, work etc. of the JTSB
2	What is accident investigation?	Elementary school students	Easy-to-understand explanation about accident investigation for elementary school students and older
3	About aircraft accident investigation	General (High school students and older), aviation businesses, etc.	Easy-to-understand explanation about aircraft accident investigations, including the background, concrete examples, etc.
4	About railway accident investigation	General (High school students and older), railway businesses, etc.	Easy-to-understand explanation about railway accident investigations, including the background, concrete examples, etc.
5	About marine accident investigation	General (High school students and older), maritime businesses, etc.	Easy-to-understand explanation about marine accident investigations, including the background, concrete examples, etc.
6	About marine accident investigation (fire, explosion, engine failure)	General (High school students and older), maritime businesses, etc.	Explanation about marine accident investigations related to fire, explosion and engine failure, including the background, concrete examples, countermeasures, etc.
7	About the JTSB Digests	General (High school students and older), transportation businesses, etc.	Introduction to case studies of accidents and explanation of various statistical materials across various modes, based on the JTSB Digests that have been issued to date.
8	About the JTSB Digests (Analyses of Aircraft Accidents)	General (High school students and older), aviation businesses, etc.	Explanation about various themes taken up in the analyses of aircraft accidents in the JTSB Digests.
9	About the JTSB Digests (Analyses of Railway Accidents)	General (High school students and older), railway businesses, etc.	Explanation about various themes taken up in the analyses of railway accidents in the JTSB Digests.
10	About the JTSB Digests (Analyses of Marine Accidents)	General (High school students and older), maritime businesses, etc.	Explanation about various themes taken up in the analyses of marine accidents in the JTSB Digests.
11	Trends in the occurrence of marine accidents, and preventing recurrence	General (High school students and older), maritime businesses, etc.	Schematic explanations about risks and waters where marine accidents frequently occur using the J-MARISIS, and explanations about accident prevention methods.
12	Analysis digests local office edition (marine accident-related) [each regional office in Hakodate, Sendai, Yokohama, Kobe, Hiroshima, Moji, Nagasaki, and Naha]	General (High school students and older), maritime businesses, etc.	Explanations on each topic regarding analysis digests from regional offices. *Lists can be found by clicking the link below. https://www.mlit.go.jp/jtsb/bunseki-kankoubutu/localanalysis/localanalysis_new.html

*No. 12, in principle, is restricted to requests from the areas under the jurisdiction of the local office.

Flow chart from application to implementation of lecture



13 Activities of the Accident Victim Information Liaison Office

The Japan Transport Safety Board gives full consideration to the emotions of the victim and their families, as well as bereaved families. In addition to providing information on accident investigations in an appropriate manner at the appropriate time, a contact point for providing accident investigation information to victims, etc. was established in April 2011 with the aim of providing attentive response to opinions and feedback. Furthermore, in order to promote the provision of information, the Accident Victim Information Liaison Office was established under the directive of the organization in April 2012. Contact points for the provision of information were also set up in local offices to provide integral support alongside with Tokyo.

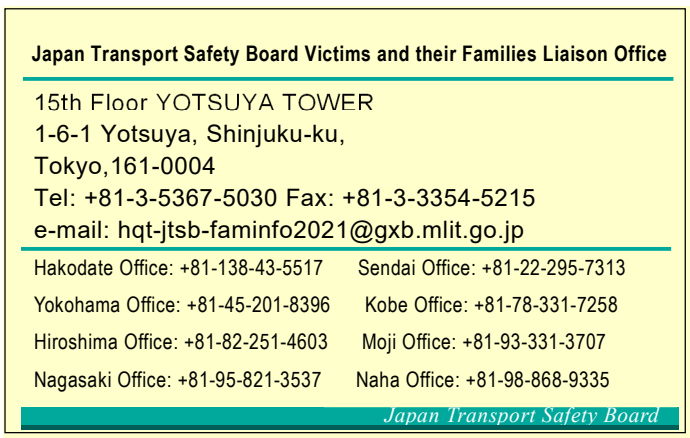
In 2022, information on accident investigation and other matters was provided to 71 persons, including the 13 cases of aircraft/railway/marine accidents.

In addition, we provided explanations to families concerned about the flooding of the passenger ship KAZU I occurred on April 23, 2022 before providing information to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (see the page 128 in Chapter 5 for details) and publishing the interim report (see page 18 in Chapter 1 for details).

The Accident Victim Information Liaison Office hands out "Contact Information Cards" to victims of accidents.

The Office receives inquiries and consultation about the accident investigations from victims and families of accidents, as well as bereaved families. Please feel free to contact the following where necessary.

Contact Information Cards



Chapter 7 International efforts for accident prevention

1 Objectives and significance of international cooperation

Aircraft and marine accidents, which are part of Japan Transport Safety Board's investigation scope, includes international in nature. Creating and operating systems for these kinds of investigations therefore involve international organizations. Also, it may be necessary to cooperate and coordinate with the accident investigation authorities of the states concerned during the investigation process.

In addition to the nation where an aircraft accident occurred, the state of registry, the state of the operator, and the state where the aircraft was designed and manufactured are the states concerned. An annex to the Convention on International Civil Aviation (the Chicago Convention) states that the state of occurrence is responsible for starting and accomplishing an accident investigation while the other states also have the right and responsibility to appoint a representative to participate in the investigation. Proper cooperation with the accident investigation authorities of those states concerned is necessary for the accomplishment of the investigation.

Similarly, in marine accidents involving vessels above a certain level, the International Convention for the Safety of Life at Sea (SOLAS) places the obligation of investigation on the flag state of the vessel. Additionally, other states concerned, such as coastal states in whose territory the marine accident occurs and the state(s) of victims are entitled to investigate the accident. The convention defines the standard framework of marine accident investigations. The flag state and states concerned must cooperate with each other in multiple ways, such as through information sharing, when conducting accident investigations.

Based on this background, a variety of international meetings are held for each mode, which JTSB actively participates in. The meetings are for the purpose of facilitating collaboration in the case of accidents or incidents, sharing information on accidents and investigation methods on a regular basis, and achieving results of prevention for repeated accidents all over the world. Additionally, for the investigation of railway accidents, for which there is no international organization, various international seminars to exchange information on accident and incident investigations are held in major countries. Because in regards to this area, the fundamental investigation system of each state is generally standardized. Furthermore, some universities overseas have specialized training courses for accident and incident investigations, to which JTSB is also actively dispatching investigators.

As shown above, JTSB aims to improve transport safety in Japan and all over the world. It hopes to do so through sharing of our findings worldwide, which have been acquired in individual accident and incident investigations. Relating to this, the following sections introduce each of our international activities in 2022.

2 International conferences under the COVID-19 pandemic

Until last year, due to the COVID-19 pandemic, most international conferences were held virtually (on the Web). However, many of the conferences planned for 2022 were both held on-site and online to allow each country to participate according to its respective situation.

In the conferences, not only information on the traditional accident investigation methods were shared and exchanged, but also information on the effect and restrictions of investigation activities under the COVID-19 pandemic as well as the situation of responses of each country was shared and exchanged by new participating countries.

The Web conference have the advantage of allowing the persons in charge to participate in conferences with many staff even if it is difficult for them to go abroad due to their work schedule. However, since these conferences were held sometimes at the European time, persons in participating countries were obliged to

participate late at night or early in the morning due to time difference and participants of the JTSB also sometimes participated in these conferences at night or early in the morning at the time in Japan.

3 Efforts of international organizations and JTSB's contributions

(1) Efforts of the International Civil Aviation Organization and JTSB's involvement

The International Civil Aviation Organization (ICAO, Headquarters: Montreal, Canada) is a United Nations specialized agency established in 1947. Japan acceded to it in 1953. ICAO comprises the Assembly, Council, and Secretariat, and as of October 2022, 193 states are members of ICAO. The Council has subordinate bodies, such as Air Navigation Commission, Legal Committee, Air Transportation Committee, Joint Operation Committee, and Finance Committee. In addition, it has regional offices in seven locations, including Bangkok, Cairo, and Paris. Besides, there are expert meetings such as Air navigation conference, a variety of working groups, and panel meetings which are called in for certain projects.

The objectives of ICAO are provided in Article 44 of the Chicago Convention as being “to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport.” ICAO is engaging in a wide variety of activities, including the drafting of conventions regarding international air transport services and aviation security such as countermeasures against hijacking. It also engages in audits of contracting states’ safety monitoring systems, and responses to environmental problems.

ICAO establishes the Annexes of the Chicago Convention for items that must be covered by globally unified rules. The Annexes determines the rules for 19 fields, including personnel licensing, rules of the air, registration of aircraft, airworthiness, aeronautical telecommunications, search and rescue, security, and the safe transport of dangerous goods and safety management. Among them, Annex 13 establishes the standards and recommendations for aircraft accident and incident investigations. In addition, the Act for the Establishment of the Japan Transport Safety Board states that: "The Board shall conduct investigations prescribed in items (i) to (ii) of Article 5 in conformity with the provisions of the Convention on International Civil Aviation and with the Standards, Practices and Procedures adopted as Annexes thereto." (Article 18).

The Accident Investigation Panel (AIGP), which is a subordinate organization of the Air Navigation Aviation Commission, is mainly a forum for discussion on the revision to Annex 13 and the preparation of guidance materials. The JTSB has participated as a member since the 4th meeting held in May 2018. The 7th Accident Investigation Panel Meeting (AIGP/7) was held in Paris, France in May 2022, in which aircraft accident investigators of the JTSB participated. Regarding the working groups (WGs) established under the panel, JTSB is participating in the “Safety Recommendation of Global Concerns WG” and the “Unmanned Aircraft System Accident Investigation WG” as well as in the “Family Information WG.”

In addition, the Asia Pacific Accident Investigation Group (APAC-AIG) operates as a framework for safety in Asia and Pacific Regions, and considers the building of a cooperative system for accident investigation in these regions. The 10th Asia-Pacific Regional Accident Investigation Group conference (APAC-AIG/10) was held in a hybrid format of on-site and on the Web. From the JTSB, aircraft accident investigators participated in the meeting and discussed a variety of issues, including the issues related to victim support and media response, issues related to the expansion of the scope of investigations of unmanned aircraft, improvement of investigative capabilities in the region based on the regional characteristics of the Asia-Pacific region, and promoting cooperation in the region.

(2) Efforts of the International Maritime Organization and JTSB's involvement

The International Maritime Organization (IMO, Headquarters: London, United Kingdom) was established in 1958 as a specialized agency of the United Nations. It was originally called as the Inter-Governmental Maritime Consultative Organization (IMCO). The IMO comprises the Assembly, the Council and five committees. These are the Maritime Safety Committee (MSC), Legal Committee (LEG), Marine

Environmental Protection Committee (MEPC), Technical Cooperation Committee (TC) and Facilitation Committee (FAL). In addition, there is a Secretariat, and the MSC (and MEPC) has seven subcommittees. As of October 2022, IMO has 175 member states/territories and three regions as associate members.

IMO engages in various activities, such as the facilitation of intergovernmental cooperation, effective safety measures and drafting of conventions that relate to technical and legal problems with maritime life safety and safe marine navigations.

The Sub-Committee on Implementation of IMO Instruments (III) is a subordinate group of MSC and MEPC. It discusses how to ensure the responsibility of the flag state, including the investigation of marine accidents and incidents. III analyzes the accident or incident investigation reports submitted from states based on SOLAS and the International Convention for the Prevention of Pollution from Ships (MARPOL) to draw lessons from, which III subsequently makes public on the IMO website. By doing so, III promotes activities for the prevention of the repeated occurrence of marine accidents.

The Correspondence Group (which undertakes analysis during periods outside of the sessions) and the Working Group (which verifies the analysis results during the session period) comprises volunteer investigators from some member states. They discuss these analysis results, which the III plenary subsequently approves. Depending on the matter in question, if III determines that further discussion is required for a convention revision, it will submit recommendations or information to MSC, MEPC and other IMO subcommittees. The 8th session of the Sub-Committee on Implementation of IMO Instruments (III 8) was held virtually in July 2022. A JTSB marine accident investigator became the group member, and conducted analyses of accident and incident investigation reports submitted by each country. The provisional translation of the past analysis results is shown in the JTSB website:

(URL: https://www.mlit.go.jp/jtsb/casualty_analysis/casualty_analysis_top.html)

4 Cooperation and information exchange with foreign accident investigation authorities and investigators

(1) Participation in international meetings

①Chairperson meeting of the International Transportation Safety Association

The International Transportation Safety Association (ITSA) was established by accident investigation boards from the Netherlands, the United States, Canada, and Sweden in 1993. As of October 2022, the international organization has members from the transport accident investigation authorities of 18 countries and territories. Organizations that are permitted to join must be permanent accident investigation authorities that are independent from any regulatory authority.

Based on the idea that any findings from an accident and incident investigation in one field can be used as a lesson for another field, ITSA holds annual chairperson meetings where the participating accident investigation authorities present their experiences in accident investigation. These presentations are for all the modes of aviation, railway, and marine accidents and incidents. The chairpersons learn about the causes of accidents and the methodologies of accident investigations, thus aiming to improve transport safety in general. As for Japan, the Aircraft and Railway Accidents Investigation Commission was approved for accession in June 2006. The board has participated in all the meetings held after 2007.

In the conference held in Helsinki, Finland in June 2022, Chairperson Takeda and other members from the JTSB participated on the Web. In the meeting, Chairperson Takeda participated as a panelist in the safety research by theme, in which we did not only present our efforts of analysis work, but also presented the publication of “JTSB Digest” as well as the provision of the “Japan-Marine Accident Risk and Safety Information System (J -MARISIS)” and posting of “Prevention of Railway Level Crossing Accident” as the outcome thereof.

②International Society of Air Safety Investigators and Asian Society of Air Safety Investigators

The International Society of Air Safety Investigators (ISASI) has been organized by national aircraft accident investigation authorities. The purpose of this society is to support accident investigations aimed at preventing repeating occurrences of aircraft accidents and incidents. This aim is to be achieved by improving further a cooperative system of investigation authorities, through the facilitation of communications between member countries about their experience and knowledge, as well as information about the technical aspects of aircraft accident investigations.

ISASI holds annual seminar each year, and Japan has participated in each one of them since the establishment of Japan Aircraft Accident Investigation Commission in 1974. In this seminar, working groups including the Flight Recorder Working Group, the Investigator Training and Education Working Group, the Cabin Safety Working Group, and the Government Air Safety Investigators Group are held in parallel with the general meeting. Japan also participates in these working groups to endeavor to improve investigation technologies for aircraft accidents and incidents.

The 2022 Annual Seminar was held in a hybrid format of on-site and on the Web. This seminar provided 6 keynote speeches and 23 presentations.

ISASI has regional associations in Australia (ASASI), Canada (CSASI), Europe (ESASI), France (ESASI French), Korea (KSARAI), Middle East and North Africa (MENASASI), Latin America (LARSASI), New Zealand (NZSASI), Pakistan (PakistanSASI), Russia (RSASI), the United States (USSASI) and Asia (AsiaSASI). Each of these associations also holds their own seminars.

In AsiaSASI, The National Transportation Safety Committee of Indonesia currently serves as Chairperson, with Hong Kong Civil Aviation Department as Vice Chairperson, and Transport Safety Investigation Bureau of Singapore as Secretariat, and the JTSB serves as an executive committee.

③Accident Investigator Recorder (AIR) Meeting and Asia Accident Investigation and Analysis Technology Exchange Conference

The Accident Investigator Recorder (AIR) Meeting is an international conference for aircraft accident investigators who analyze digital flight data recorders (DFDR) and cockpit voice recorders (CVR). At this meeting, aircraft accident investigation analysts from all over the world share know-how by exchanging their experience, knowledge, information relating to the analysis of DFDR, and discuss the relevant technologies on DFDR. The conference aims to further develop the technical capacity of accident investigation authorities around the world and to further improvement the cooperative system amongst the authorities.

This meeting was established in 2004, and the accident investigation authorities of each country hold a meeting every year. JTSB has participated in nearly all the conferences since 2006.

The conferences in 2020 to 2022 were postponed due to the COVID-19 pandemic.

The Asia Accident Investigation and Analysis Technology Exchange Conference has been held every year since 2020 with the participation of accident investigators who are in charge of digital data analysis of flight recorders to share research cases related to analysis work and study to solve the issues of each country. In 2019 and 2020, Japan hosted the plenary sessions (held on the Web), and the conference in 2022 was held in Singapore.

This Conference aims not only to grasp the international technological trends related to flight recorders and analyzers, but also to promote technical exchanges by analysts in the Asian region to build a cooperation system when an accident requiring investigations occurs.

④Marine Accident Investigators' International Forum

The Marine Accident Investigators' International Forum (MAIIF) is an international conference held

annually since 1992. It was originally based on a proposal from the Transportation Safety Board of Canada. Its purpose is to maintain and develop international cooperation among marine accident investigators and to foster and improve international cooperation in marine accident investigations and thus, advancing maritime safety and prevent marine pollution. In 2008, MAIIF was granted the status of an Inter-Governmental Organization (IGO) in IMO.

Under this forum, marine accident investigators around the world take the opportunities to exchange frankly opinions and share information on marine accident investigations. Recently, there has been more demand to make use of the findings obtained from the marine accident and incident investigations in the discussions in IMO. In 2009, MAIIF made a proposal based on the investigation results from the state investigation authorities to IMO for the first time. Japan has joined the forum every year since the third conference.

The 29th conference, which was scheduled to be held in Lima, Peru in November 2021, was postponed due to the COVID-19 pandemic. marine accidents investigators from the JTSB participated in a hybrid format of on-site and on the Web in September, 2022.

⑤Marine Accident Investigators Forum in Asia

The Marine Accident Investigators Forum in Asia (MAIFA) was established by a proposal from Japan to build a mutual cooperation system for marine accident and incident investigations in the Asia region and to assist developing countries in enhancing their investigation systems. Since 1998, meetings have been held annually, and Japan has been playing a leading role in this forum, including the sponsorship of the 13th meeting in Tokyo in 2010. The network of investigators that has been established through the forum is now effective in its promotion of rapid and smooth international cooperation in accident and incident investigations. Encouraged by the success of MAIFA, E-MAIIF was established in Europe in 2005. A-MAIF was then established in North, Central and South Americas in 2009. These trends contribute more than ever in furthering the exchange and cooperation between marine accident investigators in each region. In the Asia region, there are not only a lot of straits with sea traffic congestion, but also severe weather and hydrographic phenomena that often give rise to tragic marine accidents. Nonetheless, some countries have insufficient capacities or systems for accident investigations. This situation makes these regional fora very important.

The 23rd conference was scheduled to be held in Shanghai, China in 2021, but was postponed due to the COVID-19 pandemic, and an interim conference was held in November 2022 on the Web

(2) Examples of international cooperation among accident investigation agencies in individual cases

For the aircraft accident and incident investigations, based on the provisions in Annex 13 of ICAO, the state where an aircraft accident occurred must notify the state of registry, the state of design/manufacturing, and the state of operation. If necessary, these states concerned may appoint their own Accredited Representative (AR) to join the investigation.

When an Agusta AW139 (rotor aircraft) belonging to the Iwate Prefectural Disaster Prevention Air Corps was engaged in firefighting activities in a forest fire that had broken out in Iwaizumi Town, Shimohei County, Iwate Prefecture on April, 2022, the water sprayed from the sky hit a fire brigade member on the ground causing a serious injury. The JTSB is conducting investigations on the matter with Italy as the country for designing the aircraft, Unites States as the country for manufacturing the aircraft body and Canada as the country for designing and manufacturing the engine.

In marine accident and incident investigations, the IMO Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code) states that the interested states, including the flag state of the ship and the coastal state of the accident, must cooperate in the marine accident investigation. Also in Japan, if a marine accident or incident occurs that concerns more than one state, Japan's accident investigators are to collaborate with the accident investigation authorities of the other interested states in order to obtain information about the

accident.

Regarding the case occurred in the high seas in October 2021 wherein crew members of the LPG ship PGC Patreas were injured, the JTSB was requested to cooperate in the investigation by the accident investigation organization of the Republic of Malta as the flag state of the LPG ship. In response to this request, we have provided information necessary for the investigation to the organization of the Republic of Malt and we have been received inquiry about the draft investigation report before its publication.

Among the marine accident and incident investigation reports that were published in 2022, JTSB sent three draft reports to the flag states and other interested states upon request in order to invite their comments.

5 Technical cooperation

In response to requests from overseas railway accident investigation organizations, the JTSB implements human resource development support including the training of railway accident investigators.

So far, we have not only participated in the field of railway accident investigation in the “Indian Railway Safety Capability Enhancement Project” implemented as a technical assistance project of the Japan International Cooperation Agency (JICA), but also have been contributing to the improvement of overseas railway safety by recently establishing a department to investigate railway accidents to provide Japanese railway accident investigation technologies according to their categories, including the provision of raining to overseas railway accident investigation organizations which have started railway accident investigations as a technical aid to them.

These efforts contribute to the initiative “to support efforts related to technology transfer and human resource development to allow overseas countries to properly operate and maintain their own railway” in the “Infrastructure Systems Overseas Expansion Action Plan 2022 of the Ministry of Land, Infrastructure, Transport and Tourism” which summarizes its projects to promote the expansion of the infrastructure systems to overseas, and we will continue to work for improving the transportation safety in the future through technical cooperation with overseas accident investigation organizations.

6 Participation in overseas training

The JTSB is making efforts to advance the capacity of accident investigators through measures such as training and international information exchanges to investigate accidents accurately, and also actively participates in overseas training for accident investigations.

In 2022, JTSB’s aircraft accident investigators participated in the training on unmanned aircraft system and training to read and analyze data from damaged FDR and CVR organized by the Southern California Safety Society (SCSI) in the United States.

In addition, every year the JTSB dispatches aircraft accident investigators and marine accident investigators to Cranfield University (UK), which has a proven track record in accident investigation training. Due to the CIVID-19 pandemic, the dispatch of 2022 was cancelled.

Column

Resumption of the Holding On-Site of International Conferences

International Affairs Office

The travel restrictions due to the COVID-19 pandemic have greatly affected the international exchange of people and they were a big blow to airline companies, travel agencies, and the tourism industry in particular. The international work of the JTSB was not an exception, either. The JTSB participates in international conferences to establish standards for preventing the recurrence of the accidents in cooperation with accident investigation organizations around the world, and to improve investigation skills and gain an understanding of overseas trends by exchanging information, etc. These conferences include the annual meeting of the International Transport Safety Association (ITSA), the ICAO Accident Investigation Panel (AIGP), the annual seminar of the International Association of Aircraft Accident Investigators (ISASI), the executive meeting of the Asian Society of Air Safety Investigators (AsiaSASI), the Accident Investigator Recorder (AIR) Meeting, the Marine Accident Investigators' International Forum (MAIIF), and the Marine Accident Investigators Forum in Asia (MAIFA).

Due to the COVID-19 pandemic, some of the international conferences in which the JTSB participates were canceled or postponed in 2021, but many conferences were held on the Web.

In FY2022, the progress in vaccination allowed the resumption of international conferences including travels abroad. ITSA, AIGP, and ISASI held meetings in a hybrid format in which the conferences were held on site and on the Web. Staff of the JTSB participated in the 7th meeting of AIGP held in May in Paris, France, the annual seminar of ISASI held in Brisbane, Australia, and the Asia Accident Investigation and Analysis Technology Exchange Conference which is the Asian version of the AIR Meeting held in Singapore in November. In addition, in the same month, we held a face-to-face meeting with the Transportation Safety Investigation Bureau (TSIB) of Singapore to conduct a field survey for the training next year of TSIB railway accident investigators.

As a countermeasure against COVID-19, remote work, remote classes, web conferences, etc. are being carried out at government offices, private companies, or schools, etc., which allow work and classes to be performed without going to work or school.

The advantage of web conferencing lies in the fact that we can participate in a conference while seeing the faces of the participants on the monitor without taking the trouble to travel to the site. We neither suffer a jet lag nor get tired of a long trip. In addition, no traveling costs are incurred. Then, why conferences held on site have been brought back? This is because there are benefits to them being held on site.

In particular, we conduct accident investigations within the frame of the Convention on International Civil Aviation (Chicago Convention) in the field of aviation and the International Convention for the Safety of Life at Sea (SOLAS) in the field of navigation, and we also conduct accident investigations together with foreign accident investigators from time to time. At that time,

what is important is the presence or absence of interaction between investigators. If we know each other or if we know their colleagues, we can work together smoothly. In addition, ICAO holds the annual meeting in Montreal and IMO in London for revising annex of the Conventions, and if staff participates there, it is possible for the staff to build a network of contacts by directly exchanging information with the members of each country who have held heated discussions. Furthermore, it is also possible to arrange a side meeting between meetings to make face-to-face adjustments to conclude a memorandum of cooperation in the field of accident investigations with the investigation agencies of certain countries.

Practical training for analyzing a flight recorder, etc., is provided at the AIR Meeting, in which aircraft accident investigators participate. This is a field which cannot be conducted in a web conference. In addition, although we held discussions while seeing their railway system directly in the field survey for the training of railway accident investigators of Singapore, we believe that such activities was beyond comprehension in a web conference.

On the other hand, we are also aware of the advantage of web conferencing. For example, when discussing issues of concern within the working group before an international conference such as ICAO referred to above, we can discuss amongst ourselves using meeting apps such as Teams and Zoom to wrap up a conclusion of the working group for attending the annual meetings.

Recently, international conferences are often held in a hybrid format of on-site and on the Web. If we are unable to travel due to work or other reasons, we participate in conferences on the Web, and otherwise, we are sending actively our staff. As such, there are more options in these days.

In this manner, the resumption of the holding on site of international conferences is welcomed not only by the JTSB but also by accident investigation agencies of other countries. In the future, we will enhance our cooperation with accident investigation organizations of other countries through international conferences, etc., by participating on site and on the Web.

Annual seminar of the International Society of Air Safety Investigators (ISASI2022)

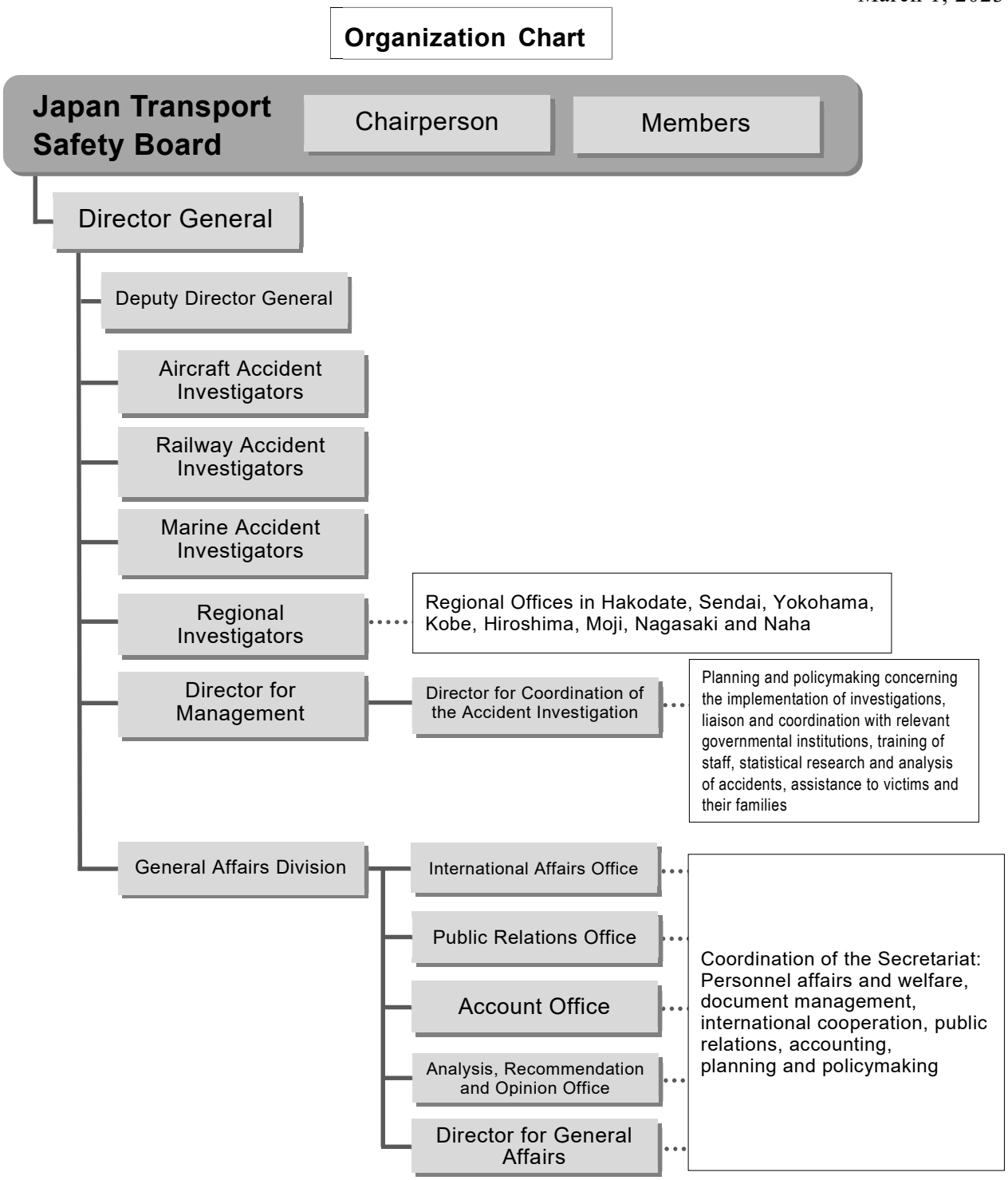
Appendices

Appendices Contents

1 Outline of the organization

The Japan Transport Safety Board consists of the Chairperson, 12 members, and 182 secretariat staff (as of April 1, 2022). The staff in the secretariat consist of investigators who conduct investigations of aircraft, railway and marine accidents; the General Affairs Division that performs coordination-related jobs for the secretariat; and the Director for Management who is dedicated to the support and statistical analysis of accident investigations, and international cooperation. In addition, special support staff and local investigators are stationed at eight regional offices around the country (Hakodate, Sendai, Yokohama, Kobe, Hiroshima, Moji, Nagasaki and Naha). These local investigators investigate marine accidents (excluding serious ones) and support staff provide initial support for aircraft, railway and marine accidents.

March 1, 2023



2 Board Members

As of March 1, 2023

TAKEDA Nobuo, Chairperson (Full-time), Director of Aircraft Committee

TAKEDA Nobuo was appointed as Chairperson of the Japan Transport Safety Board on April 1, 2019; belongs to the Aircraft Committee, the Railway Committee and the Marine Committee with special expertise in aerospace engineering, strength of materials and composite materials engineering.
Career summary: PhD, University of Florida and Graduate School of Engineering, the University of Tokyo (doctor of engineering), Emeritus Professor, Former Vice President, the University of Tokyo
Former Technical Advisor in Structures and Advanced Composite Research Unit, Aeronautical Technology Directorate of the Japan Aerospace Exploration Agency (JAXA)

SODA Hisako, Member (Full-time)

SODA Hisako was appointed as a member on April 1, 2022; belongs to the Aircraft Committee, the Railway Committee and the Marine Committee with special expertise in legislation.
Career summary: Graduated from Faculty of Law, the University of Tokyo, Former Judge, Tokyo District Court

SHIMAMURA Atsushi, Member (Full-time), Vice-Chairperson, Deputy Director of Aircraft Committee

SHIMAMURA Atsushi was appointed as a member on February 27, 2022; belongs to the Aircraft Committee, with special expertise in operation and maintenance of aircraft and air navigation services engineering.
Career summary: Master of Engineering, Graduate School of Engineering, Yokohama National University
Former Fellow of Corporate Safety & Security of Japan Airlines Co., Ltd.

MARUI Yuichi, Member (Full-time)

MARUI Yuichi was appointed as a member on December 6, 2016; belongs to the Aircraft Committee, with special expertise in maneuvering of aircraft.
Career summary: Graduated from Civil Aviation College
Former D. Senior Vice President, Corporate Safety and Security, All Nippon Airways Co., Ltd.

OKUMURA Fuminao, Member (Full-time), Director of Railway Committee

OKUMURA Fuminao was appointed as a member on December 6, 2016; belongs to the Railway Committee, with special expertise in railway engineering and geotechnical engineering.
Career summary: Doctor of Engineering, graduated from the Department of Civil Engineering, Faculty of Engineering, Tokyo Institute of Technology
Former Executive Director of the Railway Technical Research Institute

ISHIDA Hiroaki, Member (Full-time), Deputy Director of Railway Committee

ISHIDA Hiroaki was appointed as a member on December 26, 2016; belongs to the Railway Committee, with special expertise in dynamics of machinery, vehicle dynamics and railway vehicle engineering.
Career summary: Doctor of Engineering, graduated from the Department of Industrial Mechanical Engineering, Faculty of Engineering, the University of Tokyo
Former Professor in the Program in Mechanical Engineering, Department of Interdisciplinary Science and Engineering, School of Science and Engineering, Meisei University

SATO Yuji, Member (Full-time), Director of Marine Committee

SATO Yuji was appointed as a member on October 1, 2017; belongs to the Marine Committee and the Marine Special Committee, with special expertise in ship operation and maritime traffic safety.
Career summary: Graduated from Japan Coast Guard Academy
Former Commandant of Japan Coast Guard
Former President of Japan Coast Guard Foundation

TAMURA Kenkichi, Member (Full-time), Deputy Director of Marine Committee

TAMURA Kenkichi was appointed as a member on October 1, 2017; belongs to the Marine Committee and the Marine Special Committee, with special expertise in naval architect.
Career summary: Doctor of Engineering, Graduate School of Engineering, the University of Tokyo
Former Senior Director for Research of National Maritime Research Institute, National Institute of Maritime, Port and Aviation Technology

NAKANISHI Miwa, Member (Part-time)

NAKANISHI Miwa was appointed as a member on February 27, 2016; belongs to the Aircraft Committee, with special expertise in ergonomics (human factors).
Career summary: Doctor of Engineering, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Keio University
Associate Professor in the Department of Administration Engineering, Faculty of Science and Technology, Keio University (current post)

TSUDA Hiroka, Member (Part-time)

TSUDA Hiroka was appointed as a member on October 1, 2020; belongs to the Aircraft Committee, with special expertise in flight dynamics and control of aircraft, flight simulation and flight test.
Career summary: Completion of the doctoral first course for Department of Human Media Systems, Graduate School of Information Systems, The University of Electro-Communications
Senior R&D Fellow, Aviation Use Expansion Innovation Hub, Aeronautical Technology Directorate, Japan Aerospace Exploration Agency (current post)

SUZUKI Mio, Member (Part-time)

SUZUKI Mio was appointed as a member on December 6, 2019; belongs to the Railway Committee, with special expertise in traffic engineering and human factors.
Career summary: Doctor of Engineering, Department of Built Environment, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Associate Professor in the Department of Civil Engineering, Tokai University (current post)

NIITSUMA Mihoko, Member (Part-time)

NIITSUMA Miho was appointed as a member on December 6, 2019; belongs to the Railway Committee, with special expertise in electrical engineering.
Career summary: Doctor of Engineering, Department of Electrical Engineering and Information Systems, Graduate School of Engineering, The University of Tokyo
Professor in the Department of Precision Mechanics, Faculty of Science and Engineering, Chuo University (current post)

OKAMOTO Makiko, Member (Part-time)

OKAMOTO Makiko was appointed as a member on October 1, 2017; belongs to the Marine Committee and the Marine Special Committee, with special expertise in safety ergonomics.
Career Summary: Doctor of Human Sciences, Graduate School of Human Sciences, Waseda University, Lawyer, Associate Professor in Faculty of Social Security Science, Kansai University (current post)

The chairperson and members of the Board shall be appointed by the Minister of Land, Infrastructure, Transport and Tourism with the consent of both houses of Representatives and Councilors.

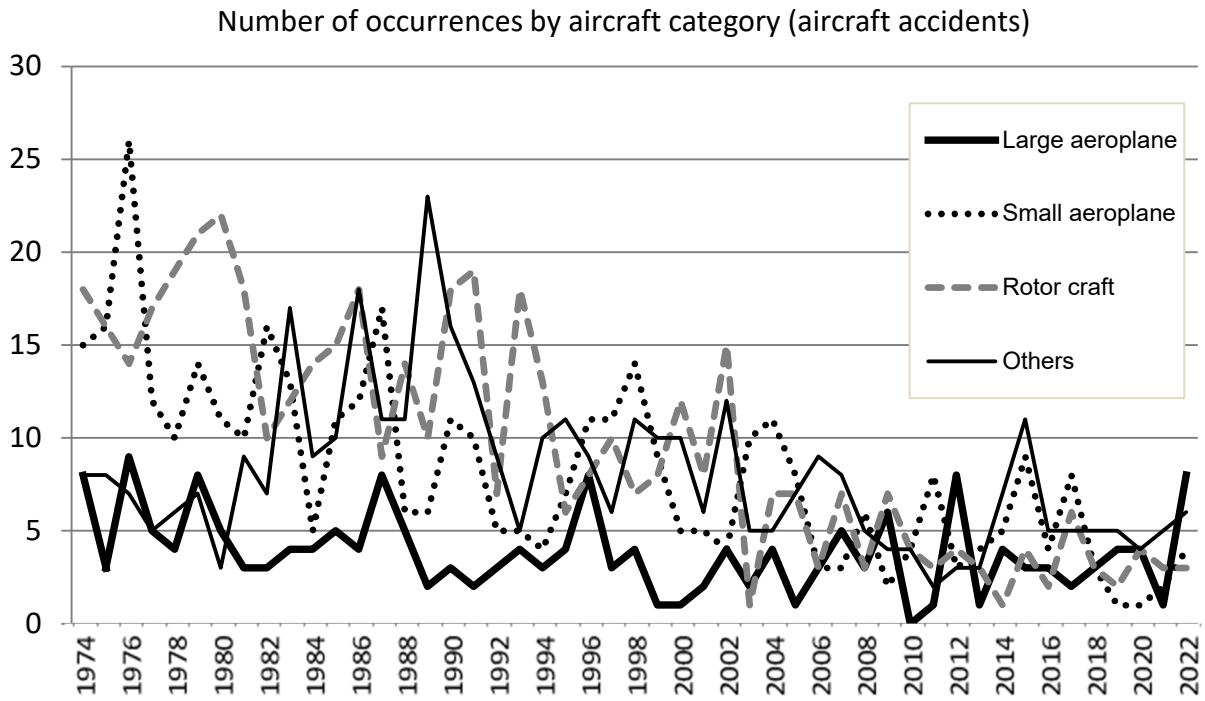
3 Number of occurrences by aircraft category (aircraft accidents)

(Cases)

Category / Year of occurrence	Aircraft			Rotorcraft		Glider	Airship	Unmanned aircraft	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane				
1974	8	15	0	17	1	8	0	-	49
1975	3	16	0	16	0	8	0	-	43
1976	9	26	0	14	0	7	0	-	56
1977	5	12	0	16	1	5	0	-	39
1978	4	10	0	18	1	6	0	-	39
1979	8	14	0	20	1	6	1	-	50
1980	5	11	0	22	0	3	0	-	41
1981	3	10	1	18	0	8	0	-	40
1982	3	16	0	9	1	7	0	-	36
1983	4	13	10	12	0	7	0	-	46
1984	4	5	6	13	1	3	0	-	32
1985	5	11	6	15	0	4	0	-	41
1986	4	12	14	15	3	4	0	-	52
1987	8	17	8	8	1	3	0	-	45
1988	5	6	7	12	2	3	1	-	36
1989	2	6	11	9	1	12	0	-	41
1990	3	11	9	16	2	7	0	-	48
1991	2	10	6	19	0	7	0	-	44
1992	3	5	5	7	0	4	0	-	24
1993	4	5	3	17	1	2	0	-	32
1994	3	4	8	13	0	2	0	-	30
1995	4	7	10	6	0	1	0	-	28
1996	8	11	5	8	0	4	0	-	36
1997	3	11	3	8	2	3	0	-	30
1998	4	14	5	6	1	6	0	-	36
1999	1	9	5	7	1	5	0	-	28
2000	1	5	5	11	1	5	0	-	28
2001	2	5	2	8	0	4	0	-	21
2002	4	4	5	15	0	7	0	-	35
2003	2	10	3	1	0	2	0	-	18
2004	4	11	2	6	1	3	0	-	27
2005	1	8	0	7	0	7	0	-	23
2006	3	3	4	2	1	5	0	-	18
2007	5	3	4	7	0	4	0	-	23

Category / Year of occurrence	Aircraft			Rotorcraft		Glider	Airship	Unmanned aircraft	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane				
2008	3	6	2	3	0	3	0	-	17
2009	6	2	1	7	0	3	0	-	19
2010	0	4	2	4	0	2	0	-	12
2011	1	8	1	3	0	1	0	-	14
2012	8	3	2	4	0	1	0	-	18
2013	1	4	1	3	0	2	0	-	11
2014	4	5	2	1	0	5	0	-	17
2015	3	9	3	3	1	8	0	-	27
2016	3	4	1	2	0	4	0	-	14
2017	2	8	3	5	1	2	0	-	21
2018	3	3	4	3	0	1	0	-	14
2019	4	1	2	2	0	3	0	-	12
2020	4	1	4	3	1	0	0	-	13
2021	1	2	2	3	0	3	0	-	11
2022	8	4	4	3	0	2	0	0	21
Total	188	400	181	447	26	212	2	0	1,456

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission.
2. Large aeroplanes are aircraft with a maximum take-off weight of more than 5,700 kg.
3. Small aeroplanes are aircraft with a maximum take-off weight of 5,700kg or less, excluding Ultralight planes.
4. Ultralight planes include self-made, ultralight plane-shaped aircraft.
5. Gyroplanes include self-made, gyroplane-shaped aircraft.
6. The number of unmanned aircraft in 2022 is from December onward.



4 Number of fatalities in accidents (aircraft accidents)

(Persons)

Year of occurrence \ Category		Aircraft			Rotorcraft		Glider	Total	
		Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane			
2008	Crew	0	1	1	2	0	1	5	5
	Passengers and others	0	0	0	0	0	0	0	
2009	Crew	2	0	2	5	0	0	9	9
	Passengers and others	0	0	0	0	0	0	0	
2010	Crew	0	2	1	14	0	0	17	17
	Passengers and others	0	0	0	0	0	0	0	
2011	Crew	0	5	0	1	0	0	6	6
	Passengers and others	0	0	0	0	0	0	0	
2012	Crew	0	0	0	0	0	0	0	1
	Passengers and others	0	1	0	0	0	0	1	
2013	Crew	0	0	0	0	0	1	1	2
	Passengers and others	0	0	0	0	0	1	1	
2014	Crew	0	1	0	0	0	0	1	2
	Passengers and others	0	1	0	0	0	0	1	

Year of occurrence \ Category		Aircraft			Rotorcraft		Glider	Total	
		Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane			
2015	Crew	0	1	1	2	0	1	5	10
	Passengers and others	0	2	1	2	0	0	5	
2016	Crew	0	1	0	0	0	3	4	8
	Passengers and others	0	3	0	0	0	1	4	
2017	Crew	0	2	0	2	1	1	6	22
	Passengers and others	0	4	0	12	0	0	16	
2018	Crew	0	0	2	1	0	0	3	11
	Passengers and others	0	0	0	8	0	0	8	
2019	Crew	0	0	1	0	0	0	1	1
	Passengers and others	0	0	0	0	0	0	0	
2020	Crew	0	0	1	1	0	0	2	2
	Passengers and others	0	0	0	0	0	0	0	
2021	Crew	0	0	0	1	0	1	2	3
	Passengers and others	0	0	0	0	0	1	1	
2022	Crew	0	2	1	1	0	1	5	9
	Passengers and others	0	2	1	0	0	1	4	
	Crew	2	15	10	30	1	9	67	108
	Passengers and others	0	13	2	22	0	4	41	
	Total	2	28	12	52	1	13		

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission in 2008
2. Death tolls represent data for the respective years of occurrence relisted from the annual reports published for those years.
3. Large aeroplanes are aircraft with a maximum take-off weight of more than 5,700 kg.
4. Small aeroplanes are aircraft with a maximum take-off weight of 5,700kg or less, excluding Ultralight planes.
5. Ultralight planes include self-made, ultralight plane-shaped aircraft.
6. Gyroplanes include self-made, gyroplane-shaped aircraft.

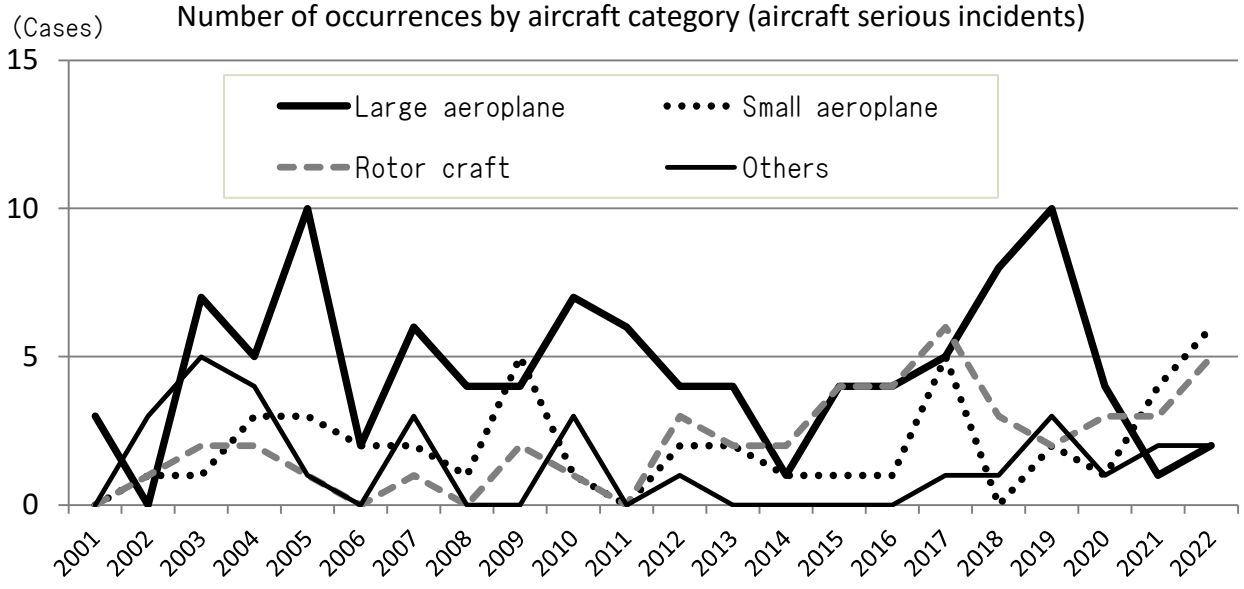
5 Number of occurrences by aircraft category (aircraft serious incidents)

(Cases)

Year of occurrence \ Category	Aircraft			Rotorcraft		Glider	Airship	Unmanned aircraft	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane				
2001	3	0	0	0	0	0	0	-	3
2002	0	1	2	1	0	1	0	-	5
2003	7	1	4	2	0	1	0	-	15
2004	5	3	4	2	0	0	0	-	14
2005	10	3	1	1	0	0	0	-	15

Category / Year of occurrence	Aircraft			Rotorcraft		Glider	Airship	Unmanned aircraft	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane				
2006	2	2	0	0	0	0	0	-	4
2007	6	2	2	1	0	1	0	-	12
2008	4	1	0	0	0	0	0	-	5
2009	4	5	0	2	0	0	0	-	11
2010	7	1	3	1	0	0	0	-	12
2011	6	0	0	0	0	0	0	-	6
2012	4	2	0	3	0	1	0	-	10
2013	4	2	0	2	0	0	0	-	8
2014	1	1	0	2	0	0	0	-	4
2015	4	1	0	4	0	0	0	-	9
2016	4	1	0	4	0	0	0	-	9
2017	5	5	0	6	0	1	0	-	17
2018	8	0	0	3	0	1	0	-	12
2019	10	2	0	2	0	3	0	-	17
2020	4	1	1	3	0	0	0	-	9
2021	1	4	1	3	0	1	0	-	10
2022	2	6	1	5	0	1	0	0	15
Total	101	44	19	47	0	11	0	0	222

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission.
The number of cases for 2001 represents those that occurred from October onward.
2. Large aeroplanes are aircraft with a maximum take-off weight of more than 5,700 kg.
3. Small aeroplanes are aircraft with a maximum take-off weight of 5,700kg or less, excluding Ultralight planes.
4. Ultralight planes include self-made, ultralight plane-shaped aircraft.
5. The number of unmanned aircraft in 2022 is from December onward.



6 Number of occurrences by type (railway accidents)

(Cases)

Year of occurrence \ Type	Railway							Tramway							Total
	Train collision	Train derailment	Train fire	Level crossing accident	Accident against road traffic	Other accidents with casualties	Heavy property loss without casualties	Vehicle collision	Vehicle derailment	Vehicle fire	Level crossing accident	Accident against road traffic	Other accidents with casualties	Heavy property loss without casualties	
2001	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
2002	1	14	1	2	0	1	1	0	0	0	0	0	0	0	20
2003	1	20	2	0	0	0	0	0	0	0	0	0	0	0	23
2004	0	18	0	1	0	0	0	0	1	0	0	0	0	0	20
2005	2	20	0	0	0	1	0	0	1	0	0	0	0	0	24
2006	1	13	0	1	0	0	0	1	0	0	0	0	0	0	16
2007	0	12	2	3	0	0	0	0	2	0	0	0	0	0	19
2008	0	7	2	2	0	1	1	0	0	0	0	0	0	0	13
2009	0	5	1	2	0	3	0	0	0	0	0	0	0	0	11
2010	0	6	0	0	0	1	0	0	0	0	0	2	0	0	9
2011	0	12	0	1	0	1	0	0	0	0	0	0	0	0	14
2012	0	13	2	0	0	2	0	0	2	0	0	1	0	0	20
2013	0	11	1	1	0	1	0	0	1	0	0	0	0	0	15
2014	1	9	0	4	0	0	0	0	0	0	0	0	0	0	14
2015	1	5	1	4	0	1	0	0	1	0	0	0	0	0	13

2016	0	7	0	15	0	0	0	0	1	0	0	0	0	0	23
2017	0	9	0	7	0	2	1	0	0	0	0	0	0	0	19
2018	0	2	0	9	0	0	0	0	0	0	0	0	0	0	11
2019	0	9	0	7	0	1	0	0	0	0	0	0	0	0	17
2020	0	7	0	6	0	0	0	0	0	0	0	0	0	0	13
2021	0	6	0	5	0	0	0	0	0	0	0	0	0	0	11
2022	0	5	0	8	0	1	0	0	0	0	0	0	0	0	14
Total	7	214	13	78	0	16	3	1	9	0	0	3	0	0	344

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission.
2. The number of cases for 2001 represents those that occurred from October onward.

7 Number of fatalities in accidents (railway accidents)

(Persons)

Death Classification / Year of occurrence	Crew members	Passengers	Others	Total
2008	0	0	2	2
2009	0	0	3	3
2010	0	0	2	2
2011	0	0	1	1
2012	0	0	1	1
2013	0	0	1	1
2014	0	0	6	6
2015	0	2	4	6
2016	0	0	15	15
2017	0	0	10	10
2018	0	0	9	9
2019	0	0	8	8
2020	0	0	1	1
2021	0	0	5	5
2022	0	0	9	9
Total	0	2	77	79

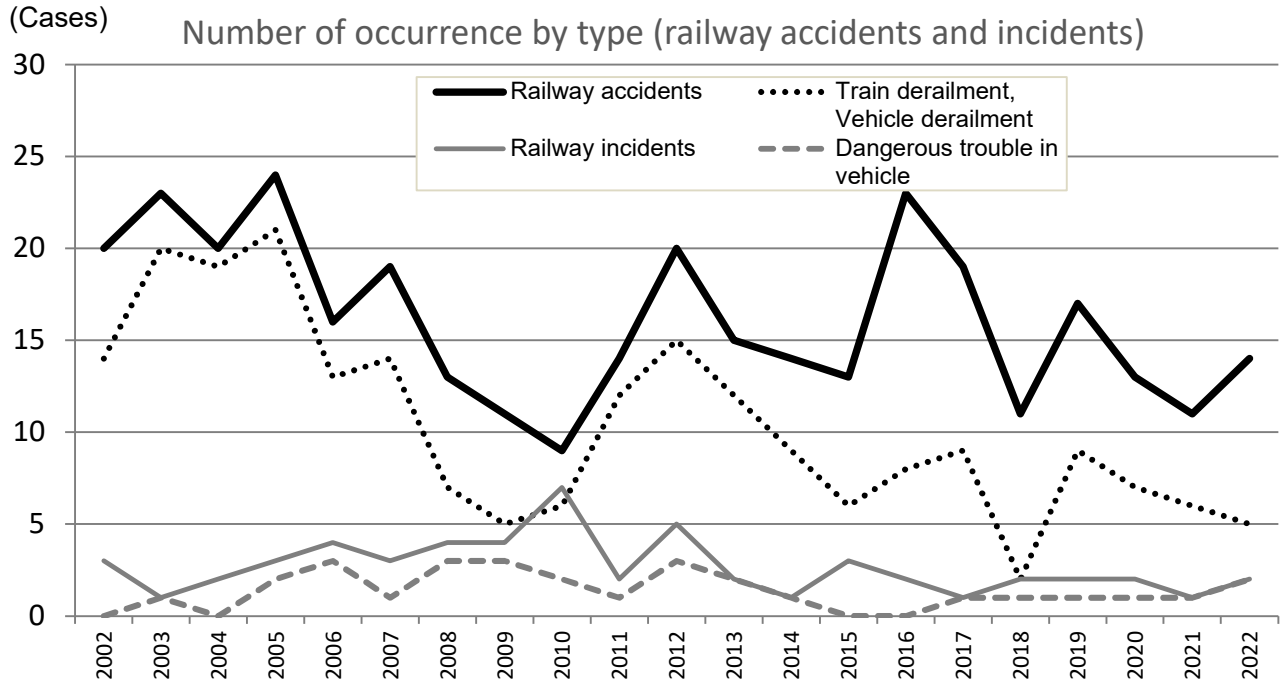
(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission in 2008
2. Death tolls represent data for the respective years of occurrence relisted from the annual reports published for those years.
3. As investigations began to cover fatal accidents at third- and fourth-class crossings without crossing gates in April 2014, the number of deaths occurring in those locations were added.

8 Number of occurrences by type (railway serious incidents)

(Cases)

Type / Year of occurrence	Railway										Tramway							Total
	Incorrect management of safety block	Incorrect indication of signal	Violating red signal	Main track overrun	Violating closure section	Vehicle derailment	Dangerous damage in facilities	Dangerous trouble in vehicle	Heavy leakage of dangerous object	Others	Incorrect management of safety block	Violating red signal	Main track overrun	Dangerous damage in facilities	Dangerous trouble in vehicle	Heavy leakage of dangerous object	Others	
2001	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2002	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2003	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
2004	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
2005	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3
2006	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	4
2007	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	3
2008	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	4
2009	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	4
2010	1	0	0	0	1	1	0	2	0	0	1	1	0	0	0	0	0	7
2011	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
2012	0	0	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	5
2013	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
2014	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
2015	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	3
2016	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
2017	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
2018	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
2019	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
2020	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2
2021	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
2022	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Total	1	7	0	1	7	2	3	29	0	3	3	1	0	0	0	0	0	57

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission.
2. The number of cases for 2001 represents those that occurred from October onward.



9 Number of occurrences by area (marine accidents and incidents)

(Cases)

Area / Year of occurrence	In Japanese waters			Outside Japanese waters	Total
	In ports specified by the Cabinet Order	Within 12 nautical miles	In lakes or rivers		
2007	0	3	0	0	3
2008	227	576	15	55	873
2009	341	1,065	34	82	1,522
2010	305	909	38	82	1,334
2011	238	781	28	79	1,126
2012	224	807	31	53	1,115
2013	214	764	35	69	1,082
2014	193	762	31	44	1,030
2015	153	674	44	39	910
2016	147	638	43	21	849
2017	154	670	35	47	906
2018	186	689	38	44	957
2019	218	761	53	35	1,067
2020	176	641	38	18	873
2021	156	685	26	17	884
2022	176	607	40	19	842
Total	3,108	11,032	529	704	15,373

(Note) The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of December 2021 (including those carried over from the former Marine Accident Inquiry Agency).

10 Number of occurrences by type (marine accidents and incidents)

(Cases)

Type / Year	Marine accidents												Marine incidents				Total
	Collision	Contact	Grounding	Foundering	Flooding	Capsizing	Fire	Explosion	Missing	Facility damage	Fatality/Injury	Others	Loss of control	Stranded	Safety obstruction	Navigation obstruction	
2007	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
2008	181	101	255	12	4	28	15	3	0	30	61	0	54	34	8	87	873
2009	325	174	431	16	19	58	42	3	0	38	217	2	105	33	0	59	1,522
2010	356	180	369	15	18	50	35	2	0	26	146	0	83	16	0	38	1,334
2011	282	145	265	12	18	56	32	1	0	23	142	1	103	10	1	35	1,126
2012	246	133	264	5	21	55	44	2	0	33	155	0	113	5	4	35	1,115
2013	264	145	210	10	25	49	33	2	0	38	163	2	106	7	3	25	1,082
2014	265	116	213	7	11	61	35	1	0	37	150	3	92	15	0	24	1,030
2015	244	102	202	5	12	56	38	3	0	20	122	1	85	4	4	12	910
2016	217	94	163	5	19	46	26	3	0	21	144	0	85	6	6	14	849
2017	200	96	181	14	22	55	27	3	0	23	143	0	115	4	3	20	906
2018	243	86	172	21	26	52	24	2	0	24	180	0	107	10	0	10	957
2019	219	98	201	11	26	67	31	1	0	40	145	2	181	24	0	21	1,067
2020	190	94	155	13	15	52	29	2	0	21	134	1	141	14	2	10	873
2021	199	80	173	3	36	67	26	3	1	35	122	1	121	12	0	5	884
2022	176	87	143	7	16	57	30	2	1	9	130	2	169	10	0	3	842
Total	3,607	1,732	3,399	156	288	809	467	33	2	418	2,154	15	1,660	204	31	398	15,373

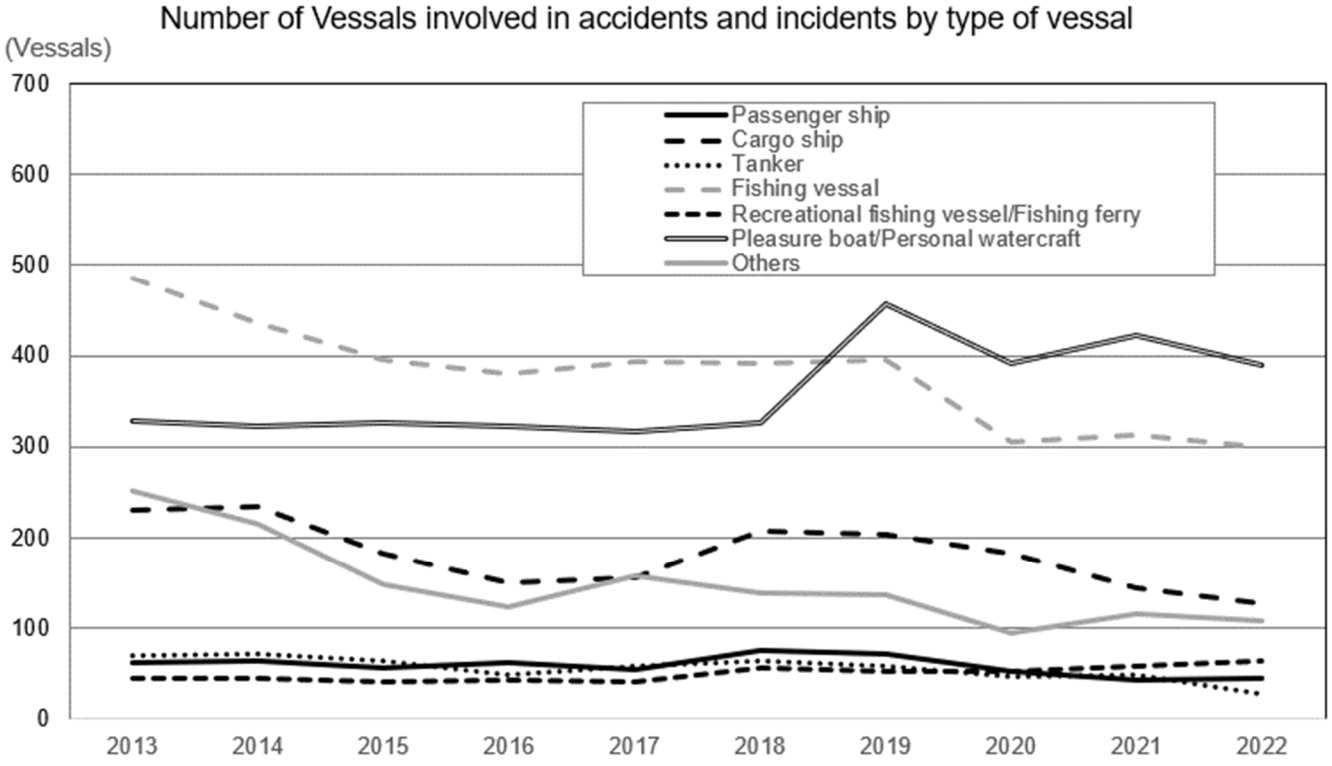
(Note) 1. The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of December 2021 (including those carried over from the former Marine Accident Inquiry Agency).
2. The figures in the column “Fatality/Injury” are the number of cases involving death, death and injury, missing persons, or injury which is not a result from other types of accident.

11 Number of vessels involved in accidents and incidents by type of vessel (marine accidents and incidents)

(Vessels)

Type of Vessel / Year	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational	Fishing ferry	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
2007	2	1	0	0	0	0	0	0	0	0	0	0	0	3
2008	55	318	55	307	98	28	6	27	59	11	126	31	7	1,128
2009	103	480	83	605	163	39	5	35	104	40	249	65	23	1,994

Type of Vessel / Year	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational	Fishing ferry	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
2010	99	398	105	555	123	53	6	48	82	24	251	66	18	1,828
2011	68	285	105	504	89	38	6	29	50	16	250	46	21	1,507
2012	79	296	75	467	91	33	8	36	59	14	247	55	8	1,468
2013	62	231	70	485	101	41	4	37	72	24	264	64	18	1,473
2014	63	235	71	436	91	39	5	36	58	17	253	69	13	1,386
2015	57	183	63	396	53	33	7	28	45	14	279	48	9	1,215
2016	62	150	49	379	47	36	7	27	33	11	254	68	5	1,128
2017	55	155	59	393	63	37	3	29	45	13	275	42	7	1,176
2018	76	207	63	391	52	48	8	20	36	14	269	57	16	1,257
2019	72	203	58	396	50	47	6	30	32	10	411	46	15	1,376
2020	52	183	47	306	35	50	2	14	22	10	335	56	13	1,125
2021	42	144	49	312	37	53	5	30	23	12	365	57	13	1,142
2022	44	127	27	300	34	60	3	22	22	17	336	54	13	1,059
Total	991	3,597	979	6,232	1,127	635	81	448	742	247	4,164	824	198	20,265



(Note) The above table shows the number of vessels involved in accidents and incidents into which the JTSB launched an investigation as of the end of December 2021 (including those carried over from the former Marine Accident Inquiry Agency).

12 Number of vessels involved in accidents and incidents by gross tonnage (marine accidents and incidents)

(Vessels)

Gross Tonnage / Year	Less than 20 tons	20 to less than 100 tons	100 to less than 200 tons	200 to less than 500 tons	500 to less than 1,600 tons	1,600 to less than 3,000 tons	3,000 to less than 5,000 tons	5,000 to less than 10,000 tons	10,000 to less than 30,000 tons	More than 30,000 tons	Unknown	Total
2007	1	0	0	1	0	0	0	0	0	0	1	3
2008	485	52	138	216	77	24	16	17	10	15	78	1,128
2009	903	89	230	288	116	42	34	49	30	14	199	1,994
2010	900	86	175	260	128	36	37	39	25	24	118	1,828
2011	823	59	142	194	101	39	18	32	21	17	61	1,507
2012	790	53	133	199	78	33	25	38	25	20	74	1,468
2013	881	44	113	142	93	47	27	36	19	17	54	1,473
2014	839	46	86	145	87	38	26	29	17	17	56	1,386
2015	762	43	66	111	64	32	18	28	22	19	50	1,215
2016	745	31	64	104	61	23	17	21	18	10	34	1,128
2017	756	39	80	116	69	24	14	22	17	6	33	1,176
2018	798	32	79	118	75	46	31	19	15	12	32	1,257
2019	929	32	47	130	68	29	20	34	11	14	62	1,376
2020	769	19	47	124	54	21	6	27	13	15	30	1,125
2021	809	27	40	98	51	18	18	14	14	16	37	1,142
2022	678	30	40	102	31	20	9	19	9	4	117	1,059
Total	11,868	682	1,480	2,348	1,153	472	316	424	266	220	1,036	20,265

(Note) The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of December 2022 (including those carried over from the former Marine Accident Inquiry Agency).

13 Number of vessels involved in accidents and incidents in 2022 by type of accident/incident and type of vessel (marine accidents and incidents)

(Vessels)

Type of accident /incident / Type of Vessel	Marine accidents												Marine incidents				Total
	Collision	Contact	Grounding	Foundering	Flooding	Capsizing	Fire	Explosion	Missing	Facility damage	Fatality/Injury	Others	Loss of control	Stranded	Safety obstruction	Navigation obstruction	
Passenger ship	8	16	5	0	1	0	1	0	0	1	6	0	2	2	0	2	44
Cargo ship	48	25	30	0	1	1	2	0	0	2	4	1	11	2	0	0	127
Tanker	12	6	5	0	0	0	0	0	0	1	1	0	2	0	0	0	27
Fishing vessel	115	12	26	4	5	13	13	0	0	0	77	0	35	0	0	0	300
Tug boat, push boat	8	7	9	0	0	2	1	0	0	1	3	0	2	1	0	0	34
Recreational fishing vessel	26	3	11	0	1	0	0	0	0	0	4	0	15	0	0	0	60

Fishing ferry	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	3
Work vessel	7	2	1	0	0	4	3	0	0	1	3	0	1	0	0	0	22
Barge, lighter	5	4	7	1	0	1	0	0	0	0	3	0	1	0	0	0	22
Public-service ship	8	3	2	0	0	1	1	0	0	1	1	0	0	0	0	0	17
Pleasure boat	95	13	53	2	5	35	9	2	1	3	15	1	96	5	0	1	336
Personal water craft	23	0	0	0	3	1	0	0	0	0	23	0	4	0	0	0	54
Others	9	2	0	0	0	1	0	0	0	0	0	0	1	0	0	0	13
Total	364	93	150	7	16	59	31	2	1	10	141	2	170	10	0	3	1,059

(Note) 1. The above table shows the number of vessels involved in accidents and incidents into which the JTSB launched an investigation as of the end of December 2022.
2. The figures in the column “Fatality/Injury” are the number of cases involving death, death and injury, missing persons, or injury which is not a result from other types of accident.

14 Number of fatalities in accidents (marine accidents)

(Persons)

Year of occurrence \ Type of Vessel		Passenger ship	Cargo ship	Tanker	Fishing vessel	Recreational fishing vessel/ Fishing ferry	Pleasure boat/Personal water craft	Others	Total	
2008	Crew	0	2	1	51	1	5	1	61	71
	Passengers	0	0	0	0	2	0	0	2	
	Others	0	0	0	0	1	6	1	8	
2009	Crew	3	1	2	109	0	26	4	145	191
	Passengers	0	0	0	0	3	0	0	3	
	Others	1	5	0	6	0	27	4	43	
2010	Crew	1	10	1	74	0	11	2	99	129
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	3	0	1	1	22	2	29	
2011	Crew	3	4	8	83	3	18	7	126	146
	Passengers	4	0	0	0	2	0	0	6	
	Others	0	2	0	0	0	12	0	14	
2012	Crew	2	6	4	79	1	22	3	117	133
	Passengers	1	0	0	0	2	0	0	3	
	Others	1	1	0	1	0	8	2	13	
2013	Crew	0	17	2	69	0	19	7	114	134
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	2	0	0	0	16	1	19	
2014	Crew	0	11	3	89	0	17	3	123	138
	Passengers	0	0	0	0	2	0	0	2	
	Others	0	1	1	1	0	10	0	13	

Year of occurrence \ Type of Vessel		Passenger ship	Cargo ship	Tanker	Fishing vessel	Recreational fishing vessel/ Fishing ferry	Pleasure boat/Persona water craft	Others	Total	
2015	Crew	3	5	0	44	0	12	5	69	87
	Passengers	2	0	0	0	2	0	0	4	
	Others	0	0	0	0	0	13	1	14	
2016	Crew	1	4	5	45	1	10	4	70	93
	Passengers	0	0	0	0	2	0	0	2	
	Others	0	2	0	2	0	15	2	21	
2017	Crew	2	4	0	46	0	7	20	79	93
	Passengers	0	0	0	0	0	0	0	0	
	Others	0	0	0	0	0	12	2	14	
2018	Crew	0	2	1	48	0	10	2	63	87
	Passengers	0	0	0	0	1	0	0	1	
	Others	1	0	0	1	0	17	4	23	
2019	Crew	0	17	0	57	1	11	1	87	103
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	3	0	1	0	10	1	15	
2020	Crew	1	3	1	47	1	12	2	67	87
	Passengers	0	0	0	0	3	0	0	3	
	Others	0	2	0	0	0	11	4	17	
2021	Crew	0	4	1	51	0	15	2	73	89
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	1	0	0	0	14	0	15	
2022	Crew	2	1	1	32	0	10	6	52	76
	Passengers	18	0	0	0	0	0	0	18	
	Others	0	0	0	1	0	2	3	6	
Total	Crew	18	91	30	924	8	205	69	1,345	1,657
	Passengers	25	0	0	0	23	0	0	48	
	Others	3	22	1	14	2	195	27	264	
	Total	46	113	31	938	33	400	96		

(Note) The above table shows the number of vessels involved in accidents and incidents into which the JTSB launched an investigation as of the end of December 2022 (including those carried over from the former MarineAccident Inquiry Agency).

15 Numbers of issued recommendations, opinions and safety recommendations

Type and mode / Year	Recommendation			Opinion			Safety recommendation	
	Aircraft	Railway	Vessel	Aircraft	Railway	Vessel	Aircraft	Vessel
2008	—	—	—	2	—	—	—	—
2009	—	—	—	1	1	1	3	—
2010	—	—	—	—	—	1	1	—
2011	—	1	2	1	—	5	—	9
2012	1	1	6	1	—	4	1	2
2013	4	3	4	—	—	2	3	—
2014	4	—	—	—	—	1	2	6
2015	2	—	—	—	1	—	—	—
2016	1	—	—	—	—	—	1	3
2017	1	—	1	—	—	—	—	2
2018	1	—	1	1	2	2	—	1
2019	1	—	1	—	1	1	—	5
2020	3	—	2	—	—	—	—	1
2021	—	1	3	—	1	—	—	4
2022	—	—	1	—	—	3	—	—
Total	18	6	21	6	6	20	11	33

(Note) These were issued after the establishment of the JTSB in October 2008.

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