JAPAN TRANSPORT SAFETY BOARD
ANNUAL REPORT 2014

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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

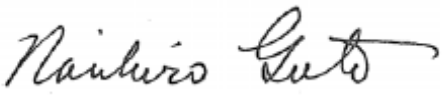
The Japan Transport Safety Board (JTSB) has the duty that we contribute to preventing the occurrence of accidents and mitigating the damage caused by them, thus improving transport safety while raising public awareness, and thereby protecting the people's lives by accomplishing appropriate accident investigations 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. In order to undertake accident investigations that are truly useful tocitizens, we have made concerted efforts to tackle the following issues: "Conducting of appropriate accident investigations," "Timely and appropriate feedback," "Consideration for victims" and "Strengthening the foundation of our organization."

We also ensure that we take into consideration the fact that there have been some accidents in recent years that have attracted a lot of attention. With this in mind, we are trying to develop and sophisticate our investigations of accidents and serious incidents. We also make better use of investigation results, as well as develop international cooperation. For instance, since April 2014, we have engaged our investigation field for railway. In addition, in order to improve transport safety for society as a whole, we have published the "Japan-Marine Accident Risk and Safety Information System" (in Japanese and English). We have also issued "JTSB Digests" and the "Analysis Digests Local Office Edition." Among these, we have released a global version of the first "Japan-Marine Accident Risk and Safety Information System" in April 2014. We have established this information system in the hope of making more detailed information available to other countries that can be used to prevent accidents.

We will continue to actively improve transport safety so that we at JTSB can meet our social responsibilities.

The "Japan Transport Safety Board Annual Report 2014" presents a summary of our investigation reports published in 2013, which deal with each of the transport modes of aircraft, railway, and marine. This publication also includes summaries of the accidents and incidents that occurred in 2013, and contains related statistical materials. Furthermore, it includes some feature articles for the "Utilization of Accident Investigation Results to Improve Transport Safety" and columns by the accident investigator. We sincerely hope that this Annual Report will enable you, the readers, to have a better understanding of what the JTSB is contributing to.

Your understanding of, and cooperation with, our activities is deeply appreciated.



Norihiro Goto
Chairman
Japan Transport Safety Board

June 2014

Japan Transport Safety Board
Annual Report 2014

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Appendixes

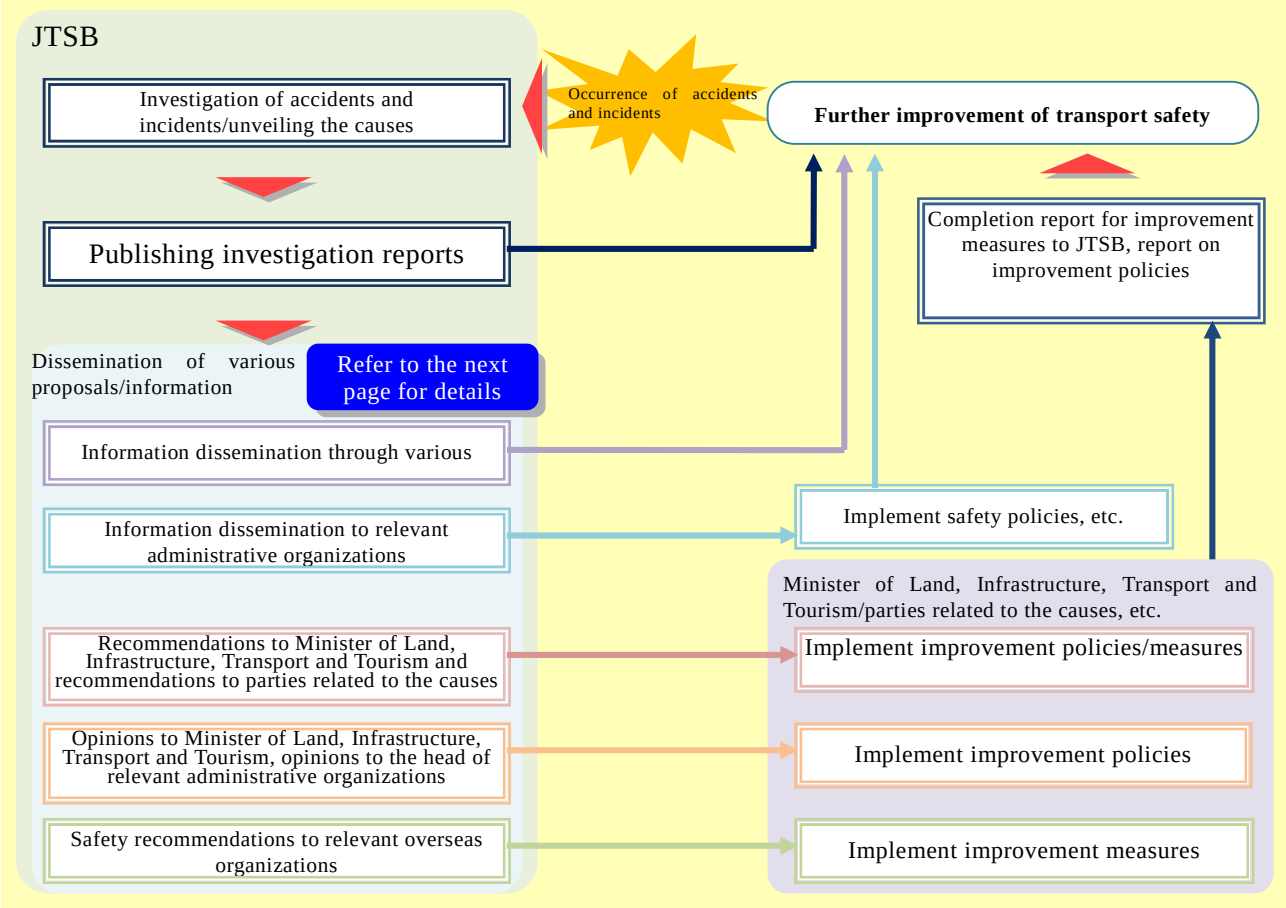
Special Article: Improving transport safety by utilizing accident investigation results

As the JTSB Mission states, our goal is to “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”. In order to do so, we must make the efforts not only to disseminate probable causes and preventive measures for accidents and incidents, which have been acquired through individual accident and incident investigations, in a timely and proactive manner but also to more effectively and widely establish them in society within and outside of Japan through all means.

In addition, conducting follow-ups on policies and measures taken by relevant administrative organizations and parties related to the causes based on various proposals (recommendations, safety recommendations, and opinions) made by JTSB also has an important position in the work cycle of JTSB (unveiling the causes→proposal→safety measures) (refer to the diagram below).

Therefore, JTSB not only enhances the PR activities and contents on preventive measures and enlightenment but also proactively disseminates information through various publications, such as “JTSB Digests”, and homepage, etc. by utilizing accident and incident investigation results, etc. In addition, JTSB not only provides information to/promotes enlightenment activities with relevant parties in cooperation with relevant administrative organizations and relevant organizations, etc. but also provides feedback on accident preventive measures, etc. to relevant parties by dispatching lecturers to safety seminars, etc.

Furthermore, we aim to enhance the various contents by comprehending the needs of users, such as how lessons, etc. learned in the field are utilized and what kind of information disseminating measure is required, by exchanging opinions with relevant organizations and companies, etc.



Work cycle of JTSB (unveiling the causes→proposal→safety measures)

Various proposals

Recommendation

・After completing accident and incident investigations, JTSB requests the Minister of Land, Infrastructure, Transport and Tourism or parties related to the causes to implement policies or measures based on the investigation results in order to prevent accidents and incidents/mitigate the damage caused by accidents. The Minister of Land, Infrastructure, Transport and Tourism must report the policies, which are taken based on the recommendations, to JTSB. In addition, if parties related to the causes did not implement measures without valid reasons, JTSB may release the fact.

Opinions

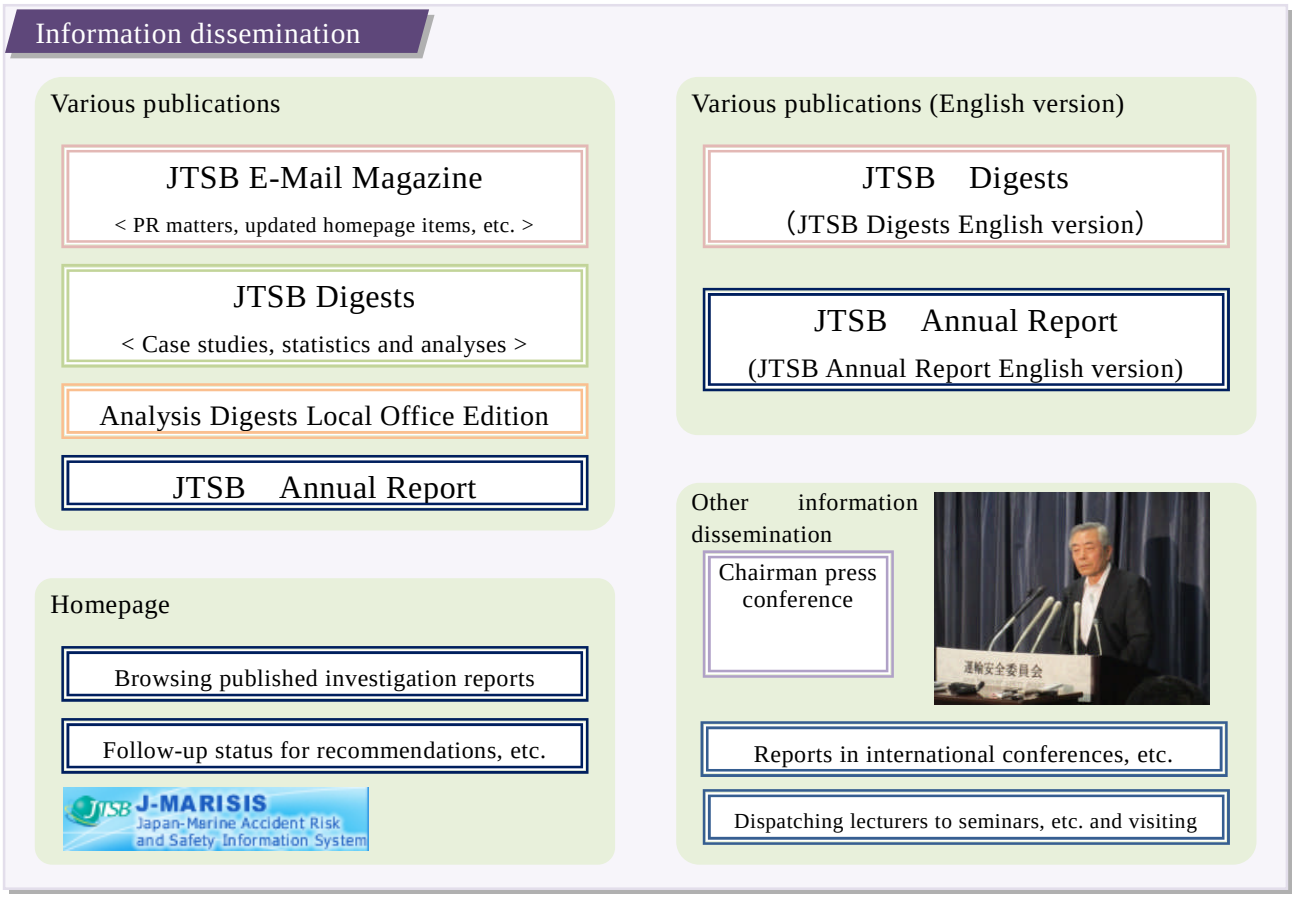
・JTSB requests the Minister of Land, Infrastructure, Transport and Tourism or the head of the relevant administrative organization to implement policies in order to prevent accidents and incidents/mitigate the damage caused by accidents based on the progress of the investigation or multiple examples of accidents and incidents in the past even if the accident and incident investigation has not been completed.

Safety recommendations

・JTSB requests relevant overseas organizations (parties) to implement measures that should be swiftly taken in order to enhance safety as necessary based on international conventions even if the accident and incident investigation has not been completed.

Information provision to relevant administrative organization

・If urgent unsafe factors which must be notified come to light in the course of the investigation of accidents and incidents, JTSB swiftly provides information to administrative organizations.



1 Various proposals (recommendations, opinions, safety recommendations), information provision

In response to the JTSB Mission to "-urging the implementation of necessary policies and measures through the issuance of safety recommendations and opinions or provision of safety information", we can more effectively contribute to preventing recurrence of accidents and mitigating the damage by providing recommendations and opinions, etc. in a more timely and proactive manner. Therefore, JTSB strives to consider and provide various possible proposals (improvement measures) in each stage of accident and incident investigations, JTSB reviews, and investigation report publication. In addition, JTSB introduces various proposal issuance and status of policies and measures taken based on various proposals through Chairman press conferences. Additionally, we also strive to promote the horizontal deployment of information regarding unsafe matters, etc. through the homepage and enlightenment activities, etc. through seminars, etc.

2 JTSB Digests

The JTSB Advisory Meeting for Duty Improvement and Duty Improvement Action Plan require further development and enhancement of the "JTSB Digests" as "Analysis Digests" as a means to utilize the results gained through individual accident and incident investigations in order to prevent recurrence and promote enlightenment.

6 digests are issued per year (bi-monthly issuance). Among the 6 issues are one issue of Digest of Aircraft Accident Analyses, one issue of Digest of Railway Accident Analyses, two issues of Digest of

Marine Accident Analyses, two issues of case studies (case studies for three modes). (Please refer to Page 137 for details)

The objectives of these issues are to be utilized as materials for safety education and enlightenment in safety seminars targeting those involved with the safety of each transport mode as well as to be used as basic materials for researchers belonging to academic organizations.

We select the themes for the contents based on the published accident and incident investigation reports and accident and incident cases that have occurred at the time of the issuance and include various statistical materials and accident and incident investigation cases describing the occurrence situations of accidents and incidents.

For the past themes for the Digest of Aircraft Accident Analyses, we focused on “small aeroplanes” and “helicopters”, which cover more than 50% of aircraft accidents and incidents investigated by JTSB. We presented the fact that many accidents for both types of aircraft occur due to composite factors involving personnel factors as the statistical trend.

For the Digest of Railway Accident Analyses, we focused on the occurrence of accidents and incidents caused by personnel factors as well as organizational factors for “accidents during work”. For “accidents involving automobiles in level crossing, etc.”, the contents are aimed to enlighten not only railway companies but also general automobile drivers in a broad manner.

The Digest of Marine Accident Analyses covers themes on “marine leisure” and “passenger ships”, such as pleasure boats and personal water craft, etc., as well as anoxia accidents, etc. involving “on-board works”. It was issued to help those involved with each ship/job prevent accidents.

In addition, after issuing each issue of digests, we aim to provide enlightenment to prevent accidents not only by disseminating information through the JTSB E-Mail Magazine and providing information to relevant parties and relevant organizations, etc. but also by offering lectures, etc. using accident and incident case studies and analysis contents included in the publications.

3 Analysis Digests Local Office Edition

Our regional offices select unique themes in each respective jurisdiction in order to contribute to the prevention of marine accidents and incidents within the respective jurisdictions and issue Analysis Digests Local Office Edition (Please refer to Page 140 for details)

In addition, after issuing each issue of digests, we not only disseminate information through the JTSB E-Mail Magazine and provide information to various communication committees, etc. but also offer lectures, etc. using accident and incident case studies and analysis contents included in the publications. In some cases, we prepare A5-size pamphlets and distribute them to customers, etc. through manufacturers and distributors to be utilized for accident prevention.

4 Information dissemination to other countries

We think that the lessons we learn through JTSB accident and incident investigations can work as valuable materials to prevent recurrence of similar accidents not only in Japan but also in other countries.

Therefore, we not only consider how we can effectively utilize such lessons but also reinforce the information dissemination to other countries in order to enhance our international presence as an accident

investigation organization that is trusted on a global scale.

Specific measures include the English translation of the “JTSB Digests”, which summarize lessons that we have learned through accident and incident investigations. We disseminate information by releasing them on the homepage and through overseas media transmissions, etc. one by one.

In addition, we proactively introduce the summary of and lessons that we have learned from accident and incident investigations in Japan through international organizations, such as the ITSA (International Transportation Safety Association), ICAO (International Civil Aviation Organization), IMO (International Maritime Organization), etc. as well as various international seminars, etc.

Furthermore, regarding railway accidents and incidents, we have translated the Train Derailment Accident on the JR Fukuchiyama Line into English as a case with great social impact among our investigation reports. By posting the translation on the English version homepage, we aim to internationally share the seriousness and lessons of the accident.

5 Japan-Marine Accident Risk and Safety Information System

Various vessels, such as ocean-going ships, domestic ships, passenger ships, fishing vessels, pleasure boats, etc., use the same water. However, it is probable that safety-related information is not sufficiently shared among each vessel type.

Therefore, we have considered and exchanged opinions with approximately 50 organizations including maritime-related organizations, vessel companies, etc. regarding the necessity of the system “Japan-Marine Accident Risk and Safety Information System”, through which we can acquire beneficial safety-related information, such as information involving locations of marine accidents and incidents, Analysis Digests Local Office Edition prepared by each regional office, and even weather data, fishing grounds, vessel traffic density based on AIS (Automatic Identification System) data, etc. by cooperating with relevant administrative organizations and relevant organizations with the aim of preventing the recurrence of accidents.

In addition, the “Japan-Marine Accident Risk and Safety Information System” has been in operation since 2013 as an internet service that enables users to overlap and see the marine accident and incident locations on the map by using marine accident and incident data that we have accumulated in the past. (Please refer to Page 142 for details)

Column

“Face-to-Face” information dissemination

Director for Analysis, Recommendation and Opinion

We have given lectures on the theme of publications, such as “JTSB Digests”, seminars hosted by various organizations, academic conferences, international symposiums and other occasions.

When we give lectures, we must compile the presentation contents in order that the needs of the audience and the matters that we wish to promote coincide with each other.

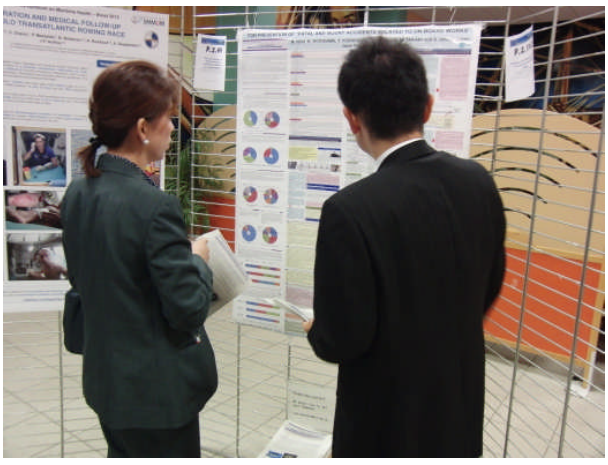
“Crewmember training sessions” can target many different types of crewmembers. In the case of crewmembers of vessels, they can be people like masters and deckhands who are directly involved with vessel maneuvaring as well as people like cooks and stewards and stewardes service staff who are required to consider the safety of passengers and themselves, although they are not involved with vessel maneuvering. When the presentation discusses matters regarding vessel maneuvering practice, the contents are sometimes only understandable by part of the audience. Therefore, we must be innovative so that the presentation contents would interest in the audience as much as possible of all.

When we hear their inpressions after lectures, we would sometimes receive positive words, such as “I was able to reconfirm the importance of hazard anticipation” and “the presentation was thorough and easy to understand,” but we sometimes receive opinions and comments with issues for us to address in the future, such as “The terminology was too hard to understand” and “I wanted to introduce more specific accident case studies.” We are very grateful to receive such feedback.

On the other hand, when we give presentations in academic conferences and international symposiums, the audience would be experienced academic experts with expertise who belong to domestic and foreign universities and research organizations. It is also valuable oppotunities to receive opinions from experts. We hope that having more opportunities such occasions would help us find useful hints for preparing statistics and analysis materials that can be used as research basic materials that help each academic field develop.

I feel that the initiatives that are required of us are not only information dissemination through the homepage and publications in a one-way manner but also actually have face-to-face communication and listen to the voices in the field with a humble attitude.

Lecture in the Oceanographic Society of Japan Ocean Traffic Laws and Regulations Study Group



Presentation of posters at the International Maritime Health Symposium (France)

Column

Accident investigators in the future

Director for Analysis, Recommendation and Opinion

One day in December, 12 pupils of a certain elementary school visited JTSB office as part of a field trip.

In this field trip, pupils visited various ministries and agencies as part of the group activities, and then JTSB described the outline to them.

It was the first time for us to attempt describing our work contents to pupils; therefore, we had a number of considerations in the preparing stage of presentation materials to determine what kind of structure would make it easy for children to understand the contents.

Unlike the police and coast guard officers, it is difficult for children to clearly picture the work of “accident investigators”. In order to encourage them to be interested in this work, we described the work contents by using photos such as tools used in investigations and discussing stories from our experiences.

Since this field trip was for 5th and 6th grade pupils, some children were very familiar with accidents that happened in the past. As a consequence, we felt that this was also a field that interests children, as children are familiar with these vehicles.

I hope to have more opportunities like this in the future in order that we can help children be familiar and learn more about accident investigations; accordingly, they would want to become accident investigators when they grow up.

Chapter 1 Summary of major investigation activities in 2013

1 Statistics of accident investigation activities

When aircraft, railway or marine accidents/incidents occur, the JTSB designates an investigator-in-charge and accident investigators to conduct investigations to determine the cause, etc. of the accident or incident. When and where accidents or incidents will occur is unpredictable. Therefore, we are making continuous efforts to be able to undertake investigation activities quickly when accidents or incidents occur.

Various accidents and incidents occurred in 2013. 11 accidents occurred in the aircraft field. One of these was in March when a privately owned Hoffman H-36 Dimona (motor glider) went missing after the takeoff and crashed in mountains. Another was in December, when part of Robinson R44 operated by Ilas Air Co., Ltd. touched the water surface and crashed while flying low for sightseeing. We investigated a total of 35 aircraft accidents in 2013, including 24 cases carried over from 2012. We also investigated 24 serious aircraft incidents in 2013, of which eight cases newly occurred in 2013 and the remaining 16 cases had been carried over from 2012. One of these was the serious incident in which the instruments of Boeing 787-8 operated by All Nippon Airways showed main battery failure and they smelled a strange odor within the cockpit while climbing.

We completed investigations into 17 aircraft accidents and six serious aircraft incidents, and published investigation reports on these cases.

Of the investigation reports published in 2013, we made recommendations to Aero Asahi Corp. concerning an accident involving Aerospatiale AS332L, operated by Aero Asahi Corp., on January 25, 2013. On April 26, we made safety recommendations to the Federal Aviation Administration (FAA) concerning an accident involving McDonnell Douglas MD-11F, operated by Federal Express Corporation. We issued 4 recommendations and 3 safety recommendations.

15 accidents occurred in the railway field in 2013. One of these accidents was a train derailment accident after it collided into a vehicle transporting vehicles, which was in a level crossing between Iho Station and Arai Station on Main Line of Sanyo Electric Railway Co., Ltd. in February, and another was the train derailment accident within Onuma Station on Hakodate Line, involving Japan Freight Railway Company, in September. We investigated a total of 38 railway accidents,

including 23 cases carried over from 2012. We also investigated eight serious railway incidents in 2013, of which two cases newly occurred in 2013 and the remaining six cases had been carried over from 2012.

We completed investigations into 17 railway accidents and three serious railway incidents, and published investigation reports on these cases.

In the investigation reports published in 2013, we made three recommendations, including the recommendations to the Hokkaido Railway Company on May 31 concerning a train derailment accident within Sekisho Line Seifuzan Signal Station, involving Hokkaido Railway Company.

We launched investigations into 946 accidents in the maritime field in 2013. One of these accidents was the fire accident of Cambodian registered cargo ship TAIGAN in May, and another was in September when Sierra Leonean cargo ship JIA HUI collided with cargo ship EIFUKU MARU No.18. We investigated a total of 1,734 marine accidents in 2013, including 789 cases carried over from 2012 (excluding cases that did not come under the category of accident or incident as a result of the investigations, etc.). We also investigated 259 marine incidents in 2013, of which investigations of 151 cases were launched in 2013 and the remaining 109 cases had been carried over from 2012 (excluding cases that did not come under the category of accident or incident as a result of the investigations, etc.).

We completed investigations into 993 marine accidents and 158 marine incidents, and published investigation reports on these cases.

In the investigation reports published in 2013, we made four recommendations, including the recommendations to the Minister of Land, Infrastructure, Transport and Tourism and AST Corporation on April 26 concerning an accident in which a crew member suffered fatal injuries on chemical tanker KYOKUHO MARU No.2. Although we are currently investigating the collision accident of cargo ship NIKKEI TIGER and fishing vessel HORIEI MARU, which occurred in September of 2012, we stated our opinion on October 25 to the Minister of Land, Infrastructure, Transport and Tourism and Director-General of the Fisheries Agency, considering the seriousness of the accident damage and scale of social impact, etc.

Accident investigators must have diversified knowledge because they are responsible for investigating accidents and incidents and at the same time drafting proposals as well as recommendations and opinions concerning the measures to be taken to prevent the recurrence of accidents and incidents and to mitigate damage caused by such accidents and incidents, inviting comments from the parties related to the causes. Therefore, they actively participate in seminars at home and abroad in an effort to improve their professional knowledge and attend international conferences to share relevant information on accident investigations with foreign countries.

We will continue to conduct thorough investigations to determine the causes of aircraft, railway and marine accidents and incidents and publish investigation reports as quickly as possible; and then, based on the results of the investigations, we will make recommendations or state opinions, as necessary, to relevant

administrative organizations and the parties related to the accident/incident causes, thereby striving to prevent a recurrence of such accidents and incidents.

Chapter 2 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.

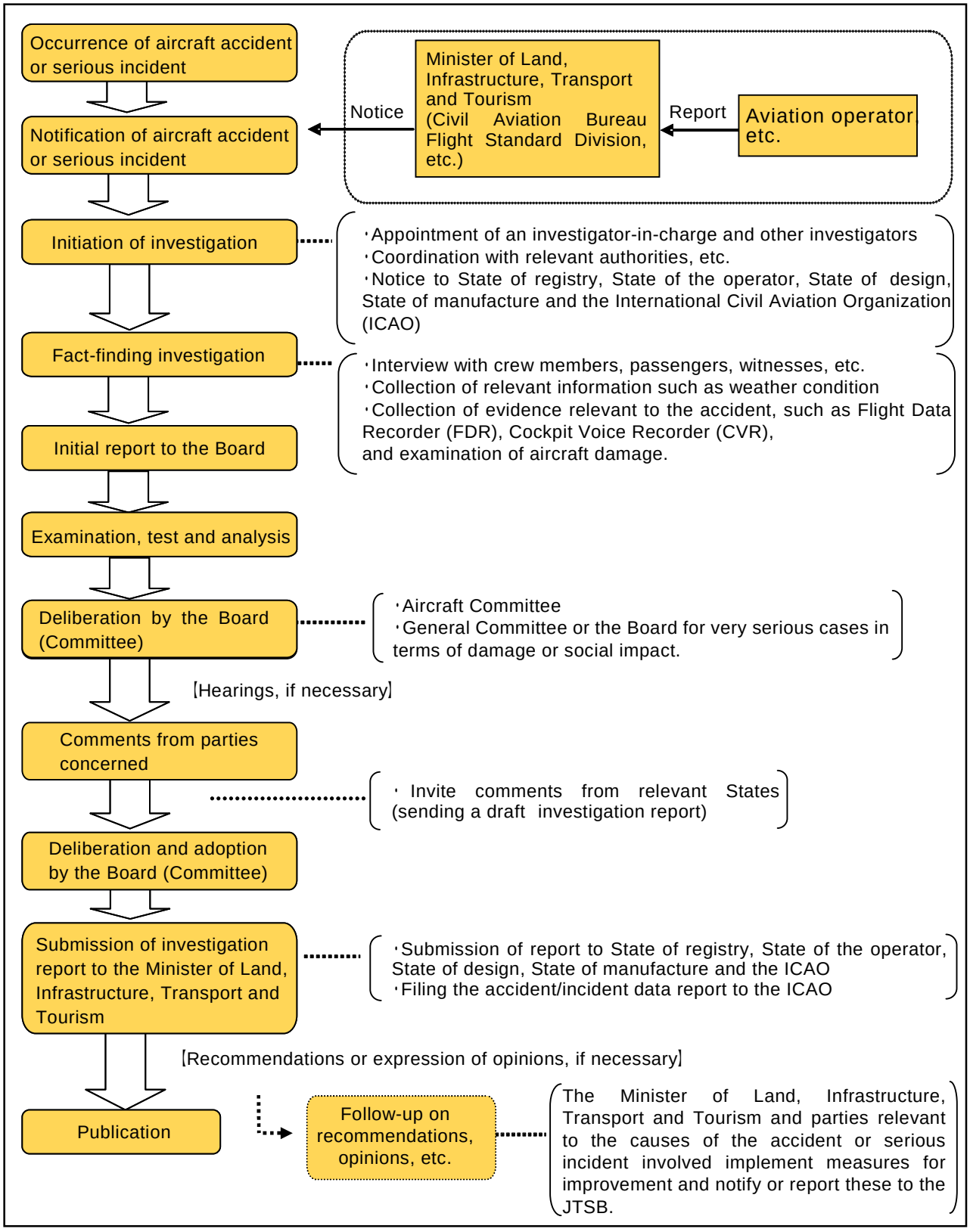
◎ **Article 76-2 of the Civil Aeronautics Act**

- 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 or a major damage occurred inside the 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 parts dropped from aircraft collided with one or more persons
16 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 2013 as follows: Twenty-four aircraft accident investigations had been carried over from 2012, and 11 accident investigations newly launched in 2013. Seventeen investigation reports were published in 2013, and thereby 18 accident investigations were carried over to 2014.

Sixteen aircraft serious incident investigations had been carried over from 2012, and 8 serious incident investigations newly launched in 2013. Six investigation reports were published in 2013, and thereby 18 serious incident investigations were carried over to 2014.

Among the 23 reports published in 2013, four were issued with recommendations and three with safety recommendations.

Number of investigations of aircraft accidents and serious incidents in 2013

(Cases)

Category	Carried over from 2012	Launched in 2013	Total	Published investigat-ion reports	(Recom-menda tions)	(Safety recom-mendat ions)	(Opinio-ns)	(Remar-ks)	Carried over to 2014	(Interim report)
Aircraft accident	24	11	35	17	(4)	(2)	(0)	(0)	18	(0)
Aircraft serious incident	16	8	24	6	(0)	(1)	(0)	(0)	18	(0)

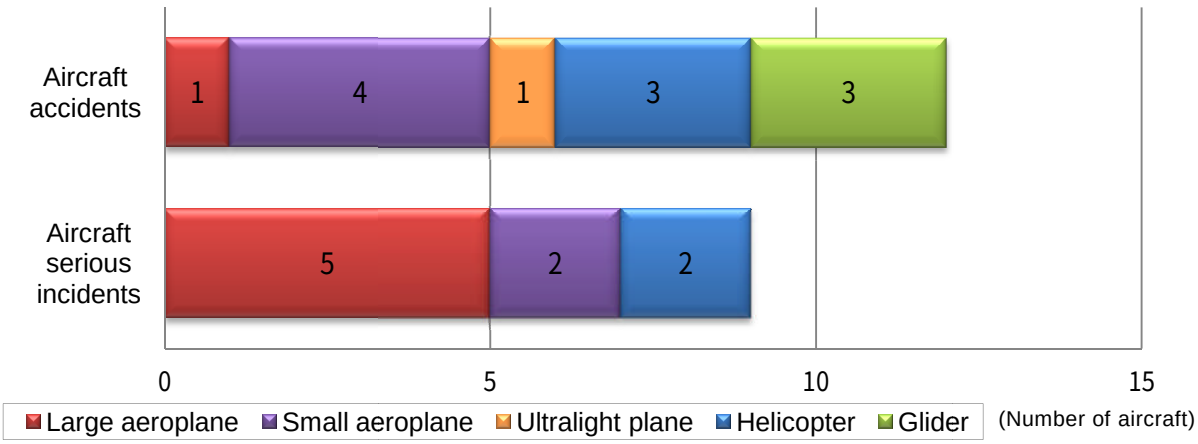
4 Statistics of aircraft accident and serious incident investigations launched in 2013

The number of aircraft accident and serious incident investigations launched in 2013 included 11 aircraft accidents, down seven cases from 18 cases for the previous year, and 8 aircraft serious incidents, down two cases from ten cases for the previous year.

By aircraft category, one of the accidents involved large aeroplanes and four other cases concerned small aeroplanes, while one ultralight plane, three helicopters and three gliders were involved in the remaining cases. The aircraft serious incidents included five cases involving large aeroplanes, two cases involving small aeroplanes, and two cases involving helicopters.

Note: In aircraft accidents and serious incidents, two or more aircraft are sometimes involved in a single case. See details on Pages 15-19.

Number of investigated aircraft accidents and serious incidents by aircraft category in 2013



In the 11 aircraft accidents, the number of casualties was 16, consisting of two deaths and 14 injured persons.

Statistics of number of casualties (aircraft accident)

(Persons)

2013							
Aircraft category	Dead		Missing		Injured		Total
	Crew	Passengers and others	Crew	Passengers and others	Crew	Passengers and others	
Large aeroplane	0	0	0	0	0	0	0
Small aeroplane	0	0	0	0	1	7	8
Ultralight plane	0	0	0	0	1	0	1
Helicopter	0	0	0	0	2	3	5
Glider	1	1	0	0	0	0	2
Total	1	1	0	0	4	10	16
	2		0		14		

5 Summaries of aircraft accidents and serious incidents which occurred in 2013

The aircraft accidents and serious incidents which occurred in 2013 are summarized as follows: The summaries are based on information available at the start of the investigations and therefore, may change depending on the course of investigations and deliberations.

(Aircraft accidents)

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
1	March 15, 2013 In the mountains on the south side of Mt. Satsunai in Nakasatsunai Village, Kasai-gun, Hokkaido Prefecture	Private	JA2405 Hoffman H-3 Dimona (motor glider)	The aircraft took off from Memanbetsu Airport, but it did not arrive there even after the estimated arrival time at Shikabu Airport and went missing. As a result of the following search, part of the aircraft was found crashed near the location refered to the left column. Two people on board sustained fatal injuries.
2	March 16, 2013 Yamamoto-kou 129-1, Asanamihara, Matsuyama City, Ehime Prefecture	Private	JA23TN Robinson R22 Beta (rotorcraft)	The aircraft took off from a temporary helipad in Fukuyama City, Hiroshima Prefecture. It made an emergency landing due to an engine failure near the location refered to the left column, and the aircraft turned to its right side. The pilot sustained injuries.

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
3	June 9, 2013 Yanagita Town 1405-1, Utsunomiya City, Tochigi Prefecture	Private	JR1003 Ultralight Aircraft Challenger II-R503L (ultralight plane)	While flying after taking off from a temporary air field in Utsunomiya City, Tochigi Prefecture, the aircraft hit a power pole near the location refered to the left column and crashed. One pilot sustained injuries.
4	July 21, 2013 Near Tajima Airport	Private	JA4175 Gulfstream Aerospace AG-5B (small aeroplane)	While flying after taking off from Fukui Airport, the pilot changed the destination to Tajima Airport due to the fact that he felt that the engine was malfunctioning. During the landing, the aircraft hit the guardrail on the south side of the airport and crashed on the slope. Three passengers sustained injuries. (One was seriously, and two were slightly injured)
5	August 18, 2013 Near Ami Airport in Ami Town, Inashiki-gun, Ibaraki Prefecture	Private	JA4152 Beechcraft A36 (small aeroplane)	The aircraft took off from Matsumoto Airport and was approaching Ami Airport from the east side. When it performed a go-around due to the fact that its engine thrust went down too much, it crashed on the south side of a runway. The pilot and three passengers sustained injuries.
6	September 14, 2013 At approximately 300m above Menuma Glide Field, Kumagaya City, Saitama Prefecture	Private (Aircraft A)	JA22WP Rolladen-Schneider LS4-b (glider)	Aircraft A that left Menuma Gliding Field Runway 1 in winch tow and Aircraft B that left Menuma Gliding Field Runway 2 in winch tow hit each other in the air. Both aircraft landed in the said gliding field afterwards.
		Private (Aircraft B)	JA22RW Alexander Schleicher ASK21 (glider)	
7	September 16, 2013 Nishiyoshino Town Nishino, Gojo City, Nara Prefecture	Nara Disaster Prevention Air Corps	JA20NA Bell 412EP (rotorcraft)	While executing rescue activities with hoist near the location refered to the left column, a rescuee sustained injuries in her left index finger during hoisting.
8	September 23, 2013 Osaki 158, Yachiyo City, Chiba Prefecture	Private	JA3492 Fuji Heavy Industries FA-200-160 (small aeroplane)	While flying after taking off from Otone Airport, the engine power of the aircraft went down over Yachiyo City, Chiba Prefecture, leading to an emergency landing in the location refered to the left column. One passenger sustained injuries.
9	October 26, 2013 On runway of Matsuyama Airport	Private	JA4159 Beechcraft A36 (small aeroplane)	The aircraft bounced upon landing in Matsuyama Airport and the nose landing gear sustained substantial damage and the propeller was deformed. Due to this, it became immobile on the runway.

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
10	November 29, 2013 At approximately 1,100m high approximately 20km northeast of Fukue Airport	ANA WINGS CO.,LTD.	JA462A Bombardier DHC-8-402 (large aeroplane)	The aircraft took off from Fukuoka Airport for Fukue Airport. While approaching Fukue Airport, the aircraft was struck by lightning near the location refered to the left column. However, it continued to fly afterwards and arrived at the said airport.
11	December 31, 2013 Above the sea approximately 100m east of the point approximately 880m on the Kouri Bridge in Nago City, Okinawa Prefecture, from Yagaji Island toward Kouri Island	ILAS Air Service Co., Ltd.	JA106Y Robinson R44 (rotorcraft)	While the aircraft was flying at low altitude for sightseeing after taking off from a temporary helipad in Nakijin Village in Kunigami-gun, Okinawa Prefecture, part of the aircraft hit the water surface. The aircraft crashed near the location refered to the left column. The pilot and two passengers sustained injuries.

(Aircraft serious incidents)

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
1	January 16, 2013 At approximately 32,000ft high near Takamatsu Airport	All Nippon Airways	JA804A Boeing 787-8 (large aeroplane)	While the aircraft was climbing after taking off from Yamaguchi Ube Airport for Tokyo International Airport, its instruments indicated main battery failure over Shikoku, and a strange odor within the cockpit occurred. Therefore, the aircraft diverted to Takamatsu Airport and landed in the said airport. The aircraft executed emergency evacuation over taxiway T4 of the airport. There were a total of 137 persons on board the aircraft, consisting of the pilot, seven crewmembers and 129 passengers, and three passengers sustained injuries. The main battery of the aircraft sustained substantial damage.
2	May 6, 2013 Above taxiway A4 in Osaka International Airport	J-AIR Corporation	JA206J Bombardier CL-600-2B19 (large aeroplane)	After landing on runway A in Osaka International Airport, the instruments of the aircraft indicated that there was a fire in the No.2 (right) engine on taxiway A4. The right engine was shut down while the fire-extinguishing system was activated. Afterwards, the aircraft taxied to the apron.

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
3	June 30, 2013 Ryugasaki Airfield in Handa Town, Ryugasaki City, Ibaraki Prefecture	Private	JA3919 Piper PA-28-161 (small aeroplane)	When the aircraft landed at the airport refered to the left column, it overran the runway and stopped on the overrun area (grassy area).
4	August 5, 2013 East end of runway B in Niigata Airport	Korean Airlines Co.、Ltd.	HL7599 Boeing 737-900 (large aeroplane)	When the aircraft landed on runway 10 in Niigata Airport, it ran off the runway and stopped with the nose landing gear sticking out on the grassy area on the east side of the runway. The 115 passengers and crewmembers did not suffer any injuries.
5	September 10, 2013 Vicinity of approximately 3km west-southwest of runway A in Kansai International Airport and on runway A in Kansai International Airport	All Nippon Airways(Aircraft A) Aero Asahi Corp. (Aircraft B)	JA605A Boeing 767-300 (large aeroplane) JA06NR Bell 430 (rotorcraft)	Aircraft B entered runway A despite instructions by an air traffic controller to hold short of the runway. Therefore, Aircraft A, which had obtained a landing clearance, performed a go-around on instructions from the air traffic controller.
6	October 14, 2013 In front of Kumamoto Air Rescue Team hangar attached to Kumamoto Airport	Kumamoto Air Rescue Team	JA15KM Aerospatiale AS365N3 (rotorcraft)	During a hoist training executing at a height of 60 ft (about 18m) above the location refered to the left column, the aircraft encountered close proximity to another aircraft. Reported distance between two aircraft was 50 ft (about 15 m) horizontally.
7	November 16, 2013 Araya Town Shitakawara, Akita City, Akita Prefecture	Honda Airways Co., Ltd.	JA4000 Cessna TU206G (small aeroplane)	While flying after taking off from Honda Airport, the lubricating oil pressure for the engine reduced above the vicinity of Noshiro City. Therefore, the pilot changed the destination to Odate-Noshiro Airport, but the weather was bad. He changed the destination again to Akita Airport and continued to fly, but the engine began to vibrate. The pilot decided to make an emergency landing on a runway of the old Akita Airport refered to the left column. The engine stopped during approach to the old Akita Airport but the aircraft successfully landed.
8	December 13, 2013 Approximately 9,900m high approximately 110km west of Tokyo International Airport	All Nippon Airways	JA701A Boeing 777-200 (large aeroplane)	While the aircraft was climbing after taking off from Tokyo International Airport, its instrument showed that No.2 engine thrust declined and that there was an increase in the exhaust gas temperature near the location refered to the left column. The engine was then shut down. The pilot declared an emergency and the

No.	Date and location	Operator	Aircraft registration number and aircraft type	Summary
				aircraft turned back and landed at the airport.

6 Statistics of published aircraft accident and serious incident investigation reports

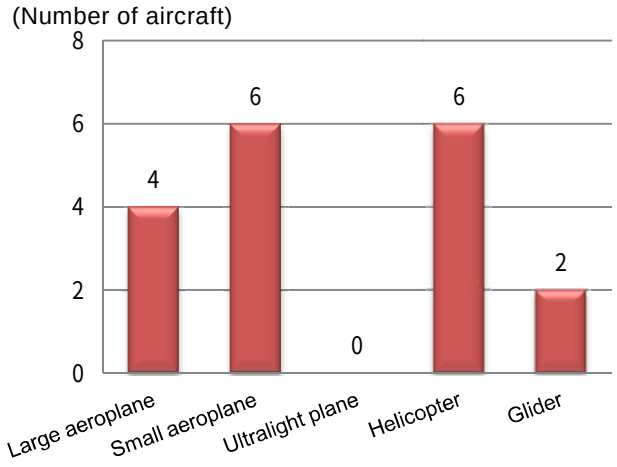
The number of investigation reports of aircraft accidents and serious incidents published in 2013 was 23, consisting of 17 aircraft accidents and six aircraft serious incidents.

Looking at those accidents and serious incidents by aircraft category, the accidents involved four large aeroplanes, six small aeroplanes, six helicopters and two gliders. The aircraft serious incidents involved four large aeroplanes, one small aeroplane, two helicopters and one glider.

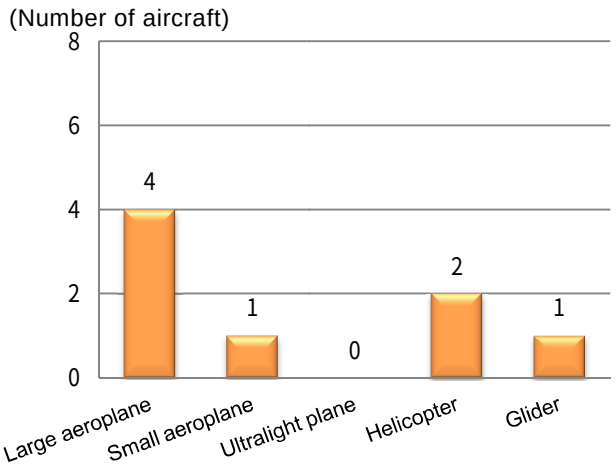
Note: In aircraft accidents and serious incidents, two or more aircraft are sometimes involved in a single case. See details on Pages 20-25.

In the 17 accidents, the number of casualties was 18, consisting of 8 deaths, one missing person and 9 injured persons.

Number of published aircraft accident reports (17 cases) by aircraft category in 2013



Number of published aircraft serious incident reports (six cases) by aircraft category in 2013



The investigation reports for aircraft accidents and serious incidents published in 2013 are summarized as follows:

List of published investigation reports on aircraft accidents (2013)

No.	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type	Summary
1	January 25, 2013	September 26, 2010 In the mountains near the Kigensugi cedar in Yakushima Town, Kumage-gun, Kagoshima Prefecture	Aero Asahi Corp.	JA9635 Aerospatiale AS332L (rotorcraft)	Refer to "7. Summaries of recommendations and opinions" (Page 25-①)
2	January 25, 2013	July 24, 2011 Inside of Tajima Airport apron	Private	JA4123 Socata TB21 (small aeroplane)	When the aircraft was taxiing on the apron for flying from Tajima Airfield to Nagoya Airport, its left-hand main landing gear was retracted and the left wing contacted with the ground surface and sustained damage. There were the pilot and one passenger on board the aircraft, but they did not sustain any injuries. The aircraft was damaged; however, no fire broke out.
3	January 25, 2013	January 18, 2012 At approximately 1,000 ft above sea near Kitakojima Island, Ishigaki City, Okinawa Prefecture	Japan Coast Guard	JA720A Bombardier DHC-8-315 (large aeroplane)	The aircraft took off from Naha Airport for Ishigaki Airport for marine patrol flight over the East China Sea. Just after making a left turn near Kitakojima Island, the aircraft had a bird-strike.
4	January 25, 2013	February 19, 2012 Karifuridake Temporary Helipad, Minami-Furano Town, Sorachi-gun, Hokkaido Prefecture	HELL-SYS Japan, Inc.	JA710H Eurocopter EC120B (rotorcraft)	The aircraft rolled over during takeoff from Karifuridake Temporary Helipad and sustained substantial damage. There was only the pilot on board the aircraft, and the pilot suffered no injury. The aircraft was damaged; however, no fire broke out.
5	January 25, 2013	April 28, 2012 On Yoshii River adjacent to Oku Gliding Field, Setouchi City, Okayama Prefecture	Private (Aircraft A)	JA21KA Sheibe SF25C (motor glider, two-seater)	Aircraft A with a pilot in the left seat took off from Oku Gliding Field in Setouchi City, Okayama Prefecture, while towing Aircraft B with a trainee pilot on board. But both gliders ditched in Yoshii River adjacent to the gliding field immediately after the takeoff and sustained substantial damage.
			Private (Aircraft B)	JA2376 Shempp-Hirth Discus b (glider, single-seater)	

No.	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type	Summary
6	February 22, 2013	October 3, 2011 On runway in Chofu Airport	Kyoritsu Air Survey Co., LTD.	JA3959 Cessna TU206G (small aeroplane)	The aircraft took off from Chofu Airfield for aerial photo mission. After the photo mission, its nose gear sustained substantial damage upon landing at Chofu Airfield, veered off the runway and stopped. There were a total of two persons on board the aircraft, consisting of the pilot and the cameraman, but they did not sustain any injuries. The aircraft was damaged; however, no fire broke out.
7	March 29, 2013	June 18, 2012 At approximately 200 ft, above Ryugasaki Airfield, Ryugasaki City, Ibaraki Prefecture	IBEX Aviation Co., Ltd.	JA4135 Cessna 172P (small aeroplane)	When the aircraft was conducting consecutive touch-and-go training on runway of Ryugasaki Airfield with two persons on board, consisting of the instructor and a student pilot, a bird climbed up to the height of the aircraft wing after take off and collided into the front edge of the left main wing.
8	March 29, 2013	July 5, 2012 At approximately 23,000ft high approximately 150km north of Narita International Airport	United Airlines	N224UA Boeing 777-200 (large aeroplane)	When the aircraft was flying toward Narita International Airport after taking off from Incheon International Airport (Republic of Korea), pitch oscillations occurred near the location refered to the left column. One flight attendant was seriously injured, and three other flight attendants suffered slight injuries. There was no damage to the aircraft.
9	March 29, 2013	October 16, 2012 Above runway at Aguni Airport, Okinawa Prefecture	First Flying Co., Ltd.	JA5324 Britten Norman BN-2B-20 (small aeroplane)	Immediately after starting to run in preparation for the take off from Aguni Airport for Naha Airport, they noticed a bird-like object approaching from ahead on the right side. When they landed in Naha Airport and parked the aircraft, a mechanic noticed that the the right wing leading edge was deformed (dented). Death or injuries: None. Degree of the aircraft damage: Substantial damage.
10	April 26, 2013	March 23, 2009 Runway A of Narita International Airport	Federal Express Corporation	N526FE McDonnell MD-11F (large aeroplane)	Refer to “7. Summaries of recommendations and opinions” (Page 29-④)

No.	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type	Summary
11	April 26, 2013	October 3, 2011 Kiyokawa Village, Aiko-gun, Kanagawa Prefecture	Toho Air Service Co., Ltd.	JA508A Eurocopter AS350B3 (rotorcraft)	The aircraft took off from a Karasawa temporary helipad in Kiyokawa Village, Aiko-gun, Kanagawa Prefecture, to transport cargos. During the flight, the aircraft sustained substantial damage and crashed at Choja-Yashiki Campground in the village. There were a total of two persons on board the aircraft, consisting of the pilot and the mechanic. The pilot sustained fatal injuries, and the mechanic was seriously injured. The aircraft was destroyed, and a fire broke out.
12	June 28, 2013	September 22, 2011 Hiketa, Higashikagawa City, Kagawa Prefecture	Shikoku Air Service Co., Ltd.	JA6522 Eurocopter AS350B3 (rotorcraft)	Refer to “7. Summaries of recommendations and opinions” (Page 26-②)
13	June 28, 2013	June 29, 2012 Nagashima Dam temporary helipad in Kawanehon Town, Haibara-gun, Shizuoka Prefecture	Chubu Regional Bureau, Ministry of Land, Infrastructure, Transport and Tourism (Operated by contracted Nakanihon Air Service Co. ,Ltd.)	JA6817 Bell 412EP (rotorcraft)	When landing on the Nagashima dam temporary helipad, the aircraft made a hard landing. The pilot was seriously injured, and one of the passengers was slightly injured. There were a total of eight persons on board the aircraft, consisting of the pilot and 7 passengers. The aircraft was slightly damaged, but no fire broke out.
14	August 30, 2013	November 19, 2012 Shakadake loading/ unloading site in Kitahira, Otsu City, Shiga Prefecture	Nakanihon Air Service Co. Ltd.	JA9965 Aerospatiale AS332L1 (rotorcraft)	When the aircraft was hoisting and transporting a work shed from the location refered to the Mt.Shaka Loading Site in Kitahira, a worker on the ground fell on the valley side and was seriously injured with a broken wrist.

No.	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type	Summary
15	September 27, 2013	February 5, 2012 Above Runway 27 of Sendai Airport	Air Nippon Co., Ltd.	JA8384 Airbus Industry A320-200 (large aeroplane)	After the aircraft performed a go-around over the runway after approaching Runway 27 at Sendai Airport, the aircraft had the lower part of its rear fuselage contacted with the runway. The aircraft sustained substantial damage. There were a total of 166 persons on board the aircraft, consisting of the pilot, five crewmembers, and 160 passengers. They did not sustain any injuries.
16	October 25, 2013	July 26, 2011 Suruga Bay between Okitsu River mouth in Shimizu District, Shizuoka Prefecture, and off the coast of Fuji River mouth	Private	JA22DB Extra EA300/200 (small aeroplane)	Only the pilot boarded the aircraft for flight test before the airworthiness inspection. The aircraft took off from Fujigawa Glider strip, but it did not arrive there even after the estimated arrival time at Fujigawa Glider strip and went missing. As a result of the search, some parts of the aircraft were collected at the location refered to the left column. However, the pilot was not found.
17	December 20, 2013	July 28, 2011 In Mt. Tsurugi in Memuro, Kasai-gun, Hokkaido Prefecture	Obihiro Branch School of the Civil Aviation College	JA4215 Beechcraft A36 (small aeroplane)	Refer to “7. Summaries of recommendations and opinions” (Page 28-③)

List of published investigation reports on aircraft serious incidents (2013)

No.	Date of publication	Date and location	Operator	Aircraft registration number and aircraft type	Summary
1	February 22, 2013	June 27, 2011 Approximately 6,700ft high approximately 13km southwest of Osaka International Airport	ANA WINGS CO.,LTD.	JA805K Bombardier DHC-8-314 (large aeroplane)	While the aircraft was climbing after taking off from Osaka International Airport, a strange noise came from No.1 engine and its engine thrust went down. The engine was then shut down, and the aircraft turned back to Osaka International Airport. In an post-flight engine inspection, they confirmed substantial damage around the entire turbine blade on several stages of the said engine. There were a total of 34 persons on board the aircraft, consisting of the pilot, three crewmembers, and 30 passengers. No one sustained any injuries.

2	April 26, 2013	July 8, 2012 On Runway 34 of Fukuoka Airport	Private (Aircraft A)	JA4178 Cessna 172RG (small aeroplane)	While Aircraft A was approaching Runway 34 of Fukuoka Airport after receiving a landing clearance from an air traffic controller, Aircraft B, which was scheduled to take off from the said runway, approached the said runway after being instructed to wait on the runway from the air traffic controller. The air traffic controller instructed Aircraft A to perform a go-around. There were a total of three persons on board Aircraft A, consisting of the pilot and two passengers, and there were a total of 75 persons on board Aircraft B, consisting of the pilot, three crewmembers, and 71 passengers. No one sustained any injuries on either of the aircraft, and neither aircraft sustained substantial damage.
			Japan Air Commuter Co. ,Ltd. (Aircraft B)	JA847C Bombardier DHC-8-402 (large aeroplane)	
3	September 27, 2013	March 28, 2009 Approximately 6nm (approximately 11km) above the sea northwest of the Kerama Islands in Okinawa Prefecture	Hirata Gakuen	JA135E Eurocopter EC135T2 (rotorcraft)	Refer to “7. Summaries of recommendations and opinions” (Page 32-⑤)
4	October 25, 2013	July 8, 2011 Approximately 8,500m high approximately 79km northwest of Tokyo International Airport	All Nippon Airways	JA8674 Boeing 767-300 (large aeroplane)	The aircraft took off from Tokyo International Airport for Toyama Airport, and a strange noise and vibration occurred in No.1 (left) engine near the location refered to the left column. The engine was then shut down, and the aircraft turned back to Tokyo International Airport.
5	October 25, 2013	April 7, 2012 Fujigawa Gliding Field, Shizuoka City, Shizuoka Prefecture	Fuji Glider Club	JA109B Globe G109B (motor glider/ two-seater)	The aircraft took off from the Fujigawa Glider Strip for the familiarization flight. When it landed on the said gliding field for continuous touch-and-go training, the aircraft veered to the right, went off the runway, and stopped. Although the aircraft sustained minor damage, no one was injured.

6	December 20, 2013	October 31, 2012 On runway of Yakushima Airport	Noevir Aviation Co., Ltd. (Aircraft A)	JA35BB Eurocopter AS350B3 (rotorcraft)	Aircraft A approached Runway 32 of Yakushima Airport to take off for a familiarization flight and took off from the said runway before Aircraft B, which had already landed and was taxiing on the runway to vacate the runway. There was one pilot on board Aircraft A, and there were a total of 38 persons on board Aircraft B, consisting of the pilot, three crewmembers, and 34 passengers. No one sustained any injuries on either of the aircraft, and neither aircraft sustained damage.
			Japan Air Commuter Co., Ltd (Aircraft B)	JA849C Bombardier DHC-8-402 (large aeroplane)	

7 Summaries of recommendations and opinions

Summaries of recommendations and opinions for 2013 are as follows.

① Aircraft accident involving Aerospatiale AS332L (rotorcraft), registered JA9635, operated by Aero Asahi Corporation.

(Recommended on January 25, 2013)

○ Summary of the Accident

On Sunday, September 26, 2010, an Aerospatiale AS332L, registered JA9635, operated by Aero Asahi Corporation, took off for sling load cargo transport from Yakusugi Land temporary helipad located in Yakushima-Town, Kumage-Gun, Kagoshima Prefecture, and crashed into the mountain slope near Kigensugi cedar tree in Yakushima-Town at about 07:50 local time.

Onboard the helicopter were a pilot and a loadmaster, and both of them suffered fatal injuries.

The helicopter was destroyed and consumed by fire.

○ Probable Causes

In this accident, it is probable that the helicopter, while flying in the mountain valley with underslung external cargo, made a left turn to turn back, crashed after nearing the slope with its underslung cargo caught in ground objects during the maneuver. The post-crash fire consumed the helicopter and the pilot and loadmaster suffered fatal injuries.

The following are possible reasons why the helicopter came close to the slope during the left turn, and the underslung cargo came to be caught in ground objects: executable OGE hovering for turn-around was not carried out; en route altitude was well below minimum safe altitude; the climbing was restrained during the left turn as the opening under the cloud base was small; and the

miss judgement on clearance between the cargo and the ground objects.

○ Recommendations to Aero Asahi Corporation.

Review flight operations whether there were non-compliance activities against laws and regulations.

Remind all employees engaged in safety-related works including pilots and mechanics of the importance of observing fundamental safety standards such as minimum safe altitudes.

Review internal emergency communication procedure.

② Aircraft accident involving Eurocopter AS350B3 (rotorcraft), registered JA6522, operated by Shikoku Air Service Co., Ltd.

(Safety recommendation on June 28, 2013)

○ Summary of the Accident

On Thursday, September 22, 2011, a Eurocopter AS350B3, registered JA6522, operated by Shikoku Air Service Co., Ltd. took off from Takamatsu Airport at around 09:23 for power transmission lines inspection flight. A burnt smell and white smoke rose in the cabin during this flight, and at around 10:10, the helicopter made a forced landing at a baseball field located at Hiketa, Higashikagawa City, Kagawa Prefecture.

On board the helicopter were a pilot and two passengers, but none of them suffered injury.

After the forced landing, the helicopter caught fire and was destroyed.

○ Probable Causes

In this accident, it is highly probable that a fire occurred in the rear hold of the helicopter and the helicopter made a forced landing.

Regarding a fire in the rear hold, the ignition source could not be identified; nevertheless it is possible that a fire occurred from the wiring connected to the strobe light power supply, which was installed in the rear hold, and that the fire spreaded to flammable materials placed around the power supply.

This is because the wiring was not designed and structured so that it was fully protected so as to prevent it from being damaged due to the movement of cargo and to preclude the risk of a fire when it was damaged or destroyed.

It is also possible that since it was not covered with nets to prevent its movement, embarkation in the rear hold damaged the wiring, which was not fully protected from damage due to the movement of the embarkation.

○ Recommendations to Shikoku Air Service Co., Ltd.

(1) Embarkation on board

In this accident, it is possible that since measures were not taken to prevent the movement of embarkation in the rear hold using a floor tie-down net, the embarkation moved during the flight, and then damaged the wiring of electrical equipment in the hold, causing a fire.

When having embarkation in the rear hold of Eurocopter AS350B3, the Company should take measures to prevent its movement using a net as provided in the Flight Manual in order to prevent an unforeseen event due to such movement. In addition, when transporting items that fall into the category of explosives and other dangerous goods, the Company should confirm the content of the public notification and comply with the standards specified therein when transporting such items.

(2) Establishment of a system that enables pilots to perform emergency procedures of aircraft without failure

In this accident, when smoke arose in the cabin, the pilot attempted to perform emergency procedures, but could not do so as stipulated in the Flight Manual because he had not enough time to confirm procedures with the emergency procedure checklist inserted into the knee board and because he did not remember necessary emergency procedures.

The Company should establish a system that enables pilots, when operating aircraft, to perform appropriate emergency procedures of aircraft swiftly and reliably in a state of emergency mainly by memorizing those which must be performed immediately.

○ Safety Recommendations to the European Aviation Safety Agency (EASA)

(1) Electrical equipment and its wiring in the baggage compartment

In this accident, the wiring connected to the strobe light power supply, installed in the rear hold of the helicopter where a fire occurred, were not protected in a cage or rigid housing.

The airworthiness standards: FAR 27.855(b) stipulates as follows:

(b) No compartment may contain any controls, wiring, lines, equipment, or accessories whose damage or failure would affect safe operation, unless those items are protected so that:

(1) They cannot be damaged by the movement of cargo in the compartment; and

(2)Their breakage or failure will not create a fire hazard.

Therefore, the EASA should make it mandatory to modify the rear hold of the Eurocopter AS 350 series so that electrical equipment and its wiring are fully protected.

(2) Manifestation of the matters which must be dealt with immediately by memory among the emergency procedures

In this accident, when smoke arose in the cabin, the pilot attempted to perform emergency procedures of aircraft, but failed to do so as provided in the Flight Manual because he had not enough time to confirm procedures with the emergency procedures checklist inserted into the knee board and because he did not remember necessary emergency procedures. The Flight Manual did not manifest the emergency procedures that must be dealt with immediately.

Therefore, in the Flight Manual of the Eurocopter AS350 Series, the EASA should urge the designer and manufacturer of the helicopter to specify the memory items among emergency

procedures so that they can be performed immediately.

③ Aircraft accident involving Beechcraft A36 (small aeroplane), registered JA4215, operated by Obihiro Branch School of the Civil Aviation College

(Recommended on December 20, 2013)

○ Summary of the Accident

On Thursday, July 28, 2011, a Beechcraft A36, registered JA4215, operated by the Obihiro Branch School of the Independent Administrative Institution Civil Aviation College, took off from Obihiro Airport for flight training at 09:11 Japan Standard Time. At around 09:22, when practicing basic instrument flight in the training and testing area, the airplane crashed into the slope of Mt. Tsurugi in Memuro-cho, Kasai-gun, Hokkaido.

On board the airplane were four persons: an instructor who was captain, two students, and an instructor in educational and research flight. Three of them: the captain, one of the students, and other instructor suffered fatal injuries, and the remaining student sustained serious injury.

The airplane was destroyed and a post-crash fire broke out.

○ Probable Causes

It is highly probable that the accident occurred as follows: The hooded student conducting VFR Basic Instrument Flight
training was instructed by his instructor to fly into the mountainous area; It then flew into clouds or close to the clouds that covered the mountains, losing sight of ground references and approached the ground very close against the instructor's expectation; The instructor took the controls from the student and attempted to evade the mountains, but the airplane failed to change its course to an appropriate direction and crashed into the slope of the mountain.

It is somewhat likely that the instructor flew close to or into the clouds which covered the mountain with some intention; however, his death denied us the clarification of his intention.

It is somewhat likely that the basic safety policy of the College was not instilled into the field instructors, and that there was a gap in safety awareness between management and field instructors.

It is also somewhat likely that behind the accident was a problem that involved the entire organization of the College—a work environment/organizational culture that consequently allowed unsafe behaviors.

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

The Minister should grasp reliably the actual condition of efforts towards improvement of the safety management system of the College, check the implementation status whether such various safety measures set by the College based on the medium-term plans, etc. are carried out continuously and certainly by such as periodically audits in the field and provide more guidance depending on the results until the College becomes able to operate a safety management system

autonomously and steadily. Moreover, in setting safety-related medium-term goals as prescribed in the Act on General Rules for Independent Administrative Agencies, the Minister should consider how the College's medium-term goals should be, such as setting specific goals to ensure that a safety culture is brewed and safety activity is implemented surely and continuously, including reviewing in timely manner, based on that the organizational climate cannot be built in a day but also it is brewed by daily ongoing activity.

○ Recommendations to the Independent Administrative Institution Civil Aviation College

(1) Review of the Training Procedures

In the accident, it is somewhat likely that the airplane of the College was into or close to clouds during VFR training, and that another instructor onboard the airplane gave no advice about this behavior.

The College should aim to create an opened educational environment that enables observer instructors and students to give advice on safety issues in the training airplane without hesitation if necessary. Therefore, it should also consider to introduce effective methods, such as utilizing installed video cameras in the airplane, etc.

(2) Strengthening of the Safety Management System

The College should establish a system for grasping the actual condition of instructors' teaching methods and provide them with appropriate guidance and supervision.

The possible contributing factors to the accident occurrence are that the safety management of the College actually deviated from its philosophy in its Safety Management Regulations and that there was a gap in safety awareness between management and field instructors, creating a work environment/organizational culture that allowed unsafe acts—a problem that involved the entire organization.

Thus in order to prevent recurrence of such situation and brew and keep an appropriate organizational climate, the College needs to establish a safety management system with the commitment of the all personnel from the General Safety Manager to field instructors and to properly operate it with continued reviewing.

(3) Review of medium-term plans and other related plans

In order to make sure to carry out the initiatives recommended in (1) and (2) above and make them an integral part of its administration, the College should review the medium-term and annual plans and reflect these initiatives on the plans.

④ Aircraft accident involving McDonnell Douglas MD-11F (large aeroplane), registered N526FE, operated by Federal Express Corporation

(Safety Recommendation on April 26, 2013)

○ Summary of the Accident

On March 23 (Monday), 2009, about 06:49 local time, a McDonnell Douglas MD-11F, registered N526FE, operated by Federal Express Corporation as the scheduled cargo flight FDX80, bounced repeatedly during landing on Runway 34L at Narita International Airport. During the course of bouncing, its left wing was broken and separated from the fuselage attaching point and the airplane caught fire. The airplane rolled over to the left being engulfed in flames, swerved off the runway to the left and came to rest inverted in a grass area.

The Pilot in Command (PIC) and the First Officer (FO) were on board the airplane, and both of them suffered fatal injuries.

The airplane was destroyed and the post-crash fire consumed most parts.

○ Probable Causes

In this accident, when the airplane landed on Runway 34L at Narita International Airport, it fell into porpoising. It is highly probable that the left wing fractured as the load transferred from the left MLG to the left wing structure on the third touchdown surpassed the design limit (ultimate load).

It is highly probable that a fire broke out as the fuel spillage from the left wing caught fire, and the airplane swerved left off the runway rolling to the left and came to rest inverted on the grass area.

The direct causes which the airplane fell into the porpoise phenomenon are as follows:

(1) Large nose-down elevator input at the first touchdown resulted in a rapid nose -down motion during the first bounce, followed by the second touchdown on the NLG with negative pitch attitude. Then the pitch angle rapidly increased by the ground reaction force, causing the larger second bounce, and

(2) The PF's large elevator input in an attempt to control the airplane without thrust during the second bounce.

In addition, the indirect causes are as follows:

(1) Fluctuating airspeed, pitch attitude due to gusty wind resulted in an approach with a large sink rate,

(2) Late flare with large nose-up elevator input resulted in the first bounce and

(3) Large pitch attitude change during the bounce possibly made it difficult for the crewmembers to judge airplane pitch attitude and airplane height relative to the ground (MLG height above the runway).

(4) The PM's advice, override and takeover were not conducted adequately.

It is somewhat likely that, if the fuse pin in the MLG support structure had failed and the MLG had been separated in the overload condition in which the vertical load is the primary component, the damage to the fuel tanks would have been reduced to prevent the fire from developing rapidly.

It is probable that the fuse pin did not fail because the failure mode was not assumed under an overload condition in which the vertical load is the primary component due to the interpretation of the requirement at the time of type certification for the MD-11 series airplanes.

○ Safety Recommendations to the Federal Aviation Administration (FAA)

1 Actions to be Taken by the Federal Aviation Administration

(1) Although the MD-11 airplane was certified to the requirement 14 CFR 25.721(a) under the interpretation at the time of certification, its design would not meet the present interpretation of the requirement since the design allows the possibilities of causing severe damage to the airplane structure in the failure mode under an overload condition where the vertical load is the primary component, resulting in the fire due to fuel spillage. As this kind of design should not be certified from now on, the airworthiness regulation rather than the guidance material should be revised to mandate the assumption of the overload condition in which the vertical load is the primary component.

(2) Heat and smoke from the fire reached the cockpit at an early stage after the accident, making it difficult to initiate quick rescue activities from outside. In order to increase the crew survivability, studies about ways to separate the flight crew compartment from heat, smoke and toxic gas should be made, and if there are any effective solutions, the FAA should consider their application to in-service airplanes.

2 Measures to Be Taken to Supervise the Boeing Company as the Airplane Manufacturer

The Federal Aviation Administration require the Boeing Company to study the possibility of design change for the MLG support structure and matters mentioned below in order to prevent the recurrence of similar accidents and minimize damage to be caused by such accidents.

(1) In order to reduce the occurrence of MD-11 series airplanes‘ severe hard landing and bounce in which an overload is transferred to the MLGs and their supporting structure, the Boeing Company should improve the controllability and maneuver characteristics by improving the LSAS functions, reducing the AGS deployment delay time and other possible means.

Possible improvement on LSAS functions may include: a function to limit large nose-down elevator input during touchdown phase, which is a common phenomenon in severe hard landing cases accompanied by structural destruction for MD-11; and a function to assist bounce recovery and go-around in case of bounce.

(2) In order to help pilots to conduct recovery operation from large bounces and judge the necessity of go-around, studies should be made to install a visual display and an aural warning system which show gear touchdown status on MD-11 series airplanes.

⑤ Aircraft serious incident involving Eurocopter EC135T2 (rotorcraft), registered JA135E, operated by Hirata Gakuen

(Safety Recommendation on September 27, 2013)

○ Summary of the Serious Incident

A Eurocopter EC135T2, registration JA135E, operated by an academic corporate body HIRATAGAKUEN, took off from Kumejima Helipad at 10:07 local time on March 28, 2009 for emergency patient transportation. When the helicopter was flying over the sea enroute to Shuri Helipad on the main island of Okinawa, its left engine stopped around 10:20 at about 800 ft (about 240 m) about 6 nm (about 11 km) northwest of the Kerama Islands. It changed the destination to Naha Airport and landed there at 10:46.

There were six persons on board, consisting of the pilot in command (PIC) and a mechanic, a doctor and a nurse as medical personnel, and an emergency patient and an attendant, but no one was injured.

The inside of the left engine of the helicopter was destroyed, but there was no outbreak of fire.

○ Probable Causes

It is very likely that in this serious incident, the clogged injectors located relatively lower part of the left engine combustion chamber caused uneven fuel injection and combustion limited in the upper part, lead to a heat concentration to the Upper Structure resulting in engine interior damage.

Sea salt accumulation on fungicide with increased viscosity by heat probably clogged the fuel nozzles. Improper use of fungicide is probable. The route of the sea salt penetration could not be determined.

○ Safety Recommendations to the European Aviation Safety Agency (EASA)

It is recommended that the European Safety Agency directs Eurocopter and Turbomeca to cooperatively study the helicopter operational environment and the effects of fungicide to inform helicopter customers of the proper dosing instructions and precautions.

Column

Training after being employed as an aircraft accident investigator

Aircraft accident investigator

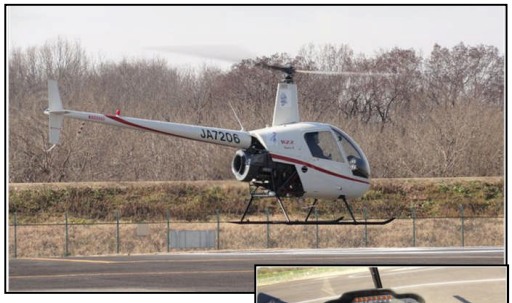
It has been a year since I was employed as an aircraft accident investigator. Since investigations of aircraft accidents require a broad range of knowledge and a high level of expertise, we continuously undergo various kinds of training.

In this column, I would like to introduce how we learn the necessary knowledge as investigators while introducing the training that I have taken before I actually started conducting investigations after being employed as an aircraft accident investigator.

The first training is called the initial training for newly appointed investigators. In this training, we learn a broad range of knowledge and techniques from conventions/laws and regulations involving investigations of aircraft accidents to investigation methods and handling of special investigation equipment in approximately 3 months.

After this, OJT and specialized training start. In OJT, we go to actual accident and serious incident sites and experience the field investigations. In addition, specialized training is determined based on the experience and skills, etc. of each investigator.

In my case, I was involved with operation maintenance work as an aircraft mechanic for an airline before being employed as an investigator. I also have experience operating small aeroplanes in a company as a pilot for a short period. Because of this background, I was assigned to take the simulator training for rotorcraft and twin-engine plane turboprop aircraft, training involving maintenance of rotorcraft, training for rotorcraft operation, etc.



In this column, I would like to introduce the operation training using rotorcraft (helicopter) Robinson R22 among such training.

In fiscal 2013, two investigators with no experience in rotorcraft operations received this training. (They previously served as an aircraft mechanic and an air traffic controller.) This training is aimed at deepening trainees' knowledge about aircraft operations in order to facilitate their jobs as investigators, rather than having them obtain licenses. The training has curriculums which enable participants to not only learn operations but also obtain a broad range of experience in a short period of time.

Training using actual aircraft is simultaneously conducted with classroom training. In the training using actual aircraft, trainees repeatedly undergo the basic air works, the hovering training which can said to be a special skill of helicopters, and consecutive touch-and-go training while flying along a traffic pattern.

Since I had the experience as an airplane pilot in addition to a mechanic, I expected that my flight operation experience would work to a certain degree and have a smooth flight before I started the training. However, this confidence (?) was crushed quickly on the first day. The helicopter shifted to the right and left while suddenly dipping forward and tilting backward. I tried to comfort myself, telling myself that it was because of the wind. However, when I looked around, the smoke was going straight up, and the instructor next to me said that it was the best day to fly because there was no wind. I quickly gave up my status as "someone with the operation experience" on the first day.

Trainees experience operations that respond to emergency situations that are unique to rotorcraft as well as operations using auto rotation with simulating an engine failure as we continue the training.

Although I learned complex structures and flying characteristics through textbooks, I was able to experience the sense of operation that I would never have been able to learn by studying and understanding the theory.

I feel that the fact that I was able to learn many aspects in this rotorcraft operation training from rotorcraft structure to operations and pilot psychology will be extremely effective when I conduct accident and serious incident investigations involving rotorcraft in the future.

8 Actions taken in response to recommendations in 2013

Actions taken in response to recommendations were reported with regard to three aircraft accidents and two aircraft serious incidents in 2013. Summaries of these reports are as follows.

① Aircraft accident involving Aerospatiale AS332L, registered JA9635, operated by Aero Asahi Corpration.

(Recommended on January 25, 2013)

As a result of the investigation of an aircraft accident which occurred in the mountains near the Kigensugi cedar in Yakushima Town, Kumage-gun, Kagoshima Prefecture on September 26, 2010, the Japan Transport Safety Board published an investigation report and made recommendations to the Company as one of the parties relevant to the cause of the accident, on January 25, 2013. The Board received the following report (completion report) on the implementation of measures in response to the recommendations.

○ Summary of the Accident, Probable Causes, and Description of the Recommendations

Refer to “7. Summaries of recommendations and opinions” (Page 25-①)

○ Actions Taken in Response to the Recommendations (completion report)

1 Conducting the “Review flight operations whether there were non-compliance activities against laws and regulations”

Operation general manager and maintenance general manager reviewed all the works of every unit of Operation/Maintenance of Air Operation Department from the perspective of compliance with laws and regulations.

Based on the result of this review, they took improving measures as necessary.

2 “Remind all employees engaged in safety-related works including pilots and mechanics of the importance of observing fundamental safety standards such as minimum safe altitudes”

Held a safety meeting for all the employees of Air Operation Department.

Thoroughly and continually enforce the significance and importance of observing the fundamental safety standards through Aviation Safety Event, safety education, CRM, etc. in the future.

3 “Review internal emergency communication procedure”

Investigated and considered the current internal emergency communication procedure and implemented the following corrective measures.

① Current situation of the internal emergency communication procedure

As a result of the investigation of the current status, it was confirmed that there existed a few working sites where no on-demand communication was available between heliport and cargo loading/unloading site.

② Review of the communication procedure and consideration of supplemental communication means

As a result of reviewing the communication procedure and considering the supplemental communication means, Aero Asahi Corporation decided to establish the on-demand communication procedures by also asking for the cooperation of ordering agent.

When ordering agents are not able to provide necessary communication equipment, etc., Aero Asahi Corporation loans satellite mobile phones to them.

Aero Asahi Corporation newly purchased 6 sets of satellite mobile phones to be loaned and placed a set at each of their branch offices

③ Clarification of Communication Procedures between Heliport and Cargo Loading/Unloading Site

As a result of considering the clarification of communication procedures between heliport and cargo loading/unloading site, Aero Asahi Corporation decided to take the following measures and notified the concerned personnel of them.

- Make a separate chart of site communication procedures at the site where no emergency communication procedures is mentioned in a construction plan, etc. on work order.
- Add a check item for emergency communication procedures on the pre-work meeting sheet, and confirm it before work by work-crews.
- Added a description on emergency communication procedures in “Study Guide of Cargo Transport” of Aero Asahi Corporation.

* The completion report is posted on the JTSB website:
http://www.mlit.go.jp/jtsb/airkankoku/kankoku2re_130426.pdf

② Aircraft accident involving Eurocopter AS350B3, registered JA6522, operated by Shikoku Air Service Co., Ltd.

(Recommended on June 28, 2013)

As a result of the investigation of an aircraft accident which occurred in Hiketa, Higashikagawa City, Kagawa Prefecture, on September 22, 2011, the Japan Transport Safety Board published an investigation report and made recommendations to the Company as one of the parties relevant to the cause of the accident, on June 28, 2013. The Board received the following report (completion report) on the implementation of measures in response to the recommendations.

○ Summary of the Accident, Probable Causes, and Description of the Recommendations

Refer to “7. Summaries of recommendations and opinions” (Page 26-②)

○ Actions Taken in Response to the Recommendations (completion report)

1 “Take measures to prevent its movement using a net as provided in the Flight Manual”

Flight division general manager made the following matters more thoroughly known to relevant personnel belonging to the flight division:

- When having embarkation in the rear hold of Eurocopter AS350B3, the Company should take measures to prevent its movement using a net as provided in the Flight Manual
- Pilot is to open the rear hold door and check the net fixation situation before flight

2 "When transporting items that fall into the category of explosives and other goods, the Company should confirm the content of the pronouncement and meet the standards specified therein when transporting such items"

Flight division general manager made the following matters more thoroughly known again to relevant personnel belonging to the flight division:

- Reconfirm the compliance situation of "the pronouncement that laid down standards and other guidelines for transport of explosives and so on by aircraft" (Ministry of Transport Pronouncement No. 572 of November 15, 1983) involving the said explosives, etc. regarding the technical standards
- When transporting explosives and other goods., do so after taking required measures according to the said standards

3 "Shikoku Air Service Co., Ltd. should establish a system that enables pilots, when operating aircraft, to perform appropriate emergency procedures of aircraft swiftly and reliably in a state of emergency mainly by memorizing matters which must be performed immediately"

The board, including the safety general manager, decided on the original measure to confirm the swift and thorough performance of appropriate procedures in case of emergency involving this matter as a review item in the regular review conducted each year.

The operation manager thoroughly instructed this decision to all pilots, and the flight general manager instructed the designated technical review personnel to implement this measure in the regular review.

* The completion report is posted on the JTSB website :
http://www.mlit.go.jp/jtsb/airkankoku/kankoku3re_130925.pdf

③ Aircraft accident involving McDonnell MD-11F, registered N526FE, operated by Federal Express Corporation

(Safety Recommendation on April 26, 2013)

As a result of the investigation of an aircraft accident which occurred on a runway at Narita International Airport on March 23, 2009, the Japan Transport Safety Board published an investigation report and made safety recommendations to the Federal Aviation Administration (FAA), on April 26, 2013. The Board received the following responding report on the actions taken in response to the safety recommendations.

○ Summary of the Accident, Probable Causes, and Description of the Recommendations

Refer to "7. Summaries of recommendations and opinions" (Page 29-④)

○ Actions Taken in Response to the Safety Recommendations

Actions taken by the Federal Aviation Administration

(1) FAA judged that the revision of FAR25.721 (a) and Advisory Circular (AC) issuance ensure that the gear will be appropriately separated on aircraft, which will be designed in the future, under an overload condition in which the vertical load is the primary component. They are scheduled to issue the revisions on December 31, 2014, and the said AC is scheduled to include the statement "Destruction of gears due to overload must be considered based on the assumption that overload can occur in all logical combinations of weight in the vertical direction as well as toward the rear direction."

(2) FAA takes sufficient measures to prevent smoke and gas occurrence in case of a fire as well as their expansion in the current standards. In addition, it is considered that it is not required that these measures fulfill their functions to the extent of a major destruction, such as this accident. Therefore, no additional action is scheduled to be taken regarding this matter.

Actions to be instructed to the Boeing Company, which is the designer/manufacturer of this aircraft

(1) LSAS is a longitudinal stability increasing system, which was developed to provide MD-11 with the same level of operability as DC-10.

FAA thinks that further function change to LSAS may have harmful effects on the Flight Control Computer and the Automatic Flight System, and they are not scheduled to add functions to LSAS.

(2) FAA agrees with the direction of designing and approving of a visual display device that displays bounces. The Boeing Company has launched the development of a system that displays whether or not the aircraft has touched the ground with the target approval date being January, 2014.

* The report (original) from the Federal Aviation Administration is shown on the home page of the Board.

http://www.mlit.go.jp/jtsb/airkankoku/anzenkankoku6re_130925.pdf

④ Aircraft serious incident involving Bombardier DHC-8-402, registered JA847C, operated by Japan Air Commuter Co. Ltd.

(Safety Recommendation on August 27, 2010)

As a result of the investigation of an aircraft serious incident which occurred approximately 6km north-northwest of Tanegashima Airport on March 25, 2009, the Japan Transport Safety Board published an investigation report and made safety recommendations to the Transport Canada Civil Aviation (TCCA), on August 27, 2010. The Board received the following responding report on the actions taken in response to the safety recommendations.

○ Summary of the Serious Incident

On March 25 (Wednesday), 2009, at 9:33 Japan Standard Time (JST: unless otherwise stated, all times are indicated in JST (UTC+9h)), a Bombardier DHC-8-402, registered JA847C, operated by Japan Air Commuter as regularly scheduled Flight 3760, took off from Tanegashima Airport. At about 9:34, while the aircraft was climbing in airspace approximately 6 km north-northwest of Tanegashima Airport bound for Kagoshima Airport, an abnormal noise emanated from the No. 1 engine and instrument indications showed the occurrence of engine failure. The engine was then shut down and the aircraft requested emergency landing clearance from the Kagoshima Radar Approach Control Facility. The aircraft landed at Kagoshima Airport at 10:26.

There were 42 persons on board: the Pilot in Command, the First Officer, two cabin attendants and 38 passengers. No one was injured in the serious incident.

○ Probable Causes

It is highly probable that this serious incident occurred through the following series of events:

While the Aircraft was climbing after takeoff, the RGB helical input gearshaft of the No. 1 engine sustained fatigue fracture and was detached from its position; the fragments of the broken shaft then flew off, damaging the engine case and breaking the blades of the HPT and the blades and vanes of the LPT and PT at the downstream stages, and this resulted in breakdown of the engine.

With regard to the fatigue fracture of the RGB helical input gearshaft, it is considered probable that fatigue cracks had started from the impurity inclusion present in the metal stock of the helical gear developed in the shaft, and after undergoing repetitive application of stress, the shaft was finally fractured.

○ Description of the Safety Recommendations to the Transport Canada Civil Aviation (TCCA)

(1) Considering the detrimental effect on safety brought about by the inclusion of impurities in the RGB helical input gearshaft of the engine involved in this serious incident, P&WC, the manufacturer of the engine, should make company-wide efforts including the management of the metal stock supplier and component manufacturer serving P&WC, towards improved quality control concerning the production of the RGB helical input gear shaft.

(2) P&WC assigned a hazard severity of "Significant – Level 3" to this serious incident by considering only the occurrence of an IFSD as the basis for the risk level determination, but the actual conditions included the loss of all functions of the feathering system for the propeller of the shutdown engine in addition to the engine in IFSD. The risk assessment of this serious incident should not be made only on the engine necessitating an IFSD, but instead the incident must be reassessed from the viewpoint of the safety of the entire aircraft, and safety improvement actions should be taken if the results of the reassessment indicate this to be necessary.

○ Actions Taken in Response to the Safety Recommendations

Actions Taken by the Transport Canada Civil Aviation

(1) As a result of the consideration, they have already reinforced the procurement procedure to minimize the inclusion of impurities. Due to the fact that the Transport Canada Civil Aviation is satisfied with the new procedure, in which the recurrence risk has been reduced, they do not intend to take further measures at this point.

(2)
- The Transport Canada Civil Aviation conducted a review on the impact of failure of the feathering system for the propeller on operation safety based on the risk assessment submitted by the aircraft manufacturer and related information from the propeller manufacturer.
- The propeller of this aircraft includes counterweight. If the hydraulic pressure is reduced to change the pitch, the propeller automatically shifts to a higher pitch direction. The impact of this on the operability of the aircraft is minimal, and the windmill drag is not hazardous.
- In addition, if the feathering system pump fails, although the pitch cannot be changed to the full feathering position, the drag difference is only approximately 0.5% compared to full feathering. The aircraft manufacturer revised the aircraft operation manual and added this entry. In addition, the propeller manufacturer made it known to users that the impact of auxiliary feathering pump failure on safe operation is minimal.
- Since inoperable feathering system is not an unsafe event, they consider that no corrective action is required at this point.

* The report (original) from the Transport Canada Civil Aviation is shown on the home page of the Board.
http://www.mlit.go.jp/jtsb/airkankoku/anzenkankoku4re_130329.pdf

⑤ Aircraft serious incident involving McDonnell Douglas MD-90-30 operated by Japan Airlines International Co., Ltd.

(Safety Recommendation on June 29, 2012)

As a result of the investigation of an aircraft serious incident which occurred approximately 11km west of Sendai Airport on August 15, 2010, the Japan Transport Safety Board published an investigation report and made safety recommendations to the Federal Aviation Administration (FAA), on June 29, 2012. The Board received the following responding report on the actions taken in response to the safety recommendations.

○ Summary of the Serious Incident

On Sunday August 15, 2010, at 16:08 Japan Standard Time (JST: UTC+9hr, unless otherwise stated all times are indicated in JST on a 24-hour clock), a McDonnell Douglas MD-90-30, registered JA002D, operated by Japan Airlines International Co., Ltd. took off from Sendai Airport for Fukuoka Airport as a scheduled flight 3538. Around 16:10, while climbing, it declared a state of emergency upon the activation of the right engine fire warning alarm at about 5,500 ft. The right engine was shut down while the fire-extinguishing system was activated; consequently, the aircraft returned to Sendai Airport and it landed at 16:23. Heat damage inside the cowling of the right engine was confirmed after landing.

There were 111 people on board, consisting of the Pilot in Command (PIC), 4 other crewmembers, and 106 passengers, but no one was injured.

○ Probable Causes

It is probable that this serious incident occurred as follows: The Aircraft No. 4 Bearing Scavenge Tube of the right engine fractured during takeoff, resulted in the Tube breaking loose from the Diffuser Case letting the engine oil blow out through an opening where it broke loose, and subsequently the oil contact with the engine high temperature section developed into an engine fire.

It is highly probable that the repeated stress associated with engine operations generated the crack origins in the No.4 Scavenge Tube and the fatigue crack grew into the fracture of the tube.

○ Description of the Recommendations to the Federal Aviation Administration (FAA)

In the serious incident, it is highly probable that the fatigue crack originating from the outer diameter of the No.4 Bearing Scavenge Tube progressed into the fracture, whereas the Tube is covered with the heat shield, making it impossible to have a direct inspection of the relevant spot during a regular maintenance work. Therefore, it is recommended that the manufacturer review the Tube design and overhaul inspection method thereof in order to prevent the recurrence of similar cases.

○ Actions Taken in Response to the Safety Recommendations

Actions Taken by the Federal Aviation Administration

The Federal Aviation Administration agreed with the safety recommendations of JTSB and reviewed the data regarding tube fracture. As a result, they decided that it was necessary to make Airworthiness Directives (AD) to mandate the replacement of the interior tubes with new tubes at the time of overhauls and issued the directives.

In addition, the Federal Aviation Administration mandated in the said AD to inspect whether or not the outer tubes are installed appropriately and to replace them if they are not installed appropriately.

The engine manufacturer is currently reviewing the possibility of changing the tube design.

* The report (original) from the Federal Aviation Administration is shown on the home page of the Board.
http://www.mlit.go.jp/jtsb/airkankoku/anzenkankoku5re_130726.pdf

9 Information dissemination in the process of investigations in 2013

The JTSB disseminated information on the following two cases (one aircraft accident and one aircraft serious incident) in 2013. The information is summarized below.

① Aircraft serious incident involving a Bombardier CL-600-2B19, registered JA206J, operated by J-Air Co., Ltd.

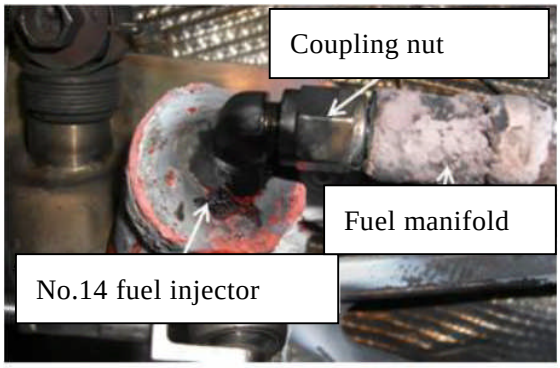
(Disseminated on June 6, 2013)

The JTSB disseminated information regarding the aircraft serious incident (fire within an engine fire-prevention area) involving Bombardier CL-600-2B19, which occurred on May 6, 2013, as follows to the Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism:

(Information dissemination)

As a result of the investigation up until now, the following point has been clarified with regard to the right engine:

Wet motoring check discovered that there was a fuel leak around the coupling nut installed on the fuel manifold used to joint with No.14 fuel injector. On further detailed investigation, it was confirmed that the said coupling nut was loose. When the said coupling nut was tightened according to the specified torque, fuel leak was no longer confirmed.



Nut area where a leak was confirmed

* This information dissemination is shown on the home page of the Board.
http://www.mlit.go.jp/jtsb/iken-teikyo/JA206J20130606.pdf

② Aircraft accident involving a privately owned Fuji Heavy Industries FA-200-160, registered JA3492

(Disseminated on October 29, 2013)

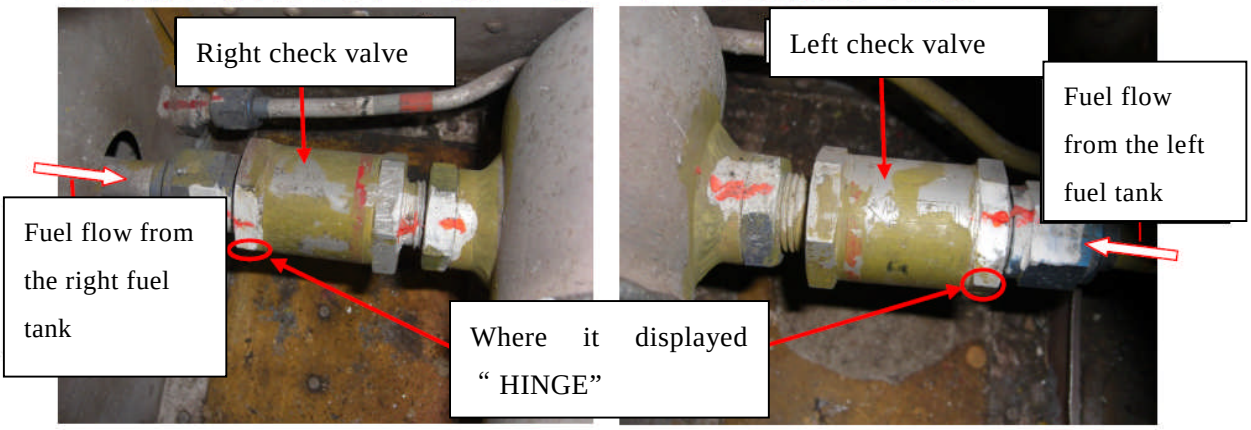
The JTSB disseminated information regarding the aircraft accident involving a privately owned Fuji Heavy Industries FA-200-160, which occurred on September 23, 2013, as follows to the Civil Aviation Bureau, the Ministry of Land, Infrastructure, Transport and Tourism:

(Information dissemination)

As a result of the investigation up until now, the following point has been clarified with regard to part installation:

The service manual of this aircraft states "When installing the check valve at the exit of the fuel injection nozzle in models up to #100, install the valve so that the side which indicates 'HINGE' is installed on top" as a caution. However, the said check valves on the left and right were installed sideways, which were shifted by approximately 90 to 120 degrees from the specified position.
Investigation to determine whether or not this matter directly affected this accident is in progress.

- Check valve that was actually installed (photos taken from the front)

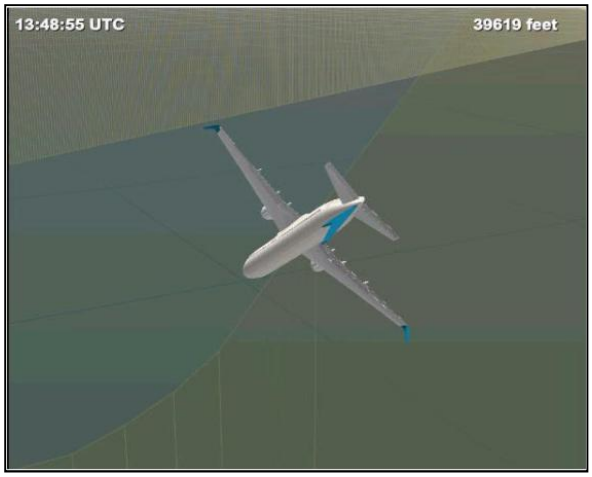


* This information dissemination is shown on the home page of the Board.
http://www.mlit.go.jp/jtsb/iken-teikyo/JA349220131029.pdf

Column

Accident Investigator Recorder (AIR) Meeting

Aircraft accident investigator



I think some of you may have seen the image on the right in a video form on TV news. The video was released to the press by JTSB regarding the incident of the aircraft sudden nosedive occurred over the Pacific on September 6, 2011.

This video was prepared by an aircraft accident investigation charge of analysis in JTSB. In this column, I would like to introduce the “Accident Investigator Recorder (AIR) Meeting”, in which officers in charge of analysis participate every year.

Needless to say, the video that you saw was not prepared with the skills and intuitions of officers in charge of analysis. The video was prepared by using special software based on the data that was recorded/stored in the aircraft. The data was recorded/stored in the flight recorder (generally referred to as “black box”). Flight recorder records the attitude/altitude/speed of the aircraft, pilot operations, conversations inside of the cockpit, etc.

It is the duty of officers in charge of analysis to analyze the course of events before the accident based on these records and communicate the accident occurrence mechanism and the probable causes of the accident to the public as accurately as possible.

In recent years, manufacturers have been developing new types of flight recorders every year. Not only flight recorders but also GPS receivers and smartphones carried by pilots sometimes contain data that would inform us of the course of aircraft involved in the accident with cases of small aeroplanes, etc. Such devices are often collected broken in crash accidents, etc.

Since there are not many accidents that require us to extract data from such devices to analyze, it is sometimes extremely difficult to respond to all of the aspects, extract as much data as possible, and analyze the data accurately with the experience and technologies of one country alone.

The AIR Meeting is held to address such issues. Officers in charge of analysis from all over the world get together, share topics from accident investigations in their countries, introduce the analysis performance of new flight recorders and acquisition of data from broken flight recorders and smartphones, etc. We strive to share information on our experiences and technologies. Furthermore, officers in charge of analysis from all over the world deepen relationships through these meetings, reinforcing the cooperative system.

In 2013, the meeting was held in Braunschweig, Germany. A total of 28 people from accident investigation organizations and aircraft manufacturers, etc. from 15 countries and regions gathered and had educational presentations on data extraction in the semiconductor chip level from a broken flight recorder, etc. We hope to utilize the shared information and human connections to swiftly conduct accurate analysis when similar accidents occur in Japan. The meeting is scheduled to be held in Singapore in 2014.

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

Crashed in mountains while flying with hoisted external cargo

Aerospatiale AS332L, registered JA9635, operated by Aero Asahi Corporation

Summary of the accident: On Sunday, September 26, 2010, The aircraft took off for sling load cargo transport from Yakusugi Land temporary helipad located in Yakushima-Town, Kumage-Gun, Kagoshima Prefecture, and crashed into the mountain slope near Kigensugi cedar tree in Yakushima-Town at about 07:50 Japan Standard Time. Onboard the helicopter were a pilot and a loadmaster, and both of them suffered fatal injuries. The helicopter was destroyed and consumed by fire.

Findings

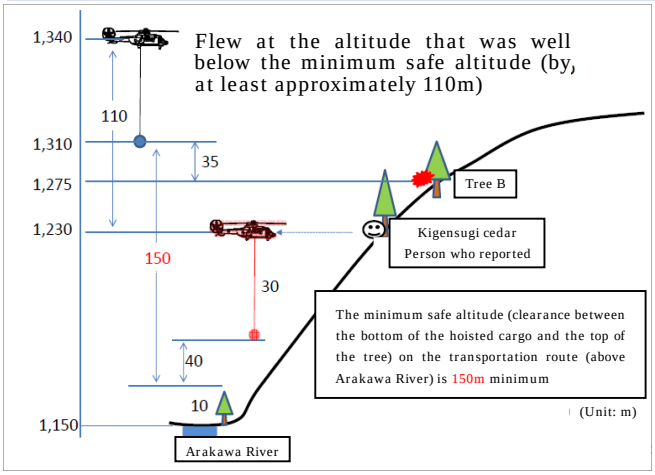
It was possible to change the direction above the Arakawa River if they had carried out OGE hovering (*1), which requires a significant power change, but it is probable that the pilot selected a left turn, which was more easily operated. As a result, the aircraft approached the slope, resulting in the hoisted cargo being caught in ground objects, such as tree B branches or rock A, etc. Below are probable reasons.

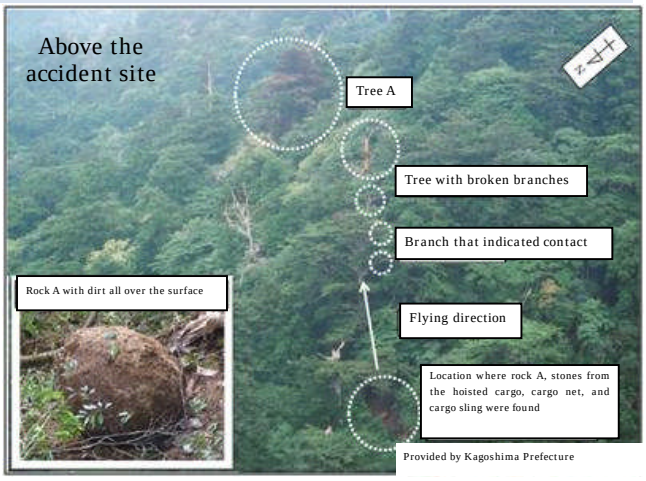
※1 Out of Ground Effect hovering (hovering at an altitude approximately larger than half the length of a main rotor diameter where the ground reaction force created by the main rotor downwash is unavailable)

① It is highly probable that the aircraft was flying at the altitude that was well below the minimum safe altitude on the transportation route for this cargo.

② It is somewhat likely that the pilot restrained the climbing during the turn to avoid the cloud because the opening between the flying altitude and the cloud base was small when they started the left turn, despite the fact that the aircraft at the time of the accident had sufficient climbing capability could avoid collision with ground objects.

③ It is somewhat likely that the pilot misjudged the clearance between the bottom of the hoisted cargo and the top of the tree because it was difficult to watch left downward since the aircraft turned left, whereas the pilot was sitting on the right seat and became the turning was made, an approximately 30m long hoisted cargo.





Probable causes: In this accident, it is probable that the helicopter, while flying in the mountain valley with underslung external cargo, made a left turn to return back, crashed after nearing the slope with its underslung cargo caught in ground objects during the maneuver. The post-crash fire consumed the helicopter and the pilot and loadmaster suffered fatal injuries. The following are possible reasons why the helicopter came close to the slope during the left turn, and the underslung cargo came to be caught in ground objects: executable OGE hovering for turn-back was not carried out; en route altitude was well below Minimum Safety Altitude; the climb rate was restrained during the left turn as the clearance under the cloud base was small; and the miss judgment on clearance between the cargo and the ground objects.

For details, please refer to the investigation report. (Published in Japanese on January 25, 2013)
http://www.mlit.go.jp/jtsb/eng-air_report/JA9635.pdf

Cargo aircraft repeatedly bounced at the time of landing, and the aircraft sustained substantial damage and had a fire

McDonnell Douglas MD-11F, registered N526FE, operated by Federal Express Corporation

Summary of the accident: On March 23 (Monday), 2009, about 06:49 Japan Standard, a McDonnell Douglas MD-11F, operated by Federal Express Corporation as the scheduled cargo flight FDX80, bounced repeatedly during landing on Runway 34L at Narita International Airport. During the course of bouncing, its left wing was broken and separated from the fuselage attaching point and the airplane caught fire. The airplane rolled over to the left being engulfed in flames, swerved off the runway to the left and came to rest inverted in a grass area. The Pilot in Command (PIC) and the First Officer (FO) were on board the airplane, and both of them suffered fatal injuries. The airplane was destroyed and the post-crash fire consumed most parts.

There were the pilot and one F/O on board the aircraft, and both suffered fatal injuries.

Findings

It is highly probable that the aircraft bounced after the touchdown due to the facts that it received strong ground reaction force due to the sink rate (approximately 7 fps) that was greater than usual and that the lift at the time of touchdown was great enough to bounce the aircraft (vertical acceleration rate immediately before the touchdown was approximately 1.24G)

It is somewhat likely that it was difficult for the PF (*1) to understand that the aircraft bounced since the pilot's view continuously approached the ground, due to the fact that the pitch angle for the aircraft reduced as it bounced.

*1 Pilot that is mainly in charge of operations

It is somewhat likely that it was difficult for the PF to accurately determine the pitch angle and altitude during the bounce, resulting in the PF judging that the PF can operate only with the control stick without feeling the necessity of operating the thrust lever.

Probable causes: In this accident, when the airplane landed on Runway 34L at Narita International Airport, it fell into porpoising (*2). It is highly probable that the left wing fractured as the load transferred from the left MLG to the left wing structure on the third touchdown surpassed the design limit (ultimate load). It is highly probable that a fire broke out as the fuel spillage from the left wing caught fire, and the airplane swerved left off the runway rolling to the left and came to rest inverted on the grass area.

*2 A phenomenon in which the airplane repeats bounces with increasing with increasing oscillatory pitch motions.

For details, please refer to the investigation report. (Published in Japanese on April 26, 2013)
http://www.mlit.go.jp/jtsb/eng-air_report/N526FE.pdf

A fire broke out in the rear hold during a power transmission lines inspection flight, and the aircraft was engulfed in flames after an emergency landing

Eurocopter AS350B3, registered JA6522, operated by Shikoku Air Service Co., Ltd.

Summary of the accident: On Thursday, September 22, 2011, the aircraft took off from Takamatsu Airport at around 09:23 Japan Standard Time for power transmission lines inspection flight. A burnt smell and white smoke rose in the cabin during this flight, and at around 10:10, the helicopter made a forced landing at a baseball field located at Hiketa, Higashikagawa City, Kagawa Prefecture. On board the helicopter were a pilot and two passengers, but none of them suffered injury. After the forced landing, the helicopter caught fire and was destroyed.

Findings

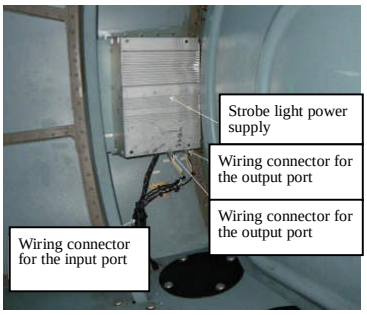
The strobe light power supply (*1) was installed behind the right side of the rear hold, and the input/output wiring extended from the device toward under the floor. However, the wiring was not protected from contacting cargo with rigid housing, etc.

*1 Device that supplies power source to strobe light that is installed on the either side of the horizontal stabilizer to prevent collision

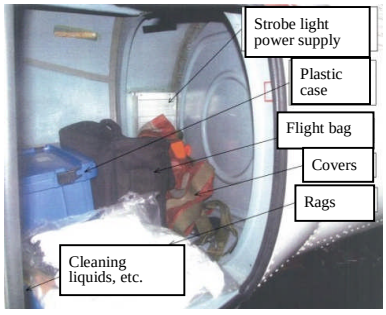
It is highly probable that the wiring was in contact with the cargo when the cargo was moved or stored/removed

It is somewhat likely that the cargo moved depending on aircraft vibration or acceleration speed. It is also highly probable that the fire spreaded to the cargo after it broke out.

[Situation of the strobe light power supply]



[Situation of the embarkation in the rear hold]



[Situation of the emergency landing]
Flame and grey smoke came from near the rear hold, and the tail boom fell off

Other safety-related matters that came to light

[Transporting explosives and other dangerous goods]
There were 4 pieces of cargo that fell under to “explosives and other dangerous goods” specified by Article 194 of the Ordinance for Enforcement of the Civil Aeronautics Act in the rear hold. It is probable that one of them was not being transported according to the method specified by the standards.

[Description of emergency procedures in the flight manual]
It is probable that the pilot had not memorized the emergency procedures in case of an uncertain smoke source because he had thought that it would be sufficient to follow procedures as he read the checklist. In addition, the flight manual of the aircraft had not manifested the emergency procedures that must be dealt with immediately by

Probable causes: In this accident, it is highly probable that a fire occurred in the rear hold of the Helicopter. Regarding a fire in the rear hold, it could not be identified the ignition source; nevertheless it is possible that a fire occurred from the wiring connected to the strobe light power supply, which was installed in the rear hold, and that it spread to inflammables placed around the power supply. This is because the wiring was not designed and structured so that it was fully protected so as to prevent it from being damaged due to the movement of embarkation and preclude a risk of occurring a fire even if it was damaged or destroyed. It is also possible that since it was not covered with nets to prevent its movement, embarkation in the rear hold damaged the wiring, which was not fully protected from damage due to the movement of the embarkation.

For details, please refer to the investigation report. (Published in Japanese on June 28, 2013)
http://www.mlit.go.jp/jtsb/eng-air_report/JA6522.pdf

Aircraft approached clouds covering the mountain and collided into the slope during flight training of a student

Beechcraft A36, registered JA4215, operated by Obihiro Branch School of the Independent Administrative Institution Civil Aviation College

Summary of the accident: On Thursday, July 28, 2011, The aircraft took off from Obihiro Airport for flight training at 09:11 Japan Standard Time. At around 09:22, when practicing basic instrument flight in the training and testing area, the airplane crashed into the slope of Mt. Tsurugi in Memuro-cho, Kasai-gun, Hokkaido. On board the airplane were four persons: an instructor who was captain, two students, and an instructor in educational and research flight. Three of them: the captain, one of the students, and other instructor suffered fatal injuries, and the remaining student sustained serious injury. The airplane was destroyed and a post-crash fire broke out.

Findings

The instructor who was the pilot had conducted the unsafe behavior of illegally entering clouds for training before, but the matter was not comprehended by the organization.

↓

Approaching clouds under VFR (*1) is a violation

□1 Flight method in which the pilot operates the aircraft while maintaining the senses between ground surface, ground objects, and clouds, etc. by vision

↓

Approached clouds covering the mountain and collided into the slope during flight training operated by a hooded student under VFR

↓

It is somewhat likely that the safety management system of the Civil Aviation College was not appropriately functioning and that the working environment/organizational culture allowed unsafe behaviors

※ This accident occurred in the year after aircraft substantial damage accidents in 2 consecutive years
- November 5, 2010 Miyazaki Airport (coming to rest upon landing)
- October 30, 2009 Kagoshima Airport (fuselage landing)

Same model aircraft as the accident aircraft

Training at the time of the accident

* “Hood” here refers to a cover, which is used for instrument flight training, that a trainee wears on his head to only see the instruments and restrict his field of view from outside ground reference

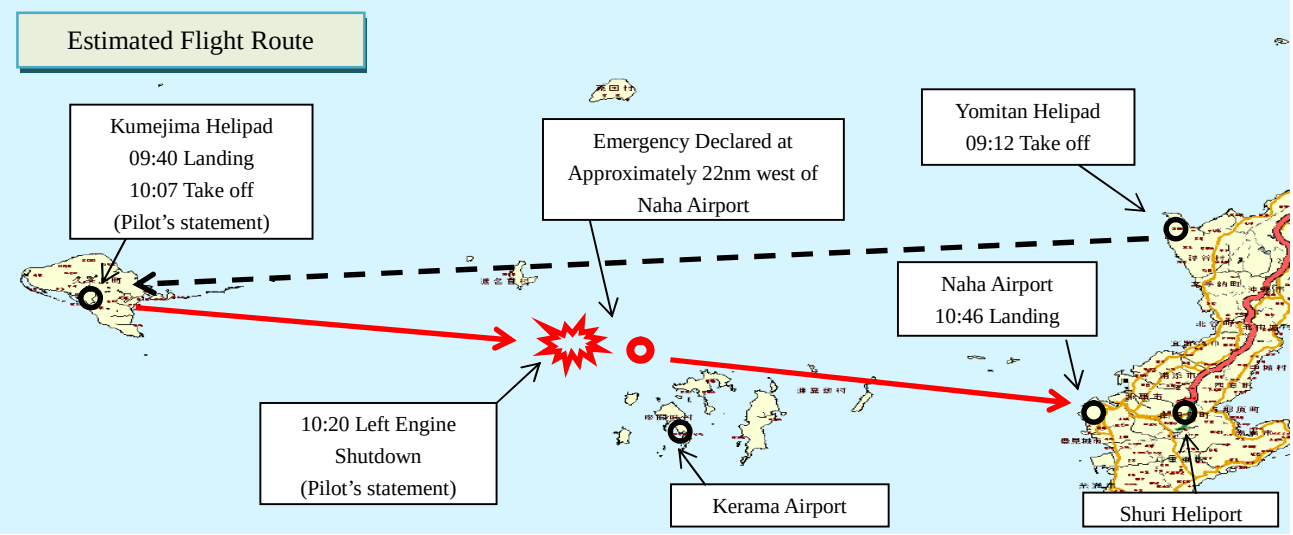
Probable causes: It is highly probable that the accident occurred as follows: The airplane conducting VFR BIF training operated by a hooded student was instructed by his instructor to fly into the mountainous area; It then flew into clouds or close to the clouds that covered the mountains, losing sight of ground references and approached the ground very close against the instructor’s expectation; The instructor took the controls from the student and attempted to evade the mountains, but the airplane failed to change its course to an appropriate direction and crashed into the slope of the mountain. It is somewhat likely that the instructor flew close to or into the clouds which covered the mountain with some intention; however, his death denied us the clarification his intention. It is somewhat likely that the basic safety policy of the College was not instilled into the field instructors, and that there was a gap in safety awareness between management and field instructors. It is also somewhat likely that behind the accident was a problem that involved the entire organization of the College—a work environment/organizational culture that consequently allowed unsafe behaviors.

For details, please refer to the investigation report. (Published in Japanese on December 20, 2013)
http://www.mlit.go.jp/jtsb/eng-air_report/JA4215.pdf

Engine damage while flying over the sea for emergency patient transportation

Eurocopter EC135T2, registered JA135E, operated by Hirata Gakuen

Summary of the accident: The aircraft took off from Kumejima Helipad at 10:07 Japan Standard Time on March 28, 2009 for emergency patient transportation. When the helicopter was flying over the sea enroute to Shuri Helipad on the main island of Okinawa, its left engine stopped around 10:20 at about 800 ft (about 240 m) about 6 nm (about 11 km) northwest of the Kerama Islands. It changed the destination to Naha Airport and landed there at 10:46. There were six persons on board, consisting of the pilot in command (PIC) and a mechanic, a doctor and a nurse as medical personnel, and an emergency patient and an attendant, but no one was injured. The inside of the left engine of the helicopter was destroyed, but there was no outbreak of fire. .

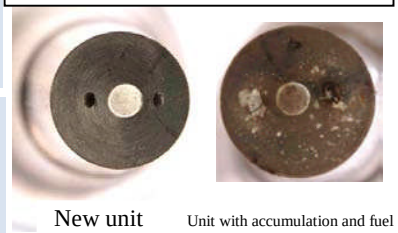


Findings

Due to the facts that salt ingredient in the accumulation on the fuel filter and injector was consistent with the ingredients of sea salt and that a trace of viscous sulfur was detected, etc., it is probable that the accumulation in the fuel filter is sea salt and that the accumulation in the injector is fungicide and sea salt.

Due to the facts that the fuel filters are filled with fuel from the fuel tank regardless of fuel pump operation and that fuel that has passed the fuel filters is injected by the injector, it is somewhat likely that sea salt that was mixed with the aircraft's fuel tank flowed with the fuel and accumulated in the fuel filters and injectors.

Injectors (2 fuel injection mouths)



New unit

Unit with accumulation and fuel injection mouth clogged

It is probable that the injectors located in the relatively lower part of the combustion chamber clogged because part of the fuel remaining in the fuel line (fuel that was not returned to the fuel tank) flowed into the injectors located in the relatively lower part of the combustion chamber as the air pressure in the combustion chamber decreased, and sea salt accumulated on the fungicide with increased viscosity by heat near the fuel injection mouth.

Probable causes: It is very likely that in this serious incident, the clogged injectors located relatively lower part of the left engine combustion chamber caused uneven fuel injection and combustion limited in the upper part, lead to a heat concentration to the Upper Structure resulting in engine interior damage. Sea salt accumulation on fungicide with increased viscosity by heat probably clogged the fuel nozzles. Improper use of fungicide is probable. The JTSB could not determine the route of the sea salt penetration.

For details, please refer to the investigation report. (Published in Japanese on September 27, 2013)
http://www.mlit.go.jp/jtsb/eng-air_report/JA135E.pdf

Chapter 3 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);

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) an accident found to be likely to have been caused owing to a railway officer's error in handling or owing to malfunction, injury, 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 that causes five or more casualties;

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 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</th><th>Train derailment</th><th>Train fire</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
(These refer to train accidents and do not include vehicle accidents on railways.*1)
[Ordinance 1-1]</td><td colspan="3">・Accidents involving the death of a passenger, crew member, etc.
・Accidents involving five or more casualties
・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., and accidents involving five or more casualties
[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: Among vehicle collisions, derailments, and fires on railways, accidents that fall under the category of level crossing accident, accidents against road traffics , or other accidents with casualties and which involve the death of a passenger, crewmember, etc. [Ordinance 1-2] or which are particularly rare and exceptional [Ordinance 1-3] are to be investigated.

(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.

The scope of railway accident investigations has been modified since April 1, 2014:

Railway Accidents

○Any fatal accident that occurs at a level crossing without an automatic barrier machine is to be investigated.

○The criteria has been modified for the subject of investigations regarding level crossing accidents, accidents against road traffic, or other accidents with casualties. It is now "A casualty figure of five or more, with at least one of the casualties dead."

○Any derailment accident involving a snowplow vehicle in operation has been excluded from the subject of investigations (except for especially extraordinary cases).

Tramway Accidents

○Any fatal accident that occurs at a level crossing without an automatic barrier machine is to be investigated.

○The criteria for the subject of investigations has been modified to "A casualty figure of five or more, with at least one of the casualties dead."

< 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 Tramway 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, injury, 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, injury, 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 in 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, injury, 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, injury, 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 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.]

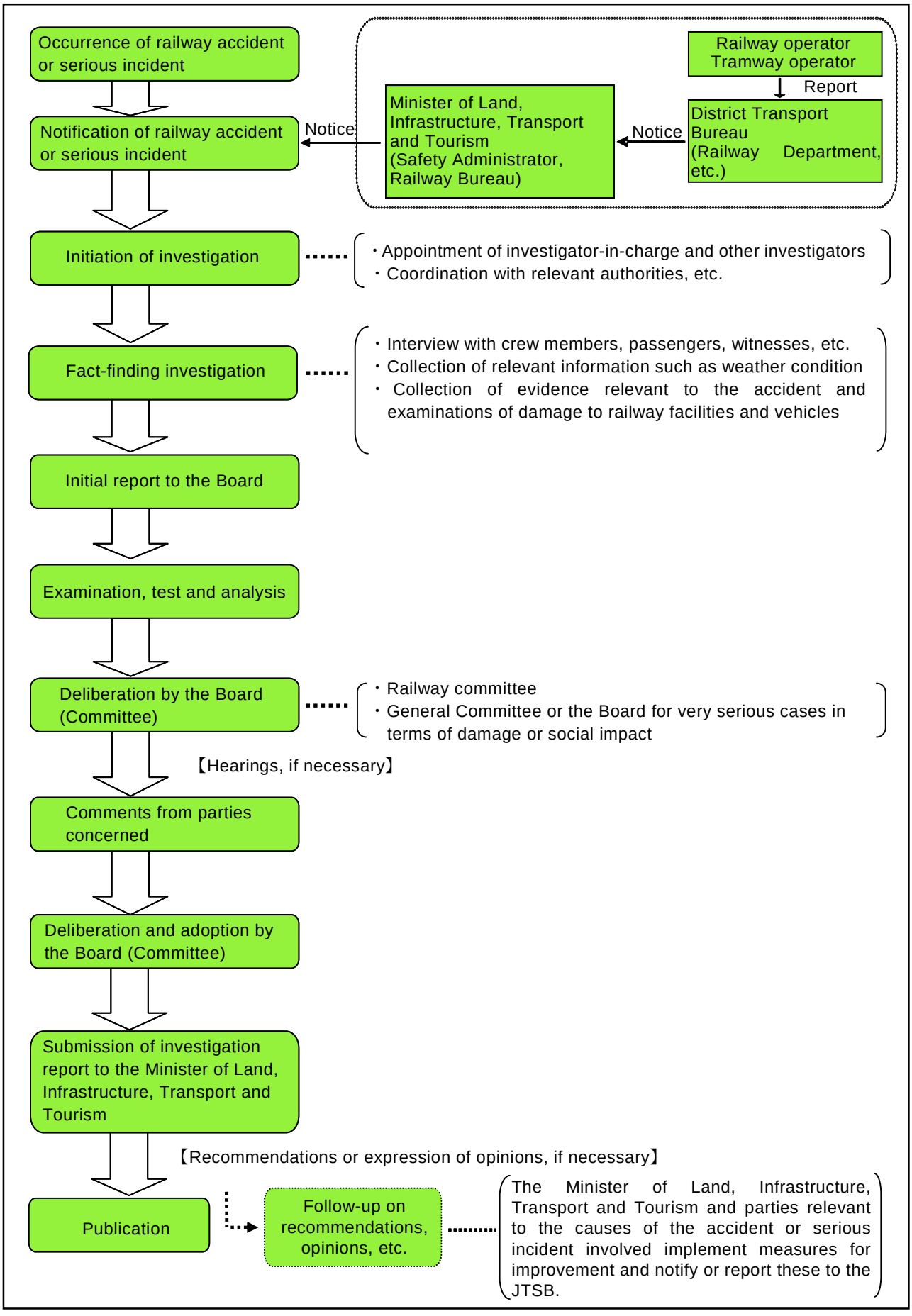
5 From among the situations occurring on a tramway operated under the application of the Ministerial Ordinances to Provide Technical Regulatory Standards Railways mutatis mutandis as specified in paragraph 1 of Article 3 of the Ordinance on Tramway Operations, the situations equivalent to those specified 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><th>Category</th><th>・Incorrect management of safety block (Railway)
・Incorrect management of safety block (Tramway)</th><th>・Incorrect indication of signal (Railway)
・Violating red signal</th><th>Dangerous damage in facilities</th><th>Dangerous trouble in vehicle</th><th>・Main track overrun
・Violating closure section for construction (Railway)
・Vehicle derailment (Railway)
・Heavy leakage of dangerous object
・Others</th></tr>
<tr><td rowspan="2">Railway
(including tramway operated as equivalent to railway)
[Notice 2-5]</td><td colspan="2">Certain conditions such as the presence of another train
[Ordinances 2-1, 2-2, and 2-3]</td><td colspan="2">Risk of collision, derailment or fire
[Ordinances 2-4/ 2-5]</td><td></td></tr>
<tr><td colspan="5">Incidents that are particularly rare and exceptional [Ordinance 2-6]</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 for the investigations of railway accidents and serious incidents

In 2013, the JTSB carried out investigations of railway accidents and serious incidents. The results are as follows. 23 accident investigations had been carried over from 2012, and 15 accident investigations were newly launched in 2013. 17 investigation reports were published in 2013, and 21 accident investigations were carried over to 2014.

Six railway serious incident investigations had been carried over from 2012, and two railway serious incident investigations were newly launched in 2013. Three investigation reports were published in 2013, and five railway serious incident investigations were carried over to 2014.

Of 20 published investigation reports, three were issued with recommendations.

Investigations of railway accidents and railway serious incidents in 2013

(Cases)

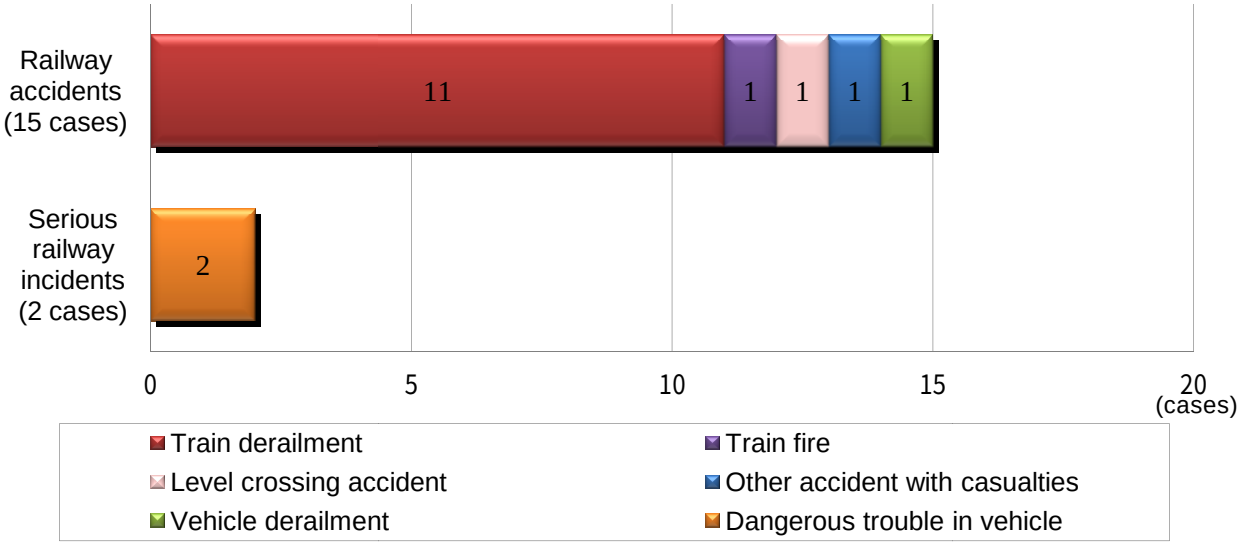
Category	Carried over from 2012	Launched in 2013	Total	Published investigation report	(Recommendations)	(Opinions)	(Remarks)	Carried over to 2014	(Interim reports)
Railway accidents	23	15	38	17	(2)	(0)	(0)	21	(0)
Railway serious incidents	6	2	8	3	(1)	(0)	(0)	5	(0)

4 Statistics for investigations launched in 2013

The railway accidents and railway serious incidents that were newly investigated in 2013 consisted of 15 railway accidents (down by five from the last year associated with 20 accidents) and two railway serious incidents (down by three from the last year associated with five incidents).

The breakdown by accident categories shows that the railway accidents are comprised of 11 train derailments, one train fire, one level crossing accident, one other accident with casualties, and one vehicle derailment. The railway serious incidents comprised of two dangerous troubles in vehicle.

Number of railway accidents and serious incidents by type



The number of casualties was 40 across the 15 accidents. These consisted of one death and 39 injured persons.

The number of casualties (in railway accidents)

(Persons)

2013							
Category	Dead			Injured			Total
	Crew	Passenger	Others	Crew	Passenger	Others	
Casualties	0	0	1	1	32	6	40
Total	1			39			

5 Summaries of railway accidents and serious incidents that occurred in 2013

The railway accidents and railway serious incidents that occurred in 2013 are summarized as follows. The summaries are based on the information available at the start of the investigations, and therefore may change depending on the course of investigations and deliberations.

(Railway accidents)

No.	Date and accident type	Operator and line section (location)	Summary
1	February 4, 2013 Train fire	East Japan Railway Company Between Tsukuda Station and Iwamoto Station, Joetsu Line (Gunma Prefecture)	While the train was running, the driver of the train felt a shock as if the cars were being pulled. He looked behind and noticed a fire from a car. He then stopped the train with the emergency brake. He was the only one in the train and he was not injured.

2	February 8, 2013 Train derailment	East Japan Railway Company Between Shimokita Station and Ominato Station, Ominato Line (Aomori Prefecture)	When the train was traveling near the Sanbonmatsu level crossing at about 60 km/h, the driver of the train sensed a shock. He then applied the brake to stop the train. He checked and found out the both of the axles in the front bogie of the first car had become derailed to the left. Out of the 11 passengers, the driver, and a track maintenance worker on board, no one died or was injured.
3	February 12, 2013 Train derailment (due to a level crossing accident)	Sanyo Electric Railway Co., Ltd. Between Iho Station and Arai Station, Main Line (Hyogo Prefecture)	While the train was running at about 95 km/h, the driver of the train noticed an obstacle at the Shinko Mae level crossing. The driver applied the emergency brake to stop the train. However, it was too late to avoid the collision with the car transportation vehicle. Out of the 50 to 60 passengers, the driver and the conductor on board, 15 people (13 passengers, the driver, and the automobile driver) were injured.
4	February 13, 2013 Other accidents with casualties	Keio Corporation Between Musashinodai Station and Tobitakyu Station, Keio Line (Tokyo)	While traveling along the left column section, the train hit a worker who was removing signal cables. The worker was died.
5	March 2, 2013 Train derailment	East Japan Railway Company Between Jinguji Station and Kariwano Station, Ou Line (Akita Prefecture)	While the train was running, the driver of the train noticed an unusual sound. He stopped to check, and found out that both of the axles in the front bogie of the first car had become derailed. None of the 130 passengers and crew members were injured.
6	April 6, 2013 Train derailment	East Japan Railway Company Between Myoko-kogen Station and Sekiyama Station, Shin-etsu Line (Niigata Prefecture)	While coasting operation at about 65 km/h, the driver of the train felt that the train cars were rising up. The driver applied the emergency brake to stop the train. A survey of the train cars revealed that both of the axles in the front bogie of the first car had become derailed to the right. Out of the 25 passengers and two crew members on board, no one was injured.
7	April 7, 2013 Train derailment (due to a level crossing accident)	East Japan Railway Company On the premises of Chigasaki Station, Tokaido Line (Kanagawa Prefecture)	The train collided with an automobile at the Jukkenzaka yard crossing in the premises of Chigasaki Station. Both axles in the front boogie of the first car were derailed. Out of the approximately 300 passengers and two crew members on board, one passenger were slightly injured. However, none of the three persons in the automobile were injured.
8	May 28, 2013 Train derailment	Kobe Electric Railway Co., Ltd. On the premises of Arimaguchi Station, Sanda Line (Hyogo Prefecture)	The driver of the train initially felt a shock when the train left from Arimaguchi Station. He applied the brake to stop the train. A survey revealed that both of the axles in the front bogie of the second car had become derailed to the right. Out of the 60 passengers and the driver on board, no one was injured.

9	July 31, 2013 Vehicle derailment	Nagasaki Electric Tramway Co., Ltd. Between Tsukimachi stop and Shimin Byoin Mae stop, Oura Branch Line (Nagasaki Prefecture)	The driver of the tram noticed a bus 10 m in front. It was on a regular route coming from the left into the car-track lane at the intersection. The driver applied the emergency brake. However, it was too late to avoid colliding with the right side of the bus. 60 passengers and the driver were in the car, and six passengers and the driver were in the bus. 13 of the passengers in the car and five of the passengers in the bus were injured.
10	August 17, 2013 Train derailment	Japan Freight Railway Company Between Yakumo Station and Yamakoshi Station, Hakodate Line (Hokkaido Prefecture)	The driver of the train noticed an obstacle in front and applied the emergency brake. After collision with the obstacle, he activated the one-touch operative emergency device, since the train appeared to be sinking. This was then followed by another impact from the upthrow. Both of the axles in the middle bogie of first car were derailed, as well as the second axles in the front bogie of the third and fourth cars. The second axle in the front bogie of the fifth car was also derailed from above the rail. The driver was on board. However, he was not injured.
11	September 17, 2013 Train derailment	East Japan Railway Company On the premises of Sagamiko Station, Chuo Line (Kanagawa Prefecture)	While the driver of the train was applying the brake to stop at Sagamiko Station, an automatic alarm started ringing when the train was running in several meters before the stop position. He then applied the emergency brake to stop the train. Out of the approximately 100 passengers and three crew members, no one was injured.
12	September 19, 2013 Train derailment	Japan Freight Railway Company On the premises of Onuma Station, Hakodate Line (Hokkaido Prefecture)	The driver of the train, sensing an abnormal feeling as if the cars were being pulled, applied the brake to stop the train. A survey revealed that both of the axles in the rear bogie of the sixth car, both of the axles in the front bogie of the seventh car, all four axles in the eighth car, and both of the axles in the front bogies of the ninth car had become derailed. The driver was the only one work on the train and was not injured.
13	November 5, 2013 Level crossing accident	Kyushu Railway Company On the premises of Takahashi Station, Sasebo Line (Saga Prefecture)	While running at about 50 km/h, the driver of the train noticed an obstacle at the level crossing in front and applied the emergency brake. However, it was too late to avoid a collision with the iron plates protruding from the loading platform of a trailer. Out of the 60 to 70 passengers and the driver on board, five passengers were injured.
14	November 24, 2013 Train derailment	Oigawa Railway Co., Ltd. On the premises of Igawa Station, Igawa Line (Shizuoka Prefecture)	The driver of the train heard an unusual sound while entering Igawa Station and stopped the train. A survey revealed that all of the axles in font bogie of first car were derailed. Out of the approximately 80 passengers, the driver, and the two conductors on board, no one was injured.

15	December 28, 2013 Train derailment	Isumi Railway Company Between Nishihata Station and Kazusa-nakano Station, Isumi Line (Chiba Prefecture)	The driver of the train noticed some unusual sound during operation and stopped the train to investigate. The driver found out that the first axle in the front bogie has become derailed. Out of the four passengers and the driver on board, no one was injured.

(Railway serious incidents)

No.	Date and incident type	Operator and line section (location)	Summary
1	January 7, 2013 Dangerous trouble in vehicle	Hokkaido Railway Company Between Tsunetoyo Signal Station and Kamiatsunai Station, Nemuro Line (Hokkaido Prefecture)	While driving at about 90 km/h, the door-pilot lamp went out. As a result, the driver of the train applied the emergency break to stop the train. A survey revealed that the door on the right side of the fifth car was open by about 30 cm. Out of the 37 passengers and two crew members on board, no one was injured.
2	July 6, 2013 Dangerous trouble in vehicle	Hokkaido Railway Company On the premises of Yamasaki Station, Hakodate Line (Hokkaido Prefecture)	While driving at about 130 km/h through the premises of Yamasaki Station, the driver of the train stopped the train after finding that the indicator for the engine operating status had turned off. The crew members noticed smoke coming out from beneath the fourth car. They used fire extinguishers to extinguish the fire. Out of the 200 passengers and four crew members on board, no one was injured.

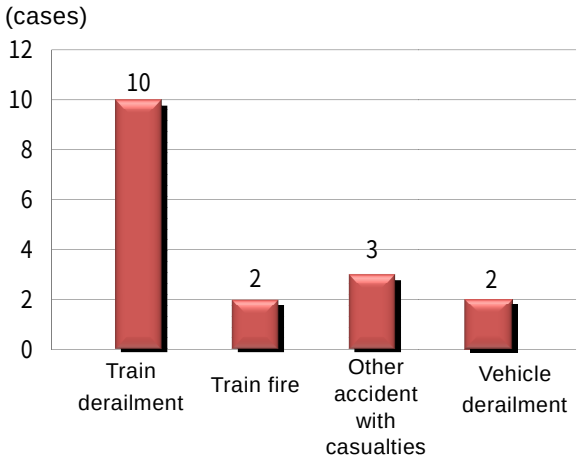
6 Publication of investigation reports

The number of investigation reports of railway accidents and serious incidents published in 2013 was 20. These consisted of 17 railway accidents and three serious incidents.

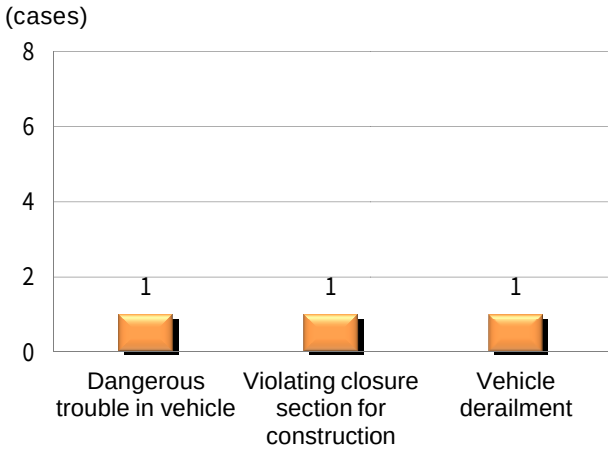
Breaking them down by category, the railway accidents contain ten train derailment accidents, two train fire accidents, three other accidents with casualties, and two vehicle derailment accidents. However, the serious railway incidents contain one dangerous trouble in vehicle, one violating closure section for construction violation of a section closed for construction, and one vehicle derailment.

In the 17 accidents, the number of casualties was 161, consisting of one death and 160 injured persons.

Railway accident reports (17 cases) published in 2013



Serious railway incident reports (three cases) published in 2013



The investigation reports for railway accidents and serious incidents published in 2013 are summarized as follows:

List of published investigation reports on railway accidents (2013)

No.	Date of publication	Date and accident type	Operator and line section (location)	Summary
1	February 22, 2013	March 11, 2011 Train derailment	East Japan Railway Company On the premises of Sendai Station, Tohoku Shinkansen Line (Miyagi Prefecture)	While the train was entering Sendai Station at a speed of about 72 km/h, the driver felt a strong vibration at the same time that the stop signal indicated in the cab signal. As a result, he applied the emergency brake. A review after the stop revealed that both of the axles in the front bogie of the fourth car were derailed to the left. This train was a test run, there were 12 vehicle inspection and repair worker and one crew member on board. However, no one was injured. Note that immediately before the accident occurred the 2011 Tohoku earthquake struck off the shore of Miyagi Prefecture with a moment magnitude of 9. This resulted in the observation of a maximum seismic intensity of 7 in the north of Miyagi Prefecture.

2	February 22, 2013	December 24, 2011 Train derailment	SEIBU RAILWAY Co., Ltd. On the premises of Higashi-Murayama Station, Seibuen Line (Tokyo)	After passing turnout No. 67 on the premises of Higashi-Murayama Station at a speed of about 32 km/h into Track 5 of the station, and when the head of the train passed the No. 66-I and RO turnouts, the driver of the train felt as if the train was being pulled from behind. Immediately after this situation, the driver noticed that the door-pilot lamp in the driver's cab had turned off for a moment. As a result, the driver applied the emergency brake. The train stopped after traveling for about 21 m after applying the brake. A survey after the stop revealed that both of the axles in the front bogie of the seventh car had become derailed to the right. Of the approximately 450 passengers and two crew members on board, no one was died or injured.
3	February 22, 2013	February 16, 2012 Train derailment	Japan Freight Railway Company On the premises of Higashi-Oiwake Station, Sekisho Line (Hokkaido Prefecture)	When entering Kawabata Station, the driver of the train was instructed by the train dispatcher of Hokkaido Railway Company that the train should pass a downbound limited express diesel train at Higashi-Oiwake, rather than at Kawabata Station. As the train was about to stop at Kawabata Station, the driver stopped briefly at the station and then departed immediately. He applied the brake to decrease the speed in order to stop at Higashi-Oiwake Station. However, the train entered into the safety siding without decreasing in speed. It penetrated the car stop and ran into the snow shelter. This resulted in the derailment of the first to fifth cars of the train, which had 16 cars in total. The only one driver was on board and was not injured.
4	February 22, 2013	March 7, 2012 Train derailment	Hokkaido Railway Company Between Hashibetsu Station and Mashike Station, Rumoi Line (Hokkaido Prefecture)	While coasting operation at about 55 km/h, the driver of the train noticed a pile of earth and sand mixed with snow about 100 m ahead on the tracks. Although he immediately applied the emergency brake, the train ran over the pile, resulting in derailment of all of the axles in the front bogie to the right. Out of the one passenger and one crew member on board, no one was injured. The front window at the driver's seat and some devices under the floor, including a snow plow, were damaged.

5	March 29, 2013	June 17, 2011 Other accidents with casualties	Nishi - Nippon Railroad Co., Ltd. Between Shimoori Station and Tofuro-mae Station, Tenjin Omuta Line (Fukuoka Prefecture)	While traveling in the left column section, the driver of the train heard a bang at the same time that overhead contact line suffered an outage. He applied the emergency brake to stop the train. At that time, sparks (or melted objects) scattered around the rear part of the third car. This caused a two-year-old passenger who was at rear right side of the car to be hurt in the abdomen. After an inspection, the train started operation again, but the service was ceased at Tofuro-mae Station and deadheaded to Chikushi Station. The cars were put into depot. After that, damage in the roof was discovered. 30 passengers and two crew members had been on board.
6	March 29, 2013	June 19, 2012 Train derailment	HAKONE TOZAN RAILWAY Co., Ltd. Between Deyama Signal Station and Ohiradai Station, Trail Line (Kanagawa Prefecture)	During a powering operation at about 20 km/h after departing from Deyama Signal Station, the driver of the train noticed a rock between the rails seven meters ahead. He immediately applied the emergency brake. However, it was too late to avoid a collision, which resulted in the derailment of the first axle in the front bogie of the first car to the left. 11 passengers and two crew members were on board, but there were no casualties. Some devices below the floor, including the water tank at the front and the foundation brake gear at the first axle of the front bogie, were damaged.
7	April 26, 2013	February 17, 2012 Other accidents with casualties	West Japan Railway Company On the premises of Nishi-Akashi Station, Sanyo Line (Hyogo Prefecture)	During a powering operation on the premises of Nishi-Akashi Station at a speed of about 106 km/h, the driver of the train realized that a general freight truck was traveling along the passage in front that crosses the railway. He immediately blew the whistle and applied the emergency brake. However, it was too late to avoid a collision with the truck. The train stopped at a point 404 m away from the intersection with the passage. Out of the 146 passengers and three crew members on board the train, nine passengers were injured. The driver on the truck was also injured in this accident. The front window glass and the coupler of the first car, as well as the window glass on the left side of the first to third cars were damaged, as well as other areas. No fire occurred despite the fact that the general freight truck was totaled.
8	May 31, 2013	May 27, 2011 Train derailment	Hokkaido Railway Company On the premises of Seifuzan Signal Station, Sekisho Line (Hokkaido Prefecture)	Refer to “7. Summaries of recommendations and opinions” (page 67-①).

9	June 28, 2013	January 4, 2012 Train fire	TOYAMA CHIHOU TETSUDOU. INC On the premises of Tateyama Station, Tateyama Line (Toyama Prefecture)	The driver of the train moved into the driver's cab in the first car, which faced the direction of travel, to prepare for departure for Dentetsu-Toyama Station. Upon doing so he discovered a fire on the floor around one meter behind the passenger door in the front right side of the car. Although he used a fire extinguisher to fight the fire, he failed to control it. Afterward, while some seats in the car were burnt, the firefighters extinguished the fire. None of the five passengers and the driver on board were injured.
10	July 26, 2013	April 4, 2012 Train fire	East Japan Railway Company On the premises of Kujiranami Station, Shin-etsu Line (Niigata Prefecture)	While operating the train at a speed of about 20 km/h due to operation control under strong winds, the driver of the train noticed an unusual sound, as well as two occurrences of an outage in the overhead contact line after coming out of the Kujiranami Tunnel. The other drivers on board checked the rear section and noticed flames around the pantograph at the front section of the second car. The driver applied the emergency brake to stop the train. The roof and ceiling around the pantograph has already become burnt, so they used extinguishers to try to control the fire. However, they were unable to control it. Afterward, firefighters arrived and extinguished the fire. Out of the 41 passengers and six crew members on board, no one was died or injured.
11	July 26, 2013	June 25, 2012 Train derailment	Shikoku Railway Company Between Konokawa Station and Iyo-Kaminada Station, Yosan Line (Ehime Prefecture)	While running the train in the section listed to the left column, the train driver noticed utility poles and piles of earth over the railway. He immediately applied the emergency brake but it was too late. The train ran into a mixture of sand and rocks and stopped with all four axles derailed. Only the driver was on board and was not injured. Some devices at the front end under the floor of the vehicle were damaged.
12	July 26, 2013	July 28, 2012 Train derailment	TOYAMA CHIHOU TETSUDOU.INC Between Kosugi Station and Kamihori Station, Kamidaki Line (Toyama Prefecture)	Refer to "7. Summaries of recommendations and opinions" (page 69-②).
13	August 30, 2013	July 24, 2012 Other accidents with casualties	Central Japan Railway Company On the premises of Higashi-Shizuoka Station, Tokaido Line (Shizuoka Prefecture)	During a coasting operation at a speed of about 92 km/h while making an entry into Higashi-Shizuoka Station, the driver of the train noticed a train watchman walking between the platform and the right-side rail of the down line in the station premises. He was walking in the direction of Shizuoka Station, with his back to the train. The driver blew the whistle and applied the service brake. However, the watchman did not escape to the outside of the railway. He then applied the emergency brake, but it was too late to avoid hitting the watchman, leading to his death. Slight damage was discovered on the right side of first car of the train. Out of the 29 passengers, the driver, and a conductor on board, no one was injured.

14	September 27, 2013	June 11, 2012 Vehicle derailment (caused by trouble with road traffic)	OKAYAMA ELECTRIC TRAMWAY Co Ltd. Between Kencho-dori stop and Saidaiji-cho stop, Higashiyama Main Line (Okayama Prefecture)	In the section from the Kencho-dori stop toward the Saidaiji-cho stop, the driver made the tram coasting operation at about 30 km/h. The driver of the tram noticed a automobile coming into the tram tracks from the opposite lane so that it could turn right at the intersection. The automobile was about ten meters in front of the tram. Although the tram driver immediately applied the emergency brake, the electric tram collided with the automobile, went through the intersection, and stopped at a point about 20 m ahead in a derailed state. The automobile collided with a utility pole and stopped. Out of the 71 passengers and the driver on board the tram, eight passengers were injured. The only one driver was in the automobile and was not injured.
15	September 27, 2013	September 15, 2012 Vehicle derailment (caused by trouble with road traffic)	Tosa Electric Railway Co., Ltd. Between Nagasaki stop and Kogome-dori stop, Gomen Line (Kochi Prefecture)	During a powering operation through the line along National Route (NR) 195 at a speed of about 30 km/h, the train driver noticed a general freight hauler with a large trailer coming into the intersection of NR 195 and NR 32 from the left. This occurred within the section described in the left column. He immediately blew the whistle and applied the emergency brake. However, it collided with the hauler. The train was stopped and was derailed to the right. Out of the ten passengers and the driver on board, four of the passengers and the driver were injured. A driver on the general hauler was also injured. The train suffered damages to the windows at the front and in the passenger room. The hauler also suffered damages to the front and right side surface of the body. No fire happened in the general freight hauler.
16	September 27, 2013	September 24, 2012 Train derailment	Keikyu Corporation Between Oppama Station and Keikyu Taura Station, Main Line (Kanagawa Prefecture)	During a coasting operation at about 72 km/h, the driver of the train noticed a pile of earth and sand on the tracks 30-40 meters ahead. He immediately applied the emergency brake, but it was too late to avoid running into the pile of sand. The train stopped after traveling a further 84 m. All the four axles in the first car, both of the axles in the front bogie of the second car, and both of axles in the front bogie of the third car were derailed to the right. When the train stopped, the part of the train from first car to the middle of fourth car was in the Funakoshi Daiichi Tunnel. Out of the approximately 700 passengers and two crew members on board, 55 passengers and the driver were injured.
17	December 20, 2013	December 15, 2012 Train derailment	Kyushu Railway Company Between Setoishi Station and Kaiji Station, Hisatsu Line (Kumamoto Prefecture)	After the train went out of the Koudabe Tunnel and went through a right curve, the driver noticed a large rock about 30 m ahead on the tracks. Although he immediately applied the emergency brake, it was too late to avoid the collision with the rock before stopping. A check by the driver revealed that the second axle in the front bogie of the second car had become derailed to the left. Out of the 45 passengers and two crew members on board, no one was injured.

List of published investigation reports on serious railway incidents (2013)

No.	Date of publication	Date and incident type	Operator and line section (location)	Summary
1	October 25, 2013	June 27, 2012 Vehicle derailment	Sangi Railway Co., Ltd. On the premises of Higashi-Fujiwara Station, Sangi Line (Mie Prefecture)	Refer to "7. Summaries of recommendations and opinions" (page 70-③).
2	November 29, 2013	August 9, 2011 Dangerous trouble in vehicle	Tenryu Hamanako Railroad Co., Ltd. Between Hamamatsu Daigaku Mae Station and Miyakoda Station, Tenryu Hamanako Line (Shizuoka Prefecture)	While applying the brake to stop at Miyakoda Station, the driver of the train used the brake handle to stop the train immediately after the passenger door in the front right section of the car opened. A survey after the stop revealed that the passenger door in the front right section of the car was fully open, and the passengers were coming into the train through the passenger door at the rear right side. Afterward, in accordance with the instructions from the operation dispatcher, the train was operated with the door that had been experiencing problems locked. The vehicle was exchanged for another one at Tenryu Futamata Station. There were dozens of passengers on the train, but no one was injured due to falling.
3	December 20, 2013	July 13, 2012 Violating closure section for construction	East Japan Railway Company On the premises of Takasaki Station, Takasaki Line (Gunma Prefecture)	The assistant stationmaster of Takasaki Station received an application to approve the launch of construction to close the railway for the up and down lines. This application was left from the construction manager. After confirming that the up line train in the Joetsu Line had departed from the section to be closed, he approved the launch. A down line train from Takasaki to Yokokawa of Shin-etsu Line departed from Track No. 6 on time, and made its way into the section to be closed after the approval.

7 Summaries of recommendations and opinions

The recommendations and opinions issued in 2013 were summarized below:

① Hokkaido Railway Company: Train derailment accident on the premises of Seifuzan Signal Station in the Sekisho Line

(Recommendation issued on May 31, 2013)

○ Summary of the accident

On May 27, 2011, an up line train of six cars, from Kushiro Station to Sapporo Station, operated by Hokkaido Railway Company, departed from Tomamu Station two minutes behind schedule.

While the train was running toward Seifuzan Signal Station, the conductor at the conductor's

cabin in the fourth car noticed unusual sounds and vibrations. As a result, the conductor notified the driver of the event. The driver immediately made arrangements to stop the train. It was in the Dai-ichi Niniu Tunnel on the premises of the signal station.

Smoke from a fire that broke out in one of the cars then came flying inside the other cars. The driver tried to move the train out of the tunnel, but the train would no longer start.

There were 248 passengers, the driver, the conductor and two cabin attendants on board train. All of them escaped out of the tunnel on foot. 78 passengers and the conductor were injured.

The first axle in the rear bogie of the fifth car was derailed to the left. One of the transmissions of the train in the rear of the fourth car was damaged. The components of the broken transmission were scattered around the line from 2 km back from the place that the train stopped. The fire burnt all the six cars of the train.

○ Probable Causes

In this accident, the falling off of the hanger pin for the reduction gear at the rear of fourth car was considered to be the cause of both the axles in the rear bogie of the fourth car, as well as the first axle in the rear bogie of the fifth car, becoming derailed. It is though that events proceeded as follows:

(1) The reduction gear was hanging down around the axle and facing frontward. The propeller shaft was also hanging down at a later stage. These factors resulted in damage to an universal joint and separation of the reducer gear and the propeller shaft.

(2) After the separation, the hanging part of the rotating reducer gear came into contact with one of the 12-RO turnout's lead rail while on the premises of Seifuzan Signal Station. This contact pushed the rear bogie of the fourth car to the left along the rail, causing the first axle and then the second axle to be derailed. The two axles then returned back to the line at the 11-I turnout.

(3) The bevel gears fell off from the hanged reduction gear and into the gauge. The rear bogie of the fifth car came in contact with the bevel gears. This caused the bogie to be pushed up, forcing the first axle to become derailed.

It is thought that the hanger pin for the reduction gear fell off in the following procedure of events. In terms of the cause, it is considered that the irregular circular shape of the left wheel of the first axle in the rear bogie of the fourth car played a role in the occurrence of the large vibration.

(1) The split pins of fluted hex nuts on the hanger pins for the reduction gear and cotter pins on the upper part of the hanger pins suffered a local abrasion due to contact with the other components.

(2) The loosened fluted hex nuts imposed a repetitive load on the split pins, resulting in them falling off.

(3) The fluted hex nuts then loosened even further and fell off.

(4) The cotter pins on the upper part of the hanger pins for the reduction gear fell off due to the repetitive load received from the hanger pins.

(5) After fluted hex nuts and cotter pins fell off, the hanger pins for the reduction gear also fell

from the prop stick of the reduction gear.

The cause of the cars of the train being burnt in this accident is considered to be the damage to the fuel tank at the front of the sixth car. This was caused by the fallen bevel gear of the reduction, which leaked light oil that scattered around the wooden railroad ties. A fire then broke out near the generator or the rear upper edge surface of the engine and spread to a wider area.

A overhaul analysis of the devices under the floor, which suffered considerable damage from the fire, as well as of the devices that generated heat during the operation, revealed that all of them were burnt by an external source. It was therefore impossible to identify the precise point that the fire broke out or its cause.

○ Description of the recommendation to Hokkaido Railway Company

Hokkaido Railway Company should establish proper plans and processes for inspection and thoroughly manage the state of the wheel treads. This is to prevent the use of wheels that have too much abrasion on their tread or too long peels.

② Toyama Chihou Tetsudou, Inc.: Train derailment accident between Kosugi Station and Kamihori Station, Kamidaki Line

(Recommendation issued on July 26, 2013)

○ Summary of the accident

On July 28 2012, a driver was operating a Toyama Chihou Tetsudou No. 624 two-car local train from Iwakuraji Station to Dentetsu-Toyama Station. On the way, he noticed unusual sounds and shocks when stopping at Kamihori Station. He then applied the emergency brake to immediately stop the train. A check after the train stopped revealed that all eight of the axles were derailed.

There were 20 passengers and the driver on board the train. No one was injured.

○ Probable Causes

In our opinion, at the outlet-side transition curve of the left-hand curve, which is followed by a reverse right-hand curve, the lateral displacement of the track (track irregularity) was larger than allowed under the maintenance criteria and decreased the fastening force of the rail fastening system. This caused the lateral force associated with the running of the train to extend the gauge, leading the left wheel inside the rail to derail to the right.

The causes of these are considered to be:

(1) The looseness of the bolts of the line's rail fastening system, which was caused by repetitive lateral force of trains. This had not been modified since the rail had been replaced two months before the accident.

(2) The excessive shifting of track that had not been modified. However the track irregularity was larger than allowed under the criteria for maintenance at the time of rail replacement, the rails had been in use with this situation not being addressed. Also, the result of a regular

inspection on the shifting of track after the rail replacement had remained unanalyzed.

○ Description of the recommendation to Toyama Chihou Tetsudou, Inc.

(1) Toyama Chihou Tetsudou, Inc. (TCT) should establish a solid management system for the maintenance of tracks. Within this system, the measurement results for the shifting of track should be analyzed and evaluated immediately after measurement. Any problems should be quickly resolved in accordance with an established repair plan.

(2) TCT should not only develop a detailed implementation plan regarding the following items, with the active involvement of its business administrations, including its safety management committee, but also properly manage the implementation status of such a plan.

① All the items of the preventive measures defined by TCT in response to the train derailment accident occurred on the premises of Nakakazumi Station in 2008.

② Thorough checks after working on the tracks and management of a fastening system for PC rail ties, as well as the management system for the maintenance of tracks that was developed in (1).

③ Sangi Railway Co., Ltd.: Serious railway incident on the premises of Higashi-Fujiwara Station on the Sangi Line

(Recommendation issued on October 25, 2013)

○ Summary of the serious incident

At about 3:00 P.M. on June 27 2012, one of Sangi Railway Co., Ltd.'s 18-car shunting train (two electric locomotives and 16 freight cars) sets started from the private siding of a cement factory for the downbound main line in Higashi-Fujiwara Station.

The driver of the train set, noticing an abnormal condition when it was passing the Higashi-Fujiwara No. 13-I turnout, immediately applied the emergency brake to stop the train. The first axle in the front bogie of the second locomotive was derailed to the right.

A driver was working in the second locomotive, and two guides were in the first one, as well as a switchman in the third one. None of them were injured.

○ Probable Causes

This serious incident occurred when the set of 18-car shunting train (two electric locomotives and 16 freight cars) was running along the section of the base line side of a turnout that goes in the same direction as the curve. The turnout was in a section that contained four consecutive curves. The situation was attributable to an increase in the derailment coefficient, which occurred at the same time as a decrease in the threshold derailment coefficient. As a result, the right wheel in the first axle of the second locomotive's front bogie subsequently ran up the outside rail and derailed to the right.

The increase in the derailment coefficient is considered to be a result of the increase in lateral force, as well as a decrease in the wheel weight. This situation can be deduced from the following

factors: the track was deformed in a direction that results in the reduction of the radius; the twist of the track increased so that the train leaned to the front right, and; it is assumed that the train was running with excess of cant, which was due to its low-speed. The shift of the axle load due to the power running at an ascent can also be considered as a factor.

The decrease in the threshold derailment coefficient is considered to result from a shifting of track, which is associated with an excessive reduction of the radius, resulting in an increase in the angle of attack for the first axle of the front bogie.

The rapid shifting of track and the increase in twists may have resulted from their poor management of the shapes and shifts of the tracks. They did not understand the specification of plain curves, or did not inspect the shifts of the tracks in the turnouts. As a result, they were not able to recognize that the state of the tracks exceeded the allowances of its maintenance criteria.

○ Description of the recommendation to Sangi Railway Co., Ltd.

Sangi Railway Co., Ltd. should make sure that their tracks are well maintained. They should do so by grasping the design values for maintenance and management and by inspecting shifts properly in accordance with the “Practice Criteria for construction works” in sections involving curves and/or turnouts.

8 Actions taken in response to recommendations in 2013

Actions taken in response to recommendations were reported with regard to one railway accident and one serious railway incident in 2013. Summaries of these reports are as follows.

① Hokkaido Railway Company: Serious railway incident on the premises of Oiwake Station, Sekisho Line (dangerous damage in facilities)

(Recommendation issued on November 30, 2012)

On November 30, 2012, the Japan Transport Safety Board (JTSB) published an investigation report and issued a recommendation to Hokkaido Railway Company, parties concerned, regarding the serious railway incidents that occurred on the premises of Oiwake Station in Sekisho Line between June 14 and June 16, 2011. JTSB then received the following report regarding the measures (implementation plans) to be taken based on the recommendation.

○ Summary of the serious incident

First incident:

On June 14 2011, one of Hokkaido Railway Company’s westbound one-car local trains from Oiwake Station to Sapporo Station departed from Track No. 1 at Oiwake Station on time.

A signaler at the station’s signal cabin noticed that even though the train departed from Track No. 1, the indicator of the track’s starting signal did not light off on the indicator panel to provide an indication to stop. Instead, it stayed lit-up in green. The sequence recorder of the interlocking device

stated that the starting signal did not indicate a red stop light at the time.

Second incident:

On June 14 2011, a westbound four-car local train from Sapporo to Obihiro departed from Track No. 1 in Oiwake Station on time.

The same signaler involved in the first incident noticed that even though the train departed from Track No. 1, the indicator for the track's starting signal did not light off on the indicator panel to provide an indication to stop. Instead, it stayed lit-up in green. The sequence recorder of the interlocking device stated that the starting signal did not indicate a red stop light at the time.

Third incident:

On June 15 2011, a westbound five-car local train from Sapporo to Obihiro departed from Track No. 1 in Oiwake Station on time.

A different signaler from the one involving the first and second incidents noticed that even though the train departed from Track No. 1, the indicator for the track's starting signal did not light off on the indicator panel to provide an indication to stop. Instead, it stayed lit-up in green. A construction worker also confirmed that the starting signal did not indicate the stop signal.

Fourth incident:

On June 16 2011, a westbound one-car local train from Chitose to Yubari departed from Track No. 4 in Oiwake Station two minutes behind the schedule.

A staff other than the ones involved in the first to third incidents noticed that even though the train departed from Track No. 4, the indicator for the track's starting signal did not light off on the indicator panel to provide an indication to stop. Instead, it stayed lit-up in green. The sequence recorder of the interlocking device stated that the starting signal did not indicate a red stop light at that time.

○ Probable Causes

This serious incident can be attributed to an incorrect circuit being made during the improvement work for the future implementation of CTC and PRC. In the circuit, the signal control relay for the starting signals received a feedback current when the westbound starting signals for Sekisho and Muroran lines were set up at the same time. Therefore, it is likely that every time a train reached the westbound starting signal for the Sekisho Line, the signal did not change from the proceed to stop indication.

In its wiring operation:

(1) No switching plugs were used to connect the anodes of the new relays to the existing facilities.

(2) The cathodes of the new relays were connected each other.

(3) New relays had been inserted into the relay rack.

Therefore, if the routes for Sekisho Line and for Muroran Line were set up at the same time, a circuit passing the cathodes of the interconnected new relays would be generated. This would result in the current flowing back into the signal control relay that corresponds to the configured route.

These likely to related to:

(1) Non-compliance with the provisions of its office regulation, which require a switching plug to be inserted into both the anodes and cathodes of the existing facilities when using a switching plug to improve these facilities.

(2) A lack of adherence to the rule that any wiring work to existing facilities that in any way improves an interlocking device as a signaling system should be regarded as having the possibility of influencing the operation of trains.

(3) The absence of a prior check for the portions related to wiring by using wiring diagrams showing the switching plugs. This was the case even though the electric connection diagrams were double-checked.

(4) The wiring was conducted before the wiring diagram had been approved.

(5) Improper progress management for the wiring.

It is possible that the absence of a prior check for the wiring diagrams of the portions was attributable to the situation where both the supervisor and the subcontractor of the wiring were busy with other construction work. This resulted in the omission of a large part of the prior check.

In this case, similar incidents occurred many times. The reasons for thinking this are because: a) even though the signal was not operating correctly (it did not indicate a stop light when it should have), it was not regarded as an incident, b) no emergency contact system was launched, and c) staff members did not properly take over their jobs.

○ Description of the recommendation to Hokkaido Railway Company

(1) Hokkaido Railway Company has defined its preventive measures as being: a) the need to develop a procedure for construction in order to avoid influences on the existing signaling system, including checks for the position of inserted switching plugs and checks for various drawings. As well as, b) the need for the operation manual to describe some of the measures to be taken when a signaler recognizes an event where a signal that should indicate a stop signal is not lighting off properly. These measures are considered effective for the prevention of reoccurrence. However, it is essential to continuously educate the company's employees so that they fully understand the point of these measures and take appropriate measures against any abnormal situations.

(2) The company also experienced a serious incident on the Hakodate Line on January 15, 2009 where a block signal that should have indicated a stop light did not so. This serious incident occurred despite the fact that some of the preventive measures had already been taken after the former incident. Considering this, the company should re-inspect the system for construction and the measurement methods, and train everyone engaged in construction, including outside partners, so that they can acquire the basic operations for construction related to signaling equipment. By doing so, they should discuss safety measures and take all necessary measures

to prevent any more serious events.

○ Measures to be taken based on the recommendation (implementation plan)

I. Ask for that preventive measures be understood and undertake continuous training of employees

1 Measures already taken

After this serious incident, we have taken the following four measures to prevent similar accidents relating to signal wiring:

① When using plug jacks, make sure to disconnect both sides of the wiring so as to avoid wiring to existing facilities while the lines active.

② So as to avoid making a circuit flowing current back into the circuit through relays, no relay should be inserted until the launch of the renewed facility, except for test runs.

③ The wiring of active lines to existing circuits should be treated as a task that can influence the operation of trains. This task should therefore be done only after a temporary stopping procedures for operating equipment.

④ In order to prevent errors in wiring, make sure to use approved drawings. Also make sure to hold a meeting between the supervisor and subcontractors to discuss in detail the specifics of the wiring, necessary procedures, and the impacts on existing facilities. Use the diagrams while doing so. Furthermore, make sure to control the progress of the wiring.

In addition, an instruction for station staff has been added to its station operation manual. It states that if they notice any false signal in the control panel or the display panel, they must force all the signals to indicate stop, as well as notify the train dispatcher and related manager of electric facilities of the event.

2 Measures to be taken later

Continuously conduct the educational training shown in (1) to (3) below, which relates to the purposes of the preventive measures.

(1) Educational training for those engaging in signal work

① For employees engaging in work on the signaling system, the following content should be added in the annual education curriculum developed in the electricity plan division, so that educational training can continue:

i. In the safety training for employees working with electricity, which is performed every year for all employees engaging in work with signaling system, the preventive measures should be taught.

ii. Every year after 2012, a joint education on interlocking devices and wiring should be performed for those who are engaging in the change of interlocking devices. Preventive measures are also taught for this area.

iii. Every year after 2012, we should perform practical trainings relating to the approval of drawings and wiring work, including hands-on training for wiring in training facilities. This is so we can enable anyone to perform wiring work in accordance to the

rules for wiring.

iv. Preventive measures should be taught in the on-site training for signaling protective systems (e.g., level crossing protective devices). These should be guided by the staff of the electricity planning division from 2012.

② Continuously train staff from any subcontractor in accordance with the following content:

i. In the education for those engaging in tasks directly related to the operation of trains, which is conducted every year by the electricity planning division, lectures on the preventive measures should be added to the curriculum for those engaging in the construction of signaling system.

ii. In the lecture about the qualifications that signal work technicians are required to finish once every three years, lectures on the preventive measures should be added to the curriculum.

iii. The purposes for the preventive measures should be added to the training materials produced by the subcontractors. The electricity planning divisions should check the achievement of the subcontractor's training for preventive measures. They should do so by looking at the achievement records.

③ Continued achievement of the education shown in ① and ② should be explicitly stated in our operation manual for construction of the train protection system.

(2) Education and training for station attendants

The following education about operations should be achieved for the station attendants so that they can take preventive measures as well as operation suspension arrangements. This is necessary in case they are forced to stop trains due to an accident or any related risks.

① The station operation manual and other materials should be used for the in-house training for existing station attendants and for the training for new signalers at each station. It should be used to teach detailed operations, such as the structure of automatic blocks and how to use the interlocking devices, as well as how to respond to failures in an interlocking device. The station planning division should make sure it is aware of the staff's degree of understanding and the educational records.

Furthermore, the station planning division should draft a guideline for the education of the station staff that specifies detailed steps, such as the structure of automatic blocks and how to use the interlocking devices, as well as how to respond to failures in an interlocking device.

② The station planning division should add how to respond to failures in an interlocking device to the curricula for the general training for station masters, signalers, and transport officers. The station planning division should grasp the degree of understanding through end-of-course examinations.

(3) Education and training for dispatchers

The example of this set of serious incidents should be added to the case studies of incidents taught in the in-house education. This will ensure that the trainees understand that

when they notice false signals in the display panel, or are notified of false signals in the station, they should set up all the related signals in the station yard to stop and notify the signal and communication dispatchers to inspect the facilities. To continue the education, our guideline for education and training for dispatchers should explicitly state that this item should be taught at least once a year.

II. Safety measures for construction of the signaling system

1 Measures already taken

After this serious incident, the measures of ① to ③ have already been taken as preventive measures:

① To reinforce the construction management systems, we have defined a rule that staff members at our construction technology center, which is in charge of design, should supervise constructions that change the actions of interlocking devices.

② In order to avoid mistakes or leaked items in the wiring diagram and test checklist for interlocking devices, a dedicated checker should be assigned to the electricity planning division to check wiring diagrams and test checklists. This should be done in addition to the conventional checks made by the Construction Technology Center, which is in charge of the supervision and electricity offices responsible for field construction. The reason for this is to reinforce the management system of drawings.

③ Before the launch of new or improved interlocking devices, a launch meeting should be held consisting of a selection of responsible staff. We have thus established a system of mutual checks for in-house examinations and construction structures.

2 Measures to be taken later

The electricity planning division should refer to examples of wiring used by other companies and conduct the following rechecks:

(1) Education and training have been undertaken for those engaging in the construction of signaling systems in the curriculum stated above in section I, such as for preventing serious incidents like this one. However, in addition to this, the staff members of the electricity planning division should also visit the office of the contractor to recheck whether the defined rules are being correctly performed regarding the quality management of documents and the progress for the wiring work. This includes checks for applied drawings, procedures of approval and adherence to the rules.

(2) We should recheck for discrepancies in the related regulations or insufficient content in the preventive measures for case studies of past accidents.

(3) We should immediately take safety measures against any problems identified in the checks stated above in (1) and (2). We should also teach these problems in the education stated above in I if necessary.

Based on the results of the checks the following actions should be taken. Firstly, the field

manager for construction should continuously check whether the defined rules and basic operations are being adhered to. Secondly, the electricity planning division should regularly inspect the items in (1), as well as the performance of safety checks. Thirdly, any problems that need to be corrected should be taught and instructed in a way that allows the workers to acquire the skills for basic operations as soon as they are identified. To realize these actions, standardize the inspection methods for safety checks and countermeasures in regards to problems and results.

* The implementation plan is available on the board's website:
http://www.mlit.go.jp/jtsb/railkankoku/railway-kankoku2re-1_20130220.pdf

② Hokkaido Railway Company: Train Accident on the premises of Seifuzan Signal Station in the Sekisho Line

(Recommendation issued on May 31, 2013)

On May 31 2013, the Japan Transport Safety Board (JTSB) published an investigation report and issued a recommendation to Hokkaido Railway Company, who was responsible for the accident. The report and recommendation were in regards the train accident that occurred on the premises of Seifuzan Signal Station in the Sekisho Line, which was managed by the company, on May 27 2011. The JTSB then received the following report regarding the measures (implementation plans) to be taken based on the recommendation.

○ Refer to "7. Summaries of recommendations and opinions (page 67-①)" for the overview, cause, and recommendation for the accident.

○ Measures to be taken based on the recommendation (implementation plan)

1 Measures already taken

Our vehicle planning division has already taken the following measures to strictly manage the states of wheels and tread surfaces:

(1) Continuous sets of detachments on the tread (detachments from abrasion or from heat cracks) are treated as single detachments. Daily inspections and regular inspections include checks for the state of the wheel treads, including checks for continuous detachments. If the inspection results reveal that the allowable criteria has been exceeded, operations are immediately stopped so that the wheels can be turned or replaced. These measures are to be detailed in the corporate regulation, which states the purpose of establishing a system of continuous inspections.

(2) It was decided in a meeting of wheel inspection managers that all the field staff must be instructed to observe the rule described in (1), in addition to the conventional criteria.

(3) We held a technical session for field managers and wheel management staff to educate them on the importance of wheel management and distinguishing unavailable wheels. We did so by reviewing actual wheels that had been damaged and lectures from wheel manufacturers.

(4) We drafted a document to help educate the wheel managers, and use this to reeducate the wheel management staff and daily inspection staff, as well.

(5) We held a new integrated training, known as the "Wheel Management Course." This was held in order to teach wheel management to the wheel management staff and daily inspection staff. This training should be stated in the Educational Guidance (annual education plan) and be held regularly.

(6) We delivered samples of wheels that contained detachments to the six places where vehicles are arranged. We did so to teach about heat cracks and wheel detachments to the wheel management staff and daily inspection staff.

(7) We determined that the interval of wheel turning, as an indication of car mileage, for the 283 Series diesel railcars is 100,000 km in the summer and 80,000 km in the winter. We made this standard known through the technical sessions for field managers and wheel management staff.

2 Measures to be taken later

To prevent similar accidents from occurring, our vehicle planning division should take the following measures to improve quality:

2.1. Items regarding wheel inspections

(1) Establish a system to constantly check the wheels for states of abrasion and detachment. This includes using a procedure to record any discovered abrasions or detachments below the criteria in the inspection book, which should be inspected again in order to understand how much the wheels have deteriorated.

(2) Staff in our vehicle planning division should visit each field twice a year to understand the status of wheel management and wheel inspections. They should also guide and review the inspection methods if necessary.

(3) Introduction at a system should be discussed as early as possible in order to continuously and quantitatively detect heat cracking and abrasions (including detachments) on the wheel. The system should be able to be executed while the train is operating and should be able to detect issues.

2.2. Items regarding the drafting of wheel turning intervals

(1) Since "detachment through heat cracks" is gradually generated around the wheel surface, we should investigate the relationship that it has with the vibration that occurs while the train is in operation. We should also investigate the progress of the detachment

over a period that covers multiple winters.

(2) Through the achievement of (1), we should try to optimize the wheel turning interval for each type of vehicle.

(3) We should validate the necessity of reviewing conventional criteria for the length of the tread cracks and detachments for high-speed vehicles, as well as for vehicles with wheels that have a small diameter.

* The implementation plan is available on the board's website:
http://www.mlit.go.jp/jtsb/railkankoku/railway-kankoku3re-1_20130809.pdf

9 Information dissemination in the process of investigations in 2013

There were no cases of information dissemination in 2013.

10 Summaries of major railway accident and serious incident investigation reports

The seismic vibration from the main shock of the Great East Japan Earthquake forced a Shinkansen train to be derailed

Train Derailment in Sendai Station, Tohoku Shinkansen Line, East Japan Railway Company

Summary: On Friday, March 11, 2011, a ten--car train set departed from the Sendai rolling stock depot on time at 2:40 P.M. During the train's entrance into Sendai station at 72 km/h, the driver felt a strong tremor and noticed at the same time that the stop signal had been activated in the cab signal. the driver immediately applied the emergency brake. After the stop, a review from inside and outside of the cars revealed that both axles in the front bogie of the fourth car had become derailed to the left.

It was a test run, and 12 vehicle inspectors and one crew member were on board. However, no one was killed or injured.

At 2:46 P.M. on the day that "the Great East Japan Earthquake" occurred, which had a moment magnitude of 9 centered at the shore of Miyagi Prefecture, the maximum seismic intensity of 7 was observed in the north of Miyagi Prefecture.

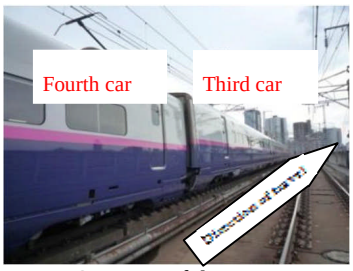
Findings

The train stopped just after the cars received strong horizontal vibrations. After that, vehicle inspectors confirmed the derailment. The train is presumed to have derailed due to the seismic vibrations from the main shock of the Great East Japan Earthquake.

It is somewhat likely that the external force of the Earthquake's seismic vibration caused the train to undergo upper center rolling (*1), which means that the wheels of both sides severely hit the rails as the train rolled.

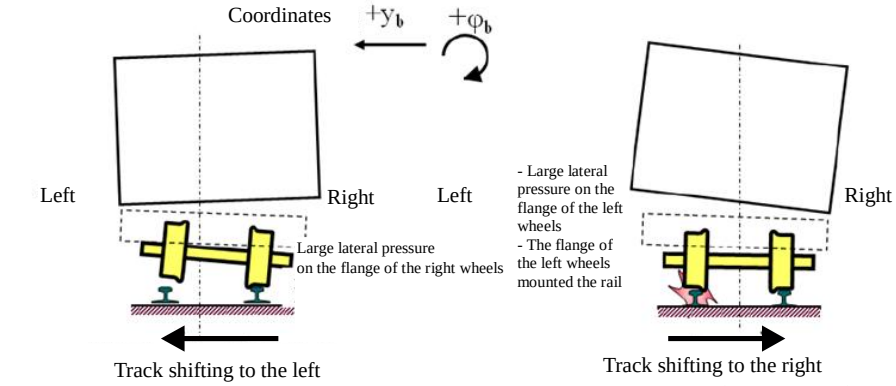
Considering the results of the vehicle movement simulations, the upper center rolling could have been caused by the large shaking at the No.3 Odawara viaduct, which had a frequency exceeding 1.5-1.7 Hz. Shaking of this magnitude is prone to generating upper center rolling of an orthogonal direction in the rails).

It is considered probable that out of the frequency components of the earthquake's seismic vibrations, the vibrations around 1.8 Hz, which are the natural frequency of the bridge, have enlarged significantly by resonance, even more so than the other frequency ranges.



Situation of the train

*1 The rotating movement of vehicles that is centered on the antero-posterior axis is called rolling; if the center of the rolling is above the barycenter, it is called "upper center rolling." It is also called "lower center rolling" if occurs under the barycenter. Whether the center of rolling is upper, lower, or a combination of both depends mainly on the vibration frequency.



(a) Large lateral pressure on the right wheels at near 60.5 sec
Left wheels rose 63 mm at near 60.6 sec

(b) Large lateral pressure on the left wheels just before 60.8 sec
Wheel flange just above the rail at near 60.8 sec

Movement of the train and cars just before derailment (conceptual diagram)

Vehicle Movement Simulation

We conducted a vehicle movement simulation that was similar to the method used to determine the cause of the train derailment accident in the Joetsu Shinkansen Line, which was caused by the Niigata Chuetsu Earthquake. (Simulation times are shown on the left)

Probable causes: It is considered highly probable that the train was derailed by the seismic vibration of the main shock from the Great East Japan Earthquake. It is also considered highly probable that, when the accident occurred there were no problems with the railway facilities including the tracks, the train or any of its operations. Furthermore, the time of the derailment is thought to be just after the time when the main shock from the Great East Japan Earthquake had arrived at Sendai city.

For details, please refer to the investigation report.
(Published in Japanese on February 22, 2013)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2013-1-1.pdf

A train moved onto the turnout's tongue rail, traveled in the incorrect direction, and then derailed

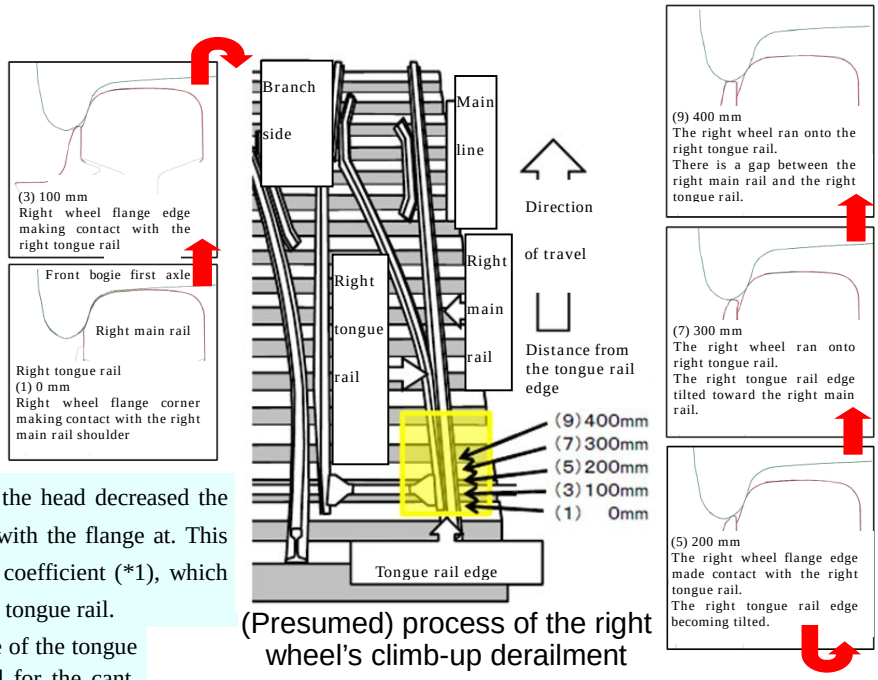
Train derailment accident in Higashi-murayama Station, Seibuen Line, Seibu Railway Co., Ltd.

Summary: On Saturday, December 24, 2011, an eight-car upbound train set departed from Seibuen Station on time. After passing turnout No. 67 on the premises of Higashi Murayama Station at a speed of 32 km/h into Track 5 of the station, the driver of the train felt as if the train was being pulled from behind when the front part of the train passed near I-RO turnout No. 66. Immediately after noticing this, the driver checked the instrument and noticed that the driver-noticing light had turned off for a moment. The driver then applied the emergency brake immediately. The train stopped after traveling for about 21 m after the brake. A survey after the stop revealed that the first and the second axles in the front bogie of the seventh car had become derailed to the right.

Out of the approximately 450 passengers and two crew members on board, no one was killed or injured.

Findings

It is considered probable that at curved turnouts in the same direction, if there is an excessive difference in the number of trains running between the main line and the branch line, the progress of abrasion in the rails will be also different between the lines, the gap between the main line rails and the tongue line rails was occurred to be a result of these differences, and the reason that the tongue rail head tilted towards the main rail.



(Presumed) process of the right wheel's climb-up derailment

It is considered probable that the tilt of the head decreased the angle that the tongue rail made contact with the flange at. This resulted in a lower threshold derailment coefficient (*1), which made it easier for the train to run onto the tongue rail.

The speed at the time of passing the edge of the tongue rail was lower than the balancing speed for the cant. Therefore, it is considered highly probable that, compared to the static wheel loads, the load on the left wheel increased while the load on the right wheel decreased.

With the increasing pressure to one of the axles from a left wheel to the right direction (lateral pressure), in addition to the decreased load on the right wheel, it is considered probable that the derailment coefficient probably increased. Derailment coefficient refers to the ratio of lateral pressure and the wheel load.

*1 The "threshold derailment coefficient" is calculated from the balancing equation of the wheel loads and the lateral pressure that affect the point of contact between the rail and wheel flanges when the wheel flange slides up on the rail. The larger the coefficient of friction, or the smaller the angle of contact (the angle of the wheel flange), the lower the threshold derailment coefficient becomes. When a derailment coefficient gets larger than the threshold, the possibility of derailment becomes greater.

*2 The "angle of attack" is the relative angle of the rolling wheel and the rail. The larger the angle is, the more dangerous the derailment becomes.

At turnout No. 67, the curve radius rapidly reduced from 300 m to 184 m. It is considered probable that this leads the angle of attack (*2) to increase.

As described above, it is considered probable that the branch line side of the turnout was prone to producing climb-up derailments. This is due to multiple factors. It is considered probable that this situation caused the vehicle to derail.

Probable causes: It is considered probable that this accident is thought to have the following background. The right wheel of the first axle in the front bogie of the seventh car slid up onto the outer tongue rail of No. 67 curved turnout in the same direction. This forced the train to enter the wrong direction to the main line side. The train was then pulled by its front cars in the branch line, causing the seventh car to become derailed to the right of the branch line rail.

For details, Please refer to the investigation report.
(Published in Japanese on February 22, 2013)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2013-1-2.pdf

Reduction gear parts fell from a diesel car that made contacted with a bogie, leading to derailment and fire

Train derailment accident at Seifuzan Signal Station, Sekisho Line, Hokkaido Railway Company

Summary: On Friday, May 27, 2011, a six-car upbound train set limited express train (Super Ozora 14) departed from Tomamu station two minutes behind schedule. While running the train for Seifuzan Signal Station, the conductor, who was in the conductor's cabin on the fourth car, heard unusual sounds and felt vibrations. The conductor notified the driver of the event. The driver immediately made arrangements to stop the train in the signal station's tunnel. Thereafter smoke from a fire that broke out in one of the cars poured inside of the other cars. The driver tried to move the train out of the tunnel, but the train would no longer start. The first axle in the rear bogie of the fifth car was derailed to the left, and the transmission at the rear of the fourth car was damaged. The components of the broken transmission were scattered around the line from 2 km back from the place that the train had stopped. The fire burnt all six of the train's cars.

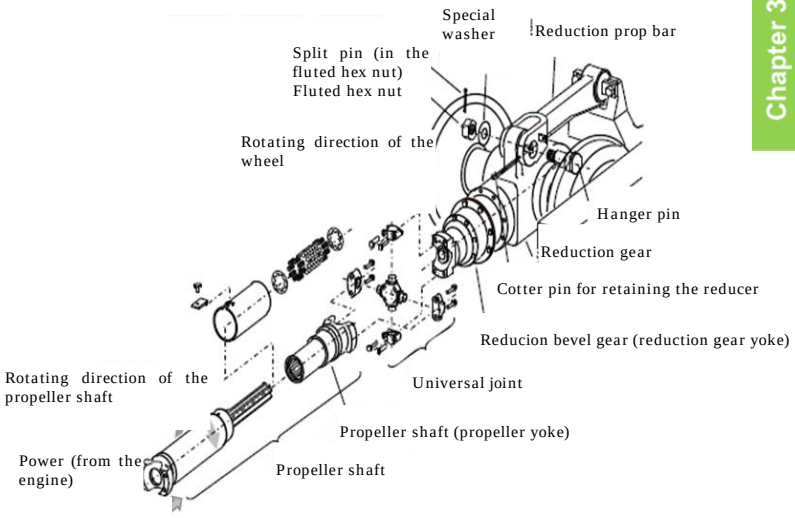
There were 248 passengers, the driver, the conductor and two crew members on board in the train. All of them escaped out of the tunnel on foot. 78 passengers and the conductor got injured.

Findings

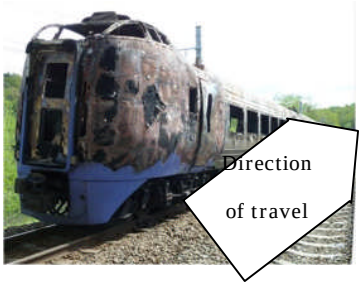
Operating with irregularly shaped wheels and dented tread can give significant vibrations on unsprung devices. It is considered probable that this leads to bolts loosening and devices falling out.

It is considered probable that the reason the fluted hex nuts' hanger pins fell off could be due to the repetitive effects of vibrations during the operation.

The hanger pins for the reduction gear fell off and then the reduction gear and propeller shaft started hanging down. This caused the reduction bevel gear on the universal joint to begin making contact with the propelling axle. After this, it is considered probable that the bevel gear was further dangled, resulting in the universal joint becoming locked and damaged.



Transmission system in the vehicle



Status of the burnt cars

The universal joint that was damaged could have led to the separation of the reducion gear and the propeller shaft. The external cylinder and the joints of the shaft had then fallen off, and lubricant oil had become scattered from the reducer. The reducion bevel gear dangled down began making contact with the sleepers. On top of this, the damaged reduction gear box then hit the dangled the reduction bevel gear, which is thought to have then caused the rear bogie of the fifth car to be pushed up, resulting in the first axle becoming derailed to the left.

The cause for the cars of the train to become burnt in this accident is thought to be the damage to the fuel tank at the front of the sixth car. This caused the light oil to scatter around the incinerated wooden rail sleepers. As a result, a fire broke out and spread from near the generator or the rear edge surface of the engine. It then expanded into the cars by entering in through their side windows.

Probable causes: This accident can be summarized as follows. It is considered probable that the hanger pins supporting the reduction gear at the rear of the fourth fallen off and by the reduction gear dangled and damaged both the axles in the rear bogie of the fourth car, as well as the first axle in the rear bogie of the fifth car to become derailed. The cars were burnt because of the leaked light oil that scattered around the wooden rail sleepers from the fuel tank at the front of the sixth car, which was damaged by the fallen bevel gear of the reduction gear. The oil caused the fire to break out near the generator or the rear edge surface of the engine. The fire then spread across a wide area.

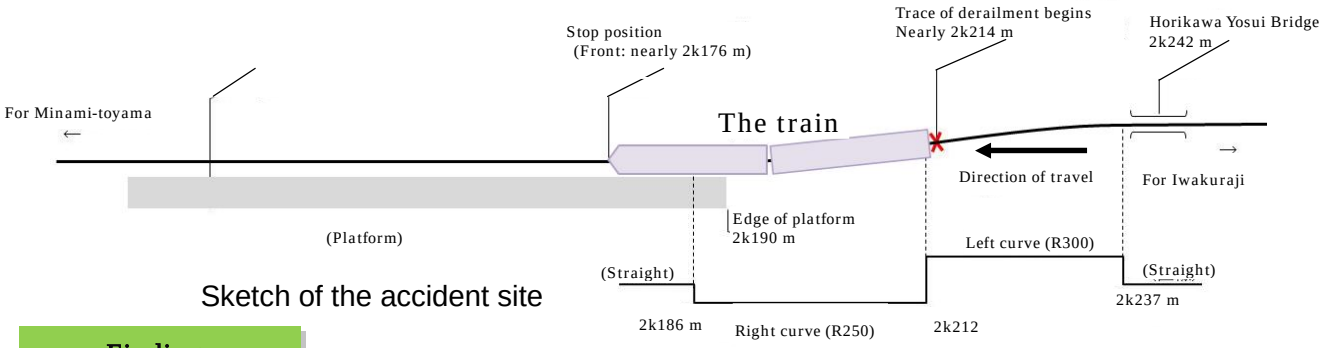
For details, please refer to the investigation report.
(Published in Japanese on May 31, 2013)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2013-4-1.pdf

By the fastening force of the rail fastening system degraded,facilitated gauge expansion due to lateral pressure, leading to derailment

Train derailment accident between Kosugi Station and Kamihori Station, Kamitaki Line Toyama Chiho Railroad Co., Ltd.

Summary: On Saturday, July 28, 2012, the driver of a two-car upbound train set noticed unusual sounds and shocks when stopping at Kamihori Station during a one-man operation. The driver applied the emergency brake to immediately stop the train. A check after the stop revealed that all the eight axles of the car had become derailed.

There were twenty passengers and two drivers on board the train. No one was killed or injured.



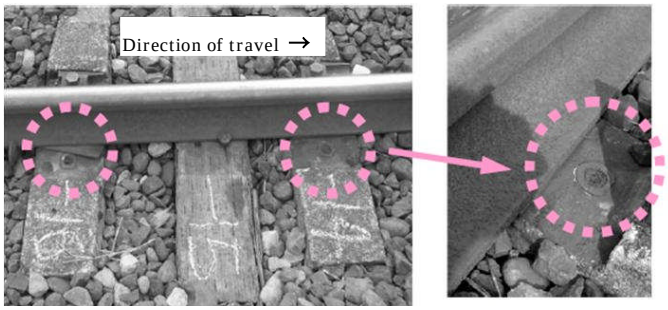
Sketch of the accident site

Findings

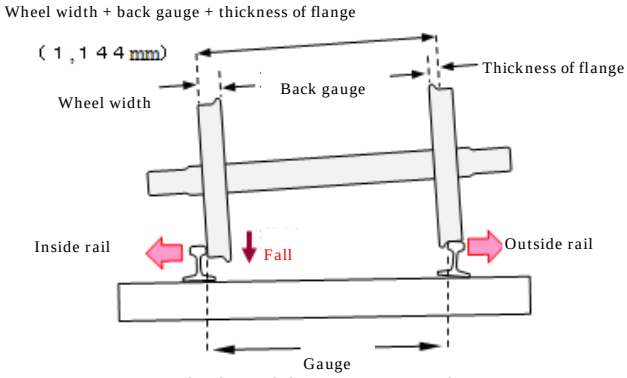
The irregularity of gauge exceeded the limit allowed in the maintenance criteria from two months prior, when the rails had been replaced. The degree of shifting is considered to have become slightly larger after the replacement.

Pushing force was applied in the direction from the inside to the outside rail while its wheelsets were running on the curve, probably leading to an enlargement in lateral pressure on the wheels on the outside rail.

The company did not have any knowledge or experience in tightening the fastening bolts. As a result, the bearing capacity of the rail fastening system near the accident site got lower and lower as external forces from passing trains were repeatedly applied on the system.



Damage of inserts of rail fasteners on PC



Relationship between the rails and wheelset

Over a period of two months prior to the accident, the traffic of trains continuously reduced the capacity to bear the rails. As a result, it is considered probable that the irregularity of gauge have increased.

With the significantly weakened fastening force of the rail and the increased the irregularity of gauge, the left wheels of the first axle in the first car fell between the rails from the left rail head. It is considered probable that this caused the irregularity og gauge to become wider toward the right, causing all of the left wheels of the second axle in the first car and behind to fall between the rails near the site.

Probable causes: It is considered probable that, at the outlet-side transition curve of the left-hand curve that is followed by a reverse right-hand curve, the lateral displacement of track (the shifting of track) was larger than allowed by the maintenance criteria. This decreased fastening force of the rail fastening system and made the action of lateral force associated with the running of the train extend the gauge, leading to the derailment of the left wheels between the rails.

For details,please refer to the investigation report.
(Published in Japanese on July 26, 2013)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2013-6-3.pdf

A landslide caused by heavy rain piled up earth and sand on the track, causing derailment

Train derailment accident between Oppama Station and Taura Station, Main Line of Keikyu Corporation

Summary: On Monday, September 24, 2012, an eight-car train set departed from Oppama station one minute behind schedule. During a coasting operation at 72 km/h, the driver noticed a pile of earth and sand on the railway approximately 30 to 40 meters ahead. Although the driver immediately applied the emergency brake, it was too late to avoid running onto the piled-up sand. The train stopped after traveling approximately 84 m further. All four axles in the first car, both the axles in the front bogie of the second car, and both the axles in the front bogies of the third car became derailed to the right. When the train stopped, the section of the train from the first car to the middle of fourth car was in the tunnel.

Out of the approximately 700 passengers and two crew members on board the train, 55 passengers and the driver were injured.

Findings

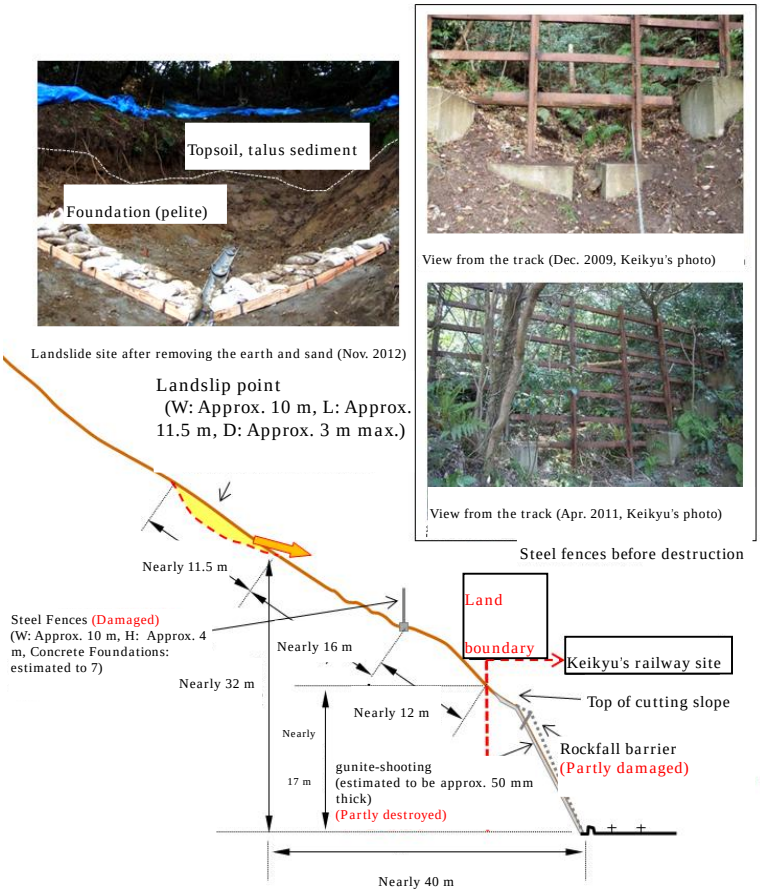
It is considered highly probable that a large amount of rain was falling for a short time around the slope at the time of the accident.

It is considered probable that the surface, as well as the top of the bedrock layer under the surface around the site of the landslide, had become fragile due to the long-term influence of rainfall and springwater.

Although the area (including the landslide site) above the cut slope face where the steel fences were is private land, it is considered highly probable that the area (including the fences) had been viewed as a survey area that should be paid attention to.

Earth and sand containing large amounts of water from heavy rain flew down from the slope failure nearly 20 m above the steel fences. It is considered probable that the multiple concrete foundations collapsed in the slope or fallen to the bottom of the slope.

It is considered highly probable that the train collided with a pile of earth, sand, and one of the concrete foundations, which had all become accumulated on the track. The front bogie then ran onto the foundation, resulting in derailment, with the bogie jumping up one meter.



Conditions of the slope and landslide site

Probable causes: It is considered highly probable that this train derailment accident was caused by the accumulated earth and sand, which contained a concrete foundation, flowing down from the collapsed slope face, and then the front bogie ran onto them. It is considered highly probable that the concrete foundation that came into contact with the first car's bogie made the situation even worse. It is considered probable that the cause of this landslide is to be the rise in the level of groundwater in the surface of the slope. It is considered somewhat likely that this happened due to the large amount of rainwater that fell on the surface, as well as on the top of the bedrock layer under the surface, which had possibly become fragile. It is unclear why the steel fences' concrete foundations, which were built on the slope, fell down. This is due to a lack of records detailing the reasons for building the fence, or structural drawings. However, it is considered somewhat likely that the cause was the deterioration of the foundation, in addition to the flow of an amount of earth and sand that was larger than expected in the original plan.

For details, please refer to the investigation report.
(Published in Japanese on September 27, 2013)
http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2013-8-3.pdf

Chapter 4 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.

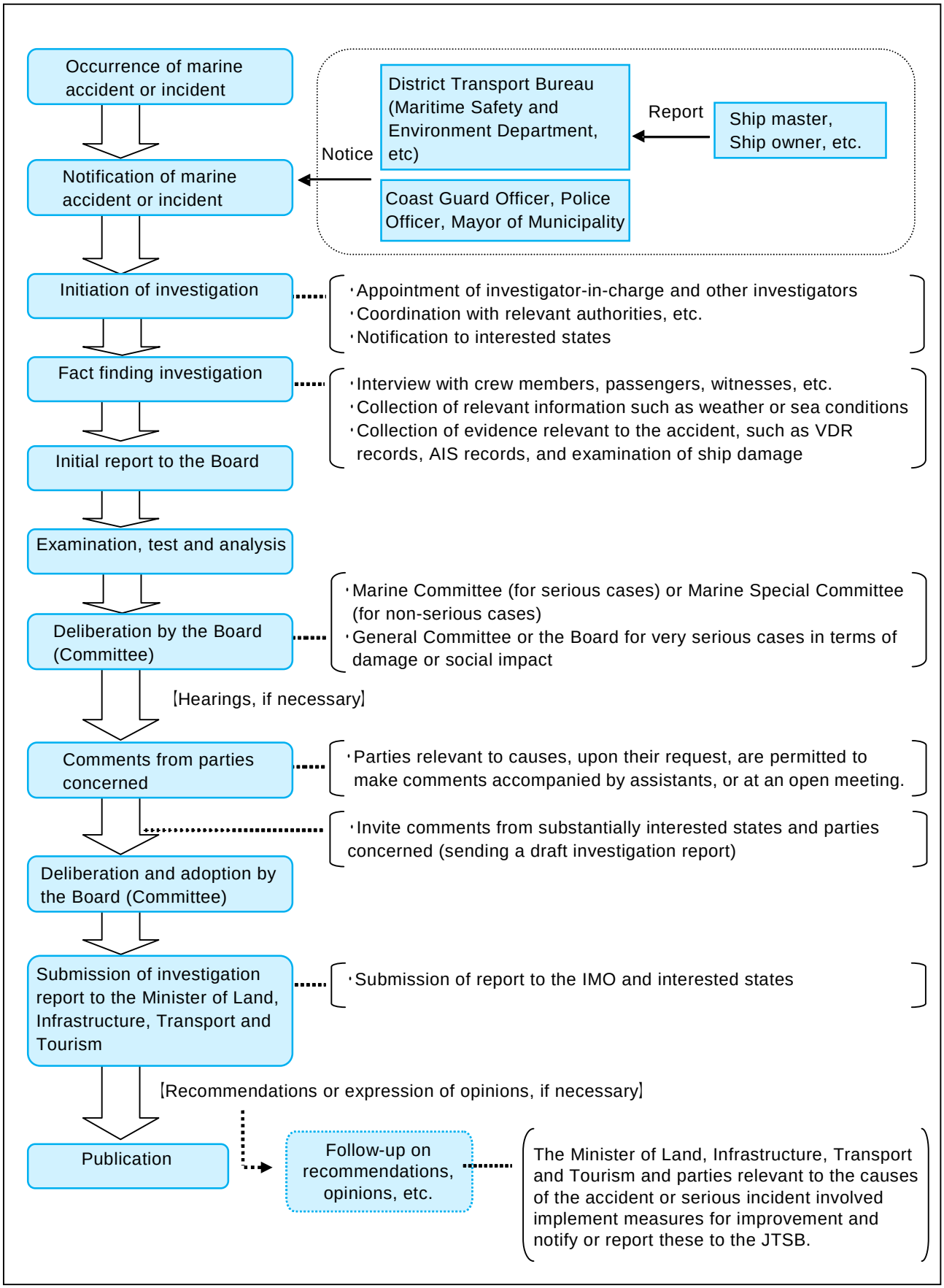
2 The situation where a ship grounded without any damage to the hull; and

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>

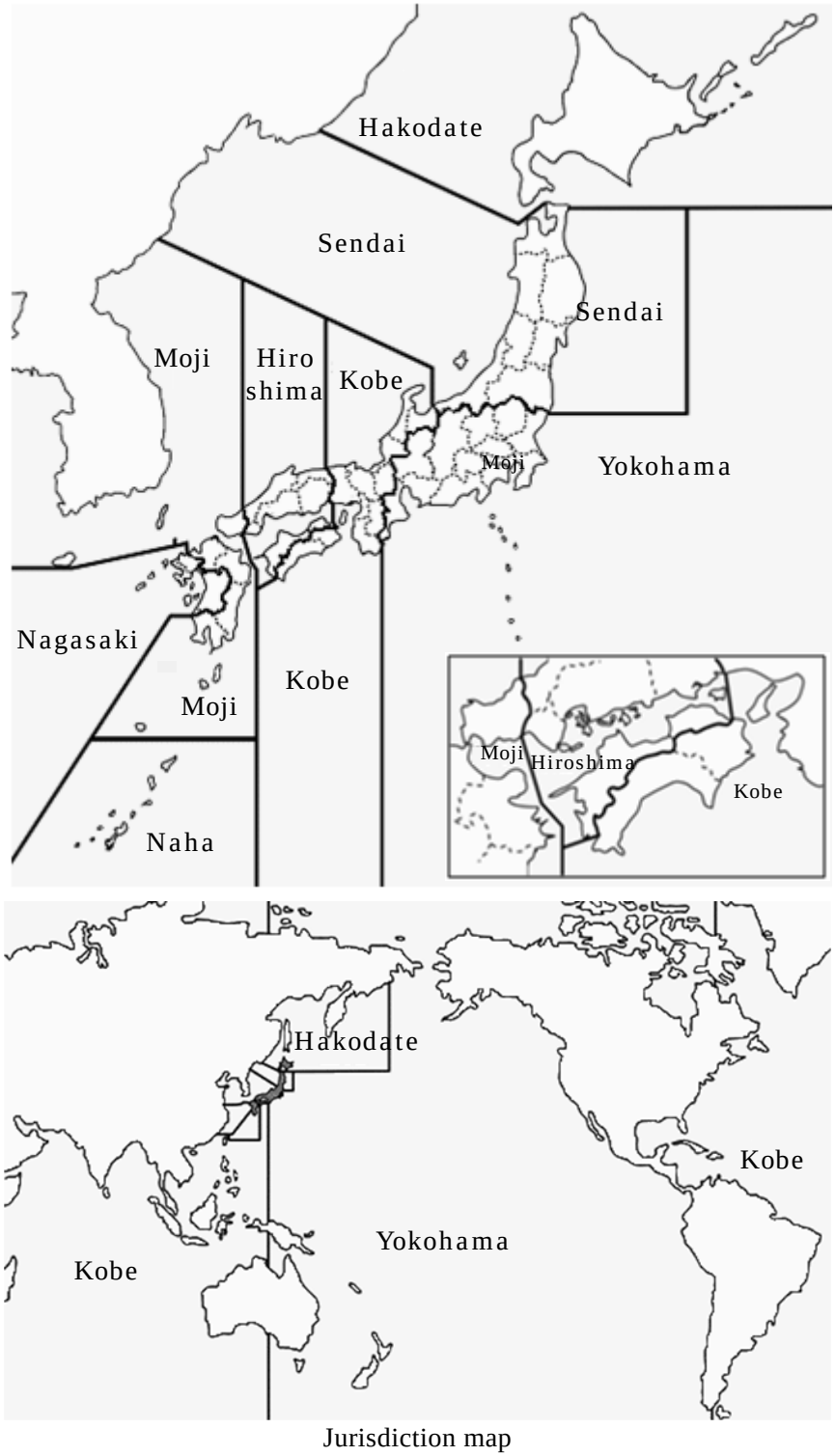
Marine accident and incident to be investigated		Type of marine accident and incident
Marine accident	Damage to ships or other facilities involved in ship operation	Collision, Grounding, Sinking, Flooding, Capsizing, Fire, Explosion, Missing, Damage to facilities
	Casualty related to ship structures,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

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

<table>
<tr><td>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 2014)

The JTSB carried out investigations of marine accidents and incidents in 2013 as follows: Investigations into 789 accidents had been carried over from 2012, and 946 accident investigations newly launched in 2013. Investigation reports on 993 accidents and one interim report were published in 2013, and thereby 741 accident investigations were carried over to 2014.

Investigations into 109 incidents had been carried over from 2012, and 151 incident investigations newly launched in 2013. Investigation reports on 158 incidents were published, and thereby 101 incident investigations were carried over to 2014.

Among the 1,151 reports published in 2013, four were issued with recommendations. Two opinions

were expressed during the course of the investigation.

Investigations of marine accidents and incidents in 2013

(Cases)

Category	Carried over from 2012	Launched in 2013	Not applicable	Transferred to Tokyo Office	Total	Publication of investigation report	Recommendations	Safety recommendations	Opinions	Remarks	Carried over to 2014	Interim report
Marine accident	789	946	△1	0	1,734	993	(4)	(0)	(2)	(0)	741	(1)
Tokyo Office (Serious cases)	32	18		8	58	22	(4)		(2)		36	(1)
Regional Offices (Non-serious cases)	757	928	△1	△8	1,676	971					705	
Marine incident	109	151	△1	0	259	158	(0)	(0)	(0)	(0)	101	(0)
Tokyo Office (Serious cases)	0	1		1	2	1					1	
Regional Offices (Non-serious cases)	109	150	△1	△1	257	157					100	
Total	898	1,097	△2	0	1,993	1,151	(4)	(0)	(2)	(0)	842	(1)

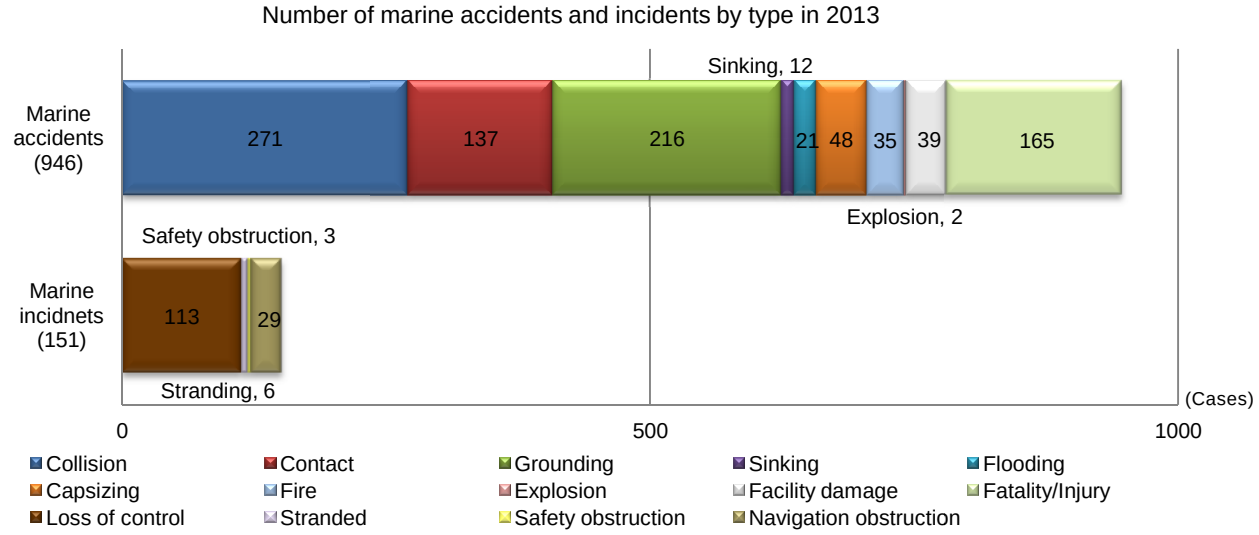
Note 1: The column “Not applicable” shows the number of cases which did not come under the category of accident or incident as defined in Article 2 of the Act for Establishment of the Japan Transport Safety Board.

Note 2: 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 2013 (As of end of February 2014)

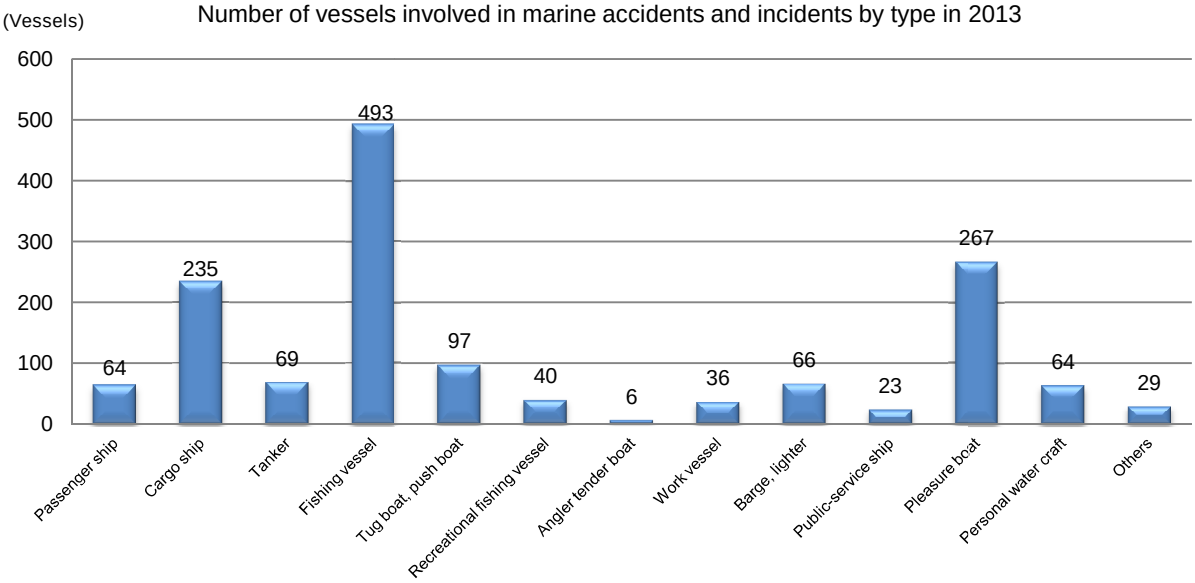
(1) Types of accidents and incidents

The 1,097 investigations launched in 2013 are classified by types as follows: With regard to marine accidents, there were 271 cases of collision, 216 cases of grounding, 165 cases of fatality/injury, and 137 cases of contact. With regard to marine incidents, there were 113 cases of loss of control (including 69 cases of machinery failure, 6 cases of rope entangling, etc.), 29 cases of navigation obstruction, and 6 cases of stranded. The objects of contact were quays in 39 cases, breakwaters in 25 cases, and light buoys in 14 cases.



(2) Types of vessels

The number of vessels involved in marine accidents and incidents is 1,489. Those vessels are classified by type as follows: 493 fishing vessels, 267 pleasure boats, 235 cargo ships, 97 tug boats and push boats, and 69 tankers. The total of the three categories of fishing vessels, pleasure boats, and cargo



ships is 995, accounting for nearly 70 % of all the accidents and incidents.

The number of foreign-registered vessels involved in marine accidents and incidents was 124, and they were classified by accident type as follows: 63 vessels in collision, 18 vessels in grounding, and 18 vessels in contact. As for the nationality of vessels, 26 vessels were registered in South Korea, 24 vessels in Panama, 14 vessels in Cambodia, and 8 in Singapore. The number of vessels registered in Asian countries or regions was accounting for the majority of the accidents and incidents.

Number of foreign-registered vessels by nationality

(Vessels)

South Korea	26	Hong Kong	7	Bahamas	4	Malaysia	2
Panama	24	Marshall Islands	5	Liberia	3	China	2
Cambodia	14	Tuvalu	5	Taiwan	3	Philippines	2
Singapore	8	Kiribati	5	Belize	3	Others	11

(3) Number of casualties

The number of casualties was 514, consisting of 117 deaths, 29 missing persons, and 368 injured persons. By type of vessel, 173 persons in fishing vessels and 113 persons in pleasure boats. By type of accident, 192 persons in casualties (not involved in other types of accidents), 148 persons in collision, 103 persons in contact, and 29 persons in sinking or capsizing.

With regard to persons dead or missing, 80 persons were involved in fishing vessel accidents, 29 persons in pleasure-boat accidents, indicating dead or missing cases occurred frequently in fishing vessels.

Number of casualties (marine accident)

(Persons)

2013										
Vessel type	Dead			Missing			Injured			Total
	Crew	Passengers	Others	Crew	Passengers	Others	Crew	Passengers	Others	
Passenger ship	0	0	0	0	0	0	8	45	1	54
Cargo ship	9	0	2	7	0	0	8	0	2	28
Tanker	2	0	0	2	0	0	2	0	0	6
Fishing vessel	65	0	0	14	0	1	87	0	6	173
Tug boat, push boat	4	0	0	0	0	0	3	0	0	7
Recreational fishing vessel	0	1	0	0	0	0	8	38	4	51
Angler tender boat	0	0	0	0	0	0	1	4	0	5
Work vessel	0	0	1	2	0	0	2	0	3	8
Barge, lighter	0	0	0	0	0	0	0	0	0	0
Public-service ship	0	0	0	0	0	0	1	0	1	2
Pleasure boat	15	0	11	3	0	0	25	0	59	113
Personal water craft	4	0	3	0	0	0	14	0	42	63
Others	0	0	0	0	0	0	2	0	2	4

Total	99	1	17	28	0	1	161	87	120	514
	117			29			368			

7 Summaries of serious marine accidents and incidents which occurred in 2013

The serious marine accidents which occurred in 2013 are summarized as follows: The summaries are based on information available at the initial stage of the investigations and therefore, may change depending on the course of investigations and deliberations.

(Marine accident)

No.	Date and location	Vessel type and name Accident type	Summary
1	January 8, 2013 West-northwest of Katsumoto Port, Iki City, Nagasaki Prefecture	Recreational fishing vessel SHINKAI Injury to fishing passenger	When the vessel started sailing to move to the fishing grounds it was subject to a swell that caused a fishing passenger to be lifted into the air and to be injured from the subsequent fall on the deck.
2	January 10, 2013 Around 1.2 nautical miles northeast of Nakanose D Light Buoy, Tokyo Bay	LNG ship PUTERI NILAM SATU (Ship A, Malaysia) LPG ship SAKURA HARMONY (Ship B, Panama) Collision	Both ships collided while Ship A was sailing west-southwest and Ship B was sailing north in the sea east of Kawasaki Section, Keihin Port. There was no cargo on either ship and no oil spill.
3	January 23, 2013 Around 10 nautical miles southeast of Katsuura City, Chiba Prefecture	Container ship BAI CHAY BRIDGE (Ship A, Panama) Fishing vessel SEIHOU MARU No. 18 (Ship B) Collision	Ship A and Ship B collided in the sea referenced in the left column. Although Ship B listed as a result of the collision, all crew members of the ship were rescued.
4	February 7, 2013 Maruyama Minami Multipurpose International Terminal, Tsuruga Port, Fukui Prefecture	Container ship PANCON SUCCESS(South Korea) Death of crew	While the vessel was moored at the terminal referenced in the left column, a mooring rope snapped and hit a crew member, causing the crew member to die.
5	February 25, 2013 Around 3 nautical miles west of Kansai International Airport	Container ship WAN HAI 162 (Ship A, Taiwan) Fishing vessel SEINAN MARU No. 7 (Ship B) Fishing vessel SEINAN MARU No. 8 (Ship C) Collision	Ship A, Ship B, and Ship C collided in the sea referenced in the left column and Ship B and Ship C capsized. One crew member died and one crew member went missing of the crew members of Ship B and Ship C.
6	March 26, 2013 Kobe Section, Hanshin Port	Cargo ship JURONG (Panama) Casualty to worker	Loaded tires fell over in the vessel anchored at the location referenced in the left column, causing a Japanese worker to die and one person to be injured.

No.	Date and location	Vessel type and name Accident type	Summary
7	April 9, 2013 Hamada Port, Hamada City, Shimane Prefecture	Tug boat KOUN MARU No. 58 Capsizing	The vessel capsized while tugging out a container ship for departure and the skipper that fell overboard died.
8	April 30, 2013 Quay 4, Shiomi, Sakai Senboku District, Hanshin Port	Cargo ship FAVOR SAILING (Cambodia) Foundering	The vessel listed in the sea near Izumiotsu City, Osaka, and while the crew members attempted to restore the list after being towed to berth to the quay referenced in the left column, the vessel toppled over and foundered.
9	May 16, 2013 Wharf 2, Tenpoku, Wakkanai Port, Wakkanai City, Hokkaido Prefecture	Cargo ship TAIGAN(Cambodia) Fire	A fire broke out when the vessel was berthed to the wharf referenced in the left column, after which six dead bodies were discovered and three people were transported to the hospital.
10	May 27, 2013 East of Oishinohana, Sumoto City, Hyogo Prefecture	Push boat SANKYO MARU No. 38 Capsizing	The vessel capsized in the sea referenced in the left column. Two deckhands died and the ship foundered while being towed by a tug boat.
11	June 15, 2013 North-northeast of Genkaijima, Fukuoka City, Fukuoka Prefecture	Cargo ship FUKUKAWA (Ship A, Cambodia) Fishing vessel TSUNOMINE MARU (Ship B) Collision	Ship B was discovered capsized in the sea referenced in the left column, while the skipper was rescued from the vessel and confirmed dead. Subsequently it was determined that Ship A and Ship B collided.
12	June 23, 2013 Around 161 nautical miles 074° from Inubozaki Lighthouse, Choshi City, Chiba Prefecture	Cargo ship NOCC OCEANIC (Ship A, Marshall Islands) Fishing vessel YUJIN MARU No. 7 (Ship B) Collision	As Ship A was sailing north from Kawasaki Section, Keihin Port to Balboa Port, the Republic of Panama it collided with Ship B that was sailing southeast from Shiogama Port, Miyagi Prefecture to a fishing ground. Ship A suffered from a scratch to the bow, while Ship B was cut in half at the center, causing the skipper to go missing.
13	June 26, 2013 Oniike Port, Amakusa City, Kumamoto Prefecture	Passenger ferry FERRY AMAKUSA Injury to passenger	While berthing to the prefecture-run quay No. 2 at the port referenced in the left column, the starboard bow came in contact with the quay and three passengers suffered light injuries. The vessel sustained a dent on the hull of the starboard bow and the foundation of the quay's fender was cracked.
14	July 15, 2013 West of Fukaura Port, Fukaura Town, Aomori Prefecture	Tug boat SHIMAFUJI (Ship A) Work platform MIYABI (Ship B) Fishing vessel KYUYOSHI MARU No. 88 (Ship C) Collision	Ship B and Ship C collided while Ship A was towing Ship B and Ship C was sailing to a fishing ground. Although ship B suffered a breach in the middle part of the starboard hull and Ship C suffered a crack in the bulbous bow, there were no casualties on either ship.

No.	Date and location	Vessel type and name Accident type	Summary
15	August 12, 2013 North of Nokonoshima, Fukuoka City, Fukuoka Prefecture	Roll-on roll-off cargo ship URIZUN 21 (Ship A) Cargo ferry FERRY TAISHU (Ship B) Collision	The ships collided in the area referenced in the left column while Ship A was sailing to the entrance of Hakata Port and Ship B was sailing to exit Hakata Port. Ship A suffered bending and scratches in the bulwark on the port bow, while Ship B suffered scratches and holes in the hull of the port side of the stern and the ship's ramp way was deformed. Neither ship suffered any casualties.
16	August 13, 2013 South Quay B, Funabashi Central Wharf, Funabashi City, Chiba Prefecture	Cargo ship WELLINGTON STAR (Bahamas) Death of worker	While containers (40ft containers, weight of 24t) were being loaded using the vessel's deck crane while the vessel was berthed to the quay referenced in the left column, one stevedore became caught between a container and the vessel's sludge tank and then died.
17	August 14, 2013 Rocks on northeast of Oshima located in Mikuni Town, Sakai City, Fukui Prefecture	Recreational fishing vessel HOSHIN MARU No. 5 Grounding	While the vessel crewed with the skipper and other crew members and carrying three fishing passengers was returning from recreational fishing, it grounded on the rocks referenced in the left column and all crew members including the fishing passengers were injured.
18	September 11, 2013 Himeji Port, Hyogo Prefecture	Cargo ship GREEN HOPE (Panama) Injury to worker	While stevedoring work was being conducted at Nakajima Quay 3 at Himeji Port, the cargo handling crane on the deck fell over and one Japanese worker operating the crane suffered from a pelvic fracture.
19	September 22, 2013 Rocks in Yashiro Bay, Obama City, Fukui Prefecture	Recreational fishing vessel SATO MARU No. 7 Contact with rocks	The vessel came in contact with Okinoishi (rocks) while sailing in Yashiro Bay, Obama City. Six fishing passengers and the skipper were injured, and the bow was severely damaged.
20	September 27, 2013 Approximately 4.4 nautical miles west of Izu Oshima, Oshima Town, Tokyo	Cargo ship JIA HUI (Ship A, Sierra Leone) Cargo ship EIFUKU MARU No. 18 (Ship B) Collision	The ships collided in the area referenced in the left column while Ship A was sailing southwest from Kawasaki Section, Keihin Port to Busan Port, South Korea and Ship B was sailing northeast from Nagoya Port, Aichi Prefecture to Katsunan District, Chiba Port, Chiba Prefecture. Ship B capsized and all six crew members died. In addition, the bow of Ship A was damaged.
21	September 28, 2013 Breakwater at entrance of Dokai Bay, Kitakyushu City, Fukuoka Prefecture	Recreational fishing vessel DAISHIN MARU Contact with breakwater	The vessel came into contact with the breakwater referenced in the left column while sailing to the fishing ground. Two fishing passengers and the skipper were injured, there was a breach in the bottom of the bow, and water flooded the engine room.

No.	Date and location	Vessel type and name Accident type	Summary
22	December 17, 2013 Isla Cedros, United Mexican States	Cargo ship ONOE Death of crew	While conducting cargo handling operations at Isla Cedros, United Mexican States, the second officer fell 5 to 6m from the shore gangways onto the dolphin wharf and subsequently died despite being transported to the hospital.

(Marine incident)

No.	Date and location	Name of incident	Summary
1	June 11, 2013 Kanmon passage (east of Mutsurejima, Shimonoseki City, Yamaguchi Prefecture)	Car carrier AUTO BANNER (Ship A, Panama) Training ship SHIMAYUKI (Ship B) Safety obstruction	The ships came close to each other in the sea referenced in the left column as Ship B was sailing north and Ship A was sailing south.

Column

Recreational fishing vessel rock collision accident

Marine accident investigator

There was an accident in which a recreational fishing vessel crewed by the skipper and carrying six fishing passengers came into contact with the Okinoishi rocks in the night while sailing in Yashiro Bay, Obama City, Fukui Prefecture, and as a result all fishing passengers and the skipper suffered serious injuries.

It is probable that the accident was caused by the collision with the rocks as a result of the skipper of the recreational fishing vessel not noticing that he was sailing into rocks because a proper lookout could not be kept. The skipper of the recreational fishing vessel said that one of the factors that prevented a proper lookout from being kept was the work light that was lit attached to the outer wall in front of the steering house. Because this work light was lit, it created an area of high-brightness in a portion of the field of vision near the bow, and this glare caused a reduction in the ability to see, making visual confirmation near the bow difficult.

Glare refers to over-brightness, and according to a reference document, it causes the ability to see to be reduced as stated above and for other areas to be difficult to see. One of the characteristics of glare is that its effects become more significant the higher the luminance is, the larger the apparent area is, and the closer the bright area is to the line of vision.

Regarding this accident we identified the measures which the owner of the recreational fishing vessel needs to take, including securing a field of vision towards the bow by turning off work lights on the bow when sailing during the night and keeping a proper lookout by properly using navigational equipment such as GPS plotters. Additionally, to make these measures widely known, we have requested cooperation from recreational fishing related organizations that provide training to persons in charge of recreational fishing vessel operation so that they provide guidance to recreational fishing businesses.

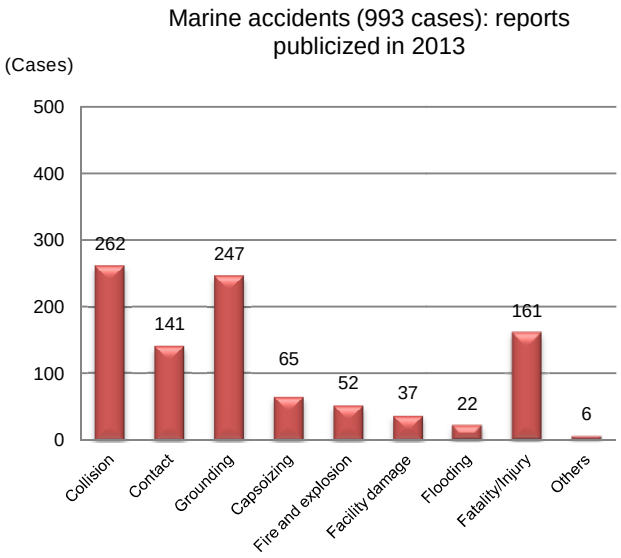
Lighting Handbook (Compact Edition) (edited by The Illuminating Engineering Institute of Japan, published in 2006 by Ohmsha)

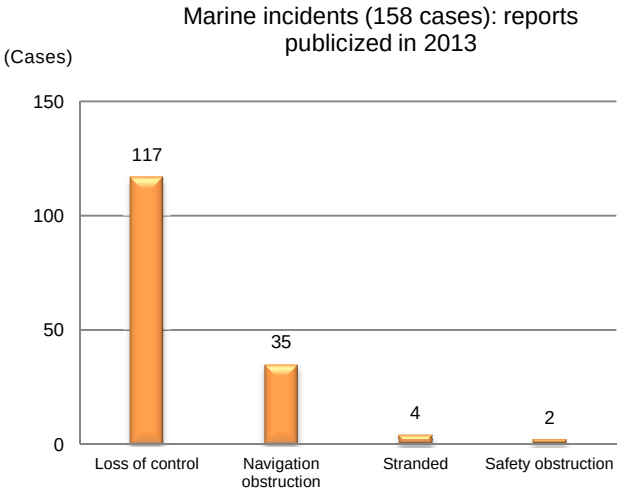
8 Publication of investigation reports

The number of investigation reports of marine accidents and incidents published in 2013 was 1,151 composed of 993 marine accidents (among them, 22 were serious) and 158 marine incidents (among them, 1 was serious).

Looking those accidents and incidents by type, there were 262 cases of collision, 247 cases of grounding, 161 cases of fatality/injury, and 141 cases of contact in marine accidents. Whereas in marine incidents, there were 117 cases of losses of control, (including 112 cases of navigational equipment failure and five cases of out-of-fuel), 35 cases of navigation obstruction, and four cases of stranded.

As for the objects of contact, 36 were quays, 21 were breakwaters, and 16 were breakwater blocks.





The number of vessels involved in marine accidents and incidents was 1,520. Looking at those vessels by type, the vessels involved in marine accidents were 460 fishing vessels, 246 cargo ships, 244 pleasure boats, 80 tug boats and push boats, and 65 tankers. The vessels involved in marine incidents were 61 fishing vessels, 24 pleasure boats, 20 cargo ships, and 17 passenger ships. The sum of the number of fishing vessels, pleasure boats, and cargo ships involved in accidents or incidents is 1,055, accounting for almost 70 % of all the vessels involved in accidents or incidents.

Number of vessels by type involved in marine accidents and incidents for which reports were publicized in 2013

(Vessels)

Classification	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational fishing vessel	Angler tender boat	Work vessel	Barge, lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
Marine accident	60	246	65	460	80	38	4	34	56	15	244	42	15	1,359
Marine incident	17	20	15	61	8	2	0	1	2	3	24	7	1	161
Total	77	266	80	521	88	40	4	35	58	18	268	49	16	1,520
%	5.1	17.5	5.3	34.2	5.8	2.6	0.3	2.3	3.8	1.2	17.6	3.2	1.1	100.0

An overview of the published investigation reports on serious marine accidents and incidents in 2013 is as follows.

List of published investigation reports on serious marine accidents (2013)

No.	Date of publication	Date and location	Name of accident	Summary
1	January 25, 2013	July 6, 2011 Southeast of the Daikoku Wharf in Section 3, Keihin Port, Yokohama	Cargo ship AQUAMARINE (Ship A, Vietnam) Fishing vessel HIRASHIN MARU (Ship B) Collision	Heading southeast on the Tsurumi passage established in Section 3, Keihin Port, Yokohama, Ship A crewed by the master and 21 crew members collided with Ship B crewed by the skipper and one crew member while making a turn pulling a trawl net. In terms of Ship B, the skipper died and the deckhand was injured, the keel buckled, there were breaches, etc. In terms of Ship A, damage included dents to the bulbous bow.
2	January 25, 2013	May 2, 2011 Basin for small crafts at Omuta River in Omuta City, Fukuoka Prefecture	Motor Boat KEN-YU Explosion	The vessel was embarked by the skipper and three friends, who were preparing to depart from a basin for small crafts. When the main engine was started, there was an explosion within the engine casing. Two occupants of the vessel suffered broken bones and the side shell plating, bulwark, and cockpit instrument panel, etc. were damaged.
3	February 22, 2013	November 27, 2011 North of Okinoshima, Munakata City, Fukuoka Prefecture	Cargo ship MARUKA (Ship A, South Korea) Fishing vessel KAIRYO MARU No. 18 (Ship B) Collision	The ships collided while Ship A was crewed by the master and seven other crew members sailing northwest to Masan Port in South Korea and Ship B was crewed by the skipper and one crew member sailing south-southeast to Hakata Port, Fukuoka City, Fukuoka Prefecture. In terms of Ship B, one of the crew members went missing, the skipper suffered injuries including a rib fracture, the ship was cut in half near the center, and the ship foundered leaving nothing but the bow part. Ship A suffered from breaches in the bulbous bow on the starboard side and cracks in the center of this area.
4	February 22, 2013	June 19, 2011 West coast of Takahama Canal, Section 2, Keihin Port, Tokyo	Pleasure boat PEERLESS Contact with quayside	The vessel boarded by the skipper and five persons came into contact with a quayside while sailing south along the Takahama Canal in Section 2, Keihin Port, Tokyo. The skipper and all persons on the vessel suffered injuries, and the hull of the bottom of the bow suffered breaches and scratches. The quay on the west side of the Takahama Canal bank suffered breakage and dents to the safety fence.

No.	Date of publication	Date and location	Name of accident	Summary
5	February 22, 2013	June 26, 2011 South of Imagireguchi, Lake Hamana, Shizuoka Prefecture	Motor Boat HEISEI VII Capsizing	While the vessel boarded by the skipper and three persons was fishing in the Sea of Enshu at the location referenced in the left column, the waves began to get high, so they stopped fishing and started sailing north towards Lake Hamana. At that point a wave from behind washed over the vessel and the vessel capsized. One of the occupants died, the skipper and two other occupants suffered injuries, and the vessel soon foundered after capsizing.
6	March 29, 2013	November 18, 2011 Northeast of Fukuejima, Goto City, Nagasaki Prefecture	Passenger ferry MANYO Listing	The ship was crewed by the master and 13 crew members and carrying 316 passengers and cargo including 21 vehicles. While sailing northeast in the sea northeast of Fukuejima, the ship listed significantly to the port side. Three passengers suffered from injuries, ten trucks and two cars suffered damage including dents, and the weathertight door accessing the port side engine room on the car deck was damaged.
7	March 29, 2013	June 24, 2012 South of Nakama Port, Taketomi Town,Okinawa Prefecture	Passenger ship ANEI GO No. 3 Injury to passenger	Refer to “9. Summaries of recommendations and opinions” (page 105-①)
8	March 29, 2013	June 26, 2012 South of Nakama Port, Taketomi Town,Okinawa Prefecture	Passenger ship ANEI GO No. 38 Injury to passenger	Refer to “9. Summaries of recommendations and opinions” (page 105-①)
9	April 26, 2013	September 21, 2011 Kawasaki Section, Keihin Port	Cargo ship BEAGLE VII (Panama) Contact with quayside	The vessel was crewed by the master and 16 crew members, and dragged the anchor while anchored south of Ogishima at the location referenced in the left column when faced with a southerly wind as the center of Typhoon No. 15 passed near Keihin Port. After weighing the anchor, the vessel became overwhelmed by the pressure of the southerly wind and came into contact with a quayside on the southeast of Ogishima. While the hull of starboard side was dented and partially cracked, there were no casualties. In addition, the concrete of the quayside was exfoliated.

No.	Date of publication	Date and location	Name of accident	Summary
10	April 26, 2013	February 7, 2012 Section 7, Sakai Senboku District, Hanshin Port	Chemical tanker KYOKUHO MARU No. 2 Death of crew	Refer to “9. Summaries of recommendations and opinions” (page 108-②)
11	April 26, 2013	April 4, 2011 Near Hachinohe wave observation light buoy	Fishing vessel RYOEI MARU No. 18 Foundering	The vessel crewed by the skipper and five crew members departed Hachinohe Port, Hachinohe City at around 22:30 on April 3 in order to fish with a small trawl net. After a light was witnessed by another fishing vessel at the location referenced in the left column at around 04:30 on April 3, because it was not possible to make contact, a search for the vessel was conducted. It is probable that the vessel foundered as nothing was discovered during the search. While three of the crew members were found drifting and their death was confirmed, the skipper and two crew members could not be found and have been declared dead.
12	May 31, 2013	May 23, 2012 Near north end of West Breakwater of Section 4, Rumoi Port, Rumoi City, Hokkaido Prefecture	Angler tender boat ARAKAZE Contact with breakwater	The vessel crewed by the skipper and carrying three fishing passengers departed from the mooring in the timber yard of Section 2, Rumoi Port, Rumoi City, Hokkaido. While sailing to take the fishing passengers across to the West Breakwater of Section 4, Rumoi Port, the vessel came into contact with near the northern end of the inner side of the West Breakwater. One fishing passenger and the skipper suffered an injury and the bow of the vessel was crushed.
13	May 31, 2013	July 15, 2011 Northeast of Saruru Fishing Port, Okoppe Town, Hokkaido Prefecture	Recreational fishing vessel TAIKO MARU No. 18 Injury to fishing passenger	The vessel crewed by the skipper and carrying five fishing passengers departed Saruru Fishing Port, Okoppe Town, Hokkaido. While sailing for the fishing ground in the sea northeast of the port, the bow was lifted up by the high waves from the direction of the bow, and one fishing passenger standing on the deck at the bow was injured from the impact when the bow fell back to the surface of the sea. There were no injuries to the other fishing passengers and the vessel was not damaged.

No.	Date of publication	Date and location	Name of accident	Summary
14	May 31, 2013	April 20, 2012 Near C-11 Quay, Yumeshima Container Wharf, Section 1, Osaka, Hanshin Port	Container ship EVER UNISON (Singapore) Contact with quay	While the vessel crewed with the master and 22 crew member was being piloted by the pilot and berthing to C-11 Quay, Yumeshima Container Wharf, it came into contact with the quay. While the hull of the port stern side was dented and scratched, there were no casualties. The C-11 Quay suffered damage to two fenders and four bumpers.
15	June 28, 2013	March 25, 2012 East-southeast of Shiraoi Port, Shiraoi Town, Hokkaido Prefecture	Pleasure boat MIHO VII Capsizing	While the vessel boarded by the skipper and four persons was fishing in Shiraoi Port, Shiraoi Town, Hokkaido, they stopped fishing because of increasingly strong winds. It capsized while returning. All occupants fell overboard. One of the occupants who fell overboard went missing, two of the four occupants who were rescued died, and the other two suffered from hypothermia. The vessel's navigation equipment suffered from water damage.
16	July 26, 2013	June 7, 2012 Fukuyama Port, Hiroshima Prefecture	Cargo ship JUNIPER PIA (South Korea) Death of crew	While the vessel crewed with the master and 14 crew members was sailing towards the JFE Steel Export Berth No. 2 in Fukuyama Port, the second officer was discovered bleeding and fallen over in cargo hold No.2 at the aft end of the starboard side. Although he was transported to a hospital in an ambulance after berthing, he was confirmed dead.
17	July 26, 2013	January 24, 2012 South of Hakodate City, Hokkaido Prefecture	Cargo ship RYUEI Damaged equipment	The starboard anchor of the vessel crewed by the master, chief officer, and four crew members was dropped into the water and all anchor chains were released. The vessel continued sailing in the area referenced in the left column while pulling the starboard anchor. The starboard anchor of the vessel became caught with electric lines at the bottom of the sea, and the lines were damaged. The vessel was unable to proceed as the starboard anchor became entangled with the electric lines, and the chain of the anchor was cut off and the anchor was abandoned.

No.	Date of publication	Date and location	Name of accident	Summary
18	August 30, 2013	March 23, 2012 Around 140km west-northwest of Naze Port, Amami City, Kagoshima Prefecture	Fishing vessel KASUGA MARU Capsizing	While sailing to a fishing grounds in the sea northwest of main island of Okinawa, the vessel crewed by the skipper and five crew members listed to port and capsized. Of the six crew members, two died and four were injured. It is probable that the vessel foundered after capsizing.
19	September 27, 2013	April 22, 2012 West of Satamisaki, Minamiosumi Town, Kagoshima Prefecture	Passenger ship TOPPY 1 Contact with whale	The vessel was crewed by the master, chief officer, chief engineer, first engineer, and five passenger cabin crew members and carrying 184 passengers. The hull was lifted out of the water by the lift of a hydrofoil and the vessel came into contact with a whale while sailing south to Miyanoura, Yakushima Town, Kagoshima Prefecture in the sea referenced in the left column. Light injuries were suffered by 32 passengers, while two crew members suffered heavy injuries and two suffered light injuries. The hydrofoil at the bow fell off, the hydrofoil at the stern was destroyed, breaches were suffered by the outer plate of the bulbous bow and outer plate of the bottom of the bow, and compartments No.9 and No.14 were inundated by water and the distribution switch board suffered water damage.
20	September 27, 2013	October 6, 2012 Tokuyamakudamatsu Port, Yamaguchi Prefecture	Cargo ship SAGE SAGITTARIUS (Panama) Death of worker (superintendent)	While a cargo operation was being conducted to unload coal from the ship's hold at the Kudamatsu Coal Transshipment Terminal at the Tokuyamakudamatsu it was discovered that the superintendent who had boarded the ship to conduct maintenance and instructions regarding the automatic loading equipment had gotten stuck in the unloader feeder conveyor roller and was confirmed dead.
21	November 29, 2013	December 11, 2012 West of Saka Town, Hiroshima Prefecture	Oil tanker MATSU MARU No. 12 Contact with oyster aquaculture facilities	While sailing southeast in the area referenced in the left column, the vessel crewed by the master and ten crew members came into contact with oyster aquaculture facilities. Although the hull of the bottom of the bow suffered scratches, there were no casualties. At the oyster aquaculture facilities, 40 oyster rafts were damaged and seven wire ropes used to hold oyster rafts in place were cut.

No.	Date of publication	Date and location	Name of accident	Summary
22	November 29, 2013	July 3, 2012 Mizushima Port, Kurashiki City, Okayama Prefecture	Container ship TIAN FU (TIANJIN) (Ship A, China) Chemical tanker SENTAI MARU (Ship B) Collision	While Ship A crewed by the master and 17 crew members was sailing northwest on the Mizushima Port inner route bound for Tamashima District, Mizushima Port and Ship B crewed by the master and five crew members was sailing northwest on the same route towards Mizushima District in the same port, the two ships collided near Futonojishima, Kurashiki City, Okayama Prefecture. Although Ship A suffered breaches in the hull of the port side and the Ship B suffered damage in the bow bulwark, there were no casualties on either vessel.

List of published investigation reports on marine incidents (2013)

No.	Date of publication	Date and location	Name of incident	Summary
1	November 29, 2013	December 3, 2012 Southeast of the Toden Ogishima LNG Berth in Section 2, Keihin Port, Kawasaki	LNG tanker LNG ARIES (Marshall Islands) Loss of control (blackout)	While the vessel crewed by the master, chief engineer, and 32 crew members was berthing at Toden Ogishima LNG Berth in Section 2, Keihin Port, Kawasaki with the objective of unloading liquefied natural gas from Qatar, control was lost as there was a blackout on the vessel and the main turbine (the main engine) could not be operated. The vessel was berthed to the Toden Ogishima LNG Berth using four tug boats and no casualties were suffered.

9 Summaries of recommendations and opinions

The recommendations and opinions for 2013 are summarized below.

① Passenger injury on the passenger ship ANEI GO No. 3 and on the passenger ship ANEI GO No. 38

(Recommendation on March 29, 2013)

(Passenger injury on the passenger ship ANEI GO No. 3)

○ Summary of the accident

The ANEI GO No. 3 was crewed by the master and one deckhand, carrying 56 passengers. While sailing from Nakama Port, Iriomote Island, Taketomi Town to Hateruma Fishery Harbor, Taketomi Town, the vessel pitched in the sea south of Nakama Port, Iriomote Island at around 12:51 on June 24, 2012, and one passenger was injured.

○ Probable causes

It is probable that this accident was caused by a chain of events in which the ANEI GO No. 3 was sailing south-southwest at a speed of approximately 15 to 22 knots (kn) in the sea south of Nakama Port when continuous waves from the south with a wave height of approximately 2 to 2.5m hit the port bow, and because the passenger was not guided to the back cabin where the pitching is relatively low and Anei Kanko Co., Ltd. did not take measures to ensure that the passenger properly wore their seat belt, when the vessel pitched the passenger in his seat in the front passenger cabin not wearing his seat belt was lifted up from the seat and the impact on his posterior when falling back on the seat caused a compression fracture in his lumbar spine.

It is probable that on the ANEI GO No.3 the passenger was not guided to the back cabin where

the pitching is relatively low and Anei Kanko Co., Ltd. did not take measures to ensure that the passenger properly wore their seat belt because Anei Kanko Co., Ltd. did not thoroughly ensure that its crew complied with the safe operatoin manual for adverse weather.

(Passenger injury on the passenger ship ANEI GO No. 38)

○ Summary of the accident

ANEI GO No. 38 was crewed by the master and one deckhand, carrying 66 passengers. While sailing from Ishigaki Port, Ishigaki City, Okinawa Prefecture to Hateruma Fishery Harbor, Taketomi Town, the vessel pitched in the sea south-southwest of Nakama Port, Taketomi Town at around 09:20 on June 26, 2012 (Tuesday), and one passenger was injured.

○ Probable causes

It is probable that this accident was caused by a chain of events in which the ANEI GO No. 38 was sailing south-southwest at a speed of approximately 15 to 20kn in the sea south-southwest of Nakama Port when continuous waves from the south-southeast with a wave height of approximately 1.5m hit the port bow, and because the passenger was not guided to the back cabin where the pitching is relatively low and Anei Kanko Co., Ltd. did not take measures to ensure that the passenger properly wore their seat belt, when the ANEI GO No. 38's bow rode the high wave crest with a wave height of approximately 2.0m and fell down between the waves, the passenger's body was lifted up from the seat and the impact on her posterior when falling back on the seat caused a compression fracture in her lumbar spine.

It is probable that in the ANEI GO No. 38 the passenger was not guided to the back cabin where the pitching is relatively low and Anei Kanko Co., Ltd. did not take measures to ensure that the passenger properly wore their seat belt because Anei Kanko Co., Ltd. did not thoroughly ensure that its crew complied with the safe operation manual for adverse weather.

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

Reinstruct operators of small high-speed vessels to thoroughly ensure compliance with safe operation manuals for adverse weather.

Operators are instructed to particularly ensure implementation of the following accident prevention measures concerning the content of safe operation manuals for adverse weather.

(1) Guide passengers to the back cabin where the pitching is relatively low.

(2) For ships that are equipped with seat belts, ensure that passengers are properly wearing their seat belts by conducting patrols within the ship to confirm that passengers are properly wearing their seat belts.

○ Description of the recommendations to Anei Kanko Co., Ltd.

Consider implementing the following measures and make efforts to thoroughly enforce the measures adopted in order to ensure the safe transport of passengers.

(1) Measures to prevent accidents

① Guiding passengers to the back cabin where the pitching is relatively low

Guide passengers to the back cabin where the pitching is relatively low.

In addition, if significant pitching can be expected, restrict passengers so that seating is restricted for front seats of the front passenger cabin where the risk of injury is high.

② Providing information to passengers regarding matters such as properly wearing seat belts and ensuring that passengers properly wear their seat belts

a Appropriately provide information to passengers

Provide information within the vessel in a visual manner that clearly stresses to passengers such as written papers like aircraft safety cards or a posting displayed behind each passenger seat containing information including the importance of properly wearing a seat belt, the risk of accidents occurring, and the proper way of wearing a seat belt.

In addition, when selling tickets provide specific explanations to passengers on disadvantageous information including the possibility of the voyage being canceled in the event of poor weather, safety information such as the level of ship pitching expected based on the weather and sea condition forecasts for that day and the weather and sea condition information subsequently acquired, and information on matters such as the importance of properly wearing a seat belt, the risk of accidents occurring, and the proper way of wearing a seat belt.

b Ensuring that passengers properly wear their seat belt through onboard announcements and patrols

Based on ② a. above, use onboard announcement to provide explanations regarding the proper way of wearing a seat belt.

In addition, conduct patrols to ensure that passengers are properly wearing their seat belts because if explanations and guidance that only rely on the passengers' sense of hearing are given and passengers are not aware of these explanations and guidance, there could be the risk of the passengers failing to listen to the explanations and guidance.

③ Speed adjustments in response to waves

In consideration of the acceleration of the pitch in seats, slow ships down to reduce pitching and carefully watch for waves.

④ Sharing sea condition information

The management side having an accurate understanding of the navigation status is important for navigational safety. Accordingly, establish guidelines that have the master of each ship report

sea condition information for routes where the sharing of sea condition information is highly necessary such as this route so that each ship sailing that route can be given proper instructions and so that the sea condition information obtained can be provided to passengers in a timely and proper manner.

Make additions to the safe operation manuals for adverse weather on the established report guidelines for sea condition information.

⑤ Keeping seat belts maintained and in good order

Conduct checks and maintenance of seat belts so that seat belts can be properly worn. In particular, conduct prompt replacement to new seat belts for seat belts that become difficult to adjust.

In addition, keep seat belts in good order before passengers embark on the vessel so that the seat belts are easy for passengers to notice.

⑥ Shock-absorbing materials such as cushion seats

Select cushion seats of appropriate materials such as low-resilience soft polyurethane foam and equip seats with high pitching with these materials.

(2) Implement safety training concerning matters including the safe operation manuals for adverse weather

In consideration of the implementation status of (1) ① to ④ above, further enhance the content of the safe operation manual for adverse weather and conduct continual safety training for crew members concerning the manual and safety management manuals (including operations standards).

(3) Improve communication

① Improve communication and establish a safer operation system

Establish a safer operations system through effort to improve mutual communication between the management side and the crew side, improve mutual relationships, have everyone in the company reconfirm the corporate philosophy and management philosophy, and have each and every employee strive towards closer communication with an awareness of team work.

② Establish an operations schedule that reduces the burden on crew members

Establish an operations schedule that ensures crew members can operate vessels without being overly fatigued.

② Death of crew member on chemical tanker KYOKUHO MARU No. 2

(Recommendation on April 26, 2013)

○ Summary of the accident

The chemical tanker KYOKUHO MARU No. 2 was crewed by the master, the second officer, and

three other crew members as it departed from Komatsu Wharf, Izumiotsu Port, Izumiotsu City, Osaka. As the vessel was sailing north towards Umemachi Terminal in Section 1, Osaka, Hanshin Port, at around 12:29 on February 7, 2012 the chief engineer discovered that the second officer collapsed on the port side of No.l cargo tank.

Although the second officer was rescued, he could not breathe because of gas inhalation, and died due to an oxygen deficiency.

○ Probable causes

It is probable that this accident was caused by a chain of events in which AST Inc. did not thoroughly instruct its crew members on guidelines for entering cargo tanks or measuring oxygen and gas concentration, nor did AST Inc. clarify the work procedures for tank cleaning when there is residual cleaning fluid in a cargo tank. For these reasons, the second officer entered No.2 cargo tank on the port side that had residual washing water and a gas smell, and inhaled chloroform gas when checking the state of cargo tanks while the chemical tanker KYOKUHO MARU No.2 was heading north to the Umemachi Terminal.

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

Provide the following guidance to coastal shipping operators that operate chemical tankers.

(1) Provide guidance to crew members on measuring oxygen and gas concentration when entering enclosed spaces and ensure compliance, and also make regular visits to vessels to confirm that oxygen and gas concentration measurements are being faithfully conducted.

(2) Have masters record the implementation status of oxygen and gas concentration measurements, and when gas detection equipment is used for gas concentration measurements keep records of the number of detector tubes purchased, used, and remaining. In addition, make regular visits to vessels to investigate records of implementation status and records of detector tubes to confirm that oxygen and gas concentration measurements are being accurately conducted.

(3) Ensure that the tank cleaning work procedures including the confirmation of washing water, and removal through stripping, drying, and gas ventilation procedures if there is washing water are compiled in a simplified format that is easy to understand for crew members, and are displayed in a location that is easy to see when conducting work.

(4) Conduct regularly education and training programs on emergency such as accidents regarding how to respond to emergencies including accidents by not acting impulsively or based on their own judgment, but to instead act in consideration of precautions.

In addition, when visiting vessels conduct checks through regular audits that include guidance to crew members on (1) through (4) above, investigation of records of detector tubes to confirm that oxygen and gas concentration measurements are being accurately conducted, efforts by operators to ensure safe transport, and efforts to improve operations management.

○ ◯ Description of the recommendations to AST Inc.

Take the following measures to prevent the recurrence of similar accidents.

(1) Provide guidance to crew members on measuring oxygen and gas concentration when entering enclosed spaces and ensure compliance, and also make regular visits to vessels to confirm that oxygen and gas concentration measurements are being faithfully conducted.

(2) Have masters record the implementation status of oxygen and gas concentration measurements, and when gas detection equipment is used for gas concentration measurements keep records of the number of detector tubes purchased, used, and remaining. In addition, make regular visits to vessels to investigate records of implementation status and records of detector tubes to confirm that oxygen and gas concentration measurements are being accurately conducted.

(3) Ensure that the tank cleaning work procedures including the confirmation of washing water, and removal through stripping, drying, and gas ventilation procedures if there is washing water are compiled in a simplified format that is easy to understand for crew members, and are displayed in a location that is easy to see when conducting work.

(4) Conduct regularly education and training programs on emergency such as accidents regarding how to respond to emergencies including accidents by not acting impulsively or based on their own judgment, but to instead act in consideration of precautions.

③ Collision of cargo ship NIKKEI TIGER and fishing vessel HORIEI MARU

(Recommendation in the interim report on October 25, 2013)

○ Summary of the accident

The cargo ship NIKKEI TIGER crewed by the master and 20 crew members departed from Shibushi Port, Shibushi City, Kagoshima Prefecture and sailed northeast bound for Vancouver, Canada, and the fishing vessel HORIEI MARU crewed by the skipper, chief fisherman, and 20 crew members sailed south in order to avoid the impact of atmospheric pressure. The ships collided at about 01:56 on September 24, 2012 (Japan time, same below) in the Pacific Ocean approximately 930km east of Kinkazan, Ishinomaki City, Miyagi Prefecture.

13 crew members of the HORIEI MARU went missing and were subsequently recognized as dead.

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

1 For fishing vessels that are currently not equipped with Automatic Identification System or simplified Automatic Identification System, for example, particularly for fishing vessels those operate and navigate in the open sea (second-class fishing vessel based on the Ship Safety Act), consider conducting further education and awareness raising activities towards ship owners on the effectiveness of this equipment in preventing collision accidents and other necessary measures to promote early adoption.

2 Instruct marine transport operators to obtain and use information on fishing vessel operation conditions in seas where their ships operate from sources such as the information provided by fishing industry organizations and the Japan Marine Accident Risk and Safety Information System of the Japan Transport Safety Board in order to prevent collision accidents.

○ Description of the opinion towards the Director-General of the Fisheries Agency

1 For fishing vessels that are currently not equipped with Automatic Identification System or simplified Automatic Identification System, for example, particularly for those operate and navigate in the open sea (second-class fishing vessel based on the Ship Safety Act), consider conducting further education and awareness raising activities towards ship owners on the effectiveness of this equipment in preventing collision accidents and other necessary measures to promote early adoption.

2 Instruct owners of fishing vessels to obtain and use information on the status of accident occurrence at fishing grounds and traffic routes and the navigation routes of merchant ships from sources such as the Japan Marine Accident Risk and Safety Information System of the Japan Transport Safety Board in order to prevent collision accidents.

10 Actions taken in response to recommendations in 2013

Actions taken in response to recommendations were reported with regard to four marine accident in 2013. Summaries of these reports are as follows.

① Marine accident related to the capsizing of a cutter (unnamed)

(Recommendation on January 27, 2012)

Concerning the cutter (unnamed) capsizing accident that occurred in the north of Lake Hamana, Hamamatsu City, Shizuoka Prefecture on June 18, 2010, the Japan Transport Safety Board published a report on the investigation results of the accident and concurrently gave recommendations to Shogakukan-Shueisha Productions Co., Ltd. and the Shizuoka Prefectural Board of Education who were relevant to the cause of the accident, on January 27, 2012, and received a report on the completion (completion report) of the implementation of recommendation-based measures as follows.

○ Summary of the accident

18 students and 2 teachers were in the training of cutter rowing on a cutter (unnamed) of Mikkabi Youth Center as an outdoor activity lesson of the junior high school. The wind and waves became so heavy that the crew then found it difficult to continue the rowing. When running southwestward off the south of Sakume in Lake Hamana, while being towed by a motorboat MikkabiYouthCenter of the Center,

the cutter capsized portside at around 15:25 on June 18, 2010 (Friday).

The cutter capsized, and one student trapped inside the ship died. In addition, while one oar was broken, there was no damage to the hull.

○ Probable causes

The probable causes of this accident are as follows. Under rainy weather of which heavy rain, thunder, gale, high-wave and flood advisories had been forecast, the cutter was used for an outdoor exercise for the junior high school at the Mikkabi Youth Center and was engaged in a cutter rowing training without a trainer along an east course, which is a usual way of the training, off the north shore of Lake Hamana. The gale and wind grew stronger to render the rowing difficult, and the director of the Mikkabi Youth Center went for rescuing on the motor boat, and towed the cutter (unnamed) obliquely to port with continuous inflow of lake water thereinto from the port bow. When being towed in those states southwestward off the south of Sakume, the cutter's port list developed under increasing flowed-in water accumulation on her bottom and caused the port side oars to catch water and to turn her bow to port. Sometime later, the students sitting on the starboard side lost balance and were shifted toward port side, to further increase the port list. Consequently, the port side submerged, lake water flooded into the boat, and the boat overturned portside.

(1) It is probable that the reason why the director of the Mikkabi Youth Center towed the cutter while the cutter (unnamed) was listing to the port side and lake water was continually pouring into the cutter (unnamed) from the port bow is that he had no experience and little knowledge of towing the cutter, and that when towing of the cutter (unnamed) was commenced the director was fully exerting himself to attaching the towlines and towing the cutter (unnamed) so that it went against the wind, and as a result did not communicate to the cutter the precautions for being towed such as the removal of accumulated water and how to operate the rudder and took a route that went against the wind.

(2) It is probable that the reason why under rainy weather of which heavy rain, thunder, gale, high-wave and flood advisories had been forecast, the cutter was used for an outdoor exercise and was engaged in a cutter rowing training without a trainer along an east course, which is a usual way of the training, is that while the director of Mikkabi Youth Center and one leader instructor knew of the weather advisory in the weather forecast, because the forecast for 15:00 was an east wind with a wind velocity of 4m/s, they did not believe the weather conditions would interfere with the training.

(3) It is somewhat likely that the use of the usual way of training for the training on the day of the accident by Mikkabi Youth Center was related to the occurrence of this accident.

(4) It is probable that the reason the cutter (unnamed) was difficult to row is the fact that the instruction manual was not adequate as it had no stipulations on training suspension criteria in the case of weather advisories being issued or stipulations on training methods during periods of poor weather or training course selection timing, which means that while the gale and wind from the

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south gradually grew stronger, the training was continued, which caused oars to fall out of rhythm and for students to suffer from seasickness.

(5) It is probable that the reason the instruction manual was not adequate as it had no stipulations on training suspension criteria in the case of weather advisories being issued or stipulations on training methods during periods of poor weather or training course selection timing include the following:

① Because Shogakukan-Shueisha Productions Co., Ltd. was requested by the former director the training methods including cutter training suspension criteria implemented by the previous direction when Mikkabi Youth Center was operated by the prefecture to be continued when Mikkabi Youth Center moved to a designated manager system and no requests concerning this were made by the Shizuoka Prefectural Board of Education, during year one cutter training was conducted based on the training methods including training suspension standards implemented when Mikkabi Youth Center was operated by the prefecture.

② Because Shogakukan-Shueisha Productions Co., Ltd. believed it would be acceptable to continue the measures implemented when Mikkabi Youth Center was operated by the prefecture for safety measures, no safety considerations were made concerning cutter training and the instruction manual and instruction timing stipulated when Mikkabi Youth Center was operated by the prefecture were continued.

(6) It is probable that director of the Mikkabi Youth Center had no experience and little knowledge of towing the cutter because Shogakukan-Shueisha Productions Co., Ltd. did not establish a risk management manual on a rescue system assuming cutter accidents including guidelines for towing the cutter or conduct cutter towing training for the staff at the Mikkabi Youth Center.

(7) It is probable that the fact that Shogakukan-Shueisha Productions Co., Ltd. did not establish a risk management manual on a rescue system assuming cutter accidents including guidelines for towing the cutter or conduct cutter towing training for the staff at the Mikkabi Youth Center was related to the occurrence of this accident.

(8) It is probable that the fact that the Shizuoka Prefectural Board of Education did not have Shogakukan-Shueisha Productions Co., Ltd. establish a risk management manual on a rescue system assuming cutter accidents including guidelines for towing the cutter or conduct cutter towing training for Shogakukan-Shueisha Productions Co., Ltd. including at the time of the preliminary transfer concerning Mikkabi Youth Center was related to the occurrence of this accident.

○ Description of the recommendations to Shogakukan-Shueisha Productions Co., Ltd.

① The criteria for cutter training suspension and the cutter training methods used at the Mikkabi Youth Center should be reviewed taking the experience of the trainees into consideration, and the following provisions should be included in the instruction manual:

a The criteria for suspending training when weather advisories are broadcast.

b The criteria for suspending training under bad weather other than when weather warnings or advisories are broadcast.

c Training methods under bad weather.

d The time for deciding whether to give permission or not for training and the time (including a time during training) for deciding a training method.

e Treatment of training if suspended on its way.

f Provisions for safety in training (including the arrangement and duty of a guard boat, constant contact with weather information, and preparations for the tow of cutter).

② A rescue system, supposing cutter accidents and including procedures for towing and rescuing a cutter, should be established, and the Mikkabi Youth Center personnel should be periodically trained. Effort should be made to strengthen cooperation with rescuing agencies.

③ Effort should also be made to improve the knowledge of the Mikkabi Youth Center personnel with respect to cutter and weather, and to increase their awareness of securing training safety.

○ Completion report of the implementation of recommendation-based measures by Shogakukan-Shueisha Productions Co., Ltd.

① Implantation results based on recommendation ①

The criteria for cutter training suspension and the cutter training methods used at the Mikkabi Youth Center were reviewed taking the experience of the trainees into consideration, and manuals were established including the following provisions in consideration of objective opinions from experts and other specialists in the prefectural Safety Measures Committee and the review meetings concerning the Mikkabi Youth Center's marine activities safety measures manual and verification through mock training of staff members.

It was decided that the manuals would be inspected and reviewed at least once a year and be revised as necessary.

(Manuals developed)

I. Marine activities safety measures manual

II. Marine activities emergency response manual

III. Marine activities rescue manual (including cutter towing guidelines)

(Items stipulated)

I. Judgment criteria for implementation and suspension (marine activities safety measures manual)

Stipulates the suspension criteria when weather warnings or advisories are broadcast and when weather is bad.

II. Training plan assuming sudden weather changes (marine activities safety measures manual, marine activities emergency response manual)

It was decided that while cutter training is conducted administrative staff would confirm

weather information every 30 minutes and that criteria are established and training would be conducted on matters including how to contact people and the response that should be conducted by staff members in cases such as when weather warnings or advisories are broadcast.

III. The time for deciding whether to give permission or not for training and the time (including a time during training) for deciding a training method (marine activities safety measures manual)

It was decided that the decision on whether or not to hold training and the scope of activities would be made on meetings held by training leaders on the day of marine activities and advance joint meetings.

IV. Treatment of training if suspended on its way (marine activities safety measures manual, marine activities rescue manual)

Stipulates matters such as how to contact people if the activity suspension activities apply, returning to harbors, and how to make landings at the nearest point.

V. Provisions for safety measures in training (marine activities safety measures manual, marine activities emergency response manual, marine activities rescue manual)

- Stipulates the positioning and duties of safety boats.
- Stipulates the response when emergencies occur.
- Stipulates the relief supplies to be loaded on all boats.

VI. Preparations for the tow of cutter (marine activities rescue manual)

Stipulates the towing procedures in consideration of factors such as the opinions of the Safety Measures Committee and towing experts, and the result of towing training.

VII. Cutter boarding conditions (marine activities safety measures manual)

Stipulates the criteria for which school years can board the cutter.

② Implementation results based on recommendation ②

I. Measures concerning rescues (improving knowledge of rescue methods, improving skills and knowledge concerning towing)

- All members participated and completed the advanced lifesaving course offered by the Hamamatsu City Fire Department.
- Implemented overboard rescue drills and towing training one to two times per month.
- Participated in courses and training programs held by similar facilities.

II. System for emergencies

a Initiatives for considering rescue methods and measures assuming emergencies such as capsizing

- Methods for injecting air using gas tanks into a vessel that has capsized and restoring the vessel were verified and implemented.
- Joint water rescue training was conducted with the Shizuoka Prefecture Marina

Association and the Hamamatsu City Fire Department near the Mikkabi Youth Center's harbor.

b Initiatives to regularly conduct emergency rescue training and towing training

- Implemented overboard rescue drills and towing training one to two times per month.
- Trial training was conducted during a set period of time established in advance of the implementation of full-scale training including Safety Measures Committee and training workshop joint training.

c Initiatives to establish organizational structures and supervising command systems for emergencies

- In preparation for emergencies, a contact system with the Shizuoka Prefecture Marina Association and the Hamamatsu City Fire Department was established through the implementation of joint water rescue training.
- A system was established for emergencies in which the parties responsible for the facility would be on standby in the office, a countermeasures headquarters would be established at the marina, and the directors and deputy directors of each facility would provide response and supervision.

d Initiatives to strengthen coordination with relevant organizations in rescue efforts

- In preparation for emergencies, a contact system with the Shizuoka Prefecture Marina Association and the Hamamatsu City Fire Department was established.
- Joint water rescue training was conducted with the Shizuoka Prefecture Marina Association and the Hamamatsu City Fire Department near the Mikkabi Youth Center's harbor.

e Initiatives to ensure the thorough preparation of passenger logs required for safety checks

- Made the submission of passenger logs obligatory.
- Established a system for sharing the passenger log after confirmation before training with the captain, supervisor, harbor representative, and headquarters.
- Adopted a system in which students wear a wrist band stating their seat number and this is compared with the passenger log before training.

③ Implementation results based on recommendation ③

I. Measures to improve knowledge of cutters

- Implemented overboard rescue drills and towing training one to two times per month.
- When conducting the training above, a similar facility called Shibukawa Youth Center of Okayama Prefecture that mainly conducts cutter training was invited and guidance was received.
- A safety activities course by the National Institution for Youth Education was held at the Mikkabi Youth Center, in which experts were invited to share opinions and guidance and information was exchanged with similar facilities.

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II. Measures to improve knowledge of weather conditions

- Two staff members from the instruction department were selected as weather condition representatives, they participated in a correspondence course for becoming a certified meteorologist, and collected information on weather conditions based on this knowledge.
- It was decided that the weather condition representative would collect weather condition data including weather condition and wind vane and anemometer values four times a day at 9:00, 11:00, 14:00, and 17:00.
- Efforts were made to strengthen cooperation with marinas and boaters in the area and gather information concerning weather predictions based on wind direction and the shape of the clouds.

III. Initiatives to increase awareness towards ensuring safe training

- Safety training and matters concerning accidents that could be assumed were incorporated in the annual training implementation plan and the training was implemented.
- Two safety management representatives were assigned in efforts to collect information on near-miss cases, consider countermeasures, and share information among staff at the staff meetings held every month and the instructor meetings held once a week led by the safety management representatives.
- Manuals were established and improved through staff meetings and instructor meetings in consideration of objective opinions from experts and other specialists in prefectural Safety Measures Committee and the review meetings concerning the Mikkabi Youth Center's marine activities safety measures manual and verification through mock training of staff members.
- Participated in safety measures training held by the National Awaji Youth Friendship Center, the Shibukawa Youth Center, and the Mikkabi Youth Center.

○ Description of the recommendations to the Shizuoka Prefectural Board of Education

The Board should review the criteria for cutter training suspension, the training methods, and the emergency management manual of the Youth Center; should give them necessary corrections, if found any; and should have tow training practiced.

○ Completion report of the implementation of recommendation-based measures by the Shizuoka Prefectural Board of Education

① The following measures were implemented based on the recommendation.

I. Manuals developed

After the main points of safety measures required by the Shizuoka Prefectural Board of Education were presented, the designated manager of the Mikkabi Youth Center,

Shogakukan-Shueisha Productions Co., Ltd. (hereinafter "the designated manager") was made to develop the criteria for cutter training suspension, the training methods, and the emergency management manual (hereinafter "the manuals") in accordance with the following procedure, and the manuals were confirmed at the FY 2012 4th Safety Measures Committee.

a Manuals developed

At the FY 2011 3rd Safety Measures Committee, causes of accidents were brainstormed and the main points of safety measures were reviewed based on the investigation reports of marine accidents, and this was incorporated in manuals by the designated manager.

At the FY 2011 4th Safety Measures Committee, the status of incorporation of main points was confirmed in the manuals submitted by the designated manager.

b Manuals verified

The FY 2012 1st Safety Measures Committee was held at Mikkabi Youth Center, during which the manual amendments were reconfirmed and cutter mock training was held with staff members based on the manuals. The status of the training was made open to external experts.

In addition, the manuals were sent to external experts to gain their opinions, and at the FY 2012 1st Review Meeting Concerning the Mikkabi Youth Center's Marine Activities Safety Measures Manual (hereinafter the "Manual Review Meeting") measures incorporating these opinions were considered.

Furthermore, the FY 2012 2nd Manual Review Meeting and FY 2012 3rd Safety Measures Committee were also held, and similar studies were conducted.

II. Developing a system for inspecting and correcting the manuals after establishment

A system conducting regular inspections of manuals that have been established in the future to ensure that their contents are appropriate and make corrections accordingly was considered. The system was developed as follows in consideration of the studies conducted at the FY 2012 2nd Manual Review Meeting.

(Frequency and method of inspections and corrections in the future)

a The designated manager shall review the manuals every year and report the results to the Shizuoka Prefectural Board of Education. Manual Review Meeting shall be held and the guidance and advice of external experts received as necessary.

b On-site checks shall be conducted four times a year (two times accompanied by external experts), and the manuals shall be reviewed by the designated manager as necessary and the results reported to the Shizuoka Prefectural Board of Education.

c The annual training plans and results reports for rescues including towing training and monthly reports concerning the regular management of the facility shall be confirmed, and the manuals shall be reviewed by the designated manager as necessary and the results reported to the Shizuoka Prefectural Board of Education.

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② The following matters were considered in order to conduct cutter towing training

I. Studies concerning towing training

The designated manager was made to prepare a towing manual that incorporates matters such as towing methods, the towing training implementation guidelines, and the submission of the towing training implementation plan, and the manual was confirmed at the FY 2012 4th Safety Measures Committee .

a Towing methods

The designated manager was made to document the implementation methods in the event of a cutter having an accident and needing to be rescued by towing. The Shizuoka Prefectural Board of Education amended the designated manager's draft in consideration of implementation methods by similar facilities and the opinions of experts concerning ship structures and ship rescues. Based on this, studies were conducted at the FY 2012 2nd Manual Review Meeting and the designated manager was provided with guidance and advice concerning towing methods. After this, at the FY 2012 3rd Safety Measures Committee, towing training was conducted at the Mikkabi Youth Center with the participation of external experts, local marinas, local rescue organizations, and the staff members of similar facilities.

b Towing training implementation guidelines

The designated manager was made to establish cutter towing training implementation guidelines for the staff members of the Mikkabi Youth Center based on the opinions in the FY 2012 2nd Manual Review Meeting and those concerning the towing training in the FY 2012 3rd Safety Measures Committee, and the implementation guidelines were confirmed at the FY 2012 4th Safety Measures Committee.

Note that consideration was given to the fact that implementing towing training jointly with other organizations involved in marine activities would improve the knowledge and skills of staff members.

c Towing training implementation plan

The designated manager was made to submit a towing training implementation plan at the beginning of every year in consideration of opinions in the FY 2012 2nd Manual Review Meeting concerning a system to ensure that towing training is properly implemented.

II. Studies concerning towing training inspections and guidance

The system was developed as follows in consideration of the studies conducted at the FY 2012 2nd Manual Review Meeting as the system for conducting regular inspections and corrections to ensure that towing methods and the towing training implementation system and implementation plans are appropriate.

Note that towing training shall be conducted in the presence of an expert to provide instructions and guidance as necessary.

(Frequency and method of inspections and corrections in the future)

a Have the designated manager submit plans stipulating towing training at the beginning of every year, and confirm these plans. In addition, have implementation reports submitted after implementation, and confirm these reports.

b Have an external expert present at least once a year to conduct on-site confirmation at the towing training conducted by the designated manger.

③ The implementation of recommendation-based measures was led by the Safety Measures Committee and with the cooperation of external experts, local marinas, local rescue organizations, etc.

* The completion report is shown on the Board's website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku8re-2_20130220.pdf

Marine accident involving the capsizing of tug boat KITA MARU No. 12

(Recommendation on November 30, 2012)

Concerning the marine accident involving the capsizing of tug boat KITA MARU No. 12 that occurred in Wajima Port, Wajima City, Ishikawa Prefecture on September 19, 2011, the Japan Transport Safety Board published a report on the investigation results of the accident and concurrently gave recommendations to the Japan Coast Guard School and Kita-Gumi Co., Ltd. who were relevant to the cause of the accident, on November 30, 2012 and received a report on the completion (completion report) of the implementation of recommendation-based measures as follows.

○ Summary of the accident

When towing the patrol boat MIURA to assist its departure, together with the tug boat KITA MARU No.8, the tug boat KITA MARU No.12 with the skipper and a crew member aboard it capsized at around 07:36:47-54 on Sept. 19, 2011.

All the crew members (2 crewmen) of KITA MARU No.12 were taken out of the water but died. On a later day, the boat was salvaged but was declared a total loss.

○ Probable causes

It is probable that when KITA MARU No.12, along with KITA MARU No.8, was towing MIURA to assist the departure of MIURA from Wajima Port, with the towing rope tied at the bow of MIURA, under north-northeast to northeast wind velocity of approx. 10 m/s and wave-height of approx. 3 m, KITA MARU No.12 capsized because the tension of her towing rope exceeded her stability.

It is probable that the reasons the tension of the towing rope of KITA MARU No.12 exceeded

stability are as follows.

(1) After the MIURA was parallel away from the quay, MIURA advised KITA MARU No.12 to tug even more parallel towards 3 o'clock (approximately 016°). However, the KITA MARU No.12 interpreted this as the direction of Sosogi (approximately 066°), and tugged in the direction of Sosogi together with KITA MARU No.8, which caused the MIURA to be tugged backwards and to come into close contact with the breakwater blocks.

(2) To prevent from going backwards, MIURA advised the KITA MARU No.12 to tug toward 2 o'clock starboard and the KITA MARU No.12 and KITA MARU No.8 towed while turning left in order to tow westward. Afterwards, in order to stop backward movement and avoid the risk of the stern colliding with the quay, the MIURA moved ahead.

(3) When the speed reached 2.3kn, the MIURA increased the speed turning hard to starboard toward the port entrance.

(4) The length of the towing rope of KITA MARU No.12 was approximately 50m.

○ Description of the recommendations to the Japan Coast Guard School

In view of the fact that the Japan Coast Guard School has been accepting the MIURA every year as training ship, the School is recommended to define clear organization managed by the school principal to carry out safe onboard sea training on the MIURA, and to establish the comprehensive management system for ensuring: to prevent accidents and give safety guidance under normal circumstances; to share information required for the safe navigations/operations such as meteorological and navigational warning information; to understand the operational status of the MIURA when she is on the training mission; and to secure communications and support in case of emergency.

○ Completion report of the implementation of recommendation-based measures by the Japan Coast Guard School

(1) The Japan Coast Guard School Onboard Sea Training Safety Management Promotion Division Regulations (February 19, 2013) were established and all staff members were notified of the establishment of a system for implementing safe onboard sea training throughout the school under the supervision of the principal.

(Main points of the regulations)

① A safety management promotion organization headed by the principal was established.

② The roles of each department and staff member within the school during normal operations and emergencies were clarified.

③ Implement safety guidance to prevent accidents under normal circumstances.

④ Share information required for the safe navigations and operations such as meteorological and navigational warning information with training ships and within the school.

⑤ Understand the operational status of training ships that are on training missions and share this

information.

⑥ Clarified announcement criteria and implementation measures for the support system for emergencies.

(2) Dedicated communication methods (mobile phones, etc.) were developed that can be used by staff responsible for contacting training ships at any time.

○ Description of the recommendations to Kita-Gumi Co., Ltd.

Kita-Gumi Co., Ltd. is recommended to take the following actions to ensure the safety of towing operations with its tug boats:

(1) To check and maintain towing hooks and to perform its operation training.

(2) To instruct the crew members to wear outfits such as lifejacket properly during the towing operations.

○ Completion report of the implementation of recommendation-based measures by Kita-Gumi Co., Ltd.

To ensure the safety of towing operations with tug boats, checks and maintenance were conducted, operational training was conducted, and guidance on wearing outfits such as lifejackets was provided for crew members of tug boats and work boats.

(1) Checks and maintenance for towing hooks

To ensure that the emergency breakaway handle functions as stipulated in advance of training, after removal of paint and rust attached to each hook, each moving part was lubricated with oil and grease, and these checks and operations were confirmed.

(2) Operational training for towing hooks

After the completion of checks and maintenance, operational training was conducted with all employees from the process of tugging with hooked towing rope to proper removal. The procedure was as in 1. to 4. below.

① Remove the safety pin from the towing hooks

② Pull the emergency breakaway handle

③ Tug the towing rope

④ The towing rope comes off

(3) Instructing the crew members to wear outfits such as lifejacket during the towing operations

All participants were instructed on how to properly wear lifejackets and how to use them during emergencies. At the same time, two lifebuoys were replaced.

(4) Safety management initiatives going forward

With efforts led by the company's Safety Measures Office, in an aim to ensure safe towing operations, in the company-wide safety patrols that are conducted once a month, training will be conducted on attaching towing hooks and towing rope and aboardage, lifebuoys will be inspected, and instructions will be provided on wearing lifejackets. In addition, towing hook operations

training will be conducted at the regular operational training twice a year.

* The completion report is shown on the Board's website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku11re-1_20130327.pdf

③ Marine accident involving passenger injury on the passenger ship ANEI GO No. 3 and on the passenger ship ANEI GO No. 38

(Recommendation on March 29, 2013)

Concerning the marine accident involving passenger injury on the passenger ship ANEI GO No. 3 and on the passenger ship ANEI GO No. 38 that occurred off the Nakama Port, Taketomi Town, Okinawa Prefecture on June 24 and 26, 2012, the Japan Transport Safety Board published a report on the investigation results of the accident and concurrently gave recommendations to the Minister of Land, Infrastructure, Transport and Tourism and Anei Kanko Co., Ltd. (who was relevant to the cause of the accident), on March 29, 2013 and received a report on the completion (completion report) of the implementation of recommendation-based measures as follows.

○ Summary of the accident, causes, and a description of recommendations

Refer to "9. Summaries of recommendations and opinions" (page 105-①)

○ Measures implemented by the Minister of Land, Infrastructure, Transport and Tourism based on the recommendations

Issuing the Notice on Ensuring the Enforcement of Safety Measures of Small High-Speed Vessels, the Minister has instructed the relevant local transportation authorities to communicate and ensure that businesses engaged in regular passenger shipping operations using small high-speed vessels implement the following measures, and has decided to visit ships to provide guidance in the period from April 2013 until the busy summer season, taking opportunities such as overall safety inspections.

Details

Comply with safe operation manuals for adverse weather. Operators are instructed to particularly ensure implementation of the following accident prevention measures concerning the content of safe operation manuals for adverse weather.

① Guide passengers to the back cabin where the pitching is relatively low.

② For ships that are equipped with seat belts, ensure that passengers are properly wearing their seat belts by conducting patrols within the ship to confirm that passengers are properly wearing their seat belts.

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* The notice including reference materials is shown on the Board's website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku12-1re_20130724.pdf

○ Completion report of the implementation of recommendation-based measures by Anei Kanko Co., Ltd.

Measures were implemented for each of the following matters, and these measures will continue to be implemented going forward.

(1) Measures to prevent accidents

① Guiding passengers to the back cabin where the pitching is relatively low

(Measures)

Use onboard announcement and patrols to guide senior citizens, handicapped people, and infants to the back cabin, and limit use of the front seats (first three rows) if significant pitching can be expected.

Increase priority seating for senior citizens from the current six seats to 12 seats, and make it easier to guide them to the back.

② Providing information to passengers regarding matters such as properly wearing seat belts and ensuring that passengers properly wear their seat belts

a Appropriately provide information to passengers

(Measures)

Point of ticket sales: Provide voyage outlook information such as the level of ship pitching expected and the possibility of the voyage being canceled based on the weather and sea condition forecasts.

Display precautions concerning weather and sea conditions inside the ship.

In addition, provide explanations on the importance of properly wearing a seat belt and the proper way of wearing a seat belt.

Within the ship: Use onboard announcement and patrols to explain the proper way of wearing a seat belt, and post warning and cooperation requests for riding high-speed ships on the back of seats.

Post precautions (on properly wearing a seat belt) on the company's website.

b Ensuring that passengers properly wear their seat belt through onboard announcements and patrols

Use onboard announcements to provide explanations on properly wearing a seat belt, conduct onboard patrol at least two to three times per voyage, and review and increase the number of items on the onboard patrol record log.

③ Speed adjustments in response to waves

(Measures)

Add guidelines for adverse weather for each route in the safe operation manual for adverse weather, and in accordance with this manual, slow ships down to reduce pitching and carefully watch for waves.

④ Sharing sea condition information

(Measures)

Make efforts to share information in accordance with Article 11 (normal contacts) and Article 12 (contact methods) of the Operations Standards. State the methods for transmitting information in the safe operation manual for adverse weather.

State in the safe operation manual for adverse weather that the headquarters ship department should be contacted by mobile phone in the event of waves that fit the adverse weather guidelines when they occur (or after entering port).

⑤ Keeping seat belts maintained and in good order

(Measures)

Add the inspection item of keeping seat belts maintained and in good order to the pre-departure check form, always check and maintain seat belts, and place seat belts above the seat before passengers board so that they are easy for passengers to put on.

The positioning of seat belts was added to the safe operation manual for adverse weather entitled Passenger Safety Measure Guidelines for Adverse Weather.

If a seat belt inspection reveals that there are seat belts that are stuck, use silicon spray (has the effect of making zippers used on clothing move more smoothly) to improve sticking and make it easier to adjust seat belts.

⑥ Shock-absorbing materials such as cushion seats

(Measures)

Install cushion seats (Tempur Seat Cushion S) in the first three rows where there are many accidents by the end of April 2013.

In addition, give positive consideration to installing up to row five.

(2) Implement safety training concerning matters including the safe operation manuals for adverse weather

(Measures)

In consideration of the implementation status of (1) 1. to 4. above, work to further enhance the safe operation manual for adverse weather and implement continual instructions and education concerning the compliance of safety management manuals and the safe operation manual for adverse weather at the safety workshops held every month and the morning meetings.

(3) Improve communication

① Improve communication and establish a safer operations system

(Measures)

Hold a Workplace Improvement Committee every month to discuss matters including requests,

suggestions, problems, and issues.

Members shall include representatives from each department, namely, office representatives (operations, sales, cargo), masters, deckhands, and maintenance representatives. In addition to implementing top-down decisions, create trust relationships by enabling people in the field to make proposal in order to mutually resolve problems and make improvements.

② Establish an operations schedule that reduces the burden on crew members

(Measures)

From April 2013 arrival times were deleted from schedules for each route, statements were made that the required time could change depending on the vessel used and weather conditions, and efforts were made to inform customers of these adjustments.

Going forward, the necessity of operations schedule revisions will be considered, through means such as conducting surveys of actual operations time for ship navigation journal and using them as reference materials when preparing operations schedules.

* The completion report including reference materials is shown on the Board's website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku12re-1_20130809.pdf

④ Marine accident involving death of crew member on chemical tanker KYOKUHO MARU No. 2

(Recommendation on April 26, 2013)

Concerning the marine accident involving the death of crew member on chemical tanker KYOKUHO MARU No. 2 that occurred in Sakai Semboku Section 7 of Hanshin Port on February 7, 2012, the Japan Transport Safety Board published a report on the investigation results of the accident and concurrently gave recommendations to the Minister of Land, Infrastructure, Transport and Tourism and AST Inc. (who was relevant to the cause of the accident), on April 26, 2013 and received a report on measures that should be taken based on the recommendations as follows (implementation plan).

○ Summary of the accident, causes, and a description of recommendations

Refer to "9. Summaries of recommendations and opinions" (page 108-②)

○ Measures that should be taken by AST Inc. based on the recommendations

(1) Implementation plan based on recommendation (1)

① Instructing crew members and ensuring compliance

When conducting boarding education, dock safety education, and ship visit education that will be conducted based on a target of one to two times per month for each ship, add guidance on the necessity of oxygen and gas concentration measurements and the measurement methods to the

education programs and ensure compliance.

In particular, for toxic gases of chloroform, dichloromethane, and carbon tetrachloride that the company transports, before entering the tanks or pump room after washing, in addition to an oxygen concentration measurement, measure residual gas using a Kitagawa gas detector and the detector tubes for the applicable product for the near future.

Note that the toxic gas measurement method shall be revised as appropriate in consideration of the consideration results of the Coastal Chemical Safety Measures Working Group established in the Japan Coastal Tanker Association.

② Confirmation of oxygen and gas concentration measurement

Add an oxygen and gas concentration measurement record and a record for the number of gas detector tubes purchased, used, and remaining to the ship health and safety quality control record checklist that is currently used during ship visits and confirm that these activities are being faithfully implemented when visiting each ship one to two times per month.

(2) Implementation plan based on recommendation (2)

① Recording of the implementation status of oxygen and gas concentration measurement

For toxic gases including chloroform that the company transports, before entering the tanks or pump room after washing, in addition to an oxygen concentration measurement, measure gas concentration using a Kitagawa gas detector and the detector tubes for the applicable product.

Have the master record the measurement results on the oxygen concentration measurement and residual gas detection record table, and record the receipt date, number of tubes received, date used, number of tubes used, and number of tubes remaining on the gas detector tube management table.

② Confirming of the implementation status, inspecting and confirming detector tube records

Inspect and confirm the above-mentioned oxygen concentration measurement and residual gas detection record table and gas detector tube management table, and enter this in the check list.

(3) Implementation plan based on recommendation (3)

① Display contents and location

Summarize and clarify the work procedures in a simplified format for confirmation of cleaning fluid, and removal through stripping, drying, and gas ventilation procedures if there is cleaning fluid, and display these procedures in the bridge and salon.

② Confirmation of work procedures

When having meetings before cleaning, use the ship cleaning work guidelines document to confirm the tank cleaning work procedures including the confirmation of cleaning fluid, and removal through stripping, drying, and gas ventilation procedures if there is cleaning fluid.

(4) Implementation plan based on recommendation (4)

① Measures concerning equipment

Following the occurrence of this accident, oxygen concentration and the non-existence of residual gas have been confirmed, and tiger-rope has been set on cargo tank manhole hatches in order to call attention until safety can be confirmed.

② Implementation of education and training

Conduct regular training to educate the crew how to respond to emergencies including accidents by not acting impulsively or based on their own judgment, but to instead report immediately to the bridge and wait for support until the people required for rescue have gathered.

Provide this education when conducting boarding education, dock safety education, and ship visit education.

The training will be participated in by all crew members and held on the ship once a year.

* The implementation plan including reference materials is shown on the Board's website.
http://www.mlit.go.jp/jtsb/shiphoukoku/ship-kankoku13re-1_20130809.pdf

11 Information dissemination in the process of investigations in 2013

The JTSB disseminated information on the following three marine accidents in 2013. The information is summarized below.

① Marine accident involving gravel carrier SEIWA MARU explosion

(Disseminated on January 23, 2013)

In regard to the gravel carrier SEIWA MARU explosion that occurred on December 11, 2012, the Japan Transport Safety Board supplied information to the Ministry of Land, Infrastructure, Transport and Tourism as follows.

(Facttual information)

The facts found to date are as follows.

(1) Location of the explosion

Within the bow store

(2) Installation of gas stove, propane gas canisters, etc.

The vessel was carrying a gas canister (capacity 5kg) in the bow store that was connected to a gas stove using a rubber hose. Note that while the gas canister has been replaced the day before the accident, the gas canister was nearly empty after the explosion.

* The information disseminated is shown on the Board's website.
http://www.mlit.go.jp/jtsb/iken-teikyo/seiwa20130123.pdf

② Marine accident involving passenger injury on the passenger ship KOUN MARU No. 3 and on the passenger ship LAKE FLOWER

(Disseminated on February 14, 2013)

In regard to the passenger injury on the passenger ship KOUN MARU No. 3 that occurred on December 24, 2012 and the passenger injury on the passenger ship LAKE FLOWER that occurred on January 3, 2013, the Japan Transport Safety Board supplied information to the Ministry of Land, Infrastructure, Transport and Tourism as follows.

(Factual information)

Although the facts will be confirmed in investigation going forward, the facts found to date are as follows.

Both ships had outboard motors with underwater exhaust at the stern and were equipped with a house above the catamaran hull. This house had a structure consisting of small openings to the lake surface called fishing holes in the surface of both sides of the house that allowed pond smelt fishing in a house that was heated even during the winter.

It was confirmed that passengers that had been transported to the hospital after complaining of a headache had carbon monoxide poisoning. In addition, according to an operations investigation on-site carbon monoxide was detected near the indoor fishing holes when the heating unit that could cause carbon monoxide indoors was stopped.

* The information disseminated is shown on the Board's website.
http://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo6_20130214.pdf

③ Marine accident involving the collision of push boat DAIEI MARU No. 11 and barge DAIEI MARU No. 12

(Disseminated on April 25, 2013)

In regard to the collision of push boat DAIEI MARU No. 11 and barge DAIEI MARU No. 12 that occurred on February 16, 2013, the Japan Transport Safety Board supplied information to the Ministry of Land, Infrastructure, Transport and Tourism as follows.

(Factual information)

Although the facts will be confirmed in investigation going forward, the facts found to date are as follows.

The accident occurred while the push boat was pushing the barge during bad weather in the sea off

Sodegaura City and the device coupling the push boat and barge became undone. The push boat and barge then collided, a breach was suffered in hull of the starboard side of the engine room, and the vessel flooded and foundered.

The push boat DAIEI MARU No. 11 and barge DAIEI MARU No. 12 are joined by a special coupling device in which the bow of the push boat is inserted into a notch in the stern of the barge. The barge is called a pusher barge and is navigated based on the thrust of the push boat, and the dimension ratios of the push boat's engine room are extremely high compared to a standard cargo ship.

* The information disseminated is shown on the Board's website.
http://www.mlit.go.jp/jtsb/iken-teikyo/s-teikyo7_20130425.pdf

Column

Thoughts on fires onboard ships

Nagasaki Office

At the Board, including the era of the former Marine Accidents Inquiry Agency, incidents of fires onboard ships have mostly been handled by investigators that were formerly ship engineers. Limited to the cases we have been involved with, we have knowledge but have not had any experience of tracking fires caused by plugs inserted in outlets, and it seems that there are many fires caused by short circuits and electric leaks.

The level of difficulty for investigating fires can vary significantly depending on whether the vessel has sunk or whether or not there are still cinders.

If a ship sinks, especially for small FRP (reinforced plastic) ships, often the only evidence available was interviews with crew members who did all they could to escape, because these ships burn surprisingly fast and easily. If we are fortunate enough to have some cinders, we have to work with scorched black bilge mixed with small fibers and soot from the FRP cinders that irritate the skin and try to identify the cause in a manner that is very much a process of trial and error.

When putting out fires, while the key principle is to reduce the temperature in the same manner as fires on land, because it is not possible to keep on throwing water to lower the temperature which would result in the ship losing buoyancy, initial fire fighting with portable dry chemical fire extinguisher is important. For engine rooms that are often the source of fires, it is necessary to install fire detectors and automatic dry chemical fire extinguisher and to cut off oxygen in order to extinguish fires.

First and foremost, so that fires are not allowed to occur it is important to conduct regular checks to mitigate and eliminate risks, such as by eliminating causes of electric leaks through means including the appropriate measurement and replacement of insulation resistance for electric machinery and electric wires, conducting checks as appropriate for fuel and lubricants in pipe joints that can cause fires if they leak into the exhaust pipes for the main engine, and taking precautions with battery charging, which is important, but can also lead to the electrolysis of water within batteries if they are overcharged and generate hydrogen which is ignitable.

12 Summaries of major marine accident investigation reports

Explosion ignited by flammable gas remaining after use of a cleaning spray can

Motor Boat KEN-YU explosion

Summary: The vessel (gross tonnage: less than 5 tons) was embarked by the skipper and three friends, who were preparing to depart from a basin for small crafts at Omuta River in Omuta City. When the main engine was started there was an explosion within the engine casing at around 10:10 on May 2, 2011. Two occupants of the vessel suffered broken bones and the side shell plating, bulwark, and cockpit instrument panel, etc. were damaged

Skipper

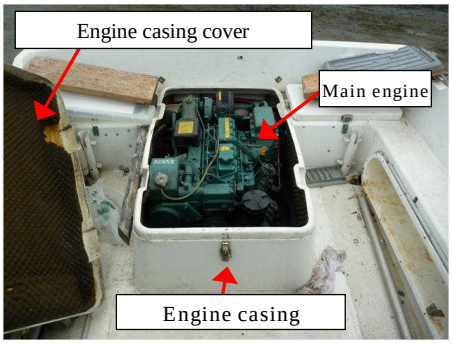
Five minutes before the accident occurred, while the vessel was mooring, an entire spray can containing oil-based cleaner was sprayed for approximately three minutes to clean the top of the main engine contained in the engine casing, and the engine casing cover was then immediately closed and locked.

Because the liquid cleaner evaporated once it adhered to the top of the main engine when it was sprayed, the skipper believed that the propellant liquefied petroleum gas (LPG) was diffused outside the engine casing together with the evaporated gas from the cleaner.

Inside the engine casing

Because the cleaner that was sprayed became vaporized and converted into a flammable gas together with the LPG heavier than the air, it remained inside the engine casing that had no ventilation.

There was no warning stated on the spray can itself that the gas evaporating from the cleaner is heavier than air and flammable, and that ventilation is necessary as it tends to accumulate in low areas if there is no wind or if used in an enclosed space.



Skipper

The main engine was started using the key switch by the cockpit.

The skipper did not think an electric spark from the starter motor occurred or that there was an ignition source inside the engine casing.

Inside the engine casing

Because flammable gas became retained in the engine casing, an electric spark from the starter motor **ignited and caused an explosion**

Probable causes: It is probable that this accident was caused by a chain of events in which the skipper used a spray can to clean the top of the main engine contained in the engine casing while the vessel was mooring at a basin for small crafts downstream at Omuta River and then immediately closed the engine casing cover. Because the flammable gas composed of a combination of the vaporized gas from the cleaner and propellant LPG remained in the engine casing, when the main engine was started an electric spark from the starter motor ignited the flammable gas and caused an explosion.

It is probable that the reason the flammable gas composed of a combination of the vaporized gas from the cleaner and propellant LPG remained in the engine casing is that in order to clean the top of the main engine contained in the engine casing the skipper sprayed the entire spray can for approximately three minutes on the top of the main engine from above the deck, immediately closed the engine casing after cleaning was completed, and as a result there was no ventilation.

For details, please refer to the investigation report. (Published in Japanese on January 25, 2013)
http://www.mlit.go.jp/jtsb/ship/rep-acci/2013/MA2013-1-1_2012tk0045.pdf

Collision of two vessels due to lack of a proper lookout by both vessels, causing the skipper of the fishing vessel to die

Collision of cargo ship AQUAMARINE with fishing vessel HIRASHIN MARU

Summary: Heading southeast on the Tsurumi passage established in Section 3, Yokohama, Keihin Port, the cargo ship AQUAMARINE (Ship A, gross tonnage: 4,095 tons) crewed by the master and 21 crew members collided with the fishing vessel HIRASHIN MARU (Ship B, gross tonnage: 4.9 tons) crewed by the skipper and one crew member while making a turn pulling a trawl net at around 06:14 on July 6, 2011 in the area southeast of the Daikoku Wharf in Section 3, Yokohama, Keihin Port.
In terms of Ship B, the skipper died and the deckhand was injured, the keel buckled, there were breaches, etc. In terms of Ship A, damage included dents to the bulbous bow.

Ship A

While keeping watch with two radars with a 3nm and 6nm range scale, the vessel proceeded at a course of approximately 140°.

Many fishing vessels were in sight ahead of the vessel at around 06:07, and because most of them were moving from the starboard side to the port side of the vessel, in order to avoid the group of fishing vessels the course was changed to 155° and the speed to 8kn at around 06:10.

When the vessel saw that Ship B and another vessel that had passed ahead of the vessel to the port side were turning to port, because the bearing of both vessels had changed to port, the judgment was made that if the vessel proceeded on the same course and at the same speed, Ship B and the other fishing vessel would pass the port side of the vessel.

While the vessel was proceeding while paying attention to the anchored vessel ahead and small cargo ships that were underway, it was found that Ship B was crossing the vessel's course and coming close to the port bow, and it was not possible to avoid a collision.

Ship B

The vessel exhibited an hourglass shaped object to indicate it was engaged in fishing, placed a trawl net in the water at around 05:35, and commenced trawling at a speed of approximately 3kn in the northeast direction.

The vessel began to turn to port in order to turn around and drag the net to the southwest.

While turning to port at approximately 2.8 to 3.6kn, the skipper of Ship B proceeded without noticing that the vessel was approaching the bow of Ship A.

Collision

Probable causes: It is somewhat likely that this accident was caused by a chain of events in which Ship A was proceeding southeast in the area southeast of the Daikoku Wharf in Section 3, Yokohama, Keihin Port and Ship B began to turn to port in order to drag the net to the southwest. The master of Ship A navigated the vessel while paying attention to the anchored vessel ahead and small cargo ships that were underway and did not notice that Ship B was coming close to the port bow while the skipper of Ship B proceeded without noticing that the vessel was approaching the bow of Ship A, and for this reason both vessels collided.
It is probable that the reason the master of Ship A navigated the vessel while paying attention to the anchored vessel ahead and small cargo ships that were underway and did not notice that Ship B was coming close to the port bow is that Ship B had passed ahead of the vessel to the port side and the bearing of Ship B had changed to port, and for this reason the judgment was made that if Ship A proceeded on the same course and at the same speed, Ship B would pass the port side of Ship A.

For details, please refer to the investigation report. (Published in Japanese on January 25, 2013)
http://www.mlit.go.jp/jtsb/eng-mar_report/2013/2011tk0014e.pdf

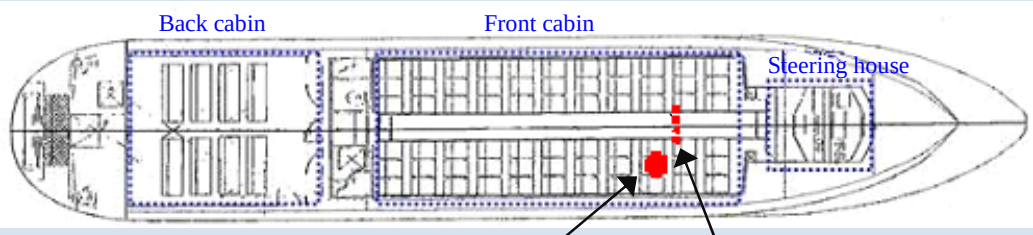
Compression fracture in passenger's lumbar spine from the impact of pitching

Passenger injury on the passenger ship ANEI GO No. 38

Summary: The vessel was crewed by the master and one deckhand, carrying 66 passengers. While sailing from Ishigaki Port, Ishigaki City, Okinawa Prefecture to Hateruma Fishery Harbor, Taketomi Town, the vessel pitched in the sea south-southwest of Nakama Port, Taketomi Town at around 09:20 on June 26, 2012, and one passenger (Passenger A) was injured.

Seating status of Passenger A at the time of the accident

Owner of the ship: Company A, gross tonnage: 19 tons, maximum number of persons: 90 passengers and 2 crew members



Position of Passenger A's seat (third row from the front)

Front passenger cabin seating

- While the master had intended to limit seating by passengers for the front seats of the front passenger cabin where the pitching is likely to be significant, the seating restriction chain was moved from the fifth row to the second row due to the number of passengers.
- The master and deckhand did not guide Passenger A to the back cabin where the pitching is relatively low

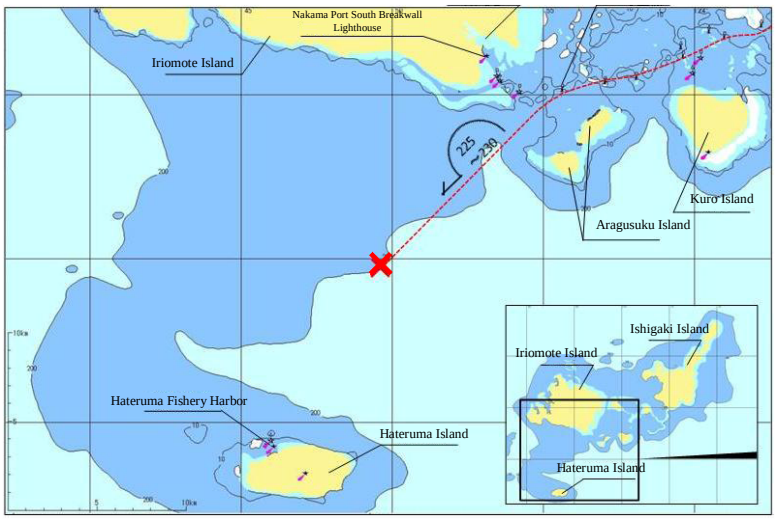
Events leading up to the accident

The vessel sailed towards Hateruma Fishery Harbor in the sea south-southwest of Nakama Port at a speed of 15 to 20kn while waves struck the hull from the port bow.

While discovering a high wave with a wave height of approximately 2.0m, the master was not able to change course or slow down, and the vessel's bow rode the high wave crest and fell down between the waves.

When the vessel's bow fell down between the waves, Passenger A's **body was lifted up from the seat and the impact on their posterior when falling back on the seat caused a compression fracture in her lumbar spine**

[Weather and sea conditions at the time of the accident]
Significant wave height: 1.52m, wave period: 6.5s, wave direction: south-southeast, wind direction: south wind velocity 7m/s



Probable causes: It is probable that this accident was caused by a chain of events in which the ship was sailing south-southwest at a speed of approximately 15 to 20kn in the sea south-southwest of Nakama Port when continuous waves from the south-southeast with a wave height of approximately 1.5m hit the port bow, and because Passenger A was not guided to the back cabin where the pitching is relatively low and Company A did not take measures to ensure that Passenger A properly wore their seat belt, when the vessel's bow rode the high wave crest with a wave height of approximately 2.0m and fell down between the waves, Passenger A's body was lifted up from the seat and the impact on her posterior when falling back on the seat caused a compression fracture in her lumbar spine.
It is probable that Passenger A was not guided to the back cabin where the pitching is relatively low and Company A did not take measures to ensure that Passenger A properly wore their seat belt because Company A did not thoroughly ensure that its crew complied with the safe operation manual for adverse weather.

For details, please refer to the investigation report. (Published in Japanese on March 29, 2013)
http://www.mlit.go.jp/jtsb/ship/report/MA2013-3-3_2012tk0031.pdf

Crew member dies from inhaling chloroform gas while checking the inside of a cargo tank
Death of crew member on chemical tanker KYOKUHO MARU No. 2

Summary: The vessel (gross tonnage: 388 tons, operator: Company A) was crewed by the master, the second officer, and three other crew members as it departed from Komatsu Wharf, Izumiotsu Port, Izumiotsu City, Osaka. As the vessel was sailing north towards Umemachi Terminal in Section 1, Osaka, Hanshin Port, at around 12:29 on February 7, 2012 the chief engineer discovered that the second officer collapsed in No.1 cargo tank on the port side. Although the second officer was rescued, he could not breathe because of gas inhalation, and died due to an oxygen deficiency.

State of work on the vessel until the day before the accident

On the day before the accident of February 6, after leaving a berth having completed discharging the cargo including chloroform, the inside of cargo tanks were cleaned and the vessel was berthed to Komatsu Wharf at around 16:55. A turbofan was operated to dry the inside of all cargo tanks No.1 through No.3 and ventilation was conducted for approximately 13 hours until noon on the 7th to ensure that the tanks were free of gas.

On the day before the accident the chief engineer confirmed that no chloroform washing water remained in the suction well (*1).

*1. A suction well is a hollow area on the stern side within the cargo tank so that cargo and washing water can be effectively suctioned, and it is equipped with suction pipes for cargo and washing water.

Events leading to the accident

While the vessel was heading to Umemachi Terminal at around 12:10 on February 7 after having departed from Komatsu Wharf, in order to check the state inside cargo tanks it was decided that the chief officer would check the starboard side cargo tanks and that the second officer would check the port side cargo tanks. The chief officer instructed the second officer to open the manhole hatch of No.1 cargo tank on the port side at around 12:25.

Manhole hatch of No.1 cargo tank on the port side

As the chief officer smelled chloroform from the manhole hatch of No.1 cargo tank on the port side, he instructed the second officer not to enter that cargo tank because there was chloroform gas and left the location.

When walking on the upper deck to check the state of work at around 12:29, the chief engineer noticed that the manhole hatch for No.1 cargo tank on the port side was opened. The chief engineer looked inside the cargo tank, and **discovered that the second officer collapsed leaning against the bulkhead close to the suction well**

When the second officer was discovered, No.1 cargo tank on the port side smelled strongly of gas and chloroform washing water remained in the suction well that had been empty the previous day.
→ It is somewhat likely that when ventilation was conducted with the turbofan on the previous day, this caused the washing water that had remained in the pipes to be pushed out and it then returned back to the tank.

Company A's guidelines for entering cargo tanks and pump rooms (excerpt)

- Confirm that there is no residual liquid or residual smell
- Measure and record oxygen and residual gas concentration as appropriate (tank or room entry if there is a dangerous atmosphere is strictly prohibited)
- Conduct work in groups of more than one person and in accordance with the instructions of the supervisor (working alone and acting based on your own decisions are strictly prohibited)

Probable causes: It is probable that this accident was caused by a chain of events in which Company A did not thoroughly instruct its crew members on guidelines for entering cargo tanks or measuring oxygen and gas concentration, nor did Company A clarify the work procedures for tank cleaning when there is residual washing water in a cargo tank. For these reasons, the second officer entered No.1 cargo tank on the port side that had residual washing water and a gas smell, and inhaled chloroform gas when checking the state of cargo tanks while heading north to the Umemachi Terminal.

For details, please refer to the investigation report. (Published in Japanese on April 26, 2013)
http://www.mlit.go.jp/jtsb/ship/rep-acci/2013/MA2013-4-2_2012tk0002.pdf

Seawater washed over the vessel causing her to list and capsize, leading to the death of two crew members
Capsizing of fishing vessel KASUGA MARU

Summary: The vessel (gross tonnage: 33.72 tons) was crewed by the skipper, the chief fisherman, and crew members A, B, C, and D and sailing to a fishing grounds in the sea northwest of main island of Okinawa. At around 15:15 on March 23, 2012 the vessel listed to port and capsized into the sea approximately 140km west-northwest of Naze Port, Amami City, Kagoshima Prefecture. Of the six crew members, two died and four were injured.

Around 11:30 on March 22
The vessel departed Yamagawa Port, Ibusuki City, Kagoshima Prefecture for a fishing ground in order to conduct long-line fishing

The center of gravity of the vessel became higher due to the loading of fishing equipment, and stability was reduced

Around 15:00 on March 23
While Crew Member A was on watch duty and the vessel was proceeding southwest on autopilot in the seas west-northwest of Naze Port, the vessel was heeling to port by wind from the west-northwest on the starboard side.

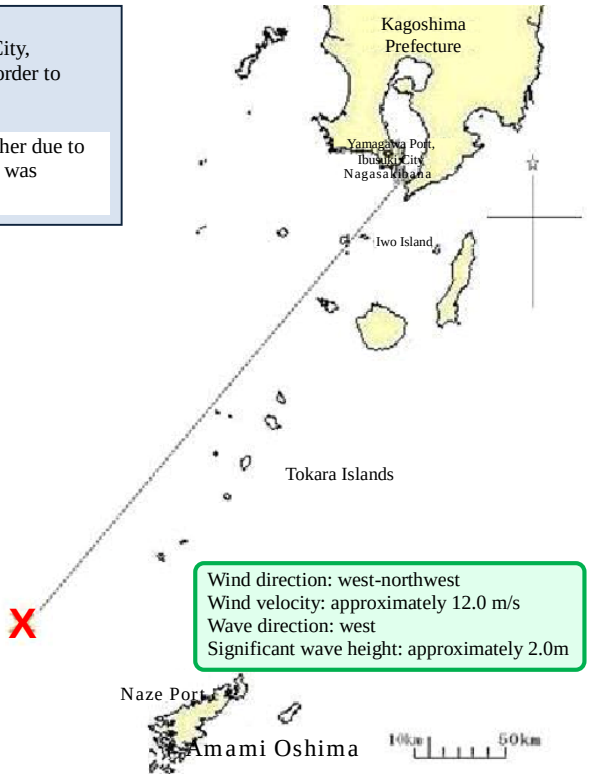
Due to waves from the west, seawater continuously washed over the "waist" (*1), but the vessel sailed maintaining its course and speed.

*1. In the case of this vessel, the term refers to the part of the upper deck between the back wall of the forecastle and the front of the bridge.

Although steering and speed changes were usually conducted by the skipper and chief fisherman for this vessel, both were taking a break at the time.

Around 15:15
The seawater that continuously washed over the waist became trapped on the port side of the upper deck, causing the port list to increase and the scuppers on the port side to become submerged and more seawater was trapped on the deck. When the trapped seawater flooded into the engine room and crew's cabin, **the port list increased even further and capsized.**

- The vessel's elevated wooden deck, the wooden deck's stringer boards, the size of the scuppers, and the structure around the scuppers affected and prevented water from being drained.
- The doors to the engine room and crew's cabin were open.



[Crew members (no crew members wore life jackets)]
- Skipper, chief fisherman, crew members A and B: Rescued by the Japan Coast Guard
- Crew member C: missing (found on March 27, dead)
- Crew member D: missing (found on August 24, removed from family register)

[The vessel]
It is probable that the vessel foundered.

Probable causes : It is probable that this accident was caused by a chain of events in which the vessel was sailing southwest in the sea west-northwest of Naze Port while being subject to winds from the west-northwest and waves from the west, during which seawater that continuously washed over the waist became trapped on the port side of the upper deck, causing the port list to increase and the scuppers on the port side to become submerged and more seawater was trapped on the deck. When the trapped seawater flooded into the engine room and crew's cabin, the port list increased even further and the vessel capsized.
It is probable that the reason trapped seawater flooded into the engine room and crew's cabin is that the doors of the engine room and crew's cabin had been opened to monitor the engine room and ventilate the crew's cabin.
It is probable that the reason the seawater that washed over became trapped on the port side of the upper deck is that the vessel's elevated wooden deck, the wooden deck's stringer board, the size of the scuppers, and the structure around the scuppers affected and prevented water from being drained and because the vessel was listing towards port side due to the wind.

For details, please refer to the investigation report. (Published in Japanese on August 30, 2013)
http://www.mlit.go.jp/jtsb/ship/rep-acci/2013/MA2013-8-1_2012tk0016.pdf

Chapter 5: 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.

You can read our publications and subscribe to our E-Mail Magazine service via the JTSB website.

URL：http://www.mlit.go.jp/jtsb/

2 Issuance of the JTSB Digest

With the aim of fostering awareness of accidents, and preventing similar ones from occurring, we issue a bimonthly “JTSB Digests.” This publication introduces you to statistics-based analyses and must-know cases of accidents.

We also issue “JTSB Digests” (English version) as part of our efforts to encourage overseas communications.

In 2013, we released six issues of “JTSB Digests” (February, April, June, August, October, and December: Issues No. 6-11) as well as two issues of “JTSB Digests” (English version, April and December).

The summary of each issue is as follows:

① JTSB Digests Issue No. 6 [Case Studies] (Issued on February 12, 2013)

- Case study of an accident investigation (marine): “Seawater poured through an air tube and into a ballast tank. This increased the list of the ship and resulted in it capsizing and sinking.”
- Case study of a serious incident investigation (aircraft): “An outbound airplane that had been directed to wait in front of a runway entered without acknowledging the directions it had been given. This resulted in an arriving airplane, which had obtained clearance for landing, having to go around.”
- Case study of a serious incident investigation (railway): “The starting signal did not switch to ‘stop’ but stayed on ‘proceed’ multiple times, even after the departure of trains.”

② JTSB Digests Issue No. 7 [Marine Accident Analyses] “Toward the prevention of passenger ship accidents” (Issued on April 26, 2013)

- Circumstances of each accident
- Case study of an accident investigation: “A passenger, who was seated at the front part of the cabin without buckling up, fell on his seat and landed on his buttocks when the vessel’s body was shaken up and down. The passenger sustained a compression fracture in the lumber vertebra upon impact.” (Similar examples appeared.)
- Case study of an accident investigation: “A passenger, who was seated in the fifth row from the front of the cabin, was lifted up when the vessel’s body was shaken up and down. He then hit their head on the ceiling, and then dropped into the seat, resulting in a fracture in his lumber vertebra.”
- Case study of an accident investigation: “A sightseeing boat going down the river ran into a rock and then capsized.”
- Case study of an accident investigation: “A vessel listed during the sailing due to a wave from behind, causing its load to collapse.”

③ JTSB Digests Issue No. 8 [Case Studies] (Issued on June 21, 2013)

- Case study of an accident investigation (aircraft): “A freight plane bounced multiple times when landing, resulting in the rupture of its left main wing and an outbreak of fire that burnt the plane.”
- Case study of an accident investigation (marine): “Steered by its captain, who was drunk at the time, a ship ran into a canal and crashed into the shore protection.”
- Case study of an accident investigation (railway): “A bullet train was derailed by the seismic shaking from the main shock of the Great East Japan Earthquake”

④ JTSB Digests Issue No. 9 [Marine Accident Analyses] “Toward the prevention of fatal and injury-causing accidents relating to oxygen deprivation or gas poisoning” (Issued on August 13, 2013)

- Circumstances of each accident
- Case study of an accident investigation: “A crew member inhaled chloroform gas when checking inside of a cargo tank, leading to an inability to breathe that caused him to die from oxygen deprivation.”
- Case study of an accident investigation: “A crew member who was engaging in unloading operations entered a cargo tank. The crew member died from asphyxiation due to oxygen deprivation.”
- Case study of an accident investigation: “After unloading chloroform, a crew member became unconscious in the ballast pump room due to inhalation of the chloroform gas.”
- Case study of an accident investigation: “Two crew members died from the hydrogen sulfide gas generated in the slop tank”

⑤ JTSB Digests Issue No. 10 [Railway Accident Analyses] “Toward the prevention of accidents involving cars that occur at level crossings and other places” (Issued on October 11, 2013)

- Circumstances of each accident
- Case study of an accident investigation: “A train collided with a large dump truck that was stopped at a level crossing, causing it to derail. The passengers aboard the train were injured.”
- Case study of an accident investigation: “A bus entered a level crossing without stopping and collided with a train. Six of the passengers on the bus were injured”
- Case study of an accident investigation: “A dump truck entered a level crossing while a train was approaching. It collided with the train and burst into flames.”
- Case study of an accident investigation: “A limited express train collided with a car at a level crossing. The driver of the car had not noticed the sign stating that the road was blocked off.”
- Case study of an accident investigation: “A trailer truck ignored a traffic light to enter an intersection, resulting in a collision with a tram. As a result, the tram was derailed.”

⑥ JTSB Digests Issue No. 11 [Aircraft Accident Analyses] “Toward the prevention of helicopter accidents” (Issued on December 18, 2013)

- Circumstances of each accident
- Case study of an accident investigation: “When a helicopter hanged the cargo during a flight, the cargo got caught in a ground object, such as perhaps trees or rocks. This resulted in the helicopter crashing in the mountains.”
- Case study of an accident investigation: “While it was lowering a rescue worker with a hoist for rescue work, a helicopter crashed in a rivulet. The rivulet was downstream of a waterfall basin.”
- Case study of an accident investigation: “During a flight for the delivery of materials, a sling

damaged helicopter's tail rotor, causing it become out-of-control and crash."

- Case study of an accident investigation: "An aircraft with a high rate of descending suffered a hard-landing, causing some of its passengers to get injured."
- Case study of an accident investigation: "A helicopter was stuck in an obstacle on the ground; it rolled over when its driver attempted to take off."
- Case study of an accident investigation: "During a flight to observe power lines, a fire broke out in the rear cargo room; the aircraft was burnt and wrecked after a forced landing."

⑦ For Prevention of Small Aeroplane Accidents (Issued on April 15, 2013)

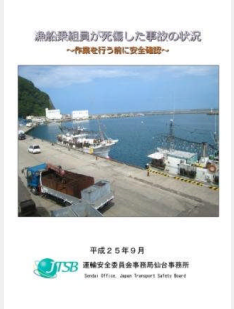
⑧ For prevention of Fatal and Injury Accidents Caused by Anoxia or Gas Poisoning (Issued on December 18, 2013)

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 2013

Hakodate	Circumstances of vessel collisions in the Hokkaido coastal area
Sendai	Situation of accidents where fishing vessel member(s) died or were injured
Yokohama	Circumstances of pleasure boat accidents in Hamana Lake, as well as Imagireguchi in Hamana Lake
	Situation of pleasure boat accidents in Ise Bay and Mikawa Bay
Kobe	Personal Watercraft: Driving precautions
Hiroshima	Situation of grounding accidents in the Seto Naikai Sea
Moji	Situation of grounding accidents in Kanmon Port
	Situation of marine accidents that occurred when a crew member was operating their cell phone
Nagasaki	Situation of grounding accidents in Hiradoseto
Naha	Toward the prevention of accidents in leisure ships



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 July 2013, we issued the JTSB Annual Report 2013. We did so in order to share the lessons learned from accidents and incidents with interested parties, by introducing our general activities in 2012.

As part of our efforts to provide information overseas, we issued the “Japan Transport Safety Board Annual Report 2013” on November 2013. We did so to let people overseas know about the topics in this Annual Report.

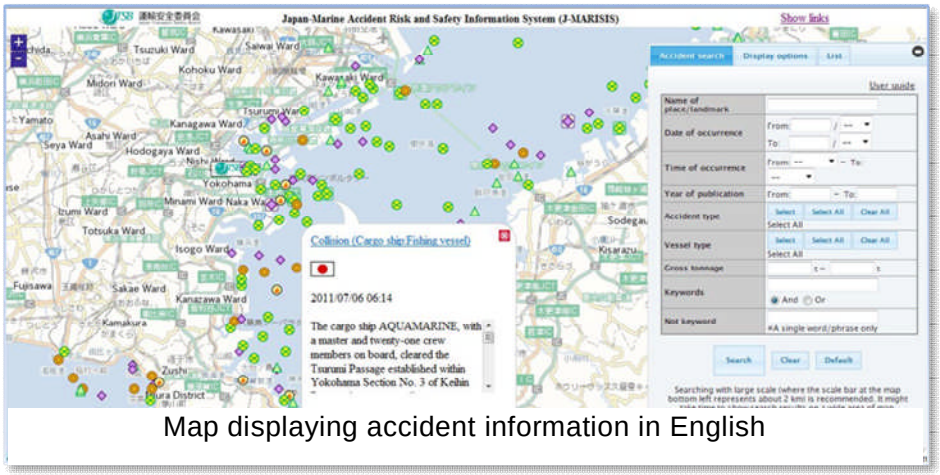
5 Japan-Marine Accident Risk and Safety Information System: Using the map to find information on accidents, risks, and safety

JTSB launched a web-based marine accident map that provides the information about where the marine accidents have occurred. This map, the Japan-Marine Accident Risk and Safety Information System, was launched in Japanese at the end of May 2013.

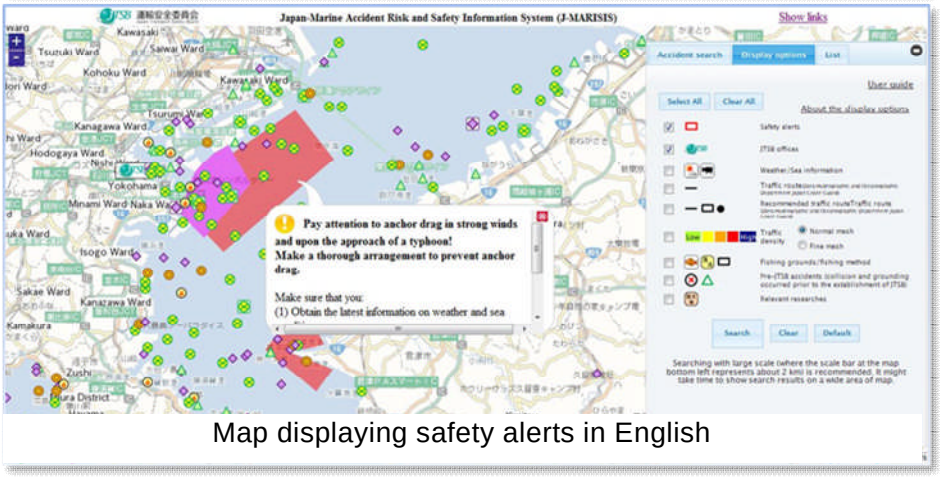
This system enables you to view accident summaries and investigation reports for accidents and serious incidents, as well as vessel traffic, water routes, and fishing spots, on the same map. By disclosing the risks of accidents in each sea area, this system is designed to alert those who are on board ships that are sailing through the area to potential risks. By doing so, the system aims to prevent similar accidents and further improve the safety of sea traffic.

Maritime organizations have told us about how they use system, and how they would like to use it further. We have received feedback such as: “Since we can use the system to search by vessel types and accident types, we would like to utilize it as material in the training for our seamen, as well as the safety training programs,” and “By using the system to search by seasons and time, we want to use it to create documents for the safe operation of ships.”

In addition, in response to numerous requests for an English version of this system, for the education of foreign seamen and information provision to foreign vessels, we launched the English version (J-MARISIS) on September 2013. This is because today, most of the merchant fleets in Japan are run by foreign seamen, and accidents involving foreign vessels frequently occur in Japanese coastal waters.



Map displaying accident information in English



Map displaying safety alerts in English

Column

Japan-Marine Accident Risk and Safety Information System: Global Version

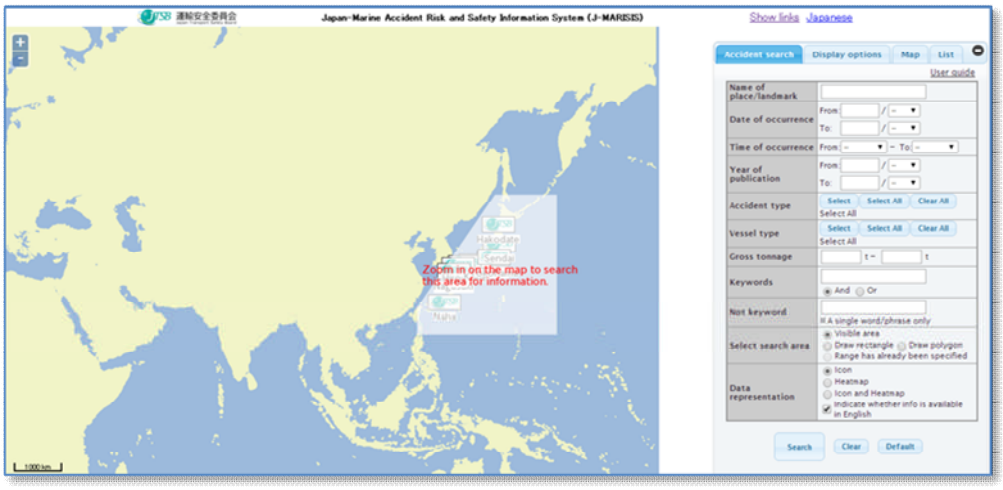
Internationalization and functionality enhancement

http://jtsb.mlit.go.jp/hazardmap/

Director for Analysis, Recommendation, and Opinion

In April 2014, JTSB launched the “Japan-Marine Accident Risk and Safety Information System (J-MARISIS) Global Version.” The system expanded the search range to enable users to search for investigation reports of marine accidents and incidents all over the world.

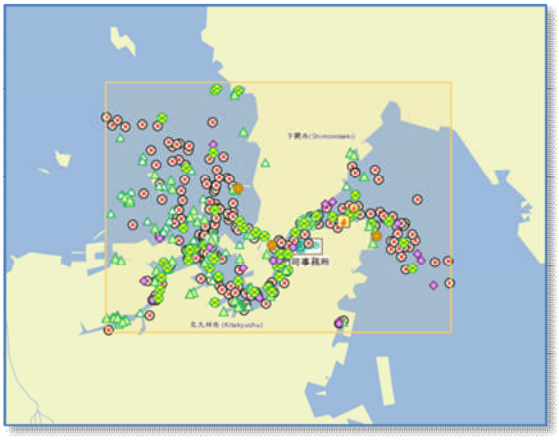
In accordance with requests from users to be able to search for marine accidents in any sea area around the world, JTSB enhanced the system to allow users to search not only our investigation reports, but also those published by foreign accident investigation authorities. (We presented J-MARISIS at the 9th European Marine Accident Investigators’ International Forum, which was held in Switzerland in September 2013. We also presented it at the 22nd Marine Accident Investigators’ International Forum, which was held in South Korea in October. Furthermore, we have added links to investigation reports published by the accident investigation authorities of the seven countries that agreed on the idea of this system at these forums.)



Front Page in the Global Version

On top of this, we’ve enhanced the system to provide new functions, including the display of marine accident information that are under investigation, search functions in any range, and distance estimations and drawing. These are functions that have requested by many of our customers.

We’d like to hear your ideas and opinions to further enhance the system in the future. We hope that you can make use of the system to prevent marine accidents.



Search function is available in any

You can draw planned routes

6 Dispatch of lecturers to seminars

The JTSB uses accident case studies and analysis results in its accident prevention activities to impart knowledge and accident prevention measures to concerned parties.

Zengyoren

JTSB lecturers have been dispatched to conduct seminars and training, which are organized by various companies and organizations. We select a topic suitable for the audience and explain case studies, prevention measures, and lessons learned from past accident investigations in an easy-to-understand manner.

The following is a list of some of the seminars that JTSB lecturers were dispatched to in 2013.

Major seminars that JTSB lecturers were dispatched to (2013)

Date	Name / Sponsor	Participants	Theme	Lecturers (Office)
June 27, 2013	Discussion among users of Light Plane ASI-NET [Association of Air Transport Engineering and Research]	30 aircraft and helicopter pilots	Helicopter accident investigations and safety lessons	Aircraft accident investigator (JTSB Secretariat)
June 28, 2013	J-MARISIS briefing session [JF Zengyoren]	Approximately 50 employees of the fishermen's union and others	About J-MARISIS	Marine accident investigator (JTSB Secretariat)
July 11, 2013	2013 Special Course for Railway Technology Training [On-site Inspection]	25 on-site inspectors	The roles of railway accident investigations	Railway accident investigator (JTSB Secretariat)

	[Kashiwa Training Center, College of Land, Infrastructure, Transport, and Tourism]			
July 29, 2013	13th Maritime Promotion Seminar [Kyushu Transport Development Center]	Approximately 100 persons engaged in maritime affairs	About marine accidents in the Kyushu region: Situation of marine accidents drawn from the hazard map	Director General, marine accident investigator (JTSB Secretariat)
August 21, 2013	6th Engineering Ethics Training [Institute of Electrical Engineers of Japan]	Approximately 50 IEC members, students, and others	Transport accident investigation and ethics for engineers	Board member (JTSB)
September 10, 2013	The 45th Meeting of the Prevention of Mariner Accidents [Shikoku branch of the Association for Accident Prevention Among Seafarers]	Approximately 80 employees, crew members, and others from shipping companies	Application examples of J-MARISIS and examples of marine accidents with casualties: Information on accidents, risks, and safety found out from the map	Regional accident investigator (Hiroshima Office)
October 23, 2013	2013 Special Training for Aviation Security and Disaster Prevention Personnel (II) [Aviation Safety Dept., Civil Aviation Bureau]	10 aviation security and disaster prevention personnel	Case studies and verification of aircraft accidents	Aircraft accident investigator (JTSB Secretariat)
December 5, 2013	First crew training for 2013 [Kanto Passengerboat Association]	Approximately 60 seamen who work as members of the association	Prevention of passenger ship accidents: Summary and analysis of accident and incident investigations	Accident prevention investigator (JTSB Secretariat)
December 10, 2013	2013 Special Courses for Building Guidance, Elevator Safety, and Accident Training [College of Land, Infrastructure, Transport, and Tourism]	29 elevator safety and accident-related personnel	Investigation of railway accidents	Railway accident investigator (JTSB Secretariat)

7 Provision of information for accident victims and their families

Following the alleged disclosure of information during the investigation of the Train Derailment Accident between Tsukaguchi and Amagasaki Stations on the Fukuchiyama Line of the West Japan Railway Company, we established a meeting consisting of victims of the accident and members of their families, as well as experts and bereaved families. The purpose of the meeting was to verify the reliability of the accident's investigation report. The verification meeting compiled a proposal for the future of the JTSB.

Based on this proposal, we established the Duty Improvement Action Plan, which specified four action principles. In line with the plan, we are striving to improve our duties by combining all of our resources. We set "consideration for the victims" as one of the four principles, and we are making efforts to take the feelings of the victims and their families, or the bereaved, into account in an appropriate manner. We are also making efforts to provide them with information regarding the accident investigation in a timely and appropriate manner, and to sincerely respond to their input. To this end, in April 2011, we established a contact point for providing information regarding accident investigations. To further promote the provision of related information, we also established the Victims and their Families Liaison Office, as stipulated in the official directive in April 2012. Furthermore, contact points were established at our regional offices to deal with situations in coordination with the Tokyo Headquarters.

Through these contact points, we strive to ensure mutual communications with victims and their family members. We do so by carefully listening to their perspectives and concerns and using these opportunities to further improve our duties.

In May 2012, we adopted the "Information Provision Manual" as a specific effort to better provide information to victims and their family members. At their request, we provide investigation reports and other information on investigations; we also listen to their opinions or requests at all times. We have also prepared an information card to be distributed that contains handy information about contact points.

Information Card for Victims and their Families

In addition, we have organized lecture meetings with victims and their family members where we have invited them to be guest speakers. This has allowed us to further our understanding of their situations and feelings, as well as their expectations for our investigations and information provision activities. Doing so, we try to improve the skills of our staff. At a meeting held in September 2014, a member of a family bereaved in the Japan Airlines Flight 123 Accident spoke about information provision regarding the accident investigation from the perspective of bereaved families.

Lecture meeting

Chapter 6: International efforts for accident prevention

1 Objectives and significance of international cooperation

Aircraft and marine accidents, which are the 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 involved during the investigation process.

In addition to the nation where the aircraft accident occurred, the aircraft accident also concerns the nation of registry, the nation of the operator, and the nation where the aircraft was designed and/or manufactured. An annex in the Convention on International Civil Aviation states that the state of occurrence is responsible for starting and accomplishing an accident investigation, while the other states also have the right to appoint a representative to participate in the investigation. Proper cooperation with the accident investigation authorities of the concerned countries is necessary for the accomplishment of an investigation.

Similarly, in marine accidents 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. However, other concerned states, such as coastal states and the nation(s) of victims are also entitled to investigate the accident. The convention defines the standard structure of marine accident investigations. The flag state and concerned countries 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, sharing information on accidents and investigation methods on a regular basis, and achieving a high level 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 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 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 investigations. Relating to this, the following sections introduce you to each of our international activities in 2013.

2 Efforts of international organization 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 is comprised of the Assembly, Council, Air Navigation Commission (a subordinate agency of the Council), Legal Committee, Air Transport Bureau, Technical Co-operation Bureau and Finance Committee, Secretariat, and Regional Offices (these and other committees are under the control of the Council), Secretariat, and regional offices. In addition, aviation meetings, regional aviation meetings, working groups, and specialist meetings, which are like panels, are called in for certain projects. As of October 2013, 191 states are members of ICAO.

The objective of ICAO is defined in Article 44 of the Convention on International Civil Aviation ("the Chicago Convention") as being "to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport." ICAO is engaging in a wide variety of activities, including the drafting of conventions regarding international air transport and aviation security such as countermeasures against hijacking. It also engages in audits of member states' security 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 in air and safety management. Among them, Annex 13 defines the standards and recommendations for aircraft accident and incident investigations. In addition to this, 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).

Note that since November 2013, the 14th amendment of Annex 13, which added the definition of contributing factors, has been in effect along with Annex 19 (Safety Management), which is new.

In March 2013, the Council approved the Policy Document on Assistance to Aircraft Accident Victims and their Families. This endeavor intends to call on contracting states to provide support for aircraft accident victims and their families. A task force for the drafting of this document was launched in ICAO. As one of its members, Japan appointed the manager of the Victims and their Families Liaison Office from JTSB, and contributed to the discussions.

In addition, ICAO established the Regional Aviation Safety Group, Asia and Pacific Regions, (RASG - APAC) in 2011. This group will operate as a new framework for safety in the Asia and Pacific area. Under this group, a subordinate group, the Asia Pacific Accident Investigation Group (APAC-AIG), discusses the building of a cooperative system for accident investigation in this region. JTSB dispatched

APAC-AIG Meeting (Indonesia)

aircraft accident investigators to each of the meetings, which were held in March 2013 (Bangkok, Thailand) and the following September (Bali, Indonesia).

(2) Efforts of the International Maritime Organization and JTSB's involvement

The International Maritime Organization (IMO, Headquarters: London, UK) was established in 1958 as a specialized agency of the United Nations. It was originally known as the "Inter-Governmental Maritime Consultative Organization (IMCO). The IMO is comprised of 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 to this, there is a Secretariat, and the MSC and MEPC also have seven subcommittees. As of March 2012, IMO has 170 member states/regions and three associate member regions. IMO has been discussing a restructure of its subcommittees as a part of its efforts to improve efficiency of deliberation. As a result, in the 28th Assembly on November 2013, it approved a reduction of the number of subcommittees from nine to seven.

IMO engages in various activities, such as the facilitation of intergovernmental cooperation and the drafting of effective safety measures and conventions that relate to technical and legal problems with maritime life safety and safe marine navigations. The Sub-Committee on Flag State Implementation (FSI) 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. FSI analyzes the accident investigation reports submitted from states. It does so based on SOLAS and the International Convention for the Prevention of Pollution from Ships (MARPOL) to draw lessons from, which FSI then makes public on the IMO website. By doing so, FSI promotes activities for the prevention of the repeated occurrence of marine accidents. The Correspondence Group (which implements analysis during periods outside of the session) and the Working Group (which verifies the analysis results during the session period) are comprised of volunteer investigators from the member states. They discuss these analysis tasks, which the FSI session then approves. Depending on the matter in question, if FSI determines that further discussion is required about a convention revision, it will submit recommendations or information to MSC, MEPC, and other IMO subcommittees. The FSI21 was held in March 2013. At this event, JTSB's marine accident investigators took part as a group member and analyzed 29 accident investigation reports from various states. Tentative translations of these analysis results are published on JTSB website.

FSI21

(URL: http://www.mlit.go.jp/jtsb/casualty_analysis/casualty_analysis_top.html)

Note that FSI was renamed the Sub-Committee on Implementation of IMO Instruments (III) as a result of the subcommittee reforms.

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 a group of accident investigation boards from the Netherlands, the United States, Canada, and Sweden in 1993. As of March 2014, the international organization has members from the transport accident investigation authorities of 16 states and regions. Organizations that are permitted to join must be permanent boards that are independent from any regulatory body.

Participants in the ITSA chairman meeting (India)

Based on the idea that any findings from an accident 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. The parties learn about the causes of accidents and the methodologies of accident investigations, thus helping 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.

Committee members of the board's railway workgroup took part in the chairman meeting held in New Delhi in February 2013, where they informed the participants of the current situation of accident and incident investigations in Japan. They also spoke about the status of the investigation for the derailment accident in JR Hokkaido Sekisho Line.

② Board meetings of the International Society of Air Safety Investigators and the 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 the repeated occurrence of aircraft accidents. This aims is to be achieved by improving a cooperative system of investigation bodies, through the facilitation of communications between member states about their experience and knowledge, as well as information about the technical aspects of aircraft accident investigations.

ISASI holds annual seminars, and the Japan Aircraft Accident Investigation Commission has participated in each one of them since its establishment in 1974. In this seminar, a flight recorder workshop, an accident investigation training workshop, a cabin safety workshop, and

a government investigators meeting are held in parallel with the general meeting. Japan also participates these workshops to contribute to technical improvements in these areas.

The 2013 Annual Seminar was held in Vancouver, Canada under the theme “Preparing the Next Generation of Investigators.” JTSB aircraft accident investigators took part in the seminar, actively communicating information with the persons engaged in the accident investigations.

ISASI has regional associations in Australia (ASASI), Canada (CSASI), Europe (ESASI), France (ESASI French), Latin America (LARSASI), New Zealand (NZSASI), Russia (RSASI), the United States (USSASI), and Asia (AsiaSASI). Each of these associations also holds their own seminars.

In AsiaSASI, the Hong Kong Civil Aviation Department currently serves as the Chairman, with JTSB as the Vice Chairman, and the Air Accident Investigation Bureau of Singapore as the Secretariat.

In June 2013, a second AsiaSASI seminar was held in Taiwan, in which JTSB’s aircraft accident investigators participated and made a presentation about the methods for recognizing aircraft accidents and analysis results for incorrect entries into runways.

③ The International Rail Accident Investigation Conference

Presentation

In November 2013, the International Rail Accident Investigation Conference (IRAIC) was held in London. JTSB’s railway accident investigators participated along with other members in the conference and made a presentation about the accidents that arose from natural disasters, such as sudden gusts of wind, heavy rain, or earthquake. This attracted a lot interest from a variety of countries. The railway accident investigation authorities of various states, including the UK, drew up the concept for this conference. It was hosted by the Institution of Mechanical Engineers (IMechE). For the purpose of sharing the findings on railway accident investigations from multiple nations, the conference is held every three years from 2007, and JTSB has participated every time since its second one. The latest conference was attended by 122 persons affiliated with the accident investigation agencies, universities, and corporations of 19 states from Europe (the UK, Norway, the Netherlands, etc.), North America (the US and Canada) and Asia (Taiwan, South Korea, and Japan). The participants shared a large amount of information on various specialized areas related to railway accident investigations.

④ The 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. Thus, the conference aims to further develop the technical capacity of accident investigation authorities around the world and to further improvement the cooperative system between them.

Established in 2004, the accident investigation bodies of each state hold a meeting every year. JTSB has participated in nearly all the conferences since 2006.

The 2013 conference was held in September in Brunswick, Germany. JTSB dispatched aircraft accident investigators 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.

⑤ The 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 for 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.

During this conference, marine accident investigators around the world improve their opportunities to exchange opinions and share information on marine accident investigations. Recently, there has been more demand to make use of the findings obtained from the 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 it every year since the third conference and hosted the eighth conference in Tokyo in 1999.

MAIIF22 (Busan, South Korea)

At the 22nd conference in Busan, South Korea in October 2013, JTSB's associate marine accident investigator and others made a presentation about Japan-Marine Accident Risk and Safety Information System (J-MARISIS).

MAIFA16 (Busan, South Korea)

⑥ The 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 investigations in the Asia region and to assist developing countries enhance their investigation systems. From 1998 the meeting has been held annually, and Japan has played a leading role in this forum, including in 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 investigations. Encouraged by the success of MAIFA, E-MAIIF was established in Europe in 2005. A-MAIF was then established in the Americas in 2009. These trends contribute more than ever in furthering the exchange and cooperation between marine accident investigators. 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 meetings very important.

The 16th conference of MAIFA was held in October 2013 in Busan, South Korea, alongside the MAIIF conference. JTSB sent an associate marine accident investigator and others to MAIFA, and made a presentation on the investigation status of the collision accident involving the Yong Cai containership and Daini Shinyo Maru fishing boat.

(2) Examples of international cooperation among accident investigation agencies in individual cases

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 concerned states may appoint their own Accredited Representative (AR) to join the investigation.

Among the aircraft accidents that foreign accident investigation authorities started investigating in 2013, three were cases that Japan was one of the states of registry, design/manufacturing, or operation. For these cases, JSTB's aircraft accident investigators were appointed as ARs.

As for the case concerning batteries of Boeing 787 that occurred at Boston, USA in January 2013, JTSB's AR is working with the accident investigation authority in the US, as well as on a similar case in Japan. They have participated in various meetings and public hearings to share information and the investigators of both nations have coordinated closely with each other. For example, both of them witnessed the tests conducted in Japan and in the US. For the serious incident that occurred in Brazil in January 2013, where a small aircraft made in Japan belly-landed due to an inability to deploy its wheels, JTSB appointed AR to assist in Brazil's accident investigation. In addition, for the accident that occurred in Taiwan in October 2013 with three casualties, where a Japanese-made helicopter crashed in the mountains, JTSB also appointed an AR to support the accident investigation authority in Taiwan.

In marine accident 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 concerned 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 occurs that concerns more than one state, Japan's accident investigators are to collaborate with the accident investigation authorities of the other related states in order to obtain information about the accident.

Among the marine accidents that JTSB began to investigate in 2013, 11 were serious accidents that related to foreign vessels. JTSB notified the occurrence of these accidents to the accident investigation authorities of each flag state. In the investigation of the accident where the Cambodian cargo ship Favor Sailing rolled over at Sakai-Senboku Port in the Hanshin Port area on April 30, 2013, we obtained information about the seaman's competency certificate through the accident investigation authority of Cambodia. For the investigation of the incident where the Cambodian cargo ship Taigan caught on fire at Wakkanai Port on May 16, 2013, we obtained information about the certificates and rules in effect for the ship via the accident investigation authority of Cambodia.

Among the marine accident investigation reports that we published in 2013, we sent 11 draft reports to the flag states upon request, in order to ask for their opinions.

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 properly. We also actively participate in overseas training for accident investigations.

From last year onwards, in 2013 we dispatched an aircraft accident investigator and a marine accident investigator to Cranfield University in the UK, which has a good track record in accident investigation training. They were dispatched with the aim of improving their accident investigation capabilities. The training at the university let the students learn about a variety of topics, from the basics to expert information about accident investigations. After the training, the participating investigator made the other investigators of each mode aware of what was learned in the training, thereby helping to improve the capabilities of all of our investigators.

Column

How to read accident investigation reports from all around the world

Director for International Affairs

The accident investigation authorities all over the world, including JTSB, publish investigation reports in order to spread information to the public, thus helping improve transport safety.

However, it is very time consuming to check the accident investigation authority of each country, and access their websites one by one, in order to refer to the reports from various countries.

Therefore, by summarizing the reports drafted by the authorities all over the world, this column introduces you to websites that can help you to refer to the investigation reports from various countries.

- (Aviation) ICAO E-library of Final Reports
  http://www.icao.int/safety/airnavigation/AIG/Pages/E-library-of-Final-Reports.aspx

  Appendix 13 of the Convention on International Civil Aviation, which defines the international standards for aircraft accident investigations, states that if a member state conducts an investigation into an accident or incident involving an aircraft with a maximum mass of over 5,700 kg, that state must send the accident investigation report to ICAO.

  This website, which is operated by ICAO, discloses the investigation reports (mainly in English) that have been sent to ICAO from states' aircraft accident investigation agencies.

  Approximately 1,200 reports have been published as of March 2014. New reports will be added from time to time.

  The disclosed reports can be searched for by aircraft models, the state of occurrence, keywords, and so on. For information on how to search, there is a user guide available on the website.

- (Maritime) IMO Global Integrated Shipping Information System (GISIS)
  http://gisis.imo.org/Public/Default.aspx

  Like ICAO, IMO requires the contracting states to send investigation reports of the marine accidents they investigated if the vessels involved are totally destroyed or if there are any fatalities.

  This website, which is operated by IMO, requires users to register in order to access it. This can be done by clicking "Log In" in the upper-right hand corner. The information about accident investigations can be referred to from "Marine Casualties and Incidents," which discloses a variety of data about accidents, including investigation reports (mainly in English). You can search for data by vessel types, vessel name, date of occurrence, site of occurrence, keywords, and so on.

- (Maritime) MAIIF (Marine Accident Investigators International Forum) Investigation Reports page
  http://www.maiif.org/index.php/investigation-reports

  This page is on the MAIIF website, which is organized by marine accident investigators from all over the world. It summarizes the different pages where each of the marine accident investigation authorities publish their reports.

- (Railway) ITSA (International Transportation Safety Association)'s Members page
  http://www.itsasafety.org/home/members/

  This page is on the ITSA website, which is organized by the transport accident investigation agencies of the major advanced countries. It lists the members of ITSA and includes links to each member's website. Access to the website of an investigation agency will refer you to a page that discloses its railway accident investigation reports. Note that Russia (IAC), France (BEA), and Chinese Taipei (ASC) only conduct investigations into aircraft accidents and incidents.

Appendixes

Japan Transport Safety Board
Annual Report 2014

Appendixes

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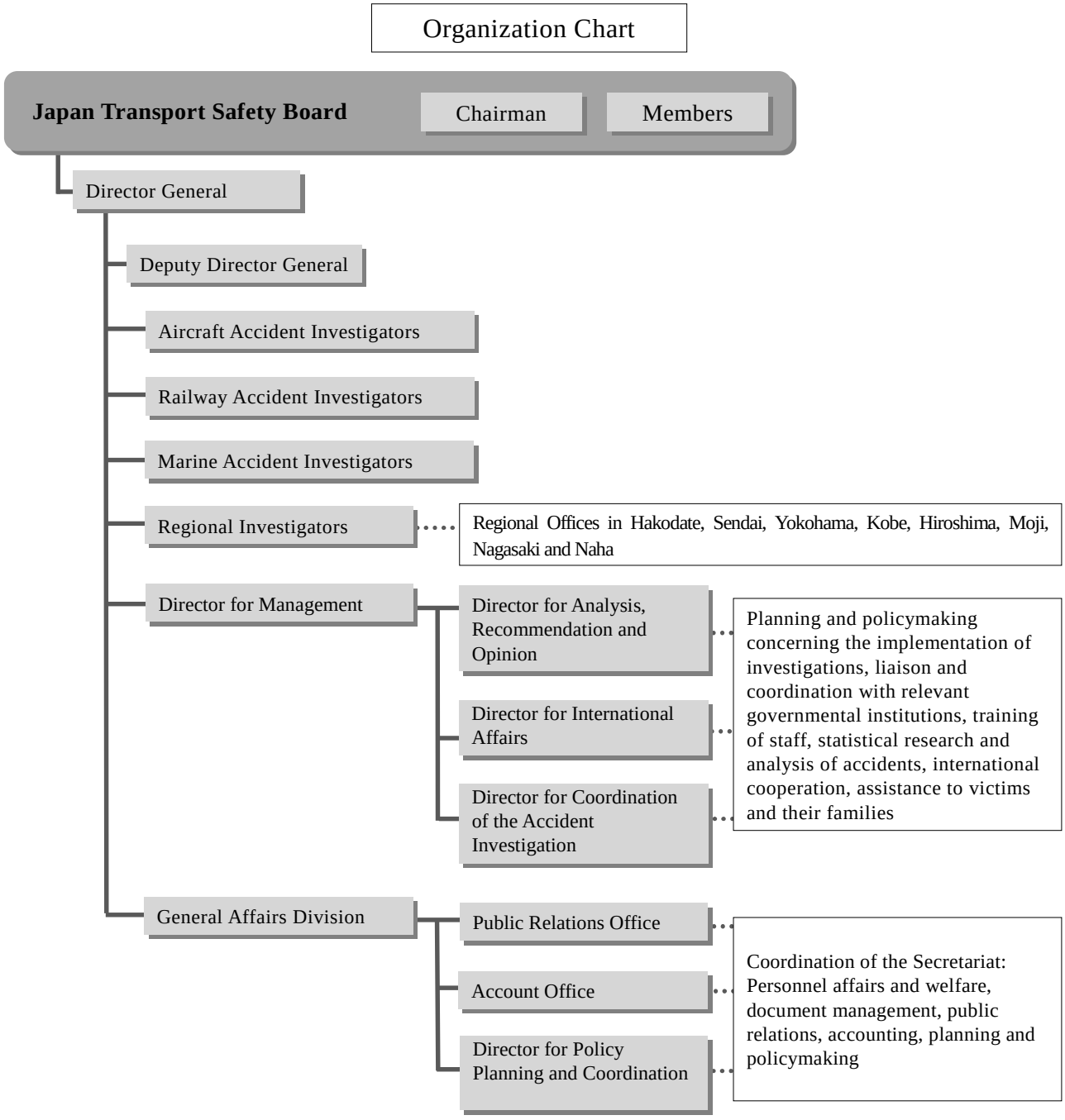
1 Outline of the organization

The Japan Transport Safety Board consists of the Chairman, 12 members, and 176 secretariat staff (as of the end of March 2014). 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

After accident investigators prepare a draft investigation report, the draft report will be deliberated at the Board or Committees. In general, the committee which set up in each mode: Aircraft, Railway, Marine and Marine Special Committees will deliberate on the draft reports while particularly serious accidents will be deliberated at the General Committee, and extremely serious accidents at the Board.

The Board (Committee) is convened by the Chairman (or the Director of Committee), and attended by the members from the respective disciplines. Any matters shall be decided by a majority of the members present. 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, 2014

Norihiro Goto, Chairman (Full-time), Director of Aircraft Committee

Chairman Norihiro Goto was appointed as Chairman of the Aircraft and Railway Accidents Investigation Commission in February 2007, currently in the third term of office.

During his tenure as Chairman, he has published many investigation reports concerning accidents and incidents, such as a train derailment and fire accident on the Sekisho Line of Hokkaido Railway Company, an accident in which the passenger boat TENRYU MARU No. 11 capsized in Tenryugawa River and an accident in which a McDonnell Douglas MD-11F operated by Federal Express Corporation was destroyed by fire on landing at Narita International Airport.

He has also started holding a regular press conference every month from August 24, 2011 and has been releasing a broad range of information mainly about the progress of accident and incident investigations, and the achievements of our duty improvement efforts.

Previously, he was engaged in education and research at the Department of Aeronautics and Astronautics at Kyushu University for about 35 years. He also took part in aeronautics and astronautics-related projects and accident investigations while serving mainly as members of the Space Activities Commission of the Ministry of Education, Culture, Sports, Science and Technology and a task force set up by the Japan Aerospace Exploration Agency (JAXA) to look into the causes for an accident involving an experimental supersonic airplane.

Career summary : Doctor of Engineering, Graduate School of Engineering, The University of Tokyo
(Mechanical engineering: mechanical dynamics and control, comprehensive engineering: aerospace engineering)

Former Professor for Department of Aeronautics and Astronautics, Faculty of Engineering, Kyushu University

Toshiyuki Ishikawa, Member (Full-time)

Toshiyuki Ishikawa was appointed as member on March 15, 2010, currently in the second term of office; specializes in legislation of administrative law and the others; in charge of the Aircraft Committee, the Railway Committee and the Marine Committee

Career summary : Doctor of Law, Graduate School of Law, Chuo University Former Professor for Law School, Chuo University

Shinsuke Endoh, Member (Full-time), Acting Director of Aircraft Committee

Shinsuke Endoh was appointed as member on February 22, 2007, currently in the third term of office; specializes in aviation safety, and operation and maintenance of aircraft; in charge of the Aircraft Committee

Career summary : Master's course, Graduate School of Engineering, The University of Tokyo
Former adviser, Association of Air Transport Engineering and Research

Sadao Tamura, Member (Full-time)

Sadao Tamura was appointed as member on December 6, 2010, currently in the second term of office; specializes in maneuvering of aircraft; in charge of the Aircraft Committee

Career summary : Former General Manager of Operations Support Office, Flight Operations Department, All Nippon Airways Co., Ltd.

Akira Matsumoto, Member (Full-time), Director of Railway Committee

Akira Matsumoto was appointed a member on October 1, 2007, currently in the third term of office; specializes in railway engineering and safety engineering; in charge of the Railway Committee

Career summary : Graduated from Department of Mechanical Engineering, Faculty of Engineering, Yokohama National University

Former Executive Researcher for Safety Technologies of New Urban Transportation Systems, National Traffic Safety & Environment Laboratory

Shigeru Yokoyama, Member (Full-time), Acting Director of Railway Committee

Shigeru Yokoyama was appointed as member on December 6, 2013; specializes in electrical engineering and electronics; in charge of the Railway Committee

Career summary : Doctor of Engineering, Department of Electronics, Faculty of Engineering, The University of Tokyo

Former Professor for Department of Electrical and Electronic Engineering, Shizuoka University

Tetsuo Yokoyama, Member (Full-time), Acting Chairman, Director of Marine Committee

Tetsuo Yokoyama was appointed as member on October 1, 2008, currently in the second term of office; specializes in maneuvering of ship; in charge of the Marine Committee and the Marine Special Committee

Career summary : Graduated from Japan Coast Guard Academy

Former Commissioner of Japan Marine Accident Inquiry Agency

Kuniaki Shoji, Member (Full-time), Acting Director of Marine Committee

Kuniaki Shoji was appointed as member on October 1, 2011; specializes in marine engineering and naval architecture; in charge of the Marine Committee and the Marine Special Committee

Career summary : Doctor of Engineering, Graduate School of Engineering, The University of Tokyo

Former professor, Faculty of Marine Technology, Tokyo University of Marine Science and Technology

Yuki Shuto, Member (Part-time)

Yuki Shuto was appointed as member on February 22, 2007, currently in the third term of office; specializes in ergonomics (human factors); in charge of the Aircraft Committee

Career summary : Master's course, Graduate School of Human Sciences, Waseda University
Representative Director and President of Research Institute for Social Safety

Keiji Tanaka, Member (Part-time)

Keiji Tanaka was appointed as member on February 27, 2013; specializes in flight simulation and flight dynamics; in charge of the Aircraft Committee

Career summary : Doctor of Engineering, 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

Norio Tomii, Member (Part-time)

Norio Tomii was appointed as member on October 1, 2007, currently in the third term of office; specializes in railway operation planning and management; in charge of the Railway Committee

Career summary : Doctor of Informatics, Graduate School of Informatics, Kyoto University
Professor for Department of Computer Science, Faculty of Information and Computer Science, Chiba Institute of Technology

Miyoshi Okamura, Member (Part-time)

Miyoshi Okamura was appointed as member on December 6, 2010; currently in the second term of office specializes in structural engineering, earthquake engineering and maintenance management engineering (steel structural engineering); in charge of the Railway Committee

Career Summary : Doctor of Engineering, Graduate School of Engineering, University of Yamanashi

Associate Professor for Department of Research Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi

Mina Nemoto, Member (Part-time)

Mina Nemoto was appointed as member on October 1, 2008, currently in the second term of office; specializes in ergonomics (human factors); in charge of the Marine Committee and the Marine Special Committee

Career summary : Doctor of Philosophy, Graduate School of Media and Governance, Keio University

Manager, Maritime Service Team, Maritime Business Group, Japan Marine Science Inc.

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 Duties improvement of JTSB

The Japan Transport Safety Board (JTSB) was established in October 2008 under Article 3 of the National Government Organization Act. It is an independent professional investigation agency formed by the merger of the Aircraft and Railway Accidents Investigation Commission (ARAIC) and the Japan Marine Accident Inquiry Agency (JMAIA), which investigated marine accidents. The agency's purpose is to conduct scientific investigation into the causes of aviation, railway, and marine accidents or incidents from impartial and neutral standpoint so as to contribute to prevent the occurrence of accidents and mitigate the damage by them.

However, 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.

1 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 November 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 regtettable 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 and the meetings held 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)

○ First Meeting

Time : 2 p.m. to 4 p.m., July 27, 2011 (Wednesday)
Place : JTSB Board Room
Subjects : (i) Current initiatives (ii) Scope of review on JTSB duty improvement (iii) Introduction to concrete efforts in investigation reports (iv) Others

○ Second Meeting

Time : 3 p.m. to 5 p.m., March 19, 2012 (Monday)
Place : JTSB Board Room
Subjects : (i) JTSB Duty Improvement Action Plan (Draft) (ii) Others

○ Third Meeting

Time : 2 p.m. to 4 p.m., August 1, 2012 (Wednesday)
Place : JTSB Board Room
Subjects : (i) A review of the progress of the Duty Improvement Action Plan (ii) New challenges (iii) Comments from experts (iv) Others

○ Fourth Meeting

Time : 2 p.m. to 4 p.m., March 15, 2013 (Friday)
Place : JTSB Board Room
Subjects : (i) A review of the progress of the Duty Improvement Action Plan (ii) New challenges (iii) A revision of the Duty Improvement Action Plan

○ Fifth Meeting

Time : 3 p.m. to 5 p.m., November 6, 2013 (Wednesday)
Place : JTSB Board Room
Subjects : (i) A review of the progress of the Duty Improvement Action Plan (ii) Using outcome of the investigation (iii) Others

(3) In December 2011, a meeting on duty improvement was held among the advisors and the JTSB to exchange opinions on various issues. In March 2012 and December 2013, a meeting was also held with the Verification Members of the JR Fukuchiyama Line accident report to hear their comments.

2 Mission and Principles

As part of the duty improvement process, the mission of the JTSB and its guiding principles were established. The mission and principles are displayed at the Tokyo Headquarters and eight regional offices nationwide to remind each and every staff member to bear this in mind while carrying out their

daily work.

(1) 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.

(2) 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.

3 Duty Improvement Action Plan

In line with four action principles set forth in the Mission for the JTSB, we established the Duty Improvement Action Plan as a concrete action plan in March 2012. (The Action Plan was second revised in April 2014.)

4 Continuous duty improvement

The JTSB will diligently implement the Duty Improvement Action Plan and review the plan on a timely and appropriate basis, while action items shall be followed-up during the Advisory Meeting.

5 Number of occurrence by aircraft category (aircraft accidents)(Cases)

Category / Year of occurrence	Aircraft			Rotor craft		Glider	Airship	Total
	Large aeroplane	Small aeroplane	Ultralight plane	Helicopter	Gyroplane			
1974	8	15	0	17	1	8	0	49
1975	3	16	0	16	0	8	0	43
1976	9	26	0	14	0	7	0	56
1977	5	12	0	16	1	5	0	39
1978	4	10	0	18	1	6	0	39
1979	8	14	0	20	1	6	1	50
1980	5	11	0	22	0	3	0	41
1981	3	10	1	18	0	8	0	40
1982	3	16	0	9	1	7	0	36
1983	4	13	10	12	0	7	0	46
1984	4	5	6	13	1	3	0	32
1985	5	11	6	15	0	4	0	41
1986	4	12	14	15	3	4	0	52
1987	8	17	8	8	1	3	0	45
1988	5	6	7	12	2	3	1	36
1989	2	6	11	9	1	12	0	41
1990	3	11	9	16	2	7	0	48
1991	2	10	6	19	0	7	0	44
1992	3	5	5	7	0	4	0	24
1993	4	5	3	17	1	2	0	32
1994	3	4	8	13	0	2	0	30
1995	4	7	10	6	0	1	0	28
1996	8	11	5	8	0	4	0	36
1997	3	11	3	8	2	3	0	30
1998	4	14	5	6	1	6	0	36
1999	1	9	5	7	1	5	0	28
2000	1	5	5	11	1	5	0	28
2001	2	5	2	8	0	4	0	21
2002	4	4	5	15	0	7	0	35
2003	2	10	3	1	0	2	0	18

2004	4	11	2	6	1	3	0	27
2005	1	8	0	7	0	7	0	23
2006	3	3	4	2	1	5	0	18

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
Total	156	363	156	422	23	184	2	1,306

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accident 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.

6 Number of occurrence 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	5	2	0	1	0	0	0	8
Total	63	23	16	14	0	4	0	120

(Note) 1. The figures include the cases handled by the Aircraft and Railway Accident 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. The number of cases for 2001 represents those that occurred from October onward.

7 Number of occurrence 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
Total	5	155	12	13	0	11	2	1	7	0	0	3	0	0	209

(Notes) 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 occurrence 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
Total	1	7	0	0	6	2	1	21	0	1	1	1	0	0	0	0	0	41

(Notes) 1. The figures include the cases handled by the Aircraft and Railway Accidents Investigation Commission.
2. The number of cases for 2001 represents those that occurred from October onward.

9 Number of accidents and incidents 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		3			3
2008	227	576	15	55	873
2009	341	1,065	34	82	1,522
2010	305	909	38	82	1,334
2011	239	780	28	79	1,126
2012	225	805	32	53	1,115
2013	217	747	34	66	1,064
Total	1,554	4,885	181	417	7,037

Note: The above table shows the number of accidents and incidents into which the JTSB launched an investigation as of the end of February 2014 (including those carried over from the former Marine Accident Inquiry Agency).

10 Number of accidents and incidents by type (marine accidents and incidents)

(Cases)

Type / Year	Types of marine accident											Type of marine incident				Total
	Collision	Contact	Grounding	Sinking	Flooding	Capsizing	Fire	Explosion	Facility damage	Casualty	Others	Loss of control	Stranded	Safety obstruction	Navigation obstruction	
2007		1	2													3
2008	181	101	255	12	4	28	15	3	30	61		54	34	8	87	873
2009	325	174	431	16	19	57	42	3	38	218	2	105	33		59	1,522
2010	356	180	369	15	18	50	35	2	26	146		83	16		38	1,334
2011	282	145	264	12	18	57	32	1	23	142	1	103	10	1	34	1,126
2012	247	132	264	5	21	56	44	2	34	154		113	5	4	35	1,115
2013	262	136	210	12	22	47	33	2	34	162		108	7	3	26	1.064
Total	1,653	869	1,795	72	102	295	201	13	185	883	3	566	105	16	279	7,037

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 2014 (including those carried over from the former Marine Accident Inquiry Agency).

Note 2: The figures in the column “Casualty” are the number of cases involving death, death and injury, missing persons, or injury.

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

(Vessels)

Type of Vessel / Year	Passenger ship	Cargo ship	Tanker	Fishing vessel	Tug boat, push boat	Recreational fishing vessel	Angler tender boat	Work vessel	Barge, Lighter	Public-service ship	Pleasure boat	Personal water craft	Others	Total
2007	2	1												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	295	75	467	90	34	8	36	59	14	246	55	9	1,467
2013	60	230	68	476	99	39	4	35	68	23	255	64	23	1,444
Total	466	2,007	491	2,914	662	231	36	210	423	128	1,376	327	100	9,371

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 2014 (including those carried over from the former Marine Accident Inquiry Agency).

12 Number of vessels involved in accidents and incidents by gross tonnage (marine accidents and incidents)

(Vessels)

Gross tonnage / Year	less than 20 tons	20 to less than 100 tons	100 to less than 200 tons	200 to less than 500 tons	500 to less than 1,600 tons	1,600 to less than 3,000 tons	3,000 to less than 5,000 tons	5,000 to less than 10,000 tons	10,000 to less than 30,000 tons	More than 30,000 tons	Unknown	Total
2007	1			1							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	783	53	131	199	77	33	25	38	24	21	83	1,467

2013	719	43	110	137	87	44	22	36	20	16	210	1,444
Total	4,614	382	926	1,295	586	218	152	211	130	107	750	9,371

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 2014 (including those carried over from the former Marine Accident Inquiry Agency).

13 Number of vessels involved in accidents and incidents in 2013 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	Casualty	Loss of control	Stranded	Safety obstruction	Navigation obstruction	
Passenger ship	6	19	13		2				1	4	3			12	60
Cargo ship	90	33	50	2	1	1	6		8	12	18	6	2	2	231
Tanker	33	11	12				1		2	3	5	1			68
Fishing vessel	207	17	46	1	10	24	18	2	9	86	50		1	5	476
Tug boat, push boat	26	21	24	5	1	5	1		6	3	5			1	98
Recreational fishing vessel	20	3	4	1		1	1		1	6	2				39
Angler tender boat	1	1								2					4
Work vessel	6	3	9	4		3			1	6	1				33
Barge, Lighter	27	13	15	2	1	2			4	2	2				68
Public-service ship	5	6	4			1	2			1	1		1	3	24
Pleasure boat	87	20	49	2	8	18	4		14	29	21			3	255
Personal water craft	35	3	2							22	2				64
Others	12	4	3	1		1			1	1	1				24
Total	555	154	231	18	23	56	33	2	47	177	111	7	4	26	1,444

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 2014.

Note 2: The figures in the column "Casualty" are the number of cases involving death, death and injury, missing persons, or injury.

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Japan Transport Safety Board
2-1-2, Kasumigaseki, Chiyoda-ku, Tokyo, 100-8918 Japan
Tel: +81-3-5253-8824 Fax: +81-3-5253-1680
E-mail: jtsb_international@mlit.go.jp
URL: http://www.mlit.go.jp/jtsb/english.html