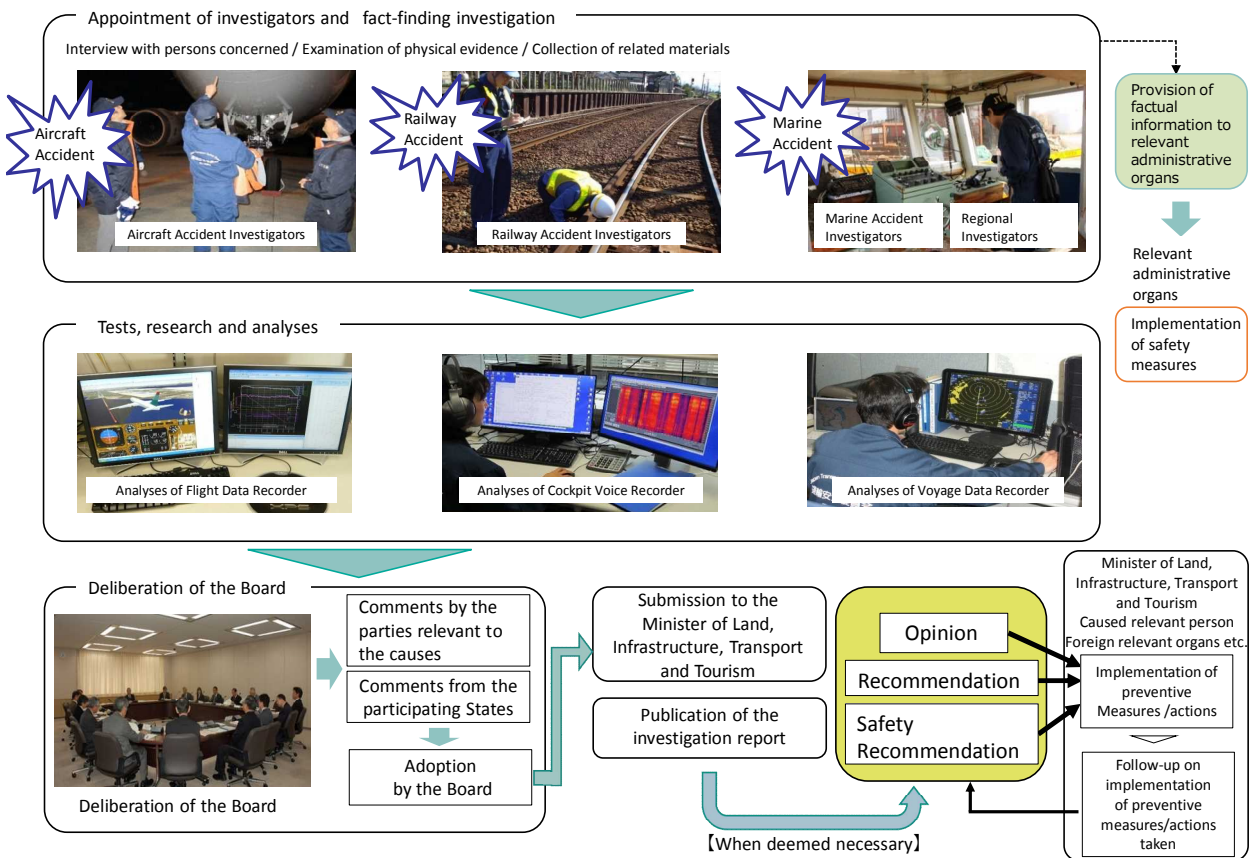


Feature: Footsteps of Japan Transport Safety Board over past 10 years

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

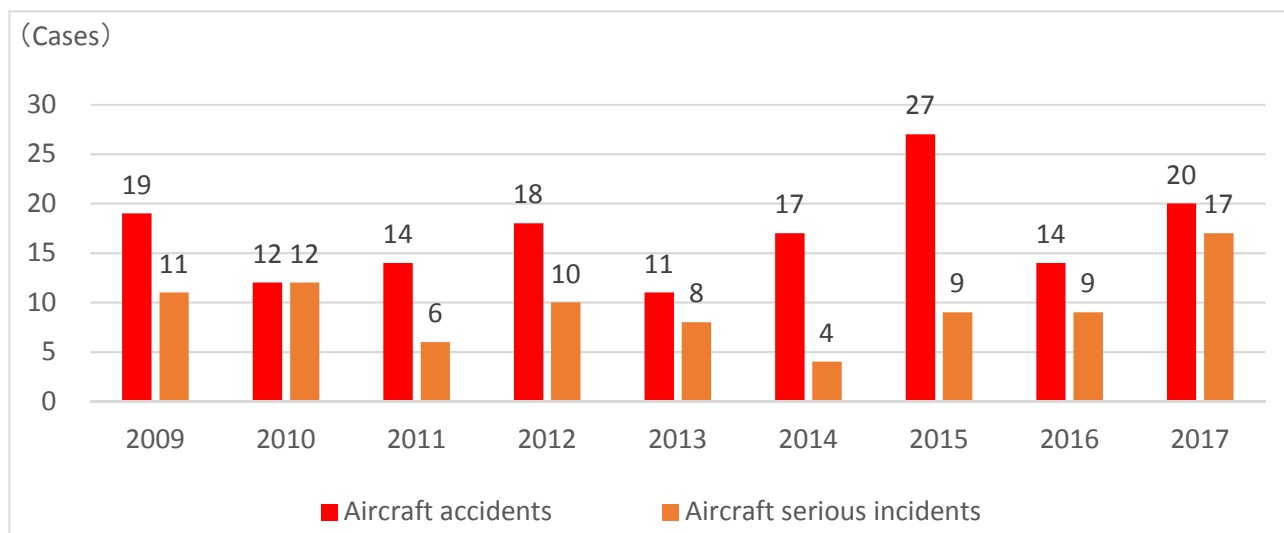
The number of accidents and serious incidents subjected to investigation from the establishment of the JTSB in October 2008 until December 2017 (as of the end of February 2018)

	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)

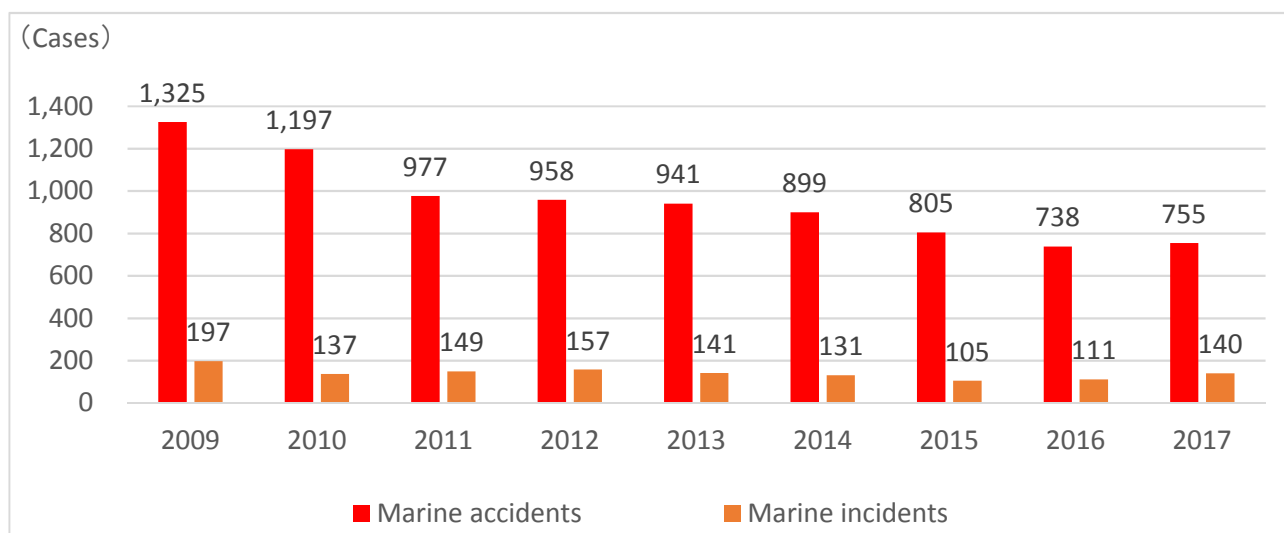
• Aircraft accidents, etc.



• 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.

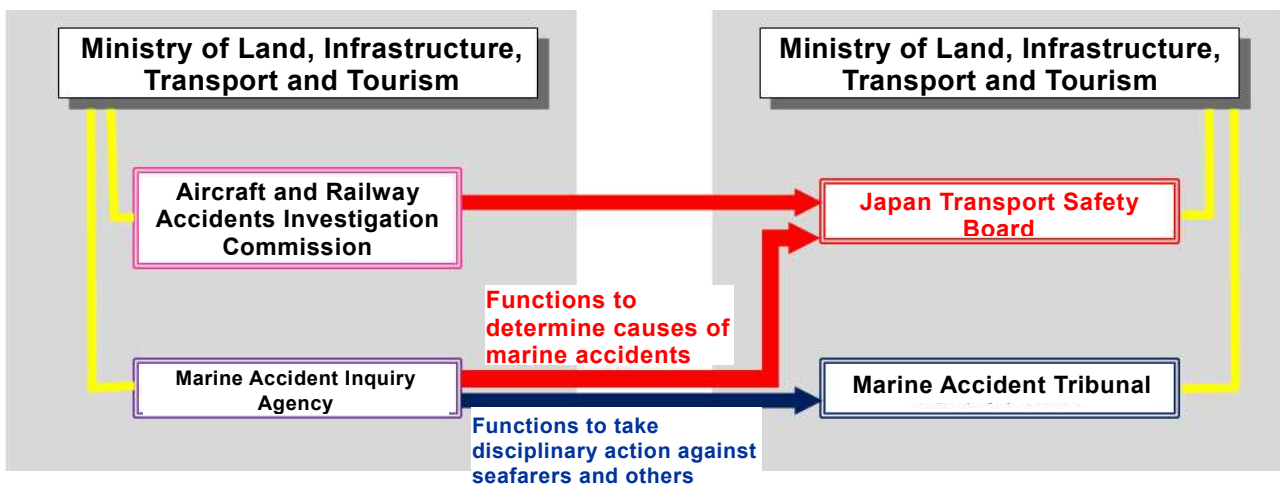
The Act on Marine Accident Inquiry was revised in 2006 to facilitate measures to prevent the recurrence of marine accidents, allowing the MAIA to give opinions on measures that should be taken to prevent marine accidents to the Minister of Land, Infrastructure, Transport and Tourism and the heads of 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

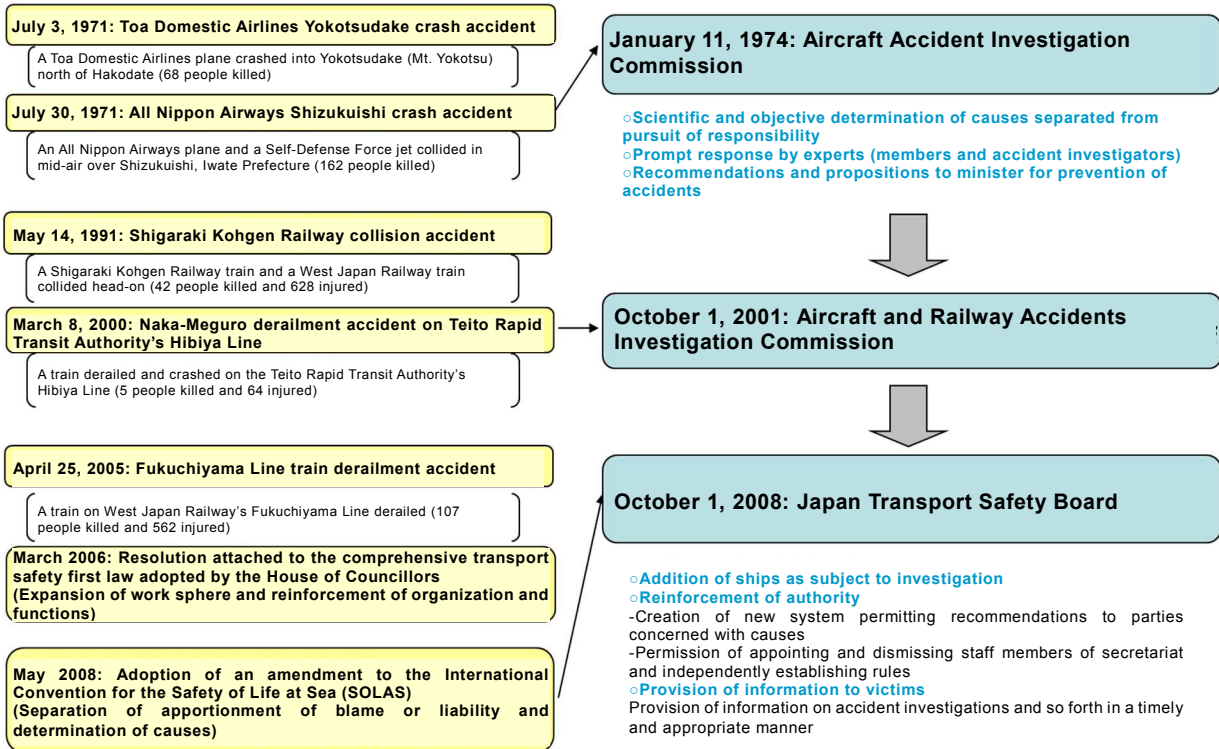
The pursuit of causes and implementation of disciplinary action with regard to marine accidents had been undertaken in an integrated manner under the maritime accident inquiry procedures in Japan. But international rules under the International Maritime Organization, a specialized agency of the United 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



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

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.

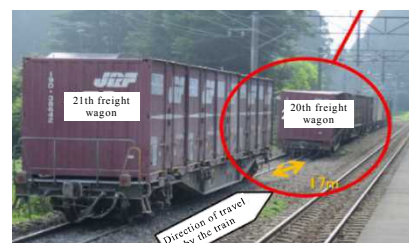
(1) Aircraft accidents, etc.

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	<p>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.</p> <p>An emergency evacuation was executed using slides on T4 taxiway.</p> <p>Four passengers out of 137 occupants (the Captain, seven crewmembers and 129 passengers) suffered minor injuries during the evacuation.</p> <p>Although the main battery was damaged, it did not lead to a fire.</p>		
Probable Causes	<p>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.</p> <p>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.</p> <p>Cell 6 heat generation was probably caused by internal short circuit; however, the conclusive mechanism thereof was not identified.</p> <p>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.</p>		
Safety Recommendation	<p>Safety Recommendation to the Federal Aviation Administration (FAA).(September 25, 2014)</p> <ol style="list-style-type: none"> 1. Actions to be taken by the Federal Aviation Administration <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 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	<p>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)</p>		



(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	<p>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.</p>		
Probable Causes	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>		
Opinions	<p>Opinions for The Minister of Land, Infrastructure, Transport and Tourism (December 17, 2015)</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <ol style="list-style-type: none"> 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	<p>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)</p>		



(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	<p>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.</p> <p>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.</p> <p>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.</p>		
Remarks	<p>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.</p> <p>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.</p>		
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 JTTSB'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>