Japan Transport Safety Board
Annual Report 2022
【March 2022】

ANNUAL REPORT 2022

Japan Transport Safety Board

JTSB

Japan Transport Safety Board

Aiming for continuous contribution to fostering a culture of transportation safety

During the past two years, the COVID-19 pandemic has had a considerable impact on the accident investigation activities of our committee, as we have been required to take thorough measures to prevent the spread of infection, such as the avoidance of enclosed spaces, crowding, close proximity, and prevention of droplets, when conducting on-site investigations and interviews with those involved in accidents. However, thanks to the steady efforts and ingenuity of the accident investigators and the secretariat that supports them, we have been able to continue our investigation activities close to normal last year.

Although society and the economy have been greatly affected by the COVID-19 pandemic, the number of accidents and serious incidents in aircraft, railway and marine has not decreased drastically. Even under these circumstances, the transportation safety that has been cultivated in Japan must not be impaired. By investigating the causes of accidents and serious incidents, and recommending measures to prevent recurrence and to mitigate damage, we hope to steadily fulfill the important role of the Japan Transport Safety Board (JTSB), which is the key to protecting transportation safety, from a fair and neutral standpoint.

With this mission in mind, the JTSB has independent authority to manage personnel affairs as an external organ of the Ministry of Land, Infrastructure, Transport and Tourism, and independently and continuously recruits not only accident investigators but also administrative and technical staff as needed. Three staff members were hired in FY 2021, and the same number of staff members are expected to be hired in FY 2022 and beyond. Even if staff members are not hired as accident investigators, we are working to develop human resources by preparing a career advancement route for them to become accident investigators by gaining various experiences in the secretariat. In addition, with the enforcement of the revised Civil Aeronautics Act and other acts enacted last year, the JTSB will newly conduct accident investigations involving unmanned aircraft such as drones, whose

use is expected to expand in the future. For this reason, two new aircraft accident investigators have been hired, and we are prepared to respond well to accident investigations in this new field.

By the way, some of the accidents and incidents that we handle are high-profile, and we have been steadily investigating the causes of these cases and making recommendations for the prevention of similar accidents and mitigation of damage. On the other hand, the importance of all accidents and incidents subject to investigation remains unchanged for the purpose of contributing to the prevention of accidents and mitigation of damage.

For example, in the aviation mode, when there are incidents involving small aeroplane operated by individuals, such as ultralight plane and gliders, or when passengers and cabin crew are injured due to aircraft turbulence, we believe that it is also important to contribute to the safety of the aviation sector by carefully investigating each accidents and serious incidents, clarifying the cause, and providing useful information to prevent similar accidents so that people can enjoy aviation leisure and air travel safely.

In the railway mode, focusing on fatal accidents at class 3 and class 4 level crossings without automatic barrier machine, the JTSB has set up a section on our website, entitled "To Prevent Level Crossing Accidents," where we provide information obtained through investigations and examples of efforts to abolish class 3 and class 4 level crossings and replace them with class 1 level crossings. There are still many fatal accidents at the approximately 3,200 class 3 and class 4 level crossings, and the JTSB will continue to investigate the causes and make recommendations for accident prevention based on appropriate investigations, as well as make efforts to disseminate information, including by enhancing the website.

In recent years, the marine mode has been using quantitative collision risk analysis and assessment methods based on the AIS (Automatic Identification System) records of the ships involved to determine the causes of collisions. We will also continue to actively utilize quantitative analysis from the perspective of enhancing more scientific research. In addition, the eight regional offices of the JTSB investigate and publish reports on hundreds of marine accidents and incidents every year. Accidents related to pleasure boats and other marine leisure activities

continue to occur, and we intend to continue our efforts to contribute to accident prevention by utilizing the results of the regional office's investigation.

The JTSB will contribute to the prevention of accidents and mitigation of damages by steadily accumulating facts on each case, conducting more scientific and objective analysis such as quantitative assessment, compiling a report at an early stage, and making recommendations as needed, as well as actively contributing to the fostering of a culture of transportation safety in Japan by providing information necessary for safety.

Your understanding, support and cooperation would be highly appreciated.

March, 2022

TAKEDA Nobuo
Chairperson
Japan Transport Safety Board

Japan Transport Safety Board
Annual Report 2022
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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. Investigating aircraft accidents using drones

The aviation field started aircraft accident investigations actively using drones.

Contracted private business operators have used drones for some accident investigations. It took them time to pre-arrange photographing points, etc. with relevant drone controllers and to conduct contract procedures. Thus, using drones in a timely manner has been an issue.

Photo 1. Drone of Japan Transport Safety Board

Now, compact and light weight drone (Photo 1) has been introduced which enables aerial photographing even in 4K. Because of this, accident investigators are able to pack such a drone in a bag to carry with them, fly the drone by themselves at the accident location, and take on-site images from the sky in a timely manner.

On-site photographingby drone has enabled investigators to easily grasp the distribution of wreckage by capturing a wide image of the site (see Photo 2), visually reveal the mark from a contact point to a stop position on a runway when landing, or depict a flight path of an airframe from a contact position to a crash location with an obstacle, etc. in three dimensions (see Photo 2). In addition, it is also possible to create three-dimensional digital images, which are called orthomosaic images, based on a series of images obtained through a programmed flight using photogrammetric software.

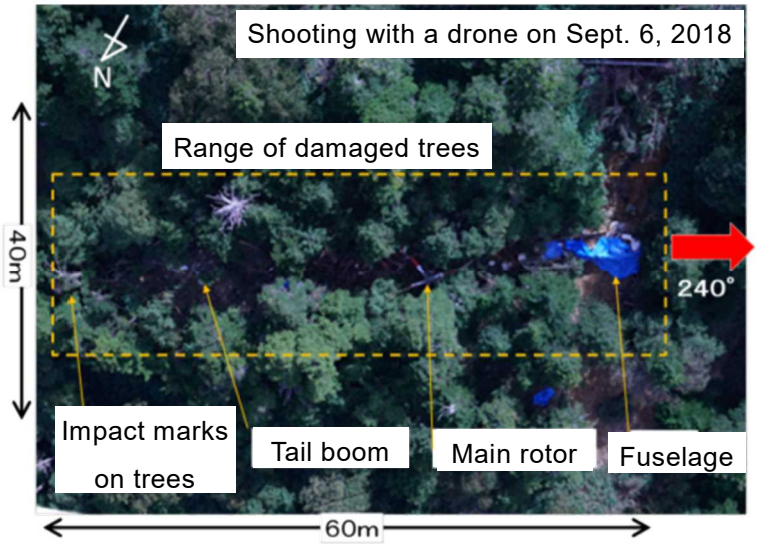


Photo 2. Distribution of wreckage and a trace up to the stop position

Although photographing from helicopters or other small airplanes is possible, drones enable easy, inexpensive, and speedy photographing with high accuracy from low altitudes without restrictions such as weather and the lowest flight altitude that aircrafts must comply with, excluding cases under rain and/or strong wind.

In accident investigations so far, investigators used measures, laser distance meters, or GPS receivers to conduct measuring and then create wreckage layout drawings, etc. by plotting positions on the drawings, but now investigators can measure highly-accurate positional relationships by using photographs by drones and their data.

To use drones in investigations, it is essential to learn how to control drones and photograph aerial

images in order to acquire qualifications. Acquiring such qualifications is on-going and various methods of photographing aerial images are being studied.

Thus, it is thought that using data obtained with drones enables more scientific analysis, and helps investigators make investigation reports more visually easy-to-understand than they are now. Moreover, investigators are putting more effort into using drones for accident investigations related to unmanned aircrafts planned to be implemented from the end of 2022.

2. Aircraft serious incident investigation report published regarding the front landing gear damaged of a passenger aircraft at landing

[Summary]

On Saturday, March 24, 2018, a passenger aircraft was forced to stop on the runway with its nose wheel turned sideways at about 90 degrees after landing at Fukuoka Airport. Consequently, the aircraft was unable to continue taxiing. (See Photo 1)

None of passengers were injured.

Photo 1. Serious incident aircraft
(at the time of the serious incident)

[Probable causes]

It is highly probable that the aircraft was unable to continue taxiing because during its landing roll, the Apex pin was disconnected, which is one of parts that link the crew's steering operations to the nose wheel, causing lost control of the nose wheel steering.

After the accident occurred, the pin was found on the runway, and it was revealed that the threads of the pin were damaged and corroded (see Photo 2). Because the damage and corrosion of the pin threads might have caused it to fall out, and other aircrafts of the same type might have similar potential troubles, the Japan Transport Safety Board provided information on the damage to the pin to the Civil Aviation Bureau. In response to the information, the Civil Aviation Bureau instructed business operators in Japan that operate aircrafts of the same type to inspect the concerned pins. As a result, a corroded pin was found on an aircraft of the same type, and thus, necessary measures were taken to prevent the pin from falling out, etc.

The accident investigation and analysis were carried out to determine the cause of the pin falling out, cooperating with the French aircraft accident investigating authority, the BEA (Bureau d'Enquêtes et d'Analyses: France is the State of Design and Manufacture of the aircraft). As a result, it was revealed that repeated pin installation and removal for inspection damaged the cadmium plating applied to the pin threads to prevent corrosion. Corrosion started and progressed in the damaged cadmium plating, subsequently the threads got damaged, and eventually the pin fell out. It was also revealed that inappropriate work at the contracted maintenance operator

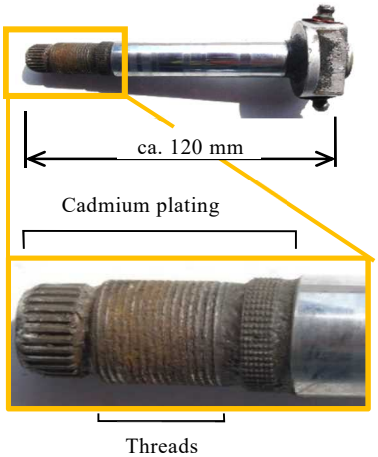


Photo 2. Apex pin

might have accelerated the corrosion progress.

Based on these investigation results, the aircraft manufacturer is to instruct aircraft operators to conduct periodic inspection of the pins concerned, additionally, the aircraft manufacturer is to take measures to prevent such recurrences by clarifying such as the maintenance manual, and developing pins with improved corrosion resistance as permanent measures (see Chapter 3 (page 45)).

3. Accident inspection report published on the automatically operated train

[Summary]

On June 1, 2019, the outbound train started from Shin-Sugita station bound for Namiki-Chuo station departed from Shin-Sugita station in the unmanned automatic operation, but the train moved to the inbound direction (running in the wrong direction) and collided with the car stop. 17 passengers were injured.

Wired status viewed from aisle side, broken in back side of the circled bundle of cables

[Probable causes]

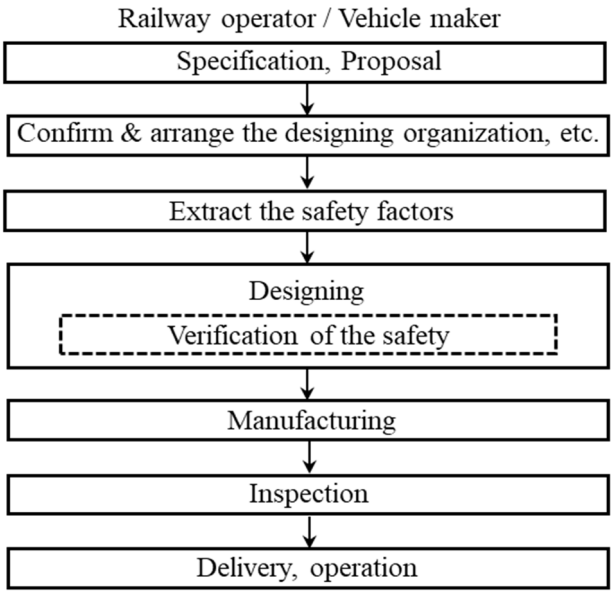
It is probable that the electric wire to convey the running direction in the Device Room of the train was broken, so the running direction did not change in the control device at the turn-back station. Therefore, the train ran in wrong direction, resulting in collision with the car stop.

As a background to this accident, it is likely that the latent causes for such dangerous incident were existed because the confirmation and the arrangement on the understandings for the designing organization, etc., and the extraction of items to be paid attention before designing between related parties the safety factors were not implemented sufficiently, in the designing and manufacturing process of the vehicle. In addition, it is probable that the existance of latent causes of the dangerous events was not noticed due to the insufficient verification of the safety during the design examination, etc.

In this investigation, in view of widely preventing accidents caused by the designing and manufacturing process of the vehicle as well as preventing the recurrence of the accident, analysis was conducted even on the background of the accident, such as factors resulted in the designing in which conditions led to the backward running were overlooked, and factors that made risk of the backward running not be noticed even during the design examination.

Based on the result, Japan Transport Safety Board has recommended establishing of the following stages regarding to the designing and manufacturing process to the Minister of Land, Infrastructure, Transport and Tourism: "confirm and arrange the designing organization, etc.", "extract safety factors", "verify the safety", for preparing the designing organization to implement the system integration, etc., and the thorough instruction provision to the railway and tramway operators and the manufacturers of the railway vehicles, etc., and has also provided opinions to the Minister of Land, Infrastructure, Transport and Tourism on considering the institutionalization of the details of the recommendations.

(For more details, see Chapter 2 (page 19 and page 24), Chapter 4 (page 70).)



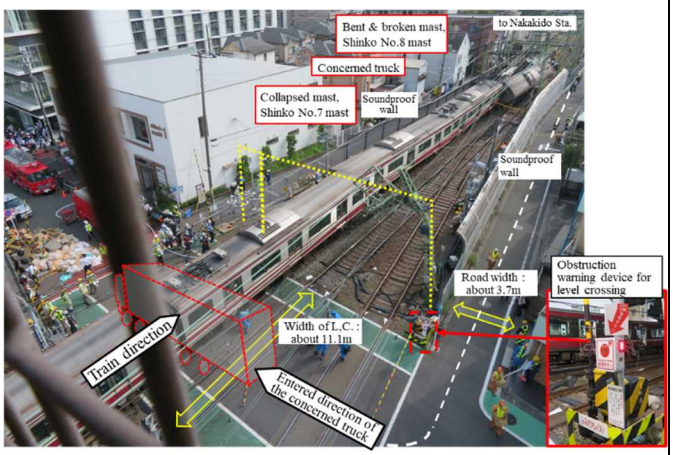
Design and manufacturing process

4. Accident investigation report published regarding derailment caused by collision between a train and truck

[Summary]

On September 5, 2019, the train started from Aoto station bound for Misakiguchi station collided with a truck and derailed at Kanagawa-shimmachi No.1 level crossing. In addition, the truck was wrecked and caught fire.

The Truck driver died, and 75 passengers, the Driver of the train, and the Conductor were injured.



Status of around the accident site

[Probable causes]

The JTSB concludes that the probable cause of this accident was certain that the truck entered the Level crossing and hindered the route of the train, and the train could not stop before the Level crossing although the obstruction warning signal of the Level crossing had been indicating the stop signal, then collided with the Truck.

In the investigation, analysis was conducted, focusing on how the truck entered the Level crossing and hindered the route of the train, and on the brake application after the stop signal for the train was indicated, and other factors.

As a result, it was revealed that it is likely that the Truck stayed in the Level crossing because it took a long time to pass through due to the narrow width of the road. In addition, it was revealed that the brake operation of the train involved with the installation position of the obstruction warning signal, obstructed view, and so on, delayed noticing of the stop signal of the obstruction warning signal, and the rules for handling the brake when the stop signal was indicated were not clearly stated, and so on.

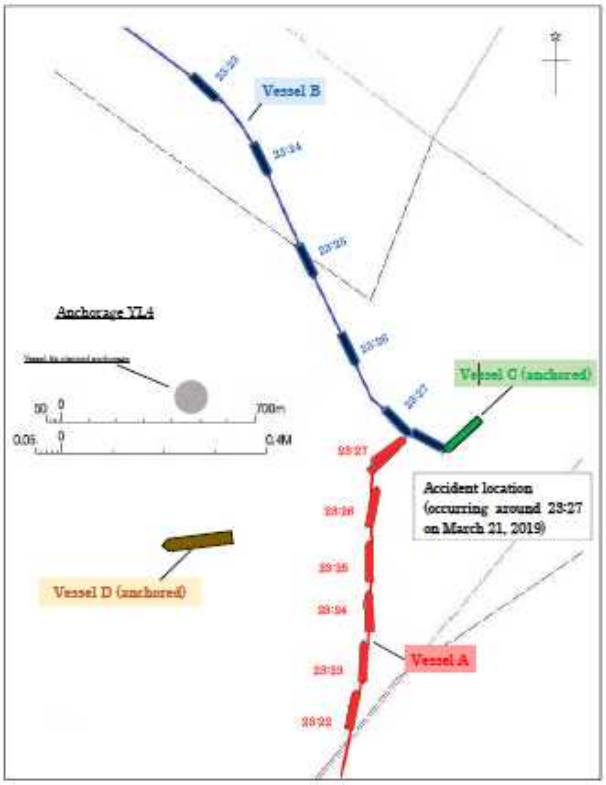
The accident investigation report published describes not only the analysis result above but also measures considered to be necessary for preventing the recurrence of such an accident, e.g., taking measures to prevent automobiles from wrongly entering narrow roads that are hard to pass, providing the appropriate number of obstruction warning signals at appropriate positions, and more (see Chapter 4 on page 73).

5. Collision accident inspection report published, involving three container ships

[Summary]

On March 21, 2019, the container ship (13,764 t) (Vessel A), proceeding north toward her planned anchorage within Anchorage YL4 of Yokohama Section 5, Keihin Port and the container ship (9,610 t) (Vessel B), proceeding south-southeast toward Nagoya Port, Aichi Prefecture collided in Anchorage YL4. Vessel B subsequently collided with the anchored container ship (18,252 t) (Vessel C).

None of passengers were injured.



Estimated navigation routes

[Probable causes]

It is probable that at night within an anchorage that had become confined with the presence of anchored Vessels, under conditions in which the courses of Vessel A and Vessel B intersected between anchored Vessel C and another anchored vessel, and the danger of collision was rising, Vessel A and Vessel B collided because Vessel A intended to pass Vessel B port-to-port and Vessel B intended to pass Vessel A starboard-to-starboard, and subsequently Vessel B collided with Vessel C.

In the investigation, analysis was conducted on the level of collision risk using multiple evaluation indicators based on records of both vessels' Automatic Identification Systems (AIS) in order to determine the timing of starting appropriate give-way vessel maneuvering while the level of collision risk was increasing at each time step before collision, and an appropriate standard of give-way method based on the positional relationship of vessels, and to clarify when and what kind of failure occurred in judgment made by both vessels' operators, comparing the timing and standard determined to those of actual vessels involved in the accident.

As a result, it was revealed that it is probable that Vessel A could have prevented the accident by taking such measures as promptly reducing speed, without expecting Vessel B to make a starboard turn, and Vessel B could have prevented the accident by taking such measures as promptly reducing speed, without attempting to navigate near Vessel A's bow.

Based on these investigation results, the Japan Transport Safety Board made safety recommendations to the management companies of Vessel A and Vessel B to instruct including the captains to take measures to avoid collision by promptly reducing speed, etc., while sufficient time is available after confirming maneuvering intentions with the other vessel by engaging in VHF

communication.

In addition, because the quantitative analysis method used in this investigation is advanced, the JTSB has been sharing the investigation method and analysis status internationally by introducing it at the chairperson meeting of the International Transportation Safety Association (ITSA) held in May 2021 and at other opportunities.

(For more details, see Chapter 2 (page 25), Chapter 5 (page 101), and Chapter 7 (page 142).)

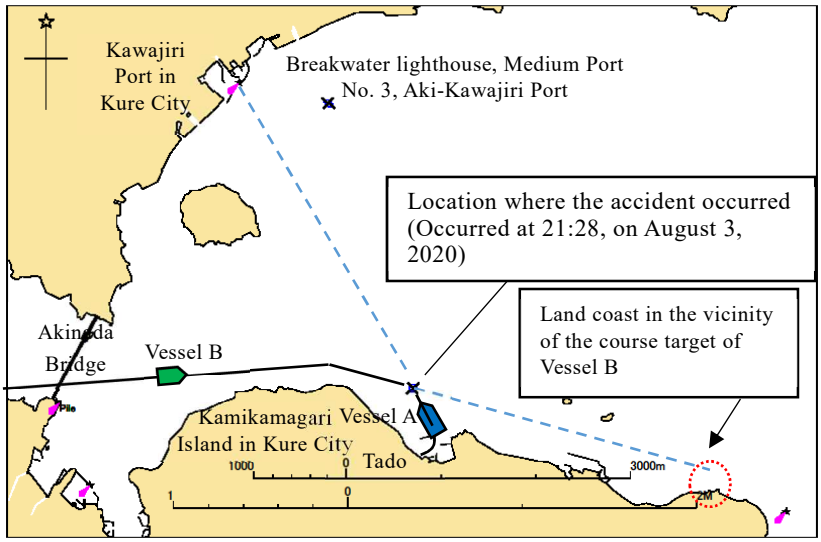
6. Small vessel accident investigation

Of the vessel accidents and serious incidents that the JTSB investigated, the number of accidents and serious incidents involving small vessels under 20 t reached 716 vessels in 2021, accounting for 66.3% of overall investigated cases in the ship field. Among them, many collision accidents have occurred, involving fishing vessels or pleasure boats with severe damage, such as the death of persons on board or heavily damaged hulls.

From such cases, one small vessel accident investigation report will be introduced.

[Summary]

On August 3, 2020, off the northern coast of Kamikamagari Island in Kure City, Hiroshima Prefecture, a pleasure boat (4.2 t) (Vessel A) was proceeding north northwest to return to the port after fishing, exhibiting a legal light, and a fishing vessel (1.0 t) (Vessel B) was proceeding east southeast to move to a fishing ground, exhibiting a bi-colored light. They collided, and a deckhand on the fishing vessel died due to wound shock.



Schematic diagram of accident occurrence progress

[Probable causes]

At night, the captain of the pleasure boat kept proceeding on the same course and at the same speed, focusing on setting the course to the breakwater lighthouse, Medium Port No. 3, Aki-Kawajiri Port. The captain of the fishing vessel was assuming that there was no vessel in the starboard direction and kept proceeding with the same course and at the same speed with a blind spot in the starboard bow direction. Therefore, it is probable that they collided without noticing that they were mutually approaching.

The investigation carried out the detailed interviews about the blind spot in the bow direction caused by the awning in place at the time of the accident and the objects that the crew members were focusing on, and the verifications of the captain's visual recognition of the radar screen from the maneuvering position, and so on. Further detailed interviews were conducted on the blind spot created by the net hauler in the fishing vessel's bow direction, the action conducted by the crew members in order to eliminate the blind spot, and so on.

As preventive measures against recurrence based on the investigation result, the Japan Transport Safety Board offered opinions as follows: (1) during navigation captains shall keep their eyes on the surroundings by the methods such as using a radar, without assuming that there are no other vessels around and without focusing on a specific direction only, (2) keep watching, covering any blind spots in the bow direction by standing up or moving horizontally and (3) persons who get on board small vessels shall always wear a life jacket on exposed decks.

7. Establishment of Small ship - Engine Trouble Search System (S-ETSS)

As mentioned in the preceding paragraph, the number of accidents and serious incidents involving small vessels under 20 t accounts for more than 60% of the overall accidents and serious incidents. In addition, many cases of crippled vessels involving failure in handling or maintaining engines, etc. occurred. From such cases, the Japan Transport Safety Board established and disclosed on its website the Small ship - Engine Trouble Search System (S-ETSS) for people involving in operations of small vessels in April 2021 (see Chapter 6, page 133).

S-ETSS shows cases of crippled small vessels involving faulty engines, collected from accident investigation reports published by the Japan Transport Safety Board, and also enables confirming the cases in a ranking format and in an easy-to-understand manner to find what failure occurs at which part.

Specifically, the top page of the S-ETSS enables confirming the number of failures for each engine part in decreasing order by selecting and searching an item of engine layout type (outboard or inboard motor, and so on.), fuel type, or faulty part (lubrication system, exhaust system, or electrical system, and so on.). For more information, the S-ETSS enables confirming not only the summary and causes but also the accident investigation report of each case.

The S-ETSS is available for anybody for free, excluding communication fees. Refer to the S-ETSS as a reference of the pre-departure inspection and regular inspections to ensure safety of maritime navigation.

Top page

Number of failures by engine part in a ranking format

List of accidents and probable causes

8. International technical cooperation in the railway field

The Japan Transport Safety Board has been addressing international technical cooperation through holding training sessions for overseas accident investigators and other actions, using the knowledge obtained through investigations of accidents and serious incidents. This section presents our two activities for supporting development of human resources in the railway field, progressed in 2021.

(1) India

In response to the request from Government of India, the Japan International Cooperation Agency (JICA) started the "Technical Cooperation (TC) project of Capacity Development on Railway Safety" in November 2018. The Japan Transport Safety Board has been actively participating in the project through visiting India to explain Japan's methods of investigating railway accidents, and so on, since the beginning of the project.

In July 2019, The JTSB held 10-day training sessions in Japan to provide 10 executives of the Ministry of Railways and the Commission of Railway Safety of India with technical knowhow of railway accident investigations, etc.

Since the spread of COVID-19, holding meetings in India has become difficult, so the method of meeting was changed from a face-to-face form to a web form to hold a plenary meeting in October

2020 and September 2021 in order to confirm the status of the project. At both meetings, the participants considered and suggested measures to improve issues based on the needs of and requests from India for the purpose of supporting the actions to embed technical knowhow there.

In addition to the confirmation of the achievements of the support, another meeting was held in December 2021 for the purpose of evaluating and providing advice on the railway accident investigation reports created by the accident investigation institution, etc. of India in order to facilitate further improvement. At this meeting, the Japan Transport Safety Board provided comments including concrete measures for improvements in detail on three reports, and received gratitude from India, saying that the comments were very good references for them.

(2) Singapore

The Transport Safety Investigation Bureau (TSIB) in Singapore has started investigations on accidents and serious incidents in the railway field since April 2020. The TSIB has implemented investigations on accidents and serious incidents in the aviation and marine fields, however the railway field is a new field for them to address, so the Japan Transport Safety Board received a request from the TSIB for support for development of human resources as railway accident investigators.

In response to the request, the JTSB held a meeting with the TSIB in a web form to explain Japan's railway accident investigation methods and past investigation examples, and also had a question-and-answer session, etc. mainly on basic matters. In the future, after implementing surveys on railway-related circumstances and training session needs in Singapore, the JTSB is to develop new training materials and provide more specialized training sessions, cooperating with external experts.

Column

Response to on-site interviews

Public Relations Office

Once an accident or serious incident to be investigated by the JTSB occur, the JTSB promptly dispatches accident investigators to the accident site to confirm the situation and collect information from related parties. In the case of an accident or serious incident of high social concern, news reports include our investigators working on-site, and also responding to informal interviews surrounded by reporters at times such as on-site investigation intervals.

It is necessary for accident investigators to bring information collected at the site to the JTSB, analyze it, and deliberate probable causes of and safety measures for the accident or serious incident in the JTSB. Therefore, investigators do not declare probable causes when interviewed at the site. However, especially in the case of an accident occurring at a place where general public cannot see, investigators try to explain the situation of the site to the extent possible at an informal interview surrounded by reporters.

Such informal interviews may be arranged by the Public Relations Office in advance to set up a place and timing that do not interfere with on-site investigations for informal interviews with cooperation of news correspondents in order to proceed with investigations effectively.

In addition, it is necessary to select a place where investigators and reporters do not disturb the general public and to obtain approval for the place. Moreover, in the case of investigations of airplane crash sites in mountains or vessels berthed on the sea, it is necessary for news correspondents to wait for investigators for long hours because it is unclear when they will come back to the place where news correspondents are waiting after finishing investigations for the day.

According to the location where an accident or serious incident occurs and the form of occurrence, responses to on-site interviews vary. The Japan Transport Safety Board considers the ability to provide smooth responses as much as possible through coordination between accident investigators and the Public Relations Office as an important thing to do in order to make our activities understood.

Example of responses to on-site interviews

Chapter 1 Summary of major investigation activities in 2021

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 2021, 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 2020, 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 2021” (page 18).]

1 Major accidents and serious incidents occurred in 2021 for which investigations commenced

The accidents and serious incidents also occurred in 2021. The primary investigations which the JTSB commenced are listed below:

(1) Aviation mode

· A forced landing accident, which damaged the fuselage of a privately-owned Aerospatiale AS350B (rotorcraft) in Aoki Village, Chiisagata District, Nagano Prefecture (Occurred on March 23)

· A serious incident in which a P-1 (large airplane) owned by Kawasaki Heavy Industries, Ltd. deviated from a runway at the JASDF Gifu Air Base (Occurred on September 7)

· A ground impact accident involving a Kaman K-1200 (rotorcraft) owned by Akagi Helicopter Co., Ltd. in Okuwa Village, Kiso District, Nagano Prefecture (Occurred on September 20)

· A ground impact accident involving a privately-owned Robinson R22 Beta (rotorcraft) in Hadano City, Kanagawa Prefecture (Occurred on October 7)

· A ground impact accident involving a privately-owned Schempp-Hirth Arcus M (motor glider)

in the vicinity of the Biei Glider Field (Occurred on October 12)

In 2021, 11 aircraft accidents were subject to investigation, with investigations into the causes of 29 accidents conducted, including 18 ongoing accident investigations from the previous year. Further, 10 aircraft serious incidents were subject to investigation, with investigations into the causes of 32 serious incidents conducted, including 22 ongoing serious incident investigations from the previous year.

(2) Railway mode

- **A level crossing accident between East Japan Railway Company's Oguni Station and Echigo-Kanamaru Station on the Yonesaka Line, Oguni Town, Yamagata Prefecture (Occurred on May 16)**
- **A train derailment between East Japan Railway Company's Mataki Station and Rikuchu-Kanzaki Station on the Ofunato Line, Ichinoseki City, Iwate Prefecture (Occurred on July 5)**
- **A train derailment in the Sumidagawa Station yard on the Joban Line of Japan Freight Railway Company, Arakawa, Tokyo (Occurred on July 24)**
- **A train derailment in the Toneri-koen Station yard of the Nippori-Toneri Liner of Tokyo Metropolitan Bureau of Transportation, Adachi, Tokyo (Occurred on October 7)**
- **A train derailment between Japan Freight Railway Company's Seno Station and Hachihommatsu Station on the Sanyo Line, Hiroshima City, Hiroshima Prefecture (Occurred on December 28)**

In 2021, 11 railway accidents were subject to investigation, with investigations into the causes of 25 accidents conducted, including 11 ongoing accident investigations from the previous year. Further, 1 railway serious incident was subject to investigation, with investigations into the causes of 3 serious incidents conducted, including 2 ongoing serious incident investigations from the previous year.

(3) Marine mode

- **A collision between cargo ship OCEAN ARTEMIS and submarine SOURYU off the south-southeastern coast of Cape Ashizuri, Tosashimizu City, Kochi Prefecture (Occurred on February 8)**
- **An explosion of pleasure boat KUMASAN007 at the Motobu Port in Motobu Town, Kunigami District, Okinawa Prefecture (Occurred on April 27)**
- **A collision between recreational fishing vessel AMAMASA MARU and recreational fishing vessel HANABUSA MARU at sea in the vicinity of 9,200 m east from Isumi City, Chiba Prefecture (Occurred on May 20)**
- **A collision between cargo ship BYAKKO and chemical tanker ULSAN PIONEER at the west entrance of Kurushima Strait (Occurred on May 27)**
- **A grounding accident involving cargo ship CRIMSON POLARIS in the Hachinohe Port, Hachinohe City, Aomori Prefecture (Occurred on August 11)**

In 2021, 736 marine accidents were subject to investigation, with investigations into the causes of 1,339 accidents conducted, including 612 ongoing accident investigations from the previous year

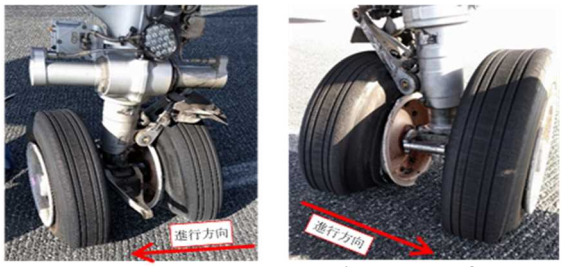
(excluding 9 incidents deemed to not be an accident as a result of investigations). Further, 153 marine incidents were subject to investigation, with investigations into the causes of 286 (excluding 1 incidents deemed to not be an incident as a result of investigations) incidents conducted, including 134 ongoing incident investigations from the previous year.

2 Major accidents and serious incidents for which investigation reports were published in 2021

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

(1) Aviation mode

- **A serious incident in which Airbus A320-214 (large airplane) owned by Peach Aviation Limited was disabled to perform taxiing due to damages to the nose landing gear at the Fukuoka Airport (Occurred on March 24, 2018)**
- **A serious incident in which a Embraer ERJ170-200STD (large airplane) owned by Fuji Dream Airlines Co., Ltd. deviated from a runway at the Yamagata Airport (Occurred on April 23, 2019)**
- **A human injury accident involving a Boeing 787-8 (large airplane) owned by All Nippon Airways Co., Ltd. due to aircraft shaking in the airspace over Chengde City, Hebei Province, China (Occurred on August 15, 2019)**



Damages to the nose landing gear of the Peach Aviation Limited's aircraft

- **A serious incident in which a F-2A owned by Japan Air Self-Defense Force (large airplane) approached to the runway of the Misawa Air Base without clearance from the control tower during a final approach of a Embraer ERJ170-100STD (large airplane) owned by J-AIR Corporation to the runway of the Misawa Air Base with clearance to land (Occurred on October 3, 2019)**
- **A ground impact accident involving a privately-owned EX-03C PUFFIN-LT447 (ultralight plane) manufactured by the Sanyo Tekko Co., Ltd. during a jump flight in Shiroishi Town, Kishima District, Saga Prefecture (Occurred on June 9, 2020)**

Completed investigation reports into 12 aircraft accidents and 11 serious aircraft incidents have been published.

(2) Railway mode

- A railway accident resulting in casualties at Shin-Sugita Station on the Kanazawa Seaside Line of Yokohama Seaside Line Co., Ltd. in Yokohama City, Kanagawa Prefecture (Occurred on June 1, 2019)

- **A train derailment in the Kanagawa-shimmachi Station yard on the Main Line of Keikyu Corporation in Yokohama City, Kanagawa Prefecture (Occurred on September 5, 2019)**
- **A train derailment in the Mino-Ota Station yard on the Etsumi-Nan Line of Nagaragawa Railway Co.,Ltd in Minokamo City, Gifu Prefecture (Occurred on March 18, 2020)**
- **A train derailment in the Higashi-Shinjo Station yard on the Main Line of Toyama Chihou Tetsudou Inc. in Toyama City, Toyama Prefecture (Occurred on July 26, 2020)**
- **Main track overrun (serious incident) between Willer Trains Inc's Tango-Yura Station and Kunda Station on the Miyazu Line, Miyazu City, Kyoto Prefecture (Occurred on October 4, 2020)**

Completed investigation reports into 12 railway accidents and two serious railway incidents have been published.

Among the published investigation reports, the JTSB made recommendations and stated our opinions to the Minister of Land, Infrastructure, Transport and Tourism regarding the "railway accident resulting in casualties at Shin-Sugita Station on the Kanazawa Seaside Line of Yokohama Seaside Line Co., Ltd. in Yokohama City, Kanagawa Prefecture" on February 18.

(For more details, see “Chapter 2. Summary of recommendations and opinions issued in 2021” at pages 19 and 24.)

(3) Marine mode

- **A collision between container ship APL GUAM, container ship MARCLIFF＋, and container ship HANSA STEINBURG at Anchorage YL4, Yokohama Section 5, Keihin Port (Occurred on March 21, 2019)**
- **A foundering accident involving cargo ship JIA DE off the southeast coast of Higashi-Ogi Island in Kawasaki City, Kanagawa Prefecture (Occurred on October 12, 2019)**
- **A grounding accident involving cargo ship AZUL CHALLENGE at shallows on the western side of Nakato Shima, Imabari City, Ehime Prefecture (Occurred on July 22, 2019)**
- **A fire accident involving passenger ship ASUKA II at Osanbashi Pier D of Yokohama Section 1, Keihin Port (Occurred on June 16, 2020)**
- **A passenger injury accident involving pleasure boat GURILAND 900 off the northern coast of the Ogura Peninsula in Towada City, Aomori Prefecture (Occurred on September 19, 2019**

Foundering accident involving cargo ship JIA DE

Completed investigation reports into 673 marine accidents and 156 incidents have been published.

Among the published investigation reports, the JTSB made recommendations to the irregular shipping business operator and safety manager and vessel operations controller regarding the "passenger injury

accident involving pleasure boat GURILAND 900" on August 26, and to NS United Kaiun Kaisha, Ltd. and Otokura coastal shipping cooperative partnerships regarding the "collision between cargo ship SENSHO MARU and cargo ship SUMIHO MARU" on December 16.

The JTSB also made safety recommendations to the Panama Maritime Authority of the Republic of Panama regarding the "foundering accident involving cargo ship JIA DE" on February 18, to APL MARITIME LTD. and MARCONSULT SCHIFFAHRT GMBH regarding the "collision between container ship APL GUAM, container ship MARCLIFF, and container ship HANSA STEINBURG" on February 18, and to Jangho Shipping Co., Ltd. regarding the "accident involving fatality of the crew member of cargo ship FIRST AI" on June 24.

(For more details, see “Chapter 2. Summary of recommendations and opinions issued in 2021” at pages 21-23 and 25-27.)

3 Major accidents and serious incidents for which progress reports were published in 2021

Accident progress reports are made to the Minister of Land, Infrastructure and Transport, 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 Japan Transport Safety Board website are as follows.

· Marine accident investigation on casualties of persons waiting for boarding a pulled float at the Inawashiro Lake (Occurred on September 6, 2020)

It was required to proceed with confirmation and analysis on the facts based on the information obtained so far through the investigation on this marine accident under investigation, and to invite comments from parties relevant to the cause of the accident. For this reason, it is expected to be difficult to finish this investigation within one year from the date when the accident occurred. Therefore, the JTSB submitted a progress report to the Minister of Land, Infrastructure, Transport and Tourism on August 26. The report was made publicly available.

This progress report has been published on the Japan Transport Safety Board website.
(https://www.mlit.go.jp/jtsb/ship/rep-acci/2021/keika20210826-0_2020tk0008.pdf)

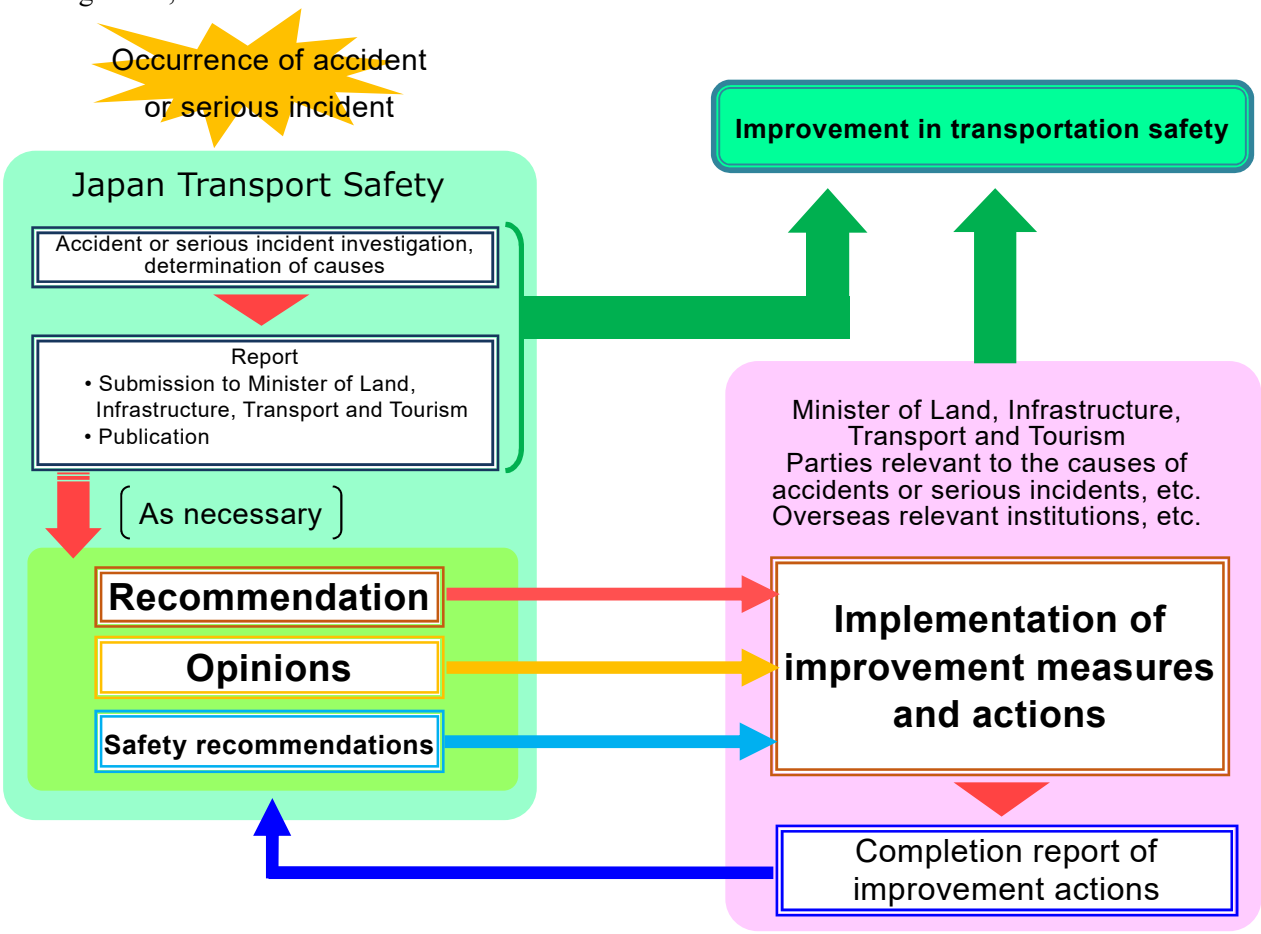
Chapter 2 Summary of recommendations and opinions issued in 2021

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

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

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

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



The recommendations and safety recommendations issued by the Japan Transport Safety Board in 2021 are summarized as follows.

1 Recommendations

(1) Recommendations on the railway accident resulting in casualties occurred at Shin-Sugita Station of Yokohama Seaside Line Co., Ltd.

(Recommendations on February 18, 2021)

Summary of the Accident and Probable Causes

See Chapter 4, page 70.

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

The direct cause of this accident was the breakage of the electric cable in the forward and backward switching circuit of the train, which resulted to start running as the direction of the driving motors was in the inbound direction toward the terminal end of the track. It is probable that the situation, that the confirmation and the arrangement of the designing organizations, etc., the extraction of the safety factors and the verification of the safety, had not been implemented sufficiently in the designing and manufacturing process of the vehicles, was the background of the situation that the dangerous incident in the occurrence of such troubles could not be excluded.

When designing, manufacturing or remodeling of the automatic operation system, etc., of the train, which neither the driver nor the staff to operate the emergency stop procedures boarding on the forefront of the train in the railway and tramway vehicle, in the situation that the vehicle design is advancing in complexity more and more in recent years, it is important to prepare the designing organization to implement the system integration, and extract and evaluate the conditions caused to the dangerous incidents without lack before designing, and reflect these measures as the matters of the safety factors, also it is necessary to manage the safety for the whole life cycle including the manufacturing and the operation. Among them, it is probable that the railway, tramway operators and so on should prepare the phases to confirm and arrange the designing organization, etc., to extract the safety factors carefully, and implement these phases sufficiently, and implement the verification of the safety sufficiently after finished the designing works.

In the view of the result of this accident investigation, the Japan Transport Safety Board recommends the Minster of the Land, Infrastructure, Transport and Tourism pursuant to Article 26, paragraph (1) of the Act for Establishment of the Japan Transport Safety Board, to implement the following measures, in order to prevent the railway accident and to reduce damages when the railway accident had happened.

Recommendations

The Railway Bureau, MLIT, should enforce the instruction on the following matters to the railway and tramway operators and the manufacturers related to the designing and manufacturing of the railway vehicles in the whole country.

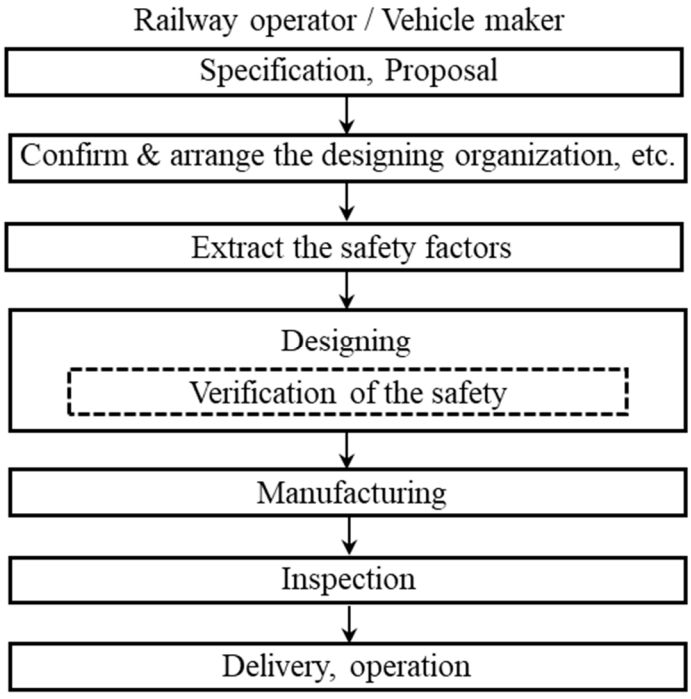
[1] When conduct the design of manufacturing or remodeling of the system to implement the automatic operation of the train which the driver did not boarded, prepare the phases to confirm and arrange the designing organization, etc., to extract safety factors, to verify the safety, and implement each phase sufficiently, referring the designing and manufacturing process shown in Attachment.

[2] In the phase to confirm and arrange the designing organization, etc., prepare the designing organization to implement the system integration, and confirm and arrange the roles and the sharing responsibility between individual companies, the specifications that each company considered as the standard or considered as general for each device.

[3] In the phase to extract the safety factors, conduct the systematic safety analysis, etc., corresponding to the characteristics of the system, and arrange the required matters, etc., necessary to secure the safety, in order to be confirmed the safety comprehensively against the abnormal status supposed to happen.

[4] In the phase to verify the safety, verify the designed results whether the whole system secured the sufficient safety or not, for the safety factors extracted in the above [3].

Attachment



* For details on the activities of the Japan Transport Safety Board, please see "Major activities in the past year 3" on page 4.

(2) Recommendations on the passenger injury accident involving pleasure boat GURILAND 900

(Recommendations on August 26, 2021)

Summary of the Accident and Probable Causes

See Chapter 5, page 110.

Recommendations to the parties relevant to the causes of accidents or serious incidents

The west-northwest wind gradually getting stronger with a strong wind warning announced ,the captain 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 probably caused by the impacts the passenger received on the buttocks caused by falling onto the seating surface multiple times.

On vessels operated by the irregular shipping business operator and safety manager and vessel operations controller (hereinafter referred to as "Vessel Business Operator") of passenger transport, a similar case of accident occurred in the past. The Vessel Business Operator has been providing safety education and training and so on to crew members, etc. after the similar case of accident.

However, although the captain of the pleasure boat GURILAND 900 had to stop the standard navigation pursuant to the safety management manual and the navigation standard, he 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 Japan Transport Safety Board submits recommendations pursuant to the provision of Article 27, paragraph (1) of the Act for Establishment of the Japan Transport Safety Board to the Vessel Business Operator as follows:

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

(1) The Vessel Business Operator shall ensure its captains 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 mitigate the vessel oscillation.

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

(3) The Vessel Business Operator shall 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 vessel for safety reason.

(3) Recommendations on the collision between cargo ship SENSYO MARU and cargo ship SUMIHO MARU

(Recommendations on December 16, 2021)

Summary of the Accident and Probable Causes

See Chapter 5, page 111.

Recommendations to the parties relevant to the causes of accidents or serious incidents

The probable causes of this collision accident is that during the night, off the southern coast of the Cape Inubo under limited visibility caused by a thick fog, while SENSHO MARU was traveling southwest and SUMIHO MARU was traveling 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 navigate 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 navigate by starboard side to starboard side and navigated visually keeping the course and the speed. Therefore, it was late to notice they are approaching each other, resulting in collision.

In this accident, if the navigation officer on duty 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.

In addition, if the individual captains were notified by their navigation 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 Japan Transport Safety Board submits recommendations pursuant to the provision of Article 27, paragraph (1) of the Act for Establishment of the Japan Transport Safety Board to the NS United Kaiun Kaisha, Ltd. and Otokura coastal shipping cooperative partnerships as follows:

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 coastal shipping cooperative partnerships shall continuously instruct crew members of their operating vessels 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 coastal shipping cooperative partnerships shall continuously instruct crew members of their operating vessels to know the importance of instructions given by their captain on the bridge and reinforce the watch system under the condition of limited visibility.

2 Opinions

(1) Opinions on the railway accident resulting in casualties occurred at Shin-Sugita Station of Yokohama Seaside Line Co., Ltd.

(Opinions on February 18, 2021)

Summary of the Accident and Probable Causes

See Chapter 4, page 70.

Content of the opinions to the Minister of Land, Infrastructure, Transport and Tourism

When designing, manufacturing or remodeling of the automatic operation system and others, of the train, which the driver nor the staff to operate the emergency stopping procedures boarded on the forefront of the train in the railway and tramway vehicle, it is important to extract and evaluate the conditions to cause the dangerous incidents without lack before designing, and reflect these measures as the matters of the safety factors, also it is necessary to manage the safety for the whole life cycle including the manufacturing and the operation.

Therefore, accompanied with the "recommendations on the railway accident resulting in casualties occurred at Shin-Sugita Station of Yokohama Seaside Line Co., Ltd." (UN-I-SAN No. 99; hereinafter referred to "Recommendations") issued to the Minister of Land, Infrastructure, Transport and Tourism as of today's date, the Japan Transport Safety Board, the JTSB expresses its opinions as follows to the Minster of the Land, Infrastructure, Transport and Tourism pursuant to Article 28 of the Act for Establishment of the Japan Transport Safety Board, as the measures to be implemented in order to prevent the accidents and incidents when the automatic operation system spread in the future.

In addition, it would be appreciated if the content of any measures taken in response to these opinions are notified to the Japan Transport Safety Board.

Recommendations

The Railway Bureau of the MLIT, preparing for the spread of the automatic operation system in the future, study on the institutionalize individual matters described in Recommendations, in the view point to prevent the occurrence of the latent causes for the dangerous incidents when implemented designing, manufacturing or remodeling of the system.

* For details on the activities of the Japan Transport Safety Board, please see "Major activities in the past year 3" on page 4.

3 Safety Recommendations

(1) Collision accident between container ship APL GUAM, container ship MARCLIFF, and container ship HANSA STEINBURG

(Safety Recommendations on February 18, 2021)

Summary of the Accident and Probable Causes

See Chapter 5, page 101.

Safety recommendations to the parties relevant to the causes of accidents or serious incidents

In view of the results of this accident investigation, the Japan Transport Safety Board recommends that APL MARITIME Ltd., which is the management company of APL GUAM, and MARCONSULT SCHIFFAHRT GMBH, which is the management company of MARCLIFF take the following measures for the purpose of preventing the recurrence of similar accidents.

APL MARITIME Ltd. and MARCONSULT SCHIFFAHRT GMBH should instruct the captains, etc. of all the vessels that they manage or operate to ensure to implement the following matters.

(1) Avoid a situation on large vessels as much as possible, in which there is an anchoring vessel whose course intersects another vessel's in the anchored area which is narrow.

(2) Captains shall confirm mutually their operational intentions earlier by proactively and appropriately communicating using VHF without judging with an assumption about the movement of an approaching vessel if any.

(3) Captains shall consider the situation of see-going vessels, anchored vessels and so on surrounding their vessels, and judge if their vessels may significantly approaching to or colliding with other vessels. If they judge that their vessels collide with other approaching vessels, they shall take measures to avoid collision at a sufficiently earlier timing for deceleration, etc.

* For details on the activities of the Japan Transport Safety Board, please see "Major activities in the past year 5" on page 7.

(2) Foundering accident involving cargo ship JIA DE

(Safety Recommendations on February 18, 2021)

Summary of the Accident and Probable Causes

See Chapter 5, page 103.

Safety recommendations to the Panama Maritime Authority

It is probable that the accident occurred because the cargo vessel JIA DE foundered due to the fact that sea water which was being retained due to wave uprush on the upper deck (hereafter referred to as “the Retained Water”) began flooding due to taking on sea water in the interior of the cargo holds, and then her steering was uncontrollable and she was receiving winds and wave uprush from the port fore side to port side, and furthermore her hull greatly heeled to the starboard side and she continued to be flooded due to taking on sea water in the interior of the cargo holds, and she subsequently rolled over due to her stability having been decreasing and flooding due to taking on sea water into the interior of the cargo holds progressed, with the result being that she foundered. It is probable that this situation began while JIA DE was anchoring in the nighttime under conditions of rolling and pitching due to receiving winds and waves that had increased due to the typhoon No.19 approaching the area of K1 anchorage point of Keihin Port.

It is probable that the Retained Water on the deck of JIA DE began flooding due to taking on sea water in the interior of the cargo holds because the lids for opening parts of the ventilation cylinders of the cargo holds were in an open condition, and the water receiver railings at the connection parts between the panels of the hatch covers of the cargo holds had a number of broken holes and some part of the panels of the hatch covers were deformed, and thereby the hatch covers were not securely weather-tight. In addition, it is considered probable that wave uprush on the deck further increased because her freeboard had been decreasing due to ingress water into the interior of the cargo holds and the Retained Water.

It is probable that JIA DE was in a state in which her steering was uncontrollable because ingress water that infiltrated into the marine diesel oil (MDO) tank interior through the air vents on the upper deck was supplied to the diesel generator engines with MDO through the fuel oil supply line of the diesel generator engines supply line, and then the diesel generator engines experienced combustion failure or misfiring, and subsequently stopped, and thereby the blackout occurred.

In view of the results of this accident investigation, the Japan Transport Safety Board recommends that the Panama Maritime Authority, the Republic of Panama (hereafter referred to as “Panama”) as the flag state of JIA DE should take the following measures to prevent similar accidents and to reduce damage.

The Panama Maritime Authority, Panama should instruct the Owners and the Management Companies (hereafter referred to as "the Companies") of Panama flag vessels to engage in the following practices due to securing safety for crew members and vessels in stormy weather and rough seas.

(1) The Companies should instruct masters and crew members to reliably carry out closing of opening parts on exposed decks such as lids of opening parts of ventilation cylinders of cargo holds, etc. in case that stormy weather and rough seas are expected.

(2) The Companies should instruct masters and crew members to secure significant freeboard in any sea condition, and therefore should crew members to carry out adjustment of the ship's condition.

(3) The Companies should instruct masters and crew members to carry out the drain discharging operation in which each drain valve of fuel oil tanks is operated not only periodically as routine work, but also on a timely basis in a condition of rolling and pitching in stormy weather and rough seas so as not to supply fuel oil with infiltrated water into the fuel oil supply lines such as generator engines in case that air vent pipes of fuel oil tanks were not equipped automatic opening and closing-type air vent head, etc. to automatically prevent the infiltration of water.

(4) The Companies should instruct masters and crew members to conduct refresher training for crew members concerning survival techniques at sea for getting ready for abandon ship, such as taking out belongings, escape behavior from the interior of the vessel, putting on a life jacket and immersion suit, dressing warmly, etc.

(5) The Companies should implement maintenance necessary including the water receiver railings of the hatch cover to secure weather-tightness of the hatch cover of the cargo holds themselves with regard to the vessels managed and owned by the Companies.

(3) Accident involving fatality of the crew member of cargo ship FIRST AI

(Safety Recommendations on June 24, 2021)

Summary of the Accident and Probable Causes

See Chapter 5, page 108.

Safety recommendations to the parties relevant to the causes of accidents or serious incidents

In view of the results of this accident investigation, the Japan Transport Safety Board recommends that JANGHO SHIPPING Co., Ltd., which is the management company of FIRST AI, takes the following measures for the purpose of preventing the recurrence of a similar accident and reducing damage.

1. JANGHO SHIPPING Co., Ltd. should make the crew of ships under their management aware of the danger of being caught in the hatch cover and instruct them not to pass through the space between the winding drum and the hatch coaming unless it is absolutely necessary. Furthermore, when it is unavoidable to work under the panel, the crew should be instructed to take measures to prevent falling before starting the work.
2. If the hatch covers of vessels managed by the company are damaged, JANGHO SHIPPING Co., Ltd. should carry out appropriate repairing measures before opening and closing them.

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** (Definition of aircraft accident)

The term "Aircraft Accident" as used in this Act shall mean the accident listed in Article 76, paragraph (1), each items of the Civil Aeronautics Act.

◎**Article 76, paragraph (1), of the Civil Aeronautics Act** (Obligation to report)

1 Crash, collision or fire of aircraft;

2 Injury or death of any person, or destruction of any object caused by aircraft;

3 Death (except those specified in Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism) or disappearance of any person on board the aircraft;

4 Contact with other aircraft; and

5 Other accidents relating to aircraft specified in Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism (Ordinance for Enforcement of the Civil Aeronautics Act).

◎**Article 165-3 of the Ordinance for Enforcement of the Civil Aeronautics Act**

(Accidents related to aircraft prescribed in the Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism under Article 76, paragraph (1), item (v) of the Act)

The cases (excluding cases where the repair of a subject aircraft does not correspond to the major repair work) where navigating aircraft is damaged (except the sole damage of engine, cowling, engine accessory, propeller, wing tip, antenna, tire, brake or fairing).

< Aircraft serious incidents to be investigated>

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

Aircraft serious incidents to be investigated refers to situations that may escalate into aircraft accidents as specified by the Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism (Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board).

◎Article 1 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

(Situations specified in Article 2, paragraph (2), item (ii) of the Act for Establishment of the Japan Transport Safety Board)

* The contents of Article 166-4 of the Ordinance for Enforcement of the Civil Aeronautics Act, cited in Article 1 are also provided here.

1 The following situations (Situations (8), (11) and (12) relate only to an in-flight aircraft.)

(1) Case recognized by the captain that it may have resulted in contact between the in-flight aircraft and another object

(2) Takeoff from a closed runway, from a runway being used by other aircraft, from a runway different from the designated one or from a taxiway, or aborted takeoff

(3) Landing or the landing attempt on a closed runway, on a runway being used by other aircraft, on a runway different from the one designated, or on a location where aircraft are not normally supposed to land such as a taxiway or road

(4) Contact of engine cowling, wingtip or component other than landing gear with ground surface during landing

(5) Overrun, undershoot and deviation from a runway (limited to when an aircraft is disabled to perform taxiing)

(6) Case where emergency evacuation was conducted with the use for emergency evacuation slide

(7) Case where aircraft crew executed an emergency operation during navigation in order to avoid crash into water or contact on the ground

(8) Damage of engine (limited to such a case where fragments penetrated the casing of subject engine)

(9) Continued halt or loss of power or thrust (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

(10) Case where any of aircraft propeller, rotary wing, landing gear, rudder, elevator, aileron or flap is damaged and thus flight of the subject aircraft could not be continued

(11) Multiple malfunctions in one or more systems equipped on aircraft impeding the safe flight of aircraft

(12) Occurrence of fire or smoke inside an aircraft and occurrence of fire within an engine fire prevention area

(13) Abnormal decompression inside an aircraft

(14) Shortage of fuel requiring urgent measures

(15) 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

(16) Case where aircraft crew became unable to perform services normally due to injury or disease

(17) Case where a slung load, any other load carried external to an aircraft or an object being towed by an aircraft was released unintentionally or intentionally as an emergency measure

(18) Case where parts dropped from aircraft collided with one or more persons

(19) Case equivalent to any of (2) to (18) above.

2 The following situations are considered extraordinary:

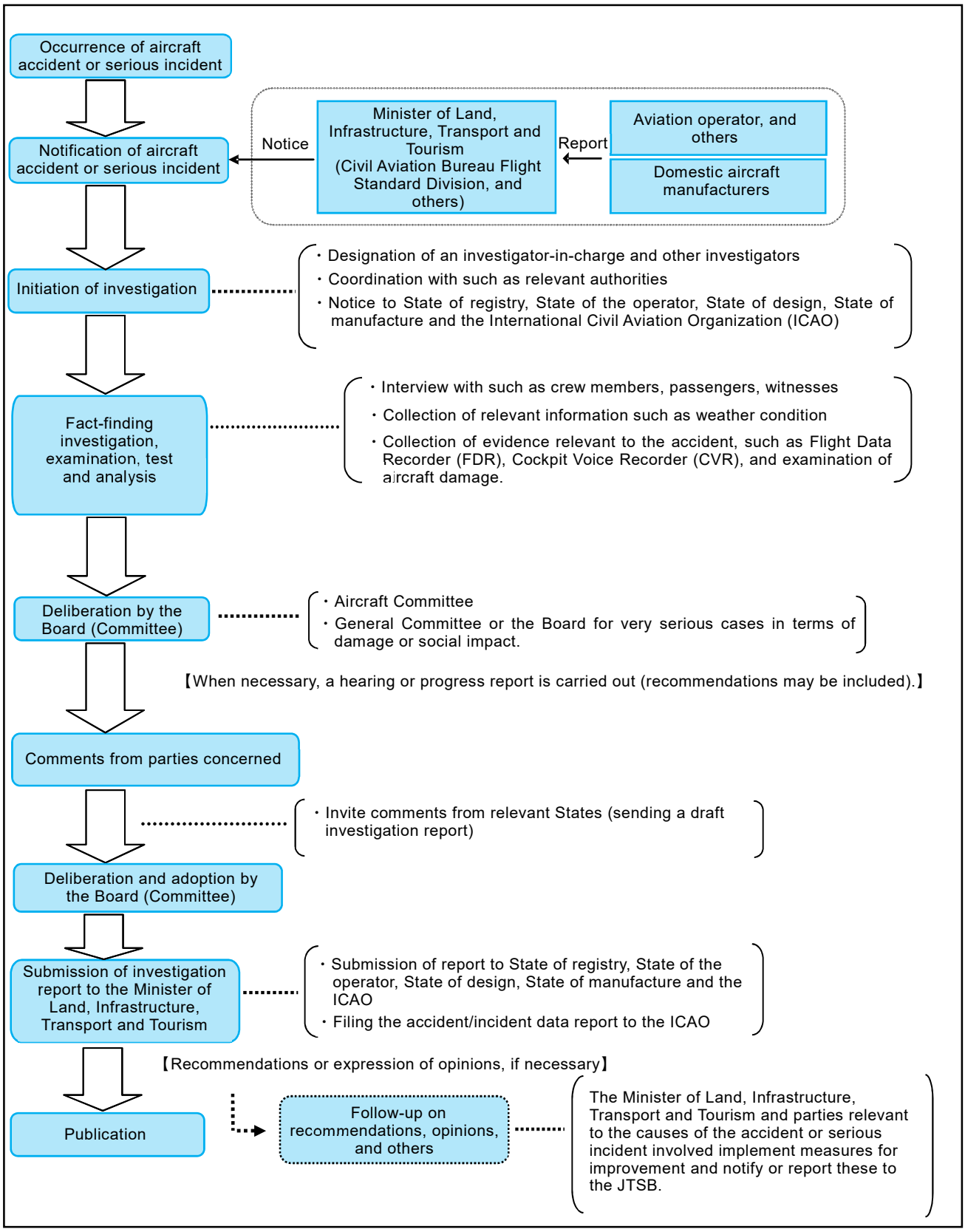
(1) Situations described in (8), (11) and (12) of 1 above occurring with aircraft not in flight

(2) Damage to an aircraft not in flight (except the sole damage of engine, engine cowling, engine accessory, propeller, wingtip, antenna, tire, brake or fairing) (excluding cases where the repair of the aircraft does not correspond to major repair work)

(3) Case where the propeller, rotary wing, landing gear, rudder, elevator, aileron, or flap is damaged, hindering the start of its flight

(4) Case equivalent to those described in (1) to (3)

2 Procedure of aircraft accident/serious incident investigation



* Opinions may be expressed in a flow chart (as above) or whenever and however necessary to prevent accidents or incidents or mitigate damage thereof.

3 Statistics of investigations of aircraft accidents and serious incidents

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

In 2021, 18 accident investigations were carried over from 2020 and 11 accident investigations were newly launched. Besides, 12 investigation reports were published, and thereby 17 accident investigations were carried over to 2022.

Moreover, 22 serious incident investigations were carried over from 2020, and 10 serious incident investigations were newly launched in 2021. Furthermore, 11 investigation reports were published in 2021, and thereby 21 serious incident investigations were carried over to 2022.

Among the 23 investigation reports published in 2021, none was issued with recommendations and none was issued with opinions.

Investigations of aircraft accidents and serious incidents in 2021

(Cases)

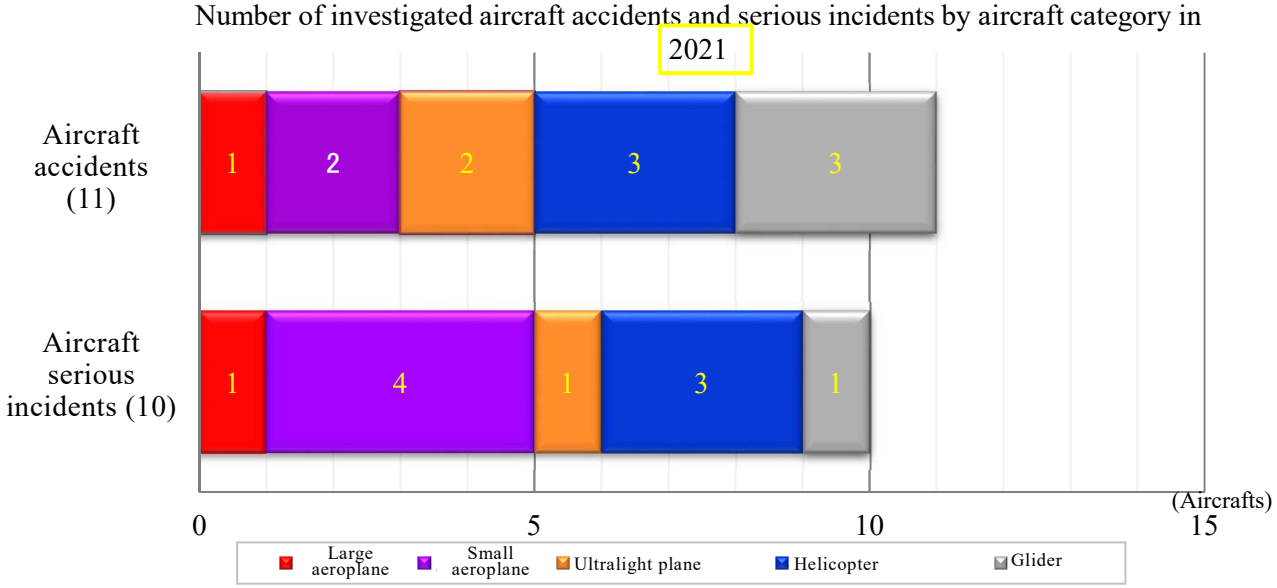
Category	Carried over from 2020	Launched in 2021	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2022	(Interim report)
Aircraft accident	18	11	29	12	(0)	(0)	(0)	17	(7)
Aircraft serious incident	22	10	32	11	(0)	(0)	(0)	21	(7)

4 Statistics of investigated aircraft accidents and serious incidents in 2021

The aircraft accidents and serious incidents that were newly investigated in 2021 consisted of 11 aircraft accidents, which decreased by two from 13 for the previous year, and 10 aircraft serious incidents, which increased by one from nine for the previous year.

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

Number of investigated aircraft accidents and serious incidents by aircraft category in 2021



* 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 13 in 11 cases, including three deaths and 10 injuries.

The number of casualties (aircraft accident)

(Persons)

2021							
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	0	0	0
Small aeroplane	0	0	0	0	0	0	0
Helicopter	1	0	0	0	2	5	8
Ultralight plane	0	0	0	0	1	0	1
Glider	1	1	0	0	1	1	4
Total	2	1	0	0	4	6	13
	3		0		10		

* 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 2021

The aircraft accidents and serious incidents which occurred in 2021 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
	February 1, 2021 On runway A of Narita International Airport	Nippon Cargo Airlines Co., Ltd.	JA13KZ Boeing 747-8F (Large aeroplane)
	Summary	The aircraft took off from Hong Kong. While approaching runway A of Narita International Airport, it tried landing again due to turbulence, and landed on the runway. The post-flight inspection revealed scratch marks on the lower part of the aft fuselage.	
2	Date and location	Operator	Aircraft registration number and aircraft type
	February 20, 2021 In the vicinity of the grassland in Moriya City, Ibaraki Prefecture	Privately owned	JR1734 Rans S-7 Courier R503L (ultralight plane)
	Summary	See "6 Publication of investigation reports" (page 43 No.12)	
3	Date and location	Operator	Aircraft registration number and aircraft type
	March 23, 2021 In the vicinity of a rice field in Aoki Village, Chiisagata District, Nagano Prefecture	Privately owned	JA6050 Aerospatiale AS350B (rotorcraft)
	Summary	The rotorcraft took off from the Tokyo Heliport. When a forced landing was made in the vicinity of the rice field in Aoki Village, Chiisagata District, Nagano Prefecture, the airframe was damaged.	
4	Date and location	Operator	Aircraft registration number and aircraft type
	April 14, 2021 At Yao Airport	Privately owned	JA001T Cessna 525A (Small aeroplane)
	Summary	The aircraft took off from Yao Airport, but immediately collided with a bird, and then returned to the airport for landing.	
5	Date and location	Operator	Aircraft registration number and aircraft type
	August 1, 2021 On runway A of Sendai Airport	Privately owned	JA4077 Piper PA-46-350P (Small aeroplane)
	Summary	When the aircraft landed on runway A of Sendai Airport, the nose landing gear moved toward the housing direction, which thereby the front lower part of the fuselage made contact on the runway, and consequently stopped on the runway.	
6	Date and location	Operator	Aircraft registration number and aircraft type
	September 20, 2021 In the vicinity of Tono, Okuwa Village, Kiso District, Nagano Prefecture	Akagi Helicopter Co., Ltd.	JA6200 Kaman K-1200 (Rotorcraft)
	Summary	The rotorcraft took off from a temporary airfield in Okuwa Village, Kiso District, Nagano Prefecture. While transporting wood, it crashed in the mountain in the vicinity of the above location.	

7	Date and location	Operator	Aircraft registration number and aircraft type
	October 7, 2021 At the grassland in Hadano City, Kanagawa Prefecture	Privately owned	JA7975 Robinson R22 Beta (Rotorcraft)
	Summary	The rotorcraft took off from a temporary airfield in Oi Town, Ashigarakami District, Kanagawa Prefecture. While flying, it crashed in the vicinity of the above location.	
8	Date and location	Operator	Aircraft registration number and aircraft type
	October 10, 2021 At the temporary airfield in Aso City, Kumamoto Prefecture	Kita Kyushu Glider Club	JA2189 Alexander Schleicher ASK 13 (Glider)
	Summary	When the glider took off from a temporary airfield in Aso City, Kumamoto Prefecture, it deviated from the takeoff and landing zone, which it then came into contact with a shrub which caused damage to the airframe.	
9	Date and location	Operator	Aircraft registration number and aircraft type
	October 12, 2021 At 500 m northwest of the Biei Glider Field	Privately owned	JA11AM Schempp-Hirth Arcus M (Motor glider)
	Summary	After taking off the Biei Glider Field, the motor glider's engine stopped, and it then crashed in the vicinity of the above location.	
10	Date and location	Operator	Aircraft registration number and aircraft type
	November 3, 2021 At Shinshinotsu Glider field in Shinshinotsu Village, Ishikari District, Hokkaido	Privately owned	JA100K Alexander Schleicher ASK 13 (Glider)
	Summary	At the Shinshinotsu Glider field in Shinshinotsu Village, Ishikari District, Hokkaido, the glider fell to the ground while being towed for taking off.	
11	Date and location	Operator	Aircraft registration number and aircraft type
	November 7, 2021 At the temporary airfield in Yamaguchi City, Yamaguchi Prefecture	Privately owned	JR1347 Quicksilver MXII Sprint Top-R582L (Ultralightplane)
	Summary	The plane fell immediately after taking off from the temporary airfield in Yamaguchi City, Yamaguchi Prefecture.	

(Aircraft serious incidents)

1	Date and location	Operator	Aircraft registration number and aircraft type
	February 3, 2021 On the runway of Kitakyushu Airport	Japan Coast Guard	JA393A Textron Aviation 172S (Small aeroplane)
	Summary	The aircraft took off from Kitakyushu Airport. While approaching to the airport, it tried landing again due to being unstable, and then the lower part of the aft fuselage contacted on the runway. It subsequently landed at the airport.	

2	Date and location	Operator	Aircraft registration number and aircraft type
	March 13, 2021 In the vicinity of the runway of Kounan Airport	Okayama Air Service Co., Ltd.	JA01HJ Honda Aircraft HA-420 (Small aeroplane)
	Summary	After departing and landing at Kounan Airport, the aircraft deviated leftward and stopped in the green belt south from the runway.	
3	Date and location	Operator	Aircraft registration number and aircraft type
	July 5, 2021 At the Nagano City Gliding Field in Nagano City, Nagano Prefecture	Privately owned	JX0167 Zenith Aircraft CH701 (Self-made aircraft)
	Summary	In the Nagano City Gliding Field in Nagano City, Nagano Prefecture, the aircraft deviated from the runway and stopped on the grassland while conducting a jump flight (slightly suspending in the air to fly).	
4	Date and location	Operator	Aircraft registration number and aircraft type
	July 18, 2021 In the vicinity of the runway of Niigata Airport	Privately owned	JA201M Piper PA-28RT-201T (Small aeroplane)
	Summary	When landing at Niigata Airport, the aircraft deviated from the runway and stopped on the grassland.	
5	Date and location	Operator	Aircraft registration number and aircraft type
	August 26, 2021 On the runway of Kumamoto Airport	Kumamoto Prefecture Disaster Relief Aviation Unit (Aircraft A)	JA90MT Airbus Helicopters AS365N3 (Rotorcraft)
		An incorporated educational institution Kimigafuchi Gakuen (Aircraft B)	JA31UK Cessna 172S (Small aeroplane)
	Summary	Aircraft A took off after landing on the runway during a test flight at Kumamoto Airport. Therefore, an air traffic controller permitted aircraft B, which was the following aircraft, to conduct a touch-and-go. After that, because aircraft A touched the runway again, the controller instructed aircraft B to conduct a go-around, however, aircraft B ascended after touching the runway.	
6	Date and location	Operator	Aircraft registration number and aircraft type
	September 7, 2021 On the runway of JASDF Gifu Air Base	Kawasaki Heavy Industries, Ltd.	JQ5533 P-1 (Large aeroplane)
	Summary	When landing at ASDF Gifu Air Base, the aircraft deviated from the runway.	

7	Date and location	Operator	Aircraft registration number and aircraft type
	September 8,2021 At an altitude of around 330 m above the traffic pattern on the west side of Menuma Gliding Field	Japan Students Aviation League (Aircraft A)	JA2379 Alexander Schleicher ASK 21 (Glider)
		Suisan Aviation Co., Ltd. (Aircraft B)	JA3904 Cessna U206G (Small aeroplane)
	Summary	While flying after taking off from Menuma Gliding Field, aircraft A visually recognized aircraft B passing the upper right side of aircraft A and sensed danger at the above location.	
8	Date and location	Operator	Aircraft registration number and aircraft type
	September 23, 2021 On the taxiway of Nagasaki Airport	Ogawa Air Co., Ltd.	JA76EL Robinson R44 II (Rotorcraft)
	Summary	The rotorcraft was instructed from an air traffic controller to take off from the runway, however, it started taking off from the taxiway.	
9	Date and location	Operator	Aircraft registration number and aircraft type
	November 27, 2021 On the runway of Menuma Gliding Field	Privately owned	JA4083 Christen Industries A-1 (Small aeroplane)
	Summary	When the aircraft landed at Menuma Gliding Field, its left wing tip contacted with the ground	
10	Date and location	Operator	Aircraft registration number and aircraft type
	December 22, 2021 At an altitude of approximately 50 m over the vicinity of Kiryu City, Gunma Prefecture	Aero Asahi Corporation	JA9584 Bell 412 (Rotorcraft)
	Summary	While the rotorcraft was flying while suspending materials. After taking off the temporary airfield in Kiryu City, Gunma Prefecture, a part of the materials (a weight of about 800 to 900 kg of ready-mixed concrete) fell in the mountains of the city.	

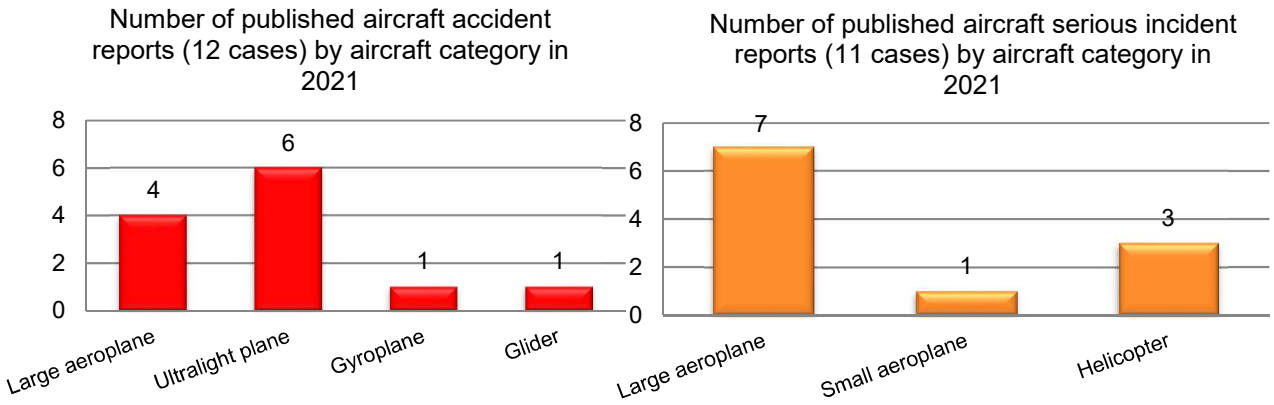
6 Publication of investigation reports

The number of investigation reports of aircraft accidents and serious incidents published in 2021 was 23, consisting of 12 aircraft accidents and 11 aircraft serious incidents.

Breaking them down by aircraft category, the aircraft accidents involved four large aeroplanes, six ultralight planes, one gyroplane, and one glider. The aircraft serious incidents involved seven large aeroplanes, one small aeroplane, and three helicopters.

Note: In aircraft accidents and serious incidents, two or more aircrafts are sometimes involved in a single case. See page 38 to 52 for details.

In the 12 accidents, the number of casualties was 14, consisting of two deaths and 12 injuries.

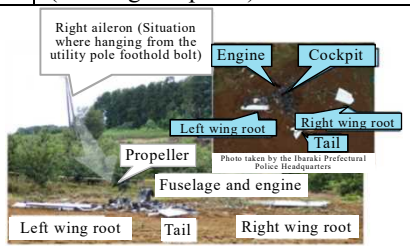


The aircraft accidents and serious incidents which occurred in 2021 are summarized as follows.

Aircraft accident investigation reports published in 2021

1	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	January 21, 2021	May 6, 2020 In Aso City, Kumamoto Prefecture	Privately owned	JR0213 Quicksilver MX II J-R503L (Two-seat ultralight plane)
	Summary	During a flight above Yamada, Aso City, Kumamoto Prefecture, the engine output dropped and could not be recovered, resulting in a forced landing, damage to the airframe and injuries of both persons of a pilot and a passenger on board. 		
	Probable causes	It is probable that this accident occurred because during the flight, the connector for the engine ignition system was removed, which caused the aircraft to not be able to achieve a thrust required for flight, consequently a forced landing was performed and damages to the airframe were caused.		
	Safety Actions	**Measures taken by the flying club where the aircraft's pilot belongs to** (1) Checking on the connection condition of the connector of the engine ignition system was added in the pre-flight and periodic checks. (2) The base leg of the traffic pattern in case of taking off in an easterly direction was changed to be closer to the airfield by about 100 m in order to allow forced landings in the airfield in case of engine failure in the base leg.		
	Report	https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-1-1-JR0213.pdf (In Japanese only)		

<table>
<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>February 18, 2021</td><td>April 29, 2019
At Iwami Airport</td><td>Privately owned</td><td>JA2500
Glaser-Dirks DG-500M
(Motor glider, two-seater)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The aircraft attempted to land with its main landing gear remained retracting in gliding condition because the engine was not restarted in flight with a total of two people on board including a pilot and a passenger. Then it hit the ground surface and suffered damage to the airframe.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is probable that this accident occurred because the right wing tip contacted with the ground surface when the aircraft was making a right turn for a landing, it hit the ground surface while losing its balance and suffered damage to the airframe.
Regarding the fact that the right wing tip contacted with the ground surface, it is probable that because the engine and the propeller which were unable to stow produced a large drag and the wind condition was a headwind, the Aircraft entered the Airport at a low altitude while losing much altitude.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA2500.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>February 18, 2021</td><td>August 15, 2019
At an altitude of about 5,500 m over Chengde City, Hebei Province, China</td><td>All Nippon Airways Co., Ltd.</td><td>JA808A
Boeing 787-8
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The aircraft operated by All Nippon Airways Co., Ltd., took off from Tokyo International Airport for Beijing Capital International Airport as a scheduled flight 963. The aircraft shook while flying, and two passengers were seriously injured and two cabin crew members sustained minor injuries.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">It is probable that this accident occurred because the aircraft shook violently when flying near the cumulus cloud top, causing two passengers who were not in their seats sustained serious injuries.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">Measures taken by the Company in order to prevent the recurrence of similar accidents after this accident
(1) Flight operations department
The Company provided the flight crew with the newly issued flight safety information and others in order to ensure that each crewmember knows the outline of the accident and understands how to respond to turbulence.
(2) Inflight services department
1. Through internal communication, the Company provided the cabin crew members with the information on the measures to be taken when the fasten seat belt sign is turned on, which are stipulated in Cabin Attendant Manual in order to ensure that they thoroughly understand them.
2. The Company revised Announcement Manual so that cabin crew members make a PA announcement to urge the passengers to go to the lavatory earlier in order not to have the passengers leave their seats during 30 minutes before landing of international flight.
3. By focusing on the injury prevention of the passengers and cabin crew members as the theme for safety promotion, the Company ensured that cabin crew members raise their awareness about securing the safety of the passengers or themselves who are not in their seats at the time of encountering turbulence.
(3) Creation of inflight safety video
In order to call additional attention to the passengers, the Company decided to create an inflight safety video to visualize specific examples of conduct at the time of encountering a sudden shaking of the aircraft.</td></tr>
</table>

<table>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA808A.pdf</td></tr>
<tr><td rowspan="4">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>February 18, 2021</td><td>October 20, 2019
In Kasumigaura City, Ibaraki Prefecture</td><td>Privately owned</td><td>None
TL-2000 STING Carbon
(Ultralight plane)</td></tr>
<tr><td>Summary</td><td colspan="3">The aircraft crashed in the field of Niihari, Kasumigaura City, Ibaraki Prefecture after taking off from a temporary airfield of Chiyoda Flying Club.
The aircraft with a total of two people on board including a pilot and a passenger crashed and was heavily damaged, catching fire and caused the people on board to die from the fire.
 

Damage situation of the aircraft</td></tr>
<tr><td>Probable causes</td><td colspan="3">Because the aircraft continued to fly at a low altitude with an unstable flying situation after taking off, it is highly probable that a part of the airframe hit some utility poles and trees, consequently crashing.
It is considered that the flight instability was caused by the exceeding the wind speed when taking of, and by the insufficient capability of the pilot's skills to control flying the aircraft (including a jump flight), or from engine trouble, etc. However, because the pilot died in the accident and the airframe was heavily damaged, it was impossible to know the real reason.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-2-3-none.pdf (In Japanese only)</td></tr>
<tr><td rowspan="5">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>April 22, 2021</td><td>January 12, 2020
At FL250 about 30 km northwest of Fukuoka Airport</td><td>Jin Air Co., Ltd.</td><td>HL8243
Boeing 737-800
(Large aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">The aircraft operated by Jin Air Co., Ltd., took off from Kitakyushu Airport, and during the climb to the cruising altitude bound for Incheon International Airport in the Republic of Korea, the aircraft experienced shaking, which caused a cabin crew member to fall down resulting in her injury.</td></tr>
<tr><td>Probable causes</td><td colspan="3">In this accident, it is highly probable that the aircraft was strongly shaken by encountering clear air turbulence during the climb, which caused the cabin crew member who was standing in the center of the aft galley to fall down and fracture her right ankle.</td></tr>
<tr><td>Safety Actions</td><td colspan="3">Safety actions the Company took upon the occurrence of the accident for the flight crew members to prevent recurrence
(1) notified of the summary of the Accident,
(2) to thoroughly confirm the turbulence procedures against expected turbulence at a pre-flight briefing, and to manage turbulence hazards through thoroughly analyzing weather charts,
(3) to conduct detailed briefings on weather information and to reconfirm the seat belt operation procedures specified in the FOM[*1], at the pre-flight briefing with the flight crew members and the cabin crew members,
(4) to carefully operate seat belt sign against expected turbulence.
[*1] "FOM"…Flight Operating Manual</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/HL8243.pdf</td></tr>
</table>

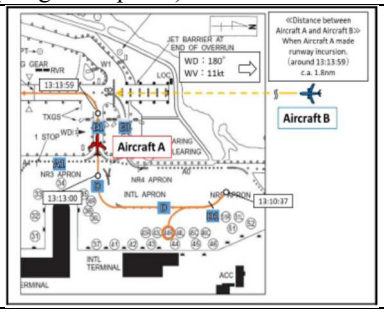
6	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 22, 2021	April 30, 2020 At Isesaki temporary airfield in Isesaki City, Gunma Prefecture	Privately owned	JE0205 Air Command R532 (Gyroplane)
	Summary	During a jump flight at the temporary airfield in Isesaki City, Gunma Prefecture, after it ascended by about 10 meters, it lost altitude suddenly upon turning left, resulting in a hard landing on the nose landing gear. The airframe got intermediate damage and the pilot was seriously injured. 		
	Probable causes	It is probable that this accident occurred because the aircraft taking off and landing during the jump flight made a steep turn to the leeward side, subsequently the airspeed dropped, the rotor speed decreased and altitude was lost, resulting in making contact with the ground from the nose landing gear which caused damage to the airframe.		
	Report	https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-3-2-JE0205.pdf (In Japanese only)		
7	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 22, 2021	June 9, 2020 In Shiroishi Town, Kishima District, Saga Prefecture	Privately owned	JR0862 Sanyo Tekko EX-03C PUFFIN-LT447 (Single-seat ultralight plane))
	Summary	The aircraft crashed at Kita-Ariake temporary airfield during the jump flight. Only a pilot was on board and died. The aircraft got heavily damaged with no fire. 		
	Probable causes	It is probable that this accident occurred because the propeller blade got damaged after starting the takeoff run, subsequently some scattered fragments collided with the rear strut of the left wing, then the strut buckled and also the left-wing front joint was separated, which caused the aircraft to crash. Regarding the damaged propeller blade, there may be a possibility of external damage due to a collision with foreign matter or potential internal damage, and influence in association with the processing to change the propeller diameter, however, none of them were identified. Regarding the separation of the left-wing front joint, it is probable that an inappropriate assembly and maintenance of the aircraft as well as the buckled strut were involved.		
	Report	https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-3-3-JR0862.pdf (In Japanese only)		
8	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	June 24, 2021	August 1, 2020 At Tatsuta temporary airfield in Aisai City, Aichi Prefecture	Privately owned	JR7151 New Wings MAX-R447·MAW (Two-seat ultralight plane)
	Summary	When the aircraft conducted a jump flight at Tatsuta temporary airfield in Aisai City, Aichi Prefecture with one pilot on board for flight control training, it unintentionally ascended and immediately after that, it crashed from its nose. The aircraft got heavily damaged and the pilot got injured.		
	Probable causes	It is probable that this accident occurred because the control stick was not properly handled and the throttle caused the pilot to ascend up to the unintentional altitude after floating, and the continued ascension caused a decrease in the speed, resulting in a crash from the nose. It is probable that the inappropriate control of the control stick and throttle occurred because the pilot had insufficient flight training both on the ground before conducting a jump flight and flying with a flight instructor, causing the pilot to have insufficient learning of basic flight		

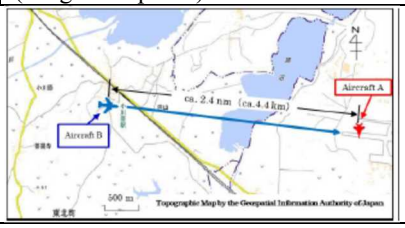
		control.		
	Report	https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-4-1-JR7151.pdf (In Japanese only)		
9	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	July 29, 2021	October 12, 2019 At an altitude of approximately 10,800 ft. (approx. 3,300 m) over above 57 km north-northwest of Tanegashima Airport	Japan Air Commuter Co., Ltd.	JA01JC ATR 42-500 (Large aeroplane)
	Summary	The aircraft shook in the flight from Kagoshima Airport to Tanegashima Airport, and a cabin attendant was injured.		
	Probable causes	The JTSB concludes that the probable cause of this accident was that the aircraft was suddenly shaken, therefore, the cabin attendant who was walking along the aisle fell off balance and injured. It is probable that regarding the aircraft was suddenly shaken was because the aircraft attitude changed due to the nose-up pitch control by the flight crew members to avoid exceeding the VMO and the nose-up effects resulting from an increase in the aircraft speed, following the encounter of localized changes in the wind direction and velocity.		
	Safety Actions	**Measures the Company took to prevent the recurrence of similar accidents** (1) The Company issued Operating Information[*2] regarding procedures in the case of approaching or exceeding the VMO[*1]. (Excerpt) i) It is specified that if approaching the VMO limit due to abrupt changes in wind conditions or outside air temperature could be anticipated, the speed with a sufficient safety margin against the VMO limit shall be selected early. And the speed recommended to select when passing territories was set forth. ii) In the case of approaching or exceeding the VMO, the speed shall be corrected using autopilot system. a. During cruise · Reduce engine thrust up to the flight idle as needed. b. During descent · Reduce engine thrust up to the flight idle as needed. · Set the autopilot system in ALT HOLD mode to maintain an altitude, or set in VS mode and adjust vertical speed to zero. iii) Deceleration by manual flying should be applied only when the autopilot system cannot correct the airspeed definitely because it might result in an abrupt pitch change. Nose up maneuver should be done at the same nose up rate (2-3˚/sec) recommended at takeoff to avoid changing an aircraft attitude abruptly even if manual flying (including using TCS[*3]) would be required to avoid an emergency avoidance. iv) Dual inputs by the PF and the PM[*4] shall be strictly forbidden. v) The transfer control procedures were specified (To ensure Take Over procedures with callouts such as "I have" and "You have") vi) Early taking over shall be carried out. (2) Classroom lectures and simulator training covering the contents of Operating Information were provided to the flight crew members involved in this accident. *1 "VMO" stands for Maximum Operating Speed *2 "Operating Information" provides a supplementary explanation about the contents of aircraft operations manual, and commentary and information on other materials. *3 "TCS" stands for Touch Control Steering, which enables a temporary manual flying without disabling the autopilot system *4 "PF" and "PM" are the terms used to identify pilots by their different roles in aircraft operated by two persons. PF is an abbreviation of Pilot Flying and is		

<table>
<tr><td></td><td></td><td colspan="3">mainly responsible for maneuvering the aircraft. PM is an abbreviation of Pilot Monitoring mainly responsible for monitoring flight status of the aircraft and cross-checking of PF's maneuvering and undertakes other nonoperational tasks.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA01JC.pdf</td></tr>
<tr><td rowspan="4">10</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>July 29, 2021</td><td>January 3, 2020
In Miyako Island, Okinawa Prefecture</td><td>Privately owned</td><td>JR0251
Maxair Drifter XP-R503L
(Two-seat ultralight plane)</td></tr>
<tr><td>Summary</td><td colspan="3">When the aircraft conducted a forced landing on the road in the vicinity of Gusukubenagama, Miyako Island, Okinawa Prefecture, its left wing collided with trees at the side of the road, and then fell to the ground. The airframe got heavily damaged and the passenger got severely injured.
  </td></tr>
<tr><td>Probable causes</td><td colspan="3">During the flight, the engine speed did not increase, and the thrust required for continuous flying was not achieved. For that reason, it is probable that the aircraft started to descend, consequently colliding with trees before reaching the destination for the forced landing, fell to the ground and the airframe got damaged, and thereby the passenger got severely injured.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-5-2-JR0251.pdf (In Japanese only)</td></tr>
<tr><td rowspan="5">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>October 28, 2021</td><td>April 12, 2020
At an altitude of approximately 8,200 m (FL270) over Ozu City, Ehime Prefecture</td><td>ANA Wings Co., Ltd.</td><td>JA64AN
Boeing 737-800
(Large aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">While the aircraft was flying from Fukuoka Airport to Osaka International Airport, the Aircraft shook causing a cabin crew member to fall and sustain an injury.</td></tr>
<tr><td>Probable causes</td><td colspan="3">It is probable that this accident occurred when the aircraft shook during the flight in the clouds accompanied by the disturbance, and thereby one of the cabin crew members, who was not seated and floated in the air, was struck on the floor losing his or her balance, and sustained the injury.</td></tr>
<tr><td>Safety Actions</td><td colspan="3">Measures taken by the Company in order to prevent the recurrence of similar accidents after this accident
(1) To flight crew members
A message from Senior Manager for Flight Operations has been sent and flight safety information, etc. has been issued to secure that the outline of the event has fully been understood and utilization of meteorological information and management of seat belt sign have thoroughly been in place.
(2) To cabin crew members
(i) Flight safety information, etc. has been issued to secure that the outline of the event has fully been understood, and internal documents describing response for the case of encountering turbulence have been updated for thorough understanding.
(ii) Documents have been issued to ensure that in-flight monitoring, while seated depending on the situations, is conducted even if seat belt sign is turned off unless providing in-flight services or taking care of passengers.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA64AN.pdf</td></tr>
</table>

12	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	October 28, 2021	February 20, 2021 In Moriya City, Ibaraki Prefecture	Privately owned	JR1734 Rans S-7 Courier R503L (Two-seat ultralight plane)
	Summary	The aircraft crashed into trees while flying the traffic pattern of the airfield of Ogashiwa, Moriya City, Ibaraki Prefecture. The aircraft got heavily damaged but the pilot was not injured. 		
	Probable causes	It is probable that this accident occurred because of the change in the aircraft's angle of flight in response to the flap control and the inappropriate control in response to the speed reduction causing the aircraft to stall and decrease in altitude, which caused it to crash into the trees.		
	Report	https://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2021-6-2-JR1734.pdf (In Japanese only)		

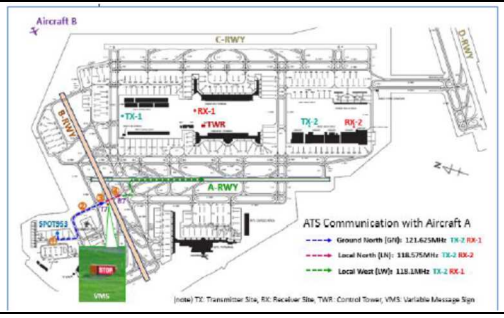
Aircraft serious incident investigation reports published in 2021

1	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	January 21, 2021	July 21, 2019 On runway 18 at Naha Airport	Asiana Airlines, Inc. (Aircraft A)	HL8256 Airbus A321-231 (Large aeroplane)
			Japan Transocean Air Co., Ltd. (Aircraft B)	JA01RK Boeing 737-800 (Large aeroplane)
	Summary	Aircraft A made incursion into runway 18 at Naha Airport without obtaining ATC clearance when aircraft B was on the final approach to the runway after obtaining landing clearance. 		
	Probable causes	It is highly probable that this serious incident occurred because aircraft A entered the runway despite of being instructed to hold short of runway 18, when aircraft B, which were cleared to land by the tower, attempted to land at the same runway. Regarding the fact that aircraft A entered the runway, it is probable that when the PIC A received the ATC instruction, he mistook the tower's instruction to hold short of runway as the instruction to line up and wait, and his misunderstanding was not corrected. It is probable that the reason why the PIC A's misunderstanding was not corrected is because the PIC A and the FO A did not cross-check the ATC clearance, as specified in the company A's manual.		
	Safety Actions	**Measures Asiana Airlines, Inc. took to prevent the recurrence of similar accidents** · Updating the Airport Information and notifying all the flight crew for flight safety. · Changed in Standard Callouts[*1] during taxi. · Company campaign for the prevention of runway/taxiway incursion.		

<table>
<tr><td></td><td></td><td colspan="3">· Strengthening evaluation standards and line audit procedures for all the flight crew.
· Remedial education and training to the flight crew involved in this serious incident.
*1 "Standard Callouts" means callouts excluding orders for specific operations like "FLAP UP" from the various callouts for normal operations.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/HL8256_JA01RK.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>January 21, 2021</td><td>October 3, 2019
On runway 10 of Misawa Airbase</td><td>Japan Air Self-Defense Force
(Aircraft A)</td><td>93-8550
F-2A
(Large aeroplane)</td></tr>
<tr><td></td><td></td><td></td><td>J-AIR Corporation
(Aircraft B)</td><td>JA216J
Embraer ERJ 170-100 STD
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">Aircraft A made incursion into runway 10 at Naha Airport without obtaining ATC clearance when aircraft B was on the final approach to the runway after obtaining landing clearance.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">In this serious incident, it is probable that aircraft A made an incursion on the runway which aircraft B with landing clearance was approaching on the final course, because the PIC of aircraft A who was waiting on the taxiway in front of the runway misunderstood the departure delay information provided by the air traffic controller as the take-off clearance, failed to listen to the controller's corrective response by reporting the completion of pre-flight procedures immediately after making incorrect read-back, and failed to visually confirm the final approach course.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">(1) Major safety actions the 3rd Wing of JASDF took upon occurrence of the serious incident
1. Ensured to listen to ATC instructions and clearance, etc.
2. Ensured to perform basic procedures and actions.
3. Revised the reporting procedures in the case of solo flight.
4. Ensured to establish the mutual supplementary system.
5. Reconfirmed the status in which deviations from ATC communications are likely to occur.
(2) JASDF notified all the Flight Squadrons of safety information concerning the serious incident, and each Flight Squadron provided safety training according to this information.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/93-8550_JA216J.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>February 18, 2021</td><td>March 24, 2018
At Fukuoka Airport</td><td>Peach Aviation Limited</td><td>JA805P
Airbus A320-214
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The aircraft was forced to stop on the runway with its nose wheel turned sideways after landing at Fukuoka Airport as a scheduled flight 151 of Peach Aviation Ltd. Consequently, the aircraft was unable to continue taxiing.
  </td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">In this serious incident, it is highly probable that the aircraft was unable to continue taxiing with its nose wheel turned sideways about 90° because during</td></tr>
</table>

		landing roll, the pin that connected the upper and lower torque links was disconnected, and it had lost control of the nosewheel steering. It is probable that the pin disconnection occurred because the mechanical strength of the threads was deteriorated by corrosion developed on the pin threads, the pin assembly could not withstand the loading transmitting from the torque links to the nut during steering operations, and the nut was torn. Regarding the corrosion development on the pin threads, it is probable that the cadmium plating was damaged and the corrosion resistance was reduced because installations and removals of the pin and nut were repeatedly conducted after the aircraft production, and the torque links were misassembled. In addition, it is somewhat likely that during reinstallation at the heavy maintenance check on the aircraft, the lubrication of the pin threads was not sufficient and the torque links were misassembled, which contributed to the acceleration of the corrosion development on the pin threads.
	Safety Actions	**(1) Design manufacturer of the aircraft** 1. Following this serious incident, the Aircraft Maintenance Manual was reviewed. As a result of this review, the Aircraft Maintenance Manual was updated by making the cleaning procedures in the detailed inspection on the pin much clearer, and adding the inspection method regarding corrosion. Besides, the pin installation procedures were updated to ensure that the grease application method and region were clarified. In the revised manual, it is required to clean carefully and dry all the pin threads and splines, and to completely fill the threads and splines with reapplied grease. 2. To the A320 family operators, the "Technical Follow-Up" was issued to provide the information on this serious incident in detail and the revised Aircraft Maintenance Manual. In addition, the Service Bulletin was issued to recommend the operators to perform an initial inspection of the pin threads and recurrent A320 fleet inspections subsequently. 3. As a terminating action, the pin and nut with improved corrosion resistance will be developed on future. **(2) The Company** After the serious incident, the Company performed inspections on the pin condition of their A320 fleet, and replaced the pin suspected corrosion. Although inspections on the pin threads and reapplication of grease used to be performed every six to ten months to monitor the status of the applied grease, after receiving the Service Bulletin mentioned as above, the inspection procedures were established in accordance with this Service Bulletin. It was decided that the pin inspection was established as an item for witness inspection by the Company's inspector in case of outsourcing the heavy maintenance check to other company.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA805P.pdf
	Reference	Major activities in the past year (page 3)

4	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	February 18, 2021	February 16. 2020 In Ishikari City, Hokkaido	Sapporo City Fire Department Air Corps	JA17AR Agusta AW139 (Rotorcraft)
	Summary	The Rotorcraft took off from Ishikari Temporary Airfield and while approaching from the west side of the Airfield for rescue training, dropped weights attached to the hoist over the national forest.		
	Probable causes	The JTSB concludes that the probable cause of this serious incident was the weight hook was almost certainly not properly closed when attached on the hoist hook, and at the timing weights with the hoist hook were released outside of the rotorcraft, the hook opened and weights dropped.		

<table>
<tr><td></td><td>Safety Actions</td><td colspan="3">Safety actions that Sapporo City Fire Department Air Corps took after this serious incident
· They suspended to use this weight.
· Revised the confirmation procedures when positioning the weight on the hoist hook as follows.
1) The weight installation work shall be done inside the aircraft by the jumpmaster.
2) After the weight installation, it shall be confirmed by applying tension.
3) The connection state of weights shall be double-checked by the jumpmaster and the hoist operator, and fall prevention rope shall be removed after this check and weight to be released outside of the rotorcraft.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA17AR.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>March 25, 2021</td><td>October 27, 2018
At Tokyo International Airport</td><td>Okayama Air Service Co., Ltd.
(Aircraft A)</td><td>JA123F
Cessna 510
(Small aeroplane)</td></tr>
<tr><td></td><td></td><td></td><td>Shanghai Deer Jet Co., Ltd.
(Aircraft B)</td><td>B-3276
Gulfstream Aerospace G-VI
(Large aeroplane)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">When aircraft A was on final approach to runway 22 with a landing clearance, aircraft B, which was instructed to hold short of the runway, entered and crossed the runway without clearance at Tokyo International Airport. Aircraft A executed a go-around as instructed by the air traffic controller.
 
</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">In this serious incident, it is probable that because of the situation where the radio voice transmission of aircraft B did not reach LN, communication between aircraft B and LN was not established, and furthermore, aircraft B misunderstood that crossing runway was approved by hearing part of voice messages intended for other aircraft, which resulted in aircraft B entering the runway which aircraft A was approaching with a landing clearance. Regarding that the voice of transmission of aircraft B did not reach LN could not be determined its reason.
Besides, it is probable that the following matters are contributed to the occurrence of this serious incident.
(1) When aircraft B changed frequency to LN, the communication with LN was not established surely, and a sequence of call and reply was not performed between them.
(2) Flight crew of aircraft B could not notice the illuminated VMS.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">Measures taken by Shanghai Deer Jet Co., Ltd. after the serious incident in order to prevent occurrence of similar cases in the future.
(1) Issuance of Safety Circular
Safety circular in relation to Tokyo International Airport was issued for thorough dissemination to flight crew along with using this serious incident case as one of educational materials.
(2) Follow-up of radio equipment of aircraft A
The Company has set to continuously gather information from flight crew to follow up reliability of VHF-1 radio of aircraft B, and in the event that the radio does not function, the pertinent radio is set to be replaced without delay.
(3) Review and improvement of preventive measures against runway incursion
The Company carried out review and improvement of the preventive measures described in the SOP (Standard Operating Procedures) of Gulfstream Aerospace G-VI, and provided education to flight crew.</td></tr>
</table>

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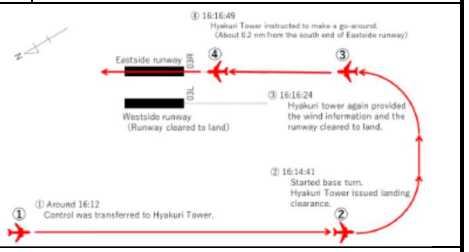
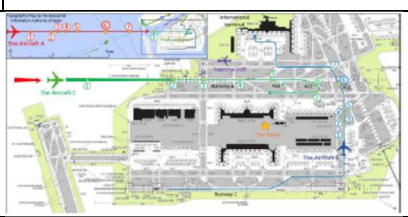
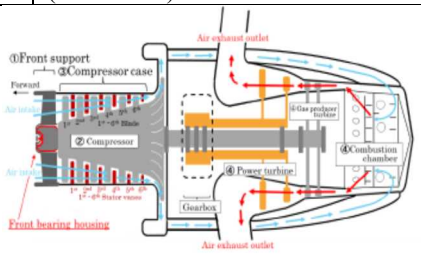
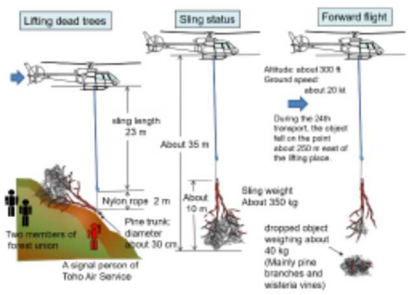
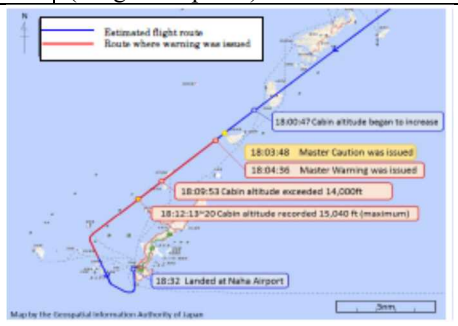
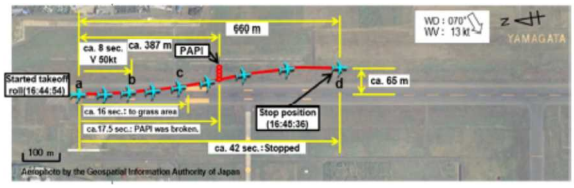
<tr><td></td><td></td><td colspan="3">(4) Measures to address potential risks of radio communication
With TEM (Threat and Error Management), the Company conducted an analysis on potential risks of radio communication and devised a method to control them so that flight crew would be able to address those risks.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA123F_B-3276.pdf</td></tr>
<tr><td rowspan="5">6</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>March 25, 2021</td><td>August 22, 2019
About 0.2 nm southwest from the south end of runway 03R of Hyakuri Airfield</td><td>Easter Jet Co., Ltd</td><td>HL8052
Boeing 737-800
(Large aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">The aircraft attempted to land on the runway different from the one cleared to land by a controller, on which an inspection vehicle was running, before landing at Hyakuri Airfield.
 
</td></tr>
<tr><td>Probable causes</td><td colspan="3">In this serious incident, it is highly probable that because the captain of the aircraft misidentified the runway cleared to land, he made an approach for the different runway where an inspection vehicle was running on.
It is somewhat likely that the captain as the PF*1 did not thoroughly perform the visual recognition of runway, and in addition, the FO as the PM*1 did not adequately monitor the flight status of the aircraft, which may be involved in the runway misidentification made by the captain of the aircraft.
*1 "PF" and "PM" are the terms used to identify pilots by their different roles in aircraft operated by two persons. PF is an abbreviation of Pilot Flying and is mainly responsible for maneuvering the aircraft. PM is an abbreviation of Pilot Monitoring mainly responsible for monitoring flight status of the aircraft and cross-checking of PF's maneuvering and undertakes other nonoperational tasks.</td></tr>
<tr><td>Safety Actions</td><td colspan="3">Preventive actions that the Company took in the wake of this serious incident
(1) Made known the serious incident in details to flight crew.
(2) Added the condition in which the PIC flying to Hyakuri Airfield is required to have flight experience with the flight time of 500 hours or more as the PIC*1.
*1 "PIC" stands for Pilot in Command who is the pilot responsible for the operation and safety of an aircraft. In aircraft operated by several pilots qualified as PIC, from whom one PIC is appointed.</td></tr>
<tr><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/HL8052.pdf</td></tr>
<tr><td rowspan="5">7</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 rowspan="2">April 22, 2021</td><td rowspan="2">June 15, 2019
At Tokyo International Airport</td><td>Skymark Airlines Inc.
(Aircraft A)</td><td>JA73AB
Boeing 737-800
(Large aeroplane)</td></tr>
<tr><td>All Nippon Airways Co., Ltd.
(Aircraft B)</td><td>JA885A
Boeing 787-9
(Large aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">Aircraft B crossed runway 34L at Tokyo International Airport after receiving an ATC clearance, when aircraft A was on the final approach to the runway after receiving a landing clearance.
  </td></tr>
</table>

	Probable causes	It is certain that this serious incident occurred because the aircraft B crossed the runway after being cleared from the tower west position, when the aircraft A was approaching runway A after receiving a landing clearance from the tower west position. It is highly probable that the tower west position issued a clearance of crossing runway A to the aircraft B, because the supervisor A, not recognizing the landing clearance issued to the aircraft A, urged the trainee to issue a clearance of crossing the runway to the aircraft B, and because the trainee, who forgot issuing a landing clearance to the aircraft A, issued a clearance of crossing the runway to the aircraft B according to the instruction of the supervisor A.
	Safety Actions	**(1) Safety actions that Tokyo Aerodrome Control Facility, the Tokyo Airport Office, the Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism took in the wake of this serious incident** · Established the guideline to manage training environment appropriately so that the OJT shall be interrupted and the supervisor shall carry out the operations of ATC services in case where the supervisor needs to coordinate with other positions. · Improved the initial training curriculum before starting the OJT in order to include trainings related to the coordination with other positions and raise the level of OJT qualifying. · Provided retraining for supervisors. **(2) Measures taken by the Air Navigation Services Department, Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism** · Conducted training for personnel in charge of training and the local TRM[*1] from July 8 to 9, 2019 and considered new efforts in order to properly conduct the OJT based on the safety of air traffic. Besides, it is instructed to come up with and implement initiatives in each facility based on the training content. *1 "TRM" stands for Team Resource Management, created by applying the concept of CRM (Crew Resource Management) of the aircraft operators to the team carrying out the operations of ATC services.
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA73AB_JA885A.pdf

8	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	May 27, 2021	June 19, 2019 Over an area near Aikawa Town, Aiko District, Kanagawa Prefecture	Toho Air Service Co., Ltd.	JA6697 Aerospatiale AS355F2 (Rotorcraft)
	Summary	The aircraft took off from Tokyo Heliport for press and news coverage. While flying over an area near Aikawa Town, Aiko District, Kanagawa Prefecture, the No.1 engine (left engine) was shut down. The helicopter made a preventive landing on a riverbed of the Nakatsu River in Aikawa Town. During an inspection after landing, it was confirmed that fragments of the No. 1 engine penetrated the engine case. 
	Probable causes	It is highly probable that fracture of the 2nd stage blades of the engine (left engine) compressor during the flight, which resulted in damage to the subsequent stages blades and stator vanes, etc., and those fragments penetrated the compressor case. It is probable that fracture of the 2nd stage blades of compressor was caused by damage due to corrosion, which reduced the robustness of the blades.
	Safety Actions	**Safety actions taken by the operator** On June 20, 2019, the operator decided to conduct occasional inspections for the same type of helicopters in operation as temporary safety actions for this serious incident, and confirmed there were no anomalies in the overall airframes and engines.

<table>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA6697.pdf</td></tr>
<tr><td rowspan="4">9</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>July 29, 2021</td><td>December 4, 2020
In Higashi-Matsushima City, Miyagi Prefecture</td><td>Toho Air Service Co., Ltd.</td><td>JA504D
Airbus Helicopters AS350B3
(Rotorcraft)</td></tr>
<tr><td>Summary</td><td colspan="3">The helicopter while transporting withered pine weevils trees by cargo sling dropped some of the dead trees on a fallow field in Miyato Island, Higashi-Matsushima City, Miyagi Prefecture. There was no damage to the helicopter, or injury to persons on board or on the ground.
 
</td></tr>
<tr><td>Probable causes</td><td colspan="3">In this serious incident, during the flight at low speed, it is highly probable that some of the dead trees dropped on the fallow field due to the wind pressure including downwash because the measures to prevent the slung dead trees from dropping were not sufficient.</td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="3">On December 9, 2020, the company additionally stipulated in the Toho Standard Operating Procedure the methods for packaging and the procedures to suspend the slinging work to prevent dropping, made it public within the company and implemented the safety education.
 
Wind the rope at around 1/3 or around 1 m of carried out tree with the root side (thicker side) above basically.
Use a blue sheet to prevent branches or trees from coming out of the net.
Bind at the four corners of the net in the same way as packaging for general goods.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/eng-air_report/JA504D.pdf</td></tr>
<tr><td rowspan="4">10</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>August 26, 2021</td><td>February 20, 2020
At FL250 about 92 km north-northeast of Naha Airport</td><td>Silver Air Corp.</td><td>N829RA
Bombardier BD-700-1A10
(Large aeroplane)</td></tr>
<tr><td>Summary</td><td colspan="3">The aircraft took off from Tokyo International Airport as a charter flight. While the aircraft was flying at FL400 to Tan Son Nhat International Airport (the Socialist Republic of Vietnam), the instrument indicated loss of cabin pressurization. The flight crew member of the aircraft declared an emergency and made an emergency descent until the aircraft reached an altitude of approximately 10,000 ft. The Pilot in Command changed its destination to Naha Airport and the Aircraft landed at Naha Airport.
 
</td></tr>
<tr><td>Probable causes</td><td colspan="3">The JTSB concludes that the probable cause of this serious incident was the shutdown of both PACKs of the Aircraft during the flight at FL400, which resulted in loss of cabin pressurization. Concerning the shutdown of both PACKs, it is highly</td></tr>
</table>

		probable that the flight crew member was going to operate the switches of fuel recirculation system but erroneously pushed both PACK switches to position "OFF" without noticing.
	Safety Actions	**Safety actions taken by the Company after the serious incident** The following safety actions were taken for all crew members who operate the same type of aircraft. (1) Strict adherence to checklists and procedures during all phases of flight, especially in climb out and cruise, as was identified in this incident. (2) It was informed that it is important for a PIC to emphasis on Crew Resource Management (CRM*1) and crew communication is vital and will be briefed and emphasized during all phases of flight. (3) Review of fuel recirculation procedures on aircraft with manual fuel recirculation action, such as N829RA, crew shall do a thorough review of the fuel recirculation system to include limitations of such actions. (4) Re-emphasis the challenge and response items to various phases of the checklist to ensure proper cockpit switchology. *1 "CRM" refers to the effective use of all available resources: human resources, hardware and information, in order to accomplish safe and efficient operations. (AIM-JAPAN)
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/N829RA.pdf

11	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type
	October 28, 2021	April 23, 2019 At Yamagata Airport	Fuji Dream Airlines Co., Ltd.	JA11FJ Embraer ERJ 170-200 STD (Large aeroplane)
	Summary	The aircraft started takeoff roll to fly from Yamagata Airport to Prefectural Nagoya Airfield with a total of 64 people, consisting of the pilot in command, three crew members, and 60 passengers, then ran off while veering to the left, and stopped in the grass field. 
	Probable causes	The JTSB concludes that the probable cause of this serious incident was that because the aircraft could not change its direction while trying to control the nosewheel steering with the pedal mode when it started takeoff roll, the aircraft was disabled to move on its own when it stopped in the grass field after running off the side of the runway while aborting the takeoff. Regarding the reason why the pedal mode could not control the nosewheel steering, it is highly probable that because there was an abnormality in the microswitch inside the handle, the steering mode stayed in the handle mode. The cause of the microswitch failure could not be determined even in the detailed investigation.
	Safety Actions	**(1) Measures taken by the Company** a. The Company issued an Operating Information*1 "Response when occurring an abnormality in the steering system," and has informed the flight crew members the outline of the steering system and the response at the time when an abnormality would occur in it. b. The Company provided the flight crew members with the training for a rejected takeoff at low speed in the periodic training of the 2019 fiscal year. **(2) Measures taken by the Manufacturer** The manufacturer has revised the normal procedure in the AOM*2 related to the operational check for the flight control system as below. (Revised on November 6, 2020) · Added the verification of the displayed status of the EICAS message "STEER

		OFF" after pushing the steering disengage switch to disengage the rudder pedal and the steering system when starting the operational check for the flight control system as the NOTE (Operating procedures, techniques and other related information, which are considered essential to emphasize the safety of flight.). *Verify the STEER OFF Status message is displayed on EICAS and check it remains displayed until the Nosewheel Steering Handle is pressed to engage the Steering.* · The procedure to enable the steering to use after completing the operational check for the flight control system. Before: *Press the NOSEWHEEL STEERING Handle to engage the STEERING* After: *Press the NOSEWHEEL STEERING Handle until STEER OFF Status message extinguishes to engage the STEERING* *1 "Operating Information" refers to reference information on aircraft operation which provides additional information related to the AOM and aircraft modification information and others related to the operation. *2 "AOM" stands for Airplane Operations Manual
	Report	https://www.mlit.go.jp/jtsb/eng-air_report/JA11FJ.pdf

7 Actions taken in response to recommendations in 2021 (aircraft accidents and serious incidents)

A summary of the actions taken in response to recommendations in 2021 is as follows.

① Aircraft accident related to privately-owned SOCATATBM 700

(Recommendations on July 25, 2019)

The Japan Transport Safety Board (JTSB) published an investigation report and made recommendations to the Minister of Land, Infrastructure, Transport and Tourism on July 25, 2019, regarding the aircraft accident involving the privately-owned SOCATA TBM 700, registered N702AV, occurred in Yamazoe Village, Yamabe District, Nara Prefecture occurred on August 14, 2017. On March 31, 2021, the JTSB received the following notification on actions taken in response to the recommendations.

(See the JTSB website at the following URL for the summary and probable causes of the accident:
https://jtsb.mlit.go.jp/jtsb/aircraft/detail.php?id=2192 (In Japanese only)

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

It is probable that there is a possibility of inappropriate flight control operations due to a lack of the captain's knowledge and skills required to control the aircraft, causing the aircraft to lose its control while flying. The captain had Japan's valid competence certification, however, the certification allow its holders to be privileged to fly aircrafts within the scope of works according to the qualifications held regardless of the characteristics of individual aircrafts if the class restrictions are fulfilled for aircrafts that do not require type restrictions.

For this reason, the Japan Transport Safety Board recommends the Minister of Land, Infrastructure, Transport and Tourism to take the following measures pursuant to the provision of Article 26 of the Act for Establishment of the Japan Transport Safety Board in order to provide aviation safety based on the matters revealed during this aircraft accident investigation.

The Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (hereafter: MLIT) shall instruct pilots to fly an aircraft of a type, which they have never flown, after certainly acquiring knowledge and skills required to fly the aircraft concerned even if flying the aircraft concerned that does not require type restrictions in the pilot's competence certification.

○Measures taken in response to the recommendations

MLIT has been providing guidelines regarding education and training for flying aircrafts that pilots have never flown within the scope of class restrictions pursuant to the "Regarding Guidelines of Education and Training for Flying Rotorcrafts but the Types without Experiences of Flying Them within the Same Class Restrictions" (KU-JO No. 2090, September 29, 1995) and the "Regarding Guidelines of Education and Training for Flying Gliders within the Same Class in a Departing Manner that Pilots Have Never Experienced" (KOKU-KU-JO No. 86, June 23, 2006). In addition, the following actions were taken based on the recommendations.

1. MLIT issued KOKU-KU-KO No. 821 "Regarding Securing Safety when Flying Aircrafts that Pilots Never Flown" (Appendix 1) as of July 25, 2019 to relevant organization related to operations of aircrafts. If flying aircrafts of types that pilots have never flown even though the aircrafts are within the scope of class restrictions, pilots must learn
   · overview and structure of the airframe;
   · flight manual and performance;
   · various systems and handling;
   · taking off and landing; and
   · normal and emergency operations;
   and other items of knowledge and skills required to fly the aircraft concerned through education and training related to theories and practices provided by personnel experienced flying the aircraft concerned. MLIT also promoted awareness to ensure safety securely.

2. As the detailed guidelines related to 1., MLIT established the "Guidelines related to Education and Training for Flying Aircrafts, etc. of Types, which Pilots Have Never Experienced to Fly, with the Same Kinds and Class as Restrictions Granted in Competence Certification" (KOKU-KU-KO No. 1055, June 29, 2020) (Appendix 2) as of June 29, 2020, and provided concrete guidelines regarding:
   · details when education and training are required for each kind of aircrafts;
   · concrete items of theoretical education and practical education;
   · requirements for implementers of education and training; and
   · record method of implementing education and training, etc.

3. MLIT promoted actions to disseminate the details of the guidelines mentioned in 2 through the "Safe Aircraft Operation Seminar" of FY 2020 hosted by the Civil Aviation Bureau of MLIT, and required pilots to learn knowledge and skills required following the guidelines when flying aircrafts of types that the pilots have never flown or when flying aircrafts in a departing manner that pilots have never experienced, even if flying aircrafts within the class restrictions of competence certification.

* Notifications (original) from the Minister of Land, Infrastructure, Transport and Tourism are available on the JTSB website.
https://www.mlit.go.jp/jtsb/airkankoku/kankoku16re_030331.pdf (In Japanese only)

② Accident involving a Bell 412EP owned by Gunma Prefecture Disaster Prevention Air Corps (Recommendations on February 27, 2020)

The Japan Transport Safety Board (JTSB) published an investigation report and made recommendations to the Minister of Land, Infrastructure, Transport and Tourism on January 31, 2020, regarding the aircraft accident involving the BELL 412EP, registered JA200G, operated by Gunma Prefecture Disaster Prevention Air Corps occurred in the vicinity of about two km northeast of Mt. Yokote, Nakanojo Town, Agatsuma District, Gunma Prefecture on August 10, 2018. On March 31, 2021, the JTSB received the following notification on actions taken in response to the recommendations.

(See the JTSB website at the following URL for the summary and probable causes of the accident:
https://jtsb.mlit.go.jp/jtsb/aircraft/detail.php?id=2222 (In Japanese only)

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

It is probable that the aircraft crashed into the mountain slope because the captain were disabled to perform appropriate aircraft control in order to maintain the aircraft attitude due to the captain's spatial disorientation, caused by discontinued visual recognition of the ground surface due to visibility deteriorated by approaching the airspace with many clouds while flying the mountain areas in order to investigate the mountain trail.

Regarding the ground surface was not be continuously visually recognized due to deteriorated visibility, it is probable that the captain continued to fly the aircraft with his/her delayed determination for turning back while getting difficult to maintain the visual meteorological condition.

Pilots of aircrafts for searching and rescuing activities by police, etc. frequently fly in the mountains areas where it is difficult to anticipate the local weather which is likely to change often, due to the nature of mission. Even if the weather suddenly deteriorates, it is important to take appropriate actions without suffering spatial disorientation in order to escape promptly from the airspace where the weather has deteriorated. For this purpose, it is considered to deepen the understanding on risk of spatial disorientation, immediately switch the control with the one using the

basic instruments when necessary, and also practice on a daily basis to acquire concrete preventive measures and countermeasures against spatial disorientation appropriately using automatic flying equipment, etc., if available.

From this, the Japan Transport Safety Board make recommendations to the Minister of Land, Infrastructure, Transport and Tourism (hereafter: MLIT) based on the results of this accident investigation to take the following measures pursuant to Article 26, paragraph (1) of the Act for Establishment of the Japan Transport Safety Board in order to prevent aircraft accidents and mitigate damage when aircraft accidents occur.

The Civil Aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism shall promote awareness on risk of spatial disorientation for pilots of aircrafts for searching and rescuing activities, and also disseminate concrete preventive measures in order to avoid suffering spatial disorientation and measures for escaping from a situation in spatial disorientation, if suffering it.

○Measures taken in response to the recommendations

MLIT has been promoting awareness on and disseminating risk of flying in clouds to small aeroplane operators through safety seminars, etc., and also cooperating with the Fire and Disaster Management Agency in studying for formulating "Standard for flight operations of fire and disaster prevention helicopters" (Fire and Disaster Management Agency notice No. 4 on September 24, 2019), and taking other actions in order to prevent recurrence of aircraft accidents, however took the following actions in response to the recommendations.

1. The MLIT issued "Regarding Securing Safety of Flight Operations Pursuant to Visual Flight Rules (Related to Spatial Disorientation)"(Appendix 1) (KOKU-KU-KO No. 3113 on February 27, 2020) to relevant ministries and agencies related to searching and rescuing activities in order to request:
   (1) Regular implementation of theoretical training on risk of and countermeasures for spatial disorientation and practical training for escaping from a situation in spatial disorientation using instruments by simulating a situation with deteriorated visibility using an actual aeroplane or a simulator; and
   (2) Dissemination of risk of flying with deteriorated visibility and with spatial disorientation, and full enforcement of countermeasures.

In addition, the MLIT also requested the content of the above item 2. to small aeroplane-related organizations. (Appendix 2)

2. The MLIT took the following actions in consultation with experts and related organizations, etc. in the 8th Safety Promotion Committee Meeting Related to Small Aeroplanes, etc. held on April 22, 2020.
   (1) Creation and distribution of leaflets with cooperation from related organizations in order to disseminate safety measures based on the details of the recommendations, and also issuance of documents to small aeroplane operators, related organizations, and pilot competency

assessors in order to disseminate the details of the leaflets and request promoting understanding of them (Appendix 3)

(2) Disclosure of the leaflets, etc. on its website, dissemination of and promotion of awareness on their details in the "Safe Aircraft Operation Seminar" of FY 2020 hosted by the Civil Aviation Bureau of the MLIT

(3) Creation of videos to promote safety for pilots of rotorcrafts including the introduction of risk of spatial disorientation in flight in clouds, coordinating with related organizations, etc., and also publication of the videos on the MLIT website on September 2, 2020 (Appendix 4)

* Notifications (original) from the Minister of Land, Infrastructure, Transport and Tourism are available on the JTSB website.
https://www.mlit.go.jp/jtsb/airkankoku/kankoku17re_030331.pdf

8 Provision of factual information in 2021 (aircraft accidents and serious incidents)

The JTSB provided no factual information in 2021.

Column

Overseas business trips in investigations of aircraft accidents and serious incidents

Aircraft Accident Investigator

I had a business trip to the U.S. while the state of emergency was being declared. Most meetings under the COVID-19 pandemic are held online. However, there have been more than a few meetings and investigations that are unable to achieve their mission due to being held online.

In field investigations, it is necessary not only to investigate details of damaged parts in dedicated facilities, but also to investigate the facilities involved in the damage. Especially in this investigation, it was necessary to investigate the on-site facilities directly because it has been considered that the facilities of designers and manufacturers might be involved in the causes.

The details of information obtained from photographs and videos depend on the people who take them, resulting in occasional misunderstandings. To create accurate investigation reports, it is necessary to conduct neutral investigations without bias, and investigators themselves need to directly obtain information based on the so-called 5W1H method, e.g., what kind of work with what kind of difficulties has been carried out by workers with what kind of skills, at what kind of facilities, under what kind of environment, and in what time zone. Then, proceeding with discussions with designers and manufacturers and implementing the PDCA cycle will lead to prompt discovery of measures to prevent recurrences. On-site communication helps building a relationship of trust with related countries. Sometimes more than 100 questions can be resolved in one or two days. Exchanging emails may not resolve them even in several months. Moreover, "off-the-record information" included in conversations during lunch time, which is unable to be conveyed by email, can be actually very useful to resolve questions.

Difficulties in overseas business trips under the COVID-19 pandemic

<Obstacle 1: Scheduling>

Scheduling of on-site investigations was difficult because the country which I intended to visit, was under lockdown. I repeatedly made phone calls to communicate about scheduling in order to gather all the persons concerned (professional engineers and accident investigators of related countries), and it took me four months from planning to implementation of the trip.

<Obstacle 2: Departure>

It was required to obtain a certificate that proved negative results for COVID-19 in the format approved by the country I intended to visit within 72 hours before departure. It took me time and effort to find a test institution that was capable to conduct tests on Saturdays and Sundays and issue a certificate on the same day as the testing day in the "language approved by the country I intended to visit."

<Obstacle 3: Transportation in the county I visited and returning to Japan>

It was a given to have two certificates from PCR tests that showed negative results for COVID-19, i.e. when transporting by airplane in the U.S. and when returning to Japan. I needed to make reservations by myself for testing by searching testing institutions and taking tests between the on-site investigations.

<Obstacle 4: Isolation>

After returning to Japan, my 14-days of isolation started. For the first three days, I moved to an accommodation from the airport for forced isolation at an accommodation specified by the quarantine station chief by a dedicated microbus after taking a PCR

test, installing a dedicated application on my smart phone, and being interviewed, etc. In the accommodation, three packed meals per day were distributed.

After the forced isolation ended, I transferred to the phase of self-isolation for the remaining 11 days. During that phase, my health was observed, and I received health confirmation via video chatting, and reported my health status and current location using a GPS terminal.

<Obstacle 5: Invisible obstacles>

CNN reports that costs of hospitalization and treatment of COVID-19 patients in the U.S. are $75,000 (or ¥8,550,000 at the exchange rate as of January 2022). Such suffering is waiting for a person who would be infected with COVID-19 even if they implemented all possible infection control practices.

<Implementation of international accident investigations>

International agreements related to aircraft accident investigations prescribe that an investigating country shall notify related countries including designing countries, manufacturing countries and so on of an occurrence of an accident, and that the related countries shall provide necessary information to the investigating country. Accident investigations are made pursuant to such rules, cooperating with the related countries.

In addition, there are many cases where facilities of designers and manufacturers of airframes are located outside Japan. For this reason, investigation authorities of countries carry out on-site investigations at such facilities if necessary in order to investigate probable causes of accidents.

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)

The term "Railway Accident" as used in this Act shall mean a serious accident prescribed by the Ordinance of Ministry of Land, Infrastructure, Transport and Tourism among those of the following kinds of accidents; an accident that occurs during the operation of trains or vehicles as provided in Article 19 of the Railway Business Act, collision or fire involving trains or any other accidents that occur during the operation of trains or vehicles on a dedicated railway, collision or fire involving vehicles or any other accidents that occur during the operation of vehicles on a tramway.

◎Article 2 of Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

(Serious accidents prescribed by the Ordinance of Ministry of Land, Infrastructure, Transport and Tourism, stipulated in Article 2, paragraph (3) of the Act for Establishment of the Japan Transport Safety Board)

1 The accidents specified in Article 3, paragraph (1), items (i) through (iii) of the Ordinance on Report on Railway Accidents, etc. (the Ordinance) (except for accidents that involve working snowplows that specified in item 2 of the above paragraph);

2 From among the accidents specified in Article 3, paragraph (1), items (iv) through (vi) of the Ordinance, that which falls under any of the following sub-items:

(a) an accident involving any passenger, crew, etc. killed;

(b) an accident involving five or more persons killed or injured;

(c) a fatal accident that occurred at a level crossing with no automatic barrier machine;

(d) an accident found to be likely to have been caused owing to a railway officer's error in handling or owing to malfunction, damage, destruction, etc. of the vehicles or railway facilities, which resulted in the death of any person;

3 The accidents specified in Article 3, paragraph (1), items (iv) through (vii) of the Ordinance which are found to be particularly rare and exceptional;

4 The accidents equivalent to those specified in Article 3, paragraph (1), items (i) through (vii) of the Ordinance which have occurred relevant to dedicated railways and which are found to be particularly rare and exceptional; and

5 The accidents equivalent to those specified in items (i) through (iii) which have occurred relevant to a tramway, as specified by a public notice issued by the Japan Transport Safety Board.

[Reference] The accidents listed in Article 3, paragraph (1), each items of the Ordinance on Report on Railway Accidents, etc.

item (i): Train collision

item (ii): Train derailment

item (iii): Train fire

item (iv): Level crossing accident

item (v): Accident against road traffic

item (vi): Other accidents with casualties

item (vii): Heavy property loss without casualties

○Article 1 of the Public Notice of the Japan Transport Safety Board

(Accidents specified by the public notice stipulated in Article 2, item (v) of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board)

1 From among the accidents specified in Article 1, paragraph (1), items (i) through (vi) of the Ordinance on Reporting on Tramway Accidents, etc. (the Ordinance), that which falls under any of the following sub-items:

(a) an accident that causes the death of a passenger, crewmember, 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 machine;

2 The accidents specified in Article 1, paragraph (1), items (i) through (vii) of the Ordinance which are found to be particularly rare and exceptional; and

3 From among the accidents occurring on a tramway operated under the application of the Ministerial Ordinances to provide Technical Regulatory Standards on Railways mutatis mutandis as specified in Article 3, paragraph (1) of the Ordinance on Tramway Operations, the accidents equivalent to those specified in Article 1, items (i) through (iii) of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

[Reference] The accidents specified in Article 1, paragraph (1), each items of the Ordinance on Reporting on Tramway Accidents, etc.

item (i): Vehicle collision

item (ii): Vehicle derailment

item (iii): Vehicle fire

item (iv): Level crossing accident

item (v): Accidents against road traffic

item (vi): Other accidents with casualties

item (vii): Heavy property loss without casualties

Railway accidents to be investigated

<table>
<tr><th>Category</th><th>Train collision*2)</th><th>Train derailment*2)</th><th>Train fire*2)</th><th>Level crossing accident</th><th>Accident against road traffic</th><th>Other accidents with casualties</th><th>Heavy property loss without casualties</th></tr>
<tr><td rowspan="2">Railway (including tramway operated as equivalent to railway)

[Notice 1-3]</td><td colspan="3" rowspan="2">All accidents*1)
[Ordinance 2-1]</td><td colspan="3">・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 2-2]</td><td></td></tr>
<tr><td colspan="4">Accidents that are particularly rare and exceptional
[Ordinance 2-3]</td></tr>
<tr><td>Dedicated railway</td><td colspan="7">Accidents that are particularly rare and exceptional [Ordinance 2-4]</td></tr>
<tr><td rowspan="2">Tramway
[Ordinance 2-5]</td><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 2-1] However, accidents that are particularly rare and exceptional are to be investigated. [Ordinance 2-3]

*2 If these categories occur on a tramway, the accident types shall each be renamed to "vehicle collision," "vehicle derailment," or "vehicle fire."

(Note) "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 paragraph numbers.

<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 (Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board), deemed to bear a risk of accident occurrence.

◎Article 3 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

(A situation prescribed by the Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism, stipulated in Article 2, paragraph (4), item (ii) of the Act for Establishment of the Japan Transport Safety Board)

【JTSB Website: https://www.mlit.go.jp/jtsb/example.pdf (See cases ①～⑩.) (Japanese only)】

1 The situation specified in Article 4, paragraph (1), item (i) of the Ordinance on Report on Railway Accidents, etc. (the Ordinance), wherein another train or vehicle had existed in the zone specified in said item;

[A situation where a train starts moving for the purpose of operating in the relevant block section before completion of the block procedure: Referred to as "Incorrect management of safety block." (case ①)]

2 The situation specified in Article 4, paragraph (1), item (ii) of the Ordinance, wherein a train had entered into the route as specified in said item;

[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: Referred to as "Incorrect indication of signal." (case ②)]

3 The situation specified in Article 4, paragraph (1), item (iii) of the Ordinance, wherein another train or vehicle had entered into the protected area of the signal which protects the zone of the route as specified in said item;

[A situation where a train proceeds regardless of a stop signal, thereby obstructing the route of another train or vehicle: Referred to as "Violating red signal." (case ③)]

4 The situation specified in Article 4, paragraph (1), item (vii) of the Ordinance, which caused malfunction, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train;

[A situation that causes a malfunction, etc., of facilities: Referred to as "Dangerous damage in facilities." (case ⑦)]

5 The situation specified in Article 4, paragraph (1), item (viii) of the Ordinance, which caused malfunction, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train;

[A situation that causes a malfunction, etc., of a vehicle: Referred to as "Dangerous trouble in vehicle." (case ⑧)]

6 The situation specified in Article 4, paragraph (1), items (i) through (x) of the Ordinance which

is found to be particularly rare and exceptional; and

[These are referred to as: item (iv) "Main track overrun" (case ④); item (v) "Violating closure section for construction" (case ⑤); item (vi) "Vehicle derailment" (case ⑥); item (ix) "Heavy leakage of dangerous object" (case ⑨); and item (x) "Others," (case ⑩) respectively.]

7 The situations occurred relevant to the tramway as specified by a public notice of the Japan Transport Safety Board as being equivalent to the situations specified in the preceding items.

○Article 2 of the Public Notice of the Japan Transport Safety Board

(A situation prescribed by the public notice stipulated in Article 3, item (vii) of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board (Serious incident on a tramway))

1 The situation specified in Article 2, item (i) of the Ordinance on Reporting on Tramway Accidents, etc. (the Ordinance), wherein another vehicle operating on the main track had existed in the zone specified in said item;

[A situation where a vehicle is operating on the main track for the purpose of operating in the relevant safety zone before the completion of safety system procedures: Referred to as "Incorrect management of safety block."]

2 The situation specified in Article 2, item (iv) of the Ordinance, which caused malfunction, damage, destruction, etc., bearing a particularly serious risk of collision, derailment of or fire in a vehicle operating on the main track;

[A situation that causes a malfunction, etc., of facilities: Referred to as "Dangerous damage in facilities."]

3 The situation specified in Article 2, item (v) of the Ordinance, which caused malfunction, damage, destruction, etc., bearing a particularly serious risk of collision, derailment or fire in a vehicle operating on the main track;

[A situation that causes a malfunction, etc., of a vehicle: Referred to as "Dangerous trouble in vehicle."]

4 The situation specified in Article 2, items (i) through (vii) of the Ordinance which is found to be particularly rare and exceptional; and

[These are referred to as: item (ii) "Violating red signal;" item (iii) "Main track overrun;" item (vi) "Heavy leakage of dangerous object;" and item (vii) "Others," respectively.]

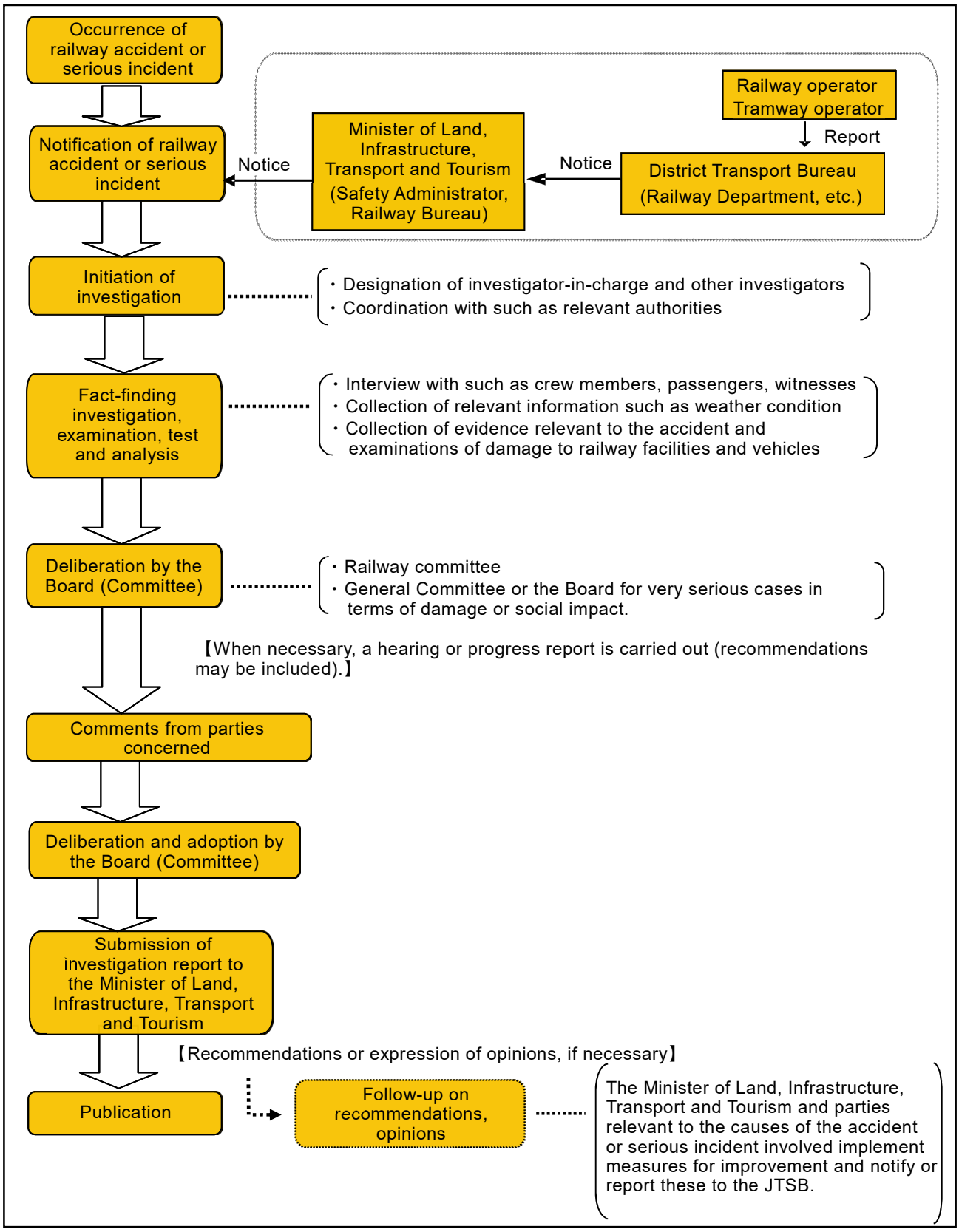
5 From among the situations occurring on a tramway operated under the application of the Ministerial Ordinances to provide Technical Regulatory Standards on Railways mutatis mutandis as specified in Article 3, paragraph (1) of the Ordinance on Tramway Operations, the situations equivalent to those specified in Article 2, items (i) through (vi) of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

Serious incidents to be investigated

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

(Note) "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 paragraph numbers.

2 Procedure of railway accident/serious incident investigation



* Opinions may be expressed in a flow chart (as above) or whenever and however necessary to prevent accidents or incidents or mitigate damage thereof.

3 Statistics of investigations of railway accidents and serious incidents

The JTSB carried out investigations of railway accidents and serious incidents in 2021 as follows:

14 accident investigations were carried over from 2020, and 11 accident investigations were newly launched in 2021. Among these, 12 investigation reports were published in 2021, and 13 accident investigations were carried over to 2022.

Moreover, two railway serious incident investigations were carried over from 2020, and one serious incident investigation was newly launched in 2021. Among these, two investigation reports were published in 2021, and one investigation was carried over to 2022.

Among the 14 investigation reports published, the JTSB provided one recommendation and one opinion.

Investigations of railway accidents and serious incidents in 2021

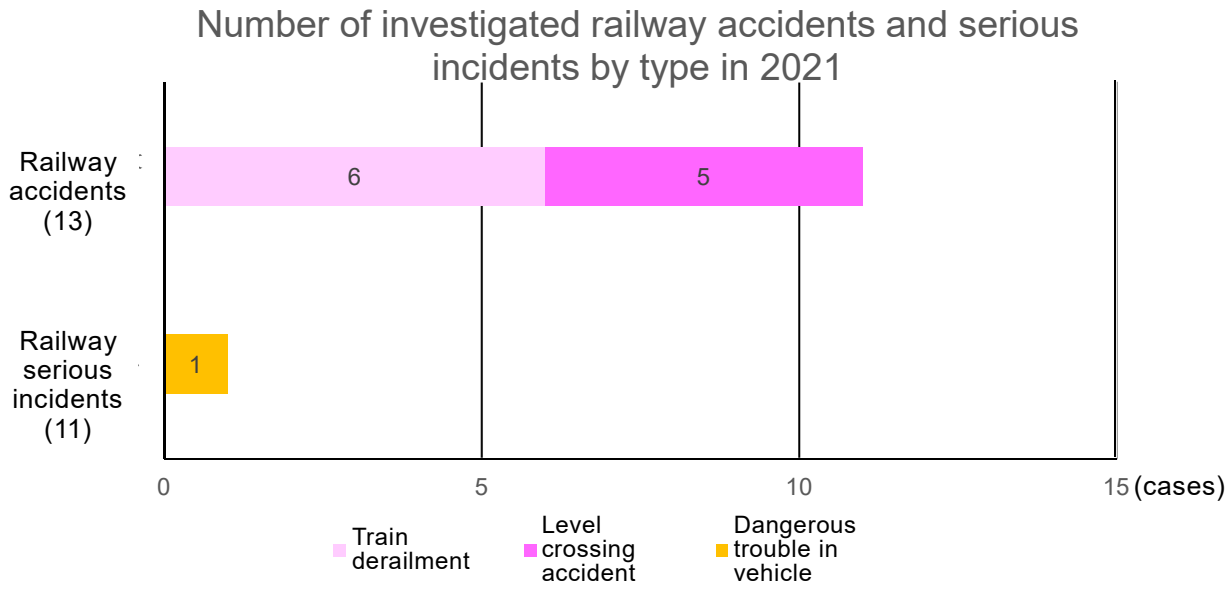
(Cases)

Category	Carried over from 2020	Launched in 2021	Total	Published investigation reports	(Recommendations)	(Opinions)	Carried over to 2022	(Interim report)
Railway accident	14	11	25	12	(1)	(1)	13	(4)
Railway serious incident	2	1	3	2	(0)	(0)	1	(0)

4 Statistics of investigated railway accidents and serious incidents in 2021

Regarding the number of railway accidents and incidents investigated in 2021, there were 11, a decrease of two from 13 in the previous year, and there was one serious railway incident, a decrease of one from two in the previous year.

The breakdown by type of accidents and serious incidents is as follows: The railway accidents consisted of six derailments and five level crossing accidents. As for railway serious incidents, there was one dangerous trouble in vehicle.



There were eight persons killed or injured in 11 accidents, five of whom were killed and three were injured.

The number of casualties (in railway accidents)

(Persons)

2021							
Category	Dead			Injured			Total
	Crew	Passenger	Others	Crew	Passenger	Others	
Casualties	0	0	5	0	3	0	8
Total	5			3			

* 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 2021

The railway accidents and railway serious incidents which occurred in 2021 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)
	March 26, 2021 Train derailment	East Japan Railway Company	Between Tsuchiura Station and Kandatsu Station on the Joban Line, Ibaraki Prefecture
	Summary	The driver of the train noticed an automobile stopped on the railway and carried out an emergency stop operation, but failed to avoid collision. All of the No. 1 bogie axles of the forefront vehicle derailed.	
2	Date and accident type	Railway operator	Line section (location)
	May 16, 2021 Level crossing accident	East Japan Railway Company	Between Oguni Station and Echigo-Kanamaru Station on the Yonesaka Line, Yamagata Prefecture Masuoka level crossing (class 4 level crossing without automatic barrier machine nor road warning device)
	Summary	The driver of the train noticed that an automobile entered the level crossing from the right of the train's travel direction and carried out an emergency stop operation, but failed to avoid collision. Later, the death of the driver of the automobile was confirmed.	
3	Date and accident type	Railway operator	Line section (location)
	July 5, 2021 Train derailment	East Japan Railway Company	Between Mataki Station and Rikuchu-Kanzaki Station on the Ofunato Line, Iwate Prefecture
	Summary	The driver of the train noticed a fallen tree obstructing the route of the train and carried out an emergency stop operation, but failed to avoid collision. All two axles of the first bogie derailed.	
4	Date and accident type	Railway operator	Line section (location)
	July 12, 2021 Level crossing accident	Amagi Tetsudou	Between Nishitachiarai Station and Yamaguma Station on the Amagi Line, Fukuoka Prefecture Minami-Tsuchitori level crossing (class 4 level crossing without automatic barrier machine nor road warning device)
	Summary	The driver of the train noticed that an automobile entered the level crossing from the left side of the train's travel direction and carried out an emergency stop operation, but failed to avoid collision. Later, the death of the driver of the automobile was confirmed.	
5	Date and accident type	Railway operator	Line section (location)
	July 21, 2021 Level crossing accident	Hokkaido Railway Company	Between Shikaribetsu Station and Niki Station on the Hakodate Line, Hokkaido Naito level crossing (class 4 level crossing without automatic barrier machine nor road warning device)
	Summary	The driver of the train noticed that a pedestrian entered the level crossing from the left side of the travel direction and carried out an emergency stop operation, but failed to avoid collision. Later, the death of the pedestrian was confirmed.	
6	Date and accident type	Railway operator	Line section (location)
	July 24, 2021 Train derailment	Japan Freight Railway Company	In the Sumidagawa Station yard on the Joban Line, Tokyo

	Summary	The train started running for the return line, and the locomotive was conducting propelling movement of 19 freight wagons, both axles on the front side of the travel direction of the third freight wagon from the locomotive derailed.	
7	Date and accident type	Railway operator	Line section (location)
	September 27, 2021 Level crossing accident	Echigo TOKImeki Railway Company	Between Sekiyama Station and Nihongi Station on the Myoko Haneuma Line, Niigata Prefecture Fukuzaki level crossing (class 4 level crossing without automatic barrier machine nor road warning device)
	Summary	The driver of the train noticed that a motorcycle entered the level crossing from the left side of the travel direction and carried out an emergency stop operation, but failed to avoid collision. Later, the death of the motorcyclist was confirmed	
8	Date and accident type	Railway operator	Line section (location)
	October 7, 2021 Train derailment	Tokyo Metropolitan Bureau of Transportation	In the Toneri-koen Station yard of the Nippori-Toneri Liner, Tokyo
	Summary	The commander noticed the warning sound sounded by the Urgent Earthquake Detection and Alarm System (Earthquake Early Warning), and used the button for emergency stop of all trains. The train stopped while running the junction after departing Toneri-koen Station. Later, checking the vehicle revealed that the front bogie of the forefront vehicle had deviated from the running track.	
9	Date and accident type	Railway operator	Line section (location)
	December 27, 2021 Train derailment	OHMI Railway Co., Ltd.	In the Hikoneguchi Station yard of the Main Line, Shiga Prefecture Okamichi level crossing
	Summary	When the train was running on the level crossing to remove snow at a speed of 15 km/h, the first axle of the front bogie of the forefront vehicle derailed to the left side of the travel direction.	
10	Date and accident type	Railway operator	Line section (location)
	December 28, 2021 Train derailment	Japan Freight Railway Company	Between Seno Station and Hachihommatsu Station on the Sanyo Line, Hiroshima Prefecture
	Summary	When the train was running between these stations, the train stopped by an automatic emergency brake. Checking the vehicle condition revealed that all axles (four wheels) of the front-side bogie of the 12th vehicle from the forefront had derailed.	
11	Date and accident type	Railway operator	Line section (location)
	December 30, 2021 Level crossing accident	Joshin Dentetsu Co., Ltd.	Between Higashi-Tomioka Station and Joshu-Tomioka Station on the Joshin Line, Gunma Prefecture Seiunji level crossing (class 4 level crossing without automatic barrier machine nor road warning device)
	Summary	The driver of the train noticed a person crouching in the level crossing and carried out an emergency stop operation, but failed to avoid collision. Later, the death of the person was confirmed.	

(Railway serious incidents)

1	Date and incident type	Railway operator	Line section (location)
	November 23, 2021 Dangerous trouble in vehicle	Kintetsu Railway Co., Ltd.	In the Ise-Asahi Station yard on the Nagoya Line, Mie Prefecture
	Summary	The conductor of the train noticed the open passenger door on the left side of the furthest vehicle's travel direction while passing in the vicinity of Ise-Asahi Station. No passengers fell outside the train through the open door.	

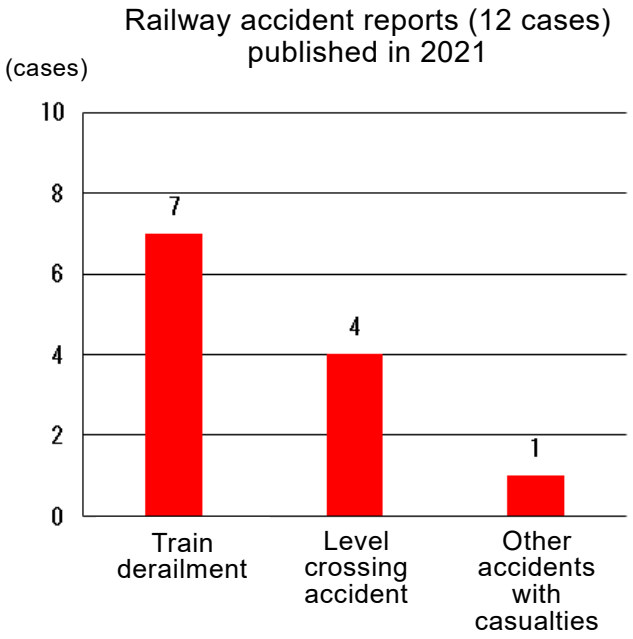
6 Publication of investigation reports

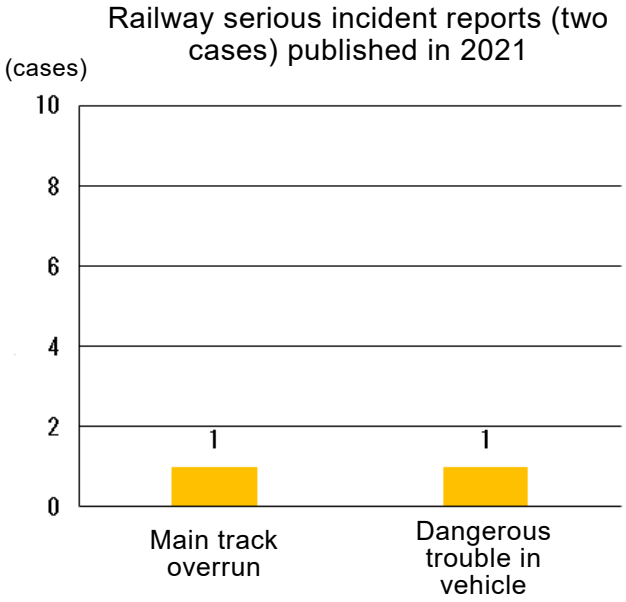
The number of investigation reports of railway accidents and serious incidents published in 2021 was 14, consisting of 12 railway accidents and two serious incidents.

Breaking them down by type, the railway accidents contained seven train derailment accidents, four level crossing accidents, and one accident resulting in casualties. The railway serious incidents contained one main track overrun, and one dangerous trouble in vehicle.

In the 12 accidents, the number of casualties was 103, consisting of seven deaths and 96 injuries.

The investigation reports on railway accidents and serious incidents published in 2021 are summarized as follows.





Railway accident investigation reports published in 2021

1	Date of publication	Date and accident type	Railway operator	Line section (location)
	February 18, 2021	June 1, 2019 Other accidents with casualties	Yokohama Seaside Line Co., Ltd.	In the Shin-Sugita Station yard on the Kanazawa Seaside Line, Kanagawa Prefecture
	Summary	The train departed from the starting station, Shin-Sugita station, on schedule, by the unmanned automatic operation. However, the train moved to the inbound direction opposite to the direction of travel i.e., the outbound direction, and collided with the car stop at the end terminal of the track. There were 25 passengers boarded on the train, the 17 passengers among them were injured.  		
	Probable causes	The JTSB concludes that the probable cause of this accident was certain that this accident occurred because the Train started to run in the inbound direction, i.e., the outbound direction opposite to the direction of travel, when turned back in Shin-Sugita station, and collided with the car stop at the end terminal of the track. It is highly probable that the Train started to move by the power running in the direction opposite to the designated running direction without intention, because the motor control device of the 2000 series vehicle drove the motors in the inbound direction that had been preserved in the memory function, as the F cable, which is the command cable to transmit the signal on the running direction of the train to the motor control device, became in the de-energized status due to be broken in the 1st vehicle. Furthermore, it is probable that the measures such as the emergency stop procedures could not be implemented, because the station ATO ground unit recognized that the running direction of the train had been set normally, as the station ATO onboard unit had transmitted the status of the running direction based on the energized status of the command line to select the driving desk, which is different to the input signal to the motor control device, and also there was no function to detect the backward running or the function to detect by the other methods backward moving such as in this accident. It is probable that the F cable had broken as that the insulator of the F cable wore gradually by the friction with the upper surface of the end panel due to the vibration while the vehicle was running, and fault grounded to the end panel, as the results of that the bundle of cables including the F cable in the device room were wired without attaching the protecting materials for the electric wires sufficiently, and had been contacted with the end panel made of the stainless steel, but the inspection had not been implemented after finished the wiring works. It is likely that the existence of the latent causes for such dangerous incident and the insufficient security of the safety against the abnormal status such as the backward running, etc., were not noticed, because the confirmation and the arrangement on the understandings for the designing organization, the basic concept, and the specifications, etc., among the Company, the vehicle manufacturer and the device manufacturer, and the extraction of the safety factors before designing were not implemented sufficiently, in the designing and manufacturing process of the 2000 series vehicle, the latent causes of the dangerous incident for the occurrence of the backward running was generated, in addition, also the verification of the safety was insufficient, in the back ground of this accident.		
	Safety actions	**Measures taken by the Company** Safety actions of the running in wrong direction implemented by the Company after this accident were as follows. [1] Changed the electric circuit to add the contact terminal of the relay to detect the energized status of the F cable and the R cable, in the condition of the operation of the departure condition relay in the ATO[*1] onboard unit. In addition, for the purpose that the ground units comprehend correctly the recognition on the running direction of the vehicle, changed the command cable, which return the information on the status of running direction to the ground units via the station ATO onboard unit, from the conventional command cables to select the		

driving desk, i.e., the 194G cable and the 195G cable, to the F cable and the R cable, furthermore, set the F cable and the R cable as the loop circuit in the trainset to enable to obtain the information from the end terminal side.

[2] Changed the software of the motor control device to implement the powering operation and the regenerative braking control only when one of the F cable and the R cable was in the energized status.

[3] Changed the software in the ATC[*2] onboard unit, as to operate the emergency brake when detected vehicle running in the status that both the F cable and the R cable, which are the command cable for the running direction, are in the de-energized status due to the breakage of cables, etc.

[4] Abolished the relay to correct the stopped position backward[*3], in order to improve the reliability still more of the circuit to instruct running direction of the vehicle.

Besides, the Company implemented the following measures.

[5] The wired status in the device rooms in all trainset composed of the 2000 series vehicles were checked and attached the protecting materials to the electric wires and the vehicle materials for the electric wires, etc., close to the vehicle materials.

[6] Implemented the hazard analysis on the automatic operation system of the 2000 series vehicles, and implemented to check the existence of the part with the safety problem. As the results, it is confirmed that there was no part with the safety problem, except for the implemented measures in the above [1] to [4].

[7] It was difficult to investigate the personal information of the passengers and to comprehend the number of the transported injuries, etc., correctly, due to the small number of the station staffs who responded just after the accident against the number of the injured passengers in this accident. Therefore, created the "contact address card" to establish the system that enabled to be contacted from the passengers in the other day by distributing it to the injured passengers when the similar incident happened, and enabled to comprehend the number of the transferred persons, etc.

Measures Implemented by the Vehicle Manufacturer

The vehicle manufacturer implemented the following measures against the wiring works after this accident.

[1] Revised the check sheet for the wiring works of the low voltage terminal rack, by adding the items on the wired status and the protected status of the electric wires. In addition, the vehicle manufacturer conducted the education and training on the revision to the company staffs thoroughly.

[2] Expressed clearly the concrete examples with the explanatory diagrams on the protection for the electric wires and the body structure, in the manual for wiring processing. In addition, added the confirmation of the distance between the electric wires and the body structure and the flaws of the electric wires, etc., in the manual to draw up instructions of the works.

[3] The procedures of the wiring and connecting works, implemented as the contract works, were made clear that as to implement the inspection of the first products is implemented by the relevant staffs, and receive after implemented the minor adjustment.

[4] Decided to manage and share the photographs recording the wired status in the unified format as the formal record.

[5] The actual vehicle implementing the wiring works were checked by the staffs relevant to the designing and manufacturing, and after the wired status and the protection of the wired cables are confirmed particularly in the narrow portion, they are added to the manual for designing and the instruction for manufacturing. Furthermore, strengthen the instruction by brushing up the on-site confirmation, the drawings and the manuals, considering as necessary to check the omission of the instruction and the on-site confirmation in the designing work for the new vehicles.

[6] The vehicle manufacturer established the "working team to study on the manual for handling wiring works in the narrow space" composed of the relevant persons in the design section, manufacture section, etc., and implemented together with the "review of wiring in the narrow space" and the examination of wiring in narrow space in the actual vehicles, and decided to feedback to the design drawings and the manual for handling wiring works, etc.

In addition, the vehicle manufacturer implemented the following measures as the effort to

improve the safety of the products.

[7] Revised the contents to be attended to the covering electric wires in the "10 admonitions", which was established in order to make lessons on the important works for the safety in the manufacturing process, and excite further attentions.

[8] Implemented the education to the workers, and known well again by the managers on the circumstances to establish the "10 admonitions" established in 2018 and on the important parts in the working site.

[9] On the "rules for safety products design, the 10 rules" established in 2018, decided to utilize in the "review of new standpoints", etc., that had been started before this accident to review on the risk of the safety when the design was changed, and aimed the improvement of the product safety.

Measures Taken by the MLIT after this Accident

[1] On June 2, 2019, the MLIT instructed the Company to implement the investigation on the probable causes and the safety actions to secure the safe railway transportation.

[2] On June 2, 2019, the MLIT issued "On the railway accident with casualties occurred in Kanazawa seaside Line of Yokohama Seaside Line Co. Ltd.", Railway Technology No.18, Railway Facility No.25, Railway Safety No.8, to the railway and tramway operators in the whole country, and issued the notification "On the railway accident with casualties occurred in Kanazawa Seaside Line, information provision" to the guide rail type railway operators, to let them well known the summary of this accident and instructed to endeavor to secure the safe and stable transportation by the railway and the tramway system consecutively.

[3] On June 3, 2019, the MLIT issued "On the railway accident with casualties occurred in Kanazawa Seaside Line of Yokohama Seaside Line Co. Ltd.", Railway Technology No.19, Railway Facility No.30, Railway Safety No.9, to the railway and tramway operators in the whole country to let them known well on the status of investigation reported from the Company, and instructed the six railway operators who are operating the vehicles by the unmanned automatic operation, to pay sufficient attention particularly to the train operation in the turn back station, until the probable causes are made clear.

[4] From the evening of June 3 to early morning of June 4, 2019, the staffs of the Railway Bureau and the Kanto District Transport Bureau attended the confirmation test conducted to resume the operation by the manual operation of Kanazawa Seaside Line.

[5] On June 6, 2019, the MLIT gathered 7 operators who are operating the vehicles by the unmanned automatic operation, and shared the information on this accident and exchanged opinions on the prevention of the accidents, etc.

[6] On June 14, 2019, the MLIT established the "Study meeting on the prevention of the accident in the railway and tramway systems operated by the unmanned automatic operation system", and held the first meeting. In the study meeting, the information was shared and the study on the measures to prevent the recurrence, etc., was implemented among the relevant persons. The meetings were held 3 times.

[7] On July 19, 2019, in the 3rd study meeting, the MLIT instructed to share the information on the analyzing method for the occurrence and the causes of the dangerous incidents such as the FTA[*4], FMEA[*5], etc., from the professionals on the risk analysis, and to implement the verification of the safety by the FTA, etc., on the malfunction of the brake which is one of the serious risks other than the backward running, because the analysis based on the FTA, etc., is considered as effective as the method to evaluate the safety, even though it was confirmed that there was no problem in the other method on the operation of the motor control device.

[8] On the same day, the above-mentioned study meeting published the intermediate report[*6].

[9] From the night time of August 23, 2019, to early morning in the next day, and from the night time of August 30, 2019, to the early morning in the next day, the staffs of the Railway Bureau and the Kanto District Railway Bureau attended in the confirmation test conducted to resume the automatic train operation after implemented the measures to prevent the recurrence of the Route.

[10] On February 27, 2020, the MLIT gathered 7 operators who are operating the vehicles by the unmanned automatic operation and the vehicle manufacturers, etc., and implemented to exchange opinions on the interim report issued by the JTSB, etc.

<table>
<tr><td></td><td></td><td colspan="3">*1 The "ATO" is the abbreviation of the Automatic Train Operation that is the system to implement automatically, the starting control, the on-schedule operation control, the stopping control at the predetermined position, etc.
*2 "ATC" is the abbreviation of the automatic train control, and the system to control the velocity of the train continuously less than the limited velocity when the velocity of the train exceeded the limited velocity, by checking the train velocity continuously based on the speed control signal instructed continuously responding to the position of the foregoing train and the conditions of the track.
*3 "Relay to correct stopped position backward" in this context, is the relay used when corrected the stop position of the train if the train stopped after overran beyond the designated stop position in the station, in the automatic operation.
*4 "FTA" is the abbreviation of the fault tree analysis, and the technique to analyze the process, the causes and the provability of the occurrence of the undesirable incidents.
*5 "FMEA", is the abbreviation of the failure mode and effect analysis, and the technique to analyze the effects of the trouble mode of the components and the effects to the higher lank items.
*6 Intermediate report of the "Study meeting on the prevention of the accident in the railway and tramway systems operated by the unmanned automatic operation system", the MLIT, 2019</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-1-1.pdf
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-1-1-p.pdf (Explanatory material, in Japanese only)</td></tr>
<tr><td></td><td>Reference</td><td colspan="3">Major activities in the past year (page 4) and Chapter 2 (page 19 and page 24)</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 18, 2021</td><td>September 5, 2019
Train derailment, accompanied to the level crossing accident</td><td>Keikyu Corporation</td><td>In the Kanagawa-shimmachi Station yard on the Main Line, Kanagawa Prefecture
Kanagawa-shimmachi No.1 level crossing (class 1 level crossing with automatic barrier machine and road warning device)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">The train departed from Keikyu Kawasaki station on schedule. While the train was running between Koyasu station and Kanagawa-shimmachi station at the velocity of about 120 km/h, the driver of the train noticed that the obstruction warning signal of Kanagawa-shimmachi No.1 level crossing (the level crossing) was indicating the stop signal, then applied the service brake.
After that, the driver noticed that the emergency inform device of Kanagawa-shimmachi station is also operating, then applied the emergency brake. After that, the driver of the Train noticed a standard sized truck (the truck) entering the route of the Train in the level crossing, then sounded the whistle and operated the emergency alarm of the train protection radio, but the Train collided with the truck and stopped after passed about 67 m from the level crossing.
About 500 passengers, the driver and the conductor boarded on the Train, among them, 75 passengers, including 15 seriously injured passengers, and the driver and the conductor were injured. In addition, the driver who was in the truck alone was dead.
Due to this collision, the 1st vehicle to the 3rd vehicle of the Train derailed and a part of the vehicle bodies and the apparatus were damaged. In addition, the truck had wrecked and caught fire.
  </td></tr>
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	Probable causes	The Japan Transport Safety Board concludes that probable cause of this accident was certain that the standard sized truck entered the Kanagawa-shimmachi No.1 level crossing and hindered the route of the train, and the train could not stop before the level crossing although the obstruction warning signal of the level crossing had been indicating the stop signal, then collided with the truck. It is certain that the truck hindered the route of the train because the road warning device started the warning operation after the truck started to enter the level crossing, and completed the blocking operation before the truck had passed through the level crossing, then the truck stayed in the level crossing. It is likely that the truck stayed in the level crossing because it took long time for the truck to pass through the level crossing due to the narrow width of the road against the size of the truck, when the truck turned right in the intersection and enter the level crossing. As a side note, it is likely that the truck driver, selected the route to the level crossing via the Urashima route 152 to bypass the usual route, related to that the truck could not operate in the usual route. However, it could not be determined why the truck passed the unusual route because the truck driver was dead. The train could not stop before the level crossing, even though the obstruction warning signal of the level crossing had been indicating the stop signal. It is probable that this situation was caused because the driver of the train could not implement the braking operation to stop the train before the level crossing at the position where the indication of the obstruction warning signal of the level crossing became to be sighted from the driver of the train. Concerning that the driver of the train could not implement the braking operation at the place where the driver became able to sight the operation of the obstruction warning device of the level crossing, it is probable that it was difficult for the driver to respond instantaneously to the obstruction warning signal that indicate the stop signal in unanticipated timing. In addition, it is probable that the driver noticed with delay concerned with that there was the scene that the flickering status of the remote obstruction warning device was blocked intermittently by the masts, etc. in spite of the place where the obstruction warning device became to be sighted. As a side note, it is likely that the velocity when the train collided could be reduced if the Driver had operated the emergency stop procedures by the emergency brake when operated the service brake. However, the company stipulated to use the service brake to stop the train as the principle under the rule "when the stop signal was indicated in the obstruction warning device, stop immediately". And the company had entrusted the driver with the judgement to operate the service brake or the emergency brake, considering the status as the velocity, distance, etc. Therefore, it is likely that the above situation was caused as related with that the brake to be used had not been prescribed clearly in the implementing standard of handling operation and the working standard of the driver of electric railcar.
	Safety actions	Measures Taken by the Railway Operators after the Accident On September 2019, after this accident, the Company notified the change of the Working Standards of the Driver of Electric Railcar, an internal rule, to "stop immediately" on the handling of the brake when noticed the stop signal of the OWS. After that, the rule was changed as "operate the emergency brake procedures immediately" on November 2019. Furthermore the rule was changed as "when noticed the indication of the flashing light signal, operate the emergency brake immediately and stop the train, provided that the use of the service brake is allowed only when the train can stop certainly in approach of the confirmed flashing light signal, such as the train was operating in low speed as in the slowing down operation or there is enough distance until to the noticed flashing light signal" on February 2020. At the same time, the Company implemented the education and the training for all drivers. On December 2019, the Company reviewed the rules to install the OWS, and decided the installing position where the OWS can be sighted from the place in the distance that the margins are added to the conventional place, i.e., "the place where the OWS can be sighted from the place beyond the distance that train can be stopped by the emergency brake", in order to add the still more margins to brake operation and to improve the visibility of the OWS. Additionally, the Company installed the additional OWS for the Level crossing on December 2019. In addition, the Company implemented the additional measures to install the OWS, for the other level crossings. **Measures implemented by the trucking company after the accident**

Corresponding to the occurrence of this accident, the trucking company, for which the driver of the standard sized truck was working, implemented the instruction to the drivers so that they select the proper route and operate the truck studyingon the selection of the operating route in advance. In addition, the trucking company instructed for the drivers to contact with the police when the passage became in the difficult status.

Measures Taken by the Ministry of Land, Infrastructure, Transport and Tourism after the Accident

On September 6, 2019, the Automobile Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, the MLIT, responded to the occurrence of this accident, in order to prevent the recurrence of the similar accident, made commonly known the trucking operators in the whole country to enforce the followings in the roll call, the guidance, supervising for the drivers.

(1) Implement the required instruction to secure the safe operation of the automobiles for business purpose such as to select the route that can pass, to the drivers in the roll call.

(2) Instruct the drivers to implement the proper measures for protection against the trains by pushing the emergency push button, etc., when the automobile became unable to operate in the level crossing.

(3) Urge the drivers to select the proper operating route to avoid the route difficult to pass through, as the driver comprehended the operating route in advance, in the guidance and the supervising for the drivers.

In addition, the Automobile Bureau has been studying on the investigation and analysis of the factors to cause the accident related to the truck in this accident and on the measures to prevent the recurrence in the investigation committee for the accident of the automobiles for business purpose.

The Railway Bureau of the MLIT, responding to the measures of the Company against this accident to install the additional OWS and to review the braking operation when the OWS indicated the stop signal, let the railway operators in the whole country known well on the measures implemented by the Company, in order to make absolutely sure to secure the safety of the train operation and to prevent the recurrence of the similar accident, and instructed to review on the installed status of the OWS and on the handling when the drivers noticed the indication of the stop signal of the OWS, and to implement the measures depending on the necessity.

Measures Taken by the Road Administrator after the Accident

The road administrator, i.e., Kanagawa Civil Engineering Office of the City of Yokohama, installed the guidance board to suppress the entrance of the large-sized automobiles and the guiding sign to indicate the bypass route, in around Nakakido station, i.e., in the direction to end of the Urashima route 152, where the Truck had passed on the way to the Level crossing, as shown in Figure 10 (see the report), in December 2019.

Report: https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-1-2.pdf
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-1-2-p.pdf (Explanatory material, in Japanese only)

Reference: Major activities in the past year (page 6)

3	Date of publication	Date and accident type	Railway operator	Line section (location)
	February 18, 2021	November 27, 2019 Train derailment	Aizu Railway Co., Ltd.	Between Tonohetsuri station and Yunokami Onsen station on the Aizu Line, Fukushima Prefecture

Summary

While the train was running in the left curved track (hereinafter, the fore and aft and side to side shall be based on the train direction) between Tonohetsuri station and Yunokami Onsen station at the velocity of about 60 km/h, the driver of the train noticed the earth and sand flowed into the track in ahead, and applied the emergency brake but the train ran onto the earth and sand, and all four axles of the front vehicle derailed.

There were 11 passengers and the train crew onboard the train, but no one was injured.

<table>
<tr><td></td><td>Probable causes</td><td colspan="3">The JTSB concludes that the probable cause of this accident was that the slope in the railway track side collapsed, and the train ran onto the earth and sand flowed into the railway track and derailed in the accident.
It is probable that the slope collapsed and earth and sand flowed into the railway track because the strength of the waterway, which had been laid underground of the Fukushima Prefectural Road 347 located in upper part of the collapsed slope, deteriorated over the years, and broken caused the leaking water, that soaked into the collapsed slope, composed of the colluvium layer, and made unstable status due to the increased water content.
It is likely that the waterway broke as deteriorated strength due to the deterioration over the years, related by that the management of the waterway had not been conducted properly.</td></tr>
<tr><td></td><td>Safety actions</td><td colspan="3">Measures taken by the Company
(1) Emergency measures taken
1. Requested a traffic ban of dump trucks for construction to the Minami-Aizu Construction Office (hereinafter referred to as "the Office") of Fukushima Prefecture that is the administrator of Fukushima prefectural road No. 347 (hereinafter referred to as "the prefectural Road") after the accident occurred.
2. Allocated on-site lookout persons in the vicinity of the collapsed slope from the restarting day on November 30, 2019 (up to December 14 when a wire net was installed), and also regulated the Prefectural Road at a slow speed of 15 km/h during the period for the traffic of dump trucks for construction.
3. Installed lighting equipment in the vicinity of the collapsed slope when restarting the train operation. (Up to September 30, 2020)
4. Reinforced the surrounding area including the collapsed slope using a wire net as a temporary slope treatment. (Installation completed on December 14, 2019)
5. Confirmed with the Office as of June 10, 2020 that the traffic of dump trucks for road construction shall be restarted after the execution of slope protection work, and also confirmed the traffic restrictions (one track operation, very slow speed, and precipitation control, etc. in the area of about 300 m in the vicinity of the route with the collapsed slope).
(2) Permanent measures taken
1. Executed slope protection work by slope crib (free frame method) on the slope that is likely to impede the train operation around the accident site including the collapsed slope. (See Figure Implementation status of slope protection work)
2. Installed a protection net and a collapse detection sensor, and also reinforced the lower part of the slope that is likely to impede the train operation in the vicinity of the collapsed slope.
3. Confirmed with the Office that the Office shall carry out the joint reinforcement of road gutters, the maintenance and management of road-crossing water conduit and catch basin.

Measures taken by Fukushima Prefecture
Removed the water conduit buried under the Prefectural Road on December 5, 2019, installed a new water conduit on February 22, 2020, and decided that the Fukushima Prefecture shall manage it.
 

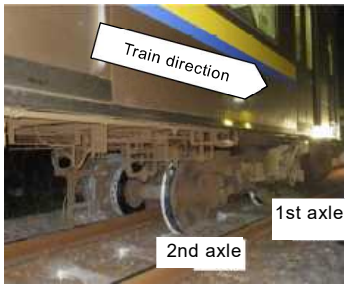
Figure Implementation status of slope protection work</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-1-3.pdf (In Japanese only)
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-1-3-p.pdf (Explanatory material)</td></tr>
<tr><td>4</td><td>Date of publication</td><td>Date and accident type</td><td>Railway operator</td><td>Line section (location)</td></tr>
<tr><td></td><td>February 18, 2021</td><td>March 10, 2020
Train derailment, accompanied to the level crossing accident</td><td>Chikuho Electric Railroad Co., Ltd.</td><td>Between Kusubashi station and Chikuho-Katsuki station on the Chikuho Electric Railroad Line, Fukuoka Prefecture
Chikuho-Katsuki No.7 level crossing (class 1 level crossing with automatic</td></tr>
</table>

				barrier machine and road warning device)
	Summary	The driver of the train operated the train between Kusubashi station and Chikuho-Katsuki station at the velocity of about 57 km/h, the driver of the train noticed the compact sedan entered Chikuho-Katsuki No.7 level crossing, class 1 level crossing, from left, and applied the emergency brake immediately, but the train collided with the compact sedan and all 2 axles in the front bogie derailed to right. The driver of the compact sedan was dead on this accident. 		
	Probable causes	The JTSB concludes that the probable cause of this accident was that the approaching train collided with the compact sedan at the velocity of about 50 km/h, and right wheels of the train ran onto right rail and derailed in this accident, because the compact sedan turned right and entered the level crossing as pushing up the crossing rod in the status that the road warning device was operating and the crossing rod had been lowered, and stopped, and the compact sedan was caught between left side surface of the train and the concrete column for the overhead trolley, etc., and pushed out the vehicle body of the train to right. Besides, it could not be determined why the compact sedan entered the level crossing, because the driver of the compact sedan was dead.		
	Safety actions	**Measures taken by the Company** (1) The Company took the following measures. [i] Installed the red colored revolving lights aimed to improve the sighting ability when the level crossing is operated, to the prop of the road warning device of the level crossing, on May 20, 2020. [ii] Let the information on this accident commonly possessing, and conducted the education on the importance of the train protection to all train crews. (2) The companyand the road administrator, i.e., Kitakyushu City, discussed on the measures for the safety. **Measures taken by Kitakyushu City** (3) Responding to the discussion in the above (2), the road administrator, i.e., Kitakyushu City, painted again the blurred stop lines, and installed the light-emitting type road rivets*1 to promote the attention of car drivers, on October 2, 2020. *1 "Light-emitting type road rivet" emits flashing night-light to raise awareness of car drivers, and is installed by embedding them on road surfaces such as stop lines, edge markings, and cross walk.		
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-1-4.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-1-4-p.pdf (Explanatory material)		
5	Date of publication	Date and accident type	Railway operator	Line section (location)
	March 25, 2021	March 9, 2020 Train derailment	West Japan Railway Company	Between Tojo station and Bingo-Yawata station on the Geibi Line, Hiroshima Prefecture
	Summary	The train departed from Tojo station on schedule. While the train was running between Tojo station and Bingo-Yawata station at the velocity of about 65 km/h, in the dark circumference before sunrise, the driver of the train felt a shock and operated the emergency brake but the train collided with earth and sand in the pocket type catch net for falling rocks accumulated due to the collapse of the slope. The train tilted to left side against the direction of travel and the vehicle body turned over, caused the derailment of the whole axles. Only the driver was onboard the train, but was not injured. 		
	Probable causes	The JTSB concludes that the probable cause of this accident was that the fallen rocks and earth and sand, etc., which were caused by the collapse of the slope and accumulated in the pocket type catch net for falling rocks and pushed out resulted to hinder the route of the train,		

		and the approaching train collided with them, turned over, and resulted the derailment of all axles, in this accident. It is probable that the slope had collapsed because the strength of the fragile inner bedrock in upper part of the slope deteriorated gradually by the progress of the weathering in long period. In addition, it is likely that the driver could not noticed that the earth and sand, etc., accumulated in the pocket type catch net for the falling rocks was hindering the route of the train, related with that the circumference was dark as it was before sunrise.
	Safety actions	Reinforced the slope using the mortar spraying (lath net*1 included) method to prevent weathering and erosion as restoration measures and installed non-pocket type catch net*2 made of high-specification zinc-aluminum-plated wires, with technical instructions provided by the third party that was requested to investigate the derailed area of the train caused by the collapsed slope. Ensured inspectors in the track maintenance area, etc. to inspect slopes that have a pocket type catch net by adding "the accumulation status of the earth and sand on the back of the pocket type catch net and the tension status of the wire net, etc." to the viewpoints of inspections. *1 "Lath net" is a wire net used as a mortar underbed to prevent mortar from coming off. *2 "Non-pocket type catch net" is a measure to bind rocks that lost the bonding strength to natural ground using the friction with natural ground and the tension of the net.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-2-1.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-2-1-p.pdf (Explanatory material)
6	Date of publication	Date and accident type / Railway operator / Line section (location)
	March 25, 2021	March 18, 2020 Train derailment / Nagaragawa Railway Co., Ltd. / In the premises of Mino-Ota station, Etsuminan Line, Gifu Prefecture
	Summary	While the train was running in around the left curved track of 300 m radius in the premises of Mino-Ota station at the velocity of about 17 km/h, the driver of the train felt the impact and applied the emergency brake to stop the train. After the train stopped, the driver checked the under floor of the vehicle and found that all axles in the front bogie had been derailed to right. There were 10 passengers and the driver were onboard the train, but no one was injured. 
	Probable causes	The JTSB concludes that the probable cause of this accident was that, the left wheels of all 2 axles in the front bogie went off to the inside gauge, after that the right wheels of all 2 axles in the front bogie went off to outside gauge in this accident, because the gauge was widened dynamically while the train was passing through left curved track of 300 m radius. It is probable that that the gauge was widened dynamically by the rail tilting and the rail movement caused by the lateral force while the train was passing, because the poor sleepers and the poor rail fastening status had been existed continuously. It is probable that the poor sleepers and the poor rail fastening status existed continuously because the company staff in the work-site division, who was assumed as lacked in the technical abilities, had judged that the status was enough to be observing the progress and had not been implemented the maintenance, in the management of the sleepers and the rail fastening status. In addition, it is probable that the lack of the technical activity was caused by the insufficient education and confirmation for the staffs in the work-site division by the head office.
	Safety actions	**Measures Taken by the Railway Operator after the Accident** (1) Urgent measures 1. Exchanged 292 poor sleepers located in the area from the starting point up to about 0 k 470 m, and implemented track maintenance (completed on March 28). 2. Exchanged at least one in three sleepers in the area where continuous failure of sleepers is confirmed and sleepers with ongoing failure (68 sleepers) and installed tie plates in the curve of 400 m radius or less of the whole line (completed on March 28). 3. Implemented running at 40km/h reduced speed from 55 km/h, i.e. at 15 km/h or less as

		the speed limit for outbound trains, and at 30km/h reduced speed from 45 km/h, i.e. at 15 km/h or less as the speed limit for inbound trains and monitored the track status by carrying out a daily track inspection for seven days from the restarting day of the train operation (from April 1 to April 7, 2020). (2) Permanent measures 1. When inspecting sleepers or conducting an on-foot track patrol, etc., the corrosion status of sleepers shall be checked, and the digging into or displacement of wooden sleepers of the rail bottom or tie plates shall be checked according to the situation especially, the fastening status of the sleepers and the rail fastening device shall be confirmed. In addition, the inspection results of sleepers shall be securely managed using a management ledger for one sleeper, and also appropriate track maintenance shall be carried out (started from March 31, 2020). 2. Inspection documents shall be confirmed by personnel up to the safety manager, and a system shall be established to enable reporting information to superiors urgently without considering costs, etc., if emergency repair, etc. is needed. In addition, it was decided to share information regularly (about once a month) by interviewing each section head (for the building work section, started from November 26, 2020). 3. Since the work did not proceed much due to the small number of workers of the building work section, two new recruits were provided to the building work section (October 1, 2020). In addition, one more recruit was provided in December of the same year. 4. Wooden sleepers in the vicinity from the starting point to 0 k 470 m were replaced with PC sleepers (October 3, 2020). 5. Reference cases with photographs were informed within the building work section for references when evaluating poor sleepers and floating spikes (implemented from October 16, 2020). 6. When inspecting sleepers, if a sleeper, for which replacement is not needed, has a floating spike, although the sleeper management ledger has not described the floating spike, the internal regulations for managing one sleeper shall be changed (to be carried out early) to add D rank to the judgment ranking (a triangle mark shall be given if spare work or hammering is needed due to the floating spike despite of good condition of the sleeper). Moreover, a triangle mark was given using a paint to sleepers with a floating spike, found during the sleeper inspection (completed on November 10, 2020). 7. It was decided to change the number of spikes to be hammered to the number stated in the "track maintenance and management manual" when maintenance is made, such as replacing sleepers in the tie plate installation section (to be implemented every time construction work occurrs). 8. Inspection and maintenance of poor bridge sleepers between Mino-Ota station and Seki station (to be replaced in FY 2022). 9. Replacement with PC sleepers for at least one in three sleepers in the curve of 400 m radius or less, excluding the area with switch sleepers (to be implemented by FY 2023).
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-2-2.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-2-2-p.pdf (Explanatory material)

7	Date of publication	Date and accident type	Railway operator	Line section (location)
	March 25, 2021	May 8, 2020 Train derailment	East Japan Railway Company	Between Awa-Kamogawa station and Awa-Amatsu station on the Sotobo Line, Chiba Prefecture
	Summary	The train departed from Awa-Kamogawa station on schedule. While the train was running at the velocity of about 94 km/h, the trainee driver of the train felt the impact as thrusted up from downward when passed No.1 Shinden level crossing, then applied the emergency brake to stop the train. After the train stopped, the instructor driver, who had been coaching the trainee driver, reported the situation to the train dispatcher and checked the vehicle. As it was found that the 1st and the 2nd axles in the front bogie of the 1st vehicle had been derailed to left side of the direction of travel, the instructor driver reported it to the train dispatcher. There were 16 passengers and 3 train crews, i.e., the trainee driver, the instructor driver		



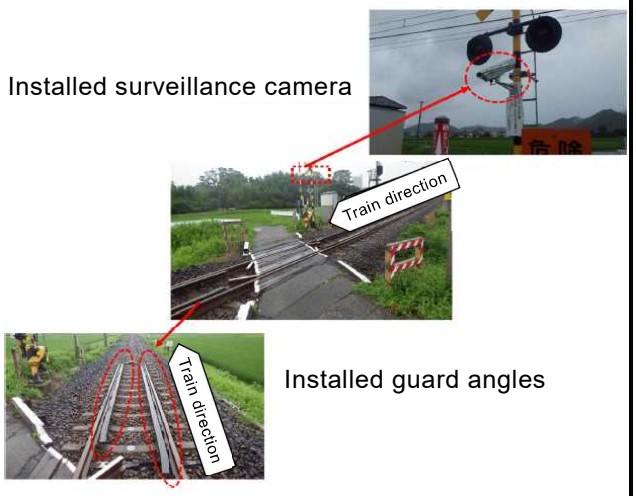
<table>
<tr><td></td><td></td><td colspan="3">and the conductor, were onboard the train, among them, one passenger was injured.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">The JTSB concludes that the probable cause of this accident was that, while the train was running in No.1 Shinden level crossing, the 1st and the 2nd axles in the front bogie of the 1st vehicle ran onto the plural ballasts in around the top surface of rail in the level crossing and derailed to left side of the direction of travel, in this accident.
It could not be determined the precise reason why the plural ballasts had been existed in around the top surface of rail in the level crossing, although there was the possibility as to be placed intensively.</td></tr>
<tr><td></td><td>Safety actions</td><td colspan="3">Measures taken by the railway operator after the accident
(1) Installed a guard angle within the gauge parallel to the rail before and behind the level crossing and a surveillance camera to the road warning device of the level crossing. In addition, these are installed at the level crossing as tentative measures in the stage where probable causes of the derailment are unknown. (See the figure)
(2) Issued a document requesting cooperation to local governments in Chiba Prefecture in order to raise awareness on the dangerous act of placing stones.
(3) Taken the following awareness-raising actions to prevent unsafe actions at a level crossing.
1. Displayed posters at stations and advertisement in trains running mainly in Chiba Prefecture
2.Implemented awareness-raising activities at multiple locations in Kamogawa City with cooperation of local governments, etc.
 

Figure Installation status of guard angles and a surveillance camera</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-2-3.pdf (In Japanese only)
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-2-3-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>June 24, 2021</td><td>May 5, 2020
Level crossing accident</td><td>East Japan Railway Company</td><td>In the premises of Higashi-Yamoto station on the Senseki Line, Miyagi Prefecture
No.1 Shimoura level crossing (class 3 level crossing without automatic barrier machine, with road warning device)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">While the train was running between Yamoto station and Higashi-Yamoto station at the velocity of about 90 km/h, the driver of the train noticed the pedestrian entering No.1 Shimoura level crossing (class 3 level crossing; the level crossing) at about 20 m before the level crossing, and sounded the whistle and applied the emergency brake immediately, but the train collided with the pedestrian.
The pedestrian was dead in this accident.
 
</td></tr>
</table>

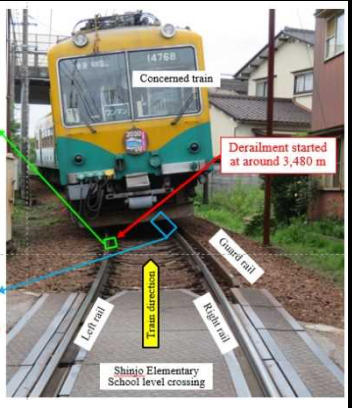
	Probable causes	The JTSB concludes that the probable cause of this accident was that the pedestrian entered No.1 Shimoura level crossing, the class 3 level crossing equipped with the road warning device but without the crossing gate, in the status that the road warning device was operating and responded to the approaching train. It could not be determined why the pedestrian entered the level crossing because the pedestrian was dead, although it is likely that the pedestrian did not hear the rumbling sound of the road warning device and that the pedestrian overlooked the red flashing lamps of the road warning device.
	Safety actions	Proposed a discussion to Higashi-Matsushima City regarding abolition or upgrading the level crossing, given that the accident occurred. However, since the discussion with the city did not progress, the level crossing was constructed for upgrading to class 1 level crossing, considering safety as the first priority. **(1) Measures taken by the Company** 1. Applied yellow paint to the edge end of the level crossing on May 11. 2. Taken the awareness-raising activities regarding level crossing accidents at Higashi-Yamoto station and Yamoto station on May 13. (jointly with the cities and Ishinomaki Police Station). 3. Changed the red flashing lamps of the level crossing to omnidirectional red flashing lamps on May 13. 4. Applied a paint to the halt line of the level crossing on May 14. 5. Upgraded the level crossing to class 1 level crossing, and started to operate it from November 21. **(2) Measures taken by the City** 1. Taken public-relations activities at Higashi-Yamoto station and Yamoto station on May 13 jointly with Ishimaki Police Station, Ishinomaki district safe driving manager society, the Company, and the traffic safety association, and the disaster prevention section, the general affairs department of Higashi-Matsushima City. 2. Leveled crushed stones as safety measure for pedestrians for non-statutory public properties owned and managed by Higashi-Matsushima City on July 22. 3. Confirming the on-site status such as the paint of the edge ends and halt lines of No.1 Shimoura level crossing once a month by the construction section, the construction department of Higashi-Matsushima City.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-3-1.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-3-1-p.pdf (Explanatory material)

9	Date of publication	Date and accident type	Railway operator	Line section (location)
	June 24, 2021	July 26, 2020 Train derailment	Toyama Chihou Tetsudou Inc.	In the premises of Higashi-Shinjo station on the Main Line, Toyama Prefecture

Summary

While the train was passing in the left curved track of 181 m radius at the velocity of about 34 km/h, the driver of the train felt the abnormal sound and the impact, then, applied the emergency brake to stop the train.

After the train stopped, the driver checked the vehicle and found that the 1st axle in the front bogie of the front vehicle derailed to right, and all axles in the front bogie and the 1st axle in the rear bogie of the rear vehicle derailed to right.



There were 31 passengers and the driver were onboard the train, but no one was injured.

	Probable causes	The JTSB concludes that the probable cause of this accident was that the gauge widened significantly while the train was passing in the left curve of 181 m radius, and the left wheel of the 1st axle in the front bogie went off inside gauge. It is probable that the gauge widened significantly because the gauge widened dynamically due to the lateral movement and the tilting of rail caused by the lateral force accompanied by the train running, as the poor rail fastening devices existed continuously in the curved track, where the static irregularity of gauge had been exceeding the maintenance standard value. It is probable that the irregularity of gauge had been exceeded the maintenance standard value because the maintenance was not implemented before the occurrence of this accident as the period from when the gauge exceeded the maintenance standard value to the maintenance had not been stipulated, and there were many places where the gauge exceeded the maintenance standard value and the maintenance of the other places were considered as in higher priority. It is likely that the poor rail fastening devices existed continuously because the management based on the dangerousness against the wide gauge had not been conducted as there was no manual, etc., to enable the proper judgement and measures in the inspection of sleepers and the lack of technical activities for the maintenance management.
	Safety actions	**Measures taken by the railway operator after the accident** (1) Replaced the sleepers and right rail (outer track) in the curve. In addition, removed the guard rail, and installed a derailment prevention rail inside the gauge of the left rail (inner track). In addition, the derailment prevention rail is to be changed to a derailment prevention guard in the future. (2) Applied a reduced train speed of 25 km/h in the curve. (3) Decided to implement an on-foot track patrol once in five days and confirm the rail fastening status by measuring the track irregularities at the same time. (4) Made replacement of all the poor portions and portions with white paint applied for the follow-up purpose of the rail fastening device.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-3-2.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-3-2-p.pdf (Explanatory material)

10	Date of publication	Date and accident type	Railway operator	Line section (location)
	August 26, 2021	October 18, 2020 Level crossing accident	Japan Freight Railway Company	Hachioji No.2 level crossing, between Hikari station and Shimata station on the San-yo Line, Yamaguchi Prefecture (class 4 level crossing without automatic barrier machine nor road warning device) (managed by West Japan Railway Company)

	Summary	While the train was running between Hikari station and Shimata station at the velocity of about 70 km/h, the driver of the train noticed two pedestrians entering Hachioji No.2 level crossing (the level crossing)*1, class 4 level crossing, from right, and applied the emergency brake, but the train collided with the pedestrians. The two pedestrians were dead in this accident. *1 West Japan Railway Company (hereinafter referred to as the "JR West Japan") manages the level crossing. 
	Probable causes	The JTSB concludes that the probable cause of this accident was certain that two pedestrians entered Hachioji No.2 level crossing, the class 4 level crossing without crossing gate nor road warning device, in the status that the train was approaching and collided with the train. It could not be determined the precise situation why two pedestrians entered the level crossing concerned in the status that the train was approaching, because the two pedestrians were dead.

<table>
<tr><td></td><td>Safety actions</td><td colspan="3">Measures taken by the JP West Japan
1. Implemented periodic weeding around the level crossing. (October 23, 2020)
2. Installed a stop sign at the level crossing. (November 30, 2020) (See the figure)
3. Explained the situation of the accident and reported the current status of class 4 level crossings in Yamaguchi Prefecture to Yamaguchi Prefectural Police Headquarters. (October 22, 2020)
4. Discussed with Hikari Police Station and Hikari City and confirmed to cooperate with them in order to discuss with local communities toward the abolition of the level crossing. (November 6 and 25, 2020)
 

Figure Safety measures implementation status by the JR West Japan</td></tr>
<tr><td></td><td>Report</td><td colspan="3">https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-4-1.pdf (In Japanese only)
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-4-1-p.pdf (Explanatory material)</td></tr>
<tr><td>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></td><td>November 18, 2021</td><td>November 15, 2020
Level crossing accident</td><td>Echizen Railway Company</td><td>Between Nakatsuno station and Washizuka-Haribara station on the Mikuni-Awara Line, Fukui Prefecture
Nakatsuno level crossing (class 4 level crossing without crossing gate nor road warning device)</td></tr>
<tr><td></td><td>Summary</td><td colspan="3">While the train was running between Nakatsuno station and Washizuka-Haribara station at the velocity of about 60 km/h, the driver of the train noticed the subcompact truck entering Nakatsuno level crossing (the level crossing), class 4 level crossing, and applied the emergency brake immediately, but the train collided with the subcompact truck.
The driver of the subcompact truck was dead by this accident.</td></tr>
<tr><td></td><td>Probable causes</td><td colspan="3">The JTSB concludes that the probable cause of this accident was certain that the train collided with the subcompact truck in Nakatsuno level crossing, the class 4 level crossing without the crossing gate nor the road warning device, because the subcompact truck entered the level crossing in the status as the train was approaching.
It could not be determined the precise reasons why the subcompact truck entered the level crossing in the status when the train was approaching, because the driver of the subcompact truck was dead, even though it is likely that the driver did not noticed the approaching train.</td></tr>
<tr><td></td><td>Safety actions</td><td colspan="3">(1) Measures taken by the Company
1. Installed the board to call attention for the level crossings, as shown in the figure, under the warning post on both left and right sides (hereinafter, the fore and aft and side to side shall be based on the train direction) of the level crossing in December 2020.
2. Reapplied yellow paint to the railroad crossing warning fences of the level crossing in February 2021.
3. Installed the weed-killer sheets on both the left and right sides of 50 m before and beyond the level crossing, and also attached yellow reflecting materials to the railroad crossing warning fences in March 2021.
4. Installed the board similar to that of 1 in March 2021. at the five level crossings (one on the Mikuni-Awara Line, and four on the Katsuyama Eiheiji Line) where many crossing
 

Figure Warning board planted by the company on the level crossing</td></tr>
</table>

automobiles, which were forbidden to pass were witnessed by the drivers of the trains after the occurrence of the accident at the level crossing where the traffic control of automobiles is established. In addition, boards similar to that of 1. are to be installed according to the frequency of witnessed cases at other level crossings.

5. Promoted the arrangement with the relevant parties in the policy to abolish the Class 4 level crossing basically, responding to the occurrence of the accident.

(2) Measures taken by the road administrator

Fukui City that is the road owner informed the land improvement district*1 that is the road administrator of the safety check stated in (3) below, and the land improvement district decided to install a board to warn of the traffic control, etc. at the farm roads connecting to the level crossing by the end of 2021.

In addition, Fukui City decided to explain traffic rules and manners, and hazards for crossing level crossings at traffic safety seminars for elderly in the area adjacent to the level crossing and regions where there are level crossings. Moreover, the city decided to call for compliance with traffic rules and manners including how to cross level crossings to citizens including elderly from time to time.

(3) Measures taken by Fukui Police Station

Strengthened the regulation on the traffic control at the level crossing for a certain period after the accident, given instructions to avoid passing the level crossing with automobiles subject to the traffic control, and let regional residents known well on occurrence of the accident and arising attention to that automobiles are forbidden to pass, etc through representatives of regional self-government body etc.

Conducted the safety check including the company, Fukui City, transport safety association, relevant regional self-governing body in the vicinity of the level crossing, etc. at the level crossing in December 2020. Exchanged opinions on and discussed safety measures, etc. during the safety check. Made the summary of the accident and the traffic ban of standard-size and subcompact automobiles at the level crossing known again. Planned to consider that the road administrator, etc. improves traffic markings.

*1 "Land improvement district" is an organization of farmers that implement land improvement business in lieu of the administration, and manages land improvement facilities including farm roads pursuant to the "Land Improvement Act" (Act No. 195 of 1949) and other law.

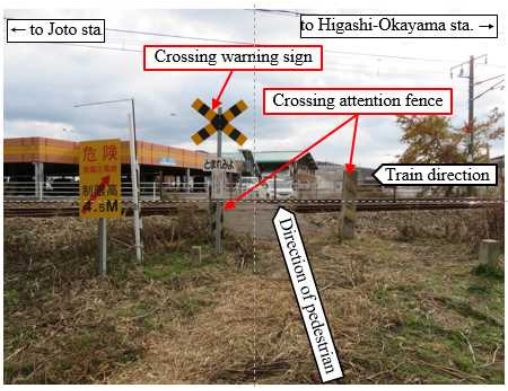
Report: https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-5-1.pdf (In Japanese only)
https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-5-1-p.pdf (Explanatory material)

12	Date of publication	Date and accident type	Railway operator	Line section (location)
	December 16, 2021	December 19, 2020 Level crossing accident	Japan Freight Railway Company	Between Higashi-Okayama station and Joto station on the Sanyo Line, Okayama Prefecture (class 4 level crossing without automatic barrier machine nor road warning device) (managed by West Japan Railway Company)

Summary

While the train was running between Higashi-Okayama station and Joto station at the velocity of about 84 km/h, the driver of the train noticed a figure in Gonotsubo level crossing, class 4 level crossing, at about 100 m before the level crossing, and sounded the whistle. After that the driver recognized that the figure was the pedestrian at about 50 m before the level crossing, and sounded the whistle again and applied the emergency brake, but the train collided with the pedestrian.

The pedestrian was dead in this accident.



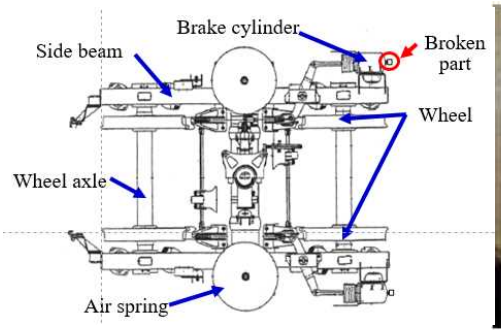
*1 West Japan Railway Company (hereinafter referred to as the "JR West Japan") manages

		the level crossing.
	Probable causes	The JTSB concludes that the probable cause of this accident was that the pedestrian entered Gonotsubo level crossing, the class 4 level crossing, the without crossing gate nor the road warning device, in the status that the train was approaching the level crossing, and collided with the train. It could not be determined the precise reason why the pedestrian entered the level crossing in the status that the train was approaching, because the pedestrian was dead.
	Safety actions	JR West Japan and Okayama City abolished the level crossing on September 29, 2021 after discussion.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-acci/RA2021-6-1.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RA2021-6-1-p.pdf (Explanatory material)

Railway serious incident investigation reports published in 2021

1	Date of publication	Date and serious incident type	Railway operator	Line section (location)
	August 26, 2021	October 4, 2021 Main track overrun	WILLER TRAINS Inc.	Between Tangoyura station and Kunda station on the Miyazu Line, Kyoto Prefecture

Summary



While the driver operated the train between Tangoyura station and Kunda station at the velocity of about 68 km/h in the coasting operation, the driver heard the dull sound as "bump", after that, he felt that the brake did not act well as usual, therefore, stopped the train using the emergency brake.

The driver checked the instruments such as the pressure gauge, etc., and found that the pressure in the main air reservoir was 0 kPa. The driver tried to implement the measures to prevent rolling wheels, but the train started to move, therefore, he applied the security brake and the conductor's valve but the brake had not been acted. After the train passed Kunda station, stopped again temporarily and ran in the reverse direction, and stopped at the place about 206 m from Kunda station in the direction to Toyooka station.

There were three passengers and two train crews were boarded on the train, but no one was injured.

The Kitakinki Tango Railway Corporation, hereinafter referred to as "the Tango Railway Co.", owned and managed the railway facilities of the Miyazu Line and the Miyafuku Line as the Class 3 railway operator*1, and the Company operated the trains as the Class 2 railway operator*2.

*1 "Class 3 railway operator" is the operator who constructed the railway track and let the Class 2 railway operator, who transported the passengers or the freights, to use them.

*2 "Class 2 railway operator" is the operator to implement the transportation of the passengers or the freights using railway track that was constructed by the other operator.

	Probable causes	The JTSB concludes that the probable cause of this serious incident was highly probable that the train, that stopped once by the emergency brake in the down grade section, overran in this serious incident, because all brake shoes pushed to each wheel were released and both the service brake and the security brake became not to function, caused as the compressed air, stored in the main air reservoir, the supply air reservoir and the security brake air reservoir, had been lost completely due to the leakage of the compressed air between the main air reservoir and the brake cylinder completely, since the train had collided with the animal invaded to the front part of the rear axle in the front bogie from right side and the pipe connected to the brake cylinder had folded and broken. It is probable that the pipe connected to the brake cylinder had folded and broken as bent in around the root part in the direction opposite to the direction of travel, because the pipe had been overhung in lower side of the brake cylinder in the near place to side surface of the vehicle body and could not prevent the collision with the animal invaded to front part of the rear axle of the front bogie from right side of the track.
	Safety actions	1 Measures Implemented by the Company after this Serious Incident (1) Urgent measures The Company decided to implement the following items. 1. The Company let all train crews in the Company about this serious incident, and to pay the closest attention to the air leakage from the brake pipe of the cylinder part when implemented the under floor inspection during operation, etc., including the inspection implemented in the train depot. Finished to commonly known this item on October 11, 2020. 2. The Company implemented the measures that the pipe does not folded and broken easily when collided with animals, as fixed the pipe connected to the brake cylinder to the bogie frame in all 16 vehicles of the same kind structure, and completed on October 23, 2020. Here, the Company and the Tango Railway Co., discussed each other on the measures, and the Tango Railway Co., arranged the budget and implemented the measures. 3. The Company and the Tango Railway Co., requested the track side local government on the activities to capture animals, and the track side local government asked their jurisdictional hunting companions and started to capture animals in the places where there were many records of collision along the track side. (2) Permanent measures The Company decided to implement the following items. 1. Revised the "Basic procedures when faced abnormality" to make clear the handling when the brake did not work, and prescribed to use the hand brake, on November 1, 2020. 2. The Company and the Tango Railway Co., discussed each other and promote the preparation toward the implementation of changing layout of the pipe connected to the brake cylinder in the all 16 vehicles of the similar structures. 2 Measures Implemented by the Ministry of Land, Infrastructure, Transport and Tourism after this Serious Incident The Ministry of Land, Infrastructure, Transport and Tourism took the following actions based on the occurrence of this serious incident. (1) On October 5, 2020, implemented the "information provision" to the railway and tramway operators, and instructed the "investigation of causes and implementation of the safety actions" to the Company. (2) On October 6, 2020, instructed the railway and tramway operators to report on the existence of the vehicles with the similar structure, i.e., both the brake pipe and the brake cylinder are laid in the most outside of the bogie frame in the vehicle operated alone. (3) On May 6, 2021, let the railway and tramway operators known well on the contents of the measures described in 1 (1) (ii) and (2) (ii), and instructed the railway and tramway operators who owned the vehicles with the similar structure, to study on the similar measures.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-inci/RI2021-1-1.pdf https://www.mlit.go.jp/jtsb/railway/p-pdf/RI2021-1-1-p.pdf (Explanatory material, in Japanese only)

2	Date of publication	Date and serious incident type	Railway operator	Line section (location)
	December 16, 2021	December 30, 2020 Dangerous trouble in vehicle	West Japan Railway Company	In the premises of Hommataga station on the Yamaguchi Line, Shimane Prefecture

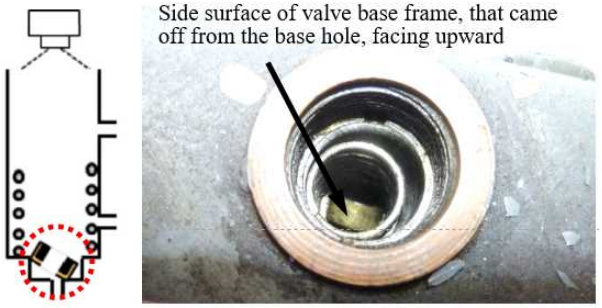
Summary

The driver of the train noticed the door-pilot lamp, etc., has been turned off while operating the braking operation when arriving at the platform of Hommataga station. After the train stopped at the station, the driver implemented the inspection of the cabin, and found that the rear door in right side (hereinafter, the fore and aft and side to side shall be based on the train direction), opposite to the platform, had been opened by about 70%. Therefore, the driver locked the door, and after reported it to the train dispatcher, continued the train operation.

There were seven passengers and a train crew, i.e., the driver, onboard the train, but no one was injured by being fallen to the track.

Probable causes

The JTSB concludes that the probable cause of this serious incident was highly probable that the force pushing the slide door had decreased and became smaller than the inertial force caused by the braking operation, because as the valve base frame which was press fitted to the counterbore had come off, in the D valve in the valve cabinet of the door operating equipment, which opened while the train was running, and consequently the compressed air in the closing cylinder of the door operating equipment flew out to the air.



It is probable that the valve base frame, which had been press fitted to the counterbore, came off from the counterbore related with the following situations.

1. There was the possibility that the upward force by the restoring force of the spring had acted to the switching valve A, and the upward force had also acted to the valve base frame indirectly, when there is no compressed air in the closing cylinder of the door operating equipment. The friction force of the side surface of the counterbore of the D valve and the side surface of the valve base frame was small compared in the status when press fitted as usual, and the valve base frame had been in the status to be risen easily.
2. The valve base frame had been in the status that the unexpected force acted to rise the valve base frame in the undersurface of the valve base frame, while the vehicle was operating and the doors were closed (there was the compressed air in the closing cylinder of the door operating equipment) because there was the space between the undersurface of the valve base frame and bottom surface of the counterbore.
3. There was the possibility that the switching valve A and the valve base frame were strongly pressed and adhered, because the unexpected force had been acted for a long period to the contacted part between the switching valve A and the valve base frame.
4. As the results of the above situations 1 to 3, there was the space that the valve base frame could pass through inside of the spring when the valve base frame was rising in the counterbore, and, at the same time, the valve base frame could rise to the upper edge of the counterbore between the undersurface of the screw cock and the upper edge of the switching valve B.

It is likely that the valve base frame settled in the inside of the counterbore in the status as the side surface was in the upside, because the situations of the above 1 to 3 had been repeated for a long period, the undersurface of the valve base frame, which rose gradually inside the counterbore, got over the upper edge of the counterbore when the serious incident occurred, that caused the leakage of the compressed air in the closing cylinder of the door operating equipment, and resulted that the valve base frame fell when from the pressed and adhered valve base frame and the switching valve A were released by the wind pressure of the air stream.

Furthermore, it is probable that the chance to prevent the concerned serious incident could not be used in the most, because, although the driver of the train had been noticed that there was the leakage of air from the door before departed from the starting station, and it took a long time to turn on the door pilot lamp compared to as usual, the driver departed the train

		unless to not reporting it to the related sections such as the train dispatcher or the station master, etc., because the doors had closed.
	Safety actions	**1 Measures taken by the Company** The Company implemented emergency checks and an instructions as shown below after the occurrence of the serious incident. (1) Vehicle depot Checked the existence of the leaked air from the door operating equipment in the door "closed" status by the operation start on January 1, and made the summarized events of the incident and the following details known to relevant sections and persons concerned. Inspection and repair employees · Pay particular attention to the status of the door operating equipment and check carefully the existence of the leaked air from the door operating equipment. · If noticing leaked air, promptly report it to relevant employees and deal with the leakage before resuming the operation. Drivers in the premises: · Pay attention to check the existence of the leaked air from the door operating equipment when carrying out the inspection before departure from depot or when going through the vehicles to carry out switching work, etc. · If noticing air leak noise, arrange an inspection and repair as currently specified. (2) Crew depot Made the summarized incident and the details stated below known to the crew. Made written notification on January 3, 2021 after raising awareness and giving instructions as a flash report on December 31, 2020. Drivers: · Pay attention to check for air leak noise from the vicinity of the doors when checking each door status of vehicles in the inspection before departure from depot. · If noticing the leaked air, communicate to the train dispatcher, the station master, or the shift workers of inspection and repair. If noticing it before driving the train, communicate to the dispatcher or the station master. · If noticing the leaked air or receiving the report of the leaked air, in the middle of driving the train, immediately carry out a stop operation. · If noticing that a lamp to notify the driver (or the door pilot lamp) is turned off, immediately apply the emergency brake, and if there is an adjacent line, trigger the train protection radio. Conductors: · If noticing the leaked air from the vicinity of the door, carry out a stop operation of the train. · If noticing that the "fully-closed-door lamp" is turned off during driving a passenger train, carry out an emergency stop operation. **2 Measures taken by the Door Operating Equipment Manufacturer** The door operating equipment Manufacturer considers that there is no particular need to take urgent measures for the valve cabinet because there had been no air leak after the valve cabinet was modified to be numerically controlled. However, the manufacturer created and established the "TK105 valve cabinet assembly work standard" document as a recurrence prevention measures on May 11 2021. The standard document describes integrated precautions for work on valves D and E that have the same press-fitting process.
	Report	https://www.mlit.go.jp/jtsb/railway/rep-inci/RI2021-2-1.pdf (In Japanese only) https://www.mlit.go.jp/jtsb/railway/p-pdf/RI2021-2-1-p.pdf (Explanatory material)

7 Actions taken in response to recommendations in 2021 (railway accidents and serious incidents)

No actions were taken in response to recommendations, etc. notified in 2021.

8 Provision of factual information in 2021 (railway accidents and serious incidents)

The JTSB provided no factual information in 2021.

Column

Establishment of a website summarizing information on the prevention of level crossing accidents

Accident Prevention Analyst and Railway Accident Investigator

In February 2021, the Japan Transport Safety Board established the page, entitled "To prevent level crossing accidents from occurring," summarizing information on the prevention of level crossing accidents, on our website. This is our first initiative for raising awareness on safety.

Of the whole railway operation accidents, level crossing accidents account for a large percentage, i.e., 34.2% (FY 2020). 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 many people's understanding, including users'. For that purpose, the JTSB created the webpage by avoiding the use of technical terms as much as possible and making the design of the webpage creative, and also added the banner with a train logo for quick access to the webpage on the top page of the website.

Moreover, for users, the webpage provides rules for crossing level crossings with slogans, e.g., "Stop, look, and listen" to call for complying with the rules. For railway operators, road administrators, and other relevant parties, the webpage provides examples of initiatives, e.g., abolishing level crossings, as references for proceeding with discussions and taking measures in order to prevent accidents.

The JTSB would be very happy if you use the content introduced in the webpage as references in order to reduce level crossing accidents.

URL：https://www.mlit.go.jp/jtsb/guide/fumikiri.html (In Japanese only)

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

(A situation, prescribed by Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism, stipulated in Article 2, paragraph (6), item (ii) 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.

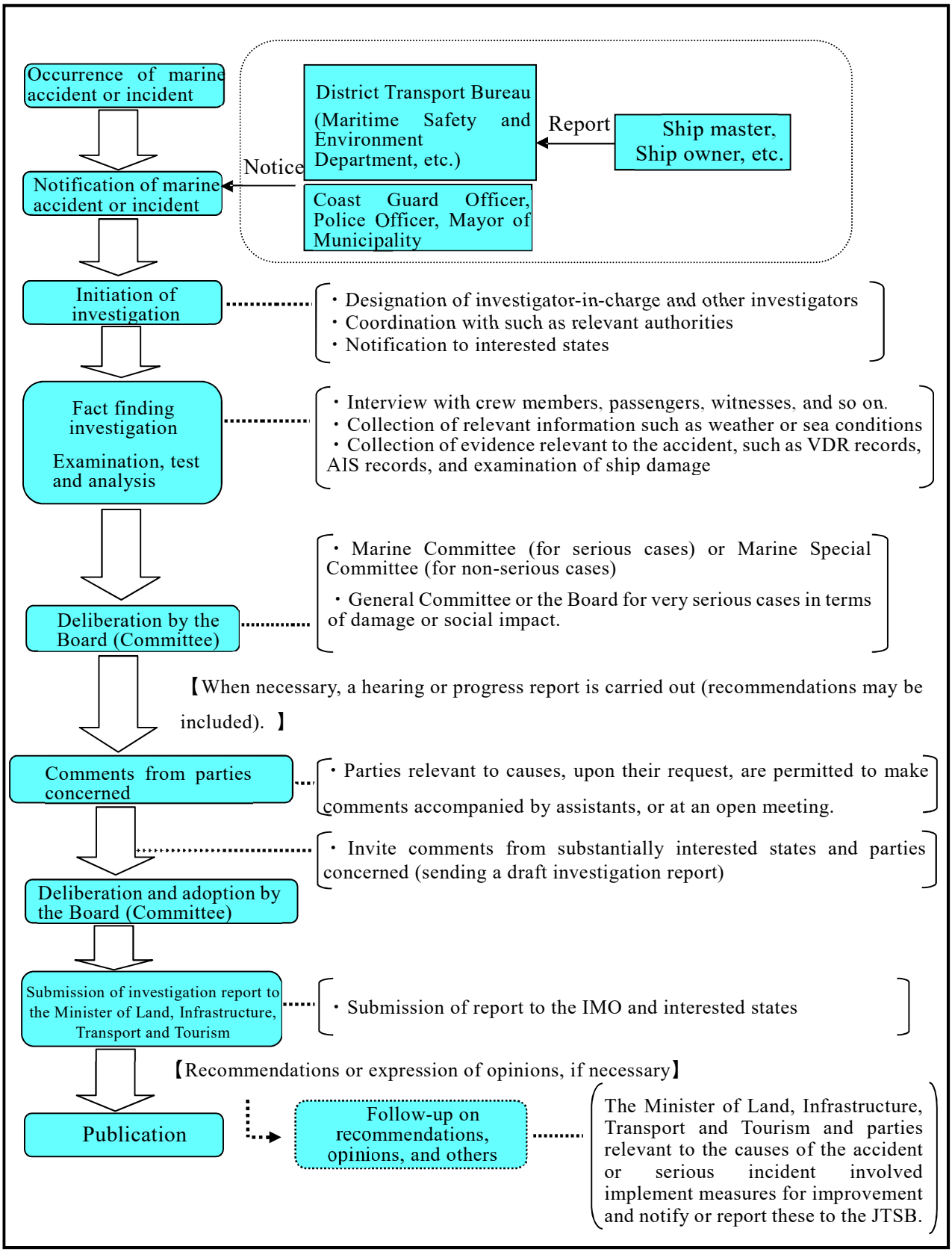
2 The situation where a ship grounded without any damage to the hull; and

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, Sinking, 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

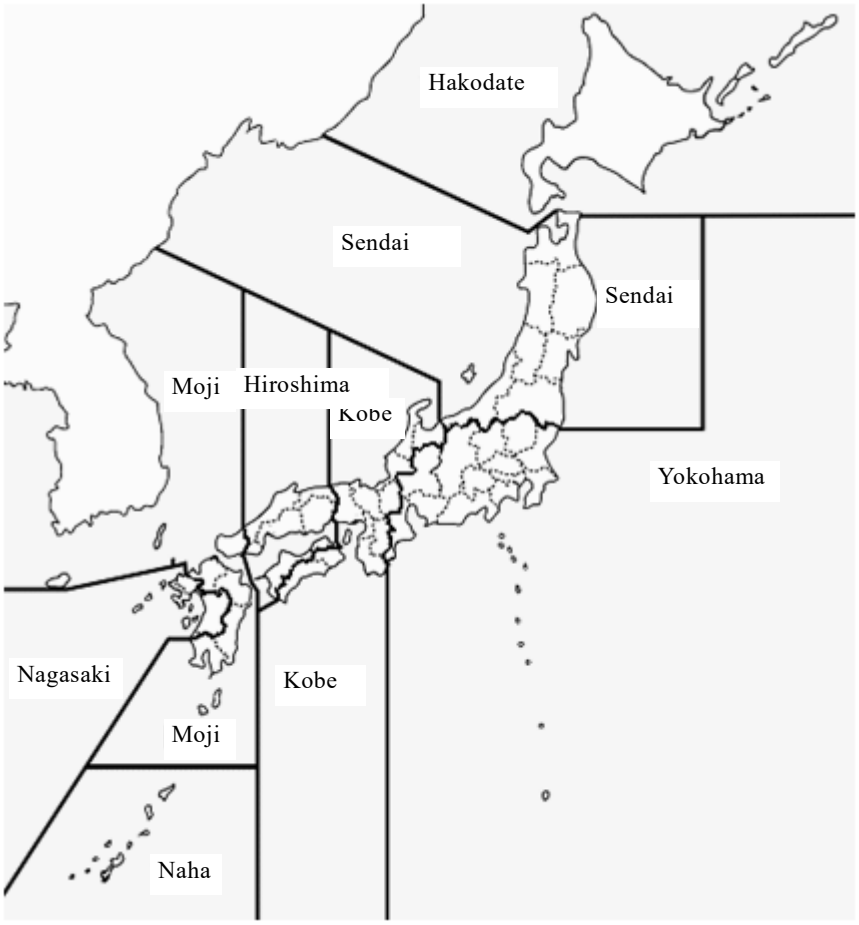
2 Procedure of marine accident/incident investigation

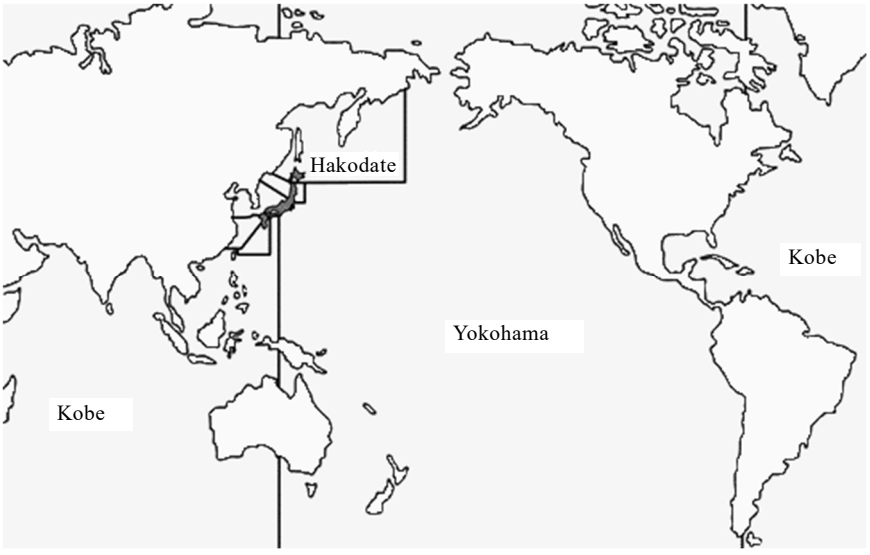


* Opinions may be expressed in a flow chart (as above) or whenever and however necessary to prevent accidents or incidents or mitigate damage thereof.

3 Jurisdiction of the Offices over marine accidents and incidents

For the investigation of marine accidents and incidents regional investigators are stationed in the regional offices (eight offices). Our jurisdiction covers marine accidents and incidents in the waters around the world, including rivers and lakes in Japan. The regional offices are in charge of investigations in the respective areas shown in the following map. Marine accident investigators in the Tokyo Office (Headquarters) are in charge of marine serious accidents and incidents.





4 Role of the Offices and Committees according to category of accident and incident

Marine serious accidents and incidents are investigated by the marine accident investigators in the Headquarters, and are deliberated in the Marine Committee. However, particularly serious accidents are deliberated in the General Committee, and extremely serious accidents are deliberated in the Board.

Non-serious marine accidents and incidents are investigated by regional investigators stationed in the eight regional offices, and deliberated in the Marine Special Committee.

<table>
<tr><td>Marine serious 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 “marine serious accidents and incidents”
• Cases where a passenger died or went missing, or two or more passengers were severely injured
• Cases where five or more persons died or went missing
• Cases involved a vessel engaged on international voyages where the vessel was a total loss, or a person on the vessel died or went missing
• Cases of spills of oil or other substances where the environment was severely damaged
• Cases where unprecedented damage occurred following a marine accident or incident
• Cases which made a significant social impact
• Cases where identification of the causes is expected to be significantly difficult
• Cases where essential lessons for the mitigation of damage are expected to be learned</td></tr>
<tr><td>Marine non-serious accidents and incidents</td><td>Office in charge of investigation: Regional investigators in the regional offices

Committee in charge of deliberation and adoption: Marine Special Committee</td></tr>
</table>

Jurisdiction map

5 Statistics of investigations of marine accidents and incidents

(As of end of December 2021)

The JTSB carried out investigations of marine accidents and incidents in 2021 as follows:

In 2020, 612 accident investigations had been carried over from 2020, and 736 accident investigations were newly launched. Besides, 673 investigation reports were published in 2021, and thereby 666 accident investigations were carried over to 2022.

Moreover, 134 incident investigations were carried over from 2020, and 153 incident investigations were newly launched in 2021. Furthermore, 156 investigation reports were published in 2021 and thereby 130 incident investigations were carried over to 2022.

Among the 829 investigation reports published, two were issued with recommendations, zero with safety recommendation and none was issued with opinions.

Investigations of marine accidents and incidents in 2021

(Cases)

Category	Carried over from 2020	Launched in 2021	Not applicable	Transferred to Tokyo Office	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2022	(Interim report)
Marine accident	612	736	-9	0	1,339	673	(2)	(3)	(0)	666	(11)
Tokyo Office (Serious cases)	23	7	0	2	32	11	(2)	(3)	(0)	21	(11)
Regional Offices (Non-serious cases)	589	729	-9	-2	1,307	662	(0)	(0)	(0)	645	(0)
Marine incident	134	153	-1	0	286	156	(0)	(0)	(0)	130	(0)
Tokyo Office (Serious cases)	1	0	0	0	1	1	(0)	(0)	(0)	0	(0)
Regional Offices (Non-serious cases)	133	153	-1	0	285	155	(0)	(0)	(0)	130	(0)
Total	746	889	-10	0	1,625	829	(2)	(3)	(0)	796	(11)

Note 1: The figures for “Launched in 2021” includes cases which occurred in 2020 or earlier, and which the JTSB was notified of in 2021 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.

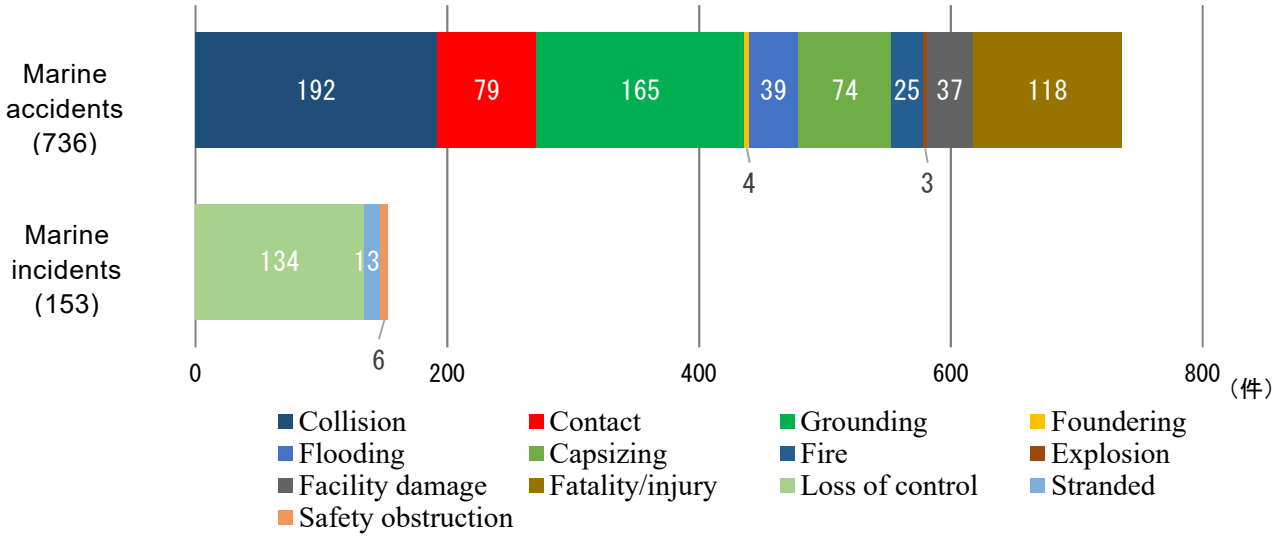
6 Statistics of investigated marine accidents and incidents

(As of end of December 2021)

(1) Types of accidents and incidents

The breakdown of the 889 investigations launched in 2021 by type of accidents and incidents is as follows: The marine accidents included 192 cases of collision, 165 cases of grounding, 118 cases of fatality/injury (not involved in other types of accidents), and 79 cases of contact. The marine incidents included 134 cases of loss of control, 13 cases of stranded, and six cases of navigation obstructions. Objects that collided with ships included quays in 23 cases, breakwaters in 13 cases, and buoys in nine cases.

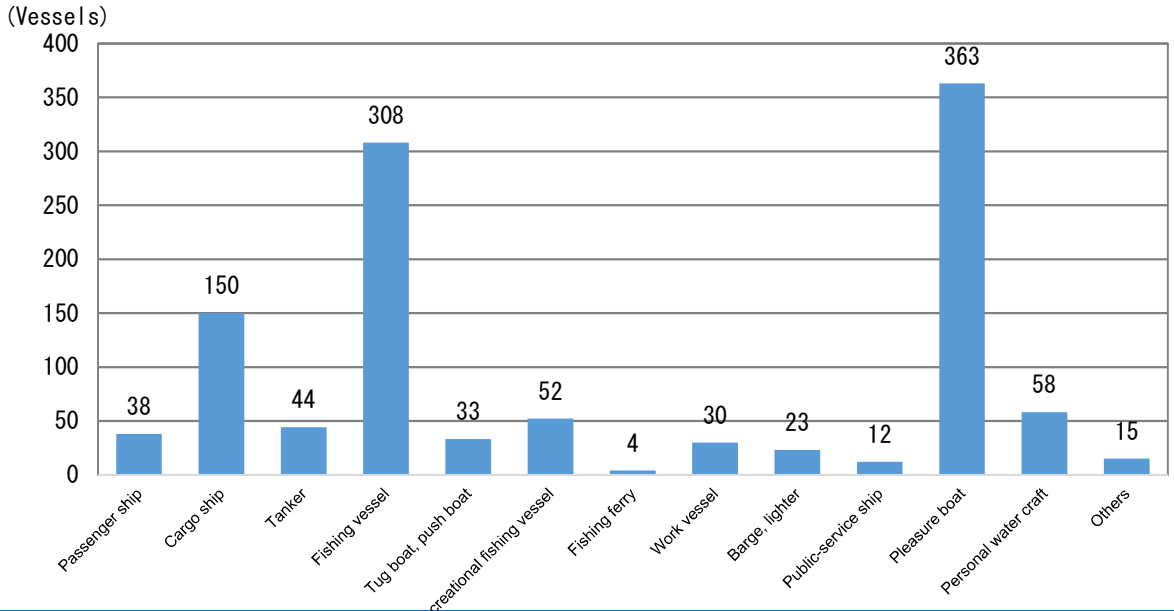
Number of investigated marine accidents and incidents by type in 2021



(2) Types of vessels

The number of vessels involved in marine accidents and incidents was 1,130. By type of vessel, they included 363 pleasure boats, 308 fishing vessels, 150 cargo ships, 58 personal water craft and 52 recreational fishing vessels.

Number of vessels involved in marine accidents and incidents by type in 2021



The number of foreign-registered vessels involved in marine accidents and incidents was 51, and they were classified by accident type as follows: 29 vessels in collision, 12 vessels in grounding, and seven vessels in contact. As for the flag of vessels, 18 vessels were registered in Panama, nine vessels in Republic of Korea, four vessels in Marshall Islands.

Number of foreign-registered vessels by flag

(Vessels)

Panama	18	Republic of Korea	9	Marshall Islands	4
Liberia	3	Sierra Leone	3	Others	14

(3) Number of casualties

The number of casualties was 338, consisting of 76 deaths, 21 missing persons, and 241 injured persons. By type of vessel, 114 persons in pleasure boats, 99 persons in fishing vessels and 44 persons in personal water craft. By type of accident, 125 persons in collision, 119 persons in fatality/injury, 29 persons in contact, 29 persons in grounding, and 27 persons in capsizing.

With regard to the number of person's dead or missing, 55 persons were involved in fishing vessel accidents, 26 persons in pleasure boat accidents, five persons in personal water craft, indicating dead or missing cases occurred frequently in fishing vessels.

Number of casualties (marine accident)

(Persons)

2021										
Vessel type	Dead			Missing			Injured			Total
	Crew	Passengers	Others	Crew	Passengers	Others	Crew	Passengers	Others	
Passenger ship	0	0	0	1	0	0	3	5	0	9
Cargo ship	2	0	0	2	0	0	5	0	2	11
Tanker	1	0	0	0	0	0	3	0	0	4
Fishing vessel	43	0	0	12	0	0	44	0	0	99
Tug boat, push boat	0	0	0	0	0	0	1	0	0	1
Recreational fishing vessel	0	1	0	0	0	0	4	28	0	33
Fishing ferry	0	0	0	0	0	0	0	1	1	2
Work vessel	2	0	0	0	0	0	8	0	2	12
Barge, lighter	0	0	0	0	0	0	1	0	0	1
Public-service ship	0	0	0	1	0	0	3	0	2	6
Pleasure boat	15	0	6	4	0	1	32	0	56	114
Personal water craft	3	0	2	0	0	0	9	0	30	44
Others	0	0	1	0	0	0	0	0	1	2
Total	66	1	9	20	0	1	113	34	94	338
	76			21			241			

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

7 Summaries of Marine serious accidents and incidents which occurred in 2021

The marine serious accidents which occurred in 2021 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
	February 8, 2021 Off the south-southeast of Cape Ashizuri, Tosashimizu City, Kochi Prefecture	Cargo ship OCEAN ARTEMIS (Vessel A, Hong Kong) Submarine SORYU (Vessel B) Collision
	Summary	Vessel A collided with Vessel B at the south-southeast of Cape Ashizuri, Tosashimizu City, Kochi Prefecture For Vessel B, its three crewmembers were injured, and its diving plane on the starboard was bent and damaged. For Vessel A, its bulbous bow's shell on the starboard was cracked.
2	Date and location	Vessel type and name, accident type
	February 23, 2021 At sea 25 km southeast off Katagai Port, Kujukuri, Sambu District, Chiba Prefecture	Cargo Ship ASAHI MARU (Vessel A) Recreational Fishing Vessel SANSHOICHIMARU (Vessel B) Collision
	Summary	Vessel A collided with Vessel B at sea approx. 25 km southeast off Katagai Port, Kujukuri, Sambu District, Chiba Prefecture.
3	Date and location	Vessel type and name, accident type
	April 27, 2021 Motobu Port in Motobu Town, Kunigami District, Okinawa Prefecture (Toguchi District)	Pleasure Boat KUMASAN 007 Explosion
	Summary	The vessel exploded at Motobu Port in Motobu Town, Kunigami District, Okinawa Prefecture (Toguchi District).
4	Date and location	Vessel type and name, accident type
	May 20, 2021 At sea approx. 9,200 m east off Isumi City, Chiba Prefecture	Recreational Fishing Vessel AMAMASA MARU (Vessel A) Recreational Fishing Vessel HANABUSA MARU (Vessel B) Collision
	Summary	Vessel A collided with Vessel B at sea approx. 9,200 m east off Isumi City, Chiba Prefecture, and one passenger in Vessel B died.
5	Date and location	Vessel type and name, accident type
	May 27, 2021 West end of Kurushima Strait	Cargo Ship BYAKKO (Vessel A) Chemical Tanker ULSAN PIONEER (Vessel B, Marshall Islands) Collision
	Summary	Vessel A collided with Vessel B at the west end of Kurushima Strait Traffic Route. One crewmember in Vessel A died and two went missing.
6	Date and location	Vessel type and name, accident type
	August 11, 2021 Hachinohe Port, Hachinohe City, Aomori Prefecture	Cargo Ship CRIMSON POLARIS (Panama) Grounding
	Summary	The vessel ran aground at Hachinohe Port, Hachinohe City, Aomori Prefecture.
7	Date and location	Vessel type and name, accident type
	September 5, 2021 At sea approx. 4,900 m off Hakotsukuri, Hannan City, Osaka Prefecture	Fishing Vessel UNOHIMARU (Vessel A) Recreational Fishing Vessel SAKAE MARU (Vessel B) Collision
	Summary	Vessel A collided with Vessel B at sea approx. 4,900 m off Hakotsukuri, Hannan City, Osaka Prefecture. One crewmember in Vessel A and one crewmember and five passengers in Vessel B were injured.

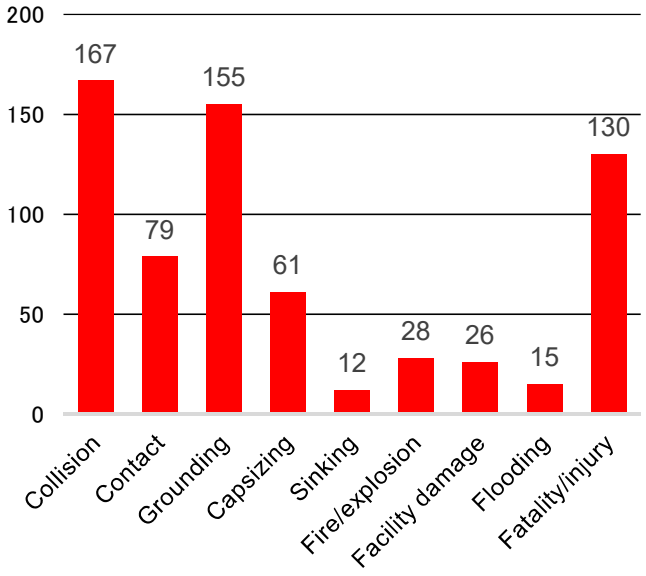
8 Publication of investigation reports

The number of investigation reports of marine accidents and incidents published in 2021 were 829, consisting of 673 marine accidents (among them, 11 were serious) and 156 marine incidents (among them, one was serious).

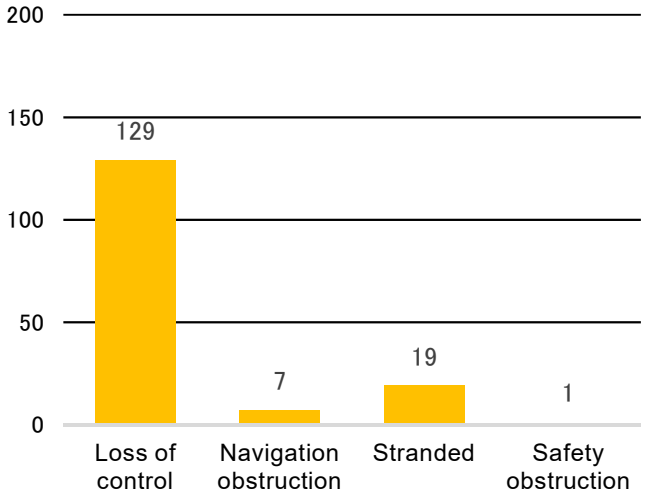
Breaking them down by type, the marine accidents included 167 cases of collision, 155 cases of grounding, 130 cases of fatality/injury, and 79 cases of contact. The marine incidents included 129 cases of losses of control, (118 cases of navigational equipment failure, 11 cases of fuel shortages, etc.), 19 cases of stranded, and seven cases of navigation obstruction.

As for the objects of contact, 17 were quays, 11 were buoys, and 10 were breakwaters.

Marine accidents (673 cases): reports publicized in 2021



Marine incidents (156 cases): reports publicized in 2021



The number of vessels involved in marine accidents and incidents was 1,054. Breaking them down by type, the marine accidents involved 280 fishing vessels, 224 pleasure boats, 148 cargo ships, 47 personal water craft, and 37 recreational fishing vessel. The marine incidents involved 84 pleasure boats, 25 cargo ships, 25 fishing vessels, and six tankers.

Number of vessels by type involved in marine accidents and incidents for which reports were publicized in 2021

(Vessels)

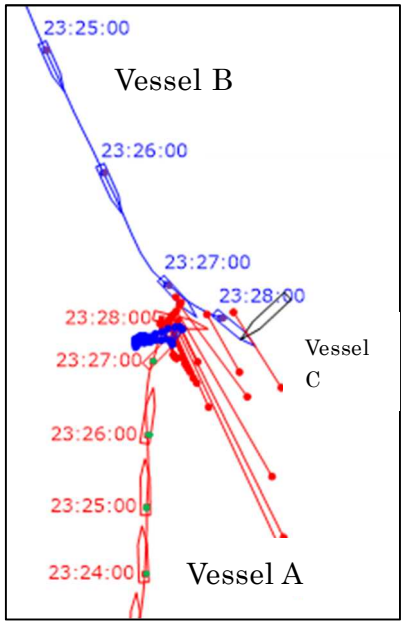
Classification	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational fishing vessel	Fishing ferry	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Others
Marine accident	36	148	32	280	27	37	4	18	18	8	224	47	18	897
Marine incident	5	25	6	25	1	3	0	1	0	0	84	5	2	157
Total	41	173	38	305	28	40	4	19	18	8	308	52	20	1,054
Composition ratio %	3.9	16.4	3.6	28.9	2.7	3.8	0.4	1.8	1.7	0.8	29.2	4.9	1.9	100.0

The marine accidents and serious incidents which occurred in 2021 are summarized as follows:

Marine serious accident reports published in 2021

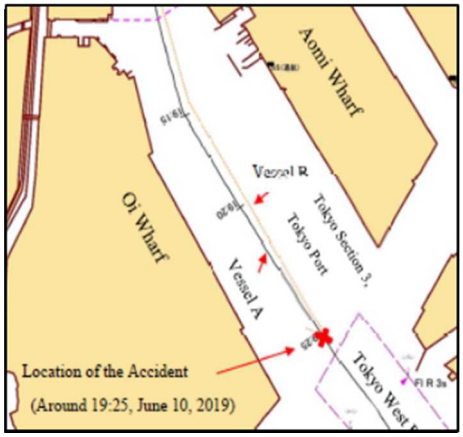
<table>
<tr><td rowspan="6">1</td><td>Date of publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td>January 21, 2021</td><td>December 21, 2018
Off the east of Sumoto Port, Sumoto City, Hyogo Prefecture</td><td>Cargo ship CAPE VERDE (Vessel A, Singapore)
Fishing vessel MUNEYOSHI MARU (Vessel B)
Collision (Fishing gear)</td></tr>
<tr><td>Summary of the Accident</td><td colspan="2">Vessel A, with a master and 23 crewmembers on board, proceeded northeast to Fukuyama Port in Fukuyama City, Hiroshima Prefecture on pilotage by a pilot and Vessel B, with a skipper and a crewmember, proceeded northeast while pulling the fishing net. Vessel A collided with the fishing gear of Vessel B near the Sumoto Offing Light Buoy.
In Vessel B, the crewmember drowned, the hull capsized and the fishing gear was damaged.
Vessel A had scratches on the rudder, but there were no casualties.</td></tr>
<tr><td>Probable Causes</td><td colspan="2">It is probable that the accident occurred when, while Vessel A was proceeding northeast under pilotage by Pilot A and Vessel B was proceeding northeast while pulling the fishing net off the east of Sumoto Port under circumstances of heavy traffic and many ships, Vessel A collided with the fishing gear of Vessel B because Vessel A turned to starboard close to the stern of Vessel B.
It is probable that Vessel A turned to starboard close to the stern of Vessel B because Pilot A noticed that it was difficult to carry out the originally planned idea of passing between Fishing Vessel on the port bow and Fishing Vessel on the bow and believed that, considering the visually measured distance of about 1 M from Vessel B operating on the starboard bow, it would be safe to pass over the fishing gear of Vessel B.
It is somewhat likely that the situation that Master A left the bridge, leaving Pilot A alone to make decisions about ship maneuvering contributed to the occurrence of this accident.
Vessel A 
Vessel B  </td></tr>
<tr><td>Safety Actions</td><td colspan="2">Safety Actions Taken by the Vessel A Management Company
Together with a summary of the accident, the Vessel A management company informed the managing vessels of measures to prevent any recurrence of such accidents, including: Sharing detailed information with the pilot, including information on fishing vessels; challenging the doubtful intention of the pilot in order to change the maneuvering method, etc.; entrusting navigation to the pilot taking the traffic density, etc. into consideration and giving due consideration in the number of bridge team members during pilotage by a pilot.
In addition, it conducted internal audits and on-board education and training on voyage, ship maneuvering and risk analysis for the crew of Vessel A.

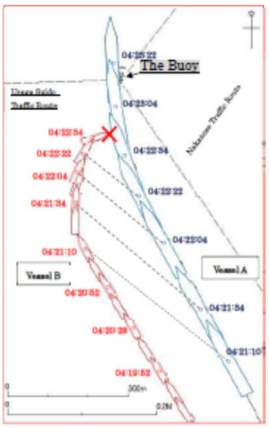
Safety Actions Taken by the Pilots' Association of Osaka Bay Pilot District
The Pilots' Association of Osaka Bay Pilot District took the following measures after the accident:
(1) A Marine Accident Response Headquarters was established and inform members of the occurrence and summary of the accident.
(2) Study meetings for members were held regarding the operation state of fishing vessels in Osaka Bay by inviting fishery-related persons.</td></tr>
<tr><td>Report</td><td colspan="2">https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2018tk0024e.pdf</td></tr>
<tr><td rowspan="2">2</td><td>Date of publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td>February 18, 2021</td><td>March 21, 2019
Anchorage YL4, Yokohama Section 5, Keihin Port</td><td>Container Ship APL GUAM (Vessel A, U.S.)
Container Ship MARCLIFF (Vessel B, Antigua and Barbuda)</td></tr>
</table>

			Container Ship HANSA STEINBURG (Vessel C, Liberia) Collision
	Summary of the Accident	Vessel A, with a master and 20 other crew members on board, was proceeding north toward her planned anchorage within Anchorage YL4 of Yokohama Section 5, Keihin Port, under the pilotage of a pilot, and while Vessel B, with a master and 15 other crew members on board, was proceeding south-southeast toward Nagoya Port, Aichi Prefecture, both vessels collided in Anchorage YL4. Vessel B subsequently collided with the anchored container ship Vessel C, which had a master and 19 other crew members on board. Vessel A sustained dents and other damage with a hole to her bow's plating shell, Vessel B sustained dents and other damage to her bow's plating shell and starboard side bow's plating shell, and Vessel C sustained dents and other damage with a hole to her starboard bow's plating shell. However, there were no casualties on any of the vessels involved.	
	Probable Causes	It is probable that the accident occurred when, as Vessel A was proceeding north toward her planned anchorage and Vessel B was proceeding south-southeast toward the sea area west of Nakanose in Tokyo Bay at night within an anchorage of the Keihin Port Yokohama 5th District that had become confined with the presence of anchored vessels, and under conditions in which the courses of Vessel A and Vessel B intersected between anchored Vessel C and another anchored vessel, and the danger of collision was rising, Vessel A and Vessel B collided and then Vessel B turned to port and proceeded southeast with headway and collided with Vessel C because both vessels maintained course and speed until they approached each other, as master and pilot of Vessel A intended to pass Vessel B port-to-port and master of Vessel B intended to pass Vessel A starboard-to-starboard. It is probable that master and pilot of Vessel A maintained course and speed until Vessel A approached Vessel B with the intention of passing Vessel B port-to-port because they predicted that Vessel B, which had turned to starboard, would turn to starboard again and pass Vessel A port-to-port rather than navigating in the narrow sea area between Vessel A and Vessel C. It is probable that master of Vessel B maintained course and speed until Vessel B approached Vessel A with the intention of passing Vessel A starboard-to-starboard because he predicted that MARCLIFF would safely pass Vessel A starboard-to-starboard if Vessel A maintained her course and speed. It is probable that, under conditions in which the course of each vessel intersected the course of the other and the danger of collision was rising, Vessel A and Vessel B could have taken measures to avoid a collision, such as confirming each other's maneuvering intentions and promptly reducing speed, by communicating early by international VHF radio telephone (VHF), and therefore it is probable that both vessels' continued navigation without communicating by VHF contributed to the accident's occurrence.	
	Safety Actions	**Safety Actions Taken by the Vessel A Management Company** **The Vessel A management company** documented the accident in Company A's Safety Management System for full transparency and took the following measures after the accident. (1) A reminder on Bridge Team Management (BTM) *1 protocols was sent to entire Fleet. (2) Entire Fleet were informed that they should always prepare their own escape plans in case other vessels fail to comply with the law or behave unexpectedly. (3) Reviewed policies with deck officers regarding increased vigilance necessary when anchoring and with pilot onboard. (4) The accident is routinely reviewed and discussed at annual Senior Officer's Conferences and at training seminars. **Safety Actions Taken by the Pilots' Association of Tokyo Bay Pilot District** The Pilots' Association made the following points known to its member pilots.	

		(1) When letting go anchor, make every effort to avoid situations in which encounters with other vessels will occur in a confined anchorage where anchored vessels are present, and when such a situation is anticipated, reduce speed or change course prior to entering the anchorage and avoid coming into a relationship that could result in a collision. (2) When letting go anchor in an anchorage near a passage entrance, check whether ships will be entering or leaving the passage by communicating with the port radio, etc., beforehand, and if entering/leaving ships are present and may come near, communicate with them by VHF and confirm their maneuvering intentions. (3) When navigating near anchored vessels at night, be aware that own vessel may be difficult to see from other vessels due to the presence of the anchor lights of anchored vessels, etc. (4) When having doubts about the movements of another vessel, proactively issue warnings using a daytime signaling lamp if it is night and take measures to avoid hazardous relationship. (5) When sensing the danger of a collision, etc., do not hesitate to take such measures as immediately turning the rudder hard over or setting the engine to full astern. *1 "Bridge Team Management (BTM)" refers to a practical management method by which team members on the bridge utilize all the resources on the bridge and systematically achieve safe navigation under clear standards.
	Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0012e.pdf	
	Reference	Major activities in the past year (Page 7), Chapter 2 (Page 25), Chapter 7 (Page 142)	
3	Date of publication	Date and location	Vessel type and name, accident type
	February 18, 2021	October 12, 2019 Higashi-Ogi Island offing to the south-east, Kawasaki City, Kanagawa Prefecture	Cargo vessel JIA DE (Panama) Foundering
	Summary of the Accident	When the vessel, manned with a master and eleven crewmembers, left a wharf of Keihin Port, and was anchoring at K1 anchorage point of Keihin Port on the way to proceed to Song Dang Port, the Socialist Republic of Vietnam, then the vessel received winds and waves that had increased due to the typhoon No.19 approaching and heeled to the starboard side, and subsequently rolled over and was flooded due to taking on sea water into the interior of the cargo holds, and thereby foundered around the anchorage. The master and three crewmembers were rescued, but eight crewmembers died.	
	Probable Causes	It is probable that the accident occurred because the Vessel foundered due to the fact that sea water which was being retained due to wave uprush on the upper deck (hereafter referred to as "the Retained Water") began flooding due to taking on sea water in the interior of the cargo holds, and then her steering was uncontrollable and she was receiving winds and wave uprush from the port fore side to port side, and furthermore her hull greatly heeled to the starboard side and she continued to be flooded due to taking on sea water in the interior of the cargo holds, and she subsequently rolled over due to her stability having been decreasing and flooding due to taking on sea water into the interior of the cargo holds progressed, with the result being that she foundered. This situation began while the Vessel was anchoring in the nighttime under conditions of rolling due to receiving winds and waves that had increased due to the typhoon No. 19 approaching the area of K1 anchorage point of Keihin Port. It is probable that the Retained Water on the deck began flooding due to taking on sea water in the interior of the cargo holds because the lids for opening parts of the ventilation cylinders of the cargo holds were in an open condition, and the water receiver railings at the connection parts between the panels of the hatch covers of the cargo holds had a number of broken holes and some parts of the panels were deformed, and thereby the hatch covers were not securely weather-tight. In addition, it is considered probable that wave uprush on the deck further increased because her dry draft had been decreasing due to ingress water into the interior of the cargo holds and the Retained Water. It is probable that JIA DE was in a state in which her steering was uncontrollable because ingress water that infiltrated into the marine diesel oil (MDO) tank interior through air vents on the upper deck was supplied to the diesel generator engines with MDO through the fuel oil supply line of the diesel generator engines, and then the diesel generator engines experienced combustion failure or misfiring, and subsequently stopped, and thereby the blackout occurred.	

<table>
<tr><td></td><td></td><td colspan="2">It is probable that after the steering of the Vessel was uncontrollable and she was receiving further increased winds and wave uprush from the port fore side to port side, she heeled to the starboard side due to receiving winds and waves and came to roll on that angle, and then heeling to the starboard side gradually increased due to receiving strong wind and heavy waves due to the typhoon No. 19. It is probable that after she attained the angle of stability in maximum condition, and subsequently the lateral heeling angle increased due to continuous waves, because this thereby led to the lateral heeling angle attaining the angle of loss of residual stability and she rolled over to the starboard side.
  </td></tr>
<tr><td></td><td>Report</td><td colspan="2">https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0023e.pdf</td></tr>
<tr><td></td><td>Reference</td><td colspan="2">Chapter 2 (Page 25)</td></tr>
<tr><td>4</td><td>Date of publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>February 18, 2021</td><td>November 16, 2019
Wakayama Shimotsu Port, Wakayama Prefecture</td><td>Cargo ship ORANGE PHOENIX (Panama)
Fatality of a crew member</td></tr>
<tr><td></td><td>Summary of the Accident</td><td colspan="2">While the vessel with the master and 20 crew members aboard was anchoring at Wakayama Shimotsu Port, Wakayama Prefecture, a crew member died of a fall from a lifeboat to the deck when engaging in the lifting and recovery of the lifeboat in an abandon ship drill.</td></tr>
<tr><td></td><td>Probable Causes</td><td colspan="2">It is probable that the accident occurred in a manner that, when the Vessel was doing the lifting and recovery work of the lifeboat in the abandon ship drill while anchoring at Wakayama Shimotsu Port, Navigation Officer B lost his balance and fell to the deck because he was taking photographs in a bent-over posture at the doorway at the stern of the lifeboat without wearing the safety belt, and the hook of the release system was released from the ring of the boat davit and the lifeboat moved downward along the guide rail.
It is probable that the hook of the release system was released from the ring of the boat davit because it islikely that the lock piece was not hooked in the appropriate place.
  </td></tr>
<tr><td></td><td>Safety Actions</td><td colspan="2">Safety Actions Taken by the Company managing the Vessel
The company managing the vessel issued a document concerning the accident to gain the attention of all the vessels it manages and also implemented the following measures following the accident.
- The master and the chief officer provide the crew members with on-site education concerning the release system restoration procedures using an actual lifeboat on a regular basis.
- The master provides the crew members with on-site education concerning appropriate equipment, such as a safety belt, for work in a high place
- The master holds a meeting before an abandon ship drill and provides explanation to the crew members concerning the prediction of danger, thereby having each crew member become aware of safe work.
- Before conducting a lifeboat lifting and recovery work, the chief officer confirms and thoroughly ensures the following key points of the work: the hook of the release system is hooked on the ring of the boat davit; the hoisting wire is not released until the hook is completely fixed; the reset position of the hook is confirmed by the green paint of the lock piece; the hook is surely fixed with the safety pin lock by inserting the safety pin.
- Each vessel holds an onboard safety meeting and gives explanation about the details of the accident, and reports the record of implementation of on-site education to Company A.
- The company's supervisor visits the vessels Company A manages and confirms that the release system is actually operated in an appropriate manner.</td></tr>
<tr><td></td><td>Report</td><td colspan="2">https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0026e.pdf</td></tr>
<tr><td>5</td><td>Date of publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>March 25, 2021</td><td>June 10, 2019
Keihin Port, Tokyo Section 3</td><td>Roll-on/Roll-off Cargo Ship PANSTAR GENIE (Vessel A, Republic of Korea)</td></tr>
</table>

		Around the Tokyo West Breakwater Lighthouse	Tugboat DAITOUMARU (Vessel B) Collision
	Summary of the Accident	Vessel A, with her master and 16 other crew members on board (seven nationals of the Republic of Korea and nine nationals of the Republic of the Philippines), left the Shinagawa Wharf, Tokyo Section 2, Keihin Port, and was proceeding southeast to Nagoya Port, Aichi Prefecture, while Vessel B, with her captain alone, was proceeding southeast toward Daikoku Wharf, Yokohama Section, Keihin Port after she departed from Shibaura Landing Stage, Tokyo Section 2, Keihin Port. The two vessels collided in the vicinity of the northern end of the Tokyo West Passage, Tokyo Section 3, Keihin Port. Vessel A suffered abrasions on her port and starboard bow's shell plating and Vessel B suffered fractures and other damages on her mast, but there were no casualties on either vessel.	
	Probable Causes	It is probable that the accident occurred when Vessel A and Vessel B were both proceeding southeast, Vessel A approached from the stern, gradually sped up, and continued to navigate parallel without noticing Vessel B navigating near her bow at twilight after sunse t in Tokyo Section 3 at Tokyo Port under the condition whereby it became dark and difficult to see in the surroundings due to heavy rain. It is probable that both vessels collided because Vessel B also continued navigating at a constant speed without noticing that Vessel A was proceeding southeast after she departed It is probable that Vessel A continued her navigation without noticing Vessel B because the surroundings were dark and the visibility was poor due to the influence of heavy rain. On top of that, Vessel B was a small vessel approaching Vessel A from her stern, and after she navigated within the minimum detection distance of Vessel A's radar, she navigated inside the blind spot from Vessel A's wheelhouse. It is probable that the fact that Vessel A dismissed her crew members from departure stations and began proceeding southeast under the condition of poor visibility due to the influence of heavy rain, might have contributed to Vessel A not being able to notice Vessel B. It is probable that the reason why Master B did not monitor Vessel A's movements and continued with the navigation was, from the first time he noticed Vessel A, he assumed that she was an incoming vessel mooring at the Shinagawa Wharf, Tokyo Section 2, Keihin Port. It is probable that the noise from Vessel B's main engine and the sound of rainfall at the time of the accident might have caused Master B not to notice that Vessel A was approaching.	
	Safety Actions	**Safety Actions Taken by the Vessel A Management Company and Vessel A** After this accident, as a safety measure to prevent the recurrence of similar accidents, the following steps were taken by the Vessel A management company. (1) Issued warnings to prevent the recurrence of similar accidents and provided non-conforming information about this accident to vessels under their management. (2) Make sure that the crew members know that they should remain on their departure station when departing the Shinagawa Wharf, Tokyo Section 2, Keihin Port until they reach the vicinity of the Oi Container Wharf. **Safety Actions Taken by the Vessel B Operator** The Vessel B Operator shared the information on the sequence of events, conditions, and causes of the accident with the crew members employed by Company B. Moreover, Company B also retrained their crew members regarding the safe navigation precautions for large vessel navigation based on the "Navigational Safety Instruction Manual for Construction Vessels in Tokyo Port (3rd Edition)" published by the Bureau of Port and Harbor, Tokyo Metropolitan Government. Furthermore, in accordance with Article 18 of the Act on Port Regulations, they were instructed to navigate far enough from large vessels while navigating within the port.	
	Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0014e.pdf	
6	Date of publication	Date and location	Vessel type and name, accident type

	March 25, 2021	R1.10.15 Uraga Suido Traffic Route, off the northeast of Yokosuka Port, Yokosuka City, Kanagawa Prefecture	Container ship APL PUSAN (Vessel A, Singapore) Cargo ship SHOUTOKUMARU (Vessel B) Collision
	Summary of the Accident	Vessel A, with a master and 22 other crew members aboard, was proceeding to Section 2 in Keihin Port under the pilotage of a pilot, while Vessel B, with a master, an officer, and 2 other crew members aboard, was proceeding for anchorage Y1 at Yokohama Section in Keihin Port. While both vessels were proceeding northwest bound in Uraga Suido Traffic Route, both vessels collided on the Traffic Route, and Vessel A collided with a light buoy after that. Vessel A suffered a dent on her port bow, Vessel B's bulwark bow suffered damages, etc. while the light buoy's guard frame suffered a dent, but there were no casualties on either vessel.	
	Probable Causes	It is probable that in this accident, when both Vessel A and Vessel B were proceeding northwestward in the vicinity of the north exit of the Uraga Suido Traffic Route at night, the pilot of Vessel A, thinking that he could safely overtake Vessel B even if he did not inform Vessel B of his intention to overtake on the starboard side by the International VHF Radio Telephone equipment (VHF), etc., continued to navigate in a manner to overtake Vessel B, and when the officer of Vessel B received information from Japan Coast Guard TOKYO WAN Vessel Traffic Service Center (Tokyo MARTIS) that she was obliged to navigate the Nakanose Traffic Route, he turned to starboard toward the Nakanose Traffic Route without knowing the existence of Vessel A on the starboard quarter, so both vessels collided, and then the starboard bow of Vessel A collided with the Uraga Suido Traffic Route light buoy No. 8 (the Buoy) It is probable that the pilot of Vessel A thought that he could overtake Vessel B safely without informing Vessel B of his intention to overtake starboard side of Vessel B by VHF or other means because Vessel B, after proceeding toward the center of the Uraga Suido Traffic Route, did not turn to starboard toward Nakanose Traffic Route even after passing through the southwest of Daini Kaiho, and continued proceeding northwestward toward the north exit of the Uraga Suido Traffic Route. It is probable that the officer of Vessel B turned to starboard toward Nakanose Traffic Route without knowing the existence of Vessel A on the starboard quarter because he thought that the speed difference of vessels navigating the Uraga Suido Traffic Route with speed limitation was small and that Vessel B would not be overtaken, and when he received information from the Tokyo MARTIS to the effect that she was obliged to navigate the Nakanose Traffic Route, he thought it necessary to enter the Nakanose Traffic Route immediately because he thought it was an instruction, and thought that he would not be able to enter the Nakanose Traffic Route by turning in front of the Buoy on the starboard bow unless he turned to starboard immediately, and was proceeding paying attention to turning to starboard toward the Nakanose Traffic Route while paying attention to other vessels on her bow.  It is probable that the following factors contributed to the occurrence of the accident: the master of Vessel B entrusted the officer with the bridge watch on Uraga Suido Traffic Route; Vessel B was on bridge watch by the officer while the master and the officer did not properly share information necessary for navigation such as navigation plans; the officer communicated to Tokyo MARTIS the location different from the scheduled anchorage without knowing that the name of the scheduled anchorage was anchorage Y1, and continued the navigation without hearing the information concerning Vessel A provided by VHF from Tokyo MARTIS.	

	Safety Actions	**Safety Actions Taken by Tokyo Bay Licensed PILOTS' Association** After this accident, as a safety measure to prevent the recurrence of similar accidents, Tokyo Bay Licensed PILOTS' Association made Pilot A took a ship maneuvering training on a ship maneuvering simulator under the conditions at the time of the accident and made the following matters known to the members. (1) Not overtaking another vessel until the other's vessel movements and safety can be confirmed. (2) When there is a risk of another vessel approaching, communicate on the VHF at an early stage to make sure of her maneuvering intention, and If necessary, give a whistle signal such as an alert signal. (3) Avoid approaching other vessels in the vicinity of a Passage entrance or the point where a vessel is altering her course. **Safety Actions Taken by the Vessel B management company and operator** After this accident, as a safety measure to prevent the recurrence of similar accidents, the Vessel B management company and operator instructed all the crew members to strictly conduct a lookout with their vision and the radar, they also would regularly conduct training based on this accident and retrained their crew members regarding the following issues. (1) Matters concerning laws and regulations such as the Maritime Traffic Safety Act (2) Matters concerning the sea area, etc. sea area where the captain should command as prescribed in the Safety Management Regulation
	Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2020tk0011e.pdf

7	Date of publication	Date and location	Vessel type and name, accident type
	April 22, 2021	July 22, 2019 Shallows on the western side of Nakato Shima, Imabari City, Ehime Prefectur	Cargo Ship AZUL CHALLENGE (Panama) Grounding
	Summary of the Accident	The vessel, with a master and 20 other crew members as well as a pilot aboard, proceeded east in the Seto Inland Sea and then was proceeding south in the Kurushima Kaikyo Naka Suido off of Uma Shima, Imabari City, Ehime Prefecture, for Fukuyama Port, Hiroshima Prefecture, when she ran aground on shallows on the western side of Nakato Shima, Imabari City. The vessel sustained dents to the port-side plating shell of her No. 1 to 7 ballast tanks and other damage. However, there were no fatalities or injuries.	
	Probable Causes	It is probable that the accident occurred when, as the Vessel made a turn to starboard toward the Naka Suido after the tide turned to the south in the Kurushima Kaikyo Traffic Route, which is the most difficult point encountered when navigating the strait, the Vessel's turn slowed and, consequently, she was pushed by the current, crossed the eastern edge of the traffic route and went outside the traffic route, approached the west side of Nakato Shima with her starboard turn still slowing, and ran aground on shallows on the west side of Nakato Shima. It is probable that the Vessel's turn slowed because, in maneuvering away from Uma Shima, Pilot A decided to execute course indication-based ship maneuvering that differed from rudder angle indication-based ship maneuvering guidelines. It is probable that the Vessel approached the west side of Nakato Shima in a starboard turn that continued to slow because, even after the Vessel went outside the traffic route, Pilot A continued to engage in ship maneuvering by giving course indications while checking the Vessel's position by visual means only, and because Quartermaster A did not set large rudder angles for the reason that he was given course indications. It is somewhat likely that Master A's thinking that he had no choice but to trust Pilot A's piloting abilities and entrust ship maneuvering to him, as it was Master A's first time navigating through the Kurushima Kaikyo's Naka Suido, where unique tidal currents exist, in the eastbound direction, and that Master A's not quickly giving ship maneuvering advice to Pilot A and not taking over conning the Vessel without hesitation as specified in the Safety Management System Manual even after the Vessel left the traffic route contributed to the accident's occurrence.	

	Safety Actions	**Measures Taken by the Vessel Management Company** (1) The vessel management company instructed masters that navigate in the Kurushima Kaikyo Traffic Route to send information on the planned channel of navigation and tide information to the company by email after sharing this information with pilots. (2) The company sent information on the accident to the vessels it manages and called their attention to preventing the recurrence of similar accidents. (3) The company confirmed with masters and crew members that they should make maximum use of the cooperative "bridge team" system, with the master exchanging information with the pilot quickly and without hesitation when the pilot's ship maneuvering becomes dangerous, and that Company A will give advice to the pilot on the master's behalf if the pilot remains uncooperative. **Measures Taken by the Vessel's Operator** The vessel's operator made information on the accident involving the company managing the vessel known to the vessels it manages and called their attention to preventing the recurrence of similar accidents. **Measures taken by the Licensed Inland Sea Pilots' Association** (1) Established a marine accident response headquarters to respond to accidents and gave association members an outline of it. (2) Reminded association pilots of the ship maneuvering guidelines and urged them to fully follow the guidelines. (3) Established an accident response committee to investigate the accident's cause and compile preventative measures that included the following items, and made the measures known to association pilots. i) Carry out ship maneuvering in accordance with the "Navigation Directions for the Kurushima Kaikyo Traffic Route" noted in operational reference materials of the Licensed Inland Sea Pilots' Association. ii) Refer to the "Kurushima Kaikyo Navigation Reference Map." iii) When navigating in a narrow channel, check position using conspicuous targets and the like, effectively use electronic devices (e.g., ECDIS*1, PPU*2, and so on.), and reconfirm own vessel's position, conditions of driving currents, etc. iv) As a means of contributing to the consistent practice of BRM*3 on the Vessel, strive to maintain an effective communication environment so that information on ship's position and surroundings can be provided by crew members continuously by, for example, indicating the specific planned course beforehand *1 ECDIS: Electronic Chart Display and Information System. *2 A portable pilot unit (PPU) is an electronic device that consists of a locational information receiver and laptop that has electronic charts and displays information necessary for pilotage. *3 Bridge resource management (BRM) is to effectively manage all kinds of resources available in a bridge for safe navigation of the vessel, including crew, equipment, and information. In this concept, with the assumption that human beings have a tendency to make errors (including speech error, mishearing, misreading, misunderstanding, and operating error), they should work well as a team (such as by cross-checking data) to nip errors before they bud and cause a tragedy.
	Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0017e.pdf

8	Date of publication	Date and location	Vessel type and name, accident type
	June 24, 2021	September 9, 2019 Kita Wharf, Maizuru Port, Maizuru City, Kyoto	Cargo Vessel FIRST AI (Republic of Korea) Fatality of a crew member
	Summary of the Accident	While the cargo vessel FIRST AI was mooring, a boatswain died as his head was trapped in a hatch cover panel when performing hatch cover closing duty.	
	Probable Causes	It is probable that the accident occurred due to the following situation. As the boatswain received instruction from Officer A, he stopped winding up the drum for the closing of the hatch cover after the Vessel had unloaded the cargo. Afterward, the boatswain passed through the space between the hatch cover panel winding drum and the hatch coaming (hereinafter referred to as "the Space"),	

		and the hinge plate (hereinafter referred to as "the Hinge Plate") attached with arms for connecting the port side panel between panel No. 11 and No. 10 of the stern side's hatch cover (hereinafter referred to as "the Arm") bent outward horizontally, the Key Plate flaked off, and the Arm Pin, which was no longer restrained, fell off, causing panel No. 11 of the hatch cover to fall. As a result, his head was caught between panel No. 11 and panel No. 7, which was already stored in the drum. The reason why the boatswain passed through the Space, although he had been warned not to do so before the accident, could not be clarified. It is probable that the bent of the Hinge Plate occurred because the hatch cover was opened and closed after the temporary repair took place on the Vessel without taking account of the residual stress. 
	Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0021e.pdf
	Reference	Chapter 2 (Page 27)

9	Date of publication	Date and location	Vessel type and name, accident type
	July 29, 2021	June 16, 2020 Osanbashi Pier D of Yokohama Section 1, Keihin Port	Passenger Ship ASUKA II Fire
	Summary	When the vessel, with a master and 152 other people on board, was at its mooring at Osanbashi Pier D of Yokohama Section 1, Keihin Port, a fire occurred at an upholstery shop in Deck 12, where repair materials and other items were stored. There were burn damage at the shop, but no fatalities or injuries.	
	Probable causes	It is probable that the accident occurred when the vessel was at its mooring at Osanbashi Pier D of Yokohama Section 1, Keihin Port. During repair work (the "Work") in which corroded steel floorboards (the "Floorboards") in the vent space of Deck 12 (the "Vent Space") was cut and replaced with new steel plate, safety measures relating to the work and set forth in the safety management system (SMS) manuals were not observed. When this work was performed, the Floorboards were gas-cut in the Vent Space adjacent to an upholstery shop. Before crew members realized it, heat was transferred to the wall on the starboard side between the upholstery shop and the Vent Space (the "Wall"), causing fire from flammables near the Wall in the upholstery shop and spreading it to other flammables. -It is probable that safety measures set forth in the SMS manuals relating to the Work were not observed, because when an engineer who supervised the repair work under instructions for the repair work (the "Engineer") checked the safety measures, he or she thought that only downward direction should be checked for work involving fire as the Floorboards of the Vent Space is replaced and did not consider the upholstery shop as a target adjacent area. Further, a section chief who ordered the repair work to the engineer who supervised the Work did not share information on the Work with the engineer, and entrust the check of the safety measures to the engineer.  It is likely that the reason heat was transmitted to the Wall, and flammable materials located near the Wall of the upholstery room ignited and spread to other combustible materials was that cardboard boxes, located near the lower side of the Wall of the upholstery room, continued to be heated due to the high-temperature heat conducted to the wall, reached its ignition point and caused fire, which spread to scraps of cloth for repair, etc. in the cardboard boxes and rolled cloth stored in upper shelves.	
	Safety Actions	**Measures taken by the vessel owner and vessel management company to prevent accidents** After the accident, the vessel owner and the vessel management company set up an accident investigation committee to confirm facts related to the accident and how the vessel was damaged and identify problems. The committee decided to implement short- and long-term measures to prevent recurrence of the accident, including ensuring and educating the safety of hot work, inspecting fire-fighting equipment, reviewing fire-fighting systems, and improving safety management systems. The main measures to prevent a recurrence of the fire are as follows. The company ordered the	

		vessel to stop the hot work outside the designated hot work location in the engine room until the following measures have been completed, and took measures by October 2020. (1) Clarify adjacent areas for hot work. (2) Make work sites, work details, and results of inspections in adjacent areas visible in drawings and photographs when issuing a hot work permission. Review the format of the hot work permission and add a signature field for a person who actually confirmed safety measures at the work site. (3) Establish a method for sharing information using billboards, etc., so that a master and duty officer can know the time and location of hot work carried out on the vessel. (4) Ensure that fire patrols witness hot work *1 at the start and end of it. (5) Carry out training on hot work involving welding for crew in August and October 2020, and introduced it into the training system from April, 2021. (6) Carry out risk assessment *2 at the time of the implementation of Hot Work, and necessitate approval from the company regardless of the result of the risk management when passengers go abroad. *1 "Fire Patrol" means crew members who, for the purpose of safety and security, are on duty to patrol the vessel for 24 hours to check for fire and other abnormal conditions. *2 "Risk Assessment" means overall processes to identify, analyze, and evaluate risks. Companies must decide risk reduction measures, and take appropriate measures based on the results.
	Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2021/MA2021-7-1_2020tk0004.pdf (Japanese only) https://www.mlit.go.jp/jtsb/ship/p-pdf/MA2021-7-1-p.pdf (Explanatory material (Japanese only))

<table>
<tr><td rowspan="6">10</td><td>Date of publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td>August 26, 2021</td><td>September 19, 2019
At sea north off Mikurahan Island, Towada City, Aomori Prefecture (East of Towada Lake)</td><td>Pleasure Boat GURILAND 900
Passenger injury</td></tr>
<tr><td>Summary</td><td colspan="2">While the vessel, with its master and 12 passengers on board, proceeded east in the east of Towada Lake, Towada City, Aomori Prefecture and rode on continuous waves, the vessel was struck against the sea surface continuously and was subject to impact several times, injuring one passenger.</td></tr>
<tr><td>Probable causes</td><td colspan="2">The west-northwest wind gradually getting stronger with a strong wind warning announced ,the captain of the vessel 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 50cm. For this reason, the boat rode on the first wave with a wave height of approximately 50cm 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 probably caused by receiving multiple impacts on their buttocks by rising and falling onto the seat's surface.
It is probable that the reason the vessel continued its voyage at a speed of about 18 kn is that, even though the master understood the risk of front seats in heavy seas and it was supposed to stop standard voyage and reduce speed in accordance with safety management rules and navigation standards, the master had not experienced this kind of accident since he was appointed a tramp route operator, safety supervisor and navigation manager (the "navigation operator") as a master, and thought that he did not have to reduce speed in order to soften impact on the vessel.
It is probable that the reason the injured passenger kept seated on the front seat was that, even though the master orally told all passengers to half rise from the seats, the passenger would not hear the instruction due to the noise of wind, engine, and so on.
  </td></tr>
<tr><td>Safety Actions</td><td colspan="2">Measures taken by the Ministry of Land, Infrastructure, Transport and Tourism
After the accident, the Tohoku Regional Transportation Bureau got a navigation supervisor to conduct a local audit but did not confirm violation of safety management rules. Nevertheless, the supervisor venbally instructed the navigation operator on the following matters.
(1) Continue giving precautions for preventing injury of passengers at the reception desks, taking care to ensure that they are communicated to all passengers.
(2) Masters will give precautions for explaining the characteristics of the vessel and preventing injury when passengers are on board. Allow the cancellation of the ride on the spot.
(3) Do not allow the use of front seats depending on the characteristic of the passenger, such as age.
(4) Display precautions for preventing injury of passengers on the website for inviting passengers.

Measures taken by the navigation operator
The navigation operator sold the vessel after the accident, but took the following measures to prevent the recurrence of the accident on similar rigidhulled inflatable boats.
(1) If there is sufficient seating capacity, the front seats should be avoided, and if it is inevitable that passengers are seated in front seats, the master should carefully control the vessel and repeatedly call attention to passengers, depending on the navigation environment.
(2) When a vessel is subject to the impact of waves while sailing, the vessel should slow down and the master should will call attention to passengers from time to time.
(3) The website for inviting passengers will display precautions for tour with rigid hulled inflatable boats.</td></tr>
<tr><td>Report</td><td colspan="2">https://www.mlit.go.jp/jtsb/ship/rep-acci/2021/MA2021-8-1_2021tk0003.pdf (Japanese only)</td></tr>
<tr><td>Reference</td><td colspan="2">Chapter 2 (Page 21)</td></tr>
</table>

11	Date of publication	Date and location	Vessel type and name, accident type
	December 16, 2021	May 26, 2019 At sea south off Inubosaki, Choshi City, Chiba Prefecture	Cargo Ship SENSHO MARU (Vessel A) Cargo Ship SUMIHO MARU (Vessel B) Collision

Summary

Vessel A collided with Vessel B when Vessel A, with a master and four other people on broad, was navigating southwest to Hanshin Port at sea south off Inubosaki, Choshi City, Chiba Prefecture with limited visibility due to dense fog, and Vessel B, with a master and three other people on board, was navigating northeast to Shiogama Port, Sendai, Miyagi Prefecture.

For Vessel A, the master was rescued but four crew members died, and Vessel B suffered dented the shell plate on port fore side but there were no causalities.

Probable causes

The probable causes of this collision accident is that during the night, off the southern coast of the Cape Inubo under limited visibility caused by a dense fog, while Vessel A was navigating southwest and Vessel B was navigating northeast, both ships were approaching dead ahead. In that situation, while Vessel A was approaching up to about 1,600 meters to Vessel B, Vessel A turned right keeping the speed to navigate by port side to port side, and while Vessel B was approaching up to about two nautical miles to Vessel A, Vessel B changed its course slightly to the left to navigate by starboard side to starboard side and navigated visually keeping the course and the speed. Therefore, they were too late to notice that they were approaching each other, resulting in collision.

It is possible that Vessel A turned right to navigate by portside to portside with Vessel B because the Duty Officer A turned the vessel right in accordance with how to navigate a vessel when visibility is limited. However, the officer's intention is unknown since he or she died in this accident.

It is probable that vessel B slightly turned left to navigate by starboardside to starboardside with Vessel A thinking that Vessel A would turn left too and kept the course and speed under visual observation, possibly because Vessel A on the radar was traveling southwest slightly on the right of Vessel B's stem line and the Duty Officer B turned the course to the left by 2 degrees to expand the closest approach distance and felt safe.

It is probable that in this accident, if Duty Officer A and Duty Officer B confirmed the movement of the other vessel mutually on the radar screen when the both vessels get close to each other in a straight line under limited visibility, and also used acoustic signals or communicated each other through VHF earlier, it is probable that they could have taken measures to avoid the collision by decelerating, etc. while confirming mutual movements and operational intentions.

It is likely that if Duty Officer A and Duty Officer B changed their courses drastically under limited visibility, they could have noticed the other's navigation intention and avoided the accident.

It is probable that in addition, if the masters were notified by their navigation duty officer 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 confirmed mutual movements and operational intentions, leading to the avoidance of the occurrence of this accident, such as by reducing the speed of vessels to avoid collision.

Safety Actions

Measures Taken by the Vessel A's Operator

(1) Vessel A's operator have informed its operating vessels to arrange life jackets to vessel bridges.

(2) Vessel A's operator visited its operating vessels and instructed masters by providing them with documents that contain the following information on how to prevent marine accidents under dense fog.

i) Make the most effective use of navigation instruments such as radar and electronic sea maps and

ensure early detection and avoidance and continuous monitoring of related vessels.

ii) Masters shall give clear instructions to duty officers via a night order book regarding the limited conditions, such as calling the master.

iii) In this case, the officer did not call the master even though there was a risk (limited visibility). If there is a risk of danger, officers should always call a master, and the master should take control of the vessel at the bridge. (Article 10 of the Crew Act: Command on the Deck / Strengthening the duty system when safety management visibility is 3 miles or less)

iv) Actively send out fog signals and maneuvering signals to avoid danger even at night.

v) If the intention of the other ship is unclear, use VHF to communicate with the other ship early.

vi) Allow immediate operation of an engine. (Safe speed)

vii) Taking into account that the other ship may turn the course to the left despite limited visibility, and change the course drastically so that the other vessel can acknowledge the change of the course.

viii) Seek to obtain information on fog, etc.

Measures Taken by the Vessel B's Owner

(1) The Vessel B's owner installed AIS*1 on Vessel B in order to use VHF and acoustic signals for better communication.

(2) The Vessel B's owner conducted a commercial embarkation diagnosis and safety education to prevent the recurrence of similar incidents, and confirmed the following points in the embarkation diagnosis.

i) When visibility is limited, it is necessary to "determine the risk of collision (radar plotting)", "not to turn left", "continue monitoring the radar", "decelerate or stop the vessel".

ii) In accordance with the provisions of the Crew Act, the master must take control of the vessel if it is in a dangerous situation.

iii) Turning performance and speed standard must be available in the bridge.

Measures Taken by the Vessel B's Operator

(1) The Vessel B's operator shared information on this accident with the vessel owner, and informed its managed vessels of the overview of the accident.

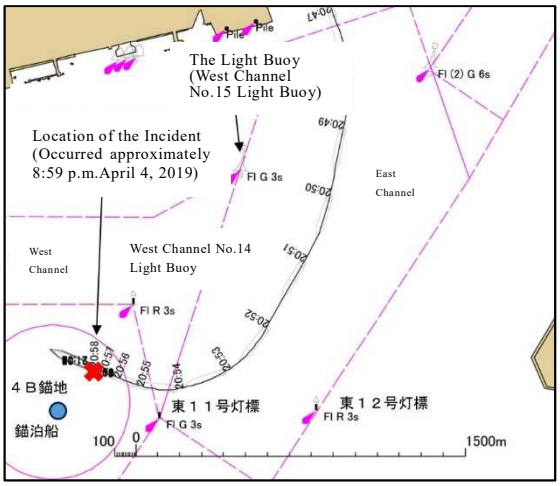
(2) The Vessel B's operator shared information on this accident with the owner of the vessel, and installed AIS on the Vessel B and conducted commercial embarkation inspection and safety lectures with the vessel owner.

*1 AIS (Automatic Identification System) means a system that automatically sends and receives vessels' identification codes, types, names, positions, courses, speed, destinations and navigation status to and from vessels, and exchanges the information with other vessels or navigation aid stations on the land.

Report	https://www.mlit.go.jp/jtsb/ship/rep-acci/2021/MA2021-12-1_2019tk0013.pdf (Japanese only)
Reference	Chapter 2 (Page 22)

Marine serious incident investigation report published in 2021

1	Date of publication	Date and location	Incident name
	December 16, 2021	April 4, 2019 4B Anchorage, Nagoya Port, Aichi Prefecture Near No.11 Light Beacon, Nagoya Port East Channel	Container ship WAN HAI 316 (Singapore) Grounding
	Summary of the Incident	The vessel, with its master and 20 other crew members, was navigated under escort by two pilots on board, ran aground at the 4B Anchorage, Nagoya Port, Aichi Prefecture which was at a water depth of approximately 6 meters, while turning to the starboard with a draft of approximately 8.5 meters at the bow and 9.6 meters at the stern at approximately 770 meters to the eastward offing of Port Island, Nagoya Port.	
	Probable Causes	It is considered probable that this incident occurred, while the Vessel was proceeding the south in the East Channel of Nagoya Port for Yokkaichi Port in the nighttime, a pilot trainee (hereinafter referred to as “Pilot A”) was conducting pilotage operation as part of practical training for new pilot under guidance and evaluation of a supervising pilot (hereinafter referred to as “Pilot B”), Pilot A passed and continued the Vessel to proceed the south without noticing the Nagoya Port West Channel No.15 Light Buoy (hereinafter referred to as “the Light Buoy”), which was the bearing target to turn to the starboard for the West Channel of Nagoya Port, and then Pilot A instructed the rudder angle of starboard 15° without confirming the Vessel position due to being urged to the starboard turn by Pilot B when the Vessel was at the east offing of the West Channel No. 14 Light Beacon, Nagoya Port (hereinafter referred to as the "West 14 Light Beacon"), and furthermore Pilot B instructed the rudder angle of hard to starboard because, the Vessel was turning to the starboard and proceeded 4B Anchorage, with the result that the Vessel ran aground at 4B Anchorage. It is considered probable that Pilot A passed the Light Buoy and continued to proceed the south without noticing the Light Buoy, because it might be that the speed of Vessel was a little higher at approximately 8 knot when he passed the southeast end of Tobishima Wharf and turned to the starboard, and moreover he paid attention to the East 12 Light Beacon as the next bearing target in situation of increasing the ship speed, and then after noticing the Vessel passing the Light Buoy, and subsequently he did not determine immediately whether he would be able to make the starboard turn in time for the West Channel or not. It is considered probable that Pilot A instructed the rudder angle of starboard turn 15° without confirming the Vessel position due to urging to take the starboard turn by Pilot B, because he thought that the evaluation operation had been suspended and Pilot B had maneuvering command of the Vessel. It is considered likely that Pilot B urged Pilot A to turn to the starboard strongly and furthermore instructed the rudder angle of hard to starboard, because the Vessel passed the Light Buoy, and then Pilot B had suspicion about the situation of proceeding the south in a state of no instruction of the starboard turn by Pilot A, because even though Pilot B urged Pilot A to turn to the starboard, Pilot A did not instruct the starboard turn, and then Pilot B felt concerned that they would lose the opportunity to turn to the starboard, and subsequently, Pilot B decided to be able to turn to the starboard by eye-estimation of the distance to the West 14 Light Beacon. It is considered probable that the Master did not conduct to maneuver the Vessel himself even though he had suspicion about maneuvering the Vessel by Pilot A and pilot B, because Pilot B with a lot of experience of pilotage operation conducted to instruct Pilot A in Japanese and there was no problem to keep navigating to the south in the East Channel in this situation, and moreover, Pilot B knew that the distance to the West 14 Beacon was 0.4 M when he began to take to turn to the starboard by the rudder angle of hard to starboard, and subsequently, he began to decelerate ship speed at the similar moment, and therefore, he thought that the Vessel would successfully turn to starboard for the West Channel.	

	It is considered likely that he was aware that he should maneuver the Vessel himself to secure safety navigation for her at adequate timing when he had suspicion about maneuvering the Vessel by Pilot A, Pilot B did not clearly inform Pilot A and the Master that the evaluation operation of Pilot A's was suspended at adequate timing, and subsequently, Pilot B did not conduct to take safety measures by maneuvering the Vessel himself at an early stage in accordance with Training Rules of the Pilots' Association. It is considered probable that it was involved in the occurrence of an incident that Pilot A and Pilot B did not have communication with the crew members in the bridge sufficiently. 
Safety Actions	**Safety Actions Taken by the Pilots' Association of Ise Mikawa Bay** (1) Enhancement of Education and Training System for Pilot Trainee i) Formulation of detailed navigation plans ii) Recommendation and saturation of promoting usage appropriately regarding PPU (Portable Pilot Unit : pilotage operation support system) (2) Clarification of Supervising Pilot Responsibilities i) Re-recognition of supervising pilot responsibilities ii) Provision of information to supervising pilots regarding evaluation summary, etc. in past training.
Report	https://www.mlit.go.jp/jtsb/eng-mar_report/2021/2019tk0011e.pdf

9 Actions taken in response to recommendations and opinions in 2021

Measures taken in response to recommendations in 2021 are summarized as follows:

Accident involving passenger ship NANKYU No. 10, which resulted in passenger injuries

(Recommendations on November 26, 2020)

For the investigation of the accident resulted in passengers injuries involving passenger ship NANKYU No. 10 which occurred outside Nejime Port, Minamiosumi-cho, Kagoshima Prefecture on December 2, 2019, Japan Transport Safety Board published the incident investigation report and made recommendations for the Minister of Land, Infrastructure, Transport and Tourism on November 26, 2020 and received reports on measures taken on the basis of the recommendations on March 31, 2021.

(See the JTSB website at the following URL for the summary and probable causes of the accident:
https://jtsb.mlit.go.jp/jtsb/ship/detail.php?id=12044)

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

It is probable that this accident occurred because Nankyu No. 10 departed from Nejime Port despite weather and hydrographic conditions that had reached the standards for departure and navigation cancellation conditions specified by the safety management manual of Nankyu-Dock Co., Ltd and

continued operations taking a north-northwest course (further north from the standard route), at about 12 knots outside the port. The ship was struck and lifted by oncoming tidal waves, which in turn caused passengers to be lifted above their seats and be slammed down, resulting in injuries.

It is probable that the ship continued navigating at 12 knots in the north-northwest direction, which was further north than the standard route, because the captain believed that, despite the up-and-down motions, the ship could safely avoid the oncoming waves by making a series of left turns and navigating at a slower pace than that specified by the navigation standard table and although he knew that taking the north-northwest course would subject the ship to the oncoming wind and waves, he thought that the course would prevent the ship from drifting toward the aquaculture facilities located to the west from the breakwater and lighthouse of Nejime Port.

It is probable that the captain considered the course to be safe probably because he did not consider the possibility of passengers being tossed violently upward from their seats and subsequently falling back down with such force that lumbar fractures would ensue.

Among accidents published in the accident investigation reports of the JTSB from 2008 to October 2020, 15 involved small passenger ships (excluding hydrofoil boats) that navigated solo and their passengers suffered spinal injuries similar to those described above. In 11of these accidents, the vessels were traveling at less than 22 knots.

It is probable that operators of small high-speed ships (excluding those of less than 20 tons in total tonnage and which attain speeds of 22 knots or more in service speed navigating only in horizontal areas) have been instructed by the Minister of Land, Infrastructure, Transport and Tourism to develop written protocols for navigation under wild weather and thoroughly implement accident prevention measures. However, instructions obligating measures for preventing similar accidents are also deemed necessary for passenger transportation business operators (referred to as “transportation business operators”) operating small passenger ships other than small high-speed ships.

Therefore, on the basis of the investigation results of the above accident and to ensure passenger transport safety, the JTSB recommends the following pursuant to the provision of Article 26, Paragraph 1 of the Act for Establishment of the Japan Transport Safety Board:

It is recommended that the Minister of Land, Infrastructure, Transport and Tourism should instruct transportation business operators to take the following measures:

1. 1. Transportation business operators shall provide the following instructions to captains and relevant crew members:
   i) When a ship oscillates due to wave impact, the operator shall decelerate to a speed that is adequate to prevent the passenger injuries.
   ii) When significant up-and-down motions of a ship are anticipated with a strong wind and highseas warning issued, the captain and relevant crew members shall guide passengers to take the suitable seats (e.g. rear seats in cases in which a ship’s center of gravity is located in its rear section) beforehand so that risks of being ejected from the seats and suffering violent impacts are minimal.
2. 2. Transportation business operators shall recheck the possibility of topographical, tidal, tidal

waves or heavy swell effects for standard routes, departure and arrival ports and share such information with captains and relevant crew members.

3. 3. Transportation business operators shall regularly instruct captains and crew members to ensure compliance with the standards judgement as to whether departure and standard navigation are possible as specified by safety management manual.

○ Measures taken by the Minister of Land, Infrastructure, Transport and Tourism in accordance with Recommendations

On the basis of the recommendations of November 26, 2020, the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism issued the document "Thorough Observation of Safety Measures for Small Passenger Ships Based on Recommendations from Japan Transport Safety Board" to Minister of Land, Infrastructure, Transport and Tourism" on the same day to Regional Transportation Bureaus, Kobe District Transport Bureau, and the Okinawa General Bureau of the Cabinet Office (hereinafter referred to as the "Regional Transportation Bureaus, etc.") and ordered the Regional Transportation Bureaus, etc. to direct companies who operate passenger ships of less than 20 gross tons that exclude small high-speed vessels (vessels with less than 20 gross tons and navigation speed of 22 kn or more, which do not travel only inland water areas) under the jurisdiction of Regional Transportation Bureaus, etc. (hereinafter referred to as "small passenger ships") to create manuals for safety navigation at the time of heavy weather and comply with them.

This time, Regional Transportation Bureaus, etc. conducted a series of instructions regarding the preparation of the manual for companies that operate small passenger ships, for which the manuals must be created.

Regional Transportation Bureaus, etc. will continue to ensure safety for small passenger ships, by checking how the manuals are made and providing instructions.

* Notifications (original) from the Minister of Land, Infrastructure, Transport and Tourism are available on the JTSB website.

https://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku21re_20201126.pdf

10 Provision of factual information in 2021 (marine accidents and incidents)

The JTSB provided factual information on one case (marine accidents) to relevant administrative organs in 2021. The details are as follows.

Information provided by JTSB regarding accident with the passenger injury including a fall from an opening in a passenger ship

(Information provided on August 4, 2021)

The Japan Transport Safety Board provided the following information to the Ministry of Land, Infrastructure, Transport and Tourism and the Japan Passenger Boat Association.

1. Summary of the accident

(1) Occurrence Date: April 3, 2021

(2) Occurrence Location: An offshore area east from the Shimonoseki Sotohama Breakwater Lighthouse in Shimonoseki Section, Kanmon Port

(3) Description of the accident

A passenger ship GANRIU ("the Vessel"), with a master, one crew member, and 33 passengers on board, departed from Moji Ward, Kanmon Port bounding for Shimonoseki Ward, Kanmon Port at around 09:50, April 3, 2021 and was traveling in an offshore area east from the Shimonoseki Sotohama Breakwater Lighthouse in Shimonoseki Section, Kanmon Port, when one passenger fell from the engine room entrance, which was left open, at the passenger room corridor on the near side into the engine room and got injured.

2. Factual information

The facts revealed through investigation thus far are as follows:

(1) Information on the Vessel

Gross tonnage: 19 tons

Maximum capacity: 122 persons (120 passengers and 2 crew members)

Route Shimonoseki to Moji

(2) Layout of passenger rooms, etc.

The Vessel had rooms at the front and rear of the upper deck, and chair seat at promenade deck on the upper side of the rear passenger rooms. The entrance of the engine room was near the center of the rear-side passenger room corridor and was usually closed with a hatch. Passengers were traveling over the hatch when they got on and off the Vessel.

3. Past similar accidents

Five accidents similar to this one have occurred since 2016, including cases of injuries caused by passengers' fall from an opening on a deck, and accident investigation reports have been published for four of them.

These four accidents occurred because crew members forgot that they opened a hatch for supporting passengers, or left a hatch open thinking that passengers would not get on soon or that

they would come back soon.

Measures to prevent recurrences include putting fences around the openings to prevent passengers from approaching a hatch, or immediately close them after work. Each accident is summarized in the attachment below.

Attachment

April 20, 2016 (4/20/2016)	Passenger Ship GREEN AUKLET (19 tons)	Slight injury One person	The vessel was moored at a fishing port in Ogawa Island, Karatsu City, Saga Prefecture. A crew member thought that passengers would not get on the vessel soon, and left the hatch for the engine room open while inspecting the engine. A passenger fell from the hatch into the engine room when he or she was walking on the passenger room corridor and got injured.	・ If a crew member inspects an engine while leaving the floor hatch for the engine room open, staff on the platform must warn passengers, or close the platform if such staff is not available.
			Report URL: https://www.mlit.go.jp/jtsb/ship/rep-acci/2016/keibi2016-10-28_2016ns0039.pdf	
July 22, 2018 (7/22/2018)	Passenger Ship YUKIHIME (19 tons)	Injured One person	The vessel was moored at Pier 3 of Itsukushima Port, Hatsukaichi City, Hiroshima Prefecture. The master thought that all passengers had got off the vessel for sightseeing and would not return soon, so left the hatch open. When a passenger returned to the vessel for his baggage, he fell from the hatch into the bottom of the hold and got injured.	・ A master must immediately close the opening after finishing their work. ・ Passengers must tell a master when they will return to their rooms after disembarking.
			Report URL: https://www.mlit.go.jp/jtsb/ship/rep-acci/2019/MA2019-6-18_2018hs0168.pdf	
April 22, 2019 (4/22/2019)	Passenger Ship KONPIRA MARU 5 (19 tons)	Injured One person	The vessel was moored near the floating bridge at the platform of Iwai Island, Kaminoseki Town, Yamaguchi Prefecture. The master left the hatch at the rear side of a passenger room corridor open when there were no passengers in the passenger rooms. When a passenger returned to a passenger room, she fell from the hatch into the floor of the engine room. The master let the passenger room unattended with the hatch left open, because he thought it would be fine if he went to get tiger rope and return immediately.	・ The master made it possible to display signs indicating that entry after this accident is prohibited when the hatch is open. ・ The master must inform a reception desk not to tell passengers to get on the vessel until safety confirmation is complete in the vessel. ・ Necessary safety measures must be taken when carrying out work.
			Report URL: https://www.mlit.go.jp/jtsb/ship/rep-acci/2019/MA2019-10-21_2019hs0050.pdf	
July 13, 2020 (7/13/2020)	Passenger Ship HAYABUSA 2 (68 tons)	Serious injury One person	The ship was moored in Shinojima Port, Aichi Prefecture. The chief engineer forgot that he left the engine room hatch in a passenger room open. When passengers started to get on the vessel, one passenger's left limb fell into the hatch and got injured. The engineer chief was in a rush to respond to passengers when they get on the vessel in Shinojima Port, and forgot about the engine room hatch until he saw the fallen passenger. Port staff let passengers get on the vessel because it was five minutes before departure.	・ When the engineer chief will open the engine room hatch or other entrances, he must put fences or other objects around the hatch for preventing passengers from falling. ・ The master must carry out pre-departure inspection and ensure safety in passenger rooms before passengers get on the vessel. ・ Port staff must not let passengers get on the vessel until directed by a vessel operation leader. ・ The passenger transport carrier must ensure that crew complies with safety management rules.
			Report URL: https://www.mlit.go.jp/jtsb/ship/rep-acci/2021/MA2021-7-23_2020yh0089.pdf	

* The relevant information is posted on the JTSB website.

https://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo19_20210804.pdf

Column

Accident Investigation Conducted by the Marine Accident Investigators

Marine Accident Investigators

On August 11 2021, an accident occurred which involved a Panama registered cargo ship operated by a Japanese shipping company running aground within the Hachinohe Port (outside of the breakwater) in Aomori Prefecture. Following the day of the accident, on August 12, the hull of the cargo ship broke in two, spilling its fuel which caused oil pollution with the fuel oil drifting to the east coast of Aomori Prefecture. The following is information regarding the accident investigation conducted by the marine accident investigators.

The main team of marine accident investigators in charge of the investigation usually consists of three people. Before proceeding with an on-site investigation, the investigation schedule is adjusted to conduct ship crew member interviews and gather information for the ship hull investigation while contacting and enquiring about the accident with the coast guard within the jurisdiction of the sea area where the accident occurred and the vessel's shipping company. In addition to clarifying beforehand what to confirm with the ship crew members and what to be aware of when conducting the ship hull investigation, digital cameras, IC recorders and other necessary equipment that will be used during the on-site investigation is prepared.

For this accident the usual amount of three marine accident investigators were sent to the site of the accident. Investigations including interviews with the crew members and investigation on parts of the cargo ship which drifted and ended up near the harbor were conducted. The interviews with the crew members were conducted in a large, well-ventilated conference room to prevent the spread of COVID-19.

Furthermore, this accident was accompanied by the ship hull broken and its fuel spilled. Therefore, with oil pollution being part of recent social issues, we have also received on-the-move interview from a lot of media such as local TV stations and newspaper reporters during the investigations on site. As a result, the current situation of the the ship hull investigation and a part of the planned investigations such as regarding the analysis of a broken-off piece of the hull's surface, are brought up in certain media including local news broadcasts and local newspapers articles.

Although the investigation of the tail of the ship hull broken in two by this accident has been proven not easy as of now due to the bridge of the ship being under water making investigations aboard the ship and retrieval of documents on board of the ship difficult, we plan to conduct further investigations as the salvage operation progresses. We are also continuing to conduct necessary investigations such as collecting information about the cargo ship and enquiring the ship management company about the vessel. Upon analyzing the information retrieved from these investigations so far, we are planning to investigate the cause of the accident.

A picture of the cargo ship's hull broken in two taken on August 12. The picture was provided by the 2nd Regional Coast Guard Headquarters.

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 2021, we released one issue of "JTSB Digest" (October: Issue No. 37).

The contents of the issue is as follows.

JTSB Digest No. 37 [Marine accident analysis digest] "Toward the prevention of collision accidents of small vessels - Let's use Automatic Identification System (AIS) -" (Published October 26, 2021)

The digest recommends points such as calling for the use of the AIS, and keeping appropriate watch at all times for the prevention of collision accidents especially involving small vessels and pleasure boats, e.g., analyzing actual investigated cases.

- The situations of the occurrences of marine accidents where a person died or went missing
- Investigated accident case: During a return voyage, the fishing vessel was navigating with a blind spot in the bow direction, and collided with another navigating fishing boat
- Investigated accident case: When the fishing vessel continued to navigate, paying attention to fishing, she collided with the other wandering fishing vessel
- Investigated accident case: Two vessels collided with each other without noticing the existence of the other boat during their navigations, keeping their course and speed
- Questionnaire results on the effects of the AIS equipment, etc.

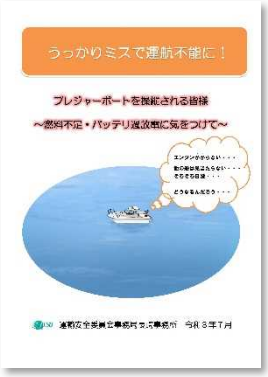
3 Issuance of the Analysis Digest Local Office Edition

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 2021)

Hakodate	**For the prevention of marine accidents in which people fall overboard** (Main contents) · Situation for casualties in accidents involving fishing vessels · Situation for falling overboard · Life jacket wearing status of fallen overboard persons · Situation for locations where accidents occurred · Situation for hitting bodies to ship hulls · Accident cases of falling overboard · Measures to prevent the recurrence of similar accidents

Yokohama	**Situation for occurrence of dragging anchor accidents in Tokyo Bay** (Main contents) · Situation for occurrence of the dragging anchor accidents · Case 1: Unable to ensure sufficient anchor hold power · Case 2: Inappropriate anchoring location · Case 3: Not noticing the dragging anchor of the vessel · Summary: For the prevention of accidents caused by anchors dragged due to typhoons, etc. 
Kobe	**For the prevention of accidents of recreational fishing vessels and fishing ferries!** (Main contents) · Analysis of accidents involving recreational fishing vessels, etc. in the jurisdiction of Kobe Office · Case 1: The recreational fishing vessel collided with the other vessel while navigating, assuming there were no other vessels on her course · Case 2: When the recreational fishing vessel oscillated after riding the wave while navigating, a fishing visitor got injured · Case 3: When fishing visitors were boarding the fishing ferry at the rocky shore, a fishing visitor was caught between the ferry and the rocks and got injured · Points to prevent accidents and mitigate damage 
Hiroshima	**Look around even when the vessel is anchored!!** **- Dangers hidden in wandering and anchored vessels -** (Main contents) · Situation analysis of wandering and anchored vessels · Case in which wandering Vessel Z collided with navigating Vessel Y · For the prevention of similar accidents 

Moji	**J–MARISIS of the Kanmon Straight and the Sea of Hibiki** **- Present situation for small vessel accidents in the Kanmon Straight and the Sea of Hibiki and prevention of reocurrence-** (Main contents) · Situation for occurrence of small vessel accidents in the Kanmon Straight and the Sea of Hibiki · Column: What is the J–MARISIS · Probable causes, measures to prevent the recurrence of similar accidents, and accident cases in the sea area where accidents occur frequently 
Nagasaki	**Vessel operation disabled due to a simple mistake!** (Main contents) · Situation for occurrence of pleasure boat accidents, etc. · Situation for occurrence of disabled vessel incidents (fuel shortage, battery over discharge) · Case 1: The remaining amount of fuel has not been checked · Case 2: The fuel consumption has not been known · Case 3: The fuel reserve tank has not been loaded · Case 4: Multiple electronic devices have been used while the engine was being stopped 
Naha	**Do you know the typhoons and wind changes in Okinawa?** **- Typhoons have more power nowadays and it is hard to forecast their courses, so "Do not try to do operation even under the not-so-serious level of typhoon" -** (Main contents) · Accident case during the approach of the typhoon · Wind types Spring: Wind change in February Summer: South wind of the summer solstice Fall: New north wind Winter: North blow 

Beware of the dangerous north blow in Okinawa!

(Main contents)

- Situation for occurrence of marine accidents or incidents according to the statics data
  Monthly situation for occurrence of marine accident and incidents
  Situation for occurrence of marine accidents with the north wind involved, and more
- Basic knowledge on waves caused by winds
- Situation for occurrence of accidents
  Location where the accident occurred
  Accident cases, and more

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.

Column

Issuance of analysis digest by local office editions, "Typhoons and wind changes in Okinawa" and "Beware of the dangerous north blow in Okinawa!"

Naha Office, Secretariat

In Okinawa located in the area of passing typhoons, powerful typhoons approach or strike Okinawa almost every year, seriously impacting vessel operations. In August 2020, an accident occurred with a fishing vessel capsized and three crew members gone missing occurred while a typhoon was approaching. Moreover, many marine accidents occurred in winter according to the statistics even though Okinawa is strongly imaged with the summer sea. In three capsizal accidents and one grounding accident occurred sequentially in the short period between December 2020 to January 2021, it was revealed that the northward wind was the cause.

At the Naha Office, staff members have been exchanging opinions based on the tendency of the occurrences of marine accidents and characteristics of the sea area around Okinawa to decide on topics to be addressed in the local office digest to prevent the recurrence of similar accidents. For FY 2021, the members selected "typhoons" and "the north wind" for analysis topics, given the situations mentioned above.

To create the "Typhoons and wind changes in Okinawa" with typhoons selected as the theme, we had interviews with fishermen and the members of fishery cooperatives in Okinawa on the tendency of typhoons nowadays and the measures for typhoons. In particular, a very powerful typhoon struck the area of Daito Islands in September 2020. We were able to interview them immediately after the typhoon passed, allowing us to obtain valuable opinions, including information on their on-site troubles and the size of the impact of the typhoon. The opinions and the information helped us not only create the local office digest but also contribute to future accident investigations.

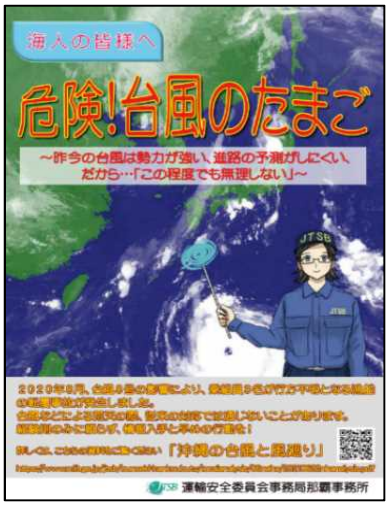
Providing explanation to the press

Regarding the "Beware of the dangerous north blow in Okinawa!" with the north wind selected as the topic, among 730 investigation reports of accidents and incidents created and published at Naha Office in the period from October 2008 when the Japan Transport Safety Board was established to September 2021, 84 accidents involving the north wind were analyzed on weather, wind power,

type of vessel, gross tonnage and the tendency of each accident type. Furthermore, the accident cases and the basic knowledge on the winds and waves are also included in its Digest to pay attention for when navigating the sea of Okinawa in winter.

The JTSB puts effort into making the issuance of the local office digest be noticed not only by on-shore persons concerned but also by persons who operate vessels at sea as directly as possible by creating and handing out posters to the people in fishery cooperatives, marinas and fisharinas, etc. In addition, we provided the opportunity to explain the content of the local office digest at the local press club and notified through news and newspaper articles.

Seasonal winds such as typhoons and the north wind are generated whenever the season comes every year, no one can avoid such natural phenomena, so the JTSB is planning to use such local office digests for dissemination activities to prevent marine accidents.



Posters for dissemination

Column

Use of the "J–MARISIS" to easily understand the "difficult parts of the sea"

Moji Office, Secretariat

In July 2020, a pleasure boat collided with the breakwater at the entrance of Dokai Bay in Kita-Kyushu City, Fukuoka Prefecture. The investigation result revealed that the probable cause was that the master kept navigating the boat without knowing the existence of the breakwater nor knowing that she was approaching the breakwater in the night when it was hard to see the breakwater.

Moreover, four collision accidents occurred already at the breakwater since the JTSB was established, and they occurred in the similar situation as this accident without noticing they were approaching the breakwater in the night or before dawn when the breakwater was hard to see.

If the master had known that it was a place with higher hazard of collision with the breakwater because four accidents, this accident could had been avoided by carefully navigating the boat after confirming the location of the breakwater in advance or while confirming her location using a GPS plotter.

Thus, the JTSB decided to post information for calling attention in the "J–MARISIS" to let persons related to pleasure boats, etc. know that "the vicinity of the breakwater is dangerous and is a 'difficult point of the sea' from the standpoint of the situation for the occurrence of the accidents" in an easy-to-understand manner.

Indicating the "difficult point of the sea from the standpoint of the accidents" is also one of the original purposes of the "J–MARISIS."

Moreover, since it was revealed that the jurisdiction of Moji Office had sea areas where many other accidents occurred, the JTSB considered information for calling attention to five sea areas, including this breakwater, in the Kanmon Straight and the Sea of Hibiki, and posted the information on the "J–MARISIS."

Furthermore, in addition to the information for calling attention, the JTSB published the situation for occurrence of accidents in this sea area and the summarized accident cases as the local office digest.

When selecting sea areas and considering information for calling attention, we paid attention to the following:

○ Selection of sea areas

In the sea areas where many accidents occurred, measures such as installing beacons have already been taken by the relevant administrative organs, etc. For the sea areas where no accident has occurred recently, the JTSB examined its reasons to help select the sea areas.

○ Information for calling attention

The JTSB decided to describe characteristics of sea areas, if any, to make persons concerned understand "why is this sea area dangerous."

In addition, the JTSB we considered the opinions of persons related to small vessels and marine leisure when selecting sea areas and creating the contents that call for attention.

The JTSB will proceed with considering information for calling attention to "difficult points in the sea" of other sea areas (the Sea of Genkai, West Kyushu, and South Kyushu) as well as putting effort to disseminate these items of information for calling attention in cooperation with persons concerned.

4 Issuance of the JTSB Annual Report

In order to publicize the JTSB's general activities in 2020 and prevent the occurrence of accidents based on what was learned in past accidents, the JTSB issued the "JTSB Annual Report 2021" in July 2021.

As part of our efforts to provide information overseas, we issued the English version of the report "Japan Transport Safety Board Annual Report 2021" in December 2021. 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 2021, we prepared a leaflet summarizing examples of utilization in order to disseminate information on the Small ship - Engine Trouble Search System to many people when the system was published.

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.

For the safe navigation of recreational fishing vessels and fishing vessels
– Prevention of accidents and incidents involving an engine trouble

Leaflet for disseminating the Small ship - Engine Trouble Search System

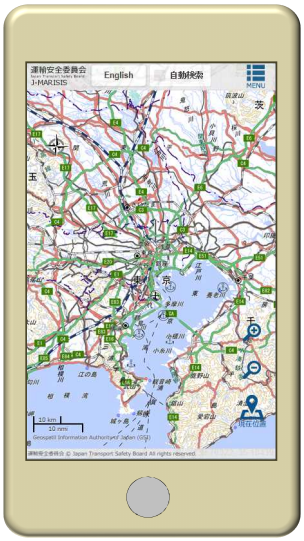
6 J–MARISIS – Now even easier to use

So that more effective use can be made of published marine accident investigation reports, the Japan Transport Safety Board began providing the Japan-Marine Accident Risk and Safety Information System (J -MARISIS) as an Internet service from the end of May 2013, allowing users to search reports from maps. In April 2014, we also released the global version of J-MARISIS, further allowing users to search investigation reports published by overseas marine accident investigation organizations from world maps.

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.

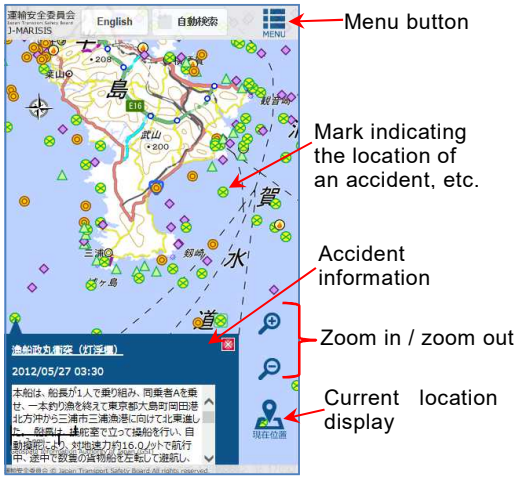
With touch panel support as well as revised display buttons and layouts, its ease of use has been increased, and the GPS functions of mobile terminals can be used to display information on areas near the user's current location. As a result, users on pleasure boats, recreational fishing boats or other 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.

The Japan Transport Safety Board welcomes your views, requests and other comments/communication from users of J-MARISIS.

Please use the "Contact us" section of our website.

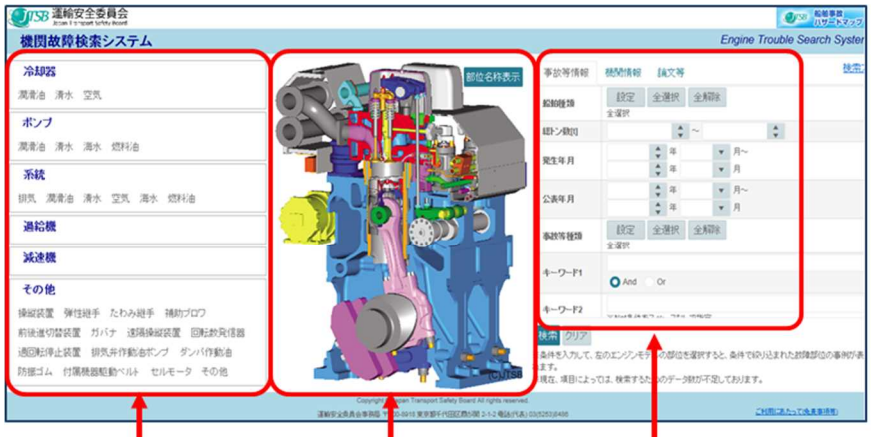
Contact us https://www.mlit.go.jp/jtsb/toi.html

7 Engine Trouble Search System ～ Easy Search with Click ～

The Japan Transport Safety Board (JTSB) 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.

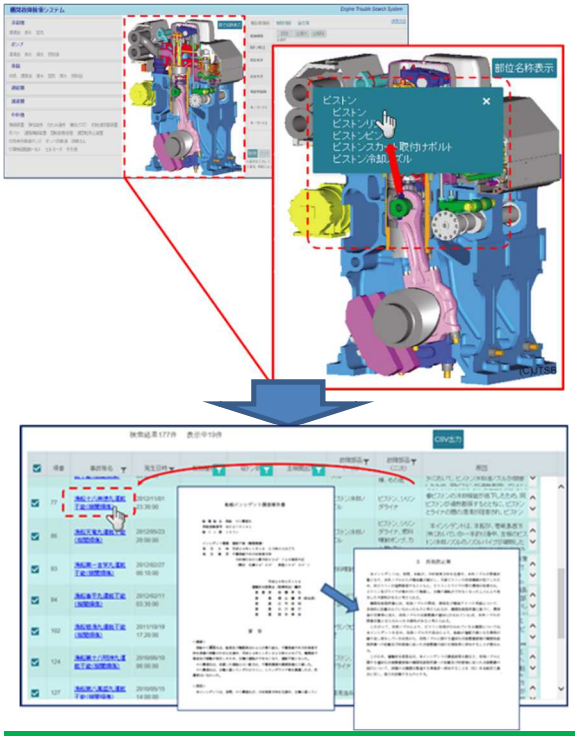
ETSS is designed to search for marine accidents and incidents from engine failure parts and parts, and to use reports that are appropriate for the purpose of use. You can use ETSS free of charge other than internet communication fees.

Engine Trouble Search System https://jtsb.mlit.go.jp/hazardmap/etss/



You can look at it from the place, the appearance, or the condition

<Usage Example>
As part of the engine was overheated, select the place (piston part) and investigate the case of trouble



① When you select the piston part in the appearance view, the part related to the piston part is displayed in more detail. Select to display a list of related reports.
② If the number of cases is large, it can be narrowed down by ship type, gross tonnage, output, damaged parts, cause, etc. By selecting "fishing boat," a gross tonnage of "1 - 20 tons," and an output of "400 - 500", and refine your research, the phrase "The cooling function was deteriorated, and the piston of the equipment expanded due to overheating." was discovered.
③ You can find and use reports that may be relevant.

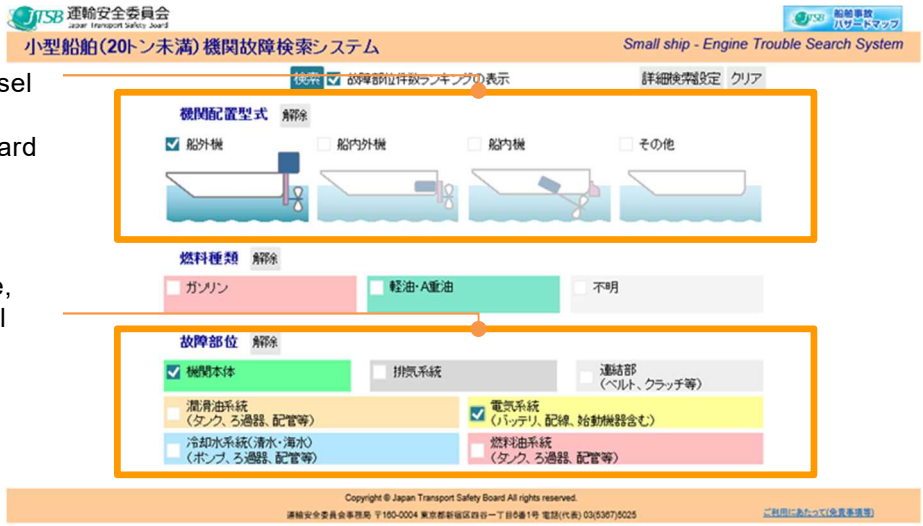
8 Small ship - Engine Trouble Search System ～ Easy search of small vessel engine trouble ～

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 more than 60% of the overall marine accidents and incidents handled by the JTSB. Among them, many cases are involved with crippled vessels from failure in handling, maintaining engines, and so on.

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 inspection 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 inspections for assumed engine failure, etc.

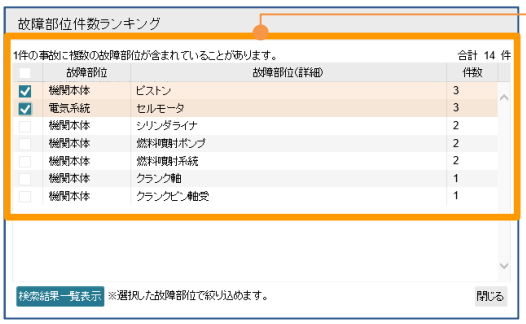
<Usage Example>
When searching an accident involving an engine itself and an electrical system in the engine layout of your vessel



Select a typel of your vessel in the **"Engine layout model"** field (here, outboard motor))

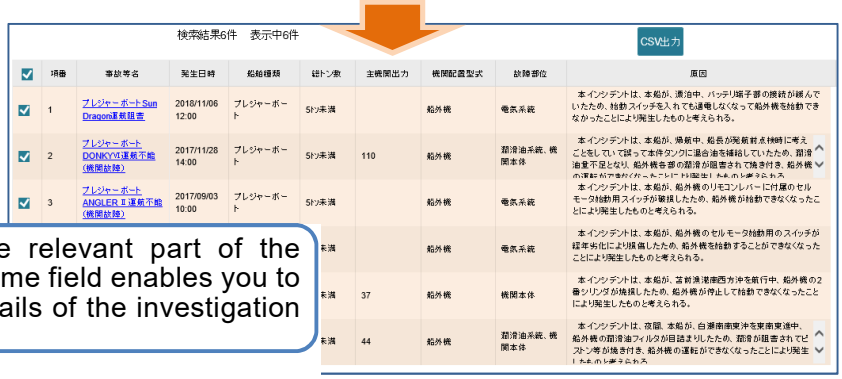
Select failure part you are concerned with in the **"Failure parts"** field (here, Engine itself and Electrical system)

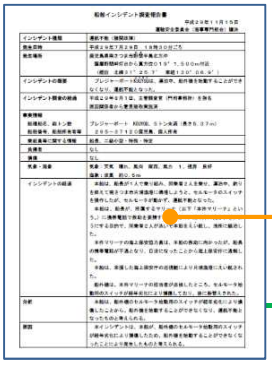
Click the 検索 button



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

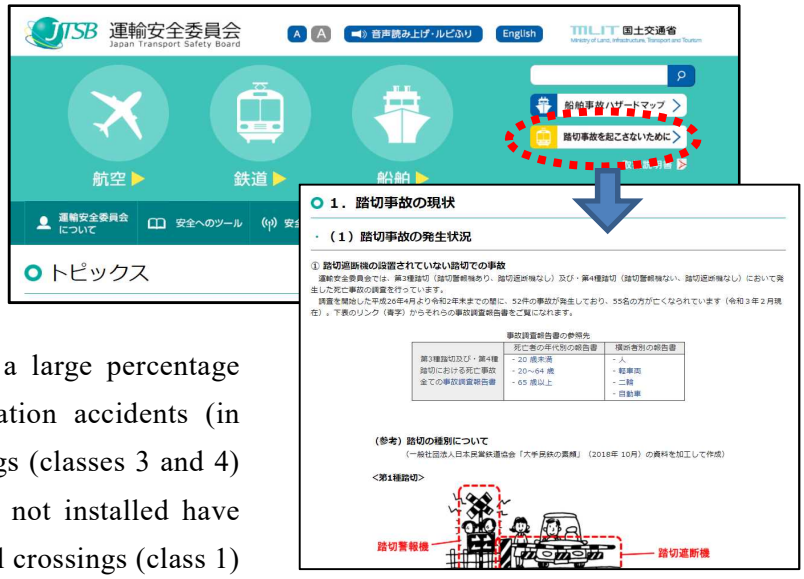




Clicking the relevant part of the accident name field enables you to see the details of the investigation report.

9 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 established the webpage, entitled "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 (34.2%) of the overall railway operation accidents (in FY2021). 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 have 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 please refer to them to reduce level crossing accidents. (See Chapter 4 (page 91).)

10 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 mitigating damage from aircraft, railway, and marine accidents. Members of the staff 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 Japan Transport Safety Board website.

https://www.mlit.go.jp/jtsb/demaekouza.html

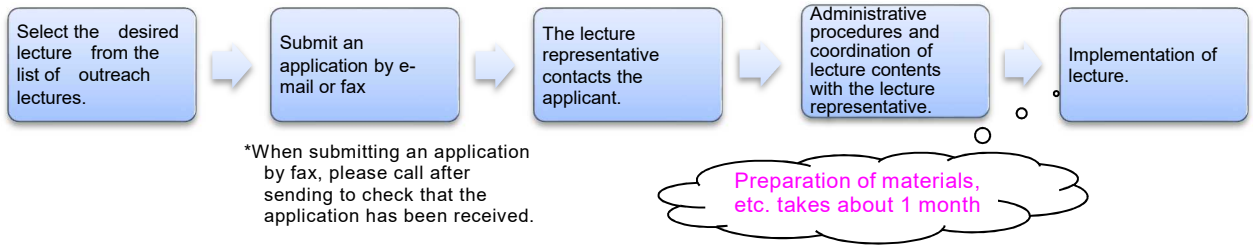
List of outreach lectures

No.	Course	Main audience	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 Japan Transport Safety Board
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 of regional offices (marine accident-related) [each	General (High school students and older),	Explanations on each topic regarding analysis digests from regional offices. *Lists can be found by clicking the link below.

	regional office in Hakodate, Sendai, Yokohama, Kobe, Hiroshima, Moji, Nagasaki, and Naha]	maritime businesses, etc.	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



11 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 2021, information on accident investigation and other matters was provided to 78 persons, including the 17 cases of aircraft/railway/marine accidents.

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

Column

Information dissemination for preventation of collision accident of small vessels

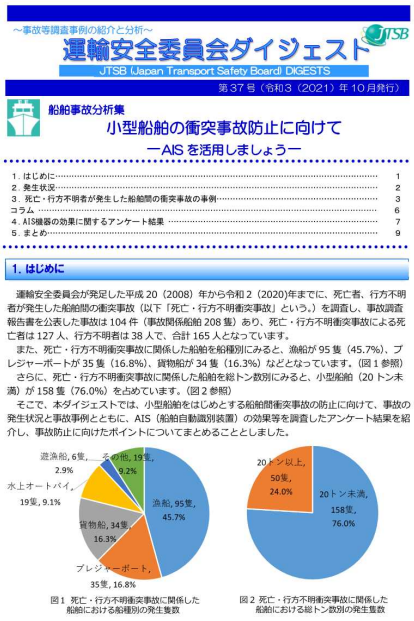
Accident Prevention Analyst

The Japan Transport Safety Board not only investigates aircraft, railway, and marine accidents and incidents and causes of their damage, but also comprehensively analyzes investigation reports and data accumulated to date, and recommends various safety measures in the "JTSB Digests."

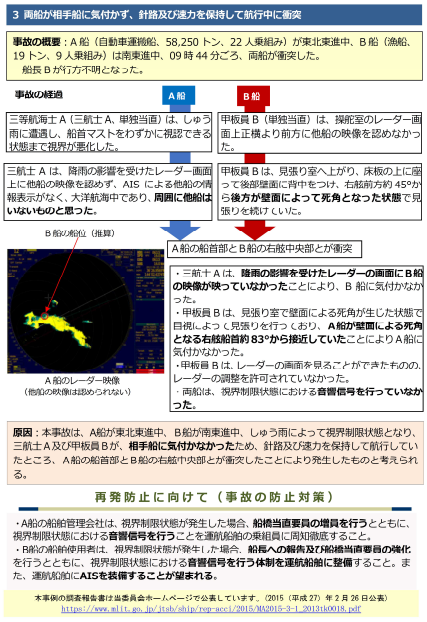
Most recently, in October 2021, the JTSB issued the JTSB Digest No. 37, "Toward prevention of collision accidents of small vessels - Use Automatic Identification System (AIS) -" for the purpose of preventing collision accidents of small vessels and pleasure boats, which have occurred many times. In the Digest No. 37 the JTSB summarizes and analyzes actual cases callected from collision accident investigations on small vessels and pleasure boats, and recommends points for the prevention of collision accidents, e.g., calling for keeping appropriate watch all the time.

In addition, the JTSB held a questionnaire survey on the effect of the AIS. The digest includes the survey responses of vessel owners who use the simplified AIS, e.g., "The AIS makes us feel less afraid when other vessels are approaching" and "The AIS is useful for preventing collisions," to call for using the AIS to people concerned, and also introduces the situations of the demonstration experiments of a function to issue an alert for avoiding a collision using a smart phone application, which have been conducted by the Fisheries Agency.

The JTSB will continuously recommend measures that are useful for preventing accidents in an easy-to-understand manner and introduce related activities through issuing the JTSB Digests.



The JTSB Digest No. 37



The page introducing an investigated accident case

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 2021.

2 International conferences under the COVID-19 pandemic

Most international conferences are being held virtually (on the Web) as a result of the COVID-19 pandemic. Some of the international conferences that the JTSB was scheduled for participation in were canceled or postponed, but many were held virtually. Because they were held virtually, their agendas were altered and time allotments shortened but information was shared among the participating countries, regarding impact and restrictions on investigation activities and how they were handling under the COVID-19 pandemic. Web conferences were sometimes held during daytime in Europe, so other countries had to participate at night due to international time differences. Sometimes the participants

from the JTSB also attended at night from 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, Air Navigation Commission (a supporting body of the Council), the subordinate bodies of the Council (such as Legal Committee, Air Transport Committee, Committee on Joint Support of Air Navigation Services, and Finance Committee), secretariat and regional offices. In addition, Air Navigation Conferences, Regional Air Navigation meetings, a variety of working groups and panel meetings, which are called in for certain projects. As of October 2021, 193 states are members of ICAO.

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 Civil Aviation Committee, is mainly a forum for discussion on the revision of Annex 13 and the preparation of guidance materials. The JTSB has participated as a member since the fourth meeting held in May 2018. The 6th Accident Investigation Panel Meeting (AIGP/6) was held virtually in May 2021 and JTSB aircraft accident investigators participated in the meeting. Regarding the working groups (WG) established under the panel, JTSB is newly participating in the " UAS (Unmanned Aircraft System) investigation WG" in addition to the " Safety Recommendation of Global Concern 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 9th Meeting of the Asia Pacific Accident Investigation Group (APAC-AIG/9) scheduled for October 2021 in Papua New Guinea was held on the Web. A JTSB aircraft accident investigator participated in the meeting, and discussed tasks in accident/incident investigations while taking into account the characteristics of the Asia-Pacific region. They also discussed measures for improving the investigative ability 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 2021, 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 7th session of the Sub-Committee on Implementation of IMO Instruments (III 7) was held virtually in July 2021. 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

① Chairperson 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 2021, 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.

Due to the COVID-19 pandemic, a meeting scheduled for May 2021 in Sydney, Australia was canceled. However, meetings were held on the Web in February, May, and October to exchange information related to efforts towards accident investigations in this pandemic. JTSB's Chairperson Takeda and other board members participated in these meetings. At the meeting held in February, the Transportation Safety Board of Argentina (JST) was approved to join the ITSA. At the meeting held in May, JTSB's board member Tamura made a presentation regarding a collision accident investigation report involving three container ships to share information on our efforts to quantify the evaluation and analysis of marine collision risks. (See "Major activities in the past year" on page 7)

② International 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 2021 annual seminar was held virtually. This seminar provided five keynote speeches and 32 presentations. JTSB's aircraft accident investigator participated in the seminar and introduced details analyzed from the viewpoint of a human factor (maintenance) on a ground impact accident of a helicopter.

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.

③ Accident Investigator Recorder (AIR) Meeting

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 AIR meeting scheduled for 2021 in Hampshire, UK was postponed due to the COVID-19 pandemic.

④ Marine 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 forum scheduled for November 2021 in Lima, Peru was postponed due to the COVID-19 pandemic. In May and November, a Web conference for reporting inter-forum progress was held and JTSB marine accident investigators and othermembers participated.

⑤ Marine 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 forum scheduled for 2021 in Shanghai, China was postponed due to the COVID-19 pandemic.

(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.

In March 2021, the JTSB investigated the case of the privately-owned Aerospatiale AS350B (rotorcraft) damaged due to forced landing in the vicinity of the rice field in Aoki Village, Chiisagata District, Nagano Prefecture with cooperation of the French aircraft accident investigation authority, the BEA (France is the State of Design and Manufacture.)

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.

Among the marine accidents that were targeted by the JTSB in 2021, JTSB notified the accident investigation agencies in the related flag states of occurrences of two marine serious accidents involving ships engaged in international voyages.

In May 2021, the JTSB investigated the case of the collision between cargo ship BYAKKO and chemical tanker ULSAN PIONEER in Kurushima Strait with cooperation of the accident investigation authority of Marshall Islands, which are the flag state of the tanker.

Among the marine accident and incident investigation reports that were published in 2021, JTSB sent eight draft reports to the flag states and other interested states upon request in order to invite their comments.

5 Technical cooperation

The JTSB supports human resources development such as providing training sessions for railway accident investigators upon request from countries and regions where a large-scale railway accident has occurred.

Until now, the JTSB has actively been participating in technical cooperation projects of the Japan International Cooperation Agency (JICA), e.g., "the Project for Capacity Development on Indian Railway Safety" launched in 2018, and also contributing to the improvement of railway safety by providing Japan's railway accident investigation methods to the other country.

In order to promote the international development of the infrastructure system, which is the government's important growth strategy, the "MLIT Action Plan 2021 for the Overseas Development of Infrastructure Systems," that compiles the main policy to be addressed and main projects to closely observe from now on in the fields of land, transportation, and tourism states that "supports efforts related to technology transfer and human resources development, etc. in order to enable the other country itself to maintain, manage, and operate its railways appropriately." These technical cooperqation are efforts that also contribute to promoting the international development of Japan's railway system, which our government has devoted effort.

6 Participation in overseas training

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.

Every year, the JTSB dispatches aircraft and marine accident investigators to Cranfield University (UK) for accident/incident investigation training (see the Column on page 55). JTSB decided to cancel participation in the course in 2021 due to the difficulty of sending accident investigators under the COVID-19 pandemic.

Appendices

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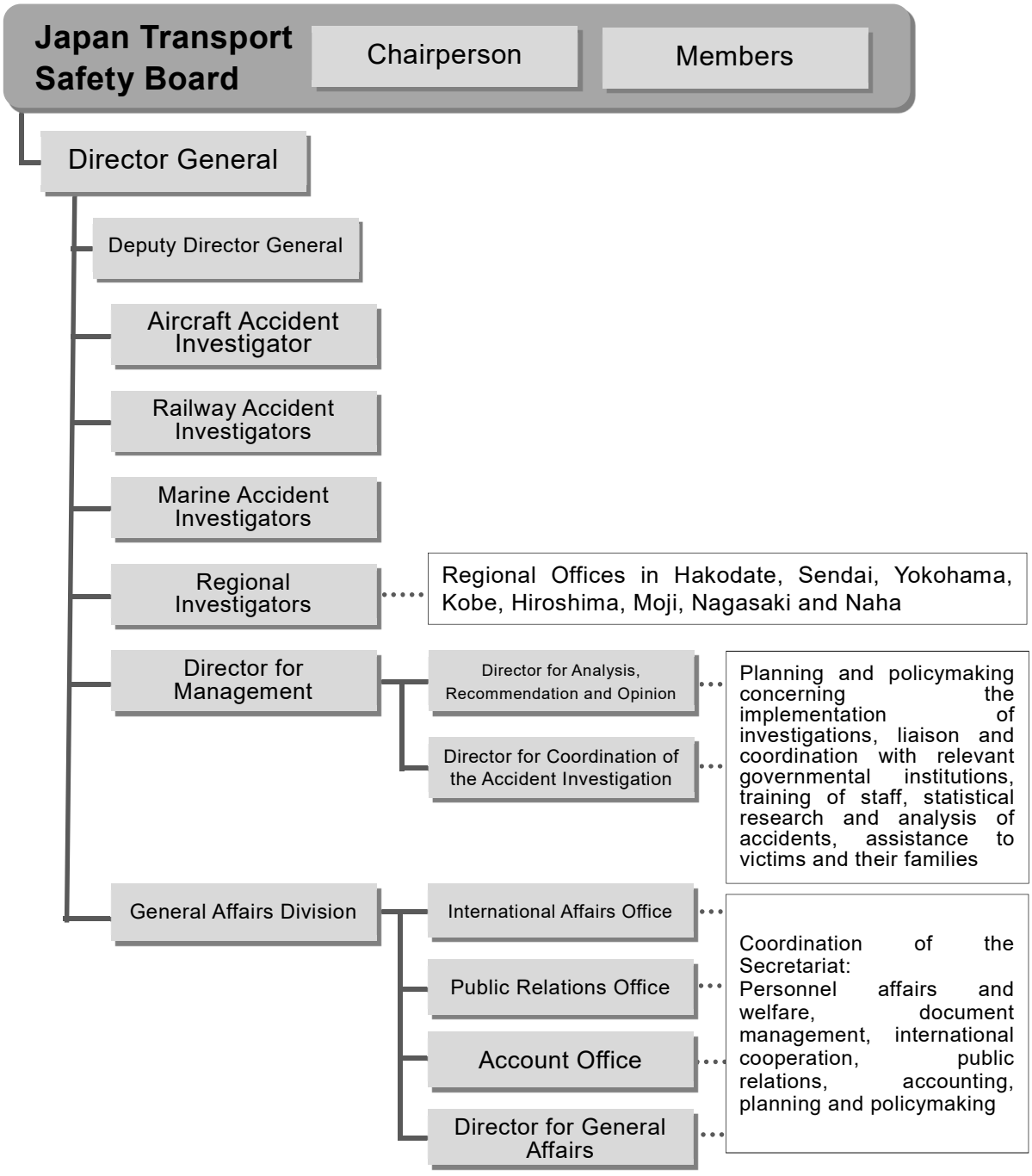
1 Outline of the organization

The Japan Transport Safety Board consists of the Chairperson, 12 members, and 182 secretariat staff (as of March 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.

Organization Chart

March 1, 2022



2 Board Members

As of March 1, 2022

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)

KAKISHIMA Yoshiko, Member (Full-time)

KAKISHIMA Yoshiko was appointed as a member on April 1, 2019; belongs to the Aircraft Committee, the Railway Committee and the Marine Committee, with special expertise in Anglo-American law and others.

Career summary: Graduated from the Department of Law, the University of Tokyo

Former Professor in Graduate Schools for Law and Politics, Faculty of Law, The University of Tokyo

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)

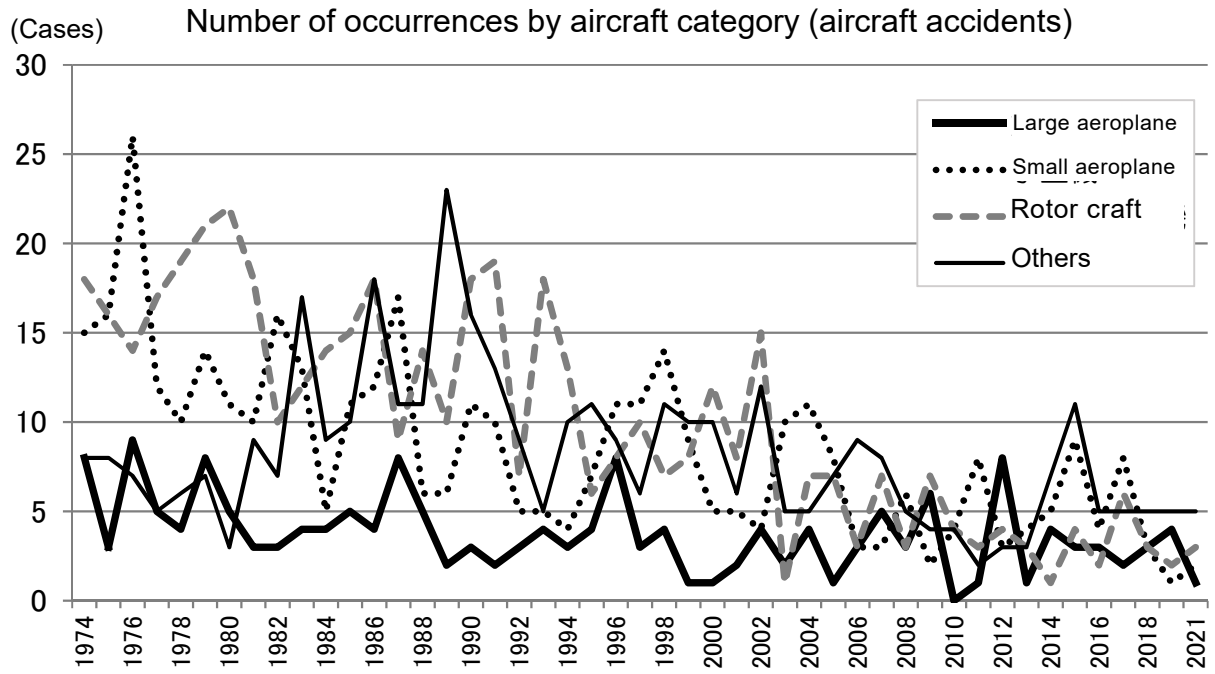
(Cases)

Category / Year of occurrence	Aircraft			Rotor craft		Glider	Airship	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

(Cases)

Category / Year of occurrence	Aircraft			Rotor craft		Glider	Airship	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	5	3	0	0	0	13
2021	1	2	2	3	0	3	0	11
Total	180	396	178	444	25	210	2	1,435

(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.



4 Number of fatalities in accidents (aircraft accidents)

(Persons)

Year of occurrence \ Category		Aircraft			Rotor craft		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			Rotor craft		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	
	Crew	2	13	9	29	1	8	62	99
	Passengers and others	0	11	1	22	0	3	37	
	Total	2	24	10	51	1	11		

(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.

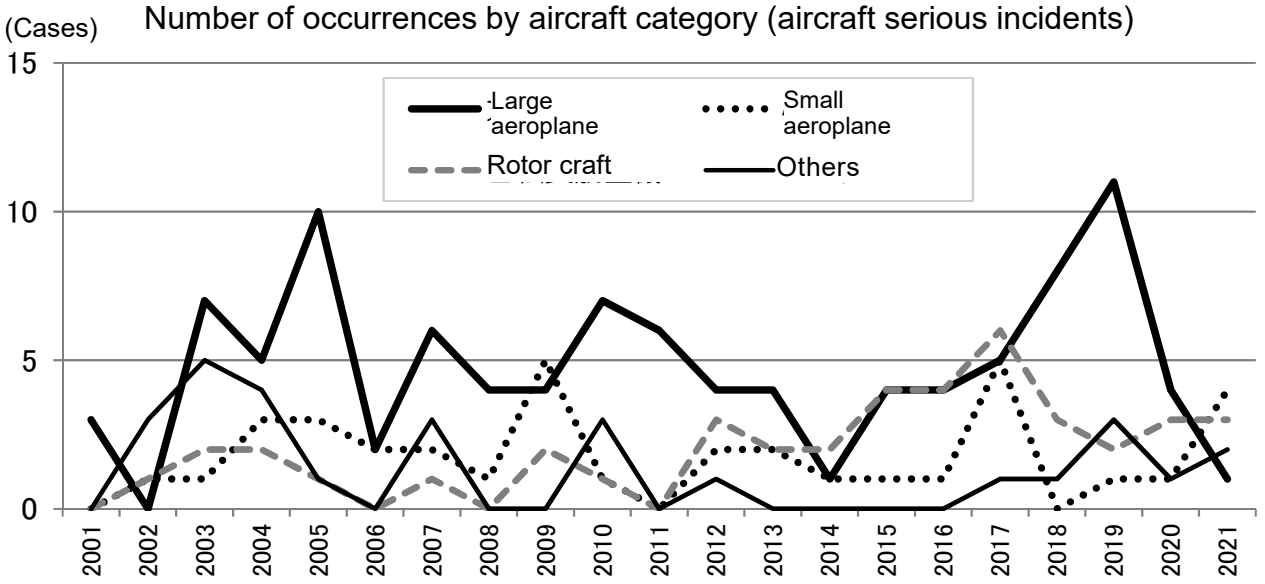
5 Number of occurrences by aircraft category (aircraft serious incidents)

(Cases)

Year of occurrence \ Category	Aircraft			Rotor craft		Glider	Airship	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
2006	2	2	0	0	0	0	0	4

Category / Year of occurrence	Aircraft			Rotor craft		Glider	Airship	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane			
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	11	1	0	2	0	3	0	17
2020	4	1	1	3	0	0	0	9
2021	1	4	1	3	0	1	0	10
Total	100	37	18	42	0	10	0	207

(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.



6 Number of occurrences by type (railway accidents)

(Cases)

Type / Year of occurrence	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
Total	7	209	13	70	0	15	3	1	9	0	0	3	0	0	330

(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
Total	0	2	68	70

(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.

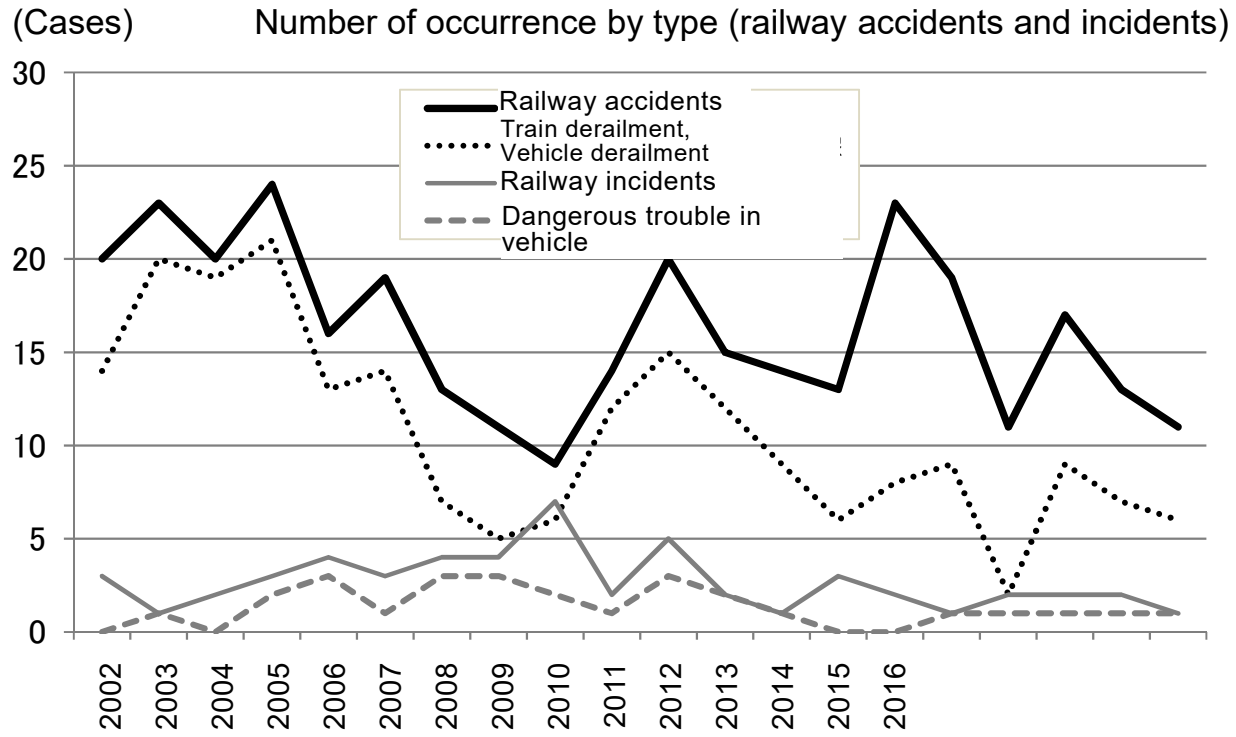
8 Number of occurrences by type (railway serious incidents)

(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 for construction	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

Year of occurrence \ Type	Railway										Tramway							Total
	Incorrect management of safety block	Incorrect indication of signal	Violating red signal	Main track overrun	Violating closure section for construction	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	
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
Total	1	7	0	1	7	2	3	27	0	3	3	1	0	0	0	0	0	55

(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	308	906	38	82	1,334
2011	239	780	28	79	1,126
2012	227	804	31	53	1,115
2013	215	763	35	69	1,082
2014	193	762	31	44	1,030
2015	154	673	44	39	910
2016	147	636	43	23	849
2017	154	671	35	47	907
2018	194	731	38	47	1,010
2019	217	757	52	35	1,061
2020	176	639	36	17	868
2021	148	660	29	15	852
Total	2,940	10,426	489	687	14,542

(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 accident											Marine incident				Total
	Collision	Contact	Grounding	Sinking	Flooding	Capsizing	Fire	Explosion	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	3
2008	181	101	255	12	4	28	15	3	30	61	0	54	34	8	87	873
2009	325	174	431	16	19	58	42	3	38	217	2	105	33	0	59	1,522
2010	356	180	369	15	18	50	35	2	26	146	0	83	16	0	38	1,334
2011	282	145	265	12	18	56	32	1	23	142	1	103	10	1	35	1,126
2012	246	133	264	5	21	55	44	2	33	155	0	113	5	4	35	1,115
2013	264	145	210	10	25	49	33	2	38	163	2	106	7	3	25	1,082
2014	265	116	213	7	11	61	35	1	37	150	3	92	15	0	24	1,030
2015	244	102	202	5	12	56	38	3	20	122	1	85	4	4	12	910

Type / Year	Marine accident											Marine incident				Total
	Collision	Contact	Grounding	Sinking	Flooding	Capsizing	Fire	Explosion	Facility damage	Fatality / Injury	Others	Loss of control	Stranded	Safety obstructio	Navigation obstruction	
2016	217	94	163	5	19	46	26	3	21	144	0	85	6	6	14	849
2017	200	96	181	14	22	55	27	3	23	144	0	115	4	3	20	907
2018	253	90	182	22	26	57	25	2	29	182	0	119	10	0	13	1,010
2019	215	101	200	11	25	65	31	1	42	146	0	181	22	0	21	1,061
2020	188	95	155	13	15	51	29	2	21	134	0	140	14	1	10	868
2021	183	77	158	3	39	71	25	3	34	115	0	127	13	0	4	852
Total	3,419	1,650	3,250	150	274	758	437	31	415	2,021	9	1,508	193	30	397	14,542

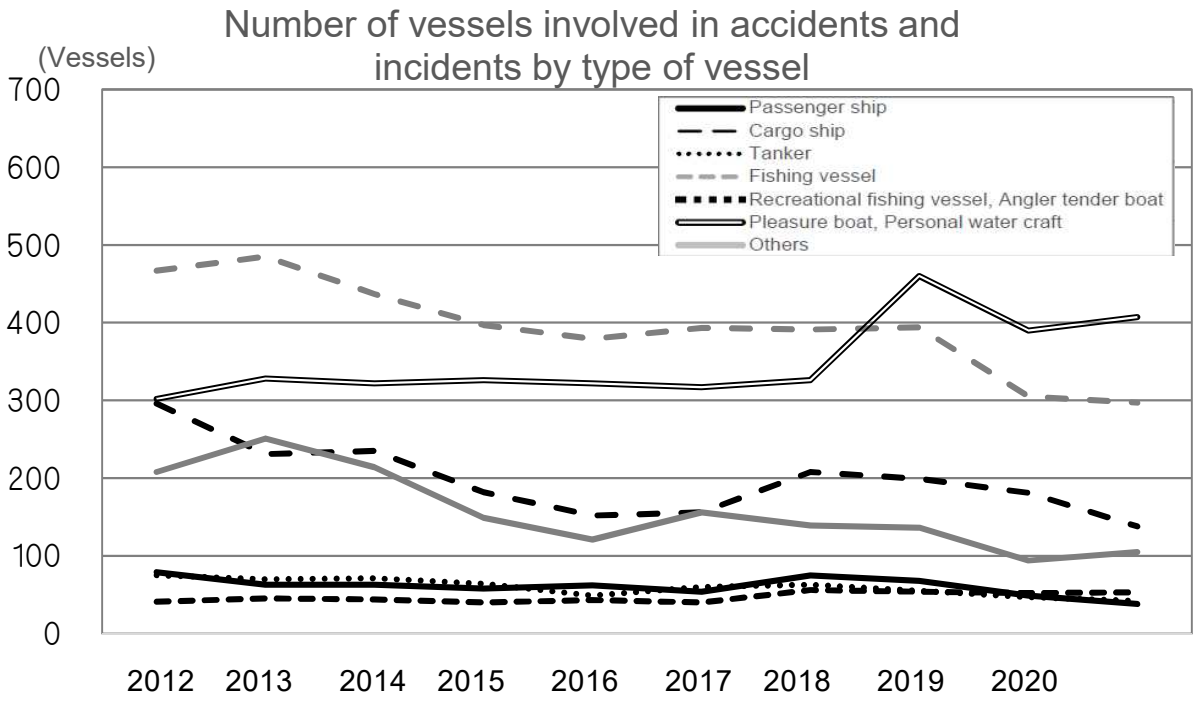
(Note) 1. The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of December 2021 (including those carried over from the former Marine Accident Inquiry Agency).

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 vessel	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	60	11	125	31	7	1,128
2009	103	480	83	605	163	39	5	35	104	40	249	65	23	1,994
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	63	231	70	485	100	41	4	37	72	24	264	64	18	1,473
2014	63	235	71	437	89	39	5	36	58	17	253	69	14	1,386
2015	58	182	64	397	53	33	7	27	45	14	278	48	10	1,216
2016	62	152	49	379	45	36	7	27	33	11	254	68	5	1,128
2017	55	156	60	393	62	37	3	29	45	12	275	42	8	1,177
2018	79	224	65	411	55	51	8	22	37	14	286	60	18	1,330
2019	69	203	57	395	50	47	6	29	33	10	412	46	15	1,372
2020	49	181	47	306	35	50	2	14	22	10	334	56	13	1,119
2021	38	138	42	297	29	49	4	30	20	12	349	58	14	1,080
Total	942	3,480	948	5,938	1,082	574	77	426	720	229	3,827	774	192	19,209



(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	112	65	32	18	27	22	19	50	1,216
2016	745	31	64	104	61	23	17	21	18	10	34	1,128
2017	757	39	80	116	69	24	14	22	17	6	33	1,177
2018	840	35	83	127	83	48	31	18	17	12	36	1,330
2019	928	31	46	130	68	28	20	34	11	14	62	1,372
2020	759	24	47	124	54	21	6	27	13	14	30	1,119
2021	716	24	34	84	47	15	20	14	14	14	98	1,080
Total	11,129	656	1,437	2,242	1,127	450	309	403	259	213	984	19,209

(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).

13 Number of vessels involved in accidents and incidents in 2021 by type of accident/incident and type of vessel (marine accidents and incidents)

(Vessels)

Type of accident /incident / Type of Vessel	Marine accident											Marine incident				Total
	Collision	Contact	Grounding	Sinking	Flooding	Capsizing	Fire	Explosion	Facility damage	Fatality / Injury	Others	Loss of control	Stranded	Safety obstruction	Navigation obstruction	
Passenger ship	10	11	7	0	0	0	0	0	1	3	0	2	0	0	4	38
Cargo ship	56	28	30	0	4	1	2	0	7	4	0	4	2	0	0	138
Tanker	16	8	5	0	1	0	0	0	3	3	0	4	2	0	0	42
Fishing vessel	120	7	39	2	11	22	17	0	3	58	0	16	2	0	0	297
Tug boat, push boat	9	5	6	0	0	1	1	0	3	3	0	1	0	0	0	29
Recreational fishing vessel	29	3	6	0	1	0	2	0	1	2	0	5	0	0	0	49
Fishing ferry	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	4
Work vessel	6	2	7	0	1	4	1	1	0	6	0	2	0	0	0	30
Barge, lighter	5	6	3	0	0	0	1	0	4	1	0	0	0	0	0	20
Public-service ship	2	2	5	0	0	0	0	0	0	3	0	0	0	0	0	12
Pleasure boat	89	8	47	1	20	41	5	1	18	23	0	89	7	0	0	349
Personal water craft	29	3	4	0	0	2	0	1	0	16	0	3	0	0	0	58
Others	5	1	4	0	1	0	1	0	0	1	0	1	0	0	0	14
Total	378	84	164	3	39	72	30	3	40	123	0	127	13	0	4	1,080

(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 2021.
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	

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	
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	
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	88
	Passengers	0	0	0	0	1	0	0	1	
	Others	1	0	0	1	0	18	4	24	
2019	Crew	0	16	0	57	1	11	1	86	102
	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	86
	Passengers	0	0	0	0	2	0	0	2	
	Others	0	2	0	0	0	11	4	17	
2021	Crew	0	1	1	42	0	18	2	64	74
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	0	0	0	0	8	1	9	

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	
Total	Crew	16	86	29	883	8	198	63	1,283	1,565
	Passengers	7	0	0	0	22	0	0	29	
	Others	3	21	1	13	2	188	25	253	
	Total	26	107	30	896	32	386	88		

(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).

15 Numbers of issued recommendations, opinions and safety recommendations

Year \ Type and mode	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	2	-	1	-	-	3
Total	18	6	19	6	6	17	11	32

(Note) These were issued after the establishment of the JTSB in October 2008.

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