Annual Report 2018

JTSB Japan Transport Safety Board

JTSB Mission

We contribute to

- preventing the occurrence of accidents and
- mitigating the damage caused by them,

thus improving transport safety while raising public awareness, and thereby protecting the people's lives by

- accomplishing appropriate accident investigations which thoroughly unveil the causes of accidents and damages incidental to them, and
- urging the implementation of necessary policies and measures through the issuance of safety recommendations and opinions or provision of safety information.

JTSB Principles

1 Conduct of appropriate accident investigations

We conduct scientific and objective accident investigations separated from apportioning blame and liability, while deeply exploring into the background of the accidents, including the organizational factors, and produce reports with speed. At the same time, we ensure that the reports are clear and easy to understand and we make efforts to deliver information for better understanding.

2 Timely and appropriate feedback

In order to contribute to the prevention of accidents and mitigation of the damage caused by them, we send messages timely and proactively in the forms of recommendations, opinions or factual information notices nationally and internationally. At the same time, we make efforts towards disclosing information in view of ensuring the transparency of accident investigations.

3 Consideration for victims

We think of the feelings of victims and their families, or the bereaved appropriately, and provide them with information regarding the accident investigations in a timely and appropriate manner, and respond to their voices sincerely as well.

4 Strengthening the foundation of our organization

We take every opportunity to develop the skills of our staff, including their comprehensive understanding of investigation methods, and create an environment where we can exchange opinions freely and work as a team to invigorate our organization as a whole.

A Message from the Chairman
on the 10th Anniversary of the Japan Transport Safety Board

The Japan Transport Safety Board (JTSB) will mark the 10th anniversary of its foundation in October 2018 since it was established as a merger of the Aircraft and Railway Accidents Investigation Commission and a part of the Japan Marine Accident Inquiry Agency for identifying the causes of accidents. Since its establishment, the JTSB has made utmost organization-wide efforts to further enhance transportation safety and protect the life and living of people by conducting investigations immediately after accidents or serious incidents in the traffic fields of "aviation," "railway" and "marine," greatly related to the daily lives of people, and determining their causes to prevent the recurrence of accidents and incidents.

As a specific program, the JTSB had released 10,738 investigation reports by March 2018 since its foundation. Among recent examples, the JTSB released a report on a light plane crash into private houses in Chofu, Tokyo (which occurred in July 2015), in July 2017, a report on the derailing of a bullet train from the tracks of the Kyushu Shinkansen Line (which occurred in April 2016) in the wake of the Kumamoto Earthquake in November 2017, and a report on the capsizing of the crab-fishing boat Daifuku-maru (which occurred in December 2016) in November 2017.

To enhance transportation safety, the JTSB gives recommendations, safety recommendations or opinions on the occasion of releasing reports to heads of administrative agencies and parties relevant to the causes of accidents and incidents when it finds policies or measures necessary to prevent the recurrence thereof and reduce damage. Since its establishment until March 2018, the JTSB has issued 31 recommendations, 33 safety recommendations and 22 opinions. Administrative agencies and parties relevant to the causes of accidents and incidents have taken reform and other measures based on them.

In the meantime, however, many major and minor accidents and incidents have frequently occurred. Accidents and incidents, which drew strong social attention, occurred in 2017, such as "a fire helicopter's crash in Nagano Prefecture (in March)," "a serious incident involving a bullet train of West Japan Railway Company's Tokaido-Sanyo Shinkansen Line (in December)" and "a collision between a U.S. naval Aegis-guided destroyer and a Philippine-flagged container ship (in June)."

Taking those situations into account, the JTSB has steadily implemented and reviewed the Duties Improvement Action Plan, compiled in March 2012, to review its work, and has enhanced and upgraded investigations into accidents and incidents to accurately and promptly determine their causes. Based on the timely and appropriate transmission of information based on knowledge gained through the progress, the JTSB has striven to prevent the recurrence of accidents and incidents as much as possible.

For the timely and appropriate transmission of information, the chairman of the JTSB has held press conferences on a regular basis since August 2011 to provide wide-ranging information such as reports on progress in accident investigations. The board established the "Accident Victim Information Liaison Office" in April 2012 from the viewpoint of care for accident victims and has since continued offering them

information on investigations of accidents and incidents as needed. In the same year, furthermore, it began to compile the “JTSB Digest,” introducing accident cases, analyses based on a variety of statistics and so forth, and published 26 issues through 2017. For accidents and incidents involving ships, the JTSB started publishing the “Analysis Digest Local Office Edition” consisting of investigations and analyses about locally unique themes in 2010.

In 2013, the JTSB began to make public the “Japan-Marine Accident Risk and Safety Information System (J-MARISIS)” readily accessible on the Internet to check waters where marine accidents and incidents frequently occur and investigation results. The board has since developed the program in stages as it released the “Global Version of J-MARISIS” in 2014 to contribute to the safety of international navigation by ships and began operating the “Mobile Version of J-MARISIS” accessible via smartphones and tablets in 2015.

To enhance and upgrade investigations of accidents and incidents, the JTSB has carried out training programs, including the dispatch of accident investigators to Cranfield University of Britain, and introduced cutting-edge technologies such as the utilization of drones to photograph accident sites and visualized outlines of accidents by means of computer graphics while reinforcing its organization through an increase in the number of accident investigators and other measures.

The “JTSB Annual Report 2018” gives brief descriptions of accidents and incidents that occurred and became subject to investigation in 2017, and an outline of investigation reports published in 2017, with additional statistics and other data. I expect that the Annual Report will provide useful lessons for improving safety in your various activities.

I hope I can count on your continued understanding and support in connection with JTSB activities in future.

Kazuhiro Nakahashi
Chairman
Japan Transport Safety Board
June 2018

On the 10th Anniversary of the Japan Transport Safety Board

Norihiro Goto
Former Chairman
Japan Transport Safety Board
Former Director
Aircraft Committee

The Japan Transport Safety Board was founded in 2008 and will mark its 10th anniversary on October 1, 2018.

As I recall, air accidents in 1971 -- a Toa Domestic Airlines plane dubbed “Bandai-go” crashing into Yokotsudake (Mt. Yokotsu) and a midair collision involving All Nippon Airways’ B727 and the Air Self-Defense Force’s F86 jet fighter over Shizukuishi -- led to the establishment of the Aircraft Accident Investigation Commission, the origin of the JTSB, in January 1974. Since then, 44 years have passed. The Shigaraki Kohgen Railway collision accident in 1991, the Naka-Meguro derailment on the Hibiya Line in 2000 and other accidents increased calls for ensuring the safety of trains. With railway accident investigations added to the commission’s task, its name was changed to the Aircraft and Railway Accidents Investigation Commission in October 2001. In addition, international rules under the International Maritime Organization, a specialized agency of the United Nations, stipulating that investigations into marine accidents should be oriented toward determining causes, separated from disciplinary action, were converted into a treaty (effectuated in January 2010). As a result, the Aircraft and Railway Accidents Investigation Commission and the Japan Marine Accident Inquiry Agency were reorganized into the JTSB as an extra-ministerial bureau of the Ministry of Land, Infrastructure, Transport and Tourism under Article 3 of the National Government Organization Act on October 1, 2008. Established through such a process, the JTSB’s mission has three modes, namely aviation, railways and marine, and scientifically determines the causes of accidents and serious incidents in them while in operation and prevents the recurrence of such accidents and serious incidents and reduces damage when an accident occurs from a fair and neutral perspective.

In March 2012, the JTSB clarified its mission in written form as follows:
“We thoroughly unveil the causes of accidents and damage incidental to them through appropriate accident investigations and urge the implementation of necessary policies and measures through the issuance of safety recommendations and opinions or provision of factual information to contribute to the prevention of accidents and reduction of damage caused by them, enhance the safety of transportation and protect people’s life and living while deepening the social awareness of transport safety.” At the same time, we announced the Duties Improvement Action Plan mainly consisting of four action guidelines: 1. Conduct of appropriate accident investigations, 2. Timely and appropriate transmission of information, 3. Consideration of victims and 4. Strengthening the foundation of our organization.

While 10 years have passed since the establishment of the JTSB through the abovementioned process, there

remain a number of challenges conceived at that time.

First is a steep increase in overall accident handlings, including marine accidents. There is an impression that the work is fully functioning due to a large increase in investigators including those at regional organizations. But the way of assigning investigators and other issues need to be addressed.

Second, the JTSB is tasked with preventing the recurrence of accidents and reducing damage caused by them rather than apportioning blame or liability. Some people mistakenly consider that the apportionment of blame or liability is part of our mission and this misunderstanding leads to criticisms against our methods of investigation and investigation results. Nevertheless, it is important to conduct investigations by reconfirming our mission, compile reports and offer recommendations and opinions.

Third, we need to recognize changes in the nature of accidents and incidents in line with technological advances in aircraft, railways and ships and their operation systems. We must increase our knowledge to address the changes and advance our methods of investigation. We are required to make such efforts.

In addition, Professor Seiji Abe, chairman of the Advisory Meeting for Duty Improvement of the JTSB, pointed out in his message on the fifth anniversary of the board, that even if investigation reports we compile are technologically advanced in content, the format and writing style should make them easy to read and understand for the public at large. While the point raised by him has been well understood by the JTSB and put into practice, I want the board to pay greater attention to it in each investigation.

Taking these matters into consideration, I am recalling accidents and serious incidents that have occurred over the past 10 years. In the sector of aviation where I chaired the Aircraft Committee, I vividly remember a "B787-8 airliner catching fire from its lithium ion battery on April 1, 2014." I have recently been involved in the Japan Soaring Association and the Japan Students Aviation League and am considering how to deal with accidents and serious incidents occurring in the field of general aviation including gliders. Under a system to examine operating skills introduced in the field on April 1, 2014, examinations of operating skills have started. I hope for upgrading of the system and enhancement of safety. I also recall and pay attention to investigation activities regarding "a collision between a bulk carrier (25,074 tons) and a fishing boat (119 tons) off the east of Kinkazan, Ishinomaki, which occurred in September 2012" in the marine sector and "a trouble involving a bullet train car on the Tokaido Shinkansen Line (West Japan Railway) that occurred in December 2017 (under investigation)" and others in the railway sector.

I contribute this message as former chairman of the JTSB and former director of the Aircraft Committee, hoping that the board will carry out its task while keeping its mission and challenges in mind and that parties concerned will further cooperate with each other.

On the 10th Anniversary of the Japan Transport Safety Board

Akira Matsumoto
Former Director
Railway Committee
Japan Transport Safety Board

To Recall Work Done by the JTSB

The Japan Transport Safety Board will mark the 10th anniversary of its foundation in October 2018. When it comes to railways, it has a history of 17 years if the seven years as the accident investigation commission are added. I spent nine years in the JTSB including one year at the accident investigation commission. Before the establishment of the Aircraft and Railway Accidents Investigation Commission in 2001, I was involved in investigations to determine the causes of an accident on the Teito Rapid Transit Authority's Hibiya Line and of the Shigaraki Kohgen Railway collision accident. I therefore would like to write about the history of the accident investigation commission and the JTSB and wishes I have for the future of the board.

The Aircraft and Railway Accidents Investigation Commission, the first official railway accident investigating organ, was founded in October 2001. Investigations to determine the causes of the Naka-Meguro derailment and collision accident on the Hibiya Line, which occurred in March 2000, were jointly conducted by the railway accident investigation and study panel in the Ministry of Transport and the Tokyo Metropolitan Police Department. Although the panel was not an official body eligible for a budget, it consisted of researchers and engineers in related areas in Japan and could determine the causes, including matters unexplained at that time, in cooperation with the TMPD. Masakazu Iguchi, professor emeritus at the University of Tokyo, who chaired the panel, said, "Japan needs an official railway accident investigation body." Based on the proposal and support from the Tetsudo Anzen Suishin Kaigi (TASK) or the Railroad Safety Promotion Conference, a nonprofit organization that has been actively conducting activities since the Shigaraki Kohgen Railway collision accident, the Aircraft and Railway Accidents Investigation Commission was established.

As you know, subsequent accidents, such as the derailment accident on the Fukuchiyama Line in the railway sector and a series of serious incidents in the aviation sector as well as social pleas in the marine sector, such as the IMO's policy of separating organs for investigations from those for the apportioning of blame or liability, led to the establishment of the JTSB. I think the JTSB, which has become a comprehensive investigative organ in the three modes of aviation, railways and marine, has played social roles in each transport mode. Accidents and incidents that drew public attention, such as the derailment of Shinkansen trains caused by two earthquakes in the railway mode, a Boeing 787 plane's fire incident related to a lithium-ion battery in the aviation mode and a tour boat capsized on Tenryu River in the marine mode, occurred. But I think grave accidents are decreasing as a whole. Effects of activities by the JTSB cannot be quantified but I think the board has been steadily generating results.

Wishes for the future of the JTSB

The JTSB has grown much bigger as an organization and improved its management since I became a member of it. But I think there is room for improvements at the board. I would like to point them out, taking a somewhat harsh stance including remorse I feel when I recall the days of my membership.

As the most important improvement desired, the JTSB should release investigation reports in the fastest possible manner. I think that reports released by the board to date have been almost sufficient in terms of accuracy and meticulousness but somewhat inadequate as far as expeditiousness is concerned. When I read released reports, I often thought the JTSB had taken "so much time" for release because of elaborate experiments and deliberations. But many reports on serious accidents failed to live up to the principle of release within one year. When I was a member of the board, I thought "timely reports are better than grand reports released after everyone has forgotten." Reflecting on what I failed to accomplish, I hope that such reports will be realized. The JTSB can address the question of expeditiousness, among other options, by releasing information such as progress reports before a final report. Above all, it should be noted that if an accident is followed by a similar accident before the JTSB releases a report on the original one, the board is regarded as failing to fulfill its responsibility for preventing the recurrence of accidents.

The promotion of information disclosure is the second most important improvement desired. Although I believe that the issue has drastically improved since I joined the JTSB 10 years ago, I think there remains room for improvements. While information gathered from investigations is disclosed only through reports in principle at present, I think information, which does not cause any trouble if released through other means, may well be disclosed as reference material for studies on ways of preventing the recurrence of accidents and enhancing safety. It may be also recommendable for the JTSB to convene a session, say once a year, to release reports or explain them in an open-doors manner and listen to outside researchers and experts. Although there may be a variety of hurdles for creating such an opportunity, the board can learn from a variety of external opinions.

In closing, after writing many matters of concern from my own perspective, I would like to pay respect to the incumbent investigators and board members involved in accident investigations on a daily basis and hope that accident investigations useful for enhancing safety will continue.

On the 10th Anniversary of the Japan Transport Safety Board

Tetsuo Yokoyama
Former Director
Marine Committee
Japan Transport Safety Board

I engaged in marine accident investigations during my six-year membership on the Japan Transport Safety Board. I heartily congratulate the JTSB for its 10th anniversary this year.

More than 6,900 investigation reports on marine accidents were released while I was with the board, revealing causes of various accidents and incidents. A person at the helm of a ship recognizes the surrounding conditions based on reports from lookouts and makes judgments on handling of the vessel and other operations. Many accidents occur due to flaws in the work process.

Based on investigations into a marine accident caused by a ship handler's slumber, the JTSB presented the Minister of Land, Infrastructure, Transport and Tourism in May 2010 with an opinion that measures to prevent slumbering for non-international coastal vessels of less than 500 gross tons and others should be studied, such as requiring them to install an anti-slumbering device (bridge navigational watch alarm system). As a result, the Ministry of Land, Infrastructure, Transport and Tourism made it mandatory in May 2011 for ships, including non-international coastal vessels of less than 500 gross tons, to install devices such as an anti-slumbering machine.

In September 2012, a cargo carrier and a fishing boat collided off the east of Japan, causing 13 crew members of the fishing boat to go missing.

The operator of the cargo carrier saw the lights of the fishing boat but failed to confirm the boat on the radar under rainfall and high waves. He was also unable to gain information from the automated identification system and the two vessels are considered to have come closer to each other and eventually collided while he was trying to determine the cargo carrier's location vis-à-vis the fishing boat.

As fishing vessels are not required to install an AIS, the boat in question was not equipped with it. There are cases in which radar fails to detect a small ship due to effects of rainfall and waves or depending on how it is tuned.

An AIS is less affected by rainfall and other conditions and can promptly and stably gather information on other ships' locations and other matters of concern. With the system expected to be effective in preventing collisions, the widespread use of it was recommended as a measure to prevent the recurrence of accidents similar to the collision. The JTSB presented the director-general of the Fisheries Agency with opinions concerning the widespread use of the system and other issues. The agency thus launched a financial support program for fishing boats installing an AIS.

Lookout is the base of safe navigation and the Act for Preventing Collisions at Sea requires maintaining a proper lookout at all times. But an anti-slumber device, which triggers an alarm when a ship handler falls asleep

to warn him or her of the slumber as well as crew members, is expected to be highly effective in such work as securing proper lookouts. In addition, an AIS reinforces the act of keeping watch as it can promptly and readily grasp other ships' movements. Ideally, the system should be adopted by ships regardless of their sizes and types.

Based on findings by investigations into accidents, the JTSB offers opinions on ways of preventing the recurrence thereof in order to prompt improvements in the systems and other issues and enhance safety. I hope the board will continue to promote its activities by taking the actual conditions of accidents into consideration.

Marine accidents are occasionally caused by tidal currents and other conditions in waters. It is therefore extremely important for the operators of ships to understand tidal currents and other conditions in waters where they sail.

Needless to say, information of such a kind should be obtained from nautical charts and publications. At the end of May 2013, furthermore, the JTSB began to provide the Japan-Marine Accident Risk and Safety Information System on the internet enabling users to gain access to reminders and other information related to marine accident investigation reports, conditions under which accidents occurred, navigation and other matters of concern. The JTSB has recently released the mobile version of the system. I hope that the system will be widely used for the safety of navigation as information on conditions in water, useful for preventing accidents, can be easily obtained from it.

As mentioned above, the JTSB has continued offering a large amount of information for preventing the recurrence of accidents. I hope that the JTSB will continue contributing to the prevention of accidents and reduction of damage and further enhance the safety of transport by stepping up efforts to offer viable information.

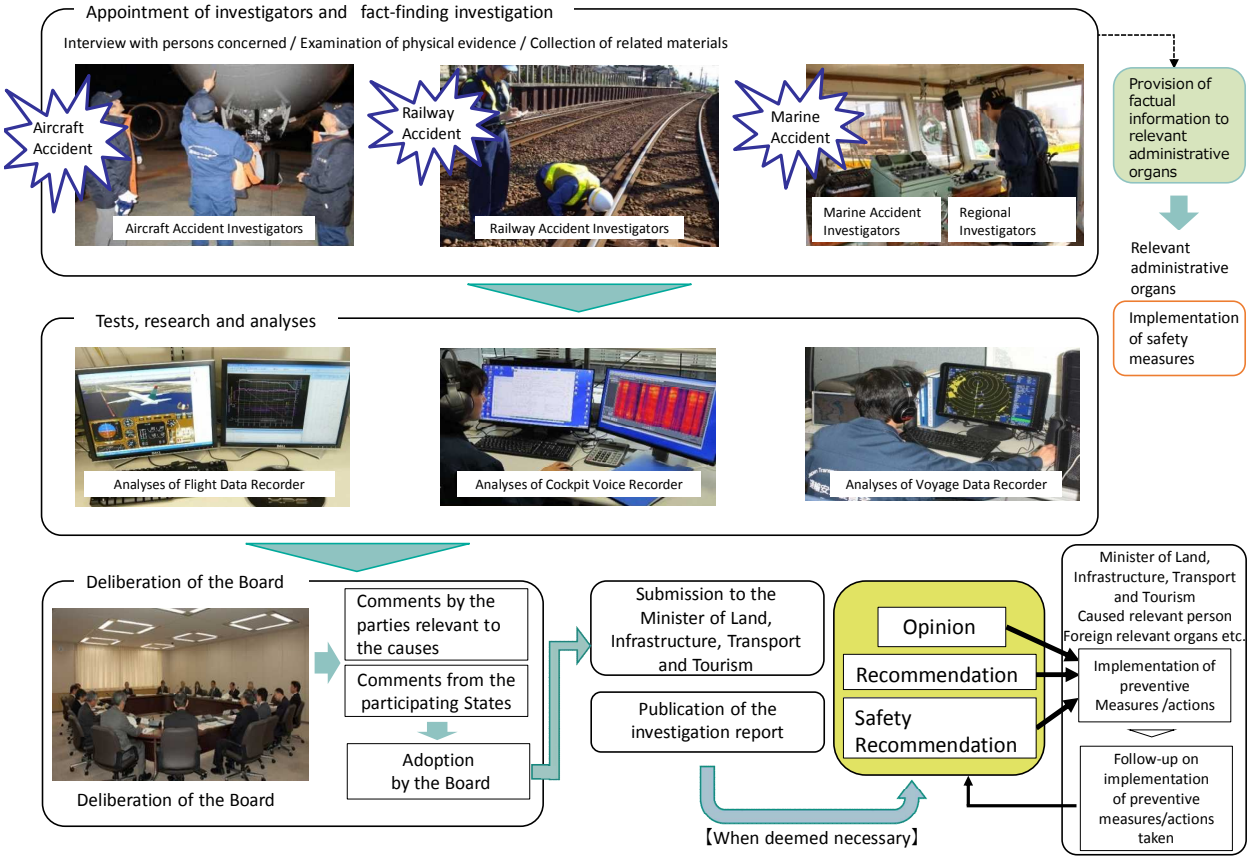
Japan Transport Safety Board
Annual Report 2018

Contents

Feature: Footsteps of Japan Transport Safety Board over past 10 years

1 On the footsteps of the Japan Transport Safety Board over the past 10 years since its foundation

The Japan Transport Safety Board has conducted investigations since its foundation in October 2008 to determine the causes of damage resulting from accidents and serious incidents (hereinafter referred to as "accidents, etc."), involving aircraft, trains and ships, and offered the heads of administrative agencies and parties relevant to the causes of accidents, etc. recommendations and opinions, based on investigation findings, about policies and measures to prevent accidents, etc. and reduce damage when an accident occurs in order to encourage improvements.



2 On investigations into accidents, etc. after the establishment of the JTSB

(1) Number of accidents, etc. subject to investigation

The number of accidents and serious incidents subjected to investigation from the establishment of the JTSB in October 2008 until December 2017 (as of the end of February 2018)

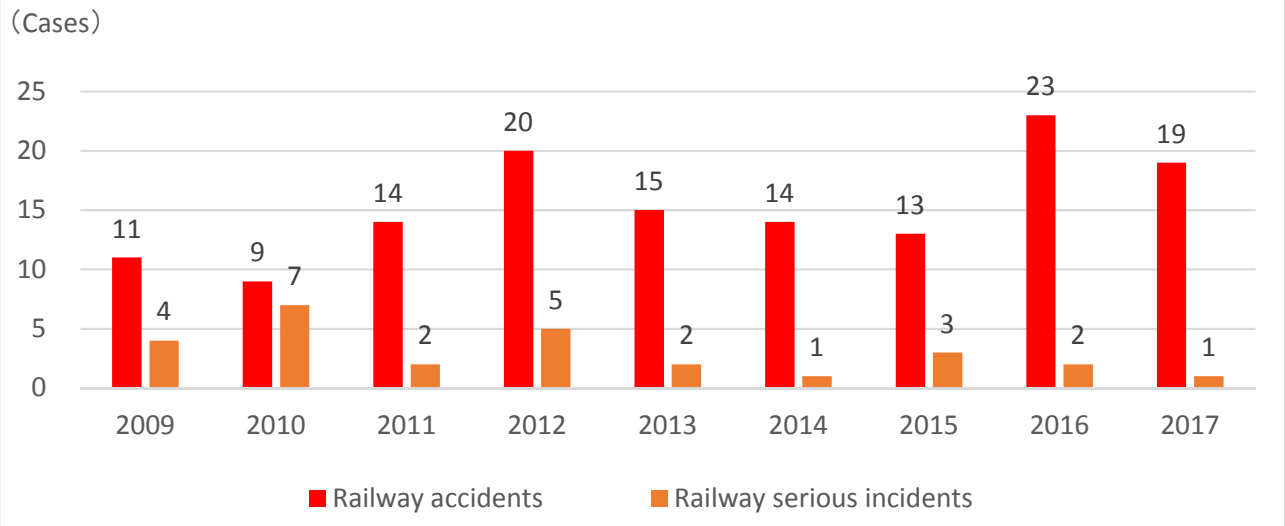
	Aviation	Railway	Marine
Accidents	160	140	9,288
Serious incidents	86	28	1,451
Total	246	168	10,739

Note: The number of accidents and serious accidents in the marine sector includes those that occurred before the establishment of the JTSB and which were subjected investigation afterwards.

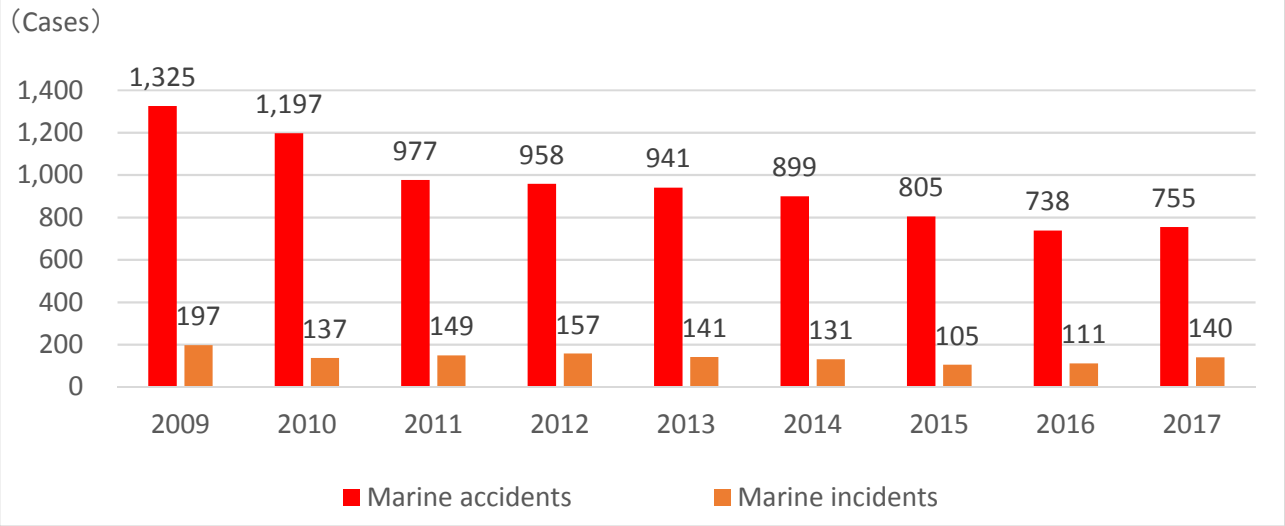
(2) Number of accidents, etc. subject to investigation (by year of occurrence)

・Aircraft accidents, etc.

・Railway accidents, etc.



・Marine accidents, etc.



3 Background of the establishment of the JTSB

(1) Aircraft and Railway Accidents Investigation Commission

In April 1971, Toa Domestic Airlines' YA-11 plane, dubbed "Bandai-go," crashed into Yokotsudake (Mr. Yokotsu) and All Nippon Airways' Boeing 727 and the Air Self-Defense Force's F86 jet fighter collided in mid-air over Shizukuishi. The successive accidents heightened the awareness of needs for the establishment of a permanent accident investigation organ to ensure the fair, prompt and accurate determination of causes. As a result, the Aircraft Accident Investigation Commission was established in January 1974 as a council for the then Ministry of Transport under the Act for the Establishment of the Aircraft Accident Investigation Commission.

The Shigaraki Kohgen Railway collision accident in May 1991, the derailment accident in the compound of Naka-Meguro Station of the Teito Rapid Transit Authority's Hibiya Line in March 2000 and other railway accidents enhanced the awareness of needs for the establishment of a permanent railway accident investigation organ against the backdrop of increased calls for the safety of railways. With railway accident investigations added to the commission's mission, its name was changed to the Aircraft and Railway Accidents Investigation Commission in October 2001.

Recent rises in the speed and transport capacity of public transit systems, furthermore, increased concern about the risk of huge damage once an accident occurs, as seen in the derailment accident on West Japan Railway Company's Fukuchiyama Line in April 2005. In April 2006, therefore, the commission was given an additional task of determining causes of an accident when it occurs and reducing damage caused thereby.

(2) Marine Accident Inquiry Agency

The Marine Accident Inquiry Agency was established as a marine accident tribunal in February 1948 under the Act on Marine Accident Inquiry to determine causes of marine accidents through court proceedings in order to help prevent the recurrence thereof. With the National Government Organization Act taking effect in June 1949, the tribunal was renamed the Marine Accident Inquiry Agency and became an extra-ministerial organ of the then Ministry of Transport. Under a two-trial system adopted by the MAIA, local marine accident inquiry agencies were responsible for first trials while the High Marine Inquiry Agency was tasked with examining cases in the second trial. If accidents were found to have occurred due to seafarers' or others' intent or negligence, they were disciplined.

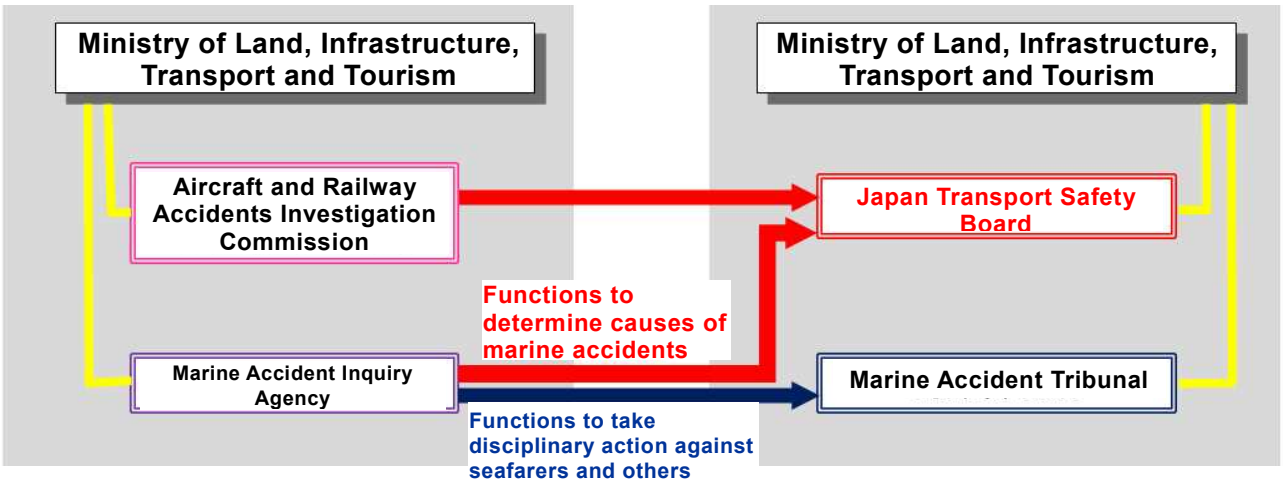
The Act on Marine Accident Inquiry was revised in 2006 to facilitate measures to prevent the recurrence of marine accidents, allowing the MAIA to give opinions on measures that should be taken to prevent marine accidents to the Minister of Land, Infrastructure, Transport and Tourism and the heads of administrative agencies concerned. The legal revision was aimed at encouraging the MAIA to actively make proposals, based on information on marine accidents and lessons learned from judgements and others, to the Minister of Land, Infrastructure, Transport and Tourism and others to extensively appeal to maritime industries through the proposals to prevent the recurrence of marine accidents.

(3) Establishment of the Japan Transport Safety Board

The pursuit of causes and implementation of disciplinary action with regard to marine accidents had been undertaken in an integrated manner under the maritime accident inquiry procedures in Japan. But international rules under the International Maritime Organization, a specialized agency of the United Nations, stipulating that investigations into accidents at sea should be oriented toward determining causes, separated from disciplinary action, were converted into a treaty slated to take effect in January 2010.

As for the Aircraft and Railway Accidents Investigation Commission, furthermore, a collateral resolution adopted by the Diet stressed the need, among others, for reinforcing the organization and functions of the commission and expanding its land-sea-and-air spheres of work.

Under the circumstances, the Japan Transport Safety Board was established in October 2018 as an external organ of the Ministry of Land, Infrastructure, Transport and Tourism (under Article 3 of the National Government Organization Act through the reorganization of the Aircraft and Railway Accidents Investigation Commission and the Japan Marine Accident Inquiry Agency to determine causes of accidents, etc. and causes of damage resulting from them in order to contribute to preventing accidents, etc. and reducing damage. For disciplinary action, the Japan Marine Accident Tribunal was established as a special organ of the Ministry of Land, Infrastructure, Transport and Tourism.



Sequence of events toward the establishment of the Japan Transport Safety Board

July 3, 1971: Toa Domestic Airlines Yokotsudake crash accident

A Toa Domestic Airlines plane crashed into Yokotsudake (Mt. Yokotsu) north of Hakodate (68 people killed)

July 30, 1971: All Nippon Airways Shizukuishi crash accident

An All Nippon Airways plane and a Self-Defense Force jet collided in mid-air over Shizukuishi, Iwate Prefecture (162 people killed)

January 11, 1974: Aircraft Accident Investigation Commission

○Scientific and objective determination of causes separated from pursuit of responsibility
○Prompt response by experts (members and accident investigators)
○Recommendations and propositions to minister for prevention of accidents

May 14, 1991: Shigaraki Kohgen Railway collision accident

A Shigaraki Kohgen Railway train and a West Japan Railway train collided head-on (42 people killed and 628 injured)

March 8, 2000: Naka-Meguro derailment accident on Teito Rapid Transit Authority's Hibiya Line

A train derailed and crashed on the Teito Rapid Transit Authority's Hibiya Line (5 people killed and 64 injured)

October 1, 2001: Aircraft and Railway Accidents Investigation Commission

April 25, 2005: Fukuchiyama Line train derailment accident

A train on West Japan Railway's Fukuchiyama Line derailed (107 people killed and 562 injured)

March 2006: Resolution attached to the comprehensive transport safety first law adopted by the House of Councillors (Expansion of work sphere and reinforcement of organization and functions)

May 2008: Adoption of an amendment to the International Convention for the Safety of Life at Sea (SOLAS) (Separation of apportionment of blame or liability and determination of causes)

October 1, 2008: Japan Transport Safety Board

○Addition of ships as subject to investigation
○Reinforcement of authority
-Creation of new system permitting recommendations to parties concerned with causes
-Permission of appointing and dismissing staff members of secretariat and independently establishing rules
○Provision of information to victims
Provision of information on accident investigations and so forth in a timely and appropriate manner

4 Duties improvement of JTSB

(1) Background

In September 2009, it came to light that a member of the ARAIC leaked information on the investigation of the Train Derailment Accident on the Fukuchiyama Line of the West Japan Railway Company in 2005 and that undermined the public's confidence in our investigation. After verification of this regrettable event, the JTSB established a mission, principles and the Duty Improvement Action Plan in March 2012 to promote its reforms so that the JTSB can achieve truly needed investigation and greater social confidence by improving the issues identified through the verification. The JTSB has been steadily implementing them and continuously taking actions for duties improvement.

(2) Duty improvement review process

① In order to verify the reliability of the Final Report on the JR Fukuchiyama line accident which was publicized in June 2007, including whether the information leakage had any influence on the report, a verification meeting consisting of the victims, their families and experts (the Verification Members) was formed in December 2009. The verification was subsequently conducted over the next one and a half years.

The verification concluded that the Final Report was not influenced by the leakage, but the Verification Members pointed out other issues and challenges the JTSB faced, and compiled a proposal on the future of the JTSB (the Proposal). The Proposal pointed out key areas that require improvement, such as ensuring transparency in accident investigation, enhancing the provision of information to victims, and various other issues. It recommended that the JTSB address the issue of duty improvement by setting up a panel of external advisors to review and improve the Board's duties where necessary in future.

> The Proposal on the future of the JTSB (excerpt)
>
> 10. JTSB Duty Improvement Policy
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> Taking the regrettable event as a lesson, the JTSB is in the process of reviewing the work processes. It should continue to proactively review its duties so as to achieve truly needed investigation and greater social confidence, exploiting the Board's great capabilities. To this end, the external advisors should be invited to set up a panel to identify specific organizational and duty improvements to address the key issues raised in the Proposal and others necessary.

② In July 2011, the Advisory Meeting for the duty improvement of the JTSB was established. The members are as follows:

> Members of the Advisory Meeting
>
> Mr. Seiji Abe (Professor, Kansai University)
> Mr. Takemune Sato (Attorney at law)
> Mr. Shigeru Haga (Professor, Rikkyo University)
> Mr. Kunio Yanagida (Writer)
> Mr. Hiroyuki Yamato (Professor, Graduate School, the University of Tokyo)

(3) Action guidelines for duties improvement

① Mission and principles

The JTSB worked out action guidelines to flesh out its mission as part of duties improvement (the principles are posted on the opening page of this report). The mission and action guidelines are posted in the office in Tokyo as well as at eight regional offices across Japan so that each staff member works while keeping them in mind.

② Action plan for duties improvement

The JTSB worked out a Duties Improvement Action Plan in line with four action guidelines for the mission in March 2012 and revised it in April 2014, adding actions the board should primarily take.

(4) Actions for duties improvement

The JTSB has conducted proper investigations, released information in a timely and proper manner, given consideration to victims and upgraded its organizational foundation in line with the mission, action guidelines and Duties Improvement Action Plan. Following are among specific actions taken:

○Regular press conferences by chairman

As a specific example of proper and timely issuance of information, the chairman began to hold press conferences on a regular basis in August 2011 to release useful information for preventing the recurrence of accidents in a timely manner. At the press conferences, the chairman reports the progress in accident investigations, subject to strong public attention, from the viewpoint of ensuring the transparency of the process of accident investigations. From the viewpoint of preventing the recurrence of accidents, the chairman also offers safety information useful for preventing the recurrence of accidents even when investigations are underway, while introducing policies and measures adopted based on recommendations and others issued by the board.

○Establishment of Accident Victim Information Liaison Office

To provide information on accident investigations in a timely and proper manner to victims, their families and the bereaved while giving full consideration to their sentiments, the JTSB set up a liaison for provision of information on accident investigations to victims and others concerned in April 2011. To further promote the provision of information, the board established the Accident Victim Information Liaison Office as an organ in charge in April 2012. Establishing information provision sections even in regional offices, the secretariat of the liaison office is carrying out the task in an integrated manner.

○Japan-Marine Accident Risk and Safety Information System (J-MARISIS)

In 2013, the JTSB began to make public the “Japan-Marine Accident Risk and Safety Information System (J-MARISIS)” readily accessible on the internet to check waters where marine accidents, etc. frequently occur and investigation results. The board started operating the “Global Version of J-MARISIS” in 2014, adding information on 11 countries in the world to contribute to the safety of international navigation by ships. In 2015, furthermore, it began to operate the “Mobile Version of J-MARISIS” accessible via smartphones and tablets.

The JTSB will ceaselessly strive to improve its work by continuously and steadily implementing the Duties Improvement Action Plan and timely and properly reviewing it.

5 Case studies of accidents, etc.

(1) Aircraft accidents, etc.

Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
September 25, 2014	January 16, 2013 Takamatsu Airport, Kagawa Prefecture	All Nippon Airways Co., Ltd.	JA804A Boeing 787-8

Summary

The airplane, registered JA804A, took off from Yamaguchi Ube Airport for Tokyo international Airport as its scheduled flight. When it was climbing through 32,000 ft over Shikoku Island, an EICAS message of battery failure came on accompanied by unusual smell in the cockpit. The airplane diverted to Takamatsu Airport and landed there.

An emergency evacuation was executed using slides on T4 taxiway.
Four passengers out of 137 occupants (the Captain, seven crewmembers and 129 passengers) suffered minor injuries during the evacuation.
Although the main battery was damaged, it did not lead to a fire.

Probable Causes

The emergency evacuation was executed on Takamatsu Airport taxiway in the serious incident, which was a consequence of emergency landing deriving from the main battery thermal runaway during the airplane's takeoff climb.
Internal heat generation in cell 6 very likely developed into venting, making it the initiating cell, resulting in cell-to-cell propagation and subsequent failure of the main battery. It is very likely that cell 6 internal heat generation and increased internal pressure caused it to swell, melt the surrounding insulation material and contact the brace bar creating a grounding path that allowed high currents to flow through the battery box. The currents generated arcing internal to the battery that contributed to cell-to-cell propagation consequently destroying the battery.
Cell 6 heat generation was probably caused by internal short circuit; however, the conclusive mechanism thereof was not identified.
In the serious incident, the internal short circuit of a cell developed into cell heat generation, thermal propagation to other cells, and consequently damaged the whole battery. The possible contributing factors to the thermal propagation are that the test conducted during the developmental phase did not appropriately simulate the on-board configuration, and the effects of internal short circuit were underestimated.

Safety Recommendation

Safety Recommendation to the Federal Aviation Administration (FAA).(September 25, 2014)

1. Actions to be taken by the Federal Aviation Administration
   a. Provide instruction to airplane manufactures and equipment manufactures to perform equipment tests simulating actual flight operations.
   b. Review the technical standards for lithium ion battery to ensure that the electric environment is appropriately simulated, and if necessary, amend the standards.
   c. Review the lithium ion battery failure rate estimated during the 787 type certification, and if necessary, based on its result, review the lithium ion battery safety assessment.
   d. Review the type certificate for its appropriateness on heat propagation risk.
   e. Assess the impact of contactor opening after the cell vent on the flight operation and take appropriate actions, if necessary.
2. Measures to Be Taken to Instruct The Boeing Company as a Designer and Manufacturer of the 787
   a. Continue the study of internal short circuit mechanism considering the effects of non-uniform winding formation and other factors deriving from manufacturing process; and continue efforts to improve lithium ion battery quality and its reliability, reviewing the LIB operational conditions, such as temperature.
   b. Improve BCU and contactor operations which are outside the design envelop.

Report

http://www.mlit.go.jp/jtsb/eng-air_report/JA804A.pdf
http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AI2014-4-3-p.pdf (Explanatory material)

(2) Railway accidents, etc.

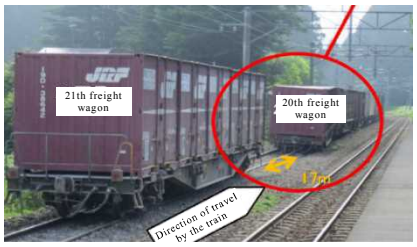
Date of Publication	Date and accident type	Railway operator	Line section (location)
December 17, 2015	June 22, 2014 Train derailment	Japan Freight Railway Company	Between Izumisawa station and Satsukari station, single track, Esashi Line, Hokkaido.

Summary

The train, while running at about 69 km/h in the premises of Satsukari station, the brake pipe pressure decreased suddenly and, at the same time, an emergency brake acted automatically, and stopped.
After the train stopped, the driver checked the train and found that the all two axles in the rear bogie of the 20th vehicle, freight wagon, derailed to right. Furthermore, the 21th vehicle, freight wagon, decoupled from the 20th vehicle and stopped at about 17 m behind the 20th vehicle.
There was the train driver onboard the train, but he was not injured.

Probable Causes

It is somewhat likely that the accident occurred as the wheel in the outer rail side of the Ko-Ki 107 type freight wagon, climbed up the rail and derailed to right because the derailment coefficient increased due to the decrease of the wheel load and increase of the lateral force for the outer rail side wheel, as the body of the freight wagon was excited to vibrate in rolling mode significantly while the train was running in the 350 m radius left curved track.
It is probable that the significant roll vibration were excited to the vehicle body due to the existence of the large combination of alignment and cross-level which should be maintained, in the track before the point where the wheel started climbing up the rail.
It is somewhat likely that the existence of the large alignment to shorten the radius of curvature effected to increase the lateral force in the outer rail side wheels.
It is somewhat likely that the large combination of alignment and cross-level which should be maintained had existed because the on-site track maintenance section could not understand the existence of the plural kinds of the combination of alignment and cross-level measured by the high speed track inspection car, and these situation was caused in relation with the improper method to decide the necessity of the maintenance work by communication of the inspected results to the on-site track maintenance section, and a lack of the knowledge about the combination of alignment and cross-level in the on-site track maintenance section.
Although it could not be determined whether the unbalanced loading actually related to the occurrence of derailment, it is somewhat likely that the status of loading just before the accident became to a factor to promote derailment.



Opinions

Opinions for The Minister of Land, Infrastructure, Transport and Tourism (December 17, 2015)

The three derailment accidents by the freight train, which occurred from April, 2012, to June, 2014 at Esashi Line, have the common situation such as that the outer rail side wheels of the freight wagon in the freight train running in relatively sharp curve near the limited speed, derailed by flange climbing.
As the probable causes for each accident were described in each investigation report, it was probable that these accidents were caused by complex combination of the factors, such as vehicle, track, loading of the freight etc., although their effected levels were different.
In addition, the Japan Transport Safety Board analyzed the issues to be dealt with cooperation by the parties concerned towards the improvement of the safety and the prevention of the derailment accidents of the freight train due to the complex combination of the factors such as vehicle, track, freight loading, etc., based on the knowledge obtained from the previous investigations, integrating the investigated results of these three derailment accidents of the freight train occurred in Esashi Line.
The railway system is the integration of the various technology area, such as civil engineering, vehicle technology, electric engineering, operation, etc. Hence, the interested parties of the freight railway transportation, such as the passenger railway operators charged with track maintenance, the freight railway operators charged with vehicle management and operation etc., the freight transporters and the freight senders charged with loading freight and the railway vehicle makers manufacturing the freight wagons, are related with each other.
In view of the results of these accident investigations, the Japan Transport Safety Board expresses its opinion as follows to the Minister of Land, Infrastructures, Transport and Tourism, pursuant to Article 28 of the Act for Establishment of the Japan Transport Safety Board in order to promote the parties concerned to consider the issues analyzed by the Board to improve safety for the freight train operation. When some measures were implemented according to the following opinions, please notify the Board.

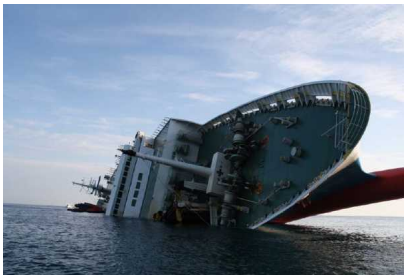
1. Let the context of the accident investigation reports about the three derailment accidents of freight train occurred in Esashi Line and the attached Opinion, well known widely, to the railway operators provided tracks to freight train operation, freight railway operators, freight transporters using freight trains, railway vehicle manufacturers, etc.
2. To supervise and guide the railway operators based on the laws and ordinances, to implement smoothly the required measures for prevention of recurrence described in each accident investigation report.
3. To promote the persons concerned in railway operators, railway vehicle manufacturers, freight transporters using freight trains, freight senders, research and development organization, etc., to investigate in cooperated with each other, about the issues related with vehicles such as design of freight wagon, issues related with track such as track category and track technology in each section, issues related with freight such as loading methods, etc., towards the improvement of safety for the freight train operation.

Report

http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2015-9-3.pdf
http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2015-9-3-p.pdf (Explanatory material)

(3) Marine accidents, etc.

Date of Publication	Date and location	Operator	Vessel type and name, accident type
February 25, 2011	November 13, 2009 Off the southeast of Kiho Town, Mie Prefecture (the Kumano Nada), Approximately 115.5° true bearing, 14.0 nautical miles from North Lighthouse, East Breakwater, Udono Port	A-Line Ferry Co., Ltd.	Ro-Ro Passenger Ferry ARIAKE Listing
Summary	While the ferry Ariake, boarded with a master and 20 crew members, was proceeding in the southwest direction in the Kumano Nada, carrying seven passengers, 150 containers and others on board, the hull of the ferry listed heavily to starboard at around 05:06, and afterward, she grounded and laid sideways off the coast of Mihama Town, Mie Prefecture. Two passengers and one crew member were injured.		
Probable Causes	It is probable that the accident occurred when the Vessel heeled about 25° to starboard and cargoes on board the Vessel started collapsing as they slid sideways after being hit by a wave on the port quarter at about 40° with a wave height of about 6.9 meters, because the Vessel was navigating in the Dangerous Zone in Following Seas with High Waves while proceeding in the southwest direction in the Kumano Nada during the night. It is probable that the reason why the Vessel was navigating in the Dangerous Zone in Following Seas with High Waves was that both the master and the chief officer deemed the Vessel was resistant to following sea conditions, as they had no knowledge about the Dangerous Zone, and as the master had not experienced any large ship motions on board the Vessel even while proceeding in following seas. It is probable that the reason why cargoes on board the Vessel started sliding was that A-Line Ferry Co., Ltd. had not taken any preventive measures against excessive cargo shifting with the deck boards in the car spaces as prescribed in Standards for Construction of Car Ferries.		
Remarks	It is probable that the accident occurred when the Vessel heeled about 25° to starboard and cargoes on board the Vessel started collapsing while navigating in following sea conditions. It is desirable that vessel operating companies should reconfirm that they are entrusted with ensuring the safety of human lives and transport, mention in their safety management manuals (operation standard) about hazards while navigating in following sea conditions as described in the Navigation Guidance in Adverse Weather Conditions, and provide a safety education to those who are engaged in vessel operation and acquaint them thoroughly with the hazards. Moreover, in order to prevent containers from being caused to slide by the listing of a vessel, it is desirable that vessel operating companies should study effective lashing methods for cargoes on board, and consider not only coating deck boards with non-slip painting materials but also installing prevention devices for collapse of cargoes like stringers and detachable cones.		
Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2014/2009tk0012e.pdf		



* Other cases of investigations into accidents, etc. can be browsed from the JTSB's homepage at the address below. Full-text retrieval is possible by specifying investigation reports and so forth, utilizing browsing and other functions.

http://www.mlit.go.jp/jtsb/index.html

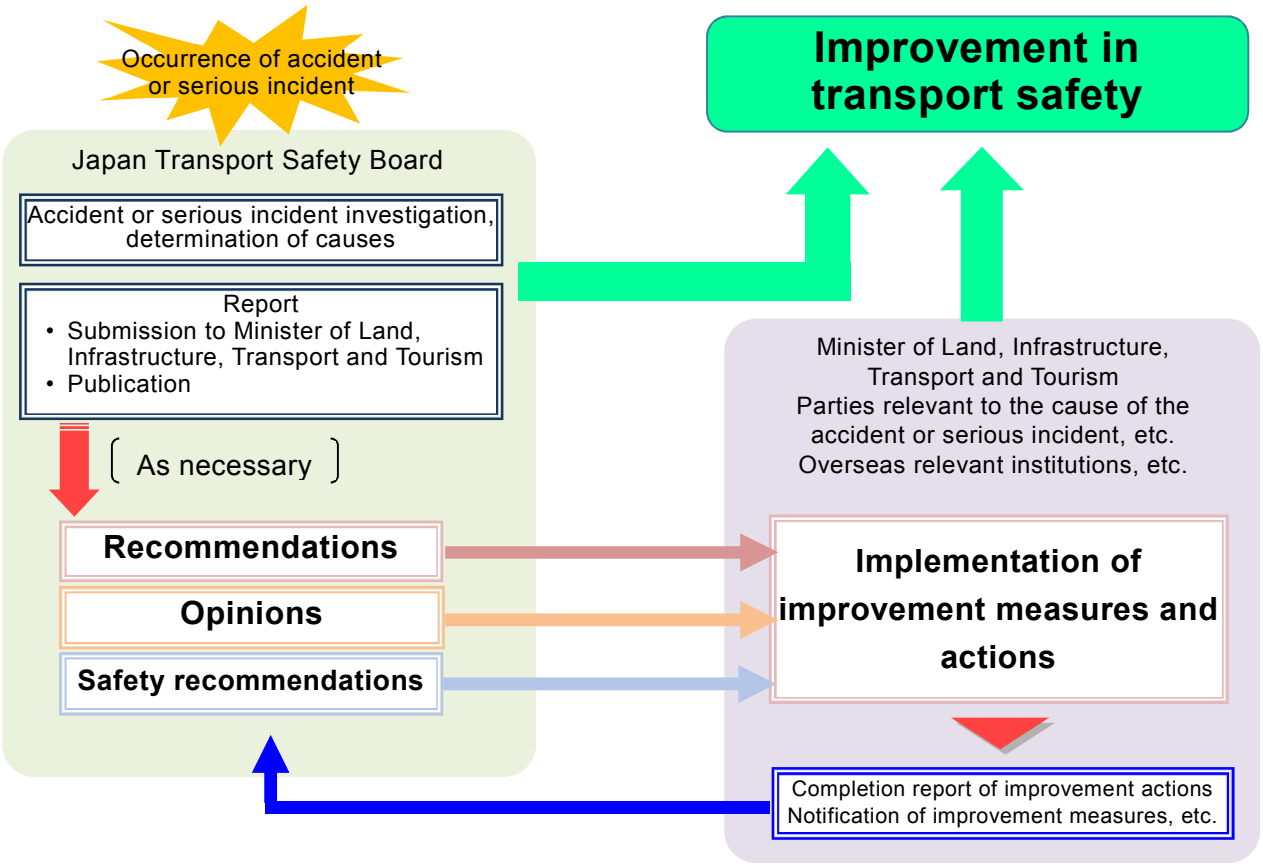
Chapter 1 Summary of recommendations and opinions issued in 2017

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).

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 2017 are summarized as follows.

There were no opinions issued.

1 Recommendations

(1) Aircraft Accident involving a privately owned PIPER PA-46-350P, registered JA4060

(Recommendations on July 18, 2017)

Summary of the Accident

On Sunday, July 26, 2015, at around 10:58 Japan Standard Time (JST: UTC + 9 hrs: unless otherwise stated, all times are indicated in JST using the 24-hour clock), a privately owned Piper PA-46-350P, registered JA4060, crashed into a private house at Fujimi Town in Chofu City, right after its takeoff from Runway 17 of Chofu Airport. There were five people on board, consisting of a captain and four passengers. The captain and one passenger died and three passengers were seriously injured. In addition, one resident died and two residents had minor injuries.

The aircraft was destroyed and a fire broke out. The house where the aircraft had crashed into were consumed in a fire and neighboring houses sustained damage due to the fire and other factors.

Probable Causes

It is highly probable that this accident occurred as the speed of the Aircraft decreased during takeoff and climb, which led the Aircraft to stall and crashed into a residential area near Chofu Airport.

It is highly probable that decreased speed was caused by the weight of the Aircraft exceeding the maximum takeoff weight, takeoff at low speed, and continued excessive nose-up attitude.

As for the fact that the Captain made the flight with the weight of the Aircraft exceeding the maximum takeoff weight, it is not possible to determine whether or not the Captain was aware of the weight of the Aircraft exceeded the maximum takeoff weight prior to the flight of the accident because the Captain is dead. However, it is somewhat likely that the Captain had insufficient understanding of the risks of making flights under such situation and safety awareness of observing relevant laws and regulations.

It is somewhat likely that taking off at low speed occurred because the Captain decided to take a procedure to take off at such a speed; or because the Captain reacted and took off due to the approach of the Aircraft to the runway threshold.

It is somewhat likely that excessive nose-up attitude was continued in the state that nose-up tended to occur because the position of the C.G. of the Aircraft was close to the aft limit, or the Captain maintained the nose-up attitude as he prioritized climbing over speed.

Adding to these factors, exceeding maximum takeoff weight, takeoff at low speed and continued excessive nose-up attitude, as the result of analysis using mathematical models, it is somewhat likely that the decreased speed was caused by the decreased engine power of the Aircraft; however, as there was no evidence of showing the engine malfunction, it was not possible to determine this.

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

In this accident, small private aircraft crashed into a residential area and caused injury to residents as well as damages to houses, however the Aircraft was flying with exceeding the maximum takeoff weight and without satisfying the requirements for performance prescribed in the flight manual, and over the past five years, there have been two fatal accidents involving small private aircraft affected by inappropriate weight and position of the center of gravity of the aircraft ((1) Mooney M20C, JA3788, which crashed when landing at Yao Airport in March 2016, and (2) Cessna 172N Ram, JA3814, which veered off the runway of Otone Airfield, Kawachi Town, Inashiki-gun, Ibaraki Prefecture, and made a fatal contact with a ground worker in August 2012). In view of the result of these accident investigations, as operation safety of small private aircraft needs to be improved, the Japan Transport Safety Board recommends the Minister of Land, Infrastructure, Transport and Tourism pursuant to Article 26 of the Act for Establishment of the Japan Transport Safety Board to take the following measures:

(1) Promote pilots of small private aircraft to understand the importance to confirm that requirements for performance prescribed in the flight manual are satisfied, in addition to the importance to comply with maximum takeoff weight and limit for the position of the center of gravity, as confirmation before departure, at the occasions like specific pilot competency

assessments and aviation safety seminars.

Enforce instructions and trainings to pilots of small private aircraft to plan the actions in advance including to follow the emergency procedure prescribed in the flight manual and confirm these actions thorough self-briefing by a pilot himself at the time of preparation before departure. along with compliance with the speed and procedure prescribed in the flight manual, as for the actions to the situation of degraded flight performance due to lack of acceleration or decrease in speed during takeoff.

(2) Study and compile the cases of effective measures connecting entrance taxiways to runway thresholds in order to make maximum use of runway length and inform aerodrome providers and administrators of these case studies as maximum use of runway length at takeoff, will allow a pilot to have a margin to make a decision during takeoff roll and contribute to improving safety.

(2) Collision involving the Passenger Ship BEETLE and a Marine Life

(Recommendations on July 27, 2017)

Summary of the Accident

A passenger ship BEETLE, with a captain, a chief officer and five crews on board and carrying 184 passengers, collided with a marine life at around 09:54 on January 8, 2016 when she was proceeding off the west of Kami Shima, Tsushima City, Nagasaki Prefecture toward the Port of Hakata from the Port of Busan at 40 knots, with lifting the hull of the ship above sea level by lift force of hydrofoil wings.

Three of the passengers were seriously injured by a lumbar vertebra compressed fracture etc., and four of the passengers and two of the cabin crews suffered minor injuries. Two shock absorbers on the bow stretched out, and then BEETLE returned to the Port of Busan in hullborne mode.

Probable Causes

Concerning the accident, it is probable that BEETLE collided with a marine life in spite of a rudder turn since the marine life was discovered in the proximity during the maneuver at a cruising speed (40 km).

It is somewhat likely that discovering the marine life in the proximity is associated with the captain not directing enhancement of lookout by four persons of a captain, a chief engineer, a chief officer, and a first engineer, suspension of inboard sales by cart, seating of cabin crews, and implementation of airing of seat belt wearing to passengers, in addition to decelerated maneuver at 36 – 38 kn (cetacean-cautious maneuver) as well as navigating without enhancing lookout.

It is probable that the reason why the captain did not direct cetacean-cautious maneuver was that Company A had not established operating guidelines of cetacean-cautious maneuver in the safety management rules and was not thoroughly disseminating them, had informed the allowable delay time associated with implementation of decelerated maneuver, and did not have a grasp of the implementation status of cetacean-cautious maneuver.

Recommendations to the JR KYUSHU JET FERRY INC.

Concerning the accident, it is probable that the passenger ship BEETLE collided with a marine life when she was sailing in a reduction area at a cruising speed, passengers who were not appropriately using a seat belt, passengers who had their tables set up with wearing a seat belt, and cabin crews who were engaged in inboard sales by cart and others.

It is probable that JR KYUSHU JET FERRY INC. had not established operating guidelines of cetacean-cautious maneuver such as decelerated maneuver, enhancement of lookout for marine animals, suspension of inboard sales by cart, and implementation of dissemination of seat belt wearing to passengers in safety management rules, and had not thoroughly disseminated them, had informed allowable delay time associated with implementation of decelerated maneuver, and had not grasped an implementation status of cetacean-cautious maneuver.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends JR KYUSHU JET FERRY INC. pursuant to paragraph (1) of Article 27 of the Act for Establishment of the Japan Transport Safety Board as follows:

JR KYUSHU JET FERRY INC. must take the following actions in order to ensure safety of passenger transportation.

(1) Prescribe implementation of cetacean-cautious maneuver in safety management rules.

(2) Make each ship enforce cetacean-cautious maneuver in setup reduction areas.

(3) Establish an administration system capable of grasping an implementation status of cetacean-cautious maneuver in each ship.

(4) Accelerate mounting of shock-absorbing material in passenger cabins and storing of table at cetacean-cautious maneuver.

2 Safety Recommendations

(1) Collision between the Container Ship SINOKOR INCHEON and the Fishing Vessel TOSHIMARU

(Safety Recommendations on March 30, 2017)

Summary of the Accident

While container ship SINOKOR INCHEON was proceeding east toward Mishima-Kawanoe Port, Shikokuchuo City, Ehime Prefecture, with a master and a second officer and other 15 crew members onboard, and while fishing vessel TOSHIMARU was proceeding north-northwest toward Mitajiri District of Mitajiri-Nakanoseki Port, Hofu City, Yamaguchi Prefecture, with a skipper onboard, the two Ships collided at around 23:56 on February 19, 2016, off to the east of Hime Shima, Himeshima Village, Oita Prefecture.

TOSHIMARU received a hole and other damage to her port -side center shell plating and capsized, becoming a total loss. Her skipper was killed.

SINOKOR INCHEON had abrasions on her bulbous bow.

Probable Causes

It is probable that, off the eastern coast of Hime Shima at night, while SINOKOR INCHEON was proceeding east and TOSHIMARU was proceeding north-northwest, the SINOKOR INCHEON and TOSHIMARU collided because second officer of SINOKOR INCHEON was not keeping lookout on TOSHIMARU because he thought there was no danger of a collision with TOSHIMARU, and because Skipper of TOSHIMARU did not notice of SINOKOR INCHEON until SINOKOR INCHEON had come close to TOSHIMARU.

It is probable that second officer of SINOKOR INCHEON thought that there was no danger of colliding with TOSHIMARU because, when he extended the radar's true speed vectors, he found that the tip of TOSHIMARU's vector reached a point behind the tip of SINOKOR INCHEON's vector.

It is somewhat likely that Skipper of TOSHIMARU did not notice SINOKOR INCHEON until SINOKOR INCHEON had come close to TOSHIMARU because Skipper of TOSHIMARU had accumulated fatigue; however, it was not possible to determine the situation of lookout as Skipper of TOSHIMARU was killed in this accident.

Safety Recommendations to the KOREA SHIPMANAGERS CO., LTD.

In view of the result of this accident investigation, the Japan Transport Safety Board recommends that KOREA SHIPMANAGERS CO., LTD. should take the following measures.

Instruct all crews on board operating ships to thoroughly comply with "STANDARDS REGARDING WATCHKEEPING" of the mandatory regulations of the STCW convention, the Safety Management Manual and Master's Standing Order, including keeping appropriate lookout.

(2) Grounding of Cargo Ship CITY

(Safety Recommendations on September 28, 2017)

Summary of the Accident

When a cargo ship CITY, with a master and 17 persons on board, was riding a single-anchor near the Port of Sakata in Sakata City, Yamagata Prefecture, a wind velocity increased and though she hove up anchor and attempted to standing out to sea, she was driven by a pressure, and stranded on a tetrapod at around 05:09 on January 10, 2016 near the Port of Sakata.

Though the CITY swamped to the position of the bridge of her hull and became total loss, there was no fatality.

Probable Causes

It is probable that the accident occurred because weather and sea information was not appropriately obtained on the CITY during anchorage in the waters off the Port of Sakata under the condition of anticipated a wind with a maximum speed of 15 m/s and about 2.8-meter-high waves and the master did not have a grasp of the seaworthiness of the CITY, she missed the timing for evacuating to a safe water area, and although she heaved up anchor and tried to head out to sea, the speed necessary to keep the course and the ship became unable to maneuver, and ran on a wave-absorbing blocks.

It is probable that the reason why the master did not appropriately obtain weather and sea information because the master thought there was no sign of worsening weather seeing Asian Pacific surface analysis charts and coastal wave analysis charts.

It is probable that the reason why the master did not have a grasp of the seaworthiness of the ship was because the safety management manual of Trans Ocean Shipping Co., Ltd. did not describe about seaworthiness such as limiting clutch force and limit wind speed in a ballasted condition and a limit of ship maneuvering for course keeping considering a wind pressure and output power of the main engine in the said condition.

Safety Recommendations to the Trans Ocean Shipping Co., Ltd.

It is probable that the accident occurred as a result of the course of events that the CITY had not appropriately obtained weather and sea information during her anchorage and that she missed the timing of evacuating to a safe water area because the master did not have a grasp of seaworthiness of the ship due to lack of descriptions about seaworthiness such limiting clutch force and limit wind speed in a ballasted condition and a limit of ship maneuvering for course keeping considering a wind pressure and output power of the main engine in the said condition in the safety management manual of Trans Ocean Shipping Co., Ltd. and thereby she became unable to maneuver despite an attempt to head out to sea.

It is probable that the reason why the CITY had not appropriately obtained weather and sea

information is that the master thought there was no sign of worsening weather seeing weather and sea analysis charts and therefore had not obtained other weather information.

From these, in view of the result of this accident investigation, the Japan Transport Safety Board recommends Trans Ocean Shipping Co., Ltd. which is the vessel management company of the CITY to take the following measures for the purpose of prevention of the recurrence of similar casualties and etc.

(1) Trans Ocean Shipping Co., Ltd. educates masters of the ships under control of the company about obtaining necessary weather information.

(2) Trans Ocean Shipping Co., Ltd. describes information about limiting clutch force and limit wind speed in a ballasted condition and a limit of ship maneuvering for course keeping considering a wind pressure and output power of the main engine in the said condition in the safety management manual.

Chapter 2 Summary of major investigation activities in 2017

1 Statistics of accident investigation activities

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.

Various accidents occurred in 2017.

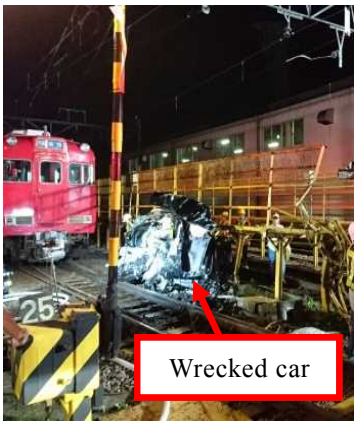
In terms of aviation, there were 20 aircraft accidents. These included a crash of a Bell 412EP operated by Nagano Prefectural Fire and Disaster Prevention Center near Mt. Hachibuse in Nagano Prefecture in March, and a crash of an Aerospatiale AS332L operated by Toho Air Service Co., Ltd. at Oaza Otomo, Ueno Village, Tano District, Gunma Prefecture in November. We investigated the causes of 37 accidents in all, including 17 ongoing investigations from the previous year. Beside these, there were 17 aircraft serious incidents involving aircraft, including a serious incident in September when a fairing panel fell from the root of the main right wing of a Boeing 777-200 operated by KLM Royal Dutch Airlines while it was ascending over Osaka City after taking off from Kansai International Airport and the panel hit a motor vehicle running on a road. We investigated the causes of 31 serious incidents in all, including 14 ongoing investigations from the previous year.

Of the above, we have published investigation reports on 16 aircraft accidents and nine serious incidents following completion of the respective investigations.

Of the published investigation reports, we issued recommendations to the Minister of Land, Infrastructure, Transport and Tourism regarding the “Aircraft Accident involving a privately owned Piper PA-46-350P.”

(For more details, see Chapter 1 “Summary of Recommendations and Opinions Issued in 2017”, P.11-13.)

In terms of railways, there were 19 railway accidents in all. These included an accident with casualties on the premises of Itozaki station on Sanyo Line of West Japan Railway Company in February, a derailment accompanied with level crossing accident on the premises of Sanage station on Mikawa Line of Nagoya Railroad Co., Ltd. in July, and a derailment between Tarui station and Ozaki station on Nankai Main Line of Nankai Electric Railway Co. Ltd. in October. We investigated the causes of 38 accidents in all, including 19 ongoing investigations from the previous year. As for railway serious incidents, there was one case of a serious incident in which a crack in the bogie frame of a vehicle West Japan Railway Company was found on the premises of Nagoya station on Tokaido Shinkansen Line in



December. We investigated the causes of three serious incidents in all, including two ongoing investigations from the previous year.

Of the above, we have published investigation reports on 23 railway accidents and two serious incidents following completion of the respective investigations.

In terms of marine, a total of 782 marine accidents were investigated. These included a contact with a breakwater involving the water taxi SAKURA in May, and a collision between the container ship ACX CRYSTAL and the U.S. naval ship FITZGERALD in June. We investigated the causes of 1,359 accidents in all, including 578 ongoing investigations from the previous year (excluding cases that proved non-applicable as a result of the initial investigation). Besides these, 140 marine incidents were investigated. We investigated the causes of 210 incidents in all, including 70 ongoing investigations from the previous year (excluding cases that proved non-applicable as a result of the initial investigation).

Of the above, we have published investigation reports on 825 marine accidents and 122 marine incidents following completion of the respective investigations.

Of the published investigation reports, we issued recommendations to JR Kyushu Jet Ferry Inc., the ship owner, regarding the “collision involving the passenger ship BEETLE and a marine life”. We also issued safety recommendations to Korea Shipmanagers Co., Ltd., the ship management company, regarding the “collision between the container ship SINOKOR INCHEON and the fishing vessel TOSHIMARU” and to Trans Ocean Shipping Co., Ltd., the ship management company, regarding the “grounding of the cargo ship CITY”.

(For more details, see Chapter 1 “Summary of Recommendations and Opinions Issued in 2017” P.13-17.)

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 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.

Chapter 3 Aircraft accident and serious incident investigations

1 Aircraft accidents and serious incidents to be investigated

<Aircraft accidents to be investigated>

◎Paragraph 1, Article 2 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 each of the items in paragraph 1 of Article 76 of the Civil Aeronautics Act.

◎Paragraph 1, Article 76 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.

◎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 item 5 of the paragraph1 of the Article 76 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>

◎Item 2, Paragraph 2, Article 2 of the Act for Establishment of the Japan Transport Safety Board (Definition of aircraft serious incident)

A situation where a pilot in command of an aircraft during flight recognized a risk of collision or contact with any other aircraft, or any other situations prescribed by the Ordinances of Ministry of Land, Infrastructure, Transport and Tourism under Article 76-2 of the Civil Aeronautics Act.

◎Article 76-2 of the Civil Aeronautics Act

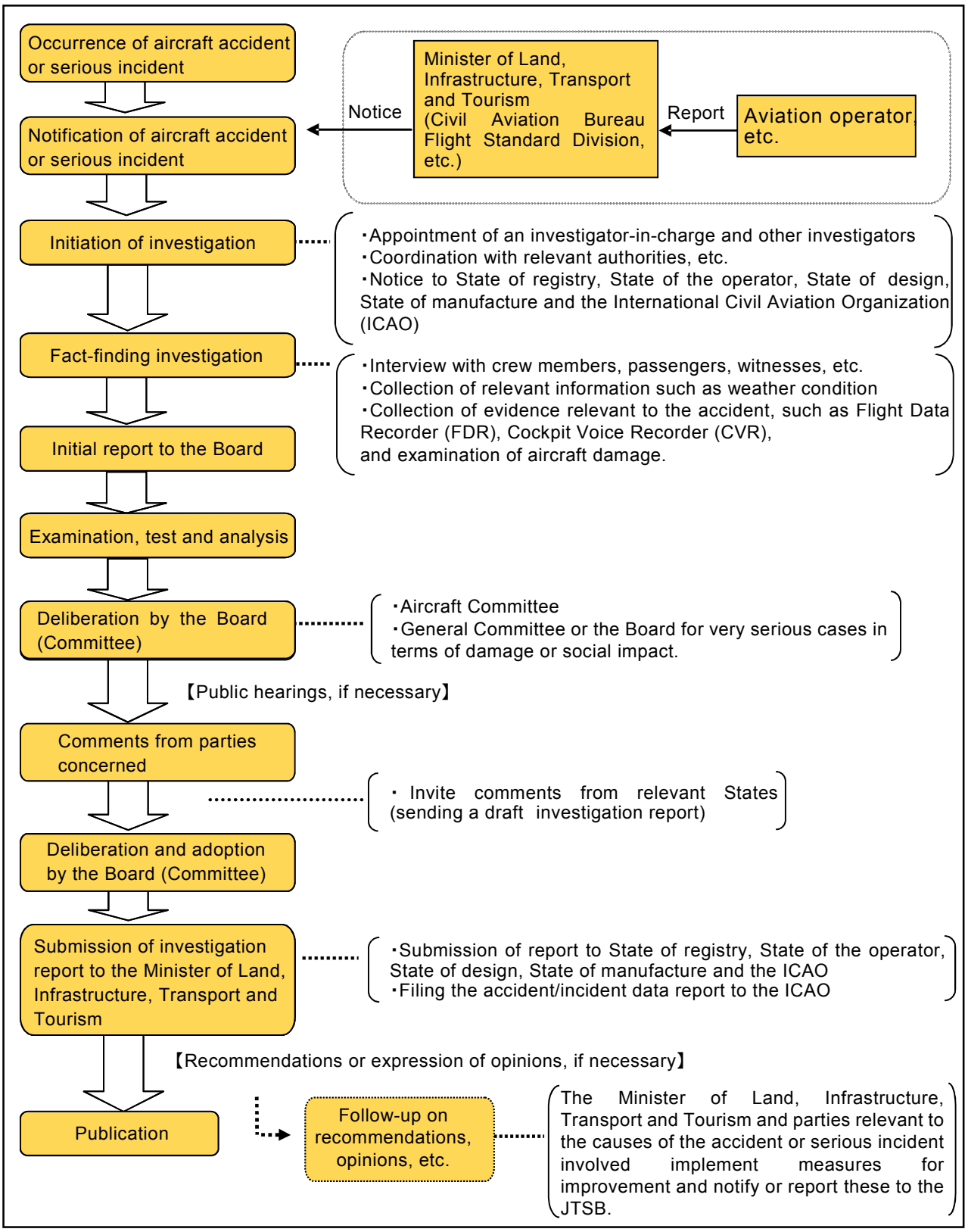
・When the pilot in command has recognized during flight that there was a danger of collision or contact with any other aircraft.

・When the pilot in command has recognized during flight that there is a danger of causing any of accidents listed in each item of paragraph 1, article 76 of the Civil Aeronautics Act, specified by Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism.

◎**Article 166-4 of the Ordinance for Enforcement of the Civil Aeronautics Act** (The case prescribed in the Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism under Article 76-2 of the Civil Aeronautics Act)

1 Take-off from a closed runway or a runway being used by other aircraft or aborted take-off
2 Landing on a closed runway or a runway being used by other aircraft or attempt of landing
3 Overrun, undershoot and deviation from a runway (limited to when an aircraft is disabled to perform taxiing)
4 Case where emergency evacuation was conducted with the use for emergency evacuation slide
5 Case where aircraft crew executed an emergency operation during navigation in order to avoid crash into water or contact on the ground
6 Damage of engine (limited to such a case where fragments penetrated the casing of subject engine
7 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
8 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 be continued
9 Multiple malfunctions in one or more systems equipped on aircraft impeding the safe flight of aircraft
10 Occurrence of fire or smoke inside an aircraft and occurrence of fire within an engine fire-prevention area
11 Abnormal decompression inside an aircraft
12 Shortage of fuel requiring urgent measures
13 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
14 Case where aircraft crew became unable to perform services normally due to injury or disease
15 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
16 Case where parts dropped from aircraft collided with one or more persons
17 Case equivalent to those listed in the preceding items

2 Procedure of aircraft accident/incident investigation



3 Statistics of investigations of aircraft accidents and serious incidents

The JTSB carried out investigations of aircraft accidents and serious incidents in 2017 as follows:

17 accident investigations had been carried over from 2016, and 20 accident investigations were newly launched in 2017. 16 investigation reports were published in 2017, and thereby 21 accident investigations were carried over to 2018.

14 serious incident investigations had been carried over from 2016, and 17 serious incident investigations were newly launched in 2017. Nine investigation reports were published in 2017, and thereby 22 serious incident investigations were carried over to 2018.

Among the 25 investigation reports published in 2017, one was issued with recommendations.

Investigations of aircraft accidents and serious incidents in 2017

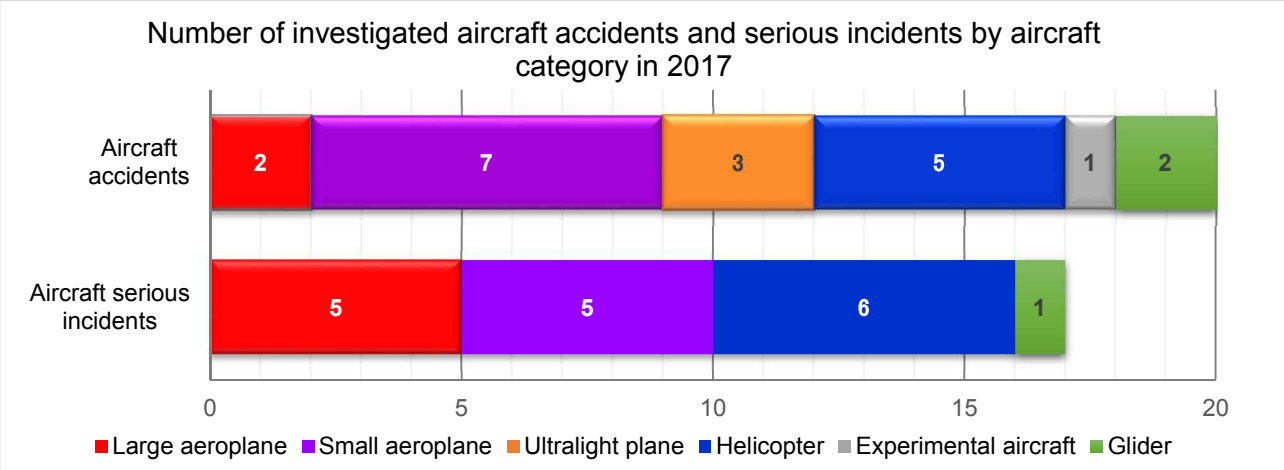
(Cases)

Category	Carried over from 2016	Launched in 2017	Total	Published investigation reports	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2018	(Interim report)
Aircraft accident	17	20	37	16	(1)	(0)	(0)	21	(0)
Aircraft serious incident	14	17	31	9	(0)	(0)	(0)	22	(0)

4 Statistics of investigations launched in 2017

The aircraft accidents and serious incidents that were newly investigated in 2017 consisted of 20 aircraft accidents, up six from 14 for the previous year, and 17 aircraft serious incidents, up eight from nine for the previous year.

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



* 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.

In the 20 aircraft accidents, the number of casualties was 31, consisting of 22 deaths and nine injured persons.

Statistics of number of casualties (aircraft accident)

(Persons)

2017							
Aircraft category	Dead		Missing		Injured		Total
	Crew	Passengers and others	Crew	Passengers and others	Crew	Passengers and others	
Large aeroplane	0	0	0	0	2	0	2
Small aeroplane	2	4	0	0	1	3	10
Ultralight plane	0	0	0	0	2	0	2
Helicopter	2	12	0	0	0	0	14
Experimental aircraft	1	0	0	0	0	0	1
Glider	1	0	0	0	1	0	2
Total	6	16	0	0	6	3	31
	22		0		9		

5 Summaries of aircraft accidents and serious incidents which occurred in 2017

The aircraft accidents and serious incidents which occurred in 2017 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
	February11, 2017 Oshima Airport, Tokyo	Privately owned	JA3357 Beechcraft 35-C33A
	Summary	See “6 Publication of investigation reports” (P.35, No.10)	
2	Date and location	Operator	Aircraft registration number and aircraft type
	March 5, 2017 Near Mt. Hachibuse in Nagano Prefecture	Nagano Prefectural Fire and Disaster Prevention Center	JA97NA Bell 412EP
	Summary	The aircraft took off from Matsumoto Airport and crashed near Mt. Hachibuse, killing nine people on board.	
3	Date and location	Operator	Aircraft registration number and aircraft type
	March 14, 2017 Grass field on the premises of Kobe Airport, Hyogo Prefecture	Educational Corporation Hiratagakuen	JA500H Eurocopter AS350B3
	Summary	The aircraft took off from Kobe Airport for flight training and rolled over on a grass field on the premises of the airport. No one was injured.	

	Date and location	Operator	Aircraft registration number and aircraft type
4	March 18, 2017 Near Odaira, Itoigawa City, Niigata Prefecture	Privately owned	JA7907 Robinson R44
	Summary: The aircraft took off from the temporary airfield (Mt. Hirukura) in Itoigawa City, Niigata Prefecture, and rolled over when it landed near the abovementioned location. No one was injured.		
5	Date and location	Operator	Aircraft registration number and aircraft type
	March 24, 2017 At the sea off Beppu City, Oita Prefecture (near Beppu International Tourist Port)	Setouchi SEAPLANES, Inc.	JA02TG Quest Kodiak 100
	Summary: The aircraft took bounces during the takeoff run from water and suffered damage to the aircraft when contacting water surface.		
6	Date and location	Operator	Aircraft registration number and aircraft type
	April 15, 2017 Lake Shinji, Matsue City, Shimane Prefecture	Privately owned	JA007P Cessna T206H
	Summary: The aircraft suffered damage due to a collision with wave during takeoff run from water at Lake Shinji, heading to Tottori Airport for a familiarization flight. No one was injured.		
7	Date and location	Operator	Aircraft registration number and aircraft type
	April 16, 2017 Aki-ota Town, Yamagata District, Hiroshima Prefecture	Privately owned	JR1286 Quicksilver MXII Sprint TOP-R582L (ultralight plane)
	Summary: See “6 Publication of investigation reports” (P.37, No.14)		
8	Date and location	Operator	Aircraft registration number and aircraft type
	May 3, 2017 Shirataka Town, Nishiokitama District, Yamagata Prefecture	Privately owned	None AutoGyro Cavaron (experimental aircraft)
	Summary: See “6 Publication of investigation reports” (P.35, No.11)		
9	Date and location	Operator	Aircraft registration number and aircraft type
	May 14, 2017 Tabayama Village, Kitatsuru District, Yamanashi Prefecture	Aviation Unit of Yamanashi Prefectural Police Department	JA110Y Bell 412EP
	Summary: While the aircraft engaged in rescue work near the abovementioned location after taking off from a helipad of the Yamanashi Prefectural Police Department, a person to be rescued was hit by objects such as tree branches and killed.		
10	Date and location	Operator	Aircraft registration number and aircraft type
	June 3, 2017 Near Ashikuraji, Tateyama Town, Nakaniikawa District, Toyama Prefecture	New Central Airservice Co.	JA3989 Cessna 172P
	Summary: The aircraft took off from Toyama Airport and crashed near the abovementioned location, killing four people aboard.		

11	Date and location	Operator	Aircraft registration number and aircraft type
	June 29, 2017 On the runway at Nagasaki Airport, Nagasaki Prefecture	Educational Corporation Kimigafuchi Gakuen	JA5304 Beachcraft 58
	Summary: The aircraft made a belly landing which caused damages to the aircraft at Nagasaki Airport during a training flight. No one was injured.		

12	Date and location	Operator	Aircraft registration number and aircraft type
	July 1, 2017 Approx. 45km southwest of Fukushima Airport At an altitude of approx. 4,500m	United Airlines	N29968 Boeing 787-9
	Summary: The aircraft took off from San Francisco and shook during its flight near the abovementioned location, injuring one of the cabin crew.		

13	Date and location	Operator	Aircraft registration number and aircraft type
	July 11, 2017 In a golf course (Himeji Aioi Country Club) in Yano Town, Aioi City, Hyogo Prefecture	Privately owned	GBYLP HALES CS RAND KR-2 (ultralight plane)
	Summary: The aircraft took off from Niigata Airport and made an emergency landing on the abovementioned location, suffering damage and injuring one person aboard.		

14	Date and location	Operator	Aircraft registration number and aircraft type
	August 14, 2017 Near Yamazoe Village, Yamabe District, Nara Prefecture	Privately owned	N702AV SOCATA TBM 700
	Summary: The aircraft took off from Yao Airport and reported that it would return to the airport, and thereafter it crashed into the mountains near the abovementioned location, suffering fatal damage.		

15	Date and location	Operator	Aircraft registration number and aircraft type
	August 27, 2017 Fukushima City, Fukushima Prefecture (in the vicinity of Bandai-Azuma Skyline Fudosawa Bridge)	Privately owned	JA2406 Hoffmann H-36 Dimona (glider)
	Summary: The aircraft took off from Fukushima Sky Park, and crashed into the mountains near the abovementioned location during flight.		

16	Date and location	Operator	Aircraft registration number and aircraft type
	September 10, 2017 Near Yamaoka Town, Ena City, Gifu Prefecture	Privately owned	JR1925 Quicksilver Max II Top-R582L Nishiyama (ultralight plane)
	Summary: The aircraft took off from the temporary airfield in Yamaoka Town, Ena City, Gifu Prefecture, and made an emergency landing in a forest near the abovementioned location, suffering damage. No one was injured.		

17	Date and location	Operator	Aircraft registration number and aircraft type
	October 8, 2017 Temporary airfield in Kurihara City, Miyagi	Privately owned	JA3447

	Prefecture		Beechcraft E33
	Summary	The aircraft attempted to take off from the temporary airfield in Kurihara City, Miyagi Prefecture, but failed, overrunning the runway. Four people were either killed or injured.	
18	Date and location	Operator	Aircraft registration number and aircraft type
	October 22, 2017 Approx. 40km east-northeast of Kumamoto Airport At an altitude of approx. 4,500m	Spring Japan	JA03GR Boeing 737-800
	Summary	The aircraft took off from Narita International Airport and shook during a descent over the abovementioned location, injuring one of the cabin crew.	
19	Date and location	Operator	Aircraft registration number and aircraft type
	November 8, 2017 Near Oaza Otomo, Ueno Village, Tano District, Gunma Prefecture	Toho Air Service Co., Ltd.	JA9672 Aerospatiale AS332L
	Summary	The aircraft took off from the temporary airfield in Hayakawa Town, Minamikoma District, Yamanashi Prefecture and crashed during its flight on a road near the abovementioned location and suffered fatal damage. Four people on board were killed.	
20	Date and location	Operator	Aircraft registration number and aircraft type
	November 10, 2017 Ono Gliding Field, Ibi District, Gifu Prefecture	Privately owned	JA05KG Schempp-Hirth V.L. Discus CS (glider)
	Summary	The aircraft attempted to make a winch-tow take-off but failed to gain enough altitude and so separated itself from the winch and tried to land on the ground. But it flipped over during landing because its right main wing hit the winch. No one was injured.	

(Aircraft serious incidents)

1	Date and location	Operator	Aircraft registration number and aircraft type
	January 19, 2017 Near the end of the Runway 01R at New Chitose Airport, Hokkaido Prefecture	ANA Wings Co., Ltd.	JA461A Bombardier DHC-8-402
	Summary	The aircraft took off from Akita Airport as a scheduled flight 1831 of ALL NIPPON AIRWAYS CO., LTD. as the joint undertaking for transport with ANA Wings, overran and came to a halt at the snow covered grassland when landing at New Chitose Airport.	
2	Date and location	Operator	Aircraft registration number and aircraft type
	February 12, 2017 At the vicinity of Kohnan Aerodrome, Okayama Prefecture	Okayama Glider Club	JA2330 Scheibe SF25C Falke (glider)
	Summary	See “6 Publication of investigation reports” (P.41, No.6)	
3	Date and location	Operator	Aircraft registration number and aircraft type
	February 14, 2017 Near Runway B at Narita International Airport, Chiba Prefecture (Thai AirAsia X)	Thai AirAsia X Co., Ltd. (Aircraft A)	HS-XTC Airbus A330-343X

	Approx. 2km south-southeast of and at an altitude of approx. 180m from the entry of Runway B at Narita International Airport (China Airlines)	China Airlines (Aircraft B)	B-18361 Airbus A330-302
	Summary	The Aircraft A crossed Holding Position Marking and entered onto the runway, despite an instruction to hold short of runway given by Aerodrome Control Facility. Because of this, the Aircraft B, approaching to land with the Landing Clearance, made a go-around as being instructed by Aerodrome Control Facility.	
4	Date and location	Operator	Aircraft registration number and aircraft type
	April 6, 2017 Over Komatsu City, Ishikawa Prefecture at an altitude of approx. 20,000 ft (approx. 6,100m)	Privately owned	JA01EP Beechcraft B200
	Summary	See “6 Publication of investigation reports” (P.42, No.9)	
5	Date and location	Operator	Aircraft registration number and aircraft type
	April 27, 2017 At a height of approx. 50m above the vicinity of Teshikaga Town, Kawakami-gun, Hokkaido Prefecture	Nakanihon Air Service Co., Ltd.	JA9743 Aerospatiale AS350B1
	Summary	The aircraft took off from the temporary airfield in Kawakami District, Hokkaido Prefecture, and sprayed fertilizer over a farm in the district. During its flight back to the temporary airfield, the aircraft dropped an empty bucket roughly 1.2m high and 1.3m across and weighing about 130kg.	
6	Date and location	Operator	Aircraft registration number and aircraft type
	June 27, 2017 On the runway at Fukushima Airport, Fukushima Prefecture	Privately owned	JA4010 Piper PA-46-310P
	Summary	The aircraft took off from Honda Airport and landed on the runway at Fukushima Airport but became stranded there.	
7	Date and location	Operator	Aircraft registration number and aircraft type
	July 1, 2017 Higashidori Village, Shimokita District, Aomori Prefecture	Japan Aerospace Exploration Agency	JA21RH Kawasaki BK117C-2
	Summary	For a test of dropping an object, the aircraft flew from the temporary airfield in Higashidori Village, Shimokita District, Aomori Prefecture, toward the dropping site but dropped the object on a sand beach on the way.	
8	Date and location	Operator	Aircraft registration number and aircraft type
	July 15, 2017 Near Runway B at Narita International Airport, Chiba Prefecture	Polar Air Cargo Worldwide Inc.	N852GT Boeing 747-8F
	Summary	When the aircraft was to take off from Runway B at Narita International Airport, it ran close to the end of the runway (approx. 85m before the end of the runway) before taking off.	
9	Date and location	Operator	Aircraft registration number and aircraft type
	August 3, 2017 Above near Kurobe City, Toyama Prefecture At an altitude of approx. 1,000m	Aero Asahi Corporation	JA6512 Eurocopter AS350B3

	Summary	The aircraft took off from the temporary airfield in Unazuki Town, Kurobe City, Toyama Prefecture, to carry an object (content: machine tools weighing approx. 700kg in total) hung outside from it but dropped the object near the abovementioned location.	
10	Date and location	Operator	Aircraft registration number and aircraft type
	August 13, 2017 Temporary Airfield of Akeno Sky Sports Club, Chikusei City, Ibaraki Prefecture	Privately owned (Aircraft A)	JA3353 Cessna172H Ram
		Privately owned (Aircraft B)	JX0157 Sakamoto SS-9 (ultralight plane)
	Summary	While Aircraft A was preparing for a take-off at the north end of the airfield in Chikusei City, Ibaraki Prefecture, Aircraft B landed on the airfield from the north.	
11	Date and location	Operator	Aircraft registration number and aircraft type
	August 27, 2017 Above near Yamashina Ward, Kyoto City, Kyoto Prefecture At an altitude of approx. 2,300m	Takumi Enterprise	JA7981 Robinson R44
	Summary	The aircraft took off from the temporary airfield in Oyabe City, Toyama Prefecture, and turned on the light to suggest that it was running out of fuel. The destination of the flight was thus changed to the ground of a school in Ogurisumaruyama, Fushimi Ward, Kyoto City, Kyoto Prefecture and the aircraft landed on the ground.	
12	Date and location	Operator	Aircraft registration number and aircraft type
	September 5, 2017 On Runway C at Tokyo International Airport, Tokyo	Japan Airlines Co.	JA743J Boeing 777-300ER
	Summary	When the aircraft was running on Runway C at Tokyo International Airport for a take-off, the flight instrument that warns of trouble on the first (left) engine blinked. After taking off, the pilot turned off the engine and requested priority in air traffic control and landed the aircraft on Runway A at the airport.	
13	Date and location	Operator	Aircraft registration number and aircraft type
	September 23, 2017 Above near Kitagawa Village, Aki District, Kochi Prefecture At a height of 70m	Nakanihon Air Service Co.	JA6717 Aerospatiale AS332L
	Summary	The aircraft took off from the temporary airfield in Kitagawa Village, Aki District, Kochi Prefecture, for goods transportation and dropped stone materials roughly 5cm to 25cm in diameter and weighing a total of about 2.7 tons near the abovementioned location during its flight.	
14	Date and location	Operator	Aircraft registration number and aircraft type
	September 23, 2017 Above near Osaka City, Osaka Prefecture	KLM Royal Dutch Airlines	PHBQC Boeing 777-200
	Summary	The aircraft took off from Kansai International Airport and dropped a fairing panel (roughly 100cm by 60cm and weighing 4.3kg) from the root of the main right wing while ascending over near the abovementioned location but continued its flight and reached Amsterdam. The panel hit a motor vehicle running near 3-Chome, Nishitemma, Kita Ward, Osaka City, Osaka Prefecture.	
15	Date and location	Operator	Aircraft registration number and aircraft type
	October 6, 2017 Above near Ishikari City, Hokkaido Prefecture At an altitude of approx. 500m	Privately owned	JA3500 Cessna 172K

	Summary	The aircraft took off from Sapporo Airfield and made an emergency landing on a sand beach along the shore of Ishikari Bay in Ishikari City, Hokkaido Prefecture, as the power output of its engine dropped during the flight.	
16	Date and location	Operator	Aircraft registration number and aircraft type
	October 15, 2017 Near the airfield traffic pattern of Fukui Airport, Fukui Prefecture At an altitude of approx. 300m	Privately owned	JA3842 Beechcraft A36
	Summary	The aircraft took off from Niigata Airport and made an emergency landing on the Kuzuryu River as the power output of its engine dropped while flying over near the abovementioned location.	
17	Date and location	Operator	Aircraft registration number and aircraft type
	November 11, 2017 Above Uozumi Town, Akashi City, Hyogo Prefecture A flying altitude of approx. 1,000 to 1,100 feet (approx. 300 to 330m)	Privately owned (Reporting planes)	JA274J Robinson R44 II
		Educational Corporation Hiratagakuen (Related plane)	JA831H Eurocopter EC135P2+
	Summary	When the reporting plane was flying level westward at an altitude of around 330m, it crossed over the other aircraft within a horizontal distance of about 30m to 60m at an altitude difference of around 30m to 60m.	

6 Publication of investigation reports

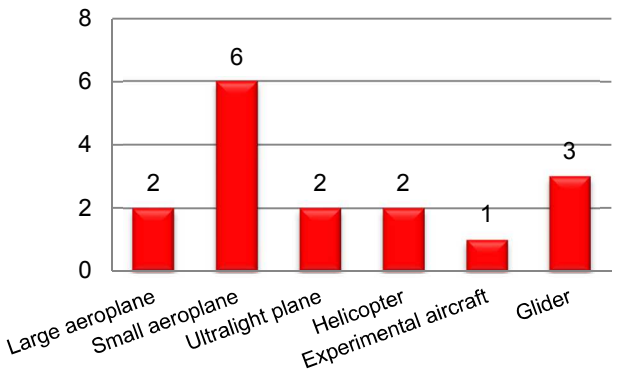
The number of investigation reports of aircraft accidents and serious incidents published in 2017 was 25, consisting of 16 aircraft accidents and nine aircraft serious incidents.

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

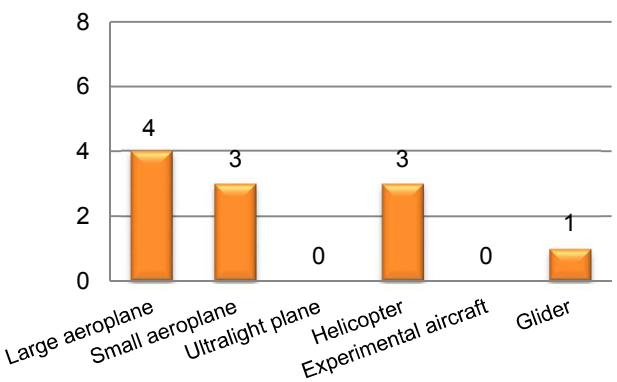
Note: In aircraft accidents and serious incidents, two or more aircraft are sometimes involved in a single case.

In the 16 accidents, the number of casualties was 23, consisting of 13 death, and 10 injured persons.

Number of published aircraft accident reports (16 cases) by aircraft category in 2017



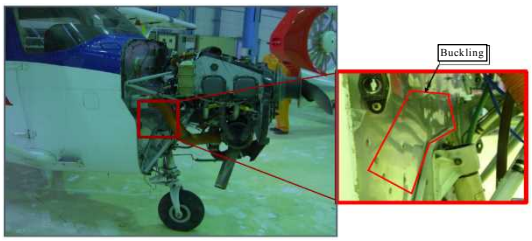
Number of published aircraft serious incident reports (9 cases) by aircraft category in 2017



The aircraft accidents and serious incidents which occurred in 2017 are summarized as follows.

Aircraft accident investigation reports published in 2017

1	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	February 23, 2017	April 10, 2016 Aso City Kumamoto Prefecture	Privately owned	JA2437 S.N. Centrair C 101B (glider)
	Summary	The aircraft crashed on the cross country course (lawn) by failure of forced landing in the Aso Tourism Ranch, with a winch has failed while climbing by winch launch for a familiarization flight from runway 26 of Aso Tourism Ranch landing field. The fuselage was destroyed. The Captain was not injured 		
	Probable Causes	In this accident, it is highly probable that, the winch failed while the Aircraft was climbing with winch launch, and after the release of the tow line, nevertheless there was its insufficient altitude, as the Captain tried to make landing after a turn, and it was crashed by allowing the airframe contact with the groves. It is highly probable that the reason for the Captain tried landing after a turn although there was not enough altitude was that he could not properly read the correct AGL from the barometric altimeter and judged its value higher than the actual one. It is probably involved in the fact that the advance preparation by the Captain to read the AGL from the barometric altimeter was inadequate.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA2437.pdf		
2	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	March 30, 2017	May 23, 2015 Bed of the Tone River, Kashiwa City, Chiba Prefecture	Privately owned	JR0552 Maxair Drifter XP-R503 Vert L (ultralight plane)
	Summary	The aircraft took off from the Moriya Temporary Airfield for a familiarization flight and made an emergency landing on a bed of the Tone River as its engine stopped working while flying over the traffic pattern of the airfield. The aircraft suffered damage to its frame. 		
	Probable Causes	In this accident, it is probable that the aircraft suffered damage to its frame when it made an emergency landing on the grass as its engine stopped working during flight. It is probable that the engine stopped because the V-belt, which activates the cooling fan, was cut off and became unable to cool the engine enough, making it too hot.		
	Report	http://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2017-2-1-JR0552.pdf		
3	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	March 30, 2017	March 26, 2016 Yao Airport, Osaka Prefecture	Privately owned	JA3788 Mooney M20C

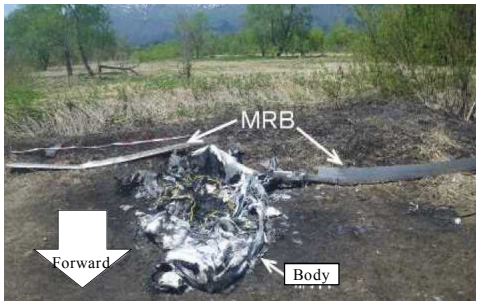
	Summary	The aircraft bounced while landing on Runway 27 of Yao Airport and attempted go-around, but stalled during climbing and went into spin, and then crashed into the south side shoulder of the runway. A captain and three passengers were on board and all of them were fatally injured. The aircraft was destroyed and a fire broke out. 		
	Probable Causes	In this accident, the aircraft bounced while landing and attempted a go-around, and it made an abnormal nose-up continued and decelerated, and then the stall could not be avoid in a situation where it imminent; consequently, it is highly probable that it stalled and went into spin, and finally it had crashed. Regarding the reason why the stall could not be avoid in the imminent situation, it is somewhat likely that the captain or passenger A who maneuvered the aircraft could not suppress the excessive nose-up movement because it was exceeding the maneuverable range and others. All members of the aircraft on board were died; accordingly, the investigation was unable to determine the causes. Besides, the aircraft had overweight and aft CG location for the aft limit corresponding to the maximum weight. It is somewhat likely that these condition affected the controllability and the stability, and contributed to the bounce on touchdown, the abnormal nose-up posture during a goaround, the decreased stability at low speed flight and the occurrence of stall and spin.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA3788.pdf http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AA2017-2-2-p.pdf (Explanatory material) See summaries of major aircraft accident and serious incident investigation reports (P.53).		
4	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	May 25, 2017	September 22, 2015 Honda Airport Okegawa City, Saitama Prefecture	Honda Airways Co., Ltd.	JA31HA Cessna 172S,
	Summary	The aircraft suffered damage to its airframe upon landing on the Runway 32 of Honda Airport, for a solo flight training. A trainee who was the only person onboard the aircraft, was not injured. The aircraft sustained substantial damage, but no fire broke out. 		
	Probable Causes	In this accident, when the aircraft landed, it is probable that it made a dropped landing and bounced; subsequently, it strongly grounded again from the nose landing gear, the empennage struck the runway due to its reaction and the go-around operation, and then the airframe was damaged. Regarding the reason why the aircraft made a dropped landing at its landing, it is probable that the Trainee continued a flare operation without executing a go-around to prevent a dropped landing, even though he felt that the altitude to commence a flare operation was slightly higher more than usual. Regarding the reason why the Trainee continued the flare operation without executing a go-around to prevent the drop-landing, it is somewhat likely that his maneuvering skill was not the level to operate a safe and stable landing including a flare operation. Moreover, the Company did not have a proper skill management system for flight trainees and it allowed the solo flight training even though the Trainee's skill did not fulfill the Safety Criteria for Solo Flight established by it; besides, the methods for a supervision to monitor and an instruction for a solo flight training were inadequate; accordingly, it is somewhat likely that they contributed to the occurrence of the accident.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA31HA.pdf		

<table>
<tr><td rowspan="3">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>July 18, 2017</td><td>July 26, 2015
Chofu City, Tokyo Metropolitan</td><td>Privately owned</td><td>JA4060
Piper PA-46-350P</td></tr>
<tr><td>Summary</td><td colspan="3">The aircraft crashed into a private house at Fujimi Town in Chofu City, right after its takeoff from Runway 17 of Chofu Airport.
There were five people on board, consisting of a captain and four passengers. The captain and one passenger died and three passengers were seriously injured. In addition, one resident died and two residents had minor injuries.
The aircraft was destroyed and a fire broke out. The house where the aircraft had crashed into were consumed in a fire and neighboring houses sustained damage due to the fire and other factors.</td></tr>
<tr><td></td><td>Probable Causes</td><td colspan="3">It is highly probable that this accident occurred as the speed of the Aircraft decreased during takeoff and climb, which led the Aircraft to stall and crashed into a residential area near Chofu Airport.
It is highly probable that decreased speed was caused by the weight of the Aircraft exceeding the maximum takeoff weight, takeoff at low speed, and continued excessive nose-up attitude.
 
As for the fact that the Captain made the flight with the weight of the Aircraft exceeding the maximum takeoff weight, it is not possible to determine whether or not the Captain was aware of the weight of the Aircraft exceeded the maximum takeoff weight prior to the flight of the accident because the Captain is dead. However, it is somewhat likely that the Captain had insufficient understanding of the risks of making flights under such situation and safety awareness of observing relevant laws and regulations.
It is somewhat likely that taking off at low speed occurred because the Captain decided to take a procedure to take off at such a speed; or because the Captain reacted and took off due to the approach of the Aircraft to the runway threshold.
It is somewhat likely that excessive nose-up attitude was continued in the state that nose-up tended to occur because the position of the C.G. of the Aircraft was close to the aft limit, or the Captain maintained the nose-up attitude as he prioritized climbing over speed.
Adding to these factors, exceeding maximum takeoff weight, takeoff at low speed and continued excessive nose-up attitude, as the result of analysis using mathematical models, it is somewhat likely that the decreased speed was caused by the decreased engine power of the Aircraft; however, as there was no evidence of showing the engine malfunction, it was not possible to determine this.</td></tr>
<tr><td></td><td>Report</td><td colspan="3">http://www.mlit.go.jp/jtsb/eng-air_report/JA4060.pdf
http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AA2017-4-1-p.pdf (Explanatory material)
See summaries of major aircraft accident and serious incident investigation reports (P.54).</td></tr>
<tr><td rowspan="3">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>July 27, 2017</td><td>November 22, 2015
Matsuida Town, Annaka City, Gunma Prefecture</td><td>Privately owned</td><td>JA7963
Robinson R22 Beta (Rotorcraft)</td></tr>
<tr><td>Summary</td><td colspan="3">The rotorcraft took off from Tokyo Heliport flight to Komoro Temporary Helipad at Komoro City, Nagano Prefecture. The rotorcraft collided into a slope face of a mountain at side of Joshin-etsu Expressway near Matsuida Town, Annaka City, and Gunma Prefecture.
A captain and a passenger were on board the rotorcraft and both of them died in the collision.
The rotorcraft was destroyed, but there was no outbreak of fire.</td></tr>
</table>

	Probable Causes	In this accident, it is probable that the rotorcraft collided into a slope face of a mountain, because it continued a flight in spite of a deteriorated weather during the flight to a temporary helipad of destination and resulted in flying at low altitude in order to secure a visibility under a condition where VMC could not be maintained. Regarding the reason for the rotorcraft to continue a flight in spite of the deteriorated weather, it is probable that it was because the pilot was trying to find a route to the destination. 		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA7963.pdf		
7	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	July 27, 2017	May 5, 2016 Miharu Town, Tamura District, Fukushima Prefecture	Privately owned	JA21BB Glasflugel 304CZ-17 (glider)
	Summary	The aircraft took off from the Kakuda Glider Field in Kakuda City, Miyagi Prefecture by aero tow for a training flight, but crashed in a mountain forest in Miharu Town, Tamura-Gun, Fukushima Prefecture. The pilot was the only person on board the aircraft, and he was fatally injured. The glider was destroyed, but there was no outbreak of fire.		
	Probable Causes	It is highly probable that this accident occurred when JA21BB crashed in a mountain forest because it broke up in mid-air while flying. It is somewhat likely that the glider broke up in mid-air because, after it had entered a steep turn and stalled while the pilot had succumbed to a state of hypoxia and was semi-conscious, excessive bending occurred owing to aerodynamic force on the glider and the Glider was subjected to load exceeding the ultimate maneuvering load, influenced by the fact that the glider assumed a significant nose-down attitude including spin and nosedived, and that it passed through an area of turbulence. It is somewhat likely that the pilot succumbed to a state of hypoxia because he had forgotten to open the oxygen valve before setting off and thus started the flight with no supply of oxygen, and had not noticed that oxygen was not being supplied because he did not check the oxygen supply during flight, and so continued to climb without noticing signs of hypoxia in himself. 		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA21BB.pdf		
8	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	November 16, 2015 Sendai Airport, Miyagi Prefecture	Privately owned	JA3762 Beechcraft A36
	Summary	The aircraft with the captain and one passenger on board, took off from the runway 12 of Sendai Airport and during the touch-and-go training, it made a belly landing, which caused damages to the aircraft fuselage. 		

	Probable Causes	In this accident, it is certain that the aircraft made a belly landing without extend the landing gear and damaged the aircraft fuselage. Regarding the aircraft landed without extend the landing gear, it is probable that because the approach was implemented under the condition that the captain had no spare time to assess the situation, to pilot or to maneuver, the captain forgot the landing gear operation, furthermore, he had forgot to confirm the landing gear operation at the before landing check and to reconfirm the landing gear operation during the final approach. Regarding the situation for the captain to approach without any spare to assess the situation and to pilot maneuver, it is probable that the facts to pilot or maneuver the unfamiliar aircraft without any prior understanding of any systems is involved. Furthermore, it is somewhat likely that because the landing gear warning device was not worked due to the functional defect, it possibly contributed the captain and the passenger who could not find out their forgetting to operate the landing gear until the last.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA3762.pdf		
9	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	March 17, 2016 Sakae Town, Inba District, Chiba Prefecture	Privately owned	JA50KM PZL-Bielsko SZD-50-3 Puchacz (glider)
	Summary	The aircraft launched from the Otone airfield for a flight training by aero-tow. It crashed on two houses in a residential area in Sakae-town, Inba-gun, Chiba prefecture and was destroyed and both of an instructor and a trainee on board died.		
	Probable Causes	In this accident, it is probable that the Glider was crashed because it had entered a spin and could not recover from it. Regarding why the Glider entered the spin and could not recover from it, it is not possible to determine the cause because the persons on board died. 		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA50KM.pdf http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AA2017-6-1-p.pdf(Explanatory material) See summaries of major aircraft accident and serious incident investigation reports (P.55).		
10	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	February 11, 2017 Oshima Airport, Tokyo	Privately owned	JA3357 Beechcraft 35-C33A
	Summary	The aircraft suffered a damage to the aircraft, because a landing gear was retracted during a landing roll.		
	Probable Causes	In this accident, it is probable that the Aircraft was damaged because the Aircraft retracted the landing gear during the landing roll. Regarding the retraction of landing gears during the landing roll, it is probable that there were possibilities for the Pilot to move the landing gear position switch to up position by a mistake instead of the flap position switch, and for the safety switch which should prevent to retract the landing gear on ground, not to open the landing gear retracting circuit because the safety switch had detected the situation of being mid-air due to the Aircraft was blown by wind at these conditions. 		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA3357.pdf		
11	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	May 3, 2017 Shirataka Town, Nishiokitama	Privately owned	None AutoGyro Cavaron (experimental

		District, Yamagata Prefecture		aircraft)
	Summary	The aircraft took off during a ground-based running test at the temporary airfield in Shirataka Town, Nishiokitama District, Yamagata Prefecture, and crashed while flying level. The plane was fatally damaged and burst into flames, killing the operator.		
	Probable Causes	In the accident, it is highly probable that the aircraft took off during a ground-based running test and the MR suddenly inclined backward to an abnormal angle while flying, letting the MRBs hit the rear part of the airframe and cutting it off and so the aircraft crashed. For the backward tilt of the MR, it is probable that the operator exponentially gave a forward entry to the control stick, making the aircraft tilt forward while creating a low load factor, and then gave so rapid a backward entry to the controlling stick that the aircraft failed to follow the MR's tilt. It is somewhat likely that the rapid forward entry was given to the controlling stick as the operator was short of knowledge and skills. But real reasons could not be determined due to the operator's death.		
	Report	http://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2017-6-5-none.pdf		
12	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	November 10, 2016 About 21nm (About 39 km) East-Southeast of Kagoshima Airport at an Altitude of About 17,000 ft (About 5,200 m)	Japan Airlines Co., Ltd.	JA658J Boeing 767-300
	Summary	The aircraft had one cabin attendant fell and injured during a takeoff climb for a flight from Kagoshima Airport to Tokyo International Airport with 129 persons on board, consisting of 11 crew members and 118 passengers.		
	Probable Causes	In this accident, it is probable that the CA suffered the injury, because during the takeoff climbing at the time of the seat belt signs to be turned on, as the CA found an infant crawled out of the hands of the custodian to the vacant next seat and attempted to stand up in order to call out, lost balance, fell backward to the floor at right of the jump seat. It is somewhat likely that the CA lost balance, because the shake of the Aircraft increased its strength again due to the turbulence when the CA tried to stand up.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA658J.pdf		
13	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	October 26, 2017	May 6, 2016 Temporary airfield (Miho Airstrip), Shizuoka City, Shizuoka Prefecture	Privately owned	JA4023 Socata TB10
	Summary	The aircraft had taken off from Miho Temporary Airfield for a practice flight, then it was stranded in the area where sand had been accumulated around the end of runway 15, because it was not able to stop within the runway when it had landed on runway 15.		



	Probable Causes	In this accident, it is probable that because the appropriate maneuvering operation was not performed considering the wind that was changed in the direction of the tailwind, its touchdown was long down the runway, in addition, the pilot continued the landing operation based on his judgment that it would be able to stop inside the runway at the time of its touchdown despite the distance from the touchdown position to the end of the runway was insufficient margin against the landing performance (landing roll distance), it had overrun and was stranded in the area that sand accumulated near the end of runway 15. Regarding why the pilot did not conduct the appropriate operation in consideration of the changed wind direction to tailwind, it is probable that the pilot did not notice the change of the wind because he did not verify the wind by checking the windsock and others. 		
	Report	http://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2017-7-1-JA4023.pdf		
14	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	October 26, 2017	April 16, 2017 Aki-ota Town, Yamagata District, Hiroshima Prefecture	Privately owned	JR1286 Quicksilver MXII Sprint Top-R582L (ultralight plane)
	Summary	The aircraft, with only the operator aboard, took off from the temporary airfield of Sugi-no-Tomari Sky Hobby Field in Akiota Town, Yamagata District, Hiroshima Prefecture, for a familiarization flight. As the engine stopped working during climb, the aircraft made an emergency landing on a road nearby, suffering damage to its frame and causing the operator a severe injury.		
	Probable Causes	In the accident, it is highly probable that the aircraft took off from the airfield and the operator tried to make an emergency landing as the engine stopped working during an ascent but suffered a severe injury. It is highly probable that the shutdown of the engine was ascribable to the accumulation of carbon in the piston ring of the front cylinder which caused the piston ring to firmly attach to the piston. A resultant increase in friction between the piston and the cylinder caused temperatures in the cylinder to rise and thermally expanded the piston. The piston strongly rubbed against the cycler and so its movement was restricted. It is somewhat likely that inadequate inspection and maintenance of the aircraft was a factor contributing to the accumulation of carbon in the piston ring. 		
	Report	http://www.mlit.go.jp/jtsb/aircraft/rep-acci/AA2017-7-2-JR1286.pdf		
15	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	November 30, 2017	August 8, 2016 Hirasawa, Hadano City, Kanagawa Prefecture	Aero Asahi Corporation	JA6917 Kawasaki BK117C-2
	Summary	The Aircraft was damaged because of a hard landing in an attempt to land at the Temporary Helipad in Hadano City, Kanagawa Prefecture, in order to transport a sick and wounded person for an emergency medical care.		

	Probable Causes	It is highly probable that in this accident, the rotorcraft was damaged because the landing was resulted in the hard landing. With regard to the hard landing of the rotorcraft, it is probable that because it did not used an approach path to the temporary helipad along an approach surface which is confirmed to comply with the standard, flew over the high steel tower near the temporary helipad of the planned destination, commenced the approach at a rather large approach angle and descent rate, and decreased the forward airspeed in order to transit to hover, the main rotor developed VRS and in spite that the pilot pulled CP up, the corresponding lift could not be gained. 
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA6917.pdf

16	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	December 21, 2017	February 23, 2016 New Chitose Airport, Hokkaido	Japan Airlines Co., Ltd.	JA322J Boeing 737-800
	Summary	The aircraft as a scheduled flight 3512 of the company, after being pushed back from an apron, was holding to taxi on a taxiway in order to depart from New Chitose Airport to Fukuoka Airport. Snow started to fall suddenly. The captain decided to move to the designated apron in order to remove the ice and snow from the aircraft. When the aircraft had stopped on a taxiway where the aircraft was moving because snow became harder, odd smells and smoke were generated within the cabin and the flame was confirmed at rear of No.2 engine (right side). Because of these, at around 15:10, an Emergency Evacuation was conducted through the evacuation slide at the Taxiway T2.  There were 165 people in total aboard the aircraft, consisting of the captain and five other crewmembers and 159 passengers. During this Emergency Evacuation, one passenger suffered serious injury and two passenger suffered minor injuries. The aircraft was not damaged.		
	Probable Causes	In this accident, it is probable that while holding on the taxiway to taxi following the heavy snowfall, odd smells and smoke were generated within the cabin, following these events, because the flame from rear of No.2 engine was continued, the flight crew conducted the Emergency Evacuation from the aircraft. At the time, a passenger descended the slide, fell down to the ground from the hip of the passenger and suffered serious injury. Regarding the occurrences of odd smells and smoke in the cabin and the continuation of the flame at the rear of No.2 engine, it is probable that the Heavy Snow became intense due to the rapid weather deterioration, and because the icing was set at fan blades and low pressure compressor, the engine oil was leaked into inside of the engine and the oil vaporized into the cabin and the leaked oil was accumulated within in the tailpipe to catch the fire.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA322J.pdf http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AA2017-9-1-p.pdf (Explanatory material) See summaries of major aircraft accident and serious incident investigation reports (P.56).		

Aircraft serious incident reports published in 2017

1	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 27, 2017	June 3, 2015 Naha Airport, Okinawa Prefecture	Japan Transocean Air Co., Ltd. (Aircraft A)	JA8938 Boeing 737-400
			All Nippon Airways Co., Ltd. (Aircraft B)	JA80AN Boeing 737-800
			Japan Air Self-Defense Force (Aircraft C)	57-4493 CH - 47J

Summary

The Aircraft A as its scheduled flight 610 was approaching the runway 18 of Naha Airport for landing.
The Aircraft B as its scheduled flight 1694 bound for New Chitose Airport commenced a take-off roll on the runway with the take-off clearance from the aerodrome control tower of the aerodrome control facility however, it rejected a take-off due to the fact a the Aircraft C was approaching the runway after taking off from the taxiway A-5.
After that, although aerodrome control tower of the aerodrome control facility instructed the Aircraft A which approaching the runway to execute a go-around, it landed on the runway before the vacating of the Aircraft B.
There were 44 persons on board the Aircraft A, consisting of the Pilot in Command (PIC), four crew members, and 39 passengers; 83 persons on board the Aircraft B, consisting of the PIC, five crew members and 77 passengers; seven persons on board the Aircraft C, consisting of the Pilot, four crew members, and two passengers. There were no injuries to these persons.

Probable Causes

It is certain that this serious incident occurred as follows: when the Aircraft B rejected a take-off on the runway 18 due to the Aircraft C crossed over in its front, and the Aircraft A landed on the runway 18 before its vacating.
It is probable that the Aircraft A landed on the runway was because the PIC, recognizing the existence of the Aircraft B on the runway when it started flare, as it had been issued the landing clearance by the aerodrome control tower, although he could not confirm the trend of the Aircraft B, based on his experience at the airport and on the same type of aircraft and the landing performance, it was judged by the PIC that it could land safely. It is also somewhat likely that the judgment is related to the fact the PIC could not confirm the trend of the Aircraft C which had crossed over the runway.
Regarding the Aircraft A landed on the runway although the aerodrome control tower of the aerodrome control facility instructed it to execute a go-around, it is probable that it had already landed on the runway and the reverse thrust operation was started when the PIC and the FO were recognizing the instruction. In addition, it is probable that it was involved that the instruction of executing a go-around had missed the timing.
It is highly probable that the reason why the Aircraft B rejected take-off is that, while the PIC was in the situation that he was not able to determine the flight direction of the Aircraft C approaching its departure course after the take-off of the Aircraft C and because the PIC of the Aircraft B felt a serious danger in the continued take-off; therefore, he decided to reject the takeoff.
Besides, it is highly probable that, regarding the take-off of the Aircraft C, its pilots misunderstood the take-off clearance for the Aircraft B as the clearance for their aircraft, as well as the Pilot and the Load-master carried out external visual checks; however, it was due to delay in noticing the Aircraft B that commenced a take-off roll.
Moreover, regarding the fact that the pilots of the Aircraft C misunderstood the take-off clearance for the Aircraft B as their take-off clearance, although they could not accurately hear what was transmitted to them by the aerodrome control tower, it is probable that they did not make mutual confirmation of the contents of the transmission. Besides, it is probable that the pilots of the Aircraft C did not notice misunderstanding the take-off clearance, as there was nothing pointed out from the aerodrome control tower of the aerodrome control facility to the wrong read-back of the Aircraft C.
It is probable that because the Aircraft C was not pointed out from the aerodrome control tower

		of the aerodrome control facility to the wrong read-back, as the aerodrome control tower was not able to hear its read-back. About this matter, it is probable that because the characteristics of the VHF receiver used for air traffic control communication was involved.
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/57-4493_JA80AN_JA8938.pdf http://www.mlit.go.jp/jtsb/aircraft/p-pdf/AI2017-1-2-p.pdf (Explanatory material) See summaries of major aircraft accident and serious incident investigation reports (P.57).

2	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	April 27, 2017	July 22, 2015 Yurihonjo City, Akita Prefecture	Tohoku Air Service, Inc.	JA6777 Aerospatiale AS332L1 (Rotorcraft)
	Summary	The rotorcraft took off from a temporary helipad in Iwaki-takinomata-jinai, Yurihonjo City, Akita prefecture. When the rotorcraft slung a work hut at a cargo loading site in Iwaki-fukunomata-jinai, the same city and flew to a cargo unloading site in Iwakifukunomata- jinai, the sliding doors of the slung work hut dropped from the rotorcraft to a forest.		
	Probable Causes	In this serious incident, it is probable that the sliding doors of the work hut derailed and dropped because of no effective measures taken to prevent the objects from dropping, when transporting the work hut by slinging. It is somewhat likely that contents of the education by the subcontractor A did not include the detailed method to pack the unique shaped cargo; the safety education to transport cargos was not sufficiently infiltrated; and there were a study and a check to prevent the drop from the slung object contributed no effective measures taken to prevent the objects from dropping.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA6777.pdf		

3	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	June 29, 2017	December 4, 2015 Otone Temporary Airfield Kawachi Town, Inashiki-Gun, Ibaraki Prefecture	Privately owned	JA30HT Maule Air M-7-235C
	Summary	The aircraft damaged the tailwheel during its taxiing to an apron after landing at Otone Temporary Airfield, therefore, the aircraft could not be continued taxiing and stopped in front of the apron.		
	Probable Causes	At this serious incident, it is certain that the aircraft could not continue the operation because during its taxiing after the landing, it dropped the tailwheel from the tail spring of the airframe. Regarding the falling of the tailwheel from the airframe tail spring, it is highly probable that because the head part of the bolt connecting the tailwheel bracket assembly had a fatigue fracture generated and was fractured. Regarding the breakage due to the generation of fatigue fracture at the bolt head part, it is certain that it involved not to implement a proper maintenance work following the technical materials such as maintenance manual, parts catalogue and drawings applicable to the specification of the tailwheel.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA30HT.pdf		

4	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	July 27, 2017	March 1, 2016 Mihama Town, Mikata-gun, Fukui Prefecture	Aero Asahi Corporation	JA9678 Aerospatiale AS332L1 (Rotorcraft)
	Summary	The rotorcraft took off from a temporary helipad at Mihama Town, Mikata-gun, Fukui Prefecture and dropped one of cargos to mountain forest, during a flight to a work site suspending two cargos by a sling.		

	Probable Causes	It is highly probable that the serious incident was occurred due to the dropping the object because the keeper of the hook in use opened during the flight of the rotorcraft. Regarding why the keeper of the hook opened, it is somewhat likely that because the keeper was not locked even though a load was applied and the pushrod entered in the gap generated between the keeper and the toggle due to a horizontal load because of the occurrence of the improper wire roping at the unlocked keeper condition. Regarding why the eye of the wire resulted in the improper wire roping, it is somewhat likely that because the work-classified operation manual did not have the procedure to confirm the position of lock indicator of the keeper and the ground worker did not have enough time to prepare the wire like matching the length of the wire and removing the twist. 
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA9678_170727.pdf

5	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	August 31, 2017	March 21, 2016 Kagoshima Airport, Kagoshima Prefecture	Privately owned	JA01YK Cirrus SR22T
	Summary	The aircraft took off from Nagasaki Airport for the purpose of a familiarization flight, the strut assembly of the nose landing gear was fractured at landing on the runway 34 of Kagoshima Airport and the Aircraft stopped there as its nose in contract with the runway. There were five people on board, consisting of a captain and four passengers, there were no injured. The Aircraft sustained minor damages, but there was no outbreak of fire.		
	Probable Causes	It is certain that this serious incident occurred as the Aircraft was unable to taxi itself because the Aircraft had fractured its nose landing gear strut tube at landing and halted as leaning forward condition while the nose of the Aircraft was in contact with the runway. Regarding the fracture of the nose landing gear strut tube, it is probable that because undetected fatigue crack which had been generated at the forward toe of the Gusset tube weld bead of the strut tube prior to the occurrence of the serious incident progressed and the strength of the nose landing gear strut tube was decreased significantly, the load which was applied on the nose landing gear at landing of this serious incident resulted in the fracture. Regarding the initiation and progression of the fatigue crack at the forward of the Gusset tube weld bead of the strut tube, it is somewhat likely that the repeated occurrences of the shimmy at landing of the Aircraft had contributed. In addition, it is probable that the repeated application of high tensile stress onto the left side of the forward of the Gusset tube weld bead of the strut tube had contributed to the progress of the crack, because the captain had operational tendencies to initiate the left turn at the speed which the Aircraft did not decelerate sufficiently in order to vacate the runway after landing.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA01YK.pdf		

6	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	September 28, 2017	February 12, 2017 In the vicinity of Kohnan Aerodrome, Okayama Prefecture	Okayama Glider Club	JA2330 Scheibe SF25C Falke (motor glider)
	Summary	The aircraft landed on Kohnan Aerodrome by gliding and halted on a runway, because its engine halted while flying over Okayama City and was unable to restart.		
	Probable Causes	In this serious incident, it is highly probable that the engine halted and could not restart due to the carburetor icing occurrences during the flight of the aircraft. As for the reason of occurrences of the carburetor icing, it is probable that the carburetor heater was not used while the aircraft executed descent by idling at the low oil temperature, was holding at the airspace of serious carburetor icing risk. 		

	Report	http://www.mlit.go.jp/jtsb/aircraft/rep-inci/AI2017-5-1-JA2330.pdf		
7	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	October 26, 2017	June 30, 2015 Approx. 55 km east-northeast of Tanegashima Airport, Kagoshima prefecture At an altitude of approx. 37,000 ft	Japan Transocean Air Co., Ltd.	JA8525 Boeing 737-400
	Summary	The aircraft during a flight as the scheduled Flight 002 from Naha Airport to Kansai International Airport, at about 55 km east-northeast of Tanegashima Airport, made emergency descend to the altitude of about 10,000 ft due to decompression inside the aircraft. After that, the aircraft continued the flight and landed at Kansai International Airport.		
	Probable Causes	It is highly probable that the serious incident occurred because the supply from the both Bleed Air systems were stopped, abnormal decompression was occurred in the cabin. As for the stoppage of the both Bleed Air supply, it is highly probable that PRSOV was closed because the Bleed Air temperature was rising and exceeding the specified values in a state of occurrence of failures due to the cracks in the both systems of 450 ºF Thermostat, and malfunctions were generated due to deteriorations at the both systems of Pre-cooler Control Valve.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA8525.pdf		
8	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	December 21, 2017	April 17, 2016 Approx. 33nm north-northwest of Hiroshima Airport, Hiroshima Prefecture At an altitude of approx. 38,500ft	Ibex Airlines Co., Ltd.	JA06RJ Bombardier CL-600-2C10
	Summary	The aircraft had flown as scheduled flight 084 of the company from Fukuoka Airport to Komatsu Airport, however, the aircraft returned to Fukuoka Airport because of the bad weather at the destination. During the flight to Fukuoka Airport, because bleed air supply from both right and left systems stopped, it made an emergency descent, continued the flight after descending to an altitude of about 10,000ft and landed at Fukuoka Airport.		
	Probable Causes	In this serious incident, it is highly probable that both bleed air systems stopped supplying the bleed air and the cabin altitude rose, because the AILC had detected the air leaks on both bleed air systems. It was not possible to determine why the AILC detected the bleed air leaks, although it was somewhat likely that there was any malfunction in the AILC, the bleed air leaked actually, or the sensing elements had any malfunction.		
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA06RJ.pdf		
9	Date of Publication	Date and location	Operator	Aircraft registration number and aircraft type
	December 21, 2017	April 6, 2017 Over Komatsu City, Ishikawa Prefecture at an altitude of approx. 20,000 ft (approx. 6,100m)	Privately owned	JA01EP Beechcraft B200
	Summary	While a the aircraft was flying from Gifu Airfield via Komatsu VORTAC to Takamatsu Airport for a training flight, smoke and smell like something were burning appeared in the cockpit. After that, since whole right windshield a cracked, it returned back to Gifu Airfield and landed.		
	Probable Causes	In this serious incident, it is probable that because screw of the terminal block at the right windshield had being loosened, the electrical resistance at the contact point increased and the terminal block was overheated, the surrounding combustible parts and components were burned out and the smoke was generated in the aircraft. Regarding loosening of the screw at the terminal blocks, it is somewhat likely that because the tightening torque was insufficient when replacing the windshield, the loosening grew bigger by		

		the vibration caused in flights. Furthermore, it is somewhat likely that it was contributed to the generating of the incident that proper measures were not taken to correct indications and symptoms of malfunctions which were occurring repeatedly.
	Report	http://www.mlit.go.jp/jtsb/eng-air_report/JA01EP.pdf

7 Actions taken in response to recommendations in 2017

Actions taken in response to recommendations were reported with regard to three aircraft accidents and one aircraft serious incident in 2017. Summaries of these reports are as follows.

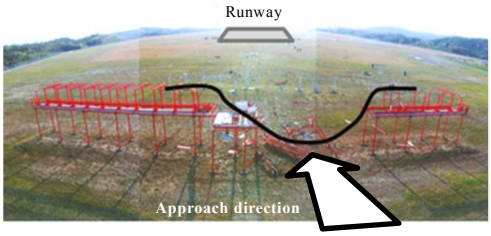
① Aircraft accident involving an Airbus A320-200 (large aeroplane), registered HL7762, operated by Asiana Airlines, Inc.

(Safety recommendations on November 24, 2016)

Following its investigation of an aircraft accident at Hiroshima airport on April 14, 2015, the Japan Transport Safety Board published an investigation report and issued safety recommendations to the Ministry of Land, Infrastructure and Transportation, Republic of Korea on November 24, 2016. The Board received the following notice concerning actions taken in response to the recommendations.

○Summary of the Accident

On Tuesday, April 14, 2015, an Airbus A320-200, registered HL7762, operated by Asiana Airlines, Inc., as the scheduled Flight 162 of the company, approached lower than the prescribed approach path during approach to Hiroshima airport. The aircraft collided with the Aeronautical Radio Navigation Aids located in front of the runway 28 at 20:05 JST and KST, and it touched down in front of the threshold of the runway. Subsequently, it moved forward on the runway, and then deviated to the south side of the runway and came to a stop inside the runway strip of the airport.



There were 81 people on board, consisting of the Pilot-in-Command (PIC), six other crew members, a boarding mechanic and 73 passengers. Among them, 26 passengers and two crew members, 28 people in total, were slightly injured.

The aircraft was substantially damaged, but there was no fire breakout.

○Probable Causes

It is certain that when landing on runway 28 at Hiroshima airport, the aircraft undershot and the PIC commenced executing a go-around; however, it collided with the Aeronautical Radio Navigation Aids located in front of runway 28 threshold, just before turning to climb.

Regarding the fact that the aircraft undershot, it is probable that there might be following aspects in causes: The PIC continued approaching without executing a goaround while the position of the aircraft could not be identified by visual references which should have been in view and identified continuously at or below the approach height threshold (Decision Altitude: DA); and as well, the first officer, as pilot-monitoring who should have monitored meteorological conditions and flight operations, did not make a call-out of go-around immediately when he could not see the runway at DA.

Regarding the fact that the PIC continued approaching without executing a goaround while the position of the aircraft could not be identified by visual references which should have been in view and identified continuously at or below DA, he did not comply with the regulations and Standard Operating Procedures (SOP), and it is probable that there was a background factor that the education and trainings for compliance of rules in the company was insufficient. In addition, regarding the fact that the first officer did not make an assertion of go-around, it is probable that the Crew Resource Management (CRM) did not function appropriately.

○Safety recommendations to the Ministry of Land, Infrastructure and Transport, Republic of Korea

The Ministry of Land, Infrastructure and Transport, Republic of Korea should supervise Asiana Airlines, Inc. in the following items:

(1) The Company should reemphasize and reinforce the significance of compliance by flight crew members, while reviewing company procedures and ensuring comprehensive training.

(2) The Company should surely implement the education and training that flight crew members should refer primarily to visual references, using flight instruments as supplementary tools appropriately, when approaching below DA.

○Actions taken in response to the safety recommendations

(part of the response is under evaluation)

(1) The Company should reemphasize and reinforce the significance of compliance by flight crew members, while reviewing company procedures and ensuring comprehensive training.
- — Promotion of reporting culture
- — Distribution of Korean version of HL7762 HIJ accident investigation report to flight crew
- — Modification of mandatory training manual regarding the importance of compliance with rules
- — Slogan to emphasize the importance of compliance with regulations

(2) The Company should surely implement the education and training that flight crew members should refer primarily to visual references, using flight instruments as supplementary tools appropriately, when approaching below DA.
- — Establishment of clear company policy in terms of the transition from instrument flight to visual flying

— Discussion regarding implementation of a new procedure in term of lost contact with visual references below DA/MDA

※The original text of the notification from the Ministry of Land, Infrastructure and Transport can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/eng-air_report/MOLIT_20161124.pdf

② Aircraft accident involving a Viking DHC-6-400 (small aeroplane), registered JA201D, operated by First Flying Co., Ltd.

(Recommendations on December 15, 2016)

Following its investigation of an aircraft accident at Aguni Airport on August 28, 2015, the Japan Transport Safety Board published an investigation report and issued recommendations to the First Flying Co., Ltd. as a party relevant to the cause of the accident on December 15, 2016. The Board received the following notice concerning actions taken in response to the recommendations.

○Summary of the Accident

On Friday, August 28, 2015, at around 08:55 Japan Standard Time a Viking DHC-6-400 registered JA201D and operated by First Flying Co., Ltd. departed from the side of the runway during landing at Aguni Airport for the purpose of passenger transport, collided with the airport perimeter fence and lateral groove and damaged aircraft.

There were 14 people on board the Aircraft, consisting of a PIC, a crewmember and 12 passengers (including one company employee). Of these, a crewmember and ten passengers suffered minor injuries.

The aircraft suffered substantial damage, but there was no outbreak of fire.

○Probable Causes

It is highly probable that this accident occurred because, when the aircraft landed, the First Officer, as the PF in charge of flying, could not properly control the aircraft as it started to deflect after touchdown, as a result of which the aircraft departed from the side of the runway and collided with a fence on the airport perimeter.

It is probable that the aircraft started to deflect after touchdown because the PF forgot to perform the checklist, while the PIC, as the PM in charge of duties other than flying, did not properly monitor the situation or did not perform the necessary pointed out, as a result of which the aircraft touched down with the nose wheel deflected to the right.

It is somewhat likely that the PF could not properly control the aircraft as it started to deflect after touchdown, because his knowledge concerning the aircraft system of the aircraft was inadequate, as a result of which he did not fully understand situations that cause deflection to start.
It is somewhat likely, moreover, that the insufficient response by the PIC when an unforeseen situation arose contributed to this.
It is probable that the knowledge of the PF was inadequate and he did not fully understand situations that cause deflection to start, because the company had not properly confirmed the effectiveness of ground school training that should be undertaken prior to route training and training related to establishing knowledge.

○Recommendations to First Flying Co., Ltd.

Ascertain the current situation of ground training and flight training correctly, and then improve its system for training to enable the stipulated training to be carried out properly.

○Actions taken in response to the recommendations (completion report)

1 Content of recommendations

"Ascertain the current situation of ground training and flight training correctly, and then improve its system for training to enable the stipulated training to be carried out properly."

2 Actions that should be taken (completion report)

2-1 On improvement measures after ascertaining the current situation of ground training and flight training correctly.

(1) Stipulation of implementation guidelines on pre-flight briefing

To prevent omissions in items subject to pre-flight confirmation, such as the purpose of flight, division of tasks assigned to pilots and measures to address an emergency situation, "group briefing" was added to Chapter 5-3-6 of the implementation guidelines (section 2). (Confirmed in Osaka Civil Aviation Bureau's implementation guideline No. 4652, dated November 24, 2016)

(2) NWS confirmation guidelines

To stipulate the key points of confirming the work of the PTM's centering latch, normal operations in Chapter 4 of the Aircraft Operation Manual (AOM) were revised while the means of confirming the NES's center latch was added and stipulated in 2-6, 2-8 and 2-12 of the training manual. (Confirmed in Osaka Civil Aviation Bureau's implementation guideline No. 4653, dated November 24, 2016)

(3) Formulation of guidelines on takeover during route training and standards for judgment

"Implementation terms for take-off and landing maneuvering by the co-pilot from the right seat" and "implementation of maneuvering by the co-pilot and candidate" in 2-2 of the chapter 2 the implementation guidelines (section 2) were revised, while "maneuvering by the co-pilot" was newly created in chapter 6 and the gist of guidelines on implementation by aircraft crew members was also revised to formulate guidelines on takeover during route training and standards for judgment (Confirmed in the West Japan Civil Aviation Bureau's implementation guideline No. 4652, dated November 24, 2016).

(4) Familiarization training

1) NWS operation

2) Instructor takeover guidelines

Operating guidelines using NWS and instructor takeover guidelines are set forth in each flight training syllabus and will be implemented in actual training.

2-2 On "improvement of training system designed to carry out set training plans"

(1) Radical revision of the training system for air crew

1) Review and revision of training manual

Formulation of provisional training screening regulations, based on business improvement orders and measures to prevent the recurrence of the JA201D accident, and implementation of provisional training to foster flight instructors with the approval of the Civil Aviation Bureau. Revision of the air crew training screening regulations based on the training (completed in May 2017)

2) Creation of a new Training Section in charge of formulating training plans, monitoring progress, managing proficiency, and other work with a view to strengthening the training system (completed on May 1, 2016).

3) Creation of the Operation manual for the Training Section (completed on July 20, 2016).

4) Formulation of instructors' guide, route training guide, training material for adoption of ground instructors and training material for adoption of flight instructors (Confirmed in the West Japan Civil Aviation Bureau's implementation guideline No. 4233, dated November 2, 2016).

(2) Re-education on flight regulations

Re-education on the content of the AOM and others, and on the importance of complying with matters stipulated (completed on August 28, 2016).

Re-education conducted on the subsequently revised regulations for operational business implementation (section 2) and AOM on December 1, 2016.

On the regulations for air crew training screening which are being revised, re-education will be conducted upon completion.

(3) Reinforce safety awareness and provide compliance education

1) The president's "safety first" discourse was announced (on March 11, 2016) and the president gave instructions at the morning assembly at the Okinawa operational headquarters on March 24, 2016. They were also mentioned in a circular and on a bulletin board on March 14, 2016.
   In addition, a program in which all workers of all sections at the Yao and Okinawa operational headquarters chant together, "Maintenance and improvement of safety is our top priority," continues.
2) First round of education given to all of the management, managerial staff and rank-and-file employees in accordance with their spheres of responsibility to enhance their awareness of safety and compliance was completed on May 18, 2016.
3) Regulations for implementation of safety education training, dated June 14, 2018, were formulated, setting up quarterly recurrent training and education to enhance the awareness of safety and compliance which is continuously held on a regular basis.

* The completion report can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/airkankoku/kankoku9re_170328.pdf

8 Provision of factual information in 2017

The JTSB provided factual information on one case (one aircraft accident and two serious incident) to relevant administrative organs in 2017. The contents are as follows.

① Aircraft serious incident involving a Boeing 777-300, registered HL7534, operated by Korean Air Lines Co., Ltd.

(Information provided on November 8, 2017)

The Japan Transport Safety Board provided the following information on the serious incident that occurred on May 27, 2016, to Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism.

(Summary of the serious incident)

At around 12:38 Japan Standard Time (JST: UTC+9hr) on May 27, 2016, while a Boeing 777-300, registered HL7534, operated by Korean Air Lines Co., Ltd. was making a takeoff run on Runway C at Tokyo International Airport, a malfunction occurred in engine No.1 (left-side), causing the takeoff to be aborted and the aircraft to stop on the runway, whereupon the emergency evacuation slide was used to evacuate the passengers.

(Content of investigation)

Investigations into the damaged engine No.1 and the fire breakout confirmed that the first stage high pressure turbine disk had been partially fractured, damaging its case and the engine cover.

The turbulence of the engine, which resulted from the fracture of the first stage high pressure turbine disk, caused cracks in an engine part (fuel oil heat exchanger) and fuel leaked from the part under review causing a fire outside the fire protection section including the engine cover, as confirmed by the investigations.

Fire Breakout on No. 1 Engine

Closeup view from (1)

Closeup view from (2)

Trace of fire on engine outside fire protection section
Damage, fire-caused carbonization and fire-caused melting on engine cover

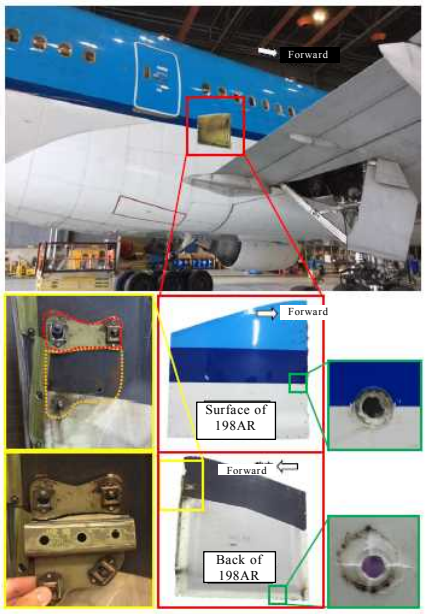
* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/HL753420160527-2.pdf

② Serious aircraft incident involving a Boeing 777-200ER, registered PH-BQC, operated by KLM Royal Dutch Airlines

(Information provided on November 8, 2017)

The Japan Transport Safety Board provided the following information on the serious incident that occurred on September 23, 2017, to Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism.

Fallen panel and panel-side bracket



(Summary of the serious incident)

An airplane, registered PH-BQC (Boeing 777-200ER) and operated by KLM Royal Dutch Airlines, took off from Kansai International Airport on September 23, 2017, and dropped a fuselage panel from the root of the main right wing during climb, which hit a motor vehicle running around Kita Ward, Osaka City.

(Content of investigation)

Facts discovered by investigations to date

- Fractures found in the bracket (metal fitting P/N:149W5913-4) fixing the panel (198AR) to the fuselage

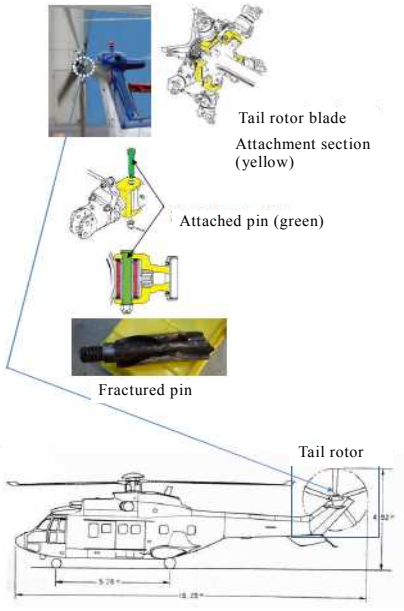
- After removing the bracket, bolts and screws fixing the panel to the fuselage were found fitted to the fuselage. But a wrong bolt was used.
- The panel had a hole with signs showing the passage of a bolt and a screw.

* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/PHBQC20170923.pdf

③ Aircraft accident involving an Aeroespacial AS332L, registered JA9672, operated by Toho Air Service Co., Ltd.

(Information provided on November 21, 2017)

The Japan Transport Safety Board provided the following information on the incident that occurred on November 8, 2017, to Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism.



(Summary of the accident)

A helicopter, registered JA9672 (Aeroespacial AS332L) and operated by Toho Air Service Co., Ltd., took off from the temporary airfield in Yamanashi Prefecture on November 8, 2017, and crashed, while flying over Ueno Village, Gunma Prefecture, on a road in the village.

(Content of investigation)

Facts discovered by investigation to date

- A pin at the root of the tail rotor of the crashed aircraft was fractured

As a result, the users of the AS332L and AS332L1 aircraft were

- provided by the designer and manufacturer of the crashed aircraft (Airbus Helicopters SAS) with the service bulletin, dated November 21 (Japan Time), calling for checking the pin under review
- provided by the European Aviation Safety Agency with the airworthiness directive, also dated November 21 (Japan Time), requiring the implementation of the service bulletin concerned.

* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/JA967220171108.pdf

Column

Analysis of flight conditions via video and other means needed for aircraft accident investigations

Aircraft Accident Investigator

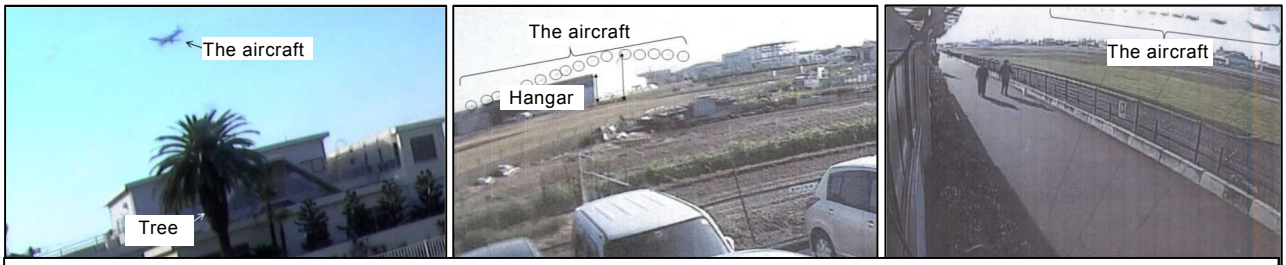
An aircraft accident investigation conducted by aircraft accident investigators needs to confirm the flight route taken by an aircraft concerned and its attitude before the accident in order to determine the causes of the accident. While there are a variety of means of confirmation, video images are among those used especially in the case of light aircraft.

Video images and others include those taken by monitoring cameras at an airport, meteorological and other live cameras, and smartphones and other cameras by passengers or witnesses. To deepen investigation, an important point is to gather as many records as possible and images with a large volume of information (videos).

A photo of a DC-10 plane taken by a witness just before its crash (selected from the ICAO investigation manual)

An investigation starts with hearings with parties concerned, witnesses, local governments, facilities managers and others to determine the kinds of images and others available. When the presence of videos and others are confirmed and the owners of them agree to offer them for use, they can be used for the investigation. As images are taken for various purposes, investigators from time to time need to carefully explain the aim of the aircraft accident investigation in order to obtain the images while winning the owners' understanding. The process is a difficult part of investigation. As mentioned in the aircraft accident investigation manual for investigators, it should be noted that downsampling (processing of low resolution information) may result in depletion of valuable information contained in original data. It is therefore important to obtain original images to the maximum possible extent and accurately confirm the locations of shooting for proper use.

Of obtained images and others, horizontal and vertical profiles of a flight are reproduced (analyzed) in chronological order or combined with geographical positions. There are many things to do in the process. For example, if there are time requirements for use or there are GPS data, necessary corrections are made or both corners at the time of shooting and distortions on lenses are taken into consideration. If images have sound, a delay in the passage of time is added. It there are multiple images, they are superimposed to increase the accuracy of analytical information so as to calculate posture angles, velocity, altitude and others.



Cases of estimation based on visual images obtained are an entry angle from an aboveground target, left, a flying speed from the distance and time of flight, center, and a height of flight above the ground, right.

The action guidelines of the Japan Transport Safety Board mention the implementation of scientific and objective accident investigations. The JTSB is compiling factual information, while not only maintaining but also improving existing methods on a daily basis, to analyze causes. The board is also considering utilizing various methods to make reports more visually understandable.

For use in accident investigations, we humbly ask for the supply, when we request, of video images and others applicable to the confirmation of meteorological and other conditions.

9 Summaries of major aircraft accident and serious incident investigation reports (case studies)

Stall during climbing and crash into a runway while attempting go-around

Privately owned Mooney M20C, JA3788

Summary: A privately owned Mooney M20C, registered JA3788, bounced while landing on Runway 27 of Yao Airport and attempted go-around, but stalled during climbing and went into spin, and then crashed into the south side shoulder of the runway on Saturday, March 26, 2016.
A captain and three passengers were on board and all of them were fatally injured.
The aircraft was destroyed and a fire broke out.

Summary and Findings

Flight Situation of the Aircraft

○Preflight Check by the Captain

- the weight was 2,708 lb and exceeded the maximum weight by 133 lb
- the CG location was 0.52 in. aft for the aft limit corresponding to the maximum weight

It is somewhat likely that these conditions affected the controllability and the stability and contributed to:

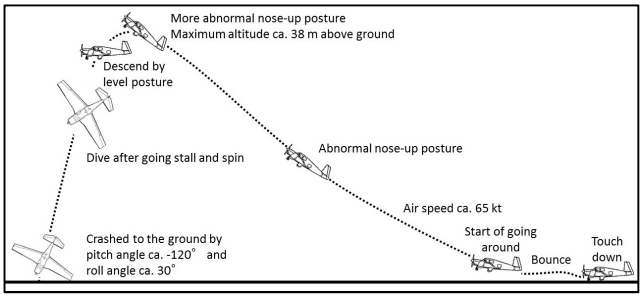
- the abnormal nose-up posture during a go-around
- the decreased stability at low speed flight
- the occurrence of stall and spin.

And, it is probable that:

- the captain and three passengers decided to make a round trip flight on the aircraft to Kobe Airport by the natural course of the conversation at the apron.
- the captain made a round trip flight with insufficient preflight check or without any check.

○Regarding the bounce the aircraft made, it is somewhat likely that:

- the stability at low speed was reduced by the aft CG location.
- the aircraft approached the runway taking deep approach angle.



Situation of the crash (conceptual figure)

Probable Causes: In this accident, the aircraft bounced while landing and attempted a go-around, and it made an abnormal nose-up continued and decelerated, and then the stall could not be avoid in a situation where it imminent; consequently, it is highly probable that it stalled and went into spin, and finally it had crashed.
Regarding the reason why the stall could not be avoid in the imminent situation, it is somewhat likely that the captain or passenger A who maneuvered the aircraft could not suppress the excessive nose-up movement because it was exceeding the maneuverable range and others. All members of the aircraft on board were died; accordingly, the investigation was unable to determine the causes.
Besides, the aircraft had overweight and aft CG location for the aft limit corresponding to the maximum weight. It is somewhat likely that these condition affected the controllability and the stability, and contributed to the bounce on touchdown, the abnormal nose-up posture during a go-around, the decreased stability at low speed flight and the occurrence of stall and spin.

For details, please refer to the accident investigation report. (Published on March 30, 2017)
http://www.mlit.go.jp/jtsb/eng-air_report/JA3788.pdf

Crash into a house right after takeoff

Privately owned Piper PA-46-350P, JA4060

Summary: On Sunday, July 26, 2015, a privately owned Piper PA-46-350P, registered JA4060, crashed into a private house at Fujimi Town in Chofu City, right after its takeoff from Runway 17 of Chofu Airport.
There were five people on board, consisting of a captain and four passengers. The captain and one passenger died and three passengers were seriously injured. In addition, one resident died and two residents had minor injuries. The aircraft was destroyed and a fire broke out.
The house where the aircraft had crashed into were consumed in a fire and neighboring houses sustained damage due to the fire and other factors.

Findings

Takeoff Weight and Balance

- It is highly probable that the aircraft was approximately 58 kg heavier than the maximum takeoff weight.
- It is highly probable that the position of the C.G. was close to the aft limit.
- It is somewhat likely that the captain had insufficient understanding of the risks of making flights under such situation and insufficient safety awareness of observing laws, regulations and provisions.

Flight of the Aircraft at the Time of the Accident

- It is highly probable that the takeoff speed was approximately 73 kt, lower than the lift-off speed of 78 kt.
- The aircraft took off slower than the lift-off speed and climbed with excessive nose-up attitude, and thereby the captain could not accelerate sufficiently to reach necessary climb speed. It is probable that these were the factors for the subsequent decrease in height and the crash.

Improvement of Safety

- It is necessary to promote pilots of small private aircrafts to understand the importance to confirm that requirements (takeoff distance) for performance prescribed on the flight manual are satisfied before departure. As for the actions to the situation of degraded flight performance, it is necessary to enforce instructions and trainings to pilots of small private aircraft to plan the actions in advance.
- It is necessary to study and compile the cases of effective measures connecting entrance taxiways to runway thresholds in order to make maximum use of runway length and inform aerodrome providers and administrators of these case studies.
- It is necessary for small private aircraft to be securely maintained based on a proper understanding of technical information.

Probable Causes: It is highly probable that this accident occurred as the speed of the Aircraft decreased during takeoff and climb, which led the Aircraft to stall and crashed into a residential area near Chofu Airport.
It is highly probable that decreased speed was caused by the weight of the Aircraft exceeding the maximum takeoff weight, takeoff at low speed, and continued excessive nose-up attitude.
As for the fact that the Captain made the flight with the weight of the Aircraft exceeding the maximum takeoff weight, it is not possible to determine whether or not the Captain was aware of the weight of the Aircraft exceeded the maximum takeoff weight prior to the flight of the accident because the Captain is dead. However, it is somewhat likely that the Captain had insufficient understanding of the risks of making flights under such situation and safety awareness of observing relevant laws and regulations.
It is somewhat likely that taking off at low speed occurred because the Captain decided to take a procedure to take off at such a speed; or because the Captain reacted and took off due to the approach of the Aircraft to the runway threshold.
It is somewhat likely that excessive nose-up attitude was continued in the state that nose-up tended to occur because the position of the C.G. of the Aircraft was close to the aft limit, or the Captain maintained the nose-up attitude as he prioritized climbing over speed.
Adding to these factors, exceeding maximum takeoff weight, takeoff at low speed and continued excessive nose-up attitude, as the result of analysis using mathematical models, it is somewhat likely that the decreased speed was caused by the decreased engine power of the Aircraft; however, as there was no evidence of showing the engine malfunction, it was not possible to determine this.

For details, please refer to the accident investigation report. (Published on July 18, 2017)
http://www.mlit.go.jp/jtsb/eng-air_report/JA4060.pdf

Crash into houses not recovering from a spin

Privately owned PZL-Bielsko SZD-50-3 Puchacz, JA50KM

Summary: On Thursday, March 17, 2016, a privately owned PZL-Bielsko SZD-50-3 Puchacz, registered JA50KM, launched from the Otone airfield for a flight training by aero-tow. It crashed on two houses in a residential area in Sakae-town, Inba-gun, Chiba prefecture and was destroyed and both of an instructor and a trainee on board died.

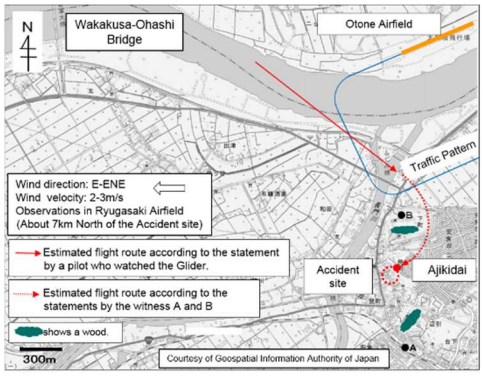
Findings

Situation at the time of the accident

○Thermal: The temperature is apt to rise due to solar radiation since the area around the accident site is a densely populated residential area.

→It is somewhat likely that a thermal was existing locally at the time of the accident.

○It is probable that the glider was banked to left and crashed with the posture that the nose was so low.



The glider had entered a spin since it was flying while rotating with the posture that the nose was so low.

It had entered a spin

There are following possibilities:
- It stalled and entered a spin during a turn in a thermal
- It stalled during turn to manage the altitude in order to land.

It could not recover from the spin

There are following possibilities:
- The recovery operation was not appropriate
- The recovery operation was executed, but the height loss was too large against the flight altitude.

Probable Causes: In this accident, it is probable that the glider was crashed because it had entered a spin and could not recover from it.

Regarding why the Glider entered the spin and could not recover from it, it is not possible to determine the cause because the persons on board died.

For details, please refer to the accident investigation report. (Published on September 28, 2017)
http://www.mlit.go.jp/jtsb/eng-air_report/JA50KM.pdf

Passenger injuries during emergency evacuation using evacuation slides

Boeing 737-800, JA322J

Summary: On Tuesday, February 23, 2016, a Boeing 737-800 registered JA322J and operated by Japan Airlines Co., Ltd, as a scheduled flight 3512 of the company, after being pushed back from an apron, was holding to taxi on a taxiway in order to depart from New Chitose Airport to Fukuoka Airport. Snow started to fall suddenly. The captain decided to move to the designated apron in order to remove the ice and snow from the aircraft. When the aircraft had stopped on a taxiway where the aircraft was moving because snow became harder, odd smells and smoke were generated within the cabin and the flame was confirmed at rear of No.2 engine (right side).Because of these, at around 15:10, an Emergency Evacuation was conducted through the evacuation slide at the Taxiway T2.
There were 165 people in total aboard the aircraft, consisting of the captain and five other crewmembers and 159 passengers. During this Emergency Evacuation, one passenger suffered serious injury and two passenger suffered minor injuries.
The aircraft was not damaged.

Findings

The icing was set at the engine
It is probable that the heavy snow became intense due to the rapid weather deterioration, the icing was set at fan blades and low pressure compressor, the amount of air flow inlet decreased, the efficiency for a compressor lowered, and then the engine oil was leaked into inside of the engine.

○The odd smells and smoke
They were generated because the engine oil was mixed with compressed air from the air-conditioning system and it flew into the cabin in fog like condition.

○Flame at the rear part of the engine
After the engine stopped, the engine oil remained at inside of the tailpipe was ignited by its exposure to the heat of tailpipe.

Emergency Evacuation
Many of passengers attempted to go down the slide with baggage not following instructions from the cabin attendants. The cabin attendants removed their baggage near the emergency exit and some of the baggage were piled up at the space in front of the cockpit door. The flight crews hesitated to move to the cabin fearing the risk of clogging the evacuation route for passengers

○Accident when using an evacuation slide
The body of the passenger jumped forward, hit ground from the hip as the passenger was sliding down the slide.
→One passenger suffered serious injury

Overhead bin after the emergency evacuation

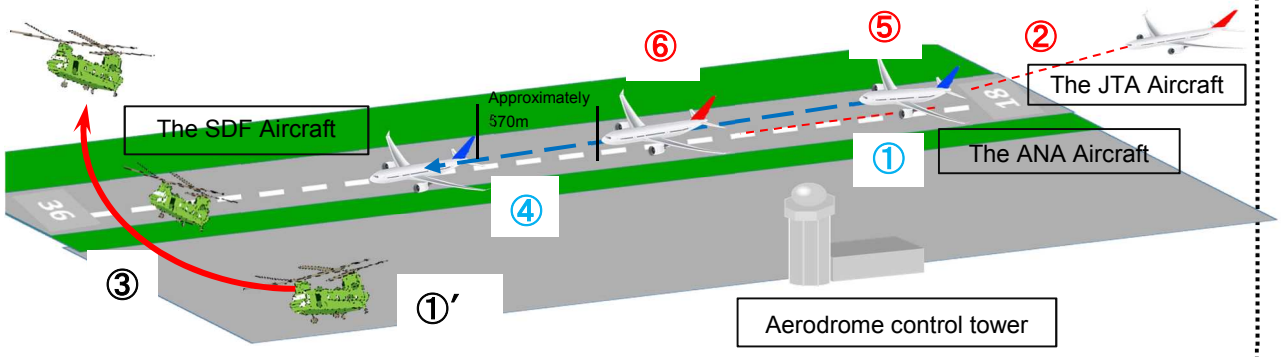
Probable Causes: In this accident, it is probable that while holding on the taxiway to taxi following the heavy snowfall, odd smells and smoke were generated within the cabin, following these events, because the flame from rear of No.2 engine was continued, the flight crew conducted the Emergency Evacuation from the aircraft. At the time, a passenger descended the slide, fell down to the ground from the hip of the passenger and suffered serious injury.
Regarding the occurrences of odd smells and smoke in the cabin and the continuation of the flame at the rear of No.2 engine, it is probable that the Heavy Snow became intense due to the rapid weather deterioration, and because the icing was set at fan blades and low pressure compressor, the engine oil was leaked into inside of the engine and the oil vaporized into the cabin and the leaked oil was accumulated within in the tailpipe to catch the fire.

For details, please refer to the accident investigation report. (Published on December 21, 2017)
http://www.mlit.go.jp/jtsb/eng-air_report/JA322J.pdf

Landing on a runway before it is vacated of another aircraft rejecting takeoff

Japan Air Self-Defense Force CH-47J, 57-4493
All Nippon Airways Co., Ltd. Boeing 737-800, JA80AN
Japan Transocean Air Co., Ltd. Boeing 737-400, JA8938

Summary and findings: On Wednesday, June 3, 2015, a Boeing 737-400, registered JA8938 (the JTA Aircraft) operated by Japan Transocean Air Co., Ltd. as its scheduled flight 610 was approaching the runway 18 of Naha Airport for landing.
A Boeing 737-800, registered JA80AN (the ANA Aircraft) operated by All Nippon Airways Co., Ltd. commenced a take-off roll on the runway [①] with the take-off clearance from the aerodrome control tower of the aerodrome control facility however, it rejected a take-off [④] due to the fact a CH-47J of Japan Air Self-Defense Force, registered 57-4493 (the SDF Aircraft) was approaching the runway [③] after taking off from the taxiway A-5 [①′] (and the tower issued a landing clearance to the JTA Aircraft [②]).
After that, although aerodrome control tower of the aerodrome control facility instructed the JTA Aircraft which approaching the runway to execute a go-around [⑤], it landed on the runway [⑥] before the vacating of the ANA Aircraft at 13:24 JST.
There were 44 persons on board the JTA Aircraft, consisting of the Pilot in Command (PIC), four crew members, and 39 passengers; 83 persons on board the ANA Aircraft, consisting of the PIC, five crew members and 77 passengers; seven persons on board the SDF Aircraft, consisting of the Pilot, four crew members, and two passengers. There were no injuries to these persons.



Probable Causes:

○The take-off of the SDF Aircraft
→Its pilots misunderstood the take-off clearance for the ANA Aircraft as the clearance for their aircraft.
→It is highly probable that the Pilot and the Load-master were delayed in noticing the ANA Aircraft that commenced a take-off roll.

○The pilots of the SDF Aircraft misunderstood the take-off clearance for the ANA Aircraft as their take-off clearance
→Although they could not accurately hear what was transmitted to them by the tower, it is probable that they did not make confirmation of the contents of the transmission.
→It is highly probable that the pilots of the SDF Aircraft did not notice misunderstanding the take-off clearance, as there was nothing pointed out from the tower to the wrong read-back of the SDF Aircraft.

○The ANA Aircraft rejected take-off
→It is highly probable that while the PIC was in the situation that he was not able to determine the flight direction of the SDF Aircraft approaching its departure course after the take-off of the SDF Aircraft and because the PIC of the ANA Aircraft felt a serious danger in the continued take-off; therefore, he decided to reject the take-off.

○The JTA Aircraft landed on the runway
→The PIC of the JTA Aircraft recognized the existence of the ANA Aircraft on the runway when it started flare, but
・it had been issued the landing clearance by the aerodrome control tower
・it was judged by the PIC that it could land safely, based on his experience at the airport and on the same type of aircraft and the landing performance.
→It is somewhat likely that the judgment is related to the fact the PIC could not confirm the trend of the SDF Aircraft which had crossed over the runway.

○The JTA Aircraft landed on the runway although the aerodrome control tower instructed it to execute a go-around
→It had already landed on the runway and the reverse thrust operation was started when the PIC and the FO were recognizing the instruction.
→It was involved that the instruction of executing a go-around had missed the timing.

It is certain that this serious incident occurred as follows: when the Aircraft B rejected a takeoff on the runway 18 due to the Aircraft A crossed over in its front, and the Aircraft C landed on the runway 18 before its vacating.

For details, please refer to the serious incident investigation report. (Published on April 27, 2017)
http://www.mlit.go.jp/jtsb/eng-air_report/57-4493_JA80AN_JA8938.pdf

Chapter 4 Railway accident and serious incident investigations

1 Railway accidents and serious incidents to be investigated

< Railway accidents to be investigated >

◎Paragraph 3, Article 2 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 1 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 paragraph 3, Article 2 of the Act for Establishment of the Japan Transport Safety Board)

1 The accidents specified in items 1 to 3 inclusive of paragraph 1 of Article 3 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 items 4 to 6 inclusive of paragraph 1 of Article 3 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 items 4 to 7 inclusive of paragraph 1, Article 3 of the Ordinance which are found to be particularly rare and exceptional;

4 The accidents equivalent to those specified in items 1 to 7 inclusive of paragraph 1, Article 3 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 1 to 3 inclusive 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 each of the items of paragraph 1, Article 3 of the Ordinance on Reporting on Railway Accidents, etc.

Item 1: Train collision
Item 2: Train derailment
Item 3: Train fire
Item 4: Level crossing accident
Item 5: Accident against road traffic
Item 6: Other accidents with casualties
Item 7: 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 item 5, Article 1 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board)

1 From among the accidents specified in items 1 to 6 inclusive of paragraph 1 of Article 1 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 items 1 to 7 inclusive of paragraph 1 Article 1 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 paragraph 1 of Article 3 of the Ordinance on Tramway Operations, the accidents equivalent to those specified in items 1 to 3 of Article 1 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

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

Item 1: Vehicle collision
Item 2: Vehicle derailment
Item 3: Vehicle fire
Item 4: Level crossing accident
Item 5: Accidents against road traffic
Item 6: Other accidents with casualties
Item 7: 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 1-1]</td><td colspan="4">・Accidents involving the death of a passenger, crew member, etc.
・Accidents involving five or more casualties with at least one of the casualties dead
・Fatal accidents that occur at level crossings with no automatic barrier machines
・Accidents found to have likely been caused by a railway worker's error in procedure or due to the malfunction, damage, destruction, etc., of vehicles or railway facilities, which resulted in the death of a person [Ordinance 1-2]</td><td></td></tr>
<tr><td colspan="4">Accidents that are particularly rare and exceptional [Ordinance 1-3]</td></tr>
<tr><td>Dedicated railway</td><td colspan="7">Accidents that are particularly rare and exceptional [Ordinance 1-4]</td></tr>
<tr><td rowspan="2">Tramway [Ordinance 1-5]</td><td colspan="6">・Accidents involving the death of a passenger, crewmember, 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 1-1]
However, accidents that are particularly rare and exceptional are to be investigated. [Ordinance 1-3]

*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 >

◎Item 2, paragraph 4, Article 2 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 2 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 item 2, paragraph 4, Article 2 of the Act for Establishment of the Japan Transport Safety Board)

1 The situation specified in item 1 of paragraph 1 of Article 4 of the Ordinance on Reporting 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."]

2 The situation specified in item 2 of paragraph 1 of Article 4 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."]

3 The situation specified in item 3 of paragraph 1 of Article 4 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."]

4 The situation specified in item 7 of paragraph 1 of Article 4 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."]

5 The situation specified in item 8 of paragraph 1 of Article 4 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."]

6 The situation specified in items 1 to 10 inclusive of paragraph 1 of Article 4 of the Ordinance which is found to be particularly rare and exceptional; and

[These are referred to as: item 4 "Main track overrun"; item 5 "Violating closure section for

construction"; item 6 "vehicle derailment"; item 9 "Heavy leakage of dangerous object"; and item 10 "others," 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 item 7, Article 2 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 item 1 of Article 2 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 item 4 of Article 2 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 item 5 of Article 2 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 items 1 to 7 inclusive of Article 2 of the Ordinance which is found to be particularly rare and exceptional; and

[These are referred to as: item 2 "Violating red signal;" item 3 "Main track overrun;" item 6 "Heavy leakage of dangerous object;" and item 7 "others," respectively.]

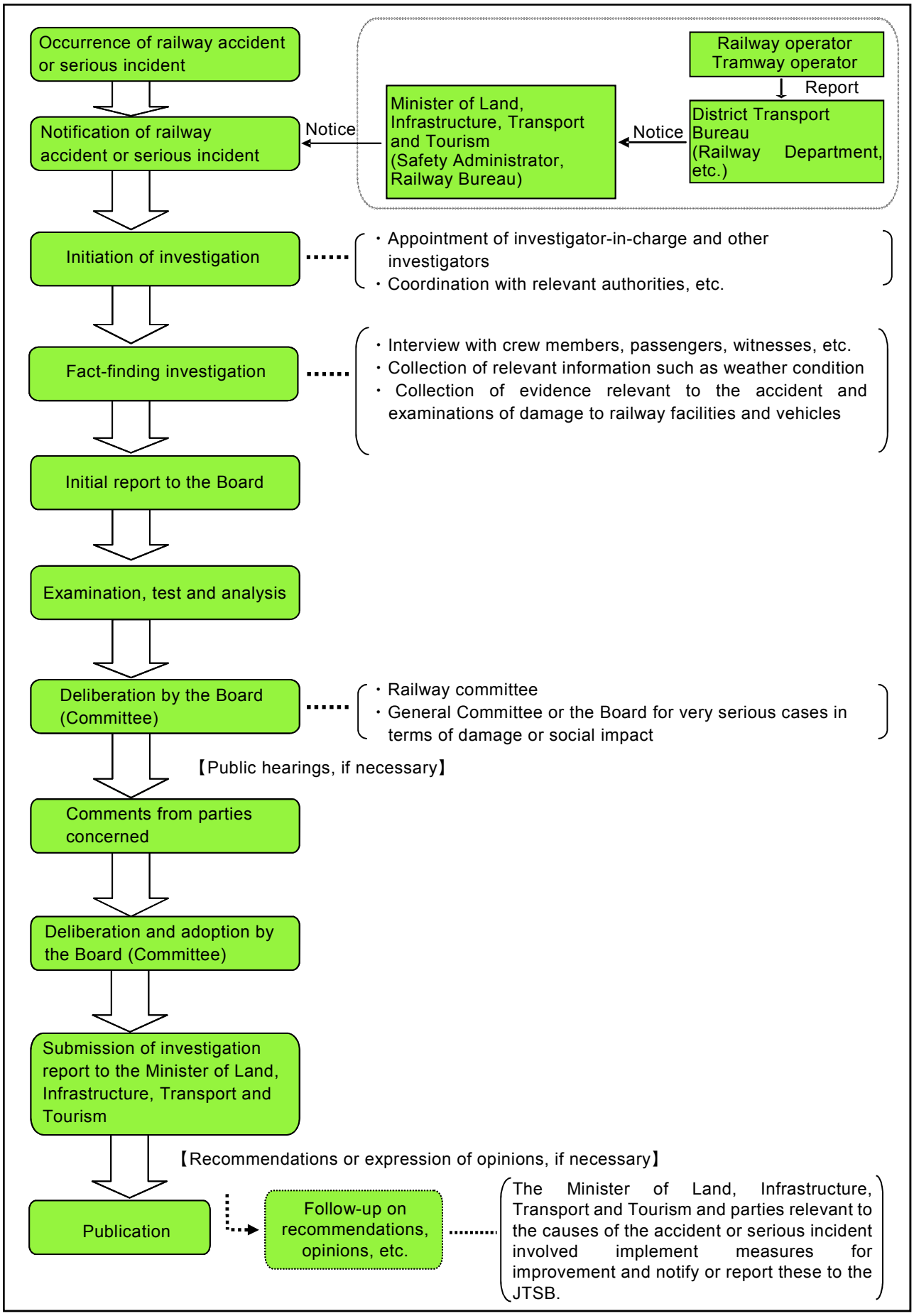
5 From among the situations occurring on a tramway operated under the application of the Ministerial Ordinances to provide Technical Regulatory Standards on Railways mutatis mutandis as specified in paragraph 1 of Article 3 of the Ordinance on Tramway Operations, the situations equivalent to those specified in items 1 to 6 of Article 2 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board.

Serious incidents to be investigated

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



3 Statistics of investigations of railway accidents and serious incidents

The JTSB carried out investigations of railway accidents and serious incidents in 2017 as follows:

19 accident investigations had been carried over from 2016, and 19 accident investigations were newly launched in 2017. 23 investigation reports were published in 2017, and thereby 15 accident investigations were carried over to 2018.

Two serious incident investigations had been carried over from 2016, and one serious incident investigation was newly launched in 2017. Two investigation reports were published in 2017, and thereby one serious incident investigation was carried over to 2018.

Investigations of railway accidents and serious incidents in 2017

(Cases)

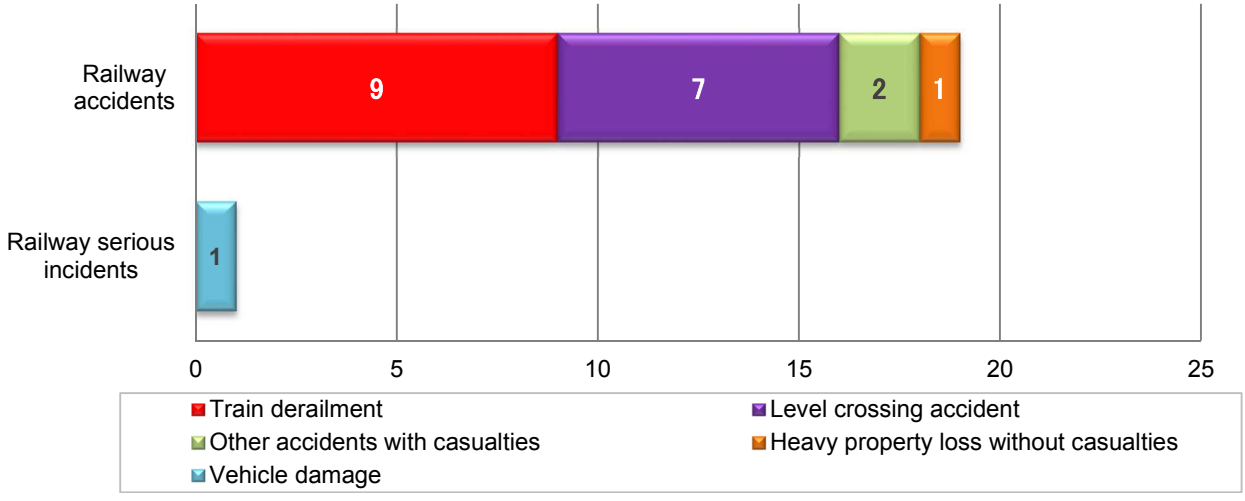
Category	Carried over from 2016	Launched in 2017	Total	Published investigation reports	(Recommendations)	(Opinions)	Carried over to 2018	(Interim report)
Railway accident	19	19	38	23	(0)	(0)	15	(0)
Railway serious incident	2	1	3	2	(0)	(0)	1	(0)

4 Statistics of investigations launched in 2017

The railway accidents and serious incidents that were newly investigated in 2017 consisted of 19 railway accidents, down by four from 23 for the previous year, and one railway serious incident, down by one from two for the previous year.

The breakdown by type of accidents and serious incidents is as follows: The railway accidents included nine train derailments, seven level crossing accidents, two other accidents with casualties and one heavy property loss without casualties. The railway serious incidents included one vehicle damage.

Number of investigated railway accidents and serious incidents by type in 2017



In the 19 railway accidents, the number of casualties was 19, consisting of 10 death and nine injured persons.

The number of casualties (in railway accidents)

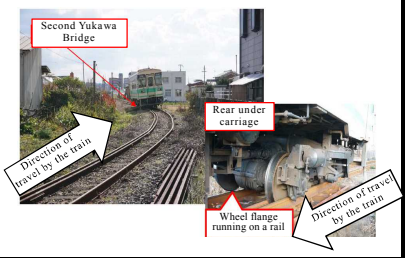
(Persons)

2017							
Category	Dead			Injured			Total
	Crew	Passenger	Others	Crew	Passenger	Others	
Casualties	0	0	10	0	8	1	19
Total	10			9			

5 Summaries of railway accidents and serious incidents which occurred in 2017

The railway accidents and railway serious incidents which occurred in 2017 are summarized as follows. The summaries are based on information available at the start of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Railway accidents)

1	Date and accident type	Railway operator	Line section (location)
	January 8, 2017 Level crossing accident	Kyushu Railway Company	Tekkosho level crossing (class four level crossing without automatic barrier machine nor road warning device) between Obi station and Nichinan station, Nichinan Line (Miyazaki Prefecture)
	Summary	See “6 Publication of investigation reports” (P.76, No.13)	
2	Date and accident type	Railway operator	Line section (location)
	January 22, 2017 Train derailment	Kishu Railway	Between Gobo station and Gakumon station, Kishu Railway Line (Wakayama Prefecture)
	Summary	While the train was running approx. 500m ahead from Gobo station, the driver of the train heard abnormal sounds a number of times from under the floor of the vehicle and applied the emergency brake to bring the train to a halt. The driver got off the train and checked, finding all axels in the rear bogie of the vehicle derailed to right. While five passengers and the driver were aboard the train, none of them were injured.	
3	Date and accident type	Railway operator	Line section (location)
	January 24, 2017 Train derailment	West Japan Railway Company	On the premises of Gokei station, Hakubi Line (Okayama Prefecture)
	Summary	See “6 Publication of investigation reports” (P.76, No.14)	
4	Date and accident type	Railway operator	Line section (location)
	February 11, 2017 Other accidents with casualties	West Japan Railway Company	On the premises of Itozaki station, Sanyo Line (Hiroshima Prefecture)
	Summary	Five workers engaging in construction work on the premises of the station and a lookout worker left the work site to escape from the approaching High Speed Freight 58 train, 25 vehicle train set, which started from Tosu Freight Terminal Station and was bound for Osaka Freight Terminal	

		Station. When the train passed the passing place, the site foreman heard abnormal sounds and looked around for confirmation, finding the lookout lying on the track. The driver of the train passed Itozaki station on time at 68 km/h. The driver recognized the workers working ahead, but continued running the train as he saw a white light swinging from side to side, concluding that the retreat of the workers to the passing place had been completed. After passing Onomichi Station, the driver stopped the train according to the instruction by the train dispatcher. In the accident, the lookout worker died.
5	Date and accident type	Railway operator / Line section (location)
	February 22, 2017 Train derailment	Kumamoto Electric Railway Between Fujisakigumae station and Kurokamimachi station, Fujisaki Line (Kumamoto Prefecture)
	Summary	The train without conductors was running at approx. 20km/h near the 'Between Kurokami and Fujisaki Number8 level crossing' after leaving Fujisakigumae station for Kurokamimae station when the driver felt a shock and applied the emergency brake and brought the train to a halt. All axels of the front bogie of the first vehicle were found as detailed to the right when the train stopped. A subsequent investigation discovered that all axels of the rear bogie of the first vehicle had derailed to right but had gotten back on the track Some 50 passengers and the driver were aboard the train but none of them were injured. 
6	Date and accident type	Railway operator / Line section (location)
	February 23, 2017 Train derailment	Japan Freight Railway Company On the premises of Kitairie signal station, Muroran Line (Hokkaido)
	Summary	While the train was running in the section under review, the driver of the train heard abnormal sounds and stopped the train for checking, finding two axels of the third bogie of the locomotive derailed to the right in the direction of travel. The driver then informed the train dispatcher of the accident.
7	Date and accident type	Railway operator / Line section (location)
	March 2, 2017 Train derailment accompanied with level crossing accident	Central Japan Railway Company Koyabu level crossing (class one level crossing equipped with automatic barrier machine and road warning device) between Nishiokazaki station and Anjo station, Tokaido Line (Aichi Prefecture)
	Summary	While the train was running at approx. 120km/h between Nishiokazaki Station and Anjo Station, the driver of the train noticed a motor vehicle entering Koyabu level crossing (class one level crossing) and applied the emergency brake. But the train collided with the motor vehicle and all axels of the front bogie of the first vehicle derailed to right. Hit by the train, the motor vehicle crashed into objects, such as a power pole built along the railway, before smashing up and bursting into flames. In the accident, the driver of the motor vehicle died while three passengers aboard the train were injured.
8	Date and accident type	Railway operator / Line section (location)
	March 6, 2017 Level crossing accident	West Japan Railway Company Senzoku Number 1 level crossing (class four level crossing without automatic barrier machine nor road warning device) between Kuga station and Suotakamori station, Gantoku Line (Yamaguchi Prefecture)
	Summary	While the train was running between Kuga station and Suotakamori station, the driver of the train noticed a person riding on a bicycle on this side of Senzoku Number 1 level crossing (class four level crossing) and applied the emergency brake but the train hit the person. In the accident, the person died. 

9	Date and accident type	Railway operator	Line section (location)
	March 23, 2017 Level crossing accident	Matsuura Railway Co., Ltd.	Nakiri-cho level crossing (class three level crossing equipped with road warning device but without automatic barrier machine) between Kita-Sasebo station and Naka-Sasebo station, Nishi-Kyushu Line (Nagasaki Prefecture)
	Summary	See “6 Publication of investigation reports” (P.79, No.19)	
10	Date and accident type	Railway operator	Line section (location)
	May 22, 2017 Train derailment	Watarase Keikoku Railway Co., Ltd.	Between Hanawa station and Mizunuma station, Watarase Keikoku Line (Gunma Prefecture)
	Summary	While the train was running between Hanawa station and Mizuuma station, the driver of the train heard abnormal sounds and stopped the train, finding all axels of the second vehicle derailed to the left in the direction of travel.	
11	Date and accident type	Railway operator	Line section (location)
	June 20, 2017 Level crossing accident	Hokkaido Railway Company	Jinjadoro level crossing (class four level crossing without automatic barrier machine nor road warning device) between Owada station and Fujiyama station, Rumoi Line (Hokkaido)
	Summary	See “6 Publication of investigation reports” (P.80, No.22)	
12	Date and accident type	Railway operator	Line section (location)
	June 27, 2017 Level crossing accident	Kyushu Railway Company	Mukobara Number 2 level crossing (class four level crossing without automatic barrier machine nor road warning device) between Sakanoue station and Goino station, Ibusukimakurazaki Line (Kagoshima Prefecture)
	Summary	While the train was running between Sakanoue station and Goino station, the driver of the train noticed a pedestrian entering Mukobara Number 2 level crossing (class four level crossing). Though the driver immediately sounded a whistle and applied the emergency brake, the train hit the pedestrian. In the accident, the pedestrian died.	
13	Date and accident type	Railway operator	Line section (location)
	July 9, 2017 Train derailment accompanied with level crossing accident	Nagoya Railroad Co., Ltd.	Hirato-bashi Number 1 level crossing (class one level crossing equipped with automatic barrier machine and road warning device) on the premises of Sanage station, Mikawa Line (Aichi Prefecture)
	Summary	See “6 Publication of investigation reports” (P.80, No.21)	
14	Date and accident type	Railway operator	Line section (location)
	September 7, 2017 Level crossing accident	West Japan Railway Company	Iwasakinoichi level crossing (class four level crossing without automatic barrier machine nor road warning device) between Michinoue station and Managura station, Fukuen Line (Hiroshima Prefecture)
	Summary	While the train was running between Michinoue Station and Managura Station, the driver of the train noticed a motorized bicycle entering the Iwasakinoichi level crossing (class four level crossing). Though the driver sounded a whistle and applied the emergency brake, the train hit the motorized bicycle. In the accident, the rider of the motorized bicycle died.	
15	Date and accident type	Railway operator	Line section (location)
	September 18, 2017	Kyushu Railway	Ebe level crossing (class three level crossing

	Level crossing accident	Company	equipped with road warning device but without automatic barrier machine) between Uto station and Midorikawa station, Misumi Line (Kumamoto Prefecture)
	Summary	While the train was running between Uto station and Midorikawa station, the driver of the train noticed a bicycle entering Ebe level crossing (class three level crossing). Though the driver immediately applied the emergency brake and sounded a whistle, the train hit the bicycle. In the accident, the rider of the bicycle died.	
16	Date and accident type	Railway operator	Line section (location)
	September 18, 2017 Heavy property loss without casualties	Kyushu Railway Company	On the premises of Nogata Station (Nogata Rolling Stock Center), Chikuho Line (Fukuoka Prefecture)
	Summary	While the train was entering the east No. 1 lead track from the No. 15 storage track on the premises of Nogata Station, it collided with the buffer stop on the east No. 1 lead track and derailed to the right in the direction of travel, obstructing the clearance of the adjacent main track. Another inbound train, which left Nogata Station thereafter, passed the place under review on the inbound track before the adoption of train protection.	
17	Date and accident type	Railway operator	Line section (location)
	October 22, 2017 Train derailment	Nankai Electric Railway Co. Ltd.	Between Tarui station and Ozaki station, Nankai Main Line (Osaka Prefecture)
	Summary	While the train was running on Onosatogawa Bridge, the driver noticed the down track curving to the left in the direction of travel and sinking at about the middle of the bridge roughly 50m on this side and immediately took braking action. The train stopped around 270m after passing the place. As a result, five passengers were injured (minor injuries).	
18	Date and accident type	Railway operator	Line section (location)
	December 6, 2017 Train derailment	Hokkaido Railway Company	On the premises of Zenibako station, Hakodate Line (Hokkaido)
	Summary	The driver of the train heard abnormal sounds and confirmed a sign showing trouble in the brake when the train ran roughly 30 km/h on the Track No. 2 at Zenibako Station and resorted to emergency braking action to stop the train. After the train came to a halt, damage was discovered in parts in the bottom of the vehicle and in a point machine on the premises of the station. As a subsequent in-depth investigation into the vehicle concerned found traces of contact on its wheels, an additional examination of the rail track on the premises of Zenibako station was conducted and found traces showing that the train had derailed from Zenibako Seibu level crossing within the premises and gotten back on the track at a point roughly 68m in the direction of Otaru.	
19	Date and accident type	Railway operator	Line section (location)
	December 16, 2017 Other accidents with casualties	Japan Freight Railway Company	On the premises of Chihaya Station, Kagoshima Line (Fukuoka Prefecture)
	Summary	While the train was running on the premises of Chihaya station, the driver of the train heard abnormal sounds and looked around, finding a worker in charge of signals lying there. It is probable that the worker was hit by the train while lighting a snow melting machine to prevent a point machine within the premises of the station from becoming unworkable because of such factors as snow and ice. The worker was later confirmed dead.	

(Railway serious incidents)

1	Date and incident type	Railway operator	Line section (location)
	December 11, 2017 Dangerous trouble in vehicle	West Japan Railway Company	On the premises of Nagoya station, Tokaido Shinkansen Line (Aichi Prefecture)
	Summary	As a conductor of the train smelled an abnormal odor near Kyoto station, workers of the Nagoya Rolling Stock Depot were dispatched to Nagoya station and confirmed abnormal sounds from under the floor of the train when it was arriving at Nagoya station.	

		An underfloor investigation at Nagoya station found an oil leak near the gearbox, leading to a conclusion that the vehicle was inoperable. The operation of the train was suspended. When the vehicle was about to be moved to the Nagoya Rolling Stock Depot, a crack in the bogie frame of the second bogie of the No. 13 vehicle was found. In addition, the gear coupling was found discolored.

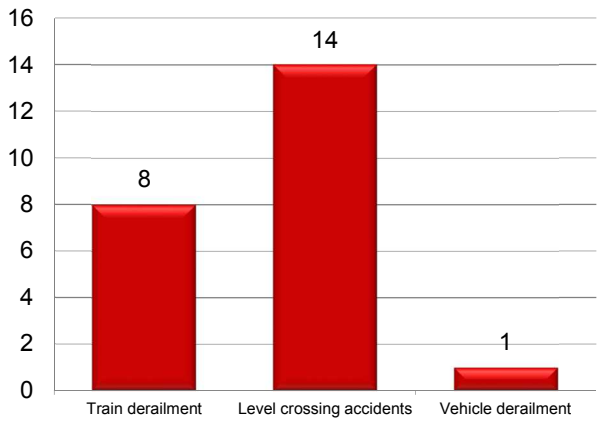
6 Publication of investigation reports

The number of investigation reports of railway accidents and serious incidents published in 2017 was 25, consisting of 23 railway accidents and two serious incidents.

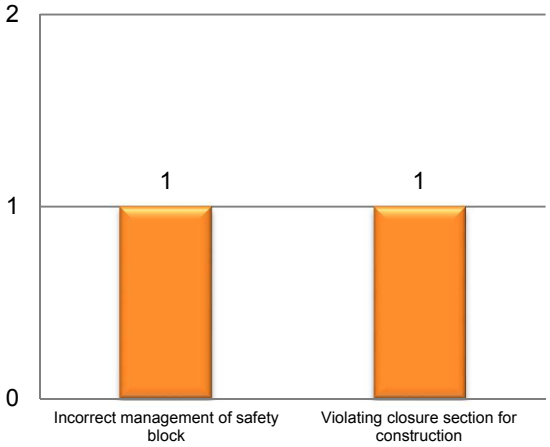
Breaking them down by type, the railway accidents contained eight train derailment accidents, 14 level crossing accidents, and one vehicle derailment. The railway serious incidents contained one incorrect management of safety block and one violating closure section for construction.

In the 23 accidents, the number of casualties was 34, consisting of 14 death and 20 injured persons.

Railway accident reports (23 cases) published in 2017



Railway serious incident reports (two cases) published in 2017



The investigation reports of railway accidents and serious incidents published in 2017 are summarized as follows.

Railway accident reports published in 2017

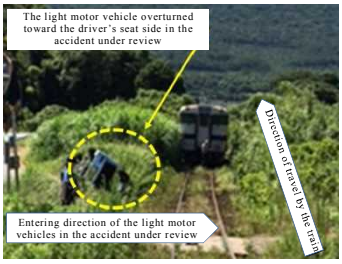
1	Date of Publication	Date and accident type	Railway operator	Line section (location)
	February 23, 2017	April 15, 2016 Train derailment	Nagaragawa Railway Co., Ltd.	Between Han-no station and Suhara station, Etsumi-nan Line (Gifu Prefecture)
	Summary	The train departed from Han-no station on schedule, by one-man operation. While the train was running in cruising operation at about 50 km/h in Suhara tunnel between Han-no station and Suhara station, the driver of the train felt violent shock accompanied with abnormal sound, and applied an emergency brake immediately to stop the train. After the train had stopped, the driver got off the train and checked around the train, and found that all two axles in the rear bogie were derailed to left. There were two passengers and the driver onboard the train. The driver of the train was injured in the accident.		

Rear train cars inclined to the left

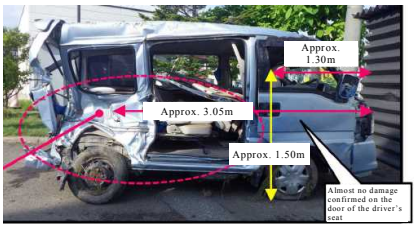
	Probable Causes	It is somewhat likely that, while the train was running in the curved track section in the tunnel, the accident had occurred as the left wheel of the third axle in the rear bogie climbed over the rail and derailed due to the increased derailment coefficient by the significantly decreased wheel load, which were caused by the followings. (1) Lateral force, usually acted on wheels in outer rail of the curved track, increased larger than as usual due to the existence of relatively large irregularity of line alignment. (2) The irregularity of cross level increased still more by the passage of trains because there were loosed fastening bolts of rail fastening device and fallen away rail pads in the track continuously along the track, where relatively large irregularity of cross level, to promote decrease of wheel load. (3) In addition, the irregularity of cross level increased still more when the rear bogie of the train had passed, because the left rail, i.e., outer rail, had been broken. It is somewhat likely that the rail in the tunnel was broken in relation with that the reducing ratio of cross section of the rail by corrosion had been exceeded substantially the criteria to decide rail replacement, and cracks considered to be caused by corrosion of rail or continuous existence of loosed fastening bolts of the rail fastening device and fallen away rail pads along the track, could not be recognized in the track inspection implemented periodically by the company.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-1-1.pdf

2	Date of Publication	Date and accident type	Railway operator	Line section (location)
	February 23, 2017	June 17, 2016 Level crossing accident	Chichibu Railway Co., Ltd.	Ishihara Number 12 level crossing (class four level crossing without automatic barrier machine nor road warning device) on the premises of Hirosegawara station, Chichibu Main Line (Saitama Prefecture)
	Summary	While the train was running on the premises of Hirosegawara station, the driver of the train found a pedestrian in Ishihara Number 12 level crossing, class four level crossing, and then sounded an emergency whistle and applied an emergency brake, but the train hit the pedestrian. The pedestrian was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the right side of front face of the train hit a pedestrian because the pedestrian went into Ishihara Number 12 level crossing, class four level crossing, in the situation that the train was approaching. It is somewhat likely that the pedestrian went into the level crossing in the situation that the train was approaching, because the pedestrian did not notice the approaching train. But it could not be determined the precise situations because the pedestrian was dead in the accident.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-1-2.pdf		

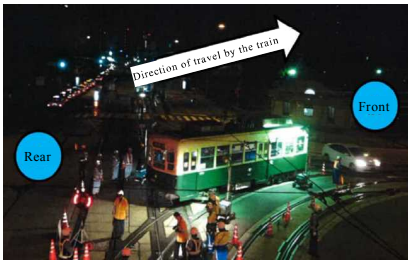
3	Date of Publication	Date and accident type	Railway operator	Line section (location)
	February 23, 2017	August 22, 2016 Level crossing accident	Kyushu Railway Company	Number 2 Motoyashiki level crossing (class four level crossing without automatic barrier machine nor road warning device) between Ei station and Irino station, Ibusuki-Makurazaki Line (Kagoshima Prefecture)
	Summary	While the train was running at about 44 km/h between Ei station and Irino station, the driver of the train noticed a light motor vehicle entered to Number 2 Motoyashiki level crossing, class four level crossing, then applied an emergency brake, but the train collided with the light motor vehicle. The driver of the light motor vehicle was dead, and a fellow passenger was injured in the accident.		

	Probable Causes	It is highly probable that the accident had occurred as the train collided with a light motor vehicle, because the light motor vehicle entered to Number 2 Motoyashiki level crossing, class four level crossing, in the situation that the train was approaching. It could not be determined why the driver of the light motor vehicle drove the vehicle into the level crossing where the train was approaching, because the driver of the light motor vehicle was dead in the accident. 
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-1-3.pdf

4	Date of Publication	Date and accident type	Railway operator	Line section (location)
	February 23, 2017	September 6, 2016 Level crossing accident	Tsugaru Railway Company	Goshogawara Kiten 6k100m level crossing (class four level crossing without automatic barrier machine nor road warning device) between Tsugaru-Iizume station and Bishamon station, Tsugaru Railway Line (Aomori Prefecture)

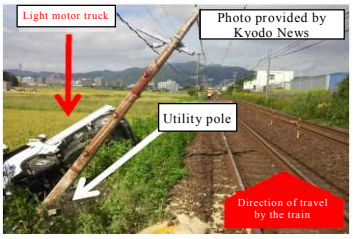
	Summary	While the train was running between Tsugaru-Iizume station and Bishamon station, the driver of the train noticed a light motor vehicle entering to Goshogawara Kiten 6k100m level crossing, class four level crossing, and applied an emergency brake immediately, but the train collided with the light motor vehicle. The driver of the light motor vehicle was dead in the accident.
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a light motor vehicle, because the light motor vehicle entered to Goshogawara Kiten 6k100m level crossing, class four level crossing, in the situation that the train was approaching. It could not be determined why the light motor vehicle entered to the level crossing in the situation that the train was approaching, because the driver of the light motor vehicle was dead in the accident.  However, it is somewhat likely that the poor visibility in the direction of the approaching train due to the copse beside the track was related to obstructing sufficient confirmation of safety in right and left direction by the driver of the light motor vehicle just before the level crossing. Also, it is somewhat likely that the rainy weather when the accident had occurred and the upward steep slope just before the level crossing in right curved road between fields were related to declining attention to the approaching train of the driver of the light motor vehicle.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-1-4.pdf

5	Date of Publication	Date and accident type	Railway operator	Line section (location)
	March 30, 2017	June 2, 2016 Vehicle derailment	Nagasaki Electric Tramway Co. Ltd.	Between Suwajinja-Mae tram stop and Kokaido-Mae tram stop, Sakuramachi Branch Line (Nagasaki Prefecture)

	Summary	While the vehicle was passing the right curved branch line for Nagasaki Eki-Mae tram stop, in the turnout at Kokaido-Mae intersection, the driver of the vehicle felt abnormal situation as if the vehicle was heaved up accompanied with abnormal sound, then the driver applied an emergency brake and stopped the vehicle. The driver got off the vehicle to check the situation, and found that all two axles in the rear bogie were derailed to left of rail. There were a passenger and the driver onboard the vehicle, but there was no casualty. The accident site was in the intersection of the road together with tramway, but the derailed vehicle did not contact nor collide with automobiles, etc., before and after the derailment. 

	Probable Causes	It is probable that the accident had occurred as the vehicle running right curve in the turnout in the intersection, as the backside of right wheel of the first axle of the rear bogie had been contacting with the side surface of the portion which had the function of guard rail in the diamond crossing, the back side of right wheel climbed up around the tip of the nose rail and started derailment, and after the wheel flange ran on the upper part of the side surface of the portion, the left wheel of the axle ran onto the left rail and the axle derailed to left, then followed the derailments of the second axle in the rear bogie to left. It is probable that the right wheel of the first axle in the rear bogie ran onto the rail and derailed caused by the effects of increased lateral force acting on backside of the wheel due to the abrupt contact of the wheel and the deformed tip of the nose rail, and decreased contact angle between backside of the wheel and the deformed tip of the nose rail. It is probable that the tip of nose rail was deformed by the repeating shocks by backside of right wheels of the front axle of bogies of plural vehicles, acting on the tip of the nose rail in the state of being easily deformed, caused by the effects of the lowered height of the tip of the nose rail by the design modification, in the diamond crossing existed in very small radius curve where wheels always contact with tip of the nose rail structurally.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-2-1.pdf See summaries of major railway accident and serious incident investigation reports (P.87).

6	Date of Publication	Date and accident type	Railway operator	Line section (location)
	March 30, 2017	October 8, 2016 Level crossing accident	West Japan Railway Company	Nakada Number 1 level crossing (class four level crossing without automatic barrier machine nor road warning device) between Yotsutsuji station and Shin-Yamaguchi station, San-yo Line (Yamaguchi Prefecture)

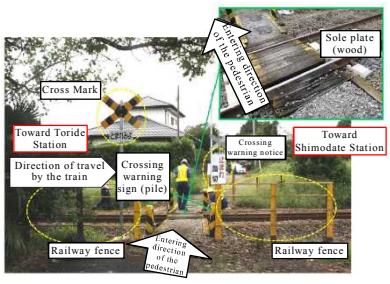
	Summary	While the train was running between Yotsutsuji station and Shin-Yamaguchi station, the driver of the train noticed a light motor truck entered to Nakada Number 1 level crossing, class four level crossing, and applied an emergency brake immediately, but the train collided with the light motor truck. The driver of the light motor truck was dead in the accident.
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a light motor truck, because the light motor truck entered to Nakada Number 1 level crossing, class four level crossing, in the situation that the train was approaching. It is somewhat likely that the light motor truck entered to the level crossing in the situation that the train was approaching because the driver did not notice the approaching train, but it could not be determined the precise situations because the driver of the light motor truck was dead in the accident. 
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-2-2.pdf

7	Date of Publication	Date and accident type	Railway operator	Line section (location)
	April 27, 2017	December 11, 2015 Train derailment	East Japan Railway Company	Between Hiratsuto station and Matsukusa station, Yamada Line (Iwate Prefecture)

	Summary	The train departed from Hiratsuto station on schedule. While the train was running at about 55 km/h between Hiratsuto station and Matsukusa station, the driver of the train found the trees fell on the track ahead, and applied an emergency brake, but the train hit and ran over the fallen trees and earth and sands, etc., flowed into the track, and stopped. It was found in the later investigation that all four axles of the train were derailed and the vehicle body was tilted to right. In addition, the slope in left side of the stopped train was collapsed, and earth and sand, etc., flowed onto the track. There were 22 passengers and 2 train crews, i.e., the driver and the conductor, were onboard the 

		train. Among them, 15 passengers and the driver were injured.
	Probable Causes	It is highly probable that the accident had occurred as the train was derailed by hit and ran onto the fallen trees or earth and sand, etc., flowed into railway track due to the collapse of the slope in track side. It is somewhat likely that the slope collapsed by the increased weight of the surface layer of the slope due to rainfall and melting snow, where the surface layer of the slope had been unstable by the steep slope and weathering.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-3-1.pdf See summaries of major railway accident and serious incident investigation reports (P.85).

8	Date of Publication	Date and accident type	Railway operator	Line section (location)
	April 27, 2017	July 7, 2016 Level crossing accident	Shikoku Railway Company	Miyaji level crossing (class four level crossing without automatic barrier machine nor road warning device) between Iyo-Yokota station and Torinoki station, Yosan Line (Ehime Prefecture)
	Summary	While the train was running between Iyo-Yokota station and Torinoki station, the driver of the train noticed a pedestrian went into Miyaji level crossing, class four level crossing, and applied an emergency brake, but the train hit the pedestrian. The pedestrian was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train hit a pedestrian because the pedestrian went into Miyaji level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the pedestrian went into the level crossing, because the pedestrian was not able to judge properly due to the effects of deteriorated function of the brain, but it could not be determined the precise situations because the pedestrian was dead in the accident.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-3-3.pdf		

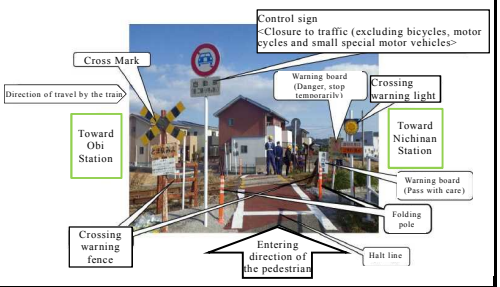
9	Date of Publication	Date and accident type	Railway operator	Line section (location)
	April 27, 2017	September 12, 2016 Level crossing accident	Kanto Railway Co., Ltd.	Inoue Number 1 level crossing (class four level crossing without automatic barrier machine nor road warning device) between Kurogo station and Otago station, Joso Line (Ibaraki Prefecture)
	Summary	While the train was running between Kurogo station and Otago station, the driver of the train noticed a person riding bicycle went into Inoue Number 1 level crossing, class four level crossing, then sound a whistle and applied an emergency brake immediately, but the train hit the person riding bicycle. The person riding bicycle was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train hit a person riding bicycle because the person riding bicycle went into Inoue Number 1 level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the person riding bicycle went into the level crossing, in the situation that the train was approaching, related with that the person riding bicycle could not find the approaching train until he approached beside the prop of crossing warning sign due to trees, but it could not be determined the precise situations because the person riding bicycle was dead in the accident.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-3-4.pdf		

10	Date of Publication	Date and accident type	Railway operator	Line section (location)
	April 27, 2017	September 27, 2016 Level crossing	East Japan Railway	Nakahara level crossing (class four level crossing without automatic barrier machine nor

		accident	Company	road warning device) between Minamihara station and Chitose station, Uchibo Line (Chiba Prefecture)
	Summary	While the train was running between Minamihara station and Chitose station, the driver of the train noticed a motorized bicycle entered to Nakahara level crossing, class four level crossing, then sound a whistle and applied an emergency brake immediately, but the train collided with the motorized bicycle. The driver of the motorized bicycle was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a motorized bicycle, because the motorized bicycle entered to Nakahara level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the motorized bicycle entered to the level crossing where the train was approaching, related with the restricted visibility of the track by hedges and overgrown weeds, but it could not be determined the precise situations because the driver of the motorized bicycle was dead in the accident.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-3-2.pdf		
11	Date of Publication	Date and accident type	Railway operator	Line section (location)
	June 29, 2017	June 23, 2016 Train derailment	West Japan Railway Company	Between Seno station and Hachihommatsu station, San-yo Line (Hiroshima Prefecture)
	Summary	The train departed from Seno station about 31 minutes behind the scheduled time. The driver of the train, while operating the train at about 80 km/h between Seno station and Hachihommatsu station, found earth and sand, etc., on the front track, and applied an emergency brake immediately. But the train hit and went onto the earth and sand etc., flowed onto the railway track, and stopped. It was found that the all 2 axles in the front bogie of the first vehicle of the train derailed to right, in the investigation implemented after the train had stopped. There were 124 passengers and 2 train crews, i.e., the driver and the conductor. Among them, the driver of the train was injured.		
	Probable Causes	It is highly probable that the train derailed because the train ran onto the earth and sand, etc., flowed onto the railway track from the collapsed slope by rain water, in the accident. It is probable that the slope collapsed because the slope became unstable as the rain water around the slope, by the rain fall around the accident site, flowed and concentrated into the road transverse drain, was guided to the slope, due to the drainage in downstream side of the road transverse drain was not installed.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-4-1.pdf		
12	Date of Publication	Date and accident type	Railway operator	Line section (location)
	June 29, 2017	July 14, 2016 Train derailment	West Japan Railway Company	Between Nishi-Miyoshi station and Shiwachi station, Geibi Line (Hiroshima Prefecture)

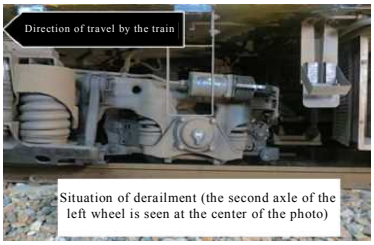
	Summary	The train departed from Nishi-Miyoshi station on schedule. The driver of the train, while driving the train in powering operation at about 70 km/h, noticed the earth and sand disturbing the front track near the exit of Aoga tunnel, and applied an emergency brake, but the train ran onto the earth and sand containing cluster of rocks, and stopped the train. It was found that the second axle in the front bogie and the second axle in the rear bogie of the first vehicle were derailed to right, by the check implemented after the train had stopped. There were 24 passengers, 2 train crews, i.e., the driver and the conductor, and a facility maintenance staff onboard the train, but there was no casualty. 
	Probable Causes	It is highly probable that the train was derailed because the train hit and ran onto earth and sand containing cluster of rocks flowed into the track, which were transported by the water flowed from swamp in the slope above the longitudinal drain in left side of the track, and overflowed the longitudinal drain, in the accident. It is probable that earth and sand overflowed the longitudinal drain because the inlet of the longitudinal drain was filled up by the earth and sand, that were transformed from the eroded sediments in the riverbed of downstream of the swamp and transported to upper part of the longitudinal drain, when the rain water by the local heavy rain around the accident site flowed downward along the swamp.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-4-2.pdf

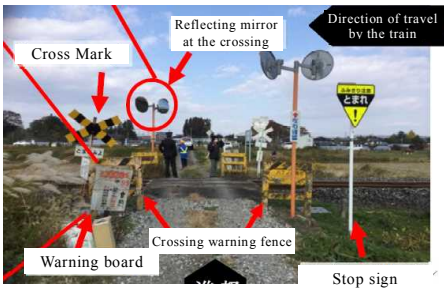
13	Date of Publication	Date and accident type	Railway operator	Line section (location)
	July 27, 2017	January 8, 2017 Level crossing accident	Kyushu Railway Company	Tekkosho level crossing (class four level crossing without automatic barrier machine nor road warning device) between Obi station and Nichinan station, Nichinan Line (Miyazaki Prefecture)

	Summary	While the train was running between Obi station and Nichinan station, the driver of the train noticed a pedestrian went into Tekkosho level crossing, class four level crossing, then applied an emergency brake immediately, but the train hit the pedestrian. The pedestrian was dead in the accident. 
	Probable Causes	It is highly probable that the accident had occurred as the train hit a pedestrian, because the pedestrian went into Tekkosho level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It could not be determined why the pedestrian went into the level crossing in the situation that the train was approaching, because the pedestrian was dead in the accident.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-5-4.pdf

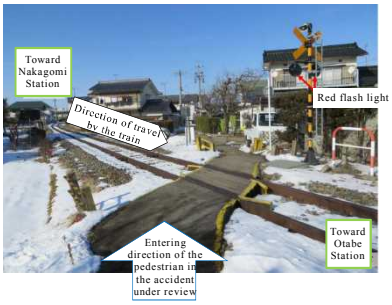
14	Date of Publication	Date and accident type	Railway operator	Line section (location)
	July 27, 2017	January 24, 2017 Train derailment	West Japan Railway Company	On the premises of Gokei station, Hakubi Line (Okayama Prefecture)

	Summary	When the train departed from Gokei station on schedule, the driver of the train noticed the fire came out from around the turnout of up track in right side of the front track. Then the driver stopped the train about 15 m beyond the predetermined stop position, and communicated with the conductor and the train dispatcher, then got off the train for firefighting. After the firefighting was finished, the driver communicated with the train dispatcher and the conductor again, and started the train according to the departure sign from the conductor. Immediately after the train had started, the emergency brake was acted and the train was stopped again after running about 7 m ahead.

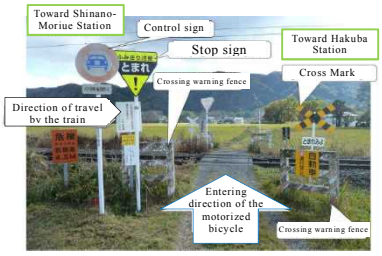
		After that, the driver was informed about the situation from the conductor, and got off the train to check the vehicles. It was found that the second axle in the front bogie of the third vehicle was derailed to right. There was no casualty in the accident.
	Probable Causes	It is highly probable that the second axle in the front bogie of the third vehicle of the train was derailed to right because the left wheel of the second axle ran onto the wheel stopper that was set by the conductor at the left wheel of the second axle when the driver got off the train for firefighting, and forgot to remove it before the train was restarted, in the accident. It is probable that the conductor set the wheel stopper, in relation with that he thought as wheel stopper should be set when asked measures to prevent rolling wheels from the driver, according to his experiences up to that moment, even though it was not conductor's mission. Also, it is probable that the conductor forgot to remove the wheel stopper before restarting the train, in relation with that his attention was focused on early restart of the train, in the process of communication with the driver after finishing firefighting.  Situation of derailment (the second axle of the left wheel is seen at the center of the photo)
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-5-3.pdf

15	Date of Publication	Date and accident type	Railway operator	Line section (location)
	July 27, 2017	November 6, 2016 Level crossing accident	East Japan Railway Company	Hacchonome level crossing (class four level crossing without automatic barrier machine nor road warning device) between Kogota station and Kitaura station, Rikuu-To Line (Miyagi Prefecture)
	Summary	While the train was running between Kogota station and Kitaura station, the driver of the train noticed a light motor truck entered to Hacchonome level crossing, class four level crossing, then sound a whistle and applied an emergency brake immediately, but the train collided with the light motor truck. The driver of the light motor truck was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a light motor truck because the light motor truck entered to Hacchonome level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the light motor truck entered to the level crossing in the situation that the train was approaching, in relation with that the eyes of the driver of the light motor truck was turned opposite to the approaching train, but it could not be determined the precise situations because the driver of the light motor truck was dead in the accident.  		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-5-1.pdf		

16	Date of Publication	Date and accident type	Railway operator	Line section (location)
	July 27, 2017	November 10, 2016 Level crossing accident	East Japan Railway Company	Number 2 Shinmachi level crossing (class three level crossing equipped with road warning device but without automatic barrier machine) between Nakagomi station and Otabe station, Koumi Line (Nagano Prefecture)
	Summary	While the train was running between Nakagomi station and Otabe station, the driver of the train noticed a pedestrian staying in Number 2 Shinmachi level crossing, class three level crossing, and then sound a whistle and applied an emergency brake immediately, but the train hit the pedestrian. The pedestrian was dead in the accident.		

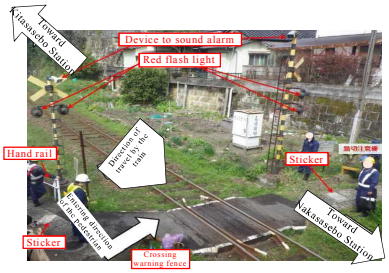
	Probable Causes	It is probable that the accident had occurred as the train hit a pedestrian, because the pedestrian went into Number 2 Shinmachi level crossing, class three level crossing equipped with road warning device, in the situation that the road warning device was in warning operation. It is somewhat likely that the pedestrian entered to the level crossing where the road warning device was in warning operation, related with the deterioration of hearing ability of both ears of the pedestrian. In addition, it is somewhat likely that the pedestrian could not recognize red flash lights when the pedestrian went into the level crossing, but it could not be determined the precise situations because the pedestrian was dead in the accident. 
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-5-2.pdf

17	Date of Publication	Date and accident type	Railway operator	Line section (location)
	August 31, 2017	October 16, 2016 Level crossing accident	Kumamoto Electric Railway	Between Hakenomiya and Horikawa Number 8 level crossing (class four level crossing without automatic barrier machine nor road warning device) between Horikawa station and Hakenomiya station, Kikuchi Line (Kumamoto Prefecture)
	Summary	While the train was running between Horikawa station and Hakenomiya station, the driver of the train noticed a sedan entering to Between Hakenomiya and Horikawa Number 8 level crossing, class four level crossing, and applied an emergency brake, but the train collided with the sedan. The driver of the sedan was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a sedan because the sedan entered to Between Hakenomiya and Horikawa Number 8 level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the driver of the sedan moved the sedan into the level crossing in the situation that the train was approaching, in relation with the bad visibility for trains from the seated driver in the sedan, but it could not be determined the precise situations because the driver of the sedan was dead in the accident. 		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-6-1.pdf		

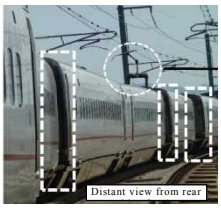
18	Date of Publication	Date and accident type	Railway operator	Line section (location)
	August 31, 2017	November 2, 2016 Level crossing accident	East Japan Railway Company	Takami-Kita level crossing (class four level crossing without automatic barrier machine nor road warning device) between Shinano-Moriue station and Hakuba station, Oito Line (Nagano Prefecture)
	Summary	While the train was running between Shinano-Moriue station and Hakuba station, the driver of the train noticed a motorized bicycle entering to Takami-Kita level crossing, class four level crossing, and applied an emergency brake immediately, but the train hit the motorized bicycle. The driver of the motorized bicycle was dead in the accident.		
	Probable Causes	It is probable that the accident had occurred as the train hit a motorized bicycle because the motorized bicycle entered to Takami-Kita level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the motorized bicycle entered to the level crossing in the situation that the train was approaching, in relation with the situation 		

		that the approaching train was difficult to see for the driver of the motorized bicycle due to the overgrown weeds until he approached the level crossing beyond the fence of warning level crossing. But it could not be determined the precise situations because the driver of the motorized bicycle was dead in the accident.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-6-2.pdf

19	Date of Publication	Date and accident type	Railway operator	Line section (location)
	September 28, 2017	March 23, 2017 Level crossing accident	Matsuura Railway Co., Ltd.	Nakiri-cho level crossing (class three level crossing equipped with road warning device but without automatic barrier machine) between Kita-Sasebo station and Naka-Sasebo station, Nishi-Kyushu Line (Nagasaki Prefecture)

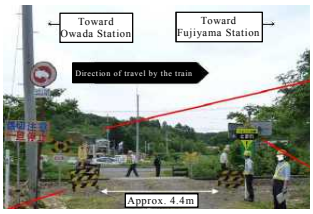
Summary	The train was running between Kita-Sasebo station and Naka-Sasebo station, the driver of the train noticed a pedestrian went into Nakiri-Cho level crossing, class three level crossing, and applied an emergency brake immediately, but the train hit the pedestrian. The pedestrian was dead in the accident.
Probable Causes	It is probable that the accident had occurred as the train hit a pedestrian because the pedestrian went into the Nakiri-Cho level crossing, class three level crossing equipped with road warning device, in the situation that the road warning device was in warning operation according to the approaching train. It is somewhat likely that the pedestrian went into the level crossing in the situation that the road warning device was in warning operation, in relation with the situation that the pedestrian had been lost hearing sense. Also, it is somewhat likely that the pedestrian could not recognize red flashing lights when the pedestrian entered to the level crossing, but it could not be determined the precise situations because the pedestrian was dead in the accident. 
Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-7-1.pdf

20	Date of Publication	Date and accident type	Railway operator	Line section (location)
	November 30, 2017	April 14, 2016 Train derailment	Kyushu Railway Company	Between Kumamoto station and Kumamoto General Train Depot, Kyushu Shinkansen (Kumamoto Prefecture)

Summary	The train arrived at Kumamoto station. After that, the train departed from Kumamoto station on schedule, in the deadhead operation. While the train was running at about 78 km/h, the driver of the train felt vertical jolts as if the earth were heaving upward, then turned off the powering notch and applied emergency brake immediately. There were large swaying shakes after the vertical jolts. After the train had stopped at around 99,461 m from the origin at Hakata station, the driver got off the train and checked underfloor condition of the vehicles, and found that all 6 vehicles were derailed. Only the driver was onboard the train, conductors were not boarded, between Kumamoto station and Kumamoto General Train Depot, but there was no casualty. Here, the earthquake of magnitude 6.5, one of the 2016 Kumamoto Earthquakes, that the hypocenter was in depth of about 11 km in Kumamoto district, Kumamoto Prefecture, had occurred at about 21:26, April 14, 2016. The maximum seismic intensity 7 was observed in Mashiki Town, Kumamoto Prefecture.
Probable Causes	It is probable that the accident occurred as the train was derailed due to being acted by the ground motion of the earthquake occurred on about 21:26, April 14, 2016, which was one of the 2016 Kumamoto Earthquakes. As for the process to the derailment, it is probable that many axles were derailed almost the same timing, because each vehicle in the train rolled significantly and wheel flanges of left or right wheels jumped on the rail, due to the amplified rolling motion in the frequency range to promote rolling of vehicles acted in the structures, in  

		addition to the violent shakes in lateral direction to the track acted on just under the structure around the accident site, caused by the amplified ground motion.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-8-2.pdf http://www.mlit.go.jp/jtsb/railway/p-pdf/RA2017-8-2-p.pdf (Explanatory material) See summaries of major railway accident and serious incident investigation reports (P.86).

21	Date of Publication	Date and accident type	Railway operator	Line section (location)
	November 30, 2017	July 9, 2017 Train derailment accompanied with level crossing accident	Nagoya Railroad Co., Ltd.	Hirato-bashi Number 1 level crossing (class one level crossing equipped with automatic barrier machine and road warning device) on the premises of Sanage station, Mikawa Line (Aichi Prefecture)
	Summary	While the train was in cruising operation at about 45 km/h and just before to approach Hirato-bashi Number 1 level crossing, the driver of the train noticed a sedan went into the level crossing from right side, and applied an emergency brake immediately, but the train collided with the sedan. The second axle in the front bogie of the front vehicle of the train was once derailed to left, and restored during running operation after that. The driver of the sedan was slightly injured in the accident.		
	Probable Causes	It is probable that the train collided with a sedan and derailed as the sedan went into Hirato-bashi Number 1 level crossing where automatic barrier machine and road warning device were in operation according to the approaching train, because the driver of the sedan did not notice operation of the warning system in the level crossing and entered to the level crossing without temporary stop. It is probable that the driver of the sedan entered to the level crossing without noticing the operation of warning system in the level crossing, in relation with that the driver was handling displayed map of the car navigation device and hearing music in large volume while closing all windows during driving of the sedan.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-8-1.pdf		

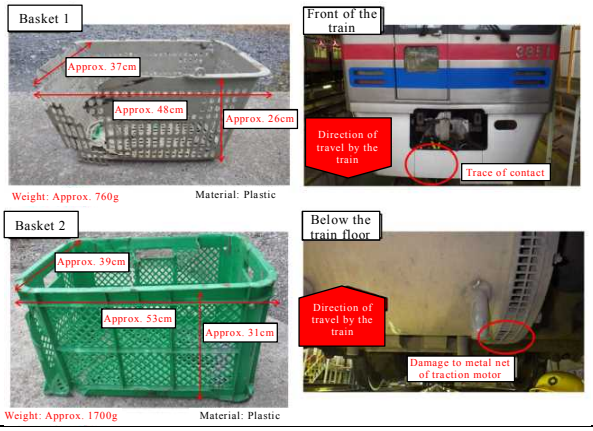
22	Date of Publication	Date and accident type	Railway operator	Line section (location)
	December 21, 2017	June 20, 2017 Level crossing accident	Hokkaido Railway Company	Jinjadoro level crossing (class four level crossing without automatic barrier machine nor road warning device) between Owada station and Fujiyama station, Rumoi Line (Hokkaido)
	Summary	While the train was running between Owada station and Fujiyama station, the driver of the train noticed a motor vehicle entering to Jinjadoro level crossing, class four level crossing, and applied an emergency brake immediately, but the train collided with the motor vehicle. The driver of the motor vehicle was dead in the accident.		
	Probable Causes	It is highly probable that the accident had occurred as the train collided with a motor vehicle because the motor vehicle entered to Jinjadoro level crossing, class four level crossing without automatic barrier machine nor road warning device, in the situation that the train was approaching. It is somewhat likely that the motor vehicle entered to the level crossing in the situation that the train was approaching, in relation with that the approaching train was difficult to see for the driver seated in the motor vehicle. But it could not be determined the precise situations because the driver of the motor vehicle was dead in the accident.		
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-9-1.pdf		

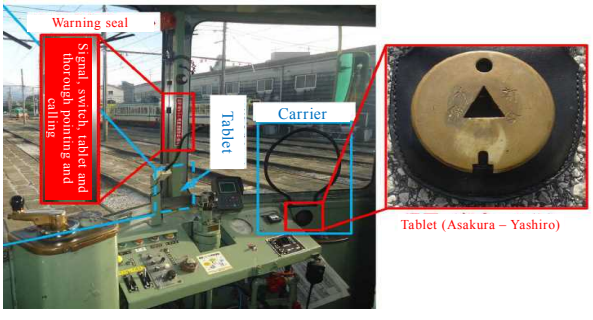
23	Date of Publication	Date and accident type	Railway operator	Line section (location)
	December 21, 2017	October 6, 2016 Train derailment	Seino Railway Co., Ltd.	Between Otomezaka station and Mino-Akasaka station, Ichihashi Line (Gifu Prefecture)

	Summary	The driver of the train, while the train was running before reaching Mino-Akasaka station, felt that the velocity decelerated quickly than as usual, then he checked backward of the train and found that the freight wagons were tilted. The driver applied an emergency brake immediately to stop the train. The driver checked the train and found that freight wagons were derailed, then he communicate with the related staffs such as the station master of Mino-Akasaka station, etc. Station master of Mino-Akasaka station checked the status of the accident site, and found that all 2 axles in the rear bogie of 11th freight wagon and all 4 axles of 12th freight wagon were derailed to left. There were the driver, the station staff and 2 yard guidance staffs onboard the diesel locomotive, but there was no casualty 
	Probable Causes	It is probable that the accident had occurred as the right wheel of the front axle in the front bogie of the 12th freight wagon derailed to inside of track, and after running as widening gauge, left wheel of the axle climbed up left rail and derailed, then the front and rear axles in the rear bogie of the 11th freight wagon and the rear axle in the front bogie and front and rear axles in the rear bogie of the 12th freight wagon were derailed, while the train was running in right curved track of 201 m radius. It is somewhat likely that the right wheel of the front axle in the front bogie of the 12th vehicle derailed inside the track, because the right wheel of the front axle in the front bogie came out of the inside rail, i.e., right rail, and dropped, as the irregularity of gauge was widened by running trains, by the weakened support force of rail due to the deteriorated sleepers and the floated loosed rail spikes existed continuously, in addition to wider irregularity of gauge. It is probable that the larger irregularity of gauge and enlarged irregularity of gauge due to passage of trains were related with the lack of the definite management standard to implement proper maintenance about irregularity of gauge, and understanding of maintained status about rail flow, sleepers, rail spikes etc., and the maintenance based on the understandings were not implemented well.
	Report	http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-9-2.pdf See summaries of major railway accident and serious incident investigation reports (P.88).

Railway serious incidents reports published in 2017

1	Date of Publication	Date and incident type	Railway operator	Line section (location)
	May 25, 2017	July 27, 2016 Violating closure section for construction	Keisei Electric Railway Co., Ltd.	Between Keisei-Usui station and Keisei-Sakura station, Keisei Main Line (Chiba Prefecture)
	Summary	The assistant manager of Sogo Branch Office of the Conductor's Office received the request to start construction work in the down track between Keisei-Usui station and Sogosando station, from the person in charge of the track closing work. The assistant manager confirmed that the outbound 2345 train, the last train bound for Keisei-Narita station departing from the down track of Sogosando station, had departed from Sogosando station, and approved to start the work. On the other hand, the outbound 2373K train, the last train bound for Keisei-Sakura station, departed from Keisei-Usui station about one minute behind schedule, and went into the closed track section after the start of the work was approved.		
	Probable Causes	It is highly probable that the serious incident had occurred as the 2373K train ran in the closed track section after the approval of the track closing work that should be implemented to stop train operation, because the request to start the work was approved without confirmed arrival of the 2373K train at Keisei-Sakura station, the last train bound for Keisei-Sakura station. It is probable that the approval to start the track closing work without confirmation of arrival of the 2373K train at Keisei-Sakura station, was related the situation that it has been usual situation		

		that the regulation, that the track closing procedures should be implemented based on the mutual consensus in the related station masters, was not obeyed, because it was the situation that the absence of trains in the closed track section was confirmed by the departure of the 2345 train from Sogosando station, in the serious incident. Here, it is somewhat likely that the 2373K train entered to the closed track section in the background that the company had treated as the measure not to enter trains into closed track section, only to confirm absence of trains etc., in the closed track section, in the decision of approval to start the track closing work. 
	Report	http://www.mlit.go.jp/jtsb/railway/rep-inci/RI2017-1-1.pdf See summaries of major railway accident and serious incident investigation reports (P.89).

2	Date of Publication	Date and incident type	Railway operator	Line section (location)
	November 30, 2017	November 17, 2016 Incorrect management of safety block	Tosaden Traffic Co., Ltd.	Between Asakura tram stop and Yashiro tram stop, Ino Line (Kochi Prefecture)
	Summary	While the tablet instrument block system had been applied in the single track section between Sakura tram stop and Yashiro tram stop, the driver of the 317 vehicle being stopped at Asakura tram stop, received the sign as getting on and off of passengers were completed, from the staff dispatched to Asakura tram stop to control a party of passengers, then started the vehicle from the tram stop. After that, when the vehicle moved about 85 m, the driver of the vehicle noticed that he had no tablet, then decelerated the vehicle, but he found the 316 vehicle, composed of one railway vehicle, started from Ino tram stop bound for Monju-Dori tram stop, in about 90 m ahead, then he stopped the 317 vehicle. On the other hand, the driver of the 316 vehicle, while operating between Asakurajinja-Mae tram stop and Asakuraeki-Mae tram stop, noticed the 317 vehicle stopped at about 60 m ahead, then stopped the 316 vehicle at about 5 m before Asakuraeki-Mae tram stop. There were about 70 passengers and the driver were onboard the 317 vehicle, and about 25 passengers and the driver were onboard the 316 vehicle, but there was no casualty.
	Probable Causes	It is highly probable that the serious incident had occurred as the 317 vehicle ran in the safety section where the 316 vehicle had existed, because the driver of the 317 vehicle started the vehicle from Asakura tram stop without carrying the tablet, in the single track section between Asakura tram stop and Yashiro tram stop where the tablet instrument block system had been applied. It is highly probable that the driver started the vehicle without carrying the tablet because he did not confirm to carry tablet and forgot the transferring tablet before starting the vehicle. It is somewhat likely that the driver started the vehicle without carrying the tablet, because the driver judged simplistically that he could start the vehicle when he received sign of completion of getting on and off of passengers, from the staff to control passengers. It is probable that these situations were related with that the driver was lacking sense for the company's rule that the driver should start operation of vehicle after confirming that there was no hindrance to start vehicle such as completion of getting on and off of passengers, the safety system, etc. 
	Report	http://www.mlit.go.jp/jtsb/railway/rep-inci/RI2017-2-1.pdf

7 Actions taken in response to recommendations in 2017

There were no actions taken in response to recommendations in 2017.

8 Provision of factual information in 2017

There were no cases of provision of factual information in 2017.

Column

On Investigation into Kyushu Shinkansen Derailment Accident

Railway Accident Investigator

A major earthquake with a magnitude of 6.5 (maximum seismic intensity of 7) occurred beneath the Kumamoto area in Kumamoto Prefecture at 21:26 on April 14, 2016, which was followed by another shock with a magnitude of 7.3 (maximum seismic intensity of 7) at 1:25 on April 16. The two earthquakes (foreshock and mainshock of the 2016 Kumamoto earthquakes) caused train derailment accidents on the Kyushu Shinkansen Line and the Hohi Line. But no human damage was caused because the two trains were deadheading and were carrying no passengers. In this report, I will recall the initial investigations into the Shinkansen bullet train derailment accident, conducted amid the continuation of aftershocks, and a simulation-based analysis of what happens to a train when a large-scale earthquake occurs.

Three accident investigators, who were appointed to investigate the accident in the dead of night on April 14, arrived at Kumamoto Airport before 10 a.m. on April 15 (the airport was then closed until April 19). As the secretariat in Tokyo began necessary work immediately after the initial quake, including collection of information, coordination with organs concerned and arrangement of transportation, we, the investigators, could smoothly start investigations after our arrival in Kumamoto.

At the accident site, no major damage to the viaduct was confirmed but many wheelsets of the train were derailed, seriously damaging the track. As investigations into the train at the accident site had to be done in a manner enabling the investigators and others involved to evacuate for fear of a possible collapse of the train when an aftershock occurred, close-up checking of the train was avoided. Visual records taken by video cameras from distant positions proved highly useful for subsequent fact checking and analyses.

Before dawn on April 16, the bigger “2016 Kumamoto Earthquake (mainshock)” occurred and dealt serious blows to railway networks in Kumamoto Prefecture and its vicinity, including a derailment accident on the Hohi Line. Although we moved by car for our investigation of the Kyushu Shinkansen on April 16, we eventually had no other choice but to abandon the day’s investigation because we were stuck in heavy traffic congestion in the city of Kumamoto.

The analysis of the accident based on factual information gathered through subsequent investigations at the accident site, collection of information and other activities went smoothly. But a simulation-based analysis was necessary to surmise and estimate jolts on the surface of the ground near the site of derailment and movements of the train while in motion until its derailment. We therefore invited expert members and listened to them and advanced the analytical work, receiving cooperation from the Railway Technical Research Institute and others. For the means of estimating jolts on the surface of the ground directly under the viaduct near the place of derailment from records logged by the Japan Meteorological Agency’s seismometers, we conducted careful studies, using seismological records taken at the time of the mainshock and many aftershocks. We carried out the analytical work as fast as we could and completed it in around March 2017, finding that the time, place, situation and others of the derailment generally corresponded to results of analyses based on factual information. As an analytical conclusion we obtained, the installation of anti-derailment guards prevents the occurrence of derailment.

A series of deliberations were held on a railway accident report (draft) describing the abovementioned results and others and the report was released on November 30, 2017, roughly one year and a half after the accident. Taking the risks of earthquake and derailment occurrence, large-scale damage that may be caused by the post-derailment running of trains and other factors into consideration, we proposed in the report the further installation and advancement of anti-derailment guards and other measures to prevent accident recurrence. We hope that the report will contribute to the further safety improvement of Shinkansen trains when a large-scale earthquake occurs.

We would like to take this opportunity to thank expert members and the Railway Technical Research Institute for their great contribution to our investigation.

9 Summaries of major railway accident and serious incident investigation reports (case studies)

Train derails after hitting and running over fallen trees, earth, etc. that flowed onto track

East Japan Railway Company: Train derailment between Hiratsuto station and Matsukusa station on the Yamada Line

Summary: On December 11, 2015, the inbound local 645D train, composed of one railway vehicle, started from Miyako station bound for Morioka station, Yamada Line of East Japan Railway Company, departed from Hiratsuto station on schedule at 19:24. While the train was running at about 55 km/h between Hiratsuto station and Matsukusa station, the driver of the train found the trees fell on the track ahead, and applied an emergency brake, but the train hit and ran over the fallen trees and earth and sands, etc., flowed onto the track, and stopped.
It was found in the later investigation that all four axles of the vehicle were derailed and the vehicle body was tilted to right. In addition, the slope in left side of the stopped train was collapsed, and earth and sand, etc., flowed onto the track.
There were 22 passengers and 2 train crews, i.e., the driver and the conductor, were onboard the train. Among them, 15 passengers and the driver were injured.

Findings

It is highly probable that the accident occurred as the train derailed after hitting and running over fallen trees and earth, sand and others that flowed onto the track due to the collapse of the slope, derailing all four axels of the front and real bogies of the vehicle.

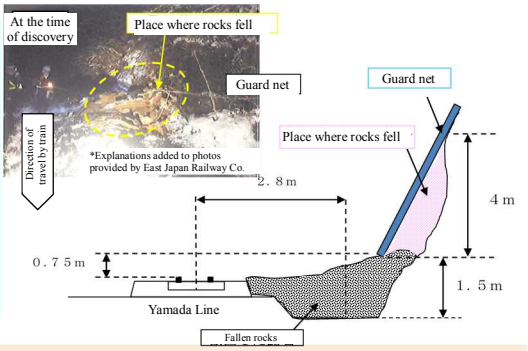
The slope is steep, having a gradient of about 60 degrees at the cut earth part near the railway track and of around 35 degrees above it.

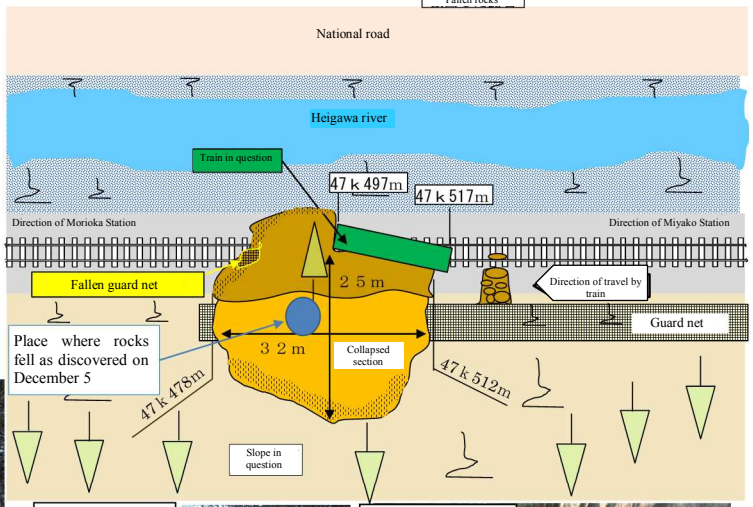
It is somewhat likely that there was a layer of weathered clayslate to a depth of around 10m from the surface of the ground and the surface of the slope was destabilizing.

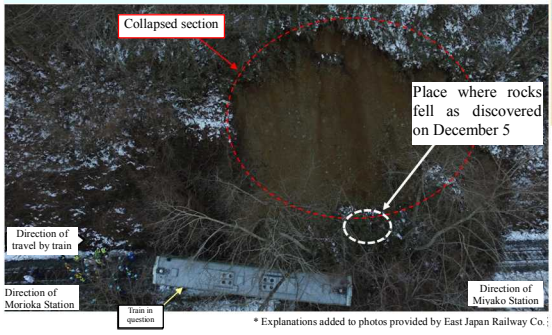
It is somewhat likely that rainwater, etc. permeated into the slope due to stoppage of rainfall and snow melting and made the surface of the slope heavier.

On December 5, 2015, before the accident, rocks used to reinforce the slope fell under the guard net placed over the collapsed section of the slope.

It is somewhat likely that rocks fell in a situation almost identical with the collapse of the slope. It is also somewhat likely that the phenomenon was a predictor of the collapse of the slope.







Probable Causes: It is highly probable that the accident had occurred as the train was derailed by hit and ran onto the fallen trees or earth and sand, etc., flowed into railway track due to the collapse of the slope in track side.
It is somewhat likely that the slope collapsed by the increased weight of the surface layer of the slope due to rainfall and melting snow, where the surface layer of the slope had been unstable by the steep slope and weathering.

For details, please refer to the accident investigation report. (Published on April 27, 2017)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-3-1.pdf

Train derails after large side-to-side sways caused by strong jolts

Kyushu Railway Company: Train derailment between Kumamoto station and Kumamoto General Train Depot on the Kyushu Shinkansen

Summary: On April 14, 2016, the 5347A train, composed of six vehicles, started from Hakata station bound for Kumamoto station, Kyushu Shinkansen of Kyushu Railway Company, arrived at Kumamoto station. After that, the train departed from Kumamoto station on schedule at 21:25, in the deadhead operation. While the train was running at about 78 km/h, the driver of the train felt vertical jolts as if the earth were heaving upward, then turned off the powering notch and applied emergency brake immediately. There were large swaying shakes after the vertical jolts. After the train had stopped at around 99,461 m from the origin at Hakata station, the driver got off the train and checked underfloor condition of the vehicles, and found that all 6 vehicles were derailed.
Only the driver was onboard the train, conductors were not boarded, between Kumamoto station and Kumamoto General Train Depot, but there was no casualty.
The earthquake of magnitude 6.5, one of the 2016 Kumamoto Earthquakes, that the hypocenter was in depth of about 11 km in Kumamoto district, Kumamoto Prefecture, had occurred at about 21:26, April 14, 2016. The maximum seismic intensity 7 was observed in Mashiki Town, Kumamoto Prefecture.

Findings

Observation records logged at the Japan Meteorological Agency's seismic station in Kasuga, Nish Ward, Kumamoto City, which is the closest to the accident site, showed steep accelerations in north-south and east-west directions at about 21:26.41 on April 14, 2016.

It is probable that the derailment started before 21:26.44 due to the instantaneous blackout of the ATC device and a plunge in the axle speed of the brake control unit records.

It is highly probable that frequency factors at around a frequency of 1Hz were amplified due to the influence of subsurface ground.

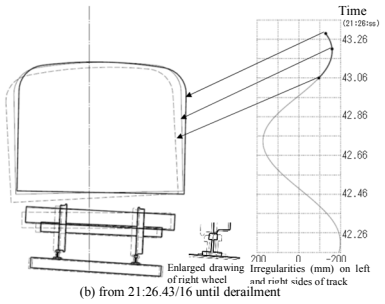
It is probable that wheelsets were pushed side-to-side by lateral force created by large side-to-side shakes of the railway track, causing the wheels to rise by more than 30mm (height of flange), and as a result, the flange of either the left or right wheels jumped on a rail before derailment.

According to records, the inner pressure of the air spring of each vehicle began to vibrate at around 21:26.42, possibly suggesting that the train started large side-to-side sways. The vibration of the train occurred roughly about 1 second after the left-mentioned time when the large acceleration was recorded at the left-mentioned seismic station.

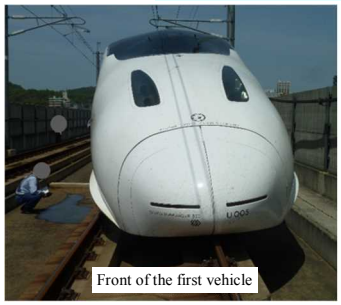
While the train was running some 150m after derailment, 22 of all 24 axles derailed, creating a situation unthinkable under normal operating conditions.

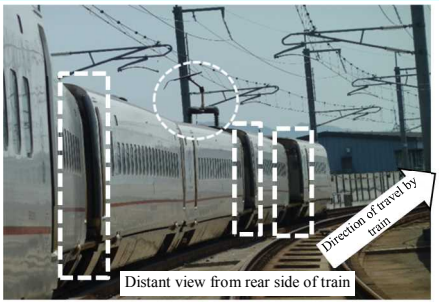
It is probable that vibrations were amplified at the structure's frequency of around 1.3Hz, affected by the natural frequency of the structure.

It is probable that vehicles derailed on both the left and right sides of the direction of travel because structural differences in the positions of individual vehicles running on the viaduct at the same time caused moderate differences in the vibrations each vehicle received from the track so that each vehicle showed different movements.



(b) from 21:26.43/16 until derailment


Front of the first vehicle



Distant view from rear side of train

Probable Causes: It is probable that the accident occurred as the train was derailed due to being acted by the ground motion of the earthquake occurred on about 21:26, April 14, 2016, which was one of the 2016 Kumamoto Earthquakes. As for the process to the derailment, it is probable that many axles were derailed almost the same timing, because each vehicle in the train rolled significantly and wheel flanges of left or right wheels jumped on the rail, due to the amplified rolling motion in the frequency range to promote rolling of vehicles acted in the structures, in addition to the violent shakes in lateral direction to the track acted on just under the structure around the accident site, caused by the amplified ground motion.

For details, please refer to the accident investigation report. (Published on November 30, 2017)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-8-2.pdf

Tram derails after backside of right wheel heaved up near tip of nose rail

Nagasaki Electric Tramway Co. Ltd.: Vehicle derailment between Suwajinja-Mae tram stop and Kokaido-Mae tram stop on the Sakuramachi Branch Line

Summary: On June 2, 2016, the 362 vehicle, composed of one railway vehicle, started from Hotarujaya tram stop bound for Akasako tram stop of Nagasaki Electric Tramway Co., Ltd., departed from Suwajinja-Mae tram stop on schedule at 22:47.30. While the vehicle was passing the right curved branch line for Nagasaki Eki-Mae tram stop, in the turnout at Kokaido-Mae intersection, the driver of the vehicle felt abnormal situation as if the vehicle was heaved up accompanied with abnormal sound, then the driver applied an emergency brake and stopped the vehicle. The driver got off the vehicle to check the situation, and found that all two axles in the rear bogie were derailed to left of rail.
There were one passenger and the driver onboard the vehicle, but there was no casualty. The accident site was in the intersection of the road together with tramway, but the derailed vehicle did not contact nor collide with automobiles, etc., before and after the derailment.

Findings

The curve with an extremely small curve radius is designed for wheels to contact the tip of a nose rail.

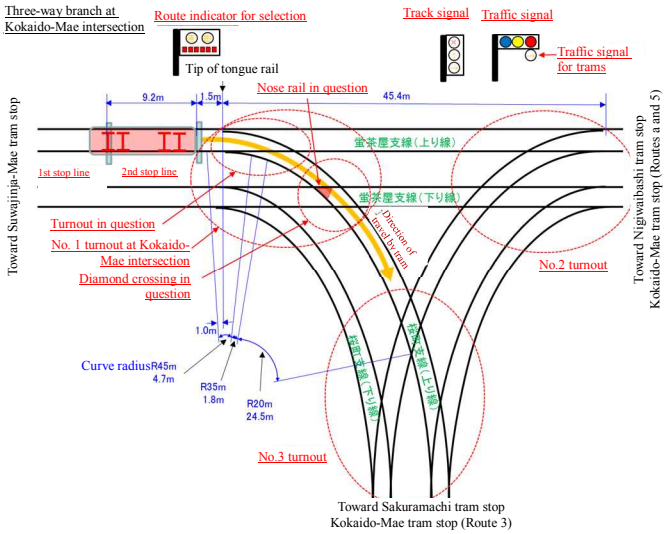
The diamond crossing, which began to be used 11 days before the accident, had little abrasion on each section but the tip of the nose rail had a transfiguration seen as if bent to the left.

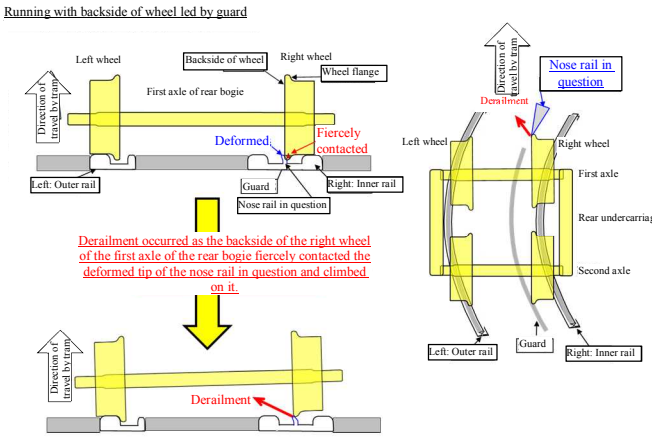
It is somewhat likely that a design change to lower the height of the nose rail tip inside the curved diamond crossing made it readily deformable.

The angle of contact between the nose rail in question, which had become deformed due to collision with the back side of wheels of multiple trams, and wheels.

Huge lateral force was created near the tip of the nose rail as the backside of the right wheel of the first axle in the rear bogie of the tram fiercely contacted the tip of the nose rail.

Following the accident, meanwhile, Nagasaki Electric Tramway Co., Ltd. newly designed a turnout and enlarged the curve radius at the accident site.





Probable Causes (excerpt): It is probable that the accident had occurred as the vehicle running right curve in the turnout in the intersection, as the backside of right wheel of the first axle of the rear bogie had been contacting with the side surface of the portion which had the function of guard rail in the diamond crossing, the back side of right wheel climbed up around the tip of the nose rail and started derailment, and after the wheel flange ran on the upper part of the side surface of the portion, the left wheel of the axle ran onto the left rail and the axle derailed to left, then followed the derailments of the second axle in the rear bogie to left.
It is probable that the right wheel of the first axle in the rear bogie ran onto the rail and derailed caused by the effects of increased lateral force acting on backside of the wheel due to the abrupt contact of the wheel and the deformed tip of the nose rail, and decreased contact angle between backside of the wheel and the deformed tip of the nose rail.

For details, please refer to the accident investigation report. (Published on March 30, 2017)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-2-1.pdf

Train derails after running on rails on deteriorated sleepers and those with flaws such as loosened rail spikes

Seino Railway Co., Ltd.: Train derailment between Otomezaka station and Mino-Akasaka station on the Ichihashi Line

Summary: On October 6, 2016, the inbound 1022 train, composed of total 25 vehicles, i.e., a diesel locomotive and 24 freight wagons, started from Otomezaka station bound for Mino-Akasaka station, departed from Otomezaka station at 08:08. The driver of the train, while the train was running before reaching Mino-Akasaka station, felt that the velocity decelerated quickly than as usual, then he checked backward of the train and found that the freight wagons were tilted. The driver applied an emergency brake immediately to stop the train.
The driver checked the train and found that freight wagons were derailed, then he communicate with the related staffs such as the station master of Mino-Akasaka station, etc. Station master of Mino-Akasaka station checked the status of the accident site, and found that all 2 axles in the rear bogie of 11th freight wagon and all 4 axles of 12th freight wagon were derailed to left.
There were the driver, the station staff and 2 yard guidance staffs onboard the diesel locomotive, but there was no casualty.

Findings

The last inspection into track irregularities, made on April 5, 2016, before the accident in question near the place where the derailment started found gauge irregularities and cross-level irregularities in excess of maintenance standards.

Seino Railway Co. had not set the period of implementing track improvements in its track-related maintenance standards in the case of irregularities exceeding the maintenance standards.

Before the accident, the last track maintenance work near the place where the derailment started was conducted on April 2, 2014. It is probable that no other track maintenance work had been done until the occurrence of the accident.

As there were differences equivalent to rail flaws between gauge data measured by the inspection and the actual track, it is probable that the actual track with an abraded rail flaw was larger than the measured figure.

It is probable that a rail flaw had dropped off the right rail (inner rail) near the place where the derailment started, further enlarging the gauge.

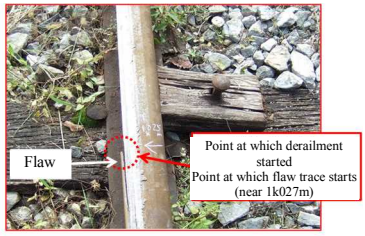
Before the accident, the last inspection into sleepers and the rail fastening device near the place where the derailment started was conducted on May 10, 2016, recording that four sleepers and one sleeper needed to be continuously monitored and replaced, respectively.

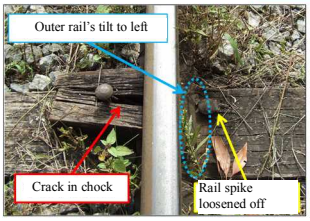
It is probable that the sleeper considered involved in the derailment was not among the sleepers that were subjected to continuous monitoring as a result of the company's regular inspection.

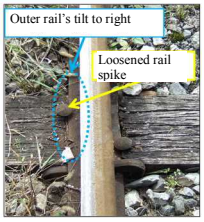
It is somewhat likely that spikes were less effective in fastening rails due to the successive deterioration of six sleepers at the time of the accident or a broken chock made the function of gauge irregularity prevention unworkable.

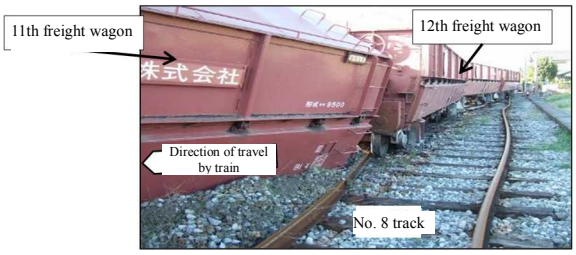
It is probable that the company neither grasped the maintenance condition of the sleepers and rail fastening devices nor adopted sufficient necessary actions.

"Flaw" in the circle means "rail flaw."









Probable Causes (excerpt): It is probable that the accident had occurred as the right wheel of the front axle in the front bogie of the 12th freight wagon derailed to inside of track, and after running as widening gauge, left wheel of the axle climbed up left rail and derailed, then the front and rear axles in the rear bogie of the 11th freight wagon and the rear axle in the front bogie and front and rear axles in the rear bogie of the 12th freight wagon were derailed, while the train was running in right curved track of 201 m radius.
It is somewhat likely that the right wheel of the front axle in the front bogie of the 12th vehicle derailed inside the track, because the right wheel of the front axle in the front bogie came out of the inside rail, i.e., right rail, and dropped, as the irregularity of gauge was widened by running trains, by the weakened support force of rail due to the deteriorated sleepers and the floated loosed rail spikes existed continuously, in addition to wider irregularity of gauge.

For details, please refer to the accident investigation report. (Published on December 21, 2017)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-9-2.pdf

Train enters closed track section after approval for start of construction in the section

Keisei Electric Railway Co., Ltd.: Serious Incident between Keisei-Usui station and Keisei-Sakura station, Keisei Main Line (Violating closure section for construction)

Summary: On July 27, 2016, the assistant manager of Sogo Branch Office of the Conductor's Office accepted the request to start track closing work in the down track between Keisei-Usui station and Sogosando station, from the person in charge of the track closing work. The assistant manager confirmed that the outbound 2345 train, the last train bound for Keisei-Narita station departing from the down track of Sogosando station, had departed from Sogosando station, and approved to start the work at about 00:51.
On the other hand, the outbound 2373K train, the last train bound for Keisei-Sakura station, departed from Keisei-Usui station about one minute behind schedule, at about 00:55, and went into the closed track section after the start of the work was approved.

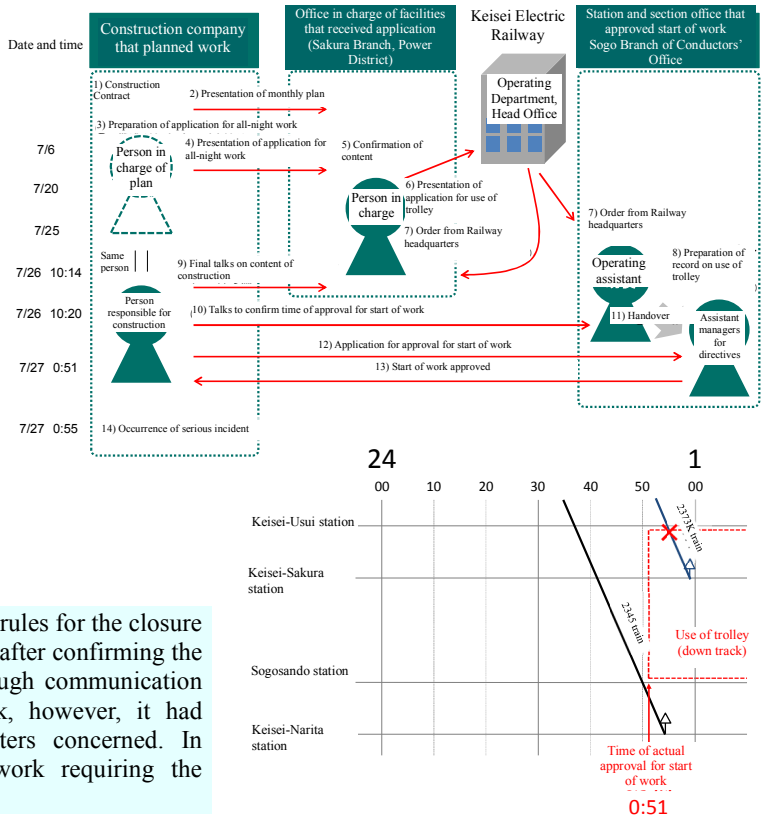
Findings

A person responsible for closing a track submitted an application for all-night work based on misunderstanding that the departure of the last train from Sogosando Station was the time of approval for starting closed-track work, although the person should have confirmed the time of arrival by the last train, bound for Keisei-Sakura Station, at Keisei-Sakura Station.

An official concerned at an office in charge of facilities in the track section concerned, who received the application, failed to inform the correction of time to approve the start of the closed-track work.

The assistant manager for directives, who approved the start of the closed-track work, approved the start without confirming the presence or absence of any train in all sections closed for the work.

According to Keisei Electric Railway Co., Ltd.'s rules for the closure of tracks, approval for the start of work is issued after confirming the absence of trains in a closed track section through communication with stationmasters concerned. In actual work, however, it had become customary not to inform stationmasters concerned. In addition, there had been little closed-track work requiring the confirmation of multiple trains.



The company has rules banning the entry of any train, etc. into a closed track section. In the implementation of the rules, however, it is highly probable that the ban on entry of any train, etc. into a closed track section was effectuated only by confirming the presence of no train, etc. in the closed section after the end of operations in the section. As judging the end of train services in this method exclusively relies on confirmation by stationmasters concerned, it is highly probable that the entry of a train into a closed section was possible in case of an error in confirmation by any stationmaster. It is probable that this kind of handling by the company was inadequate in preventing any train from entering a closed section.

Probable Causes (excerpt): It is highly probable that the serious incident had occurred as the 2373K train ran into the closed track section after the approval of the track closing work that should be implemented to stop train operation, because the request to start the work was approved without confirmed arrival of the 2373K train at Keisei-Sakura station, the last train bound for Keisei-Sakura station.
It is probable that the approval to start the track closing work without confirmation of arrival of the 2373K train at Keisei-Sakura station, was related the situation that it has been usual situation that the regulation, that the track closing procedures should be implemented based on the mutual consensus in the related stationmasters, was not obeyed, because it was the situation that the absence of trains in the closed track section was confirmed by the departure of the 2345 train from Sogosando station, in the serious incident.

For details, please refer to the serious incident investigation report. (Published on May 25, 2017)
http://www.mlit.go.jp/jtsb/railway/rep-inci/RI2017-1-1.pdf

Chapter 5 Marine accident and incident investigations

1 Marine accidents and incidents to be investigated

<Marine accidents to be investigated>

◎Paragraph 5, Article 2 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>

◎Item 2, paragraph 6, Article 2 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 3 of 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 item 2, paragraph 6, Article 2 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.

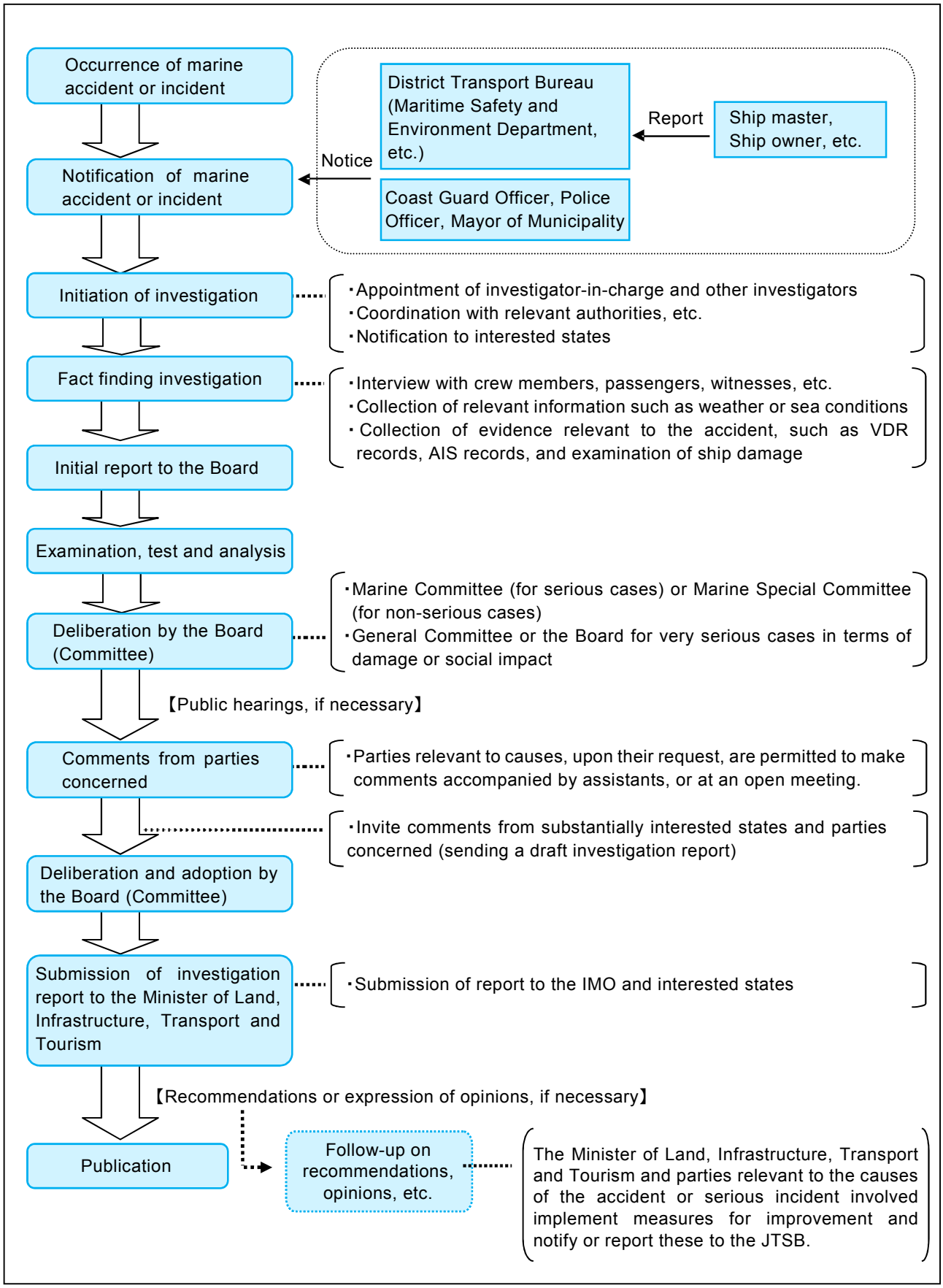
2 The situation where a ship grounded without any damage to the hull; and

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>

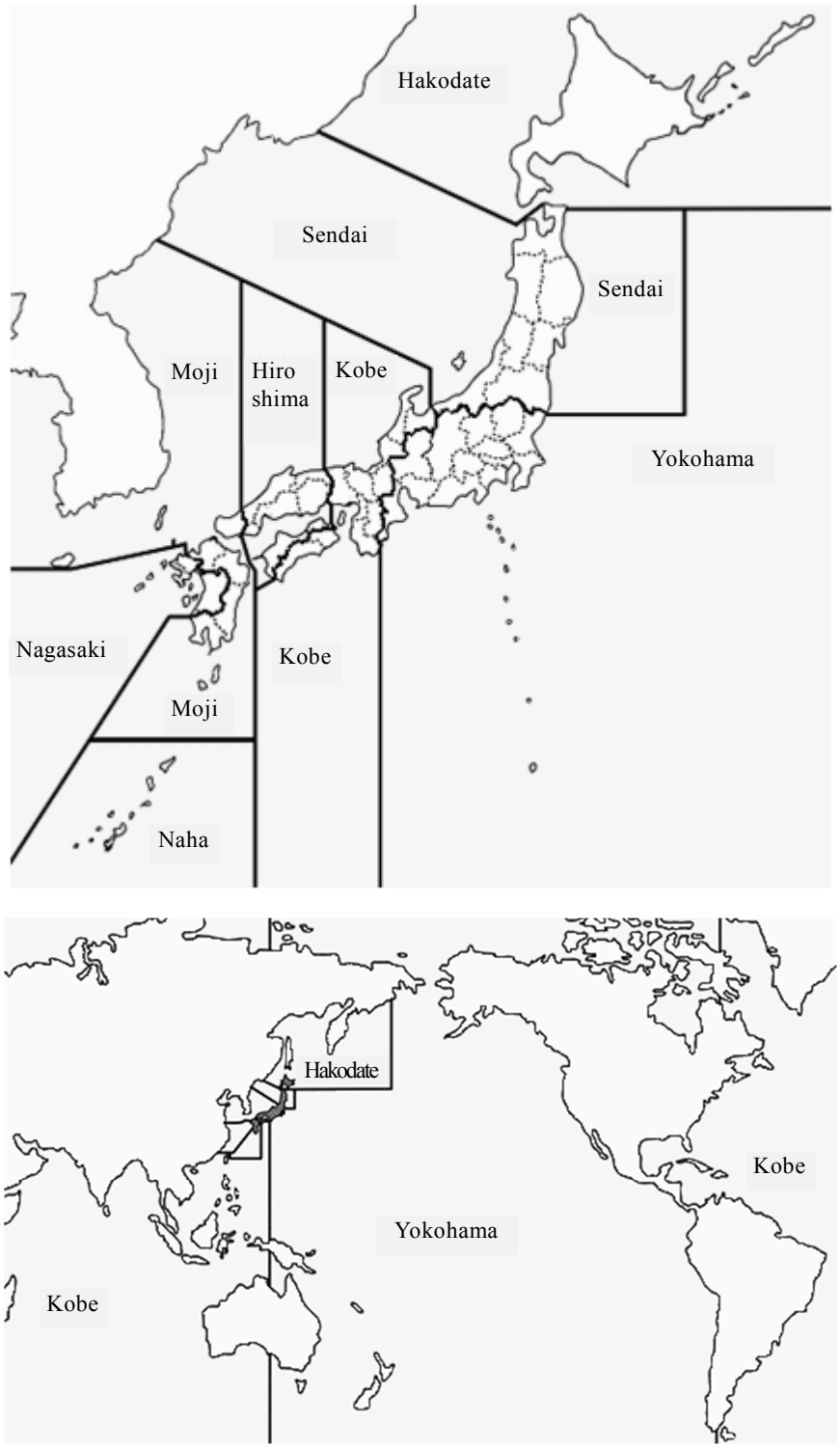
Marine accident and incident to be investigated		Type of marine accident and incident
Marine accident	Damage to ships or other facilities involved in ship operation	Collision, Grounding, Sinking, Flooding, Capsizing, Fire, Explosion, Missing, Damage to facilities
	Casualty related to ship structures, 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



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 serious marine accidents and incidents.



Jurisdiction map

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

Serious marine 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.

(For the deliberation items of the Board and each Committee, refer to page 2 of the Appendixes)

<table>
<tr><td>Serious marine accidents and incidents</td><td>Office in charge of investigation: Marine accident investigators in the Headquarters
Committee in charge of deliberation and adoption: Marine Committee</td></tr>
<tr><td colspan="2">Definition of ”serious marine accidents and incidents”
•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>Non-serious marine 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>

5 Statistics of investigations of marine accidents and incidents (As of end of February 2018)

The JTSB carried out investigations of marine accidents and incidents in 2017 as follows:

578 accident investigations had been carried over from 2016, and 782 accident investigations were newly launched in 2017. 825 investigation reports were published in 2017, and thereby 534 accident investigations were carried over to 2018.

70 incident investigations had been carried over from 2016, and 140 incident investigations were newly launched in 2017. 122 investigation reports were published in 2017, and thereby 88 incident investigations were carried over to 2018.

Investigations of marine accidents and incidents in 2017

(Cases)

Category	Carried over from 2016	Launched in 2017	Not applicable	Transferred to Tokyo Office	Total	Publication of investigation report	(Recommendations)	(Safety recommendations)	(Opinions)	Carried over to 2018	(Interim report)
Marine accident	578	782	△1	0	1,359	825	(1)	(2)	(0)	534	(0)
Tokyo Office (Serious cases)	17	12	△1	0	28	15	(1)	(2)		13	
Regional Offices (Non-serious cases)	561	770	0	0	1,331	810				521	
Marine incident	70	140	0	0	210	122	(0)	(0)	(0)	88	(0)
Tokyo Office (Serious cases)	0	1	0	0	1	0				1	
Regional Offices (Non-serious cases)	70	139	0	0	209	122				87	
Total	648	922	△1	0	1,569	947	(1)	(2)	(0)	622	(0)

Note 1. The figures for “Launched in 2017” includes cases which occurred in 2016 or earlier, and which the JTSB was notified of in 2016 as subjects of investigation.

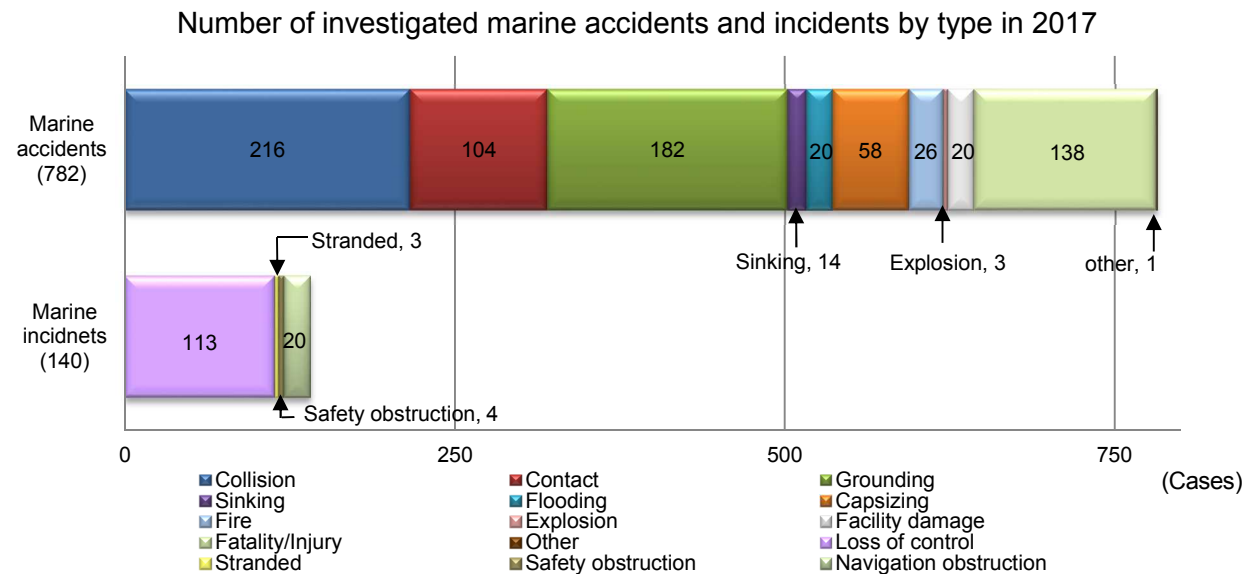
Note 2: The column “Not applicable” shows the number of cases which did not come under the category of accident or incident as defined in Article 2 of the Act for Establishment of the Japan Transport Safety Board.

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 investigations launched in 2017 (As of end of February 2018)

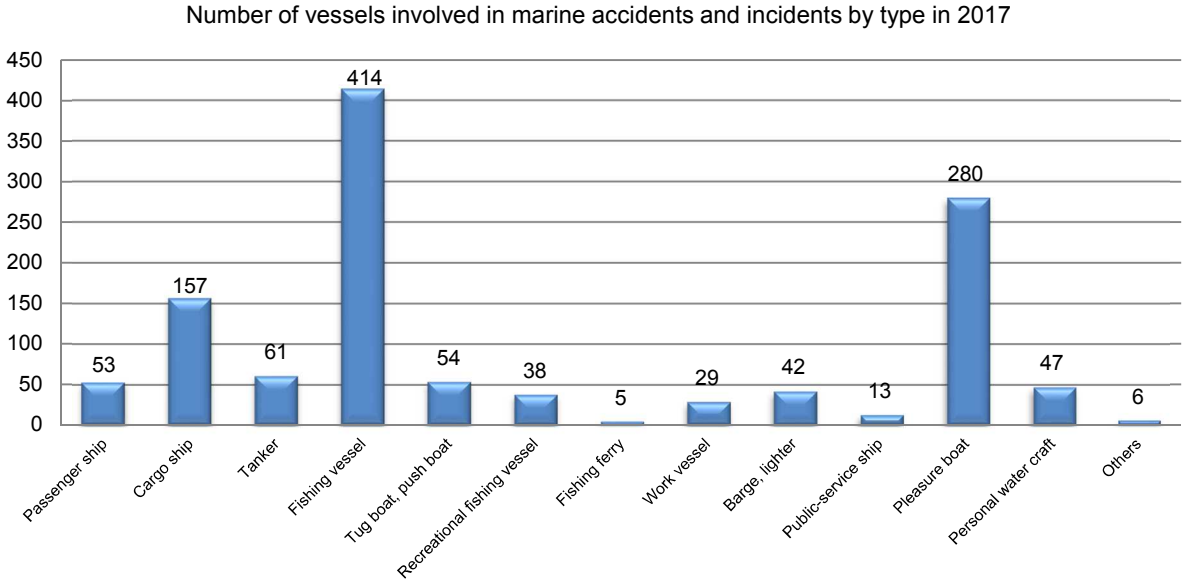
(1) Types of accidents and incidents

The breakdown of the 922 investigations launched in 2017 by type of accidents and incidents is as follows: The marine accidents included 216 cases of collision, 182 cases of grounding, 138 cases of fatality/injury (not involved in other types of accidents), and 104 cases of contact. The marine incidents included 113 cases of loss of control, 20 cases of navigation obstruction, four cases of safety obstruction, and three cases of stranded. The objects of contact were breakwaters in 28 cases, quays in 16 cases, and piers in 12 cases.



(2) Types of vessels

The number of vessels involved in marine accidents and incidents was 1,199. By type of vessel, they included 414 fishing vessels, 280 pleasure boats, 157 cargo ships, 61 tanker, 54 tug boat and push boat.



The number of foreign-registered vessels involved in marine accidents and incidents was 58, and they were classified by accident type as follows: 27 vessels in collision, 14 vessels in contact and seven vessels in grounding. As for the flag of vessels, 17 vessels were registered in Panama, five vessels in South Korea, five vessels in Belize, three vessels in Hong Kong.

Number of foreign-registered vessels by flag

(Vessels)

Panama	17	Hong Kong	3	Marshall Islands	2
South Korea	5	Cyprus	2	Taiwan	2
Belize	5	Philippines	2	Others	20

(3) Number of casualties

The number of casualties was 471, consisting of 84 deaths, 26 missing persons, and 361 injured persons. By type of vessel, 132 persons in fishing vessels and 126 persons in pleasure boats. By type of accident, 163 persons in fatality/injury, 126 persons in collision, 115 persons in contact, 28 persons in capsizing, and 23 persons in grounding.

With regard to the number of persons dead or missing, 59 persons were involved in fishing vessel accidents, 23 persons in pleasure-boat accidents, indicating dead or missing cases occurred frequently in fishing vessels.

Number of casualties (marine accident)

(Persons)

2017										
Vessel type	Dead			Missing			Injured			Total
	Crew	Passengers	Others	Crew	Passengers	Others	Crew	Passengers	Others	
Passenger ship	3	0	0	1	0	0	3	49	3	59
Cargo ship	3	0	1	1	0	0	14	0	0	19
Tanker	0	0	0	0	0	0	2	0	0	2
Fishing vessel	37	0	0	16	0	0	77	0	2	132
Tug boat, push boat	8	0	0	1	0	0	6	0	0	15
Recreational fishing vessel	0	0	0	0	0	0	5	30	0	35
Fishing ferry	0	2	0	0	0	0	0	0	0	2
Work vessel	1	0	0	0	0	0	3	0	2	6
Barge, lighter	0	0	2	0	0	0	1	0	0	3
Public-service ship	9	0	0	0	0	0	9	0	5	23
Pleasure boat	9	0	8	5	0	1	30	0	73	126
Personal water craft	1	0	0	1	0	0	12	0	33	47
Others	0	0	0	0	0	0	1	0	1	2
Total	71	2	11	25	0	1	163	79	119	471
	84			26			361			

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

7 Summaries of serious marine accidents and incidents which occurred in 2017

The serious marine accidents which occurred in 2017 are summarized as follows: The summaries are based on information available at the initial stage of the investigations and therefore are subject to change depending on the course of investigations and deliberations.

(Marine accidents)

1	Date and location	Vessel type and name, accident type
	January 19, 2017 Port of Felixstowe, United Kingdom	Container ship MANHATTAN BRIDGE Explosion of the auxiliary boiler
	Summary	While the vessel was berthing with a master, 25 crew members and a pilot onboard at the port of Felixstowe, United Kingdom of Great Britain and Northern Ireland, an explosion occurred in the furnace of the auxiliary boiler. The duty oiler died, the second engineer suffered injuries and the burner unit of the auxiliary boiler damaged.
2	Date and location	Vessel type and name, accident type
	January 30, 2017 Tomakomai Port, Tomakomai city, Hokkaido Prefecture	Cargo ship SWIFTNES (Vessel A) Work boat FUJI MARU (Boat B) Capsizing
	Summary	Boat B, with its skipper and a crew member onboard, was assisting Vessel A's berthing at Tomakomai Port in Tomakomai City, Hokkaido Prefecture. During the work, Boat B was pulled and capsized because a mooring rope extended from the aft of Vessel A got tangled with the propeller of Vessel A. In the accident, the skipper died and a crew member suffered severe injuries including a fracture in the eighth rib. Boat B was totally lost. On Ship A, the propeller was damaged.
3	Date and location	Vessel type and name, accident type
	February 11, 2017 Southwest shore of Suwanose Island, Kagoshima Prefecture	Chemical tanker SAGAN Grounding
	Summary	While sailing toward South Korea, the vessel began to drift due to engine failure and grounded on the southwest shore of Suwanose Island, Kagoshima Prefecture.
4	Date and location	Vessel type and name, accident type
	April 24, 2017 Hakozaki No. 16 Pier, Higashi Ward, Fukuoka City, Hakata Port, Fukuoka Prefecture	Cargo ship TAI YUAN (Belize) Fire
	Summary	The vessel, with scrap loaded, caught fire and sank while being moored.
5	Date and location	Vessel type and name, accident type
	May 14, 2017 Breakwater off Kuroshima Port, Kuroshima Town, Sasebo City, Nagasaki Prefecture	Water taxi SAKURA Contact with breakwater
	Summary	With passengers getting onboard at Kuroshima, an island in Sasebo City, the vessel collided with a breakwater while sailing to Ainoura Port in the city. In the accident, seven people were injured.
6	Date and location	Vessel type and name, accident type
	June 17, 2017 Off southeast coast of Irozaki, Shizuoka Prefecture	Container ship ACX CRYSTAL (Vessel A, Philippines) U.S. naval ship FITZGERALD (Vessel B) Collision
	Summary	While both Vessel A and Vessel B were underway, they collided with each other off the southeast coast of Irozaki, Shizuoka Prefecture. In the accident, seven crew members onboard Vessel B died while three were injured.
7	Date and location	Vessel type and name, accident type
	July 26, 2017 East approaching light beacon E2 at Kobe Airport, Hyogo Prefecture	Passenger ship SORA Contact with lighthouse
	Summary	The vessel, while sailing from Kansai International Airport to Kobe Airport, collided with the east approaching beacon E2 at Kobe Airport. In the accident, 15 people were injured.

8	Date and location	Vessel type and name, accident type
	August 2, 2017 Between Hakata Port, Fukuoka Prefecture, and Shibushi Port, Kagoshima Prefecture	Container ship SINOKOR AKITA Missing of crew member
	Summary	While the vessel was sailing from Hakata Port to Shibushi Port, a crew member (Philippine nationality) went missing.
9	Date and location	Vessel type and name, accident type
	August 22, 2017 Off northern coast of Hirado Island, Nagasaki Prefecture	Towboat No. 6 AOI MARU (Vessel A) Barge No. 8 AOI MARU (Vessel B) Sinking
	Summary	Both Vessel A and Vessel B sank 4km off the northern coast of Hirado Island after sending distress signals at sea
10	Date and location	Vessel type and name, accident type
	October 23, 2017 Toyama District, Fushiki-Toyama Port, Toyama Prefecture	Cargo ship REAL Grounding
	Summary	The vessel ran onto wave-dissipating blocks in Toyama District at Fushiki-Toyama Port

(Marine incidents)

1	Date and location	Vessel type and name, incident type
	January 11, 2017 Off the north of Oshima Island, Munakata City, Fukuoka Prefecture (approximately 33°56.3'N, 130°25.3'E)	Cargo ship TONG DA Loss of control (listing)
	Summary	While the vessel was proceeding east-northeast in Genkai-nada, with a master and 13 other crew members onboard, her hull listed to port and she was intentionally run aground. The vessel had seawater damage to her engine, cargo, etc.

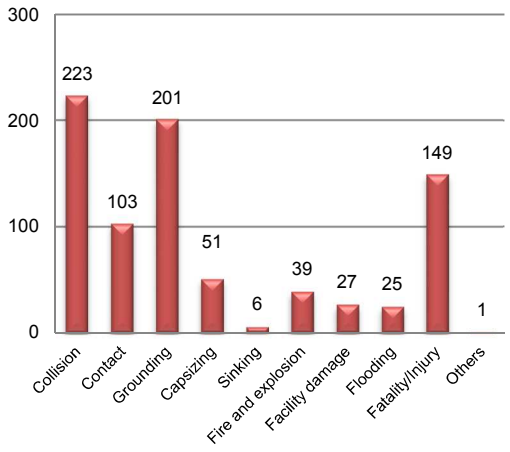
8 Publication of investigation reports

The number of investigation reports of marine accidents and incidents published in 2017 was 947, consisting of 825 marine accidents (among them, 15 were serious) and 122 marine incidents.

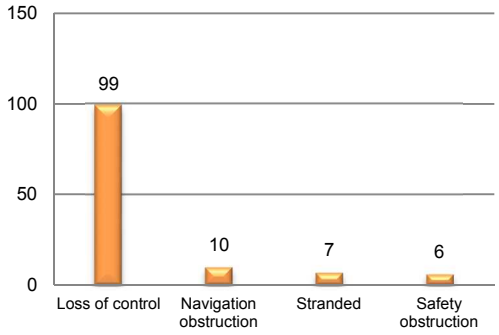
Breaking them down by type, the marine accidents included 223 cases of collision, 201 cases of grounding, 149 cases of fatality/injury, and 103 cases of contact. The marine incidents included 99 cases of losses of control, (91 cases of navigational equipment failure, seven cases of out-of-fuel, and one case of listing), 10 cases of navigation obstruction, seven cases of stranded, and six cases of safety obstruction.

As for the objects of contact, 26 were breakwaters, 13 were piers, and 12 were quays.

Marine accidents (825 cases): reports publicized in 2017



Marine incidents (122 cases): reports publicized in 2017



The number of vessels involved in marine accidents and incidents was 1,244. Breaking them down by type, the marine accidents involved 362 fishing vessels, 249 pleasure boats, 155 cargo ships, and 69 personal water craft. The marine incidents involved 48 fishing vessels, 43 pleasure boats, 11 cargo ships, and five passenger ships.

Number of vessels by type involved in marine accidents and incidents for which reports were publicized in 2017

(Vessel)

Classification	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational fishing vessel	Fishing ferry	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
Marine accident	50	155	50	362	55	32	6	33	42	13	249	69	4	1,120
Marine incident	5	11	4	48	3	1	0	5	1	0	43	3	0	124
Total	55	166	54	410	58	33	6	38	43	13	292	72	4	1,244
%	4.4	13.3	4.3	33.0	4.7	2.6	0.5	3.1	3.5	1.0	23.5	5.8	0.3	100.0

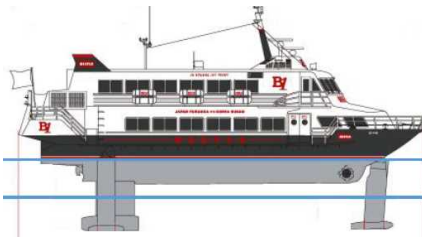
The marine accidents and serious incidents which occurred in 2017 are summarized as follows:

Marine serious accident reports published in 2017

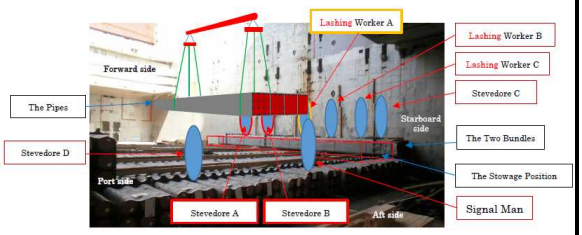
<table>
<tr><td rowspan="4">1</td><td>Date of Publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td>February 23, 2017</td><td>October 17, 2015
East off Mutsureshima Island, Shimonoseki City, Yamaguchi Prefecture
(Kanmon Passage, Kanmon Port)</td><td>Chemical Tanker SULPHUR GARLAND (Vessel A)
Oil Tanker WAKOMARU NO. 2 (Vessel B)
Collision</td></tr>
<tr><td>Summary</td><td colspan="2">While Vessel A was proceeding north-northeast along Kanmon Passage of Kanmon Port toward Zhenjiang Port, People's Republic of China, with a master and a second officer and other 15 crew members onboard, and while Vessel B was proceeding south-southeast along the same passage toward Oita Port, Oita Prefecture, with a master and a second officer and other eight crew members onboard, the two vessels collided near the West Entrance of Kanmon Passage, east of Mutureshima Island, Shimonoseki City, Yamaguchi Prefecture.
The bow of Vessel A was crushed, and the aft starboard side shell plating of Vessel B was holed and dented, which resulted in an oil spill.
There were no fatalities or injuries on either vessel.</td></tr>
<tr><td>Probable Causes</td><td colspan="2">It is probable that, Vessel A and Vessel B collided during nighttime, at off the eastern coast of Mutsureshima Island, because, while Vessel A was proceeding north-northwest through Kanmon Passage toward the West Entrance of the passage, and Vessel B was proceeding south-southeast toward the West Entrance of Kanmon Passage having medium-sized purse seine fishing vessel sailing in the same direction in her starboard bow, Vessel B came close to Medium-sized purse seine fishing vessel and turned to port to an entered the left part side of Kanmon Passage, while Vessel A maintained course and speed.
It is somewhat likely that the reason that Vessel B came close to Medium-sized purse seine fishing vessel, turned to port and entered the left part of Kanmon Passage was that, after observing Vessel A proceeding north through Kanmon Passage and Medium-sized purse seine fishing vessel proceeding Southeast toward the West Entrance of the passage, he did not maintain proper lookout om Vessel A and Medium-sized purse seine fishing vessel, and therefore, he was unable to anticipate that Vessel B would be in a situation crossing ahead of Vessel A, which was proceeding north through the Kanmon Passage, and at that time, sailing the port side of Medium-sized purse seine fishing vessel, and further, he made Vessel B's speed almost same with the speed of Medium-sized purse seine fishing vessel which was sailing in the starboard ahead that made Vessel B unable to take starboard turn and Navigation Vessel B's second officer became confused.
It is somewhat likely that the fact that Navigation Vessel B's second officer had never experience bride watch without master's conning and was handling lookout, steering, and VHF radio telephone communication by his own in Kanmon Passage, contributed to Navigation Vessel B's second officer's confusion.
It is probable that the reason that Vessel A maintained course and speed was that second officer thought that information provided by the Kanmon Kaikyo Vessel Traffic Service Center to keep to the starboard side was an instruction, and that he thought that WAKOMARU NO. 2 would eventually turn to starboard and pass port to port with Vessel A navigating the starboard side of the passage.
  </td></tr>
<tr><td>Report</td><td colspan="2">http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2015tk0008e.pdf
Refer to case studies (P.118).</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>March 30, 2017</td><td>February 19, 2016
East off Hime Shima, Himeshima Village, Oita Prefecture</td><td>Container ship SINOKOR INCHEON (Vessel A, Republic of Korea)
Fishing vessel TOSHIMARU (Vessel B)
Collision</td></tr>
</table>

	Summary	While Vessel A was proceeding east toward Mishima-Kawanoe Port, Shikokuchuo City, Ehime Prefecture, with a master and a second officer and other 15 crew members onboard, and while Vessel B was proceeding north-northwest toward Mitajiri District of Mitajiri-Nakanoseki Port, Hofu City, Yamaguchi Prefecture, with a skipper onboard, the two vessels collided off to the east of Hime Shima, Himeshima Village, Oita Prefecture. Vessel B received a hole and other damage to her port -side center shell plating and capsized, becoming a total loss. Her skipper was killed. Vessel A had abrasions on her bulbous bow. 	
	Probable Causes	It is probable that, off the eastern coast of Hime Shima at night, while Vessel A was proceeding east and Vessel B was proceeding north-northwest, the Vessel A and Vessel B collided because second officer of Vessel A was not keeping lookout on Vessel B because he thought there was no danger of a collision with Vessel B, and because the skipper of Vessel B did not notice of Vessel A until Vessel A had come close to Vessel B. It is probable that second officer of Vessel A thought that there was no danger of colliding with Vessel B because, when he extended the radar's true speed vectors, he found that the tip of Vessel B's vector reached a point behind the tip of Vessel A's vector . It is somewhat likely that the skipper of Vessel B did not notice Vessel A until Vessel A had come close to Vessel B because the skipper of Vessel B had accumulated fatigue; however, it was not possible to determine the situation of lookout as the skipper of Vessel B was killed in this accident.	
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0002e.pdf	
3	Date of Publication	Date and location	Vessel type and name, accident type
	April 27, 2017	September 23, 2016 Off west-southwest coast of Okinoshima, Wakayama City, Wakayama Prefecture	Recreational fishing vessel TSURIBITOYA XI Injuries to fishing passengers
	Summary	The boat, with its skipper, a crew member and 23 fishing passengers onboard, while sailing south in Tomogashima Channel, moved up and down, injuring three fishing passengers.	
	Probable Causes	It is probable that the accident occurred as the vessel, while moving south in Tomogashima Channel, sailed over a high wave of around 1.5m at about 15kn and so moved up and down, throwing three fishing passengers on chairs in the front section of the deck up from them and down onto the chairs, etc. 	
	Report	http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-4-1_2016tk0014.pdf	
4	Date of Publication	Date and location	Vessel type and name, accident type
	June 29, 2017	May 10, 2016 Omaezaki Port, Shizuoka Prefecture	Cargo ship CENTURY SHINE (Panama) Grounding
	Summary	The vessel, with its master and 14 crew members onboard, ran on a shallow place while sailing south-southwest in Omaezaki Port, Shizuoka Prefecture. There were no casualties while the vessel sustained scratching damage to the outer panel of its bottom.	

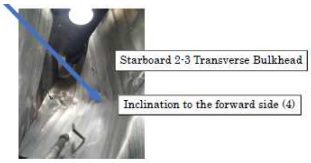
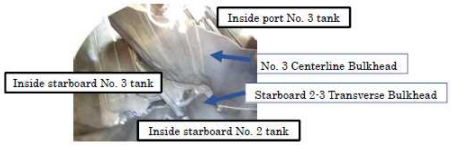
	Probable Causes	It is probable that the accident occurred because the master of the ship, with no knowledge about the location of the shallow place in question prior to the vessel's entry into Omaezaki Port, had the vessel sail on the side of the breakwater light beacon C and run on the shallow place. It is probable that the master of the vessel had no knowledge about the location of the shallow place as information about it was unavailable during advance studies on waterways using a nautical chart and other means. It is probable that information about the location of the shallow place was unavailable on the nautical chart and other means because the administration office concerned had not conducted water depth investigations in Omaezaki Port for a long time and so did not have information about the depth of water that should be given to the 3rd Regional Coast Guard Headquarters.  It is probable that the administration office in question had not conducted water depth investigation in Omaezaki Port because no major changes in the depth of water had been recognized until 2000 and due to, among other reasons, the absence of a large river flowing into the port. It is probable that the vessel took a course on the side of the breakwater light beacon C as the master steered the ship to starboard in a water area before the central wharf.
	Report	http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-6-1_2016tk0007.pdf

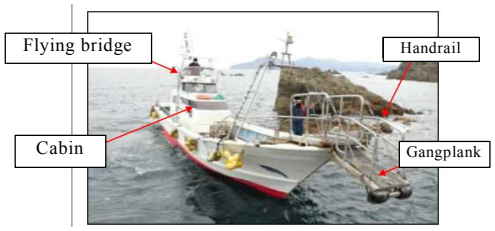
5	Date of Publication	Date and location	Vessel type and name, accident type
	July 27, 2017	January 8, 2016 Northwest off Kami Shima, Tsushima City, Nagasaki Prefecture	Passenger ship BEETLE Contact with marine creature
	Summary	The vessel with a master, a chief officer and five crewmembers onboard and carrying 184 passengers, collided with a marine life when she was proceeding off the west of Kami Shima, Tsushima City, Nagasaki Prefecture toward the Port of Hakata from the Port of Busan at 40 knots, with lifting the hull of the ship above sea level by lift force of hydrofoil wings. Three of the passengers were seriously injured by a lumbar vertebra compressed fracture etc., and four of the passengers and two of the cabin crews suffered minor injuries. Two shock absorbers on the bow stretched out, and then the vessel returned to the Port of Busan in hullborne mode.	
	Probable Causes	Concerning the accident, it is probable that the vessel collided with a marine life in spite of a rudder turn since the marine life was discovered in the proximity during the maneuver at a cruising speed (40 km) It is somewhat likely that discovering the marine life in the proximity is associated with the master not directing enhancement of lookout by four persons of a master, a chief engineer, a chief officer, and a first engineer, suspension of inboard sales by cart, seating of cabin crews, and implementation of airing of seat belt wearing to passengers, in addition to decelerated maneuver at 36 – 38 kn (cetacean-cautious maneuver) as well as navigating without enhancing lookout.  It is probable that the reason why the master did not direct cetacean-cautious maneuver was that JR Kyushu Jet Ferry Inc. had not established operating guidelines of cetacean-cautious maneuver in the safety management rules and was not thoroughly disseminating them, had informed the allowable delay time associated with implementation of decelerated maneuver, and did not have a grasp of the implementation status of cetacean-cautious maneuver.	
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0005e.pdf	

6	Date of Publication	Date and location	Vessel type and name, accident type
	August 31, 2017	May 16, 2016 Off the west of Heigun-tou, Yamaguchi Prefecture	Cargo ship HUNAN (Singapore) Missing of a crew member
	Summary	When the ship, with a master, 22 crewmembers and a pilot on board, was moving northeast on the Heigun Channel off the west of Heigun-tou, Yanai City, Yamaguchi Prefecture toward the Port of Fukuyama, Hiroshima Prefecture, an able seaman fell off an accommodation ladder and although he hanged in midair with a lifeline of "a harness-type safety belt with an expansion-type life jacket" (safety belt) he wore, slip under the water and went missing.	
	Probable Causes	It is probable that the accident occurred by able seaman who was working on lifting up and stowing a pilot ladder with three crews falling off an accommodation ladder and hanging in midair with a lifeline of the safety belt and going by the board as his body separated from the safety belt when he raised both arms in an attempt to grab a rope or the like when the ship was moving northeast on the Heigun Channel. It is probable that the separation of the body of able seaman from the safety belt stems from his failure to have two thigh buckles of the safety belt fastened. It is probable that the reason why he raised both arms in an attempt to grab the rope or the like was because he was not able to the rope or the like as he was in a state of being dragged on the sea surface though he tried to grab one with his left hand. It is probable that not taking measures to ease the situation of able seaman being dragged on the sea surface such as decelerating or stopping the ship was involved in able seaman remaining in that situation. It is somewhat likely that the boatswain and others not having held an advance meeting with regard to the contents such as: (1) Necessity of doing the lifting up and stowing work (2) Implementation of safety measures such as confirmation of adequate wearing of a safe protector in connection with engaging in the lifting up and stowing work with the responsible official for work in doing the work of lifting up and stowing the pilot ladder was involved in the occurrence of the accident.	
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0004e.pdf	
7	Date of Publication	Date and location	Vessel type and name, accident type
	August 31, 2017	May 21, 2016 Unknown (Off the south of Cape Ashizuri, Tosashimizu City, Kochi Prefecture)	Chemical tanker FINE CHEMI (Republic of Korea) Missing of a crew member
	Summary	While the tanker was proceeding east toward Chiba Port, Chiba Prefecture, off the south of Cape Ashizuri, with a master and other 11 crew members onboard, the chief engineer went missing.	
	Probable Causes	It is probable that the accident occurred when, as the tanker was proceeding east toward Chiba Port at night off the south of Ashizuri, the chief engineer fell into the sea after leaving the access opening that leads from the engine room to the exposed part of the tanker.	
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0006e.pdf	
8	Date of Publication	Date and location	Vessel type and name, accident type
	September 28, 2017	January 10, 2016 Near the Port of Sakata, Sakata City, Yamagata Prefecture	Cargo ship CITY (Panama) Grounding

	Summary	When the ship, with a master and 17 crewmembers on board, was riding a single-anchor near the Port of Sakata in Sakata City, Yamagata Prefecture, a wind velocity increased and though she hove up anchor and attempted to standing out to sea, she was driven by a pressure, and stranded on a tetrapod near the Port of Sakata. Though the ship swamped to the position of the bridge of her hull and became total loss, there was no fatality.
	Probable Causes	It is probable that the accident occurred because weather and sea information was not appropriately obtained on the ship during anchorage in the waters off the Port of Sakata under the condition of anticipated a wind with a maximum speed of 15 m/s and about 2.8-meter-high waves and the master did not have a grasp of the seaworthiness of the ship, she missed the timing for evacuating to a safe water area, and although she heaved up anchor and tried to head out to sea, the speed necessary to keep the course and the ship became unable to maneuver, and ran on a wave-absorbing blocks.  It is probable that the reason why the master did not appropriately obtain weather and sea information because the master thought there was no sign of worsening weather seeing Asian Pacific surface analysis charts and coastal wave analysis charts. It is probable that the reason why the master did not have a grasp of the seaworthiness of the ship was because the safety management manual of Trans Ocean Shipping Co., Ltd. did not describe about seaworthiness such as limiting clutch force and limit wind speed in a ballasted condition and a limit of ship maneuvering for course keeping considering a wind pressure and output power of the main engine in the said condition.
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0001e.pdf
9	Date of Publication	Date and location / Vessel type and name, accident type
	September 28, 2017	October 30, 2016 Shinko East Quay T Wharf, Kobe Section, Hanshin Port Cargo ship BBC ASIA (Antigua and Barbuda) Death and injury of workers
	Summary	The accident occurred on the ship when, during work to load pipes with a crane at Shinko East Quay T Wharf, Kobe Section, Hanshin Port, three workers who were working in a cargo hold were caught between pipes being hoisted by the crane and a side wall. Two of the workers were killed and one was seriously injured. 
	Probable Causes	It is probable that the accident occurred when, as the ship was being loaded with cargo starboard-side alongside at Shinko East Quay T Wharf, Kobe Section, Hanshin Port, “stainless steel pipes bundled in sets of nine” (the Pipes), which had been hoisted and then stopped by the No. 1 crane, swung to the starboard side, and as a result two stevedores, and one lashing worker, who had been standing by and doing other activities on top of the cargoes that had been stowed on the starboard side, were caught between the Pipes and starboard wall. It is probable that the Pipes, which had been hoisted and then stopped by the No. 1 crane, swung to the starboard side because—under conditions whereby, at the time of the accident, the underside of the fender on the vessel’s starboard midship hull was caught on the tops of the wharf’s fenders and the vessel’s starboard inclination was arrested because, among other reasons, the height of tide had fallen compared to that at the time of docking and the vessel’s draft had increased—the underside of the hull’s fender came off the tops of the wharf’s fenders when the Pipes were hoisted by the No. 1 crane and then stopped “at a position at which the Pipes’ starboard side was approximately 3 meters from the starboard wall and bottom was approximately 2.75 meters above the inner bottom plating”(the Stop Position), which caused the vessel’s hull to roll and she inclined to the starboard side.

<table>
<tr><td></td><td></td><td colspan="2">It is probable that workers were standing by and doing other activities on top of the cargoes that had been stowed on the starboard side at the time of the accident because, in addition to not being prohibited from standing on top of the cargoes for reasons that included over the cargoes not being in the handling area of the Pipes, they could not predict that the Pipes would swing over the cargoes from the Stop Position, as theretofore hoisted cargo had not swing greatly when the crane operation was stopped.</td></tr>
<tr><td></td><td>Report</td><td colspan="2">http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0015e.pdf
Refer to case studies (P.119).</td></tr>
<tr><td>10</td><td>Date of Publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>September 28, 2017</td><td>April 22, 2016
Port of Bordeaux, French Republic</td><td>Chemical tanker BUCCOO REEF
Fatality of a crew member</td></tr>
<tr><td></td><td>Summary</td><td colspan="2">While the Vessel was docking, with a master, 21 crew members and a pilot onboard, assisted by tugboats at the port of Bordeaux, French Republic, an ordinary seaman who was letting out the messenger rope of a tug line was struck on his body by a structural part of the bow and fell overboard and died on April 23.</td></tr>
<tr><td></td><td>Probable Causes</td><td colspan="2">It is probable that the accident occurred when, as BUCCOO REEF (Vessel A) was docking in an approximately 2.6-knot upstream current in Bordeaux Port, French Republic, in a state in which a tug line from RM PAUILLAC (Vessel B) had been removed from a bollard on Vessel A's bow's port side during release of the end of the tug line, and as the ordinary seaman in charge of letting out the tug line (Ordinary Seaman A) was letting out the messenger rope of the tug line with it coiled once around the bollard, Ordinary Seaman A fell to the deck and was dragged until his body struck a structure on the foredeck because the messenger rope's exit speed increased, and then his leg had become entangled in the messenger rope. The circumstances by which Ordinary Seaman A's leg became entangled in the messenger rope could not be determined as there were no witnesses to those circumstances.
 
It is probable that the increase in the messenger rope's exit speed was caused by an increase in the separation speed between Vessel A's bow end and Vessel B that occurred when Vessel A gathered sternway while continuing her starboard turn.
It is somewhat likely that chief officer of Vessel A gave Ordinary Seaman A no instructions to keep distance from the messenger rope such as holding the end of the messenger rope in case unexpected tension occur, when having Ordinary Seaman A hold the messenger rope in order to avoid it becoming entangled with the propeller, and that this contributed to the accident.</td></tr>
<tr><td></td><td>Report</td><td colspan="2">http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0009e.pdf</td></tr>
<tr><td>11</td><td>Date of Publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>October 26, 2017</td><td>September 9, 2016
Off to the south of Gobo City, Wakayama Prefecture</td><td>Oil/Chemical tanker EIWA MARU 3
Explosion</td></tr>
<tr><td></td><td>Summary</td><td colspan="2">While the tanker was sailing southeast off to the south of Gobo City, Wakayama Prefecture for Yokkaichi Port, Yokkaichi City, Mie Prefecture, with a master and other nine crew members onboard, after unloading base oil, which is a base material of lubricants and other products, at Wakayama Shimotsu Port, Wakayama Prefecture, and with her crew cleaning her cargo tanks, an explosion occurred in her cargo tanks.
One crew member of the tanker was killed and two crew members suffered serious injuries. The tops and bulkheads of the vessel's No. 2 and No. 3 cargo tanks were bent.</td></tr>
</table>

	Probable Causes	It is probable that the accident occurred when, as the Vessel was proceeding southeast off to the south of Gobo City while conducting cleaning of the cargo tanks at night after unloading base oil in her No. 1 and No. 3 cargo tanks at Wakayama Shimotsu Port and leaving port, explosions occurred when, under conditions in which the tanker began cleaning the cargo tanks using seawater with Butterworth cleaning machines and the cargo pumps and, in the course of the cleaning, base oil that remained in No. 2 cargo pump, bottoms of the No. 1 and No. 3 cargo tanks, and cargo-handling piping for the tanks was sprayed in the No. 3 cargo tank and became airborne up to the starboard No. 3 cargo tank ventilation duct, base oil in the duct and starboard No. 3 cargo tank vaporized and ignited because the chief engineer conducted welding on the starboard No. 3 cargo tank ventilation duct. It is somewhat likely that the chief engineer conducted the welding of the starboard No. 3 cargo tank ventilation duct as cleaning work was being done in tanks that had carried base oil with a high flash point because he thought there was no danger because the welded area was small and welding ted quickly. It is probable that not flushing the cargo tanks, etc., prior to cleaning of the cargo tanks contributed to the circumstances in which base oil was sprayed in the No. 3 cargo tank and became airborne up to the starboard No. 3 cargo tank ventilation duct.  (Looking forward from the back of starboard No. 3 tank)  (Looking forward from the front of starboard No. 3 tank) Note: The (1) to (5) appearing in the photos correspond to items 2.3 (1) to (5) . 
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0013e.pdf

12	Date of Publication	Date and location	Vessel type and name, accident type
	October 26, 2017	December 30, 2016 Near southwest coat of Kuwashima, Amakusa City, Kumamoto Prefecture	Fishing ferry HAIYA MARU Fatality of a fishing passenger
	Summary	The boat, with its skipper and 11 fishing passengers onboard, left Ushibuka Port in Amakusa City to visit fishing spots. While two passengers were getting off the boat to land on a rocky stretch near the southwest coast of the Kuwashima island, one of them fell into the sea and died.	
	Probable Causes	The accident occurred when the boat pushed its gangplank to the landing spot in question. It is probable that the passenger lost balance and fell into the sea while stepping on a spot with the left leg.  	
	Report	http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-10-2_2017tk0003.pdf	

13	Date of Publication	Date and location	Vessel type and name, accident type
	November 30, 2017	December 14, 2016 Off north of Mihonoseki lighthouse in Matsue City, Shimane Prefecture	Fishing vessel DAIFUKU MARU Capsizing
	Summary	The main engine of the fishing vessel DAIFUKU MARU (Boat A), with its skipper and eight crew members, stopped while returning to Sakaiminato. Boat A was thus towed by another fishing boat, the No. 2 KYOFUKU MARU (Boat B), but capsized and sank north of the Mihonoseki lighthouse in Matsue City, Shimane Prefecture. In the accident, four of the nine onboard Boat A died and the remaining five went missing.	

<table>
<tr><td></td><td>Probable Causes</td><td colspan="2">It is somewhat likely that the main engine of Boat A stopped when the vessel became less stable, sailing at night, and its freeboard was reduced. While being towed northeast by Boat B north of the Mihonoseki lighthouse in Matsue City, Shimane Prefecture, it is somewhat likely that Boat A became almost unable to regain stability as the angle of the heel exceeded the bulwark submerge angle and was overturned in the face of continuous waves.
It is somewhat likely that the angle of the heel exceeded the bulwark submerge angle due to static heel caused by wind, wave-triggered large sways and an increase in heeling moment caused by the power of towing.
It is somewhat likely that the reason for the increase in heeling moment caused by the force of towing is that Boat A was exposed to the possibility of a sudden increase in towing power as the towing rope used was not long enough so that the angle created by the towing rope and the bow's direction expanded.
It is somewhat likely that the stability of Boat A weakened and the freeboard was reduced due to, among other reasons, the addition of structural objects, etc. to the ship and presence of a water tank on its deck.
 
</td></tr>
<tr><td></td><td>Report</td><td colspan="2">http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-11-1_2016tk0016.pdf
Refer to case studies (P.120).</td></tr>
<tr><td>14</td><td>Date of Publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>November 30, 2017</td><td>January 30, 2017
Tomakomai Port, Tomakomai city, Hokkaido</td><td>Cargo ship SWIFTNES (Vessel A, Panama)
Work boat FUJI MARU (Vessel B)
Capsize</td></tr>
<tr><td></td><td>Summary</td><td colspan="2">During its service to help Vessel A dock at Tomakomai Port, Tomakomai City, Hokkaido, Vessel B, with a coxswain and a workman on board, the mooring ropes being veered out from the aft deck of Vessel A entangled the propeller of Vessel A, and was drawn toward the propeller.
The coxswain of Vessel B died and the workman was wounded. Vessel A suffered damage on her propeller.</td></tr>
<tr><td></td><td>Probable Causes</td><td colspan="2">It is probable that the accident occurred when, its service to help Vessel A dock at Tomakomai Port, in a circumstance in which the four stern lines which Vessel B was towing was veered out from the aft deck of Vessel A, due to Vessel A's engine was used, the four stern lines was entangled the propeller of Vessel A, toward which Vessel B was pulled and then capsized.
It is probable that the reason why Vessel A's engine was used was the master and the pilot had not shared the information as for the four stern lines, had expected each other securing propeller clear which had not been conducted.
  </td></tr>
<tr><td></td><td>Report</td><td colspan="2">http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2017tk0005e.pdf</td></tr>
<tr><td>15</td><td>Date of Publication</td><td>Date and location</td><td>Vessel type and name, accident type</td></tr>
<tr><td></td><td>December 21, 2017</td><td>January 19, 2017
Port of Felixstowe, United Kingdom of Great Britain and Northern Ireland</td><td>Container ship MANHATTAN BRIDGE
Explosion of the auxiliary boiler</td></tr>
</table>

	Summary	While the ship was docking with a master, 25 crew members and a pilot onboard at the port of Felixstowe, United Kingdom of Great Britain and Northern Ireland an explosion occurred in the furnace of the auxiliary boiler. The duty oiler died, the second engineer suffered injuries and the burner unit of the auxiliary boiler damaged. 
	Probable Causes	It is probable that the accident occurred, in the night time, while the ship was docking at the port of Felixstowe, United Kingdom of Great Britain and Northern Ireland, an explosion occurred within the furnace of the auxiliary boiler. It is considered somewhat likely that explosion occurred in the furnace is because under existence of carbon monoxide gases heated by incomplete combustion and flames in the furnace, the second engineer operated the forced draft fan and the secondary air was supplied. The explosion occurred by a rapid chemical reaction changing heated carbon monoxide gas. Or in the situation where marine gas oil existed as a highly concentrated flammable gas in the high temperature furnace, the forced draft fan was operated and secondary air was supplied, then the flammable gas was mixed with air, the concentration was between the upper limit and lower limit concerning the explosion. As a result, the explosion occurred. It is probable that the second engineer operated the forced draft fan for the purge in the furnace. It is probable that the existence of the marine gas oil a highly concentrated flammable gas was as follows. Under slimy wax-like material stuck to strainer etc., which was clogged causing the marine gas oil pressure drop but the marine gas oil pressure did not drop to fuel oil low pressure alarm set point, the marine gas oil to the rotary cup burner flow reduced. The primary air and the secondary air was supplied as same volume as before marine gas oil clogging, the marine gas oil was blown away and the atomizing marine gas oil became unevenly stable. The flame was cooled by the excess air and flame pattern was broken causing the combustion status very bad and remaining unburnt marine gas oil in the furnace and unburnt marine gas oil vaporized. It is probable that the carbon monoxide gases heated by incomplete combustion and flame existed in the furnace because the forced draft fan stopped by the Furnace (Flame-Eye) Abnormal alarm, the secondary air damper was closed, secondary air was not supplied, and combustion continued under insufficient air quantity. It is probable that the strainer was clogged as follows. When the ship used the marine gas oil containing a large amount of paraffin wax and the Cold Filter Plugging Point of it was high, the temperature around the auxiliary boiler oil burning apparatus was below the cold filter plugging point of the marine gas oil and the paraffin wax precipitated in the strainer.
	Report	http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2017tk0004e.pdf Refer to case studies (P.121).

(Marine incident)

No serious marine incident occurred in 2017.

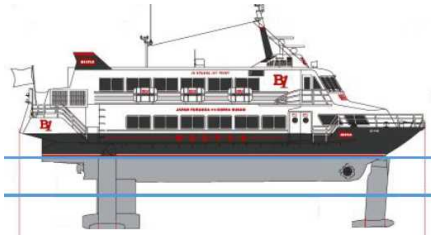
9 Actions taken in response to recommendations in 2017

Actions taken in response to recommendations were reported with regard to accidents and marine serious incident in 2017. Summaries of these reports are as follows.

① Contact of passenger ship BEETLE with marine creature

(Recommendations on July 27, 2017)

The Japan Transport Safety Board investigated an accident in which a passenger ship, BEETLE, collided with a marine creature off the northwest coast of Kamijima, Tsushima City, Nagasaki Prefecture, on January 8, 2016. On July 27, 2017, the JTSB released a report on the investigation and made recommendations to JR Kyushu Jet Ferry Inc. The board received a report (action plan) on what the company should do, as follows, based on the recommendations.



○Summary of the Accident, Probable Causes and Recommendations

See “Chapter 1 Summary of Recommendations and Opinions Issued in 2017, 1 Recommendations ” (P.13 (2))

○Measures JR Kyushu Jet Ferry Inc. should take based on the recommendations (implementation plan)

Recommendation:

(1) Prescribe implementation of cetacean-cautious maneuver in safety management rules.

Measures:

Addition to the safety management rules of such items as the effectuation of a document for setting decelerating ocean areas, implementation of navigation with vigilance for cetaceans and monitoring of them, and of cetacean-cautious navigation to the operation manual of the rules. Effective on September 21, 2017, a “notification of changes in the safety management rules” was submitted to the Kyushu District Transport Bureau.

Recommendation:

(2) Make each ship enforce cetacean-cautious maneuver in setup reduction areas.

Measures:

- In addition to thorough sharing of “visual confirmation of whales” by the distribution of mails via information-sharing terminals conducted hitherto, a decision was made to distribute a “document for setting decelerating marine areas,” mentioning marine areas for speed reduction and a period of deceleration, etc. to enable each vessel to recognize what should be done more clearly. All crew members were informed of the measure through the administrative circular 27-7 “On Document for Setting Decelerating Marine Areas,” dated January 26, 2016.
- Reconfirmation will be also made at the Safety Management Committee which is convened every six months or twice a year in principle (last meeting was held on April 26, 2017) in compliance with the safety management guidebook (called the “safety management manual” at our company) as set forth in Article 12 of the enforcement regulations of the Ship Safety Act

  Members of the Safety Management Committee

  Chief executive officer (President), committee chairman (person in charge of safety management), vice committee chairmen (deputy), official members (ship captains, chief engineers and head of the maintenance center) and special members (managing director and director)

- In case navigation with vigilance for cetaceans is not deemed enforced rigorously, the operation manager or deputy manager telephones or directly visits a vessel concerned to give instructions for rigorous enforcement. When necessary, the Safety Management Committee is convened to prompt the thorough implementation of cetacean-cautious navigation.

Recommendation:

(3) Establish an administration system capable of grasping an implementation status of cetacean-cautious maneuver in each ship.

Measures:

- Implementation of cetacean-cautious maneuver is monitored as follows during a period of deceleration (roughly one week) as set forth in the document for setting decelerating marine areas.
- The operation manager or operating worker confirms the ship's speed reduction, based on information from the automatic identification system, on a monitor in the office
- Check columns for the following points are added by revising the form of the document for setting decelerating marine areas so that the captain of a ship confirms the reduction of speed and places a check mark in each column for timely confirmation by the operation manager or deputy. (1) Navigation at reduced speed (2) Reinforcement of lookout (3) End of wagon-based sale and (4) Use of seat belts and storing of tables

Recommendation:

(4) Accelerate mounting of shock-absorbing material in passenger cabins and storing of table at cetacean-cautious maneuver.

Measures:

- To mount shock-absorbing material on the upper parts of armrests in sequence in each ship, starting in late November 2017.
- To inform passengers of the need for storing tables over the intercom in each ship 10 minutes before the start of navigation at a reduced speed. The first officer and passenger cabin attendants orally ask passengers to store tables, if they are in use, when they make their rounds.

Deadline for presentation of completion report:

Report on the status of measures, including already completed measures, is due to be presented, together with reference materials for confirmation of the status, by June 30, 2018.

* The original text of the notification from JR Kyushu Jet Ferry Inc. can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku17re-1_20171024.pdf

10 Provision of factual information in 2017

The JTSB provided factual information on one case (two marine accident) to relevant administrative organs in 2017. The contents are as follows.

① Information provided on accidents involving personal water craft operated by unlicensed drivers

(Information provided on April 11, 2017)

An analysis conducted on accidents that occurred between 2011 and 2015, involving personal water craft operated by unlicensed drivers (hereinafter called "unlicensed driver accident"), based on marine accident reports released by the Japan Transport Safety Board, found the following results. Information on the findings was provided to the Ministry of Land, Infrastructure, Transport and Tourism.

(1) There were 27 unlicensed driver accidents involving 30 personal water crafts
The number of accidents breaks down into five in 2011, eight in 2012, six in 2013, five in 2014 and three in 2015.

(2) The unlicensed driver accidents consisted of 12 collisions between personal water crafts, seven cases of death or injury and five collisions against objects such as a seawall.

(3) The 27 unlicensed drier accidents resulted in 43 casualties (four dead, one missing and 38 injured, including 21 seriously).

(4) Roughly 90% of the 27 unlicensed driver accidents occurred in July or August and about 80% of the summertime accidents occurred between 12 and 16 o'clock).

(5) Of the 30 unlicensed drivers
① 16 were in their 10s or 20s
② Six were drunk
③ While nine were driving wet bikes without owners' permission, four were allowed by owners to drive them.
④ While six rode personal water crafts for the first time, 12 had already rode them and began doing so several years before.

(6) Prior to unlicensed driver accidents, drivers, who were considered not to understand basic features of personal water crafts, had taken the following behaviors, etc.
① They pulled the throttle level, seeing it as the brake of a bicycle, motorcycle or other vehicle, when they thought, while driving the personal water craft, they would collide with another personal water craft.
② They thought the operation of a personal water craft was the same as a road bike.
③ When they noticed an obstacle ahead, they took their hand off the throttle lever and immediately turned the handlebar.
④ When they attempted to pass through a water channel between detached breakwaters, they failed to make enough of a turn and took their hand off the throttle lever before an imminent

detached breakwater.

⑤ They did not know how to stop the personal water craft.

⑥ They were riding a personal water craft with both knees down rather than in a normal standing position for riding.

(7) Following are principal measures to prevent the recurrence of unlicensed driver accidents mentioned in investigation reports on them.

① The owner of a personal water craft should take control of the vehicle so as not let an unlicensed person ride it through such measures as pulling the ignition key when leaving it.

② The owner of a personal water craft, when asked for permission by another person to drive the vehicle, should check whether the person has a driving license or not.

* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo9_20170411.pdf

② Information provided on capsizing accident of fishing vessel DAIFUKU MARU

(Information provided on May 16, 2017)

Information was provided to Tottori Prefecture and Shimane Prefecture

1. Summary of accident

(1) Date of occurrence: December 14, 2016

(2) Place of occurrence: Off north of Mihonoseki lighthouse in Matsue City, Shimane Prefecture

(3) Developments to accident

Fishing vessel DAIFUKU MARU, with its skipper and eight crew members onboard, developed engine failure while sailing toward Sakaiminato, Tottori Prefecture. While being towed by a consort ship, it capsized and sank some 1,600 km north of the Mihonoseki lighthouse in Matsue City, Shimane Prefecture, at around 5:02 a.m. on December 14, 2016.

Place of the accident

DAIFUKU MARU (Photo: Tottori Prefecture)

Of the nine crew members onboard DAIFUKU MARU, four died and five went missing.

2. Information on facts about waves

Following is the situation of waves near the place where the accident occurred, as calculated by a commissioned external organ.

(1) Significant wave height*1

The marine area near the place where the accident occurred (off Mihonoseki) is off the marine area sheltered by the Oki Islands and waves (about 3.7m) were higher than those (around 3.3m) around Oki-no-Gozenjima and waters around the island, in addition to reflected waves from Mihonoseki (See Drawing 1 for reference)

(2) Significant wave period*2

The significant wave period near the place where the accident occurred had a longer wave cycle (of about 7.4 seconds) than (around 7.1 seconds) in the surrounding water area because of the same influence as mentioned in (1).

(3) Wave direction

The marine area near the place where the accident occurred had a combined wave formed by an overlapping of waves from a total of three directions -- two from the offshore directions (northeast and north-northeast) and one from the seacoast direction (See Drawing 3 for reference).

(4) Data and estimation models used to estimate waves (including verification of estimation results)

① Data

a. Wave observation data (Nationwide Ocean Wave Information Network for Ports and Harbors (NOWPHAS))

b. Water depth terrain data (Nautical chart published by the Japan Coast Guard, etc.)

c. Ocean wind data (Local Forecast Model (LFM))

② Models

The following two third-generation wave estimation models were used to estimate waves:

a. WAM (Wave Model)

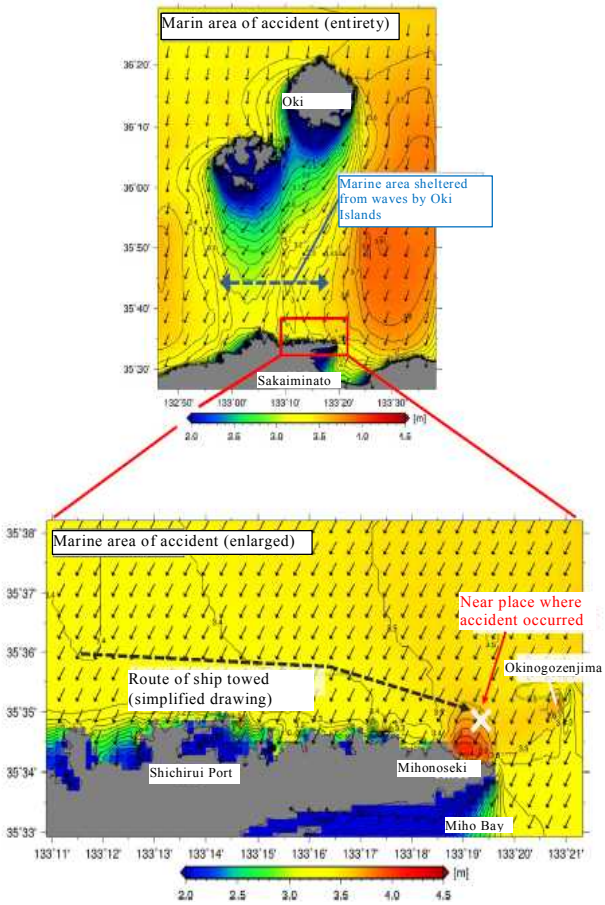
The model has been created to cover the oceanic region and is adopted by many countries in the world, especially those in Europe. In Japan, it is also used as a standard model at the time of estimating offshore waves in designing fishing ports and harbors.

b. SWAN (Simulating Wave Nearshore)

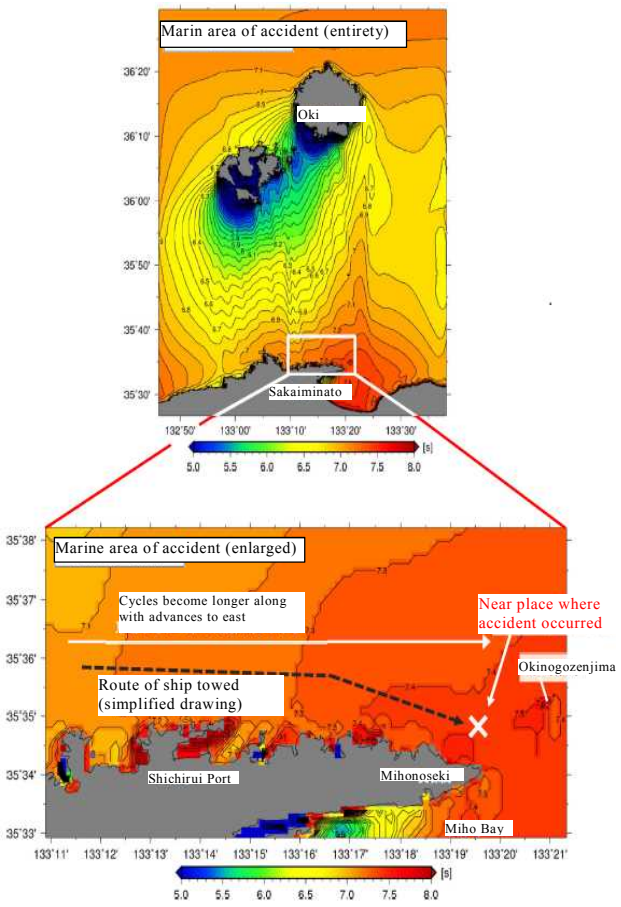
The model has been created to cover coastal regions and is used by many countries in the world, especially those in Europe. In Japan, it is also used generally by universities, research institutes and others.

*1 The "significant wave height" is the average calculated from the highest third of waves when a sequence of waves is observed at a place. It is known to be close to a figure by visual observation. On the actual ocean surface, there are waves higher and lower than the significant wave height. Statistically, the highest of 100 waves observed is estimated to be roughly 1.6 times the significant wave height and the highest of 1,000 waves observed is estimated to be nearly double the significant wave height.

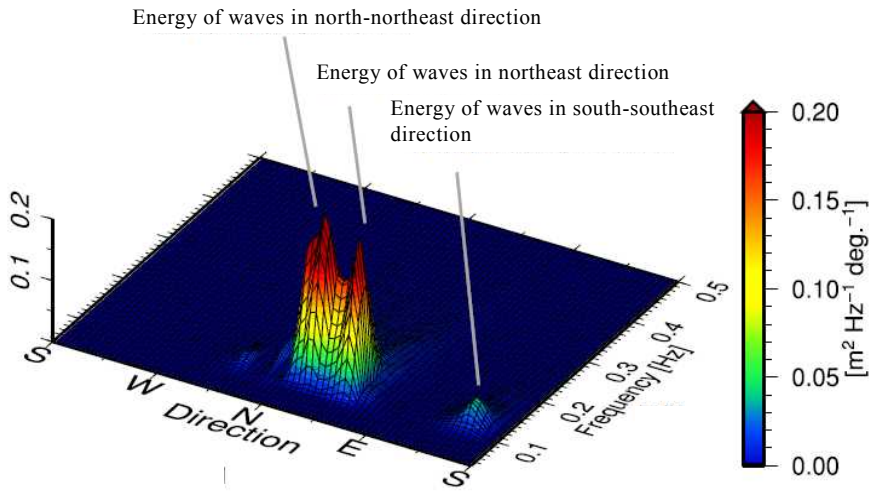
*2 The "significant wave period" is the average cycle of the highest third of waves when a sequence of waves is observed at a place. It is known to be close to a figure by visual observation.



Drawing 1: Situation of wave height (at 05:00 on December 14)



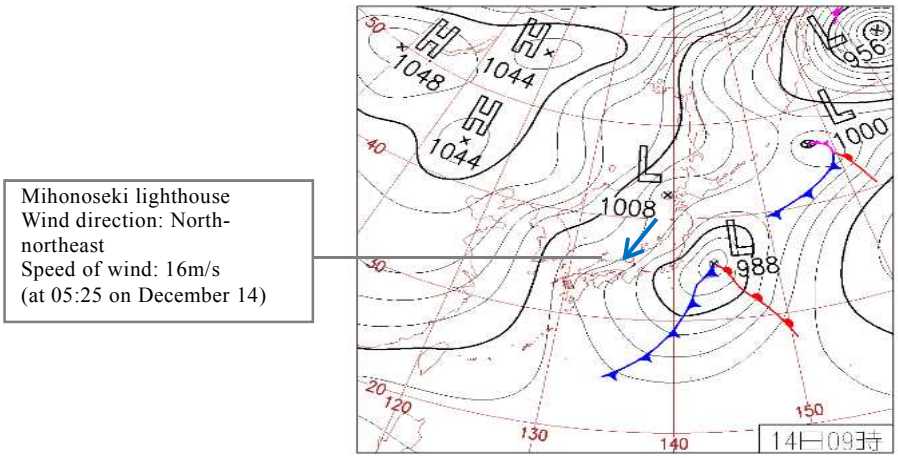
Drawing 2: Situation of Cycles (05:00 on December 14)



Drawing 3: Spectrum situation of wave directions near place where accident occurred (at 5:00 on December 14)

(Reference) Weather at time of accident

On the day of the accident, low atmospheric pressure passed while growing rapidly when the winter pressure pattern spread on a nationwide basis. A north-northeast wind was blowing in the marine area where the accident occurred. (See the weather chart for reference)



* The information provided can be found on the JTSB website.
http://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo10_20170516.pdf

Column Cooperative relations with overseas investigation authorities

Marine Accident Investigator

We received cooperation from overseas investigation authorities in four serious accidents we released or investigated in 2017. The four consisted of three accidents involving Japanese-flagged ships at overseas ports or on the high seas and one accident of a foreign-registered ship in the territorial sea. The number is larger than usual and is expected to further grow due to an increase in the number of Japanese-registered ships. While we conduct our own investigations in many cases, investigations into foreign-registered ships and their crew members, etc., are limited, compared with home-registered ships, due to the application range of domestic laws and other factors. To make up for such a limitation, therefore, we seek cooperation from overseas investigation authorities. Following are the kinds of cooperation we received in 2017.

In an accident in which a high-speed craft collided with a whale and seriously injured three passengers, we needed to check how the passengers were injured from the viewpoint of reducing damage. As the injured passengers were South Koreans living in South Korea, we sought cooperation from an investigation authority in South Korea. JTSB investigators thus were able to interview the passengers.

A crew member of a Japanese-registered chemical tanker died during berthing work by a tugboat at a port in France. Although JTSB investigators could not directly investigate the tugboat, a French investigation authority investigated crew members of the tugboat and others and provided findings to us. As a result, the JTSB compiled a balanced report based on oral statements by crew members of both the Japanese and French ships concerned and objective data (from voyage data recorder, etc.).

An auxiliary boiler exploded on a Japanese-registered container ship at a port in Britain, killing a crew member. The British investigation authority is very powerful and able to seize evidential matters and conduct hearings on people concerned before the criminal investigation agency. In the case in question, a British team of investigators conducted prompt and extensive investigations. Following the British team, the JTSB, the investigation authority of the flag State, started investigations into the container ship and others in Singapore where the vessel made a port call. Sensing that detailed investigations of its own were possible, the JTSB decided to do so. The British investigation authority thus decided to end its investigations and relegated its work to the JTSB's independent investigations and handed over information collected through its investigations until then to the JTSB.

A Philippine-flagged container ship and a U.S. naval battleship collided with each other in Japan's territorial sea, killing seven crew members of the latter. From the beginning, investigations into the U.S. warship were considered difficult in light of the U.N. Convention of the Law of the Sea and military secrets. Soon after the launch of investigations, meanwhile, the Coast Guard, commissioned by the National Transportation Safety Board of the U.S., and the JTSB established amicable and cooperative relations with each other. Under the relationship, the JTSB obtained many photos of damaged parts on the warship and a collection of oral statements by crew members of the ship, which contributed to advancements toward the identification of causes. The accident was a case in which JTSB investigators demonstrated their human resourcefulness and negotiation skills.

All told, JTSB investigators investigate marine accidents receiving assistance from their overseas peers (marine accident investigation authorities) and working in cooperation with them.

11 Summaries of major marine accident investigation reports (case studies)

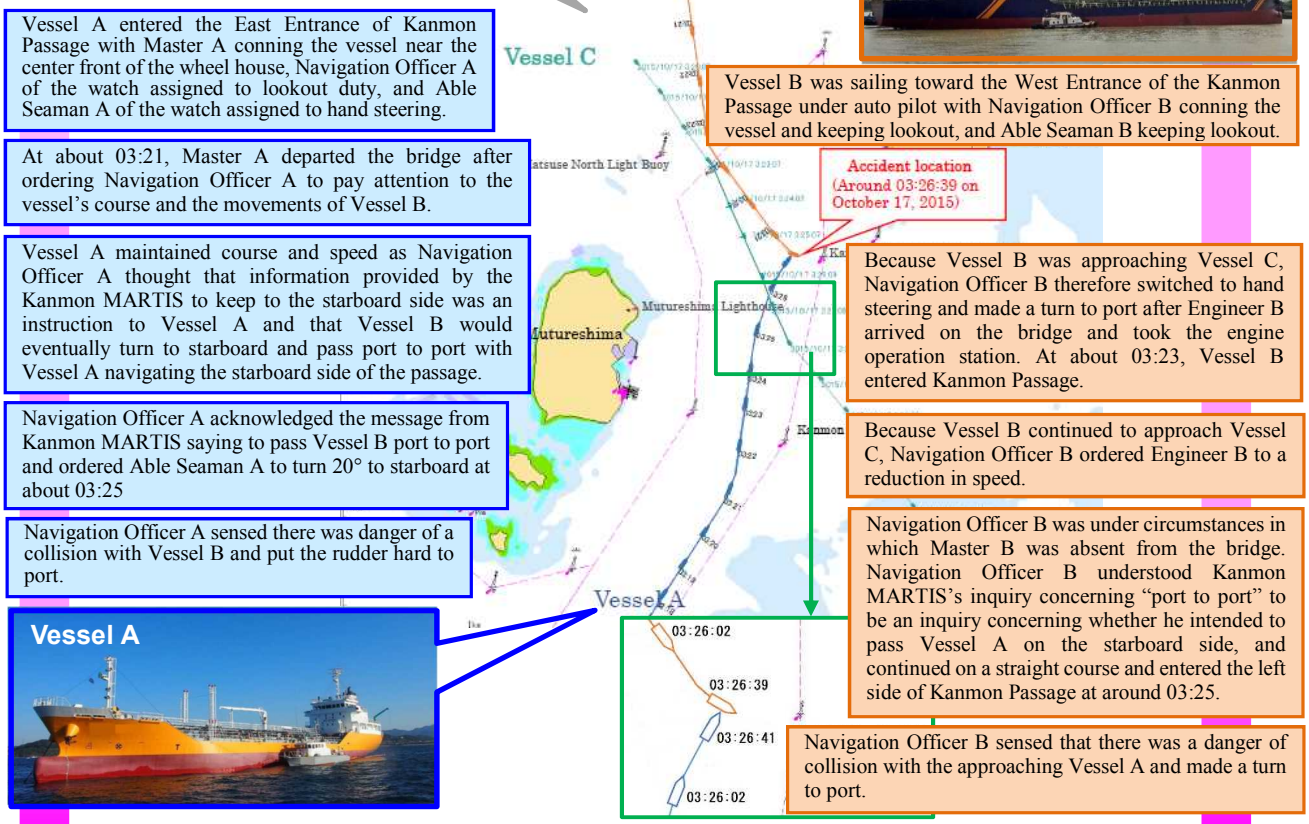
Tanker collision causing an oil spill at Kanmon Passage of Kanmon Port

Collision between chemical tanker SULPHUR GARLAND and oil tanker WAKOMARU No. 2

Summary: While **chemical tanker SULPHUR GARLAND (Vessel A, 3,498 gross tons)** was proceeding north-northeast along Kanmon Passage of Kanmon Port toward Zhenjiang Port, People's Republic of China, with a master and a second officer and other 15 crew members onboard, and while **oil tanker WAKOMARU NO. 2 (Vessel B, 2,018 gross tons)** was proceeding south-southeast along the same passage toward Oita Port, Oita Prefecture, with a master and a second officer and other 8 crew members onboard, the two vessels collided at about 03:26 on October 17, 2015, near the West Entrance of Kanmon Passage, east of Mutureshima Island, Shimonoseki City, Yamaguchi Prefecture.
The bow of Vessel A was crushed, and the aft starboard side shell plating of Vessel B was holed and dented, which resulted in an oil spill. There were no fatalities or injuries on either vessel.

Kanmon MARTIS called Vessel C by VHF at about 03:21; however, Vessel C did not respond because it did not have VHF installed. (Vessel C was not required to have VHF)

Navigation course



Vessel A entered the East Entrance of Kanmon Passage with Master A conning the vessel near the center front of the wheel house, Navigation Officer A of the watch assigned to lookout duty, and Able Seaman A of the watch assigned to hand steering.

At about 03:21, Master A departed the bridge after ordering Navigation Officer A to pay attention to the vessel's course and the movements of Vessel B.

Vessel A maintained course and speed as Navigation Officer A thought that information provided by the Kanmon MARTIS to keep to the starboard side was an instruction to Vessel A and that Vessel B would eventually turn to starboard and pass port to port with Vessel A navigating the starboard side of the passage.

Navigation Officer A acknowledged the message from Kanmon MARTIS saying to pass Vessel B port to port and ordered Able Seaman A to turn 20° to starboard at about 03:25

Navigation Officer A sensed there was danger of a collision with Vessel B and put the rudder hard to port.

Vessel B was sailing toward the West Entrance of the Kanmon Passage under auto pilot with Navigation Officer B conning the vessel and keeping lookout, and Able Seaman B keeping lookout.

Because Vessel B was approaching Vessel C, Navigation Officer B therefore switched to hand steering and made a turn to port after Engineer B arrived on the bridge and took the engine operation station. At about 03:23, Vessel B entered Kanmon Passage.

Because Vessel B continued to approach Vessel C, Navigation Officer B ordered Engineer B to a reduction in speed.

Navigation Officer B was under circumstances in which Master B was absent from the bridge. Navigation Officer B understood Kanmon MARTIS's inquiry concerning "port to port" to be an inquiry concerning whether he intended to pass Vessel A on the starboard side, and continued on a straight course and entered the left side of Kanmon Passage at around 03:25.

Navigation Officer B sensed that there was a danger of collision with the approaching Vessel A and made a turn to port.

Collision (around 03:26)

Probable Causes (excerpt): It is probable that Vessel A and Vessel B collided during nighttime off the eastern coast of Mutsureshima Island because, while Vessel A was proceeding north-northwest through Kanmon Passage toward the West Entrance of the passage and Vessel B was proceeding south-southeast toward the West Entrance of the passage having medium-sized purse seine fishing vessel sailing in the same direction in her starboard bow, Vessel B came close to Vessel C and turned to port to enter the left side of Kanmon Passage while Vessel A maintained course and speed.
It is somewhat likely that the reason why Vessel B came close to Vessel C, turned to port and entered the left side of Kanmon Passage was that, after observing Vessel A proceeding north through Kanmon Passage and the medium-sized purse seine fishing vessel proceeding southeast toward the West Entrance of the passage, Navigation Officer B did not maintain proper lookout on Vessel A and Vessel C, and therefore he was unable to anticipate that Vessel B would be in a situation crossing ahead of Vessel A, which was proceeding north through the Kanmon Passage and sailing the port side of Vessel C, and further he made Vessel B's speed almost same with the speed of Vessel C which was sailing in the starboard ahead which made him confused as Vessel B unable to take starboard turn.
It is probable that the reason why Vessel A maintained course and speed was that Navigation Officer A thought that information provided by the Kanmon MARTIS to keep to the starboard side was an instruction, and that he thought that Vessel B would eventually turn to starboard and pass port to port with Vessel A navigating the starboard side of the passage.

For details, please refer to the accident investigation report. (Published on February 23, 2017)
http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2015tk0008e.pdf

Three workers killed and injured due to load sway caused by ship rolling during loading operation using a crane

Fatality and Injury of workers on cargo ship BBC ASIA

Summary: The accident occurred at around 11:31 on October 30, 2016, on the **cargo ship BBC ASIA (Vessel A, 7,014 gross tons)** during work to load pipes with a crane at Shinko East Quay T Wharf, Kobe Section, Hanshin Port, when three workers who were working in a cargo hold were caught between pipes being hoisted by the crane and a side wall. Two of the workers were killed and one was seriously injured.

Vessel A docked starboard-side alongside at the Wharf in the Kobe Section of Hanshin Port. At around 10:00, Vessel A loaded 30 bundles of pipes that had been arranged on the Wharf using the No. 1 crane.

At around 11:15, Vessel A began loading bundled pipes that had been loaded on Vessel B, which was alongside on the port side, using the No. 1 crane and stowed two bundles on the starboard side.

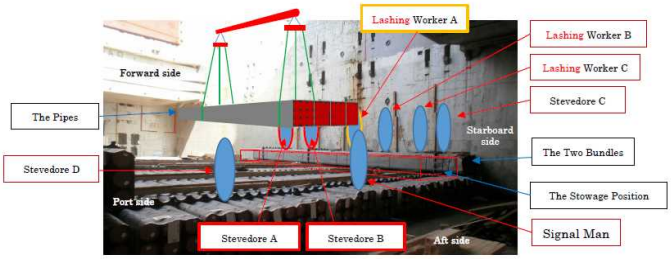
A stevedore who directed cargo-handling in the No. 2 cargo hold (the Signal Man) moved four bundles of nine pipes (the Pipes) hoisted from Vessel B by instructing the stevedore in charge of crane operation (the Winchman) to rotate the crane's jib toward the stowage position. Then the Signal Man instructed the Winchman to temporarily stop operating the crane so he could check the positions of workers and other circumstances.

After the jib of the No. 1 crane was stopped, Vessel A inclined to starboard and inclined to the point that the lower horizontal bar of the handrail installed on the starboard side of Vessel A's upper deck was at about the same height as the bumpers on the wharf.

The Pipes began moving in the starboard direction.

Stevedore A, Stevedore B, and Lashing Worker A, who were standing by and doing other activities on top of the two bundles of pipes, were caught between the Pipes and the starboard wall. (around 11:31)

(Arrangement of workers at the time of the accident)

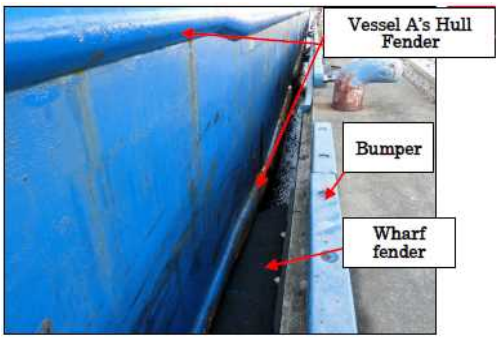


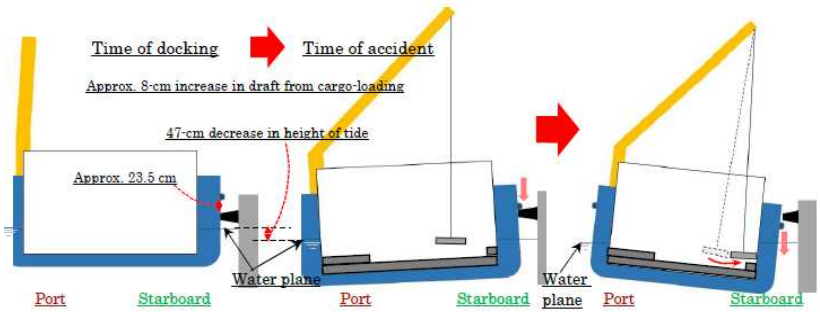
(Situation where Vessel A inclined to starboard)

Vessel A had semicircular steel fenders from the stern end toward the bow on both sides of the hull.

Rubber fenders were installed horizontally at intervals of twenty meters on the Wharf's surface.

It is probable that Vessel A rolled and inclined approximately 7° to the starboard side at the time of the accident when the underside of the hull fender on Vessel A's starboard midship hull came off the tops of the wharf fenders when the Pipes were hoisted by the No. 1 crane and then stopped under conditions where the underside of the hull fender was caught on the tops of the wharf fenders and Vessel A's starboard inclination was arrested because, among other reasons, the height of tide had fallen compared to that at the time of docking and the vessel's draft had increased.





Probable Causes (excerpt): It is probable that the accident occurred when the Pipes which had been hoisted and then stopped by the No. 1 crane swung to the starboard side, and as a result, two stevedores and one lashing worker, who had been standing by and doing other activities on top of the cargoes that had been stowed on the starboard side, were caught between the Pipes and starboard wall, as Vessel A was being loaded with cargo starboard-side alongside at Shinko East Quay T Wharf, Kobe Section, Hanshin Port.

For details, please refer to the accident investigation report. (Published on September 28, 2017)
http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2016tk0015e.pdf

Vessel capsized due to angle of heel exceeding bulwark submerge angle and exposure to continuous waves while being towed
Capsize of fishing vessel DAIFUKU MARU

Summary: The main engine of the **fishing vessel DAIFUKU MARU (Vessel A, 76 gross tons)**, with its skipper and eight crew members onboard, stopped when returning to Sakaiminato. While being towed by another fishing vessel, KYOFUKU MARU No. 2 (Vessel B, 117 gross tons), Vessel A capsized and sank north of the Mihonoseki lighthouse in Matsue City, Shimane Prefecture at about 5:15 on December 14, 2016.

In the accident, four of the nine crewmembers onboard Vessel A died and five went missing.

Vessel A left Sakaiminato on December 8 to fish for snow crabs at a fishing ground off Hamada City, Tottori Prefecture. Ending the fishing operation at night on December 13, Vessel A informed an intermediate agent of fishery products that it would return to Sakaiminato at around 2:00 on December 14.

At about 1:54 on December 14, Vessel A asked a consort ship to tow it because its main engine had stopped. The consort ship then asked Vessel B to tow Vessel A because it was closer to Vessel A and bigger.

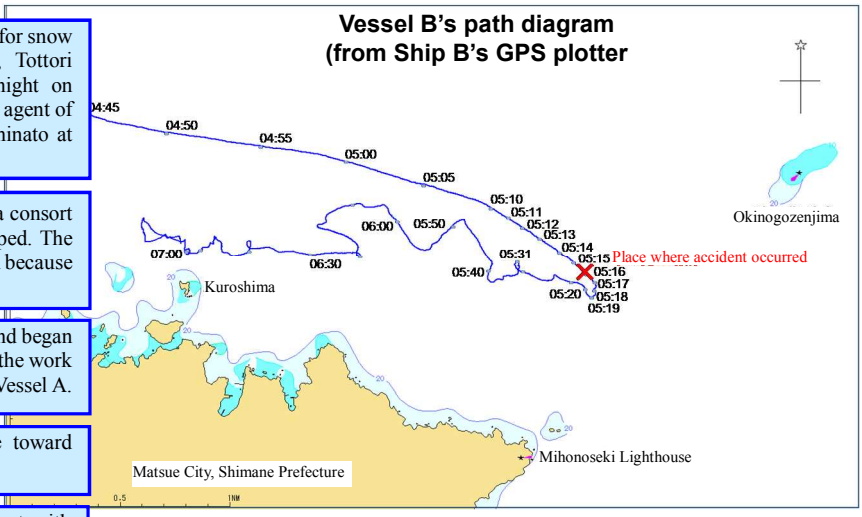
Vessel B came close to Vessel A at around 2:30 and began to connect the two vessels with a tow rope. With the work completed at about 4:00, Vessel B started to tow Vessel A.

At around 5:00, Vessel B changed its course toward Sakaiminato to avoid rolling.

At around 5:14 to 5:15, Vessel B's radio contact with Vessel A went silent.

Capsizing (at around 5:15)

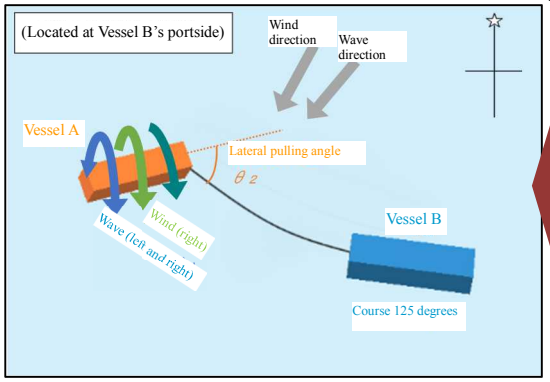
Vessel B's path diagram (from Ship B's GPS plotter



(Situation of Wave Height)

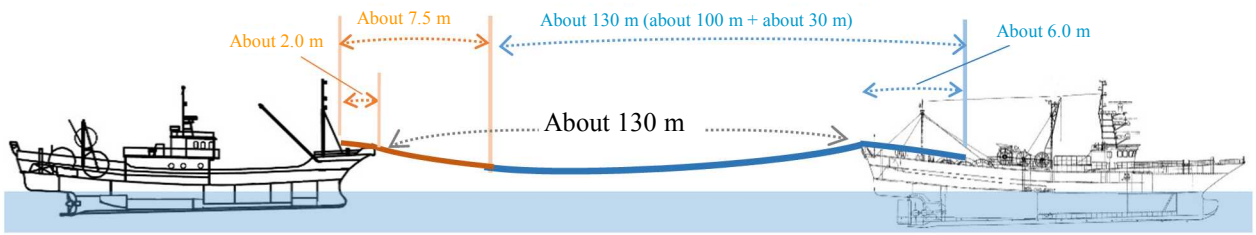
The marine area near the place where the accident occurred is off the marine area sheltered by the Oki Islands. It is probable that waves there were higher than those near Okinogozenjima and in waters around the island, in addition to reflected waves from Mihonoseki.

(Vessel A's heeling moment)



(Situation of capsizing)

- It is probable that the stability of Vessel A was reduced due to addition of structural objects, etc. to it and water tanks on its deck and the freeboard of the ship also decreased.
- Vessel A was exposed to the risk of a sudden increase in heeling moment because the towing rope was not long enough. It is somewhat likely that the heeling moment increased due to the.
- It is probable that the angle of the heel of Vessel A became larger than the bulwark submerge angle due to a combination of Vessel A's steady heel caused by wind, rolling motions caused by waves and Vessel A's heeling energy caused by the tension on the towing rope.
- While Vessel A's angle of heel exceeded the bulwark submerge angle and the righting lever became smaller, it is somewhat likely that continuous waves capsized Vessel A with the bulwark acting as resistance to stability.



Vessel A: length overall 34m

(Situation of towing)

Vessel B: length overall 38m

Probable Causes (excerpt): It is somewhat likely that the accident occurred as follows: The main engine of Vessel A stopped at night when the ship's stability was reduced and its freeboard decreased. While being towed southeast by Vessel B north of the Mihonoseki lighthouse, Vessel A became almost unable to regain stability as the angle of the heel exceeded the bulwark submerge angle and capsized by continuous waves.

For details, please refer to the accident investigation report. (Published on November 30, 2017)
http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-11-1_2016tk0016.pdf

Auxiliary oiler in the engine room exploded during berthing operation

Explosion of an auxiliary boiler on container ship MANHATTAN BRIDGE

Summary: While the **container vessel MANHATTAN BRIDGE (the Vessel, 152,297 gross tons)** was docking with a master, 25 crew members and a pilot onboard at the port of Felixstowe, United Kingdom of Great Britain and Northern Ireland, at around 23:04 on January 19, 2017 (local time), an explosion occurred in the furnace of the auxiliary boiler. The duty oiler died, the second engineer suffered injuries and the burner unit of the auxiliary boiler damaged.

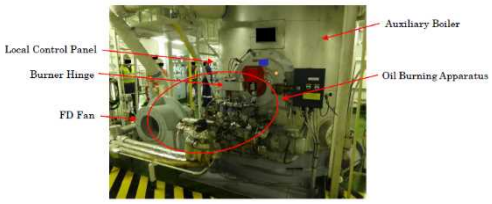
At around 14:35 on January 16, 2017 (local time), the Vessel changed the fuel oil (FO) supply from heavy fuel oil to marine gas oil (the MGO) that had been supplied in the port of Rotterdam on 8 November 2016.

When arriving at the port of Felixstowe, at around 16:00, all engineers and duty oiler were assigned to each standby station in the engine department.

The auxiliary boiler emergency trip alarm was activated at around 17:30 and the second engineer (Engineer A) opened the rotary cup burner of the auxiliary boiler oil burning apparatus and cleaned the inside.
After that, the auxiliary boiler emergency trip alarm was activated three times up to 19:51. On every occasion, after checking the auxiliary boiler, the other engineer had cancelled the auxiliary boiler alarm at the auxiliary boiler local control panel and re-started it.

At 23:01, the engine control room alarm panel indicated an auxiliary boiler emergency trip alarm. The Engineer A switched the auxiliary boiler control from 'Auto' to 'Manual' to purge unburnt gases at the auxiliary boiler local control panel, then the forced draft fan (FD fan) started running. While the Engineer A was in position in starboard-fore side of the oil burning apparatus and the oiler who was assigned to his standby station at 20:00 was in position in front of the oil burning apparatus to wait for instruction from the Engineer A, the Engineer A confirmed a flame in the furnace and tried to stop the FD fan after closing the quick-closing valve. However it was impossible to stop the FD fan.

(Auxiliary boiler)



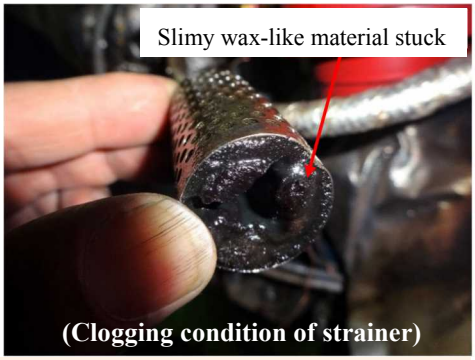
An explosion occurred in the furnace of the auxiliary boiler (at around23:04)
The duty oiler died, the Engineer A suffered injuries

(Analysis on the occurrence of explosion in the furnace of the auxiliary boiler)

- It is somewhat likely that under the condition where the primary air and the secondary air was supplied as same volume as before MGO clogging, the MGO pressure dropped and the MGO flow to the rotary cup burner was reduced and then the atomizing of MGO became unstable. The flame was cooled by excessive air and the burning process was disturbed causing the combustion status very bad and unburnt MGO remained in the furnace.
- After automatic combustion of the rotary cup burner was stopped, unburned MGO remaining in the furnace during automatic combustion was vaporized, became a flammable gas and continued to burn. Then Furnace (Flame-Eye) Abnormal alarm was activated, FD fan stopped, the secondary air damper was closed and combustion air was not supplied. As a result, flame of incomplete combustion and flammable carbon monoxide gas or flammable gas of the MGO became present in the furnace.
- For the purpose of the purge in the furnace, the FD fan was operated in the auxiliary boiler and the secondary air was supplied, and therefore the explosion occurred by a rapid chemical reaction of oxygen and heated carbon monoxide gas. Or in the situation where MGO existed as a highly concentrated flammable gas in the high temperature furnace, the FD fan was operated and secondary air was supplied, and therefore the explosion occurred because the concentration of the flammable gas mixed with air was within the flammability limits.

(Analysis of the MGO remained in the furnace)

- It is somewhat likely that under the condition where the primary air and the secondary air was supplied as same volume as before MGO clogging, slimy wax-like material stuck to the strainer of MGO line or the pressure adjusting valve malfunctioned due to the influence of the precipitated paraffin wax, which caused reduced flow of the MGO to the rotary cup burner and unstable atomization of the MGO.
- It is somewhat likely that slimy wax-like material stuck to strainer etc. at the time of using the MGO, which caused the MGO pressure to drop. However, as the MGO pressure did not drop to the set point for fuel oil low pressure alarm, automatic combustion continued. The atomizing of MGO became unstable. The flame was cooled by excessive air and the burning process was disturbed causing the combustion status very bad and unburnt MGO remained in the furnace.



(Clogging condition of strainer)

Probable Causes (excerpt): It is probable that the accident occurred, in the night time, while the Vessel was docking at the port of Felixstowe, United Kingdom of Great Britain and Northern Ireland, an explosion occurred within the furnace of the auxiliary boiler.

For details, please refer to the accident investigation report. (Published on December 21, 2017)
http://www.mlit.go.jp/jtsb/eng-mar_report/2017/2017tk0004e.pdf

Collision of cargo ship and stone carrier off Himeji Port sinks stone carrier, claiming 2 lives

Collision between cargo ship HOSHO MARU and stone carrier YAMATO MARU No. 8

Summary: The **cargo ship HOSHO MARU (Vessel A, 499 gross tons)**, with its master and four crew members onboard, was sailing southwest toward Niihama Port in Niihama City, Ehime Prefecture, on July 15, 2016, while the **stone carrier YAMATO MARU No. 8 (Vessel B, 499 gross tons)**, with its master and two crew members onboard, were sailing southeast toward the Osaka section of Hanshin Port. At about 11:43 on the day, the bow of Vessel A collided with the portside of Vessel B off the east coast of Kurakake Island.
In the accident, two crew members of Vessel B died and one member was injured. The ship suffered a hole in the center of its portside and other kinds of damage and sank. Vessel A received damage such as a deformation in its bulbous bow but experienced no casualties.

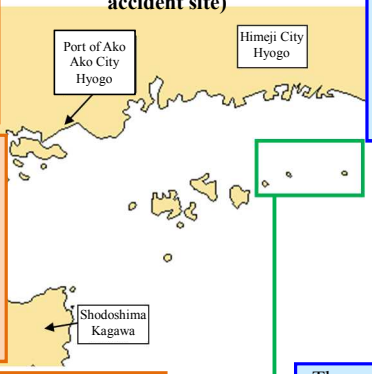
Vessel B was sailing in automatic steering mode with the navigation officer on Vessel B assigned as the sole bridge watchkeeper and noticed Vessel B at around 45 degrees 3.0M on the portside bow for the first time.

When Vessel A's distance came to about 1M, the officer became concerned as Vessel A was nearing without greatly changing its course. But the officer thought Vessel A would give way because it was the give-way vessel in the case and so Vessel B continued to sail in the same course at the same speed.

Vessel A did not change its course when its distance from Vessel B neared to around 1,000m, and the officer felt the danger of a collision and so turned Vessel B to starboard by about 5-10 degrees and sounded a whistle signal.

As Vessel A did not change its course and showed no signs of giving way to Vessel B, the officer turned Vessel B to starboard when Vessel A came to a distance of 200-300m, decreased the number of the main engine's rotations and sounded the electronic horn again.

(Diagrammatic illustration of accident site)



Vessel A was sailing in automatic steering mode, with the master on Vessel A serving as the sold bridge watchkeeper. As Vessel B was southwest of Kurakake Island roughly between 11:28 and 11:31, the master could not detect Vessel B either visually or by radar.

Considering that there was no ship ahead as an obstacle to Vessel A's sailing, the master engaged in such work as filling in a document on a chart table in the rear part of the portside bridge and did not maintain a lookout.

The master noticed Vessel B at about 30 degrees on the starboard side bow roughly 300-500m away for the first time. The master maneuvered the steering mode shift lever to make a shift from automatic to manual steering and tried to turn Vessel A to port. But he operated the power source switch lever on the right side of the mode shift lever and turned off the power source of the automatic steering device.

Although the master turned the steering wheel, he tried to bring the operating lever to the hold position because the helm indicator did not work.

(Vessel A's presumed sailing route based on GPS records and Vessel B's presumed route)

Collision (at around 11:43)

Probable Causes (excerpt): It is probable that the accident occurred as follows: Vessel A was sailing southwest off the east coast of Kurakake Island while Vessel B was traveling southeast. The master on Vessel A did not notice Vessel B early enough as he engaged in such work as filling in a document and did not maintain a lookout, considering that there was no ship ahead as an obstacle. At the same time, the navigation officer on Vessel B noticed Vessel A on Vessel B's portside bow but thought Vessel A would eventually give way. Although the officer sounded a whistle signal, he did not take actions to avoid the collision in time.

For details, please refer to the accident investigation report. (Published on June 29, 2017)
http://www.mlit.go.jp/jtsb/ship/rep-acci/2017/MA2017-6-26_2016kb0069.pdf

Chapter 6 Efforts toward accident prevention

1 Publications

The JTSB prepares and issues various publications, as well as investigation reports, regarding specific cases.

We place these publications on our website and, in order to make them more accessible to the public, we also introduce them through our monthly JTSB E-Mail Magazine service (only available in Japanese).

Our e-mail magazine service is widely used by people in the aviation, railway, and shipping industries, as well as administrative agencies and educational/research organizations.

We also exchange opinions with business operators and other parties on effective information dissemination from the JTSB, and we will continue to make improvements based on the opinions that 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 2017, we released three issues of “JTSB Digests” (March, June and December: Issues No. 24-26) as well as one issue of the English version of “JTSB Digests” (February).

The contents of each issue are as follows.

① JTSB Digests Issue No.24 [Analyses of Aircraft Serious Incidents] “For prevention of aircraft accidents, taking clues from serious incidents” (issued on March 28, 2017)

- Circumstances of occurrence
- Serious incident investigation case: “Nearing of aircraft behind due to false recognition of plane to follow”
- Serious incident investigation case: “Attempt to land on closed runway due to pilot’s assumption”
- Serious incident investigation case: “Approval for incoming plane’s landing while forgetting work vehicle on runway, etc.”

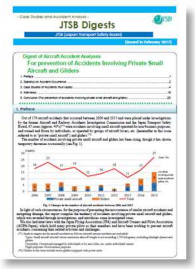
② JTSB Digests Issue No.25 [Analyses of Marine Accidents] “For safe operation of pleasure boats” (issued on June 27, 2017)

- Circumstances of accidents, etc.
- Accident investigation case study: ”Engine failure”
- Accident investigation case study: ”Failure to supply fuel”
- Accident investigation case study: ”Excess discharge from battery”
- Accident investigation case study: ”Fuel shortage”
- Accident investigation case study: ”Hull inspection”

③ JTSB Digests No. 26, [Analyses of Aircraft Accident] “Injuries, etc. during use of escape slide in case of emergency” (issued on December 21, 2017)

- Circumstances of occurrence
- Accident investigation case study: ”Emergency escape as white smoke filled inside plane”
- Accident investigation case study: ”Emergency escape due to report on tire catching fire”
- Accident investigation case study: ”Bursting into flame as fuel leaked from fuel tank on fire”
- Accident investigation case study: ”Emergency escape due to report on smoke coming out of cargo compartment”
- Accident investigation case study: ”Emergency escape due to abnormal odor and smoke inside plane and blaze coming out of engine”

④ For prevention of Accidents Involving Private Small Aircraft and Gliders (issued on February 21, 2017)

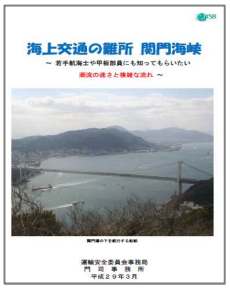


3 Issuance of the Analysis Digest Local Office Edition

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 2017）

Hakodate	**Fixed fishing net may be close to where you are sailing!** **—For prevention of accidents damaging fixed nets in waters off coast of Hokkaido—** (Main content) ・Circumstances of accidents damaging fixed nets ・Accident case studies (3 cases) ・Summary - Prevention of accidents damaging fixed nets	
Sendai	**Let's prevent fatal and injury accidents during fishing operations!** **—For prevention of fatal and injury accidents involving workers pulled into fishing machines or falling into sea—** (Main content) ・Occurring circumstances of fatal and injury accidents during fishing operations ・Accident case studies (3 cases) ・Summary	
Yokohama	**For prevention of accidents during mooring and unmooring work** **—Full attention needed for handling mooring rope!—** (Main content) ・About mooring rope ・Occurring circumstances of accidents during mooring and unmooring work ・Accident case studies (2 cases) ・Measures to prevent recurrence of accidents	
Kobe	**Let's make sure to conduct pre-departure inspections!** **—Always keep safety in mind—** (Main content) ・Accident case studies (6 cases) ・Measures to prevent recurrence ・Checking list for pre-departure inspection	

Hiroshima	**To enjoy fishing from boats —Circumstances of accidents involving pleasure boats during anchoring or roving—** (Main content) ・Circumstances of occurrence ・Accident case studies (3 cases) ・Summary	
Moji	**Kanmon Strait, chokepoint in marine traffic —Speed and complexity of tidal flows young navigation officers and deck men should know.—** (Main content) ・Outline of Kanmon Strait ・Accident case studies (3 cases) ・Summary	
Nagasaki	**Collision of small ship under way and small ship during anchoring or drifting** (Main content) ・Circumstances of occurrence ・Circumstances of both ships and ship operators before collision ・Summary	

As you read these local office digests, you can not only find out the circumstances of local accidents, but can also gain some tips for accident prevention.

The local offices will make further efforts to regularly issue the analysis digest local office editions. By doing so, they will ensure that you will be provided with more satisfactory content.

4 Issuance of the JTSB Annual Report

In June 2017, we issued the JTSB Annual Report 2017. We did so in order to share the lessons learned from accidents and incidents with interested parties, by introducing our general activities in 2016.

As part of our efforts to provide information overseas, we issued the English version of the report “Japan Transport Safety Board Annual Report 2017” on September 2017. We did so to let people overseas know about the topics in this Annual Report.

5. Preparation of safety leaflet

When the Japan Transport Safety Board published the JTSB Digest or releases investigation reports on accidents and incidents for which measures to prevent the recurrence thereof need to be urgently implemented, it prepared single-page, A4-sized leaflets to let as many people as possible see various safety information mentioned in them. To raise attention to the prevention of accidents, the board distributed the leaflets at event venues and asked organs concerned for cooperation in distributing them.

For safe operation of pleasure boats.

Issues that should be kept in mind when being towed.

Column

Accident caused by gusty wind

Moji Office

Grasping weather information is an important factor indispensable for the safe maneuvering of ships. Stormy weather and limited visibility bring tremendous tensions to crew members and operators of ships and directly or indirectly threaten the safe maneuvering of ships. We believe that people involved in the operation of ships therefore should make use of TV, newspapers, the internet and weather information services to pay keen attention to weather changes day after day and take the best possible countermeasures as occasion demands. Greater attention may be necessary for the operation of small ships because their safety can be greatly affected even by moderate changes in weather conditions.

As far as general weather changes are concerned, we do not think great risks will occur if information provided by TV and other sources are firmly followed and if reckless maneuvering is avoided. From time to time, however, strong wind, which is hardly predictable, causes huge damage to ships and human lives. The wind of such a kind is a furious gusting wind from cumulonimbus clouds created by a typhoon or low atmospheric pressure.

In September 2015, six small fishing boats were overturned by a gusting wind off the east cost of Tsushima and five people were killed in the accidents. In August last year, furthermore, a sudden gust of wind toppled a fishing vessel in Fukuoka Bay. Both cases occurred while an atmospheric depression with a front was moving and cumulonimbus clouds are considered to have been involved, according to surveys by the Fukuoka Regional Headquarters of the Japan Meteorological Agency and others concerned.

In investigating the Fukuoka Bay accident, we, the Moji Office, conducted research in the form of a questionnaire in cooperation with the Fukuoka City Passenger Vessel Office and crew members of ships belonging to the office in order to understand weather conditions in detail around the accident site at that time. As a result, all respondents were found to have shared a recognition of a temporary drop in visibility and a sudden increase in rain precipitation and the velocity of wind. We held direct talks with a number of respondents who said dark clouds had suddenly appeared along with a sudden gust of wind under fine and benign weather. But the changed weather conditions shortly settled and sunny spells were observed, they said. Combing their remarks with the speed of wind recorded at a place near the accident site, sudden and temporary changes in weather evidently occurred. Exposed to such a condition, it is considered difficult for skippers of small fishing vessels and pleasure boats, even if well experienced, to avoid risks. While, therefore, it is important to fully grasp weather information on a sailing area through TV, the internet and other means, careful maneuvering, such as escaping to a safe area when a disturbing cloud is seen, should be kept in mind.

Both accidents occurred in autumn, as it was after the first day of autumn according to the calendar. A Japanese proverb says, “A woman’s mind and autumn wind will change often.” Regardless of season, sufficient attention should be paid to changes in weather conditions. If you sail aboard a small fishing vessel or a pleasure boat, please don’t forget life jackets.

We would like to this opportunity to thank the Fukuoka City Passenger Vessel Office and crew members of ships belonging to it for their cooperation.

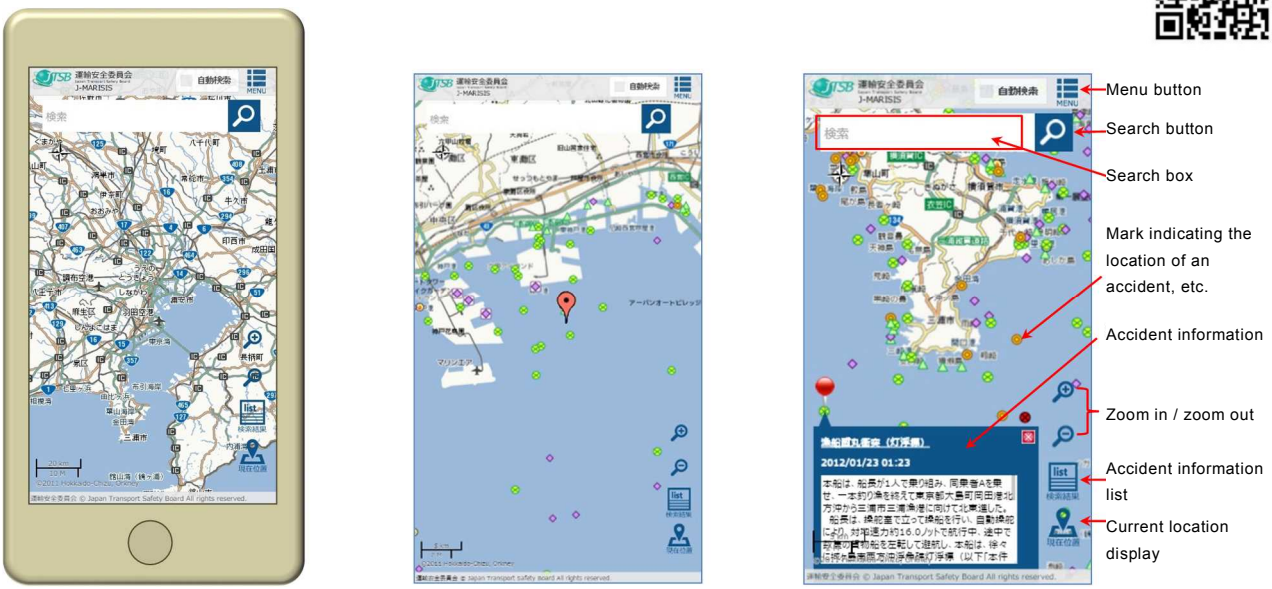
6 J–MARISIS – Now even easier to use

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 http://jtsb.mlit.go.jp/hazardmap/mobile/index_en.html



Screen displaying accident information

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 http://www.mlit.go.jp/jtsb/contact.html

Column

Recording device and accident investigation

Director for Analysis, Recommendation and Opinion

There was a malignant incident on an expressway last year, in which a parking spat prompted a driver involved to chase the other vehicle, resulting in a traffic accident killing a married couple. I feel my heart wrung when I think of the couple's surviving children. While the accident has led to toughing of punishments against tailgating, an increasing number of cars are reportedly having drive recorders installed as self-defense against such an atrocity. While recorded videos serve as evidence of tailgating and accidents, tailgating is said to be prevented by making the installation of drive recorders clear.

In the meantime, aircraft, trains and ships, which are subject to investigations by the Japan Transport Safety Board when accidents occur, are required to have devices under set standards to record operations and other matters of concern in case of accidents. As for aircrafts' digital flight data recorders and cockpit voice recorders which are generally known as "black boxes," the "aviation law" and its "enforcement regulations" set forth aircraft required to install them and what should be recorded. In the case of trains, the "ordinance setting technological standards related to trains" states that "trains, operation control centers and other places concerned must have "devices to record train operations (skip the rest)." Ships are required to have voyage data recorders under the "ship equipment regulations." Deliberations on each of such recording devices started following a series of accidents or major accidents. For devices to record train operations, in particular, deliberation began after a proposal based on an investigation report on the derailment accident on the Fukuchiyama Line compiled by the Aircraft and Railway Accidents Investigation Commission, the predecessor of the JTSB.

Unlike drive recorders, recording devices, aimed at analyzing causes of accidents, are not expected to prevent accidents while driving. In the case of aircraft and ships, data protection capsules have eye-catching colors, such as fluorescent orange, as they are supposed to be recovered in devastating accidents or from the bottom of the ocean. But there is no emphasis on the installation of any of them. Train passengers during commuting to and from schools and workplaces may see devices to record train operations as some types are designed to be partially placed on the control platform. In any case, most machine sections are not in places open to the general public and so there are no opportunities for train and ship passengers to see them.

While videos taken by drive recorders are used for self-protection, there reportedly are videos for listening and viewing enjoyment and those put on video sites for earnings. Data of recording devices are used only for accident investigations in principle.

Data from recording devices are very important to accident investigations. But as they are neither recorded to show the minds of pilots, train drivers and navigation officers nor record various developments in an accident, it is difficult to determine the causes of an accident by the data alone. Purposes of maneuvering planes, trains and ships can be analyzed using voice recording, altitude, velocity and other data. Investigation results on airframes, train bodies, hulls and others, related reference materials and information gathered from people concerned through interviews and others need to be added to recorded data for integrated studies in order to determine specifics such as "why the plane flew low for entry," "why the train exceeded the speed limit" and "why the ship changed its course to port" at "that time."

7 Outreach lectures (dispatch of lecturers to seminars, etc.)

Scene of an outreach lecture

The Japan Transport Safety Board launched a series of outreach lectures in April 2014, as part of its efforts to raise awareness on the work of the Board, 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 as lecturers to various seminars and schools.

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.

http://www.mlit.go.jp/jtsb/demaekouza.html (in Japanese)

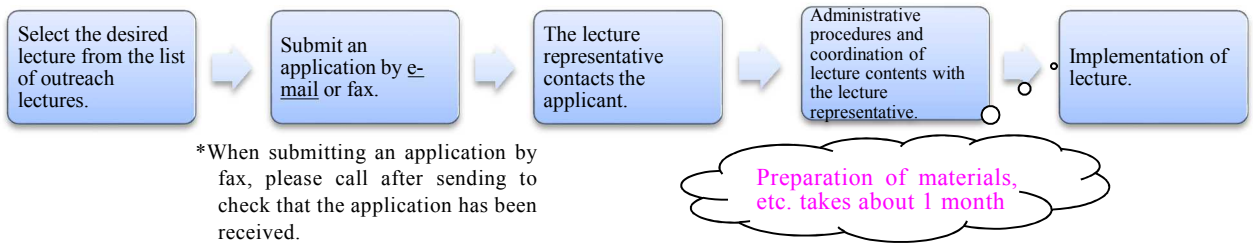
List of outreach lectures

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 regional office in Hakodate, Sendai, Yokohama, Kobe, Hiroshima, Moji, Nagasaki, and Naha]	General (High school students and older), maritime businesses, etc.	Explanations on each topic regarding analysis digests from regional offices. *Lists can be found by clicking the link below. http://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



8 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 2017, information on accident investigation and other matters was provided to 80 persons, including the victims, of 36 cases of aircraft/railway/marine accidents.

The status for other activities is as follows.

○Memorials for accident victims

The JTSB made memorial visits to accident sites including Mount Osutaka in Ueno Village, Tano District, Gunma Prefecture, the site of the JAL Flight 123 crash, and presented offerings of flowers from the Board members and the Director-General at each accident site to express our deepest sympathy for those lost in these accidents.

By presenting these memorial offerings first-hand, we deeply felt the emotions of those who still have painful memories of these events, and renewed our awareness of the importance of closely sharing

the feelings of bereaved families and victims.

Prayer at the altar for flowers at the Mount Osutaka crash site

Prayer at the alter for flowers at the site of the Fukuchiyama Line derailment

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

Information for Victims and their Families

Japan Transport Safety
Victims and their Families
Liaison Office

Japan Transport Safety Board

(Front)

Japan Transport Safety Board
Victims and their Families
Liaison Office

2-1-2 Kasumigaseki, Chiyoda,
Tokyo, Japan 100-8918

Tel: +81-3-5253-8823 Fax: +81-3-5253-1680
e-mail: jtsb_faminfo@mlit.go.jp

Japan Transport Safety Board

(Back)

Column

Relocation of JTSB

General Affairs Division

Please be informed that the Tokyo office of the Japan Transport Safety Board was temporarily relocated from the 15th floor of the Central Government Building No. 2 at 2 Kasumigaseki, Chiyoda Ward, Tokyo, to the 8th floor of the Central Government Otemachi Building No. 3 at 1 Otemachi, Chiyoda Ward, Tokyo, effective on June 4, 2018.

The relocation followed the review of the arrangement of the Land, Infrastructure, Transport and Tourism Ministry-related departments and bureaus located in the Central Government Building No. 2 and the adjacent building No. 3. The Tokyo office of the JTSB also become subject to the review.

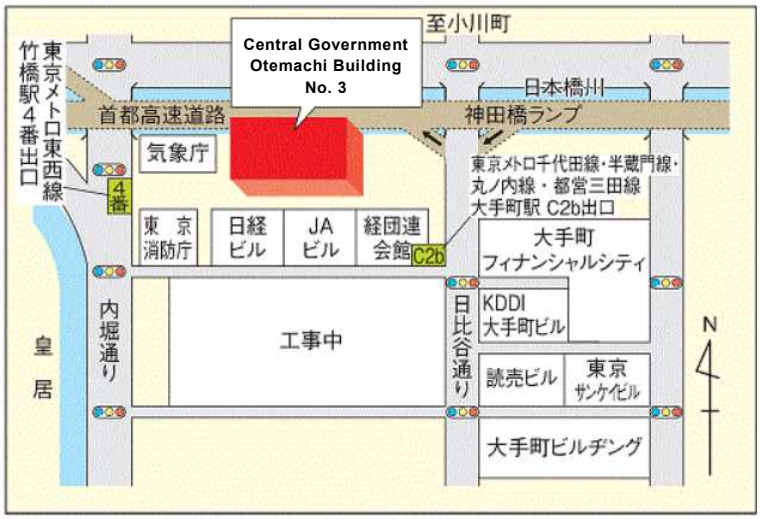
The temporary relocation will end within fiscal 2018 and the JTSB will be officially relocated to the Central Government Building No. 2 again by the end of the fiscal year.

We would like to ask visitors to the JTSB to avoid confusion.

While the Aircraft Accident Investigation Commission, the predecessor of the JTSB, was established in the Central Government Building No. 3 in January 1974, the large-scale relocation was the first in 17 years since the move to the Central Government Building No. 2 in October 2001 when the Aircraft and Railway Accidents Investigation Commission was founded. In addition, the relocation straddling two districts from Kasumigaseki to Otemachi is the first, having strong strains on unfamiliar officials concerned. In any case, we are heaving a sigh of relief as the temporary relocation has been completed.

Temporary location of Japan Transport Safety Board
Central Government Otemachi Building No. 3, 8F
1-3-3 Otemachi, Chiyoda Ward, Tokyo 100-0004

* Although the telephone number of the secretariat of the Japan Transport Safety Board remains unchanged at 03-5253-8486, calls to the Ministry of Land, Infrastructure, Transport and Tourism (03-5253-8486) cannot be forwarded to it.



Central Government Otemachi Building No. 3

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, are international in nature. Creating and operating systems for these kinds of investigations therefore involve international organizations. Also, it is 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. In regards to this, 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 2017.

2 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) was established as a specialized agency of the United Nations in 1947. Japan acceded to it in 1953. ICAO comprises the Assembly, Council, Air Navigation Commission (a supporting body of the Council), Legal Committee, Air Transport Committee, and Committee on Joint Support of Air Navigation Services, all of which are the subordinate bodies of the Council, 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 March 2018, 192 states are members of ICAO.

The objectives of ICAO is provided in Article 44 of the Convention on International Civil Aviation

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 Convention on International Civil Aviation 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).

APAC-AIG/5
(Singapore)

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.

When the APAC-AIG/5 held a meeting in Singapore in August 2017, JTSB members, including a Deputy Investigator-General for Aircraft Accident, attended to discuss questions related to accident investigations and other issues, based on features of the Asia-Pacific region, and to exchange views on, among others, ways of improving the investigation capacity.

(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 Co-operation Committee (TC) and Facilitation Committee (FAL). In addition, there is a Secretariat, and the MSC (and MEPC) has seven subcommittees. As of March 2018, IMO has 173 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

III4

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 III4 was held in September 2017. In this event, JTSB's marine accident investigators took part as group members and analyzed accident investigation reports from various states. Tentative translations of these analysis results are published on JTSB website.
(URL: http://www.mlit.go.jp/jtsb/casualty_analysis/casualty_analysis_top.html)

3 Cooperation and information exchange with foreign accident investigation authorities and investigators

(1) Participation in international meetings

① Chairman 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 March 2018, the international organization has members from the transport accident investigation authorities of 16 countries and territories. Organizations that are permitted to join must be permanent accident investigation bodies that are independent from any regulatory body.

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 chairman 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.

Participants in the ITSA chairman meeting (Japan)

The 2017 meeting was held in Japan in September and attended by 14 countries and territories. The meeting listened to activity reports from the countries and territories, confirmed the direction of future activities by ITSA and discussed challenges in accident and other investigations.

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 aims is to be achieved by improving further a cooperative system of investigation bodies, 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 contribute to technical improvements in these areas.

The annual seminar in 2017 was held in San Diego, United States, with the theme "Investigations - Do they really make a difference?" This was attended by a Board member and a Senior Aircraft Accident Investigator from JTSB, who participated in active exchange of opinions with accident investigation personnel from various countries.

ISASI annual seminar
(United States)

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, JTSB currently serves as Chairman, with Hong Kong Civil Aviation Department as Vice Chairman, and Transport Safety Investigation Bureau of Singapore as Secretariat.

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 bodies of each country hold a meeting every year. JTSB has participated in nearly all the conferences since 2006.

The 2017 conference was held in September in Dublin, Ireland. JTSB dispatched an aircraft accident investigator to acquire the latest information and know-how for the analysis of flight recorders. This was achieved through the exchange of information and ideas with foreign accident investigation analysts.

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. Its aim is to advance 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 and actively contributed to the forum every year since the third conference and hosted the eighth conference in Tokyo in 1999.

The 26th conference, held in Rotorua, New Zealand in November 2017, was attended by a Deputy Investigator-General for Marine Accident and others from JTSB, who gave a presentation on cases of marine accident investigation conducted by JTSB in cooperation with investigation authorities in other countries.

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.

MAIFA20
(Indonesia)

The 20th meeting, held in Yogyakarta, Indonesia, in October 2017, was attended by a Senior Marine Accident Investigator and others from JTSB, who gave a presentation on major marine accident investigations conducted by JTSB.

(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.

On the serious incident in which a panel that fell from a KLM Royal Dutch Airlines Boeing 777-200 after taking off from Kansai International Airport hit a moving vehicle on the ground in September 2017, an investigation is in progress with the cooperation of the accident investigation authorities of the United States as the state of design/manufacture and the Netherlands as the state of the operator.

On the accident in which a helicopter operated by Toho Air Service Co., Ltd. crashed in Ueno Village in Gunma Prefecture in November 2017, an investigation is in progress with the cooperation of the accident investigation authority of France as the state of design/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 and incidents that JTSB launched investigations in 2017, with regard to the six serious accidents involving ships engaged on international voyages, the accident investigation authorities of the states to which the ships were registered were notified of the accidents.

On the accident in which an auxiliary boiler on the Japanese container vessel MANHATTAN BRIDGE exploded and one crewmember died and another was injured in Felixstowe Port, United Kingdom, in January 2016, JTSB conducted an investigation with the cooperation of the accident investigation authority of the United Kingdom as the coastal state and published the investigation report in December 2017. On the accident in which the container vessel ACX CRYSTAL and the warship FITZGERALD collided with each other off to the southeast of Cape Irozaki in Shizuoka Prefecture and 10 crewmembers on the warship died in June 2017, an investigation is in progress with the cooperation of the accident investigation authorities of the Philippines and the United States as the flag state.

Among the marine accident and incident investigation reports that were published in 2017, JTSB sent 14 draft reports to the flag states and other interested states upon request in order to invite their comments.

4 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.

In 2017, JTSB made efforts to improve our accident investigation capabilities, continuing from the previous year to dispatch an aircraft accident investigator and a marine accident investigator to Cranfield University in the UK, which has a good track record in accident and incident investigation training. The content of this training session lets the participants learn about a variety of topics, from the basics to expert knowledge about accident investigations. After the training, the participating investigators made the other investigators of each mode of transport aware of what was learned in the training, thereby helping to improve the capabilities of all of our investigators.

JTSB also dispatched an aircraft accident investigator to training held by a manufacturer in Canada to be familiarized with analysis software to analyze data from DFDRs in preparation for future investigations.

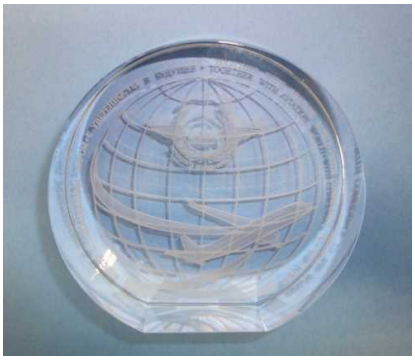
Column

Thoughts on International Conferences

International Affairs Office

As mentioned in Chapter 7, the International Transportation Safety Association held its chairman meeting in Tokyo on September 25 to 27, 2017. With Japan hosting the event for the first time, I was gravely concerned about whether it would go smoothly. Thanks to preparations made incorporating a variety of advice from ITSA members, all participants, after the meeting, praised not only JTSB Chairman Kazuhiro Nakahashi's chairmanship of the conference but also the arrangement of the venue and the management of the event. I therefore heaved a sigh of relief. I would like to introduce some "thank you" gifts for our efforts from participant countries.

1. When I shook farewell hands with the chairman of the U.S. National Transportation Safety Board, he was holding a colorful medal with a diameter of around 3.5cm. A message etched on the back of the medal reads, "From Tragedy We Draw Knowledge to Improve Safety for Us All." I was reminded anew of our primary responsibility as an accident investigation organ.



2. From the Russian Interstate Aviation Committee, I received a paperweight as thick as about 2.5cm on which a message was etched, along with a passenger plane illustration, saying in Russian and English, "Together with Aviation World with Confidence to the Future." Although flight services using Boeing and Airbus planes are becoming the mainline of operations in Russia as in other countries, the message may be taken as hope that Russian-made aircraft have a bright future and a determination to ensure safety. We pin hopes on the first Japanese-made jet airliner MRJ.

3. The Dutch Safety Board presented me with a Christmas tree ornament. I was told that the Dutch celebrate Christmas twice in December and enjoy Christmas trees until early January. The spherical ornament, with a diameter of around 7cm, has an illustrated windmill drawn on it, reflecting the advancement of windmills in the Netherlands. The beautiful ceramic ornament is so heavy that it may bend a Christmas tree unless it is solid enough. (When I think of giving Christmas gifts to my family members, I am glad, as Christmas is celebrated only once a year in Japan.)

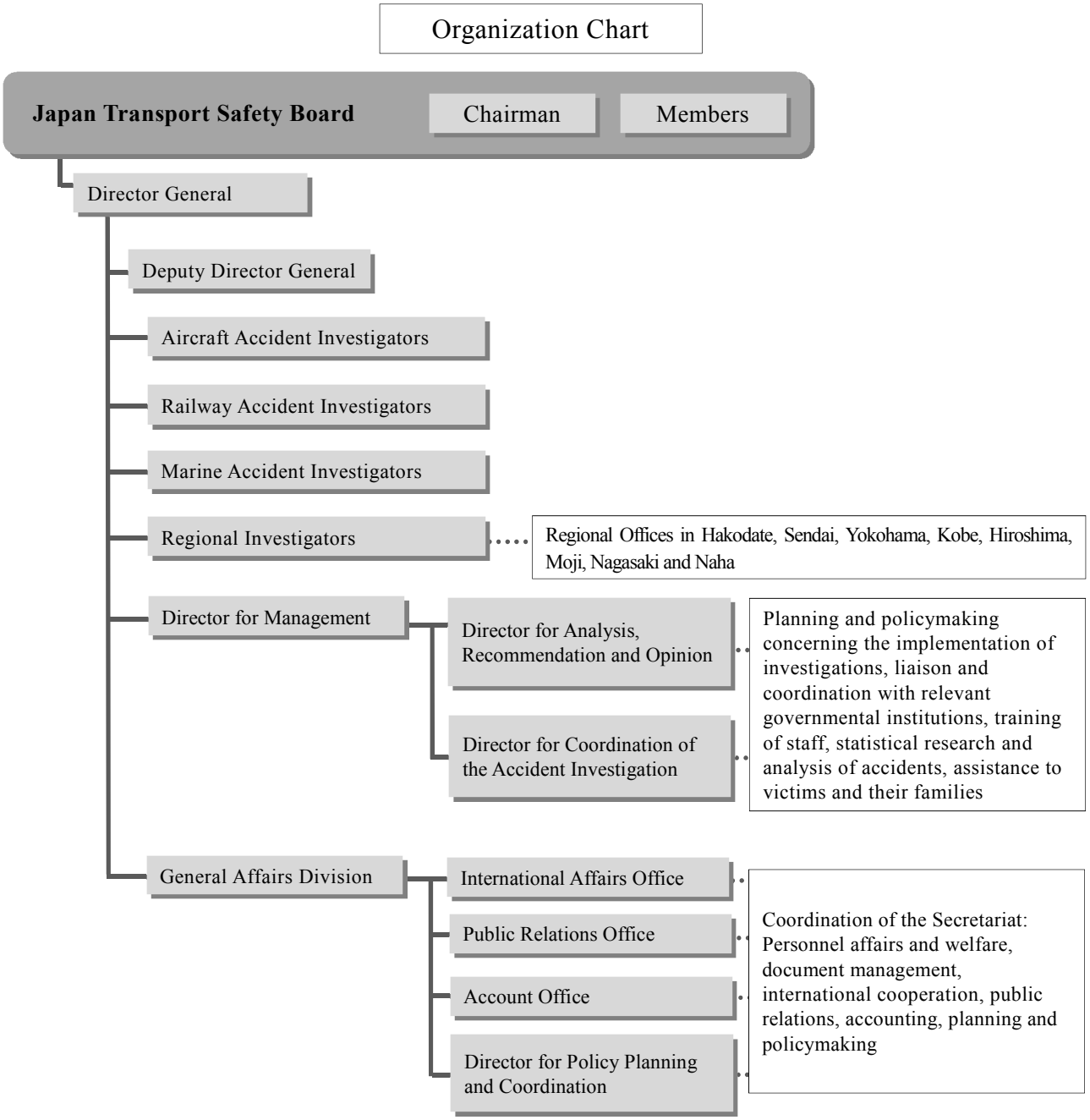
While achievements are discussed as the top priority agenda at international conferences, participants also need to deepen relations with other participants and gather information. The JTSB is willing to expand its international network of cooperation through such means as the preparation of gifts that present Japaneseness.

Appendixes

Appendixes

1 Outline of the organization

The Japan Transport Safety Board consists of the Chairman, 12 members, and 178 secretariat staff (as of the end of March 2015). 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.



2 Deliberation items of Board and each Committee

When investigations of accidents have progressed and the facts, as well as the causes and factors of accidents, have become clear to a certain extent, accident investigators put these results together and prepare a draft investigation report. This draft is then deliberated in the Board or Committees. As indicated in the table below, matters related to extremely serious accidents are deliberated in the Board, and matters related to particularly serious accidents are deliberated in the General Committee, and so nearly all draft investigation reports are deliberated in committees set up for each transport mode (Aircraft, Railway, Marine and Marine Special Committees).

The Board is composed of eight full-time members, including the Chairman, and five part-time members, with its assemblies convened by the Chairman. The Committees are composed of members with expertise related to each Committee, and their meetings are convened by their own Committee Directors. Any matters shall be decided by a majority of the members present for both the Board and Committees, and for both of these, a meeting cannot be convened and a decision cannot be made unless more than half of the members are present.

The Board (Committee) meeting is also attended by the Director General, Deputy Director General, Director for Management, Investigators concerned from the Secretariat.

Deliberation items of Board and each Committee

Board and Committees	Matters to be deliberated
Board	・Matters that the Board considers as extremely serious accidents based on the scale of damage and other matters including social impact
General Committee	・Matters related to particularly serious accidents (i) An accident involving ten or more persons killed or missing (ii) An accident involving twenty or more persons killed, missing or seriously injured (With regard to aircraft accidents and a marine accidents, (i) and (ii) are limited to passenger transport services.) ・Any other matters deemed to be necessary by the Board
Aircraft Committee	・Matters related to aircraft accidents and aircraft serious incidents (excluding the accidents to be handled by the General Committee)
Railway Committee	・Matters related to railway accidents and railway serious incidents (excluding the accidents to be handled by the General Committee)
Marine Committee	・Matters related to marine accidents and marine incidents as may be deemed serious by the Board (excluding the accidents to be handled by the General Committee and the Marine Special Committee)
Marine Special Committee	・Matters related to marine accidents and marine incidents (excluding the accidents to be handled by the General Committee and the Marine Committee)

3 Board Members

As of April 1, 2017

Kazuhiro Nakahashi, Chairman (Full-time), Director of Aircraft Committee
Kazuhiro Nakahashi was appointed as Chairman of the Japan Transport Safety Board on February 27, 2016; belongs to the Aircraft Committee, the Railway Committee and the Marine Committee with special expertise in aerospace engineering and computational fluid dynamics
Career summary: Doctor of Engineering, Graduate School of Engineering, the University of Tokyo
Former Professor in the Graduate School of Engineering, Tohoku University
Former Vice President of the Japan Aerospace Exploration Agency

Toshiyuki Ishikawa, Member (Full-time)
Toshiyuki Ishikawa was appointed as a member on March 15, 2010, currently in the third term of office; belongs to the Aircraft Committee, the Railway Committee and the Marine Committee, with special expertise in legislation of administrative law and others
Career summary: Doctor of Law, Graduate School of Law, Chuo University
Former Professor in the Law School, Chuo University

Toru Miyashita, Member (Full-time), Vice-Chairman, Deputy Director of Aircraft Committee
Toru Miyashita was appointed as a member on February 27, 2016; belongs to the Aircraft Committee, with special expertise in operation and maintenance of aircraft
Career summary: Graduated from the Department of Aeronautics, Faculty of Engineering, the University of Tokyo
Former Executive Director of the Association of Air Transport Engineering & Research

Yuichi Marui, Member (Full-time)
Yuichi Marui 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.

Fuminao Okumura, Member (Full-time), Director of Railway Committee
Fuminao Okumura 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

Hiroaki Ishida, Member (Full-time), Deputy Director of Railway Committee
Hiroaki Ishida 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

Yuji Sato, Member (Full-time), Director of Marine Committee
Yuji Sato 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

Kenkichi Tamura, Member (Full-time), Deputy Director of Marine Committee

Kenkichi Tamura 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

Keiji Tanaka, Member (Part-time)

Keiji Tanaka was appointed as a member on February 27, 2013, currently in the second term of office; belongs to the Aircraft Committee, with special expertise in flight simulation and flight dynamics

Career summary: Doctor of Engineering, graduated from the Department of Aeronautics, Faculty of Engineering, the University of Tokyo
Former Professor for Aerospace Engineering Course, Monozukuri Engineering Department, Tokyo Metropolitan College of Industrial Technology

Miwa Nakanishi, Member (Part-time)

Miwa Nakanishi 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)

Miyoshi Okamura, Member (Part-time)

Miyoshi Okamura was appointed as a member on December 6, 2010; currently in the third term of office; belongs to the Railway Committee, with special expertise in structural engineering, earthquake engineering and maintenance management engineering (steel structure engineering)

Career Summary: Doctor of Engineering, Graduate School of Engineering, University of Yamanashi
Associate Professor in the Department of Research, Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi (current post)

Miwako Doi, Member (Part-time)

Miwako Doi was appointed as a member on December 6, 2016; belongs to the Railway Committee, with special expertise in electrical engineering and traffic management (human interface)

Career Summary: Doctor of Philosophy
Auditor, National Institute of Information and Communications Technology
Executive Director, Nara Institute of Science and Technology

Makiko Okamoto, Member (Part-time)

Makiko Okamoto 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 the Faculty of Societal Safety Science, Kansai University (current post)

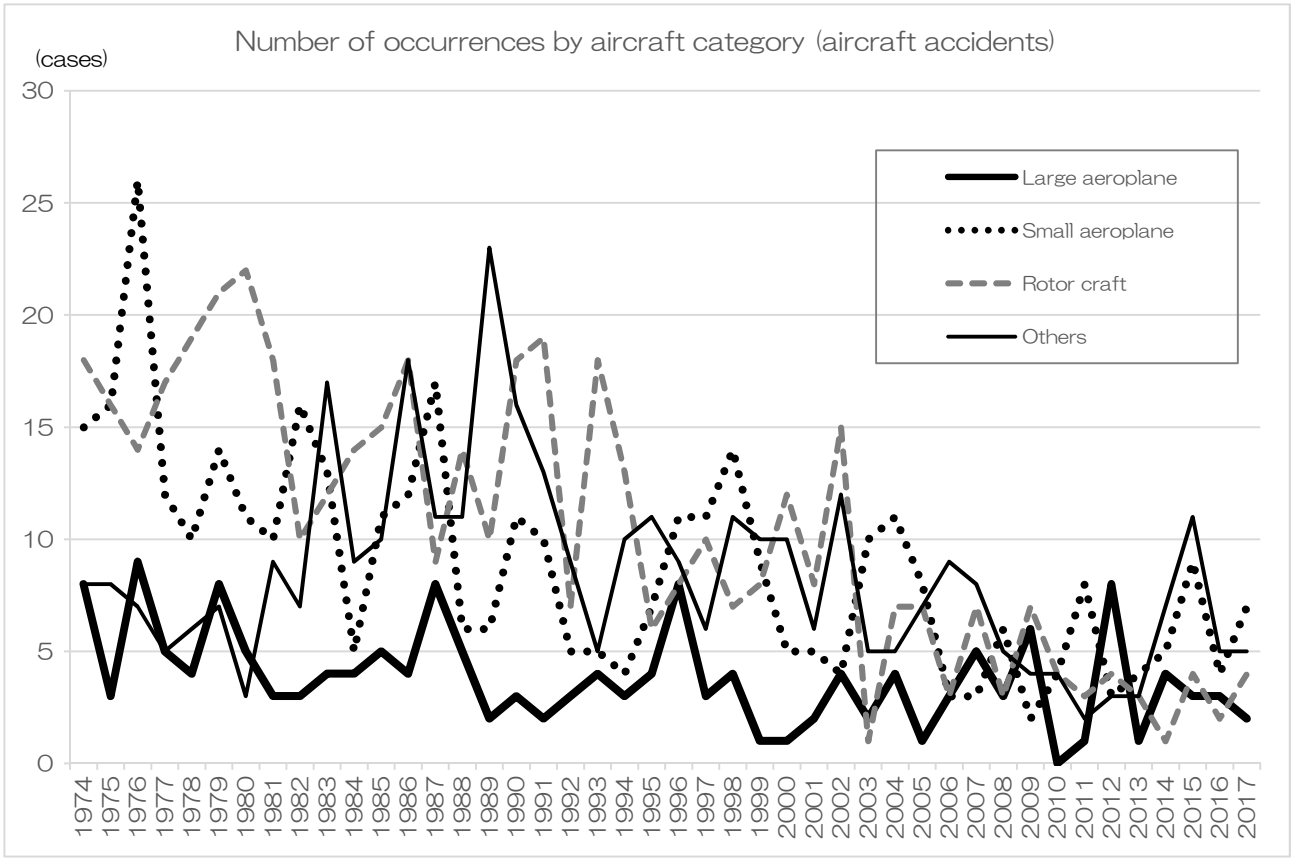
The chairman and members of the Board shall be appointed by the Minister of Land, Infrastructure, Transport and Tourism with the consent of both houses of Representatives and Councilors.

4 Number of occurrences by aircraft category (aircraft accidents)

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

Category / Year of occurrence	Aircraft			Rotor craft		Glider	Airship	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane			
2007	5	3	4	7	0	4	0	23
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	7	3	5	1	2	0	20
Total	168	388	165	433	25	203	2	1,384

(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 5,700kg.
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.



5 Number of fatalities in accidents (aircraft accidents)

(Persons)

Year of occurrence \ Category		Large aeroplane	Small Aeroplane	Ultralight Plane	Helicopter	Gyroplane	Glider	Total	
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	
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	
	Crew	2	13	5	26	1	7	54	82
	Passengers and others	0	11	1	14	0	2	28	
	Total	2	24	6	40	1	9		

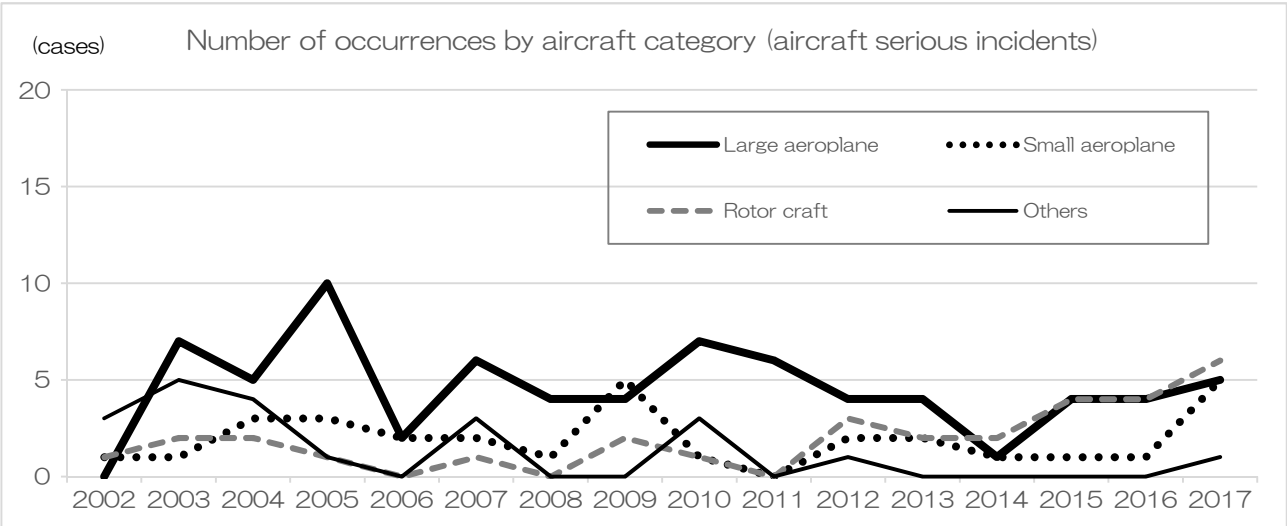
(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission in 2008
2. Death tolls represent data for the respective years of occurrence relisted from the annual reports published for those years.
3. Large aeroplanes are aircraft with a maximum take-off weight of more than 5,700kg.
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.

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

(Cases)

Category / Year of occurrence	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
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
Total	76	31	16	31	0	5	0	159

(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 5,700kg.
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.



7 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
Total	7	185	13	43	0	14	3	1	9	0	0	3	0	0	278

(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.

8 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

Death Classification / Year of occurrence	Crew members	Passengers	Others	Total
2014	0	0	6	6
2015	0	2	4	6
2016	0	0	15	15
2017	0	0	10	10
Total	0	2	45	47

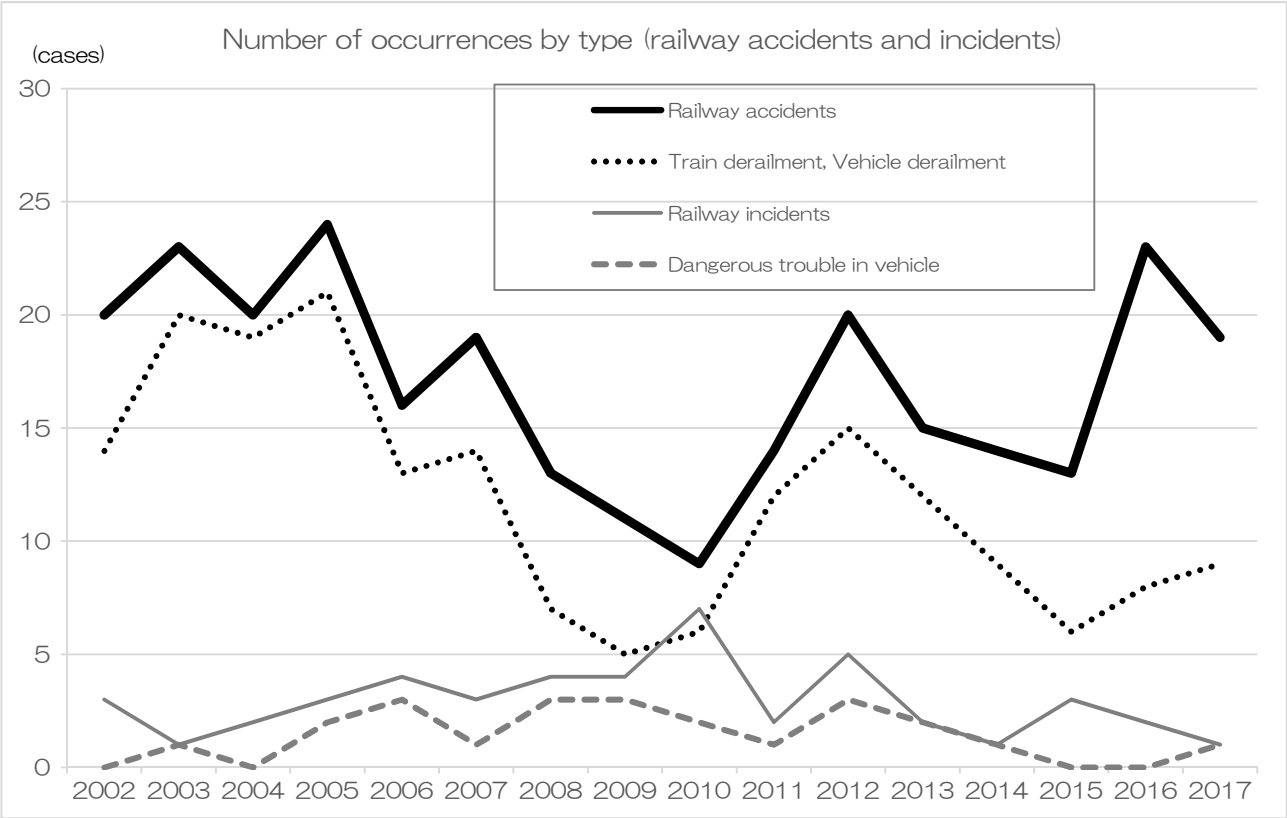
(Note) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission in 2008
2. Dealt tolls represent data for the respective years of occurrence relisted from the annual reports published for those years.
3. As investigations began to cover fatal accidents at third- and fourth-class crossings without crossing gates in April 2014, the number of deaths occurring in those locations were added.

9 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
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
Total	1	7	0	0	7	2	2	23	0	3	2	1	0	0	0	0	0	48

(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.



10 Number of occurrences by area (marine accidents and incidents)

(Cases)

Area / Year	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	674	43	39	910
2016	147	637	42	23	849
2017	155	663	35	42	895
Total	2,206	7,633	332	568	10,739

(Note) The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of February 2018 (including those carried over from the former Marine Accident Inquiry Agency).

11 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	265	144	210	10	25	49	33	2	38	163	2	106	7	3	25	1,082
2014	266	115	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
2016	217	94	163	5	19	46	26	3	21	144	0	85	6	6	14	849
2017	202	92	184	14	20	54	26	3	22	137	1	112	4	4	20	895
Total	2,584	1,281	2,558	101	167	513	326	23	288	1,437	10	938	134	30	349	10,739

(Note) 1. The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of February 2018 (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.

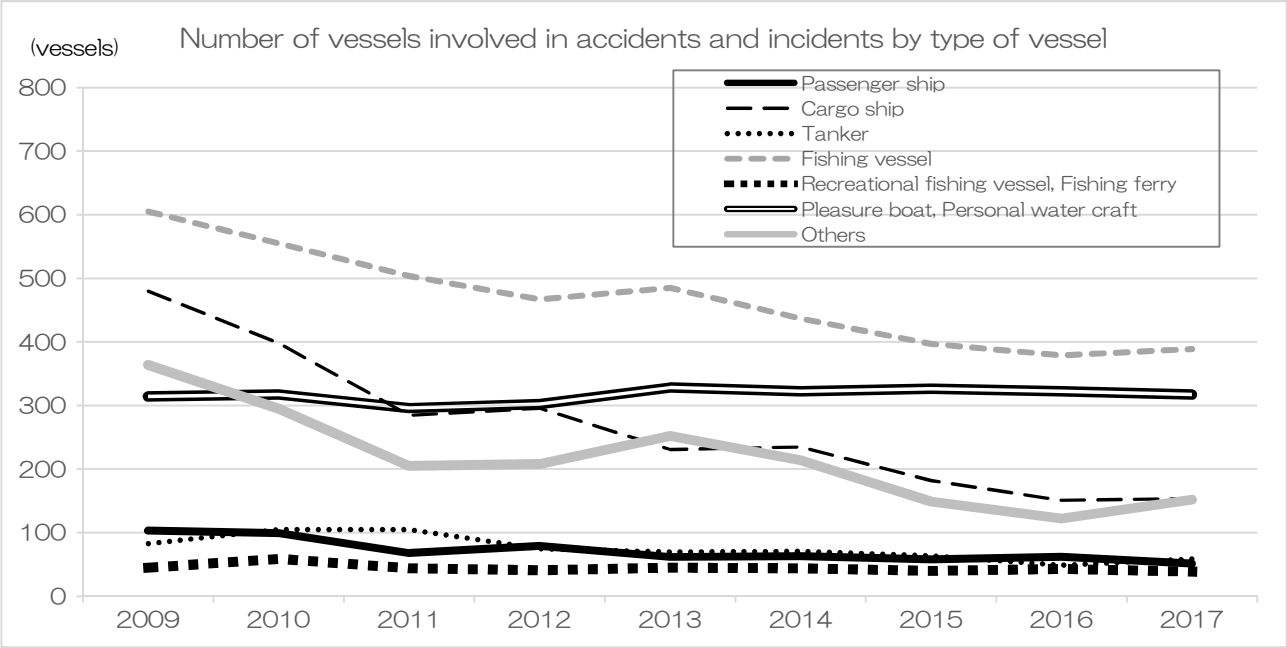
12 Number of vessels involved in accidents and incidents by type of vessel (marine accidents and incidents)

(Cases)

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	6	35	104	40	249	65	22	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	62	231	70	485	100	41	4	37	72	24	264	64	19	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

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
2016	62	151	49	379	45	36	7	27	33	11	254	68	6	1,128
2017	51	154	59	389	58	36	3	29	44	13	275	42	8	1,161
Total	702	2,731	736	4,525	909	376	58	331	607	184	2,446	554	133	14,292

(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 February 2018 (including those carried over from the former Marine Accident Inquiry Agency).



13 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

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
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	725	39	75	112	67	23	14	22	17	6	61	1,161
Total	7,854	542	1,222	1,773	873	337	232	310	204	159	786	14,292

(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 February 2018 (including those carried over from the former Marine Accident Inquiry Agency).

14 Number of vessels involved in accidents and incidents in 2017 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	8	14	10	0	1	1	0	0	0	8	0	2	0	1	6	51
Cargo ship	62	24	27	0	2	1	3	1	5	12	0	16	1	0	0	154
Tanker	29	8	11	0	1	0	1	0	1	2	0	4	1	0	1	59
Fishing vessel	151	12	48	2	6	19	17	1	6	68	1	50	0	0	8	389
Tug boat, push boat	13	4	17	3	2	2	0	0	4	6	0	6	0	1	0	58
Recreational fishing vessel	26	4	1	1	0	0	1	0	0	3	0	0	0	0	0	36
Fishing ferry	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	3
Work vessel	7	2	5	3	1	1	2	0	2	4	0	0	1	0	1	29
Barge, Lighter	11	1	12	3	2	2	1	0	2	6	0	3	0	1	0	44
Public-service ship	3	2	4	0	0	0	1	0	0	2	0	1	0	0	0	13
Pleasure boat	84	20	59	6	6	34	1	1	6	21	0	32	1	1	3	275
Personal water craft	19	4	2	0	0	0	0	0	0	16	0	1	0	0	0	42
Others	4	1	0	0	0	0	0	0	0	0	0	1	0	1	1	8
Total	417	96	197	18	22	60	27	3	26	149	1	116	4	5	20	1,161

(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 February 2018.

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.

15 Number of fatalities in accidents (marine accidents)

(Persons)

Year of occurrence \ Type of Vessel		Passenger ship	Cargo ship	Tanker	Cargo ship	Recreational fishing vessel, Fishing ferry	Pleasure boat, Personal water craft	Others	Total	
2008	Crew	0	2	2	51	1	21	1	61	71
	Passengers	0	0	0	0	2	0	0	2	
	Others	0	0	0	0	1	6	1	8	
2009	Crew	3	1	2	109	0	26	4	145	191
	Passengers	0	0	0	0	3	0	0	3	
	Others	1	5	0	6	0	27	4	43	
2010	Crew	1	10	1	74	0	11	2	99	129
	Passengers	0	0	0	0	1	0	0	1	
	Others	0	3	0	1	1	22	2	29	
2011	Crew	3	4	8	83	3	18	7	126	146
	Passengers	4	0	0	0	2	0	0	6	
	Others	0	2	0	0	0	12	0	14	
2012	Crew	2	6	4	79	1	22	3	117	133
	Passengers	1	0	0	0	2	0	0	3	
	Others	1	1	0	1	0	8	2	13	
2013	Crew	1	17	2	69	0	19	6	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	2	5	0	44	0	12	5	68	86
	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	3	0	45	0	10	19	79	90
	Passengers	0	0	0	0	0	0	0	0	
	Others	0	1	0	0	0	8	2	11	

Year of occurrence \ Type of Vessel		Passenger ship	Cargo ship	Tanker	Cargo ship	Recreational fishing vessel, Fishing ferry	Pleasure boat, Personal water craft	Others	Total	
Total	Crew	15	63	26	688	6	150	54	1,002	1,211
	Passengers	7	0	0	0	17	0	0	24	
	Others	2	17	1	11	2	137	15	185	
	Total	24	80	27	699	25	287	69		

(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 February 2018 (including those carried over from the former Marine Accident Inquiry Agency).

~ Japan Transport Safety Board Annual Report 2018 ~

Japan Transport Safety Board
2-1-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918 Japan

Temporary address (from June 2018 through February 2019 (tentative)):
1-3-3, Otemachi, Chiyoda-ku, Tokyo, 100-0004 Japan
Tel: +81-3-5253-8486 Fax: +81-3-5253-1680
E-mail: jtsb_international@mlit.go.jp